TECHNICAL MANUAL
MAINTENANCE INSTRUCTIONS
UNIT MAINTENANCE
M1083 SERIES, 5-TON, 6 X 6,
MEDIUM TACTICAL VEHICLES (MTV)
VOLUME NO. 3 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 21-11.

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)

EXHAUST PIPE 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.

COMPRESSED AIR 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.

WHEEL DRUM 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.

WHEEL DRUM 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.

BRAKE SHOES 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.

CAGE SPRING BRAKE WARNING

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

AIR CHAMBER WARNING

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

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

VOLUME NO. 3 OF 5

TM 9-2320-366-20-3, 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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Place this change sheet in the front of the publication for reference purposes.
By Order of the Secretary of the Army:

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Chief of Staff

Official:

SANDRA R. RILEY
Administrative Assistant to the
Secretary of the Army
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By Order of the Secretary of the Air Force:

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Commander, Air Force Materiel Command

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

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MAINTENANCE INSTRUCTIONS
UNIT MAINTENANCE
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Place this change sheet in the front of the publication for reference purposes.
By Order of the Secretary of the Army:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official:

SANDRA R. RILEY
Administrative Assistant to the
Secretary of the Army
0401515

By Order of the Secretary of the Air Force:

JOHN P. JUMPER
General, United States Air Force
Chief of Staff

Official:

GREGORY S. MARTIN
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Commander, Air Force Materiel Command

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**ARMY TM 9-2320-366-20-3**
**AIR FORCE T.O. 36A12-1C-1102-3**

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. 3 OF 5**

TM 9-2320-366-20-3, 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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By Order of the Secretary of the Army:

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

Official:

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

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Dates of issue for original and changed pages are:
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# Unit Maintenance Manual

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

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**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

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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 3 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, TROUBLESHOOTING (CONT)**
- **CHAPTER 3, ENGINE MAINTENANCE**
- **CHAPTER 4, FUEL SYSTEM MAINTENANCE**
- **CHAPTER 5, EXHAUST SYSTEM MAINTENANCE**
- **CHAPTER 6, COOLING SYSTEM MAINTENANCE**
- **CHAPTER 7, ELECTRICAL SYSTEM MAINTENANCE**
- **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 3 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 Volume 1, 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.
CHAPTER 2
VEHICLE MAINTENANCE (CONT)

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### Table 2-52. Central Tire Inflation System (CTIS) Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>m1.</td>
<td>Two Steady Mode Lights Illuminate on Central Tire Inflation System (CTIS) ECU</td>
<td>2-2008</td>
</tr>
<tr>
<td>m2.</td>
<td>Four CTIS ECU Indicator Lights Flashing</td>
<td>2-2042</td>
</tr>
<tr>
<td>m3.</td>
<td>Five Central Tire Inflation System (CTIS) ECU Indicator Lights Flashing</td>
<td>2-2070</td>
</tr>
<tr>
<td>m4.</td>
<td>CTIS Repeatedly Resumes Cycling 30 Seconds After</td>
<td>2-2104</td>
</tr>
<tr>
<td>m5.</td>
<td>Central Tire Inflation System (CTIS) ECU Indicates No Fault Code But System Fails to Inflate or Deflate</td>
<td>2-2110</td>
</tr>
<tr>
<td>m6.</td>
<td>No Overspeed Warning Light and/or Overspeed Pressure Change</td>
<td>2-2122</td>
</tr>
</tbody>
</table>
m1. TWO STEADY MODE LIGHTS ILLUMINATE ON CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU

INITIAL SETUP

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

Materials/Parts
Soap, Laundry (Item 63, Appendix D)

Personnel Required
(2)

Tools and Special Tools

Materials/Parts
Tool Kit, Genl Mech (Item 46, Appendix C)
Goggles, Industrial (Item 15, Appendix C)
Trestle, Motor Vehicle Maintenance (2) (Item 47, Appendix C)
Pan, Wash (Item 25, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)

 KNOWLEDGE INFO

Nothing

POSSIBLE PROBLEMS
Faulty air hose from wet tank to manifold valve assembly.
Faulty air compressor or governor adjustment.
Faulty wheel valve venting.
Faulty manifold valve assembly relief valve.
Faulty manifold valve assembly.
Faulty quick release valve(s).
Faulty rear axle quick release valve fittings.
Faulty intermediate axle quick release valve fittings.
Faulty intermediate axle tee fittings.
Faulty front quick release valve fittings.
Faulty front tee fittings.
Faulty manifold valve assembly delivery port fittings.
Faulty cab floor supply hose fittings.
Faulty supply hoses from quick release valve(s) to wheel valve(s).
Faulty wheel valve filters.
Faulty electrical connections at CTIS ECU and manifold valve assembly.
Faulty CTIS ECU.

WARNING
Read WARNING on following page.

Are two steady mode lights illuminated during inflation?

NO

YES

TEST OPTIONS

Visual Inspection

REASON FOR QUESTION

If two mode lights illuminate during inflation, air supply to manifold valve assembly may not be adequate.

Go to step 4 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.

NOTE

Two steady mode lights are an indication that the CTIS has disconnected operation because of particular inflation or deflation sequence has taken longer than limits allow (40 minutes for inflate; 20 minutes for deflate).

Two steady mode lights indicates that system shut off with air pressure between modes.

The CTIS may still operate including modes that are illuminated by manually pressing the desired mode.

To perform deflate or inflate checks throughout this task, it will be necessary to perform the opposite function first from time to time so that a desired mode selection is available.

2. Select an inflation mode on CTIS ECU (TM 9-2320-366-10-1) and determine if two light mode is displayed.
3. Select RUN FLAT mode or shut down engine and restart engine (TM 9-2320-366-10-1) again to reset ECU.
4. Select a deflation mode on CTIS ECU (TM 9-2320-366-10-1) and determine if two light mode is displayed.
5. Shut down engine (TM 9-2320-266-10-1).
6. If two steady light mode lights do not illuminate during inflation, go to step 4 of this fault.
Two steady mode lights illuminate during inflation.

**POSSIBLE PROBLEMS**
- Faulty air hoses from wet tank to manifold valve assembly.
- Faulty air compressor or governor adjustment.
- Faulty wheel valve venting.
- Faulty manifold valve assembly relief valve.
- Faulty manifold valve assembly.
- Faulty quick release valve(s).
- Faulty rear axle quick release valve fittings.
- Faulty intermediate axle quick release valve fittings.
- Faulty intermediate axle tee fittings.
- Faulty front quick release valve fittings.
- Faulty front tee fittings.
- Faulty manifold valve assembly delivery port fittings.
- Faulty cab floor supply hose fittings.
- Faulty supply hoses from quick release valve(s) to wheel valve(s).
- Faulty wheel valve filters.
- Faulty electrical connections at CTIS ECU and manifold valve assembly.
- Faulty ECU.

**TEST OPTIONS**
- Soapy Water Leak Test

**REASON FOR QUESTION**
- Steady Mode lights may light if an air leak is present.

2. Are air hoses from wet tank to manifold valve assembly free from leaks?

**YES**
- Tighten loose air hoses. Replace damaged air hoses and/or fittings (para 23-2).

**NO**
NOTE

- Two steady mode lights are an indication that the CTIS has discontinued operation because a particular inflate or deflate sequence has taken longer than limits allow (40 minutes for inflate; 20 minutes for deflate).
- Two steady mode lights indicate that CTIS is shut off with air pressure between modes.
- The CTIS may still operate including modes that are lit, by manually pressing the desired mode.
- To perform deflate or inflate checks throughout this task, it may be necessary to perform the opposite function first so that a desired mode selection is available.

<table>
<thead>
<tr>
<th>SOAPY WATER LEAK TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove kick panel (para 16-3).</td>
</tr>
<tr>
<td>(2) Apply soapy water solution to supply air hose fitting at manifold valve assembly.</td>
</tr>
<tr>
<td>(3) Check for air escaping at manifold valve assembly, indicated by air bubbles.</td>
</tr>
<tr>
<td>(4) Remove two screws and washers from front grille.</td>
</tr>
<tr>
<td>(5) Remove screw and washer from front grille.</td>
</tr>
<tr>
<td>(6) Remove front grille from cab.</td>
</tr>
<tr>
<td>(7) Apply soapy water solution to supply air hose from wet tank at cab floor.</td>
</tr>
<tr>
<td>(8) Check for air escaping at cab floor fittings, indicated by air bubbles.</td>
</tr>
</tbody>
</table>
m1. TWO STEADY MODE LIGHTS ILLUMINATE ON CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air hoses from wet tank to manifold valve assembly OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty air compressor or governor adjustment.</td>
</tr>
<tr>
<td>Faulty wheel valve venting.</td>
</tr>
<tr>
<td>Faulty manifold valve assembly relief valve.</td>
</tr>
<tr>
<td>Faulty manifold valve assembly.</td>
</tr>
<tr>
<td>Faulty quick release valve(s).</td>
</tr>
<tr>
<td>Faulty rear axle quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty intermediate axle quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty intermediate axle tee fittings.</td>
</tr>
<tr>
<td>Faulty front quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty front tee fittings.</td>
</tr>
<tr>
<td>Faulty manifold valve assembly delivery port fittings.</td>
</tr>
<tr>
<td>Faulty cab floor supply hose fittings.</td>
</tr>
<tr>
<td>Faulty supply hoses from quick release valve(s) to wheel valve(s).</td>
</tr>
<tr>
<td>Faulty wheel valve filters.</td>
</tr>
<tr>
<td>Faulty electrical connections at CTIS ECU and manifold valve assembly.</td>
</tr>
<tr>
<td>Faulty ECU.</td>
</tr>
</tbody>
</table>

**TEST OPTIONS**

| Visual inspection |

**REASON FOR QUESTION**

If two mode lights persist during inflation with engine operating at 1,000 RPM for more than five minutes, air supply from air compressor may be inadequate.

3. **Is air compressor supplying enough air to CTIS for operation of inflation mode?**

**NO**

Perform Air System Troubleshooting (j1. Air System Loses Pressure During Operation).

**YES**

Go to step 6 of this fault.
(1) Start engine (TM 9-2320-366-10-1) and operate at 1,000 RPM for five minutes.
(2) Select an inflation mode at CTIS ECU and check if two steady mode light returns.
(3) Apply and release brakes once or twice and check if pressure gages are slow to reach 120 psi.
(4) If two steady mode lights remain illuminated and brake air pressure gages are slow to reach 120 psi, Perform Air System Troubleshooting (j1. Air System Loses Pressure During Operation).
(5) Shut down engine (TM 9-2320-366-10-1).
4. Are all wheel valves properly vented?

**Known Info**

- Air hoses from wet tank to manifold valve assembly OK.
- Air compressor and governor adjustment OK.

**Possible Problems**

- Faulty wheel valve venting.
- Faulty manifold valve assembly relief valve.
- Faulty manifold valve assembly.
- Faulty quick release valve(s).
- Faulty rear axle quick release valve fittings.
- Faulty intermediate axle quick release valve fittings.
- Faulty intermediate axle tee fittings.
- Faulty front quick release valve fittings.
- Faulty front tee fittings.
- Faulty manifold valve assembly delivery port fittings.
- Faulty cab floor supply hose fittings.
- Faulty supply hoses from quick release valve(s) to wheel valve(s).
- Faulty wheel valve filters.
- Faulty electrical connections at CTIS ECU and manifold valve assembly.
- Faulty ECU.

**Warning**

---

Read WARNING on following page.

**Test Options**

- Wheel Valve Vent Test

**Reason for Question**

Changes in temperature can cause wheel valves to stay closed and prevent deflation to lower settings causing two steady mode lights to illuminate.

---

Replace faulty CTIS wheel valve(s) (para 12-5).
WHEEL VALVE VENT TEST

(1) Release air from all CTIS wheel valves by backing off vent screws approximately three turns.
(2) If CTIS wheel valve fails to release air, replace CTIS wheel valve (para 12-5).
(3) Tighten vent screws. Do not overtighten.

WARNING
Do not loosen screw on wheel valve while CTIS is in use. Failure to comply may result in injury to personnel.

NOTE
At high temperatures, air pressure increases in cap chamber of wheel valve, adding to spring pressure so that valve cannot open to allow tire deflation to lower settings.
m1. TWO STEADY MODE LIGHTS ILLUMINATE ON CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air hoses from wet tank to manifold valve assembly OK.</td>
</tr>
<tr>
<td>Air compressor and governor adjustment OK.</td>
</tr>
<tr>
<td>Wheel valves venting OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty manifold valve assembly relief valve.</td>
</tr>
<tr>
<td>Faulty manifold valve assembly.</td>
</tr>
<tr>
<td>Faulty quick release valve(s).</td>
</tr>
<tr>
<td>Faulty rear axle quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty intermediate axle quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty intermediate axle tee fittings.</td>
</tr>
<tr>
<td>Faulty front quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty front tee fittings.</td>
</tr>
<tr>
<td>Faulty manifold valve assembly delivery port fittings.</td>
</tr>
<tr>
<td>Faulty cab floor supply hose fittings.</td>
</tr>
<tr>
<td>Faulty supply hoses from quick release valve(s) to wheel valve(s).</td>
</tr>
<tr>
<td>Faulty wheel valve filters.</td>
</tr>
<tr>
<td>Faulty electrical connections at CTIS ECU and manifold valve assembly.</td>
</tr>
<tr>
<td>Faulty ECU.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A damaged relief valve may cause continual air loss and prevent proper inflation of tires for CTIS mode.</td>
</tr>
</tbody>
</table>

5. Is relief valve on manifold valve assembly operating?

- [ ] NO
  - Replace relief valve (para 12-7).
- [ ] YES
RELIEF VALVE TEST

1. Remove kick panel (para 16-3).
2. Check if relief valve poppet on manifold valve assembly is missing.
3. Position master power switch to on (TM 9-2320-366-10-1).
4. Select a mode that is lower on CTIS ECU (TM 9-2320-366-10-1).
5. Check if air escapes continuously from relief valve during deflation sequence.
6. If air escapes continuously, replace relief valve (para 12-7).
7. Position master power switch to off (TM 9-2320-366-10-1).
m1. TWO STEADY MODE LIGHTS ILLUMINATE ON CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air hoses from wet tank to manifold valve assembly OK.</td>
</tr>
<tr>
<td>Air compressor and governor adjustment OK.</td>
</tr>
<tr>
<td>Wheel valves venting OK.</td>
</tr>
<tr>
<td>Manifold valve assembly relief valve OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty manifold valve assembly.</td>
</tr>
<tr>
<td>Faulty quick release valve(s).</td>
</tr>
<tr>
<td>Faulty rear axle quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty intermediate axle quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty intermediate axle tee fittings.</td>
</tr>
<tr>
<td>Faulty front quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty front tee fittings.</td>
</tr>
<tr>
<td>Faulty manifold valve assembly delivery port fittings.</td>
</tr>
<tr>
<td>Faulty cab floor supply hose fittings.</td>
</tr>
<tr>
<td>Faulty supply hoses from quick release valve(s) to wheel valve(s).</td>
</tr>
<tr>
<td>Faulty wheel valve filters.</td>
</tr>
<tr>
<td>Faulty electrical connections at CTIS ECU and manifold valve assembly.</td>
</tr>
<tr>
<td>Faulty ECU.</td>
</tr>
</tbody>
</table>

6. Is manifold valve assembly operating?

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manifold Valve Assembly Test</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If manifold valve assembly is not operating, CTIS cannot inflate or deflate, and will cause two steady mode lights to illuminate.</td>
</tr>
</tbody>
</table>

NO

Repair or replace manifold valve assembly (para 12-7).

YES
**NOTE**
When checking manifold valve assembly, ensure air pressure in air tanks is 120 psi. Manifold valve assembly cannot be checked if air supply is not available to it.

<table>
<thead>
<tr>
<th>MANIFOLD VALVE ASSEMBLY 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) If two mode lights illuminate during deflation:</td>
</tr>
<tr>
<td>(a) Select a mode that is lower on CTIS ECU (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(b) Check if manifold valve assembly clicks when no air is escaping from relief valve.</td>
</tr>
<tr>
<td>(c) If manifold valve assembly clicks and no air escapes at relief valve, replace manifold valve assembly (para 12-7).</td>
</tr>
<tr>
<td>(3) If two mode lights illuminate during inflation:</td>
</tr>
<tr>
<td>(a) Select a mode that is higher on CTIS ECU (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(b) Disconnect air hose at delivery port of manifold valve assembly.</td>
</tr>
<tr>
<td>(c) Check if manifold valve assembly clicks and no air escapes at delivery port.</td>
</tr>
<tr>
<td>(d) If no air escapes at delivery port during inflation mode, replace manifold valve assembly (para 12-7).</td>
</tr>
</tbody>
</table>
m1. TWO STEADY MODE LIGHTS ILLUMINATE ON CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air hoses from wet tank to manifold valve assembly OK.</td>
<td>Visual inspection</td>
<td>If air leaks continuously from quick release valve(s) during inflation or deflation, CTIS will not to selected tire pressure and two steady mode lights will illuminate.</td>
</tr>
<tr>
<td>Air compressor and governor adjustment OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheel valves venting OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manifold valve assembly relief valve OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manifold valve assembly OK.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| POSSIBLE PROBLEMS | | |
|-------------------|------------------|
| Faulty CTIS quick release valve(s). | Is CTIS quick release valve(s) free from leaks and damage? |
| Faulty rear axle quick release valve fittings. | | |
| Faulty intermediate axle quick release valve fittings. | | |
| Faulty intermediate axle tee fittings. | | |
| Faulty front quick release valve fittings. | | |
| Faulty front tee fittings. | | |
| Faulty manifold valve assembly delivery port fittings. | | |
| Faulty cab floor supply hose fittings. | | |
| Faulty supply hoses from quick release valve(s) to wheel valve(s). | | |
| Faulty wheel valve filters. | | |
| Faulty electrical connections at CTIS ECU and manifold valve assembly. | | |
| Faulty ECU. | | |
| Replace or clean quick release valve(s) (para 12-8 or 12-9). | | |
(1) Position CTIS ECU in a mode that is higher.

(2) Check for air escaping continuously from exhaust port of quick release valve.

(3) If air escapes continuously from quick release valve during inflation, quick release valve diaphragm is damaged, replace quick release valve(s) (para 12-9).
8. Are rear axle quick release valve fittings free from leaks and damage?

**Known Info**
- Air hoses from wet tank to manifold valve assembly OK.
- Air compressor and governor adjustment OK.
- Wheel valves venting OK.
- Manifold valve assembly relief valve OK.
- Manifold valve assembly OK.
- Quick release valves OK.

**Possible Problems**
- Faulty rear axle quick release valve fittings.
- Faulty intermediate axle quick release valve fittings.
- Faulty intermediate axle tee fittings.
- Faulty front quick release valve fittings.
- Faulty front tee fittings.
- Faulty manifold valve assembly delivery port fittings.
- Faulty cab floor supply hose fittings.
- Faulty supply hoses from quick release valve(s) to wheel valve(s).
- Faulty wheel valve filters.
- Faulty electrical connections at CTIS ECU and manifold valve assembly.
- Faulty ECU.

**Test Options**
- Visual Inspection and Soapy Water Leak Test

**Reason for Question**
CTIS may be unable to reach selected pressure and two lights will flash if air leaks from CTIS air hoses during inflation/deflation sequences.

**YES**

Tighten loose air hoses.
Replace damaged air hoses or fittings (para 23-2).

**NO**

Tighten loose air hoses.
Replace damaged air hoses or fittings (para 23-2).
(1) Select an inflation mode at CTIS ECU (TM 9-2320-366-10-1).
(2) If obvious air escape is heard, tighten loose air hoses or replace damaged air hoses and/or fittings (para 23-2).
(3) If no obvious air escape is heard, proceed to Soapy Water Leak Test.

<table>
<thead>
<tr>
<th>SOAPY WATER LEAK TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Apply soapy water solution to quick release valve fittings at rear axle.</td>
</tr>
<tr>
<td>(2) Check for air bubbles indicating leaks.</td>
</tr>
</tbody>
</table>
m1. TWO STEADY MODE LIGHTS ILLUMINATE ON CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
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<tbody>
<tr>
<td>Air hoses from wet tank to manifold valve assembly OK.</td>
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<tr>
<td>Air compressor and governor adjustment OK.</td>
</tr>
<tr>
<td>Wheel valves venting OK.</td>
</tr>
<tr>
<td>Manifold valve assembly relief valve OK.</td>
</tr>
<tr>
<td>Manifold valve assembly OK.</td>
</tr>
<tr>
<td>Quick release valves OK.</td>
</tr>
<tr>
<td>Rear axle quick release valve fittings OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty intermediate axle quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty intermediate axle tee fittings.</td>
</tr>
<tr>
<td>Faulty front quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty front tee fittings.</td>
</tr>
<tr>
<td>Faulty manifold valve assembly delivery port fittings.</td>
</tr>
<tr>
<td>Faulty cab floor supply hose fittings.</td>
</tr>
<tr>
<td>Faulty supply hoses from quick release valve(s) to wheel valve(s).</td>
</tr>
<tr>
<td>Faulty wheel valve filters.</td>
</tr>
<tr>
<td>Faulty electrical connections at CTIS ECU and manifold valve assembly.</td>
</tr>
<tr>
<td>Faulty ECU.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Inspection and Soapy Water Leak Test</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTIS may be unable to reach selected pressure and two lights will flash if air leaks from CTIS air hoses during inflation/deflation sequences.</td>
</tr>
</tbody>
</table>

9. Are intermediate axle quick release valve fittings free from leaks and damage?

**NO**

Tighten loose air hoses. Replace damaged air hoses or fittings (para 23-2).

**YES**
SOAPY WATER LEAK TEST

1. Apply soapy water solution to quick release valve fittings at intermediate axle.
2. Check for air bubbles indicating leaks.

1. Select an inflation mode at CTIS ECU (TM 9-2320-366-10-1).
2. If obvious air escape is heard, tighten loose air hoses and/or replace damaged air hoses and/or fittings (para 23-2).
3. If no obvious air escape is heard, proceed to Soapy Water Leak Test.
m1. TWO STEADY MODE LIGHTS ILLUMINATE ON CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air hoses from wet tank to manifold valve assembly OK. Air compressor and governor adjustment OK. Wheel valves venting OK. Manifold valve assembly relief valve OK. Manifold valve assembly OK. Quick release valves OK. Rear axle quick release valve fittings OK. Intermediate axle quick release valve fittings OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty intermediate axle tee fittings. Faulty front quick release valve fittings. Faulty front tee fittings. Faulty manifold valve assembly delivery port fittings. Faulty cab floor supply hose fittings. Faulty supply hoses from quick release valve(s) to wheel valve(s). Faulty wheel valve filters. Faulty electrical connections at CTIS ECU and manifold valve assembly. Faulty ECU.</td>
</tr>
</tbody>
</table>

10. Are intermediate axle tee fittings free from leaks and damage?

- **NO**
  - Tighten loose air hoses. Replace damaged air hoses and/or fittings (para 23-2).

- **YES**

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soapy Water Leak Test</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTIS may be unable to reach selected pressure and two lights will flash if air leaks from CTIS air hoses during inflation/deflation sequences.</td>
</tr>
</tbody>
</table>
SOAPY WATER LEAK TEST

(1) Apply soapy water solution to tee fittings at intermediate axle.
(2) Check for air bubbles indicating leaks.
m1. TWO STEADY MODE LIGHTS ILLUMINATE ON CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air hoses from wet tank to manifold valve assembly OK.</td>
</tr>
<tr>
<td>Air compressor and governor adjustment OK.</td>
</tr>
<tr>
<td>Wheel valves venting OK.</td>
</tr>
<tr>
<td>Manifold valve assembly relief valve OK.</td>
</tr>
<tr>
<td>Manifold valve assembly OK.</td>
</tr>
<tr>
<td>Quick release valves OK.</td>
</tr>
<tr>
<td>Rear axle quick release valve fittings OK.</td>
</tr>
<tr>
<td>Intermediate axle quick release valve fittings OK.</td>
</tr>
<tr>
<td>Intermediate axle tee fittings OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty front quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty front tee fittings.</td>
</tr>
<tr>
<td>Faulty manifold valve assembly delivery port fittings.</td>
</tr>
<tr>
<td>Faulty cab floor supply hose fittings.</td>
</tr>
<tr>
<td>Faulty supply hoses from quick release valve(s) to wheel valve(s).</td>
</tr>
<tr>
<td>Faulty wheel valve filters.</td>
</tr>
<tr>
<td>Faulty electrical connections at CTIS ECU and manifold valve assembly.</td>
</tr>
<tr>
<td>Faulty ECU.</td>
</tr>
</tbody>
</table>

11. Is CTIS front quick release valve fittings free from leaks and damage?

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soapy Water Leak Test</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTIS may be unable to reach selected pressure and two lights will flash if air leaks from CTIS air hoses during inflation/deflation sequences.</td>
</tr>
</tbody>
</table>

Tighten loose air lines. Replace damaged air lines and/or fittings (para 23-2).
SOAPY WATER LEAK TEST

(1) Apply soapy water solution to front quick release valve fittings.
(2) Check for air bubbles indicating leaks.
12. Are fittings for tee at muffler free from leaks and damage?

**Known Info**
- Air hoses from wet tank to manifold valve assembly OK.
- Air compressor and governor adjustment OK.
- Wheel valves venting OK.
- Manifold valve assembly relief valve OK.
- Manifold valve assembly OK.
- Quick release valves OK.
- Rear axle quick release valve fittings OK.
- Intermediate axle quick release valve fittings OK.
- Intermediate axle tee fittings OK.
- Front quick release valve fittings OK.

**Possible Problems**
- Faulty front tee fittings.
- Faulty manifold valve assembly delivery port fittings.
- Faulty cab floor supply hose fittings.
- Faulty supply hoses from quick release valve(s) to wheel valve(s).
- Faulty wheel valve filters.
- Faulty electrical connections at CTIS ECU and manifold valve assembly.
- Faulty ECU.

**Test Options**
- Soapy Water Leak Test

**Reason for Question**
CTIS may be unable to reach selected pressure and two lights will flash if air leaks from CTIS air hoses during inflation/deflation.

---

**Flowchart**

- If **NO**, tighten loose air hoses. Replace damaged air hoses or fittings (para 23-2).
- If **YES**, further diagnostics are needed.
SOAPY WATER LEAK TEST

(1) Apply soapy water solution to fittings at tee above muffler.
(2) Check for air bubbles indicating leaks.
### 13. Are manifold valve assembly delivery port fittings free from leaks and damage?

**KNOWN INFO**
- Air hoses from wet tank to manifold valve assembly OK.
- Air compressor and governor adjustment OK.
- Wheel valves venting OK.
- Manifold valve assembly relief valve OK.
- Manifold valve assembly OK.
- Quick release valves OK.
- Rear axle quick release valve fittings OK.
- Intermediate axle quick release valve fittings OK.
- Intermediate axle tee fittings OK.
- Front quick release valve fittings OK.
- Front tee fittings OK.

**POSSIBLE PROBLEMS**
- Faulty manifold valve assembly delivery port fittings.
- Faulty cab floor supply hose fittings.
- Faulty supply hoses from quick release valve(s) to wheel valve(s).
- Faulty wheel valve filters.
- Faulty electrical connections at CTIS ECU and manifold valve assembly.
- Faulty ECU.

**TEST OPTIONS**
- Soapy Water Leak Test

**REASON FOR QUESTION**
- CTIS may be unable to reach selected pressure and two lights will flash if air leaks from CTIS air hoses during inflation/deflation.

**Diagram**
- Branch 1: YES
- Branch 2: NO
- Branch 2a: Tighten loose air hoses. Replace damaged air hoses or fittings (para 23-2).
### SOAPY WATER LEAK TEST

1. Apply soapy water solution to manifold valve assembly delivery port fittings.
2. Check for air bubbles indicating leaks.

---

**Diagram:**
- **MANIFOLD VALVE ASSEMBLY**
- **DELIVERY PORT**
- **MANIFOLD VALVE ASSEMBLY**

---

4PR0118A
14. **Soapy Water Leak Test**

**Known Info**

- Air hoses from wet tank to manifold valve assembly OK.
- Air compressor and governor adjustment OK.
- Wheel valves venting OK.
- Manifold valve assembly relief valve OK.
- Manifold valve assembly relief valve OK.
- Quick release valves OK.
- Rear axle quick release valve fittings OK.
- Intermediate axle quick release valve fittings OK.
- Intermediate axle tee fittings OK.
- Front quick release valve fittings OK.
- Front tee fittings OK.
- Manifold valve assembly delivery port fittings OK.

**Possible Problems**

- Faulty cab floor supply hose fittings.
- Faulty supply hoses from quick release valve(s) to wheel valve(s).
- Faulty wheel valve filters.
- Faulty electrical connections at CTIS ECU and manifold valve assembly.
- Faulty ECU.

**Test Options**

- **Soapy Water Leak Test**

**Reason for Question**

- CTIS may be unable to reach selected pressure and two lights will flash if air leaks from CTIS air hoses during inflation/deflation.

**Flowchart**

- Are cab floor supply hose fittings free from leaks and damage?
  - **No**
    - Tighten loose air hoses. Replace damaged air hoses and/or fittings (para 23-2).
  - **Yes**

---

2-2034
**SOAPY WATER LEAK 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) Apply soapy water solution to cab floor supply hose fittings.
(5) Check for air bubbles indicating leaks.
(6) Position front grille on cab with washer and screw.
(7) Position two washers and screws in front grille.
(8) Tighten screw to 48-60 lb-in. (5-7 N·m).
(9) Tighten two screws to 24 lb-in. (3 N·m).
m1. TWO STEADY MODE LIGHTS ILLUMINATE ON CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air hoses from wet tank to manifold valve assembly OK.</td>
</tr>
<tr>
<td>Air compressor and governor adjustment OK.</td>
</tr>
<tr>
<td>Wheel valves venting OK.</td>
</tr>
<tr>
<td>Manifold valve assembly relief valve OK.</td>
</tr>
<tr>
<td>Manifold valve assembly OK.</td>
</tr>
<tr>
<td>Quick release valves OK.</td>
</tr>
<tr>
<td>Rear axle quick release valve fittings OK.</td>
</tr>
<tr>
<td>Intermediate axle quick release valve fittings OK.</td>
</tr>
<tr>
<td>Intermediate axle tee fittings OK.</td>
</tr>
<tr>
<td>Front quick release valve fittings OK.</td>
</tr>
<tr>
<td>Front tee fittings OK.</td>
</tr>
<tr>
<td>Manifold valve assembly delivery port fittings OK.</td>
</tr>
<tr>
<td>Cab floor supply line fittings OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty supply hoses from quick release valve(s) to wheel valve(s).</td>
</tr>
<tr>
<td>Faulty wheel valve filters.</td>
</tr>
<tr>
<td>Faulty electrical connections at CTIS ECU and manifold valve assembly.</td>
</tr>
<tr>
<td>Faulty ECU.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheel Valve Air Line Test</td>
</tr>
<tr>
<td>REASON FOR QUESTION</td>
</tr>
<tr>
<td>Leaking or blocked air supply hoses to wheel valves will prevent CTIS from coming to selected pressure during inflation or deflation and cause two steady mode lights to illuminate.</td>
</tr>
</tbody>
</table>

15. Are air supply hoses from quick release valves to wheel valves free from leaks and damage? 

- **NO**
  - Tighten loose air hoses. Replace damaged air hoses and/or fittings (para 23-2).

- **YES**
WHEEL VALVE AIR LINE TEST

(1) Check tire pressures after a deflation or inflation sequence. If one or more tires are at a different pressure than the rest, air hose to affected wheel(s) may be faulty.

(2) Disconnect supply air hose at banjo fitting on affected wheel(s).

(3) Select an inflation sequence at CTIS ECU (TM 9-2320-366-10-1).

(4) Check if air escapes at wheel during inflation.

(5) If air does not escape, locate leak or blockage by tracing hose between quick release valve and affected wheel(s) (refer to pneumatic schematic).
m1. TWO STEADY MODE LIGHTS ILLUMINATE ON CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are filters at wheel valves clean?</td>
<td>Wheel Valve Filter Inspection</td>
</tr>
<tr>
<td>REASON FOR QUESTION</td>
<td>Clogged wheel valve filters prevent air from passing into or escaping from tires during inflation or deflation and cause two steady mode lights to illuminate.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
<th>CLEAN OR REPLACE WHEEL VALVE FILTERS (PARA 12-5).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty wheel valve filters.</td>
<td>Clean or replace wheel valve filters (para 12-5).</td>
</tr>
<tr>
<td>Faulty electrical connections at CTIS ECU and manifold valve assembly.</td>
<td>Clean or replace wheel valve filters (para 12-5).</td>
</tr>
<tr>
<td>Faulty ECU.</td>
<td>Clean or replace wheel valve filters (para 12-5).</td>
</tr>
</tbody>
</table>
WHEEL VALVE FILTER INSPECTION

(1) Jack up axle at affected wheel and support with trestles.
(2) Remove two screws from wheel valve.
(3) Remove wheel valve and unscrew from delivery hose.
(4) Unscrew wheel valve filter from wheel valve.
(5) Check if filter is clean and free from obstruction.
(6) If filter is plugged with dirt, clean or replace wheel valve filters (para 12-5).
(7) Install wheel valve on delivery hose.
(8) Install wheel valve with two screws.
(9) Install supply air line on banjo fitting.
m1. TWO STEADY MODE LIGHTS ILLUMINATE ON CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU (CONT)

17. Are electrical connectors at CTIS ECU and at manifold valve assembly clean and secure?

- **NO**
  - Clean and/or tighten electrical connections. Notify DS maintenance if electrical connectors are damaged.

- **YES**
  - Replace CTIS ECU (para 12-6).

**KNOWN INFO**
- Air hoses from wet tank to manifold valve assembly OK.
- Air compressor and governor adjustment OK.
- Wheel valves venting OK.
- Manifold valve assembly relief valve OK.
- Manifold valve assembly OK.
- Quick release valves OK.
- Rear axle quick release valve fittings OK.
- Intermediate axle quick release valve fittings OK.
- Intermediate axle tee fittings OK.
- Front quick release valve fittings OK.
- Front tee fittings OK.
- Manifold valve assembly delivery port fittings OK.
- Cab floor supply hose fittings OK.
- Supply hoses from quick release valve to wheel valves OK.
- Wheel valve filters OK.

**POSSIBLE PROBLEMS**
- Faulty electrical connections at CTIS ECU and manifold valve assembly.
- Faulty ECU.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- Erratic operation of CTIS system can often be traced to poor electrical connections.
(1) Disconnect connectors P110 at CTIS ECU, P112 at manifold valve assembly solenoid, and P113 at manifold valve assembly pressure transducer.

(2) Check if connectors are clean and pins are undamaged.

(3) Connect and tighten connectors P113, P112, and P110.

(4) Install kick panel (para 16-3).
m2. FOUR CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING

**INITIAL SETUP**

<table>
<thead>
<tr>
<th>Equipment Conditions</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine running (TM 9-2320-366-10-1).</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td>Parking brake on (TM 9-2320-366-10-1).</td>
<td>Goggles, Industrial (Item 15, Appendix C)</td>
</tr>
<tr>
<td>Wheels chocked (TM 9-2320-366-10-1).</td>
<td>Gage, Tire Pressure (Item 11, Appendix C)</td>
</tr>
<tr>
<td></td>
<td>Pan, Wash (Item 25, Appendix C)</td>
</tr>
<tr>
<td></td>
<td>Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)</td>
</tr>
<tr>
<td>Materials/Parts</td>
<td></td>
</tr>
<tr>
<td>Soap, Laundry (Item 63, Appendix D)</td>
<td></td>
</tr>
</tbody>
</table>

**KNOWN INFO**

<table>
<thead>
<tr>
<th>Air pressure at wet tank OK.</th>
</tr>
</thead>
</table>

**POSSIBLE PROBLEMS**

- Faulty tire(s).
- Faulty CTIS wheel seal(s).
- Faulty kneeling valve(s) at front wheel(s).
- Faulty CTIS wheel valve(s).
- Faulty air hoses from quick release valve to affected wheel(s).
- Faulty front axle quick release valve.
- Faulty rear axle quick release valve(s).
- Faulty rear axle quick release valve fittings.
- Faulty intermediate axle quick release valve fittings.
- Faulty intermediate axle tee fittings.
- Faulty front axle quick release valve fittings.
- Faulty front tee fittings.
- Faulty manifold valve assembly delivery port fittings.
- Faulty cab floor air hose fittings.
- Faulty manifold valve assembly.
- Faulty CTIS ECU.

**TEST OPTIONS**

- Tire Pressure Measurement

**REASON FOR QUESTION**

- Low tire pressure or tire damage may cause CTIS to shut down to protect tire pressure in other wheels. Four CTIS ECU indicator lights will flash.

**WARNING**

Read WARNING and CAUTION on following page.

**CAUTION**

- Air pressure at wet tank OK.

**TEST OPTIONS**

- Tire Pressure Measurement

**REASON FOR QUESTION**

- Low tire pressure or tire damage may cause CTIS to shut down to protect tire pressure in other wheels. Four CTIS ECU indicator lights will flash.
NOTE

Four mode lights flashing indicate CTIS has shut off due to uneven tire pressure (one tire 50 percent less than other pressures will do it), tire damage, or major leak. Operator can continue CTIS operation by pressing RUN FLAT on CTIS ECU. When RUN FLAT has been selected CTIS ECU checks pressures at 15 second intervals.

<table>
<thead>
<tr>
<th>TIRE PRESSURE MEASUREMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Measure and record the tire pressure of each tire (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(2) If any tire pressure is lower than the rest, visually inspect tire for damage.</td>
</tr>
<tr>
<td>(3) Apply soapy water solution to tire bead.</td>
</tr>
<tr>
<td>(4) Observe tire for bubbles indicating leaks.</td>
</tr>
</tbody>
</table>
### m2. FOUR CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air pressure at wet tank OK.</td>
<td>CTIS Wheel Seal Test</td>
<td>Four CTIS ECU indicator lights may flash if CTIS wheel seal is damaged.</td>
</tr>
<tr>
<td>Tires OK.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty CTIS wheel seal(s).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty kneeling valve(s) at front wheel(s).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty CTIS wheel valve(s).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty air hoses from quick release valve to affected wheel(s).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty front axle quick release valve.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty rear axle quick release valve(s).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty rear axle quick release valve fittings.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty intermediate axle quick release valve fittings.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty intermediate axle tee fittings.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty front axle quick release valve fittings.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty front tee fittings.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty manifold valve assembly delivery port fittings.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty cab floor air hose fittings.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty manifold valve assembly.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty CTIS ECU.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Are CTIS wheel seals free from leaks at affected wheel(s)?

- **NO**
  - Replace CTIS wheel seal (para 10-2).

- **YES**
CTIS WHEEL SEAL TEST

1. Check axle hubs for presence of oil leaks that indicate a damaged CTIS wheel seal.
2. Ensure wheel is at rest with hub plug at top of hub.
3. Remove hub oil plug.
5. Determine if air is escaping from hub. If air escapes, replace CTIS wheel seal (para 10-2).
6. Install hub oil plug on wheel hub.
m2. FOUR CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air pressure at wet tank OK.</td>
</tr>
<tr>
<td>Tires OK.</td>
</tr>
<tr>
<td>CTIS wheel seals OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty kneeling valve(s) at front wheel(s).</td>
</tr>
<tr>
<td>Faulty CTIS wheel valve(s).</td>
</tr>
<tr>
<td>Faulty air hoses from quick release valve to affected wheel(s).</td>
</tr>
<tr>
<td>Faulty front axle quick release valve.</td>
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<td>Faulty rear axle quick release valve(s).</td>
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<tr>
<td>Faulty rear axle quick release valve fittings.</td>
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<td>Faulty intermediate axle quick release valve fittings.</td>
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<td>Faulty intermediate axle tee fittings.</td>
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</tr>
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</tr>
<tr>
<td>Faulty CTIS ECU.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Soapy Water Leak Test</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air leaks from wheel valves and kneeling valve at front wheels may cause four CTIS ECU indicator lights to flash.</td>
</tr>
</tbody>
</table>

3. Are CTIS wheel valves and front wheel kneeling valves free from leaks and damage at affected wheel(s)?

- **NO**

- **YES**
  - Clean or replace kneeling valve (para 12-5). Replace wheel seal (para 12-5).
SOAPY WATER LEAK TEST

(1) If front wheel is leaking, ensure kneeling valve is tight and secure in valve seat.
(2) Apply soapy water to kneeling valve and check for leaks.
(3) Apply soapy water solution to fittings on either side of wheel valve and observe fittings for bubbles indicating leaks.
(4) With wheel valve still connected to tire, disconnect wheel valve air supply hose from hub at banjo fitting.
(5) Place open end of air supply hose in container of water. Look for bubbles. Persistent bubbles from air supply hose indicate leaking wheel valve.
(6) Connect air supply hose to hub at banjo fitting.
m2. FOUR CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
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<tbody>
<tr>
<td>Air pressure at wet tank OK.</td>
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<tr>
<td>Tires OK.</td>
</tr>
<tr>
<td>CTIS wheel seals OK.</td>
</tr>
<tr>
<td>Kneeling valves at front wheels OK.</td>
</tr>
<tr>
<td>CTIS wheel valves OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty air hoses from quick release valve to affected wheel(s).</td>
</tr>
<tr>
<td>Faulty front axle quick release valve.</td>
</tr>
<tr>
<td>Faulty rear axle quick release valve(s).</td>
</tr>
<tr>
<td>Faulty rear axle quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty intermediate axle quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty intermediate axle tee fittings.</td>
</tr>
<tr>
<td>Faulty front axle quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty front tee fittings.</td>
</tr>
<tr>
<td>Faulty manifold valve assembly delivery port fittings.</td>
</tr>
<tr>
<td>Faulty cab floor air hose fittings.</td>
</tr>
<tr>
<td>Faulty manifold valve assembly.</td>
</tr>
<tr>
<td>Faulty CTIS ECU.</td>
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<td>Soapy Water Leak Test</td>
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</tbody>
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<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A leak in supply hose to affected wheel will prevent wheel from coming to matching pressure with all other wheels and will cause four CTIS ECU indicator lights to flash.</td>
</tr>
</tbody>
</table>

4. Are air hoses and fittings from quick release valve to affected wheel(s) free from leaks and damage?

- **NO**
  - Yes, if air hoses and fittings are free from leaks and damage.
  - No, if air hoses and fittings are not free from leaks and damage.

- **YES**
  - Tighten loose air hoses.
  - Replace damaged air hoses or fittings (para 23-2).
### SOAPY WATER LEAK TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1.   | **If affected wheel is on intermediate axle:**  
  (a) Apply soapy water solution to air supply fittings at affected wheel(s).  
  (b) Select RUN FLAT at CTIS ECU (TM 9-2320-366-10-1).  
  (c) Check for bubbles indicating leaks at fittings.  
  (d) Inspect air hose from wheel to quick release valve for leaks and damage. |
| 2.   | **If affected wheel is on front axle:**  
  (a) Apply soapy water solution to air supply fittings at affected wheel(s) and at frame adapter.  
  **NOTE**  
  CTIS air supply is front fitting on left front wheel; back fitting on right front wheel.  
  (b) Select RUN FLAT at CTIS ECU (TM 9-2320-366-10-1).  
  (c) Check for bubbles indicating leaks at fittings.  
  (d) Inspect air hose from frame adapter to quick release valve for leaks and damage. |
m2. FOUR CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING (CONT)

**KNOWN INFO**
- Air pressure at wet tank OK.
- Tires OK.
- CTIS wheel seals OK.
- Kneeling valves at front wheels OK.
- CTIS wheel valves OK.
- Air hoses from quick release valve to affected wheels OK.

**POSSIBLE PROBLEMS**
- Faulty front axle quick release valve.
- Faulty rear axle quick release valve(s).
- Faulty rear axle quick release valve fittings.
- Faulty intermediate axle quick release valve fittings.
- Faulty intermediate axle tee fittings.
- Faulty front axle quick release valve fittings.
- Faulty front tee fittings.
- Faulty manifold valve assembly delivery port fittings.
- Faulty cab floor air hose fittings.
- Faulty manifold valve assembly.
- Faulty CTIS ECU.

**TEST OPTIONS**

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
</tr>
<tr>
<td>Four CTIS ECU indicator lights will flash if quick release valve continually purges air.</td>
</tr>
</tbody>
</table>

5. Is front axle quick release valve free from constant escape of air during inflation sequence?

- **NO**
  - Clean or replace quick release valve (para 12-8).

- **YES**
(1) Select RUN FLAT at CTIS ECU (TM 9-2320-366-10-1).

(2) Check front axle quick release valve for constant escape of air during inflation sequence.

(3) If air escapes from quick release valve exhaust port during inflation attempt, quick release valve diaphragm is damaged or a foreign object is lodged under diaphragm preventing it from closing.
m2. FOUR CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING (CONT)

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<tr>
<td>CTIS wheel valves OK.</td>
</tr>
<tr>
<td>Air hoses from quick release valve to affected wheels OK.</td>
</tr>
<tr>
<td>Front axle quick release valve OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Faulty rear axle quick release valve(s).</td>
</tr>
<tr>
<td>Faulty rear axle quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty intermediate axle quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty intermediate axle tee fittings.</td>
</tr>
<tr>
<td>Faulty front axle quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty front tee fittings.</td>
</tr>
<tr>
<td>Faulty manifold valve assembly delivery port fittings.</td>
</tr>
<tr>
<td>Faulty cab floor air hose fittings.</td>
</tr>
<tr>
<td>Faulty manifold valve assembly.</td>
</tr>
<tr>
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</tr>
</tbody>
</table>

| 6. | Are rear axle quick release valves free from constant escape of air during inflation sequence? |
| NO | Clean or replace rear quick release valve (para 12-9). |
| YES | |

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Visual inspection</td>
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</tbody>
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<tbody>
<tr>
<td>Four CTIS ECU indicator lights will flash if quick release valve continually purges air.</td>
</tr>
</tbody>
</table>
(1) Select RUN FLAT at CTIS ECU (TM 9-2320-366-10-1).
(2) Check rear axle quick release valve for constant escape of air during inflation sequence.
(3) If air escapes from quick release valve exhaust port during inflation attempt, quick release valve diaphragm is damaged or a foreign object is lodged under diaphragm preventing it from closing.
m2. FOUR CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING (CONT)

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<td>Kneeling valves at front wheels OK.</td>
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<tr>
<td>CTIS wheel valves OK.</td>
</tr>
<tr>
<td>Air hoses from quick release valve to affected wheels OK.</td>
</tr>
<tr>
<td>Front axle quick release valve OK.</td>
</tr>
<tr>
<td>Rear axle quick release valves OK.</td>
</tr>
</tbody>
</table>

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</thead>
<tbody>
<tr>
<td>Faulty rear axle quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty intermediate axle quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty intermediate axle tee fittings.</td>
</tr>
<tr>
<td>Faulty front axle quick release valve fittings.</td>
</tr>
<tr>
<td>Faulty front tee fittings.</td>
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<tr>
<td>Faulty manifold valve assembly delivery port fittings.</td>
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</tr>
</tbody>
</table>

**TEST OPTIONS**

| Soapy Water Leak Test |

**REASON FOR QUESTION**

CTIS may be unable to reach selected pressure and four CTIS ECU indicator lights will flash if air leaks from CTIS air hoses during inflation/deflation sequence.

---

7. Are rear axle quick release valve fittings free from leaks and damage?

**YES**

Tighten loose air hoses. Replace damaged air hoses or fittings (para 23-2).

**NO**
SOAPY WATER LEAK TEST

(1) Select RUN FLAT at CTIS ECU (TM 9-2320-366-10-1) and listen for obvious air escape in CTIS system.
(2) If obvious air escape is heard, perform repair at damaged area. If no obvious air escape is heard, proceed to quick release valve leak check.
(3) Apply soapy water solution to quick release valve fittings at rear axle.
(4) Check for bubbles indicating leaks.
m2. FOUR CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING (CONT)

**KNOWN INFO**
- Air pressure at wet tank OK.
- Tires OK.
- CTIS wheel seals OK.
- Kneeling valves at front wheels OK.
- CTIS wheel valves OK.
- Air hoses from quick release valve to affected wheels OK.
- Front axle quick release valve OK.
- Rear axle quick release valve OK.
- Rear axle quick release valve fittings OK.

**POSSIBLE PROBLEMS**
- Faulty intermediate axle quick release valve fittings.
- Faulty intermediate axle tee fittings.
- Faulty front axle quick release valve fittings.
- Faulty front tee fittings.
- Faulty manifold valve assembly delivery port fittings.
- Faulty cab floor air hose fittings.
- Faulty manifold valve assembly.
- Faulty CTIS ECU.

**TEST OPTIONS**
- Soapy Water Leak Test

**REASON FOR QUESTION**
- CTIS may be unable to reach selected pressure and four CTIS ECU indicator lights will flash if air leaks from CTIS air hoses during inflation/deflation sequence.

**8. Are intermediate axle quick release valve fittings free from leaks and damage?**

**YES**
- Tighten loose air hoses. Replace damaged air hoses or fittings (para 23-2).

**NO**
**SOAPY WATER LEAK TEST**

1. Select RUN FLAT at CTIS ECU (TM 9-2320-366-10-1) and listen for obvious air escape in CTIS system.
2. If obvious air escape is heard, perform repair at damaged area. If no obvious air escape is heard, proceed to quick release valve leak check.
3. Apply soapy water solution to quick release valve fittings at intermediate axle.
4. Check for bubbles indicating leaks.
9. Are intermediate axle tee fittings free from leaks and damage?

**Known Info**
- Air pressure at wet tank OK.
- Tires OK.
- CTIS wheel seals OK.
- Kneeling valves at front wheels OK.
- CTIS wheel valves OK.
- Air hoses from quick release valve to affected wheels OK.
- Front axle quick release valve OK.
- Rear axle quick release valves OK.
- Rear axle quick release valve fittings OK.
- Intermediate axle quick release valve fittings OK.

**Possible Problems**
- Faulty intermediate axle tee fittings.
- Faulty front axle quick release valve fittings.
- Faulty front tee fittings.
- Faulty manifold valve assembly delivery port fittings.
- Faulty cab floor air hose fittings.
- Faulty manifold valve assembly.
- Faulty CTIS ECU.

**Test Options**

- **Soapy Water Leak Test**
  - **Reason for Question**
    - CTIS may be unable to reach selected pressure and four CTIS ECU indicator lights will flash if air leaks from CTIS air hoses during inflation/deflation sequence.

**Action**
- **Yes**
  - Tighten loose air hoses. Replace damaged air hoses or fittings (para 23-2).

**No**
**SOAPY WATER LEAK TEST**

1. Apply soapy water solution to intermediate axle tee fittings.
2. Select RUN FLAT at CTIS ECU (TM 9-2320-366-10-1).
3. Check for bubbles indicating leaks.
m2. FOUR CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING (CONT)

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<td>Kneeling valves at front wheels OK.</td>
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<tr>
<td>CTIS wheel valves OK.</td>
</tr>
<tr>
<td>Air hoses from quick release valve to affected wheels OK.</td>
</tr>
<tr>
<td>Front axle quick release valve OK.</td>
</tr>
<tr>
<td>Rear axle quick release valves OK.</td>
</tr>
<tr>
<td>Rear axle quick release valve fittings OK.</td>
</tr>
<tr>
<td>Intermediate axle quick release valve fittings OK.</td>
</tr>
<tr>
<td>Intermediate axle tee fittings OK.</td>
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</table>

<table>
<thead>
<tr>
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<tbody>
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<td>Faulty front axle quick release valve fittings.</td>
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<tr>
<td>Faulty front tee fittings.</td>
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<tr>
<td>Faulty manifold valve assembly delivery port fittings.</td>
</tr>
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<td>Faulty cab floor air hose fittings.</td>
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<tr>
<td>Faulty manifold valve assembly.</td>
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<tr>
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10. Are front axle quick release valve fittings free from leaks and damage?

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<th>REASON FOR QUESTION</th>
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</table>

<table>
<thead>
<tr>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tighten loose air hoses. Replace damaged air hose and/or fittings (para 23-2).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Tighten loose air hoses. Replace damaged air hose and/or fittings (para 23-2).</td>
</tr>
</tbody>
</table>


**SOAPY WATER LEAK TEST**

1. Apply soapy water solution to front quick release valve fittings.
2. Select RUN FLAT at CTIS ECU (TM 9-2320-366-10-1).
3. Check for bubbles indicating leaks.
m2. FOUR CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING (CONT)

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<th>KNOWN INFO</th>
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<tbody>
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</tr>
<tr>
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</tr>
<tr>
<td>CTIS wheel seals OK.</td>
</tr>
<tr>
<td>Kneeling valves at front wheels OK.</td>
</tr>
<tr>
<td>CTIS wheel valves OK.</td>
</tr>
<tr>
<td>Air hoses from quick release valve to affected wheels OK.</td>
</tr>
<tr>
<td>Front axle quick release valve OK.</td>
</tr>
<tr>
<td>Rear axle quick release valves OK.</td>
</tr>
<tr>
<td>Rear axle quick release valve fittings OK.</td>
</tr>
<tr>
<td>Intermediate axle quick release valve fittings OK.</td>
</tr>
<tr>
<td>Intermediate axle tee fittings OK.</td>
</tr>
<tr>
<td>Front quick release valve fittings OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Faulty front tee fittings.</td>
</tr>
<tr>
<td>Faulty manifold valve assembly delivery port fittings.</td>
</tr>
<tr>
<td>Faulty cab floor air hose fittings.</td>
</tr>
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<td>Faulty manifold valve assembly.</td>
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11. Are front tee fittings free from leaks and damage?

TEST OPTIONS

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<tbody>
<tr>
<td>Soapy Water Leak Test</td>
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</table>

REASON FOR QUESTION

CTIS may be unable to reach selected pressure and four CTIS ECU indicator lights will flash if air leaks from CTIS air hoses during inflation/deflation sequence.

NO

YES

Tighten loose air hoses Replace damaged air hoses or fittings (para 23-2).
SOAPY WATER LEAK TEST

(1) Apply soapy water solution to tee fittings at muffler.
(2) Select RUN FLAT at CTIS ECU (TM 9-2320-366-10-1).
(3) Check for bubbles indicating leaks.
12. Are manifold valve assembly delivery port fittings free from leaks and damage?

**KNOWN INFO**
- Air pressure at wet tank OK.
- Tires OK.
- CTIS wheel seals OK.
- Kneeling valves at front wheels OK.
- CTIS wheel valves OK.
- Air hoses from quick release valve to affected wheels OK.
- Front axle quick release valve OK.
- Rear axle quick release valves OK.
- Rear axle quick release valve fittings OK.
- Intermediate axle quick release valve fittings OK.
- Intermediate axle tee fittings OK.
- Front quick release valve fittings OK.
- Front tee fittings OK.

**POSSIBLE PROBLEMS**
- Faulty manifold valve assembly delivery port fittings.
- Faulty cab floor air hose fittings.
- Faulty manifold valve assembly.
- Faulty CTIS ECU.

**TEST OPTIONS**
- Soapy Water Leak Test

**REASON FOR QUESTION**
CTIS may be unable to reach selected pressure and four CTIS ECU indicator lights will flash if air leaks from CTIS air hoses during inflation/deflation sequence.

**TIGHTEN LOOSE AIR HOSES. REPLACE DAMAGED AIR HOSES OR FITTINGS (PARA 23-2).**
SOAPY WATER LEAK TEST

1. Remove kick panel (para 16-3).
2. Apply soapy water solution to manifold valve assembly delivery port fittings.
4. Check for bubbles indicating leaks.
m2. FOUR CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING (CONT)

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<td>Air hoses from quick release valve to affected wheels OK.</td>
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<td>Front axle quick release valve OK.</td>
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<tr>
<td>Intermediate axle tee fittings OK.</td>
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<tr>
<td>Front quick release valve fittings OK.</td>
</tr>
<tr>
<td>Front tee fittings OK.</td>
</tr>
<tr>
<td>Manifold valve assembly delivery port fittings OK.</td>
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<table>
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</thead>
<tbody>
<tr>
<td>Faulty cab floor air hose fittings.</td>
</tr>
<tr>
<td>Faulty manifold valve assembly.</td>
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</table>

13. Are cab floor supply hose fittings free from leaks and damage?

- **NO**
  - Tighten loose air hoses. Replace damaged air hoses or fittings (para 23-2).

- **YES**
SOAPY WATER LEAK 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) Apply soapy water solution to cab floor supply hose fittings.
(5) Select RUN FLAT at CTIS ECU (TM 9-2320-366-10-1).
(6) Check for bubbles indicating leaks.
(7) Position front grille on cab with washer and screw.
(8) Position two washers and screws in front grille.
(9) Tighten screw to 48-60 lb-in. (5-7 N·m).
(10) Tighten two screws to 24 lb-in. (3 N·m).
m2. FOUR CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING (CONT)

14. Does manifold valve assembly click when selecting mode change and is no air heard blowing through valve?

   TEST OPTIONS
   Manifold Valve Assembly Test

   REASON FOR QUESTION
   Four CTIS ECU indicator lights will flash if manifold valve assembly is defective.

   NO

   YES
   Repair or replace manifold valve assembly (para 12-7).

   KNOWLEDGE INFO
   Air pressure at wet tank OK.
   Tires OK.
   CTIS wheel seals OK.
   Kneeling valves at front wheels OK.
   CTIS wheel valves OK.
   Air hoses from quick release valve to affected wheels OK.
   Front axle quick release valve OK.
   Rear axle quick release valves OK.
   Rear axle quick release valve fittings OK.
   Intermediate axle quick release valve fittings OK.
   Intermediate axle tee fittings OK.
   Front quick release valve fittings OK.
   Rear axle quick release valve fittings OK.
   Front tee fittings OK.

   POSSIBLE PROBLEMS
   Faulty manifold valve assembly.
   Faulty CTIS ECU.

   Replace CTIS ECU (para 12-6).
### MANIFOLD VALVE ASSEMBLY TEST

1. Select RUN FLAT at CTIS ECU (TM 9-2320-366-10-1).
2. Check manifold valve assembly by listening for clicking when selecting mode change. If no clicking is heard or if air blows through manifold valve assembly, manifold valve assembly is faulty.
3. If manifold valve is ok, ECU may be faulty.
4. Install kick panel (para 16-3).
**m3. FIVE CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING**

**INITIAL SETUP**

**Equipment Conditions**
- Engine shut down (TM 9-2320-366-10-1).
- Kick panel removed (para 16-3).

**Personnel Required**
- (2)

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)

---

**KNOWN INFO**

- Front and rear air gages read 120 PSI.

**POSSIBLE PROBLEMS**

- CTIS manifold valve vent hose or bulkhead fitting plugged or restricted.
- Faulty air hose or fittings.
- Faulty front axle CTIS quick release valve.
- Faulty intermediate axle CTIS quick release valve.
- Faulty rear axle CTIS quick release valve.
- Faulty wheel valve.
- Faulty front wheel kneeling valve.
- Faulty wheel seals.
- Faulty electrical system.

---

**WARNING**

Read WARNING on following page.

**TEST OPTIONS**

- Visual Inspection

**REASON FOR QUESTION**

If CTIS manifold valve vent hose or bulkhead fitting is plugged, CTIS system will not operate correctly.

---

1. Is CTIS manifold valve vent hose or bulkhead fitting plugged or restricted?

   **YES**
   - Go to step 2 of this fault.

   **NO**
   - Clean CTIS manifold valve vent hose (para 2-43).
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.

(1) Check to see if vehicle is equipped with vent cover and vent cover is in good condition.
(2) If vehicle is not equipped with vent cover or vent cover is damaged perform steps (4) through (18) of this test.
(3) If vehicle is equipped with vent cover and vent cover is in good condition, go to step 2 of this fault.
(4) Disconnect CTIS manifold valve vent hose from CTIS manifold valve assembly.
(5) Disconnect CTIS manifold valve vent hose from bulkhead fitting in cab floor.
(6) Check to see if CTIS manifold valve vent hose or bulkhead fitting is plugged or restricted.
(7) If CTIS manifold valve vent hose and bulkhead fitting are not plugged or restricted, go to step 2 of this fault.
(8) If CTIS manifold valve vent hose or bulkhead fitting is plugged or restricted, clean CTIS manifold valve vent hose and bulkhead fitting (para 2-43).
(9) Connect CTIS manifold valve vent hose to CTIS manifold valve assembly.
(10) Connect CTIS manifold valve vent hose to bulkhead fitting in cab floor.
(11) Remove two screws and washer from front grille.
(12) Remove screw, washer, and front grille from cab.

NOTE

Perform step (13) if vent cover is damaged.

(13) Remove retaining nut and vent cover from bulkhead fitting. Discard retaining nut and vent cover.

NOTE

Part number 12422659 is required for step (14).

(14) Install vent cover on bulkhead fitting with retaining nut.
(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).
m3. FIVE CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING (CONT)

| KNOWN INFO |
| Front and rear air gages read 120 PSI.  
CTIS manifold valve vent hose and bulkhead fitting OK. |

| POSSIBLE PROBLEMS |
| Faulty air hose or fittings.  
Faulty front axle CTIS quick release valve.  
Faulty intermediate axle CTIS quick release valve.  
Faulty rear axle CTIS quick release valve.  
Faulty wheel valve.  
Faulty front wheel kneeling valve.  
Faulty wheel seals.  
Faulty electrical system. |

| TEST OPTIONS |
| Visual Inspection |

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

2. Is air present from port C on CTIS manifold valve?

   NO

   Go to Electrical System Troubleshooting (e85. Central Tire Inflation System (CTIS) Does Not Operate).

   YES

3. Is CTIS air hoses and fittings free from air leaks during inflation mode?

   NO

   Replace or repair air hose or fittings (para 2-45).

   YES

| TEST OPTIONS |
| Visual Inspection |

| REASON FOR QUESTION |
| If air is leaking during inflation mode, CTIS pneumatic system is faulty. |
NOTE

Four flashing indicator lights indicate a defect in CTIS critical component(s) causing system to shut off. Override cannot be applied but system can be activated by turning vehicle off and then on again.

1. Disconnect CTIS manifold output hose from CTIS manifold valve assembly port C.
4. Wait for CTIS to cycle and check for quick bursts of air to expel from CTIS manifold valve assembly port C.
5. Check for five CTIS ECU indicator lights flashing.
6. If air does not expel from CTIS manifold valve assembly or CTIS ECU does not have five flashing indicator lights, go to Electrical System Troubleshooting (e85. Central Tire Inflation System (CTIS) Does Not Operate).
7. Shut down engine (TM 9-2320-366-10-1).
8. Connect CTIS manifold output hose to CTIS manifold valve assembly port C.
9. Install kick panel (para 16-3).
4. Is front axle CTIS quick release valve free from exhausting air during inflation mode?

- **YES**
  - Replace front axle CTIS quick release valve (para 12-8).

- **NO**
  - Visual Inspection
  - If air exhausts from CTIS quick release valve during inflation mode, CTIS quick release valve is faulty.

### KNOWN INFO
- Front and rear air gages read 120 PSI.
- CTIS manifold valve vent hose and bulkhead fitting OK.
- Air hose and fittings OK.

### POSSIBLE PROBLEMS
- Faulty front axle CTIS quick release valve.
- Faulty intermediate axle CTIS quick release valve.
- Faulty rear axle CTIS quick release valve.
- Faulty wheel valve.
- Faulty front wheel kneeling valve.
- Faulty wheel seals.
- Faulty electrical system.
(1) Start engine (TM 9-2320-366-10-1).
(2) Select CTIS inflation mode (TM 9-2320-366-10-1).
(3) Check for air escaping from front axle CTIS quick release valve during inflation mode.
(4) If air is escaping from front axle CTIS quick release valve during inflation mode, replace front axle CTIS quick release valve (para 12-8).
(5) Shut down engine (TM 9-2320-366-10-1).
m3. FIVE CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING
(CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front and rear air gages read 120 PSI.</td>
</tr>
<tr>
<td>CTIS manifold valve vent hose and bulkhead fitting OK</td>
</tr>
<tr>
<td>Air hose and fittings OK.</td>
</tr>
<tr>
<td>Front axle CTIS quick release valve OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty intermediate axle CTIS quick release valve.</td>
</tr>
<tr>
<td>Faulty rear axle CTIS quick release valve.</td>
</tr>
<tr>
<td>Faulty wheel valve.</td>
</tr>
<tr>
<td>Faulty front wheel kneeling valve.</td>
</tr>
<tr>
<td>Faulty wheel seals.</td>
</tr>
<tr>
<td>Faulty electrical system.</td>
</tr>
</tbody>
</table>

5. Are intermediate and rear axle CTIS quick release valves free from exhausting air during inflation mode?

<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 exhausts from CTIS quick release valve during inflation mode, CTIS quick release valve is faulty.</td>
</tr>
</tbody>
</table>

- YES
  - Replace intermediate or rear axle CTIS quick release valve (para 12-9).

- NO
(1) Start engine (TM 9-2320-366-10-1).
(2) Select CTIS inflation mode (TM 9-2320-366-10-1).
(3) Check for air escaping from intermediate and rear axle CTIS quick release valves during inflation mode. (Intermediate CTIS quick release valve shown.)
(4) If air is escaping from intermediate or rear axle CTIS quick release valve during inflation mode, replace affected CTIS quick release valve (para 12-9).
(5) Shut down engine (TM 9-2320-366-10-1).
m3. FIVE CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING (CONT)

**KNOWN INFO**

| Front and rear air gages read 120 PSI. |
| CTIS manifold valve vent hose and bulkhead fitting OK. |
| Air hose and fittings OK. |
| Front axle CTIS quick release valves OK. |
| Intermediate axle CTIS quick release valve OK. |
| Rear axle CTIS quick release valve OK. |

**POSSIBLE PROBLEMS**

- Faulty wheel valve.
- Faulty front wheel kneeling valve.
- Faulty wheel seals.
- Faulty electrical system.

**TEST OPTIONS**

- Visual Inspection

**REASON FOR QUESTION**

Leaks at wheel valves and front wheel kneeling valve(s) that cause rapid tire deflation will make five CTIS ECU mode lights flash.

---

6. Are CTIS wheel valves and front wheel kneeling valves free from leaks and damage?

**YES**

Replace kneeling valve(s) or wheel valve(s) (para 12-5).

**NO**
(1) Start engine (TM 9-2320-366-10-1).
(2) Select CTIS inflation mode (TM 9-2320-366-10-1).
(3) Listen for audible escape of air at kneeling valve (front wheels only) and CTIS wheel valves on each wheel.
(4) If audible escape of air is present, replace wheel kneeling valve(s) or wheel valve(s) (para 12-5).
(5) Shut down engine (TM 9-2320-366-10-1).
m3. FIVE CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATOR LIGHTS FLASHING (CONT)

**KNOWLEDGE**

Front and rear air gages read 120 PSI. CTIS manifold valve vent hose and bulkhead fitting OK. Air hose and fittings OK. Front axle CTIS quick release valves OK. Intermediate axle CTIS quick release valve OK. Rear axle CTIS quick release valve OK. Wheel valves OK. Front wheel kneeling valves OK.

**POSSIBLE PROBLEMS**

Faulty wheel seals. Faulty electrical system.

**TEST OPTIONS**

<table>
<thead>
<tr>
<th>Visual Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REASON FOR QUESTION</strong></td>
</tr>
<tr>
<td>Seriously damaged wheel seals will audibly exhaust air and cause CTIS to shutdown with five CTIS ECU mode lights flashing.</td>
</tr>
</tbody>
</table>

**7.** Are wheel seals free from major leaks?

- **NO**
  - **TEST OPTIONS**
  - **REASON FOR QUESTION**

- **YES**
  - Replace wheel seals (para 12-2).

Go to Electrical System Troubleshooting (e85. Central Tire Inflation System (CTIS) Does Not Operate).
(1) Move vehicle until hub plug on wheel is in 12 o'clock position.
(2) Remove wheel hub plug.
(3) Start engine (TM 9-2320-366-10-1).
(4) Select CTIS inflation mode (TM 9-2320-366-10-1).
(5) Listen at wheel hub for audible escape of air.
(6) If audible escape of air is present, replace wheel seal (para 12-2).
(7) Install wheel hub plug.
(8) Perform steps 1 through 5 on remaining wheels.
(9) If no air is audibly present from wheel hub, Go to Electrical System Troubleshooting (e85. Central Tire Inflation System (CTIS) Does Not Operate).
(10) Shut down engine (TM 9-2320-366-10-1).
1. Are front tires losing pressure?

- **KNOW INFO**
  - Front and rear pressure gages read 120 psi.
  - CTIS system operates OK.

- **POSSIBLE PROBLEMS**
  - Faulty kneeling valve(s).
  - Faulty tire(s).
  - Faulty wheel valve(s).
  - Faulty air hose(s) from quick release valve to affected wheel(s).
  - Faulty quick release valve(s).

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**

1. Tire Pressure Measurement
   - Low tire pressure caused by leaking kneeling valve(s) (front tires only), damaged tire(s) or CTIS wheel valve(s) may cause system to recycle.

   **REASON FOR QUESTION**

   - Faulty kneeling valve(s).
   - Faulty tire(s).
   - Faulty wheel valve(s).
   - Faulty air hose(s) from quick release valve to affected wheel(s).
   - Faulty quick release valve(s).

   **START**

   **GO TO STEP 3 OF THIS FAULT.**
WARNING

Wear appropriate eye protection when working under vehicle and around CTIS system due to the possibility of falling and/or blown debris. Failure to comply may result in injury to personnel.

NOTE

CTIS ECU checks tire pressure 30 seconds after completing a pressure change sequence. If tire pressures are the same, system reverts to checking pressure every 15 minutes. If tires are losing pressure, ECU inflates tires and checks pressure again in 30 seconds. If CTIS has to repeat this process more than 10 times, ECU will display four flashing lights.

(1) Measure and record the tire pressure of each tire (TM 9-2320-366-10-1).

(2) If front tire(s) have lower pressure than the rest, kneeling valve, tire or CTIS wheel valve is faulty.

(3) If rear tire(s) have lower pressure than the rest, tire or CTIS wheel valve is faulty.
m4. CENTRAL TIRE INFLATION SYSTEM (CTIS) REPEATEDLY RESUMES CYCLING 30 SECONDS AFTER INDICATOR LIGHTS STOP FLASHING (CONT)

**KNOWN INFO**
- Front and rear pressure gages read 120 psi.
- CTIS system operates OK.

**POSSIBLE PROBLEMS**
- Faulty kneeling valve(s).
- Faulty tire(s).
- Faulty wheel valve(s).
- Faulty air hose(s) from quick release valve to affected wheel(s).
- Faulty quick release valve(s).

**TEST OPTIONS**
- Soapy Water Leak Test

**REASON FOR QUESTION**
- A leaking kneeling valve can cause tire to loose air pressure and CTIS system may repeat inflation sequence.

2. Is kneeling valve on affected wheel(s) free from leaks?

**TEST OPTIONS**
- Soapy Water Leak Test

**REASON FOR QUESTION**
- A leaking kneeling valve can cause tire to loose air pressure and CTIS system may repeat inflation sequence.

**KNOWN INFO**
- Front and rear pressure gages read 120 psi.
- CTIS system operates OK.

**POSSIBLE PROBLEMS**
- Faulty kneeling valve(s).
- Faulty tire(s).
- Faulty wheel valve(s).
- Faulty air hose(s) from quick release valve to affected wheel(s).
- Faulty quick release valve(s).

3. Are tires free from leaks or damage?

**TEST OPTIONS**
- Soapy Water Leak Test

**REASON FOR QUESTION**
- A leaking tire can cause CTIS system to detect a pressure loss and repeat inflation sequence.

**KNOWN INFO**
- Front and rear pressure gages read 120 psi.
- CTIS system operates OK.

**POSSIBLE PROBLEMS**
- Faulty tire(s).
- Faulty wheel valve(s).
- Faulty air hose(s) from quick release valve to affected wheel(s).
- Faulty quick release valve(s).

**TEST OPTIONS**
- Repair tire(s) (para 12-2) or replace tire(s) (TM 9-2320-366-10).
### SOAPY WATER LEAK TEST

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Check kneeling valve is tight and secure in valve seat.</td>
</tr>
<tr>
<td>2</td>
<td>Apply soapy water to valve and check for leaks.</td>
</tr>
</tbody>
</table>

### SOAPY WATER LEAK TEST

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Visually inspect tire for damage.</td>
</tr>
<tr>
<td>2</td>
<td>Apply soapy water solution to tire bead.</td>
</tr>
<tr>
<td>3</td>
<td>Observe tire for bubbles indicating leaks.</td>
</tr>
</tbody>
</table>
4. CENTRAL TIRE INFLATION SYSTEM (CTIS) REPEATEDLY RESUMES CYCLING 30 SECONDS AFTER INDICATOR LIGHTS STOP FLASHING (CONT)

**KNOWN INFO**
- Front and rear pressure gages read 120 psi.
- CTIS system operates OK.
- Kneeling valve(s) OK.
- Tire(s) OK.

**POSSIBLE PROBLEMS**
- Faulty wheel valve(s).
- Faulty air hose(s) from quick release valve to affected wheel(s).
- Faulty quick release valve(s).

**TEST OPTIONS**
- Soapy Water Leak Test

**REASON FOR QUESTION**
If CTIS wheel valves are leaking, CTIS ECU may detect loss of pressure on system and repeat inflation sequence.

**YES**

Replace wheel valve (para 12-5).

**NO**

5. Are air lines between affected wheel(s) and quick release valve(s) free from folds or constrictions?

**KNOWN INFO**
- Front and rear pressure gages read 120 psi.
- CTIS system operates OK.
- Kneeling valve(s) OK.
- Tire(s) OK.
- Wheel valve(s) OK.

**POSSIBLE PROBLEMS**
- Faulty air hose(s) from quick release valve to affected wheel(s).
- Faulty quick release valve(s).

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
If air line(s) between wheel(s) and quick release valves are constricted, wheel valve(s) may not close immediately and tires will lose air, causing CTIS to recycle.

**YES**

Replace damaged air lines (para 23-2).

**NO**

Replace faulty quick release valve(s) (para 12-8 and/or 12-9).
(1) Check air supply line(s) from quick release valve(s) to affected wheel(s) for constrictions. See illustration for fitting and quick release valve locations.
(2) If air supply line is not constricted, quick release valve for affected wheel is faulty.

NOTE
If air line from quick release valve to affected wheel is partially obstructed, air line to wheel cannot escape back to quick release valve immediately after tire is pressurized causing wheel valve to remain partially open and tire to lose pressure. System will cycle again when low pressure is checked after 30 seconds.

(1) Apply soapy water solution to CTIS fittings on outside of wheel.
(2) Observe fittings for bubbles indicating leaks.
(3) With wheel valve still connected to tire, disconnect wheel valve air supply line from hub at banjo bolt.
(4) Place open end of air supply line in container of water. Look for air bubbles.
(5) Persistent bubbles from air line indicate faulty wheel valve.
(6) Connect wheel valve to hub at banjo bolt.

SOAPY WATER LEAK TEST

WHEEL VALVE

AIR HOSE FITTINGS WHEELS TO QUICK RELEASE VALVES
m5. CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATES NO FAULT CODE BUT SYSTEM FAILS TO INFLATE OR DEFLATE

INITIAL SETUP

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

Materials/Parts
Soap, Laundry (Item 63, Appendix D)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Pan, Wash (Item 25, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

WARNING
Read WARNING on following page.

POSSIBLE PROBLEMS
Leaking air hoses or fittings.
Faulty pressure protection valve.
Faulty main air supply hose.
Faulty CTIS manifold input hose.
Faulty electrical system.

TEST OPTIONS
Visual Inspection

REASON FOR QUESTION
If air is leaking during inflation mode, CTIS air hose(s) and/or fittings are faulty.

START

1.
If air is leaking during inflation mode, CTIS air hose(s) and/or fittings are faulty.

WARNING
Read WARNING on following page.

Is CTIS air hoses and fittings free from air leaks during inflation mode?

NO

YES

Replace air hose(s) and/or fittings (para 23-2).
Wear appropriate eye protection when working under vehicle due to the possibility of falling debris. Failure to comply may result in injury to personnel.

2. Set CTIS ECU to RUN FLAT mode (TM 9-2320-366-10-1).
3. Apply soapy water solution to CTIS air hoses and fittings (Table 23-2 Central Tire Inflation System (CTIS) Air Hose Locations).
4. Check for soap bubbles indicating leaks.
5. If any leaks are found, replace CTIS air hose and/or fittings (para 23-2).
m5. CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATES NO FAULT CODE BUT SYSTEM FAILS TO INFLATE OR DEFLATE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front and rear air gauges read 120 psi.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaking air hoses or fittings.</td>
</tr>
<tr>
<td>Faulty pressure protection valve.</td>
</tr>
<tr>
<td>Faulty main air supply hose.</td>
</tr>
<tr>
<td>Faulty CTIS manifold input hose.</td>
</tr>
<tr>
<td>Faulty electrical system.</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 leaking from air transportability air hose(s) and/or fittings, air hose(s) and/or fittings are faulty.</td>
</tr>
</tbody>
</table>

2. Are air transportability air hoses and fittings free from leaks?

- **NO**
  - Replace air hose(s) and/or fittings (para 23-3).

- **YES**
  - Replace air hose(s) and/or fittings (para 23-3).
(1) Start engine (TM 9-2320-366-10-1).
(2) Apply soapy water solution to air transportability air hoses and fittings (Table 23-3. Air Transportability Air Hose Locations).
(3) Check for soap bubbles indicating leaks.
(4) If any leaks are found, replace air transportability air hose and/or fittings (para 23-3).
(5) Shut down engine (TM 9-2320-366-10-1).
3. **Is air present from pressure protection valve?**

**KNOWN INFO**
- Front and rear air gages read 120 psi.
- Air hoses and fittings free from leaks.

**POSSIBLE PROBLEMS**
- Faulty pressure protection valve.
- Faulty main air supply hose.
- Faulty CTIS manifold input hose.
- Faulty electrical system.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
- If air is not present from pressure protection valve, pressure protection valve is faulty.

**YES**
- Replace pressure protection valve (para 11-29).

**NO**
(1) Disconnect main air supply hose from pressure protection valve.
(2) Start engine (TM 9-2320-366-10-1).
(3) If air is not present from pressure protection valve, replace pressure protection valve (para 11-29).
(4) Shut down engine (TM 9-2320-366-10-1).
(5) Connect main air supply hose to pressure protection valve.
m5. CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATES NO FAULT CODE BUT SYSTEM FAILS TO INFLATE OR DEFLETE (CONT)

**KNOWN INFO**
Front and rear air gages read 120 psi. Air hoses and fittings free from leaks. Pressure protection valve OK.

**POSSIBLE PROBLEMS**
Faulty main air supply hose. Faulty CTIS manifold input hose. Faulty electrical system.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
If air is not present from main air supply hose, main air supply hose is faulty.

4. Is air present from main air supply hose?

- **NO**
  - Replace main air supply hose (para 23-2).

- **YES**
(1) Remove kick panel (para 16-3).
(2) Disconnect CTIS manifold input hose from cab bulkhead fitting.
(3) Start engine (TM 9-2320-366-10-1).
(4) If air is not present from cab bulkhead fitting, replace main air supply hose (para 23-2).
(5) Shut down engine (TM 9-2320-366-10-1).
(6) Connect CTIS manifold input hose to cab bulkhead fitting.
m5. CENTRAL TIRE INFLATION SYSTEM (CTIS) ECU INDICATES NO FAULT CODE BUT SYSTEM FAILS TO INFLATE OR DEFLATE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front and rear air gages read 120 psi.</td>
</tr>
<tr>
<td>Air hoses and fittings free from leaks.</td>
</tr>
<tr>
<td>Pressure protection valve OK.</td>
</tr>
<tr>
<td>Main air supply hose OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty CTIS manifold input hose.</td>
</tr>
<tr>
<td>Faulty electrical system.</td>
</tr>
</tbody>
</table>

5. Is air present from CTIS manifold input hose?

- **NO**
  - If air is not present from CTIS manifold input hose, CTIS manifold input hose is faulty.
  - Replace CTIS manifold input hose (para 23-2).

- **YES**
  - Go to Electrical System Troubleshooting (e85. Central Tire Inflation System (CTIS) Does Not Operate).

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
- If air is not present from CTIS manifold input hose, CTIS manifold input hose is faulty.
(1) Disconnect CTIS manifold input hose from CTIS manifold valve.
(2) Start engine (TM 9-2320-366-10-1).
(3) If air is not present from CTIS manifold input hose, replace CTIS manifold input hose (para 23-2).
(4) If air is present from CTIS manifold input hose go to Electrical Troubleshooting (e85. Central Tire Inflation System (CTIS) Does Not Operate).
(5) Shut down engine (TM 9-2320-366-10-1).
(6) Connect CTIS manifold input hose to CTIS manifold valve.
(7) Install kick panel (para 16-3).
m6. CTIS OVERSPEED WARNING LIGHT DOES NOT ILLUMINATE AND/OR OVERSPEED PRESSURE CHANGE

INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Conditions</th>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine running (TM 9-2320-366-10-1)</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>Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)</td>
</tr>
<tr>
<td>References</td>
<td>Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)</td>
</tr>
<tr>
<td>TM 9-4910-571-12&amp;P</td>
<td>STE/ICE-R (Item 41, Appendix C)</td>
</tr>
</tbody>
</table>

START

1. Do overspeed warning light and overspeed pressure change bolts fail to operate?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breakers OK.</td>
<td>Visual inspection</td>
</tr>
<tr>
<td>Power supplied to CTIS.</td>
<td></td>
</tr>
<tr>
<td>Speedometer OK.</td>
<td>If ECU does not receive a</td>
</tr>
<tr>
<td>indicator display lights OK.</td>
<td>speed signal it cannot</td>
</tr>
<tr>
<td></td>
<td>activate the overspeed</td>
</tr>
<tr>
<td></td>
<td>protection system.</td>
</tr>
</tbody>
</table>

POSSIBLE PROBLEMS

Faulty CTIS cable-speed signal.
Faulty cab dashboard wiring harness - speed signal.
Faulty cab dashboard wiring harness - LED input to CTIS cable.
Faulty CTIS cable - LED input to ECU.
Faulty ECU - O.S pressure change function.
Faulty overspeed indicator LED.
Faulty cab dashboard wiring harness - ground for LED.
Faulty cab dashboard wiring harness - power to LED.
Faulty CTIS cable power to LED.
Faulty ECU - O.S warning indicator function.

Go to step 6 of this fault.
(1) Select X-C mode at CTIS ECU (TM 9-2320-366-10-1).
(2) Turn on headlights (TM 9-2320-366-10-1).
(3) Perform road test.
(4) Increase speed to 40 mph.
(5) Check if overspeed warning light flashes.
(6) After about one minute, check if overspeed pressure change is activated to raise tire pressure to HWY mode.
(7) If both functions fail to activate, speed signal to ECU is faulty or ECU may be faulty.
(8) Shut down engine (TM 9-2320-366-10-1).
m6. **CTIS OVERSPEED WARNING LIGHT DOES NOT ILLUMINATE AND/OR OVERSPEED PRESSURE CHANGE** (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breakers OK.</td>
</tr>
<tr>
<td>Power supplied to CTIS.</td>
</tr>
<tr>
<td>Speedometer OK.</td>
</tr>
<tr>
<td>Indicator display lights OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty CTIS cable-speed signal.</td>
</tr>
<tr>
<td>Faulty cab dashboard wiring harness - speed signal.</td>
</tr>
<tr>
<td>Faulty cab dashboard wiring harness - LED input to CTIS cable.</td>
</tr>
<tr>
<td>Faulty CTIS cable - LED input to ECU.</td>
</tr>
<tr>
<td>Faulty ECU - O.S pressure change function.</td>
</tr>
<tr>
<td>Faulty overspeed indicator LED.</td>
</tr>
<tr>
<td>Faulty cab dashboard wiring harness - ground for LED.</td>
</tr>
<tr>
<td>Faulty cab dashboard wiring harness - power to LED.</td>
</tr>
<tr>
<td>Faulty CTIS cable power to LED.</td>
</tr>
<tr>
<td>Faulty ECU - O.S. warning indicator function.</td>
</tr>
</tbody>
</table>

2. **Is continuity present from P110U to P111B?**

   - **NO**
   - **YES**

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

   **REASON FOR QUESTION**
   - CTIS overspeed warning light and overspeed pressure change will not operate if CTIS ECU does not receive speed signal through CTIS cable assembly.

   **Repair**
   - Repair wire 1528 (para 2-45) or replace CTIS cable assembly (para 7-60).
### CONTINUITY TEST

1. Remove kick panel (para 16-3).
2. Disconnect connector P110 from CTIS ECU.
3. Disconnect connector P111 from connector J111.
4. Set multimeter to ohms.
5. Connect positive (+) probe of multimeter to connector P110U.
6. Connect negative (−) probe of multimeter to connector P111B and note reading on multimeter.
7. If continuity is not present, repair wire 1528 (para 2-45) or replace CTIS cable assembly (para 7-60).
m6. CTIS OVERSPEED WARNING LIGHT DOES NOT ILLUMINATE AND/OR OVERSPEED PRESSURE CHANGE

**KNOWN INFO**
- Circuit breakers OK.
- Power supplied to CTIS.
- Speedometer OK.
- Indicator display lights OK.
- CTIS cable-speed signal OK.

**POSSIBLE PROBLEMS**
- Faulty cab dashboard wiring harness - speed signal.
- Faulty cab dashboard wiring harness - LED input to CTIS cable.
- Faulty CTIS cable - LED input to ECU.
- Faulty ECU - O.S pressure change function.
- Faulty overspeed indicator LED.
- Faulty cab dashboard wiring harness - ground for LED.
- Faulty cab dashboard wiring harness - power to LED.
- Faulty CTIS cable power to LED.
- Faulty ECU - O.S. warning indicator function.

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

**REASON FOR QUESTION**
CTIS overspeed warning light and overspeed pressure change will not operate if CTIS ECU does not receive speed signal through cab dashboard wiring harness.

3. Is continuity present from J111B to PX8-4?

**YES**
Repair wire 1793 (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) Remove instrument panel assembly for access (para 7-15).</td>
</tr>
<tr>
<td>(2) Disconnect connector clamp from speedometer connector.</td>
</tr>
<tr>
<td>(3) Disconnect connector PX8 from speedometer.</td>
</tr>
<tr>
<td>(4) Set multimeter to ohms position.</td>
</tr>
<tr>
<td>(5) Connect positive (+) probe of multimeter to connector J111B.</td>
</tr>
<tr>
<td>(6) Connect negative (-) probe of multimeter to connector PX8-4 and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If continuity is not present, repair wire 1793 (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) Connect connector PX8 to speedometer.</td>
</tr>
<tr>
<td>(9) Connect connector clamp to speedometer connector.</td>
</tr>
<tr>
<td>(10) Install instrument panel assembly (para 7-15).</td>
</tr>
</tbody>
</table>

[Diagram of speedometer and connectors]
m6. CTIS OVERSPEED WARNING LIGHT DOES NOT ILLUMINATE AND/OR OVERSPEED PRESSURE CHANGE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breakers OK.</td>
</tr>
<tr>
<td>Power supplied to CTIS.</td>
</tr>
<tr>
<td>Speedometer OK.</td>
</tr>
<tr>
<td>Indicator display lights OK.</td>
</tr>
<tr>
<td>CTIS cable-speed signal OK.</td>
</tr>
<tr>
<td>Cab dashboard wiring harness - speed signal OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty cab dashboard wiring harness - LED input to CTIS cable.</td>
</tr>
<tr>
<td>Faulty CTIS cable - LED input to ECU.</td>
</tr>
<tr>
<td>Faulty ECU - O.S pressure change function.</td>
</tr>
<tr>
<td>Faulty overspeed indicator LED.</td>
</tr>
<tr>
<td>Faulty cab dashboard wiring harness - ground for LED.</td>
</tr>
<tr>
<td>Faulty cab dashboard wiring harness - power to LED.</td>
</tr>
<tr>
<td>Faulty CTIS cable power to LED.</td>
</tr>
<tr>
<td>Faulty ECU - O.S. warning indicator function.</td>
</tr>
</tbody>
</table>

4. Is 24 vdc present on P111D power input to CTIS harness for warning light?

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

**REASON FOR QUESTION**
- CTIS overspeed indicator will not work without 24 vdc to P111D.

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

**YES**
- Repair wire 1793 (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.

### VOLTAGE TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Position master power switch to on (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>2</td>
<td>Connect positive (+) probe of multimeter to connector P111D.</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 24 vdc is not present, repair wire 1793 (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>5</td>
<td>Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>6</td>
<td>Connect connector P111 to connector J111.</td>
</tr>
</tbody>
</table>

CONNECTOR J111

CONNECTOR P111

P111
m6. CTIS OVERSPEED WARNING LIGHT DOES NOT ILLUMINATE AND/OR OVERSPEED PRESSURE CHANGE (CONT)

**KNOWLEDGE INFO**
- Circuit breaker OK.
- Power supplied to CTIS.
- Speedometer OK.
- Indicator display lights OK.
- CTIS cable-speed signal OK.
- Cab dashboard wiring harness - speed signal OK.
- Cab dashboard wiring harness - LED input to CTIS cable OK.

**POSSIBLE PROBLEMS**
- Faulty CTIS cable - LED input to ECU.
- Faulty ECU - O.S. pressure change function.
- Faulty overspeed indicator LED.
- Faulty cab dashboard wiring harness - ground for LED.
- Faulty cab dashboard wiring harness - power to LED.
- Faulty CTIS cable power to LED.
- Faulty ECU - O.S. warning indicator function.

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

**REASON FOR QUESTION**
- CTIS overspeed indicator will not work without 24 vdc to P110E.

**WARNING**
Read WARNING on following page.

5. Is 24 vdc present on P110E power input to ECU for warning light?

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

**REASON FOR QUESTION**
- CTIS overspeed indicator will not work without 24 vdc to P110E.

YES

Go to step 9 of this fault.

NO

Replace CTIS ECU (para 12-6).
**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) Position master power switch to on (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(2) Connect positive (+) probe of multimeter to connector P110E.</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, CTIS wiring harness is faulty.</td>
</tr>
<tr>
<td>(5) If 24 vdc is present, replace CTIS ECU (para 12-6).</td>
</tr>
<tr>
<td>(6) Position master power switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(7) Connect connector P110 to CTIS ECU.</td>
</tr>
</tbody>
</table>
m6. CTIS OVERSPEED WARNING LIGHT DOES NOT ILLUMINATE AND/OR OVERSPEED PRESSURE CHANGE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breaker OK.</td>
</tr>
<tr>
<td>Power supplied to CTIS.</td>
</tr>
<tr>
<td>Speedometer OK.</td>
</tr>
<tr>
<td>Indicator display lights OK.</td>
</tr>
<tr>
<td>CTIS cable-speed signal OK.</td>
</tr>
<tr>
<td>Cab dashboard wiring harness - speed signal OK.</td>
</tr>
<tr>
<td>Cab dashboard wiring harness - LED input to CTIS cable OK.</td>
</tr>
<tr>
<td>CTIS cable - LED input to ECU OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty ECU - O.S pressure change function.</td>
</tr>
<tr>
<td>Faulty overspeed indicator LED.</td>
</tr>
<tr>
<td>Faulty cab dashboard wiring harness - ground for LED.</td>
</tr>
<tr>
<td>Faulty cab dashboard wiring harness - power to LED.</td>
</tr>
<tr>
<td>Faulty CTIS cable power to LED.</td>
</tr>
<tr>
<td>Faulty ECU - O.S. warning indicator function.</td>
</tr>
</tbody>
</table>

6. Was the overspeed light the function that failed during road test?

   NO

   YES

   Replace CTIS ECU (para 12-6).

   TEST OPTIONS
   Visual inspection
   REASON FOR QUESTION
   If overspeed warning light failed, warning lamp or warning lamp circuit may be faulty.
(1) If overspeed warning light failed on road test while overspeed pressure change occurred;
   (a) Warning lamp may be faulty.
   (b) Wiring from ECU to lamp or lamp to ground may be faulty.
   (c) ECU may be faulty.

(2) If overspeed warning light flashed on road test while overspeed pressure change did not occur, ECU has received a good speed signal but has not translated the signal into an overspeed inflation, replace CTIS ECU (para 12-6).
m6. CTIS OVERSPEED WARNING LIGHT DOES NOT ILLUMINATE AND/OR OVERSPEED PRESSURE CHANGE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
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<tbody>
<tr>
<td>Circuit breaker OK.</td>
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<tr>
<td>Power supplied to CTIS.</td>
</tr>
<tr>
<td>Speedometer OK.</td>
</tr>
<tr>
<td>Indicator display lights OK.</td>
</tr>
<tr>
<td>CTIS cable-speed signal OK.</td>
</tr>
<tr>
<td>Cab dashboard wiring harness - speed signal OK.</td>
</tr>
<tr>
<td>Cab dashboard wiring harness - LED input to CTIS cable OK.</td>
</tr>
<tr>
<td>CTIS cable - LED input to ECU OK.</td>
</tr>
<tr>
<td>ECU - O.S. pressure change function OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
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<tbody>
<tr>
<td>Faulty overspeed indicator LED.</td>
</tr>
<tr>
<td>Faulty cab dashboard wiring harness - ground for LED.</td>
</tr>
<tr>
<td>Faulty cab dashboard wiring harness - power to LED.</td>
</tr>
<tr>
<td>Faulty CTIS cable power to LED.</td>
</tr>
<tr>
<td>Faulty ECU - O.S. warning indicator function.</td>
</tr>
</tbody>
</table>

7. Is continuity verified on indicator display lights socket 9 to socket 17?

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

REASON FOR QUESTION
CTIS overspeed indicator will not work if continuity is not present from indicator display lights socket 9 to socket 17.

Replace lighted indicator display (para 7-16).
CONTINUITY TEST

(1) Remove four screws from lighted indicator display.
(2) Remove lighted indicator display from instrument panel assembly.
(3) Disconnect connector PX7 from lighted indicator display.
(4) Set multimeter to ohms.
(5) Connect positive (+) probe of multimeter to lighted indicator display terminal 17.
(6) Connect negative (-) probe of multimeter to lighted indicator terminal 9 and note reading on multimeter.
(7) If continuity is not present, replace lighted indicator display (para 7-16).
m6. CTIS OVERSPEED WARNING LIGHT DOES NOT ILLUMINATE AND/OR OVERSPEED PRESSURE CHANGE (CONT)

**KNOWN INFO**
- Circuit breaker OK.
- Power supplied to CTIS.
- Speedometer OK.
- Indicator display lights OK.
- CTIS cable-speed signal OK.
- Cab dashboard wiring harness - speed signal OK.
- Cab dashboard wiring harness - LED input to CTIS cable OK.
- CTIS cable - LED input to ECU OK.
- ECU - O.S. pressure change function OK.
- Overspeed indicator LED OK.

**POSSIBLE PROBLEMS**
- Faulty cab dashboard wiring harness - ground for LED.
- Faulty cab dashboard wiring harness - power to LED.
- Faulty CTIS cable power to LED.
- Faulty ECU - O.S. warning indicator function.

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

**REASON FOR QUESTION**
- CTIS overspeed indicator requires continuity from PX7-17 to ground.

Is continuity present from PX7-17 to ground?

- **NO**
- **YES**

- Repair wire 3130 (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 PX7-17.
(3) Connect negative (-) probe of multimeter to ground and note reading on multimeter.
(4) If continuity is not present, repair wire 3130 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
m6. CTIS OVERSPEED WARNING LIGHT DOES NOT ILLUMINATE AND/OR OVERSPEED PRESSURE CHANGE (CONT)

<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>CTIS overspeed indicator</td>
</tr>
<tr>
<td>Power supplied to CTIS.</td>
<td>STE/ICE-R Test #91</td>
<td>requires continuity from</td>
</tr>
<tr>
<td>Speedometer OK.</td>
<td></td>
<td>J111D to PX7-9.</td>
</tr>
<tr>
<td>Indicator display lights OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTIS cable-speed signal OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cab dashboard wiring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>harness - speed signal OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cab dashboard wiring</td>
<td></td>
<td></td>
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<tr>
<td>harness - LED input to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTIS cable OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTIS cable - LED input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>to ECU OK.</td>
<td></td>
<td></td>
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<tr>
<td>ECU - O.S. pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>change function OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overspeed indicator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cab dashboard wiring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>harness - ground for</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED OK.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty cab dashboard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>wiring harness - power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>to LED.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty CTIS cable power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>to LED.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty ECU - O.S. warning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>indicator function.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Is continuity present from J111D to PX7-9?

- **NO**

- **YES**
  - Repair wire 1528 (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 PX7-9.
3. Connect negative (-) probe of multimeter to connector J111D and note reading on multimeter.
4. If continuity is not present, repair wire 1528 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
5. Connect lighted indicator display to connector PX7.
6. Position lighted indicator display in instrument panel assembly with four screws.
7. Tighten four screws to 6-10 lb-in. (1 N·m).
m6. CTIS OVERSPEED WARNING LIGHT DOES NOT ILLUMINATE AND/OR OVERSPEED PRESSURE CHANGE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breaker OK.</td>
<td>Continuity Test or STE/ICE-R Test #91</td>
</tr>
<tr>
<td>Power supplied to CTIS.</td>
<td>CTIS overspeed indicator requires continuity from P111D to P110E.</td>
</tr>
<tr>
<td>Speedometer OK.</td>
<td></td>
</tr>
<tr>
<td>Indicator display lights OK.</td>
<td></td>
</tr>
<tr>
<td>CTIS cable-speed signal OK.</td>
<td></td>
</tr>
<tr>
<td>Cab dashboard wiring harness - speed signal OK.</td>
<td></td>
</tr>
<tr>
<td>Cab dashboard wiring harness - LED input to CTIS cable OK.</td>
<td></td>
</tr>
<tr>
<td>CTIS cable - LED input to ECU OK.</td>
<td></td>
</tr>
<tr>
<td>ECU - O.S. pressure change function OK.</td>
<td></td>
</tr>
<tr>
<td>Overspeed indicator LED OK.</td>
<td></td>
</tr>
<tr>
<td>Cab dashboard wiring harness - ground for LED OK.</td>
<td></td>
</tr>
<tr>
<td>Cab dashboard wiring harness - power to LED 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 CTIS cable power to LED.</td>
<td></td>
</tr>
<tr>
<td>Faulty ECU - O.S. warning indicator function.</td>
<td></td>
</tr>
</tbody>
</table>

10. Is continuity present from P111D to P110E?

- **NO**
  - Replace CTIS ECU (para 12-6).

- **YES**
  - Repair wire 1528 (para 2-45) or replace CTIS cable assembly (para 7-60).
### CONTINUITY TEST

1. Disconnect connector P110 from CTIS ECU.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter to connector P111D.
4. Connect negative (-) probe of multimeter to connector P110E and note reading on multimeter.
5. If continuity is not present, repair wire 1528 (para 2-45) or replace CTIS cable assembly (para 7-60).
6. If continuity is present, replace CTIS ECU (para 12-6).
7. Connect connector P110 to CTIS ECU.
8. Connect connector P111 to connector J111.
9. Install kick panel (para 16-3).
2-25. AXLE TROUBLESHOOTING

This paragraph covers Axle Troubleshooting. The Axle Fault Index, Table 2-53, lists faults for the axles of the vehicle.

Table 2-53. Axle Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>n1</td>
<td>Axle Differential(s) Noisy</td>
<td>2-2144</td>
</tr>
</tbody>
</table>
**n1. AXLE DIFFERENTIAL(S) NOISY**

**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**

Nothing

**POSSIBLE PROBLEMS**

- Leaking planetary wheel ends and/or wheel bearings.
- Leaking axle differential and/or pinion drive yoke.
- Damaged axle differential.
- Low or contaminated oil in differential.
- Faulty pinion drive yoke.

---

**TEST OPTIONS**

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

   Are planetary wheel ends, and wheel bearings free from leaks?

   - **NO**
     Replace seal (para 10-2).

   - **YES**
     Notify DS Maintenance.

---

**KNOWN INFO**

No visible leaks of planetary wheel ends or wheel bearings.

**POSSIBLE PROBLEMS**

- Leaking axle differential and/or pinion drive yoke.
- Damaged axle differential.
- Low or contaminated oil in differential.
- Faulty pinion drive yoke.

---

**TEST OPTIONS**

2. Visual inspection

   Are axle differentials and pinion drive yoke free from leaks?

   - **NO**
     Notify DS Maintenance.

   - **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.

(1) Check planetary wheel ends for leaks (para 10-2).
(2) Check wheel bearings for leaks (para 10-2).
(3) If leaks are found replace seal(s) (para 10-2).

(1) Check differential and pinion drive yoke seal for leaks.
(2) If leaks are found, notify unit maintenance.
n1. AXLE DIFFERENTIAL(S) NOISY (CONT)

**KNOWN INFO**
No visible leaks of planetary wheel ends or wheel bearings. No visible leaks of axle differential or pinion drive yoke.

**POSSIBLE PROBLEMS**
Damaged axle differential. Low or contaminated oil in axle differential. Faulty pinion drive yoke.

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
Axle differential(s) may be unusually noisy when operating if damaged.

3. Are the axle differentials free from damage?

- **Yes**: Notify DS Maintenance.
- **No**: 
  
4. Is the axle differential oil at proper level and free of contamination?

- **Yes**: 
  
- **No**: Add/change oil (Appendix H).

**KNOWN INFO**
No visible leaks of planetary wheel ends or wheel bearings. No visible leaks of axle differential or pinion drive yoke. Axle differential(s) free from damage.

**POSSIBLE PROBLEMS**
Low or contaminated oil in axle differential. Faulty pinion drive yoke.
(1) Check input and output shafts for leaks and damage.
(2) Check axle differential for loose, missing, or damaged hardware.
(3) If axle differential is damaged, Notify DS Maintenance.
(4) Check drive shaft and bearing caps for looseness.
(5) If drive shaft is loose, perform Drive Shaft Troubleshooting (para 2-18).

(1) Check oil level according to (Appendix H).
(2) Remove axle differential fill plug.
(3) Insert finger into axle differential to check oil level.
(4) Remove axle differential drain plug.
(5) Allow differential oil to drain into pan.
(6) Check oil for contamination. If metal chips are present, notify DS Maintenance.
(7) Install axle differential drain plug.
(8) Fill axle differential with oil (Appendix H).
(9) Install axle differential fill plug.
n1. AXLE DIFFERENTIAL(S) NOISY (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>No visible leaks of planetary wheel ends or wheel bearings.</td>
</tr>
<tr>
<td>No visible leaks of axle differential or pinion drive yoke.</td>
</tr>
<tr>
<td>Axle differential(s) free from damage.</td>
</tr>
<tr>
<td>Axle differential oil OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty pinion drive yoke.</td>
</tr>
</tbody>
</table>

5. Is pinion drive yoke secure and free from 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 loose or damaged pinion drive yoke may cause axle differential(s) to be unusually noisy when operating.</td>
</tr>
</tbody>
</table>

- **NO**
  - Notify DS Maintenance.

- **YES**
  - Notify DS Maintenance.
(1) Check pinion drive yoke for looseness by attempting to rotate pinion drive yoke in both directions and listening for unusual backlash noise.
(2) If pinion drive yoke is damaged, notify DS Maintenance.
(3) If pinion drive yoke is not damaged, notify DS Maintenance.
This paragraph covers Steering Troubleshooting. The Steering Fault Index, Table 2-54, lists faults for the Steering of the vehicle.

### Table 2-54. Steering Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>p1</td>
<td>Hard to Steer</td>
<td>2-2152</td>
</tr>
<tr>
<td>p2</td>
<td>Wanders, Pulls to One Side, or Shimmies</td>
<td>2-2158</td>
</tr>
<tr>
<td>p3</td>
<td>Excessive Play When Turning Steering Wheel</td>
<td>2-2164</td>
</tr>
<tr>
<td>p4</td>
<td>No Response When Turning Steering Wheel</td>
<td>2-2168</td>
</tr>
</tbody>
</table>
INITIAL SETUP

Equipment Conditions
Engine running (TM 9-2320-366-10-1).

Personnel Required
(2)

Equipment Conditions
Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

Personnel Required
Materials/Parts
Locknut (Item 68, Appendix G)

1. HARD TO STEER

START

WARNING
Read WARNING on following page.

Are reservoir components and steering pump hoses and fittings free from leaks, kinks and damage?

YES

Tighten hardware if loose.
Notify DS maintenance of damaged air compressor.

NO

Tires OK.
Steering oil level OK.

POSSIBLE PROBLEMS
Damaged power steering pump hoses or fittings.
Faulty air compressor.
Faulty power steering pump.
Faulty steering gear assembly.
Faulty steering shaft and tie rod.
Faulty pitman arm and drag link.

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
Vehicle may steer hard if oil lines are leaking, kinked, or damaged.

Replace damaged oil hose(s) and fitting(s) (para 13-7).

YES

NO

Are reservior components and steering pump hoses and fittings free from leaks, kinks and damage?

YES

NO

Is air compressor secure, free from damage and noisy operation?

POSSIBLE PROBLEMS
Faulty air compressor.
Faulty power steering pump.
Faulty steering gear assembly.
Faulty steering shaft and tie rod.
Faulty pitman arm and drag link.

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
Vehicle may steer hard if air compressor is not secure and is damaged or noisy or does not rotate.

NO

Tighten hardware if loose.
Notify DS maintenance of damaged air compressor.

YES

NO

Tires OK.
Steering level oil OK.

POSSIBLE PROBLEMS
Damaged power steering pump hoses or fittings.
Faulty air compressor.
Faulty power steering pump.
Faulty steering gear assembly.
Faulty steering shaft and tie rod.
Faulty pitman arm and drag link.

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
Vehicle may steer hard if oil lines are leaking, kinked, or damaged.

Replace damaged oil hose(s) and fitting(s) (para 13-7).
WARNING

- Engine compartment and its components may be hot to the touch. Extreme care should be taken when checking for leaks in the engine compartment. Failure to comply may result in burns or injury to personnel.

- Engine compartment includes a partially covered fan blade. Extreme care should be taken when working in the engine compartment. Failure to comply may cause injury to personnel.

NOTE

Refer to steering hydraulic hose schematic for steering hose locations.

Check reservoir components and steering hoses and fittings for leakage, kinks and damage.

Check air compressor for loose or missing mounting hardware, damage and noisy operation and rotation.
p1. HARD TO STEER (CONT)

**KNOWN INFO**
- Tires OK.
- Steering oil level OK.
- Power steering pump oil hoses and fittings OK.
- Air compressor OK.
- Power steering pump OK.
- Steering gear assembly OK.

**POSSIBLE PROBLEMS**
- Faulty steering shaft and tie rod.
- Faulty pitman arm and drag link.

3. Is steering shaft and tie rod properly lubricated, secure, and free from damage?

   **TEST OPTIONS**
   - Visual inspection
   - Steering Shaft/Tie Rod Test
   - Reason for Question: Vehicle may steer hard if steering shaft or tie rod is loose, damaged, or requires lubrication.

   **YES**

   **NO**

   Lubricate tie rods (Appendix H).
   Replace damaged tie rods (para 13-4).
   Notify DS maintenance of damaged steering shaft.

4. Is pitman arm and drag link secure, and free from damage?

   **TEST OPTIONS**
   - Visual inspection
   - Pitman Arm/Drag Link Test
   - Reason for Question: Vehicle may steer hard if pitman arm or drag link is loose or damaged.

   **YES**

   **NO**

   Tighten loose drag link.
   Replace drag link (para 13-3).
   Notify DS maintenance of loose or damaged pitman arm.

   **YES**
Check steering shaft and tie rod for damage, and loose or missing mounting hardware. Refer to Appendix H to lubricate tie rods.

**STEERING SHAFT/TIE ROD TEST**

1. Grasp steering shaft to ensure there is no up and down play.
2. Grasp tie rod to ensure there is no up and down or left and right play.

---

Check pitman arm and drag link for damage, and loose or missing mounting hardware.

**PITMAN ARM/DRAG LINK TEST**

1. Check nut securing pitman arm to steering gear assembly. Ensure there is no play.
2. Grasp drag link and ensure there is no play left and right or up and down.
3. Check for loose bolts, nuts, and clamps on drag link.
**HARD TO STEER (CONT)**

**5.** Is power steering pump free from leaks or damage and is required mounting hardware secure and free from damage?

- **NO**
  - Tighten power steering pump and hoses. Notify DS maintenance of damaged power steering pump.

- **YES**
  - Notify DS Maintenance.

**6.** Does steering gear assembly output shaft turn freely by hand?

- **NO**
  - Notify DS Maintenance.

- **YES**
  - Notify DS Maintenance.
An alignment mark shall be marked on yoke and steering gear assembly to ensure ease during installation.

**NOTE**


<table>
<thead>
<tr>
<th>STEERING GEAR TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2) Remove yoke from top steering gear assembly shaft.</td>
</tr>
<tr>
<td>(3) Remove drag link (para 13-3).</td>
</tr>
<tr>
<td>(4) Turn top steering gear assembly shaft to check for binding and proper output. Notify DS maintenance if steering gear assembly fails to turn smoothly or if it binds when top shaft is turned.</td>
</tr>
<tr>
<td>(5) Install drag link (para 13-3).</td>
</tr>
<tr>
<td>(6) Position yoke onto top steering gear assembly shaft.</td>
</tr>
<tr>
<td>(7) Install belt and self-locking nut into yoke to secure yoke to top steering gear assembly shaft.</td>
</tr>
</tbody>
</table>
1. Is steering shaft and tie rod properly lubricated, secure, and free from damage?

YES

Lubricate tie rods (Appendix H). Replace loose or damaged tie rods (para 13-4). Notify DS maintenance of damaged steering shaft or U-joint.

NO

 Возможно проблемы:

- Неправильное состояние рулевого управление.
- Неправильное состояние рычага.
- Неправильное состояния тормозов.
- Неправильное состояние карданных шарниров, шарниров или карданных втулок.

Измерения:

- Визуальный осмотр.
- Мануальный контроль.
(1) Raise cab (TM 9-2320-366-10-1).
(2) Check steering shaft and tie rods for damage, and loose or missing mounting hardware. Refer to Appendix H to lubricate tie rods.
(3) Grasp the steering gear shaft and ensure there is no up and down play.
(4) Grasp the tie rod and ensure there is no up and down or sideways play.
2. **Is pitman arm and drag link properly secure and free from damage?**

   - **YES**
   - **NO**

   **Possible Problems**
   - Faulty pitman arm and drag link.
   - Faulty steering gear assembly.
   - Brakes out of adjustment.

   **Reason for Question**
   - A pitman arm or drag link that is loose, damaged, may cause vehicle to wander, pull to one side, or shimmy.

   **Test Options**
   - Visual inspection
   - Manual check

   **Test Options**
   - Visual inspection
   - Manual check

   **Test Options**
   - Visual inspection
   - Manual check

   **Known Info**
   - Lugnuts OK.
   - Tires OK.
   - Steering shaft and tie rod OK.
   - U-joints, splines and yokes OK.
   - Pitman arm and drag link OK.

   **Possible Problems**
   - Faulty steering gear assembly.
   - Brakes out of adjustment.

3. **Is steering gear assembly free from damage, and mounted securely?**

   - **YES**
   - **NO**

   **Known Info**
   - Lugnuts OK.
   - Tires OK.
   - Steering shaft and tie rod OK.
   - U-joints, splines and yokes OK.
   - Pitman arm and drag link OK.

   **Possible Problems**
   - Faulty steering gear assembly.
   - Brakes out of adjustment.

   **Reason for Question**
   - Damaged steering gear assembly or mounting hardware may cause vehicle to wander, pull to one side, or shimmy.

   **Test Options**
   - Visual inspection
   - Manual check

   **Test Options**
   - Visual inspection
   - Manual check

   **Test Options**
   - Visual inspection
   - Manual check

   **Known Info**
   - Lugnuts OK.
   - Tires OK.
   - Steering shaft and tie rod OK.
   - U-joints, splines and yokes OK.
   - Pitman arm and drag link OK.

   **Known Info**
   - Lugnuts OK.
   - Tires OK.
   - Steering shaft and tie rod OK.
   - U-joints, splines and yokes OK.
   - Pitman arm and drag link OK.

   **Test Options**
   - Visual inspection
   - Manual check

   **Test Options**
   - Visual inspection
   - Manual check

   **Test Options**
   - Visual inspection
   - Manual check

   **Test Options**
   - Visual inspection
   - Manual check

   **Known Info**
   - Lugnuts OK.
   - Tires OK.
   - Steering shaft and tie rod OK.
   - U-joints, splines and yokes OK.
   - Pitman arm and drag link OK.

   **Known Info**
   - Lugnuts OK.
   - Tires OK.
   - Steering shaft and tie rod OK.
   - U-joints, splines and yokes OK.
   - Pitman arm and drag link OK.

   **Test Options**
   - Visual inspection
   - Manual check

   **Test Options**
   - Visual inspection
   - Manual check

   **Test Options**
   - Visual inspection
   - Manual check

   **Test Options**
   - Visual inspection
   - Manual check
(1) Check pitman arm and drag link for damage, and loose or missing mounting hardware.
(2) Grasp pitman arm and ensure it and drag link are free of play.

(1) Check steering gear assembly for damage, and loose or missing mounting hardware.
(2) Lower cab (TM 9-2320-366-10-1).
p2. WANDERS, PULLS TO ONE SIDE, OR SHIMMIES (CONT)

KNOWLEDGE OF THE FUNCTION

- Lugnuts OK.
- Tires OK.
- Steering shaft and tie rod OK.
- U-joints, splines and yoke OK.
- Pitman arm and drag link OK.
- Steering gear assembly OK.

POSSIBLE PROBLEMS

- Brakes out of adjustment.

TEST OPTIONS

Refer to brake adjustment procedure (para 11-2 or 11-3).

REASON FOR QUESTION

- Vehicle may wander, pull to one side, or shimmy if brakes are not properly adjusted.

Fault not corrected. Perform Suspension System Troubleshooting (r1. Wanders, Pulls To One Side, Or Shimmies).

Are brakes properly adjusted?

NO

Adjust brakes (para 11-2 or 11-3).

YES

Refer to brake adjustment procedure (para 11-2 or 11-3).
Refer to para 11-2 or 11-3 to adjust brakes.
### EXCESSIVE PLAY WHEN TURNING STEERING WHEEL

#### 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>Cab raised (TM 9-2320-366-10-1).</td>
<td></td>
</tr>
<tr>
<td>Personnel Required</td>
<td>Materials/Parts</td>
</tr>
<tr>
<td>(2)</td>
<td>Locknut (Item 68, Appendix G)</td>
</tr>
</tbody>
</table>

#### KNOWN INFO

<table>
<thead>
<tr>
<th>Known Info</th>
<th>Possible Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering oil level OK.</td>
<td>Faulty steering shaft U-joints and tie rod.</td>
</tr>
<tr>
<td>Steering lines OK.</td>
<td>Faulty pitman arm and drag link.</td>
</tr>
<tr>
<td>Steering shaft and tie rod OK.</td>
<td>Faulty steering gear assembly.</td>
</tr>
</tbody>
</table>

#### TEST OPTIONS

<table>
<thead>
<tr>
<th>Reason for Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
</tr>
<tr>
<td>Steering Gear Shaft</td>
</tr>
<tr>
<td>Tie Rod Test</td>
</tr>
</tbody>
</table>

**REASON FOR QUESTION**

A steering shaft U-joint, steering gear assembly shaft or tie rod that is loose, damaged, or requires lubrication may cause vehicle to have excessive play when turning steering wheel.

#### START

1. **Is steering shaft U-joint, steering gear assembly shaft and tie rod properly lubricated, secure, and free from damage?**

   - **YES**
     - Lubricate tie rods (Appendix H).
     - Replace damaged tie rod (para 13-4).
     - Notify DS maintenance of damaged steering shaft.
   
   - **NO**

2. **Is pitman arm and drag link secure and free from damage?**

   - **YES**
     - Tighten loose drag link.
     - Replace drag link (para 13-3).
     - Notify DS maintenance of loose or damaged pitman arm.
   
   - **NO**
Check steering shaft U-joint, steering gear assembly shafts, and tie rod for damage and loose or missing mounting hardware. Refer to Appendix H to lubricate tie rods.

NOTE
An alignment mark shall be used on yoke and steering gear assembly to ensure ease during installation.

<table>
<thead>
<tr>
<th>STEERING GEAR SHAFT TIE ROD TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Grasp steering shaft and ensure there is no up and down play.</td>
</tr>
<tr>
<td>(2) Remove self-locking nut and bolt securing yoke of top steering shaft to steering gear assembly shaft. Discard self-locking nut.</td>
</tr>
<tr>
<td>(3) Remove yoke from top steering gear assembly shaft.</td>
</tr>
<tr>
<td>(4) Ensure spline shaft of steering gear assembly and yoke of steering shaft are not damaged.</td>
</tr>
<tr>
<td>(5) Grasp tie rod and ensure there is no up and down or left or right play.</td>
</tr>
</tbody>
</table>

Check pitman arm and drag link for damage and loose or missing mounting hardware.

<table>
<thead>
<tr>
<th>PITMAN ARM/DRAG LINK TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Check nut securing pitman arm to steering gear assembly. Ensure there is no play.</td>
</tr>
<tr>
<td>(2) Grasp drag link and ensure there is no play left or right and up or down.</td>
</tr>
<tr>
<td>(3) Check for loose bolts, nuts, and clamps on drag link.</td>
</tr>
</tbody>
</table>
3. Does pitman arm move immediately when turning steering wheel?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering oil level OK.</td>
<td>Steering Gear Preload Test</td>
</tr>
<tr>
<td>Steering lines OK.</td>
<td>Reason for Question</td>
</tr>
<tr>
<td>Steering linkage OK.</td>
<td>If steering gear input shaft turns</td>
</tr>
<tr>
<td>POSSIBLE PROBLEMS</td>
<td>before pitman arm begins to move,</td>
</tr>
<tr>
<td>Faulty steering gear assembly.</td>
<td>steering gear assembly has</td>
</tr>
<tr>
<td></td>
<td>excessive play.</td>
</tr>
</tbody>
</table>

- **NO**
  - Notify DS Maintenance.

- **YES**
  - Notify DS Maintenance.
STEERING GEAR PRELOAD TEST

1. Remove drag link (para 13-3).
2. Pull pitman arm back and forth to check for binding and proper output. If pitman arm fails to turn smoothly or if it binds and top shaft does not turn immediately, steering gear assembly is damaged.
3. Install drag link (para 13-3).
4. Position yoke onto top steering gear assembly shaft.
5. Install bolt and self-locking nut onto yoke to secure yoke to top steering gear assembly shaft.
**INITIAL SETUP**

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

Tools and Special Tools
- Tool Kit, Genl Mech (Item 46, Appendix C)

Materials/Parts
- Locknut (Item 68, Appendix G)

**p4. NO RESPONSE WHEN TURNING STEERING WHEEL**

**TEST OPTIONS**
- Visual inspection
- Manual check

**REASON FOR QUESTION**
- A steering shaft, U-joint, splines or yoke that is loose or damaged may cause no response when turning steering wheel.

**KNOWN INFO**
- Nothing

**POSSIBLE PROBLEMS**
- Faulty steering shaft, U-joints and tie rod.
- Faulty pitman arm and drag link.
- Faulty steering gear assembly.
- Faulty U-joints, splines and yoke.

**TEST OPTIONS**
- Visual inspection
- Manual check

**REASON FOR QUESTION**
- A pitman arm or drag link which is loose or damaged may cause no response when turning steering wheel.

**KNOWN INFO**
- U-joints, splines and yoke OK.

**POSSIBLE PROBLEMS**
- Faulty pitman arm and drag link.
- Faulty steering gear assembly.

**TEST OPTIONS**
- Visual inspection
- Manual check

**REASON FOR QUESTION**
- Tighten loose drag link. Replace drag link (para 13-3). Notify DS maintenance of loose or damaged pitman arm.

**TEST OPTIONS**
- Visual inspection
- Manual check

**REASON FOR QUESTION**
- Notify DS Maintenance.
(1) Check pitman arm and drag link for damage and loose or missing mounting hardware.
(2) Grasp pitman arm and ensure it and drag link are free of play.
(3) Repeat step (2) while observing yoke, U-joint and locknuts.

(1) Check steering shaft for looseness and damage.
(2) Grasp steering shaft and ensure it is free of play.
(3) Repeat step (2) while observing yoke, U-joint and locknuts.
p4. NO RESPONSE WHEN TURNING STEERING WHEEL (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering oil level OK.</td>
<td>Visual inspection</td>
<td>A faulty steering gear assembly may cause no response when turning steering wheel.</td>
</tr>
<tr>
<td>Steering shaft OK.</td>
<td>Manual check</td>
<td></td>
</tr>
<tr>
<td>Pitman arm and drag link OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U-joints, splines and yokes OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POSSIBLE PROBLEMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty steering gear assembly.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Does steering gear assembly output shaft turn freely?

YES

Notify DS Maintenance.

NO

Notify DS Maintenance.
NOTE
An alignment mark shall be made on yoke and steering gear assembly shaft prior to disassembly to ensure proper alignment during installation.

<table>
<thead>
<tr>
<th>STEERING GEAR TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove bolt and locknut from lower yoke of steering gear arm. Discard locknut.</td>
</tr>
<tr>
<td>(2) Remove yoke from top steering gear assembly shaft.</td>
</tr>
<tr>
<td>(3) Remove drag link (para 13-3).</td>
</tr>
<tr>
<td>(4) Turn pitman arm to check for binding and proper output. Notify DS Maintenance if steering gear assembly fails to turn smoothly or if it binds when top shaft is turned.</td>
</tr>
<tr>
<td>(5) Install drag link (para 13-3).</td>
</tr>
<tr>
<td>(6) Position yoke on steering gear assembly.</td>
</tr>
<tr>
<td>(7) Install bolt and locknut into yoke to top steering gear assembly shaft.</td>
</tr>
<tr>
<td>(8) Lower cab (TM 9-2320-366-10-1).</td>
</tr>
</tbody>
</table>
This paragraph covers Fifth Wheel Troubleshooting. The Fifth Wheel Fault Index, Table 2-55, lists faults for the Fifth Wheel of the vehicle.

Table 2-55. Fifth Wheel Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>q1.</td>
<td>Fifth Wheel Does Not Lock When Coupling Trailer to Tractor</td>
<td>2-2174</td>
</tr>
<tr>
<td>q2.</td>
<td>Excessive Movement of Trailer King Pin in Fifth Wheel</td>
<td>2-2178</td>
</tr>
<tr>
<td>q3.</td>
<td>Fifth Wheel Does Not Unlock When Disconnecting Trailer From Tractor</td>
<td>2-2182</td>
</tr>
<tr>
<td>q4.</td>
<td>Fifth Wheel Sliding Mechanism Does Not Operate</td>
<td>2-2186</td>
</tr>
</tbody>
</table>
1. Is fifth wheel properly lubricated?
   - If NO, lubricate fifth wheel (Appendix H).
   - If YES, proceed to the next step.

2. Is fifth wheel properly adjusted?
   - If NO, adjust fifth wheel (para 14-11).
   - If YES, complete the test.

**Known Info:**
- Primary and secondary release handles in lock position.
- Fifth wheel lubrication: OK or required.
- Fifth wheel adjustment.
- Loose, broken, or missing king pin jaws.

**Possible Problems:**
- Fifth wheel lubrication.
- Fifth wheel adjustment.
- Loose, broken, or missing king pin jaws.

**Test Options:**
- **Visual Inspection**
  - Reason for question:
    - Fifth wheel may not lock if it requires lubrication.
  - Test:
    - Lubricate fifth wheel (Appendix H).
    - Adjust fifth wheel (para 14-11).

**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)
  - Gun, Lubricating (Item 16, Appendix C)

**Reason for Question:**
- Fifth wheel may not lock when coupling trailer to tractor.
Refer to Appendix H to lubricate fifth wheel.

Refer to para 14-11 to check for proper fifth wheel adjustment.
q1. FIFTH WHEEL WILL NOT LOCK WHEN COUPLING TRAILER TO TRACTOR (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fifth wheel lubrication OK.</td>
<td>Loose, broken, or missing king pin jaws.</td>
</tr>
<tr>
<td>Primary and secondary release handles in lock position.</td>
<td></td>
</tr>
<tr>
<td>Fifth wheel is properly adjusted.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection</td>
<td>Fifth wheel may not lock if king pin jaws are loose, broken, or missing.</td>
</tr>
</tbody>
</table>

3. Are king pin jaws secure and free from damage or missing parts?

- **NO** Notify DS Maintenance.
- **YES** Perform Fifth Wheel Troubleshooting (q2. Excessive Movement of Trailer King Pin in Fifth Wheel.)
Check for loose, damaged, or missing king pin jaws. Check that king pin jaws stay open when primary lock release handle is in locked position (TM 9-2320-366-10-1).
INITIAL SETUP


Tools and Special Tools: Tool Kit, Genl Mech (Item 46, Appendix C)

q2. EXCESSIVE MOVEMENT OF TRAILER KING PIN IN FIFTH WHEEL

START

1. Is fifth wheel mounting hardware secure and free from damage?
   - Known Info
     - Nothing
   - Possible Problems
     - Fifth wheel mounting hardware loose, missing, or broken.
     - Fifth wheel adjustment.
     - Loose, broken, or missing king pin jaws.
     - Loose or broken spring cushions or bushings.

   - Test Options
     - Visual inspection

   - Reason for Question
     - There may be excessive movement of trailer king pin in fifth wheel if mounting hardware is loose, missing, or broken.

   - NO
     - Notify DS Maintenance.

   - YES

2. Are fifth wheel spring cushions and bushings secure and free of cracks and breaks?
   - Known Info
     - Fifth wheel mounting hardware OK.
   - Possible Problems
     - Loose or broken spring cushions or bushings.
     - Fifth wheel adjustment.
     - Loose, broken or missing king pin jaws.

   - Test Options
     - Visual inspection

   - Reason for Question
     - There will be excessive movement of trailer king pin in fifth wheel if spring cushions and bushings are damaged.

   - NO
     - Notify DS Maintenance.

   - YES
Check fifth wheel for loose, missing or broken mounting hardware.

Check spring cushions and bushings in fifth wheel for looseness, cracks or breaks.
q2. EXCESSIVE MOVEMENT OF TRAILER KING PIN IN FIFTH WHEEL (CONT)

3. Is fifth wheel properly adjusted?
   - **NO**
     - Adjust fifth wheel (para 14-11).
   - **YES**

4. Are king pin jaws secure and free from damage or missing parts?
   - **NO**
     - Notify DS Maintenance.
   - **YES**

**KNOWN INFO**
- Fifth wheel mounting hardware OK.
- Fifth wheel spring cushions and bushings OK.

**POSSIBLE PROBLEMS**
- Fifth wheel adjustment.
- Loose, broken, or missing king pin jaws.

**TEST OPTIONS**
- Refer to fifth wheel adjustment procedure (para 14-11).

**REASON FOR QUESTION**
- There will be excessive movement of trailer king pin in fifth wheel if improperly adjusted.

**KNOWN INFO**
- Fifth wheel mounting hardware OK.
- Fifth wheel spring cushions and bushings OK.
- Fifth wheel is properly adjusted.

**POSSIBLE PROBLEMS**
- Loose, broken, or missing king pin jaws.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- Fifth wheel may have excessive movement if king pin jaws are loose, broken, or missing.
Check for loose, damaged, or missing king pin jaws. Check that king pin jaws stay open when primary lock release handle is in locked position (TM 9-2320-366-10-1).

Refer to para 14-11 to check for proper fifth wheel adjustment.
q3. FIFTH WHEEL WILL NOT UNLOCK WHEN DISCONNECTING TRAILER FROM TRACTOR

**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)
Gun, Lubricating (Item 16, Appendix C)

---

**TEST OPTIONS**

1. Is fifth wheel properly adjusted?

   **TEST OPTIONS**
   Refer to fifth wheel adjustment procedure (para 14-11).

   **REASON FOR QUESTION**
   Fifth wheel may not unlock if it requires adjustment.

   **YES**
   Adjust fifth wheel (para 14-11).

   **NO**

2. Is fifth wheel properly lubricated?

   **TEST OPTIONS**
   Visual inspection

   **REASON FOR QUESTION**
   Fifth wheel may not unlock if it requires lubrication.

   **NO**
   Lubricate fifth wheel (Appendix H).

---

**KNOWN INFO**

Primary and secondary release handles in lock position.

**POSSIBLE PROBLEMS**

Fifth wheel adjustment.
Fifth wheel lubrication.
Loose or broken fifth wheel spring cushions or bushings.
Release handles broken or disconnected.

**KNOWN INFO**

Primary and secondary release handles in lock position.
Fifth wheel is properly adjusted.

**POSSIBLE PROBLEMS**

Fifth wheel lubrication.
Loose or broken fifth wheel spring cushions or bushings.
Release handles broken or disconnected.
Refer to para 14-11 to check for proper fifth wheel adjustment.

Refer to Appendix H to lubricate fifth wheel.
q3. FIFTH WHEEL WILL NOT UNLOCK WHEN DISCONNECTING TRAILER FROM TRACTOR (CONT)

**KNOWN INFO**
- Primary and secondary release handles in lock position.
- Fifth wheel is properly adjusted.
- Fifth wheel lubrication OK.

**POSSIBLE PROBLEMS**
- Loose or broken fifth wheel spring cushions or bushings.
- Release handles broken or disconnected.

---

3. Are fifth wheel spring cushions and bushings secure and free of cracks and breaks?

- **NO**
  - Notify DS Maintenance.
- **YES**

---

4. Do primary or secondary lock release handles operate freely?

- **NO**
  - Notify DS Maintenance (fifth wheel needs replacement).
- **YES**

---

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- Fifth wheel may not unlock if spring cushions and bushings are damaged.
Check spring cushions and bushings in fifth wheel for looseness, cracks, or breaks.

Attempt to perform trailer disconnect procedure (TM 9-2320-366-10-1).
INITIAL SETUP


Tools and Special Tools: Tool Kit, Genl Mech (Item 46, Appendix C)

1. Is fifth wheel sliding mechanism properly adjusted?

   KNOWN INFO
   - Primary and secondary release handles in lock position.

   POSSIBLE PROBLEMS
   - Fifth wheel sliding mechanism adjustment.

   TEST OPTIONS
   - Refer to fifth wheel sliding mechanism adjustment procedure (para 14-11).
   - Reason for question: Fifth wheel sliding mechanism will not operate unless adjusted properly.

   NO

   YES

   Adjust fifth wheel sliding mechanism (para 14-11).

   Notify DS Maintenance.
Refer to para 14-11 to check for proper fifth wheel sliding mechanism adjustment.
2-28. SUSPENSION SYSTEM TROUBLESHOOTING

This paragraph covers Suspension System Troubleshooting. The Suspension System Fault Index, Table 2-56, lists faults for the Suspension System of the vehicle.

Table 2-56. Suspension System Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>r1.</td>
<td>Wanders, Pulls to One Side, or Shimmies</td>
<td>2-2190</td>
</tr>
<tr>
<td>r2.</td>
<td>Leans to One Side or Rear of Vehicle Sags</td>
<td>2-2200</td>
</tr>
</tbody>
</table>
r1. WANDERS, PULLS TO ONE SIDE, OR SHIMMIES

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)
Iron, Tire (Item 20, Appendix C)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lugnuts OK.</td>
</tr>
<tr>
<td>Steering shaft and components OK.</td>
</tr>
<tr>
<td>Brake adjustment OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty or damaged front shock absorbers.</td>
</tr>
<tr>
<td>Faulty or damaged front leaf springs.</td>
</tr>
<tr>
<td>Faulty or damaged rear shock absorbers or shock absorber brackets.</td>
</tr>
<tr>
<td>Faulty or damaged spring bushings or spring shackles.</td>
</tr>
<tr>
<td>Faulty or damaged rear leaf springs.</td>
</tr>
<tr>
<td>Faulty or damaged control vehicular suspension arms.</td>
</tr>
<tr>
<td>Faulty or damaged resilient mounts.</td>
</tr>
<tr>
<td>Faulty or damaged v-rod control arms.</td>
</tr>
<tr>
<td>Faulty or damaged stabilizer bar.</td>
</tr>
</tbody>
</table>

**TEST OPTIONS**

- Visual inspection
- Shock Absorber Test

**REASON FOR QUESTION**
Vehicle may wander, pull to one side, or shimmy if shock absorbers and bracket(s) are loose or damaged.

**START**

1. Are front shock absorbers and bracket(s) secure and free from damage?

   **NO**

   Replace damaged shock absorber(s) or bracket(s) (para 15-3).

   **YES**

   Continue with the process.
NOTE

Perform Steering System Troubleshooting (p2, Wanders, Pulls To One Side, Or Shimmies) before starting the steps given below.

1. Check shock absorbers for damage or leaks, and for missing mounting hardware.
2. Check shock absorbers bushings for movement.
3. Check shock absorber brackets for damage and for missing mounting hardware.

<table>
<thead>
<tr>
<th>SHOCK ABSORBER TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Grasp shock absorber and ensure there is not excessive play.</td>
</tr>
<tr>
<td>2. Replace worn bushings.</td>
</tr>
</tbody>
</table>
r1. WANDERS, PULLS TO ONE SIDE, OR SHIMMIES (CONT)

### KNOWN INFO
- Lugnuts OK.
- Steering shaft and components OK.
- Brake adjustment OK.
- Front shock absorbers OK.

### POSSIBLE PROBLEMS
- Faulty or damaged front leaf springs.
- Faulty or damaged rear shock absorbers or shock absorber brackets.
- Faulty or damaged spring bushings or spring shackles.
- Faulty or damaged front leaf springs.
- Faulty or damaged control vehicular suspension arms.
- Faulty or damaged resilient mounts.
- Faulty or damaged v-rod control arms.
- Faulty or damaged stabilizer bar.

### TEST OPTIONS
- Visual inspection
- Spring Shackle/Bushing Test

### REASON FOR QUESTION
- Vehicle may wander, pull to one side, or shimmy if leaf springs are loose or damaged.

#### 2.
Are front leaf springs secure and free from damage?

- **Yes**
- **No**

  **NO**
  - Notify DS Maintenance.

  **YES**

#### 3.
Are spring shackles and spring bushings secure and free from damage?

- **No**
  - Lubricate spring bushings (Appendix H) or notify DS Maintenance.
- **Yes**
(1) Check leaf springs for cracked or broken leaves or missing spring clips and U-bolts.
(2) Check seats for looseness or damage.

Check spring shackles and spring bushings for damage and for missing mounting hardware. Refer to Appendix H for lubrication of spring bushings.

**SPRING SHACKLE/BUSHING TEST**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Position tire iron between spring assembly and frame.</td>
</tr>
<tr>
<td>2</td>
<td>Pry up and down and ensure there is no movement.</td>
</tr>
<tr>
<td>3</td>
<td>Shackles or bushings are damaged if movement occurs.</td>
</tr>
</tbody>
</table>
3. Are spring shackles and spring bushings secure and free from damage?

**Known Info**
- Lugnuts OK.
- Steering shaft and components OK.
- Brake adjustment OK.
- Front shock absorbers OK.
- Front leaf springs OK.

**Possible Problems**
- Faulty or damaged spring bushings or spring shackles.
- Faulty rear shock absorbers and shock absorber brackets.
- Faulty or damaged rear leaf springs.
- Faulty or damaged control vehicular suspension arms.
- Faulty or damaged resilient mounts.
- Faulty or damaged v-rod control arms.
- Faulty or damaged stabilizer bar.

**Test Options**
- Visual inspection
- Spring Shackle/Bushing Test

**Reason for Question**
- Vehicle may wander, pull to one side, or shimmy if spring shackles and spring bushings are loose or damaged.

**Flowchart**
- **NO**
  - Lubricate spring bushings (Appendix H) or notify DS Maintenance.
- **YES**
Check spring shackles and spring bushings for damage and for missing mounting hardware. Refer to Appendix H for lubrication of spring bushings.

**SPRING SHACKLE/BUSHING TEST**

1. Position tire iron between spring assembly and frame.
2. Pry up and down and ensure there is no movement.
3. Shackles or bushings are damaged if movement occurs.
4. Are rear shock absorbers and shock absorber brackets secure and free from damage?

**KNOWN INFO**
- Lugnuts OK.
- Steering shaft and components OK.
- Brake adjustment OK.
- Front shock absorbers OK.
- Front leaf springs OK.
- Spring bushings or spring shackles OK.

**POSSIBLE PROBLEMS**
- Faulty or damaged rear shock absorbers or shock absorber brackets.
- Faulty or damaged rear leaf springs.
- Faulty or damaged control vehicular suspension arms.
- Faulty or damaged resilient mounts.
- Faulty or damaged v-rod control arms.
- Faulty or damaged stabilizer bar.

**TEST OPTIONS**
- Visual inspection
- Shock Absorber Test

**REASON FOR QUESTION**
- Vehicle may wander, pull to one side, or shimmy if shock absorber and shock absorber brackets are loose or damaged.

If **NO**, replace damaged shock absorber(s) or brackets (para 15-4).

If **YES**, continue to next step.

5. Are leaf springs secure and free from damage?

**KNOWN INFO**
- Lugnuts OK.
- Steering shaft and components OK.
- Brake adjustment OK.
- Front shock absorbers OK.
- Front leaf springs OK.
- Rear shock absorbers and shock absorber brackets OK.
- Spring bushings and spring shackles OK.

**POSSIBLE PROBLEMS**
- Faulty or damaged rear leaf springs.
- Faulty or damaged control vehicular suspension arms.
- Faulty or damaged resilient mounts.
- Faulty or damaged v-rod control arms.
- Faulty or damaged stabilizer bar.

**TEST OPTIONS**
- Visual inspection

**REASON FOR QUESTION**
- Vehicle may wander, pull to one side, or shimmy if leaf springs are loose or damaged.

If **NO**, notify DS Maintenance.

If **YES**, continue to next step.
(1) Check shock absorbers for damage or leaks, and for missing mounting hardware.
(2) Check shock absorber brackets for damage and for missing mounting hardware.
(3) Check shock absorber bushings for movement.

**SHOCK ABSORBER TEST**

<table>
<thead>
<tr>
<th>1</th>
<th>Grasp shock absorber and ensure there is no excessive play.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Replace worn bushings.</td>
</tr>
</tbody>
</table>

Check rear leaf springs for damage and for missing mounting hardware.
r1. WANDERS, PULLS TO ONE SIDE, OR SHIMMIES (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lugnuts OK.</td>
</tr>
<tr>
<td>Steering shaft and components OK.</td>
</tr>
<tr>
<td>Brake adjustment OK.</td>
</tr>
<tr>
<td>Front shock absorbers OK.</td>
</tr>
<tr>
<td>Front leaf springs OK.</td>
</tr>
<tr>
<td>Rear shock absorbers and shock absorber brackets OK.</td>
</tr>
<tr>
<td>Spring bushings and spring shackles OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty or damaged rear leaf springs.</td>
</tr>
<tr>
<td>Faulty or damaged control vehicular suspension arms.</td>
</tr>
<tr>
<td>Faulty or damaged resilient mounts.</td>
</tr>
<tr>
<td>Faulty or damaged v-rod control arms.</td>
</tr>
<tr>
<td>Faulty or damaged stabilizer bar.</td>
</tr>
</tbody>
</table>

5. Are leaf springs secure and free from 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>Vehicle may wander, pull to one side, or shimmy if leaf springs are loose or damaged.</td>
</tr>
</tbody>
</table>

NO

YES

Notify DS Maintenance.
Check rear leaf springs for damage and for missing mounting hardware.
r2. LEANS TO ONE SIDE OR REAR OF VEHICLE SAGS

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)

---

1.

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nothing.</td>
<td>Visual inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty or damaged front shock absorbers.</td>
<td>Vehicle may lean to one side if shock absorbers are loose or damaged.</td>
</tr>
<tr>
<td>Faulty or damaged front leaf springs.</td>
<td></td>
</tr>
<tr>
<td>Faulty or damaged rear shock absorbers.</td>
<td></td>
</tr>
<tr>
<td>Faulty or damaged rear leaf springs.</td>
<td></td>
</tr>
<tr>
<td>Faulty or damaged control vehicular suspension arms.</td>
<td></td>
</tr>
</tbody>
</table>

Are front shock absorbers secure and free from damage?

NO

Replace damaged shock absorber(s) (para 15-3).

YES

2.

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front shock absorbers OK.</td>
<td>Visual inspection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty or damaged front leaf springs.</td>
<td>Vehicle may lean to one side if front leaf springs are loose or damaged.</td>
</tr>
<tr>
<td>Faulty or damaged rear shock absorbers.</td>
<td></td>
</tr>
<tr>
<td>Faulty or damaged rear leaf springs.</td>
<td></td>
</tr>
<tr>
<td>Faulty or damaged control vehicular suspension arms.</td>
<td></td>
</tr>
</tbody>
</table>

Are front leaf springs secure and free from damage?

NO

Notify DS Maintenance.

YES
Check shock absorbers for damage or leaks, and for missing or cracked mounting hardware.

Check front leaf springs for damage and for loose or missing mounting hardware.
r2. LEANS TO ONE SIDE OR REAR OF VEHICLE SAGS (CONT)

3. Are rear shock absorbers secure and free from damage?
   - **YES**
   - **NO**
     - Replace damaged shock absorber(s) (para 15-4).

4. Are rear leaf springs secure and free from damage?
   - **YES**
   - **NO**
     - Notify DS Maintenance if rear leaf springs are loose or damaged.

5. Is control vehicular suspension arm secure and free from damage?
   - **YES**
   - **NO**
     - Notify DS Maintenance if control vehicular suspension arms are loose or damaged.

Notify DS Maintenance.
Check shock absorbers for damage or leaks, and for missing or cracked mounting hardware.

Check rear leaf springs for damage or leaks, and for missing mounting hardware.

Check control vehicular suspension arms for damage or bushing failure, and for missing mounting hardware.
This paragraph covers 15K Self-Recovery Winch (SRW) System Troubleshooting. The 15K Self-Recovery Winch (SRW) System Fault Index, Table 2-57, lists faults for the 15K Self-Recovery Winch (SRW) system of the vehicle.

Table 2-57. 15K Self-Recovery Winch (SRW) System Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>s1</td>
<td>15K Self-Recovery Winch (SRW) Does Not Work</td>
<td>2-2206</td>
</tr>
</tbody>
</table>
s1. 15K SELF-RECOVERY WINCH DOES NOT WORK

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>Personnel Required</td>
<td>STE/ICE-R (Item 41, Appendix C)</td>
</tr>
<tr>
<td>(2)</td>
<td>Pan, Drain (Item 24, Appendix C)</td>
</tr>
<tr>
<td>References</td>
<td>Transducer, STE/ICE-R (Item 1, Appendix J)</td>
</tr>
<tr>
<td>TM 9-4910-571-12&amp;P</td>
<td>Goggles, Industrial (Item 15, Appendix C)</td>
</tr>
</tbody>
</table>

Materials/Parts
Rag, Wiping (Item 50, Appendix D)

START

WARNING
Read WARNING on following page.

1. Is hydraulic pressure to winch control valve OK?

   KNOWN INFO
   Hydraulic oil level OK.
   Hydraulic tubes and fittings OK.

   POSSIBLE PROBLEMS
   Faulty hydraulic pump.
   Faulty 15K self-recovery winch.
   Faulty winch control valve.
   Faulty electrical supply/ control valve solenoid.

   TEST OPTIONS
   Input Flow Test

   REASON FOR QUESTION
   Faulty hydraulic pump will cause winch to not operate.

NO

YES

Notify DS maintenance.
**WARNING**

- Drop hydraulic pressure to zero before disconnecting any hydraulic hoses, tubes or fittings. Failure to comply may result in injury to personnel.
- Wear approved eye protection when performing pressure checks. Failure to comply may result in oil getting into eyes. If oil contacts eyes, seek medical attention immediately.
- Fuel and oil are slippery and can cause falls. Wipe up spilled fuel or oil with rags. Failure to comply may result in injury to personnel.

<table>
<thead>
<tr>
<th>INPUT FLOW TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Place drain pan under control valve.</td>
</tr>
<tr>
<td>(2) Disconnect hose from port P of winch control valve.</td>
</tr>
<tr>
<td>(3) Connect STE/ICE-R with 5/8 in. tee and adapter kit between hose fitting and port P.</td>
</tr>
<tr>
<td>(4) Start engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(5) Position PTO switch to on (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(6) Attach stall load to winch cable (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(7) Position WINCH POWER switch to on (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(9) Toggle WINCH IN/OUT switch to IN (TM 9-2320-366-10-1) and perform STE/ICE-R test #51 (TM 9-4910-574-12&amp;P) and note pressure reading.</td>
</tr>
<tr>
<td>(10) Check if pressure is between 2450-2600 psi (16893-17927 kPa), if pressure is lower than 2450 psi, notify DS Maintenance.</td>
</tr>
<tr>
<td>(11) Position WINCH POWER and PTO switches to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(12) Shut down engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(13) Disconnect STE/ICE-R, tee, and adapter kit.</td>
</tr>
<tr>
<td>(14) Connect hose fitting to port P.</td>
</tr>
<tr>
<td>(15) Remove drain pan.</td>
</tr>
</tbody>
</table>
**15K SELF-RECOVERY WINCH DOES NOT WORK (CONT)**

**KNOWN INFO**
- Hydraulic oil level OK.
- Hydraulic tubes and fittings OK.
- Hydraulic pump OK.

**POSSIBLE PROBLEMS**
- Faulty 15K self-recovery winch.
- Faulty winch control valve.
- Faulty electrical supply/control valve solenoid.

**TEST OPTIONS**
- Winch Control Valve Pressure Test

**REASON FOR QUESTION**
- Faulty winch control valve will cause 15K self-recovery winch not to operate due to low or absent hydraulic pressure.

**2.**
Is pressure absent or 2450-2600 psi (16893-17927 kPa) at V1 and/or V2 on 15K self-recovery winch?

- **YES**
  - Notify DS maintenance.
- **NO**
**WINCH CONTROL VALVE PRESSURE TEST**

1. Disconnect hose from fitting below elbow at port V1 (on side of 15K self-recovery winch toward front of vehicle).
2. Connect STE/ICE-R with tee between port V1 and hose.
4. Attach stall load to winch cable (TM 9-2320-366-10-1).
5. Position PTO switch and WINCH POWER switch to ON (TM 9-2320-366-10-1).
7. Perform STE/ICE-R test #51 and toggle WINCH IN/OUT switch to IN position and hold (TM 9-4910-571-12&P).
8. Check if pressure reading is between 2450-2600 psi (16893-17927 kPa) on STE/ICE-R.
9. If pressure is less than 2600 psi, notify DS Maintenance.
12. Disconnect STE/ICE-R and tee.
15. Position PTO and WINCH POWER switches to on (TM 9-2320-366-10-1).
16. Perform STE/ICE-R test #51 and toggle WINCH IN/OUT switch to OUT (TM 9-4910-571-12&P).
17. Check if pressure reading is between 2450-2600 psi (16893-17927 kPa).
18. If pressure is lower than 2450 psi, notify DS Maintenance.
20. Position WINCH POWER and PTO switches to off (TM 9-2320-366-10-1).
23. Position WINCH POWER and PTO switches to off (TM 9-2320-366-10-1).
24. Connect hose fitting to port V1.
25. Connect hose fitting to port V2.
s1. 15K SELF-RECOVERY WINCH DOES NOT WORK (CONT)

**KNOWN INFO**
- Hydraulic oil level OK.
- Hydraulic lines and fittings OK.
- Hydraulic pump OK.
- 15K self-recovery winch OK.

**POSSIBLE PROBLEMS**
- Faulty winch control valve.
- Faulty electrical supply/control valve solenoid.

3. Is pressure totally absent at V1 and/or V2 on 15K self-recovery winch?

**TEST OPTIONS**
- Winch Control Valve Fault Check

**REASON FOR QUESTION**
A faulty electrical system or winch control valve will cause pressure to be absent at both ports on 15K self-recovery winch.

- **YES**
  - Replace winch control valve (para 17-25).
  - Perform Electrical System Troubleshooting (e88. Self-Recovery Winch Does Reel In or Pay Out).

- **NO**
  - Replace winch control valve (para 17-25).
**WINCH CONTROL VALVE FAULT CHECK**

1. If hydraulic pressure was absent in winch control valve pressure test (step 2.), perform electrical system troubleshooting (68. 15K Self-Recovery Winch Does Not Reel In or Pay Out).

2. If hydraulic pressure was low in winch control valve pressure test (step 2.), replace winch control valve (para 17-25).
2-30. STEERING HYDRAULIC SYSTEM TROUBLESHOOTING

This paragraph covers Steering Hydraulic System Troubleshooting. The Steering Hydraulic System Fault Index, Table 2-58, lists faults for the Steering Hydraulic System of the vehicle.

Table 2-58. Steering Hydraulic System Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>t1</td>
<td>Steering Hard or Does Not Work</td>
<td>2-2214</td>
</tr>
</tbody>
</table>
1. **TEST OPTIONS**

**REASON FOR QUESTION**
Faulty steering components are often revealed by noise, or visible clues.

**KNOWN INFO**
- Steering oil level OK.
- Hydraulic lines and fittings OK.

**POSSIBLE PROBLEMS**
- Faulty steering pump.
- Faulty steering gear.
- Faulty steering gear adjustment.

**START**

Are visible or audible indications of faulty steering components absent?

**WARNING**
Read WARNING on following page.

**NO**
Notify DS Maintenance.

**YES**

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
Faulty steering components are often revealed by noise, or visible clues.
WARNING

- Drop hydraulic pressure to zero before disconnecting any hydraulic line. Failure to comply may result in injury to personnel.

- Wear approved eye protection when performing pressure checks. Failure to comply may result in oil getting into eyes. If oil contacts eyes, seek medical attention immediately.

- Fuel and oil are slippery and can cause falls. Wipe up spilled fuel or oil with rags. Failure to comply may result in injury to personnel.

(1) Check steering oil level and fill as required (Appendix H).
(2) Start engine (TM 9-2320-366-10-1).
(3) Turn steering wheel from lock-to-lock.
(4) Listen for unusual sounds. Faulty steering pump or steering gear may be noisy.
(5) Shut down engine (TM 9-2320-366-10-1).
2. If steering is hard to one side but not the other, adjustment may be faulty.

POSSIBLE PROBLEMS
Faulty steering gear adjustment.

Is steering hard in both directions?

NO

YES

Perform Steering Troubleshooting (p1. Hard to Steer).

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
If steering is hard to one side but not the other, adjustment may be faulty.

Notify DS Maintenance.
(1) Raise cab (TM 9-2320-366-10-1).

(2) Inspect point on each end of front axle housing where wheel stop contacts axle. If this spot is gouged or peened or if steering is harder in one direction than the other, steering adjustment may be faulty.

(3) Lower cab (TM 9-2320-366-10-1).
2-31. AIR TRANSPORT TROUBLESHOOTING

This paragraph covers Air Transport Components Troubleshooting. The Air Transport Components Fault Index, Table 2-59, lists faults for the Air Transport Components of the vehicle.

Table 2-59. Air Transport Components Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>u1</td>
<td>Cab Tilt, Spare Tire Retainer, and Suspension Compression Do Not Operate</td>
<td>2-2220</td>
</tr>
<tr>
<td>u2</td>
<td>Suspension Does Not Compress or Return to Normal</td>
<td>2-2230</td>
</tr>
<tr>
<td>u3</td>
<td>Cab Leveling Air Springs Do Not Operate</td>
<td>2-2232</td>
</tr>
</tbody>
</table>
u1. CAB TILT, SPARE TIRE RETAINER, AND SUSPENSION COMPRESSION DO NOT OPERATE

INITIAL SETUP

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

Personnel Required
(2)

Material/Parts
Filter Assembly (2) (Item 14, Appendix G)
Rag, Wiping (Item 50, Appendix D)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
STE/ICE-R (Item 41, Appendix C)
Pan, Drain (Item 24, Appendix C)
Goggles, Industrial (Item 15, Appendix C)
Transducer, 10,000 PSI (Item 1, Appendix J)
Gloves, Rubber (Item 13, Appendix C)

References
TM 9-4910-571-12&P

KNOWN INFO

Hydraulic hoses free from leaks.

POSSIBLE PROBLEMS
Faulty air/hydraulic manifold filter(s).
Faulty hydraulic hose 515.
Faulty air/hydraulic power unit.
Faulty air hose 507.
Faulty secondary air tank inversion valve.
Faulty air hose 502.
Faulty hydraulic hose 514.
Faulty back-up hydraulic pump.
Faulty hydraulic hose 521.
Faulty hydraulic hose 520.
Faulty air/hydraulic manifold.

TEST OPTIONS

Visual Inspection

REASON FOR QUESTION

This question eliminates possible problems and determines where troubleshooting continues.

START

1. Does either PUMP button or back-up hydraulic pump operate?

NO

YES

Go to step 10 of this fault.
(1) Attempt to raise cab using PUMP button (TM 9-2320-366-10-1).

(2) Attempt to raise cab using back-up hydraulic pump (TM 9-2320-366-10-1).

(3) If cab does not raise in both steps (1) and (2), go to step 10 of this fault.
u1. CAB TILT, SPARE TIRE RETAINER, AND SUSPENSION COMPRESSION DO NOT OPERATE (CONT)

**KNOWN INFO**
- Hydraulic hoses free from leaks.
- Air/hydraulic manifold filters OK.

**POSSIBLE PROBLEMS**
- Faulty hydraulic hose 515.
- Faulty air/hydraulic power unit.
- Faulty air hose 507.
- Faulty secondary air tank inversion valve.
- Faulty air hose 502.
- Faulty hydraulic hose 514.
- Faulty back-up hydraulic pump.
- Faulty hydraulic hose 521.
- Faulty hydraulic hose 520.
- Faulty air/hydraulic manifold.

**TEST OPTIONS**
- Visual Inspection

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

2. Does back-up hydraulic pump operate?

2. **NO**

2. **YES**

   Go to step 12 of this fault.

3. Is 2,500-4,000 psi (17,238-27,580 kPa) present at air/hydraulic power unit return port?

3. **NO**

3. **YES**

   Go to step 11 of this fault.
(1) Attempt to raise cab using back-up hydraulic pump (TM 9-2320-366-10-1).
(2) If cab does not raise, go to step 12 of this fault.
(3) Lower cab (TM 9-2320-366-10-1).

---

**PRESSURE TEST**

(1) Position drain pan under air/hydraulic power unit.
(2) Disconnect hydraulic hose 514 from air/hydraulic power unit return port.
(3) Connect STE/ICE-R between hydraulic hose 514 and return port.
(4) Start engine (TM 9-2320-366-10-1).
(5) Position SUSPENSION knob to LOWER (TM 9-2320-366-10-1).
(6) Position FUNCTION SELECT knob to SUSPENSION (TM 9-2320-366-10-1).
(7) Push and hold PUMP plunger button (TM 9-2320-366-10-1) and perform STE/ICE-R Test #51.
(8) If 2,500-4,000 psi (17,238-27,580 kPa) is not present, go to step 11 of this fault.
(9) Disconnect STE/ICE-R from hydraulic hose 514 and return port.
(10) Connect hydraulic hose 514 to return port.
4. Is 2,500-4,000 psi (17,238-27,580 kPa) present at port P1?

**TEST OPTIONS**
Pressure Test or STE/ICE-R Test #51

**REASON FOR QUESTION**
If 2,500-4,000 psi (17,238-27,580 kPa) is present, air/hydraulic manifold is faulty.

**KNOWN INFO**
- Hydraulic hoses free from leaks.
- Air/hydraulic manifold filters OK.
- Hydraulic hose 514 OK.
- Back-up hydraulic pump OK.
- Hydraulic hose 521 OK.
- Hydraulic hose 520 OK.

**POSSIBLE PROBLEMS**
- Faulty hydraulic hose 515.
- Faulty air/hydraulic power unit.
- Faulty air hose 507.
- Faulty secondary air tank inversion valve.
- Faulty air hose 502.
- Faulty air/hydraulic manifold.

YES

Replace air/hydraulic manifold (para 19-4).

NO

Go to step 5 of this fault.
**PRESSURE TEST**

1. Position drain pan under air/hydraulic manifold.
2. Disconnect hydraulic hose 515 from port P1.
3. Connect STE/ICE-R between hydraulic hose 515 and port P1.
5. Position SUSPENSION knob to LOWER (TM 9-2320-366-10-1).
7. Push and hold PUMP plunger button (TM 9-2320-366-10-1) and perform STE/ICE-R Test #51.
8. If 2,500-4,000 psi (17,238-27,580 kPa) is not present, go to step 5 of this fault.
9. If 2,500-4,000 psi (17,238-27,580 kPa) is present, replace air/hydraulic manifold (para 19-4).
10. Disconnect STE/ICE-R from hydraulic hose 515 and port P1.
11. Connect hydraulic hose 515 to port P1.
5. Is 2,500-4,000 psi (17,238-27,580 kPa) present at air/hydraulic power unit output port?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic hoses free from leaks.</td>
</tr>
<tr>
<td>Air/hydraulic manifold filters OK.</td>
</tr>
<tr>
<td>Hydraulic hose 514 OK.</td>
</tr>
<tr>
<td>Back-up hydraulic pump OK.</td>
</tr>
<tr>
<td>Hydraulic hose 521 OK.</td>
</tr>
<tr>
<td>Hydraulic hose 520 OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty hydraulic hose 515.</td>
</tr>
<tr>
<td>Faulty air/hydraulic power unit.</td>
</tr>
<tr>
<td>Faulty air hose 507.</td>
</tr>
<tr>
<td>Faulty secondary air tank inversion valve.</td>
</tr>
<tr>
<td>Faulty air hose 502.</td>
</tr>
<tr>
<td>Faulty air/hydraulic manifold.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Test or STE/ICE-R Test #51</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If 2,500-4,000 psi (17,238-27,580 kPa) is present, hydraulic hose 515 is faulty.</td>
</tr>
</tbody>
</table>

**YES**

Replace hydraulic hose 515 (para 19-12).

**NO**

Go to step 6 of this fault.
PRESSURE TEST

(1) Position drain pan under air/hydraulic power unit.
(2) Disconnect hydraulic hose 515 from output port.
(3) Connect STE/ICE-R between hydraulic hose 515 and output port.
(4) Start engine (TM 9-2320-366-10-1).
(5) Position SUSPENSION knob to LOWER (TM 9-2320-366-10-1).
(6) Position FUNCTION SELECT knob to SUSPENSION (TM 9-2320-366-10-1).
(7) Push and hold PUMP plunger button (TM 9-2320-366-10-1) and perform STE/ICE-R Test #51.
(8) If 2,500-4,000 psi (17,238-27,580 kPa) is not present, go to step 6 of this fault.
(9) If 2,500-4,000 psi (17,238-27,580 kPa) is present, replace hydraulic hose 515 (para 19-12).
(10) Disconnect STE/ICE-R from hydraulic hose 515 and output port.
(11) Connect hydraulic hose 515 to output port.
6. Is air present at air/hydraulic power unit supply port?

**Known Info**
- Hydraulic hoses free from leaks.
- Air/hydraulic manifold filters OK.
- Hydraulic hose 515 OK.
- Hydraulic hose 514 OK.
- Back-up hydraulic pump OK.
- Hydraulic hose 521 OK.
- Hydraulic hose 520 OK.

**Possible Problems**
- Faulty air/hydraulic power unit.
- Faulty air hose 507.
- Faulty secondary air tank inversion valve.
- Faulty air hose 502.
- Faulty air/hydraulic manifold.

**Test Options**
- Visual Inspection

**Reason for Question**
If air is present, air/hydraulic power unit is faulty.

**Yes**
Replace air/hydraulic power unit (para 19-3).

**No**
Go to step 7 of this fault.
(1) Drain air tanks (TM 9-2320-366-10-1).
(2) Loosen air hose 507 at air/hydraulic power unit.
(3) Start engine and charge air tanks (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose 507.
(5) If air is not present, go to step 7 of this fault.
(6) If air is present, replace air/hydraulic power unit (para 19-3).
(7) Drain air tanks (TM 9-2320-366-10-1).
(8) Tighten air hose 507 at air/hydraulic power unit.
7. Is air present at PUMP CYL port?

**KNOWN INFO**
- Hydraulic hoses free from leaks.
- Air/hydraulic manifold filters OK.
- Hydraulic hose 515 OK.
- Air/hydraulic power unit OK.
- Hydraulic hose 514 OK.
- Back-up hydraulic pump OK.
- Hydraulic hose 521 OK.
- Hydraulic hose 520 OK.

**POSSIBLE PROBLEMS**
- Faulty air hose 507.
- Faulty secondary air tank inversion valve.
- Faulty air hose 502.
- Faulty air/hydraulic manifold.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
If air is present, air hose 507 is faulty.

If NO:
- Go to step 8 of this fault.

If YES:
- Replace air hose 507 (para 23-3).
(1) Drain air tanks (TM 9-2320-366-10-1).
(2) Loosen air hose 507 at PUMP CYL port.
(3) Start engine and charge air tanks (TM 9-2320-366-10-1).
(4) Check for presence of air at PUMP CYL port.
(5) If air is not present, go to step 8 of this fault.
(6) If air is present, replace air hose 507 (para 23-3).
(7) Drain air tanks (TM 9-2320-366-10-1).
(8) Tighten air hose 507 at PUMP CYL port.
Known Info

Hydraulic hoses free from leaks.
Air/hydraulic manifold filters OK.
Hydraulic hose 515 OK.
Air/hydraulic power unit OK.
Air hose 507.
Hydraulic hose 514 OK.
Back-up hydraulic pump OK.
Hydraulic hose 521 OK.
Hydraulic hose 520 OK.

Possible Problems

Faulty air/hydraulic manifold.
Faulty secondary air tank inversion valve.
Faulty air hose 502.

Test Options

Visual Inspection

Reason for Question

If air is present, air/hydraulic manifold is faulty.

8. Is air present at AIR IN P port?

No

Replace air/hydraulic manifold (para 19-4).

Yes

Go to step 9 of this fault.
(1) Drain air tanks (TM 9-2320-366-10-1).
(2) Loosen air hose 502 at AIR IN P port.
(3) Start engine and charge air tanks
   (TM 9-2320-366-10-1).
(4) Check for presence of air at air hose 502.
(5) If air is not present, go to step 9 of this fault.
(6) If air is present, replace air/hydraulic manifold
    (para 19-4).
(7) Drain air tanks (TM 9-2320-366-10-1).
(8) Tighten air hose 502 at AIR IN P port.
u1. CAB TILT, SPARE TIRE RETAINER, AND SUSPENSION COMPRESSION DO NOT OPERATE (CONT)

**KNOWN INFO**
- Hydraulic hoses free from leaks.
- Air/hydraulic manifold filters OK.
- Hydraulic hose 515 OK.
- Air/hydraulic power unit OK.
- Air hose 507.
- Hydraulic hose 514 OK.
- Back-up hydraulic pump OK.
- Hydraulic hose 521 OK.
- Hydraulic hose 520 OK.
- Air/hydraulic manifold OK.

**POSSIBLE PROBLEMS**
- Faulty secondary air tank inversion valve.
- Faulty air hose 502.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
If air is not present, secondary air tank inversion valve is faulty. If air is present, air hose 502 is faulty.

---

**9.**
Is air present at secondary air tank inversion valve delivery port?

**YES**
- Replace secondary air tank inversion valve (para 23-6).

**NO**
- Replace air hose 502 (para 23-3).
(1) Drain air tanks (TM 9-2320-366-10-1).
(2) Loosen air hose 502 at secondary air tank inversion valve delivery port.
(3) Start engine and charge air tanks (TM 9-2320-366-10-1).
(4) Check for presence of air at secondary air tank inversion valve delivery port.
(5) If air is not present, replace secondary air tank inversion valve (para 23-6).
(6) If air is present, replace air hose 502 (para 23-3).
(7) Drain air tanks (TM 9-2320-366-10-1).
(8) Tighten air hose 502 at secondary air tank inversion valve delivery port.
10. **WARNING**
Read **WARNING** on following page.

Are air/hydraulic manifold filters free from debris?

---

**KNOWN INFO**
- Hydraulic hoses free from leaks.
- Hydraulic hose 515 OK.
- Air/hydraulic power unit OK.
- Air hose 507 OK.
- Secondary air tank inversion valve OK.
- Air hose 502 OK.
- Hydraulic hose 514 OK.
- Back-up hydraulic pump OK.
- Hydraulic hose 521 OK.
- Hydraulic hose 520 OK.

**POSSIBLE PROBLEMS**
- Debris in air/hydraulic manifold filter(s).
- Faulty air/hydraulic manifold.

---

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
- If air/hydraulic manifold filter(s) is clogged, filter(s) is faulty.

---

**YES**
Replace air/hydraulic manifold filter(s) (para 19-5).

---

**NO**

---

Replace air/hydraulic manifold (para 19-4).
WARNING

Drop hydraulic pressure to zero before disconnecting any hydraulic hoses. Failure to comply may result in injury to personnel.

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 into contact with hydraulic fluid should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury to personnel.

Compressed air used for cleaning purposes will not exceed 30 psi (270 kPa). Use only with effective chip guarding and personal protective equipment (goggles, shields, gloves, etc.). Failure to comply may result in injury to personnel.

(1) Remove two plugs from air/hydraulic manifold. Discard plugs.
(2) Remove two retainers, filters, and springs from air/hydraulic manifold. Discard retainers and springs.
(3) Inspect filters for debris or signs of damage.
(4) Discard filters.
(5) If filters are free from debris and damage, repair or replace air/hydraulic manifold (para 19-4).
(6) Position two springs and filters in hydraulic manifold with two retainers.
(7) Install two preformed packings on plugs.
(8) Install two plugs in air/hydraulic manifold.
u1. CAB TILT, SPARE TIRE RETAINER, AND SUSPENSION COMPRESSION DO NOT OPERATE (CONT)

**KNOWN INFO**
- Hydraulic hoses free from leaks.
- Air/hydraulic manifold filters OK.
- Hydraulic hose 515.
- Air/hydraulic power unit OK.
- Air hose 507 OK.
- Secondary air tank inversion valve OK.
- Air hose 502 OK.
- Back-up hydraulic pump OK.
- Hydraulic hose 521 OK.
- Hydraulic hose 520 OK.

**POSSIBLE PROBLEMS**
- Faulty hydraulic hose 514.
- Faulty air/hydraulic manifold.

**TEST OPTIONS**
- Pressure Test or STE/ICE-R Test #51

**REASON FOR QUESTION**
- If 2,500-4,000 psi (17,238-27,580 kPa) is not present, air/hydraulic manifold is faulty.
- If 2,500-4,000 psi (17,238-27,580 kPa) is present, hydraulic hose 514 is faulty.

11. Is 2,500-4,000 psi (17,238-27,580 kPa) present at port T1?

**YES**
- Replace hydraulic hose 514 (para 19-12).

**NO**
- Replace air/hydraulic manifold (para 19-4).
PRESSURE TEST

(1) Position drain pan under air/hydraulic manifold.
(2) Disconnect hydraulic hose 514 from port T1.
(3) Connect STE/ICE-R between hydraulic hose 514 and port T1.
(4) Start engine (TM 9-2320-366-10-1).
(5) Position SUSPENSION knob to LOWER (TM 9-2320-366-10-1).
(6) Position FUNCTION SELECT knob to SUSPENSION (TM 9-2320-366-10-1).
(7) Push and hold PUMP plunger button (TM 9-2320-366-10-1) and perform STE/ICE-R Test #51.
(8) If 2,500-4,000 psi (17,238-27,580 kPa) is not present, replace air/hydraulic manifold (para 19-4).
(9) If 2,500-4,000 psi (17,238-27,580 kPa) is present, replace hydraulic hose 514 (para 19-12).
(10) Disconnect STE/ICE-R from hydraulic hose 514 and port T1.
(11) Connect hydraulic hose 514 to port T1.
Is 2,500-4,000 psi (17,238-27,580 kPa) present at back-up hydraulic pump return port?

- **NO**
  - Go to step 15 of this fault.

- **YES**
  - Go to step 15 of this fault.

**KNOWN INFO**
- Hydraulic hoses free from leaks.
- Air/hydraulic manifold filters OK.
- Hydraulic hose 515 OK.
- Air/hydraulic power unit OK.
- Air hose 507 OK.
- Secondary air tank inversion valve OK.
- Air hose 502 OK.
- Air hose 514 OK.

**POSSIBLE PROBLEMS**
- Faulty back-up hydraulic pump.
- Faulty hydraulic hose 521.
- Faulty hydraulic hose 520.
- Faulty air/hydraulic manifold.

**TEST OPTIONS**
- Pressure Test or STE/ICE-R Test #51

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

(1) Position drain pan under back-up hydraulic pump.
(2) Disconnect hydraulic hose 520 from back-up hydraulic pump return port.
(3) Connect STE/ICE-R between hydraulic hose 520 and return port.
(4) Start engine (TM 9-2320-366-10-1).
(5) Position SUSPENSION knob to LOWER (TM 9-2320-366-10-1).
(6) Position FUNCTION SELECT knob to SUSPENSION (TM 9-2320-366-10-1).
(7) Push and hold PUMP plunger button (TM 9-2320-366-10-1) and perform STE/ICE-R Test #51.
(8) If 2,500-4,000 psi (17,238-27,580 kPa) is not present, go to step 15 of this fault.
(9) Disconnect STE/ICE-R from hydraulic hose 520 and return port.
(10) Connect hydraulic hose 520 to return port.
13. Is 2,500-4,000 psi (17,238-27,580 kPa) present at port P2?

**Known Info**
- Hydraulic hoses free from leaks.
- Air/hydraulic manifold filters OK.
- Hydraulic hose 515 OK.
- Air/hydraulic power unit OK.
- Air hose 507 OK.
- Secondary air tank inversion valve OK.
- Air hose 502 OK.
- Air hose 514 OK.
- Air hose 520 OK.

**Possible Problems**
- Faulty back-up hydraulic pump.
- Faulty hydraulic hose 521.
- Faulty air/hydraulic manifold.

**Test Options**
- Pressure Test or STE/ICE-R Test #51

**Reason for Question**
If 2,500-4,000 psi (17,238-27,580 kPa) is present, air/hydraulic manifold is faulty.

- **YES**
  - Go to step 14 of this fault.

- **NO**
  - Replace air/hydraulic manifold (para 19-4).
PRESSURE TEST

(1) Position drain pan under air/hydraulic manifold.
(2) Disconnect hydraulic hose 521 from port P2.
(3) Connect STE/ICE-R between hydraulic hose 521 and port P2.
(4) Position SUSPENSION knob to LOWER (TM 9-2320-366-10-1).
(5) Position FUNCTION SELECT knob to SUSPENSION (TM 9-2320-366-10-1).
(6) Operate back-up hydraulic pump (TM 9-2320-366-10-1) and perform STE/ICE-R Test #51.
(7) If 2,500-4,000 psi (17,238-27,580 kPa) is not present, go to step 14 of this fault.
(8) If 2,500-4,000 psi (17,238-27,580 kPa) is present, replace air/hydraulic manifold (para 19-4).
(9) Disconnect STE/ICE-R from hydraulic hose 521 and port P2.
(10) Connect hydraulic hose 521 to port P2.
14. Is 2,500-4,000 psi (17,238-27,580 kPa) present at back-up hydraulic pump output port?

- **YES**
  - Replace hydraulic hose 521 (para 19-12).

- **NO**
  - Replace back-up hydraulic pump (para 19-2).

**KNOWN INFO**
- Hydraulic hoses free from leaks.
- Air/hydraulic manifold filters OK.
- Hydraulic hose 515 OK.
- Air/hydraulic power unit OK.
- Air hose 507 OK.
- Secondary air tank inversion valve OK.
- Air hose 502 OK.
- Air hose 514 OK.
- Hydraulic hose 520 OK.
- Air/hydraulic manifold OK.

**POSSIBLE PROBLEMS**
- Faulty back-up hydraulic pump.
- Faulty hydraulic hose 521.

**TEST OPTIONS**
- Pressure Test or STE/ICE-R Test #51

**REASON FOR QUESTION**
- If 2,500-4,000 psi (17,238-27,580 kPa) is not present, back-up hydraulic pump is faulty. If 2,500-4,000 psi (17,238-27,580 kPa) is present, hydraulic hose 521 is faulty.
PRESSURE TEST

(1) Position drain pan under back-up hydraulic pump.
(2) Disconnect hydraulic hose 521 from back-up hydraulic pump output port.
(3) Connect STE/ICE-R between hydraulic hose 521 and output port.
(4) Position SUSPENSION knob to LOWER (TM 9-2320-366-10-1).
(5) Position FUNCTION SELECT knob to SUSPENSION (TM 9-2320-366-10-1).
(6) Operate back-up hydraulic pump (TM 9-2320-366-10-1) and perform STE/ICE-R Test #51.
(7) If 2,500-4,000 psi (17,238-27,580 kPa) is not present, replace back-up hydraulic pump (para 19-2).
(8) If 2,500-4,000 psi (17,238-27,580 kPa) is present, replace hydraulic hose 521 (para 19-12).
(9) Disconnect STE/ICE-R from hydraulic hose 521 and output port.
(10) Connect hydraulic hose 521 to output port.
u1. CAB TILT, SPARE TIRE RETAINER, AND SUSPENSION COMPRESSION DO NOT OPERATE (CONT)

**KNOWN INFO**

- Hydraulic hoses free from leaks.
- Air/hydraulic manifold filters OK.
- Hydraulic hose 515.
- Air/hydraulic power unit OK.
- Air hose 507 OK.
- Secondary air tank inversion valve OK.
- Air hose 502 OK.
- Hydraulic hose 514 OK.
- Back-up hydraulic pump OK.
- Hydraulic hose 521 OK.

**POSSIBLE PROBLEMS**

- Faulty hydraulic hose 520.
- Faulty air/hydraulic manifold.

---

**TEST OPTIONS**

<table>
<thead>
<tr>
<th>Pressure Test or STE/ICE-R Test #51</th>
</tr>
</thead>
</table>

**REASON FOR QUESTION**

If 2,500-4,000 psi (17,238-27,580 kPa) is not present, air/hydraulic manifold is faulty. If 2,500-4,000 psi (17,238-27,580 kPa) is present, hydraulic hose 520 is faulty.

---

**15.**

Is 2,500-4,000 psi (17,238-27,580 kPa) present at port T2?

- **NO**
  - Replace air/hydraulic manifold (para 19-4).

- **YES**
  - Replace hydraulic hose 520 (para 19-12).
PRESSURE TEST

1. Position drain pan under air/hydraulic manifold.
2. Disconnect hydraulic hose 520 from port T2.
3. Connect STE/ICE-R between hydraulic hose 520 and port T2.
5. Position SUSPENSION knob to LOWER (TM 9-2320-366-10-1).
7. Push and hold PUMP plunger button (TM 9-2320-366-10-1) and perform STE/ICE-R Test #51.
8. If 2,500-4,000 psi (17,238-27,580 kPa) is not present, replace air/hydraulic manifold (para 19-4).
9. If 2,500-4,000 psi (17,238-27,580 kPa) is present, replace hydraulic hose 520 (para 19-12).
10. Disconnect STE/ICE-R from hydraulic hose 520 and port T2.
11. Connect hydraulic hose 520 to port T2.
**u2. SUSPENSION DOES NOT COMPRESS AND/OR RETURN TO NORMAL**

**INITIAL SETUP**

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

**Personnel Required**  
(2)

**Material/Parts**  
Rag, Wiping (Item 50, Appendix D)

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Pan, Drain (Item 24, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)
- Transducer, 10,000 PSI (Item 1, Appendix J)
- Gloves, Rubber (Item 13, Appendix C)

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

---

**KNOWLEDGE**

Other hydraulic manifold functions OK.  
Hydraulic hoses free from leaks.

**POSSIBLE PROBLEMS**
- Faulty hydraulic hose(s) 508 and/or 510.  
- Faulty suspension compression tee fitting.  
- Faulty air/hydraulic manifold.  
- Faulty hydraulic hose 512.  
- Faulty hydraulic hose 513.  
- Faulty suspension release tee fitting.  
- Faulty suspension cylinder(s).  
- Faulty hydraulic hose(s) 509 and/or 511.

---

**TEST OPTIONS**

Pressure Test or  
STE/ICE-R Test #51

**REASON FOR QUESTION**

This question eliminates possible problems and determines where troubleshooting continues.

**START**

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

**Is 2,500-4,000 psi (17,238-27,580 kPa) present at suspension cylinder input ports?**

**NO**

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

---

Is 2,500-4,000 psi (17,238-27,580 kPa) present at suspension cylinder input ports?  

---

TM 9-2320-366-20-3

---
**NOTE**

SYSTEM PARK control must be engaged (TM 9-2320-366-10-1) before operating SUSPENSION compression.

---

<table>
<thead>
<tr>
<th>PRESSURE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Position drain pan under RH suspension cylinder.</td>
</tr>
<tr>
<td>(2) Disconnect hydraulic hose 508 from RH suspension cylinder input port.</td>
</tr>
<tr>
<td>(3) Connect STE/ICE-R between hydraulic hose 508 and RH suspension cylinder input port.</td>
</tr>
<tr>
<td>(4) Start engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(5) Position FUNCTION SELECT knob to SUSPENSION (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(6) Push and hold PUMP plunger button (TM 9-2320-366-10-1) and perform STE/ICE-R Test #51.</td>
</tr>
<tr>
<td>(7) Shut down engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(8) Disconnect STE/ICE-R from RH suspension cylinder input port and hydraulic hose 508.</td>
</tr>
<tr>
<td>(9) Connect hydraulic hose 508 to RH suspension cylinder input port.</td>
</tr>
<tr>
<td>(10) Repeat steps (1) through (9) on LH suspension cylinder and hydraulic hose 510.</td>
</tr>
<tr>
<td>(11) If 2,500-4,000 psi (17,238-27,580 kPa) is not present at either suspension cylinder, go to step 3 of this fault.</td>
</tr>
</tbody>
</table>

---

**WARNING**

Drop hydraulic pressure to zero before disconnecting any hydraulic hoses. Failure to comply may result in injury to personnel.

Hydraulic oil (MIL-H 5605) 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 into contact with hydraulic oil should be washed immediately. Failure to comply may result in injury to personnel.

Hydraulic oil (MIL-H 5605) 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 into contact with hydraulic oil should be washed immediately. Failure to comply may result in injury to personnel.
u2. SUSPENSION DOES NOT COMPRESS AND/OR RETURN TO NORMAL (CONT)

**KNOWN INFO**
- Other hydraulic manifold functions OK.
- Hydraulic hoses free from leaks.
- Hydraulic hoses 508 and 510 OK.
- Suspension compression tee fitting OK.
- Hydraulic hose 512 OK.

**POSSIBLE PROBLEMS**
- Faulty air/hydraulic manifold.
- Faulty hydraulic hose 513.
- Faulty suspension release tee fitting.
- Faulty suspension cylinder(s).
- Faulty hydraulic hose(s) 509 and/or 511.

**TEST OPTIONS**
- Pressure Test or STE/ICE-R Test #51

**REASON FOR QUESTION**
If 2,500-4,000 psi (17,238-27,580 kPa) is present, air/hydraulic manifold is faulty.

2. Is 2,500-4,000 psi (17,238-27,580 kPa) present at PILOT input port?

NO

- Go to step 6 of this fault.

YES

- Repair or replace air/hydraulic manifold (para 19-4).
PRESSURE TEST

(1) Position drain pan under air/hydraulic manifold.
(2) Disconnect hydraulic hose 513 from PILOT port.
(3) Connect STE/ICE-R between hydraulic hose 513 and PILOT port.
(4) Start engine (TM 9-2320-366-10-1).
(5) Position SUSPENSION knob to LOWER (TM 9-2320-366-10-1).
(6) Position FUNCTION SELECT knob to SUSPENSION (TM 9-2320-366-10-1).
(7) Push and hold PUMP plunger button (TM 9-2320-366-10-1) and perform STE/ICE-R Test #51.
(8) If 2,500-4,000 psi (17,238-27,580 kPa) is not present, go to step 6 of this fault.
(9) If 2,500-4,000 psi (17,238-27,580 kPa) is present, repair or replace air/hydraulic manifold (para 19-4).
(10) Disconnect STE/ICE-R from hydraulic hose 513 and PILOT port.
(11) Connect hydraulic hose 513 to PILOT port.
u2. SUSPENSION DOES NOT COMPRESS AND/OR RETURN TO NORMAL (CONT)

Known Info

- Other hydraulic manifold functions OK.
- Hydraulic hoses free from leaks.
- Hydraulic hose 513 OK.
- Suspension release tee fitting OK.
- Suspension cylinders OK.
- Hydraulic hoses 509 and 511 OK.

Possible Problems

- Faulty hydraulic hose(s) 508 and/or 510.
- Faulty suspension compression tee fitting.
- Faulty air/hydraulic manifold.
- Faulty hydraulic hose 512.

Test Options

- Pressure Test or STE/ICE-R Test #51

Reason for Question

If 2,500-4,000 psi (17,238-27,580 kPa) is present, hydraulic hose(s) 508 and/or 510 is faulty.

3. Is 2,500-4,000 psi (17,238-27,580 kPa) present at suspension compression tee fitting output ports?

- NO
  - Go to step 4 of this fault.
- YES
  - Replace hydraulic hose(s) 508 and/or 510 (para 19-12).
PRESSURE TEST

(1) Position drain pan under suspension compression tee fitting.
(2) Disconnect hydraulic hose 510 from suspension compression tee fitting LH output port.
(3) Connect STE/ICE-R between hydraulic hose 510 and suspension compression tee fitting LH output port.
(4) Start engine (TM 9-2320-366-10-1).
(5) Position SUSPENSION knob to RAISE (TM 9-2320-366-10-1).
(6) Position FUNCTION SELECT knob to SUSPENSION (TM 9-2320-366-10-1).
(7) Push and hold PUMP plunger button (TM 9-2320-366-10-1) and perform STE/ICE-R Test #51.
(8) If 2,500-4,000 psi (17,238-27,580 kPa) is not present, go to step 4 of this fault.
(9) If 2,500-4,000 psi (17,238-27,580 kPa) is present, replace hydraulic hose 510 (para 19-12).
(10) Disconnect STE/ICE-R from hydraulic hose 510 and suspension compression tee fitting LH output port.
(11) Connect hydraulic hose 510 to suspension compression tee fitting LH output port.
(12) Repeat steps (2) through (12) on hydraulic hose 508 and suspension compression tee fitting RH output port.
u2. SUSPENSION DOES NOT COMPRESS AND/OR RETURN TO NORMAL (CONT)

Known Info

Other hydraulic manifold functions OK.
Hydraulic hoses free from leaks.
Hydraulic hoses 508 and 510 OK.
Hydraulic hose 513 OK.
Suspension release tee fitting OK.
Suspension cylinders OK.
Hydraulic hoses 509 and 511 OK.

Possible Problems

Faulty suspension compression tee fitting.
Faulty air/hydraulic manifold.
Faulty hydraulic hose 512.

Test Options

Pressure Test or STE/ICE-R Test #51

Reason for Question

If 2,500-4,000 psi (17,238-27,580 kPa) is present, suspension compression tee fitting is faulty.

4. Is 2,500-4,000 psi (17,238-27,580 kPa) present at suspension compression tee fitting input port?

No

Replace suspension compression tee fitting (para 19-12).

Yes

Go to step 5 of this fault.
**PRESSURE TEST**

1. Disconnect hydraulic hose 512 from suspension compression tee fitting input port.
2. Connect STE/ICE-R between hydraulic hose 512 and suspension compression tee fitting input port.
5. Position FUNCTION SELECT knob to SUSPENSION (TM 9-2320-366-10-1).
6. Push and hold PUMP plunger button (TM 9-2320-366-10-1) and perform STE/ICE-R Test #51.
7. If 2,500-4,000 psi (17,238-27,580 kPa) is not present, go to step 5 of this fault.
8. If 2,500-4,000 psi (17,238-27,580 kPa) is present, replace suspension compression tee fitting (para 19-12).
9. Disconnect STE/ICE-R from hydraulic hose 512 and suspension compression tee fitting input port.
10. Connect hydraulic hose 512 to suspension compression tee fitting input port.
5. Is 2,500-4,000 psi (17,238-27,580 kPa) present at SUSP COMPRESS output port?

   YES

   Replace hydraulic hose 512 (para 19-12).

   NO

   Repair or replace air/hydraulic manifold (para 19-4).

KNOWN INFO

Other hydraulic manifold functions OK.
Hydraulic hoses free from leaks.
Hydraulic hoses 508 and 510 OK.
Suspension compression tee fitting OK.
Hydraulic hose 513 OK.
Suspension release tee fitting OK.
Suspension cylinders OK.
Hydraulic hoses 509 and 511 OK.

POSSIBLE PROBLEMS

Faulty air/hydraulic manifold.
Faulty hydraulic hose 512.

TEST OPTIONS

Pressure Test or STE/ICE-R Test #51

REASON FOR QUESTION

If 2,500-4,000 psi (17,238-27,580 kPa) is not present, air/hydraulic manifold is faulty.
If 2,500-4,000 psi (17,238-27,580 kPa) is present, hydraulic hose 512 is faulty.
PRESSURE TEST

(1) Position drain pan under air/hydraulic manifold.
(2) Disconnect hydraulic hose 512 from SUSP COMPRESS port.
(3) Connect STE/ICE-R between hydraulic hose 512 and SUSP COMPRESS port.
(4) Start engine (TM 9-2320-366-10-1).
(5) Position SUSPENSION knob to RAISE (TM 9-2320-366-10-1).
(6) Position FUNCTION SELECT knob to SUSPENSION (TM 9-2320-366-10-1).
(7) Push and hold PUMP plunger button (TM 9-2320-366-10-1) and perform STE/ICE-R Test #51.
(8) If 2,500-4,000 psi (17,238-27,580 kPa) is not present, repair or replace air/hydraulic manifold (para 19-4).
(9) If 2,500-4,000 psi (17,238-27,580 kPa) is present, replace hydraulic hose 512 (para 19-12).
(10) Disconnect STE/ICE-R from hydraulic hose 512 and SUSP COMPRESS port.
(11) Connect hydraulic hose 512 to SUSP COMPRESS port.
u2. SUSPENSION DOES NOT COMPRESS AND/OR RETURN TO NORMAL (CONT)

**KNOWN INFO**
- Other hydraulic manifold functions OK.
- Hydraulic hoses free from leaks.
- Hydraulic hoses 508 and 510 OK.
- Suspension compression tee fitting OK.
- Air/hydraulic manifold OK.
- Hydraulic hose 512 OK.

**POSSIBLE PROBLEMS**
- Faulty hydraulic hose 513.
- Faulty suspension release tee fitting.
- Faulty suspension cylinder(s).
- Faulty hydraulic hose(s) 509 and/or 511.

**TEST OPTIONS**
- Pressure Test or STE/ICE-R Test #51

**REASON FOR QUESTION**
- If 2,500-4,000 psi (17,238-27,580 kPa) is present, hydraulic hose 513 is faulty.

6. Is 2,500-4,000 psi (17,238-27,580 kPa) present at suspension release tee fitting output port?

- **NO**
  - Go to step 7 of this fault.

- **YES**
  - Replace hydraulic hose 513 (para 19-12).
(1) Position drain pan under suspension release tee fitting.
(2) Disconnect hydraulic hose 513 from suspension release tee fitting output port.
(3) Connect STE/ICE-R between hydraulic hose 513 and suspension release tee fitting output port.
(4) Start engine (TM 9-2320-366-10-1).
(5) Position SUSPENSION knob to LOWER (TM 9-2320-366-10-1).
(6) Position FUNCTION SELECT knob to SUSPENSION (TM 9-2320-366-10-1).
(7) Push and hold PUMP plunger button (TM 9-2320-366-10-1) and perform STE/ICE-R Test #51.
(8) If 2,500-4,000 psi (17,238-27,580 kPa) is not present, go to step 7 of this fault.
(9) If 2,500-4,000 psi (17,238-27,580 kPa) is present, replace hydraulic hose 513 (para 19-12).
(10) Disconnect STE/ICE-R from hydraulic hose 513 and suspension release tee fitting output port.
(11) Connect hydraulic hose 513 to suspension release tee fitting output port.
u2. SUSPENSION DOES NOT COMPRESS AND/OR RETURN TO NORMAL (CONT)

**KNOWN INFO**
- Other hydraulic manifold functions OK.
- Hydraulic hoses free from leaks.
- Hydraulic hoses 508 and 510 OK.
- Suspension compression tee fitting OK.
- Air/hydraulic manifold OK.
- Hydraulic hose 512 OK.
- Hydraulic hose 513 OK.

**POSSIBLE PROBLEMS**
- Faulty suspension release tee fitting.
- Faulty suspension cylinder(s).
- Faulty hydraulic hose(s) 509 and/or 511.

7.

**TEST OPTIONS**
- Pressure Test or STE/ICE-R Test #51

**REASON FOR QUESTION**
- If 2,500-4,000 psi (17,238-27,580 kPa) is present, suspension release tee fitting is faulty.

Is 2,500-4,000 psi (17,238-27,580 kPa) present at suspension release tee fitting input ports?

- **YES**
  - Replace suspension release tee fitting (para 19-12).

- **NO**
  - Go to step 8 of this fault.
PRESSURE TEST

(1) Disconnect hydraulic hose 511 from suspension release tee fitting LH input port.
(2) Connect STE/ICE-R between hydraulic hose 511 and suspension release tee fitting LH input port.
(3) Start engine (TM 9-2320-366-10-1).
(4) Position SUSPENSION knob to LOWER (TM 9-2320-366-10-1).
(5) Position FUNCTION SELECT knob to SUSPENSION (TM 9-2320-366-10-1).
(6) Push and hold PUMP plunger button (TM 9-2320-366-10-1) and perform STE/ICE-R Test #51.
(7) If 2,500-4,000 psi (17,238-27,580 kPa) is not present, go to step 5 of this fault.
(8) If 2,500-4,000 psi (17,238-27,580 kPa) is present, replace hydraulic hose 511 (para 19-12).
(9) Disconnect STE/ICE-R from hydraulic hose 511 and suspension release tee fitting LH input port.
(10) Connect hydraulic hose 511 to suspension release tee fitting LH input port.
(11) Repeat steps (2) through (12) on hydraulic hose 509 and suspension release tee fitting RH input port.
u2. SUSPENSION DOES NOT COMPRESS AND/OR RETURN TO NORMAL (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other hydraulic manifold functions OK.</td>
</tr>
<tr>
<td>Hydraulic hoses free from leaks.</td>
</tr>
<tr>
<td>Hydraulic hoses 508 and 510 OK.</td>
</tr>
<tr>
<td>Suspension compression tee fitting OK.</td>
</tr>
<tr>
<td>Air/hydraulic manifold OK.</td>
</tr>
<tr>
<td>Hydraulic hose 512 OK.</td>
</tr>
<tr>
<td>Hydraulic hose 513 OK.</td>
</tr>
<tr>
<td>Suspension release tee fitting OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty suspension cylinder(s).</td>
</tr>
<tr>
<td>Faulty hydraulic hose(s) 509 and/or 511.</td>
</tr>
</tbody>
</table>

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8. Is 2,500-4,000 psi (17,238-27,580 kPa) present at suspension cylinder output ports?

- **YES**
  - Replace suspension cylinder(s) (para 19-10).

- **NO**
  - Replace hydraulic hose(s) 509 and/or 511 (para 19-12).

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Test or STE/ICE-R Test #51</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If 2,500-4,000 psi (17,238-27,580 kPa) is not present, suspension cylinder(s) is faulty. If 2,500-4,000 psi (17,238-27,580 kPa) is present, hydraulic hose 509 and/or 511 is faulty.</td>
</tr>
</tbody>
</table>
PRESSURE TEST

1. Position drain pan under RH suspension cylinder.
2. Disconnect hydraulic hose 509 from RH suspension cylinder output port.
3. Connect STE/ICE-R between hydraulic hose 509 and RH suspension cylinder output port.
5. Position SUSPENSION knob to RAISE (TM 9-2320-366-10-1).
7. Push and hold PUMP plunger button (TM 9-2320-366-10-1) and perform STE/ICE-R Test #51.
9. Disconnect STE/ICE-R from RH suspension cylinder output port and hydraulic hose 509.
10. Connect hydraulic hose 509 to RH suspension cylinder output port.
11. Repeat steps (1) through (10) on LH suspension cylinder and hydraulic hose 511.
12. If 2,500-4,000 psi (17,238-27,580 kPa) is not present, replace suspension cylinder(s) (para 19-10).
13. If 2,500-4,000 psi (17,238-27,580 kPa) is present, replace hydraulic hose(s) 509 and/or 511.
u3. CAB LEVELING AIR SPRINGS DO NOT OPERATE

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)
Goggles, Industrial (Item 15, Appendix C)

References
TM 9-4910-571-12&P

Known Info
CTIS operates.
Air hoses free from kinks and leaks.

Possible Problems
Faulty variable control check valve.
Faulty air hose 503.
Faulty air hose 522.
Faulty cab leveling valve tee fitting.
Faulty air hose 506.
Faulty air/hydraulic manifold.
Faulty pressure protection valve.
Faulty air hose 501.
Faulty cab leveling valve.
Faulty air spring cylinder(s).
Faulty air hose(s) 504 and/or 505.

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

Test Options
Visual Inspection

Start

1. Do cab air springs deflate?

No

Go to step 5 of this fault.

Yes

TM 9-2320-366-20-3

2-2232 Change 1
NOTE
SYSTEM PARK control must be engaged (TM 9-2320-366-10-1) before operating SUSPENSION compression.

(1) Attempt to deflate cab air springs (TM 9-2320-366-10-1).
(2) If cab air springs do not deflate, go to step 5 of this fault.
**u3. CAB LEVELING AIR SPRINGS DO NOT OPERATE (CONT)**

**KNOWN INFO**
- CTIS operates.
- Air hoses free from kinks and leaks.
- Air hose 522 OK.
- Air hose 506 OK.
- Air/hydraulic manifold OK.
- Pressure protection valve OK.
- Air hose 501 OK.

**POSSIBLE PROBLEMS**
- Faulty variable control check valve.
- Faulty air hose 503.
- Faulty cab leveling valve tee fitting.
- Faulty cab leveling valve.
- Faulty air spring cylinder(s).
- Faulty air hose(s) 504 and/or 505.

**TEST OPTIONS**
- Visual Inspection

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

2. **Do cab air springs inflate?**

   **NO**
   - Go to step 13 of this fault.

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

3. **Is air present at variable control check valve input port?**

   **NO**
   - Go to step 4 of this fault.

   **YES**
   - Replace variable control check valve (para 16-9).

**KNOWN INFO**
- CTIS operates.
- Air hoses free from kinks and leaks.
- Air hose 522 OK.
- Air hose 506 OK.
- Air/hydraulic manifold OK.
- Pressure protection valve OK.
- Air hose 501 OK.
- Cab leveling valve OK.
- Air spring cylinders OK.
- Air hoses 504 and 505 OK.

**POSSIBLE PROBLEMS**
- Faulty variable control check valve.
- Faulty air hose 503.
- Faulty cab leveling valve tee fitting.
(1) Attempt to inflate cab air springs (TM 9-2320-366-10-1).
(2) If cab air springs do not inflate, go to step 13 of this fault.

(1) Start engine and allow air tanks to pressurize (TM 9-2320-366-10-1).
(2) Shut down engine (TM 9-2320-366-10-1).
(3) Raise cab (TM 9-2320-366-10-1).
(4) Loosen air hose 503 at variable control check valve input port.
(5) Check for pressure of air at air hose 503.
(6) Tighten air hose 503 to variable control check valve.
(7) If air is not present, go to step 4 of this fault.
(8) If air is present, replace variable control check valve (para 16-9).
4. TEST OPTIONS

Is air present at cab leveling valve tee fitting check valve output port?

NO

Replace cab leveling valve tee fitting (para 16-8).

YES

Replace air hose 503 (para 23-3).

KNOWLEDGE INFO

CTIS operates.
Air hoses free from kinks and leaks.
Variable control check valve OK.
Air hose 522 OK.
Air hose 506 OK.
Air/hydraulic manifold OK.
Pressure protection valve OK.
Air hose 501 OK.
Cab leveling valve OK.
Air spring cylinders OK.
Air hoses 504 and 505 OK.

POSSIBLE PROBLEMS

Faulty air hose 503.
Faulty cab leveling valve tee fitting.

TEST OPTIONS

Visual Inspection

REASON FOR QUESTION

If air is not present, cab leveling valve tee fitting. If air is present, air hose 503 is faulty.
(1) Loosen air hose 503 at cab leveling valve tee fitting check valve output port.
(2) Check for pressure of air at cab leveling valve tee fitting check valve output port.
(3) Tighten air hose 503 at cab leveling valve tee fitting check valve output port.
(4) If air is not present, replace cab leveling valve tee fitting (para 16-8).
(5) If air is present, replace air hose 503 (para 23-3).
u3. CAB LEVELING AIR SPRINGS DO NOT OPERATE (CONT)

**KNOWN INFO**
- CTIS operates.
- Air hoses free from kinks and leaks.
- Variable control check valve OK.
- Air hose 503 OK.

**POSSIBLE PROBLEMS**
- Faulty air hose 522.
- Faulty cab leveling valve tee fitting.
- Faulty air hose 506.
- Faulty air/hydraulic manifold.
- Faulty pressure protection valve.
- Faulty air hose 501.
- Faulty cab leveling valve.
- Faulty air spring cylinder(s).
- Faulty air hose(s) 504 and/or 505.

**TEST OPTIONS**

**REASON FOR QUESTION**
- If air is present, air spring cylinder(s) is faulty.

5. Is air present at air spring cylinder input ports?

- **YES**
  - Replace air spring cylinder(s) (para 16-9).

- **NO**
  - Go to step 6 of this fault.
(1) Start engine and allow air tanks to pressurize (TM 9-2320-366-10-1).
(2) Shut down engine (TM 9-2320-366-10-1).
(3) Raise cab (TM 9-2320-366-10-1).
(4) Loosen air hose 504 at RH air spring cylinder.
(5) Turn CAB knob to the right and push in (TM 9-2320-366-10-1).
(6) Check for presence of air at air hose 504.
(7) Turn CAB knob to the left (TM 9-2320-366-10-1).
(8) Tighten air hose 504 at RH air spring cylinder.
(9) Repeat steps (4) through (8) on LH air spring cylinder and air hose 505.
(10) If air is not present, go to step 6 of this fault.
(11) If air is present, replace air spring cylinder(s) (para 16-9).
u3. CAB LEVELING AIR SPRINGS DO NOT OPERATE (CONT)

**KNOWN INFO**
- CTIS operates.
- Air hoses free from kinks and leaks.
- Variable control check valve OK.
- Air hose 503 OK.
- Air spring cylinders OK.

**POSSIBLE PROBLEMS**
- Faulty air hose 522.
- Faulty cab leveling valve tee fitting.
- Faulty air hose 506.
- Faulty air/hydraulic manifold.
- Faulty pressure protection valve.
- Faulty air hose 501.
- Faulty cab leveling valve.
- Faulty air hose(s) 504 and/or 505.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
- If air is present, air hose(s) 504 and/or 505 is faulty.

6. Is air present at cab leveling valve output ports?

- **NO**
  - Go to step 7 of this fault.

- **YES**
  - Replace air hose(s) 504 and/or 505 (para 23-3).
(1) Loosen air hoses 504 and 505 at cab leveling valve output ports.
(2) Turn CAB knob to the right and push in (TM 9-2320-366-10-1).
(3) Check for presence of air at cab leveling valve output ports.
(4) Turn CAB knob to the left (TM 9-2320-366-10-1).
(5) Tighten air hoses 504 and 505 at cab leveling valve output ports.
(6) If air is not present, go to step 7 of this fault.
(7) If air is present, replace air hose(s) 504 and/or 505 (para 23-3).
u3. CAB LEVELING AIR SPRINGS DO NOT OPERATE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTIS operates.</td>
</tr>
<tr>
<td>Air hoses free from kinks and leaks.</td>
</tr>
<tr>
<td>Variable control check valve OK.</td>
</tr>
<tr>
<td>Air hose 503 OK.</td>
</tr>
<tr>
<td>Air spring cylinders OK.</td>
</tr>
<tr>
<td>Air hoses 504 and 505 OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty air hose 522.</td>
</tr>
<tr>
<td>Faulty cab leveling valve tee fitting.</td>
</tr>
<tr>
<td>Faulty air hose 506.</td>
</tr>
<tr>
<td>Faulty air/hydraulic manifold.</td>
</tr>
<tr>
<td>Faulty pressure protection valve.</td>
</tr>
<tr>
<td>Faulty air hose 501.</td>
</tr>
<tr>
<td>Faulty cab leveling valve.</td>
</tr>
</tbody>
</table>

7. Is air present at cab leveling valve input port?

<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, cab leveling valve is faulty.</td>
</tr>
</tbody>
</table>

- **NO**

- **YES**
  
  Go to step 8 of this fault.

  Replace cab leveling valve (para 16-8).
(1) Loosen air hose 522 at cab leveling valve input port.
(2) Turn CAB knob to the right and push in (TM 9-2320-366-10-1).
(3) Check for presence of air at air hose 522.
(4) Turn CAB knob to the left (TM 9-2320-366-10-1).
(5) Tighten air hose 522 at cab leveling valve input port.
(6) If air is not present, go to step 8 of this fault.
(7) If air is present, replace cab leveling valve (para 16-8).
u3. CAB LEVELING AIR SPRINGS DO NOT OPERATE (CONT)

8. Is air present at cab leveling valve tee fitting output port?

- **NO**
  - POSSIBLE PROBLEMS
    - Faulty air hose 522
    - Faulty cab leveling valve tee fitting
    - Faulty air hose 506
    - Faulty air/hydraulic manifold
    - Faulty pressure protection valve
    - Faulty air hose 501

- **YES**
  - Replace air hose 522 (para 23-3)
  - Go to step 9 of this fault

**KNOWN INFO**
- CTIS operates
- Air hoses free from kinks and leaks
- Variable control check valve OK
- Air hose 503 OK
- Cab leveling valve OK
- Air spring cylinders OK
- Air hoses 504 and 505 OK

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
If air is present, air hose 522 is faulty.
(1) Loosen air hose 522 at cab leveling valve tee fitting output port.
(2) Turn CAB knob to the right and push in (TM 9-2320-366-10-1).
(3) Check for presence of air at cab leveling valve tee fitting output port.
(4) Turn CAB knob to the left (TM 9-2320-366-10-1).
(5) Tighten air hose 522 at cab leveling valve tee fitting output port.
(6) If air is not present, go to step 9 of this fault.
(7) If air is present, replace cab leveling valve tee fitting (para 16-8).
9. **Is air present at cab leveling valve tee fitting input port?**

   **KNOWN INFO**
   - CTIS operates.
   - Air hoses free from kinks and leaks.
   - Variable control check valve OK.
   - Air hose 503 OK.
   - Air hose 522 OK.
   - Cab leveling valve OK.
   - Air spring cylinders OK.
   - Air hoses 504 and 505 OK.

   **POSSIBLE PROBLEMS**
   - Faulty cab leveling valve tee fitting.
   - Faulty air hose 506.
   - Faulty air/hydraulic manifold.
   - Faulty pressure protection valve.
   - Faulty air hose 501.

   **TEST OPTIONS**
   - Visual Inspection

   **REASON FOR QUESTION**
   - If air is present, cab leveling valve tee fitting is faulty.

   **If NO:**
   - Go to step 10 of this fault.

   **If YES:**
   - Replace cab leveling valve tee fitting (para 16-8).
(1) Loosen air hose 506 at cab leveling valve tee fitting input port.
(2) Turn CAB knob to the right and push in (TM 9-2320-366-10-1).
(3) Check for presence of air at air hose 506.
(4) Turn CAB knob to the left (TM 9-2320-366-10-1).
(5) Tighten air hose 506 at cab leveling valve tee fitting input port.
(6) If air is not present, go to step 10 of this fault.
(7) If air is present, replace cab leveling valve tee fitting (para 16-8).
u3. CAB LEVELING AIR SPRINGS DO NOT OPERATE (CONT)

**KNOWN INFO**
- CTIS operates.
- Air hoses free from kinks and leaks.
- Variable control check valve OK.
- Air hose 503 OK.
- Air hose 522 OK.
- Cab leveling valve tee fitting OK.
- Cab leveling valve OK.
- Air spring cylinders OK.
- Air hoses 504 and 505 OK.

**POSSIBLE PROBLEMS**
- Faulty air hose 506.
- Faulty air/hydraulic manifold.
- Faulty pressure protection valve.
- Faulty air hose 501.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
- If air is present, air hose 506 is faulty.

10. Is air present at air/hydraulic manifold BAG CYL port?

- **NO**
  - Go to step 11 of this fault.

- **YES**
  - Replace air hose 506 (para 23-3).
(1) Loosen air hose 506 at air/hydraulic manifold BAG CYL port.
(2) Turn CAB knob to the right and push in (TM 9-2320-366-10-1).
(3) Check for presence of air at air/hydraulic manifold BAG CYL port.
(4) Turn CAB knob to the left (TM 9-2320-366-10-1).
(5) Tighten air hose 506 at air/hydraulic manifold BAG CYL port.
(6) If air is not present, go to step 11 of this fault.
(7) If air is present, replace air hose 506 (para 23-3).
u3. CAB LEVELING AIR SPRINGS DO NOT OPERATE (CONT)

**KNOWN INFO**
- CTIS operates.
- Air hoses free from kinks and leaks.
- Variable control check valve OK.
- Air hose 503 OK.
- Air hose 522 OK.
- Cab leveling valve tee fitting OK.
- Air hose 506 OK.
- Cab leveling valve OK.
- Air spring cylinders OK.
- Air hoses 504 and 505 OK.

**POSSIBLE PROBLEMS**
- Faulty air/hydraulic manifold.
- Faulty pressure protection valve.
- Faulty air hose 501.

11. Is air present at air/hydraulic manifold AIR IN B port?

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
If air is present, air/hydraulic manifold is faulty.

**DECISION POINTS**
- **NO**
  - Go to step 12 of this fault.
- **YES**
  - Repair or replace air/hydraulic manifold (para 19-4).
(1) Loosen air hose 501 at air/hydraulic manifold AIR IN B port.
(2) Check for presence of air at air hose 501.
(3) Tighten air hose 501 at air/hydraulic manifold AIR IN B port.
(4) If air is not present, go to step 12 of this fault.
(5) If air is present, repair or replace air/hydraulic manifold (para 19-4).
u3. CAB LEVELING AIR SPRINGS DO NOT OPERATE (CONT)

**KNOWN INFO**
CTIS operates.
Air hoses free from kinks and leaks.
Variable control check valve OK.
Air hose 503 OK.
Air hose 522 OK.
Cab leveling valve tee fitting OK.
Air hose 506 OK.
Cab leveling valve OK.
Air spring cylinders OK.
Air hoses 504 and 505 OK.
Air/hydraulic manifold OK.

**POSSIBLE PROBLEMS**
Faulty pressure protection valve.
Faulty air hose 501.

**TEST OPTIONS**
Visual Inspection

**REASON FOR QUESTION**
If air is not present, pressure protection valve is faulty. If air is present, air hose 501 is faulty.

12. Is air present at pressure protection valve output port?

- **NO**
  - Replace pressure protection valve (para 11-29).

- **YES**
  - Replace air hose 501 (para 23-3).
(1) Loosen air hose 501 at pressure protection valve output port.
(2) Check for presence of air at pressure protection valve output port.
(3) Tighten air hose 501 at pressure protection valve output port.
(4) If air is not present, replace pressure protection valve (para 11-29).
(5) If air is present, replace air hose 501 (para 23-3).
u3. CAB LEVELING AIR SPRINGS DO NOT OPERATE (CONT)

**KNOWN INFO**

CTIS operates.
Air hoses free from kinks and leaks.
Variable control check valve OK.
Air hose 503 OK.
Air hose 522 OK.
Cab leveling valve tee fitting OK.
Air hose 506 OK.
Air/hydraulic manifold OK.
Pressure protection valve OK.
Air hose 501 OK.

**POSSIBLE PROBLEMS**

Faulty cab leveling valve.
Faulty air spring cylinder(s).
Faulty air hose(s) 504 and/or 505.

**TEST OPTIONS**

Visual Inspection

**REASON FOR QUESTION**

If air is present, cab leveling valve is faulty.

13. Is air present at cab leveling valve input ports?

**Possible Flowchart Responses:**

- **YES**
  - Go to step 14 of this fault.
  - Replace cab leveling valve (para 16-8).

- **NO**
(1) Start engine and allow air tanks to pressurize (TM 9-2320-366-10-1).
(2) Shut down engine (TM 9-2320-366-10-1).
(3) Raise cab (TM 9-2320-366-10-1).
(4) Loosen air hoses 504 and 505 at cab leveling valve input ports.
(5) Turn CAB knob to the left (TM 9-2320-366-10-1).
(6) Check for presence of air at air hoses 504 and 505.
(7) Tighten air hoses 504 and 505 at cab leveling valve input ports.
(8) If air is not present, go to step 14 of this fault.
(9) If air is present, replace cab leveling valve (para 16-8).
u3. CAB LEVELING AIR SPRINGS DO NOT OPERATE (CONT)

**KNOWN INFO**
- CTIS operates.
- Air hoses free from kinks and leaks.
- Variable control check valve OK.
- Air hose 503 OK.
- Air hose 522 OK.
- Cab leveling valve tee fitting OK.
- Air hose 506 OK.
- Air/hydraulic manifold OK.
- Pressure protection valve OK.
- Air hose 501 OK.
- Cab leveling valve OK.

**POSSIBLE PROBLEMS**
- Faulty air spring cylinder(s).
- Faulty air hose(s) 504 and/or 505.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
If air is present, air hose(s) 504 and/or 505 is faulty. If air is not present, air spring cylinder(s) is faulty.

---

14. Is air present at air spring cylinder output ports?

- **NO**
  - Replace air spring cylinder(s) (para 16-9).

- **YES**
  - Replace air hose(s) 504 and/or 505 (para 23-3).
(1) Loosen air hose 504 at RH air spring cylinder.
(2) Turn CAB knob to the left (TM 9-2320-366-10-1).
(3) Check for presence of air at RH air spring cylinder.
(4) Tighten air hose 504 at RH air spring cylinder.
(5) Repeat steps (1) through (4) on LH air spring cylinder and air hose 505.
(6) Lower cab (TM 9-2320-366-10-1).
(7) If air is not present, replace air spring cylinder(s) (para 16-9).
(8) If air is present, replace air hose(s) 504 and/or 505 (para 23-3).
2-32. DUMP BODY HYDRAULIC SYSTEM TROUBLESHOOTING

This paragraph covers Dump Body Hydraulic System Troubleshooting. The Dump Body Hydraulic System Fault Index, Table 2-60, lists faults for the Dump Body Hydraulic System of the vehicle.

Table 2-60. Dump Body Hydraulic System Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1.</td>
<td>Dump Body Does Not Raise</td>
<td>2-2238</td>
</tr>
<tr>
<td>V2.</td>
<td>Dump Body Does Not Lower</td>
<td>2-2240.2</td>
</tr>
<tr>
<td>V3.</td>
<td>Dump Body Drifts Down From Raised Position</td>
<td>2-2240.6</td>
</tr>
</tbody>
</table>
v1. DUMP BODY DOES NOT RAISE

INITIAL SETUP

Equipment Conditions
Engine shutdown (TM 9-2320-366-10-1).

Personnel Required
(2)

Materials/Parts
Rag, Wiping (Item 50, Appendix D)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

WARNING
Read WARNING and CAUTION on following page.

POSSIBLE PROBLEMS
Faulty hydraulic hoses and fittings.
Faulty hydraulic oil filter.
Faulty electrical system.
Faulty hydraulic rotary pump.
Faulty four-way relief valve.
Faulty pressure reducing valve.
Faulty dump body hoist cylinder.

TEST OPTIONS
Visual Inspection

REASON FOR QUESTION
If Class III leaks or damage is present, dump body may not raise.

1. Are hydraulic lines and hose free from Class III leaks and damage?

NO

YES

Replace leaking hydraulic hose or fitting (para 19-15).
CAUTION

Wear approved eye protection when performing pressure checks. Failure to comply may result in oil getting into eyes. If oil contacts eyes, seek medical attention immediately.

NOTE

(9) If Class III leaks are present, replace leaking hydraulic hose or fitting (para 19-15).

WARNING

Start engine (TM 9-2320-366-10-1).
(2) Position PTO switch to on (TM 9-2320-366-10-1).

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 to 1250-1450 RPM (TM 9-2320-366-10-1).
(4) Toggle DUMP UP/DOWN switch to UP position momentarily (TM 9-2320-366-10-1).
(5) Check hydraulic hoses and fittings for Class III leaks.

NOTE

In the event of a tachometer failure, a HAND THROTTLE lever positioned to L is approximately 1,250-1,450 RPM.

(6) Set engine speed to 750 RPM (TM 9-2320-366-10-1).
(7) Position PTO switch to off (TM 9-2320-366-10-1).
(8) Shut down engine (TM 9-2320-366-10-1).
(9) If Class III leaks are present, replace leaking hydraulic hose or fitting (para 19-15).
### Known Info

<table>
<thead>
<tr>
<th>Hydraulic oil level OK.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTO OK.</td>
</tr>
<tr>
<td>Hydraulic hoses and fittings OK.</td>
</tr>
</tbody>
</table>

### Possible Problems

- Faulty hydraulic oil filter.
- Faulty electrical system.
- Faulty hydraulic rotary pump.
- Faulty four-way relief valve.
- Faulty pressure reducing valve.
- Faulty dump body hoist cylinder.

---

**Test Options**

- Visual Inspection

**Reason for Question**

If hydraulic oil filter is clogged or damaged, dump body may not raise.

---

**WARNING**

Read WARNING on following page.

---

**2.** Is hydraulic oil filter free of debris.

- **NO**
  - Replace hydraulic oil filter (para 19-13).
- **YES**
  - Perform Electrical System troubleshooting task e143. M1090/M1094 Dump Body Does Not Raise.
WARNING

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.

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.

Lubricating oil is slippery and can cause falls. Wipe up spilled oil with rags. Failure to comply may result in injury to personnel.

(1) Service hydraulic oil filter (para 19-13).
(2) If hydraulic oil filter is damaged or blocked, replace hydraulic oil filter (para 19-13).
(3) If hydraulic oil filter is not damaged or blocked, perform Electrical System troubleshooting task e143. M1090/M1094 Dump Body Does Not Raise.
v2. DUMP BODY DOES NOT LOWER

INITIAL SETUP

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

**Personnel Required**
(2)

**Materials/Parts**
Rag, Wiping (Item 50, Appendix D)

**Tools and Special Tools**
Tool Kit, Genl Mech (Item 46, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

---

**KNOWN INFO**
Hydraulic oil level OK. PTO OK.

**POSSIBLE PROBLEMS**
Faulty hydraulic hoses and fittings.
Faulty electrical system.
Faulty hydraulic oil filter.
Faulty four-way relief valve.
Faulty dump body hoist cylinder.

---

**TEST OPTIONS**

**REASON FOR QUESTION**
If Class III leaks or damage is present, dump body may not lower.

---

1. Are hydraulic lines and hose free from Class III leaks and damage?

---

**WARNING**

**CAUTION**

Read WARNING and CAUTION on following page.

---

**YES**
Replace leaking hydraulic hose or fitting (para 19-15).

---

**NO**
WARNING

Wear approved eye protection when performing pressure checks. Failure to comply may result in oil getting into eyes. If oil contacts eyes, seek medical attention immediately.

(1) Start engine (TM 9-2320-366-10-1).
(2) Position PTO switch to on (TM 9-2320-366-10-1).

CAUTION

Keep tachometer within 1,250-1,450 RPM when PTO is engaged. 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 to 1250-1450 RPM (TM 9-2320-366-10-1).
(4) Toggle DUMP UP/DOWN switch to UP position momentarily (TM 9-2320-366-10-1).
(5) Check hydraulic hoses and fittings for Class III leaks.

NOTE

In the event of a tachometer failure, a HAND THROTTLE lever positioned to L is approximately 1,250-1,450 RPM.

(6) Set engine speed to 750 RPM (TM 9-2320-366-10-1).
(7) Position PTO switch to off (TM 9-2320-366-10-1).
(8) Shut down engine (TM 9-2320-366-10-1).
(9) If Class III leaks are present, replace leaking hydraulic hose or fitting (para 19-15).
2. DUMP BODY DOES NOT LOWER (CONT)

**Known Info**

- Hydraulic oil level OK.
- PTO OK.
- Hydraulic hoses and fittings OK.

**Possible Problems**

- Faulty hydraulic oil filter.
- Faulty electrical system.
- Faulty four-way relief valve.
- Faulty dump body hoist cylinder.

**Test Options**

- Visual Inspection

**Reason for Question**

If hydraulic oil filter is clogged or damaged, dump body may not lower.

**Flowchart**

1. **Is hydraulic oil filter free of debris?**
   - **YES**
     - Replace hydraulic oil filter (para 19-13).
   - **NO**
     - Perform Electrical System troubleshooting task e144. M1090/M1094 Dump Body Does Not Lower.

**WARNING**

Read WARNING on following page.
WARNING

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.

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.

Lubricating oil is slippery and can cause falls. Wipe up spilled oil with rags. Failure to comply may result in injury to personnel.

(1) Service hydraulic oil filter (para 19-13).
(2) If hydraulic oil filter is damaged or blocked, replace hydraulic oil filter (para 19-13).
(3) If hydraulic oil filter is not damaged or blocked, perform Electrical System troubleshooting task e144. M1090/M1094 Dump Body Does Not Lower.
### INITIAL SETUP

**Equipment Conditions**

- Engine shutdown (TM 9-2320-366-10-1).

**Personnel Required**

- (2)

**Materials/Parts**

- Rag, Wiping (Item 50, Appendix D)

**Tools and Special Tools**

- Tool Kit, Genl Mech (Item 46, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)

### KNOWN INFO

- Hydraulic oil level OK.
- PTO OK.

### POSSIBLE PROBLEMS

- Faulty hydraulic hoses and fittings.
- Faulty counterbalance valve.
- Faulty dump body hoist cylinder.

### TEST OPTIONS

**Visual Inspection**

- If Class III leaks or damage is present, dump body may drift down from raised position.

### REASON FOR QUESTION

- Are hydraulic lines and hose free from Class III leaks and damage?

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAUTION</td>
</tr>
</tbody>
</table>

- Read WARNING and CAUTION on following page. 

---

1. **YES**

   - Replace leaking hydraulic hose or fitting (para 19-15).

   - Notify DS Maintenance.

---

1. **NO**
WARNING

Wear approved eye protection when performing pressure checks. Failure to comply may result in oil getting into eyes. If oil contacts eyes, seek medical attention immediately.

(1) Start engine (TM 9-2320-366-10-1).
(2) Position PTO switch to on (TM 9-2320-366-10-1).

CAUTION

Keep tachometer within 1,250-1,450 RPM when PTO is engaged. 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 to 1250-1450 RPM (TM 9-2320-366-10-1).
(4) Toggle DUMP UP/DOWN switch to UP position momentarily (TM 9-2320-366-10-1).
(5) Check hydraulic hoses and fittings for Class III leaks.

NOTE

In the event of a tachometer failure, a HAND THROTTLE lever positioned to L is approximately 1,250-1,450 RPM.

(6) Set engine speed to 750 RPM (TM 9-2320-366-10-1).
(7) Position PTO switch to off (TM 9-2320-366-10-1).
(8) Shut down engine (TM 9-2320-366-10-1).
(9) If Class III leaks are present, replace leaking hydraulic hose or fitting (para 19-15).
(10) If Class III leaks are not present, notify DS Maintenance.
2-33. WRECKER HYDRAULIC SYSTEM TROUBLESHOOTING

This paragraph covers Wrecker Hydraulic System Troubleshooting. The Wrecker Hydraulic System Fault Index, Table 2-61, lists faults for the Wrecker Hydraulic System of the vehicle.

Table 2-61. Wrecker Hydraulic System Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>w1</td>
<td>M1089 Material Handling Crane (MHC) Does Not Operate</td>
<td>2-2244</td>
</tr>
<tr>
<td>w2</td>
<td>M1089 Stifflegs/Left 30K Winch/15K SRW Do Not Operate</td>
<td>2-2246</td>
</tr>
<tr>
<td>w3</td>
<td>M1089 Stiffleg(s) Does Not Operate or Operates Slowly</td>
<td>2-2248</td>
</tr>
<tr>
<td>w4</td>
<td>M1089 Left 30K Winch Does Not Operate</td>
<td>2-2254</td>
</tr>
<tr>
<td>w5</td>
<td>M1089 Stinger/Telescopic Lift Cylinders/Fold Cylinder/Right 30K Winch Do Not Operate</td>
<td>2-2256</td>
</tr>
<tr>
<td>w6</td>
<td>M1089 Stinger Does Not Operate</td>
<td>2-2258</td>
</tr>
<tr>
<td>w7</td>
<td>M1089 Underlift Telescopic Lift Cylinder(s) Does Not Operate</td>
<td>2-2260</td>
</tr>
<tr>
<td>w8</td>
<td>M1089 Fold Cylinder Does Not Operate</td>
<td>2-2262</td>
</tr>
<tr>
<td>w9</td>
<td>M1089 Right 30K Winch Does Not Operate</td>
<td>2-2264</td>
</tr>
<tr>
<td>w10</td>
<td>M1089 Material Handling Crane (MHC) Hand Pump Does Not Work</td>
<td>2-2266</td>
</tr>
<tr>
<td>w11</td>
<td>No Service or External Hydraulic Power From M1089</td>
<td>2-2268</td>
</tr>
</tbody>
</table>
1. M1089 MATERIAL HANDLING CRANE (MHC) 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)

**KNOWN INFO**
PTO OK.
Left 30K winch OK.
Right 30K winch OK.
Stifflegs OK.
15K self-recovery winch OK.
Underlift OK.

**POSSIBLE PROBLEMS**
Damaged hydraulic tube(s) or fitting(s).
Faulty electrical system.

**TEST OPTIONS**
Visual inspection

**REASON FOR QUESTION**
Oil quantity may be insufficient to operate MHC if hydraulic hoses are leaking or damaged.

**START**

1. Are hydraulic tubes and fittings to MHC free from leaks and damage?
   - **NO**
     - Replace damaged oil tube(s) and fitting(s) (para 17-15).
   - **YES**
     - Perform Electrical System Troubleshooting (e120. M1089 Material Handling Crane (MHC) Does Not Operate).
(1) Check hydraulic tube and fittings between pump and check valve for leaks and damage.
(2) Check hydraulic tube and fittings between check valve and port P of MHC for leaks and damage.
(3) Check for proper hydraulic fluid level at reservoir (TM 9-2320-366-10-1).
(4) If hydraulic tube(s) or fitting(s) is not free from leaks or damage, replace tube(s) or fitting(s) (para 17-15).
(5) If hydraulic tubes and fitting are free from leaks and damage, perform Electrical System Troubleshooting (e120. M1089 Material Handling Crane (MHC) Does Not Operate).
## INITIAL SETUP

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

**Personnel Required**
- (2)

**Materials/Parts**
- Rag, Wiping (Item 50, Appendix D)
- Cap and Plug Set (Item 14, Appendix D)

**Known Info**
- Hydraulic oil level OK.
- PTO OK.
- Right 30K winch OK.
- Stinger OK.
- Folding cylinder OK.
- Lift cylinders OK.
- MHC OK.

**Possible Problems**
- Faulty hydraulic pump.
- Faulty linear directional valve.
- Faulty upper main control valve.

## Test Options

<table>
<thead>
<tr>
<th>Test Options</th>
<th>Reason for Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>CK4 Check Valve</td>
<td>If pressure is between 2400-3000 psi at output hose of hydraulic pump, main control</td>
</tr>
<tr>
<td>Pressure Test</td>
<td>valve is faulty. If pressure is below 2400 psi, pump is faulty.</td>
</tr>
</tbody>
</table>

**START**

**Is pressure present at pump output?**

**NOTICE**

Read **WARNING** on following page.

- Notify DS Maintenance.

---

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

- Drop hydraulic pressure to zero before disconnecting any hydraulic hoses, tubes and fittings. Failure to comply may result in injury to personnel.
- Wear approved eye protection when performing pressure checks. Failure to comply may result in oil getting into eyes. If oil contacts eyes, seek medical attention immediately.
- Fuel and oil are slippery and can cause falls. Wipe up spilled fuel or oil with rags. Failure to comply may result in injury to personnel.

NOTE

Adapter and tee kit used in this STE/ICE test, includes:
(a) 3/4" swivel nut run tee.
(b) 1/2" internal pipe, 3/4" 37 degree flare swivel adapter.

PRESSURE TEST

1. Place drain pan under vehicle.
2. Disconnect hydraulic pressure hose from lower main pressure tube.
3. Connect STE/ICE-R, with adapter and tee, between hydraulic pressure hose and tube.
5. Position PTO switch to on (TM 9-2320-366-10-1).
6. Perform STE/ICE-R test #51 (TM 9-4910-571-12&P) and note pressure reading is between 2400-3000 psi (16,548-20,685 kPa).
7. If pressure noted in step (6) is below 2400 psi (16,548 kPa), notify DS Maintenance.
8. If pressure noted in step (6) is between 2400-3000 kPa) notify DS Maintenance.
11. Disconnect STE/ICE-R, tee, and adapter from pressure line.
12. Connect hydraulic pressure hose to lower main pressure tube.
13. Tighten hydraulic hose to 36-39 lb-ft (49-53 N·m).
1. Are hydraulic hoses, tubes and fittings free from leaks or damage?

**WARNING**
Read WARNING on following page.

**REASON FOR QUESTION**
Leaking hydraulic hoses, tubes or fittings will cause stifflegs to operate slowly or not at all.

YES

NO

Tighten loose fitting(s) and replace damaged hydraulic hose(s), tubes(s) and fitting(s) (para 19-16, 19-17).

START

**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>Personnel Required</td>
<td>Pan, Drain (Item 24, Appendix C)</td>
</tr>
<tr>
<td>(2)</td>
<td>Trestle, Motor Vehicle Maintenance (Item 47, Appendix C)</td>
</tr>
<tr>
<td>Materials/Parts</td>
<td>Goggles, Industrial (Item 15, Appendix C)</td>
</tr>
<tr>
<td>Rag, Wiping (Item 50, Appendix D)</td>
<td>Transducer, STE/ICE-R (Item 1, Appendix J)</td>
</tr>
<tr>
<td>Lockwasher (6) (Item 100, Appendix G)</td>
<td></td>
</tr>
<tr>
<td>Cap and Plug Set (Item 14, Appendix D)</td>
<td>References</td>
</tr>
<tr>
<td></td>
<td>TM 9-4910-571-12&amp;P</td>
</tr>
</tbody>
</table>

**KNOWLEDGE INFO**

- Hydraulic oil level OK.
- PTO OK.
- Left 30K winch OK.
- 15K self-recovery winch OK.

**POSSIBLE PROBLEMS**

- Faulty hydraulic hoses tubes and fittings.
- Faulty upper main control valve.
- Faulty stiffleg relief valve.
- Faulty stiffleg cylinder.
WARNING

- Drop hydraulic pressure to zero before disconnecting any hydraulic hoses, tubes, and fittings. Failure to comply may result in injury to personnel.
- Wear approved eye protection when performing pressure checks. Failure to comply may result in oil getting into eyes. If oil contacts eyes, seek medical attention immediately.
- Fuel and oil are slippery and can cause falls. Wipe up spilled fuel or oil with rags. Failure to comply may result in injury to personnel.

1. Place drain pan under vehicle.
2. Remove four screws, lockwashers, and washers from middle control panel cover. Discard lockwashers.
3. Remove two screws, washers, lockwashers, nuts and middle control panel cover from control panel. Discard lockwashers.
4. Check hydraulic hoses, tubes and fittings for leakage and damage from upper main control valve to stiffleg cylinders.
5. Position middle control panel cover on control panel with two screws, washers, lockwashers and nuts.
6. Install four washers, lockwashers and screws in middle control panel cover.
w3. M1089 STIFFLEG(S) DOES NOT OPERATE OR OPERATES SLOWLY (CONT)

**KNOWING INFO**
- Hydraulic oil level OK.
- PTO OK.
- Left 30K winch OK.
- 15K self-recovery winch OK.
- Hydraulic hoses, tubes and fittings OK.

**POSSIBLE PROBLEMS**
- Faulty upper main control valve.
- Faulty stiffleg relief valve.
- Faulty stiffleg cylinder.

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

   **TEST OPTIONS**
   - V1 Pressure Test

   **REASON FOR QUESTION**
   - Stiffleg(s) will not operate if upper main control valve is faulty.

   Is pressure present at port V1 of cylinder for affected stiffleg?

   - **YES**
     - Notify DS Maintenance.
   - **NO**

V1 PRESSURE TEST

1) If stiffleg has failed in an off-the-ground position, place trestle under foot of stiffleg before doing tests.
2) Open box lid over affected stiffleg and slide off cylinder cover.
3) Disconnect UP pressure hose at V1 port of affected stiffleg cylinder.
4) Cap V1 fitting on top of cylinder.
5) Connect STE/ICE-R transducer and adapter onto end of disconnected UP pressure hose.
6) Start engine (TM 9-2320-366-10-1).
7) Position PTO switch to on (TM 9-2320-366-10-1).
8) Perform STE/ICE-R test # 51. (TM 9-4910-571-12&P).
9) Momentarily position stiffleg lever for affected stiffleg to UP position, release lever.
10) Observe pressure reading. If pressure is below 3000 psi (20,685 kPa), notify DS Maintenance.
12) Shut down engine (TM 9-2320-366-10-1).
13) Disconnect STE/ICE-R from UP pressure hose.
14) Remove cap from V1 fitting on top of cylinder.
15) Connect UP pressure hose to V1 port of cylinder.
16) Close box lid cover over affected stiff leg cylinder.
17) Remove trestle if required.
3. **M1089 STIFFLEG(S) DOES NOT OPERATE OR OPERATES SLOWLY (CONT)**

<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></td>
<td>Faulty relief valve or stiffleg cylinder will cause stiffleg to drift or to not work.</td>
</tr>
<tr>
<td>PTO OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left 30K winch OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15K self-recovery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>winch OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydraulic hoses, tubes and fittings OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POSSIBLE PROBLEMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty stiffleg relief valve.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty left stiffleg cylinder.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Is affected stiffleg cylinder leaking oil?

- **YES**
  - Notify DS Maintenance.

- **NO**
  - Notify DS Maintenance.
### STIFFLEG CYLINDER INSPECTION

2. Position PTO switch to on (TM 9-2320-366-10-1).
3. If stiffleg will operate, lower and raise left stiffleg two or more times (TM 9-2320-366-10-1) and observe stiffleg for leaks.
4. If leaks are observed in step (3) notify DS Maintenance.
5. If cylinder is dry, notify DS Maintenance.
7. Shut down engine (TM 9-2320-366-10-1).
8. Slide cover over cylinder into closed position.
9. Remove drain pan from under vehicle.
w4. M1089 LH 30K WINCH DOES NOT OPERATE

INITIAL SETUP

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

**Materials/Parts**
Rag, Wiping (Item 50, Appendix D)

**Tools and Special Tools**
Tool Kit, Genl Mech (Item 46, Appendix C)
Pan, Drain (Item 24, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

**WARNING**
Read WARNING on following page.

**KNOWLEDGMENT**

Hydraulic tank oil level OK.
MAIN WINCH LH FREESPOOL switch to OFF.
MAIN WINCH LH FREESPOOL switch OK.

**POSSIBLE PROBLEMS**
Faulty hydraulic tubes and fittings.
Faulty upper main valve assembly.
Faulty pressure relief valve assembly.
Faulty LH 30K winch assembly.

**TEST OPTIONS**

Visual Inspection

**REASON FOR QUESTION**
Leaking hydraulic tubes or fittings will cause LH 30K winch not to operate.

**START**

1. Are hydraulic tubes and fittings free from leaks or damage?

**YES**
Tighten loose fitting(s) and replace damaged hydraulic tube(s) and fitting(s) (para 17-27).

**NO**
WARNING

Drop hydraulic pressure to zero before disconnecting any hydraulic hoses, tubes, and fittings. Failure to comply may result in injury to personnel.

Wear approved eye protection when performing pressure checks. Failure to comply may result in oil getting into eyes. If oil contacts eyes, seek medical attention immediately.

Fuel and oil are slippery and can cause falls. Wipe up spilled fuel or oil with rags. Failure to comply may result in injury to personnel.

(1) Check hydraulic tubes and fittings for leakage and damage.

(2) If hydraulic tubes and fittings are leaking or damaged, tighten loose fitting(s) and replace damaged hydraulic tube(s) and fitting(s).
**Known Info**

- Hydraulic tank oil level OK.
- MAIN WINCH LH FREESPOOL switch to OFF.
- MAIN WINCH LH FREESPOOL switch OK.
- Hydraulic tubes and fittings OK.

**Possible Problems**

- Faulty upper main valve assembly.
- Faulty pressure relief valve assembly.
- Faulty LH 30K winch assembly.

**Test Options**

- Operational Test

**Reason for Question**

This question eliminates possible problems and determines where to continue troubleshooting.

**Diagram**

2. Do LH and RH stifflegs operate?

- **NO**
  - Perform Wrecker Hydraulic System Troubleshooting task w2. M1089 STIFFLEGS/ LEFT 30K WINCH/ 15K SRW DO NOT OPERATE.

- **YES**
  - Notify DS Maintenance.
OPERATIONAL TEST

(1) Attempt to operate LH and RH stifflegs (TM 9-2320-366-10-2).
(2) If LH and RH stifflegs do not operate, perform Wrecker Hydraulic System Troubleshooting task w2. M1089 STIFFLEGS/ LEFT 30K WINCH/ 15K SRW DO NOT OPERATE.
(3) If LH and RH stifflegs does operate, notify DS Maintenance.
**INITIAL SETUP**

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

**Personnel Required**
(2)

**Material/Parts**
Rag, Wiping (Item 50, Appendix D)

**Tools and Special Tools**
- Tool Kit, Gen Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Pan, Drain (Item 24, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)
- Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)
- Transducer, STE/ICE-R (Item 1, Appendix J)

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

---

**KNOWLEDGE INFO**
- Hydraulic oil level OK.
- PTO OK.
- Left 30K winch OK.
- Stifflegs OK.
- 15K self-recovery winch OK.

**POSSIBLE PROBLEMS**
- Faulty lower main control valve.
- Faulty three stage hydraulic pump.

**START**

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

   Is pressure present at three stage hydraulic pump output?

   **NO**

   **YES**

   Notify DS Maintenance.

   Notify DS Maintenance.
WARNING

- Drop hydraulic pressure to zero before disconnecting any hydraulic hoses, tubes, and fittings. Failure to comply may result in injury to personnel.
- Wear approved eye protection when performing pressure checks. Failure to comply may result in oil getting into eyes. If oil contacts eyes, seek medical attention immediately.
- Fuel and oil are slippery and can cause falls. Wipe up spilled fuel or oil with rags. Failure to comply may result in injury to personnel.

NOTE

Tee and adapter used in STE/ICE test are:
(a) 3/4” swivel nut run tee.
(b) Internal pipe 1/2” F/ 37 degree flair 3/4”F swivel adapter.

PRESSURE TEST

(1) Place drain pan under vehicle.
(2) Disconnect hydraulic pressure hose from upper main pressure tube.
(3) Connect STE/ICE-R, with adapter and tee between hydraulic pressure hose and tube.
(4) Start engine (TM 9-2320-366-10-1).
(5) Position PTO switch to on (TM 9-2320-366-10-1).
(6) Perform STE/ICE-R test #51 (TM 9-4910-571-12&P) and note pressure reading is between 2400-3000 psi (16,548-20,685 kPa).
(7) If pressure noted in step (6) is below 2400 psi (16,548 kPa), notify DS Maintenance.
(8) If pressure noted in step (6) is between 2400-3000 psi (16,548-20,685 kPa), notify DS Maintenance.
(9) Position PTO switch to off (TM 9-2320-366-10-1).
(10) Shut down engine (TM 9-2320-366-10-1).
(11) Disconnect STE/ICE-R test equipment, adapter and tee from hydraulic pressure hose.
(12) Connect hydraulic pressure hose to upper main pressure tube valve.
(13) Tighten hydraulic tube fitting to 36-39 lb-ft (49-53 N-m).
(14) Remove drain pan from under vehicle.
w6. M1089 STINGER 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, Gen Mech (Item 46, Appendix C)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic oil level OK.</td>
</tr>
<tr>
<td>PTO OK.</td>
</tr>
<tr>
<td>Right main winch OK.</td>
</tr>
<tr>
<td>Folding cylinder OK.</td>
</tr>
<tr>
<td>Stiffleg cylinder OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty stinger hydraulic system.</td>
</tr>
<tr>
<td>Faulty stinger electrical system.</td>
</tr>
</tbody>
</table>

1. Does stinger operate from wrecker control panel only?

   - **YES**: Notify DS Maintenance.

   - **NO**: Perform Electrical System Troubleshooting (e138. All Wrecker Functions Do Not Operate From Wrecker Control Panel).
STINGER OPERATIONAL CHECK

(1) Connect remote control unit to RH remote control hook-up (J2) at rear of vehicle.
(2) Start engine (TM 9-2320-366-10-1).
(3) Position PTO switch to on (TM 9-2320-366-10-1).
(4) Position STATION SELECTOR switch to REMOTE CONTROL.
(5) Check if stinger operates at remote control (TM 9-2320-366-10-1).
(6) Position STATION SELECTOR switch to WRECKER CONTROL panel.
(7) Check if stinger operates IN or OUT from wrecker control panel (TM 9-2320-366-10-1).
(8) If stinger does not operate from remote or wrecker control panel, notify DS Maintenance.
(9) If stinger operates from wrecker control panel but not remote, perform Electrical System Troubleshooting (e138. All Wrecker Functions Do Not Operate From Wrecker Control Panel).
(10) Position PTO switch to off (TM 9-2320-366-10-1).
(11) Shut down engine (TM 9-2320-366-10-1).
(12) Remove and stow remote control unit and cable.
INITIAL SETUP

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

Tools and Special Tools
Tool Kit, Gen Mech (Item 46, Appendix C)

w7. M1089 UNDERLIFT TELESCOPIC LIFT CYLINDER(S) DOES NOT OPERATE

<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>Underlift Operation Check</td>
<td>If underlift operates from wrecker control panel and not from remote, underlift electrical system is faulty.</td>
</tr>
<tr>
<td>PTO OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right 30K winch OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Folding cylinder OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stinger cylinder OK.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POSSIBLE PROBLEMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty underlift hydraulic system.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty underlift electrical system.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Do underlift cylinders operate from wrecker control panel only?

- **NO**
  - Notify DS Maintenance.

- **YES**
  - Perform Electrical System Troubleshooting (e137. All Wrecker Functions Do Not Operate From Wrecker Remote Control).
<table>
<thead>
<tr>
<th>UNDERLIFT OPERATIONAL CHECK</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Connect remote control unit to RH remote control hook-up (J2) at rear of vehicle.</td>
</tr>
<tr>
<td>(2) Start engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(3) Position PTO switch to on (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(4) Position STATION SELECTOR switch to REMOTE CONTROL.</td>
</tr>
<tr>
<td>(5) Check if underlift operates at remote control (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(6) Position STATION SELECTOR switch to WRECKER CONTROL panel.</td>
</tr>
<tr>
<td>(7) Check if underlift operates UP or DOWN from wrecker control panel (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(8) If underlift does not operate from remote or wrecker control panel, notify DS Maintenance.</td>
</tr>
<tr>
<td>(9) If underlift operates from wrecker control panel but not remote, perform Electrical System Troubleshooting (e137. All Wrecker Functions Do Not Operate From Wrecker Remote Control).</td>
</tr>
<tr>
<td>(10) Position PTO switch to off (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(11) Shut down engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(12) Remove and stow remote control.</td>
</tr>
</tbody>
</table>
w8. M1089 FOLDING CYLINDER 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)

START

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic oil level OK.</td>
</tr>
<tr>
<td>PTO OK.</td>
</tr>
<tr>
<td>Right 30K winch OK.</td>
</tr>
<tr>
<td>Stinger cylinder OK.</td>
</tr>
<tr>
<td>Underlift OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty underlift fold hydraulic system.</td>
</tr>
<tr>
<td>Faulty electrical system.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does folding cylinder operate from wrecker control panel only?</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If folding cylinder operates from wrecker control panel and not from remote, electrical system is faulty.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notify DS Maintenance.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perform Electrical System Troubleshooting (e137. All Wrecker Functions Do Not Operate From Wrecker Remote Control).</td>
</tr>
</tbody>
</table>
REMOTE CONTROL TEST

(1) Connect remote control unit to RH remote control connector (J2) at rear of wrecker (TM 9-2320-366-10-1).
(2) Start engine (TM 9-2320-366-10-1).
(3) Position PTO switch to on (TM 9-2320-366-10-1).
(4) Position STATION SELECTOR switch to REMOTE CONTROL (TM 9-2320-366-10-1).
(5) Check if folding cylinder operates (UP or DOWN) at REMOTE CONTROL panel (TM 9-2320-366-10-1).
(6) Position STATION SELECTOR switch to WRECKER CONTROL panel (TM 9-2320-366-10-1).
(7) Check if folding cylinder operates (UP or DOWN) from wrecker control panel.
(8) If folding cylinder does not operate from remote or wrecker control panels, notify DS Maintenance.
(9) If folding cylinder operates from wrecker control panel but not from remote, perform Electrical System Troubleshooting (e137. All Wrecker Functions Do Not Operate From Wrecker Remote Control).
(10) Position PTO switch to off (TM 9-2320-366-10-1).
(11) Shut down engine (TM 9-2320-366-10-1).
(12) Disconnect remote control unit and stow.
w9. M1089 RH 30K WINCH DOES NOT OPERATE

INITIAL SETUP

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

Materials/Parts
Rag, Wiping (Item 50, Appendix D)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Pan, Drain (Item 24, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

START

WARNING
Read WARNING on following page.

1.
Are hydraulic tubes and fittings free from leaks or damage?

YES

NO

Tighten loose fitting(s) and replace damaged hydraulic tube(s) and fitting(s) (para 17-27).

TEST OPTIONS
Visual Inspection

REASON FOR QUESTION
Leaking hydraulic tubes or fittings will cause RH 30K winch not to operate.

KNOWN INFO
Hydraulic tank oil level OK.
MAIN WINCH RH FREESPOOL switch to OFF.
MAIN WINCH RH FREESPOOL switch OK.

POSSIBLE PROBLEMS
Faulty hydraulic tubes and fittings.
Faulty lower main valve assembly.
Faulty pressure relief valve assembly.
Faulty RH 30K winch assembly.
WARNING

Drop hydraulic pressure to zero before disconnecting any hydraulic hoses, tubes, and fittings. Failure to comply may result in injury to personnel.

Wear approved eye protection when performing pressure checks. Failure to comply may result in oil getting into eyes. If oil contacts eyes, seek medical attention immediately.

Fuel and oil are slippery and can cause falls. Wipe up spilled fuel or oil with rags. Failure to comply may result in injury to personnel.

(1) Place drain pan under vehicle.
(2) Check hydraulic tubes and fittings for leakage and damage.
2. Does underlift fold cylinder operate?

**KNOWN INFO**
- Hydraulic tank oil level OK.
- MAIN WINCH RH FREESPOOL switch to OFF.
- MAIN WINCH RH FREESPOOL switch OK.
- Hydraulic tubes and fittings OK.

**POSSIBLE PROBLEMS**
- Faulty lower main valve assembly.
- Faulty pressure relief valve assembly.
- Faulty RH 30K winch assembly.

**TEST OPTIONS**
- Operational Test

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

**YES**
- Perform Wrecker Hydraulic System Troubleshooting task w5. M1089 STINGER/TELESCOPIC LIFT CYLINDERS/FOLD CYLINDER/RIGHT 30K WINCH DO NOT OPERATE.

**NO**
- Notify DS Maintenance.
(1) Attempt to operate underlift (TM 9-2320-366-10-2).
(2) If underlift does not operate, perform Wrecker Hydraulic System Troubleshooting task w5. M1089 STINGER/TELESCOPIC LIFT CYLINDERS/FOLD CYLINDER/RIGHT 30K WINCH DO NOT OPERATE.
(3) If underlift does operate, notify DS Maintenance.
10. M1089 MATERIAL HANDLING CRANE (MHC) HAND PUMP DOES NOT WORK

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)
Pan, Drain (Item 24, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

Materials/Parts
Rag, Wiping (Item 50, Appendix D)

KNOWN INFO
Hydraulic oil level OK.
Hydraulic lines and fittings OK.
All functions operate with PTO engaged.

POSSIBLE PROBLEMS
Faulty input check valve.
Faulty hand pump.

WARNING
Read WARNING on following page.

START

Does hand pump build pressure?

TEST OPTIONS
Hand Pump Test

REASON FOR QUESTION
Faulty check valve or hand pump will prevent manual operation of crane.

NO

YES

Notify DS Maintenance.

Notify DS Maintenance.
WARNING

- Drop hydraulic pressure to zero before disconnecting any hydraulic line. Failure to comply may result in injury to personnel.
- Wear approved eye protection when performing pressure checks. Failure to comply may result in oil getting into eyes. If oil contacts eyes, seek medical attention immediately.
- Fuel and oil are slippery and can cause falls. Wipe up spilled fuel or oil with rags. Failure to comply may result in injury to personnel.

HAND PUMP TEST

1. Disconnect hand pump delivery line from elbow at hand pump.
2. Place drain pan under port at pump to catch hydraulic fluid.
4. Check if hydraulic fluid pumps out of port with each stroke.
5. If little or no hydraulic fluid pumps out, hand pump is faulty.
6. Connect delivery line to elbow at hand pump.
7. Remove drain pan.
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)
Pan, Drain (Item 24, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

Materials/Parts
Rag, Wiping (Item 50, Appendix D)
Lockwasher (6) (Item 100, Appendix G)

KNOWLEDGE INFO
Hydraulic oil level OK.
PTO OK.
Normal wrecker functions OK.

POSSIBLE PROBLEMS
Leaking or damaged hydraulic hoses, tubes and/or fittings.
Faulty linear directional valve.
Faulty slaved vehicle or external power tool.

WARNING
Read WARNING on following page.

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
Hydraulic oil quantity may be insufficient to operate slave or external power if hoses, tubes or fittings are damaged.

1. Are hydraulic hoses, tubes and fittings free from leaks and damage?

NO

YES

Tighten loose fitting(s) and replace damaged hydraulic hose(s), tube(s) and/or fitting(s) (para 19-17, 19-18).

Perform Electrical System Troubleshooting (e138. All Wrecker Functions Do Not Operate From Wrecker Control Panel).
WARNING

- Drop hydraulic pressure to zero before disconnecting any hydraulic line. Failure to comply may result in injury to personnel.
- Wear approved eye protection when performing pressure checks. Failure to comply may result in oil getting into eyes. If oil contacts eyes, seek medical attention immediately.
- Fuel and oil are slippery and can cause falls. Wipe up spilled fuel or oil with rags. Failure to comply may result in injury to personnel.

(1) Place drain pan under vehicle.
(2) Remove four screws, lockwashers and washers from middle control panel cover. Discard lockwashers.
(3) Remove two screws, washers, lockwashers, nuts and middle control panel cover from control panel. Discard lockwashers.
(4) Check hydraulic hoses, tubes and fittings from linear directional valve to slave and external output ports.
(5) Position middle control panel cover on control panel with two screws, washers and nuts.
(6) Install four washers, lockwashers, and screws in middle control panel cover.
This paragraph covers Special Purpose Kit Troubleshooting. The Special Purpose Kit Fault Index, Table 2-62, lists faults for the Special Purpose Kits of the vehicle.

### Table 2-62. Special Purpose Kit Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>x1.</td>
<td>No Power to Digitization Rack</td>
<td>2-2272</td>
</tr>
<tr>
<td>x2.</td>
<td>No Power to Mobile Tracking System (MTS) Sense</td>
<td>2-2282</td>
</tr>
<tr>
<td>x3.</td>
<td>No Power to Enhanced Position Location Reporting System (EPLRS)</td>
<td>2-2288</td>
</tr>
<tr>
<td>x4.</td>
<td>No Power to Precision Lightweight Global Positioning System Receiver (PLGR)</td>
<td>2-2292</td>
</tr>
<tr>
<td>x5.</td>
<td>No Power to Drive Visual Enhancement (DVE)</td>
<td>2-2296</td>
</tr>
<tr>
<td>x6.</td>
<td>No Power to SINCGAR/Force XXI Battle Command Brigade and Below (FBCB)</td>
<td>2-2300</td>
</tr>
<tr>
<td>x7.</td>
<td>No Power to Mobile Tracking System (MTS)</td>
<td>2-2304</td>
</tr>
<tr>
<td>x8.</td>
<td>Deleted</td>
<td>2-2310</td>
</tr>
<tr>
<td>x9.</td>
<td>Deleted</td>
<td>2-2314</td>
</tr>
<tr>
<td>x10.</td>
<td>Deleted</td>
<td>2-2324</td>
</tr>
<tr>
<td>x11.</td>
<td>Deleted</td>
<td>2-2326</td>
</tr>
<tr>
<td>x12.</td>
<td>Deleted</td>
<td>2-2332</td>
</tr>
<tr>
<td>x13.</td>
<td>Deleted</td>
<td>2-2344</td>
</tr>
<tr>
<td>x14.</td>
<td>Deleted</td>
<td>2-2354</td>
</tr>
<tr>
<td>x15.</td>
<td>Deleted</td>
<td>2-2356</td>
</tr>
<tr>
<td>x16.</td>
<td>Deleted</td>
<td>2-2362</td>
</tr>
<tr>
<td>x17.</td>
<td>Deleted</td>
<td>2-2368</td>
</tr>
<tr>
<td>x18.</td>
<td>Troop Transport Alarm Does Not Operate</td>
<td>2-2372</td>
</tr>
<tr>
<td>x19.</td>
<td>Light Material Handling Crane (LMHC) Does Not Operate</td>
<td>2-2382</td>
</tr>
<tr>
<td>x20.</td>
<td>Light Material Handling Crane (LMHC) Hoist In Does Not Operate</td>
<td>2-2400</td>
</tr>
<tr>
<td>x21.</td>
<td>Light Material Handling Crane (LMHC) Hoist Out Does Not Operate</td>
<td>2-2404</td>
</tr>
</tbody>
</table>
x1. NO POWER TO DIGITIZATION RACK

INITIAL SETUP

**Equipment Conditions**
Engine shut down (TM 9-2320-366-10-2)

**Materials/Parts**
Ties, Cable, Plastic (Item 69, Appendix D)

**Tools/Special Tools**
Multimeter, Digital (Item 22, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)

**Personnel Required**
(2)

---

**TEST OPTIONS**

| Nothing. |

---

**POSSIBLE PROBLEMS**

- Circuit breaker CB11 tripped.
- Faulty circuit breaker CB11.
- Faulty power cable from terminal lug TL24 to terminal lug TL20.
- Faulty power cable from terminal lug TL23 to terminal lug TL16.
- Faulty power cable from terminal lug TL18 to terminal block TB2.
- Faulty Power Distribution Panel (PD1).

---

**REASON FOR QUESTION**

This question eliminates possible problems and determines where troubleshooting continues.

---

**START**

1. WARNING
   
   Read WARNING on following page.
   
   Is 24 VDC present at terminal lug TL16?

   **TEST OPTIONS**

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

   **YES**
   
   Go to step 2 of this fault.

   **NO**
   
   Go to step 5 of this fault.

---

2. **WARNING**

   Nothing.

   **TEST OPTIONS**

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

   **YES**
   
   Go to step 2 of this fault.

   **NO**
   
   Go to step 5 of this fault.
VOLTAGE TEST

(1) Remove wing screw from power
distribution shelf.
(2) Loosen wing screw on electrical
distribution block cover.
(3) Remove electrical distribution block cover
from power distribution shelf.
(4) Remove dust boot from terminal lug TL16.
(5) Set multimeter to volts DC.
(6) Connect positive (+) probe of multimeter to
terminal lug TL16.
(7) Connect negative (-) probe of multimeter to
known good ground and note reading on
multimeter.
(8) If 24 VDC is not present, go to step 2 of
this fault.
(9) If 24 VDC is present, go to step 5 of this
fault.
(10) Install dust boot on terminal lug TL16.

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.
x1. NO POWER TO DIGITIZATION RACK (CONT)

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nothing.</td>
<td>Circuit breaker CB11 tripped.</td>
</tr>
<tr>
<td></td>
<td>Faulty circuit breaker CB11.</td>
</tr>
<tr>
<td></td>
<td>Faulty power cable from terminal lug TL24 to terminal lug TL20.</td>
</tr>
<tr>
<td></td>
<td>Faulty power cable from terminal lug TL23 to terminal lug TL16.</td>
</tr>
</tbody>
</table>

2. Is circuit breaker CB11 tripped?

If circuit breaker CB11 is tripped, digitization rack will not have power.

- No
- Yes

If circuit breaker CB11, trips again replace circuit breaker CB11 (para 20-81).

Go to step 3 of this fault.
(1) Remove three screws and washers from Power Distribution Panel (PDP).
(2) Remove three screws from Power Distribution Panel (PDP).
(3) Lift Power Distribution Panel (PDP) to gain access.
(4) Push in reset button on circuit breaker CB11 to see if it is tripped.
(5) If circuit breaker CB11 is not tripped, go to step 3 of this fault.
(6) If circuit breaker CB11 trips again, replace circuit breaker CB11 (para 20-81).

**NOTE**
Perform steps (7) through (9) if circuit breaker CB11 is faulty.

(7) Position electrical distribution block cover on power distribution shelf.
(8) Tighten wing screw on electrical distribution block cover.
(9) Install wing screw in power distribution shelf.
x1. NO POWER TO DIGITIZATION RACK (CONT)

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
</table>

**Is 24 VDC present at terminal lug TL24?**

- **NO**
  - **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, power cable from terminal lug TL24 to terminal lug TL20 is faulty.

- **YES**
  - Replace power cable from terminal lug TL24 to terminal lug TL20 (para 20-81).
**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>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove dust boot from terminal lug TL24.</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 lug TL24.</td>
</tr>
<tr>
<td>4</td>
<td>Connect negative (-) probe of multimeter to a known good ground and note reading on multimeter.</td>
</tr>
<tr>
<td>5</td>
<td>If 24 VDC is not present, replace power cable from terminal lug TL24 to terminal lug TL20 (para 20-81).</td>
</tr>
<tr>
<td>6</td>
<td>Install dust boot on terminal lug TL24.</td>
</tr>
</tbody>
</table>
TEST OPTIONS

Circuit breaker CB11 not tripped. Power cable from terminal lug TL24 to terminal lug TL20 OK.

POSSIBLE PROBLEMS

Faulty circuit breaker CB11. Faulty power cable from terminal lug TL23 to terminal lug TL16.

---

4.

Is 24 VDC present at terminal lug TL23?

TEST OPTIONS

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

REASON FOR QUESTION

If 24 VDC is not present, circuit breaker CB11 is faulty. If 24 VDC is present, power cable from terminal lug TL23 to terminal lug TL16 is faulty.

---

NO

YES

Replace circuit breaker CB11 (para 20-81).

Replace power cable from terminal TL23 to terminal TL16 (para 20-81).
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) Remove dust boot from terminal lug TL23.</td>
</tr>
<tr>
<td>(2) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(3) Connect positive (+) probe of multimeter to terminal lug TL23.</td>
</tr>
<tr>
<td>(4) Connect negative (-) probe of multimeter to a known good ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(5) If 24 VDC is not present, replace circuit breaker CB11 (para 20-81).</td>
</tr>
<tr>
<td>(6) If 24 VDC is present, replace power cable from terminal lug TL23 to terminal lug TL16 (para 20-81).</td>
</tr>
</tbody>
</table>

NOTE

Perform steps (7) through (9) if circuit breaker CB11 is faulty.

(7) Position electrical distribution block cover on power distribution shelf.
(8) Tighten wing screw on electrical distribution block cover.
(9) Install wing screw on power distribution shelf.
x1. NO POWER TO DIGITIZATION RACK (CONT)

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breaker CB11 not tripped.</td>
<td>Faulty power cable from terminal lug TL18 to terminal block TB2.</td>
</tr>
<tr>
<td>Circuit breaker CB11 OK.</td>
<td>Faulty Power Distribution Panel (PD1).</td>
</tr>
<tr>
<td>Power cable from terminal lug TL24 to terminal lug TL20 OK.</td>
<td></td>
</tr>
<tr>
<td>Power cable from terminal lug TL23 to terminal lug TL16 OK.</td>
<td></td>
</tr>
</tbody>
</table>

5. Is continuity present from terminal lug TL18 to a known good ground?

- NO
  - Replace power cable from terminal lug TL18 to terminal board TB2 (para 20-81).

- YES
  - Test Options
    - Continuity Test or STE/ICE-R Test #91
  - Reason for Question
    - If continuity is not present, power cable from terminal lug TL18 to terminal board TB2 is faulty. If continuity is present, Power Distribution Panel (PD1) is faulty.

- Replace Power Distribution Panel (PD1) (para 20-81).
CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to terminal lug TL18.
3. Connect negative (-) probe of multimeter to a known good ground and note reading on multimeter.
4. If continuity is not present, replace power cable from terminal lug TL18 to terminal board TB2 (para 20-81).
5. If continuity is present, replace Power Distribution Panel (PD1) (para 20-81).
### INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Conditions</th>
<th>Tools/Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-2)</td>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
</tr>
<tr>
<td></td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td></td>
<td>Personnel Required (2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Materials/Parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ties, Cable, Plastic (Item 69, Appendix D)</td>
</tr>
</tbody>
</table>

### TEST OPTIONS

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

### POSSIBLE PROBLEMS

- Faulty circuit breaker CB1.
- Faulty power cable from terminal lug TL15 to terminal lug TL22.
- Faulty Power Distribution Panel (PD2).
- Faulty Mobile Tracking System (MTS) Sense.

### TEST OPTIONS

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

### REASON FOR QUESTION

- If 24 VDC is not present, go to step 2 of this fault. If 24 VDC is present perform Mobile Tracking System (MTS) Sense troubleshooting.

### Step 1

- **Is 24 VDC present at terminal lug TL6?**

### Step 2

- **NO**
  - Contact supervisor, Mobile Tracking System (MTS) Sense troubleshooting needs to be performed.

- **YES**
  - Go to step 2 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.

**VOLTAGE TEST**

1. Remove wing screw from power distribution shelf.
2. Loosen wing screw on electrical distribution block cover.
3. Remove electrical distribution block cover from power distribution shelf.
4. Set multimeter to volts DC.
5. Connect positive (+) probe of multimeter to terminal lug TL6.
6. Connect negative (-) probe of multimeter to known good ground.
7. Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
9. If 24 VDC is not present, go to step 2 of this fault.
10. If 24 VDC is present, contact supervisor, Mobile Tracking System (MTS) Sense troubleshooting needs to be performed.
### TEST OPTIONS
- Circuit breaker CB1 is not tripped.

### POSSIBLE PROBLEMS
- Faulty circuit breaker CB1.
- Faulty power cable from terminal lug TL15 to terminal lug TL22.
- Faulty Power Distribution Panel (PD2).

#### 2.
Is continuity present through circuit breaker CB1?

- **Yes**
  - Replace circuit breaker CB1 (para 20-80).
- **No**
  - Continuity Test or STE/ICE-R Test #91

#### REASON FOR QUESTION
If continuity is not present, circuit breaker CB1 is faulty.
### CONTINUITY TEST

1. Remove circuit breaker CB1 from Power Distribution Panel (PD2).
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter to one terminal of circuit breaker CB1.
4. Connect negative (-) probe of multimeter to other terminal of circuit breaker CB1 and note reading on multimeter.
5. If continuity is not present, replace circuit breaker CB1 (para 20-80).
x2. NO POWER TO MOBILE TRACKING SYSTEM (MTS) SENSE (CONT)

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breaker CB1 is not tripped. Circuit breaker CB1 OK.</td>
<td>Faulty power cable from terminal lug TL15 to terminal lug TL22. Faulty Power Distribution Panel (PD2).</td>
</tr>
</tbody>
</table>

3. Is 24 VDC present at terminal lug TL15?

- **NO**
  - Replace power cable from terminal lug TL15 to terminal lug TL22 (para 20-81).

- **YES**
  - Replace Power Distribution Panel (PD2) (para 20-81).

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

**REASON FOR QUESTION**
If 24 VDC is not present, power cable from terminal lug TL15 to terminal lug TL22 is faulty. If 24 VDC is present, Power Distribution Panel (PD2) is faulty.

**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 circuits and cause severe burns or electrical shock.

---

### VOLTAGE TEST

1. Remove dust boot from terminal lug TL15.
2. Set multimeter to volts DC.
3. Connect positive (+) probe of multimeter to terminal lug TL15.
4. Connect negative (-) probe of multimeter to known good ground.
5. Position master power switch to on (TM 9-2320-366-10-1) and note reading on multimeter.
7. If 24 VDC is not present, replace power cable from terminal lug TL15 to terminal lug TL22.
8. If 24 VDC is present, replace Power Distribution Panel (PD2).
x3. NO POWER TO ENHANCED POSITION LOCATION REPORTING SYSTEM (EPLRS)

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-2)

Materials/Parts
Ties, Cable, Plastic (Item 69, Appendix D)

Tools/Special Tools
Multimeter, Digital (Item 22, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)

Personnel Required
(2)

START

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

Is 24 VDC present at terminal lug TL8?

**TEST OPTIONS**

Circuit breaker CB5 is not tripped.

**POSSIBLE PROBLEMS**
Faulty circuit breaker CB5.
Faulty digitization rack power supply.
Faulty Enhanced Position Location Reporting System (EPLRS).

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

**REASON FOR QUESTION**
If 24 VDC is not present, go to step 2 of this fault. If 24 VDC is present, perform Enhanced Position Location Reporting System (EPLRS) troubleshooting.

YES

NO

Contact supervisor, Enhanced Position Location Reporting System (EPLRS) troubleshooting needs to be performed.

Go to step 2 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.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove wing screw from power distribution shelf.</td>
</tr>
<tr>
<td>(2) Loosen wing screw on electrical distribution block cover.</td>
</tr>
<tr>
<td>(3) Remove electrical distribution block cover from power distribution shelf.</td>
</tr>
<tr>
<td>(4) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(5) Connect positive (+) probe of multimeter to terminal lug TL8.</td>
</tr>
<tr>
<td>(6) Connect negative (-) probe of multimeter to known good ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If 24 VDC is not present, go to step 2 of this fault.</td>
</tr>
<tr>
<td>(8) If 24 VDC is present, contact supervisor, Enhanced Position Location Reporting System (EPLRS) troubleshooting needs to be performed.</td>
</tr>
</tbody>
</table>
2. Is continuity present through circuit breaker CB5?

**TEST OPTIONS**
- Circuit breaker CB5 is not tripped.
- Faulty circuit breaker CB5. Faulty digitization rack power supply.

**POSSIBLE PROBLEMS**
- Faulty circuit breaker CB5.
- Faulty digitization rack power supply.

**REASON FOR QUESTION**
- If continuity is not present, circuit breaker CB5 is faulty.
- If continuity is present, perform Special Purpose Kit Troubleshooting task x1. No Power to Digitization Rack.

If continuity is present, perform Special Purpose Kit Troubleshooting task x1. No Power to Digitization Rack.

Replace circuit breaker CB5 (para 20-80).

Perform Special Purpose Kit Troubleshooting task x1. No Power to Digitization Rack.
CONTINUITY TEST

(1) Remove circuit breaker CB5 from Power Distribution Panel (PD1).
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to one terminal of circuit breaker CB5.
(4) Connect negative (-) probe of multimeter to other probe of circuit breaker CB5 and note reading on multimeter.
(5) If continuity is not present, replace circuit breaker CB5 (para 20-80).
(6) If continuity is present, perform Special Purpose Kit Troubleshooting task x1. No Power to Digitization Rack.

NOTE
Perform steps (7) through (10), if continuity is present through circuit breaker CB5.

(7) Install circuit breaker CB5 in Power Distribution Panel (PD1)
(8) Position electrical distribution block cover on power distribution shelf.
(9) Tighten wing nut on electrical distribution block cover.
(10) Install wing screw on power distribution shelf.
**x4. NO POWER TO PRECISION LIGHTWEIGHT GLOBAL POSITIONING SYSTEM RECEIVER (PLGR)**

### INITIAL SETUP

**Equipment Conditions**
Engine shut down (TM 9-2320-366-10-2)

**Materials/Parts**
Ties, Cable, Plastic (Item 69, Appendix D)

**Tools/Special Tools**
- Multimeter, Digital (Item 22, Appendix C)
- Tool Kit, Genl Mech (Item 46, Appendix C)

**Personnel Required**
(2)

### TEST OPTIONS

<table>
<thead>
<tr>
<th>Circuit breaker CB7 is not tripped.</th>
</tr>
</thead>
</table>

### POSSIBLE PROBLEMS

- Faulty circuit breaker CB7.
- Faulty digitization rack power supply.
- Faulty Precision Lightweight Global Positioning System Receiver (PLGR).

### TEST OPTIONS

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

### REASON FOR QUESTION

If 24 VDC is not present, go to step 2 of this fault. If 24 VDC is present, perform Precision Lightweight Global Positioning System Receiver (PLGR) troubleshooting.

---

**WARNING**

Read WARNING on following page.

1. Is 24 VDC present at terminal lug TL9?

**YES**

Go to step 2 of this fault.

**NO**

Contact supervisor, Precision Lightweight Global Positioning System Receiver (PLGR) troubleshooting needs to be performed.
VOLTAGE TEST

(1) Remove wing screw from power distribution shelf.
(2) Loosen wing screw on electrical distribution block cover.
(3) Remove electrical distribution block cover from power distribution shelf.
(4) Set multimeter to volts DC.
(5) Connect positive (+) probe of multimeter to terminal lug TL9.
(6) Connect negative (-) probe of multimeter to known good ground and note reading on multimeter.
(7) If 24 VDC is not present, go to step 2 of this fault.
(8) If 24 VDC is present, contact supervisor, Precision Lightweight Global Positioning System Receiver (PLGR) troubleshooting needs to be performed.

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.
x4. NO POWER TO PRECISION LIGHTWEIGHT GLOBAL POSITIONING SYSTEM RECEIVER (PLGR) (CONT)

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breaker CB7 is not tripped.</td>
<td>Faulty circuit breaker CB7. Faulty digitization rack power supply.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity Test or STE/ICE-R Test #91</td>
<td>If continuity is not present, circuit breaker CB7 is faulty. If continuity is present, perform Special Purpose Kits Troubleshooting task x1. No Power to Digitization Rack.</td>
</tr>
</tbody>
</table>

2. Is continuity present through circuit breaker CB7?

- **NO**
  - Replace circuit breaker CB7 (para 20-80).

- **YES**
  - Perform Special Purpose Kit Troubleshooting task x1. No Power to Digitization Rack.
## CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove circuit breaker CB7 from Power Distribution Panel (PD1).</td>
</tr>
<tr>
<td>2</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>3</td>
<td>Connect positive (+) probe of multimeter to one terminal of circuit breaker CB7.</td>
</tr>
<tr>
<td>4</td>
<td>Connect negative (-) probe of multimeter to other probe of circuit breaker CB7 and note reading on multimeter.</td>
</tr>
<tr>
<td>5</td>
<td>If continuity is not present, replace circuit breaker CB7 (para 20-80).</td>
</tr>
<tr>
<td>6</td>
<td>If continuity is present, perform Special Purpose Kit Troubleshooting task x1. No Power to Digitization Rack.</td>
</tr>
</tbody>
</table>

### NOTE

Perform steps (7) through (10), if continuity is present through circuit breaker CB7.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Install circuit breaker CB7 in Power Distribution Panel (PD1).</td>
</tr>
<tr>
<td>8</td>
<td>Position electrical distribution block cover on power distribution shelf.</td>
</tr>
<tr>
<td>9</td>
<td>Tighten wing nut on electrical distribution block cover.</td>
</tr>
<tr>
<td>10</td>
<td>Install wing screw on power distribution shelf.</td>
</tr>
</tbody>
</table>
x5. NO POWER TO DRIVER VISUAL ENHANCEMENT (DVE)

INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Conditions</th>
<th>Tools/Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-2)</td>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
</tr>
<tr>
<td>Ties, Cable, Plastic (Item 69, Appendix D)</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
</tbody>
</table>

Personnel Required
(2)

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 2 of this fault. If 24 VDC is present, perform Driver Visual Enhancement (DVE) troubleshooting.

POSSIBLE PROBLEMS

Circuit breaker CB6 is not tripped.
Faulty circuit breaker CB6.
Faulty digitization rack power supply.
Faulty Driver Visual Enhancement (DVE) system.

START

1. Is 24 VDC present at terminal lug TL3?

YES

Contact supervisor, Driver Visual Enhancement (DVE) troubleshooting needs to be performed.

NO

Go to step 2 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.

<table>
<thead>
<tr>
<th>VOLTAGE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove wing screw from power distribution shelf.</td>
</tr>
<tr>
<td>(2) Loosen wing screw on electrical distribution block cover.</td>
</tr>
<tr>
<td>(3) Remove electrical distribution block cover from power distribution shelf.</td>
</tr>
<tr>
<td>(4) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(5) Connect positive (+) probe of multimeter to terminal lug TL3.</td>
</tr>
<tr>
<td>(6) Connect negative (-) probe of multimeter to known good ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If 24 VDC is not present, go to step 2 of this fault.</td>
</tr>
<tr>
<td>(8) If 24 VDC is present, contact supervisor, Driver Visual Enhancement (DVE) troubleshooting needs to be performed.</td>
</tr>
</tbody>
</table>
x5. NO POWER TO DRIVER VISUAL ENHANCEMENT (DVE) (CONT)

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breaker CB6 is not tripped.</td>
<td>Faulty circuit breaker CB6. Faulty digitization rack power supply.</td>
</tr>
</tbody>
</table>

2. Is continuity present through circuit breaker CB6?

- NO
  - Replace circuit breaker CB6 (para 20-80).
- YES
  - Perform Special Purpose Kit Troubleshooting task x1. No Power to Digitization Rack.

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

**REASON FOR QUESTION**
- If continuity is not present, circuit breaker CB6 is faulty. If continuity is present, perform Special Purpose Kits Troubleshooting task x1. No Power to Digitization Rack.
CONTINUITY TEST

(1) Remove circuit breaker CB6 from Power Distribution Panel (PD1).
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to one terminal of circuit breaker CB6.
(4) Connect negative (-) probe of multimeter to other probe of circuit breaker CB6 and note reading on multimeter.
(5) If continuity is not present, replace circuit breaker CB6 (para 20-80).
(6) If continuity is present, perform Special Purpose Kit Troubleshooting task x1. No Power to Digitization Rack.

NOTE
Perform steps (7) through (10), if continuity is present through circuit breaker CB6.

(7) Install circuit breaker CB6 in Power Distribution Panel (PD1)
(8) Position electrical distribution block cover on power distribution shelf.
(9) Tighten wing nut on electrical distribution block cover.
(10) Install wing screw on power distribution shelf.
x6. NO POWER TO SINGLE CHANNEL GROUND & AIR BORNE RADIO (SINCGARS)/FORCE XXI BATTLE COMMAND BRIGADE OR BELOW (FBCB)

INITIAL SETUP

**Equipment Conditions**
Engine shut down (TM 9-2320-366-10-2)

**Materials/Parts**
Ties, Cable, Plastic (Item 69, Appendix D)

**Tools/Special Tools**
Multimeter, Digital (Item 22, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)

**Personnel Required**
(2)

---

**TEST OPTIONS**

<table>
<thead>
<tr>
<th>Circuit breaker CB8 is not tripped.</th>
</tr>
</thead>
</table>

**POSSIBLE PROBLEMS**

Faulty circuit breaker CB8.
Faulty digitization rack power supply.
Faulty SINCGARS/FBCB.

---

**TEST OPTIONS**

Voltage Test or STE/ICE-R Test #89

**REASON FOR QUESTION**
If 24 VDC is not present, go to step 2 of this fault. If 24 VDC is present, perform SINCGARS/FBCB troubleshooting.

---

1. Is 24 VDC present at terminal lug TL2?

---

START

*WARNING Read WARNING on following page.*

---

NO

---

YES

Contact supervisor, SINCGARS/FBCB troubleshooting needs to be performed.

---

Go to step 2 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.

VOLTAGE TEST

(1) Remove wing screw from power distribution shelf.
(2) Loosen wing screw on electrical distribution block cover.
(3) Remove electrical distribution block cover from power distribution shelf.
(4) Set multimeter to volts DC.
(5) Connect positive (+) probe of multimeter to terminal lug TL2.
(6) Connect negative (-) probe of multimeter to known good ground and note reading on multimeter.
(7) If 24 VDC is not present, go to step 2 of this fault.
(8) If 24 VDC is present, contact supervisor, SINCGARS/FBCB troubleshooting needs to be performed.
x6. NO POWER TO SINGLE CHANNEL GROUND & AIR BORNE RADIO (SINCGARS)/FORCE XXI BATTLE COMMAND BRIGADE OR BELOW (FBCB) (CONT)

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breaker CB8 is not tripped.</td>
<td>Faulty circuit breaker CB8. Faulty digitization rack power supply.</td>
</tr>
</tbody>
</table>

Is continuity present through circuit breaker CB8?

**NO**

Replace circuit breaker CB8 (para 20-80).

**YES**

Perform Special Purpose Kit Troubleshooting task x1. No Power to Digitization Rack.

**REASON FOR QUESTION**

If continuity is not present, circuit breaker CB8 is faulty. If continuity is present, perform Special Purpose Kits Troubleshooting task x1. No Power to Digitization Rack.
CONTINUITY TEST

(1) Remove circuit breaker CB8 from Power Distribution Panel (PD1).
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to one terminal of circuit breaker CB8.
(4) Connect negative (-) probe of multimeter to other probe of circuit breaker CB8 and note reading on multimeter.
(5) If continuity is not present, replace circuit breaker CB8 (para 20-80).
(6) If continuity is present, perform Special Purpose Kit Troubleshooting task x1. No Power to Digitization Rack.

NOTE
Perform steps (7) through (10), if continuity is present through circuit breaker CB8.

(7) Install circuit breaker CB8 in Power Distribution Panel (PD1)
(8) Position electrical distribution block cover on power distribution shelf.
(9) Tighten wing nut on electrical distribution block cover.
(10) Install wing screw on power distribution shelf.
x7. NO POWER TO MOBILE TRACKING SYSTEM (MTS)

INITIAL SETUP

<table>
<thead>
<tr>
<th>Equipment Conditions</th>
<th>Tools/Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine shut down (TM 9-2320-366-10-2)</td>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
</tr>
<tr>
<td>Ties, Cable, Plastic (Item 69, Appendix D)</td>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
</tbody>
</table>

Personnel Required

(2)

TEST OPTIONS

Circuit breaker CB10 is not tripped.

POSSIBLE PROBLEMS

Faulty circuit breaker CB10.
Faulty digitization rack power supply.
Faulty Mobile Tracking System (MTS).

START

WARNING
Read WARNING on following page.

1. Is 24 VDC present at terminal lug TL1?

REASON FOR QUESTION

If 24 VDC is not present, go to step 2 of this fault. If 24 VDC is present, perform Mobile Tracking System (MTS) troubleshooting.

NO

YES

Go to step 2 of this fault.

Contact supervisor, Mobile Tracking System (MTS) troubleshooting needs to be performed.
**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) Remove wing screw from power distribution shelf.</td>
</tr>
<tr>
<td>(2) Loosen wing screw on electrical distribution block cover.</td>
</tr>
<tr>
<td>(3) Remove electrical distribution block cover from power distribution shelf.</td>
</tr>
<tr>
<td>(4) Set multimeter to volts DC.</td>
</tr>
<tr>
<td>(5) Connect positive (+) probe of multimeter to terminal lug TL1.</td>
</tr>
<tr>
<td>(6) Connect negative (-) probe of multimeter to known good ground and note reading on multimeter.</td>
</tr>
<tr>
<td>(7) If 24 VDC is not present, go to step 2 of this fault.</td>
</tr>
<tr>
<td>(8) If 24 VDC is present, contact supervisor, Mobile Tracking System (MTS) troubleshooting needs to be performed.</td>
</tr>
</tbody>
</table>
2. Is continuity present through circuit breaker CB10?

**TEST OPTIONS**
- Circuit breaker CB10 is not tripped.

**POSSIBLE PROBLEMS**
- Faulty circuit breaker CB10.
- Faulty digitization rack power supply.

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

**REASON FOR QUESTION**
If continuity is not present, circuit breaker CB10 is faulty. If continuity is present, perform Special Purpose Kit Troubleshooting task x1. No Power to Digitization Rack.

If continuity is present through circuit breaker CB10?

- **YES**
  - Replace circuit breaker CB10 (para 20-80).

- **NO**
  - Perform Special Purpose Kit Troubleshooting task x1. No Power to Digitization Rack.
CONTINUITY TEST

(1) Remove circuit breaker CB10 from Power Distribution Panel (PD1).
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to one terminal of circuit breaker CB10.
(4) Connect negative (-) probe of multimeter to other probe of circuit breaker CB10 and note reading on multimeter.
(5) If continuity is not present, replace circuit breaker CB10 (para 20-80).
(6) If continuity is present, perform Special Purpose Kit Troubleshooting task x1. No Power to Digitization Rack.

**NOTE**
Perform steps (7) through (10), if continuity is present through circuit breaker CB10.

(7) Install circuit breaker CB10 in Power Distribution Panel (PD1).
(8) Position electrical distribution block cover on power distribution shelf.
(9) Tighten wing nut on electrical distribution block cover.
(10) Install wing screw on power distribution shelf.
x18. TROOP TRANSPORT ALARM 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)
- STE/ICE-R (Item 41, Appendix C)
- Multimeter, Digital (Item 22, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Wire, Elect, 50 ft (Item 71, Appendix D)

References
TM 9-4910-571-12&P

KNOWLEDGE

Nothing.

POSSIBLE PROBLEMS
- Faulty troop transport alarm switch.
- Faulty troop transport alarm cable assembly.
- Faulty troop transport alarm switch connector.
- Faulty engine control cable assembly.
- Faulty dashboard cable assembly.
- Faulty audible alarm.

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

REASON FOR QUESTION
If continuity is not present, troop transport alarm switch is faulty.

START

1. Is continuity present across troop transport alarm switch?

NO

YES

Replace troop transport alarm switch (para 20-70).
CONTINUITY TEST

(1) Disconnect connector P921 from connector J921.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to pin 1 of troop transport alarm switch.
(4) Connect negative (-) probe of multimeter to pin 2 of troop transport alarm switch.
(5) Press troop transport alarm switch and note reading on multimeter.
(6) If continuity is not present, replace troop transport alarm switch (para 20-70).
2. Is continuity present from terminal lug TL165 to connector J921-C?

**Known Info**

- Troop seat alarm switch OK.

**Possible Problems**

- Faulty troop transport alarm switch connector.
- Faulty troop transport alarm cable assembly.
- Faulty engine control cable assembly.
- Faulty dashboard cable assembly.
- Faulty audible alarm.

**Test Options**

- Continuity Test or STE/ICE-R #91
- Reason for Question
  - If continuity is not present, wire 32 is faulty.

**Diag Progressions**

- **NO**
  - Repair wire 32 (para 2-45) or replace troop transport switch connector (para 20-70).

- **YES**
  - Repair wire 3028 (para 2-45) or replace troop transport switch connector (para 20-70).

3. Is continuity present from terminal lug TL165 to connector J921-C?

**Known Info**

- Troop transport alarm switch OK.

**Possible Problems**

- Faulty troop transport alarm switch connector.
- Faulty troop transport alarm cable assembly.
- Faulty engine control cable assembly.
- Faulty dashboard cable assembly.
- Faulty audible alarm.

**Test Options**

- Continuity Test or STE/ICE-R #91
- Reason for Question
  - If continuity is not present, wire 3028 is faulty.

**Diag Progressions**

- **NO**
  - Repair wire 3028 (para 2-45) or replace troop transport switch connector (para 20-70).
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to terminal lug TL164.
(3) Connect negative (-) probe of multimeter to connector J921-A and note reading on multimeter.
(4) If continuity is not present, repair wire 32 (para 2-45) or replace troop transport alarm switch connector (para 20-70).

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to terminal lug TL165.
(3) Connect negative (-) probe of multimeter to connector J921-C and note reading on multimeter.
(4) If continuity is not present, repair wire 3028 (para 2-45) or replace troop transport alarm switch connector (para 20-70).
4. Is continuity present from connector P921-A to connector J39-2?
   - NO
     - REASON FOR QUESTION
       - If continuity is not present, wire 32 is faulty.
       - Repair wire 32 (para 2-45) or replace troop transport alarm cable assembly (para 20-69).
   - YES
     - KNOWN INFO
       - Troop transport alarm switch OK.
       - Troop transport switch connector OK.
     - POSSIBLE PROBLEMS
       - Faulty troop transport alarm cable assembly.
       - Faulty engine control cable assembly.
       - Faulty dashboard cable assembly.
       - Faulty audible alarm.

5. Is continuity present from connector P921-C to connector J39-1?
   - NO
     - REASON FOR QUESTION
       - If continuity is not present, wire 3028 is faulty.
   - YES
     - KNOWN INFO
       - Troop transport alarm switch OK.
       - Troop transport alarm switch connector OK.
     - POSSIBLE PROBLEMS
       - Faulty troop transport alarm cable assembly.
       - Faulty engine control cable assembly.
       - Faulty dashboard cable assembly.
       - Faulty audible alarm.
     - TEST OPTIONS
       - Continuity Test or STE/ICE-R #91
       - Repair wire 3028 (para 2-45) or replace troop transport alarm cable assembly (para 20-69).
### 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>Disconnect connector clamp from connector J39.</td>
</tr>
<tr>
<td>3.</td>
<td>Disconnect connector J39 from connector P39.</td>
</tr>
<tr>
<td>4.</td>
<td>Connect positive (+) probe of multimeter to connector P921-A.</td>
</tr>
<tr>
<td>5.</td>
<td>Connect negative (-) probe of multimeter to connector J39-2 and note reading on multimeter.</td>
</tr>
<tr>
<td>6.</td>
<td>If continuity is not present, repair wire 32 (para 2-45) or replace troop transport alarm cable assembly (para 20-69).</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 P921-C.</td>
</tr>
<tr>
<td>3.</td>
<td>Connect negative (-) probe of multimeter to connector J39-1 and note reading on multimeter.</td>
</tr>
<tr>
<td>4.</td>
<td>If continuity is not present, repair wire 3028 (para 2-45) or replace troop transport alarm cable assembly (para 20-69).</td>
</tr>
<tr>
<td>5.</td>
<td>Connect connector P921 to connector J921.</td>
</tr>
</tbody>
</table>
18. TROOP TRANSPORT ALARM DOES NOT OPERATE (CONT)

**KNOWN INFO**
- Troop transport alarm switch OK.
- Troop transport alarm switch connector OK.
- Troop transport alarm cable assembly OK.

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

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

**REASON FOR QUESTION**
- If continuity is not present, wire 32 is faulty.

---

6. Is continuity present from connector P39-2 to connector P31-17?

- **YES**
  - Repair wire 32 (para 2-45) or replace engine control cable assembly (para 7-80).

- **NO**
  - If continuity is not present, wire 32 is faulty.

---

7. Is continuity present from connector P39-1 to connector P31-9?

- **YES**
  - Repair wire 3028 (para 2-45) or replace engine control cable assembly (para 7-80).

- **NO**
  - If continuity is not present, wire 3028 is faulty.
## CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lift instrument panel assembly outward to gain access (para 7-15).</td>
</tr>
<tr>
<td>2</td>
<td>Disconnect connector P31 from connector J31.</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 P39-2.</td>
</tr>
<tr>
<td>5</td>
<td>Connect negative (-) probe of multimeter to connector P31-17 and note reading on multimeter.</td>
</tr>
<tr>
<td>6</td>
<td>If continuity is not present, repair wire 32 (para 2-45) or replace engine control cable assembly (para 7-80).</td>
</tr>
</tbody>
</table>

---

<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 P39-1.</td>
</tr>
<tr>
<td>3</td>
<td>Connect negative (-) probe of multimeter to connector P31-9 and note reading on multimeter.</td>
</tr>
<tr>
<td>4</td>
<td>If continuity is not present, repair wire 3028 (para 2-45) or replace engine control cable assembly (para 7-80).</td>
</tr>
<tr>
<td>5</td>
<td>Connect connector P39 to connector J39.</td>
</tr>
<tr>
<td>6</td>
<td>Connect connector clamp to connector J39.</td>
</tr>
</tbody>
</table>

---

![Diagram of connector assembly]
8. Is continuity present from connector J31-9 to ground?

- **NO**
  - Repair wire 3028 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

- **YES**
  - Replace audible alarm (para 7-43).

9. Is continuity present from connector J31-17 to terminal lug TL178?

- **NO**
  - Repair wire 32 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).

- **YES**
  - Replace audible alarm (para 7-43).
CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to connector J31-9.
3. Connect negative (-) probe of multimeter to ground and note reading on multimeter.
4. If continuity is not present, repair wire 3028 (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 screw and terminal lug TL178 from audible alarm.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter to connector J31-17.
4. Connect negative (-) probe of multimeter to terminal lug TL178 and note reading on multimeter.
5. If continuity is not present, repair wire 32 (para 2-45) or replace WTEC II dashboard cable assembly (para 7-10) or WTEC III dashboard cable assembly (para 7-11).
6. If continuity is present, replace audible alarm (para 7-43).
7. Install terminal lug TL178 on audible alarm with screw.
9. Install instrument panel assembly (para 7-15).
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)
STE/ICE-R (Item 41, Appendix C)

Multimeter, Digital (Item 22, Appendix C)

References
TM 9-4910-571-12&P

**KNOWN INFO**

Engine starts.

**POSSIBLE PROBLEMS**
Faulty NATO power cable.
Faulty NATO plug.
Faulty wire 150.
Faulty circuit breaker.
Faulty wire 170.
Faulty wire 592.
Faulty power cable.
Faulty power harness.
Faulty out solenoid.
Faulty in solenoid.
Faulty LMHC winch assembly.
Faulty winch cable.

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

**REASON FOR QUESTION**
If 24 vdc is not present, NATO power cable is faulty.

1. Is 24 vdc present across NATO power receptacle?

START

WARNING
Read WARNING on following page.

YES

NO

Replace NATO power cable (para 7-70).
**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 when working with batteries.

---

**VOLTAGE TEST**

1. Disconnect NATO plug from NATO power cable receptacle.
2. Set multimeter to volts dc.
3. Connect positive (+) probe of multimeter to inside of NATO power cable receptacle.
4. Connect negative (-) probe of multimeter to outside of NATO power cable receptacle and note reading on multimeter.
5. If 24 vdc is not present, replace NATO power cable (para 7-70).
### x19. LIGHT MATERIAL HANDLING CRANE (LMHC) DOES NOT OPERATE (CONT)

#### KNOWN INFO
- Engine starts.
- NATO power cable OK.

#### POSSIBLE PROBLEMS
- Faulty NATO plug.
- Faulty wire 150.
- Faulty circuit breaker.
- Faulty wire 170.
- Faulty wire 592.
- Faulty power cable.
- Faulty power harness.
- Faulty out solenoid.
- Faulty in solenoid.
- Faulty LMHC winch assembly.
- Faulty winch cable.

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

#### REASON FOR QUESTION
- If continuity is not present, NATO plug is faulty.

#### 2. Is continuity present from NATO plug pin to NATO plug positive (+) terminal?

- **NO**
  - Replace NATO plug (para 20-70).

- **YES**
  - Replace NATO plug (para 20-70).

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

#### REASON FOR QUESTION
- If continuity is not present, NATO plug is faulty.

#### 3. Is continuity present from NATO plug outer wall to NATO plug negative (-) terminal?

- **NO**
  - Replace NATO plug (para 20-70).

- **YES**
  - Replace NATO plug (para 20-70).
CONTINUITY TEST

(1) Remove eight screws, cover, and retainer from NATO plug.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to NATO plug pin.
(4) Connect negative (-) probe of multimeter to NATO plug positive (+) terminal lug and note reading on multimeter.
(5) If continuity is not present, replace NATO plug (para 20-70).

---

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to NATO plug outer wall.
(3) Connect negative (-) probe of multimeter to NATO plug negative (-) terminal lug and note reading on multimeter.
(4) If continuity is not present, replace NATO plug (para 20-70).
x19. LIGHT MATERIAL HANDLING CRANE (LMHC) DOES NOT OPERATE (CONT)

4. Is continuity present from NATO plug positive (+) terminal to LMHC control box circuit breaker supply post?

   NO
   
   YES
   Replace wire 170 (para 20-70).

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

REASON FOR QUESTION
If continuity is not present, wire 170 is faulty.

5. Is continuity present from NATO plug negative (-) terminal to LMHC control box connector pin B?

   NO
   
   YES
   Replace wire 150 (para 20-70).

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

REASON FOR QUESTION
If continuity is not present, wire 150 is faulty.

KNOWLEDGE INFO

- Engine starts.
- NATO power cable OK.
- NATO plug OK.

POSSIBLE PROBLEMS

- Faulty wire 170.
- Faulty circuit breaker.
- Faulty wire 150.
- Faulty wire 592.
- Faulty power cable.
- Faulty power harness.
- Faulty out solenoid.
- Faulty in solenoid.
- Faulty LMHC winch assembly.
- Faulty winch cable.

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

Reason for Question:
- If continuity is not present, wire 170 is faulty.

Replace wire 170 (para 20-70).

Replace wire 150 (para 20-70).
CONTINUITY TEST

(1) Open cover on LMHC control box.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to NATO plug positive (+) terminal.
(4) Connect negative (-) probe of multimeter to LMHC control box circuit breaker supply post and note reading on multimeter.
(5) If continuity is not present, replace wire 170 (para 20-70).

(1) Disconnect LMHC control box power cable from LMHC control box connector.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to NATO plug negative (-) terminal.
(4) Connect negative (-) probe of multimeter to LMHC control box connector pin B and note reading on multimeter.
(5) If continuity is not present, replace wire 150 (para 20-70).
(6) Install cover and retainer on NATO plug with eight screws.
x19. LIGHT MATERIAL HANDLING CRANE (LMHC) DOES NOT OPERATE (CONT)

6. Is continuity present across LMHC control box circuit breaker?
   - YES
     - Replace LMHC control box circuit breaker (para 20-67).
   - NO
     - If continuity is not present, circuit breaker is faulty.

7. Is continuity present from LMHC control box circuit breaker outlet post to LMHC control box connector pin A?
   - YES
     - Replace wire 592 (para 20-70).
   - NO
     - If continuity is not present, wire 592 is faulty.

KNOWN INFO
- Engine starts.
- NATO power cable OK.
- NATO plug OK.
- Wire 170 OK.
- Wire 150 OK.

POSSIBLE PROBLEMS
- Faulty circuit breaker.
- Faulty wire 592.
- Faulty power cable.
- Faulty power harness.
- Faulty out solenoid.
- Faulty in solenoid.
- Faulty LMHC winch assembly.
- Faulty winch cable.

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

REASON FOR QUESTION
- If continuity is not present, circuit breaker 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 one end of LMHC control box circuit breaker.</td>
</tr>
<tr>
<td>3</td>
<td>Connect negative (-) probe of multimeter to other end of LMHC control box circuit breaker.</td>
</tr>
<tr>
<td>4</td>
<td>Position LMHC control box circuit breaker to ON and note reading on multimeter.</td>
</tr>
<tr>
<td>5</td>
<td>If continuity is not present, replace LMHC control box circuit breaker (para 20-67).</td>
</tr>
<tr>
<td>6</td>
<td>Position LMHC control box circuit breaker to OFF.</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 LMHC control box circuit breaker outlet post.</td>
</tr>
<tr>
<td>3</td>
<td>Connect negative (-) probe of multimeter to LMHC control box connector pin A and note reading on multimeter.</td>
</tr>
<tr>
<td>4</td>
<td>If continuity is not present, replace wire 592 (para 20-70).</td>
</tr>
<tr>
<td>5</td>
<td>Close cover on LMHC control box.</td>
</tr>
<tr>
<td>6</td>
<td>Connect LMHC control box power cable to LMHC control box connector.</td>
</tr>
</tbody>
</table>
8. Is continuity present from one end of LMHC control box power cable socket A to other end of LMHC control box power cable socket A?  

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine starts.</td>
</tr>
<tr>
<td>NATO power cable OK.</td>
</tr>
<tr>
<td>NATO plug OK.</td>
</tr>
<tr>
<td>Wire 170 OK.</td>
</tr>
<tr>
<td>Wire 150 OK.</td>
</tr>
<tr>
<td>Circuit breaker OK.</td>
</tr>
<tr>
<td>Wire 592 OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty power cable.</td>
</tr>
<tr>
<td>Faulty power harness.</td>
</tr>
<tr>
<td>Faulty out solenoid.</td>
</tr>
<tr>
<td>Faulty in solenoid.</td>
</tr>
<tr>
<td>Faulty LMHC winch assembly.</td>
</tr>
<tr>
<td>Faulty winch cable.</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, LMHC control box power cable is faulty.</td>
</tr>
</tbody>
</table>

9. Is continuity present from one end of LMHC control box power cable socket B to other end of LMHC control box power cable socket B?  

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine starts.</td>
</tr>
<tr>
<td>NATO power cable OK.</td>
</tr>
<tr>
<td>NATO plug OK.</td>
</tr>
<tr>
<td>Wire 170 OK.</td>
</tr>
<tr>
<td>Wire 150 OK.</td>
</tr>
<tr>
<td>Circuit breaker OK.</td>
</tr>
<tr>
<td>Wire 592 OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty power cable.</td>
</tr>
<tr>
<td>Faulty power harness.</td>
</tr>
<tr>
<td>Faulty out solenoid.</td>
</tr>
<tr>
<td>Faulty in solenoid.</td>
</tr>
<tr>
<td>Faulty LMHC winch assembly.</td>
</tr>
<tr>
<td>Faulty winch cable.</td>
</tr>
</tbody>
</table>

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<tr>
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</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, LMHC control box power cable is faulty.</td>
</tr>
</tbody>
</table>

YES: Replace LMHC control box power cable.

NO: Replace LMHC control box power cable.
### CONTINUITY TEST

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Disconnect LMHC control power cable from LMHC winch assembly power connector.</td>
</tr>
<tr>
<td>2.</td>
<td>Set multimeter to ohms.</td>
</tr>
<tr>
<td>3.</td>
<td>Connect positive (+) probe of multimeter to one end of LMHC control box power cable socket A.</td>
</tr>
<tr>
<td>4.</td>
<td>Connect negative (-) probe of multimeter to other end of LMHC control box power cable socket A and note reading on multimeter.</td>
</tr>
<tr>
<td>5.</td>
<td>If continuity is not present, replace LMHC control box power cable.</td>
</tr>
</tbody>
</table>

![LMHC Control Box Connector](image1)

### 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 LMHC control box power cable socket B.</td>
</tr>
<tr>
<td>3.</td>
<td>Connect negative (-) probe of multimeter to LMHC control box power cable socket B and note reading on multimeter.</td>
</tr>
<tr>
<td>4.</td>
<td>If continuity is not present, replace LMHC control box power cable.</td>
</tr>
</tbody>
</table>

![LMHC Control Box](image2)
x19. LIGHT MATERIAL HANDLING CRANE (LMHC) DOES NOT OPERATE (CONT)

10. Is continuity present from power harness connector pin A to top post of out solenoid?

- **YES**
  - Replace power harness (para 20-60).

- **NO**
  - Power harness is faulty.

11. Is continuity present across out solenoid top and bottom right post?

- **YES**
  - Replace out solenoid (para 20-60).

- **NO**
  - Out solenoid is faulty.
CONTINUITY TEST

(1) Remove 18 screws and cover from base plate.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to power harness connector pin A.
(4) Connect negative (-) probe of multimeter to top post of out solenoid and note reading on multimeter.
(5) If continuity is not present, replace power harness (para 20-60).

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to top right post of out solenoid.
(3) Connect negative (-) probe of multimeter to bottom right post of out solenoid and note reading on multimeter.
(4) If continuity is not present, replace out solenoid (para 20-60).
x19. LIGHT MATERIAL HANDLING CRANE (LMHC) DOES NOT OPERATE (CONT)

12. Is continuity present from bottom post of out solenoid to winch assembly top terminal lug?

- **YES**
  - Replace power harness (para 20-60).
- **NO**
  - If continuity is not present, power harness is faulty.

13. Is continuity present from power harness connector pin B to left top post of in solenoid?

- **YES**
  - Replace power harness (para 20-60).
- **NO**
  - If continuity is not present, power harness is faulty.
CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to bottom post of out solenoid.
(3) Connect negative (-) probe of multimeter to winch assembly top terminal lug and note reading on multimeter.
(4) If continuity is not present, replace power harness (para 20-60).

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to power harness connector pin B.
(3) Connect negative (-) probe of multimeter to left top post of in solenoid and note reading on multimeter.
(4) If continuity is not present, replace power harness (para 20-60).
14. Is continuity present from left top post to left bottom post of in solenoid?

- **YES**
  - Replace in solenoid (para 20-60).

- **NO**
  - Test Options
    - Continuity Test or STE/ICE-R #91
  - Reason for Question
    - If continuity is not present, in solenoid is faulty.

15. Is continuity present from left top post of in solenoid to winch assembly bottom terminal lug?

- **NO**
  - Test Options
    - Continuity Test or STE/ICE-R #91
  - Reason for Question
    - If continuity is not present, power harness is faulty.

- **YES**
  - Replace power harness (para 20-60).
### CONTINUITY TEST

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to left top post of in solenoid.
3. Connect negative (-) probe of multimeter to left bottom post of in solenoid and note reading on multimeter.
4. If continuity is not present, replace in solenoid (para 20-60).

#### Diagram

- **IN SOLENOID**
- **LEFT TOP**
- **LEFT BOTTOM**
- **OUT SOLENOID**
- **WINCH MOTOR**
- **WINCH ASSEMBLY BOTTOM TERMINAL LUG**
16. Is continuity present from top middle post of in solenoid to winch remote control connector pin A?

- **NO**
  - Replace power harness (para 20-60).

- **YES**
  - Replace power harness (para 20-60).

17. Is continuity present from winch remote control cable connector socket A to socket B and from socket A to socket C?

- **NO**
  - Replace winch remote control cable.

- **YES**
  - Replace winch remote control cable.

**POSSIBLE PROBLEMS**
- Faulty power harness.
- Faulty LMHC winch assembly.
- Faulty winch remote control cable.

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

**REASON FOR QUESTION**
- If continuity is not present, power harness is faulty.

**POSSIBLE PROBLEMS**
- Faulty LMHC winch assembly.
- Faulty winch remote control cable.

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

**REASON FOR QUESTION**
- If continuity is not present, winch remote control cable is faulty. If continuity is present, LMHC winch assembly is faulty.

**POSSIBLE PROBLEMS**
- Faulty power harness.
- Faulty LMHC winch assembly.
- Faulty winch remote control cable.

**KNOWN INFO**
- Engine starts.
- NATO power cable OK.
- NATO plug OK.
- Wire 170 OK.
- Wire 150 OK.
- Circuit breaker OK.
- Wire 592 OK.
- Power cable OK.
- Out solenoid OK.
- In solenoid OK.

---

**KNOWN INFO**
- Engine starts.
- NATO power cable OK.
- NATO plug OK.
- Wire 170 OK.
- Wire 150 OK.
- Circuit breaker OK.
- Wire 592 OK.
- Power cable OK.
- Out solenoid OK.
- In solenoid OK.
- Power harness OK.

**POSSIBLE PROBLEMS**
- Faulty LMHC winch assembly.
- Faulty winch remote control cable.
**CONTINUITY TEST**

1. Disconnect winch remote control cable from winch remote control connector.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter to top middle post of in solenoid.
4. Connect negative (-) probe of multimeter to winch remote control connector pin A and note reading on multimeter.
5. If continuity is not present, replace power harness (para 20-60).

**CONTINUITY TEST**

1. Set multimeter to ohms.
2. Connect positive (+) probe of multimeter to winch remote control cable connector socket A.
3. Connect negative (-) probe of multimeter to winch remote control cable connector socket B.
4. Position winch remote control switch to OUT and note reading on multimeter.
5. Connect positive (+) probe of multimeter to winch remote control cable connector socket A.
6. Connect negative (-) probe of multimeter to winch remote control cable connector socket C.
7. Position winch remote control switch to in and note reading on multimeter.
8. If continuity is not present, replace winch remote control cable.
9. If continuity is present, replace LMHC winch assembly (para 20-60).
10. Connect LMHC control power cable to LMHC winch assembly power connector.
11. Connect winch remote control cable to winch remote control connector.
12. Install cover on base plate with 18 screws.
TM 9-2320-366-20-3

**x20. LIGHT MATERIAL HANDLING CRANE (LMHC) HOIST IN DOES NOT OPERATE**

<table>
<thead>
<tr>
<th>INITIAL SETUP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equipment Conditions</strong></td>
</tr>
<tr>
<td>Engine shut down (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td><strong>Personnel Required</strong></td>
</tr>
<tr>
<td>(2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tools and Special Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool Kit, Genl Mech (Item 46, Appendix C)</td>
</tr>
<tr>
<td>STE/ICE-R (Item 41, Appendix C)</td>
</tr>
<tr>
<td>Multimeter, Digital (Item 22, Appendix C)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM 9-4910-571-12&amp;P</td>
</tr>
</tbody>
</table>

---

**START**

1. **KNOWN INFO**
   - LMHC hoist out operates.
   - **POSSIBLE PROBLEMS**
     - Faulty in solenoid.
     - Faulty power harness.
     - Faulty LMHC winch assembly.
     - Faulty winch cable.

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

   **REASON FOR QUESTION**
   - If continuity is not present, in solenoid is faulty.

   **YES**
   - Replace in solenoid (para 20-60).

   **NO**
   - Is continuity present from left top post to left bottom post of in solenoid?
CONTINUITY TEST

1. Remove 18 screws and cover from base plate.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter to left top post of in solenoid.
4. Connect negative (-) probe of multimeter to left bottom post of in solenoid and note reading on multimeter.
5. If continuity is not present, replace in solenoid (para 20-60).
x20. LIGHT MATERIAL HANDLING CRANE (LMHC) HOIST IN DOES NOT OPERATE (CONT)

**KNOWN INFO**
- LMHC hoist out operates. In solenoid OK.

**POSSIBLE PROBLEMS**
- Faulty power harness.
- Faulty LMHC winch assembly.
- Faulty winch cable.

---

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

**REASON FOR QUESTION**
- If continuity is not present, power harness is faulty.

---

2. Is continuity present from middle top post of in solenoid to LMHC remote control connector pin C?

**NO**
- Replace power harness (para 20-60).

**YES**
- Replace LMHC hoist in operates.
- In solenoid OK.
- Power harness OK.

**POSSIBLE PROBLEMS**
- Faulty LMHC winch assembly.
- Faulty winch cable.

---

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

**REASON FOR QUESTION**
- If continuity is not present, winch remote control cable is faulty. If continuity is present, LMHC winch assembly is faulty.

---

3. Is continuity present from winch remote control cable socket A to socket C?

**NO**
- Replace winch remote control cable.

**YES**
- Replace winch remote control cable.
CONTINUITY TEST

(1) Disconnect winch remote control cable from winch remote control connector.

(2) Set multimeter to ohms.

(3) Connect positive (+) probe of multimeter to left middle post of in solenoid.

(4) Connect negative (-) probe of multimeter to winch remote control connector pin C and note reading on multimeter.

(5) If continuity is not present, replace power harness (para 20-60).

---

CONTINUITY TEST

(1) Set multimeter to ohms.

(2) Connect positive (+) probe of multimeter to winch remote control cable socket A.

(3) Connect negative (-) probe of multimeter to winch remote control cable socket C.

(4) Position winch remote control switch to in and note reading on multimeter.

(5) If continuity is not present, replace winch remote control cable.

(6) If continuity is present, replace LMHC winch assembly (para 20-60).

(7) Connect winch remote control cable to winch remote control connector.

(8) Install cover on base plate with 18 screws.
**21. LIGHT MATERIAL HANDLING CRANE (LMHC) HOIST OUT 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>
<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

---

**Diagram:**

1. **Is continuity present from right top post to right bottom post of out solenoid?**
   - **YES** → Replace out solenoid (para 20-60).
   - **NO** → If continuity is not present, out solenoid is faulty.

**Known Info**

- LMHC hoist in operates.

**Possible Problems**

- Faulty out solenoid.
- Faulty power harness.
- Faulty LMHC winch assembly.
- Faulty winch cable.

**Test Options**

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

1. Remove 18 screws and cover from base plate.
2. Set multimeter to ohms.
3. Connect positive (+) probe of multimeter to right top post of out solenoid.
4. Connect negative (-) probe of multimeter to right bottom post of out solenoid and note reading on multimeter.
5. If continuity is not present, replace out solenoid (para 20-60).
21. LIGHT MATERIAL HANDLING CRANE (LMHC) HOIST OUT DOES NOT OPERATE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMHC hoist in operates. Out solenoid OK.</td>
<td>Continuity Test or STE/ICE-R #91</td>
<td>If continuity is not present, power harness is faulty.</td>
</tr>
<tr>
<td>Faulty power harness. Faulty LMHC winch assembly. Faulty winch cable.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Is continuity present from middle top post of out solenoid to LMHC remote control connector pin B?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMHC hoist in operates. Out solenoid OK. Power harness OK.</td>
<td>Continuity Test or STE/ICE-R #91</td>
<td>If continuity is not present, winch remote control cable is faulty. If continuity is present, LMHC winch assembly is faulty.</td>
</tr>
<tr>
<td>Faulty LMHC winch assembly. Faulty winch cable.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Is continuity present from winch remote control cable socket A to socket B?

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
<th>TEST OPTIONS</th>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- YES: Replace power harness (para 20-60).
- NO: Replace winch remote control cable.

Replace LMHC winch assembly (para 20-60).
CONTINUITY TEST

(1) Disconnect winch remote control cable from winch remote control connector.
(2) Set multimeter to ohms.
(3) Connect positive (+) probe of multimeter to right middle post of out solenoid.
(4) Connect negative (-) probe of multimeter to winch remote control connector pin B and note reading on multimeter.
(5) If continuity is not present, replace power harness (para 20-60).

CONTINUITY TEST

(1) Set multimeter to ohms.
(2) Connect positive (+) probe of multimeter to winch remote control cable socket A.
(3) Connect negative (-) probe of multimeter to winch remote control cable socket B.
(4) Position winch remote control switch to out and note reading on multimeter.
(5) If continuity is not present, replace winch remote control cable.
(6) If continuity is present, replace LMHC winch assembly (para 20-60).
(7) Connect winch remote control cable to winch remote control connector.
(8) Install cover on base plate with 18 screws.
This paragraph covers M1084/M1086 Material Handling Crane (MHC) Hydraulic Troubleshooting. The M1084/M1086 Material Handling Crane (MHC) Hydraulic Fault Index, Table 2-63, lists faults for the M1084/M1086 MHC Hydraulic system.

Table 2-63. M1084/M1086 Material Handling Crane (MHC) Hydraulic Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>y1</td>
<td>M1084/M1086 Material Handling Crane (MHC) Hand Pump Does Not Work</td>
<td>2-2410</td>
</tr>
</tbody>
</table>
y1. M1084/M1086 MATERIAL HANDLING CRANE (MHC) HAND PUMP DOES NOT WORK

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)
Pan, Drain (Item 24, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

Materials/Parts
Rag, Wiping (Item 50, Appendix D)

KNOWLEDGE INFO
Hydraulic fluid level OK.
Hydraulic lines and fittings OK.
All functions operate with PTO engaged.

POSSIBLE PROBLEMS
Faulty input check valve.
Faulty hand pump.

WARNING
Read WARNING on following page.

1. Does hand pump build pressure?

NO

TEST OPTIONS
Hand Pump Test

REASON FOR QUESTION
Faulty check valve or hand pump will prevent manual operation of crane.

YES

Replace hand pump (para 17-10).

Notify DS Maintenance.
WARNING

- Drop hydraulic pressure to zero before disconnecting any hydraulic line. Failure to comply may result in injury to personnel.
- Wear approved eye protection when performing pressure checks. Failure to comply may result in oil getting into eyes. If oil contacts eyes, seek medical attention immediately.
- Fuel and oil are slippery and can cause falls. Wipe up spilled fuel or oil with rags. Failure to comply may result in injury to personnel.

HAND PUMP TEST

1. Disconnect hand pump delivery line from elbow at hand pump.
2. Place drain pan under port at pump to catch hydraulic fluid.
4. Check if hydraulic fluid pumps out of port with each stroke.
5. If little or no fluid pumps out, replace hand pump (para 17-10).
6. Connect delivery line to elbow at hand pump.
7. Remove drain pan.
2-36. CAB AND SPARE TIRE RETAINER TROUBLESHOOTING

This paragraph covers Cab and Spare Tire Retainer Troubleshooting. The Cab and Spare Tire Retainer Fault Index, Table 2-64, lists faults for the cab and spare tire retainer of the vehicle.

Table 2-64. Cab and Spare Tire Retainer Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>z1</td>
<td>Cab Does Not Raise</td>
<td>2-2414</td>
</tr>
<tr>
<td>z2</td>
<td>Cab Does Not Lower</td>
<td>2-2414.8</td>
</tr>
<tr>
<td>z3</td>
<td>Spare Tire Retainer Does Not Raise</td>
<td>2-2416</td>
</tr>
<tr>
<td>z4</td>
<td>Spare Tire Retainer Does Not Lower</td>
<td>2-2416.6</td>
</tr>
</tbody>
</table>
### z1. CAB DOES NOT RAISE

<table>
<thead>
<tr>
<th>INITIAL SETUP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equipment Condition</strong></td>
</tr>
</tbody>
</table>
| Engine shut down (TM 9-2320-366-10-1).  
Air tanks drained (TM 9-232-366-10-1). |
| **Personnel Required** |
| (2) |
| **Material/Parts** |
| Rag, Wiping (Item 50, Appendix D)  
Filter Element, Fluid (Item 21.1, Appendix G) |
| **Tools and Special Tools** |
| Tool Kit, Genl Mech (Item 46, Appendix C)  
STE/ICE-R (Item 41, Appendix C)  
Pan, Drain (Item 24, Appendix C)  
Goggles, Industrial (Item 15, Appendix C)  
Transmitter, Pressure (Item 1, Appendix J)  
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)  
Key, Socket Head Screw (Item 38.1, Appendix B) |

### KNOWN INFO

- Air/hydraulic power unit oil level OK.
- Air/hydraulic power unit primed.
- Hydraulic and air hoses OK.
- Air tanks charged.
- Hydraulic oil filter OK.
- Other hydraulic manifold functions OK.

### POSSIBLE PROBLEMS

- Debris in orifice filter (if equipped).
- Debris in orifice screw.
- Faulty cab hydraulic latch.
- Faulty hydraulic manifold CAB TILT valve.
- Faulty cab hydraulic cylinder.

### TEST OPTIONS

**Visual Inspection**

**REASON FOR QUESTION**

- If orifice screw and/or orifice filter (if equipped) is clogged, orifice screw and/or orifice filter is faulty.

### NOTES

On vehicles S/N 0001 through 7558, the hydraulic manifold, P/N 12420621, was not originally equipped with an orifice filter. Orifice filter, P/N 117073098-000, however, may have been installed during previous maintenance to the hydraulic manifold.

---

**START**

**1.**  
Is orifice screw or orifice filter (if equipped) free of debris?  
**YES**  
Clean orifice screw and/or replace orifice filter (if equipped).  
**NO**

---

**TM 9-2320-366-20-3**  
2-2414 Change 1
WARNING

Drop hydraulic pressure to zero before disconnecting any hydraulic hoses. Failure to comply may result in injury to personnel.

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 into contact with hydraulic fluid should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury to personnel.

Compressed air used for cleaning purposes will not exceed 30 psi (270 kPa). Use only with effective chip guarding and personal protective equipment (goggles, shields, gloves, etc.). Failure to comply may result in injury to personnel.

NOTE

Perform steps (1) through (12) on hydraulic manifolds installed on vehicles S/N 001 through 7558.

(1) Remove pin from hydraulic manifold cover and lower cover.
(2) Cycle FUNCTION SELECT knob through all settings.
(3) Cycle CAB TILT knob through both selector settings.
(4) Remove screw, knob, and CAB TILT valve from hydraulic manifold.
(5) Remove orifice filter (if equipped) from hydraulic manifold.
(6) If debris is present in orifice filter, replace orifice filter.
(7) Remove orifice screw from hydraulic manifold.
(8) If debris is present in orifice screw, clean orifice screw with compressed air.

NOTE

If no orifice filter was previously installed, orifice filter will be installed at this time.

(9) Install orifice screw and orifice filter in hydraulic manifold.
(10) Position CAB TILT valve and knob on hydraulic manifold with screw.
(11) Tighten screw to 5-15 lb-in. (1-2 N·m).
(12) Close hydraulic manifold cover and install pin.

Cont. on page 2-2414.3.
WARNING

Drop hydraulic pressure to zero before disconnecting any hydraulic hoses. Failure to comply may result in injury to personnel.

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 into contact with hydraulic fluid should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury to personnel.

Compressed air used for cleaning purposes will not exceed 30 psi (270 kPa). Use only with effective chip guarding and personal protective equipment (goggles, shields, gloves, etc.). Failure to comply may result in injury to personnel.

NOTE

Perform steps (13) through (25) on hydraulic manifolds installed on vehicles S/N 7559 and higher or on vehicles where hydraulic manifolds have two valves on left side.

(13) Remove pin from hydraulic manifold cover and lower cover.
(14) Cycle FUNCTION SELECT knob through all settings.
(15) Cycle CAB TILT knob through both selector settings.
(16) Remove nut, knob, spring, spacer, retainer ring, and rubber sleeve from CAB TILT valve.
(17) Remove CAB TILT valve from hydraulic manifold.
(18) Remove orifice filter from hydraulic manifold.
(19) If debris is present in orifice filter, replace orifice filter.
(20) Remove orifice screw from hydraulic manifold.
(21) If debris is present in orifice screw, clean orifice screw with compressed air.
(22) Install orifice screw and orifice filter in hydraulic manifold.
(23) Install CAB TILT valve in hydraulic manifold.
(24) Install rubber sleeve, retainer ring, spacer, spring, knob, and nut on hydraulic manifold.
(25) Close hydraulic manifold cover and install pin.
z1. CAB DOES NOT RAISE (CONT)

**Known Info**
- Air/hydraulic power unit oil level OK.
- Air/hydraulic power unit primed.
- Hydraulic and air hoses OK.
- Air tanks charged.
- Hydraulic oil filter OK.
- Other hydraulic manifold functions OK.
- Orifice filter OK.
- Orifice screw OK.

**Possible Problems**
- Faulty cab hydraulic latch.
- Faulty hydraulic manifold CAB TILT valve.
- Faulty cab hydraulic cylinder.

**Test Options**
- Visual Inspection

**Reason For Question**
If cab hydraulic latch is not adjusted properly, cab hydraulic latch is faulty.

**Diagram**
- **2. Is cab hydraulic latch adjusted properly?**
  - **No**
    - Faulty cab hydraulic latch.
    - Faulty hydraulic manifold CAB TILT valve.
    - Faulty cab hydraulic cylinder.
  - **Yes**
    - Adjust cab hydraulic latch (para 19-7).
(1) Start engine and charge air tanks (TM 9-2320-366-10-1).
(2) Position CAB TILT knob to RAISE.
(3) Position FUNCTION SELECT knob to CAB TILT.
(4) Check to see if cab hydraulic latch indicator button is in the unlatched position.
(5) If cab hydraulic latch indicator button does not unlatch, adjust cab hydraulic latch (para 19-7).
z1. CAB DOES NOT RAISE (CONT)

**KNOWN INFO**
- Air/hydraulic power unit oil level OK.
- Air/hydraulic power unit primed.
- Hydraulic and air hoses OK.
- Air tanks charged.
- Hydraulic oil filter OK.
- Other hydraulic manifold functions OK.
- Orifice filter OK.
- Orifice screw OK.
- Cab hydraulic latch OK.

**POSSIBLE PROBLEMS**
- Faulty hydraulic manifold CAB TILT valve.
- Faulty cab hydraulic cylinder.

**TEST OPTIONS**
Pressure Test or STE/ICE-R Test #51

**REASON FOR QUESTION**
If 2,500-4,000 psi (17,237-27,580 kPa) is not present, hydraulic manifold CAB TILT valve is faulty. If 2,500-4,000 psi (17,237-27,580 kPa) is present, cab hydraulic cylinder is faulty.

**WARNING**
Read WARNING on following page.

3. Is 2,500-4,000 psi (17,237-27,580 kPa) present at CAB RAISE output port?

- **NO**
  - Repair hydraulic manifold CAB TILT valve (para 19-4).
  - Replace cab hydraulic cylinder (para 19-11).

- **YES**
  - Replace cab hydraulic cylinder (para 19-11).
WARNING

Drop hydraulic pressure to zero before disconnecting any hydraulic hoses. Failure to comply may result in injury to personnel.

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 into contact with hydraulic fluid should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury to personnel.

<table>
<thead>
<tr>
<th>PRESSURE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Position drain pan under cab hydraulic cylinder.</td>
</tr>
<tr>
<td>(2) Disconnect CAB RAISE pressure hose from cab hydraulic cylinder output port.</td>
</tr>
<tr>
<td>(3) Connect STE/ICE-R to CAB RAISE pressure hose.</td>
</tr>
<tr>
<td>(4) Start engine and charge air tanks (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(5) Position CAB TILT knob to RAISE.</td>
</tr>
<tr>
<td>(6) Position FUNCTION SELECT knob to CAB TILT.</td>
</tr>
<tr>
<td>(7) Push and hold PUMP plunger button and perform STE-ICE-R Test #51 (TM 9-4910-571-12&amp;P).</td>
</tr>
<tr>
<td>(8) If pressure is not 2,500-4,000 psi (17,237-27,580 kPa), repair hydraulic manifold CAB TILT valve (para 19-4).</td>
</tr>
<tr>
<td>(9) If pressure is 2,500-4,000 psi (17,237-27,580 kPa), replace cab hydraulic cylinder (para 19-11).</td>
</tr>
<tr>
<td>(10) Drain air tanks (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(11) Disconnect STE/ICE-R from pressure hose.</td>
</tr>
<tr>
<td>(12) Connect pressure hose to cab hydraulic cylinder output port.</td>
</tr>
</tbody>
</table>
2. CAB DOES NOT LOWER

**INITIAL SETUP**

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

**Personnel Required**
(2)

**Material/Parts**
- Rag, Wiping (Item 50, Appendix D)
- Filter Element, Fluid (Item 21.1, Appendix G)

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Pan, Drain (Item 24, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)
- Transmitter, Pressure (Item 1, Appendix J)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Key, Socket Head Screw (Item 38.1, Appendix B)

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

**NOTE**
On vehicles S/N 0001 through 7558, the hydraulic manifold, P/N 12420621, was not originally equipped with an orifice filter. Orifice filter, P/N 117073098-000, however, may have been installed during previous maintenance to the hydraulic manifold.

**KNOWN INFO**
- Air/hydraulic power unit oil level OK.
- Air/hydraulic power unit primed.
- Hydraulic and air hoses OK.
- Air tanks charged.
- Hydraulic oil filter OK.
- Other hydraulic manifold functions OK.

**POSSIBLE PROBLEMS**
- Debris in orifice filter (if equipped).
- Debris in orifice screw.
- Faulty hydraulic manifold CAB TILT valve.
- Faulty cab hydraulic cylinder.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
- If orifice screw and/or orifice filter (if equipped) is clogged, orifice screw and/or orifice filter is faulty.

**START**

1. Is orifice screw or orifice filter (if equipped) free of debris?

**NO**

**YES**

Clean orifice screw and/or replace orifice filter (if equipped).
WARNING

Drop hydraulic pressure to zero before disconnecting any hydraulic hoses. Failure to comply may result in injury to personnel.

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 into contact with hydraulic fluid should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury to personnel.

Compressed air used for cleaning purposes will not exceed 30 psi (270 kPa). Use only with effective chip guarding and personal protective equipment (goggles, shields, gloves, etc.). Failure to comply may result in injury to personnel.

NOTE
Perform steps (1) through (12) on hydraulic manifolds installed on vehicles S/N 001 through 7558.

(1) Remove pin from hydraulic manifold cover and lower cover.
(2) Cycle FUNCTION SELECT knob through all settings.
(3) Cycle CAB TILT knob through both selector settings.
(4) Remove screw, knob, and CAB TILT valve from hydraulic manifold.
(5) Remove orifice filter (if equipped) from hydraulic manifold.
(6) If debris is present in orifice filter, replace orifice filter.
(7) Remove orifice screw from hydraulic manifold.
(8) If debris is present in orifice screw, clean orifice screw with compressed air.

NOTE
If no orifice filter was previously installed, orifice filter will be installed at this time.

(9) Install orifice screw and orifice filter in hydraulic manifold.
(10) Position CAB TILT valve and knob on hydraulic manifold with screw.
(11) Tighten screw to 5-15 lb-in. (1-2 N·m).
(12) Close hydraulic manifold cover and install pin.

Cont. on page 2-2414.11.
WARNING
Drop hydraulic pressure to zero before disconnecting any hydraulic hoses. Failure to comply may result in injury to personnel.

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 into contact with hydraulic fluid should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury to personnel.

Compressed air used for cleaning purposes will not exceed 30 psi (270 kPa). Use only with effective chip guarding and personal protective equipment (goggles, shields, gloves, etc.). Failure to comply may result in injury to personnel.

NOTE
Perform steps (13) through (25) on hydraulic manifolds installed on vehicles S/N 7559 and higher or on vehicles where hydraulic manifolds have two valves on left side.

(13) Remove pin from hydraulic manifold cover and lower cover.
(14) Cycle FUNCTION SELECT knob through all settings.
(15) Cycle CAB TILT knob through both selector settings.
(16) Remove nut, knob, spring, spacer, retainer ring, and rubber sleeve from CAB TILT valve.
(17) Remove CAB TILT valve from hydraulic manifold.
(18) Remove orifice filter from hydraulic manifold.
(19) If debris is present in orifice filter, replace orifice filter.
(20) Remove orifice screw from hydraulic manifold.
(21) If debris is present in orifice screw, clean orifice screw with compressed air.
(22) Install orifice screw and orifice filter in hydraulic manifold.
(23) Install CAB TILT valve in hydraulic manifold.
(24) Install rubber sleeve, retainer ring, spacer, spring, knob, and nut on hydraulic manifold.
(25) Close hydraulic manifold cover and install pin.
z2. CAB DOES NOT LOWER (CONT)

**KNOWN INFO**

Air/hydraulic power unit oil level OK.
Air/hydraulic power unit primed.
Hydraulic and air hoses OK.
Air tanks charged.
Hydraulic oil filter OK.
Other hydraulic manifold functions OK.
Orifice filter OK.
Orifice screw OK.

**POSSIBLE PROBLEMS**

Faulty hydraulic manifold CAB TILT valve.
Faulty cab hydraulic cylinder.

---

**TEST OPTIONS**

Pressure Test or STE/ICE-R Test #51

**REASON FOR QUESTION**

If 2,500-4,000 psi (17,237-27,580 kPa) is not present, hydraulic manifold CAB TILT valve is faulty. If 2,500-4,000 psi (17,237-27,580 kPa) is present, cab hydraulic cylinder is faulty.

---

**2.**

Is 2,500-4,000 psi (17,237-27,580 kPa) present at CAB LOWER output port?

- **NO**
  - Repair hydraulic manifold CAB TILT valve (para 19-4).
  - Replace cab hydraulic cylinder (para 19-11).

- **YES**
  - Replace cab hydraulic cylinder (para 19-11).
<table>
<thead>
<tr>
<th><strong>PRESSURE TEST</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Position drain pan under cab hydraulic cylinder.</td>
</tr>
<tr>
<td>(2) Disconnect CAB LOWER pressure hose from cab hydraulic cylinder output port.</td>
</tr>
<tr>
<td>(3) Connect STE/ICE-R to CAB LOWER pressure hose.</td>
</tr>
<tr>
<td>(4) Start engine and charge air tanks (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(5) Position CAB TILT knob to LOWER.</td>
</tr>
<tr>
<td>(6) Position FUNCTION SELECT knob to CAB TILT.</td>
</tr>
<tr>
<td>(7) Push and hold PUMP plunger button and perform STE-ICE-R Test #51 (TM 9-4910-571-12&amp;P).</td>
</tr>
<tr>
<td>(8) If pressure is not 2,500-4,000 psi (17,237-27,580 kPa), repair hydraulic manifold CAB TILT valve (para 19-4).</td>
</tr>
<tr>
<td>(9) If pressure is 2,500-4,000 psi (17,237-27,580 kPa), replace cab hydraulic cylinder (para 19-11).</td>
</tr>
<tr>
<td>(10) Drain air tanks (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(11) Disconnect STE/ICE-R from pressure hose.</td>
</tr>
<tr>
<td>(12) Connect pressure hose to cab hydraulic cylinder output port.</td>
</tr>
</tbody>
</table>

---

**WARNING**

Drop hydraulic pressure to zero before disconnecting any hydraulic hoses. Failure to comply may result in injury to personnel.

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 into contact with hydraulic fluid should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury to personnel.
z3. SPARE TIRE RETAINER DOES NOT RAISE

INITIAL SETUP

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

Personnel Required
- (2)

Material/Parts
- Rag, Wiping (Item 50, Appendix D)
- Filter, Element, Fluid (Item 21.1, Appendix G)

Tools and Special Tools
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Pan, Drain (Item 24, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)
- Transmitter, Pressure (Item 1, Appendix J)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Key, Socket Head Screw (Item 38.1, Appendix B)

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

NOTE
On vehicles S/N 0001 through 7558, the hydraulic manifold, P/N 12420621, was not originally equipped with an orifice filter. Orifice filter, P/N 117073098-000, however, may have been installed during previous maintenance to the hydraulic manifold.

START

1. Is orifice screw or orifice filter (if equipped) free of debris?

NO

YES

TEST OPTIONS

Visual Inspection

REASON FOR QUESTION
- If orifice screw and/or orifice filter (if equipped) is clogged, orifice screw and/or orifice filter is faulty.

Clean orifice screw and/or replace orifice filter (if equipped).
WARNING

Drop hydraulic pressure to zero before disconnecting any hydraulic hoses. Failure to comply may result in injury to personnel.

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 into contact with hydraulic fluid should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury to personnel.

Compressed air used for cleaning purposes will not exceed 30 psi (270 kPa). Use only with effective chip guarding and personal protective equipment (goggles, shields, gloves, etc.). Failure to comply may result in injury to personnel.

NOTE

Perform steps (1) through (12) on hydraulic manifolds installed on vehicles S/N 001 through 7558.

(1) Remove pin from hydraulic manifold cover and raise cover.
(2) Cycle FUNCTION SELECT knob through all settings.
(3) Cycle SPARE TIRE knob through both selector settings.
(4) Remove screw, knob, and SPARE TIRE valve from hydraulic manifold.
(5) Remove orifice filter (if equipped) from hydraulic manifold.
(6) If debris is present in orifice filter, replace orifice filter.
(7) Remove orifice screw from hydraulic manifold.
(8) If debris is present in orifice screw, clean orifice screw with compressed air.

NOTE

If no orifice filter was previously installed, orifice filter will be installed at this time.

(9) Install orifice screw and orifice filter in hydraulic manifold.
(10) Position SPARE TIRE valve and knob on hydraulic manifold with screw.
(11) Tighten screw to 5-15 lb-in. (1-2 N·m).
(12) Close hydraulic manifold cover and install pin.

Cont. on page 2-2416.3.
WARNING

Drop hydraulic pressure to zero before disconnecting any hydraulic hoses. Failure to comply may result in injury to personnel.

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 into contact with hydraulic fluid should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury to personnel.

Compressed air used for cleaning purposes will not exceed 30 psi (270 kPa). Use only with effective chip guarding and personal protective equipment (goggles, shields, gloves, etc.). Failure to comply may result in injury to personnel.

NOTE

Perform steps (13) through (25) on hydraulic manifolds installed on vehicles S/N 7559 and higher or on vehicles where hydraulic manifolds have two valves on left side.

(13) Remove pin from hydraulic manifold cover and raise cover.
(14) Cycle FUNCTION SELECT knob through all settings.
(15) Cycle SPARE TIRE knob through both selector settings.
(16) Remove nut, knob, spring, spacer, retainer ring, and rubber sleeve from SPARE TIRE valve.
(17) Remove SPARE TIRE valve from hydraulic manifold.
(18) Remove orifice filter from hydraulic manifold.
(19) If debris is present in orifice filter, replace orifice filter.
(20) Remove orifice screw from hydraulic manifold.
(21) If debris is present in orifice screw, clean orifice screw with compressed air.
(22) Install orifice screw and orifice filter in hydraulic manifold.
(23) Install SPARE TIRE valve in hydraulic manifold.
(24) Install rubber sleeve, retainer ring, spacer, spring, knob, and nut on hydraulic manifold.
(25) Close hydraulic manifold cover and install pin.
z3. SPARE TIRE RETAINER DOES NOT RAISE (CONT)

**KNOWN INFO**

- Air/hydraulic power unit oil level OK.
- Air/hydraulic power unit primed.
- Hydraulic and air hoses OK.
- Air tanks charged.
- Hydraulic oil filter OK.
- Other hydraulic manifold functions OK.
- Orifice filter OK.
- Orifice screw OK.

**POSSIBLE PROBLEMS**

- Faulty hydraulic manifold SPARE TIRE valve.
- Faulty spare tire retainer cylinder.

**TEST OPTIONS**

- Pressure Test or STE/ICE-R Test #51

**REASON FOR QUESTION**

If 2,500-4,000 psi (17,237-27,580 kPa) is not present, hydraulic manifold SPARE TIRE valve is faulty. If 2,500-4,000 psi (17,237-27,580 kPa) is present, spare tire retainer cylinder is faulty.

**2.**

- Is 2,500-4,000 psi (17,237-27,580 kPa) present at SPARE EXT port?

- **NO**
  - Repair hydraulic manifold SPARE TIRE valve (para 19-4).
  - Replace spare tire retainer cylinder (para 14-9 or 14-10).

- **YES**
  - Replace spare tire retainer cylinder (para 14-9 or 14-10).
WARNING

Drop hydraulic pressure to zero before disconnecting any hydraulic hoses. Failure to comply may result in injury to personnel.

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 into contact with hydraulic fluid should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury to personnel.

PRESSURE TEST

(1) Position drain pan under spare tire retainer cylinder.
(2) Disconnect SPARE EXT pressure hose from spare tire retainer cylinder port.
(3) Connect STE/ICE-R to SPARE EXT pressure hose.
(4) Start engine and charge air tanks (TM 9-2320-366-10-1).
(5) Position SPARE TIRE knob to RAISE.
(6) Position FUNCTION SELECT knob to SPARE TIRE.
(7) Push and hold PUMP plunger button and perform STE-ICE-R Test #51 (TM 9-4910-571-12&P).
(8) If pressure is not 2,500-4,000 psi (17,237-27,580 kPa), repair hydraulic manifold SPARE TIRE valve (para 19-4).
(9) If pressure is 2,500-4,000 psi (17,237-27,580 kPa), replace spare tire retainer cylinder (para 14-9 or 14-10).
(10) Drain air tanks (TM 9-2320-366-10-1).
(11) Disconnect STE/ICE-R from pressure hose.
(12) Connect pressure hose to spare tire retainer cylinder port.
z4. SPARE TIRE RETAINER DOES NOT LOWER

**INITIAL SETUP**

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

**Personnel Required**
- (2)

**Material/Parts**
- Rag, Wiping (Item 50, Appendix D)
- Filter Element, Fluid (Item 21.1, Appendix G)

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- Pan, Drain (Item 24, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)
- Transducer, 10,000 PSI (Item 1, Appendix J)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Key, Socket Head Screw (Item 38.1, Appendix B)

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

**NOTE**
On vehicles S/N 0001 through 7558, the hydraulic manifold, P/N 12420621, was not originally equipped with an orifice filter. Orifice filter, P/N 117073098-000, however, may have been installed during previous maintenance to the hydraulic manifold.

**KNOWLEDGE INFO**
- Air/hydraulic power unit oil level OK.
- Air/hydraulic power unit primed.
- Hydraulic and air hoses OK.
- Air tanks charged.
- Hydraulic oil filter OK.
- Other hydraulic manifold functions OK.

**POSSIBLE PROBLEMS**
- Debris in orifice filter (if equipped).
- Debris in orifice screw.
- Faulty hydraulic manifold.
- SPARE TIRE valve.
- Faulty spare tire retainer cylinder.

**TEST OPTIONS**
- Visual Inspection

**REASON FOR QUESTION**
- If orifice screw and/or orifice filter (if equipped) is clogged, orifice screw and/or orifice filter is faulty.

**START**

1. Is orifice screw or orifice filter (if equipped) free of debris?

**NO**

**YES**

Clean orifice screw and/or replace orifice filter (if equipped).
WARNING
Drop hydraulic pressure to zero before disconnecting any hydraulic hoses. Failure to comply may result in injury to personnel.

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 into contact with hydraulic fluid should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury to personnel.

Compressed air used for cleaning purposes will not exceed 30 psi (270 kPa). Use only with effective chip guarding and personal protective equipment (goggles, shields, gloves, etc.). Failure to comply may result in injury to personnel.

NOTE
Perform steps (1) through (12) on hydraulic manifolds installed on vehicles S/N 001 through 7558.
(1) Remove pin from hydraulic manifold cover and lower cover.
(2) Cycle FUNCTION SELECT knob through all settings.
(3) Cycle SPARE TIRE knob through both selector settings.
(4) Remove screw, knob, and SPARE TIRE valve from hydraulic manifold.
(5) Remove orifice filter (if equipped) from hydraulic manifold.
(6) If debris is present in orifice filter, replace orifice filter.
(7) Remove orifice screw from hydraulic manifold.
(8) If debris is present in orifice screw, clean orifice screw with compressed air.

NOTE
If no orifice filter was previously installed, orifice filter will be installed at this time.
(9) Install orifice screw and orifice filter in hydraulic manifold.
(10) Position SPARE TIRE valve and knob on hydraulic manifold with screw.
(11) Tighten screw to 5-15 lb-in. (1-2 N·m).
(12) Close hydraulic manifold cover and install pin.

Cont. on page 2-2416.9.
WARNING

Drop hydraulic pressure to zero before disconnecting any hydraulic hoses. Failure to comply may result in injury to personnel.

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 into contact with hydraulic fluid should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury to personnel.

Compressed air used for cleaning purposes will not exceed 30 psi (270 kPa). Use only with effective chip guarding and personal protective equipment (goggles, shields, gloves, etc.). Failure to comply may result in injury to personnel.

NOTE

Perform steps (13) through (25) on hydraulic manifolds installed on vehicles S/N 7559 and higher or on vehicles where hydraulic manifolds have two valves on left side.

(13) Remove pin from hydraulic manifold cover and lower cover.
(14) Cycle FUNCTION SELECT knob through all settings.
(15) Cycle SPARE TIRE knob through both selector settings.
(16) Remove nut, knob, spring, spacer, retainer ring, and rubber sleeve from SPARE TIRE valve.
(17) Remove SPARE TIRE valve from hydraulic manifold.
(18) Remove orifice filter from hydraulic manifold.
(19) If debris is present in orifice filter, replace orifice filter.
(20) Remove orifice screw from hydraulic manifold.
(21) If debris is present in orifice screw, clean orifice screw with compressed air.
(22) Install orifice screw and orifice filter in hydraulic manifold.
(23) Install SPARE TIRE valve in hydraulic manifold.
(24) Install rubber sleeve, retainer ring, spacer, spring, knob, and nut on hydraulic manifold.
(25) Close hydraulic manifold cover and install pin.
z4. SPARE TIRE RETAINER DOES NOT LOWER (CONT)

### KNOWN INFO
- Air/hydraulic power unit oil level OK.
- Air/hydraulic power unit primed.
- Hydraulic and air hoses OK.
- Air tanks charged.
- Hydraulic oil filter OK.
- Other hydraulic manifold functions OK.
- Orifice filter OK.
- Orifice screw OK.

### POSSIBLE PROBLEMS
- Faulty hydraulic manifold SPARE TIRE valve.
- Faulty spare tire retainer cylinder.

---

#### TEST OPTIONS
- Pressure Test or STE/ICE-R Test #51

#### REASON FOR QUESTION
- If 2,500-4,000 psi (17,237-27,580 kPa) is not present, hydraulic manifold SPARE TIRE valve is faulty. If 2,500-4,000 psi (17,237-27,580 kPa) is present, spare tire retainer cylinder is faulty.

---

#### 2. 
Is 2,500-4,000 psi (17,237-27,580 kPa) present at SPARE RET port?

- **NO**
  - Replace spare tire retainer cylinder (para 14-9 or 14-10).

- **YES**
  - Repair hydraulic manifold SPARE TIRE valve (para 19-4).
**WARNING**

Drop hydraulic pressure to zero before disconnecting any hydraulic hoses. Failure to comply may result in injury to personnel.

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 into contact with hydraulic fluid should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury to personnel.

<table>
<thead>
<tr>
<th>PRESSURE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Position drain pan under spare tire retainer cylinder.</td>
</tr>
<tr>
<td>(2) Disconnect SPARE RET pressure hose from spare tire retainer cylinder port.</td>
</tr>
<tr>
<td>(3) Connect STE/ICE-R to SPARE RET pressure hose.</td>
</tr>
<tr>
<td>(4) Start engine and charge air tanks (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(5) Position SPARE TIRE knob to LOWER.</td>
</tr>
<tr>
<td>(6) Position FUNCTION SELECT knob to SPARE TIRE.</td>
</tr>
<tr>
<td>(7) Push and hold PUMP plunger button and perform STE-ICE-R Test #51 (TM 9-4910-571-12&amp;P).</td>
</tr>
<tr>
<td>(8) If pressure is not 2,500-4,000 psi (17,237-27,580 kPa), repair hydraulic manifold SPARE TIRE valve (para 19-4).</td>
</tr>
<tr>
<td>(9) If pressure is 2,500-4,000 psi (17,237-27,580 kPa), replace spare tire retainer cylinder (para 14-9 or 14-10).</td>
</tr>
<tr>
<td>(10) Drain air tanks (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(11) Disconnect STE/ICE-R from pressure hose.</td>
</tr>
<tr>
<td>(12) Connect pressure hose to spare tire retainer cylinder port.</td>
</tr>
</tbody>
</table>
This paragraph covers M1089 Air System Troubleshooting. The M1089 Air System Fault Index, Table 2-65, lists faults for the M1089 air system of the vehicle.

Table 2-65. M1089 Air System Fault Index

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>aa1</td>
<td>M1089 LH or RH 30K Winch Does Not Pay-In</td>
<td>2-2420</td>
</tr>
<tr>
<td>aa2</td>
<td>Main Winch LH FreeSpool Does Not Operate</td>
<td>2-2422</td>
</tr>
<tr>
<td>aa3</td>
<td>Main Winch RH FreeSpool Does Not Operate</td>
<td>2-2426</td>
</tr>
<tr>
<td>aa4</td>
<td>Main Winch LH and RH FreeSpool(s) Do Not Operate</td>
<td>2-2428</td>
</tr>
<tr>
<td>aa5</td>
<td>M1089 LH or RH 30K Winch Cable Drum Tensioner Does Not Operate</td>
<td>2-2430</td>
</tr>
<tr>
<td>aa6</td>
<td>One Wrecker Function Does Not Operate From Wrecker Remote Control</td>
<td>2-2432</td>
</tr>
</tbody>
</table>
aa1. M1089 LH OR RH 30K WINCH DOES NOT PAY-IN

### INITIAL SETUP

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

### NOTE

Perform Electrical System Troubleshooting e138A. M1089 LH or RH 30K Winch Does Not Pay-In prior to beginning this task.

---

**Start**

**WARNING**

Read WARNING on following page.

1. Is air pressure present at LH/RH 30K winch freespool input 90 degree fitting?

**TEST OPTIONS**

- Air Pressure Test

**REASON FOR QUESTION**

If air pressure is not present, perform Wrecker Hydraulic System Troubleshooting. If air pressure is present, 30K winch pneumatic manifold solenoid is faulty.

**YES**


**NO**

Replace 30K winch pneumatic manifold solenoid valve (refer to Table 65.1. 30K Winch Freespool Solenoid Valves (para 17-29)).

---

**KNOWN INFO**

- Hydraulic tank oil level OK.
- MAIN WINCH LH and RH FREESPOOL switches to OFF.
- MAN WINCH LH FREESPOOL switch OK.
- MAN WINCH RH FREESPOOL switch OK.

**POSSIBLE PROBLEMS**

- Faulty 30K winch pneumatic manifold solenoid valve.
- Faulty wrecker hydraulic system.
WARNING

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

**AIR PRESSURE TEST**

**NOTE**

LH and RH air hose are removed the same way. LH hose shown.

1. Disconnect air hose from LH/RH 30K winch freespool input 90 degree fitting.
3. If air pressure is not present at air hose, perform Wrecker Hydraulic System Troubleshooting task w4. M1089 LH 30K Winch Does Not Operate or w9. M1089 RH 30K Winch Does Not Operate.
4. If air pressure is present at air hose, replace 30K winch pneumatic manifold solenoid valve (refer to Table 65.1. 30K Winch Freespool Solenoid Valves) (para 17-29).
5. Shut down engine (TM 9-2320-366-10-1).
6. Connect air hose to LH/RH 30K winch free spool input 90 degree fitting.

---

**Table 65.1. 30K Winch Freespool Solenoid Valves**

<table>
<thead>
<tr>
<th>30K Winch</th>
<th>Solenoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>LH</td>
<td>L19</td>
</tr>
<tr>
<td>RH</td>
<td>L17</td>
</tr>
</tbody>
</table>
aa2. MAIN WINCH LH FREESPOOL DOES NOT OPERATE

INITIAL SETUP

Equipment Conditions
- Engine shut down (TM 9-2320-366-10-1).
- Air tanks drained (TM 9-2320-366-10-1).

Personnel Required
- (2)

Tools and Special Tools
- Tool Kit, Gen'l Mech (Item 46, Appendix C)
- STE/ICE-R (Item 41, Appendix C)
- M1089 30K Winch Pneumatic Test Adapter (Item 25, Appendix E)
- Goggles, Industrial (Item 15, Appendix C)

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

NOTE
Perform Electrical System Troubleshooting task e140. Main Winch LH or RH Freespool Switch Does Not Operate prior to beginning this task.

START

WARNING
Read WARNING on following page.

Is 75-120 PSI (518-827 kPa) present at pneumatic manifold solenoid L19 port 1?

TEST OPTIONS
- Air Pressure Test
  - STE/ICE-R Test #50

REASON FOR QUESTION
If 75-120 PSI (518-827 kPa) is not present, 30K winch pneumatic manifold is faulty.

YES
Repair 30K winch pneumatic solenoid or replace solenoid L19 (para 17-29).

NO

POSSIBLE PROBLEMS
- Faulty 30K winch pneumatic manifold solenoid L19.
- Faulty air hose.
- Faulty LH 30K winch assembly.

KNOWN INFO
- LH 30K winch operates.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.
- MAIN WINCH LH SPEED switch operates.
- RH 30K winch freespools.
- MAIN WINCH LH FREESPOOL switch OK.
- M1089 control panel wiring harness OK.
- Terminal block jumper OK.

TM 9-2320-366-20-3
2-2422 Change 1
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
Tag air hose and connection point prior to disconnecting

<table>
<thead>
<tr>
<th>AIR PRESSURE TEST STE/ICE-R TEST #50</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Open LH and RH catwalks.</td>
</tr>
<tr>
<td>(2) Disconnect air hose from pneumatic manifold solenoid L19 port 1.</td>
</tr>
<tr>
<td>(3) Remove tube nipple from M1089 30K winch pneumatic test adapter.</td>
</tr>
<tr>
<td>(4) Connect M1089 30K winch pneumatic test adapter on pneumatic manifold solenoid L19 port 1.</td>
</tr>
<tr>
<td>(5) Install STE/ICE-R 0-1000 PSI transducer on M1089 30K winch pneumatic test adapter.</td>
</tr>
<tr>
<td>(6) Start engine (TM 9-2320-366-10-1) and allow vehicle to build air pressure.</td>
</tr>
<tr>
<td>(7) Position MAIN WINCH LH FREESPOOL switch to ON.</td>
</tr>
<tr>
<td>(8) Perform STE/ICE-R Test #50 and note reading on STE/ICE-R.</td>
</tr>
<tr>
<td>(9) If 75-120 PSI (518-827 kPa) is not present, repair 30K winch pneumatic solenoid or replace solenoid L19 (para 17-29).</td>
</tr>
<tr>
<td>(10) Shutdown engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(11) Drain air tanks (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(12) Position MAIN WINCH LH FREESPOOL switch to OFF.</td>
</tr>
<tr>
<td>(13) Disconnect M1089 30K winch pneumatic test adapter from pneumatic solenoid L19 port 1.</td>
</tr>
<tr>
<td>(14) Connect air hose to pneumatic solenoid L19 port 1.</td>
</tr>
<tr>
<td>(15) Close LH and RH catwalks.</td>
</tr>
</tbody>
</table>
aa2. MAIN WINCH LH FREESPOOL DOES NOT OPERATE (CONT)

**KNOWN INFO**
- LH 30K winch operates.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.
- MAIN WINCH LH SPEED switch operates.
- RH 30K winch freespools.
- MAIN WINCH LH FREESPOOL switch OK.
- M1089 control panel wiring harness OK.
- Terminal block jumper OK.
- 30K winch pneumatic manifold solenoid L19 OK.

**POSSIBLE PROBLEMS**
- Faulty air hose.
- Faulty LH 30K winch assembly.

2. 

**WARNING**
Read WARNING on following page.

**TEST OPTIONS**
- Air Pressure Test
- STE/ICE-R Test #50

**REASON FOR QUESTION**
- If 75-120 PSI (518-827 kPa) is not present, air hose is faulty.
- If 75-120 PSI (518-827 kPa) is present, LH 30K winch assembly is faulty.

Is 75-120 PSI (518-837 kPa) present at LH 30K winch freespool input 90 degree fitting?

**YES**
- Replace air hose (para 23-5).

**NO**
- Notify DS Maintenance, LH 30K winch assembly is faulty.
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

Tag air hose and connection point prior to disconnecting.

AIR PRESSURE TEST STE/ICE-R TEST #50

(1) Disconnect air hose from LH 30K winch freespooil input 90 degree fitting.
(2) Install tube nipple on M1089 30K winch pneumatic test adapter.
(3) Connect air hose to M1089 30K winch pneumatic test adapter.
(4) Start engine (TM 9-2320-366-10-1) and allow vehicle to build air pressure.
(5) Position MAIN WINCH LH FREESPOOL switch to ON.
(6) Perform STE/ICE-R Test #50 and note reading on STE/ICE-R.
(7) If 75-120 PSI (518-827 kPa) is not present, replace air hose (para 23-5).
(8) If 75-120 PSI (518-827 kPa) is present, notify DS Maintenance, LH 30K winch assembly is faulty.
(9) Shutdown engine (TM 9-2320-366-10-1).
(10) Drain air tanks (TM 9-2320-366-10-1).
(11) Position MAIN WINCH LH FREESPOOL switch to OFF.
(12) Remove STE/ICE-R 0-1000 PSI transducer from test adapter.
(13) Disconnect air hose from M1089 30K winch pneumatic test adapter.
(14) Connect air hose to LH 30K winch free spool 90 degree fitting.
aa3. MAIN WINCH RH FREESPOOL DOES NOT OPERATE

INITIAL SETUP

Equipment Conditions
- Engine shut down (TM 9-2320-366-10-1).
- Air tanks drained (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)
- M1089 30K Winch Pneumatic Test Adapter (Item 25, Appendix E)
- Goggles, Industrial (Item 15, Appendix C)

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

NOTE
Perform Electrical System Troubleshooting task e140. Main Winch LH or RH Freespool Switch Does Not Operate prior to beginning this task.

START

WARNING
- Read WARNING on following page.

1. Is 75-120 PSI (518-837 kPa) present at pneumatic manifold solenoid L17 port 1?

TEST OPTIONS
- Air Pressure Test
- STE/ICE-R Test #50

REASON FOR QUESTION
If 75-120 PSI (518-827 kPa) is not present, 30K winch pneumatic manifold is faulty.

NO

POSSIBLE PROBLEMS
- Faulty 30K winch pneumatic manifold solenoid L17.
- Faulty air hose.
- Faulty RH 30K winch assembly.

YES

Repair 30K winch pneumatic solenoid or replace solenoid L17 (para 17-29).
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

Tag air hose and connection point prior to disconnecting

<table>
<thead>
<tr>
<th>AIR PRESSURE TEST STE/ICE-R TEST #50</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Open LH and RH catwalks.</td>
</tr>
<tr>
<td>(2) Disconnect air hose from pneumatic manifold solenoid L17 port 1.</td>
</tr>
<tr>
<td>(3) Remove tube nipple from M1089 30K winch pneumatic test adapter.</td>
</tr>
<tr>
<td>(4) Connect M1089 30K winch pneumatic test adapter on pneumatic manifold solenoid L17 port 1.</td>
</tr>
<tr>
<td>(5) Install STE/ICE-R 0-1000 PSI transducer on M1089 30K winch pneumatic test adapter.</td>
</tr>
<tr>
<td>(6) Start engine (TM 9-2320-366-10-1) and allow vehicle to build air pressure.</td>
</tr>
<tr>
<td>(7) Position MAIN WINCH RH FREESPOOL switch to ON.</td>
</tr>
<tr>
<td>(8) Perform STE/ICE-R Test #50 and note reading on STE/ICE-R.</td>
</tr>
<tr>
<td>(9) If 75-120 PSI (518-827 kPa) is not present, repair 30K winch pneumatic solenoid or replace solenoid L17 (para 17-29).</td>
</tr>
<tr>
<td>(10) Shutdown engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(11) Drain air tanks (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(12) Position MAIN WINCH RH FREESPOOL switch to OFF.</td>
</tr>
<tr>
<td>(13) Disconnect M1089 30K winch pneumatic test adapter from pneumatic solenoid L19 port 1.</td>
</tr>
<tr>
<td>(14) Connect air hose to pneumatic solenoid L17 port 1.</td>
</tr>
<tr>
<td>(15) Close LH and RH catwalks.</td>
</tr>
</tbody>
</table>
aa3. MAIN WINCH RH FREESPOOL DOES NOT OPERATE (CONT)

**KNOW INFO**
- RH 30K winch operates.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.
- MAIN WINCH RH SPEED switch operates.
- LH 30K winch freespools.
- MAIN WINCH RH FREESPOOL switch OK.
- M1089 control panel wiring harness OK.
- Terminal block jumper OK.
- 30K winch pneumatic manifold solenid L17 OK.

**POSSIBLE PROBLEMS**
- Faulty air hose.
- Faulty RH 30K winch assembly.

---

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

*Is 75-120 PSI (518-837 kPa) present at RH 30K winch freespool input 90 degree fitting?*

---

**TEST OPTIONS**
- Air Pressure Test
- STE/ICE-R Test #50

**REASON FOR QUESTION**
- If 75-120 PSI (518-827 kPa) is not present, air hose is faulty.
- If 75-120 PSI (518-827 kPa) is present, RH 30K winch assembly is faulty.

---

**IF NO**

**YES**
Replace air hose (para 23-5).

Notify DS Maintenance, RH 30K winch assembly is faulty.
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

Tag air hose and connection point prior to disconnecting.

<table>
<thead>
<tr>
<th>AIR PRESSURE TEST STE/ICE-R TEST #50</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Disconnect air hose from RH 30K winch freespool input 90 degree fitting.</td>
</tr>
<tr>
<td>(2) Install tube nipple on M1089 30K winch pneumatic test adapter.</td>
</tr>
<tr>
<td>(3) Connect air hose to M1089 30K winch pneumatic test adapter.</td>
</tr>
<tr>
<td>(4) Start engine (TM 9-2320-366-10-1) and allow vehicle to build air pressure.</td>
</tr>
<tr>
<td>(5) Position MAIN WINCH RH FREESPOOL switch to ON.</td>
</tr>
<tr>
<td>(6) Perform STE/ICE-R Test #50 and note reading on STE/ICE-R.</td>
</tr>
<tr>
<td>(7) If 75-120 PSI (518-827 kPa) is not present, replace air hose (para 23-5).</td>
</tr>
<tr>
<td>(8) If 75-120 PSI (518-827 kPa) is present, notify DS Maintenance, RH 30K winch assembly is faulty.</td>
</tr>
<tr>
<td>(9) Shutdown engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(10) Drain air tanks (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(11) Position MAIN WINCH RH FREESPOOL switch to OFF.</td>
</tr>
<tr>
<td>(12) Remove STE/ICE-R 0-1000 PSI transducer from M1089 30K winch pneumatic test adapter.</td>
</tr>
<tr>
<td>(13) Disconnect air hose from M1089 30K winch pneumatic test adapter.</td>
</tr>
<tr>
<td>(14) Connect air hose to RH 30K winch free spool 90 degree fitting.</td>
</tr>
</tbody>
</table>
**aa4. MAIN WINCH LH AND RH FREESPOOLS DO NOT OPERATE**

**INITIAL SETUP**

**Equipment Conditions**
- Engine shut down (TM 9-2320-366-10-1).
- Air tanks drained (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)
- M1089 30K Winch Pneumatic Test Adapter (Item 25, Appendix E)
- M1089 30K Winch Test Adapter (Item 7, Appendix E)
- Goggles, Industrial (Item 15, Appendix C)

**Material/Parts**
- Tape, Antiseizing (Item 66, Appendix D)

**NOTE**
Perform Electrical System Troubleshooting task e140. Main Winch LH or RH Freespool Switch Does Not Operate prior to beginning this task.

**KNOWLEDGE INFO**
- LH and RH 30K winches operates.
- STATION SELECTOR switch to WRECKER CONTROL PANEL.
- MODE SELECTOR SWITCH to NORMAL.
- MAIN WINCH LH and RH SPEED switch operates.
- Terminal block jumper OK.

**POSSIBLE PROBLEMS**
- Faulty pressure protection valve.
- Faulty air hose.
- Faulty M1089 30K winch manifold assembly.
- Faulty M1089 30K winch pneumatic manifold assembly.

**TEST OPTIONS**
- Air Pressure Test
- STE/ICE-R Test #50

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

**START**

**WARNING**
Read WARNING on following page.

1. Is 75-120 PSI (518-837 kPa) present at input tee fitting on pressure regulator valve?

**NO**

**YES**
Go to step 5 of this fault.
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
Tag air hose and connection point prior to disconnecting.

**AIR PRESSURE TEST STE/ICE-R TEST #50**

1. Open LH and RH catwalks.
2. Disconnect input air hose from input tee fitting on pressure regulator.
3. Connect input air hose to M1089 30K winch pneumatic test adapter.
4. Install STE/ICE-R 0-1000 PSI transducer on M1089 30K winch pneumatic test adapter.
5. Start engine (TM 9-2320-366-10-1).
6. Perform STE/ICE-R Test #50 and note reading on STE/ICE-R.
7. If 75-120 PSI (518-827 kPa) is not present, go to step 5 of this fault.
10. Disconnect input air hose from M1089 30K winch pneumatic test adapter.
aa4. MAIN WINCH LH AND RH FREESPOOLS DO NOT OPERATE (CONT)

NOTE
Ensure that pressure regulator valve is fully open by lifting knob and turning clockwise.

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>LH and RH 30K winches operates.</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 switch operates.</td>
</tr>
<tr>
<td>Terminal block jumper OK.</td>
</tr>
<tr>
<td>Pressure protection valve OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty air hose.</td>
</tr>
<tr>
<td>Faulty M1089 30K winch manifold assembly.</td>
</tr>
<tr>
<td>Faulty M1089 30K winch pneumatic manifold assembly.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARNING Read WARNING on following page.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is 75-120 PSI (518-827 kPa) present through M1089 30K winch pneumatic manifold?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Pressure Test</td>
</tr>
<tr>
<td>STE/ICE-R Test #50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If 75-120 PSI (518-827 kPa) is not present, M1089 30K winch pneumatic manifold is faulty.</td>
</tr>
</tbody>
</table>

NO

YES

Repair or replace M1089 30K winch pneumatic manifold (para 17-29).
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  
Tag air hose and connection point prior to disconnecting.

<table>
<thead>
<tr>
<th>AIR PRESSURE TEST STE/ICE-R TEST #50</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove STE/ICE-R 0-1000 PSI transducer from M1089 30K winch pneumatic tester.</td>
</tr>
<tr>
<td>(2) Connect M1089 30K winch test adapter to input tee fitting.</td>
</tr>
<tr>
<td>(3) Install STE/ICE-R 0-1000 PSI transducer in M1089 30K winch test adapter.</td>
</tr>
<tr>
<td>(4) Connect input air hose to M1089 30K winch test adapter.</td>
</tr>
<tr>
<td>(5) Disconnect air hose from input tee fitting.</td>
</tr>
<tr>
<td>(6) Remove tube nipple from M1089 30K winch pneumatic test adapter.</td>
</tr>
<tr>
<td>(7) Connect M1089 30K winch pneumatic test adapter to input tee fitting.</td>
</tr>
</tbody>
</table>

NOTE  
Apply antiseizing tape to first two to five threads of plug prior to installation.

| (8) Install plug in M1089 30K winch pneumatic test adapter. |
| (9) Start engine (TM9-2320-366-10-1) and allow vehicle to build air pressure. |
| (10) Perform STE/ICE-R Test #50 and note reading on STE/ICE-R. |
| (11) If 75-120 PSI (518-827 kPa) is not present, repair or replace M1089 30K winch pneumatic manifold (para 17-29). |
| (12) Shut down engine (TM 902320-366-10-1). |
| (13) Drain air tanks (TM9-2320-366-10-1). |
| (14) Remove plug from M1089 30K winch pneumatic test adapter. |
| (15) Disconnect M1089 30K winch pneumatic test adapter from input tee fitting. |
| (16) Install tube nipple on 30K winch pneumatic test adapter. |
| (17) Connect air hose to input tee fitting. |
| (18) Disconnect input air hose from M1089 30K winch test adapter. |
| (19) Remove STE/ICE-R 0-1000 PSI transducer from M1089 30K winch test adapter. |
| (20) Disconnect M1089 30K winch test adapter from input tee fitting. |
| (21) Connect input air hose to input tee fitting. |
aa4. MAIN WINCH LH AND RH FREESPOOLS DO NOT OPERATE (CONT)

**KNOWN INFO**

LH and RH 30K winches operate.
STATION SELECTOR switch to WRECKER CONTROL PANEL.
MODE SELECTOR SWITCH to NORMAL.
MAIN WINCH LH and RH SPEED switch operates.
Terminal block jumper OK.
Pressure protection valve OK.

**POSSIBLE PROBLEMS**

Faulty air hose.
Faulty M1089 30K winch manifold assembly.
Faulty M1089 30K winch pneumatic manifold assembly.

---

**TEST OPTIONS**

- Air Pressure Test
- STE/ICE-R Test #50

**REASON FOR QUESTION**

If 75-120 PSI (518-827 kPa) is not present, air hose is faulty.

---

**WARNING**

Read WARNING on following page.

3. Is 75-120 PSI (518-827 kPa) present at input fitting of M1089 30K winch manifold assembly?

---

**YES**

Replace air hose (para 23-5).

---

**NO**
NOTE
Tag air hose and connection point prior to disconnecting

<table>
<thead>
<tr>
<th>AIR PRESSURE TEST STE/ICE-R TEST #50</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remove wrecker control panel top cover (para 14-4).</td>
</tr>
<tr>
<td>(2) Disconnect air hose from input fitting of 30K winch manifold assembly.</td>
</tr>
<tr>
<td>(3) Connect air hose to M1089 30K winch pneumatic test adapter.</td>
</tr>
<tr>
<td>(4) Install STE/ICE-R 0-1000 PSI transducer in M1089 30K winch pneumatic test adapter.</td>
</tr>
<tr>
<td>(5) Start engine (TM9-2320-366-10-1) and allow vehicle to build air pressure.</td>
</tr>
<tr>
<td>(6) Perform STE/ICE-R Test #50 and note reading on STE/ICE-R.</td>
</tr>
<tr>
<td>(7) If 75-120 PSI (518-827 kPa) is not present, replace air hose (para 23-5).</td>
</tr>
<tr>
<td>(8) Shut down engine (TM 902320-366-10-1).</td>
</tr>
<tr>
<td>(9) Drain air tanks (TM9-2320-366-10-1).</td>
</tr>
<tr>
<td>(10) Remove STE/ICE-R 0-1000 PSI transducer from M1089 30K winch pneumatic test adapter.</td>
</tr>
<tr>
<td>(11) Disconnect air hose from M1089 30K winch pneumatic test adapter.</td>
</tr>
</tbody>
</table>

WARNING
Wear protective goggles to protect against possible injury from release of high pressure air. Failure to comply may result in injury to personnel.
LH and RH 30K winches operates.
STATION SELECTOR switch to WRECKER CONTROL PANEL.
MODE SELECTOR SWITCH to NORMAL.
MAIN WINCH LH and RH SPEED switch operates.
Terminal block jumper OK.
Pressure protection valve OK.
Air hoses OK.

Faulty M1089 30K winch manifold assembly.
Faulty M1089 30K winch pneumatic manifold assembly.

Is 75-120 PSI (518-827 kPa) present at 30K winch manifold assembly?

If 75-120 PSI (518-827 kPa) is not present, M1089 30K winch manifold assembly is faulty. If 75-120 PSI (518-827 kPa) is present, M1089 30K winch manifold assembly is faulty.

Notify DS Maintenance to repair or replace M1089 30K winch manifold assembly.

Repair or replace M1089 30K winch pneumatic manifold (para 17-29).
NOTE
Tag air hose and connection point prior to disconnecting

<table>
<thead>
<tr>
<th>AIR PRESSURE TEST STE/ICE-R TEST #50</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Connect M1089 30K winch test adapter to input fitting.</td>
</tr>
<tr>
<td>(2) Connect air hose to M1089 30K winch test adapter.</td>
</tr>
<tr>
<td>(3) Install STE/ICE-R 0-1000 PSI transducer in M1089 30K winch test adapter.</td>
</tr>
<tr>
<td>(4) Start engine (TM9-2320-366-10-1) and allow vehicle to build air pressure.</td>
</tr>
<tr>
<td>(5) Perform STE/ICE-R Test #50 and note reading on STE/ICE-R.</td>
</tr>
<tr>
<td>(6) If 75-120 PSI (518-827 kPa) is not present, notify DS Maintenance to repair or replace M1089 30K winch manifold assembly.</td>
</tr>
<tr>
<td>(7) If 75-120 PSI (518-827 kPa) is present, repair or replace M1089 30K winch pneumatic manifold assembly (para 17-29).</td>
</tr>
<tr>
<td>(8) Shut down engine (TM 902320-366-10-1).</td>
</tr>
<tr>
<td>(9) Drain air tanks (TM9-2320-366-10-1).</td>
</tr>
<tr>
<td>(10) Remove STE/ICE-R 0-1000 PSI transducer from M1089 30K winch test adapter.</td>
</tr>
<tr>
<td>(11) Disconnect air hose from M1089 30K winch test adapter.</td>
</tr>
<tr>
<td>(12) Disconnect M1089 30K winch test adapter from input fitting.</td>
</tr>
<tr>
<td>(13) Connect air hose to input fitting on M1089 30K winch manifold assembly.</td>
</tr>
<tr>
<td>(14) Close LH and RH catwalks.</td>
</tr>
<tr>
<td>(15) Install wrecker control panel top cover (para 14-4).</td>
</tr>
</tbody>
</table>
aa4. MAIN WINCH LH AND RH FREESPOOLS DO NOT OPERATE (CONT)

<table>
<thead>
<tr>
<th>KNOWN INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>LH and RH 30K winches operates.</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 switch operates.</td>
</tr>
<tr>
<td>Terminal block jumper OK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty pressure protection valve.</td>
</tr>
<tr>
<td>Faulty air hose.</td>
</tr>
</tbody>
</table>

5. **WARNING**

Read **WARNING** on following page.

Is 75-120 PSI (518-827 kPa) present at 90 degree fitting of pressure protection valve?

If 75-120 PSI (518-827 kPa) is not present, pressure protection valve is faulty. If 75-120 PSI (518-827 kPa) is present, air hose is faulty.

<table>
<thead>
<tr>
<th>TEST OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Pressure Test</td>
</tr>
<tr>
<td>STE/ICE-R Test #50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REASON FOR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace pressure protection valve (para 11-29).</td>
</tr>
</tbody>
</table>

Replace air hose (para 23-5).

YES

NO
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
Tag air hose and connection point prior to disconnecting

**AIR PRESSURE TEST STE/ICE-R TEST #50**

1. Disconnect air hose from 90 degree fitting of pressure protection valve.
2. Remove tube nipple from M1089 30K winch pneumatic test adapter.
3. Connect M1089 30K winch pneumatic test adapter to 90 degree fitting of pressure protection valve.
4. Start engine (TM9-2320-366-10-1) and allow vehicle to build air pressure.
5. Perform STE/ICE-R Test #50 and note reading on STE/ICE-R.
6. If 75-120 PSI (518-827 kPa) is not present, replace pressure protection valve (para 11-29).
7. If 75-120 PSI (518-827 kPa) is present, replace air hose (para 23-5).
8. Shut down engine (TM 902320-366-10-1).
10. Remove STE/ICE-R 0-1000 PSI transducer from M1089 30K winch pneumatic test adapter.
11. Disconnect M1089 30K winch pneumatic test adapter from 90 degree fitting of pressure protection valve.
12. Connect air hose to 90 degree fitting of pressure protection valve.
13. Connect input air hose to input tee fitting.
15. Install tube nipple on 30K winch pneumatic test adapter.
aa5. M1089 LH OR RH 30K WINCH CABLE DRUM TENSIONER DOES NOT OPERATE

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).
Air tanks drained (TM 9-2320-366-10-1).
M1089 control panel covers removed (para 17-20) (RH side).

Personnel Required
(2)

References
TM 9-4910-571-12&P

WARNING
Read WARNING on following page.

TEST OPTIONS
Air Pressure Test
STE/ICE-R Test #50

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

NOTE
M1089 LH and RH 30K winch cable drum tensioners are tested the same way. LH side shown.

**KNOWN INFO**

| Main winch LH/RH freespools. |

**POSSIBLE PROBLEMS**

| Faulty M1089 LH/RH 30K winch cable tensioner. |
| Faulty 30K winch pneumatic manifold solenoid L8/L4. |
| Faulty M1089 LH/RH 30K winch pneumatic valve assembly. |
| Faulty air hose. |

1. Is 55-65 PSI (380-448 kPa) present at output 90 degree fitting of shuttle valve?

NO

YES

Go to step 3 of this fault.
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. Open LH and RH catwalks.
2. Disconnect air hose from output 90 degree fitting of shuttle valve.
3. Remove tube nipple from M1089 30K winch pneumatic test adapter.
4. Connect M1089 30K winch pneumatic test adapter to output 90 degree fitting of shuttle valve.
5. Install STE/ICE-R 0-1000 PSI transducer on M1089 30K winch pneumatic test adapter.
6. Start engine (TM 9-2320-366-10-1) and allow vehicle to build air pressure.
7. Perform STE/ICE-R Test #50 and note reading on STE/ICE-R.
8. If 55-65 PSI (340-448 kPa) is not present, go to step 3 of this fault.

### NOTE
Air pressure trapped in wrecker air system will be released when disconnecting M1089 30K winch pneumatic test adapter from output 90 degree fitting.

11. Disconnect M1089 30K winch pneumatic test adapter from output 90 degree fitting of shuttle valve.
12. Connect air hose to output 90 degree fitting of shuttle valve.
13. Install tube nipple on M1089 30K winch pneumatic test adapter.
### Known Info

- Main winch LH/RH freespools.
- 30K winch pneumatic manifold solenoid L8/L4 OK.
- M1089 LH/RH 30K winch tensioner pneumatic valve assembly OK.

### Possible Problems

- Faulty M1089 LH/RH 30K winch cable tensioner.
- Faulty air hose.

---

#### Test Options

- Air Pressure Test
- STE/ICE-R Test #50

#### Reason for Question

- If 55-65 PSI (380-448 kPa) is not present, air hose is faulty.
- If 55-65 PSI (380-448 kPa) is present, M1089 LH/RH 30K winch cable tensioner is faulty.

---

#### Flowchart

2. **Is 55-65 PSI (380-448 kPa) present at input 90 degree fitting of M1089 LH/RH 30K winch drum tension actuator?**

   - **No**: Replace air hose (para 23-5).
   - **Yes**: Repair or replace M1089 LH/RH 30K winch cable tensioner (para 17-30).
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

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Disconnect air hose from input 90 degree fitting of M1089 LH/RH 30K winch drum tension actuator.</td>
</tr>
<tr>
<td>2</td>
<td>Connect air hose to M1089 30K winch pneumatic test adapter.</td>
</tr>
<tr>
<td>3</td>
<td>Start engine (TM 9-2320-366-10-1) and allow vehicle to build air pressure.</td>
</tr>
<tr>
<td>4</td>
<td>Perform STE/ICE-R Test #50 and note reading on STE/ICE-R.</td>
</tr>
<tr>
<td>5</td>
<td>If 55-65 PSI (380-448 kPa) is not present, replace air hose (para 23-5).</td>
</tr>
<tr>
<td>6</td>
<td>If 55-65 PSI (380-448 kPa) is present, repair or replace M1089 LH/RH 30K winch cable tensioner (para 17-30).</td>
</tr>
<tr>
<td>7</td>
<td>Shut down engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>8</td>
<td>Drain air tanks (TM9-2320-366-10-1).</td>
</tr>
<tr>
<td>9</td>
<td>Disconnect air hose from M1089 30K winch pneumatic test adapter.</td>
</tr>
<tr>
<td>10</td>
<td>Connect air hose to input 90 degree fitting of M1089 LH/RH 30K winch drum tension actuator.</td>
</tr>
<tr>
<td>11</td>
<td>Close LH and RH catwalks.</td>
</tr>
</tbody>
</table>

NOTE
Air pressure trapped in wrecker air system will be released when disconnecting air hose from M1089 30K winch pneumatic test adapter.

Change 1       2-2430.3
aa5. M1089 LH OR RH 30K WINCH CABLE DRUM TENSIONER DOES NOT OPERATE (CONT)

KNOWN INFO
Main winch LH/RH freespools.

POSSIBLE PROBLEMS
Faulty 30K winch pneumatic manifold solenoid L8/L4.
Faulty M1089 LH/RH 30K winch pneumatic valve assembly.
Faulty air hose.

3. WARNING
Read WARNING on following page.

TEST OPTIONS
Air Pressure Test
STE/ICE-R Test #50

REASON FOR QUESTION
If 75-120 PSI (518-827 kPa) is not present, 30K winch pneumatic manifold solenoid L8/L4 is faulty.

YES

NO

Is 75-120 PSI (518-827 kPa) present at pneumatic manifold (refer to Table 2-65.2. 30K Winch Pneumatic Manifold Drum Tensioner Solenoids) port 1?

Repair M1089 30K winch pneumatic manifold solenoid or replace solenoid (refer to Table 2-65.2. 30K Winch Pneumatic Manifold Drum Tensioner Solenoids) (para 17-29).
Wear protective goggles to protect against possible injury from release of high pressure air. Failure to comply may result in injury to personnel.

**WARNING**

Air pressure trapped in wrecker air system will be released when disconnecting M1089 30K winch pneumatic test adapter from solenoid port 1.

(1) Disconnect air hose from pneumatic manifold (refer to Table 2-65.2. 30K Winch Pneumatic Manifold Drum Tensioner Solenoids) solenoid port 1.
(2) Remove tube nipple from M1089 30K winch pneumatic test adapter.
(3) Connect M1089 30K winch pneumatic test adapter to pneumatic manifold (refer to Table 2-65.2. 30K Winch Pneumatic Manifold Drum Tensioner Solenoids) solenoid port 1.
(4) Start engine (TM 9-2320-366-10-1) and allow vehicle to build air pressure.
(5) Perform STE/ICE-R Test #50 and note reading on STE/ICE-R.
(6) If 75-120 PSI (518-827 kPa) is not present, repair M1089 30K winch pneumatic manifold solenoid or replace solenoid (refer to Table 2-65.2. 30K Winch Pneumatic Manifold Drum Tensioner Solenoids) (para 17-29).
(7) Shut down engine (TM 9-2320-366-10-1).
(8) Drain air tanks (TM9-2320-366-10-1).

**NOTE**

<table>
<thead>
<tr>
<th>Side</th>
<th>Solenoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>LH</td>
<td>L8</td>
</tr>
<tr>
<td>RH</td>
<td>L4</td>
</tr>
</tbody>
</table>

Table 2-65.2. 30K Winch Pneumatic Manifold Drum Tensioner Solenoids
aa5. M1089 LH OR RH 30K WINCH CABLE DRUM TENSIONER DOES NOT OPERATE (CONT)

KNOWN INFO

Main winch LH/RH freespools. 30K winch pneumatic manifold solenoid L8/L4 OK.

POSSIBLE PROBLEMS

Faulty M1089 LH/RH 30K winch pneumatic valve assembly. Faulty air hose.

TEST OPTIONS

Air Pressure Test
STE/ICE-R Test #50

REASON FOR QUESTION

If 75-120 PSI (518-827 kPa) is not present, air hose is faulty.

Warning
Read WARNING on following page.

4. Is 75-120 PSI (518-827 kPa) present at input 90 degree fitting of regulator valve?

NO

YES

Replace air hose (para 23-5).
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

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tag air hose and connection point prior to disconnecting.</td>
</tr>
</tbody>
</table>

1. Disconnect input air hose from input 90 degree fitting of regulator valve.
2. Connect input air hose to M1089 30K winch pneumatic test adapter.
3. Start engine (TM 9-2320-366-10-1) and allow vehicle to build air pressure.
4. Perform STE/ICE-R Test #50 and note reading on STE/ICE-R.
5. If 75-120 PSI (518-827 kPa) is not present, replace air hose (para 23-5).

**NOTE**

Air pressure trapped in wrecker air system will be released when disconnecting input air hose from M1089 30K winch pneumatic test adapter.

8. Disconnect input air hose from M1089 30K winch pneumatic test adapter.
9. Remove STE/ICE-R 0-1000 PSI transducer from M1089 30K winch pneumatic test adapter.
aa5. M1089 LH OR RH 30K WINCH CABLE DRUM TENSIONER DOES NOT OPERATE (CONT)

**KNOWN INFO**
Main winch LH/RH freespools. 30K winch pneumatic manifold solenoid L8/L4 OK. Air hoses OK.

**POSSIBLE PROBLEMS**
Faulty M1089 LH/RH 30K winch pneumatic valve assembly.

**TEST OPTIONS**
- Air Pressure Test
- STE/ICE-R Test #50

**REASON FOR QUESTION**
If 55-65 PSI (380-440 kPa) is not present, regulator valve is faulty. If 55-65 PSI (380-440 kPa) is present, shuttle valve is faulty.

5. Is 55-65 PSI (380-440 kPa) present at output 90 degree fitting of regulator valve?

- **NO**
  - Replace regulator valve (para 17-30).
- **YES**
  - Replace shuttle valve (para 17-13).

TM 9-2320-366-20-3 2-2430.8 Change 1
**AIR PRESSURE TEST**

**NOTE**
Tag air hoses and connection points prior to disconnecting.

1. Disconnect air hose from adapter fitting on shuttle valve.
2. Disconnect air hose from 90 degree fitting on shuttle valve.
5. Remove regulator valve from pipe nipple.
6. Install STE/ICE-R 0-1000 PSI pressure transducer in output port of regulator valve.
7. Connect input air hose to input 90 degree fitting of regulator valve.
8. Start engine (TM 9-2320-366-10-1) and allow vehicle to build air pressure.
9. Perform STE/ICE-R Test #50 and note reading on STE/ICE-R.
10. If 55-65 PSI (380-440 kPa) is not present, perform step (18) through (22).
11. If 55-65 PSI (380-440 kPa) is present, replace shuttle valve (para 17-30).
14. Disconnect input air hose from output 90 degree fitting of regulator valve.
15. Remove STE/ICE-R 0-1000 PSI transducer from output port of regulator valve.

**NOTE**
Perform step (17) for M1089 RH 30K winch cable drum tensioner.

17. Install M1089 control panel covers (para 17-20).
18. Pull out and turn knob on regulator valve fully counter clockwise.
19. Pull out and turn knob on regulator valve clockwise until STE/ICE-R shows between 55-65 PSI (380-440 kPa).
20. If 55-65 PSI (380-440 kPa) is present after adjustment, perform steps (23) through (30).
21. If 55-65 PSI (380-440 kPa) is still not present after adjustment, replace regulator valve (para 17-30).
22. Perform steps (12) through (17).
25. Disconnect input air hose from input 90 degree fitting of regulator valve.
aa6. ONE WRECKER FUNCTION DOES NOT OPERATE FROM WRECKER REMOTE CONTROL

INITIAL SETUP

Equipment Conditions
- Engine shut down (TM 9-2320-366-10-1).
- Top control panel cover removed (para 17-20).
- Front middle and lower panel covers removed (para 17-20).
- Air tanks drained (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)
- M1089 Solenoid Test Adapter (Item 8, Appendix E)
- Goggles, Industrial (Item 15, Appendix C)

References
TM 9-4910-571-12&P

---

### KNOWN INFO
- Circuit breaker CB50 OK.
- Hydraulic functions OK.
- STATION SELECTOR switch to REMOTE CONTROL.
- MODE SELECTOR SWITCH to NORMAL.
- Air system OK.
- Electrical functions OK.

### POSSIBLE PROBLEMS
- Faulty solenoid valve assembly.
- Faulty air hose.
- Faulty upper or lower valve assemblies.

### TEST OPTIONS
- Air Pressure Test
- STE/ICE-R Test #50

### WARNING
Read WARNING on following page.

1. Is 75 to 120 psi (517 to 827 kPa) present at solenoid valve output?

- **YES** Notify DS Maintenance.
- **NO**

**REASON FOR QUESTION**
If air pressure at solenoid valve output is not present, solenoid valve assembly is faulty.
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
Tag air hose and connection point prior to disconnecting.

<table>
<thead>
<tr>
<th>AIR PRESSURE TEST STE/ICE-R TEST #50</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Disconnect air hose from solenoid valve listed in Table 2-66. Wrecker Function Solenoid Valves and Actuators.</td>
</tr>
<tr>
<td>(2) Install test adapter on solenoid valve.</td>
</tr>
<tr>
<td>(3) Install STE/ICE-R 0-1000 psi transducer on test adapter.</td>
</tr>
<tr>
<td>(4) Start engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(5) Position WRECKER REMOTE CONTROL switch listed in Table 2-66. Wrecker Function Solenoid Valve.</td>
</tr>
<tr>
<td>(6) Perform STE/ICE-R Test #50 and note reading on STE/ICE-R.</td>
</tr>
<tr>
<td>(7) If 75 to 120 psi (517 to 827 kPa) is not present, notify DS Maintenance.</td>
</tr>
<tr>
<td>(8) Shut down engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(9) Drain air tanks (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(10) Remove STE/ICE-R and test adapter from solenoid valve.</td>
</tr>
<tr>
<td>(11) Install air hose on solenoid valve.</td>
</tr>
</tbody>
</table>

Table 2-66. Wrecker Function Solenoid Valves and Actuators

<table>
<thead>
<tr>
<th>Function</th>
<th>Wrecker Remote Control Switch Position</th>
<th>Actuator and Solenoid Valve</th>
<th>Upper or Lower Valve Actuator Air Hose Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underlift Fold Up</td>
<td>Up</td>
<td>L18</td>
<td>Lower Front</td>
</tr>
<tr>
<td>Underlift Fold Down</td>
<td>Down</td>
<td>L15</td>
<td>Lower Rear</td>
</tr>
<tr>
<td>Stinger In</td>
<td>In</td>
<td>L16</td>
<td>Lower Front</td>
</tr>
<tr>
<td>Stinger Out</td>
<td>Out</td>
<td>L13</td>
<td>Lower Rear</td>
</tr>
<tr>
<td>Underlift Up</td>
<td>Up</td>
<td>L14</td>
<td>Lower Front</td>
</tr>
<tr>
<td>Underlift Down</td>
<td>Down</td>
<td>L11</td>
<td>Lower Rear</td>
</tr>
<tr>
<td>Main Winch LH In</td>
<td>In</td>
<td>L6</td>
<td>Upper Front</td>
</tr>
<tr>
<td>Main Winch LH Out</td>
<td>Out</td>
<td>L5</td>
<td>Upper Rear</td>
</tr>
<tr>
<td>Main Winch RH In</td>
<td>In</td>
<td>L2</td>
<td>Lower Front</td>
</tr>
<tr>
<td>Main Winch RH Out</td>
<td>Out</td>
<td>L1</td>
<td>Lower Rear</td>
</tr>
</tbody>
</table>
aa6. **ONE WRECKER FUNCTION DOES NOT OPERATE FROM WRECKER REMOTE CONTROL (CONT)**

### KNOWN INFO

- Circuit breaker CB50 OK.
- Hydraulic functions OK.
- STATION SELECTOR switch to REMOTE CONTROL.
- MODE SELECTOR SWITCH to NORMAL.
- Air system OK.
- Electrical functions OK.
- Solenoid valve assembly OK.

### POSSIBLE PROBLEMS

- Faulty air hose.
- Faulty upper or lower valve assemblies.

### TEST OPTIONS

- Air Pressure Test
- STE/ICE-R Test #50

### WARNING

Read WARNING on following page.

2. Is 75 to 120 psi (517 to 827 kPa) present at actuator end of air hose?

#### NO

- Notify DS Maintenance.

#### YES

- Replace air hose (para 23-5).

### REASON FOR QUESTION

If air pressure is not present, air hose is faulty.
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
Tag air hose and connection point prior to disconnecting.

<table>
<thead>
<tr>
<th>AIR PRESSURE TEST STE/ICE-R TEST #50</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Disconnect air hose from actuator listed in Table 2-66. Wrecker Function Solenoid Valves and Actuators.</td>
</tr>
<tr>
<td>(2) Install test adapter on solenoid valve.</td>
</tr>
<tr>
<td>(3) Install STE/ICE-R 0-1000 psi transducer on test adapter.</td>
</tr>
<tr>
<td>(4) Start engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(5) Position WRECKER REMOTE CONTROL switch listed in Table 2-67. Wrecker Function Actuator.</td>
</tr>
<tr>
<td>(6) Perform STE/ICE-R Test #50 and note reading on STE/ICE-R.</td>
</tr>
<tr>
<td>(7) If 75 to 120 psi (517 to 827 kPa) is not present, replace air hose (para 23-5).</td>
</tr>
<tr>
<td>(8) If 75 to 120 psi (517 to 827 kPa) is present, notify DS Maintenance.</td>
</tr>
<tr>
<td>(9) Shut down engine (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(10) Drain air tanks (TM 9-2320-366-10-1).</td>
</tr>
<tr>
<td>(11) Remove STE/ICE-R and test adapter from solenoid valve.</td>
</tr>
<tr>
<td>(12) Install air hose on actuator.</td>
</tr>
<tr>
<td>(13) Install front middle and lower panel covers (para 17-20).</td>
</tr>
<tr>
<td>(14) Install top control panel cover (para 17-20).</td>
</tr>
</tbody>
</table>
This paragraph covers Frame Troubleshooting. The Frame Fault Index, Table 2-68, lists faults for the frame of the vehicle.

**Table 2-68. Frame Fault Index**

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ab1</strong></td>
<td>Tires Continue to Wear After Front End Alignment and/or Vehicle Drives Sideways Down Road</td>
<td>2-2436</td>
</tr>
</tbody>
</table>
ab1. TIRES CONTINUE TO WEAR AFTER FRONT END ALIGNMENT 
AND/OR VEHICLE DRIVES SIDEWAYS DOWN ROAD

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)

Personnel Required
(4)

1. Tire pressure OK.

YES

NO

START

TEST OPTIONS
Visual inspection

REASON FOR QUESTION
If damage is visible on frame rail(s), frame rail is faulty.

1. Does frame rail pass visual inspection for damage?

YES

Notify DS Maintenance.

NO

TEST OPTIONS
Refer to para 13-7.

REASON FOR QUESTION
If front end is not aligned properly, tires will continue to wear.

2. Is front end aligned properly?

NO

YES

Align front end (para 13-5).

KNOW UNKNOWN INFO

POSSIBLE PROBLEMS

Tire pressure OK.
Damaged frame rail.
Improper toe-in.

KNOWN INFO

POSSIBLE PROBLEMS

Tire pressure OK.
Damaged frame rail.
Improper toe-in.
Inspect frame rails and cross members for visible damage. If frame rail(s) and/or cross member(s) show any evidence of damage or bends, notify DS Maintenance.

Perform front end alignment and verify proper toe-in (para 13-5).
ab1. Tires continue to wear after front end alignment and/or vehicle drives sideways down road (cont)

Known Info
- Tire pressure OK.
- Front end aligned properly.
- Possible Problems
- Damaged frame rail.

Test Options
- Road Test

Reason for Question
- If vehicle does not travel in a straight line, frame rail(s) is faulty.

3. Does vehicle travel in a straight line?

- Yes: Notify DS Maintenance.
- No: Fault corrected.
(1) Road test vehicle with additional vehicle following.
(2) Have following vehicle monitor path of lead vehicle.
(3) If front of vehicle can be seen while in direct line of rear of vehicle, notify DS Maintenance.

<table>
<thead>
<tr>
<th>ROAD TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Road test vehicle with additional vehicle following.</td>
</tr>
<tr>
<td>(2) Have following vehicle monitor path of lead vehicle.</td>
</tr>
<tr>
<td>(3) If front of vehicle can be seen while in direct line of rear of vehicle, notify DS Maintenance.</td>
</tr>
</tbody>
</table>
Section V. MAINTENANCE PROCEDURES

2-39. MAINTENANCE INTRODUCTION

This section provides general procedures to be followed for the Unit Maintenance level as specified in the Maintenance Allocation Chart (MAC). When a special procedure is used, the detailed procedure will be in the section covering that component.

2-40. GROUND HANDLING

a. Towing. Two towing eyes are located at front and two located at rear of vehicle.

b. Parking. Parking brakes are designed to hold GVW on a minimum of 7-9 percent grade, pointing either uphill or downhill per Federal Motor Carrier Safety Regulation 393.41.

c. Mooring and Transporting. For forward, aft, lateral and upward movements, vehicle has four tiedown rings. Refer to TM 9-2320-366-10-2 for mooring condition and tiedown locations.

d. Hoisting. Sling assemblies and towing eyes used for hoisting are found on the vehicle.

2-41. GENERAL REMOVAL INSTRUCTIONS

a. Work Required. Remove parts if repair or replacement is required. Do not disassemble a component any further than needed.

b. Preparation. Before removal of any electrical, hydraulic, or air system components, ensure system component is not energized or pressurized. Disconnect battery ground cables. Relieve air system pressure. Before removal of fasteners (nuts, locknuts) remove any paint on threads to prevent binding of fastener.

c. Identification. To ease assembly and installation, tag and mark shims, connectors, wires and mating ends of lines before disconnecting them. Identify similar parts to ensure correct assembly.

d. Position of Valves. Before removing valve handles, mark or diagram their positions when open and closed. This will help during assembly.

e. Tire Removal. Before removing any tires, position jackstands under axles, walking beams or frame. This will secure the vehicle for safe tire removal.

f. Location. Before removing cable ties, cushion clamps, hoses, tubing, wiring, etc., note the location, position and routing to ensure correct assembly.
2-41. GENERAL REMOVAL INSTRUCTIONS (CONT)

g. Data Plate Removal.

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

**CAUTION**
Use appropriate size drill bit when removing rivets. Failure to comply may cause damage to equipment.

Remove rivets and data plate from vehicle.

h. Rivnut Removal.

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

**CAUTION**
Use appropriate size drill bit when removing rivets. Failure to comply may cause damage to equipment.

Remove rivets and rivnut from vehicle.

2-42. GENERAL DISASSEMBLY INSTRUCTIONS

a. **Cleanliness.** Work area must be as clean as possible to prevent contamination to components.

**CAUTION**
Self-locking fasteners that are loosened must be replaced, not tightened.

b. **Locking Parts.** Replace all lockwashers, cotter pins and self-locking nuts at time of reassembly.

c. **Expendable Parts.** All gaskets, packings, and seals removed during repair must be discarded and replaced with new parts.

d. **Removing Seals.** Be sure all traces of oil, gaskets, and sealants are removed from components. When possible, use wood or plastic probes and scrapers to prevent damage to machined surfaces.
CAUTION

Do not use tape to close off fuel or oil openings. Sticky surface of tape can mix with fuel and oil and cause engine malfunctions.

e. Parts Protection. To keep dust, dirt, moisture, and other objects out of internal parts of systems or components, cap or tape all open tubes, hoses, air lines, fittings and component openings as soon as part is removed. Wrap all removed parts in clean paper or dip parts in preservation oil.

2-43. GENERAL CLEANING INSTRUCTIONS

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 degrees F (38 degrees C) and for Type II is 130 degrees F (50 degrees 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 solvent contacts skin or clothes, flush with cold water. If solvent contacts eyes, immediately flush eyes with water and get immediate medical attention. Failure to comply may result in injury to personnel.

- Never use fuel to clean parts. Fuel is highly flammable. Serious injury or death could result if fuel ignites during cleaning.

a. Cleaning Solvents. Use only approved cleaning solvents to clean parts. Dry Cleaning Solvent P-D-680 (Item 65, Appendix D) is commonly used. Always work in a well-ventilated area.

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.

b. Removing Deposits. Soak parts in Dry Cleaning Solvent P-D-680 (Item 65, Appendix D), and wash away deposits by flushing or spraying. When necessary, brush with a soft bristle brush (not wire) moistened in solvent. Use compressed air to dry parts, except bearings, after cleaning. Bearings must drip and air dry.

c. Tools. Do not use wire brushes, abrasive wheels, or compounds to clean parts unless specifically approved in the detailed procedures. Parts may be scratched or altered and may weaken a highly stressed part.

d. Ball and Roller Bearings. When cleaning ball or roller bearings, place them in a basket and suspend them in a container of Dry Cleaning Solvent P-D-680 (Item 65, Appendix D). If needed, use a brush to remove caked grease, chips, etc. Avoid rotating bearing before solid particles are removed to prevent damaging races and balls. When bearings have been cleaned, coat them lightly with lubricating oil (Item 42, Appendix D) to remove solvent.
2-43. GENERAL CLEANING INSTRUCTIONS (CONT)

CAUTION

Do not clean tires, lubricant seals, rubber hoses, or electrical components with solvent mixture. Failure to comply may result in damage to equipment.

e. Rubber Parts. Do not clean preformed packings or other rubber parts in Dry Cleaning Solvent. Wipe parts clean with a dry wiping rag (Item 50, Appendix D).

WARNING

Steam cleaning creates hazardous noise levels and severe burn potential. Eye, skin, and ear protection is required. Failure to comply may result in injury to personnel.

CAUTION

Steam cleaning may cause water to enter the transmission Electronic Control Unit (ECU) connector. Failure to dry off connector after steam cleaning may result in bad ECU codes.

f. Exterior Parts. Steam clean all exterior parts thoroughly before removing. This will make inspection and disassembly easier.

WARNING

Solvents used with a spray gun must be used in a spray booth with filter. Face shield must be used by personnel operating spray gun. Failure to comply may result in injury to personnel.

g. Engine, Cab, and Body. Use a spray gun and solvent mixture for cleaning exterior of engine, cab, and body. Allow mixture to remain on item surface for 10 minutes before rinsing. Rinse with hot water under 80 to 120 psi (550 to 830 kPa), if available. An ordinary garden hose with nozzle may be used if other equipment is not available. Rinse thoroughly.

CAUTION

To prevent corrosion, parts should be dipped in rust preventive within two hours of degreasing. Failure to comply may result in damage to equipment.

h. Degreasing Machine. A degreasing machine may be used to remove heavy grease and oil from metal parts.
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 degrees F (38 degrees C) and for Type II is 130 degrees F (50 degrees 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 solvent contacts skin or clothes, flush with cold water. If solvent contacts eyes, immediately flush eyes with water and get immediate medical attention. Failure to comply may result in injury to personnel.

- Never use fuel to clean parts. Fuel is highly flammable. Serious injury or death could result if fuel ignites during cleaning.

i. Passages. After degreasing, check all oil passages and cavities for dirt or blockage before coating with lubricating oil (Item 42, Appendix D). Run a thin, flexible wire through oil passages to make sure they are not clogged. Use a pressure spray gun and Dry Cleaning Solvent P-D-680 (Item 65, Appendix D) to clean dirty passages.

j. Electrical Parts. Electrical parts; such as coils, junction blocks, and switches; should not be soaked or sprayed with cleaning solutions. Clean these parts with a clean wiping rag (Item 50, Appendix D) moistened with Dry Cleaning Solvent P-D-680 (Item 65, Appendix D).

CAUTION

Do not use soap or alkalies for cleaning tank interiors. Failure to comply may result in damage to equipment.

k. Fuel Tank. Pay special attention to all warnings and cautions when working on vehicle fuel tank. Fuel tanks should be flushed, using a spray gun and Dry Cleaning Solvent P-D-680 (Item 65, Appendix D).

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.

l. Battery. Exterior surfaces of the electrical system and battery should be cleaned with a weak solution of baking soda and water. Apply solution with a bristle brush to remove any corrosion. Pay special attention to all warnings and cautions when working on batteries.

m. Hydraulic System. When cleaning hydraulic system parts use Dry Cleaning Solvent P-D-680 (Item 65, Appendix D). Clean and dry parts thoroughly to make sure no residue remains. If a coating of preservative is required before assembly, apply a light film of lubricating oil (Item 42, Appendix D).
2-44. GENERAL INSPECTION INSTRUCTIONS

a. **Cleaning.** Clean all parts before inspection. Check for defects such as physical distortion, wear, cracks, and pitting.

b. **Sealing Surfaces.** Inspect all surfaces in contact with gaskets, packings, or seals for nicks and burrs. If any defect is found, remove it before assembly.

c. **Bearings.** Inspect bearings for rusted or pitted balls, races, or separators. Inspect balls and races for brinelling, abrasion, and serious discoloration. The following are conditions for bearing rejection:
   
   (1) Cuts or grooves parallel to ball or roller rotation.
   
   (2) Fatigue pits (not minor machine marks or scratches).
   
   (3) Cracks.

d. **Gears and Splined Shafts.** Inspect gears and splined shafts for wear, pittings, rolling, peening, scoring, burning, brinnelling and fatigue cracks.

e. **Tubing and Hoses.** Inspect all hose surfaces for broken or frayed fabric. Check for breaks caused by sharp kinks or contact with other parts of the vehicle. Inspect copper tubing lines for kinks. Inspect fitting threads and mating surfaces for damage. Replace any defective part. After assembly and during initial vehicle operation period, check for leaks.

f. **Electrical Parts.** Inspect all wiring harnesses and cable assemblies for broken, chafed, or burned wiring. Inspect all terminal connectors for loose connections and broken parts.

g. **Metal Parts.** Visually inspect all castings and weldments for cracks. Parts that carry a great load should receive magnetic particle inspection. Critical non-ferrous parts may be inspected with fluorescent penetrant.

h. **Drain Plugs.** When removing drain plugs from transmission, engine, hydraulic system components, or axle differential and planetary hubs, check amount of sediment on plugs. Accumulations of grit or fine metal particles may indicate actual or potential component failure. A few fine particles are normal. This inspection helps to determine if there are defective parts prior to internal inspection of the component and to predict degradation of the equipment.

2-45. GENERAL REPAIR INSTRUCTIONS

a. **Burrs.** Remove burrs from surface teeth with a fine-cut file or crocus cloth.

b. **Exterior Parts.** Chassis and exterior painted parts may be resurfaced when paint is damaged, or where parts have been repaired (TB 43-0242).

NOTE

Polished and machined steel parts not protected by cadmium, tin, copper, or other plating or surface treatment require protection. Bare metal parts must be free of moisture when protective coating is applied.

c. **Protecting Parts.** Protect bare steel surfaces from rust when not actually undergoing repair work. Dip parts in, or spray them with, corrosion preventive compound (Item 18, Appendix D). Aluminum parts may require protection in atmospheres having a high salt content.
d. **Screws, Nuts and Fittings.** Replace any screw, nut, or fitting with damaged threads. Inspect tapped holes for thread damage. If cross-threading is evident retap the hole for the next oversize screw or stud. If the retapping will weaken the part, or if the cost of the part makes retapping impractical, replace the part. Chasing the threads with proper size tap or die may be adequate.

e. **Stud Installation.** When installing studs use a proper driver. A worn stud driver may damage the end thread. Then a chasing die must be used before a nut can be screwed on. This procedure will remove cadmium plating and allow corrosion. Before installing a stud, inspect the hole for chips. Blow out foreign matter and start stud by hand. Before final insertion, coat threads with a film of antiseize compound (Item 13, Appendix D). Install stud to proper "setting height", which is the total projecting length.

f. **Dents.** Straighten minor body dents by tapping with a soft-faced hammer while using a wooden block backing.

g. **Sheet Metal Repair.** Repair minor skin cracks by installing patches.

h. **Wire Repair.** Replace all broken, worn, or burned electrical wiring. Wires with several broken strands must be replaced. Broken strands will increase the resistance of the wire and impair efficiency of electrical components, especially the ignition system. Wire numbers must be permanently identified on any new wiring.

i. **Repair of Wires with Female Sockets.** Strip insulation from wire to equal depth of terminal well. Slide shell and sleeve over wire insulation. Insert wire into terminal well. Crimp terminal well on wire. Slide sleeve and shell over terminal.

j. **Repair of Wires with Male Plugs.** Strip insulation from wire to equal depth of terminal well. Slide shell over wire insulation. Insert wire into terminal well. Crimp terminal well on wire. Place slotted washer over crimped terminal well. Slide shell over slotted washer and terminal.

k. **Repair of Wires with Terminals of Various Configurations.** Strip insulation from wire to equal depth of terminal well. Slide insulator over insulation. Insert wire into terminal well. Crimp terminal well on wire. Slide insulator over crimped terminal well.

l. **Repair of Cables with Multiple Conductor Receptacle Connectors.** Remove insulation sleeving from cable. Discard insulation sleeving. Extract electrical contact from receptacle body. Strip insulation from wire to equal depth of well in electrical contact. Position insulation sleeving on cable. Crimp electrical contact on wire. Install electrical contact in receptacle body. Heat shrink insulation sleeving.

m. **Repair of Cables with Multiple Conductor Plug Connectors.** Remove insulation sleeving from cable. Discard insulation sleeving. Extract electrical contact from plug body. Strip insulation from wire to equal depth of well in electrical contact. Position insulation sleeving on cable. Crimp electrical contact on wire. Install electrical contact in plug body. Heat shrink insulation sleeving.

n. **Repair of Cables with Multiple Conductor Mate-N-Lock Series Connectors.** Remove electrical contact from connector body. Strip insulation equal to depth of well on electrical contact. Position wire end in electrical contact. Crimp electrical contact on wire end. Install electrical contact in connector body. Remove electrical contact from connector body. Strip insulation equal to depth of well on electrical contact. Position wire end in electrical contact. Crimp electrical contact on wire end. Install electrical contact in connector body.

o. **Repair of Cables with Multi-Conductor Metri-Pack Series Connectors.** Extract electrical contact from connector body. Strip insulation from wire to equal depth of well in electrical contact. Crimp electrical contact on wire. Install electrical contact in connector body.

q. Repair of Cables with MIL-SPEC Solder-Type Terminal Connectors. Loosen two retaining screws on cable clamp. Remove cable clamp from connector body. Desolder wire from electrical contact. Remove wire from electrical contact. Strip insulation from wire to equal depth of well in electrical contact. Position wire in electrical contact. Solder wire to electrical contact. Install cable clamp on connector body with two retaining screws.

2-46. GENERAL ASSEMBLY INSTRUCTIONS

a. Preparation. Remove protective grease coatings from new parts before installation.

b. Preformed Packing Installation. Lubricate all preformed packings with a thin coat of lubricating oil (Item 42, Appendix D) before installing. To install a preformed packing, first clean the groove, then stretch packing and place into position. Place component on flat surface and uniformly press packing into position.

c. Pipe Joints and Fittings. Use antiseize compound (Item 13, Appendix D) or antiseizing tape (Item 66, Appendix D) to join pipes and fittings.

d. Oil Seals. Coat oil seals evenly with oil or grease before installing. Install oil seals with seal lip facing toward lubricant, applying an even force to outer edge of seal. If oil seals are to be installed over keyed or splined shafts, use a guide to prevent sharp edge of keyway or splines from cutting the leather or neoprene seal. Construct guides of very thin gauge sheet metal and shape to the required diameter. Make certain guide edges are not sharp and are bent slightly inward so they do not cut the seal.

e. Bearings and Shafts. When mounting bearings on shafts always apply force to the inner races. When mounting bearings into housing always apply the force to the outer race.

f. Bearing Lubrication. Lubricate bearings before assembly with lubricant used in the related housing or container to provide the first run-in until lubricant from the system can reach the bearings.

WARNING

On direct contact, uncured silicone sealant irritates eyes. In case of contact, flush eyes with water and seek medical attention. In case of skin contact, wipe off and flush with water. Failure to comply may result in injury to personnel.

g. Silicone Sealant. Silicone sealant is often used instead of a gasket to seal mating parts. The mating parts must be clean, dry, and free of oil or grease for proper adhesion. After silicone sealant has been applied, the mating parts must be assembled immediately. Silicone sealant starts to set-up in 15 minutes and takes 24 hours to completely dry. Excess silicone sealant should be wiped off after assembling the mating parts.
2-46. GENERAL ASSEMBLY INSTRUCTIONS (CONT)

h. Gaskets. Remove all traces of previous gasket and sealant before installing new gasket. Coat both sides of gasket with sealant to provide added sealing.

2-47. GENERAL INSTALLATION INSTRUCTIONS

a. Preparation. When unpacking items, remove all packing material, barrier paper, tape, plastic bags, protective caps and protective grease coatings. Handle and store removed components carefully.

CAUTION

Use sealing compound sparingly and only on threads. Do not apply compound to hose connections. Failure to comply may result in damage to equipment.

b. Sealing Compounds. Use only the sealing compounds specified in each maintenance task.

c. Torquing. Tighten bolts, screws, nuts, and fittings as required in each maintenance task or in Appendix F.

d. Identification Tags. Put hoses, tubes, lines, and electrical wiring in place by matching identification tags and markings on equipment.

e. Hoses, Air Lines and Wiring. After installing hoses, air lines and wiring, ensure that they do not contact moving parts or component edges. Secure in place, out of the way, with cable ties and cushion clamps.

f. Data Plate Installation.

Install data plate on vehicle with rivets.

g. Rivnut Installation.

Install rivnut on vehicle with rivets.

2-48. PREPARATION FOR STORAGE OR SHIPMENT INTRODUCTION

a. This section gives instructions for making the vehicle ready for shipment or storage.

b. Refer to AR 750-1 for detailed administrative storage instructions.

c. Refer to TB 9-2300-422-20 for security procedures.

2-49. PREPARATION FOR STORAGE OR SHIPMENT

a. Perform Preventive Maintenance Checks and Services (PMCS) listed in Table 2-1.

b. Correct all deficiencies noted during inspection, if facilities are available. If repairs are required, beyond the scope of Unit Maintenance, refer the deficiencies to Direct Support or General Support Maintenance.
2-50. STORAGE MAINTENANCE PROCEDURES

a. Provide access to the vehicle during storage.

**CAUTION**

Ensure tires are not resting on surfaces containing grease or oil. Failure to comply may result in damage to equipment.

b. Do not block wheels, but do be sure tires are not resting on surfaces containing grease or oil.

c. Perform complete lubrication in accordance with TM 9-2320-366-10-1 and Appendix H.

d. If possible, store vehicles close together, out of direct sunlight and away from electrical or generating equipment.

e. Ensure the fuel tank contains at least 20 gallons (75.7 liters) of treated fuel. The fuel should be treated with Biobor J.F. The addition of 3 teaspoons of Biobor to 20 gallons of fuel will provide adequate protection against fungus growth. When storing a vehicle in freezing conditions, the addition of 3 ounces of isopropyl alcohol to every 20 gallons of diesel fuel will help prevent fuel-line freeze up.

f. **Monthly Storage Maintenance Instructions.**

   (1) Conduct visual inspection of vehicle. Check lubricant, battery electrolyte, coolant level, and tire pressures. Correct any discrepancies.

   (2) Inspect oil can points. Lubricate if necessary.

   (3) Start engine and idle for 10 minutes. After 10 minutes of engine idle, operate engine for 5 minutes at 1500 rpm or until engine water temperature reaches 180 degrees F. Shift transmission slowly through all gear selector positions. Return transmission to neutral.

   (4) Move vehicle 30 feet forward and reverse.

   (5) Idle engine 10 minutes before shutdown.

   (6) Check grease coating on all chromium plated and unpainted surfaces. If grease was wiped from chromium plates or unpainted surfaces when vehicle was moved, recoat these surfaces.

g. **Quarterly Storage Maintenance Instructions.**

   (1) Move vehicle at least 1/4 mile. While driving, shift transmission through all gear ranges.

   (2) Exercise all auxiliary equipment and winch. While operating winch or crane, lubricate hoist and cables.

h. **Yearly Storage Maintenance Instructions.**

   (1) Clean exterior, engine, and undercarriage. Clean interior of cab. Wash any oil or grease from tires.

   (2) Visually inspect vehicle. Check lubricant levels and tire pressures. Correct all discrepancies.

   (3) Lubricate chassis, auxiliary equipment, winch, hoist cable, and oil can points.
CHAPTER 3
ENGINE MAINTENANCE

RESTRICTED MAINTENANCE NOTICE

Units not authorized SC 4910-95-CL-A72 (SHOP EQUIPMENT, COMMON NO. 2) in their T.O.E. may be unable to perform some of the maintenance tasks described in this chapter. If the required tools are not authorized, the equipment must be submitted to DS Maintenance for repair.

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Section I. INTRODUCTION

3-1. INTRODUCTION

This chapter contains maintenance instructions for replacing engine components authorized by the Maintenance Allocation Chart (MAC) at the Unit Maintenance level.
Section II. MAINTENANCE PROCEDURES

3-2. LIFTING PLATE REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).
Cab raised (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, Torque, 0-175 lb-ft (Item 58, Appendix C)
Container (40 qt (38 L) capacity)

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.

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

a. Removal.

(1) Remove radiator cap (1) from radiator overflow tank (2).

(2) Position container under radiator draincock (3).

(3) Open radiator draincock (3) and drain approximately five gallons (19 L) of coolant.

(4) Close radiator draincock (3).
(5) Disconnect air compressor inlet coolant tube (4) from fitting (5) on thermostat housing (6).

(6) Remove five screws (7), washers (8), and front lifting plate (9) from engine (10).

(7) Remove four screws (11), washers (12), and rear lifting plate (13) from engine (10).
b. Installation.

(1) Position rear lifting plate (1) on engine (2) with four washers (3) and screws (4).

(2) Tighten four screws (4) to 47 lb-ft (64 N·m).

(3) Position front lifting plate (5) on engine (2) with five washers (6) and screws (7).

(4) Tighten five screws (7) to 47 lb-ft (64 N·m).

(5) Connect air compressor inlet coolant tube (8) to fitting (9) on thermostat housing (10).
c. Follow-On Maintenance.

(1) Lower cab (TM 9-2320-366-10-1).

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

(3) Check for coolant leaks under vehicle.

(4) Add coolant to radiator overflow tank (TM 9-2320-366-10-2).

(5) Check coolant level after normal operating temperature is reached.

(6) Check for coolant leaks under vehicle.

(7) Raise cab (TM 9-2320-366-10-1).

(8) Check around thermostat housing for coolant leaks.

(9) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
3-3. VALVE COVER AND GASKET REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Charge air cooler to air inlet elbow tubes/hoses removed (para 4-5).

Tool and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 36, Appendix C)

Materials/Parts
Rag, Wiping (Item 50, Appendix D)
Sealing Compound (Item 59, Appendix D)
Gasket (for valve cover 7W5627) (Item 42, Appendix G)
Gasket (for valve cover 119-2960) (Item 28, Appendix G)
Adhesive (Item 6, Appendix D)
Screw, Cap (14) (for replacement of valve cover 7W5627 with valve cover 119-2960) (Item 262, Appendix G)

a. Removal.

NOTE
Position hoses to allow access to valve cover.

(1) Remove screw (1), washer (2), and clamp (3) from valve cover (4).
CAUTION

Area around valve cover must be clean before removing valve cover from inlet manifold to prevent contaminants from entering inlet manifold. Failure to comply may result in damage to equipment.

(2) Remove 13 screws (5) and washers (6) from valve cover (4).

CAUTION

Cover inlet manifold with wiping rags after valve cover is removed to prevent contamination of engine. Failure to comply may result in damage to equipment.

(3) Remove valve cover (4) from inlet manifold (7).

CAUTION

Engine data plate must remain with original engine. It contains engine serial number and other data for this engine. Failure to comply may result in damage to equipment.

(4) Remove valve cover gasket (8) from valve cover (4). Discard gasket.

(5) Remove engine data plate (9) from valve cover (4).
b. Installation.

**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.

1. Install engine data plate (1) on valve cover (2) with adhesive.

2. Apply sealing compound between screw holes of valve cover (2).

3. Position valve cover gasket (3) on valve cover (2).

**NOTE**

Vehicle serial numbers 0001 through 3091 were originally equipped with valve cover part number 7W5627. Vehicle serial numbers 3092 and higher serial numbers were originally equipped with valve cover part number 119-2960. If replacing valve cover part number 7W5627 with valve cover part number 119-2960, it will be necessary to use the longer screws.

4. Position valve cover (2) on inlet manifold (4) with 13 washers (5) and screws (6).
(5) Position clamp (7) on valve cover (2) with washer (8) and screw (9).

(6) Tighten 13 screws (6) and screw (9) to 84-132 lb-in. (9-15 N·m) in sequence shown.

c. Follow-On Maintenance.

(1) Install charge air cooler to air inlet elbow tubes/hoses (para 4-5).

(2) Lower cab (TM 9-2320-366-10-1).

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

(4) Raise cab (TM 9-2320-366-10-1).

(5) Check for oil leaks around valve cover gasket.

(6) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
3-4. ENGINE OIL FILTER REPLACEMENT

This task covers:

a. Removal
b. Installation

c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).
Cab raised (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, Strap, Adjustable (Item 57, Appendix C)
Container (40 qt (38 L) capacity)

Materials/Parts
Oil, Lubricating, OE/HDO 15W/40 (Item 44, Appendix D)
Filter, Oil (Item 23, Appendix G)
Packing, Preformed (Item 203, Appendix G)

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.

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

a. Removal.

(1) Position container under oil pan (1).

(2) Remove oil pan plug (2) from oil pan (1).

(3) Remove preformed packing (3) from oil pan drain plug (2). Discard preformed packing.
(4) Remove oil filter (4) from oil filter base (5). Discard oil filter.

b. Installation.

(1) Install preformed packing (1) on oil pan drain plug (2).

(2) Install oil pan drain plug (2) in oil pan (3).

(3) Apply a thin coat of lubricating oil to oil filter gasket (4).

(4) Install oil filter (5) on oil filter base (6), hand tight.
3-4. ENGINE OIL FILTER REPLACEMENT (CONT)

c. Follow-On Maintenance.

(1) Add oil to engine (Appendix H).

(2) Lower cab (TM 9-2320-366-10-1).

(3) Check for oil leaks under vehicle.

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

(5) Raise cab (TM 9-2320-366-10-1).

(6) Check for oil leaks around oil filter and oil pan drain plug.

(7) Check engine oil level (TM 9-2320-366-10-2); if low, add oil (Appendix H).

(8) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
3-5. CRANKCASE BREATHER REPLACEMENT

This task covers:

- a. Removal
- b. Installation
- c. Follow-On Maintenance

INITIAL SETUP

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

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 35, Appendix C)

Materials/Parts
Rag, Wiping (Item 50, Appendix D)
Packing, Preformed (Item 207, Appendix G)
Oil, Lubricating, OE/HDO 30 (Item 45, Appendix D)

a. Removal.

CAUTION
Wipe around fuel filter base before removing crankcase breather housing. Failure to comply may result in damage to equipment.

(1) Loosen hose clamp (1) on hose (2).

(2) Remove hose (2) from crankcase breather housing (3).

(3) Remove screw (4) and washer (5) from crankcase breather housing (3).

(4) Remove crankcase breather housing (3) from fuel filter base (6).

(5) Remove preformed packing (7) from fuel filter base (6). Discard preformed packing.
b. Installation.

(1) Apply a thin coat of lubricating oil to both sides of preformed packing (1).

(2) Install preformed packing (1) on fuel filter base (2).

(3) Position crankcase breather housing (3) on fuel filter base (2) with washer (4) and screw (5).

(4) Tighten screw (5) to 96-144 lb-in. (11-16 N·m).

(5) Position hose (6) on crankcase breather housing (3) with clamp (7).

(6) Tighten clamp (7) to 35-45 lb-in. (4-5 N·m).

c. Follow-On Maintenance.

(1) Lower cab (TM 9-2320-366-10-1).

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

(3) Check for oil leaks under vehicle.

(4) Raise cab (TM 9-2320-366-10-1).

(5) Check for oil leaks around breather housing gasket.

(6) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
3-6. ENGINE AND TRANSMISSION OIL SAMPLING VALVES REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

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

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Pan, Drain (Item 24, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Wrench Set, Socket (Item 51, Appendix C)

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
Packing, Preformed (Item 186, Appendix G)
Antiseize Compound (Item 58, Appendix D)

**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.

a. Removal.

(1) Position drain pan under transmission oil sampling valve (1) and engine oil sampling valve (2).

**NOTE**

Tag hoses and connection points prior to disconnecting.

(2) Disconnect transmission oil sampling hose (3) from transmission oil sampling valve (1).

(3) Disconnect engine oil sampling hose (4) from engine oil sampling valve (2).

(4) Remove nut (5) and transmission oil sampling valve (1) from bracket (6).

(5) Remove nut (7) and engine oil sampling valve (2) from bracket (6).
(6) Remove transmission oil sampling hose (3) from 45-degree fitting (8).

**NOTE**
- Note orientation of fitting prior to removal.
- Perform steps (7) and (8) on vehicles equipped with transmission oil cooler tubes.

(7) Remove 45-degree fitting (8) from transmission oil cooler tube (9).

(8) Remove preformed packing (10) from 45-degree fitting (8). Discard preformed packing.

**NOTE**
Perform step (9) on vehicles equipped with transmission oil cooler hoses.

(9) Remove 45-degree fitting (8) from transmission oil cooler hose (9).

(10) Remove engine oil sampling hose (4) from adapter (11).

(11) Remove adapter (11) from 90-degree fitting (12).
b. Installation.

**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.

1. Apply antiseize compound to threads of adapter (1).
2. Install adapter (1) on 90-degree fitting (2).
3. Install engine oil sampling hose (3) on adapter (1).

**NOTE**

Perform steps (4) and (5) on vehicles equipped with transmission oil cooler tubes.

4. Install preformed packing (4) on 45-degree fitting (5).
5. Install 45-degree fitting (5) in transmission oil cooler tube (6).

**NOTE**

Perform step (5.1) and (5.2) on vehicles equipped with transmission oil cooler hoses.

5.1 Apply antiseize compound to threads of 45-degree fitting (5).
5.2 Install 45-degree fitting (5) in transmission oil cooler hose (6).
6. Install transmission oil sampling hose (7) on 45-degree fitting (5).
(7) Position engine oil sampling valve (8) on bracket (9) with nut (10).

(8) Position transmission oil sampling valve (11) on bracket (9) with nut (12).

(9) Tighten nuts (10 and 12) to 67 lb-in. (8 N·m).

(10) Install engine oil sampling hose (3) on engine oil sampling valve (8).

(11) Install transmission oil sampling hose (7) on transmission oil sampling valve (11).

c. Follow-On Maintenance.

(1) Lower cab (TM 9-2320-366-10-1).

(2) Check for oil leaks under vehicle.

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

(4) Raise cab (TM 9-2320-366-10-1).

(5) Check for oil leaks around transmission and engine oil sampling hoses and valves.

(6) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
3-7. ENGINE OIL FILL TUBE REPLACEMENT

This task covers:

a. Removal
b. Installation

c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).
Cab raised (TM 9-2320-366-10-1).
Transmission oil fill tube removed (Para 8-22).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)
Screwdriver Attachment, Socket Wrench (Item 61, Appendix B)

Tools and Special Tools (Cont)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 36, Appendix C)

Materials/Parts
Nut, Self-Locking (2) (all models except M1093/M1094) (Item 167, Appendix G)
Nut, Self-Locking (M1093/M1094) (Item 167, Appendix G)

a. Removal.

(1) Remove cap (1) from engine oil fill tube (2).

NOTE

Perform steps (2) and (3) on all models except M1093/M1094.

(2) Remove self-locking nut (3), washer (4), engine oil fill tube (2), screw (5), and washer (6) from radiator overflow tank bracket (7). Discard self-locking nut.

(3) Remove self-locking nut (8), washer (9), engine oil fill tube (2), screw (10), and washer (11) from front lifting beam (12). Discard self-locking nut.
NOTE

Perform step (4) on M1093/M1094.

(4) Remove self-locking nut (3), washer (4), engine oil fill tube (2), screw (13), washer (6), and spacer (14) from radiator overflow tank bracket (7). Discard self-locking nut.

(5) Loosen clamp (15) on engine oil fill hose (16).

(6) Remove engine oil fill tube (2) from engine oil fill hose (16).

b. Installation.

(1) Position engine oil fill tube (1) in engine oil fill hose (2) with clamp (3).

(2) Tighten clamp (3) to 24-48 lb-in. (3-5 N·m).
NOTE

Perform steps (3) and (4) on M1093/ M1094.

(3) Position engine oil fill tube (1) on radiator overflow tank bracket (4) with spacer (5), washer (6), screw (7), washer (8), and self-locking nut (9).

(4) Tighten self-locking nut (9) to 22-26 lb-ft (29-35 N·m).

NOTE

Perform steps (5) through (7) on all models except M1093/M1094.

(5) Position engine oil fill tube (1) on front lifting beam (10) with washer (11), screw (12), washer (13), and self-locking nut (14).

(6) Position engine oil fill tube (1) on radiator overflow tank bracket (4) with washer (6), screw (15), washer (8), and self-locking nut (9).

(7) Tighten self-locking nuts (9 and 14) to 22-26 lb-ft (29-35 N·m).

(8) Install cap (16) on engine oil fill tube (1).

c. Follow-On Maintenance.

(1) Install transmission oil fill tube (para 8-22).

(2) Lower cab (TM 9-2320-366-10-1).

End of Task.
CHAPTER 4
FUEL SYSTEM MAINTENANCE

RESTRICTED MAINTENANCE NOTICE

Units not authorized SC 4910-95-CL-A72 (SHOP EQUIPMENT, COMMON NO. 2) in their T.O.E. may be unable to perform some of the maintenance tasks described in this chapter. If the required tools are not authorized, the equipment must be submitted to DS Maintenance for repair.

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Section I. INTRODUCTION

4-1. INTRODUCTION

This chapter contains maintenance instructions for replacing, repairing, and adjusting fuel system components authorized by the Maintenance Allocation Chart (MAC) at the Unit Maintenance level.
Section II. MAINTENANCE PROCEDURES

4-2. INTAKE AIR CLEANER FILTER ELEMENT, AIR CLEANER ASSEMBLY, AND PARTICLE EXTRACTION TUBE REPLACEMENT

This task covers:

a. Intake Air Cleaner Filter Element Removal
b. Intake Air Cleaner Filter Element Installation
c. Intake Air Cleaner Assembly Removal (All Models Except M1093/M1094)
d. M1093/M1094 Intake Air Cleaner Assembly Removal
e. Intake Air Cleaner Disassembly
f. Intake Air Cleaner Assembly

g. M1093/M1094 Intake Air Cleaner Assembly Installation
h. Intake Air Cleaner Assembly Installation (All Models Except M1093/M1094)
i. Particle Extraction Tube Removal
j. Particle Extraction Tube Installation
k. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
- Engine shut down (TM 9-2320-366-10-1).
- Cab raised (TM 9-2320-366-10-1).
- Batteries disconnected (para 7-57).
- Chemical detection unit removed, if equipped (TM 3-6665-225-12).
- Transmission oil fill tube removed (M1093/M1094) (para 8-22).

Tools and Special Tools

| Tool Kit, Genl Mech (Item 46, Appendix C) |
| Wrench, Torque, 0-175 lb-ft (Item 59, Appendix C) |
| Crowfoot Attachment, Socket Wrench (Item 6, Appendix B) |
| Screwdriver Attachment, Socket Wrench (Item 61, Appendix B) |
| Socket Set, Socket Wrench (Item 36, Appendix C) |

Tools and Special Tools (Cont)

| Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C) |

Materials/Parts

| Rag, Wiping (Item 50, Appendix D) |
| Gasket (Item 31, Appendix G) |
| Filter Element (Item 21, Appendix G) |
| Washer, Spring (2) (Item 291, Appendix G) |
| Nut, Self-Locking (3) (Item 156, Appendix G) |
| Nut, Self-Locking (3) (M1093/M1094) (Item 150, Appendix G) |
| Nut, Self-Locking (3) (all models except M1093/M1094) (Item 157, Appendix G) |

References

| TM 3-6665-225-12 |
| FM 3-4 |
| FM 3-5 |

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 materials 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.
a. Intake Air Cleaner Filter Element Removal.

(1) Unlatch three clasps (1) on cover (2).

(2) Remove cover (2) from intake air cleaner housing (3).

(3) Loosen wingnut (4) and remove filter element (5) from intake air cleaner housing (3). Discard filter element.

b. Intake Air Cleaner Filter Element Installation.

NOTE

Wipe inside of intake air cleaner housing with damp wiping rag.

(1) Position filter element (1) in intake air cleaner housing (2).

CAUTION

Tighten wingnut securely to prevent air leakage around air cleaner filter element. Do not overtighten. Failure to comply may result in damage to equipment.

(2) Tighten wingnut (3) on filter element (1).

(3) Install cover (4) on intake air cleaner housing (2) with three clasps (5).
c. Intake Air Cleaner Assembly Removal (All Models Except M1093/M1094).

(1) Remove dust cap (1) from connector J106 (2).

(2) Remove nut (3), dust cap lanyard (4), and connector J106 (2) from chemical detector mounting bracket (5).

(3) Remove four screws (6) and washers (7) from chemical detector mounting bracket (5).

(4) Disconnect air filter restriction gauge hose (8) from air flow sensor (9).

(5) Loosen clamp (10) on particle extraction hose (11).

(6) Remove particle extraction hose (11) from adapter (12).

(7) Loosen clamp (13) on air compressor intake hose (14).

(8) Remove air compressor intake hose (14) from intake air cleaner boot (15).
(9) Loosen clamp (16) on turbocharger intake hose (17).

(10) Remove turbocharger intake hose (17) from intake air cleaner boot (15).

(11) Remove two nuts (18), washers (19), lockwashers (19.1), and screws (20) from bracket (21). Discard lockwashers.

(12) Remove two screws (22), washers (23), and bracket (21) from engine inlet manifold (24).
4-2. INTAKE AIR CLEANER FILTER ELEMENT, AIR CLEANER ASSEMBLY, AND PARTICLE EXTRACTION TUBE REPLACEMENT (CONT)

(13) Loosen clamp (25) on turbocharger inlet coupling (26).

(14) Remove turbocharger tube (27) from turbocharger inlet coupling (26).

(15) Loosen clamp (28) on turbocharger inlet coupling (26).

CAUTION

Cover turbocharger inlet with wiping rags after removing turbocharger inlet coupling. Failure to comply may result in damage to equipment.

(16) Remove turbocharger inlet coupling (26) from turbocharger (29).

(17) Loosen clamp (30) on turbocharger intake hose (17).

(18) Remove turbocharger intake hose (17) from turbocharger tube (27).
(19) Remove screw (31) and washer (32) from resilient mount (33).

(20) Remove three self-locking nuts (34) and screws (35) from mounting brackets (36). Discard self-locking nuts.

(21) Remove intake air cleaner assembly (37) from three mounting brackets (36) and resilient mount (33).

(22) Remove screw (38), washer (39), and resilient mount (33) from mounting bracket (36).

d. M1093/M1094 Intake Air Cleaner Assembly Removal.

(1) Remove dust cap (1) from connector J106 (2).

(2) Remove nut (3), dust cap lanyard (4), and connector J106 (2) from chemical detector mounting bracket (5).

(3) Remove four screws (6) and washers (7) from chemical detector mounting bracket (5).

(4) Disconnect air filter restriction gauge hose (8) from air flow sensor (9).
4-2. INTAKE AIR CLEANER FILTER ELEMENT, AIR CLEANER ASSEMBLY, AND PARTICLE EXTRACTION TUBE REPLACEMENT (CONT)

(5) Loosen clamp (10) on particle extraction hose (11).

(6) Remove particle extraction hose (11) from adapter (12).

(7) Loosen clamp (13) on air compressor intake hose (14).

(8) Remove air compressor intake hose (14) from intake air cleaner boot (15).

(9) Loosen clamp (16) on turbocharger intake hose (17).

(10) Remove turbocharger intake hose (17) from intake air cleaner boot (15).
(11) Remove two nuts (18), washers (19), lockwashers (19.1), and screws (20) from bracket (21). Discard lockwashers.

(12) Remove two screws (22), washers (23), and bracket (21) from engine inlet manifold (24).

(13) Loosen clamp (25) on turbocharger inlet coupling (26).

(14) Remove turbocharger tube (27) from turbocharger inlet coupling (26).

(15) Loosen clamp (28) on turbocharger inlet coupling (26).

**CAUTION**

Cover turbocharger inlet with wiping rags after removing turbocharger inlet coupling. Failure to comply may result in damage to equipment.

(16) Remove turbocharger inlet coupling (26) from turbocharger (29).
4-2. INTAKE AIR CLEANER FILTER ELEMENT, AIR CLEANER ASSEMBLY, AND PARTICLE EXTRACTION TUBE REPLACEMENT (CONT)

(17) Loosen clamp (30) on turbocharger intake hose (17).

(18) Remove turbocharger intake hose (17) from turbocharger tube (27).

(19) Remove screw (31) and washer (32) from resilient mount (33).

(20) Remove three self-locking nuts (34) and screws (35) from mounting brackets (36). Discard self-locking nuts.

(21) Remove intake air cleaner assembly (37) from mounting brackets (36) and resilient mount (33).

(22) Remove screw (38), washer (39), and resilient mount (33) from mounting bracket (36).
e. Intake Air Cleaner Disassembly.

(1) Remove air flow sensor (1) from pipe coupling (2).

(2) Remove pipe coupling (2) from intake air cleaner housing (3).

(3) Loosen clamp (4) on intake air cleaner boot (5).

(4) Remove intake air cleaner boot (5) from intake air cleaner housing (3).

(5) Loosen clamp (6) on intake air cleaner boot (5).

(6) Remove adapter (7) from intake air cleaner boot (5).

(7) Loosen clamp (8) on air intake hood (9).

(8) Remove air intake hood (9) from air intake adapter (10).

(9) Remove self-locking nut (11), screw (11.1), and clamp (11.2) from air intake adapter (10). Discard self-locking nut.

NOTE

• Vehicles may be equipped with air intake adapters PN 12420527, PN 12421274, or PN 12421380. If air intake adapter PN 12420527 or PN 12421274 is damaged, replace with intake adapter PN 12421380 and clamp PN 12421379-001.

• Perform step (9) on vehicles equipped with air intake adapter PN 12420572.

Change 1 4-10.1
4-2. INTAKE AIR CLEANER FILTER ELEMENT, AIR CLEANER ASSEMBLY, AND PARTICLE EXTRACTION TUBE REPLACEMENT (CONT)

NOTE

Perform step (10) on vehicles equipped with air intake adapter PN 12421274.

(10) Remove self-locking nut (11) and screw (11.1) from band (11.2). Discard self-locking nut.

NOTE

Perform step (10.1) on vehicles equipped with air intake adapter PN 12421380.

(10.1) Remove self-locking nut (11) and clamp (11.2) from air intake adapter (10). Discard self-locking nut.

(10.2) Remove air intake adapter (10) from intake air cleaner housing (3).

(11) Loosen clamp (12) on resilient mount (13).

(12) Remove resilient mount (13) from intake air cleaner housing (3).

(13) Loosen clamp (14) on resilient mount (13).

(14) Remove adapter (15) from resilient mount (13).
(15) Remove pin (16), air shutter (17), and gasket (18) from intake air cleaner housing (3). Discard gasket.

f. Intake Air Cleaner Assembly.

(1) Install gasket (1), air shutter (2), and pin (3) in intake air cleaner housing (4).

(2) Install adapter (5) on resilient mount (6) with clamp (7).

(3) Install resilient mount (6) on intake air cleaner housing (4) with clamp (8).
(4) Position air intake adapter (9) on intake air cleaner housing (4).

**NOTE**

Perform steps (5) and (5.1) on vehicles equipped with air intake adapter PN 12421380.

(5) Position clamp (10) on air intake adapter (9) with self-locking nut (10.1).

(5.1) Tighten self-locking nut (10.1) to 6-8 lb-ft (10-11 N·m).

**NOTE**

Perform steps (5.2) and (5.3) on vehicles equipped with air intake adapter PN 12421274.

(5.2) Position screw (10.2) and self-locking nut (10.1) on band (10).

(5.3) Tighten self-locking nut (10.1) to 33-39 lb-ft (44-54 N·m).

**NOTE**

Perform steps (5.4) and (5.5) on vehicles equipped with air intake adapter PN 12420572.

(5.4) Position clamp (10) on air intake adapter (9) with screw (10.2) and self-locking nut (10.1).

(5.5) Tighten self-locking nut (10.1) to 33-39 lb-ft (44-54 N·m).
(6) Position air intake hood (11) on air intake adapter (9) with clamp (12).

(7) Tighten clamp (12) to 72-96 lb-in. (8-11 N·m).

(8) Install adapter (13) in intake air cleaner boot (14) with clamp (15).

(9) Position intake air cleaner boot (14) on intake air cleaner housing (4) with clamp (16).

(10) Tighten clamp (16) to 36-48 lb-in. (4-5 N·m).

(11) Install pipe coupling (17) in intake air cleaner housing (4).

(12) Install air flow sensor (18) in pipe coupling (17).

g. M1093/M1094 Intake Air Cleaner Assembly Installation.

(1) Position washer (1), screw (2), and resilient mount (3) on mounting bracket (4).

(2) Tighten screw (2) to 40-46 lb-ft (54-62 N·m).
4-2. INTAKE AIR CLEANER FILTER ELEMENT, AIR CLEANER ASSEMBLY, AND PARTICLE EXTRACTION TUBE REPLACEMENT (CONT)

(3) Position intake air cleaner assembly (5) on mounting brackets (4).

(4) Position washer (6) and screw (7) in resilient mount (3).

(5) Position three screws (8) and self-locking nuts (9) in mounting brackets (4).

(6) Tighten screw (7) to 40-52 lb-ft (54-70 N·m).

(7) Tighten three self-locking nuts (9) to 40-52 lb-ft (54-70 N·m).

(8) Position turbocharger intake hose (10) on turbocharger tube (11) with clamp (12).

(9) Tighten clamp (12) to 36-48 lb-in. (4-5 N·m).

CAUTION
Distance between front edge of air duct and alternator fan shroud must be no less than 0.5 in. (1.27 cm). Failure to comply may result in damage to equipment.

(10) Position air duct (13) on turbocharger (14) with clamp (15).

(11) Tighten clamp (15) to 21-25 lb-in. (2-3 N·m).

(12) Position turbocharger tube (11) in air duct (13) with clamp (16).

(13) Tighten clamp (16) to 36-48 lb-in. (4-5 N·m).
(14) Position bracket (17) on engine inlet manifold (18) with two washers (19) and screws (20).

(15) Tighten two screws (20) to 15-25 lb-ft (20-34 N·m).

(16) Position intake tube (21) on bracket (17) with two lockwashers (22), screws (23), washers (23.1) and nuts (23.2).

(17) Tighten two nuts (23.2) to 22-26 lb-ft (29-35 N·m).

(18) Position turbocharger intake hose (10) on intake air cleaner boot (24) with clamp (25).

(19) Tighten clamp (25) to 36-48 lb-in. (4-5 N·m).
(20) Position air compressor intake hose (26) on intake air cleaner boot (24) with clamp (27).

(21) Tighten clamp (27) to 36-48 lb-in. (4-5 N·m).

(22) Position particle extraction hose (28) on adapter (29) with clamp (30).

(23) Tighten clamp (30) to 36-48 lb-in. (4-5 N·m).

(24) Connect air filter restriction gauge hose (31) to air flow sensor (32).

(25) Install connector J106 (33) and dust cap lanyard (34) on chemical detector mounting bracket (35) with nut (36).

(26) Install dust cap (37) on connector J106 (33).

(27) Install four washers (38) and screws (39) in chemical detector mounting bracket (35).
h. Intake Air Cleaner Assembly Installation (All Models Except M1093/M1094).

(1) Position washer (1), screw (2), and resilient mount (3) on mounting bracket (4).

(2) Tighten screw (2) to 40-52 lb-ft (54-70 N·m).

(3) Position intake air cleaner housing (5) on mounting brackets (4).

(4) Position washer (6) and screw (7) in resilient mount (3).

(5) Position three screws (8) and self-locking nuts (9) in mounting brackets (4).

(6) Tighten screw (7) to 50-52 lb-ft (54-70 N·m).

(7) Tighten three self-locking nuts (9) to 43-52 lb-ft (58-70 N·m).

(8) Position turbocharger intake hose (10) on turbocharger tube (11) with clamp (12).

(9) Tighten clamp (12) to 36-48 lb-in. (4-5 N·m).
Distance between front edge of air duct and alternator fan shroud must be no less than 0.5 in. (1.27 cm). Failure to comply may result in damage to equipment.

10. Position air duct (13) on turbocharger (14) with clamp (15).

11. Tighten clamp (15) to 21-25 lb-in. (2-3 N·m).

12. Position turbocharger tube (11) in air duct (13) with clamp (16).

13. Tighten clamp (16) to 36-48 lb-in. (4-5 N·m).

14. Position bracket (17) on engine inlet manifold (18) with two washers (19) and screws (20).

15. Tighten two screws (20) to 15-25 lb-ft (20-34 N·m).

16. Position intake tube (21) on bracket (17) with two lockwashers (22), screws (23), washers (23.1) and nuts (23.2).

17. Tighten two nuts (23.2) to 22-26 lb-ft (29-35 N·m).
(18) Position turbocharger intake hose (10) on intake air cleaner boot (24) with clamp (25).

(19) Tighten clamp (25) to 36-48 lb-in. (4-5 N·m).

(20) Position air compressor intake hose (26) on intake air cleaner boot (24) with clamp (27).

(21) Tighten clamp (27) to 36-48 lb-in. (4-5 N·m).

(22) Position particle extraction hose (28) on adapter (29) with clamp (30).

(23) Tighten clamp (30) to 36-48 lb-in. (4-5 N·m).
4-2. INTAKE AIR CLEANER FILTER ELEMENT, AIR CLEANER ASSEMBLY, AND PARTICLE EXTRACTION TUBE REPLACEMENT (CONT)

(24) Connect air filter restriction gauge hose (31) to air flow sensor (32).

(25) Install connector J106 (33) and dust cap lanyard (34) on chemical detector mounting bracket (35) with nut (36).

(26) Install dust cap (37) on connector J106 (33).

(27) Install four washers (38) and screws (39) in chemical detector mounting bracket (35).

i. Particle Extraction Tube Removal.

(1) Loosen clamp (1) on particle extraction hose (2).

(2) Remove particle extraction hose (2) from particle extraction tube (3).

(3) Remove self-locking nut (4) and screw (5) from bracket (6). Discard self-locking nut.

(4) Loosen two clamps (7) on particle extraction hose (8).

(5) Remove particle extraction hose (8) from particle extraction tube (3) and tailpipe (9).
(6) Remove self-locking nut (10), screw (11), and clamp (12) from clamp (13). Discard self-locking nut.


**CAUTION**

Use care when removing particle extraction tube from vehicle. Failure to comply may result in damage to equipment.

**NOTE**

- Step (8) requires the aid of an assistant.
- Remove particle extraction tube toward front of vehicle.

(8) Remove particle extraction tube (3) from vehicle.
(9) Remove self-locking nut (16), screw (17), bracket (18), and screw (15) from vehicle. Discard self-locking nut.

j. Particle Extraction Tube Installation.

(1) Position screw (1), bracket (2), screw (3), and self-locking nut (4) on vehicle.

**NOTE**
Steps (2) through (5) require the aid of an assistant.

(2) Tighten self-locking nut (4) to 46-58 lb-ft (62-79 N·m).

**CAUTION**
Use care when installing particle extraction tube on vehicle. Failure to comply may result in damage to equipment.

**NOTE**
Install particle extraction tube from front of vehicle.

(3) Position particle extraction tube (5) on vehicle.

(4) Position self-locking nut (6) on screw (1).

(5) Tighten self-locking nut (6) to 46-58 lb-ft (62-79 N·m).
(6) Position clamp (7) on clamp (8) with screw (9) and self-locking nut (10).

(7) Tighten self-locking nut (10) to 46-58 lb-ft (62-79 N·m).

(8) Position particle extraction hose (11) on tailpipe (12) and particle extraction tube (5) with two clamps (13).

(9) Tighten clamp (13) to 36-48 lb-in. (4-5 N·m).

(10) Position screw (14) and self-locking nut (15) on bracket (16).

(11) Tighten self-locking nut (15) to 46-58 lb-ft (62-79 N·m).

(12) Position particle extraction hose (17) on particle extraction tube (5) with clamp (18).

(13) Tighten clamp (18) to 36-48 lb-in. (4-5 N·m).
k. Follow-On Maintenance.

(1) Install transmission oil fill tube (M1093/M1094) (para 8-22).

(2) Install chemical detection unit, if equipped (TM 3-6665-225-12).

(3) Connect batteries (para 7-57).

(4) Lower cab (TM 9-2320-366-10-1).

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

(6) Check for air leaks around hose and tube connections.

(7) Check AIR FILTER RESTRICTION GAUGE (TM 9-2320-366-10-1).

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

End of Task.
4-3. FUEL PRESSURE REGULATING VALVE REPLACEMENT

This task covers:

a. Removal
b. Installation

c. Follow-On Maintenance

INITIAL SETUP

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

Materials/Parts
Packing, Preformed (Item 210, Appendix G)
Packing, Preformed (Item 203, Appendix G)
Packing, Preformed (Item 200, Appendix G)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

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.

a. Removal.

(1) Disconnect fuel return hose assembly (1) from 90-degree fitting (2).

(2) Remove 90-degree fitting (2) and preformed packing (3) from adapter (4). Discard preformed packing.
(3) Remove adapter (4) and preformed packing (5) from tube assembly (6). Discard preformed packing.

(4) Remove spring (7) from tube assembly (6).

(5) Remove fuel pressure regulating valve (8) and preformed packing (9) from tube assembly (6). Discard preformed packing.

b. Installation.

(1) Install preformed packing (1) and fuel pressure regulating valve (2) in tube assembly (3).

(2) Install spring (4) in tube assembly (3).

(3) Install preformed packing (5) and adapter (6) in tube assembly (3).

(4) Install preformed packing (7) and 90-degree fitting (8) in adapter (6).

(5) Connect fuel return hose assembly (9) to 90-degree fitting (8).
c. Follow-On Maintenance.

(1) Lower cab (TM 9-2320-366-10-1).

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

(3) Raise cab (TM 9-2320-366-10-1).

(4) Check for fuel leaks around regulating valve.

(5) Check that engine runs smoothly at low idle speed.

(6) Check that engine runs smoothly at high idle speed.

(7) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
4-4. TURBOCHARGER TO CHARGE AIR COOLER TUBE AND HOSES REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

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

Materials/Parts
Cap and Plug Set (Item 14, Appendix D)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 36, Appendix C)

a. Removal.

NOTE

Note position of clamps prior to removal.

(1) Loosen two hose clamps (1) and hose clamps (2) on turbocharger to charge air cooler tube (3).

(2) Remove turbocharger to charge air cooler tube (3) from charge air cooler (4) and turbocharger (5).

CAUTION

Cap or plug turbocharger outlet and charge air cooler inlet to prevent contamination of engine intake air system. Failure to comply may result in damage to equipment.

(3) Cap or plug turbocharger outlet (6) and charge air cooler inlet (4).
(4) Remove two clamps (1) and hose (7) from turbocharger to charge air cooler tube (3).

(5) Remove two clamps (2) and hose (8) from turbocharger to charge air cooler tube (3).

b. Installation.

(1) Position hose (1) on turbocharger to charge air cooler tube (2) with two clamps (3).

(2) Position hose (4) on turbocharger to charge air cooler tube (2) with two clamps (5).

(3) Remove caps or plugs from turbocharger outlet (6) and charge air cooler inlet (7).

**CAUTION**

Clamps at charge air cooler end of turbocharger to charge air cooler tube must be oriented as noted in removal. Failure to comply may result in damage to equipment.

(4) Position turbocharger to charge air cooler tube (2) on charge air cooler (7) and turbocharger (8).

(5) Tighten two hose clamps (3) and hoses clamps (5) to 90-100 lb-in. (10-11 N-m).
c. Follow-On Maintenance.

(1) Lower cab (TM 9-2320-366-10-1).

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

(3) Raise cab (TM 9-2320-366-10-1).

(4) Check for air leaks around turbocharger to charge air cooler tube.

(5) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
4-5. CHARGE AIR COOLER TO AIR INLET ELBOW TUBES AND HOSES REPLACEMENT

This task covers:

a. Removal  
b. Installation  
c. Follow-On Maintenance

INITIAL SETUP

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

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)  
Screwdriver Attachment, Socket Wrench (Item 61, Appendix B)

Tools and Special Tools (Cont)
Socket Set, Socket Wrench (Item 36, Appendix C)  
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)  
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)

Materials/Parts
Nut, Self-Locking (2) (Item 154, Appendix G)

a. Removal.

(1) Remove two self-locking nuts (1), screws (2), and upper charge air tube bracket (3) from lower charge air tube bracket (4). Discard self-locking nuts.

(2) Loosen clamp (5) on hose (6).

(3) Disconnect hose (6) from air inlet elbow (7).

NOTE

Inner and outer charge air cooler to air inlet elbow tubes are removed the same way. Outer charge air cooler to air inlet elbow tube shown.
4-5. CHARGE AIR COOLER TO AIR INLET ELBOW TUBES AND HOSES REPLACEMENT (CONT)

**NOTE**

Note position of clamps prior to removal.

(4) Loosen three clamps (8) on hose (9).

(5) Remove charge air cooler to air inlet elbow tube (10) from hose (9).

(6) Remove hose (9) from charge air cooler (11).

**NOTE**

Vehicle serial numbers 0001 through 3091 were originally equipped with a lower charge air tube bracket (part number 12421172). Vehicle serial numbers 3092 and higher were originally equipped with a lower charge air tube bracket (part number 12421172-001). Perform steps (7) and (8) on vehicle serial numbers 0001 through 3091 that have not previously had a valve cover or lower charge air tube bracket replaced.

(7) Remove screw (12) and washer (13) from lower charge air tube bracket (4).

(8) Remove screw (14), washer (15), and lower charge air tube bracket (4) from duct manifold (16).
NOTE

Perform steps (9) through (11) on vehicle serial numbers 3091 and higher, and vehicle serial numbers 0001 through 3091 that have previously had a valve cover or lower charge air tube bracket replaced.

(9) Remove screw (12) and washer (13) from lower charge air tube bracket (17).

(10) Remove screw (18), washer (19), and clamp (20) from lower charge air tube bracket (17).

(11) Remove screw (21), washer (22) and lower charge air tube bracket (17) from air inlet elbow (23).

(12) Loosen clamp (24) on hose (6).

(13) Remove hose (6) from charge air cooler to air inlet elbow tube (10).

b. Installation.

(1) Position hose (1) on charge air cooler to air inlet elbow tube (2) with clamp (3).
NOTE

Perform steps (2) through (5) on vehicle serial numbers 3091 and higher, and vehicle serial numbers 0001 through 3091 that have previously had a valve cover or lower charge air tube bracket replaced.

(2) Position lower charge air tube bracket (4) on air inlet elbow (5) with washer (6) and screw (7).

(3) Position clamp (8), washer (9), and screw (10) in lower charge air tube bracket (4).

(4) Position washer (11) and screw (12) in lower charge air tube bracket (4).

(5) Tighten screw (7), screw (10), and screw (12) to 15-25 lb-ft (20-34 N·m).

NOTE

Perform steps (6) through (8) on vehicle serial numbers 0001 through 3091 that have not previously had a valve cover or lower charge air tube bracket replaced.

(6) Position lower charge air tube bracket (13) on duct manifold (14) with washer (15) and screw (16).

(7) Position washer (17) and screw (18) in lower charge air tube bracket (13).

(8) Tighten screws (16 and 18) to 15-25 lb-ft (20-34 N·m).
NOTE

Inner and outer charge air cooler to air inlet elbow tubes are installed the same way. Outer charge air cooler to air inlet elbow tube shown.

(9) Position hose (19) on charge air cooler (20) with three clamps (21).

(10) Position charge air cooler to air inlet elbow tube (2) in hose (19).

**CAUTION**

Clamps at charge air cooler end of charge air cooler to air inlet elbow tube must be oriented with screw vertical. Failure to comply will cause interference with bottom of cab.

(11) Tighten three clamps (21) to 90-100 lb-in. (7-8 N·m).

**CAUTION**

All clamps on engine air intake path must be positioned and tightened correctly. Failure to comply may allow foreign matter into engine air intake and result in engine failure.

(12) Position hose (1) on air inlet elbow (5) with clamp (22).

(13) Tighten clamps (3 and 22) to 90-100 lb-in. (7-18 N·m).
4-5. CHARGE AIR COOLER TO AIR INLET ELBOW TUBES AND HOSES REPLACEMENT (CONT)

(14) Position upper charge air tube bracket (23) on lower charge air tube bracket (4) with two screws (24) and self-locking nuts (25).

(15) Tighten two self-locking nuts (25) to 20-26 lb-ft (27-35 N·m).

c. Follow-On Maintenance.

(1) Lower cab (TM 9-2320-366-10-1).

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

(3) Raise cab (TM 9-2320-366-10-1).

(4) Check around charge air cooler to air inlet elbow tubes and hoses for air leaks.

(5) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
4-6. FUEL RATIO CONTROL TUBE REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

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

Materials/Parts
Packing, Preformed (2) (Item 206, Appendix G)
Packing, Preformed (2) (Item 204, Appendix G)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)

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.

a. Removal.

(1) Remove screw (1), washer (2), and loop clamp (3) from pressure regulating orifice (4).

(2) Disconnect fuel ratio control tube (5) from adapter (6).

(3) Remove preformed packing (7) from adapter (6). Discard preformed packing.

(4) Remove adapter (6) from inlet manifold (8).

(5) Remove preformed packing (9) from adapter (6). Discard preformed packing.
4-6. FUEL RATIO CONTROL TUBE REPLACEMENT (CONT)

(6) Remove fuel ratio control tube (5) from adapter (10).

(7) Remove preformed packing (11) from adapter (10). Discard preformed packing.

(8) Remove adapter (10) from fuel governor (12).

(9) Remove preformed packing (13) from adapter (10). Discard preformed packing.

b. Installation.

(1) Install preformed packing (1) on adapter (2).

(2) Install adapter (2) in fuel governor (3).

(3) Install preformed packing (4) in adapter (2).

(4) Connect fuel ratio control tube (5) to adapter (2).

(5) Install preformed packing (6) on adapter (7).

(6) Install adapter (7) in inlet manifold (8).

(7) Install preformed packing (9) on adapter (7).

(8) Install fuel ratio control tube (5) on adapter (7).

(9) Position loop clamp (10), washer (11), and screw (12) in pressure regulating orifice (13).

(10) Tighten screw (12) to 15-25 lb-ft (20-34 N·m).
c. Follow-On Maintenance.

(1) Lower cab (TM 9-2320-366-10-1).

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

(3) Raise cab (TM 9-2320-366-10-1).

(4) Check for fuel leaks around fuel ratio control tube.

(5) Check that engine runs smoothly at low idle speed.

(6) Check that engine runs smoothly at high idle speed.

(7) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
4-7. ORIFICE TUBE ASSEMBLY REPLACEMENT

This task covers:

a. Removal  
b. Installation  
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
- Engine shut down (TM 9-2320-366-10-1).
- Cab raised (TM 9-2320-366-10-1).
- Fuel pressure regulating valve removed (para 4-3).
- Fuel ratio control tube removed (para 4-6).

Tools and Special Tools
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)

Materials/Parts
- Packing, Preformed (Item 209, Appendix G)

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.

a. Removal.

(1) Remove two screws (1) and washers (2) from orifice tube assembly (3).

(2) Remove screw (4), orifice tube assembly (3), and preformed packing (5) from cylinder head (6). Discard preformed packing.

b. Installation.

(1) Position preformed packing (5) on cylinder head (6).

(2) Position orifice tube assembly (3) on cylinder head (6) with screw (4).

(3) Position two washers (2) and screws (1) in orifice tube assembly (3).

(4) Tighten screw (4) to 15-25 lb-ft (20-34 N·m).

(5) Tighten two screws (1) to 33-47 lb-ft (45-64 N·m).
c. Follow-On Maintenance.

(1) Install fuel ratio control tube (para 4-6).
(2) Install fuel pressure regulating valve (para 4-3).
(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 fuel leaks around fuel ratio control tube and orifice tube assembly.
(7) Check that engine runs smoothly at low idle speed.
(8) Check that engine runs smoothly at high idle speed.
(9) Lower cab (TM 9-2320-366-10-1).
(10) Shut down engine (TM 9-2320-366-10-1).

End of Task.
4-8. FUEL TANK AND BRACKETS REPLACEMENT

This task covers:

a. Removal
b. Installation

c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Container (60 Gal (227 L) capacity)
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)
Wrench, Torque, 0-600 lb-ft (Item 60, Appendix C)
Socket Set, Impact (Item 33, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)

Materials/Parts
Rag, Wiping (Item 50, Appendix D)
Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
Ties, Cable, Plastic (Item 69, Appendix D)
Sealing Compound (Item 56, Appendix D)
Primer, Sealing Compound (Item 49, Appendix D)
Packing, Preformed (Item 216, Appendix G)
Nut, Self-Locking (2) (Item 156, Appendix G)
Nut, Self-Locking (8) (Item 161, Appendix G)

Personnel Required
(2)

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.

a. Removal.

NOTE
Remove plastic cable ties as required.

(1) Disconnect connector clamp (1) from fuel level sending unit connector (2).

(2) Disconnect fuel level sending unit connector (2) from connector P82 (3).

(3) Position container under fuel tank (4).

(4) Remove drain plug (5) from fuel tank (4) and drain fuel.
Tag fuel hoses and connection points prior to disconnecting.

5) Disconnect fuel hose (6) from 90-degree pickup tube fitting (7).

6) Disconnect fuel hose (8) from 90-degree return fitting (9).

7) Disconnect fuel hose (10) from relief valve (11).

8) Remove four nuts (12) from two straps (13).

9) Move two straps (13) away from fuel tank (4).

NOTE

Step (10) requires the aid of an assistant.

10) Remove fuel tank (4) from support brackets (14 and 15).

11) Remove relief valve (11) from fuel tank (4).

12) Remove 90-degree pickup tube fitting (7) from fuel tank (4).

13) Remove 90-degree return fitting (9) from fuel tank (4).

14) Remove five screws (16), fuel level sending unit (17), and preformed packing (18) from fuel tank (4). Discard preformed packing.

15) Deleted.
(16) Remove fuel tank insulators (20 and 21) from support brackets (14 and 15).

(17) Remove two bolts (22) and straps (13) from support brackets (14 and 15).

(18) Remove two insulator straps (23) from straps (13).

(19) Remove four self-locking nuts (24), bolts (25), two plates (26), and support bracket (14) from frame rail (27). Discard self-locking nuts.

(20) Remove two self-locking nuts (28), washers (29), and screws (30) from support bracket (15). Discard self-locking nuts.

(21) Remove self-locking nut (31) and bolt (32) from support bracket (15). Discard self-locking nut.
(22) Remove self-locking nut (33) and bolt (34) from support bracket (15). Discard self-locking nut.

(23) Remove two self-locking nuts (35), bolts (36), plate (37), and support bracket (15) from frame rail (27). Discard self-locking nuts.

b. Installation.

(1) Position support bracket (1) on frame rail (2) with plate (3), two bolts (4), and self-locking nuts (5).

(2) Position bolt (6) and self-locking nut (7) in support bracket (1).

(3) Position bolt (8) and self-locking nut (9) in support bracket (1).

**NOTE**

Step (4) requires the aid of an assistant.

(4) Tighten two self-locking nuts (5), and self-locking nuts (7 and 9) to 197-237 lb-ft (267-321 N·m).

(5) Position two screws (10), washers (11), and self-locking nuts (12) in support bracket (1).

(6) Tighten two self-locking nuts (12) to 42-52 lb-ft (57-70 N·m).
(7) Position support bracket (13) on frame rail (2) with two plates (14), four bolts (15), and self-locking nuts (16).

**NOTE**

Step (8) requires the aid of an assistant.

(8) Tighten four self-locking nuts (16) to 197-237 lb-ft (267-321 N·m).

(9) Install two insulator straps (17) on straps (18).

(10) Position two straps (18) on support brackets (1 and 13) with bolts (19).

(11) Tighten two bolts (19) to 76-94 lb-ft (103-127 N·m).

(12) Install fuel tank insulators (20 and 21) on support brackets (1 and 13).
(13) Deleted.

(14) Deleted.

(15) Deleted.

(16) Deleted.

(17) Position preformed packing (25) and fuel level sending unit (26) in fuel tank (23) with five screws (27).

(17.1) Tighten five screws (27) to 20-24 lb-in. (2-3 N·m).

(18) Apply sealing compound primer to threads of 90-degree return fitting (28), 90-degree pickup tube fitting (29), and relief valve (30).

(19) Apply sealing compound to threads of 90-degree return fitting (28), 90-degree pickup tube fitting (29), and relief valve (30).

(20) Install 90-degree return fitting (28) in fuel tank (23).

(21) Install 90-degree pickup tube fitting (29) in fuel tank (23).

(22) Install relief valve (30) in fuel tank (23).

**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.
4-8. FUEL TANK AND BRACKETS REPLACEMENT (CONT)

NOTE
Step (23) requires the aid of an assistant.

(23) Install fuel tank (23) on support brackets (1 and 13) with straps (18).

(24) Position two nuts (31) on two straps (18).

(25) Tighten two nuts (31) to 76-94 lb-ft (103-127 N·m).

(26) Install two nuts (32) on two straps (18).

NOTE
Install plastic cable ties as required.

(27) Connect fuel hose (33) to relief valve (30).

(28) Connect fuel hose (34) to 90-degree return fitting (28).

(29) Connect fuel hose (35) to 90-degree pickup tube fitting (29).
(30) Install drain plug (36) in fuel tank (23).

(31) Connect fuel level sending unit connector (37) to connector P82 (38).

(32) Connect connector clamp (39) to fuel level sending unit connector (37).

c. Follow-On Maintenance.

(1) Fill fuel tank (TM 9-2320-366-10-1).

(2) Bleed fuel system (para 4-11).

(3) Check for fuel leaks around hoses and fittings.

(4) Connect batteries (para 7-57).

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

(6) Check for fuel leaks around hoses and fittings.

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

End of Task.
4-9. FUEL HOSES REPLACEMENT

This task covers:

- a. Fuel Supply Hose Removal
- b. Fuel Supply Hose Installation
- c. Fuel Transfer Hose Removal
- d. Fuel Transfer Hose Installation
- e. Fuel Return Hose Removal
- f. Fuel Return Hose Installation
- g. Fuel Tank Vent Hose Removal
- h. Fuel Tank Vent Hose Installation
- i. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
- Batteries disconnected (para 7-57).
- Cab raised (TM 9-2320-366-10-1).
- Spare tire lowered (TM 9-2320-366-10-2).

Tools and Special Tools
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Pan, Drain (Item 24, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Socket Set, Socket Wrench (Item 34, Appendix C)

Tools and Special Tools (Cont)
- Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)

Materials/Parts
- Ties, Cable, Plastic (Item 69, Appendix D)
- Nut, Self-Locking (Item 150, Appendix G)
- Nut, Self-Locking (Item 156, Appendix G)

**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.


(1) Disconnect fuel supply hose assembly (1) from 90-degree fitting (2).
NOTE

- Remove plastic cable ties as required.

- Perform steps (2) and (3) on vehicle serial number 3092 and higher, and vehicle serial numbers 0001 through 3091 that have previously had a spare tire retainer or fuel hose replaced.

(2) Remove self-locking nut (3), screw (4), and clamp (5) from spare tire retainer (6). Discard self-locking nut.

(3) Remove fuel supply hose assembly (1) from clamp (5).

(4) Remove self-locking nut (7), screw (8), and clamp (9) from spare tire retainer (6). Discard self-locking nut.

(5) Remove fuel supply hose assembly (1) from clamp (9).

(6) Remove fuel supply hose assembly (1) from 90-degree fuel pickup tube fitting (10).
b. Fuel Supply Hose Installation.

(1) Install fuel supply hose assembly (1) on 90-degree fuel pickup tube fitting (2).

(2) Install fuel supply hose assembly (1) in clamp (3).

(3) Position clamp (3) on spare tire retainer (4) with screw (5) and self-locking nut (6).

(4) Tighten self-locking nut (6) to 87-107 lb-in. (10-12 N·m).

(5) Install fuel supply hose assembly (1) in clamp (7).

(6) Position clamp (7) on spare tire retainer (4) with screw (8) and self-locking nut (9).

(7) Tighten self-locking nut (9) to 43-52 lb-ft (58-71 N·m).
NOTE

Install plastic cable ties as required.

(8) Connect fuel supply hose assembly (1) to 90-degree fitting (10).

c. Fuel Transfer Hose Removal.

(1) Disconnect fuel transfer hose assembly (1) from fuel/water separator (2).

(2) Remove fuel transfer hose assembly (1) from 90-degree fitting (3).
d. Fuel Transfer Hose Installation.

(1) Install fuel transfer hose assembly (1) on 90-degree fitting (2).

(2) Connect fuel transfer hose assembly (1) to fuel/water separator (3).

e. Fuel Return Hose Removal.

(1) Disconnect fuel return hose assembly (1) from 90-degree fitting (2).
NOTE

- Remove plastic cable ties as required.

- Perform steps (2) and (3) on vehicle serial number 3092 and higher, and vehicle serial numbers 0001 through 3091 that have previously had a spare tire retainer or fuel hose replaced.

(2) Remove self-locking nut (3), screw (4), and clamp (5) from spare tire retainer (6). Discard self-locking nut.

(3) Remove fuel return hose assembly (1) from clamp (5).

(4) Remove self-locking nut (7), screw (8), and clamp (9) from spare tire retainer (6). Discard self-locking nut.

(5) Remove fuel return hose assembly (1) from clamp (9).

(6) Remove fuel return hose assembly (1) from 90-degree return fitting (10).
f. Fuel Return Hose Installation.

1. Install fuel return hose assembly (1) on 90-degree return fitting (2).

2. Install fuel return hose assembly (1) in clamp (3).

3. Position clamp (3) on spare tire retainer (4) with screw (5) and self-locking nut (6).

4. Tighten self-locking nut (6) to 87-107 lb-in. (10-12 N·m).

5. Install fuel return hose assembly (1) in clamp (7).

6. Position clamp (7) on spare tire retainer (4) with screw (8) and self-locking nut (9).

7. Tighten self-locking nut (9) to 43-52 lb-ft (58-71 N·m).
NOTE

Install plastic cable ties as required.

(8) Connect fuel return hose assembly (1) to 90-degree fitting (10).

---

g. Fuel Tank Vent Hose Removal.

1. Remove self-locking nut (1), screw (2), and clamp (3) from spare tire retainer (4). Discard self-locking nut.

2. Remove fuel tank vent hose (5) from clamp (3).

3. Remove fuel tank vent hose (5) from relief valve (6).

4. Remove adapter (7) from fuel tank vent hose (5).

NOTE

Remove plastic cable ties as required.

(1) Remove self-locking nut (1), screw (2), and clamp (3) from spare tire retainer (4). Discard self-locking nut.

(2) Remove fuel tank vent hose (5) from clamp (3).
h. Fuel Tank Vent Hose Installation.

(1) Install adapter (1) in fuel tank vent hose (2).

(2) Install fuel tank vent hose (2) on relief valve (3).

NOTE

Install plastic cable ties as required.

(3) Form a 180-degree bend in fuel tank vent hose (2).

CAUTION

Use care when installing fuel tank vent hose in clamp so that fuel tank vent hose is not pinched or crimped. Failure to comply may result in damage to equipment.

(4) Install fuel tank vent hose (2) in clamp (4).

(5) Position clamp (4) on spare tire retainer (5) with screw (6) and self-locking nut (7).

(6) Tighten self-locking nut (7) to 87-107 lb-in. (10-12 N·m).
i. **Follow-On Maintenance.**

1. Bleed fuel system (para 4-11).
2. Lower cab (TM 9-2320-366-10-1).
3. Connect batteries (para 7-57).
5. Raise cab (TM 9-2320-366-10-1).
6. Check for fuel leaks around hoses and fittings.

**End of Task.**
4-10. FUEL FILTER TUBES REPLACEMENT

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Equipment Conditions
Cab raised (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).

Materials/Parts
Packing, Preformed (4) (Item 178, Appendix G)
Packing, Preformed (6) (Item 203, Appendix G)
Sealant, Pipe Teflon (Item 58, Appendix D)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

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.

a. Removal.

(1) Disconnect fuel tube assembly (1) from tee fitting (2).

(2) Remove preformed packing (3) from tee fitting (2).
Discard preformed packing.

(3) Remove fuel tube assembly (1) and 90-degree fitting (4) from adapter (5).

(4) Remove preformed packing (6) from adapter (5).
Discard preformed packing.

(5) Remove adapter (5) from fuel governor (7).

(6) Remove preformed packing (8) from adapter (5).
Discard preformed packing.
(7) Remove 90-degree fitting (4) from fuel tube assembly (1).

(8) Remove preformed packing (9) from 90-degree fitting (4). Discard preformed packing.

(9) Remove screw (10), washer (11), and clip (12) from cylinder head (13).

(10) Remove clip (12) from fuel tube assembly (14).

(11) Disconnect fuel tube assembly (14) from tee fitting (15).

(12) Remove preformed packing (16) from tee fitting (15). Discard preformed packing.
(13) Remove fuel tube assembly (14) from 90-degree fitting (17).

(14) Remove preformed packing (18) from 90-degree fitting (17). Discard preformed packing.

(15) Remove 90-degree fitting (17) from cylinder head (13).

(16) Remove preformed packing (19) from 90-degree fitting (17). Discard preformed packing.

(17) Remove plug (20) from adapter (21).

(18) Remove adapter (21) from tee fitting (2).

(19) Remove preformed packing (22) from adapter (21). Discard preformed packing.

(20) Remove tee fitting (2) from fuel filter base (23).

(21) Remove preformed packing (24) from tee fitting (2). Discard preformed packing.
(22) Remove tee fitting (15) from fuel filter base (23).

(23) Remove preformed packing (25) from tee fitting (15).
    Discard preformed packing.

b. Installation.

(1) Install preformed packing (1) on tee fitting (2).

(2) Install tee fitting (2) in fuel filter base (3).

(3) Install preformed packing (4) on tee fitting (5).

(4) Install tee fitting (5) in fuel filter base (3).

(5) Install preformed packing (6) on adapter (7).

(6) Install adapter (7) in tee fitting (5).

**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.

(6.1) Apply sealing compound to threads of plug (8).

(7) Install plug (8) in adapter (7).
(8) Install preformed packing (9) on 90-degree fitting (10).

(9) Install 90-degree fitting (10) in cylinder head (11).

(10) Install preformed packing (12) on 90-degree fitting (10).

(11) Install fuel tube assembly (13) on 90-degree fitting (10).

(12) Install preformed packing (14) on tee fitting (2).

(13) Install fuel tube assembly (13) on tee fitting (2).
4-10. FUEL FILTER TUBES REPLACEMENT (CONT)

(14) Install clip (15) on fuel tube assembly (13).

(15) Install clip (15) on cylinder head (11) with washer (16) and screw (17).

(16) Install preformed packing (18) on 90-degree fitting (19).

(17) Install fuel tube assembly (20) on 90-degree fitting (19).

(18) Install preformed packing (21) on adapter (22).

(19) Install adapter (22) in fuel governor (23).

(20) Install preformed packing (24) on adapter (22).

(21) Install 90-degree fitting (19) on adapter (22).
(22) Install preformed packing (25) on tee fitting (5).

(23) Install fuel tube assembly (20) on tee fitting (5).

c. Follow-On Maintenance.

(1) Lower cab (TM 9-2320-366-10-1).

(2) Connect batteries (para 7-57).

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

(4) Check for fuel leaks under vehicle.

(5) Raise cab (TM 9-2320-366-10-1).

(6) Check for fuel leaks around tubes and fittings.

(7) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
4-11. FUEL SYSTEM BLEEDING

This task covers:

a. Bleeding
b. Follow-On Maintenance

INITIAL SETUP

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

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Pan, Drain (Item 24, Appendix C)

Materials/Parts
Ties, Cable, Plastic (Item 69, Appendix D)

NOTE

Remove plastic cable ties as required.

(1) Position drain pan below fuel return hose assembly (1).
(2) Disconnect fuel return hose assembly (1) from 90-degree fitting (2).
(3) Direct fuel return hose assembly (1) into drain pan.

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.

a. Bleeding.

NOTE

Remove plastic cable ties as required.
(4) Depress button (3) on fuel/water separator (4) as many times as necessary to get a steady stream of clear fuel.

**NOTE**

Install plastic cable ties as required.

(5) Connect fuel return hose assembly (1) to 90-degree fitting (2).

**b. Follow-On Maintenance.**

(1) Lower cab (TM 9-2320-366-10-1).

(2) Start engine and allow to run until engine runs smoothly (TM 9-2320-366-10-1).

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

End of Task.
4-12. GOVERNOR LINKAGE REPLACEMENT

This task covers:

a. Removal  
b. Disassembly  
c. Assembly  
d. Installation  
e. Follow-On Maintenance

INITIAL SETUP

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

Materials/Parts
Pin, Cotter (Item 224, Appendix G)  
Bushing, Sleeve (Item 6, Appendix G)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

a. Removal.

(1) Remove cotter pin (1), washer (2), and TPS cable assembly (3) from stud (4). Discard cotter pin.

(2) Remove clip (5) and throttle control cable (6) from stud (7).

**NOTE**

Note position of two springs prior to removal.

(3) Remove springs (8 and 9) from linkage plate (10).

(4) Remove bolt (11), washer (12), and linkage plate (10) from governor (13).

(5) Remove bolt (14), washer (15), and sensor bracket (16) from governor (13).
b. **Disassembly.**

(1) Remove ring spacer (1) from linkage plate (2). Discard ring spacer.

(2) Remove nut (3), washer (4), and stud (5) from sensor bracket (6).

c. **Assembly.**

(1) Install stud (1), washer (2), and nut (3) on sensor bracket (4).
(2) Install ring spacer (5) in linkage plate (6).

d. Installation.

(1) Position sensor bracket (1) on governor (2) with washer (3) and bolt (4).
(2) Tighten bolt (4) to 9 lb-ft (12 N·m).
(3) Position linkage plate (5) on governor (2) with washer (6) and bolt (7).
(4) Tighten bolt (7) to 20 lb-ft (27 N·m).

(5) Install springs (8 and 9) on linkage plate (5).
(6) Install throttle control cable (10) on stud (11) with clip (12).
(7) Install TPS cable assembly (13) on stud (14) with washer (15) and cotter pin (16).

e. Follow-On Maintenance.

(1) Lower cab (TM 9-2320-366-10-1).
(2) Operate vehicle and check for proper engine operation (TM 9-2320-366-10-1).

End of Task.
4-13. FUEL/WATER SEPARATOR AND FILTER REPLACEMENT

This task covers:

a. Filter Removal
b. Filter Installation
c. Pump Head Removal
d. Pump Head Installation
e. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Cab raised (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Pan, Drain (Item 24, Appendix C)

Materials/Parts
Cloth, Cleaning (Item 16, Appendix D)
Oil, Fuel, Diesel (Item 36 or 37, Appendix D)
Filter Element, Fluid (Item 17, Appendix G)
Packing, Preformed (2) (Item 200, Appendix G)

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.

a. Filter Removal.

(1) Disconnect connector clamp (1) from fuel/water separator connector (2).

(2) Disconnect connector P33 (3) from fuel/water separator connector (2).

(3) Position drain pan under hose (4).

(4) Open drain valve (5) and allow fuel to drain.

(5) Loosen clamp (6) on hose (4).

(6) Remove hose (4) from drain valve (5).
(7) Remove fluid filter element (7) and bowl assembly (8) from pump head (9).

(8) Remove bowl assembly (8) from fluid filter element (7). Discard fluid filter element.

(9) Remove preformed packing (10) from bowl assembly (8). Discard preformed packing.

(10) Clean debris from valve (11) on bottom of pump head (9).

b. Filter Installation.

(1) Close drain valve (1).

(2) Install preformed packing (2) on bowl assembly (3).

(3) Install bowl assembly (3) on fluid filter element (4).

(4) Install fluid filter element (4) on pump head (5).

(5) Install hose (6) on drain valve (1) with clamp (7).

(6) Connect connector P33 (8) to fuel/water separator connector (9).

(7) Connect connector clamp (10) on fuel/water separator connector (9).
c. Pump Head Removal.

(1) Disconnect fuel transfer hose assembly (1) from adapter (2).

(2) Remove adapter (2) and preformed packing (3) from pump head (4). Discard preformed packing.

(3) Disconnect fuel supply hose assembly (5) from 90-degree fitting (6).

(4) Remove 90-degree fitting (6) and preformed packing (7) from pump head (4). Discard preformed packing.

(5) Remove two screws (8), washers (9), and pump head (4) from bracket (10).

d. Pump Head Installation.

(1) Install pump head (1) on bracket (2) with two washers (3) and screws (4).
(2) Install preformed packing (5) on 90-degree fitting (6).

(3) Install 90-degree fitting (6) in pump head (1).

(4) Install fuel supply hose assembly (7) on 90-degree fitting (6).

(5) Install preformed packing (8) on adapter (9).

(6) Install adapter (9) in pump head (1).

(7) Install fuel transfer hose assembly (10) on adapter (9).

e. **Follow-On Maintenance.**

(1) Bleed fuel system (para 4-11).

(2) Lower cab (TM 9-2320-366-10-1).

(3) Connect batteries (para 7-57).

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

(5) Check for fuel leaks under vehicle.

(6) Raise cab (TM 9-2320-366-10-1).

(7) Check engine compartment for fuel leaks.

(8) Lower cab (TM 9-2320-366-10-1).

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

**End of Task.**
# 4-14. FUEL FILTER AND FILTER BASE REPLACEMENT

This task covers:

- a. Filter Removal
- b. Filter Installation
- c. Filter Base Removal
- d. Filter Base Installation
- e. Follow-On Maintenance

## INITIAL SETUP

### Equipment Conditions

- Cab raised (TM 9-2320-366-10-1).
- Batteries disconnected (para 7-57).

### Tools and Special Tools

- Pan, Drain (Item 24, Appendix C)
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Socket Set, Socket Wrench (Item 36, Appendix C)
- Wrench, Strap, Adjustable (Item 57, Appendix C)

### Materials/Parts

- Oil, Fuel, Diesel (Item 36 or 37, Appendix D)
- Filter, Fuel (Item 22, Appendix G)
- Packing, Preformed (2) (Item 178, Appendix G)
- Packing, Preformed (3) (Item 203, Appendix G)
- Packing, Preformed (Item 207, Appendix G)
- Gasket, Fuel Filter (Item 44, Appendix G)

---

**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.

a. Filter Removal.

1. Position drain pan under filter element (1).
2. Remove filter element (1) from fuel filter base (2).
b. Filter Installation.

(1) Coat filter element seal (1) with a light coat of fuel.

(2) Fill filter element (2) with diesel fuel.

(3) Install filter element (2) on fuel filter base (3). Then turn 3/4-turn after filter element touches fuel filter base.

c. Filter Base Removal.

(1) Remove screw (1) and washer (2) from top of crankcase breather (3).

(2) Remove crankcase breather (3) from fuel filter base (4).

(3) Remove preformed packing (5) from fuel filter base (4). Discard preformed packing.

(4) Disconnect fuel tube assembly (6) from tee fitting (7).

(5) Remove preformed packing (8) from tee fitting (7). Discard preformed packing.
(6) Remove tee fitting (7) from fuel filter base (4).

(7) Remove preformed packing (9) from tee fitting (7). Discard preformed packing.

(8) Disconnect fuel tube assembly (10) from tee fitting (11).

(9) Remove preformed packing (12) from tee fitting (11). Discard preformed packing.

(10) Remove tee fitting (11) from fuel filter base (4).

(11) Remove preformed packing (13) from tee fitting (11). Discard preformed packing.

(12) Remove four screws (14) and washers (15) from fuel filter base (4).

(13) Remove fuel filter base (4) and gasket (16) from engine (17). Discard gasket.

(14) Remove plug (18) from fuel filter base (4).

(15) Remove preformed packing (19) from plug (18). Discard preformed packing.
d. Filter Base Installation.

1. Install preformed packing (1) on plug (2).
2. Install plug (2) in fuel filter base (3).
3. Position fuel filter base (3) and gasket (4) on engine (5) with four washers (6) and screws (7).
4. Tighten four screws (7) to 96-144 lb-in. (11-16 N·m).
5. Install preformed packing (8) on tee fitting (9).
6. Install tee fitting (9) in fuel filter base (3).
7. Install preformed packing (10) on tee fitting (9).
8. Connect fuel tube assembly (11) to tee fitting (9).
9. Install preformed packing (12) on tee fitting (13).
10. Install tee fitting (13) in fuel filter base (3).
(11) Install preformed packing (14) on tee fitting (13).

(12) Connect fuel tube assembly (15) to tee fitting (13).

(13) Apply thin coat of lubricating oil to both sides of preformed packing (16).

(14) Install preformed packing (16) on top of fuel filter base (3).

(15) Position crankcase breather (17) on top of fuel filter base (3) with washer (18) and screw (19).

(16) Tighten screw (19) to 96-144 lb-in. (11-16 N·m).

e. Follow-On Maintenance.

(1) Bleed fuel system (para 4-11).

(2) Lower cab (TM 9-2320-366-10-1).

(3) Connect batteries (para 7-57).

(4) Start engine (TM 9-2320-366-10-1).
(5) Check for fuel leaks under vehicle.

(6) Raise cab (TM 9-2320-366-10-1).

(7) Check for fuel leaks around fuel filter.

(8) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
4-15. ETHER STARTING AID REPLACEMENT

This task covers:

a. Ether Cylinder Removal
b. Ether Cylinder Installation
c. Clamp Removal
d. Clamp Installation
e. Ether Valve Removal
f. Ether Valve Installation
g. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions

Batteries disconnected (para 7-57).
Spare tire lowered (TM 9-2320-366-10-2).

Tools and Special Tools

Goggles, Industrial (Item 15, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)

Materials/Parts

Gasket (Item 26, Appendix G)
Nut, Self-Locking (4) (Item 153, Appendix G)

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.

a. Ether Cylinder Removal.

(1) Remove wingnut (1) from clamp (2).

(2) Remove ether cylinder (3) and gasket (4) from ether valve (5). Discard gasket.

(3) Remove ether cylinder (3) from clamp (2).

(4) Remove cap (6) from cap retainer (7).

(5) Install cap (6) on ether valve (5).
b. Ether Cylinder Installation.
   (1) Remove cap (1) from ether valve (2).
   (2) Install cap (2) on cap retainer (3).
   (3) Install gasket (4) in ether valve (2).
   (4) Position ether cylinder (5) in clamp (6).
   (5) Install ether cylinder (5) on ether valve (2).
   (6) Install wingnut (7) on clamp (6).

c. Clamp Removal.

   Remove two self-locking nuts (1), screws (2), and clamp (3) from spare tire retainer (4). Discard self-locking nuts.

d. Clamp Installation.
   (1) Position clamp (1) on spare tire retainer (2) with two screws (3) and self-locking nuts (4).
   (2) Tighten two self-locking nuts (4) to 25-31 lb-ft (34-42 N·m).
4-15. ETHER STARTING AID REPLACEMENT (CONT)

e. Ether Valve Removal.

(1) Disconnect ether tube (1) from ether valve (2).

(2) Disconnect ether valve electrical connector (3) from connector J93 (4).

(3) Remove two self-locking nuts (5), screws (6), washers (7), terminal lug TL84 (8), and ether valve (2) from spare tire retainer (9). Discard self-locking nuts.

f. Ether Valve Installation.

(1) Position ether valve (1) on spare tire retainer (2), terminal lug TL84 (3), two washers (4), screws (5), and self-locking nuts (6).

(2) Tighten self-locking nuts (6) to 25-31 lb-ft (34-42 N·m).

(3) Connect ether valve electrical connector (7) to connector J93 (8).

(4) Connect ether tube (9) to ether valve (1).

g. Follow-On Maintenance.

(1) Raise spare tire (TM 9-2320-366-10-2).

(2) Connect batteries (para 7-57).

(3) Operate ether starting aid (TM 9-2320-366-10-2) and check for ether leaks.

End of Task.
4-16. THROTTLE POSITION SENSOR (TPS) CABLE ASSEMBLY REPLACEMENT

This task covers:

a. Removal  
b. Installation

INITIAL SETUP

Equipment Conditions
- Batteries disconnected (para 7-57).
- Cab raised (TM 9-2320-366-10-1).

Materials/Parts
- Pin, Cotter (Item 224, Appendix G)

Tools and Special Tools
- Tool Kit, Genl Mech (Item 46, Appendix C)

a. Removal.

(1) Disconnect electrical connector (1) from TPS cable assembly (2).

(2) Remove three nuts (3), washers (4), screws (5), and TPS cable assembly (2) from bracket (6).

(3) Remove cotter pin (7) and washer (8) from stud (9). Discard cotter pin.

(4) Remove TPS cable assembly (2) from stud (9).

(5) Release latch (10) on clamp (11).

(6) Remove TPS cable assembly (2) from clamp (11).

(7) Remove TPS cable assembly (2) from engine.
4-16. THROTTLE POSITION SENSOR (TPS) CABLE ASSEMBLY REPLACEMENT (CONT)

b. Installation.

(1) Position TPS cable assembly (1) in clamp (2).
(2) Close latch (3) on clamp (2).
(3) Position TPS cable assembly (1) on stud (4).
(4) Install washer (5) and cotter pin (6) on stud (4).
(5) Install TPS cable assembly (1) on bracket (7) with three screws (8), washers (9) and nuts (10).
(6) Connect electrical connector (11) to TPS cable assembly (1).
(7) Lower cab (TM 9-2320-366-10-1).
(8) Connect batteries (para 7-57).

NOTE
Wait until Neutral (N) indication appears in pushbutton shift selector display before positioning master power switch off.

(9) Position master power switch on and off five times (TM 9-2320-366-10-1).

NOTE
TPS will self-adjust but vehicle will need to be operated through all gear ranges several times before correct shifting will be noticed.

(10) Operate vehicle and check for smooth transmission shifting through all gear ranges (TM 9-2320-366-10-1).

End of Task.
4-17. HAND THROTTLE LEVER REPLACEMENT/ADJUSTMENT

This task covers:

a. Removal
b. Installation/Adjustment
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Instrument panel assembly removed for access (para 7-15).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Scale, Weighing (Item 30, Appendix C)

Materials/Parts
Washer, Spring (Item 294, Appendix G)

a. Removal.

Remove nut (1), washer (2), spring washer (3), HAND THROTTLE lever (4), and friction disk (5) from dashboard (6). Discard spring washer.

b. Installation/Adjustment.

**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.

(1) Position friction disk (5), HAND THROTTLE lever (4), spring washer (3), washer (2), and nut (1) on dashboard (6).

**CAUTION**

HAND THROTTLE lever nut must be tightened so that 9-11 lbs (40-49 N) of force is required to change position of HAND THROTTLE lever. Failure to comply may result in damage to equipment.

(2) Tighten nut (1) on HAND THROTTLE lever (4).
4-17. HAND THROTTLE LEVER REPLACEMENT/ADJUSTMENT (CONT)

c. Follow-On Maintenance.

(1) Install instrument panel assembly (para 7-15).

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

(3) Check for smooth operation of HAND THROTTLE lever.

(4) Check high/low HAND THROTTLE lever positions (para 4-22).

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

End of Task.
# 4-18. Throttle Control Cable Replacement/Adjustment

This task covers:

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<thead>
<tr>
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<td>d. Follow-On Maintenance</td>
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</table>

## Initial Setup

**Equipment Conditions**
- Engine shut down (TM 9-2320-366-10-1).
- Steering wheel removed (para 13-2).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)

**Materials/Parts**
- Grease, Molybdenum Disulfide (Item 24, Appendix D)

**Personnel Required**
- (2)

## a. Removal

1. Position master power switch to on (TM 9-2320-366-10-1).
2. Place wiper blades in the full left position (TM 9-2320-366-10-1).
4. Disconnect batteries (para 7-57).
5. Remove instrument panel assembly for access (para 7-15).

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

6. Remove retaining ring (1) and bellcrank (2) from stud (3).
(7) Remove clip (4) and throttle control cable (5) from stud (6).

(8) Loosen two nuts (7) with washers (8) on throttle control cable (5).

(9) Remove throttle control cable (5) from dashboard (9).

(10) Raise cab (TM 9-2320-366-10-1).

(11) Remove throttle control cable (5) and grommet (10) from cab (11).

(12) Remove clip (12) and throttle control cable (5) from stud (13).

**NOTE**

Count threads showing on throttle control cable ferrule. Record this number prior to removal.

(13) Loosen nut (14) with washers (15) on throttle control cable (5).

(14) Remove throttle control cable (5) from bracket (16).
NOTE

- Note routing of throttle control cable prior to removal.
- Remove plastic cable ties as required.

(15) Remove throttle control cable (5) from vehicle.

b. Installation.

(1) Position throttle control cable (1) on vehicle.

(2) Position nut (2) on throttle control cable (1) so that same number of threads are showing on ferrule as was recorded in removal.

(3) Position throttle control cable (1) in bracket (3) with two washers (4) and nut (5).

(4) Install throttle control cable (1) on stud (6) with clip (7).
(5) Position grommet (8) and throttle control cable (1) in cab (9).

(6) Lower cab (TM 9-2320-366-10-1).

(7) Position throttle control cable (1) in dashboard (10) with two washers (11) and nuts (12).

(8) Install throttle control cable (1) on stud (13) with clip (14).

(9) Apply grease to stud (15).

**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.

(10) Install bellcrank (16) on stud (15) with retaining ring (17).
c. Adjustment.

(1) Raise cab (TM 9-2320-366-10-1).

**CAUTION**

Ensure governor linkage rests against low idle stop with throttle control cable installed. Failure to comply may result in damage to equipment.

**NOTE**

Perform steps (2) and (3) if governor linkage does not contact low idle stop with throttle control cable installed.

(2) Loosen nut (1) on throttle control cable (2) until governor linkage (3) contacts low idle stop (4).

(3) Tighten nut (5) on throttle control cable (2).

**WARNING**

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

**CAUTION**

Ensure governor linkage contacts high idle stop with accelerator pedal fully depressed. Failure to comply may result in damage to equipment.

**NOTE**

Steps (4) through (7) require the aid of an assistant.

(4) Depress accelerator pedal (6) to cab floor (7).
(5) Observe movement of governor linkage (3) to high idle stop (8).

(6) Release accelerator pedal (6) from cab floor (7).

(7) Observe movement of governor linkage (3) from high idle stop (8) to low idle stop (4).
(8) Loosen nut (9) on throttle control cable (2).

(9) Tighten nut (10) on throttle control cable (2).

(10) Perform steps (4) through (9) until freeplay is removed from throttle control cable (2).

d. Follow-On Maintenance.

(1) Lower cab (TM 9-2320-366-10-1).

(2) Install instrument panel assembly (para 7-15).

(3) Operate windshield wipers, position wipers stowed (TM 9-2320-366-10-1).

(4) Start engine, check accelerator for smooth operation (TM 9-2320-366-10-1).

(5) Check high/low HAND THROTTLE lever positions (para 4-22).

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

End of Task.
4-19. THROTTLE CONTROL THREADED ROD REPLACEMENT

This task covers:

- a. Removal
- b. Installation
- c. Follow-On Maintenance

INITIAL SETUP

**Equipment Conditions**

Instrument panel assembly removed for access (para 7-15).

**Materials/Parts**

Grease, Molybdenum Disulfide (Item 24, Appendix D)

**Tools and Special Tools**

Tool Kit, Genl Mech (Item 46, Appendix C)

a. Removal.

(1) Remove clip ring (1) from ball seat (2).

(2) Remove ball seat (2) and threaded rod (3) from ball stud (4).

(3) Remove clip ring (5) from ball seat (6).

(4) Remove ball seat (6) and threaded rod (3) from accelerator pedal (7).
(5) Loosen two jam nuts (8) behind ball seats (2 and 6).

(6) Remove ball seats (2 and 6) and two jam nuts (8) from threaded rod (3).

b. Installation.

(1) Install two jam nuts (1) to bottom of threads on threaded rod (2).

(2) Install ball seats (3 and 4) on threaded rod (2) until ball seats contact two jam nuts (1).

(3) Tighten two jam nuts (1) against ball seats (3 and 4).

(4) Apply grease to inside of ball seat (3).

(5) Install ball seat (3) in accelerator pedal (5).

(6) Install clip ring (6) on ball seat (3).
(7) Apply grease to inside of ball seat (4).

(8) Install ball seat (4) on ball stud (7).

(9) Install clip ring (8) on ball seat (4).

c. Follow-On Maintenance.

(1) Install instrument panel assembly (para 7-15).

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

(3) Depress accelerator pedal and check for smooth operation.

(4) Check high/low HAND THROTTLE lever positions (para 4-22).

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

End of Task.
4-20. THROTTLE CONTROL LEVER REPLACEMENT

This task covers:

a. Removal
b. Installation

c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Steering wheel removed (para 13-2).

Materials/Parts
Grease, Molybdenum Disulfide (Item 24, Appendix D)
Washer, Spring (Item 288, Appendix G)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

a. Removal.

(1) Position master power switch to on (TM 9-2320-366-10-1).

(2) Place wiper blades in the full left position (TM 9-2320-366-10-1).

(3) Position master power switch to off (TM 9-2320-366-10-1).

(4) Disconnect batteries (para 7-57).

(5) Remove instrument panel assembly for access (para 7-15).

(6) Remove clip ring (1) from ball seat (2).

(7) Remove ball seat (2) with threaded rod (3) from ball stud (4).
4-20. THROTTLE CONTROL LEVER REPLACEMENT (CONT)

**WARNING**

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

(8) Remove retaining ring (5) and lever (6) from lever stud (7).

(9) Remove bushing (8) from lever stud (7).

(10) Remove clip (9) and throttle control cable (10) from stud (11).

(11) Remove nut (12), spring washer (13), and ball stud (4) from lever (6). Discard spring washer.

b. Installation.

(1) Install ball stud (1) on lever (2) with spring washer (3) and nut (4).

(2) Install throttle control cable (5) on stud (6) with clip (7).
(3) Apply grease to bushing (8) and lever stud (9).

**WARNING**

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

(4) Install bushing (8) and lever (2) on lever stud (9) with retaining ring (10).

(5) Apply grease to ball stud (1).

(6) Install ball seat (11) with threaded rod (12) on ball stud (1).

(7) Install clip ring (13) on ball seat (11).

c. Follow-On Maintenance.

(1) Install instrument panel assembly (para 7-15).

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

(3) Position windshield wiper control to off (TM 9-2320-366-10-1).

(4) Depress accelerator pedal and check for smooth operation.

(5) Check high/low HAND THROTTLE lever positions (para 4-22).

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

End of Task.
4-21. ACCELERATOR PEDAL REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On 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)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Socket Set, Socket Wrench (Item 35, Appendix C)

Materials/Parts
- Grease, Molybdenum Disulfide (Item 24, Appendix D)

a. Removal.

(1) Remove clip ring (1) from ball seat (2).

(2) Remove ball seat (2) and threaded rod (3) from ball stud (4).

(3) Remove two screws (6), washers (7), and accelerator pedal (5) from cab floor (8).

b. Installation.

(1) Position accelerator pedal (5) on cab floor (8) with two washers (7) and screws (6).

(2) Tighten two screws (6) to 72-84 lb-in. (8-10 N·m).

(3) Apply grease to inside of ball seat (2).

(4) Install ball seat (2) and threaded rod (3) on ball stud (4).

(5) Install clip ring (1) on ball seat (2).

c. Follow-On Maintenance.

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

(2) Depress accelerator pedal and check for smooth operation.

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

End of Task.
4-22. CHECKING AND STENCILING HIGH/LOW HAND THROTTLE POSITIONS

This task covers:

<table>
<thead>
<tr>
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**Equipment Conditions**
Engine shut down (TM 9-2320-366-10-1).

**Tools and Special Tools**
- STE/ICE-R (Item 41, Appendix C)
- Gloves, Rubber (Item 13, Appendix C)
- Respirator, Air Filter (Item 29, Appendix C)

**Materials/Parts**
- Rubber Stamp Set, Fixed Type (Item 53, Appendix D)
- Polyurethane Coating (Item 48, Appendix D)
- Ink, Marking Stencil (Item 26, Appendix D)
- Inking Pad, Rubber Stamp (Item 27, Appendix D)

**References**
- TM 9-4910-571-12&P
- TB 43-0209

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a. Checking High/Low Hand Throttle Positions.

(1) Connect STE/ICE-R to DCA connector (1).

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

(3) Position HAND THROTTLE lever (2) so that upper edge of lever is even with line below L setting.

**NOTE**
Acceptable engine RPM with HAND THROTTLE lever at L setting is 1250-1450 RPM.

(4) Perform STE/ICE-R test #10.
(5) Position HAND THROTTLE lever (2) so that upper edge of lever is even with line below H setting.

**NOTE**

Acceptable engine RPM with HAND THROTTLE lever at H setting is 2000-2200 RPM.

(6) Perform STE/ICE-R test #10.

(7) Perform subparagraph b. **Stenciling High/Low Hand Throttle Positions** if engine RPM results from steps (4) and (6) are not within acceptable limits.

### b. Stenciling High/Low Hand Throttle Positions.

(1) Paint over old high and low HAND THROTTLE lever position markings (TB 43-0209).

(2) Connect STE/ICE-R to DCA connector (1).

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

(4) Perform STE/ICE-R test #10.
(5) Raise engine RPM to 1350 using HAND THROTTLE lever (2).

(6) Stencil a line even with top edge of HAND THROTTLE lever (2).

(7) Raise engine RPM to 2100 using HAND THROTTLE LEVER (2).

(8) Stencil a line even with top edge of HAND THROTTLE lever (2).

(9) Lower engine RPM to idle using HAND THROTTLE lever (2).

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

(11) Stencil L above lower line.

(12) Stencil H above upper line.

End of Task.
CHAPTER 5
EXHAUST SYSTEM MAINTENANCE

RESTRICTED MAINTENANCE NOTICE

Units not authorized SC 4910-95-CL-A72 (SHOP EQUIPMENT, COMMON NO. 2) in their T.O.E. may be unable to perform some of the maintenance tasks described in this chapter. If the required tools are not authorized, the equipment must be submitted to DS Maintenance for repair.

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Section I. INTRODUCTION

5-1. INTRODUCTION

This chapter contains maintenance instructions for replacing exhaust system components authorized by the Maintenance Allocation Chart (MAC) at the Unit Maintenance level.
Section II. MAINTENANCE PROCEDURES

5-2. MUFFLER AND EXHAUST HEAT SHIELDS REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

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)
Drill, Electric, Portable (Item 7, Appendix C)
Drill Set, Twist (Item 6, Appendix C)
Drill, Twist (Item 8, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)
Socket Set, Socket Wrench (Item 36, Appendix C)

Materials/Parts
Nut, Self-Locking (2) (Item 157, Appendix G)
Nut, Self-Locking (4) (Item 154, Appendix G)
Nut, Self-Locking (Item 156, Appendix G)
Nut, Self-Locking (2) (Item 129, Appendix G)
Nut, Self-Locking (2) (Item 168, Appendix G)
Washer, Flat (4) (Item 280, Appendix G)
Screw, Cap (2) (Item 261, Appendix G)
Grommet, Nonmetallic (6) (Item 52, Appendix G)

Personnel Required
(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.
- Ensure exhaust system is cool before performing maintenance. Failure to comply may result in injury to personnel.
- Do not operate MTV vehicle with muffler removed. Toxic exhaust fumes may enter cab, resulting in serious injury or death to personnel.

a. Removal.


2. Disconnect exhaust pipe (3) from muffler (4).

(4) Disconnect tail pipe (7) from muffler (4).

NOTE
Vehicle serial numbers 0001 through 3091, except M1088 and M1089, were originally equipped with different mounting hardware than vehicle serial numbers 3092 and higher serial numbers. Perform steps (5) through (7) on vehicle serial numbers 0001 through 3091, except M1088 and M1089, that have not previously had a muffler replaced.

(5) Remove two screws (8) and washers (9) from muffler straps (10).

NOTE
Step (6) requires the aid of an assistant.

(6) Remove muffler (4) from two muffler support brackets (11).
(7) Remove four nuts (12), washers (13), screws (14), washers (15), and two resilient mounts (16) from muffler support brackets (11). Discard nuts, washers, screws, and resilient mounts.

**NOTE**

- Perform step (8) on M1088/M1089, vehicle serial numbers 3092 and higher, and vehicles that have previously had a muffler replaced.

- Step (8) requires the aid of an assistant.

(8) Remove two self-locking nuts (17), washers (18), rubber grommets (19), screws (20), washers (21), four rubber grommets (22), and muffler (4) from muffler support brackets (11). Discard self-locking nuts and rubber grommets.
(9) Remove four self-locking nuts (23), screws (24), and exhaust heat shield (25) from two muffler support brackets (11). Discard self-locking nuts.

(10) Remove two self-locking nuts (26), screws (27), and muffler straps (28) from muffler (4). Discard self-locking nuts.

b. Installation.

NOTE

Perform steps (1) through (5) on vehicle serial numbers 0001 through 3091, except M1088 and M1089, that have not previously had a muffler replaced.

(1) Scribe a line on muffler support bracket (1) 9.7 in. (24.6 cm) out from right frame rail (2).

(2) Scribe a line on muffler support bracket (1) 1.25 in. (3.2 cm) from front edge of front muffler support bracket.

(3) Drill a pilot hole at intersection of lines scribed in steps (1) and (2).

(4) Enlarge pilot hole to 16.5 mm.

(5) Perform steps (1) through (4) on rear muffler support bracket.
5-2. MUFFLER AND EXHAUST HEAT SHIELDS REPLACEMENT (CONT)

(6) Position two muffler straps (3) on muffler (4) with two screws (5) and self-locking nuts (6).

(7) Position exhaust heat shield (7) on two muffler support brackets (2) with four screws (8) and self-locking nuts (9).

(8) Tighten four self-locking nuts (9) to 25-29 lb-ft (34-39 N·m).

**NOTE**

Step (9) requires the aid of an assistant.

(9) Install muffler (4) on two muffler support brackets (2) with two rubber grommets (10), four rubber grommets (11), two washers (12), screws (13), washers (14), and self-locking nuts (15).
(10) Position tailpipe (16) on muffler (4) with clamp (17).

(11) Position exhaust pipe (18) on muffler (4) with clamp (19) and self-locking nut (20).

(12) Tighten self-locking nut (20) to 89-109 lb-in. (10-12 N·m).

(13) Tighten two self-locking nuts (6) to 42-52 lb-ft (51-71 N·m).

(14) Position self-locking nut (21) on clamp (17).

(15) Tighten self-locking nut (21) to 89-109 lb-in. (10-12 N·m).

c. Follow-On Maintenance.

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

(2) Check around muffler for exhaust leaks, excessive noise, and vibration.

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

End of Task.
5-3. EXHAUST PIPE REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

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

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 36, Appendix C)

Materials/Parts
Nut, Self-Locking (4) (Item 156, Appendix G)
Nut, Self-Locking (3) (Item 129, Appendix G)

WARNING

- Ensure exhaust system is cool before performing maintenance. 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.

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

a. Removal.

(1) Remove self-locking nut (1) from clamp (2). Discard self-locking nut.

(2) Disconnect exhaust pipe (3) from muffler (4).

(3) Remove clamp (2) from exhaust pipe (3).
(4) Remove two self-locking nuts (5), screws (6), and loop clamp half (7) from exhaust bracket (8). Discard self-locking nut.

(5) Remove two bolts (9) and exhaust bracket (8) from transmission (10).


(7) Remove exhaust pipe (3) from exhaust pipe (13).

(8) Remove clamp (12) from exhaust pipe (3).

(9) Remove two self-locking nuts (14), two screws (15), and loop clamp half (16) from exhaust pipe bracket (17). Discard self-locking nuts.

(11) Remove exhaust pipe (13) from rear of turbocharger (20).

(12) Remove clamp (19) from exhaust pipe (13).

b. Installation.

(1) Install exhaust pipe (1) and clamp (2) to rear of turbocharger (3).

(2) Position self-locking nut (4) on clamp (2).

(3) Tighten self-locking nut (4) to 89-109 lb-in. (10-12 N·m).

(4) Position loop clamp half (5) on exhaust pipe bracket (6) with two screws (7) and self-locking nuts (8).

(5) Tighten two self-locking nuts (8) to 42-52 lb-ft (57-71 N·m).
(6) Position exhaust pipe (9) and clamp (10) on exhaust pipe (1).

(7) Position self-locking nut (11) on clamp (10).

(8) Tighten self-locking nut (11) to 89-109 lb-in. (10-12 N·m).

(9) Position exhaust bracket (12) on transmission (13) with two bolts (14).

(10) Tighten two bolts (14) to 44-55 lb-ft (60-75 N·m).

(11) Position loop clamp half (15) on muffler exhaust pipe (9) with two screws (16) and self-locking nuts (17).

(12) Tighten two self-locking nuts (17) to 42-52 lb-ft (57-71 N·m).

(13) Position exhaust pipe (9) and clamp (18) on muffler (19).

(14) Position self-locking nut (20) on clamp (18).

(15) Tighten self-locking nut (20) to 89-109 lb-in. (10-12 N·m).
5-3. EXHAUST PIPE REPLACEMENT (CONT)

c. Follow-On Maintenance.

(1) Lower cab (TM 9-2320-366-10-1).

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

(3) Check for exhaust leaks, excessive noise, and vibration.

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

End of Task.
5-4. TAILPIPE REPLACEMENT

This task covers:

- a. Removal
- b. Installation
- c. Follow-On Maintenance

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)
- Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Socket Set, Socket Wrench (Item 36, Appendix C)

Materials/Parts
- Nut, Self-Locking (4) (Item 156, Appendix G)
- Nut, Self-Locking (Item 129, Appendix G)

WARNING

- Ensure exhaust system is cool before performing maintenance. 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.

a. Removal.

(1) Loosen hose clamp (1) on particle extraction hose (2).

(2) Remove particle extraction hose (2) from tailpipe (3).
(3) Remove self-locking nut (4) from clamp (5). Discard self-locking nut.

(4) Disconnect tailpipe (3) from muffler (6).

(5) Remove clamp (5) from tailpipe (3).

(6) Remove two self-locking nuts (7), screws (8), and loop clamp halves (9) from tailpipe (3). Discard self-locking nuts.

(7) Remove two self-locking nuts (10), screws (11), and tailpipe bracket (12) from frame (13). Discard self-locking nuts.

b. Installation.

(1) Position tailpipe bracket (1) on frame (2) with two screws (3) and self-locking nuts (4).

(2) Tighten two self-locking nuts (4) to 42-52 lb-ft (57-71 N·m).

(3) Position two loop clamp halves (5) and tailpipe (6) on tailpipe bracket (1) with two screws (7) and self-locking nuts (8).
(4) Position clamp (9) and tailpipe (6) on muffler (10).

(5) Position self-locking nut (11) on clamp (9).

(6) Tighten self-locking nut (11) to 89-109 lb-in. (10-12 N·m).

(7) Tighten two self-locking nuts (8) to 42-52 lb-ft (57-71 N·m).

(8) Install particle extraction hose (12) on tailpipe (6) with hose clamp (13).

c. Follow-On Maintenance.

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

(2) Check around muffler and tailpipe for exhaust leaks.

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

End of Task.
CHAPTER 6
COOLING SYSTEM MAINTENANCE

RESTRICTED MAINTENANCE NOTICE

Units not authorized SC 4910-95-CL-A72 (SHOP EQUIPMENT, COMMON NO. 2) in their T.O.E. may be unable to perform some of the maintenance tasks described in this chapter. If the required tools are not authorized, the equipment must be submitted to DS Maintenance for repair.

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Section I. INTRODUCTION

6-1. INTRODUCTION

This chapter contains maintenance instructions for replacing and repairing cooling system components authorized by the Maintenance Allocation Chart (MAC) at the Unit Maintenance level.
Section II. MAINTENANCE PROCEDURES

6-2. RADIATOR/CHARGE AIR COOLER REPLACEMENT

This task covers:

a. Removal  
b. Installation  
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions

Radiator fan shrouds removed (para 6-4).

Tools and Special Tools

Goggles, Industrial (Item 15, Appendix C)  
Tool Kit, Genl Mech (Item 46, Appendix C)  
Sling, Cargo (Item 31, Appendix C)  
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)  
Adapter, Socket Wrench (Item 2, Appendix B)

Materials/Parts

Antiseize Compound (Item 58, Appendix D)  
Lockwasher (6) (Item 95, Appendix G)  
Nut, Self-Locking (4) (Item 156, Appendix G)  
Grommet, Nonmetallic (Item 53, Appendix G)  
Screw, Self-Locking (6) (Item 263, Appendix G)

Personnel Required

(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.

a. Removal.

(1) Disconnect air hose (1) from fitting (2).

(2) Remove fitting (2) from fan clutch assembly (3).
NOTE

Perform steps (3) through (6) on vehicles serial number 8426 and lower that have not had the fan clutch replaced.

(3) Remove six screws (4), lockwashers (5), and washers (6) from engine fan (7). Discard lockwashers.

CAUTION

Mark front of engine fan before removing. Failure to comply may result in damage to equipment.

(4) Remove engine fan (7) from fan clutch assembly (3).

(5) Remove fan support plate (8) from engine fan (7).

(6) Remove grommet (9) from engine fan (7). Discard grommet.

NOTE

Perform steps (6.1) and (6.2) on vehicles serial number 8427 and higher and on vehicles that have had the fan, clutch replaced.

(6.1) Remove six nuts (9.1), lockwashers (9.2), and washers (9.3) from engine fan (9.4). Discard lockwashers.

CAUTION

Mark front of engine fan before removal. Failure to comply may result in damage to equipment.

(6.2) Remove engine from (9.4) from fan clutch assembly (9.5).
(7) Remove four self-locking nuts (10) and screws (11) from radiator mounting brackets (12). Discard self-locking nuts.

NOTE

- Additional coolant may drain out of radiator during removal.
- Steps (8) and (9) require the aid of an assistant.

(8) Slide radiator (13) to the rear approximately four inches, enough to clear left and right cab hinge pins (14).
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.

- 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.

(9) Remove radiator (13) and charge air cooler (15) from vehicle.

(10) Remove six screws (16) and charge air cooler (15) from two radiator mounting brackets (12).

(11) Remove ten screws (17) and two radiator mounting brackets (12) from radiator (13).

b. Installation.

(1) Position two radiator mounting brackets (1) on radiator (2) with ten screws (3).

(2) Tighten ten screws (3) to 20-26 lb-ft (27-35 N·m).

(3) Position charge air cooler (4) between two radiator mounting brackets (1) with six screws (5).

(4) Tighten six screws (5) to 20-26 lb-ft (27-35 N·m).
6-2. RADIATOR/CHARGE AIR COOLER REPLACEMENT (CONT)

**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.

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

**CAUTION**

Use caution when lowering radiator and charge air cooler into vehicle. Failure to comply may result in damage to equipment.

**NOTE**

Step (5) requires the aid of an assistant.

(5) Position radiator (2) and charge air cooler (4) in vehicle.

(6) Position four screws (6) and self-locking nuts (7) through frame rails (8) and two radiator mounting brackets (1).

(7) Tighten four self-locking nuts (7) to 42-52 lb-ft (57-71 N·m).
CAUTION

Ensure engine fan is positioned with mark facing forward. Failure to comply may result in damage to equipment.

NOTE

Perform steps (7.1) through (7.3) on vehicles serial number 8427 and higher and on vehicles that have had the fan clutch replaced.

(7.1) Position engine fan (8.1) on fan clutch assembly (8.2) with six washers (8.3), lockwashers (8.4) and nuts (8.5).

(7.2) Tighten six nuts (8.5) to 15 lb-ft (20 N·m) in sequence shown.

(7.3) Re-tighten six nuts (8.5) to 23-29 lb-ft (31-39 N·m) in sequence shown.

NOTE

Perform steps (8) through (12) on vehicles serial number 8426 and lower that have not had fan clutch replaced.

(8) Install grommet (9) on engine fan (10).

(9) Install fan support plate (11) on engine fan (10).

(10) Position engine fan (10) and fan support plate (11) on fan clutch assembly (12) with six washers (13), lockwashers (14), and screws (15).

(11) Tighten six screws (15) to 15 lb-ft (20 N·m) in sequence shown.

(12) Re-tighten six screws (15) to 22-32 lb-ft (30-44 N·m) in sequence shown.
6-2. RADIATOR/CHARGE AIR COOLER REPLACEMENT (CONT)

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.

(13) Apply antiseize compound to threads of fitting (16).

(14) Install fitting (16) in fan clutch assembly (12).

(15) Connect air hose (17) to fitting (16).

c. Follow-On Maintenance.

   Install radiator fan shrouds (para 6-4).

End of Task.
6-3. RADIATOR OVERFLOW TANK AND BRACKET REPLACEMENT/REPAIR

This task covers:

- a. Radiator Overflow Tank Removal
- b. Radiator Overflow Tank Disassembly
- c. Radiator Overflow Tank Assembly
- d. Radiator Overflow Tank Installation
- e. Radiator Overflow Tank Bracket Removal
- f. Radiator Overflow Tank Bracket Installation
- g. Follow-On Maintenance

INITIAL SETUP

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

Tools and Special Tools
- Pan, Drain (Item 24, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Screwdriver Attachment, Socket Wrench (Item 48, Appendix B)
- Socket Set, Socket Wrench (Item 36, Appendix C)
- Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)

Materials/Parts
- Antiseize Compound (Item 58, Appendix D)
- Antifreeze, Ethylene Glycol, Permanent (Item 12, Appendix D)
- Nut, Self-Locking (2) (Item 167, Appendix G)
- Nut, Self-Locking (3) (Item 156, Appendix G)
- Nut, Self-Locking (Item 152, Appendix G)

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.

a. Radiator Overflow Tank Removal.

(1) Remove radiator cap (1) from radiator overflow tank (2).

(2) Position drain pan under radiator draincock (3).

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) Open radiator draincock (3) and drain approximately three gallons (11 L) of coolant.

(4) Close radiator draincock (3).

(5) Loosen hose clamp (4) on lower coolant hose (5).

(6) Remove lower coolant hose (5) from radiator overflow tank (2).
(7) Loosen two hose clamps (6) on upper coolant hoses (7 and 8).

(8) Remove upper coolant hoses (7 and 8) from radiator overflow tank (2).

(9) Loosen screw (9) and remove clamp (10) from bracket (11).

(10) Remove radiator overflow tank (2) from bracket (11).

b. Radiator Overflow Tank Disassembly.

NOTE
Perform step (1) on all models except M1093/M1094.

(1) Remove 90-degree fitting (1) from radiator overflow tank (2).

NOTE
Perform step (2) on M1093/M1094.

(2) Remove 45-degree fitting (3) from radiator overflow tank (2).
(3) Remove two adapters (4) from radiator overflow tank (2).

(4) Remove two sightglasses (5) from radiator overflow tank (2).

c. Radiator Overflow Tank Assembly.

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.

(1) Apply antiseize compound to threads of two sightglasses (1) and adapters (2).

(2) Install two sightglasses (1) in radiator overflow tank (3).

(3) Install two adapters (2) in radiator overflow tank (3).
6-3. RADIATOR OVERFLOW TANK AND BRACKET REPLACEMENT/REPAIR (CONT)

**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.

**NOTE**

Perform step (4) on M1093/M1094.

(4) Install 45-degree fitting (4) in radiator overflow tank (3).

**NOTE**

Perform step (5) on all models except M1093/M1094.

(5) Install 90-degree fitting (5) in radiator overflow tank (3).

d. Radiator Overflow Tank Installation.

**NOTE**

If replacing radiator overflow tank 12421810 with radiator overflow tanks 12421810-001 or 12421810-002, replace clamp 12421379-004 with clamp 12421379-006.

(1) Position radiator overflow tank (1) on bracket (2) with clamp (3) and screw (4).

(2) Tighten screw (4) to 108-132 lb-in. (12-15 N·m).
(3) Position two hose clamps (5) and upper coolant hoses (6 and 7) on radiator overflow tank (1).

(4) Position hose clamp (8) and lower coolant hose (9) on radiator overflow tank (1).

(5) Tighten two hose clamps (5) and hose clamp (8) to 36-44 lb-in. (4-5 N·m).

e. Radiator Overflow Tank Bracket Removal.

NOTE
Perform step (1) on all models except M1093/M1094.

(1) Remove self-locking nut (1), washer (2), screw (3), and washer (4) from radiator overflow tank bracket (5). Discard self-locking nut.

NOTE
Perform step (2) on M1093/M1094.

(2) Remove self-locking nut (6), washer (7), screw (8), washer (9), and spacer (10) from radiator overflow tank bracket (5). Discard self-locking nut.
6-3. RADIATOR OVERFLOW TANK AND BRACKET REPLACEMENT/REPAIR (CONT)

(3) Remove self-locking nut (11), screw (12), and chain (13), from radiator overflow tank bracket (5). Discard self-locking nut.

(4) Remove three self-locking nuts (14), bolts (15), and radiator overflow tank bracket (5) from front lifting bracket (16). Discard self-locking nuts.

f. Radiator Overflow Tank Bracket Installation.

(1) Position radiator overflow tank bracket (1) on front lifting bracket (2) with three bolts (3) and self-locking nuts (4).

(2) Tighten three bolts (3) to 44-56 lb-ft (60-76 N·m).
(3) Position chain (5), screw (6) and self-locking nut (7) in radiator overflow tank bracket (1).

(4) Tighten screw (6) to 22-26 lb-ft (30-35 N·m).

NOTE

Perform steps (5) and (6) on M1093/M1094.

(5) Position washer (8), screw (9), spacer (10), washer (11), and self-locking nut (12) in radiator overflow tank bracket (1).

(6) Tighten self-locking nut (12) to 22-26 lb-ft (30-35 N·m).

NOTE

Perform steps (7) and (8) on all models except M1093/M1094.

(7) Position washer (13), screw (14), washer (15), and self-locking nut (16) in radiator overflow tank bracket (1).

(8) Tighten self-locking nut (16) to 22-26 lb-ft (30-35 N·m).
6-3. RADIATOR OVERFLOW TANK AND BRACKET REPLACEMENT/REPAIR (CONT)

**g. Follow-On Maintenance.**

(1) Add coolant to radiator overflow tank (TM 9-2320-366-10-2).

(2) Lower cab (TM 9-2320-366-10-1).

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

(4) Check for coolant leaks under vehicle.

(5) Check coolant level after normal operating temperature is reached. Add coolant as needed (TM 9-2320-366-10-2).

(6) Raise cab (TM 9-2320-366-10-1).

(7) Check for coolant leaks around radiator overflow tank.

(8) Lower cab (TM 9-2320-366-10-1).

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

**End of Task.**
**6-4. RADIATOR FAN SHROUDS REPLACEMENT**

This task covers:

- a. Top Radiator Fan Shroud Removal
- b. Top Radiator Fan Shroud Installation
- c. Bottom Radiator Fan Shroud Removal
- d. Bottom Radiator Fan Shroud Installation
- e. Follow-On Maintenance

**INITIAL SETUP**

**Equipment Conditions**
- Turbocharger to charge air cooler tube/hoses removed (para 4-4).
- Charge air cooler to air inlet elbow tubes/hoses removed (para 4-5).
- Upper coolant tube and hoses removed (para 6-9).

**Tools and Special Tools**
- Goggles, Industrial (Item 15, Appendix C)
- Container (52 qt (50 L) capacity)
- Socket Set, Socket Wrench (Item 35, Appendix C)
- Tool Kit, Genl Mech (Item 44, Appendix C)
- Wrench, Torque, 0-175 lb-ft (Item 57, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 58, Appendix C)
- Wrench, Torque, 0-75 lb-in. (Item 86, Appendix B)

**Materials/Parts**
- Nut, Self-Locking (6) (Item 116, Appendix G)
- Antifreeze, Ethylene Glycol, Permanent (Item 13, Appendix D)
- Sealing Compound (Item 58, Appendix D)

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**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.

a. **Top Radiator Fan Shroud Removal.**

1. Loosen hose clamp (1) on radiator vent hose (2).
2. Disconnect radiator vent hose (2) from radiator (3).
3. Disconnect fan clutch hoses (4 and 5) from 90-degree fitting (6).
(4) Remove three self-locking nuts (7), six washers (8), and three screws (9) from left side of top radiator fan shroud (10). Discard self-locking nuts.

(5) Remove screw (11) and washer (12) from left side of top radiator fan shroud (10).

(6) Remove three self-locking nuts (7), six washers (8), three screws (9), clamp (13), and fan clutch hose (4) from right side of top radiator fan shroud (10). Discard self-locking nuts.

(7) Remove screw (14) and washer (15) from right side of top radiator fan shroud (10).

(8) Remove top radiator fan shroud (10) from vehicle.

(9) Remove 90-degree fitting (6) from pipe coupling (11).

(10) Remove fitting (12) from pipe coupling (11).

(11) Remove nut (13), washer (14), and pipe coupling (11) from top radiator fan shroud (10).
b. Top Radiator Fan Shroud Installation.

1. Install coupling (1) in top radiator fan shroud (2) with washer (3) and nut (4).

**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, 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.

2. Apply sealing compound to threads of 90-degree fitting (5) and fitting (6).

3. Install fitting (6) in pipe coupling (1).

4. Install 90-degree fitting (5) in pipe coupling (1).

5. Position top radiator fan shroud (2) on vehicle.

**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.

6. Apply sealing compound to threads of screw (7).

7. Position washer (8) and screw (7) on right side of radiator fan shroud (2).

8. Tighten screw (7) to 84-108 lb-in. (10-12 N·m).

9. Position fan clutch hose (9), clamp (10), six washers (11), three screws (12) and self-locking nuts (13) on right side of top radiator fan shroud (2).

10. Tighten three self-locking nuts (13) to 84-108 lb-in. (10-12 N·m).
(11) Apply sealing compound to threads of screw (14).

(12) Install washer (15) and screw (14) on left side of top radiator fan shroud (2).

(13) Tighten screw (14) to 84-108 lb-in. (10-12 N·m).

(14) Position six washers (11), three screws (12), and self-locking nuts (13) on left side of top radiator fan shroud (2).

(15) Tighten three self-locking nuts (13) to 84-108 lb-in. (10-12 N·m).

(16) Connect fan clutch hoses (9 and 16) to 90-degree fitting (5).

(17) Install radiator vent hose (17) on radiator (18) with hose clamp (19).

c. Bottom Radiator Fan Shroud Removal.

(1) Position container under radiator (1).

(2) Remove radiator cap (2) from radiator overflow tank (3).

(3) Open radiator draincock (4) and drain coolant from radiator (1).

(4) Close radiator draincock (4).
(5) Loosen clamps (5 and 6) on lower coolant hose (7).

(6) Remove lower coolant hose (7) from radiator (1) and transmission oil cooler (8).

(7) Remove radiator draincock (4) from radiator (1).

(8) Remove three self-locking nuts (9), six washers (10), and three screws (11) from left side of bottom radiator fan shroud (12). Discard self-locking nuts.
(9) Remove three self-locking nuts (13), six washers (14), three screws (15), clamp (16), and fan clutch hose (4) from right side of bottom radiator fan shroud (12). Discard self-locking nuts.

(10) Remove two screws (17) and washers (18) from each side of bottom radiator fan shroud (12).

(11) Remove bottom radiator fan shroud (12) and two engine airflow baffles (19).
d. Bottom Radiator Fan Shroud Installation.

(1) Position bottom radiator fan shroud (1) in mounting location.

(2) Position two engine airflow baffles (2) between bottom radiator fan shroud (1) and radiator (3).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, 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.

(3) Apply sealing compound to threads of four screws (5).

(4) Position two washers (4) and screws (5) in each side of bottom radiator fan shroud (1).
(5) Position six washers (6), three screws (7), and self-locking nuts (8) on left side of bottom radiator fan shroud (1).

(6) Tighten three self-locking nuts (8) to 84-108 lb-in. (10-12 N·m).

(7) Position six washers (9), three screws (10), self-locking nuts (11), fan clutch hose (12), and clamp (13) on right side of bottom radiator fan shroud (1).

(8) Tighten three self-locking nuts (11) to 84-108 lb-in. (10-12 N·m).

(9) Tighten two screws (5) on each side of bottom radiator fan shroud (1) to 84-108 lb-in (10-12 N·m).
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.

(10) Apply antiseize compound to threads of radiator draincock (14).

(11) Install radiator draincock (14) in radiator (3).

(12) Loosen two screws (15) in clamps (16) as far as possible without disengaging screws from D-nuts (17).

(13) Unhook clamp tabs (18) from tab windows (19).

CAUTION

• Clamp tongue must be started in clamp groove. Failure to comply may result in damage to equipment.

• Position clamps so that screws will be toward center of vehicle and angled down.

(14) Position two clamps (16) on lower coolant hose (20).
6-4. RADIATOR FAN SHROUDS REPLACEMENT (CONT)

(15) Install lower coolant hose (20) between radiator (3) and transmission oil cooler (21).

(16) Engage as many clamp tabs (18) as possible in tab windows (19) allowing little or no play between clamps (16) and lower coolant hose (20).

(17) Tighten two clamps (16) to 12-18 lb-in. (1-2 N·m).

**NOTE**
Minimum allowable gap on clamp is 0.2 in. (5 mm). If gap is less than 0.2 in. (5 mm), remove and re-install clamp.

(18) Measure gap on two clamps (16).

**e. Follow-On Maintenance.**

(1) Install upper coolant tube and hoses (para 6-9).

(2) Install charge air cooler to air inlet elbow tubes/hoses (para 4-5).

(3) Install turbocharger to charge air cooler tube/hoses (para 4-4).

(4) Add coolant to radiator overflow tank (TM 9-2320-365-10).

(5) Check for coolant leaks under vehicle.

(6) Start engine (TM 9-2320-365-10).

(7) Check for coolant leaks under vehicle.
(8) Check coolant level after normal operating temperature is reached. Add coolant as required.

(9) Install radiator cap on radiator overflow tank.

(10) Check for coolant leaks under vehicle.

(11) Raise cab (TM 9-2320-365-10).

(12) Check for coolant leaks in engine compartment.

(13) Check to make sure engine fan does not contact fan shroud.

(14) Lower cab (TM 9-2320-365-10).

(15) Shut down engine (TM 9-2320-365-10).

End of Task.
6-5. THERMOSTAT REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

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

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Pan, Drain (Item 24, Appendix C)

Tools and Special Tools (Cont)
Goggles, Industrial (Item 15, Appendix C)
Gloves, Rubber (Item 13, Appendix C)

Materials/Parts
Adhesive (Item 5, Appendix D)
Gasket and Preformed Packing Set (Item 43.1, Appendix G)

a. Removal.

(1) Position drain pan under thermostat housing (1).

(2) Remove two screws (2) and washers (3) from outlet housing (4).

(3) Remove outlet housing (4) from thermostat housing (1).

(4) Remove thermostat (5) from thermostat housing (1).

(5) Remove thermostat gasket (6) from thermostat housing (1). Discard thermostat gasket.

(6) Remove thermostat gasket debris from outlet housing (4) and thermostat housing (1).
b. Installation.

**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.

(1) Apply adhesive to thermostat housing surface (1).
(2) Position thermostat gasket (2) on thermostat housing (1).
(3) Install thermostat (3) with long end up.
(4) Apply adhesive to outlet housing (4) mating surface.
(5) Install outlet housing (4) on thermostat housing (1) with two washers (5) and screws (6).

c. Follow-On Maintenance.

(1) Lower cab (TM 9-2320-366-10-1).
(2) Add coolant to radiator overflow tank (TM 9-2320-366-10-2).
(3) Check for coolant leaks under vehicle.
(4) Start engine (TM 9-2320-366-10-1).
(5) Check coolant level after normal operating temperature is reached. Add coolant as required (TM 9-2320-366-10-2).
(6) Raise cab (TM 9-2320-366-10-1).
(7) Check thermostat housing for coolant leaks.

(8) Install radiator cap on radiator overflow tank.

(9) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
6-6. THERMOSTAT HOUSING REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Thermostat removed (para 6-5).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Pan, Drain (Item 24, Appendix C)
Goggles, Industrial (Item 15, Appendix C)
Gloves, Rubber (Item 13, Appendix C)

Materials/Parts
Antiseize Compound (Item 58, Appendix D)
Antifreeze, Ethylene Glycol, Permanent (Item 12, Appendix D)
Adhesive (Item 5, Appendix D)
Packing, Preformed (Item 201, Appendix G)

a. Removal.

(1) Position drain pan under thermostat housing (1).

(2) Disconnect heater tube (2) from fitting (3).

(3) Loosen hose clamp (4) on radiator fill hose (5).

(4) Disconnect radiator fill hose (5) from fitting (6).

(5) Disconnect connector clamp (7) from water temperature transducer connector (8).

(6) Disconnect water temperature transducer connector (8) from connector P41 (9).

(7) Remove water temperature transducer (10) from tee fitting (11).

(8) Disconnect connector clamp (12) from water temperature light switch connector (13).

(9) Disconnect water temperature light switch connector (13) from connector P37 (14).

(10) Remove water temperature light switch (15) from thermostat housing (1).
(11) Loosen hose clamp (16) on transmission oil cooler hose (17).

(12) Disconnect transmission oil cooler hose (17) from thermostat housing (1).

(13) Disconnect compressor inlet coolant tube (18) from 90-degree fitting (19).

(14) Remove two screws (20) from thermostat housing (1).

(15) Remove thermostat housing (1) and gasket (21) from engine block (22). Discard gasket.

(16) Remove 90-degree fitting (19) from thermostat housing (1).

(17) Remove preformed packing (23) from 90-degree fitting (19). Discard preformed packing.

(18) Remove gasket debris from thermostat housing (1).

(19) Remove tee fitting (11) from thermostat housing (1).

(20) Remove fitting (6) from tee fitting (11).

(21) Remove fitting (24) from thermostat housing (1).
b. Installation.

**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 with soap and water. Failure to comply may result in injury to personnel.

(1) Apply adhesive to threads of tee fitting (1) and fittings (2 and 3).

(2) Install fitting (2) in tee fitting (1).

(3) Install tee fitting (1) in thermostat housing (4).

(4) Install fitting (3) in thermostat housing (4).

(5) Install preformed packing (5) on 90-degree fitting (6).

(6) Install 90-degree fitting (6) in thermostat housing (4).

(7) Apply adhesive to surfaces of thermostat housing (4) and engine block (7).

(8) Position gasket (8) on engine block (7).

(9) Install thermostat housing (4) on engine block (7) with two screws (9).
(10) Connect compressor inlet coolant tube (10) to 90-degree fitting (6).

(11) Install transmission oil cooler hose (11) on thermostat housing (4) with hose clamp (12).

**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 with soap and water. Failure to comply may result in injury to personnel.

(12) Apply antiseize compound to threads of water temperature light switch (13).

(13) Install water temperature light switch (13) in thermostat housing (4).

(14) Connect water temperature light switch connector (14) to connector P37 (15).

(15) Connect connector clamp (16) on water temperature light switch connector (14).
6-6. THERMOSTAT HOUSING REPLACEMENT (CONT)

**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 with soap and water. Failure to comply may result in injury to personnel.

(16) Apply antiseize compound to threads of water temperature transducer (17).

(17) Install water temperature transducer (17) in tee fitting (1).

(18) Connect water temperature transducer connector (18) to connector P41 (19).

(19) Connect connector clamp (20) on water temperature transducer connector (18).

(20) Install radiator fill hose (21) on fitting (2) with hose clamp (22).

(21) Connect heater tube (23) to fitting (2).

c. Follow-On Maintenance.

(1) Install thermostat (para 6-5).

(2) Add coolant to radiator overflow tank (TM 9-2320-366-10-2).

(3) Lower cab (TM 9-2320-366-10-1).

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

(5) Check for coolant leaks under vehicle.

(6) Check coolant level after normal operating temperature is reached. Add coolant as required (TM 9-2320-366-10-2).

(7) Check for coolant leaks under vehicle.
(8) Raise cab (TM 9-2320-366-10-1).

(9) Check for coolant leaks at thermostat housing.

(10) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
6-7. COOLANT BYPASS TUBE REPLACEMENT

This task covers:

a. Removal
b. Installation

c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).
Cab raised (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Container (52 qt (50 L) capacity)
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)

Materials/Parts
- Antiseize Compound (Item 58, Appendix D)
- Antifreeze, Ethylene Glycol, Permanent (Item 12, Appendix D)
- Nut, Self-Locking (Item 128, Appendix G)

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.

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

a. Removal.

(1) Remove radiator cap (1) from radiator overflow tank (2).

(2) Position container under radiator (3).

(3) Open radiator draincock (4) and drain coolant.

(4) Close radiator draincock (4).
(5) Remove self-locking nut (5), washer (6), screw (7), and clamp (8) from bracket (9). Discard self-locking nut.

(6) Remove clamp (8) from coolant bypass tube (10).

(7) Disconnect connector clamp (11) from ether sensor connector (12).

(8) Disconnect ether sensor connector (12) from connector P42 (13).

(9) Loosen two clamps (14) on coolant hose (15).

(10) Remove coolant hose (15) and flow restrictor (16) from transmission oil cooler (17).

(11) Remove coolant hose (15) and two clamps (14) from coolant bypass tube (10).
6-7. COOLANT BYPASS TUBE REPLACEMENT (CONT)

(12) Loosen two clamps (18) on coolant hose (19).

(13) Remove coolant bypass tube (10) from coolant hose (19).

(14) Remove coolant hose (19) from thermostat housing (20).

(15) Remove ether sensor (21) from coolant bypass tube (10).
b. Installation.

**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.

1. Apply antiseize compound to threads of ether sensor (1).

2. Install ether sensor (1) in coolant bypass tube (2).

**NOTE**

Both coolant hoses are assembled the same way. Only one shown.

3. Loosen two screws (3) in clamps (4) and clamps (5) as far as possible without disengaging screws from D-nuts (6).

4. Unhook clamp tabs (7) from tab windows (8).
CAUTION

Clamp tongue must be started in clamp groove. Failure to comply may result in damage to equipment.

(5) Position two clamps (4) on coolant hose (9).
(6) Position two clamps (5) on coolant hose (10).

(7) Position coolant hose (9) on thermostat housing (11).
(8) Position coolant bypass tube (2) in coolant hose (9).
(9) Engage as many clamp tabs (7) as possible in tab windows (8) allowing little or no play between two clamps (4) and coolant hose (9).
(10) Position coolant hose (10) on coolant bypass tube (2).

(11) Position flow restrictor (12) and coolant hose (10) on transmission oil cooler (13).

(12) Engage as many clamp tabs (7) as possible in tab windows (8) allowing little or no play between two clamps (5) and coolant hose (10).

(13) Tighten two clamps (5) to 12-18 lb-in. (1-2 N·m).

(14) Tighten two clamps (4) to 12-18 lb-in. (1-2 N·m).

**NOTE**
Minimum allowable gap on clamp is 0.2 in. (5 mm). If gap is less than 0.2 in. (5 mm), remove and re-install clamp.

(15) Measure gap on two clamps (5).
(16) Measure gap on two clamps (4).

(17) Install clamp (14) on coolant bypass tube (2).

(18) Install clamp (14) on bracket (15) with screw (16), washer (17), and self-locking nut (18).

(19) Connect connector P42 (19) to ether sensor connector (20).

(20) Connect connector clamp (21) on ether sensor connector (20).
c. **Follow-On Maintenance.**

(1) Connect batteries (para 7-57).

(2) Add coolant to radiator overflow tank (TM 9-2320-366-10-2).

(3) Lower cab (TM 9-2320-366-10-1).

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

(5) Check for coolant leaks under vehicle.

(6) Check coolant level after normal operating temperature is reached. Add coolant as required (TM 9-2320-366-10-2).

(7) Install radiator cap on radiator overflow tank.

(8) Check for coolant leaks under vehicle.

(9) Raise cab (TM 9-2320-366-10-1).

(10) Check around transmission oil cooler, thermostat, and coolant bypass tube for coolant leaks.

(11) Lower cab (TM 9-2320-366-10-1).

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

**End of Task.**
6-8. PERSONNEL HEATER HOSES REPLACEMENT

This task covers:

a. Removal
b. Installation

c. Follow-On Maintenance

INITIAL SETUP

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

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Container (10 gal (38 L) capacity)
Tool Kit, Genl Mech (Item 46, Appendix C)

Tools and Special Tools (Cont)
Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 36, Appendix C)

Materials/Parts
Ties, Cable, Plastic (Item 69, Appendix D)

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.

a. Removal.

(1) Remove radiator cap (1) from radiator overflow tank (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.

(2) Position container under radiator draincock (3).

(3) Open radiator draincock (3) and drain approximately five gallons (19 L) of coolant.

(4) Close radiator draincock (3).
NOTE

Remove plastic cable ties as required.

(5) Remove two screws (4) and washers (5) from front grille (6).

(6) Remove screw (7) and washer (8) from front grille (6).

(7) Remove front grille (6) from cab (9).

(8) Loosen clamp (10) on heater inlet hose (11).

(9) Remove heater inlet hose (11) from supply fitting (12).

(10) Loosen clamp (13) on heater outlet hose (14).

(11) Remove heater outlet hose (14) from return fitting (15).

(12) Raise cab (TM 9-2320-366-10-1).

(13) Loosen clamp (16) on heater inlet hose (11).

(14) Remove heater inlet hose (11) from supply tube (17).
(15) Loosen clamp (18) on heater outlet hose (14).

(16) Remove heater outlet hose (14) from return fitting (19).

b. Installation.

(1) Loosen four screws (1) in clamps (2) as far as possible without disengaging screws from D-nuts (3).

(2) Unhook clamp tabs (4) from tab windows (5).

CAUTION

Clamp tongue must be started in clamp groove. Failure to comply may result in damage to equipment.

(3) Position two clamps (2) on heater outlet hose (6).

(4) Position two clamps (2) on heater inlet hose (7).
(5) Position heater outlet hose (6) on return fitting (8).

(6) Engage as many clamp tabs (4) as possible in tab windows (5) allowing little or no play between clamp (2) and heater outlet hose (6).

(7) Tighten clamp (2) to 12-18 lb-in. (1-2 N·m).

(8) Position heater inlet hose (7) on supply tube (9).

(9) Engage as many clamp tabs (4) as possible in tab windows (5) allowing little or no play between clamp (2) and heater inlet hose (7).

(10) Tighten clamp (2) to 12-18 lb-in. (1-2 N·m).
6-8. PERSONNEL HEATER HOSES REPLACEMENT (CONT)

(11) Lower cab (TM 9-2320-366-10-1).

**NOTE**

Heater outlet hose is marked with an arrow pointing down.

(12) Position heater outlet hose (6) on return fitting (10).

**NOTE**

Heater inlet hose is marked with an arrow pointing up.

(13) Position heater inlet hose (7) on supply fitting (11).

(14) Engage as many clamp tabs (4) as possible in tab windows (5) allowing little or no play between clamps (2) and heater outlet hose (6) and heater inlet hose (7).

(15) Tighten two clamps (2) to 8-9 lb-in. (1 N•m).

(16) Raise cab (TM 9-2320-366-10-1).

**NOTE**

Minimum allowable gap on clamp is 0.1 in. (0.3 cm). If gap is less than 0.1 in. (0.3 cm), remove and re-install clamp

(17) Measure gap on two clamps (2).
(18) Measure gap on clamp (2).

(19) Measure gap on clamp (2).

(20) Lower cab (TM 9-2320-366-10-1).

(21) Position front grille (12) on cab (13) with washer (14) and screw (15).

(22) Position two washers (16) and screws (17) in front grille (12).

(23) Tighten screw (15) to 48-60 lb-in. (5-7 N·m).

(24) Tighten two screws (17) to 24 lb-in. (3 N·m).
c. Follow-On Maintenance.

(1) Add coolant to radiator overflow tank (TM 9-2320-366-10-2).

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

(3) Operate personnel heater (TM 9-2320-366-10-1).

(4) Raise cab (TM 9-2320-366-10-1).

(5) Check for coolant leaks around hoses and fittings.

(6) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
6-9. UPPER COOLANT TUBE AND HOSES REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).
Cab raised (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).

Tools and Special Tools
Pan, Drain (Item 24, Appendix C)
Goggles, Industrial (Item 15, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)

Materials/Parts
Antiseize Compound (Item 58, Appendix D)
Antifreeze, Ethylene Glycol, Permanent (Item 12, Appendix D)

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.

a. Removal.

(1) Remove radiator cap (1) from radiator overflow tank (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.

(2) Position drain pan under radiator (3).

(3) Open radiator draincock (4) and drain approximately one gallon of coolant.

(4) Close radiator draincock (4).
6-9. UPPER COOLANT TUBE AND HOSES REPLACEMENT (CONT)

(5) Disconnect connector clamp (5) from water temperature switch electrical connector (6).

(6) Disconnect water temperature switch electrical connector (6) from connector P36 (7).

(7) Remove water temperature switch (8) from upper coolant tube (9).

(8) Loosen four hose clamps (10) on coolant hoses (11 and 12).

(9) Slide coolant hose (11) completely onto upper coolant tube (9).

(10) Remove upper coolant tube (9) from vehicle.

(11) Remove coolant hose (12) from radiator (3).
(12) Remove coolant hose (11) from upper coolant tube (9).

(13) Remove four clamps (10) from coolant hoses (11 and 12).

b. Installation.

**NOTE**
Both coolant hoses are assembled the same way. One coolant hose shown.

(1) Loosen two screws (1) in clamps (2) as far as possible without disengaging screws from D-nuts (3).

(2) Unhook clamp tabs (4) from tab windows (5).
CAUTION

Clamp tongue must be started in clamp groove. Failure to comply may result in damage to equipment.

(3) Position two clamps (2) on coolant hose (6).

(4) Perform steps (1) through (3) on coolant hose (7).

(5) Position coolant hose (6) on upper coolant tube (8).

(6) Position coolant hose (7) on radiator (9).
(7) Position upper coolant tube (8) between coolant hose (7) and thermostat housing (10).

(8) Slide coolant hose (6) onto thermostat housing (10).

(9) Engage as many clamp tabs (4) as possible in tab windows (5) allowing little or no play between four clamps and two coolant hoses (6 and 7).

(10) Tighten four clamps (2) to 12-18 lb-in. (1-2 N·m).

NOTE
Minimum allowable gap on clamp is 0.2 in. (5 mm). If gap is less than 0.2 in. (5 mm), remove and re-install clamp.

(11) Measure gap on four clamps (2).
6-9. UPPER COOLANT TUBE AND HOSES REPLACEMENT (CONT)

**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.

(12) Apply antiseize compound to threads of water temperature switch (11).

(13) Install water temperature switch (11) in upper coolant tube (8).

(14) Connect water temperature switch electrical connector (12) to connector P36 (13).

(15) Connect connector clamp (14) on water temperature switch electrical connector (12).

c. **Follow-On Maintenance.**

(1) Connect batteries (para 7-57).

(2) Add coolant to radiator overflow tank (TM 9-2320-366-10-2).

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

(4) Check for coolant leaks under vehicle.

(5) Remove radiator cap from radiator overflow tank.

(6) Check coolant level after normal operating temperature is reached. Add coolant as required (TM 9-2320-366-10-2).

(7) Install radiator cap on radiator overflow tank.

(8) Raise cab (TM 9-2320-366-10-1).

(9) Check for coolant leaks around hoses and fittings.

(10) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
6-10. LOWER COOLANT HOSE REPLACEMENT

This task covers:

a. Removal
b. Installation

INITIAL SETUP

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

Tools and Special Tools
- Goggles, Industrial (Item 15, Appendix C)
- Container (52 qt (50 L) capacity)
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)

Materials/Parts
Antifreeze, Ethylene Glycol, Permanent (Item 12, Appendix D)

**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.

a. Removal.

(1) Remove radiator cap (1) from radiator overflow tank (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.

(2) Position container under radiator draincock (3).

(3) Open radiator draincock (3) and drain coolant.

(4) Close radiator draincock (3).
(5) Loosen two clamps (4) on lower coolant hose (5).

(6) Remove lower coolant hose (5) from radiator (6) and transmission oil cooler (7).

b. Installation.

(1) Loosen two screws (1) in clamps (2) as far as possible without disengaging screws from D-nuts (3).

(2) Unhook clamp tabs (4) from tab windows (5).
CAUTION

- Clamp tongue must be started in clamp groove. Failure to comply may result in damage to equipment.

- Position clamps so that screws will be toward center of vehicle and angled down.

(3) Position two clamps (2) on lower coolant hose (6).

(4) Install lower coolant hose (6) between radiator (7) and transmission oil cooler (8).

(5) Engage as many clamp tabs (4) as possible in tab windows (5) allowing little or no play between clamp and lower coolant hose (6).

(6) Tighten two clamps (2) to 12-18 lb-in. (1-2 N·m).

NOTE

Minimum allowable gap on clamp is 0.2 in. (0.5 cm). If gap is less than 0.2 in. (0.5 cm), remove and re-install clamp.

(7) Measure gap on two clamps (2).
6-10. LOWER COOLANT HOSE REPLACEMENT (CONT)

c. Follow-On Maintenance.

(1) Add coolant to radiator overflow tank (TM 9-2320-366-10-2).

(2) Install radiator cap on radiator overflow tank.

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

(4) Check for coolant leaks around lower coolant hose.

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

End of Task.
6-11. AIR COMPRESSOR INLET AND OUTLET COOLANT TUBES REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

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

Tools and Special Tools
Pan, Drain (Item 24, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)

Materials/Parts
Antifreeze, Ethylene Glycol, Permanent (Item 12, Appendix D)

a. Removal.

(1) Position drain pan under air compressor (1).

(2) Disconnect air compressor inlet coolant tube (2) from air compressor (1).

(3) Disconnect air compressor inlet coolant tube (2) from water pump (3).

(4) Remove air compressor inlet coolant tube (2) from vehicle.
6-11. AIR COMPRESSOR INLET AND OUTLET COOLANT TUBES REPLACEMENT (CONT)

(5) Disconnect air compressor outlet coolant tube (4) from air compressor (1).

(6) Disconnect air compressor outlet coolant tube (4) from thermostat housing (5).

(7) Remove air compressor outlet coolant tube (4) from vehicle.

b. Installation.

(1) Connect air compressor outlet coolant tube (1) to thermostat housing (2).
(2) Connect air compressor outlet coolant tube (1) to air compressor (3).

(3) Connect air compressor inlet coolant tube (4) to water pump (5).

(4) Connect air compressor inlet coolant tube (4) to air compressor (3).
6-11. AIR COMPRESSOR INLET AND OUTLET COOLANT TUBES REPLACEMENT (CONT)

c. Follow-On Maintenance.

(1) Add coolant to radiator overflow tank (TM 9-2320-366-10-2).

(2) Lower cab (TM 9-2320-366-10-1).

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

(4) Check for coolant leaks under vehicle.

(5) Check coolant level after normal operating temperature is reached. Add coolant as needed (TM 9-2320-366-10-2).

(6) Install radiator cap on radiator overflow tank.

(7) Raise cab (TM 9-2320-366-10-1).

(8) Check for coolant leaks around coolant lines and fittings.

(9) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
6-12. WATER PUMP AND FITTINGS REPLACEMENT

This task covers:

a. Water Pump Removal
b. Water Pump Installation
c. Fittings Removal
d. Fittings Installation
e. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
100 amp alternator removed, if equipped (para 7-2).
200 amp alternator removed, if equipped (para 20-45).
Alternator brackets removed (para 7-4).

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Container (52 qt (50 L) capacity)
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)
Wrench, Adjustable, Automotive (Item 53, Appendix C)
Gage, Belt Tension (Item 19, Appendix B)
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)

Materials/Parts
Antifreeze, Ethylene Glycol, Permanent (Item 12, Appendix D)
Packing, Preformed (Item 195, Appendix G)
Packing, Preformed (Item 214, Appendix G)
Packing, Preformed (3) (Item 205, Appendix G)
Packing, Preformed (2) (Item 202, Appendix G)

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.

a. Water Pump Removal.

(1) Position container under radiator (1).

(2) Remove radiator cap (2) from radiator overflow tank (3).

(3) Open radiator draincock (4) and drain coolant.

(4) Close radiator draincock (4).
(5) Disconnect heater supply tube (5) from fitting (6).

(6) Remove 45-degree fitting (6) and preformed packing (7) from water pump (8). Discard preformed packing.

(7) Loosen two clamps (9).

(8) Remove coolant hose (10) from water pump (8).

(9) Disconnect coolant tubes (11 and 12) from water pump (8).

**NOTE**

Note position and size of washers prior to removal.

(10) Remove two screws (13), washers (14), and drive belt/tension pulley (15) from engine (16).

(11) Remove water pump drive belt (17) from water pump (8).
(12) Remove four screws (18) from water pump (8).

(13) Remove water pump (8) and preformed packings (19 and 20) from engine (16). Discard preformed packings.

b. Water Pump Installation.

(1) Install preformed packings (1 and 2) in water pump (3).

(2) Position water pump (3) on engine (4) with four screws (5).

(3) Tighten four screws (5) to 33-47 lb-ft (45-64 N·m).
(4) Position drive belt/tension pulley (6) on engine (4) with two washers (7) and screws (8).

(5) Install water pump drive belt (9) on water pump (3) and drive belt/tension pulley (6).

**NOTE**

Use square hole in drive belt/tension pulley to apply and maintain tension on drive belt while adjusting belt tension.

(6) Adjust water pump drive belt (9) with drive belt/tension pulley (6) as follows:

   a. New belt (less than 30 minutes running time) 115-125 lb (512-556 N).

   b. Used belt 80-100 lb (356-444 N).

(7) Tighten two screws (8) to 35 lb-ft (47 N·m).

(8) Connect coolant tubes (10 and 11) to water pump (3).
(9) Loosen two screws (12) in clamps (13) as far as possible without disengaging screws from D-nuts (14).

(10) Unhook clamp tabs (15) from tab windows (16).

CAUTION
• Clamp tongue must be started in clamp groove. Failure to comply may result in damage to equipment.
• Position clamps with screw heads facing forward so they do not interfere with alternator mount.

(11) Position coolant hose (17) on water pump (3).

(12) Position two clamps (13) on coolant hose (17).

(13) Engage as many clamp tabs (15) as possible in tab windows (16) allowing little or no play between clamp and coolant hose (17).

(14) Tighten two clamps (13) to 13-17 lb-in. (2 N·m).

NOTE
Minimum allowable gap on clamp is 0.2 in. (5 mm). If gap is less than 0.2 in. (5 mm), remove and re-install clamp.

(15) Measure gap on two clamps (13).

(16) Install preformed packing (18) and 45-degree fitting (19) in water pump (3).

(17) Connect heater supply tube (20) to 45-degree fitting (3).
c. Fittings Removal.

(1) Remove plug (1) and preformed packing (2) from water pump (3). Discard preformed packing.

(2) Remove connector (4) and preformed packing (5) from water pump (3). Discard preformed packing.

(3) Remove fitting (6) and preformed packing (7) from pipe bushing (8). Discard preformed packing.

(4) Remove pipe bushing (8) and preformed packing (9) from water pump (3). Discard preformed packing.

d. Fittings Installation.

(1) Install preformed packing (1) on pipe bushing (2).

(2) Install pipe bushing (2) in water pump (3).

(3) Install preformed packing (4) on fitting (5).

(4) Install fitting (5) in pipe bushing (2).

(5) Install preformed packing (6) on connector (7).

(6) Install connector (7) in water pump (3).

(7) Install preformed packing (8) on plug (9).

(8) Install plug (9) in water pump (3).
e. **Follow-On Maintenance.**

(1) Install alternator bracket assembly (para 7-4).

(2) Install alternator (para 7-2 or 20-45).

(3) Add coolant to radiator overflow tank (TM 9-2320-366-10-2).

(4) Lower cab (TM 9-2320-366-10-1).

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

(6) Check for coolant leaks under vehicle.

(7) Check coolant level after normal operating temperature is reached. Add coolant as required (TM 9-2320-366-10-2).

(8) Raise cab (TM 9-2320-366-10-1).

(9) Check for coolant leaks around water pump.

(10) Lower cab (TM 9-2320-366-10-1).

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

**End of Task.**
6-13. DRIVE BELT AND TENSION PULLEY REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Top radiator fan shroud removed (para 6-4).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Gage, Belt Tension (Item 19, Appendix B)
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)

Materials/Parts
Antiseize Compound (Item 58, Appendix D)
Lockwasher (6) (Item 95, Appendix G)
Screw, Self-Locking (6) (Item 263, Appendix G)
Grommet, Nonmetallic (Item 53, Appendix G)

a. Removal.

CAUTION
Mark front of engine fan before removing. Failure to comply may result in damage to equipment.

(1) Remove air hose (1) from fitting (2) on fan clutch assembly (3).
(2) Remove fitting (2) from fan clutch assembly (3).

(3) Remove six screws (4), lockwashers (5), and washers (6) from engine fan (7). Discard lockwashers and screws.

NOTE
Perform steps (3) through (6) on vehicles serial number 8426 and lower that have not had the fan clutch replaced.

(3) Remove six screws (4), lockwashers (5), and washers (6) from engine fan (7). Discard lockwashers and screws.
(4) Remove engine fan (7) from fan clutch assembly (3).
(5) Remove fan support plate (8) from engine fan (7).
(6) Remove grommet (9) from engine fan (7). Discard grommet.
NOTE

Perform steps (6.1) and (6.2) on vehicles serial number 8427 and higher and vehicles that have previously had the fan clutch replaced.

(6.1) Remove six nuts (9.1), lockwashers (9.2), and washers (9.3) from engine fan (9.4). Discard lockwashers.

(6.2) Remove engine fan (9.4) from fan clutch assembly (9.5).

(7) Loosen two screws (10) from front of engine block (11).

(8) Release alternator belts (12) tension by moving tension bracket (13) up.

(9) Remove two alternator belts (12) from engine (14).

(10) Remove two screws (15), washers (16), and tension pulley (17) from engine (14).

(11) Remove drive belt (18) from water pump pulley (19) and pulley damper (20).
b. Installation.

(1) Install drive belt (1) on pulley damper (2) and water pump pulley (3).

(2) Position tension pulley (4) on engine (5) with two washers (6) and screws (7).

NOTE

Use square hole in drive belt/tension pulley to apply and maintain tension on drive belt while adjusting belt tension.

(3) Adjust water pump drive belt with drive belt/tension pulley (4) as follows:

   (a) New belt (less than 30 minutes running time) 115-125 lb (512-556 N).

   (b) Used belt 80-100 lb (356-444 N).

(4) Tighten two screws (7) to 35 lb-ft (47 N•m).
(5) Install two alternator belts (8) onto engine (5).

**NOTE**

Use square hole in drive belt/tension bracket to apply and maintain tension on alternator belts while adjusting belt tension.

(6) Adjust alternator belts with tension bracket (9) as follows:

(a) New belt (less than 30 minutes running time) 115-125 lb (512-556 N).

(b) Used belt 80-100 lb (356-444 N).

(7) Tighten screw (10).

(8) Tighten screw (11) to 47 lb-ft (64 N·m).

---

**CAUTION**

Ensure engine fan is positioned with mark facing forward. Failure to comply may result in damage to equipment.

**NOTE**

Perform steps (8.1) through (8.3) on vehicles serial number 8427 and higher.

(8.1) Position engine fan (11.1) on fan clutch assembly (11.2) with six washers, lockwashers

(8.2) Tighten six nuts (11.5) to 15 lb-ft (20 N·m) in sequence shown.

(8.3) Re-tighten six nuts (11.5) to 23-29 lb-ft (31-39 N·m) in sequence shown.
**NOTE**

Perform steps (9) through (13) on vehicles serial numbers 8426 and lower that have not had fan clutch replaced.

(9) Install grommet (12) on engine fan (13).

(10) Install fan support plate (14) on engine fan (13).

(11) Position engine fan (13) and fan support plate (14) on fan clutch assembly (15) with six washers (16), lockwashers (17), and screws (18).

(12) Tighten six screws (18) to 15 lb-ft (20 N·m) in sequence shown.

(13) Re-tighten six screws (18) to 22-32 lb-ft (30-44 N·m) in sequence shown.

---

**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.

(14) Apply antiseize compound to threads of fitting (19).

(15) Install fitting (19) on fan clutch assembly (15).

(16) Connect air hose (20) to fitting (19).

---

c. **Follow-On Maintenance.**

Install top radiator fan shroud (para 6-4).

End of Task.
6-14. ENGINE FAN AND FAN CLUTCH ASSEMBLY REPLACEMENT

This task covers:

a. Removal  
b. Installation  
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Top radiator fan shroud removed (para 6-4).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)  
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)  
Adapter, Socket Wrench (Item 2, Appendix B)

Materials/Parts
Antiseize Compound (Item 13, Appendix D)  
Lockwasher (6) (Item 95, Appendix G)  
Screw, Self-Locking (6) (Item 263, Appendix G)

a. Removal.

(1) Disconnect air hose (1) from fitting (2) on fan clutch assembly (3).

(2) Remove fitting (2) from fan clutch assembly (3).
NOTE

Perform steps (3) through (8) on vehicles serial number 8426 and lower that have not had the fan clutch replaced.

(3) Remove six screws (4), lockwashers (5), and washers (6) from engine fan (7). Discard lockwashers and screws.

(4) Remove fan support plate (8) from engine fan (7).

(5) Remove grommet (9) from engine fan (7). Discard grommet.

CAUTION

Mark front of engine fan before removal. Failure to comply may result in damage to equipment.

(6) Remove engine fan (7) from fan clutch assembly (3).

(7) Remove spacer plate (10) from fan clutch assembly (3).
NOTE

Perform steps (8) and (8.1) on vehicles serial number 8427 and higher and on vehicles that have had the fan clutch replaced.

(8) Remove six nuts (10.1), lockwashers (10.2), and washers (10.3) from engine fan (10.4). Discard lockwashers.

CAUTION

Mark front of engine fan before removal. Failure to comply may result in damage to equipment.

(8.1) Remove engine fan (10.4) from fan clutch assembly (10.5).

NOTE

- Application of 30 psi (207 kPa) air pressure to fan clutch will free rotation of fan clutch and allow removal of fan clutch screws.
- Both fan clutches are removed the same way. Fan clutch without studs shown.

(8.2) Install fitting (2) in fan clutch assembly (3).

(9) Apply 30 psi (207 kPa) air pressure to fitting (2).

(10) Turn fan clutch assembly (3) until bolts (11) are visible through fan clutch access holes (12).

(11) Remove six bolts (11) from pulley damper (13).

(12) Remove fan clutch assembly (3) from pulley damper (13).
b. Installation.

**NOTE**
Discard fan clutch assembly PN 1090-08000-03 and replace with fan clutch assembly PN 1090-08000-01.

1. Position bolt (1) through hole (1.1) in fan clutch assembly (2).
2. Position fan clutch assembly (2) on pulley damper (3).
3. Position five bolts (1) on fan clutch assembly (2).
4. Tighten six bolts (1) to 42-52 lb-ft (57-71 N•m).

**CAUTION**
Ensure engine fan is positioned with mark facing forward. Failure to comply may result in damage to equipment.

**NOTE**
Discard engine fan PN 4035-41393-74 and replace with engine fan PN 12421972.

5. Position engine fan (4) on fan clutch assembly (2) with six washers (5), lockwashers (6), and nuts (7).
6. Tighten six nuts (7) to 15 lb-ft (20 N·m) in sequence shown.
7. Re-tighten six nuts (7) to 23-29 lb-ft (31-39 N·m) in sequence shown.
6-14. ENGINE FAN AND FAN CLUTCH ASSEMBLY REPLACEMENT (CONT)

**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.

(8) Apply antiseize compound to threads of fitting (8).

(9) Install fitting (8) in fan clutch assembly (2).

(10) Connect air hose (9) to fitting (8).

c. **Follow-On Maintenance.**

(1) Install top radiator fan shroud (para 6-4).

(2) Lower cab (TM 9-2320-366-10-1).

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

(4) Check for coolant leaks under vehicle.

(5) Raise cab (TM 9-2320-366-10-1).

(6) Check for coolant leaks around radiator.

(7) Lower cab (TM 9-2320-366-10-1).

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

**End of Task.**
# CHAPTER 7
## ELECTRICAL SYSTEM MAINTENANCE

### RESTRICTED MAINTENANCE NOTICE

Units not authorized SC 4910-95-CL-A72 (SHOP EQUIPMENT, COMMON NO. 2) in their T.O.E. may be unable to perform some of the maintenance tasks described in this chapter. If the required tools are not authorized, the equipment must be submitted to DS Maintenance for repair.

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Section I. INTRODUCTION

7-1. INTRODUCTION

This chapter contains maintenance instructions for replacing, repairing, and adjusting electrical components authorized by the Maintenance Allocation Chart (MAC) at the Unit Maintenance level.
Section II. MAINTENANCE PROCEDURES

7-2. 100 AMP ALTERNATOR REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).
Alternator belts removed (para 7-3).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Vise, Machinist (Item 48, Appendix C)
Caps, Vise Jaw (Item 4, Appendix C)
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 36, Appendix C)

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
Nut, Self-Locking (Item 153, Appendix G)
Tape, Insulation, Electrical (Item 68, Appendix D)
Ties, Cable, Plastic (Item 69, Appendix D)

Personnel Required
(2)

a. Removal.

NOTE
Tag wires and connection points prior to disconnecting.

(1) Remove screw (1), lockwasher (2), terminal lug TL5 (3), washer (4), and ground strap (5) from alternator (6).

(2) Position washer (4), lockwasher (2), and screw (1) on alternator (6).

(3) Lift boot (7) on terminal lug TL60 (8).

(4) Remove self-locking nut (9), washer (10), terminal lug TL60 (8), and two washers(11) from alternator (6).

(5) Position two washers (11), washer (10), and self-locking nut (9) on alternator (6).
(6) Remove screw (13), washer (14), and clamp (15) from alternator (6).

(7) Lift dust boot (16) on terminal lug TL2 (17).

(8) Remove self-locking nut (18), washer (19), terminal lugs TL2 (17) and TL6 (21), and two washers (22) from alternator (6).

(9) Position two washers (22), washer (19), and self-locking nut (18) on alternator (6).

(10) Lift dust boot (23) on terminal lug TL35 (24).

(11) Remove self-locking nut (25), washer (26), and terminal lug TL35 (24) from voltage regulator (27).

(12) Position washer (26) and self-locking nut (25) on voltage regulator (27).

(13) Lift dust boot (28) on terminal lug TL110 (29).

NOTE

Perform steps (14) and (15) on vehicles equipped with alternator P/N N1506-1 (12420852).

(14) Remove self-locking nut (30), washer (31), and terminal lug TL110 (29) from voltage regulator (27).

(15) Position washer (31) and self-locking nut (30) on voltage regulator (27).
(16) Remove nut (32), washer (33), screw (34), and washer (35) from alternator (6).

(17) Remove self-locking nut (36), screw (37), and washer (38) from alternator (6). Discard self-locking nut.

**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.

**NOTE**

Step (18) requires the aid of an assistant.

(18) Remove alternator (6) from support bracket (39).

(19) Position pulley (40) in vise.

(20) Loosen self-locking nut (41).

(21) Remove pulley (40) from vise.

(22) Remove self-locking nut (41), washer (42), pulley (40), and key (43) from alternator (6).

(23) Position washer (42) and self-locking nut (41) on alternator (6).

**CAUTION**

Alternator pulley must be positioned in a vise equipped with vise jaw caps when loosening self-locking nut. Failure to comply may result in damage to equipment.
7-2. 100 AMP ALTERNATOR REPLACEMENT (CONT)

b. Installation.

(1) Remove self-locking nut (1) and washer (2) from alternator (3).

(2) Position key (4) and pulley (5) on alternator (3) with washer (2) and self-locking nut (1).

CAUTION

Alternator pulley must be positioned in a vise equipped with vise jaw caps when tightening self-locking nut. Failure to comply may result in damage to equipment.

(3) Position pulley (5) in vise.

(4) Tighten self-locking nut (1) to 120 lb-ft (163 N·m).

(5) Remove pulley (5) from vise.

WARNING

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

NOTE

Step (6) requires the aid of an assistant.

(6) Position alternator (3) on support bracket (6) with washer (7), screw (8), and self-locking nut (9).

(7) Position washer (10), screw (11), washer (12) and nut (13) on alternator (3).

(8) Tighten nut (13) to 18-22 lb-ft (24-30 N·m).

(9) Tighten self-locking nut (9) to 44-56 lb-ft (60-76 N·m).
(10) Apply electrical tape to terminal lug TL110 (17).

NOTE

- Perform step (10) if replacing alternator P/N N1506-1 (12420852) with alternator P/N N1509-1 (12422863).
- Install plastic cable ties as required to terminal lug TL110 and tie wire away from alternator.

(10.1) Remove self-locking nut (14) and washer (15) from voltage regulator (16).

(11) Position terminal lug TL110 (17), washer (15), and self-locking nut (14) on voltage regulator (16).

(12) Tighten self-locking nut (14) to 20-lb-in. (3 N·m).

(13) Position dust boot (18) on terminal lug TL110 (17).

(14) Remove self-locking nut (19) and washer (20) from voltage regulator (16).

(15) Position terminal lug TL35 (21), washer (20), and self-locking nut (19) on voltage regulator (16).

(16) Tighten self-locking nut (19) to 25 lb-in. (3 N·m).

(17) Position dust boot (22) on terminal lug TL35 (21).

(18) Remove self-locking nut (23), washer (24), and two washers (25) from alternator (3).

(19) Position two washers (25) terminal lugs TL6 (26) and TL2 (27), washer (24), and self-locking nut (23) on alternator (3).

(20) Tighten self-locking nut (23) to 80 lb-in. (9 N·m).

(21) Position dust boot (28) on terminal lug TL2 (27).

(22) Position clamp (29), washer (30), and screw (31) on alternator (3).

(23) Tighten screw (31) to 80 lb-in. (9 N·m).
(24) Remove self-locking nut (32), washer (33), and two washers (34) from alternator (3).

(25) Position two washers (34), terminal lug TL60 (35), washer (33), and self-locking nut (32) on alternator (3).

(26) Tighten self-locking nut (32) to 80 lb-in. (9 N·m).

(27) Position dust boot (36) on terminal lug TL60 (35).

(28) Remove screw (37), lockwasher (38), and washer (39) from alternator (3).

(29) Position ground strap (40), washer (39), and terminal lug TL5 (41) on alternator (3) with lockwasher (38) and screw (37).

(30) Tighten screw (37) to 80 lb-in. (9 N·m).

c. Follow-On Maintenance.

(1) Install alternator belts (para 7-3).

(2) Connect batteries (para 7-57).

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

(4) Check alternator operation (TM 9-2320-366-10-1).

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

End of Task.
### 7-3. ALTERNATOR BELTS REPLACEMENT

**This task covers:**

- a. Removal
- b. Installation
- c. Follow-On Maintenance

#### INITIAL SETUP

**Equipment Conditions**
- Engine shut down (TM 9-2320-366-10-1).
- Cab raised (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)
- Gage, Belt Tension (Item 19, Appendix B)
- Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)

**Personnel Required**
- (2)

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**CAUTION**

Alternator belts must be replaced as a pair. Failure to comply may result in damage to equipment.

**a. Removal.**

1. Disconnect air hose (1) from fan clutch (2).

2. Loosen two screws (3) on front of engine block (4).

3. Move tension bracket (5) up.

4. Remove two alternator belts (6) from pulley (7).

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7-3. ALTERNATOR BELTS REPLACEMENT (CONT)

b. Installation.

(1) Position two alternator belts (1) on pulley (2).

**CAUTION**

Tension bracket adjustment varies for new or reinstalled belts. New belts must be adjusted to 110-130 lbs (489-478 N), reinstalled belts must be adjusted to 80-100 lbs (356-444 N). Failure to comply may result in early belt failures.

**NOTE**

- Steps (2) and (3) require the aid of an assistant.
- Use square hole in tension bracket to apply tension to alternator belts.

(2) Push tension bracket (3) down until belt tension gage indicates correct tension for new or reinstalled belts (1).

(3) Maintain belt tension and tighten two screws (4).

(4) Connect air hose (5) to fan clutch (6).
(5) Lower cab (TM 9-2320-366-10-1).

(6) Start engine and run for five minutes.

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

(8) Raise cab (TM 9-2320-366-10-1).

**NOTE**

Check belt tension for proper tension for new or reinstalled belts.

(9) Loosen one screw (4) and readjust tension bracket (3) for new or reinstalled belts, as required.

(10) Tighten two screws (4) to 47 lb-ft (64 N·m).

c. **Follow-On Maintenance.**

(1) Lower cab (TM 9-2320-366-10-1).

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

(3) Check VOLTS gage for indication of 22-28 volts (TM 9-2320-366-10-1).

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

**End of Task.**
# 7-4. ALTERNATOR BRACKETS REPLACEMENT

This task covers:

| a. Support Brackets Removal                      | c. Belt Take-Up Bracket Removal                   |
| b. Support Brackets Installation                 | d. Belt Take-Up Bracket Installation              |
|                                                 | e. Follow-On Maintenance                          |

## INITIAL SETUP

**Equipment Conditions**

- 100 amp alternator removed, if equipped (para 7-2).
- 200 amp alternator removed, if equipped (para 20-45).

**Tools and Special Tools**

- Goggles, Industrial (Item 15, Appendix C)
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)
- Gage, Belt Tension (Item 19, Appendix B)

**Material/Parts**

- Sealing Compound (Item 57, Appendix D)
- Nut, Self-Locking (Item 167, Appendix G)

**Personnel Required**

(2)

---


**NOTE**

Note location of different size screws for installation.

(1) Remove two screws (1), washers (2), and belt adjusting arm (3) from alternator bracket (4).
(2) Remove two screws (5) and washers (6) from alternator support bracket (7).

(3) Remove three screws (8) from alternator bracket (4).

(4) Remove self-locking nut (9) and alternator bracket (4) from thermostat housing (10). Discard self-locking nut.

(5) Remove two screws (11) and alternator support bracket (7) from engine block (12).

b. Support Brackets Installation.

(1) Position alternator support bracket (1) on engine block (2) with two screws (3).

(2) Tighten two screws (3) to 121-147 lb-ft (164-200 N·m).
7-4. ALTERNATOR BRACKETS REPLACEMENT (CONT)

**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.

(3) Apply sealing compound to threads of three screws (4) and stud (5).

(4) Position alternator bracket (6) on thermostat housing (7) with three screws (4).

(5) Install self-locking nut (8) on stud (5).

(6) Tighten three screws (4) to 18-22 lb-ft (24-30 N·m).

(7) Position two washers (9) and screws (10) in alternator bracket (6).

(8) Tighten two screws (10) to 121-147 lb-ft (164-200 N·m).

(9) Position belt adjusting arm (11) on alternator bracket (6) with two washers (12) and screws (13).

(10) Tighten two screws (13) to 18-22 lb-ft (24-30 N·m).
c. Belt Take-Up Bracket Removal.

**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 two screws (1) on water pump pulley bracket (2).

2. Position water pump pulley bracket (2) for access to three screws (3).

3. Remove screw (4) and washer (5) from alternator belt take-up plate (6).

4. Remove screw (7), washer (8), and alternator belt take-up plate (6) from alternator belt take-up mounting bracket (9).

5. Remove three screws (3) from alternator belt take-up mounting bracket (9).

6. Remove two screws (10) and alternator belt take-up mounting bracket (9) from engine front cover (11).
d. Belt Take-Up Bracket Installation.

(1) Position alternator belt take-up mounting bracket (1) on engine front cover (2) with two screws (3).

(2) Position three screws (4) in engine front cover (2).

(3) Tighten two screws (3) to 121-147 lb-ft (164-200 N·m).

(4) Tighten three screws (4) to 106-130 lb-ft (144-176 N·m).

(5) Install alternator belt take-up plate (5) on alternator belt take-up mounting bracket (1) with washer (6) and screw (7).

(6) Install washer (8) and screw (9) in alternator belt take-up plate (5).

NOTE

• Steps (7) and (8) require the aid of an assistant.

• Use square hole in water pump belt pulley bracket to apply and maintain tension on water pump belt while adjusting belt tension.

(7) Adjust tension on water pump belt (10) to 80-100 lbs (356-444 N).

(8) Tighten two screws (11) to 35 lb-ft (47 N·m).
e. Follow-On Maintenance.

(1) Install 200 amp alternator, if equipped (para 20-45).

(2) Install 100 amp alternator, if equipped (para 7-2).

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

(4) Check VOLTS gage for charge indication (TM 9-2320-366-10-1).

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

End of Task.
7-5. 100 AMP VOLTAGE REGULATOR REPLACEMENT

This task covers:

a. Removal
b. Installation

c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
- Cab raised (TM 9-2320-366-10-1).
- Batteries disconnected (para 7-57).

Tools and Special Tools
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Socket Set, Socket Wrench (Item 34, Appendix C)

Materials/Parts
- Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
- Lockwasher (2) (Item 104, Appendix G)
- Nut, Self-Locking (Item 143, Appendix G)
- Nut, Self-Locking (Item 144, Appendix G)
- Sealing Compound (Item 59, Appendix D)
- Tape, Insulation Electrical (Item 68, Appendix D)
- Tie, Cable, Plastic (Item 69, Appendix D)

a. Removal.

NOTE
Tag wires and connection points prior to disconnecting.

(1) Lift dust boot (1) on terminal lug TL35 (2).

(2) Remove self-locking nut (3), washer (4), and terminal lug TL35 (2) from voltage regulator (5). Discard self-locking nut.

NOTE
Perform steps (3) and (4) on vehicles equipped with alternator P/N N1506-1 (12420852).

(3) Lift dust boot (6) on terminal lug TL110 (7).

(4) Remove self-locking nut (8), washer (9), and terminal lug TL110 (7) from voltage regulator (5). Discard self-locking nut.
(5) Disconnect voltage regulator connector (10) from voltage regulator (5).

(6) Remove two screws (11), lockwashers (12), and voltage regulator (5) from alternator (13). Discard lockwashers.

b. Installation.

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.

(1) Apply sealing compound to threads of two screws (1).

(2) Position voltage regulator (2) on alternator (3) with two lockwashers (4) and screws (1).

(3) Tighten two screws (1) to 65 lb-in. (7 N m).

(4) Connect voltage regulator connector (5) to voltage regulator (2).
7-5. 100 AMP VOLTAGE REGULATOR REPLACEMENT (CONT)

NOTE

- Perform step (5) if replacing alternator P/N N1506-1 (12420852) with alternator P/N N1509-1 (12422863).

- Install plastic cable ties to terminal lug TL110 and tie wire away from alternator.

(5) Apply electrical tape to terminal lug TL110 (6).

NOTE

Perform steps (5.1) through (7) on alternator N1506-1 (12420852).

(5.1) Cut terminal lug TL110 (6) from engine control cable assembly wire (6.1)

(6) Remove dust boot (7) from engine control cable assembly wire (6.1).

(7) Apply electrical tape to engine control cable assembly wire (6.1) so wire doesn’t interfere with engine or alternator operations.

(8) Position terminal lug TL35 (10) on voltage regulator (2) with washer (11), and self-locking nut (12).

(9) Tighten self-locking nut (12) to 25 lb-in. (3 N·m).

(10) Position dust boot (13) on terminal lug TL35 (10).

c. Follow-On Maintenance

(1) Lower cab (TM 9-2320-366-10-1).

(2) Connect batteries (para 7-57).

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

(4) Check VOLTS gage for charge indication (TM 9-2320-366-10-1).

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

End of Task.
7-6. AUXILIARY STARTER SOLENOID REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).
Cab raised (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 36, Appendix C)

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape
(Item 20, Appendix D)
Adhesive (Item 8, Appendix D)
Lockwasher (2) (Item 87, Appendix G)
Lockwasher (2) (Item 89, Appendix G)
Nut, Self-Locking (2) (Item 128, Appendix G)

a. Removal.

NOTE
Tag wires and connection points prior to disconnecting.

(1) Remove adhesive, two nuts (1), lockwashers (2),
terminal lugs TL9 (3) and TL24 (4) from auxiliary starter
solenoid (5). Discard lockwashers.

(2) Remove adhesive, two nuts (6), lockwashers (7),
terminal lugs TL23 (8) and TL33 (9) from auxiliary starter
solenoid (5). Discard lockwashers.
7-6. AUXILIARY STARTER SOLENOID REPLACEMENT (CONT)

NOTE

Perform steps (3) and (4) on vehicle serial number 7413 and higher, and vehicle serial numbers 0001 through 7412 which have previously had an auxiliary starter solenoid replaced.

(3) Remove self-locking nut (10), washer (11), and screw (12) from bracket (13). Discard self-locking nut.

(4) Remove self-locking nut (14), washer (15), clamp (16), screw (17), and auxiliary starter solenoid (5) from bracket (13). Discard self-locking nut.

NOTE

Perform step (5) on vehicle serial numbers 0001 through 7412 which have not previously had an auxiliary starter solenoid replaced.

(5) Remove self-locking nuts (10 and 14), washers (11 and 15), screws (12 and 17), and auxiliary starter solenoid (5) from bracket (13). Discard self-locking nuts.

b. Installation.

(1) Position auxiliary starter solenoid (1) on bracket (2) with screw (3), clamp (4), washer (5), and self-locking nut (6).

(2) Position screw (7), washer (8), and self-locking nut (9) in bracket (2).

(3) Tighten self-locking nuts (6 and 9) to 96-120 lb-in. (11-14 N·m).
(4) Install terminal lugs TL33 (10) and TL23 (11) on auxiliary starter solenoid (1) with two lockwashers (12) and nuts (13).

(5) Install terminal lugs TL24 (14) and TL9 (15) on auxiliary starter solenoid (1) with two lockwashers (16) and nuts (17).

**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.

(6) Apply adhesive on nuts (13 and 17) and terminal lugs TL33 (10), TL23 (11), TL24 (14), and TL9 (15).
7-6. AUXILIARY STARTER SOLENOID REPLACEMENT (CONT)

c. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Lower cab (TM 9-2320-366-10-1).

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

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

End of Task.
7-7. STARTING MOTOR REPLACEMENT

This task covers:

a. Removal
b. Installation

c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
- Cab raised (TM 9-2320-366-10-1).
- Batteries disconnected (para 7-57).

Tools and Special Tools
- Goggles, Industrial (Item 15, Appendix C)
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)
- Sling, Endless (Item 32, Appendix C)
- Wrench Set, Socket (Item 51, Appendix C)
- Socket Set, Socket Wrench (Item 34, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Adapter, Socket Wrench (Item 2, Appendix B)
- Heater, Gun Type, Electric (Item 24, Appendix B)
- Crowfoot Attachment, Socket Wrench (Item 8, Appendix B)

Materials/Parts
- Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
- Adhesive (Item 8, Appendix D)
- Bolt, Machine (3) (Item 2, Appendix G)
- Gasket (Item 39, Appendix G)
- Splice, Conductor (Item 261, Appendix G)
- Tape, Insulation, Electrical (Item 68, Appendix D)
- Insulation, Sleeving, Electrical (Item 28.1, Appendix D)

Personnel Required
- (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.

a. Removal.

NOTE

Tag wires and connection points prior to disconnecting.

1. Remove adhesive, nut (1), terminal lugs TL55 (2) and TL12 (3) from solenoid terminal (4).

2. Position nut (1) on solenoid terminal (4).

3. Remove adhesive, nut (5), and terminal lug TL26 (6) from solenoid terminal (7).

4. Position nut (5) on solenoid terminal (7).
(5) Remove adhesive, nut (8), terminal lugs TL25 (9), TL46 (10), ground strap (11), and terminal lug TL53 (12) from starting motor terminal (13).

(6) Position nut (8) on starting motor terminal (13).

[NOTE]
Perform step (7) on vehicles that have not had connector P81 removed.

(7) Disconnect connector P81 (14) from starting motor connector (15).

(8) Remove screw (16) from starting motor (17). Discard screw.

[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.

[NOTE]
Step (9) requires the aid of an assistant.

(9) Remove two screws (18) and starting motor (17) from flywheel housing (19). Discard screws.

(10) Remove gasket (20) from starting motor (17). Discard gasket.
b. Installation.

(1) Deleted.

(2) Deleted.

(3) Deleted.

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.

(4) Apply a bead of adhesive around flange (4) of starting motor (5).

(5) Install gasket (6) on starting motor (5).

(6) Apply a bead of adhesive around gasket (6).
7-7. STARTING MOTOR REPLACEMENT (CONT)

**WARNING**

Starting motor 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.

**NOTE**

Step (7) requires the aid of an assistant.

(7) Position starting motor (5) in flywheel housing (7) with two screws (8).

(8) Position screw (9) in starting motor (5).

(9) Tighten two screws (8) and screw (9) to 47 lb-ft (64 N·m).

**NOTE**

Perform step (10) through (21) on vehicles that have not had connector P81 removed.

(10) Cut connector P81 (10) from start and charging cable assembly (11).

(11) Remove band marker (12) from start and charging cable assembly (11).

**NOTE**

Remove electrical tape as required.

(12) Remove convoluted tubing (13) from two wires (14 and 15).

(13) Remove insulation sleeving (16) from two wires (14 and 15).
NOTE

Measure wires from body of start and charging cable assembly.

(14) Cut wire (14) to 3 in. (7.6 cm) in length.

(15) Cut wire (15) to 4 in. (10.2 cm) in length.

(16) Remove 0.38 in. (1 cm) of insulation from two wires (14 and 15).

(17) Cut insulation sleeving (17) 1.5 in. (3.8 cm).

(18) Position insulation sleeving (17) on wire (15).

(19) Install conductor splice (18) on two wires (14 and 15).

(20) Install insulation sleeving (17) on conductor splice (18).

NOTE

Install electrical tape as required.

(21) Install convoluted tubing (13) on two wires (14 and 15).

(22) Deleted.

(23) Remove nut (19) from starting motor terminal (20).

(24) Position terminal lug TL53 (21), ground strap (22), terminal lugs TL46 (23), and TL25 (24) on starting motor terminal (20) with nut (19).

(25) Tighten nut (19) to 33-37 lb-ft (45-50 N·m).

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.

(26) Apply adhesive on terminal lug TL53 (21), ground strap (22), terminal lugs TL46 (23), TL25 (24), nut (19), and starting motor terminal (20).
(27) Remove nut (25) from solenoid terminal (26).

(28) Position terminal lug TL26 (27) on solenoid terminal (26) with nut (25).

(29) Tighten nut (25) to 31 lb-in. (4 N·m).

(30) Remove nut (28) from solenoid terminal (29).

(31) Position terminal lugs TL12 (30) and TL55 (31) on solenoid terminal (29) with nut (28).

(32) Tighten nut (28) to 30 lb-ft (41 N·m).

---

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.

(33) Apply adhesive on terminal lug TL26 (27), solenoid terminal (26), and nut (25).

(34) Apply adhesive on terminal lugs TL12 (30), TL55 (31), solenoid terminal (29), and nut (28).
c. Follow-On Maintenance.

(1) Lower cab (TM 9-2320-366-10-1).

(2) Connect batteries (para 7-57).

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

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

End of Task.
7-8. AUXILIARY PANEL REPLACEMENT

This task covers:

a. Removal
b. Disassembly
c. Assembly
d. Installation
e. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 34, Appendix C)

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
Decal (Item 11, Appendix G)
Nut, Self-Locking (2) (Item 131, Appendix G)

a. Removal

(1) Remove six screws (1) from auxiliary panel (2).
(2) Lift auxiliary panel (2) outward from auxiliary panel housing (3) to gain access.

(3) Lift tab (4) on connector P904 (5).
(4) Disconnect connector P904 (5) from PTO switch (6).
(5) Disconnect connector P904A (7) from PTO switch (6).

NOTE

- Tag electrical connectors and connection points prior to removal.
- All rocker switches are removed the same way. PTO switch shown
(3) Lift tab (4) on connector P904 (5).
(4) Disconnect connector P904 (5) from PTO switch (6).
(5) Disconnect connector P904A (7) from PTO switch (6).
(6) Push in two tabs (8) on PTO switch (6).

(7) Remove PTO switch (6) from auxiliary panel (2).

**NOTE**

Auxiliary panel rocker switches will vary according to vehicle model.

(8) Perform steps (3) through (7) on remaining rocker switches.

(9) Disconnect connector clamp (9) from tachometer connector (10).

(10) Disconnect connector P901 (11) from tachometer connector (10).

(11) Remove two protective caps (12), self-locking nuts (13), retaining ring (14), and tachometer (15) from auxiliary panel (2). Discard self-locking nuts.

(12) Remove auxiliary panel (2) from vehicle.

(13) Remove eight screws (16) from auxiliary panel housing (3).

(14) Remove auxiliary panel housing (3) from heater assembly (17).

(15) Remove auxiliary panel cable assembly (18) from auxiliary panel housing (3).
(16) Disconnect connector J925 (19) from connector P925 (20)

(17) Remove auxiliary cable assembly (18) auxiliary panel jumper cable assembly (21), and connector J925 (1) from auxiliary panel housing (3).

b. Disassembly

NOTE
Perform step (1) and (2) on models M1090 and M1094.

(1) Remove four nuts (1), screws (2), ring (3), rubber shield (4), and ring (5) from auxiliary panel housing (6).

(2) Remove grommet (7) from auxiliary panel housing (6).

c. Assembly

NOTE
Perform steps (1) and (2) on models M1090 and M1094.

(1) Install grommet (1) in auxiliary panel (2).

(2) Install ring (3), rubber shield (4), and ring (5) on auxiliary panel (2) with four screws (6) and nuts (7).
d. Installation.

(1) Install decal (1) on auxiliary panel housing (2).

(2) Route auxiliary panel cable assembly (3) in auxiliary panel housing (2).

(3) Position auxiliary panel housing (2) on heater assembly (4) with eight screws (5).

(4) Tighten eight screws (5) to 35-44 lb-in. (4-5 N\cdot m).

(4.1) Route connector J925 (5.1) auxiliary panel jumper cable assembly (3) in auxiliary panel housing (2).

(4.2) Connect connector P925 (5.3) to connector J925 (5.1).

(5) Position tachometer (6) in auxiliary panel (7) with retaining ring (8) and two self-locking nuts (9).

(6) Tighten two self-locking nuts (9) to 9 lb-in. (1 N\cdot m).

(7) Install two protective caps (10) on tachometer (6).

(8) Connect connector P901 (11) to tachometer connector (12).

(9) Connect connector clamp (13) on tachometer connector (12).

NOTE

Perform steps (4.1) and (4.2) on models M1090 and M1094.

(4.1) Route connector J925 (5.1) auxiliary panel jumper cable assembly (3) in auxiliary panel housing (2).

(4.2) Connect connector P925 (5.3) to connector J925 (5.1).
(10) Install PTO switch (14) in auxiliary panel (7).
(11) Connect connector P904A (15) to PTO switch (14).
(12) Connect connector P904 (16) to PTO switch (14).

**NOTE**
All rocker switches are installed the same way. PTO switch shown.

(13) Perform steps (10) through (12) on remaining rocker switches.

**NOTE**
Auxiliary panel rocker switches will vary according to vehicle model.

(14) Position auxiliary panel (7) on auxiliary panel Housing (2) with six screws (17).
(15) Tighten six screws (17) to 18 lb-in. (2 N\text{m}).

**e. Follow-On Maintenance.**
(1) Connect batteries (para 7-57).
(2) Check rocker switches and tachometer operation (TM9-2320-366-10-1).

End of Task.
7-9. CIRCUIT BREAKER, DIODE, AND RELAY REPLACEMENT

This task covers:

a. Removal  
b. Installation  
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions

Batteries disconnected (para 7-57).
PDP cover removed (para 16-2).

NOTE

All circuit breakers, diodes, and relays are replaced the same way. Circuit breaker replacement shown.

a. Removal.

(1) Locate diode, relay, or circuit breaker to be replaced.

NOTE

Refer to Figure 7-1. Power Distribution Panel (PDP) Circuit Breakers, Diodes, and Relays, Table 7-1. Power Distribution Panel (PDP) Relays, and Table 7-1.1 Power Distribution Panel (PDP) Circuit Breakers for details.

(2) Remove circuit breaker (1) from PDP (2).

Figure 7-1. Power Distribution Panel (PDP) Circuit Breakers, Diodes, and Relays
<table>
<thead>
<tr>
<th>Relay</th>
<th>VDC</th>
<th>Throw</th>
<th>Function</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1</td>
<td>24 VDC</td>
<td>SPST</td>
<td>Starter Relay</td>
<td></td>
</tr>
<tr>
<td>K2</td>
<td>12 VDC</td>
<td>SPST</td>
<td>Control Power Relay</td>
<td></td>
</tr>
<tr>
<td>K6</td>
<td>12 VDC</td>
<td>SPST</td>
<td>Stop Light Relay</td>
<td></td>
</tr>
<tr>
<td>K7</td>
<td>12 VDC</td>
<td>SPST</td>
<td>Headlight Relay</td>
<td></td>
</tr>
<tr>
<td>K8</td>
<td>12 VDC</td>
<td>SPDT</td>
<td>Headlight LO/HI-Beam Relay</td>
<td></td>
</tr>
<tr>
<td>K9</td>
<td>12 VDC</td>
<td>SPDT</td>
<td>Hazard Flasher Blackout Override Relay</td>
<td></td>
</tr>
<tr>
<td>K10</td>
<td>12 VDC</td>
<td>SPDT</td>
<td>Stop/Hazard Flasher Relay</td>
<td></td>
</tr>
<tr>
<td>K11</td>
<td>24 VDC</td>
<td>SPST</td>
<td>Alternator Excitation Relay</td>
<td></td>
</tr>
<tr>
<td>K12</td>
<td>12 VDC</td>
<td>SPST</td>
<td>Worklights Relay</td>
<td>M1088/M1089</td>
</tr>
<tr>
<td>K13</td>
<td>12 VDC</td>
<td>SPST</td>
<td>Rotating Beacon Relay</td>
<td></td>
</tr>
<tr>
<td>K15</td>
<td>24 VDC</td>
<td>SPDT</td>
<td>Auxiliary Oil Cooler Relay</td>
<td></td>
</tr>
<tr>
<td>K19</td>
<td>24 VDC</td>
<td>SPDT</td>
<td>Start Inhibit Relay</td>
<td></td>
</tr>
<tr>
<td>K20</td>
<td>12 VDC</td>
<td>SPST</td>
<td>Marker Lights Relay</td>
<td></td>
</tr>
<tr>
<td>K21</td>
<td>24 VDC</td>
<td>SPDT</td>
<td>Cranking Lock-Out Relay</td>
<td></td>
</tr>
<tr>
<td>K25</td>
<td>24 VDC</td>
<td>SPST</td>
<td>Empty</td>
<td>WTEC II</td>
</tr>
<tr>
<td>K26</td>
<td>24 VDC</td>
<td>SPST</td>
<td>Neutral Start Relay</td>
<td>WTEC III</td>
</tr>
<tr>
<td>K26</td>
<td>24 VDC</td>
<td>SPST</td>
<td>Empty</td>
<td>WTEC III</td>
</tr>
<tr>
<td>K27</td>
<td>12 VDC</td>
<td>SPST</td>
<td>Blackout Stoplight Relay</td>
<td></td>
</tr>
<tr>
<td>K28</td>
<td>12 VDC</td>
<td>SPST</td>
<td>Trailer Rear Marker and Taillight Relay</td>
<td></td>
</tr>
<tr>
<td>K29</td>
<td>12 VDC</td>
<td>SPST</td>
<td>Trailer Blackout Marker Relay</td>
<td></td>
</tr>
<tr>
<td>K30</td>
<td>12 VDC</td>
<td>SPST</td>
<td>24 VDC Intervehicular Left Rear Composite Lamp Relay</td>
<td></td>
</tr>
<tr>
<td>K31</td>
<td>12 VDC</td>
<td>SPST</td>
<td>24 VDC Intervehicular Right Rear Composite Lamp Relay</td>
<td></td>
</tr>
<tr>
<td>K32</td>
<td>24 VDC</td>
<td>SPST</td>
<td>Horn Relay</td>
<td></td>
</tr>
<tr>
<td>K34</td>
<td>24 VDC</td>
<td>SPDT</td>
<td>Inter-Axle Relay</td>
<td>WTEC III</td>
</tr>
<tr>
<td>K37</td>
<td>24 VDC</td>
<td>SPST</td>
<td>Empty</td>
<td>WTEC II</td>
</tr>
<tr>
<td>K37</td>
<td>24 VDC</td>
<td>SPDT</td>
<td>PTO Relay</td>
<td>WTEC III</td>
</tr>
<tr>
<td>K52</td>
<td>12 VDC</td>
<td>SPDT</td>
<td>CTIS Overspeed Indication Relay</td>
<td></td>
</tr>
<tr>
<td>K53</td>
<td>24 VDC</td>
<td>SPDT</td>
<td>Radio Power</td>
<td></td>
</tr>
</tbody>
</table>
# 7-9. CIRCUIT BREAKER, DIODE, AND RELAY REPLACEMENT (CONT)

## Table 7-1.1 Power Distribution Panel (PDP) Circuit Breakers

<table>
<thead>
<tr>
<th>CB</th>
<th>Amp</th>
<th>Function</th>
<th>Reset</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>CB20</td>
<td>25 AMP</td>
<td>Cab Radio</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB23</td>
<td>15 AMP</td>
<td>Personnel Heater</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB24</td>
<td>10 AMP</td>
<td>Chemical Alarm, Chemical Detector, and Chemical Detector Indicator Light</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB25</td>
<td>15 AMP</td>
<td>WTEC II TEPSS and WTEC II VIM</td>
<td>Manual</td>
<td>WTEC II</td>
</tr>
<tr>
<td>CB26</td>
<td>15 AMP</td>
<td>Empty</td>
<td>Manual</td>
<td>WTEC III</td>
</tr>
<tr>
<td>CB27</td>
<td>20 AMP</td>
<td>Horn</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB28</td>
<td>20 AMP</td>
<td>Windshield Wiper ECU and Wiper Motor</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB29</td>
<td>20 AMP</td>
<td>Rotating Warning Light(s)</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB30</td>
<td>10 AMP</td>
<td>24 VDC Intervehicular Blackout Stoplights</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB31</td>
<td>10 AMP</td>
<td>CTIS, CTIS Air Pressure Switch, and CTIS Overspeed Indicator Light</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB32</td>
<td>15 AMP</td>
<td>24 VDC Intervehicular Clearance and Rear Lights</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB33</td>
<td>10 AMP</td>
<td>24 VDC Intervehicular Blackout Clearance, Left Blackout Marker, and Right Blackout Marker Lights</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB34</td>
<td>15 AMP</td>
<td>24 VDC Intervehicular Left Turn Light and Stoplight</td>
<td>Manual</td>
<td>WTEC II</td>
</tr>
<tr>
<td>CB35</td>
<td>10 AMP</td>
<td>WTEC III Transmission ECU Power</td>
<td>Manual</td>
<td>WTEC III</td>
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<tr>
<td>CB36</td>
<td>15 AMP</td>
<td>24 VDC Intervehicular Right Turn Light and Stoplight</td>
<td>Manual</td>
<td>WTEC II</td>
</tr>
<tr>
<td>CB37</td>
<td>15 AMP</td>
<td>24 VDC Intervehicular Right and Left Turn Lights and Stoplights</td>
<td>Manual</td>
<td>WTEC III</td>
</tr>
<tr>
<td>CB38</td>
<td>15 AMP</td>
<td>Not Used</td>
<td>Manual</td>
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</tr>
<tr>
<td>CB39</td>
<td>20 AMP</td>
<td>Not Used</td>
<td>Manual</td>
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<tr>
<td>CB40</td>
<td>15 AMP</td>
<td>Fuel/Water Separator, PTO Solenoid, PTO Switch, Winch In Solenoid, Winch In/Out Switch, Winch Out Solenoid, and Winch Switch</td>
<td>Manual</td>
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<tr>
<td>CB42</td>
<td>15 AMP</td>
<td>Material Handling Crane</td>
<td>Manual</td>
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Table 7-1.1 Power Distribution Panel (PDP) Circuit Breakers (CONT)

<table>
<thead>
<tr>
<th>CB</th>
<th>Amp</th>
<th>Function</th>
<th>Reset</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>CB54</td>
<td>8 AMP</td>
<td>Blackout Drive Light</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB61</td>
<td></td>
<td>Empty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CB62</td>
<td></td>
<td>Empty</td>
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<td></td>
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<tr>
<td>CB63</td>
<td></td>
<td>Empty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CB64</td>
<td></td>
<td>Empty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CB65</td>
<td>8 AMP</td>
<td>Front Right and Left Parking Lights</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB66</td>
<td>8 AMP</td>
<td>Front Left, Front Right, Rear LH, and Rear RH Blackout Marker Lights and</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>WTEC II/WTEC III TPSS Dimmer Module</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CB67</td>
<td>25 AMP</td>
<td>12 VDC Intervehicular Marker Light and All Marker Lights</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB68</td>
<td>25 AMP</td>
<td>Auxiliary Oil Cooler Fan Motors</td>
<td>Manual</td>
<td>M1088/M1089</td>
</tr>
<tr>
<td></td>
<td>20 AMP</td>
<td>Auxiliary Oil Cooler Fan Motors</td>
<td>Manual</td>
<td>All models except M1088/M1089</td>
</tr>
<tr>
<td>CB70</td>
<td>20 AMP</td>
<td>Circuit Breakers CB54, CB65, CB66, CB74, and CB76, Dimmer Module,</td>
<td>Manual</td>
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<tr>
<td></td>
<td></td>
<td>Instrument and Auxiliary Panel Rocker Switch Lights, Instrument and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auxiliary Panel Gage Lights, Main Light Switch, Master Power Switch,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Personnel Heater Lights, Headlight HI/LO Switch, and Rotating Warning</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Light Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CB71</td>
<td>15 AMP</td>
<td>Hazard Warning Switch, Turn Signal Flasher, and Worklight Switch</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB72</td>
<td>15 AMP</td>
<td>Worklights, Blackout Override Switch</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB73</td>
<td>8 AMP</td>
<td>Backup Light</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB74</td>
<td>10 AMP</td>
<td>Turn Signal Flasher ECU</td>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>CB76</td>
<td>15 AMP</td>
<td>12 VDC Intervehicular Left and Right Turn Signals, and Stoplight,</td>
<td>Manual</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>24 VDC Intervehicular Auxiliary, Front Left and Right Turn Signals,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hazard Warning Switch, Left and Right Blackout Stoplights, Left and</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Right Turn Signal Indicators, Rear Right and Left Turn Signals, Stoplight</td>
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<tr>
<td></td>
<td></td>
<td>Switches (A) and (B), and Tractor Stoplight Switch</td>
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</tr>
</tbody>
</table>
Table 7-1.1 Power Distribution Panel (PDP) Circuit Breakers (CONT)

<table>
<thead>
<tr>
<th>CB</th>
<th>Amp</th>
<th>Function</th>
<th>Reset</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>CB78</td>
<td>15 AMP</td>
<td>Left and Right Headlights</td>
<td>Auto</td>
<td></td>
</tr>
<tr>
<td>CB79</td>
<td>15 AMP</td>
<td>WTEC II 10 AMP Fuse TEPSS, Fuel Solenoid, M1089 Remote Engine Kill Switch, and Start Inhibit Pushbutton Switch</td>
<td>Manual</td>
<td>WTEC II</td>
</tr>
<tr>
<td>CB80</td>
<td>25 AMP</td>
<td>12 VDC Intervehicular Taillight, Left and Right Taillights</td>
<td>Manual</td>
<td></td>
</tr>
</tbody>
</table>

b.Installation.

**NOTE**

Refer to Figure 7-1. Power Distribution Panel (PDP) Circuit Breakers, Diodes, and Relays, Table 7-1. Power Distribution Panel (PDP) Relays, and Table 7-1.1 Power Distribution Panel (PDP) Circuit Breakers for details.

Install circuit breaker (1) on PDP (2).

c.Follow-On Maintenance.

(1) Install PDP cover (para 16-2).

(2) Connect batteries (para 7-57).

End of Task.
a. **Removal.**

**NOTE**

- Remove plastic cable ties as required.
- Tag wires and connection points prior to disconnecting.

(1) Disconnect steering column switch connector J19 (1) from connector P19 (2).

(2) Disconnect steering column switch connector P18 (3) from connector J18 (4).

(3) Disconnect connector J118 (5) from connector P118 (6).
(4) Disconnect connector J43 (7) from connector P43 (8).

(5) Disconnect connector J31 (9) from connector P31 (10).

(6) Remove screw (11), washer (12), and clamp (13) from WTEC II dashboard cable assembly (14).

(7) Disconnect connector PX26 (15) from frequency ECU connector (16).

(8) Remove two screws (17) and frequency ECU (18) from left side dashboard (19).
(9) Remove nut (20), lockwasher (21), and terminal lug TL151 (22) from front brake air pressure transmitter terminal G (23). Discard lockwasher.

(10) Remove nut (24), lockwasher (25), and terminal lug TL157 (26) from front brake air pressure transmitter terminal WK (27). Discard lockwasher.

(11) Remove nut (28), lockwasher (29), and terminal lug TL150 (30) from rear brake air pressure transmitter terminal G (31). Discard lockwasher.

(12) Remove nut (32), lockwasher (33), and terminal lug TL156 (34) from rear brake air pressure transmitter terminal WK (35). Discard lockwasher.

(13) Remove two nuts (36), lockwashers (37), and terminal lugs TL153 (38) and TL152 (39) from rear stoplight switch (40). Discard lockwashers.

(14) Remove two nuts (41), lockwashers (42), and terminal lugs TL154 (43) and TL155 (44) from front stoplight switch (45). Discard lockwashers.
7-10. WTEC II DASHBOARD CABLE ASSEMBLY REPLACEMENT/REPAIR (CONT)

NOTE

Perform steps (15) and (16) on vehicles equipped with auxiliary panel.

(15) Disconnect connector J912 (46) from connector P912 (47).

(16) Disconnect connector P913 (48) from connector J913 (49).

(17) Remove windshield wiper ECU (50) from PDP (51).

(18) Disconnect terminal lugs TL158 (52) and TL159 (53) from start inhibit pushbutton switch (54).

(19) Remove spring clip (55) from start inhibit pushbutton switch (54).

(20) Remove start inhibit pushbutton switch (54) from PDP (51).
NOTE

Perform step (21) on vehicles not equipped with auxiliary panel.

(21) Disconnect connector P912A (56) from connector J912 (46).

(22) Disconnect connector J27 (57) from connector P27 (58).

(23) Disconnect connector J51 (59) from connector P51 (60).

(24) Disconnect connector PX34 (61) from fan solenoid connector (62).

(25) Disconnect connector PX50 (63) from differential solenoid connector (64).

(26) Disconnect connector J65 (65) from warning light cable connector P65 (66).

(27) Disconnect connector P99 (67) from chemical alarm kit cable connector J99 (68).

(28) Disconnect connector PX20 (69) from flasher module (70).

(29) Disconnect connector P111 (71) from connector J111 (72).
(30) Loosen captive screw (73) and disconnect connector PX33 (74) from WTEC II VIM (75).

**NOTE**
Perform step (31) on vehicles equipped with cab radio.

(31) Disconnect connector J78 (76) from connector P78 (77).

**NOTE**
Perform step (32) on M1088.

(32) Remove two nuts (78), lockwashers (79), and terminal lugs TL501 (80) and TL502 (81) from terminal studs (82 and 83). Discard lockwashers.
(33) Disconnect WTEC II TEPSS dimmer module (84) from connector J7 (85).

(34) Remove screw (86), lockwasher (87), terminal lug TL56 (88), and terminal lug (89) from PDP (51).

(35) Position terminal lug (89) on PDP (51) with lockwasher (87) and screw (86).

(36) Remove screw (90), lockwasher (91), terminal lug TL41 (92), and four terminal lugs (93) from PDP (51).

(37) Position four terminal lugs (93) on PDP (51) with lockwasher (91) and screw (90).
(38) Remove screw (94), lockwasher (95), terminal lug TL42 (96), and four terminal lugs (97) from PDP (51).

(39) Position four terminal lugs (97) on PDP (51) with lockwasher (95), and screw (94).

(40) Remove terminal lug TL86 (98) from terminal board TB2 (99) position 4.

(41) Remove two nuts (100), lockwashers (101), washers (102), cover (103), and two washers (102) from terminal board TB1 (104).

(42) Remove terminal lug TL74 (105) from terminal board TB1 (104) position 3.

(43) Remove terminal lug TL73 (106) from terminal board TB1 (104) position 1.
(44) Remove terminal lug TL71 (107) from terminal board TB2 (99) position 2.

(45) Remove terminal lug TL75 (108) from terminal board TB1 (104) position 2.

(46) Position two washers (102) and cover (103) on terminal board TB1 (104) with two washers (102), lockwashers (101), and nuts (100).

(47) Remove terminal lug TL87 (109) from terminal board TB2 (99) position 6.

(48) Remove terminal lug TL14 (110) from terminal board TB2 (99) position 12.

**NOTE**

Step (49) requires the aid of an assistant.

(49) Remove WTEC II dashboard cable assembly (14) from dashboard (19).

**NOTE**

- Perform steps (50) and (51) on M1084/M1086/M1088 and M1089.
- Tag relays and circuit breaker prior to removal.

(50) Remove relay K12 (111) from PDP (51).

(51) Remove circuit breaker CB72 (112) from PDP (51).

(52) Remove relay K15 (113) from PDP (51).
(53) Remove circuit breaker CB68 (114) from PDP (51).

(54) Deleted

(55) Deleted

(56) Deleted

b. Disassembly.

NOTE
Tag wires and connection points prior to removal.

(1) Remove nut (1), lockwasher (2), washer (3), and wire 1603 (4) from terminal board TB2 (5). Discard lockwasher.

(2) Remove 42 quick disconnect terminals (6) from terminal board TB2 (5) positions 3, 8, 9, 10, 11, 14, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 28, 30, 31, 32, 33, 34, 35, 36, 37, 39, 43, 44, 45, 46, 47, 50, 53, 55, 56, 58, 60, 62, 70, 74, 77, and 79.

(3) Remove two nuts (7), lockwashers (8), screws (9), and terminal board TB2 (5) from PDP frame (10). Discard lockwashers.
(4) Remove screw (11), lockwasher (12), and wire 1603 (4) from PDP frame (10). Discard lockwasher.

(5) Remove two nuts (13), lockwashers (14), washers (15), cover (16), and two washers (15) from terminal board TB1 (17). Discard lockwashers.

(6) Remove 40 quick disconnect terminals (18) from terminal board TB1 (17) positions 5, 9, 11, 19, 20, 22, 23, 24, 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 46, 47, 50, 51, 52, 53, 54, 56, 57, 59, 60, 61, 62, 63, and 64.

(7) Remove two nuts (19), lockwashers (20), washers (21), spacers (22), terminal board TB1 (17), two spacers (23), and screws (24) from PDP frame (10). Discard lockwashers.

(8) Remove six quick disconnect terminals (25) from connector PX21 (26).

(9) Push in two locking tabs (27) and remove connector PX21 (26) from front of PDP frame (10).
NOTE

Tag terminal lugs and connection points prior to removal.

(10) Remove screw (28), lockwasher (29), and four terminal lugs (30) from PDP (31). Discard lockwasher.

(11) Remove screw (32), lockwasher (33), and four terminal lugs (34) from PDP (31). Discard lockwasher.

(12) Remove 94 retaining locks (35) from PDP (31).

(13) Remove 94 terminals (36) from PDP (31).

(14) Remove bus bar X1 (37) from PDP (31).

(15) Remove bus bar X6 (38) from PDP (31).

(16) Remove bus bar X2 (39) from PDP (31).
(17) Remove 41 retaining locks (40) from PDP (31).

(18) Remove 41 terminals (41) from PDP (31).

(19) Remove six nuts (42), lockwashers (43), screws (44), washers (45), and PDP (31) from PDP frame (10). Discard lockwashers.

**NOTE**

Tag diodes, relays, and circuit breakers prior to removal.

(20) Remove three diodes (46) from PDP (31).

(21) Remove 20 relays (47) from PDP (31).

(22) Remove 30 circuit breakers (48) from PDP (31).
c. Assembly.

(1) Install 30 circuit breakers (1) on PDP (2).

(2) Install 20 relays (3) on PDP (2).

(3) Install three diodes (4) on PDP (2).

(4) Position PDP (2) on PDP frame (5) with six washers (6), screws (7), lockwashers (8), and nuts (9).

(5) Tighten six nuts (9) to 46-57 lb-ft (63-77 N·m).

(6) Install 41 terminals (10) on PDP (2).

(7) Install 41 retaining locks (11) on PDP (2).
(8) Install bus bar X2 (12) on PDP (2).

(9) Install bus bar X6 (13) on PDP (2).

(10) Install bus bar X1 (14) on PDP (2).

(11) Install 94 terminals (15) on PDP (2).

(12) Install 94 retaining locks (16) on PDP (2).

(13) Position four terminal lugs (17) on PDP (2) with lockwasher (18), and screw (19).

(14) Position four terminal lugs (20) on PDP (2) with lockwasher (21), and screw (22).

(15) Push in two locking tabs (23) and install connector PX21 (24) through front of PDP frame (5).

(16) Install six quick disconnect terminals (25) in connector PX21 (24).
(17) Install terminal board TB1 (26) on PDP frame (5) with two screws (27), spacers (28), spacers (29), washers (30), lockwashers (31), and nuts (32).

(18) Install 40 quick disconnect terminals (33) on terminal board TB1 (26) positions 5, 9, 11, 19, 20, 22, 23, 24, 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 46, 47, 50, 51, 52, 53, 54, 56, 57, 59, 60, 61, 62, 63, and 64.

(19) Position two washers (34) and cover (35) on terminal board TB1 (26) with two washers (34), lockwashers (36), and nuts (37).

(20) Position wire 1603 (38) on PDP frame (5) with lockwasher (39), and screw (40).
(21) Install terminal board TB2 (41) on PDP frame (5) with two screws (42), lockwashers (43), and nuts (44).

(22) Install 42 quick disconnect terminals (45) on terminal board TB2 (41) positions 3, 8, 9, 10, 11, 14, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 28, 30, 31, 32, 33, 34, 35, 36, 37, 39, 43, 44, 45, 46, 47, 50, 53, 55, 56, 58, 60, 62, 70, 74, 77, and 79.

(23) Position wire 1603 (38) on terminal board TB2 (41) with washer (46), lockwasher (47), and nut (48).

d. Installation.

(1) Deleted
(2) Deleted
(3) Deleted
(4) Install circuit breaker CB68 (5) on PDP (2).
(5) Install relay K15 (6) on PDP (2).

**NOTE**

Perform steps (6) and (7) on M1084/ M1086/M1088 and M1089.

(6) Install circuit breaker CB72 (7) on PDP (2).

(7) Install relay K12 (8) on PDP (2).

**NOTE**

- Step (8) requires the aid of an assistant.
- Install plastic cable ties as required.

(8) Position WTEC II dashboard cable assembly (9) in dashboard (10).

(9) Install terminal lug TL14 (11) on terminal board TB2 (12) position 12.

(10) Install terminal lug TL87 (13) on terminal board TB2 (12) position 6.

(11) Remove two nuts (14), lockwashers (15), washers (16), cover (17), and two washers (16) from terminal board TB1 (18).

(12) Install terminal lug TL75 (19) on terminal board TB1 (18) position 2.

(13) Install terminal lug TL71 (20) on terminal board TB2 (12) position 2.
(14) Install terminal lug TL73 (21) on terminal board TB1 (18) position 1.

(15) Install terminal lug TL74 (22) on terminal board TB1 (18) position 3.

(16) Install two washers (16) and cover (17) on terminal board TB1 (18) with two washers (16), lockwashers (15), and nuts (14).

(17) Install terminal lug TL86 (23) on terminal board TB2 (12) position 4.

(18) Remove screw (24), lockwasher (25), and four terminal lugs (26) from PDP (2).

(19) Position four terminal lugs (26) and terminal lug TL42 (27) on PDP (2) with lockwasher (25), and screw (24).

(20) Tighten screw (24) to 35-45 lb-in. (4-5 N·m).

(21) Remove screw (28), lockwasher (29), and four terminal lugs (30) from PDP (2).

(22) Position four terminal lugs (30) and terminal lug TL41 (31) on PDP (2) with lockwasher (29) and screw (28).

(23) Tighten screw (28) to 35-45 lb-in. (4-5 N·m).

(24) Remove screw (32), lockwasher (33), and terminal lug (34) from PDP (2).

(25) Position terminal lug (34) and terminal lug TL56 (35) on PDP (2) with lockwasher (33) and screw (32).

(26) Tighten screw (32) to 35-45 lb-in. (4-5 N·m).
(27) Connect WTEC II TEPSS dimmer module (36) to connector J7 (37).

NOTE
Perform step (28) on M1088.

(28) Install terminal lugs TL502 (38) and TL501 (39) on terminal studs (40 and 41) with two lockwashers (42) and nuts (43).

NOTE
Perform step (29) on vehicles equipped with cab radio.

(29) Connect connector P78 (44) to connector J78 (45).
(30) Connect connector PX33 (46) to WTEC II VIM (47).

(31) Tighten captive screw (48) in connector PX33 (46).

(32) Connect connector P111 (49) to connector J111 (50).

(33) Connect connector PX20 (51) to flasher module (52).

(34) Connect connector J99 (53) to chemical alarm kit cable connector P99 (54).

(35) Connect connector P65 (55) to warning light cable connector J65 (56).

(36) Connect differential lock solenoid connector (57) to connector PX50 (58).

(37) Connect fan solenoid connector (59) to connector PX34 (60).
(38) Connect connector P51 (61) to connector J51 (62).

(39) Connect connector P27 (63) to connector J27 (64).

**NOTE**

Perform step (40) on vehicles not equipped with auxiliary panel.

(40) Connect connector P912A (65) to connector J912 (66).

(41) Position start inhibit pushbutton switch (67) in PDP (2).

(42) Install spring clip (68) on start inhibit pushbutton switch (67).

(43) Connect terminal lugs TL159 (69) and TL158 (70) to start inhibit pushbutton switch (67).

(44) Install windshield wiper ECU (71) on PDP (2).
NOTE

Perform steps (45) and (46) on vehicles equipped with auxiliary panel.

(45) Connect connector P913 (72) to connector J913 (73).

(46) Connect connector P912 (74) to connector J912 (66).

(47) Install terminal lugs TL155 (75) and TL154 (76) on front stoplight switch (77) with two lockwashers (78) and nuts (79).

(48) Install terminal lugs TL152 (80) and TL153 (81) on rear stoplight switch (82) with two lockwashers (83) and nuts (84).

(49) Install terminal lug TL156 (85) on rear brake air pressure transmitter terminal WK (86) with lockwasher (87) and nut (88).

(50) Install terminal lug TL150 (89) on rear brake air pressure transmitter terminal G (90) with lockwasher (91) and nut (92).
(51) Install terminal lug TL157 (93) on front brake air pressure transmitter terminal WK (94) with lockwasher (95) and nut (96).

(52) Install terminal lug TL151 (97) on front brake air pressure transmitter terminal G (98) with lockwasher (99) and nut (100).

(53) Install frequency ECU (101) on left side dashboard (10) with two screws (102).

(54) Connect connector PX26 (103) to frequency ECU connector (104).

(55) Position clamp (105) on WTEC II dashboard cable assembly (9).

(56) Position clamp (105) on dashboard (10) with washer (106) and screw (107).

(57) Tighten screw (107) to 35-45 lb-in. (4-5 N•m).
(58) Connect connector J31 (108) to connector P31 (109).

(59) Connect connector J43 (110) to connector P43 (111).

(60) Connect connector P118 (112) to connector J118 (113).

(61) Connect steering column switch connector P18 (114) to connector J18 (115).

(62) Connect steering column switch connector J19 (116) to connector P19 (117).

**e. Follow-On Maintenance.**

(1) Install windshield wiper motor (para 18-4).

(2) Install personnel heater (para 18-9).

(3) Install instrument panel assembly (para 7-15).

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

(5) Check instruments operation (TM 9-2320-366-10-1).

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

**End of Task.**
7-11. WTEC III DASHBOARD CABLE ASSEMBLY REPLACEMENT/REPAIR

This task covers:

a. Removal  
b. Disassembly  
c. Assembly  
d. Installation  
e. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Windshield wiper motor removed (para 18-4).  
Personnel heater removed (para 18-9).  
Instrument panel assembly removed (para 7-15).

Tools and Special Tools
Tool Kit, Auto Fuel (Item 43, Appendix C)  
Tool Kit, Genl Mech (Item 46, Appendix C)  
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)  
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)  
Socket Set, Socket Wrench (Item 34, Appendix C)

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)  
Ties, Cable, Plastic (Item 69, Appendix D)  
Lockwasher (4) (Item 71, Appendix G)  
Lockwasher (6) (Item 93, Appendix G)  
Lockwasher (2) (Item 84, Appendix G)  
Lockwasher (11) (Item 83, Appendix G)  
Lockwasher (4) (Item 88, Appendix G)

Personnel Required
(2)

a. Removal.

NOTE

- Remove plastic cable ties as required.
- Tag wires and connection points prior to disconnecting.

(1) Disconnect steering column switch connector J19 (1) from connector P19 (2).

(2) Disconnect steering column switch connector P18 (3) from connector J18 (4).
(3) Disconnect connector J43 (5) from connector P43 (6).

(4) Disconnect connector J31 (7) from connector P31 (8).

(5) Remove screw (9), washer (10), and clamp (11) from WTEC III dashboard cable assembly (12).

(6) Disconnect connector PX26 (13) from frequency ECU connector (14).

(7) Remove two screws (15) and frequency ECU (16) from left side dashboard (17).
7-11. WTEC III DASHBOARD CABLE ASSEMBLY REPLACEMENT/REPAIR (CONT)

(8) Remove nut (18), lockwasher (19), and terminal lug TL151 (20) from front brake air pressure transmitter terminal G (21). Discard lockwasher.

(9) Remove nut (22), lockwasher (23), and terminal lug TL157 (24) from front brake air pressure transmitter terminal WK (25). Discard lockwasher.

(10) Remove nut (26), lockwasher (27), and terminal lug TL150 (28) from rear brake air pressure transmitter terminal G (29). Discard lockwasher.

(11) Remove nut (30), lockwasher (31), and terminal lug TL156 (32) from rear brake air pressure transmitter terminal WK (33). Discard lockwasher.

(12) Remove two nuts (34), lockwashers (35), and terminal lugs TL153 (36) and TL152 (37) from rear stoplight switch (38). Discard lockwashers.

(13) Remove two nuts (39), lockwashers (40), and terminal lugs TL154 (41) and TL155 (42) from front stoplight switch (43). Discard lockwashers.
NOTE

Perform steps (14) and (15) on vehicles equipped with auxiliary panel.

(14) Disconnect connector J912 (44) from connector P912 (45).

(15) Disconnect connector P913 (46) from connector J913 (47).

(16) Remove windshield wiper ECU (48) from PDP (49).

(17) Disconnect terminal lugs TL158 (50) and TL159 (51) from start inhibit pushbutton switch (52).

(18) Remove spring clip (53) from start inhibit pushbutton switch (52).

(19) Remove start inhibit pushbutton switch (52) from PDP (49).
NOTE

Perform step (20) on vehicles not equipped with auxiliary panel.

(20) Disconnect connector P912A (54) from connector J912 (44).

(21) Disconnect connector J27 (55) from connector P27 (56).

(22) Disconnect connector J51 (57) from connector P51 (58).

(23) Disconnect connector PX34 (59) from fan solenoid connector (60).

(24) Disconnect connector PX50 (61) from differential solenoid connector (62).

(25) Disconnect connector J65 (63) from warning light cable connector P65 (64).

(26) Disconnect connector P99 (65) from chemical alarm kit cable connector J99 (66).
(27) Disconnect connector PX20 (67) from flasher module (68).

(28) Disconnect connector P111 (69) from connector J111 (70).

(29) Disconnect connector clamp (71) from connector P115 (72).

(30) Disconnect connector P115 (72) from WTEC III transmission ECU (73).

(31) Disconnect connector clamp (74) from connector P116 (75).

(32) Disconnect connector P116 (75) from WTEC III transmission ECU (73).

NOTE

Perform step (33) on vehicles equipped with cab radio.

(33) Disconnect connector J78 (76) from connector P78 (77).
NOTE

Perform step (34) on M1088.

(34) Remove two nuts (78), lockwashers (79), and terminal lugs TL501 (80) and TL502 (81) from terminal studs (82 and 83). Discard lockwashers.

(35) Remove screw (84), lockwasher (85), terminal lug TL56 (86), and terminal lug (87) from PDP (49).

(36) Position terminal lug (87) on PDP (49) with lockwasher (85) and screw (84).

(37) Remove screw (88), lockwasher (89), terminal lug TL41 (90), and four terminal lugs (91) from PDP (49).

(38) Position four terminal lugs (91) on PDP (49) with lockwasher (89) and screw (88).

(39) Remove screw (92), lockwasher (93), terminal lug TL42 (94), and four terminal lugs (95) from PDP (49).

(40) Position four terminal lugs (95) on PDP (49) with lockwasher (93), and screw (92).
(41) Remove terminal lug TL86 (96) from terminal board TB2 (97) position 4.

(42) Remove two nuts (98), lockwashers (99), washers (100), cover (101), and two washers (100) from terminal board TB1 (102).

(43) Remove terminal lug TL74 (103) from terminal board TB1 (102) position 3.

(44) Remove terminal lug TL73 (104) from terminal board TB1 (102) position 1.

(45) Remove terminal lug TL71 (105) from terminal board TB2 (97) position 2.

(46) Remove terminal lug TL75 (106) from terminal board TB1 (102) position 2.

(47) Position two washers (100) and cover (101) on terminal board TB1 (102) with two washers (100), lockwashers (99), and nuts (98).

(48) Remove terminal lug TL87 (107) from terminal board TB2 (97) position 6.

(49) Remove terminal lug TL14 (108) from terminal board TB2 (97) position 12.
(50) Remove nut (109), lockwasher (110), terminal lug TL190 (111), terminal lug TL57 (112), two washers (113), and screw (114) from dashboard (17). Discard lockwasher.

**NOTE**

Step (51) requires the aid of an assistant.

(51) Remove WTEC III dashboard cable assembly (12) from dashboard (17).

- Perform steps (52) and (53) on M1084/M1086/M1088 and M1089.
- Tag relays and circuit breaker prior to removal.

(52) Remove relay K12 (115) from PDP (49).

(53) Remove circuit breaker CB72 (116) from PDP (49).

(54) Remove relay K15 (117) from PDP (49).
b. Disassembly.

NOTE

Tag wires and connection points prior to removal.

(1) Remove nut (1), lockwasher (2), washer (3), and wire 1603 (4) from terminal board TB2 (5). Discard lockwasher.

(2) Remove 46 quick disconnect terminals (6) from terminal board TB2 (5) positions 3, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 39, 40, 43, 44, 45, 46, 47, 50, 53, 55, 56, 60, 62, 70, 74, 77, and 79.

(3) Remove two nuts (7), lockwashers (8), screws (9), and terminal board TB2 (5) from PDP frame (10). Discard lockwashers.
(4) Remove screw (11), lockwasher (12), and wire 1603 (4) from PDP frame (10). Discard lockwasher.

(5) Remove two nuts (13), lockwashers (14), washers (15), cover (16), and two washers (15) from terminal board TB1 (17). Discard lockwashers.

(6) Remove 38 quick disconnect terminals (18) from terminal board TB1 (17) positions 5, 11, 20, 23, 24, 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 46, 47, 50, 51, 52, 53, 54, 56, 57, 58, 59, 60, 61, 62, 63, and 64.

(7) Remove two nuts (19), lockwashers (20), washers (21), spacers (22), terminal board TB1 (17), two spacers (23), and screws (24) from PDP frame (10). Discard lockwashers.

(8) Remove six quick disconnect terminals (25) from connector PX21 (26).

(9) Push in two locking tabs (27) and remove connector PX21 (26) from front of PDP frame (10).
NOTE
Tag terminal lugs and connection points prior to removal.

(10) Remove screw (28), lockwasher (29), and four terminal lugs (30) from PDP (31). Discard lockwasher.

(11) Remove screw (32), lockwasher (33), and four terminal lugs (34) from PDP (31). Discard lockwasher.

(12) Remove 94 retaining locks (35) from PDP (31).

(13) Remove 94 terminals (36) from PDP (31).

(14) Remove bus bar X1 (37) from PDP (31).

(15) Remove bus bar X6 (38) from PDP (31).

(16) Remove bus bar X2 (39) from PDP (31).

(17) Remove 41 retaining locks (40) from PDP (31).

(18) Remove 41 terminals (41) from PDP (31).
(19) Remove six nuts (42), lockwashers (43), screws (44), washers (45), and PDP (31) from PDP frame (10). Discard lockwashers.

**NOTE**
Tag diodes, relays, and circuit breakers prior to removal.

(20) Remove three diodes (46) from PDP (31).

(21) Remove 24 relays (47) from PDP (31).

(22) Remove 29 circuit breakers (48) from PDP (31).

c. Assembly.

(1) Install 29 circuit breakers (1) on PDP (2).

(2) Install 24 relays (3) on PDP (2).

(3) Install three diodes (4) on PDP (2).
(4) Position PDP (2) on PDP frame (5) with six washers (6), screws (7), lockwashers (8), and nuts (9).

(5) Tighten six nuts (9) to 46-57 lb-ft (63-77 N·m).

(6) Install 41 terminals (10) on PDP (2).

(7) Install 41 retaining locks (11) on PDP (2).

(8) Install bus bar X2 (12) on PDP (2).

(9) Install bus bar X6 (13) on PDP (2).

(10) Install bus bar X1 (14) on PDP (2).

(11) Install 94 terminals (15) on PDP (2).

(12) Install 94 retaining locks (16) on PDP (2).
(13) Position four terminal lugs (17) on PDP (2) with lockwasher (18), and screw (19).

(14) Position four terminal lugs (20) on PDP (2) with lockwasher (21), and screw (22).

(15) Push in two locking tabs (23) and install connector PX21 (24) through front of PDP frame (5).

(16) Install six quick disconnect terminals (25) in connector PX21 (24).

(17) Install terminal board TB1 (26) on PDP frame (5) with two screws (27), spacers (28), spacers (29), washers (30), lockwashers (31), and nuts (32).
(18) Install 38 quick disconnect terminals (33) on terminal board TB1 (26) positions 5, 11, 20, 23, 24, 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 46, 47, 50, 51, 52, 53, 54, 56, 57, 58, 59, 60, 61, 62, 63, and 64.

(19) Position two washers (34) and cover (35) on terminal board TB1 (26) with two washers (34), lockwashers (36), and nuts (37).

(20) Position wire 1603 (38) on PDP frame (5) with lockwasher (39), and screw (40).

(21) Install terminal board TB2 (41) on PDP frame (5) with two screws (42), lockwashers (43), and nuts (44).

(22) Install 46 quick disconnect terminals (45) on terminal board TB2 (41) positions 3, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 39, 40, 43, 44, 45, 46, 47, 50, 53, 55, 56, 60, 62, 70, 74, 77, and 79.

(23) Position wire 1603 (38) on terminal board TB2 (41) with washer (46), lockwasher (47), and nut (48).
d. Installation.

(1) Deleted

(2) Deleted

(3) Deleted

(4) Install circuit breaker CB68 (5) on PDP (2).

(5) Install relay K15 (6) on PDP (2).

**NOTE**

Perform steps (6) and (7) on M1084/M1086/M1088 and M1089.

(6) Install circuit breaker CB72 (7) on PDP (2).

(7) Install relay K12 (8) on PDP (2).

**NOTE**

- Step (8) requires the aid of an assistant.
- Install plastic cable ties as required.

(8) Position WTEC III dashboard cable assembly (9) in dashboard (10).

(9) Install two washers (11), screw (12), terminal lug TL57 (13), terminal lug TL190 (14), lockwasher (15), and nut (16) on dashboard (10).
(10) Install terminal lug TL14 (17) on terminal board TB2 (18) position 12.

(11) Install terminal lug TL87 (19) on terminal board TB2 (18) position 6.

(12) Remove two nuts (20), lockwashers (21), two washers (22), cover (23), and two washers (22) from terminal board TB1 (24).

(13) Install terminal lug TL75 (25) on terminal board TB1 (24) position 2.

(14) Install terminal lug TL71 (26) on terminal board TB2 (18) position 2.

(15) Install terminal lug TL73 (27) on terminal board TB1 (24) position 1.

(16) Install terminal lug TL74 (28) on terminal board TB1 (24) position 3.

(17) Install two washers (22) and cover (23) on terminal board TB1 (24) with two washers (22), lockwashers (21), and nuts (20).

(18) Install terminal lug TL86 (29) on terminal board TB2 (18) position 4.

(19) Remove screw (30), lockwasher (31), and four terminal lugs (32) from PDP (2).

(20) Position four terminal lugs (32) and terminal lug TL42 (33) on PDP (2) with lockwasher (31), and screw (30).

(21) Tighten screw (30) to 35-45 lb-in. (4-5 N·m).
(22) Remove screw (34), lockwasher (35), and four terminal lugs (36) from PDP (2).

(23) Position four terminal lugs (36) and terminal lug TL41 (37) on PDP (2) with lockwasher (35) and screw (34).

(24) Tighten screw (34) to 35-45 lb-in. (4-5 N·m).

(25) Remove screw (38), lockwasher (39), and terminal lug (40) from PDP (2).

(26) Position terminal lug (40) and terminal lug TL56 (41) on PDP (2) with lockwasher (39) and screw (38).

(27) Tighten screw (38) to 35-45 lb-in. (4-5 N·m).

(28) Install terminal lugs TL502 (42) and TL501 (43) on terminal studs (44 and 45) with two lockwashers (46) and nuts (47).

Perform step (28) on M1088.

(29) Connect connector P78 (48) to connector J78 (49).

NOTE

Perform step (29) on vehicles equipped with cab radio.
(30) Connect connector P116 (50) to WTEC III transmission ECU (51).

(31) Connect connector clamp (52) on connector P116 (50).

(32) Connect connector P115 (53) to WTEC III transmission ECU (51).

(33) Connect connector clamp (54) on connector P115 (53).

(34) Connect connector P111 (55) to connector J111 (56).

(35) Connect connector PX20 (57) to flasher module (58).

(36) Connect connector J99 (59) to chemical alarm kit cable connector P99 (60).

(37) Connect connector P65 (61) to warning light cable connector J65 (62).

(38) Connect differential lock solenoid connector (63) to connector PX50 (64).

(39) Connect fan solenoid connector (65) to connector PX34 (66).
(40) Connect connector P51 (67) to connector J51 (68).

(41) Connect connector P27 (69) to connector J27 (70).

**NOTE**

Perform step (42) on vehicles not equipped with auxiliary panel.

(42) Connect connector P912A (71) to connector J912 (72).

(43) Position start inhibit pushbutton switch (73) in PDP (2).

(44) Install spring clip (74) on start inhibit pushbutton switch (73).

(45) Connect terminal lugs TL159 (75) and TL158 (76) to start inhibit pushbutton switch (73).

(46) Install windshield wiper ECU (77) on PDP (2).
NOTE

Perform steps (47) and (48) on vehicles equipped with auxiliary panel.

(47) Connect connector P913 (78) to connector J913 (79).

(48) Connect connector P912 (80) to connector J912 (72).

(49) Install terminal lugs TL155 (81) and TL154 (82) on front stoplight switch (83) with two lockwashers (84) and nuts (85).

(50) Install terminal lugs TL152 (86) and TL153 (87) on rear stoplight switch (88) with two lockwashers (89) and nuts (90).

(51) Install terminal lug TL156 (91) on rear brake air pressure transmitter terminal WK (92) with lockwasher (93) and nut (94).

(52) Install terminal lug TL150 (95) on rear brake air pressure transmitter terminal G (96) with lockwasher (97) and nut (98).
(53) Install terminal lug TL157 (99) on front brake air pressure transmitter terminal WK (100) with lockwasher (101) and nut (102).

(54) Install terminal lug TL151 (103) on front brake air pressure transmitter terminal G (104) with lockwasher (105) and nut (106).

(55) Install frequency ECU (107) on left side dashboard (10) with two screws (108).

(56) Connect connector PX26 (109) to frequency ECU connector (110).

(57) Position clamp (111) on WTEC III dashboard cable assembly (9).

(58) Position clamp (111) on dashboard (10) with washer (112) and screw (113).

(59) Tighten screw (113) to 35-45 lb-in. (4-5 N•m).
(60) Connect connector J31 (114) to connector P31 (115).

(61) Connect connector J43 (116) to connector P43 (117).

(62) Connect steering column switch connector P18 (118) to connector J18 (119).

(63) Connect steering column switch connector J19 (120) to connector P19 (121).

e. Follow-On Maintenance.

(1) Install windshield wiper motor (para 18-4).

(2) Install personnel heater (para 18-9).

(3) Install instrument panel assembly (para 7-15).

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

(5) Check instruments operation (TM 9-2320-366-10-1).

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

End of Task.
7-12. DIMMER SWITCH REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Instrument panel assembly removed for access (para 7-15).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

a. Removal.

(1) Disconnect connector clamp (1) from dimmer switch connector (2).

(2) Disconnect connector PX24 (3) from dimmer switch connector (2).

(3) Loosen screw (4) on dimmer switch knob (5).

(4) Remove dimmer switch knob (5) from dimmer switch (6).

(5) Remove nut (7), washer (8), and dimmer switch (6) from instrument panel assembly (9).

b. Installation.

(1) Install dimmer switch (6) in instrument panel assembly (9) with washer (8) and nut (7).

(2) Install dimmer switch knob (5) on dimmer switch (6).

(3) Tighten screw (4) on dimmer switch knob (5).

(4) Connect connector PX24 (3) to dimmer switch connector (2).

(5) Connect connector clamp (1) on dimmer switch connector (2).

c. Follow-On Maintenance.

(1) Install instrument panel assembly (para 7-15).

(2) Check dimmer switch operation (TM 9-2320-366-10-1).

End of Task.
7-13. WTEC II TRANSMISSION ECU PUSHBUTTON SHIFT SELECTOR (TEPSS) DIMMER MODULE REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
- Batteries disconnected (para 7-57).
- PDP cover removed (para 16-2).

Materials/Parts
- Ties, Cable, Plastic (Item 69, Appendix D)

Tools and Special Tools
- Tool Kit, Genl Mech (Item 46, Appendix C)

a. Removal.

1. Remove three screws (1) and washers (2) from PDP (3).
2. Remove three screws (4) from PDP (3).
3. Lift PDP (3) out to gain access.

NOTE
Remove plastic cable ties as required.

4. Disconnect connector J7 (5) from WTEC II TEPSS dimmer module connector (6).
b. Installation.

**NOTE**

Install plastic cable ties as required.

(1) Connect connector J7 (1) to WTEC II TEPSS dimmer module connector (2).

(2) Install PDP (3) on dashboard (4) with three screws (5).

(3) Install three washers (6) and screws (7) in PDP (3).

c. Follow-On Maintenance.

(1) Install PDP cover (para 16-2).

(2) Connect batteries (para 7-57).

End of Task.
### 7-14. ELECTRICAL GAGES REPLACEMENT

This task covers:

- a. Removal
- b. Installation
- c. Follow-On Maintenance

#### INITIAL SETUP

**Equipment Conditions**

Instrument panel assembly removed for access (para 7-15).

**Tools and Special Tools**

- Tool Kit, Genl Mech (Item 46, Appendix C)
- Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)

<table>
<thead>
<tr>
<th>Materials/Parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ties, Cable, Plastic (Item 69, Appendix D)</td>
</tr>
<tr>
<td>Nut, Self-Locking (2) (Item 133, Appendix G)</td>
</tr>
</tbody>
</table>

#### a. Removal.

**NOTE**

All electrical gages are removed the same way. Speedometer shown.

1. Disconnect connector clamp (1) from speedometer connector (2).

**NOTE**

Remove plastic cable ties as required.

2. Disconnect connector PX8 (3) from speedometer connector (2).

**NOTE**

Note position of speedometer prior to removal.

3. Remove two protective caps (4), self-locking nuts (5), retaining ring (6), and speedometer (7) from instrument panel assembly (8). Discard self-locking nuts.
7-14. ELECTRICAL GAGES REPLACEMENT (CONT)

b. Installation.

CAUTION

Ensure dipswitch settings are correct. Failure to comply may result in inaccurate speedometer readings.

NOTE

Perform steps (1) through (3) on speedometer:

1. Remove cover (1) from speedometer (2).
2. Set dipswitches 3, 6, 7, and 9 in the down position.
3. Set dipswitches 1, 2, 4, 5, 8, and 10 in the up position.

NOTE

Note position of speedometer prior to installation:

4. Position speedometer (2) in instrument panel assembly (3) with retaining ring (4) and two self-locking nuts (5).
5. Tighten two self-locking nuts (5) to 9 lb-in. (1 N·m).
6. Install two protective caps (6) on speedometer (2).

NOTE

Install plastic cable ties as required:

7. Connect connector PX8 (7) on speedometer connector (8).
8. Connect connector clamp (9) on speedometer connector (8).


c. Follow-On Maintenance.

1. Install instrument panel assembly (para 7-15).
2. Check gage(s) operation (TM 9-2320-366-10-1).

End of Task.
7-15. INSTRUMENT PANEL ASSEMBLY REPLACEMENT/REPAIR

This task covers:

- a. Removal
- b. Disassembly
- c. Assembly
- d. Installation
- e. Follow-On Maintenance

INITIAL SETUP

**Equipment Conditions**
- Batteries disconnected (para 7-57).
- Steering wheel removed (para 13-2).
- Inclinometer removed (para 16-29)
- Dump Switch Bracket removed (para 7-146)

**Tools and Special Tools**
- Tool Kit, General Mech (Item 46, Appendix C)
- Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Socket Set, Socket Wrench (Item 34, Appendix C)

**Materials/Parts**
- Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)

---

a. Removal.

**NOTE**

Perform steps (1) through (4) if removing instrument panel assembly for access.

1. Loosen screw (1) in HAND THROTTLE knob (2).
2. Remove HAND THROTTLE knob (2) from HAND THROTTLE lever (3).

**NOTE**

Depending upon pre-conditioned items removed; configuration of instrument panel can have from 12 to 16 screw. Configuration with 16 screws shown.

3. Remove 16 screws (4) and washers (5) from instrument panel assembly (6).
4. Lift instrument panel assembly (6) outward to gain access.
7-15. INSTRUMENT PANEL ASSEMBLY REPLACEMENT/REPAIR (CONT)

NOTE

Remove plastic cable ties as required.

(5) Disconnect connector PX7 (7) from lighted indicator display (8).

NOTE

All electrical gages are disconnected the same way. OIL PRESS gage shown. Refer to **Table 7-1.2 Electrical Gages Connectors** for correct combinations of gages and connectors.

**Table 7-1.2 Electrical Gages Connectors**

<table>
<thead>
<tr>
<th>Electrical Gage</th>
<th>Connector Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRONT BRAKE AIR</td>
<td>PX4</td>
</tr>
<tr>
<td>REAR BRAKE AIR</td>
<td>PX5</td>
</tr>
<tr>
<td>FUEL</td>
<td>PX9</td>
</tr>
<tr>
<td>Speedometer</td>
<td>PX8</td>
</tr>
<tr>
<td>OIL PRESS</td>
<td>PX6</td>
</tr>
<tr>
<td>VOLTS</td>
<td>PX10</td>
</tr>
<tr>
<td>WATER TEMP</td>
<td>PX11</td>
</tr>
</tbody>
</table>

(6) Disconnect connector clamp (9) from OIL PRESS gage connector (10).

(7) Disconnect connector (11) from OIL PRESS gage connector (10).

(8) Perform steps (6) and (7) on remaining electrical gages.
NOTE

- Vehicle serial numbers 0002 through 0017, 0019 through 0025, 0027 through 0031, 0033 through 0038, 0040 and 0041, 0043 through 0053, 0055 through 0089, 0091 through 0254, 0256 through 0258, 0260, 0261, 0263 through 2400, and 2402 through 3091 are not equipped with LAMP TEST switch.

- Vehicle serial numbers 0001 through 1477 were originally equipped with dashboard cable assemblies containing two unused connectors for LAMP TEST switch. Vehicle serial numbers 1478 through 3091 were originally equipped with dashboard cable assemblies without connectors for LAMP TEST switch.

- All rocker switches are disconnected the same way. Hazard lights switch shown. Refer to Table 7-2. Rocker Switch Connectors for correct combinations of rocker switches and connectors.

Table 7-2. Rocker Switch Connectors

<table>
<thead>
<tr>
<th>Switch Name</th>
<th>Connector Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiator Fan Off</td>
<td>PX1 and PX1A</td>
</tr>
<tr>
<td>LAMP TEST</td>
<td>PX2 and PX2A</td>
</tr>
<tr>
<td>Ether Start</td>
<td>PX13 and PX13A</td>
</tr>
<tr>
<td>Master Power</td>
<td>PX17 and PX17A</td>
</tr>
<tr>
<td>Warning Light</td>
<td>PX12 and PX12A</td>
</tr>
<tr>
<td>Hazard Lights</td>
<td>PX14 and PX14A</td>
</tr>
</tbody>
</table>

(9) Lift tab (12) on connector (13).

(10) Disconnect connector (13) from hazard lights switch (14).

(11) Disconnect connector (15) from hazard lights switch (14).

(12) Perform steps (9) through (11) on remaining rocker switches.

(13) Disconnect vacuum hose (16) from AIR FILTER RESTRICTION GAUGE (17).
Perform step (14) on M1084, M1086, M1088, M1089, M1092, and M1096.

(14) Remove two screws (18) and terminal lugs TL160 (19) and TL161 (20) from audible alarm (21).

Perform step (15) on M1083, M1085, M1090, M1093, and M1094.

(15) Remove three screws (18) and terminal lugs TL160 (19), TL161 (20), and TL178 (22) from audible alarm (21).

(16) Remove connector clamp (23) from dimmer switch (24).

(17) Disconnect connector PX24 (25) from dimmer switch (24).

(18) Disconnect connector PX15 (26) from main light switch (27).
(19) Disconnect terminal lugs TL162 (28) and TL163 (29) from starter pushbutton switch (30).

NOTE
Perform steps (20) through (22) on vehicles equipped with WTEC II transmission controls.

(20) Disconnect connector J115 (31) from WTEC II TEPSS (32).

(21) Disconnect connector J114 (33) from WTEC II TEPSS (32).

(22) Remove screw (34), washer (35) and terminal lug (36) from instrument panel assembly (6).

NOTE
Perform step (23) on vehicles equipped with WTEC III transmission controls.

(23) Disconnect connector PX33 (37) from WTEC III TPSS (38).

(24) Remove instrument panel assembly (6) from dashboard (39).
b. Disassembly.

NOTE

- All rocker switches are removed the same way. Radiator fan off switch shown.
- Note position of rocker switches prior to removal.

(1) Push in two tabs (1) on radiator fan off switch (2).

(2) Remove radiator fan off switch (2) from instrument panel (3).

(3) Perform steps (1) and (2) on remaining rocker switches.

NOTE

- All electrical gages are removed the same way. FUEL gage shown.
- Note position of electrical gages prior to removal.

(4) Remove two protective caps (4), self-locking nuts (5), retaining ring (6), and FUEL gage (7) from instrument panel (3). Discard self-locking nuts.

(5) Perform step (4) on remaining electrical gages.
NOTE

Perform steps (6) and (7) on vehicles equipped with WTEC II transmission controls.

(6) Remove two screws (8) and washers (9) from mounting bracket (10).

(7) Remove four screws (11), mounting bracket (10), three clip nuts (12), and WTEC II TEPSS (13) from instrument panel (3).

NOTE

Perform steps (8) and (9) on vehicles equipped with WTEC III transmission controls.

(8) Remove two nuts (14) brackets (15) from WTEC III TPSS (16).

(9) Remove WTEC III TPSS (16) from instrument panel (3).

(10) Remove four screws (17) and lighted indicator display (18) from instrument panel (3).
(11) Remove lock ring (19) and audible alarm (20) from instrument panel (3).

(12) Remove nut (21), washer (22), and starter pushbutton switch (23) from instrument panel (3).

(13) Remove two screws (24), faceplate (25) and AIR FILTER RESTRICTION GAUGE (26) from instrument panel (3).
(14) Loosen screw (27) on dimmer switch knob (28).
(15) Remove dimmer switch knob (28) from dimmer switch (29).
(16) Remove nut (30), washer (31), and dimmer switch (29) from instrument panel (3).

(17) Remove three screws (32) from knobs (33).
(18) Remove three knobs (33) and spacers (34) from main light switch (35).
(19) Remove four screws (36) and main light switch (35) from instrument panel (3).
(20) Remove electrical switch cover (37) from instrument panel (3).

c. Assembly.

(1) Install electrical switch cover (1) in instrument panel (2).
(2) Position main light switch (3) in instrument panel (2) with four screws (4).
(3) Tighten four screws (4) to 9 lb-in. (1 N·m).
(4) Install three spacers (5) and knobs (6) on main light switch (3).
(5) Install three screws (7) in knobs (6).
(6) Position dimmer switch (8) in instrument panel (2) with washer (9) and nut (10).

(7) Tighten nut (10) to 159-195 lb-in. (18-22 N·m).

(8) Install dimmer switch knob (11) on dimmer switch (8).

(9) Tighten screw (12) in dimmer switch knob (11).

(10) Install AIR FILTER RESTRICTION GAUGE (13) and faceplate (14) on instrument panel (2) with two screws (15).

(11) Position starter pushbutton switch (16) in instrument panel (2) with washer (17) and nut (18).

(12) Tighten nut (18) to 57-70 lb-in. (6-8 N·m).
(13) Install audible alarm (19) in instrument panel (2) with lock ring (20).

(14) Position lighted indicator display (21) in instrument panel (2) with four screws (22).

(15) Tighten four screws (22) to 9 lb-in. (1 N·m).

NOTE

Perform steps (16) through (19) on vehicles equipped with WTEC II transmission controls.

(16) Position WTEC II TEPSS (23) in instrument panel (2) with three clip nuts (24), mounting bracket (25) and four screws (26).

(17) Position two screws (27) and washers (28) in mounting bracket (25).

(18) Tighten four screws (26) to 9 lb-in. (1 N·m).

(19) Tighten two screws (27) to 27-35 lb-in. (3-4 N·m).
7-15. INSTRUMENT PANEL ASSEMBLY REPLACEMENT/REPAIR (CONT)

NOTE
Perform steps (20) through (22) on vehicles equipped with WTEC III transmission controls.

(20) Install WTEC III TPSS (29) in instrument panel (2).

(21) Position two brackets (30) on rear of WTEC III TPSS (29) with two nuts (31).

(22) Tighten two nuts (31) to 11-13 lb-in. (1.3-1.5 N·m).

NOTE
All electrical gages are installed the same way. FUEL gage shown.

(23) Position FUEL gage (32) in instrument panel (2) with mounting ring (33) and two self-locking nuts (34).

(24) Tighten two self-locking nuts (34) to 9 lb-in. (1 N·m).

(25) Install two protective caps (35) on FUEL gage (32).

(26) Perform steps (23) through (25) on remaining gages.
NOTE

All rocker switches are installed the same way. Radiator fan off switch shown.

(27) Install radiator fan off switch (36) in instrument panel (2).

(28) Perform step (27) on remaining rocker switches.

d. Installation.

(1) Position instrument panel assembly (1) on dashboard (2).

NOTE

Perform steps (2) through (4) on vehicles equipped with WTEC II transmission controls.

(2) Connect connector J114 (3) to WTEC II TEPSS (4).

(3) Connect connector J115 (5) to WTEC II TEPSS (4).

(4) Install terminal lug (6) on instrument panel assembly (1) with washer (7) and screw (8).
NOTE

Perform step (5) on vehicles equipped with WTEC III transmission controls.

(5) Connect connector PX33 (9) to WTEC III TPSS (10).

(6) Connect terminal lugs TL163 (11) and TL162 (12) to starter pushbutton switch (13).

(7) Connect connector PX15 (14) to main light switch (15).

(8) Connect connector PX24 (16) to dimmer switch (17).

(9) Connect connector clamp (18) on dimmer switch (17).
NOTE
Perform step (10) on M1083, M1085, M1090, M1093, and M1094.

(10) Install terminal lugs TL160 (19), TL161 (20), and TL178 (21) on audible alarm (22) with three screws (23).

NOTE
Perform step (11) on M1084, M1086, M1088, M1089, M1092, and M1096.

(11) Install terminal lugs TL160 (19) and TL161 (20) on audible alarm (22) with two screws (23).
(12) Connect vacuum hose (24) to AIR FILTER RESTRICTION GAUGE (25).

NOTE

- Vehicle serial numbers 0002 through 0017, 0019 through 0025, 0027 through 0031, 0033 through 0038, 0040 and 0041, 0043 through 0053, 0055 through 0089, 0091 through 0254, 0256 through 0258, 0260, 0261, 0263 through 2400, and 2402 through 3091 are not equipped with LAMP TEST switch.

- Vehicle serial numbers 0001 through 1477 were originally equipped with dashboard cable assemblies containing two unused connectors for LAMP TEST switch. Vehicle serial numbers 1478 through 3091 were originally equipped with dashboard cable assemblies without connectors for LAMP TEST switch.

- All rocker switches are connected the same way. Hazard lights switch shown. Refer to Table 7-2. Rocker Switch Connectors for correct combinations of rocker switches and connectors.

(13) Connect connector (26) to hazard lights switch (27).

(14) Connect connector (28) to hazard lights switch (27).

(15) Perform steps (13) and (14) on remaining rocker switches.
NOTE

All electrical gages are connected the same way. OIL PRESS gage shown. Refer to Table 7-1.2 Electrical Gages Connectors for correct combinations of gages and connectors.

(16) Connect connector (29) to OIL PRESS gage connector (30).

(17) Connect connector clamp (31) on OIL PRESS gage connector (30).

(18) Perform steps (16) and (17) on remaining electrical gages.

(19) Connect connector PX7 (32) to lighted indicator display (33).

NOTE

Depending upon pre-conditioned items removed; configuration of the instrument panel can have from 12 to 16 screws. Configuration with 6 screws shown.

(20) Position instrument panel assembly (1) on dashboard (2) with 16 washers (34) and screws (35).

(21) Tighten 16 screws (35) to 24 lb-in. (3 Nm).

(22) Install HAND THROTTLE knob (36) on HAND THROTTLE lever (37) with screw (38).

e. Follow-On Maintenance.

(1) Install steering wheel (para 13-2).

(2) Connect batteries (para 7-57).

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

(4) Check operation of instrument panel assembly switches and gages (TM 9-2320-366-10-1).

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

End of Task.
7-16. LIGHTED INDICATOR DISPLAY REPLACEMENT/REPAIR

This task covers:

a. Removal  
b. Disassembly  
c. Assembly  
d. Installation  
e. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)  
Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)

Materials/Parts
Lamp, Incandescent (Item 65, Appendix G)  
Lamp, Incandescent (Item 66, Appendix G)

a. Removal.

(1) Remove four screws (1) and lighted indicator display (2) from instrument panel assembly (3).

(2) Disconnect connector PX7 (4) from lighted indicator display (2).

b. Disassembly.

(1) Loosen four captive screws (1) in lamp mounting panel (2).

(2) Remove lamp mounting panel (2) from lighted indicator display housing (3).

(3) Remove faulty lamp(s) (4) from printed circuit board (5). Discard faulty lamp(s).
c. Assembly.

**NOTE**

Left turn indicator, right turn indicator, and high beam indicator are 12 vdc lamps. All other lamps are 24 vdc.

1. Install replacement lamp(s) (1) in printed circuit board (2).

2. Install lamp mounting panel (3) in lighted indicator display housing (4).

3. Tighten four captive screws (5) in lamp mounting panel (3).

d. Installation.

1. Connect connector PX7 (1) to lighted indicator display (2).

2. Position lighted indicator display (2) in instrument panel assembly (3) with four screws (4).

3. Tighten four screws (4) to 9 lb-in. (1 N·m).

e. Follow-On Maintenance.

1. Connect batteries (para 7-57).

2. Check operation of lighted indicator display (TM 9-2320-366-10-1).

End of Task.
7-17. MAIN LIGHT SWITCH REPLACEMENT

This task covers:

a. Removal
b. Installation

c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Instrument panel assembly removed for access (para 7-15).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)

Materials/Parts
Ties, Cable, Plastic (Item 69, Appendix D)

a. Removal.

(1) Remove three screws (1) from knobs (2).

(2) Remove three knobs (2) and spacers (3) from main light switch (4).

NOTE
Remove plastic cable ties as required.

(3) Disconnect connector PX15 (5) from main light switch (4).

(4) Remove four screws (6) and main light switch (4) from instrument panel assembly (7).
b. Installation.

(1) Position main light switch (1) in instrument panel assembly (2) with four screws (3).

(2) Tighten four screws (3) to 11-13 lb-in. (1 N·m).

**NOTE**

Install plastic cable ties as required.

(3) Connect connector PX15 (4) to main light switch (1).

(4) Install three spacers (5) and knobs (6) on main light switch (1).

(5) Install three screws (7) in knobs (6).

c. Follow-On Maintenance.

(1) Install instrument panel assembly (para 7-15).

(2) Check lighting system operation (TM 9-2320-366-10-1).

End of Task.
7-18. **ROCKER SWITCHES REPLACEMENT**

This task covers:

a. Instrument Panel Rocker Switch Removal
b. Instrument Panel Rocker Switch Installation
c. Auxiliary Panel Rocker Switch Removal
d. Auxiliary Panel Rocker Switch Installation
e. Follow-On Maintenance

### INITIAL SETUP

**Equipment Conditions**

Instrument panel assembly removed for access (for instrument panel rocker switches) (para 7-15).

**Materials/Parts**

Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)

**Tools and Special Tools**

Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)

---

a. **Instrument Panel Rocker Switch Removal.**

**NOTE**

- Vehicle serial numbers 0002 through 0017, 0019 through 0025, 0027 through 0031, 0033 through 0038, 0040, 0041, 0043 through 0053, 0055 through 0089, 0091 through 0254, 0256 through 0258, 0260, 0261, 0263 through 2400, and 2402 through 3091 are not equipped with LAMP TEST switch.

- All instrument panel rocker switches are removed the same way. Radiator fan off switch shown.

- Tag electrical connectors and connection points prior to disconnecting.

1. Lift tab (1) on connector PX1 (2).

2. Disconnect connector PX1 (2) from radiator fan off switch (3).

3. Disconnect connector PX1A (4) from radiator fan off switch (3).

4. Push in two tabs (5) on radiator fan off switch (3).

5. Remove radiator fan off switch (3) from instrument panel assembly (6).
(6) Remove lamp base (7) from radiator fan off switch (3).

(7) Remove lamp (8) from lamp base (7).


![Diagram of instrument panel rocker switch installation]

**NOTE**

All instrument panel rocker switches are installed the same way. Radiator fan off switch shown.

(1) Install lamp (1) in lamp base (2).

(2) Install lamp base (2) in radiator fan off switch (3).

(3) Install radiator fan off switch (3) in instrument panel assembly (4).

(4) Connect connector PX1A (5) to radiator fan off switch (3).

(5) Connect connector PX1 (6) to radiator fan off switch (3).
c. Auxiliary Panel Rocker Switch Removal.

(1) Remove six screws (1) from auxiliary panel (2).

(2) Lift auxiliary panel (2) outward to gain access.

NOTE

- All auxiliary panel rocker switches are removed the same way. PTO switch shown.
- Tag electrical connectors and connection points prior to disconnecting.

(3) Lift tab (3) on connector P903 (4).

(4) Disconnect connector P903 (4) from PTO switch (5).

(5) Disconnect connector P903A (6) from PTO switch (5).

(6) Push in two tabs (7) on PTO switch (5).

(7) Remove PTO switch (5) from auxiliary panel (2).
(8) Remove lamp base (8) from PTO switch (5).
(9) Remove lamp (9) from lamp base (8).

d. Auxiliary Panel Rocker Switch Installation.

NOTE
All auxiliary panel rocker switches are installed the same way. PTO switch shown.

(1) Install lamp (1) in lamp base (2).
(2) Install lamp base (2) in PTO switch (3).

(3) Install PTO switch (3) in auxiliary panel (4).
(4) Connect connector P903A (5) to PTO switch (3).
(5) Connect connector P903 (6) to PTO switch (3).
(6) Position auxiliary panel (4) on auxiliary panel housing (7) with six screws (8).

(7) Tighten six screws (8) to 18 lb-in. (2 N·m).

e. Follow-On Maintenance.

(1) Install instrument panel assembly (for instrument panel rocker switches) (para 7-15).

(2) Check rocker switch operation (TM 9-2320-366-10-1).

End of Task.
## 7-19. START INHIBIT PUSHBUTTON SWITCH REPLACEMENT

This task covers:

- a. Removal
- b. Installation
- c. Follow-On Maintenance

### INITIAL SETUP

**Equipment Conditions**

- Batteries disconnected (para 7-57).
- PDP cover removed (para 16-2).

**Materials/Parts**

- Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)

**Tools and Special Tools**

- Tool Kit, Genl Mech (Item 46, Appendix C)

### a. Removal.

1. Remove three screws (1) and washers (2) from PDP (3).
2. Remove three screws (4) from PDP (3).
3. Lift PDP (3) outward to gain access.

**NOTE**

Tag electrical connectors and connection points prior to disconnecting.

4. Disconnect terminal lugs TL158 (5) and TL159 (6) from start inhibit pushbutton switch (7).
5. Remove spring clip (8) and start inhibit pushbutton switch (7) from PDP (3).
7-19. START INHIBIT PUSHBUTTON SWITCH REPLACEMENT (CONT)

b. Installation.

(1) Install start inhibit pushbutton switch (1) in PDP (2) with spring clip (3).

(2) Connect terminal lugs TL159 (4) and TL158 (5) to start inhibit pushbutton switch (1).

(3) Position PDP (2) on dashboard (6).

(4) Install three screws (7) in PDP (2).

(5) Install three washers (8) and screws (9) in PDP (2).

c. Follow-On Maintenance.

(1) Install PDP cover (para 16-2).

(2) Connect batteries (para 7-57).

End of Task.
7-20. STARTER PUSHBUTTON SWITCH REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Instrument panel assembly removed for access (para 7-15).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 34, Appendix C)

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)

a. Removal.

NOTE
Tag wires and connection points prior to disconnecting.

(1) Disconnect terminal lugs TL162 (1) and TL163 (2) from starter pushbutton switch (3).

(2) Remove nut (4), washer (5), and starter pushbutton switch (3) from instrument panel assembly (6).

b. Installation.

(1) Position starter pushbutton switch (3) in instrument panel assembly (6) with washer (5) and nut (4).

(2) Tighten nut (4) to 57-70 lb-in. (6-8 N·m).

(3) Connect terminal lugs TL163 (2) and TL162 (1) to starter pushbutton switch (3).

c. Follow-On Maintenance.

(1) Install instrument panel assembly (para 7-15).

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

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

End of Task.
7-21. TACHOMETER REPLACEMENT

This task covers:

a. Removal  
b. Installation  
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).

Materials/Parts
Nut, Self-Locking (2) (Item 133, Appendix G)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)  
Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)

a. Removal.

(1) Remove six screws (1) and auxiliary panel (2) from auxiliary panel housing (3).

(2) Lift auxiliary panel (2) outward to gain access.

(3) Disconnect connector clamp (4) from tachometer connector (5).

(4) Disconnect connector P901 (6) from tachometer connector (5).

(5) Remove two protective caps (7), self-locking nuts (8), and retaining ring (9) from tachometer (10). Discard self-locking nuts.

(6) Remove tachometer (10) from auxiliary panel (2).
b. Installation.

(1) Position tachometer (1) in auxiliary panel (2) with retaining ring (3) and two self-locking nuts (4).

(2) Tighten two self-locking nuts (4) to 9 lb-in. (1 N·m).

(3) Install two protective caps (5) on tachometer (1).

(4) Connect connector P901 (6) to tachometer connector (7).

(5) Connect connector clamp (8) on tachometer connector (7).

(6) Position auxiliary panel (2) on auxiliary panel housing (9) with six screws (10).

(7) Tighten six screws (10) to 18 lb-in. (2 N·m).

c. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

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

(3) Check tachometer operation (TM 9-2320-366-10-1).

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

End of Task.
7-22. COOLANT TEMPERATURE LIGHT SWITCH REPLACEMENT

This task covers:

a. Removal
b. Installation

c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Cab raised (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Pan, Drain (Item 24, Appendix C)
Goggles, Industrial (Item 15, Appendix C)
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)
Crowfoot Attachment, Socket Wrench (Item 6, Appendix B)

Materials/Parts
Antiseize Compound (Item 58, Appendix D)
Ties, Cable, Plastic (Item 69, Appendix D)
Antifreeze, Ethylene Glycol, Permanent (Item 12, Appendix D)

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.

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

a. Removal.

(1) Remove radiator cap (1) from radiator overflow tank (2).

(2) Position container under radiator draincock (3).

(3) Open radiator draincock (3) and drain approximately one gal (one L) of coolant.

(4) Close radiator draincock (3).
NOTE

Remove plastic cable ties as required.

(5) Disconnect connector clamp (4) from coolant temperature light switch (5).

(6) Disconnect connector P37 (6) from coolant temperature light switch (5).

(7) Remove coolant temperature light switch (5) from thermostat housing (7).

b. Installation.

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.

(1) Apply antiseize compound to threads of coolant temperature light switch (1).

(2) Position coolant temperature light switch (1) in thermostat housing (2).

(3) Tighten coolant temperature light switch (1) to 20-23 lb-ft (27-31 N·m).

(4) Connect connector P37 (3) to coolant temperature light switch (1).

NOTE

Install plastic cable ties as required.

(5) Connect connector clamp (4) on coolant temperature light switch (1).
c. Follow-On Maintenance.

(1) Add coolant to radiator overflow tank (TM 9-2320-366-10-2).

(2) Connect batteries (para 7-57).

(3) Lower cab (TM 9-2320-366-10-1).

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

(5) Check for coolant leaks under vehicle.

(6) Check coolant level after normal temperature is reached. Add coolant as required (TM 9-2320-366-10-2).

(7) Raise cab (TM 9-2320-366-10-1).

(8) Check for leaks around coolant temperature light switch.

(9) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
7-23. M1090/M1094 DUMP BODY SWITCH REPLACEMENT/ADJUSTMENT

This task covers:

a. Removal  
   b. Installation  
   c. Adjustment  
   d. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Dump body raised to maintenance position (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)  
Goggles, Industrial (Item 15, Appendix C)

Materials/Parts
Lockwasher (Item 80, Appendix G)

Personnel Required
(2)

a. Removal.

(1) Disconnect connector P25 (1) from dump body switch connector (2).

(2) Remove nut (3) and washer (4) from dump body switch (5).

(3) Remove lever (6) from dump body switch (5).
(4) Remove nut (7), lockwasher (8), and dump body switch (5) from mounting plate (9). Discard lockwasher.

(5) Remove screw (10), washer (11), and mounting plate (9) from frame (12).

b. Installation.

(1) Position mounting plate (1) on frame (2) with washer (3) and screw (4).
(2) Install dump body switch (5) in mounting plate (1) with lockwasher (6) and nut (7).

CAUTION
Lever must be installed so that it is approximately level before adjustment. Failure to comply may result in damage to equipment.

(3) Install lever (8) on dump body switch (5) with washer (9) and nut (10).

(4) Connect dump body switch connector (11) to connector P25 (12).

(5) Lower dump body (TM 9-2320-366-10-1).
c. Adjustment.

**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.

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

1. Loosen screw (1) in mounting plate (2).
2. Position master power switch to on (TM 9-2320-366-10-1).

**NOTE**

Step (3) requires the aid of an assistant.

3. Push up on lever (3) until DUMP BODY UP indicator (4) goes out.
4. Tighten screw (1).
5. Position master power switch to off (TM 9-2320-366-10-1).

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**d. Follow-On Maintenance.**

1. Raise dump body and check that DUMP BODY UP indicator is lit (TM 9-2320-366-10-1).
2. Lower dump body and check that DUMP BODY UP indicator goes out (TM 9-2320-366-10-1).

End of Task.
7-24. FAN AND DIFFERENTIAL LOCK SOLENOIDS REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Air tanks drained (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).
Kick panel removed (para 16-3).

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

a. Removal.

(1) Disconnect fan solenoid connector (1) from connector PX34 (2).

(2) Disconnect differential lock solenoid connector (3) from connector PX50 (4).

NOTE
Tag air hoses and connection points prior to disconnecting.

(3) Disconnect air hose (5) from 90-degree fitting (6).

(4) Disconnect two air hoses (7) from fittings (8).

(5) Remove four screws (9) and bracket (10) from dashboard (11).
(6) Remove two screws (12) and bracket (10) from solenoids (13).

(7) Remove 90-degree fitting (6) from solenoids (13).

(8) Remove two fittings (8) from solenoids (13).

(9) Remove plug (14) from solenoids (13).

b. Installation.

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.

(1) Apply antiseize compound to threads of plug (1), two fittings (2), and 90-degree fitting (3).

(2) Install plug (1) in solenoids (4).

(3) Install two fittings (2) in solenoids (4).

(4) Install 90-degree fitting (3) in solenoids (4).

(5) Install bracket (5) on solenoids (4) with two screws (6).
(6) Install bracket (5) on dashboard (7) with four screws (8).

(7) Connect two air hoses (9) to fittings (2).

(8) Connect air hose (10) to 90-degree fitting (3).

(9) Connect differential lock solenoid connector (11) to connector PX50 (12).

(10) Connect fan solenoid connector (13) to connector PX34 (14).

c. Follow-On Maintenance.

(1) Install kick panel (para 16-3).

(2) Connect batteries (para 7-57).

(3) Start engine and allow engine temperature to rise to normal operating levels (TM 9-2320-366-10-1).

(4) Check operation of fan and differential locks (TM 9-2320-366-10-1).

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

End of Task.
7-25. FLASHER UNIT REPLACEMENT

This task covers:

a. Removal  
b. Installation  
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).  
Kick panel removed (para 16-3).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

a. Removal.

(1) Remove two screws (1), washers (2), and flasher unit (3) from dashboard (4).

(2) Disconnect connector PX20 (5) from flasher unit (3).

b. Installation.

(1) Connect connector PX20 (5) to flasher unit (3).

(2) Install flasher unit (3) on dashboard (4) with two washers (2) and screws (1).

c. Follow-On Maintenance.

(1) Install kick panel (para 16-3).

(2) Connect batteries (para 7-57).

(3) Check turn signal and hazard lights operation (TM 9-2320-366-10-1).

End of Task.
7-26. TURN SIGNAL SWITCH REPLACEMENT

This task covers:

a. Removal
b. Installation

c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Instrument panel assembly removed for access (para 7-15).

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape
(Item 20, Appendix D)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

a. Removal.

NOTE

Tag connectors and connection points prior to disconnecting.

(1) Disconnect turn signal switch connectors (1 and 2) from connectors P18 and J19 (3 and 4).

(2) Remove turn signal switch connectors (1 and 2) through opening (5) in dashboard (6).

(3) Remove screw (7) and sleeve (8) from steering column (9).
(4) Remove two screws (10), collar half (11), and turn signal switch (12) from steering column (9).

b. Installation.

(1) Install turn signal switch (1) on steering column (2) with collar half (3) and two screws (4).

(2) Install sleeve (5) on steering column (2) with screw (6).
(3) Route turn signal switch connectors (7 and 8) through opening (9) in dashboard (10).

(4) Connect turn signal switch connectors (7 and 8) to connectors P18 (11) and J19 (12).

c. **Follow-On Maintenance.**

(1) Install instrument panel assembly (para 7-15).

(2) Check operation of turn signal switch (TM 9-2320-366-10-1).

End of Task.
7-27. M1084/M1086 JUNCTION BOX ASSEMBLY REPLACEMENT/REPAIR

This task covers:

- a. Removal
- b. Disassembly
- c. Assembly
- d. Installation
- e. Follow-On Maintenance

### INITIAL SETUP

#### Equipment Conditions

- Crane erected (TM 9-2320-366-10-1).
- Engine shut down (TM 9-2320-366-10-1).
- Batteries disconnected (para 7-57).

#### Tools and Special Tools

- Tool Kit, Genl Mech (Item 46, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)
- Drill, Portable, Electric (Item 7, Appendix C)
- Drill Set, Twist (Item 6, Appendix C)
- Tool Kit, Blind Rivet (Item 44, Appendix C)
- Tool Kit, Electrical (Item 45, Appendix C)
- Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)

#### Materials/Parts

- Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
- Insulation Sleeving, Electrical (Item 29, Appendix D)
- Varnish, Oil (Item 70, Appendix D)
- Ties, Cable, Plastic (Item 69, Appendix D)
- Nut, Conduit (3) (Item 124, Appendix G)
- Nut, Conduit (3) (Item 125, Appendix G)
- Lockwasher (4) (Item 94, Appendix G)
- Lockwasher (10) (Item 91, Appendix G)
- Lockwasher (12) (Item 92, Appendix G)
- Rivet, Blind (Item 255, Appendix G)
- Lockwasher (Item 93, Appendix G)
- Modification Kit, Junction Box (Item 31.1, Appendix D)
- Rag, Wiping (Item 50, Appendix D)

### a. Removal.

**NOTE**

Remove plastic cable ties as required.

1. Loosen four screws (1) on junction box (2).
2. Open cover (3) on junction box (2).
NOTE

Tag wires and connection points prior to disconnecting.

(3) Disconnect quick disconnect terminal (4) from ground strip (5) position 17.

(4) Remove two screws (6) from terminal block (7) positions 6 and 11.

(5) Remove conduit nut (8) and right jack cylinder proximity sensor cable (9) from junction box (2). Discard conduit nut.

(6) Disconnect quick disconnect terminal (10) from ground strip (5) position 14.

(7) Remove three screws (11) from terminal blocks (7) and (12) positions 6, 25, and 28.
(8) Remove four nuts (13), lockwashers (14), screws (15), and overload lockout cable (16) from junction box (2). Discard lockwashers.

(9) Disconnect quick disconnect terminal (17) from ground strip (5) position 18.

(10) Remove three screws (18) from terminal block (7) positions 3, 4, and 5.

(11) Remove four nuts (19), lockwashers (20), screws (21), and crane power cable (22) from junction box (2). Discard lockwashers.
(12) Disconnect quick disconnect terminal (23) from ground strip (5) position 16.

(13) Remove screw (24) from terminal block (7) position 10.

(14) Remove conduit nut (25) and left jack cylinder proximity sensor cable (26) from junction box (2). Discard conduit nut.

(15) Disconnect quick disconnect terminal (27) from ground strip (5) position 15.

(16) Remove two screws (28) from terminal block (7) positions 9 and 14.

(17) Remove ten screws (29) from terminal block (12) positions 17 through 26.
(18) Remove four nuts (30), lockwashers (31), screws (32), and remote control cable (33) from junction box (2). Discard lockwashers.

(19) Disconnect four quick disconnect terminals (34) from ground strip (5) positions 6, 7, 9, and 10.

(20) Remove four screws (35) from terminal block (12) positions 21 through 24.

(21) Remove conduit nut (36) and hoist up solenoid, hoist down solenoid, boom up solenoid, and boom down solenoid cable assembly (37) from junction box (2). Discard conduit nut.
(22) Disconnect two quick disconnect terminals (38) from ground strip (5) positions 2 and 8.

(23) Remove two screws (39) from terminal blocks (7) and (12) positions 12 and 28.

(24) Remove conduit nut (40) and system shutdown solenoid and boom up lockout solenoid cable assembly (41) from junction box (2). Discard conduit nut.

(25) Disconnect four quick disconnect terminals (42) from ground strip (5) positions 4, 5, 11, and 12.

(26) Remove screw (43) from terminal block (7) position 8.
(27) Remove conduit nut (44) and telescope out lockout solenoid, hoist up lockout solenoid, control lockout solenoid, and boom down lockout solenoid cable assembly (45) from junction box (2). Discard conduit nut.

(28) Disconnect three quick disconnect terminals (46) from ground strip (5) positions 1, 3, and 13.

(29) Remove five screws (47) from terminal block (12) positions 17 through 21.

(30) Remove conduit nut (48) and telescope in solenoid, telescope out solenoid, swing CCW solenoid, and swing CW solenoid cable assembly (49) from junction box (2). Discard conduit nut.
(31) Remove nut (50), terminal lug (51), lockwasher (52), and washer (53) from mounting stud (54). Discard lockwasher.

(32) Remove three nuts (50), lockwashers (52), washers (53), and junction box (2) from mounting studs (54). Discard lockwashers.

b. Disassembly.

NOTE
Tag wires and connection points prior to removing.

(1) Disconnect three quick disconnect terminals (1) from diode assembly (2).

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

(2) Remove two rivets (3) and diode assembly (2) from junction box (4).
NOTE

Perform steps (3) through (6) on junction boxes that have not had modification kit installed.

(3) Unsolder five wires (5) from lockout relay (6).

(4) Unsolder five wires (7) from shutdown relay (8).

WARNING

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

(5) Remove six rivets (9) and brackets (10 and 11) from junction box (4).

(6) Remove six nuts (12), lockwashers (13), washers (14) and brackets (10 and 11) from shutdown relay (8) and lockout relay (6). Discard lockwashers.
NOTE

Perform steps (6.1) through (6.4) on junction boxes that have modification kit installed.

(6.1) Disconnect shutdown relay connector (14.1) from shutdown relay (14.2).

(6.2) Disconnect lockout relay connector (14.3) from lockout relay (14.4).

(6.3) Remove nut (14.5), lockwasher (14.6), washer (14.7), shutdown relay (14.2), lockout relay (14.4) and screw (14.8) from bracket (14.9). Discard lockwasher.

WARNING

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

(6.4) Remove two rivets (14.10) and bracket (14.9) from junction box (4).
(7) Disconnect two quick disconnect terminals (15) from ground strip (16) positions 19 and 20.

(8) Remove two nuts (17), lockwashers (18), washers (19), nylon washers (20), screws (21), and ground strip (16) from junction box (4). Discard lockwashers.

(9) Remove screw (22) and terminal lug (23) from terminal block (24) position 7.

(10) Remove nut (25), lockwasher (26), washer (27), and circuit breaker (28) from junction box (4). Discard lockwasher.

**WARNING**

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

(11) Remove four rivets (29) and panel (30) from junction box (4).
NOTE

Remove plastic cable ties as required.

(12) Remove seven screws (31) and terminal lugs (32) from terminal block (22) positions 5, 8, 9, 10, 12, 13 and 14.

(13) Remove screw (33) and terminal lug (34) from terminal block (22) position 7.

(14) Remove two nuts (35), lockwashers (36), washers (37), screws (38), decal (39), and terminal block (22) from bracket (40). Discard lockwashers.

WARNING

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

(15) Remove four rivets (41) and bracket (40) from junction box (4).
(16) Remove two nuts (42), lockwashers (43), washers (44), screws (45), decal (46), and terminal block (47) from bracket (48). Discard lockwashers.

**WARNING**

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

(17) Remove four rivets (49) and bracket (48) from junction box (4).

c. Assembly.

(1) Install bracket (1) on junction box (2) with four rivets (3).

(2) Install decal (4) and terminal block (5) on bracket (1) with two screws (6), washers (7), lockwashers (8), and nuts (9).

(3) Install bracket (10) on junction box (2) with four rivets (11).

(4) Install decal (12) and terminal block (13) on bracket (10) with two screws (14), washers (15), lockwashers (16), and nuts (17).
(5) Install terminal lug (18) on terminal block (5) position 7 with screw (19).

(6) Install seven terminal lugs (20) on terminal block (5) positions 5, 8, 9, 10, 12, 13, and 14 with seven screws (21).

(7) Install panel (22) on junction box (2) with four rivets (23).

(8) Install circuit breaker (24) on junction box (2) with washer (25), lockwasher (26), and nut (27).

(9) Tighten nut (27) to 25 lb-in. (3 N·m).

(10) Install terminal lug (28) on terminal block (5) position 7 with screw (29).
(11) Install ground strip (30) on junction box (2) with two screws (31), nylon washers (32), washers (33), lockwashers (34), and nuts (35).

(12) Connect two quick disconnect terminals (36) to ground strip (30) positions 19 and 20.

(12.1) Install bracket (36.1) on junction box (2) with two rivets (36.2).

(12.2) Install lockout relay (36.3) and shutdown relay (36.4) on bracket (36.5) with screw (36.6), washer (36.7), lockwasher (36.8), and nut (36.9).

(12.3) Connect lockout relay connector (36.10) to lockout relay (36.3).

(12.4) Connect shutdown relay connector (36.11) to shutdown relay (36.4).

NOTE

Perform steps (12.1) through (12.4) on junction boxes that have had modification kit installed.

(12.1) Install bracket (36.1) on junction box (2) with two rivets (36.2).
NOTE

Perform steps (13) through (16) on junction boxes that have not had modification kit installed.

(13) Install lockout relay (37) and shutdown relay (38) on brackets (39 and 40) with six washers (41), lockwashers (42), and nuts (43).

(14) Install brackets (39 and 40) in junction box (2) with six rivets (44).

(15) Install shrink tubing (45) over ends of five wires (46) and solder ends on shutdown relay (38) positions 1 through 5.

(16) Install shrink tubing (45) over ends of five wires (47) and solder ends on lockout relay (37) positions 1 through 5.
(17) Install diode assembly (48) on junction box (2) with two rivets (49).

(18) Connect three quick disconnect terminals (50) to diode assembly (48).

(19) Apply varnish to three quick disconnect terminals (50).

d. Installation.

(1) Install junction box (1) on mounting stud (2) and three mounting studs (3) with three washers (4), lockwashers (5), and nuts (6).

(2) Install washer (4), lockwasher (5), and terminal lug (7) on mounting stud (2) with nut (6).

(3) Loosen four screws (8) on junction box (1).

(4) Open cover (9) on junction box (1).

(5) Install telescope in solenoid, telescope out solenoid, swing CCW solenoid, and swing CW solenoid cable assembly (10) in junction box (1) with conduit nut (11).
(6) Connect three quick disconnect terminals (12) to ground strip (13) positions 1, 3, and 13.

(7) Install five terminal lugs (14) on terminal block (15) positions 17 through 21 with five screws (16).

(8) Install telescope out lockout solenoid, hoist up lockout solenoid, control lockout solenoid, and boom down lockout solenoid cable assembly (17) in junction box (1) with conduit nut (18).

(9) Connect four quick disconnect terminals (19) to ground strip (13) positions 4, 5, 11, and 12.

(10) Install terminal lug (20) on terminal block (21) position 8 with screw (22).
(11) Install system shutdown solenoid and boom up lockout solenoid cable assembly (24) in junction box (1) conduit nut (25).

(12) Connect two quick disconnect terminals (26) to ground strip (13) positions 8 and 2.

(13) Install two terminal lugs (27) on terminal block (15) position 28 and terminal block (21) position 12 with two screws (28).

(14) Install hoist up solenoid, hoist down solenoid, boom up solenoid, and boom down solenoid cable assembly (29) in junction box (1) with conduit nut (30).
(15) Connect four quick disconnect terminals (31) to ground strip (13) positions 6, 7, 9, and 10.

(16) Install four terminal lugs (32) on terminal block (15) positions 21 through 24 with four screws (33).

(17) Install remote control cable (34) in junction box (1) with four screws (35), lockwashers (36), and nuts (37).

(18) Connect quick disconnect terminal (38) to ground strip (13) position 15.

(19) Install 12 terminal lugs (39) on terminal block (15) positions 17 through 26 and terminal block (21) positions 9 and 14 with 12 screws (40).
(20) Install left proximity sensor cable (41) in junction box (1) with conduit nut (42).

(21) Connect quick disconnect terminal (43) to ground strip (13) position 16.

(22) Install terminal lug (44) on terminal block (21) position 10 with screw (45).

(23) Install crane power cable (46) in junction box (1) with four screws (47), lockwashers (48), and nuts (49).
(24) Connect quick disconnect terminal (50) to ground strip (13) position 18.

(25) Install three terminal lugs (51) on terminal block (21) positions 3, 4, and 5 with three screws (52).

(26) Install overload lockout cable (53) in junction box (1) with four screws (54), lockwashers (55), and nuts (56).

(27) Connect quick disconnect terminal (57) on ground strip (13) position 14.

(28) Install three terminal lugs (58) on terminal block (15) position 25 and 28 and terminal block (21) position 6 with three screws (59).
(29) Install right proximity sensor cable (60) in junction box (1) with conduit nut (61).

(30) Connect quick disconnect terminal (62) to ground strip (13) position 17.

(31) Install two terminal lugs (63) on terminal block (21) position 6 and 11 with two screws (64).

(32) Close cover (9) on junction box (1).

(33) Tighten four screws (8) on junction box (1).

e. **Follow-On Maintenance.**

(1) Connect batteries (para 7-57).

(2) Operate crane and check all crane functions (TM 9-2320-366-10-1).

**End of Task.**
## 7-28. M1089 JUNCTION BOX ASSEMBLY REPLACEMENT/REPAIR

This task covers:

- a. Removal
- b. Disassembly
- c. Assembly
- d. Installation
- e. Follow-On Maintenance

### INITIAL SETUP

**Equipment Conditions**
- Crane erected (TM 9-2320-366-10-1).
- Engine shut down (TM 9-2320-366-10-1).
- Batteries disconnected (para 7-57).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)
- Drill, Portable, Electric (Item 7, Appendix C)
- Drill, Set Twist (Item 6, Appendix C)
- Tool Kit, Blind Rivet (Item 44, Appendix C)
- Tool Kit, Electrical (Item 45, Appendix C)

**Materials/Parts**
- Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
- Insulation Sleeving, Electrical (Item 29, Appendix D)
- Ties, Cable, Plastic (Item 69, Appendix D)
- Varnish, Oil (Item 70, Appendix D)
- Adhesive (Item 5, Appendix D)
- Nut, Conduit (3) (Item 124, Appendix G)
- Nut, Conduit (2) (Item 125, Appendix G)
- Lockwasher (16) (Item 91, Appendix G)
- Lockwasher (4) (Item 94, Appendix G)
- Lockwasher (Item 92, Appendix G)
- Rivet, Blind (Item 255, Appendix G)
- Lockwasher (Item 93, Appendix G)
- Modification Kit, Junction Box (Item 31.1, Appendix D)
- Rag, Wiping (Item 50, Appendix D)

### a. Removal.

**NOTE**

Remove plastic cable ties as required.

1. Loosen four screws (1) on junction box (2).
2. Open cover (3) on junction box (2).
NOTE

Tag wires and connection points prior to disconnecting.

(3) Remove quick disconnect terminal (4) from ground strip (5) position 20.

(4) Remove screw (6) from terminal block (7) position 19.

(5) Remove conduit nut (8) and boom down lockout solenoid cable (9) from junction box (2). Discard conduit nut.

(6) Remove quick disconnect terminal (10) from ground strip (5) position 3.

(7) Remove three screws (11) from terminal block (7) positions 1, 17, and 19.
(8) Remove four nuts (12), lockwashers (13), screws (14) and overload shutdown system cable (15) from junction box (2). Discard lockwashers.

(9) Remove quick disconnect terminal (16) from ground strip (5) position 2.

(10) Remove three screws (17) from terminal block (7) positions 2, 3, and 4.

(11) Remove four nuts (18), lockwashers (19), screws (20) and crane power cable (21) from junction box (2). Discard lockwashers.
(12) Remove two quick disconnect terminals (22) from ground strip (5) positions 14 and 15.

(13) Remove conduit nut (23), telescope out lockout solenoid and hoist up lockout solenoid cable assembly (24) from junction box (2). Discard conduit nut.

(14) Remove quick disconnect terminal (25) from ground strip (5) position 4.

(15) Remove 12 screws (26) from terminal block (7) positions 7 through 18.
(16) Remove four nuts (27), lockwashers (28), screws (29) and left side remote control cable (30) from junction box (2). Discard lockwashers.

(17) Remove four quick disconnect terminals (31) from ground strip (5) positions 16, 17, 18, and 19.

(18) Remove four screws (32) from terminal block (7) positions 13 through 16.

(19) Remove conduit nut (33) and hoist up solenoid, hoist down solenoid, boom up solenoid, and boom down solenoid cable assembly (34) from junction box (2). Discard conduit nut.
(20) Remove two quick disconnect terminals (35) from ground strip (5) positions 9 and 10.

(21) Remove screw (36) from terminal block (7) position 5.

(22) Remove conduit nut (37) and hydraulic system solenoid and boom up lockout solenoid cable assembly (38) from junction box (2). Discard conduit nut.

(23) Remove four quick disconnect terminals (39) from ground strip (5) positions 5, 6, 7, and 8.

(24) Remove four screws (40) from terminal block (7) positions 9 through 12.
(25) Remove conduit nut (41) and telescope in solenoid, telescope out solenoid, swing CCW solenoid, and swing CW solenoid cable assembly (42) from junction box (2). Discard conduit nut.

(26) Remove quick disconnect terminal (43) from ground strip (5) position 1.

(27) Remove four nuts (44), lockwashers (45), screws (46) and right side remote control cable (47) from junction box (2). Discard lockwashers.
(28) Remove four screws (48), lockwashers (49), and washers (50) from junction box (2). Discard lockwashers.

(29) Remove junction box assembly (2) from crane.

b. Disassembly.

NOTE
Tag wires and connection points prior to disconnecting.

(1) Remove three quick disconnect terminals (1) from diode assembly (2).

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

(2) Remove two rivets (3) from diode assembly (2).

(3) Remove diode assembly (2) from junction box (4).
Perform steps (4) through (6) on junction boxes that have not had modification kit installed.

(4) Unsolder five wires (5) from shutdown relay (6).

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

(5) Remove three rivets (7) and bracket (8) from junction box (4).

(6) Remove three nuts (9), lockwashers (10), washers (11), and shutdown relay (6) from bracket (8). Discard lockwashers.

Perform steps (6.1) through (6.3) on junction boxes that have modification kits installed.

(6.1) Disconnect shutdown relay connector (11.1) from shutdown relay (11.2).

(6.2) Remove nut (11.3), lockwasher (11.4), washer (11.5), shutdown relay (11.2) and screw (11.6) from bracket (11.7). Discard lockwasher.
WARNING

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

(6.3) Remove two rivets (11.8) and bracket (11.7) from junction box (4).

(7) Remove quick disconnect terminal (12) from ground strip (13) position 13.

(8) Remove two nuts (14), lockwashers (15), washers (16), screws (17), nylon washers (18), and ground strip (13) from junction box (4). Discard lockwashers.
(9) Remove four screws (19) from terminal block (20) positions 1, 2, 5 and 6.

(10) Remove nut (21), lockwasher (22), and lockring (23) from circuit breaker (24). Discard lockwasher.

(11) Remove circuit breaker (24) from junction box (4).

(12) Remove two screws (25), lockwashers (26), and terminal lugs (27) from circuit breaker (24). Discard lockwashers.

**WARNING**

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

(13) Remove four rivets (28) and panel (29) from junction box (4).
(14) Remove two screws (30) from terminal block (20) positions 7 and 8.

(15) Remove two nuts (31), lockwashers (32), washers (33), screws (34), decal (35), and terminal block (20) from bracket (36). Discard lockwashers.

**WARNING**

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

(16) Remove four rivets (37) and bracket (36) from junction box (4).
c. Assembly.

(1) Install bracket (1) on junction box (2) with four rivets (3).

(2) Install decal (4) and terminal block (5) on bracket (1) with two screws (6), washers (7), lockwashers (8), and nuts (9).

(3) Install two terminal lugs (10) on terminal block (5) positions 7 and 8 with two screws (11).

(4) Install panel (12) on junction box (2) with four rivets (13).
(5) Install two terminal lugs (14) on circuit breaker (15) with two lockwashers (16) and screws (17).

(6) Position circuit breaker (15) in junction box (2) with lockring (18), lockwasher (19), and nut (20).

(7) Tighten nut (20) to 25 lb-in. (3 N·m).

(8) Install four terminal lugs (21) on terminal block (5) positions 1, 2, 5 and 6 with four screws (22).

(9) Install ground strip (23) on junction box (2) with two nylon washers (24), screws (25), washers (26), lockwashers (27), and nuts (28).

(10) Install quick disconnect terminal (29) in ground strip (23) position 13.
7-28. M1089 JUNCTION BOX ASSEMBLY REPLACEMENT/REPAIR (CONT)

NOTE

Perform steps (10.1) through (10.3) on junction boxes that have had modification kit installed.

(10.1) Install bracket (29.2) on junction box (2) with two rivets (29.8).

(10.2) Install shutdown relay (29.1) on bracket (29.2) with screw (29.3), washer (29.4), lockwasher (29.5) and nut (29.6).

(10.3) Connect shutdown relay connector (29.7) to shutdown relay (29.1).
**NOTE**

Perform steps (11) through (14) on junction boxes that have not had modification kit installed.

(11) Install shutdown relay (30) on bracket (31) with three washers (32), lockwashers (33), and nuts (34).

(12) Install bracket (31) on junction box (2) with three rivets (35).

(13) Install shrink tubing (36) over ends of five wires (37) and solder ends on shutdown relay (30) positions 1 through 5.

(14) Shrink the tubing over ends of all relay pins.

(15) Install diode assembly (38) on junction box (2) with two rivets (39).

(16) Connect three quick disconnect terminals (40) on diode assembly (38).

(17) Apply varnish to quick disconnect terminals (40).
d. Installation.

(1) Install junction box (1) on crane with four washers (2), lockwashers (3), and screws (4).

(2) Loosen four screws (5) on junction box (1).

(3) Open cover (6) on junction box (1).

(4) Install right side remote control cable (7) in junction box (1) with four screws (8), lockwashers (9), and nuts (10).

(5) Install quick disconnect terminal (11) on ground strip (12) position 1.
(6) Install telescope in solenoid, telescope out solenoid, swing CCW solenoid, and swing CW solenoid cable assembly (13) in junction box (1) with conduit nut (14).

(7) Install four quick disconnect terminals (15) on ground strip (12) positions 5, 6, 7, and 8.

(8) Install four terminal lugs (16) on terminal block (17) positions 9 through 12 with four screws (18).

(9) Install hydraulic system solenoid and boom up lockout solenoid cable assembly (19) in junction box (1) with conduit nut (20).
(10) Install quick disconnect terminals (21) on ground strip (12) positions 9 and 10.

(11) Install terminal lug (22) on terminal block (17) position 5 with screw (23).

(12) Install hoist up solenoid, hoist down solenoid, boom up solenoid, and boom down solenoid cable assembly (24) in junction box (1) with conduit nut (25).

(13) Install four quick disconnect terminals (26) on ground strip (12) positions 16, 17, 18, and 19.

(14) Install four terminal lugs (27) on terminal block (17) positions 13 through 16 with four screws (28).
(15) Install left side remote control cable (29) in junction box (1) with four screws (30), lockwashers (31), and nuts (32).

(16) Install quick disconnect terminal (33) on ground strip (12) position 4.

(17) Install terminal lugs (34) on terminal block (17) positions 7 through 18 with 12 screws (35).

(18) Install telescope out lockout solenoid, and hoist up lockout solenoid cable assembly (36) in junction box (1) with conduit nut (37).
(19) Install quick disconnect terminals (38) on ground strip (12) positions 14 and 15.

(20) Install crane power cable (39) in junction box (1) with four screws (40), lockwashers (41), and nuts (42).

(21) Install quick disconnect terminal (43) on ground strip (12) position 2.

(22) Install three terminal lugs (44) on terminal block (17) positions 2 through 4 with three screws (45).
(23) Install overload shutdown system cable (46) in junction box (1) with four screws (47), lockwashers (48), and nuts (49).

(24) Install quick disconnect terminal (50) on ground strip (12) position 3.

(25) Install four terminal lugs (51) on terminal block (17) positions 1, 17 and 19 with three screws (52).

(26) Install boom down lockout solenoid cable (53) in junction box (1) with conduit nut (54).
(27) Install quick disconnect terminal (55) on ground strip (12) position 20.

(28) Install terminal lug (56) on terminal block (17) position 19 with screw (57).

(29) Close cover (58) on junction box (1).

(30) Tighten four screws (59) on junction box (1).

e. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Operate crane and check all crane functions (TM 9-2320-366-10-1).

End of Task.
# 7-29. SHUNT REPLACEMENT

This task covers:

- a. Removal
- b. Installation
- c. Follow-On Maintenance

## INITIAL SETUP

**Equipment Conditions**
- Spare tire lowered (TM 9-2320-366-10-2).
- Batteries disconnected (para 7-57).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)

**Materials/Parts**
- Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
- Lockwasher (2) (Item 86, Appendix G)
- Lockwasher (2) (Item 87, Appendix G)
- Nut, Self-Locking (2) (Item 150, Appendix G)

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a. **Removal.**

(1) Loosen clamp (1) on air hose (2).

(2) Remove air hose (2) from intake air cleaner boot (3).

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**NOTE**

Tag wires and connection points prior to disconnecting.

(3) Remove screw (4), lockwasher (5), and terminal lug TL52 (6) from shunt (7). Discard lockwasher.

(4) Remove screw (8), lockwasher (9), and terminal lug TL45 (10) from shunt (7). Discard lockwasher.
(5) Remove screw (11), lockwasher (12), washer (13), and terminal lug TL51 (14) from shunt (7). Discard lockwasher.

(6) Remove screw (15), lockwasher (16), washer (17), and terminal lug TL38 (18) from shunt (7). Discard lockwasher.

(7) Remove two self-locking nuts (19), screws (20), and shunt (7) from spare tire retainer (21). Discard self-locking nuts.

b. Installation.

(1) Install shunt (1) on spare tire retainer (2) with two screws (3) and self-locking nuts (4).
(2) Install terminal lug TL38 (5) on shunt (1) with washer (6), lockwasher (7), and screw (8).

(3) Install terminal lug TL51 (9) on shunt (1) with washer (10), lockwasher (11), and screw (12).

(4) Install terminal lug TL45 (13) on shunt (1) with lockwasher (14) and screw (15).

(5) Install terminal lug TL52 (16) on shunt (1) with lockwasher (17) and screw (18).

(6) Position air hose (19) on intake air cleaner boot (20) with clamp (21).

(7) Tighten clamp (21) to 36-48 lb-in. (4-5 N·m).
c. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Raise spare tire (TM 9-2320-366-10-2).

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

(4) Check VOLTS gage for charge indication (TM 9-2320-366-10-1).

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

End of Task.
# 7-30. 100 AMP REVERSE POLARITY RELAY REPLACEMENT

This task covers:

a. Removal  
b. Installation  
c. Follow-On Maintenance

## INITIAL SETUP

### Equipment Conditions
Spare tire lowered (TM 9-2320-366-10-2).  
Batteries disconnected (para 7-57).

### Tools and Special Tools
- Tool Kit, Genl Mech (Item 46, Appendix C)  
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)  
- Socket Set, Socket Wrench (Item 34, Appendix C)

### Materials/Parts
- Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)  
- Lockwasher (4) (Item 95, Appendix G)  
- Washer, Spring (6) (Item 290, Appendix G)  
- Nut, Self-Locking (6) (Item 165, Appendix G)

## a. Removal.

**NOTE**

Tag wires and connection points prior to disconnecting.

1. Loosen clamp (1) on intake air cleaner boot (2).
2. Remove intake air cleaner boot (2) from intake air cleaner housing (3).
3. Lift terminal cover (4) on terminal lugs TL61 (5) and TL47 (6).
4. Remove nut (7), lockwasher (8) and terminal lugs TL61 (5) and TL47 (6) from 100 amp reverse polarity relay (9). Discard lockwasher.
5. Lift dust boot (10) on terminal lug TL44 (11).
6. Remove nut (12), lockwasher (13), and terminal lug TL44 (11) from 100 amp reverse polarity relay (9). Discard lockwasher.
(7) Lift dust boot (14) on terminal lug TL80 (15).

(8) Remove nut (16), lockwasher (17), and terminal lug TL80 (15) from 100 amp reverse polarity relay (9). Discard lockwasher.

(9) Lift terminal cover (18) on terminal lugs TL1 (19), TL37 (20) and TL36 (21).

(10) Remove nut (22), lockwasher (23), and terminal lugs TL1 (19), TL37 (20), and TL36 (21) from 100 amp reverse polarity relay (9). Discard lockwasher.

(11) Remove six self-locking nuts (24), spring washers (25), screws (26), and 100 amp reverse polarity relay (9) from bracket (27). Discard spring washers and self-locking nuts.

b. Installation.

(1) Position 100 amp reverse polarity relay (1) on bracket (2) with six screws (3), spring washers (4), and self-locking nuts (5).

(2) Tighten six screws (3) to 60-72 lb-in. (7-8 N·m).
(3) Position terminal lugs TL36 (6), TL37 (7), and TL1 (8) on 100 amp reverse polarity relay (1) with lockwasher (9) and nut (10).

(4) Tighten nut (10) to 120-144 lb-in. (14-16 N·m).

(5) Position terminal cover (11) on terminal lugs TL36 (6), TL37 (7), and TL1 (8).

(6) Position terminal lug TL80 (12) on 100 amp reverse polarity relay (1) with lockwasher (13) and nut (14).

(7) Tighten nut (14) to 120-144 lb-in. (14-16 N·m).

(8) Position dust boot (15) on terminal lug TL80 (12).

(9) Position terminal lug TL44 (16) on 100 amp reverse polarity relay (1) with lockwasher (17) and nut (18).

(10) Tighten nut (18) to 120-144 lb-in. (14-16 N·m).

(11) Position dust boot (19) on terminal lug TL44 (16).

(12) Position terminal lug TL47 (20) and TL61 (21) on 100 amp reverse polarity relay (1) with lockwasher (22) and nut (23).

(13) Tighten nut (23) to 120-144 lb-in. (14-16 N·m).

(14) Position terminal cover (24) on terminal lugs TL47 (20) and TL61 (21).
(15) Position intake air cleaner boot (25) on intake air cleaner housing (26) with clamp (27).

(16) Tighten clamp (27) to 36-48 lb-in. (4-5 N·m).

c. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Raise spare tire (TM 9-2320-366-10-2).

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

(4) Check VOLTS gage for charge indication (TM 9-2320-366-10-1).

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

End of Task.
7-31. FREQUENCY ECU REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Instrument panel assembly removed for access (para 7-15).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

a. Removal.

(1) Disconnect frequency ECU connector (1) from connector PX26 (2).

(2) Remove two screws (3) and frequency ECU (4) from bracket (5).

(3) Remove two nuts (6), washers (7), screws (8), washers (9), and bracket (5) from dashboard (10).
b. Installation.

(1) Install bracket (1) on dashboard (2) with two washers (3), screws (4), washers (5), and nuts (6).

(2) Install frequency ECU (7) on bracket (1) with two screws (8).

(3) Connect frequency ECU connector (9) to connector PX26 (10).

c. Follow-On Maintenance.

Install instrument panel assembly (para 7-15).

End of Task.
7-32. REMOTE CONTROL UNIT REPAIR

This task covers:

a. Controller Removal  
b. Controller Installation  
c. Toggle Switch Removal  
d. Toggle Switch Installation  
e. Harness Removal  
f. Harness Installation  
g. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions

MHC remote control unit removed (TM 9-2320-366-10-1 or TM 9-2320-366-10-2).

Tools and Special Tools

Tool Kit, Genl Mech (Item 46, Appendix C)  
Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)

Materials/Parts

Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)  
Adhesive (Item 5, Appendix D)  
Nut, Self-Locking (4) (Item 175, Appendix G)

a. Controller Removal.

**NOTE**

All four controllers are removed the same way. Boom Up/Down controller shown.

1. Remove four self-locking nuts (1) from boom up/down controller (2). Discard self-locking nuts.
2. Remove boom up/down controller (2) from REMOTE CONTROL UNIT (3) until connector (4) is accessible.
3. Disconnect connector (4) from boom up/down controller (2).
4. Remove adhesive from seating surface (5).
5. Loosen jam nut (6) on boom up/down controller (2).
6. Remove knob (7) from boom up/down controller (2).
7. Remove jam nut (6) from boom up/down controller (2).
b. Controller Installation.

NOTE

All four controllers are installed the same way. Boom Up/Down controller shown.

(1) Install jam nut (1) on boom up/down controller (2).

(2) Install knob (3) on boom up/down controller (2).

(3) Tighten jam nut (1) against knob (3).

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.

(4) Apply adhesive to seating surface (4).

(5) Connect connector (5) to boom up/down controller (2).

(6) Position boom up/down controller (2) in REMOTE CONTROL UNIT (6).

(7) Apply adhesive to the first 2 to 5 threads of mounting studs (7).

(8) Position four self-locking nuts (8) on boom up/down controller (2).

(9) Tighten four self-locking nuts (8) to 14 lb-in. (2 N·m).

NOTE

Adhesive requires 24 hours to cure.

(10) Spread excess adhesive over heads of four self-locking nuts (8).
c. Toggle Switch Removal.

**NOTE**

One controller needs to be removed for access to toggle switch. Boom Up/Down controller shown.

1. Remove four self-locking nuts (1) from boom up/down controller (2). Discard self-locking nuts.

2. Remove boom up/down controller (2) from REMOTE CONTROL UNIT (3) until connector (4) is accessible.

3. Disconnect connector (4) from boom up/down controller (2).

4. Remove adhesive from seating surface (5).

5. Remove nut (6), nylon washer (7), and switch guard cover (8) from toggle switch (9).

6. Remove toggle switch (9) from REMOTE CONTROL UNIT (3) until four wires (10) are accessible.

**NOTE**

Tag wires and connection points prior to disconnecting.

7. Disconnect four wires (10) from toggle switch (9).
d. Toggle Switch Installation.

(1) Connect four wires (1) to toggle switch (2).

**NOTE**

Keyway of toggle switch aligns with keyway slot in mounting hole.

(2) Position toggle switch (2) in mounting hole (3).

(3) Install switch guard cover (4) on toggle switch (2) with nylon washer (5) and nut (6).

**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.

(4) Apply adhesive to seating surface (7).

(5) Connect connector (8) to boom up/down controller (9).

(6) Position boom up/down controller (9) in REMOTE CONTROL UNIT (10).
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.

(7) Apply adhesive to the first 2 to 5 threads of mounting studs (11).

(8) Position four self-locking nuts (12) on boom up/down controller (9).

(9) Tighten four self-locking nuts (12) to 14 lb-in. (2 N·m).

NOTE

Adhesive requires 24 hours to cure.

(10) Spread excess adhesive over heads of four self-locking nuts (12).

e. Harness Removal.

NOTE

• All four controllers are removed for harness removal.

• All four controllers are removed the same way. Boom Up/Down controller shown.

(1) Remove four self-locking nuts (1) from boom up/down controller (2). Discard self-locking nuts.

(2) Remove boom up/down controller (2) from REMOTE CONTROL UNIT (3) until connector (4) is accessible.

(3) Disconnect connector (4) from boom up/down controller (2).

(4) Remove adhesive from seating surface (5).
(5) Remove nut (6), nylon washer (7), and switch guard cover (8) from toggle switch (9).

(6) Remove toggle switch (9) from REMOTE CONTROL UNIT (3) until four wires (10) are accessible.

**NOTE**
Tag wires and connection points prior to disconnecting.

(7) Disconnect four wires (10) from toggle switch (9).

(8) Disconnect harness ground wire (11) from ground tab (12).

(9) Remove dust cap (13) from receptacle (14).

(10) Remove nut (15) and washer (16) from receptacle (14).

(11) Remove harness (17) from REMOTE CONTROL UNIT (3).

Change 1  7-195
f. Harness Installation.

(1) Position harness (1) in REMOTE CONTROL UNIT (2).

(2) Install receptacle (3) with washer (4) and nut (5) on REMOTE CONTROL UNIT (2).

(3) Connect harness ground wire (6) to ground tab (7).

(4) Install dust cap (8) on receptacle (3).

(5) Connect four wires (9) to toggle switch (10).

**NOTE**

Keyway of toggle switch aligns with keyway slot in mounting hole.

(6) Position toggle switch (10) in mounting hole (11).

(7) Install switch guard cover (12) on toggle switch (10) with nylon washer (13) and nut (14).
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.

NOTE

All four controllers are installed the same way. Boom Up/Down controller shown.

(8) Apply adhesive to seating surface (15).

(9) Connect connector (16) to boom up/down controller (17).

(10) Position boom up/down controller (17) in REMOTE CONTROL UNIT (2).

(11) Apply adhesive to the first 2 to 5 threads of mounting studs (18).

(12) Position four self-locking nuts (19) on boom up/down controller (17).

(13) Tighten four self-locking nuts (19) to 14 lb-in. (2 N·m).

NOTE

Adhesive requires 24 hours to cure.

(14) Spread excess adhesive over heads of four self-locking nuts (19).

g. Follow-On Maintenance.

Operate crane using REMOTE CONTROL UNIT (TM 9-2320-366-10-1 or TM 9-2320-366-10-2).

End of Task.
7-33. M1089 TERMINAL BLOCK REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

Material/Parts
Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
Nut, Self-Locking (2) (Item 133, Appendix G)
Lockwasher (8) (Item 100, Appendix G)
Nut, Self-Locking (2) (Item 128, Appendix G)

a. Removal.

(1) Remove two self-locking nuts (1), four washers (2), and two screws (3) from top cover (4). Discard self-locking nuts.

(2) Remove eight screws (5), lockwashers (6), washers (7), and top cover (4) from control panel (8). Discard lockwashers.

NOTE

- Remove plastic cable ties as required.
- Tag and record wires, terminal block jumpers and connection points prior to disconnecting.

(3) Loosen screws (9) on top of terminal blocks (10).

(4) Remove wires (11) from top of terminal blocks (10).

(5) Remove five terminal block jumpers (12) from top of terminal blocks (10).
(6) Remove two self-locking nuts (13), screws (14), washers (15), and channel (16) from winch assembly (17). Discard self-locking nuts.

(7) Loosen screws (18) on bottom of terminal blocks (10).

(8) Remove wires (19) from bottom of terminal blocks (10).
(9) Loosen screw (20) in two clamps (21).

**NOTE**

Record position of terminal blocks prior to removal.

(10) Remove two clamps (21), end cap (22) and 28 terminal blocks (10) from channel (16).

---

**b. Installation.**

(1) Label 28 terminal blocks (1) as recorded in removal.

(2) Position 28 terminal blocks (1), end cap (2) on channel (3) with two clamps (4).

(3) Tighten screw (5) in two clamps (4).
(4) Position wires (6) on bottom of terminal blocks (1) as recorded in removal.

(5) Tighten screws (7) on bottom of terminal blocks (1).

(6) Install channel (3) on winch assembly (8) with two washers (9), screws (10), and self-locking nuts (11).

(7) Position five terminal block jumpers (12) on top of terminal blocks (1) as recorded in removal.

**NOTE**

Install plastic cable ties as required.

(8) Position wires (13) on top of terminal blocks (1) as recorded in removal.

(9) Tighten screws (14) on top of terminal blocks (1).
(10) Install top cover (15) on control panel (16) with eight washers (17), lockwashers (18), and screws (19).

(11) Install four washers (20), two screws (21), and self-locking nuts (22) in top cover (15).

c. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Operate all wrecker functions and check for proper operation (TM 9-2320-366-10-1).

End of Task.
7-34. M1089 WRECKER CONTROL PANEL TOGGLE SWITCH REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Tool Kit, Electrical (Item 45, Appendix C)
Heater, Gun Type, Electric (Item 24, Appendix B)

Material/Parts
Dispenser, Pressure Sensitive Adhesive Tape
(Item 20, Appendix D)
Insulation Sleeving, Electrical (Item 29, Appendix D)
Lockwasher (8) (Item 100, Appendix G)
Lockwasher (Item 74, Appendix G)
Nut, Self-Locking (2) (Item 134, Appendix G)
Splice, Conductor (2) (Item 275, Appendix G)
Splice, Conductor (Item 276, Appendix G)

a. Removal.

NOTE
There are seven toggle switches on the WRECKER CONTROL PANEL. Steps (1 and 2) apply to all seven toggle switches.

(1) Remove eight screws (1), lockwashers (2), and washers (3) from control panel top cover (4). Discard lockwashers.

(2) Remove two self-locking nuts (5), four washers (6), two screws (7), and control panel top cover (4) from WRECKER CONTROL PANEL (8). Discard self-locking nuts.
NOTE

- Steps (3 and 4) apply only to the MAIN WINCH LH FREE SPOOL and MAIN WINCH RH FREE SPOOL toggle switches. MAIN WINCH LH FREE SPOOL toggle switch shown.

- Tag wires and connection points prior to disconnecting.

(3) Remove nut (9), lockwasher (10), switch cover (11), nut (12), tab washer (13), and MAIN WINCH LH FREE SPOOL toggle switch (14) from WRECKER CONTROL PANEL (8). Discard lockwasher.

(4) Remove two screws (15) and terminal lugs (16) from MAIN WINCH LH FREE SPOOL toggle switch (14).

CAUTION

Switch covers contain an integral nut. Do not attempt to pull switch cover off toggle switch. Failure to comply will result in damage to equipment.

NOTE

Steps (5 through 9) apply to the remaining five toggle switches. Two toggle switches have three electrical connections, the remaining three have only two electrical connections. EMERGENCY SHUTDOWN toggle switch shown.

(5) Remove switch cover nut (17) and EMERGENCY SHUTDOWN toggle switch (18) from WRECKER CONTROL PANEL (8).
(6) Disconnect conductor splice (19) from two wires (20).

(7) Remove conductor splice (21) and EMERGENCY SHUTDOWN toggle switch (18) from wire (22).

(8) Remove conductor splices (19 and 21) from EMERGENCY SHUTDOWN toggle switch (18). Discard conductor splices.

b. Installation.

NOTE
Steps (1 through 6) apply to the remaining five toggle switches. Two toggle switches have three electrical connections, the remaining three have only two electrical connections. EMERGENCY SHUTDOWN toggle switch shown.

(1) Position insulation sleeving (1) over two wires (2).

(2) Position insulation sleeving (1) over wire (3).

(3) Install conductor splices (4 and 5) on EMERGENCY SHUTDOWN toggle switch (6).

(4) Install conductor splice (5) on wire (3).

(5) Install conductor splice (4) on two wires (2).
(6) Install EMERGENCY SHUTDOWN toggle switch (6) in WRECKER CONTROL PANEL (7) with switch cover nut (8).

NOTE
Steps (7) and (8) apply only to the MAIN WINCH LH FREE SPOOL and MAIN WINCH RH FREE SPOOL toggle switches. MAIN WINCH LH FREE SPOOL toggle switch shown.

(7) Install two terminal lugs (9) and screws (10) on MAIN WINCH LH FREE SPOOL toggle switch (11).

(8) Install MAIN WINCH LH FREE SPOOL toggle switch (11) in WRECKER CONTROL PANEL (7) with tab washer (12), nut (13), switch cover (14), lockwasher (15), and nut (16).
(9) Install control panel top cover (17) on WRECKER CONTROL PANEL (7) with four washers (18), two screws (19), and self-locking nuts (20).

(10) Install eight washers (21), lockwashers (22), and screws (23) in control panel top cover (17).

c. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Operate function of toggle switch that was replaced (TM 9-2320-366-10-1) and check for proper operation.

End of Task.
7-35. M1089 WRECKER REMOTE CONTROL REPAIR

This task covers:

a. Disassembly  
b. Assembly  
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
REMOTE CONTROL assembly removed (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)  
Tool Kit, Electrical (Item 45, Appendix C)

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)  
Ties, Cable, Plastic (Item 69, Appendix D)  
Insulation Sleeving, Electrical (Item 29, Appendix D)  
Nut, Conduit (Item 123, Appendix G)

a. Disassembly.

(1) Open cover (1) on REMOTE CONTROL (2).

(2) Remove four screws (3), washers (4), and panel (5) from REMOTE CONTROL (2).
NOTE

- Remove plastic cable ties as required.
- All 8 switches are removed the same way. UNDERLIFT FOLD switch shown.

(3) Remove switch cover nut (6) and switch (7) from panel (5).

NOTE

- Cut cable wires at heat shrink when removing switch.
- Tag wires and connection points prior to disconnecting.

(4) Remove switch (7) from cable (8).

(5) Perform steps (3) and (4) on remaining seven switches.

(6) Remove conduit nut (9) and cable (8) from remote control box (2). Discard conduit nut.

(7) Remove seal (10) from adapter (11).

(8) Remove nut (12) from adapter (11).

(9) Remove adapter (11), seal (13), grip (14), and nut (12) from cable (8).
b. Assembly.

(1) Position nut (1), grip (2), seal (3), and adapter (4) on cable (5).

(2) Install seal (6) on adapter (4).

(3) Position cable (5) in remote control box (7).

(4) Position conduit nut (8) on cable (5).

NOTE

Perform steps (5) through (7) for all switches.

(5) Position tubing (9) on switch (10).

(6) Attach switch (10) to cable (5) with splice connector (11).

(7) Shrink tubing (9) over splice connector (11).

(8) Install switch (10) in panel (12) with switch cover nut (13).
(9) Install adapter (4) in REMOTE CONTROL (7) with conduit nut (8).

(10) Install seal (3) and grip (2) on adapter (4) with nut (1).

(11) Install panel (12) on REMOTE CONTROL (7) with four washers (14) and screws (15).

(12) Close cover (16) on REMOTE CONTROL (7).

c. Follow-On Maintenance.

Test operate wrecker with REMOTE CONTROL (TM 9-2320-366-10-1).

End of Task.
7-36. BACKUP LIGHT ASSEMBLY REPLACEMENT/REPAIR

This task covers:

a. M1088 Backup Light Assembly Removal
b. M1088 Backup Light Assembly Installation
c. M1089 Backup Light Assembly Removal
d. M1089 Backup Light Assembly Installation
e. Deleted
f. Deleted
g. M1083/M1084/M1085/M1086/M1090/M1092/M1093/M1094/M1096 Backup Light Assembly Removal
h. M1083/M1084/M1085/M1086/M1090/M1092/M1093/M1094/M1096 Backup Light Assembly Installation
i. Disassembly
j. Assembly
k. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)

Materials/Parts
Lockwasher (2) (Item 96, Appendix G)
Lockwasher (4) (Item 114, Appendix G)
Packing, Preformed (Item 215, Appendix G)
Nut, Self-Locking (4) (Item 168, Appendix G)


(1) Disconnect backup light connector (1) from connector P87 (2).

(2) Remove two screws (3), lockwashers (4), terminal lug TL17 (5), and backup light assembly (6) from bracket (7). Discard lockwashers.

b. M1088 Backup Light Assembly Installation.

(1) Position terminal lug TL17 (5), two lockwashers (4), screws (3), and backup light assembly (6) on bracket (7).

(2) Tighten two screws (3) to 19-24 lb-ft (26-32 N·m).

(3) Connect connector P87 (2) to backup light connector (1).
c. M1089 Backup Light Assembly Removal.

(1) Disconnect backup light connector (1) from connector P87 (2).

(2) Remove screw (3), lockwasher (4), and terminal lug TL47 (5) from bracket (6). Discard lockwasher.

(3) Remove screw (7), lockwasher (8), and backup light assembly (9) from bracket (6). Discard lockwasher.

(4) Remove two self-locking nuts (10), lockwashers (11), screws (12), and bracket (6) from bracket (13). Discard lockwashers and self-locking nuts.

d. M1089 Backup Light Assembly Installation.

(1) Position bracket (1) on bracket (2) with two lockwashers (3), screws (4), and self-locking nuts (5).

(2) Tighten two screws (4) to 35-43 lb-ft (48-58 N·m).
(3) Position backup light assembly (6) on bracket (1) with lockwasher (7) and screw (8).

(4) Position terminal lug TL47 (9), lockwasher (10), and screw (11) in backup light assembly (6).

(5) Tighten screws (8 and 11) to 35-42 lb-ft (48-57 N·m).

(6) Connect backup light connector (12) to connector P87 (13).

e. Deleted
7-36. BACKUP LIGHT ASSEMBLY REPLACEMENT/REPAIR (CONT)

f. Deleted
g. M1083/M1084/M1085/M1086/M1090/M1092/M1093/M1094/M1096 Backup Light Assembly Removal.

(1) Disconnect backup light connector (1) from connector P87 (2).

(2) Remove two screws (3), lockwashers (4), terminal lug TL17 (5), and backup light assembly (6) from taillight carrier (7). Discard lockwashers.

h. M1083/M1084/M1085/M1086/M1090/M1092/M1093/M1094/M1096 Backup Light Assembly Installation.

(1) Position terminal lug TL17 (5), two lockwashers (4), screws (3), and backup light assembly (6) on taillight carrier (7).

(2) Tighten two screws (3) to 35-42 lb-ft (48-57 N·m).

(3) Connect backup light connector (1) to connector P87 (2).

i. Disassembly.

(1) Loosen six screws (1) on lens (2).

(2) Remove lens (2) from housing (3).

(3) Remove preformed packing (4) from housing (3). Discard preformed packing.

(4) Remove two lamps (5) from sockets (6).
j. Assembly.

(1) Install two lamps (1) in sockets (2).

(2) Install preformed packing (3) and lens (4) on housing (5) with six screws (6).

k. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Check backup light operation (TM 9-2320-366-10-1).

End of Task.
7-37. BLACKOUT DRIVE LIGHT REPLACEMENT/REPAIR

This task covers:

a. Removal
b. Disassembly
c. Assembly
d. Installation
e. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 34, Appendix C)

Materials/Parts
Lockwasher (Item 96, Appendix G)
Packing, Preformed (Item 189, Appendix G)

a. Removal.

(1) Disconnect connector P17 (1) from blackout drive light (2).

(2) Remove nut (3), lockwasher (4), washer (5), washer (6), and terminal lug TL79 (7) from blackout drive light (2). Discard lockwasher.

(3) Remove blackout drive light (2) from bumper (8).

b. Disassembly.

(1) Loosen three screws (1) on cover (2).

(2) Remove cover (2) and preformed packing (3) from housing (4). Discard preformed packing.

(3) Remove lamp (5) from socket (6).
c. Assembly.

(1) Install lamp (1) in socket (2).

(2) Install preformed packing (3) and cover (4) on housing (5) with three screws (6).

d. Installation.

(1) Position blackout drive light (1) on bumper (2).

(2) Position terminal lug TL79 (3), washer (4), washer (5), lockwasher (6), and nut (7) on blackout drive light (1).

(3) Tighten nut (7) to 156-192 lb-in. (18-22 N·m).

(4) Connect connector P17 (8) to back of blackout drive light (1).

e. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Check blackout drive light operation (TM 9-2320-366-10-1).

End of Task.
7-38. CLEARANCE AND MARKER LIGHT ASSEMBLIES REPLACEMENT

This task covers:

a. Cab Clearance and Marker Light Removal  
b. Cab Clearance and Marker Light Installation  
c. Chassis Clearance and Marker Light Removal  
d. Chassis Clearance and Marker Light Installation  
e. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

Materials/Parts
Adhesive (Item 5, Appendix D)  
Lockwasher (2) (Item 82, Appendix G)

a. Cab Clearance and Marker Light Removal.

NOTE
All cab clearance and marker lights are removed the same way. Front left marker light shown.

(1) Remove two screws (1) and lens cover (2) from base (3).

(2) Remove two clips (4) and lens (5) from lens cover (2).

(3) Remove lamp (6) from socket (7).

(4) Remove four screws (8) from base (3).
CAUTION

Do not let wires slip through hole and into cab structure. If wires slip into cab structure, vehicle will need further disassembly to retrieve wires.

(5) Disconnect marker light connector (9) from connector P50 (10).

(6) Remove nut (11), lockwasher (12), terminal lug (13), lockwasher (14), base (3), and gasket (15) from vehicle. Discard lockwashers.

(7) Remove nut (16), and screw (17) from base (3).

b. Cab Clearance and Marker Light Installation.

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.

(1) Apply adhesive to threads of screw (1).

(2) Install screw (1) in base (2) with nut (3).

NOTE

Clearance and marker lights originally come with cork gaskets. Discard cork gaskets and replace with rubber gaskets PN 12421469.

(3) Install gasket (4) on base (2).

(4) Connect marker light connector (5) to connector P50 (6).

(5) Install lockwasher (7), terminal lug (8), lockwasher (9), and nut (10) on back of base (2).
(6) Install base (2) on vehicle with four screws (11).

(7) Install lamp (12) in socket (13).

(8) Install lens (14) in lens cover (15) with two clips (16).

(9) Install lens cover (15) on base (2) with two screws (17).

c. Chassis Clearance and Marker Light Removal.

**NOTE**

All chassis clearance and marker lights are removed the same way. Right rear marker light shown.

(1) Remove two screws (1) and lens cover (2) from base (3).

(2) Remove two clips (4) and lens (5) from lens cover (2).
(3) Remove lamp (6) from socket (7).

(4) Disconnect marker light connector (8) from connector P54 (9).

(5) Remove nut (10), lockwasher (11), terminal lug (12), and lockwasher (13) from screw (14). Discard lockwashers.

NOTE
Perform step (6) on three center clearance lights on all models except M1084/M1086 and M1089.

(6) Remove four nuts (15), washers (16), screws (17), washers (18), base (3), and gasket (19) from vehicle.

NOTE
Perform step (7) on three center clearance lights on M1084/M1086 and M1089.

(7) Remove four nuts (15), washers (16), screws (17), base (3), and gasket (19) from vehicle.

(8) Remove nut (20) and screw (14) from base (3).
d. Chassis Clearance and Marker Light Installation.

**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.

1. Apply adhesive to threads of screw (1).
2. Install screw (1) in base (2) with nut (3).

**NOTE**

Clearance and marker lights originally come with cork gaskets. Discard cork gaskets and replace with rubber gaskets PN 12421469.

3. **DELETED**

**NOTE**

Perform step (4) on three center clearance lights on M1084/M1086 and M1089.

4. Install gasket (4) and base (2) on vehicle with four screws (5), washers (6), and nuts (7).

**NOTE**

Perform step (5) on three center clearance lights on all models except M1084/M1086 and M1089.

5. Install gasket (4) and base (2) on vehicle with four washers (8), screws (5), washers (6), and nuts (7).
(6) Install lockwasher (9) and terminal lug (10) on screw (1) with lockwasher (11) and nut (12).

(7) Connect marker light connector (13) to connector P54 (14).

(8) Install lamp (15) in socket (16).

(9) Install lens (17) on lens cover (18) with two clips (19).

(10) Install lens cover (18) on base (2) with two screws (20).

e. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Check clearance and marker light operation (TM 9-2320-366-10-1).

End of Task.
7-39. COMPOSITE TAILLIGHT ASSEMBLY REPLACEMENT/REPAIR

This task covers:

a. M1088 Composite Taillight Assembly Removal
b. M1088 Composite Taillight Assembly Installation
c. M1089 Composite Taillight Assembly Removal
d. M1089 Composite Taillight Assembly Installation
e. Deleted
f. Deleted
g. Deleted
h. Deleted
i. Composite Taillight Assembly Removal (All Models Except M1088/M1089)
j. Composite Taillight Assembly Installation (All Models Except M1088/M1089)
k. Disassembly
l. Assembly
m. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).

Tools and Special Tools
Cookie Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
Ties, Cable, Plastic (Item 69, Appendix D)
Lockwasher (2) (Item 96, Appendix G)
Packing, Preformed (Item 191, Appendix G)

NOTE

- Tag wires and connection points prior to disconnecting.
- Remove plastic cable ties as required.
- Right side connectors are P61, P62, P63, P64, 22-460, 24, 23, 21, and TL 21.

a. M1088 Composite Taillight Assembly Removal.

NOTE

Left and right composite taillights are removed the same way. Left side shown.

(1) Disconnect connectors P74, P76, P77, P78 (1) from composite taillight connectors 22-461, 24, 23, 21 (2).

(2) Remove two screws (3), lockwashers (4), terminal lug TL18 (5), and composite taillight assembly (6) from vehicle. Discard lockwashers.
7-39. COMPOSITE TAILLIGHT ASSEMBLY REPLACEMENT/REPAIR (CONT)

b. M1088 Composite Taillight Assembly Installation.

**NOTE**

- Left and right composite taillights are installed the same way. Left side shown.
- Install plastic cable ties as required.

1. Position composite taillight assembly (1) on vehicle with terminal lug TL18 (2), two lockwashers (3), and screws (4).

2. Tighten two screws (4) to 19-24 lb-ft (26-32 N·m).

3. Connect connectors P74, P76, P77, P78 (5) to composite taillight connectors 22-461, 24, 23, 21 (6).

c. M1089 Composite Taillight Assembly Removal.

**NOTE**

Left and right composite taillights are removed the same way. Left side shown.

1. Disconnect connectors P74, P76, P77, P78 (1) from composite taillight connectors 22-461, 24, 23, 21 (2).

2. Remove two screws (3), lockwashers (4), terminal lugs TL18 (5), and composite taillight assembly (6) from vehicle. Discard lockwashers.
d. **M1089 Composite Taillight Assembly Installation.**

   **NOTE**
   - Left and right composite taillights are installed the same way. Left side shown.
   - Install plastic cable ties as required.

   (1) Position composite taillight assembly (1) on vehicle with two terminal lugs TL18 (2), lockwashers (3), and screws (4).

   (2) Tighten two screws (4) to 50-60 lb-in. (6-7 N·m).

   (3) Connect connectors P74, P76, P77, P78 (5) to composite taillight connectors 22-461, 24, 23, 21 (6).

e. Deleted.
f. Deleted.

g. Deleted.
h. Deleted.

i. Composite Taillight Assembly Removal (All Models Except M1088/M1089).

NOTE

Left and right composite taillights are removed the same way. Left side shown.

(1) Remove self-locking nut (1), screw (2), and clamp (3) from taillight carrier (4). Discard self-locking nut.

(2) Disconnect connectors P74, P76, P77, P78 (5) from composite taillight connectors 22-461, 24, 23, 21 (6).

(3) Remove two screws (7), lockwashers (8), terminal lug TL18 (9), and composite taillight assembly (10) from taillight carrier (4). Discard lockwashers.
j. Composite Taillight Assembly Installation (All Models Except M1088/M1089).

**NOTE**

- Left and right composite taillights are installed the same way. Left side shown.
- Install plastic cable ties as required.

1. Position two lockwashers (1), screws (2), terminal lug TL18 (3), and composite taillight assembly (4) on taillight carrier (5).

2. Tighten two screws (2) to 35-42 lb-ft (48-57 N·m).

3. Connect connectors P74, P76, P77, P78 (6) to composite taillight connectors 22-461, 24, 23, 21 (7).

4. Install clamp (8) on taillight carrier (5) with screw (9) and self-locking nut (10).

k. Disassembly.

1. Remove six screws (1), cover (2), and preformed packing (3) from housing (4). Discard preformed packing.

2. Remove two screws (5), bezel (6), lens (7), and retainer (8) from cover (2).
(3) Remove lamps (9 and 10) from sockets (11 and 12).

(4) Position blackout stoplight lamp (13) for access to socket (14).

(5) Remove connector (15) from socket (14).

(6) Position blackout marker lamp (16) for access to socket (17).

(7) Remove connector (18) from socket (17).

I. Assembly.

(1) Install connector (1) in socket (2).

(2) Position blackout marker lamp (3) in connector (1).

(3) Install connector (4) in socket (5).

(4) Install blackout stoplight lamp (6) in connector (4).

(5) Install two lamps (7 and 8) in sockets (9 and 10).

(6) Position retainer (11), lens (12), and bezel (13) on cover (14) with two screws (15).

(7) Position preformed packing (16) and cover (14) on housing (17) with six screws (18).

(8) Tighten two screws (15) and six screws (18) to 20-25 lb-in. (1 N·m).
m. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Check operation of taillights (TM 9-2320-366-10-1).

(3) Check operation of blackout lights (TM 9-2320-366-10-1).

(4) Check operation of brake lights (TM 9-2320-366-10-1).

End of Task.
7-40. COMPOSITE FRONT LIGHT ASSEMBLY REPLACEMENT/REPAIR

This task covers:

a. Removal                                      d. Installation
b. Disassembly                                 e. Follow-On Maintenance
c. Assembly

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).
Cab raised (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 34, Appendix C)

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape
(Item 20, Appendix D)
Lockwasher (2) (Item 96, Appendix G)
Packing, Preformed (Item 191, Appendix G)

a. Removal.

NOTE

- Both composite front light assemblies are removed the same way. Left side shown.
- Tag wires and connection points prior to disconnecting.
- Connectors for right side are P8, P9 and P10.

(1) Disconnect connectors P22, P23, and P24 (1) from composite front light assembly (2).

(2) Remove two screws (3), lockwashers (4), three terminal lugs (5), and composite front light assembly (2) from front bumper (6). Discard lockwashers.
b. Disassembly.

(1) Loosen five screws (1) on cover (2).

(2) Remove cover (2) and preformed packing (3) from housing (4). Discard preformed packing.

(3) Remove lamps (5 and 6) from sockets (7).

(4) Open blackout marker lamp (8).

(5) Remove blackout marker lamp (8) from socket (9).

c. Assembly.

(1) Open blackout marker lamp (1).

(2) Install blackout marker lamp (1) in socket (2).

(3) Install lamps (3 and 4) in sockets (5).

(4) Install preformed packing (6) and cover (7) on housing (8) with five screws (9).
d. Installation.

NOTE
Both composite front light assemblies are installed the same way. Left side shown.

(1) Position composite front light assembly (1) in front bumper (2).

(2) Position three terminal lugs (3), two lockwashers (4), and screws (5) on composite front light assembly (1).

(3) Tighten two screws (5) to 156-192 lb-in. (18-22 N·m).

(4) Connect connectors P22, P23, and P24 (6) to composite front light assembly (1).

e. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Check operation of hazard lights, turn signals, park lights, and blackout marker lights (TM 9-2320-366-10-1).

End of Task.
7-41. HEADLIGHT AND HOUSING REPLACEMENT/REPAIR/ADJUSTMENT

This task covers:

a. Removal
b. Disassembly
c. Assembly
d. Installation
e. Adjustment

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).
Cab raised (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 34, Appendix C)
Headlight Adjustment Screen (Item E-6, Appendix E)

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape
(Item 18, Appendix C)
Grommet, Nonmetallic (3) (Item 55, Appendix G)
Lockwasher (3) (Item 85, Appendix G)

a. Removal.

NOTE

• Both headlights are removed the same way.
  Left headlight shown.

• Perform steps (1) through (3) to remove lamp only.

(1) Remove three screws (1) and retaining ring (2) from housing (3).

(2) Remove lamp (4) from housing (3).

NOTE

• Tag connectors and connection points prior to disconnecting.

• Connector numbers are the same on left and right headlights.

(3) Disconnect connectors 18, 91, and 17 (5) from housing (3).
NOTE

• Tag connectors and connection points prior to disconnecting.

• Connectors for right side are P13, P14, and P12.

(4) Disconnect connectors P4, P19, and P20 (6) from housing (3).

(5) Remove three nuts (7) and housing (3) from bumper (8).

b. Disassembly.

(1) Remove two screws (1) and lens retainer (2) from housing (3).

(2) Remove three nuts (4), resilient mounts (5), washers (6), and lockwashers (7) from housing (3). Discard lockwashers.

(3) Remove three adapters (8) and grommets (9) from housing (3). Discard grommets.

c. Assembly.

(1) Install three grommets (1) and adapters (2) on housing (3).

(2) Install three resilient mounts (4) on housing (3) with three washers (5), lockwashers (6), and nuts (7).

(3) Install lens retainer (8) on housing (3) with three screws (9).
7-41. HEADLIGHT AND HOUSING REPLACEMENT/REPAIR/ADJUSTMENT (CONT)

d. Installation.

**NOTE**
Both headlights are installed the same way.
Left headlight shown.

1. Position housing (1) on bumper (2) with three nuts (3).
2. Tighten three nuts (3) to 60-72 lb-in. (7-8 N·m).

**NOTE**
Connectors for right side are P13, P14, and P12.

3. Install connectors P20, P19, and P4 (4) to back of housing (1).

- Perform steps (4) through (6) to install lamp only.
- Connector numbers are the same on left and right headlights.

4. Connect connectors 18, 91, and 17 (5) on housing (1).

5. Install lamp (6) in housing (1).

6. Install retaining ring (7) on housing (1) with three screws (8).

e. Adjustment.

**NOTE**

Vehicle must be empty when making headlight adjustment.

1. Connect batteries (para 7-57).

2. Position vehicle on level surface with both headlights approximately 36 in. (91 cm) from headlight adjustment screen with vertical lines (1) directly in front of bumper ends (2).

3. Turn headlights on LOW beam (TM 9-2320-366-10-1).

4. Observe headlight spots on headlight adjustment screen. If headlight spots are within squares (3), alignment is correct.

**NOTE**

Perform steps (5) and (6) if headlights need adjusting.

5. Adjust screw (4) to move headlight spot up or down.

6. Adjust screw (5) to move headlight spot left or right.

7. Turn off headlights (TM 9-2320-366-10-1).

**End of Task.**
**7-42. M1088/M1089 STATIONARY WORKLIGHT ASSEMBLY REPLACEMENT/REPAIR**

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**a. Removal.**

**NOTE**

Left side and right side stationary worklight assemblies are removed the same way. Right side shown.

1. Disconnect worklight connector (1) from connector P134A (2).
2. Remove nut (3), lockwasher (4), washer (5) and worklight assembly (6) from vehicle. Discard lockwasher.

**b. Disassembly.**

1. Remove screw (1) and retaining ring (2) from worklight assembly (3).
2. Loosen two screws (4) on back of lamp (5).
3. Disconnect two terminals (6) from lamp (5).
c. Assembly.

(1) Install two terminals (1) on lamp (2) with two screws (3).

(2) Install lamp (2) and retaining ring (4) on worklight assembly (5) with two screws (6).

d. Installation.

NOTE

Left side and right side stationary worklight assemblies are installed the same way.
Right side shown.

(1) Position worklight assembly (1) in mounting location on vehicle.

(2) Install washer (2), lockwasher (3) and nut (4) on worklight assembly (1).

(3) Connect worklight connector (5) to connector P134A (6).

e. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Check operation of work light (TM 9-2320-366-10-1).

End of Task.
7-43. AUDIBLE ALARM REPLACEMENT

This task covers:

- a. Removal
- b. Installation
- c. Follow-On Maintenance

INITIAL SETUP

**Equipment Conditions**
Instrument panel assembly removed for access (para 7-15).

**Materials/Parts**
Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)

**Tools and Special Tools**
Tool Kit, Genl Mech (Item 46, Appendix C)

a. **Removal.**

(1) Disconnect connector PX7 (1) from lighted indicator display (2).
(2) Remove lock ring (3) and audible alarm (4) from instrument panel assembly (5).

**NOTE**

- Tag wires and connection points prior to disconnecting.
- Perform step (3) on M1084, M1086, M1088, and M1089.

(3) Remove two screws (6) and terminal lugs TL161 (7) and TL160 (8) from audible alarm (4).

**NOTE**

Perform steps (4) and (5) on all models except M1084, M1086, M1088, and M1089.

(4) Remove two screws (6) and terminal lugs TL161 (7) and TL178 (8) from audible alarm (4).

(5) Remove screw (9) and TL160 (10) from audible alarm (4).

b. Installation.

**NOTE**

Perform steps (1) and (2) on all models except M1084, M1086, M1088, and M1089.

(1) Install terminal lug TL160 (1) on audible alarm (2) with screw (3).

(2) Install terminal lugs TL161 (4) and TL178 (5) on audible alarm (2) with two screws (6).

**NOTE**

Perform step (3) on M1084, M1086, M1088, and M1089.

(3) Install terminal lugs TL160 (5) and TL161 (4) on audible alarm (2) with two screws (6).

(4) Install audible alarm (2) in instrument panel assembly (7) with lock ring (8).
(5) Connect connector PX7 (9) to lighted indicator display (10).

c. **Follow-On Maintenance.**

   (1) Install instrument panel assembly (para 7-15).

   (2) Check operation of audible alarm (TM 9-2320-366-10-1).

**End of Task.**
7-44. AIR PRESSURE TRANSMITTER REPLACEMENT

This task covers:

a. Removal  
b. Installation  
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).  
Air tanks drained (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 58, Appendix C)

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)  
Packing, Preformed (Item 191.1, Appendix G)  
Lockwasher (2) (Item 71, Appendix G)

a. Removal.

• NOTE

• Tag wires and connection points prior to disconnecting.

• Front brake air pressure transmitter and rear brake air pressure transmitter are removed the same way. Rear brake air pressure transmitter shown.

• Terminal lugs on front brake air pressure transmitter are TL150 for terminal G and TL156 for terminal WK.

(1) Remove nut (1), lockwasher (2), and terminal lug TL151 (3) from air pressure transmitter terminal G (4). Discard lockwasher.

(2) Remove nut (5), lockwasher (6), and terminal lug TL157 (7) from air pressure transmitter terminal WK (8).

(3) Remove air pressure transmitter (9) from reducer (10).

NOTE

Perform the following step on air pressure transmitters equipped with preformed

(4) Remove preformed packing (11) from air pressure transmitter (9). Discard preformed packing.
b. **Installation.**

1. Install preformed packing (1) on air pressure transmitter (2).
2. Install air pressure transmitter (1) in reducer (2).

**NOTE**

- Front brake air pressure transmitter and rear brake air pressure transmitter are installed the same way. Rear brake air pressure transmitter shown.
- Terminal lugs on front brake air pressure transmitter are TL150 for terminal G and TL156 for terminal WK.

3. Install terminal lug TL157 (4) on air pressure transmitter terminal WK (5) with lockwasher (6) and nut (7).
4. Install terminal lug TL151 (8) on air pressure transmitter terminal G (8) with lockwasher (10) and nut (11).

c. **Follow-On Maintenance.**

1. Connect batteries (para 7-57).
3. Check FRONT BRAKE AIR and REAR BRAKE AIR pressure gage operation (TM 9-2320-366-10-1).

**End of Task.**
7-45. COOLANT TEMPERATURE GAGE SENSOR REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Cab raised (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).

Materials/Parts
Sealing Compound (Item 58, Appendix D)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

a. Removal.

NOTE

Perform steps (1) through (3) on coolant temperature gage sensors equipped with a connector clamp.

(1) Disconnect connector clamp (1) from coolant temperature gage sensor (2).

(2) Disconnect connector P41 (3) from coolant temperature gage sensor (2).

(3) Remove coolant temperature gage sensor (2) from adapter (4).

NOTE

Perform steps (4) and (5) on coolant temperature gage sensors not equipped with a connector clamp.

(4) Disconnect connector P41 (3) from coolant temperature gage sensor (2).

(5) Remove coolant temperature gage sensor (2) from adapter (4).
b. Installation.

**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.

(1) Apply antiseize compound to threads of coolant temperature gage sensor (1).

(2) Install coolant temperature gage sensor (1) in adapter (2).

(3) Connect connector P41 (3) to coolant temperature gage sensor (1).

c. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Lower cab (TM 9-2320-366-10-1).

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

(4) Check coolant temperature gage operation (TM 9-2320-366-10-1).

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

End of Task.
a. Removal.

(1) Disconnect connector clamp (1) from engine speed sensor connector (2).

(2) Disconnect engine speed sensor connector (2) from connector P38 (3).

(3) Loosen jam nut (4) on engine speed sensor (5).

(4) Remove engine speed sensor (5) from flywheel housing (6).
b. Installation.

(1) Turn engine speed sensor (5) to the right in fly wheel housing (6) until engine speed sensor contacts fly wheel.

(2) Turn engine speed sensor (5) to the left out of fly wheel housing (6) two full turns.

(3) Tighten jam nut (4) on engine speed sensor (5).

(4) Connect engine speed sensor connector (2) to connector P38 (3).

(5) Connect connector clamp (1) on engine speed sensor connector (2).

c. Adjustment.

(1) Lower cab (TM 9-2320-366-10-1).

(2) Connect batteries (para 7-57).

**NOTE**

Perform step (3) on vehicles not equipped with tachometer.

(3) Connect STE/ICE-R to DCA connector (1).

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

**NOTE**

- Perform step (5) on vehicles equipped with tachometer.
- If engine speed is not obtained in steps (5) or (6), perform steps (7) through (13).

(5) Depress accelerator pedal and check tachometer operation (TM 9-2320-366-10-1).

**NOTE**

Perform step (3) on vehicles not equipped with tachometer.

(6) Perform STE/ICE-R test 10 and verify engine speed (TM 9-4910-571-12&P).
7-46. ENGINE SPEED SENSOR REPLACEMENT/ADJUSTMENT (CONT)

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

(8) Raise cab (TM 9-2320-366-10-1).

(9) Loosen jam nut (2) on engine speed sensor (3).

(10) Turn engine speed sensor (3) right one-quarter turn.

(11) Tighten jam nut (2) on engine speed sensor (3).

(12) Lower cab (TM 9-2320-366-10-1).

(13) Repeat steps (4) through (12) to verify engine speed.

(14) If engine speed is not obtained, perform engine troubleshooting.

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

NOTE

Perform step (16) on vehicles not equipped with tachometer.

(16) Disconnect STE/ICE-R from DCA connector (1).

End of Task.
7-47. ETHER SENSOR REPLACEMENT

This task covers:

- a. Removal
- b. Installation
- c. Follow-On Maintenance

INITIAL SETUP

**Equipment Conditions**
- Cab raised (TM 9-2320-366-10-1).
- Batteries disconnected (para 7-57).

**Materials/Parts**
- Antiseize Compound (Item 13, Appendix D)

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)

---

**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.

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

a. Removal.

(1) Remove radiator cap (1) from radiator overflow tank (2).

(2) Position container under radiator draincock (3).

(3) Open radiator draincock (3) and drain approximately one gallon (one L) of coolant.

(4) Close radiator draincock (3).
(5) Disconnect connector clamp (4) from ether sensor connector (5).

(6) Disconnect connector P42 (6) from ether sensor connector (5).

(7) Remove ether sensor (7) from coolant bypass tube (8).

**b. Installation.**

**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.

(1) Apply antiseize compound to threads of ether sensor (1).

(2) Install ether sensor (1) in coolant bypass tube (2).

(3) Connect connector P42 (3) to ether sensor connector (4).

(4) Connect connector clamp (5) on ether sensor connector (4).
c. Follow-On Maintenance.

(1) Add coolant to radiator overflow tank (TM 9-2320-366-10-2).

(2) Connect batteries (para 7-57).

(3) Lower cab (TM 9-2320-366-10-1).

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

(5) Check for coolant leaks under vehicle.

(6) Check coolant level after normal temperature is reached. Add coolant as required (TM 9-2320-366-10-2).

(7) Raise cab (TM 9-2320-366-10-1).

(8) Check for coolant leaks around ether sensor.

(9) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
7-48. OIL PRESSURE SWITCH REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Cab raised (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).

Materials/Parts
Antiseize Compound (Item 58, Appendix D)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

a. Removal.

(1) Disconnect connector clamp (1) from connector J34 (2).

(2) Disconnect connector P34 (3) from connector J34 (2).

(3) Remove oil pressure switch (4) from fitting (5).

b. Installation.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, 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.

(1) Apply antiseize compound to threads of oil pressure switch (4).

(2) Install oil pressure switch (4) in fitting (5).

(3) Connect connector P34 (3) to connector J34 (2).

(4) Connect connector clamp (1) on connector J34 (2).
c. **Follow-On Maintenance.**

(1) Connect batteries (para 7-57).

(2) Lower cab (TM 9-2320-366-10-1).

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

(4) Check that low oil pressure is not indicated (TM 9-2320-366-10-1).

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

**End of Task.**
7-49. OIL PRESSURE TRANSMITTER REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Cab raised (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).

Materials/Parts
Antiseize Compound (Item 58, Appendix D)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

a. Removal.

(1) Disconnect connector P32 (1) from oil pressure transmitter (2).

(2) Remove oil pressure transmitter (2) from fitting (3).

b. Installation.

**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.

(1) Apply antiseize compound to threads of oil pressure transmitter (2).

(2) Install oil pressure transmitter (2) in fitting (3).

(3) Connect connector P32 (1) to oil pressure transmitter (2).
c. **Follow-On Maintenance.**

(1) Connect batteries (para 7-57).

(2) Lower cab (TM 9-2320-366-10-1).

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

(4) Check oil pressure gage operation (TM 9-2320-366-10-1).

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

**End of Task.**
7-50. WATER TEMPERATURE SWITCH REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Cab raised (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

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.

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

a. Removal.

(1) Remove radiator cap (1) from radiator overflow tank (2).

(2) Position container under radiator draincock (3).

(3) Open radiator draincock (3) and drain approximately one gallon (one L) of coolant.

(4) Close radiator draincock (3).
(5) Disconnect connector clamp (4) from connector P36 (5).

(6) Disconnect water temperature switch connector (6) from connector P36 (5).

(7) Remove water temperature switch (7) from upper coolant tube (8).

b. Installation.

(1) Install water temperature switch (1) in upper coolant tube (2).

(2) Connect connector P36 (3) to water temperature switch connector (4).

(3) Connect connector clamp (5) on connector P36 (3).
c. Follow-On Maintenance.

(1) Add coolant to radiator overflow tank (TM 9-2320-366-10-2).

(2) Connect batteries (para 7-57).

(3) Lower cab (TM 9-2320-366-10-1).

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

(5) Check for coolant leaks under vehicle.

(6) Check coolant level after normal temperature is reached. 
    Add coolant as required (TM 9-2320-366-10-2).

(7) Raise cab (TM 9-2320-366-10-1).

(8) Check for leaks around water temperature switch.

(9) Lower cab (TM 9-2320-366-10-1).

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

End of Task.
7-51. M1084/M1086 JACK CYLINDER PROXIMITY SENSOR REPLACEMENT

This task covers:

a. Removal
b. Installation

c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

Materials/Parts
Ties, Cable, Plastic (Item 69, Appendix D)

Personnel Required
(2)

a. Removal.

NOTE

Remove plastic cable ties as required.

(1) Disconnect connector (1) from proximity sensor connector (2).

(2) Remove nut (3) from proximity sensor (4).

(3) Remove proximity sensor (4) from mounting bracket (5).

(4) Remove nut (6) from proximity sensor (4).
b. Installation.

(1) Position nut (1) approximately 1 1/4 - 1 3/8 in. (3.2 - 3.5 cm) from bottom of proximity sensor (2).

(2) Position proximity sensor (2) in mounting bracket (3) with nut (4).

(3) Adjust proximity sensor (2) until gap between fitting (5) and proximity sensor is 3/16 in. (0.5 cm).

(4) Tighten nuts (1 and 4).

NOTE
Install plastic cable ties as required.

(5) Connect proximity sensor connector (6) to connector (7).
c. Follow-On Maintenance.

Operate MHC and check jack cylinder operation (TM 9-2320-366-10-1).

End of Task.
### 7-52. TRANSMISSION ENGINE SPEED SENSOR REPLACEMENT

This task covers:

- a. Removal
- b. Installation
- c. Follow-On Maintenance

#### INITIAL SET-UP

**Equipment Conditions**
- Batteries disconnected (para 7-57).

**Tools and Special Tools**
- Goggles, Industrial (Item 15, Appendix C)
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)

**Materials/Parts**
- Packing, Preformed (Item 199, Appendix G)

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**WARNING**

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

**a. Removal.**

1. Disconnect engine speed sensor connector (1) from transmission engine speed sensor (2).
2. Remove screw (3), transmission engine speed sensor bracket (4), and transmission engine speed sensor (2) from converter housing module (5).
3. Remove preformed packing (6) from transmission engine speed sensor (2). Discard preformed packing.
b. Installation.

(1) Install preformed packing (1) on transmission engine speed sensor (2).

(2) Position transmission engine speed sensor bracket (3) and transmission engine speed sensor (2) on converter housing module (4) with screw (5).

(3) Tighten screw (5) to 22-26 lb-ft (30-35 N·m).

(4) Connect engine speed sensor connector (6) to transmission engine speed sensor (2).

c. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

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

(3) Check for diagnostic codes logged (para 8-4 or 8-5).

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

End of Task.
7-53. HORN AND BRACKET REPLACEMENT

This task covers:

a. Removal  b. Installation  c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 34, Appendix C)

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape
(Item 20, Appendix D)
Lockwasher (2) (Item 71, Appendix G)

a. Removal.

(1) Remove two screws (1) and washers (2) from front grille (3).

(2) Remove screw (4), washer (5), and front grille (3) from cab (6).

NOTE
Tag connectors and connection points prior to disconnecting.

(3) Disconnect connectors P5 (7) and P6 (8) from horn (9).

(4) Remove two screws (10), lockwashers (11), strap (12), and horn (9) from horn bracket (13). Discard lockwashers.
(5) Remove two screws (14), washers (15), and horn bracket (13) from cab (6).

b. Installation.

(1) Install horn bracket (1) on cab (2) with two washers (3) and screws (4).

(2) Position horn (5) on horn bracket (1) with strap (6), two lockwashers (7), and screws (8).

(3) Tighten two screws (8) to 96-120 lb-in. (11-14 N·m).

(4) Connect connectors P6 (9) and P5 (10) to horn (5).
(5) Position front grille (11) on cab (2) with washer (12) and screw (13).

(6) Position two washers (14) and screws (15) in front grille (11).

(7) Tighten screw (13) to 48-60 lb-in. (5-7 N·m).

(8) Tighten two screws (15) to 24 lb-in. (3 N·m).

c. Follow-On Maintenance.

   Connect batteries (para 7-57).

End of Task.
7-54. BATTERY TESTER REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions

Engine shut down (TM 9-2320-366-10-1).
Battery box cover removed (TM 9-2320-366-10-2).

Tools and Special Tools

Goggles, Industrial (Item 15, Appendix C)
Apron, Rubber (Item 3, Appendix C)
Gloves, Rubber (Item 13, Appendix C)
Puller, Battery Terminal (Item 28, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)

Materials/Parts

Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
Grease, Automotive and Artillery (GAA) (Item 22, Appendix D)
Lockwasher (Item 87, Appendix G)

a. Removal.

**NOTE**

(1) Remove nut (1) and lockwasher (2) from battery ground cable (3). Discard lockwasher.

(2) Deleted.

(3) Remove terminal lugs TL50A (5), TL48 (6), and battery tester terminal lug (7) from battery ground cable (3).

**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.

Negative battery terminals must be disconnected first. Failure to comply may result in serious injury or death to personnel.
NOTE

Remove battery terminal covers as required.

(4) Loosen two terminal screws (8) on battery ground cable (3).

(5) Remove battery ground cable (3) from battery terminals BT4 E2 (9) and BT3 E2 (10).

(6) Remove nut (11) from battery 24 VDC cable (12).

(7) Deleted.

(8) Remove terminal lug TL49A (14) and battery tester terminal lug (15) from battery 24 VDC cable (12).
(9) Remove screw (16) and clamp (17) from battery hold-down bracket (18).

(10) Remove battery tester (19) from spring clip (20).

(11) Remove two screws (21) and spring clip (20) from battery hold-down bracket (18).

b. Installation.

(1) Install spring clip (1) on battery hold-down bracket (2) with two screws (3).

(2) Install battery tester (4) in spring clip (1).

(3) Install clamp (5) on battery hold-down bracket (2) with screw (6).
WARNING

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

(4) Install battery tester terminal lug (7) and terminal lug TL49A (8) on battery 24 VDC cable (9).

(5) Deleted.

(6) Install nut (11) on battery 24 VDC cable (9).

NOTE

Install battery terminal covers as required.

(7) Install battery ground cable (12) on battery terminals BT4 E2 (13) and BT3 E2 (14).

(8) Tighten two terminal screws (15) on battery ground cable (12).
(9) Install battery tester terminal lug (16), and terminal lugs TL50A (17) and TL48 (18) on battery ground cable (12).

(10) Deleted.

(11) Install lockwasher (20) and nut (21) on battery ground cable (12).

(12) Apply grease to all battery terminals.

c. Follow-On Maintenance.

Install battery box cover (TM 9-2320-366-10-2).

End of Task.
7-55. BATTERY/BATTERY CABLES REPLACEMENT

This task covers:

- a. Removal
- b. Installation
- c. Follow-On Maintenance

INITIAL SETUP

**Equipment Conditions**
- Engine shut down (TM 9-2320-366-10-1).
- Battery box cover removed (TM 9-2320-366-10-2).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Apron, Rubber (Item 3, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)
- Gloves, Rubber (Item 13, Appendix C)
- Puller, Battery Terminal (Item 28, Appendix C)

**Materials/Parts**
- Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
- Grease, Automotive and Artillery (GAA) (Item 22, Appendix D)
- Lockwasher (Item 100, Appendix G)

**References**
- TM 9-6140-200-14

a. Removal.

![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.

- 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.

- 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.
NOTE

Tag cables and connection points prior to disconnecting.

(1) Remove nut (1) and lockwasher (2) from battery ground cable (3). Discard lockwasher.

(2) Deleted.

(3) Remove terminal lugs TL50A (5), TL48 (6), battery tester terminal lug (7) and washer (4) from battery ground cable (3).

NOTE

Remove battery terminal covers as required.

(4) Loosen two terminal screws (8) on battery ground cable (3).

(5) Remove battery ground cable (3) from battery terminals BT4 E2 (9) and BT3 E2 (10).

(6) Remove nut (11) and terminal lug TL99 (12) from battery BT2 to BT4 12 vdc cable (13).
(7) Remove nut (14) and terminal lug TL136 (15) from battery BT2 to BT4 12 vdc cable (13).

(8) Loosen two terminal screws (16) on battery BT4 to BT2 12 vdc cable (13).

(9) Remove battery BT2 to BT4 12 vdc cable (13) from battery terminals BT4 E1 (17) and BT2 E2 (18).

(10) Loosen two terminal screws (19) on battery BT1 to BT3 12 vdc cable (20).

(11) Remove battery BT1 to BT3 12 vdc cable (20) from battery terminals BT1 E2 (21) and BT3 E1 (22).

(12) Remove nut (23) from battery 24 vdc cable (24).

(13) Deleted.

(14) Remove terminal lug TL49A (26) and battery tester terminal lug (27) from battery 24 vdc cable (24).
(15) Remove nut (28), and terminal lugs TL39 (29) and TL10 (30) from battery 24 vdc cable (24).

(16) Loosen two terminal screws (31) on battery 24 vdc cable (24).

(17) Remove battery 24 vdc cable (24) from battery terminals BT1 E1 (32) and BT2 E1 (33).

(17) Remove nut (34) and washer (35) from battery bracket hold down screw (36).
(18) Remove battery hold down bracket (37) from battery box (38).

(19) Remove batteries BT3 (39), BT4 (40), BT1 (41), and BT2 (42) from battery box (38).

b. Installation

NOTE

Install battery terminal covers as required.

(1) Position batteries BT1 (1), BT2 (2), BT3 (3), and BT4 (4) in battery box (5).

(2) Position battery hold down bracket (6) in battery box (5).

(3) Install washer (7) and nut (8) on battery bracket hold down screw (9).
(4) Install battery 24 vdc cable (10) on battery terminals BT1 E1 (11) and BT2 E1 (12).

(5) Tighten two terminal screws (13) on battery 24 vdc cable (10).

(6) Install terminal lugs TL10 (14), TL39 (15) on battery 24 vdc cable (10) with nut (16).

**WARNING**

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

(7) Install battery tester terminal lug (17) and terminal lug TL49A (18) on battery 24 vdc cable (10).

(8) Deleted.

(9) Install nut (20) on battery 24 vdc cable (10).
(10) Install battery BT1 to BT3 12 vdc cable (21) on battery terminals BT1 E2 (22) and BT3 E1 (23).

(11) Tighten two terminal screws (24) on battery BT1 to BT3 12 vdc cable (21).

(12) Install battery BT2 to BT4 12 vdc cable (25) on battery terminals BT4 E1 (26) and BT2 E2 (27).

(13) Tighten two terminal screws (28) on battery BT2 to BT4 12 vdc cable (25).

(14) Install terminal lug TL136 (29) on battery BT2 to BT4 12 vdc cable (25) with nut (30).

(15) Install terminal lug TL99 (31) on battery BT2 to BT4 12 vdc cable (25) with nut (32).
(16) Install battery ground cable (33) on battery terminals BT4 E2 (34) and BT3 E2 (35).

(17) Tighten two terminal screws (36) on battery ground cable (33).

(18) Install battery tester terminal lug (37), terminal lugs TL48 (38) and TL50A (39) and washer (40) on battery ground cable (33).

(19) Deleted.

(20) Install lockwasher (41) and nut (42) on battery ground cable (33).

(21) Apply grease to all battery terminals.

c. Follow-On Maintenance.

(1) Service batteries (TM 9-6140-200-14).

(2) Install battery box cover (TM 9-2320-366-10-2).

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

(4) Check VOLTS gage for charge indication (TM 9-2320-366-10-1).

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

End of Task.
7-56. BATTERY BOX REPLACEMENT

This task covers:

a. Removal  
   b. Installation  
   c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions

- Batteries removed (para 7-55).
- NATO power cable removed (para 7-70).
- Wet tank removed (para 23-12).
- Secondary and primary air tanks removed (para 11-22).

Tools and Special Tools

- Tool Kit, Genl Mech (Item 46, Appendix C)
- Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Drill, Portable, Electric (Item 7, Appendix C)
- Drill Set, Twist (Item 6, Appendix C)
- Goggles, Industrial (Item 15, Appendix C)
- Tool Kit, Blind Rivet (Item 74, Appendix C)
- Socket Set, Socket Wrench (Item 34, Appendix C)
- Wrench Set, Socket (Item 51, Appendix C)
- Wrench, Torque, 0-600 lb-ft (Item 60, Appendix C)
- Adapter, Socket Wrench (Item 1, Appendix C)
- Socket Set, Socket Wrench (Item 35, Appendix C)

Materials/Parts

- Lockwasher (2) (Item 90, Appendix G)
- Nut, Self-Locking (4) (Item 161, Appendix G)
- Washer, Flat (10) (Item 279.1, Appendix G)
- Tape, Adhesive, Rubber (Item 65.2, Appendix D)
- Rivet, Blind (Item 254.1, Appendix G)
- Rivet, Blind (Item 254.2, Appendix G)

Personnel Required

(3)

a. Removal.

(1) Remove 16 nuts (1), screws (2), and 32 washers (3) from battery tray (4).

(2) Remove battery tray (4) from battery box (5).

(3) Deleted.

WARNING

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

(3.1) Remove six rivets (6), washers (6.1), and two latches (6.2) from battery box (5).

(3.2) Remove six band clamps (6.3) from battery box (5).
(4) Remove two nuts (7), lockwashers (8), and stud (9) from battery tray (4). Discard lockwashers.

(5) Remove nut (10), screw (11), and washer (12) from battery box (5).

(5.1) Remove two nuts (13.1), screws (13.2), four washers (13.3), and stone guard (13) from battery box (5).

(6) Remove two self-locking nuts (14) and screws (15) from battery box (5). Discard self-locking nuts.

NOTE
Step (6) requires the aid of an assistant.
**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.

**NOTE**

Step (7) requires the aid of two assistants.

(7) Remove two self-locking nuts (16), screws (17), reinforcing plate (18), and battery box (5) from left frame rail (19). Discard self-locking nuts.

(8) Remove three nuts (20), screws (21), washers (22), and LH bracket (23) from battery box (5) and bracket (23.1).

(9) Remove six nuts (24), screws (25), washers (26) and bracket (23.1) from battery box (5).

(10) Deleted.
(11) Remove two nuts (30), screws (31), reinforcing plate (32), and RH bracket (33) from battery box (5).

**WARNING**

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

(12) Remove four rivets (34), washers (35), strip (36), and two plates (37) from battery box (5).

(13) Remove adhesive tape (38) from strip (36).

b. **Installation.**

(1) Cut adhesive tape (1) to 18 1/4 in. (465 mm).

(2) Install adhesive tape (1) on strip (2).

(3) Install two plates (3) and strips (2) on battery box (4) with four screws (6), washers (5) and nuts (6.1).
(4) Position RH bracket (7) and reinforcing plate (8) on battery box (4) with two screws (9) and nuts (10).

(5) Position bracket (10.1), six screws (11), washers (12), and nuts (13) in battery box (4).

(6) Tighten six nuts (13) to 31-39 lb-ft (42-53 N·m).

(7) Tighten two nuts (10) to 68-78 lb-ft (92-106 N·m).

(8) Deleted.

(9) Position bracket (10.1) and LH bracket (17) on battery box (4) with three screws (18), washers (19), and nuts (20).
**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.

**NOTE**

Step (10) requires the aid of two assistants.

(10) Position battery box (4), and reinforcing plate (21) on left frame rail (22) with two screws (23) and self-locking nuts (24).

(11) Deleted.

**NOTE**

Steps (12) and (13) require the aid of an assistant.

(12) Position two screws (27) and self-locking nuts (28) in battery box (4).

(13) Tighten screws (23 and 27) to 171-209 lb-ft (232-283 N·m).

(14) Position stone guard (29) on battery box (4) with screw (30), washer (31), and nut (32).

(14.1) Position two screws (32.1), four washers (32.2), and two nuts (32.3) in stone guard (29).

(15) Tighten nuts (32, 32.3 and 20) to 31-39 lb-ft (42-53 N·m).
(16) Position stud (33) in battery tray (34) with two lockwashers (35) and nuts (36).

(17) Tighten two nuts (36) to 81-99 lb-in. (9-11 N·m).

(18) Install two latches (37) on battery box (4) with six screws (38), lockwashers (39) and nuts (39.1).

(19) Install six band clamps (39.2) in battery box (4).

(20) Position battery tray (34) in battery box (4).

(21) Position 32 washers (40), 16 screws (41) and self-locking nuts (42) in battery tray (34).

(22) Tighten 16 nuts (42) to 9-11 lb-ft (12-15 N·m).
c. Follow-On Maintenance.

(1) Deleted.
(2) Deleted.
(3) Install secondary and primary air tanks (para 11-22).
(4) Install wet tank (para 23-12).
(5) Install NATO power cable (para 7-70).
(6) Install batteries (para 7-55).
(7) Start engine (TM 9-2320-366-10-1).
(8) Check VOLTS gage for charge indication (TM 9-2320-366-10-1).
(9) Shut down engine (TM 9-2320-366-10-1).

End of Task.
7-57. DISCONNECTING/CONNECTING BATTERIES

This task covers:

a. Disconnecting
b. Connecting
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).
Battery box cover removed (TM 9-2320-366-10-2).

Tools and Special Tools

- Goggles, Industrial (Item 15, Appendix C)
- Apron, Rubber (Item 3, Appendix C)
- Gloves, Rubber (Item 13, Appendix C)
- Puller, Battery Terminal (Item 28, Appendix C)

Tools and Special Tools (Cont)

- Tool Kit, Genl Mech (Item 46, Appendix C)

Materials/Parts

- Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
- Grease, Automotive and Artillery (GAA) (Item 22, Appendix D)
- Lockwasher (Item 87, Appendix G)

a. Disconnecting.

**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 severed burns or electrical shock. Batteries can explode from a spark. Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries. Failure to comply may result in injury to personnel.

- 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.

**NOTE**

Tag battery terminals, terminal lugs, and connection points prior to disconnecting.

1. Remove nut (1) and lockwasher (2) from battery 24 VDC ground cable (3). Discard lockwasher.

2. Deleted.

3. Remove terminal lugs TL50A (5), TL48 (6), battery tester terminal lug (7) and washer (8) from battery 24 VDC ground cable (3).
(4) Remove nut (9) and terminal lug TL99 (10) from battery 12 VDC cable (11).

b. Connecting.

(1) Install terminal lug TL99 (1) on battery 12 VDC cable (2) with nut (3).

(2) Install washer (4) battery tester terminal lug (5), and terminal lugs TL48 (6) and TL50A (7) on battery 24 VDC ground cable (8).

(3) Deleted.

(4) Install lockwasher (10) and nut (11) on battery 24 VDC ground cable (8).

(5) Apply grease to all battery terminals.

WARNING

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

(1) Install terminal lug TL99 (1) on battery 12 VDC cable (2) with nut (3).
c. Follow-On Maintenance.

(1) Install battery box cover (TM 9-2320-366-10-2).

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

(3) Check VOLTS gage for charge indication (TM 9-2320-366-10-1).

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

End of Task.
7-58. AUXILIARY PANEL CABLE ASSEMBLY REPLACEMENT

This task covers:

- a. Removal
- b. Installation
- c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Personnel heater removed (para 18-9).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
Ties, Cable, Plastic (Item 69, Appendix D)

a. Removal.

NOTE

- Remove plastic cable ties as required.
- Tag wires and connection points prior to disconnecting.

(1) Disconnect connector J108 (1) from connector P108 (2).
(2) Disconnect connector J210 (3) from connector P210 (4).
(3) Disconnect connector P913 (5) from connector J913 (6).
(4) Disconnect connector P912 (7) from connector J912 (8).
(5) Remove auxiliary panel cable assembly (9) from dashboard (10).
b. Installation.

(1) Position auxiliary panel cable assembly (1) in dashboard (2).

(2) Connect connector P913 (3) to connector J913 (4).

(3) Connect connector P912 (5) to connector J912 (6).

NOTE
Install plastic cable ties as required.

(4) Connect connector P108 (7) to connector J108 (8).

(5) Connect connector P210 (9) to connector J210 (10).

c. Follow-On Maintenance.

(1) Install personnel heater (para 18-9).

(2) Check rocker switches and tachometer operation (TM 9-2320-366-10-1).

End of Task.
7-59. CHEMICAL ALARM KIT CABLE ASSEMBLY REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

**Equipment Conditions**
- Batteries disconnected (para 7-57).
- Kick panel removed (para 16-3).

**Materials/Parts**
- Ties, Cable, Plastic (Item 69, Appendix D)

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)

a. Removal.

**NOTE**

- Note routing of chemical alarm kit cable prior to removal.
- Remove plastic cable ties as required.

(1) Disconnect connector J99 (1) from connector P99 (2).

(2) Remove chemical alarm kit cable assembly (3) from vehicle.

b. Installation.

**NOTE**

Install plastic cable ties as required.

Connect connector P99 (2) to connector J99 (1) and route chemical alarm kit cable assembly (3).

c. Follow-On Maintenance.

(1) Install kick panel (para 16-3).

(2) Connect batteries (para 7-57).

End of Task.
7-60. CENTRAL TIRE INFLATION SYSTEM (CTIS) CABLE ASSEMBLY REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions

Batteries disconnected (para 7-57).
Kick panel removed (para 16-3).
Personnel heater removed (para 18-9).

Materials/Parts

Ties, Cable, Plastic (Item 69, Appendix D)

Tools and Special Tools

Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)

a. Removal.

NOTE

• Note routing of CTIS cable assembly prior to removal.

• Remove plastic cable ties as required.

(1) Disconnect connector P111 (1) from connector J111 (2).

(2) Disconnect connector P112 (3) from manifold valve assembly (4).

(3) Disconnect connector P113 (5) from pressure transducer (6).

(4) Remove CTIS cable assembly (7) from vehicle.

b. Installation.

NOTE

Install plastic cable ties as required.

(1) Position CTIS cable assembly (7) in vehicle.

(2) Connect connector P113 (5) to pressure transducer (6).

(3) Connect connector P112 (3) to manifold valve assembly (4).

(4) Connect connector P111 (1) to connector J111 (2).
c. Follow-On Maintenance.

(1) Install personnel heater (para 18-9).

(2) Install kick panel (para 16-3).

(3) Connect batteries (para 7-57).

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

(5) Operate vehicle and check CTIS system for proper operation (TM 9-2320-366-10-1).

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

End of Task.
7-61. LEFT-HAND DOOR AND CAB MARKER LIGHTS CABLE ASSEMBLY REPLACEMENT

This task covers:

a. Removal  
b. Installation  
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions

- Batteries disconnected (para 7-57).
- PDP cover removed (para 16-2).

Tools and Special Tools

- Tool Kit, Genl Mech (Item 46, Appendix C)

Materials/Parts

- Ties, Cable, Plastic (Item 69, Appendix D)
- Lockwasher (4) (Item 82, Appendix G)
- Lockwasher (2) (Item 88, Appendix G)
- Gasket (2) (Item 24, Appendix G)

a. Removal.

NOTE

- Note routing of left-hand door and cab marker lights cable assembly prior to removal.
- Remove plastic cable ties as required.

(1) Remove three screws (1) and washers (2) from PDP (3).
(2) Remove three screws (4) from PDP (3).
(3) Lift PDP (3) outward to gain access.
(4) Remove two nuts (5), lockwashers (6), washers (7), and cover (8) from terminal board TB1 (9). Discard lockwashers.
(5) Disconnect terminal lug TL75 (10) from terminal board TB1 (9) position 2.
(7) Remove two screws (13) and marker lens cover (14) from marker light (15).

(8) Remove four screws (16) and marker light (15) from cab (17).

(9) Remove nut (18), lockwasher (19), terminal lug TL133 (20), and lockwasher (21) from marker light (15). Discard lockwashers.

(10) Disconnect connector P129 (22) from marker light connector 489 (23).

(11) Remove gasket (24) from marker light (15). Discard gasket.
(12) Remove two screws (25) and marker lens cover (26) from marker light (27).

(13) Remove four screws (28) and marker light (27) from door (29).

(14) Remove nut (30), lockwasher (31), and terminal lug TL130 (32), and lockwasher (33) from marker light (27). Discard lockwashers.

(15) Disconnect connector P130 (34) from marker light connector 489 (35).

(16) Remove gasket (36) from marker light (27). Discard gasket.
(17) Remove tube protector (37) and left-hand door and cab marker lights cable assembly (38) from door (29).

(18) Remove left-hand door and cab marker lights cable assembly (38) from dashboard (39).

b. Installation.

NOTE
Install plastic cable ties as required.

(1) Position left-hand door and cab marker lights cable assembly (1) in dashboard (2).

(2) Install left-hand door and cab marker lights cable assembly (1) and tube protector (3) in door (4).

(3) Install gasket (5) on marker light (6).

(4) Connect connector P130 (7) to marker light connector 489 (8).

(5) Install lockwasher (8.1) and terminal lug TL130 (9) on marker light (6) with lockwasher (10) and nut (11).
(6) Install marker light (6) on door (4) with four screws (12).

(7) Install marker lens cover (13) on marker light (6) with two screws (14).

(8) Install gasket (15) on marker light (16).

(9) Connect connector P129 (17) to marker light connector 489 (18).

(10) Install lockwasher (18.1) and terminal lug TL133 (19) on marker light (16) with lockwasher (20) and nut (21).
(11) Install marker light (16) on cab (22) with four screws (23).

(12) Install marker lens cover (24) on marker light (16) with two screws (25).

(13) Connect terminal lug TL87 (26) to terminal board TB2 (27) position 6.

(14) Connect terminal lug TL75 (28) to terminal board TB1 (29) position 2.

(15) Install cover (30) on terminal board TB1 (29) with two washers (31), lockwashers (32), and nuts (33).
(16) Install PDP (34) on dashboard (2) with three screws (35).
(17) Install three washers (36) and screws (37) in PDP (34).

c. Follow-On Maintenance.

(1) Install PDP cover (para 16-2).
(2) Connect batteries (para 7-57).
(3) Check operation of left-hand door and cab marker lights (TM 9-2320-366-10-1).

End of Task.
7-62. M1093/M1094 CAB CLEARANCE AND MARKER LIGHTS LOWER CABLE ASSEMBLY REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).
PDP cover removed (para 16-2).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)

Material/Parts
Dispenser, Pressure Sensitive Adhesive Tape
(Item 20, Appendix D)
Lockwasher (2) (Item 88, Appendix G)

A. Removal.

(1) Remove three screws (1) and washers (2) from PDP (3).
(2) Remove three screws (4) from PDP (3).
(3) Lift PDP (3) outward to gain access.

NOTE
Tag wires and connection points prior to disconnecting.

(4) Remove two nuts (5), lockwashers (6), washers (7), and cover (8) from terminal board TB1 (9). Discard lockwashers.
(5) Disconnect terminal lug TL74 (10) from terminal board TB1 (9) position 3.
7. Disconnect connector P3 (13) from connector J3 (14).

8. Remove two screws (15), washers (16), clamps (17), and M1093/M1094 cab clearance and marker lights lower cable assembly (18) from cab (19).

9. Remove two clamps (17) from M1093/M1094 cab clearance and marker lights lower cable assembly (18).

b. Installation.

1. Install two clamps (1) on M1093/M1094 cab clearance and marker lights lower cable assembly (2).

2. Position M1093/M1094 cab clearance and marker lights lower cable assembly (2) in cab (3) with two clamps (1), washers (4), and screws (5).

3. Tighten two screws (5) to 29-35 lb-in. (3-4 N·m).

4. Connect connector P3 (6) to connector J3 (7).

5. Connect terminal lug TL86 (8) to terminal board TB2 (9) position 4.

6. Connect terminal lug TL74 (10) to terminal board TB1 (11) position 3.

7. Install cover (12) on terminal board TB1 (11) with two washers (13), lockwashers (14), and nuts (15).
(8) Position PDP (16) on dashboard (17).

(9) Install three screws (18) in PDP (16).

(10) Install three washers (19) and screws (20) in PDP (16).

c. Follow-On Maintenance.

(1) Install PDP cover (para 16-2).

(2) Connect batteries (para 7-57).

(3) Check operation of cab clearance and marker lights (TM 9-2320-366-10-1).

End of Task.
7-63. M1093/M1094 CAB CLEARANCE AND MARKER LIGHTS UPPER CABLE ASSEMBLY REPLACEMENT

This task covers:

a. Removal
b. Installation

c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions

Batteries disconnected (para 7-57).

Tools and Special Tools

Tool Kit, Genl Mech (Item 46, Appendix C)

Wrench, Torque, 0-75 lb-in. (Item 90, Appendix B)

Materials/Parts

Lockwire (Item 30, Appendix D)

Gasket (5) (Item 24, Appendix G)

Lockwasher (10) (Item 82, Appendix G)

a. Removal.

(1) Disconnect connector J3 (1) from connector P3 (2).

NOTE

All M1093/M1094 cab clearance and marker lights are removed the same way. Upper left cab marker light shown.

(2) Remove two screws (3) and lens cover (4) from marker light (5).
(3) Remove four screws (6) and marker light (5) from cab roof (7).

NOTE

• Wrap mechanics wire on each connector and terminal lug for ease of installation.

• Refer to Table 7-3. M1093/M1094 Cab Clearance and Marker Lights Connectors for combinations of terminal lugs and connectors on each light.

(4) Remove nut (8), lockwasher (9), terminal lug (10), and lockwasher (11) from marker light (5). Discard lockwashers.

(5) Disconnect connector (12) from marker light connector 489 (13).

(6) Remove gasket (14) from marker light (5). Discard gasket.

Table 7-3. M1093/M1094 Cab Clearance and Marker Lights Connectors

<table>
<thead>
<tr>
<th>Light Location</th>
<th>Connector</th>
<th>Terminal lug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Side Marker</td>
<td>P50</td>
<td>TL27</td>
</tr>
<tr>
<td>Left Center Clearance</td>
<td>P57</td>
<td>TL22</td>
</tr>
<tr>
<td>Center Clearance</td>
<td>P60</td>
<td>TL8</td>
</tr>
<tr>
<td>Right Center Clearance</td>
<td>P59</td>
<td>TL4</td>
</tr>
<tr>
<td>Right Side Marker</td>
<td>P55</td>
<td>TL3</td>
</tr>
</tbody>
</table>
(7) Remove M1093/M1094 cab clearance and marker lights upper cable assembly (15) from cab roof (7).

b. Installation.

NOTE

Transfer mechanics wire to new M1093/M1094 cab clearance and marker lights upper cable assembly.

(1) Position M1093/M1094 cab clearance and marker lights upper cable assembly (1) in cab roof (2).

NOTE

- All M1093/M1094 cab clearance and marker lights are installed the same way. Upper left cab marker light shown.
- Refer to Table 7-3. M1093/M1094 Cab Clearance and Marker Lights Connectors for combinations of terminal lugs and connectors on each light.

(2) Install gasket (3) on marker light (4).

(3) Connect connector (5) to marker light connector 489 (6).

(4) Install lockwasher (6.1) and terminal lug (7) on marker light (4) with lockwasher (8) and nut (9).
(5) Install marker light (4) on cab roof (2) with four screws (10).

(6) Install lens cover (11) on marker light (4) with two screws (12).

(7) Connect connector J3 (13) to connector P3 (14).

c. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Check operation of cab clearance and marker lights (TM 9-2320-366-10-1).

End of Task.
This task covers:

a. Removal  
b. Installation  
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions

Batteries disconnected (para 7-57).
PDP cover removed (para 16-2).

Tools and Special Tools

Tool Kit, Genl Mech (Item 46, Appendix C)

Materials/Parts

Ties, Cable, Plastic (Item 69, Appendix D)
Lockwasher (4) (Item 82, Appendix G)
Lockwasher (2) (Item 88, Appendix G)
Gasket (2) (Item 24, Appendix G)

a. Removal.

NOTE

- Note routing of right-hand door and cab marker lights cable assembly prior to removal.
- Remove plastic cable ties as required.

(1) Remove three screws (1) and washers (2) from PDP (3).

(2) Remove three screws (4) from PDP (3).

(3) Lift PDP (3) outward to gain access.

(4) Remove two nuts (5), lockwashers (6), washers (7), and cover (8) from terminal board TB1 (9). Discard lockwashers.

(5) Disconnect terminal lug TL73 (10) from terminal board TB1 (9) position 1.

(6) Disconnect terminal lug TL71 (11) from terminal board TB2 (12) position 2.
(7) Remove two screws (13) and marker lens cover (14) from marker light (15).

(8) Remove four screws (16) and marker light (15) from cab (17).

(9) Remove nut (18), lockwasher (19), terminal lug TL134 (20), and lockwasher (20.1) from marker light (15). Discard lockwashers.

(10) Disconnect connector P132 (21) from marker light connector 489 (22).

(11) Remove gasket (23) from marker light (15). Discard gasket.
(12) Remove two screws (24) and marker lens cover (25) from marker light (26).

(13) Remove four screws (27) and marker light (26) from door (28).

(14) Remove nut (29), lockwasher (30), terminal lug TL131 (31), and lockwasher (31.1) from marker light (26). Discard lockwashers.

(15) Disconnect connector P131 (32) from marker light connector 489 (33).

(16) Remove gasket (34) from marker light (26). Discard gasket.
(17) Remove tube protector (35) and right-hand door and cab marker lights cable assembly (36) from door (28).

(18) Remove right-hand door and cab marker lights cable assembly (36) dashboard (37).

b. Installation.

![Diagram of installation process]

**NOTE**

Install plastic cable ties as required.

(1) Position right-hand door and cab marker lights cable assembly (1) in dashboard (2).

(2) Install right-hand door and cab marker lights cable assembly (1) and tube protector (3) in door (4).

(3) Install gasket (5) on marker light (6).

(4) Connect connector P131 (7) to marker light connector 489 (8).

(5) Install lockwasher (8.1) and terminal lug TL131 (9) on marker light (6) with lockwasher (10) and nut (11).
(6) Install marker light (6) on door (3) with four screws (12).

(7) Install marker lens cover (13) on marker light (6) with two screws (14).

(8) Install gasket (15) on marker light (16).

(9) Connect connector P132 (17) to marker light connector 489 (18).

(10) Install lockwasher (18.1) and terminal lug TL134 (19) on marker light (16) with lockwasher (20) and nut (21).
(11) Install marker light (16) on cab (22) with four screws (23).

(12) Install marker lens cover (24) on marker light (16) with two screws (25).

(13) Connect terminal lug TL71 (26) to terminal board TB2 (27) position 2.

(14) Connect terminal lug TL73 (28) to terminal board TB1 (29) position 1.

(15) Install cover (30) on terminal board TB1 (29) with two washers (31), lockwashers (32), and nuts (33).
(16) Position PDP (34) on dashboard (2) with three screws (35).

(17) Deleted.

(18) Install three washers (36) and screws (37) in PDP (34).

c. Follow-On Maintenance.

(1) Install PDP cover (para 16-2).

(2) Connect batteries (para 7-57).

(3) Check operation of right-hand door and cab marker lights (TM 9-2320-366-10-1).

End of Task.
7-65. STE/ICE-R CABLE ASSEMBLY REPLACEMENT

This task covers:

- a. Removal
- b. Installation
- c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Instrument panel assembly removed for access (para 7-15).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

Materials/Parts
Ties, Cable, Plastic (Item 69, Appendix D)
Lockwasher (4) (Item 76, Appendix G)

a. Removal.

NOTE
Remove plastic cable ties as required.

(1) Disconnect connector J31X (1) from connector P31X (2).

(2) Disconnect connector J43X (3) from connector P43X (4).

(3) Remove two screws (5) and bracket (6) from cab (7).
(4) Remove two screws (8), washers (9), junction box (10), and STE/ICE-R cable assembly (11) from dashboard (12).

(5) Remove four nuts (13), lockwashers (14), screws (15), chain (16), and bracket (6) from STE/ICE-R cable assembly (11). Discard lockwashers.

b. Installation.

**NOTE**

Install plastic cable ties as required.

(1) Install bracket (1) on STE/ICE-R cable assembly (2) with chain (3), four screws (4), lockwashers (5), and nuts (6).
(2) Position STE/ICE-R cable assembly (2) in dashboard (7).

(3) Install junction box (8) on dashboard (7) with two washers (9) and screws (10).

(4) Install bracket (1) on cab (11) with two screws (12).

(5) Connect connector J43X (13) to connector P43X (14).

(6) Connect connector J31X (15) to connector P31X (16).

c. Follow-On Maintenance.

Install instrument panel assembly (para 7-15).

End of Task.
7-66. CAB CLEARANCE MARKER LIGHTS CABLE ASSEMBLY REPLACEMENT

This task covers:

a. Removal
b. Installation

c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions

- Batteries disconnected (para 7-57).
- PDP cover removed (para 16-2).

Tools and Special Tools

- Tool Kit, Genl Mech (Item 46, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Socket Set, Socket Wrench (Item 34, Appendix C)

Materials/Parts

- Lockwire (Item 30, Appendix D)
- Lockwasher (10) (Item 82, Appendix G)
- Lockwasher (2) (Item 88, Appendix G)
- Gasket (5) (Item 24, Appendix G)

a. Removal.

1. Remove three screws (1) and washers (2) from PDP (3).

2. Remove three screws (4) from PDP (3).

3. Lift PDP (3) outward to gain access.

4. Remove two nuts (5), lockwashers (6), washers (7), and cover (8) from terminal board TB1 (9). Discard lockwashers.

5. Disconnect terminal lug TL74 (10) from terminal board TB1 (9) position 3.

NOTE

All cab clearance marker lights are removed the same way. Upper left cab clearance marker light shown.

(7) Remove two screws (13) and marker lens cover (14) from marker light (15).

(8) Remove four screws (16) and marker light (15) from cab (17).

NOTE

• Wrap mechanics wire on each connector and terminal lug for ease of installation.

• Refer to Table 7-4. Cab Clearance Marker Light Connectors for combinations of terminal lugs and connectors on each marker light.

(9) Remove nut (18), lockwasher (19), terminal lug (20), and lockwasher (20.1) from marker light (15). Discard lockwashers.

(10) Disconnect connector (21) from marker light connector 489 (22).

(11) Remove gasket (23) from marker light (15). Discard gasket.
(12) Remove eight screws (24), washers (25), clamps (26), and cab clearance marker lights cable assembly (27) from cab (17).

(13) Remove eight clamps (26) from cab clearance marker lights cable assembly (27).

b. Installation.

Transfer mechanics wire to new cab clearance marker lights cable assembly.

(1) Install eight clamps (1) on cab clearance marker lights cable assembly (2).

(2) Install cab clearance marker lights cable assembly (2) on cab (3) with eight clamps (1), washers (4), and screws (5).
NOTE

- All cab clearance marker lights are installed the same way. Upper left cab clearance marker light shown.

- Refer to Table 7-4, Cab Clearance Marker Light Connectors for combinations of terminal lugs and connectors on each marker light.

(3) Install gasket (6) on marker light (7).

(4) Connect connector (8) to marker light connector 489 (9).

(5) Install lockwasher (9.1) and terminal lug (10) on marker light (7) with lockwasher (11) and nut (12).

(6) Install marker light (7) on cab (2) with four screws (13).

(7) Install marker lens cover (14) on marker light (7) with two screws (15).
(8) Connect terminal lug TL86 (16) to terminal board TB2 (17) position 4.

(9) Connect terminal lug TL74 (18) to terminal board TB1 (19) position 3.

(10) Install cover (20) on terminal board TB1 (19) with two washers (21), lockwashers (22), and nuts (23).

(11) Position PDP (24) on dashboard (25).

(12) Install three screws (26) in PDP (24).

(13) Install three washers (27) and screws (28) in PDP (24).

c. Follow-On Maintenance.

(1) Install PDP cover (para 16-2).

(2) Connect batteries (para 7-57).

(3) Check operation of cab clearance marker lights (TM 9-2320-366-10-1).

End of Task.
This task covers:

- a. Removal
- b. Installation
- c. Follow-On Maintenance

**INITIAL SETUP**

**Equipment Conditions**
Batteries disconnected (para 7-57).

**Materials/Parts**
Nut, Self-Locking (Item 167, Appendix G)

**Tools and Special Tools**
Tool Kit, Genl Mech (Item 46, Appendix C)

---

**a. Removal.**

(1) Loosen screw (1) and open cab step tread (2).

(2) Disconnect connector J25 (3) from connector P25 (4).

(3) Disconnect connector P125 (5) from windshield washer pump (6).
(4) Remove self-locking nut (7), washer (8), screw (9), washer (10), terminal lug TL94 (11), and windshield washer pump EMI cable (12) from box (13). Discard self-locking nut.

b. Installation.

(1) Position windshield washer pump EMI cable (1) in box (2).

(2) Install terminal lug TL94 (3) on box (2) with washer (4), screw (5), washer (6), and self-locking nut (7).

(3) Connect connector P125 (8) to windshield washer pump (9).

(4) Connect connector P25 (10) to connector J25 (11).
(5) Close cover (12) and tighten screw (13).

c. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Check operation of windshield washers (TM 9-2320-366-10-1).

End of Task.
7-68. WINDSHIELD WIPER ELECTROMAGNETIC INTERFERENCE (EMI) CABLE REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions

Batteries disconnected (para 7-57).
PDP cover removed (para 16-2).

Tools and Special Tools

Tool Kit, Genl Mech (Item 46, Appendix C)

Materials/Parts

Ties, Cable, Plastic (Item 69, Appendix D)

a. Removal.

(1) Remove three screws (1) and washers (2) from PDP (3).

(2) Remove three screws (4) from PDP (3).

(3) Lift PDP (3) outward to gain access.

NOTE

Remove plastic cable ties as required.

(4) Disconnect windshield wiper EMI cable connector PX22 (5) from windshield wiper motor (6).

(5) Disconnect windshield wiper EMI cable connector P2 (7) from connector J2 (8).
b. Installation.

NOTE

Install plastic cable ties as required.

(1) Connect windshield wiper EMI cable connector P2 (1) to connector J2 (2).

(2) Connect windshield wiper EMI cable connector PX22 (3) to windshield wiper motor (4).

(3) Position PDP (5) on dashboard (6).

(4) Install three screws (7) in PDP (5).

(5) Install three washers (8) and screws (9) in PDP (5).

c. Follow-On Maintenance.

(1) Install PDP cover (para 16-2).

(2) Connect batteries (para 7-57).

(3) Check operation of windshield wipers (TM 9-2320-366-10-1).

End of Task.
7-69. WINDSHIELD WIPER ECU REPLACEMENT

This task covers:

| a. Removal               | b. Installation               | c. Follow-On Maintenance |

INITIAL SETUP

**Equipment Conditions**
- Batteries disconnected (para 7-57).
- PDP cover removed (para 16-2).

a. **Removal.**

Remove windshield wiper ECU (1) from PDP (2).

b. **Installation.**

Install windshield wiper ECU (1) in PDP (2).

c. **Follow-On Maintenance.**

1. Install PDP cover (para 16-2).
2. Connect batteries (para 7-57).
3. Check operation of windshield wipers (TM 9-2320-366-10-1).

**End of Task.**
7-70. NATO POWER CABLE REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Engine shut down (TM 9-2320-366-10-1).
Battery box cover removed (TM 9-2320-366-10-2).

Tools and Special Tools
Goggles, Industrial (Item 15, Appendix C)
Gloves, Rubber (Item 13, Appendix C)
Apron, Rubber (Item 3, Appendix C)
Tool Kit, Genl Mech (Item 46, Appendix C)

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
Grease, Automotive and Artillery (GAA) (Item 22, Appendix D)
Nut, Self-Locking (4) (Item 158, Appendix G)
Lockwasher (Item 87, Appendix G)

a. Removal.

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 when working with batteries. Failure to comply may result in injury to personnel.

- 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.

NOTE

Tag battery terminals, terminal lugs, and connection points prior to disconnecting.

(1) Remove nut (1) and lockwasher (2) from battery ground cable (3). Discard lockwasher.

(2) Deleted.

(3) Remove terminal lugs TL50A (5), TL48 (6), and battery tester terminal lug (7) from battery ground cable (3).
7-70. NATO POWER CABLE REPLACEMENT (CONT)

(4) Remove nut (8) from battery 24 vdc cable (9).

(5) Deleted.

(6) Remove terminal lug TL49A (11) and battery tester terminal lug (12) from battery 24 vdc cable (9).

(7) Remove four self-locking nuts (13), washers (14), screws (15), and eyelet (16) from NATO power cable (17). Discard self-locking nuts.

(8) Remove NATO power cable (17) and terminal lugs TL49A (11) and TL50A (5) from bracket (18) and battery box (19).

b. Installation.

(1) Position terminal lugs TL49A (1) and TL50A (2), and NATO power cable (3) in bracket (4) and battery box (5).

(2) Install NATO power cable (3) and eyelet (6) on bracket (4) with four screws (7), washers (8), and self-locking nuts (9).
WARNING

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

(3) Install battery tester terminal lug (10) and terminal lug TL49A (1) on battery 24 vdc cable (11).

(4) Deleted.

(5) Install nut (13) on battery 24 vdc cable (11).

(6) Install battery tester terminal lug (14), and terminal lugs TL48 (15) and TL50A (2) on battery ground cable (16).

(7) Deleted.

(8) Install lockwasher (18) and nut (19) on battery ground cable (16).

(9) Apply grease to all battery terminals.

c. Follow-On Maintenance.

Install battery box cover (TM 9-2320-366-10-2).

End of Task.
7-71. ALTERNATOR GROUND STRAP REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Cab raised (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).

Materials/Parts
Lockwasher (Item 103, Appendix G)
Lockwasher (Item 81, Appendix G)
Nut, Self-Locking (Item 158, Appendix G)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)

a. Removal.

(1) Remove screw (1), lockwasher (2), washer (3), terminal lug TL5 (4), and ground cable (5) from alternator (6). Discard lockwasher.

(2) Remove self-locking nut (7), washer (8), ground cable (5), lockwasher (9), screw (10), and washer (11) from right frame rail (12). Discard self-locking nut and lockwasher.
b. Installation.

(1) Install lockwasher (1) and ground cable (2) on right frame rail (3) with washer (4), screw (5), washer (6) and self-locking nut (7).

(2) Install ground cable (2) and terminal lug TL5 (8) on alternator (9) with washer (10), lockwasher (11), and screw (12).

c. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Lower cab (TM 9-2320-366-10-1).

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

(4) Check VOLTS gage for charge indication (TM 9-2320-366-10-1).

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

End of Task.
This task covers:

- a. Removal
- b. Installation
- c. Follow-On Maintenance

**INITIAL SETUP**

**Equipment Conditions**
- Spare tire lowered (TM 9-2320-366-10-2).
- Cab raised (TM 9-2320-366-10-1).
- Batteries disconnected (para 7-57).

**Tools and Special Tools**
- Tool Kit, Genl Mech (Item 46, Appendix C)
- Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)
- Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
- Socket Set, Socket Wrench (Item 34, Appendix C)

**Materials/Parts**
- Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
- Ties, Cable, Plastic (Item 69, Appendix D)
- Lockwasher (Item 96, Appendix G)
- Nut, Self-Locking (Item 144.1, Appendix G)

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**a. Removal.**

1. Loosen clamp (1) on turbocharger intake hose (2).
2. Remove turbocharger intake hose (2) from intake air cleaner boot (3).

**NOTE**

Remove plastic cable ties as required.

3. Lift terminal cover (4) on terminal lugs TL47 (5) and TL61 (6).

**NOTE**

Remove plastic cable ties as required.

4. Remove nut (7), lockwasher (8), and terminal lugs TL47 (5) and TL61 (6) from reverse polarity relay 12 VDC LOAD terminal (9). Discard lockwasher.
(5) Lift dust boot (10) on terminal lug TL60 (11).

(6) Remove self-locking nut (12), washer (13), insulation washer (14), and terminal lug TL60 (11) from alternator (15). Discard self-locking nut.

(7) Remove dust boot (10) from 100 amp alternator to reverse polarity relay 12 vdc cable (16).

(8) Remove three screws (17), washers (18), clamps (19), and 100 amp alternator to reverse polarity relay 12 vdc cable (16) from engine (20).

(9) Remove three clamps (19) from 100 amp alternator to reverse polarity relay 12 vdc cable (16).

b. Installation.

(1) Install three clamps (1) on 100 amp alternator to reverse polarity relay 12 vdc cable (2).

NOTE

Install plastic cable ties as required.

(2) Position 100 amp alternator to reverse polarity relay 12 vdc cable (2) on engine (3) with three clamps (1), washers (4), and screws (5).

(3) Tighten three screws (5) to 22-27 lb-ft (31-37 N·m).
(4) Install dust boot (6) on 100 amp alternator to reverse polarity relay 12 vdc cable (2).

**CAUTION**

Insulation washer must be installed with flat side up. Failure to comply may result in damage to equipment.

(5) Position terminal lug TL60 (7) on alternator (8) with insulator washer (9), washer (10) and self-locking nut (11).

(6) Tighten self-locking nut (11) to 40 lb-in. (5 N·m).

(7) Position dust boot (6) on terminal lug TL60 (7).

(8) Position terminal lugs TL61 (12) and TL47 (13) on reverse polarity relay 12 VDC LOAD terminal (14) with lockwasher (15) and nut (16).

(9) Tighten nut (16) to 120-144 lb-in. (14-16 N·m).

(10) Position terminal cover (17) on terminal lugs TL47 (13) and TL61 (12).

(11) Position turbocharger intake hose (18) on intake air cleaner boot (19) with clamp (20).

(12) Tighten clamp (20) to 36-48 lb-in. (4-5 N·m).
c. **Follow-On Maintenance.**

(1) Connect batteries (para 7-57).

(2) Raise spare tire (TM 9-2320-366-10-2).

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

(4) Check VOLTS gage for charge indication (TM 9-2320-366-10-1).

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

**End of Task.**
This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Spare tire lowered (TM 9-2320-366-10-2).
Cab raised (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 34, Appendix C)

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
Ties, Cable, Plastic (Item 69, Appendix D)
Lockwasher (Item 96, Appendix G)
Nut, Self-Locking (Item 143, Appendix G)

a. Removal.

(1) Loosen clamp (1) on turbocharger intake hose (2).
(2) Remove turbocharger intake hose (2) from intake air cleaner boot (3).

NOTE

Remove plastic cable ties as required.

(3) Lift terminal cover (4) on terminal lugs TL1 (5), TL36 (6), and TL37 (7).

(4) Remove nut (8), lockwasher (9), and terminal lugs TL1 (5), TL36 (6), and TL37 (7) from reverse polarity relay 24 VDC LOAD terminal (10). Discard lockwasher.
(5) Lift dust boot (11) on terminal lugs TL2 (12) and TL6 (13).

(6) Remove self-locking nut (14), washer (15), insulation washer (16), and terminal lugs TL2 (12) and TL6 (13) from alternator (17). Discard self-locking nut.

(7) Remove 100 amp alternator to reverse polarity relay 24 vdc cable (18) from dust boot (11).

(8) Remove three screws (19), washers (20), clamps (21), and 100 amp alternator to reverse polarity relay 24 vdc cable (18) from engine (22).

(9) Remove three clamps (21) from 100 amp alternator to reverse polarity relay 24 vdc cable (18).
b. Installation.

(1) Install three clamps (1) on 100 amp alternator to reverse polarity relay 24 vdc cable (2).

**NOTE**

Install plastic cable ties as required.

(2) Position 100 amp alternator to reverse polarity relay 24 vdc cable (2) on engine (3) with three clamps (1), washers (4), and screws (5).

(3) Tighten three screws (5) to 22-27 lb-ft (31-37 N·m).

(4) Install 100 amp alternator to reverse polarity relay 24 vdc cable (2) in dust boot (6).

**CAUTION**

Insulation washer must be installed with flat side up. Failure to comply may result in damage to equipment.

(5) Position terminal lugs TL6 (7) and TL2 (8) on alternator (9) with insulation washer (10), washer (11) and self-locking nut (12).

(6) Tighten self-locking nut (12) to 40 lb-in. (5 N·m).

(7) Position dust boot (6) on terminal lugs TL2 (8) and TL6 (7).
(8) Position terminal lugs TL37 (13), TL36 (14), and TL1 (15) on reverse polarity relay 24 VDC LOAD terminal (16) with lockwasher (17) and nut (18).

(9) Tighten nut (18) to 120-144 lb-in. (14-16 N·m).

(10) Position terminal cover (19) on terminal lugs TL1 (15), TL36 (14), and TL37 (13).

(11) Position turbocharger intake hose (20) on intake air cleaner boot (21) with clamp (22).

(12) Tighten clamp (22) to 36-48 lb-in. (4-5 N·m).

c. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Raise spare tire (TM 9-2320-366-10-2).

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

(4) Check VOLTS gage for charge indication (TM 9-2320-366-10-1).

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

End of Task.
7-74. BATTERY TO 100 AMP REVERSE POLARITY RELAY 12 VDC CABLE REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Spare tire lowered (TM 9-2320-366-10-2).
Cab raised (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 34, Appendix C)

Materials/Parts
Ties, Cable, Plastic (Item 63, Appendix C)
Lockwasher (Item 96, Appendix G)

a. Removal.

(1) Lift terminal cover (1) on terminal lugs TL61 (2) and TL47 (3).

**NOTE**
Remove plastic cable ties as required.

(2) Remove nut (4), lockwasher (5), and terminal lugs TL61 (2) and TL47 (3) from 100 amp reverse polarity relay 12 VDC BAT terminal (6). Discard lockwasher.

**NOTE**
Note routing of 100 amp reverse polarity relay 12 vdc cable prior to removal.

(3) Remove battery to 100 amp reverse polarity relay 12 vdc cable (7) from vehicle.
b. Installation.

NOTE

Install plastic cable ties as required.

(1) Position battery to 100 amp reverse polarity relay 12 vdc cable (1) on vehicle.

(2) Position terminal lugs TL47 (2) and TL61 (3) on 100 amp reverse polarity relay 12 VDC BAT terminal (4) with lockwasher (5) and nut (6).

(3) Tighten nut (6) to 120-144 lb-in. (14-16 N·m).

(4) Position terminal cover (7) on terminal lugs TL47 (2) and TL61 (3).

c. Follow-On Maintenance.

(1) Raise spare tire (TM 9-2320-366-10-2).

(2) Connect batteries (para 7-57).

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

(4) Check VOLTS gage for charge indication (TM 9-2320-366-10-1).

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

End of Task.
7-75. BATTERY TO 100 AMP REVERSE POLARITY RELAY 24 VDC CABLE REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions

Spare tire lowered (TM 9-2320-366-10-2).
Cab raised (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).

Materials/Parts

Lockwasher (Item 96, Appendix G)

Tools and Special Tools

Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 36, Appendix C)
Goggles, Industrial (Item 15, Appendix C)

a. Removal.

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 when working with batteries. Failure to comply may result in injury to personnel.

(1) Remove nut (1) and terminal lugs TL39 (2) and TL10 (3) from battery 24 vdc cable (4).
(2) Loosen clamp (5) on turbocharger intake hose (6).

(3) Remove turbocharger intake hose (6) from intake air cleaner boot (7).

(4) Lift terminal cover (8) on terminal lugs TL1 (9), TL36 (10), and battery to 100 amp reverse polarity relay 24 vdc cable terminal lug TL37 (11).

(5) Remove nut (12), lockwasher (13), terminal lugs TL1 (9), TL36 (10), and battery to 100 amp reverse polarity relay 24 vdc cable terminal lug TL37 (11) from 100 amp reverse polarity relay 24 VDC BAT terminal (14). Discard lockwasher.

b. Installation.

(1) Position battery to 100 amp reverse polarity relay 24 vdc cable terminal lug TL37 (1) and terminal lugs TL36 (2) and TL1 (3) on 100 amp reverse polarity relay 24 VDC BAT terminal (4) with lockwasher (5) and nut (6).

(2) Tighten nut (6) to 120-144 lb-in. (14-16 N-m).

(3) Position terminal cover (7) on terminal lugs TL1 (3), TL36 (2), and battery to 100 amp reverse polarity relay 24 vdc cable terminal lug TL37 (1).
(4) Position turbocharger intake hose (8) on intake air cleaner boot (9) with clamp (10).

(5) Tighten clamp (10) to 36-48 lb-in. (4-5 N·m).

(6) Install terminal lugs TL10 (11) and TL39 (12) on battery 24 vdc cable (13) with nut (14).

c. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Raise spare tire (TM 9-2320-366-10-2).

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

(4) Check VOLTS gage for 24 vdc (TM 9-2320-366-10-1).

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

End of Task.
7-76. BATTERY TO SHUNT CABLE ASSEMBLY REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Spare tire lowered (TM 9-2320-366-10-2).
Cab raised (TM 9-2320-366-10-1).
Batteries disconnected (para 7-57).

Materials/Parts
Lockwasher (Item 87, Appendix G)

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-200 lb-in. (Item 59, Appendix C)
Socket Set, Socket Wrench (Item 34, Appendix C)

a. Removal.

(1) Loosen clamp (1) on turbocharger intake hose (2).

(2) Remove turbocharger intake hose (2) from intake air cleaner boot (3).

(3) Remove screw (4), lockwasher (5), and terminal lug TL52 (6) from shunt (7). Discard lockwasher.
b. Installation.

(1) Install terminal lug TL52 (1) on shunt (2) with lockwasher (3) and screw (4).

(2) Position turbocharger intake hose (5) on intake air cleaner boot (6) with clamp (7).

(3) Tighten clamp (7) to 36-48 lb-in. (4-5 N·m).

c. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

(2) Raise spare tire (TM 9-2320-366-10-2).

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

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

End of Task.
7-77. BATTERY TO STARTER CABLE ASSEMBLY REPLACEMENT

This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Batteries disconnected (para 7-57).
Cab raised (TM 9-2320-366-10-1).

Tools and Special Tools
Tool Kit, Genl Mech (Item 46, Appendix C)
Wrench, Torque, 0-175 lb-ft (Item 58, Appendix C)

Materials/Parts
Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
Ties, Cable, Plastic (Item 69, Appendix D)
Adhesive (Item 8, Appendix D)
Nut, Self-Locking (2) (Item 150, Appendix G)

Personnel Required
(2)

a. Removal.

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 when working with batteries. Failure to comply may result in injury to personnel.

NOTE

• Note routing of battery to starter cable assembly prior to removal.
• Tag wires and connection points prior to disconnecting.

(1) Remove nut (1) and terminal lugs TL39 (2) and TL10 (3) from battery 24 vdc cable (4).
NOTE

- Both clamps are removed the same way. One shown.
- Remove plastic cable ties as required.

(2) Remove self-locking nut (5), screw (6), battery to starter cable assembly (7), and clamp (8) from frame rail (9). Discard self-locking nut.

NOTE

Step (3) requires the aid of an assistant.

(3) Perform step (2) on remaining clamp.

(4) Remove two clamps (8) from battery to starter cable assembly (7).

(5) Remove adhesive, nut (10), and terminal lug TL12 (11) from starter solenoid (12).
b. Installation.

(1) Position terminal lug TL12 (1) on starter solenoid (2) with nut (3).

(2) Tighten nut (3) to 15-20 lb-ft (20-27 N·m).

**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.

(3) Apply adhesive to terminal lug TL12 (1) on starter solenoid (2).

**NOTE**

Both clamps are installed the same way. One shown.

(4) Install two clamps (4) on battery to starter cable assembly (5).

**NOTE**

Steps (5) through (7) require the aid of an assistant.

(5) Position battery to starter cable assembly (5) on frame rail (6) with clamp (4), screw (7) and self-locking nut (8).

(6) Perform Step (5) on remaining clamp.

**NOTE**

Install plastic cable ties as required.

(7) Tighten two self-locking nuts (8) to 97-124 lb-in. (11-14 N·m).
(8) Install terminal lugs TL10 (9) and TL39 (10) on battery 24 vdc cable (11) with nut (12).

c. Follow-On Maintenance.

(1) Lower cab (TM 9-2320-366-10-1).
(2) Connect batteries (para 7-57).
(3) Start engine (TM 9-2320-366-10-1).
(4) Shut down engine (TM 9-2320-366-10-1).

End of Task.
7-78. CAB TO CHASSIS GROUND STRAP REPLACEMENT

This task covers:

a. Removal  
b. Installation  
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions  
Batteries disconnected (para 7-57).

Tools and Special Tools  
Tool Kit, Genl Mech (Item 46, Appendix C)  
Wrench, Torque, 0-200 lb-in. (Item 58, Appendix C)

Tools and Special Tools (Cont)  
Socket Set, Socket Wrench, (Item 35, Appendix C)

Materials/Parts  
Ties, Cable, Plastic (Item 69, Appendix D)  
Nut, Self-Locking (Item 167, Appendix G)  
Lockwasher (Item 75, Appendix G)

a. Removal.

NOTE

Remove plastic cable ties as required.

(1) Remove two screws (1) and washers (2) from front grille (3).

(2) Remove screw (4) and washer (5) from front grille (3).

(3) Remove front grille (3) from cab (6).

(4) Loosen screw (7) in chassis (8) and remove cab to chassis ground cable (9).

(5) Remove self-locking nut (10), washer (11), cab to chassis ground cable (9), and lockwasher (12) from stud (13). Discard self-locking nut and lockwasher.
b. Installation.

(1) Install cab to chassis ground cable (1) on stud (2) with lockwasher (3), washer (4), and self-locking nut (5).

(2) Position cab to chassis ground cable (1) on chassis (6) and tighten screw (7).

(3) Position front grille (8) on cab (9) with washer (10) and screw (11).

(4) Position two washers (12) and screws (13) in front grille (8).

(5) Tighten screw (11) to 48-60 lb-in. (5-7 N·m).

(6) Tighten two screws (13) to 24 lb-in. (3 N·m).

c. Follow-On Maintenance.

(1) Connect batteries (para 7-57).

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

(3) Check VOLTS gage for charge indication (TM 9-2320-366-10-1).

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

End of Task.
This task covers:

a. Removal
b. Installation
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions

- Batteries disconnected (para 7-57).
- Kick panel removed (para 16-3).

Tools and Special Tools

- Tool Kit, Genl Mech (Item 46, Appendix C)

Materials/Parts

- Dispenser, Pressure Sensitive Adhesive Tape (Item 20, Appendix D)
- Ties, Cable, Plastic (Item 69, Appendix D)
- Lockwasher (2) (Item 96, Appendix G)
- Washer, Spring (2) (Item 289, Appendix G)
- Washer, Spring (2) (Item 296, Appendix G)
- Nut, Self-Locking (19) (Item 154, Appendix G)

a. Removal.

(1) Disconnect connector P171 (1) from crane junction box connector (2).

NOTE

- Remove plastic cable ties as required.
- Tag terminal lugs and connection points prior to disconnecting.

(2) Remove screw (3), terminal lugs TL67 (4), TL17 (5), TL69 (6), and lockwasher (7) from left taillight carrier (8). Discard lockwasher.
(3) Remove dust cap (9) from connector P135 (10).

(4) Remove nut (11), screw (12), spring washer (13), and lanyard (14) from left taillight carrier (8). Discard spring washer.

(5) Remove nut (15), spring washer (16), and connector P135 (10) from left tail light carrier (8). Discard spring washer.

(6) Remove screw (17), terminal lugs TL20 (18), TL21 (19), TL68 (20), and lockwasher (21) from right taillight carrier (22). Discard lockwasher.

(7) Remove dust cap (23) from connector P136 (24).

(8) Remove nut (25), screw (26), spring washer (27), and lanyard (28) from worklight connector bracket (29). Discard spring washer.

(9) Remove nut (30), spring washer (31), and connector P136 (24) from worklight connector bracket (29). Discard spring washer.
(10) Remove 19 self-locking nuts (32), screws (33), and clamps (34) from right frame rail (35). Discard self-locking nuts.

(11) Remove crane power control cable assembly (36) from 19 clamps (34).

(12) Disconnect connector P108 (37) from connector J108 (38).

(13) Remove grommet (39) from cab (40).

(14) Remove crane power control cable assembly (29) from grommet (39).

(15) Remove crane power control cable assembly (29) from cab (40).

b. Installation.

(1) Route crane power control cable assembly (1) inside cab (2).

(2) Install crane power control cable assembly (1) in grommet (3).

(3) Connect connector P108 (4) to connector J108 (5).
(4) Install crane power control cable assembly (1) in 19 clamps (6).

(5) Install 19 clamps (6) on right frame rail (7) with 19 screws (8) and self-locking nuts (9).

(6) Install connector P136 (10) in worklight connector bracket (11) with spring washer (12) and nut (13).

(7) Install lanyard (14) on worklight connector bracket (11) with spring washer (15), screw (16), and nut (17).

(8) Install dust cap (18) on connector P136 (10).

(9) Install terminal lugs TL68 (19), TL21 (20), and TL20 (21) on right taillight carrier (22) with lockwasher (23) and screw (24).
(10) Install connector P135 (25) in left taillight carrier (26) with spring washer (27) and nut (28).

(11) Install lanyard (29) on left taillight carrier (26) with spring washer (30), screw (31), and nut (32).

(12) Install dust cap (33) on connector P135 (25).

(13) Install terminal lugs TL69 (34), TL17 (35), and TL67 (36) on left taillight carrier (26) with lockwasher (37) and screw (38).

(14) Connect crane junction box connector (39) to connector P171 (40).

c. Follow-On Maintenance.

(1) Install kick panel (para 16-3).

(2) Connect batteries (para 7-57).

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

(4) Check MHC operation (TM 9-2320-366-10-1).

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

End of Task.
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 DA Publications and Blank Forms ........................................... DA Form 2028-2
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 for Soldiers .......................................................................................................... FM 21-11
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) ........................................ T B 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 ....................TM 43-0143
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
Metal Body Repair and Related Operations .......................................... FM 43-2
Operator’s and Organizational Maintenance Manual for Radio Sets .......... TM 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 ........................................... TM 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
A-4. OTHER PUBLICATIONS (CONT)

i. Land, Sea, and Air Shipment (Cont).

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 including fault location/troubleshooting, removal/installation, and disassembly/assembly procedures, and maintenance actions 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 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.

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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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\(^5\)This 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>(2) Component/Assembly</th>
<th>(3) Maintenance Function</th>
<th>(4) Maintenance Level</th>
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### Section II. MAINTENANCE ALLOCATION CHART FOR THE MTV VEHICLE

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B-10 Change 3
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## Section II. MAINTENANCE ALLOCATION CHART FOR THE MTV VEHICLE

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## Section II. MAINTENANCE ALLOCATION CHART FOR THE MTV VEHICLE

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- **Field Level**: C = Component, O = Operational, F = Functional, H = High, D = Depot
- **Sustainment Level**: 1.0 = Direct Support, 1.5 = General Support, 4.0 = Depot
- **Remarks Code**: 80 = Repair, 61,80,90 = Replace
### Section II. MAINTENANCE ALLOCATION CHART FOR THE MTV VEHICLE

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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>ITEM NUMBER</th>
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<td>GGG-W-641</td>
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<td>58</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>
<th>(3) National Stock Number</th>
<th>(4) Description</th>
<th>(5) U/M</th>
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<td>Adapter, Pipe to Tube (81343) 4-4 010103B</td>
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<td>Adhesive (71984) 3145 RTV Clear</td>
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<td>6</td>
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<td>8040-00-776-9602</td>
<td>Adhesive (73168) 80055-31</td>
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<td>7</td>
<td>O</td>
<td>8040-00-522-3429</td>
<td>Adhesive (81349) (MIL-A-46106)</td>
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<td>10.2</td>
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<td>8040-00-728-3088</td>
<td>Adhesive (78500) 1199-T-3842 6 oz</td>
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<td>11</td>
<td>C</td>
<td>6850-00-174-1806</td>
<td>Antifreeze, Arctic Type (81349) (MIL-A-11755) 55 gal drum</td>
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<tr>
<td>12</td>
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<td>6850-01-441-3218</td>
<td>Antifreeze, Multi-Engine Type (58536) (A-A-52624A)</td>
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<td>13</td>
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<td>8030-00-597-5367</td>
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<td>8030-00-903-0931</td>
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### Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST (CONT)

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<td>9150-00-180-6382</td>
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<td>Ink, Marking Stencil (81349) (MIL-I-43553)</td>
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### Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST (CONT)

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<td>31</td>
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### Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST (CONT)

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Change 1  D-7/(D-8 Blank)
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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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.

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Figure E-1. Brake Adjusting Tool Support

- All dimensions are in inches (millimeters).
- Cut steel sheet as shown by dimensions on Figure E-1. Brake Adjusting Tool Support.
- 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.
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.

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<td>Steel, Flat Bar</td>
<td>4.0 in. (10.2 cm) X 33.38 in. X 84.8 cm X 0.38 in. (0.96 cm)</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<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>
<td>1</td>
</tr>
<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>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>H.S.105VW-1</td>
<td>Insulgrip, CSA 105 C</td>
<td></td>
<td></td>
</tr>
</tbody>
</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.
Figure E-4. Cab Support Tool Seat

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.
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.
Figure E-6. Cab Support Tool Assembly

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>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>N/A</td>
<td>Plate, Mounting</td>
<td>1</td>
</tr>
</tbody>
</table>

![Diagram of Dump Body Lifting Bracket]

Figure E-7. Dump Body Lifting Bracket

- All dimensions are in inches (centimeters).
- Position and clamp pieces (1 through 5) together as shown by dimensions on Figure E-7. Dump Body Lifting Bracket.
- Weld pieces together as shown in Figure E-7. Dump Body Lifting Bracket.
- 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>
</tr>
<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>
<td>1</td>
</tr>
<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**

- All dimensions are in inches (centimeters).
- Fabricate (1),(2), and (4) from ASTM A-36 steel plate as shown on Figure E-8. Rear, Top, and Guide Plate.
- De-burr and remove sharp edges.
<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>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>
<td>1</td>
</tr>
<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.
E-6. HEADLIGHT ADJUSTMENT SCREEN

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>
<tr>
<th>Part Number</th>
<th>Material Description</th>
<th>National Stock Number</th>
<th>Qty</th>
</tr>
</thead>
<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>
<th>Material Description</th>
<th>National Stock Number</th>
<th>Qty</th>
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</thead>
<tbody>
<tr>
<td>2-2-2 080401CA</td>
<td>Tee, Tube</td>
<td>4730-01-214-6990</td>
<td>1</td>
</tr>
<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>
</tr>
<tr>
<td>NB-2-031</td>
<td>Tubing, Nonmetallic</td>
<td>4720-01-287-4499</td>
<td>24 in.</td>
</tr>
</tbody>
</table>

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. Install nonmetallic tubing (1) on tube tee (5).
g. Remove nut (6) and ferrule sleeve (7) from pipe to tube elbow (8).
h. Install two nuts (3 and 6) and ferrule sleeves (4 and 7) on nonmetallic tubing (2).
i. Install nonmetallic tubing (2) on tube tee (5).
j. Install nut (6) on pipe to tube elbow (8).
k. 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>
<th>National Stock Number</th>
<th>Cut Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIL-R-6130</td>
<td>Tape, Adhesive, Rubber</td>
<td>9320-00-501-7537</td>
<td>24.7</td>
</tr>
</tbody>
</table>

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>
</tr>
<tr>
<td>12414690-002</td>
<td>NT-100-4 (79470)</td>
<td>16.0</td>
</tr>
<tr>
<td>12414690-003</td>
<td>NT-100-4 (79470)</td>
<td>15.0</td>
</tr>
<tr>
<td>12414690-004</td>
<td>NT-100-4 (79470)</td>
<td>74.8</td>
</tr>
<tr>
<td>12414690-005</td>
<td>NT-100-4 (79470)</td>
<td>69.7</td>
</tr>
</tbody>
</table>
## Table E-1. Pneumatic Tube Lengths (Cont)

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<th>Bulk Tubing Part Number</th>
<th>Cut Length</th>
</tr>
</thead>
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<td>12414690-006</td>
<td>NT-100-4 (79470)</td>
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<td>12414690-007</td>
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<td>NT-100-4 (79470)</td>
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<td>J844TYBSIZE 3/8 (81343)</td>
<td>274.3</td>
</tr>
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<td>12414690-168</td>
<td>J844TYBSIZE 3/8 (81343)</td>
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</tr>
<tr>
<td>12414690-169</td>
<td>J844TYBSIZE 3/8 (81343)</td>
<td>37.5</td>
</tr>
<tr>
<td>12414690-201</td>
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<tr>
<td>12414690-202</td>
<td>C608-100BLK (13174)</td>
<td>16.5</td>
</tr>
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<td>12414690-203</td>
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<td>36.8</td>
</tr>
<tr>
<td>12414690-204</td>
<td>C608-100BLK (13174)</td>
<td>37.7</td>
</tr>
<tr>
<td>12414690-205</td>
<td>C608-100BLK (13174)</td>
<td>39.5</td>
</tr>
<tr>
<td>12414690-206</td>
<td>C608-100BLK (13174)</td>
<td>17.0</td>
</tr>
<tr>
<td>12414690-207</td>
<td>C608-100BLK (13174)</td>
<td>49.5</td>
</tr>
<tr>
<td>12414690-208</td>
<td>C608-100BLK (13174)</td>
<td>39.3</td>
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<td>12414690-209</td>
<td>C608-100BLK (13174)</td>
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</tr>
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<td>12414690-210</td>
<td>C608-100BLK (13174)</td>
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<td>12414690-211</td>
<td>C608-100BLK (13174)</td>
<td>414.0</td>
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<td>12414690-212</td>
<td>C608-100BLK (13174)</td>
<td>406.4</td>
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</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>
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</tr>
<tr>
<td>12414690-220</td>
<td>C608-100BLK (13174)</td>
<td>45.5</td>
</tr>
<tr>
<td>12414690-221</td>
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</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>
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</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>
<td>131.9</td>
</tr>
<tr>
<td>12414690-237</td>
<td>C608-100BLK (13174)</td>
<td>147.6</td>
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<td>12414690-238</td>
<td>C608-100BLK (13174)</td>
<td>179.5</td>
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<td>12414690-239</td>
<td>C608-100BLK (13174)</td>
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<td>C608-100BLK (13174)</td>
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</tr>
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<td>12414690-242</td>
<td>C608-100BLK (13174)</td>
<td>159.0</td>
</tr>
<tr>
<td>12414690-243</td>
<td>C608-100BLK (13174)</td>
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<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>
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<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>12416381P12</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>
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<td>12416381P35</td>
<td>49005</td>
<td>21.8</td>
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<td>12416381P36</td>
<td>49005</td>
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<td>12416381P37</td>
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<td>8.0</td>
</tr>
<tr>
<td>12416381P38</td>
<td>49008</td>
<td>3.7</td>
</tr>
<tr>
<td>12416381P4</td>
<td>49008</td>
<td>12.0</td>
</tr>
<tr>
<td>12416381P5</td>
<td>49008</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</td>
<td>1/16 in. stranded wire cable</td>
<td>4 in. (102 mm)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Type 1, Comp B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>MS51844-22</td>
<td>Sleeve</td>
<td>.06 in. (16 cm) X .37 in. (9.5 mm) X 1.25 in. (32 mm)</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>N/A</td>
<td>Tab, Stainless Steel ASTM A617</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
Figure E-14. Lanyard Assembly

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.
E-20. WHEEL HUB GREASE SEAL DRIVER 3256-K-1051

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></td>
<td></td>
<td>in.</td>
<td>mm</td>
<td>in.</td>
<td>mm</td>
<td></td>
</tr>
<tr>
<td>Air Supply</td>
<td>NB-4-035</td>
<td>96.0</td>
<td>2438</td>
<td>12420924-001</td>
<td>94.0</td>
<td>2388</td>
</tr>
<tr>
<td>Manifold Supply</td>
<td>NB-4-035</td>
<td>40.0</td>
<td>1016</td>
<td>12420924-001</td>
<td>38.0</td>
<td>965</td>
</tr>
<tr>
<td>LH freespool</td>
<td>NB-4-035</td>
<td>66.0</td>
<td>1676</td>
<td>12420924-001</td>
<td>64.0</td>
<td>1626</td>
</tr>
<tr>
<td>RH freespool</td>
<td>NB-4-035</td>
<td>48.0</td>
<td>1219</td>
<td>12420924-001</td>
<td>46.0</td>
<td>1168</td>
</tr>
<tr>
<td>LH regulator input</td>
<td>NB-4-035</td>
<td>12.0</td>
<td>305</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>RH regulator input</td>
<td>NB-4-035</td>
<td>12.0</td>
<td>305</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>LH check valve return</td>
<td>NB-4-035</td>
<td>3.0</td>
<td>76</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>RH check valve return</td>
<td>NB-4-035</td>
<td>3.0</td>
<td>76</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Front LH tension supply</td>
<td>NB-4-035</td>
<td>48.0</td>
<td>1219</td>
<td>12420924-001</td>
<td>46.0</td>
<td>1168</td>
</tr>
<tr>
<td>Front RH tension supply</td>
<td>NB-4-035</td>
<td>66.0</td>
<td>1676</td>
<td>12420924-001</td>
<td>64.0</td>
<td>1626</td>
</tr>
</tbody>
</table>
Table E-3. M1089 30K Air Hose Lengths and Fittings (Cont)

<table>
<thead>
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<th>Bulk Hose P/N</th>
<th>Bulk Hose Length</th>
<th>Bulk Tubing P/N</th>
<th>Convoluted Tubing P/N</th>
<th>Fittings P/N</th>
<th>Fittings Qty.</th>
</tr>
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<tbody>
<tr>
<td>RH 30K winch supply</td>
<td>NB-2-016</td>
<td>40.0 1016</td>
<td>N/A</td>
<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>NB-2-016</td>
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<td>N/A</td>
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<td>1</td>
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<td>NB-2-016</td>
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<td>N/A</td>
<td>N/A</td>
<td>2-2 100102BA 2-2 100202BA</td>
<td>1 1</td>
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<tr>
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<td>NB-2-016</td>
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<td>N/A</td>
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<td>1 1</td>
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<td>N/A</td>
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<td>N/A</td>
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<td>N/A</td>
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</table>
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>
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<tr>
<th>Part Number</th>
<th>Material Description</th>
<th>National Stock Number</th>
<th>Qty.</th>
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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>
</tr>
<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>

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.
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

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Threads per inch</th>
<th>Material Grade Markings</th>
</tr>
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</tr>
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<td></td>
</tr>
<tr>
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<td>20</td>
<td>3-5</td>
</tr>
<tr>
<td></td>
<td>28</td>
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<td>15-19</td>
</tr>
<tr>
<td>3/8</td>
<td>32</td>
<td>15-21</td>
</tr>
<tr>
<td>7/16</td>
<td>14</td>
<td>20-28</td>
</tr>
<tr>
<td></td>
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<td>23-31</td>
</tr>
<tr>
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<td>28</td>
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**NOTE**

Manufacturer's marks may vary. These are all SAE Grade 5.
**Table F-1. Dry Torque Limits for SAE and ANSI Screws and Free Spinning Nuts (Cont)**

Manufacturer’s marks may vary. These are all SAE Grade 5

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<td>345-459</td>
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<td>413-551</td>
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<td>538-718</td>
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Table F-2. Dry Torque Limits for SAE and ANSI Prevailing Torque Nuts

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<table>
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**Torque**

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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**

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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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Manufacturer’s marks may vary. These are all SAE Grade 5.
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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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.

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.

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)."
### H-5. LUBRICATION/SERVICES KEY

<table>
<thead>
<tr>
<th>LUBRICANTS</th>
<th>Specification</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIL-L-2104 (OE/HDO)</td>
<td>Lubricating Oil, Internal Combustion Engine, Combat/Tactical Service</td>
<td></td>
</tr>
<tr>
<td>MIL-L-46167 (OEA)</td>
<td>Lubricating Oil, Internal Combustion Engine, Arctic</td>
<td></td>
</tr>
<tr>
<td>MIL-L-2105 (GO)</td>
<td>Lubricating Oil, Gear, Multipurpose</td>
<td></td>
</tr>
<tr>
<td>MIL-G-10924 (GAA)</td>
<td>Grease, Automotive and Artillery</td>
<td></td>
</tr>
<tr>
<td>MIL-G-18458 (GW)</td>
<td>Grease, Wire-Rope and Exposed Gear</td>
<td></td>
</tr>
<tr>
<td>MIL-H-5606 (OHA)</td>
<td>Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>CAPACITY</th>
<th>EXPECTED TEMPERATURES</th>
</tr>
</thead>
<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>OE/HDO-15/40</td>
</tr>
<tr>
<td>Transmission (at oil change) (all models except M1088 and M1089)</td>
<td>36.8 qt (34.7 L)</td>
<td>OE/HDO-15/40</td>
</tr>
<tr>
<td>Transmission (total system) (M1088 and M1089)</td>
<td>58.6 qt (55.4 L)</td>
<td>OE/HDO-15/40</td>
</tr>
<tr>
<td>Transmission (at oil change) (M1088 and M1089)</td>
<td>31.8 qt (30.0 L)</td>
<td>OE/HDO-15/40</td>
</tr>
<tr>
<td>Transmission (after overhaul)</td>
<td>39.0 qt (37.0 L)</td>
<td>OE/HDO-15/40</td>
</tr>
<tr>
<td>Steering system</td>
<td>5 qt (4.8 L)</td>
<td>OE/HDO-10</td>
</tr>
<tr>
<td>Hydraulic reservoir (except M1089)</td>
<td>27 gal (102.2 L)</td>
<td>OE/HDO-10</td>
</tr>
<tr>
<td>Hydraulic tank (M1089)</td>
<td>74 gal (280 L)</td>
<td>OE/HDO-10</td>
</tr>
<tr>
<td>Front axle differential (maximum capacity)</td>
<td>9.5 qt (9 L)</td>
<td>GO-80/90</td>
</tr>
<tr>
<td>Intermediate axle differential (maximum capacity)</td>
<td>14.7 qt (13.9 L)</td>
<td>GO-80/90</td>
</tr>
<tr>
<td>Rear axle differential (maximum capacity)</td>
<td>12.15 qt (11.5 L)</td>
<td>GO-80/90</td>
</tr>
<tr>
<td>Front axle planetary hubs</td>
<td>11-13 oz (0.33-0.38 L)</td>
<td>GO-80/90</td>
</tr>
</tbody>
</table>
### H-5. LUBRICATION/SERVICES KEY (CONT)

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>CAPACITY</th>
<th>EXPECTED TEMPERATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Above +40 °F (Above +4 °C)</td>
</tr>
<tr>
<td>Rear axle bogie</td>
<td>0.5 qt (0.5 L)</td>
<td>GO-85/140</td>
</tr>
<tr>
<td>15K Self-Recovery Winch (SRW)</td>
<td>As Required</td>
<td>GO-85/140</td>
</tr>
<tr>
<td>30K winches</td>
<td>As Required</td>
<td>GO-85/140</td>
</tr>
<tr>
<td>Propeller shaft universal and slip joints</td>
<td>As Required</td>
<td>GAA</td>
</tr>
<tr>
<td>Tie rod ends</td>
<td>As Required</td>
<td>GAA</td>
</tr>
<tr>
<td>Towing pintle assembly</td>
<td>As Required</td>
<td>GAA</td>
</tr>
<tr>
<td>Fifth wheel</td>
<td>As Required</td>
<td>GAA</td>
</tr>
<tr>
<td>Spring bolts and spring shackles</td>
<td>As Required</td>
<td>GAA</td>
</tr>
<tr>
<td>Front axle shaft U-joints and steering knuckles</td>
<td>As Required</td>
<td>GAA</td>
</tr>
<tr>
<td>Front axle inner wheel bearing</td>
<td>As Required</td>
<td>GAA</td>
</tr>
<tr>
<td>Intermediate axle inner wheel bearing</td>
<td>As Required</td>
<td>GAA</td>
</tr>
<tr>
<td>Rear axle inner wheel bearing</td>
<td>As Required</td>
<td>GAA</td>
</tr>
<tr>
<td>Front lifting beam</td>
<td>As Required</td>
<td>GAA</td>
</tr>
<tr>
<td>15K Self-Recovery Winch (SRW) cable</td>
<td>As Required</td>
<td>GW</td>
</tr>
<tr>
<td>30K winch cables</td>
<td>As Required</td>
<td>GW</td>
</tr>
<tr>
<td>Air/hydraulic power unit</td>
<td>3 pt (1.4 L)</td>
<td>OHA</td>
</tr>
<tr>
<td>Backup hydraulic pump</td>
<td>19 oz (562 ml)</td>
<td>OHA</td>
</tr>
</tbody>
</table>

### COOLANT

<table>
<thead>
<tr>
<th>Specification</th>
<th>Type</th>
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<tbody>
<tr>
<td>A-A-52624A</td>
<td>Antifreeze, Multi-Engine Type</td>
</tr>
<tr>
<td>MIL-A-11755</td>
<td>Antifreeze, Arctic-Type</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>CAPACITY</th>
<th>EXPECTED TEMPERATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Above +40 °F (Above +4 °C)</td>
</tr>
<tr>
<td>Cooling system (engine only)</td>
<td>14 qt (13 L)</td>
<td>A-A-52624A</td>
</tr>
<tr>
<td>Cooling system (total system)</td>
<td>50.3 qt (47.6 L)</td>
<td>A-A-52624A</td>
</tr>
<tr>
<td>Cooling system (total system) (M1088, M1089)</td>
<td>52.8 qt (49.9 L)</td>
<td>A-A-52624A</td>
</tr>
<tr>
<td>Cooling system, Arctic (total system)</td>
<td>64.8 qt (61.3 L)</td>
<td>N/A</td>
</tr>
<tr>
<td>Cooling system, Arctic (total system) (M1088, M1089)</td>
<td>76.5 qt (72.4 L)</td>
<td>N/A</td>
</tr>
</tbody>
</table>
### CLEANING AGENT

<table>
<thead>
<tr>
<th>Specification</th>
<th>Type</th>
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</thead>
<tbody>
<tr>
<td>P-D-680</td>
<td>Dry Cleaning Solvent, SD-II</td>
</tr>
<tr>
<td>O-C-1901</td>
<td>Cleaning Compound, Windshield</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>CAPACITY</th>
<th>EXPECTED TEMPERATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Above +15 °F (Above -9 °C)</td>
</tr>
<tr>
<td>All metal parts as required</td>
<td>N/A</td>
<td>SD-II (all temperatures)</td>
</tr>
<tr>
<td>Windshield washer reservoir</td>
<td>7.5 qt</td>
<td>2/3 water to 1/3 O-C-1901</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Above +15 °F (Above -9 °C)</th>
<th>+15 °F to -15 °F (-9 °C to -26 °C)</th>
<th>+15 °F to -50 °F (-26 °C to -46 °C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Above +15 °F (Above -9 °C)</td>
<td>+15 °F to -15 °F (-9 °C to -26 °C)</td>
<td>+15 °F to -50 °F (-26 °C to -46 °C)</td>
</tr>
</tbody>
</table>

For arctic operation refer to FM 9-207.

### H-6. LUBRICATION/SERVICES INTERVALS

<table>
<thead>
<tr>
<th>Intervals</th>
<th>Total Man-Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quarterly (Q)</td>
<td>2.0</td>
</tr>
<tr>
<td>Semi-annually (S)</td>
<td>6.0</td>
</tr>
<tr>
<td>Annually (A)</td>
<td>1.5</td>
</tr>
<tr>
<td>Biennially (B)</td>
<td>3.5</td>
</tr>
<tr>
<td>3K</td>
<td>1.0</td>
</tr>
<tr>
<td>6K</td>
<td>1.0</td>
</tr>
<tr>
<td>12K</td>
<td>6.5</td>
</tr>
<tr>
<td>24K</td>
<td>0.5</td>
</tr>
</tbody>
</table>

* Whichever occurs first.
** No calendar interval.
H-7. LOCATOR VIEWS

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)

INTERVAL LUBRICANT

- 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.
NOTE: Dashed arrows indicate lubrication on both sides of vehicle.
NOTE: Dashed arrows indicate lubrication on both sides of vehicle.
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.
M1089 UNDERLIFT ASSEMBLY

NOTE: Dashed arrows indicate lubrication on both sides of vehicle
H-8. LOCAL VIEWS (CONT)

E. Transmission Drain Plug

F. Transfer Case Drain Plug

G. Power Steering Reservoir

H. Spring Bolt
H-8. LOCAL VIEWS (CONT)

HYDRAULIC TANK
FILTER
AD

REAR ROLLER FAIRLEAD
AE

REAR ROLLER FAIRLEAD
AF

REAR AXLE BOGIE
AG
H-8. LOCAL VIEWS (CONT)
H-8. LOCAL VIEWS (CONT)

- **BOOM SHEAVE**
- **SWING DRIVE GEARBOX**
- **LIFT CYLINDER PIVOTS**
- **ERECTION CYLINDER AND TENSION LINK PIVOTS**
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).
      (2) Soak and clean winch cable with new OE/HDO 30.
      (3) Wipe off excess OE/HDO 30.
      (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 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 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 once 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)

**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 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.

### 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 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>Installed Controls or Controls Being Installed</td>
<td>Installed Transmission or Transmission Being Installed</td>
<td>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>
</tr>
<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>
</tr>
<tr>
<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>
</tr>
<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>
</tr>
</tbody>
</table>

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.
<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 III (with ECU manufactured after October 1999)</td>
<td>TID 2 (transmission serial number 6510142172 to 6510262116)</td>
<td>No modification required.</td>
</tr>
<tr>
<td>WTEC III (with ECU manufactured after October 1999)</td>
<td>TID 3 (transmission serial number 6510262117 and subsequent)</td>
<td>No modification required.</td>
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**Section III.**

### MODIFICATION PARTS IDENTIFICATION

<table>
<thead>
<tr>
<th>Identification</th>
<th>Part Number/NSN</th>
<th>Description</th>
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<tr>
<td>31-pin connector</td>
<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>
</tr>
<tr>
<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>
</tr>
<tr>
<td>Gasket</td>
<td>29503283 5330-01-360-9035</td>
<td>Required when replacing transmission internal wiring harness.</td>
</tr>
<tr>
<td>ID harness</td>
<td>200100 6150-21-921-1191</td>
<td>Allows WTEC III controls to communicate with a PRE-ID transmission.</td>
</tr>
<tr>
<td>Adapter cable assembly</td>
<td>29519210 6150-01-420-5987</td>
<td>Adapts a PRE-ID transmission with 24-pin (&quot;D&quot; type) connector to a transmission external wiring harness with a 31-pin (round) connector.</td>
</tr>
</tbody>
</table>
MODIFICATION PARTS IDENTIFICATION (CONT)

FIGURE 1

24 PIN CONNECTOR

MANUFACTURE DATE

31 PIN CONNECTOR

WTEC II PUSHBUTTON SHIFT SELECTOR

WTEC II PUSHBUTTON SHIFT SELECTOR
## SUBJECT INDEX

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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

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**PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS**

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USAPA V3.01
# RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS

For use of this form, see AR 25-30; the proponent agency is OAASA

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## PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

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* Reference to line numbers within the paragraph or subparagraph.

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**DA FORM 2028, FEB 74** REPLACES DA FORM 2028, 1 DEC 68, WHICH WILL BE USED. USAPA V3.01
### PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

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### PART III - REMARKS

(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)

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**Legend:**
- H: Section
- J: Description

**Figure:** FO-2, Pneumatic System Schematic
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**Figure F0-5 Air Transportability Hydraulic/Pneumatic System Schematic**

Foldout 2 of 3
# 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 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
- 1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
- 1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

## 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 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches
- 1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet
- 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 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°F Fahrenheit is equivalent to 100°C Celsius
- 90°F Fahrenheit is equivalent to 32.2°C Celsius
- 32°F Fahrenheit is equivalent to 0°C Celsius

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