# TECHNICAL MANUAL

## MAINTENANCE INSTRUCTIONS

### UNIT MAINTENANCE

M1083 SERIES, 5-TON, 6 X 6, MEDIUM TACTICAL VEHICLES (MTV)

**VOLUME NO. 2 OF 5**

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HEADQUARTERS, DEPARTMENTS OF THE ARMY AND THE AIR FORCE

SEPTEMBER 1998
WARNING SUMMARY

EXHAUST GASES CAN KILL

1. **DO NOT** operate your vehicle engine in an enclosed area.
2. **DO NOT** idle vehicle engine with cab windows closed.
3. **DO NOT** drive vehicle with inspection plates or covers removed.
4. **BE ALERT** at all times for exhaust odors.
5. **BE ALERT** for exhaust poisoning symptoms, they are:
   - Headache
   - Dizziness
   - Sleepiness
   - Loss of Muscular Control
6. **IF YOU SEE** another person with exhaust poisoning symptoms:
   - Remove person from area.
   - Expose to open air.
   - Keep person warm.
   - Do not permit person to move.
   - Administer cardiopulmonary resuscitation, if necessary.*

* For cardiopulmonary resuscitation, refer to FM 4-25.11.

WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock. Batteries can explode from a spark. Battery acid is harmful to skin and eyes. Always wear eye protection and rubber gloves when working with batteries. Failure to comply may result in injury to personnel.

WARNING

Do not work on fuel system when engine is hot; fuel can be ignited by a hot engine.
WARNING SUMMARY (CONT)

**WARNING**

Battery acid (electrolyte) is extremely harmful. Always wear safety goggles and rubber gloves, and do not smoke when performing maintenance on batteries. Injury will result if acid contacts skin or eyes. Wear rubber apron to prevent clothing being damaged. Failure to comply may result in injury to personnel.

**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. Keep away from open fire and use in a well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury to personnel.

**WARNING**

Dry Cleaning Solvent (P-D-680) is TOXIC and flammable. Wear protective goggles and gloves; use only in well ventilated area; avoid contact with skin, eyes, and clothes, and do not breathe vapors. Keep away from heat or flame. Never smoke when using solvent; the flashpoint for Type I Dry Cleaning Solvent is 100°F (38°C) and for Type II is 130°F (50°C). Failure to comply may result in serious injury or death to personnel.

If personnel become dizzy while using Dry Cleaning Solvent, immediately get fresh air and medical help. If Dry Cleaning Solvent contacts skin or clothes, flush with cold water. If Dry Cleaning Solvent contacts eyes, immediately flush eyes with water and get immediate medical attention. Failure to comply may result in injury to personnel.

**WARNING**

Diesel fuel is flammable. If fuel is spilled, clean it up immediately. Failure to comply may result in serious injury or death to personnel.

**WARNING**

Diesel fuel is flammable. Do not fill fuel tank with engine running, while smoking, or when near an open flame. Never overfill the tank or spill fuel. If fuel is spilled, clean it up immediately. Failure to comply may result in serious injury or death to personnel.

**WARNING**

Use care when removing/installing springs. Springs are under tension and can act as projectiles when being removed. Failure to comply can cause injury to personnel.
WARNING

Adhesive sealant MIL-S-46163 can damage your eyes. Wear safety goggles/glasses when using; avoid contact with eyes. If sealant contacts eyes, flush eyes with water and get immediate medical attention. Failure to comply may result in injury to personnel.

WARNING

After Nuclear, Biological, or Chemical (NBC) exposure of vehicle, all air filters shall be handled with extreme caution. Unprotected personnel may experience serious injury or death if residual toxic agents or radioactive material are present. If vehicle is exposed to chemical or biological agents, servicing personnel shall wear protective mask, hood, protective overgarments, and chemical protective gloves and boots in accordance with FM-3-4. All contaminated air filters shall be placed in double-lined plastic bags and moved swiftly to a segregation area away from the worksite. The same procedure applies for radioactive dust contamination. The Company NBC team should measure radiation prior to filter removal to determine extent of safety procedures required per the NBC Annex to the unit Standard Operating Procedures (SOP). The segregation area in which the contaminated air filters are temporarily stored shall be marked with appropriate NBC placards. Final disposal of contaminated air filters shall be in accordance with local SOP. Decontamination operation shall be in accordance with FM-3-5 and local SOP. Failure to comply may result in serious injury or death to personnel.

WARNING

Ensure exhaust system is cool before performing maintenance. Failure to comply may result in injury to personnel.

WARNING

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

WARNING

Post signs that read "NO SMOKING WITHIN 50 FEET" when working with open fuel, fuel lines or fuel tanks. Failure to comply may result in injury to personnel or damage to equipment.

WARNING

Do not operate vehicle with muffler removed. Toxic exhaust fumes may enter cab, resulting in serious injury or death to personnel.
WARNING SUMMARY (CONT)

WARNING

Exhaust pipe, transmission oil lines, and transmission scavenge pump hose may be hot to the touch. Extreme care should be taken when checking exhaust pipe, transmission oil lines, and transmission scavenge pump hose for leaks. Failure to comply may result in injury to personnel.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc). Failure to comply may result in injury to personnel.

WARNING

Wheel drum weighs approximately 90 lbs (41 kgs). Use the aid of an assistant to help remove wheel drum. Failure to comply may result in injury to personnel.

WARNING

Wheel drum weighs approximately 90 lbs (41 kgs). Use the aid of an assistant to help install wheel drum. Failure to comply may result in injury to personnel.

WARNING

Brake shoes may be covered with dust. Breathing this dust may be harmful to your health. Do not use compressed air to clean brake shoes. Wear a filter mask approved for use against brake dust. Failure to comply may result in injury to personnel.

WARNING

Cage spring brake before air chamber is removed or severe injury to personnel will occur.

WARNING

Ensure air chamber is caged prior to installation. Failure to comply may result in injury to personnel.

WARNING

Ensure that tire is totally deflated before removing self-locking nuts. Failure to comply may result in serious injury or death to personnel.
WARNING

Spring brakes must be caged before attempting replacement of a rear axle wheel stud. Failure to comply may result in severe injury to personnel.

WARNING

Wear protective goggles to protect against possible injury from release of high pressure air. Failure to comply may result in injury to personnel.

WARNING

Prolonged contact with lubricating oil (MIL-L-2104) may cause a skin rash. Skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Saturated clothing should be removed immediately. Areas in which lubricating oil is used should be well ventilated to keep fumes to a minimum. Failure to comply may result in injury to personnel.

WARNING

Hydraulic fluid (MIL-H-5606) is TOXIC. Wear protective goggles and gloves; use only in well ventilated area; avoid contact with skin, eyes, and clothes. Skin and clothing that come in contact with hydraulic oil should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury to personnel.

WARNING

Never let moving wire rope slide through hands, even when wearing gloves. A broken wire could cut through gloves and cut hands. Failure to comply may result in injury to personnel.

WARNING

Wear appropriate eye protection when removing rivets. Failure to comply may result in injury to personnel.

WARNING

Wear appropriate eye protection when drilling holes. Failure to comply may result in injury to personnel.

WARNING

Wear leather gloves at all times when handling winch cable. Do not allow cable to slide through hands even with gloves on. Broken wires may cause injury.
WARNING SUMMARY (CONT)

WARNING

Use extreme caution when working around moving cable. Failure to do so may result in serious injury to personnel.

WARNING

Caution must be exercised while cab is raised. Ensure that locking mechanism is functioning properly before proceeding. Failure to comply may result in death or serious injury to personnel and damage to equipment.

WARNING

Coolant may be very hot and under pressure from engine operation. Ensure engine is cool before performing maintenance. Failure to comply may result in injury to personnel.

WARNING

Light Material Handling Crane (LMHC) weighs approximately 250 lbs (114 kgs). Attach a suitable lifting device prior to removal. Failure to comply may result in injury to personnel.

WARNING

Light Material Handling Crane (LMHC) mast weighs approximately 110 lbs (50 kgs). Attach a suitable lifting device prior to installation. Failure to comply may result in injury to personnel or damage to equipment.

WARNING

Light Material Handling Crane (LMHC) boom assembly weighs approximately 150 lbs (68 kgs). Use an assistant when removing boom assembly. Failure to comply may result in injury to personnel.
WARNING

Light Material Handling Crane (LMHC) boom weighs approximately 60 lbs (27 kgs). Attach a suitable lifting device prior to installation. Failure to comply may result in injury to personnel or damage to equipment.

WARNING

Machine gun ring assembly weighs approximately 350 pounds (159 kgs). Attach a suitable lifting device prior to removal. Failure to comply may result in injury to personnel or damage to equipment.

WARNING

Ensure vehicle is on level ground prior to installation/removal of collapsible drums. Failure to comply may result in serious injury or death to personnel or damage to equipment.

WARNING

Ensure cargo bed is free of equipment and debris and not warped or damaged in any way. Failure to comply may result in serious injury or death to personnel or damage to equipment.

WARNING

Both collapsible drums weigh approximately 235 lbs (107 kgs) empty and 3800 lbs (1725 kgs) full. Attach a suitable lifting device prior to installation. Failure to comply may result in serious injury or death to personnel or damage to equipment.

WARNING

S-280 shelter weighs approximately 1500 lbs (680 kgs) empty. Attach a suitable lifting device prior to installation. Failure to comply may result in serious injury or death to personnel or damage to equipment.

WARNING

Ensure vehicle is on level ground prior to installation or removal of tank and pump unit. Failure to comply may result in serious injury or death to personnel or damage to equipment.

WARNING

Tank weighs approximately 500 lbs (227 kgs) empty or 4000 lbs (1816 kgs) full. Attach a suitable lifting device prior to installation. Failure to comply may result in serious injury or death to personnel or damage to equipment.
WARNING SUMMARY (CONT)

WARNING

Pump unit weighs approximately 870 lbs (395 kgs). Attach a suitable lifting device prior to installation. Failure to comply may result in serious injury or death to personnel or damage to equipment.

WARNING

Do not remove oil filter while engine is hot. Failure to comply may result in injury to personnel.

WARNING

Starting fluid is toxic and highly flammable. Container is pressurized. NEVER heat container and NEVER discharge starting fluid in confined areas or near open flame. Failure to comply may cause serious injury or death to personnel.

WARNING

Tab of HAND THROTTLE lever must be positioned above throttle pivot bar. Failure to comply may result in injury to personnel or damage to equipment.

WARNING

Use extreme care when opening cab door with cab raised. Failure to comply may result in injury to personnel or damage to equipment.

WARNING

Do not operate vehicle with exhaust pipe removed. Toxic exhaust fumes may enter cab, resulting in serious injury or death to personnel.

WARNING

Radiator and charge air cooler assembly weigh approximately 160 lbs (73 kgs). Attach a suitable lifting device prior to removal. Failure to comply may result in injury to personnel or damage to equipment.

WARNING

Cargo sling must be placed under charge air cooler inlet and outlet ports. Failure to comply may result in injury to personnel or damage to equipment.
WARNING

Alternator weighs approximately 50 lbs (23 kgs). The aid of an assistant is required to remove alternator. Failure to comply may result in injury to personnel.

WARNING

Starting motor weighs approximately 60 lbs (27 kgs). Attach a suitable lifting device prior to removal. Failure to comply may result in injury to personnel or damage to equipment.

WARNING

Negative battery terminals must be connected last. Failure to comply may result in serious injury or death to personnel.

WARNING

Negative battery terminals and battery tester negative terminal lug must be disconnected first. Failure to comply may result in serious injury or death to personnel.

WARNING

Battery box weighs approximately 70 lbs (32 kgs). The aid of two assistants is required to remove battery box from vehicle frame. Failure to comply may result in injury to personnel.

WARNING

Battery box weighs approximately 70 lbs (32 kgs). The aid of two assistants is required to position battery box on vehicle frame. Failure to comply may result in injury to personnel.

WARNING

Ensure WTEC III cab transmission harness does not interfere with throttle linkage. Failure to comply may result in injury to personnel.

WARNING

Self-adjusting brakes will not self-adjust without applying brake pedal. Failure to comply may result in injury to personnel.
WARNING SUMMARY (CONT)

**WARNING**

Ensure air hoses are connected to correct fittings. Failure to comply may result in serious injury or death to personnel.

**WARNING**

Proper adjustment of load sensing valve may only be accomplished with vehicle unloaded. Failure to comply may result in injury to personnel or damage to equipment.

**WARNING**

Always use an inflation safety cage to inflate tires mounted on multipiece rims, and tire/rim assemblies not mounted on a tire changing machine that has a positive lock down device designed to hold the assembly during inflation (TM 9-2610-200-14). When using a tire changing machine, always follow manufacturer’s mounting and safety instructions. Failure to comply may result in serious injury or death to personnel. Always inflate tires that are mounted on rims with demountable side ring flanges or lockrings in an inflation safety cage or serious injury or death may result.

**WARNING**

Tire weighs approximately 350 lbs (159 kgs). Use extreme care when handling tire. Failure to comply may result in injury to personnel.

**WARNING**

Wheel drum weighs approximately 92 lbs (42 kgs). Use the aid of an assistant to help remove wheel drum from axle. Failure to comply may result in injury to personnel.

**WARNING**

The sudden release of high pressure air can cause damage to eyes. Wear appropriate eye protection when working near pressurized air. Failure to comply may result in injury to personnel.

**WARNING**

Leave shackles installed in front bumper to support front bumper until ready to remove. Failure to comply may result in injury to personnel.
WARNING

Front bumper weighs approximately 100 lbs (45 kgs). Use the aid of an assistant to remove front bumper. Failure to comply may result in injury to personnel.

WARNING

Tractor platform weighs approximately 550 lbs (250 kgs). Attach a suitable lifting device prior to removal. Failure to comply may result in injury to personnel or damage to equipment.

WARNING

Spare tire retainer weighs approximately 150 lbs (68 kgs). The aid of two assistants is required to remove spare tire retainer from vehicle. Failure to comply may result in injury to personnel.

WARNING

Rear stabilizer bar weighs approximately 50 lbs (22 kgs). Attach a suitable lifting device prior to removal. Failure to comply may result in injury to personnel or damage to equipment.

WARNING

Cab roof weighs approximately 110 lbs (50 kgs). Attach a suitable lifting device prior to removal. Failure to comply may result in injury to personnel.

WARNING

Use care when removing/installing window. Do not force window, or window may shatter. Failure to comply may result in injury to personnel or damage to equipment.

WARNING

Tailgate assembly weighs approximately 130 lbs (59 kgs). Attach a suitable lifting device prior to removal. Failure to comply may result in injury to personnel or damage to equipment.

WARNING

Tow bar weighs approximately 150 lbs (68 kgs). Attach a suitable lifting device prior to removal. Failure to comply may result in injury to personnel or damage to equipment.
WARNING SUMMARY (CONT)

**WARNING**

Rear tool box weighs approximately 75 lbs (34 Kgs) empty. Attach a suitable lifting device prior to removal. Failure to comply may result in injury to personnel or damage to equipment.

**WARNING**

Cable can become frayed or contain broken wires. Wear heavy leather-palmed gloves when handling cable. Frayed or broken wires can injure hands. Failure to comply may result in injury to personnel.

**WARNING**

Remote control must be used to operate 30K winch while breaking in cables. Failure to comply may result in injury to personnel.

**WARNING**

Cab weighs approximately 3000 lbs (1362 kgs) attach a suitable lifting device prior to raising cab. Failure to comply may result in injury to personnel.

**WARNING**

Hydraulic tank weighs approximately 190 lbs (86 kgs). Attach a suitable lifting device prior to removal. Failure to comply may result in injury to personnel or damage to equipment.

**WARNING**

Extreme care must be taken when lowering gravel deflector. Coolant hoses could be pulled loose. Failure to comply could result in serious eye injury.

**WARNING**

Retaining rings are under tension and can act as projectiles when released causing severe eye injury. Use care when installing retaining rings. Failure to comply may result in injury to personnel.

**WARNING**

Do not open coolant fill cap if temperature reads above 110 degrees F (43 degrees C). Steam or hot coolant is under pressure. Failure to comply may result in injury to personnel.
WARNING

Pressure in reservoir tank must be released before removing cap. Failure to comply may result in injury to personnel.

WARNING

200 amp alternator weighs approximately 72 lbs (33 kgs). The aid of an assistant is required to install 200 amp alternator. Failure to comply may result in injury to personnel.

WARNING

100 amp alternator weighs approximately 70 lbs (32 kgs). Attach a suitable lifting device prior to removal. Failure to comply may result in injury to personnel.

WARNING

Both collapsible drums weigh approximately 235 lbs (107 kgs) empty and 3800 lbs (1725 kgs) full each. Attach a suitable lifting device prior to removal. Failure to comply may result in serious injury or death to personnel or damage to equipment.

WARNING

Air dryer may contain air pressure. Loosen input air hose connector slowly to vent off air pressure. Failure to comply may result in injury to personnel.

WARNING

Radiator and charge air cooler assembly weigh approximately 160 lbs (73 Kgs). Attach a suitable lifting device prior to installation. Failure to comply may result in injury to personnel or damage to equipment.

WARNING

Tractor platform weighs approximately 550 lbs (250 kgs). Attach a suitable lifting device prior to installation. Failure to comply may result in injury to personnel or damage to equipment.
WARNING SUMMARY (CONT)

WARNING

Spare tire retainer weighs approximately 150 lbs (68 kgs). The aid of two assistants is required to install spare tire retainer on vehicle. Failure to comply may result in injury to personnel.

WARNING

Rear stabilizer bar weighs approximately 50 lbs (22 kgs). Attach a suitable lifting device prior to installation. Failure to comply may result in injury to personnel or damage to equipment.

WARNING

Cab roof weighs approximately 110 lbs (50 kgs). Attach a suitable lifting device prior to installation. Failure to comply may result in injury to personnel.

WARNING

Do not remove radiator cap when the engine is hot; steam and hot coolant can escape and burn skin. Failure to comply may result in injury to personnel.

WARNING

Wear appropriate eye protection when removing spring rings. Spring rings are under tension and can act as projectiles when being removed. Failure to comply may result in injury to personnel.

WARNING

Wear appropriate eye protection when installing spring rings. Spring rings are under tension and can act as projectiles when being installed. Failure to comply may result in injury to personnel.
CHANGE
NO. 3

HEADQUARTERS
DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
Washington, D.C., 10 February 2006

TECHNICAL MANUAL
MAINTENANCE INSTRUCTIONS
UNIT MAINTENANCE
M1083 SERIES, 5-TON, 6x6,
MEDIUM TACTICAL VEHICLE
(MTV)

VOLUME NO. 2 OF 5

TM 9-2320-366-20-2, 15 September 1998, is changed as follows:
1. Remove old pages and insert new pages as indicated below.
2. New or changed material is indicated by a vertical bar in the out margin of the page.
3. Added or revised illustrations are indicated by a vertical bar adjacent to the illustration.

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HEADQUARTERS
DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
Washington, D.C., 20 August 2005

CHANGE
NO. 2

TECHNICAL MANUAL
MAINTENANCE INSTRUCTIONS
UNIT MAINTENANCE
M1083 SERIES, 5-TON, 6x6,
MEDIUM TACTICAL VEHICLE
(MTV)

VOLUME NO. 2 OF 5

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ARMY TM 9-2320-366-20-2
AIR FORCE T.O. 36A12-1C-1102-2

CHANGE
NO. 1

HEADQUARTERS
DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
Washington, D.C., 1 July 2003

TECHNICAL MANUAL
MAINTENANCE INSTRUCTIONS
UNIT MAINTENANCE
M1083 SERIES, 5-TON, 6x6,
MEDIUM TACTICAL VEHICLE
(MTV)

VOLUME NO. 2 OF 5

TM 9-2320-366-20-2, 15 September 1998, is changed as follows:
1. Remove old pages and insert new pages as indicated below.
2. New or changed material is indicated by a vertical bar in the out margin of the page.
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2 of 2
By Order of the Secretary of the Army:

JOHN M. KEANE
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the Secretary of the Army
0110110

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- **Original** ......... 0 ....... 15 September 1998
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OVERVIEW

This Technical Manual (TM) is provided to help you maintain the MTV at the Unit Maintenance level. Because of its size, it is divided into five volumes. Volume 2 contains the following major sections in order of appearance:

- **WARNING SUMMARY.** Provides a summary of the most important warnings that apply throughout the manual.

- **CHAPTER 2, VEHICLE MAINTENANCE.** This chapter contains the continuation of the troubleshooting tables.

- **APPENDIX A, REFERENCES.** Lists publications used with the MTV.

- **APPENDIX B, MAINTENANCE ALLOCATION CHART.** The maintenance allocation chart denotes the level of maintenance which performs specific maintenance tasks and the time required. It also lists tools and special tools required for each task.
• **APPENDIX C, TOOLS IDENTIFICATION LIST.** Lists equipment used in the performance of maintenance and references publications which contain information regarding the equipment.

• **APPENDIX D, EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST.** Lists expendable and durable items used in the performance of maintenance.

• **APPENDIX E, ILLUSTRATED LIST OF MANUFACTURED ITEMS.** Illustrates and describes items that must be fabricated from bulk materials for repair of the MTV.

• **APPENDIX F, TORQUE LIMITS.** Lists the standard torque values for specific attaching hardware.

• **APPENDIX G, MANDATORY REPLACEMENT PARTS.**

• **APPENDIX H, LUBRICATION ORDER.**

• **APPENDIX J, ADDITIONAL AUTHORIZATION LIST (AAL).**

• **APPENDIX K, TRANSMISSION/TRANSMISSION CONTROLS ADAPTABILITY CHART.** Lists actions required to mate different transmission configurations with WTEC II or WTEC III controls.

• **SUBJECT INDEX.** Lists important subjects contained in volume 2 in alphabetical order and gives the associated paragraph number.

### FINDING INFORMATION

There are several ways to find the information you need in this manual. They are as follows:

• **FRONT COVER INDEX.** The front cover index contains a list of the most important topics contained in each volume. It features a black box at the right edge of the cover which corresponds with a black box on the page containing the topic. The topics listed on the front cover are highlighted in the table of contents with a box.

• **TABLE OF CONTENTS.** Lists chapters, sections, appendixes, and indexes with page numbers in order of appearance.

• **CHAPTER INDEXES.** List paragraphs contained in the individual chapters with paragraph and page numbers in order of appearance.

• **SYMPTOM INDEX.** Lists malfunctions contained in the troubleshooting table with page numbers in order of appearance.

### TROUBLESHOOTING

Troubleshooting is contained in chapter 2. When a malfunction occurs, look at the symptom index for the vehicle troubleshooting table in chapter 2. Find the malfunction in the index. Turn to the page number listed for the malfunction in the troubleshooting table. Perform the steps required to correct the malfunction. If you can’t find the malfunction, or the malfunction is not corrected, notify your supervisor.

### MAINTENANCE

• **SCHEDULED MAINTENANCE.** Your scheduled maintenance is located in table 2-1, PMCS. These checks and services are mandatory at the intervals listed. Always follow the WARNINGS and CAUTIONS.
UNSCHEDULED MAINTENANCE. Unscheduled maintenance is located in chapters 3 through 24. The PMCS and troubleshooting tables often reference you to these procedures. When you perform maintenance, look over the entire procedure before starting. Make sure you have the necessary tools and materials at hand. Always follow the WARNINGS and CAUTIONS.

FOLLOW THESE GUIDELINES WHEN USING THIS MANUAL:

- Become familiar with the entire maintenance procedure before beginning a maintenance task.
- Read all WARNINGS and CAUTIONS before performing any procedures.
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e85. CENTRAL TIRE INFLATION SYSTEM (CTIS) DOES NOT OPERATE

START

Is continuity present from connector P110 socket T?

NO

YES

Go to step 21 of this fault.

BEGIN

NOTE

Perform Electrical System Troubleshooting e1. Circuit Breaker Does Not Operate on circuit breaker CB40 prior to beginning this task.

KNOWLEDGE INFO

VOLTS gage registers in green zone with engine running. Circuit breaker CB40 OK. FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal.

POSSIBLE PROBLEMS


CAUTION

Read CAUTION on following page.

TEST OPTIONS

Continuity Test or STE/ICE-R Test #91

REASON FOR QUESTION

This question eliminates possible problems and determines where troubleshooting continues.
**CAUTION**

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

---

**CONTINUITY TEST**

(1) Start engine (TM 9-2320-366-10-1).
(2) Allow air pressure to build until FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read approximately 120 PSI.
(3) Shut down engine (TM 9-2320-366-10-1).
(4) Disconnect connector P110 from CTIS ECU.
(5) Set multimeter to ohms.
(6) Connect positive (+) probe of multimeter to connector P110 socket T.
(7) Connect negative (-) probe of multimeter to known good ground and note reading on multimeter.
(8) If continuity is not present, go to step 21 of this fault.
2. **WARNING**
   Read WARNING on following page.

   Is 24 VDC present at connector P110 socket H?

   **KNOWN INFO**
   - VOLTS gage registers in green zone with engine running.
   - Circuit breaker CB40 OK.
   - FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal.
   - Air pressure switch OK.
   - Start and charging cable assembly OK.

   **POSSIBLE PROBLEMS**
   - Faulty air pressure transducer.
   - Faulty manifold valve assembly.
   - Faulty CTIS ECU.
   - Faulty WTEC II / WTEC III dashboard cable assembly.
   - Faulty CTIS cable assembly.

   **TEST OPTIONS**
   - Voltage Test or STE/ICE-R Test #89

   **REASON FOR QUESTION**
   This question eliminates possible problems and determines where troubleshooting continues.
WARNING
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Position master power switch to on (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(2) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to connector P110 socket H.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to known good ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(5) If 24 VDC is not present, go to step 25 of this fault.</td>
</tr>
<tr>
<td>(6) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
### KNOWN INFO

- VOLTS gage registers in green zone with engine running.
- Circuit breaker CB40 OK.
- FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal.
- Air pressure switch OK.
- Start and charging cable assembly OK.

### POSSIBLE PROBLEMS

- Faulty air pressure transducer.
- Faulty manifold valve assembly.
- Faulty CTIS ECU.
- Faulty WTEC II / WTEC III dashboard cable assembly.
- Faulty CTIS cable assembly.

### TEST OPTIONS

- Continuity Test or STE/ICE-R Test #91

### REASON FOR QUESTION

This question eliminates possible problems and determines where troubleshooting continues.

3. Is continuity present from connector P110 socket F to known good ground?

- **NO**
  - Go to step 26 of this fault.

- **YES**
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P110 socket F.
(3) Connect negative (-) probe of multimeter to known good ground and note reading on multimeter.
(4) If continuity is not present, go to step 26 of this fault.
e85. CENTRAL TIRE INFLATION SYSTEM (CTIS) DOES NOT OPERATE (CONT)

**KNOWN INFO**

VOLTS gage registers in green zone with engine running.
Circuit breaker CB40 OK.
FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal.
Air pressure switch OK.
Start and charging cable assembly OK.
WTEC II / WTEC III dashboard cable assembly OK.

**POSSIBLE PROBLEMS**

Faulty air pressure transducer.
Faulty manifold valve assembly.
Faulty CTIS ECU.
Faulty CTIS cable assembly.

**TEST OPTIONS**

Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**

If continuity is not present, CTIS cable assembly is faulty.

---

4. Is continuity present from connector P111 pin A to connector P112 socket A?

- **NO**
  - Replace CTIS cable assembly (para 7-60).

- **YES**
  - Replace CTIS cable assembly (para 7-60).

---

5. Is continuity present from connector P111 pin A to connector P112 socket B?

- **NO**
  - Replace CTIS cable assembly (para 7-60).

- **YES**
  - Replace CTIS cable assembly (para 7-60).
CONTINUITY TEST
(1) Remove kick panel (para 16-3).
(2) Disconnect connector P112 from pneumatic controller connector.
(3) Disconnect connector J111 from connector P111.
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter to connector P111 pin A.
(6) Connect negative (-) probe of multimeter to connector P112 socket A and note reading on multimeter.
(7) If continuity is not present, replace CTIS cable assembly (para 7-60).

CONTINUITY TEST
(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P111 pin A.
(3) Connect negative (-) probe of multimeter to connector P112 socket B and note reading on multimeter.
(4) If continuity is not present, replace CTIS cable assembly (para 7-60).
(5) Connect connector J111 from connector P111.
6. Is continuity present from connector P110 socket R to connector P112 socket D?

   **TEST OPTIONS**
   - Continuity Test or STE/ICE-R Test #91
   
   **REASON FOR QUESTION**
   - If continuity is not present, CTIS cable assembly is faulty.

   **YES**
   - Replace CTIS cable assembly (para 7-60).

   **NO**

7. Is continuity present from connector P110 socket B to connector P112 socket F?

   **TEST OPTIONS**
   - Continuity Test or STE/ICE-R Test #91
   
   **REASON FOR QUESTION**
   - If continuity is not present, CTIS cable assembly is faulty.

   **NO**

   **YES**
   - Replace CTIS cable assembly (para 7-60).
### CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector P110 socket R.
3. Connect negative (-) probe of multimeter to connector P112 socket D and note reading on multimeter.
4. If continuity is not present, replace CTIS cable assembly (para 7-60).

---

### CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector P110 socket B.
3. Connect negative (-) probe of multimeter to connector P112 socket F and note reading on multimeter.
4. If continuity is not present, replace CTIS cable assembly (para 7-60).
**e85. CENTRAL TIRE INFLATION SYSTEM (CTIS) DOES NOT OPERATE (CONT)**

**KNOWN INFO**
VOLTS gage registers in green zone with engine running.
Circuit breaker CB40 OK.
FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal.
Air pressure switch OK.
Start and charging cable assembly OK.
WTEC II / WTEC III dashboard cable assembly OK.

**POSSIBLE PROBLEMS**
Faulty air pressure transducer.
Faulty manifold valve assembly.
Faulty CTIS ECU.
Faulty CTIS cable assembly.

---

**TEST OPTIONS**
Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present, CTIS cable assembly is faulty.

---

**KNOWLEDGE**
Is continuity present from connector P110 socket P to terminal lug TL50?

---

**KNOWN INFO**
VOLTS gage registers in green zone with engine running.
Circuit breaker CB40 OK.
FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal.
Air pressure switch OK.
Start and charging cable assembly OK.
WTEC II / WTEC III dashboard cable assembly OK.

**POSSIBLE PROBLEMS**
Faulty air pressure transducer.
Faulty manifold valve assembly.
Faulty CTIS ECU.
Faulty CTIS cable assembly.

---

**TEST OPTIONS**
Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present, CTIS cable assembly is faulty.

---

**KNOWLEDGE**
Is continuity present from connector P110 socket C to connector P112 socket E?
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P110 socket C.
(3) Connect negative (-) probe of multimeter to connector P112 socket E and note reading on multimeter.
(4) If continuity is not present, replace CTIS cable assembly (para 7-60).

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P110 socket P.
(3) Connect negative (-) probe of multimeter to terminal lug TL50 and note reading on multimeter.
(4) If continuity is not present, replace CTIS cable assembly (para 7-60).
(5) Connect connector P110 to CTIS ECU.
e85. CENTRAL TIRE INFLATION SYSTEM (CTIS) DOES NOT OPERATE (CONT)

**KNOWN INFO**

VOLTS gage registers in green zone with engine running. Circuit breaker CB40 OK. FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal. Air pressure switch OK. Start and charging cable assembly OK. WTEC II / WTEC III dashboard cable assembly OK.

**POSSIBLE PROBLEMS**

Faulty air pressure transducer. Faulty manifold valve assembly. Faulty CTIS ECU. Faulty CTIS cable assembly.

**TEST OPTIONS**

Resistance Test or STE/ICE-R Test #91

**REASON FOR QUESTION**

If 30-80 ohms resistance is not present, manifold valve assembly is faulty.

---

10. Is 30-80 ohms resistance present from pneumatic controller connector pin D to pin B?

**YES**

Replace manifold valve assembly (para 12-7).

**NO**

---

11. Is 30-80 ohms resistance present from pneumatic controller connector pin F to pin A?

**YES**

Replace manifold valve assembly (para 12-7).

**NO**

---

FAVLTY AIR PRESSURE TRANSDUCER.

Faulty manifold valve assembly.

Faulty CTIS ECU.

Faulty CTIS cable assembly.
**RESISTANCE TEST**

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to pneumatic controller connector pin D.
3. Connect negative (-) probe of multimeter to pneumatic controller connector pin B and note reading on multimeter.
4. If 30-80 ohms resistance is not present, replace manifold valve assembly (para 12-7).

---

**RESISTANCE TEST**

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to pneumatic controller connector pin F.
3. Connect negative (-) probe of multimeter to pneumatic controller connector pin A and note reading on multimeter.
4. If 30-80 ohms resistance is not present, replace manifold valve assembly (para 12-7).
### Known Info

| VOLTS gage registers in green zone with engine running. |
| Circuit breaker CB40 OK. |
| FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal. |
| Air pressure switch OK. |
| Start and charging cable assembly OK. |
| WTEC II / WTEC III dashboard cable assembly OK. |

### Possible Problems

- Faulty air pressure transducer.
- Faulty manifold valve assembly.
- Faulty CTIS ECU.
- Faulty CTIS cable assembly.

### Test Options

- Resistance Test or STE/ICE-R Test #91

### Reason for Question

If 30-80 ohms resistance is not present, manifold valve assembly is faulty.

---

12. Is 30-80 ohms resistance present from pneumatic controller connector pin E to pin A?

- **NO**
  - Repair manifold valve assembly (para 12-7).

- **YES**

---

2-958.2 Change 2
RESISTANCE TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to pneumatic controller connector pin E.
(3) Connect negative (-) probe of multimeter to pneumatic controller connector pin A and note reading on multimeter.
(4) If 30-80 ohms resistance is not present, repair manifold valve assembly (para 12-7).
(5) Connect connector P112 to pneumatic controller connector.
**Known Info**

- VOLTS gage registers in green zone with engine running.
- Circuit breaker CB40 OK.
- FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal.
- Air pressure switch OK.
- Start and charging cable assembly OK.
- WTEC II / WTEC III dashboard cable assembly OK.
- Manifold valve assembly OK.

**Possible Problems**

- Faulty air pressure transducer.
- Faulty CTIS ECU.
- Faulty CTIS cable assembly.

**Test Options**

- Resistance Test or STE/ICE-R Test #91

**Reason for Question**

- If 1-50 ohms resistance is not present, pressure transducer is faulty.

---

**13.**

Is 1-50 ohms resistance present from pressure transducer connector pin A to pin B?

- **Yes**
  - Replace pressure transducer (para 12-7).
- **No**

---

**14.**

Is 1-50 ohms resistance present from pressure transducer connector pin B to pin C?

- **Yes**
  - Replace pressure transducer (para 12-7).
- **No**

---

**Known Info**

- VOLTS gage registers in green zone with engine running.
- Circuit breaker CB40 OK.
- FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal.
- Air pressure switch OK.
- Start and charging cable assembly OK.
- WTEC II / WTEC III dashboard cable assembly OK.
- Manifold valve assembly OK.

**Possible Problems**

- Faulty air pressure transducer.
- Faulty CTIS ECU.
- Faulty CTIS cable assembly.

**Test Options**

- Resistance Test or STE/ICE-R Test #91

**Reason for Question**

- If 1-50 ohms resistance is not present, pressure transducer is faulty.
## RESISTANCE TEST

1. Disconnect connector P113 from pressure transducer connector.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter to pressure transducer connector pin A.
4. Connect negative (-) probe of multimeter to pressure transducer connector pin B and note reading on multimeter.
5. If 1-50 ohms resistance is not present, replace pressure transducer (para 12-7).
15. Is 1-50 ohms resistance present from pressure transducer connector pin C to pin A?

If 1-50 ohms resistance is not present, pressure transducer is faulty.

Replace pressure transducer (para 12-7).

Possible Problems:
- Faulty air pressure transducer.
- Faulty CTIS ECU.
- Faulty CTIS cable assembly.

Known Info:
- VOLTS gage registers in green zone with engine running.
- Circuit breaker CB40 OK.
- FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal.
- Air pressure switch OK.
- Start and charging cable assembly OK.
- WTEC II / WTEC III dashboard cable assembly OK.
- Manifold valve assembly OK.

Test Options:
- Resistance Test or STE/ICE-R Test #91

Reason for Question:
- If 1-50 ohms resistance is not present, pressure transducer is faulty.
**RESISTANCE TEST**

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to pressure transducer connector pin C.
3. Connect negative (-) probe of multimeter to pressure transducer connector pin A and note reading on multimeter.
4. If 1-50 ohms resistance is not present, replace pressure transducer (para 12-7).
e85. CENTRAL TIRE INFLATION SYSTEM (CTIS) DOES NOT OPERATE (CONT)

16. Is continuity present from connector P110 socket c to connector P113 socket C?

   YES
   Replace CTIS cable assembly (para 7-60).

   NO

17. Is continuity present from connector P110 socket b to connector P113 socket B?

   YES
   Replace CTIS cable assembly (para 7-60).

   NO

Known Info:

VOLTS gage registers in green zone with engine running.
Circuit breaker CB40 OK.
FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal.
Air pressure switch OK.
Start and charging cable assembly OK.
WTEC II / WTEC III dashboard cable assembly OK.
Manifold valve assembly OK.
Air pressure transducer OK.

Possible Problems:

Faulty air pressure transducer.
Faulty CTIS ECU.
Faulty CTIS cable assembly.

Test Options:

Continuity Test or STE/ICE-R Test #91

Reason for Question:

If continuity is not present, CTIS cable assembly is faulty.
CONTINUITY TEST

(1) Disconnect connector P110 from CTIS ECU.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to connector P110 socket c.
(4) Connect negative (-) probe of multimeter to connector P113 socket C and note reading on multimeter.
(5) If continuity is not present, replace CTIS cable assembly (para 7-60).

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P110 socket b.
(3) Connect negative (-) probe of multimeter to connector P113 socket B and note reading on multimeter.
(4) If continuity is not present, replace CTIS cable assembly (para 7-60).
18. Is continuity present from connector P110 socket j to connector P113 socket A?
   - **YES**: Replace CTIS cable assembly (para 7-60).
   - **NO**: Possible problems:
     - Faulty air pressure transducer.
     - Faulty CTIS ECU.
     - Faulty CTIS cable assembly.

19. Is connector P113 socket A, socket B, or socket C short circuited?
   - **NO**: If connector P113 is short circuited, CTIS cable assembly is faulty.
   - **YES**: Go to step 20 of this fault.
     - **YES**: Replace CTIS cable assembly (para 7-60).
     - **NO**: Possible problems:
       - Faulty air pressure transducer.
       - Faulty CTIS ECU.
       - Faulty CTIS cable assembly.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P110 socket j.
(3) Connect negative (-) probe of multimeter to connector P113 socket A and note reading on multimeter.
(4) If continuity is not present, replace CTIS cable assembly (para 7-60).

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P113 socket A.
(3) Connect negative (-) probe of multimeter to known good ground and note reading on multimeter.
(4) Connect negative (-) probe of multimeter to all other sockets on connector P113 and note reading on multimeter.
(5) Connect positive (+) probe of multimeter to connector P113 socket B.
(6) Connect negative (-) probe of multimeter to known good ground and note reading on multimeter.
(7) Connect negative (-) probe of multimeter to all other sockets on connector P113 and note reading on multimeter.
(8) Connect positive (+) probe of multimeter to connector P113 socket C.
(9) Connect negative (-) probe of multimeter to known good ground and note reading on multimeter.
(10) Connect negative (-) probe of multimeter to all other sockets on connector P113 and note reading on multimeter.
(11) If continuity not present is steps 3, 4, 6, 7, 9, and 10, go to step 20 of this fault.
(12) If continuity present is steps 3, 4, 6, 7, 9, or 10, replace CTIS cable assembly (para 7-60).
20. Voltage Test or STE/ICE-R Test #89

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
If 4.9-5.1 VDC is not present, CTIS ECU is faulty. If 4.9-5.1 VDC is present, pressure transducer is faulty.

**POSSIBLE PROBLEMS**
Faulty air pressure switch.
Faulty start and charging cable assembly.
Faulty WTEC II / WTEC III dashboard cable assembly.
Faulty CTIS cable assembly.

**KNOWN INFO**
VOLTS gage registers in green zone with engine running.
Circuit breaker CB40 OK.
FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal.
Air pressure switch OK.
Start and charging cable assembly OK.
WTEC II / WTEC III dashboard cable assembly OK.
Manifold valve assembly OK.
CTIS cable assembly OK.

<table>
<thead>
<tr>
<th>YES</th>
<th>Replace pressure transducer (para 12-7).</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Replace CTIS ECU (para 12-6).</td>
</tr>
</tbody>
</table>

21. Is continuity present from air pressure switch pin A to air pressure switch pin B?

**TEST OPTIONS**
Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present, air pressure switch is faulty.

**POSSIBLE PROBLEMS**
Faulty air pressure switch.
Faulty start and charging cable assembly.
Faulty WTEC II / WTEC III dashboard cable assembly.
Faulty CTIS cable assembly.

**KNOWN INFO**
VOLTS gage registers in green zone with engine running.
Circuit breaker CB40 OK.
FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal.

<table>
<thead>
<tr>
<th>YES</th>
<th>Replace air pressure switch (para 23-13).</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Replace CTIS ECU (para 12-6).</td>
</tr>
</tbody>
</table>
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

**VOLTAGE TEST**

1. Connect connector P110 from CTIS ECU.
2. Position master power switch to on (TM 9-2320-366-10-1).
3. Set multimeter to volts DC.
4. Connect positive (+) probe of multimeter to connector P113 socket A.
5. Connect negative (-) probe of multimeter to known good ground and note reading on multimeter.
7. If 4.9-5.1 VDC is not present, replace CTIS ECU (para 12-6).
8. If 4.9-5.1 VDC is present, replace air pressure transducer (para 12-7).

**NOTE**

Perform steps (9) and (10) if 4.9-5.1 VDC is not present.

9. Connect connector P113 to air pressure transducer connector.
10. Install kick panel (para 16-3).

**CONTINUITY TEST**

1. Connect connector P110 to CTIS ECU.
2. Disconnect connector P84 from air pressure switch.
3. Set multimeter to ohms.
4. Connect positive (+) probe of multimeter to air pressure switch pin A.
5. Connect negative (-) probe of multimeter to air pressure switch pin B and note reading on multimeter.
6. If continuity is not present, replace air pressure switch (para 23-13).
e85. CENTRAL TIRE INFLATION SYSTEM (CTIS) DOES NOT OPERATE (CONT)

22. Is continuity present from connector P84 socket A to ground?

- **NO**
  - Repair wire 3032 from connector P84 socket A to terminal lug TL85 (para 2-45) or replace start and charging cable assembly (para 7-132).

- **YES**
  - Replace CTIS cable assembly (para 7-60).

23. Is continuity present from connector P111 pin F to connector P110 socket T?

- **NO**
  - If continuity is not present, wire 3032 in start and charging cable assembly is faulty.

- **YES**
  - Replace CTIS cable assembly (para 7-60).

KNOWLEDGE

VOLTS gage registers in green zone with engine running.
Circuit breaker CB40 OK.
FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal.
Air pressure switch OK.

POSSIBLE PROBLEMS

Faulty start and charging cable assembly.
Faulty WTEC II / WTEC III dashboard cable assembly.
Faulty CTIS cable assembly.

TEST OPTIONS

Continuity Test or STE/ICE-R Test #91

REASON FOR QUESTION

If continuity is not present, wire 3032 in start and charging cable assembly is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P84 socket A.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, repair wire 3032 from connector P84 socket A to terminal lug TL85 (para 2-45) or replace start and charging cable assembly (para 7-132).
(5) Connect connector P84 to air pressure switch.

CONTINUITY TEST

(1) Disconnect connector P110 from CTIS ECU.
(2) Remove kick panel (para 16-3).
(3) Disconnect connector P111 from connector J111.
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter to connector P111 pin F.
(6) Connect negative (-) probe of multimeter to connector P110 socket T and note reading on multimeter.
(7) If continuity is not present, replace CTIS cable assembly (para 7-60).
e85. CENTRAL TIRE INFLATION SYSTEM (CTIS) DOES NOT OPERATE (CONT)

**KNOWN INFO**
- VOLTS gage registers in green zone with engine running.
- Circuit breaker CB40 OK.
- FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal.
- Air pressure switch OK.
- CTIS cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty start and charging cable assembly.
- Faulty WTEC II / WTEC III dashboard cable assembly.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, wire 1790 from connector J43 socket 2 to connector J111 socket F is faulty. If continuity is present, wire 1790 from connector P43 pin 2 to connector P84 socket B is faulty.

**Flowchart**
- **Is continuity present from connector J 43 socket 2 to connector J 111 socket F?**
  - **NO**
    - Repair wire 1790 from connector J 43 socket 2 to connector J 111 socket F (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
  - **YES**
    - Repair wire 1790 from connector P43 pin 2 to connector P84 socket B (para 2-45) or replace start and charging cable assembly (para 7-132).
CONTINUITY TEST

(1) Connect connector P110 to CTIS ECU.
(2) Remove instrument panel assembly for access (para 7-15).
(3) Disconnect connector J 43 from connector P43.
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter to connector J 43 socket 2.
(6) Connect negative (-) probe of multimeter to connector J 111 socket F and note reading on multimeter.
(7) If continuity is not present, repair wire 1790 from connector J 43 socket 2 to connector J 111 socket F (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
(8) If continuity is present, repair wire 1790 from connector P43 pin 2 to connector P84 socket B (para 2-45) or replace start and charging cable assembly (para 7-132).
(9) Connect connector P43 to connector J 43.
(10) Install instrument panel assembly (para 7-15).
(11) Connect connector J 111 to connector P111.
(12) Install kick panel (para 16-3).
**Known Info**

- VOLTS gage registers in green zone with engine running.
- Circuit breaker CB40 OK.
- FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal.
- Air pressure switch OK.
- Start and charging cable assembly OK.

**Possible Problems**

- Faulty WTEC II / WTEC III dashboard cable assembly.
- Faulty CTIS cable assembly.

---

**Test Options**

- Continuity Test or STE/ICE-R Test #91

---

**Reason for Question**

- If continuity is not present, wire 1911 from connector J111 socket E to circuit breaker CB40 socket 7 is faulty. If continuity is present, CTIS cable assembly is faulty.

---

**25.** Is continuity present from connector J111 socket E to circuit breaker CB40 socket 7?

- **Yes**: Repair wire 1911 from connector J111 socket E to circuit breaker CB40 socket 7 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
- **No**: Replace CTIS cable assembly (para 7-60).
CONTINUITY TEST

1. Connect connector P110 to CTIS ECU.
2. Remove kick panel (para 16-3).
3. Remove circuit breaker CB40 from PDP.
4. Disconnect connector P111 from connector J111.
5. Set multimeter to ohms.
6. Connect positive (+) probe of multimeter to connector J111 socket E.
7. Connect negative (-) probe of multimeter to circuit breaker CB40 socket 7 and note reading on multimeter.
8. If continuity is not present, repair wire 1911 from connector J111 socket E to circuit breaker CB40 socket 7 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
9. If continuity is present, replace CTIS cable assembly (para 7-60).
10. Install circuit breaker CB40 on PDP.
11. Connect connector J111 to connector P111.
12. Install kick panel (para 16-3).
26. Is continuity present from connector P111 pin A to connector P110 socket F?

- **NO**
  - If continuity is not present, CTIS cable assembly is faulty. If continuity is present, wire 3031 from connector J111 socket A to terminal board TB2 position 35 is faulty.

- **YES**
  - Replace CTIS cable assembly (para 7-60).

**KNOWN INFO**
- VOLTS gage registers in green zone with engine running.
- Circuit breaker CB40 OK.
- FRONT BRAKE AIR and REAR BRAKE AIR pressure gages read normal.
- Air pressure switch OK.
- Start and charging cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II / WTEC III dashboard cable assembly.
- Faulty CTIS cable assembly.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, CTIS cable assembly is faulty. If continuity is present, wire 3031 from connector J111 socket A to terminal board TB2 position 35 is faulty.

**Replace CTIS cable assembly (para 7-60).**

- Repair wire 3031 from connector J111 socket A to terminal board TB2 position 35 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
## CONTINUITY TEST

1. Remove kick panel (para 16-3).
2. Disconnect connector J111 from connector P111.
3. Set multimeter to ohms.
4. Connect positive (+) probe of multimeter to connector P110 socket F.
5. Connect negative (-) probe of multimeter to connector P111 pin A and note reading on multimeter.
6. If continuity is not present replace CTIS cable assembly (para 7-60).
7. If continuity is present, repair wire 3031 from connector J111 socket A to terminal board TB2 position 35 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
8. Connect connector J111 to connector P111.
9. Install kick panel (para 16-3).
10. Connect connector P110 to CTIS ECU.
e86. CENTRAL TIRE INFLATION SYSTEM (CTIS) DOES NOT INFLATE TIRES

INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Condition</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1).</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Personnel Required</th>
<th>Materials/Parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2)</td>
<td>Wire, Elect, 50 ft (Item 71, Appendix D)</td>
</tr>
</tbody>
</table>

References
TM 9-4910-571-12&P

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTIS deflates tires.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty CTIS ECU.</td>
</tr>
<tr>
<td>Faulty CTIS cable assembly.</td>
</tr>
<tr>
<td>Faulty manifold valve assembly.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational Test</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If CTIS inflates tires, CTIS ECU is faulty.</td>
</tr>
</tbody>
</table>

1. Does replacement CTIS ECU inflate tires?

- YES
  - Go to step 2 of this fault.

- NO
  - Replace CTIS ECU (para 12-6).
<table>
<thead>
<tr>
<th>OPERATIONAL TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Disconnect connector P110 from CTIS ECU.</td>
</tr>
<tr>
<td>(2) Connect connector P110 to a known-good CTIS ECU.</td>
</tr>
<tr>
<td>(3) Start vehicle (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(4) Allow air pressure to reach 85 psi.</td>
</tr>
<tr>
<td>(6) If tires do not inflate, go to step 2 of this fault.</td>
</tr>
<tr>
<td>(7) If tires inflate, replace CTIS ECU (para 12-6).</td>
</tr>
<tr>
<td>(8) Shut down vehicle (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(9) Disconnect connector P110 from known-good CTIS ECU.</td>
</tr>
</tbody>
</table>
2. Is continuity present between connector P110-B and connector P112-F?

   NO

   YES

   Replace CTIS cable assembly (para 7-60).

3. Is continuity present between connector P110-F and connector P112-A?

   NO

   YES

   Replace CTIS cable assembly (para 7-60).

   TEST OPTIONS
   Continuity Test or STE/ICE-R #91

   REASON FOR QUESTION
   If continuity is not present, CTIS cable assembly is faulty.
CONTINUITY TEST

(1) Remove kick panel (para 16-3).
(2) Disconnect connector P112 from manifold valve assembly.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to connector P110-B.
(5) Connect negative (-) probe of multimeter to connector P112-F and note reading on multimeter.
(6) If continuity is not present, replace CTIS cable assembly (para 7-60).

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P110-F.
(3) Connect negative (-) probe of multimeter to connector P112-A and note reading on multimeter.
(4) If continuity is not present, replace CTIS cable assembly (para 7-60).
4. Is continuity present between connector P110-R and connector P112-D?

   NO

   YES

   Replace CTIS cable assembly (para 7-60).

5. Is continuity present between connector P110-F and connector P112-B?

   NO

   YES

   Replace CTIS cable assembly (para 7-60).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P110-R.
(3) Connect negative (-) probe of multimeter to connector P112-D and note reading on multimeter.
(4) If continuity is not present, replace CTIS cable assembly (para 7-60).

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P110-F.
(3) Connect negative (-) probe of multimeter to connector P112-B and note reading on multimeter.
(4) If continuity is not present, replace CTIS cable assembly (para 7-60).
(5) Connect connector P112 to manifold valve assembly.
6. Is continuity present between connector P110-b and connector P113-B?

- **YES**
  - Replace CTIS cable assembly (para 7-60).

- **NO**
  - CTIS deflates tires. CTIS ECU OK.
  - Known Info
  - Possible Problems
  - Faulty CTIS cable assembly.
  - Faulty manifold valve assembly.
  - Reason for Question
  - Test Options
  - Continuity Test or STE/ICE-R #91

7. Is continuity present between connector P110-c and connector P113-C?

- **YES**
  - Replace CTIS cable assembly (para 7-60).

- **NO**
  - CTIS deflates tires. CTIS ECU OK.
  - Known Info
  - Possible Problems
  - Faulty CTIS cable assembly.
  - Faulty manifold valve assembly.
  - Reason for Question
  - Test Options
  - Continuity Test or STE/ICE-R #91

CONTINUITY TEST

(1) Disconnect connector P113 from manifold valve assembly.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to connector P110-b.
(4) Connect negative (-) probe of multimeter to connector P113-B and note reading on multimeter.
(5) If continuity is not present, replace CTIS cable assembly (para 7-60).

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P110-c.
(3) Connect negative (-) probe of multimeter to connector P113-C and note reading on multimeter.
(4) If continuity is not present, replace CTIS cable assembly (para 7-60).
8. Is continuity present between connector P110-J and connector P113-A?

**Known Info**
- CTIS deflates tires.
- CTIS ECU OK.

**Possible Problems**
- Faulty CTIS cable assembly.
- Faulty manifold valve assembly.

**Test Options**
- Continuity Test or STE/ICE-R #91

**Reason For Question**
- If continuity is not present, CTIS cable assembly is faulty. If continuity is present, manifold valve assembly is faulty.

- **YES**
  - Replace CTIS cable assembly (para 7-60).

- **NO**
  - Replace manifold valve assembly (para 12-7).
## CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>2.</td>
<td>Connect positive (+) probe of multimeter to connector P110-J.</td>
</tr>
<tr>
<td>3.</td>
<td>Connect negative (-) probe of multimeter to connector P113-A and note reading on multimeter.</td>
</tr>
<tr>
<td>4.</td>
<td>If continuity is not present, replace CTIS cable assembly (para 7-60).</td>
</tr>
<tr>
<td>5.</td>
<td>If continuity is present, replace manifold valve assembly (para 12-7).</td>
</tr>
<tr>
<td>6.</td>
<td>Connect connector P113 to manifold valve assembly.</td>
</tr>
<tr>
<td>7.</td>
<td>Install kick panel (para 16-3).</td>
</tr>
<tr>
<td>8.</td>
<td>Connect connector P110 to CTIS ECU.</td>
</tr>
</tbody>
</table>

**Diagram:**
- MANIFOLD VALVE ASSEMBLY
- CONNECTOR P113
- STEERING WHEEL REMOVED FOR CLARITY
- CTIS ECU
- CONNECTOR P110
- P110
**INITIAL SETUP**

- **Equipment Condition**: Engine shut down (TM 9-2320-366-10-1).
- **Personnel Required**: (2)
- **References**: TM 9-4910-571-12&P

---

**KNOWLEDGE INFO**
- CTIS inflates tires.

**POSSIBLE PROBLEMS**
- Faulty CTIS ECU.
- Faulty CTIS cable assembly.
- Faulty manifold valve assembly.

---

**TEST OPTIONS**

- **Operational Test**
  - **REASON FOR QUESTION**
    - If CTIS deflates tires, CTIS ECU is faulty.

---

**START**

1. **Does replacement CTIS ECU deflate tires?**

---

**NO**

**YES**

- Go to step 2 of this fault.
- Replace CTIS ECU (para 12-6).
OPERATIONAL TEST

1. Disconnect connector P110 from CTIS ECU.
2. Connect connector P110 to a known-good CTIS ECU.
4. Allow air pressure to reach 85 psi.
6. If tires do not deflate, go to step 2 of this fault.
7. If tires deflate, replace CTIS ECU (para 12-6).
9. Disconnect connector P110 from known-good CTIS ECU.
2. Is continuity present between connector P110-C and connector P112-E?

   **KNOWN INFO**
   - CTIS inflates tires.
   - CTIS ECU OK.

   **POSSIBLE PROBLEMS**
   - Faulty CTIS cable assembly.
   - Faulty manifold valve assembly.

   **TEST OPTIONS**
   - Continuity Test or STE/ICE-R #91

   **REASON FOR QUESTION**
   - If continuity is not present, CTIS cable assembly is faulty.

   **YES**
   - Replace CTIS cable assembly (para 7-60).

   **NO**

3. Is continuity present between connector P110-F and connector P112-A?

   **KNOWN INFO**
   - CTIS inflates tires.
   - CTIS ECU OK.

   **POSSIBLE PROBLEMS**
   - Faulty CTIS cable assembly.
   - Faulty manifold valve assembly.

   **TEST OPTIONS**
   - Continuity Test or STE/ICE-R #91

   **REASON FOR QUESTION**
   - If continuity is not present, CTIS cable assembly is faulty.

   **YES**
   - Replace CTIS cable assembly (para 7-60).

   **NO**

---

**KNOW INFO**
- CTIS inflates tires.
- CTIS ECU OK.

**POSSIBLE PROBLEMS**
- Faulty CTIS cable assembly.
- Faulty manifold valve assembly.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, CTIS cable assembly is faulty.

**YES**
- Replace CTIS cable assembly (para 7-60).

**NO**

CONTINUITY TEST

(1) Remove kick panel (para 16-3).
(2) Disconnect connector P112 from manifold valve assembly.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to connector P110-C.
(5) Connect negative (-) probe of multimeter to connector P112-E and note reading on multimeter.
(6) If continuity is not present, replace CTIS cable assembly (para 7-60).

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P110-F.
(3) Connect negative (-) probe of multimeter to connector P112-A and note reading on multimeter.
(4) If continuity is not present, replace CTIS cable assembly (para 7-60).
**e87. CENTRAL TIRE INFLATION SYSTEM (CTIS) DOES NOT DEFLATE TIRES (CONT)**

**KNOWN INFO**
- CTIS inflates tires.
- CTIS ECU OK.

**POSSIBLE PROBLEMS**
- Faulty CTIS cable assembly.
- Faulty manifold valve assembly.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, CTIS cable assembly is faulty.

4. **Is continuity present between connector P110-R and connector P112-D?**

   - **NO**
     - Replace CTIS cable assembly (para 7-60).
   - **YES**
     - Replace CTIS cable assembly (para 7-60).

5. **Is continuity present between connector P110-F and connector P112-B?**

   - **NO**
     - Replace CTIS cable assembly (para 7-60).
   - **YES**
     - Replace CTIS cable assembly (para 7-60).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P110-R.
(3) Connect negative (-) probe of multimeter to connector P112-D and note reading on multimeter.
(4) If continuity is not present, replace CTIS cable assembly (para 7-60).

(5) Connect connector P112 to manifold valve assembly.
6. Is continuity present between connector P110-b and connector P113-B?

- **Known Info**
  - CTIS inflates tires.
  - CTIS ECU OK.

- **Possible Problems**
  - Faulty CTIS cable assembly.
  - Faulty manifold valve assembly.

- **Test Options**
  - Continuity Test or STE/ICE-R #91

- **Reason For Question**
  - If continuity is not present, CTIS cable assembly is faulty.

   - **Yes**
     - Replace CTIS cable assembly (para 7-60).

   - **No**

7. Is continuity present between connector P110-c and connector P113-C?

- **Known Info**
  - CTIS inflates tires.
  - CTIS ECU OK.

- **Possible Problems**
  - Faulty CTIS cable assembly.
  - Faulty manifold valve assembly.

- **Test Options**
  - Continuity Test or STE/ICE-R #91

- **Reason For Question**
  - If continuity is not present, CTIS cable assembly is faulty.

   - **Yes**
     - Replace CTIS cable assembly (para 7-60).

   - **No**
CONTINUITY TEST

(1) Disconnect connector P113 from manifold valve assembly.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to connector P110-b.
(4) Connect negative (-) probe of multimeter to connector P113-B and note reading on multimeter.
(5) If continuity is not present, replace CTIS cable assembly (para 7-60).

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P110-c.
(3) Connect negative (-) probe of multimeter to connector P113-C and note reading on multimeter.
(4) If continuity is not present, replace CTIS cable assembly (para 7-60).
8. Is continuity present between connector P110-J and connector P113-A?

**KNOWN INFO**
- CTIS inflates tires.
- CTIS ECU OK.

**POSSIBLE PROBLEMS**
- Faulty CTIS cable assembly.
- Faulty manifold valve assembly.

**REASON FOR QUESTION**
- If continuity is not present, CTIS cable assembly is faulty. If continuity is present, manifold valve assembly is faulty.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**YES**
- Replace CTIS cable assembly (para 7-60).

**NO**
- Replace manifold valve assembly (para 12-7).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P110-J.
(3) Connect negative (-) probe of multimeter to connector P113-A and note reading on multimeter.
(4) If continuity is not present, replace CTIS cable assembly (para 7-60).
(5) If continuity is present, replace manifold valve assembly (para 12-7).
(6) Connect connector P113 to manifold valve assembly.
(7) Install kick panel (para 16-3).
(8) Connect connector P110 to CTIS ECU.
e88. 15K SELF-RECOVERY WINCH (SRW) DOES NOT REEL IN OR PAY OUT

**INITIAL SETUP**

<table>
<thead>
<tr>
<th>Equipment Condition</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1).</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td>Personnel Required</td>
<td>STE/ICE-R (Item 41, Appendix C)</td>
</tr>
<tr>
<td>(2)</td>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
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<tr>
<td>Materials/Parts</td>
<td>References</td>
</tr>
<tr>
<td>Wire, Elect, 50 ft (Item 71, Appendix D)</td>
<td>TM 9-4910-571-12&amp;P</td>
</tr>
</tbody>
</table>

**KNOWN INFO**

<table>
<thead>
<tr>
<th>Circuit breaker OK.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTO OK.</td>
</tr>
</tbody>
</table>

**POSSIBLE PROBLEMS**

| Faulty auxiliary panel cable assembly. |
| Faulty winch power switch.            |
| Faulty WINCH IN/OUT switch.           |

**TEST OPTIONS**

<table>
<thead>
<tr>
<th>Voltage Test or STE/ICE-R #89</th>
</tr>
</thead>
</table>

**REASON FOR QUESTION**

If 24 VDC is not present, wire 1904 is faulty.

**START**

1. Is 24 VDC present on connector P902 terminal 6?

**NO**

**YES**

Repair wire 1904 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

**WARNING**

Read WARNING on following page.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove auxiliary panel and tilt back. Do not disconnect connectors (para 7-8).</td>
</tr>
<tr>
<td>(2) Disconnect connector P902 from winch power switch.</td>
</tr>
<tr>
<td>(3) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter to connector P902 terminal 6.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(6) Position master power switch to on (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(7) Position PTO switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(8) If 24 vdc is not present, repair wire 1904 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).</td>
</tr>
<tr>
<td>(9) Position PTO switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(10) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
KNOW INFO
Circuit breaker OK.
PTO OK.

POSSIBLE PROBLEMS
Faulty winch power switch.
Faulty auxiliary panel cable assembly.
Faulty WINCH IN/OUT switch.

2. Is continuity present between winch power switch terminals 6 and 2?

TEST OPTIONS
Continuity Test or STE/ICE-R #91

REASON FOR QUESTION
If continuity is not present, winch power switch is faulty.

YES

NO

Replace winch power switch (para 7-18).
CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to winch power switch terminal 6.
3. Connect negative (-) probe of multimeter to winch power switch terminal 2.
4. Position winch power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
5. If continuity is not present, replace winch power switch (para 7-18).
7. Connect connector P902 to winch power switch.
3. Is 24 vdc present on connector P903 terminal 3?

   NO

   YES

   Repair wire 1924 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

4. Is continuity present between WINCH IN/OUT switch terminal 3 and terminal 1?

   NO

   YES

   Replace WINCH IN/OUT switch (para 7-18).

   Fault not corrected. Notify DS Maintenance.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

**VOLTAGE TEST**

1. Disconnect connector P903 from WINCH IN/OUT switch.
2. Set multimeter to volts dc.
3. Connect positive (+) probe of multimeter to connector P903 terminal 3.
4. Connect negative (-) probe of multimeter to ground.
5. Position master power switch to on (TM 9-2320-366-10-1).
7. Position winch power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
8. If 24 vdc is not present, repair wire 1924 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

**CONTINUITY TEST**

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to WINCH IN/OUT switch terminal 3.
3. Connect negative (-) probe of multimeter to WINCH IN/OUT switch terminal 1.
4. Position WINCH IN/OUT switch to in (TM 9-2320-366-10-1) and note reading on multimeter.
5. If continuity is not present, replace WINCH IN/OUT switch (para 7-18).
6. If continuity is present, fault not corrected. Notify DS Maintenance.
7. Connect connector P903 to WINCH IN/OUT switch.
8. Install auxiliary panel (para 7-8).
1. **START**

**Known Info**
- Circuit breaker OK.
- 15K SRW pays out.

**Possible Problems**
- Faulty winch control valve cable assembly.
- Faulty winch control valve assembly.
- Faulty WINCH IN/OUT switch.
- Faulty PTO cable assembly.
- Faulty auxiliary panel cable assembly.

**Warning**
Read **Warning** on following page.

**Question**
Is 24 vdc present on winch in solenoid L4 connector terminal 1?

**Test Options**
- Voltage Test or STE/ICE-R #89

**Reason for Question**
This question eliminates possible problems and determines where troubleshooting continues.

**Yes**
- Go to step 3 of this fault.

**No**
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove four nuts, washers, solenoid bracket, washers, and screws.</td>
</tr>
<tr>
<td>(2) Loosen screw and disconnect winch in solenoid L4 connector from solenoid L4.</td>
</tr>
<tr>
<td>(3) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter to winch in solenoid L4 connector terminal 1.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(6) Position master power switch to on (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(7) Position PTO switch to on (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(8) Position winch power switch to on (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(9) Position WINCH IN/OUT switch to IN (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(10) If 24 vdc is not present, go to step 3 of this fault.</td>
</tr>
<tr>
<td>(11) Position winch power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(12) Position PTO switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(13) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
2. Is continuity present between winch in solenoid L4 connector terminal 2 and a known good ground?

- **YES**: Replace winch control valve assembly (para 17-25).
- **NO**: Repair wire 3069 (para 2-45) or replace winch control valve cable assembly (para 7-135).

### KNOWN INFO
- Circuit breaker OK.
- 15K SRW pays out.
- WINCH IN/OUT switch OK.
- Auxiliary panel cable assembly OK.
- PTO cable assembly OK.

### POSSIBLE PROBLEMS
- Faulty winch control valve cable assembly.
- Faulty winch control valve assembly.

### TEST OPTIONS
- Continuity Test or STE/ICE-R #91

### REASON FOR QUESTION
- If continuity is not present, wire 3069 is faulty. If continuity is present, winch control valve assembly is faulty.
(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to winch in solenoid L4 terminal 2.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, repair wire 3069 (para 2-45) or replace winch control valve cable assembly (para 7-135).
(5) If continuity is present, replace winch control valve assembly (para 17-25).
(6) Connect winch in solenoid L4 connector on solenoid L4 and tighten screw.
3. **Is continuity present between WINCH IN/OUT switch terminal 3 and terminal 1?**

- **YES**
  - Replace WINCH IN/OUT switch (para 7-18).

- **NO**
  - **TEST OPTIONS**
    - Continuity Test or STE/ICE-R #91
  - **REASON FOR QUESTION**
    - If continuity is not present, WINCH IN/OUT switch is faulty.

**KNOWN INFO**
- Circuit breaker OK.
- 15K SRW pays out.
- Winch control valve assembly OK.

**POSSIBLE PROBLEMS**
- Faulty winch in/out switch.
- Faulty winch control valve cable assembly.
- Faulty PTO cable assembly.
- Faulty auxiliary panel cable assembly.
**CONTINUITY TEST**

1. Remove six screws from auxiliary panel.
2. Lift auxiliary panel from auxiliary panel housing to gain access.
3. Disconnect connector P903 from WINCH IN/OUT switch.
4. Set multimeter to ohms.
5. Connect positive (+) probe of multimeter to WINCH IN/OUT switch terminal 3.
6. Connect negative (-) probe of multimeter to WINCH IN/OUT switch terminal 1.
7. Position WINCH IN/OUT switch to in (TM 9-2320-366-10-1) and note reading on multimeter.
8. If continuity is not present, replace WINCH IN/OUT switch (para 7-18).
4. Is continuity present between connector P903-1 and connector P210-14?

- **YES**
  - Repair wire 2005 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

- **NO**
  - Continuity Test or STE/ICE-R #91
  - If continuity is not present, wire 2005 is faulty.

**KNOWN INFO**
- Circuit breaker OK.
- 15K SRW pays out.
- Winch control valve assembly OK.
- WINCH IN/OUT switch OK.

**POSSIBLE PROBLEMS**
- Faulty winch control valve cable assembly.
- Faulty PTO cable assembly.
- Faulty auxiliary panel cable assembly.

**REASON FOR QUESTION**
- 15K SELF-RECOVERY WINCH (SRW) DOES NOT REEL IN (CONT)
CONTINUITY TEST

(1) Remove kick panel (para 16-3).
(2) Disconnect connector P210 from connector J210.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to connector P903-1.
(5) Connect negative (-) probe of multimeter to connector P210-14 and note reading on multimeter.
(6) If continuity is not present, repair wire 2005 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
(7) Connect connector P903 to WINCH IN/OUT switch.
(8) Position auxiliary panel on auxiliary panel housing with six screws.
(9) Tighten six screws to 24 lb-in. (3 N·m).
5. Is continuity present between connector J210-14 and connector P215-2?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breaker OK.</td>
<td>Continuity Test or</td>
<td>If continuity is not present,</td>
</tr>
<tr>
<td>15K SRW pays out.</td>
<td>STE/ICE-R #91</td>
<td>wire 2005 is faulty.</td>
</tr>
<tr>
<td>Winch control valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>assembly OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WINCH IN/OUT switch OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auxiliary panel cable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>assembly OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POSSIBLE PROBLEMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty winch control valve</td>
<td>Repair wire 2005 (para 2-45)</td>
<td></td>
</tr>
<tr>
<td>cable assembly.</td>
<td>or replace PTO cable</td>
<td></td>
</tr>
<tr>
<td>Faulty PTO cable</td>
<td>assembly (para 7-127).</td>
<td></td>
</tr>
<tr>
<td>assembly.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

YES: Repair wire 2005 (para 2-45) or replace PTO cable assembly (para 7-127).

NO: If continuity is not present, wire 2005 is faulty.
CONTINUITY TEST

(1) Disconnect connector P215 from connector J215.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to connector J210-14.
(4) Connect negative (-) probe of multimeter to connector P215-2 and note reading on multimeter.
(5) If continuity is not present, repair wire 2005 (para 2-45) or replace PTO cable assembly (para 7-127).
(6) Connect connector P210 to connector J210.
(7) Install kick panel (para 16-3).
6. Is continuity present between connector J215-2 and winch in solenoid L4 connector terminal 1?

- NO
  - If continuity is not present, wire 2005 is faulty. If continuity is present, notify DS Maintenance.

- YES
  - Repair wire 2005 (para 2-45) or replace winch control valve cable assembly (para 7-135).

Known Info:
- Circuit breaker OK.
- 15K SRW pays out.
- Winch control valve assembly OK.
- WINCH IN/OUT switch OK.
- Auxiliary panel cable assembly OK.
- PTO cable assembly OK.

Possible Problems:
- Faulty winch control valve cable assembly.

Test Options:
- Continuity Test or STE/ICE-R #91

Reason for Question:
- If continuity is not present, wire 2005 is faulty. If continuity is present, notify DS Maintenance.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector J215-2.
(3) Connect negative (-) probe of multimeter to winch in solenoid L4 connector terminal 1 and note reading on multimeter.
(4) If continuity is not present, repair wire 2005 (para 2-45) or replace winch control valve cable assembly (para 7-135).
(5) If continuity is present, notify DS Maintenance.
(6) Connect connector P215 to connector J215.
(7) Connect winch in solenoid L4 connector to solenoid L4 and tighten screw.
1. **START**

**KNOWN INFO**
- Circuit breaker OK.
- 15K SRW reels in OK.

**POSSIBLE PROBLEMS**
- Faulty winch control valve cable assembly.
- Faulty winch control valve assembly.
- Faulty WINCH IN/OUT switch.
- Faulty PTO cable assembly.
- Faulty auxiliary panel cable assembly.

**WARNING**
Read WARNING on following page.

1. Is 24 vdc present on winch out solenoid L5 connector terminal 1?

**TEST OPTIONS**
- Voltage Test or
  - STE/ICE-R #89

**REASON FOR QUESTION**
This question eliminates possible problems and determines where troubleshooting continues.

**YES**
Go to step 3 of this fault.

**NO**
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
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</thead>
<tbody>
<tr>
<td>(1) Remove four nuts, washers, solenoid bracket, washers, and screws.</td>
</tr>
<tr>
<td>(2) Loosen screw and disconnect winch out solenoid L5 connector from solenoid L5.</td>
</tr>
<tr>
<td>(3) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter to winch out solenoid L5 connector terminal 1.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(6) Position master power switch to on (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(7) Position PTO switch to on (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(8) Position winch power switch to on (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(9) Position WINCH IN/OUT switch to OUT (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(10) If 24 vdc is not present, go to step 3 of this fault.</td>
</tr>
<tr>
<td>(11) Position winch power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(12) Position PTO switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(13) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
2. Is continuity present between winch out solenoid L5 connector terminal 2 and a known good ground?

- **YES**
  - Repair wire 3070 (para 2-45) or replace winch control valve cable assembly (para 7-135).
  - Replace winch control valve assembly (para 17-25).

- **NO**
  - If continuity is not present, wire 3070 is faulty. If continuity is present, winch control valve assembly is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to winch out solenoid L5 terminal 2.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, repair wire 3070 (para 2-45) or replace winch control valve cable assembly (para 7-135).
(5) If continuity is present, replace winch control valve assembly (para 17-25).
(6) Connect winch out solenoid L5 connector on solenoid L5 and tighten screw.
**3.** Is continuity present between WINCH IN/OUT switch terminal 3 and terminal 7?

**KNOWN INFO**
- Circuit breaker OK.
- 15K SRW reels in OK.
- Winch control valve assembly OK.

**POSSIBLE PROBLEMS**
- Faulty winch in/out switch.
- Faulty winch control valve cable assembly.
- Faulty PTO cable assembly.
- Faulty auxiliary panel cable assembly.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, WINCH IN/OUT switch is faulty.

**YES**
- Replace WINCH IN/OUT switch (para 7-18).

**NO**
CONTINUITY TEST

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Remove six screws from auxiliary panel.</td>
</tr>
<tr>
<td>(2)</td>
<td>Lift auxiliary panel from auxiliary panel housing to gain access.</td>
</tr>
<tr>
<td>(3)</td>
<td>Disconnect connector P903 from WINCH IN/OUT switch.</td>
</tr>
<tr>
<td>(4)</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>(5)</td>
<td>Connect positive (+) probe of multimeter to WINCH IN/OUT switch terminal 3.</td>
</tr>
<tr>
<td>(6)</td>
<td>Connect negative (-) probe of multimeter to WINCH IN/OUT switch terminal 7.</td>
</tr>
<tr>
<td>(7)</td>
<td>Position WINCH IN/OUT switch to out (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(8)</td>
<td>If continuity is not present, replace WINCH IN/OUT switch (para 7-18).</td>
</tr>
</tbody>
</table>

2-1003
4. Is continuity present between connector P903-7 and connector P210-8? 

**KNOWN INFO**
- Circuit breaker OK.
- 15K SRW reels in OK.
- Winch control valve assembly OK.
- WINCH IN/OUT switch OK.

**POSSIBLE PROBLEMS**
- Faulty winch control valve cable assembly.
- Faulty PTO cable assembly.
- Faulty auxiliary panel cable assembly.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, wire 2008 is faulty.

**YES**
- Repair wire 2008 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

**NO**
CONTINUITY TEST

(1) Remove kick panel (para 16-3).
(2) Disconnect connector P210 from connector J210.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to connector P903-7.
(5) Connect negative (-) probe of multimeter to connector P210-8 and note reading on multimeter.
(6) If continuity is not present, repair wire 2008 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
(7) Connect connector P903 to WINCH IN/OUT switch.
(8) Position auxiliary panel on auxiliary panel housing with six screws.
(9) Tighten six screws to 24 lb-in. (3 N·m).
5. Is continuity present between connector J210-8 and connector P215-1?

If continuity is not present, wire 2008 is faulty.

YES

Repair wire 2008 (para 2-45) or replace PTO cable assembly (para 7-127).

NO

Circuit breaker OK.
15K SRW reels in OK.
Winch control valve assembly OK.
WINCH IN/OUT switch OK.
Auxiliary panel cable assembly OK.

Faulty winch control valve cable assembly.
Faulty PTO cable assembly.

POSSIBLE PROBLEMS

Continuity Test or STE/ICE-R #91

REASON FOR QUESTION

If continuity is not present, wire 2008 is faulty.

TEST OPTIONS
CONTINUITY TEST

(1) Disconnect connector P215 from connector J215.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to connector J210-8.
(4) Connect negative (-) probe of multimeter to connector P215-1 and note reading on multimeter.
(5) If continuity is not present, repair wire 2008 (para 2-45) or replace PTO cable assembly (para 7-127).
(6) Connect connector P210 to connector J210.
(7) Install kick panel (para 16-3).
e90. 15K SELF-RECOVERY WINCH (SRW) DOES NOT PAY OUT (CONT)

**KNOWN INFO**
- Circuit breaker OK.
- 15K SRW reels in OK.
- Winch control valve assembly OK.
- WINCH IN/OUT switch OK.
- Auxiliary panel cable assembly OK.
- PTO cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty winch control valve cable assembly.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, wire 2008 is faulty. If continuity is present, notify DS Maintenance.

6. Is continuity present between connector J215-1 and winch out solenoid L5 connector terminal 1?

- **NO**
  - Notify DS Maintenance.

- **YES**
  - Repair wire 2008 (para 2-45) or replace winch control valve cable assembly (para 7-135).
CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector J215-1.
3. Connect negative (-) probe of multimeter to winch out solenoid L5 connector terminal 1 and note reading on multimeter.
4. If continuity is not present, repair wire 2008 (para 2-45) or replace winch control valve cable assembly (para 7-135).
5. If continuity is present, notify DS Maintenance.
7. Connect winch out solenoid L5 connector to solenoid L5 and tighten screw.
e91. POWER TAKE-OFF (PTO) DOES NOT OPERATE

INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Condition</th>
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<tr>
<td>Engine shut down (TM 9-2320-366-10-1)</td>
<td>Tool Kit, Geni Mech (Item 46, Appendix C)</td>
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<tr>
<td>Personnel Required</td>
<td>STE/ICE-R (Item 41, Appendix C)</td>
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<tr>
<td>(2)</td>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
</tr>
<tr>
<td>References</td>
<td>Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)</td>
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<tr>
<td>TM 9-4910-571-12&amp;P</td>
<td></td>
</tr>
</tbody>
</table>

REFERENCES

- Circuit breaker OK.
- Vehicle starts.
- Faulty PTO cable assembly.
- Faulty PTO.
- Faulty dashboard cable assembly.
- Faulty auxiliary panel cable assembly.
- Faulty PTO switch.
- Faulty WTEC II VIM.
- Faulty WTEC II relay SF02.
- Faulty WTEC III relay K37.
- Faulty WTEC III transmission ECU.

This question helps eliminate possible problems and determines where troubleshooting continues.

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Test or STE/ICE-R #89</td>
<td>This question helps eliminate possible problems and determines where troubleshooting continues.</td>
</tr>
</tbody>
</table>

START

1. WARNING
   Read WARNING on following page.

   Is 24 vdc present at connector P217-B?

   NO

   YES

   Go to step 3 of this fault.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

VOLTAGE TEST

(1) Disconnect connector P217 from PTO.
(2) Set multimeter to volts dc.
(3) Connect positive (+) probe of multimeter to connector P217-B.
(4) Connect negative (-) probe of multimeter to ground.
(5) Start engine (TM 9-2320-366-10-1).
(6) Position PTO switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
(7) If 24 vdc is not present, go to step 3 of this fault.
(8) Position PTO switch to off (TM 9-2320-366-10-1).
(9) Shut down engine (TM 9-2320-366-10-1).
2. Is continuity present at connector P217-A?

**KNOWN INFO**
- Circuit breaker OK.
- Vehicle starts.
- Dashboard cable assembly OK.
- Auxiliary panel cable assembly OK.
- PTO switch OK.
- WTEC II VIM OK.
- WTEC III relay K37 OK.
- WTEC III transmission ECU OK.

**POSSIBLE PROBLEMS**
- Faulty PTO cable assembly.
- Faulty PTO.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91
- Reason for Question
  - If continuity is not present, wire 3068 is faulty. If continuity is present, PTO is faulty.

**YES**
- Repair wire 3068 (para 2-45) or replace PTO cable assembly (para 7-127).

**NO**
- Notify DS Maintenance.

---

**POSSIBLE PROBLEMS**
- Faulty PTO cable assembly.
- Faulty PTO.
## CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector P217-A.
3. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
4. If continuity is not present, repair wire 3068 (para 2-45) or replace PTO cable assembly (para 7-127).
5. If continuity is present, notify DS Maintenance.
6. Connect connector P217 to PTO.
e91. POWER TAKE-OFF (PTO) DOES NOT OPERATE (CONT)

**KNOWN INFO**
- Circuit breaker OK.
- Vehicle starts.
- PTO OK.

**POSSIBLE PROBLEMS**
- Faulty auxiliary panel cable assembly.
- Faulty PTO switch.
- Faulty dashboard cable assembly.
- Faulty PTO cable assembly.
- Faulty WTEC II VIM.
- Faulty WTEC II relay SF02.
- Faulty WTEC III relay K37.
- Faulty WTEC III transmission ECU.

---

**TEST OPTIONS**
- Voltage Test or STE/ICE-R #89

**REASON FOR QUESTION**
- If 24 vdc is not present, wire 1925 is faulty.

**WARNING**
Read WARNING on following page.

3. Is 24 vdc present at connector P904-5?

- **NO**
  - Repair wire 1925 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

- **YES**

---

3. Is 24 vdc present at connector P904-5?
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

VOLTAGE TEST

(1) Remove six screws from auxiliary panel.
(2) Lift auxiliary panel from auxiliary panel housing to gain access.
(3) Disconnect connector P904 from PTO switch.
(4) Set multimeter to volts dc.
(5) Connect positive (+) probe of multimeter to connector P904-5.
(6) Connect negative (-) probe of multimeter to ground.
(7) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
(8) If 24 vdc is not present, repair wire 1925 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
(9) Position master power switch to off (TM 9-2320-366-10-1).
**4.** Is continuity present from PTO switch terminal 5 to terminal 1?

- **YES**
  - Replace PTO switch (para 7-18).

- **NO**
  - If continuity is not present, PTO switch is faulty.

**KNOWN INFO**
- Circuit breaker OK.
- Vehicle starts.
- PTO OK.

**POSSIBLE PROBLEMS**
- Faulty PTO switch.
- Faulty auxiliary panel cable assembly.
- Faulty dashboard cable assembly.
- Faulty PTO cable assembly.
- Faulty WTEC II VIM.
- Faulty WTEC II relay SF02.
- Faulty WTEC III relay K37.
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91
<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to PTO switch terminal 5.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to PTO switch terminal 1.</td>
</tr>
<tr>
<td>(4) Position PTO switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(5) If continuity is not present, replace PTO switch (para 7-18).</td>
</tr>
<tr>
<td>(6) Position PTO switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
5. Is continuity present from connector P210-4 to connector P217-B?

   YES
   Repair wire 2019 (para 2-45) or replace PTO cable assembly (para 7-127).

   NO

   

TEST OPTIONS
Continuity Test or STE/ICE-R #91

REASON FOR QUESTION
If continuity is not present, wire 2019 is faulty.

KNOWN INFO
Circuit breaker OK.
Vehicle starts.
PTO OK.
PTO switch OK.

POSSIBLE PROBLEMS
Faulty PTO cable assembly.
Faulty WTEC II VIM.
Faulty dashboard cable assembly.
Faulty auxiliary panel cable assembly.
Faulty WTEC II relay SF02.
Faulty WTEC III relay K37.
Faulty WTEC III transmission ECU.
CONTINUITY TEST

(1) Remove kick panel (para 16-3).
(2) Disconnect connector P210 from connector J210.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to connector P210-4.
(5) Disconnect connector P217 from PTO.
(6) Connect negative (-) probe of multimeter to connector P217-B and note reading on multimeter.
(7) If continuity is not present, repair wire 2019 (para 2-45) or replace PTO cable assembly (para 7-127).
(8) Connect connector P217 to PTO.
(9) Connect connector P210 to connector J210.
6. Is vehicle equipped with WTEC II transmission controls?

- **YES**
  - Go to step 13 of this fault.

- **NO**
  - This question helps eliminate possible problems and determines where troubleshooting continues.

### KNOWN INFO
- Circuit breaker OK.
- Vehicle starts.
- PTO OK.
- PTO switch OK.
- PTO cable assembly OK.

### POSSIBLE PROBLEMS
- Faulty WTEC II VIM.
- Faulty dashboard cable assembly.
- Faulty auxiliary panel cable assembly.
- Faulty WTEC II relay SF02.
- Faulty WTEC III relay K37.
- Faulty WTEC III cab transmission harness.
- Faulty WTEC III transmission ECU.

### TEST OPTIONS
- Visual inspection

### REASON FOR QUESTION
- This question helps eliminate possible problems and determines where troubleshooting continues.
(1) Check if vehicle is equipped with WTEC II TEPSS.
(2) If transmission pushbutton shift selector is not mounted with four screws and does not have a filter cover, go to step 13.
7. Does PTO operate after replacing WTEC II relay SF02?

- **YES**: Replace WTEC II VIM (para 8-6).
- **NO**:
  - **OPERATIONAL TEST**
    - **REASON FOR QUESTION**
      - If PTO operates after replacing WTEC II relay SF02, WTEC II relay SF02 is faulty. If PTO does not operate after replacing WTEC II relay SF02, WTEC II VIM is faulty.

**KNOWN INFO**
- Circuit breaker OK.
- Vehicle starts.
- PTO OK.
- PTO switch OK.
- PTO cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II VIM.
- Faulty WTEC II dashboard cable assembly.
- Faulty auxiliary panel cable assembly.
- Faulty WTEC II relay SF02.
<table>
<thead>
<tr>
<th>OPERATIONAL TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove WTEC II relay SF02 (para 8-6).</td>
</tr>
<tr>
<td>(2) Install new WTEC II relay SF02 (para 8-6).</td>
</tr>
<tr>
<td>(3) Start engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(4) Position PTO switch to on (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(5) If PTO operates, replace WTEC II relay SF02 (para 8-6).</td>
</tr>
<tr>
<td>(6) If PTO does not operate, replace WTEC II VIM (para 8-6).</td>
</tr>
</tbody>
</table>
**e91. POWER TAKE-OFF (PTO) DOES NOT OPERATE (CONT)**

**KNOWN INFO**
- Circuit breaker OK.
- Vehicle starts.
- PTO OK.
- PTO switch OK.
- PTO cable assembly OK.
- WTEC II VIM OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II dashboard cable assembly.
- Faulty auxiliary panel cable assembly.
- Faulty WTEC II relay SF02.

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
- Voltage Test or STE/ICE-R #89

**REASON FOR QUESTION**
- If 24 vdc is not present, wire 1925 is faulty.

8.

Is 24 vdc present at connector J913-5?

**YES**
- Repair wire 1925 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).

**NO**

---

---
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove personnel heater for access (para 18-9).</td>
</tr>
<tr>
<td>(2) Disconnect connector J913 from connector P913.</td>
</tr>
<tr>
<td>(3) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter to connector J913-5.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(6) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If 24 vdc is not present, repair wire 1925 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).</td>
</tr>
<tr>
<td>(8) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
**91. POWER TAKE-OFF (PTO) DOES NOT OPERATE (CONT)**

### KNOWN INFO
- Circuit breaker OK.
- Vehicle starts.
- PTO OK.
- PTO switch OK.
- PTO cable assembly OK.
- WTEC II VIM OK.

### POSSIBLE PROBLEMS
- Faulty auxiliary panel cable assembly.
- Faulty WTEC II dashboard cable assembly.
- Faulty WTEC II relay SF02.

#### 9.

Is continuity present from connector P904-1 to connector P913-15?

- **NO**
  - If continuity is not present, wire 1904 is faulty.

- **YES**
  - Repair wire 1904 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

#### TEST OPTIONS
- Continuity Test or STE/ICE-R #91

#### REASON FOR QUESTION
- If continuity is not present, wire 1904 is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P904-1.
(3) Connect negative (-) probe of multimeter to connector P913-15 and note reading on multimeter.
(4) If continuity is not present, repair wire 1904 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
Is continuity present from connector J913-15 to connector PX33-E3?

- **YES**
  - Repair wire 1904 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).

- **NO**
  - Faulty WTEC II dashboard cable assembly.
  - Faulty auxiliary panel cable assembly.
  - Faulty WTEC II relay SF02.

Is continuity present from connector PX33-E2 to connector J913-14?

- **YES**
  - Repair wire 2019 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).

- **NO**
  - Faulty WTEC II dashboard cable assembly.
  - Faulty auxiliary panel cable assembly.
  - Faulty WTEC II relay SF02.
CONTINUITY TEST

(1) Loosen screw in connector PX33.
(2) Disconnect connector PX33 from WTEC II VIM.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to connector J913-15.
(5) Connect negative (-) probe of multimeter to connector PX33-E3 and note reading on multimeter.
(6) If continuity is not present, repair wire 1904 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector PX33-E2.
(3) Connect negative (-) probe of multimeter to connector J913-14 and note reading on multimeter.
(4) If continuity is not present, repair wire 2019 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
(5) Connect connector PX33 to WTEC II VIM.
(6) Tighten screw in connector PX33.
e91. POWER TAKE-OFF (PTO) DOES NOT OPERATE (CONT)

12. Is continuity present from connector P913-14 to connector J210-4?

- **YES**
  - Repair wire 2019 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

- **NO**
  - Replace WTEC II relay SF02 (para 8-6).

**KNOWN INFO**
- Circuit breaker OK.
- Vehicle starts.
- PTO OK.
- PTO switch OK.
- PTO cable assembly OK.
- WTEC II VIM OK.
- WTEC II dashboard cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty auxiliary panel cable assembly.
- Faulty WTEC II relay SF02.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91
- **REASON FOR QUESTION**
  - If continuity is not present, wire 2019 is faulty.
CONTINUITY TEST

2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter to connector P913-14.
4. Connect negative (-) probe of multimeter to connector J210-4 and note reading on multimeter.
5. If continuity is not present, repair wire 2019 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
6. If continuity is present, replace WTEC II relay SF02 (para 8-6).
7. Connect connector P913 to connector J913.
9. Install personnel heater (para 18-9).
e91. POWER TAKE-OFF (PTO) DOES NOT OPERATE (CONT)

**KNOWLEDGE INFO**
- Circuit breaker OK.
- Vehicle starts.
- PTO OK.
- PTO switch OK.
- PTO cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III dashboard cable assembly.
- Faulty auxiliary panel cable assembly.
- Faulty WTEC III relay K37.
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Voltage Test or STE/ICE-R #89

**REASON FOR QUESTION**
- If 24 vdc is not present, wire 1925 is faulty.

**WARNING**
Read WARNING on following page.

13. Is 24 vdc present at connector J913-5?

- **NO**
  - Repair wire 1925 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).

- **YES**
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove personnel heater for access (para 18-9).</td>
</tr>
<tr>
<td>(2) Disconnect connector J913 from connector P913.</td>
</tr>
<tr>
<td>(3) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter to connector J913-5.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(6) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If 24 vdc is not present, repair wire 1925 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
<tr>
<td>(8) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
14. Is continuity present from connector P904-1 to connector P913-15?

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91
- **REASON FOR QUESTION**
  - If continuity is not present, wire 1904 is faulty.

**KNOWN INFO**
- Circuit breaker OK.
- Vehicle starts.
- PTO OK.
- PTO switch OK.
- PTO cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty auxiliary panel cable assembly.
- Faulty WTEC III dashboard cable assembly.
- Faulty WTEC III relay K37.
- Faulty WTEC III transmission ECU.

**YES**
- Repair wire 1904 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

**NO**
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P904-1.
(3) Connect negative (-) probe of multimeter to connector P913-15 and note reading on multimeter.
(4) If continuity is not present, repair wire 1904 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
**KNOWN INFO**
- Circuit breaker OK.
- Vehicle starts.
- PTO OK.
- PTO switch OK.
- PTO cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III dashboard cable assembly.
- Faulty auxiliary panel cable assembly.
- Faulty WTEC III relay K37.
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
If continuity is not present, wire 1904 is faulty.

15. **Is continuity present from connector J913-15 to WTEC III relay K37 terminal 30?**

   **NO**
   - Repair wire 1904 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).

   **YES**
CONTINUITY TEST

(1) Remove WTEC III relay K37 from PDP.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to connector J913-15.
(4) Connect negative (-) probe of multimeter to PDP, terminal 30, where WTEC III relay K37 was removed, and note reading on multimeter.
(5) If continuity is not present, repair wire 1904 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
(6) Install WTEC III relay K37 in PDP.
16. Is 24 VDC present at WTEC III relay K37 terminal 87?

Known Info:
- Circuit breaker OK.
- Vehicle starts.
- PTO OK.
- PTO switch OK.
- PTO cable assembly OK.

Possible Problems:
- Faulty WTEC III dashboard cable assembly.
- Faulty auxiliary panel cable assembly.
- Faulty WTEC III relay K37.
- Faulty WTEC III transmission ECU.

Test Options:
- Voltage Test or STE/ICE-R #89

Reason for Question:
This step helps eliminate possible problems and determines where troubleshooting continues.

Warning:
Read WARNING on following page.

If NO is selected, go to step 18 of this fault.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Install personnel heater hoses (para 18-9).</td>
</tr>
<tr>
<td>(2) Remove PTO switch from auxiliary panel.</td>
</tr>
<tr>
<td>(3) Install PTO switch on connector P904.</td>
</tr>
<tr>
<td>(4) Remove WTEC III relay K37 from PDP.</td>
</tr>
<tr>
<td>(5) Insert relay test wire in PDP terminal 87, where WTEC III relay K37 was removed.</td>
</tr>
<tr>
<td>(6) Install WTEC III relay K37 in PDP.</td>
</tr>
<tr>
<td>(7) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(8) Connect positive (+) probe of multimeter to relay test wire.</td>
</tr>
<tr>
<td>(9) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(10) Start engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(11) Position PTO switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(12) If 24 vdc is not present, go to step 18 of this faulty.</td>
</tr>
<tr>
<td>(13) Position PTO switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(14) Shut down engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(15) Remove WTEC III relay relay K37 from PDP.</td>
</tr>
<tr>
<td>(16) Remove relay test wire from PDP.</td>
</tr>
<tr>
<td>(17) Install WTEC III relay K37 in PDP.</td>
</tr>
</tbody>
</table>
e91. POWER TAKE-OFF (PTO) DOES NOT OPERATE (CONT)

**KNOWN INFO**
- Circuit breaker OK.
- Vehicle starts.
- PTO OK.
- PTO switch OK.
- PTO cable assembly OK.
- WTEC III relay K37 OK.
- WTEC III transmission ECU OK.

**POSSIBLE PROBLEMS**
- Faulty auxiliary panel cable assembly.
- Faulty WTEC III dashboard cable assembly.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, wire 2019 is faulty.

17. Is continuity present from connector P913-14 to connector J210-4?

**YES**
- Repair wire 2019 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

**NO**
- Repair wire 2019 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
<table>
<thead>
<tr>
<th></th>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Disconnect connector P210 from connector J210.</td>
</tr>
<tr>
<td>2</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>3</td>
<td>Connect positive (+) probe of multimeter to connector P913-14.</td>
</tr>
<tr>
<td>4</td>
<td>Connect negative (-) probe of multimeter to connector J210-4 and note reading on multimeter.</td>
</tr>
<tr>
<td>5</td>
<td>If continuity is not present, repair wire 2019 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).</td>
</tr>
<tr>
<td>6</td>
<td>If continuity is present, repair wire 2019 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
<tr>
<td>7</td>
<td>Connect connector P913 to connector J913.</td>
</tr>
<tr>
<td>8</td>
<td>Remove PTO switch from connector P904.</td>
</tr>
<tr>
<td>9</td>
<td>Install personnel heater (para 18-9).</td>
</tr>
</tbody>
</table>

![Diagram showing the continuity test connections](image-url)
e91. POWER TAKE-OFF (PTO) DOES NOT OPERATE (CONT)

18. Is continuity present from WTEC III relay K37 terminal 85 to ground?

YES
Repair wire 3101 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).

NO

TEST OPTIONS
Continuity Test or STE/ICE-R #91

REASON FOR QUESTION
If continuity is not present, wire 3101 faulty.

KNOWN INFO
Circuit breaker OK.
Vehicle starts.
PTO OK.
PTO switch OK.
PTO cable assembly OK.

POSSIBLE PROBLEMS
Faulty WTEC III dashboard cable assembly.
Faulty WTEC III relay K37.
Faulty WTEC III transmission ECU.
CONTINUITY TEST

(1) Remove WTEC III relay K37 from PDP.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to PDP, where WTEC III relay K37 terminal 85 was removed.
(4) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(5) If continuity is not present, repair wire 3101 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
e91. **POWER TAKE-OFF (PTO) DOES NOT OPERATE (CONT)**

**KNOWN INFO**
- Circuit breaker OK.
- Vehicle starts.
- PTO OK.
- PTO cable assembly OK.
- Auxiliary panel cable assembly OK.
- PTO switch OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III dashboard cable assembly.
- Faulty WTEC III relay K37.
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Voltage Test or STE/ICE-R #89

**REASON FOR QUESTION**
- If 24 vdc is not present, wire 118 is faulty.

19. **WARNING**

Read WARNING on following page.

Is 24 vdc present on connector P115-13?

- **NO**
  - Repair wire 118 (para 2-45) replace WTEC III dashboard cable assembly (para 7-11).

- **YES**
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

VOLTAGE TEST

(1) Disconnect connector clamp from connector P115.
(2) Disconnect connector P115 from WTEC III transmission ECU.
(3) Set multimeter to volts dc.
(4) Connect positive (+) probe of multimeter to connector P115-13.
(5) Connect negative (-) probe of multimeter to ground.
(6) Position master power switch to on (TM 9-2320-366-10-1).
(7) Position PTO switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
(8) If 24 vdc is not present, repair wire 118 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
(9) Position PTO switch to off (TM 9-2320-366-10-1).
(10) Position master power switch to off (TM 9-2320-366-10-1).
20. Is continuity present from connector P115-22 to WTEC III relay K37 terminal 86?

- **YES**
  - Repair wire 112 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).

- **NO**
  - If continuity is not present, wire 112 is faulty.

**KNOWN INFO**
- Circuit breaker OK.
- Vehicle starts.
- PTO OK.
- PTO cable assembly OK.
- Auxiliary panel cable assembly OK.
- PTO switch OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III dashboard cable assembly.
- Faulty WTEC III relay K37.
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- Faulty WTEC III dashboard cable assembly.
- Faulty WTEC III relay K37.
- Faulty WTEC III transmission ECU.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P115-22.
(3) Connect negative (-) probe of multimeter to PDP, where WTEC III relay K37 terminal 86 was removed, and note reading on multimeter.
(4) If continuity is not present, repair wire 112 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
(5) Connect connector P115 to WTEC III transmission ECU.
(6) Connect connector clamp on connector P115.
21. Is 24 vdc present on WTEC III relay K37 terminal 86?

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
Voltage Test or STE/ICE-R #89

**REASON FOR QUESTION**
If 24 vdc is not present, WTEC III transmission ECU is faulty. If 24 vdc is present, WTEC III relay K37 is faulty.

**KNOWN INFO**
- Circuit breaker OK.
- Vehicle starts.
- PTO OK.
- PTO cable assembly OK.
- Auxiliary panel cable assembly OK.
- PTO switch OK.
- WTEC III dashboard cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III relay K37.
- Faulty WTEC III transmission ECU.

If YES, replace WTEC III transmission ECU (para 8-7).
If NO, replace WTEC III relay K37 (para 7-9).

---

Replace WTEC III relay K37 (para 7-9).

---

WARNING
Read WARNING on following page.
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to PDP, where WTEC III relay K37 terminal 86 was removed.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(4) If 24 vdc is not present, replace WTEC III transmission ECU (para 8-7).</td>
</tr>
<tr>
<td>(5) If 24 vdc is present, replace WTEC III relay K37 (para 7-9).</td>
</tr>
<tr>
<td>(6) Install WTEC III relay K37 on PDP.</td>
</tr>
<tr>
<td>(7) Remove PTO switch from connector P904.</td>
</tr>
<tr>
<td>(8) Install personnel heater (para 18-9).</td>
</tr>
</tbody>
</table>
TM 9-2320-366-20-2

**E92. ELECTRICAL SYSTEM DOES NOT MAINTAIN A CHARGE**

### INITIAL SETUP

**Equipment Conditions**
- Engine shut down (TM 9-2320-366-10-1).

**Materials/Parts**
- Wire, Elect, 50 ft (Item 71, Appendix D)
- Wire, Relay Test (Item 9, Appendix E)
- Nut, Self-Locking (Item 144.1, Appendix G) (100 AMP)
- Nut, Self-Locking (Item 143.1, Appendix G) (200 AMP)

**References**
- TM 9-6140-200-14
- TM 9-4910-571-12&P

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Apron, Rubber (Item 3, Appendix C)
- Gloves, Rubber (Item 13, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)
- Tester, Antifreeze and Battery (Item 42, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)

**Personnel Required**
- (2)

---

**KNOWLEDGE INFO**

- Engine oil pressure indicator light illuminates.
- Oil PRESS gage operates.
- Engine starts.
- Alternator belts OK.

**POSSIBLE PROBLEMS**

- Faulty battery(ies).
- Faulty engine oil pressure switch.
- Faulty relay K11.
- Faulty dashboard cable assembly.
- Faulty engine control cable assembly.
- Faulty alternator ground strap.
- Faulty alternator.
- Faulty voltage regulator.
- Faulty 100 AMP alternator to reverse polarity relay 12 VDC cable.
- Faulty 200 AMP alternator to terminal block 12 VDC cable.
- Faulty 100 AMP alternator to reverse polarity relay 24 VDC cable.
- Faulty 200 AMP alternator to terminal block 24 VDC cable.

---

**TEST OPTIONS**

- Battery Specific Gravity Test

**REASON FOR QUESTION**

If battery(ies) is unserviceable, 12 VDC circuits will not operate.

---

START

1. WARNING
   Read WARNING on following page.

   Are batteries serviceable?

   NO

   YES

   Charge battery(ies) (TM 9-6140-200-14) or replace battery(ies) (para 7-55).
BATTERY SPECIFIC GRAVITY TEST

(1) Remove battery box cover from battery box (TM 9-2320-366-10-2).
(2) Remove four batteries from battery box (para 7-55).
(3) Test batteries for serviceability (TM 9-6140-200-14).
(4) Replace battery(ies) if unserviceable (TM 9-6140-200-14).
(5) Install four batteries in battery box (para 7-55).
(6) Install battery box cover on battery box (TM 9-2320-366-10-2).
2. Does engine oil pressure indicator light go out before the OIL PRESS gage reaches 20 PSI?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine oil pressure indicator light illuminates.</td>
</tr>
<tr>
<td>OIL PRESS gage operates.</td>
</tr>
<tr>
<td>Engine starts.</td>
</tr>
<tr>
<td>Alternator belts OK.</td>
</tr>
<tr>
<td>Battery(ies) OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty engine oil pressure switch.</td>
</tr>
<tr>
<td>Faulty relay K11.</td>
</tr>
<tr>
<td>Faulty dashboard cable assembly.</td>
</tr>
<tr>
<td>Faulty engine control cable assembly.</td>
</tr>
<tr>
<td>Faulty alternator ground strap.</td>
</tr>
<tr>
<td>Faulty alternator.</td>
</tr>
<tr>
<td>Faulty voltage regulator.</td>
</tr>
<tr>
<td>Faulty 100 AMP alternator to reverse polarity relay 12 VDC cable.</td>
</tr>
<tr>
<td>Faulty 200 AMP alternator to terminal block 12 VDC cable.</td>
</tr>
<tr>
<td>Faulty 100 AMP alternator to reverse polarity relay 24 VDC cable.</td>
</tr>
<tr>
<td>Faulty 200 AMP alternator to terminal block 24 VDC cable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If oil pressure indicator light remains illuminated, oil pressure switch is faulty.</td>
</tr>
</tbody>
</table>

YES: Replace engine oil pressure switch (para 7-48).

NO: Faulty engine oil pressure switch.
Faulty relay K11.
Faulty dashboard cable assembly.
Faulty engine control cable assembly.
Faulty alternator ground strap.
Faulty alternator.
Faulty voltage regulator.
Faulty 100 AMP alternator to reverse polarity relay 12 VDC cable.
Faulty 200 AMP alternator to terminal block 12 VDC cable.
Faulty 100 AMP alternator to reverse polarity relay 24 VDC cable.
Faulty 200 AMP alternator to terminal block 24 VDC cable.
(1) Start engine (TM 9-2320-366-10-1).
(2) If engine oil pressure indicator light remains on after OIL PRESS gage reaches 20 PSI, replace engine oil pressure switch (para 7-48).
(3) Shut down engine (TM 9-2320-366-10-1).
Is continuity present from relay K11 terminal 30 to terminal 87A?

Possible Problems:
- Faulty relay K11.
- Faulty dashboard cable assembly.
- Faulty engine control cable assembly.
- Faulty alternator ground strap.
- Faulty alternator.
- Faulty voltage regulator.
- Faulty 100 AMP alternator to reverse polarity relay 12 VDC cable.
- Faulty 200 AMP alternator to terminal block 12 VDC cable.
- Faulty 100 AMP alternator to reverse polarity relay 24 VDC cable.
- Faulty 200 AMP alternator to terminal block 24 VDC cable.

Test Options:
- Continuity Test or STE/ICE-R Test #91

Reason for Question:
If continuity is not present, relay K11 is faulty.

YES

Replace relay K11 (para 7-9).

NO
CONTINUITY TEST

(1) Disconnect batteries (para 7-57).
(2) Remove power distribution panel (PDP) cover (para 16-2).
(3) Remove relay K11 from power distribution panel (PDP).
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter to relay K11 terminal 30.
(6) Connect negative (-) probe of multimeter to relay K11 terminal 87A and note reading on multimeter.
(7) If continuity is not present, replace relay K11 (para 7-9).
4. TEST OPTIONS

REASON FOR QUESTION

NO

YES

Go to step 9 of this fault.

Is continuity present from relay K11 socket 87A on PDP to terminal lug TL35?

TEST OPTIONS

Continuity Test or STE/ICE-R Test #91

POSSIBLE PROBLEMS

Faulty dashboard cable assembly.
Faulty engine control cable assembly.
Faulty alternator ground strap.
Faulty alternator.
Faulty voltage regulator.
Faulty 100 AMP alternator to reverse polarity relay 12 VDC cable.
Faulty 200 AMP alternator to terminal block 12 VDC cable.
Faulty 100 AMP alternator to reverse polarity relay 24 VDC cable.
Faulty 200 AMP alternator to terminal block 24 VDC cable.

KNOWN INFO

Engine oil pressure indicator light illuminates.
OIL PRESS gage operates.
Engine starts.
Alternator belts OK.
Battery(ies) OK.
Engine oil pressure switch OK.
Relay K11 OK.
<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to relay K11 socket 87A on PDP.</td>
</tr>
<tr>
<td>(3) Raise cab (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(4) Lift dust boot on terminal lug TL35.</td>
</tr>
<tr>
<td>(6) Connect negative (-) probe of multimeter to terminal lug TL35 and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If continuity is not present, go to step 9 of this fault.</td>
</tr>
<tr>
<td>(8) Position terminal lug TL35 on voltage regulator with washer and self-locking nut.</td>
</tr>
<tr>
<td>(9) Tighten self-locking nut to 23-27 lb-in. (3 N.m).</td>
</tr>
<tr>
<td>(10) Position dust boot on terminal lug TL35.</td>
</tr>
</tbody>
</table>
Is continuity present from terminal lug TL58 to ground?

- **YES**: Replace alternator ground strap (para 7-71).
- **NO**: If continuity is not present, alternator ground strap is faulty.

### KNOWN INFO
- Engine oil pressure indicator light illuminates.
- OIL PRESS gage operates.
- Engine starts.
- Alternator belts OK.
- Battery(ies) OK.
- Engine oil pressure switch OK.
- Relay K11 OK.
- Dashboard cable assembly OK.
- Engine control cable assembly OK.

### POSSIBLE PROBLEMS
- Faulty alternator ground strap.
- Faulty alternator.
- Faulty voltage regulator.
- Faulty 100 AMP alternator to reverse polarity relay 12 VDC cable.
- Faulty 200 AMP alternator to terminal block 12 VDC cable.
- Faulty 100 AMP alternator to reverse polarity relay 24 VDC cable.
- Faulty 200 AMP alternator to terminal block 24 VDC cable.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to terminal lug TL58.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, replace alternator ground strap (para 7-71).
(5) Connect batteries (para 7-57).
**e92. ELECTRICAL SYSTEM DOES NOT MAINTAIN A CHARGE (CONT)**

### KNOWN INFO
- Engine oil pressure indicator light illuminates.
- OIL PRESS gage operates.
- Engine starts.
- Alternator belts OK.
- Battery(ies) OK.
- Engine oil pressure switch OK.
- Relay K11 OK.
- Dashboard cable assembly OK.
- Engine control cable assembly OK.
- Alternator ground strap OK.

### POSSIBLE PROBLEMS
- Faulty alternator.
- Faulty voltage regulator.
- Faulty 100 AMP alternator to reverse polarity relay 12 VDC cable.
- Faulty 200 AMP alternator to terminal block 12 VDC cable.
- Faulty 100 AMP alternator to reverse polarity relay 24 VDC cable.
- Faulty 200 AMP alternator to terminal block 24 VDC cable.

---

**TEST OPTIONS**
- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
- If 12 VDC is not present, 100 AMP alternator to reverse polarity relay 12 VDC cable or 200 AMP alternator to terminal block 12 VDC cable is faulty.

---

<table>
<thead>
<tr>
<th>6.</th>
<th>WARNING</th>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is 12 VDC present at terminal lug TL60?</td>
<td>Read WARNING on following page.</td>
<td>Voltage Test or STE/ICE-R Test #89</td>
</tr>
</tbody>
</table>

---

**YES**
- Replace 100 AMP alternator to reverse polarity relay 12 VDC cable (para 7-72) or replace 200 AMP alternator to terminal block 12 VDC cable (para 20-48).

---

**NO**
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

---

**VOLTAGE TEST**

1. Raise cab (TM 9-2320-366-10-1).
2. Lift dust boot from terminal lug TL60.
3. Set multimeter to volts DC.
4. Connect positive (+) probe of multimeter to terminal lug TL60.
5. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
6. If 12 VDC is not present, replace 100 AMP alternator to reverse polarity relay 12 VDC cable (para 7-72) or replace 200 AMP alternator to terminal block 12 VDC cable (para 20-48).
7. Position dust boot on terminal lug TL60.
**e92. ELECTRICAL SYSTEM DOES NOT MAINTAIN A CHARGE (CONT)**

**Known Info**
- Engine oil pressure indicator light illuminates.
- OIL PRESS gage operates.
- Engine starts.
- Alternator belts OK.
- Battery(ies) OK.
- Engine oil pressure switch OK.
- Relay K11 OK.
- Dashboard cable assembly OK.
- Engine control cable assembly OK.
- Alternator ground strap OK.
- 100 AMP alternator to reverse polarity relay 12 VDC cable OK.
- 200 AMP alternator to terminal block 12 VDC cable OK.

**Possible Problems**
- Faulty alternator.
- Faulty voltage regulator.
- Faulty 100 AMP alternator to reverse polarity relay 24 VDC cable.
- Faulty 200 AMP alternator to terminal block 24 VDC cable.

**Test Options**
- Voltage Test or STE/ICE-R Test #89

**Reason for Question**
- If 24 VDC is not present, 100 AMP alternator to reverse polarity relay 24 VDC cable or 200 AMP alternator to terminal block 24 VDC cable is faulty.

**Diagram**
- **Question 7**: Is 24 VDC present at terminal lug TL2?
- **Yes**: Replace 100 AMP alternator to reverse polarity relay 24 VDC cable (para 7-73) or replace 200 AMP alternator to terminal block 24 VDC cable (para 20-50).
- **No**: Read WARNING on following page.
**WARNING**
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Lift dust boot from terminal lug TL2.</td>
</tr>
<tr>
<td>(2) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to terminal lug TL2.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(5) If 24 VDC is not present, replace 100 AMP alternator to reverse polarity relay 24 VDC cable (para 7-73) or replace 200 AMP alternator to terminal block 12 VDC cable (para 20-50).</td>
</tr>
<tr>
<td>(6) Position dust boot on terminal lug TL2.</td>
</tr>
<tr>
<td>(7) Disconnect batteries (para 7-57).</td>
</tr>
<tr>
<td>(8) Lower cab (TM9-2320-366-10-1).</td>
</tr>
<tr>
<td>(9) Install relay K11 in PDP.</td>
</tr>
<tr>
<td>(10) Install PDP cover (para 16-2).</td>
</tr>
<tr>
<td>(11) Connect batteries (para 7-57).</td>
</tr>
</tbody>
</table>
Engine oil pressure indicator light illuminates.
OIL PRESS gage operates.
Engine starts.
Alternator belts OK.
Battery(ies) OK.
Engine oil pressure switch OK.
Relay K11 OK.
Dashboard cable assembly OK.
Engine control cable assembly OK.
Alternator ground strap OK.
100 AMP alternator to reverse polarity relay 12 VDC cable OK.
200 AMP alternator to terminal block 12 VDC cable OK.
100 AMP alternator to reverse polarity relay 24 VDC cable OK.
200 AMP alternator to terminal block 24 VDC cable OK.

POSSIBLE PROBLEMS
Faulty alternator.
Faulty voltage regulator.

B. Is the alternator output within normal voltage range for both 12 VDC and 24 VDC terminal studs with a known good voltage regulator?

NO

Replace 100 AMP alternator (para 7-2) or 200 AMP alternator (para 20-45).

YES

Replace 100 AMP voltage regulator (para 7-5) or 200 AMP voltage regulator (para 20-46).

WARNING
Read WARNING on following page.

TEST OPTIONS
Voltage Test or STE/ICE-R Test #89

REASON FOR QUESTION
With a known good voltage regulator installed; if the voltage regulator output is not within normal range, the alternator is faulty. If the voltage regulator output is within normal range, the previous voltage regulator is faulty.
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

### VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Replace 100 AMP voltage regulator (para 7-5) or 200 AMP voltage regulator (para 20-46) with a known good voltage regulator.</td>
</tr>
<tr>
<td>4.</td>
<td>Lift dust boot from alternator 12 VDC terminal stud.</td>
</tr>
<tr>
<td>5.</td>
<td>Set multimeter to volts DC.</td>
</tr>
<tr>
<td>6.</td>
<td>Connect positive (+) probe of multimeter to alternator 12 VDC terminal stud.</td>
</tr>
<tr>
<td>7.</td>
<td>Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>8.</td>
<td>If 13.25 - 14.75V is not present, replace 100 AMP alternator (para 7-2) or 200 AMP alternator (para 20-45).</td>
</tr>
<tr>
<td>9.</td>
<td>If 13.25 - 14.75V is present, replace 100 AMP voltage regulator (para 7-5) or 200 AMP voltage regulator (para 20-46).</td>
</tr>
<tr>
<td>10.</td>
<td>Position dust boot on alternator 12 VDC terminal stud.</td>
</tr>
<tr>
<td>11.</td>
<td>Lift dust boot from alternator 24 VDC terminal stud.</td>
</tr>
<tr>
<td>12.</td>
<td>Connect positive (+) probe of multimeter to alternator 24 VDC terminal stud.</td>
</tr>
<tr>
<td>13.</td>
<td>Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>14.</td>
<td>If 27.25 - 28.75V is not present, replace 100 AMP alternator (para 7-2) or 200 AMP alternator (para 20-45).</td>
</tr>
<tr>
<td>15.</td>
<td>If 27.25 - 28.75V is present, replace 100 AMP voltage regulator (para 7-5) or 200 AMP voltage regulator (para 20-46).</td>
</tr>
<tr>
<td>16.</td>
<td>Position dust boot on alternator 24 VDC terminal stud.</td>
</tr>
<tr>
<td>17.</td>
<td>Lower cab (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
Is continuity present from relay K11 terminal 87A on PDP to connector J31 pin 1?

If continuity is not present, wire 568A from connector J31 pin 1 to relay K11 terminal 87A on PDP is faulty. If continuity is present, wire 568A from connector P31 socket 1 to terminal lug TL35 is faulty.

If continuity is not present, repair wire 568A from connector J31 pin 1 to relay K11 terminal 87A on PDP (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

If continuity is present, repair wire 568A from connector P31 socket 1 to terminal lug TL35 (para 2-45) or replace engine control cable assembly (para 7-80).

Known Info
- Engine oil pressure indicator light illuminates.
- OIL PRESS gage operates.
- Engine starts.
- Alternator belts OK.
- Battery(ies) OK.
- Engine oil pressure switch OK.
- Relay K11 OK.

Possible Problems
- Faulty dashboard cable assembly.
- Faulty engine control cable assembly.

Caution
Read CAUTION on following page.

Reason for Question
If continuity is not present, wire 568A from connector J31 pin 1 to relay K11 terminal 87A on PDP is faulty. If continuity is present, wire 568A from connector P31 socket 1 to terminal lug TL35 is faulty.

Test Options
Continuity Test or STE/ICE-R Test #91
CONTINUITY TEST

(1) Lower cab (TM 9-2320-366-10-1).
(2) Remove instrument panel for access (para 7-15).
(3) Disconnect connector J31 from connector P31.
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter to relay K11 terminal 87A on PDP.
(6) Connect negative (−) probe of multimeter to connector J31 pin 1 and note reading on multimeter.
(7) If continuity is not present, repair wire 568A from connector J31 pin 1 to relay K11 terminal 87A (para 2-45) on PDP or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
(8) If continuity is present, repair wire 568A from connector P31 socket 1 to terminal lug TL35 (para 2-45) or replace engine control cable assembly (para 7-80).
(9) Connect connector J31 to connector P31.
(10) Install instrument panel (para 7-15).
(11) Install relay K11 in PDP.
(12) Install PDP cover (para 16-2).
(13) Connect batteries (para 7-57).
**e93. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) ILLUMINATION DOES NOT DIM**

**INITIAL SETUP**

**Equipment Condition**
- Engine shut down (TM 9-2320-366-10-1).

**Personnel Required**
- (2)

**References**
- TM 9-4910-571-12&P

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)

**Materials/Parts**
- Wire, Elect, 50 ft (Item 71, Appendix D)

---

**KNOWN INFO**
- Marker lights illuminate.
- Blackout lights illuminate.
- WTEC II TEPSS illuminates.

**POSSIBLE PROBLEMS**
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II VIM.
- Faulty WTEC II dashboard cable assembly.
- Faulty WTEC II TEPSS dimmer module.

---

**REASON FOR QUESTION**
- If continuity is not present, wire 158 is faulty.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

---

1. **Is continuity present between connector J115-24 and connector J116C3?**

---

**YES**
- Repair wire 158 (para 2-45) or replace WTEC II cab transmission harness (para 7-137).

**NO**
## CONTINUITY TEST

1. Remove kick panel (para 16-3).
2. Disconnect connector J116 from WTEC II VIM.
3. Remove instrument panel assembly for access (para 7-15).
4. Disconnect connector J115 (top connector) from WTEC II TEPSS.
5. Set multimeter to ohms.
7. Connect negative (-) probe of multimeter to connector J116C3.
8. If continuity is not present, repair wire 158 (para 2-45) or replace WTEC II cab transmission harness (para 7-137).
9. Connect connector J115 to WTEC II TEPSS.
10. Install instrument panel assembly (para 7-15).
2. Is continuity present between WTEC II VIM connector J116C3 and WTEC II VIM connector terminal J3?

- **NO**
  - Marker lights illuminate.
  - Blackout lights illuminate.
  - WTEC II TEPSS illuminates.
  - WTEC II cab transmission harness OK.
  - **POSSIBLE PROBLEMS**
    - Faulty WTEC II VIM.
    - Faulty WTEC II dashboard cable assembly.
    - Faulty WTEC II TEPSS dimmer module.

- **YES**
  - Replace WTEC II VIM (para 8-6).

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, WTEC II VIM is faulty.
CONTINUITY TEST

(1) Loosen screw and disconnect connector PX33 from WTEC II VIM.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to WTEC II VIM connector J116C3.
(4) Connect negative (-) probe of multimeter to WTEC II VIM connector terminal J3 and note reading on multimeter.
(5) If continuity is not present, replace WTEC II VIM (para 8-6).
(6) Connect connector J116 to WTEC II VIM.
(7) Connect connector PX33 to WTEC II VIM and tighten screw.
3. If continuity is not present, wire 158 is faulty.

**KNOWN INFO**
- Marker lights illuminate.
- Blackout lights illuminate.
- WTEC II TEPSS illuminates.
- WTEC II VIM OK.
- WTEC II cab transmission harness OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II dashboard cable assembly.
- Faulty WTEC II TEPSS dimmer module.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- Is continuity present between connector J7-4 and ground?

**YES**
- Repair wire 158 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).

**NO**
CONTINUITY TEST

(1) Remove three screws and washers from PDP.
(2) Remove three screws from PDP.
(3) Lift PDP outward to gain access.
(4) Disconnect connector J7 from WTEC II TEPSS dimmer module.
(5) Set multimeter to ohms.
(6) Connect positive (+) probe of multimeter to connector J7-4.
(7) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(8) If continuity is not present, repair wire 158 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
4. **Is continuity present between connector J7-1 and a known good ground?**

   - **NO**
     - **NO**
     - Repair wire 1426 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
   - **YES**
     - **YES**
     - Repair wire 1426 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).

5. **Is continuity present between connector J7-2 and a known good ground?**

   - **NO**
     - **NO**
     - Repair wire 1408 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
   - **YES**
     - **YES**
     - Repair wire 1408 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector J7-1.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, repair wire 1426 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).

---

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector J7-2.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, repair wire 1408 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
6. Is continuity present between connector J7-3 and a known good ground?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marker lights illuminate.</td>
</tr>
<tr>
<td>Blackout lights illuminate.</td>
</tr>
<tr>
<td>WTEC II TEPSS illuminates.</td>
</tr>
<tr>
<td>WTEC II cab transmission harness OK.</td>
</tr>
<tr>
<td>WTEC II VIM OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty WTEC II dashboard cable assembly.</td>
</tr>
<tr>
<td>Faulty WTEC II TEPSS dimmer module.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE-R #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, wire 3099 is faulty. If continuity is present, WTEC II TEPSS dimmer module is faulty.</td>
</tr>
</tbody>
</table>

- **NO**
  - Repair wire 3099 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
- **YES**
  - Replace WTEC II TEPSS dimmer module (para 7-13).
## CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector J7-3.
3. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
4. If continuity is not present, repair wire 3099 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
5. If continuity is present, replace WTEC II TEPPS dimmer module (para 7-13).
6. Connect connector J7 to WTEC II TEPPS dimmer module.
7. Install PDP on dashboard with three screws.
8. Install three washers and screws in PDP.
9. Install kick panel (para 16-3).
e94. DIFFERENTIAL LOCK SOLENOID DOES NOT OPERATE

INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Condition</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1)</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td>Personnel Required</td>
<td>STE/ICE-R (Item 41, Appendix C)</td>
</tr>
<tr>
<td>(2)</td>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
</tr>
<tr>
<td>References</td>
<td>TM 9-4910-571-12&amp;P</td>
</tr>
</tbody>
</table>

Vehicle runs.
Backup light OK.

POSSIBLE PROBLEMS
Faulty differential lock solenoid.
Faulty dashboard cable assembly.
Faulty relay SF04 in WTEC II VIM.
Faulty WTEC II cab transmission harness.
Faulty WTEC II TEPSS.
Faulty WTEC III relay K34.
Faulty WTEC III transmission ECU.
Faulty WTEC III TPSS.

START

1. Is continuity present from differential lock solenoid connector pin 1 to socket 2?

  NO

  If continuity is not present, differential lock solenoid is faulty.

  YES

Replace differential lock solenoid (para 7-24).
CONTINUITY TEST

(1) Remove kick panel (para 16-3).
(2) Disconnect connector PX50 from differential lock solenoid connector.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to differential lock solenoid connector pin 1.
(5) Connect negative (-) probe of multimeter to differential lock solenoid connector socket 2 and note reading on multimeter.
(6) If continuity is not present, replace differential lock solenoid (para 7-24).
**DIFFERENTIAL LOCK SOLENOID DOES NOT OPERATE (CONT)**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle runs.</td>
</tr>
<tr>
<td>Backup light OK.</td>
</tr>
<tr>
<td>Differential lock solenoid OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty dashboard cable assembly.</td>
</tr>
<tr>
<td>Faulty relay SF04 in WTEC II VIM.</td>
</tr>
<tr>
<td>Faulty WTEC II cab transmission harness.</td>
</tr>
<tr>
<td>Faulty WTEC II TEPSS.</td>
</tr>
<tr>
<td>Faulty WTEC III relay K34.</td>
</tr>
<tr>
<td>Faulty WTEC III transmission ECU.</td>
</tr>
<tr>
<td>Faulty WTEC III TPSS.</td>
</tr>
</tbody>
</table>

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, wire 3008 is faulty.

2. **Is continuity present from connector PX50-1 to a known good ground?**

**YES**

**REPAIR**
- Repair wire 3008 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

**NO**
<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to connector PX50-1.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(4) If continuity is not present, repair wire 3008 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
</tbody>
</table>

![Diagram of PX50 connector]
e94. DIFFERENTIAL LOCK SOLENOID DOES NOT OPERATE (CONT)

3.
Is vehicle equipped with WTEC II transmission controls?

YES

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
This question helps eliminate possible problems and determines where troubleshooting continues.

NO

Go to step 9 of this fault.

KNOWN INFO
Vehicle runs.
Backup light OK.
Differential lock solenoid OK.

POSSIBLE PROBLEMS
Faulty dashboard cable assembly.
Faulty relay SF04 in WTEC II VIM.
Faulty WTEC II cab transmission harness.
Faulty WTEC II TEPSS.
Faulty WTEC III relay K34.
Faulty WTEC III transmission ECU.
Faulty WTEC III TPSS.
(1) Check if vehicle is equipped with WTEC II TEPSS.
(2) If transmission pushbutton shift selector is not mounted with four screws and does not have a filter cover, go to step 9 of this fault.
4. **WARNING**
   Read **WARNING** on following page.

   **TEST OPTIONS**
   - Voltage Test or STE/ICE-R #89

   **REASON FOR QUESTION**
   - If 24 vdc is not present, wire 1692 is faulty.

   **KNOWN INFO**
   - Vehicle runs.
   - Backup light OK.
   - Differential lock solenoid OK.
   - Vehicle is equipped with WTEC II transmission controls.

   **POSSIBLE PROBLEMS**
   - Faulty WTEC II dashboard cable assembly.
   - Faulty relay SF04 in WTEC II VIM.
   - Faulty WTEC II cab transmission harness.
   - Faulty WTEC II TEPSS.

   **Tree Diagram**
   - **Is 24 vdc present at connector PX33-E1?**
     - **YES**
       - Repair wire 1692 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
     - **NO**
       - If 24 vdc is not present, wire 1692 is faulty.
**WARNING**
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Loosen screw in connector PX33.</td>
</tr>
<tr>
<td>(2) Disconnect connector PX33 from WTEC II VIM.</td>
</tr>
<tr>
<td>(3) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter to connector PX33-E1.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(6) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If 24 vdc is not present, repair wire 1692 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).</td>
</tr>
<tr>
<td>(8) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
e94. DIFFERENTIAL LOCK SOLENOID DOES NOT OPERATE (CONT)

**KNOWN INFO**
- Vehicle runs.
- Backup light OK.
- Differential lock solenoid OK.
- Vehicle is equipped with WTEC II transmission controls.

**POSSIBLE PROBLEMS**
- Faulty WTEC II dashboard cable assembly.
- Faulty relay SF04 in WTEC II VIM.
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, wire 1697 is faulty.

5. Is continuity present from connector PX33-D1 to connector PX50-2?

**YES**
- Repair wire 1697 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).

**NO**
### CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector PX33-D1.
(3) Connect negative (-) probe of multimeter to connector PX50-2 and note reading on multimeter.
(4) If continuity is not present, repair wire 1697 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
(5) Connect connector PX33 to WTEC II VIM.
(6) Tighten screw in connector PX33.
(7) Connect connector PX50 to differential lock solenoid connector.
6. Is continuity present from WTEC II VIM relay SF04-30 to SF04-87a?

   NO

   YES

   Replace relay SF04 in WTEC II VIM (para 8-6).

   TEST OPTIONS
   - Continuity Test or STE/ICE-R #91
   - REASON FOR QUESTION
     If continuity is not present, relay SF04 in WTEC II VIM is faulty.

   KNOWN INFO
   - Vehicle runs.
   - Backup light OK.
   - Differential lock solenoid OK.
   - Vehicle is equipped with WTEC II transmission controls.
   - WTEC II dashboard cable assembly OK.
   
   POSSIBLE PROBLEMS
   - Faulty relay SF04 in WTEC II VIM.
   - Faulty WTEC II cab transmission harness.
   - Faulty WTEC II TEPSS.

7. Is continuity present from WTEC II VIM relay SF04-86 to SF04-85?

   NO

   YES

   Replace relay SF04 in WTEC II VIM (para 8-6).

   TEST OPTIONS
   - Continuity Test or STE/ICE-R #91
   - REASON FOR QUESTION
     If continuity is not present, relay SF04 in WTEC II VIM is faulty.

   KNOWN INFO
   - Vehicle runs.
   - Backup light OK.
   - Differential lock solenoid OK.
   - Vehicle is equipped with WTEC II transmission controls.
   - WTEC II dashboard cable assembly OK.
   
   POSSIBLE PROBLEMS
   - Faulty relay SF04 in WTEC II VIM.
   - Faulty WTEC II cab transmission harness.
   - Faulty WTEC II TEPSS.
### CONTINUITY TEST

1. Remove seven screws and washers from cover.
2. Remove screw, washer, cover, and nut from WTEC II VIM.
3. Remove relay SF04 from WTEC II VIM.
4. Set multimeter to ohms.
5. Connect positive (+) probe of multimeter to relay SF04 terminal 30.
6. Connect negative (-) probe of multimeter to relay SF04 terminal 87a and note reading on multimeter.
7. If continuity is not present, replace relay SF04 in WTEC II VIM (para 8-6).

### CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to relay SF04 terminal 86.
3. Connect negative (-) probe of multimeter to relay SF04 terminal 85 and note reading on multimeter.
4. If continuity is not present, replace relay SF04 in WTEC II VIM (para 8-6).
5. Install relay SF04 in WTEC II VIM.
6. Install cover on WTEC II VIM with nut, washer, and screw.
7. Install seven washers and screws in cover.
94. DIFFERENTIAL LOCK SOLENOID DOES NOT OPERATE (CONT)

**KNOWN INFO**
- Vehicle runs.
- Backup light OK.
- Differential lock solenoid OK.
- Vehicle is equipped with WTEC II transmission controls.
- WTEC II dashboard cable assembly OK.
- Relay SF04 in WTEC II VIM OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

8. Is continuity present from connector J116-C2 to connector J114-25?

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, WTEC II cab transmission harness is faulty. If continuity is present, WTEC II TEPSS is faulty.

- Replace WTEC II cab transmission harness (para 7-137).

- Replace WTEC II TEPSS (para 8-2).
<table>
<thead>
<tr>
<th><strong>CONTINUITY TEST</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove instrument panel assembly for access (para 7-15).</td>
</tr>
<tr>
<td>(2) Disconnect connector J114 from WTEC II TEPSS.</td>
</tr>
<tr>
<td>(3) Loosen screw in connector J116.</td>
</tr>
<tr>
<td>(4) Disconnect connector J116 from WTEC II VIM.</td>
</tr>
<tr>
<td>(5) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(6) Connect positive (+) probe of multimeter to connector J116-C2.</td>
</tr>
<tr>
<td>(7) Connect negative (-) probe of multimeter to connector J114-25 and note reading on multimeter.</td>
</tr>
<tr>
<td>(8) If continuity is not present, replace WTEC II cab transmission harness (para 7-137).</td>
</tr>
<tr>
<td>(9) If continuity is present, replace WTEC II TEPSS (para 8-2).</td>
</tr>
<tr>
<td>(10) Connect connector J114 to WTEC II TEPSS.</td>
</tr>
<tr>
<td>(11) Install instrument panel assembly (para 7-15).</td>
</tr>
<tr>
<td>(12) Connect connector J116 to WTEC II VIM.</td>
</tr>
<tr>
<td>(13) Tighten screw in connector J116.</td>
</tr>
<tr>
<td>(14) Install kick panel (para 16-3).</td>
</tr>
</tbody>
</table>

**Diagram:**
- Connector J114
- Connector J116
- WTEC II Transmission ECU Pushbutton Shift Selector
- WTEC II VIM
- Connector J116
**94. DIFFERENTIAL LOCK SOLENOID DOES NOT OPERATE (CONT)**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle runs.</td>
</tr>
<tr>
<td>Backup light OK.</td>
</tr>
<tr>
<td>Differential lock solenoid OK.</td>
</tr>
<tr>
<td>Vehicle is equipped with WTEC III transmission controls.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty WTEC III dashboard cable assembly.</td>
</tr>
<tr>
<td>Faulty WTEC III relay K34.</td>
</tr>
<tr>
<td>Faulty WTEC III transmission ECU.</td>
</tr>
<tr>
<td>Faulty WTEC III TPSS.</td>
</tr>
</tbody>
</table>

---

**WARNING**

9. Read WARNING on following page.

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Test or STE/ICE-R #89</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If 24 vdc is not present, wire 1692 is faulty.</td>
</tr>
</tbody>
</table>

---

**Diagram:**

- **YES:** Repair wire 1692 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
- **NO:** Is 24 vdc present at power distribution panel relay K34 terminal 30?

---

**Possible Problems:**

- Faulty WTEC III dashboard cable assembly.
- Faulty WTEC III relay K34.
- Faulty WTEC III transmission ECU.
- Faulty WTEC III TPSS.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove WTEC III relay K34 from PDP.</td>
</tr>
<tr>
<td>(2) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to PDP, terminal 30, where WTEC III relay K34 was removed.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(5) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(6) If 24 vdc is not present, repair wire 1692 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
<tr>
<td>(7) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
e94. DIFFERENTIAL LOCK SOLENOID DOES NOT OPERATE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle runs.</td>
</tr>
<tr>
<td>Backup light OK.</td>
</tr>
<tr>
<td>Differential lock solenoid OK.</td>
</tr>
<tr>
<td>Vehicle is equipped with WTEC III transmission controls.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty WTEC III dashboard cable assembly.</td>
</tr>
<tr>
<td>Faulty WTEC III relay K34.</td>
</tr>
<tr>
<td>Faulty WTEC III transmission ECU.</td>
</tr>
<tr>
<td>Faulty WTEC III TPSS.</td>
</tr>
</tbody>
</table>

10. Is continuity present from PDP relay K34 terminal 87a to connector PX50-2?

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE-R #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, wire 1697 is faulty.</td>
</tr>
</tbody>
</table>

| YES |

| NO |

Repair wire 1697 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to PDP, terminal 87a, where WTEC III relay K34 was removed.
(3) Connect negative (-) probe of multimeter to connector PX50-2 and note reading on multimeter.
(4) If continuity is not present, repair wire 1697 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
(5) Connect connector PX50 to differential lock solenoid connector.
e94. DIFFERENTIAL LOCK SOLENOID DOES NOT OPERATE (CONT)

**KNOWN INFO**
Vehicle runs.
Backup light OK.
Differential lock solenoid OK.
Vehicle is equipped with WTEC III transmission controls.

**POSSIBLE PROBLEMS**
Faulty WTEC III relay K34.
Faulty WTEC III dashboard cable assembly.
Faulty WTEC III transmission ECU.
Faulty WTEC III TPSS.

**TEST OPTIONS**
Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
If continuity is not present, WTEC III relay K34 is faulty.

---

11. Is continuity present from WTEC III relay K34-30 to K34-87a?

- **YES**
  - Replace relay K34 (para 7-9).

- **NO**
  - Faulty WTEC III relay K34.
  - Faulty WTEC III dashboard cable assembly.
  - Faulty WTEC III transmission ECU.
  - Faulty WTEC III TPSS.

---

12. Is continuity present from WTEC II relay K34-86 to K34-85?

- **YES**
  - Replace relay K34 (para 7-9).

- **NO**
  - Faulty WTEC III relay K34.
  - Faulty WTEC III dashboard cable assembly.
  - Faulty WTEC III transmission ECU.
  - Faulty WTEC III TPSS.
## CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to WTEC III relay K34 terminal 30.
3. Connect negative (-) probe of multimeter to WTEC III relay K34 terminal 87a and note reading on multimeter.
4. If continuity is not present, replace WTEC III relay K34 (para 7-9).

---

## CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to WTEC III relay K34 terminal 86.
3. Connect negative (-) probe of multimeter to WTEC III relay K34 terminal 85 and note reading on multimeter.
4. If continuity is not present, replace WTEC III relay K34 (para 7-9).
e94. DIFFERENTIAL LOCK SOLENOID DOES NOT OPERATE (CONT)

**KNOWN INFO**
- Vehicle runs.
- Backup light OK.
- Differential lock solenoid OK.
- Vehicle is equipped with WTEC III transmission controls.
- WTEC III relay K34 OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III dashboard cable assembly.
- Faulty WTEC III transmission ECU.
- Faulty WTEC III TPSS.

13. Is continuity present from PDP relay K34 terminal 85 to connector P115-18?
- **YES**
  - Repair wire 125 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
- **NO**
  - TEST OPTIONS
    - Continuity Test or STE/ICE-R #91
  - REASON FOR QUESTION
    - If continuity is not present, wire 125 is faulty.
### CONTINUITY TEST

1. Disconnect connector clamp from connector P115.
2. Disconnect connector P115 from WTEC III transmission ECU.
3. Set multimeter to ohms.
4. Connect positive (+) probe of multimeter to connector P115-18.
5. Connect negative (-) probe of multimeter to PDP, terminal 85, where WTEC III relay K34 was removed, and note reading on multimeter.
6. If continuity is not present, repair wire 125 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
7. Connect connector P115 to WTEC III transmission ECU.
8. Connect connector clamp on connector P115.
9. Install WTEC III relay K34 on PDP.
e94. DIFFERENTIAL LOCK SOLENOID DOES NOT OPERATE (CONT)

**KNOWN INFO**
Vehicle runs.
Backup light OK.
Differential lock solenoid OK.
Vehicle is equipped with WTEC III transmission controls.
WTEC III relay K34 OK.

**POSSIBLE PROBLEMS**
Faulty WTEC III dashboard cable assembly.
Faulty WTEC III transmission ECU.
Faulty WTEC III TPSS.

**TEST OPTIONS**
Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
If continuity is not present, wire 143 is faulty.

14. Is continuity present from connector P116-32 to connector PX33-P?

- **YES**
  - Repair wire 143 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).

- **NO**
## CONTINUITY TEST

1. Remove instrument panel assembly for access (para 7-15).
2. Disconnect connector PX33 from WTEC III TPSS.
3. Disconnect connector clamp from connector P116.
4. Disconnect connector P116 from WTEC III transmission ECU.
5. Set multimeter to ohms.
6. Connect positive (+) probe of multimeter to connector P116-32.
7. Connect negative (-) probe of multimeter to connector PX33-P and note reading on multimeter.
8. If continuity is not present, repair wire 143 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
9. Connect connector PX33 to WTEC III TPSS.
10. Install instrument panel assembly (para 7-15).
11. Connect connector P116 to WTEC III transmission ECU.
e94. DIFFERENTIAL LOCK SOLENOID DOES NOT OPERATE (CONT)

**KNOWN INFO**
- Vehicle runs.
- Backup light OK.
- Differential lock solenoid OK.
- Vehicle is equipped with WTEC III transmission controls.
- WTEC III relay K34 OK.
- WTEC III dashboard cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III transmission ECU.
- Faulty WTEC III TPSS.

**TEST OPTIONS**

**15.**
Does differential lock solenoid operate with replacement WTEC III transmission ECU installed?

**REASON FOR QUESTION**
If differential lock solenoid operates with replacement WTEC III transmission ECU installed, WTEC III transmission ECU is faulty. If differential lock solenoid does not operate with replacement WTEC III transmission ECU installed, WTEC III TPSS is faulty.

**YES**
Replace WTEC III transmission ECU (para 8-7).

**NO**

Replace WTEC III TPSS (para 8-3).
(1) Remove original WTEC III transmission ECU (para 8-7).

(2) Install replacement WTEC III transmission ECU (para 8-7).

(3) Start engine (TM 9-2320-366-10-1).

(4) Select MODE on WTEC III transmission TPSS (TM 9-2320-366-10-1) and listen for operation of differential lock solenoid.

(5) If differential lock solenoid operates, replace WTEC III transmission ECU (para 8-7).

(6) If differential lock solenoid does not operate, replace WTEC III TPSS (para 8-3).

(7) Shut down engine (TM 9-2320-366-10-1).

(8) Install original WTEC III transmission ECU (para 8-7).
1. Is continuity present between water temperature switch connector terminal 1 and terminal 2?

   **YES**
   Replace water temperature switch (para 7-50).

   **NO**

   **REASON FOR QUESTION**
   If continuity is not present, water temperature switch is faulty.

**KNOWN INFO**
- Engine fan turns off using deep water fording switch.

**POSSIBLE PROBLEMS**
- Faulty water temperature switch.
- Faulty dashboard cable assembly.
- Faulty engine control cable assembly.

**INITIAL SETUP**
- Personnel Required: 2

**TOOLS AND SPECIAL TOOLS**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)

**REFERENCES**
- TM 9-4910-571-12&P
**CONTINUITY TEST**

**NOTE**
Engine must be cool during test.

1. Raise cab (TM 9-2320-366-10-1).
2. Disconnect connector clamp from water temperature switch connector.
3. Disconnect connector P36 from water temperature switch connector.
4. Set multimeter to ohms.
5. Connect positive (+) probe of multimeter to water temperature switch connector terminal 1.
6. Connect negative (-) probe of multimeter to water temperature switch connector terminal 2 and note reading on multimeter.
7. If continuity is not present, replace water temperature switch (para 7-50).
Known Info

- Know Info
- Faulty dashboard cable assembly.
- Faulty engine control cable assembly.

Possible Problems

- Faulty dashboard cable assembly.
- Faulty engine control cable assembly.

Test Options

- Voltage Test or STE/ICE-R #89

Reason for Question

This question eliminates possible problems and determines where troubleshooting continues.

YES

- Go to step 4 of this fault.

NO

Next Scenario

- Fault corrected.

Problem 2

- Is 24 vdc present at connector P36-2?

NO

- No

YES

- Yes

Next Scenario

- Go to step 4 of this fault.

Problem 3

- Is continuity present between connector P36-1?

NO

- No

YES

- Yes

Next Scenario

- Go to step 5 of this fault.

Fault Corrected.

- Fault corrected.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

### VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set multimeter to volts dc.</td>
</tr>
<tr>
<td>2</td>
<td>Connect positive (+) probe of multimeter to connector P36-2.</td>
</tr>
<tr>
<td>3</td>
<td>Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>4</td>
<td>Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>5</td>
<td>If 24 vdc is not present, go to step 4 of this fault.</td>
</tr>
<tr>
<td>6</td>
<td>Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>

### CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>2</td>
<td>Connect positive (+) probe of multimeter to connector P36-1.</td>
</tr>
<tr>
<td>3</td>
<td>Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>4</td>
<td>If continuity is not present, go to step 5 of this fault.</td>
</tr>
<tr>
<td>5</td>
<td>If continuity is present, fault corrected.</td>
</tr>
<tr>
<td>6</td>
<td>Connect connector P36 to water temperature switch connector.</td>
</tr>
<tr>
<td>7</td>
<td>Connect connector clamp on water temperature switch connector.</td>
</tr>
</tbody>
</table>
e95. ENGINE FAN RUNS CONSTANTLY (CONT)

**KNOWN INFO**
- Engine fan turns off using deep water fording switch.
- Water temperature switch OK.

**POSSIBLE PROBLEMS**
- Faulty dashboard cable assembly.
- Faulty engine control cable assembly.

4. **WARNING**
   Read WARNING on following page.

**TEST OPTIONS**
- Voltage Test or STE/ICE-R #89

**REASON FOR QUESTION**
- If 24 vdc is not present, wire 1807 in dashboard cable assembly is faulty.
- If 24 vdc is present, wire 1807 in engine control cable assembly is faulty.

**Is 24 vdc present at connector J31-3?**

**YES**
- Repair wire 1807 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

**NO**
- Repair wire 1807 (para 2-45) or replace engine control cable assembly (para 7-80).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

VOLTAGE TEST

1. Lower cab (TM 9-2320-366-10-1).
2. Remove instrument panel assembly for access (para 7-15).
3. Disconnect connector J31 from connector P31.
4. Set multimeter to volts dc.
5. Connect positive (+) probe of multimeter to connector J31-3.
6. Connect negative (-) probe of multimeter to ground.
7. Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
8. If 24 vdc is not present, repair wire 1807 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
9. If 24 vdc is present, repair wire 1807 (para 2-45) or replace engine control cable assembly (para 7-80).
12. Install instrument panel assembly (para 7-15).
e95. ENGINE FAN RUNS CONSTANTLY (CONT)

**KNOWN INFO**
- Engine fan turns off using deep water fording switch. Water temperature switch OK.

**POSSIBLE PROBLEMS**
- Faulty dashboard cable assembly.
- Faulty engine control cable assembly.

**TEST OPTIONS**
- Voltage Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If 24 vdc is not present, wire 1807 in dashboard cable assembly is faulty. If 24 vdc is present, wire 1807 in engine control cable assembly is faulty.

**WARNING**
- Read WARNING on following page.

4. Is 24 vdc present at connector J31-3?

- **NO**
  - Repair wire 1807 (para 2-45) or replace engine control cable assembly (para 7-80).

- **YES**
  - Repair wire 1807 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Lower cab (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(2) Remove instrument panel assembly for access (para 7-15).</td>
</tr>
<tr>
<td>(3) Disconnect connector J31 from connector P31.</td>
</tr>
<tr>
<td>(4) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(5) Connect positive (+) probe of multimeter to connector J31-3.</td>
</tr>
<tr>
<td>(6) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(7) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(8) If 24 vdc is not present, repair wire 1807 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
<tr>
<td>(9) If 24 vdc is present, repair wire 1806 (para 2-45) or replace engine control cable assembly (para 7-80).</td>
</tr>
<tr>
<td>(10) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(11) Connect connector J31 to connector P31.</td>
</tr>
<tr>
<td>(12) Install instrument panel assembly (para 7-15).</td>
</tr>
</tbody>
</table>
e96. ENGINE FAN DOES NOT TURN OFF USING RADIATOR FAN OFF SWITCH

INITIAL SETUP

Equipment Condition
Engine shut down (TM 9-2320-366-10-1).

Personnel Required
(2)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Multimeter, Digital (Item 22, Appendix C)

References
TM 9-4910-571-12&P

START

WARNING
Read WARNING on following page.

1. Is 24 vdc present at connector PX34-1?

TEST OPTIONS
Voltage Test or
STE/ICE-R #89

REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

YES
Go to step 4 of this fault.

NO

KNOWN INFO
Circuit breaker OK.

POSSIBLE PROBLEMS
Faulty dashboard cable assembly.
Faulty fan solenoid.
Faulty fan clutch.
Faulty radiator fan off switch.
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

---

**VOLTAGE TEST**

1. Remove kick panel (para 16-3).
2. Remove three screws and washers from PDP.
3. Remove three screws from PDP.
4. Lift PDP outward to gain access.
5. Disconnect wire 1807 from terminal board TB1 terminal 38.
6. Disconnect connector PX34 from fan solenoid JX34.
7. Set multimeter to volts dc.
8. Connect positive (+) probe of multimeter to connector PX34-1.
9. Connect negative (-) probe of multimeter to ground.
11. Position radiator fan off switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
12. If 24 vdc is not present, go to step 4 of this fault.
15. Connect wire 1807 to terminal board TB1 terminal 38.
2. Is continuity present between connector PX34-2 and a known good ground?

- **YES**
  - Repair wire 3011 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

- **NO**
  - Wire 3011 is faulty.

3. Does fan solenoid release air pressure to radiator fan?

- **YES**
  - Replace fan solenoid (para 7-24).

- **NO**
  - Replace fan clutch (para 6-14).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector PX34-2.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, repair wire 3011 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
(5) Connect connector PX34 to fan solenoid.

OPERATIONAL TEST

(1) Remove air hose from fan solenoid.
(2) Start engine (TM 9-2320-366-10-1) and allow air pressure to build up to normal level.
(3) Position radiator fan off switch to on (TM 9-2320-366-10-1).
(4) If air pressure is not present, replace fan solenoid (para 7-24).
(5) If air pressure is present, replace fan clutch (para 6-14).
(6) Position radiator fan off switch to off (TM 9-2320-366-10-1).
(7) Position master power switch to off (TM 9-2320-366-10-1).
(8) Connect wire 1807 to terminal board TB1 terminal 38.
(9) Install PDP on dashboard with three screws.
(10) Install three washers and screws in PDP.
(11) Install air hose on fan solenoid.
(12) Install kick panel (para 16-3).
4. **WARNING**
   Read WARNING on following page.
   
   Is 24 vdc present at terminal board TB1 terminal 37?
   
   NO
   
   YES
   
   Repair wire 1935 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

5. **KNOWN INFO**
   Circuit breaker OK.
   Fan solenoid OK.
   Fan clutch OK.
   
   **POSSIBLE PROBLEMS**
   Faulty dashboard cable assembly.
   Faulty radiator fan off switch.
   
   **TEST OPTIONS**
   Voltage Test or STE/ICE-R #89
   
   **REASON FOR QUESTION**
   If 24 vdc is not present, wire 1935 is faulty.
   
   NO
   
   YES
   
   Replace radiator fan off switch (para 7-18).

   **KNOWN INFO**
   Circuit breaker OK.
   Fan solenoid OK.
   Fan clutch OK.
   
   **POSSIBLE PROBLEMS**
   Faulty radiator fan off switch.
   Faulty dashboard cable assembly.
   
   **TEST OPTIONS**
   Continuity Test or STE/ICE-R #91
   
   **REASON FOR QUESTION**
   If continuity is not present, radiator fan off switch is faulty.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

VOLTAGE TEST

(1) Set multimeter to volts dc.
(2) Connect positive (+) probe of multimeter to terminal board TB1 terminal 37.
(3) Connect negative (-) probe of multimeter to ground.
(4) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
(5) If 24 vdc is not present, repair wire 1935 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
(6) Position master power switch to off (TM 9-2320-366-10-1).
(7) Install PDP on dashboard with three screws.
(8) Install three washers and screws in PDP.
(9) Install kick panel (para 16-3).

CONTINUITY TEST

(1) Remove instrument panel assembly for access (para 7-15).
(2) Disconnect connector PX1 from radiator fan off switch.
(3) Position radiator fan off switch to on (TM 9-2320-366-10-1).
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter to radiator fan off switch terminal 5.
(6) Connect negative (-) probe of multimeter to radiator fan off switch terminal 1.
(7) If continuity is not present, replace radiator fan off switch (para 7-18).
(8) Position radiator fan off switch to off (TM 9-2320-366-10-1).
6. **KNOWN INFO**

   Engine fan turns off using radiator fan off switch.
   Water temperature switch OK.

   **POSSIBLE PROBLEMS**

   Faulty dashboard cable assembly.
   Faulty engine control cable assembly.

---

**TEST OPTIONS**

   **Voltage Test or STE/ICE-R #91**

   **REASON FOR QUESTION**

   If 24 vdc is not present, wire 1806 in dashboard cable assembly is faulty. If 24 vdc is present, wire 1806 in engine control cable assembly is faulty.

---

**WARNING**

   Read WARNING on following page.

   Is 24 vdc present at connector J31-4?

---

   **YES**

   Repair wire 1806 (para 2-45) or replace engine control cable assembly (para 7-80).

   **NO**

   Repair wire 1812 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
VOLTAGE TEST

(1) Lower cab (TM 9-2320-366-10-1).
(2) Remove instrument panel assembly for access (para 7-15).
(3) Disconnect connector J31 from connector P31.
(4) Set multimeter to volts dc.
(5) Connect positive (+) probe of multimeter to connector J31-4.
(6) Connect negative (-) probe of multimeter to ground.
(7) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
(8) If 24 vdc is not present, repair wire 1806 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
(9) If 24 vdc is present, repair wire 1806 (para 2-45) or replace engine control cable assembly (para 7-80).
(10) Position master power switch to off (TM 9-2320-366-10-1).
(11) Connect connector J31 to connector P31.
(12) Install instrument panel assembly (para 7-15).
### INITIAL SETUP

<table>
<thead>
<tr>
<th>KNOWLEDGE INFO</th>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breaker OK. Ether cylinder OK.</td>
<td>Faulty start and charging cable assembly.</td>
</tr>
<tr>
<td></td>
<td>Faulty ether valve.</td>
</tr>
<tr>
<td></td>
<td>Faulty ether start switch.</td>
</tr>
<tr>
<td></td>
<td>Faulty dashboard cable assembly.</td>
</tr>
<tr>
<td></td>
<td>Faulty engine control cable assembly.</td>
</tr>
</tbody>
</table>

### WARNING

Read WARNING on following page.

### TEST OPTIONS

- Voltage Test or STE/ICE-R #89

### REASON FOR QUESTION

This question eliminates possible problems and determines where troubleshooting continues.

---

**Is 24 vdc present at connector J93-1?**

- **YES**
  - Go to step 3 of this fault.

- **NO**
  - This question eliminates possible problems and determines where troubleshooting continues.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Disconnect connector clamp from ether valve connector.</td>
</tr>
<tr>
<td>(2) Disconnect ether valve connector from connector J93.</td>
</tr>
<tr>
<td>(3) Disconnect connector clamp from ether sensor connector.</td>
</tr>
<tr>
<td>(4) Disconnect connector P42 from ether sensor connector.</td>
</tr>
<tr>
<td>(5) Install jumper wire from connector P42-1 to connector P42-2.</td>
</tr>
<tr>
<td>(6) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(7) Connect positive (+) probe of multimeter to connector J93-1.</td>
</tr>
<tr>
<td>(8) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(9) Position master power switch to on (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(10) Press ether start switch (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(11) If 24 vdc is not present, go to step 3 of this fault.</td>
</tr>
<tr>
<td>(13) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(14) Remove jumper wire from connector P42-1 and connector P42-2.</td>
</tr>
<tr>
<td>(15) Connect connector P42 to ether sensor connector.</td>
</tr>
<tr>
<td>(16) Lower cab (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
2-1112

**e97. ETHER START DOES NOT OPERATE (CONT)**

**KNOWN INFO**
- Circuit breaker OK.
- Ether cylinder OK.
- Ether start switch OK.
- Dashboard cable assembly OK.
- Engine control cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty start and charging cable assembly.
- Faulty ether valve.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
If continuity is not present, wire 3014 is faulty. If continuity is present, ether valve is faulty.

---

2. Is continuity present between connector J93-2 and a known good ground?

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

---

If continuity is not present, ether start switch is faulty.

---

3. Is continuity present between ether start switch terminal 1 and terminal 3?

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

---

If continuity is not present, ether start switch is faulty.

---

**KNOWN INFO**
- Circuit breaker OK.
- Ether cylinder OK.
- Start and charging cable assembly OK.
- Ether valve OK.

**POSSIBLE PROBLEMS**
- Faulty ether start switch.
- Faulty dashboard cable assembly.
- Faulty engine control cable assembly.

---

If continuity is not present, ether valve is faulty. If continuity is present, ether valve is faulty.

---

**REPLACE**
- Replace ether valve (para 4-15).
- Replace ether start switch (para 7-18).
- Repair wire 3014 (para 2-45) or replace start and charging cable assembly (para 7-132).
Continuity Test

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector J93-2.
3. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
4. If continuity is not present, repair wire 3014 (para 2-45) or replace start and charging cable assembly (para 7-132).
5. If continuity is present, replace ether valve (para 4-15).

Continuity Test

1. Remove instrument panel assembly for access (para 7-15).
2. Disconnect connector PX13 from ether start switch.
3. Set multimeter to ohms.
4. Connect positive (+) probe of multimeter to ether start switch terminal 1.
5. Connect negative (-) probe of multimeter to ether start switch terminal 3.
6. Position ether start switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
7. If continuity is not present, replace ether start switch (para 7-18).
**4.** Is 24 vdc present at connector PX13-1?  
If 24 vdc is not present, wire 1401 is faulty.

**WARNING**  
Read WARNING on following page.

**TEST OPTIONS**  
Voltage Test or STE/ICE-R #89

**REASON FOR QUESTION**  
If 24 vdc is not present, wire 1401 is faulty.

**YES**  
**NO**

**YES**  
Repair wire 1401 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

**5.** Is continuity present from connector J31-2 to connector PX13-3?  
If continuity is not present, wire 1402 is faulty.

**TEST OPTIONS**  
Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**  
If continuity is not present, wire 1402 is faulty.

**YES**  
**NO**

**YES**  
Repair wire 1402 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

### VOLTAGE TEST

1. Set multimeter to volts dc.
2. Connect positive (+) probe of multimeter to connector PX13-1.
3. Connect negative (-) probe of multimeter to ground.
4. Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
5. If 24 vdc is not present, repair wire 1401 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

### CONTINUITY TEST

1. Disconnect connector P31 from connector J31.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter to connector PX13-3.
4. Connect negative (-) probe of multimeter to connector J31-2 and note reading on multimeter.
5. If continuity is not present, repair wire 1402 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
**KNOWN INFO**
- Circuit breaker OK.
- Ether cylinder OK.
- Start and charging cable assembly OK.
- Ether valve OK.
- Ether start switch OK.

**POSSIBLE PROBLEMS**
- Faulty engine control cable assembly.
- Faulty ether sensor.
- Faulty dashboard cable assembly.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, wire 1402 is faulty.

---

6. **Is continuity present between connector P31-2 and connector P42-2?**

   **YES**
   - Repair wire 1402 (para 2-45) or replace engine control cable assembly (para 7-80).

   **NO**
CONTINUITY TEST

(1) Raise cab (TM 9-2320-366-10).
(2) Disconnect connector P42 from ether sensor connector.
(3) Connect jumper wire to connector P42-2.
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter to connector P31-2.
(6) Connect negative (-) probe of multimeter to jumper wire and note reading on multimeter.
(7) If continuity is not present, repair wire 1402 (para 2-45) or replace engine control cable assembly (para 7-80).
e97. ETHER START DOES NOT OPERATE (CONT)

**KNOWN INFO**
- Circuit breaker OK.
- Ether cylinder OK.
- Start and charging cable assembly OK.
- Ether valve OK.
- Ether start switch OK.
- Dashboard cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty engine control cable assembly.
- Faulty ether sensor.

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
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<tbody>
<tr>
<td>Continuity Test or STE/ICE-R #91</td>
</tr>
</tbody>
</table>

**REASON FOR QUESTION**
If continuity is not present, ether sensor is faulty.

7. Is continuity present between ether sensor terminal 1 and terminal 2?

**YES**
- Replace ether sensor (para 7-47).

**NO**
CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to ether sensor terminal 1.
3. Connect negative (-) probe of multimeter to ether sensor terminal 2 and note reading on multimeter.
4. If continuity is not present, replace ether sensor (para 7-47).
**KNOW INFO**

- Circuit breaker OK.
- Ether cylinder OK.
- Start and charging cable assembly OK.
- Ether valve OK.
- Ether start switch OK.
- Dashboard cable assembly OK.

**POSSIBLE PROBLEMS**

- Faulty engine control cable assembly.
- Faulty ether sensor.

**8.** is continuity present between connector P42-1 and connector P31-15?

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>Continuity Test or STE/ICE-R #91</th>
</tr>
</thead>
<tbody>
<tr>
<td>REASON FOR QUESTION</td>
<td>If continuity is not present, wire 1403 is faulty.</td>
</tr>
</tbody>
</table>

**YES**

Repair wire 1403 (para 2-45) or replace engine control cable assembly (para 7-80).

**NO**

- Circuit breaker OK.
- Ether cylinder OK.
- Start and charging cable assembly OK.
- Ether valve OK.
- Ether start switch OK.
- Dashboard cable assembly OK.

- Faulty engine control cable assembly.
- Faulty ether sensor.

If continuity is not present, wire 1403 is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect jumper wire to connector P42-1.
(3) Lower cab (TM 9-2320-366-10-1).
(4) Connect positive (+) probe of multimeter to connector P31-15.
(5) Connect negative (-) probe of multimeter to jumper wire and note reading on multimeter.
(6) If continuity is not present, repair wire 1403 (para 2-45) or replace engine control cable assembly (para 7-80).
(7) Raise cab (TM 9-2320-366-10-1).
(8) Remove jumper wire from connector P42.
(9) Connect connector P42 to ether sensor connector.
(10) Connect connector clamp on ether sensor connector.
(11) Lower cab (TM 9-2320-366-10-1).
9. **Is continuity present between connector J31-15 and connector J43-1?**

**KNOWN INFO**
- Circuit breaker OK.
- Ether cylinder OK.
- Start and charging cable assembly OK.
- Ether valve OK.
- Ether start switch OK.
- Dashboard cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty engine control cable assembly.
- Faulty ether sensor.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
If continuity is not present, wire 1403 is faulty.

**YES**
Repair wire 1403 (para 2-45) or replace engine control cable assembly (para 7-80).

**NO**
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector J31-15.
(3) Connect negative (-) probe of multimeter to connector J43-1 and note reading on multimeter.
(4) If continuity is not present, repair wire 1403 (para 2-45) or replace engine control cable assembly (para 7-80).
KNOWLEDGE INFO
Circuit breaker OK.
Ether cylinder OK.
Start and charging cable assembly OK.
Ether valve OK.
Ether start switch OK.
Dashboard cable assembly OK.

POSSIBLE PROBLEMS
Faulty engine control cable assembly.
Faulty ether sensor.

10. Is continuity present between connector P43-1 and connector J93-1?

TEST OPTIONS
Continuity Test or STE/ICE-R #91

REASON FOR QUESTION
If continuity is not present, wire 1403 is faulty.

YES
Repair wire 1403 (para 2-45) or replace engine control cable assembly (para 7-80).

NO
Replace ether sensor (para 7-47).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect jumper wire to connector J93-1.
(3) Connect positive (+) probe of multimeter to connector P43-1.
(4) Connect negative (-) probe of multimeter to jumper wire and note reading on multimeter.
(5) If continuity is not present, repair wire 1403 (para 2-45) or replace engine control cable assembly (para 7-80).
(6) If continuity is present, replace ether sensor (para 7-47).
(7) Remove jumper wire from connector J93.
(8) Connect connector J93 to ether valve connector.
(9) Connect connector clamp to ether valve connector.
(10) Connect connector J43 to connector P43.
(11) Install instrument panel assembly (para 7-15).
1. Is 24 vdc present on connector P33-2?

**START**

**WARNING**
Read WARNING on following page.

- **YES**
  - Go to step 3 of this fault.
- **NO**
  - This question eliminates possible problems and determines where to continue troubleshooting.

**KNOWLEDGE**

- **Engine starts.**
- **POSSIBLE PROBLEMS**
  - Faulty engine control cable assembly.
  - Faulty dashboard cable assembly.
  - Faulty fuel/water separator.

**TEST OPTIONS**

- **Voltage Test or STE/ICE-R #89**

**REASON FOR QUESTION**

- This question eliminates possible problems and determines where to continue troubleshooting.

**INITIAL SETUP**

- **Equipment Condition**
  - Engine shut down (TM 9-2320-366-10-1).

- **Personnel Required**
  - (2)

- **References**
  - TM 9-4910-571-12&P

**Tools and Special Tools**

- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)

**Materials/Parts**

- Wire, Elect, 50 ft (Item 71, Appendix D)
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Raise cab (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(2) Disconnect connector clamp from fuel/water separator.</td>
</tr>
<tr>
<td>(3) Disconnect connector P33 from fuel/water separator.</td>
</tr>
<tr>
<td>(4) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(5) Connect positive (+) probe of multimeter to connector P33-2.</td>
</tr>
<tr>
<td>(6) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(7) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(8) If 24 vdc is not present, go to step 3 of this fault.</td>
</tr>
<tr>
<td>(9) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
2. Is continuity present between connector P33-1 and a known good ground?

- **NO**
  - Repair wire 3017 (para 2-45) or replace engine control cable assembly (para 7-80).
  - Replace fuel/water separator (para 4-13).

- **YES**
  - Repair wire 3017 (para 2-45) or replace engine control cable assembly (para 7-80).

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, wire 3017 is faulty. If continuity is present, fuel/water separator is faulty.

---

3. Is 24 vdc present on connector J31-13?

- **NO**
  - Repair wire 1460 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

- **YES**
  - Repair wire 1460 (para 2-45) or replace engine control cable assembly (para 7-80).

**TEST OPTIONS**
- Voltage Test or STE/ICE-R #89

**WARNING**
- Read WARNING on following page.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P33-1.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, repair wire 3017 (para 2-45) or replace engine control cable assembly (para 7-80).
(5) If continuity is present, replace fuel/water separator (para 4-13).
(6) Connect connector P33 to fuel/water separator.
(7) Connect connector clamp on fuel/water separator.
(8) Lower cab (TM 9-2320-366-10-1).

WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

VOLTAGE TEST

(1) Remove instrument panel assembly for access (para 7-15).
(2) Disconnect connector P31 from connector J31.
(3) Set multimeter to volts dc.
(4) Connect positive (+) probe of multimeter to connector J31-13.
(5) Connect negative (-) probe of multimeter to ground.
(6) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
(7) If 24 vdc is not present, repair wire 1460 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
(8) If 24 vdc is present, repair wire 1460 (para 2-45) or replace engine control cable assembly (para 7-80).
(9) Position master power switch to off (TM 9-2320-366-10-1).
(10) Connect connector P31 to connector J31.
(11) Install instrument panel assembly on (para 7-15).
INITIAL SETUP

Equipment Condition
Engine shut down (TM 9-2320-366-10-1).

Personnel Required
(2)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Multimeter, Digital (Item 22, Appendix C)

References
TM 9-4910-571-12&P

KNOWN INFO
Circuit breaker OK.

POSSIBLE PROBLEMS
Faulty relay K53.
Faulty dashboard cable assembly.
Faulty radio.

WARNING
Read WARNING on following page.

TEST OPTIONS
Voltage Test or STE/ICE-R #89

REASON FOR QUESTION
This step eliminates possible problems and determines where troubleshooting continues.

START

1. Is 12 vdc present on connector J78-3?

NO

YES

Go to step 4 of this fault.
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove kick panel (para 16-3).</td>
</tr>
<tr>
<td>(2) Disconnect connector J78 from radio.</td>
</tr>
<tr>
<td>(3) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter to connector J78-3.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(6) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If 12 vdc is not present, go to step 4 of this fault.</td>
</tr>
<tr>
<td>(8) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
2. Is continuity present between connector J78-2 and a known good ground?

- **YES**
  - Repair wire 3018 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

- **NO**
  - If continuity is not present, wire 3018 is faulty.

3. Is continuity present between connector J78-4 and a known good ground?

- **YES**
  - Repair wire 3019 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

- **NO**
  - If continuity is not present, wire 3019 is faulty. If continuity is present, radio is faulty.

Replace radio (notify Communications Section).
**CONTINUITY TEST**

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector J78-2.
3. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
4. If continuity is not present, repair wire 3018 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

---

**CONTINUITY TEST**

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector J78-4.
3. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
4. If continuity is not present, repair wire 3019 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
5. If continuity is present, replace radio (notify Communications Section).
6. Connect connector J78 to radio.
7. Install kick panel (para 16-3).

---

**CONNECTOR J78**

![Diagram of connector J78](image-url)
4. If continuity is not present, relay K53 is faulty.

5. Is 24 vdc present at relay K53 terminal 85?
   - YES: Replace relay K53 (para 7-9).
   - NO: Read WARNING on following page.

WARNING
Read WARNING on following page.

5. Is 24 vdc present at relay K53 terminal 85?
   - YES: Repair wire 1906 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
   - NO: Repair wire 1960 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

TEST OPTIONS
Continuity Test or STE/ICE-R #91

REASON FOR QUESTION
If continuity is not present, relay K53 is faulty.

TEST OPTIONS
Voltage Test or STE/ICE-R #89

REASON FOR QUESTION
If 24 vdc is not present, wire 1960 is faulty. If 24 vdc is present, wire 1906 is faulty.

POSSIBLE PROBLEMS
Faulty relay K53.
Faulty dashboard cable assembly.

KNOWN INFO
Circuit breaker OK.
Radio OK.
Relay K53 OK.

Circuit breaker OK.
Radio OK.
### CONTINUITY TEST

1. Remove relay K53 from PDP.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter to relay K53 terminal 30.
4. Connect negative (-) probe of multimeter to relay K53 terminal 87A and note reading on multimeter.
5. If continuity is not present, replace relay K53 (para 7-9).

### WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

### VOLTAGE TEST

1. Set multimeter to volts dc.
2. Connect positive (+) probe of multimeter to PDP, terminal 85, where relay K53 was removed.
3. Connect negative (-) probe of multimeter to ground.
4. Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
5. If 24 vdc is not present, repair wire 1960 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
6. If 24 vdc is present, repair wire 1906 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
7. Position master power switch to off (TM 9-2320-366-10-1).
8. Install relay K53 in PDP.
9. Connect connector J78 to radio.
10. Install kick panel (para 16-3).
e100. START INHIBIT PUSHPUTTON DOES NOT OPERATE

INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Condition</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1).</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td>Personnel Required</td>
<td>STE/ICE-R (Item 41, Appendix C)</td>
</tr>
<tr>
<td>(2)</td>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
</tr>
<tr>
<td>Materials/Parts</td>
<td>References</td>
</tr>
<tr>
<td>Wire, Elect, 50 ft (Item 71, Appendix D)</td>
<td>TM 9-4910-571-12&amp;P</td>
</tr>
</tbody>
</table>

References

TM 9-4910-571-12&P

TEST OPTIONS

Continuity Test or STE/ICE-R #91

REASON FOR QUESTION

If continuity is not present, start inhibit pushbutton switch is faulty.

KNOWN INFO

Engine will start after start inhibit pushbutton switch is pressed.

POSSIBLE PROBLEMS

Faulty start inhibit pushbutton switch.
Faulty dashboard cable assembly.
Faulty relay K19.

1. Is continuity present between start inhibit pushbutton switch terminal 2 and terminal 1?

NO

YES

Replace start inhibit pushbutton switch (para 7-19).
CONTINUITY TEST

1. Remove PDP cover (para 16-2).
2. Remove three screws and washers from PDP.
3. Remove three screws from PDP.
4. Lift PDP outward to gain access.
5. Disconnect terminal lugs TL158 and TL159 from start inhibit pushbutton switch.
6. Set multimeter to ohms.
7. Connect positive (+) probe of multimeter to start inhibit pushbutton switch terminal 1.
8. Connect negative (-) probe of multimeter to start inhibit pushbutton switch terminal 2.
9. Press start inhibit pushbutton switch and hold (TM 9-2320-366-10-1) and note reading on multimeter.
10. If continuity is not present, replace start inhibit pushbutton switch (para 7-19).
11. Install PDP on dashboard with three screws.
12. Install three washers and screws in PDP.
1. **KNOWN INFO**
   - Engine will start after start inhibit pushbutton switch is pressed.
   - Start inhibit pushbutton switch OK.

2. **POSSIBLE PROBLEMS**
   - Faulty dashboard cable assembly.
   - Faulty relay K19.

   **WARNING**
   - Read WARNING on following page.
   - Is 24 vdc present on terminal lug TL159?

   **TEST OPTIONS**
   - Voltage Test or STE/ICE-R #89
   - If 24 vdc is not present, wire 1463 is faulty.

   **YES**
   - Repair wire 1463 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

   **NO**
   - Is continuity present between terminal lug TL158 and relay K19 terminal 86?

   **TEST OPTIONS**
   - Continuity Test or STE/ICE-R #91
   - If continuity is not present, wire 1637 is faulty.

   **YES**
   - Repair wire 1637 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

   **NO**
   - Engine will start after start inhibit pushbutton switch is pressed.
   - Start inhibit pushbutton switch OK.

   **POSSIBLE PROBLEMS**
   - Faulty dashboard cable assembly.
   - Faulty relay K19.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set multimeter to volts dc.</td>
</tr>
<tr>
<td>2</td>
<td>Connect positive (+) probe of multimeter to terminal lug TL159.</td>
</tr>
<tr>
<td>3</td>
<td>Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>4</td>
<td>Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>5</td>
<td>If 24 vdc is not present, repair wire 1463 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
<tr>
<td>6</td>
<td>Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>

CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove relay K19 from PDP.</td>
</tr>
<tr>
<td>2</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>3</td>
<td>Connect positive (+) probe of multimeter to terminal lug TL158.</td>
</tr>
<tr>
<td>4</td>
<td>Connect negative (-) probe of multimeter to PDP, terminal 86, where relay K19 was removed, and note reading on multimeter.</td>
</tr>
<tr>
<td>5</td>
<td>If continuity is not present, repair wire 1637 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
<tr>
<td>6</td>
<td>Connect terminal lugs TL158 and TL159 to start inhibit pushbutton switch.</td>
</tr>
</tbody>
</table>
Is continuity present between relay K19 terminal 85 and a known good ground?

Yes:
Replace relay K19 (para 7-9).

No:
Repair wire 3016 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

Known Info:
- Engine will start after start inhibit pushbutton switch is pressed.
- Start inhibit pushbutton switch OK.
- Wire 1463 OK.
- Wire 1637 OK.

Possible Problems:
- Faulty dashboard cable assembly.
- Faulty relay K19.

Test Options:
- Continuity Test or STE/ICE-R #91

Reason for Question:
If continuity is not present, wire 3016 is faulty. If continuity is present, relay K19 is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to PDP, terminal 85, where relay K19 was removed.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, repair wire 3016 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
(5) If continuity is present, replace relay K19 (para 7-9).
(6) Install relay K19 in PDP.
(7) Install PDP cover (para 16-2).
e101. AIR DRYER DOES NOT OPERATE (ALL MODELS EXCEPT M1090/M1094)

INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Condition</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1).</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td>Personnel Required</td>
<td>STE/ICE-R (Item 41, Appendix C)</td>
</tr>
<tr>
<td>(2)</td>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
</tr>
</tbody>
</table>

References

TM 9-4910-571-12&P

---

START

1. WARNING
   Read WARNING on following page.

   Is 24 vdc present on connector P80-2?

   **KNOWN INFO**
   - Air hoses and fittings OK.
   - Air compressor governor OK.
   - Faulty air dryer.
   - Faulty dashboard cable assembly.
   - Faulty start and charging cable assembly.

   **POSSIBLE PROBLEMS**

   **TEST OPTIONS**
   - Voltage Test or STE/ICE-R #89

   **REASON FOR QUESTION**
   This question eliminates possible problems and determines where troubleshooting continues.

YES

NO

Go to step 3 of this fault.

YES

Go to step 3 of this fault.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Disconnect connector P80 from air dryer connector.</td>
</tr>
<tr>
<td>(2) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to connector P80-2.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(5) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(6) If 24 vdc is not present, go to step 3 of this fault.</td>
</tr>
<tr>
<td>(7) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
2. Is continuity present from connector P80-1 to ground?

- **YES**: Repair wire 3009 (para 2-45) or replace start and charging cable assembly (para 7-132).

- **NO**: Replace or repair air dryer (para 23-11).

**KNOWN INFO**
- Air hoses and fittings OK.
- Air compressor governor OK.
- Dashboard cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty air dryer.
- Faulty start and charging cable assembly.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, wire 3009 is faulty. If continuity is present, air dryer is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P80-1.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, repair wire 3009 (para 2-45) or replace start and charging cable assembly (para 7-132).
(5) If continuity is present, replace or repair air dryer (para 23-11).
(6) Connect connector P80 to air dryer connector.
Is 24 vdc present on connector J43-9?

If 24 vdc is not present, wire 1481 in dashboard cable assembly is faulty.
If 24 vdc is present, wire 1481 in start and charging cable assembly is faulty.

POSSIBLE PROBLEMS
Faulty dashboard cable assembly.
Faulty start and charging cable assembly.

TEST OPTIONS
Voltage Test or STE/ICE-R #89

REASON FOR QUESTION
If 24 vdc is not present, wire 1481 in dashboard cable assembly is faulty.
If 24 vdc is present, wire 1481 in start and charging cable assembly is faulty.

Repair wire 1481 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

Repair wire 1481 (para 2-45) or replace start and charging cable assembly (para 7-132).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove instrument panel assembly for access (para 7-15).</td>
</tr>
<tr>
<td>(2) Disconnect connector J43 from connector P43.</td>
</tr>
<tr>
<td>(3) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter to connector J43-9.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(6) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If 24 vdc is not present, repair wire 1481 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
<tr>
<td>(8) If 24 vdc is present, repair wire 1481 (para 2-45) or replace start and charging cable assembly (para 7-132).</td>
</tr>
<tr>
<td>(9) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(10) Connect connector J43 to connector P43.</td>
</tr>
<tr>
<td>(11) Install instrument panel assembly (para 7-15).</td>
</tr>
</tbody>
</table>
1. WARNING
Read WARNING on following page.

Is 24 vdc present on connector P80B-2?

POSSIBLE PROBLEMS
Faulty air dryer.
Faulty dashboard cable assembly.
Faulty start and charging cable assembly.
Faulty dump cable assembly.

TEST OPTIONS
Voltage Test or STE/ICE-R #89

REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.
VOLTAGE TEST

(1) Disconnect connector P80B from air dryer.
(2) Set multimeter to volts dc.
(3) Connect positive (+) probe of multimeter to connector P80B-2.
(4) Connect negative (-) probe of multimeter to ground.
(5) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
(6) If 24 vdc is not present, go to step 3 of this fault.
(7) Position master power switch to off (TM 9-2320-366-10-1).

WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.
2. Is continuity present from connector P80B-1 to ground?

YES

Go to step 5 of this fault.

NO

Replace air dryer (para 23-11).

TEST OPTIONS

Continuity Test or STE/ICE-R #91

REASON FOR QUESTION

If continuity is not present, wire 3009 is faulty. If continuity is present, air dryer is faulty.

KNOWN INFO

Air lines and fittings OK.
Air compressor governor OK.
Dump up indicator OK.
Dashboard cable assembly OK.

POSSIBLE PROBLEMS

Faulty air dryer.
Faulty start and charging cable assembly.
Faulty dump cable assembly.

Air lines and fittings OK.
Air compressor governor OK.
Dump up indicator OK.
Dashboard cable assembly OK.
POSSIBLE PROBLEMS
Faulty air dryer.
Faulty start and charging cable assembly.
Faulty dump cable assembly.

Air lines and fittings OK.
Air compressor governor OK.
Dump up indicator OK.
Dashboard cable assembly OK.
POSSIBLE PROBLEMS
Faulty air dryer.
Faulty start and charging cable assembly.
Faulty dump cable assembly.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P80B-1.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, go to step 5 of this fault.
(5) If continuity is present, replace air dryer (para 23-11).
(6) Connect connector P80B to air dryer.
3. Is 24 vdc present on connector J43-9?

YES

Repair wire 1481 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

NO

If 24 vdc is not present, wire 1481 in dashboard cable assembly is faulty.

**WARNING**
Read WARNING on following page.

**REASON FOR QUESTION**
If 24 vdc is not present, wire 1481 in dashboard cable assembly is faulty.

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air lines and fittings OK.</td>
</tr>
<tr>
<td>Air compressor governor OK.</td>
</tr>
<tr>
<td>Dump up indicator OK.</td>
</tr>
<tr>
<td>Air dryer OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty dashboard cable assembly.</td>
</tr>
<tr>
<td>Faulty start and charging cable assembly.</td>
</tr>
<tr>
<td>Faulty dump cable assembly.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Test or STE/ICE-R #89</td>
</tr>
</tbody>
</table>

2-1152
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

**WARNING**

(1) Remove instrument panel assembly for access (para 7-15).
(2) Disconnect connector J43 from connector P43.
(3) Set multimeter to volts dc.
(4) Connect positive (+) probe of multimeter to connector J43-9.
(5) Connect negative (-) probe of multimeter to ground.
(6) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
(7) If 24 vdc is not present, repair wire 1481 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
(8) Position master power switch to off (TM 9-2320-366-10-1).
(9) Connect connector J43 to connector P43.
(10) Install instrument panel assembly (para 7-15).

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove instrument panel assembly for access (para 7-15).</td>
</tr>
<tr>
<td>(2) Disconnect connector J43 from connector P43.</td>
</tr>
<tr>
<td>(3) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter to connector J43-9.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(6) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If 24 vdc is not present, repair wire 1481 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
<tr>
<td>(8) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(9) Connect connector J43 to connector P43.</td>
</tr>
<tr>
<td>(10) Install instrument panel assembly (para 7-15).</td>
</tr>
</tbody>
</table>
4. Is 24 vdc present on connector P80-2?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air lines and fittings OK.</td>
</tr>
<tr>
<td>Air compressor governor OK.</td>
</tr>
<tr>
<td>Dump up indicator OK.</td>
</tr>
<tr>
<td>Air dryer OK.</td>
</tr>
<tr>
<td>Dashboard cable assembly OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty start and charging cable assembly.</td>
</tr>
<tr>
<td>Faulty dump cable assembly.</td>
</tr>
</tbody>
</table>

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
Voltage Test or STE/ICE-R #89

**REASON FOR QUESTION**
If 24 vdc is not present, wire 1481 in start and charging cable assembly is faulty. If 24 vdc is present, wire 1481 in dump cable assembly is faulty.

- NO
- YES

*Repair wire 1481 (para 2-45) or replace start and charging cable assembly (para 7-132).*

*Repair wire 1481 (para 2-45) or replace dump cable assembly (para 7-124).*
VOLTAGE TEST

(1) Disconnect connector P80 from connector J80A.
(2) Set multimeter to volts dc.
(3) Connect positive (+) probe of multimeter to connector P80-2.
(4) Connect negative (-) probe of multimeter to ground.
(5) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
(6) If 24 vdc is not present, repair wire 1481 in start and charging cable assembly (para 2-45) or replace start and charging cable assembly (para 7-132).
(7) If 24 vdc is present, repair wire 1481 in dump cable assembly (para 2-45) or replace dump cable assembly (para 7-124).
(8) Position master power switch to off (TM 9-2320-366-10-1).
(9) Connect connector P80 to connector J80A.
(10) Connect connector P80B to air dryer.
5. Is continuity present from connector P80-1 to ground?

- **NO**
  - If continuity is not present, wire 3009 in start and charging cable assembly is faulty. If continuity is present, wire 3009 in dump cable assembly is faulty.

- **YES**
  - Repair wire 3009 (para 2-45) or replace start and charging cable assembly (para 7-132).
  - Repair wire 3009 (para 2-45) or replace dump cable assembly (para 7-124).

**KNOWN INFO**
- Air lines and fittings OK.
- Air compressor governor OK.
- Dump up indicator OK.
- Air dryer OK.
- Dashboard cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty start and charging cable assembly.
- Faulty dump cable assembly.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, wire 3009 in start and charging cable assembly is faulty. If continuity is present, wire 3009 in dump cable assembly is faulty.
CONTINUITY TEST

1. Connect connector P80B to air dryer.
2. Disconnect connector P80 from connector J80A.
3. Set multimeter to ohms.
4. Connect positive (+) probe of multimeter to connector P80-1.
5. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
6. If continuity is not present, repair wire 3009 in start and charging cable assembly (para 2-45) or replace start and charging cable assembly (para 7-132).
7. If continuity is present, repair wire 3009 in dump cable assembly (para 2-45) or replace dump cable assembly (para 7-124).
8. Connect connector P80 to connector J80A.
103. BATTERY TESTER DOES NOT OPERATE

INITIAL SETUP

Equipment Condition
Engine shut down (TM 9-2320-366-10-1).

Personnel Required
(2)

References
TM 9-4910-571-12&P

Tools and Special Tools
STE/ICE-R (Item 41, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
Goggles, Industrial (Item 15, Appendix C)
Gloves, Rubber (Item 13, Appendix C)
Apron, Rubber (Item 3, Appendix C)

KNOWLEDGE
Vehicle starts.

POSSIBLE PROBLEMS
Faulty fuse.
Faulty battery tester.

WARNING
Read WARNING on following page.

TEST OPTIONS
Continuity Test or STE/ICE-R #91

REASON FOR QUESTION
If continuity is not present, battery tester fuse is faulty.

If continuity is present across battery tester fuse?

NO

YES
Replace fuse (para 7-54).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock. Batteries can explode from a spark. Battery acid is harmful to skin and eyes. Always wear eye protection and rubber gloves when working with batteries.

CONTINUITY TEST

(1) Remove battery box cover (TM 9-2320-366-10-2).
(2) Open fuse holder on battery tester.
(3) Remove fuse from fuse holder.
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter to one end of fuse.
(6) Connect negative (-) probe of multimeter to other end of fuse and note reading on multimeter.
(7) If continuity is not present, replace battery tester 3 milliamp fuse (para 7-54).
2. Is 24 vdc present from right side of fuse holder to ground?

**TEST OPTIONS**
- Voltage Test or STE/ICE-R #89

**REASON FOR QUESTION**
If 24 vdc is not present, wire from fuse holder to BT2-E1 is faulty.

- **NO**
  - Repair wire from fuse holder to BT2-E1 (para 2-45) or replace battery tester (para 7-54).

- **YES**
  - Replace battery tester (para 7-54).
WARNING
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock. Batteries can explode from a spark. Battery acid is harmful to skin and eyes. Always wear eye protection and rubber gloves when working with batteries.

VOLTAGE TEST

1. Set multimeter to volts dc.
2. Connect positive (+) probe of multimeter to terminal in right side of fuse holder.
3. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
4. If 24 vdc is not present, repair wire from right side of fuse holder to BT2-E1 (para 2-45) or replace battery tester (para 7-54).
5. If 24 vdc is present, replace battery tester (para 7-54).
6. Install fuse in battery tester fuse holder.
7. Close battery tester fuse holder.
8. Install battery box cover (TM 9-2320-366-10-2).
e104. M1084/M1086 MATERIAL HANDLING CRANE (MHC) DOES NOT OPERATE

INITIAL SETUP

Equipment Conditions
   Engine shut down (TM 9-2320-366-10-1).

Personnel Required
   (2)

Tools and Special Tools
   Tool Kit, Genl Mech (Item 46, Appendix C)
   Multimeter, Digital (Item 22, Appendix C)
   STE/ICE-R (Item 41, Appendix C)

References
   TM 9-4910-571-12&P

<table>
<thead>
<tr>
<th>KNOWLEDGE INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery voltage OK.</td>
</tr>
<tr>
<td>Circuit breakers OK.</td>
</tr>
<tr>
<td>Auxiliary panel cable assembly OK.</td>
</tr>
<tr>
<td>Dashboard wiring harness OK.</td>
</tr>
<tr>
<td>Hydraulic system OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty crane power cable.</td>
</tr>
<tr>
<td>Faulty junction box internal wiring.</td>
</tr>
<tr>
<td>Faulty reverse polarity diode(s).</td>
</tr>
</tbody>
</table>

START

1. Is input voltage present at junction box terminal board position 5?

   WARNING
   Read WARNING on following page.

   Battery voltage OK.
   Circuit breakers OK.
   Auxiliary panel cable assembly OK.
   Dashboard wiring harness OK.
   Hydraulic system OK.

   Faulty crane power cable.
   Faulty junction box internal wiring.
   Faulty reverse polarity diode(s).

   REASON FOR QUESTION
   Crane will not operate if 24 VDC is not present at junction box terminal board position 5.

   TEST OPTIONS
   Voltage Test or STE/ICE-R Test #89

   GO TO:
   YES - Go to step 2 of this fault.
   NO  - Perform Electrical Troubleshooting (e115, M1084/M1086 Material Handling Crane (MHC) Overload Shutdown System Stays Activated).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

### VOLTAGE TEST

1. Loosen four screws on junction box cover.
2. Open cover on junction box.
3. Set multimeter to volts dc.
4. Connect positive (+) probe of multimeter on terminal board position 5.
5. Connect negative (-) probe of multimeter on ground quick-connect terminal block (above main power switch) and note reading on multimeter.
6. If 24 VDC is not present, go to step 2 of this fault.
7. If 24 VDC is present, perform Electrical System troubleshooting task e115. M1084/M1086 Material Handling Crane (MHC) Overload Shutdown System Stays Activated.
**e104. M1084/M1086 MATERIAL HANDLING CRANE (MHC) DOES NOT OPERATE (CONT)**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery voltage OK.</td>
</tr>
<tr>
<td>Circuit breakers OK.</td>
</tr>
<tr>
<td>Auxiliary panel cable assembly OK.</td>
</tr>
<tr>
<td>Dashboard wiring harness OK.</td>
</tr>
<tr>
<td>Hydraulic system OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
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<tbody>
<tr>
<td>Faulty crane power cable.</td>
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<tr>
<td>Faulty junction box internal wiring.</td>
</tr>
<tr>
<td>Faulty reverse polarity diode(s).</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE-R Test #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, crane power cable is faulty.</td>
</tr>
</tbody>
</table>

2. Is continuity present between crane power cable connector pin B and terminal board position 5?

- **NO**
  - Replace crane power cable (para 7-90).
- **YES**
CONTINUITY TEST

(1) Disconnect connector P171 from crane power cable connector.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to crane power cable connector pin B.
(4) Connect negative (-) probe of multimeter to ground quick-connect terminal block (above main power switch) and note reading on multimeter.
(5) If continuity is not present, replace crane power cable (para 7-90).
(6) Connect positive (+) probe of multimeter to crane power cable connector pin C.
(7) Connect negative (-) probe of multimeter to junction box terminal board position 5 and note reading on multimeter.
(8) If continuity is not present, replace crane power cable (para 7-90).
(9) Close cover on junction box.
(10) Tighten four screws on junction box.
3. **TEST OPTIONS**

- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
If 24 VDC is not present, wire 2069 is faulty.

---

**KNOWLEDGE**
- Battery voltage OK.
- Circuit breakers OK.
- Auxiliary panel cable assembly OK.
- Dashboard wiring harness OK.
- Hydraulic system OK.

**POSSIBLE PROBLEMS**
- Faulty crane power cable.
- Faulty junction box internal wiring.
- Faulty reverse polarity diode(s).

**WARNING**
Read WARNING on following page.

**Is 24 VDC present at connector P171-C?**

---

**YES**
Repair wire 2069 (para 2-45) or replace crane power cable (para 7-90).

**NO**
(1) Set multimeter to volts DC.
(2) Connect positive (+) probe of multimeter on connector P171-C.
(3) Connect negative (-) probe of multimeter on ground.
(3) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
(4) If 24 VDC is not present, repair wire 2069 (para 2-45) or replace crane power cable (para 7-90).
(5) Position master power switch to off (TM 9-2320-366-10-1).
known info
battery voltage ok.
circuit breakers ok.
auxiliary panel cable assembly ok.
dashboard wiring harness ok.
hydraulic system ok.

possible problems
faulty crane power cable.
faulty junction box internal wiring.
faulty reverse polarity diode(s).

4.

is continuity present between connector p171-b and ground?

no

yes

repair wire 3077 (para 2-45) or replace crane power cable (para 7-90).

reason for question

yes

no

repair wire 3078 (para 2-45) or replace crane power cable (para 7-90).

known info
battery voltage ok.
circuit breakers ok.
auxiliary panel cable assembly ok.
dashboard wiring harness ok.
hydraulic system ok.

possible problems
faulty crane power cable.
faulty junction box internal wiring.
faulty reverse polarity diode(s).

5.

is continuity present between connector p171-e and ground?

no

yes

reason for question

if continuity is not present, wire 3077 is faulty.

if continuity is not present, wire 3078 is faulty. if continuity is present, notify ds maintenance.
CONTINUITY TEST

<table>
<thead>
<tr>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to connector P171-B.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(4) If continuity is not present, repair wire 3077 (para 2-45) or replace crane power cable (para 7-90).</td>
</tr>
</tbody>
</table>

---

CONTINUITY TEST

<table>
<thead>
<tr>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to connector P171-E.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(4) If continuity is not present, repair wire 3078 (para 2-45) or replace crane power cable (para 7-90).</td>
</tr>
<tr>
<td>(5) If continuity is present, notify DS Maintenance.</td>
</tr>
<tr>
<td>(6) Connect connector P171 to crane power cable connector.</td>
</tr>
</tbody>
</table>
### e105. M1084/M1086 MATERIAL HANDLING CRANE (MHC) DOES NOT OPERATE FROM REMOTE CONTROL

#### INITIAL SETUP

**Equipment Condition**
- Engine shut down (TM 9-2320-366-10-1).

**Personnel Required**
- (2)

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)

**References**
- TM 9-4910-571-12&P

---

#### KNOWN INFO

- Battery voltage OK.
- Main power circuit breaker switch OK.
- Input connector OK.
- Crane power cable OK.
- Reverse polarity diodes OK.
- Control lockout relay OK.
- Left outrigger proximity sensing switch cable assembly OK.
- Right outrigger proximity sensing switch cable assembly OK.
- Junction box internal wiring OK.
- Overload shutdown system OK.
- Hydraulic system shutdown relay OK.

#### POSSIBLE PROBLEMS

- Faulty remote control cable.
- Faulty external remote control cable.
- Faulty remote control box ON/OFF switch.

---

#### TEST OPTIONS

**Continuity Test or STE/ICE Test #91**

**REASON FOR QUESTION**

If continuity is not present, remote control cable is faulty.

---

**START**

1. **Is continuity present from remote control cable pin E to terminal board position 25?**

- **YES**
  - Replace remote control cable (para 7-96).

- **NO**
  - **NO**
    - **YES**
      - Replace remote control cable (para 7-96).
**CONTINUITY TEST**

1. Loosen four screws on junction box cover.
2. Open cover on junction box.
3. Disconnect remote control cable from remote control box.
4. Set multimeter to ohms.
5. Connect positive (+) probe of multimeter on pin E of connector on remote control cable.
6. Connect negative (-) probe on junction box terminal board position 25 and note reading on multimeter.
7. If continuity is not present, replace remote control cable (para 7-96).
8. Close cover on junction box.
9. Tighten four screws on junction box cover.
**Known Info**

- Battery voltage OK.
- Main power circuit breaker switch OK.
- Input connector OK.
- Crane power cable OK.
- Reverse polarity diodes OK.
- Control lockout relay OK.
- Left outrigger proximity sensing switch cable assembly OK.
- Right outrigger proximity sensing switch cable assembly OK.
- Junction box internal wiring OK.
- Overload shutdown system OK.
- Hydraulic system shutdown relay OK.
- Remote control cable OK.

**Possible Problems**

- Faulty external remote control cable.
- Faulty remote control box ON/OFF switch.

**Test Options**

Continuity Test or STE/ICE Test #91

**Reason for Question**

If continuity is not present, external remote control cable is faulty.

---

2. Is continuity present from one end of external remote control cable pin E to other end of external remote control cable pin E?

**YES**

Replace external remote control cable.

**NO**
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin E of one end of external remote control cable connector.
(3) Connect negative (-) probe of multimeter on pin E of other end of external remote control cable and note reading on multimeter.
(4) If continuity is not present, replace external remote control cable.
3. Is continuity present from remote control box receptacle pin H to pin J and from pin E to pin K?

- **NO**
  - Replace ON/OFF switch (para 7-32).
  - Notify DS Maintenance.

- **YES**
  - Continuity Test or STE/ICE Test #91

**KNOWLEDGE INFO**
- Battery voltage OK.
- Main power circuit breaker switch OK.
- Input connector OK.
- Crane power cable OK.
- Reverse polarity diodes OK.
- Control lockout relay OK.
- Left outrigger proximity sensing switch cable assembly OK.
- Right outrigger proximity sensing switch cable assembly OK.
- Junction box internal wiring OK.
- Overload shutdown system OK.
- Hydraulic system shutdown relay OK.
- Remote control cable OK.
- External remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control box ON/OFF switch.
CONTINUITY TEST

(1) Position ON/OFF switch to ON.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin H of remote control box receptacle.
(4) Connect negative (-) probe of multimeter on pin J of remote control box receptacle and note reading on multimeter.
(5) If continuity is not present, replace ON/OFF switch (para 7-32).
(6) Position ON/OFF switch to OFF.
(7) Connect positive (+) probe of multimeter on pin E of remote control box receptacle.
(8) Connect negative (-) probe of multimeter on pin K of remote control box receptacle and note reading on multimeter.
(9) If continuity is not present, replace ON/OFF switch (para 7-32).
(10) If continuity is present, notify DS Maintenance.
e106. M1084/M1086 MATERIAL HANDLING CRANE (MHC) HOIST UP DOES NOT OPERATE FROM REMOTE STATION

INITIAL SETUP

Equipment Conditions
Outriggers lowered (TM 9-2320-366-10-1).
Crane erected with approximately five feet of cable payed out (TM 9-2320-366-10-1).
Engine shut down (TM 9-2320-366-10-1).

Personnel Required
(2)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
STE/ICE-R (Item 41, Appendix C)

References
TM 9-4910-571-12&P

KNOWN INFO
Other crane functions from remote station OK.

POSSIBLE PROBLEMS
Faulty hoist up solenoid cable.
Faulty hoist up solenoid.
Faulty HOIST UP/DOWN controller.
Faulty remote control box internal wiring harness.
Faulty external remote control cable.
Faulty remote control cable.

TEST OPTIONS
Voltage Test or STE/ICE-R Test #89

REASON FOR QUESTION
This question eliminates possible problems and determines where to continue troubleshooting.

START

WARNING
1. Read WARNING on following page.

Is 24 vdc present at junction box assembly terminal board position 23?

NO

YES

Go to step 3 of this fault.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.

OUTPUT VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connect external remote control cable to and remote control box (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>2</td>
<td>Loosen four screws on junction box.</td>
</tr>
<tr>
<td>3</td>
<td>Open cover on junction box.</td>
</tr>
<tr>
<td>4</td>
<td>Position MAIN POWER switch to ON.</td>
</tr>
<tr>
<td>5</td>
<td>Lift guard and position remote control box ON/OFF switch to ON.</td>
</tr>
<tr>
<td>6</td>
<td>Set multimeter to volts dc.</td>
</tr>
<tr>
<td>7</td>
<td>Connect positive (+) probe of multimeter on terminal board lower position 23.</td>
</tr>
<tr>
<td>8</td>
<td>Connect negative (-) probe of multimeter on ground quick-connect terminal board (above MAIN POWER switch).</td>
</tr>
</tbody>
</table>

NOTE
Step (9) requires the aid of an assistant.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Position HOIST UP/DOWN to UP and note reading on multimeter.</td>
</tr>
<tr>
<td>10</td>
<td>If 24 volts dc is not present, go to step 3 of this fault.</td>
</tr>
</tbody>
</table>
2. Is continuity present from hoist up solenoid cable connector pin 2 to ground and pin 1 to terminal board lower position 23?

**KNOWN INFO**
- Other crane functions from remote station OK.
- Remote control box OK.
- HOIST UP/DOWN controller OK.

**POSSIBLE PROBLEMS**
- Faulty hoist up solenoid cable.
- Faulty hoist up solenoid.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
If continuity is not present, hoist up solenoid cable is faulty. If continuity is present, hoist up solenoid is faulty.

**YES**
Replace hoist up solenoid cable (para 7-93).

**NO**

**Notify DS Maintenance.**
CONTINUITY TEST

(1) Disconnect hoist up solenoid connector from hoist up solenoid.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin 2 of hoist up solenoid cable connector.
(4) Connect negative (-) probe of multimeter on ground and note reading on multimeter.
(5) Connect positive (+) probe of multimeter on pin 1 of hoist up solenoid cable connector.
(6) Connect negative (-) probe of multimeter on terminal board lower position 23 and note reading on multimeter.
(7) If continuity is not present, replace hoist up solenoid cable (para 7-93).
(8) If continuity is present, notify DS Maintenance.
(9) Connect hoist up solenoid cable connector to hoist up solenoid.
(10) Close cover on junction box.
(11) Tighten four screws on junction box cover.
(12) Stow crane (TM 9-2320-366-10-1).
3. Is continuity present from remote control box pin F to pin H?

- **NO**
  - Go to step 4 of this fault.

- **YES**
  - Go to step 5 of this fault.

**Known Info**
- Other crane functions from remote station OK.
- Hoist up solenoid cable OK.
- Hoist up solenoid OK.

**Possible Problems**
- Faulty hoist up/down controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

**Test Options**
- Continuity Test or STE/ICE Test #91

**Reason for Question**
- This question eliminates possible problems and determines where to continue troubleshooting.
CONTINUITY TEST

(1) Disconnect external remote control cable from remote control box.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin F of connector on remote control box.
(4) Connect negative (-) probe of multimeter on pin H of connector on remote control box.

NOTE
Step (5) requires the aid of an assistant.

(5) Position HOIST UP/DOWN controller to UP and note reading on multimeter.
(6) If continuity is not present, go to step 4 of this fault.
(7) If continuity is present, go to step 5 of this fault.
4. Is continuity present from remote control box connector pin F to HOIST UP/DOWN controller internal wiring harness pin 3 and remote control box connector pin H to HOIST UP/DOWN controller internal wiring harness pin 1?

- **NO**
  - Replace HOIST UP/DOWN controller (para 7-32).

- **YES**
  - Repair remote control box internal wiring harness (para 7-32).

**KNOWLEDGE INFO**
- Other crane functions from remote station OK.
- Hoist up solenoid cable OK.
- Hoist up solenoid OK.
- External remote control cable OK.
- Remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control box internal wiring harness.
- Faulty hoist up/down controller.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, remote control box internal wiring harness is faulty.
- If continuity is present, HOIST UP/DOWN controller is faulty.
CONTINUITY TEST

1. Remove HOIST UP/DOWN controller (para 7-32).
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter on pin F of remote control box connector.
4. Connect negative (-) probe of multimeter on pin 3 of HOIST UP/DOWN controller internal wiring harness and note reading on multimeter.
5. Connect positive (+) probe of multimeter on pin H of remote control box connector.
6. Connect negative (-) probe of multimeter on pin 1 of HOIST UP/DOWN controller internal wiring harness and note reading on multimeter.
7. If continuity is not present, replace remote control box internal wiring harness (para 7-32).
8. If continuity is present, replace HOIST UP/DOWN controller (para 7-32).
10. Close cover on junction box.
11. Tighten four screws on junction box cover.
5. Is continuity present from one end of external remote control cable connector pin F to other end of external remote control cable connector pin F?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Hoist up solenoid cable OK.</td>
</tr>
<tr>
<td>Hoist up solenoid OK.</td>
</tr>
<tr>
<td>Remote control box internal wiring harness OK.</td>
</tr>
<tr>
<td>HOIST UP/DOWN controller OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty external remote control cable.</td>
</tr>
<tr>
<td>Faulty remote control cable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE Test #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, external remote control cable is faulty.</td>
</tr>
</tbody>
</table>

YES

Replace external remote control cable.

NO
**CONTINUITY TEST**

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter on pin F of one end of external remote control cable connector.
3. Connect negative (-) probe of multimeter on pin F of other end of external remote control cable and note reading on multimeter.
4. If continuity is not present, replace external remote control cable.
6. Is continuity present from remote control cable connector pin F to terminal board position 23?

- **NO**
  - Replace remote control cable (para 7-96).

- **YES**
  - Notify DS Maintenance.

**KNOWN INFO**
- Other crane functions from remote station OK.
- Hoist up solenoid cable OK.
- Remote control box internal wiring harness OK.
- HOIST UP/DOWN controller OK.
- External remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control cable.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, remote control cable is faulty.
**CONTINUITY TEST**

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter on pin F of remote control cable connector.
3. Connect negative (-) probe of multimeter on terminal board lower position 23 and note reading on multimeter.
4. If continuity is not present, replace remote control cable (para 7-96).
5. If continuity is present, notify DS Maintenance.
6. Close cover on junction box.
7. Tighten four screws on junction box cover.
e107. M1084/M1086 MATERIAL HANDLING CRANE (MHC) HOIST DOWN DOES NOT OPERATE FROM REMOTE STATION

INITIAL SETUP

Equipment Conditions
- Outriggers lowered (TM 9-2320-366-10-1).
- Crane erected with approximately five feet of cable payed out (TM 9-2320-366-10-1).
- Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

Personnel Required
- (2)

References
- TM 9-4910-571-12&P

**WARNING**
Read **WARNING** on following page.

**POSSIBLE PROBLEMS**
- Faulty hoist down solenoid cable.
- Faulty hoist down solenoid.
- Faulty HOIST UP/DOWN controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

**TEST OPTIONS**
- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
This question eliminates possible problems and determines where to continue troubleshooting.

**KNOWLEDGE**
Other crane functions from remote station OK.

**START**

1. Is 24 vdc present at junction box assembly terminal board position 24?

**NO**
- Go to step 3 of this fault.

**YES**
- Go to step 3 of this fault.
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.

### OUTPUT VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connect external remote control cable to and remote control box (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>2</td>
<td>Loosen four screws on junction box.</td>
</tr>
<tr>
<td>3</td>
<td>Open cover on junction box.</td>
</tr>
<tr>
<td>4</td>
<td>Position MAIN POWER switch to ON.</td>
</tr>
<tr>
<td>5</td>
<td>Lift guard and position remote control box ON/OFF switch to ON.</td>
</tr>
<tr>
<td>6</td>
<td>Set multimeter to volts dc.</td>
</tr>
<tr>
<td>7</td>
<td>Connect positive (+) probe of multimeter on terminal board lower position 24.</td>
</tr>
<tr>
<td>8</td>
<td>Connect negative (-) probe of multimeter on ground quick-connect terminal board (above MAIN POWER switch).</td>
</tr>
</tbody>
</table>

**NOTE**

Step (9) requires the aid of an assistant.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Position HOIST UP/DOWN to DOWN and note reading on multimeter.</td>
</tr>
<tr>
<td>10</td>
<td>If 24 volts dc is not present, go to step 3 of this fault.</td>
</tr>
</tbody>
</table>
M1084/M1086 MATERIAL HANDLING CRANE (MHC) HOIST DOWN DOES NOT OPERATE FROM REMOTE STATION (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
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</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Remote control box OK.</td>
</tr>
<tr>
<td>HOIST UP/DOWN controller OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty hoist down solenoid cable.</td>
</tr>
<tr>
<td>Faulty hoist down solenoid.</td>
</tr>
</tbody>
</table>

2. Is continuity present from hoist down solenoid cable connector pin 2 to ground and pin 1 to terminal board lower position 24?

- **NO**
  - Notify DS Maintenance.

- **YES**
  - Replace hoist down solenoid cable (para 7-91).

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE Test #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, hoist down solenoid cable is faulty. If continuity is present, hoist down solenoid is faulty.</td>
</tr>
</tbody>
</table>
CONTINUITY TEST

(1) Disconnect hoist down solenoid connector from hoist up solenoid.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin 2 of hoist down solenoid cable connector.
(4) Connect negative (-) probe of multimeter on ground and note reading on multimeter.
(5) Connect positive (+) probe of multimeter on pin 1 of hoist down solenoid cable connector.
(6) Connect negative (-) probe of multimeter on terminal board lower position 24 and note reading on multimeter.
(7) If continuity is not present, replace hoist down solenoid cable (para 7-91).
(8) If continuity is present, notify DS Maintenance.
(9) Connect hoist down solenoid cable connector to hoist down solenoid.
(10) Close cover on junction box.
(11) Tighten four screws on junction box cover.
(12) Stow crane (TM 9-2320-366-10-1).
3. Is continuity present from remote control box connector pin G to pin H?

**Known Info**
- Other crane functions from remote station OK.
- Hoist down solenoid cable OK.
- Hoist down solenoid OK.

**Possible Problems**
- Faulty hoist up/down controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

**Test Options**
- Continuity Test or STE/ICE Test #91

**Reason for Question**
This question eliminates possible problems and determines where to continue troubleshooting.

**Flowchart**
- **YES**
  - Go to step 5 of this fault.
- **NO**
  - Go to step 4 of this fault.

**Other Crane Functions from Remote Station OK.**
- Hoist down solenoid cable OK.
- Hoist down solenoid OK.
CONTINUITY TEST

(1) Disconnect external remote control cable from remote control box.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin G of connector on remote control box.
(4) Connect negative (-) probe of multimeter on pin H of connector on remote control box.

NOTE
Step (5) requires the aid of an assistant.

(5) Position HOIST UP/DOWN controller to DOWN and note reading on multimeter.
(6) If continuity is not present, go to step 4 of this fault.
(7) If continuity is present, go to step 5 of this fault.
4. Is continuity present from remote control box connector pin G to HOIST UP/DOWN controller internal wiring harness pin 4 and remote control box connector pin H to HOIST UP/DOWN controller internal wiring harness pin 1?

**NO**

**YES**

- Repair remote control box internal wiring harness (para 7-32).
- Replace HOIST UP/DOWN controller (para 7-32).

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
If continuity is not present, remote control box internal wiring harness is faulty. If continuity is present, HOIST UP/DOWN controller is faulty.

**KNOWN INFO**
- Other crane functions from remote station OK.
- Hoist down solenoid cable OK.
- Hoist down solenoid OK.
- External remote control cable OK.
- Remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control box internal wiring harness.
- Faulty hoist up/down controller.
CONTINUITY TEST

(1) Remove HOIST UP/DOWN controller (para 7-32).
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin G of remote control box connector.
(4) Connect negative (-) probe of multimeter on pin 4 of HOIST UP/DOWN controller internal wiring harness and note reading on multimeter.
(5) Connect positive (+) probe of multimeter on pin H of remote control box connector.
(6) Connect negative (-) probe of multimeter on pin 1 of HOIST UP/DOWN controller internal wiring harness and note reading on multimeter.
(7) If continuity is not present, replace remote control box internal wiring harness (para 7-32).
(8) If continuity is present, replace HOIST UP/DOWN controller (para 7-32).
(9) Install HOIST UP/DOWN controller (para 7-32).
(10) Close cover on junction box.
(11) Tighten four screws on junction box cover.
(12) Stow crane (TM 9-2320-366-10-1).
5. Is continuity present from one end of external remote control cable connector pin G to other end of external remote control cable connector pin G?

<table>
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<tbody>
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<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Hoist down solenoid cable OK.</td>
</tr>
<tr>
<td>Remote control box internal wiring harness OK.</td>
</tr>
<tr>
<td>HOIST UP/DOWN controller OK.</td>
</tr>
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</table>

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<tr>
<th>POSSIBLE PROBLEMS</th>
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<tbody>
<tr>
<td>Faulty external remote control cable.</td>
</tr>
<tr>
<td>Faulty remote control cable.</td>
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</table>

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<tr>
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<tbody>
<tr>
<td>Continuity Test or STE/ICE Test #91</td>
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</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, external remote control cable is faulty.</td>
</tr>
</tbody>
</table>

YES -> Replace external remote control cable.

NO -> Replace external remote control cable.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin G of one end of external remote control cable connector.
(3) Connect negative (-) probe of multimeter on pin G of other end of external remote control cable and note reading on multimeter.
(4) If continuity is not present, replace external remote control cable.
6. Is continuity present from remote control cable connector to terminal board position 247?

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, remote control cable is faulty.

**KNOWLEDGE INFO**
- Other crane functions from remote station OK.
- Hoist down solenoid cable OK.
- Hoist down solenoid OK.
- Remote control box internal wiring harness OK.
- HOIST UP/DOWN controller OK.
- External remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control cable.

**YES**
- Notify DS Maintenance.

**NO**
- Replace remote control cable (para 7-96).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin G of remote control cable connector.
(3) Connect negative (-) probe of multimeter on terminal board lower position 24 and note reading on multimeter.
(4) If continuity is not present, replace remote control cable (para 7-96).
(5) If continuity is present, notify DS Maintenance.
(6) Close cover on junction box.
(7) Tighten four screws on junction box cover.
(8) Stow crane (TM 9-2320-366-10-1).
INITIAL SETUP

Equipment Conditions
Outriggers lowered (TM 9-2320-366-10-1).
Crane erected with approximately five feet
of cable payed out (TM 9-2320-366-10-1).
Engine shut down (TM 9-2320-366-10-1).

Personnel Required
(2)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
STE/ICE-R (Item 41, Appendix C)

References
TM 9-4910-571-12&P

KNOWLEDGE

Other crane functions from
remote station OK.

POSSIBLE PROBLEMS
Faulty boom up solenoid
cable.
Faulty boom up solenoid.
Faulty BOOM UP/DOWN
controller.
Faulty remote control
box internal wiring
harness.
Faulty external remote
control cable.
Faulty remote control
cable.

TEST OPTIONS
Voltage Test or
STE/ICE-R Test #89

REASON FOR QUESTION
This question eliminates
possible problems and
determines where to
continue troubleshooting.

Go to step 3 of this fault.
OUTPUT VOLTAGE TEST

(1) Connect external remote control cable to remote control box (TM 9-2320-366-10-1).
(2) Loosen four screws on junction box.
(3) Open cover on junction box.
(4) Position MAIN POWER switch to ON.
(5) Lift guard and position remote control box ON/OFF switch to ON.
(6) Set multimeter to volts dc.
(7) Connect positive (+) probe of multimeter on terminal board lower position 21.
(8) Connect negative (-) probe of multimeter on ground quick-connect terminal board (above MAIN POWER switch).

NOTE
Step (9) requires the aid of an assistant.

(9) Position BOOM UP/DOWN to UP and note reading on multimeter.
(10) If 24 volts dc is not present, go to step 3 of this fault.

WARNING
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.
2. Is continuity present from boom up solenoid cable connector pin 2 to ground and from pin 1 to terminal board lower position 21?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK. Remote control box OK. BOOM UP/DOWN controller OK.</td>
<td>Continuity Test or STE/ICE Test #91</td>
</tr>
<tr>
<td>POSSIBLE PROBLEMS</td>
<td></td>
</tr>
<tr>
<td>Faulty boom up solenoid cable. Faulty boom up solenoid.</td>
<td></td>
</tr>
</tbody>
</table>

NO

Replace boom up solenoid cable (para 7-88).

YES

Notify DS Maintenance.
CONTINUITY TEST

1. Disconnect boom up solenoid connector from boom up solenoid.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter on pin 2 of boom up solenoid cable connector.
4. Connect negative (-) probe of multimeter on ground and note reading on multimeter.
5. Connect positive (+) probe of multimeter on pin 1 of boom up solenoid cable connector.
6. Connect negative (-) probe of multimeter on terminal board lower position 21 and note reading on multimeter.
7. If continuity is not present, replace boom up solenoid cable (para 7-88).
8. If continuity is present, notify DS Maintenance.
9. Connect boom up solenoid cable connector to boom up solenoid.
10. Close cover on junction box.
11. Tighten four screws on junction box cover.
### KNOWN INFO
- Other crane functions from remote station OK.
- Boom up solenoid cable OK
- Boom up solenoid OK.

### POSSIBLE PROBLEMS
- Faulty boom up/down controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

### TEST OPTIONS
- Continuity Test or STE/ICE Test #91

### REASON FOR QUESTION
This question eliminates possible problems and determines where to continue troubleshooting.

### 3. Is continuity present from remote control box connector pin N to pin H?

**NO**
- Go to step 4 of this fault.

**YES**
- Go to step 5 of this fault.
CONTINUITY TEST

(1) Disconnect external remote control cable from remote control box.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin N of connector on remote control box.
(4) Connect negative (-) probe of multimeter on pin H of connector on remote control box.

NOTE
Step (5) requires the aid of an assistant.

(5) Position BOOM UP/DOWN controller to UP and note reading on multimeter.
(6) If continuity is not present, go to step 4 of this fault.
(7) If continuity is present, go to step 5 of this fault.
**TM 9-2320-366-20-2**

**e108. M1084/M1086 MATERIAL HANDLING CRANE (MHC) BOOM UP DOES NOT OPERATE FROM REMOTE STATION (CONT)**

<table>
<thead>
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<th>KNOWN INFO</th>
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<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Boom up solenoid cable OK.</td>
</tr>
<tr>
<td>Boom up solenoid OK.</td>
</tr>
<tr>
<td>External remote control cable OK.</td>
</tr>
<tr>
<td>Remote control cable OK.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty remote control box internal wiring harness.</td>
</tr>
<tr>
<td>Faulty boom up/down controller.</td>
</tr>
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</table>

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<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, remote control box internal wiring harness is faulty. If continuity is present, BOOM UP/DOWN controller is faulty.</td>
</tr>
</tbody>
</table>

4. Is continuity present from remote control box connector pin N to BOOM UP/DOWN controller internal wiring harness pin 3 and remote control box connector pin H to BOOM UP/DOWN controller internal wiring harness pin 1?

- **NO**
  - Repair remote control box internal wiring harness (para 7-32).

- **YES**
  - Replace BOOM UP/DOWN controller (para 7-32).
CONTINUITY TEST

(1) Remove BOOM UP/DOWN controller (para 7-32).
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin N of remote control box connector.
(4) Connect negative (-) probe of multimeter on pin 3 of BOOM UP/DOWN controller internal wiring harness and note reading on multimeter.
(5) Connect positive (+) probe of multimeter on pin H of remote control box connector.
(6) Connect negative (-) probe of multimeter on pin 1 of BOOM UP/DOWN controller internal wiring harness and note reading on multimeter.
(7) If continuity is not present, replace remote control box internal wiring harness (para 7-32).
(8) If continuity is present, replace BOOM UP/DOWN controller (para 7-32).
(9) Install BOOM UP/DOWN controller (para 7-32).
(10) Close cover on junction box.
(11) Tighten four screws on junction box cover.
(12) Stow crane (TM 9-2320-366-10-1).
5. Is continuity present from one end of external remote control cable connector pin N to other end of external remote control cable connector pin N?

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<tbody>
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<td>Other crane functions from remote station OK.</td>
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<tr>
<td>Boom up solenoid cable OK.</td>
</tr>
<tr>
<td>Boom up solenoid OK.</td>
</tr>
<tr>
<td>Remote control box internal wiring harness OK.</td>
</tr>
<tr>
<td>BOOM UP/DOWN controller OK.</td>
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</table>

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<tr>
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<tbody>
<tr>
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</thead>
<tbody>
<tr>
<td>If continuity is not present, external remote control cable is faulty.</td>
</tr>
</tbody>
</table>

NO

YES

Replace external remote control cable.
CONTINUITY TEST

(1) Set multimeter to ohms.

(2) Connect positive (+) probe of multimeter on pin N of one end of external remote control cable connector.

(3) Connect negative (-) probe of multimeter on pin N of other end of external remote control cable and note reading on multimeter.

(4) If continuity is not present, replace external remote control cable.
## Known Info

<table>
<thead>
<tr>
<th>Test Options</th>
<th>Reason for Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE Test #91</td>
<td>If continuity is not present, remote control cable is faulty.</td>
</tr>
</tbody>
</table>

### Possible Problems

- Faulty remote control cable.

### Test Options

<table>
<thead>
<tr>
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<th>Reason for Question</th>
</tr>
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<tr>
<td>Continuity Test or STE/ICE Test #91</td>
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</tbody>
</table>

### Known Info

- Other crane functions from remote station OK.
- Boom up solenoid cable OK.
- Boom up solenoid OK.
- Remote control box internal wiring harness OK.
- BOOM UP/DOWN controller OK.
- External remote control cable OK.

### Possible Problems

- Faulty remote control cable.

---

**6.** Is continuity present from remote control cable connector pin N to terminal board lower position 21?

- **Yes**: Replace remote control cable (para 7-96).
- **No**: Notify DS Maintenance.
## CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter on pin N of remote control cable connector.
3. Connect negative (-) probe of multimeter on terminal board lower position 21 and note reading on multimeter.
4. If continuity is not present, replace remote control cable (para 7-96).
5. If continuity is present, notify DS Maintenance.
6. Close cover on junction box.
7. Tighten four screws on junction box cover.
**e109. M1084/M1086 MATERIAL HANDLING CRANE (MHC) BOOM DOWN DOES NOT OPERATE FROM REMOTE STATION**

**INITIAL SETUP**

**Equipment Conditions**
- Outriggers lowered (TM 9-2320-366-10-1).
- Crane erected with approximately five feet of cable payed out (TM 9-2320-366-10-1).
- Engine shut down (TM 9-2320-366-10-1).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

**References**
- TM 9-4910-571-12&P

**Personnel Required**
- (2)

**KNOWLEDGMENT/POSSIBLE PROBLEMS**

- Other crane functions from remote station OK.
- Faulty boom down solenoid cable.
- Faulty boom down solenoid.
- Faulty BOOM UP/DOWN controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

**WARNING**

1. Read WARNING on following page.

**TEST OPTIONS**

- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**

This question eliminates possible problems and determines where to continue troubleshooting.

**START**

**YES**

Go to step 3 of this fault.

**NO**
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>OUTPUT VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Connect external remote control cable to remote control box (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(2) Loosen four screws on junction box.</td>
</tr>
<tr>
<td>(3) Open cover on junction box.</td>
</tr>
<tr>
<td>(4) Position MAIN POWER switch to ON.</td>
</tr>
<tr>
<td>(5) Lift guard and position remote control box ON/OFF switch to ON.</td>
</tr>
<tr>
<td>(6) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(7) Connect positive (+) probe of multimeter on terminal board lower position 22.</td>
</tr>
<tr>
<td>(8) Connect negative (-) probe of multimeter on ground quick-connect terminal board (above MAIN POWER switch).</td>
</tr>
</tbody>
</table>

**NOTE**

Step (9) requires the aid of an assistant.

(9) Position BOOM UP/DOWN to DOWN and note reading on multimeter.

(10) If 24 volts dc is not present, go to step 3 of this fault.
2. Is continuity present from boom down solenoid cable connector pin 2 to ground and from pin 1 to terminal board lower position 22?

- **NO**
  - Replace boom down solenoid cable (para 7-86).

- **YES**
  - Notify DS Maintenance.

**KNOWN INFO**
- Other crane functions from remote station OK.
- Remote control box OK.
- BOOM UP/DOWN controller OK.

**POSSIBLE PROBLEMS**
- Faulty boom down solenoid cable.
- Faulty boom down solenoid

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, boom down solenoid cable is faulty. If continuity is present, boom down solenoid is faulty.
CONTINUITY TEST

(1) Disconnect boom down solenoid connector from boom down solenoid.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin 2 of boom down solenoid cable connector.
(4) Connect negative (-) probe of multimeter on ground and note reading on multimeter.
(5) Connect positive (+) probe of multimeter on pin 1 of boom down solenoid cable connector.
(6) Connect negative (-) probe of multimeter on terminal board lower position 22 and note reading on multimeter.
(7) If continuity is not present, replace boom down solenoid cable (para 7-86).
(8) If continuity is present, notify DS Maintenance.
(9) Connect boom down solenoid cable connector to boom down solenoid.
(10) Close cover on junction box.
(11) Tighten four screws on junction box cover.
(12) Stow crane (TM 9-2320-366-10-1).
3. Is continuity present from remote control box connector pin M to pin H?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Boom down solenoid cable OK.</td>
</tr>
<tr>
<td>Boom down solenoid OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty boom up/down controller.</td>
</tr>
<tr>
<td>Faulty remote control box internal wiring harness.</td>
</tr>
<tr>
<td>Faulty external remote control cable.</td>
</tr>
<tr>
<td>Faulty remote control cable.</td>
</tr>
</tbody>
</table>

If NO, go to step 4 of this fault.

If YES, go to step 5 of this fault.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
This question eliminates possible problems and determines where to continue troubleshooting.
CONTINUITY TEST

(1) Disconnect external remote control cable from remote control box.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin M of connector on remote control box.
(4) Connect negative (-) probe of multimeter on pin H of connector on remote control box.

NOTE
Step (5) requires the aid of an assistant.

(5) Position BOOM UP/DOWN controller to DOWN and note reading on multimeter.
(6) If continuity is not present, go to step 4 of this fault.
(7) If continuity is present, go to step 5 of this fault.
4. Is continuity present from remote control box connector pin M to BOOM UP/DOWN controller internal wiring harness pin 4 and from remote control box connector pin H to BOOM UP/DOWN controller internal wiring harness pin 1?

**Known Info**
- Other crane functions from remote station OK.
- Boom down solenoid cable OK.
- Boom down solenoid OK.
- External remote control cable OK.
- Remote control cable OK.

**Possible Problems**
- Faulty remote control box internal wiring harness.
- Faulty boom up/down controller.

**Test Options**
- Continuity Test or STE/ICE Test #91

**Reason for Question**
- If continuity is not present, remote control box internal wiring harness is faulty.
- If continuity is present, BOOM UP/DOWN controller is faulty.

**YES**
- Repair remote control box internal wiring harness (para 7-32).

**NO**
- Replace BOOM UP/DOWN controller (para 7-32).
CONTINUITY TEST

(1) Remove BOOM UP/DOWN controller (para 7-32).
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin M of remote control box connector.
(4) Connect negative (-) probe of multimeter on pin 4 of BOOM UP/DOWN controller internal wiring harness and note reading on multimeter.
(5) Connect positive (+) probe of multimeter on pin H of remote control box connector.
(6) Connect negative (-) probe of multimeter on pin 1 of BOOM UP/DOWN controller internal wiring harness and note reading on multimeter.
(7) If continuity is not present, replace remote control box internal wiring harness (para 7-32).
(8) If continuity is present, replace BOOM UP/DOWN controller (para 7-32).
(9) Install BOOM UP/DOWN controller (para 7-32).
(10) Close cover on junction box.
(11) Tighten four screws on junction box cover.
(12) Stow crane (TM 9-2320-366-10-1).
5. Is continuity present from one end of external remote control cable connector pin M to other end of external remote control cable connector pin M?

**NO**
- Replace external remote control cable.

**YES**
- Known Info
  - Other crane functions from remote station OK.
  - Boom down solenoid cable OK.
  - Boom down solenoid OK.
  - Remote control box internal wiring harness OK.
  - BOOM UP/DOWN controller OK.

**Possible Problems**
- Faulty external remote control cable.
- Faulty remote control cable.

**Test Options**
- Continuity Test or STE/ICE Test #91

**Reason for Question**
- If continuity is not present, external remote control cable is faulty.
**CONTINUITY TEST**

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter on pin M of one end of external remote control cable connector.
3. Connect negative (-) probe of multimeter on pin M of other end of external remote control cable and note reading on multimeter.
4. If continuity is not present, replace external remote control cable.
6. Is continuity present remote control cable connector pin M to terminal board lower position 22?

**KNOW INFO**
- Other crane functions from remote station OK.
- Boom down solenoid cable OK.
- Boom down solenoid OK.
- Remote control box internal wiring harness OK.
- BOOM UP/DOWN controller OK.
- External remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control cable.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, remote control cable is faulty.

**YES**
- Notify DS Maintenance.

**NO**
- Replace remote control cable (para 7-96).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin M of remote control cable connector.
(3) Connect negative (-) probe of multimeter on terminal board lower position 22 and note reading on multimeter.
(4) If continuity is not present, replace remote control cable (para 7-96).
(5) If continuity is present, notify DS Maintenance.
(6) Close cover on junction box.
(7) Tighten four screws on junction box cover.
(8) Stow crane (TM 9-2320-366-10-1).
1. Other crane functions from remote station OK.

### KNOWN INFO
- Other crane functions from remote station OK.

### POSSIBLE PROBLEMS
- Faulty telescope in solenoid cable.
- Faulty telescope in solenoid.
- Faulty TELESCOPE IN/OUT controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

### TEST OPTIONS
- Voltage Test or STE/ICE-R Test #89

### REASON FOR QUESTION
This question eliminates possible problems and determines where to continue troubleshooting.

---

Is 24 vdc present at junction box assembly terminal board position 20?

- NO
  - Go to step 3 of this fault.
- YES
  - Go to step 3 of this fault.
OUTPUT VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connect external remote control cable to remote control box (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>2</td>
<td>Loosen four screws on junction box.</td>
</tr>
<tr>
<td>3</td>
<td>Open cover on junction box.</td>
</tr>
<tr>
<td>4</td>
<td>Position MAIN POWER switch to ON.</td>
</tr>
<tr>
<td>5</td>
<td>Lift guard and position remote control box ON/OFF switch to ON.</td>
</tr>
<tr>
<td>6</td>
<td>Set multimeter to volts dc.</td>
</tr>
<tr>
<td>7</td>
<td>Connect positive (+) probe of multimeter on terminal board lower position 20.</td>
</tr>
<tr>
<td>8</td>
<td>Connect negative (-) probe of multimeter on ground quick-connect terminal board (above MAIN POWER switch).</td>
</tr>
</tbody>
</table>

**NOTE**
Step (9) requires the aid of an assistant.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Position TELESCOPE IN/OUT to IN and note reading on multimeter.</td>
</tr>
<tr>
<td>10</td>
<td>If 24 volts dc is not present, go to step 3 of this fault.</td>
</tr>
</tbody>
</table>

**WARNING**
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.

**WARNING**
Wires removed for clarity

**WARNING**
Remote control box ON/OFF switch

**WARNING**
Telescope IN/OUT controller

**WARNING**
Main power switch

**WARNING**
Junction box
**KNOWN INFO**
- Other crane functions from remote station OK.
- Remote control box OK.
- TELESCOPE IN/OUT controller OK.

**POSSIBLE PROBLEMS**
- Faulty telescope in solenoid cable.
- Faulty telescope in solenoid.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, telescope in solenoid cable is faulty. If continuity is present, telescope in solenoid is faulty.

**Diagram:**
- **YES:** Replace telescope in solenoid cable (para 7-101).
- **NO:**
  - Is continuity present from telescope in solenoid cable connector pin 2 to ground and from pin 1 to terminal board lower position 20?
  - Replace telescope in solenoid cable (para 7-101). Notify DS Maintenance.
CONTINUITY TEST

1. Disconnect telescope in solenoid connector from telescope in solenoid.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter on pin 2 of telescope in solenoid cable connector.
4. Connect negative (-) probe of multimeter on ground and note reading on multimeter.
5. Connect positive (+) probe of multimeter on pin 1 of telescope in solenoid cable connector.
6. Connect negative (-) probe of multimeter on terminal board lower position 20 and note reading on multimeter.
7. If continuity is not present, replace telescope in solenoid cable (para 7-101).
8. If continuity is present, notify DS Maintenance.
9. Connect telescope in solenoid cable connector to telescope in solenoid.
10. Close cover on junction box.
11. Tighten four screws on junction box cover.
3. Is continuity present from remote control box connector pin D to pin H?

NO → Go to step 4 of this fault.

YES → Go to step 5 of this fault.

**Known Info**
- Other crane functions from remote station OK.
- Telescope in solenoid cable OK.
- Telescope in solenoid OK.

**Possible Problems**
- Faulty telescope in/out controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

**Test Options**
- Continuity Test or STE/ICE Test #91

**Reason for Question**
This question eliminates possible problems and determines where to continue troubleshooting.
CONTINUITY TEST

(1) Disconnect external remote control cable from remote control box.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin D of connector on remote control box.
(4) Connect negative (-) probe of multimeter on pin H of connector on remote control box.

NOTE
Step (5) requires the aid of an assistant.
(5) Position TELESCOPE IN/OUT controller to IN and note reading on multimeter.
(6) If continuity is not present, go to step 4 of this fault.
(7) If continuity is present, go to step 5 of this fault.
**KNOWLEDGE INFO**

- Other crane functions from remote station OK.
- Telescope in solenoid cable OK.
- Telescope in solenoid OK.
- External remote control cable OK.
- Remote control cable OK.

**POSSIBLE PROBLEMS**

- Faulty remote control box internal wiring harness.
- Faulty telescope in/out controller.

**TEST OPTIONS**

- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**

- If continuity is not present, remote control box internal wiring harness is faulty.
- If continuity is present, TELESCOPE IN/OUT controller is faulty.

**PROCEDURE**

1. Is continuity present from remote control box connector pin D to TELESCOPE IN/OUT controller internal wiring harness pin 3 and from remote control box connector pin H to TELESCOPE IN/OUT controller internal wiring harness pin 1?

   - **NO**
     - Repair remote control box internal wiring harness (para 7-32).

   - **YES**
     - Replace TELESCOPE IN/OUT controller (para 7-32).
### CONTINUITY TEST

1. Remove TELESCOPE IN/OUT controller (para 7-32).
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter on pin D of remote control box connector.
4. Connect negative (-) probe of multimeter on pin 3 of TELESCOPE IN/OUT controller internal wiring harness and note reading on multimeter.
5. Connect positive (+) probe of multimeter on pin H of remote control box connector.
6. Connect negative (-) probe of multimeter on pin 1 of TELESCOPE IN/OUT controller internal wiring harness and note reading on multimeter.
7. If continuity is not present, replace remote control box internal wiring harness (para 7-32).
8. If continuity is present, replace TELESCOPE IN/OUT controller (para 7-32).
9. Install TELESCOPE IN/OUT controller (para 7-32).
10. Close cover on junction box.
11. Tighten four screws on junction box cover.
5. Is continuity present from one end of external remote control cable connector pin D to other end of external remote control cable connector pin D?

**KNOWN INFO**
- Other crane functions from remote station OK.
- Telescope in solenoid cable OK.
- Telescope in solenoid OK.
- Remote control box internal wiring harness OK.
- TELESCOPE IN/OUT controller OK.

**POSSIBLE PROBLEMS**
- Faulty external remote control cable.
- Faulty remote control cable.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, external remote control cable is faulty.

---

- Yes -> Replace external remote control cable.
- No -> Replace external remote control cable.
<table>
<thead>
<tr>
<th><strong>CONTINUITY TEST</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)  Set multimeter to ohms.</td>
</tr>
<tr>
<td>(2)  Connect positive (+) probe of multimeter on pin D of one end of external</td>
</tr>
<tr>
<td>remote control cable connector.</td>
</tr>
<tr>
<td>(3)  Connect negative (-) probe of multimeter on pin D of other end of external</td>
</tr>
<tr>
<td>remote control cable and note reading on multimeter.</td>
</tr>
<tr>
<td>(4)  If continuity is not present, replace external remote control cable.</td>
</tr>
</tbody>
</table>

**EXTERNAL REMOTE CONTROL CABLE**
e110. M1084/M1086 MATERIAL HANDLING CRANE (MHC) TELESCOPE IN DOES NOT OPERATE FROM REMOTE STATION (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Telescope in solenoid cable OK.</td>
</tr>
<tr>
<td>Telescope in solenoid OK.</td>
</tr>
<tr>
<td>Remote control box internal wiring harness OK.</td>
</tr>
<tr>
<td>TELESCOPE IN/OUT controller OK.</td>
</tr>
<tr>
<td>External remote control cable OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty remote control cable.</td>
</tr>
</tbody>
</table>

6. Is continuity present from remote control cable connector pin D to terminal board lower position 20?

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE Test #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, remote control cable is faulty.</td>
</tr>
</tbody>
</table>

NO

Replace remote control cable (para 7-96).

YES

Notify DS Maintenance.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin D of remote control cable connector.
(3) Connect negative (-) probe of multimeter on terminal board lower position 20 and note reading on multimeter.
(4) If continuity is not present, replace remote control cable (para 7-96).
(5) If continuity is present, notify DS Maintenance.
(6) Close cover on junction box.
(7) Tighten four screws on junction box cover.
(8) Stow crane (TM 9-2320-366-10-1).
## INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Conditions</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outriggers lowered (TM 9-2320-366-10-1).</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td>Crane erected with approximately five feet of cable payed out (TM 9-2320-366-10-1).</td>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
</tr>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1).</td>
<td>STE/ICE-R (Item 41, Appendix C)</td>
</tr>
</tbody>
</table>

**Personnel Required**

(2)

**References**

TM 9-4910-571-12&P

#### KNOWN INFO

- Other crane functions from remote station OK.

#### POSSIBLE PROBLEMS

- Faulty telescope out solenoid cable.
- Faulty telescope out solenoid.
- Faulty TELESCOPE IN/OUT controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

#### WARNING

Read WARNING on following page.

1. **Is 24 vdc present at junction box assembly terminal board position 19?**

#### TEST OPTIONS

- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**

This question eliminates possible problems and determines where to continue troubleshooting.

**START**

**NO**

Go to step 3 of this fault.

**YES**
**OUTPUT VOLTAGE TEST**

1. Connect external remote control cable to remote control box (TM 9-2320-366-10-1).
2. Loosen four screws on junction box.
3. Open cover on junction box.
4. Position MAIN POWER switch to ON.
5. Lift guard and position remote control box ON/OFF switch to ON.
6. Set multimeter to volts dc.
7. Connect positive (+) probe of multimeter on terminal board lower position 19.
8. Connect negative (-) probe of multimeter on ground quick-connect terminal board (above MAIN POWER switch).

**NOTE**

Step (9) requires the aid of an assistant.

9. Position TELESCOPE IN/OUT to OUT and note reading on multimeter.
10. If 24 volts dc is not present, go to step 3 of this fault.

---

**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.

**NOTE**

Step (9) requires the aid of an assistant.

---

**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.
2. Is continuity present from telescope out solenoid cable connector pin 2 to ground and from pin 1 to terminal board lower position 19?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Remote control box OK.</td>
</tr>
<tr>
<td>TELESCOPE IN/OUT controller OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty telescope out solenoid cable.</td>
</tr>
<tr>
<td>Faulty telescope out solenoid.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE Test #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, telescope out solenoid cable is faulty. If continuity is present, telescope out solenoid is faulty.</td>
</tr>
</tbody>
</table>

**NO**

- Replace telescope out solenoid cable (para 7-103).

**YES**

- Notify DS Maintenance.
**CONTINUITY TEST**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Disconnect telescope out solenoid connector from telescope out solenoid.</td>
</tr>
<tr>
<td>2</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>3</td>
<td>Connect positive (+) probe of multimeter on pin 2 of telescope out solenoid cable connector.</td>
</tr>
<tr>
<td>4</td>
<td>Connect negative (-) probe of multimeter on ground and note reading on multimeter.</td>
</tr>
<tr>
<td>5</td>
<td>Connect positive (+) probe of multimeter on pin 1 of telescope out solenoid cable connector.</td>
</tr>
<tr>
<td>6</td>
<td>Connect negative (-) probe of multimeter on terminal board lower position 19 and note reading on multimeter.</td>
</tr>
<tr>
<td>7</td>
<td>If continuity is not present, replace telescope out solenoid cable (para 7-103).</td>
</tr>
<tr>
<td>8</td>
<td>If continuity is present, notify DS Maintenance.</td>
</tr>
<tr>
<td>9</td>
<td>Connect telescope out solenoid cable connector to telescope out solenoid.</td>
</tr>
<tr>
<td>10</td>
<td>Close cover on junction box.</td>
</tr>
<tr>
<td>11</td>
<td>Tighten four screws on junction box cover.</td>
</tr>
<tr>
<td>12</td>
<td>Stow crane (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
111. M1084/M1086 MATERIAL HANDLING CRANE (MHC) TELESCOPE OUT DOES NOT OPERATE FROM REMOTE STATION (CONT)

### KNOWN INFO
- Other crane functions from remote station OK.
- Telescope out solenoid cable OK.
- Telescope out solenoid OK.

### POSSIBLE PROBLEMS
- Faulty telescope in/out controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

#### 3. Is continuity present from remote control box connector pin C to pin H?

- **YES**
  - Go to step 5 of this fault.

- **NO**
  - Go to step 4 of this fault.

### TEST OPTIONS
- Continuity Test or STE/ICE Test #91

### REASON FOR QUESTION
- This question eliminates possible problems and determines where to continue troubleshooting.

Go to step 4 of this fault.
CONTINUITY TEST

(1) Disconnect external remote control cable from remote control box.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin C of connector on remote control box.
(4) Connect negative (-) probe of multimeter on pin H of connector on remote control box.

NOTE
Step (5) requires the aid of an assistant.
(5) Position TELESCOPE IN/OUT controller to OUT and note reading on multimeter.
(6) If continuity is not present, go to step 4 of this fault.
(7) If continuity is present, go to step 5 of this fault.
**111. M1084/M1086 MATERIAL HANDLING CRANE (MHC) TELESCOPE OUT DOES NOT OPERATE FROM REMOTE STATION (CONT)**

**KNOWN INFO**
- Other crane functions from remote station OK.
- Telescope out solenoid cable OK.
- Telescope out solenoid OK.
- External remote control cable OK.
- Remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control box internal wiring harness.
- Faulty telescope in/out controller.

<table>
<thead>
<tr>
<th><strong>TEST OPTIONS</strong></th>
<th><strong>REASON FOR QUESTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE Test #91</td>
<td></td>
</tr>
</tbody>
</table>

4. Is continuity present from remote control box connector pin C to TELESCOPE IN/OUT controller internal wiring harness pin 4 and from remote control box connector pin H to TELESCOPE IN/OUT controller internal wiring harness pin 1?

- **NO**
  - Repair remote control box internal wiring harness (para 7-32).

- **YES**
  - Replace TELESCOPE IN/OUT controller (para 7-32).
CONTINUITY TEST

(1) Remove TELESCOPE IN/OUT controller (para 7-32).
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin C of remote control box connector.
(4) Connect negative (-) probe of multimeter on pin 4 of TELESCOPE IN/OUT controller internal wiring harness and note reading on multimeter.
(5) Connect positive (+) probe of multimeter on pin H of remote control box connector.
(6) Connect negative (-) probe of multimeter on pin 1 of TELESCOPE IN/OUT controller internal wiring harness and note reading on multimeter.
(7) If continuity is not present, replace remote control box internal wiring harness (para 7-32).
(8) If continuity is present, replace TELESCOPE IN/OUT controller (para 7-32).
(9) Install TELESCOPE IN/OUT controller (para 7-32).
(10) Close cover on junction box.
(11) Tighten four screws on junction box cover.
(12) Stow crane (TM 9-2320-366-10-1).
5. Is continuity present from one end of external remote control cable connector pin C to other end of external remote control cable connector pin C?

   NO
   
   Replace external remote control cable.

   YES
   
   Replace external remote control cable.

TEST OPTIONS

Continuity Test or STE/ICE Test #91

REASON FOR QUESTION

If continuity is not present, external remote control cable is faulty.

KNOWN INFO

Other crane functions from remote station OK.
Telescope out solenoid cable OK.
Telescope out solenoid OK.
Remote control box internal wiring harness OK.
TELESCOPE IN/OUT controller OK.

POSSIBLE PROBLEMS

Faulty external remote control cable.
Faulty remote control cable.

---

111. M1084/M1086 MATERIAL HANDLING CRANE (MHC) TELESCOPE OUT DOES NOT OPERATE FROM REMOTE STATION (CONT)
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin C of one end of external remote control cable connector.
(3) Connect negative (-) probe of multimeter on pin C of other end of external remote control cable and note reading on multimeter.
(4) If continuity is not present, replace external remote control cable.
6. Is continuity present from remote control cable connector pin C to terminal board lower position 19?

- **NO**
  - Replace remote control cable (para 7-96).
- **YES**
  - Notify DS Maintenance.

**KNOWN INFO**
- Other crane functions from remote station OK.
- Telescope out solenoid cable OK.
- Telescope out solenoid OK.
- Remote control box internal wiring harness OK.
- TELESCOPE IN/OUT controller OK.
- External remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control cable.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, remote control cable is faulty.
### CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>2.</td>
<td>Connect positive (+) probe of multimeter on pin C of remote control cable connector.</td>
</tr>
<tr>
<td>3.</td>
<td>Connect negative (-) probe of multimeter on terminal board lower position 19 and note reading on multimeter.</td>
</tr>
<tr>
<td>4.</td>
<td>If continuity is not present, replace remote control cable (para 7-96).</td>
</tr>
<tr>
<td>5.</td>
<td>If continuity is present, notify DS Maintenance.</td>
</tr>
<tr>
<td>6.</td>
<td>Close cover on junction box.</td>
</tr>
<tr>
<td>7.</td>
<td>Tighten four screws on junction box cover.</td>
</tr>
</tbody>
</table>
**e112. M1084/M1086 MATERIAL HANDLING CRANE (MHC) SWING CW DOES NOT OPERATE FROM REMOTE STATION**

### INITIAL SETUP

**Equipment Conditions**
- Outriggers lowered (TM 9-2320-366-10-1).
- Crane erected with approximately five feet of cable payed out (TM 9-2320-366-10-1).
- Engine shut down (TM 9-2320-366-10-1).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

**Personnel Required**
(2)

**References**
- TM 9-4910-571-12&P

### KNOWN INFO

<table>
<thead>
<tr>
<th>Other crane functions from remote station OK.</th>
</tr>
</thead>
</table>

### POSSIBLE PROBLEMS

- Faulty swing CW solenoid cable.
- Faulty swing CW solenoid.
- Faulty SWING CW/CCW controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

### WARNING

1. Read WARNING on following page.

### TEST OPTIONS

- Voltage Test or STE/ICE-R Test #89

### REASON FOR QUESTION

This question eliminates possible problems and determines where to continue troubleshooting.

### Flowchart:

- **START**
  - **WARNING**
    - **Is 24 vdc present at junction box assembly terminal board position 18?**
      - **NO**
        - **GO TO STEP 3 OF THIS FAULT.**
      - **YES**
        - **Go to step 3 of this fault.**
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.

### WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>OUTPUT VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Connect external remote control cable to remote control box (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(2) Loosen four screws on junction box.</td>
</tr>
<tr>
<td>(3) Open cover on junction box.</td>
</tr>
<tr>
<td>(4) Position MAIN POWER switch to ON.</td>
</tr>
<tr>
<td>(5) Lift guard and position remote control box ON/OFF switch to ON.</td>
</tr>
<tr>
<td>(6) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(7) Connect positive (+) probe of multimeter on terminal board lower position 18.</td>
</tr>
<tr>
<td>(8) Connect negative (-) probe of multimeter on ground quick-connect terminal board (above MAIN POWER switch).</td>
</tr>
</tbody>
</table>

**NOTE**

Step (9) requires the aid of an assistant.

(9) Position SWING CW/CCW to CW and note reading on multimeter.

(10) If 24 volts dc is not present, go to step 3 of this fault.
2. **KNOWN INFO**
   - Other crane functions from remote station OK.
   - Remote control box OK.
   - SWING CW/CCW controller OK.

   **POSSIBLE PROBLEMS**
   - Faulty swing CW solenoid cable.
   - Faulty swing CW solenoid.

   **TEST OPTIONS**
   - Continuity Test or STE/ICE Test #91

   **REASON FOR QUESTION**
   - If continuity is not present, swing CW solenoid cable is faulty. If continuity is present, swing CW solenoid is faulty.

   **Diagram**
   - **YES**
     - Replace swing CW solenoid cable (para 7-99).
   - **NO**
     - Is continuity present from swing CW solenoid cable connector pin 2 to ground and from pin 1 to terminal board lower position 18?

   **Actions**
   - Notify DS Maintenance.
CONTINUITY TEST

(1) Disconnect swing CW solenoid connector from swing CW solenoid.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin 2 of swing CW solenoid cable connector.
(4) Connect negative (-) probe of multimeter on ground and note reading on multimeter.
(5) Connect positive (+) probe of multimeter on pin 1 of swing CW solenoid cable connector.
(6) Connect negative (-) probe of multimeter on terminal board lower position 18 and note reading on multimeter.
(7) If continuity is not present, replace swing CW solenoid cable (para 7-99).
(8) If continuity is present, notify DS Maintenance.
(9) Connect swing CW solenoid cable connector to swing CW solenoid.
(10) Close cover on junction box.
(11) Tighten four screws on junction box cover.
(12) Stow crane (TM 9-2320-366-10-1).
3. Is continuity present from remote control box connector pin L to pin N?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Swing CW solenoid cable OK.</td>
</tr>
<tr>
<td>Swing CW solenoid OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty SWING CW/CCW controller.</td>
</tr>
<tr>
<td>Faulty remote control box internal wiring harness.</td>
</tr>
<tr>
<td>Faulty external remote control cable.</td>
</tr>
<tr>
<td>Faulty remote control cable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
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</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE Test #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>This question eliminates possible problems and determines where to continue troubleshooting.</td>
</tr>
</tbody>
</table>

- **NO**
  - Go to step 4 of this fault.

- **YES**
  - Go to step 5 of this fault.
CONTINUITY TEST

(1) Disconnect external remote control cable from remote control box.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin L of connector on remote control box.
(4) Connect negative (-) probe of multimeter on pin H of connector on remote control box.

NOTE
Step (5) requires the aid of an assistant.

(5) Position SWING CW/CCW controller to CW and note reading on multimeter.
(6) If continuity is not present, go to step 4 of this fault.
(7) If continuity is present, go to step 5 of this fault.
KNOWLEDGE INFORMATION
Other crane functions from remote station OK.
Swing CW solenoid cable OK.
Swing CW solenoid OK.
External remote control cable OK.
Remote control cable OK.
POSSIBLE PROBLEMS
Faulty remote control box internal wiring harness.
Faulty SWING CW/CCW controller.

TEST OPTIONS
Continuity Test or STE/ICE Test #91

REASON FOR QUESTION
Is continuity present from remote control box connector pin L to SWING CW/CCW controller internal wiring harness pin 4 and from remote control box connector pin H to SWING CW/CCW controller internal wiring harness pin 1?

YES
Replace SWING CW/CCW controller (para 7-32).

NO
Repair remote control box internal wiring harness (para 7-32).

If continuity is not present, remote control box internal wiring harness is faulty. If continuity is present, SWING CW/CCW controller is faulty.
<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove SWING CW/CCW controller (para 7-32).</td>
</tr>
<tr>
<td>(2) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter on pin L of remote control box connector.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter on pin 4 of SWING CW/CCW controller internal wiring harness and note reading on multimeter.</td>
</tr>
<tr>
<td>(5) Connect positive (+) probe of multimeter on pin H of remote control box connector.</td>
</tr>
<tr>
<td>(6) Connect negative (-) probe of multimeter on pin 1 of SWING CW/CCW controller internal wiring harness and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If continuity is not present, replace remote control box internal wiring harness (para 7-32).</td>
</tr>
<tr>
<td>(8) If continuity is present, replace SWING CW/CCW controller (para 7-32).</td>
</tr>
<tr>
<td>(9) Install SWING CW/CCW controller (para 7-32).</td>
</tr>
<tr>
<td>(10) Close cover on junction box.</td>
</tr>
<tr>
<td>(11) Tighten four screws on junction box cover.</td>
</tr>
<tr>
<td>(12) Stow crane (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
5. Is continuity present from one end of external remote control cable connector pin L to other end of external remote control cable connector pin L?

   YES
   Replace external remote control cable.

   NO
   Test Options
   Continuity Test or STE/ICE Test #91
   Reason for Question
   If continuity is not present, external remote control cable is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin L of one end of external remote control cable connector.
(3) Connect negative (-) probe of multimeter on pin L of other end of external remote control cable and note reading on multimeter.
(4) If continuity is not present, replace external remote control cable.
6. Is continuity present from remote control cable connector pin L to terminal board lower position 18?

- **Yes**: Notify DS Maintenance.
- **No**: Replace remote control cable (para 7-96).

**Known Info**
- Other crane functions from remote station OK.
- Swing CW solenoid cable OK.
- Swing CW solenoid OK.
- Remote control box internal wiring harness OK.
- SWING CW/CCW controller OK.
- External remote control cable OK.

**Possible Problems**
- Faulty remote control cable.

**Test Options**
- Continuity Test or STE/ICE Test #91

**Reason for Question**
- If continuity is not present, remote control cable is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin L of remote control cable connector.
(3) Connect negative (-) probe of multimeter on terminal board lower position 18 and note reading on multimeter.
(4) If continuity is not present, replace remote control cable (para 7-96).
(5) If continuity is present, notify DS Maintenance.
(6) Close cover on junction box.
(7) Tighten four screws on junction box cover.
(8) Stow crane (TM 9-2320-366-10-1).
e113. M1084/M1086 MATERIAL HANDLING CRANE (MHC) SWING CCW DOES NOT OPERATE FROM REMOTE STATION

**INITIAL SETUP**

**Equipment Conditions**
- Outriggers lowered (TM 9-2320-366-10-1).
- Crane erected with approximately five feet of cable payed out (TM 9-2320-366-10-1).
- Engine shut down (TM 9-2320-366-10-1).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

**Personnel Required**
- (2)

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

**References**
- TM 9-4910-571-12&P

---

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
This question eliminates possible problems and determines where to continue troubleshooting.

---

**KNOWLEDGE INFO**

**POSSIBLE PROBLEMS**
- Faulty swing CCW solenoid cable.
- Faulty swing CCW solenoid.
- Faulty SWING CW/CCW controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

**TEST OPTIONS**
- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
This question eliminates possible problems and determines where to continue troubleshooting.

---

**START**

**WARNING**
Is 24 vdc present at junction box assembly terminal board position 17?

**NO**
- Go to step 3 of this fault.

**YES**

---

---

---
OUTPUT VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Connect external remote control cable to remote control box (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(2)</td>
<td>Loosen four screws on junction box.</td>
</tr>
<tr>
<td>(3)</td>
<td>Open cover on junction box.</td>
</tr>
<tr>
<td>(4)</td>
<td>Position MAIN POWER switch to ON.</td>
</tr>
<tr>
<td>(5)</td>
<td>Lift guard and position remote control box ON/OFF switch to ON.</td>
</tr>
<tr>
<td>(6)</td>
<td>Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(7)</td>
<td>Connect positive (+) probe of multimeter on terminal board lower position 17.</td>
</tr>
<tr>
<td>(8)</td>
<td>Connect negative (-) probe of multimeter on ground quick-connect terminal board (above MAIN POWER switch).</td>
</tr>
</tbody>
</table>

NOTE
Step (9) requires the aid of an assistant.

(9) Position SWING CW/CCW controller to CCW and note reading on multimeter.

(10) If 24 volts dc is not present, go to step 3 of this fault.
e113. M1084/M1086 MATERIAL HANDLING CRANE (MHC) SWING CCW DOES NOT OPERATE FROM REMOTE STATION (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Remote control box OK.</td>
</tr>
<tr>
<td>SWING CW/CCW controller OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty swing CCW solenoid cable.</td>
</tr>
<tr>
<td>Faulty swing CCW solenoid.</td>
</tr>
</tbody>
</table>

2. Is continuity present from swing CCW solenoid cable connector pin 2 to ground and from pin 1 to terminal board lower position 17?

- **NO**
  - Replace swing CCW solenoid cable (para 7-98).

- **YES**
  - Notify DS Maintenance.

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE Test #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, swing CCW solenoid cable is faulty. If continuity is present, swing CCW solenoid is faulty.</td>
</tr>
</tbody>
</table>
CONTINUITY TEST

1. Disconnect swing CCW solenoid connector from swing CCW solenoid.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter on pin 2 of swing CCW solenoid cable connector.
4. Connect negative (-) probe of multimeter on ground and note reading on multimeter.
5. Connect positive (+) probe of multimeter on pin 1 of swing CCW solenoid cable connector.
6. Connect negative (-) probe of multimeter on terminal board lower position 17 and note reading on multimeter.
7. If continuity is not present, replace swing CCW solenoid cable (para 7-98).
8. If continuity is present, notify DS Maintenance.
9. Connect swing CCW solenoid cable connector to swing CCW solenoid.
10. Close cover on junction box.
11. Tighten four screws on junction box cover.
3. Is continuity present from remote control box connector pin A to pin H?

**Known Info**
- Other crane functions from remote station OK.
- Swing CCW solenoid cable OK.
- Swing CCW solenoid OK.

**Possible Problems**
- Faulty SWING CW/CCW controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

**Test Options**
- Continuity Test or STE/ICE Test #91

**Reason for Question**
This question eliminates possible problems and determines where to continue troubleshooting.

---

**Go to step 4 of this fault.**

**Go to step 5 of this fault.**
CONTINUITY TEST

(1) Disconnect external remote control cable from remote control box.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin A of connector on remote control box.
(4) Connect negative (-) probe of multimeter on pin H of connector on remote control box.

NOTE
Step (5) requires the aid of an assistant.
(5) Position SWING CW/CCW controller to CCW and note reading on multimeter.
(6) If continuity is not present, go to step 4 of this fault.
(7) If continuity is present, go to step 5 of this fault.
4. Is continuity present from remote control box connector pin A to SWING CW/CCW controller internal wiring harness pin 3 and from remote control box connector pin H to SWING CW/CCW controller internal wiring harness pin 1?

**KNOWN INFO**
- Other crane functions from remote station OK.
- Swing CCW solenoid cable OK.
- Swing CCW solenoid OK.
- External remote control cable OK.
- Remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control box internal wiring harness.
- Faulty SWING CW/CCW controller.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, remote control box internal wiring harness is faulty. If continuity is present, SWING CW/CCW controller is faulty.

**YES**
- Repair remote control box internal wiring harness (para 7-32).

**NO**
- Replace SWING CW/CCW controller (para 7-32).
CONTINUITY TEST

(1) Remove SWING CW/CCW controller (para 7-32).
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin A of remote control box connector.
(4) Connect negative (-) probe of multimeter on pin 3 of SWING CW/CCW controller internal wiring harness and note reading on multimeter.
(5) Connect positive (+) probe of multimeter on pin H of remote control box connector.
(6) Connect negative (-) probe of multimeter on pin 1 of SWING CW/CCW controller internal wiring harness and note reading on multimeter.
(7) If continuity is not present, replace remote control box internal wiring harness (para 7-32).
(8) If continuity is present, replace SWING CW/CCW controller (para 7-32).
(9) Install SWING CW/CCW controller (para 7-32).
(10) Close cover on junction box.
(11) Tighten four screws on junction box cover.
(12) Stow crane (TM 9-2320-366-10-1).
5. Is continuity present from one end of external remote control cable connector pin A to other end of external remote control cable connector pin A?

- **NO**
  - Replace external remote control cable.

- **YES**
  - Replace external remote control cable.

**KNOWN INFO**

- Other crane functions from remote station OK.
- Swing CCW solenoid cable OK.
- Swing CCW solenoid OK.
- Remote control box internal wiring harness OK.
- SWING CW/CCW controller OK.

**POSSIBLE PROBLEMS**

- Faulty external remote control cable.
- Faulty remote control cable.

**TEST OPTIONS**

- Continuity Test or
- STE/ICE Test #91

**REASON FOR QUESTION**

- If continuity is not present, external remote control cable is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin A of one end of external remote control cable connector.
(3) Connect negative (-) probe of multimeter on pin A of other end of external remote control cable and note reading on multimeter.
(4) If continuity is not present, replace external remote control cable.
6. Is continuity present from remote control cable connector pin A to terminal board lower position 17?

- **NO**
  - Replace remote control cable (para 7-96).

- **YES**
  - Notify DS Maintenance.

**KNOWN INFO**
- Other crane functions from remote station OK.
- Swing CCW solenoid cable OK.
- Swing CCW solenoid OK.
- Remote control box internal wiring harness OK.
- SWING CW/CCW controller OK.
- External remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control cable.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, remote control cable is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin A of remote control cable connector.
(3) Connect negative (-) probe of multimeter on terminal board lower position 17 and note reading on multimeter.
(4) If continuity is not present, replace remote control cable (para 7-96).
(5) If continuity is present, notify DS Maintenance.
(6) Close cover on junction box.
(7) Tighten four screws on junction box cover.
(8) Stow crane (TM 9-2320-366-10-1).
e114. M1084/M1086 MATERIAL HANDLING CRANE (MHC) OVERLOAD SHUTDOWN SYSTEM DOES NOT ACTIVATE

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
STE/ICE-R (Item 41, Appendix C)

References
TM 9-4910-571-12&P

KNOWLEDGE

Battery voltage OK.
Input voltage to overload shutdown system OK.
Hydraulic system shutdown solenoid OK.
Hydraulic system shutdown relay OK.
Crane functions OK.

POSSIBLE PROBLEMS
Faulty overload lockout cable.
Faulty overload shutdown box.
Faulty lockout solenoid cable.

TEST OPTIONS

1. Is continuity present from overload lockout cable connector socket A to terminal board position 6?
   Continuity Test or STE/ICE-R Test #91
   REASON FOR QUESTION
   Overload shutdown system will not operate if continuity is not present at overload lockout cable connector socket A.

   NO
   Replace overload lockout cable (para 7-95).

   YES

2. Is continuity present from overload lockout cable connector socket B to terminal board position 28?
   Continuity Test or STE/ICE-R Test #91
   REASON FOR QUESTION
   Overload shutdown system will not operate if continuity is not present from overload lockout cable connector socket B to terminal board position 28.

   NO
   Replace overload lockout cable (para 7-95).

   YES

### CONTINUITY TEST

1. Loosen four screws on junction box.
2. Open cover on junction box.
3. Disconnect overload lockout cable connector from overload shutdown box.
4. Set multimeter to ohms.
5. Connect positive (+) probe of multimeter in socket A of overload lockout cable connector.
6. Connect negative (-) probe of multimeter to terminal board position 6 and note reading on multimeter.
7. If continuity is not present, replace overload lockout cable (para 7-95).

### CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter in socket B of overload lockout cable connector.
3. Connect negative (-) probe of multimeter on terminal board position 28 and note reading on multimeter.
4. If continuity is not present, replace overload lockout cable (para 7-95).
6. Connect overload lockout cable connector to overload shutdown box.
7. Close cover on junction box.
8. Tighten four screws on junction box.
9. Connect batteries (para 7-57).
### INITIAL SETUP

**Equipment Conditions**
- Batteries disconnected (para 7-57).

**Tests and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

**References**
- TM 9-4910-571-12&P

---

### KNOWN INFO

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<tr>
<th>Known Info</th>
<th>Possible Problems</th>
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</thead>
<tbody>
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<td>Battery voltage OK.</td>
<td>Faulty junction box internal wiring.</td>
</tr>
<tr>
<td>Input voltage to overload shutdown system OK.</td>
<td>Faulty overload lockout cable.</td>
</tr>
<tr>
<td>Hydraulic system shutdown solenoid OK.</td>
<td>Faulty hoist layer sensing switch.</td>
</tr>
<tr>
<td>Hydraulic system shutdown relay OK.</td>
<td>Faulty hoist load cell.</td>
</tr>
<tr>
<td></td>
<td>Faulty overload shutdown system.</td>
</tr>
</tbody>
</table>

### POSSIBLE PROBLEMS

- Faulty junction box internal wiring.
- Faulty overload lockout cable.
- Faulty hoist layer sensing switch.
- Faulty hoist load cell.
- Faulty overload shutdown system.

---

### TEST OPTIONS

**1.** Is junction box internal wiring OK?

- **NO**
  - Repair junction box assembly (para 7-27).

- **YES**

**2.** Is continuity present from terminal board position 28 to terminal board position 6?

- **NO**
  - Replace overload lockout cable (para 7-95).

- **YES**

---

**Reason for Question**
- Shorted junction box internal wiring will cause overload shutdown system to stay activated.
- Faulty overload lockout cable will cause overload shutdown system to stay activated.

---

**Notify DS Maintenance.**
(1) Loosen four screws on junction box.
(2) Open cover on junction box.
(3) Visually inspect the wiring around terminal board position 28 for shorted wires that could put 24 vdc on position 28.

---

**CONTINUITY TEST**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
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<td>1</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>2</td>
<td>Connect positive (+) probe of multimeter to terminal board position 28.</td>
</tr>
<tr>
<td>3</td>
<td>Connect negative (-) probe of multimeter to terminal board position 6 and note reading on multimeter.</td>
</tr>
<tr>
<td>4</td>
<td>If continuity is not present, replace overload lockout cable (para 7-27).</td>
</tr>
<tr>
<td>5</td>
<td>If continuity is present, notify DS Maintenance.</td>
</tr>
<tr>
<td>6</td>
<td>Close cover on junction box.</td>
</tr>
<tr>
<td>7</td>
<td>Tighten four screws on junction box.</td>
</tr>
<tr>
<td>8</td>
<td>Connect batteries (para 7-57).</td>
</tr>
</tbody>
</table>
e116. M1084/M1086 MATERIAL HANDLING CRANE (MHC) HOIST UP LOCKOUT DOES NOT ACTIVATE

INITIAL SETUP

Equipment Conditions
- Batteries disconnected (para 7-57).

Tools and Special Tools
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

References
- TM 9-4910-571-12&P

START

1. Is continuity present from hoist up lockout cable connector socket 1 to terminal board position 28?

   NO

   YES

   Replace hoist up lockout solenoid cable (para 7-92).

TEST OPTIONS
- Continuity Test or STE/ICE-R #91

   REASON FOR QUESTION
   - Hoist up lockout will not operate if continuity is not present at hoist up lockout solenoid cable connector socket 1.

KNOWLED GE INFO
- Battery voltage OK.
- Input voltage to overload shutdown system OK.
- Hydraulic system shutdown solenoid OK.
- Hydraulic system shutdown relay OK.
- Crane functions OK.
- Overload lockout cable OK.
- Overload shutdown box OK.
- Tension load cell OK.
- Proximity sensor OK.

POSSIBLE PROBLEMS
- Faulty hoist up lockout solenoid cable.
- Faulty solenoid valve.

2. Is continuity present from boom up lockout solenoid cable connector socket 2 to ground?

   NO

   YES

   Replace hoist up lockout solenoid cable (para 7-92).

TEST OPTIONS
- Continuity Test or STE/ICE-R #91

   REASON FOR QUESTION
   - Hoist up lockout will not operate if continuity is not present from hoist up lockout solenoid cable connector socket 2 to ground.

KNOWLED GE INFO
- Battery voltage OK.
- Input voltage to overload shutdown system OK.
- Hydraulic system shutdown solenoid OK.
- Hydraulic system shutdown relay OK.
- Crane functions OK.
- Overload lockout cable OK.
- Overload shutdown box OK.
- Tension load cell OK.
- Proximity sensor OK.

POSSIBLE PROBLEMS
- Faulty hoist up lockout solenoid cable.
- Faulty solenoid valve.
### CONTINUITY TEST

1. Loosen four screws on junction box.
2. Open cover on junction box.
3. Disconnect hoist up lockout solenoid cable connector from hoist up lockout solenoid.
4. Set multimeter to ohms.
5. Connect positive (+) probe of multimeter in socket 1 of hoist up lockout solenoid cable connector.
6. Connect negative (-) probe of multimeter to terminal board position 28 and note reading on multimeter.
7. If continuity is not present, replace hoist up lockout solenoid cable (para 7-92).

---

### CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter in socket 2 of hoist up lockout solenoid cable connector.
3. Connect negative (-) probe of multimeter on ground in junction box and note reading on multimeter.
4. If continuity is not present, replace hoist up lockout solenoid cable (para 7-92).
5. Connect hoist up lockout solenoid cable connector to hoist up lockout solenoid valve.
6. Close cover on junction box.
7. Tighten four screws on junction box cover.
3. Is continuity present across hoist up lockout solenoid valve contacts?

**KNOWN INFO**
- Battery voltage OK.
- Input voltage to overload shutdown system OK.
- Hydraulic system shutdown solenoid OK.
- Hydraulic system shutdown relay OK.
- Crane functions OK.
- Overload lockout cable OK.
- Overload shutdown box OK.
- Tension load cell OK.
- Proximity sensor OK.
- Hoist up lockout solenoid cable OK.

**POSSIBLE PROBLEMS**
- Faulty solenoid valve

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
Hoist up lockout will not operate if continuity is not present across hoist up lockout solenoid valve contacts.

Yes: Notify DS Maintenance.

No: Notify DS Maintenance.
## CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter on contact two of hoist up lockout solenoid valve.
3. Connect negative (-) probe of multimeter to contact one of hoist up lockout solenoid valve and note reading on multimeter.
4. If continuity is not present, notify DS Maintenance.
5. If continuity is present, notify DS Maintenance.
6. Connect hoist up lockout solenoid cable to boom up lockout solenoid valve.
7. Connect batteries (para 7-57).
INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).

References
TM 9-4910-571-12&P

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
STE/ICE-R (Item 41, Appendix C)

KNOWLEDGE INFO

| Battery voltage OK. |
| Input voltage to overload shutdown system OK. |
| Hydraulic system shutdown solenoid OK. |
| Hydraulic system shutdown relay OK. |
| Crane functions OK. |
| Overload lockout cable OK. |
| Overload shutdown box OK. |
| Tension load cell OK. |
| Proximity sensor OK. |

POSSIBLE PROBLEMS
Faulty boom down lockout solenoid cable.
Faulty solenoid valve.

1. Is continuity present from boom down lockout solenoid cable connector socket 1 to terminal board position 28?

   NO

   YES

   Replace boom down lockout solenoid cable (para 7-85).

   TEST OPTIONS

   Continuity Test or STE/ICE-R #91

   REASON FOR QUESTION

   Boom down lockout will not operate if continuity is not present at boom down lockout solenoid cable connector socket 1.

   KNOWN INFO

   Battery voltage OK.
   Input voltage to overload shutdown system OK.
   Hydraulic system shutdown solenoid OK.
   Hydraulic system shutdown relay OK.
   Crane functions OK.
   Overload lockout cable OK.
   Overload shutdown box OK.
   Tension load cell OK.
   Proximity sensor OK.
   Continuity to boom down lockout solenoid OK.

   POSSIBLE PROBLEMS
   Faulty boom down lockout solenoid cable.
   Faulty solenoid valve.

2. Is continuity present from boom down lockout solenoid cable connector socket 2 to ground?

   NO

   YES

   Replace boom down lockout solenoid cable (para 7-85).

   TEST OPTIONS

   Continuity Test or STE/ICE-R #91

   REASON FOR QUESTION

   Boom down lockout will not operate if continuity is not present from boom down lockout solenoid cable connector socket 2 to ground.
CONTINUITY TEST

(1) Loosen four screws on junction box.
(2) Open cover on junction box.
(3) Disconnect boom down lockout solenoid cable connector from boom down lockout solenoid valve.
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter in socket 1 of boom down lockout solenoid cable.
(6) Connect negative (-) probe of multimeter to terminal board position 28 and note reading on multimeter.
(7) If continuity is not present, replace boom down lockout solenoid cable (para 7-85).

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter in socket 2 of boom down lockout solenoid cable connector.
(3) Connect negative (-) probe of multimeter on ground in junction box and note reading on multimeter.
(4) If continuity is not present, replace boom down lockout solenoid cable (para 7-85).
(5) Connect boom down lockout solenoid cable connector to boom down lockout solenoid valve.
(6) Close cover on junction box.
(7) Tighten four screws on junction box cover.
3. Is continuity present across boom down lockout solenoid valve contacts?

**KNOWN INFO**
- Battery voltage OK
- Input voltage to overload shutdown system OK
- Hydraulic system shutdown solenoid OK
- Hydraulic system shutdown relay OK
- Crane functions OK
- Overload lockout cable OK
- Overload shutdown box OK
- Tension load cell OK
- Proximity sensor OK
- Boom down lockout solenoid cable OK

**POSSIBLE PROBLEMS**
- Faulty solenoid valve

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- Boom down lockout will not operate if continuity is not present across boom down lockout solenoid valve contacts.

**NOTIFY DS MAINTENANCE**
CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter on contact two of boom down lockout solenoid valve.
3. Connect negative (-) probe of multimeter to contact one of boom down lockout solenoid valve and note reading on multimeter.
4. If continuity is not present, notify DS Maintenance.
5. If continuity is present, notify DS Maintenance.
6. Connect boom down lockout solenoid cable to boom down lockout solenoid valve.
7. Connect batteries (para 7-57).
**INITIAL SETUP**

**Equipment Conditions**
- Batteries disconnected (para 7-57).

**References**
- TM 9-4910-571-12&P

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

---

**KNOWLEDGE INFO**

- Battery voltage OK.
- Input voltage to overload shutdown system OK.
- Hydraulic system shutdown solenoid OK.
- Hydraulic system shutdown relay OK.
- Crane functions OK.
- Overload lockout cable OK.
- Overload shutdown box OK.
- Tension load cell OK.
- Proximity sensor OK.

**POSSIBLE PROBLEMS**

- Faulty boom up lockout solenoid cable.
- Faulty solenoid valve.

---

**TEST OPTIONS**

**REASON FOR QUESTION**

- Continuity Test or STE/ICE-R #91
- Boom up lockout will not operate if continuity is not present from boom up lockout solenoid cable connector socket 1.

---

**Diagram:**

1. **Is continuity present from boom up lockout solenoid cable connector socket 1 to terminal board position 28?**

   - **NO**
   - **YES**
     - Replace boom up lockout solenoid cable (para 7-87).

2. **Is continuity present from boom up lockout solenoid cable connector socket 2 to ground?**

   - **NO**
   - **YES**
     - Replace boom up lockout solenoid cable (para 7-87).
### CONTINUITY TEST

1. Loosen four screws on junction box.
2. Open cover on junction box.
3. Disconnect boom up lockout solenoid cable connector from boom up lockout solenoid valve.
4. Set multimeter to ohms.
5. Connect positive (+) probe of multimeter in socket 1 of boom up lockout solenoid cable.
6. Connect negative (-) probe of multimeter to terminal board terminal 28 and note reading on multimeter.
7. If continuity is not present, replace boom up lockout solenoid cable (para 7-87).

---

<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
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<tr>
<td>(1) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter in socket 2 of boom up lockout solenoid cable connector.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter on ground in junction box and note reading on multimeter.</td>
</tr>
<tr>
<td>(4) If continuity is not present, replace boom up lockout solenoid cable (para 7-87).</td>
</tr>
<tr>
<td>(5) Connect boom up lockout solenoid cable connector to boom up lockout solenoid valve.</td>
</tr>
<tr>
<td>(6) Close cover on junction box.</td>
</tr>
<tr>
<td>(7) Tighten four screws on junction box cover.</td>
</tr>
</tbody>
</table>
3. Is continuity present across boom up lockout solenoid valve contacts?

NO

YES

Notify DS Maintenance.

Notify DS Maintenance.

KNOWNS INFO

Battery voltage OK.
Input voltage to overload shutdown system OK.
Hydraulic system shutdown solenoid OK.
Hydraulic system shutdown relay OK.
Crane functions OK.
Overload lockout cable OK.
Overload shutdown box OK.
Tension load cell OK.
Proximity sensor OK.
Boom up lockout solenoid cable OK.

POSSIBLE PROBLEMS

Faulty solenoid valve

TEST OPTIONS

Continuity Test or STE/ICE-R #91

REASON FOR QUESTION

Boom up lockout will not operate if continuity is not present across boom up lockout solenoid valve contacts.

118. M1084/M1086 MATERIAL HANDLING CRANE (MHC) BOOM UP LOCKOUT DOES NOT ACTIVATE (CONT)
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on contact two of boom up lockout solenoid valve.
(3) Connect negative (-) probe of multimeter to contact one of boom up lockout solenoid valve and note reading on multimeter.
(4) If continuity is not present, notify DS Maintenance.
(5) If continuity is present, notify DS Maintenance.
(6) Connect boom up lockout solenoid cable to boom up lockout solenoid valve.
(7) Connect batteries (para 7-57).
Is continuity present from telescope out lockout solenoid cable connector socket 2 to ground?

1. YES
   - Replace telescope out lockout solenoid cable (para 7-102).

2. NO
   - Faulty telescope out lockout solenoid cable.
   - Faulty solenoid valve.

TEST OPTIONS
- Continuity Test or STE/ICE-R #91

REASON FOR QUESTION
Telescope out lockout will not operate if continuity is not present from telescope out lockout solenoid cable connector socket 2 to ground.
CONTINUITY TEST

(1) Loosen four screws on junction box.
(2) Open cover on junction box.
(3) Disconnect telescope out lockout solenoid cable connector from telescope out lockout solenoid valve.
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter in socket 1 of telescope out lockout solenoid cable.
(6) Connect negative (-) probe of multimeter to terminal board terminal 28 and note reading on multimeter.
(7) If continuity is not present, replace telescope out lockout solenoid cable (para 7-102).

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter in socket 2 of telescope out lockout solenoid cable connector.
(3) Connect negative (-) probe of multimeter on ground in junction box and note reading on multimeter.
(4) If continuity is not present, replace telescope out lockout solenoid cable (para 7-102).
(5) Connect telescope out lockout solenoid cable connector to telescope out lockout solenoid valve.
(6) Close cover on junction box.
(7) Tighten four screws on junction box cover.
e119. M1084/M1086 MATERIAL HANDLING CRANE (MHC) TELESCOPE OUT LOCKOUT DOES NOT ACTIVATE (CONT)

**KNOWN INFO**
- Battery voltage OK.
- Input voltage to overload shutdown system OK.
- Hydraulic system shutdown solenoid OK.
- Hydraulic system shutdown relay OK.
- Crane functions OK.
- Overload lockout cable OK.
- Overload shutdown box OK.
- Tension load cell OK.
- Proximity sensor OK.
- Telescope out lockout solenoid cable OK.

**POSSIBLE PROBLEMS**
- Faulty solenoid valve

---

3. Is continuity present across telescope out lockout solenoid valve contacts?

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<th>TEST OPTIONS</th>
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<td>Continuity Test or STE/ICE-R #91</td>
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**REASON FOR QUESTION**
Telescope out lockout will not operate if continuity is not present across telescope out lockout solenoid valve contacts.

---

Notify DS Maintenance.
CONTINUITY TEST

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<td>Set multimeter to ohms.</td>
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<tr>
<td>(2)</td>
<td>Connect positive (+) probe of multimeter on contact two of telescope out lockout solenoid valve.</td>
</tr>
<tr>
<td>(3)</td>
<td>Connect negative (-) probe of multimeter to contact one of telescope out lockout solenoid valve and note reading on multimeter.</td>
</tr>
<tr>
<td>(4)</td>
<td>If continuity is not present, notify DS Maintenance.</td>
</tr>
<tr>
<td>(5)</td>
<td>If continuity is present, notify DS Maintenance.</td>
</tr>
<tr>
<td>(6)</td>
<td>Connect telescope out lockout solenoid cable to telescope out lockout solenoid valve.</td>
</tr>
<tr>
<td>(7)</td>
<td>Connect batteries (para 7-57).</td>
</tr>
</tbody>
</table>
**INITIAL SETUP**

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Personnel Required
(2)

Tools and Special Tools
1. Tool Kit, Genl Mech (Item 46, Appendix C)
2. Multimeter, Digital (Item 22, Appendix C)
3. STE/ICE-R (Item 41, Appendix C)

References
TM 9-491-571-12&P

---

**WARNING**

Read WARNING on following page.

1. Is 24 vdc present at junction box assembly terminal board position 2?

**TEST OPTIONS**

Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**

If 24 vdc is not present, crane power cable is faulty.

---

**KNOWN INFO**

Battery voltage OK.
Circuit breakers OK.
Power control cable assembly OK.
Auxiliary panel cable assembly OK.
Dashboard cable assembly OK.
Hydraulic system OK.

**POSSIBLE PROBLEMS**

Faulty crane power cable.
Faulty junction box assembly.

---

**REPLACE**

Replace crane power cable (para 7-79).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
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<tbody>
<tr>
<td>(1) Loosen four screws on junction box cover.</td>
</tr>
<tr>
<td>(2) Open cover on junction box.</td>
</tr>
<tr>
<td>(3) Set multimeter to vdc.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter to terminal board position 2.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to GROUND quick-connect terminal block (above main power switch) and note reading on multimeter.</td>
</tr>
<tr>
<td>(6) If 24 vdc is not present, replace crane power cable (para 7-79).</td>
</tr>
</tbody>
</table>
120. M1089 MATERIAL HANDLING CRANE (MHC) DOES NOT OPERATE (CONT)

**KNOWN INFO**
Battery voltage OK.
Circuit breakers OK.
Power control cable assembly OK.
Auxiliary panel cable assembly OK.
Dashboard cable assembly OK.
Hydraulic system OK.
Crane power cable OK.

**POSSIBLE PROBLEMS**
Faulty junction box assembly.

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
If 24 vdc is not present, junction box assembly is faulty.

**OK**

2. Is 24 vdc present at junction box assembly D6?

**NO**

Repair junction box (para 7-28).

**YES**

3. Is 24 vdc present at junction box assembly D7?

**NO**

Repair junction box (para 7-28).

**YES**

**OK**
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

**VOLTAGE TEST**

1. Set multimeter to vdc.
2. Connect positive (+) probe of multimeter to D6 of junction box.
3. Connect negative (-) probe of multimeter to GROUND quick-connect terminal block (above main power switch) and note reading on multimeter.
4. If 24 vdc is not present, repair junction box assembly (para 7-28).

---

**VOLTAGE TEST**

1. Set multimeter to vdc.
2. Connect positive (+) probe of multimeter to D7 of junction box.
3. Connect negative (-) probe of multimeter to GROUND quick-connect terminal block (above main power switch) and note reading on multimeter.
4. If 24 vdc is not present, repair junction box assembly (para 7-28).
**WARNING**
Read WARNING on following page.

**KNOWLEDGE**
- Battery voltage OK.
- Circuit breakers OK.
- Power control cable assembly OK.
- Auxiliary panel cable assembly OK.
- Dashboard cable assembly OK.
- Hydraulic system OK.
- Crane power cable OK.

**POSSIBLE PROBLEMS**
- Faulty junction box assembly.

**TEST OPTIONS**
- **Voltage Test or STE/ICE-R Test #89**

**REASON FOR QUESTION**
- If 24 vdc is not present, junction box assembly is faulty.

4. **Is 24 vdc present between junction box assembly D6 and D7?**

   **NO**
   - Repair junction box (para 7-28).

   **YES**

5. **Is 24 vdc present at junction box assembly MAIN POWER switch?**

   **NO**
   - Repair junction box (para 7-28).

   **YES**
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to vdc.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to center position, between D6 and D7 of junction box.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to GROUND quick-connect terminal block (above main power switch) and note reading on multimeter.</td>
</tr>
<tr>
<td>(4) If 24 vdc is not present, repair junction box assembly (para 7-28).</td>
</tr>
</tbody>
</table>

![Diagram of junction box assembly](image-url)

**VOLTAGE TEST**

(1) Set multimeter to vdc.
(2) Connect positive (+) probe of multimeter to MAIN POWER switch line position (white wire).
(3) Connect negative (-) probe of multimeter to GROUND quick-connect terminal block (above main power switch) and note reading on multimeter.
(4) If 24 vdc is not present, repair junction box assembly (para 7-28).
6. Is 24 vdc present at junction box assembly MAIN POWER switch?

   NO

   YES

   Repair junction box (para 7-28).

7. Is 24 vdc present at junction box assembly terminal board TB1 position 1?

   NO

   YES

   Repair junction box (para 7-28).

   REASON FOR QUESTION
   If 24 vdc is not present, junction box assembly is faulty.

   TEST OPTIONS
   Voltage Test or STE/ICE-R Test #89

   WARNING
   Read WARNING on following page.

   KNOWN INFO
   Battery voltage OK.
   Circuit breakers OK.
   Power control cable assembly OK.
   Auxiliary panel cable assembly OK.
   Dashboard cable assembly OK.
   Hydraulic system OK.
   Crane power cable OK.

   POSSIBLE PROBLEMS
   Faulty junction box assembly.

Perform Electrical System Troubleshooting (e135. M1089 Material Handling Crane (MHC) Overload Shutdown System Stays Activated).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to vdc.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to MAIN POWER switch load position (black wire).</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to GROUND quick-connect terminal block (above main power switch).</td>
</tr>
<tr>
<td>(4) Position MAIN POWER switch to ON and note reading on multimeter.</td>
</tr>
<tr>
<td>(5) If 24 vdc is not present, repair junction box assembly (para 7-28).</td>
</tr>
</tbody>
</table>

VOLTAGE TEST

(1) Set multimeter to vdc.
(2) Connect positive (+) probe of multimeter to junction box terminal board TB1 position 1.
(3) Connect negative (-) probe of multimeter to GROUND quick-connect terminal block (above main power switch) and note reading on multimeter.
(4) If 24 vdc is not present, repair junction box assembly (para 7-28).
(5) Position MAIN POWER switch to OFF.
(6) Close cover on junction box.
(7) Tighten four screws on junction box cover.
e121. M1089 MATERIAL HANDLING CRANE (MHC) DOES NOT OPERATE FROM REMOTE CONTROL

INITIAL SETUP

Equipment Condition
Engine shut down (TM 9-2320-366-10-1).

Personnel Required
(2)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Multimeter, Digital (Item 22, Appendix C)

References
TM 9-4910-571-12&P

WARNING
Read WARNING on following page.

Is 24 vdc present at remote control bulkhead connector pin E?

NO

YES

POSSIBLE PROBLEMS
Faulty remote control cable.
Faulty external remote control cable.
Faulty remote control box ON/OFF switch.
Faulty remote control box internal wiring.

TEST OPTIONS
Voltage Test or STE/ICE Test #89

REASON FOR QUESTION
If 24 vdc is not present, remote control cable is faulty.

Replace remote control cable (para 7-115 or 7-118).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove cover from left or right remote control cable bulkhead connector.</td>
</tr>
<tr>
<td>(2) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to pin E of remote control bulkhead connector.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to pin B of remote control bulkhead connector.</td>
</tr>
<tr>
<td>(5) Position MAIN POWER switch to ON (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(6) If 24 vdc is not present, replace left or right remote control cable (para 7-115 or 7-118).</td>
</tr>
</tbody>
</table>
2. **WARNING**

Read **WARNING** on following page.

Is 24 vdc present at pin E of external remote control cable connector?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery voltage OK.</td>
</tr>
<tr>
<td>Overload shutdown system OK.</td>
</tr>
<tr>
<td>Hydraulic system shutdown relay OK.</td>
</tr>
<tr>
<td>Remote control cables OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty external remote control cable.</td>
</tr>
<tr>
<td>Faulty crane remote control box.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Test or STE/ICE Test #89</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If 24 vdc is not present, external remote control cable is faulty.</td>
</tr>
</tbody>
</table>

**YES**

Replace external remote control cable.

**NO**
### WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

### CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Connect external remote control cable to left or right remote control cable bulkhead connector.</td>
</tr>
<tr>
<td>(2)</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>(3)</td>
<td>Connect positive (+) probe of multimeter on pin E of remote control cable connector.</td>
</tr>
<tr>
<td>(4)</td>
<td>Connect negative (-) probe of multimeter on pin B of remote control cable connector and note reading on multimeter.</td>
</tr>
<tr>
<td>(5)</td>
<td>If 24 vdc is not present, replace external remote control cable.</td>
</tr>
<tr>
<td>(6)</td>
<td>Disconnect external remote control cable from left or right remote control cable bulkhead connector.</td>
</tr>
<tr>
<td>(7)</td>
<td>Install cover on left or right remote control cable bulkhead connector.</td>
</tr>
</tbody>
</table>

![Diagram of remote control cable](image)
**121. M1089 MATERIAL HANDLING CRANE (MHC) DOES NOT OPERATE FROM REMOTE CONTROL (CONT)**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery voltage OK.</td>
</tr>
<tr>
<td>Overload shutdown system OK.</td>
</tr>
<tr>
<td>Hydraulic system shutdown relay OK.</td>
</tr>
<tr>
<td>Remote control cable OK.</td>
</tr>
<tr>
<td>External remote control cable OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty crane remote control box.</td>
</tr>
</tbody>
</table>

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
If continuity is not present, crane remote control box is faulty.

**3.** Is continuity present from one end of crane remote control box connector pin J to other end of crane remote control box connector pin H?

<table>
<thead>
<tr>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repair crane remote control box wiring harness (para 7-32).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace ON/OFF switch (para 7-32).</td>
</tr>
</tbody>
</table>
**CONTINUITY TEST**

1. Remove cover from crane remote control box connector.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter on pin J of crane remote control box connector.
4. Connect negative (-) probe of multimeter on pin H of crane remote control box connector and note reading on multimeter.
5. If continuity is not present, replace ON/OFF switch (para 7-32).
6. If continuity is present, repair crane remote control box internal wiring harness (para 7-32).
7. Install cover on crane remote control box connector.
1. Other crane functions from remote station OK.

TEST OPTIONS
Voltage Test or STE/ICE-R Test #89

REASON FOR QUESTION
This question eliminates possible problems and determines where to continue troubleshooting.

YES

NO

Go to step 3 of this fault.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>OUTPUT VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Connect external remote control cable to and remote control box (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(2) Loosen four screws on junction box.</td>
</tr>
<tr>
<td>(3) Open cover on junction box.</td>
</tr>
<tr>
<td>(4) Position MAIN POWER switch to ON.</td>
</tr>
<tr>
<td>(5) Lift guard and position remote control box ON/OFF switch to ON.</td>
</tr>
<tr>
<td>(6) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(7) Connect positive (+) probe of multimeter on terminal board lower position 15.</td>
</tr>
<tr>
<td>(8) Connect negative (-) probe of multimeter on ground quick-connect terminal board (above MAIN POWER switch).</td>
</tr>
</tbody>
</table>

NOTE

Step (9) requires the aid of an assistant.

(9) Position HOIST UP/DOWN controller to UP and note reading on multimeter.

(10) If 24 volts dc is not present, go to step 3 of this fault.

(11) Position MAIN POWER switch to OFF.
### 122. M1089 MATERIAL HANDLING CRANE (MHC) HOIST UP DOES NOT OPERATE FROM REMOTE STATION (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Remote control box OK.</td>
</tr>
<tr>
<td>HOIST UP/DOWN controller OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty hoist up solenoid cable.</td>
</tr>
<tr>
<td>Faulty hoist up solenoid.</td>
</tr>
</tbody>
</table>

#### 2. Is continuity present from hoist up solenoid cable connector pin 2 to ground and from pin 1 to terminal board lower position 15?

- **YES**
  - Replace hoist up solenoid cable (para 7-113).
  - Notify DS Maintenance.

- **NO**
  - Continuity Test or STE/ICE Test #91
  - If continuity is not present, hoist up solenoid cable is faulty. If continuity is present, hoist up solenoid is faulty.
CONTINUITY TEST

1. Disconnect hoist up solenoid connector from hoist up solenoid.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter on pin 2 of hoist up solenoid cable connector.
4. Connect negative (-) probe of multimeter on ground and note reading on multimeter.
5. Connect positive (+) probe of multimeter on pin 1 of hoist up solenoid cable connector.
6. Connect negative (-) probe of multimeter on terminal board lower position 15 and note reading on multimeter.
7. If continuity is not present, replace hoist up solenoid cable (para 7-113).
8. If continuity is present, notify DS Maintenance.
9. Connect hoist up solenoid cable connector to hoist up solenoid.
10. Close cover on junction box.
11. Tighten four screws on junction box cover.
e122. M1089 MATERIAL HANDLING CRANE (MHC) HOIST UP DOES NOT OPERATE FROM REMOTE STATION (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Hoist up solenoid cable OK.</td>
</tr>
<tr>
<td>Hoist up solenoid OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty hoist up/down controller.</td>
</tr>
<tr>
<td>Faulty remote control box internal wiring harness.</td>
</tr>
<tr>
<td>Faulty external remote control cable.</td>
</tr>
<tr>
<td>Faulty remote control cable.</td>
</tr>
</tbody>
</table>

3. Is continuity present from remote control box connector pin F to pin H?

- **NO**
  - Go to step 4 of this fault.

- **YES**
  - Go to step 5 of this fault.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
This question eliminates possible problems and determines where to continue troubleshooting.
CONTINUITY TEST

1. Disconnect external remote control cable from remote control box.
2. Position remote control box switch to ON.
3. Set multimeter to ohms.
4. Connect positive (+) probe of multimeter on pin F of connector on remote control box.
5. Connect negative (-) probe of multimeter on pin H of connector on remote control box.

NOTE
Step (6) requires the aid of an assistant.

6. Position HOIST UP/DOWN controller to UP and note reading on multimeter.
7. If continuity is not present, go to step 4 of this fault.
8. If continuity is present, go to step 5 of this fault.
9. Position remote control box switch to OFF.
### KNOWN INFO
- Other crane functions from remote station OK.
- Hoist up solenoid cable OK.
- Hoist up solenoid OK.
- External remote control cable OK.
- Remote control cable OK.

### POSSIBLE PROBLEMS
- Faulty remote control box internal wiring harness.
- Faulty hoist up/down controller.

### TEST OPTIONS
- Continuity Test or STE/ICE Test #91

### REASON FOR QUESTION
- If continuity is not present, remote control box internal wiring harness is faulty.
- If continuity is present, HOIST UP/DOWN controller is faulty.

### Flowchart

4. Is continuity present from remote control box connector pin F to HOIST UP/DOWN controller internal wiring harness pin 3 and from remote control box connector pin H to HOIST UP/DOWN controller internal wiring harness pin 1?

- **YES**
  - Repair remote control box internal wiring harness (para 7-32).
  - Replace HOIST UP/DOWN controller (para 7-32).

- **NO**
  - Repair remote control box internal wiring harness (para 7-32).
CONTINUITY TEST

(1) Remove HOIST UP/DOWN controller (para 7-32).
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin F of remote control box connector.
(4) Connect negative (-) probe of multimeter on pin 3 of HOIST UP/DOWN controller internal wiring harness and note reading on multimeter.
(5) Position remote control box switch to ON.
(6) Connect positive (+) probe of multimeter on pin H of remote control box connector.
(7) Connect negative (-) probe of multimeter on pin 1 of HOIST UP/DOWN controller internal wiring harness and note reading on multimeter.
(8) If continuity is not present, replace remote control box internal wiring harness (para 7-32).
(9) If continuity is present, replace HOIST UP/DOWN controller (para 7-32).
(10) Position remote control box switch to OFF.
(11) Install HOIST UP/DOWN controller (para 7-32).
(12) Close cover on junction box.
(13) Tighten four screws on junction box cover.
(14) Stow crane (TM 9-2320-366-10-1).
5. Is continuity present from one end of external remote control cable connector pin F to other end of external remote control cable connector pin F?

NO

YES

Replace external remote control cable.

KNOWLEDGE

Other crane functions from remote station OK.
Hoist up solenoid cable OK.
Hoist up solenoid OK.
Remote control box internal wiring harness OK.
HOIST UP/DOWN controller OK.

POSSIBLE PROBLEMS

Faulty external remote control cable.
Faulty remote control cable.

TEST OPTIONS

Continuity Test or STE/ICE Test #91

REASON FOR QUESTION

If continuity is not present, external remote control cable is faulty.
## CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter on pin F of one end of external remote control cable connector.
3. Connect negative (-) probe of multimeter on pin F of other end of external remote control cable and note reading on multimeter.
4. If continuity is not present, replace external remote control cable.
**122. M1089 MATERIAL HANDLING CRANE (MHC) HOIST UP DOES NOT OPERATE FROM REMOTE STATION (CONT)**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Hoist up solenoid cable OK.</td>
</tr>
<tr>
<td>Hoist up solenoid OK.</td>
</tr>
<tr>
<td>Remote control box internal wiring harness OK.</td>
</tr>
<tr>
<td>HOIST UP/DOWN controller OK.</td>
</tr>
<tr>
<td>External remote control cable OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty remote control cable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE Test #91</td>
</tr>
</tbody>
</table>

**REASON FOR QUESTION**

If continuity is not present, remote control cable is faulty.

**6.**

Is continuity present from remote control cable connector pin F to terminal board lower position 15?

- **YES**
  - Notify DS Maintenance.

- **NO**
  - Replace remote control cable (para 7-115 or 7-118).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin F of remote control cable connector.
(3) Connect negative (-) probe of multimeter on terminal board lower position 15 and note reading on multimeter.
(4) If continuity is not present, replace remote control cable (para 7-115 or 7-118).
(5) If continuity is present, notify DS Maintenance.
(6) Close cover on junction box.
(7) Tighten four screws on junction box cover.
(8) Stow crane (TM 9-2320-366-10-1).
1. Is 24 VDC present at junction box assembly terminal board position 16?

**WARNING**

Read WARNING on following page.

**TEST OPTIONS**
Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
This question eliminates possible problems and determines where to continue troubleshooting.

**YES**
Go to step 3 of this fault.

**NO**

## INITIAL SETUP

### Equipment Conditions
- Outriggers lowered (TM 9-2320-366-10-1).
- Crane erected with approximately five feet of cable payed out (TM 9-2320-366-10-1).
- Engine shut down (TM 9-2320-366-10-1).

### Personnel Required
(2)

### Tools and Special Tools
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

### References
TM 9-4910-571-12&P

## KNOWN INFO

- Other crane functions from remote station OK.

## POSSIBLE PROBLEMS
- Faulty hoist down solenoid cable.
- Faulty hoist down solenoid.
- Faulty HOIST UP/DOWN controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.
### OUTPUT VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connect external remote control cable to and remote control box (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>2</td>
<td>Loosen four screws on junction box.</td>
</tr>
<tr>
<td>3</td>
<td>Open cover on junction box.</td>
</tr>
<tr>
<td>4</td>
<td>Position MAIN POWER switch to ON.</td>
</tr>
<tr>
<td>5</td>
<td>Lift guard and position remote control box ON/OFF switch to ON.</td>
</tr>
<tr>
<td>6</td>
<td>Set multimeter to volts dc.</td>
</tr>
<tr>
<td>7</td>
<td>Connect positive (+) probe of multimeter on terminal board lower position 16.</td>
</tr>
<tr>
<td>8</td>
<td>Connect negative (-) probe of multimeter on ground quick-connect terminal board (above MAIN POWER switch).</td>
</tr>
</tbody>
</table>

**NOTE**
Step (9) requires the aid of an assistant.

- (9) Position HOIST UP/DOWN controller to DOWN and note reading on multimeter.
- (10) If 24 volts dc is not present, go to step 3 of this fault.
- (11) Position MAIN POWER switch to OFF.

---

**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.
123. **M1089 MATERIAL HANDLING CRANE (MHC) HOIST DOWN DOES NOT OPERATE FROM REMOTE STATION (CONT)**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
<td>Continuity Test or STE/ICE Test #91</td>
</tr>
<tr>
<td>Remote control box OK.</td>
<td></td>
</tr>
<tr>
<td>HOIST UP/DOWN controller OK.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty hoist down solenoid cable.</td>
<td>If continuity is not present, hoist down solenoid cable is faulty.</td>
</tr>
<tr>
<td>Faulty hoist down solenoid.</td>
<td>If continuity is present, hoist down solenoid is faulty.</td>
</tr>
</tbody>
</table>

2. Is continuity present from hoist down solenoid cable connector pin 2 to ground and from pin 1 to terminal board lower position 24?

- **NO**
  - Replace hoist down solenoid cable (para 7-111).

- **YES**
  - Notify DS Maintenance.
## CONTINUITY TEST

1. Disconnect hoist down solenoid connector from hoist down solenoid.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter on pin 2 of hoist down solenoid cable connector.
4. Connect negative (-) probe of multimeter on ground and note reading on multimeter.
5. Connect positive (+) probe of multimeter on pin 1 of hoist down solenoid cable connector.
6. Connect negative (-) probe of multimeter on terminal board lower position 24 and note reading on multimeter.
7. If continuity is not present, replace hoist down solenoid cable (para 7-111).
8. If continuity is present, notify DS Maintenance.
9. Connect hoist down solenoid cable connector to hoist down solenoid.
10. Close cover on junction box.
11. Tighten four screws on junction box cover.
3. Is continuity present from remote control box connector pin G to pin H?

**Known Info**
- Other crane functions from remote station OK.
- Hoist down solenoid cable OK.
- Hoist down solenoid OK.

**Possible Problems**
- Faulty hoist up/down controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

**Test Options**
- Continuity Test or STE/ICE Test #91

**Reason for Question**
This question eliminates possible problems and determines where to continue troubleshooting.

**Flowchart**
- NO: Go to step 4 of this fault.
- YES: Go to step 5 of this fault.
CONTINUITY TEST

(1) Disconnect external remote control cable from remote control box.
(2) Position remote control box switch to ON.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter on pin G of connector on remote control box.
(5) Connect negative (-) probe of multimeter on pin H of connector on remote control box.

NOTE
Step (6) requires the aid of an assistant.

(6) Position HOIST UP/DOWN controller to DOWN and note reading on multimeter.
(7) If continuity is not present, go to step 4 of this fault.
(8) If continuity is present, go to step 5 of this fault.
(9) Position remote control box switch to OFF.
4. If continuity is not present, remote control box internal wiring harness is faulty. If continuity is present, HOIST UP/DOWN controller is faulty.

**KNOW INFO**
- Other crane functions from remote station OK.
- Hoist down solenoid cable OK.
- Hoist down solenoid OK.
- External remote control cable OK.
- Remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control box internal wiring harness.
- Faulty hoist up/down controller.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- Is continuity present from remote control box connector pin G to HOIST UP/DOWN controller internal wiring harness pin 4 and from remote control box connector pin H to HOIST UP/DOWN controller internal wiring harness pin 1?

- **NO**
  - Repair remote control box internal wiring harness (para 7-32).

- **YES**
  - Replace HOIST UP/DOWN controller (para 7-32).
### CONTINUITY TEST

1. Remove HOIST UP/DOWN controller (para 7-32).
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter on pin G of remote control box connector.
4. Connect negative (-) probe of multimeter on pin 4 of HOIST UP/DOWN controller internal wiring harness and note reading on multimeter.
5. Position remote control box switch to ON.
6. Connect positive (+) probe of multimeter on pin H of remote control box connector.
7. Connect negative (-) probe of multimeter on pin 1 of HOIST UP/DOWN controller internal wiring harness and note reading on multimeter.
8. If continuity is not present, replace remote control box internal wiring harness (para 7-32).
9. If continuity is present, replace HOIST UP/DOWN controller (para 7-32).
10. Position remote control box switch to OFF.
11. Install HOIST UP/DOWN controller (para 7-32).
12. Close cover on junction box.
13. Tighten four screws on junction box cover.
M1089 MATERIAL HANDLING CRANE (MHC) HOIST DOWN DOES NOT OPERATE FROM REMOTE STATION (CONT)

5. Is continuity present from one end of external remote control cable connector pin G to other end of external remote control cable connector pin G?

TEST OPTIONS
- Continuity Test or STE/ICE Test #91

REASON FOR QUESTION
- If continuity is not present, external remote control cable is faulty.

KNOWLEDGE INFO
- Other crane functions from remote station OK.
- Hoist down solenoid cable OK.
- Hoist down solenoid OK.
- Remote control box internal wiring harness OK.
- HOIST UP/DOWN controller OK.

POSSIBLE PROBLEMS
- Faulty external remote control cable.
- Faulty remote control cable.

YES
- Replace external remote control cable.

NO
**CONTINUITY TEST**

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter on pin G of one end of external remote control cable connector.
3. Connect negative (-) probe of multimeter on pin G of other end of external remote control cable and note reading on multimeter.
4. If continuity is not present, replace external remote control cable.
6. Is continuity present from remote control cable connector pin G to terminal board lower position 16?

**KNOWN INFO**
- Other crane functions from remote station OK.
- Hoist down solenoid cable OK.
- Hoist down solenoid OK.
- Remote control box internal wiring harness OK.
- HOIST UP/DOWN controller OK.
- External remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control cable.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, remote control cable is faulty.

**YES**
- Notify DS Maintenance.

**NO**
- Replace remote control cable (para 7-115 or 7-118).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin G of remote control cable connector.
(3) Connect negative (-) probe of multimeter on terminal board lower position 16 and note reading on multimeter.
(4) If continuity is not present, replace remote control cable (para 7-115 or 7-118).
(5) If continuity is present, notify DS Maintenance.
(6) Close cover on junction box.
(7) Tighten four screws on junction box cover.
(8) Stow crane (TM 9-2320-366-10-1).
e124. M1089 MATERIAL HANDLING CRANE (MHC) BOOM UP DOES NOT OPERATE FROM REMOTE STATION

INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Conditions</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outriggers lowered (TM 9-2320-366-10-1).</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td>Crane erected with approximately five feet of cable paid out (TM 9-2320-366-10-1).</td>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
</tr>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1).</td>
<td>STE/ICE-R (Item 41, Appendix C)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Personnel Required</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2)</td>
<td>TM 9-4910-571-12&amp;P</td>
</tr>
</tbody>
</table>

KNOWLEDGE INFO

Other crane functions from remote station OK.

POSSIBLE PROBLEMS

- Faulty boom up solenoid cable.
- Faulty boom up solenoid.
- Faulty BOOM UP/DOWN controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

1. WARNING

Read WARNING on following page.

Is 24 vdc present at junction box assembly terminal board position 13?

TEST OPTIONS

- Voltage Test or STE/ICE-R Test #89

REASON FOR QUESTION

This question eliminates possible problems and determines where to continue troubleshooting.

START

NO

YES

Go to step 3 of this fault.
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelery can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.

**WARNING**

OUTPUT VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connect external remote control cable to remote control box (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>2</td>
<td>Loosen four screws on junction box.</td>
</tr>
<tr>
<td>3</td>
<td>Open cover on junction box.</td>
</tr>
<tr>
<td>4</td>
<td>Position MAIN POWER switch to ON.</td>
</tr>
<tr>
<td>5</td>
<td>Lift guard and position remote control box ON/OFF switch to ON.</td>
</tr>
<tr>
<td>6</td>
<td>Set multimeter to volts dc.</td>
</tr>
<tr>
<td>7</td>
<td>Connect positive (+) probe of multimeter on terminal board lower position 13.</td>
</tr>
<tr>
<td>8</td>
<td>Connect negative (-) probe of multimeter on ground quick-connect terminal board (above MAIN POWER switch).</td>
</tr>
</tbody>
</table>

**NOTE**

Step (9) requires the aid of an assistant.

9. Position BOOM UP/DOWN controller to UP and note reading on multimeter.

10. If 24 volts dc is not present, go to step 3 of this fault.

11. Position MAIN POWER switch to OFF.
2. Is continuity present from boom up solenoid cable connector pin 2 to ground and from pin 1 to terminal board lower position 13?

   | KNOWN INFO |
   | Other crane functions from remote station OK. |
   | Remote control box OK. |
   | BOOM UP/DOWN controller OK. |

   | POSSIBLE PROBLEMS |
   | Faulty boom up solenoid cable. |
   | Faulty boom up solenoid. |

   | TEST OPTIONS |
   | Continuity Test or STE/ICE Test #91 |

   | REASON FOR QUESTION |
   | If continuity is not present, boom up solenoid cable is faulty. If continuity is present, boom up solenoid is faulty. |

   NO

   Replace boom up solenoid cable (para 7-108).

   YES

   Notify DS Maintenance.
CONTINUITY TEST

(1) Disconnect boom up solenoid connector from boom up solenoid.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin 2 of boom up solenoid cable connector.
(4) Connect negative (-) probe of multimeter on ground and note reading on multimeter.
(5) Connect positive (+) probe of multimeter on pin 1 of boom up solenoid cable connector.
(6) Connect negative (-) probe of multimeter on terminal board lower position 13 and note reading on multimeter.
(7) If continuity is not present, replace boom up solenoid cable (para 7-108).
(8) If continuity is present, notify DS Maintenance.
(9) Connect boom up solenoid cable connector to boom up solenoid.
(10) Close cover on junction box.
(11) Tighten four screws on junction box cover.
(12) Stow crane (TM 9-2320-366-10-1).
3. Is continuity present from remote control box connector pin N to pin H?

**NO**
- Go to step 4 of this fault.

**YES**
- Go to step 5 of this fault.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- This question eliminates possible problems and determines where to continue troubleshooting.

**KNOWN INFO**
- Other crane functions from remote station OK.
- Boom up solenoid cable OK
- Boom up solenoid OK.

**POSSIBLE PROBLEMS**
- Faulty boom up/down controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.
### CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Disconnect external remote control cable from remote control box.</td>
</tr>
<tr>
<td>2</td>
<td>Position remote control box switch to ON.</td>
</tr>
<tr>
<td>3</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>4</td>
<td>Connect positive (+) probe of multimeter on pin N of connector on remote control box.</td>
</tr>
<tr>
<td>5</td>
<td>Connect negative (-) probe of multimeter on pin H of connector on remote control box.</td>
</tr>
</tbody>
</table>

**NOTE**

Step (6) requires the aid of an assistant.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Position BOOM UP/DOWN controller to UP and note reading on multimeter.</td>
</tr>
<tr>
<td>7</td>
<td>If continuity is not present, go to step 4 of this fault.</td>
</tr>
<tr>
<td>8</td>
<td>If continuity is present, go to step 5 of this fault.</td>
</tr>
<tr>
<td>9</td>
<td>Position remote control box switch to OFF.</td>
</tr>
</tbody>
</table>
4. Is continuity present from remote control box connector pin N to BOOM UP/DOWN controller internal wiring harness pin 3 and from remote control box connector pin N to BOOM UP/DOWN controller internal wiring harness pin 1?

**NO**
- Repair remote control box internal wiring harness (para 7-32).

**YES**
- Replace BOOM UP/DOWN controller (para 7-32).

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, remote control box internal wiring harness is faulty.
- If continuity is present, BOOM UP/DOWN controller is faulty.
CONTINUITY TEST

(1) Remove BOOM UP/DOWN controller (para 7-32).
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin N of remote control box connector.
(4) Connect negative (-) probe of multimeter on pin 3 of BOOM UP/DOWN controller internal wiring harness and note reading on multimeter.
(5) Position remote control box switch to ON.
(6) Connect positive (+) probe of multimeter on pin H of remote control box connector.
(7) Connect negative (-) probe of multimeter on pin 1 of BOOM UP/DOWN controller internal wiring harness and note reading on multimeter.
(8) If continuity is not present, replace remote control box internal wiring harness (para 7-32).
(9) If continuity is present, replace BOOM UP/DOWN controller (para 7-32).
(10) Position remote control box switch to OFF.
(11) Install BOOM UP/DOWN controller (para 7-32).
(12) Close cover on junction box.
(13) Tighten four screws on junction box cover.
(14) Stow crane (TM 9-2320-366-10-1).
5. Is continuity present from one end of external remote control cable connector pin N to other end of external remote control cable connector pin N?

**KNOWN INFO**
- Other crane functions from remote station OK.
- Boom up solenoid cable OK
- Boom up solenoid OK.
- Remote control box internal wiring harness OK.
- BOOM UP/DOWN controller OK.

**POSSIBLE PROBLEMS**
- Faulty external remote control cable.
- Faulty remote control cable.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, external remote control cable is faulty.

**YES**
- Replace external remote control cable.

**NO**
- Replace external remote control cable.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin N of one end of external remote control cable connector.
(3) Connect negative (-) probe of multimeter on pin N of other end of external remote control cable and note reading on multimeter.
(4) If continuity is not present, replace external remote control cable.
6. Is continuity present from remote control cable connector pin N to terminal board lower position 13?

**NO**
- Replace remote control cable (para 7-115 or 7-118).

**YES**
- Notify DS Maintenance.

**KNOWN INFO**
- Other crane functions from remote station OK.
- Boom up solenoid cable OK
- Boom up solenoid OK.
- Remote control box internal wiring harness OK.
- BOOM UP/DOWN controller OK.
- External remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control cable.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, remote control cable is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin N of remote control cable connector.
(3) Connect negative (-) probe of multimeter on terminal board lower position 13 and note reading on multimeter.
(4) If continuity is not present, replace remote control cable (para 7-115 or 7-118).
(5) If continuity is present, notify DS Maintenance.
(6) Close cover on junction box.
(7) Tighten four screws on junction box cover.
(8) Stow crane (TM 9-2320-366-10-1).
e125. M1089 MATERIAL HANDLING CRANE (MHC) BOOM DOWN DOES NOT OPERATE FROM REMOTE STATION

INITIAL SETUP

Equipment Conditions
Outriggers lowered (TM 9-2320-366-10-1).
Crane erected with approximately five feet of cable payed out (TM 9-2320-366-10-1).
Engine shut down (TM 9-2320-366-10-1).

Personnel Required
(2)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
STE/ICE-R (Item 41, Appendix C)

References
TM 9-4910-571-12&P

KNOWLEDGE

Other crane functions from remote station OK.

POSSIBLE PROBLEMS
Faulty boom down solenoid cable.
Faulty boom down solenoid.
Faulty BOOM UP/DOWN controller.
Faulty remote control box internal wiring harness.
Faulty external remote control cable.
Faulty remote control cable.

TEST OPTIONS
Voltage Test or STE/ICE-R Test #89

REASON FOR QUESTION
This question eliminates possible problems and determines where to continue troubleshooting.

START

WARNING
1. Read WARNING on following page.

Is 24 vdc present at junction box assembly terminal board position 14?

NO

GO TO STEP 3 OF THIS FAULT

YES

Go to step 3 of this fault.
### OUTPUT VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connect external remote control cable to remote control box (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>2</td>
<td>Loosen four screws on junction box.</td>
</tr>
<tr>
<td>3</td>
<td>Open cover on junction box.</td>
</tr>
<tr>
<td>4</td>
<td>Position MAIN POWER switch to ON.</td>
</tr>
<tr>
<td>5</td>
<td>Lift guard and position remote control box ON/OFF switch to ON.</td>
</tr>
<tr>
<td>6</td>
<td>Set multimeter to volts dc.</td>
</tr>
<tr>
<td>7</td>
<td>Connect positive (+) probe of multimeter on terminal board lower position 14.</td>
</tr>
<tr>
<td>8</td>
<td>Connect negative (-) probe of multimeter on ground quick-connect terminal board (above MAIN POWER switch).</td>
</tr>
</tbody>
</table>

**NOTE**

- Step (9) requires the aid of an assistant.
- Position BOOM UP/DOWN controller to DOWN and note reading on multimeter.
- If 24 volts dc is not present, go to step 3 of this fault.
- Position MAIN POWER switch to OFF.

---

**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.

---

**NOTE**

- Step (9) requires the aid of an assistant.
- Position BOOM UP/DOWN controller to DOWN and note reading on multimeter.
- If 24 volts dc is not present, go to step 3 of this fault.
- Position MAIN POWER switch to OFF.
2. Is continuity present from boom down solenoid cable connector pin 2 to ground and from pin 1 to terminal board lower position 14?

- **NO**
  - Replace boom down solenoid cable (para 7-106).

- **YES**
  - Notify DS Maintenance.

**KNOWN INFO**
- Other crane functions from remote station OK.
- Remote control box OK.
- BOOM UP/DOWN controller OK.

**POSSIBLE PROBLEMS**
- Faulty boom down solenoid cable.
- Faulty boom down solenoid

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, boom down solenoid cable is faulty. If continuity is present, boom down solenoid is faulty.
<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Disconnect boom down solenoid connector from boom down solenoid.</td>
</tr>
<tr>
<td>(2) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter on pin 2 of boom down solenoid cable connector.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter on ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(5) Connect positive (+) probe of multimeter on pin 1 of boom down solenoid cable connector.</td>
</tr>
<tr>
<td>(6) Connect negative (-) probe of multimeter on terminal board lower position 14 and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If continuity is not present, replace boom down solenoid cable (para 7-106).</td>
</tr>
<tr>
<td>(8) If continuity is present, notify DS Maintenance.</td>
</tr>
<tr>
<td>(9) Connect boom down solenoid cable connector to boom down solenoid.</td>
</tr>
<tr>
<td>(10) Close cover on junction box.</td>
</tr>
<tr>
<td>(11) Tighten four screws on junction box cover.</td>
</tr>
<tr>
<td>(12) Stow crane (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
### Known Info

- Other crane functions from remote station OK.
- Boom down solenoid cable OK.
- Boom down solenoid OK.

### Possible Problems

- Faulty boom up/down controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

### Test Options

- Continuity Test or STE/ICE Test #91

### Reason for Question

This question eliminates possible problems and determines where to continue troubleshooting.

---

**3.** Is continuity present from remote control box connector pin M to pin H?

- **NO**
  - Go to step 4 of this fault.
- **YES**
  - Go to step 5 of this fault.
CONTINUITY TEST

1. Disconnect external remote control cable from remote control box.
2. Position remote control box switch to ON.
3. Set multimeter to ohms.
4. Connect positive (+) probe of multimeter on pin M of connector on remote control box.
5. Connect negative (-) probe of multimeter on pin H of connector on remote control box.

NOTE
Step (6) requires the aid of an assistant.

6. Position BOOM UP/DOWN controller to DOWN and note reading on multimeter.
7. If continuity is not present, go to step 4 of this fault.
8. If continuity is present, go to step 5 of this fault.
9. Position remote control box switch to OFF.
4. Is continuity present from remote control box connector pin M to BOOM UP/DOWN controller internal wiring harness pin 4 and from remote control box connector pin H to BOOM UP/DOWN controller internal wiring harness pin 1?

**YES**
- Repair remote control box internal wiring harness (para 7-32).
- Replace BOOM UP/DOWN controller (para 7-32).

**NO**
- Replace BOOM UP/DOWN controller (para 7-32).

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, remote control box internal wiring harness is faulty.
- If continuity is present, BOOM UP/DOWN controller is faulty.

**KNOWN INFO**
- Other crane functions from remote station OK.
- Boom down solenoid cable OK.
- Boom down solenoid OK.
- External remote control cable OK.
- Remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control box internal wiring harness.
- Faulty boom up/down controller.
CONTINUITY TEST

(1) Remove BOOM UP/DOWN controller (para 7-32).
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin M of remote control box connector.
(4) Connect negative (-) probe of multimeter on pin 4 of BOOM UP/DOWN controller internal wiring harness and note reading on multimeter.
(5) Position remote control box switch to ON.
(6) Connect positive (+) probe of multimeter on pin H of remote control box connector.
(7) Connect negative (-) probe of multimeter on pin 1 of BOOM UP/DOWN controller internal wiring harness and note reading on multimeter.
(8) If continuity is not present, replace remote control box internal wiring harness (para 7-32).
(9) If continuity is present, replace BOOM UP/DOWN controller (para 7-32).
(10) Position remote control box switch to OFF.
(11) Install BOOM UP/DOWN controller (para 7-32).
(12) Close cover on junction box.
(13) Tighten four screws on junction box cover.
(14) Stow crane (TM 9-2320-366-10-1).
5. If continuity is not present, external remote control cable is faulty. If continuity is present, continue with the next test.

### TEST OPTIONS
- Continuity Test or
- STE/ICE Test #91

### REASON FOR QUESTION
- If continuity is not present, external remote control cable is faulty.
- If continuity is present, continue with the next test.

### KNOWN INFO
- Other crane functions from remote station OK.
- Boom down solenoid cable OK.
- Boom down solenoid OK.
- Remote control box internal wiring harness OK.
- BOOM UP/DOWN controller OK.

### POSSIBLE PROBLEMS
- Faulty external remote control cable.
- Faulty remote control cable.

### Logic Diagram

- **YES**
  - Replace external remote control cable.

- **NO**
  - Is continuity present from one end of external remote control cable connector pin M to other end of external remote control cable connector pin M?
CONTINUITY TEST
(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin M of one end of external remote control cable connector.
(3) Connect negative (-) probe of multimeter on pin M of other end of external remote control cable and note reading on multimeter.
(4) If continuity is not present, replace external remote control cable.
6. Is continuity present from remote control cable connector pin M to terminal board lower position 14?

- **YES**
  - Notify DS Maintenance.

- **NO**
  - Replace remote control cable (para 7-115 or 7-118).

### KNOWN INFO
- Other crane functions from remote station OK.
- Boom down solenoid cable OK.
- Boom down solenoid OK.
- Remote control box internal wiring harness OK.

### POSSIBLE PROBLEMS
- Faulty remote control cable.

### TEST OPTIONS
- Continuity Test or STE/ICE Test #91

### REASON FOR QUESTION
- If continuity is not present, remote control cable is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin M of remote control cable connector.
(3) Connect negative (-) probe of multimeter on terminal board lower position 14 and note reading on multimeter.
(4) If continuity is not present, replace remote control cable (para 7-115 or 7-118).
(5) If continuity is present, notify DS Maintenance.
(6) Close cover on junction box.
(7) Tighten four screws on junction box cover.
(8) Stow crane (TM 9-2320-366-10-1).
E126. M1089 MATERIAL HANDLING CRANE (MHC) TELESCOPE IN DOES NOT OPERATE FROM REMOTE STATION

INITIAL SETUP

Equipment Conditions
Outriggers lowered (TM 9-2320-366-10-1).
Crane erected with approximately five feet of cable payed out (TM 9-2320-366-10-1).
Engine shut down (TM 9-2320-366-10-1).

Personnel Required
(2)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
STE/ICE-R (Item 41, Appendix C)

References
TM 9-4910-571-12&P

KNOWLEDGE

Other remote station functions from remote station OK.

POSSIBLE PROBLEMS
Faulty telescope in solenoid cable.
Faulty telescope in solenoid.
Faulty TELESCOPE IN/OUT controller.
Faulty remote control box internal wiring harness.
Faulty external remote control cable.
Faulty remote control cable.

WARNING

Read WARNING on following page.

1. Is 24 vdc present at junction box assembly terminal board position 12?

NO

Go to step 3 of this fault.

YES

TEST OPTIONS

Voltage Test or STE/ICE-R Test #89

REASON FOR QUESTION

This question eliminates possible problems and determines where to continue troubleshooting.
WARNING
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.

OUTPUT VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connect external remote control cable to remote control box (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>2</td>
<td>Loosen four screws on junction box.</td>
</tr>
<tr>
<td>3</td>
<td>Open cover on junction box.</td>
</tr>
<tr>
<td>4</td>
<td>Position MAIN POWER switch to ON.</td>
</tr>
<tr>
<td>5</td>
<td>Lift guard and position remote control box ON/OFF switch to ON.</td>
</tr>
<tr>
<td>6</td>
<td>Set multimeter to volts dc.</td>
</tr>
<tr>
<td>7</td>
<td>Connect positive (+) probe of multimeter on terminal board lower position 12.</td>
</tr>
<tr>
<td>8</td>
<td>Connect negative (-) probe of multimeter on ground quick-connect terminal board (above MAIN POWER switch).</td>
</tr>
</tbody>
</table>

NOTE
Step (9) requires the aid of an assistant.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Position TELESCOPE IN/OUT controller to IN and note reading on multimeter.</td>
</tr>
<tr>
<td>10</td>
<td>If 24 volts dc is not present, go to step 3 of this fault.</td>
</tr>
</tbody>
</table>
2. **Known Info**

| Other crane functions from remote station OK.  
| Remote control box OK.  
| Telescope in/out controller OK.  

**Possible Problems**

| Faulty telescope in solenoid cable.  
| Faulty telescope in solenoid.  

**Test Options**

- Continuity Test or STE/ICE Test #91

**Reason for Question**

- If continuity is not present, telescope in solenoid cable is faulty. If continuity is present, telescope in solenoid is faulty.

**Diagram Steps**

- **Yes**
  - Replace telescope in solenoid cable (para 7-121).

- **No**
  - Is continuity present from telescope in solenoid cable connector pin 2 to ground and from pin 1 to terminal board lower position 12?

  - If yes:
    - Replace telescope in solenoid cable (para 7-121).
  
  - If no:
    - Notify DS Maintenance.
CONTINUITY TEST

(1) Disconnect telescope in solenoid connector from telescope in solenoid.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin 2 of telescope in solenoid cable connector.
(4) Connect negative (-) probe of multimeter on ground and note reading on multimeter.
(5) Connect positive (+) probe of multimeter on pin 1 of telescope in solenoid cable connector.
(6) Connect negative (-) probe of multimeter on terminal board lower position 12 and note reading on multimeter.
(7) If continuity is not present, replace telescope in solenoid cable (para 7-121).
(8) If continuity is present, notify DS Maintenance.
(9) Connect telescope in solenoid cable connector to telescope in solenoid.
(10) Close cover on junction box.
(11) Tighten four screws on junction box cover.
(12) Stow crane (TM 9-2320-366-10-1).
3. Is continuity present from remote control box connector pin D to pin H?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Telescope in solenoid cable OK.</td>
</tr>
<tr>
<td>Telescope in solenoid OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty telescope in/out controller.</td>
</tr>
<tr>
<td>Faulty remote control box internal wiring harness.</td>
</tr>
<tr>
<td>Faulty external remote control cable.</td>
</tr>
<tr>
<td>Faulty remote control cable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE Test #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>This question eliminates possible problems and determines where to continue troubleshooting.</td>
</tr>
</tbody>
</table>

YES

Go to step 4 of this fault.

NO

Go to step 5 of this fault.
CONTINUITY TEST

(1) Disconnect external remote control cable from remote control box.
(2) Position remote control box switch to ON.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter on pin D of connector on remote control box.
(5) Connect negative (-) probe of multimeter on pin H of connector on remote control box.

NOTE
Step (6) requires the aid of an assistant.

(6) Position TELESCOPE IN/OUT controller to IN and note reading on multimeter.
(7) If continuity is not present, go to step 4 of this fault.
(8) If continuity is present, go to step 5 of this fault.
(9) Position remote control box switch to OFF.
4. Is continuity present from remote control box connector pin D to TELESCOPE IN/OUT controller internal wiring harness connector pin 3 and from remote control box connector pin H to TELESCOPE IN/OUT controller internal wiring harness pin 1?

**KNOWN INFO**
- Other crane functions from remote station OK.
- Telescope in solenoid cable OK.
- Telescope in solenoid OK.
- External remote control cable OK.
- Remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control box internal wiring harness.
- Faulty telescope in/out controller.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, remote control box internal wiring harness is faulty.
- If continuity is present, TELESCOPE IN/OUT controller is faulty.

**FLOW CHART**

- **NO**
  - Replace TELESCOPE IN/OUT controller (para 7-32).
- **YES**
  - Repair remote control box internal wiring harness (para 7-32).

*Note: The flow chart and table details the troubleshooting process for the M1089 MATERIAL HANDLING CRANE (MHC) TELESCOPE IN DOES NOT OPERATE FROM REMOTE STATION (CONT)*
### CONTINUITY TEST

1. Remove TELESCOPE IN/OUT controller (para 7-32).
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter on pin D of remote control box connector.
4. Connect negative (-) probe of multimeter on pin 3 of TELESCOPE IN/OUT controller internal wiring harness and note reading on multimeter.
5. Position remote control box switch to ON.
6. Connect positive (+) probe of multimeter on pin H of remote control box connector.
7. Connect negative (-) probe of multimeter on pin 1 of TELESCOPE IN/OUT controller internal wiring harness and note reading on multimeter.
8. If continuity is not present, replace remote control box internal wiring harness (para 7-32).
9. If continuity is present, replace TELESCOPE IN/OUT controller (para 7-32).
10. Position remote control box switch to OFF.
11. Install TELESCOPE IN/OUT controller (para 7-32).
12. Close cover on junction box.
13. Tighten four screws on junction box cover.
5. Is continuity present from one end of external remote control cable connector pin D to other end of external remote control cable connector pin D?

**NO**
- Replace external remote control cable.

**YES**
- Replace external remote control cable.

**KNOWN INFO**
- Other crane functions from remote station OK.
- Telescope in solenoid cable OK.
- Telescope in solenoid OK.
- Remote control box internal wiring harness OK.
- TELESCOPE IN/OUT controller OK.

**POSSIBLE PROBLEMS**
- Faulty external remote control cable.
- Faulty remote control cable.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, external remote control cable is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin D of one end of external remote control cable connector.
(3) Connect negative (-) probe of multimeter on pin D of other end of external remote control cable and note reading on multimeter.
(4) If continuity is not present, replace external remote control cable.
6. Is continuity present from remote control cable connector pin D to terminal board lower position 12?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Telescope in solenoid cable OK.</td>
</tr>
<tr>
<td>Telescope in solenoid OK.</td>
</tr>
<tr>
<td>Remote control box internal wiring harness OK.</td>
</tr>
<tr>
<td>TELESCOPE IN/OUT controller OK.</td>
</tr>
<tr>
<td>External remote control cable OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty remote control cable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE Test #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, remote control cable is faulty.</td>
</tr>
</tbody>
</table>

NO → Replace remote control cable (para 7-115 or 7-118).

YES → Notify DS Maintenance.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin D of remote control cable connector.
(3) Connect negative (-) probe of multimeter on terminal board lower position 12 and note reading on multimeter.
(4) If continuity is not present, replace remote control cable (para 7-115 or 7-118).
(5) If continuity is present, notify DS Maintenance.
(6) Close cover on junction box.
(7) Tighten four screws on junction box cover.
(8) Stow crane (TM 9-2320-366-10-1).
1. Other crane functions from remote station OK.

START

WARNING
Read WARNING on following page.

Is 24 vdc present at junction box assembly terminal board position 11?

NO

Go to step 3 of this fault.

YES

TEST OPTIONS
Voltage Test or STE/ICE-R Test #89

REASON FOR QUESTION
This question eliminates possible problems and determines where to continue troubleshooting.

KNOWLEDGE INFO
Other crane functions from remote station OK.

POSSIBLE PROBLEMS
Faulty telescope out solenoid cable.
Faulty telescope out solenoid.
Faulty TELESCOPE IN/OUT controller.
Faulty remote control box internal wiring harness.
Faulty external remote control cable.
Faulty remote control cable.

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
STE/ICE-R (Item 41, Appendix C)

References
TM 9-4910-571-12&P

INITIAL SETUP
Equipment Conditions
Outriggers lowered (TM 9-2320-366-10-1).
Crane erected with approximately five feet of cable payed out (TM 9-2320-366-10-1).
Engine shut down (TM 9-2320-366-10-1).

Personnel Required
(2)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
STE/ICE-R (Item 41, Appendix C)

References
TM 9-4910-571-12&P
### OUTPUT VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connect external remote control cable to remote control box (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>2</td>
<td>Loosen four screws on junction box.</td>
</tr>
<tr>
<td>3</td>
<td>Open cover on junction box.</td>
</tr>
<tr>
<td>4</td>
<td>Position MAIN POWER switch to ON.</td>
</tr>
<tr>
<td>5</td>
<td>Lift guard and position remote control box ON/OFF switch to ON.</td>
</tr>
<tr>
<td>6</td>
<td>Set multimeter to volts dc.</td>
</tr>
<tr>
<td>7</td>
<td>Connect positive (+) probe of multimeter on terminal board lower position 11.</td>
</tr>
<tr>
<td>8</td>
<td>Connect negative (-) probe of multimeter on ground quick-connect terminal board (above MAIN POWER switch).</td>
</tr>
</tbody>
</table>

**NOTE**
Step (9) requires the aid of an assistant.

- Position TELESCOPE IN/OUT controller to OUT and note reading on multimeter.
- If 24 volts dc is not present, go to step 3 of this fault.

**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.
2. **Is continuity present from telescope out solenoid cable connector pin 2 to ground and from pin 1 to terminal board lower position 11?**

   - **YES**
     - Replace telescope out solenoid cable (para 7-123).

   - **NO**
     - Notify DS Maintenance.

**KNOWN INFO**
- Other crane functions from remote station OK.
- Remote control box OK.
- TELESCOPE IN/OUT controller OK.

**POSSIBLE PROBLEMS**
- Faulty telescope out solenoid cable.
- Faulty telescope out solenoid.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, telescope out solenoid cable is faulty. If continuity is present, telescope out solenoid is faulty.
CONTINUITY TEST

(1) Disconnect telescope out solenoid connector from telescope out solenoid.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin 2 of telescope out solenoid cable connector.
(4) Connect negative (-) probe of multimeter on ground and note reading on multimeter.
(5) Connect positive (+) probe of multimeter on pin 1 of telescope out solenoid cable connector.
(6) Connect negative (-) probe of multimeter on terminal board lower position 11 and note reading on multimeter.
(7) If continuity is not present, replace telescope out solenoid cable (para 7-123).
(8) If continuity is present, notify DS Maintenance.
(9) Connect telescope out solenoid cable connector to telescope out solenoid.
(10) Close cover on junction box.
(11) Tighten four screws on junction box cover.
(12) Stow crane (TM 9-2320-366-10-1).
3. Is continuity present from remote control box connector pin C to pin H?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Telescope out solenoid cable OK.</td>
</tr>
<tr>
<td>Telescope out solenoid OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty telescope in/out controller.</td>
</tr>
<tr>
<td>Faulty remote control box internal wiring harness.</td>
</tr>
<tr>
<td>Faulty external remote control cable.</td>
</tr>
<tr>
<td>Faulty remote control cable.</td>
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</tbody>
</table>

<table>
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<tr>
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<tbody>
<tr>
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</table>

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>This question eliminates possible problems and determines where to continue troubleshooting.</td>
</tr>
</tbody>
</table>

NO

- Go to step 4 of this fault.

YES

- Go to step 5 of this fault.
CONTINUITY TEST

(1) Disconnect external remote control cable from remote control box.
(2) Position remote control box switch to ON.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter on pin C of connector on remote control box.
(5) Connect negative (-) probe of multimeter on pin H of connector on remote control box.

NOTE

Step (6) requires the aid of an assistant.

(6) Position TELESCOPE IN\OUT controller to OUT and note reading on multimeter.
(7) If continuity is not present, go to step 4 of this fault.
(8) If continuity is present, go to step 5 of this fault.
(9) Position remote control box switch to OFF.
127. M1089 MATERIAL HANDLING CRANE (MHC) TELESCOPE OUT DOES NOT OPERATE FROM REMOTE STATION (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Telescope out solenoid cable OK.</td>
</tr>
<tr>
<td>Telescope out solenoid OK.</td>
</tr>
<tr>
<td>External remote control cable OK.</td>
</tr>
<tr>
<td>Remote control cable OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty remote control box internal wiring harness.</td>
</tr>
<tr>
<td>Faulty telescope in/out controller.</td>
</tr>
</tbody>
</table>

4. Is continuity present from remote control box connector pin C to TELESCOPE IN/OUT controller internal wiring harness pin 4 and from remote control box connector pin H to TELESCOPE IN/OUT controller internal wiring harness pin 1?

- **YES**
  - Repair remote control box internal wiring harness (para 7-32).
  - Replace TELESCOPE IN/OUT controller (para 7-32).

- **NO**
  - Replace TELESCOPE IN/OUT controller (para 7-32).

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

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<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, remote control box internal wiring harness is faulty.</td>
</tr>
<tr>
<td>If continuity is present, TELESCOPE IN/OUT controller is faulty.</td>
</tr>
</tbody>
</table>
### CONTINUITY TEST

1. Remove TELESCOPE IN/OUT controller (para 7-32).
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter on pin C of remote control box connector.
4. Connect negative (-) probe of multimeter on pin 4 of TELESCOPE IN/OUT controller internal wiring harness and note reading on multimeter.
5. Position remote control box switch to ON.
6. Connect positive (+) probe of multimeter on pin H of remote control box connector.
7. Connect negative (-) probe of multimeter on pin 1 of TELESCOPE IN/OUT controller internal wiring harness and note reading on multimeter.
8. If continuity is not present, replace remote control box internal wiring harness (para 7-32).
9. If continuity is present, replace TELESCOPE IN/OUT controller (para 7-32).
10. Position remote control box switch to OFF.
11. Install TELESCOPE IN/OUT controller (para 7-32).
12. Close cover on junction box.
13. Tighten four screws on junction box cover.
5. If continuity is not present, external remote control cable is faulty.

POSSIBLE PROBLEMS
- Faulty external remote control cable.
- Faulty remote control cable.

TEST OPTIONS
- Continuity Test or STE/ICE Test #91

REASON FOR QUESTION
- If continuity is not present, external remote control cable is faulty.

If continuity is present from one end of external remote control cable connector pin C to other end of external remote control cable connector pin C?

YES
Replace external remote control cable.

NO
## CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter on pin C of one end of external remote control cable connector.
3. Connect negative (-) probe of multimeter on pin C of other end of external remote control cable and note reading on multimeter.
4. If continuity is not present, replace external remote control cable.
6. Is continuity present from remote control cable connector pin C to terminal board lower position 11?

- **NO**
  - Replace remote control cable (para 7-115 or 7-118).

- **YES**
  - Notify DS Maintenance.

**KNOWN INFO**
- Other crane functions from remote station OK.
- Telescope out solenoid cable OK.
- Telescope out solenoid OK.
- Remote control box internal wiring harness OK.
- TELESCOPE IN/OUT controller OK.
- External remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control cable.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, remote control cable is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin C of remote control cable connector.
(3) Connect negative (-) probe of multimeter on terminal board lower position 11 and note reading on multimeter.
(4) If continuity is not present, replace remote control cable (para 7-115 or 7-118).
(5) If continuity is present, notify DS Maintenance.
(6) Close cover on junction box.
(7) Tighten four screws on junction box cover.
(8) Stow crane (TM 9-2320-366-10-1).
**e128. M1089 MATERIAL HANDLING CRANE (MHC) SWING CW DOES NOT OPERATE FROM REMOTE STATION**

**INITIAL SETUP**

**Equipment Conditions**
- Outriggers lowered (TM 9-2320-366-10-1).
- Crane erected with approximately five feet of cable payed out (TM 9-2320-366-10-1).
- Engine shut down (TM 9-2320-366-10-1).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

**References**
- TM 9-4910-571-12&P

**Personnel Required**
- (2)

**Known Info**
- Other crane functions from remote station OK.

**Possible Problems**
- Faulty swing CW solenoid cable.
- Faulty swing CW solenoid.
- Faulty SWING CW/CCW controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

**Test Options**
- Voltage Test or STE/ICE-R Test #89

**Reason for Question**
- This question eliminates possible problems and determines where to continue troubleshooting.

**Flowchart**

1. Read WARNING on following page.

   Is 24 vdc present at junction box assembly terminal board position 10?

   - **NO**
     - **Go to step 3 of this fault.**
   - **YES**
     - **START**
<table>
<thead>
<tr>
<th>OUTPUT VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Connect external remote control cable to remote control box (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(2) Loosen four screws on junction box.</td>
</tr>
<tr>
<td>(3) Open cover on junction box.</td>
</tr>
<tr>
<td>(4) Position MAIN POWER switch to ON.</td>
</tr>
<tr>
<td>(5) Lift guard and position remote control box ON/OFF switch to ON.</td>
</tr>
<tr>
<td>(6) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(7) Connect positive (+) probe of multimeter on terminal board lower position 10.</td>
</tr>
<tr>
<td>(8) Connect negative (-) probe of multimeter on ground quick-connect terminal board (above MAIN POWER switch).</td>
</tr>
</tbody>
</table>

**NOTE**
Step (9) requires the aid of an assistant.

(9) Position SWING CW/CCW controller to CW and note reading on multimeter.
(10) If 24 volts dc is not present, go to step 3 of this fault.

---

**WARNING**
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.
**128. M1089 MATERIAL HANDLING CRANE (MHC) SWING CW DOES NOT OPERATE FROM REMOTE STATION (CONT)**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Remote control box OK.</td>
</tr>
<tr>
<td>SWING CW/CCW controller OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty swing CW solenoid cable.</td>
</tr>
<tr>
<td>Faulty swing CW solenoid.</td>
</tr>
</tbody>
</table>

2. **TEST OPTIONS**
   - Continuity Test or STE/ICE Test #91
   - **REASON FOR QUESTION**
   - If continuity is not present, swing CW solenoid cable is faulty. If continuity is present, swing CW solenoid is faulty.

   **Is continuity present from swing CW solenoid cable connector pin 2 to ground and from pin 1 to terminal board lower position 10?**

   **NO**
   - Replace swing CW solenoid cable (para 7-120).

   **YES**
   - Notify DS Maintenance.
CONTINUITY TEST

1. Disconnect swing CW solenoid connector from swing CW solenoid.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter on pin 2 of swing CW solenoid cable connector.
4. Connect negative (-) probe of multimeter on ground and note reading on multimeter.
5. Connect positive (+) probe of multimeter on pin 1 of swing CW solenoid cable connector.
6. Connect negative (-) probe of multimeter on terminal board lower position 10 and note reading on multimeter.
7. If continuity is not present, replace swing CW solenoid cable (para 7-120).
8. If continuity is present, notify DS Maintenance.
9. Connect swing CW solenoid cable connector to swing CW solenoid.
10. Close cover on junction box.
11. Tighten four screws on junction box cover.
3. Is continuity present from remote control box connector pin L to pin H?

**Known Info**
- Other crane functions from remote station OK.
- Swing CW solenoid cable OK.
- Swing CW solenoid OK.

**Possible Problems**
- Faulty SWING CW/CCW controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

**Test Options**
- Continuity Test or STE/ICE Test #91

**Reason for Question**
This question eliminates possible problems and determines where to continue troubleshooting.

- **Yes**
  - Go to step 4 of this fault.

- **No**
  - Go to step 5 of this fault.
## CONTINUITY TEST

1. Disconnect external remote control cable from remote control box.
2. Position remote control box switch to ON.
3. Set multimeter to ohms.
4. Connect positive (+) probe of multimeter on pin L of connector on remote control box.
5. Connect negative (-) probe of multimeter on pin H of connector on remote control box.

**NOTE**
Step (6) requires the aid of an assistant.

6. Position SWING CW/CCW controller to CW and note reading on multimeter.
7. If continuity is not present, go to step 4 of this fault.
8. If continuity is present, go to step 5 of this fault.
9. Position remote control box switch to OFF.

![Diagram of remote control box and SWING CW/CCW controller](attachment:image.png)
4. Is continuity present from remote control box connector pin L to SWING CW/CCW controller internal wiring harness connector pin 4 and from remote control box connector pin H to SWING CW/CCW controller internal wiring harness pin 1?

- **YES**
  - Replace SWING CW/CCW controller (para 7-32).
  - Repair remote control box internal wiring harness (para 7-32).

- **NO**
  - Continuity Test or STE/ICE Test #91
  - Reason for question:

    - If continuity is not present, remote control box internal wiring harness is faulty.
    - If continuity is present, SWING CW/CCW controller is faulty.
### CONTINUITY TEST

1. Remove SWING CW/CCW controller (para 7-32).
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter on pin L of remote control box connector.
4. Connect negative (-) probe of multimeter on pin 4 of SWING CW/CCW controller internal wiring harness and note reading on multimeter.
5. Position remote control box switch to ON.
6. Connect positive (+) probe of multimeter on pin H of remote control box connector.
7. Connect negative (-) probe of multimeter on pin 1 of SWING CW/CCW controller internal wiring harness and note reading on multimeter.
8. If continuity is not present, replace remote control box internal wiring harness (para 7-32).
9. If continuity is present, replace SWING CW/CCW controller (para 7-32).
10. Position remote control box switch to OFF.
11. Install SWING CW/CCW controller (para 7-32).
12. Close cover on junction box.
13. Tighten four screws on junction box cover.
5. Is continuity present from one end of external remote control cable connector pin L to other end of external remote control cable connector pin L?

- **NO**
  - Replace external remote control cable.

- **YES**
  - Replace external remote control cable.

**KNOWN INFO**
- Other crane functions from remote station OK.
- Swing CW solenoid cable OK.
- Swing CW solenoid OK. Remote control box internal wiring harness OK. SWING CW/CCW controller OK.

**POSSIBLE PROBLEMS**
- Faulty external remote control cable.
- Faulty remote control cable.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, external remote control cable is faulty.

---

- **128. M1089 MATERIAL HANDLING CRANE (MHC) SWING CW DOES NOT OPERATE FROM REMOTE STATION (CONT)***
<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter on pin L of one end of external remote control cable connector.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter on pin L of other end of external remote control cable and note reading on multimeter.</td>
</tr>
<tr>
<td>(4) If continuity is not present, replace external remote control cable.</td>
</tr>
</tbody>
</table>

**EXTERNAL REMOTE CONTROL CABLE**
6. Is continuity present from remote control cable connector pin L to terminal board lower position 10?

**KNOWN INFO**
- Other crane functions from remote station OK.
- Swing CW solenoid cable OK.
- Swing CW solenoid OK.
- Remote control box internal wiring harness OK.
- SWING CW/CCW controller OK.
- External remote control cable OK.

**POSSIBLE PROBLEMS**
- Faulty remote control cable.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
If continuity is not present, remote control cable is faulty.

**YES**
- Notify DS Maintenance.

**NO**
- Replace remote control cable (para 7-115 or 7-118).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on pin L of remote control cable connector.
(3) Connect negative (-) probe of multimeter on terminal board lower position 10 and note reading on multimeter.
(4) If continuity is not present, replace remote control cable (para 7-115 or 7-118).
(5) If continuity is present, notify DS Maintenance.
(6) Close cover on junction box.
(7) Tighten four screws on junction box cover.
(8) Stow crane (TM 9-2320-366-10-1).
e129. M1089 MATERIAL HANDLING CRANE (MHC) SWING CCW DOES NOT OPERATE FROM REMOTE STATION

### INITIAL SETUP

**Equipment Conditions**
- Outriggers lowered (TM 9-2320-366-10-1).
- Crane erected with approximately five feet of cable payed out (TM 9-2320-366-10-1).
- Engine shut down (TM 9-2320-366-10-1).

**Personnel Required**
(2)

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

**References**
TM 9-4910-571-12&P

### KNOWN INFO

- Other crane functions from remote station OK.

### POSSIBLE PROBLEMS

- Faulty swing CCW solenoid cable.
- Faulty swing CCW solenoid.
- Faulty SWING CW/CCW controller.
- Faulty remote control box internal wiring harness.
- Faulty external remote control cable.
- Faulty remote control cable.

### WARNING

1. Read WARNING on following page.

**TEST OPTIONS**

- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
This question eliminates possible problems and determines where to continue troubleshooting.

Is 24 vdc present at junction box assembly terminal board position 9?

**NO**

Go to step 3 of this fault.

**YES**

Go to step 3 of this fault.
## OUTPUT VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Connect external remote control cable to remote control box</td>
</tr>
<tr>
<td>(2)</td>
<td>Loosen four screws on junction box</td>
</tr>
<tr>
<td>(3)</td>
<td>Open cover on junction box</td>
</tr>
<tr>
<td>(4)</td>
<td>Position MAIN POWER switch to ON</td>
</tr>
<tr>
<td>(5)</td>
<td>Lift guard and position remote control box ON/OFF switch to ON</td>
</tr>
<tr>
<td>(6)</td>
<td>Set multimeter to volts dc</td>
</tr>
<tr>
<td>(7)</td>
<td>Connect positive (+) probe of multimeter on terminal board lower position</td>
</tr>
<tr>
<td>(8)</td>
<td>Connect negative (-) probe of multimeter on ground quick-connect terminal board above MAIN POWER switch</td>
</tr>
</tbody>
</table>

### NOTE

Step (9) requires the aid of an assistant.

(9) Position SWING CW/CCW controller to CCW and note reading on multimeter.

(10) If 24 volts dc is not present, go to step 3 of this fault.

(11) Position MAIN POWER switch to OFF.

---

**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around the vehicle. Jewelry can catch on equipment and cause injury or short circuit across electrical circuits and cause severe burns or electrical shock.

---

### Diagram

- MAIN POWER SWITCH
- COVER
- SCREW
- JUNCTION BOX
- WIRES REMOVED FOR CLARITY
- GROUND QUICK-CONNECT TERMINAL BOARD
- POSITION 9
- SWING CW/CCW CONTROLLER
- REMOTE CONTROL BOX ON/OFF SWITCH
- POSITIONS 9
- TERMINAL BOARD
2. Is continuity present from swing CCW solenoid cable connector pin 2 to ground and from pin 1 to terminal board lower position 9?

- **NO**
  - Replace swing CCW solenoid cable (para 7-119).

- **YES**
  - Notify DS Maintenance.

**KNOWN INFO**
- Other crane functions from remote station OK.
- Remote control box OK.
- SWING CW/CCW controller OK.

**POSSIBLE PROBLEMS**
- Faulty swing CCW solenoid cable.
- Faulty swing CCW solenoid.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, swing CCW solenoid cable is faulty. If continuity is present, swing CCW solenoid is faulty.
## CONTINUITY TEST

1. Disconnect swing CCW solenoid connector from swing CCW solenoid.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter on pin 2 of swing CCW solenoid cable connector.
4. Connect negative (-) probe of multimeter on ground and note reading on multimeter.
5. Connect positive (+) probe of multimeter on pin 1 of swing CCW solenoid cable connector.
6. Connect negative (-) probe of multimeter on terminal board lower position 9 and note reading on multimeter.
7. If continuity is not present, replace swing CCW solenoid cable (para 7-119).
8. If continuity is present, notify DS Maintenance.
9. Connect swing CCW solenoid cable connector to swing CCW solenoid.
10. Close cover on junction box.
11. Tighten four screws on junction box cover.
**129. M1089 MATERIAL HANDLING CRANE (MHC) SWING CCW DOES NOT OPERATE FROM REMOTE STATION (CONT)**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Swing CCW solenoid cable OK.</td>
</tr>
<tr>
<td>Swing CCW solenoid OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty SWING CW/CCW controller.</td>
</tr>
<tr>
<td>Faulty remote control box internal wiring harness.</td>
</tr>
<tr>
<td>Faulty external remote control cable.</td>
</tr>
<tr>
<td>Faulty remote control cable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE Test #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>This question eliminates possible problems and determines where to continue troubleshooting.</td>
</tr>
</tbody>
</table>

3. Is continuity present from remote control box connector pin A to pin H?

- **NO**
  - Go to step 4 of this fault.

- **YES**
  - Go to step 5 of this fault.
CONTINUITY TEST

1. Disconnect external remote control cable from remote control box.
2. Position remote control box switch to ON.
3. Set multimeter to ohms.
4. Connect positive (+) probe of multimeter on pin A of connector on remote control box.
5. Connect negative (-) probe of multimeter on pin H of connector on remote control box.

**NOTE**
Step (6) requires the aid of an assistant.

6. Position SWING CW/CCW controller to CCW and note reading on multimeter.
7. If continuity is not present, go to step 4 of this fault.
8. If continuity is present, go to step 5 of this fault.
9. Position remote control box switch to OFF.
4.
Is continuity present from remote control box connector pin A to SWING CW/CCW controller internal wiring harness pin 3 and from remote control box connector pin H to SWING CW/CCW controller internal wiring harness pin 1?

YES
Repair remote control box internal wiring harness (para 7-32).

NO
Replace SWING CW/CCW controller (para 7-32).

KNOWN INFO
Other crane functions from remote station OK.
Swing CCW solenoid cable OK.
Swing CCW solenoid OK.
External remote control cable OK.
Remote control cable OK.

POSSIBLE PROBLEMS
Faulty remote control box internal wiring harness.
Faulty SWING CW/CCW controller.

TEST OPTIONS
Continuity Test or STE/ICE Test #91

REASON FOR QUESTION
If continuity is not present, remote control box internal wiring harness is faulty.
If continuity is present, SWING CW/CCW controller is faulty.
CONTINUITY TEST

(1) Remove SWING CW/CCW controller (para 7-32).
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter on pin A of remote control box connector.
(4) Connect negative (-) probe of multimeter on pin 3 of SWING CW/CCW controller internal wiring harness and note reading on multimeter.
(5) Position remote control box switch to ON.
(6) Connect positive (+) probe of multimeter on pin H of remote control box connector.
(7) Connect negative (-) probe of multimeter on pin 1 of SWING CW/CCW controller internal wiring harness and note reading on multimeter.
(8) If continuity is not present, replace remote control box internal wiring harness (para 7-32).
(9) If continuity is present, replace SWING CW/CCW controller (para 7-32).
(10) Position remote control box switch to OFF.
(11) Install SWING CW/CCW controller (para 7-32).
(12) Close cover on junction box.
(13) Tighten four screws on junction box cover.
(14) Stow crane (TM 9-2320-366-10-1).
5. If continuity is not present from one end of external remote control cable connector A to other end of external remote control cable connector pin A?

- **YES**: Replace external remote control cable.
- **NO**: If continuity is not present, external remote control cable is faulty.

### Known Info
- Other crane functions from remote station OK.
- Swing CCW solenoid cable OK.
- Swing CCW solenoid OK.
- Remote control box internal wiring harness OK.
- SWING CW/CCW controller OK.

### Possible Problems
- Faulty external remote control cable.
- Faulty remote control cable.

### Test Options
- Continuity Test or STE/ICE Test #91

### Reason for Question
- If continuity is not present, external remote control cable is faulty.
**CONTINUITY TEST**

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter on pin A of one end of external remote control cable connector.
3. Connect negative (-) probe of multimeter on pin A of other end of external remote control cable and note reading on multimeter.
4. If continuity is not present, replace external remote control cable.
M1089 MATERIAL HANDLING CRANE (MHC) SWING CCW DOES NOT OPERATE FROM REMOTE STATION (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other crane functions from remote station OK.</td>
</tr>
<tr>
<td>Swing CCW solenoid cable OK.</td>
</tr>
<tr>
<td>Swing CCW solenoid OK.</td>
</tr>
<tr>
<td>Remote control box internal wiring harness OK.</td>
</tr>
<tr>
<td>SWING CW/CCW controller OK.</td>
</tr>
<tr>
<td>External remote control cable OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty remote control cable.</td>
</tr>
</tbody>
</table>

6. Is continuity present from remote control cable connector pin A to terminal board lower position 9?

- **NO**
  - Replace remote control cable (para 7-115 or 7-118).

- **YES**
  - Notify DS Maintenance.

**TEST OPTIONS**
- Continuity Test or STE/ICE Test #91

**REASON FOR QUESTION**
- If continuity is not present, remote control cable is faulty.
### CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter on pin A of remote control cable connector.
3. Connect negative (-) probe of multimeter on terminal board lower position 9 and note reading on multimeter.
4. If continuity is not present, replace remote control cable (para 7-115 or 7-118).
5. If continuity is present, notify DS Maintenance.
6. Close cover on junction box.
7. Tighten four screws on junction box cover.
M1089 MATERIAL HANDLING CRANE (MHC) HOIST UP LOCKOUT DOES NOT ACTIVATE

INITIAL SETUP

Equipment Conditions
- Batteries disconnected (para 7-57).

Tools and Special Tools
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

References
- TM 9-4910-571-12&P

---

**Known Info**

- Battery voltage OK.
- Input voltage to overload shutdown system OK.
- Hydraulic system shutdown solenoid OK.
- Hydraulic system shutdown relay OK.
- Crane functions OK.
- Overload lockout cable OK.
- Overload shutdown box OK.
- Tension load cell OK.
- Proximity sensor OK.

**Possible Problems**

- Faulty hoist up lockout solenoid cable.
- Faulty solenoid valve.

**Test Options**

**Reason for Question**

- Continuity Test or STE/ICE-R #91

---

1. **Is continuity present from hoist up lockout cable connector socket 1 to terminal board position 19?**

   **Yes**
   - Replace hoist up lockout solenoid cable (para 7-112).

   **No**
   - Hoist up lockout will not operate if continuity is not present from hoist up lockout solenoid cable connector socket 1.

---

2. **Is continuity present from boom up lockout solenoid cable connector socket 2 to ground?**

   **Yes**
   - Replace hoist up lockout solenoid cable (para 7-112).

   **No**
   - Hoist up lockout will not operate if continuity is not present from hoist up lockout solenoid cable connector socket 2 to ground.
CONTINUITY TEST

1. Loosen four screws on junction box.
2. Open cover on junction box.
3. Disconnect hoist up lockout solenoid cable connector from hoist up lockout solenoid.
4. Set multimeter to ohms.
5. Connect positive (+) probe of multimeter in socket 1 of hoist up lockout solenoid cable.
6. Connect negative (-) probe of multimeter to terminal board position 19 and note reading on multimeter.
7. If continuity is not present, replace hoist up lockout solenoid cable (para 7-112).

CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter in socket 2 of hoist up lockout solenoid cable connector.
3. Connect negative (-) probe of multimeter on ground in junction box and note reading on multimeter.
4. If continuity is not present, replace hoist up lockout solenoid cable (para 7-112).
5. Connect hoist up lockout solenoid cable connector to hoist up lockout solenoid valve.
6. Close cover on junction box.
7. Tighten four screws on junction box cover.
3. Is continuity present across hoist up lockout solenoid valve contacts?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery voltage OK.</td>
</tr>
<tr>
<td>Input voltage to overload shutdown system OK.</td>
</tr>
<tr>
<td>Hydraulic system shutdown solenoid OK.</td>
</tr>
<tr>
<td>Hydraulic system shutdown relay OK.</td>
</tr>
<tr>
<td>Crane functions OK.</td>
</tr>
<tr>
<td>Overload lockout cable OK.</td>
</tr>
<tr>
<td>Overload shutdown box OK.</td>
</tr>
<tr>
<td>Tension load cell OK.</td>
</tr>
<tr>
<td>Proximity sensor OK.</td>
</tr>
<tr>
<td>Hoist up lockout solenoid cable OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty solenoid valve</td>
</tr>
</tbody>
</table>

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<tr>
<th>TEST OPTIONS</th>
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</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE-R #91</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoist up lockout will not operate if continuity is not present across hoist up lockout solenoid valve contacts.</td>
</tr>
</tbody>
</table>

- **YES** Notify DS Maintenance.
- **NO** Notify DS Maintenance.
### CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter on contact two of hoist up lockout solenoid valve.
3. Connect negative (-) probe of multimeter to contact one of hoist up lockout solenoid valve and note reading on multimeter.
4. If continuity is not present, notify DS Maintenance.
5. If continuity is present, notify DS Maintenance.
6. Connect hoist up lockout solenoid cable to boom up lockout solenoid valve.
7. Connect batteries (para 7-57).
M1089 MATERIAL HANDLING CRANE (MHC) BOOM DOWN LOCKOUT DOES NOT ACTIVATE

**INITIAL SETUP**

**Equipment Conditions**
- Batteries disconnected (para 7-57).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

**References**
- TM 9-4910-571-12&P

---

**KNOWN INFO**

- Battery voltage OK.
- Input voltage to overload shutdown system OK.
- Hydraulic system shutdown solenoid OK.
- Hydraulic system shutdown relay OK.
- Crane functions OK.
- Overload lockout cable OK.
- Overload shutdown box OK.
- Tension load cell OK.
- Proximity sensor OK.

**POSSIBLE PROBLEMS**

- Faulty boom down lockout solenoid cable.
- Faulty solenoid valve.

---

**TEST OPTIONS**

**REASON FOR QUESTION**

- Boom down lockout will not operate if continuity is not present at boom down lockout solenoid cable connector socket 1.

---

1. **Is continuity present from boom down lockout solenoid cable connector socket 1 to terminal board position 19?**

   - **NO**
   - **YES**
     - Replace boom down lockout solenoid cable (para 7-105).

---

2. **Is continuity present from boom down lockout solenoid cable connector socket 2 to ground?**

   - **NO**
   - **YES**
     - Replace boom down lockout solenoid cable (para 7-105).

---

**Tools and Special Tools**

- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
CONTINUITY TEST

1. Loosen four screws on junction box.
2. Open cover on junction box.
3. Disconnect boom down lockout solenoid cable connector from boom down lockout solenoid valve.
4. Set multimeter to ohms.
5. Connect positive (+) probe of multimeter in socket 1 of boom down lockout solenoid cable.
6. Connect negative (-) probe of multimeter to terminal board position 19 and note reading on multimeter.
7. If continuity is not present, replace boom down lockout solenoid cable (para 7-105).

CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter in socket 2 of boom down lockout solenoid cable connector.
3. Connect negative (-) probe of multimeter on ground in junction box and note reading on multimeter.
4. If continuity is not present, replace boom down lockout solenoid cable (para 7-105).
5. Connect boom down lockout solenoid cable connector to boom down lockout solenoid valve.
6. Close cover on junction box.
7. Tighten four screws on junction box cover.
3. Is continuity present across boom down lockout solenoid valve contacts?

- **NO**
  - Notify DS Maintenance.

- **YES**
  - Notify DS Maintenance.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
Boom down lockout will not operate if continuity is not present across boom down lockout solenoid valve contacts.

**KNOWN INFO**
- Battery voltage OK.
- Input voltage to overload shutdown system OK.
- Hydraulic system shutdown solenoid OK.
- Hydraulic system shutdown relay OK.
- Crane functions OK.
- Overload lockout cable OK.
- Overload shutdown box OK.
- Tension load cell OK.
- Proximity sensor OK.
- Boom down lockout solenoid cable OK.

**POSSIBLE PROBLEMS**
- Faulty solenoid valve
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on contact two of boom down lockout solenoid valve.
(3) Connect negative (-) probe of multimeter to contact one of boom down lockout solenoid valve and note reading on multimeter.
(4) If continuity is not present, notify DS Maintenance.
(5) If continuity is present, notify DS Maintenance.
(6) Connect boom down lockout solenoid cable to boom down lockout solenoid valve.
(7) Connect batteries (para 7-57).
0132. M1089 MATERIAL HANDLING CRANE (MHC) BOOM UP LOCKOUT DOES NOT ACTIVATE

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
STE/ICE-R (Item 41, Appendix C)

References
TM 9-4910-571-12&P

---

KNOWLEDGE INFO

Battery voltage OK.
Input voltage to overload shutdown system OK.
Hydraulic system shutdown solenoid OK.
Hydraulic system shutdown relay OK.
Crane functions OK.
Overload lockout cable OK.
Overload shutdown box OK.
Tension load cell OK.
Proximity sensor OK.

POSSIBLE PROBLEMS
Faulty boom up lockout solenoid cable.
Faulty solenoid valve.

---

TEST OPTIONS

Continuity Test or STE/ICE-R #91

REASON FOR QUESTION

Boom up lockout will not operate if continuity is not present from boom up lockout solenoid cable connector socket 1 to terminal board position 19.

---

1.
Is continuity present from boom up lockout solenoid cable connector socket 1 to terminal board position 19?

NO

YES

Replace boom up lockout solenoid cable (para 7-107).

---

2.
Is continuity present from boom up lockout solenoid cable connector socket 2 to ground?

NO

YES

Replace boom up lockout solenoid cable (para 7-107).

---

Equipment Conditions
Batteries disconnected (para 7-57).

References
TM 9-4910-571-12&P

---

KNOWN INFO

Battery voltage OK.
Input voltage to overload shutdown system OK.
Hydraulic system shutdown solenoid OK.
Hydraulic system shutdown relay OK.
Crane functions OK.
Overload lockout cable OK.
Overload shutdown box OK.
Tension load cell OK.
Proximity sensor OK.
Continuity to boom up lockout solenoid OK.

POSSIBLE PROBLEMS
Faulty boom up lockout solenoid cable.
Faulty solenoid valve.

---

TEST OPTIONS

Continuity Test or STE/ICE-R #91

REASON FOR QUESTION

Boom up lockout will not operate if continuity is not present from boom up lockout solenoid cable connector socket 2 to ground.
## Continuity Test

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Loosen four screws on junction box.</td>
</tr>
<tr>
<td>2</td>
<td>Open cover on junction box.</td>
</tr>
<tr>
<td>3</td>
<td>Disconnect boom up lockout solenoid cable connector from boom up lockout solenoid valve.</td>
</tr>
<tr>
<td>4</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>5</td>
<td>Connect positive (+) probe of multimeter in socket 1 of boom up lockout solenoid cable.</td>
</tr>
<tr>
<td>6</td>
<td>Connect negative (-) probe of multimeter to terminal board position 19 and note reading on multimeter.</td>
</tr>
<tr>
<td>7</td>
<td>If continuity is not present, replace boom up lockout solenoid cable (para 7-107).</td>
</tr>
</tbody>
</table>

---

### Additional Steps

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>2</td>
<td>Connect positive (+) probe of multimeter in socket 2 of boom up lockout solenoid cable connector.</td>
</tr>
<tr>
<td>3</td>
<td>Connect negative (-) probe of multimeter on ground in junction box and note reading on multimeter.</td>
</tr>
<tr>
<td>4</td>
<td>If continuity is not present, replace boom up lockout solenoid cable (para 7-107).</td>
</tr>
<tr>
<td>5</td>
<td>Connect boom up lockout solenoid cable connector to boom up lockout solenoid valve.</td>
</tr>
<tr>
<td>6</td>
<td>Close cover on junction box.</td>
</tr>
<tr>
<td>7</td>
<td>Tighten four screws on junction box cover.</td>
</tr>
</tbody>
</table>

---

For clarity, wires are removed from the diagram.
3. Is continuity present across boom up lockout solenoid valve contacts?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery voltage OK.</td>
</tr>
<tr>
<td>Input voltage to overload shutdown system OK.</td>
</tr>
<tr>
<td>Hydraulic system shutdown solenoid OK.</td>
</tr>
<tr>
<td>Hydraulic system shutdown relay OK.</td>
</tr>
<tr>
<td>Crane functions OK.</td>
</tr>
<tr>
<td>Overload lockout cable OK.</td>
</tr>
<tr>
<td>Overload shutdown box OK.</td>
</tr>
<tr>
<td>Tension load cell OK.</td>
</tr>
<tr>
<td>Proximity sensor OK.</td>
</tr>
<tr>
<td>Boom up lockout solenoid cable OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty solenoid valve</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE-R #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boom up lockout will not operate if continuity is not present across boom up lockout solenoid valve contacts.</td>
</tr>
</tbody>
</table>

--

Notify DS Maintenance.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on contact two of boom up lockout solenoid valve.
(3) Connect negative (-) probe of multimeter to contact one of boom up lockout solenoid valve and note reading on multimeter.
(4) If continuity is not present, notify DS Maintenance.
(5) If continuity is present, notify DS Maintenance.
(6) Connect boom up lockout solenoid cable to boom up lockout solenoid valve.
(7) Connect batteries (para 7-57).
INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).

References
TM 9-4910-571-12&P

1. Is continuity present from telescope out lockout solenoid cable connector socket 1 to terminal board position 19?

- **NO**
  - Replace telescope out lockout solenoid cable (para 7-122).

- **YES**
  - **KNOW INFO**
    - Battery voltage OK.
    - Input voltage to overload shutdown system OK.
    - Hydraulic system shutdown solenoid OK.
    - Hydraulic system shutdown relay OK.
    - Crane functions OK.
    - Overload lockout cable OK.
    - Overload shutdown box OK.
    - Tension load cell OK.
    - Proximity sensor OK.
  - **POSSIBLE PROBLEMS**
    - Faulty telescope out lockout solenoid cable.
    - Faulty solenoid valve.

2. Is continuity present from telescope out lockout solenoid cable connector socket 2 to ground?

- **NO**
  - Replace telescope out lockout solenoid cable (para 7-122).

- **YES**
  - **TEST OPTIONS**
    - Continuity Test or STE/ICE-R #91
  - **REASON FOR QUESTION**
    - Telescope out lockout will not operate if continuity is not present from telescope out lockout solenoid cable connector socket 2 to ground.

- **KNOW INFO**
  - Battery voltage OK.
  - Input voltage to overload shutdown system OK.
  - Hydraulic system shutdown solenoid OK.
  - Hydraulic system shutdown relay OK.
  - Crane functions OK.
  - Overload lockout cable OK.
  - Overload shutdown box OK.
  - Tension load cell OK.
  - Proximity sensor OK.
  - Continuity to telescope out lockout solenoid OK.

- **POSSIBLE PROBLEMS**
  - Faulty telescope out lockout solenoid cable.
  - Faulty solenoid valve.

**TOOLS AND SPECIAL TOOLS**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
CONTINUITY TEST

(1) Loosen four screws on junction box.
(2) Open cover on junction box.
(3) Disconnect telescope out lockout solenoid cable connector from telescope out lockout solenoid valve.
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter in socket 1 of telescope out lockout solenoid cable.
(6) Connect negative (-) probe of multimeter to terminal board position 19 and note reading on multimeter.
(7) If continuity is not present, replace telescope out lockout solenoid cable (para 7-122).

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter in socket 2 of telescope out lockout solenoid cable connector.
(3) Connect negative (-) probe of multimeter on ground in junction box and note reading on multimeter.
(4) If continuity is not present, replace telescope out lockout solenoid cable (para 7-122).
(5) Connect telescope out lockout solenoid cable connector to telescope out lockout solenoid valve.
(6) Close cover on junction box.
(7) Tighten four screws on junction box cover.
3. Is continuity present across telescope out lockout solenoid valve contacts?

**KNOWN INFO**
- Battery voltage OK.
- Input voltage to overload shutdown system OK.
- Hydraulic system shutdown solenoid OK.
- Hydraulic system shutdown relay OK.
- Crane functions OK.
- Overload lockout cable OK.
- Overload shutdown box OK.
- Tension load cell OK.
- Proximity sensor OK.
- Telescope out lockout solenoid cable OK.

**POSSIBLE PROBLEMS**
- Faulty solenoid valve.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
Telescope out lockout will not operate if continuity is not present across telescope out lockout solenoid valve contacts.

If NO, Notify DS Maintenance.

If YES, Notify DS Maintenance.
CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter on contact two of telescope out lockout solenoid valve.
3. Connect negative (-) probe of multimeter to contact one of telescope out lockout solenoid valve and note reading on multimeter.
4. If continuity is not present, notify DS Maintenance.
5. If continuity is present, notify DS Maintenance.
6. Connect telescope out lockout solenoid cable to telescope out lockout solenoid valve.
7. Connect batteries (para 7-57).
**INITIAL SETUP**

**Equipment Conditions**
- Batteries disconnected (para 7-57).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

**References**
- TM 9-4910-471-12&P

---

**KNOWN INFO**
- Battery voltage OK.
- Input voltage to overload shutdown system OK.
- Hydraulic system shutdown solenoid OK.
- Hydraulic system shutdown relay OK.
- Crane functions OK.

**POSSIBLE PROBLEMS**
- Faulty overload lockout cable.
- Faulty overload shutdown box.
- Faulty lockout solenoid cable.

---

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- Overload shutdown system will not operate if continuity is not present at overload lockout cable connector socket A.

---

1. **Is continuity present from overload lockout cable connector socket A to terminal board position 28?**

   **NO**

   - Replace overload lockout cable (para 7-116).

   **YES**

---

2. **Is continuity present from overload lockout cable connector socket B to terminal board position 28?**

   **NO**

   - Replace overload lockout cable (para 7-116).

   **YES**

---

**Perform Electrical System Troubleshooting**
CONTINUITY TEST
(1) Loosen four screws on junction box.
(2) Open cover on junction box.
(3) Disconnect overload lockout cable connector from overload shutdown box.
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter in socket A of overload lockout cable connector.
(6) Connect negative (-) probe of multimeter to terminal board position 1 and note reading on multimeter.
(7) If continuity is not present, replace overload lockout cable (para 7-116).

CONTINUITY TEST
(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter in socket B of overload lockout cable connector.
(3) Connect negative (-) probe of multimeter on terminal board position 19 and note reading on multimeter.
(4) If continuity is not present, replace overload lockout cable (para 7-116).
(6) Connect overload lockout cable connector to overload shutdown box.
(7) Close cover on junction box.
(8) Tighten four screws on junction box.
(9) Connect batteries (para 7-57).
**INITIAL SETUP**

**Equipment Conditions**
- Batteries disconnected (para 7-57).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

**References**
- TM 9-4910-571-12&P

---

### KNOWN INFO

**1.**
- Battery voltage OK.
- Input voltage to overload shutdown system OK.
- Hydraulic system shutdown solenoid OK.
- Hydraulic system shutdown relay OK.

**POSSIBLE PROBLEMS**
- Faulty junction box internal wiring.
- Faulty overload lockout cable.
- Faulty hoist layer sensing switch.
- Faulty hoist load cell.
- Faulty overload shutdown system.

**TEST OPTIONS**
- Visual Inspection
  - Shorted junction box internal wiring will cause overload shutdown system to stay activated.

---

**2.**
- Battery voltage OK.
- Input voltage to overload shutdown system OK.
- Hydraulic system shutdown solenoid OK.
- Hydraulic system shutdown relay OK.
- Crane functions OK.

**POSSIBLE PROBLEMS**
- Faulty overload lockout cable.
- Faulty hoist layer sensing switch.
- Faulty hoist load cell.
- Faulty overload shutdown system.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91
  - Faulty overload lockout cable will cause overload shutdown system to stay activated.

---

**NOTIFY DS MAINTENANCE.**
(1) Loosen four screws on junction box.
(2) Open cover on junction box.
(3) Visually inspect the wiring around terminal board position 28 for shorted wires that could put 24 vdc on position 28.

CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>2</td>
<td>Connect positive (+) probe of multimeter to terminal board position 19.</td>
</tr>
<tr>
<td>3</td>
<td>Connect negative (-) probe of multimeter to terminal board position 1 and note reading on multimeter.</td>
</tr>
<tr>
<td>4</td>
<td>If continuity is not present, replace overload lockout cable (para 7-116).</td>
</tr>
<tr>
<td>5</td>
<td>If continuity is present, notify DS Maintenance.</td>
</tr>
<tr>
<td>6</td>
<td>Close cover on junction box.</td>
</tr>
<tr>
<td>7</td>
<td>Tighten four screws on junction box.</td>
</tr>
<tr>
<td>8</td>
<td>Connect batteries (para 7-57).</td>
</tr>
</tbody>
</table>
Is 24 vdc present at connector P107g?

**Initial Setup**

**Equipment Conditions**
- Top control panel cover removed (para 17-20).

**Personnel Required**
- (2)

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

**References**
- TM 9-4910-571-12&P

**Known Info**
- Circuit breaker OK.
- Mode selector switch in NORMAL position.
- Hydraulic functions OK.
- Pneumatic functions OK.

**Possible Problems**
- Faulty station selector switch.
- Faulty wrecker control panel wiring harness.
- Faulty dashboard cable assembly.
- Faulty rear lights cable assembly.

**Warning**
- Read WARNING on following page.

**Test Options**
- Voltage Test or STE/ICE-R Test #89

**Reason for Question**
- This question eliminates possible problems and determines where troubleshooting continues.

**Flowchart**
- Start
- **Yes**
  - Go to step 4 of this fault.
- **No**
  - Is 24 vdc present at connector P107g?
WARNING
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Disconnect connector P107 from connector J4.</td>
</tr>
<tr>
<td>(2) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to connector P107g.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(5) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(6) If 24 vdc is not present, go to step 4 of this fault.</td>
</tr>
<tr>
<td>(7) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(8) Connect connector P107 to connector J4.</td>
</tr>
</tbody>
</table>
2. KNOWN INFO
- Circuit breaker OK.
- Mode selector switch in NORMAL position.
- Hydraulic functions OK.
- Pneumatic functions OK.
- Dashboard cable assembly OK.
- Rear lights cable assembly OK.

POSSIBLE PROBLEMS
- Faulty station selector switch.
- Faulty wrecker control panel wiring harness.

TEST OPTIONS
- Voltage Test or STE/ICE-R Test #89

REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

WARNING
Read WARNING on following page.

Is 24 vdc present at wrecker control panel terminal board position 9?

NO
Go to step 6 of this fault.

YES

2-1424
### WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>STATION SELECTOR SWITCH VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to wrecker control panel terminal board position 9.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to wrecker control panel terminal board position C.</td>
</tr>
<tr>
<td>(4) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(5) If 24 vdc is not present, go to step 6 of this fault.</td>
</tr>
<tr>
<td>(6) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
3. **KNOWLEDGE**

Is 24 vdc present at station selector switch pin 9?

**TEST OPTIONS**

- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**

If 24 vdc is not present, wire 9 is faulty. If 24 vdc is present, station selector switch is faulty.

**YES**

Replace station selector switch (para 7-34).

**NO**

Repair wire 9 (para 2-45) or replace wrecker control panel wiring harness (para 7-83).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to station selector switch center pin 9.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(4) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(5) If 24 vdc is not present, repair wire 9 (para 2-45) or replace wrecker control panel wiring harness (para 7-83).</td>
</tr>
<tr>
<td>(6) If 24 vdc is present, replace station selector switch (para 7-34).</td>
</tr>
<tr>
<td>(7) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(8) Install top control panel cover (para 17-20).</td>
</tr>
</tbody>
</table>
136. **ALL M1089 CONTROL FUNCTIONS DO NOT OPERATE FROM WRECKER CONTROL PANEL AND WRECKER REMOTE CONTROL (CONT)**

### KNOWN INFO
- Circuit breaker OK.
- Mode selector switch in NORMAL position.
- Hydraulic functions OK.
- Pneumatic functions OK.
- Station selector switch OK.
- Wrecker control panel wiring harness OK.

### POSSIBLE PROBLEMS
- Faulty dashboard cable assembly.
- Faulty rear lights cable assembly.

**4.** Is 24 vdc present at connector P912-1?

**TEST OPTIONS**
- Voltage Test or STE/ICE-R Test #89
- **REASON FOR QUESTION**
  - If 24 vdc is not present, wire 2006 is faulty.

**YES**

**NO**

- Repair wire 2006 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove personnel heater for access (para 18-9).</td>
</tr>
<tr>
<td>(2) Disconnect connector P912 from connector J912.</td>
</tr>
<tr>
<td>(3) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter to connector P912-1.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(6) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If 24 vdc is not present, repair wire 2006 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
<tr>
<td>(8) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(9) Connect connector P912 to connector J912.</td>
</tr>
</tbody>
</table>
e136. ALL M1089 CONTROL FUNCTIONS DO NOT OPERATE FROM WRECKER CONTROL PANEL AND WRECKER REMOTE CONTROL (CONT)

**KNOWN INFO**
- Circuit breaker OK.
- Mode selector switch in NORMAL position.
- Hydraulic functions OK.
- Pneumatic functions OK.
- Station selector switch OK.
- Wrecker control panel wiring harness OK.

**POSSIBLE PROBLEMS**
- Faulty dashboard cable assembly.
- Faulty rear lights cable assembly.

5. **WARNING**
   Read WARNING on following page.

- Is 24 vdc present at connector P108-18?

   **TEST OPTIONS**
   - Voltage Test or STE/ICE-R Test #89

   **REASON FOR QUESTION**
   - If 24 vdc is not present, wire 2006 in dashboard cable assembly is faulty.
   - If 24 vdc is present, wire 2006 in rear lights cable assembly is faulty.

   **YES**
   - Repair wire 2006 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

   **NO**
   - Repair wire 2006 (para 2-45) or replace rear lights cable assembly (para 7-104).
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Disconnect connector P108 from connector J108.</td>
</tr>
<tr>
<td>(2) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to connector P108-18.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(5) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(6) If 24 vdc is not present, repair wire 2006 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
<tr>
<td>(7) If 24 vdc is present, repair wire 2006 (para 2-45) or replace rear lights cable assembly (para 7-104).</td>
</tr>
<tr>
<td>(8) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(9) Connect connector P108 to connector J108.</td>
</tr>
<tr>
<td>(10) Install personnel heater (para 18-9).</td>
</tr>
<tr>
<td>(11) Install top control panel cover (para 17-20).</td>
</tr>
</tbody>
</table>
6. ALL M1089 CONTROL FUNCTIONS DO NOT OPERATE FROM WRECKER CONTROL PANEL AND WRECKER REMOTE CONTROL (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breaker OK.</td>
</tr>
<tr>
<td>Mode selector switch in NORMAL position.</td>
</tr>
<tr>
<td>Hydraulic functions OK.</td>
</tr>
<tr>
<td>Pneumatic functions OK.</td>
</tr>
<tr>
<td>Station selector switch OK.</td>
</tr>
<tr>
<td>Dashboard cable assembly OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty wrecker control panel wiring harness.</td>
</tr>
<tr>
<td>Faulty rear lights cable assembly.</td>
</tr>
</tbody>
</table>

- **Is continuity present between connector J4-g and wrecker control panel terminal board position 9?**

  - **NO**
    - Repair wire 9 (para 2-45) or replace wrecker control panel wiring harness (para 7-83).
  - **YES**
    - **TEST OPTIONS**
      - Continuity Test or STE/ICE-R Test #91
      - **REASON FOR QUESTION**
      - If continuity is not present, wire 9 is faulty.
CONTINUITY TEST

(1) Disconnect connector P107 from connector J4.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to connector J4-g.
(4) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(5) If continuity is not present, repair wire 9 (para 2-45) or replace wrecker control panel wiring harness (para 7-83).
136. ALL M1089 CONTROL FUNCTIONS DO NOT OPERATE FROM WRECKER CONTROL PANEL AND WRECKER REMOTE CONTROL (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breaker OK.</td>
</tr>
<tr>
<td>Mode selector switch in NORMAL position.</td>
</tr>
<tr>
<td>Hydraulic functions OK.</td>
</tr>
<tr>
<td>Pneumatic functions OK.</td>
</tr>
<tr>
<td>Station selector switch OK.</td>
</tr>
<tr>
<td>Dashboard cable assembly OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty wrecker control panel wiring harness.</td>
</tr>
<tr>
<td>Faulty rear lights cable assembly.</td>
</tr>
</tbody>
</table>

7. Is continuity present between connector J4-a and J4-b and wrecker control panel terminal board position C?

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE-R Test #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, wire 9 is faulty. If continuity is present, wire 3087 is faulty.</td>
</tr>
</tbody>
</table>

If NO, repair wire 9 (para 2-45) or replace wrecker control panel wiring harness (para 7-83).

If YES, repair wire 3087 (para 2-45) or replace rear lights cable assembly (para 7-104).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector J4-a.
(3) Connect negative (-) probe of multimeter to wrecker control panel terminal board position C and note reading on multimeter.
(4) Connect positive (+) probe of multimeter to connector J4-b.
(5) Connect negative (-) probe of multimeter to wrecker control panel terminal board position C and note reading on multimeter.
(6) If continuity is not present at connector J4-a and/or J4-b, repair wire 9 (para 2-45) or replace wrecker control panel wiring harness (para 7-83).
(7) If continuity is present, repair wire 3087 (para 2-45) or replace rear lights cable assembly (para 7-104).
(8) Connect connector P107 to connector J4.
(9) Install top control panel cover (para 17-20).
## e137. ALL WRECKER FUNCTIONS DO NOT OPERATE FROM WRECKER REMOTE CONTROL

### INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Conditions</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1).</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td>Top control panel cover removed (para 17-20).</td>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
</tr>
<tr>
<td></td>
<td>STE/ICE-R (Item 41, Appendix C)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Personnel Required</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2)</td>
<td>TM 9-4910-571-12&amp;P</td>
</tr>
</tbody>
</table>

### KNOWN INFO

- Circuit breaker CB50 OK.
- M1089 Material Handling
- Crane operates.
- All functions operate from wrecker control panel.
- Hydraulic functions OK.

### POSSIBLE PROBLEMS

- Faulty station selector switch.
- Faulty wrecker control panel wiring harness.
- Faulty wrecker remote control wiring harness.

### WARNING

Read WARNING on following page.

1. **Is 24 vdc present at station selector switch rear pin?**

   - **NO**
     - **Is 24 vdc present at station selector switch rear pin?**
   - **YES**
     - Replace station selector switch (para 7-34).

### TEST OPTIONS

- Voltage Test or STE/ICE-R Test #89

### REASON FOR QUESTION

If 24 vdc is not present, station selector switch is faulty.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set multimeter to vdc.</td>
</tr>
<tr>
<td>2</td>
<td>Connect positive (+) probe of multimeter to station selector switch rear pin.</td>
</tr>
<tr>
<td>3</td>
<td>Connect negative (-) probe of multimeter to wrecker control panel terminal board position C.</td>
</tr>
<tr>
<td>4</td>
<td>Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>5</td>
<td>If 24 vdc is not present, replace station selector switch (para 7-34).</td>
</tr>
<tr>
<td>6</td>
<td>Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
2. Is 24 vdc present at TB 7?

- **NO**
  - Is there 24 vdc present at TB 7?
  - If yes, proceed to the next step. If no, refer to the wiring diagram (para 2-45) and replace the wiring harness (para 7-83).

- **YES**
  - Repair wire 7 (para 2-45) or replace wrecker control panel wiring harness (para 7-83).

**Known Info**
- Circuit breaker CB50 OK.
- M1089 Material Handling Crane operates.
- All functions operate from wrecker control panel.
- Hydraulic functions OK.
- Station selector switch OK.

**Possible Problems**
- Faulty wrecker control panel wiring harness.
- Faulty wrecker remote control wiring harness.

**Test Options**
- Voltage Test or STE/ICE-R Test #89

**Reason for Question**
- If 24 vdc is not present, wire 7 is faulty.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

VOLTAGE TEST

1. Set multimeter to vdc.
2. Connect positive (+) probe of multimeter to wrecker control panel terminal board position 7.
3. Connect negative (-) probe of multimeter to wrecker control panel terminal board position C.
4. Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
5. If 24 vdc is not present, repair wire 7 (para 2-45), or replace wrecker control panel wiring harness (para 7-83).
7. Install wrecker control panel top cover (para 17-20).
3. Circuit breaker CB50 OK. M1089 Material Handling Crane operates. All functions operate from wrecker control panel. Hydraulic functions OK. Station selector switch OK. Wrecker control panel wiring harness OK.

POSSIBLE PROBLEMS
Faulty wrecker remote control wiring harness.

Is 24 vdc present at pin C of J1 and/or J2?

NO

YES

Perform Wrecker Pneumatic Troubleshooting (aa1. All Wrecker Functions Do Not Operate From Wrecker Remote Control).

Test Options
Voltage Test or STE/ICE-R Test #89

Reason for Question
If 24 vdc is not present, wire 7 is faulty.

Repair wire 7 (para 2-45) or replace wrecker control panel wiring harness (para 7-83).
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to vdc.</td>
</tr>
<tr>
<td>(2) Position station selector switch to REMOTE CONTROL (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to pin C of connector J1 and/or J2.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(5) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(5) If 24 vdc is not present, repair wire 7 (para 2-45), or replace wrecker control panel wiring harness (para 7-83).</td>
</tr>
<tr>
<td>(6) If 24 vdc is present, perform Wrecker Pneumatic Troubleshooting (aa1. All Wrecker Functions Do Not Operate From Wrecker Remote Control).</td>
</tr>
<tr>
<td>(7) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
e138. ALL WRECKER FUNCTIONS DO NOT OPERATE FROM WRECKER CONTROL PANEL

INITIAL SETUP

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment Conditions</td>
<td>Voltage Test or STE/ICE-R Test #89</td>
</tr>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1). Wrecker control panel top cover removed (para 17-20).</td>
<td>REASON FOR QUESTION</td>
</tr>
<tr>
<td>NO</td>
<td>If 24 vdc is not present, station selector switch is faulty.</td>
</tr>
<tr>
<td>YES</td>
<td>Replace station selector switch (para 7-34).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty station selector switch. Faulty wrecker control panel wiring harness.</td>
<td></td>
</tr>
</tbody>
</table>
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

VOLTAGE TEST

(1) Set multimeter to volts dc.
(2) Connect positive (+) probe of multimeter to station selector switch front pin.
(3) Connect negative (-) probe of multimeter to ground.
(4) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
(5) If 24 vdc is not present, replace station selector switch (para 7-34).
(6) Position master power switch to off (TM 9-2320-366-10-1).
- 2. **WARNING**
   Read WARNING on following page.

   Is 24 vdc present at TB-7A?

   **NO**

   **YES**

   Repair wire 7A (para 2-45) or replace wrecker control panel wiring harness (para 7-83).

   **TEST OPTIONS**
   Voltage Test or STE/ICE-R Test #89

   **REASON FOR QUESTION**
   If 24 vdc is not present, wire 7A is faulty.

**KNOWN INFO**
- Circuit breaker CB50 OK.
- Mode selector switch in NORMAL position.
- Hydraulic functions OK.
- Station selector switch in wrecker control panel position.
- Operation from wrecker control panel OK.
- Station selector switch OK.

**POSSIBLE PROBLEMS**
- Faulty wrecker control panel wiring harness.

**NOTE**
- Perform Electrical System Troubleshooting (e140. Main Winch Left or Right Speed Function Does Not Operate From Wrecker Control Panel and e141. Main Winch Left or Right Free Spool Function Does Not Operate From Wrecker Control Panel).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to TB-7A.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(4) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(5) If 24 vdc is not present, repair wire 7A (para 2-45) or replace wrecker control panel wiring harness (para 7-83).</td>
</tr>
<tr>
<td>(6) If 24 vdc is present, perform Electrical System Troubleshooting (e140. Main Winch Left or Right Speed Function Does Not Operate From Wrecker Control Panel or e141. Main Winch Left or Right Free Spool Function Does Not Operate From Wrecker Control Panel).</td>
</tr>
<tr>
<td>(7) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(8) Install wrecker control panel top cover (para 17-20).</td>
</tr>
</tbody>
</table>
**e138A. M1089 LH OR RH 30K WINCH DOES NOT PAY-IN**

**INITIAL SETUP**

**Equipment Conditions**
Engine shut down (TM 902320-366-10-1).

**Personnel Required**
(2)

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

**References**
TM 9-4910-571-12&P

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**KNOWN INFO**

- Hydraulic tank oil level OK.
- MAIN WINCH LH and RH FREE SPOOL switches to OFF.
- MODE SELECTOR SWITCH to NORMAL.

**POSSIBLE PROBLEMS**

- Faulty wrecker remote control.
- Faulty MAIN WINCH LH FREE SPOOL switch.
- Faulty MAIN WINCH RH FREE SPOOL switch.
- Faulty M1089 air system.
- Faulty wrecker hydraulic system.

**START**

**1. CAUTION Read CAUTION on following page.**

Does LH/RH 30K winch pay-in from wrecker control panel?

- **NO**
  - **TEST OPTIONS**
    - Operational Test
    - **REASON FOR QUESTION**
      - If LH/RH 30K winch pays-in from wrecker control panel, wrecker remote control is faulty.

- **YES**
  - Go to step 2 of this fault.

**Perform Electrical System troubleshooting**
(e141. One Wrecker Function Does Not Operate From Wrecker Remote Control).
OPERATIONAL TEST

(1) Start engine (TM 9-2320-366-10-1).
(2) Position PTO switch to on.

CAUTION

Keep tachometer within 1,250-1,450 rpm when Power Take-Off (PTO) is engaged. Do not exceed 1,450 rpm. Failure to comply may result in damage to equipment.

NOTE

In the event of a tachometer failure a HAND THROTTLE lever positioned to L is approximately 1,250-1,450 rpm.

(3) Set engine speed by increasing HAND THROTTLE lever until tachometer reads 1,250-1,450 rpm.
(4) Position STATION SELECTOR switch to WRECKER CONTROL PANEL.

NOTE

The LH and RH 30K winches are operated the same way. LH shown.

(5) Position MAIN WINCH LH SPEED switch to LOW.
(6) Position MAIN WINCH LH lever to IN until cable is fully recovered.
(7) If LH 30K winch does not pay-in, go to step 2 of this fault.
(8) If LH 30K winch does pay-in, perform Electrical System Troubleshooting task e141. One Wrecker Function Does Not Operate From Wrecker Remote Control.
(9) Set engine speed to idle (750 rpm) by decreasing HAND THROTTLE lever to full down position.
(10) Position PTO to off.
(11) Shut down engine (TM 9-2320-366-10-1).
WARNING
Read WARNING on following page.

2.
Is 24 VDC present at terminal block (see Table 2-12.20. MAIN WINCH LH/RH FREE SPOOL Switch Terminal Blocks)?

NO

YES

Perform Wrecker Hydraulic System troubleshooting task (aa1. M1089 LH or RH 30K Winch Does Not Pay-In).

Replace MAIN WINCH LH/RH FREE SPOOL switch (para 7-34).

KNOWN INFO
Hydraulic tank oil level OK. MAIN WINCH LH and RH FREE SPOOL switches to OFF. MODE SELECTOR SWITCH to NORMAL.

POSSIBLE PROBLEMS
Faulty MAIN WINCH LH/RH FREE SPOOL switch. Faulty M1089 air system. Faulty wrecker hydraulic system.

TEST OPTIONS
Voltage Test or STE/ICE-R Test #89

REASON FOR QUESTION
If 24 VDC is not present, perform Wrecker Air System troubleshooting. If 24 VDC is present, MAIN WINCH LH/RH FREE SPOOL switch is faulty.
WARNING
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

VOLTAGE TEST
(1) Remove M1089 control panel top cover (para 14-4).
(2) Set multimeter to volts DC.
(3) Connect positive (+) probe of multimeter to terminal block (see Table 2-12.20. MAIN WINCH LH/RH FREE SPOOL Switch Terminal Blocks).
(4) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(5) If 24 VDC is not present, perform Wrecker Air System Troubleshooting task aa1. M1089 LH or Rh 30K Winch Does Not Pay-In.
(6) If 24 VDC is present, replace MAIN WINCH LH/RH FREE SPOOL switch (para 7-34).
(7) Install M1089 control panel top cover (para 14-4).

Table 2-12.20. MAIN WINCH LH/RH FREE SPOOL Switch Terminal Blocks

<table>
<thead>
<tr>
<th>Side</th>
<th>Terminal Block</th>
</tr>
</thead>
<tbody>
<tr>
<td>LH</td>
<td>TB19</td>
</tr>
<tr>
<td>RH</td>
<td>TB18</td>
</tr>
</tbody>
</table>
**e139. MAIN WINCH LH OR RH SPEED SWITCH DOES NOT OPERATE FROM WRECKER CONTROL PANEL**

**INITIAL SETUP**

<table>
<thead>
<tr>
<th>Equipment Conditions</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1). Wrecker control panel top cover removed (para 14-4).</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td>Personnel Required</td>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
</tr>
<tr>
<td>(2)</td>
<td>STE/ICE-R (Item 41, Appendix C)</td>
</tr>
<tr>
<td>References</td>
<td>TM 9-4910-571-12&amp;P</td>
</tr>
</tbody>
</table>

**NOTE**
Perform Electrical System Troubleshooting task e1. Circuit Breaker Does Not Operate on circuit breaker CB50 prior to beginning this task.

**KNOWN INFO**
- LH and RH winches operate from wrecker control panel.
- Circuit breaker CB50 OK.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.

**POSSIBLE PROBLEMS**
- Faulty STATION SELECTOR switch.
- Faulty MAIN WINCH LH SPEED switch.
- Faulty MAIN WINCH RH SPEED switch.
- Faulty M1089 control panel wiring harness.
- Faulty M1089 30K winch control wiring harness.
- Faulty M1089 control panel power cable assembly.
- Faulty M1089 rear lights cable assembly.
- Faulty auxiliary panel cable assembly.
- Faulty dashboard cable assembly.
- Faulty jumper wire.
- Faulty wrecker hydraulic system.

**START**

1. Does MAIN WINCH LH SPEED switch operate?

   - **NO**
   - **YES**

   - **NO**
     - Go to step 4 of this fault.
   - **YES**

   **WARNING**
   - Read WARNING on following page.

   **TEST OPTIONS**
   - Operational Test

   **REASON FOR QUESTION**
   - This question eliminates possible problems and determines where troubleshooting continues.
WARNING
Goggles must be worn while operating wrecker control panel. Blowing dust and debris may become airborne while engine is running. Failure to comply may result in injury to personnel.

OPERATIONAL TEST

(1) Start engine (TM 9-2320-366-10-1).
(2) Position PTO switch to on.

CAUTION
Keep tachometer within 1,250-1,450 rpm when Power Take-Off (PTO) is engaged. Do not exceed 1,450 rpm. Failure to comply may result in damage to equipment.

NOTE
In the event of a tachometer failure a HAND THROTTLE lever positioned to L is approximately 1,250-1,450 rpm.

(3) Set engine speed by increasing HAND THROTTLE lever until tachometer reads 1,250-1,450 rpm.
(4) Position MAIN WINCH LH SPEED switch to LOW.
(5) Position MAIN WINCH LH FREE SPOOL switch to OFF.
(6) Position MAIN WINCH LH lever to OUT until the first five wraps of cable have pay-out.
(7) Position MAIN WINCH LH SPEED switch to HIGH.
(8) Position MAIN WINCH LH lever to OUT and note speed of winch.
(9) If LH 30K winch does not operate at high speed, go to step 4 of this fault.
e139. MAIN WINCH LH OR RH SPEED SWITCH DOES NOT OPERATE FROM WRECKER CONTROL PANEL (CONT)

**KNOWN INFO**
LH and RH winches operate from wrecker control panel.
Circuit breaker CB50 OK.
STATION SELECTOR switch to WRECKER CONTROL PANEL.
MODE SELECTOR SWITCH to NORMAL.
STATION SELECTOR switch OK.
MAIN WINCH LH SPEED switch OK.
M1089 control panel power cable assembly OK.
M1089 rear lights cable assembly.
Auxiliary panel cable assembly OK.
Dashboard cable assembly OK.

**POSSIBLE PROBLEMS**
Faulty MAIN WINCH RH SPEED switch.
Faulty M1089 control panel wiring harness.
Faulty M1089 30K winch control wiring harness.
Faulty jumper wire.
Faulty wrecker hydraulic system.

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
This question eliminates possible problems and determines where troubleshooting continues.

2. Is 24 VDC present at terminal lug on wire 12?

**Diagram:**
- **YES** → Go to step 7 of this fault.
- **NO** → Continue troubleshooting.

2-1448 Change 1
(1) Position MAIN WINCH LH SPEED switch to LOW.
(2) Position MAIN WINCH LH lever to IN until cable is fully recovered.
(3) Set engine speed to idle (750 rpm) by decreasing HAND THROTTLE lever to full down position.
(4) Position PTO switch to off.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) Remove power distribution panel (PDP) cover (para 16-2).
(7) Remove circuit breaker CB50 from power distribution panel (PDP).
(8) Open LH and RH catwalks.
(9) Disconnect terminal lug on wire 12 from RH counter balance valve.
(10) Position MAIN WINCH RH SPEED switch to HIGH.
(11) Set multimeter to volts DC.
(12) Connect positive (+) probe of multimeter to terminal lug on wire 12.
(13) Connect negative (-) probe of multimeter to ground.
(14) Install circuit breaker CB50 in power distribution panel (PDP) and note reading on multimeter.
(15) If 24 VDC is not present go to step 7 of this fault.
(16) Remove circuit breaker CB50 from power distribution panel (PDP).
(17) Connect terminal lug on wire 12 to RH counter balance valve.
(18) Position MAIN WINCH RH SPEED switch to LOW.

WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.
e139. MAIN WINCH LH OR RH SPEED SWITCH DOES NOT OPERATE FROM WRECKER CONTROL PANEL (CONT)

**KNOWN INFO**
LH and RH winches operate from wrecker control panel. Circuit breaker CB50 OK. STATION SELECTOR switch to WRECKER CONTROL PANEL. MODE SELECTOR SWITCH to NORMAL. STATION SELECTOR switch OK. MAIN WINCH LH SPEED switch OK. M1089 control panel power cable assembly OK. M1089 rear lights cable assembly. Auxiliary panel cable assembly OK. Dashboard cable assembly OK. MAIN WINCH RH SPEED switch OK. M1089 control panel wiring harness OK.

**POSSIBLE PROBLEMS**
Faulty M1089 30K winch control wiring harness. Faulty jumper wire. Faulty wrecker hydraulic system.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
This question eliminates possible problems and determines where troubleshooting continues.

**3.**
Is continuity present from terminal lug on wire C to ground?

- **NO**
  - Go to step 8 of this fault.

- **YES**
  - Notify DS Maintenance
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Disconnect terminal lug on wire C from RH counter balance valve.
(3) Connect positive (+) probe of multimeter to terminal lug on wire C.
(4) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(5) If continuity is not present, go to step 8 of this fault.
(6) If continuity is present, notify DS Maintenance.
(7) Connect terminal lug on wire C to RH counter balance valve.

NOTE
Perform steps (8) through (11) if continuity is present from terminal lug on wire C to ground.

(8) Close LH and RH catwalks.
(9) Install circuit breaker CB50 in PDP.
(10) Install PDP cover (para 16-2).
(11) Install wrecker control panel top cover (para 14-4).
e139. MAIN WINCH LH OR RH SPEED SWITCH DOES NOT OPERATE FROM WRECKER CONTROL PANEL (CONT)

**KNOWN INFO**
LH and RH winches operate from wrecker control panel. Circuit breaker CB50 OK. STATION SELECTOR switch to WRECKER CONTROL PANEL. MODE SELECTOR SWITCH to NORMAL.

**POSSIBLE PROBLEMS**
- Faulty STATION SELECTOR switch.
- Faulty MAIN WINCH LH SPEED switch.
- Faulty MAIN WINCH RH SPEED switch.
- Faulty M1089 control panel wiring harness.
- Faulty M1089 30K winch control wiring harness.
- Faulty M1089 control panel power cable assembly.
- Faulty M1089 rear lights cable assembly.
- Faulty auxiliary panel cable assembly.
- Faulty dashboard cable assembly.
- Faulty jumper wire.
- Faulty wrecker hydraulic system.

**TEST OPTIONS**
Operational Test

**REASON FOR QUESTION**
This question eliminates possible problems and determines where troubleshooting continues.

4. Does MAIN WINCH RH SPEED switch operate?

**WARNING**
Read WARNING on following page.

NO

Go to step 9 of this fault.

YES
OPERATIONAL TEST

(1) Position MAIN WINCH LH SPEED switch to LOW.
(2) Position MAIN WINCH LH lever to IN until cable is fully recovered.
(3) Position MAIN WINCH RH SPEED switch to LOW.
(4) Position MAIN WINCH RH FREE SPOOL switch to OFF.
(5) Position MAIN WINCH RH lever to OUT until the first five wraps of cable have pay-out.
(6) Position MAIN WINCH RH SPEED switch to HIGH.
(7) Position MAIN WINCH RH lever to OUT and note speed of winch.
(8) If RH 30K winch does not operate at high speed, go to step 9 of this fault.
(9) Position MAIN WINCH RH SPEED switch to LOW.
(10) Position MAIN WINCH RH lever to IN until cable is fully recovered.
(11) Set engine speed to idle (750 rpm) by decreasing HAND THROTTLE lever to the full down position.
(12) Position PTO switch to off.
(13) Shut down engine (TM 9-2320-366-10-1).

WARNING

Goggles must be worn while operating wrecker control panel. Blowing dust and debris may become airborne while engine is running. Failure to comply may result in injury to personnel.
5. Is 24 VDC present at terminal lug on wire 14?

- YES: Go to step 13 of this fault.
- NO: This question eliminates possible problems and determines where troubleshooting continues.

**KNOWN INFO**
LH and RH winches operate from wrecker control panel. Circuit breaker CB50 OK. STATION SELECTOR switch to WRECKER CONTROL PANEL. MODE SELECTOR SWITCH to NORMAL. STATION SELECTOR switch OK. MAIN WINCH RH SPEED switch OK. M1089 control panel power cable assembly OK. M1089 rear lights cable assembly. Auxiliary panel cable assembly OK. Dashboard cable assembly OK.

**POSSIBLE PROBLEMS**
### WARNING
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

### VOLTAGE TEST

1. Remove power distribution panel (PDP) cover (para 16-2).
2. Remove circuit breaker CB50 from power distribution panel (PDP).
3. Open LH and RH catwalks.
4. Disconnect terminal lug on wire 14 from LH counter balance valve.
5. Position MAIN WINCH LH SPEED switch to HIGH.
6. Set multimeter to volts DC.
7. Connect positive (+) probe of multimeter to terminal lug on wire 14.
8. Connect negative (-) probe of multimeter to ground.
9. Install circuit breaker CB50 in power distribution panel (PDP) and note reading on multimeter.
10. If 24 VDC is not present go to step 13 of this fault.
11. Remove circuit breaker CB50 from power distribution panel (PDP).
12. Connect terminal lug on wire 14 to RH counter balance valve.
13. Position MAIN WINCH LH SPEED switch to LOW.
KNOWLEDGE INFO
LH and RH winches operate from wrecker control panel. Circuit breaker CB50 OK. STATION SELECTOR switch to WRECKER CONTROL PANEL. MODE SELECTOR SWITCH to NORMAL. STATION SELECTOR switch OK. MAIN WINCH RH SPEED switch OK. M1089 control panel power cable assembly OK. M1089 rear lights cable assembly. Auxiliary panel cable assembly OK. Dashboard cable assembly OK. MAIN WINCH LH SPEED switch OK. M1089 control panel wiring harness OK.

POSSIBLE PROBLEMS
Faulty M1089 30K winch control wiring harness. Faulty jumper wire. Faulty wrecker hydraulic system.

TEST OPTIONS
Continuity Test or STE/ICE-R Test #91

REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

6. Is continuity present from terminal lug on wire C to ground?

NO

YES

Go to step 14 of this fault.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Disconnect terminal lug on wire C from RH counter balance valve.
(3) Connect positive (+) probe of multimeter to terminal lug on wire C.
(4) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(5) If continuity is not present, go to step 14 of this fault.
(6) If continuity is present, notify DS Maintenance.
(7) Connect terminal lug on wire C to LH counter balance valve.

NOTE
Perform steps (8) through (11) if continuity is present from front/rear terminal lug of LH counter balance valve to ground.

(8) Close LH and RH catwalks.
(9) Install circuit breaker CB50 in PDP.
(10) Install PDP cover (para 16-2).
(11) Install wrecker control panel top cover (para 14-4).
7. **Is 24 VDC present at terminal block TB12?**

**KNOWLEDGE INFO**
- LH and RH winches operate from wrecker control panel.
- Circuit breaker CB50 OK.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.
- STATION SELECTOR switch OK.
- MAIN WINCH LH SPEED switch OK.
- M1089 control panel power cable assembly OK.
- M1089 rear lights cable assembly.
- Auxiliary panel cable assembly OK.
- Dashboard cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty MAIN WINCH RH SPEED switch.
- Faulty M1089 control panel wiring harness.
- Faulty M1089 30K winch control wiring harness.

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
If 24 VDC is not present, MAIN WINCH RH SPEED switch and M1089 control panel wiring harness is faulty. If 24 VDC is present, M1089 30K winch wiring harness is faulty.

**YES**
- Replace MAIN WINCH RH SPEED switch (para 7-34) and M1089 control panel wiring harness (para 7-83).

**NO**
- Replace M1089 30K winch wiring harness (para 7-142).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

VOLTAGE TEST

<p>| | | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>(1) Install circuit breaker CB50 in PDP.</td>
<td>(2) Position MAIN WINCH RH SPEED switch to HIGH.</td>
<td>(3) Set multimeter to volts DC.</td>
<td>(4) Connect positive (+) probe of multimeter to terminal block TB12.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
<td>(6) If 24 VDC is not present, replace MAIN WINCH RH SPEED switch (para 7-34) and M1089 control panel wiring harness (para 7-83).</td>
<td>(7) If 24 VDC is present, replace M1089 30K winch control wiring harness (para 7-142).</td>
<td>(8) Position MAIN WINCH RH SPEED switch to LOW.</td>
</tr>
<tr>
<td>(9) Close LH and RH catwalks.</td>
<td>(10) Install PDP cover (para 16-2).</td>
<td>(11) Install wrecker control panel top cover (para 14-4).</td>
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</tbody>
</table>

(1) Install circuit breaker CB50 in PDP.
(2) Position MAIN WINCH RH SPEED switch to HIGH.
(3) Set multimeter to volts DC.
(4) Connect positive (+) probe of multimeter to terminal block TB12.
(5) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(6) If 24 VDC is not present, replace MAIN WINCH RH SPEED switch (para 7-34) and M1089 control panel wiring harness (para 7-83).
(7) If 24 VDC is present, replace M1089 30K winch control wiring harness (para 7-142).
(8) Position MAIN WINCH RH SPEED switch to LOW.
(9) Close LH and RH catwalks.
(10) Install PDP cover (para 16-2).
(11) Install wrecker control panel top cover (para 14-4).
8. Is continuity present between terminal blocks TBC(1), TBC(2), TBC(3), TBC(4), and TBC(5).

**NO**

Replace jumper wire between terminal blocks that continuity is not present (para 7-33).

**YES**

Replace M1089 30K winch control wiring harness (para 7-142).

---

**KNOWN INFO**

- LH and RH winches operate from wrecker control panel.
- Circuit breaker CB50 OK.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.
- STATION SELECTOR switch OK.
- MAIN WINCH LH SPEED switch OK.
- M1089 control panel power cable assembly OK.
- M1089 rear lights cable assembly.
- Auxiliary panel cable assembly OK.
- Dashboard cable assembly OK.
- MAIN WINCH RH SPEED switch OK.
- M1089 control panel wiring harness OK.

**POSSIBLE PROBLEMS**

- Faulty M1089 30K winch control wiring harness.
- Faulty jumper wire.

---

**TEST OPTIONS**

- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**

If continuity is not present, jumper wire is faulty. If continuity is present, M1089 30K winch control wiring is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to terminal block TBC(1).
(3) Connect negative (-) probe of multimeter to terminal block TBC(2) and note reading on multimeter.
(4) Connect positive (+) probe of multimeter to terminal block TBC(2).
(5) Connect negative (-) probe of multimeter to terminal block TBC(3) and note reading on multimeter.
(6) Connect positive (+) probe of multimeter to terminal block TBC(3).
(7) Connect negative (-) probe of multimeter to terminal block TBC(4) and note reading on multimeter.
(8) Connect positive (+) probe of multimeter to terminal block TBC(4).
(9) Connect negative (-) probe of multimeter to terminal block TBC(5) and note reading on multimeter.
(10) If continuity is not present between two terminal blocks noted above, replace jumper wire between terminal blocks that continuity is not present (para 7-33).
(11) If continuity is present, replace M1089 winch control wiring harness (para 7-142).
(12) Close LH and RH catwalks.
(13) Install circuit breaker CB50 in PDP.
(14) Install wrecker control panel top cover (para 14-4).
9. Is continuity present between terminal blocks TBC(1), TBC(2), TBC(3), TBC(4), and TBC(5).

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<td>LH and RH winches operate from wrecker control panel. Circuit breaker CB50 OK. STATION SELECTOR switch to WRECKER CONTROL PANEL. MODE SELECTOR SWITCH to NORMAL.</td>
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<th>POSSIBLE PROBLEMS</th>
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<td>Faulty STATION SELECTOR switch.</td>
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<tr>
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<td>Faulty auxiliary panel cable assembly.</td>
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<tr>
<td>Faulty dashboard cable assembly.</td>
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<tr>
<td>Faulty jumper wire.</td>
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<tbody>
<tr>
<td>If continuity is not present, jumper wire is faulty.</td>
</tr>
</tbody>
</table>

NO

YES

Replace jumper wire between terminal blocks that continuity is not present (para 7-33).
CONTINUITY TEST

(1) Remove power distribution panel (PDP) cover (para 16-2).
(2) Remove circuit breaker CB50 from power distribution panel (PDP).
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to terminal block TBC(1).
(5) Connect negative (-) probe of multimeter to terminal block TBC(2) and note reading on multimeter.
(6) Connect positive (+) probe of multimeter to terminal block TBC(2).
(7) Connect negative (-) probe of multimeter to terminal block TBC(3) and note reading on multimeter.
(8) Connect positive (+) probe of multimeter to terminal block TBC(3).
(9) Connect negative (-) probe of multimeter to terminal block TBC(4) and note reading on multimeter.
(10) Connect positive (+) probe of multimeter to terminal block TBC(4).
(11) Connect negative (-) probe of multimeter to terminal block TBC(5) and note reading on multimeter.
(12) If continuity is not present between two terminal blocks noted above, replace jumper wire between terminal blocks that continuity is not present (para 7-33).
10. Is continuity present from terminal block TBC to ground?

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<td>Circuit breaker CB50 OK.</td>
</tr>
<tr>
<td>STATION SELECTOR switch to WRECKER CONTROL PANEL.</td>
</tr>
<tr>
<td>MODE SELECTOR SWITCH to NORMAL.</td>
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<td>Faulty STATION SELECTOR switch.</td>
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<tr>
<td>Faulty M1089 control panel wiring harness.</td>
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<tr>
<td>Faulty M1089 control panel power cable assembly.</td>
</tr>
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<th>REASON FOR QUESTION</th>
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<tr>
<td>If continuity is not present, terminal lug TL54 is faulty.</td>
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</tbody>
</table>

If continuity is not present, terminal lug TL54 is faulty.

Repair terminal lug TL54 on wires 3088 and 3087 (para 2-45) or replace M1089 rear lights cable assembly (para 7-104).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to terminal block TBC.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, repair terminal lug TL54 on wires 3087 and 3088 (para 2-45) or replace M1089 rear lights cable assembly (para 7-104).
**KNOWN INFO**

LH and RH winches operate from wrecker control panel.
Circuit breaker CB50 OK.
STATION SELECTOR switch to WRECKER CONTROL PANEL.
MODE SELECTOR SWITCH to NORMAL.

**POSSIBLE PROBLEMS**
- Faulty STATION SELECTOR switch.
- Faulty M1089 control panel wiring harness.
- Faulty M1089 control panel power cable assembly.
- Faulty M1089 rear lights cable assembly.
- Faulty auxiliary panel cable assembly.
- Faulty dashboard cable assembly.
- Faulty jumper wire.

**TEST OPTIONS**

- Continuity Test or
  STE/ICE-R Test #91

**REASON FOR QUESTION**

If continuity is not present, jumper wire if faulty.

---

11. **Is continuity present from terminal block TB9(a) to terminal block TB9(b)?**

- **NO**

- **YES**

Replace jumper wire from terminal block TB9(a) to terminal block TB9(b) (para 7-33).
## CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to terminal block TB9(a).
3. Connect negative (-) probe of multimeter to terminal block TB9(b) and note reading on multimeter.
4. If continuity is not present, replace jumper wire from terminal block TB9(a) to terminal block TB9(b) (para 7-33).
Is 24 VDC present at terminal block TB9?

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
If 24 VDC is not present, go to step 15 of this fault. If 24 VDC is present M1089 control panel wiring harness and/or STATION SELECTOR switch is faulty.

12.

**KNOWLEDGE INFO**
- LH and RH winches operate from wrecker control panel.
- Circuit breaker CB50 OK.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.
- Jumper wires OK.

**POSSIBLE PROBLEMS**
- Faulty STATION SELECTOR switch.
- Faulty M1089 control panel wiring harness.
- Faulty M1089 control panel power cable assembly.
- Faulty M1089 rear lights cable assembly.
- Faulty auxiliary panel cable assembly.
- Faulty dashboard cable assembly.

Replace M1089 control panel wiring harness (para 7-83) and STATION SELECTOR switch (para 7-34).


**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

### VOLTAGE TEST

1. Install circuit breaker CB50 in PDP.
2. Set multimeter to volts DC.
3. Connect positive (+) probe of multimeter to terminal block TB9.
4. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
5. If 24 VDC is not present, go to step 15 of this fault.
6. If 24 VDC is present, replace M1089 control panel wiring harness (para 7-83) and STATION SELECTOR switch (para 7-34).

### NOTE

Perform steps (7) and (8) if 24 VDC is present at terminal block TB9.

7. Install PDP cover (para 16-2).
8. Install wrecker control panel top cover (para 14-4).
e139. MAIN WINCH LH OR RH SPEED SWITCH DOES NOT OPERATE FROM WRECKER CONTROL PANEL (CONT)

**KNOWN INFO**

- LH and RH winches operate from wrecker control panel.
- Circuit breaker CB50 OK.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.
- STATION SELECTOR switch OK.
- MAIN WINCH RH SPEED switch OK.
- M1089 control panel power cable assembly OK.
- M1089 rear lights cable assembly.
- Auxiliary panel cable assembly OK.
- Dashboard cable assembly OK.

**POSSIBLE PROBLEMS**

Faulty MAIN WINCH LH SPEED switch.
Faulty M1089 control panel wiring harness.
Faulty M1089 30K winch control wiring harness.

**TEST OPTIONS**

- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**

- If 24 VDC is not present, MAIN WINCH LH SPEED switch and M1089 control panel wiring harness is faulty.
- If 24 VDC is present M1089 30K winch control wiring harness is faulty.

13. Is 24 VDC present at terminal block TB14?

- **NO**
  - Replace M1089 30K winch wiring harness (para 7-142).

- **YES**
  - Replace MAIN WINCH LH SPEED switch (para 7-34) and M1089 control panel wiring harness (para 7-83).

**WARNING**

Read WARNING on following page.
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

**WARNING**

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
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<tbody>
<tr>
<td>(1) Install circuit breaker CB50 in PDP.</td>
</tr>
<tr>
<td>(2) Position MAIN WINCH LH SPEED switch to HIGH.</td>
</tr>
<tr>
<td>(3) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter to terminal block TB14.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(6) If 24 VDC is not present, replace MAIN WINCH LH SPEED switch (para 7-34) and M1089 control panel wiring harness (para 7-83).</td>
</tr>
<tr>
<td>(7) If 24 VDC is present, replace M1089 30K winch control wiring harness (para 7-142).</td>
</tr>
<tr>
<td>(8) Position MAIN WINCH RH SPEED switch to LOW.</td>
</tr>
<tr>
<td>(9) Close LH and RH catwalks.</td>
</tr>
<tr>
<td>(10) Install PDP cover (para 16-2).</td>
</tr>
<tr>
<td>(11) Install wrecker control panel top cover (para 14-4).</td>
</tr>
</tbody>
</table>
e139. MAIN WINCH LH OR RH SPEED SWITCH DOES NOT OPERATE FROM WRECKER CONTROL PANEL (CONT)

**KNOWN INFO**
- LH and RH winches operate from wrecker control panel.
- Circuit breaker CB50 OK.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.
- STATION SELECTOR switch OK.
- MAIN WINCH RH SPEED switch OK.
- M1089 control panel power cable assembly OK.
- M1089 rear lights cable assembly.
- Auxiliary panel cable assembly OK.
- Dashboard cable assembly OK.
- MAIN WINCH LH SPEED switch OK.
- M1089 control panel wiring harness OK.

**POSSIBLE PROBLEMS**
- Faulty M1089 30K winch control wiring harness.
- Faulty jumper wire.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, jumper wire is faulty. If continuity is present, M1089 30K winch control wiring is faulty.

14. Is continuity present between terminal blocks TBC(1), TBC(2), TBC(3), TBC(4), and TBC(5).

NO

YES

Replace jumper wire between terminal blocks that continuity is not present (para 7-33).

Replace M1089 30K winch control wiring harness (para 7-142).
<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
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<tbody>
<tr>
<td>(1) Set multimeter to ohms.</td>
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<tr>
<td>(2) Connect positive (+) probe of multimeter</td>
</tr>
<tr>
<td>to terminal block TBC(1).</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter</td>
</tr>
<tr>
<td>to terminal block TBC(2) and note reading</td>
</tr>
<tr>
<td>on multimeter.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter</td>
</tr>
<tr>
<td>to terminal block TBC(2).</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter</td>
</tr>
<tr>
<td>to terminal block TBC(3) and note reading</td>
</tr>
<tr>
<td>on multimeter.</td>
</tr>
<tr>
<td>(6) Connect positive (+) probe of multimeter</td>
</tr>
<tr>
<td>to terminal block TBC(3).</td>
</tr>
<tr>
<td>(7) Connect negative (-) probe of multimeter</td>
</tr>
<tr>
<td>to terminal block TBC(4) and note reading</td>
</tr>
<tr>
<td>on multimeter.</td>
</tr>
<tr>
<td>(8) Connect positive (+) probe of multimeter</td>
</tr>
<tr>
<td>to terminal block TBC(4).</td>
</tr>
<tr>
<td>(9) Connect negative (-) probe of multimeter</td>
</tr>
<tr>
<td>to terminal block TBC(5) and note reading</td>
</tr>
<tr>
<td>on multimeter.</td>
</tr>
<tr>
<td>(10) If continuity is not present between two</td>
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<tr>
<td>terminal blocks noted above, replace</td>
</tr>
<tr>
<td>jumper wire between terminal blocks that</td>
</tr>
<tr>
<td>continuity is not present (para 7-33).</td>
</tr>
<tr>
<td>(11) If continuity is present, replace M1089</td>
</tr>
<tr>
<td>winch control wiring harness (para 7-142).</td>
</tr>
<tr>
<td>(12) Close LH and RH catwalks.</td>
</tr>
<tr>
<td>(13) Install circuit breaker CB50 in PDP.</td>
</tr>
<tr>
<td>(14) Install wrecker control panel top cover</td>
</tr>
<tr>
<td>(para 14-4).</td>
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</tbody>
</table>

*Note: Diagrams showing terminal blocks and wiring connections.*
e139. MAIN WINCH LH OR RH SPEED SWITCH DOES NOT OPERATE FROM WRECKER CONTROL PANEL (CONT)

**KNOWN INFO**
- LH and RH winches operate from wrecker control panel.
- Circuit breaker CB50 OK.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.
- Jumper wires OK.

**POSSIBLE PROBLEMS**
- Faulty M1089 control panel power cable assembly.
- Faulty M1089 rear lights cable assembly.
- Faulty auxiliary panel cable assembly.
- Faulty dashboard cable assembly.

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
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<th>REASON FOR QUESTION</th>
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<tbody>
<tr>
<td>This question eliminates possible problems and determines where troubleshooting continues.</td>
</tr>
</tbody>
</table>

15. Is continuity present from connector J108 pin 16 to circuit breaker CB50 socket 2?

- **NO**
  - Go to step 17 of this fault.

- **YES**
  - Go to step 17 of this fault.
CAUTION
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

(1) Disconnect batteries (para 7-57).
(2) Remove kick panel (para 16-3).
(3) Disconnect connector J108 from connector P108.
(4) Remove circuit breaker CB50 from PDP.
(5) Set multimeter to ohms.
(6) Connect positive (+) probe of multimeter to connector J108 pin 16.
(7) Connect negative (-) probe of multimeter to circuit breaker CB50 socket 2 and note reading on multimeter.
(8) If continuity is not present, go to step 17 of this fault.
Is continuity present from connector P108 socket 16 to connector P107 socket g?

If continuity is not present, wire 2006 is faulty. If continuity is present, wire 9 is faulty.

Repair wire 2006 from connector P107 socket g to connector P108 socket 16 (para 2-45) or replace M1089 rear lights cable assembly (para 7-104).

Repair wire 9 from connector J107 to terminal block TB9 (para 2-45) or replace M1089 control panel power cable assembly (para 7-109).

CAUTION
Read CAUTION on following page.

Known Info
- LH and RH winches operate from wrecker control panel.
- Circuit breaker CB50 OK.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.
- Jumper wires OK.
- Auxiliary panel cable assembly OK.
- Dashboard cable assembly OK.

Possible Problems
- Faulty M1089 control panel power cable assembly.
- Faulty M1089 rear lights cable assembly.

Test Options
- Continuity Test or STE/ICE-R Test #91

Reason for Question
- If continuity is not present, wire 2006 is faulty. If continuity is present, wire 9 is faulty.
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

**CONTINUITY TEST**

1. Install circuit breaker CB50 in PDP.
2. Disconnect connector P107 from connector J107.
3. Set multimeter to ohms.
4. Connect positive (+) probe of multimeter to connector P108 socket 16.
5. Connect negative (-) probe of multimeter to connector P107 socket g and note reading on multimeter.
6. If continuity is not present, repair wire 2006 from connector P107 socket g to connector P108 socket 16 (para 2-45) or replace M1089 rear lights cable assembly (para 7-104).
7. If continuity is present, repair wire 9 from connector J107 to terminal block TB9 (para 2-45) or replace M1089 control panel power cable assembly (para 7-109).
9. Install kick panel (para 16-3).
11. Install wrecker control panel top cover (para 14-4).
12. Connect batteries (para 7-57).
**KNOWLEDGE**

LH and RH winches operate from wrecker control panel. Circuit breaker CB50 OK. STATION SELECTOR switch to WRECKER CONTROL PANEL. MODE SELECTOR SWITCH to NORMAL. Jumper wires OK.

**POSSIBLE PROBLEMS**

Faulty auxiliary panel cable assembly. Faulty dashboard cable assembly.

---

**CAUTION**

Read CAUTION on following page.

**17.** Is continuity present from connector J108 pin 16 to connector P912 pin/socket 1?

**YES**

Repair wire 2006 from connector J108 pin 16 to connector J912 socket 1 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

**NO**

If continuity is not present, wire 2006 from connector J108 pin 16 to connector J912 pin/socket 1 is faulty. If continuity is present, wire 2006 from connector P912 pin/socket 1 to circuit breaker CB50 socket 2 is faulty.

**REASON FOR QUESTION**

Test options: Continuity Test or STE/ICE-R Test #91

---

**TEST OPTIONS**

Continuity Test or STE/ICE-R Test #91

---

Repair wire 2006 from circuit breaker CB50 socket 2 to connector P912 pin (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

(1) Remove personnel heater for access (para 18-9).
(2) Disconnect connector P912 from connector J912.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to connector J108 pin 16.
(5) Connect negative (-) probe of multimeter to connector J912 pin/socket 1 and note reading on multimeter.
(6) If continuity is not present, repair wire 2006 from connector J108 pin 16 to connector J912 socket 1 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
(7) If continuity is present, repair wire 2006 from circuit breaker CB50 socket 2 to connector P912 pin 1 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
(8) Connect connector P912 to connector J912.
(9) Install personnel heater (para 18-9).
(10) Connect connector J108 to connector P108.
(11) Install circuit breaker CB50 in PDP.
(12) Install kick panel (para 16-3).
(13) Install wrecker control panel top cover (para 14-4).
(14) Connect batteries (para 7-57).
**KNOWLEDGE INFO**

LH and RH winches operate from wrecker control panel.
Circuit breaker CB50 OK.
STATION SELECTOR switch to WRECKER CONTROL PANEL.
MODE SELECTOR SWITCH to NORMAL.
MAIN WINCH LH and RH SPEED switches operate.

**POSSIBLE PROBLEMS**

Faulty MAIN WINCH LH FREESPOOL switch.
Faulty MAIN WINCH RH FREESPOOL switch.
Faulty M1089 control panel wiring harness.
Faulty M1089 30K winch control wiring harness.
Faulty jumper wire.
Faulty 30K winch pneumatic manifold solenoid L17.
Faulty 30K winch pneumatic manifold solenoid L19.
Faulty wrecker air system.

---

**INITIAL SETUP**

**Equipment Conditions**
Engine shut down (TM 9-2320-366-10-1).
Wrecker control panel top cover removed (para 14-4).

Personnel Required
(2)

**Tools and Special Tools**
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Gloves, Welder's (Item 14, Appendix C)

References
TM 9-4910-571-12&P

---

**TEST OPTIONS**

Operational Test

**REASON FOR QUESTION**

This question eliminates possible problems and determines where troubleshooting continues.

---

**START**

1. **WARNING**

   **CAUTION**

   Read WARNING and CAUTION on following page.

   Does LH 30K winch freespool?

   **YES**

   Go to step 5 of this fault.

   **NO**

   Operational Test
WARNING

Goggles must be worn while operating wrecker control panel. Blowing dust and debris may become airborne while engine is running. Failure to comply may result in injury to personnel.

Wear leather gloves at all times when handling winch cable. Do not allow cable to slide through hands even with gloves on. Broken wires may cause injury.

Never let moving cable slide through hands, even when wearing gloves. A broken wire could cut through gloves and cut hands. Failure to comply may result in injury to personnel.

OPERATIONAL TEST

(1) Start engine (TM 9-2320-366-10-1).
(2) Position PTO switch to on.

CAUTION

Keep tachometer within 1,250-1,450 rpm when Power Take-Off (PTO) is engaged. Do not exceed 1,450 rpm. Failure to comply may result in damage to equipment.

NOTE

In the event of a tachometer failure a HAND THROTTLE lever positioned to L is approximately 1,250-1,450 rpm.

(3) Set engine speed by increasing HAND THROTTLE lever until tachometer reads 1,250-1,450 rpm.
(4) Position MAIN WINCH LH FREESPOOL switch to ON.
(5) Pull cable to see if LH 30K winch drum FREESPOOLS.
(6) If LH 30K winch does not freewheel, go to step 5 of this fault.
e140. MAIN WINCH LH OR RH FREESPOOL SWITCH DOES NOT OPERATE FROM WRECKER CONTROL PANEL (CONT)

**KNOWN INFO**

LH and RH winches operate from wrecker control panel.
Circuit breaker CB50 OK.
STATION SELECTOR switch to WRECKER CONTROL PANEL.
MODE SELECTOR SWITCH to NORMAL.
MAIN WINCH LH and RH SPEED switches operate.
LH 30K winch freespools.
MAIN WINCH LH FREESPOOL switch OK.
30K winch pneumatic manifold solenoid L19 OK.

**POSSIBLE PROBLEMS**

Faulty MAIN WINCH RH FREESPOOL switch.
Faulty M1089 control panel wiring harness.
Faulty M1089 30K winch control wiring harness.
Faulty jumper wire.
Faulty 30K winch pneumatic manifold solenoid L17.
Faulty wrecker air system.

**WARNING**

Read WARNING on following page.

**TEST OPTIONS**

Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**

If 24 VDC is not present, MAIN WINCH RH FREESPOOL switch and M1089 wrecker control panel wiring harness are faulty.

2. Is 24 VDC present at terminal block TB18?

**YES**

Replace MAIN WINCH RH FREESPOOL switch (para 7-34) and M1089 wrecker control panel wiring harness (para 7-83).

**NO**
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

VOLTAGE TEST

(1) Set engine speed to idle (750 rpm) by decreasing HAND THROTTLE lever to full down position.
(2) Position PTO switch to off.
(3) Shut down engine (TM 9-2320-366-10-1).
(4) Position MAIN WINCH LH FREESPOOL switch to OFF.
(5) Position MAIN WINCH RH FREESPOOL switch to ON.
(6) Set multimeter to volts DC.
(7) Connect positive (+) probe of multimeter to terminal block TB18.
(8) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(9) If 24 VDC is not present, replace MAIN WINCH RH FREESPOOL switch (para 7-34) and M1089 wrecker control panel wiring harness (para 7-83).
(10) Position MAIN WINCH RH FREESPOOL switch to OFF.
Is continuity present between terminal blocks TBC(1), TBC(2), TBC(3), TBC(4) and TBC(5)?

Yes: Replace jumper wire between terminal blocks that continuity is not present (para 7-33).

No: Continuity Test or STE/ICE-R Test #91.

If continuity is not present, jumper wire is faulty.

**KNOWN INFO**

LH and RH winches operate from wrecker control panel. Circuit breaker CB50 OK. STATION SELECTOR switch to WRECKER CONTROL PANEL. MODE SELECTOR SWITCH to NORMAL. MAIN WINCH LH and RH SPEED switches operate. LH 30K winch freespools. MAIN WINCH LH FREESPOOL switch OK. 30K winch pneumatic manifold solenoid L19 OK. MAIN WINCH RH FREESPOOL switch OK. M1089 control panel wiring harness OK.

**POSSIBLE PROBLEMS**

(1) Remove power distribution panel (PDP) cover (para 16-2).
(2) Remove circuit breaker CB50 from power distribution panel (PDP).
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to terminal block TBC(1).
(5) Connect negative (-) probe of multimeter to terminal block TBC(2) and note reading on multimeter.
(6) Connect positive (+) probe of multimeter to terminal block TBC(2).
(7) Connect negative (-) probe of multimeter to terminal block TBC(3) and note reading on multimeter.
(8) Connect positive (+) probe of multimeter to terminal block TBC(3).
(9) Connect negative (-) probe of multimeter to terminal block TBC(4) and note reading on multimeter.
(10) Connect positive (+) probe of multimeter to terminal block TBC(4).
(11) Connect negative (-) probe of multimeter to terminal block TBC(5) and note reading on multimeter.
(12) If continuity is not present between two terminal blocks noted above, replace jumper wire between terminal blocks that continuity is not present (para 7-33).
**e140. MAIN WINCH LH OR RH FREESPOOL SWITCH DOES NOT OPERATE FROM WRECKER CONTROL PANEL (CONT)**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>LH and RH winches operate from wrecker control panel.</td>
</tr>
<tr>
<td>Circuit breaker CB50 OK.</td>
</tr>
<tr>
<td>STATION SELECTOR switch to WRECKER CONTROL PANEL.</td>
</tr>
<tr>
<td>MODE SELECTOR SWITCH to NORMAL.</td>
</tr>
<tr>
<td>MAIN WINCH LH and RH SPEED switches operate.</td>
</tr>
<tr>
<td>LH 30K winch freespools.</td>
</tr>
<tr>
<td>MAIN WINCH LH FREESPOOL switch OK.</td>
</tr>
<tr>
<td>Faulty 30K winch pneumatic manifold solenoid L19.</td>
</tr>
<tr>
<td>MAIN WINCH RH FREESPOOL switch OK.</td>
</tr>
<tr>
<td>M1089 control panel wiring harness OK.</td>
</tr>
<tr>
<td>Jumper wires OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty M1089 30K winch control wiring harness.</td>
</tr>
<tr>
<td>Faulty 30K winch pneumatic manifold solenoid L17.</td>
</tr>
<tr>
<td>Faulty wrecker air system.</td>
</tr>
</tbody>
</table>

**TEST OPTIONS**

- Air Pressure Test

**REASON FOR QUESTION**

If air pressure is not present, go step 11 of this fault. If air pressure is present, wrecker air system is faulty.

---

4. **WARNING**

Read WARNING on following page.

Is air pressure present at pneumatic manifold solenoid L17 port 1?

- **NO**
  - Go to step 11 of this fault.

- **YES**
  - Go to step 11 of this fault.

Perform Wrecker Air System Troubleshooting task aa3. Main Winch RH FREESPOOL Does Not Operate.
**WARNING**

Wear protective goggles to protect against possible injury from release of high pressure air. Failure to comply may result in injury to personnel.

### AIR PRESSURE TEST

1. Install circuit breaker CB50 in PDP.
2. Open LH and RH catwalks.
3. Disconnect air hose from pneumatic manifold solenoid L17 port 1.
5. Position MAIN WINCH RH FREESPOOL switch to ON.
6. If air pressure is not present at pneumatic manifold solenoid L17 port 1, go to step 11 of this fault.
7. If air pressure is present at pneumatic manifold solenoid L17 port 1, perform Wrecker Air System Troubleshooting task aa3. Main Winch RH Freespool Does Not Operate.
8. Position MAIN WINCH RH FREESPOOL switch to OFF.
10. Connect air hose to pneumatic manifold solenoid L17 port 1.

**NOTE**

Perform steps (11) and (13) if air pressure is present at air hose.

12. Install PDP cover (para 16-2).
13. Install wrecker control panel top cover (para 14-4).
e140. MAIN WINCH LH OR RH FREESPOOL SWITCH DOES NOT OPERATE FROM WRECKER CONTROL PANEL (CONT)

**KNOWN INFO**
- LH and RH winches operate from wrecker control panel.
- Circuit breaker CB50 OK.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.
- MAIN WINCH LH and RH SPEED switches operate.

**POSSIBLE PROBLEMS**
- Faulty MAIN WINCH LH FREESPOOL switch.
- Faulty MAIN WINCH RH FREESPOOL switch.
- Faulty M1089 control panel wiring harness.
- Faulty M1089 30K winch control wiring harness.
- Faulty jumper wire.
- Faulty 30K winch pneumatic manifold solenoid L17.
- Faulty 30K winch pneumatic manifold solenoid L19.
- Faulty wrecker air system.

**TEST OPTIONS**
- Operational Test

**REASON FOR QUESTION**
This question eliminates possible problems and determines where troubleshooting continues.

**WARNING**
Read WARNING on following page.

5. Does RH 30K winch freespool?

- **NO**
- **YES**

  Go to step 9 of this fault.
WARNING

Goggles must be worn while operating wrecker control panel. Blowing dust and debris may become airborne while engine is running. Failure to comply may result in injury to personnel.

Wear leather gloves at all times when handling winch cable. Do not allow cable to slide through hands even with gloves on. Broken wires may cause injury.

Never let moving cable slide through hands, even when wearing gloves. A broken wire could cut through gloves and cut hands. Failure to comply may result in injury to personnel.

OPERATIONAL TEST

(1) Position MAIN WINCH LH FREESPOOL switch to OFF.
(2) Position MAIN WINCH RH FREESPOOL switch to ON.
(3) Pull cable to see if RH 30K winch drum freespools.
(4) If RH 30K winch does not freespool, go to step 9 of this fault.
(5) Position MAIN WINCH RH FREESPOOL switch to OFF.
(6) Set engine speed to idle (750 rpm) by decreasing HAND THROTTLE lever to full down position.
(7) Position PTO switch to off.
(8) Shut down engine (TM 9-2320-366-10-1).
e140. MAIN WINCH LH OR RH FREESPOOL SWITCH DOES NOT OPERATE FROM WRECKER CONTROL PANEL (CONT)

**KNOWN INFO**

LH and RH winches operate from wrecker control panel. Circuit breaker CB50 OK. STATION SELECTOR switch to WRECKER CONTROL PANEL. MODE SELECTOR SWITCH to NORMAL. MAIN WINCH LH and RH SPEED switches operate. RH 30K winch freespools. MAIN WINCH LH FREESPOOL switch OK. 30K winch pneumatic manifold solenoid L17 OK.

**POSSIBLE PROBLEMS**

Faulty MAIN WINCH LH FREESPOOL switch.
Faulty M1089 control panel wiring harness.
Faulty M1089 30K winch control wiring harness.
Faulty jumper wire.
Faulty 30K winch pneumatic manifold solenoid L19.
Faulty wrecker air system.

---

**WARNING**

Read WARNING on following page.

**TEST OPTIONS**

Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**

If 24 VDC is not present, MAIN WINCH LH FREESPOOL switch and M1089 wrecker control panel wiring harness are faulty.

---

**6.**

Is 24 VDC present at terminal block TB19?

**YES**

Replace MAIN WINCH LH FREESPOOL switch (para 7-34) and M1089 wrecker control panel wiring harness (para 7-83).

**NO**
## WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

### CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Position MAIN WINCH LH FREESPOOL switch to ON.</td>
</tr>
<tr>
<td>(2)</td>
<td>Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(3)</td>
<td>Connect positive (+) probe of multimeter to terminal block TB19.</td>
</tr>
<tr>
<td>(4)</td>
<td>Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(5)</td>
<td>If 24 VDC is not present, replace MAIN WINCH LH FREESPOOL switch (para 7-34) and M1089 wrecker control panel wiring harness (para 7-83).</td>
</tr>
<tr>
<td>(6)</td>
<td>Position MAIN WINCH LH FREESPOOL switch to OFF.</td>
</tr>
</tbody>
</table>
7. Is continuity present between terminal blocks TBC(1), TBC(2), TBC(3), TBC(4) and TBC(5)?

- **NO**
  - Replace jumper wire between terminal blocks that continuity is not present (para 7-33).

- **YES**

**KNOWN INFO**
- LH and RH winches operate from wrecker control panel.
- Circuit breaker CB50 OK.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.
- MAIN WINCH LH and RH SPEED switches operate.
- RH 30K winch freespools.
- MAIN WINCH RH FREESPOOL switch OK.
- 30K winch pneumatic manifold solenoid L17 OK.
- MAIN WINCH LH FREESPOOL switch OK.
- M1089 control panel wiring harness OK.

**POSSIBLE PROBLEMS**
- Faulty M1089 30K winch control wiring harness.
- Faulty jumper wire.
- Faulty 30K winch pneumatic manifold solenoid L19.
- Faulty wrecker air system.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, jumper wire is faulty.
CONTINUITY TEST

(1) Remove power distribution panel (PDP) cover (para 16-2).
(2) Remove circuit breaker CB50 from power distribution panel (PDP).
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to terminal block TBC(1).
(5) Connect negative (-) probe of multimeter to terminal block TBC(2) and note reading on multimeter.
(6) Connect positive (+) probe of multimeter to terminal block TBC(2).
(7) Connect negative (-) probe of multimeter to terminal block TBC(3) and note reading on multimeter.
(8) Connect positive (+) probe of multimeter to terminal block TBC(3).
(9) Connect negative (-) probe of multimeter to terminal block TBC(4) and note reading on multimeter.
(10) Connect positive (+) probe of multimeter to terminal block TBC(4).
(11) Connect negative (-) probe of multimeter to terminal block TBC(5) and note reading on multimeter.
(12) If continuity is not present between two terminal blocks noted above, replace jumper wire between terminal blocks that continuity is not present (para 7-33).
e140. MAIN WINCH LH OR RH FREESPOOL SWITCH DOES NOT OPERATE FROM WRECKER CONTROL PANEL (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>LH and RH winches operate from wrecker control panel. Circuit breaker CB50 OK. STATION SELECTOR switch to WRECKER CONTROL PANEL. MODE SELECTOR SWITCH to NORMAL. MAIN WINCH LH and RH SPEED switches operate. LH 30K winch freespools. MAIN WINCH LH FREESPOOL switch OK. Faulty 30K winch pneumatic manifold solenoid L19. MAIN WINCH RH FREESPOOL switch OK. M1089 control panel wiring harness OK. Jumper wire OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty M1089 30K winch control wiring harness. Faulty 30K winch pneumatic manifold solenoid L17. Faulty wrecker air system.</td>
</tr>
</tbody>
</table>

**WARNING**
Read WARNING on following page.

8. Is air pressure present at pneumatic manifold solenoid L19 port 1?

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Pressure Test</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If air pressure is not present, go step 13 of this fault. If air pressure is present, wrecker air system is faulty.</td>
</tr>
</tbody>
</table>

**NO**

**YES**
Go to step 13 of this fault.

Perform Wrecker Air System Troubleshooting task aa3. Main Winch RH FREESPOOL Does Not Operate.
WARNING
Wear protective goggles to protect against possible injury from release of high pressure air. Failure to comply may result in injury to personnel.

<table>
<thead>
<tr>
<th>AIR PRESSURE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Install circuit breaker CB50 in PDP.</td>
</tr>
<tr>
<td>(2) Open LH and RH catwalks.</td>
</tr>
<tr>
<td>(3) Disconnect air hose from pneumatic manifold solenoid L19 port 1.</td>
</tr>
<tr>
<td>(4) Start engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(5) Position MAIN WINCH LH FREESPOOL switch to ON.</td>
</tr>
<tr>
<td>(6) If air pressure is not present at pneumatic manifold solenoid L19 port 1, go to step 13 of this fault.</td>
</tr>
<tr>
<td>(7) If air pressure is present at pneumatic manifold solenoid L19 port 1, perform Wrecker Air System Troubleshooting task aa3. Main Winch RH Freespool Does Not Operate.</td>
</tr>
<tr>
<td>(8) Position MAIN WINCH LH FREESPOOL switch to OFF.</td>
</tr>
<tr>
<td>(9) Shut down engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(10) Connect air hose to pneumatic manifold solenoid L19 port 1.</td>
</tr>
</tbody>
</table>

NOTE
Perform steps (11) and (13) if air pressure is present at air hose.

(11) Close LH and RH catwalks.
(12) Install PDP cover (para 16-2).
(13) Install wrecker control panel top cover (para 14-4).
e140. MAIN WINCH LH OR RH FREESPOOL SWITCH DOES NOT OPERATE FROM WRECKER CONTROL PANEL (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>9.</th>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LH and RH winches operate from wrecker control panel. Circuit breaker CB50 OK. STATION SELECTOR switch to WRECKER CONTROL PANEL. MODE SELECTOR SWITCH to NORMAL. MAIN WINCH LH and RH SPEED switches operate.</td>
<td>Is 24 VDC present at terminal block TB19?</td>
<td>Voltage Test or STE/ICE-R Test #89</td>
</tr>
<tr>
<td>POSSIBLE PROBLEMS</td>
<td></td>
<td>Reason for Question</td>
</tr>
<tr>
<td>Faulty M1089 control panel wiring harness. Faulty jumper wire. Faulty wrecker air system.</td>
<td>If 24 VDC is not present, M1089 control panel wiring harness is faulty.</td>
<td></td>
</tr>
</tbody>
</table>

WARNING
Read WARNING on following page.

YES
Replace M1089 control panel wiring harness (para 7-83)

NO

2-1456.12 Change 1
WARNING
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Position MAIN WINCH LH FREESPOOL switch to ON.</td>
</tr>
<tr>
<td>(2) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to terminal block TB19.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(5) If 24 VDC is not present, replace M1089 control panel wiring harness (para 7-83).</td>
</tr>
<tr>
<td>(6) Position MAIN WINCH LH FREESPOOL switch to OFF.</td>
</tr>
</tbody>
</table>
Is continuity present between terminal blocks TBC(1), TBC(2), TBC(3), TBC(4) and TBC(5)?

- **NO**
  - If continuity is not present, jumper wire is faulty. If continuity is present, wrecker air system is faulty.

- **YES**
  - Replace jumper wire between terminal blocks that continuity is not present (para 7-33).

**Perform Wrecker Air System Troubleshooting task aa4. M1089 LH And RH 30K Winch FREESPOOL Do Not Operate.**

**Known Info**
- LH and RH winches operate from wrecker control panel.
- Circuit breaker CB50 OK.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.
- MAIN WINCH LH and RH SPEED switches operate.
- M1089 control panel wiring harness OK.

**Possible Problems**
- Faulty jumper wire.
- Faulty wrecker air system.

**Test Options**
- Continuity Test or STE/ICE-R Test #91

**Reason For Question**
- If continuity is not present, jumper wires is faulty. If continuity is present, wrecker air system is faulty.
CONTINUITY TEST

(1) Remove PDP cover (para 16-2).
(2) Remove circuit breaker CB50 from PDP.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to terminal block TBC(1).
(5) Connect negative (-) probe of multimeter to terminal block TBC(2) and note reading on multimeter.
(6) Connect positive (+) probe of multimeter to terminal block TBC(2).
(7) Connect negative (-) probe of multimeter to terminal block TBC(3) and note reading on multimeter.
(8) Connect positive (+) probe of multimeter to terminal block TBC(3).
(9) Connect negative (-) probe of multimeter to terminal block TBC(4) and note reading on multimeter.
(10) Connect positive (+) probe of multimeter to terminal block TBC(4).
(11) Connect negative (-) probe of multimeter to terminal block TBC(5) and note reading on multimeter.
(12) If continuity is not present between two terminal blocks noted above, replace jumper wire between terminal blocks that continuity is not present (para 7-33).
(13) If continuity is present, perform Wrecker Air System Troubleshooting task aa4. M1089 LH And RH 30K Winch FREESPOOL Do Not Operate.
(14) Install circuit breaker CB50 in PDP.
(15) Install PDP cover (para 16-2).
(16) Install wrecker control panel top cover (para 14-4).
** KNOWN INFO **
LH and RH winches operate from wrecker control panel.
Circuit breaker CB50 OK.
STATION SELECTOR switch to WRECKER CONTROL PANEL.
MODE SELECTOR SWITCH to NORMAL.
MAIN WINCH LH and RH SPEED switches operate.
LH 30K winch freespools.
MAIN WINCH LH FREESPOOL switch OK.
Faulty 30K winch pneumatic manifold solenoid L19.
MAIN WINCH RH FREESPOOL switch OK.
M1089 control panel wiring harness OK.
Faulty jumper wire.

** POSSIBLE PROBLEMS **
Faulty M1089 30K winch control wiring harness.
Faulty 30K winch pneumatic manifold solenoid L17.
Faulty wrecker air system.

** TEST OPTIONS **
- Continuity Test or STE/ICE-R Test #91

** REASON FOR QUESTION **
If continuity is not present, M1089 winch control wiring harness is faulty.

** 11. **
Is continuity present from terminal block TB18 to wire 18?

- NO
- YES

Replace M1089 winch control wiring harness (para 7-142).
CONTINUITY TEST

(1) Remove circuit breaker CB50 from PDP.
(2) Remove electrical tape from conductor splice at pneumatic solenoid L17.
(3) Cut wire 18 from conductor splice at pneumatic solenoid L17.
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter to terminal block TB18.
(6) Connect negative (-) probe of multimeter to wire 18 and note reading on multimeter.
(7) If continuity is not present, replace M1089 winch control wiring harness (para 7-142).
e140. MAIN WINCH LH OR RH FREESPOOL SWITCH DOES NOT OPERATE FROM WRECKER CONTROL PANEL (CONT)

**KNOWN INFO**

LH and RH winches operate from wrecker control panel.
Circuit breaker CB50 OK.
STATION SELECTOR switch to WRECKER CONTROL PANEL.
MODE SELECTOR SWITCH to NORMAL.
MAIN WINCH LH and RH SPEED switches operate.
LH 30K winch freespools.
MAIN WINCH LH FREESPOOL switch OK.
Faulty 30K winch pneumatic manifold solenoid L19.
MAIN WINCH RH FREESPOOL switch OK.
M1089 control panel wiring harness OK.
Faulty jumper wire.

**POSSIBLE PROBLEMS**

Faulty M1089 30K winch control wiring harness.
Faulty 30K winch pneumatic manifold solenoid L17.
Faulty wrecker air system.

**TEST OPTIONS**

Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**

If continuity is not present, M1089 winch control wiring harness is faulty. If continuity is present, 30K winch pneumatic solenoid L17 is faulty.

---

12. Is continuity present from terminal block TBC to wire C?

**YES**

Replace M1089 winch control wiring harness (para 7-142).

**NO**

Replace 30K winch pneumatic manifold solenoid L17 (para 17-29).
CONTINUITY TEST

(1) Cut wire C from conductor splice at pneumatic solenoid L17.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to terminal block TBC.
(4) Connect negative (-) probe of multimeter to wire C and note reading on multimeter.
(5) If continuity is not present, replace M1089 winch control wiring harness (para 7-142).
(6) If continuity is present, replace 30K winch pneumatic manifold solenoid L17 (para 17-29).
(7) Install circuit breaker CB50 in PDP.
(8) Install PDP cover (para 16-2).
(9) Install wrecker control panel top cover (para 14-4).
(10) Close LH and RH catwalks.
### Known Info
- LH and RH winches operate from wrecker control panel.
- Circuit breaker CB50 OK.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.
- MAIN WINCH LH and RH SPEED switches operate.
- RH 30K winch freespools.
- MAIN WINCH RH FREESPOOL switch OK.
- Faulty 30K winch pneumatic manifold solenoid L17.
- MAIN WINCH LH FREESPOOL switch OK.
- M1089 control panel wiring harness OK.
- Faulty jumper wire.

### Possible Problems
- Faulty M1089 30K winch control wiring harness.
- Faulty 30K winch pneumatic manifold solenoid L17.
- Faulty wrecker air system.

### Test Options
- Continuity Test or STE/ICE-R Test #91

### Reason for Question
- If continuity is not present, M1089 winch control wiring harness is faulty.

### Diagram
```
13. Is continuity present from terminal block TB19 to wire 19?

   NO

   YES

Replace M1089 winch control wiring harness (para 7-142).
```
CONTINUITY TEST

(1) Remove circuit breaker CB50 from PDP.
(2) Remove electrical tape from conductor splice at pneumatic solenoid L19.
(3) Cut wire 19 from conductor splice at pneumatic solenoid L19.
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter to terminal block TB19.
(6) Connect negative (-) probe of multimeter to wire 19 and note reading on multimeter.
(7) If continuity is not present, replace M1089 winch control wiring harness (para 7-142).
e140. MAIN WINCH LH OR RH FREESPOOL SWITCH DOES NOT OPERATE FROM WRECKER CONTROL PANEL (CONT)

**KNOWN INFO**
- LH and RH winches operate from wrecker control panel.
- Circuit breaker CB50 OK.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.
- MAIN WINCH LH and RH SPEED switches operate.
- RH 30K winch freespools.
- MAIN WINCH RH FREESPOOL switch OK.
- Faulty 30K winch pneumatic manifold solenoid L17.
- MAIN WINCH LH FREESPOOL switch OK.
- M1089 control panel wiring harness OK.
- Faulty jumper wire.

**POSSIBLE PROBLEMS**
- Faulty M1089 30K winch control wiring harness.
- Faulty 30K winch pneumatic manifold solenoid L19.
- Faulty wrecker air system.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, M1089 winch control wiring harness is faulty. If continuity is present, 30K winch pneumatic solenoid L19 is faulty.

---

**FLOWCHART**

14. Is continuity present from terminal block TBC to wire C?

**NO**

Replace M1089 winch control wiring harness (para 7-142).

**YES**

Replace 30K winch pneumatic manifold solenoid L19 (para 17-29).
CONTINUITY TEST

(1) Cut wire C from conductor splice at pneumatic solenoid L19.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to terminal block TBC.
(4) Connect negative (-) probe of multimeter to wire C and note reading on multimeter.
(5) If continuity is not present, replace M1089 winch control wiring harness (para 7-142).
(6) If continuity is present, replace 30K winch pneumatic manifold solenoid L19 (para 17-29).
(7) Install circuit breaker CB50 in PDP.
(8) Install PDP cover (para 16-2).
(9) Install wrecker control panel top cover (para 14-4).
(10) Close LH and RH catwalks.
e141. ONE WRECKER FUNCTION DOES NOT OPERATE FROM WRECKER REMOTE CONTROL

INITIAL SETUP

Equipment Conditions
Top control panel cover removed (para 17-20).

Personnel Required
(2)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
STE/ICE-R (Item 41, Appendix C)

Materials/Parts
Wire, Electrical, 50 ft (Item 67, Appendix D)

References
TM 9-4910-571-12&P

---

**WARNING**
Read WARNING on following page.

1. Is 24 vdc present at actuators controlled from remote unit?

**POSSIBLE PROBLEMS**
Faulty actuator solenoids.
Faulty wrecker remote control.
Faulty remote control wiring harness.

**TEST OPTIONS**
Voltage Test

**REASON FOR QUESTION**
This question eliminates possible problems and determines where troubleshooting continues.

---

Go to step 3 of this fault.
WARNING
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

VOLTAGE TEST
(1) Connect wrecker remote control cable to RH remote control bulkhead connector (TM 9-2320-366-10-1).
(2) Set multimeter to vdc.
(3) Connect positive (+) probe of multimeter to terminal listed in Table 2-13. Actuator Voltage Test.
(4) Connect negative (-) probe of multimeter on ground.
(5) Position master power switch to on (TM 9-2320-366-10-1).
(6) Position remote control box switch to position listed in Table 2-13. Actuator Voltage Test and note reading on multimeter.
(7) If 24 vdc is not present, go to step 3 of this fault.
(8) Position master power switch to off (TM 9-2320-366-10-1).
(9) Disconnect remote control cable from RH remote control bulkhead connector (TM 9-2320-366-10-1).

<table>
<thead>
<tr>
<th>TB No.</th>
<th>ACTUATOR NAME</th>
<th>Remote Control Box Switch Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Underlift fold up</td>
<td>UP</td>
</tr>
<tr>
<td>3</td>
<td>Stinger in</td>
<td>IN</td>
</tr>
<tr>
<td>4</td>
<td>Underlift up</td>
<td>UP</td>
</tr>
<tr>
<td>6</td>
<td>Main winch LH in</td>
<td>IN</td>
</tr>
<tr>
<td>8</td>
<td>Main winch RH in</td>
<td>IN</td>
</tr>
<tr>
<td>11</td>
<td>Main winch RH out</td>
<td>OUT</td>
</tr>
<tr>
<td>12</td>
<td>Main winch speed RH high</td>
<td>HIGH</td>
</tr>
<tr>
<td>13</td>
<td>Main winch LH out</td>
<td>OUT</td>
</tr>
<tr>
<td>14</td>
<td>Main winch speed LH high</td>
<td>HIGH</td>
</tr>
<tr>
<td>15</td>
<td>Underlift down</td>
<td>DOWN</td>
</tr>
<tr>
<td>16</td>
<td>Stinger out</td>
<td>OUT</td>
</tr>
<tr>
<td>17</td>
<td>Underlift fold down</td>
<td>DOWN</td>
</tr>
</tbody>
</table>

TABLE 2-13. ACTUATOR VOLTAGE TEST
2. Is resistance present through actuator solenoid?

- **YES**
  - Perform Wrecker Pneumatic Troubleshooting (aa1. One or More Wrecker Functions Do Not Operate From Wrecker Remote Control).
  - Notify DS Maintenance.

- **NO**
  - Resistance Test or STE/ICE-R Test #91
  - REASON FOR QUESTION
    - If resistance is not present, actuator solenoid is faulty.

**KNOWN INFO**
- Circuit breaker CB50 OK.
- Mode selector switch in NORMAL position.
- Hydraulic functions OK.
- Station selector switch in remote control position.
- All functions from wrecker control panel OK.
- Wrecker remote control box OK.
- Remote control wiring harness OK.

**POSSIBLE PROBLEMS**
- Faulty actuator solenoids.
CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to terminal listed in Table 2-14. Actuator Solenoid Resistance Test.
3. Connect negative (-) probe of multimeter on terminal block TB-C and note reading on multimeter.
4. If resistance is less or greater than value listed in Table 2-14. Actuator Solenoid Resistance Test, notify DS Maintenance.
5. Install wrecker control panel top cover (para 17-20).

<table>
<thead>
<tr>
<th>Function/Solenoid</th>
<th>Terminal Board (+) Position</th>
<th>Solenoid Resistance in Ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underlift fold up - L18</td>
<td>2</td>
<td>81-101</td>
</tr>
<tr>
<td>Stinger in - L13</td>
<td>3</td>
<td>81-101</td>
</tr>
<tr>
<td>Underlift up - L14</td>
<td>4</td>
<td>81-101</td>
</tr>
<tr>
<td>Main winch LH in - L6</td>
<td>6</td>
<td>81-101</td>
</tr>
<tr>
<td>Main winch RH in - L1</td>
<td>8</td>
<td>81-101</td>
</tr>
<tr>
<td>Main winch RH out - L2</td>
<td>11</td>
<td>81-101</td>
</tr>
<tr>
<td>Main winch speed RH high</td>
<td>12</td>
<td>35-45</td>
</tr>
<tr>
<td>Main winch LH out - L5</td>
<td>13</td>
<td>81-101</td>
</tr>
<tr>
<td>Main winch speed LH high</td>
<td>14</td>
<td>35-45</td>
</tr>
<tr>
<td>Underlift down - L11</td>
<td>15</td>
<td>81-101</td>
</tr>
<tr>
<td>Stinger out - L16</td>
<td>16</td>
<td>81-101</td>
</tr>
<tr>
<td>Underlift fold down - L15</td>
<td>17</td>
<td>81-101</td>
</tr>
</tbody>
</table>
3. Is continuity present through remote control box?

**KNOWN INFO**
- Circuit breaker CB50 OK.
- Mode selector switch in NORMAL position.
- Hydraulic functions OK.
- Station selector switch in remote control position.
- All functions from wrecker control panel OK.
- Actuator solenoids OK.

**POSSIBLE PROBLEMS**
- Faulty wrecker remote control.
- Faulty remote control wiring harness.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
This question eliminates possible problems and determines where troubleshooting continues.

**如果答案是“NO”**
- Go to step 4 of this fault.

**如果答案是“YES”**
- Repair wire (para 2-45) or replace M1089 remote control wiring harness (para 7-117).
**CONTINUITY TEST**

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to pin listed in Table 2-15. Remote Control Box Continuity Test.
3. Connect negative (-) probe of multimeter to pin listed in Table 2-15. Remote Control Box Continuity Test.
4. Position remote control box switch to position listed in Table 2-15. Remote Control Box Continuity Test and note reading on multimeter.
5. If continuity is not present, go to step 4 of this fault.
6. If continuity is present, repair wire (para 2-45) or replace M1089 remote control wiring harness (para 7-117).

---

**TABLE 2-15. REMOTE CONTROL BOX CONTINUITY TEST**

<table>
<thead>
<tr>
<th>Function</th>
<th>Remote Control Box Position</th>
<th>P2 Pin Positive (+)</th>
<th>P2 Pin Negative (-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underlift fold up</td>
<td>UP</td>
<td>c</td>
<td>e</td>
</tr>
<tr>
<td>Stinger in</td>
<td>IN</td>
<td>c</td>
<td>f</td>
</tr>
<tr>
<td>Underlift up</td>
<td>UP</td>
<td>c</td>
<td>g</td>
</tr>
<tr>
<td>Main winch LH in</td>
<td>IN</td>
<td>c</td>
<td>d</td>
</tr>
<tr>
<td>Main winch RH in</td>
<td>IN</td>
<td>c</td>
<td>b</td>
</tr>
<tr>
<td>Main winch RH out</td>
<td>OUT</td>
<td>c</td>
<td>Y</td>
</tr>
<tr>
<td>Main winch speed RH high</td>
<td>HIGH</td>
<td>c</td>
<td>X</td>
</tr>
<tr>
<td>Main winch LH out</td>
<td>OUT</td>
<td>c</td>
<td>W</td>
</tr>
<tr>
<td>Main winch speed LH high</td>
<td>HIGH</td>
<td>c</td>
<td>V</td>
</tr>
<tr>
<td>Underlift down</td>
<td>DOWN</td>
<td>c</td>
<td>U</td>
</tr>
<tr>
<td>Stinger out</td>
<td>OUT</td>
<td>c</td>
<td>T</td>
</tr>
<tr>
<td>Underlift fold down</td>
<td>DOWN</td>
<td>c</td>
<td>S</td>
</tr>
<tr>
<td>Emergency stop</td>
<td>KILL</td>
<td>a</td>
<td>Z</td>
</tr>
</tbody>
</table>
4. Circuit breaker CB50 OK. Mode selector switch in NORMAL position. Hydraulic functions OK. Station selector switch in remote control position. All functions from wrecker control panel OK. Actuator solenoids OK.

Is continuity present through remote control box switch?

No:
- Faulty remote control box.
- Faulty remote control wiring harness.

Yes:
- Repair wire (para 2-45) or replace remote control box (para 7-35).
CONTINUITY TEST

<table>
<thead>
<tr>
<th>Function</th>
<th>REF DES</th>
<th>Remote Control Box Position and Switch Number</th>
<th>Switch Pin Positive (+)</th>
<th>Switch Pin Negative (-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underlift fold up</td>
<td>S15</td>
<td>UP</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Stinger in</td>
<td>S14</td>
<td>IN</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Underlift up</td>
<td>S13</td>
<td>UP</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Main winch LH in</td>
<td>S10</td>
<td>IN</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Main winch RH in</td>
<td>S8</td>
<td>IN</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Main winch RH out</td>
<td>S8</td>
<td>OUT</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Main winch speed RH high</td>
<td>S9</td>
<td>HIGH</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Main winch LH out</td>
<td>S10</td>
<td>OUT</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Main winch speed LH high</td>
<td>S11</td>
<td>HIGH</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Underlift down</td>
<td>S13</td>
<td>DOWN</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Stinger out</td>
<td>S14</td>
<td>OUT</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>Underlift fold down</td>
<td>S15</td>
<td>DOWN</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>Emergency stop</td>
<td>S7</td>
<td>KILL</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>
141. ONE WRECKER FUNCTION DOES NOT OPERATE FROM WRECKER REMOTE CONTROL (CONT)

**KNOWN INFO**
- Circuit breaker CB50 OK.
- Mode selector switch in NORMAL position.
- Hydraulic functions OK.
- Station selector switch in remote control position.
- All functions from wrecker control panel OK.
- Actuator solenoids OK.
- Wrecker remote control box OK.

**POSSIBLE PROBLEMS**
- Faulty remote control wiring harness.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present, wire is faulty.

**5. Is continuity present between TB and connector J1 and/or J2?**

- **NO**
  - Repair wire (para 2-45) or replace M1089 remote control wiring harness (para 7-117).

- **YES**
  - Perform Wrecker Pneumatic Troubleshooting (aa1. One Wrecker Function Does Not Operate From Wrecker Remote Control).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to terminal block position listed in Table 2-17. Continuity Table.
(3) Connect negative (-) probe of multimeter to J1/J2 pin listed in Table 2-17. Continuity Table and note reading on multimeter.
(4) If continuity is not present, repair wire (para 2-45) or replace remote control wiring harness (para 7-117).
(5) If continuity is present, perform Wrecker Pneumatic Troubleshooting (aa1. One Wrecker Function Does Not Operate From Wrecker Remote Control).
(6) Install wrecker control panel top cover (para 17-20).

<table>
<thead>
<tr>
<th>Function</th>
<th>TB Position</th>
<th>J1/J2 Pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underlift fold up</td>
<td>2</td>
<td>g</td>
</tr>
<tr>
<td>Stinger in</td>
<td>3</td>
<td>f</td>
</tr>
<tr>
<td>Underlift up</td>
<td>4</td>
<td>e</td>
</tr>
<tr>
<td>Main winch LH in</td>
<td>6</td>
<td>d</td>
</tr>
<tr>
<td>Main winch RH in</td>
<td>8</td>
<td>b</td>
</tr>
<tr>
<td>Main winch RH out</td>
<td>11</td>
<td>Y</td>
</tr>
<tr>
<td>Main winch speed RH high</td>
<td>12</td>
<td>X</td>
</tr>
<tr>
<td>Main winch LH out</td>
<td>13</td>
<td>W</td>
</tr>
<tr>
<td>Main winch speed LH high</td>
<td>14</td>
<td>V</td>
</tr>
<tr>
<td>Underlift down</td>
<td>15</td>
<td>U</td>
</tr>
<tr>
<td>Stinger out</td>
<td>16</td>
<td>T</td>
</tr>
<tr>
<td>Underlift fold down</td>
<td>17</td>
<td>S</td>
</tr>
<tr>
<td>Emergency shutdown run</td>
<td>9</td>
<td>a</td>
</tr>
<tr>
<td>Emergency shutdown kill</td>
<td>10</td>
<td>Z</td>
</tr>
<tr>
<td>Remote control box power</td>
<td>7</td>
<td>c</td>
</tr>
</tbody>
</table>
**e142. M1090/M1094 TAILGATE RELEASE DOES NOT OPERATE**

**INITIAL SETUP**

**Equipment Conditions**
- Engine shut down (TM 9-2320-366-10-1).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)

**Materials/Parts**
- Wire, Elec, 50ft (Item 71, Appendix D)

**Personnel Required**
- (2)

**References**
- TM 9-4910-571-12&P

---

**KNOWLEDGMENT INFO**
- Dump bed raises and lowers.
- Pneumatics system OK.

**POSSIBLE PROBLEMS**
- Faulty tailgate release solenoid.
- Faulty tailgate release switch.
- Faulty auxiliary panel cable assembly.
- Faulty dump power cable assembly.
- Faulty dump cable assembly.

**TEST OPTIONS**
- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
- This question eliminates possible problems and determines where troubleshooting continues.

---

1. Read WARNING and CAUTION on following page.

Is 24 VDC present at connector L7 socket 1?

- **NO**

- **YES** Go to step 3 of this fault.
**WARNING**

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

Dump body weighs approximately 3,034 lbs (1,376 kgs). Attach a suitable lifting device prior to lifting. Failure to comply may result in injury to personnel or damage to equipment.

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

**CAUTION**

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Raise dump bed (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(2) Loosen screw on connector L7.</td>
</tr>
<tr>
<td>(3) Disconnect connector L7 from tailgate release solenoid.</td>
</tr>
<tr>
<td>(4) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(5) Connect positive (+) probe of multimeter to connector L7 socket 1.</td>
</tr>
<tr>
<td>(6) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(7) Press and hold tailgate release switch (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(8) If 24 VDC is not present, go to step 3 of this fault.</td>
</tr>
</tbody>
</table>
Replace tailgate release solenoid (para 23-10).
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**CONTINUITY TEST**

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector L7 socket 2.
3. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
4. If continuity is not present, go to step 7 of this fault.
5. If continuity is present, replace tailgate release solenoid (para 23-10).
6. Connect connector L7 to tailgate release solenoid.
7. Tighten screw in connector L7.
3. Is 24 VDC present at connector P910 socket 3?

**WARNING**

**CAUTION**

Read WARNING and CAUTION on following page.

**TEST OPTIONS**

- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**

If 24 VDC is not present, wire 2006 in auxiliary panel cable assembly is faulty.

**KNOWN INFO**

- Dump bed raises and lowers.
- Pneumatic system OK.
- Tailgate release solenoid OK.

**POSSIBLE PROBLEMS**

- Faulty auxiliary panel cable assembly.
- Faulty tailgate release switch.
- Faulty dump power cable assembly.
- Faulty dump cable assembly.

**YES**

Repair wire 2006 from connector P910 socket 3 to connector J912 socket 1 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

**NO**
VOLTAGE TEST

1. Remove six screws from auxiliary panel.
2. Lift auxiliary panel outward to gain access.
3. Disconnect connector P910 from tailgate release switch.
4. Set multimeter to volts DC.
5. Connect positive (+) probe of multimeter to connector P910 socket 3.
6. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
7. If 24 VDC is not present, repair wire 2006 from connector P910 socket 3 to connector P912 socket 1 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

CAUTION

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

NOTE

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove six screws from auxiliary panel.</td>
</tr>
<tr>
<td>2</td>
<td>Lift auxiliary panel outward to gain access.</td>
</tr>
<tr>
<td>3</td>
<td>Disconnect connector P910 from tailgate release switch.</td>
</tr>
<tr>
<td>4</td>
<td>Set multimeter to volts DC.</td>
</tr>
<tr>
<td>5</td>
<td>Connect positive (+) probe of multimeter to connector P910 socket 3.</td>
</tr>
<tr>
<td>6</td>
<td>Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>7</td>
<td>If 24 VDC is not present, repair wire 2006 from connector P910 socket 3 to connector P912 socket 1 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).</td>
</tr>
</tbody>
</table>
4. Is continuity present from tailgate release switch terminal 1 to terminal 3?

**KNOWN INFO**
- Dump bed raises and lowers.
- Pneumatic system OK.
- Tailgate release solenoid OK.

**POSSIBLE PROBLEMS**
- Faulty auxiliary panel cable assembly.
- Faulty tailgate release switch.
- Faulty dump power cable assembly.
- Faulty dump cable assembly.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, tailgate release switch is faulty.

**CAUTION**
Read CAUTION on following page.

**YES**
- Replace tailgate release switch (para 7-18).

**NO**
**CONTINUITY TEST**

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to terminal 1 of tailgate release switch.
3. Connect negative (-) probe of multimeter to terminal 3 of tailgate release switch.
4. Push and hold tailgate release switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
5. If continuity is not present, replace tailgate release switch (para 7-18).

**CAUTION**

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.
### KNOWN INFO
- Dump bed raises and lowers.
- Pneumatic system OK.
- Tailgate release solenoid OK.
- Tailgate release switch OK.

### POSSIBLE PROBLEMS
- Faulty auxiliary panel cable assembly.
- Faulty dump power cable assembly.
- Faulty dump cable assembly.

### TEST OPTIONS
- Continuity Test or STE/ICE-R Test #91

### REASON FOR QUESTION
- If continuity is not present, wire 2045 in auxiliary panel cable assembly is faulty.

---

#### CAUTION
Read CAUTION on following page.

5. Is continuity present from connector P910 socket 1 to connector J108 pin 8?

---

**NO**

---

**YES**

Repair wire 2045 from connector P910 socket 1 to connector J108 pin 8 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
CONTINUITY TEST

(1) Remove kick panel (para 16-3).
(2) Disconnect connector P108 from connector J108.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to connector P910 socket 1.
(5) Connect negative (-) probe of multimeter to connector J108 pin 8 and note reading on multimeter.
(6) If continuity is not present, repair wire 2045 from connector P910 socket 1 to connector J108 pin 8 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
(7) Connect connector P108 to connector J108.
(8) Install kick panel (para 16-3).
(9) Connect connector P910 to tailgate release switch.
(10) Position auxiliary panel on auxiliary panel housing with six screws.
(11) Tighten six screws to 24 lb-in. (3N.m).

CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.
6. Is 24 VDC present at connector P172 socket C?

**WARNING**

Read WARNING and CAUTION on following page.

**TEST OPTIONS**

Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**

If 24 VDC is not present, wire 2045 in dump power cable assembly is faulty. If 24 VDC is present, wire 2045 in dump cable assembly is faulty.

**KNOWLEDGE INFO**

- Dump bed raises and lowers.
- Pneumatic system OK.
- Tailgate release solenoid OK.
- Tailgate release switch OK.

**POSSIBLE PROBLEMS**

- Faulty auxiliary panel cable assembly.
- Faulty dump power cable assembly.
- Faulty dump cable assembly.

**YES**

Repair wire 2045 from connector P172 socket C to connector P108 socket 8 (para 2-45) or replace dump power cable assembly (para 7-125).

**NO**

Repair wire 2045 from connector J172 pin C to connector L7 socket 1 (para 2-45) or replace dump cable assembly (para 7-124).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

## VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Disconnect connector P172 from connector J172.</td>
</tr>
<tr>
<td>2</td>
<td>Set multimeter to volts DC.</td>
</tr>
<tr>
<td>3</td>
<td>Connect positive (+) probe of multimeter to connector P172 socket C.</td>
</tr>
<tr>
<td>4</td>
<td>Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>5</td>
<td>Press and hold tailgate release switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>6</td>
<td>If 24 VDC is not present, repair wire 2045 from connector P172 socket C to connector P108 socket 8 (para 2-45) or replace dump power cable assembly (para 7-125).</td>
</tr>
<tr>
<td>7</td>
<td>If 24 VDC is present, repair wire 2045 from connector J172 pin C to connector L7 socket 1 (para 2-45) or replace dump cable assembly (para 2-124).</td>
</tr>
<tr>
<td>8</td>
<td>Connect connector P172 to connector J172.</td>
</tr>
</tbody>
</table>
Is continuity present from connector P172 socket D to known good ground?

If continuity is not present, wire 3079 in dump power cable assembly is faulty.
If continuity is present, wire 3079 in dump cable assembly is faulty.

Repair wire 3079 from connector P172 socket D to terminal lug TL78 (para 2-45) or replace dump power cable assembly (para 7-125).

Repair wire 3079 from connector J172 pin D to connector L7 socket 2 (para 2-45) or replace dump cable assembly (para 7-124).

Faulty dump power cable assembly.
Faulty dump cable assembly.

Known Info
- Dump bed raises and lowers.
- Pneumatic system OK.
- Tailgate release solenoid OK.
- Tailgate release switch OK.
- Auxiliary panel cable assembly OK.

Possible Problems
- Faulty dump power cable assembly.
- Faulty dump cable assembly.

Test Options
- Continuity Test or STE/ICE-R Test #91

Reason for Question
- If continuity is not present, wire 3079 in dump power cable assembly is faulty.
- If continuity is present, wire 3079 in dump cable assembly is faulty.
CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector P172 socket D.
3. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
4. If continuity is not present, repair wire 3079 from connector P172 socket D to terminal lug TL78 (para 2-45) or replace dump power cable assembly (para 7-125).
5. If continuity is present, repair wire 3079 from connector J172 pin D to connector L7 socket 2 (para 2-45) or replace dump cable assembly (para 7-124).
6. Connect connector P172 to connector J172.
7. Start engine (TM 9-2320-366-10-1).

CAUTION
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.
**INITIAL SETUP**

**Equipment Condition**
Engine shut down (TM 9-2320-366-10-1).

**Personnel Required**
(2)

**References**
TM 9-4910-571-12&P

---

**TEST OPTIONS**

**REASON FOR QUESTION**
This question eliminates possible problems and determines where troubleshooting continues.

---

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)
- Sling, Cargo (Item 31, Appendix C)
- Lifting Bracket, Dump Body (2) (Item E-24, Appendix E)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Socket Set, Socket Wrench (Item 34, Appendix C)

**Materials/Parts**
- Wire, Elec, 50 ft (Item 71, Appendix D)

---

**NOTE**
Perform Electrical System Troubleshooting e1. Circuit Breaker Does Not Operate on circuit breaker CB50 prior to beginning this task.

---

**KNOWLEDGE**
- Hydraulic oil level OK.
- PTO OK.
- Circuit breaker CB50 OK.

**POSSIBLE PROBLEMS**
- Faulty dump body hydraulic system.
- Faulty four-way relief valve.
- Faulty solenoid valve.
- Faulty DUMP BED UP/DOWN switch.
- Faulty auxiliary panel cable assembly.
- Faulty M1090/M1094 dump cable assembly.
- Faulty M1090/M1094 dump power cable assembly.
- Faulty dashboard cable assembly.

---

1. **WARNING**
   - **CAUTION**
   - Read **WARNING** and **CAUTION** on following page.

   1. Is 24 VDC present at connector L8 socket 2?

   **START**

   **NO**

   **YES**

   Go to step 5 of this fault.
**WARNING**

Wear appropriate eye protection when working under vehicle due to possibility of falling debris. Failure to comply may result in injury to personnel.

Dump body weighs approximately 3,030 lbs (1,376 kgs). Attach a suitable lifting device prior to lifting. Failure to comply may result in injury to personnel or damage to equipment.

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

**CAUTION**

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove safety pins from two locking pins.</td>
</tr>
<tr>
<td>(2) Remove two lock pins from dump body.</td>
</tr>
<tr>
<td>(3) Install two dump body lifting brackets in slots in dump body.</td>
</tr>
<tr>
<td>(4) Attach cargo sling to two dump body lifting brackets.</td>
</tr>
<tr>
<td>(5) Lift dump body.</td>
</tr>
<tr>
<td>(6) Raise two maintenance legs on frame.</td>
</tr>
<tr>
<td>(7) Lower dump body on maintenance legs.</td>
</tr>
<tr>
<td>(8) Loosen screw on connector L8.</td>
</tr>
<tr>
<td>(9) Disconnect connector L8 from solenoid valve.</td>
</tr>
<tr>
<td>(10) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(11) Connect positive (+) probe of multimeter to connector L8 socket 2.</td>
</tr>
<tr>
<td>(12) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(13) Press and hold DUMP BED UP/DOWN switch to UP (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(14) If 24 VDC is not present, go to step 5 of this fault.</td>
</tr>
</tbody>
</table>
2. **TEST OPTIONS**
   - Continuity Test or 
     STE/ICE-R Test #91

**REASON FOR QUESTION**
This question eliminates possible problems and determines where troubleshooting continues.

**KNOWLEDGE INFO**
- Hydraulic oil level OK.
- PTO OK.
- Circuit breaker CB50 OK.
- DUMP BED UP/DOWN switch OK.
- Dashboard cable assembly OK.
- Auxiliary panel cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty dump body hydraulic system.
- Faulty solenoid valve.

3. **TEST OPTIONS**
   - Continuity Test or 
     STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is present, dump body hydraulic system is faulty.

**KNOWLEDGE INFO**
- Hydraulic oil level OK.
- PTO OK.
- Circuit breaker CB50 OK.
- DUMP BED UP/DOWN switch OK.
- Dashboard cable assembly OK.
- Auxiliary panel cable assembly OK.
- M1090/M1094 dump cable assembly OK.
- M1090/M1094 dump power cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty dump body hydraulic system.
- Faulty solenoid valve.

- Is continuity present from connector L8 socket 1 to a known good ground?

**KNOWLEDGE INFO**
- Hydraulic oil level OK.
- PTO OK.
- Circuit breaker CB50 OK.
- DUMP BED UP/DOWN switch OK.
- Dashboard cable assembly OK.
- Auxiliary panel cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty dump body hydraulic system.
- Faulty solenoid valve.
- Faulty M1090/M1094 dump cable assembly.
- Faulty M1090/M1094 dump power cable assembly.

- Notify DS Maintenance to perform Dump Body Hydraulic System troubleshooting task k1. Dump Body Does Not Raise.

- Replace solenoid valve (para 7-142).
CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector L8 socket 1.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, go to step 4 of this fault.

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to terminal 1 on up solenoid.
(3) Connect negative (-) probe of multimeter to terminal 2 on up solenoid and note reading on multimeter.
(4) If continuity is not present, replace solenoid valve (para 7-142).
(5) If continuity is present, notify DS Maintenance to perform Dump Body Hydraulic System troubleshooting task k1. Dump Body Does Not Raise.
(6) Connect connector L8 to solenoid valve.
(7) Tighten screw in connector L8.
4. Is continuity present from connector P172 socket H to a known good ground?

**CAUTION**
Read CAUTION on following page.

**TEST OPTIONS**
Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present, wire 3084 in M1090/M1094 dump power cable assembly is faulty. If continuity is present, wire 3084 in M1090/M1094 dump cable assembly is faulty.

**KNOWN INFO**
- Hydraulic oil level OK.
- PTO OK.
- Circuit breaker CB50 OK.
- Auxiliary panel cable assembly OK.
- DUMP BED UP/DOWN switch OK.
- Dump body hydraulic system OK.

**POSSIBLE PROBLEMS**
- Faulty M1090/M1094 dump cable assembly.
- Faulty M1090/M1094 dump power cable assembly.

**YES**
- Repair wire 3084 from connector P172 socket H to terminal lug TL77 (para 2-45) or replace M1090/M1094 dump power cable assembly (para 7-125).

**NO**
- Repair wire 3084 from connector J172 pin H to connector L8 socket 2 (para 2-45) or replace M1090/M1094 dump cable assembly (para 7-124).
CONTINUITY TEST

(1) Disconnect connector P172 from connector J172.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to connector P172 socket H.
(4) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(5) If continuity is not present, repair wire 3084 from connector P172 socket H to terminal lug TL77 (para 2-45) or replace M1090/M1094 dump power cable assembly (para 7-125).
(6) If continuity is present, repair wire 3084 from connector J172 pin H to connector L8 socket 2 (para 2-45) or replace M1090/M1094 dump cable assembly (para 7-124).
(7) Connect connector P172 to connector J172.
(8) Connect connector L8 to solenoid valve.
(9) Tighten screw in connector L8.
(10) Lift dump body.
(11) Place maintenance legs in stowed position.
(12) Lower dump body.
(13) Remove cargo sling from two dump body lifting brackets.
(14) Remove two dump body lifting brackets from dump body.
(15) Position two locking pins in dump body.
(16) Install safety pin in two locking pins.

CAUTION
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.
e143. M1090/M1094 DUMP BODY DOES NOT RAISE (CONT)

5. WARNING
   CAUTION
   Read WARNING and
   CAUTION on
   following page.

   Is 24 VDC present at
   connector P911 socket 3?

   Yes
   No

   YES
   Go to step 9 of this fault.

   NO

   Known Info
   - Hydraulic oil level OK.
   - PTO OK.
   - Circuit breaker CB50 OK.

   Possible Problems
   - Faulty DUMP BED UP/DOWN switch.
   - Faulty auxiliary panel cable assembly.
   - Faulty M1090/M1094 dump cable assembly.
   - Faulty M1090/M1094 dump power cable assembly.
   - Faulty dashboard cable assembly.

   Test Options
   - Voltage Test or
     STE/ICE-R Test #89

   Reason for Question
   If 24 VDC is not present, wire 2006 is faulty.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Connect connector L8 to solenoid valve.</td>
</tr>
<tr>
<td>(2) Tighten screw in connector L8.</td>
</tr>
<tr>
<td>(3) Remove six screws from auxiliary panel.</td>
</tr>
<tr>
<td>(4) Lift auxiliary panel outward to gain access.</td>
</tr>
<tr>
<td>(5) Remove PDP cover from PDP (para 16-2).</td>
</tr>
<tr>
<td>(6) Remove circuit breaker CB50 from PDP.</td>
</tr>
<tr>
<td>(7) Disconnect connector P911 from DUMP BED UP/DOWN switch connector.</td>
</tr>
<tr>
<td>(8) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(9) Connect positive (+) probe of multimeter to P911 socket 3.</td>
</tr>
<tr>
<td>(10) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(11) Install circuit breaker CB50 in PDP and note reading on multimeter.</td>
</tr>
<tr>
<td>(12) If 24 VDC is not present, go to step 9 of this fault.</td>
</tr>
<tr>
<td>(13) Remove circuit breaker CB50 from PDP.</td>
</tr>
</tbody>
</table>
6. NO REASON FOR QUESTION

TEST OPTIONS

Continuity Test or STE/ICE-R Test #91

REASON FOR QUESTION
If continuity is not present, DUMP BED UP/DOWN switch is faulty.

CAUTION Read CAUTION on following page.
Is continuity present from terminal 3 to terminal 7 on DUMP BED UP/DOWN switch?

POSSIBLE PROBLEMS
Faulty DUMP BED UP/DOWN switch.
Faulty auxiliary panel cable assembly.
Faulty M1090/M1094 dump cable assembly.
Faulty M1090/M1094 dump power cable assembly.

KNOWN INFO
Hydraulic oil level OK.
PTO OK.
Circuit breaker CB50 OK.
Dashboard cable assembly OK.

YES Replace DUMP BED UP/DOWN switch (para 7-18).

NO
**CAUTION**

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

### CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to DUMP BED UP/DOWN switch terminal 3.
4. Press and hold DUMP BED UP/DOWN switch to UP and note reading on multimeter.
5. If continuity is not present, replace DUMP BED UP/DOWN switch (para 7-18).
7. Install circuit breaker CB50 in PDP.
7. CAUTION Read CAUTION on following page.

Is continuity present from connector J 108 pin 6 to connector P911 socket 7?

If continuity is not present, wire 2043 in auxiliary panel cable assembly is faulty.

YES

Repair wire 2043 from connector J 108 pin 6 to connector P911 socket 7 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

NO

POSSIBLE PROBLEMS
Faulty auxiliary panel cable assembly.
Faulty M1090/M1094 dump cable assembly.
Faulty M1090/M1094 dump power cable assembly.

KNOWN INFO
Hydraulic oil level OK.
PTO OK.
Circuit breaker CB50 OK.
Dashboard cable assembly OK.
DUMP BED UP/DOWN switch OK.

TEST OPTIONS
Continuity Test or STE/ICE-R Test #91

REASON FOR QUESTION
If continuity is not present, wire 2043 in auxiliary panel cable assembly is faulty.
CONTINUITY TEST

(1) Disconnect batteries (para 7-57).
(2) Remove kick panel (para 16-3).
(3) Disconnect connector P108 from connector J108.
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter to connector J108 pin 6.
(6) Connect negative (-) probe of multimeter to connector P911 socket 7 and note reading on multimeter.
(7) If continuity is not present, repair wire 2043 from connector J108 pin 6 to connector P911 socket 7 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
(8) Connect connector P911 to DUMP BED UP/DOWN switch.
(9) Position auxiliary panel on auxiliary panel housing with six screws.
(10) Tighten six screws to 24 lb-in. (3N.m).

CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.
e143. M1090/M1094 DUMP BODY DOES NOT RAISE (CONT)

**Known Info**

- Hydraulic oil level OK.
- PTO OK.
- Circuit breaker CB50 OK.
- Dashboard cable assembly OK.
- DUMP BED UP/DOWN switch OK.
- Auxiliary panel cable assembly OK.

**Possible Problems**

- Faulty M1090/M1094 dump cable assembly.
- Faulty M1090/M1094 dump power cable assembly.

**TEST OPTIONS**

- Continuity Test or STE/ICE-R Test #91

**Reason for Question**

If continuity is not present, wire 2043 in dump power cable assembly is faulty. If continuity is present, wire 2043 in dump cable assembly is faulty.

**8.**

- Is continuity present from connector P172 socket F to connector P108 socket 6?

  **NO**

  - Repair wire 2043 from connector P172 socket F to connector P108 socket 6 (para 2-45) or replace M1090/M1094 dump power cable assembly (para 7-125).

  **YES**

  - Repair wire 2043 from connector J 172 pin F to connector L8 socket 1 (para 2-45) or replace M1090/M1094 dump cable assembly (para 7-124).
**CONTINUITY TEST**

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Disconnect connector P172 from connector J172.</td>
</tr>
<tr>
<td>2</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>3</td>
<td>Connect positive (+) probe of multimeter to connector P172 socket F.</td>
</tr>
<tr>
<td>4</td>
<td>Connect negative (-) probe of multimeter to connector P108 socket 6.</td>
</tr>
<tr>
<td>5</td>
<td>If continuity is not present, repair wire 2043 from connector P172 socket F to connector P108 socket 6 (para 2-45) or replace M1090/M1094 dump power cable assembly (para 7-125).</td>
</tr>
<tr>
<td>6</td>
<td>If continuity is present, repair wire 2043 from connector J172 Pin F to connector L8 socket 1 (para 2-45) or replace M1090/M1094 dump cable assembly (para 7-124).</td>
</tr>
<tr>
<td>7</td>
<td>Connect connector P172 to connector J172.</td>
</tr>
<tr>
<td>8</td>
<td>Connect connector P108 to connector J108.</td>
</tr>
<tr>
<td>9</td>
<td>Install kick panel (para 16-3).</td>
</tr>
<tr>
<td>10</td>
<td>Connect batteries (para 7-57).</td>
</tr>
<tr>
<td>11</td>
<td>Lift dump body.</td>
</tr>
<tr>
<td>12</td>
<td>Place maintenance legs in stowed position.</td>
</tr>
<tr>
<td>13</td>
<td>Lower dump body.</td>
</tr>
<tr>
<td>14</td>
<td>Remove cargo sling from dump body lifting brackets.</td>
</tr>
<tr>
<td>15</td>
<td>Remove two dump body lifting brackets from dump body.</td>
</tr>
<tr>
<td>16</td>
<td>Position two locking pins in dump body.</td>
</tr>
<tr>
<td>17</td>
<td>Install safety pin in two locking pins.</td>
</tr>
</tbody>
</table>
9. Is continuity present from connector P911 socket 3 to connector P909 socket 5?

If continuity is not present, wire 2006 in auxiliary panel cable assembly is faulty.

Repair wire 2006 from connector P911 socket 3 to connector P909 socket 5 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

(1) Install circuit breaker CB 50 in PDP.
(2) Install PDP cover on PDP (para 16-2).
(3) Disconnect batteries (para 7-57).
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter to connector P911 socket 3.
(6) Connect negative (-) probe of multimeter to connector P909 socket 5 and note reading on multimeter.
(7) If continuity is not present, repair wire 2006 from connector P911 socket 3 to connector P909 socket 5 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
(8) Connect connector P911 to DUMP BED UP/DOWN switch.
e143. M1090/M1094 DUMP BODY DOES NOT RAISE (CONT)

**KNOWN INFO**
- Hydraulic oil level OK.
- PTO OK.
- Circuit breaker CB50 OK.

**POSSIBLE PROBLEMS**
- Faulty auxiliary panel cable assembly.
- Faulty dashboard cable assembly.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, wire 2006 in auxiliary panel cable assembly is faulty. If continuity is present, wire 2006 in dashboard cable assembly is faulty.

---

10. Is continuity present from connector P909 socket 5 to connector J912 socket 1?

**CAUTION**
Read CAUTION on following page.

- NO
  - Repair wire 2006 from connector P909 socket 5 to connector J912 socket 1 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
  - YES
    - Repair wire 2006 from connector P912 pin 1 to circuit breaker CB50 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CAUTION
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

CONTINUITY TEST

1. Remove personnel heater assembly for access (para 18-9).
2. Disconnect connector J912 from P912.
3. Set multimeter to ohms.
4. Connect positive (+) probe of multimeter to connector P909 socket 5.
5. Connect negative (-) probe of multimeter to connector J912 socket 1 and note reading on multimeter.
6. If continuity is not present, repair wire 2006 from connector P909 socket 5 to connector J912 socket 1 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
7. If continuity is present, repair wire 2006 from connector P912 Pin 1 to circuit breaker CB50 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
8. Connect connector J912 to connector P912.
9. Install personnel heater (para 18-9).
10. Position auxiliary panel on auxiliary panel housing with six screws.
11. Tighten six screws to 24 lb-in (3N.m).
12. Connect batteries (para 7-57).
13. Lift dump body.
14. Place maintenance legs in stowed position.
15. Lower dump body.
16. Remove cargo sling from dump body lifting brackets.
17. Remove two dump body lifting brackets from dump body.
18. Position two locking pins in dump body.
19. Install safety pins in two locking pins.
e144. M1090/M1094 DUMP BODY DOES NOT LOWER

INITIAL SETUP

**Equipment Condition**
Engine shut down (TM 9-2320-366-10-1).

**Personnel Required**
(2)

**References**
TM 9-4910-571-12&P

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)
- Sling, Cargo (Item 31, Appendix C)
- Lifting Bracket, Dump Body (2) (Item E-24, Appendix E)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Socket Set, Socket Wrench (Item 34, Appendix C)

**Materials/Parts**
Wire, Elec, 50 ft (Item 71, Appendix D)

---

**NOTE**
Perform Electrical System Troubleshooting e1. Circuit Breaker Does Not Operate on circuit breaker CB50 prior to beginning this task.

---

**START**

1. **WARNING**

   **CAUTION**

   Read **WARNING** and **CAUTION** on following page.

   Is 24 VDC present at connector L9 socket 1?

   **NOTE**

   **POSSIBLE PROBLEMS**

   - Faulty dump body hydraulic system.
   - Faulty solenoid valve.
   - Faulty DUMP BED UP/DOWN switch.
   - Faulty auxiliary panel cable assembly.
   - Faulty M1090/M1094 dump cable assembly.
   - Faulty M1090/M1094 dump power cable assembly.
   - Faulty dashboard cable assembly.

   **TEST OPTIONS**

   Voltage Test or STE/ICE-R Test #89

   **REASON FOR QUESTION**

   This question eliminates possible problems and determines where troubleshooting continues.

   **GO TO**

   Go to step 5 of this fault.
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**CAUTION**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

**WARNING**

Wear appropriate eye protection when working under vehicle due to possibility of falling debris. Failure to comply may result in injury to personnel.

Dump body weighs approximately 3,030 lbs (1,376 kgs). Attach a suitable lifting device prior to lifting. Failure to comply may result in injury to personnel or damage to equipment.

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

---

**VOLTAGE TEST**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove safety pins from two locking pins.</td>
</tr>
<tr>
<td>2</td>
<td>Remove two lock pins from dump body.</td>
</tr>
<tr>
<td>3</td>
<td>Install two dump body lifting brackets in slots in dump body.</td>
</tr>
<tr>
<td>4</td>
<td>Attach cargo sling to two dump body lifting brackets.</td>
</tr>
<tr>
<td>5</td>
<td>Lift dump body.</td>
</tr>
<tr>
<td>6</td>
<td>Raise two maintenance legs on frame.</td>
</tr>
<tr>
<td>7</td>
<td>Lower dump body on maintenance legs.</td>
</tr>
<tr>
<td>8</td>
<td>Loosen screw on connector L9.</td>
</tr>
<tr>
<td>9</td>
<td>Disconnect connector L9 from solenoid valve.</td>
</tr>
<tr>
<td>10</td>
<td>Set multimeter to volts DC.</td>
</tr>
<tr>
<td>11</td>
<td>Connect positive (+) probe of multimeter to connector L9 socket 1.</td>
</tr>
<tr>
<td>12</td>
<td>Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>13</td>
<td>Press and hold DUMP BED UP/DOWN switch to DOWN (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>14</td>
<td>If 24 VDC is not present, go to step 5, of this fault.</td>
</tr>
</tbody>
</table>
e144. M1090/M1094 DUMP BODY DOES NOT LOWER (CONT)

2.

Is continuity present from connector L9 socket 2 to a known good ground?

NO

YES

Go to step 4 of this fault.

3.

Is continuity present from terminal 1 to terminal 2 on down solenoid?

NO

YES

Replace solenoid valve (para 7-142).

TEST OPTIONS

Continuity Test or STE/ICE-R Test #91

CAUTION

Read CAUTION on following page.

REASON FOR QUESTION

This question eliminates possible problems and determines where troubleshooting continues.

POSSIBLE PROBLEMS

Faulty dump body hydraulic system.
Faulty solenoid valve.
Faulty M1090/M1094 dump cable assembly.
Faulty M1090/M1094 dump power cable assembly.

POSSIBLE PROBLEMS

Faulty dump body hydraulic system.
Faulty solenoid valve.

KNOWN INFO

Hydraulic oil level OK.
PTO OK.
Circuit breaker CB50 OK.
DUMP BED UP/DOWN switch OK.
Dashboard cable assembly OK.
Auxiliary panel cable assembly OK.

Hydraulic oil level OK.
PTO OK.
Circuit breaker CB50 OK.
DUMP BED UP/DOWN switch OK.
Dashboard cable assembly OK.
Auxiliary panel cable assembly OK.
M1090/M1094 dump cable assembly OK.
M1090/M1094 dump power cable assembly OK.

M1090/M1094 dump cable assembly OK.
M1090/M1094 dump power cable assembly OK.

REFERENCE

TM 9-2320-366-20-2

Faulty dump body hydraulic system.
Faulty solenoid valve.
Faulty M1090/M1094 dump cable assembly.
Faulty M1090/M1094 dump power cable assembly.

Notify DS Maintenance to perform Dump Body Hydraulic System troubleshooting task k2. Dump Body Does Not Lower.
CONTINUITY TEST

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

**CAUTION**

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

### CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector L9 socket 2.
3. Connect negative (-) probe of multimeter to terminal 1 on down solenoid and note reading on multimeter.
4. If continuity is not present, go to step 4 of this fault.

### CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector L9 socket 2.
3. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
4. If continuity is not present, go to step 4 of this fault.
5. If continuity is present, notify DS Maintenance to perform Dump Body Hydraulic System troubleshooting task k2. Dump Body Does Not Lower.
6. Connect connector L9 to solenoid valve.
e144. M1090/M1094 DUMP BODY DOES NOT LOWER (CONT)

**KNOWN INFO**
- Hydraulic oil level OK.
- PTO OK.
- Circuit breaker CB50 OK.
- Auxiliary panel cable assembly OK.
- DUMP BED UP/DOWN switch OK.
- Dump body hydraulic system OK.

**POSSIBLE PROBLEMS**
- Faulty M1090/M1094 dump cable assembly.
- Faulty M1090/M1094 dump power cable assembly.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present, wire 3084 in M1090/M1094 dump power cable assembly is faulty. If continuity is present, wire 3084 in M1090/M1094 dump cable assembly is faulty.

**CAUTION**
Read CAUTION on following page.

4. Is continuity present from connector P172 socket H to a known good ground?

- **YES**
  - Repair wire 3084 from connector J172 pin H to connector L9 socket 2 (para 2-45) or replace M1090/M1094 dump cable assembly (para 7-124).

- **NO**
  - Repair wire 3084 from connector P172 socket H to terminal lug TL77 (para 2-45) or replace M1090/M1094 dump power cable assembly (para 7-125).
**CAUTION**

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

---

<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Disconnect connector P172 from connector J172.</td>
</tr>
<tr>
<td>(2) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to connector P172 socket H.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(5) If continuity is not present, repair wire 3084 from connector P172 socket H to terminal lug TL77 (para 2-45) or replace M1090/M1094 dump power cable assembly (para 7-125).</td>
</tr>
<tr>
<td>(6) If continuity is present, repair wire 3084 from connector J172 pin H to connector L9 socket 2 (para 2-45) or replace M1090/M1094 dump cable assembly (para 7-124).</td>
</tr>
<tr>
<td>(7) Connect connector P172 to connector J172.</td>
</tr>
<tr>
<td>(8) Connect connector L9 to solenoid valve.</td>
</tr>
<tr>
<td>(9) Tighten screw in connector L9.</td>
</tr>
<tr>
<td>(10) Lift dump body.</td>
</tr>
<tr>
<td>(11) Place maintenance legs in stowed position.</td>
</tr>
<tr>
<td>(12) Lower dump body.</td>
</tr>
<tr>
<td>(13) Remove cargo sling from two dump body lifting brackets.</td>
</tr>
<tr>
<td>(14) Remove two dump body lifting brackets from dump body.</td>
</tr>
<tr>
<td>(15) Position two locking pins in dump body.</td>
</tr>
<tr>
<td>(16) Install safety pin in two locking pins.</td>
</tr>
</tbody>
</table>
e144. M1090/M1094 DUMP BODY DOES NOT LOWER (CONT)

**KNOWN INFO**

- Hydraulic oil level OK.
- PTO OK.
- Circuit breaker CB50 OK.

**POSSIBLE PROBLEMS**

- Faulty DUMP BED UP/DOWN switch.
- Faulty auxiliary panel cable assembly.
- Faulty M1090/M1094 dump cable assembly.
- Faulty M1090/M1094 dump power cable assembly.
- Faulty dashboard cable assembly.

**REASON FOR QUESTION**

If 24 VDC is not present, wire 2006 is faulty.

**TEST OPTIONS**

- Voltage Test or STE/ICE-R Test #89

**WARNING**

Read WARNING and CAUTION on following page.

5. Is 24 VDC present at connector P911 socket 3?

**NO**

**YES**

Go to step 9 of this fault.
VOLTAGE TEST

(1) Connect connector L9 to solenoid valve.
(2) Tighten screw in connector L9.
(3) Remove six screws from auxiliary panel.
(4) Lift auxiliary panel outward to gain access.
(5) Remove PDP cover from PDP (para 16-2).
(6) Remove circuit breaker CB50 from PDP.
(7) Disconnect connector P911 from DUMP BED UP/DOWN switch connector.
(8) Set multimeter to volts DC.
(9) Connect positive (+) probe of multimeter to P911 socket 3.
(10) Connect negative (-) probe of multimeter to ground.
(11) Install circuit breaker CB50 in PDP and note reading on multimeter.
(12) If 24 VDC is not present, go to step 9 of this fault.
(13) Remove circuit breaker CB50 from PDP.
6. Replace DUMP BED UP/DOWN switch (para 7-18).

CAUTION
Read CAUTION on following page.

Is continuity present from terminal 3 to terminal 1 on DUMP BED UP/DOWN switch?

NO

YES

TEST OPTIONS
Continuity Test or STE/ICE-R Test #91

REASON FOR QUESTION
If continuity is not present, DUMP BED UP/DOWN switch is faulty.

KNOW INFO
Hydraulic oil level OK.
PTO OK.
Circuit breaker CB50 OK.
Dashboard cable assembly OK.

POSSIBLE PROBLEMS
Faulty DUMP BED UP/DOWN switch.
Faulty auxiliary panel cable assembly.
Faulty M1090/M1094 dump cable assembly.
Faulty M1090/M1094 dump power cable assembly.

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e144. M1090/M1094 DUMP BODY DOES NOT LOWER (CONT)
**CAUTION**

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to DUMP BED UP/DOWN switch terminal 3.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to DUMP BED UP/DOWN switch terminal 1.</td>
</tr>
<tr>
<td>(4) Press and hold DUMP BED UP/DOWN switch to DOWN and note reading on multimeter.</td>
</tr>
<tr>
<td>(5) If continuity is not present, replace DUMP BED UP/DOWN switch (para 7-18).</td>
</tr>
<tr>
<td>(6) Release DUMP BED UP/DOWN switch.</td>
</tr>
<tr>
<td>(7) Install circuit breaker CB50 in PDP.</td>
</tr>
</tbody>
</table>
e144. M1090/M1094 DUMP BODY DOES NOT LOWER (CONT)

Known Info

- Hydraulic oil level OK.
- PTO OK.
- Circuit breaker CB50 OK.
- Dashboard cable assembly OK.
- DUMP BED UP/DOWN switch OK.

Possible Problems

- Faulty auxiliary panel cable assembly.
- Faulty M1090/M1094 dump cable assembly.
- Faulty M1090/M1094 dump power cable assembly.

7. CAUTION
Read CAUTION on following page.

Is continuity present from connector J108 pin 7 to connector P911 socket 1?

Test Options

- Continuity Test or STE/ICE-R Test #91

Reason for Question

If continuity is not present, wire 2044 in auxiliary panel cable assembly is faulty.

YES

Repair wire 2044 from connector J108 pin 7 to connector P911 socket 1 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

NO
CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Disconnect batteries (para 7-57).</td>
</tr>
<tr>
<td>2</td>
<td>Remove kick panel (para 16-3).</td>
</tr>
<tr>
<td>3</td>
<td>Disconnect connector P108 from connector J108.</td>
</tr>
<tr>
<td>4</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>5</td>
<td>Connect positive (+) probe of multimeter to connector J108 pin 7.</td>
</tr>
<tr>
<td>6</td>
<td>Connect negative (-) probe of multimeter to connector P911 socket 1 and note reading on multimeter.</td>
</tr>
<tr>
<td>7</td>
<td>If continuity is not present, repair wire 2044 from connector J108 pin 7 to connector P911 socket 1 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).</td>
</tr>
<tr>
<td>8</td>
<td>Connect connector P911 to DUMP BED UP/DOWN switch.</td>
</tr>
<tr>
<td>9</td>
<td>Position auxiliary panel on auxiliary panel housing with six screws.</td>
</tr>
<tr>
<td>10</td>
<td>Tighten six screws to 24 lb-in. (3N.m).</td>
</tr>
</tbody>
</table>

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CAUTION
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.
### KNOWN INFO
- Hydraulic oil level OK.
- PTO OK.
- Circuit breaker CB50 OK.
- Dashboard cable assembly OK.
- DUMP BED UP/DOWN switch OK.
- Auxiliary panel cable assembly OK.

### POSSIBLE PROBLEMS
- Faulty M1090/M1094 dump cable assembly.
- Faulty M1090/M1094 dump power cable assembly.

### TEST OPTIONS
- Continuity Test or STE/ICE-R Test #91

### REASON FOR QUESTION
- If continuity is not present, wire 2044 in dump power cable assembly is faulty.
- If continuity is present, wire 2044 in dump cable assembly is faulty.

---

**8.** Is continuity present from connector P172 socket G to connector P108 socket 7?

- **NO**
  - Repair wire 2044 from connector P172 socket G to connector P108 socket 7 (para 2-45) or replace M1090/M1094 dump power cable assembly (para 7-125).

- **YES**
  - Repair wire 2044 from connector J172 pin G to connector L9 socket 1 (para 2-45) or replace M1090/M1094 dump cable assembly (para 7-124).
CONTINUITY TEST

1. Disconnect connector P172 from connector J172.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter to connector P172 socket G.
4. Connect negative (-) probe of multimeter to connector P108 socket 7 and note reading on multimeter.
5. If continuity is not present, repair wire 2044 from connector P172 socket G to connector P108 socket 7 (para 2-45) or replace M1090/M1094 dump power cable assembly (para 7-125).
6. If continuity is present, repair wire 2044 from connector J172 pin G to connector L9 socket 1 (para 2-45) or replace M1090/M1094 dump cable assembly (para 7-124).
7. Connect connector P172 to connector J172.
9. Install kick panel (para 16-3).
10. Connect batteries (para 7-57).
11. Lift dump body.
12. Place maintenance legs in stowed position.
13. Lower dump body.
14. Remove cargo sling from dump body lifting brackets.
15. Remove two dump body lifting brackets from dump body.
16. Position two locking pins in dump body.
17. Install safety pin in two locking pins.

CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

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Change 1 2-1502.3
Test Options
Continuity Test or STE/ICE-R Test #91

Reason for Question
If continuity is not present, wire 2006 in auxiliary panel cable assembly is faulty.

9. CAUTION
Read CAUTION on following page.

Is continuity present from connector P911 socket 3 to connector P909 socket 5?

If NO, wire 2006 in auxiliary panel cable assembly is faulty.

If YES, repair wire 2006 from connector P911 socket 3 to connector P909 socket 5 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

Known Info
- Hydraulic oil level OK.
- PTO OK.
- Circuit breaker CB50 OK.

Possible Problems
- Faulty auxiliary panel cable assembly.
- Faulty dashboard cable assembly.
CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Install circuit breaker CB50 in PDP.</td>
</tr>
<tr>
<td>2</td>
<td>Install PDP cover on PDP (para 16-2).</td>
</tr>
<tr>
<td>3</td>
<td>Disconnect batteries (para 7-57).</td>
</tr>
<tr>
<td>4</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>5</td>
<td>Connect positive (+) probe of multimeter to connector P911 socket 3.</td>
</tr>
<tr>
<td>6</td>
<td>Connect negative (-) probe of multimeter to connector P909 socket 5 and note reading on multimeter.</td>
</tr>
<tr>
<td>7</td>
<td>If continuity is not present, repair wire 2006 from connector P911 socket 3 to (para 2-45) connector P909 socket 5 or replace auxiliary panel cable assembly (para 7-58).</td>
</tr>
<tr>
<td>8</td>
<td>Connect connector P911 to DUMP BED UP/DOWN switch.</td>
</tr>
</tbody>
</table>

CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.
10. CAUTION
Read CAUTION on following page.

Is continuity present from connector P909 socket 5 to connector J912 socket 1?

**NO**

- Repair wire 2006 from connector P909 socket 5 to connector J912 socket 1 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

**YES**

- Repair wire 2006 from connector P912 pin 1 to circuit breaker CB50 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, wire 2006 in auxiliary panel cable assembly is faulty. If continuity is present, wire 2006 in dashboard cable assembly is faulty.

**KNOWN INFO**
- Hydraulic oil level OK.
- PTO OK.
- Circuit breaker CB50 OK.

**POSSIBLE PROBLEMS**
- Faulty auxiliary panel cable assembly.
- Faulty dashboard cable assembly.
CONTINUITY TEST

(1) Remove personnel heater assembly for access (para 18-9).
(2) Disconnect connector J912 from P912.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to connector P909 socket 5.
(5) Connect negative (-) probe of multimeter to connector J912 socket 1 and note reading on multimeter.
(6) If continuity is not present, repair wire 2006 from connector P909 socket 5 to connector J912 socket 1 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
(7) If continuity is present, repair wire 2006 from connector P912 pin 1 to circuit breaker CB50 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
(8) Connect connector J912 to connector P912.
(9) Install personnel heater (para 18-9).
(10) Position auxiliary panel on auxiliary panel housing with six screws.
(11) Tighten six screws to 24 lb-in (3N.m).
(12) Connect batteries (para 7-57).
(13) Lift dump body.
(14) Place maintenance legs in stowed position.
(15) Lower dump body.
(16) Remove cargo sling from dump body lifting brackets.
(17) Remove two dump body lifting brackets from dump body.
(18) Position two locking pins in dump body.
(19) Install safety pins in two locking pins.
1. **START**

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
Voltage Test or STE/ICE-R #89

**REASON FOR QUESTION**
If 24 vdc is not present, wire 1806 is faulty.

**KNOWLEDGE INFO**
Engine fan operates normally.

**POSSIBLE PROBLEMS**
Faulty dashboard cable assembly.
Faulty relay K15.

**IS 24 vdc present at relay K15 terminal 86?**

**YES**
Repair wire 1806 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

**NO**
### WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Remove PDP cover (para 16-2).</td>
</tr>
<tr>
<td>2. Remove relay K15 from PDP.</td>
</tr>
<tr>
<td>3. Set multimeter to volts dc.</td>
</tr>
<tr>
<td>4. Connect positive (+) probe of multimeter to PDP, where relay K15 terminal 86 was removed.</td>
</tr>
<tr>
<td>5. Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>6. Position master power switch to on (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>7. Position radiator fan off switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>8. If 24 vdc is not present, repair wire 1806 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
</tbody>
</table>
2. Is continuity present between relay K15 terminal 85 and a known good ground?

- **YES**
  - Repair wire 3012 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
  - Replace relay K15 (para 7-9).

- **NO**
  - If continuity is not present, wire 3012 is faulty. If continuity is present, relay K15 is faulty.
## CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to PDP, where relay K15 terminal 85 was removed.
3. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
4. If continuity is not present, repair wire 3012 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
5. If continuity is present, replace relay K15 (para 7-9).
6. Install relay K15 in PDP.
7. Install PDP cover (para 16-2).
1. Is vehicle equipped with PTO?

- **NO**
  - This question eliminates possible problems and determines where troubleshooting continues.

- **YES**
  - Go to step 10 of this fault.

**KNOWN INFO**
- Engine starts.
- Circuit breaker OK.

**POSSIBLE PROBLEMS**
- Faulty PTO cable assembly.
- Faulty dashboard cable assembly.
- Faulty relay K15.
- Faulty auxiliary panel cable assembly.
- Faulty oil cooler fan cable assembly.
- Faulty transmission auxiliary oil cooler fan.

**TEST OPTIONS**
- Visual inspection
- **REASON FOR QUESTION**
  - This question eliminates possible problems and determines where troubleshooting continues.

**INITIAL SETUP**

**Equipment Condition**
- Engine shut down (TM 9-2320-366-10-1).

**Personnel Required**
- 2

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)

**References**
- TM 9-4910-571-12&P
(1) Check if vehicle is equipped with PTO.
(2) If vehicle is not equipped with PTO, go to step 10 of this fault.
2. Is 24 vdc present at connector J209-1?

- YES: Go to step 4 of this fault.
- NO: This question eliminates possible problems and determines where troubleshooting continues.

3. Is continuity present at connector J209-2 to ground?

- YES: Go to step 9 of this fault.

Replace transmission auxiliary oil cooler fan (para 8-19 or 8-21).
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

### VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove PDP cover (para 16-2).</td>
</tr>
<tr>
<td>2</td>
<td>Remove circuit breaker CB22 from PDP.</td>
</tr>
<tr>
<td>3</td>
<td>Disconnect connector J209 from transmission auxiliary oil cooler fan connector.</td>
</tr>
<tr>
<td>4</td>
<td>Set multimeter to volts dc.</td>
</tr>
<tr>
<td>5</td>
<td>Connect positive (+) probe of multimeter to connector J209-1.</td>
</tr>
<tr>
<td>6</td>
<td>Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>7</td>
<td>Start engine (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>8</td>
<td>If 24 vdc is not present, go to step 4 of this fault.</td>
</tr>
<tr>
<td>9</td>
<td>Shut down engine (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>

### CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>2</td>
<td>Connect positive (+) probe of multimeter to connector J209-2.</td>
</tr>
<tr>
<td>3</td>
<td>Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>4</td>
<td>If continuity is not present, go to step 9 of this fault.</td>
</tr>
<tr>
<td>5</td>
<td>If continuity is present, replace transmission auxiliary oil cooler fan (para 8-19 or 8-21).</td>
</tr>
<tr>
<td>6</td>
<td>Connect connector J209 to transmission auxiliary oil cooler fan connector.</td>
</tr>
<tr>
<td>7</td>
<td>Install circuit breaker CB22 in PDP.</td>
</tr>
<tr>
<td>8</td>
<td>Install PDP cover (para 16-2).</td>
</tr>
</tbody>
</table>
e146. TRANSMISSION AUXILIARY OIL COOLER FAN DOES NOT OPERATE (ALL MODELS EXCEPT M1088/ M1089) (CONT)

### KNOWN INFO
- Engine starts.
- Circuit breaker OK.
- Transmission auxiliary oil cooler fan OK.

### POSSIBLE PROBLEMS
- Faulty dashboard cable assembly.
- Faulty relay K15.
- Faulty auxiliary panel cable assembly.
- Faulty oil cooler fan cable assembly.
- Faulty PTO cable assembly.

### WARNING
Read WARNING on following page.

4. Is 24 vdc present at relay K15 socket 30?

- **NO**
- **YES**

  **YES**
  - Repair wire 1808 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

- **NO**

### TEST OPTIONS
- Voltage Test or STE/ICE-R #89

### REASON FOR QUESTION
If 24 vdc is not present, wire 1808 is faulty.

---

5. Is continuity present across relay K15 from pin 30 to 87A?

- **NO**
- **YES**

  **YES**
  - Replace relay K15 (para 7-9).

- **NO**

### TEST OPTIONS
- Continuity Test or STE/ICE-R #91

### REASON FOR QUESTION
If continuity is not present, relay K15 is faulty.

---
WARNING
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove relay K15 from PDP.</td>
</tr>
<tr>
<td>(2) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to relay K15 socket 30.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(5) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(6) If 24 vdc is not present, repair wire 1808 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
<tr>
<td>(7) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(8) Install circuit breaker CB22 in PDP.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to relay K15 pin 30.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to relay K15 pin 87A and note reading on multimeter.</td>
</tr>
<tr>
<td>(4) If continuity is not present, replace relay K15 (para 7-9).</td>
</tr>
</tbody>
</table>
146. TRANSMISSION AUXILIARY OIL COOLER FAN DOES NOT OPERATE (ALL MODELS EXCEPT M1088/M1089) (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine starts.</td>
</tr>
<tr>
<td>Circuit breaker OK.</td>
</tr>
<tr>
<td>Transmission auxiliary oil cooler fan OK.</td>
</tr>
<tr>
<td>Relay K15 OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty dashboard cable assembly.</td>
</tr>
<tr>
<td>Faulty auxiliary panel cable assembly.</td>
</tr>
<tr>
<td>Faulty oil cooler fan cable assembly.</td>
</tr>
<tr>
<td>Faulty PTO cable assembly.</td>
</tr>
</tbody>
</table>

6. Is continuity present from relay K15 from socket 87A to connector P912-15?

   NO

   YES

   Repair wire 1811 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE-R #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, wire 1811 is faulty.</td>
</tr>
</tbody>
</table>
CONTINUITY TEST

(1) Remove personnel heater to gain access (para 18-9).
(2) Disconnect connector P912 from connector J912.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to relay K15 socket 87A.
(5) Connect negative (-) probe of multimeter to connector P912-15 and note reading on multimeter.
(6) If continuity is not present, repair wire 1811 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
(7) Install relay K15 in PDP.
**146. TRANSMISSION AUXILIARY OIL COOLER FAN DOES NOT OPERATE (ALL MODELS EXCEPT M1088/M1089) (CONT)**

### KNOWN INFO
- Engine starts.
- Circuit breaker OK.
- Transmission auxiliary oil cooler fan OK.
- Relay K15 OK.
- Dashboard cable assembly OK.

### POSSIBLE PROBLEMS
- Faulty auxiliary panel cable assembly.
- Faulty oil cooler fan cable assembly.
- Faulty PTO cable assembly.

### TEST OPTIONS
- Continuity Test or STE/ICE-R #91

### REASON FOR QUESTION
- If continuity is not present, wire 1811 in auxiliary panel cable assembly is faulty.

**7. Is continuity present from connector J912-15 to connector J210-1?**

- **YES**
  - Repair wire 1811 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

- **NO**
CONTINUITY TEST

(1) Disconnect connector P210 from connector J210.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to connector J912-15.
(4) Connect negative (-) probe of multimeter to connector J210-1 and note reading on multimeter.
(5) If continuity is not present, repair wire 1811 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
(6) Connect connector P210 to connector J210.
(7) Connect connector P912 to connector J912.
(8) Install personnel heater (para 18-9).
8. Is continuity present from connector P209B-1 to connector J209-1?

- **NO**
  - If continuity is not present, wire 1811 in oil cooler fan cable assembly is faulty.
  - If continuity is present, wire 1811 in PTO cable assembly is faulty.
- **YES**
  - Repair wire 1811 (para 2-45) or replace oil cooler fan cable assembly (para 7-136).

9. Is continuity present from connector P209B-2 to connector J209-2?

- **NO**
  - Repair wire 3013 (para 2-45) or replace oil cooler fan cable assembly (para 7-136).
- **YES**
  - Repair wire 3013 (para 2-45) or replace PTO cable assembly (para 7-127).
## CONTINUITY TEST

1. Disconnect connector P209B from connector J209B.
2. Disconnect connector J209 from transmission auxiliary oil cooler fan connector.
3. Set multimeter to ohms.
4. Connect positive (+) probe of multimeter to connector P209B-1.
5. Connect negative (-) probe of multimeter to connector J209-1 and note reading on multimeter.
6. If continuity is not present, repair wire 1811 (para 2-45) or replace oil cooler fan cable assembly (para 7-136).
7. If continuity is present, repair wire 1811 (para 2-45) or replace PTO cable assembly (para 7-127).
8. Connect connector J209 to transmission auxiliary oil cooler fan connector.
9. Connect connector P209B to connector J209B.

---

## CONTINUITY TEST

1. Disconnect connector P209B from connector J209B.
2. Disconnect connector J209 from transmission auxiliary oil cooler fan connector.
3. Set multimeter to ohms.
4. Connect positive (+) probe of multimeter to connector P209B-2.
5. Connect negative (-) probe of multimeter to connector J209-2 and note reading on multimeter.
6. If continuity is not present, repair wire 3013 (para 2-45) or replace oil cooler fan cable assembly (para 7-136).
7. If continuity is present, repair wire 3013 (para 2-45) or replace PTO cable assembly (para 7-127).
8. Connect connector J209 to transmission auxiliary oil cooler fan connector.
9. Connect connector P209B to connector J209B.
146. TRANSMISSION AUXILIARY OIL COOLER FAN DOES NOT OPERATE (ALL MODELS EXCEPT M1088/M1089) (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine starts.</td>
</tr>
<tr>
<td>Circuit breaker OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty dashboard cable assembly.</td>
</tr>
<tr>
<td>Faulty relay K15.</td>
</tr>
<tr>
<td>Faulty oil cooler fan cable assembly.</td>
</tr>
<tr>
<td>Faulty transmission auxiliary oil cooler fan.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read WARNING on following page.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Test or STE/ICE-R #89</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>This question eliminates possible problems and determines where troubleshooting continues.</td>
</tr>
</tbody>
</table>

**10.**

Is 24 vdc present at connector J209-1?

- **NO**
  - Go to step 12 of this fault.

- **YES**
  - **Go to step 12 of this fault.**

**11.**

Is continuity present at connector J209-2 to ground?

- **NO**
  - If continuity is not present, wire 3013 in oil cooler fan cable assembly is faulty. If continuity is present, transmission auxiliary oil cooler fan is faulty.
  - Replace transmission auxiliary oil cooler fan (para 8-19 or 8-21).

- **YES**
  - Repair wire 3013 (para 2-45) or replace oil cooler fan cable assembly (para 7-136).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

VOLTAGE TEST

(1) Remove PDP cover (para 16-2).
(2) Remove circuit breaker CB22 from PDP.
(3) Disconnect connector J209 from transmission auxiliary oil cooler fan connector.
(4) Set multimeter to volts dc.
(5) Connect positive (+) probe of multimeter to connector J209-1.
(6) Connect negative (-) probe of multimeter to ground.
(7) Start engine (TM 9-2320-366-10-1) and note reading on multimeter.
(8) If 24 vdc is not present, go to step 12 of this fault.
(9) Shut down engine (TM 9-2320-366-10-1).

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector J209-2.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, repair wire 3013 (para 2-45) or replace oil cooler fan cable assembly (para 7-136).
(5) If continuity is present, replace transmission auxiliary oil cooler fan (para 8-19 or 8-21).
(6) Connect connector J209 to transmission auxiliary oil cooler fan connector.
(7) Install circuit breaker CB22 in PDP.
(8) Install PDP cover (para 16-2).
**146. TRANSMISSION AUXILIARY OIL COOLER FAN DOES NOT OPERATE (ALL MODELS EXCEPT M1088/ M1089) (CONT)**

**KNOWN INFO**
- Engine starts.
- Circuit breaker OK.
- Transmission auxiliary oil cooler fan OK.

**POSSIBLE PROBLEMS**
- Faulty dashboard cable assembly.
- Faulty relay K15.
- Faulty oil cooler fan cable assembly.

**REASON FOR QUESTION**
- Voltage Test or STE/ICE-R #89

**TEST OPTIONS**
- If 24 vdc is not present, wire 1808 is faulty.

---

**12.**
- Is 24 vdc present at relay K15 socket 30?

**YES**
- Repair wire 1808 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

**NO**
- Faulty dashboard cable assembly.
- Faulty relay K15.
- Faulty oil cooler fan cable assembly.

---

**13.**
- Is continuity present across relay K15 from pin 30 to 87A?

**YES**
- Replace relay K15 (para 7-9).

**NO**
- Faulty relay K15.
- Faulty dashboard cable assembly.
- Faulty oil cooler fan cable assembly.
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
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<tr>
<th><strong>VOLTAGE TEST</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove relay K15 from PDP.</td>
</tr>
<tr>
<td>(2) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to relay K15 socket 30.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(5) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(6) If 24 vdc is not present, repair wire 1808 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
<tr>
<td>(7) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(8) Install circuit breaker CB22 in PDP.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>CONTINUITY TEST</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to relay K15 pin 30.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to relay K15 pin 87A and note reading on multimeter.</td>
</tr>
<tr>
<td>(4) If continuity is not present, replace relay K15 (para 7-9).</td>
</tr>
</tbody>
</table>
14. TRANSMISSION AUXILIARY OIL COOLER FAN DOES NOT OPERATE (ALL MODELS EXCEPT M1088/ M1089) (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine starts.</td>
</tr>
<tr>
<td>Circuit breaker OK.</td>
</tr>
<tr>
<td>Transmission auxiliary oil cooler fan OK.</td>
</tr>
<tr>
<td>Relay K15 OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty dashboard cable assembly.</td>
</tr>
<tr>
<td>Faulty oil cooler fan cable assembly.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE-R #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, wire 1811 in dashboard cable assembly is faulty.</td>
</tr>
<tr>
<td>If continuity is present, wire 1811 in oil cooler fan cable assembly is faulty.</td>
</tr>
</tbody>
</table>

14. Is continuity present from relay K15 from socket 87A to connector P912A-15?

- **YES**
  - Repair wire 1811 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

- **NO**
  - Repair wire 1811 (para 2-45) or replace oil cooler fan cable assembly (para 7-136).
### CONTINUITY TEST

1. Remove personnel heater to gain access (para 18-9).
2. Disconnect connector P912A from connector J912.
3. Set multimeter to ohms.
4. Connect positive (+) probe of multimeter to relay K15 socket 87A.
5. Connect negative (-) probe of multimeter to connector P912A-15 and note reading on multimeter.
6. If continuity is not present, repair wire 1811 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
7. If continuity is present, repair wire 1811 (para 2-45) or replace oil cooler fan cable assembly (para 7-136).
8. Install relay K15 in PDP.
10. Install personnel heater (para 18-9).
**INITIAL SETUP**

<table>
<thead>
<tr>
<th>Equipment Condition</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1).</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td>Personnel Required</td>
<td>STE/ICE-R (Item 41, Appendix C)</td>
</tr>
<tr>
<td>(2)</td>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
</tr>
</tbody>
</table>

References

TM 9-4910-571-12&P

---

**KNOWN INFO**

<table>
<thead>
<tr>
<th>Engine starts. Circuit breaker OK.</th>
</tr>
</thead>
</table>

**POSSIBLE PROBLEMS**

- Faulty PTO cable assembly.
- Faulty transmission auxiliary oil cooler fan.
- Faulty dashboard cable assembly.
- Faulty relay K15.
- Faulty auxiliary panel cable assembly.
- Faulty oil cooler fan cable assembly.

**TEST OPTIONS**

<table>
<thead>
<tr>
<th>Visual inspection</th>
</tr>
</thead>
</table>

**REASON FOR QUESTION**

This question eliminates possible problems and determines where troubleshooting continues.

1. Does one fan motor operate?

**START**

- **YES**
  - Go to step 4 of this fault.
- **NO**
<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove PDP cover (para 16-2).</td>
</tr>
<tr>
<td>(2) Remove circuit breaker CB22 from PDP.</td>
</tr>
<tr>
<td>(3) Start engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(4) If both transmission auxiliary oil cooler fan motors do not operate, go to step 4 of this fault.</td>
</tr>
<tr>
<td>(5) Shut down engine (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
### e147. M1088/M1089 Transmission Auxiliary Oil Cooler Fan Does Not Operate (Cont)

#### WARNING
Read WARNING on following page.

#### TEST OPTIONS
- Voltage Test or STE/ICE-R #89

#### REASON FOR QUESTION
If 24 VDC is not present, wire 1811 is faulty.

#### KNOWN INFO
- Engine starts.
- Circuit breaker OK.
- Dashboard cable assembly OK.
- Relay K15 OK.
- Auxiliary panel cable assembly OK.
- Oil cooler fan cable assembly OK.

#### POSSIBLE PROBLEMS
- Faulty PTO cable assembly.
- Faulty transmission auxiliary oil cooler fan.

---

2. Is 24 VDC present at connector P209A or P209B pin 1?

- NO
  - Engine starts.
  - Circuit breaker OK.
  - Dashboard cable assembly OK.
  - Relay K15 OK.
  - Auxiliary panel cable assembly OK.
  - Oil cooler fan cable assembly OK.

- YES
  - Repair wire 1811 (para 2-45) or replace PTO cable assembly (para 7-127).
WARNING
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Disconnect connector clamp from connector J209.</td>
</tr>
<tr>
<td>(2) Disconnect connector P209A or P209B from connector J209.</td>
</tr>
<tr>
<td>(3) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter to connector P209A or P209B pin 1.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(6) Start engine (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If 24 vdc is not present, repair wire 1811 (para 2-45) or replace PTO cable assembly (para 7-127).</td>
</tr>
<tr>
<td>(8) Shut down engine (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
3. Is continuity present at connector P209A or P209B pin 2 to ground?

- YES
  - Repair wire 3013 (para 2-45) or replace PTO cable assembly (para 7-127).

- NO
  - If continuity is not present, wire 3013 is faulty.

**KNOWN INFO**
- Engine starts.
- Circuit breaker OK.
- Dashboard cable assembly OK.
- Relay K15 OK.
- Auxiliary panel cable assembly OK.
- Oil cooler fan cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty PTO cable assembly.
- Faulty transmission auxiliary oil cooler fan.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, wire 3013 is faulty.

**Replace transmission auxiliary oil cooler fan (para 8-20).**
CONTINUITY TEST

1. Set multimeter to volts dc.
2. Connect positive (+) probe of multimeter to connector P209A or P209B pin 2.
3. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
4. If continuity is not present, repair wire 3013 (para 2-45) or replace PTO cable assembly (para 7-127).
5. If continuity is present, replace transmission auxiliary oil cooler fan (para 8-20).
6. Connect connector P209A or P209B to transmission auxiliary oil cooler fan connector.
7. Connect connector clamp to connector J209.
8. Install circuit breaker CB22 in PDP.
9. Install PDP cover (para 16-2).
4. **WARNING**
   Read WARNING on following page.

   **TEST OPTIONS**
   Voltage Test or
   STE/ICE-R #89

   **REASON FOR QUESTION**
   If 24 vdc is not present, wire 1808 is faulty.

   **POSSIBLE PROBLEMS**
   Is 24 vdc present at relay K15 socket 30?

   **YES**
   Repair wire 1808 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

   **NO**

5. **TEST OPTIONS**
   Continuity Test or
   STE/ICE-R #91

   **REASON FOR QUESTION**
   If continuity is not present, relay K15 is faulty.

   **POSSIBLE PROBLEMS**
   Is continuity present across relay K15 from pin 30 to 87A?

   **YES**
   Replace relay K15 (para 7-9).

   **NO**

   **KNOWN INFO**
   Engine starts.
   Circuit breaker OK.
   Transmission auxiliary oil cooler fan OK.

   **KNOWN INFO**
   Engine starts.
   Circuit breaker OK.
   Transmission auxiliary oil cooler fan OK.

   **POSSIBLE PROBLEMS**
   Faulty dashboard cable assembly.
   Faulty relay K15.
   Faulty auxiliary panel cable assembly.
   Faulty PTO cable assembly.
   Faulty oil cooler fan cable assembly.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

VOLTAGE TEST

(1) Install circuit breaker CB22 in PDP.
(2) Remove relay K15 from PDP.
(3) Set multimeter to volts dc.
(4) Connect positive (+) probe of multimeter to relay K15 socket 30.
(5) Connect negative (-) probe of multimeter to ground.
(6) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
(7) If 24 vdc is not present, repair wire 1808 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
(8) Position master power switch to off (TM 9-2320-366-10-1).

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to relay K15 pin 30.
(3) Connect negative (-) probe of multimeter to relay K15 pin 87A and note reading on multimeter.
(4) If continuity is not present, replace relay K15 (para 7-9).
6. Is vehicle an M1088 W/O winch?

**KNOWN INFO**
Engine starts.
Circuit breaker OK.
Transmission auxiliary oil cooler fan OK.
Relay K15 OK.

**POSSIBLE PROBLEMS**
Faulty dashboard cable assembly.
Faulty auxiliary panel cable assembly.
Faulty PTO cable assembly.
Faulty oil cooler fan cable assembly.

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
This question eliminates possible problems and determines where to continue troubleshooting.

**YES**
Go to step 7 of this fault.

**NO**
Go to step 9 of this fault.

7. Is continuity present from relay K15 from socket 87A to connector P912-15?

**KNOWN INFO**
Engine starts.
Circuit breaker OK.
Transmission auxiliary oil cooler fan OK.
Relay K15 OK.
Oil cooler fan cable assembly OK.

**POSSIBLE PROBLEMS**
Faulty dashboard cable assembly.
Faulty auxiliary panel cable assembly.
Faulty PTO cable assembly.

**TEST OPTIONS**
Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
If continuity is not present, wire 1811 is faulty.

**YES**
Repair wire 1811 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

**NO**
Go to step 9 of this fault.
CONTINUITY TEST

1. Check if vehicle is M1088 W/O winch.
2. If vehicle is not an M1088 W/O winch, go to step 7 of this fault.
3. If vehicle is an M1088 W/O winch, go to step 9 of this fault.
4. Remove personnel heater for access (para 18-9).
5. Disconnect connector P912 from connector J912.
6. Set multimeter to ohms.
7. Connect positive (+) probe of multimeter to relay K15 socket 87A.
8. Connect negative (-) probe of multimeter to connector P912-15 and note reading on multimeter.
9. If continuity is not present, repair wire 1811 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
10. Install relay K15 in PDP.
147. M1088/M1089 TRANSMISSION AUXILIARY OIL COOLER FAN DOES NOT OPERATE (CONT)

**KNOWN INFO**
- Engine starts.
- Circuit breaker OK.
- Transmission auxiliary oil cooler fan OK.
- Relay K15 OK.
- Dashboard cable assembly OK.
- Oil cooler fan cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty auxiliary panel cable assembly.
- Faulty PTO cable assembly.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, wire 1811 in auxiliary panel cable assembly is faulty. If continuity is present, wire 1811 in PTO cable assembly is faulty.

8. Is continuity present from connector J912-15 to connector J210-1?

**YES**
- Repair wire 1811 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).

**NO**
- Repair wire 1811 (para 2-45) or replace PTO cable assembly (para 7-127).
CONTINUITY TEST

(1) Disconnect connector P210 from connector J210.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to connector J912-15.
(4) Connect negative (-) probe of multimeter to connector J210-1 and note reading on multimeter.
(5) If continuity is not present, repair wire 1811 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
(6) If continuity is present, repair wire 1811 (para 2-45) or replace PTO cable assembly (para 7-127).
(7) Connect connector P210 to connector J210.
(8) Connect connector P912 to connector J912.
(9) Install personnel heater (para 18-9).
**147. M1088/M1089 TRANSMISSION AUXILIARY OIL COOLER FAN DOES NOT OPERATE (CONT)**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine starts.</td>
</tr>
<tr>
<td>Circuit breaker OK.</td>
</tr>
<tr>
<td>Transmission auxiliary oil cooler fan OK.</td>
</tr>
<tr>
<td>Relay K15 OK.</td>
</tr>
<tr>
<td>Auxiliary panel cable assembly OK.</td>
</tr>
<tr>
<td>PTO cable assembly OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty auxiliary panel cable assembly.</td>
</tr>
<tr>
<td>Faulty oil cooler fan cable assembly.</td>
</tr>
</tbody>
</table>

**9. Is continuity present from relay K15 socket 87A to connector P912A-15?**

- **NO**
  - **TEST OPTIONS**
    - Continuity Test or STE/ICE-R #91
    - **REASON FOR QUESTION**
      - If continuity is not present, wire 1811A in dashboard cable assembly is faulty.
      - If continuity is present, wire 1811A in oil cooler fan cable assembly is faulty.

- **YES**
  - **REPAIR WIRING/REPLACE COMPONENTS**
    - **Repair wire 1811A (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).**
    - **Repair wire 1811A (para 2-45) or replace oil cooler fan cable assembly (para 7-136).**
CONTINUITY TEST

(1) Remove kick panel (para 16-3).
(2) Disconnect connector P912A from connector J912.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to connector P912A-15.
(5) Connect negative (-) probe of multimeter to relay K15 socket 87A and note reading on multimeter.
(6) If continuity is not present, repair wire 1811A (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
(7) If continuity is present, repair wire 1811A (para 2-45) or replace oil cooler fan cable assembly (para 7-136).
(8) Connect connector P912A to connector J912.
(9) Install kick panel (para 16-3).
**e148. M1088/M1089 WORKLIGHTS DO NOT ILLUMINATE**

### INITIAL SETUP

**Equipment Condition**
Engine shut down (TM 9-2320-366-10-1).

**Personnel Required**
(2)

**Material/Parts**
Wire, Elect, 50 ft (Item 71, Appendix D)

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Wrench, Torque, 0-200 lb-in (Item 59, Appendix C)

**References**
TM 9-4910-571-12&P

---

**NOTE**
Perform Electrical System Troubleshooting
e1. Circuit Breaker Does Not Operate on
circuit breakers CB71, CB72, and CB74
prior to beginning this task.

---

**KNOWLEDGE INFO**
- Circuit breakers CB71, CB72, and CB74 OK.
- Hazard lights illuminate.
- Light bulb OK.

**POSSIBLE PROBLEMS**
- Faulty worklights switch.
- Faulty dashboard cable assembly.
- Faulty relay K12.
- Faulty auxiliary panel cable assembly.
- Faulty diode D2B.
- Faulty relay K9.

---

**TEST OPTIONS**
- Voltage Test or
- STE/ICE-R Test #89

**REASON FOR QUESTION**
This question eliminates possible faults and
determines where troubleshooting continues.

---

**START**

1. Is 12 VDC present at connector P905 socket 5?

**WARNING CAUTION**
Read WARNING and CAUTION on following page.

**NO**

**YES**

Go to step 7 of this fault.
(1) Remove six screws from auxiliary panel.
(2) Lift auxiliary panel from auxiliary panel housing to gain access.
(3) Disconnect connector P905 from worklights switch.
(4) Set multimeter to volts DC.
(5) Connect positive (+) probe of multimeter to connector P905 socket 5.
(6) Connect negative (-) probe of multimeter to ground.
(7) Position main light switch to STOP LIGHT (TM 9-2320-366-10-1) and note reading on multimeter.
(8) If 12 VDC is not present, go to step 7 of this fault.
(9) Position main light switch to OFF (TM 9-2320-366-10-1).

WARNING
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

CAUTION
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove six screws from auxiliary panel.</td>
</tr>
<tr>
<td>(2) Lift auxiliary panel from auxiliary panel housing to gain access.</td>
</tr>
<tr>
<td>(3) Disconnect connector P905 from worklights switch.</td>
</tr>
<tr>
<td>(4) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(5) Connect positive (+) probe of multimeter to connector P905 socket 5.</td>
</tr>
<tr>
<td>(6) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(7) Position main light switch to STOP LIGHT (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(8) If 12 VDC is not present, go to step 7 of this fault.</td>
</tr>
<tr>
<td>(9) Position main light switch to OFF (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>

NOTE
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

CAUTION
Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

WARNING
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CAUTION
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NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove six screws from auxiliary panel.</td>
</tr>
<tr>
<td>(2) Lift auxiliary panel from auxiliary panel housing to gain access.</td>
</tr>
<tr>
<td>(3) Disconnect connector P905 from worklights switch.</td>
</tr>
<tr>
<td>(4) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(5) Connect positive (+) probe of multimeter to connector P905 socket 5.</td>
</tr>
<tr>
<td>(6) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(7) Position main light switch to STOP LIGHT (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(8) If 12 VDC is not present, go to step 7 of this fault.</td>
</tr>
<tr>
<td>(9) Position main light switch to OFF (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
e148. M1088/M1089 WORKLIGHTS DO NOT ILLUMINATE (CONT)

**KNOWN INFO**
- Circuit breakers CB71, CB72, and CB74 OK.
- Hazard lights illuminate.
- Light bulb OK.
- Auxiliary panel cable assembly OK.
- Relay K9 OK.
- Diode D2B OK.

**POSSIBLE PROBLEMS**
- Faulty worklights switch.
- Faulty dashboard cable assembly.
- Faulty relay K12.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, worklights switch is faulty.

2. Is continuity present from worklight switch terminal 1 to terminal 5?

**FLOW CHART**
- **NO**
  - Replace worklights switch (para 7-18).
- **YES**
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to worklights switch terminal 1.
(3) Connect negative (-) probe of multimeter to worklights switch terminal 5.
(4) Position worklights switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
(5) If continuity is not present, replace worklights switch (para 7-18).
(6) Connect connector P905 to worklights switch.
(7) Position auxiliary panel on auxiliary panel housing with six screws.
(8) Tighten six screws to 24 lb-in. (3 N·m).
e148. M1088/M1089 WORKLIGHTS DO NOT ILLUMINATE (CONT)

**KNOWN INFO**
- Circuit breakers CB71, CB72, and CB74 OK.
- Hazard lights illuminate.
- Light bulb OK.
- Auxiliary panel cable assembly OK.
- Relay K9 OK.
- Diode D2B OK.
- Worklights switch OK.

**POSSIBLE PROBLEMS**
- Faulty dashboard cable assembly.
- Faulty relay K12.

**WARNING**
Read WARNING on following page.

3. **TEST OPTIONS**
- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
If 12 VDC is not present, wire 1673 is faulty.

---

3. Is 12 VDC present at relay K12 terminal 86?

- **NO**
  - Repair wire 1673 from relay K12 terminal 86 on PDP to connector J913 pin 1 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

- **YES**
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

### VOLTAGE TEST

1. Remove PDP cover (para 16-2).
2. Remove relay K12 from PDP.
3. Set multimeter to volts DC.
4. Connect positive (+) probe of multimeter to PDP, where relay K12 terminal 86 was removed.
5. Connect negative (-) probe of multimeter to ground.
6. Position main light switch to STOP LIGHT (TM 9-2320-366-10-1) and note reading on multimeter.
7. If 12 VDC is not present, repair wire 1673 from relay K12 terminal 86 on PDP to connector J 913 pin 1 (para 2-45) or replace WTEC II dashboard cable (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
### Known Info
- Circuit breakers CB71, CB72, and CB74 OK.
- Hazard lights illuminate.
- Light bulb OK.
- Auxiliary panel cable assembly OK.
- Relay K9 OK.
- Diode D28 OK.
- Worklights switch OK.

### Possible Problems
- Faulty dashboard cable assembly.
- Faulty relay K12.

### Test Options

<table>
<thead>
<tr>
<th>Test Options</th>
<th>Reason for Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE-R Test #89</td>
<td>If continuity is not present, wire 3067 is faulty.</td>
</tr>
</tbody>
</table>

### Reason for Question

- Is continuity present from relay K12 terminal 85 and a known good ground?

#### YES
- Repair wire 3067 from relay K12 terminal 85 on PDP to terminal board TB2 position 30 or (para 2-45) replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

#### NO
- If continuity is not present, wire 3067 is faulty.

### Known Info
- Circuit breakers CB71, CB72, and CB74 OK.
- Hazard lights illuminate.
- Light bulb OK.
- Auxiliary panel cable assembly OK.
- Relay K9 OK.
- Diode D28 OK.
- Worklights switch OK.

### Possible Problems
- Faulty dashboard cable assembly.
- Faulty relay K12.

### Test Options

<table>
<thead>
<tr>
<th>Test Options</th>
<th>Reason for Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Test or STE/ICE-R Test #89</td>
<td>If 12 VDC is not present, wire 1674 is faulty.</td>
</tr>
</tbody>
</table>

### Reason for Question

- Is 12 VDC present at relay K12 terminal 30?

#### YES
- Repair wire 1674 from relay K12 terminal 30 on PDP to circuit breaker CB72 terminal 2 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

#### NO
- If 12 VDC is not present, wire 1674 is faulty.

### Warning
- Read WARNING on following page.
**CONTINUITY TEST**

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to PDP, where relay K12 terminal 85 was removed.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, repair wire 3067 from relay K12 terminal 85 on PDP to terminal board TB2 position 30 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

---

**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

---

**VOLTAGE TEST**

(1) Set multimeter to volts DC.
(2) Connect positive (+) probe of multimeter to PDP, where relay K12 terminal 30 was removed.
(3) Connect negative (-) probe of multimeter to ground.
(4) Position main light switch to STOP LIGHT (TM 9-2320-366-10-1) and note reading on multimeter.
(5) If 12 VDC is not present, repair wire 1674 from relay K12 terminal 30 on PDP to circuit breaker CB72 terminal 2 (para 2-45) or replace WTEC II dashboard cable (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
(6) Position main light switch to OFF (TM 9-2320-366-10-1).
**e148. M1088/M1089 WORKLIGHTS DO NOT ILLUMINATE (CONT)**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breakers CB71, CB72, and CB74 OK.</td>
</tr>
<tr>
<td>Hazard lights illuminate.</td>
</tr>
<tr>
<td>Light bulb OK.</td>
</tr>
<tr>
<td>Auxiliary panel cable assembly OK.</td>
</tr>
<tr>
<td>Relay K9 OK.</td>
</tr>
<tr>
<td>Diode D2B OK.</td>
</tr>
<tr>
<td>Worklights switch OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty dashboard cable assembly.</td>
</tr>
<tr>
<td>Faulty relay K12.</td>
</tr>
</tbody>
</table>

### TEST OPTIONS
- Continuity Test or STE/ICE-R Test #91

### REASON FOR QUESTION
- If continuity is not present, wire 2002 is faulty. If continuity is present, relay K12 is faulty.

### 6.
- Is continuity present from relay K12 terminal 87 to connector J51 pin 1?

#### NO
- Faulty dashboard cable assembly.
- Faulty relay K12.

#### YES
- Repair wire 2002 from relay K12 terminal 87 on PDP to connector J51 pin 1 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

- Replace relay K12 (para 7-9).
**CAUTION**

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

### VOLTAGE TEST

1. Set multimeter to ohms.
2. Remove three screws and washers from PDP.
3. Remove three screws from PDP.
4. Lift PDP outward to gain access.
5. Disconnect connector P51 from connector J51.
6. Connect positive (+) probe of multimeter to PDP, where relay K12 terminal 87 was removed.
7. Connect negative (-) probe of multimeter to connector J51 pin 1 and note reading on multimeter.
8. If continuity is not present, repair wire 2002 from relay K12 terminal 87 to connector J51 pin 1 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
9. If continuity is present, replace relay K12 (para 7-9).
10. Install relay K12 in PDP.
11. Install PDP on dashboard with three screws.
12. Install three washers and screws in PDP.
13. Install PDP cover (para 16-2).
KNOWLEDGE INFORMATION
Circuit breakers CB71, CB72, and CB74 OK.
Hazard lights illuminate.
Light bulb OK.
Auxiliary panel cable assembly OK.
Worklights switch OK.
Relay K12 OK.

POSSIBLE PROBLEMS
Faulty dashboard cable assembly.
Faulty diode D2B.
Faulty relay K9.

TEST OPTIONS
Voltage Test or STE/ICE-R Test #89

REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

Is 12 VDC present at diode D2B terminal 4?

YES

GO TO STEP 12 OF THIS FAULT.

NO

GO TO STEP 8 OF THIS FAULT.

GO TO STEP 12 OF THIS FAULT.

KNOWLEDGE INFORMATION
Circuit breakers CB71, CB72, and CB74 OK.
Hazard lights illuminate.
Light bulb OK.
Auxiliary panel cable assembly OK.
Diode D2B OK.
Worklights switch OK.
Relay K12 OK.

POSSIBLE PROBLEMS
Faulty dashboard cable assembly.
Faulty relay K9.

TEST OPTIONS
Voltage Test or STE/ICE-R Test #89

REASON FOR QUESTION
If 12 VDC is not present, wire 1514 is faulty.

Is 12 VDC present at relay K9 terminal 86?

YES

REPAIR WIRE 1514 FROM RELAY K9 TERMINAL 86 ON PDP TO CIRCUIT BREAKER CB74 TERMINAL 6 (PARA 2-45) OR REPLACE WTEC II DASHBOARD CABLE ASSEMBLY (PARA 7-10) OR WTEC III DASHBOARD CABLE ASSEMBLY (PARA 7-11).

NO

Repair wire 1514 from relay K9 terminal 86 on PDP to circuit breaker CB74 terminal 6 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

---

**CONTINUITY TEST**

1. Remove PDP cover (para 16-2).
2. Remove diode D2B from PDP.
3. Set multimeter to volts DC.
4. Connect positive (+) probe of multimeter to PDP, where diode D2B terminal 4 was removed.
5. Connect negative (-) probe of multimeter to ground.
6. Position main light switch to STOP LIGHT (TM 9-2320-366-10-1) and note reading on multimeter.
7. If 12 VDC is not present, repair wire 1514 relay K9 terminal 86 to circuit breaker CB74 terminal 6 (para 2-45) or replace WTEC II dashboard cable (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

---

**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

---

**VOLTAGE TEST**

1. Install diode D2B in PDP.
2. Remove relay K9 from PDP.
3. Set multimeter to volts DC.
4. Connect positive (+) probe of multimeter to PDP, where relay K9 terminal 86 was removed.
5. Connect negative (-) probe of multimeter to ground.
6. Position main light switch to STOP LIGHT (TM 9-2320-366-10-1) and note reading on multimeter.
7. If 12 VDC is not present, repair wire 1514 relay K9 terminal 86 to circuit breaker CB74 terminal 6 (para 2-45) or replace WTEC II dashboard cable (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
### KNOWN INFO
- Circuit breakers CB71, CB72, and CB74 OK.
- Hazard lights illuminate.
- Light bulb OK.
- Auxiliary panel cable assembly OK.
- Diode D2B OK.
- Worklights switch OK.
- Relay K12 OK.

### POSSIBLE PROBLEMS
- Faulty dashboard cable assembly.
- Faulty relay K9.

### TEST OPTIONS
- Continuity Test or STE/ICE-R Test #89

### REASON FOR QUESTION
- If continuity is not present, wire 3039 is faulty.

#### 9.
Is continuity present from relay K9 terminal 85 and a known good ground?

- **NO**
  - Repair wire 3039 from relay K9 terminal 85 on PDP to terminal board TB2 position 56 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

- **YES**

#### WARNING
Read WARNING on following page.

### 10.
Is 12 VDC present at relay K9 terminal 30?

- **NO**
  - Repair wire 1566 from relay K9 terminal 30 on PDP to circuit breaker CB71 terminal 4 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

- **YES**

### KNOWN INFO
- Circuit breakers CB71, CB72, and CB74 OK.
- Hazard lights illuminate.
- Light bulb OK.
- Auxiliary panel cable assembly OK.
- Diode D2B OK.
- Worklights switch OK.
- Relay K12 OK.

### POSSIBLE PROBLEMS
- Faulty dashboard cable assembly.
- Faulty relay K9.
### WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

### CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>2</td>
<td>Connect positive (+) probe of multimeter to PDP, where relay K9 terminal 85 was removed.</td>
</tr>
<tr>
<td>3</td>
<td>Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>4</td>
<td>If continuity is not present, repair wire 3039 from relay K9 terminal 85 on PDP to terminal board TB2 position 56 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
</tbody>
</table>

### VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set multimeter to volts DC.</td>
</tr>
<tr>
<td>2</td>
<td>Connect positive (+) probe of multimeter to PDP, where relay K9 terminal 30 was removed.</td>
</tr>
<tr>
<td>3</td>
<td>Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>4</td>
<td>Position main light switch to STOP LIGHT (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>5</td>
<td>If 12 VDC is not present, repair wire 1566 from relay K9 terminal 30 on PDP to circuit breaker CB71 terminal 4 (para 2-45) or replace WTEC II dashboard cable (para 7-10) or WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
<tr>
<td>6</td>
<td>Position main light switch to OFF (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
e148. M1088/M1089 WORKLIGHTS DO NOT ILLUMINATE (CONT)

**KNOWN INFO**
- Circuit breakers CB71, CB72, and CB74 OK.
- Hazard lights illuminate.
- Light bulb OK.
- Auxiliary panel cable assembly OK.
- Diode D2B OK.
- Worklight switch OK.
- Relay K12 OK.

**POSSIBLE PROBLEMS**
- Faulty dashboard cable assembly.
- Faulty relay K9.

11. Is continuity present from relay K9 terminal 87 to diode D2B terminal 4?

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, wire 1565 is faulty. If continuity is present, relay K9 is faulty.

- **YES**
  - Repair wire 1565 from relay K9 terminal 87 on PDP to diode D2B terminal 4 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

- **NO**
  - Replace relay K9 (para 7-9).
<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(2) Remove diode D2B from PDP.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to PDP, where relay K9 terminal 87 was removed.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to PDP, where diode D2B terminal 4 was removed and note reading on multimeter.</td>
</tr>
<tr>
<td>(5) If continuity is not present, repair wire 1565 from relay K9 terminal 87 to diode D2B terminal 4 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
<tr>
<td>(6) If continuity is present, replace relay K9 (para 7-9).</td>
</tr>
<tr>
<td>(7) Install relay K9 in PDP.</td>
</tr>
<tr>
<td>(8) Install diode D2B in PDP.</td>
</tr>
<tr>
<td>(9) Install PDP cover (para 16-2).</td>
</tr>
<tr>
<td>(10) Connect connector P905 to worklights switch.</td>
</tr>
<tr>
<td>(11) Position auxiliary panel on auxiliary panel housing with six screws.</td>
</tr>
<tr>
<td>(12) Tighten six screws to 24 lb-in. (3 N·m).</td>
</tr>
</tbody>
</table>
12. Is 12 VDC present at diode D2B terminal 3?

**YES**
- Repair wire 1672 from diode D2B terminal 3 on PDP to connector P913 socket 3 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
- Replace diode D2B (para 7-9).

**NO**
- Faulty dashboard cable assembly.
- Faulty diode D2B.

**WARNING**
Read WARNING on following page.

**REASON FOR QUESTION**
If 12 VDC is not present, diode D2B is faulty. If 12 VDC is present, wire 1672 is faulty.

**POSSIBLE PROBLEMS**
Faulty dashboard cable assembly.
Faulty diode D2B.

**KNOWN INFO**
- Circuit breakers CB71, CB72, and CB74 OK.
- Hazard lights illuminate.
- Light bulb OK.
- Auxiliary panel cable assembly OK.
- Relay K9 OK.
- Worklights switch OK.
- Relay K12 OK.

**TEST OPTIONS**
Voltage Test or STE/ICE-R Test #89
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

---

### VOLTAGE TEST

1. Set multimeter to volts DC.
2. Connect positive (+) probe of multimeter to PDP, where diode D2B terminal 3 was removed.
3. Connect negative (-) probe of multimeter to ground.
4. Position main light switch to STOP LIGHT (TM 9-2320-366-10-1) and note reading on multimeter.
5. If 12 VDC is not present, replace diode D2B (para 7-9).
6. If 12 VDC is present, repair wire 1672 from diode D2B terminal 3 on PDP to connector P913 socket 3 (para 2-45) or replace WTEC II dashboard cable (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
8. Install diode D2B in PDP.
9. Install PDP cover (para 16-2).
10. Connect connector P905 to worklights switch.
11. Position auxiliary panel on auxiliary panel housing with six screws.
12. Tighten six screws to 24 lb-in. (3 N·m).
M1088/M1089 (LH) WORKLIGHTS DO NOT ILLUMINATE

INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Condition</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1).</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td>Personnel Required</td>
<td>STE/ICE-R (Item 41, Appendix C)</td>
</tr>
<tr>
<td>(2)</td>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
</tr>
<tr>
<td>Materials/Parts</td>
<td>References</td>
</tr>
<tr>
<td>Wire, Elect, 50 ft (Item 71, Appendix D)</td>
<td>TM 9-4910-571-12&amp;P</td>
</tr>
</tbody>
</table>

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
Voltage Test or STE/ICE-R #89

**REASON FOR QUESTION**
If 12 vdc is not present, wire 2002 is faulty.

**KNOWLEDGE**
- RH tractor or wrecker worklights illuminate.

**POSSIBLE PROBLEMS**
- Faulty rear lights cable assembly.
- Faulty LH tractor or wrecker worklights.

1. Is 12 vdc present at connector P133-B or connector P133A-2?

- **NO**
- **YES**

**YES**
Repair wire 2002 (para 2-45) or replace rear lights cable assembly (para 7-104).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

---

**VOLTAGE TEST**

1. Disconnect LH tractor or wrecker worklight from connector P133 or connector P133A.
2. Set multimeter to volts dc.
3. Connect positive (+) probe of multimeter to connector P133-B or connector P133A-2.
4. Connect negative (-) probe of multimeter to ground.
5. Position main light switch to STOP/PARK (TM 9-2320-366-10-1).
6. Position work light switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
7. If 12 vdc is not present, repair wire 2002 (para 2-45) or replace rear lights cable assembly (para 7-104).
2. Is continuity present at connector P133-A or connector P133A-1?

- **NO**
  - Repair wire 3063 (fixed worklight) or wire 3064 (hand-held worklight) (para 2-45) or replace rear lights cable assembly (para 7-104).

- **YES**
  - Replace LH tractor or wrecker worklight (para 7-42).

**KNOWN INFO**
- RH tractor or wrecker worklights illuminate.

**POSSIBLE PROBLEMS**
- Faulty rear ligts cable assembly.
- Faulty LH tractor or wrecker worklights.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, wire 3063 (fixed worklight) or wire 3064 (hand-held worklight) is faulty. If continuity is present, LH tractor or wrecker worklight is faulty.
CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>2</td>
<td>Connect positive (+) probe of multimeter to connector P133-A or connector P133A-1.</td>
</tr>
<tr>
<td>3</td>
<td>Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>4</td>
<td>If continuity is not present, repair wire 3063 (fixed worklight) or wire 3064 (hand-held worklight) (para 2-45) or replace rear lights cable assembly (para 7-104).</td>
</tr>
<tr>
<td>5</td>
<td>If continuity is present, replace LH tractor or wrecker worklight (para 7-42).</td>
</tr>
<tr>
<td>6</td>
<td>Connect worklight to connector P133 or P133A on LH tractor or wrecker.</td>
</tr>
</tbody>
</table>
1. If 12 vdc is not present, wire 2002 is faulty.

**WARNING**

Read **WARNING** on following page.

**TEST OPTIONS**

Voltage Test or STE/ICE-R #89

**REASON FOR QUESTION**

If 12 vdc is not present, wire 2002 is faulty.

**REPAIR**

Repair wire 2002 (para 2-45) or replace rear lights cable assembly (para 7-104).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Disconnect RH tractor or wrecker worklight from connector P134 or connector P134A.</td>
</tr>
<tr>
<td>(2) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to connector P134-B or connector P134A-2.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(5) Position main light switch to STOP/PARK (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(6) Position work light switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If 12 vdc is not present, repair wire 2002 (para 2-45) or replace rear lights cable assembly (para 7-104).</td>
</tr>
<tr>
<td>(8) Position work light switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(9) Position main light switch to OFF (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
### Known Info
- LH tractor or wrecker worklights illuminate.
- Faulty rear lights cable assembly.
- Faulty RH tractor or wrecker worklights.

### Possible Problems
- Faulty rear lights cable assembly.
- Faulty RH tractor or wrecker worklights.

### Reason for Question
- LH tractor or wrecker worklights illuminate.
- Faulty rear lights cable assembly.
- Faulty RH tractor or wrecker worklights.

### Test Options
- Continuity Test or STE/ICE-R #91

### 2.
- Is continuity present at connector P134-A or connector P134A-1?

- **NO**
  - Repair wire 3061 (fixed worklight) or wire 3062 (hand-held worklight) (para 2-45) or replace rear lights cable assembly (para 7-104).

- **YES**
  - Replace RH tractor or wrecker worklight (para 7-42).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P134-A or connector P134A-1.
(4) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(5) If continuity is not present, repair wire 3061 (fixed worklight) or wire 3062 (hand-held worklight) (para 2-45) or replace rear lights cable assembly (para 7-104).
(6) If continuity is present, replace RH tractor or wrecker worklight (para 7-42).
(7) Connect worklight to connector P134 or P134A on RH tractor or wrecker.
1. **START**

**WARNING**
Read WARNING on following page.

1. Is 12 vdc present at connector P906-5?

**KNOWN INFO**
- Circuit breaker OK.
- Worklights normal mode OK.

**POSSIBLE PROBLEMS**
- Faulty blackout override switch.
- Faulty dashboard cable assembly.
- Faulty auxiliary panel cable assembly.
- Faulty relay K12.

**TEST OPTIONS**
- Voltage Test or STE/ICE-R #89

**REASON FOR QUESTION**
This question eliminates possible problems and determines where troubleshooting continues.

**YES**
Go to step 3 of this fault.

**NO**
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

### VOLTAGE TEST

1. Remove six screws from auxiliary panel.
2. Lift auxiliary panel from auxiliary panel housing outward to gain access.
3. Disconnect connector P906 from blackout override switch.
4. Set multimeter to volts dc.
5. Connect positive (+) probe of multimeter to connector P906-5.
6. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
7. If 12 vdc is not present, go to step 3 of this fault.
2. Is continuity present between blackout override switch pins 1 and 5?

- YES
  - Replace blackout override switch (para 7-18).
  - Go to step 4 of this fault.

- NO
  - Continuity Test or STE/ICE-R #91
  - REASON FOR QUESTION
    - If continuity is not present, blackout override switch is faulty.

**KNOWN INFO**
- Circuit breaker OK.
- Worklights normal mode OK.

**POSSIBLE PROBLEMS**
- Faulty blackout override switch.
- Faulty dashboard cable assembly.
- Faulty auxiliary panel cable assembly.
- Faulty relay K12.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Position blackout override switch to on.
(3) Connect positive (+) probe of multimeter to blackout override switch pin 5.
(4) Connect negative (-) probe of multimeter to blackout override switch pin 1 and note reading on multimeter.
(5) If continuity is not present, replace blackout override switch (para 7-18).
(6) If continuity is present, go to step 4 of this fault.
(7) Position blackout override switch to off.

Diagram showing Connector P906 and Blackout Override Switch connections.
3. Is 12 vdc present at connector J913-2?

- **YES**
  - Repair wire 1674 (para 2-45)
  - or replace auxiliary panel cable assembly (para 7-58).

- **NO**
  - If 12 vdc is not present, wire 1674 in dashboard cable assembly is faulty.
  - If 12 vdc is present, wire 1674 in auxiliary panel cable assembly is faulty.

**KNOWN INFO**
- Circuit breaker OK.
- Worklights normal mode OK.
- Blackout override switch OK.
- Relay K12 OK.

**POSSIBLE PROBLEMS**
- Faulty dashboard cable assembly.
- Faulty auxiliary panel cable assembly.

**TEST OPTIONS**
- Voltage Test or STE/ICE-R #89

**REASON FOR QUESTION**
- If 12 vdc is not present, wire 1674 in dashboard cable assembly is faulty.
- If 12 vdc is present, wire 1674 in auxiliary panel cable assembly is faulty.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

VOLTAGE TEST

1. Remove personnel heater to gain access (para 18-9).
2. Disconnect connector P913 from connector J913.
3. Set multimeter to volts dc.
4. Connect positive (+) probe of multimeter to connector J913-2.
5. Connect negative (-) probe of multimeter to ground.
6. Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
7. If 12 vdc is not present, repair wire 1674 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
8. If 12 vdc is present, repair wire 1674 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
10. Connect connector P913 to connector J913.
11. Install personnel heater (para 18-9).
12. Connect connector P906 to blackout override switch.
13. Position auxiliary panel on auxiliary panel housing with six screws.
14. Tighten six screws to 24 lb-in. (3 N·m).
4. Is continuity present between relay K12 socket 85 and ground?
   - YES
     - Repair wire 3067 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
   - NO
     - If continuity is not present, wire 3067 is faulty.

5. Is continuity present across relay K12 pin 85 to pin 86?
   - YES
     - Replace relay K12 (para 7-9).
   - NO
     - If continuity is not present, relay K12 is faulty.

Known Info:
- Circuit breaker OK.
- Worklights normal mode OK.
- Blackout override switch OK.

Possible Problems:
- Faulty dashboard cable assembly.
- Faulty auxiliary panel cable assembly.
- Faulty relay K12.

Test Options:
- Continuity Test or STE/ICE-R #91

Reason for Question:
- If continuity is not present, wire 3067 is faulty.
### CONTINUITY TEST

1. Remove PDP cover (para 16-2).
2. Remove relay K12 from PDP.
3. Set multimeter to ohms.
4. Connect positive (+) probe of multimeter to relay K12 socket 85.
5. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
6. If continuity is not present, repair wire 3067 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

---

### CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to relay K12 pin 85.
3. Connect negative (-) probe of multimeter to relay K12 pin 86 and note reading on multimeter.
4. If continuity is not present, replace relay K12 (para 7-9).
6. Is continuity present between connector J913-1 and relay K12 socket 86?

**POSSIBLE PROBLEMS**
- Faulty dashboard cable assembly.
- Faulty auxiliary panel cable assembly.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R #91

**REASON FOR QUESTION**
- If continuity is not present, wire 1673 in dashboard cable assembly is faulty.
- If continuity is present, wire 1673 in auxiliary panel cable assembly is faulty.

**Known Info**
- Circuit breaker OK.
- Worklights normal mode OK.
- Blackout override switch OK.
- Relay K12 OK.

**YES**
- Repair wire 1673 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

**NO**
- Repair wire 1673 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
VOLTAGE TEST

(1) Remove personnel heater to gain access (para 18-9).
(2) Disconnect connector P913 from connector J913.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to connector J913-1.
(5) Connect negative (-) probe of multimeter to PDP, relay K12 socket 86 and note reading on multimeter.
(6) If continuity is not present, repair wire 1673 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
(7) If continuity is present, repair wire 1673 (para 2-45) or replace auxiliary panel cable assembly (para 7-58).
(8) Connect connector P913 to connector J913.
(9) Install relay K12 in PDP.
(10) Install personnel heater (para 18-9).
(11) Connect connector P906 to blackout override switch.
(12) Position auxiliary panel on auxiliary panel housing with six screws.
(13) Tighten six screws to 24 lb-in. (3 N·m).
# M1084/M1086 Worklights DO NOT Illuminate

## Initial Setup

<table>
<thead>
<tr>
<th>Equipment Condition</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1)</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td>Personnel Required</td>
<td>STE/ICE-R (Item 41, Appendix C)</td>
</tr>
<tr>
<td>(2)</td>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Materials/Parts</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire, Elect, 50 ft (Item 71, Appendix D)</td>
<td>TM 9-4910-571-12&amp;P</td>
</tr>
</tbody>
</table>

## Known Info
- One crane worklight illuminates.

## Possible Problems
- Faulty crane worklight.
- Faulty crane power cable assembly.

## Test Options
- Voltage Test or STE/ICE-R #89

## Reason for Question
- If 12 vdc is not present, wire 2004 is faulty.

## Procedure

1. **START**

   - **WARNING**
     - Read WARNING on following page.
     - **Is 12 vdc present at connector P136-B (RH worklight) or connector P135-B (LH worklight)?**

   - **YES**
     - Repair wire 2004 (para 2-45) or replace crane power cable assembly (para 7-79).

   - **NO**
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Disconnect connector P136 (RH worklight) or P135 (LH worklight).</td>
</tr>
<tr>
<td>(2) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to connector P136-B (RH) or P135-B (LH).</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(5) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(6) If 12 vdc is not present, repair wire 2004 (para 2-45) or replace crane power cable assembly (para 7-79).</td>
</tr>
<tr>
<td>(7) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
2. Is continuity present between connector P136-A (RH worklight) or connector P135-A (LH worklight) and a known good ground?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>One crane worklight illuminates.</td>
</tr>
<tr>
<td>POSSIBLE PROBLEMS</td>
</tr>
<tr>
<td>Faulty crane power cable assembly.</td>
</tr>
<tr>
<td>Faulty crane worklight.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE-R #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, wire 3065 (RH worklight) or wire 3066 (LH worklight) is faulty. If continuity is present, crane worklight is faulty.</td>
</tr>
</tbody>
</table>

NO

YES

Replace crane worklight.

Repair wire 3065 (RH worklight) or wire 3066 (LH worklight) (para 2-45) or replace crane power cable assembly (para 7-79).
CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to (RH) connector P136-A or (LH) connector P135-A.
3. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
4. If continuity is not present, repair wire 3065 (RH) or wire 3066 (LH) (para 2-45) or replace crane power cable assembly (para 7-79).
5. If continuity is present, replace crane worklight.
6. Connect connector P136 (RH) or P135 (LH) crane worklight connector.
## 2-17. TRANSMISSION SYSTEM TROUBLESHOOTING

This paragraph covers Transmission System Troubleshooting. The Transmission System Fault Index, Table 2-18, lists faults for the transmission system of the vehicle.

### Table 2-18. Transmission System Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>f1.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Emits Eight Seconds of Beeps and/or Transmission Does Not Shift Gears</td>
<td>2-1584</td>
</tr>
<tr>
<td>f2.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 22 Sub Code 14</td>
<td>2-1586</td>
</tr>
<tr>
<td>f3.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 22 Sub Code 15</td>
<td>2-1594</td>
</tr>
<tr>
<td>f4.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 22 Sub Code 16</td>
<td>2-1600</td>
</tr>
<tr>
<td>f5.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 24 and/or 33 and Any Sub Code</td>
<td>2-1606</td>
</tr>
<tr>
<td>f6.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 32 and Any Sub Code</td>
<td>2-1620</td>
</tr>
<tr>
<td>f7.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 41, 42, 44, 45, 66, and/or 69 and Any Sub Code</td>
<td>2-1624</td>
</tr>
<tr>
<td>f8.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 43 and Any Sub Code</td>
<td>2-1628</td>
</tr>
<tr>
<td>f9.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 52 and Any Sub Code</td>
<td>2-1634</td>
</tr>
<tr>
<td>f10.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 57 and Any Sub Code</td>
<td>2-1640</td>
</tr>
<tr>
<td>f11.</td>
<td>Transmission Unusually Noisy When Operating</td>
<td>2-1644</td>
</tr>
<tr>
<td>f12.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 21 and Any Sub Code</td>
<td>2-1654</td>
</tr>
<tr>
<td>f13.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 51 Sub Code 10, 12, 21, 43, 45, or 65</td>
<td>2-1668</td>
</tr>
<tr>
<td>f14.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 25 and Any Sub Code</td>
<td>2-1672</td>
</tr>
<tr>
<td>f15.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 53 and Any Sub Code</td>
<td>2-1676</td>
</tr>
<tr>
<td>f16.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 54 Sub Code 01, 07, 10, 12, 17, 21, 23, 27, 32, 34, 43, 45, 54, 56, 65, 70, 71, 72, 80, 81, 82, 83, 85, 86, 92, 93, 95, 96, or 97</td>
<td>2-1680</td>
</tr>
<tr>
<td>f17.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 55 and Any Sub Code</td>
<td>2-1686</td>
</tr>
<tr>
<td>f18.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 56 and Any Sub Code</td>
<td>2-1692</td>
</tr>
<tr>
<td>f19.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 13 and Any Sub Code</td>
<td>2-1698</td>
</tr>
<tr>
<td>f19A.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 23 and Any Sub Code</td>
<td>2-1706.2</td>
</tr>
<tr>
<td>f19B.</td>
<td>WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Does Not Illuminate</td>
<td>2-1706.16</td>
</tr>
<tr>
<td>f20.</td>
<td>Metal Particles Found During Transmission Oil Change</td>
<td>2-1708</td>
</tr>
<tr>
<td>f21.</td>
<td>Transmission Does Not Shift or Is Slow to Shift When Cold</td>
<td>2-1710</td>
</tr>
</tbody>
</table>
**Table 2-18. Transmission System Fault Index (Cont)**

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>f22.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1712</td>
</tr>
<tr>
<td></td>
<td>Main Code 22 Sub Code 14</td>
<td></td>
</tr>
<tr>
<td>f23.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1718</td>
</tr>
<tr>
<td></td>
<td>Main Code 22 Sub Code 15</td>
<td></td>
</tr>
<tr>
<td>f24.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1722</td>
</tr>
<tr>
<td></td>
<td>Main Code 22 Sub Code 16</td>
<td></td>
</tr>
<tr>
<td>f25.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1728</td>
</tr>
<tr>
<td></td>
<td>Main Code 24 and/or 33 and Any Sub Code</td>
<td></td>
</tr>
<tr>
<td>f26.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1742</td>
</tr>
<tr>
<td></td>
<td>Main Code 32 and Any Sub Code</td>
<td></td>
</tr>
<tr>
<td>f27.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1748</td>
</tr>
<tr>
<td></td>
<td>Main Code 42, 44, 45, 46, 66, and/or 69 and Any Sub Code</td>
<td></td>
</tr>
<tr>
<td>f28.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1752</td>
</tr>
<tr>
<td></td>
<td>Main Code 52 and Any Sub Code</td>
<td></td>
</tr>
<tr>
<td>f29.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1758</td>
</tr>
<tr>
<td></td>
<td>Main Code 51 and Any Sub Code</td>
<td></td>
</tr>
<tr>
<td>f30.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1762</td>
</tr>
<tr>
<td></td>
<td>Main Code 21 and Any Sub Code</td>
<td></td>
</tr>
<tr>
<td>f31.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1776</td>
</tr>
<tr>
<td></td>
<td>Main Code 51 and Any Sub Code</td>
<td></td>
</tr>
<tr>
<td>f32.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1780</td>
</tr>
<tr>
<td></td>
<td>Main Code 25 and Any Sub Code</td>
<td></td>
</tr>
<tr>
<td>f33.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1784</td>
</tr>
<tr>
<td></td>
<td>Main Code 53 and Any Sub Code</td>
<td></td>
</tr>
<tr>
<td>f34.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1788</td>
</tr>
<tr>
<td></td>
<td>Main Code 54 and Any Sub Code</td>
<td></td>
</tr>
<tr>
<td>f35.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1794</td>
</tr>
<tr>
<td></td>
<td>Main Code 55 and Any Sub Code</td>
<td></td>
</tr>
<tr>
<td>f36.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1800</td>
</tr>
<tr>
<td></td>
<td>Main Code 56 and Any Sub Code</td>
<td></td>
</tr>
<tr>
<td>f37.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1806</td>
</tr>
<tr>
<td></td>
<td>Main Code 13 and Any Sub Code</td>
<td></td>
</tr>
<tr>
<td>f38.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Indicator</td>
<td>2-1820</td>
</tr>
<tr>
<td></td>
<td>Displays &quot;--&quot; and/or Transmission Does Not Shift Gears</td>
<td></td>
</tr>
<tr>
<td>f39.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays</td>
<td>2-1822</td>
</tr>
<tr>
<td></td>
<td>Main Code 23 and Any Sub Code</td>
<td></td>
</tr>
<tr>
<td>f40.</td>
<td>WTEC III Transmission Pushbutton Shift Selector (TPSS) Does Not Illuminate</td>
<td>2-1822.12</td>
</tr>
</tbody>
</table>
1. **WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) EMITS EIGHT SECONDS OF BEEPS AND/OR TRANSMISSION DOES NOT SHIFT GEARS**

**INITIAL SETUP**

Equipment Conditions
Engine running (TM 9-2320-366-10-1).

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine runs.</td>
</tr>
<tr>
<td>Transmission oil level OK.</td>
</tr>
<tr>
<td>Fuse OK.</td>
</tr>
<tr>
<td>Batteries OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code(s) logged in WTEC II TEPSS.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>WTEC II Diagnostic Code Reading/Code Clearing Procedure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If WTEC II TEPSS does not display any diagnostic codes after clearing, an intermittent problem was detected and corrected. If any diagnostic code(s) is logged after clearing, further troubleshooting is required.</td>
</tr>
</tbody>
</table>

**1.** Is a diagnostic code(s) logged in WTEC II TEPSS and does it return after clearing diagnostic codes?

**START**

- **NO**
  - **YES**
    - Fault corrected.

**Perform Transmission System Troubleshooting per para 8-4, Table 8-1. WTEC II Diagnostic Code List and Description.**
(1) Perform WTEC II Code Reading and Code Clearing (para 8-4).
(2) If no diagnostic codes are logged after clearing, fault is corrected.
(3) If diagnostic codes are still logged, perform Transmission System Troubleshooting of active diagnostic codes per para 8-4, Table 8-1. WTEC II Diagnostic Code List and Description.
### f2. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 22 SUB CODE 14

#### INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Conditions</th>
<th>Tools and Special Tools (Cont)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1).</td>
<td>Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)</td>
</tr>
<tr>
<td>Tools and Special Tools</td>
<td>Wrench Set, Socket (Item 51, Appendix C)</td>
</tr>
<tr>
<td>Goggles, Industrial (Item 15, Appendix C)</td>
<td>STE/ICE-R (Item 41, Appendix C)</td>
</tr>
<tr>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
<td>References</td>
</tr>
<tr>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
<td>TM 9-4910-571-12&amp;P</td>
</tr>
</tbody>
</table>

#### KNOWN INFO

<table>
<thead>
<tr>
<th>Transmission oil level OK.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuse OK.</td>
</tr>
<tr>
<td>Batteries OK.</td>
</tr>
</tbody>
</table>

#### POSSIBLE PROBLEMS

- Faulty transmission engine speed sensor.
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

#### TEST OPTIONS

<table>
<thead>
<tr>
<th>Resistance Test or STE/ICE-R Test #91</th>
</tr>
</thead>
</table>

#### REASON FOR QUESTION

If transmission engine speed sensor does not have the proper resistance, WTEC II TEPSS may display main code 22 sub code 14.

#### Diagram

1. **WARNING**
   - **CAUTION**
   - Read **WARNING** and **CAUTION** on following page.

   Is 200-400 ohms resistance present from transmission engine speed sensor pin A to pin B?

   - **NO**
     - **YES**
       - Replace transmission engine speed sensor (para 7-52).
WARNING

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

CAUTION

 Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>RESISTANCE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Disconnect transmission engine speed sensor connector from transmission engine speed sensor.</td>
</tr>
<tr>
<td>(2) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to terminal A of transmission engine speed sensor.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to terminal B of transmission engine speed sensor and note reading on multimeter.</td>
</tr>
</tbody>
</table>

NOTE

A good transmission engine speed sensor will return a reading of 200-400 ohms resistance as follows:

a. 200 ohms at -40°F (-40°C).
b. 300 ohms at 68°F (20°C).
c. 400 ohms at 230°F (110°C).

(5) If resistance is not 200-400 ohms, replace transmission engine speed sensor (para 7-52).
(6) Connect transmission engine speed sensor connector to transmission engine speed sensor.
2. If 200-400 ohms resistance is not present, or short circuits are found, DS Maintenance needs to be notified.

Resistance Test or STE/ICE-R Test #91

Reason for Question
If 200-400 ohms resistance is not present, or short circuits are found, DS Maintenance needs to be notified.

Known Info
Transmission oil level OK.
Fuse OK.
Batteries OK.
Transmission engine speed sensor OK.

Possible Problems
Faulty WTEC II cab transmission harness.
Faulty WTEC II TEPSS.

Notify DS Maintenance.
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>RESISTANCE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove two screws and washers from front grille.</td>
</tr>
<tr>
<td>(2) Remove screw and washer from front grille.</td>
</tr>
<tr>
<td>(3) Remove front grille from cab.</td>
</tr>
<tr>
<td>(4) Disconnect connector P119 from connector J119.</td>
</tr>
<tr>
<td>(5) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(6) Connect positive (+) probe of multimeter to connector P119 pin m.</td>
</tr>
<tr>
<td>(7) Connect negative (-) probe of multimeter to connector P119 pin s and note reading on multimeter.</td>
</tr>
<tr>
<td>(8) Connect negative (-) probe of multimeter to all other pins in connector P119 and note reading on multimeter.</td>
</tr>
<tr>
<td>(9) Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(10) If 200-400 ohms resistance is not present in step 7, or continuity is present in step 8 or step 9, notify DS Maintenance.</td>
</tr>
</tbody>
</table>
f2. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 22 SUB CODE 14 (CONT)

KNOWN INFO
Transmission oil level OK.
Fuse OK.
Batteries OK.
Transmission engine speed sensor OK.

POSSIBLE PROBLEMS
Faulty WTEC II cab transmission harness.
Faulty WTEC II TEPSS.

3. Is continuity present from connector socket J 119m to connector socket J 115-7?

CAUTION
Read CAUTION on following page.

TEST OPTIONS
Continuity Test or STE/ICE-R
Test #91

REASON FOR QUESTION
If continuity is not present, or short circuits are found, WTEC II cab transmission harness is faulty.

YES
Replace WTEC II cab transmission harness (para 7-137).

NO
CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove instrument panel assembly for access (para 7-15).</td>
</tr>
<tr>
<td>(2) Disconnect connector J115 (top connector) from WTEC II TEPSS.</td>
</tr>
<tr>
<td>(3) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter to connector socket J115-7.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to connector socket J119m and note reading on multimeter.</td>
</tr>
<tr>
<td>(6) Connect negative (-) probe of multimeter to all other sockets in connector J119 and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) Connect negative (-) probe of multimeter to ground to and note reading on multimeter.</td>
</tr>
<tr>
<td>(8) If continuity is not present in step 5, or continuity is present in step 6 or step 7, replace WTEC II cab transmission harness (para 7-137).</td>
</tr>
</tbody>
</table>
4. Is continuity present from connector socket J119s to connector socket J115-16?

**TEST OPTIONS**
- Continuity Test or STE/ICE-R
- Test #91

**REASON FOR QUESTION**
- If continuity is not present, or short circuits are found, WTEC II cab transmission harness is faulty.

**POSSIBLE PROBLEMS**
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Transmission engine speed sensor OK.

**CAUTION**
Read CAUTION on following page.

**YES**
- Replace WTEC II cab transmission harness (para 7-137).

**NO**
- Replace WTEC II TEPSS (para 8-2).

Replace WTEC II TEPSS (para 8-2).
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

**NOTE**

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to ohms position.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to connector socket J115-16.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to connector socket J119s and note reading on multimeter.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to all other sockets in connector J119 and note reading on multimeter.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(6) If continuity is not present in step 3, or continuity is present in step 4 or step 5, replace WTEC II cab transmission harness (para 7-137).</td>
</tr>
<tr>
<td>(7) If continuity is present in step 3 and no shorts circuits are found, replace WTEC II TEPSS (para 8-2).</td>
</tr>
<tr>
<td>(8) Connect connector J115 to WTEC II TEPSS.</td>
</tr>
<tr>
<td>(9) Install instrument panel assembly (para 7-15).</td>
</tr>
<tr>
<td>(10) Connect connector P119 to connector J119.</td>
</tr>
<tr>
<td>(11) Position front grille on cab with washer and screw.</td>
</tr>
<tr>
<td>(12) Position two washers and screws in front grille.</td>
</tr>
<tr>
<td>(13) Tighten screw to 48-60 lb-in. (5-7 N·m).</td>
</tr>
<tr>
<td>(14) Tighten two screws to 24 lb-in. (3 N·m).</td>
</tr>
<tr>
<td>(15) Clear diagnostic codes (para 8-4).</td>
</tr>
</tbody>
</table>
f3. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 22 SUB CODE 15

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)

Tools and Special Tools (Cont)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Wrench Set, Socket (Item 51, Appendix C)
STE/ICE-R (Item 41, Appendix C)

References
TM 9-4910-571-12&P

START

CAUTION
Read CAUTION on following page.

1. Is continuity present from connector J119 socket p to connector J115 socket 15?

TEST OPTIONS
Continuity Test or STE/ICE-R Test #91

REASON FOR QUESTION
If continuity is not present, or short circuits are found, WTEC II cab transmission harness is faulty.

KNOWN INFO
Transmission oil level OK.
Fuse OK.
Batteries OK.

POSSIBLE PROBLEMS
Faulty WTEC II cab transmission harness.
Faulty WTEC II TEPSS.

NO

YES

Replace WTEC II cab transmission harness (para 7-137).
CAUTION
Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove two screws and washers from front grille.</td>
</tr>
<tr>
<td>(2) Remove screw and washer from front grille.</td>
</tr>
<tr>
<td>(3) Remove front grille from cab.</td>
</tr>
<tr>
<td>(4) Disconnect connector P119 from connector J119.</td>
</tr>
<tr>
<td>(5) Remove instrument panel assembly for access (para 7-15).</td>
</tr>
<tr>
<td>(6) Disconnect connector J115 (top connector) from WTEC II TEPSS.</td>
</tr>
<tr>
<td>(7) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(8) Connect positive (+) probe of multimeter to connector J115-15.</td>
</tr>
<tr>
<td>(9) Connect negative (-) probe of multimeter to connector J119p and note reading on multimeter.</td>
</tr>
<tr>
<td>(10) Connect negative (-) probe of multimeter to all other sockets in connector J119 and note reading on multimeter.</td>
</tr>
<tr>
<td>(11) Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(12) If continuity is not present in step 9, or continuity is present in step 10 or step 11, replace WTEC II cab transmission harness (para 7-137).</td>
</tr>
</tbody>
</table>
f3. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 22 SUB CODE 15 (CONT)

KNOWLEDGE INFO
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.

POSSIBLE PROBLEMS
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

TEST OPTIONS
- Continuity Test or STE/ICE-R Test #91

CAUTION
- Read CAUTION on following page.

2. Is continuity present from connector J119 socket r to connector J115 socket 6?

YES
- Replace WTEC II cab transmission harness (para 7-137).

NO
- If continuity is not present, or short circuits are found, WTEC II cab transmission harness is faulty.

REASON FOR QUESTION
Set multimeter to ohms.

Connect positive (+) probe of multimeter to connector J115 socket 6.

Connect negative (-) probe of multimeter to connector J119 socket r and note reading on multimeter.

Connect negative (-) probe of multimeter to all other sockets in connector J119 and note reading on multimeter.

Connect negative (-) probe of multimeter to ground and note reading on multimeter.

If continuity is not present in step 3, or continuity is present in step 4 or step 5, replace WTEC II cab transmission harness (para 7-137).

**CAUTION**

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

---

**CONTINUITY TEST**

(1) Set multimeter to ohms.

(2) Connect positive (+) probe of multimeter to connector J115 socket 6.

(3) Connect negative (-) probe of multimeter to connector J119 socket r and note reading on multimeter.

(4) Connect negative (-) probe of multimeter to all other sockets in connector J119 and note reading on multimeter.

(5) Connect negative (-) probe of multimeter to ground and note reading on multimeter.

(6) If continuity is not present in step 3, or continuity is present in step 4 or step 5, replace WTEC II cab transmission harness (para 7-137).
f3. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 22 SUB CODE 15 (CONT)

KNOWN INFO
Transmission oil level OK.
Fuse OK.
Batteries OK.
WTEC II cab transmission harness OK.

POSSIBLE PROBLEMS
Faulty WTEC II TEPSS.

TEST OPTIONS
Resistance Test or STE/ICE-R Test #91

REASON FOR QUESTION
If 200-400 ohms resistance is not present, or short circuits are found, DS Maintenance needs to be notified.

CAUTION
Read CAUTION on following page.

3. Is 200-400 ohms resistance present from connector P119 pin p to pin r?

NO

YES

Notify DS Maintenance.

Replace WTEC II TEPSS (para 8-2).
**CAUTION**

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>RESISTANCE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to connector P119 pin p.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to connector P119 pin r and note reading on multimeter.</td>
</tr>
</tbody>
</table>

**NOTE**

A good turbine speed sensor will return a reading of 200-400 ohms resistance as follows:

- 200 ohms at -40°F (-40°C).
- 300 ohms at 68°F (20°C).
- 400 ohms at 230°F (110°C).

(4) Connect negative (-) probe of multimeter to all other pins in connector P119 and note reading on multimeter.

(5) Connect negative (-) probe of multimeter to ground and note reading on multimeter.

(6) If 200-400 ohms resistance is not present in step 4, or continuity is present in step 5 or step 6, notify DS Maintenance.

(7) If 200-400 ohms resistance is present in step 3, and continuity is not present in step 5 or step 6, replace WTEC II TEPSS (para 8-2).

(8) Connect connector J115 to WTEC II TEPSS.

(9) Install instrument panel assembly (para 7-15).

(10) Connect connector P119 to connector J119.

(11) Position front grille on cab with washer and screw.

(12) Position two washers and screws in front grille.

(13) Tighten screw to 48-60 lb-in. (5-7 N·m).

(14) Tighten two screws to 24 lb-in. (3 N·m).

(15) Clear diagnostic codes (para 8-4).
**f4. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 22 SUB CODE 16**

**INITIAL SETUP**

**Equipment Conditions**
- Engine shut down (TM 9-2320-366-10-1).

**References**
- TM 9-4910-571-12&P

**Tools and Special Tools**
- Goggles, Industrial (Item 15, Appendix C)
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)
- STE/ICE-R (Item 41, Appendix C)

---

**KNOWN INFO**

- Transmission oil level OK.
- Fuse OK.
- Batteries OK.

**POSSIBLE PROBLEMS**

- Faulty output speed sensor.
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

---

**TEST OPTIONS**

- Resistance Test or
- STE/ICE-R Test #91

**REASON FOR QUESTION**

If 200-400 ohms resistance is not present, DS Maintenance needs to be notified.

---

**WARNING**

CAUTION

Read WARNING and CAUTION on following page.

---

1. Is 200-400 ohms resistance present from output speed sensor pin C to pin D?

---

**START**

**NO**

**YES**

Notify DS Maintenance.
**WARNING**

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

**CAUTION**

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

### RESISTANCE TEST

1. Disconnect output speed sensor connector from transfer case connector.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter to pin C of transfer case connector.

**NOTE**

A good output speed sensor will return a reading of 200-400 ohms resistance as follows:

- a. 200 ohms at -40°F (-40°C)
- b. 300 ohms at 68°F (20°C)
- c. 400 ohms at 230°F (110°C)

4. Connect negative (-) probe of multimeter to pin D of transfer case connector and note reading on multimeter.
5. If good resistance is not noted, notify DS Maintenance.
6. Connect output speed sensor connector to transfer case connector.
f4. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 22 SUB CODE 16 (CONT)

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Output speed sensor OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If 200-400 ohms resistance is not present, or short circuits are found, DS Maintenance needs to be notified.

2. Is 200-400 ohms resistance present from connector P119n to P119g?

- **NO**
- **YES**

Notify DS Maintenance.
CONTINUITY TEST

(1) Remove two screws and washers from front grille.
(2) Remove screw and washer from front grille.
(3) Remove front grille from cab.
(4) Disconnect connector P119 from connector J119.
(5) Set multimeter to ohms.
(6) Connect positive (+) probe of multimeter to connector P119n.
(7) Connect negative (-) probe of multimeter to connector P119g and note reading on multimeter.
(8) Connect negative (-) probe of multimeter to all other pins in connector P119, one at a time, and note reading on multimeter.
(9) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(10) Connect positive (+) probe of multimeter to connector P119g.
(11) Connect negative (-) probe of multimeter to all other pins in connector P119 (except P119n), one at a time, and note reading on multimeter.
(12) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(13) If continuity 200-400 ohms resistance is not present in step 7, or continuity is present in step 8, 9, 11, or 12, notify DS Maintenance.
f4. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 22 SUB CODE 16 (CONT)

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Output speed sensor OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

3. Is continuity present from connector J 119n and J 119g to connector J 115-5 and J 115-14?

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- Replace WTEC II cab transmission harness (para 7-137).
- Replace WTEC II TEPSS (para 8-2).
CONTINUITY TEST

1. Remove instrument panel assembly for access (para 7-15).
2. Disconnect connector J 115 (top connector) from WTEC II TEPSS.
3. Install jumper wire from connector J 119g to J 119n.
4. Set multimeter to ohms.
5. Connect positive (+) probe of multimeter to connector J 115-5.
6. Connect negative (-) probe of multimeter to connector J 115-14 and note reading on multimeter.
7. Connect negative (-) probe of multimeter to all other sockets in connector J 115, one at a time, and note reading on multimeter.
8. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
9. Connect positive (+) probe of multimeter to connector J 115-14.
10. Connect negative (-) probe of multimeter to all other sockets in connector J 115 (except J 115-5), one at a time, and note reading on multimeter.
11. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
12. If continuity is not present in step 6, or continuity is present in step 7, 8, 10, or 11, replace WTEC II cab transmission harness (para 7-137).
13. If continuity is present in step 6, and continuity is not present in steps 7, 8, 10, and 11, replace WTEC II TEPSS (para 8-2).
14. Remove jumper wire from connector J 119.
15. Connect connector J 115 to WTEC II TEPSS.
16. Install instrument panel assembly (para 7-15).
17. Connect connector P119 to connector J 119.
18. Position front grille on cab with washer and screw.
19. Position two washers and screws in front grille.
20. Tighten screw to 48-60 lb-in. (5-7 N·m).
21. Tighten two screws to 24 lb-in. (3 N·m).
22. Clear diagnostic codes (para 8-4).
### INITIAL SETUP

**Equipment Conditions**

- Engine shut down (TM 9-2320-366-10-1).

**References**

- TM 9-4910-571-12&P

### Tools and Special Tools

- Goggles, Industrial (Item 15, Appendix C)
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Pan, Drain (Item 24, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

---

### KNOWN INFO

- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Engine does not overheat.

### POSSIBLE PROBLEMS

- Faulty transmission oil cooler tubes.
- Faulty transmission oil cooler hoses.
- Faulty transmission oil cooler.
- Faulty transmission auxiliary oil cooler.
- Faulty transmission oil filters.
- Faulty WTEC II cab transmission harness.
- Faulty transmission external wiring harness.
- Faulty WTEC II TEPSS.

---

**START**

1. Does WTEC II TEPSS display main code 24?

**CAUTION**

Read CAUTION on following page.

**TEST OPTIONS**

- Visual inspection

**REASON FOR QUESTION**

If main code 24 is logged, WTEC II TEPSS has detected an unacceptable sump oil temperature.

---

**PREVIOUS PAGE**

- **NO**

**YES**

Go to step 8 of this fault.
Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

1. Position master power switch to on (TM 9-2320-366-10-1).
2. Check to see if main code 24 or main code 33 is logged in WTEC II TEPSS (para 8-4).
3. If main code 24 is logged:
   (a) WTEC II TEPSS has detected a sump oil temperature above (subcode 23) or below (subcode 12) operating limits.
   (b) Troubleshoot oil cooling system followed by sump oil temperature sensor and circuits.
4. If main code 33 is logged:
   (a) WTEC II TEPSS has detected a fault with sump oil temperature sensor or its circuit.
   (b) Go to step 8 of this fault.
5. Position master power switch to off (TM 9-2320-366-10-1).
f5. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 24 AND/OR 33 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Engine does not overheat.

**POSSIBLE PROBLEMS**
- Faulty transmission oil cooler tubes.
- Faulty transmission oil cooler hoses.
- Faulty transmission oil cooler.
- Faulty transmission auxiliary oil cooler.
- Faulty transmission oil filters.
- Faulty WTEC II cab transmission harness.
- Faulty transmission external wiring harness.
- Faulty WTEC II TEPSS.

2. Are transmission oil cooler tubes/hoses free of damage?

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
Damaged oil cooler tubes/hoses may cause WTEC II TEPSS to display main code 24 and/or 33.

**YES**
Replace transmission oil cooler tubes/hoses (paras 8-15, 8-16, 8-17, or 8-25).

**NO**
(1) Check transmission oil cooler tubes/hoses for damage and restrictions.
(2) If damage or restriction are present, replace transmission oil cooler tubes/hose (paras 8-15, 8-16, 8-17, or 8-25).

WARNING
Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.
**f5. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 24 AND/OR 33 AND ANY SUB CODE (CONT)**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission oil level OK.</td>
</tr>
<tr>
<td>Fuse OK.</td>
</tr>
<tr>
<td>Batteries OK.</td>
</tr>
<tr>
<td>Engine does not overheat.</td>
</tr>
<tr>
<td>Transmission oil cooler tubes OK.</td>
</tr>
<tr>
<td>Transmission oil cooler hoses OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty transmission auxiliary oil cooler.</td>
</tr>
<tr>
<td>Faulty transmission oil cooler.</td>
</tr>
<tr>
<td>Faulty transmission oil filters.</td>
</tr>
<tr>
<td>Faulty WTEC II cab transmission harness.</td>
</tr>
<tr>
<td>Faulty transmission external wiring harness.</td>
</tr>
<tr>
<td>Faulty WTEC II TEPSS.</td>
</tr>
</tbody>
</table>

**WARNING + CAUTION**

Read WARNING and CAUTION on following page.

**TEST OPTIONS**

Transmission Oil Inspection

**REASON FOR QUESTION**

Contaminated transmission oil may cause WTEC II TEPSS to display main code 24 and/or 33.

3. Is transmission oil free from coolant contamination?

   - **NO**
     - Replace transmission oil cooler (para 8-10) and change transmission oil (Appendix H).
   - **YES**
**WARNING**

Do not drain transmission oil when transmission is hot. Failure to comply may result in injury to personnel.

**CAUTION**

Transmission oil must be changed whenever there is evidence of oil breakdown or contamination. Oil breakdown or contamination may be caused from overheating transmission and/or oil cooler internal failure and is indicated by discoloration, strong odor, or oil analysis.

<table>
<thead>
<tr>
<th>TRANSMISSION OIL INSPECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Note</strong></td>
</tr>
<tr>
<td>Transmission fluid capacity is 42.3 qt (40 L).</td>
</tr>
</tbody>
</table>

2. Allow oil to circulate for a few minutes.
3. Position drain pan under transmission AOAP valve.
4. Remove drain plug from transmission AOAP valve and press plunger to extract oil from system.
5. Allow approximately 1 qt (0.9 L) of oil to drain into drain pan. Release plunger.
6. Install drain plug on transmission AOAP valve.
7. Inspect oil for coolant contamination.
8. If oil is contaminated, replace transmission oil cooler (para 8-10).
10. Add oil to transmission (Appendix H).
Does transmission auxiliary oil cooler fan operate?

**TEST OPTIONS**

Auxiliary Oil Cooler Fan Test

**REASON FOR QUESTION**

Transmission may overheat if fan does not operate which will cause WTEC II TEPSS to display main code 24 and/or 33 sub code 23.

**WARNING**

Read WARNING on following page.

**KNOWN INFO**

- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Engine does not overheat.
- Transmission oil cooler tubes OK.
- Transmission oil cooler hoses OK.
- Transmission oil cooler OK.

**POSSIBLE PROBLEMS**

- Faulty transmission auxiliary oil cooler.
- Faulty transmission oil filters.
- Faulty WTEC II cab transmission harness.
- Faulty transmission external wiring harness.
- Faulty WTEC II TEPSS.

**Perform Electrical System Troubleshooting**

- (e148. Transmission Auxiliary Oil Cooler Fan Does Not Operate (All Models Except M1088/M1089) or e149. M1088/M1089 Transmission Auxiliary Oil Cooler Fan Does Not Operate).
WARNING
Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

AUXILIARY OIL COOLER FAN TEST

(1) Raise cab (TM 9-2320-366-10-1).
(2) Disconnect connector clamp from water temperature sensor.
(3) Disconnect connector P36 from water temperature sensor (S56) to de-energize relay K15 and provide power to auxiliary oil cooler fan.
(4) Position master power switch to on (TM 9-2320-366-10-1).

NOTE
M1088/M1089 are equipped with two transmission auxiliary oil cooler fans.

(5) Check if auxiliary oil cooler fan comes on.
(6) If fan does not come on, perform Electrical System Troubleshooting (e148. Transmission Auxiliary Oil Cooler Fan Does Not Operate (All Models Except M1088/M1089) or e149. M1088/M1089 Transmission Auxiliary Oil Cooler Fan Does Not Operate).
(7) Position master power switch to off (TM 9-2320-366-10-1).
(8) Connect connector P36 to water temperature sensor (S56).
(9) Connect connector clamp on water temperature sensor.
(10) Lower cab (TM 9-2320-366-10-1).
f5. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 24 AND/OR 33 AND ANY SUB CODE (CONT)

**KNOWN INFO**

Transmission oil level OK.
Fuse OK.
Batteries OK.
Engine does not overheat.
Transmission oil cooler tubes OK.
Transmission oil cooler hoses OK.
Transmission oil cooler OK.

**POSSIBLE PROBLEMS**

Faulty transmission auxiliary oil cooler.
Faulty transmission oil filters.
Faulty WTEC II cab transmission harness.
Faulty transmission external wiring harness.
Faulty WTEC II TEPSS.

**TEST OPTIONS**

Visual Inspection

**REASON FOR QUESTION**

Transmission may overheat if auxiliary oil cooler fins are plugged with debris which will cause WTEC II TEPSS to display main code 24 and/or 33 sub code 23.

**WARNING**

Read WARNING on following page.

5. Are transmission auxiliary oil cooler fins free from dirt, mud, or other debris?

**NO**

**YES**

Clear transmission auxiliary oil cooler fins.
NOTE
M1088/M1089 are equipped with two transmission auxiliary oil cooler fans.

(1) Check if transmission auxiliary oil cooler fins are plugged with dirt, mud, or other debris.
(2) If fins are plugged with dirt, mud or other debris, clear transmission auxiliary oil cooler fins.

WARNING
Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.
6. Transmission oil level OK.
Fuse OK.
Batteries OK.
Engine does not overheat.
Transmission oil cooler tubes OK.
Transmission oil cooler hoses OK.
Transmission oil cooler OK.
Transmission auxiliary oil cooler OK.

POSSIBLE PROBLEMS
Faulty transmission oil filters.
Faulty WTEC II cab transmission harness.
Faulty transmission external wiring harness.
Faulty WTEC II TEPSS.

TEST OPTIONS
Visual Inspection

REASON FOR QUESTION
Plugged transmission oil filters may cause WTEC II TEPSS to display main code 24 and/or 33 sub code 23.

WARNING
Read WARNING on following page.

Are transmission oil filters free from damage?

YES
Replace transmission oil filters (para 8-9).

NO

TM 9-2320-366-20-2
WARNING

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

Check transmission oil filters for damage (para 8-9).
f5. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 24 AND/OR 33 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Engine does not overheat.
- Transmission oil cooler tubes OK.
- Transmission oil cooler hoses OK.
- Transmission oil cooler OK.
- Transmission auxiliary oil cooler OK.
- Transmission oil filters OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II cab transmission harness.
- Faulty transmission external wiring harness.
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present, or short circuits are found, WTEC II cab transmission harness is faulty.

**CAUTION**
Read CAUTION on following page.

7. Is continuity present from connector J119d and J119a to connector J115-13 and J115-1?

**YES**
Replace WTEC II cab transmission harness (para 7-137).

**NO**
<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove two screws and washers from front grille.</td>
</tr>
<tr>
<td>(2) Remove screw, washer and front grille from cab.</td>
</tr>
<tr>
<td>(3) Disconnect connector P119 from connector J119.</td>
</tr>
<tr>
<td>(4) Remove instrument panel assembly for access (para 7-15).</td>
</tr>
<tr>
<td>(5) Disconnect connector J115 (top connector) from WTEC II TEPSS.</td>
</tr>
<tr>
<td>(6) Install jumper wire from connector J119d to J119a.</td>
</tr>
<tr>
<td>(7) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(8) Connect positive (+) probe of multimeter to connector J115-13.</td>
</tr>
<tr>
<td>(9) Connect negative (-) probe of multimeter on J115-1 and note reading on multimeter.</td>
</tr>
<tr>
<td>(10) Connect negative (-) probe of multimeter to all other sockets in connector J115, one at a time, and note reading on multimeter.</td>
</tr>
<tr>
<td>(11) Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(12) Connect positive (+) probe of multimeter to connector J115-1.</td>
</tr>
<tr>
<td>(13) Connect negative (-) probe of multimeter to all other pins in connector J115 (except J115-13), one at a time, and note reading on multimeter.</td>
</tr>
<tr>
<td>(14) Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(15) If continuity is not present in step 9, or continuity is present in step 10, 11, 13, or 14, replace WTEC II cab transmission harness (para 7-137).</td>
</tr>
<tr>
<td>(16) Remove jumper wire from connector J119d to connector J119a.</td>
</tr>
<tr>
<td>(17) Connect connector J115 to WTEC II TEPSS.</td>
</tr>
<tr>
<td>(18) Install instrument panel assembly (para 7-15).</td>
</tr>
</tbody>
</table>
KNOWN INFO
Transmission oil level OK.
Fuse OK.
Batteries OK.
Engine does not overheat.
Transmission oil cooler tubes OK.
Transmission oil cooler hoses OK.
Transmission oil cooler OK.
Transmission auxiliary oil cooler OK.
Transmission oil filters OK.
WTEC II cab transmission harness OK.

POSSIBLE PROBLEMS
Faulty transmission external wiring harness.
Faulty WTEC II TEPSS.

CAUTION
Read CAUTION on following page.

TEST OPTIONS
Resistance Test or STE/ICE-R Test #91

REASON FOR QUESTION
If correct resistance is not present, or short circuits are found, transmission external wiring harness is faulty, notify DS Maintenance. If correct resistance is present and no short circuits are found, WTEC II TEPSS is faulty.

Is correct resistance present, and no short circuits found, from connector P119a to P119d?

NO

YES

Replace WTEC II TEPSS (para 8-2).

Notify DS Maintenance.
CAUTION
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

RESISTANCE TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter on P119a.

NOTE
Transmission sump oil temperature sensor resistance reading is affected by temperature. Refer to Table 2-19, Transmission Sump Oil Temperature Sensor Resistance Readings for details.

(3) Connect negative (-) probe of multimeter on P119d and note reading on multimeter.
(4) Connect negative (-) probe of multimeter to all other pins in connector P119, one at a time, and note reading on multimeter.
(5) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(6) Connect positive (+) probe of multimeter to connector P119d.
(7) Connect negative (-) probe of multimeter to all other pins in connector P119 (except P119a), one at a time, and note reading on multimeter.
(8) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(9) If correct resistance is not present in step 3, or continuity is present in step 4, 5, 7, or 8, notify DS Maintenance.
(10) If correct resistance is present in step 3 and continuity is not present in step 4, 5, 7, or 8, replace WTEC II TEPSS (para 8-2).
(11) Connect connector P119 to connector J119.
(12) Position front grille on cab with washer and screw.
(13) Position two washers and screws in front grille.
(14) Tighten screw to 48-60 lb-in. (5-7 N·m).
(15) Tighten two screws to 24 lb-in. (3 N·m).
(16) Clear diagnostic codes (para 8-4).

Table 2-19. Transmission Sump Oil Temperature Sensor Resistance Readings

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4° to 14° F (-20° to -10°C)</td>
<td>691-754 ohms</td>
</tr>
<tr>
<td>14° to 32° F (-10° to 0°C)</td>
<td>754-820 ohms</td>
</tr>
<tr>
<td>32° to 50° F (0° to 10°C)</td>
<td>820-889 ohms</td>
</tr>
<tr>
<td>50° to 68° F (10° to 20°C)</td>
<td>889-962 ohms</td>
</tr>
<tr>
<td>68° to 86° F (20° to 30°C)</td>
<td>962-1039 ohms</td>
</tr>
<tr>
<td>86° to 104° F (30° to 40°C)</td>
<td>1039-1118 ohms</td>
</tr>
<tr>
<td>104° to 122° F (40° to 50°C)</td>
<td>1118-1202 ohms</td>
</tr>
<tr>
<td>122° to 140° F (50° to 60°C)</td>
<td>1202-1286 ohms</td>
</tr>
</tbody>
</table>
**f6. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 32 AND ANY SUBCODE**

**INITIAL SETUP**

**Equipment Conditions**
- Engine shut down (TM 9-2320-366-10-1).

**References**
- TM 9-4910-571-12&P

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

---

**KNOWN INFO**

- Fuse OK.
- Batteries OK.

**POSSIBLE PROBLEMS**

- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

---

**START**

1. **CAUTION**
   - Read CAUTION on following page.

   Is continuity present from connector J119h and J119j to connector J115-27 and J115-28?

   **TEST OPTIONS**

   - Continuity Test or STE/ICE-R Test #91

   **REASON FOR QUESTION**

   If continuity is not present from connector J119j to connector J115-27, or continuity is present from J119j to any other J115 sockets or ground, WTEC II cab transmission harness is faulty.

   **YES**

   Replace WTEC II cab transmission harness (para 7-137).

   **NO**

   **CAUTION**

   - Read CAUTION on following page.
CAUTION

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

**CONTINUITY TEST**

(1) Remove two screws and washers from front grille.
(2) Remove screw and washer from front grille.
(3) Remove front grille from cab.
(4) Disconnect connector P119 from connector J119.
(5) Remove instrument panel assembly for access (para 7-15).
(6) Disconnect connector J115 (top connector) from WTEC II TEPSS.
(7) Install jumper wire from connector J119h to J119j.
(8) Set multimeter to ohms.
(9) Connect positive (+) probe of multimeter to connector J115-27.
(10) Connect negative (-) probe of multimeter to connector J115-28 and note reading on multimeter.
(11) Connect negative (-) probe of multimeter to all other sockets in connector J115, one at a time, and note reading on multimeter.
(12) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(13) If continuity is not present in step 10, or continuity is present in step 11 or step 12, replace WTEC II cab transmission harness (para 7-137).
(14) Connect connector P119 to connector J119.
(15) Position front grille on cab with washer and screw.
(16) Position two washers and screws in front grille.
(17) Tighten screw to 48-60 lb-in. (5-7 N·m).
(18) Tighten two screws to 24 lb-in. (3 N·m).
f6. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 32 AND ANY SUBCODE (CONT)

**KNOWN INFO**
- Fuse OK.
- Batteries OK.
- WTEC II cab transmission harness OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- WTEC II TEPSS Replacement Check

**REASON FOR QUESTION**
If WTEC II TEPSS is faulty, WTEC II TEPSS may display main code 32.

---

2. Does main code 32 appear on WTEC II TEPSS with new WTEC II TEPSS installed?

- **YES**
  - Replace WTEC II TEPSS (para 8-2).

- **NO**
  - Notify DS Maintenance.

TM 9-2320-366-20-2
### WTEC II TEPSS REPLACEMENT CHECK

1. Remove original WTEC II TEPSS (para 8-2).
2. Install replacement WTEC II TEPSS (para 8-2).
3. Install instrument panel assembly (para 7-15).
5. Road test vehicle and read WTEC II TEPSS codes (para 8-4).
6. If main code 32 does not appear with replacement WTEC II TEPSS installed, replace original WTEC II TEPSS (para 8-2).
7. If main code 32 appears with replacement WTEC II TEPSS installed, notify DS Maintenance.
f7. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 41, 42, 44, 45, 66, AND/OR 69 ANY SUB CODE

**INITIAL SETUP**

**Equipment Conditions**  
Engine shut down (TM 9-2320-366-10-1).

**Tools and Special Tools**  
Tool Kit, Genl Mech (Item 46, Appendix C)  
Multimeter, Digital (Item 22, Appendix C)  
Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)

**Tools and Special Tools (Cont)**  
STE/ICE-R (Item 41, Appendix C)

**References**  
TM 9-4910-571-12&P

---

**KNOWLEDGE INFO**

| Fuse OK.  
| Batteries OK. |

**POSSIBLE PROBLEMS**

Faulty WTEC II cab transmission harness.  
Faulty WTEC II TEPSS.

---

**START**

1. **CAUTION**  
Read CAUTION on following page.

   **Is continuity present, and short circuits absent, on transmission solenoid circuits from connector J119 to connector J114?**

   **YES**  
   Replace WTEC II cab transmission harness (para 7-137).

   **NO**  
   **TEST OPTIONS**  
   Continuity Test or  
   STE/ICE-R Test #91

   **REASON FOR QUESTION**  
   If continuity is not present, or short circuits are found, WTEC II cab transmission harness is faulty.
Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

**CONTINUITY TEST**

1. Remove two screws and washers from front grille.
2. Remove screw and washer from front grille.
3. Remove front grille from cab.
4. Disconnect connector P119 from connector J119.
5. Remove instrument panel assembly for access (para 7-15).
6. Disconnect connector J114 (bottom connector) from WTEC II TEPSS.
7. Install jumper wire on connector J119 for appropriate sub code. Refer to Table 2-20. WTEC II Cab Transmission Harness Transmission Solenoid Test Points.
8. Set multimeter to ohms.
9. Connect positive (+) probe of multimeter to connector J114. Refer to Table 2-20. WTEC II Cab Transmission Harness Transmission Solenoid Test Points.
10. Connect negative (-) probe of multimeter to all other sockets in connector J115, one at a time, and note reading on multimeter. Refer to Table 2-20. WTEC II Cab Transmission Harness Transmission Solenoid Test Points.
11. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
12. Connect negative (-) probe of multimeter to WTEC II TEPSS.
13. If continuity is not present in step 10, or continuity is present in step 11 or step 12, replace WTEC II cab transmission harness (para 7-137).
14. Connect connector J114 to WTEC II TEPSS.
15. Install instrument panel assembly (para 7-15).

**Table 2-20. WTEC II Cab Transmission Harness Transmission Solenoid Test Points**

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Jumper Across</th>
<th>Connector J114</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive (+)</td>
<td>Negative (-)</td>
</tr>
<tr>
<td>12</td>
<td>J119M to J119B</td>
<td>J114-2</td>
</tr>
<tr>
<td>13</td>
<td>J119T to J119N</td>
<td>J114-21</td>
</tr>
<tr>
<td>14</td>
<td>J119C to J119V</td>
<td>J114-30</td>
</tr>
<tr>
<td>15</td>
<td>J119W to J119B</td>
<td>J114-2</td>
</tr>
<tr>
<td>16</td>
<td>J119U to J119N</td>
<td>J114-21</td>
</tr>
<tr>
<td>21</td>
<td>J119F to J119H</td>
<td>J114-10</td>
</tr>
<tr>
<td>22</td>
<td>J119D to J119V</td>
<td>J114-30</td>
</tr>
<tr>
<td>23</td>
<td>J119P to J119S</td>
<td>J114-22</td>
</tr>
<tr>
<td>24</td>
<td>J119J to J119B</td>
<td>J114-2</td>
</tr>
<tr>
<td>25</td>
<td>J119K to J119A</td>
<td>J114-1</td>
</tr>
</tbody>
</table>
f7. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 41, 42, 44, 45, 66, AND/OR 69 ANY SUB CODE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuse OK.</td>
</tr>
<tr>
<td>Batteries OK.</td>
</tr>
<tr>
<td>WTEC II cab transmission harness OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty circuit from P119 to affected solenoid.</td>
</tr>
<tr>
<td>Faulty WTEC II TEPSS.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance Test or STE/ICE-R Test #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If correct resistance is not present at connector P119, DS Maintenance needs to be notified.</td>
</tr>
</tbody>
</table>

2. Is correct solenoid resistance present at connector P119?

- **YES**
  - Replace WTEC II TEPSS (para 8-2).
  - Notify DS Maintenance.

- **NO**
(1) Disconnect connector P119 from connector J119.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to connector P119. Refer to Table 2-21. Connector P119 Transmission Solenoid Resistance Test Points for appropriate sub code(s) and connector P119 pin(s).
(4) Connect negative (-) probe of multimeter to connector P119 and note reading on multimeter. Refer to Table 2-21. Connector P119 Transmission Solenoid Resistance Test Points for appropriate sub code(s) and connector P119 pin(s).

Transmission solenoid resistance is affected by temperature. Refer to Table 2-22. Transmission Solenoid Resistance Readings.

(5) If resistance reading indicates transmission solenoid is good, replace WTEC II TEPSS (para 8-2).
(6) If resistance reading indicates transmission solenoid is faulty, notify DS Maintenance.
(7) Connect connector P119 to connector J119.
(8) Position front grille on cab with washer and screw.
(9) Position two washers and screws in front grille.
(10) Tighten screw to 48-60 lb-in. (5-7 N·m).
(11) Tighten two screws to 24 lb-in. (3 N·m).
(12) Clear diagnostic codes (para 8-4).

### Table 2-21. Connector P119 Transmission Solenoid Resistance Test Points

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Connector P119 Positive (+) Probe</th>
<th>Connector P119 Negative (-) Probe</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>P119M</td>
<td>P119B</td>
</tr>
<tr>
<td>13</td>
<td>P119T</td>
<td>P119N</td>
</tr>
<tr>
<td>14</td>
<td>P119C</td>
<td>P119V</td>
</tr>
<tr>
<td>15</td>
<td>P119W</td>
<td>P119B</td>
</tr>
<tr>
<td>16</td>
<td>P119U</td>
<td>P119N</td>
</tr>
<tr>
<td>21</td>
<td>P119F</td>
<td>P119H</td>
</tr>
<tr>
<td>22</td>
<td>P119D</td>
<td>P119V</td>
</tr>
<tr>
<td>23</td>
<td>P119P</td>
<td>P119S</td>
</tr>
<tr>
<td>24</td>
<td>P119J</td>
<td>P119B</td>
</tr>
<tr>
<td>26</td>
<td>P119K</td>
<td>P119A</td>
</tr>
</tbody>
</table>

### Table 2-22. Transmission Solenoid Resistance Readings

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4° to 16°F (-20° to -10°C)</td>
<td>2.50-3.12 ohms</td>
</tr>
<tr>
<td>16° to 32°F (-10° to 0°C)</td>
<td>2.62-3.25 ohms</td>
</tr>
<tr>
<td>32° to 50°F (0° to 10°C)</td>
<td>2.74-3.38 ohms</td>
</tr>
<tr>
<td>50° to 68°F (10° to 20°C)</td>
<td>2.86-3.50 ohms</td>
</tr>
<tr>
<td>68° to 86°F (20° to 30°C)</td>
<td>2.98-3.62 ohms</td>
</tr>
<tr>
<td>86° to 104°F (30° to 40°C)</td>
<td>3.09-3.75 ohms</td>
</tr>
<tr>
<td>104° to 122°F (40° to 50°C)</td>
<td>3.21-3.88 ohms</td>
</tr>
<tr>
<td>122° to 140°F (50° to 60°C)</td>
<td>3.33-4.00 ohms</td>
</tr>
</tbody>
</table>
f8. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 43 AND ANY SUB CODE

**INITIAL SETUP**

**Equipment Conditions**
- Engine shut down (TM 9-2320-366-10-1).

**References**
- TM 9-4910-571-12&P

**Tools and Special Tools**
- Goggles, Industrial (Item 15, Appendix C)
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

---

**CAUTION**

Read CAUTION on following page.

**REASON FOR QUESTION**

If continuity is not present, or short circuits are found, WTEC II cab transmission harness is faulty.

---

**KNOWN INFO**

- Transmission oil level OK.
- Fuse OK.
- Batteries OK.

**POSSIBLE PROBLEMS**

- Faulty WTEC II cab transmission harness.
- Faulty transmission external wiring harness.
- Faulty WTEC II TEPSS.

---

**1.**

Is continuity present, and short circuits absent, on transmission solenoid circuits from connector J119 to connector J114?

---

**START**

**NO**

Replace WTEC II cab transmission harness (para 7-137).

**YES**

Continuity Test or STE/ICE-R Test #91
CAUTION

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

(1) Remove two screws and washers from front grille.
(2) Remove screw and washer from front grille.
(3) Remove front grille from cab.
(4) Disconnect connector P119 from connector J119.
(5) Remove instrument panel assembly for access (para 7-15).
(6) Disconnect connectors J114 and J115 from WTEC II TEPSS.
(7) Set multimeter to ohms.
(8) Connect positive (+) probe of multimeter to High side socket of connector J119. Refer to Table 2-23. Main Code 43 Sub Code 21 and 26 High Side Test Points.
(9) Connect negative (-) probe of multimeter to High side socket of connector J114 and note reading on multimeter. Refer to Table 2-23. Main Code 43 Sub Code 21 and 26 High Side Test Points.
(10) Connect negative (-) probe of multimeter to all other sockets in connector J114, one at a time, and note reading on multimeter.
(11) Connect negative (-) probe of multimeter to all sockets in connector J115, one at a time, and note reading on multimeter.
(12) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(13) If continuity is not present in step 9, or continuity is present in step 10, 11, or 12, replace WTEC II cab transmission harness (para 7-137).

Table 2-23. Main Code 43 Sub Code 21 and 26 High Side Test Points

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Connector J114</th>
<th>Connector J119</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>7</td>
<td>F</td>
</tr>
<tr>
<td>26</td>
<td>16</td>
<td>K</td>
</tr>
</tbody>
</table>
2. Is continuity present, and short circuits absent, on transmission solenoid circuits from connector J119 to connector J114?

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present, or short circuits are found, WTEC II cab transmission harness is faulty.

**YES**
Replace WTEC II cab transmission harness (para 7-137).

**NO**
(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector J119. Refer to Table 2-24. Main Code 43 Sub Code 21 and 26 Low Side Test Points.
(3) Connect negative (-) probe of multimeter to connector J114 and note reading on multimeter. Refer to Table 2-24. Main Code 43 Sub Code 21 and 26 Low Side Test Points.
(4) Connect negative (-) probe of multimeter to all other sockets in connector J114, one at a time, and note reading on multimeter.
(5) Connect negative (-) probe of multimeter to all sockets in connector J115, one at a time, and note reading on multimeter.
(6) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(7) If continuity is not present in step 3, or continuity is present in step 4, 5, or 6, replace WTEC II cab transmission harness (para 7-137).

Table 2-24. Main Code 43 Sub Code 21 and 26 Low Side Test Points

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Connector J114</th>
<th>Connector J119</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>10</td>
<td>H</td>
</tr>
<tr>
<td>26</td>
<td>1</td>
<td>A</td>
</tr>
</tbody>
</table>
f8. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 43 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Fuse OK.
- Batteries OK.
- WTEC II cab transmission harness OK.

**POSSIBLE PROBLEMS**
- Faulty transmission external wiring harness.
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- Resistance Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If driver solenoids F and N do not have the proper resistance, WTEC II TEPSS may display main code 43.

---

**3.** Is 3.26-4.4 ohms resistance present across connector P119 pins for affected solenoid circuit(s)?

- **NO**
  - **YES** Replace WTEC II TEPSS (para 8-2).
  - **Notify DS Maintenance.**
RESISTANCE TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P119. Refer to Table 2-25. Transmission Solenoid F and G Resistance Test Points.
(3) Connect negative (-) probe of multimeter to connector P119 and note reading on multimeter. Refer to Table 2-25. Transmission Solenoid F and G Resistance Test Points.
(4) Connect negative (-) probe of multimeter to all other pins in connector P119, one at a time, and note reading on multimeter.
(5) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(6) If good resistance is not noted in step 3, or continuity is present in step 4 or step 5, transmission harness external wiring harness may be faulty, notify DS Maintenance.
(7) If good resistance is noted in step 3, and continuity is not present in step 4 or step 5, replace WTEC II TEPSS (para 8-2).
(8) Connect connector P119 to connector J119.
(9) Position front grille on cab with washer and screw.
(10) Position two washers and screws in front grille.
(11) Tighten screw to 48-60 lb-in. (5-7 N·m).
(12) Tighten two screws to 24 lb-in. (3 N·m).
(13) Connect connectors J114 and J115 to WTEC II TEPSS.
(14) Install instrument panel assembly (para 7-15).
(15) Clear diagnostic codes (para 8-4).

Table 2-25. Transmission Solenoids F and G Resistance Test Points

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Affected Solenoid</th>
<th>Connector P119 High</th>
<th>Connector P119 Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>F</td>
<td>F</td>
<td>H</td>
</tr>
<tr>
<td>26</td>
<td>N</td>
<td>K</td>
<td>A</td>
</tr>
</tbody>
</table>
f9. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 52 AND ANY SUB CODE

**INITIAL SETUP**

**Equipment Conditions**
Engine shut down (TM 9-2320-366-10-1).

**References**
TM 9-4910-571-12&P

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)
- STE/ICE-R (Item 41, Appendix C)

**KNOWN INFO**
- Fuse OK.
- Batteries OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II cab transmission harness.
- Faulty transmission external wiring harness.
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, or short circuits are found, WTEC II cab transmission harness is faulty.

**CAUTION**
Read CAUTION on following page.

**START**

1. **Is continuity present from connector J 119h to connector J 115-27?**

   - **NO**
   - **YES**

   - **YES** Replace WTEC II cab transmission harness (para 7-137).

   - **NO**
CAUTION
Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove two screws and washers from front grille.</td>
</tr>
<tr>
<td>2</td>
<td>Remove screw and washer from front grille.</td>
</tr>
<tr>
<td>3</td>
<td>Remove front grille on cab.</td>
</tr>
<tr>
<td>4</td>
<td>Disconnect connector P119 from connector J119.</td>
</tr>
<tr>
<td>5</td>
<td>Remove instrument panel assembly for access (para 7-15).</td>
</tr>
<tr>
<td>6</td>
<td>Disconnect connector J115 (top connector) from WTEC II TEPSS.</td>
</tr>
<tr>
<td>7</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>8</td>
<td>Connect positive (+) probe of multimeter to connector J119h.</td>
</tr>
<tr>
<td>9</td>
<td>Connect negative (-) probe of multimeter to connector J115-27 and note reading on multimeter.</td>
</tr>
<tr>
<td>10</td>
<td>Connect negative (-) probe of multimeter to all other sockets in connector J115, one at a time, and note reading on multimeter.</td>
</tr>
<tr>
<td>11</td>
<td>Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>12</td>
<td>If continuity is not present in step 9, or continuity is present in step 10 or step 11, replace WTEC II cab transmission harness (para 7-137).</td>
</tr>
</tbody>
</table>
Known Info
- Fuse OK.
- Batteries OK.

Possible Problems
- Faulty WTEC II cab transmission harness.
- Faulty transmission external wiring harness.
- Faulty WTEC II TEPSS.

2.
Is continuity present from connector J119j to connector J115-27 and absent from J119j to all other J115 sockets and ground?

Reason for Question
If continuity is not present from connector J119j to connector J115-27, or continuity is present from J119j to any other J115 sockets or ground, WTEC II cab transmission harness is faulty.

Test Options
- Continuity Test or STE/ICE-R Test #91

Yes
Replace WTEC II cab transmission harness (para 7-137).

No
### CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector J119.
3. Connect negative (-) probe of multimeter to connector J115-28 and note reading on multimeter.
4. Connect negative (-) probe of multimeter to all other sockets in connector J115, one at a time, and note reading on multimeter.
5. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
6. If continuity is not present in step 3, or continuity is present in step 4 or step 5, replace WTEC II cab transmission harness (para 7-137).
f9. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 52 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Fuse OK.
- Batteries OK.
- WTEC II cab transmission harness OK.

**POSSIBLE PROBLEMS**
- Faulty transmission external wiring harness.
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- Resistance Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If resistance is high (20,000 ohms or higher), WTEC II TEPSS is faulty.

<table>
<thead>
<tr>
<th>3.</th>
<th>Is high resistance (20,000 ohms or higher) present from connector P119h to P119j?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Recheck wire harnesses and connectors.</td>
</tr>
<tr>
<td>YES</td>
<td>Notify DS Maintenance.</td>
</tr>
</tbody>
</table>

Replace WTEC II TEPSS (para 8-2).
<table>
<thead>
<tr>
<th>RESISTANCE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to connector P119h.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to connector P119j and note reading on multimeter.</td>
</tr>
<tr>
<td>(4) If resistance is high (20,000 ohms or higher), replace WTEC II TEPSS (para 8-2).</td>
</tr>
<tr>
<td>(5) If resistance is low (less than 20,000 ohms), notify DS Maintenance.</td>
</tr>
<tr>
<td>(6) Connect connector J115 to WTEC II TEPSS.</td>
</tr>
<tr>
<td>(7) Install instrument panel assembly (para 7-15).</td>
</tr>
<tr>
<td>(8) Connect connector P119 to connector J119.</td>
</tr>
<tr>
<td>(9) Position front grille on cab with washer and screw.</td>
</tr>
<tr>
<td>(10) Position two washers and screws in front grille.</td>
</tr>
<tr>
<td>(11) Tighten screw to 48-60 lb-in. (5-7 N·m).</td>
</tr>
<tr>
<td>(12) Tighten two screws to 24 lb-in. (3 N·m).</td>
</tr>
<tr>
<td>(13) Clear diagnostic codes (para 8-4).</td>
</tr>
</tbody>
</table>
f10. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 57 AND ANY SUB CODE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Pan, Drain (Item 24, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Wrench Set, Socket (Item 51, Appendix C)

Materials/Parts
Packing, Preformed (Item 197, Appendix G)
Adapter, Straight, Pipe to Tube (Item 1.2, Appendix D)
Adapter, Straight, Tube to Boss (Item 1.3, Appendix D)
Hose Assembly, Nonmetallic (Item 24.13, Appendix D)

Personnel Required
(2)

References
TM 9-491-571-12&P

WARNING
CAUTION
Read WARNING and CAUTION on following page.

1. Is zero pressure present on C3 clutch when shift is made into affected range?

TEST OPTIONS
Clutch Pressure Test or STE/ICE-R Test #50

REASON FOR QUESTION
If there is pressure to C3 clutch when shift is made, DS Maintenance needs to be notified.

YES

NO

Notify DS Maintenance.
WARNING

Wear approved eye protection when performing transmission pressure checks. If oil contacts eyes, seek medical attention immediately. Failure to comply may result in injury to personnel.

CAUTION

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

**CLUTCH PRESSURE TEST**

(1) Remove front and intermediate propeller shafts (para 9-2).
(2) Position drain pan under C3 pressure tap plug.
(3) Remove C3 pressure tap plug and preformed packing from control valve module. Discard preformed packing.
(4) Connect tube to boss adapter, hose, and pipe to tube adapter to C3 pressure tap.
(5) Perform STE/ICE-R Test #50 (TM 9-4910-571-12&P).
(6) Start engine (TM 9-2320-366-10-1) and run at idle.
(7) With parking brake applied, make shift indicated by sub code while assistant notes reading on STE/ICE-R.
(8) If pressure does not drop to zero in selected range indicated by code values, gaskets or C solenoid may be faulty in control valve module, notify DS Maintenance.
(9) Shut down engine (TM 9-2320-366-10-1).
(10) Remove pipe to tube adapter, hose, and tube to boss adapter from C3 pressure tap.
(11) Position preformed packing and C3 pressure tap plug in control valve module.
(12) Tighten C3 pressure tap plug to 84-120 lb-in. (9-14 N·m).
(13) Remove drain pan under C3 pressure tap.
(14) Install front and intermediate propeller shafts (para 9-2).

---

**Table 2-26. Sub Code Range**

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Sub Code Meaning</th>
<th>Range VER</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1st</td>
<td>Range VER</td>
</tr>
<tr>
<td>22</td>
<td>2nd</td>
<td>Range VER</td>
</tr>
<tr>
<td>44</td>
<td>4th</td>
<td>Range VER</td>
</tr>
<tr>
<td>66</td>
<td>6th</td>
<td>Range VER</td>
</tr>
<tr>
<td>88</td>
<td>N1</td>
<td>Range VER</td>
</tr>
<tr>
<td>99</td>
<td>N2/N4</td>
<td>Range VER</td>
</tr>
</tbody>
</table>
f10. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 57 AND ANY SUB CODE

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission oil level OK.</td>
</tr>
<tr>
<td>Fuse OK.</td>
</tr>
<tr>
<td>Batteries OK.</td>
</tr>
<tr>
<td>WTEC II cab transmission harness OK.</td>
</tr>
<tr>
<td>Transmission external wiring harness OK.</td>
</tr>
<tr>
<td>Control valve module OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty WTEC II TEPSS.</td>
</tr>
<tr>
<td>Faulty C3 pressure switch.</td>
</tr>
</tbody>
</table>

**2. Is 2 ohms (or less) resistance present from connector P119h to P119j?**

- **NO**
  - Notify DS Maintenance.

- **YES**
  - Replace WTEC II TEPSS (para 8-2).

**TEST OPTIONS**
- Resistance Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If resistance is greater than 2 ohms, WTEC II TEPSS is faulty.
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

RESISTANCE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove two screws and washers from front grille.</td>
</tr>
<tr>
<td>2</td>
<td>Remove screw and washer from front grille.</td>
</tr>
<tr>
<td>3</td>
<td>Remove front grille from cab.</td>
</tr>
<tr>
<td>4</td>
<td>Disconnect connector P119 from connector J119.</td>
</tr>
<tr>
<td>5</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>6</td>
<td>Connect positive (+) probe of multimeter to connector P119h.</td>
</tr>
<tr>
<td>7</td>
<td>Connect negative (-) probe of multimeter to connector P119j and note reading on multimeter.</td>
</tr>
<tr>
<td>8</td>
<td>If 2 ohms (or less) resistance is present, the C3 pressure switch may be faulty, notify DS Maintenance.</td>
</tr>
<tr>
<td>9</td>
<td>If resistance is greater than 2 ohms, replace WTEC II TEPSS (para 8-2).</td>
</tr>
<tr>
<td>10</td>
<td>Connect connector P119 to connector J119.</td>
</tr>
<tr>
<td>11</td>
<td>Position front grille on cab with washer and screw.</td>
</tr>
<tr>
<td>12</td>
<td>Position two washers and screws in front grille.</td>
</tr>
<tr>
<td>13</td>
<td>Tighten screw to 48-60 lb-in. (5-7 N·m).</td>
</tr>
<tr>
<td>14</td>
<td>Tighten two screws to 24 lb-in. (3 N·m).</td>
</tr>
<tr>
<td>15</td>
<td>Clear diagnostic codes (para 8-4).</td>
</tr>
</tbody>
</table>

CAUTION
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.
 INITIAL SETUP

**Equipment Conditions**  
Engine shut down (TM 9-2320-366-10-1).

**Tools and Special Tools**  
Tool Kit, Genl Mech (Item 46, Appendix C)  
Goggles, Industrial (Item 15, Appendix C)  
Wrench Set, Socket (Item 51, Appendix C)  
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)  
Wrench, Torque, 0-175 lb ft (Item 58, Appendix C)  
STE/ICE-R (Item 41, Appendix C)

**Materials/Parts**  
Packing, Preformed (Item 197, Appendix G)  
Adapter, Straight, Pipe to Tube (Item 1.2, Appendix D)  
Adapter, Straight, Tube to Boss (Item 1.3, Appendix D)  
Hose Assembly, Nonmetallic (Item 24.13, Appendix D)

**References**  
TM 9-4910-571-12&P

---

**KNOWLEDGE INFO**

- Transmission oil level OK.
- Oil not contaminated.
- Operation temperature normal.
- No codes logged in ECU.

**POSSIBLE PROBLEMS**

- Faulty PTO engagement.
- Faulty scavenge pump engagement.
- Faulty oil pump.
- Faulty flexplate.
- Faulty propeller shafts and/or universal joints.
- Faulty transmission transfer case.

---

**START**

1. Is transmission noise present when vehicle is in neutral?

**TEST OPTIONS**

- Noise Check

**REASON FOR QUESTION**

- Some transmission faults will only be audible when vehicle is in motion.

---

**YES**

Go to step 6 of this fault.

**NO**
NOISE CHECK

(1) Check if noise is heard when transmission is in neutral.
(2) If noise is present when vehicle is in motion, probable causes are faulty propeller drive shafts, or faulty transfer case bearings.
11. TRANSMISSION UNUSUALLY NOISY WHEN OPERATING (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission oil level OK. Oil not contaminated. Operating temperature normal. No codes logged in ECU.</td>
<td>Noise Check</td>
<td>Worn transmission gear teeth and/or PTO gear teeth will cause a noisy transmission.</td>
</tr>
</tbody>
</table>

| POSSIBLE PROBLEMS | | |

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission oil level OK. Oil not contaminated. Operating temperature normal. No codes logged in ECU. PTO engagement OK.</td>
<td>Visual Inspection and Scavenge Pump Suction Test</td>
<td>Worn transmission gear teeth and/or scavenge pump gear will cause a noisy transmission.</td>
</tr>
</tbody>
</table>

| POSSIBLE PROBLEMS | | |

2. Does operating noise increase when PTO is engaged?

- NO
- YES
  - Notify DS Maintenance.

3. Is scavenge pump free from damage?

- NO
- YES
  - Notify DS Maintenance.

CAUTION Read CAUTION on following page.
### NOISE CHECK

2. Listen for unusual noise or increase in noise from PTO.
3. If transmission is noisy when PTO is engaged, transmission gear teeth are faulty and / or PTO gear teeth are faulty. Notify DS Maintenance.
5. Shut down engine (TM 9-2320-366-10-1).

### CAUTION

Be sure to shut down engine immediately after test has been completed. Failure to comply may result in damage to transmission.

### SCAVENGE PUMP SUCTION TEST

1. Place drain pan under transfer case.
2. Disconnect scavenge pump suction hose at transfer case.
4. If oil drips or runs from fitting on transfer case, scavenge is not picking up oil from transmission transfer case causing it to overflow.
5. Perform scavenge pump suction test.
7. Connect scavenge pump suction hose to transfer case.
8. Remove drain pan under transfer case.
**Known Info**
Transmission oil level OK.
Oil not contaminated.
Operating temperature normal.
No codes logged in ECU.
PTO engagement OK.
Scavenge pump engagement OK.

**Possible Problems**
Faulty oil pump.
Faulty flexplate bolts.
Faulty flexplate.
Faulty propeller shafts and/or universal joints.
Faulty transmission transfer case.

---

**Test Options**
Main Pressure Test or STE/ICE-R Test #50

**Reason for Question**
Low main oil pressure causes main regulator valve to oscillate.

---

**Warning**
Read WARNING on following page.

---

4. Is 218-276 psi (1,503-1,903 kPa) present at main oil pressure tap?

---

**Yes**
Notify DS Maintenance.

---

**No**
WARNING

Wear approved eye protection when performing transmission pressure checks. If oil contacts eyes, seek medical attention immediately. Failure to comply may result in injury to personnel.

MAIN OIL PRESSURE TEST

(1) Position drain pan under pressure tap.
(2) Remove main pressure tap plug and preformed packing from control valve module. Discard preformed packing.
(3) Connect tube to boss adapter, hose, and pipe to tube adapter to main pressure tap.
(4) Perform STE/ICE-R Test # 50 (TM 9-4910-571-12&P).
(5) Start engine (TM 9-2320-366-10-1) and run at idle.
(6) With parking brake applied, position WTEC II TEPSS to R position then to N position while assistant notes readings on STE/ICE-R.
(7) Shut down engine (TM 9-2320-366-10-1).
(8) If main oil pressure is low, oil pump is faulty. Notify DS Maintenance.
(9) If oil pressure is good, moving components in transmission are faulty. Notify DS Maintenance.
(10) Remove pipe to tube adapter, hose, and tube to boss adapter from main pressure tap.
(11) Position preformed packing and main pressure tap plug in control valve module.
(12) Tighten pressure tap plug to 84-120 lb-in. (9-14 N·m).
(13) Remove drain pan under pressure tap.
f11. TRANSMISSION UNUSUALLY NOISY WHEN OPERATING (CONT)

### KNOWN INFO
- Transmission oil level OK.
- Oil not contaminated.
- Operating temperature normal.
- No codes logged in ECU.
- PTO engagement OK.
- Scavenge pump engagement OK.
- Oil pump OK.

### POSSIBLE PROBLEMS
- Faulty flexplate bolts.
- Faulty flexplate.
- Faulty propeller shafts and / or universal joints.
- Faulty transmission transfer case.

### TEST OPTIONS

<table>
<thead>
<tr>
<th>Visual Inspection</th>
</tr>
</thead>
</table>

### REASON FOR QUESTION
Loose transmission to engine flexplate bolts and / or damaged flexplate will cause transmission to be unusually noisy when operating.

### S.
- Are transmission to engine flexplate bolts tight?

- **NO**
  - Tighten bolts to 33-47 lb-ft (45-64 N-m)

- **YES**
  - Notify DS Maintenance.
(1) Remove four bolts from engine flywheel housing plate.
(2) Turn engine alternator pulley in clockwise direction to reposition transmission flexplate for transmission to engine flexplate bolt inspection.
(3) Inspect bolts in flexplate for looseness.
(4) Inspect flexplate for play or damage.
(5) If bolts are loose, transmission will make noise.
(6) Tighten bolts in flexplate.
(7) If flexplate has play or visible signs of damage, flexplate is faulty.
**TRANSMISSION UNUSUALLY NOISY WHEN OPERATING (CONT)**

**KNOWN INFO**
- Transmission oil level OK.
- Oil not contaminated.
- Operating temperature normal.
- No codes logged in ECU.
- PTO engagement OK.
- Scavenge pump engagement OK.
- Oil pump OK.
- Flexplate bolts OK.
- Flexplate OK.

**POSSIBLE PROBLEMS**
- Faulty propeller shafts and / or universal joints.
- Faulty transmission transfer case.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
Damaged propeller shaft could cause transmission to be usually noisy when operating.

6. **WARNING**
Read WARNING on following page.

Is transmission propeller shaft free from damage?

- **NO**
  - **NOTIFY DS Maintenance.**

- **YES**
  - Replace propeller shaft(s) and / or universal joints (para 9-2)
WARNING

Wear approved eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

(1) Inspect propeller shaft for loose universal joints, bent tubing, or missing balance weights.
(2) If propeller shafts and universal joints are undamaged, bearings in transmission transfer case are faulty. Notify DS Maintenance.
f12. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 21 AND ANY SUB CODE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-365-10).

Tools and Special Tools
Tool Kit, Genl Mech (Item 44, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
STE/ICE-R (Item 39, Appendix C)

References
TM 9-4910-571-12&P

Personnel Required
(2)

KNOWINFO
Fuse OK.
Transmission oil level OK.
Batteries OK.

POSSIBLE PROBLEMS
Faulty WTEC II cab transmission harness.
Faulty TPS cable assembly.
Faulty WTEC II TEPSS.

START

CAUTION
Read CAUTION on following page.

1. Does main code 21 repeat after code has been manually cleared and throttle counts reset?

NO

YES

Fault corrected.

TEST OPTIONS
WTEC II TEPSS Reset Check

REASON FOR QUESTION
Main code 21 may appear on WTEC II TEPSS if voltage from TPS to WTEC II TEPSS is temporarily lost.
CAUTION

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

Main display code 21 needs to be cleared manually from WTEC II TEPSS after a maintenance task has been performed and before vehicle is returned to service (para 8-4).

WTEC II TEPSS RESET CHECK

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Cycle master power switch to on (TM 9-2320-365-10), then to off five times to clear existing throttle count settings.</td>
<td></td>
</tr>
<tr>
<td>(2) Position master power switch to on (TM 9-2320-365-10).</td>
<td></td>
</tr>
<tr>
<td>(3) Depress accelerator pedal from idle position to full throttle position (TM 9-2320-365-10) to set new 0% and 100% throttle count values in WTEC II TEPSS.</td>
<td></td>
</tr>
<tr>
<td>(4) Clear diagnostic code from WTEC II TEPSS (para 8-4).</td>
<td></td>
</tr>
<tr>
<td>(5) If main code 21 does not reappear, electrical communication between WTEC II TEPSS and TPS may be faulty.</td>
<td></td>
</tr>
<tr>
<td>(6) If main code 21 reappears, TPS may be faulty.</td>
<td></td>
</tr>
<tr>
<td>(7) Position master power switch to off (TM 9-2320-365-10).</td>
<td></td>
</tr>
</tbody>
</table>
12. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 21 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Fuse OK.
- Transmission oil level OK.
- Batteries OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.
- Faulty TPS cable assembly.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
Main code 21 in conjunction with main code 33 indicates loss of common ground.

2. Is main code 33 logged in conjunction with main code 21?

- **YES**
  - Go to step 4 of this fault.

- **NO**
(1) Position master power switch to on (TM 9-2320-365-10).
(2) Press MODE button on WTEC II TEPSS to bring up second code (if any).
(3) If main code 33 displays at WTEC II TEPSS, common ground may have been lost.
(4) If main code 21 is the only code displayed TPS may be faulty. Go to step 4 of this fault.
(5) Position master power switch to off (TM 9-2320-365-10).
Is continuity for common ground present from connector J115-1 to connector J119Z and J119a?

**NO**

**YES**

- Replace WTEC II cab transmission harness (para 7-137).
- Replace WTEC II TEPSS (para 8-2).

**KNOWN INFO**
- Fuse OK.
- Transmission oil level OK.
- Batteries OK.
- TPS cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity for common ground is absent, main code 33 will be logged in addition to main code 21.
1. Remove two screws and washers from front grille.
2. Remove screw and washer from front grille.
3. Remove front grille from cab.
4. Disconnect connector P119 from connector J119.
5. Remove instrument panel assembly for access (para 7-15).
6. Disconnect connector J115 (top connector) from WTEC II TEPSS.
7. Set multimeter to ohms.
8. Connect positive (+) probe of multimeter to connector J115-1.
9. Connect negative (-) probe of multimeter to connector J119a and note reading on multimeter.
10. Connect negative (-) probe of multimeter to connector J119Z and note reading on multimeter.
11. If continuity is not present from connector J115-1 to connector J119a and J119Z, replace WTEC II cab transmission harness (para 7-137).
12. If continuity is present, replace WTEC II TEPSS (para 8-2).
13. Install instrument panel assembly (para 7-15).
15. Position front grille on cab with washer and screw.
16. Position two washers and screws in front grille.
17. Tighten screw to 48-60 lb-in. (5-7 N·m).
18. Tighten two screws to 24 lb-in. (3 N·m).
KNOWN INFO
Fuse OK.
Transmission oil level OK.
Batteries OK.

POSSIBLE PROBLEMS
Faulty TPS cable assembly.
Faulty WTEC II cab transmission harness.
Faulty WTEC II TEPSS.

4. Is TPS cable assembly properly adjusted?

NO

YES

Adjust bracket assembly.

TEST OPTIONS
Linkage Test

REASON FOR QUESTION
Main code 21 will be displayed on WTEC II TEPSS if TPS cable assembly is out of adjustment.

KNOWN INFO
Fuse OK.
Transmission oil level OK.
Batteries OK.

POSSIBLE PROBLEMS
Faulty TPS cable assembly.
Faulty WTEC II cab transmission harness.
Faulty WTEC II TEPSS.

5. Is TPS operating?

NO

YES

Replace TPS cable assembly (para 4-16).

TEST OPTIONS
Continuity Test or STE/ICE-R Test #91

REASON FOR QUESTION
Main code 21 will be displayed on WTEC II TEPSS if TPS is faulty.
### RESISTANCE TEST

1. Disconnect connector P73 from TPS connector.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter to TPS terminal A.
4. Connect negative (-) probe of multimeter to TPS terminal C and verify multimeter reads between 9,000-15,000 ohms across terminals A and C.
5. Disconnect negative (-) probe of multimeter from terminal C.
6. Connect negative (-) probe of multimeter to TPS terminal B and note record on multimeter.
7. Move governor linkage to high idle stop and record reading on multimeter.
8. Return governor linkage to low idle stop.
9. Verify that difference between highest (high idle) reading and lowest (low idle) reading is between 4,000 and 6,000 ohms.
10. Verify that highest (high idle) reading does not exceed 15,000 ohms.
11. If resistance readings are not within limits, replace TPS cable assembly (para 4-16).

### LINKAGE TEST

1. Raise cab (TM 9-2320-366-10-1).
2. Verify distance between hitch pin clip on end of sensor rod and center of cable groove in ferrule is 4 in. (10 cm).
3. If distance is not 4 in. (10 cm), adjust bracket assembly to obtain correct measurement.
**f12. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 21 AND ANY SUB CODE (CONT)**

**KNOWN INFO**
- Fuse OK.
- Transmission oil level OK.
- Batteries OK.
- TPS cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE-R Test #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity is not present, DS Maintenance needs to be notified.</td>
</tr>
</tbody>
</table>

**6.** Is continuity present from connector P73 to connector P119?

- **NO**
- **YES** Notify DS Maintenance.

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE-R Test #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If any throttle position sensor wire is shorted, DS Maintenance needs to be notified.</td>
</tr>
</tbody>
</table>

**7.** Are throttle position sensor wires free from short circuits at connector P119?

- **NO**
- **YES** Notify DS Maintenance.
**CONTINUITY TEST**

1. Disconnect connector P119 from connector J119.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter to connector P119R.
4. Connect negative (-) probe of multimeter to connector P73 pin C and note reading on multimeter.
5. Connect positive (+) probe of multimeter to connector P119f.
6. Connect negative (-) probe of multimeter to connector P73 pin B and note reading on multimeter.
7. Connect positive (+) probe of multimeter to connector P119Z.
8. Connect negative (-) probe of multimeter to connector P73 pin A and note reading on multimeter.
9. If continuity is not present on one or more wires, notify DS Maintenance.

---

**CONTINUITY TEST**

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector P119R.
3. Connect negative (-) probe of multimeter to all other pins in connector P119, one at a time, and note reading on multimeter.
4. If continuity is found between pin R and any other pin, notify DS Maintenance.
5. Perform steps (2) and (3) for P119f and P119Z.
6. If continuity is found between pin f and any other pin, or between pin Z and any other pin, notify DS Maintenance.
7. Connect connector P73 to TPS connector.
Figure 12. WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 21 and Any Sub Code (Cont)

**Known Info**
- Fuse OK.
- Transmission oil level OK.
- Batteries OK.
- TPS cable assembly OK.

**Possible Problems**
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

**Test Options**
- Continuity Test or STE/ICE-R Test #91

**Reason for Question**
- If continuity is not present, WTEC II cab transmission harness is faulty.

8. Is continuity present from connector J119 to connector J114?

- **No**
  - Replace WTEC II cab transmission harness (para 7-137).

- **Yes**
CONTINUITY TEST

(1) Lower cab (TM 9-2320-366-10-1).
(2) Remove two screws and washers from front grille.
(3) Remove screw and washer from front grille.
(4) Remove front grille from cab.
(5) Remove instrument panel assembly for access (para 7-15).
(6) Disconnect connector J114 (bottom connector) at WTEC II TEPSS.
(7) Set multimeter to ohms.
(8) For each line of Table 2-27. WTEC II Cab Transmission Harness Continuity Check:
   (a) Install jumper wire across sockets in column 1.
   (b) Connect positive (+) probe of multimeter to socket in column 2.
   (c) Connect negative (-) probe of multimeter to socket in column 3 and note reading on multimeter.
(9) If continuity is not present on any wire in Table 2-27. WTEC II Cab Transmission Harness Continuity Check, replace WTEC II cab transmission harness (para 7-137).
(10) Remove jumper wire from connector J119.

Table 2-27. WTEC II Cab Transmission Harness Continuity Check

<table>
<thead>
<tr>
<th>Column 1 Jumper Across:</th>
<th>Column 2 Positive (+) Probe to:</th>
<th>COLUMN 3 Negative (-) probe to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>J119f to J119Z</td>
<td>J115-1</td>
<td>J115-22</td>
</tr>
<tr>
<td>J119Z to J119R</td>
<td>J115-1</td>
<td>J114-24</td>
</tr>
<tr>
<td>J119f to J119R</td>
<td>J115-22</td>
<td>J114-24</td>
</tr>
</tbody>
</table>
9. Are TPS wires free from short circuits at connectors J114 and J115?

- **YES**
  - Replace WTEC II cab transmission harness (para 7-137).

- **NO**
  - Replace WTEC II cab transmission harness (para 7-137).

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
WTEC II TEPSS may display main code 21 if wire is shorted to another in the harness.

**KNOWN INFO**
- Fuse OK.
- Transmission oil level OK.
- Batteries OK.
- TPS cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.
<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Disconnect connector J115 (top connector) from WTEC II TEPSS.</td>
</tr>
<tr>
<td>2</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>3</td>
<td>Connect positive (+) probe of multimeter to connector J114-24.</td>
</tr>
<tr>
<td>4</td>
<td>Connect negative (-) probe of multimeter to all other sockets in connector J114, one at a time, and all sockets in connector J115, one at a time, and note readings on multimeter.</td>
</tr>
<tr>
<td>5</td>
<td>Connect positive (+) probe of multimeter to connector J115-1.</td>
</tr>
<tr>
<td>6</td>
<td>Connect negative (-) probe of multimeter to all other sockets in connector J115, one at a time, and all sockets in connector J114, one at a time, and note readings on multimeter.</td>
</tr>
<tr>
<td>7</td>
<td>Connect positive (+) probe of multimeter to connector J115-22.</td>
</tr>
<tr>
<td>8</td>
<td>Connect negative (-) probe of multimeter to all other sockets in connector J115, one at a time, and all sockets in connector J114, one at a time, and note readings on multimeter.</td>
</tr>
<tr>
<td>9</td>
<td>If continuity is present in step 4, 6, or 8, replace WTEC II cab transmission harness (para 7-137).</td>
</tr>
<tr>
<td>10</td>
<td>If continuity is not present in step 4, 6, and 8, replace WTEC II TEPSS (para 8-2).</td>
</tr>
<tr>
<td>11</td>
<td>Connect connector J114 (bottom connector) to WTEC II TEPSS.</td>
</tr>
<tr>
<td>12</td>
<td>Connect connector J115 (top connector) to WTEC II TEPSS.</td>
</tr>
<tr>
<td>13</td>
<td>Install instrument panel assembly (para 7-15).</td>
</tr>
<tr>
<td>14</td>
<td>Connect connector P119 to connector J119.</td>
</tr>
<tr>
<td>15</td>
<td>Position front grille on cab with washer and screw.</td>
</tr>
<tr>
<td>16</td>
<td>Position two washers and screws in front grille.</td>
</tr>
<tr>
<td>17</td>
<td>Tighten screws to 48-60 lb-in. (5-7 N·m).</td>
</tr>
<tr>
<td>18</td>
<td>Tighten two screws to 24 lb-in. (3 N·m).</td>
</tr>
<tr>
<td>19</td>
<td>Clear diagnostic codes (para 8-4).</td>
</tr>
</tbody>
</table>
f13. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 51 SUB CODE 10, 12, 21, 43, 45, or 65

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Pan, Drain (Item 24, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)

Materials/Parts
Packing, Prefomed (Item 197, Appendix G)
Adapter, Straight, Pipe to Tube (Item 1.2, Appendix D)
Adapter, Straight, Tube to Boss (Item 1.3, Appendix D)
Hose Assembly, Nonmetallic (Item 24.13, Appendix D)

Personnel Required
(2)

References
TM 9-4910-571-12&P

KOWN INFO
Transmission oil level OK.
Fuse OK.
Batteries OK.

POSSIBLE PROBLEMS
Faulty output speed sensor.
Faulty turbine speed sensor.
Faulty WTEC II TEPSS.

CAUTION
Read CAUTION on following page.

1. Is main code 51 logged without main code 22 sub code 15 or 16?

NO

YES


TEST OPTIONS
Visual Inspection

REASON FOR QUESTION
If main code 22 sub code 15 or 16 is logged, turbine speed sensor, output speed sensor, or associated circuit(s) is faulty.
Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

(1) Check if main code 22 sub code 15 or 16 is logged in WTEC II TEPSS (para 8-4).
(2) If main code 22 sub code 15 or 16 is logged, WTEC II TEPSS has sensed a fault with the turbine speed sensor, output speed sensor, or associated circuits. Perform Transmission System Troubleshooting (f3. WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 22 Sub Code 15 or f4. WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 22 Sub Code 16).
13. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 51 SUB CODE 10, 12, 21, 43, 45, or 65 (CONT)

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Output speed sensor OK.
- Turbine speed sensor OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II TEPSS.

**WARNING**
Read WARNING on following page.

2. Does off-going clutch pressure go to 0 psi (0 kPa) when shift is made?

**TEST OPTIONS**
- Clutch Pressure Test or STE/ICE-R Test #50

**REASON FOR QUESTION**
If off-going clutch oil pressure does not go to 0 psi (0 kPa) when transmission shifts, WTEC II TEPSS may display main code 51 and one or more sub codes.

**YES**
- Notify DS Maintenance.

**NO**
- Replace WTEC II TEPSS (para 8-2).

Replace WTEC II TEPSS (para 8-2).
**WARNING**

Wear approved eye protection when performing transmission pressure checks. If oil contacts eyes, seek medical attention immediately. Failure to comply may result in injury to personnel.

<table>
<thead>
<tr>
<th>Table 2-28. Off-Going Clutch Pressure Tap</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sub Code</strong></td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td>21</td>
</tr>
<tr>
<td>23</td>
</tr>
<tr>
<td>43</td>
</tr>
<tr>
<td>45</td>
</tr>
<tr>
<td>65</td>
</tr>
</tbody>
</table>
f14. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 25 AND ANY SUB CODE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Pan, Drain (Item 24, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Wrench Set, Socket (Item 51, Appendix C)

Materials/Parts
Packing, Preformed (Item 197, Appendix G)
Adapter, Straight, Pipe to Tube (Item 1.2, Appendix D)
Adapter, Straight, Tube to Boss (Item 1.3, Appendix D)
Hose Assembly, Nonmetallic (Item 24.13, Appendix D)

Personnel Required
(2)

Reference
TM 9-4910-571-12&P

1. Is main code 25 logged without main code 22 sub code 16?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission oil level OK.</td>
</tr>
<tr>
<td>Fuse OK.</td>
</tr>
<tr>
<td>Batteries OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty WTEC II TEPSS.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If main code 22 sub code 16 is logged, output speed sensor or its circuit is faulty.</td>
</tr>
</tbody>
</table>

(1) Check if main code 22 sub code 16 is logged in WTEC II TEPSS (para 8-4).

(2) If main code 22 sub code 16 is logged, WTEC II TEPSS has sensed a fault with the output sensor or its circuit. Perform Transmission System Troubleshooting (f4. WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 22 Sub Code 16).

CAUTION

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.
f14. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 25 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Output speed sensor OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- Clutch Pressure Test or STE/ICE-R Test #50

**REASON FOR QUESTION**
If there is no pressure to clutch(s), or pressure is leaking when shift is made, WTEC II TEPSS may display main code 25 and one or more sub codes.

---

**WARNING**
Read WARNING on following page.

**2.**
Is there pressure to clutch(s) when shift is made?

**YES**
- Notify DS Maintenance.

**NO**
- Replace WTEC II TEPSS (para 8-2).
WARNING

Wear approved eye protection when performing transmission pressure checks. If oil contacts eyes, seek medical attention immediately. Failure to comply may result in injury to personnel.

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Sub Code Meaning</th>
<th>Pressure at Clutches(s)</th>
<th>Pressure Readings at Taps</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Speed Zero in 1st</td>
<td>C3 &amp; C6</td>
<td>215-334 psi (1480-2300 kPa)</td>
</tr>
<tr>
<td>11</td>
<td>Speed Zero in 2nd</td>
<td>C1 &amp; C5</td>
<td>215-305 psi (1480-2103 kPa)</td>
</tr>
<tr>
<td>22</td>
<td>Speed Zero in 3rd</td>
<td>C1 &amp; C4</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>33</td>
<td>Speed Zero in 4th</td>
<td>C1 &amp; C3</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>44</td>
<td>Speed Zero in 5th</td>
<td>C1 &amp; C2</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>55</td>
<td>Speed Zero in 6th</td>
<td>C2 &amp; C3</td>
<td>128-189 psi (880-1300 kPa)</td>
</tr>
<tr>
<td>66</td>
<td>Speed Zero in 7th</td>
<td>C2 &amp; C4</td>
<td>128-189 psi (880-1300 kPa)</td>
</tr>
<tr>
<td>77</td>
<td>Speed Zero in R</td>
<td>C3 &amp; C5</td>
<td>215-334 psi (1480-2300 kPa)</td>
</tr>
</tbody>
</table>

(19) If all clutches indicate proper pressure, replace WTEC II TEPSS (para 8-2).
(20) Clear diagnostic codes (para 8-4).
15. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 53 AND ANY SUB CODE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Pan, Drain (Item 24, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Wrench Set, Socket (Item 51, Appendix C)

Materials/Parts
Packing, Preformed (Item 197, Appendix G)
Adapter, Straight, Pipe to Tube (Item 1.2, Appendix D)
Adapter, Straight, Tube to Boss (Item 1.3, Appendix D)
Hose Assembly, Nonmetallic (Item 24.13, Appendix D)

Personnel Required
(2)

Reference
TM 9-4910-571-12&P

START

CAUTION
Read CAUTION on following page.

1. Is main code 53 logged without main code 22 sub code 15 or 16?

YES

NO

Test Options
Visual Inspection

Reason for Question
If main code 22 sub code 15 or 16 is logged, turbine speed sensor, output speed sensor, or associated circuitry is faulty.

(1) Check if main code 22 sub code 15 or 16 is logged in WTEC II TEPSS (para 8-4).
(2) If main code 22 sub code 15 or 16 is logged, WTEC II TEPSS has sensed a fault with the turbine speed sensor, output speed sensor, or associated circuits. Perform Transmission System Troubleshooting (f3. WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 22 Sub Code 15 or f4. WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 22 Sub Code 16).

CAUTION
Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.
2. Does off-going clutch pressure go to 8 psi (55 kPa) or less when shift is made?

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Output speed sensor OK.
- Turbine speed sensor OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- Clutch Pressure Test or STE/ICE-R Test #50

**REASON FOR QUESTION**
If off-going clutch oil pressure does not go to 8 psi (55 kPa) or less when shift is made, WTEC II TEPSS may display main code 53 and one or more sub codes.

**WARNING**
Read WARNING on following page.

**YES**
- Notify DS Maintenance.

**NO**

**Replace WTEC II TEPSS (para 8-2).**
WARNING

Wear approved eye protection when performing transmission pressure checks. If oil contacts eyes, seek medical attention immediately. Failure to comply may result in injury to personnel.

CLUTCH PRESSURE TEST

(1) Remove front and intermediate propeller shafts (para 9-2).
(2) Position drain pan under pressure tap.
(3) Remove pressure tap plug and preformed packing from off-going clutch indicated by the sub code. Refer to Table 2-30. Off-Going Clutch Pressure Tap. Discard preformed packing.
(4) Connect tube to boss adapter, hose, and pipe to tube adapter to clutch pressure tap.
(5) Perform STE/ICE-R Test # 50 (TM 9-4910-571-12&P).
(6) Start engine (TM 9-2320-366-10-1) and run at idle.
(7) With parking brake applied, make shift indicated by sub code while assistant notes reading on STE/ICE-R.
(8) If off-going clutch pressure does not go to 8 psi (55 kPa) or less when shift is made, notify DS Maintenance.
(9) If off-going clutch pressure does go to 8 psi (55 kPa) or less when shift is made, replace WTEC III TEPSS (para 8-2).
(10) Shut down engine (TM 9-2320-366-10-1).
(11) Remove pipe to tube adapter, hose, and tube to boss adapter from clutch pressure tap.
(12) Position preformed packing and pressure tap plug in control valve module.
(13) Tighten pressure tap plug to 84-120 lb-in. (9-14 N·m).
(14) Remove drain pan under pressure tap.
(15) Install front and intermediate propeller shafts (para 9-2).
(16) Clear diagnostic codes (para 8-4).

Table 2-30. Off-Going Clutch Pressure Tap

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Sub Code Meaning</th>
<th>Off-Going Clutch(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>08</td>
<td>L-N1 Shift</td>
<td>C3</td>
</tr>
<tr>
<td>18</td>
<td>1-N1 Shift</td>
<td>C1</td>
</tr>
<tr>
<td>28</td>
<td>2-N1 Shift</td>
<td>C1 &amp; C4</td>
</tr>
<tr>
<td>29</td>
<td>2-N2 Shift</td>
<td>C1</td>
</tr>
<tr>
<td>38</td>
<td>3-N1 Shift</td>
<td>C1 &amp; C3</td>
</tr>
<tr>
<td>39</td>
<td>3-N3 Shift</td>
<td>C1</td>
</tr>
<tr>
<td>48</td>
<td>4-N1 Shift</td>
<td>C1 &amp; C2</td>
</tr>
<tr>
<td>49</td>
<td>4-N3 Shift</td>
<td>C1 &amp; C2</td>
</tr>
<tr>
<td>58</td>
<td>5-N1 Shift</td>
<td>C2 &amp; C3</td>
</tr>
<tr>
<td>59</td>
<td>5-N3 Shift</td>
<td>C2</td>
</tr>
<tr>
<td>68</td>
<td>6-N1 Shift</td>
<td>C2 &amp; C4</td>
</tr>
<tr>
<td>69</td>
<td>6-N4 Shift</td>
<td>C2</td>
</tr>
<tr>
<td>78</td>
<td>R-N1 Shift</td>
<td>C3</td>
</tr>
<tr>
<td>99</td>
<td>N3-N2 or N2-N3 Shift</td>
<td>C2 &amp; C4</td>
</tr>
</tbody>
</table>
f16. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 54 SUB CODE 01, 07, 10, 12, 17, 21, 23, 27, 32, 34, 43, 45, 54, 56, 65, 70, 71, 72, 80, 81, 82, 83, 85, 86, 92, 93, 95, 96, or 97

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Pan, Drain (Item 24, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Wrench Set, Socket (Item 51, Appendix C)

Materials/Parts
Packing, Preformed (Item 197, Appendix G)
Adapter, Straight, Pipe to Tube (Item 1.2, Appendix D)
Adapter, Straight, Tube to Boss (Item 1.3, Appendix D)
Hose Assembly, Nonmetallic (Item 24.13, Appendix D)

Personnel Required
(2)

Reference
TM 9-4910-571-12&P

1. Is main code 54 logged without main code 22 sub code 15 or 16?

KONWN INFO
Transmission oil level OK.
Fuse OK.
Batteries OK.

POSSIBLE PROBLEMS
Faulty output speed sensor.
Faulty turbine speed sensor.
Faulty WTEC II TEPSS.

TEST OPTIONS
Visual Inspection

REASON FOR QUESTION
If main code 22 sub code 15 or 16 is logged, turbine speed sensor, output speed sensor or associated circuitry is faulty.

YES

NO
(1) Check if main code 22 sub code 15 or 16 is logged in the WTEC II TEPSS (para 8-4).

(2) If main code 22 sub code 15 or 16 is logged, WTEC II TEPSS has sensed a fault with the turbine speed sensor, output sensor or associated circuits. Perform Transmission System Troubleshooting (f3. WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 22 Sub Code 15 or f4. WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 22 Sub Code 16).

CAUTION

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.
f16. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 54 SUB CODE 01, 07, 10, 12, 17, 21, 23, 27, 32, 34, 43, 45, 54, 56, 65, 70, 71, 72, 80, 81, 82, 83, 85, 86, 92, 93, 95, 96, or 97 (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission oil level OK.</td>
<td>Pressure Test or STE/ICE-R Test #50</td>
<td>Low main oil pressure may cause WTEC II TEPSS to display main code 54 and one or more sub codes.</td>
</tr>
<tr>
<td>Fuse OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Batteries OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output speed sensor OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turbine speed sensor OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POSSIBLE PROBLEMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty WTEC II TEPSS.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. WARNING
Read WARNING on following page.

Is 218-276 psi (1,503-1,903 kPa) present at main oil pressure tap?

NO

YES

Notify DS Maintenance.
WARNING

Wear approved eye protection when performing transmission pressure checks. If oil contacts eyes, seek medical attention immediately. Failure to comply may result in injury to personnel.

PRESSURE TEST

(1) Position drain pan under pressure tap.
(2) Remove main pressure tap plug and preformed packing from control valve module.
(3) Connect tube to boss adapter, hose, and pipe to tube adapter to main pressure tap.
(4) Perform STE/ICE-R Test # 50 (TM 9-4910-571-12&P).
(5) Start engine (TM 9-2320-366-10-1) and run at idle.
(6) With parking brake applied, position WTEC II TEPSS to R position then to N position while assistant checks reading on STE/ICE-R.
(7) Shut down engine (TM 9-2320-366-10-1).
(8) If main oil pressure is low, notify DS Maintenance.
(9) Remove pipe to tube adapter, hose, and tube to boss adapter from main pressure tap.
(10) Position preformed packing and main pressure tap plug in control valve module.
(11) Tighten main pressure tap plug to 84-120 lb-in. (9-14 N·m).
(12) Remove drain pan under main pressure tap.
f16. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 54 SUB CODE 01, 07, 10, 12, 17, 21, 23, 27, 32, 34, 43, 45, 54, 56, 65, 70, 71, 72, 80, 81, 82, 83, 85, 86, 92, 93, 95, 96, or 97 (CONT)

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Turbine speed sensor OK.
- Output speed sensor OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- Pressure Test or STE/ICE-R Test #50

**REASON FOR QUESTION**
If there is no pressure to clutch(s) when shift is made, WTEC II TEPSS may display main code 54 and one or more sub codes.

3. Is there pressure to clutch(s) when shift is made?

- **NO**
  - Notify DS Maintenance.

- **YES**
  - Replace WTEC II TEPSS (para 8-2).
CLUTCH PRESSURE TEST

(1) Remove front and intermediate propeller shafts (para 9-2).
(2) Position drain pan under pressure tap.
(3) Remove pressure tap plug and preformed packing from clutch pressure tap indicated by the sub code. Refer to Table 2-31. Clutch Pressure Tap.
(4) Connect tube to boss adapter, hose, and pipe to tube adapter to clutch pressure tap.
(5) Start engine (TM 9-2320-366-10-1).
(6) Perform STE/ICE-R Test # 50 (TM 9-4910-571-12&P).
(7) With parking brake applied, make shift indicated by sub code. Refer to Table 2-31. Clutch Pressure Tap.
(8) Accelerate engine until WTEC II TEPS displays denied range. Refer to Table 2-31. Clutch Pressure Tap.
(9) Maintain sufficient engine speed to keep desired transmission range while assistant notes reading on STE/ICE-R.
(10) Let engine return to idle.
(11) Shift WTEC II TEPS into neutral.
(12) If one or more clutches failed to indicate proper pressure, notify DS Maintenance.
(13) If all clutches indicate proper pressure, replace WTEC II TEPS (para 8-2).
(14) Shut down engine (TM 9-2320-366-10-1).
(15) Remove pipe to tube adapter, hose, and tube to boss adapter from clutch pressure tap.
(16) Position preformed packing and pressure tap plug in control valve module.
(17) Tighten pressure tap plug to 84-120 lb-in. (9-14 N·m).
(18) Remove drain pan under pressure tap.
(19) Install front and intermediate propeller shafts (para 9-2).
(20) Clear diagnostic codes (para 8-4).

Table 2-31. Clutch Pressure Tap

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Sub Code Meaning</th>
<th>Pressure at Clutch(s)</th>
<th>Pressure Readings at Taps</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>L-1 Upshift</td>
<td>C1 &amp; C5</td>
<td>187-305 psi (1280-2100 kPa)</td>
</tr>
<tr>
<td>07</td>
<td>L-R Shift</td>
<td>C3 &amp; C5</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>10</td>
<td>1-L Downshift</td>
<td>C3 &amp; C6</td>
<td>215-334 psi (1480-2300 kPa)</td>
</tr>
<tr>
<td>12</td>
<td>1-2 Upshift</td>
<td>C1 &amp; C4</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>17</td>
<td>1-R Shift</td>
<td>C3 &amp; C5</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>21</td>
<td>2-1 Downshift</td>
<td>C1 &amp; C5</td>
<td>186-305 psi (1280-2100 kPa)</td>
</tr>
<tr>
<td>23</td>
<td>2-3 Upshift</td>
<td>C1 &amp; C3</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>27</td>
<td>2-R Shift</td>
<td>C3 &amp; C5</td>
<td>215-334 psi (1480-2300 kPa)</td>
</tr>
<tr>
<td>32</td>
<td>3-2 Downshift</td>
<td>C1 &amp; C4</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>34</td>
<td>3-4 Upshift</td>
<td>C1 &amp; C2</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>43</td>
<td>4-3 Downshift</td>
<td>C1 &amp; C3</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>45</td>
<td>4-5 Upshift</td>
<td>C2 &amp; C3</td>
<td>128-189 psi (880-1300 kPa)</td>
</tr>
<tr>
<td>54</td>
<td>5-4 Downshift</td>
<td>C1 &amp; C2</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>56</td>
<td>5-6 Upshift</td>
<td>C2 &amp; C4</td>
<td>128-189 psi (880-1300 kPa)</td>
</tr>
<tr>
<td>65</td>
<td>6-5 Downshift</td>
<td>C2 &amp; C3</td>
<td>128-189 psi (880-1300 kPa)</td>
</tr>
<tr>
<td>70</td>
<td>R-L Shift</td>
<td>C3 &amp; C6</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>71</td>
<td>R-1 Shift</td>
<td>C1 &amp; C5</td>
<td>186-305 psi (1280-2100 kPa)</td>
</tr>
<tr>
<td>72</td>
<td>R-2 Shift</td>
<td>C1 &amp; C4</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>80</td>
<td>N1-L Shift</td>
<td>C3 &amp; C6</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>81</td>
<td>N1-1 Shift</td>
<td>C1 &amp; C5</td>
<td>215-305 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>82</td>
<td>N1-2 Shift</td>
<td>C1 &amp; C4</td>
<td>186-305 psi (1280-2100 kPa)</td>
</tr>
<tr>
<td>83</td>
<td>N1-3 Shift</td>
<td>C1 &amp; C3</td>
<td>215-305 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>85</td>
<td>N1-5 Shift</td>
<td>C2 &amp; C3</td>
<td>164-239 psi (1130-1650 kPa)</td>
</tr>
<tr>
<td>86</td>
<td>N1-6 Shift</td>
<td>C2 &amp; C4</td>
<td>164-239 psi (1130-1650 kPa)</td>
</tr>
<tr>
<td>92</td>
<td>N2-2 Shift</td>
<td>C1 &amp; C4</td>
<td>215-305 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>93</td>
<td>N3-3 Shift</td>
<td>C1 &amp; C3</td>
<td>215-305 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>95</td>
<td>N3-5 Shift</td>
<td>C2 &amp; C3</td>
<td>164-239 psi (1130-1650 kPa)</td>
</tr>
<tr>
<td>96</td>
<td>N4-6 Shift</td>
<td>C2 &amp; C4</td>
<td>164-239 psi (1130-1650 kPa)</td>
</tr>
<tr>
<td>97</td>
<td>2-R Shift</td>
<td>C3 &amp; C5</td>
<td>215-305 psi (1480-1900 kPa)</td>
</tr>
</tbody>
</table>
f17. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 55 AND ANY SUB CODE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Pan, Drain (Item 24, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Wrench Set, Socket (Item 51, Appendix C)

Materials/Parts
Packing, Preformed (Item 199, Appendix G)
Adapter, Straight, Pipe to Tube (Item 1.2, Appendix D)
Adapter, Straight, Tube to Boss (Item 1.3, Appendix D)
Hose Assembly, Nonmetallic (Item 24.13, Appendix D)

References
TM 9-4910-571-12&P

Personnel Required
(2)

START

<table>
<thead>
<tr>
<th>KNOWLEDGE INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nothing</td>
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</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improper Transmission oil level. Faulty WTEC II TEPSS.</td>
</tr>
</tbody>
</table>

1. Is transmission oil level OK?

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If transmission oil level is improper code 55 may be recorded.</td>
</tr>
</tbody>
</table>

NO

YES

Correct improper transmission oil level (TM 9-2320-366-10-1).
(1) Check transmission oil level (TM 9-2320-366-10-1).

(2) If transmission oil level is improper, correct as required (TM 9-2320-366-10-1).
f17. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 55 AND ANY SUB CODE (CONT)

2. Is main code 55 logged without main code 32?

YES

NO


KNOWLEDGE
Transmission oil level OK.

POSSIBLE PROBLEMS
Faulty WTEC II TEPSS.

TEST OPTIONS
Visual Inspection

REASON FOR QUESTION
If main code 32 is logged, C3 pressure switch or its circuit is faulty.

CAUTION
Read CAUTION on following page.

Test OPTIONS
Visual Inspection

REASON FOR QUESTION
If main code 32 is logged, C3 pressure switch or its circuit is faulty.
CAUTION

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

(1) Check if main code 32 is logged in WTEC II TEPSS (para 8-4).
(2) If main code 32 is logged, WTEC II TEPSS has sensed a fault C3 pressure switch or its circuit. Perform Transmission System Troubleshooting (f6. WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 32 and Any Sub Code).
Low main oil pressure may cause WTEC II TEPSS to display main code 55 and one or more sub codes.

3. Is 218-276 psi (1,503-1,903 kPa) present at main oil pressure tap?

- **NO**
  - Notify DS Maintenance.

- **YES**

**TEST OPTIONS**
- Pressure Test or STE/ICE-R Test #50

**REASON FOR QUESTION**
Low main oil pressure may cause WTEC II TEPSS to display main code 55 and one or more sub codes.

**KNOWN INFO**
- Transmission oil level OK.
- **POSSIBLE PROBLEMS**
  - Faulty WTEC II TEPSS.

**WARNING**
Read WARNING on following page.
WARNING

Wear approved eye protection when performing transmission pressure checks. If oil contacts eyes, seek medical attention immediately. Failure to comply may result in injury to personnel.

PRESSURE TEST

(1) Position drain pan under pressure tap.
(2) Remove main pressure tap plug and preformed packing from control valve module.
(3) Connect tube to boss adapter, hose, and pipe to tube adapter to clutch pressure tap.
(4) Perform STE/ICE-R Test # 50 (TM 9-4910-571-12&P).
(5) Start engine (TM 9-2320-366-10-1) and run at idle.
(6) With parking brake applied, position WTEC II TEPSS to R position then to N position while assistant checks reading on STE/ICE-R.
(7) Shut down engine (TM 9-2320-366-10-1).
(8) If main oil pressure is low, notify DS Maintenance.
(9) Remove pipe to tube adapter, hose, and tube to boss adapter from main pressure tap.
(10) Position preformed packing and main pressure tap plug in control valve module.
(11) Tighten main pressure tap plug to 84-120 lb-in. (9-14 N·m).
(12) Remove drain pan under pressure tap.
f17. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 55 AND ANY SUB CODE (CONT)

KNOWN INFO
Transmission oil level OK.
POSSIBLE PROBLEMS
Faulty WTEC II TEPSS.

TEST OPTIONS
Pressure Test or STE/ICE-R Test #50

REASON FOR QUESTION
If pressure is low or missing to C3 clutch when shift is made, WTEC II TEPSS may display main code 55 and one or more sub codes.

1. Is pressure present at C3 clutch when shift is made?

   NO

   YES

   Replace WTEC II TEPSS (para 8-2).

   Notify DS Maintenance.
PRESSURE TEST

(1) Remove front and intermediate propeller shafts (para 9-2).
(2) Position drain pan under C3 pressure tap.
(3) Remove C3 pressure tap plug and preformed packing from control valve module.
(4) Connect tube to boss adapter, hose, and pipe to tube adapter to C3 pressure tap.
(5) Perform STE/ICE-R test # 50 (TM 9-4910-571-12&P).
(6) Start engine (TM 9-2320-366-10-1) and run at idle.
(7) With parking brake applied, make shift indicated by sub code while assistant notes reading on STE/ICE-R. Refer to Table 2-32. Clutch Pressure Tap.
(8) Shut down engine (TM 9-2320-366-10-1).
(9) If 215-276 psi pressure is not obtained for affected code, notify DS Maintenance.
(10) If 215-276 psi pressure is obtained, replace WTEC II TEPSS (para 8-2).
(11) Remove pipe to tube adapter, hose, and tube to boss adapter from C3 pressure tap.
(12) Position preformed packing and C3 pressure tap plug in control valve module.
(13) Tighten C3 pressure tap plug to 84-120 lb-in. (9-14 N·m).
(14) Remove drain pan under pressure tap.
(15) Install front and intermediate propeller shafts (para 9-2).
(16) Clear diagnostic codes (para 8-4).

Table 2-32. Clutch Pressure Tap

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Sub Code Meaning</th>
<th>Pressure Readings C3 Tap</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>1-R Shift</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>27</td>
<td>2-R Shift</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>80</td>
<td>N1-L Shift</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>87</td>
<td>N1-R Shift</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>97</td>
<td>2-R Shift</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
</tbody>
</table>
f18. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 56 AND ANY SUB CODE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Pan, Drain (Item 24, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Wrench Set, Socket (Item 51, Appendix C)

Materials/Parts
Packing, Preformed (Item 197, Appendix G)
Adapter, Straight, Pipe to Tube (Item 1.2, Appendix D)
Adapter, Straight, Tube to Boss (Item 1.3, Appendix D)
Hose Assembly, Nonmetallic (Item 24.13, Appendix D)

Personnel Required
(2)

Reference
TM 9-4910-571-12&P

---

START

1. Is main code 56 logged without main code 22 sub code 15 or 16?

CAUTION
Read CAUTION on following page.

TEST OPTIONS
Visual Inspection

REASON FOR QUESTION
If main code 22 sub code 15 or 16 is logged, turbine speed sensor, output speed sensor, or associated circuit(s) is faulty.

NO

YES


KNOWN INFO
Transmission oil level OK.
Fuse OK.
Batteries OK.

POSSIBLE PROBLEMS
Faulty output speed sensor.
Faulty transmission turbine speed sensor.
Faulty oil pressure pump.
Faulty control valve module.
Faulty WTEC II TEPSS.
Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

(1) Check if main code 22 sub code 15 or 16 is logged in WTEC II TEPSS (para 8-4).

(2) If main code 22 sub code 15 or 16 is logged, WTEC II TEPSS has sensed a fault with the turbine speed sensor, output speed sensor, or associated circuit(s). Perform Transmission System Troubleshooting (f3. WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 22 Sub Code 15 or f4. WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) Displays Main Code 22 Sub Code 16).
f18. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 56 AND ANY SUB CODE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission oil level OK.</td>
</tr>
<tr>
<td>Fuse OK.</td>
</tr>
<tr>
<td>Batteries OK.</td>
</tr>
<tr>
<td>Output speed sensor OK.</td>
</tr>
<tr>
<td>Transmission turbine speed sensor OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty oil pressure pump.</td>
</tr>
<tr>
<td>Faulty control valve module.</td>
</tr>
<tr>
<td>Faulty WTEC II TEPSS.</td>
</tr>
</tbody>
</table>

2. Is 218-276 psi (1,503-1,903 kPa) present at main oil pressure tap?

- YES
  - Notify DS Maintenance.
- NO

TEST OPTIONS

- Pressure Test or STE/ICE-R TEST #50

REASON FOR QUESTION

Low main oil pressure may cause WTEC II TEPSS to display main code 56 and one or more sub codes.

WARNING

Read WARNING on following page.
WARNING
Wear approved eye protection when performing transmission pressure checks. If oil contacts eyes, seek medical attention immediately. Failure to comply may result in injury to personnel.

PRESSURE TEST

1. Position drain pan under pressure tap.
2. Remove main pressure tap plug and preformed packing from control valve module.
3. Connect tube to boss adapter, hose, and pipe to tube adapter to main pressure tap.
5. Start engine (TM 9-2320-366-10-1) and run at idle.
6. With parking brake applied, position WTEC II TEPSS to R position then to N position while assistant checks reading on STE/ICE-R.
7. Shut down engine (TM 9-2320-366-10-1).
8. If main oil pressure is low, notify DS Maintenance.
9. Remove pipe to tube adapter, hose, and tube to boss adapter from main pressure tap.
10. Position preformed packing and main pressure tap plug in control valve module.
11. Tighten main pressure tap plug to 84-120 lb-in. (9-14 N·m).
12. Remove drain pan under pressure tap.
3. Is pressure present at clutch(s) when shift is made?

**KNOWN INFO**
Transmission oil level OK.
Fuse OK.
Batteries OK.
Output speed sensor OK.
Transmission turbine speed sensor OK.
Oil pressure pump OK.

**POSSIBLE PROBLEMS**
Faulty control valve module.
Faulty WTEC II TEPSS.

**TEST OPTIONS**
Pressure Test or STE/ICE-R Test #50

**REASON FOR QUESTION**
If pressure is low or missing to clutch(s) when shift is made, WTEC II TEPSS may display main code 56 and one or more sub codes.

**YES**
Notify DS Maintenance.

**NO**

Replace WTEC II TEPSS (para 8-2).
PRESSURE TEST

(1) Remove front and intermediate propeller shafts (para 9-2).
(2) Position drain pan under pressure tap.
(3) Remove pressure tap plug and preformed packing from clutch pressure tap indicated by the sub code. Refer to Table 2-33. Clutch Pressure Tap.
(4) Connect tube to boss adapter, hose, and pipe to tube adapter to clutch pressure tap.
(5) Perform STE/ICE-R test #50 (TM 9-4910-571-12&P).
(6) Start engine (TM 9-2320-366-10-1).
(7) Make shift indicated by sub code. Refer to Table 2-33. Clutch Pressure Tap.
(8) Accelerate engine until WTEC II TEPSS displays desired range. Refer to Table 2-33. Clutch Pressure Tap.
(9) Maintain sufficient engine speed to keep desired transmission range while assistant notes reading on STE/ICE-R.
(10) Let engine return to idle.
(11) Shift transmission into neutral (TM 9-2320-366-10-1).
(12) Shut down engine (TM 9-2320-366-10-1).
(13) If one or more of clutches failed to indicate proper pressure, notify DS Maintenance.
(14) If all clutches indicate proper pressure, replace WTEC II TEPSS (para 8-2).
(15) Remove pipe to tube adapter, hose, and tube to boss adapter from clutch pressure tap.
(16) Position preformed packing and pressure tap plug in control valve module.
(17) Tighten pressure tap plug to 84-120 lb-in. (9-14 N·m).
(18) Remove drain pan under pressure tap.
(19) Install front and intermediate propeller shafts (para 9-2).
(20) Clear diagnostic codes (para 8-4).

Table 2-33. Clutch Pressure Tap

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Sub Code Meaning</th>
<th>Pressure at Clutch(s)</th>
<th>Pressure Readings at Taps</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>L Range Test</td>
<td>C3 &amp; C6</td>
<td>215-334 psi (1480-2300 kPa)</td>
</tr>
<tr>
<td>11</td>
<td>1 Range Test</td>
<td>C1 &amp; C5</td>
<td>215-305 psi (1480-2100 kPa)</td>
</tr>
<tr>
<td>22</td>
<td>2 Range Test</td>
<td>C1 &amp; C4</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>33</td>
<td>3 Range Test</td>
<td>C1 &amp; C3</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>44</td>
<td>4 Range Test</td>
<td>C1 &amp; C2</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>55</td>
<td>5 Range Test</td>
<td>C2 &amp; C3</td>
<td>128-189 psi (880-1300 kPa)</td>
</tr>
<tr>
<td>66</td>
<td>6 Range Test</td>
<td>C2 &amp; C4</td>
<td>128-189 psi (880-1300 kPa)</td>
</tr>
<tr>
<td>77</td>
<td>R Range Test</td>
<td>C3 &amp; C5</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
</tbody>
</table>
f19. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 13 AND ANY SUB CODE

INITIAL SETUP

**Equipment Conditions**
Engine shut down (TM 9-2320-366-10-1).

**Personnel Required**
(2)

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

**References**
TM 9-4910-571-12&P

---

**Known Info**
- Fuse OK.
- Battery OK.
- Vehicle runs.
- Battery charging system OK.

**Possible Problems**
- Faulty WTEC II dashboard cable assembly.
- Faulty WTEC II VIM.
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

---

**Start**

**Warning**
Read WARNING and CAUTION on following page.

**Test Options**
- Voltage Test or STE/ICE-R Test #89

**Reason for Question**
If less than 8 VDC is present, WTEC II TEPSS may display main code 13 sub code 12.

**1. Is more than 8 VDC present on connector PX33-J1 and PX33-J2?**

**No**
- Repair wire 1900 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).

**Yes**
- Yes


**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

**CAUTION**

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

---

**VOLTAGE TEST**

1. Remove kick panel (para 16-3).
2. Set multimeter to volts DC.
4. Connect positive (+) probe of multimeter to connector PX33-J 1.
5. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
6. Connect positive (+) probe of multimeter to connector PX33-J 2.
7. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
8. If 12 to 14.5 VDC is not verified, repair wire 1900 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
f19. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 13 AND ANY SUB CODE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuse OK.</td>
</tr>
<tr>
<td>Battery OK.</td>
</tr>
<tr>
<td>Vehicle runs.</td>
</tr>
<tr>
<td>Battery charging system OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty WTEC II VIM.</td>
</tr>
<tr>
<td>Faulty WTEC II cab transmission harness.</td>
</tr>
<tr>
<td>Faulty WTEC II dashboard cable assembly.</td>
</tr>
<tr>
<td>Faulty WTEC II TEPSS.</td>
</tr>
</tbody>
</table>

**2.** Is more than 8 VDC present at connector J116-E1 and J116-E2?

**TEST OPTIONS**
Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
If WTEC II VIM does not supply more than 8 VDC output, WTEC II TEPSS may display main code 13 sub code 12.

**YES**
Replace WTEC II VIM (para 8-6).

**NO**
(1) Start engine (TM 9-2320-366-10-1).
(2) Set multimeter to volts DC.
(3) Connect positive (+) probe of multimeter to connector J 116-E1.
(4) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(5) Connect positive (+) probe of multimeter to connector J 116-E2.
(6) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(7) If 12 to 14.5 VDC is not present, replace WTEC II VIM (para 8-6).
(8) Shut down engine (TM 9-2320-366-10-1).
3. Is more than 8 VDC present at connector J115-2 and J115-11?

**REASON FOR QUESTION**
If less than 8 VDC is present at connector J115-2 and J115-11, WTEC II TEPSS may display main code 13 sub code 12.

**TEST OPTIONS**
Voltage Test or STE/ICE-R Test #89

**YES**
Replace WTEC II cab transmission harness (para 7-137).

**NO**
### VOLTAGE TEST

1. Remove instrument panel assembly for access (para 7-15).
3. Set multimeter to volts DC.
4. Disconnect connector J115 (top connector) from WTEC II TEPSS.
5. Connect positive (+) probe of multimeter to connector J115-2.
6. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
7. Connect positive (+) probe of multimeter to connector J115-11.
8. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
9. If 12 to 14.5 VDC is not present at connector J115-2 and J115-11, replace WTEC II cab transmission harness (para 7-137).
**KNOWN INFO**
- Fuse OK.
- Battery OK.
- Vehicle runs.
- Battery charging system OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II dashboard cable assembly.
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II VIM.
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
Faulty battery ground may cause WTEC II TEPSS to display main code 13 sub code 12.

---

4. Is continuity present from connector PX33-K1 and PX33-K2 to a known good ground?

**YES**
- Repair wire 3101 or 3102 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).

**NO**

---

5. Is continuity present from WTEC II VIM connector pins L1 and L2 to a known good ground?

**NO**

**YES**
- Replace WTEC II VIM (para 8-6).
CONTINUITY TEST

(1) Loosen screw in connector PX33.
(2) Disconnect connector PX33 from WTEC II VIM.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to connector PX33-K1.
(5) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(6) Connect positive (+) probe of multimeter to connector PX33-K2.
(7) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(8) If continuity is not present on connector PX33-K1, repair wire 3101 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
(9) If continuity is not present on connector PX33-K2, repair wire 3102 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
(10) Connect connector PX33 to WTEC II VIM.
(11) Tighten screw in connector PX33.

CONTINUITY TEST

(1) Loosen screw in connector J116.
(2) Disconnect connector J116 from WTEC II VIM.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to WTEC II VIM connector pin L1.
(5) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(6) Connect positive (+) probe of multimeter to WTEC II VIM connector pin L2.
(7) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(8) If continuity is not present in steps (5) and (7), replace WTEC II VIM (para 8-6).
(9) Connect connector J116 to WTEC II VIM.
(10) Tighten screw in connector J116.
(11) Install kick panel (para 16-3).
19. **WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 13 AND ANY SUB CODE (CONT)**

---

**KNOWLEDGE INFORMATION**
- Fuse OK.
- Battery OK.
- Vehicle runs.
- Battery charging system OK.
- WTEC II dashboard cable assembly OK.
- WTEC II VIM OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91
- Reason for question: Faulty battery ground may cause WTEC II TEPSS to display main code 13 sub code 12.

---

**Diagram**

**KNOWLEDGE INFORMATION**

**NO**
- Is continuity present from connector J115-9 and J115-18 to a known good ground?

**YES**
- Replace WTEC II cab transmission harness (para 7-137).

**Replace WTEC II TEPSS (para 8-2).**
## CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector J115-9.
3. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
4. Connect positive (+) probe of multimeter to connector J115-18.
5. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
6. If continuity is not present, replace WTEC II cab transmission harness (para 7-137).
7. If continuity is present, replace WTEC II TEPSS (para 8-2).
8. Connect connector J115 (top connector) to WTEC II TEPSS.
9. Install instrument panel assembly (para 7-15).
10. Clear diagnostic codes (para 8-4).
f19A. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 23 AND ANY SUB CODE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
STE/ICE-R (Item 41, Appendix C)

Personnel Required
(2)

References
TM 9-4910-571-12&P

NOTE
Perform Electrical System Troubleshooting e1.
Circuit Breaker Does Not Operate on circuit breaker C35 prior to begining this task.

START

1. Does main code 23 logged in WTEC II TEPSS return after clearing diagnostic code?

CAUTION
Read CAUTION on following page.

NO

YES

Fault corrected.

KNOWN INFO

Circuit breaker CB35 OK.

POSSIBLE PROBLEMS

Faulty WTEC II dashboard cable assembly.
Faulty 10 AMP MAIN POWER fuse.
Faulty WTEC II vehicle interface module (VIM).
Faulty WTEC II cab transmission harness.
Faulty WTEC II TEPSS.

TEST OPTIONS

WTEC II Diagnostic Code Clearing procedure.

REASON FOR QUESTION

If WTEC II TEPSS does not display any diagnostic code after clearing, an intermittent problem was detected and corrected. If diagnostic code is logged after clearing, further troubleshooting is required.
CAUTION

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

(1) Perform WTEC II Code Reading and Code Clearing (para 8-4).
(2) If diagnostic code 23 is not logged after clearing, fault is corrected.
(3) If diagnostic code 23 is logged after clearing, further troubleshooting is required.
2. REASON FOR QUESTION

KNOWN INFO
- Circuit breaker CB35 OK.

POSSIBLE PROBLEMS
- Faulty WTEC II dashboard cable assembly.
- Faulty 10 AMP MAIN POWER fuse.
- Faulty WTEC II VIM.
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

TEST OPTIONS
- Voltage Test or STE/ICE-R Test #89

REASON FOR QUESTION
- If 12 VDC is not present, wire 1900 is faulty.

WARNING
- CAUTION
- Read WARNING and CAUTION on following page.

2.
- Is 12 VDC present at connector PX33 socket J1 and J2?

NO
- Repair wire 1900 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).

YES
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

CAUTION

Use care when testing electrical connectors not to bend connector pins or damage connector sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove kick panel (para 16-3).</td>
</tr>
<tr>
<td>(2) Loosen screw in PX33 connector.</td>
</tr>
<tr>
<td>(3) Disconnect connector PX33 from VIM connector.</td>
</tr>
<tr>
<td>(4) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(5) Connect positive (+) probe of multimeter to connector PX33 socket J1.</td>
</tr>
<tr>
<td>(6) Connect negative (-) probe of multimeter to a known good ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) Connect positive (+) probe of multimeter to connector PX33 socket J2.</td>
</tr>
<tr>
<td>(8) Connect negative (-) probe of multimeter to a known good ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(9) If 12 VDC is not present in steps (5) and (7), repair wire 1900 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).</td>
</tr>
</tbody>
</table>
KNOWN INFO
Circuit breaker CB35 OK.

POSSIBLE PROBLEMS
Faulty WTEC II dashboard cable assembly.
Faulty 10 AMP MAIN POWER fuse.
Faulty WTEC II VIM.
Faulty WTEC II cab transmission harness.
Faulty WTEC II TEPSS.

3.
Is continuity present from connector PX33 socket K1 to ground?

TEST OPTIONS
Continuity Test or STE/ICE-R Test #91

REASON FOR QUESTION
If continuity is not present, wire 3101 is faulty.

NO

YES

Repair wire 3101 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector PX33 socket K1.
(3) Connect negative (-) probe of multimeter to a known good ground and note reading on multimeter.
(4) If continuity is not present, repair wire 3101 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
f19A. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 23 AND ANY SUB CODE (CONT)

**KNOWN INFO**
Circuit breaker CB35 OK.
WTEC II dashboard cable assembly OK.

**POSSIBLE PROBLEMS**
Faulty 10 AMP MAIN POWER fuse.
Faulty WTEC II VIM.
Faulty WTEC II cab transmission harness.
Faulty WTEC II TEPSS.

**TEST OPTIONS**
Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present, 10 AMP MAIN POWER fuse is faulty.

4. Is continuity present through 10 AMP MAIN POWER fuse?

**CAUTION**
Read CAUTION on following page.

---

YES

Replace 10 AMP MAIN POWER fuse (para 8-6).

NO
CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove seven screws and washers from WTEC II VIM cover.</td>
</tr>
<tr>
<td>(2) Remove screw, washer, WTEC II VIM cover, and nut from WTEC II VIM.</td>
</tr>
<tr>
<td>(3) Remove 10 AMP MAIN POWER fuse from WTEC II VIM.</td>
</tr>
<tr>
<td>(4) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(5) Connect positive (+) probe of multimeter to one terminal on 10 AMP MAIN POWER fuse.</td>
</tr>
<tr>
<td>(6) Connect negative (-) probe of multimeter to other terminal on 10 AMP MAIN POWER fuse and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If continuity is not present, replace 10 AMP MAIN POWER fuse (para 8-6).</td>
</tr>
<tr>
<td>(8) Position WTEC II VIM cover on WTEC II VIM with washer, screw, and nut.</td>
</tr>
<tr>
<td>(9) Install seven washers, and screws in WTEC II VIM cover.</td>
</tr>
</tbody>
</table>
5. Is continuity present from WTEC II VIM connector pin K3 to pin L2?

If continuity is not present, WTEC II VIM is faulty.

Repair or replace WTEC II VIM (para 8-6).
CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Loosen screw in connector J116.</td>
</tr>
<tr>
<td>2</td>
<td>Disconnect connector J116 from WTEC II VIM.</td>
</tr>
<tr>
<td>3</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>4</td>
<td>Connect positive (+) probe of multimeter to WTEC II VIM connector pin K3.</td>
</tr>
<tr>
<td>5</td>
<td>Connect negative (-) probe of multimeter to WTEC II VIM connector pin L2 and note reading on multimeter.</td>
</tr>
<tr>
<td>6</td>
<td>If continuity is not present, repair or replace WTEC II VIM (para 8-6).</td>
</tr>
<tr>
<td>7</td>
<td>Connect connector PX33 to WTEC II VIM connector.</td>
</tr>
<tr>
<td>8</td>
<td>Tighten screw in connector PX33.</td>
</tr>
</tbody>
</table>
6. Is continuity present from connector J116 socket E2 to connector J115 socket 11 and no short circuits found?

**KNOWN INFO**
- Circuit breaker CB35 OK.
- WTEC II dashboard cable assembly OK.
- 10 AMP MAIN POWER fuse OK.
- WTEC II VIM OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, or short circuits are found, WTEC II cab transmission harness is faulty.

**CAUTION**
Read CAUTION on following page.

**YES**
Replace WTEC II cab transmission harness (para 7-137).

**NO**
CAUTION

Use care when testing electrical connectors not to bend connector pins or damage connector sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

(1) Remove instrument panel assembly for access (para 7-15).
(2) Disconnect connector J 115 from WTEC II TEPSS connector.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to connector J 116 socket E2.
(5) Connect negative (-) probe of multimeter to connector J 115 socket 11 and note reading on multimeter.
(6) Connect negative probe (-) of multimeter to all other sockets in connector J 115 and note reading on multimeter.
(7) Connect negative probe (-) of multimeter to ground and note reading on multimeter.
(8) If continuity is not present in step (5), or continuity is present in step (6) or step (7), replace WTEC II cab transmission harness (para 7-137).
f19A. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DISPLAYS MAIN CODE 23 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Circuit breaker CB35 OK
- WTEC II dashboard cable assembly OK
- 10 AMP MAIN POWER fuse OK
- WTEC II VIM OK

**POSSIBLE PROBLEMS**
- Faulty WTEC II cab transmission harness
- Faulty WTEC II TEPSS

---

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, or short circuits are found, WTEC II cab transmission harness is faulty. If continuity is present and short circuits are not found, WTEC II TEPSS is faulty.

---

**7.**
Is continuity present from connector J116 socket A1 to connector J115 socket 9 and no short circuits found?

---

**CAUTION**
Read CAUTION on following page.

---

**YES**
Replace WTEC II TEPSS (para 8-2).

---

**NO**
Replace WTEC II cab transmission harness (para 7-137).

---
CAUTION

Use care when testing electrical connectors not to bend connector pins or damage connector sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector J 116 socket A1.
(3) Connect negative (-) probe of multimeter to connector J 115 socket 9 and note reading on multimeter.
(4) Connect negative probe (-) of multimeter to all other sockets in connector J 115 and note reading on multimeter.
(5) Connect negative probe (-) of multimeter to ground and note reading on multimeter.
(6) If continuity is not present in step (3), or continuity is present in step (4) or step (5), replace WTEC II cab transmission harness (para 7-137).
(7) If continuity is present in step (3) and continuity is not present in step (4) or (5), replace WTEC II TEPSS (para 8-2).
(8) Connect connector J 116 to VIM connector.
(9) Tighten screw in connector J 116.
(10) Connect connector J 115 to WTEC II TEPSS connector.
(11) Install kick panel (para 16-3).
(12) Install instrument panel assembly (para 7-15).
(13) Clear diagnostic codes (para 8-4).
## INITIAL SETUP

**Equipment Conditions**
- Engine shut down (TM 9-2320-366-10-1).
- Kick panel removed (para 16-3).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)

**Personnel Required**
- (2)

**References**
- TM 9-4910-571-12&P

---

### WARNING

Read WARNING and CAUTION on following page.

### START

#### KNOWLEDGE

1. Is 12 VDC present at connector PX33 socket J1?

#### POSSIBLE PROBLEMS

- Faulty WTEC II dashboard cable assembly.
- Faulty terminal board TB1.
- Faulty 10 AMP MAIN POWER fuse.
- Faulty 10 AMP IGNITION fuse.
- Faulty WTEC II VIM.
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

#### TEST OPTIONS

- Voltage Test or STE/ICE-R Test #89

#### REASON FOR QUESTION

If 12 VDC is not present, WTEC II dashboard cable assembly is faulty.

### IF 12 VDC IS PRESENT

#### YES

Repair wire 1900 from connector PX33 sockets J1 and J2 to circuit breaker CB35 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).

#### NO

If 12 VDC is not present, WTEC II dashboard cable assembly is faulty.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Loosen screw in connector PX33.</td>
</tr>
<tr>
<td>(2) Disconnect connector PX33 from WTEC II VIM.</td>
</tr>
<tr>
<td>(3) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter to connector PX33 socket J1.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(6) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(8) If 12 VDC is not present, repair wire 1900 from connector PX33 sockets J1 and J2 to circuit breaker CB35 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).</td>
</tr>
</tbody>
</table>
WARNING

CAUTION

Read WARNING and CAUTION on following page.

TEST OPTIONS

Voltage Test or STE/ICE-R Test #89

REASON FOR QUESTION

This question eliminates possible problems and determines where troubleshooting continues.

2.

Is 24 VDC present at connector PX33 socket C1?

POSSIBLE PROBLEMS

Faulty WTEC II dashboard cable assembly.
Faulty terminal board TB1.
Faulty 10 AMP MAIN POWER fuse.
Faulty 10 AMP IGNITION fuse.
Faulty WTEC II VIM.
Faulty WTEC II cab transmission harness.
Faulty WTEC II TEPSS.

KNOWN INFO

12 VDC and 24 VDC circuits operate.
Circuit breaker CB35 OK.
Circuit breaker CB79 OK.

NO

Go to step 10 of this fault.

YES
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

### VOLTAGE TEST

1. Set multimeter to volts DC.
2. Connect positive (+) probe of multimeter to connector PX33 socket C1.
3. Connect negative (-) probe of multimeter to ground.
4. Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
5. Position master power switch to off (TM 9-2320-366-10-1).
6. If 24 VDC is not present, go to step 10 of this fault.
3. Is continuity present from connector PX33 socket K1 to connector PX33 socket K2?

If continuity is not present, WTEC II dashboard cable assembly is faulty.

If continuity is present, repair wires 3101 and 3102 from connector PX33 sockets K1 and K2 to terminal board TB2 position 16 and 17 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

| (1) Disconnect batteries (para 7-57). |
| (2) Set multimeter to ohms. |
| (3) Connect positive (+) probe of multimeter to connector PX33 socket K1. |
| (4) Connect negative (-) probe of multimeter to connector PX33 socket K2 and note reading on multimeter. |
| (5) If continuity is not present, Repair wires 3101 and 3102 from connector PX33 sockets K1 and K2 to terminal board TB2 position 16 and 17 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10). |
4. Is continuity present from WTEC II VIM connector pin J1 to WTEC II VIM connector pin R1?

This question eliminates possible problems and determines where troubleshooting continues.
CAUTION
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST
(1) Loosen screw in connector J116.
(2) Disconnect connector J116 from WTEC II VIM.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to WTEC II connector pin J1.
(5) Connect negative (-) probe of multimeter to WTEC II connector pin R1 and note reading on multimeter.
(6) If continuity is not present, go to step 12 of this fault.
5. Is continuity present from WTEC II VIM connector pin C1 to WTEC II VIM connector pin S1?

- **NO**
  - Go to step 13 of this fault.

- **YES**
  - Go to step 13 of this fault.

**KNOWN INFO**
- 12 VDC and 24 VDC circuits operate.
- Circuit breaker CB35 OK.
- Circuit breaker CB79 OK.
- Terminal block TB1 OK.
- WTEC II dashboard cable assembly OK.
- 10 AMP MAIN POWER fuse OK.

**POSSIBLE PROBLEMS**
- Faulty 10 AMP IGNITION fuse.
- Faulty WTEC II VIM.
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- This question eliminates possible problems and determines where troubleshooting continues.
**CAUTION**

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

### CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>2</td>
<td>Connect positive (+) probe of multimeter to WTEC II connector pin C1.</td>
</tr>
<tr>
<td>3</td>
<td>Connect negative (-) probe of multimeter to WTEC II connector pin S1 and note reading on multimeter.</td>
</tr>
<tr>
<td>4</td>
<td>If continuity is not present, go to step 13 of this fault.</td>
</tr>
</tbody>
</table>
6. Is continuity present from WTEC II VIM connector pin L2 to WTEC II VIM connector pin K2?

If continuity is not present, WTEC II VIM is faulty.

Replace WTEC II VIM (para 8-6).

CAUTION
Read CAUTION on following page.

KNOWN INFO
12 VDC and 24 VDC circuits operate.
Circuit breaker CB35 OK.
Circuit breaker CB79 OK.
Terminal board TB1 OK.
WTEC II dashboard cable assembly OK.
10 AMP MAIN POWER fuse OK.
10 AMP IGNITION fuse OK.

POSSIBLE PROBLEMS
Faulty WTEC II VIM.
Faulty WTEC II cab transmission harness.
Faulty WTEC II TEPSS.

TEST OPTIONS
Continuity Test or STE/ICE-R Test #91

REASON FOR QUESTION
If continuity is not present, WTEC II VIM is faulty.
CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to WTEC II connector pin L2.
(3) Connect negative (-) probe of multimeter to WTEC II connector pin K2 and note reading on multimeter.
(4) If continuity is not present, replace WTEC II VIM (para 8-6).
(5) Connect connector PX33 to WTEC II VIM.
(6) Tighten screw in connector PX33.
7. Is continuity present from connector J116 socket E1 to connector P116 socket E2?

**KNOWLEDGE INFO**
- 12 VDC and 24 VDC circuits operate.
- Circuit breaker CB35 OK.
- Circuit breaker CB79 OK.
- Terminal board TB1 OK.
- WTEC II dashboard cable assembly OK.
- 10 AMP MAIN POWER fuse OK.
- 10 AMP IGNITION fuse OK.
- WTEC II VIM OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II cab transmission harness.
- Faulty WTEC II TEPSS.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
This question eliminates possible problems and determines where troubleshooting continues.

- **YES**
  - Go to step 14 of this fault.

- **NO**
**CAUTION**

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

### CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector J116 socket E1.
3. Connect negative (-) probe of multimeter to connector J116 socket E2 and note reading on multimeter.
4. If continuity is not present, go to step 14 of this fault.
**KNOWN INFO**

12 VDC and 24 VDC circuits operate.
Circuit breaker CB35 OK.
Circuit breaker CB79 OK.
Terminal board TB1 OK.
WTEC II dashboard cable assembly OK.
10 AMP MAIN POWER fuse OK.
10 AMP IGNITION fuse OK.
WTEC II VIM OK.

**POSSIBLE PROBLEMS**

Faulty WTEC II cab transmission harness.
Faulty WTEC II TEPSS.

---

**TEST OPTIONS**

- Continuity Test or STE/ICE-R Test #91

---

**REASON FOR QUESTION**

- If continuity is not present, WTEC II cab transmission harness is faulty.

---

**CAUTION**

Read CAUTION on following page.

---

8. Is continuity present from connector J116 socket F1 to connector J115 socket 12?

---

**YES**

Replace WTEC II cab transmission harness (para 7-137).

---

**NO**
CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove instrument panel assembly for access (para 7-15).</td>
</tr>
<tr>
<td>2</td>
<td>Disconnect connector J115 from WTEC II TEPSS.</td>
</tr>
<tr>
<td>3</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>4</td>
<td>Connect positive (+) probe of multimeter to connector J116 socket F1.</td>
</tr>
<tr>
<td>5</td>
<td>Connect negative (-) probe of multimeter to connector J115 socket 12 and note reading on multimeter.</td>
</tr>
<tr>
<td>6</td>
<td>If continuity is not present, replace WTEC II cab transmission harness (para 7-137).</td>
</tr>
</tbody>
</table>
9. Is continuity present from connector J116 socket A2 to connector J115 socket 18?

- **NO**
  - Faulty WTEC II cab transmission harness.
  - Faulty WTEC II TEPSS.

- **YES**
  - Replace WTEC II cab transmission harness (para 7-137).
  - Replace WTEC II TEPSS (para 8-2).
CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector J 116 socket A2.
3. Connect negative (-) probe of multimeter to connector J 115 socket 18 and note reading on multimeter.
4. If continuity is not present, replace WTEC II cab transmission harness (para 7-137).
5. If continuity is present, replace WTEC II TEPSS (para 8-2).
6. Connect connector J 116 to WTEC II VIM connector.
8. Install kick panel (para 16-3).
10. Is continuity present from connector PX33 socket C1 to terminal board TB1 position 60?

If continuity is not present, WTEC II dashboard cable assembly is faulty.

Repair wires 1460 from connector PX33 sockets C1 to terminal board TB1 position 60 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Disconnect batteries (para 7-57).</td>
</tr>
<tr>
<td>2. Remove PDP cover (para 16-2).</td>
</tr>
<tr>
<td>3. Remove three screws from PDP.</td>
</tr>
<tr>
<td>4. Remove three screws and washers from PDP.</td>
</tr>
<tr>
<td>5. Lift PDP outward to gain access.</td>
</tr>
<tr>
<td>6. Set multimeter to ohms.</td>
</tr>
<tr>
<td>7. Connect positive (+) probe of multimeter to connector PX33 socket C1.</td>
</tr>
<tr>
<td>8. Connect negative (-) probe of multimeter to terminal board TB1 position 60 and not reading on multimeter.</td>
</tr>
<tr>
<td>9. If continuity is not present, Repair wire 1460 from connector PX33 sockets C1 to terminal board TB1 position 60 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).</td>
</tr>
<tr>
<td>10. Connect connector PX33 to WTEC II VIM.</td>
</tr>
<tr>
<td>11. Tighten screw in connector PX33.</td>
</tr>
<tr>
<td>12. Install kick panel (para 16-3).</td>
</tr>
</tbody>
</table>
11. Is continuity present from terminal board TB1 position 60 to terminal board TB1 position 62?

- **YES**
  - Repair wires 1690 from terminal board TB1 position 62 to circuit breaker CB79 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).

- **NO**
  - Replace terminal board TB1 (7-10).

**KNOWN INFO**
- 12 VDC and 24 VDC circuits operate.
- Circuit breaker CB35 OK.
- Circuit breaker CB79 OK.
- 10 AMP MAIN POWER fuse OK.
- 10 AMP IGNITION fuse OK.
- WTEC II VIM OK.
- WTEC II cab transmission harness OK.
- WTEC II TEPSS OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC II dashboard cable assembly.
- Faulty terminal board TB1.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, terminal board TB1 is faulty.
- If continuity is present, WTEC II dashboard cable assembly is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to terminal board TB1 position 60.
(3) Connect negative (-) probe of multimeter to terminal board TB1 position 62 and note reading on multimeter.
(4) If continuity is not present, replace terminal board TB1 (para 7-10).
(5) If continuity is present, Repair wire 1690 from terminal board TB1 position 62 to circuit breaker CB79 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10).
(6) Install PDP on dashboard with three screws.
(7) Install three washers and screws in PDP.
(8) Install PDP cover (para 16-2).
(9) Connect batteries (para 7-57).
12 VDC and 24 VDC circuits operate.
Circuit breaker CB35 OK.
Circuit breaker CB79 OK.
Terminal board TB1 OK.
WTEC II dashboard cable assembly OK.
10 AMP IGNITION fuse OK.
WTEC II cab transmission harness OK.
WTEC II TEPSS OK.
Faulty 10 AMP MAIN POWER fuse.
Faulty WTEC II VIM.

**POSSIBLE PROBLEMS**

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present, 10 AMP MAIN POWER fuse is faulty. If continuity is present, WTEC II VIM is faulty.

12. Is continuity present through 10 AMP MAIN POWER fuse?

- **NO**
  - Replace 10 AMP MAIN POWER fuse (para 8-6).

- **YES**
  - Replace WTEC II VIM (para 8-6).
**CONTINUITY TEST**

1. Remove seven screws and washers from WTEC II VIM cover.
2. Remove screw, washer, cover, and nut from WTEC II VIM.
3. Remove 10 AMP MAIN POWER fuse from WTEC II VIM.
4. Set multimeter to ohms.
5. Connect positive (+) probe of multimeter to one terminal on 10 AMP MAIN POWER fuse.
6. Connect negative (-) probe of multimeter to other terminal on 10 AMP MAIN POWER fuse and note reading on multimeter.
7. If continuity is not present, replace 10 AMP MAIN POWER fuse (para 8-6).
8. If continuity is present replace WTEC II VIM (para 8-6).
13. Is continuity present through 10 AMP IGNITION fuse?

- **YES**
  - Replace 10 AMP IGNITION fuse (para 8-6).
  - Replace WTEC II VIM (para 8-6).

- **NO**
  - Replace WTEC II VIM (para 8-6).

**KNOWN INFO**
- 12 VDC and 24 VDC circuits operate.
- Circuit breaker CB35 OK.
- Circuit breaker CB79 OK.
- Terminal block TB1 OK.
- WTEC II dashboard cable assembly OK.
- 10 AMP MAIN POWER fuse OK.
- WTEC II cab transmission harness OK.
- WTEC II TEPSS OK.

**POSSIBLE PROBLEMS**
- Faulty 10 AMP IGNITION fuse.
- Faulty WTEC II VIM.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, 10 AMP IGNITION fuse is faulty. If continuity is present, WTEC II VIM is faulty.
CONTINUITY TEST

(1) Remove seven screws and washers from WTEC II VIM cover.
(2) Remove screw, washer, cover, and nut from WTEC II VIM.
(3) Remove 10 AMP IGNITION fuse from WTEC II VIM.
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter to one terminal on 10 AMP IGNITION fuse.
(6) Connect negative (-) probe of multimeter to other terminal on 10 AMP IGNITION fuse and note reading on multimeter.
(7) If continuity is not present, replace 10 AMP IGNITION fuse (para 8-6).
(8) If continuity is present replace WTEC II VIM (para 8-6).
f19B. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DOES NOT ILLUMINATE (CONT)

KNOWN INFO

| 12 VDC and 24 VDC circuits operate. |
| Circuit breaker CB35 OK. |
| Circuit breaker CB79 OK. |
| Terminal board TB1 OK. |
| WTEC II dashboard cable assembly OK. |
| 10 AMP MAIN POWER fuse OK. |
| 10 AMP IGNITION fuse OK. |
| WTEC II VIM OK. |

POSSIBLE PROBLEMS

| Faulty WTEC II cab transmission harness. |
| Faulty WTEC II TEPSS. |

14. Is continuity present from connector J115 socket 2 to connector J115 socket 11?

TEST OPTIONS

| Continuity Test or STE/ICE-R Test #91 |

REASON FOR QUESTION

If continuity is not present, cab transmission harness is faulty. If continuity is present, WTEC II TEPSS is faulty.

CAUTION

Read CAUTION on following page.

NO

YES

Replace WTEC II cab transmission harness (para 7-137).

Replace WTEC II TEPSS (para 8-2).
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Connect connector J116 to WTEC II VIM.</td>
</tr>
<tr>
<td>(2) Tighten screw in connector J116.</td>
</tr>
<tr>
<td>(3) Remove instrument panel assembly for access (para 7-15).</td>
</tr>
<tr>
<td>(4) Disconnect connector J115 from WTEC II TEPSS.</td>
</tr>
<tr>
<td>(5) Set multimeter ohms.</td>
</tr>
<tr>
<td>(6) Connect positive (+) probe of multimeter to connector J115 socket 2.</td>
</tr>
<tr>
<td>(7) Connect negative (-) probe of multimeter to connector J115 socket 11 and note reading on multimeter.</td>
</tr>
<tr>
<td>(8) If continuity is not present, replace WTEC II cab transmission harness (para 7-137).</td>
</tr>
<tr>
<td>(9) If continuity is present, replace WTEC II TEPSS (para 8-2).</td>
</tr>
<tr>
<td>(10) Install kick panel (para 16-3).</td>
</tr>
<tr>
<td>(11) Connect batteries (para 7-57).</td>
</tr>
</tbody>
</table>
f20. METAL PARTICLES FOUND DURING TRANSMISSION OIL CHANGE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

---

**KNOWN INFO**

Transmission oil level OK.
Metal particles found in transmission oil.

**POSSIBLE PROBLEMS**

Faulty C6 thrust bearing.
Faulty transfer case.

---

1. Do metal particles pass inspection criteria?

**TEST OPTIONS**

Visual inspection

**REASON FOR QUESTION**

If large metal particles are found, C6 thrust bearing or transfer case may be faulty.

---

**NOTIFY**

Notify DS Maintenance.

---

**START**

---

**NO**

---

**YES**

---
If metal particles are found on transfer case drain plug that are 0.165 in. (4.19 mm) x 0.078 in. (1.98 mm) or larger, C6 thrust bearing may be faulty. Notify DS Maintenance.
f21. TRANSMISSION DOES NOT SHIFT OR IS SLOW TO SHIFT WHEN COLD

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Personnel Required
(2)

References
(TM 9-4910-571-12&P)

Tools and Special Tools
Tool Kit, Genl, Mech (Item 46, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

Materials/Parts
Adapter, Pipe to Tube (Item 1, Appendix D)
Packing, Preformed (Item 184, Appendix G)

WARNING
Read WARNING on following page.

1. Is vehicle equipped with transmission oil cooler tubes?

START

NO

YES

Go to step 3 of this fault.

1. Visual Inspection

REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

KNOWN INFO
Transmission oil level OK.

POSSIBLE PROBLEMS
Faulty converter regulator pin.
WARNING
Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

(1) Check to see if vehicle is equipped with transmission oil cooler tubes.
(2) If vehicle is not equipped with transmission oil cooler tubes, go to step 3 of this fault.
f21. TRANSMISSION DOES NOT SHIFT OR IS SLOW TO SHIFT WHEN COLD (CONT)

**KNOWN INFO**
- Transmission oil level OK.
- **POSSIBLE PROBLEMS**
  - Faulty converter regulator pin.

**TEST OPTIONS**
- Pressure Test or
- STE/ICE-R Test #50.

**REASON FOR QUESTION**
If pressure is less than 10 PSI, converter regulator pin is faulty.

2. Is 10 PSI or more present at transmission oil cooler tube?

**WARNING**
Read WARNING on following page.

- **NO**
  - Notify DS Maintenance.

- **YES**
  - Fault corrected.
Prolonged contact with lubricating oil (MIL-L-2104) may cause a skin rash. Skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Saturated clothing should be removed immediately. Areas in which lubricating oil is used should be well ventilated to keep fumes to a minimum. Failure to comply may result in injury to personnel.

**WARNING**

(1) Place drain pan under transmission oil cooler tube.
(2) Disconnect transmission oil sampling hose from 45 degree fitting.

**NOTE**

Note orientation of 45 degree fitting prior to removal.

(3) Remove 45 degree fitting from transmission oil cooler tube.
(4) Remove preformed packing from 45 degree fitting. Discard preformed packing.
(5) Install adapter fitting in transmission oil cooler tube.
(6) Install STE/ICE-R 0-1000 PSI transducer in adapter fitting.
(7) Start engine (TM 9-2320-366-10-1).
(8) Perform STE/ICE-R Test # 50 and note reading on STE/ICE-R.
(9) If pressure is less than 10 PSI, notify DS Maintenance.
(10) Shut down engine (TM 9-2320-366-10-1).
(11) Remove STE/ICE-R 0-1000 PSI transducer from adapter fitting.
(12) Remove adapter fitting from transmission oil cooler tube.
(13) Install preformed packing on 45 degree fitting.
(14) Install 45 degree fitting in transmission oil cooler tube.
(15) Connect transmission oil sampling hose to 45 degree fitting.
(16) Remove drain pan from under oil cooler tube.
3. Is 10 PSI or more present at transmission oil cooler hose?

- **YES**
  - Notify DS Maintenance.
  - Fault corrected.

- **NO**
  - TEST OPTIONS
    - Pressure Test or STE/ICE-R Test #50.
  - REASON FOR QUESTION
    - If pressure is less than 10 PSI, converter regulator pin is faulty.

**KNOWLEDGE INFO**
- Transmission oil level OK.

**POSSIBLE PROBLEMS**
- Faulty converter regulator pin.
Prolonged contact with lubricating oil (MIL-L-2104) may cause a skin rash. Skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Saturated clothing should be removed immediately. Areas in which lubricating oil is used should be well ventilated to keep fumes to a minimum. Failure to comply may result in injury to personnel.

### PRESSURE TEST

1. Place drain pan under transmission oil cooler hose.
2. Disconnect transmission oil sampling hose from 45 degree fitting.

**NOTE**

Note orientation of 45 degree fitting prior to removal.

3. Remove 45 degree fitting from transmission oil cooler hose.
4. Install street elbow on transmission oil cooler hose.
5. Connect flexible hose assembly to street elbow.
6. Install reducer fitting on flexible hose assembly.
7. Install STE/ICE-R 0-1000 PSI transducer on reducer fitting.
9. Perform STE/ICE-R Test # 50 and note reading on STE/ICE-R.
10. If pressure is less than 10 PSI, notify DS Maintenance.
12. Remove STE/ICE-R 0-1000 PSI transducer from reducer fitting.
13. Remove reducer fitting from flexible hose assembly.
14. Disconnect flexible hose assembly from street elbow.
15. Remove street elbow from transmission oil cooler hose.
16. Install 45 degree fitting on transmission oil cooler hose.
17. Connect transmission oil sampling hose to 45 degree fitting.
18. Remove drain pan from under oil cooler hose.
**INITIAL SETUP**

**Equipment Conditions**
Engine shut down (TM 9-2320-366-10-1).

**References**
TM 9-4910-571-12&P

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)
- STE/ICE-R (Item 41, Appendix C)

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.

**POSSIBLE PROBLEMS**
- Faulty transmission engine speed sensor.
- Faulty WTEC III cab transmission harness.
- Faulty WTEC III transmission ECU.

**F22. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 22 SUB CODE 14**

**START**

**WARNING**

1. Is 200-400 ohms resistance present from transmission engine speed sensor pin A to pin B?

**CAUTION**
Read WARNING and CAUTION on following page.

**TEST OPTIONS**
- Resistance Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If 200-400 ohms resistance is not present, transmission engine speed sensor is faulty.

**YES**
Replace transmission engine speed sensor (para 7-52).

**NO**
RESISTANCE TEST

(1) Disconnect connector P72 from transmission engine speed sensor.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to pin A of transmission engine speed sensor.

NOTE
A good transmission engine speed sensor will return a reading of 200-400 ohms resistance as follows:
   a. 200 ohms at -40° F (-40° C)
   b. 300 ohms at 68° F (20° C)
   c. 400 ohms at 230° F (110° C)

(4) Connect negative (-) probe of multimeter to pin B of transmission engine speed sensor and note reading on multimeter.
(5) If good resistance is not noted, replace transmission engine speed sensor (para 7-52).
(6) Connect connector P72 to transmission engine speed sensor.
f22. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 22 SUB CODE 14 (CONT)

**KNOWN INFO**
Transmission oil level OK.
Fuse OK.
Batteries OK.
Transmission engine speed sensor OK.

**POSSIBLE PROBLEMS**
Faulty WTEC III cab transmission harness.
Faulty WTEC III transmission ECU.

**TEST OPTIONS**
Resistance Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If 200-400 ohms resistance is not present, or short circuits are found, DS Maintenance needs to be notified.

Is 200-400 ohms resistance present from connector P119m to P119s?

- **YES**
  - Notify DS Maintenance.

- **NO**
RESISTANCE TEST

(1) Remove two screws and washers from front grille.
(2) Remove screw and washer from front grille.
(3) Remove front grille from cab.
(4) Disconnect connector P119 from connector J119.
(5) Set multimeter to ohms.
(6) Connect positive (+) probe of multimeter to connector P119m.
(7) Connect negative (-) probe of multimeter to connector P119s and note reading on multimeter.
(8) Connect negative (-) probe of multimeter to all other pins in connector P119, one at a time, and note reading on multimeter.
(9) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(10) Connect positive (+) probe of multimeter to connector P119s.
(11) Connect negative (-) probe of multimeter to all other pins in connector P119 (except P119m), one at a time, and note reading on multimeter.
(12) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(13) If 200-400 ohms resistance is not present in step 7, or continuity is present in step 8, 9, 11, or 12, notify DS Maintenance.
**KNOWLEDGE**
Transmission oil level OK.
Fuse OK.
Batteries OK.
Transmission engine speed sensor OK.

**POSSIBLE PROBLEMS**
Faulty WTEC III cab transmission harness.
Faulty WTEC III transmission ECU.

3. Is continuity present from connector J119m and J119s to connector P114-14 and P114-30?

**TEST OPTIONS**
Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present, or short circuits are found, WTEC III cab transmission harness is faulty. If continuity is present, and no short circuits are found, WTEC III transmission ECU is faulty.

**YES**
Replace WTEC III cab transmission harness (para 7-138).

**NO**
Replace WTEC III transmission ECU (para 8-7).
(1) Remove kick panel (para 16-3).
(2) Disconnect connector clamp from connector P114.
(3) Disconnect connector P114 from WTEC III transmission ECU.
(4) Install jumper wire from connector J119m to J119s.
(5) Set multimeter to ohms.
(6) Connect positive (+) probe of multimeter to connector P114-14.
(7) Connect negative (-) probe of multimeter to connector P114-30 and note reading on multimeter.
(8) Connect negative (-) probe of multimeter to all other sockets in connector P114, one at a time, and note reading on multimeter.
(9) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(10) Connect positive (+) probe of multimeter to connector P114-30.
(11) Connect negative (-) probe of multimeter to all other sockets in connector P114 (except P114-14), one at a time, and note reading on multimeter.
(12) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(13) If continuity is not present in step 7, or continuity is present in step 8, 9, 11, or 12, replace WTEC III cab transmission harness (para 7-138).
(14) If continuity is present in step 7, and continuity is not present in step 8, 9, 11, and 12, replace WTEC III transmission ECU (para 8-7).
(15) Remove jumper wire from connector J119s and J119m.
(16) Connect connector P119 to connector J119.
(17) Position front grille on cab with washer and screw.
(18) Position two washers and screws in front grille.
(19) Tighten screw to 48-60 lb-in. (5-7 N·m).
(20) Tighten two screws to 24 lb-in. (3 N·m).
(21) Connect connector P114 to WTEC III transmission ECU.
(22) Connect connector clamp to connector P114.
(23) Install kick panel (para 16-3).
(24) Clear diagnostic codes (para 8-5).
1. Is continuity present from connector J119p and J119r to connector P114-15 and P114-31?

**CAUTION**
Read CAUTION on following page.

**KNOWN INFO**
Transmission oil level OK.
Fuse OK.
Batteries OK.

**POSSIBLE PROBLEMS**
Faulty WTEC III cab transmission harness.
Faulty WTEC III transmission ECU.

**REASON FOR QUESTION**
If continuity is not present, or shorts are found, WTEC III cab transmission harness is faulty.

**TEST OPTIONS**
Continuity Test or STE/ICE-R Test #91

**YES**
Replace WTEC III cab transmission harness (para 7-138).

**NO**
CAUTION

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

(1) Remove two screws and washers from front grille.
(2) Remove screw and washer from front grille.
(3) Remove front grille from cab.
(4) Disconnect connector P119 from connector J119.
(5) Remove kick panel (para 16-3).
(6) Disconnect connector clamp from connector P114.
(7) Disconnect connector P114 from WTEC III transmission ECU.
(8) Install jumper wire from connector J119r to J119.
(9) Set multimeter to ohms.
(10) Connect positive (+) probe of multimeter to connector P114-15.
(11) Connect negative (-) probe of multimeter to connector P114-31 and note reading on multimeter.
(12) Connect negative (-) probe of multimeter to all other sockets in connector P114, one at a time, and note reading on multimeter.
(13) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(14) Remove jumper wire from connector J119r and J119.
(15) Connect positive (+) probe of multimeter to connector P114-31.
(16) Connect negative (-) probe of multimeter to all sockets in connector P114 (except P114-15), one at a time, and note reading on multimeter.
(17) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(18) If continuity is not present in step 11, or continuity is present in step 12, 13, 16, or 17, replace WTEC III cab transmission harness (para 7-138).
(19) Connect connector P114 to WTEC III transmission ECU.
(20) Connect connector clamp to connector P114.
(21) Install kick panel (para 16-3).
2. Is 200 - 400 ohms resistance present from connector P119p to P119r?

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- WTEC III cab transmission harness OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Resistance Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If 200-400 ohms resistance is not present from connector P119p to P119r, or short circuits are found, DS Maintenance needs to be notified.

- **YES**
  - Replace WTEC III transmission ECU (para 8-7).
  - Notify DS Maintenance.

- **NO**
## RESISTANCE TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector P119p.
3. Connect negative (-) probe of multimeter to connector P119r and note reading on multimeter.

### NOTE
A good turbine speed sensor will return a reading of 200-400 ohms resistance as follows:

- a. 200 ohms at \(-40^\circ F\) \((-40^\circ C)\).
- b. 300 ohms at \(68^\circ F\) \((20^\circ C)\).
- c. 400 ohms at \(230^\circ F\) \((110^\circ C)\).

4. Connect negative (-) probe of multimeter to all other pins in connector P119, one at a time, and note reading on multimeter.
5. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
6. Connect positive (+) probe of multimeter to connector P119r.
7. Connect negative (-) probe of multimeter to all pins in connector P119 (except P119p), one at a time, and note reading on multimeter.
8. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
9. If good resistance is not noted in step 3, or continuity is present in step 4, 5, 7, or 8, notify DS Maintenance.
10. If good resistance is noted in step 3 and continuity is not present in step 4, 5, 7, or 8, replace WTEC III transmission ECU (para 8-7).
11. Connect connector P119 to connector J119.
12. Position front grille on cab with washer and screw.
13. Position two washers and screws in front grille.
14. Tighten screw to 48-60 lb-in. (5-7 N·m).
15. Tighten two screws to 24 lb-in. (3 N·m).
**IN INITIAL SETUP**

**Equipment Conditions**
Engine shut down (TM 9-2320-366-10-1).

**References**
TM 9-4910-571-12&P

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**Tools and Special Tools**
- Goggles, Industrial (Item 15, Appendix C)
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)
- STE/ICE-R (Item 41, Appendix C)

---

**Known Info**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.

**Possible Problems**
- Faulty WTEC III cab transmission harness.
- Faulty WTEC III transmission ECU.

---

**Test Options**
- Resistance Test or STE/ICE-R Test #91

**Reason for Question**
If 200-400 ohms resistance is not present, notify DS Maintenance.

---

**Warning and Caution**
Read WARNING and CAUTION on following page.

---

1. Is 200-400 ohms resistance present from transmission output speed sensor pin C to pin D?

---

**Start**

---

NO

---

YES

---

Notify DS Maintenance.
RESISTANCE TEST

(1) Disconnect output speed sensor connector from transfer case connector.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to pin C of transfer case connector.

NOTE
A good output speed sensor will return a reading of 200-400 ohms resistance as follows:
- a. 200 ohms at -40° F (-40° C)
- b. 300 ohms at 68° F (20° C)
- c. 400 ohms at 230° F (110° C)

(4) Connect negative (-) probe of multimeter to pin D of transfer case connector and note reading on multimeter.
(5) If good resistance is not noted, notify DS Maintenance.
(6) Connect output speed sensor connector to transfer case connector.

WARNING
Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

CAUTION
Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CAUTION
Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

WARNING
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

NOTE
A good output speed sensor will return a reading of 200-400 ohms resistance as follows:
- a. 200 ohms at -40° F (-40° C)
- b. 300 ohms at 68° F (20° C)
- c. 400 ohms at 230° F (110° C)

(4) Connect negative (-) probe of multimeter to pin D of transfer case connector and note reading on multimeter.
(5) If good resistance is not noted, notify DS Maintenance.
(6) Connect output speed sensor connector to transfer case connector.
f24. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 22 SUB CODE 16 (CONT)

**KNOWN INFO**
Transmission oil level OK.
Fuse OK.
Batteries OK.
Output speed sensor OK.

**POSSIBLE PROBLEMS**
Faulty WTEC III cab transmission harness.
Faulty WTEC III transmission ECU.

**TEST OPTIONS**
Resistance Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If 200-400 ohms resistance is not present, or short circuits are found, notify DS Maintenance.

2. Is 200-400 ohms resistance present from connector P119n to P119g?

**YES**

**NO**

Notify DS Maintenance.
RESISTANCE TEST

(1) Remove two screws and washers from front grille.
(2) Remove screw and washer from front grille.
(3) Remove front grille from cab.
(4) Disconnect connector P119 from connector J119.
(5) Set multimeter to ohms.
(6) Connect positive (+) probe of multimeter to connector P119n.
(7) Connect negative (-) probe of multimeter to connector P119g and note reading on multimeter.
(8) Connect negative (-) probe of multimeter to all other pins in connector P119, one at a time, and note reading on multimeter.
(9) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(10) Connect positive (+) probe of multimeter to connector P119g.
(11) Connect negative (-) probe of multimeter to all other pins in connector P119 (except P119n), one at a time, and note reading on multimeter.
(12) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(13) If 200-400 ohms resistance is not present in step 7, or continuity is present in step 8, 9, 11, or 12, notify DS Maintenance.
3. Is continuity present from connector J119n and J119g to connector P114-16 and P114-32?

- **YES**
  - Replace WTEC III cab transmission harness (para 7-138).
  - Replace WTEC III transmission ECU (para 8-7).

- **NO**
  - Continuity Test or STE/ICE-R Test #91
  - Reason for Question: If continuity is not present, or short circuits are found, WTEC III cab transmission harness is faulty. If continuity is present, and no short circuits are found, WTEC III transmission ECU is faulty.
<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove kick panel (para 16-3).</td>
</tr>
<tr>
<td>2</td>
<td>Disconnect connector clamp from connector P114.</td>
</tr>
<tr>
<td>3</td>
<td>Disconnect connector P114 from WTEC III transmission ECU.</td>
</tr>
<tr>
<td>4</td>
<td>Install jumper wire from connector J119g to J119n.</td>
</tr>
<tr>
<td>5</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>6</td>
<td>Connect positive (+) probe of multimeter to connector P114-32.</td>
</tr>
<tr>
<td>7</td>
<td>Connect negative (-) probe of multimeter to connector P114-16 and note reading on multimeter.</td>
</tr>
<tr>
<td>8</td>
<td>Connect negative (-) probe of multimeter to all other sockets in connector P114, one at a time, and note reading on multimeter.</td>
</tr>
<tr>
<td>9</td>
<td>Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>10</td>
<td>Connect positive (+) probe of multimeter to connector P114-16.</td>
</tr>
<tr>
<td>11</td>
<td>Connect negative (-) probe of multimeter to all other sockets in connector P114 (except P114-32), one at a time, and note reading on multimeter.</td>
</tr>
<tr>
<td>12</td>
<td>Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>13</td>
<td>If continuity is not present in step 7, or continuity is present in step 8, 9, 11, or 12, replace WTEC III cab transmission harness (para 7-138).</td>
</tr>
<tr>
<td>14</td>
<td>If continuity is present in step 7, and continuity is not present in step 8, 9, 11, and 12, replace WTEC III transmission ECU (para 8-7).</td>
</tr>
<tr>
<td>15</td>
<td>Remove jumper wire from connector J119n and J119g.</td>
</tr>
<tr>
<td>16</td>
<td>Connect connector P119 to connector J119.</td>
</tr>
<tr>
<td>17</td>
<td>Position front grille on cab with washer and screw.</td>
</tr>
<tr>
<td>18</td>
<td>Position two washers and screws in front grille.</td>
</tr>
<tr>
<td>19</td>
<td>Tighten screw to 48-60 lb-in. (5-7 N·m).</td>
</tr>
<tr>
<td>20</td>
<td>Tighten two screws to 24 lb-in. (3 N·m).</td>
</tr>
<tr>
<td>21</td>
<td>Connect connector P114 to WTEC III transmission ECU.</td>
</tr>
<tr>
<td>22</td>
<td>Connect connector clamp to connector P114.</td>
</tr>
<tr>
<td>23</td>
<td>Install kick panel (para 16-3).</td>
</tr>
<tr>
<td>24</td>
<td>Clear diagnostic codes (para 8-5).</td>
</tr>
</tbody>
</table>
### **f25. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 24 AND/OR 33 AND ANY SUB CODE**

#### INITIAL SETUP

**Equipment Conditions**  
Engine shut down (TM 9-2320-366-10-1).

**References**  
TM 9-4910-571-12&P

---

#### Tools and Special Tools

- Goggles, Industrial (Item 15, Appendix C)
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Pan, Drain (Item 24, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

---

#### CAUTION

Read CAUTION on following page.

---

#### TEST OPTIONS

Visual Inspection

---

#### REASON FOR QUESTION

If main code 24 is displayed, WTEC III transmission ECU has detected an unacceptable sump oil temperature.

---

#### KNOWN INFO

- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Engine does not overheat.

---

#### POSSIBLE PROBLEMS

- Faulty transmission oil cooler tubes.
- Faulty transmission oil cooler.
- Faulty transmission auxiliary oil cooler.
- Faulty transmission oil filters.
- Faulty WTEC III cab transmission harness.
- Faulty WTEC III transmission ECU.

---

1. Is main code 24 displayed on WTEC III TPSS?

   - **CAUTION:** Read CAUTION on following page.

   - **NO**

   - **YES**

   - **TEST OPTIONS**  
     - Visual Inspection

   - **REASON FOR QUESTION**  
     - If main code 24 is displayed, WTEC III transmission ECU has detected an unacceptable sump oil temperature.

---

Go to step 7 of this fault.
Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

(1) Position master power switch to on (TM 9-2320-366-10-1).
(2) Check to see if main code 24 or main code 33 is displayed on WTEC III TPSS (para 8-5).
(3) If main code 24 is displayed:
   (a) WTEC III transmission ECU has detected a sump oil temperature above (sub code 23) or below (sub code 12) operating limits.
   (b) Troubleshoot oil cooling system followed by sump oil temperature sensor and circuits.
(4) If main code 33 is displayed:
   (a) WTEC III transmission ECU has detected a fault with sump oil temperature sensor or its circuit.
   (b) Troubleshoot electrical system.
(5) Position master power switch to off (TM 9-2320-366-10-1).
Known Info:
Transmission oil level OK.
Fuse OK.
Batteries OK.
Engine does not overheat.

Possible Problems:
Faulty transmission oil cooler tubes.
Faulty transmission oil cooler.
Faulty transmission auxiliary oil cooler.
Faulty transmission oil filters.
Faulty WTEC III cab transmission harness.
Faulty WTEC III transmission ECU.

Test Options:
Visual Inspection

Reason for Question:
Damaged oil cooler tubes may cause WTEC III TPSS to display main code 24 and/or 33.

Warning:
Read WARNING on following page.

2. Are transmission oil cooler tubes free from damage?

Yes: Replace transmission oil cooler tube(s) (para 8-17).

No: 

F25. WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays Main Code 24 and/or 33 and Any Sub Code (Cont)
Check transmission oil cooler tubes for damage and restrictions.

(1) Check transmission oil cooler tubes for damage and restrictions.
(2) If damage or restrictions are found, replace transmission oil cooler tube(s) (para 8-17).

WARNING

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.
3. Is transmission oil free from coolant contamination?

WARNING
CAUTION
Read WARNING and CAUTION on following page.

Is transmission oil free from coolant contamination?

NO

YES

Replace transmission oil cooler (para 8-10) and change transmission oil (Appendix H).

TEST OPTIONS
Transmission Oil Inspection

REASON FOR QUESTION
Contaminated transmission oil may cause WTEC III TPSS to display main code 24 and/or 33.

POSSIBLE PROBLEMS
Faulty transmission oil cooler.
Faulty transmission auxiliary oil cooler.
Faulty transmission oil filters.
Faulty WTEC III cab transmission harness.
Faulty WTEC III transmission ECU.

KNOWN INFO
Transmission oil level OK.
Fuse OK.
Batteries OK.
Engine does not overheat.
Transmission oil cooler tubes OK.
TRANSMISSION OIL INSPECTION

WARNING

Do not drain transmission oil when transmission is hot. Failure to comply may cause severe injury to personnel.

CAUTION

Transmission oil must be changed whenever there is evidence of oil breakdown or contamination. Oil breakdown or contamination may be caused from overheating transmission and/or oil cooler internal failure and is indicated by discoloration, strong odor, or oil analysis.

NOTE

Transmission fluid capacity is 42.3 qt (40 L).

(1) Start engine (TM 9-2320-366-10-1).
(2) Allow oil to circulate for a few minutes.
(3) Place drain pan under transmission AOAP valve.
(4) Remove drain plug from transmission AOAP valve and press plunger to extract oil from system.
(5) Allow approximately 1 qt (0.9 L) of oil to drain into drain pan. Release plunger.
(6) Install drain plug on transmission AOAP valve.
(7) Inspect oil for coolant contamination.
(8) If oil is contaminated, replace transmission oil cooler (para 8-10).
(9) Shut down engine (TM 9-2320-366-10-1).
(10) Fill transmission (Appendix H).
**f25. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 24 AND/OR 33 AND ANY SUB CODE (CONT)**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission oil level OK.</td>
</tr>
<tr>
<td>Fuse OK.</td>
</tr>
<tr>
<td>Batteries OK.</td>
</tr>
<tr>
<td>Engine does not overheat.</td>
</tr>
<tr>
<td>Transmission oil cooler tubes OK.</td>
</tr>
<tr>
<td>Transmission oil cooler OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty transmission auxiliary oil cooler.</td>
</tr>
<tr>
<td>Faulty transmission oil filters.</td>
</tr>
<tr>
<td>Faulty WTEC III cab transmission harness.</td>
</tr>
<tr>
<td>Faulty transmission external wiring harness.</td>
</tr>
<tr>
<td>Faulty WTEC III transmission ECU.</td>
</tr>
</tbody>
</table>

4. Does transmission auxiliary oil cooler fan operate?

- **TEST OPTIONS**
  - Auxiliary Oil Cooler Fan Test

- **REASON FOR QUESTION**
  - Transmission may overheat if fan does not operate which will cause WTEC III TPSS to display main code 24 and/or 33 sub code 23.

- **NO**
  - Perform Electrical System Troubleshooting (e148. Transmission Auxiliary Oil Cooler Fan Does Not Operate (All Models Except M1088/M1089) or e149. M1088/M1089 Transmission Auxiliary Oil Cooler Fan Does Not Operate).

- **YES**
AUXILIARY OIL COOLER FAN TEST

(1) Raise cab (TM 9-2320-366-10-1).
(2) Disconnect connector clamp from water temperature sensor.
(3) Disconnect connector P36 from water temperature sensor (S56) to de-energize relay K15 and provide power to auxiliary oil cooler fan.
(4) Position master power switch to on (TM 9-2320-366-10-1).
(5) Check if auxiliary oil cooler fan comes on.
(6) If fan does not come on, perform Electrical System Troubleshooting (e148. Transmission Auxiliary Oil Cooler Fan Does Not Operate (All Models Except M1088/M1089) or e149. M1088/M1089 Transmission Auxiliary Oil Cooler Fan Does Not Operate).
(7) Position master power switch to off (TM 9-2320-366-10-1).
(8) Connect connector P36 to water temperature sensor (S56).
(9) Connect connector clamp on water temperature sensor.
(10) Lower cab (TM 9-2320-366-10-1).
Are transmission auxiliary oil cooler fins free from dirt, mud, or other debris?

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
Transmission may overheat if auxiliary oil cooler fins are plugged with debris which will cause WTEC III TPSS to display main code 24 and/or 33 sub code 23.

**KNOWLEDGE INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Engine does not overheat.
- Transmission oil cooler tubes OK.
- Transmission oil cooler OK.

**POSSIBLE PROBLEMS**
- Faulty transmission auxiliary oil cooler.
- Faulty transmission oil filters.
- Faulty WTEC III cab transmission harness.
- Faulty transmission external wiring harness.
- Faulty WTEC III transmission ECU.

**YES**
Clean transmission auxiliary oil cooler fins.

**NO**
NOTE

M1088/M1089 are equipped with two transmission auxiliary oil cooler fans.

(1) Check if transmission auxiliary oil cooler fins are plugged with dirt, mud, or other debris.

(2) If fins are plugged with dirt, mud or other debris, clean transmission auxiliary oil cooler fins.
TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 24 AND/OR 33 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Engine does not overheat.
- Transmission oil cooler tubes OK.
- Transmission oil cooler OK.

**POSSIBLE PROBLEMS**
- Faulty transmission oil filters.
- Faulty WTEC III cab transmission harness.
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
Plugged transmission oil filters may cause WTEC III TPSS to display main code 24 and/or 33.

6. Are transmission oil filters free from damage?

- **YES**
  - Replace transmission oil filters (para 8-9).

- **NO**
Check transmission oil filters for damage (para 8-9).
**f25. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 24 AND/OR 33 AND ANY SUB CODE (CONT)**

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Engine does not overheat.
- Transmission oil cooler tubes OK.
- Transmission oil cooler OK.
- Transmission oil filters OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III cab transmission harness.
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present, or short circuits are found, WTEC III cab transmission harness is faulty.

7. Is continuity present from connector J119d and J119a to connector P114-27 and P114-25?

- **NO**
  - Replace WTEC III cab transmission harness (para 7-138).

- **YES**
**CONTINUITY TEST**

1. Remove two screws and washers from front grille.
2. Remove screw and washer from front grille.
3. Remove front grille from cab.
4. Disconnect connector P119 from connector J119.
5. Remove kick panel (para 16-3).
6. Disconnect connector clamp from connector P114.
7. Disconnect connector P114 from WTEC III transmission ECU.
8. Install jumper wire from connector J119d to connector J119a.
9. Set multimeter to ohms.
10. Connect positive (+) probe of multimeter to P114-27.
11. Connect negative (-) probe of multimeter to connector P114-25 and note reading on multimeter.
12. Connect negative (-) probe of multimeter to all other sockets in connector P114, one at a time, and note reading on multimeter.
13. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
14. Connect positive (+) probe of multimeter to connector P114-25.
15. Connect negative (-) probe of multimeter to all sockets in connector P114 (except P114-27), one at a time, and note reading on multimeter.
16. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
17. If continuity is not present in step 11, or continuity is present in step 12, 13, 15, or 16, replace WTEC III cab transmission harness (para 7-138).
18. Remove jumper wire from connector J119.
19. Connect connector P114 to WTEC III transmission ECU.
20. Connect connector clamp on connector P114.
21. Install kick panel (para 16-3).
f25. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 24 AND/OR 33 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Engine does not overheat.
- Transmission oil cooler tubes OK.
- Transmission oil cooler OK.
- Transmission oil filters OK.
- WTEC III cab transmission harness OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III transmission ECU.

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance Test or STE/ICE-R Test #91</td>
</tr>
</tbody>
</table>

**REASON FOR QUESTION**
If correct resistance is not present or short circuits are found, DS Maintenance needs to be notified. If correct resistance is present and no short circuits are found, WTEC III transmission ECU is faulty.

---

8. Is correct resistance present, and no short circuits found, from connector P119a to P119d?

---

**YES**

- Replace WTEC III transmission ECU (para 8-7).

**NO**

- Notify DS Maintenance.
(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P119a.

**NOTE**
Transmission sump oil temperature sensor resistance reading is affected by temperature. Refer to Table 2-34.
Transmission Sump Oil Temperature Sensor Resistance Readings for details.

(3) Connect negative (-) probe of multimeter to connector P119d and note reading on multimeter.
(4) Connect negative (-) probe of multimeter to all other pins in connector P119, one at a time, and note reading on multimeter.
(5) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(6) Connect positive (+) probe of multimeter to connector P119d.
(7) Connect negative (-) probe of multimeter to all other pins in connector P119 (except P119a), one at a time, and note reading on multimeter.
(8) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(9) If correct resistance is not present in step 3, or continuity is present in step 4, 5, 7, or 8, notify DS Maintenance.
(10) If correct resistance is present in step 3 and continuity is not present in step 4, 5, 7, or 8, replace WTEC III transmission ECU (para 8-7).
(11) Connect connector P119 to connector J119.
(12) Position front grille on cab with washer and screw.
(13) Position two washers and screws in front grille.
(14) Tighten screw to 48-60 lb-in. (5-7 N·m).
(15) Tighten two screws to 24 lb-in. (3 N·m).
(16) Clear diagnostic codes (para 8-5).

---

**Table 2-34. Transmission Sump Oil Temperature Sensor Resistance Readings**

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4° to 14°F (-20° to -10°C)</td>
<td>691-754 ohms</td>
</tr>
<tr>
<td>14° to 32°F (-10° to 0°C)</td>
<td>754-820 ohms</td>
</tr>
<tr>
<td>32° to 50°F (0° to 10°C)</td>
<td>820-889 ohms</td>
</tr>
<tr>
<td>50° to 68°F (10° to 20°C)</td>
<td>889-962 ohms</td>
</tr>
<tr>
<td>68° to 86°F (20° to 30°C)</td>
<td>962-1039 ohms</td>
</tr>
<tr>
<td>86° to 104°F (30° to 40°C)</td>
<td>1039-1118 ohms</td>
</tr>
<tr>
<td>104° to 122°F (40° to 50°C)</td>
<td>1118-1202 ohms</td>
</tr>
<tr>
<td>122° to 140°F (50° to 60°C)</td>
<td>1202-1286 ohms</td>
</tr>
</tbody>
</table>
f26. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 32 AND ANY SUB CODE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

References
TM 9-4910-571-12&P

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
STE/ICE-R (Item 41, Appendix C)

KNOWN INFO
Fuse OK.
Batteries OK.

POSSIBLE PROBLEMS
Faulty WTEC III cab transmission harness.
Faulty WTEC III transmission ECU.

TEST OPTIONS
Continuity Test or STE/ICE-R Test #91

REASON FOR QUESTION
If continuity is not present from connector J 119j to connector P114-12, or continuity is present from J 119j to any other P114 sockets or ground, WTEC III cab transmission harness is faulty.

1. Is continuity present from connector J 119j to connector P114-12 and absent from J 119j to all other P114 sockets and ground?

START

CAUTION
Read CAUTION on following page.

NO

YES

Replace WTEC III cab transmission harness (para 7-138).
**CAUTION**

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

### CONTINUITY TEST

1. Remove two screws and washers from front grille.
2. Remove screw and washer from front grille.
3. Remove front grille from cab.
4. Disconnect connector P119 from connector J119.
5. Remove kick panel (para 16-3).
6. Disconnect connector clamp from connector P114.
7. Disconnect connector P114 from WTEC III transmission ECU.
8. Set multimeter to ohms.
9. Connect positive (+) probe of multimeter to connector J119.
10. Connect negative (-) probe of multimeter to connector P114-12 and note reading on multimeter.
11. Connect negative (-) probe of multimeter to all other sockets in connector P114, one at a time, and note reading on multimeter.
12. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
13. If continuity is not present in step 10, or continuity is present in step 11 or 12, replace WTEC III cab transmission harness (para 7-138).
f26. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 32 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Fuse OK.
- Batteries OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III cab transmission harness.
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, WTEC III cab transmission harness is faulty.

**2.**
Is continuity present from connector J 119h to connector P114-13?

- **NO**
  - Replace WTEC III cab transmission harness (para 7-138).

- **YES**
<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to connector J119h.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to connector P114-13 and note reading on multimeter.</td>
</tr>
<tr>
<td>(4) If continuity is not present, replace WTEC III cab transmission harness (para 7-138).</td>
</tr>
<tr>
<td>(5) Connect connector P119 to connector J119.</td>
</tr>
<tr>
<td>(6) Position front grille on cab with washer and screw.</td>
</tr>
<tr>
<td>(7) Position two washers and screws in front grille.</td>
</tr>
<tr>
<td>(8) Tighten screw to 48-60 lb-in. (5-7 N·m).</td>
</tr>
<tr>
<td>(9) Tighten two screws to 24 lb-in. (3 N·m).</td>
</tr>
</tbody>
</table>
km 9-2320-366-20-2

f26. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 32 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Fuse OK.
- Batteries OK.
- WTEC III cab transmission harness OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- WTEC III Transmission ECU Replacement Check

**REASON FOR QUESTION**
If WTEC III transmission ECU is faulty, WTEC III TPSS may display main code 32.

3. Does main code 32 appear on WTEC III TPSS with new WTEC III transmission ECU installed?

- **NO**
  - Notify DS Maintenance.

- **YES**
  - Replace WTEC III transmission ECU (para 8-7).
WTEC III TRANSMISSION ECU REPLACEMENT CHECK

(1) Remove original WTEC III transmission ECU (para 8-7).
(2) Install replacement WTEC III transmission ECU (para 8-7).
(3) Install kick panel (para 16-3).
(4) Start engine (TM 9-2320-366-10-1).
(5) Road test vehicle and read WTEC III transmission ECU codes (para 8-5).
(6) If main code 32 does not appear with new WTEC III transmission ECU, replace WTEC III transmission ECU (para 8-7).
(7) If main code 32 does appear with new WTEC III transmission ECU, notify DS Maintenance.
(8) Shut down engine (TM 9-2320-366-10-1).
(9) Install original WTEC III transmission ECU (para 8-7).
(10) Clear diagnostic codes (para 8-5).
f27. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 42, 44, 45, 46, 66, AND/OR 69 AND ANY SUB CODE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)

Tools and Special Tools (Cont)
Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)
STE/ICE-R (Item 41, Appendix C)

References
TM 9-4910-571-12&P

known info
Fuse OK.
Batteries OK.

possible problems
Faulty WTEC III cab transmission harness.
Faulty WTEC III transmission ECU.

test options
Continuity Test or STE/ICE-R Test #91

reason for question
If continuity is not present, or short circuits are found, WTEC III cab transmission harness is faulty.

CAUTION
Read CAUTION on following page.

1. Is continuity present, and short circuits absent, on transmission solenoid circuits from connector J119 to connector P114?

start

no

yes

Replace WTEC III cab transmission harness (para 7-138).
CAUTION

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

### CONTINUITY TEST

1. Remove two screws and washers from front grille.
2. Remove screw and washer from front grille.
3. Remove front grille from cab.
4. Disconnect connector P119 from connector J119.
5. Remove kick panel (para 16-3).
6. Disconnect connector clamp from connector P114.
7. Disconnect connector P114 from WTEC III transmission ECU.
8. Install jumper wire on connector J119 for appropriate sub code. Refer to Table 2-35. WTEC III Cab Transmission Harness Transmission Solenoid Test Points.
9. Set multimeter to ohms.
10. Connect positive (+) probe of multimeter to connector P114. Refer to Table 2-35. WTEC III Cab Transmission Harness Transmission Solenoid Test Points.
11. Connect negative (-) probe of multimeter to connector P114 and note reading on multimeter. Refer to Table 2-35. WTEC III Cab Transmission Harness Transmission Solenoid Test Points.
12. Connect negative (-) probe of multimeter to all other sockets in connector P114, one at a time, and note reading on multimeter.
13. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
14. If continuity is not present, in step 11, or continuity is present in step 12 or 13, replace WTEC III cab transmission harness (para 7-138).
15. Remove jumper wire from connector J119.

### Table 2-35. WTEC III Cab Transmission Harness Transmission Solenoid Test Points

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Jumper Across</th>
<th>Positive (+) Probe</th>
<th>Negative (-) Probe</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>J119M to J119B</td>
<td>P114-1</td>
<td>P114-4</td>
</tr>
<tr>
<td>13</td>
<td>J119T to J119N</td>
<td>P114-2</td>
<td>P114-20</td>
</tr>
<tr>
<td>14</td>
<td>J119C to J119V</td>
<td>P114-5</td>
<td>P114-17</td>
</tr>
<tr>
<td>15</td>
<td>J119W to J119B</td>
<td>P114-1</td>
<td>P114-21</td>
</tr>
<tr>
<td>16</td>
<td>J119U to J119N</td>
<td>P114-2</td>
<td>P114-6</td>
</tr>
<tr>
<td>21</td>
<td>J119F to J119H</td>
<td>P114-3</td>
<td>P114-22</td>
</tr>
<tr>
<td>22</td>
<td>J119D to J119V</td>
<td>P114-7</td>
<td>P114-17</td>
</tr>
<tr>
<td>23</td>
<td>J119P to J119S</td>
<td>P114-19</td>
<td>P114-23</td>
</tr>
<tr>
<td>24</td>
<td>J119J to J119B</td>
<td>P114-1</td>
<td>P114-8</td>
</tr>
<tr>
<td>26</td>
<td>J119K to J119A</td>
<td>P114-19</td>
<td>P114-24</td>
</tr>
<tr>
<td>27</td>
<td>J119M to J119B</td>
<td>P114-1</td>
<td>P114-4</td>
</tr>
</tbody>
</table>
2. Is correct solenoid resistance present at connector P119?

NO

YES

Notify DS Maintenance.

Replace WTEC III transmission ECU (para 8-7).

---

**KNOWN INFO**

- Fuse OK.
- Batteries OK.
- WTEC III cab transmission harness OK.

**POSSIBLE PROBLEMS**

- Faulty circuit from P119 to affected solenoid. Faulty WTEC III transmission ECU.

**TEST OPTIONS**

- Resistance Test or STE/ICE-R Test #91

**REASON FOR QUESTION**

- If correct resistance is not present at connector P119, DS Maintenance needs to be notified.
RESISTANCE TEST

(1) Disconnect connector P119 from
connector J119.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter
to connector P119. Refer to Table 2-36.
Connector P119 Transmission Solenoid
Resistance Test Points for appropriate sub
code(s) and connector P119 pin(s).
(4) Connect negative (-) probe of multimeter to
connector P119 and note reading on
multimeter. Refer to Table 2-36.
Connector P119 Transmission Solenoid
Resistance Test Points for appropriate sub
code(s) and connector P119 pin(s).

NOTE
Transmission solenoid resistance is
affected by temperature. Refer to Table
2-37. Transmission Solenoid
Resistance Readings.

(5) If resistance reading indicates transmission
solenoid is good, replace WTEC III
transmission ECU (para 8-7).
(6) If resistance reading indicates transmission
solenoid is faulty, notify DS Maintenance.
(7) Connect connector P119 to connector
J119.
(8) Position front grille on cab with washer
and screw.
(9) Position two washers and screws in front
griile.
(10) Tighten screw to 48-60 lb-in. (5-7 N·m).
(11) Tighten two screws to 24 lb-in. (3 N·m).
(12) Clear diagnostic codes (para 8-5).

Table 2-36. Connector P119 Transmission Solenoid
Resistance Test Points

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Positive (+) Probe</th>
<th>Negative (-) Probe</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>P119M</td>
<td>P119B</td>
</tr>
<tr>
<td>13</td>
<td>P119T</td>
<td>P119N</td>
</tr>
<tr>
<td>14</td>
<td>P119C</td>
<td>P119V</td>
</tr>
<tr>
<td>15</td>
<td>P119W</td>
<td>P119B</td>
</tr>
<tr>
<td>16</td>
<td>P119U</td>
<td>P119N</td>
</tr>
<tr>
<td>21</td>
<td>P119F</td>
<td>P119H</td>
</tr>
<tr>
<td>22</td>
<td>P119D</td>
<td>P119V</td>
</tr>
<tr>
<td>23</td>
<td>P119P</td>
<td>P119S</td>
</tr>
<tr>
<td>24</td>
<td>P119J</td>
<td>P119B</td>
</tr>
<tr>
<td>26</td>
<td>P119K</td>
<td>P119A</td>
</tr>
<tr>
<td>27</td>
<td>P119M</td>
<td>P119B</td>
</tr>
</tbody>
</table>

Table 2-37. Transmission Solenoid Resistance Readings

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4°F to 16°F (-20°F to -10°C)</td>
<td>2.50-3.12 ohms</td>
</tr>
<tr>
<td>16°F to 32°F (-10°F to 0°C)</td>
<td>2.62-3.25 ohms</td>
</tr>
<tr>
<td>32°F to 50°F (0°F to 10°C)</td>
<td>2.74-3.38 ohms</td>
</tr>
<tr>
<td>50°F to 68°F (10°F to 20°C)</td>
<td>2.86-3.50 ohms</td>
</tr>
<tr>
<td>68°F to 86°F (20°F to 30°C)</td>
<td>2.98-3.62 ohms</td>
</tr>
<tr>
<td>86°F to 104°F (30°F to 40°C)</td>
<td>3.09-3.75 ohms</td>
</tr>
<tr>
<td>104°F to 122°F (40°F to 50°C)</td>
<td>3.21-3.88 ohms</td>
</tr>
<tr>
<td>122°F to 140°F (50°F to 60°C)</td>
<td>3.33-4.00 ohms</td>
</tr>
</tbody>
</table>
f28. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 52 AND ANY SUB CODE

**INITIAL SETUP**

**Equipment Conditions**
Engine shut down (TM 9-2320-366-10-1).

**References**
TM 9-4910-571-12&P

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- STE/ICE-R (Item 41, Appendix C)

---

**KNOWN INFO**
- Fuse OK.
- Batteries OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III cab transmission harness.
- Faulty WTEC III transmission ECU.

---

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present, WTEC III cab transmission harness is faulty.

**START**

1. Is continuity present from connector J119h to connector P114-13?

**CAUTION**
Read CAUTION on following page.

**NO**

**YES**
Replace WTEC III cab transmission harness (para 7-138).
CAUTION

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

1. Remove two screws and washers from front grille.
2. Remove screw and washer from front grille.
3. Remove front grille on cab.
4. Disconnect connector P119 from connector J119.
5. Remove kick panel (para 16-3).
6. Disconnect connector clamp from connector P114.
7. Disconnect connector P114 from WTEC III transmission ECU.
8. Set multimeter to ohms.
9. Connect positive (+) probe of multimeter to connector J199h.
10. Connect negative (−) probe of multimeter to connector P114-13 and note reading on multimeter.
11. If continuity is not present, replace WTEC III cab transmission harness (para 7-138).
F28. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 52 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Fuse OK.
- Batteries OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III cab transmission harness.
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present from connector J119j to connector P114-12, or continuity is present from J119j to any other P114 sockets or ground, WTEC III cab transmission harness is faulty.

2. Is continuity present from connector J119j to connector P114-12 and absent from J119j to all other P114 sockets and ground?

- **NO**
- **YES**

Replace WTEC III cab transmission harness (para 7-138).
CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector J119.
3. Connect negative (-) probe of multimeter to connector P114-12 and note reading on multimeter.
4. Connect negative (-) probe of multimeter to all other sockets in connector P114, one at a time, and note reading on multimeter.
5. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
6. If continuity is not present in step 3, or continuity is present in step 4 or 5, replace WTEC III cab transmission harness (para 7-138).
f28. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 52 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Fuse OK.
- Batteries OK.
- WTEC III cab transmission harness OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Resistance Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If resistance is high (20,000 ohms or higher), WTEC III transmission ECU is faulty.

**3.**
- Is high resistance (20,000 ohms or higher) present from connector P119h to P119j?

**YES**
- Notify DS Maintenance.

**NO**
- Replace WTEC III transmission ECU (para 8-7).
RESISTANCE TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P119h.
(3) Connect negative (-) probe of multimeter to connector P119j and note reading on multimeter.
(4) If resistance is high (20,000 ohms or higher), replace WTEC III transmission ECU (para 8-7).
(5) If resistance is low (less than 20,000 ohms), notify DS maintenance.
(6) Install instrument panel assembly (para 7-15).
(7) Connect connector P119 to connector J119.
(8) Position front grille on cab with washer and screw.
(9) Position two washers and screws in front grille.
(10) Tighten screw to 48-60 lb-in. (5-7 N·m).
(11) Tighten two screws to 24 lb-in. (3 N·m).
(12) Connect connector P114 to WTEC III transmission ECU.
(13) Connect connector clamp on connector P114.
(14) Install kick panel (para 16-3).
(15) Clear diagnostic codes (para 8-5).
f29. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 57 AND ANY SUB CODE

INITIAL SETUP

Equipment Conditions
    Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
    Goggles, Industrial (Item 15, Appendix C)
    Tool Kit, Genl Mech (Item 46, Appendix C)
    Multimeter, Digital (Item 22, Appendix C)
    STE/ICE-R (Item 41, Appendix C)
    Pan, Drain (Item 24, Appendix C)
    Wrench Set, Socket (Item 51, Appendix C)
    Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)

Materials/Parts
    Packing, Preformed (Item 197, Appendix G)
    Adapter, Straight, Pipe to Tube (Item 1.2, Appendix D)
    Adapter, Straight, Tube to Boss (Item 1.3, Appendix D)
    Hose Assembly, Nonmetallic (Item 24.13, Appendix D)

Personnel Required
    (2)

References
    TM 9-491-571-12&P

1. Is zero pressure present on C3 clutch when shift is made into affected range?

WARNING
CAUTION
Read WARNING and CAUTION on following page.

REASON FOR QUESTION
Clutch Pressure Test or STE/ICE-R Test #50

REASON FOR QUESTION
If pressure is present on C3 clutch when shift is made, WTEC III TPSS may display main code 57 and one or more sub codes.

NO

YES

Notify DS Maintenance.
WARNING

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

CAUTION

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

CLUTCH PRESSURE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Remove front and intermediate propeller shafts (para 9-2).</td>
</tr>
<tr>
<td>(2)</td>
<td>Position drain pan under C3 pressure tap plug.</td>
</tr>
<tr>
<td>(3)</td>
<td>Remove C3 pressure tap plug and preformed packing from control valve module. Discard preformed packing.</td>
</tr>
<tr>
<td>(4)</td>
<td>Connect tube to boss adapter, hose, and pipe to tube adapter to C3 pressure tap.</td>
</tr>
<tr>
<td>(5)</td>
<td>Perform STE/ICE-R Test #50 (TM 9-4910-571-12&amp;P).</td>
</tr>
<tr>
<td>(6)</td>
<td>Start engine (TM 9-2320-366-10-1) and run at idle.</td>
</tr>
<tr>
<td>(7)</td>
<td>With parking brake applied, make shift indicated by sub code while assistant notes reading on STE/ICE-R. Refer to Table 2-38. Sub Code Range.</td>
</tr>
<tr>
<td>(8)</td>
<td>If pressure does not drop to zero in selected range indicated by code values, notify DS Maintenance.</td>
</tr>
<tr>
<td>(9)</td>
<td>Shut down engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(10)</td>
<td>Remove pipe to tube adapter, hose, and tube to boss adapter from C3 pressure tap.</td>
</tr>
<tr>
<td>(11)</td>
<td>Position preformed packing and C3 pressure tap plug in control valve module.</td>
</tr>
<tr>
<td>(12)</td>
<td>Tighten C3 pressure tap plug to 84-120 lb-in. (9-14 N·m).</td>
</tr>
<tr>
<td>(13)</td>
<td>Remove drain pan under C3 pressure tap plug.</td>
</tr>
<tr>
<td>(14)</td>
<td>Install front and intermediate propeller shafts (para 9-2).</td>
</tr>
</tbody>
</table>

Table 2-38. Sub Code Range

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Sub Code Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1st Range VER</td>
</tr>
<tr>
<td>22</td>
<td>2nd Range VER</td>
</tr>
<tr>
<td>44</td>
<td>4th Range VER</td>
</tr>
<tr>
<td>66</td>
<td>6th Range VER</td>
</tr>
<tr>
<td>88</td>
<td>N1 Range VER</td>
</tr>
<tr>
<td>99</td>
<td>N2/N4 Range VER</td>
</tr>
</tbody>
</table>
29. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 57 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- WTEC III cab transmission harness OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Resistance Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If resistance is greater than 2 ohms, WTEC III transmission ECU is faulty.

2. **CAUTION**

   Read **CAUTION** on following page.

   Is 2 ohms (or less) resistance present from connector P119h to P119j?

- **YES**
  - Replace WTEC III transmission ECU (para 8-7).

- **NO**
  - Notify DS Maintenance.
CAUTION
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>RESISTANCE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove two screws and washers from front grille.</td>
</tr>
<tr>
<td>(2) Remove screw and washer from front grille.</td>
</tr>
<tr>
<td>(3) Remove front grille from cab.</td>
</tr>
<tr>
<td>(4) Disconnect connector P119 from connector J119.</td>
</tr>
<tr>
<td>(5) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(6) Connect positive (+) probe of multimeter on P119h.</td>
</tr>
<tr>
<td>(7) Connect negative (-) probe of multimeter on P119j and note reading on multimeter.</td>
</tr>
<tr>
<td>(8) If 2 ohms (or less) resistance is present, notify DS Maintenance.</td>
</tr>
<tr>
<td>(9) If resistance is greater than 2 ohms, replace WTEC III transmission ECU (para 8-7).</td>
</tr>
<tr>
<td>(10) Connect connector P119 to connector J119.</td>
</tr>
<tr>
<td>(11) Position front grille on cab with washer and screw.</td>
</tr>
<tr>
<td>(12) Position two washers and screws in front grille.</td>
</tr>
<tr>
<td>(13) Tighten screw to 48-60 lb-in. (5-7 N·m).</td>
</tr>
<tr>
<td>(14) Tighten two screws to 24 lb-in. (3 N·m).</td>
</tr>
<tr>
<td>(15) Clear diagnostic codes (para 8-5).</td>
</tr>
</tbody>
</table>
f30. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 21 AND ANY SUB CODE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
STE/ICE-R (Item 41, Appendix C)

REMARKS
TM 9-2320-366-20-2
2-1762          Change 1

START

CAUTION
Read CAUTION on following page.

1. Does main code 21 repeat after code has been manually cleared and throttle counts reset?

TEST OPTIONS
WTEC III Transmission ECU Reset Check

REASON FOR QUESTION
Main code 21 may appear on WTEC III TPSS if voltage from TPS WTEC III transmission ECU is temporarily lost.

YES

Fault corrected.

NO

KNOWLEDGE INFO
Fuse OK.
Transmission oil level OK.
Batteries OK.

POSSIBLE PROBLEMS
Faulty WTEC III cab transmission harness.
Faulty TPS cable assembly.
Faulty WTEC III transmission ECU.

References
TM 9-4910-571-12&P

Personnel Required
(2)
Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

Main display code 21 needs to be cleared manually from WTEC III transmission ECU after a maintenance task has been performed and before vehicle is returned to service (para 8-5).

### WTEC III TRANSMISSION ECU RESET CHECK

1. Cycle master power switch to on (TM 9-2320-366-10-1), then to off five times to clear existing throttle count settings.
2. Position master power switch to on (TM 9-2320-366-10-1).
3. Depress accelerator pedal from idle position to full throttle position (TM 9-2320-366-10-1) to set new 0% and 100% throttle count values in WTEC III transmission ECU.
4. Clear diagnostic code from WTEC III transmission ECU display (para 8-5).
5. If main code 21 does not reappear, electrical communication between WTEC III transmission ECU and TPS may be faulty. If main code 21 reappears, TPS may be faulty.
f30. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 21 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Fuse OK.
- Transmission oil level OK.
- Batteries OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III cab transmission harness.
- Faulty WTEC III transmission ECU.
- Faulty TPS cable assembly.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
Main code 21 in conjunction with main code 33 indicates loss of common ground.

1. **Is main code 33 logged in conjunction with main code 21?**

   - **YES**
     - Go to step 4 of this fault.
   - **NO**
     - Go to step 4 of this fault.
(1) Position master power switch to on (TM 9-2320-366-10-1).
(2) Press MODE button on WTEC III TPSS to bring up second code (if any) (para 8-5).
(3) If main code 33 displays on WTEC III TPSS, common ground may have been lost. If main code 21 is the only code displayed, TPS may be faulty. Go to step 4 of this fault.
(4) Position master power switch to off (TM 9-2320-366-10-1).
30. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 21 AND ANY SUB CODE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuse OK.</td>
</tr>
<tr>
<td>Transmission oil level OK.</td>
</tr>
<tr>
<td>Batteries OK.</td>
</tr>
<tr>
<td>TPS cable assembly OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty WTEC III cab transmission harness.</td>
</tr>
<tr>
<td>Faulty WTEC III transmission ECU.</td>
</tr>
</tbody>
</table>

3. Is continuity for common ground present from connector P114-25 to connector J119Z and J119a?

- **NO**
  - If continuity for common ground is absent, main code 33 will be logged in addition to main code 21.

- **YES**
  - Replace WTEC III cab transmission harness (para 7-138).
  - Replace WTEC III transmission ECU (para 8-7).

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE-R Test #91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If continuity for common ground is absent, main code 33 will be logged in addition to main code 21.</td>
</tr>
</tbody>
</table>
### CONTINUITY TEST

1. Remove two screws and washers from front grille.
2. Remove screw and washer from front grille.
3. Remove front grille from cab.
4. Disconnect connector P119 from connector J119.
5. Remove kick panel (para 16-3).
6. Disconnect connector clamp from connector P114.
7. Disconnect connector P114 from WTEC III transmission ECU.
8. Set multimeter to ohms.
9. Connect positive (+) probe of multimeter to connector P114-25.
10. Connect negative (-) probe of multimeter to connector J119a and note reading on multimeter.
11. Connect negative (-) probe of multimeter to connector J119Z and note reading on multimeter.
12. If continuity is not present from connector P114-25 to connector J119a and J119Z, replace WTEC III cab transmission harness (para 7-138).
13. If continuity is present, replace WTEC III transmission ECU (para 8-7).
14. Connect connector P114 to WTEC III transmission ECU.
15. Connect connector clamp on connector P114.
16. Install kick panel (para 16-3).
17. Connect connector P119 to connector J119.
18. Position front grille on cab with washer and screw.
19. Position two washers and screws in front grille.
20. Tighten screw to 48-60 lb-in. (5-7 N·m).
21. Tighten two screws to 24 lb-in. (3 N·m).
22. Clear diagnostic codes (para 8-5).
**KNOWN INFO**
Fuse OK.
Transmission oil level OK.
Batteries OK.

**POSSIBLE PROBLEMS**
Faulty TPS cable assembly.
Faulty WTEC III cab transmission harness.
Faulty WTEC III transmission ECU.

4. **TEST OPTIONS**
   - Linkage Test

   **REASON FOR QUESTION**
   Main code 21 will be displayed on WTEC III TPSS if TPS cable assembly is out of adjustment.

4. **TEST OPTIONS**
   - Resistance Test or STE/ICE-R Test #91

   **REASON FOR QUESTION**
   Main code 21 will be displayed on WTEC III TPSS if TPS cable assembly is faulty.

5. **TEST OPTIONS**
   - Replace TPS cable assembly (para 4-16).
LINKAGE TEST

(1) Raise cab (TM 9-2320-366-10-1).
(2) Verify distance between hitch pin clip on end of sensor rod and center of cable groove in ferrule is 4 in. (10 cm).
(3) If distance is not 4 in. (10 cm), adjust bracket assembly to obtain correct measurement.

RESISTANCE TEST

(1) Disconnect connector P73 from TPS connector.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to TPS terminal A.
(4) Connect negative (-) probe of multimeter to TPS terminal C and verify multimeter reads between 9,000-15,000 ohms across terminals A and C.
(5) Disconnect negative (-) probe of multimeter from terminal C.
(6) Connect negative (-) probe of multimeter to TPS terminal B and note record on multimeter.
(7) Move governor linkage to high idle stop and record reading on multimeter.
(8) Return governor linkage to low idle stop.
(9) Verify that difference between highest (high idle) reading and lowest (low idle) reading is between 4,000 and 6,000 ohms.
(10) Verify that highest (high idle) reading does not exceed 15,000 ohms.
(11) If resistance readings are not within limits, replace TPS cable assembly (para 4-16).
6. Is continuity present from connector P73 to connector P119?

   NO

   YES

   Notify DS Maintenance.

7. Are TPS wires free from short circuits at connector P119?

   NO

   YES

   Notify DS Maintenance.
### CONTINUITY TEST

1. Disconnect connector P119 from connector J119.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter to connector P119R.
4. Connect negative (-) probe of multimeter to connector P73 pin C and note reading on multimeter.
5. Connect positive (+) probe of multimeter to connector P119f.
6. Connect negative (-) probe of multimeter to connector P73 pin B and note reading on multimeter.
7. Connect positive (+) probe of multimeter to connector P119Z.
8. Connect negative (-) probe of multimeter to connector P73 pin A and note reading on multimeter.
9. If continuity is not present on one or more wires, notify DS Maintenance.

---

### CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector P119R.
3. Connect negative (-) probe of multimeter to all other pins in connector P119, one at a time, and note reading on multimeter.
4. If continuity is found between pin R and any other pin, notify DS Maintenance.
5. Perform steps (2) and (3) for P119f and P119Z.
6. If continuity is found between pin f and any other pin, or between pin Z and any other pin, notify DS Maintenance.
7. Connect connector P73 to TPS connector.
f30. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 21 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Fuse OK.
- Transmission oil level OK.
- Batteries OK.
- TPS cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III cab transmission harness.
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present, WTEC III cab transmission harness is faulty.

8. Is continuity present from connector J119 to connector P114?

- NO
  - Continuity Test or STE/ICE-R Test #91

- YES
  - Replace WTEC III cab transmission harness (para 7-138).
CONTINUITY TEST

(1) Lower cab (TM 9-2320-366-10-1).
(2) Remove two screws and washers from front grille.
(3) Remove screw and washer from front grille.
(4) Remove front grille from cab.
(5) Remove kick panel (para 16-3).
(6) Disconnect connector clamp from connector P114.
(7) Disconnect connector P114 from WTEC III transmission ECU.
(8) Set multimeter to ohms.
(9) For each line of Table 2-39. Cab Transmission Harness Continuity Check:
   (a) Install jumper wire across sockets in column 1.
   (b) Connect positive (+) probe of multimeter to socket in column 2.
   (c) Connect negative (-) probe of multimeter to socket in column 3 and note reading on multimeter.
(10) If continuity is not present on any wire in Table 2-39. Cab Transmission Harness Continuity Check, replace WTEC III cab transmission harness (para 7-138).
(11) Remove jumper wire from connector J119.

Table 2-39. Cab Transmission Harness Continuity Check

<table>
<thead>
<tr>
<th>COLUMN 1</th>
<th>Column 2 Positive (+) Probe to:</th>
<th>Column 3 Negative (-) Probe to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>J119f to J119Z</td>
<td>P114-10</td>
<td>P114-25</td>
</tr>
<tr>
<td>J119f to J119R</td>
<td>P114-10</td>
<td>P114-9</td>
</tr>
<tr>
<td>J119R to J119Z</td>
<td>P114-25</td>
<td>P114-9</td>
</tr>
</tbody>
</table>
f30. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 21 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Fuse OK.
- Transmission oil level OK.
- Batteries OK.
- TPS cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III cab transmission harness.
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If short circuits are present, WTEC III cab transmission harness is faulty.

**9.** Are TPS wires free from short circuits at connector P114?

- **NO**
  - Replace WTEC III cab transmission harness (para 7-138).

- **YES**
  - Replace WTEC III transmission ECU (para 8-7).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P114-9.
(3) Connect negative (-) probe of multimeter to all other sockets of connector P114, one at a time, and note reading on multimeter.
(4) Connect positive (+) probe of multimeter to connector P114-10.
(5) Connect negative (-) probe of multimeter to all other sockets of connector P114, one at a time, and note reading on multimeter.
(6) Connect positive (+) probe of multimeter to connector P114-25.
(7) Connect negative (-) probe of multimeter to all other sockets of connector P114 (except P114-13), one at a time, and note reading on multimeter.
(8) If continuity is present in step 3, 5, or 7, replace WTEC III cab transmission harness (para 7-138).
(9) If no short circuits are found, replace WTEC III transmission ECU (para 8-7).
(10) Connect connector P114 to WTEC III transmission ECU.
(11) Connect connector clamp on connector P114.
(12) Install kick panel (para 16-3).
(13) Connect connector P119 to connector J119.
(14) Position front grille on cab with washer and screw.
(15) Position two washers and screws in front grille.
(16) Tighten screw to 48-60 lb-in. (5-7 N·m).
(17) Tighten two screws to 24 lb-in. (3 N·m).
(18) Clear diagnostic codes (para 8-5).
**f31. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 51 AND ANY SUB CODE**

**INITIAL SETUP**

**Equipment Conditions**
- Engine shut down (TM 9-2320-366-10-1).

**Tools and Special Tools**
- Goggles, Industrial (Item 15, Appendix C)
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Pan, Drain (Item 24, Appendix C)
- Wrench, Torque 0-200 lb in. (Item 59, Appendix C)
- Wrench Set, Socket (Item 51, Appendix C)

**Materials/Parts**
- Packing, Preformed (Item 197, Appendix G)
- Adapter, Straight, Pipe to Tube (Item 1.2, Appendix D)
- Adapter, Straight, Tube to Boss (Item 1.3, Appendix D)
- Hose Assembly, Nonmetallic (Item 24.13, Appendix D)

**Personnel Required**
- (2)

**References**
- TM 9-4910-571-12&P

---

**KNOWN INFO**

- Transmission oil level OK.
- Fuse OK.
- Batteries OK.

**POSSIBLE PROBLEMS**

- Faulty output speed sensor.
- Faulty turbine speed sensor.
- Faulty WTEC III transmission ECU.

---

**TEST OPTIONS**

- Visual Inspection

**REASON FOR QUESTION**

If main code 22 sub code 15 or 16 is present, transmission turbine speed sensor, output speed sensor, or associated circuit is faulty.

---

**START**

1. **CAUTION**
   - Read CAUTION on following page.

   Is main code 51 logged without main code 22 sub code 15 or 16?

   **NO**

   **YES**

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

(1) Check if main code 22 sub code 15 or 16 is logged in WTEC III TPSS (para 8-5).
(2) If main code 22 sub code 15 or 16 is logged, WTEC III transmission ECU has sensed a fault with the turbine speed sensor, output sensor, or associated circuits. Perform Transmission System Troubleshooting (f23. WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays Main Code 22 Sub Code 15 or f24. WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays Main Code 22 Sub Code 16).
2-1778 Change 1

**f31. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 51 AND ANY SUB CODE (CONT)**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission oil level OK.</td>
</tr>
<tr>
<td>Fuse OK.</td>
</tr>
<tr>
<td>Batteries OK.</td>
</tr>
<tr>
<td>Output speed sensor OK.</td>
</tr>
<tr>
<td>Turbine speed sensor OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty WTEC III transmission ECU.</td>
</tr>
</tbody>
</table>

**TEST OPTIONS**
- Clutch Pressure Test or STE/ICE-R Test #50

**REASON FOR QUESTION**
If off-going clutch oil pressure does not go to 0 psi (0 kPa) when transmission shifts, WTEC III TPSS may display main code 51 and one or more sub codes.

1. **KNOWN INFO**
2. **TEST OPTIONS**
3. **REASON FOR QUESTION**

2. **WARNING**
Read WARNING on following page.

2. Does off-going clutch pressure go to 0 psi (0 kPa) when shift is made?

   - **NO**
   - **YES**

   **YES**
   Notify DS Maintenance.

   **NO**

**TEST OPTIONS**
Clutch Pressure Test or STE/ICE-R Test #50

**REASON FOR QUESTION**
If off-going clutch oil pressure does not go to 0 psi (0 kPa) when transmission shifts, WTEC III TPSS may display main code 51 and one or more sub codes.

Replace WTEC III transmission ECU (para 8-7).
WARNING
Wear approved eye protection when performing transmission pressure checks. If oil contacts eyes, seek medical attention immediately. Failure to comply may result in injury to personnel.

CLUTCH PRESSURE TEST

1. Remove front and intermediate propeller shafts (para 9-2).
2. Position drain pan under pressure tap.
3. Remove pressure tap plug and preformed packing from off-going clutch indicated by the sub code, refer to Table 2-40. Off-Going Clutch Pressure Tap. Discard preformed packing.
4. Connect tube to boss adapter, hose, and pipe to tube adapter to clutch pressure tap.
5. Perform STE/ICE-R Test # 50 (TM 9-4910-571-12&P).
6. Start engine (TM 9-2320-366-10-1) and run at idle.
7. With parking brake applied, make shift indicated by sub code while assistant notes reading on STE/ICE-R. Refer to Table 2-40. Off-Going Clutch Pressure Tap.
8. If one or more off-going clutches fail to loose pressure, notify DS Maintenance.
10. Remove pipe to tube adapter, hose, and tube to boss adapter from clutch pressure tap.
11. Position preformed packing and pressure tap plug in control valve module.
12. Tighten pressure tap plug to 84-120 lb-in. (9-14 N·m).
13. Remove drain pan under pressure tap.
15. Clear diagnostic codes (para 8-5).

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Sub Code Meaning</th>
<th>Off-Going Clutch</th>
<th>Solenoid Assembly Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>2-1 Downshift</td>
<td>C5</td>
<td>Stationary Clutch</td>
</tr>
<tr>
<td>12</td>
<td>2-3 Upshift</td>
<td>C5</td>
<td>Stationary Clutch</td>
</tr>
<tr>
<td>21</td>
<td>3-2 Downshift</td>
<td>C4</td>
<td>Stationary Clutch</td>
</tr>
<tr>
<td>23</td>
<td>3-4 Upshift</td>
<td>C4</td>
<td>Stationary Clutch</td>
</tr>
<tr>
<td>43</td>
<td>5-4 Downshift</td>
<td>C2</td>
<td>Rotating Clutch</td>
</tr>
<tr>
<td>45</td>
<td>5-6 Upshift</td>
<td>C1</td>
<td>Rotating Clutch</td>
</tr>
<tr>
<td>65</td>
<td>7-6 Downshift</td>
<td>C4</td>
<td>Stationary Clutch</td>
</tr>
</tbody>
</table>
**f32. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 25 AND ANY SUB CODE**

**INITIAL SETUP**

**Equipment Conditions**
- Engine shut down (TM 9-2320-366-10-1).

**Tools and Special Tools**
- Goggles, Industrial (Item 15, Appendix C)
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Pan, Drain (Item 24, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Wrench Set, Socket (Item 51, Appendix C)

**Materials/Parts**
- Packing, Preformed (Item 197, Appendix G)
- Adapter, Straight, Pipe to Tube (Item 1.2, Appendix D)
- Adapter, Straight, Tube to Boss (Item 1.3, Appendix D)
- Hose Assembly, Nonmetallic (Item 24.13, Appendix D)

**Personnel Required**
- (2)

**References**
- TM 9-4910-571-12&P

---

**KNOWN INFO**

<table>
<thead>
<tr>
<th>Transmission oil level OK.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuse OK.</td>
</tr>
<tr>
<td>Batteries OK.</td>
</tr>
</tbody>
</table>

**POSSIBLE PROBLEMS**

Faulty WTEC III transmission ECU.

---

**CAUTION**

Read CAUTION on following page.

1. Is main code 25 logged without main code 22 sub code 16?

**TEST OPTIONS**

- Visual Inspection

**REASON FOR QUESTION**

If main code 22 sub code 16 is logged, output speed sensor or its circuit is faulty.

---

**START**

YES


NO
CAUTION

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

(1) Check if main code 22 sub code 16 is logged in the WTEC III TPSS (para 8-5).
(2) If main code 22 sub code 16 is logged, WTEC III transmission ECU has sensed a fault with the output speed sensor or its circuit. Perform Transmission System Troubleshooting (F24. WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays Main Code 22 Sub Code 16).
f32. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 25 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Output speed sensor OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Clutch Pressure Test or STE/ICE-R Test #50

**REASON FOR QUESTION**
If there is no pressure to clutch(s), or pressure is leaking when shift is made, WTEC III TPSS may display main code 25 and one or more sub codes.

---

2. Is there pressure to clutch(s) when shift is made?  

**WARNING**  
Read WARNING on following page.

---

**YES**  
Replace WTEC III transmission ECU (para 8-7).

**NO**  
Notify DS Maintenance.
**WARNING**

Wear approved eye protection when performing transmission pressure checks. If oil contacts eyes, seek medical attention immediately. Failure to comply may result in injury to personnel.

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Sub Code Meaning</th>
<th>Pressure at Clutch(s)</th>
<th>Pressure Readings at Taps</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Speed Zero in 1st</td>
<td>C3 &amp; C6</td>
<td>215-334 psi (1480-2300 kPa)</td>
</tr>
<tr>
<td>11</td>
<td>Speed Zero in 2nd</td>
<td>C1 &amp; C5</td>
<td>215-305 psi (1480-2103 kPa)</td>
</tr>
<tr>
<td>22</td>
<td>Speed Zero in 3rd</td>
<td>C1 &amp; C4</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>33</td>
<td>Speed Zero in 4th</td>
<td>C1 &amp; C3</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>44</td>
<td>Speed Zero in 5th</td>
<td>C1 &amp; C2</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>55</td>
<td>Speed Zero in 6th</td>
<td>C2 &amp; C3</td>
<td>128-189 psi (880-1300 kPa)</td>
</tr>
<tr>
<td>66</td>
<td>Speed Zero in 7th</td>
<td>C2 &amp; C4</td>
<td>128-189 psi (880-1300 kPa)</td>
</tr>
<tr>
<td>77</td>
<td>Speed Zero in R</td>
<td>C3 &amp; C5</td>
<td>215-334 psi (1480-2300 kPa)</td>
</tr>
</tbody>
</table>

Table 2-41. Clutch Pressure Tap

**CLUTCH PRESSURE TEST (CONT)**

19. If all clutches indicate proper pressure, replace WTEC III transmission ECU (para 8-7).

20. Clear diagnostic codes (para 8-5).
f33. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 53 AND ANY SUB CODE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Pan, Drain (Item 24, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Wrench Set, Socket (Item 51, Appendix C)

Materials/Parts
Packing, Preformed (Item 197, Appendix G)
Adapter, Straight, Pipe to Tube (Item 1.2, Appendix D)
Adapter, Straight, Tube to Boss (Item 1.3, Appendix D)
Hose Assembly, Nonmetallic (Item 24.13, Appendix D)

Personnel Required
(2)

References
TM 9-4910-571-12&P

TEST OPTIONS
Visual Inspection

REASON FOR QUESTION
If main code 22 sub code 15 or 16 is logged, turbine speed sensor, output speed sensor, or associated circuitry is faulty.

KNOWN INFO
Transmission oil level OK.
Fuse OK.
Batteries OK.

POSSIBLE PROBLEMS
Faulty output speed sensor.
Faulty turbine speed sensor.
Faulty WTEC III transmission ECU.

START

1. Is main code 53 logged without main code 22 sub code 15 or 16?

NO

YES

CAUTION
Read CAUTION on following page.

(1) Check if main code 22 sub code 15 or 16 is logged in WTEC III TPSS (para 8-5).
(2) If main code 22 sub code 15 or 16 is logged, WTEC III transmission ECU has sensed a fault with turbine speed sensor, output speed sensor, or associated circuits. Perform Transmission System Troubleshooting (f23. WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays Main Code 22 Sub Code 15 or f24. WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays Main Code 22 Sub Code 16).

**CAUTION**

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.
f33. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 53 AND ANY SUB CODE (CONT)

2. 

Does off-going clutch pressure go to 8 psi (55kPa) or less when shift is made?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission oil level OK.</td>
</tr>
<tr>
<td>Fuse OK.</td>
</tr>
<tr>
<td>Batteries OK.</td>
</tr>
<tr>
<td>Output speed sensor OK.</td>
</tr>
<tr>
<td>Turbine speed sensor OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty WTEC III transmission ECU.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clutch Pressure Test or STE/ICE-R Test #50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If off-going clutch oil pressure does not go to 8 psi (55 kPa) or less when shifts is made, WTEC III TPSS may display main code 53 and one or sub codes.</td>
</tr>
</tbody>
</table>

NO

YES

Replace WTEC III transmission ECU (para 8-7).

Notify DS Maintenance.
**WARNING**

Wear approved eye protection when performing transmission pressure checks. If oil contacts eyes, seek medical attention immediately. Failure to comply may result in injury to personnel.

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Sub Code Meaning</th>
<th>Off-Going Clutch(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>08</td>
<td>L-N1 Shift</td>
<td>C3</td>
</tr>
<tr>
<td>18</td>
<td>1-N1 Shift</td>
<td>C1</td>
</tr>
<tr>
<td>28</td>
<td>2-N1 Shift</td>
<td>C1 &amp; C4</td>
</tr>
<tr>
<td>29</td>
<td>2-N2 Shift</td>
<td>C1</td>
</tr>
<tr>
<td>38</td>
<td>3-N1 Shift</td>
<td>C1 &amp; C3</td>
</tr>
<tr>
<td>39</td>
<td>3-N3 Shift</td>
<td>C1</td>
</tr>
<tr>
<td>48</td>
<td>4-N1 Shift</td>
<td>C1 &amp; C2</td>
</tr>
<tr>
<td>49</td>
<td>4-N3 Shift</td>
<td>C1 &amp; C2</td>
</tr>
<tr>
<td>58</td>
<td>5-N1 Shift</td>
<td>C2 &amp; C3</td>
</tr>
<tr>
<td>59</td>
<td>5-N3 Shift</td>
<td>C2</td>
</tr>
<tr>
<td>68</td>
<td>6-N1 Shift</td>
<td>C2 &amp; C4</td>
</tr>
<tr>
<td>69</td>
<td>6-N4 Shift</td>
<td>C2</td>
</tr>
<tr>
<td>78</td>
<td>R-N1 Shift</td>
<td>C2 or C4</td>
</tr>
<tr>
<td>79</td>
<td>N3-N2 or N2-N3 Shift</td>
<td>C3</td>
</tr>
</tbody>
</table>

**CLUTCH PRESSURE TEST**

1. Remove front and intermediate propeller shafts (para 9-2).
2. Position drain pan under pressure tap.
3. Remove pressure tap plug and preformed packing from off-going clutch indicated by the sub code. Refer to Table 2-42. Off-Going Clutch Pressure Tap. Discard preformed packing.
4. Connect tube to boss adapter, hose, and pipe to tube adapter to clutch pressure tap.
5. Perform STE/ICE-R Test # 50 (TM 9-4910-571-12&P).
6. Start engine (TM 9-2320-366-10-1) and run at idle.
7. With parking brake applied, make shift indicated by sub code while assistant notes reading on STE/ICE-R. Refer to Table 2-42. Off-Going Clutch Pressure Tap.
8. If off-going clutch pressure does not go to 8 psi (55 kPa) or less when shift is made, notify DS Maintenance.
9. If off-going clutch pressure does go to 8 psi (55 kPa) or less when shift is made, replace WTEC III transmission ECU (para 8-7).
11. Remove pipe to tube adapter, hose, and tube to boss adapter from clutch pressure tap.
12. Position preformed packing and pressure tap plug in control valve module.
13. Tighten pressure tap plug to 84-120 lb-in. (9-14 N·m).
14. Remove drain pan under pressure tap.
15. Install front and intermediate propeller shafts (para 9-2).
**INITIAL SETUP**

**Equipment Conditions**
Engine shut down (TM 9-2320-366-10-1).

**Tools and Special Tools**
- Goggles, Industrial (Item 15, Appendix C)
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Pan, Drain (Item 24, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Wrench Set, Socket (Item 51, Appendix C)

**KNOWN INFO**

Transmission oil level OK.
Fuse OK.
Batteries OK.

**POSSIBLE PROBLEMS**

Faulty output speed sensor.
Faulty turbine speed sensor.
Faulty WTEC III transmission ECU.

**CAUTION**
Read CAUTION on following page.

**1.**

Is main code 54 logged without main code 22 sub code 15 or 16?

**TEST OPTIONS**

Visual Inspection

**REASON FOR QUESTION**

If main code 22 sub code 15 or 16 is logged, turbine speed sensor, output speed sensor, or associated circuitry is faulty.

**YES**

Perform Transmission System Troubleshooting:


**NO**

**Materials/Parts**

- Packing, Preformed (Item 197, Appendix G)
- Adapter, Straight, Pipe to Tube (Item 1.2, Appendix D)
- Adapter, Straight, Tube to Boss (Item 1.3, Appendix D)
- Hose Assembly, Nonmetallic (Item 24.13, Appendix D)

**Personnel Required**

(2)

**Reference**
TM 9-4910-571-12&P
(1) Check if main code 22 sub code 15 or 16 is logged in WTEC III TPSS (para 8-5).

(2) If main code 22 sub code 15 or 16 is logged, WTEC III transmission ECU has sensed a fault with the turbine speed sensor, output speed sensor, or associated circuits. Perform Transmission System Troubleshooting (f23. WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays Main Code 22 Sub Code 15 or f24. WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays Main Code 22 Sub Code 16).

CAUTION

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.
f34. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 54 AND ANY SUB CODE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission oil level OK.</td>
</tr>
<tr>
<td>Fuse OK.</td>
</tr>
<tr>
<td>Batteries OK.</td>
</tr>
<tr>
<td>Output speed sensor OK.</td>
</tr>
<tr>
<td>Turbine speed sensor OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty WTEC III transmission ECU.</td>
</tr>
</tbody>
</table>

2. Is 218-276 psi (1,503-1,903 kPa) present at main oil pressure tap?

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read WARNING on following page.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Test or STE/ICE-R Test #50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low main oil pressure may cause WTEC III TPSS to display main code 54 and one or more sub codes.</td>
</tr>
</tbody>
</table>

NO

YES

Notify DS Maintenance.
WARNING

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

PRESSURE TEST

1. Position drain pan under pressure tap.
2. Remove main pressure tap plug and preformed packing from control valve assembly.
3. Connect tube to boss adapter, hose, and pipe to tube adapter to main pressure tap.
5. Start engine (TM 9-2320-366-10-1) and run at idle.
6. With parking brake applied, position WTEC III TPSS to R position then to N position while assistant checks reading on STE/ICE-R.
7. Shut down engine (TM 9-2320-366-10-1).
8. If main oil pressure is low, notify DS Maintenance.
9. Remove pipe to tube adapter, hose, and tube to boss adapter from main pressure tap.
10. Position preformed packing and main pressure tap plug in control valve module.
11. Tighten main pressure tap plug to 84-120 lb-in. (9-14 N·m).
f34. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 54 AND ANY SUB CODE (CONT)

Known Info
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Output speed sensor OK.

Possible Problems
- Faulty WTEC III transmission ECU.

3. Is there pressure to clutch(s) when shift is made?
   - NO
     - Replace WTEC III transmission ECU (para 8-7).
   - YES
     - Notify DS Maintenance.

Test Options
- Pressure Test or STE/ICE-R Test #50

Reason for Question
If there is no pressure to clutch(s) when shift is made, WTEC III TPSS may display main code 54 and one or more sub codes.
(1) Remove front and intermediate propeller shafts (para 9-2).
(2) Position drain pan under pressure tap.
(3) Remove pressure tap plug and preformed packing from clutch pressure tap indicated by the sub code. Refer to Table 2-43. Clutch Pressure Tap.
(4) Connect tube to boss adapter, hose, and pipe to tube adapter to clutch pressure tap.
(5) Start engine (TM 9-2320-366-10-1).
(6) Perform STE/ICE-R Test #50 (TM 9-4910-571-12&P).
(7) With parking brake applied, make shift indicated by sub code. Refer to Table 2-43. Clutch Pressure Tap.
(8) Accelerate engine until WTEC III TPSS displays denied range. Refer to Table 2-43. Clutch Pressure Tap.
(9) Maintain sufficient engine speed to keep desired transmission range while assistant notes reading on STE/ICE-R.
(10) Let engine return to idle.
(11) Shift WTEC III TPSS into neutral.
(12) If one or more clutches failed to indicate proper pressure, notify DS Maintenance.
(13) If all clutches indicate proper pressure, replace WTEC III transmission ECU (para 8-7).
(14) Shut down engine (TM 9-2320-366-10-1).
(15) Remove pipe to tube adapter, hose, and tube to boss adapter from clutch pressure tap.
(16) Position preformed packing and pressure tap plug in control valve module.
(17) Tighten pressure tap plug to 84-120 lb-in. (9-14 N·m).
(18) Remove drain pan under pressure tap.
(19) Install front and intermediate propeller shafts (para 9-2).
(20) Clear diagnostic codes (para 8-5).

**Table 2-43. Clutch Pressure Tap**

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Sub Code Meaning</th>
<th>Pressure at Clutch(s)</th>
<th>Pressure Readings at Taps</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>L-1</td>
<td>C1 &amp; C5</td>
<td>187-305 psi (1280-2100 kPa)</td>
</tr>
<tr>
<td>07</td>
<td>L-R</td>
<td>C3 &amp; C5</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>10</td>
<td>1-L Downshift</td>
<td>C3 &amp; C6</td>
<td>215-334 psi (1480-2300 kPa)</td>
</tr>
<tr>
<td>12</td>
<td>1-2 Upshift</td>
<td>C1 &amp; C4</td>
<td>142-203 psi ( 980-1400 kPa)</td>
</tr>
<tr>
<td>17</td>
<td>1-R Shift</td>
<td>C3 &amp; C5</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>21</td>
<td>2-1 Downshift</td>
<td>C1 &amp; C5</td>
<td>186-305 psi (1280-2100 kPa)</td>
</tr>
<tr>
<td>23</td>
<td>2-3 Upshift</td>
<td>C1 &amp; C3</td>
<td>142-203 psi ( 980-1400 kPa)</td>
</tr>
<tr>
<td>27</td>
<td>2-R Shift</td>
<td>C3 &amp; C5</td>
<td>215-334 psi (1480-2300 kPa)</td>
</tr>
<tr>
<td>32</td>
<td>3-2 Downshift</td>
<td>C1 &amp; C4</td>
<td>142-203 psi ( 980-1400 kPa)</td>
</tr>
<tr>
<td>34</td>
<td>3-4 Upshift</td>
<td>C1 &amp; C2</td>
<td>142-203 psi ( 980-1400 kPa)</td>
</tr>
<tr>
<td>43</td>
<td>4-3 Downshift</td>
<td>C1 &amp; C3</td>
<td>142-203 psi ( 980-1400 kPa)</td>
</tr>
<tr>
<td>45</td>
<td>4-5 Upshift</td>
<td>C2 &amp; C3</td>
<td>128-189 psi ( 880-1300 kPa)</td>
</tr>
<tr>
<td>54</td>
<td>5-4 Downshift</td>
<td>C1 &amp; C2</td>
<td>142-203 psi ( 980-1400 kPa)</td>
</tr>
<tr>
<td>56</td>
<td>5-6 Upshift</td>
<td>C2 &amp; C4</td>
<td>128-189 psi ( 880-1300 kPa)</td>
</tr>
<tr>
<td>65</td>
<td>6-5 Downshift</td>
<td>C2 &amp; C3</td>
<td>128-189 psi ( 880-1300 kPa)</td>
</tr>
<tr>
<td>70</td>
<td>R-L Shift</td>
<td>C3 &amp; C6</td>
<td>142-203 psi ( 980-1400 kPa)</td>
</tr>
<tr>
<td>71</td>
<td>R-1 Shift</td>
<td>C1 &amp; C5</td>
<td>186-305 psi (1280-2100 kPa)</td>
</tr>
<tr>
<td>72</td>
<td>R-2 Shift</td>
<td>C1 &amp; C4</td>
<td>142-203 psi ( 980-1400 kPa)</td>
</tr>
<tr>
<td>80</td>
<td>N1-L Shift</td>
<td>C3 &amp; C6</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>81</td>
<td>N1-1 Shift</td>
<td>C1 &amp; C5</td>
<td>215-305 psi (1480-2100 kPa)</td>
</tr>
<tr>
<td>82</td>
<td>N1-2 Shift</td>
<td>C1 &amp; C4</td>
<td>186-305 psi (1280-2100 kPa)</td>
</tr>
<tr>
<td>83</td>
<td>N1-3 Shift</td>
<td>C1 &amp; C3</td>
<td>215-305 psi (1480-2100 kPa)</td>
</tr>
<tr>
<td>85</td>
<td>N1-5 Shift</td>
<td>C2 &amp; C3</td>
<td>164-239 psi (1130-1650 kPa)</td>
</tr>
<tr>
<td>86</td>
<td>N1-6 Shift</td>
<td>C2 &amp; C4</td>
<td>164-239 psi (1130-1650 kPa)</td>
</tr>
<tr>
<td>92</td>
<td>N2-2 Shift</td>
<td>C1 &amp; C4</td>
<td>215-305 psi (1480-2100 kPa)</td>
</tr>
<tr>
<td>93</td>
<td>N3-3 Shift</td>
<td>C1 &amp; C3</td>
<td>215-305 psi (1480-2100 kPa)</td>
</tr>
<tr>
<td>95</td>
<td>N3-5 Shift</td>
<td>C2 &amp; C3</td>
<td>164-239 psi (1130-1650 kPa)</td>
</tr>
<tr>
<td>96</td>
<td>N4-6 Shift</td>
<td>C2 &amp; C4</td>
<td>164-239 psi (1130-1650 kPa)</td>
</tr>
<tr>
<td>97</td>
<td>2-R Shift</td>
<td>C3 &amp; C5</td>
<td>215-305 psi (1480-2100 kPa)</td>
</tr>
</tbody>
</table>
f35. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 55 AND ANY SUB CODE

INITIAL SETUP

Equipment Conditions
- Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
- Goggles, Industrial (Item 15, Appendix C)
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Pan, Drain (Item 24, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Wrench Set, Socket (Item 51, Appendix C)

Materials/Parts
- Packing, Preformed (Item 197, Appendix G)
- Adapter, Straight, Pipe to Tube (Item 1.2, Appendix D)
- Adapter, Straight, Tube to Boss (Item 1.3, Appendix D)
- Hose Assembly, Nonmetallic (Item 24.13, Appendix D)

Personnel Required
- (2)

References
- TM 9-4910-571-12&P

START

Is transmission oil level OK?

1. 

POSSIBLE PROBLEMS
- Improper Transmission oil level. Faulty WTEC III TPSS.

YES

Correct improper transmission oil level (TM 9-2320-366-10-1).

NO

1. Visual Inspection

REASON FOR QUESTION
- If transmission oil level is improper code 55 may be recorded.

Known Info
- Nothing
(1) Check transmission oil level (TM 9-2320-366-10-1).
(2) If transmission oil level is improper, correct as required (TM 9-2320-366-10-1).
f35. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 55 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Transmission oil level OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
- If main code 32 is logged, C3 pressure switch or its circuit is faulty.

2. Is main code 55 logged without main code 32?

**CAUTION**
Read CAUTION on following page.

YES


NO
(1) Check if main code 32 is logged in WTEC III TPSS (para 8-5).

(2) If main code 32 is logged, WTEC III transmission ECU has sensed a fault with the C3 pressure switch or its circuit. Perform Transmission System Troubleshooting (f26. WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays Main Code 32 and Any Sub Code).

CAUTION
Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.
f35. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 55 AND ANY SUB CODE (CONT)

**KNOWN INFO**
- Transmission oil level OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Pressure Test or STE/ICE-R Test #50

**REASON FOR QUESTION**
- Low main oil pressure may cause WTEC III TPSS to display main code 55 and one or more sub codes.

**WARNING**
Read WARNING on following page.

3. Is 218-276 psi (1,503-1,903 kPa) present at main oil pressure tap?

**TEST OPTIONS**
- Pressure Test or STE/ICE-R Test #50

**REASON FOR QUESTION**
- Low main oil pressure may cause WTEC III TPSS to display main code 55 and one or more sub codes.

**YES**
- Notify DS Maintenance.

**NO**
- Notify DS Maintenance.
**WARNING**

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

**PRESSURE TEST**

1. Position drain pan under pressure tap.
2. Remove main pressure tap plug and preformed packing from control valve module.
3. Connect tube to boss adapter, hose, and pipe to tube adapter to main pressure tap.
5. Start engine (TM 9-2320-366-10-1) and run at idle.
6. With parking brake applied, position WTEC III TPSS to R position then to N position while assistant checks reading on STE/ICE-R.
7. Shut down engine (TM 9-2320-366-10-1).
8. If main oil pressure is low, notify DS Maintenance.
9. Remove pipe to tube adapter, hose, and tube to boss adapter from main pressure tap.
10. Position preformed packing and main pressure tap plug in control valve module.
11. Tighten main pressure tap plug to 84-120 lb-in. (9-14 N·m).
12. Remove drain pan under pressure tap.
f35. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 55 AND ANY SUB CODE (CONT)

KNOWN INFO
- Transmission oil level OK
- Faulty WTEC III transmission ECU.

POSSIBLE PROBLEMS
- Faulty WTEC III transmission ECU.

TEST OPTIONS
- Pressure Test or STE/ICE-R Test #50

REASON FOR QUESTION
- If pressure is low or missing to C3 clutch when shift is made, WTEC III TPSS may display main code 55 and one or more sub codes.

4.
- Is pressure present at C3 clutch when shift is made?

NO
- Notify DS Maintenance.

YES
- Replace WTEC III transmission ECU (para 8-7).
(1) Remove front and intermediate propeller shafts (para 9-2).
(2) Position drain pan under C3 pressure tap.
(3) Remove C3 pressure tap plug and preformed packing from control valve module.
(4) Connect tube to boss adapter, hose, and pipe to tube adapter to C3 pressure tap.
(5) Perform STE/ICE-R test #50 (TM 9-4910-571-12&P).
(6) Start engine (TM 9-2320-366-10-1) and run at idle.
(7) With parking brake applied, make shift indicated by sub code while assistant notes reading on STE/ICE-R.
(8) Shut down engine (TM 9-2320-366-10-1).
(9) If 215-276 psi (1480-1900 kPa) pressure is not obtained for affected code, notify DS Maintenance.
(10) If 215-276 psi (1480-1900 kPa) pressure is obtained, replace WTEC transmission ECU (para 8-7).
(11) Remove pipe to tube adapter, hose, and tube to boss adapter from C3 pressure tap.
(12) Position performed packing and C3 pressure tap plug on control valve module.
(13) Tighten C3 pressure tap plug to 84-120 lb-in. (9-14 N·m).
(14) Remove drain pan under pressure tap.
(15) Install front and intermediate propeller shafts (para 9-2).
(16) Clear diagnostic codes (para 8-5).

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Sub Code Meaning</th>
<th>Pressure Readings C3 Tap</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>1-R Shift</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>27</td>
<td>2-R Shift</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>80</td>
<td>N1-L Shift</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>87</td>
<td>N1-R Shift</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
<tr>
<td>97</td>
<td>2-R Shift</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
</tbody>
</table>
f36. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 56 AND ANY SUB CODE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Pan, Drain (Item 24, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Wrench Set, Socket (Item 51, Appendix C)

CAUTION
Read CAUTION on following page.

START

KNEWN INFO
Transmission oil level OK.
Fuse OK.
Batteries OK.

POSSIBLE PROBLEMS
Faulty output speed sensor.
Faulty turbine speed sensor.
Faulty WTEC III transmission ECU.

TEST OPTIONS
Visual Inspection

REASON FOR QUESTION
If main code 22 sub code 15 or 16 is logged, turbine speed sensor, output speed sensor, or associated circuit(s) is faulty.

Is main code 56 logged without main code 22 sub code 15 or 16?

YES

NO


Materials/Parts
Packing, Preformed (Item 197, Appendix G)
Adapter, Straight, Pipe to Tube (Item 1.2, Appendix D)
Adapter, Straight, Tube to Boss (Item 1.3, Appendix D)
Hose Assembly, Nonmetallic (Item 24.13, Appendix D)

Personnel Required
(2)

References
TM 9-4910-571-12&P
Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

(1) Check if main code 22 code 15 or 16 is logged in WTEC III TPSS (para 8-5).

(2) If main code 22 sub code 15 or 16 is logged, WTEC III transmission ECU has sensed a fault with the turbine speed sensor, output speed sensor, or associated circuit(s). Perform Transmission System Troubleshooting (f23. WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays Main Code 22 Sub Code 15 or f24. WTEC III Transmission Pushbutton Shift Selector (TPSS) Displays Main Code 22 Sub Code 16).
f36. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 56 AND ANY SUB CODE (CONT)

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
Pressure Test or STE/ICE-R TEST #50

**REASON FOR QUESTION**
Low main oil pressure may cause WTEC III TPSS to display main code 56 and one or more sub codes.

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Output speed sensor OK.
- Turbine speed sensor OK.

**POSSIBLE PROBLEMS**
Faulty WTEC III transmission ECU.

**2.**
Is 218-276 psi (1,503-1,903 kPa) present at main oil pressure tap?

- **YES**
  - Notify DS Maintenance.

- **NO**
Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

**PRESSURE TEST**

1. Position drain pan under pressure tap.
2. Remove main pressure tap plug and preformed packing from control valve module.
3. Connect tube to boss adapter, hose, and pipe to tube adapter to main pressure tap.
5. Start engine (TM 9-2320-366-10-1) and run at idle.
6. With parking brake applied, position WTEC III TPSS to R position then to N position while assistant checks reading on STE/ICE-R.
7. Shut down engine (TM 9-2320-366-10-1).
8. If main oil pressure is low, notify DS Maintenance.
9. Remove pipe to tube adapter, hose, and tube to boss adapter from main pressure tap.
10. Position preformed packing and main pressure tap plug in control valve module.
11. Tighten main pressure tap plug to 84-120 lb-in. (9-14 N·m).
12. Remove drain pan under pressure tap.
f36. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 56 AND ANY SUB CODE (CONT)

3. Is pressure present at clutch(s) when shift is made?

**KNOWN INFO**
- Transmission oil level OK.
- Fuse OK.
- Batteries OK.
- Output speed sensor OK.
- Turbine speed sensor OK.
- Main oil pressure OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- Pressure Test or STE/ICE-R Test #50

**REASON FOR QUESTION**
If pressure is low or missing to clutch(s) when shift is made, WTEC III TPSS may display main code 56 and one or more sub codes.

**YES**
Notify DS Maintenance.

**NO**
Replace WTEC III transmission ECU (para 8-7).
PRESSURE TEST

(1) Remove front and intermediate propeller shafts (para 9-2).
(2) Position drain pan under pressure tap.
(3) Remove pressure tap plug and preformed packing from clutch pressure tap indicated by the sub code. Refer to Table 2-45. Clutch Pressure Tap.
(4) Connect tube to boss adapter, hose, and pipe to tube adapter to clutch pressure tap.
(5) Perform STE/ICE-R test #50 (TM 9-4910-571-12&P).
(6) Start engine (TM 9-2320-366-10-1).
(7) Make shift indicated by sub code. Refer to Table 2-45. Clutch Pressure Tap.
(8) Accelerate engine until WTEC III TPSS displays desired range. Refer to Table 2-45. Clutch Pressure Tap.
(9) Maintain sufficient engine speed to keep desired transmission range while assistant notes reading on STE/ICE-R.
(10) Let engine return to idle.
(11) Shift transmission into neutral (TM 9-2320-366-10-1).
(12) Shut down engine (TM 9-2320-366-10-1).
(13) If one or more of clutches failed to indicate proper pressure, notify DS Maintenance.
(14) If all clutches indicate proper pressure, replace WTEC III transmission ECU (para 8-7).
(15) Remove pipe to tube adapter, hose, and tube to boss adapter from clutch pressure tap.
(16) Position preformed packing and pressure tap plug in control valve module.
(17) Tighten pressure tap plug to 84-120 lb-in. (9-14 N·m).
(18) Remove drain pan under pressure tap.
(19) Install front and intermediate propeller shafts (para 9-2).
(20) Clear diagnostic codes (para 8-5).

Table 2-45. Clutch Pressure Tap

<table>
<thead>
<tr>
<th>Sub Code</th>
<th>Sub Code Meaning</th>
<th>Pressure at Clutch(s)</th>
<th>Pressure Readings at Taps</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>L Range Test</td>
<td>C3 &amp; C6</td>
<td>215-334 psi (1480-2300 kPa)</td>
</tr>
<tr>
<td>11</td>
<td>1 Range Test</td>
<td>C1 &amp; C5</td>
<td>215-305 psi (1480-2100 kPa)</td>
</tr>
<tr>
<td>22</td>
<td>2 Range Test</td>
<td>C1 &amp; C4</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>33</td>
<td>3 Range Test</td>
<td>C1 &amp; C3</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>44</td>
<td>4 Range Test</td>
<td>C1 &amp; C2</td>
<td>142-203 psi (980-1400 kPa)</td>
</tr>
<tr>
<td>55</td>
<td>5 Range Test</td>
<td>C2 &amp; C3</td>
<td>128-189 psi (880-1300 kPa)</td>
</tr>
<tr>
<td>66</td>
<td>6 Range Test</td>
<td>C2 &amp; C4</td>
<td>128-189 psi (880-1300 kPa)</td>
</tr>
<tr>
<td>77</td>
<td>R Range Test</td>
<td>C3 &amp; C5</td>
<td>215-276 psi (1480-1900 kPa)</td>
</tr>
</tbody>
</table>
f37. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 13 AND ANY SUB CODE

INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Conditions</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1)</td>
<td>TM 9-4910-571-12&amp;P</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tools and Special Tools</th>
<th>Personnel Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
<td>(2)</td>
</tr>
<tr>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
<td></td>
</tr>
<tr>
<td>STE/ICE-R (Item 41, Appendix C)</td>
<td></td>
</tr>
</tbody>
</table>

KNOWN INFO

Vehicle runs.
Batteries OK.

POSSIBLE PROBLEMS

Faulty WTEC III dashboard cable assembly.
Faulty WTEC III transmission ECU.
Faulty WTEC III TPSS.
Faulty voltage regulator.

START

1. Does WTEC III TPSS display main code 13 sub code 12?

CAUTION
Read CAUTION on following page.

TEST OPTIONS

Transmission diagnostic code check

REASON FOR QUESTION

This question helps eliminate possible problems and determines where troubleshooting continues.

NO

YES

Go to step 7 of this fault.
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

CAUTION
Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

(1) Check to see if main code 13 sub code 12 is active in WTEC III TPSS (para 8-5).
(2) If main code 13 sub code 12 is not active in WTEC III TPSS, go to step 7 of this fault.
f37. **WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 13 AND ANY SUB CODE (CONT)**

**KNOWN INFO**
- Vehicle runs.
- Batteries OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III dashboard cable assembly.
- Faulty WTEC III transmission ECU.
- Faulty WTEC III TPSS.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If short circuits to ground or other wires are present, wire 136 is faulty.

---

**2.** Are connectors P115-1 and P115-16 free from short circuits to ground or to other wires?

---

**YES**
- Repair wire 136 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).

**NO**
- Continue with further tests.
(1) Remove kick panel (para 16-3).
(2) Disconnect connector clamp from connector P115.
(3) Disconnect connector P115 from WTEC III transmission ECU.
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter to connector P115-1.
(6) Connect negative (-) probe of multimeter to all other sockets in connector P115 (except P115-16), one at a time, and note reading on multimeter.
(7) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(8) Connect positive (+) probe of multimeter to connector P115-16.
(9) Connect negative (-) probe of multimeter to all other sockets in connector P115 (except P115-1), one at a time, and note reading on multimeter.
(10) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(11) If continuity is present repair wire 136 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
3. Is 0.5 ohms, or less, resistance present from connectors P115-17 and P115-32 to ground?

**Known Info**
- Vehicle runs.
- Batteries OK.

**Possible Problems**
- Faulty WTEC III dashboard cable assembly.
- Faulty WTEC III transmission ECU.
- Faulty WTEC III TPSS.

**Test Options**
- Resistance Test or STE/ICE-R Test #91

**Reason for Question**
- If resistance is higher than 0.5 ohms, wire 143 is faulty.

**Flowchart**
- YES: Repair wire 143 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
- NO: Resistance Test or STE/ICE-R Test #91
RESISTANCE TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P115-17.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) Connect positive (+) probe of multimeter to connector P115-32.
(5) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(6) If resistance noted in step 3 or step 5 is higher than 0.5 ohms, repair wire 143 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
(7) Connect connector P115 to WTEC III transmission ECU.
(8) Connect connector clamp on connector P115.
Is continuity present from connector P116-16 to connector PX33R and no short circuits found?

**Test Options**
Continuity Test or STE/ICE-R Test #91

**Reason for Question**
If continuity is not present, or short circuits are found, wire 136 is faulty.

**Known Info**
Vehicle runs.
Batteries OK.

**Possible Problems**
Faulty WTEC III dashboard cable assembly.
Faulty WTEC III transmission ECU.
Faulty WTEC III TPSS.

**Yes**
Repair wire 136 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).

**No**
CONTINUITY TEST

1. Disconnect connector clamp from connector P116.
2. Disconnect connector P116 from WTEC III transmission ECU.
3. Remove instrument panel assembly for access (para 7-15).
4. Disconnect connector PX33 from WTEC III TPSS.
5. Set multimeter to ohms.
6. Connect positive (+) probe of multimeter to connector P116-16.
7. Connect negative (-) probe of multimeter to connector PX33R and note reading on multimeter.
8. Connect negative (-) probe of multimeter to all other sockets in connector PX33, one at a time, and note reading on multimeter.
9. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
10. If continuity is not present in step 7, or continuity is present in step 8 or step 9, repair wire 136 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
Is continuity present from connector P116-32 to connector PX33P and no short circuits found?

- **YES**
  - Repair wire 143 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
  - Replace WTEC III transmission ECU (para 8-7).

- **NO**
  - Test options: Continuity Test or STE/ICE-R Test #91
  - Reason for question: If continuity is not present, or short circuits are found, wire 143 is faulty.

**Known Info**
- Vehicle runs.
- Batteries OK.

**Possible Problems**
- Faulty WTEC III dashboard cable assembly.
- Faulty WTEC III transmission ECU.
- Faulty WTEC III TPSS.
CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector P116-32.
3. Connect negative (-) probe of multimeter to connector PX33P and note reading on multimeter.
4. Connect negative (-) probe of multimeter to all other sockets in connector PX33, one at a time, and note reading on multimeter.
5. If continuity is not present in step 3, or continuity is present in step 4, repair wire 143 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
6. Connect connector PX33 to WTEC III TPSS.
7. Install instrument panel assembly (para 7-15).
8. Clear diagnostic codes (para 8-5).
6. Does main code 13 sub code 12 appear on WTEC III TPSS with replacement WTEC III transmission ECU installed?

**NO**

- Replace WTEC III TPSS (para 8-3).

**YES**

- Replace WTEC III transmission ECU (para 8-7).

**TEST OPTIONS**

- WTEC III transmission ECU replacement check

**REASON FOR QUESTION**

If main code 13 sub code 12 is not active, WTEC III transmission ECU is faulty. If main code 13 sub code 12 is active, WTEC III TPSS is faulty.

**KNOWN INFO**

- Vehicle runs.
- Batteries OK.
- WTEC III dashboard cable assembly OK.

**POSSIBLE PROBLEMS**

- Faulty WTEC III transmission ECU.
- Faulty WTEC III TPSS.
(1) Install replacement WTEC III transmission ECU (para 8-7).
(2) Start engine (TM 9-2320-366-10-1).
(3) Check to see if main code 13 sub code 12 appears on WTEC III TPSS (para 8-5).
(4) If main code 13 sub code 12 does not appear, replace WTEC III transmission ECU (para 8-7).
(5) If main code 13 sub code 12 does appear, replace WTEC III TPSS (para 8-3).
(6) Shut down engine (TM 9-2320-366-10-1).
(7) Install original WTEC III transmission ECU (para 8-7).
(8) Clear diagnostic codes (para 8-5).
f37. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 13 AND ANY SUB CODE (CONT)

**KNOWLEDGE INFO**
- Vehicle runs.
- Batteries OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III transmission ECU.
- Faulty voltage regulator.

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
If 33 VDC or more is present, voltage regulator is faulty. If 24-32 VDC is present, WTEC III transmission ECU is faulty.

7. Is 33 VDC or more present at DCA connector terminal N?

**YES**
Replace WTEC III transmission ECU (para 8-7).

**NO**
Replace 100 amp voltage regulator (para 7-5) or 200 amp voltage regulator (para 20-46).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Start engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(2) Remove dust cap from DCA connector.</td>
</tr>
<tr>
<td>(3) Set multimeter to volts dc.</td>
</tr>
<tr>
<td>(4) Connect positive (+) probe of multimeter to DCA connector terminal N.</td>
</tr>
<tr>
<td>(5) Connect negative (-) probe of multimeter to DCA connector terminal P and note reading on multimeter.</td>
</tr>
<tr>
<td>(6) If 33 VDC or more is present, replace 100 amp voltage regulator (para 7-5) or 200 amp voltage regulator (para 20-46).</td>
</tr>
<tr>
<td>(7) If 24-32 is present, replace WTEC III transmission ECU (para 8-7).</td>
</tr>
<tr>
<td>(8) Install dust cap on DCA connector.</td>
</tr>
<tr>
<td>(9) Clear diagnostic codes (para 8-5).</td>
</tr>
<tr>
<td>(10) Shut down engine (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
1. Is a diagnostic code(s) logged in WTEC III TPSS and does it return after clearing diagnostic codes?

- **YES**
  - Fault corrected.
  - Perform Transmission System Troubleshooting per para 8-5, Table 8-2. Diagnostic Code List and Description.

- **NO**
  - TEST OPTIONS
    - WTEC III Diagnostic Code Reading/Code Clearing Procedure
  - REASON FOR QUESTION
    - If WTEC III TPSS does not display any diagnostic codes after clearing, an intermittent problem was detected and corrected. If any diagnostic code(s) is logged after clearing further troubleshooting is required.
(1) Perform WTEC III Code Reading and Code Clearing (para 8-5).
(2) If no diagnostic codes are logged after clearing, fault is corrected.
(3) If diagnostic codes are still logged, perform Transmission System Troubleshooting of active diagnostic codes per para 8-25, Table 8-2. WTEC III Diagnostic Code List and Description.
INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multimeter, Digital (Item 22, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)

Tools and Special Tools (Cont)
Wrench Set, Socket (Item 51, Appendix C)

Personnel Required
(2)

References
TM 9-4910-571-12&P

NOTE
Perform electrical system troubleshooting e1.
Circuit Breaker Does Not Operate on circuit breakers C43 and CB79 prior to beginning this task.

KNOWLEDGE INFO
Circuit Breakers CB43 and CB79 OK.

POSSIBLE PROBLEMS
Faulty WTEC III dashboard cable assembly.
Faulty WTEC III TPSS.
Faulty WTEC III transmission ECU.

TEST OPTIONS
WTEC III Diagnostic Code Clearing procedure.

REASON FOR QUESTION
If WTEC III TPSS does not display any diagnostic code after clearing, an intermittent problem was detected and corrected. If diagnostic code is logged after clearing, further troubleshooting is required.

1. Does main code 23 logged in WTEC III TPSS return after clearing diagnostic code?

START

CAUTION
Read CAUTION on following page.

NO

YES

Fault corrected.
CAUTION

Loose or dirty connectors may cause intermittent loss of power to transmission ECU and diagnostic codes to be logged. Ensure that all connectors are clean and tight before performing troubleshooting. Failure to comply may result in incorrect test results.

(1) Perform WTEC III Code Reading and Code Clearing (para 8-5).
(2) If diagnostic code 23 is not logged after clearing, fault is corrected.
(3) If diagnostic code 23 is logged after clearing, further troubleshooting is required.
f39. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 23 AND ANY SUB CODE (CONT)

**KNOWN INFO**

<table>
<thead>
<tr>
<th>Circuit breaker CB43 and CB79 OK.</th>
</tr>
</thead>
</table>

**POSSIBLE PROBLEMS**

- Faulty WTEC III dashboard cable assembly.
- Faulty WTEC III transmission ECU.
- Faulty WTEC III TPSS.

**TEST OPTIONS**

- Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**

If 24 VDC is not present, wire 136 is faulty.

**WARNING**

CAUTION

Read WARNING and CAUTION on following page.

2. Is 24 VDC present at connector P115 sockets 1 and 16?

**NO**

**YES**

Repair wire 136 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

CAUTION

Use care when testing electrical connectors not to bend connector pins or damage connector sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

### CONTINUITY TEST

1. Remove kick panel (para 16-3).
2. Disconnect connector clamp from connector P115.
3. Disconnect connector P115 from WTEC III transmission ECU connector.
4. Set multimeter to volts DC.
5. Connect positive (+) probe of multimeter to connector P115 socket 1.
6. Connect negative (-) probe of multimeter to a known good ground and note reading on multimeter.
7. Connect positive (+) probe of multimeter to connector P115 socket 16.
8. Connect negative (-) probe of multimeter to a known good ground and note reading on multimeter.
9. If 24 VDC is not present in steps (6) and (8), repair wire 136 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
3. **Known Info**

Circuit breaker CB43 and CB79 OK.

**Possible Problems**

- Faulty WTEC III dashboard cable assembly.
- Faulty WTEC III transmission ECU.
- Faulty WTEC III TPSS.

**Test Options**

- Continuity Test or STE/ICE-R Test #91

**Reason for Question**

If continuity is not present, wire 143 is faulty.

**Flowchart**

- **Yes**
  - Repair wire 143 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).

- **No**
  - Is continuity present from connector P115 sockets 17, 25, and 32 to ground?

- **Yes**

- **No**
  - If continuity is not present, wire 143 is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector P115 socket 17.
(3) Connect negative (-) probe of multimeter to a known good ground and note reading on multimeter.
(4) If continuity is not present in step (3), repair wire 143 from connector P115-17 to terminal board 2 pin 27 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
(5) Connect positive (+) probe of multimeter to connector P115 socket 25.
(6) Connect negative (-) probe of multimeter to a known good ground and note reading on multimeter.
(7) If continuity is not present in step (6), repair wire 144 from connector P115-25 to chassis ground (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
(8) Connect positive (+) probe of multimeter to connector P115 socket 32.
(9) Connect negative (-) probe of multimeter to a known good ground and note reading on multimeter.
(10) If continuity is not present in step (9), repair wire 143 from connector P115-32 to terminal board 2 pin 16 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
(11) Connect connector P115 to WTEC III Transmission ECU.
(12) Connect connector clamp on connector P115.
**KNOWN INFO**
Circuit Breakers CB 43 and CB79 OK.

**POSSIBLE PROBLEMS**
Faulty WTEC III dashboard cable assembly.
Faulty WTEC III TPSS.
Faulty WTEC III transmission ECU.

---

**CAUTION**
Read CAUTION on following page.

**TEST OPTIONS**
Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present, or short circuits are found, wire 124 is faulty.

---

4.
Is continuity present from connector P116 socket 3 to connector PX33 socket N and no short circuits found?

---

**YES**
Repair wire 124 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).

**NO**
Use care when testing electrical connectors not to bend connector pins or damage connector sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

**CONTINUITY TEST**

1. Disconnect connector clamp from connector P116.
2. Disconnect connector P116 from WTEC III transmission ECU.
3. Remove instrument panel assembly for access (para 7-15).
4. Disconnect connector PX33 from WTEC III TPSS.
5. Connect positive (+) probe of multimeter to connector P116 socket 3.
6. Connect negative (-) probe of multimeter to connector PX33 socket N and note reading on multimeter.
7. Connect negative probe (-) of multimeter to all other sockets in connector PX33, one at a time, and note reading on multimeter.
8. Connect negative probe (-) of multimeter to ground and note reading on multimeter.
9. If continuity is not present in step 6, or continuity is present in step 7 or step 8, repair wire 124 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
f39. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DISPLAYS MAIN CODE 23 AND ANY SUB CODE (CONT)

Table: KNOWN INFO
- Circuit Breakers CB 43 and CB79 OK.

Table: POSSIBLE PROBLEMS
- Faulty WTEC III dashboard cable assembly.
- Faulty WTEC III TPSS.
- Faulty WTEC III transmission ECU.

Diagram:
1. CAUTION: Read CAUTION on following page.
2. Test Options: Continuity Test or STE/ICE-R Test #91
3. Reason for Question: If continuity is not present, or short circuits are found, wire 143 is faulty.
4. Is continuity present from connector P116 socket 32 to connector PX33 socket P and no short circuits found?
   - No: Repair wire 143 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
   - Yes: Next step.

Notes:
- 2-1822.8 Change 1
- TM 9-2320-366-20-2
CAUTION

Use care when testing electrical connectors not to bend connector pins or damage connector sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

(1) Connect positive (+) probe of multimeter to connector P116 socket 32.
(2) Connect negative (-) probe of multimeter to connector PX33 socket P and note reading on multimeter.
(3) Connect negative probe (-) of multimeter to all other sockets in connector PX33, one at a time, and note reading on multimeter.
(4) Connect negative probe (-) of multimeter to ground and note reading on multimeter.
(5) If continuity is not present in step 2, or continuity is present in step 3 or step 4, repair wire 143 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
(6) Connect connector P116 to WTEC III transmission ECU.
(7) Connect connector clamp on connector P116.
Does main code 23 appear on WTEC III TPSS with a known good WTEC III TPSS installed?

**KNOWN INFO**
- Circuit Breakers CB43 and CB79 OK.
- WTEC III dashboard cable assembly OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III TPSS.
- Faulty WTEC III transmission ECU.

**TEST OPTIONS**
- WTEC III TPSS replacement check.

**REASON FOR QUESTION**
- If main code 23 does not appear, WTEC III TPSS is faulty. If main code 23 does appear, WTEC III transmission ECU is faulty.

Replace WTEC III TPSS (para 8-3).

Replace WTEC III transmission ECU (para 8-7).
WTEC III TPSS REPLACEMENT CHECK

1. Replace WTEC III TPSS with a known good WTEC III TPSS (para 8-3).
2. Start engine (TM 9-2320-365-10).
3. Observe if main code 23 appears on WTEC III TPSS (para 8-5).
4. If main code 23 does not appear, replace WTEC III TPSS (para 8-3).
5. If main code 23 does appear, replace WTEC III transmission ECU (para 8-7).
7. Install original WTEC III TPSS (para 8-3).
8. Connect connector PX33 to WTEC III TPSS.
9. Install instrument panel assembly (para 7-15).
10. Install kick panel (para 16-3).
11. Clear diagnostic codes (para 8-5).
f40. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DOES NOT ILLUMINATE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).
Kick panel removed (para 16-3).

Personnel Required
(2)

References
TM 9-4910-571-12&P

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Multimeter, Digital (Item 22, Appendix C)

NOTE
Perform Electrical System Troubleshooting

e1. CIRCUIT BREAKER DOES NOT OPERATE
on circuit breakers CB43 and CB79 prior to
beginning this task.

1. KNOWN INFO
12 VDC and 24 VDC circuits operate.
Circuit breaker CB43 OK.
Circuit breaker CB79 OK.

1. POSSIBLE PROBLEMS
Faulty WTEC III dashboard cable assembly.
Faulty terminal board TB1.
Faulty WTEC III ECU.
Faulty WTEC III TPSS.

START

WARNING
CAUTION
Read WARNING and CAUTION on following page.

Is 24 VDC present at connector P115 socket 16?

1.

TEST OPTIONS
Voltage Test or
STE/ICE-R Test #89

REASON FOR QUESTION
If 24 VDC is not present, WTEC III dashboard cable assembly is faulty.

NO

YES

Repair wire 136 from connector P115 sockets 16 to circuit breaker CB43 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

### VOLTAGE TEST

1. Disconnect connector clamp from connector P115.
2. Disconnect connector P115 from WTEC III ECU.
3. Set multimeter to volts DC.
4. Connect positive (+) probe of multimeter to connector P115 socket 16.
5. Connect negative (-) probe of multimeter to ground note reading on multimeter.
6. If 24 VDC is not present, repair wire 136 from connector P115 sockets 16 to circuit breaker CB43 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
2. Is 24 VDC present at connector P115 socket 1?

Yes

- Repair wire 136 from connector P115 sockets 1 to circuit breaker CB43 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).

No

- If 24 VDC is not present, WTEC III dashboard cable assembly is faulty.

**WARNING**

Read WARNING and CAUTION on following page.

**CAUTION**

**REASON FOR QUESTION**

If 24 VDC is not present, WTEC III dashboard cable assembly is faulty.

**TEST OPTIONS**

Voltage Test or STE/ICE-R Test #89

**POSSIBLE PROBLEMS**

Faulty WTEC III dashboard cable assembly.
Faulty terminal board TB1.
Faulty WTEC III ECU.
Faulty WTEC III TPSS.

**KNOWN INFO**

12 VDC and 24 VDC circuits operate.
Circuit breaker CB43 OK.
Circuit breaker CB79 OK.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to connector P115 socket 1.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(4) If 24 VDC is not present, repair wire 136 from connector P115 sockets 1 to circuit breaker CB43 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
</tbody>
</table>
Is 24 VDC present at connector P116 socket 4?

**KNOWN INFO**

- 12 VDC and 24 VDC circuits operate.
- Circuit breaker CB43 OK.
- Circuit breaker CB79 OK.

**POSSIBLE PROBLEMS**

- Faulty WTEC III dashboard cable assembly.
- Faulty terminal board TB1.
- Faulty WTEC III ECU.
- Faulty WTEC III TPSS.

---

**WARNING**

CAUTION

Read WARNING and CAUTION on following page.

---

**TEST OPTIONS**

- Voltage Test or STE/ICE-R Test #89

---

**REASON FOR QUESTION**

This question eliminates possible problems and determines where troubleshooting continues.

---

**YES**

Go to step 7 of this fault.

---

**NO**
**WARNING**

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

**CAUTION**

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

**NOTE**

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Connect connector P115 to WTEC III ECU.</td>
</tr>
<tr>
<td>(2) Connect connector clamp to connector P115.</td>
</tr>
<tr>
<td>(3) Disconnect connector clamp from connector P116.</td>
</tr>
<tr>
<td>(4) Disconnect connector P116 from WTEC III ECU.</td>
</tr>
<tr>
<td>(5) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(6) Connect positive (+) probe of multimeter to connector P116 socket 4.</td>
</tr>
<tr>
<td>(7) Connect negative (-) probe of multimeter to ground.</td>
</tr>
<tr>
<td>(8) Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.</td>
</tr>
<tr>
<td>(9) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(10) If 24 VDC is not present, go to step 7 of this fault.</td>
</tr>
</tbody>
</table>
f40. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DOES NOT ILLUMINATE (CONT)

KNOWN INFO
12 VDC and 24 VDC circuits operate.
Circuit breaker CB43 OK.
Circuit breaker CB79 OK.
Terminal board TB1 OK.

POSSIBLE PROBLEMS
Faulty WTEC III dashboard cable assembly.
Faulty WTEC III ECU.
Faulty WTEC III TPSS.

TEST OPTIONS
Voltage Test or STE/ICE-R Test #89

REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

4. Is 24 VDC present at connector PX33 socket R?

WARNING
Read WARNING and CAUTION on following page.

NO

YES

Go to step 9 of this fault.
WARNING

Remove rings, bracelets, watches, necklaces, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury or short across electrical circuits and cause severe burns or electrical shock.

CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

### VOLTAGE TEST

1. Connect connector P116 to WTEC III ECU.
2. Connect connector clamp to connector P116.
3. Remove instrument panel for access (para 7-15).
4. Disconnect connector PX33 from WTEC III TPSS.
5. Set multimeter to volts DC.
6. Connect positive (+) probe of multimeter to connector PX33 socket R.
7. Connect negative (-) probe of multimeter to ground.
8. Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
10. If 24 VDC is not present, go to step 9 of this fault.
f40. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DOES NOT ILLUMINATE (CONT)

**KNOWN INFO**
- 12 VDC and 24 VDC circuits operate.
- Circuit breaker CB43 OK.
- Circuit breaker CB79 OK.
- Terminal board TB1 OK.
- WTEC III ECU OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III dashboard cable assembly.
- Faulty WTEC III TPSS.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, WTEC III dashboard cable assembly is faulty.

5. Is continuity present from connector PX33 socket T to known good ground?

If "NO" is selected, the flowchart branches to a decision point.

If "YES" is selected, the flowchart branches to a decision point:
- Repair wire 186 from connector PX33 socket T to terminal board TB2 position 15 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

<table>
<thead>
<tr>
<th>CONTINUITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set multimeter to ohms.</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to connector PX33 socket T.</td>
</tr>
<tr>
<td>(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(4) If continuity is not present, Repair wire 186 from connector PX33 socket T to terminal board TB2 position 15 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
</tbody>
</table>
6. Is continuity present from connector PX33 socket V to known good ground?

   If continuity is present, WTEC III TPSS is faulty.
   If continuity is not present, WTEC III dashboard cable assembly is faulty.

   Repair wire 188 from connector PX33 socket V to terminal board TB2 position 13 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).

   Replace WTEC III TPSS (para 8-3).
CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to connector PX33 socket V.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, Repair wire 188 from connector PX33 socket V to terminal board TB2 position 13 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
(5) If continuity is present, replace WTEC III TPSS (para 8-3).
f40. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DOES NOT ILLUMINATE (CONT)

**KNOWN INFO**
12 VDC and 24 VDC circuits operate.
Circuit breaker CB43 OK.
Circuit breaker CB79 OK.
WTEC III ECU OK.
WTEC III TPSS OK.

**POSSIBLE PROBLEMS**
Faulty WTEC III dashboard cable assembly.
Faulty terminal board TB1.

**CAUTION**
Read CAUTION on following page.

**TEST OPTIONS**
Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
If continuity is not present, WTEC III dashboard cable assembly is faulty.

7. **CAUTION**
Is continuity present from connector P116 socket 4 to terminal board TB1 position 60?

- **YES**
  Repair wire 146 from connector P116 socket 4 to terminal board TB1 position 60 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).

- **NO**
CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE

Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Disconnect batteries (para 7-57).</td>
</tr>
<tr>
<td>2</td>
<td>Remove PDP cover (para 16-2).</td>
</tr>
<tr>
<td>3</td>
<td>Remove three screws from PDP.</td>
</tr>
<tr>
<td>4</td>
<td>Remove three screws and washers from PDP.</td>
</tr>
<tr>
<td>5</td>
<td>Lift PDP outward to gain access.</td>
</tr>
<tr>
<td>6</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>7</td>
<td>Connect positive (+) probe of multimeter to connector P116 socket 4.</td>
</tr>
<tr>
<td>8</td>
<td>Connect negative (-) probe of multimeter to terminal board TB1 position 60 and note reading on multimeter.</td>
</tr>
<tr>
<td>9</td>
<td>If continuity is not present, Repair wire 146 from connector P116 socket 4 to terminal board TB1 position 60 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).</td>
</tr>
<tr>
<td>10</td>
<td>Connect connector P116 to WTEC III ECU.</td>
</tr>
<tr>
<td>11</td>
<td>Connect connector clamp to connector P116.</td>
</tr>
<tr>
<td>12</td>
<td>Install kick panel (para 16-3).</td>
</tr>
</tbody>
</table>
f40. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DOES NOT ILLUMINATE (CONT)

**KNOWN INFO**
- 12 VDC and 24 VDC circuits operate.
- Circuit breaker CB43 OK.
- Circuit breaker CB79 OK.
- WTEC III ECU OK.
- WTEC III TPSS OK.

**POSSIBLE PROBLEMS**
- Faulty WTEC III dashboard cable assembly.
- Faulty terminal board TB1.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, terminal board TB1 is faulty.
- If continuity is present, WTEC III dashboard cable assembly is faulty.

**Diagram Flow**

8. Is continuity present from terminal board TB1 position 60 to terminal board TB1 position 62?

- **NO**
  - Replace terminal board TB1 (7-11).

- **YES**
  - Repair wire 1690 from terminal board TB1 position 62 to circuit breaker CB79 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to terminal board TB1 position 60.
(3) Connect negative (-) probe of multimeter to terminal board TB1 position 62 and note reading on multimeter.
(4) If continuity is not present, replace terminal board TB1 (para 7-11).
(5) If continuity is present, Repair wire 1690 from terminal board TB1 position 62 to circuit breaker CB79 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-11).
(6) Install PDP on dashboard with three screws.
(7) Install three washers and screws in PDP.
(8) Install PDP cover (para 16-2).
(9) Connect batteries (para 7-57).
f40. WTEC III TRANSMISSION PUSHBUTTON SHIFT SELECTOR (TPSS) DOES NOT ILLUMINATE (CONT)

**KNOWN INFO**
12 VDC and 24 VDC circuits operate.
Circuit breaker CB43 OK.
Circuit breaker CB79 OK.
Terminal board TB1 OK.
WTEC III TPSS OK.

**POSSIBLE PROBLEMS**
Faulty WTEC III dashboard cable assembly.
Faulty WTEC III ECU.

**TEST OPTIONS**
- Continuity Test or STE/ICE-R Test #91

**REASON FOR QUESTION**
- If continuity is not present, WTEC III dashboard cable assembly is faulty. If continuity is present, WTEC III ECU is faulty.

**CAUTION**
Read CAUTION on following page.

9. Is continuity present from connector PX33 socket R to connector P116 socket 16?

- **NO**
  - Replace WTEC III ECU (para 8-7).

- **YES**
  - Repair wire 136 from connector PX33 socket R to connector P116 socket 16 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
CAUTION

Use care when testing electrical connectors. Do not damage connector pins or sockets with multimeter probes. Failure to comply may result in damage to equipment.

NOTE
Inspect connector pins/sockets for damage, corrosion, and serviceability. Check that connector pins are not pushed back and are capable of making good contact.

CONTINUITY TEST

(1) Disconnect connector clamp from connector P116.
(2) Disconnect connector P116 from WTEC III ECU.
(3) Set multimeter to ohms.
(4) Connect positive (+) probe of multimeter to connector PX33 socket R.
(5) Connect negative (-) probe of multimeter to connector P116 socket 16 and note reading on multimeter.
(6) If continuity is not present, repair wire 136 from connector PX33 socket R to connector P116 socket 16 (para 2-45) or replace WTEC III dashboard cable assembly (para 7-11).
(7) If continuity is present, replace WTEC III ECU (para 8-7).
(8) Connect connector PX33 to WTEC III TPSS.
(9) Install instrument panel assembly (para 7-15).
This paragraph covers Propeller Shaft Troubleshooting. The Propeller Shaft Fault Index, Table 2-46, lists faults for the drive shafts of the vehicle.

### Table 2-46. Propeller Shaft Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>g1.</td>
<td>Drive Shaft or Universal Joint Unusually Noisy When Operating</td>
<td>2-1824</td>
</tr>
</tbody>
</table>
g1. DRIVE SHAFT OR UNIVERSAL JOINT UNUSUALLY NOISY WHEN OPERATING

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

START

1. WARNING
Read WARNING on following page.

Is drive shaft properly lubricated?

NO

POSSIBLE PROBLEMS
Drive shaft require lubrication.
Loose universal joint(s) bearing cap screws.
Worn universal joints.
Faulty drive shaft.
Faulty M1086/M1089 coupler bearing or attaching hardware.
Faulty M1086/M1089 intermediate front drive shaft.

YES

KNOWN INFO
Nothing.

POSSIBLE PROBLEMS
Drive shaft require lubrication.
Loose universal joint(s) bearing cap screws.
Worn universal joints.
Faulty drive shaft.
Faulty M1086/M1089 coupler bearing or attaching hardware.
Faulty M1086/M1089 intermediate front drive shaft.

KNOWN INFO
Drive shaft properly lubricated.

POSSIBLE PROBLEMS
Loose universal joint(s) bearing cap screws.
Worn universal joints.
Faulty drive shaft.
Faulty M1086/M1089 coupler bearing or attaching hardware.
Faulty M1086/M1089 intermediate front drive shaft.

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
Drive shaft may operate unusually noisy if not properly lubricated.

Lubricate drive shaft (Appendix H).

NO

Are universal joint(s) bearing cap screws secure?

YES

Replace universal joint bearing cap screws (para 9-2).

NO

Are universal joint(s) bearing cap screws secure?

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
Drive shaft may operate unusually noisy if not secure.

Drive shaft properly lubricated.

2.

NO
Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

Lubricate drive shaft lubrication fittings (Appendix H).

(1) Visually inspect universal joint(s) bearing cap screws for tightness.
(2) Replace any screw(s) that appears to be loose (para 9-2).
g1. DRIVE SHAFT OR UNIVERSAL JOINT UNUSUALLY NOISY WHEN OPERATING (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive shaft properly lubricated. Universal joint(s) bearing cap screws tight.</td>
<td>Visual inspection</td>
<td>Drive shaft may operate unusually noisy if there is movement at universal joint.</td>
</tr>
<tr>
<td><strong>POSSIBLE PROBLEMS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worn universal joints. Faulty drive shaft. Faulty M1086/M1089 coupler bearing or attaching hardware. Faulty M1086/M1089 intermediate front drive shaft.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.</strong> Are universal joints free from observable movement?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NO</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>YES</strong></td>
<td>Replace universal joint(s) (para 9-2 or TM 9-2320-366-34).</td>
<td></td>
</tr>
<tr>
<td><strong>4.</strong> Does drive shaft pass drive shaft hinging inspection and visual inspection for damage?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NO</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>YES</strong></td>
<td>Replace drive shaft(s) (para 9-2 or TM 9-2320-366-34).</td>
<td></td>
</tr>
<tr>
<td><strong>KNOWN INFO</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive shaft properly lubricated. Universal joint(s) bearing cap screws tight. Universal joints OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>POSSIBLE PROBLEMS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty drive shaft. Faulty M1086/M1089 coupler bearing or attaching hardware. Faulty M1086/M1089 intermediate front drive shaft.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(1) Check drive shaft for excessive movement at universal joints.
(2) If universal joint(s) shows any movement, replace universal joint (para 9-2 or TM 9-2320-366-34).

(1) Perform drive shaft hinging inspection (para 9-4).
(2) Visually inspect drive shaft for damaged slip yoke, bent tubing, or missing balance weights.
(3) If drive shaft does not pass hinging inspection or visual inspection, replace drive shaft (para 9-2 or TM 9-2320-366-34).
**g1. DRIVE SHAFT OR UNIVERSAL JOINT UNUSUALLY NOISY WHEN OPERATING (CONT)**

**KNOWN INFO**
- Drive shaft properly lubricated.
- Universal joint(s) bearing cap screws tight.
- Universal joints OK.
- Drive shaft OK.

**POSSIBLE PROBLEMS**
- Faulty M1086/M1089 coupler bearing or attaching hardware.
- Faulty M1086/M1089 intermediate front drive shaft.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- Drive shaft may operate unusually noisy if M1086/M1089 coupler bearing or attaching hardware is not secure.

**TEST OPTIONS**
- Yes
  - Are M1086/M1089 coupler bearing and attaching hardware secure?
- No
  - Notify DS Maintenance.

**YES**
- Tighten M1086/M1089 coupler bearing nuts to 66-81 lb-ft (90-110 N·m).
(1) Inspect M1086/M1089 coupler bearing attaching bolts and nuts for tightness. Tighten nuts to 66-81 lb-ft (90-110 N·m).
(2) Inspect M1086/M1089 coupler bearing for any observable movement.
(3) If any movement is observed at M1086/M1089 coupler bearing, notify DS Maintenance.
2-19. POWER TAKE-OFF (PTO) TROUBLESHOOTING

This paragraph covers Power Take-Off (PTO) Troubleshooting. The PTO Fault Index, Table 2-47, lists faults for the PTO.

Table 2-47. PTO Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>h1.</td>
<td>Power Take-Off (PTO) Does Not Engage</td>
<td>2-1832</td>
</tr>
</tbody>
</table>
1. It is likely that PTO is faulty if PTO indicator light illuminates, but PTO does not engage.

- Nothing
- PTO damaged.
- Faulty PTO solenoid valve.

START

**TEST OPTIONS**

<table>
<thead>
<tr>
<th>Reason for Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
</tr>
</tbody>
</table>

It is likely that PTO is faulty if PTO indicator light illuminates, but PTO does not engage.

**INITIAL SETUP**

**Equipment Conditions**
- Engine running (TM 9-2320-366-10-1).
- Parking brake on (TM 9-2320-366-10-1).
- Wheels chocked (TM 9-2320-366-10-1).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)

**Perform Electrical System Troubleshooting (e91. PTO Does Not Operate).**

**Perform Electrical System Troubleshooting (e32. PTO Indicator Does Not Operate).**
(1) Engage PTO (TM 9-2320-366-10-1).
(2) Check if PTO indicator lights.
(3) If PTO indicator does not light, perform Electrical System Troubleshooting (e32. PTO Indicator Does Not Operate).
(4) If PTO indicator does light, perform Electrical System Troubleshooting (e91. PTO Does Not Operate).
(5) Disengage PTO (TM 9-2320-366-10-1).
(6) Shut down engine (TM 9-2320-366-10-1).
This paragraph covers Brake System Troubleshooting. The Brake System Fault Index, Table 2-48, lists faults for the Brake System of the vehicle.

### Table 2-48. Brake System Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>i1</td>
<td>Excessive Braking Distance</td>
<td>2-1836</td>
</tr>
<tr>
<td>i2</td>
<td>Rear Brakes Do Not Apply</td>
<td>2-1848</td>
</tr>
<tr>
<td>i3</td>
<td>Parking Brake Does Not Release</td>
<td>2-1878</td>
</tr>
<tr>
<td>i4</td>
<td>Front Brakes Overheat and/or Do Not Release</td>
<td>2-1904</td>
</tr>
<tr>
<td>i5</td>
<td>Vehicle Brakes Unevenly, Brakes Pull to One Side or Grab</td>
<td>2-1910</td>
</tr>
<tr>
<td>i6</td>
<td>Front Brakes Do Not Apply</td>
<td>2-1924</td>
</tr>
<tr>
<td>i7</td>
<td>Rear Brakes Overheat</td>
<td>2-1934</td>
</tr>
<tr>
<td>i8</td>
<td>Parking Brake Does Not Apply</td>
<td>2-1942</td>
</tr>
<tr>
<td>i9</td>
<td>Brake System Loses Air When Service Brakes Are Applied</td>
<td>2-1946</td>
</tr>
</tbody>
</table>

Change 1 2-1835
i1. EXCESSIVE BRAKING DISTANCE

**INITIAL SETUP**

<table>
<thead>
<tr>
<th>Equipment Conditions</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1).</td>
<td>Goggles, Industrial (Item 15, Appendix C)</td>
</tr>
<tr>
<td>Personnel Required</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td>(2)</td>
<td>Jack, Hydraulic, Hand (Item 21, Appendix C)</td>
</tr>
<tr>
<td></td>
<td>Trestle, Motor Vehicle Maintenance (2) (Item 47, Appendix C)</td>
</tr>
<tr>
<td></td>
<td>Tool, Spring Removal (Item 85, Appendix B)</td>
</tr>
</tbody>
</table>

**KNOWN INFO**

<table>
<thead>
<tr>
<th>Air tanks pressurized.</th>
</tr>
</thead>
</table>

**POSSIBLE PROBLEMS**

- Rear brakes do not apply.
- Front brakes do not apply.
- Faulty brake shoe adjustment.
- Faulty brake linings.
- Faulty return springs.
- Faulty detent washers.
- Faulty adjusting pawl.
- Faulty actuator.
- Faulty plunger chamber seals.
- Faulty wedge assemblies or brake chamber.

**TEST OPTIONS**

- Visual inspection

**REASON FOR QUESTION**

Excessive braking distance will occur if rear brakes do not apply.

**START**

1. Are rear brakes operating?

   NO

   YES

   Perform Brake System Troubleshooting (i2. Rear Brakes Do Not Apply).
(1) Apply brakes and observe operation of brake shoes at all rear wheels.
(2) If brake shoes fail to apply at all rear wheels, rear brake system is faulty. Perform Brake System Troubleshooting (i2. Rear Brakes Do Not Apply).

**WARNING**

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.
1. EXCESSIVE BRAKING DISTANCE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air tanks pressurized. Rear brakes apply OK.</td>
<td>Visual inspection</td>
<td>Excessive braking distance may occur if front brakes do not apply.</td>
</tr>
<tr>
<td>POSSIBLE PROBLEMS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Are front brakes operating?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air tanks pressurized. Rear brakes apply OK. Front brakes apply OK.</td>
<td>Visual inspection</td>
<td>Improperly adjusted brake shoes can cause excessive braking distance.</td>
</tr>
<tr>
<td>POSSIBLE PROBLEMS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Are brake shoe clearances adjusted properly?

YES

Perform Brake System Troubleshooting (i6. Front Brakes Do Not Apply.)

NO

YES

Perform brake adjustment (para 11-2 or 11-3).
(1) Apply brakes and observe operation of brake shoes at each front wheel.
(2) If all shoes at front wheels fail to apply, front brake system is faulty. Perform Brake System Troubleshooting (i.e. Front Brakes Do Not Apply).

---

(1) Jack up axle with affected brakes and support with trestles.
(2) Make periodic brake applications to position floating shoes.

**NOTE**
Over time a ridge will form on the outer edge of the brake shoes. This is normal and does not affect brake shoe serviceability.

(3) Measure shoe clearance checking along centerline of shoe at scallop. Rotate wheel during check.
(4) If clearance is not between .020" and .040", adjust brakes (para 11-2 or 11-3).
1. EXCESSIVE BRAKING DISTANCE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air tanks pressurized.</td>
<td>Visual inspection</td>
<td></td>
</tr>
<tr>
<td>Rear brakes apply OK.</td>
<td></td>
<td>Damaged or worn brake linings and drums will cause insufficient torque to stop vehicle.</td>
</tr>
<tr>
<td>Front brakes apply OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brake shoes adjustment OK.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Are brake linings or drums free from damage?

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty brake linings.</td>
</tr>
<tr>
<td>Faulty return springs.</td>
</tr>
<tr>
<td>Faulty detent washers.</td>
</tr>
<tr>
<td>Faulty adjusting pawl.</td>
</tr>
<tr>
<td>Faulty actuator.</td>
</tr>
<tr>
<td>Faulty plunger chamber seals.</td>
</tr>
<tr>
<td>Faulty wedge assemblies or brake chamber.</td>
</tr>
</tbody>
</table>

5. Are return springs free from damage?

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty return springs.</td>
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<tr>
<td>Faulty detent washers.</td>
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<td>Faulty adjusting pawl.</td>
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<td>Faulty wedge assemblies or brake chamber.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
<td></td>
</tr>
</tbody>
</table>

- Replace brake linings (para 11-2-or 11-3) or brake drums.
- Replace broken or damaged brake return spring (para 11-2 or 11-3).
(1) Remove lugnuts and lift off wheel.
(2) Slide brake drum off axle.
(3) Inspect brake linings for worn, glazed, damaged condition, or contamination (para 11-2).
(4) Inspect brake drum for, out of round, scoring, pitting, heat cracks, and blue scorch marks.

(1) Detach each return spring from brake shoe.
(2) Examine return spring for stretching, bluing, damage or breakage.
(3) If return spring(s) is damaged, replace broken or damaged return spring(s) (para 11-2 or 11-3).
6. Are all detent washers free from damage?

- **NO**
  - Replace adjusting bolt assembly (para 11-4 and 11-5).

- **YES**
  - Replace adjusting pawl and spring (para 11-4 and 11-5).

**KNOWN INFO**
- Air tanks pressurized.
- Rear brakes apply OK.
- Front brakes apply OK.
- Brake shoe adjustment OK.
- Brake linings OK.
- Return springs OK.

**POSSIBLE PROBLEMS**
- Faulty detent washers.
- Faulty adjusting pawl.
- Faulty actuator.
- Faulty plunger chamber seals.
- Faulty wedge assemblies or brake chamber.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- Damaged detent washers will not allow automatic adjusters to operate properly.

---

7. Are adjusting pawl springs present and free from damage and are pawl teeth free from damage?

- **NO**
  - Replace adjusting bolt assembly (para 11-4 and 11-5).

- **YES**
  - Replace adjusting pawl and spring (para 11-4 and 11-5).

**KNOWN INFO**
- Air tanks pressurized.
- Rear brakes apply OK.
- Front brakes apply OK.
- Brake shoe adjustment OK.
- Brake linings OK.
- Return springs OK.
- Detent washers OK.

**POSSIBLE PROBLEMS**
- Faulty adjusting pawl.
- Faulty actuator.
- Faulty plunger chamber seals.
- Faulty wedge assemblies or brake chamber.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- Automatic adjusters will not work if adjusting pawl springs are damaged or missing or if pawl teeth are damaged.
(1) Remove brake shoes from clips on wheel hub.
(2) Screw adjuster bolt out of plunger housing.
(3) Check if detent washer is damaged or broken.
(4) If detent washer is damaged, replace adjusting bolt assembly (para 11-4 or 11-5).

(1) Unscrew adjusting pawl from plunger housing.
(2) Check adjusting pawl springs for damage. Ensure that springs are not missing or broken.
(3) Check adjusting pawl teeth for damage and abrasion.
I. EXCESSIVE BRAKING DISTANCE (CONT)

8. Are actuator teeth free from damage?
   - **NO**
   - **YES**
     - **Replace actuator (para 11-4 and 11-5).**

9. Are seals free from damage?
   - **NO**
   - **YES**
     - **Replace seals (para 11-4 and 11-5).**

**KNOWN INFO**
- Air tanks pressurized.
- Rear brakes apply OK.
- Front brakes apply OK.
- Brake shoe adjustment OK.
- Brake linings OK.
- Return springs OK.
- Detent washers OK.
- Adjusting pawl OK.
- Actuator OK.

**POSSIBLE PROBLEMS**
- Faulty actuator.
- Faulty plunger chamber seals.
- Faulty wedge assemblies or brake chamber.

**TEST OPTIONS**
- Visual inspection
- REASON FOR QUESTION
  - Damaged actuator teeth will not allow automatic adjusters to operate properly.
  - Automatic adjusters will not work if seals are damaged and allow dirt to enter plunger chamber.

**REASON FOR QUESTION**
- Visual inspection
- Air tanks pressurized.
- Rear brakes apply OK.
- Front brakes apply OK.
- Brake shoe adjustment OK.
- Brake linings OK.
- Return springs OK.
- Detent washers OK.
- Adjusting pawl OK.
(1) Lift actuator from plunger housing.
(2) Check actuator teeth for damage.

(1) Check that seal elements are not damaged or broken.
(2) A damaged seal may permit dirt to enter plunger chamber and interfere with adjustment.
1. EXCESSIVE BRAKING DISTANCE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air tanks pressurized.</td>
</tr>
<tr>
<td>Rear brakes apply OK.</td>
</tr>
<tr>
<td>Front brakes apply OK.</td>
</tr>
<tr>
<td>Brake shoe adjustment OK.</td>
</tr>
<tr>
<td>Brake linings OK.</td>
</tr>
<tr>
<td>Return springs OK.</td>
</tr>
<tr>
<td>Detent washers OK.</td>
</tr>
<tr>
<td>Adjusting pawl OK.</td>
</tr>
<tr>
<td>Actuator OK.</td>
</tr>
<tr>
<td>Plunger chamber seals OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty wedge assemblies or brake chamber.</td>
</tr>
</tbody>
</table>

10. Are wedge assemblies free from wear and damage, and do they operate?

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If wedge assembly is damaged or does not operate, brake shoes will not apply.</td>
</tr>
</tbody>
</table>

- **YES**
  - Replace/repair wedge assembly (para 11-4 or 11-5).
  - Replace faulty brake chamber (para 11-7 or 11-8).

- **NO**
  - Replace faulty brake chamber (para 11-7 or 11-8).
(1) Disconnect and tag air hoses to brake chambers at wheel.
(2) Cage spring brakes on rear wheels (para 11-6).
(3) Unscrew brake chamber(s) from hub.
(4) Remove wedge assembly from wheel.
(5) Inspect wedge spring for damage.
(6) Inspect rollers for flattening or damage.
(7) Manually check operation of wedge assembly in plunger chamber.
(8) Insert wedge assembly into plunger chamber.
(9) Screw brake chamber onto wheel hub (para 11-7 or 11-8).
(10) Attach air hoses to brake chamber.
(11) Uncage rear spring brakes (para 11-6).
(12) Install plunger into plunger housing, open end up.
(13) Align slot to accept pawl (para 11-4 or 11-5).
(14) Install pawl and pawl spring into side of plunger housing.
(15) Install actuator, seal, and adjustment bolt into head of plunger housing (para 11-4 or 11-5).
(16) Install brake shoes into clips on wheel hub with leading (toe) edge of shoe fitting slot on head of adjusting bolt. Arrow stamped on shoe should point away from adjusting plunger (para 11-2 or 11-3).
(17) Install return springs on brake shoes (para 11-2 or 11-3).
(18) Install brake drum.
(19) Adjust brake shoes (para 11-2 or 11-3).
(20) Install wheel.
(21) Raise vehicle and remove trestle.
1. FRONT BRAKES OK.
   Air tanks pressurized.

   YES
   NO

   START

   Visual inspection

   KNOWN INFO
   Front brakes OK.
   Air tanks pressurized.

   POSSIBLE PROBLEMS
   Faulty supply air hose to foot control valve.
   Faulty foot control valve.
   Faulty air hoses at cab floor.
   Faulty air hose to check valve.
   Faulty check valve.
   Faulty air hose to control port of booster valve.
   Faulty air hose to supply port of booster valve.
   Faulty booster valve.
   Faulty air hose to load sensing valve.
   Faulty load sensing valve.
   Faulty air hose to control port of relay valve.
   Faulty air hose to supply port of relay valve.
   Faulty relay valve.
   Faulty air hose to spring brakes.
   Faulty vent hose from spring brake service chamber.
   Faulty spring brake chamber.

   TEST OPTIONS
   Visual inspection

   WARNING
   Read WARNING on following page.

   1. Is air present at foot control valve supply air hoses and is air hose free from leaks and damage?
   A blocked or leaking supply air hose to foot control valve will prevent air delivery to service brake chambers and cause brakes not to apply.

   NO
   YES

   Replace damaged air hose(s) (para 11-21).

   REASON FOR QUESTION
   Equipment Conditions
   Engine shut down (TM 9-2320-366-10-1).

   Tools and Special Tools
   Tool Kit, Genl Mech (Item 46, Appendix C)
   Goggles, Industrial (Item 15, Appendix C)

   Personnel Required
   (2)
(1) Loosen supply air hose at foot control valve.
(2) Check for presence of air. If no air is present, replace air hose (para 11-21).
(3) Tighten supply air hose to foot control valve.

**WARNING**

- When working on parking brake control system vehicle may roll. Wheel shocks must be positioned in front of and behind one of the rear wheels to prevent it from rolling. Failure to comply may cause serious injury or death to personnel.

- Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.
12. REAR BRAKES DO NOT APPLY (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>FRONT BRAKES OK.</th>
<th>AIR TANKS PRESSURIZED.</th>
<th>SUPPLY AIR HOSE TO FOOT CONTROL VALVE OK.</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSSIBLE PROBLEMS</td>
<td>Faulty foot control valve.</td>
<td>Faulty air hoses at cab floor.</td>
<td>Faulty air hose to check valve.</td>
</tr>
<tr>
<td></td>
<td>Faulty check valve.</td>
<td>Faulty air hose to control port of booster valve.</td>
<td>Faulty booster valve.</td>
</tr>
<tr>
<td></td>
<td>Faulty air hose to supply port of booster valve.</td>
<td>Faulty air hose to control port of relay valve.</td>
<td>Faulty relay valve.</td>
</tr>
<tr>
<td></td>
<td>Faulty air hoses to spring brakes.</td>
<td>Faulty vent hose from spring brake service chamber.</td>
<td>Faulty spring brake chamber.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>Visual inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>REASON FOR QUESTION</td>
<td>A lack of air from delivery port of foot control valve will prevent air delivery to service brake chambers and cause brakes not to apply.</td>
</tr>
</tbody>
</table>

2. Is air present at foot control valve delivery air hose?

- YES: Replace foot control valve (para 11-9).
- NO: Visual inspection
(1) Loosen delivery air hose at foot control valve.
(2) Apply brake and check for presence of air.
(3) If no air is present, replace foot control valve (para 11-9).
(3) Tighten delivery air hose on foot control valve.
### I2. REAR BRAKES DO NOT APPLY (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front brakes OK.</td>
<td>Visual inspection</td>
<td>If air hoses at cab floor junction are leaking or damaged, rear brakes may not apply.</td>
</tr>
<tr>
<td>Air tanks pressurized.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply air hose to foot control valve OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foot control valve OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>POSSIBLE PROBLEMS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty air hoses at cab floor.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty air hose to check valve.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty check valve.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty air hose to control port of booster valve.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty air hose to supply port of booster valve.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty booster valve.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty air hose to load sensing valve.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty load sensing valve.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty air hose to control port of relay valve.</td>
<td></td>
<td></td>
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<tr>
<td>Faulty air hose to supply port of relay valve.</td>
<td></td>
<td></td>
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<tr>
<td>Faulty relay valve.</td>
<td></td>
<td></td>
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<tr>
<td>Faulty air hoses to spring brakes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty vent hose from spring brake service chamber.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty spring brake chamber.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**3.** Are air hoses to rear brakes free from leaks and damage at cab floor?

- **YES**
  - Replace damaged air hose(s) and fitting (para 11-21).

- **NO**
(1) Loosen delivery air hose at cab floor.
(2) Apply brakes.
(3) Check for presence of air from air hose when brake is applied.
(4) If no air is present, replace air hose (para 11-21).
(5) Tighten air hose at cab floor.
(6) Raise cab (TM 9-2320-366-10-1).
(7) Loosen delivery air hose under cab floor.
(8) Apply foot brake.
(9) Check for presence of air from fitting when brake is applied.
(10) If no air is present, replace air hose and fitting (para 11-21).
(11) Tighten air hose and fitting.
**i2. REAR BRAKES DO NOT APPLY (CONT)**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front brakes OK.</td>
</tr>
<tr>
<td>Air tanks pressurized.</td>
</tr>
<tr>
<td>Supply air hose to foot control valve OK.</td>
</tr>
<tr>
<td>Foot control valve OK.</td>
</tr>
<tr>
<td>Air hoses at cab floor OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty air hose to check valve.</td>
</tr>
<tr>
<td>Faulty check valve.</td>
</tr>
<tr>
<td>Faulty air hose to control port of booster valve.</td>
</tr>
<tr>
<td>Faulty air hose to supply port of booster valve.</td>
</tr>
<tr>
<td>Faulty booster valve.</td>
</tr>
<tr>
<td>Faulty air hose to load sensing valve.</td>
</tr>
<tr>
<td>Faulty load sensing valve.</td>
</tr>
<tr>
<td>Faulty air hose to control port of relay valve.</td>
</tr>
<tr>
<td>Faulty air hose to supply port of relay valve.</td>
</tr>
<tr>
<td>Faulty relay valve.</td>
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<tr>
<td>Faulty air hoses to spring brakes.</td>
</tr>
<tr>
<td>Faulty vent hose from spring brake service chamber.</td>
</tr>
<tr>
<td>Faulty spring brake chamber.</td>
</tr>
</tbody>
</table>

4. Is air present at check valve supply air hose and is the air hose free from leaks and damage?

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A blocked or leaking air hose to the check valve will prevent air delivery to the check valve and will cause the rear brakes not to apply.</td>
</tr>
</tbody>
</table>

Yes

Replace damaged air hose (para 11-21).

No
(1) Loosen supply air hose at check valve.
(2) Apply brakes.
(3) Check for presence of air at air hose when brake is applied.
(4) If no air is present, replace air hose (para 11-21).
(5) Tighten air hose at supply port of check valve.
12. REAR BRAKES DO NOT APPLY (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front brakes OK.</td>
<td>Visual inspection</td>
</tr>
<tr>
<td>Air tanks pressurized.</td>
<td></td>
</tr>
<tr>
<td>Supply air hose to foot</td>
<td>REASON FOR QUESTION</td>
</tr>
<tr>
<td>control valve OK.</td>
<td>A lack of air from the air</td>
</tr>
<tr>
<td>Foot control valve OK.</td>
<td>delivery port of the check valve will not</td>
</tr>
<tr>
<td>Air hoses at cab floor OK.</td>
<td>allow the rear brakes to be applied.</td>
</tr>
<tr>
<td>Air hose to check valve OK.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty check valve.</td>
<td></td>
</tr>
<tr>
<td>Faulty air hose to control</td>
<td></td>
</tr>
<tr>
<td>port of booster valve.</td>
<td></td>
</tr>
<tr>
<td>Faulty air hose to supply</td>
<td></td>
</tr>
<tr>
<td>port of booster valve.</td>
<td></td>
</tr>
<tr>
<td>Faulty booster valve.</td>
<td></td>
</tr>
<tr>
<td>Faulty air hose to load</td>
<td></td>
</tr>
<tr>
<td>sensing valve.</td>
<td></td>
</tr>
<tr>
<td>Faulty load sensing</td>
<td></td>
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<tr>
<td>valve.</td>
<td></td>
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<tr>
<td>Faulty air hose to control</td>
<td></td>
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<tr>
<td>port of relay valve.</td>
<td></td>
</tr>
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<td>Faulty air hose to supply</td>
<td></td>
</tr>
<tr>
<td>port of relay valve.</td>
<td></td>
</tr>
<tr>
<td>Faulty relay valve.</td>
<td></td>
</tr>
<tr>
<td>Faulty air hoses to spring</td>
<td></td>
</tr>
<tr>
<td>brakes.</td>
<td></td>
</tr>
<tr>
<td>Faulty vent hose from spring</td>
<td></td>
</tr>
<tr>
<td>brake service chamber.</td>
<td></td>
</tr>
<tr>
<td>Faulty spring brake</td>
<td></td>
</tr>
<tr>
<td>chamber.</td>
<td></td>
</tr>
</tbody>
</table>

5. Is air present at the check valve delivery air hose when applying brakes?

YES

NO

Replace check valve (para 11-16).
(1) Loosen delivery air hose on check valve.
(2) Apply brakes.
(3) Check for presence of air from air hose when brake is applied.
(4) If no air is present, replace check valve (para 11-16).
(5) Tighten delivery air hose on check valve.
## 12. REAR BRAKES DO NOT APPLY (CONT)

### KNOWN INFO
- Front brakes OK.
- Air tanks pressurized.
- Supply air hose to foot control valve OK.
- Foot control valve OK.
- Air hoses at cab floor OK.
- Air hose to check valve OK.
- Check valve OK.

### POSSIBLE PROBLEMS
- Faulty air hose to control port of booster valve.
- Faulty air hose to supply port of booster valve.
- Faulty booster valve.
- Faulty air hose to load sensing valve.
- Faulty load sensing valve.
- Faulty air hose to control port of relay valve.
- Faulty air hose to supply port of relay valve.
- Faulty relay valve.
- Faulty air hoses to spring brakes.
- Faulty vent hose from spring brake service chamber.
- Faulty spring brake chamber.

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
<td>A lack of air at control port will prevent air delivery to service brake chambers and cause rear brakes not to apply.</td>
</tr>
</tbody>
</table>

### 6.

Is air present at control port of booster?

- **NO**
  - Replace damaged air hose (para 11-21).

- **YES**
(1) Loosen control port air hose at booster valve
(2) Apply brakes.
(3) Check for presence of air.
(4) If no air is present, replace damaged air hose (para 11-21).
(5) Tighten control port air hose on booster valve.
7. **Is air present at booster valve supply air hose and is air hose free from leaks and damage?**

**YES**
- Replace damaged air hose (para 11-21).

**NO**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front brakes OK.</td>
</tr>
<tr>
<td>Air tanks pressurized.</td>
</tr>
<tr>
<td>Supply air hose to foot control valve OK.</td>
</tr>
<tr>
<td>Foot control valve OK.</td>
</tr>
<tr>
<td>Air hoses at cab floor OK.</td>
</tr>
<tr>
<td>Air hose to check valve OK.</td>
</tr>
<tr>
<td>Check valve OK.</td>
</tr>
<tr>
<td>Air hose to control port of booster valve OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty air hose to supply port of booster valve.</td>
</tr>
<tr>
<td>Faulty booster valve.</td>
</tr>
<tr>
<td>Faulty air hose to load sensing valve.</td>
</tr>
<tr>
<td>Faulty load sensing valve.</td>
</tr>
<tr>
<td>Faulty air hose to control port of relay valve.</td>
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<tr>
<td>Faulty air hose to supply port of relay valve.</td>
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<tr>
<td>Faulty relay valve.</td>
</tr>
<tr>
<td>Faulty air hoses to spring brakes.</td>
</tr>
<tr>
<td>Faulty vent hose from spring brake service chamber.</td>
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<td>Faulty spring brake chamber.</td>
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</tbody>
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<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A blocked or leaking supply air hose to booster valve will prevent air delivery to service brake chambers and cause rear brakes not to apply.</td>
</tr>
</tbody>
</table>
(1) Loosen supply air hose at booster valve.
(2) Check for presence of air.
(3) If no air is present, replace air hose (para 11-21).
(4) Tighten supply air hose to booster valve.
### 8. REAR BRAKES DO NOT APPLY (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front brakes OK.</td>
</tr>
<tr>
<td>Air tanks pressurized.</td>
</tr>
<tr>
<td>Supply air hose to foot control valve OK.</td>
</tr>
<tr>
<td>Foot control valve OK.</td>
</tr>
<tr>
<td>Air hoses at cab floor OK.</td>
</tr>
<tr>
<td>Air hose to check valve OK.</td>
</tr>
<tr>
<td>Check valve OK.</td>
</tr>
<tr>
<td>Air hose to control port of booster valve OK.</td>
</tr>
<tr>
<td>Air hose to supply port of booster valve OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty booster valve.</td>
</tr>
<tr>
<td>Faulty air hose to load sensing valve.</td>
</tr>
<tr>
<td>Faulty load sensing valve.</td>
</tr>
<tr>
<td>Faulty air hose to control port of relay valve.</td>
</tr>
<tr>
<td>Faulty air hose to supply port of relay valve.</td>
</tr>
<tr>
<td>Faulty relay valve.</td>
</tr>
<tr>
<td>Faulty air hoses to spring brakes.</td>
</tr>
<tr>
<td>Faulty vent hose from spring brake service chamber.</td>
</tr>
<tr>
<td>Faulty spring brake chamber.</td>
</tr>
</tbody>
</table>

**Is air present at booster valve delivery air hose.**

- **NO**
  - Replace booster valve (para 11-15).
- **YES**

**TEST OPTIONS**

<table>
<thead>
<tr>
<th>Visual inspection</th>
</tr>
</thead>
</table>

**REASON FOR QUESTION**

A lack of air from delivery port of booster valve will prevent air delivery to service brake chambers and cause rear brakes not to apply.
(1) Loosen booster valve delivery air hose at booster valve.
(2) Apply brakes.
(3) Check for presence of air.
(4) If no air is present, replace booster valve (para 11-15).
(5) Tighten delivery air hose on booster valve.
II. REAR BRAKES DO NOT APPLY (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front brakes OK.</td>
</tr>
<tr>
<td>Air tanks pressurized.</td>
</tr>
<tr>
<td>Supply air hose to foot control valve OK.</td>
</tr>
<tr>
<td>Foot control valve OK.</td>
</tr>
<tr>
<td>Air hoses at cab floor OK.</td>
</tr>
<tr>
<td>Air hose to check valve OK.</td>
</tr>
<tr>
<td>Check valve OK.</td>
</tr>
<tr>
<td>Air hose to control port of booster valve OK.</td>
</tr>
<tr>
<td>Air hose to supply port of booster valve OK.</td>
</tr>
<tr>
<td>Booster valve OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty air hose to load sensing valve.</td>
</tr>
<tr>
<td>Faulty load sensing valve.</td>
</tr>
<tr>
<td>Faulty air hose to control port of relay valve.</td>
</tr>
<tr>
<td>Faulty air hose to supply port of relay valve.</td>
</tr>
<tr>
<td>Faulty relay valve.</td>
</tr>
<tr>
<td>Faulty air hoses to spring brakes.</td>
</tr>
<tr>
<td>Faulty vent hose from spring brake service chamber.</td>
</tr>
<tr>
<td>Faulty spring brake chamber.</td>
</tr>
</tbody>
</table>

9. Is delivery air hose from booster valve to load sensing valve free from blockage, leaks or damage?

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
<td>A blocked or leaking delivery air hose from booster valve to load sensing valve will prevent air delivery to service brake chambers and cause rear brakes not to apply.</td>
</tr>
</tbody>
</table>

YES

Replace damaged air hose (para 11-21).

NO
(1) Loosen delivery air hose at load sensing valve.
(2) Apply brakes.
(3) Check for presence of air.
(4) If no air is present, replace air hose (para 11-21).
(5) Tighten delivery air hose on load sensing valve.
### Known Info
- Front brakes OK.
- Air tanks pressurized.
- Supply air hose to foot control valve OK.
- Foot control valve OK.
- Air hoses at cab floor OK.
- Air hose to check valve OK.
- Check valve OK.
- Air hose to control port of booster valve OK.
- Air hose to supply port of booster valve OK.
- Booster valve OK.
- Air hose to load sensing valve OK.

### Possible Problems
- Faulty load sensing valve.
- Faulty air hose to control port of relay valve.
- Faulty air hose to supply port of relay valve.
- Faulty relay valve.
- Faulty air hoses to spring brakes.
- Faulty vent hose from spring brake service chamber.
- Faulty spring brake chamber.

### Test Options
- Visual inspection

### Reason for Question
A lack of air at load sensing valve will prevent air delivery to service brake chambers and cause rear brakes not to apply.

---

10. **Is air present at load sensing valve outlet hose?**

   **NO**

   **YES**

   Replace load sensing valve (para 11-10).
(1) Loosen outlet air hose at load sensing valve.
(2) Apply brakes.
(3) Check for presence of air.
(4) If no air is present, replace load sensing valve (para 11-10).
(5) Tighten outlet air hose on load sensing valve.
12. REAR BRAKES DO NOT APPLY (CONT)

**KNOWN INFO**
- Front brakes OK.
- Air tanks pressurized.
- Supply air hose to foot control valve OK.
- Foot control valve OK.
- Air hoses at cab floor OK.
- Air hose to check valve OK.
- Check valve OK.
- Air hose to control port of booster valve OK.
- Air hose to supply port of booster valve OK.
- Booster valve OK.
- Air hose to load sensing valve OK.
- Load sensing valve OK.

**POSSIBLE PROBLEMS**
- Faulty air hose to control port of relay valve.
- Faulty air hose to supply port of relay valve.
- Faulty relay valve.
- Faulty air hoses to spring brakes.
- Faulty vent hose from spring brake service chamber.
- Faulty spring brake chamber.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- A lack of air at relay valve control port air hose will prevent air delivery to service brake chambers and cause rear brakes not to apply.

**Diagram:**
- Is air present at relay valve control port air hose?
  - **YES**
  - Replace damaged air hoses (para 11-21).
  - **NO**
(1) Loosen control port air hoses at relay valve.
(2) Apply brakes.
(3) Check for presence of air.
(4) If no air is present, replace air hose(s) (para 11-21).
(5) Tighten inlet air hoses on relay valve.
12. REAR BRAKES DO NOT APPLY (CONT)

**KNOWN INFO**
- Front brakes OK.
- Air tanks pressurized.
- Supply air hose to foot control valve OK.
- Foot control valve OK.
- Air hoses at cab floor OK.
- Air hose to check valve OK.
- Check valve OK.
- Air hose to control port of booster valve OK.
- Air hose to supply port of booster valve OK.
- Booster valve OK.
- Air hose to load sensing valve OK.
- Load sensing valve OK.
- Air hose to control port of relay valve OK.

**POSSIBLE PROBLEMS**
- Faulty air hose to supply port of relay valve.
- Faulty relay valve.
- Faulty air hoses to spring brakes.
- Faulty vent hose from spring brake service chamber.
- Faulty spring brake chamber.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
A blocked or leaking supply air hose from primary tank to supply port of relay valve will prevent air delivery to service brake chambers and cause rear brakes not to apply.

**Diagram**

1. Is air present at supply port of relay valve?
   - **NO**
   - Replace damaged air hose (para 11-21).
   - **YES**
(1) Loosen supply air hose at supply port of relay valve.
(2) Apply brakes.
(3) Check for presence of air.
(4) If no air is present, replace air hose (para 11-21).
(5) Tighten supply air hose to relay valve.
12. REAR BRAKES DO NOT APPLY (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front brakes OK.</td>
</tr>
<tr>
<td>Air tanks pressurized.</td>
</tr>
<tr>
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<tr>
<td>Foot control valve OK.</td>
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<tr>
<td>Air hoses at cab floor OK.</td>
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<tr>
<td>Air hose to check valve OK.</td>
</tr>
<tr>
<td>Check valve OK.</td>
</tr>
<tr>
<td>Air hose to control port of booster valve OK.</td>
</tr>
<tr>
<td>Air hose to supply port of booster valve OK.</td>
</tr>
<tr>
<td>Booster valve OK.</td>
</tr>
<tr>
<td>Air hose to load sensing valve OK.</td>
</tr>
<tr>
<td>Load sensing valve OK.</td>
</tr>
<tr>
<td>Air hose to control port of relay valve OK.</td>
</tr>
<tr>
<td>Air hose to supply port relay valve OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty relay valve.</td>
</tr>
<tr>
<td>Faulty air hoses to spring brakes.</td>
</tr>
<tr>
<td>Faulty vent hose from spring brake service chamber.</td>
</tr>
<tr>
<td>Faulty spring brake chamber.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A lack of air at delivery port(s) of relay valve will prevent air delivery to service brake chambers and cause rear brakes not to apply.</td>
</tr>
</tbody>
</table>

13. Is air present at relay valve delivery port(s)?

- YES: Replace relay valve (para 11-14).
- NO: Replace relay valve (para 11-14).
(1) Loosen delivery air hose(s) at relay valve.
(2) Apply brakes.
(3) Check for presence of air.
(4) If no air is present, replace relay valve (para 11-14).
(5) Tighten delivery air hose(s) to relay valve.
12. REAR BRAKES DO NOT APPLY (CONT)

**KNOWN INFO**
- Front brakes OK.
- Air tanks pressurized.
- Supply air hose to foot control valve OK.
- Foot control valve OK.
- Air hoses at cab floor OK.
- Check valve OK.
- Air hose to check valve OK.
- Air hose to control port of booster valve OK.
- Air hose to control port of relay valve OK.
- Air hose to supply port of booster valve OK.
- Air hose to supply port of relay valve OK.
- Booster valve OK.
- Air hose to load sensing valve OK.
- Load sensing valve OK.
- Air hose to control port of relay valve OK.
- Air hose to supply port of relay valve OK.
- Relay valve OK.

**POSSIBLE PROBLEMS**
- Faulty air hoses to spring brakes.
- Faulty vent hose from spring brake service chamber.
- Faulty spring brake chamber.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- A lack of air at service brake air chambers will cause rear brakes not to apply.

**14.** Is air present at service brake air chamber(s) of spring brakes?

- **YES**
  - Replace damaged air hose(s) (para 11-21).
- **NO**
  - 

(1) Loosen service brake air hose at spring brake chamber.
(2) Apply brakes.
(3) Check for presence of air.
(4) If no air is present, replace air hose (para 11-21).
(5) Tighten service brake air hose on spring brake chamber.
12. REAR BRAKES DO NOT APPLY (CONT)

KNOWN INFO
Front brakes OK.
Air tanks pressurized.
Supply air hose to foot control valve OK.
Foot control valve OK.
Air hoses at cab floor OK.
Air hose to check valve OK.
Check valve OK.
Air hose to control port of booster valve OK.
Air hose to supply port of booster valve OK.
Booster valve OK.
Air hose to load sensing valve OK.
Load sensing valve OK.
Air hose to control port of relay valve OK.
Air hose to supply port relay valve OK.
Relay valve OK.
Air hoses to spring brakes OK.

POSSIBLE PROBLEMS
Faulty vent hose from spring brake service chamber.
Faulty spring brake chamber.

Is air present at spring brake vent hose on frame?

NO

YES

Replace vent hose(s) (para 11-21) or relay valve (para 11-14).

Replace rear service brake air chamber (para 11-8).

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
Blocked vent hoses will prevent air from escaping at brake service chambers and will cause rear brakes not to apply.
(1) Disconnect vent hose(s) at brake chamber(s).
(2) Blow compressed air through vent hoses.
(3) Check for air escaping at vent valve.
(4) If air does not escape from vent hose, replace vent hose(s) (para 11-21) or relay valve (para 11-14).
(5) If air does escape from vent hose, replace rear service brake air chamber (para 11-8).
(6) Connect vent hose(s) at brake chamber(s).
(7) Lower cab (TM 9-2320-366-10-1).
### I3. PARKING BRAKE DOES NOT RELEASE

#### INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Conditions</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1).</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td></td>
<td>Goggles, Industrial (Item 15, Appendix C)</td>
</tr>
</tbody>
</table>

#### KNOWN INFO
- Air tanks pressurized.
- Gladhands OK.

#### POSSIBLE PROBLEMS
- Faulty air hose 107.
- Faulty park control two-way check valve.
- Faulty SYSTEM PARK air supply valve.
- Faulty air hose 103.
- Faulty air hose 109.
- Faulty two-way check valve.
- Faulty air hose 119.
- Faulty inversion valve.
- Faulty air hose 221.
- Faulty anti-compounding valve.
- Faulty air hose 231.

#### TEST OPTIONS
- Visual Inspection

#### REASON FOR QUESTION
- If some but not all wheels fail to release, fault is delivery of air to individual wheel brakes.

#### Flowchart

1. **START**
   - **WARNING** Read WARNING on following page.
   - Do all rear wheels fail to release?

   - **NO**
     - **YES**
When working on parking brake control system, vehicle may roll. Wheel chocks must be positioned in front of and behind one of the rear wheels to keep it from rolling. Failure to comply may result in serious injury or death to personnel.

(1) Start engine (TM 9-2320-366-10-1).
(2) Release SYSTEM PARK control (TM 9-2320-366-10-1).
(3) Check if vehicle moves.
(4) If vehicle moves, locate locked wheel(s) and troubleshoot individual wheel(s).
(5) Shut down engine (TM 9-2320-366-10-1).
3. PARKING BRAKE DOES NOT RELEASE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
</table>
| Air tanks pressurized.  
  Gladhands OK.     | Faulty air hose 107.  
                       Faulty park control two-way check valve.  
                       Faulty SYSTEM PARK air supply valve.  
                       Faulty air hose 103.  
                       Faulty air hose 109.  
                       Faulty two-way check valve.  
                       Faulty air hose 119.  
                       Faulty inversion valve.  
                       Faulty air hose 221.  
                       Faulty anti-compounding valve.  
                       Faulty air hose 231. |

**WARNING**
Read WARNING on following page.

Is air present at SYSTEM PARK air supply valve port?

- **NO**
  - SYSTEM PARK air supply valve cannot be tested if no air is present at supply port.

- **YES**
  - Go to step 11 of this fault.
WARNING

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

(1) Remove roll pins from knobs of SYSTEM PARK and TRAILER AIR SUPPLY valves.
(2) Remove SYSTEM PARK and TRAILER AIR SUPPLY valve knobs.
(3) Unscrew nuts at base of knob stem on each valve.
(4) Remove six screws from dash plate.
(5) Remove dash plate from personnel heater.
(6) Pull out SYSTEM PARK air supply valve from personnel heater.
(7) Loosen air hose 107 at SYSTEM PARK air supply valve supply port.
(8) Check air hose 107 for escaping air.
(9) If no air escapes from air hose 107, go to step 11 of this fault.
**3. PARKING BRAKE DOES NOT RELEASE (CONT)**

**KNOWN INFO**
- Air tanks pressurized.
- Gladhands OK.
- Air hose 107 OK.
- Park control two-way check valve OK.

**POSSIBLE PROBLEMS**
- Faulty SYSTEM PARK air supply valve.
- Faulty air hose 103.
- Faulty air hose 109.
- Faulty two-way check valve.
- Faulty air hose 119.
- Faulty inversion valve.
- Faulty air hose 221.
- Faulty anti-compounding valve.
- Faulty air hose 231.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
- No air present at delivery port indicates faulty SYSTEM PARK air supply valve.

**Flowchart**

3. Is air present at delivery port of SYSTEM PARK air supply valve?

- **NO**
  - Replace SYSTEM PARK air supply valve (para 11-20).
- **YES**
(1) Tighten air hose 107 at SYSTEM PARK air supply valve supply port.
(2) Loosen air hose 103 at SYSTEM PARK air supply valve delivery port.
(3) Check for presence of air from SYSTEM PARK air supply valve.
(4) If no air is present, replace SYSTEM PARK air supply valve (para 11-20).
4. Is air present at air hose 103?

**KNOWN INFO**
- Air tanks pressurized.
- Gladhands OK.
- Air hose 107 OK.
- Park control two-way check valve OK.

**POSSIBLE PROBLEMS**
- Faulty air hose 103.
- Faulty air hose 109.
- Faulty two-way check valve.
- Faulty air hose 119.
- Faulty inversion valve.
- Faulty air hose 221.
- Faulty anti-compounding valve.
- Faulty air hose 231.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
No air present at air hose 103 indicates faulty air hose.

Replace air hose 103 (para 11-21).
(1) Tighten air hose 103 at SYSTEM PARK air supply valve delivery port.
(2) Loosen air hose 103 at cab floor fitting.
(3) Check for presence of air from air hose 103.
(4) If no air is present, replace air hose 103 (para 11-21).
**3. PARKING BRAKE DOES NOT RELEASE (CONT)**

**KNOWLEDGE INFORMATION**
- Air tanks pressurized.
- Gladhands OK.
- Air hose 107 OK.
- Park control two-way check valve.
- Air hose 103 OK.

**POSSIBLE PROBLEMS**
- Faulty air hose 109.
- Faulty two-way check valve.
- Faulty air hose 119.
- Faulty inversion valve.
- Faulty air hose 221.
- Faulty anti-compounding valve.
- Faulty air hose 231.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
Two-way check valve cannot be tested if no air is present at supply port.

5. Is air present at supply port of two-way check valve?

**FLOW DIAGRAM**

- **YES**: Replace air hose 109 (para 11-21).
- **NO**: Visual Inspection

---

**TM 9-2320-366-20-2**
1. Tighten air hose 103 at cab floor fitting.
2. Push SYSTEM PARK and TRAILER AIR SUPPLY valves back into personnel heater.
3. Install dash plate over valve stems with six screws.
4. Install nuts on knob stems.
5. Install SYSTEM PARK and TRAILER AIR SUPPLY knobs on stems with roll pins.
8. Check for presence of air at air hose 109.
9. If no air is present, replace air hose 109 (para 11-21).
### 3. PARKING BRAKE DOES NOT RELEASE (CONT)

#### KNOWN INFO
- Air tanks pressurized.
- Gladhands OK.
- Air hose 107 OK.
- Park control two-way check valve OK.
- Air hose 103 OK.
- Air hose 109 OK.

#### POSSIBLE PROBLEMS
- Faulty two-way check valve.
- Faulty air hose.
- Faulty inversion valve.
- Faulty air hose 221.
- Faulty anti-compounding valve.
- Faulty air hose 231.

---

6. **Is air present at delivery port of two-way check valve?**

- **NO**
  - [TEST OPTIONS](#)
    - Visual inspection
  - [REASON FOR QUESTION](#)
    - No air at delivery port of two-way check valve indicates a faulty two-way check valve.

- **YES**
  - Replace two-way check valve (para 11-16).
(1) Tighten air hose 109 at two-way check valve supply port.
(2) Loosen air hose (refer to Table 2-48.1. Air Hose Numbers) at delivery port of two-way check valve.
(3) Release SYSTEM PARK (TM 9-2320-366-10-1) and check for presence of air at air hose (refer to Table 2-48.1. Air Hose Numbers).
(4) If no air is present, replace two-way check valve (para 11-16).

### Table 2-48.1. Air Hose Numbers

<table>
<thead>
<tr>
<th>Air Hose Number</th>
<th>Model Used On</th>
</tr>
</thead>
<tbody>
<tr>
<td>131</td>
<td>M1089</td>
</tr>
<tr>
<td>133</td>
<td>M1083/M1088/M1090/</td>
</tr>
<tr>
<td></td>
<td>M1094/M1092</td>
</tr>
<tr>
<td>136</td>
<td>M1086/M1096</td>
</tr>
<tr>
<td>138</td>
<td>M1085/M1084</td>
</tr>
</tbody>
</table>
### KNOWN INFO
- Air tanks pressurized.
- Gladhands OK.
- Air hose 107 OK.
- Park control two-way check valve OK.
- Air hose 103 OK.
- Air hose 109 OK.
- Two-way check valve OK.

### POSSIBLE PROBLEMS
- Faulty air hose.
- Faulty inversion valve.
- Faulty air hose 221.
- Faulty anti-compounding valve.
- Faulty air hose 231.

### TEST OPTIONS
- Visual Inspection

### REASON FOR QUESTION
Inversion valve cannot be tested if no air is present at supply port.

---

7. Is air present at supply port of inversion valve?

- **YES** Replace air hose (para 11-21).
- **NO**
(1) Tighten air hose (refer to Table 2-48.2. Air Hose Numbers) at two-way check valve delivery port.
(2) Lower cab (TM 9-2320-366-10-1).
(3) Loosen air hose (refer to Table 2-48.2. Air Hoses Numbers) at inversion valve supply port.
(4) Check for presence of air at air hose (refer to Table 2-48.2. Air Hose Numbers).
(5) If no air is present, replace air hose (para 11-21).

<table>
<thead>
<tr>
<th>Air Hose Number</th>
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<td>M1086/M1096</td>
</tr>
<tr>
<td>138</td>
<td>M1085/M1084</td>
</tr>
</tbody>
</table>
3. PARKING BRAKE DOES NOT RELEASE (CONT)

**KNOWN INFO**
- Air tanks pressurized.
- Gladhands OK.
- Air hose 107 OK.
- Park control two-way check valve OK.
- Air hose 103 OK.
- Air hose 109 OK.
- Two-way check valve OK.
- Air hose OK.

**POSSIBLE PROBLEMS**
- Faulty inversion valve.
- Faulty air hose 221.
- Faulty anti-compounding valve.
- Faulty air hose 231.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
Leaking inversion valve may cause rapid loss of system air pressure.

8. **Is air present at inversion valve delivery port?**

- **NO**
- **YES**

**Replace inversion valve (para 11-13).**
(1) Tighten air hose (refer to Table 2-48.3. Air Hose Numbers) at inversion valve supply port.
(2) Loosen air hose 118 at inversion valve delivery port.
(3) Check for presence of air at air hose 118.
(4) If no air is present, replace inversion valve (para 11-13).

Table 2-48.3. Air Hose Numbers

<table>
<thead>
<tr>
<th>Air Hose Number</th>
<th>Model Used On</th>
</tr>
</thead>
<tbody>
<tr>
<td>131</td>
<td>M1089</td>
</tr>
<tr>
<td>133</td>
<td>M1083/M1088/M1090/ M1094/M1092</td>
</tr>
<tr>
<td>136</td>
<td>M1086/M1096</td>
</tr>
<tr>
<td>138</td>
<td>M1085/M1084</td>
</tr>
</tbody>
</table>
i3. PARKING BRAKE DOES NOT RELEASE (CONT)

KNOWN INFO
Air tanks pressurized.
Gladhands OK.
Air hose 107 OK.
Park control two-way check valve OK.
Air hose 103 OK.
Air hose 109 OK.
Two-way check valve OK.
Air hose 119 OK.
Inversion valve OK.

POSSIBLE PROBLEMS
Faulty air hose 221.
Faulty anti-compounding valve.
Faulty air hose 231.

9. Is air present at supply port of anti-compounding valve?

TEST OPTIONS
Visual Inspection

REASON FOR QUESTION
Anti-compounding valve cannot be checked if air is not present at supply port.

YES
Replace air hose 221 (para 11-21).

NO
(1) Tighten air hose 118 at inversion valve delivery port.
(2) Loosen air hose 221 at supply port of anti-compounding valve.
(3) Check for presence of air at air hose 221.
(4) If no air is present, replace air hose 221 (para 11-21).
13. PARKING BRAKE DOES NOT RELEASE (CONT)

**Known Info**
- Air tanks pressurized.
- Gladhands OK.
- Air hose 107 OK.
- Park control two-way check valve OK.
- Air hose 103 OK.
- Air hose 109 OK.
- Two-way check valve OK.
- Air hose 119 OK.
- Inversion valve OK.
- Air hose 221 OK.

**Possible Problems**
- Faulty anti-compounding valve.
- Faulty air hose 231.

**Test Options**
- Visual Inspection

**Reason for Question**
Leaking anti-compounding valve may cause rapid loss of system air pressure.

**Diagram Flow**
- Is air present at delivery ports of anti-compounding valve?
  - **Yes**
    - Replace anti-compounding valve (para 11-12).
  - **No**
    - Replace air hose 231 (para 11-21).
(1) Tighten air hose 221 at anti-compounding valve supply port.
(2) Loosen air delivery hoses at delivery ports of anti-compounding valve.
(3) Check for presence of air at anti-compounding valve air hoses.
(4) If no air is present, replace anti-compounding valve (para 11-12).
(5) If air is present, replace air hose 231 (para 11-21).
(6) Tighten air delivery hoses at delivery ports of anti-compounding valve.
11. Is air present at park control two-way check valve delivery port?

- **NO**
  - If no air pressure is present at park control two-way check valve, replace park control two-way check valve (para 11-19).
  - If air pressure is present, replace air hose 107 (para 11-21).

- **YES**
  - Replace park control two-way check valve (para 11-19).

**KNOWN INFO**
- Air tanks pressurized.
- Gladhands OK.
- No air pressure present at SYSTEM PARK air supply valve supply port.

**POSSIBLE PROBLEMS**
- Faulty air hose 107.
- Faulty park control two-way check valve.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- If no air pressure is present at park control two-way check valve, park control two-way check valve is faulty. If air pressure is present, air hose 107 is faulty.
(1) Tighten air hose 107 at SYSTEM PARK air supply valve supply port.
(2) Push SYSTEM PARK and TRAILER AIR SUPPLY valves back into personnel heater.
(3) Install dash plate over valve stems with six screws.
(4) Install nuts on knob stems.
(5) Install SYSTEM PARK and TRAILER AIR SUPPLY knobs on stems with roll pins.
(6) Loosen air hose 107 at park control two-way check valve delivery port.
(7) Check for presence of air at air hose 107.
(8) If no air is present, replace park control two-way check valve (para 11-19).
(9) If air is present, replace air hose (para 11-21).
(10) Tighten air hose 107 at park control two-way check valve.
4. FRONT BRAKES OVERHEAT AND/OR DO NOT RELEASE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Personnel
(2)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Goggles, Industrial (Item 15, Appendix C)
Trestle, Motor Vehicle Maintenance (2)
(Item 47, Appendix C)
Adjusting Tool, Brake Shoe (Item 2, Appendix C)

START

WARNING
Read WARNING on following page.

1. Are air hose 229 and fittings free from leaks or damage?

TEST OPTIONS
Soapy Water Leak Test and Visual Inspection

REASON FOR QUESTION
If leaks or damage are present, air hose 229 and/or fittings are faulty.

NO

YES

Replace air hose 229 and/or fittings (para 11-21).

KNOWLEDGE INFO
Tires undamaged and inflated to proper operating pressure. Front gladhands OK.

POSSIBLE PROBLEMS
Faulty air hose 229. Faulty brake adjusting components. Faulty wedge assembly. Faulty wheel bearings. Faulty brake chamber(s).
WARNING

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

SOAPY WATER LEAK TEST

1. Apply soapy water solution to air hose 229 and fittings.
2. Check air hose 229 and fittings for bubbles, indicating leaks.

1. Check air hose 229 from front service gladhand to two-way check valve for leaks and damage.
2. If air hose 229 and/or fittings are faulty, replace damaged air hose 229 and/or fittings (para 11-21).
4. FRONT BRAKES OVERHEAT AND/OR DO NOT RELEASE (CONT)

**KNOWN INFO**
- Tires undamaged and inflated to proper operating pressure.
- Front gladhands OK.
- Air hose 229 OK.

**POSSIBLE PROBLEMS**
- Faulty brake adjusting components.
- Faulty wedge assembly.
- Faulty wheel bearings.
- Faulty brake chamber(s).

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
Poorly adjusted brake shoes and/or stuck adjusting bolts may cause shoes to bind on wheels and brakes may overheat or not release.

2.

Are front brake adjusting bolts locked-up?

- **NO**
  - Adjust brakes (para 11-2).

- **YES**

**CAUTION**
Read CAUTION on following page.

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
Brake shoes will not retract and brakes will overheat if return springs and/or adjusting chamber components are stuck or damaged.

3.

Are front brake adjusting components functioning and free from damage and at affected wheel(s)?

- **NO**
  - Replace faulty return springs and/or adjusting chamber components (para 11-2).

- **YES**

Tires undamaged and inflated to proper operating pressure.
- Front gladhands OK.
- Air hose 229 OK.

**POSSIBLE PROBLEMS**
- Faulty brake adjusting components.
- Faulty wedge assembly.
- Faulty wheel bearings.
- Faulty brake chamber(s).
(1) Remove wheel(s) with affected brakes and disassemble brake components (para 11-2).
(2) Inspect return springs for stretching, bluing, damage, or breakage.
(3) If spring(s) is damaged, replace spring(s) (para 11-2).
(4) Check adjusting pawl spring for damage.
(5) Ensure adjusting pawl spring is not missing or broken.
(6) Check adjusting pawl teeth for damage and abrasion.
(7) Ensure seal elements are not damaged or broken.

CAUTION

Ensure seal is free from damage. Failure to comply may result in dirt entering plunger chamber and interfering with adjustment.

(8) Check actuator teeth for damage.
(9) Check plunger for freedom of movement inside plunger housing.
4. FRONT BRAKES OVERHEAT AND/OR DO NOT RELEASE (CONT)

**KNOWN INFO**
Tires undamaged and inflated to proper operating pressure.
Front gladhands OK.
Air hose 229 OK.
Brake adjusting components OK.

**POSSIBLE PROBLEMS**
Faulty wedge assembly.
Faulty wheel bearings.
Faulty brake chamber(s).

4. Are wedge assemblies free from wear and damage, and do they operate?

- **TEST OPTIONS**
  - Visual inspection

- **REASON FOR QUESTION**
  - If wedge assembly is damaged or does not operate, brake shoes may remain partially applied.

**YES**
Replace wedge assembly (para 11-4).

**NO**

5. Are wheel bearings tight and free from damage?

- **TEST OPTIONS**
  - Visual inspection

- **REASON FOR QUESTION**
  - Loose or damaged wheel bearings may cause brakes to overheat.

**YES**
Adjust or replace wheel bearings (para 10-2).

**NO**

Replace brake chamber(s) (para 11-7).
(1) Install wheel(s) (TM 9-2320-366-10-1).
(2) Rotate affected wheel(s) by hand and listen for loose or damaged bearings.
(3) If wheel makes grinding sound during rotation, replace wheel bearings (para 10-2).
(4) Grasp wheel on opposite sides of top and bottom and pull in and out.
(5) If wheel has excessive play on the axle, replace wheel bearings (para 10-2).
(6) Check wheel hub oil level (Appendix H).
(7) If oil level is low, replace wheel bearings (para 10-2).
(8) Lower wheels to ground and remove trestle stands.

(1) Disconnect and tag air hoses from brake chambers at affected wheel(s).
(2) Unscrew brake chambers from hub and remove wedge assembly from wheels (para 11-4).
(3) Inspect wedge spring for damage.
(4) Inspect rollers for flattening or damage.
(5) Manually check operation of wedge assembly in plunger chamber.
(6) Install wedge assembly and brake chamber (para 11-4).
(7) Install front wheel brake components and adjust brakes (para 11-2).
5. VEHICLE BRAKES UNEVENLY, BRAKES PULL TO ONE SIDE OR GRAB

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)
Trestle, Motor Vehicle Maintenance (2) (Item 47, Appendix C)
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)

Personnel Required
(2)

START

1. Does vehicle pull to left or right when brakes are applied?

NO

YES

Go to step 7 of this fault.

KNOWLEDGE

Air tanks pressurized.

POSSIBLE PROBLEMS

Contaminated front wheel brake shoes.
Faulty front wheel brake adjustment.
Faulty front axle quick release valve.
Faulty front brake air chamber.
Faulty front brake vent hose.
Faulty front brake air chamber.
Faulty load sensing valve.
Contaminated rear brake shoes.
Faulty rear wheel brake adjustment.
Faulty relay valve.
Faulty air hose to rear brake air chamber.
Faulty rear brake vent hose or vent valve.
Faulty rear brake air chamber(s).

TEST OPTIONS

Visual inspection

REASON FOR QUESTION

Failure or binding of front brakes on one side of vehicle will cause vehicle to pull to one side.
(1) Start engine (TM 9-2320-366-10-1).
(2) Test drive unloaded vehicle and apply brakes.
(3) Note response of brakes on both sides of vehicle and on each axle.
(4) Shut down engine (TM 9-2320-366-10-1).
(5) If vehicle pulls to one side when brakes are applied, front brakes are faulty.
(6) If all rear wheels lock up before front wheels, load sensing valve may need adjustment or is faulty.
(7) If individual rear wheel(s) lock up or drag, individual rear wheel brakes may need adjustment or are faulty.
15. VEHICLE BRAKES UNEVENLY, BRAKES PULL TO ONE SIDE OR GRAB (CONT)

**WARNING**
Read WARNING on following page.

2. Are front wheel brake shoes free from contamination, oil, and grease?

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
Brakes will slip or bind if brake shoes are contaminated.

NO

Yes

Clean brake shoes (para 2-43) and replace wheel bearing seals (para 10-2).

3. Do brakes at one front wheel fail to apply?

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
If one front wheel brake does not apply, vehicle will pull to other side when brakes are applied.

NO

Yes

Perform brake shoe clearance adjustment (para 11-2).

**KNOWN INFO**
Air tanks pressurized.

**POSSIBLE PROBLEMS**
Contaminated front wheel brake shoes.
Faulty front wheel brake adjustment.
Faulty front axle quick release valve.
Faulty air hose to front brake air chamber.
Faulty front brake vent hose.
Faulty front brake air chamber.
Faulty load sensing valve.
Contaminated rear brake shoes.
Faulty rear wheel brake adjustment.
Faulty relay valve.
Faulty air hose to rear brake air chamber.
Faulty rear brake vent hose or vent valve.
Faulty rear brake air chamber(s).

**KNOWN INFO**
Air tanks pressurized.
Front wheel brake shoes OK.

**POSSIBLE PROBLEMS**
Faulty front wheel brake adjustment.
Faulty front axle quick release valve.
Faulty air hose to front brake air chamber.
Faulty front brake vent hose.
Faulty front brake air chamber.
Faulty load sensing valve.
Contaminated rear brake shoes.
Faulty rear wheel brake adjustment.
Faulty relay valve.
Faulty air hose to rear brake air chamber.
Faulty rear brake vent hose or vent valve.
Faulty rear brake air chamber(s).
WARNING

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

(1) Lift front axle so that front wheels are off the ground and support with maintenance trestles.
(2) Rotate wheel and check for contamination, oil, or grease at brake shoe linings.
(3) If oil contamination is present replace wheel bearing seals (para 10-2).

(1) Apply brakes and observe operation of brake shoes at both front wheels.
(2) If brake shoes fail to apply on one side, brake air delivery system or brake air chamber is faulty on that side.
(3) If both wheel brakes apply, adjust brake shoe clearance (para 11-2).
(4) Rotate wheel on affected side by hand and check if wheel grabs or is hard to turn.
(5) If wheel resists turning by hand, adjust brake shoe clearance (para 11-2).
5. VEHICLE BRAKES UNEVENLY, BRAKES PULL TO ONE SIDE OR GRAB (CONT)

**KNOWN INFO**

- Air tanks pressurized.
- Front wheel brake shoes OK.
- Front wheel brake adjustment OK.

**POSSIBLE PROBLEMS**

- Faulty front axle quick release valve.
- Faulty air hose to front brake air chamber.
- Faulty front brake vent hose.
- Faulty front brake air chamber.
- Faulty load sensing valve.
- Contaminated rear brake shoes.
- Faulty rear wheel brake adjustment.
- Faulty relay valve.
- Faulty air hose to rear brake air chamber.
- Faulty rear brake vent hose or vent valve.
- Faulty rear brake air chamber(s).

**TEST OPTIONS**

- Audible and Visual inspection

**REASON FOR QUESTION**

- If air hose to front brake(s) is damaged or blocked, brakes will not operate on affected side of vehicle.

---

4. When brakes are applied, is air present at front axle quick release valve delivery port to failed brake?

**TEST OPTIONS**

- Audible and Visual inspection

**REASON FOR QUESTION**

- If front axle quick release valve is providing air to only one delivery hose, front brakes will only apply on one side.

---

5. Is air present at front brake air chamber on affected side of vehicle when brakes are applied?

**TEST OPTIONS**

- Audible and Visual inspection

**REASON FOR QUESTION**

- If air hose to front brake(s) is damaged or blocked, brakes will not operate on affected side of vehicle.

---

4. **NO**

5. **YES**

   Replace front axle quick release valve (para 11-17).

4. **YES**

5. **NO**

   Replace damaged air hose(s) (para 11-21).
(1) Remove gravel deflector extension and gravel deflector (para 14-13).
(2) Loosen delivery air hose on affected side of front axle quick release valve.
(3) Apply brakes.
(4) Listen for escaping air at delivery port of front axle quick release valve when brake is applied.
(5) If escaping air cannot be heard at delivery port for affected side, replace front axle quick release valve (para 11-17).
(6) Tighten delivery air hose at front axle quick release valve.
(7) Install gravel deflector and gravel deflector extension (para 14-13).

(1) Loosen supply air hose(s) at front brake air chamber(s).
(2) Apply brakes.
(3) Listen for escaping air at supply air hose(s) when brakes are applied.
(4) If escaping air cannot be heard, replace supply air hose(s) (para 11-21).
(5) Tighten supply air hose(s) at front brake air chamber(s).
**5. VEHICLE BRAKES UNEVENLY, BRAKES PULL TO ONE SIDE OR GRAB (CONT)**

**KNOWN INFO**
- Air tanks pressurized.
- Front wheel brake shoes OK.
- Front wheel brake adjustment OK.
- Front axle quick release valve OK.
- Air hose to front brake air chamber OK.

**POSSIBLE PROBLEMS**
- Faulty front brake vent hose.
- Faulty front brake air chamber.
- Faulty load sensing valve.
- Contaminated rear brake shoes.
- Faulty rear wheel brake adjustment.
- Faulty relay valve.
- Faulty air hose to rear brake air chamber.
- Faulty rear brake vent hose or vent valve.
- Faulty rear brake air chamber(s).

**TEST OPTIONS**
- Audible and Visual inspection

**REASON FOR QUESTION**
If vent hose is plugged, brakes will not apply on affected side of vehicle.

---

**6.**

**Is vent hose at affected wheel brake free from obstructions?**

- **NO**
  - Blow vent hose clear of obstruction or replace damaged vent hose (para 11-21).
  - Replace front brake air chamber (para 11-7).

- **YES**
  - Replace front brake air chamber (para 11-7).

---

**7.**

**Did rear brakes lock up before front brakes during road test?**

- **NO**
  - Adjust or replace load sensing valve (para 11-10).

- **YES**
  - Adjust or replace load sensing valve (para 11-10).

---

**KNOWN INFO**
- Air tanks pressurized.
- Front wheel brake shoes OK.
- Front wheel brake adjustment OK.
- Front axle quick release valve OK.
- Air hose to front brake air chamber OK.
- Front brake vent hose OK.
- Front brake air chamber OK.

**POSSIBLE PROBLEMS**
- Faulty load sensing valve.
- Contaminated rear brake shoes.
- Faulty rear wheel brake adjustment.
- Faulty relay valve.
- Faulty air line to rear brake air chamber.
- Faulty rear brake vent line or vent valve.
- Faulty rear brake air chamber(s).
(1) Disconnect vent hose at front brake air chamber.
(2) Blow compressed air through vent hose.
(3) Check for air escaping at vent.
(4) Attach vent hose at front brake air chamber.
(5) Raise front axle off maintenance trestles.
(6) Remove maintenance trestles and lower front wheels to ground.

(1) If rear brakes locked up before front brakes on road test of unloaded vehicle, check load sensing valve hardware, arm position, adjusting clamp, and cable.
(2) If valve arm is in full up position (valve spring rest position), adjust or replace load sensing valve (para 11-10).
5. VEHICLE BRAKES UNEVENLY, BRAKES PULL TO ONE SIDE OR GRAB (CONT)

**KNOWN INFO**
- Air tanks pressurized.
- Front wheel brake shoes OK.
- Front wheel brake adjustment OK.
- Front axle quick release valve OK.
- Air hose to front brake air chamber OK.
- Front brake vent hose OK.
- Front brake air chamber OK.
- Load sensing valve OK.

**POSSIBLE PROBLEMS**
- Contaminated rear brake shoes.
- Faulty rear wheel brake adjustment.
- Faulty relay valve.
- Faulty air hose to rear brake air chamber.
- Faulty rear brake vent hose or vent valve.
- Faulty rear brake air chamber(s).

---

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- Rear brakes will slip or bind on affected wheels if brake shoes are contaminated.

---

8. Are rear brake shoes on affected wheel(s) free from contamination, oil, and grease?

---

**YES**
- Clean brake shoes (para 2-43) and replace wheel bearing seals (para 10-2).

---

**NO**

---

9. Do brakes at one or more rear wheels fail to apply?

---

**YES**
- Perform brake shoe clearance adjustment (para 11-3).

---

**NO**

---

**KNOWN INFO**
- Air tanks pressurized.
- Front wheel brake shoes OK.
- Front wheel brake adjustment OK.
- Front axle quick release valve OK.
- Air hose to front brake air chamber OK.
- Front brake vent hose OK.
- Front brake air chamber OK.
- Load sensing valve OK.
- Rear brake shoes OK.

**POSSIBLE PROBLEMS**
- Faulty rear wheel brake adjustment.
- Faulty relay valve.
- Faulty air hose to rear brake air chamber.
- Faulty rear brake vent hose or vent valve.
- Faulty rear brake air chamber(s).
(1) Lift axle of each affected rear wheel so that rear wheels are off the ground and support with maintenance trestles.
(2) Rotate affected wheel(s) and check for signs of contamination, oil, or grease at brake shoe linings.
(3) If oil contamination is present, replace wheel bearing seals (para 10-2).
(4) Lift affected axle off maintenance trestles.
(5) Remove maintenance trestles and lower wheels to ground.

(1) Chock wheels.
(2) Release parking brake (TM 9-2320-366-10-1).
(3) Apply brakes and observe operation of brake shoes at rear wheels.
(4) If brake shoes fail to apply on one side or at one wheel, brake air delivery system or brake air chamber is faulty on that side or at that wheel.
(5) If all rear wheel brakes apply, adjust brake shoe clearance (para 11-3).
i5. VEHICLE BRAKES UNEVENLY, BRAKES PULL TO ONE SIDE OR GRAB (CONT)

**KNOWN INFO**
- Air tanks pressurized.
- Front wheel brake shoes OK.
- Front wheel brake adjustment OK.
- Front axle quick release valve OK.
- Air hose to front brake air chamber OK.
- Front brake vent hose OK.
- Front brake air chamber OK.
- Load sensing valve OK.
- Rear brake shoes OK.
- Rear wheel brake adjustment OK.

**POSSIBLE PROBLEMS**
- Faulty relay valve.
- Faulty air hose to rear brake air chamber.
- Faulty rear brake vent hose or vent valve.
- Faulty rear brake air chamber(s).

**TEST OPTIONS**
- Audible and Visual inspection

**REASON FOR QUESTION**
- If relay valve does not supply air to all rear brake air chambers, braking will be uneven.

**10.**
Is air present at relay valve delivery port(s) to affected wheel(s)?

**NO**

**YES**
Replace relay valve (para 11-14).

**11.**
Is air present at brake air chamber of affected wheel(s) when brakes are applied?

**NO**

**YES**
Replace damaged air hose(s) (para 11-21).
(1) Loosen delivery air hoses on relay valve delivery ports.
(2) Apply brakes.
(3) Listen for escaping air from relay valve delivery ports when brakes are applied.
(4) If escaping air cannot be heard, replace relay valve (para 11-14).
(5) Tighten delivery air hoses on relay valve delivery ports.

---

(1) Loosen service brake air hose on rear brake air chamber.
(2) Apply brakes.
(3) Listen for escaping air from service brake air hose when brakes are applied.
(4) If escaping air cannot be heard, replace air hose (para 11-21).
(5) Tighten service brake air hose on rear brake air chamber.
(6) Apply parking brake (TM 9-2320-366-10-1).
5. VEHICLE BRAKES UNEVENLY, BRAKES PULL TO ONE SIDE OR GRAB (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air tanks pressurized.</td>
</tr>
<tr>
<td>Front wheel brake shoes OK.</td>
</tr>
<tr>
<td>Front wheel brake adjustment OK.</td>
</tr>
<tr>
<td>Front axle quick release valve OK.</td>
</tr>
<tr>
<td>Air hose to front brake air chamber OK.</td>
</tr>
<tr>
<td>Front brake vent hose OK.</td>
</tr>
<tr>
<td>Front brake air chamber OK.</td>
</tr>
<tr>
<td>Load sensing valve OK.</td>
</tr>
<tr>
<td>Rear brake shoes OK.</td>
</tr>
<tr>
<td>Rear wheel brake adjustment OK.</td>
</tr>
<tr>
<td>Relay valve OK.</td>
</tr>
<tr>
<td>Air hose to rear brake air chamber OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty rear brake vent hose or vent valve.</td>
</tr>
<tr>
<td>Faulty rear brake air chamber(s).</td>
</tr>
</tbody>
</table>

12. Are vent hoses and vent valve for affected rear wheel brakes free from obstructions?

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If vent hoses or vent valves are plugged, brakes will not apply at affected wheel(s).</td>
</tr>
</tbody>
</table>

- **YES**: Replace rear brake air chamber(s) at affected wheel(s) (para 11-8).
- **NO**: Replace damaged vent hose or vent valve (para 11-21).
(1) Disconnect vent hose(s) on rear brake air chamber(s).
(2) Blow compressed air through vent hoses.
(3) Check for presence of air at vent valve.
(4) Connect vent hose(s) on rear brake air chamber(s).
(5) Remove wheel chocks (TM 9-2320-366-10-1).
6. FRONT BRAKES DO NOT APPLY

INITIAL SETUP

**Equipment Conditions**
Engine shut down (TM 9-2320-366-10-1).

**Personnel Required**
(2)

**Tools and Special Tools**
Tool Kit, Genl Mech (Item 46, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

---

**KNOWN INFO**
Air tanks pressurized.
Rear brakes OK.

**POSSIBLE PROBLEMS**
Faulty air hose 208.
Faulty foot control valve.
Faulty air hose 206.
Faulty air hose 202.
Faulty front brake two-way check valve.
Faulty air hose 218.
Faulty air hose 217.
Faulty front axle quick release valve.

---

**START**

**WARNING**
Read WARNING on following page.

1. Is air present at foot control valve supply port 12?

**TEST OPTIONS**
Audible and Visual Inspection

**REASON FOR QUESTION**
A blocked or leaking air hose 208 may cause front brakes not to apply.

---

**YES**
Replace damaged/blocke air hose 208 (para 11-21).

---

**NO**
**WARNING**

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

**NOTE**

Air system pressure must be in the 90-120 psi operating range to begin brake system troubleshooting. If air pressure cannot be maintained within operating range, proceed to Air System Troubleshooting.

1. Loosen air hose 208 at foot control valve supply port 12 and listen for presence of escaping air.
2. If escaping air cannot be heard, replace air hose 208 (para 11-21).
3. Tighten air hose 208 on foot control valve supply port 12.
6. FRONT BRAKES DO NOT APPLY (CONT)

**Known Info**
- Air tanks pressurized.
- Rear brakes OK.
- Air hose 208 OK.

**Possible Problems**
- Faulty foot control valve.
- Faulty air hose 206.
- Faulty air hose 202.
- Faulty front brake two-way check valve.
- Faulty air hose 218.
- Faulty air hose 217.
- Faulty front axle quick release valve.

2. Is air present at foot control valve delivery port 22 when applying brakes?
   - **Test Options**
     - Audible and Visual Inspection
   - **Reason for Question**
     - Lack of air from foot control valve delivery port 22 will prevent front brakes from applying.
   - **Yes**
     - Replace foot control valve (para 11-9).
   - **No**
     - Replace damaged/blocke air hose 206 (para 11-21).

3. Is air hose 206 free from leaks and damage?
   - **Test Options**
     - Audible and Visual Inspection
   - **Reason for Question**
     - A blocked or leaking air hose 206 may cause front brakes not to apply.
   - **Yes**
   - **No**

4. Faulty foot control valve.
   - **Test Options**
     - Audible and Visual Inspection
   - **Reason for Question**
     - Faulty foot control valve.

5. Faulty air hose 206.
   - **Test Options**
     - Audible and Visual Inspection
   - **Reason for Question**
     - Faulty air hose 206.

   - **Test Options**
     - Audible and Visual Inspection
   - **Reason for Question**
     - Faulty air hose 202.

7. Faulty front brake two-way check valve.
   - **Test Options**
     - Audible and Visual Inspection
   - **Reason for Question**
     - Faulty front brake two-way check valve.

8. Faulty air hose 218.
   - **Test Options**
     - Audible and Visual Inspection
   - **Reason for Question**
     - Faulty air hose 218.

   - **Test Options**
     - Audible and Visual Inspection
   - **Reason for Question**
     - Faulty air hose 217.

10. Faulty front axle quick release valve.
    - **Test Options**
      - Audible and Visual Inspection
    - **Reason for Question**
      - Faulty front axle quick release valve.

11. Air tanks pressurized.
    - **Test Options**
      - Audible and Visual Inspection
    - **Reason for Question**
      - Air tanks pressurized.

12. Rear brakes OK.
    - **Test Options**
      - Audible and Visual Inspection
    - **Reason for Question**
      - Rear brakes OK.

13. Air hose 208 OK.
    - **Test Options**
      - Audible and Visual Inspection
    - **Reason for Question**
      - Air hose 208 OK.

14. Foot control valve OK.
    - **Test Options**
      - Audible and Visual Inspection
    - **Reason for Question**
      - Foot control valve OK.
(1) Loosen air hose 206 at fitting on cab floor.
(2) Apply foot brake.
(3) Listen for air escaping from air hose 206 when brakes are applied.
(4) If escaping air cannot be heard when brakes are applied, replace air hose 206 (para 11-21).
(5) Tighten air hose 206 at fitting on cab floor.
6. FRONT BRAKES DO NOT APPLY (CONT)

**KNOWN INFO**
Air tanks pressurized.
Rear brakes OK.
Air hose 208 OK.
Foot control valve OK.
Air hose 206 OK.

**POSSIBLE PROBLEMS**
Faulty air hose 202.
Faulty front brake two-way check valve.
Faulty air hose 218.
Faulty air hose 217.
Faulty front axle quick release valve.

**TEST OPTIONS**
Audible and Visual Inspection

**REASON FOR QUESTION**
A blocked or leaking air hose 202 may cause front brakes not to apply.

---

4. **Is air present at front brake two-way check valve supply port when applying brakes?**

- **NO**
- **YES**

   **YES** Replace damaged/block air hose 202 (para 11-21).

---

5. **Is air present at front brake two-way check valve delivery port when applying brakes?**

- **NO**
- **YES**

   **YES** Replace front brake two-way check valve (para 11-26).

---

**KNOWN INFO**
Air tanks pressurized.
Rear brakes OK.
Air hose 208 OK.
Foot control valve OK.
Air hose 206 OK.
Air hose 202 OK.

**POSSIBLE PROBLEMS**
Faulty front brake two-way check valve.
Faulty air hose 218.
Faulty air hose 217.
Faulty front axle quick release valve.

**TEST OPTIONS**
Audible and Visual Inspection

**REASON FOR QUESTION**
If air is not present at front brake two-way check valve delivery port when applying brakes, front brake two-way check valve is faulty.
(1) Loosen air hose 202 on front brake two-way check valve supply port.
(2) Apply foot brake.
(3) Listen for escaping air from air hose 202 when brakes are applied.
(4) If escaping air cannot be heard when brakes are applied, replace air hose 202 (para 11-21).
(5) Tighten air hose 202 on front brake two-way check valve supply port.

(1) Loosen air hose 218 on front brake two-way check valve delivery port.
(2) Apply foot brake.
(3) Listen for air escaping from front brake two-way check valve delivery port when brakes are applied.
(4) If escaping air cannot be heard when brakes are applied, replace front brake two-way check valve (para 11-26).
(5) Tighten air hose 218 on front brake two-way check valve delivery port.
6. FRONT BRAKES DO NOT APPLY (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air tanks pressurized. Rear brakes OK. Air hose 208 OK. Foot control valve OK. Air hose 206 OK. Air hose 202 OK. Front brake two-way check valve OK.</td>
<td>Audible and Visual Inspection</td>
<td>A blocked or leaking air hose 218 may cause front brakes not to apply.</td>
</tr>
</tbody>
</table>

6. Is air present at tee fitting when applying brakes?

- **NO**
- **YES**

   **YES**
   
   Replace damaged/blocking air hose 218 (para 11-21).

   **NO**
   
   7. Is air present at front axle quick release valve supply port when applying brakes?

   - **NO**
   - **YES**

      **YES**
      
      Replace damaged/blocking air hose 217 (para 11-21).

      **NO**
      
      Replace front axle quick release valve (para 11-17).
(1) Loosen air hose 218 on tee fitting.
(2) Apply foot brake.
(3) Listen for escaping air from air hose 218 when brakes are applied.
(4) If escaping air cannot be heard when brakes are applied, replace air hose 218 (para 11-21).
(5) Tighten air hose 218 on tee fitting.

(1) Remove gravel deflector extension and gravel deflector (para 14-13).
(2) Loosen air hose 217 on front axle quick release valve supply port.
(3) Apply foot brake.
(4) Listen for air escaping from air hose 217 when brakes are applied.
(5) If escaping air cannot be heard when brakes are applied, replace air hose 217 (para 11-21).
(6) If air can be heard escaping when brakes are applied, replace front axle quick release valve (para 11-17).
(7) Tighten air hose 217 on front axle quick release valve supply port.
(8) Install gravel deflector and gravel deflector extension (para 14-13).
17. REAR BRAKES OVERHEAT

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Personnel Required
(2)

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)
Trestle, Motor Vehicle Maintenance (2) (Item 47, Appendix C)
Adjusting Tool, Brake Shoe (Item 2, Appendix C)

KNOWN INFO

Tires undamaged and inflated to operating pressure.

POSSIBLE PROBLEMS

Faulty spring brake chamber(s).
Faulty brake adjusting components.
Faulty wedge assembly.
Faulty wheel bearings.

WARNING
Read WARNING on following page.

1. Do both spring brakes release on affected rear wheels?

START

NO

YES

Tighten or replace air hose (para 11-21).
Replace spring brake chamber(s) (para 11-8).

TEST OPTIONS

Visual Inspection

REASON FOR QUESTION

A failed spring brake will cause brakes to apply and overheat affected wheel.
WARNING

- Overheated brakes can cause severe burns. Perform task only when brakes have cooled. Failure to comply may result in injury to personnel.
- Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

NOTE

If wheel drums are too hot for hand touch after road test of vehicle, brakes are overheated.

2. Check for presence of air at air hose to spring brake chamber. If air is present at spring brake chamber, replace fittings or air hose (para 11-21).
3. Remove cover plug from caging hole at back of spring brake chamber (TM 9-2320-366-10-2).
4. With flashlight directed at caging hole, apply and release parking brake. Check if spring retracts when air is supplied by releasing parking brake. If brake does not cage (retract) when air is supplied to spring brake chamber, replace spring brake chamber (para 11-8).
5. Replace plug in caging hole of spring brake chamber (TM 9-2320-366-10-2).
6. Apply parking brake (TM 9-2320-366-10-1).
2. Are brake adjusting bolts locked-up at affected wheels?

- **YES**
  - Perform brake adjustment (para 11-3).

- **NO**
  - Poorly adjusted brake shoes and/or stuck adjusting bolts may cause brakes to bind on wheel and overheat.
(1) Jack up axle with overheated brakes, and support with trestle stands.
(2) Release parking brake (TM 9-2320-366-10-1).
(3) Turn adjusting bolt clockwise with adjusting tool. If bolt will not turn or if brake shoes do not move away from wheel when adjuster is turned, perform brake adjustment (para 11-3).
I7. REAR BRAKES OVERHEAT (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tires undamaged and</td>
<td>Faulty brake adjusting components.</td>
</tr>
<tr>
<td>inflated to operating</td>
<td>Faulty wedge assembly.</td>
</tr>
<tr>
<td>pressure.</td>
<td>Faulty wheel bearings.</td>
</tr>
<tr>
<td>Spring brake chamber(s) OK</td>
<td></td>
</tr>
</tbody>
</table>

3. Are brake adjusting components free from damage and functioning at affected wheel(s)?

- NO

- YES

Replace faulty return springs and adjusting components (para 11-3).

Test Options

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
<td>Brake shoes will not retract and brakes will overheat if return springs and adjusting chamber components are stuck or damaged.</td>
</tr>
</tbody>
</table>
(1) Remove wheel(s) with affected brakes (TM 9-2320-366-10-1).
(2) Disassemble brakes (para 11-3).
(3) Inspect spring for stretching, bluing, damage, or breakage. If spring(s) is damaged, brake shoes will not retract from wheel.
(4) Check adjusting pawl spring for damage. Ensure springs are not missing or broken.
(5) Check adjusting pawl teeth for damage and abrasion.

NOTE
A damaged seal may permit dirt to enter plunger chamber and interfere with adjustment.

(6) Ensure seal elements are not damaged or broken.
(7) Check actuator teeth for damage.
(8) Check plunger for freedom of movement inside plunger housing.
17. REAR BRAKES OVERHEAT (CONT)

4. Are wedge assemblies free from wear and damage and do they operate?
- YES
  - Replace wedge assembly (para 11-5).
- NO
  - If wedge assembly is damaged or does not operate, brake shoe will remain partially applied.

5. Are wheel bearings loose or damaged?
- YES
  - Replace brake chamber(s) (para 11-8).
- NO
  - Loose or damaged wheel bearings may cause brake drums to overheat.

Possible problems:
- Faulty wedge assembly.
- Faulty wheel bearings.

Known info:
- Tires undamaged and inflated to operating pressure.
- Spring brake chamber(s) OK.
- Brake adjusting components OK.
- Wedge assembly OK.

Test options:
- Visual inspection

Reason for question:
- If wedge assembly is damaged or does not operate, brake shoe will remain partially applied.
- Loose or damaged wheel bearings may cause brake drums to overheat.

Adjust or replace wheel bearings (para 10-2).
WARNING

Spring brake chambers are very powerful. Cage spring brakes before removing chambers. Failure to comply may result in injury to personnel.

(1) Disconnect and tag air lines to spring brake chambers at wheel.
(2) Cage spring brakes on rear wheels (para 11-6).
(3) Unscrew brake chamber(s) from hub and remove wedge assembly from wheel (para 11-5).
(4) Inspect wedge spring for damage.
(5) Inspect rollers for flattening or damage.
(6) Manually check operation of wedge assembly in plunger chamber.
(7) Install wedge assembly and brake chambers (para 11-5).
(8) Install wheel brake components and adjust brakes (para 11-3).

(1) Install wheels (TM 9-2320-366-10-1).
(2) Rotate affected wheel and listen for loose or damaged wheel bearings. If wheel makes grinding sound during rotation, adjust or replace wheel bearings (para 10-2).
(3) Grasp wheel on opposite sides, top and bottom, and pull in and out. If wheel has excessive play on the axle, adjust or replace wheel bearings (para 10-2).
(4) If wheel bearings are good, replace brake chamber(s) (para 11-8).
(5) Check wheel hub oil level (Appendix H). If oil level is low, replace wheel bearings (para 10-2).
(6) Set parking brake (TM 9-2320-366-10-1).
(7) Remove trestle stands and lower wheels to ground.
I8. PARKING BRAKE DOES NOT APPLY

INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Conditions</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air tanks pressurized (TM 9-2320-366-10-1).</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1).</td>
<td>Goggles, Industrial (Item 15, Appendix C)</td>
</tr>
</tbody>
</table>

Personnel Required (2)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air tanks pressurized.</td>
</tr>
<tr>
<td>Rear brakes operate.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty system park air supply valve.</td>
</tr>
<tr>
<td>Faulty inversion valve.</td>
</tr>
<tr>
<td>Faulty anti-compounding relay valve.</td>
</tr>
<tr>
<td>Faulty rear brake plunger assembly(ies).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Park Air Supply Valve Test</td>
</tr>
</tbody>
</table>

REASON FOR QUESTION

If air cannot be heard escaping from system park air supply valve when system park air supply valve is pulled, system park air supply valve is faulty.

1. Is air release audible at system park air supply valve when system park air supply valve is pulled?

YES

Replace system park air supply valve (para 11-20).

NO
SYSTEM PARK AIR SUPPLY VALVE TEST

1. Push in system park air supply valve.
2. Pull system park air supply valve out and note release of air.
3. If air is not heard escaping from system park air supply valve, replace system park air supply valve (para 11-20).
18. PARKING BRAKE DOES NOT APPLY (CONT)

**Known Info**
- Air tanks pressurized.
- Rear brakes operate.
- System park air supply valve OK.

**Possible Problems**
- Faulty inversion valve.
- Faulty anti-compounding relay valve.
- Faulty rear brake plunger assembly(ies).

**Test Options**

### Inversion Valve Test

- **Reason for Question**
  - If air cannot be heard escaping from inversion valve when system park air supply valve is pulled, inversion valve is faulty.
  
  - **Yes**
    - Replace inversion valve (para 11-13).
  
  - **No**
    - Replace inversion valve (para 11-13).

### Anti-Compounding Relay Valve Test

- **Reason for Question**
  - If air cannot be heard escaping from anti-compounding relay valve when system park air supply valve is pulled, anti-compounding relay valve is faulty. If air can be heard escaping from anti-compounding relay valve, rear brake plunger assembly(ies) is faulty.
  
  - **Yes**
    - Repair rear brake plunger assembly(ies) (para 11-5).
  
  - **No**
    - Replace anti-compounding relay valve (para 11-12).
(1) Push in SYSTEM PARK air supply valve.
(2) Pull SYSTEM PARK air supply valve out and note release of air.
(3) If air is not heard escaping from anti-compounding relay valve, replace anti-compounding relay valve (para 11-12).
(4) If air is heard escaping from anti-compounding relay valve, repair rear brake plunger assembly(ies) (para 11-5).
(5) Pull SYSTEM PARK air supply valve out.
**I9. BRAKE SYSTEM LOSES AIR WHEN SERVICE BRAKES ARE APPLIED**

**INITIAL SETUP**

**Equipment Conditions**
Engine shut down (TM 9-2320-366-10-1).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46 Appendix C)
- Goggles, Industrial (Item 15, Appendix C)

---

**START**

1. **KNOWN INFO**
   - Air tanks pressurized.
   - **POSSIBLE PROBLEMS**
     - Faulty front axle quick release valve.
     - Faulty rear gladhand(s).

   **TEST OPTIONS**
   - Visual inspection

   **REASON FOR QUESTION**
   - If leak is present, front axle quick release valve is faulty.

   **Does air escape from front axle quick release valve when service brakes are applied?**

   **NO**

   **YES**

   **Replace front axle quick release valve (para 11-17).**

2. **KNOWN INFO**
   - Air tanks pressurized.
   - Front axle quick release valve OK.
   - **POSSIBLE PROBLEMS**
     - Faulty rear gladhand(s).

   **TEST OPTIONS**
   - Visual inspection

   **REASON FOR QUESTION**
   - If leak is present, front axle quick release valve is faulty.

   **Does air escape from front rear gladhand(s) when service brakes are applied?**

   **NO**

   **YES**

   **Replace rear gladhand(s) (para 11-24).**

---

Perform Air System Troubleshooting
J1. Air System Loses Pressure During Operation/Slow Air Pressure Buildup.
Have assistant apply service brakes (TM 9-2320-366-10-1).

Listen for air escaping from front axle quick release valve.

If air leak is present, replace front axle quick release valve (para 11-17).

**WARNING**

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

(1) Have assistant apply service brakes (TM 9-2320-366-10-1).
(2) Listen for air escaping from front axle quick release valve.
(3) If air leak is present, replace front axle quick release valve (para 11-17).

(4) If air leak is not present, perform Air System Troubleshooting J1. Air System Loses Pressure During Operation/Slow Air Pressure Buildup.
2-21. AIR SYSTEM TROUBLESHOOTING

This paragraph covers Air System Troubleshooting. The Air System Fault Index, Table 2-49, lists faults for the Air System of the vehicle.

Table 2-49. Air System Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>j1</td>
<td>Air System Loses Pressure During Operation/Slow, No, or Incorrect Air Pressure Buildup</td>
<td>2-1948</td>
</tr>
<tr>
<td>j2</td>
<td>Large Quantity of Moisture Expelled From Air Reservoirs</td>
<td>2-1964</td>
</tr>
<tr>
<td>j3</td>
<td>Air Dryer Purges Constantly</td>
<td>2-1968</td>
</tr>
<tr>
<td>j4</td>
<td>No Air Pressure Present at Rear Gladhand(s) (All Models Except M1088)</td>
<td>2-1972</td>
</tr>
<tr>
<td>j4A</td>
<td>No Air Pressure Present at All M1088 Rear and Fifth Wheel Gladhands</td>
<td>2-1976.36</td>
</tr>
<tr>
<td>j4B</td>
<td>No Air Pressure Present at M1088 Rear and/or Fifth Wheel EMERGENCY Gladhand(s)</td>
<td>2-1976.42</td>
</tr>
<tr>
<td>j4C</td>
<td>No Air Pressure Present at M1088 Rear and/or Fifth Wheel SERVICE Gladhand(s)</td>
<td>2-1976.48</td>
</tr>
<tr>
<td>j4D</td>
<td>M1088 Trailer Handbrake Control Does Not Operate</td>
<td>2-1976.60</td>
</tr>
<tr>
<td>j5</td>
<td>Air System Pressure Builds Up More Than 120 psi (827 kPa) (Compressor Fails to Unload)</td>
<td>2-1978</td>
</tr>
<tr>
<td>j6</td>
<td>Noisy Air Compressor Operation</td>
<td>2-1982</td>
</tr>
<tr>
<td>j7</td>
<td>M1088 Rear Gladhand(s) Leaks or Does Not Operate</td>
<td>2-1986</td>
</tr>
<tr>
<td>j8</td>
<td>M1091/M1094 Tailgate Release Does Not Operate</td>
<td>2-1988</td>
</tr>
</tbody>
</table>
1. Do FRONT BRAKE/REAR BRAKE AIR pressure gages show even pressure?

**YES**

Perform Brake Troubleshooting

**NO**

Low pressure on both FRONT BRAKE/REAR BRAKE AIR pressure gages indicates air system cannot maintain operating pressure.

---

**INITIAL SETUP**

**Equipment Conditions**
- Engine running (TM 9-2320-366-10-1).
- Parking brake on (TM 9-2320-366-10-1).
- Wheels chocked (TM 9-2320-366-10-1).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)
- Pan, Wash (Item 25, Appendix C)

**Materials/Parts**
- Soap, Laundry (Item 63, Appendix D).

---

**KNOWN INFO**

- Nothing.

---

**KNOW INFO**

- Faulty FRONT BRAKE/REAR BRAKE AIR pressure gages.
- Damaged air hose from air cleaner to air compressor.
- Damaged air hose from air compressor to air dryer.
- Damaged air hose from air dryer to wet tank.
- Damaged air hose from wet tank to air compressor.
- Damaged air hoses from wet tank to primary and secondary air tanks.
- Faulty check valves at primary and secondary air tanks.
- Faulty air dryer purge valve and/or clogged desiccant cartridge.
- Faulty air compressor governor.
- Faulty air compressor.
(1) Check to see if both FRONT BRAKE/REAR BRAKE AIR pressure gages indicate less than 120 psi.
(2) If only FRONT BRAKE AIR pressure gage indicates less than 120 psi, perform Brake Troubleshooting i6. Front Brakes Do Not Apply.
(3) If only REAR BRAKE AIR pressure gage indicates less than 120 psi, perform Brake Troubleshooting i2. Rear Brakes Do Not Apply.
### J1. AIR SYSTEM LOSES PRESSURE DURING OPERATION/SLOW, NO, OR INCORRECT AIR PRESSURE BUILDUP (CONT)

#### KNOWN INFO

| FRONT BRAKE/REAR BRAKE AIR pressure gages OK. |

#### POSSIBLE PROBLEMS

- Damaged air hose from air cleaner to air compressor.
- Damaged air hose from air compressor to air dryer.
- Damaged air hose from air dryer to wet tank.
- Damaged air hose from wet tank to air compressor.
- Damaged air hoses from wet tank to primary and secondary air tanks.
- Faulty check valves at primary and secondary air tanks.
- Faulty air dryer purge valve and/or clogged desiccant cartridge.
- Faulty air compressor governor.
- Faulty air compressor.

#### WARNING

Read WARNING on following page.

#### TEST OPTIONS

| Visual Inspection |

#### REASON FOR QUESTION

A damaged air intake hose may cause air system to take an excessive amount of time to build up air pressure.

---

2. Are air hose from air cleaner to air compressor and fittings free from damage?

- **NO**

- **YES**
  
  Replace damaged air intake hose and/or fittings (para 23-2).
WARNING

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

(1) Raise cab (TM 9-2320-366-10-1).
(2) Check air intake hose from air cleaner to air compressor and fittings for damage.
(3) If air intake hose and/or fittings are faulty, replace damaged air intake hose and/or fittings (para 23-2).
J1. AIR SYSTEM LOSES PRESSURE DURING OPERATION/SLOW, NO, OR INCORRECT AIR PRESSURE BUILDUP (CONT)

### KNOWN INFO
- FRONT BRAKE/REAR BRAKE
  - AIR pressure gages OK.
  - Air hoses and fittings from air cleaner to air compressor OK.

### POSSIBLE PROBLEMS
- Damaged air hose from air compressor to air dryer.
- Damaged air hose from air dryer to wet tank.
- Damaged air hose from wet tank to air compressor.
- Damaged air hoses from wet tank to primary and secondary air tanks.
- Faulty check valves at primary and secondary air tanks.
- Faulty air dryer purge valve and/or clogged desiccant cartridge.
- Faulty air compressor governor.
- Faulty air compressor.

### TEST OPTIONS
- Soapy Water Leak Test and Visual Inspection

### REASON FOR QUESTION
- A leaking or damaged supply hose or fitting may cause air system to lose pressure or take an excessive amount of time to build up air pressure.

---

3. Are supply hose from air compressor to air dryer and fittings free from leaks or damage?

**NO**

**YES**

Replace damaged supply air hose and/or fittings (para 23-2).
SOAPY WATER LEAK TEST

(1) Apply soapy water solution to hoses, fittings, and couplings.
(2) Check hoses and fittings for bubbles, indicating leaks.

(1) Check air hose from air compressor to pipe coupling and fittings for leaks or damage.
(2) Check air hose from pipe coupling to frame pipe coupling and fittings for leaks or damage.
(3) Check air hose from frame pipe coupling to air dryer and fittings for leaks or damage.
(4) If supply air hose and/or fittings are faulty, replace damaged supply air hose and/or fittings (para 23-2).
4. Are air hose from air dryer to wet tank and fittings free from leaks or damage?

**KNOWN INFO**

<table>
<thead>
<tr>
<th>FRONT BRAKE/REAR BRAKE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIR pressure gages OK.</td>
</tr>
<tr>
<td>Air hoses and fittings from air cleaner to air compressor OK.</td>
</tr>
<tr>
<td>Air hoses and fittings from air compressor to air dryer OK.</td>
</tr>
</tbody>
</table>

**POSSIBLE PROBLEMS**

- Damaged air hose from air dryer to wet tank.
- Damaged air hose from wet tank to air compressor.
- Damaged air hoses from wet tank to primary and secondary air tanks.
- Faulty check valves at primary and secondary air tanks.
- Faulty air dryer purge valve and/or clogged desiccant cartridge.
- Faulty air compressor governor.
- Faulty air compressor.

**TEST OPTIONS**

- Soapy Water Leak Test and Visual Inspection

**REASON FOR QUESTION**

A leaking or damaged hose or fitting may cause air system to loose pressure or take an excessive amount of time to build up air pressure.

**YES**

Replace damaged air hose and/or fittings (para 23-2).

**NO**
SOAPY WATER LEAK TEST

(1) Apply soapy water solution to hoses, fittings, and couplings.
(2) Check hoses and fittings for bubbles, indicating leaks.

(1) Check air hose from air dryer to wet tank and fittings for leaks or damage.
(2) If air hose and/or fittings are faulty, replace damaged air hose and/or fittings (para 23-2).
TM 9-2320-366-20-2

1. AIR SYSTEM LOSES PRESSURE DURING OPERATION/SLOW, NO, OR INCORRECT AIR PRESSURE BUILDUP (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRONT BRAKE/REAR BRAKE</td>
</tr>
<tr>
<td>Air pressure gages OK.</td>
</tr>
<tr>
<td>Air hoses and fittings from air cleaner to air compressor OK.</td>
</tr>
<tr>
<td>Air hoses and fittings from air compressor to air dryer OK.</td>
</tr>
<tr>
<td>Air hose and fittings from air dryer to wet tank OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damaged air hose from wet tank to air compressor.</td>
</tr>
<tr>
<td>Damaged air hoses from wet tank to primary and secondary air tanks.</td>
</tr>
<tr>
<td>Faulty check valves at primary and secondary air tanks.</td>
</tr>
<tr>
<td>Faulty air dryer purge valve and/or clogged desiccant cartridge.</td>
</tr>
<tr>
<td>Faulty air compressor governor.</td>
</tr>
<tr>
<td>Faulty air compressor.</td>
</tr>
</tbody>
</table>

5. Are air hose from wet tank to air compressor governor and fittings free from damage?

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soapy Water Leak Test and Visual Inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A damaged air hose or fitting may cause air system to lose pressure or take an excessive amount of time to build up air pressure.</td>
</tr>
</tbody>
</table>

NO

YES

Replace damaged air hose and/or fittings (para 23-2).
(1) Apply soapy water solution to hoses, fittings, and couplings.
(2) Check hoses and fittings for bubbles, indicating leaks.

(1) Check air hose from wet tank to pipe coupling and fittings for leaks and damage.
(2) Check air hose from pipe coupling to air compressor and fittings for leaks and damage.
(3) If air hose and/or fittings are faulty, replace damaged air hose and/or fittings (para 23-2).
(4) Lower cab (TM 9-2320-366-10-1).
6. Are air hoses from wet tank to primary and secondary air tanks, check valves, and fittings free from damage?

**Known Info**
- FRONT BRAKE/REAR BRAKE AIR pressure gages OK.
- Air hoses and fittings from air cleaner to air compressor OK.
- Air hoses and fittings from air compressor to air dryer OK.
- Air hose and fittings from air dryer to wet tank OK.
- Air hoses and fittings from wet tank to air compressor OK.

**Possible Problems**
- Damaged air hoses from wet tank to primary and secondary air tanks.
- Faulty check valves at primary and secondary air tanks.
- Faulty air dryer purge valve and/or clogged desiccant cartridge.
- Faulty air compressor governor.
- Faulty air compressor.

**Test Options**
- Soapy Water Leak Test and Visual Inspection

**Reason for Question**
A leaking or damaged air hose or fitting may cause air system to lose pressure or take an excessive amount of time to build up air pressure.

**Yes**
Replace damaged air hose and/or fittings (para 23-2).

**No**
SOAPY WATER LEAK TEST

1. Apply soapy water solution to hoses, fittings, and couplings.
2. Check hoses and fittings for bubbles, indicating leaks.

1. Check air hose from wet tank to primary air tank check valve, and fittings for leaks and damage.
2. Check air hose from primary air tank check valve to secondary air tank check valve, and fittings for leaks and damage.
3. If air hose and/or fittings are faulty, replace damaged air hose and/or fittings (para 23-2).
7. Is air dryer purge valve free from constant air leaks and excessive moisture?

NO

POSSIBLE PROBLEMS
Faulty air dryer purge valve and/or clogged desiccant cartridge.
Faulty air dryer purge valve.
Faulty air compressor.

YES

SERVICE AIR DRYER (para 23-11).

TEST OPTIONS
Soapy Water Leak Test and Visual Inspection

REASON FOR QUESTION
A leaking air dryer purge valve or a clogged air dryer desiccant cartridge may cause air system to lose pressure or take an excessive amount of time to build up air pressure.

KNOWN INFO
FRONT BRAKE/REAR BRAKE AIR pressure gages OK.
Air hoses and fittings from air cleaner to air compressor OK.
Air hoses and fittings from air dryer to air dryer OK.
Air hose and fittings from air dryer to wet tank OK.
Air hoses and fittings from wet tank to air compressor OK.
Air hoses, check valves, and fittings from wet tank to primary and secondary air tanks OK.

POSSIBLE PROBLEMS
Faulty air dryer purge valve and/or clogged desiccant cartridge.
Faulty air dryer purge valve.
Faulty air compressor.
Faulty air compressor.
SOAPY WATER LEAK TEST

(1) Apply soapy water solution to hoses, fittings, and couplings.
(2) Check hoses and fittings for bubbles, indicating leaks.

(1) Open wet tank drain cock and check for excessive amounts of moisture.
(2) If moisture exists in wet tank, service air dryer desiccant cartridge (para 23-11).
(3) Close wet tank drain cock.
8. Do both FRONT BRAKE/REAR BRAKE AIR pressure gages read 120 psi?

**Known Info**
- FRONT BRAKE/REAR BRAKE AIR pressure gages OK.
- Air hoses and fittings from air cleaner to air compressor OK.
- Air hoses and fittings from air compressor to air dryer OK.
- Air hose and fittings from air dryer to wet tank OK.
- Air hoses and fittings from wet tank to air compressor OK.
- Air hoses, check valves, and fittings from wet tank to primary and secondary air tanks OK.
- Purge valve and desiccant cartridge OK.

**Possible Problems**
- Faulty air compressor governor.
- Faulty air compressor.

**Test Options**
- Visual Inspection
  - **Reason for Question**
    - With no leaks in supply system, 120 psi cannot be maintained if air compressor governor is out of adjustment or faulty.

**Decision Flow**
- **YES**
  - Adjust or replace air compressor governor (para 11-31).

- **NO**
  - Notify DS Maintenance to replace air compressor.
(1) Allow pneumatic system to build pressure and observe FRONT BRAKE/REAR BRAKE AIR pressure gages without applying brakes or operating air system.
(2) Check to see if air pressure stabilizes at 120 psi.
(3) If air pressure remains below 120 psi, adjust or replace air compressor governor (para 11-31).
(4) If air pressure continues to remain below 120 psi, notify DS Maintenance to replace air compressor.
(5) Shut down engine (TM 9-2320-366-10-1).
j2. LARGE QUANTITY OF MOISTURE EXPELLED FROM AIR RESERVOIRS

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

---

1. **Is dessicant cartridge clean?**
   - **NO**
   - **YES**

   **KNOWN INFO**
   - Nothing.
   - Dessicant cartridge dirty.
   - Faulty air dryer purge valve.
   - Blocked governor air hose.
   - Faulty air compressor.

   **TEST OPTIONS**
   - Visual inspection
   - REASON FOR QUESTION
     - Dirty dessicant cartridge will cause dryer not to purge and will result in excess moisture in system.

   **KNOWN INFO**
   - Service air dryer (para 23-11).

2. **Is purge valve clear?**
   - **NO**
   - **YES**

   **KNOWN INFO**
   - Faulty air dryer purge valve.
   - Blocked governor air hose.
   - Faulty air compressor.

   **TEST OPTIONS**
   - Visual inspection
   - REASON FOR QUESTION
     - A blocked purge valve will cause dryer not to purge and will result in excess moisture in system.

   **KNOWN INFO**
   - Service air dryer (para 23-11).
(1) Remove desiccant cartridge from air dryer (para 23-11).
(2) Inspect the desiccant cartridge for cleanliness.

(1) Remove three screws, purge valve, and exhaust boot.
(2) Check purge valve for blockage. If blocked, purge valve is faulty.
(3) Install exhaust boot, purge valve, and three screws.
3. Blockage Test

**KNOWN INFO**
- Desiccant cartridge OK.
- Air dryer purge valve OK.

**POSSIBLE PROBLEMS**
- Blocked governor air hose.
- Faulty air compressor.

**TEST OPTIONS**
- Blockage Test

**REASON FOR QUESTION**
- Air compressor will fail to unload if governor air hose is blocked.

Does governor to air dryer purge valve air hose pass test?

- **NO**
  - Replace governor air hose (para 23-2).
  - **NO**
    - Service air dryer (para 23-11).
  - **YES**
    - Notify DS Maintenance.

- **YES**
  - **YES**
    - Replace governor air hose (para 23-2).
  - **NO**
    - **YES**
      - Notify DS Maintenance.
      - Service air dryer (para 23-11).

4. Large Quantity of Moisture Expelled from Air Reservoirs (Cont)

**KNOWN INFO**
- Desiccant cartridge OK.
- Air dryer purge valve OK.
- Governor air hose OK.

**POSSIBLE PROBLEMS**
- Faulty air compressor.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- Air compressor will fail to unload if air governor is defective.
BLOCKAGE TEST

1. Disconnect governor to air dryer air hose at governor and at purge valve.
2. Blow through one end of air hose. If no air escapes from other end of air hose, air hose is blocked.
3. Connect governor to air dryer air hose to governor and purge valve.

1. Disconnect governor air hose at air dryer purge valve.
3. Check for presence of air at air hose. If no air escapes from air hose air compressor is defective. If air escapes, service air dryer for faulty purge valve.
5. Connect air compressor to air dryer air hose to air dryer.
6. Install desiccant cartridge in air dryer (para 23-11).
1. Check Temperature

Air dryer purge valve may freeze open if temperature is below freezing and air dryer heater does not work.

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air hoses and fittings OK.</td>
<td>Faulty air dryer heater. Blocked air hose from air dryer to wet tank. Faulty air dryer. Faulty air compressor governor.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check Temperature</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air dryer purge valve may freeze open if temperature is below freezing and air dryer heater does not work.</td>
</tr>
</tbody>
</table>

2. Does air dryer heater operate?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air hoses and fittings OK.</td>
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</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check Heater Temperature</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air may leak steadily from purge valve if purge valve is frozen and heater does not operate.</td>
</tr>
</tbody>
</table>

3. AIR DRYER CONTINUALLY PURGES

START

GO TO STEP 3 OF THIS FAULT.

Perform Electrical Troubleshooting (e101. Air Dryer Does Not Operate (All Models Except M1090/M1094) or e102. M1090/M1094 Air Dryer Does Not Operate).
NOTE

- Air dryer heater cuts in at 32°F (0°C) and shuts off between 55-75°F (31-42°C).
- A failed air dryer heater will not affect operation of purge valve if vehicle is operating at temperature above freezing.

(1) Start engine (TM 9-2320-366-10-1).
(2) Bring engine to operating temperature.
(3) Check bottom (heater) housing on air dryer.
(4) If housing is not warm, heater is not receiving power or is faulty.
(5) Shut down engine (TM 9-2320-366-10-1).
### J3. AIR DRYER CONTINUALLY PURGES (CONT)

#### KNOWN INFO
- Air hoses and fittings OK.
- Air dryer heater OK.

#### POSSIBLE PROBLEMS
- Blocked air hose from air dryer to wet tank.
- Faulty air dryer.
- Faulty air compressor governor.

#### TEST OPTIONS
- Visual inspection
- **REASON FOR QUESTION**
  - A blocked air hose from air dryer to wet tank will cause purge valve to release air.

#### 3. **Does air escape from air dryer to wet tank air hose?**

**NO**

- Replace damaged air hose (para 23-2).

**YES**

#### 4. **Does air escape from compressor air hose at purge valve?**

**NO**

- Service air dryer (para 23-11).

**YES**

- Notify DS Maintenance.

#### KNOWN INFO
- Air hoses and fittings OK.
- Air dryer heater OK.
- Air hose from air dryer to wet tank OK.

#### POSSIBLE PROBLEMS
- Faulty air dryer.
- Faulty air compressor governor.

#### TEST OPTIONS
- Check for air at purge valve air hose.
- **REASON FOR QUESTION**
  - Air dryer will continually purge if air compressor governor is defective.
(1) Disconnect air hose on wet tank coming from air dryer.
(2) Start engine (TM 9-2320-366-10-1).
(3) Check for presence of air at air hose. If no air escapes from air hose, air hose is faulty.
(4) If air escapes, service air dryer (para 23-11).
(5) Shut down engine (TM 9-2320-366-10-1).

(1) Disconnect air hose from purge valve on air dryer.
(2) Start engine (TM 9-2320-366-10-1).
(3) Check for presence of air from air hose.
(4) If air is steadily present from air hose and purge valve air has stopped, air compressor governor is defective.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) Connect air hose to purge valve on air dryer.
j4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S) (ALL MODELS EXCEPT M1088)

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

KNOWLEDGE

Vehicle park and service brakes OK.
Air hoses free from kinks.

POSSIBLE PROBLEMS
Faulty emergency gladhand.
Faulty air hose 155, 157, or 167.
Faulty air hose 149, 150, or 151.
Faulty air hose 102.
Faulty air hose 108.
Faulty TRAILER AIR SUPPLY valve.
Faulty air hose 104.
Faulty service gladhand.
Faulty air hose 241, 253, or 254.
Faulty air brake protecting valve.
Faulty air hose 230 or 256.
Faulty load sensing valve control port tee fitting.
Faulty air hose 240 or 243.
Faulty booster valve.
Faulty service gladhand two-way check valve.
Faulty air hose 145.
Faulty air hose 120.
Faulty inversion valve control port 90-degree fitting.
Faulty air hose 128, 130, or 132.

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

START

1. Is there air present at either rear gladhand?

NO

YES

Go to step 5 of this fault.
(1) Disconnect dummy coupling from emergency gladhand.
(2) Start engine (TM 9-2320-366-10-1).
(3) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).
(4) Check for presence of air at emergency gladhand.
(5) Connect dummy coupling to emergency gladhand.
(6) Disconnect dummy coupling from service gladhand.
(7) Apply service brakes (TM 9-2320-366-10-1).
(8) Check for presence of air at service gladhand.
(9) Shut down engine (TM 9-2320-366-10-1).
(10) Connect dummy coupling to service gladhand.
(11) If air is not present at both rear gladhands, go to step 5 of this fault.
2. Is air present at service gladhand?

Yes

Go to step 10 of this fault.

No

This question eliminates possible problems and determines where troubleshooting continues.
(1) Disconnect dummy coupling from service gladhand.
(2) Start engine (TM 9-2320-366-10-1).
(3) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).
(4) Apply service brakes (TM 9-2320-366-10-1).
(5) Check for presence of air at service gladhand.
(6) Shut down engine (TM 9-2320-366-10-1).
(7) Connect dummy coupling to service gladhand.
(8) If air is not present, go to step 10 of this fault.
j4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S) (ALL MODELS EXCEPT M1088) (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle park and service brakes OK.</td>
</tr>
<tr>
<td>Air hoses free from kinks.</td>
</tr>
<tr>
<td>Air hose 149, 150, or 151 OK.</td>
</tr>
<tr>
<td>Air hose 102 OK.</td>
</tr>
<tr>
<td>Air hose 108 OK.</td>
</tr>
<tr>
<td>TRAILER AIR SUPPLY valve OK.</td>
</tr>
<tr>
<td>Air hose 104 OK.</td>
</tr>
<tr>
<td>Service gladhand OK.</td>
</tr>
<tr>
<td>Air hose 241, 253, or 254 OK.</td>
</tr>
<tr>
<td>Air hose 230 or 256 OK.</td>
</tr>
<tr>
<td>Load sensing valve control port tee fitting OK.</td>
</tr>
<tr>
<td>Air hose 240 or 243 OK.</td>
</tr>
<tr>
<td>Booster valve OK.</td>
</tr>
<tr>
<td>Service gladhand two-way check valve OK.</td>
</tr>
<tr>
<td>Air hose 145 OK.</td>
</tr>
<tr>
<td>Air hose 120 OK.</td>
</tr>
<tr>
<td>Inversion valve control port 90-degree fitting OK.</td>
</tr>
<tr>
<td>Air hose 128, 130, or 132 OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty emergency gladhand.</td>
</tr>
<tr>
<td>Faulty air hose 155, 157, or 167.</td>
</tr>
<tr>
<td>Faulty air brake protecting valve.</td>
</tr>
</tbody>
</table>

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- If air is present, emergency gladhand is faulty.

3. Is air present at emergency gladhand supply port?

- **NO**
  - Go to step 4 of this fault.

- **YES**
  - Replace emergency gladhand (para 11-24).
Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

(1) Loosen air hose (refer to Table 2-49.1 Emergency Gladhand Hose Numbers) at emergency gladhand.
(2) Start engine (TM 9-2320-366-10-1).
(3) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose (refer to Table 2-49.1. Emergency Gladhand Hose Numbers).
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, go to step 4 of this fault.
(7) If air is present, replace emergency gladhand (para 11-24).
(8) Tighten air hose (refer to Table 2-49.1. Emergency Gladhand Hose Numbers) at emergency gladhand.

Table 2-49.1. Emergency Gladhand Hose Numbers

<table>
<thead>
<tr>
<th>Model</th>
<th>Hose</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Except M1086 and M1089</td>
<td>157</td>
</tr>
<tr>
<td>M1086</td>
<td>167</td>
</tr>
<tr>
<td>M1089</td>
<td>155</td>
</tr>
</tbody>
</table>
**j4. NO AIR PRESSURE PRESENT AT REAR GLANDHAND(S) (ALL MODELS EXCEPT M1088) (CONT)**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle park and service brakes OK.</td>
</tr>
<tr>
<td>Air hoses free from kinks.</td>
</tr>
<tr>
<td>Emergency gladhand OK.</td>
</tr>
<tr>
<td>Air hose 149, 150, or 151 OK.</td>
</tr>
<tr>
<td>Air hose 102 OK.</td>
</tr>
<tr>
<td>Air hose 108 OK.</td>
</tr>
<tr>
<td>TRAILER AIR SUPPLY valve OK.</td>
</tr>
<tr>
<td>Air hose 104 OK.</td>
</tr>
<tr>
<td>Service gladhand OK.</td>
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<tr>
<td>Air hose 241, 253, or 254 OK.</td>
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<td>Air hose 230 or 256 OK.</td>
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<td>Load sensing valve control port tee fitting OK.</td>
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<th>POSSIBLE PROBLEMS</th>
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<tr>
<td>Faulty air hose 155, 157, or 167.</td>
</tr>
<tr>
<td>Faulty air brake protecting valve.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If air is not present, air brake protecting valve is faulty. If air is present, air hose (refer to Table 2-49.2 Emergency Gladhand Hose Numbers) is faulty.</td>
</tr>
</tbody>
</table>

4. Is air present at air brake protecting valve delivery port TRLR E?

- **NO**

- **YES** Replace air brake protecting valve (para 11-18).

Replace air hose (refer to Table 2-49.2. Emergency Gladhand Hose Numbers) (para 11-21).
(1) Loosen air hose (refer to Table 2-49.2. Emergency Gladhand Hose Numbers) at air brake protecting valve delivery port TRLR E.
(2) Start engine (TM 9-2320-366-10-1).
(3) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).
(4) Check for presence of air at air brake protecting valve delivery port TRLR E.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, replace air brake protecting valve (para 11-18).
(7) If air is present, replace air hose (refer to Table 2-49.2. Emergency Gladhand Hose Numbers) (para 11-21).
(8) Tighten air hose (refer to Table 2-49.2. Emergency Gladhand Hose Numbers) at air brake protecting valve delivery port TRLR E.

### Table 2-49.2. Emergency Gladhand Hose Numbers

<table>
<thead>
<tr>
<th>Model</th>
<th>Hose</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Except M1086 and M1089</td>
<td>157</td>
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<tr>
<td>M1086</td>
<td>167</td>
</tr>
<tr>
<td>M1089</td>
<td>155</td>
</tr>
</tbody>
</table>
j4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S) (ALL MODELS EXCEPT M1088) (CONT)

KNOWLEDGE INFO
Vehicle park and service brakes OK.
Air hoses free from kinks.
Emergency gladhand OK.
Air hose 155, 157, or 167 OK.
Service gladhand OK.
Air hose 241, 253, or 254 OK.
Air hose 230 or 256 OK.
Load sensing valve control port tee fitting OK.
Air hose 240 or 243 OK.
Booster valve OK.
Service gladhand two-way check valve OK.
Air hose 145 OK.
Air hose 120 OK.
Inversion valve control port 90-degree fitting OK.
Air hose 128, 130, or 132 OK.

POSSIBLE PROBLEMS
Faulty air hose 149, 150, or 151.
Faulty air hose 102.
Faulty air hose 108.
Faulty TRAILER AIR SUPPLY valve.
Faulty air hose 104.
Faulty air brake protecting valve.

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
If air is present, air brake protecting valve is faulty.

5. Is air present at air brake protecting valve control port TRA E?

YES

Replace air brake protecting valve (para 11-18).

NO

Go to step 6 of this fault.
(1) Loosen air hose (refer to Table 2-49.3. Air Brake Protecting Valve Control Hose Numbers) at air brake protecting valve control port TRA E.

(2) Start engine (TM 9-2320-366-10-1).

(3) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).

(4) Check for presence of air at air hose (refer to Table 2-49.3. Air Brake Protecting Valve Control Hose Numbers).

(5) Shut down engine (TM 9-2320-366-10-1).

(6) If air is not present, go to step 6 of this fault.

(7) If air is present, replace air brake protecting valve (para 11-18).

(8) Tighten air hose (refer to Table 2-49.3. Air Brake Protecting Valve Hose Numbers) at air brake protecting valve control port TRA E.

---

Table 2-49.3. Air Brake Protecting Valve Control Hose Numbers

<table>
<thead>
<tr>
<th>Model</th>
<th>Hose</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Except M1086 and M1089</td>
<td>149</td>
</tr>
<tr>
<td>M1086</td>
<td>150</td>
</tr>
<tr>
<td>M1089</td>
<td>151</td>
</tr>
</tbody>
</table>
j4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S) (ALL MODELS EXCEPT M1088) (CONT)

**KNOWN INFO**

Vehicle park and service brakes OK.
Air hoses free from kinks.
Emergency gladhand OK.
Air hose 155, 157, or 167 OK.
Service gladhand OK.
Air hose 241, 253, or 254 OK.
Air brake protecting valve OK.
Air hose 230 or 256 OK.
Load sensing valve control port tee fitting OK.
Air hose 240 or 243 OK.
Booster valve OK.
Service gladhand two-way check valve OK.
Air hose 145 OK.
Air hose 120 OK.
Inversion valve control port 90-degree fitting OK.
Air hose 128, 130, or 132 OK.

**POSSIBLE PROBLEMS**

Faulty air hose 149, 150, or 151.
Faulty air hose 102.
Faulty air hose 108.
Faulty TRAILER AIR SUPPLY valve.
Faulty air hose 104.

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>Visual inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>REASON FOR QUESTION</td>
<td>If air is present, air hose (refer to Table 2-49.4. Air Brake Protecting Valve Control Hose Numbers) is faulty.</td>
</tr>
</tbody>
</table>

6. Is air present at cab floor fitting?

- **NO**
  - Go to step 7 of this fault.

- **YES**
  - Replace air hose (refer to Table 2-49.4. Air Brake Protecting Valve Control Hose Numbers) (para 11-16).
(1) Loosen air hose 102 at cab floor fitting.
(2) Start engine (TM 9-2320-366-10-1).
(3) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose 102.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, go to step 7 of this fault.
(7) If air is present, replace air hose (refer to Table 2-49.4. Air Brake Protecting Valve Control Hose Numbers) (para 11-21).
(8) Tighten air hose 102 at cab floor fitting.

<table>
<thead>
<tr>
<th>Model</th>
<th>Hose</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Except M1086 and M1089</td>
<td>149</td>
</tr>
<tr>
<td>M1086</td>
<td>150</td>
</tr>
<tr>
<td>M1089</td>
<td>151</td>
</tr>
</tbody>
</table>
j4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S) (ALL MODELS EXCEPT M1088) (CONT)

**KNOWN INFO**
Vehicle park and service brakes OK.
Air hoses free from kinks.
Emergency gladhand OK.
Air hose 155, 157, or 167 OK.
Air hose 149, 150, or 151 OK.
Service gladhand OK.
Air hose 241, 253, or 254 OK.
Air brake protecting valve OK.
Air hose 230 or 256 OK.
Load sensing valve control port tee fitting OK.
Air hose 240 or 243 OK.
Booster valve OK.
Service gladhand two-way check valve OK.
Air hose 145 OK.
Air hose 120 OK.
Inversion valve control port 90-degree fitting OK.
Air hose 128, 130, or 132 OK.

**POSSIBLE PROBLEMS**
Faulty air hose 102.
Faulty air hose 108.
Faulty TRAILER AIR SUPPLY valve.
Faulty air hose 104.

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
If air is present, air hose 102 is faulty.

---

7. Is air present at TRAILER AIR SUPPLY valve delivery port?

If **NO**

If **YES**

Go to step 8 of this fault.

Replace air hose 102 (para 11-21).
(1) Remove roll pins from knobs of SYSTEM PARK and TRAILER AIR SUPPLY valves.
(2) Remove SYSTEM PARK and TRAILER AIR SUPPLY valve knobs.
(3) Unscrew nuts at base of valve stem on each valve.
(4) Remove six screws and dash plate from personnel heater.
(5) Pull out TRAILER AIR SUPPLY valve from personnel heater.
(6) Loosen air hose 102 at TRAILER AIR SUPPLY valve delivery port.
(7) Start engine (TM 9-2320-366-10-1).
(8) Push in SYSTEM PARK control (TM 9-2320-366-10-1).
(9) Push in TRAILER AIR SUPPLY valve stem.
(10) Check for presence of air at TRAILER AIR SUPPLY valve delivery port.
(11) If air is not present, go to step 8 of this fault.
(12) If air is present, replace air hose 102 (para 11-21).
(13) Shut down engine (TM 9-2320-366-10-1).
(14) Tighten air hose 102 at TRAILER AIR SUPPLY valve delivery port.
j4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S) (ALL MODELS EXCEPT M1088) (CONT)

Known Info

Vehicle park and service brakes OK.
Air hoses free from kinks.
Emergency gladhand OK.
Air hose 155, 157, or 167 OK.
Air hose 149, 150, or 151 OK.
Air hose 102 OK.
Service gladhand OK.
Air hose 241, 253, or 254 OK.
Air brake protecting valve OK.
Air hose 230 or 256 OK.
Load sensing valve control port tee fitting OK.
Air hose 240 or 243 OK.
Booster valve OK.
Service gladhand two-way check valve OK.
Air hose 145 OK.
Air hose 120 OK.
Inversion valve control port 90-degree fitting OK.
Air hose 128, 130, or 132 OK.

Possible Problems

Faulty air hose 108.
Faulty TRAILER AIR SUPPLY valve.
Faulty air hose 104.

Test Options

Visual inspection

Reason for Question

If air is not present, air hose 108 is faulty.

Is air present at TRAILER AIR SUPPLY valve control port?

No

Replace air hose 108 (para 11-21).

Yes
(1) Loosen air hose 108 at TRAILER AIR SUPPLY valve control port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Push in SYSTEM PARK control (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose 108.
(5) If air is not present, replace air hose 108 (para 11-21).
(6) Shut down engine (TM 9-2320-366-10-1).
(7) Tighten air hose 108 at TRAILER AIR SUPPLY valve control port.
j4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S) (ALL MODELS EXCEPT M1088) (CONT)

**KNOWN INFO**
- Vehicle park and service brakes OK.
- Air hoses free from kinks.
- Emergency gladhand OK.
- Air hose 155, 157, or 167 OK.
- Air hose 149, 150, or 151 OK.
- Air hose 102 OK.
- Air hose 108 OK.
- Service gladhand OK.
- Air hose 241, 253, or 254 OK.
- Air brake protecting valve OK.
- Air hose 230 or 256 OK.
- Load sensing valve control port tee fitting OK.
- Air hose 240 or 243 OK.
- Booster valve OK.
- Service gladhand two-way check valve OK.
- Air hose 145 OK.
- Air hose 120 OK.
- Inversion valve control port 90-degree fitting OK.
- Air hose 128, 130, or 132 OK.

**POSSIBLE PROBLEMS**
- Faulty TRAILER AIR SUPPLY valve.
- Faulty air hose 104.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- If air is not present, air hose 104 is faulty. If air is present, TRAILER AIR SUPPLY valve is faulty.

**9.**

Is air present at TRAILER AIR SUPPLY valve supply port?

- **NO**
  - Replace air hose 104 (para 11-21).

- **YES**
  - Replace TRAILER AIR SUPPLY valve (para 11-20).
(1) Loosen air hose 104 at TRAILER AIR SUPPLY valve supply port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Push in SYSTEM PARK control (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose 104.
(5) If air is not present, replace air hose 104 (para 11-21).
(6) If air is present, replace TRAILER AIR SUPPLY valve (para 11-20).
(7) Shut down engine (TM 9-2320-366-10-1).
(8) Tighten air hose 104 at TRAILER AIR SUPPLY valve supply port.
(9) Push SYSTEM PARK and TRAILER AIR SUPPLY valves back into personnel heater.
(10) Install dash plate on personnel heater with six screws.
(11) Install nuts on valve stems.
(12) Install SYSTEM PARK and TRAILER AIR SUPPLY knobs.
j4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S) (ALL MODELS EXCEPT M1088) (CONT)

**KNOW INFO**

Vehicle park and service brakes OK.
Air hoses free from kinks.
Emergency gladhand OK.
Air hose 155, 157, or 167 OK.
Air hose 149, 150, or 151 OK.
Air hose 102 OK.
Air hose 108 OK.
TRAILER AIR SUPPLY valve OK.
Air hose 104 OK.

**POSSIBLE PROBLEMS**

Faulty service gladhand.
Faulty air hose 241, 253, or 254.
Faulty air brake protecting valve.
Faulty air hose 230 or 256.
Faulty load sensing valve control port tee fitting.
Faulty air hose 240 or 243.
Faulty booster valve.
Faulty service gladhand two-way check valve.
Faulty air hose 145.
Faulty air hose 120.
Faulty inversion valve control port 90-degree fitting.
Faulty air hose 128, 130, or 132.

**TEST OPTIONS**

- Visual inspection

**REASON FOR QUESTION**

If air is present, service gladhand is faulty.

10. Is air present at service gladhand supply port?

- YES
  - Go to step 11 of this fault.
- NO
  - Replace service gladhand (para 11-24).
WARNING

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

(1) Loosen air hose (refer to Table 2-49.5. Service Gladhand Hose Numbers) at service gladhand.
(2) Start engine (TM 9-2320-366-10-1).
(3) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).
(4) Apply service brakes (TM 9-2320-366-10-1).
(5) Check for presence of air at air hose (refer to Table 2-49.5. Service Gladhand Hose Numbers).
(6) Shut down engine (TM 9-2320-366-10-1).
(7) If air is not present, go to step 11 of this fault.
(8) If air is present, replace service gladhand (para 11-24).
(9) Tighten air hose (refer to Table 2-49.5. Service Gladhand Hose Numbers) at service gladhand.

Table 2-49.5. Service Gladhand Hose Numbers

<table>
<thead>
<tr>
<th>Model</th>
<th>Hose</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Except M1086 and M1089</td>
<td>241</td>
</tr>
<tr>
<td>M1086</td>
<td>254</td>
</tr>
<tr>
<td>M1089</td>
<td>253</td>
</tr>
</tbody>
</table>
TM 9-2320-366-20-2

j4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S) (ALL MODELS EXCEPT M1088) (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle park and service brakes OK.</td>
</tr>
<tr>
<td>Air hoses free from kinks.</td>
</tr>
<tr>
<td>Emergency gladhand OK.</td>
</tr>
<tr>
<td>Air hose 155, 157, or 167 OK.</td>
</tr>
<tr>
<td>Service gladhand OK.</td>
</tr>
<tr>
<td>Air hose 149, 150, or 151 OK.</td>
</tr>
<tr>
<td>Air hose 102 OK.</td>
</tr>
<tr>
<td>Air hose 108 OK.</td>
</tr>
<tr>
<td>TRAILER AIR SUPPLY valve OK.</td>
</tr>
<tr>
<td>Air hose 104 OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty air hose 241, 253, or 254.</td>
</tr>
<tr>
<td>Faulty air brake protecting valve.</td>
</tr>
<tr>
<td>Faulty air hose 230 or 256.</td>
</tr>
<tr>
<td>Faulty load sensing valve control port tee fitting.</td>
</tr>
<tr>
<td>Faulty air hose 240 or 243.</td>
</tr>
<tr>
<td>Faulty booster valve.</td>
</tr>
<tr>
<td>Faulty service gladhand two-way check valve.</td>
</tr>
<tr>
<td>Faulty air hose 145.</td>
</tr>
<tr>
<td>Faulty air hose 120.</td>
</tr>
<tr>
<td>Faulty inversion valve control port 90-degree fitting.</td>
</tr>
<tr>
<td>Faulty air hose 128, 130, or 132.</td>
</tr>
</tbody>
</table>

11. Is air present at air brake protecting valve delivery port TRLR S?

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If air is present, air hose (refer to Table 2-49.6. Service Gladhand Hose Numbers) is faulty.</td>
</tr>
</tbody>
</table>

- **NO**
  - Go to step 12 of this fault.

- **YES**
  - Replace air hose (refer to Table 2-49.6. Service Gladhand Hose Numbers) (para 11-21).
(1) Loosen air hose (refer to Table 2-49.6. Service Gladhand Hose Numbers) at air brake protecting valve delivery port TRLR S.
(2) Start engine (TM 9-2320-366-10-1).
(3) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).
(4) Apply service brakes (TM 9-2320-366-10-1).
(5) Check for presence of air at air brake protecting valve delivery port TRLR S.
(6) Shut down engine (TM 9-2320-366-10-1).
(7) If air is not present, go to step 12 of this fault.
(8) If air is present, replace air hose (refer to Table 2-49.6. Service Gladhand Hose Numbers) (para 11-21).
(9) Tighten air hose (refer to Table 2-49.6. Service Gladhand Hose Numbers) at air brake protecting valve delivery port TRLR S.

<table>
<thead>
<tr>
<th>Model</th>
<th>Hose</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Except M1086 and M1089</td>
<td>241</td>
</tr>
<tr>
<td>M1086</td>
<td>254</td>
</tr>
<tr>
<td>M1089</td>
<td>253</td>
</tr>
</tbody>
</table>
12. **Is air present at air brake protecting valve supply port FV1?**

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle park and service brakes OK.</td>
</tr>
<tr>
<td>Air hoses free from kinks.</td>
</tr>
<tr>
<td>Emergency gladhand OK.</td>
</tr>
<tr>
<td>Air hose 155, 157, or 167 OK.</td>
</tr>
<tr>
<td>Service gladhand OK.</td>
</tr>
<tr>
<td>Air hose 149, 150, or 151 OK.</td>
</tr>
<tr>
<td>Air hose 102 OK.</td>
</tr>
<tr>
<td>Air hose 108 OK.</td>
</tr>
<tr>
<td>TRAILER AIR SUPPLY valve OK.</td>
</tr>
<tr>
<td>Air hose 104 OK.</td>
</tr>
<tr>
<td>Air hose 241, 253, or 254 OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty air brake protecting valve.</td>
</tr>
<tr>
<td>Faulty air hose 230 or 256.</td>
</tr>
<tr>
<td>Faulty load sensing valve control port tee fitting.</td>
</tr>
<tr>
<td>Faulty air hose 240 or 243.</td>
</tr>
<tr>
<td>Faulty booster valve.</td>
</tr>
<tr>
<td>Faulty service gladhand two-way check valve.</td>
</tr>
<tr>
<td>Faulty air hose 145.</td>
</tr>
<tr>
<td>Faulty air hose 120.</td>
</tr>
<tr>
<td>Faulty inversion valve control port 90-degree fitting.</td>
</tr>
<tr>
<td>Faulty air hose 128, 130, or 132.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>This question eliminates possible problems and determines where troubleshooting continues.</td>
</tr>
</tbody>
</table>

**NO**

**YES**

Go to step 14 of this fault (all models except M1089) or step 16 of this fault (M1089).
(1) Loosen air hose (refer to Table 2-49.7. Air Brake Protecting Valve Supply Hose Numbers) at air brake protecting valve supply port FV1.
(2) Start engine (TM 9-2320-366-10-1).
(3) Apply service brakes (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose (refer to Table 2-49.7. Air Brake Protecting Valve Supply Hose Numbers).
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, go to step 14 of this fault (all models except M1089) or step 16 of this fault (M1089).
(7) Tighten air hose (refer to Table 2-49.7. Air Brake Protecting Valve Supply Hose Numbers) at air brake protecting valve supply port FV1.

Table 2-49.7. Air Brake Protecting Valve Supply Hose Numbers

<table>
<thead>
<tr>
<th>Model</th>
<th>Hose</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Except M1089</td>
<td>230</td>
</tr>
<tr>
<td>M1089</td>
<td>256</td>
</tr>
</tbody>
</table>
4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S) (ALL MODELS EXCEPT M1088) (CONT)

**KNOWN INFO**

Vehicle park and service brakes OK.
Air hoses free from kinks.
Emergency gladhand OK.
Air hose 155, 157, or 167 OK.
Service gladhand OK.
Air hose 149, 150, or 151 OK.
Air hose 102 OK.
Air hose 108 OK.
TRAILER AIR SUPPLY valve OK.
Air hose 104 OK.
Air hose 241, 253, or 254 OK.
Air hose 230 or 256 OK.
Load sensing valve control port tee fitting OK.
Air hose 240 or 243 OK.
Booster valve OK.
Service gladhand two-way check valve OK.
Air hose 145 OK.

**POSSIBLE PROBLEMS**

Faulty air brake protecting valve.
Faulty air hose 120.
Faulty inversion valve control port 90-degree fitting.
Faulty air hose 128, 130, or 132.

**TEST OPTIONS**

Visual Inspection

**REASON FOR QUESTION**

If air is present, air brake protecting valve is faulty.

13. Is air present at air brake protecting valve supply port FV2?

- **NO**
  - Go to step 19 of this fault.

- **YES**
  - Replace air brake protecting valve (para 11-18).
(1) Loosen air hose 120 at air brake protecting valve supply port FV2.
(2) Start engine (TM 9-2320-366-10-1).
(3) Apply service brakes (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose 120.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, go to step 19 of this fault.
(7) If air is present, replace air brake protecting valve (para 11-18).
(8) Tighten air hose 120 at air brake protecting valve supply port FV2.
j4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S) (ALL MODELS EXCEPT M1088) (CONT)

**KNOWN INFO**
- Vehicle park and service brakes OK.
- Air hoses free from kinks.
- Emergency gladhand OK.
- Air hose 155, 157, or 167 OK.
- Service gladhand OK.
- Air hose 149, 150, or 151 OK.
- Air hose 102 OK.
- Air hose 108 OK.
- TRAILER AIR SUPPLY valve OK.
- Air hose 104 OK.
- Air hose 241, 253, or 254 OK.
- Air brake protecting valve OK.
- Air hose 120 OK.
- Inversion valve control port 90-degree fitting OK.
- Air hose 128, 130, or 132 OK.

**POSSIBLE PROBLEMS**
- Faulty air hose 230.
- Faulty load sensing valve control port tee fitting.
- Faulty air hose 240 or 243.
- Faulty booster valve.
- Faulty service gladhand two-way check valve.
- Faulty air hose 145.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- If air is present, air hose 230 is faulty.

14. Is air present at load sensing valve control port tee fitting delivery port?

- **NO**
  - Go to step 15 of this fault.

- **YES**
  - Replace air hose 230 (para 11-21).
(1) Loosen air hose 230 at load sensing valve control port tee fitting delivery port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Apply service brakes (TM 9-2320-366-10-1).
(4) Check for presence of air at load sensing valve control port tee fitting delivery port.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, go to step 15 of this fault.
(7) If air is present, replace air hose 230 (para 11-21).
(8) Tighten air hose 230 at load sensing valve control port tee fitting delivery port.
j4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S) (ALL MODELS EXCEPT M1088) (CONT)

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
If air is present, load sensing valve control port tee fitting supply port?

**KNOWN INFO**
- Vehicle park and service brakes OK.
- Air hoses free from kinks.
- Emergency gladhand OK.
- Air hose 155, 157, or 167 OK.
- Service gladhand OK.
- Air hose 149, 150, or 151 OK.
- Air hose 102 OK.
- Air hose 108 OK.
- TRAILER AIR SUPPLY valve OK.
- Air hose 104 OK.
- Air hose 241, 253, or 254 OK.
- Air brake protecting valve OK.
- Air hose 230 OK.
- Air hose 120 OK.
- Inversion valve control port 90-degree fitting OK.
- Air hose 128, 130, or 132 OK.

**POSSIBLE PROBLEMS**
- Faulty load sensing valve control port tee fitting.
- Faulty air hose 240 or 243.
- Faulty booster valve.
- Faulty service gladhand two-way check valve.
- Faulty air hose.

15. Is air present at load sensing valve control port tee fitting supply port?

- **YES**
  - Go to step 16 of this fault.

- **NO**
  - Replace load sensing valve control port tee fitting (para 11-10).
(1) Loosen air hose (refer to Table 2-49.8. Load Sensing Valve Control Port Tee Hose Numbers) at load sensing valve control port tee fitting supply port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Apply service brakes (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose (refer to Table 2-49.8. Load Sensing Valve Control Port Tee Hose Numbers).
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, go to step 16 of this fault.
(7) If air is present, replace load sensing valve control port tee fitting (para 11-10).
(8) Tighten air hose (refer to Table 2-49.8. Load Sensing Valve Control Port Tee Hose Numbers) at load sensing valve control port tee fitting supply port.

Table 2-49.8. Load Sensing Valve Control Port Tee Hose Numbers

<table>
<thead>
<tr>
<th>Model</th>
<th>Hose</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Except M1086</td>
<td>240</td>
</tr>
<tr>
<td>M1086</td>
<td>243</td>
</tr>
</tbody>
</table>
**TM 9-2320-366-20-2**

### j4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S) (ALL MODELS EXCEPT M1088) (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle park and service brakes OK.</td>
</tr>
<tr>
<td>Air hoses free from kinks.</td>
</tr>
<tr>
<td>Emergency gladhand OK.</td>
</tr>
<tr>
<td>Air hose 155, 157, or 167 OK.</td>
</tr>
<tr>
<td>Service gladhand OK.</td>
</tr>
<tr>
<td>Air hose 149, 150, or 151 OK.</td>
</tr>
<tr>
<td>Air hose 102 OK.</td>
</tr>
<tr>
<td>Air hose 108 OK.</td>
</tr>
<tr>
<td>TRAILER AIR SUPPLY valve OK.</td>
</tr>
<tr>
<td>Air hose 104 OK.</td>
</tr>
<tr>
<td>Air hose 241, 253, or 254 OK.</td>
</tr>
<tr>
<td>Air brake protecting valve OK.</td>
</tr>
<tr>
<td>Air hose 230 OK.</td>
</tr>
<tr>
<td>Load sensing valve control port tee fitting OK.</td>
</tr>
<tr>
<td>Air hose 120 OK.</td>
</tr>
<tr>
<td>Inversion valve control port 90-degree fitting OK.</td>
</tr>
<tr>
<td>Air hose 128, 130, or 132 OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty air hose 240, 243, or 256.</td>
</tr>
<tr>
<td>Faulty booster valve.</td>
</tr>
<tr>
<td>Faulty service gladhand two-way check valve.</td>
</tr>
<tr>
<td>Faulty air hose 145.</td>
</tr>
</tbody>
</table>

---

**TEST OPTIONS**

- Visual inspection

**REASON FOR QUESTION**

If air is present, air hose (refer to Table 2-49.9. Booster Valve Delivery Hose Numbers) is faulty.

---

16. Is air present at booster valve delivery port?

---

**If NO**

Go to step 17 of this fault.

---

**If YES**

Replace air hose (refer to Table 2-49.9. Booster Valve Delivery Hose Numbers) (para 11-21).
(1) Loosen air hose (refer to Table 2-49.9. Booster Valve Delivery Hose Numbers) at booster valve delivery port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Apply service brakes (TM 9-2320-366-10-1).
(4) Check for presence of air at booster valve delivery port.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, go to step 17 of this fault.
(7) If air is present, replace air hose (refer to Table 2-49.9. Booster Valve Delivery Hose Numbers) (para 11-21).
(8) Tighten air hose (refer to Table 2-49.9. Booster Valve Delivery Hose Numbers) at booster valve delivery port.

### Table 2-49.9. Booster Valve Delivery Hose Numbers

<table>
<thead>
<tr>
<th>Model</th>
<th>Hose</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Except M1086 and M1089</td>
<td>240</td>
</tr>
<tr>
<td>M1086</td>
<td>243</td>
</tr>
<tr>
<td>M1089</td>
<td>256</td>
</tr>
</tbody>
</table>
j4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S) (ALL MODELS EXCEPT M1088) (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle park and service brakes OK.</td>
</tr>
<tr>
<td>Air hoses free from kinks.</td>
</tr>
<tr>
<td>Emergency gladhand OK.</td>
</tr>
<tr>
<td>Air hose 155, 157, or 167 OK.</td>
</tr>
<tr>
<td>Service gladhand OK.</td>
</tr>
<tr>
<td>Air hose 149, 150, or 151 OK.</td>
</tr>
<tr>
<td>Air hose 102 OK.</td>
</tr>
<tr>
<td>Air hose 108 OK.</td>
</tr>
<tr>
<td>TRAILER AIR SUPPLY valve OK.</td>
</tr>
<tr>
<td>Air hose 104 OK.</td>
</tr>
<tr>
<td>Air hose 241, 253, or 254 OK.</td>
</tr>
<tr>
<td>Air brake protecting valve OK.</td>
</tr>
<tr>
<td>Air hose 230 or 256 OK.</td>
</tr>
<tr>
<td>Load sensing valve control port tee fitting OK.</td>
</tr>
<tr>
<td>Air hose 240 or 243 OK.</td>
</tr>
<tr>
<td>Air hose 120 OK.</td>
</tr>
<tr>
<td>Inversion valve control port 90-degree fitting OK.</td>
</tr>
<tr>
<td>Air hose 128, 130, or 132 OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty booster valve.</td>
</tr>
<tr>
<td>Faulty service gladhand two-way check valve.</td>
</tr>
<tr>
<td>Faulty air hose 145.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If air is present, booster valve is faulty.</td>
</tr>
</tbody>
</table>

17. Is air present at booster valve supply port?

- **NO**
  - Go to step 18 of this fault.

- **YES**
  - Replace booster valve (para 11-15).
(1) Loosen air hose 145 at booster valve supply port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Apply service brakes (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose 145.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, go to step 18 of this fault.
(7) If air is present, replace booster valve (para 11-15).
(8) Tighten air hose 145 at booster valve supply port.
j4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S) (ALL MODELS EXCEPT M1088) (CONT)

**KNOWN INFO**
- Vehicle park and service brakes OK.
- Air hoses free from kinks.
- Emergency gladhand OK.
- Air hose 155, 157, or 167 OK.
- Service gladhand OK.
- Air hose 149, 150, or 151 OK.
- Air hose 102 OK.
- Air hose 108 OK.
- TRAILER AIR SUPPLY valve OK.
- Air hose 104 OK.
- Air hose 241, 253, or 254 OK.
- Air brake protecting valve OK.
- Air hose 230 or 256 OK.
- Load sensing valve control port tee fitting OK.
- Air hose 240 or 243 OK.
- Booster valve OK.
- Air hose 120 OK.
- Inversion valve control port 90-degree fitting OK.
- Air hose 128, 130, or 132 OK.

**POSSIBLE PROBLEMS**
- Faulty service gladhand two-way check valve.
- Faulty air hose 145.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- If air is not present, service gladhand two-way check valve is faulty. If air is present, air hose 145 is faulty.

18. Is air present at service gladhand two-way check valve delivery port?

- **NO**
  - Replace service gladhand two-way check valve (para 11-25).

- **YES**
  - Replace air hose 145 (para 11-21).
(1) Raise cab (TM 9-2320-366-10-1).
(2) Loosen air hose 145 at service gladhand two-way check valve delivery port.
(3) Start engine (TM 9-2320-366-10-1).
(4) Apply service brakes (TM 9-2320-366-10-1).
(5) Check for presence of air at service gladhand two-way check valve delivery port.
(6) Shut down engine (TM 9-2320-366-10-1).
(7) If air is not present, replace service gladhand two-way check valve (para 11-25).
(8) If air is present, replace air hose 145 (para 11-21).
(9) Tighten air hose 145 at service gladhand two-way check valve delivery port.
(10) Lower cab (TM 9-2320-366-10-1).
j4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S)  
(ALL MODELS EXCEPT M1088) (CONT)

**KNOWN INFO**
- Vehicle park and service brakes OK.
- Air hoses free from kinks.
- Emergency gladhand OK.
- Air hose 155, 157, or 167 OK.
- Service gladhand OK.
- Air hose 149, 150, or 151 OK.
- Air hose 102 OK.
- Air hose 108 OK.
- TRAILER AIR SUPPLY valve OK.
- Air hose 104 OK.
- Air hose 241, 253, or 254 OK.
- Air hose 230 or 256 OK.
- Load sensing valve control port tee fitting OK.
- Air hose 240 or 243 OK.
- Booster valve OK.
- Service gladhand two-way check valve OK.
- Air hose 145 OK.
- Air brake protecting valve OK.

**POSSIBLE PROBLEMS**
- Faulty air hose 120.
- Faulty inversion valve control port 90-degree fitting.
- Faulty air hose 128, 130, or 132.

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If air is present, air hose 120 is faulty.</td>
</tr>
</tbody>
</table>

19. Is air present at inversion valve control port 90-degree fitting delivery port?

- **NO**
  - Go to step 20 of this fault.

- **YES**
  - Replace air hose 120 (para 11-21).
(1) Loosen air hose 120 at inversion valve control port 90-degree fitting delivery port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Apply service brakes (TM 9-2320-366-10-1).
(4) Check for presence of air at inversion valve control port 90-degree fitting delivery port.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, go to step 20 of this fault.
(7) If air is present, replace air hose 120 (para 11-21).
(8) Tighten air hose 120 at inversion valve control port 90-degree fitting delivery port.
4. NO AIR PRESSURE PRESENT AT REAR GLADHAND(S) (ALL MODELS EXCEPT M1088) (CONT)

**KNOWN INFO**
- Vehicle park and service brakes OK.
- Air hoses free from kinks.
- Emergency gladhand OK.
- Air hose 155, 157, or 167 OK.
- Service gladhand OK.
- Air hose 149, 150, or 151 OK.
- Air hose 102 OK.
- Air hose 108 OK.
- TRAILER AIR SUPPLY valve OK.
- Air hose 104 OK.
- Air hose 241, 253, or 254 OK.
- Air hose 230 or 256 OK.
- Load sensing valve control port tee fitting OK.
- Air hose 240 or 243 OK.
- Booster valve OK.
- Service gladhand two-way check valve OK.
- Air hose 145 OK.
- Air brake protecting valve OK.
- Air hose 120 OK.

**POSSIBLE PROBLEMS**
- Faulty inversion valve control port 90-degree fitting.
- Faulty air hose 128, 130, or 132.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
If air is not present, air hose (refer to Table 2-49.10. Inversion Valve Control Port Fitting Hose Numbers) is faulty. If air is present, inversion valve control port 90-degree fitting is faulty.

**20.** Is air present at inversion valve control port 90-degree fitting supply port?

- **NO**
  - Replace air hose (refer to Table 2-49.10. Inversion Valve Control Port Fitting Hose Numbers) (para 11-21).

- **YES**
  - Replace inversion valve control port 90-degree fitting (para 11-13).
(1) Loosen air hose (refer to Table 2-49.10. Inversion Valve Control Port Fitting Hose Numbers) at inversion valve control port 90-degree fitting supply port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Apply service brakes (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose (refer to Table 2-49.10. Inversion Valve Control Port Fitting Hose Numbers).
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, replace air hose (refer to Table 2-49.10. Inversion Valve Control Port Fitting Hose Numbers) (para 11-21).
(7) If air is present, replace inversion valve control port 90-degree fitting (para 11-13).
(8) Tighten air hose (refer to Table 2-49.10. Inversion Valve Control Port Fitting Hose Numbers) at inversion valve control port 90-degree fitting supply port.

Table 2-49.10. Inversion Valve Control Port Fitting Hose Numbers

<table>
<thead>
<tr>
<th>Model</th>
<th>Hose</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Except M1086 and M1089</td>
<td>130</td>
</tr>
<tr>
<td>M1086</td>
<td>132</td>
</tr>
<tr>
<td>M1089</td>
<td>128</td>
</tr>
</tbody>
</table>
J4A. NO AIR PRESSURE PRESENT AT ALL M1088 REAR AND FIFTH WHEEL GLADHANDS

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

KNOWLEDGE

WARNING
Read WARNING on following page.

POSSIBLE PROBLEMS
Faulty air brake protecting valve.
Faulty air hose 134.
Faulty air hose 102.
Faulty air hose 108.
Faulty air hose 104.
Faulty TRAILER AIR SUPPLY valve.

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
If air is present, air brake protecting valve is faulty.

START

1. Is air present at air brake protecting valve control port TRA E?

NO

YES

Replace air brake protecting valve (para 11-18).

Go to step 2 of this fault.

WARNING
Read WARNING on following page.
WARNING

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

(1) Loosen air hose 134 at air brake protecting valve control port TRA E.
(2) Start engine (TM 9-2320-366-10-1).
(3) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose 134.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, go to step 2 of this fault.
(7) If air is present, replace air brake protecting valve (para 11-18).
(8) Tighten air hose 134 at air brake protecting valve control port TRA E.
j4A. NO AIR PRESSURE PRESENT AT ALL M1088 REAR AND FIFTH WHEEL GLADHANDS (CONT)

**KNOWN INFO**
- Vehicle park and service brakes OK.
- Air hoses free from kinks.
- Air brake protecting valve OK.

**POSSIBLE PROBLEMS**
- Faulty air hose 134.
- Faulty air hose 102.
- Faulty air hose 108.
- Faulty air hose 104.
- Faulty TRAILER AIR SUPPLY valve.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- If air is present, air hose 134 is faulty.

---

2.

Is air present at cab floor fitting?

- **NO**
  - Go to step 3 of this fault.

- **YES**
  - Replace air hose 134 (para 11-21).

---

3.

Is air present at TRAILER AIR SUPPLY valve delivery port?

- **NO**
  - Go to step 4 of this fault.

- **YES**
  - Replace air hose 102 (para 11-21).
(1) Remove roll pins from knobs of SYSTEM PARK and TRAILER AIR SUPPLY valves.
(2) Remove SYSTEM PARK and TRAILER AIR SUPPLY valve knobs.
(3) Unscrew nuts at base of valve stem on each valve.
(4) Remove six screws and dash plate from personnel heater.
(5) Pull out TRAILER AIR SUPPLY valve from personnel heater.
(6) Loosen air hose 102 at TRAILER AIR SUPPLY valve delivery port.
(7) Start engine (TM 9-2320-366-10-1).
(8) Push in SYSTEM PARK control (TM 9-2320-366-10-1).
(9) Push in TRAILER AIR SUPPLY valve stem.
(10) Check for presence of air at TRAILER AIR SUPPLY valve delivery port.
(11) If air is not present, go to step 4 of this fault.
(12) If air is present, replace air hose 102 (para 11-21).
(13) Shut down engine (TM 9-2320-366-10-1).
(14) Tighten air hose 102 at TRAILER AIR SUPPLY valve delivery port.

(1) Loosen air hose 102 at cab floor fitting.
(2) Start engine (TM 9-2320-366-10-1).
(3) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose 102.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, go to step 3 of this fault.
(7) If air is present, replace air hose 134 (para 11-21).
(8) Tighten air hose 102 at cab floor fitting.
4A. NO AIR PRESSURE PRESENT AT ALL M1088 REAR AND FIFTH WHEEL GLADHANDS (CONT)

**KNOWN INFO**
Vehicle park and service brakes OK.
Air hoses free from kinks.
Air brake protecting valve OK.
Air hose 134 OK.
Air hose 102 OK.

**POSSIBLE PROBLEMS**
Faulty air hose 108.
Faulty air hose 104.
Faulty TRAILER AIR SUPPLY valve.

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
If air is not present, air hose 108 is faulty.

4. Is air present at TRAILER AIR SUPPLY valve control port?

**YES**
Replace air hose 108 (para 11-21).

**NO**

5. Is air present at TRAILER AIR SUPPLY valve supply port?

**YES**
Replace air hose 104 (para 11-21).

**NO**
Replace TRAILER AIR SUPPLY valve (para 11-20).
(1) Loosen air hose 108 at TRAILER AIR SUPPLY valve control port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Push in SYSTEM PARK control (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose 108.
(5) If air is not present, replace air hose 108 (para 11-21).
(6) Shut down engine (TM 9-2320-366-10-1).
(7) Tighten air hose 108 at TRAILER AIR SUPPLY valve control port.

(1) Loosen air hose 104 at TRAILER AIR SUPPLY valve supply port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Push in SYSTEM PARK control (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose 104.
(5) If air is not present, replace air hose 104 (para 11-21).
(6) If air is present, replace TRAILER AIR SUPPLY valve (para 11-20).
(7) Shut down engine (TM 9-2320-366-10-1).
(8) Tighten air hose 104 at TRAILER AIR SUPPLY valve supply port.
(9) Push SYSTEM PARK and TRAILER AIR SUPPLY valves back into personnel heater.
(10) Install dash plate on personnel heater with six screws.
(11) Install nuts on valve stems.
(12) Install SYSTEM PARK and TRAILER AIR SUPPLY knobs.
### INITIAL SETUP

**Equipment Conditions**
Engine shut down (TM 9-2320-366-10-1).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)

---

#### KNOWN INFO

- Vehicle park and service brakes OK.
- Air hoses free from kinks.
- Air present at rear and fifth wheel service gladhands.

#### POSSIBLE PROBLEMS

- Faulty rear or fifth wheel emergency gladhand.
- Faulty air hose 163 or 170.
- Faulty emergency gladhand selector valve.
- Faulty air hose 165.
- Faulty air brake protecting valve.

---

1. **Is air present at either emergency gladhand?**

   - **NO**
     - Go to step 4 of this fault.
   - **YES**
     - Go to step 4 of this fault.

---

**TEST OPTIONS**

- Visual inspection

**REASON FOR QUESTION**

This question eliminates possible problems and determines where troubleshooting continues.
1. Disconnect dummy coupling from rear emergency gladhand.
5. Check for presence of air at rear emergency gladhand.
7. Connect dummy coupling to rear emergency gladhand.
8. Disconnect fifth wheel emergency gladhand from dummy coupling.
12. Check for presence of air at fifth wheel emergency gladhand.
14. Connect fifth wheel emergency gladhand to dummy coupling.
15. If air is not present at both emergency gladhands, go to step 4 of this fault.
4B. NO AIR PRESSURE PRESENT AT M1088 REAR AND/OR FIFTH WHEEL EMERGENCY GLADHAND(S) (CONT)

**KNOWN INFO**
Vehicle park and service brakes OK.
Air hoses free from kinks.
Air present at rear and fifth wheel service gladhands.
Air hose 165 OK.
Air brake protecting valve OK.

**POSSIBLE PROBLEMS**
Faulty rear or fifth wheel emergency gladhand.
Faulty air hose 163 or 170.
Faulty emergency gladhand selector valve.

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
If air is present, affected emergency gladhand is faulty.

2.
Is air present at affected emergency gladhand supply port?

**YES**
Replace rear emergency gladhand (para 11-24) or fifth wheel emergency gladhand (para 11-33).

**NO**
Go to step 3 of this fault.

3.
Is air present at emergency gladhand selector valve output to affected emergency gladhand?

**YES**
Replace emergency gladhand selector valve (para 11-33).

**NO**

**KNOWN INFO**
Vehicle park and service brakes OK.
Air hoses free from kinks.
Air present at rear and fifth wheel service gladhands.
Rear and fifth wheel emergency gladhands OK.
Air hose 165 OK.
Air brake protecting valve OK.

**POSSIBLE PROBLEMS**
Faulty air hose 163 or 170.
Faulty emergency gladhand selector valve.

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
If air is not present, emergency gladhand selector valve is faulty. If air is present, air hose 163 or 170 is faulty.

Replace emergency gladhand selector valve (para 11-33).

Replace air hose 163 or 170 (para 11-21).
(1) Loosen air hose 163 at rear emergency gladhand or air hose 170 at fifth wheel emergency gladhand.
(2) Position emergency gladhand selector valve to affected gladhand (TM 9-2320-366-10-1).
(3) Start engine (TM 9-2320-366-10-1).
(4) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).
(5) Check for presence of air at air hose 163 or 170.
(6) Shut down engine (TM 9-2320-366-10-1).
(7) If air is not present, go to step 3 of this fault.
(8) If air is present, replace rear emergency gladhand (para 11-24) or fifth wheel emergency gladhand (para 11-33).
(9) Tighten air hose 163 at rear emergency gladhand or air hose 170 at fifth wheel emergency gladhand.

(1) Loosen air hose 163 (rear emergency gladhand) or 170 (fifth wheel emergency gladhand) at emergency gladhand selector valve output to affected gladhand.
(2) Position emergency gladhand selector valve to affected gladhand (TM 9-2320-366-10-1).
(3) Start engine (TM 9-2320-366-10-1).
(4) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).
(5) Check for presence of air at emergency gladhand selector valve output to affected emergency gladhand.
(6) Shut down engine (TM 9-2320-366-10-1).
(7) If air is not present, replace emergency gladhand selector valve (para 11-33).
(8) If air is present, replace air hose 163 or 170 (para 11-21).
(9) Tighten air hose 163 (rear emergency gladhand) or 170 (fifth wheel emergency gladhand) at emergency gladhand selector valve output to affected gladhand.
4B. NO AIR PRESSURE PRESENT AT M1088 REAR AND/OR FIFTH WHEEL EMERGENCY GLADHAND(S) (CONT)

KNOWN INFO
Vehicle park and service brakes OK.
Air hoses free from kinks.
Air present at rear and fifth wheel service gladhands.
Rear and fifth wheel emergency gladhands OK.
Air hoses 163 and 170 OK.

POSSIBLE PROBLEMS
Faulty emergency gladhand selector valve.
Faulty air hose 165.
Faulty air brake protecting valve.

4. Is air present at emergency gladhand selector valve supply port?

NO

YES

Go to step 5 of this fault.

Replace emergency gladhand selector valve (para 11-33).

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
If air is present, emergency gladhand selector valve is faulty.

5. Is air present at air brake protecting valve delivery port TRLR E?

NO

YES

Replace air brake protecting valve (para 11-18).

Replace air hose 165 (para 11-21).

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
If air is not present, air brake protecting valve is faulty. If air is present, air hose 165 is faulty.

KNOWN INFO
Vehicle park and service brakes OK.
Air hoses free from kinks.
Air present at rear and fifth wheel service gladhands.
Rear and fifth wheel emergency gladhands OK.
Air hoses 163 and 170 OK.
Emergency gladhand selector valve OK.

POSSIBLE PROBLEMS
Faulty air hose 165.
Faulty air brake protecting valve.
(1) Loosen air hose 165 at emergency gladhand selector valve supply port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose 165.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, go to step 5 of this fault.
(7) If air is present, replace emergency gladhand selector valve (para 11-33).
(8) Tighten air hose 165 at emergency gladhand selector valve supply port.

(1) Loosen air hose 165 at air brake protecting valve delivery port TRLR E.
(2) Start engine (TM 9-2320-366-10-1).
(3) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).
(4) Check for presence of air at air brake protecting valve delivery port TRLR E.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, replace air brake protecting valve (para 11-18).
(7) If air is present, replace air hose 165 (para 11-21).
(8) Tighten air hose 165 at air brake protecting valve delivery port TRLR E.
J4C. NO AIR PRESSURE PRESENT AT M1088 REAR AND/OR FIFTH WHEEL SERVICE GLADHAND(S)

INITIAL SETUP

**Equipment Conditions**
Engine shut down (TM 9-2320-366-10-1).

**Tools and Special Tools**
Tool Kit, Genl Mech (Item 46, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

---

**KNOWN INFO**

Vehicle park and service brakes OK.
Air hoses free from kinks.
Air present at rear and fifth wheel emergency gladhands.

**POSSIBLE PROBLEMS**

Faulty rear or fifth wheel service gladhand.
Faulty air hose 257 or 263.
Faulty service gladhand selector valve.
Faulty air hose 258.
Faulty air hose 135.
Faulty air brake protecting valve.
Faulty air hose 256.
Faulty booster valve.
Faulty service gladhand two-way check valve.
Faulty air hose 145.

---

**TEST OPTIONS**

Visual inspection

**REASON FOR QUESTION**

This question eliminates possible problems and determines where troubleshooting continues.

---

**START**

1. Is air present at either service gladhand?

**NO**

**YES**

Go to step 4 of this fault.
(1) Disconnect dummy coupling from rear service gladhand.
(2) Position service gladhand selector valve handle to rear position (TM 9-2320-366-10-1).
(3) Start engine (TM 9-2320-366-10-1).
(4) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).
(5) Apply service brakes (TM 9-2320-366-10-1).
(6) Check for presence of air at rear service gladhand.
(7) Shut down engine (TM 9-2320-366-10-1).
(8) Connect dummy coupling to rear service gladhand.
(9) Disconnect fifth wheel service gladhand from dummy coupling.
(10) Position service gladhand selector valve handle to fifth wheel position (TM 9-2320-366-10-1).
(11) Start engine (TM 9-2320-366-10-1).
(13) Apply service brakes (TM 9-2320-366-10-1).
(14) Check for presence of air at fifth wheel service gladhand.
(15) Shut down engine (TM 9-2320-366-10-1).
(16) Connect fifth wheel service gladhand to dummy coupling.
(17) If air is not present at both service gladhands, go to step 4 of this fault.
j4C. NO AIR PRESSURE PRESENT AT M1088 REAR AND/OR FIFTH WHEEL SERVICE GLADHAND(S) (CONT)

**KNOWN INFO**
Vehicle park and service brakes OK.
Air hoses free from kinks.
Air present at rear and fifth wheel emergency gladhands.
Air hose 258 OK.
Air hose 135 OK.
Air brake protecting valve OK.
Air hose 256 OK.
Booster valve OK.
Service gladhand two-way check valve OK.
Air hose 145 OK.

**POSSIBLE PROBLEMS**
Faulty rear or fifth wheel service gladhand.
Faulty air hose 257 or 263.
Faulty service gladhand selector valve.

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
If air is present, affected service gladhand is faulty.

2. Is air present at affected service gladhand supply port?

- **YES**
  - Go to step 3 of this fault.
  - Replace rear service gladhand (para 11-24) or fifth wheel service gladhand (para 11-33).

- **NO**
  - WARNING: Read WARNING on following page.
WARNING

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

(1) Loosen air hose 257 at rear service gladhand or air hose 263 at fifth wheel service gladhand.
(2) Position service gladhand selector valve to affected gladhand (TM 9-2320-366-10-1).
(3) Start engine (TM 9-2320-366-10-1).
(4) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).
(5) Apply service brakes (TM 9-2320-366-10-1).
(6) Check for presence of air at air hose 257 or 263.
(7) Shut down engine (TM 9-2320-366-10-1).
(8) If air is not present, go to step 3 of this fault.
(9) If air is present, replace rear service gladhand (para 11-24) or fifth wheel service gladhand (para 11-33).
(10) Tighten air hose 257 at rear service gladhand or air hose 263 at fifth wheel service gladhand.
### j4C. NO AIR PRESSURE PRESENT AT M1088 REAR AND/OR FIFTH WHEEL SERVICE GLADHAND(S) (CONT)

**KNOWN INFO**
- Vehicle park and service brakes OK.
- Air hoses free from kinks.
- Air present at rear and fifth wheel emergency gladhands.
- Rear and fifth wheel service gladhands OK.
- Air hose 258 OK.
- Air hose 135 OK.
- Air brake protecting valve OK.
- Air hose 256 OK.
- Booster valve OK.
- Service gladhand two-way check valve OK.
- Air hose 145 OK.

**POSSIBLE PROBLEMS**
- Faulty air hose 257 or 263.
- Faulty service gladhand selector valve.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- If air is not present, service gladhand selector valve is faulty. If air is present, air hose 257 or 263 is faulty.

3. Is air present at service gladhand selector valve output to affected service gladhand?

3. NO

3. YES

Replace service gladhand selector valve (para 11-33).

Replace air hose 257 or 263 (para 11-21).

**KNOWN INFO**
- Vehicle park and service brakes OK.
- Air hoses free from kinks.
- Air present at rear and fifth wheel emergency gladhands.
- Rear and fifth wheel service gladhands OK.
- Air hoses 257 and 263 OK.

**POSSIBLE PROBLEMS**
- Faulty service gladhand selector valve.
- Faulty air hose 258.
- Faulty air hose 135.
- Faulty air brake protecting valve.
- Faulty air hose 256.
- Faulty booster valve.
- Faulty service gladhand two-way check valve.
- Faulty air hose 145.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- If air is present, service gladhand selector valve is faulty.

4. Is air present at service gladhand selector valve supply port?

4. NO

4. YES

Go to step 5 of this fault.

Replace service gladhand selector valve (para 11-33).
(1) Loosen air hose 258 at service gladhand selector valve supply port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Push in TRAILER AIR SUPPLY control (TM 9-2320-366-10-1).
(4) Apply service brakes (TM 9-2320-366-10-1).
(5) Check for presence of air at air hose 258.
(6) Shut down engine (TM 9-2320-366-10-1).
(7) If air is not present, go to step 5 of this fault.
(8) If air is present, replace service gladhand selector valve (para 11-33).
(9) Tighten air hose 258 at service gladhand selector valve supply port.
TM 9-2320-366-20-2

J4C. NO AIR PRESSURE PRESENT AT M1088 REAR AND/OR FIFTH WHEEL SERVICE GLADHAND(S) (CONT)

**KNOWN INFO**
Vehicle park and service brakes OK.
Air hoses free from kinks.
Air present at rear and fifth wheel emergency gladhands.
Rear and fifth wheel service gladhands OK.
Air hoses 257 and 263 OK.
Service gladhand selector valve OK.

**POSSIBLE PROBLEMS**
Faulty air hose 258.
Faulty air hose 135.
Faulty air brake protecting valve.
Faulty air hose 256.
Faulty booster valve.
Faulty service gladhand two-way check valve.
Faulty air hose 145.

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
If air is present, air hose 258 is faulty.

---

5.

Is air present at air brake protecting valve delivery port TRLR S?

- **NO**
  - Go to step 6 of this fault.

- **YES**
  - Replace air hose 258 (para 11-21).

---

6.

Is air present at air brake protecting valve supply port FV1?

- **NO**
  - Go to step 8 of this fault.

- **YES**
  - Replace air hose 258 (para 11-21).

---

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
This question eliminates possible problems and determines where troubleshooting continues.
(1) Loosen air hose 256 at air brake protecting valve supply port FV1.
(2) Start engine (TM 9-2320-366-10-1).
(3) Apply service brakes (TM 9-2320-366-10-1).
(4) Check for presence of air at air brake protecting valve delivery port TRLR S.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, go to step 8 of this fault.
(7) Tighten air hose 256 at air brake protecting valve supply port FV1.
(8) If air is present, replace air hose 258 (para 11-21).
(9) Tighten air hose 258 at air brake protecting valve delivery port TRLR S.
4C. NO AIR PRESSURE PRESENT AT M1088 REAR AND/OR FIFTH WHEEL SERVICE GLADHAND(S) (CONT)

**KNOWN INFO**
- Vehicle park and service brakes OK.
- Air hoses free from kinks.
- Air present at rear and fifth wheel emergency gladhands.
- Rear and fifth wheel service gladhands OK.
- Air hoses 257 and 263 OK.
- Service gladhand selector valve OK.
- Air hose 258 OK.
- Air hose 256 OK.
- Booster valve OK.
- Service gladhand two-way check valve OK.
- Air hose 145 OK.

**POSSIBLE PROBLEMS**
- Faulty air hose 135.
- Faulty air brake protecting valve.

**TEST OPTIONS**

**TEST OPTIONS**

**REASON FOR QUESTION**
If air is not present, air hose 135 is faulty. If air is present, air brake protecting valve is faulty.

**TEST OPTIONS**

**REASON FOR QUESTION**
If air is present, air hose 256 is faulty.

**TEST OPTIONS**

**REASON FOR QUESTION**
If air is present, air hose 256 is faulty.

1. Is air present at air brake protecting valve supply port FV2?

   **NO**

   Replace air hose 135 (para 11-21).

   **YES**

   Replace air brake protecting valve (para 11-18).

2. Is air present at booster valve delivery port?

   **NO**

   Go to step 9 of this fault.

   **YES**

   Replace air hose 256 (para 11-21).
(1) Loosen air hose 135 at air brake protecting valve supply port FV2.
(2) Start engine (TM 9-2320-366-10-1).
(3) Apply service brakes (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose 135.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, replace air hose 135 (para 11-21).
(7) If air is present, replace air brake protecting valve (para 11-18).
(8) Tighten air hose 135 at air brake protecting valve supply port FV2.

(1) Loosen air hose 256 at booster valve delivery port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Apply service brakes (TM 9-2320-366-10-1).
(4) Check for presence of air at booster valve delivery port.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, go to step 9 of this fault.
(7) If air is present, replace air hose 256 (para 11-21).
(8) Tighten air hose 256 at booster valve delivery port.
**4C. NO AIR PRESSURE PRESENT AT M1088 REAR AND/OR FIFTH WHEEL SERVICE GLADHAND(S) (CONT)**

**KNOWN INFO**

Vehicle park and service brakes OK.
Air hoses free from kinks.
Air present at rear and fifth wheel emergency gladhands.
Rear and fifth wheel service gladhands OK.
Air hoses 257 and 263 OK.
Service gladhand selector valve OK.
Air hose 258 OK.
Air hose 135 OK.
Air brake protecting valve OK.
Air hose 256 OK.

**POSSIBLE PROBLEMS**

Faulty booster valve.
Faulty service gladhand two-way check valve.
Faulty air hose 145.

**TEST OPTIONS**

**Visual inspection**

**REASON FOR QUESTION**

If air is present, booster valve is faulty.

**9.**

Is air present at booster valve supply port?

- **NO**
  - Go to step 10 of this fault.

- **YES**
  - Replace booster valve (para 11-15).

**10.**

Is air present at service gladhand two-way check valve delivery port?

- **NO**
  - Replace service gladhand two-way check valve (para 11-25).

- **YES**
  - Replace air hose 145 (para 11-21).
(1) Loosen air hose 145 at booster valve supply port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Apply service brakes (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose 145.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, go to step 10 of this fault.
(7) If air is present, replace booster valve (para 11-15).
(8) Tighten air hose 145 at booster valve supply port.

(1) Raise cab (TM 9-2320-366-10-1).
(2) Loosen air hose 145 at service gladhand two-way check valve delivery port.
(3) Start engine (TM 9-2320-366-10-1).
(4) Apply service brakes (TM 9-2320-366-10-1).
(5) Check for presence of air at service gladhand two-way check valve delivery port.
(6) Shut down engine (TM 9-2320-366-10-1).
(7) If air is not present, replace service gladhand two-way check valve (para 11-25).
(8) If air is present, replace air hose 145 (para 11-21).
(9) Tighten air hose 145 at service gladhand two-way check valve delivery port.
(10) Lower cab (TM 9-2320-366-10-1).
J4D. M1088 TRAILER HANDBRAKE DOES NOT OPERATE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

KNOWN INFO
Air present at rear and fifth wheel gladhands when service brakes applied.
Air hoses free from kinks.

POSSIBLE PROBLEMS
Faulty air brake protecting valve.
Faulty air hose 162.
Faulty air hose 129.
Faulty trailer service brake valve.
Faulty park control two-way check valve.
Faulty air hose 161.

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
This question eliminates possible problems and determines where troubleshooting continues.

START

Is air present at air brake protecting valve supply port HC?

WARNING
Read WARNING on following page.

NO

YES

Go to step 2 of this fault.

Replace air brake protecting valve (para 11-18).
Loosen air hose 162 at air brake protecting valve supply port HC.
Start engine (TM 9-2320-366-10-1).
Apply trailer handbrake control (TM 9-2320-366-10-1).
Check for presence of air at air hose 162.
Shut down engine (TM 9-2320-366-10-1).
If air is not present, go to step 2 of this fault.
Tighten air hose 162 at air brake protecting valve supply port HC.

**WARNING**

Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.
M1088 TRAILER HANDBRAKE DOES NOT OPERATE (CONT)

**KNOWN INFO**
- Air present at rear and fifth wheel gladhands when service brakes applied.
- Air hoses free from kinks.
- Air brake protecting valve OK.

**POSSIBLE PROBLEMS**
- Faulty air hose 162.
- Faulty air hose 129.
- Faulty trailer service brake valve.
- Faulty park control two-way check valve.
- Faulty air hose 161.

2. **TEST OPTIONS**
   - Visual inspection

   **REASON FOR QUESTION**
   If air is present, air hose 162 is faulty.

   **KNOWN INFO**
   - Is air present at cab floor fitting?

   **POSSIBLE PROBLEMS**
   - Air present at rear and fifth wheel gladhands when service brakes applied.
   - Air hoses free from kinks.
   - Air brake protecting valve OK.
   - Air hose 162 OK.

   **TEST OPTIONS**
   - Visual inspection

   **REASON FOR QUESTION**
   If air is present, air hose 162 is faulty.

   **KNOWN INFO**
   - Is air present at trailer service brake valve delivery port?

   **POSSIBLE PROBLEMS**
   - Faulty air hose 129.
   - Faulty trailer service brake valve.
   - Faulty park control two-way check valve.
   - Faulty air hose 161.

   **TEST OPTIONS**
   - Visual inspection

   **REASON FOR QUESTION**
   If air is present, air hose 129 is faulty.

   **KNOWN INFO**
   - Replace air hose 162 (para 11-21).

   **POSSIBLE PROBLEMS**
   - Air present at rear and fifth wheel gladhands when service brakes applied.
   - Air hoses free from kinks.
   - Air brake protecting valve OK.
   - Air hose 162 OK.

   **TEST OPTIONS**
   - Visual inspection

   **REASON FOR QUESTION**
   If air is present, air hose 129 is faulty.

   **KNOWN INFO**
   - Replace air hose 129 (para 11-21).

   **POSSIBLE PROBLEMS**
   - Air present at rear and fifth wheel gladhands when service brakes applied.
   - Air hoses free from kinks.
   - Air brake protecting valve OK.
   - Air hose 162 OK.

   **TEST OPTIONS**
   - Visual inspection

   **REASON FOR QUESTION**
   If air is present, air hose 129 is faulty.

   **KNOWN INFO**
   - Replace air hose 129 (para 11-21).

   **POSSIBLE PROBLEMS**
   - Air present at rear and fifth wheel gladhands when service brakes applied.
   - Air hoses free from kinks.
   - Air brake protecting valve OK.
   - Air hose 162 OK.

   **TEST OPTIONS**
   - Visual inspection

   **REASON FOR QUESTION**
   If air is present, air hose 129 is faulty.

   **KNOWN INFO**
   - Replace air hose 129 (para 11-21).

   **POSSIBLE PROBLEMS**
   - Air present at rear and fifth wheel gladhands when service brakes applied.
   - Air hoses free from kinks.
   - Air brake protecting valve OK.
   - Air hose 162 OK.

   **TEST OPTIONS**
   - Visual inspection

   **REASON FOR QUESTION**
   If air is present, air hose 129 is faulty.
(1) Remove kick panel (para 16-3).
(2) Loosen air hose 129 at cab floor fitting.
(3) Start engine (TM 9-2320-366-10-1).
(4) Apply trailer service brake (TM 9-2320-366-10-1).
(5) Check for presence of air at air hose 129.
(6) Shut down engine (TM 9-2320-366-10-1).
(7) If air is not present, go to step 3 of this fault.
(8) If air is present, replace air hose 162 (para 11-21).
(9) Tighten air hose 129 at cab floor fitting.
(10) Install kick panel (para 16-3).

(1) Loosen air hose 129 at trailer service brake valve delivery port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Apply trailer service brake (TM 9-2320-366-10-1).
(4) Check for presence of air at trailer service brake valve delivery port.
(5) Shut down engine (TM 9-2320-366-10-1).
(6) If air is not present, replace trailer service brake valve (para 11-32).
(7) If air is present, replace air hose 129 (para 11-21).
(8) Tighten air hose 129 at trailer service brake valve delivery port.
4. Is air present at trailer service brake valve supply port?

**KNOWN INFO**
Air present at rear and fifth wheel gladhands when service brakes applied. 
Air hoses free from kinks. 
Air brake protecting valve OK. 
Air hose 162 OK. 
Air hose 129 OK.

**POSSIBLE PROBLEMS**
Faulty trailer service brake valve. 
Faulty park control two-way check valve. 
Faulty air hose 161.

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
If air is not present, park control two-way check valve is faulty. If air is present, trailer service brake valve is faulty.

**KNOWN INFO**
Air present at rear and fifth wheel gladhands when service brakes applied. 
Air hoses free from kinks. 
Air brake protecting valve OK. 
Air hose 162 OK. 
Air hose 129 OK. 
Trailer service brake valve OK.

**POSSIBLE PROBLEMS**
Faulty park control two-way check valve. 
Faulty air hose 161.

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
If air is not present, park control two-way check valve is faulty. If air is present, air hose 161 is faulty.

Replace trailer service brake valve (para 11-32).

Replace air hose 161 (para 11-21).
(1) Loosen air hose 161 at trailer service brake valve supply port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Check for presence of air at air hose 161.
(4) Shut down engine (TM 9-2320-366-10-1).
(5) If air is not present, go to step 5 of this fault.
(6) If air is present, replace trailer service brake valve (para 11-32).
(7) Tighten air hose 161 at trailer service brake valve supply port.

(1) Loosen air hose 161 at park control two-way check valve delivery port.
(2) Start engine (TM 9-2320-366-10-1).
(3) Check for presence of air at park control two-way check valve delivery port.
(4) Shut down engine (TM 9-2320-366-10-1).
(5) If air is not present, replace park control two-way check valve (para 11-19).
(6) If air is present, replace air hose 161 (para 11-21).
(7) Tighten air hose 161 at park control two-way check valve delivery port.
**TM 9-2320-366-20-2**

### J5. AIR SYSTEM PRESSURE BUILDS UP MORE THAN 120 PSI (827 KPA)  
(COMPRESSOR FAILS TO UNLOAD)

#### INITIAL SETUP

**Equipment Conditions**
- Engine shut down (TM 9-2320-366-10-1).
- Air tanks drained (TM 9-2320-366-10-1).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)

---

#### KNOWN INFO

<table>
<thead>
<tr>
<th>FRONT BRAKE/REAR BRAKE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AIR pressure gage reads above 120 psi.</strong></td>
</tr>
</tbody>
</table>

#### POSSIBLE PROBLEMS

- Blocked air hose.
- Faulty air compressor governor.
- Faulty purge valve.

---

#### WARNING

Read WARNING on following page.

#### TEST OPTIONS

- Visual Inspection

#### REASON FOR QUESTION

Air compressor cannot unload if air is not present at governor air intake.

---

1. **Does air escape from wet tank to governor air hose?**

---

**START**

- **NO**
  - **NO**
    - Clear or replace blocked wet tank to governor air hose (para 23-2).
  - **YES**

---

2-1978 Change 1
WARNING

Engine compartment includes a partially covered fan blade. Extreme care should be taken when working in the engine compartment. Failure to comply may result in injury to personnel.

(1) Raise cab (TM 9-2320-366-10-1).
(2) Disconnect (wet tank to governor) air hose from air compressor governor.
(3) Lower cab (TM 9-2320-366-10-1).
(4) Start engine (TM 9-2320-366-10-1).
(5) Raise cab (TM 9-2320-366-10-1).
(6) Check for air escaping from (wet tank to governor) air hose.
(7) If no air escapes, clear or replace air hose from wet tank to air compressor governor (para 23-2).
(8) Lower cab (TM 9-2320-366-10-1).
(9) Shut down engine (TM 9-2320-366-10-1).
(10) Raise cab (TM 9-2320-366-10-1).
(11) Connect (wet tank to governor) air hose to air compressor governor.
j5. AIR SYSTEM PRESSURE BUILDS UP MORE THAN 120 PSI (827 KPA) (COMPRESSOR FAILS TO UNLOAD) (CONT)

**KNOWN INFO**
FRONT BRAKE/REAR BRAKE
AIR pressure gage reads above 120 psi.
Air hose from wet tank to air compressor governor OK.

**POSSIBLE PROBLEMS**
Blocked governor air hose.
Faulty air compressor governor.
Faulty purge valve.

2. Does air escape from air compressor to air dryer purge valve air hose?

**TEST OPTIONS**
Visual Inspection

**REASON FOR QUESTION**
Air compressor will fail to unload if air compressor to purge valve air hose is blocked.

**YES**
Clear or replace air hose from air compressor to purge valve (para 23-2).

**NO**

**KNOWLEDGE**
FRONT BRAKE/REAR BRAKE
AIR pressure gage reads above 120 psi.
Air hose from wet OK.
Governor air hose OK.

**POSSIBLE PROBLEMS**
Faulty air compressor governor.
Faulty purge valve.

3. Is air present from air compressor to purge valve?

**TEST OPTIONS**
Visual Inspection

**REASON FOR QUESTION**
If air is not present from air compressor, air compressor governor is faulty. If air is present air dryer purge valve is faulty.

**NO**

**YES**
Adjust or replace air compressor governor (para 11-31).

Service air dryer (para 23-11).
(1) Disconnect (air compressor to purge valve) air hose from air compressor and purge valve.
(2) Blow through one end of air hose. If no air escapes from other end of air hose, air hose is blocked.
(3) Connect (air compressor to purge valve) air hose to air compressor.
(4) Lower cab (TM 9-2320-366-10-1).

(1) Start engine (TM 9-2320-366-10-1).
(2) Check for presence of air at (air compressor to purge valve) air hose.
(3) If no air escapes from air hose, Adjust or replace air compressor governor (para 11-31).
(4) If air escapes from air hose, service air dryer for faulty purge valve (para 23-11).
(5) Shut down engine (TM 9-2320-366-10-1).
(6) Connect (air compressor to purge valve) air hose to air dryer purge valve.
6. NOISY AIR COMPRESSOR OPERATION

INITIAL SETUP

Tools and Special Tools: Tool Kit, Genl Mech (Item 46, Appendix C)

Known Info
Engine runs.

Possible Problems
- Kinked compressor oil hoses
- Kinked compressor coolant hoses
- Loose or missing air compressor mounting hardware
- Faulty air compressor

Test Options
- Visual inspection

Reason for Question
Kinked compressor oil hoses will cause noisy air compressor operation.

Flowchart:

1. Are air compressor oil hoses free from kinks?
   - No
     - Replace air compressor oil hose(s).
   - Yes
     - Replace air compressor oil hose(s).

2. Are air compressor coolant hoses free from kinks?
   - No
     - Replace air compressor coolant hose(s) (para 6-11).
   - Yes
     - Replace air compressor coolant hose(s) (para 6-11).

Known Info
Air compressor oil hoses OK.

Possible Problems
- Kinked compressor coolant hoses
- Loose or missing air compressor mounting hardware
- Faulty air compressor
(1) Raise cab (TM 9-2320-366-10-1).
(2) Check air compressor oil hoses for kinks.

Check air compressor coolant hoses.
3. Is air compressor free from loose or missing mounting hardware?

**KNOWN INFO**
- Air compressor oil hoses OK.
- Air compressor coolant hoses OK.

**POSSIBLE PROBLEMS**
- Loose or missing air compressor mounting hardware.
- Faulty air compressor.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- Loose or missing air compressor mounting hardware will cause noisy operation.

**YES**
- Replace loose or missing mounting hardware.

**NO**
- Notify DS Maintenance.
(1) Check air compressor for loose or missing mounting hardware.
(2) Lower cab (TM 9-2320-366-10-1).
j7. M1088 REAR GLADHAND(S) LEAKS OR DOES NOT OPERATE

INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Conditions</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1).</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine runs.</td>
</tr>
<tr>
<td>POSSIBLE PROBLEMS</td>
</tr>
<tr>
<td>Faulty gladhand(s).</td>
</tr>
</tbody>
</table>

1. Is vehicle equipped with selector valve?

   NO

   Replace rear gladhand (para 11-21).

   YES

   Install M1088 gladhand selector valve (para 11-33).

   REASON FOR QUESTION

   If vehicle is not equipped with selector valve, rear gladhands must be replaced with M1088 gladhand selector valve.

TEST OPTIONS

Visual inspection
(1) Check if vehicle is equipped with selector valve.
(2) If vehicle is not equipped with selector valve, install M1088 gladhand selector valve (para 11-33).
(3) If vehicle is equipped with selector valve, replace rear gladhand (para 11-21).
**8. M1090/M1094 TAILGATE RELEASE DOES NOT OPERATE**

**INITIAL SETUP**

**Equipment Conditions**
- Engine shut down (TM 9-2320-366-10-1).
- Dump body raised to maintenance position (TM 9-2320-366-10-1).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)

---

**POSSIBLE PROBLEMS**
- Faulty solenoid valve.
- Faulty air hose to front port on tailgate pneumatic cylinder.
- Faulty air hose to rear port on tailgate pneumatic cylinder.
- Faulty tailgate pneumatic cylinder.
- Faulty pressure protection valve.
- Faulty air hose to port P on manual override valve.
- Faulty manual override valve.
- Faulty air hose to port P on solenoid valve.

**Known Info**
- Air tanks pressurized.
- Pressure protection valve OK.
- Air hose to port P on manual override valve OK.
- Manual override valve OK.
- Air hose to port P on solenoid valve OK.

---

**Test Options**

**Reason For Question**
- Visual inspection
- This question eliminates possible problems and determines where troubleshooting continues.

---

**WARNING**
- Read WARNING on following page.

1. Is air present at solenoid valve port P?
   - **NO**
   - **YES**
     - Go to step 6 of this fault.

2. Is air present at solenoid valve port A?
   - **NO**
   - **YES**
     - Replace solenoid valve (para 23-10).
NOTE
Inspect air hoses and fittings for cracks, kinks, nicks, stripped threads, and cuts.

WARNING
Wear protective goggles to protect against possible injury from release of high pressure air. Failure to comply may result in injury to personnel.

(1) Loosen air hose at solenoid valve port P.
(2) Check for present of air at port P.
(3) If air is not present, go to step 6 of this fault.
(4) Tighten air hose on solenoid valve.

(1) Loosen air hose at solenoid valve port A.
(2) Check for present of air at port A.
(3) If air is not present, replace solenoid valve (para 32-10).
(4) Tighten air hose on solenoid valve.
3. **WARNING**
Read WARNING on following page.

**Is air present at solenoid valve port B?**

- **NO**
  - **TEST OPTIONS**
  - Visual inspection
  - **REASON FOR QUESTION**
  - This question eliminates possible problems and determines where troubleshooting continues.

- **YES**
  - Perform Electrical System Troubleshooting (e142. M1090/M1094 Tailgate Release Does Not Operate).

4. **WARNING**
Read WARNING on following page.

**Is air present at tailgate pneumatic cylinder front port?**

- **NO**
  - **TEST OPTIONS**
  - Visual inspection
  - **REASON FOR QUESTION**
  - If air is not present, air hose is faulty.

- **YES**
  - Replace air hose from tailgate pneumatic cylinder front port to solenoid valve port A (para 23-4).
NOTE
Inspect air hoses and fittings for cracks, kinks, nicks, stripped threads, and cuts.

(1) Loosen air hose at solenoid valve port B.
(2) Press and hold tailgate release switch (TM 9-2320-366-10-1).
(3) Check for presence of air at solenoid valve Port B.
(4) If air is not present, perform Electrical System Troubleshooting (e142. M1090/M1094 Tailgate Release Does Not Operate).
(5) Release tailgate switch.
(6) Tighten air hose on solenoid valve.

(1) Loosen air hose at tailgate pneumatic cylinder front port.
(2) Check for presence of air at front port.
(3) If air is not present, replace air hose from tailgate pneumatic cylinder front port to solenoid valve port A (para 23-4).
(4) Tighten air hose on tailgate pneumatic cylinder.
j8. M1090/M1094 TAILGATE RELEASE DOES NOT OPERATE

**KNOWN INFO**
- Air tanks pressurized.
- Pressure protection valve OK.
- Air hose to port P on manual override valve OK.
- Manual override valve OK.
- Air hose to port P on solenoid valve OK.
- Solenoid valve OK.
- Air hose to front port on tailgate pneumatic cylinder OK.

**POSSIBLE PROBLEMS**
- Faulty air hose to rear port on tailgate pneumatic cylinder.
- Faulty tailgate pneumatic cylinder.

5.

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- Is air present at tailgate pneumatic cylinder rear port?

**YES**

Replace tailgate pneumatic cylinder (para 23-9).

**NO**

Replace air hose from tailgate pneumatic cylinder to solenoid valve port B (para 23-4).

**KNOWN INFO**
- Air tanks pressurized.
- Solenoid valve OK.
- Air hose to front port on tailgate pneumatic cylinder OK.
- Air hose to rear port on tailgate pneumatic cylinder OK.
- Tailgate pneumatic cylinder OK.

**POSSIBLE PROBLEMS**
- Faulty pressure protection valve.
- Faulty air hose to port P on manual override valve.
- Faulty manual override valve.
- Faulty air hose to port P on solenoid valve.

6.

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- Is air present at pressure protection valve?

**YES**

Replace pressure protection valve (para 23-12).

**NO**

If air is not present, pressure protection valve is faulty. If air is present, tailgate pneumatic cylinder is faulty.
NOTE
Inspect air hoses and fittings for cracks, kinks, nicks, stripped threads, and cuts.

WARNING
Wear protective goggles to protect against possible injury from release of high pressure air. Failure to comply may result in injury to personnel.

NOTE
Inspect air hoses and fittings for cracks, kinks, nicks, stripped threads, and cuts.

(1) Loosen air hose at tailgate pneumatic cylinder rear port.
(2) Check for presence of air at rear port.
(3) If air is not present, replace air hose from tailgate pneumatic cylinder rear port to solenoid valve port B (para 23-4).
(4) If air is present, replace tailgate pneumatic cylinder (para 23-9).
(5) Tighten air hose on tailgate pneumatic cylinder.

(1) Loosen air hose at pressure protection valve.
(2) Check for presence of air at pressure protection valve.
(3) If air is not present, replace pressure protection valve (para 23-12).
(4) Tighten air hose on pressure protection valve.
7. **WARNING**
Read **WARNING** on following page.

Is air present at manual override valve port P?

- **NO**
  - Replace air hose from manual override valve port P to pressure protection valve (para 23-4).

- **YES**
  - Replace air hose from manual override valve port P to pressure protection valve (para 23-4).

8. **WARNING**
Read **WARNING** on following page.

Is air present at manual override valve port A?

- **NO**
  - Replace manual override valve (para 23-8).

- **YES**
  - Replace air hose from manual override valve port A to solenoid valve port P (para 23-4).
NOTE
Inspect air hoses and fittings for cracks, kinks, nicks, stripped threads, and cuts.

WARNING
Wear protective goggles to protect against possible injury from release of high pressure air. Failure to comply may result in injury to personnel.

(1) Loosen air hose at manual override valve port P.
(2) Check for presence of air at port P on manual override valve.
(3) If air is not present, replace air hose from manual override valve port P to pressure protection valve (para 23-4).
(4) Tighten air hose on manual override valve.

(1) Loosen air hose at manual override valve port A.
(2) Check for presence of air at port A.
(3) If air is not present, replace manual override valve (para 23-8).
(4) If air is present, replace air hose from manual override valve port A to solenoid valve port P (para 23-4).
(5) Tighten air hose on manual override valve.
2-22. WHEEL TROUBLESHOOTING

This paragraph covers Wheel Troubleshooting. The Wheel Fault Index, Table 2-50, lists faults for the Wheel of the vehicle.

Table 2-50. Wheel Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>k1.</td>
<td>Tires Wear Unevenly or Excessively</td>
<td>2-1990</td>
</tr>
<tr>
<td>k2.</td>
<td>Wheel Wobbles or Shimmys</td>
<td>2-1994</td>
</tr>
</tbody>
</table>
k1. TIRES WEAR UNEVENLY OR EXCESSIVELY

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Multiplier, Torque Wrench (Item 23, Appendix C)
Wrench, Torque, 0-600 lb-ft (Item 60, Appendix C)

1. Are lug nuts tight?
   - NO
     - Tighten lug nuts to 415-475 lb-ft (576-644 N·m) in sequence shown.
   - YES

2. Are shock absorbers free from leaks and damage?
   - NO
     - Replace shock absorber(s) (para 15-3 or 15-4).
   - YES

KNOWN INFO
Tire pressure OK.
Lug nuts tight. Tire pressure OK.

POSSIBLE PROBLEMS
Loose lug nuts.
Shock absorbers damaged or leaking.
Improper toe-in.

POSSIBLE PROBLEMS
Shock absorbers damaged or leaking.
Improper toe-in.

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
Loose lug nuts may cause tires to wear unevenly.

Damaged shock absorbers may cause tires to wear unevenly.
Inspect tires for excessive wear and for spacing between lug nuts and wheels. Tires that are worn unevenly may indicate that lug nuts need tightening.

Inspect tires for excessive wear. Tires that have flat spots may indicate a defective shock absorber. Inspect shock absorbers for leaks or damage.
3. Is the tie rod properly adjusted?

- **YES**
  - Perform Wheel System Troubleshooting (k2. Wheel Wobbles or Shimmies).

- **NO**
  - Perform front wheel toe-in (para 13-5).

**KNOWN INFO**
- Lug nuts tightened.
- Tire pressure OK.
- Shock absorbers OK.

**POSSIBLE PROBLEMS**
- Improper toe-in.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- Tie rods adjusted incorrectly (improper toe-in) will cause tires to wear unevenly or excessively.
Check front wheel toe-in (para 13-5).
1. Is wheel free from damage?  
   \- YES  
   \- NO  
   \- Bent wheel will wobble or shimmy.

2. Is wheel free of play?  
   \- YES  
   \- NO  
   \- Play in wheel will cause wheel to wobble or shimmy.

3. Is drag link free of play?  
   \- YES  
   \- NO  
   \- Worn bearings will cause wheel to wobble.

- Replace damaged wheel(s) (para 12-2).
- Notify DS Maintenance.
- Replace drag link (para 13-3).
- Notify DS Maintenance.

**INITIAL SETUP**

**Equipment Conditions**
Engine shut down (TM 9-2320-366-10-1).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Trestle, Motor Vehicle Maintenance (2) (Item 47, Appendix C)

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
Wheel Runout Check
- REASON FOR QUESTION
  - Bent wheel will wobble or shimmy.
  - Play in wheel will cause wheel to wobble or shimmy.
  - Worn bearings will cause wheel to wobble.
WARNING

Vehicle must be on level ground and wheels must be chocked. Failure to comply may result in injury to personnel.

1. Jack up vehicle (TM 9-2320-366-10-1) one wheel at a time.
2. Rotate tire to check for bent wheel.
3. Insert pry bar under tire and lift while observing wheel play.
4. Check drag link play.
5. Lower vehicle (TM 9-2320-366-10-1).
2-23. HYDRAULIC SYSTEM TROUBLESHOOTING

This paragraph covers Hydraulic System Troubleshooting. The Hydraulic System Fault Index, Table 2-51, lists faults for the Hydraulic System of the vehicle.

Table 2-51. Hydraulic System Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I1</td>
<td>Loss of Hydraulic Pressure (Single Stage Pump)</td>
<td>2-1998</td>
</tr>
<tr>
<td>I2</td>
<td>Loss of Hydraulic Pressure (Three Stage Pump)</td>
<td>2-2002</td>
</tr>
</tbody>
</table>
1. Are hydraulic fittings and tubing free from kinks, bends and debris?  

   GO IF YES  
   NO  
   Replace damaged hydraulic tube(s) or fitting(s) (para 17-26).  

2. Is filter screen free of debris?  

   GO IF YES  
   NO  
   Clean filter screen.  

   TEST OPTIONS  
   Visual inspection  
   REASON FOR QUESTION  
   A clogged, bent, or kinked hydraulic tube or fitting will cause loss of hydraulic pressure.  

   TEST OPTIONS  
   Visual inspection  
   REASON FOR QUESTION  
   A clogged filter screen will cause loss of hydraulic pressure.

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Check hydraulic tubes and fittings for kinks, bends, and debris.

Check filter screen for debris.
1. LOSS OF HYDRAULIC PRESSURE (SINGLE STAGE PUMP) (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic oil level OK.</td>
</tr>
<tr>
<td>Hydraulic tubing or fittings OK.</td>
</tr>
<tr>
<td>Filter screen OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty hydraulic oil filter.</td>
</tr>
</tbody>
</table>

3. Is hydraulic oil filter free of blockage?

If NO:

- Replace hydraulic oil filter (para 19-13).

If YES:

- Notify DS Maintenance.

TEST OPTIONS

- Visual inspection

REASON FOR QUESTION

A clogged hydraulic oil filter will cause loss of hydraulic pressure.
(1) Remove hydraulic oil filter (para 19-13).
(2) Check hydraulic oil filter for blockage.
(3) Install hydraulic oil filter (para 19-13).
1. Are hydraulic fittings and tubing free from kinks, bends and debris?

   YES

   Replace damaged hydraulic tube(s) or fitting(s) (para 17-27).

   NO

   Test Options
   
   TEST OPTIONS
   
  视觉检查
   REASON FOR QUESTION
   A clogged, bent, or kinked hydraulic tube or fitting will cause loss of hydraulic pressure.

2. Is filter screen free of debris?

   YES

   Test Options
   
   TEST OPTIONS
   
  视觉检查
   REASON FOR QUESTION
   A clogged filter screen will cause loss of hydraulic pressure.

   NO

   CLEAN FILTER SCREEN

   Test Options
   
   Test Options
   
  视觉检查
   REASON FOR QUESTION
Check hydraulic tubes and fittings for kinks, bends, and debris.

Check filter screen for debris.
I2. LOSS OF HYDRAULIC PRESSURE (THREE STAGE PUMP) (CONT)

3. Is hydraulic oil filter free of blockage?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic oil level OK.</td>
<td>Visual inspection</td>
<td>A clogged hydraulic oil filter will cause loss of hydraulic pressure.</td>
</tr>
<tr>
<td>Hydraulic tubing or fittings OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filter screen OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POSSIBLE PROBLEMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty hydraulic oil filter.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- NO
  - Replace hydraulic oil filter (para 19-14).

- YES
  - Notify DS Maintenance.

Notify DS Maintenance.
(1) Remove hydraulic oil filter (para 19-14).
(2) Check hydraulic oil filter for blockage.
(3) Install hydraulic oil filter (para 19-14).
APPENDIX A
REFERENCES

A-1. SCOPE

This appendix lists all forms, field manuals, technical manuals, and other publications referenced in this manual. Those publications that should be consulted for additional information about vehicle operations are also listed.

A-2. PUBLICATIONS INDEX

The following index should be consulted frequently for latest changes or revisions and for new publications relating to material covered in this technical manual.

Consolidated Index of Army Publications and Blank Forms ........................................... DA Pam 25-30

A-3. FORMS

The following forms pertain to this manual. See DA Pam 25-30 for index of blank forms. See DA Pam 738-750, The Army Maintenance Management System (TAMMS), for instructions on the use of maintenance forms pertaining to this material.

Recommended Changes to Publications and Blank Forms ........................................... DA Form 2028
Equipment Inspection and Maintenance Worksheet ........................................................ DA Form 2404
Maintenance Request ................................................................................................... DA Form 2407
Equipment Control Record ......................................................................................... DA Form 2408-9
Processing and Deprocessing Record of Shipping, Storage, and Issue of Vehicles and
Spare Engines ................................................................................................................ DD Form 1397
Packaging Improvement Report .................................................................................. DD Form 6
Report of Item Discrepancy (ROID) .............................................................................. SF 364
Product Quality Deficiency Report .............................................................................. SF 368

A-4. OTHER PUBLICATIONS

The following publications contain information pertinent to the MTV and associated equipment.

a. Safety.

First Aid ....................................................................................................................... FM 4-25.11
Security of Tactical Wheeled Vehicles ......................................................................... TB 9-2300-422-20
Safety Inspection and Testing of Lifting Devices ......................................................... TB 43-0142
A-4. OTHER PUBLICATIONS (CONT)

b. MTV.

Direct Support and General Support Maintenance Manual for M1083 Series, 5-Ton, 6x6, Medium Tactical Vehicle (MTV) ............................................................. TM 9-2320-366-34
Hand Receipt Covering Contents of Components of End Item (COEI), Basic Issue Items (BII), and Additional Authorization List (AAL), for M1083 Series, 5-Ton, 6x6, Medium Tactical Vehicles (MTV) .................................................. TM 9-2320-366-10-HR
Operator’s Manual for M1083 Series, 5-Ton, 6x6, Medium Tactical Vehicle (MTV) ............................................................. TM 9-2320-366-10
Unit, Direct Support, and General Support Repair Parts and Special Tools List for M1083 Series, 5-Ton, 6x6, Medium Tactical Vehicle (MTV) .............................. TM 9-2320-366-24P
Warranty Program for M1083 Series, 5-Ton, 6x6, Medium Tactical Vehicle (MTV) .................................................. TB 9-2300-366-15

C. General Vehicle Operation.

Army Motor Transport Units and Operations .................................................. FM 55-30
Deleted
Manual for the Wheeled Vehicle Driver ........................................................ FM 21-305
Petroleum Tank Vehicle Operations ............................................................ FM 10-71
Safety Prevention of Motor Vehicle Accidents ................................................. AR 385-557
Vehicle Recovery Operations ................................................................. FM 20-22
d. General Maintenance and Repair.

Army Oil Analysis Program .......................................................................... TB 43-0211
Camouflage Pattern Painting ........................................................................ FM 5-20
Charging System Troubleshooting .............................................................. DA Pam 750-33
Color, Marking, and Camouflage Painting of Military Vehicles ...................... TB 43-0209
Cooling Systems: Tactical Vehicles ............................................................. TM 750-254
Corrosion Prevention and Control Including Rustproofing Procedures for Tactical Vehicles and Trailers .......................................................... TB 43-0213
Description, Use, Bonding Techniques, and Properties of Adhesives ................ TB ORD 1032
Equipment Improvement Report and Maintenance Digest: TACOM Equipment .... TB 43-0001-39-1
Equipment Improvement Report and Maintenance Summary ........................ TB 43-0001-1
Installation Instructions for Installation Kit, Electronic Equipment, MK-2700/VRC (NSN 5895-01-421-0814) (EIC: N/A) to Permit Installation of Radio Set AN/VRC-87/88/90 Series into M1078, M1080, M1081, M1083-M1086, M1088-M1094 and M1096 Family of Medium Tactical Vehicles ................ TB 11-5820-890-20-101
Installation Instructions for Installation Kit, Electronic Equipment, MK-2715/VRC (NSN 5895-01-421-0812) (EIC: N/A) to Permit Installation of Radio Set AN/VRC-89/91/92 Series into M1078, M1080, M1081, M1083-M1086, M1088-M1094 and M1096 Family of Medium Tactical Vehicles ................ TB 11-5820-890-20-92
Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance Materiel and Related Materials Including Chemicals .............................................. TM 9-247
Metal Body Repair and Related Operations .................................................. FM 43-2
Operator’s and Organizational Maintenance Manual for Radio Sets ................ TB 11-5820-498-12
Operator’s and Organizational Maintenance Manual Including Repair Parts and Special Tools List Simplified Test Equipment for Internal Combustion Engines Reprogrammable (STE/ICE-R) (NSN 4910-01-222-6589) ......................... TM 9-4910-571-12&P
Operator’s Manual, Radio Set, AN/VRC-46 ................................................ TB 11-5820-401-10-1
Operator’s Manual, Radio Set, AN/VRC-90A .............................................. TM 11-5820-890-10-1
Operator’s, Unit, Direct Support, and General Support Maintenance Manual for Lead-Acid Storage Batteries .......................................................... TM 9-6140-200-14
e. Cold Weather Operation.

Basic Cold Weather Manual .......................................................... FM 31-70
Northern Operations ........................................................................ FM 31-71
Operation and Maintenance of Ordnance Materiel in Cold Weather (0° to -65°F) .......................................................... FM 9-207

f. Decontamination.

Decontamination Operations Facilities & Equipment ................ TB 700-4
NBC Decontamination ................................................................ FM 3-5
NBC Protection .............................................................................. FM 3-4

g. Maintenance of Special Purpose Kits.

Operator and Organizational Maintenance Manual for Chemical Alarm .... TM 3-6665-225-12
Operator’s and Unit Maintenance Manual Including Repair Parts and Special Tools List for Decontaminating Apparatus: M13 ................................................... TM 3-4230-214-12&P

h. General.

Operator’s Manual (M998 Series) ............................................... TM 9-2320-280-10
Operator’s Manual (M1008 Series) ........................................... TM 9-2320-289-10
Operator’s Manual (M35 Series) ................................................. TM 9-2320-361-10
Operator’s Manual (M939 Series) ................................................. TM 9-2320-272-10
Principles of Automotive Vehicles ................................................... TM 9-8000
Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use (US Army Tank-automotive and Armaments Command) ........................................ TM 750-244-6
Route Reconnaissance and Classification ........................................ FM 5-36
Soldier’s Manual MOS 88M Motor Transport Operator, Skill Levels 1/2 ........................................ STP 55-88-M12-SM

i. Land, Sea, and Air Shipment.

Airdrop of Supplies and Equipment: Rigging 5-Ton Trucks ........................................ FM 10-526
Containerization of Military Vehicles .................................................. MTMCTEA Ref 95-55-23
Lifting and Tiedown of U.S. Military Helicopters ........................................ MTMCTEA Ref 95-55-21
Marine Lifting and Lashing Handbook ................................................. MTMCTEA Ref 95-55-22
Marine Terminal Lifting Guidance ....................................................... MTMCTEA Pam 56-1
i. Land, Sea, and Air Shipment (Cont).

Multiservice Helicopter External Air Transport: Basic Operations and Equipment ............ FM 55-450-3
Multiservice Helicopter External Air Transport: Dual-Point Load Rigging Procedures .......... FM 55-450-5
Multiservice Helicopter External Air Transport: Single-Point Load Rigging Procedures ......... FM 55-450-4
Standard Characteristics (Dimensions, Weight, and Cube) for Transportability of Military
    Vehicles and Other Outsize/Overweight Equipment (in TOE Line Sequence) ................. TB 55-46-1
Tiedown Handbook for Rail Movements .......................................................... MTMCTEA Pam 55-19
Tiedown Handbook for Truck Movements ......................................................... MTMCTEA Ref 92-55-20
APPENDIX B
MAINTENANCE ALLOCATION CHART (MAC)

SECTION I

INTRODUCTION

B-1. The Army Maintenance System MAC.

a. This introduction (Section I) provides a general explanation of all maintenance and repair functions authorized at various maintenance levels under the standard Army Maintenance System concept.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

- **Unit/FIELD** - includes two subcolumns, C (Operator/Crew) and O (Unit) maintenance.
- **Direct Support/FIELD** - includes an F subcolumn.
- **General Support/SUSTAINMENT** - includes an H subcolumn.
- **Depot/SUSTAINMENT** - includes a D subcolumn.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. Maintenance Functions. Maintenance functions are limited to and defined as follows:

a. **Inspect.** To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g. by sight, sound, or feel).

b. **Test.** To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. **Service.** Operations required periodically to keep an item in proper operating condition; e.g. to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemicals fluids, or gases.

d. **Adjust.** To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.

e. **Align.** To adjust specified variable elements of an item to bring about optimum or desired performance.

f. **Calibrate.** To determine and cause corrections to be made or to be adjusted on instruments or Test, Measurement, and Diagnostic Equipment (TMDE) used in precision measurement. Consists of comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.
g. **Remove/Install.** To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. **Replace.** To remove an unserviceable item and install a serviceable counterpart in its place. "Replace " is authorized by the MAC and assigned maintenance level is shown as the 3d position code of the SMR code.

i **Repair.** The application of maintenance services\(^1\) including fault location/troubleshooting\(^2\), removal/installation, and disassembly/assembly\(^3\) procedures, and maintenance actions\(^4\) to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. **Overhaul.** That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. **Rebuild.** Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

**B-3. Explanation of Columns in the MAC, Section II.**

a. **Column 1, Group Number.** Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly.

b. **Column 2, Component/Assembly.** Column 2 contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. **Column 3, Maintenance Function.** Column 3 lists the functions to be performed on the items listed in Column 2. (For detailed explanation of these functions, see Paragraph B-2.)

d. **Column 4, Maintenance Level.** Column 4 specifies each level of maintenance authorized to perform each function listed in Column 3, by indicating work time required (expressed in man-hours in whole hours or decimals) in the appropriate subcolumn. This work-time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work-time figures are to be shown for each level. The work-time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions.

\(^1\)Services – Inspect, test, service, adjust, align calibrate, and/or replace.

\(^2\)Fault location/troubleshooting - The process of investigating and detecting the cause of equipment malfunction; the act of isolating a fault within a system or Unit Under Test (UUT).

\(^3\)Disassembly/assembly - The step-by-step breakdown (taking apart) of a spare/functional group coded item, to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

\(^4\)Actions - Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.
This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance levels are as follows:

C ....................................................................................................................................... Operator or crew maintenance
O ....................................................................................................................................................Unit/Field maintenance
F....................................................................................................................................Direct Support/Field maintenance
L .................................................................................................................................. Specialized Repair Activity (SRA)5
H ..................................................................................................................General Support/Sustainment maintenance
D ....................................................................................................................................Depot/Sustainment maintenance

e. **Column 5, Tools and Test Equipment Reference Code.** Column 5 specifies, by code, those common tools sets (not individual tools), common TMDE, and special tools, special TMDE, and special support equipment required to perform the designated functions. Codes are keyed to tools and test equipment in Section III.

f. **Column 6, Remarks.** When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks contained in Section IV.

**B-4. Explanation of Columns in Tool and Test Equipment Requirements, Section III.**

a. **Column 1, Reference Code.** The tool and test equipment reference code correlates with a code used in the MAC, Section II column 5.

b. **Column 2, Maintenance Level.** The lowest level of maintenance authorized to use the tool or test equipment.

c. **Column 3, Nomenclature.** Name or identification of the tool or test equipment.

d. **Column 4, National Stock Number.** The National Stock Number of tool or test equipment.

e. **Column 5, Tool Number.** The manufacturer's part number, model number, or type number.

**B-5. Explanation of Columns in Remarks, Section IV.**

a. **Column 1, Remarks Code.** The code recorded in column 6, Section II.

b. **Column 2, Remarks.** This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

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5This maintenance level is not included in Section II, Column (4) of the Maintenance Allocation Chart. Functions to this level of maintenance are identified by a work-time figure in the "H" column of Section II, Column (4), and an associated reference code is used in the Remarks column (6). This code is keyed to Section IV, Remarks, and the SRA complete repair application is explained there.
## Section II. MAINTENANCE ALLOCATION CHART FOR THE MTV VEHICLE

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<th>(5) Tools and Equipment Ref Code</th>
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**Remarks Code:**
- C: Component
- O: Organization
- F: Field
- H: General Support
- D: Depot
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- **F**: General Support
- **H**: Depot
- **D**: Tools and Equipment Ref
- **Remarks Code**
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### Section II. MAINTENANCE ALLOCATION CHART FOR THE MTV VEHICLE

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### Section III. TOOLS AND TEST EQUIPMENT FOR MTV VEHICLES

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### Section III. TOOLS AND TEST EQUIPMENT FOR MTV VEHICLES

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### Section III. TOOLS AND TEST EQUIPMENT FOR MTV VEHICLES

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### Section IV. REMARKS FOR THE MTV VEHICLE

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<tr>
<td>B</td>
<td>Repair of tires will be in accordance with TM 9-2610-200-14.</td>
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APPENDIX C
TOOLS IDENTIFICATION LIST

Section I. INTRODUCTION

C-1. INTRODUCTION

This appendix lists common tools, supplements, and special tools/fixtures that are suggested for maintenance tasks performed at the Unit Maintenance level.

C-2. EXPLANATION OF COLUMNS

a. Column (1) - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the item, e.g., "Bar, Pry (Item 1, Appendix C)."

b. Column (2) - Item Name. This column contains the nomenclature for the item.

c. Column (3) - National Stock Number. This is the national stock number assigned to the item which you can use to requisition it.

d. Column (4) - Part Number. This provides the Government, manufacturer, or vendor part number for the item.

e. Column (5) - Reference. This column contains the shop catalog (SC), technical manual, or other publication which provides an illustration and description of the item, or lists whether the item is fabricated.

APPENDIX C
Section II. TOOLS IDENTIFICATION LIST

<table>
<thead>
<tr>
<th>(1) ITEM NUMBER</th>
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<th>(3) NATIONAL STOCK NUMBER</th>
<th>(4) PART NUMBER</th>
<th>(5) REFERENCE</th>
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## Section II. TOOLS IDENTIFICATION LIST (CONT)

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<td>58</td>
<td>WRENCH, TORQUE, 0-175 lb-ft</td>
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APPENDIX D
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

D-1. SCOPE

This appendix lists expendable and durable items that you will need to operate and maintain the MTV vehicle. This listing is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (except medical, class V repair parts, and heraldic items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

D-2. EXPLANATION OF COLUMNS

a. Column (1) - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the item, e.g., "Oil, Lubricating (Item 25, Appendix D).

b. Column (2) - Level. This column identifies the lowest level of maintenance that requires the item.

c. Column (3) - National Stock Number. This is the national stock number assigned to the item which you can use to requisition it.

d. Column (4) - Item Name, Description, Commercial and Government Entity Code (CAGEC), and Part Number. This provides the other information you need to identify the item.

e. Column (5) - Unit of Measure. This code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

<table>
<thead>
<tr>
<th>(1) Item Number</th>
<th>(2) Level</th>
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<th>(4) Description</th>
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### Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST (CONT)

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## Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST (CONT)

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<th>Description</th>
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Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST (CONT)

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## Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST (CONT)

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### Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST (CONT)

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<td>Wire, Nonelectrical (96906) MS20995C47 5 lb spool</td>
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APPENDIX E
ILLUSTRATED LIST OF MANUFACTURED ITEMS

Section I. INTRODUCTION

**E-1. INTRODUCTION**

This appendix includes complete instructions for manufacturing or fabricating authorized items locally. All bulk materials needed to manufacture an item are listed by part number or specification number. Figures are provided as needed. See standards and specifications DoD-Std-00100D(AR) and ANSI Y14.5M1982 for required details.

Section II. MANUFACTURED ITEMS INDEX

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<td>Dump Body Lifting Bracket</td>
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Section III. MANUFACTURED ITEMS

E-2. BRAKE ADJUSTING TOOL SUPPORT

Make the brake adjusting tool support from 0.134 in. (3.4 mm) flat steel stock according to the following instructions. Refer to the parts list and Figure E-1. Brake Adjusting Tool Support for details.

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Material Description</th>
<th>Size</th>
<th>Qty</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>N/A</td>
<td>Steel, ASTM A569 Sheet, Hot Rolled</td>
<td>6.0 in. (152.4 mm) x 6.0 in. (152.4 mm) x 0.134 in. (3.4 cm)</td>
<td>2</td>
</tr>
</tbody>
</table>

Figure E-1. Brake Adjusting Tool Support

- a. All dimensions are in inches (millimeters).
- b. Cut steel sheet as shown by dimensions on Figure E-1. Brake Adjusting Tool Support.
- c. De-burr and remove sharp edges.
E-3. BRAKE PLUNGER SEAL DRIVER

Figure E-2. Brake Plunger Seal Driver

a. All dimensions are in inches (millimeters).
b. Manufacture from round steel stock.
c. De-burr and remove sharp edges.
E-4. CAB SUPPORT TOOL

Make the cab support tool from .38 inch (.96 cm) flat steel stock and angle iron stock according to the following instructions. Refer to the parts list and Figure E-3. Cab Support Tool Strut and Cab Rest for details.

<table>
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<tr>
<th>Item</th>
<th>Part Number</th>
<th>Material Description</th>
<th>Size</th>
<th>Qty</th>
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<td>1</td>
<td>N/A</td>
<td>Steel, Flat Bar</td>
<td>4.0 in. (10.2 cm) X 33.38 in. (84.8 cm) X 0.38 in. (0.96 cm)</td>
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<td>N/A</td>
<td>Steel, Flat Bar</td>
<td>4.0 in. (10.2 cm) X 12.0 in. (30.5 cm) X 0.38 in. (0.96 cm)</td>
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<tr>
<td>3</td>
<td>N/A</td>
<td>Angle Iron</td>
<td>2.0 in. (5.1 cm) X 2.0 in. (5.1 cm) X 3.5 in. (8.9 cm)</td>
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<td>Insulgrip, CSA 105 C</td>
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</table>

Figure E-3. Cab Support Tool Strut and Cab Rest

a. All dimensions are in inches (centimeters).
b. Cut cab support tool strut (1) from steel flat bar and bend to shape as shown in Figure E-3. Cab Support Tool Strut and Cab Rest.
c. Cut cab support tool cab rest (2) from steel flat bar.
d. De-burr and remove sharp edges.
e. Remove flange side of cab support tool seats (3) as shown in Figure E-4. Cab Support Tool Seat.

f. Cut cab support tool seats (3) L and (3) R according to dimensions and left/right orientation shown on Figure E-4. Cab Support Tool Seat.

g. De-burr and remove sharp edges.

Figure E-4. Cab Support Tool Seat
h. Position and clamp cab support tool seats (3) L and (3) R together as shown by dimensions on Figure E-5. Cab Support Tool Seat Layout.

i. Weld cab support tool seat (3) L to cab support tool seat (3) R as identified on assembly table and Figure E-5. Cab Support Tool Seat Layout.

j. Position and clamp cab support tool seats (3) L and (3) R to cab support tool strut (1) as shown by dimensions on Figure E-5. Cab Support Tool Seat Layout.

k. Weld items clamped in step (f) as shown in Figure E-5. Cab Support Tool Seat Layout.

l. De-burr and remove sharp edges.
m. Position and clamp cab support tool strut (1) to cab support tool cab rest (2) as shown by dimensions on Figure E-6. Cab Support Tool Assembly, before insulgrip (4) is applied.

n. Weld cab support tool strut (1) to cab support tool cab rest (2).

o. Apply Insulgrip (4) to cab support tool cab rest (2) as described on material container.
E-5. DUMP BODY LIFTING BRACKET

Make the dump body lifting bracket assembly from the front, rear, top, guide, and mount plates according to the following instructions. Refer to the parts list tables and accompanying figures for details.

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Name/Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/A</td>
<td>Rear Plate</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>N/A</td>
<td>Top Plate</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>N/A</td>
<td>Front Plate</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>N/A</td>
<td>Guide Brace</td>
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</tr>
<tr>
<td>5</td>
<td>N/A</td>
<td>Plate, Mounting</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure E-7. Dump Body Lifting Bracket

a. All dimensions are in inches (centimeters).
b. Position and clamp pieces (1 through 5) together as shown by dimensions on Figure E-7. Dump Body Lifting Bracket.
c. Weld pieces together as shown in Figure E-7. Dump Body Lifting Bracket.
d. Coat all surfaces with Plastisol.
### E-5. DUMP BODY LIFTING BRACKET (CONT)

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Material Description</th>
<th>Size</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/A</td>
<td>Plate, steel, ASTM A-36</td>
<td>6.0 in. (15.2 cm) X 4.0 in. (10.2 cm) X 0.375 in. (0.95 cm)</td>
<td>1</td>
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<tr>
<td>2</td>
<td>N/A</td>
<td>Plate, steel, ASTM A-36</td>
<td>3.25 in. (8.26 cm) X 4.0 in. (10.2 cm) X 0.375 in. (0.95 cm)</td>
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<tr>
<td>4</td>
<td>N/A</td>
<td>Plate, steel, ASTM A-36</td>
<td>1.875 in. (10.2 cm) X 4.0 in. (10.2 cm) X 0.375 in. (0.95 cm)</td>
<td>1</td>
</tr>
</tbody>
</table>

**Figure E-8. Rear, Top, and Guide Plate**

a. All dimensions are in inches (centimeters).
b. Fabricate (1),(2), and (4) from ASTM A-36 steel plate as shown on Figure E-8. Rear, Top, and Guide Plate.
c. De-burr and remove sharp edges.
<table>
<thead>
<tr>
<th>Item</th>
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<th>Material Description</th>
<th>Size</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>N/A</td>
<td>Plate steel, ASTM A36</td>
<td>10.5 in. (26.7 cm) X 4.0 in. (10.2 cm) X 0.375 in. (0.95 cm)</td>
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<tr>
<td>5</td>
<td>N/A</td>
<td>Plate steel, ASTM A36</td>
<td>5.25 in. (13.3 cm) X 4.0 in. (10.2 cm) X 0.375 in. (0.95 cm)</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure E-9. Front and Mounting Plate

a. All dimensions are in inches (centimeters).
b. Fabricate (3) and (5) from ASTM A-36 steel plate.
c. Drill 1-1/2 inch (3.84 cm) diameter hoe in (5) as shown on Figure E-9. Front and Mounting Plate.
d. Grind bevel edge of each plate for weld surface as shown on Figure E-9. Front and Mounting Plate.
e. De-burr and remove sharp edges.
The headlight adjustment screen may be drawn on any vertical surface at least 50 in. (127 cm) high and 100 in. (254 cm) wide.

a. Draw two vertical lines (1) 50 in. (127 cm) high and 90.6 in. (230 cm) apart (centered on headlight adjustment screen).

b. Locate two points 40 in. (101.6 cm) from floor and 13 in. (33 cm) toward the center from each vertical line (1).

c. Draw vertical line (2) about 3-5 in. (8-13 cm) centered on each of the two points.

d. Draw horizontal line (3) about 3-5 in. (8-13 cm) centered on each of the two points.

e. Measure out 4 in. (10 cm) along each vertical line (2) and horizontal line (3) from each of the two points to make 8 in. (20 cm) squares (4).

Figure E-10. Headlight Adjustment Screen
Assemble the M1089 30K winch test adapter according to the following steps. Refer to the following parts list and Figure E-11. M1089 30K Winch Test Adapter for details.

<table>
<thead>
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<th>Part Number</th>
<th>Material Description</th>
<th>National Stock Number</th>
<th>Qty</th>
</tr>
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<tbody>
<tr>
<td>4-4-4 100401BA</td>
<td>Tee, Tube</td>
<td>4730-01-095-3430</td>
<td>1</td>
</tr>
<tr>
<td>4-6 100102BA</td>
<td>Adapter, Straight, Pipe to Tube</td>
<td>4730-01-096-9398</td>
<td>1</td>
</tr>
<tr>
<td>207P-4</td>
<td>Coupling, Pipe</td>
<td>4730-00-881-1161</td>
<td>1</td>
</tr>
<tr>
<td>NB-4-035</td>
<td>Tubing, Nonmetallic</td>
<td>4720-01-071-4042</td>
<td>4 in.</td>
</tr>
<tr>
<td>MIL-T-27730</td>
<td>Tape, Antiseizing</td>
<td>8030-00-889-3534</td>
<td>1 roll</td>
</tr>
</tbody>
</table>

Figure E-11. M1089 30K Winch Test Adapter

a. All dimensions are in inches (millimeters).
b. Cut two pieces of nonmetallic tubing (1 and 2) to 2.0 in. (50.8 mm) long.
c. Remove three nuts (3), sleeves (4), and ferrules (5) from tube tee (6).
d. Install two nuts (3), sleeves (4), and ferrules (5) on nonmetallic tubing (1).
e. Install nonmetallic tubing (1) on tube tee (6).
f. Remove nut (7), sleeve (8), and ferrule (9) from straight adapter (10).
g. Install two nuts (3 and 7), sleeves (4 and 8), and ferrules (5 and 9) on nonmetallic tubing (2).
h. Install nonmetallic tubing (2) on tube tee (6).
i. Install nut (9) on straight adapter (10).
j. Apply one wrap of antiseizing tape to threads of straight adapter (10).
k. Install pipe coupling (11) on straight adapter (10).
Assemble the M1089 solenoid test adapter according to the following steps. Refer to the following parts list and Figure E-12. M1089 Solenoid Test Adapter for details.

<table>
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<th>Part Number</th>
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<tr>
<td>2-2-2 080401CA</td>
<td>Tee, Tube</td>
<td>4730-01-214-6990</td>
<td>1</td>
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<tr>
<td>2-2 080202CA</td>
<td>Elbow, Pipe to Tube</td>
<td>4730-00-845-5345</td>
<td>1</td>
</tr>
<tr>
<td>4-2 130140B</td>
<td>Bushing, Pipe</td>
<td>4730-00-828-0171</td>
<td>1</td>
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<tr>
<td>NB-2-031</td>
<td>Tubing, Nonmetallic</td>
<td>4720-01-287-4499</td>
<td>24 in.</td>
</tr>
</tbody>
</table>

Figure E-12. M1089 Solenoid Test Adapter

a. All dimensions are in inches (millimeters).
b. Cut one piece of nonmetallic tubing (1) to 6.0 in. (152.4 mm) long.
c. Cut one piece of nonmetallic tubing (2) to 18.0 in. (457.2 mm) long.
d. Remove three nuts (3) and ferrule sleeves (4) from tube tee (5).
e. Install two nuts (3) and ferrule sleeves (4) on nonmetallic tubing (1).
f. Remove nut (6) and ferrule sleeve (7) from pipe to tube elbow (8).
g. Install two nuts (3 and 6) and ferrule sleeves (4 and 7) on nonmetallic tubing (2).
h. Install nonmetallic tubing (2) on tube tee (5).
i. Install nut (6) on pipe to tube elbow (8).
j. Install pipe bushing (9) on pipe to tube elbow (8).
E-9. RELAY TEST WIRE

Fabricate the relay test wire according to the following steps. Refer to the following parts list for materials.

<table>
<thead>
<tr>
<th>Material Description</th>
<th>National Stock Number</th>
<th>Cut Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire, Electrical (MIL-W-16878)</td>
<td>6145-00-330-3318</td>
<td>6 in. (152 mm)</td>
</tr>
</tbody>
</table>

a. Dimensions are in inches (millimeters).
b. Cut a length of wire six inches (152 mm) long.
c. Remove approximately 3/4 in. (19 mm) of electrical insulation from each end of wire.

E-10. TRANSMISSION AUXILIARY OIL COOLER RUBBER SEAL

Fabricate the transmission auxiliary oil cooler rubber seals in accordance with the following parts list.

<table>
<thead>
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<th>Part Number</th>
<th>Description</th>
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<th>Cut Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIL-R-6130</td>
<td>Tape, Adhesive, Rubber</td>
<td>9320-00-501-7537</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>627</td>
</tr>
</tbody>
</table>

a. Dimensions are in inches (millimeters)
b. Cut metal bar to 9.0 inches (228.6 mm) long.
c. De-burr and remove sharp edges from ends of metal bar.

E-11. WHEEL BEARING SHIM TOOL REST

Fabricate the wheel bearing shim tool rest according to the following steps. Refer to the following parts list for materials.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>National Stock Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>QQ-T-570</td>
<td>9510-00-866-1037</td>
<td>Bar, Metal</td>
</tr>
</tbody>
</table>

a. Dimensions are in inches (millimeters)
b. Cut metal bar to 9.0 inches (228.6 mm) long.
c. De-burr and remove sharp edges from ends of metal bar.

E-12. PNEUMATIC TUBES FABRICATION

Cut pneumatic tubes from bulk tubing stock listed in Table E-1. Pneumatic Tube Lengths. Use a fine-toothed hacksaw or suitable cutting device and cut tubing to required length.

<table>
<thead>
<tr>
<th>Tube Part Number</th>
<th>Bulk Tubing Part Number</th>
<th>Cut Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>12414690-001</td>
<td>NT-100-4 (79470)</td>
<td>18.1</td>
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<tr>
<td>12414690-002</td>
<td>NT-100-4 (79470)</td>
<td>16.0</td>
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<tr>
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<td>NT-100-4 (79470)</td>
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<td>12414690-005</td>
<td>NT-100-4 (79470)</td>
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</table>
## Table E-1. Pneumatic Tube Lengths (Cont)

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<th>Bulk Tubing Part Number</th>
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<td>C608-100BLK (13174)</td>
<td>8.0</td>
</tr>
<tr>
<td>12414690-212</td>
<td>C608-100BLK (13174)</td>
<td>17.0</td>
</tr>
<tr>
<td>12414690-215</td>
<td>C608-100BLK (13174)</td>
<td>163.0</td>
</tr>
<tr>
<td>12414690-216</td>
<td>C608-100BLK (13174)</td>
<td>160.0</td>
</tr>
<tr>
<td>12414690-217</td>
<td>C608-100BLK (13174)</td>
<td>62.6</td>
</tr>
</tbody>
</table>
### Table E-1. Pneumatic Tube Lengths (Cont)

<table>
<thead>
<tr>
<th>Tube Part Number</th>
<th>Bulk Tubing Part Number</th>
<th>Cut Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>inches</td>
</tr>
<tr>
<td>12414690-218</td>
<td>C608-100BLK (13174)</td>
<td>119.8</td>
</tr>
<tr>
<td>12414690-219</td>
<td>C608-100BLK (13174)</td>
<td>69.0</td>
</tr>
<tr>
<td>12414690-220</td>
<td>C608-100BLK (13174)</td>
<td>45.5</td>
</tr>
<tr>
<td>12414690-221</td>
<td>C608-100BLK (13174)</td>
<td>12.6</td>
</tr>
<tr>
<td>12414690-222</td>
<td>C608-100BLK (13174)</td>
<td>5.5</td>
</tr>
<tr>
<td>12414690-223</td>
<td>C608-100BLK (13174)</td>
<td>14.6</td>
</tr>
<tr>
<td>12414690-224</td>
<td>C608-100BLK (13174)</td>
<td>170.0</td>
</tr>
<tr>
<td>12414690-225</td>
<td>C608-100BLK (13174)</td>
<td>174.0</td>
</tr>
<tr>
<td>12414690-228</td>
<td>C608-100BLK (13174)</td>
<td>3.5</td>
</tr>
<tr>
<td>12414690-229</td>
<td>C608-100BLK (13174)</td>
<td>62.2</td>
</tr>
<tr>
<td>12414690-230</td>
<td>C608-100BLK (13174)</td>
<td>14.6</td>
</tr>
<tr>
<td>12414690-231</td>
<td>C608-100BLK (13174)</td>
<td>60.5</td>
</tr>
<tr>
<td>12414690-232</td>
<td>C608-100BLK (13174)</td>
<td>126.4</td>
</tr>
<tr>
<td>12414690-233</td>
<td>C608-100BLK (13174)</td>
<td>142.1</td>
</tr>
<tr>
<td>12414690-234</td>
<td>C608-100BLK (13174)</td>
<td></td>
</tr>
<tr>
<td>12414690-235</td>
<td>C608-100BLK (13174)</td>
<td></td>
</tr>
<tr>
<td>12414690-236</td>
<td>C608-100BLK (13174)</td>
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</tr>
<tr>
<td>12414690-237</td>
<td>C608-100BLK (13174)</td>
<td>147.6</td>
</tr>
<tr>
<td>12414690-238</td>
<td>C608-100BLK (13174)</td>
<td>179.5</td>
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<tr>
<td>12414690-239</td>
<td>C608-100BLK (13174)</td>
<td>187.0</td>
</tr>
<tr>
<td>12414690-240</td>
<td>C608-100BLK (13174)</td>
<td>111.5</td>
</tr>
<tr>
<td>12414690-241</td>
<td>C608-100BLK (13174)</td>
<td>127.5</td>
</tr>
<tr>
<td>12414690-242</td>
<td>C608-100BLK (13174)</td>
<td>159.0</td>
</tr>
<tr>
<td>12414690-243</td>
<td>C608-100BLK (13174)</td>
<td>166.5</td>
</tr>
<tr>
<td>12414690-244</td>
<td>C608-100BLK (13174)</td>
<td>41.0</td>
</tr>
<tr>
<td>12414690-245</td>
<td>C608-100BLK (13174)</td>
<td>57.0</td>
</tr>
<tr>
<td>12414690-246</td>
<td>C608-100BLK (13174)</td>
<td>88.6</td>
</tr>
<tr>
<td>12414690-247</td>
<td>C608-100BLK (13174)</td>
<td>96.0</td>
</tr>
<tr>
<td>12414690-248</td>
<td>C608-100BLK (13174)</td>
<td>48.0</td>
</tr>
<tr>
<td>12414690-249</td>
<td>C608-100BLK (13174)</td>
<td>54.0</td>
</tr>
<tr>
<td>12414690-301</td>
<td>PFT-10B-BLK-100 (61424)</td>
<td>19.0</td>
</tr>
<tr>
<td>12414690-302</td>
<td>PFT-10B-BLK-100 (61424)</td>
<td>56.0</td>
</tr>
<tr>
<td>12414690-303</td>
<td>PFT-10B-BLK-100 (61424)</td>
<td>118.1</td>
</tr>
</tbody>
</table>
E-13. NON-METALLIC ELECTRICAL CABLE CONDUIT FABRICATION

Make conduit to cover electrical cables described on 1241638 from bulk tube stock listed in Table E-2. Non-Metallic Electrical Cable Conduit Lengths. Use a fine-toothed hacksaw or suitable cutting device and cut hose/tube to required length.

Table E-2. Non-Metallic Electrical Cable Conduit Lengths

<table>
<thead>
<tr>
<th>Tube Part Number</th>
<th>Bulk Tube Part Number</th>
<th>Cut Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>inch</td>
</tr>
<tr>
<td>12416381P1</td>
<td>49008</td>
<td>8.9</td>
</tr>
<tr>
<td>12416381P10</td>
<td>49008</td>
<td>17.8</td>
</tr>
<tr>
<td>12416381P11</td>
<td>49008</td>
<td>29.9</td>
</tr>
<tr>
<td>12416381P12</td>
<td>49008</td>
<td>33.0</td>
</tr>
<tr>
<td>12416381P13</td>
<td>49008</td>
<td>13.9</td>
</tr>
<tr>
<td>12416381P14</td>
<td>49008</td>
<td>4.0</td>
</tr>
<tr>
<td>12416381P15</td>
<td>49008</td>
<td>17.4</td>
</tr>
<tr>
<td>12416381P16</td>
<td>49008</td>
<td>3.2</td>
</tr>
<tr>
<td>12416381P17</td>
<td>49008</td>
<td>4.5</td>
</tr>
<tr>
<td>12416381P18</td>
<td>49008</td>
<td>16.2</td>
</tr>
<tr>
<td>12416381P20</td>
<td>27413</td>
<td>32.8</td>
</tr>
<tr>
<td>12416381P21</td>
<td>27413</td>
<td>9.2</td>
</tr>
<tr>
<td>12416381P22</td>
<td>27413</td>
<td>8.0</td>
</tr>
<tr>
<td>12416381P23</td>
<td>27413</td>
<td>23.3</td>
</tr>
<tr>
<td>12416381P26</td>
<td>49008</td>
<td>2.5</td>
</tr>
<tr>
<td>12416381P3</td>
<td>27413</td>
<td>7.3</td>
</tr>
<tr>
<td>12416381P30</td>
<td>49007</td>
<td>17.0</td>
</tr>
<tr>
<td>12416381P32</td>
<td>49005</td>
<td>1.7</td>
</tr>
<tr>
<td>12416381P34</td>
<td>49005</td>
<td>20.7</td>
</tr>
<tr>
<td>12416381P35</td>
<td>49005</td>
<td>21.8</td>
</tr>
<tr>
<td>12416381P36</td>
<td>49005</td>
<td>5.5</td>
</tr>
<tr>
<td>12416381P37</td>
<td>49005</td>
<td>8.0</td>
</tr>
<tr>
<td>12416381P38</td>
<td>49008</td>
<td>3.7</td>
</tr>
<tr>
<td>12416381P4</td>
<td>49008</td>
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<td>12416381P5</td>
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<td>26.0</td>
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<td>12416381P6</td>
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<td>7.7</td>
</tr>
<tr>
<td>12416381P7</td>
<td>49008</td>
<td>26.7</td>
</tr>
<tr>
<td>12416381P8</td>
<td>49008</td>
<td>5.2</td>
</tr>
<tr>
<td>12416381P9</td>
<td>49008</td>
<td>16.8</td>
</tr>
</tbody>
</table>
E-14. STEERING GEAR RETURN HOSE AND TRANSMISSION OIL COOLER HOSES FABRICATION

Cut the following hoses from bulk hose using a fine-toothed hacksaw or suitable cutting device.

<table>
<thead>
<tr>
<th>Hose Part Number</th>
<th>Bulk Hose Part Number</th>
<th>Cut Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>inches</td>
</tr>
<tr>
<td>12418037</td>
<td>A110 (30327)</td>
<td>75.5</td>
</tr>
<tr>
<td>12418460-001</td>
<td>MS521302B110360 (96906)</td>
<td>17.5</td>
</tr>
<tr>
<td>12418460-002</td>
<td>MS521301A206R (96906)</td>
<td>16.0</td>
</tr>
</tbody>
</table>

E-15. LANYARD ASSEMBLIES P/N 12418763 AND 12420196 FABRICATION

Make the following lanyard assemblies from bulk cable material, sleeves, and tab material and assemble according to Figure E-14. Lanyard Assembly. The following parts list identifies part numbers and lengths of cut pieces.

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Material Description</th>
<th>Size</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MIL-W-83420 Type 1, Comp B</td>
<td>1/16 in. stranded wire cable</td>
<td>4 in. (102 mm)</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>MS51844-22</td>
<td>Sleeve</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>N/A</td>
<td>Tab, Stainless Steel ASTM A617</td>
<td>.06 in. (16 cm) X .37 in. (9.5 mm) X 1.25 in. (32 mm)</td>
<td>1</td>
</tr>
</tbody>
</table>
a. All dimensions are in inches (millimeters).
b. Make from bulk cable and flat steel material as identified in parts list.
c. Drill two 0.19 in. (4.8 mm) diameter holes through tab material as shown on Figure E-14. Lanyard Assembly.
d. De-burr and remove sharp edges.
e. Bend tab as shown on Figure E-14. Lanyard Assembly.
f. Form loops on cable ends and insert sleeve material over cable on one end of cable and over cable and through sleeve at other end of cable as shown in Figure E-14. Lanyard Assembly.
g. Crimp two sleeves over cable ends.
**E-16. NON-METALLIC VENT AIR HOSES FABRICATION**

Cut the following vent air hoses from bulk hose using a fine-toothed hacksaw or suitable cutting device.

<table>
<thead>
<tr>
<th>Hose Part Number</th>
<th>Bulk Hose Part Number</th>
<th>Cut Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>inches</td>
</tr>
<tr>
<td>12420197-001</td>
<td>483666 (02280)</td>
<td>180.0</td>
</tr>
<tr>
<td>12420197-002</td>
<td>483666 (02280)</td>
<td>120.0</td>
</tr>
<tr>
<td>12420197-003</td>
<td>483666 (02280)</td>
<td>96.0</td>
</tr>
<tr>
<td>12420197-004</td>
<td>483666 (02280)</td>
<td>36.0</td>
</tr>
<tr>
<td>12420197-005</td>
<td>483666 (02280)</td>
<td>156.0</td>
</tr>
<tr>
<td>12420197-006</td>
<td>483666 (02280)</td>
<td>72.0</td>
</tr>
<tr>
<td>12420198-001</td>
<td>881-16 (98441)</td>
<td>120.0</td>
</tr>
<tr>
<td>12420198-002</td>
<td>11657469</td>
<td>36.0</td>
</tr>
</tbody>
</table>

**E-17. PERSONNEL HEATER AIR DUCT HOSE FABRICATION**

Cut the following hoses from bulk hose using a fine-toothed hacksaw or suitable cutting device.

<table>
<thead>
<tr>
<th>Hose Part Number</th>
<th>Bulk Hose Part Number</th>
<th>Cut Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>inches</td>
</tr>
<tr>
<td>12420308-457</td>
<td>8711054 (19207)</td>
<td>18.3</td>
</tr>
<tr>
<td>12420308-760</td>
<td>8711054 (19207)</td>
<td>30.4</td>
</tr>
</tbody>
</table>

**E-18. BLOCK SEAL 12420489 FABRICATION**

Make block seal from P/N (0VXY8) STN2.38X.5. Use a suitable cutting tool to cut seal to 0.52 inch (1.3 cm) long.
E-19. CTIS SEAL DRIVER 3256-H-1048

Used on Front, Intermediate, and Rear Axle CTIS Seals.

NOTES ON USE OF DRIVER

1) SEAL END OF DRIVER TO BE CLEAN OF DEBRIS, DIRT, NICKS AND BURRS
2) DO NOT USE A METAL HAMMER ON DRIVER
   A RUBBER, PLASTIC, WOOD OR SOME OTHER DEAD BLOW TYPE MALLET
   IS TO BE USED
3) SLIGHTLY GREASE SEAL END OF DRIVER PRIOR TO INSTALLING SEAL

Figure E-15. CTIS Seal Driver

a. All dimensions are in inches (millimeters).
b. Manufacture from round steel stock.
c. De-burr and remove sharp edges.
NOTES ON USE OF DRIVER

1) SEAL END OF DRIVER TO BE CLEAN OF DEBRIS, DIRT, NICKS AND BURRS
2) DO NOT USE A METAL HAMMER ON DRIVER
   A RUBBER, PLASTIC, WOOD OR SOME OTHER DEAD BLOW TYPE MALLET IS TO BE USED
3) SLIGHTLY GREASE SEAL END OF DRIVER PRIOR TO INSTALLING SEAL

Figure E-16. Wheel Hub Grease Seal Driver

a. All dimensions are in inches (millimeters).
b. Manufacture from round steel stock.
c. De-burr and remove sharp edges.
E-21. DIMMER SWITCH TEST WIRE

Fabricate the dimmer switch test wire according to the following steps. Refer to the following parts list for materials.

<table>
<thead>
<tr>
<th>Material Description</th>
<th>National Stock Number</th>
<th>Quantity</th>
<th>Cut Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire, Electrical (M168678/14BKE9)</td>
<td>6145-01-229-4134</td>
<td>1</td>
<td>12 in (305 mm)</td>
</tr>
<tr>
<td>Pin, Grooved, Headless (12258939-1)</td>
<td>5315-01-156-6314</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Contact, Electrical (12258939-2)</td>
<td>5999-01-150-8808</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

a. Dimensions are in inches (millimeters).
b. Cut a length of electrical wire approximately 12 in. (305 mm) long.
c. Remove approximately 1/4 in. (6 mm) of insulation from each end of electrical wire.
d. Crimp headless grooved pin on one end of electrical wire.
e. Crimp electrical contact on opposite end of electrical wire.
Fabricate Purge Valve Tool according to the following instructions. Refer to Figure E-17. Purge Valve Tool for details.

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Material Description</th>
<th>Size</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/A</td>
<td>Steel, ASTM A 108 or A576 Grade 1015-1025, BAR (Ref UNS G10150-G10250). Finish Black Oxide Coat, Class I, IAW MIL-C-13924.</td>
<td>14.0 in. (356 mm)</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure E-17. Purge Valve Tool

a. All dimensions are in inches (cm).
b. Cut steel bar (1) and bend to shape as shown in Figure E-17.
c. Dimensional limits apply after coating.
d. All edges shall be broken and free from burrs.
e. Metal Stamp, electro etch, or engrave with the following marking IAW MIL-STD-130: 19207-12379968 MFR-19207.
Cut air hoses and convoluted tubing from bulk hose stock listed in Table E-3. M1089 30K Winch Air Hose Lengths and Fittings. Use a fine-toothed hacksaw or suitable cutting device and cut air hoses and convoluted tubing to required length.

**Table E-3. M1089 30K Air Hose Lengths and Fittings**

<table>
<thead>
<tr>
<th>Hose Name</th>
<th>Bulk Hose P/N</th>
<th>Hose Cut Length</th>
<th>Bulk Convoluted Tubing P/N</th>
<th>Convoluted Tubing Cut Length</th>
<th>Fittings P/N</th>
<th>Fittings Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Supply</td>
<td>NB-4-035</td>
<td>96.0 in. 2438 mm</td>
<td>12420924-001</td>
<td>94.0 in. 2388 mm</td>
<td>4-100110B</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4-100115B</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>63NTA-4</td>
<td>2</td>
</tr>
<tr>
<td>Manifold Supply</td>
<td>NB-4-035</td>
<td>40.0 in. 1016 mm</td>
<td>12420924-001</td>
<td>38.0 in. 965 mm</td>
<td>4-100110B</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4-100115B</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>63NTA-4</td>
<td>2</td>
</tr>
<tr>
<td>LH freespool</td>
<td>NB-4-035</td>
<td>66.0 in. 1676 mm</td>
<td>12420924-001</td>
<td>64.0 in. 1626 mm</td>
<td>4-100110B</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4-100115B</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>63NTA-4</td>
<td>2</td>
</tr>
<tr>
<td>RH freespool</td>
<td>NB-4-035</td>
<td>48.0 in. 1219 mm</td>
<td>12420924-001</td>
<td>46.0 in. 1168 mm</td>
<td>4-100110B</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4-100115B</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>63NTA-4</td>
<td>2</td>
</tr>
<tr>
<td>LH regulator input</td>
<td>NB-4-035</td>
<td>12.0 in. 305 mm</td>
<td>N/A</td>
<td>N/A</td>
<td>4-100110B</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4-100115B</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>63NTA-4</td>
<td>2</td>
</tr>
<tr>
<td>RH regulator input</td>
<td>NB-4-035</td>
<td>12.0 in. 305 mm</td>
<td>N/A</td>
<td>N/A</td>
<td>4-100110B</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4-100115B</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>63NTA-4</td>
<td>2</td>
</tr>
<tr>
<td>LH check valve return</td>
<td>NB-4-035</td>
<td>3.0 in. 76 mm</td>
<td>N/A</td>
<td>N/A</td>
<td>4-100110B</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4-100115B</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>63NTA-4</td>
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</tr>
<tr>
<td>RH check valve return</td>
<td>NB-4-035</td>
<td>3.0 in. 76 mm</td>
<td>N/A</td>
<td>N/A</td>
<td>4-100110B</td>
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</tr>
<tr>
<td></td>
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<td></td>
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<tr>
<td>Front LH tension supply</td>
<td>NB-4-035</td>
<td>48.0 in. 1219 mm</td>
<td>12420924-001</td>
<td>46.0 in. 1168 mm</td>
<td>4-100110B</td>
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<td>Front RH tension supply</td>
<td>NB-4-035</td>
<td>66.0 in. 1676 mm</td>
<td>12420924-001</td>
<td>64.0 in. 1626 mm</td>
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<tr>
<td>Hose Name</td>
<td>Bulk Hose P/N</td>
<td>Bulk Hose Length in.</td>
<td>Convoluted Tubing P/N in.</td>
<td>Convoluted Tubing Length mm</td>
<td>Fittings P/N</td>
<td>Fittings Qty.</td>
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<td>RH 30K winch supply</td>
<td>NB-2-016</td>
<td>40.0</td>
<td>N/A</td>
<td>N/A</td>
<td>2-2 100102BA 2-2 100202BA</td>
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<td>RH 30K winch return</td>
<td>NB-2-016</td>
<td>40.0</td>
<td>N/A</td>
<td>N/A</td>
<td>2-2 100102BA</td>
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<td>Underlift fold supply</td>
<td>NB-2-016</td>
<td>40.0</td>
<td>N/A</td>
<td>N/A</td>
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<td>Underlift fold return</td>
<td>NB-2-016</td>
<td>40.0</td>
<td>N/A</td>
<td>N/A</td>
<td>2-2 100102BA 2-2 100202BA</td>
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<td>Underlift supply</td>
<td>NB-2-016</td>
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<td>N/A</td>
<td>2-2 100102BA</td>
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<td>Underlift return</td>
<td>NB-2-016</td>
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<td>N/A</td>
<td>2-2 100102BA 2-2 100202BA</td>
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</tr>
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<td>Stinger supply</td>
<td>NB-2-016</td>
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<td>N/A</td>
<td>N/A</td>
<td>2-2 100102BA</td>
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<td>Stinger Return</td>
<td>NB-2-016</td>
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<td>N/A</td>
<td>2-2 100102BA 2-2 100202BA</td>
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<td>N/A</td>
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<td>N/A</td>
<td>N/A</td>
<td>2-2 100102BA</td>
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E-24. M1089 30K WINCH PNEUMATIC TEST ADAPTER

Assembly the M1089 30K winch pneumatic test adapter to the following steps. Refer to the following parts list and Figure E-18. M1089 30K Winch Pneumatic Test Adapter for details.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Material Description</th>
<th>National Stock Number</th>
<th>Qty.</th>
</tr>
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<tbody>
<tr>
<td>NB-4-035</td>
<td>Tubing, Nonmetallic</td>
<td>4720-01-071-4042</td>
<td>14 in. (355.6 mm)</td>
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<tr>
<td>MIL-T-27730</td>
<td>Tape, antiseizing</td>
<td>8030-00-889-3534</td>
<td>1 roll</td>
</tr>
<tr>
<td>207P-4</td>
<td>Coupling, Pipe</td>
<td>4730-00-881-1161</td>
<td>1</td>
</tr>
<tr>
<td>4-6 100102 BA</td>
<td>Adapter, Straight, Pipe to Tube</td>
<td>4730-01-096-9398</td>
<td>1</td>
</tr>
<tr>
<td>4-4 100101 BA</td>
<td>Nipple, Tube</td>
<td>4730-01-091-4012</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure E-18. M1089 30K Winch Pneumatic Test Adapter

a. All dimensions are in inches (millimeter).
b. Cut piece of nonmetallic tubing (1) to 14.0 in. (355.6 mm).
c. Remove two nuts (2), ferrules (3), and sleeves (4) from tube nipple (5).
d. Install nut (2), ferrule (3), and sleeve (4) on nonmetallic tubing (1).
e. Install nonmetallic tubing (1) on tube nipple (5).
f. Remove nut (6), ferrule (7), and sleeve (8) from straight adapter (9).
g. Install nut (6), ferrule (7), and sleeve (8) on nonmetallic tubing (1).
h. Install nonmetallic tubing (1) on straight adapter (9).
i. Apply on wrap of antiseizing tape to threads of straight adapter (9).
j. Install pipe coupling (10) on straight adapter (9).
k. Retain nut (2), ferrule (3), and sleeve (4) for future use.
APPENDIX F
TORQUE LIMITS

F-1. GENERAL
This appendix provides general torque limits for screws and nuts used on the vehicle. Special torque limits are shown in the maintenance procedures for applicable components. Use the general torque limit given in this appendix when specific torque limits are not given in the maintenance procedure. These general torque limits can not be applied to screws that retain rubber components. The rubber components will be damaged before the torque limit is reached.

If a special torque limit is not given in the maintenance instructions for a fastener which retains a rubber component, tighten the screw or nut until it touches metal, then tighten one more turn. Whenever possible, the tightening force (torque) should be applied to the nut side of the fastener group.

F-2. TORQUE LIMITS
Refer to Table F-1. Torque Limits for SAE and ANSI Fasteners for torque limits on standard (SAE and ANSI) screws and free spinning nuts. Refer to Table F-2. Torque Limits for SAE and ANSI Prevailing Torque Nuts for torque limits on standard (SAE and ANSI) self-locking nuts. Refer to Table F-3. Torque Limits for Metric Screws and Free Spinning Nuts for torque limits on metric screws and free spinning nuts. Refer to Table F-4. Torque Limits for Metric Prevailing Torque Nuts for torque limits on metric self-locking nuts.

F-3. USE OF TORQUE TABLES
(1) Measure the diameter of the screw to be installed.

(2) Count the number of threads per inch.

(3) Under the heading DIAMETER look down the column until the diameter of the screw is found. (There are usually two lines beginning with the same diameter.)

(4) Under the heading THREADS PER INCH (SAE and ANSI) or THREAD PITCH (metric), find the number of threads per inch that matches the number counted in step (2).

(5) To find the grade of the screw, match the markings on the head to the correct picture under CAPSCREW HEAD MARKINGS on the torque table.

(6) Look down the column under the picture found in step (5) until the torque limit (lb-ft or N·m) for the diameter and threads per inch (or thread pitch, in the case of metric fasteners) of the screw are located.
### Table F-1. Dry Torque Limits for SAE and ANSI Screws and Free Spinning Nuts

#### Material Grade Markings

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Threads per inch</th>
<th>SAE Grade 2</th>
<th>SAE Grade 5</th>
<th>SAE Grade 8</th>
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<td>inch</td>
<td>lb-ft</td>
<td>N·m</td>
<td>lb-ft</td>
<td>N·m</td>
</tr>
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<td>5-7</td>
<td>6-8</td>
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<td>5/16</td>
<td>24</td>
<td>8-10</td>
<td>11-15</td>
<td>12-16</td>
</tr>
<tr>
<td>5/16</td>
<td>32</td>
<td>9-11</td>
<td>12-16</td>
<td>14-18</td>
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<td>14</td>
<td>20-28</td>
<td>28-38</td>
<td>32-42</td>
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<td>20</td>
<td>23-31</td>
<td>31-41</td>
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<td>35-47</td>
<td>48-64</td>
<td>55-73</td>
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<td>96-128</td>
<td>108-146</td>
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<td>100-134</td>
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Table F-1. Dry Torque Limits for SAE and ANSI Screws and Free Spinning Nuts (Cont)

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<th>Threads per inch</th>
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# APPENDIX F
## TORQUE LIMITS

Table F-2. Dry Torque Limits for SAE and ANSI Prevailing Torque Nuts

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<thead>
<tr>
<th>Hole Diameter (inch)</th>
<th>Threads per inch</th>
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<th>SAE Grade 8 Torque (lb-ft, N·m)</th>
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Table F-3. Dry Torque Limits for Metric Screws and Free Spinning Nuts

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<th>Diameter (mm)</th>
<th>Thread Pitch</th>
<th>Metric Grade 4.8 Torque (lb-ft, N-m)</th>
<th>Metric Grade 8.8 Torque (lb-ft, N-m)</th>
<th>Metric Grade 10.9 Torque (lb-ft, N-m)</th>
<th>Metric Grade 12.9 Torque (lb-ft, N-m)</th>
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<td>17-23</td>
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<td>7-9-13</td>
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<td>18-24</td>
<td>25-33</td>
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# APPENDIX F
## TORQUE LIMITS

### Table F-4. Dry Torque Limits for Metric Prevailing Torque Nuts

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*Material Grade Markings: XAPFF131 (Metric Grade 4.8), XAPFF131 (Metric Grade 8.8), XAPFF141 (Metric Grade 10.9), XAPFF151 (Metric Grade 12.9)*
## Table F-5. Wet Torque Limits for SAE and ANSI Screws and Free Spinning Nuts

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**NOTE**
Manufacturer's marks may vary. These are all SAE Grade 5.
Table F-5. Wet Torque Limits for SAE and ANSI Screws and Free Spinning Nuts (Cont)

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APPENDIX G
MANDATORY REPLACEMENT PARTS

Section I. INTRODUCTION

G-1. SCOPE

This appendix lists mandatory replacement parts you will need to maintain the MTV vehicle.

G-2. EXPLANATION OF COLUMNS

a. Column (1) - Item Number. This number is assigned to each entry in the listing and is referenced in the Initial Setup of the applicable task under Materials/Parts.

b. Column (2) - Nomenclature. Name or identification of the part.

c. Column (3) - Part Number. The manufacturer's part number.

d. Column (4) - National Stock Number. The National stock number of the part.

---

Section II. MANDATORY REPLACEMENT PARTS LIST

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<th>(3) PART NUMBER</th>
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<td>128BSTM4</td>
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APPENDIX H

LUBRICATION ORDER AND SERVICES

SECTION I. INTRODUCTION

H-1. GENERAL

The information contained in this appendix provides the lubrication/services requirements for the MTV vehicle.

a. Adherence. Intervals (on-condition or hardtime) and the related man-hour times are based on normal operation. The man-hour time specified is the time needed to do all the services prescribed for a particular interval. On-condition (OC) oil sample intervals will be applied unless changed by the Army Oil Analysis Program (AOAP) laboratory. Change the hardtime interval if the lubricants are contaminated or if operating the equipment under adverse operating conditions, including longer-than-usual operating hours. The calendar interval may be extended during periods of low activity. If extended, adequate preservation precautions must be taken. Hardtime intervals will be applied in the event AOAP laboratory support is not available. Hardtime intervals must be applied during the warranty period.

Intervals shown in this lubrication order and services are based on mileage/calendar, and in some cases mileage alone. An example of a mileage/calendar interval is: Q, which means every 3,000 miles (4,827 km) or quarterly (every three months). The lubrication is to be performed at whichever interval occurs first for the vehicle. An example of a mileage alone interval is: 6K, which stands for every 6,000 miles (9,654 km). The lubrication/services is to be performed at the mileage indicated regardless of the calendar interval.

• Dry Cleaning Solvent (P-D-680) is TOXIC and flammable. Wear protective goggles and gloves; use only in well-ventilated area; avoid contact with skin, eyes, and clothes, and do not breath vapors. Keep away from heat or flame. Never smoke when using solvent; the flashpoint for Type I Dry Cleaning Solvent is 100 °F (38 °C) and for Type II is 138 °F (50 °C). Failure to comply may result in serious injury or death to personnel.

• If personnel become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts skin or clothes, flush with cold water. If solvent contacts eyes, immediately flush eyes with water and get medical attention. Failure to comply may result in injury to personnel.

b. Cleaning fittings before lubricating. Clean parts with dry cleaning solvent (SD P-D-680) (Item 65, Appendix D) or equivalent. Dry before lubricating. Dashed arrows indicate lubrication on both sides of the equipment.

c. Lubricating after fording. If fording occurs, lubricate all fittings below fording depth and check submerged gearboxes for presence of water.

d. Lubricating after high-pressure washing. After a thorough washing, lubricate all grease fittings and oil can points outside and underneath vehicle.

e. Level of Maintenance. The lowest level of maintenance authorized to lubricate a point is Operator/Unit Maintenance (O). Operator/crew (C) may lubricate points authorized for Unit Maintenance (O) when authorized by Unit Maintenance (O).

f. Localized views. A reference to the appropriate localized view is given after most lubrication entries. Localized views begin on page H-13.
H-1. GENERAL (CONT)

g. Interval Symbols. The lubrications/services interval symbols will be used as applicable:

- Q-quarterly/3,000 mi (4,827 km) (whichever occurs first)
- S-semiannually/6,000 mi (9,654 km) (whichever occurs first)
- A-annually/12,000 mi (19,308 km) (whichever occurs first)
- B-biennially/24,000 mi (38,616 km) (whichever occurs first)
- 3K-every 3,000 mi (4,827 km) (no calendar interval)
- 6K-every 6,000 mi (9,654 km) (no calendar interval)
- 12K-every 12,000 mi (19,308 km) (no calendar interval)
- 24K-every 24,000 mi (38,616 km) (no calendar interval)

H-2. OIL FILTERS

Oil filters shall be serviced/changed as applicable, when:

a. They are known to be contaminated, or clogged;

b. Service is recommended by AOAP laboratory analysis; or

c. At prescribed hardtime intervals while vehicle is under warranty, or if AOAP is not available/used as required.

H-3. AOAP SAMPLING INTERVAL

- Engine oil is hot and under pressure. The oil sampling valve releases oil proportionally to the amount of pressure applied to valve. Activate oil sampling valve by pressing in slowly to prevent injury to personnel. Failure to comply may result in injury to personnel.

- Wear safety goggles when taking oil sample. Oil is under pressure and could cause injury to personnel. Failure to comply may result in injury to personnel.

Units participating in AOAP will sample engine oil every 3,000 miles (4,827 km) or 6 months, whichever occurs first and change engine oil as directed by AOAP. Units participating in AOAP will sample transmission oil every 6,000 miles (9,654 km) or 12 months, whichever occurs first and change transmission oil as directed by AOAP. Units participating in AOAP will sample hydraulic system oil initially after 6 weeks or 10 hours of operation, whichever occurs first. After initial oil change samples should be taken every 12 months or 50 hours of operation, whichever occurs first and change hydraulic oil as directed by AOAP.

H-4. WARRANTY HARDTIME STATEMENT

"For equipment under manufacturer's warranty, hardtime oil service intervals shall be followed. Intervals shall be shortened if lubricants are known to be contaminated or if operation is under adverse conditions (such as longer than usual operating hours, extended idling periods, extreme dust)."
## SECTION II. LUBRICATION/SERVICES CHART

### H-5. LUBRICATION/SERVICES KEY

<table>
<thead>
<tr>
<th>LUBRICANTS</th>
<th>Specification Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification</td>
<td>Type</td>
</tr>
<tr>
<td>MIL-L-2104 (OE/HDO)</td>
<td>Lubricating Oil, Internal Combustion Engine, Combat/Tactical Service</td>
</tr>
<tr>
<td>MIL-L-46167 (OEA)</td>
<td>Lubricating Oil, Internal Combustion Engine, Arctic</td>
</tr>
<tr>
<td>MIL-L-2105 (GO)</td>
<td>Lubricating Oil, Gear, Multipurpose</td>
</tr>
<tr>
<td>MIL-G-10924 (GAA)</td>
<td>Grease, Automotive and Artillery</td>
</tr>
<tr>
<td>MIL-G-18458 (GW)</td>
<td>Grease, Wire-Rope andExposed Gear</td>
</tr>
<tr>
<td>MIL-H-5606 (OHA)</td>
<td>Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance</td>
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<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>CAPACITY</th>
<th>EXPECTED TEMPERATURES</th>
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<tbody>
<tr>
<td>Engine crankcase</td>
<td>25 qt (24 L)</td>
<td>Above +40 F (Above +4 C)</td>
</tr>
<tr>
<td>Transmission (total system) (all models except M1088 and M1089)</td>
<td>49.3 qt (46.7 L)</td>
<td>+40 F to -15 F (+4 C to -26 C)</td>
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<tr>
<td>Transmission (at oil change) (all models except M1088 and M1089)</td>
<td>36.8 qt (34.7 L)</td>
<td>+40 F to -15 F (+4 C to -26 C)</td>
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<tr>
<td>Transmission (total system) (M1088 and M1089)</td>
<td>58.6 qt (55.4 L)</td>
<td>+40 F to -15 F (+4 C to -26 C)</td>
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<td>Transmission (at oil change) (M1088 and M1089)</td>
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<tr>
<td>Transmission (after overhaul)</td>
<td>39.0 qt (37.0 L)</td>
<td>+15 F to -50 F (-26 C to -46 C)</td>
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<tr>
<td>Steering system</td>
<td>5 qt (4.8 L)</td>
<td>OEA</td>
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<tr>
<td>Hydraulic reservoir (except M1089)</td>
<td>27 gal (102.2 L)</td>
<td>OEA</td>
</tr>
<tr>
<td>Hydraulic tank (M1089)</td>
<td>74 gal (280 L)</td>
<td>OEA</td>
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<tr>
<td>Front axle differential (maximum capacity)</td>
<td>9.5 qt (9 L)</td>
<td>SAE 75W90 OR GO-75</td>
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<tr>
<td>Intermediate axle differential (maximum capacity)</td>
<td>14.7 qt (13.9 L)</td>
<td>SAE 75W90 OR GO-75</td>
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<tr>
<td>Rear axle differential (maximum capacity)</td>
<td>12.15 qt (11.5 L)</td>
<td>SAE 75W90 OR GO-75</td>
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<td>Front axle planetary hubs</td>
<td>11-13 oz (0.33-0.38 L)</td>
<td>SAE 75W90 OR GO-75</td>
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### H-5. LUBRICATION/SERVICES KEY (CONT)

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<td>Above +40°F (Above +4°C)</td>
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<td>Rear axle bogie</td>
<td>0.5 qt (0.5 L)</td>
<td>GO-85/140</td>
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<td>15K Self-Recovery Winch (SRW)</td>
<td>As Required</td>
<td>GO-85/140</td>
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<td>30K winches</td>
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<td>Propeller shaft universal and slip joints</td>
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<td>Tie rod ends</td>
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<td>Towing pintle assembly</td>
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<td>Spring bolts and spring shackles</td>
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<td>Front axle shaft U-joints and steering knuckles</td>
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<td>Front lifting beam</td>
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<td>15K Self-Recovery Winch (SRW) cable</td>
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<td>Air/hydraulic power unit</td>
<td>3 pt (1.4 L)</td>
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<td>Backup hydraulic pump</td>
<td>19 oz (562 ml)</td>
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### COOLANT

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<td>A-A-52624A</td>
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<td>MIL-A-11755</td>
<td>Antifreeze, Arctic-Type</td>
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<td>Above +40°F (Above +4°C)</td>
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<td>Cooling system (engine only)</td>
<td>14 qt (13 L)</td>
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<td>Cooling system (total system)</td>
<td>50.3 qt (47.6 L)</td>
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<td>Cooling system, Arctic (total system) (M1088, M1089)</td>
<td>64.8 qt (61.3 L)</td>
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<td>Cooling system, Arctic (total system) (M1088, M1089)</td>
<td>76.5 qt (72.4 L)</td>
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CLEANING AGENT

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<td>P-D-680</td>
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<td>O-C-1901</td>
<td>Cleaning Compound, Windshield</td>
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<td>All metal parts as required</td>
<td>N/A</td>
<td>SD-II (all temperatures)</td>
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<td>Windshield washer reservoir</td>
<td>7.5 qt (7.1 L)</td>
<td>2/3 water to 1/3 O-C-1901</td>
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For arctic operation refer to FM 9-207.

H-6. LUBRICATION/SERVICES INTERVALS

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<td>Quarterly (Q)</td>
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<tr>
<td>Semi-annually (S)</td>
<td>Lubrication performed once every six months or 6,000 mi. (9,654 km).*</td>
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<tr>
<td>Annually (A)</td>
<td>Lubrication performed once every year or every 12,000 mi. (19,308 km).*</td>
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<tr>
<td>Biennially (B)</td>
<td>Lubrication performed once every two years or every 24,000 mi. (38,616 km).*</td>
</tr>
<tr>
<td>3K</td>
<td>Lubrication performed once every 3,000 mi. (4,827 km).**</td>
</tr>
<tr>
<td>6K</td>
<td>Lubrication performed once every 6,000 mi. (9,654 km).**</td>
</tr>
<tr>
<td>12K</td>
<td>Lubrication performed once every 12,000 mi. (19,308 km).**</td>
</tr>
<tr>
<td>24K</td>
<td>Lubrication performed once every 24,000 mi. (38,616 km).**</td>
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* Whichever occurs first.
** No calendar interval.
LUBRICANT INTERVAL

Engine Crankcase Breather (O)
(See note 17 and view A)

Fuel Filter (O)
(See note 6 and view A)

Fuel/Water Separator (O)
(See note 5 and view B)

Cooling System (O)
(See note 7)

Transmission Filter (O)
(See note 3 and view F)

Transmission Drain and Fill (O)
(See note 3 and views D, E, and F)

Intermediate Axle and Rear Axle Inner Wheel Bearing Repack (O)
(See note 27)

Towing Pintle Fill (O)
(See note 16 and views J and K)

Engine Oil Filter (O)
(See note 2 and view C)

Crankcase Drain and Fill (O)
(See note 1 and views C and D)

Front Axle Inner Wheel Bearing Repack (O)
(See note 27)

Power Steering Reservoir Drain and Fill (O)
(See note 4 and view G)

Power Steering Filter (O)
(See note 4 and view G)

Rear Axle Bogie Drain and Fill (O)
(See note 28 and view AG)

15K Self-Recovery Winch (SRW) Cable Rear Roller Fairlead Fill (O)
(See note 29 and views AE and AF)

CHASSIS

NOTE: Dashed arrows indicate lubrication on both sides of vehicle.
Spring Shackle
Fill (O)
(See note 18 and view I)

Tie Rod Ends
Fill (O)
(See note 13 and view N)

Universal and Slip Joints
Fill (O)
(See note 9 and view P)

Battery Posts (O)
(See note 19 and view Q)

Air Dryer (O)
(See note 37 and view BB)

Universal and Slip Joints
Fill (O)
(See note 9 and view P)

Spring Bolt
Fill (O)
(See note 18 and view H)

Brake Wedge and Air Chamber (O)
(See note 21 and view L)

Backup Hydraulic Pump Drain and Fill (O)
(See note 10 and view R)

Air/Hydraulic Power Unit Drain and Fill (O)
(See note 10 and view S)

Brake Wedge and Air Chamber (O)
(See note 21 and view M)

Universal Joint and Slip Joints
Fill (O)
(See note 9 and view P)

Brake Wedge and Air Chamber (O)
(See note 21 and view M)

NOTE: Dashed arrows indicate lubrication on both sides of vehicle.
CHASSIS

NOTE: Dashed arrows indicate lubrication on both sides of vehicle.
30K Winch Cable
Fill (O)
(See note 14 and view AB)

Pay-Out Assembly Lower
Tension Sheave
Fill (O)
(See note 30 and view BA)

30K Winch Cable Guide Rollers
Fill (O)
(See note 30 and view AB)

30K Winch Cable Guide Rollers
Fill (O)
(See note 30 and view AC)

15K Self-Recovery Winch (SRW) Cable Front Roller Fairlead Fill (O)
(See note 29 and views Z and AA)

Hydraulic Tank and Filter Drain and Fill (O)
(See note 22 and view AD)

NOTE: Dashed arrows indicate lubrication on both sides of vehicle.
M1089 MATERIAL HANDLING CRANE (MHC)

NOTE: Dashed arrows indicate lubrication on both sides of vehicle.
**LUBRICANT INTERVAL**

- **Hoist**
  - Check and Fill (O)
  - (See note 24 and view AS)

- **Boom Wear Pads**
  - Fill (O)
  - (See note 23)

- **Boom Sheave**
  - Fill (O)
  - (See note 34 and view AT)

- **Hoist Cable**
  - Fill (O)
  - (See note 14)

- **Turntable Gearbox**
  - Check and Fill (O)
  - (See note 25 and view AU)

- **Lift Cylinder Pivots**
  - Fill (O)
  - (See note 34 and view AV)

- **Erection Cylinder and Tension Link Pivots**
  - Fill (O)
  - (See note 34 and view AW)

- **Erection Cylinder and Tension Link Pivots**
  - Fill (O)
  - (See note 34 and view AX)

- **Tension Link Grease (O)**
  - (See note 38 and view BC)

- **Turntable Bearing and Pinion Gear Teeth**
  - Fill (O)
  - (See note 26 and view AY)

- **Turntable Bearing Fill (O)**
  - (See note 32 and view AZ)

---

**M1084/M1086 MATERIAL HANDLING CRANE (MHC)**

NOTE: Dashed arrows indicate lubrication on both sides of vehicle.
Left and Right Lift Cylinder
Pivots
Fill (O)
(See note 35)

Left and Right Lower Arm
Pivots
Fill (O)
(See note 35)

Camlock Assembly
Fill (O)
(See note 35)

Crossbar Bushing
Fill (O)
(See note 35)

M1089 UNDERLIFT ASSEMBLY

NOTE: Dashed arrows indicate lubrication on both sides of vehicle
H-8. LOCAL VIEWS

A. Fuel Filter

B. Fuel/Water Separator

C. Engine Oil Filter
   - Crankcase Drain Plug

D. Transmission Oil Fill
   - Engine Oil Fill
H-8. LOCAL VIEWS (CONT)
H-9. LUBRICATION/SERVICES NOTES

1. ENGINE CRANKCASE. Check engine oil level daily. Change engine oil at initial 5,000 miles (8,045 km). During the remainder of the 12,000 mile (19,308 km)/18 month warranty period. Units participating in AOAP will sample engine oil every 3,000 miles (4,827 km) or 6 months, whichever occurs first and change oil as directed by AOAP. Units not participating in AOAP will change engine oil every 6,000 miles (9,654 km) or every six months, whichever occurs first. After expiration of engine warranty period, Units participating in AOAP will perform engine oil change as directed by AOAP. Units not participating in AOAP will change engine oil every 6,000 miles (9,654 km) or every six months, whichever occurs first, or when operating in dusty areas or under severe operating conditions, change the oil every 3,000 miles (4,827 km) or every three months, whichever occurs first. Drain engine oil when engine is warm. Refill engine crankcase with OE/HDO specified for the ambient temperature. Engine oil is full when level is within crosshatch marks on the dipstick. Do not overfill.

2. ENGINE OIL FILTER. Filter is replaced each time the crankcase is drained. If water or metal particles are detected during oil filter replacement, notify Direct Support Maintenance personnel before refilling crankcase (para 3-4).

3. TRANSMISSION. Check transmission oil level daily. Change transmission oil at initial 5,000 miles (8,045 km). During the remainder of the 24 month/unlimited mileage warranty. Units participating in AOAP will sample transmission oil every 6,000 miles (9,654 km) or 12 months, whichever occurs first and change oil as directed by AOAP. Units not participating in AOAP will perform transmission oil change every 24,000 miles (38,616 km) or once every two years, whichever occurs first. Drain transmission oil when engine is warm. Refill with OE/HDO specified for ambient temperature. Add oil until the proper level is reached (TM 9-2320-366-10-1). Do not overfill. Replace oil filters each time transmission oil is changed (para 8-9).

4. POWER STEERING. Check power steering oil level weekly. Change the oil every 24,000 miles (38,616 km). Disconnect upper and lower hoses from steering gear and drain oil. Refill power steering pump reservoir with OE/HDO specified for the ambient temperature. Reservoir is full when oil is between the two marks on the dipstick. Do not overfill. Remove dipstick, wipe clean and install dipstick fully into reservoir. Remove dipstick and read oil level. Replace oil filter each time power steering oil is changed (para 13-8).
5. **FUEL/WATER SEPARATOR.** Replace filter element every 6,000 miles (9,654 km) or once every six months, whichever occurs first (para 4-13).

6. **FUEL FILTER.** The fuel particle filter is replaced when a new fuel/water separator filter element is installed. The normal replacement interval is every 6,000 miles (9,654 km) or once every six months, whichever occurs first (para 4-14).

7. **ENGINE COOLANT.** Check engine coolant level daily. Change the coolant and flush the cooling system every 24,000 miles (38,616 km) or once every two years, whichever occurs first. Fill radiator overflow tank with an Ethylene Glycol/water mixture as specified in 0-A-548D. Service the cooling system before the specified interval if:
   - Coolant is heavily contaminated.
   - Engine overheats.
   - Oil cooler has failed allowing oil and coolant to mix.

8. **HYDRAULIC RESERVOIR AND FILTER (All Models Except M1089).** Check oil level weekly and make sure oil level gage reads **F (full)**. Units participating in AOAP will sample oil annually and change oil and filter as directed by AOAP. Units not participating in AOAP will change oil and filter every two years. Drain oil and refill hydraulic reservoir with OE/HDO specified for ambient operating temperature. Fill hydraulic reservoir until oil level gage reads **F (full)**. Do not overfill. Replace oil filter each time oil is changed (para 19-13).

9. **DRIVE SHAFT UNIVERSAL and SLIP YOKE.**

   Lubricate drive shafts with GAA every 3,000 miles (4,827 km) or once every three months, whichever occurs first, using a low pressure lubrication gun. If operating conditions are severe or abnormal, service at 1,000 miles (1,609 km) or once every month, whichever occurs first. Perform drive shaft hinging inspection every time drive shafts are serviced (para 9-3).

   - **UNIVERSAL JOINT:**
     A. Apply grease to both grease fittings until new grease purges from all four bearing caps.
     B. If grease does not purge from all four bearing caps, perform the following steps:
        1. Loosen two screws on bearing cap that does not purge, approximately 1/4 in.
        2. Apply grease to grease fitting for bearing cap that does not purge until bearing cap purges.
        3. Remove and discard the two screws loosened in step (1).
        4. Position two replacement screws in bearing cap and tighten down evenly.
        5. Tighten two screws to 26-35 lb-ft (35-47 N·m).

   - **SLIP JOINT:**
     A. Apply grease until grease appears at the vent in the welch plug.
     B. Place your finger over the welch plug vent and add grease until grease purges from the dust seal.
     C. If grease does not purge from the dust seal, inspect drive shaft slip yoke (para 9-2).

10. **AIR/HYDRAULIC POWER UNIT and BACKUP HYDRAULIC PUMP.** Change OHA oil every 24,000 miles (38,616 km) or once every two years, whichever occurs first. To service air/hydraulic power unit and backup hydraulic pump refer to vehicle para 19-8, Air Transportability Hydraulic System Service.

11. **ALL AXLE DIFFERENTIALS.** Check oil level in differentials every 3,000 miles (4,827 km). Check oil level with vehicle parked on level surface and axle differential at ambient temperature, allowing at least one hour to cool down after vehicle operation. If oil is checked when axle differential is hot, it is normal for oil to spill out of the port due to expansion from the heat. Oil level is considered full if it is within one inch of the bottom of the fill port. If oil spills from the fill port when the axle differential is cool, it is overfull. Allow oil to drain until no more drains out. If the oil level is more than one inch below the bottom of the fill port, refill axle differential with GO specified for the ambient temperature until level with bottom of fill port. Change the oil every 24,000 miles (38,616 km) or once every two years, whichever occurs first. Drain oil when hot after operation.
12. FRONT AXLE WHEEL END PLANETARY HUBS. There are two lube intervals for the front axle wheel end planetary hubs.

a. Check and fill front axle wheel end planetary hubs every 3,000 miles (4,827 km) or once every three months, whichever occurs first, as follows:

1. Position vehicle on a level surface. Allow 15 minutes for vehicle to cool before checking oil levels.
2. Position fill port at 4 o'clock position. If oil flows from fill port when plug is loosened, let oil drain to correct level. If oil level is below fill port, fill hub with GO specified for the ambient temperature until oil is level with fill port.

b. Drain and fill front axle wheel end planetary hubs every 24,000 miles (38,616 km) or once every two years, whichever occurs first, following the repacking of the inner wheel bearings, or whenever wheel end assemblies are taken apart for other maintenance as follows:

1. Position vehicle on a level surface.
2. Position fill port at the 6 o'clock (down) position.
3. Drain hub oil (allow a minimum of 15 minutes for oil to drain down from vent tubes).
4. Refill hubs with 11-13 ounces of GO specified for the ambient temperature.

13. TIE ROD ENDS. Lubricate tie rod ends with GAA every 6,000 miles (9,654 km) or once every six months, whichever occurs first, using a low pressure lubrication gun, until new grease is seen purging from the boot area. If operating conditions are severe or abnormal, service at 1,000 miles (1,609 km) or once every month, whichever occurs first.

14. WINCH CABLES:

CAUTION

Do not use dry cleaning solvent to clean winch cables. Use of dry cleaning solvent will remove lubricant from inner strands of winch cables. Failure to comply may result in damage to equipment.

a. After winch operation:

Refer to FM 5-125.

b. Care of wire rope:

Refer to FM 5-125.

c. Inspection of wire rope:

Refer to FM 5-125.

d. Every six months:

1. Unwind entire length of winch cable (TM 9-2320-366-10-1).
4. Coat winch cable with GW.
5. Rewind winch cable (TM 9-2320-366-10-1).
15. **15K SRW.** Check 15K SRW gear oil level every 6,000 miles (9,654 km) or once every six months, whichever occurs first. Refill 15K SRW with GO specified for ambient temperature. Change oil every 12,000 miles (19,308 km) or once every year, whichever occurs first. Use procedure (a) to check and fill oil level; use procedure (b) to change oil.

a. Check and fill oil level as follows:

1. Shift the freespool mechanism to the disengage position so the drum can be freely rotated.
2. Rotate the drum to where either plug is near the top of the 15K SRW. Remove the plug.
3. Rotate the drum 90 degrees in the direction that allows the other plug to be near the top of the 15K SRW. Remove the plug.

**NOTE**

Oil level is full if a small amount of oil runs out of lower plug.

4. Add oil until a small amount of oil runs out of lower plug hole.
5. Apply adhesive (Item 3, Appendix D) to plug and position plug in top hole.
6. Rotate drum until open hole is at top.
7. Apply adhesive (Item 3, Appendix D) to plug and position plug in top hole.
8. Tighten plugs to 13-15 lb-ft (18-20 N·m).

b. Change oil as follows:

1. Shift the freespool mechanism to the disengage position so the drum can be freely rotated.
2. Rotate the drum to where either plug is near the top of the 15K SRW. Remove the plug.
3. Rotate the drum 90 degrees in the direction that allows the other plug to be near the top of the 15K SRW. Remove the plug.
4. Position drain pan (Item 39, Appendix C) under 15K SRW.
5. Rotate the drum until either hole is straight down to the bottom of the 15K SRW. Allow the oil to drain completely.
6. Rotate the drum until either hole is at top.

**NOTE**

Oil level is full if a small amount of oil runs out of lower plug.

7. Add oil until a small amount of oil runs out of lower plug hole.
8. Apply adhesive (Item 3, Appendix D) to plug and position plug in top hole.
9. Rotate drum until open hole is at top.
10. Apply adhesive (Item 3, Appendix D) to plug and position plug in top hole.
11. Tighten plugs to 13-15 lb-ft (18-20 N·m).

16. **TOWING PINTLE.** Lubricate towing pintle with GAA every 6,000 miles (9,654 km) or once every six months, whichever occurs first, using a low pressure lubrication gun until new grease is seen purging.
H-9. LUBRICATION/SERVICES NOTES (CONT)

**WARNING**

- Dry Cleaning Solvent (P-D-680) is TOXIC and flammable. Wear protective goggles and gloves; use only in well-ventilated area; avoid contact with skin, eyes, and clothes, and do not breath vapors. Keep away from heat or flame. Never smoke when using solvent; the flashpoint for Type I Dry Cleaning Solvent is 100 °F (38 °C) and for Type II is 138 °F (50 °C). Failure to comply may result in serious injury or death to personnel.

- If personnel become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts skin or clothes, flush with cold water. If solvent contacts eyes, immediately flush eyes with water and get medical attention. Failure to comply may result in injury to personnel.

17. ENGINE CRANKCASE BREATHER. Remove crankcase breather and clean with Dry Cleaning Solvent (SD P-D-680) (Item 65, Appendix D) or equivalent, and replace o-ring seal every 6,000 miles (9,654 km) or once every six months, whichever occurs first (para 3-5).

18. FRONT AXLE SPRING BOLT and SPRING SHACKLE. Lubricate front axle spring bolt and spring shackle with GAA every 3,000 miles (4,827 km) or once every three months, whichever occurs first, using a low pressure lubrication gun until grease appears between pins and bushings at both ends of spring bolt and spring shackle. If pins do not accept grease, notify Direct Support to remove pins. Clean and inspect pins and bushings, replace if necessary. If operating conditions are severe or abnormal, service at 1,000 miles (1,609 km) or once every month, whichever occurs first.

19. BATTERY POSTS. Service batteries in accordance with TM 9-6140-200-14, every 6,000 miles (9,654 km) or once every six months, whichever occurs first.

20. FRONT AXLE SHAFT UNIVERSAL JOINTS and STEERING KNUCKLES. Lubricate universal joints every 3,000 miles (4,827 km) or once every three months, whichever occurs first. Lubricate steering knuckles with GAA every 6,000 miles (9,654 km) or once every six months, whichever occurs first, using a low pressure lubrication gun. If operating conditions are severe or abnormal, service at 1,000 miles (1,609 km) or once every month, whichever occurs first.

21. BRAKE WEDGE and AIR CHAMBER: BRAKE SPIDER, SELF-ADJUSTER MECHANISM, AND WEDGE ASSEMBLY. Clean and lubricate (with GAA) areas of spider and hardware that contact the brake shoes. Disassemble, clean and lubricate the self-adjuster mechanism. Clean and lubricate the wedge head, rollers and ramps in the plungers. Clean and lubricate every 6,000 miles (9,654 km). If operating conditions are severe or abnormal, service at 3,000 miles (4,827 km) or once every three months, whichever occurs first, or when any of the following occur: Refer to para 11-4 and 11-5

- Seals are replaced
- Plungers are removed
- Brakes are relined
- Grease becomes contaminated or hardened

22. HYDRAULIC TANK (M1089). Check oil level weekly and make sure oil level indicates FULL. Units participating in AOAP will sample oil annually and change oil and filter as directed by AOAP. Units not participating in AOAP will change oil and filter every two years. Drain oil and refill hydraulic tank with OE/HDO specified for ambient operating temperature. Fill hydraulic tank until oil level is at the FULL mark on the sight glass. Do not overfill. Replace hydraulic oil filter (para 19-20) when oil is changed. Check oil level with Material Handling Crane (MHC) in the stowed position.
23. BOOM WEAR PADS (M1084/M1086/M1089). Lubricate every 6,000 miles (9,654 km) or once every six months, whichever occurs first. Coat boom wear pads with GAA while boom is extended, for the lower wear pads, boom must be retracted and access cover removed at rear of base boom to grease the upper wear pads. Extend boom in and out while applying grease. This method assures full lubrication for entire length of boom. If operating conditions are severe or abnormal, service at 1,000 miles (1,609 km) or once every month, whichever occurs first.

24. HOIST ASSEMBLY DRUM (M1084/M1086/M1089). Check hoist assembly drum oil level every 6,000 miles (9,654 km) or every six months, whichever occurs first. Check oil level in hoist assembly drum using two pipe plugs (90 degrees apart) on the drum housing. Operate hoist assembly drum so that one pipe plug is positioned at top of drum (fill point) and the other is accessible and level with ground (check level point). Oil level is full if a small quantity of oil runs from check level opening. If oil level is low, add oil at fill opening. To drain, operate drum so that one pipe plug is bottom of drum. Remove plug to drain. Drain and refill with GO specified for the ambient temperature, if oil becomes contaminated.

25. SWING DRIVE GEARBOX (M1084/M1086/M1089). Check swing drive gearbox oil level every 6,000 miles (9,654 km) or every six months, whichever occurs first. Oil level is checked by removing pipe plug located on side of gear reducer. Oil level is full if a small quantity of oil runs out of opening. Add oil at fill point if necessary. Notify Direct Support to drain and refill with GO specified for the ambient temperature, if oil becomes contaminated.

26. RING GEAR TEETH and PINION GEAR TEETH (M1084/M1086/M1089). Lubricate every 6,000 miles (9,654 km), after washing, or once every six months, whichever occurs first. Apply a light coat of GAA to ring gear teeth and pinion gear teeth. Operate MHC (TM 9-2320-366-10) to rotate turntable. This will allow grease to be applied to all gear teeth. If operating conditions are severe or abnormal, service at 1,000 miles (1,609 km) or once every month, whichever occurs first.

27. FRONT, INTERMEDIATE, and REAR AXLE INNER WHEEL BEARINGS. Repack inner wheel bearings with GAA every 12,000 miles (19,308 km), when semiannual PMCS inspection of service brakes reveals oil leak from inner hub, or whenever wheel end assemblies are taken apart for other maintenance (para 10-2).

28. REAR AXLE BOGIE. Change oil every 6,000 miles (9,654 km) or once every six months, whichever occurs first. Remove six screws and rear axle bogie cover from one side at a time. Raise axle on opposite side of vehicle to allow oil to drain out. Lower axle and repeat on other side of vehicle. Apply thin bead of silicone adhesive sealant 593 to seating surface of housing. Position cover (with fill plug at the 1 o'clock position) and six screws on housing. Tighten six screws to 24 lb-ft (32 N·m). Remove plug from cover and plug from top of rear axle bogie housing. Refill rear axle bogie with GO specified for the ambient temperature, until level with port on housing cover. Install plugs in cover and housing.

29. 15K SELF-RECOVERY WINCH (SRW) CABLE ROLLER FAIRLEADS. Lubricate with GAA every 6,000 miles (9,654 km) or once every six months, whichever occurs first, using a low pressure lubrication gun. If operating conditions are severe or abnormal, service at 1,000 miles (1,609 km) or once every month, whichever occurs first.

30. 30K WINCH CABLE GUIDE ROLLERS and PAY-OUT LOWER TENSION SHEAVE. Lubricate with GAA every 6,000 miles (9,654 km) or once every six months, whichever occurs first, using a low pressure lubrication gun. If operating conditions are severe or abnormal, service at 1,000 miles (1,609 km) or once every month, whichever occurs first.
H-9. LUBRICATION/SERVICES NOTES (CONT)

- Dry Cleaning Solvent (P-D-680) is TOXIC and flammable. Wear protective goggles and gloves; use only in well-ventilated area; avoid contact with skin, eyes, and clothes, and do not breath vapors. Keep away from heat or flame. Never smoke when using solvent; the flashpoint for Type I Dry Cleaning Solvent is 100°F (38°C) and for Type II is 138°F (50°C). Failure to comply may result in serious injury or death to personnel.

- If personnel become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts skin or clothes, flush with cold water. If solvent contacts eyes, immediately flush eyes with water and get medical attention. Failure to comply may result in injury to personnel.

31. SCREEN and PLUG OIL FILTER ASSEMBLY (intermediate axle only). Clean the area around the screen and plug oil filter assembly. Remove the screen and plug oil filter assembly. Clean with Dry Cleaning Solvent (Item 65, Appendix D) or equivalent, every 12,000 miles (19,308 km) or once every year, whichever occurs first. Clean filter each time the differential is drained. If screen is crushed or bent, replace with a new one. Clean the screen cavity in the carrier of all debris and particles. If excessive amount of metal particles are detected during oil filter servicing, notify Direct Support Maintenance personnel before refilling differential.

32. TURNTABLE BEARING (M1084/M1086/M1089). Lubricate with GAA every 6,000 miles (9,654 km), after washing, or once every six months, whichever occurs first. Use a low pressure lubrication gun. Apply lubrication to grease fitting inside turntable bearing. Operate MHC (TM 9-2320-366-10) to rotate turntable bearing through full range of travel between applications of grease. This method assures full lubrication of the turntable bearing. If operating conditions are severe or abnormal, service at 1,000 miles (1,609 km) or once every month, whichever occurs first.

33. TOP and BOTTOM PLATES (M1089). Lubricate every 6,000 miles (9,654 km) or once every six months, whichever occurs first. Coat top and bottom plates with GAA. Extending outriggers in and out while applying grease assures full lubrication for the entire length of top and bottom plates. If operating conditions are severe or abnormal, service at 1,000 miles (1,609 km) or once every month, whichever occurs first.

34. CRANE GREASE FITTINGS (M1084/M1086/M1089). Lubricate with GAA every 6,000 miles (9,654), after washing, or once every six months, whichever occurs first. Use a low pressure lubrication gun. If operating conditions are severe or abnormal, service at 1,000 miles (1,609 km) or once every month, whichever occurs first.

35. UNDERLIFT ASSEMBLY GREASE FITTINGS. Lubricate with GAA every 6,000 miles (9,654), after washing, or once every six months, whichever occurs first. Use a low pressure lubrication gun. If operating conditions are severe or abnormal, service at 1,000 miles (1,609 km) or once every month, whichever occurs first.

36. FRONT LIFTING BEAM. Remove left and right lifting beams and clean with Dry Cleaning Solvent (Item 65, Appendix D) or equivalent, every 6,000 miles (9,654 km) or once every six months, whichever occurs first. Apply a light coat of GAA to lifting beams. If operating conditions are severe or abnormal, service at 1,000 miles (1,609 km) or once every month, whichever occurs first.

37. AIR DRYER. Service air dryer (para 23-11) every 12,000 miles (19,308 km) or annually, whichever occurs first.

38. TENSION LINKS. Lubricate tension link(s) every three months with GAA.

39. FRONT LEAF SPRING AND REAR BOGIE AXLE. At initial 1000 miles (1609 km) of vehicle operation, tighten U-bolts to 390-510 lb-ft (529-692 Nm).
APPENDIX J
ADDITIONAL AUTHORIZATION LIST (AAL)

Section I. INTRODUCTION

**J-1. SCOPE**

This appendix lists additional items you are authorized for the support of the MTV.

**J-2. GENERAL**

This list identifies items that do not have to accompany the MTV and that do not have to be turned in with it. These items are all authorized to you by Common Tables of Allowance (CTA), Modification Table of Organization and Equipment (MTOE), Tables of Distribution and Allowances (TDA), or Joint Table of Allowance (JTA).

**J-3. EXPLANATION OF LISTING**

National Stock Numbers, description, and quantities are provided to help you identify and request the additional items you require to support this equipment.

Section II. ADDITIONAL AUTHORIZATION LIST

<table>
<thead>
<tr>
<th>(1) National Stock Number</th>
<th>(2) Description (CAGE) Part Number</th>
<th>(3) U/M</th>
<th>(4) Qty Auth</th>
</tr>
</thead>
<tbody>
<tr>
<td>6685-01-193-1733</td>
<td>10,000 PSI Transducer: (19207) 12258956</td>
<td>EA</td>
<td>1</td>
</tr>
</tbody>
</table>
APPENDIX K
TRANSMISSION/TRANSMISSION CONTROLS ADAPTABILITY CHART

Section I. INTRODUCTION

K-1. INTRODUCTION
This appendix lists the various transmission controls and configuration modifications that may be required to permit the transmission to function correctly. This appendix will guide the mechanic through the hardware selection process by identifying compatibility issues between the transmission controls (WTEC II/WTEC III) and the numerous revisions of the Allison MD3070PT transmission (PRE-ID w/ 24-pin connector, PRE-ID w/ 31-pin connector, TID 1, TID 2, and TID 3). Refer to Figure 1. After replacing any component of the transmission controls or the transmission assembly, perform calibration procedures in TM 9-2320-366-20-4 paragraph 8-2 or 8-3.

K-2. EXPLANATION OF COLUMNS
a. Column (1) - Installed Controls or Controls Being Installed. This column lists all of the variables concerning which version of transmission controls are installed in the vehicle, or may need to be installed, to communicate correctly with the transmission.

b. Column (2) - Installed Transmission or Transmission Being Installed. This column lists all of the various revisions of the Allison MD3070PT transmissions that may be installed in the vehicle.

c. Column (3) - Required Modification. This column lists the various electrical interface (hardware) modifications that may be required to allow the transmission controls to communicate with the transmission.

K-3. HOW TO USE THIS CHART
a. Determine which controls and transmission are installed in the vehicle.

b. Determine which component requires replacement.

c. Read across the row to column (3) to determine the required modification.

Section II.

TRANSMISSION/TRANSMISSION CONTROLS ADAPTABILITY CHART

<table>
<thead>
<tr>
<th>(1) Installed Controls or Controls Being Installed</th>
<th>(2) Installed Transmission or Transmission Being Installed</th>
<th>(3) Required Modification (Refer to Section III)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WTEC II (with 24-pin connector)</td>
<td>PRE-ID w/ 24-pin connector (transmission serial number prior to 6510032369)</td>
<td>No modification required.</td>
</tr>
<tr>
<td>WTEC II (with 24-pin connector)</td>
<td>PRE-ID w/ 31-pin connector (transmission serial number 6510032369 to 6510090785)</td>
<td>Install 31-pin connector.</td>
</tr>
<tr>
<td>WTEC II (with 24-pin connector)</td>
<td>TID 1 (transmission serial number 6510090786 to 6510142171)</td>
<td>Install 31-pin connector.</td>
</tr>
<tr>
<td>WTEC II (with 24-pin connector)</td>
<td>TID 2 (transmission serial number 6510142172 to 6510262116)</td>
<td>Install 31-pin connector and replace transmission internal wiring harness.</td>
</tr>
<tr>
<td>(1) Installed Controls or Controls Being Installed</td>
<td>(2) Installed Transmission or Transmission Being Installed</td>
<td>(3) Required Modification (Refer to Section III)</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>--------------------------------------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>WTEC II (with 24-pin connector)</td>
<td>TID 3 (transmission serial number 6510262117 and subsequent)</td>
<td>Install 31-pin connector, replace transmission internal wiring harness, and reprogram WTEC II TEPSS. ¹</td>
</tr>
<tr>
<td>WTEC II (with 31-pin connector)</td>
<td>PRE-ID w/ 24-pin connector (transmission serial number prior to 6510032369)</td>
<td>Install adapter cable assembly.</td>
</tr>
<tr>
<td>WTEC II (with 31-pin connector)</td>
<td>PRE-ID w/ 31-pin connector (transmission serial number 6510032369 to 6510090785)</td>
<td>No modification required.</td>
</tr>
<tr>
<td>WTEC II (with 31-pin connector)</td>
<td>TID 1 (transmission serial number 6510090786 to 6510142171)</td>
<td>No modification required.</td>
</tr>
<tr>
<td>WTEC II (with 31-pin connector)</td>
<td>TID 2 (transmission serial number 6510142172 to 6510262116)</td>
<td>Replace transmission internal wiring harness.</td>
</tr>
<tr>
<td>WTEC II (with 31-pin connector)</td>
<td>TID 3 (transmission serial number 6510262117 and subsequent)</td>
<td>Replace transmission internal wiring harness and reprogram WTEC II TEPSS. ¹</td>
</tr>
<tr>
<td>WTEC III (with ECU manufactured prior to October 1999)²</td>
<td>PRE-ID w/ 24-pin connector (transmission serial number prior to 6510032369)</td>
<td>Install adapter cable assembly and ID harness.</td>
</tr>
<tr>
<td>WTEC III (with ECU manufactured prior to October 1999)²</td>
<td>PRE-ID w/ 31-pin connector (transmission serial number 6510032369 to 6510090785)</td>
<td>Install ID harness.</td>
</tr>
<tr>
<td>WTEC III (with ECU manufactured prior to October 1999)²</td>
<td>TID 1 (transmission serial number 6510090786 to 6510142171)</td>
<td>No modification required.</td>
</tr>
<tr>
<td>WTEC III (with ECU manufactured prior to October 1999)²</td>
<td>TID 2 (transmission serial number 6510142172 to 6510262116)</td>
<td>No modification required.</td>
</tr>
<tr>
<td>WTEC III (with ECU manufactured prior to October 1999)²</td>
<td>TID 3 (transmission serial number 6510262117 and subsequent)</td>
<td>Reprogram WTEC III ECU ¹ or install new WTEC III ECU (P/N 12421787-002).</td>
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<tr>
<td>WTEC III (with ECU manufactured after October 1999)³</td>
<td>PRE-ID w/ 24-pin connector (transmission serial number prior to 6510032369)</td>
<td>Install adapter cable assembly and ID harness.</td>
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<td>WTEC III (with ECU manufactured after October 1999)³</td>
<td>PRE-ID w/ 31-pin connector (transmission serial number 6510032369 to 6510090785)</td>
<td>Install ID harness.</td>
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<tr>
<td>WTEC III (with ECU manufactured after October 1999)³</td>
<td>TID 1 (transmission serial number 6510090786 to 6510142171)</td>
<td>No modification required.</td>
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¹ Reprogramming can only be accomplished by an authorized Allison Transmission distributor. You must provide the transmission serial number of the transmission being installed to ensure correct reprogramming. If at a later time, an earlier version transmission is installed in a WTEC II equipped vehicle, WTEC II TEPSS will require reprogramming again.

² Vehicle serial number 012477 and lower. Refer to Figure 1.

³ Vehicle serial number 012478 and higher. Refer to Figure 1.
Section III.

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<td>300130 5935-21-921-1813</td>
<td>Converts a transmission external wiring harness from a 24-pin (&quot;D&quot; type) connector to a 31-pin (round type) connector.</td>
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<td>Transmission internal wiring harness</td>
<td>29529474 6150-01-481-8088</td>
<td>Converts a TID 2 transmission to a TID 1 configuration to allow WTEC II controls to communicate with the transmission.</td>
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<td>Gasket</td>
<td>29503283 5330-01-360-9035</td>
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<td>ID harness</td>
<td>200100 6150-21-921-1191</td>
<td>Allows WTEC III controls to communicate with a PRE-ID transmission.</td>
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<td>Adapter cable assembly</td>
<td>29519210 6150-01-420-5987</td>
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FIGURE 1

WTEC III PUSHBUTTON SHIFT SELECTOR

24 PIN CONNECTOR

MANUFACTURE DATE

ECU MODULE PIN 2340XXX 02-00-9997

31 PIN CONNECTOR

WTEC III PUSHBUTTON SHIFT SELECTOR
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GLOSSARY
ABBREVIATIONS

ANSI .................................................... American National Standards Institute
CCW .......................................................... Counterclockwise
CTIS ..................................................... Central Tire Inflation System
CW .......................................................... Clockwise
ECU .......................................................... Electronic Control Unit
EMI .......................................................... Electromagnetic Interference
LED .......................................................... Light Emitting Diode
LH ........................................................... Left Hand
LMHC .................................................... Light Material Handling Crane
MAC ........................................................ Maintenance Allocation Chart
MHC ........................................................ Material Handling Crane
NATO ..................................................... North Atlantic Treaty Organization
NBC ........................................................ Nuclear, Biological, or Chemical
NO/NC .................................................. Normally Open/Normally Closed
O/R .......................................................... Outrigger
PDP .......................................................... Power Distribution Panel
PMCS .................................................... Preventive Maintenance Checks and Services
PTO .......................................................... Power Takeoff
RH .......................................................... Right Hand
SAE ........................................................ Society of Automotive Engineers
SRW ........................................................ Self-Recovery Winch
STE/ICE-R ............................................ Simplified Test Equipment/Internal Combustion Engine-Reprogrammable
TEPSS .................................................. Transmission ECU Pushbutton Shift Selector
TM .......................................................... Technical Manual
TPS .......................................................... Throttle Position Sensor

Glossary-1
GLOSSARY
ABBREVIATIONS (CONT)

TPSS ................................................... Transmission Pushbutton Shift Selector
VDC ........................................................ Volts Direct Current
VIM .......................................................... Vehicle Interface Module
WTEC II ........................................ World Transmission Electronic Controls (version 2)
WTEC III ............................................. World Transmission Electronic Controls (version 3)
By Order of the Secretary of the Army:

DENNIS J. REIMER
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the Secretary of the Army
05189

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**Item 10. Change Illustration. Reason: Text calls out 90-degree fitting. Art shows straight fitting. Text is correct.**

Step (4) of removal says to disconnect four hydraulic hoses from manifold. The correct number of hydraulic hoses is five. Correct the text to reflect the actual quantity of hydraulic hoses. The supporting illustration is correct.
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**MTV PNEUMATIC AND CTIS**

**FIGURE FO-2. PNEUMATIC SYSTEM SCHEMATIC**

**FOLDOUT 2 OF 4**
FIGURE FC-4 HYDRAULIC STEERING SYSTEM
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### THE METRIC SYSTEM AND EQUIVALENTS

#### LINEAR MEASURE
- **1 Centimeter** = 10 Millimeters = 0.01 Meters = 0.3937 Inches
- **1 Meter** = 100 Centimeters = 1000 Millimeters = 39.37 Inches
- **1 Kilometer** = 1000 Meters = 0.621 Miles

#### SQUARE MEASURE
- **1 Centimeter** = 100 Squares = 0.155 Squares
- **1 Meter** = 100 Squares = 10.76 Squares
- **1 Kilometer** = 1,000,000 Squares = 35.31 Squares

#### WEIGHTS
- **1 Gram** = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
- **1 Kilogram** = 1000 Grams = 2.2 Lb
- **1 Metric Ton** = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

#### CUBIC MEASURE
- **1 Cubic Centimeter** = 1000 Cubic Millimeters = 0.06 Cubic Inches
- **1 Cubic Meter** = 1,000,000 Cubic Centimeters = 35.31 Cubic Feet
- **1 Metric Ton** = 1000 Kilograms = 0.907 Short Tons

#### LIQUID MEASURE
- **1 Milliliter** = 0.001 Liters = 0.0338 Fluid Ounces
- **1 Liter** = 1000 Milliliters = 33.82 Fluid Ounces

#### TEMPERATURE
- **5/9 (°F - 32) = °C**
- **212° Fahrenheit is equivalent to 100° Celsius**
- **90° Fahrenheit is equivalent to 32.2° Celsius**
- **32° Fahrenheit is equivalent to 0° Celsius**
- **9/5 C° + 32 = F°**

#### APPROXIMATE CONVERSION FACTORS

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