

# TM 9-2320-312-24-1

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## TECHNICAL MANUAL

### UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL

FOR

**TRUCK, TRACTOR, YARD TYPE:  
46,662 GVWR, DED, 4 X 2, M878A2  
(NSN 2320-01-452-5579)**



Approved for public release; distribution is unlimited.

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**HEADQUARTERS, DEPARTMENT OF THE ARMY**

**December 2003**



## WARNING SUMMARY

This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this equipment. Failure to observe these precautions could result in serious injury or death to personnel. Also included are explanations of safety and hazardous materials icons used within the technical manual.



**BIOLOGICAL** - abstract symbol bug shows that a material may contain bacteria or viruses that present a danger to life or health.



**CHEMICAL** - drops of liquid on hand shows that the material will cause burns or irritation to human skin or tissue.



**EAR PROTECTION** - Headphones over ears show that noise level will harm ears.



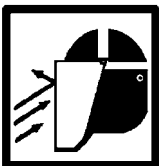
**ELECTRICAL** - electrical wire to arm with electricity symbol running through human body shows that shock hazard is present.



**EYE PROTECTION** - person with goggles shows that the material will injure the eyes.



**FIRE** - flame shows that a material may ignite and cause burns.



**FLYING PARTICLES** - arrows bouncing off face with face shield shows that particles flying through the air will harm face.



HEAVY OBJECT - human figure stooping over heavy object shows physical injury potential from improper lifting technique.



HEAVY PARTS - hand with heavy object on top shows that heavy parts can crush and harm.



HEAVY PARTS - heavy object on human figure shows that heavy parts present a danger to life or limb.



HOT AREA - hand over object radiating heat shows that part is hot and can burn.



HYDRAULIC FLUID PRESSURE - hydraulic fluid spraying human figure shows that fluid escaping under great pressure can cause injury or death.



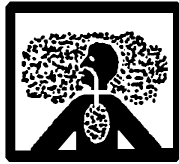
RADIOACTIVE - identifies a material that emits radioactive energy and can injure human tissue or organs.



VAPOR - human figure in a cloud shows that material vapors present a danger to life or health.



**FOR INFORMATION ON FIRST AID, REFER TO FM 21-11.**



**WARNING**

***CARBON MONOXIDE (EXHAUST GASES) CAN KILL!***

- Carbon monoxide is a colorless, odorless, deadly poison which, when breathed, deprives the body of oxygen and causes suffocation. Exposure to air containing carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, apparent drowsiness, and coma. Permanent brain damage or death can result from severe exposure.
  - Carbon monoxide occurs in exhaust fumes of internal combustion engines. Carbon monoxide can become dangerously concentrated under conditions of inadequate ventilation. The following precautions must be observed to ensure safety of personnel when engine of tractor is operated.
1. DO NOT operate tractor engine in enclosed areas without adequate ventilation.
  2. DO NOT idle tractor engine without adequate ventilation.
  3. DO NOT drive tractor with inspection plates or cover plates removed.
  4. BE ALERT for exhaust poisoning symptoms. They are:
    - Headache
    - Dizziness
    - Sleepiness
    - Loss of muscular control
  5. If you see another person with exhaust poisoning symptoms:
    - Remove person from area.
    - Expose to fresh air.
    - Keep person warm.
    - Do not permit physical exercise.
    - Administer cardiopulmonary resuscitation (CPR), if necessary.
    - Notify a medic.
  6. BE AWARE. The field protective mask for nuclear-biological-chemical (NBC) protection will not protect you from carbon monoxide poisoning.

***The Best Defense Against Carbon Monoxide Poisoning Is Good Ventilation!***

## WARNING

### AIRBRAKE SYSTEM

- DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- Brake chamber contains spring under great pressure. To prevent personnel injury, avoid working directly behind chamber. If caging bolt will not engage properly, spring may be broken.
- DO NOT remove clamp ring around spring brake chamber. It is under tension and can cause personnel injury if released.



**WARNING**  
**BATTERIES**



- To avoid injury, eye protection and acid-resistant gloves must be worn when working around batteries. Do not smoke, use open flame, make sparks or create other ignition sources around batteries. If a battery is giving off gases, it can explode and cause injury to personnel. Remove all jewelry such as rings, ID tags, watches, and bracelets. If jewelry or a tool contacts a battery terminal, a direct short will result in instant heating or electric shock, damage to equipment, and injury to personnel.
  - Sulfuric acid contained in batteries can cause serious burns. If battery corrosion or electrolyte makes contact with skin, eyes or clothing, take immediate action to stop the corrosive burning effects. Failure to follow these procedures may result in death or serious injury to personnel.
- a. **Eyes.** Flush with cold water for no less than 15 minutes and seek medical attention immediately.
  - b. **Skin.** Flush with large amounts of cold water until all acid is removed. Seek medical attention as required.
  - c. **Internal.** If corrosion or electrolyte is ingested, drink large amounts of water or milk. Follow with milk of magnesia, beaten egg or vegetable oil. Seek medical attention immediately.
  - d. **Clothing/Equipment.** Wash area with large amounts of cold water. Neutralize acid with baking soda or household ammonia.



**WARNING**  
**CAB TILT SYSTEM**

- Ensure that no part of body is under cab while tilting. Stand clear of front and rear of cab while it is being raised. Ensure that tools and supplies are removed from cab and that cab doors are securely closed before tilting cab. Failure to do so may result in injury to personnel.
- Always check that cab tilt safety prop is properly engaged before working under cab. Cab could fall and cause serious injury or death.
- Ensure cab latch fully engages after lowering cab. If cab latch is not engaged, cab could tilt while in motion. Failure to follow this warning may result in injury or death to personnel.



**WARNING**  
**CAPACITOR(S)**

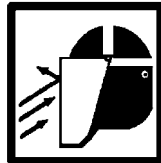


- To avoid injury, eye protection, protective clothing, and gloves must be worn when working around capacitors. Capacitors contain an electrolyte that is a potassium hydroxide solution. Potassium hydroxide is highly corrosive and can cause serious burns. If capacitor case becomes cracked, leaking electrolyte can result in fumes that are hazardous to inhale. If electrolyte makes contact with skin, eyes or clothing, take immediate action to stop the corrosive burning effects. Failure to follow these procedures may result in death or serious injury to personnel.
  - a. **Eyes.** Flush with plenty of water for at least 15 minutes, occasionally lifting upper and lower eyelids. Seek medical attention immediately.
  - b. **Skin.** Wash with soap and water for at least 15 minutes, while removing contaminated clothing and shoes. Dispose of contaminated clothing in a manner that limits further exposure. Seek medical attention immediately.
  - c. **Ingestion.** Do NOT induce vomiting. Drink 2-4 cups of milk or water. Seek medical attention immediately.
  - d. **Inhalation.** Remove from exposure to fresh air immediately. If not breathing, give CPR (cardio-pulmonary resuscitation). If breathing is difficult, administer oxygen. Seek medical attention immediately.
- Remove all jewelry such as rings, ID tags, watches, and bracelets, when working around capacitors. If jewelry or a tool contacts a capacitor terminal, a direct short may result, causing instant heating and electric shock at the point of short circuit. Damage to equipment and injury to personnel could result.

## **WARNING**

### **CLEANING AGENTS**

Improper cleaning methods and use of unauthorized cleaning agents can injure to personnel and damage equipment. To prevent this, refer to TM 9-247 for further instructions.



**WARNING**  
**COMPRESSED AIR**

Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid injury to personnel.



**WARNING**  
**DIESEL FUEL HANDLING**

- DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.
- Wear fuel-resistant gloves when handling fuels and promptly wash exposed skin and change fuel-soaked clothing.
- If equipped with arctic heater, be sure to turn heater off during refueling.



**WARNING**

***DRY CLEANING SOLVENT***



Dry cleaning solvent MIL-PRF-680 Type III is an environmentally compliant and low toxic material. However, it may be irritating to the eyes and skin. The use of protective gloves and goggles is suggested. Use in well-ventilated areas. Keep away from open flames and other sources of ignition.



**WARNING**

***ELECTRICAL SYSTEM MAINTENANCE***

Remove all jewelry, watches, rings, etc. prior to disconnecting cables from batteries or other electrical source. Items can come in contact with battery or electrical source and cause electrical shock. Failure to follow this warning may result in personnel injury or death.



**WARNING**



***ETHER AUTOMATIC COLD START SYSTEM***

Ether fuel is extremely flammable and toxic. DO NOT smoke and make sure you are in a well-ventilated area away from heat, open flames or sparks. Wear eye protection. Avoid contact with skin and eyes and avoid breathing ether fumes. If fluid enters or fumes irritate the eyes, wash immediately with large quantities of clean water for 15 minutes. Seek medical attention immediately if ether is inhaled or causes eye irritation. Failure to follow this warning may cause death or serious injury to personnel.



**WARNING**

***HAZARDOUS WASTE DISPOSAL***

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.



**WARNING**

***HEARING PROTECTION***

Hearing protection is required when operating this vehicle or when working in close proximity to vehicle when it is running. Failure to wear hearing protection may result in hearing loss.



**WARNING**  
**HYDRAULIC SYSTEM**



- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
- At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.



**WARNING**  
**LIFTING HEAVY COMPONENTS**



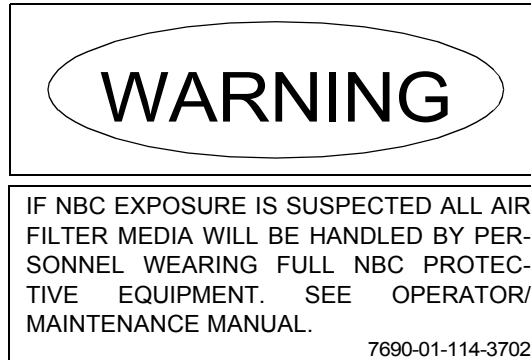
- Hydraulic jacks are intended only for lifting tractor, not for supporting vehicle to perform maintenance. DO NOT get under vehicle after it is raised unless it is properly supported with blocks or other suitable cribbing. Failure to observe this warning may result in death or injury to personnel.
- Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.
- Improper use of lifting equipment and improper attachment of cables to vehicle can result in serious personnel injury and equipment damage. Observe all standard rules of safety.



**WARNING**  
**NBC EXPOSURE**



- If NBC exposure is suspected, personnel wearing protective equipment must handle all air cleaner media. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.
- NBC contaminated filters must be handled using adequate precautions (FM 21-40) and must be disposed of by trained personnel.



***To order this NBC decal use:***

National Stock Number (NSN) - 7690-01-114-3702

Part Number (PN) - 12296626

Commercial and Government Entity Code (CAGEC) - 19207



**WARNING**

**PRESSURIZED COOLING SYSTEM**



- DO NOT service cooling system unless engine has cooled to at least 120°F (50°C) as indicated on coolant temperature gauge. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.
- Wear effective eye, glove, and skin protection when handling coolants. Failure to do so may cause injury.



**WARNING**

**R-134A REFRIGERANT**



- Liquid refrigerant, when exposed to air, quickly evaporates and will freeze skin or eye tissue. Use care to prevent refrigerant from touching your skin or eyes. Serious injury or blindness may result if you come in contact with refrigerant.
- Refrigerant R-134a air conditioning systems should not be pressure tested or leak tested with compressed air. Combustible mixtures of air and R-134a may form, resulting in a fire or explosion, which could cause personnel injury.



**WARNING**

***SLAVE STARTING***

- When slave starting tractor, use NATO slave cable that DOES NOT have loose or missing insulation.
- DO NOT proceed if suitable cable is not available.
- DO NOT use civilian-type jumper cables.

**WARNING**

***YARD TRACTOR OPERATION***

- The M878A2 Yard Tractor, without a trailer, is capable of making turns tighter than 90 degrees. When towing a trailer, attempting turns tighter than 90 degrees will cause interference between tractor and semitrailer. The point of interference is directly related to the position of the fifth wheel. The higher the fifth wheel, the more the turning radius is reduced. Failure to follow this warning could result in injury to personnel or damage to equipment.
- The M878A2 Yard Tractor has a solid mount rear axle suspension and handles differently than a tractor with a sprung suspension. When operating without a trailer, this difference is even more noticeable. Operators must become familiar with the handling of the yard tractor, during training and initial operations, to avoid the potential hazard of vehicle instability and loss of control. Failure to do so may result in serious injury or death to personnel or damage to equipment.

**WARNING**

***WHEEL AND TIRE ASSEMBLIES***

- Whenever wheel nuts require tightening or a wheel has been removed and replaced, wheel nuts must be tightened to the required torque. Failure to follow this warning may result in serious injury to personnel or damage to equipment.
- To avoid serious injury or death, NEVER attempt to inflate a tire that has been run flat or seriously under inflated. Break down tire and wheel assembly for inspection.

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**LIST OF EFFECTIVE PAGES/WORK PACKAGES**

Date of issue for original manual is:

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**TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 69 AND TOTAL NUMBER OF WORK PACKAGES IS 166 CONSISTING OF THE FOLLOWING:**

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Cover/(Back Blank)	0
A/(B Blank)	0
a to i/(j Blank)	0
i to ix/(x Blank)	0
WP 0001 00 to 0166 00	0
Index-1 to Index-13/(Index-14 Blank)	0
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TECHNICAL MANUAL  
UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT  
MAINTENANCE MANUAL

FOR

TRUCK, TRACTOR, YARD TYPE:  
46,662 GVWR, DED, 4 X 2, M878A2  
(NSN 2320-01-452-5579)

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

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**Table of Contents**

	<b>Page Number</b>
<b>VOLUME 1</b>	
Warning Summary .....	a
How to Use This Manual .....	vii
<b>CHAPTER 1 INTRODUCTORY INFORMATION WITH THEORY OF OPERATION</b>	
WP 0001 00 General Information .....	0001 00-1
WP 0002 00 Equipment Description and Data .....	0002 00-1
WP 0003 00 Theory of Operation .....	0003 00-1
<b>CHAPTER 2 TROUBLESHOOTING PROCEDURES</b>	
WP 0004 00 Troubleshooting Introduction .....	0004 00-1
WP 0005 00 Troubleshooting Symptom Index .....	0005 00-1
WP 0006 00 Troubleshooting Procedures .....	0006 00-1

## Table of Contents - Continued

	<b>Page Number</b>
<b>CHAPTER 3 UNIT MAINTENANCE</b>	
WP 0007 00 Service Upon Receipt . . . . .	0007 00-1
WP 0008 00 Unit Preventive Maintenance Checks and Services (PMCS) Introduction . . . . .	0008 00-1
WP 0009 00 Unit Preventive Maintenance Checks and Services (PMCS) . . . . .	0009 00-1
WP 0010 00 Engine Oil Dipstick Tube Replacement . . . . .	0010 00-1
WP 0011 00 Engine Oil and Oil Filter Replacement . . . . .	0011 00-1
WP 0012 00 Engine Serpentine Belt Replacement . . . . .	0012 00-1
WP 0013 00 Belt Tensioner Replacement . . . . .	0013 00-1
WP 0014 00 Throttle Position Sensor (TPS) Assembly Replacement . . . . .	0014 00-1
WP 0015 00 Engine Air Cleaner and Air Intake Tubes and Hoses Replacement . . . . .	0015 00-1
WP 0016 00 Charge Air Cooling Lines Replacement . . . . .	0016 00-1
WP 0017 00 Fuel Priming Pump Assembly/Secondary Fuel Filter Maintenance . . . . .	0017 00-1
WP 0018 00 Fuel/Water Separator Maintenance . . . . .	0018 00-1
WP 0019 00 Fuel Tank, Straps, and Brackets Replacement . . . . .	0019 00-1
WP 0020 00 Fuel Lines Replacement . . . . .	0020 00-1
WP 0021 00 Fuel Level Sending Unit Replacement . . . . .	0021 00-1
WP 0022 00 Muffler and Exhaust Pipes Replacement . . . . .	0022 00-1
WP 0023 00 Draining and Filling Radiator . . . . .	0023 00-1
WP 0024 00 Coolant Filter and Hoses Maintenance . . . . .	0024 00-1
WP 0025 00 Radiator Hoses Replacement . . . . .	0025 00-1
WP 0026 00 Radiator Air Recirculation and Heat Shields Replacement . . . . .	0026 00-1
WP 0027 00 Transmission Dipstick and Fill Tube Replacement . . . . .	0027 00-1
WP 0028 00 Transmission Range Selector Lever Replacement . . . . .	0028 00-1
WP 0029 00 Transmission Oil Cooler Hoses Replacement . . . . .	0029 00-1
WP 0030 00 Fifth Wheel Lift Control and Cable Maintenance . . . . .	0030 00-1
WP 0031 00 Front and Rear Airbrake Chambers Replacement . . . . .	0031 00-1
WP 0032 00 Shock Absorber and Mounting Brackets Replacement . . . . .	0032 00-1
WP 0033 00 Front Axle Hub, Drum, Wheel Bearings, and Oil Seal Replacement . . . . .	0033 00-1
WP 0034 00 Steering Wheel Replacement . . . . .	0034 00-1
WP 0035 00 Steering Column Assembly Replacement . . . . .	0035 00-1
WP 0036 00 Power Steering Hydraulic Hoses and Fittings Replacement . . . . .	0036 00-1
WP 0037 00 Front Bumper Replacement . . . . .	0037 00-1
WP 0038 00 Cab Steps Replacement . . . . .	0038 00-1
WP 0039 00 Rear Platform Maintenance . . . . .	0039 00-1
WP 0040 00 Propshaft Guard Replacement . . . . .	0040 00-1
WP 0041 00 Right-Side Cab Rear Cushion Mount Replacement . . . . .	0041 00-1
WP 0042 00 Grabhandle Replacement . . . . .	0042 00-1
WP 0043 00 Cab Side Vent Replacement . . . . .	0043 00-1
WP 0044 00 Cab Left-Side Door Assembly Maintenance . . . . .	0044 00-1
WP 0045 00 Cab Rear Sliding Door Assembly Maintenance . . . . .	0045 00-1
WP 0046 00 Cab Front Access Panel Replacement . . . . .	0046 00-1
WP 0047 00 Cab Heater/Air Conditioning (AC) Unit Access Door Replacement . . . . .	0047 00-1
WP 0048 00 Mudflaps Replacement . . . . .	0048 00-1
WP 0049 00 Rear Fender Replacement . . . . .	0049 00-1
WP 0050 00 Hydraulic Reservoir Step Replacement . . . . .	0050 00-1

## Table of Contents - Continued

	<b>Page Number</b>
WP 0051 00 Mirrors Replacement . . . . .	0051 00-1
WP 0052 00 Seat Replacement . . . . .	0052 00-1
WP 0053 00 Seat Repair. . . . .	0053 00-1
WP 0054 00 Seat Belt Replacement. . . . .	0054 00-1
WP 0055 00 Heater/AC Controls Replacement. . . . .	0055 00-1
WP 0056 00 Cab Heater Hoses Replacement . . . . .	0056 00-1
WP 0057 00 Air Conditioning (AC) System Inspection and Leak Test . . . . .	0057 00-1
WP 0058 00 AC Thermostatic Switch Replacement . . . . .	0058 00-1
WP 0059 00 Windshield Washer Reservoir Maintenance . . . . .	0059 00-1
WP 0060 00 Windshield Wiper Maintenance . . . . .	0060 00-1
WP 0061 00 Air Dryer Replacement . . . . .	0061 00-1
WP 0062 00 Air Reservoir Assemblies Replacement . . . . .	0062 00-1
WP 0063 00 Airbrake System Valves Replacement . . . . .	0063 00-1
WP 0064 00 Brake Pedals and Air Treadle Valve Replacement . . . . .	0064 00-1
WP 0065 00 Brake Light Switch Replacement . . . . .	0065 00-1
WP 0066 00 Air System Lines and Fittings Replacement . . . . .	0066 00-1
WP 0067 00 Front Gladhands Replacement . . . . .	0067 00-1
WP 0068 00 Rear Gladhands Replacement . . . . .	0068 00-1
WP 0069 00 Intervehicular Air Hose Assembly Maintenance . . . . .	0069 00-1
WP 0070 00 Dummy Coupling Replacement . . . . .	0070 00-1
WP 0071 00 Dual Air Pressure Gauge and Low Air Pressure Switches Replacement . . . . .	0071 00-1
WP 0072 00 Parking Brake Control Valve Replacement . . . . .	0072 00-1
WP 0073 00 Trailer Air Supply Control Valve Replacement . . . . .	0073 00-1
WP 0074 00 Trailer Brake Control Valve Replacement . . . . .	0074 00-1
WP 0075 00 Fifth Wheel Lock Control Valve Replacement. . . . .	0075 00-1
WP 0076 00 Wheel and Tire Assembly Maintenance . . . . .	0076 00-1
WP 0077 00 Ether Cold Start System Maintenance. . . . .	0077 00-1
WP 0078 00 Air Cleaner Restriction Indicator and Hoses Replacement. . . . .	0078 00-1
WP 0079 00 Pintle Hook Replacement . . . . .	0079 00-1
WP 0080 00 Data Plate and Decal Replacement . . . . .	0080 00-1
WP 0081 00 Coolant Overflow Bottle Replacement . . . . .	0081 00-1
WP 0082 00 Backup Alarm Replacement . . . . .	0082 00-1
WP 0083 00 Fifth Wheel Air Cylinder and Hose Replacement. . . . .	0083 00-1
WP 0084 00 Load Sensing Gauge and Hoses Replacement . . . . .	0084 00-1
WP 0085 00 Stowage Compartment Replacement . . . . .	0085 00-1
WP 0086 00 Cab Sun Visor Replacement . . . . .	0086 00-1
WP 0087 00 M16 Rifle Mounting Bracket Replacement . . . . .	0087 00-1
WP 0088 00 Cab-to-Frame Ground Strap Replacement . . . . .	0088 00-1
WP 0089 00 Horn Replacement. . . . .	0089 00-1
WP 0090 00 Alternator Replacement. . . . .	0090 00-1
WP 0091 00 Voltage Regulator Replacement . . . . .	0091 00-1
WP 0092 00 Starter Replacement. . . . .	0092 00-1
WP 0093 00 Front Instrument Panel Gauges and Switches Replacement . . . . .	0093 00-1
WP 0094 00 Instrument and Warning Light Cluster Replacement . . . . .	0094 00-1
WP 0095 00 Circuit Breakers and Relays Replacement . . . . .	0095 00-1
WP 0096 00 Inlet Air Heater 120A Circuit Breaker Replacement . . . . .	0096 00-1
WP 0097 00 Engine Oil Pressure Switch and Sender Replacement . . . . .	0097 00-1
WP 0098 00 Remote Start and Fan Clutch Solenoids Replacement . . . . .	0098 00-1

## Table of Contents - Continued

	<b>Page Number</b>
WP 0099 00 Trailer 24V Converter Box Maintenance . . . . .	0099 00-1
WP 0100 00 Turn Signal Lever and Turn Signal Flasher Unit Replacement . . . . .	0100 00-1
WP 0101 00 Headlight Replacement . . . . .	0101 00-1
WP 0102 00 Headlight Adjustment . . . . .	0102 00-1
WP 0103 00 Front Turn Signal Light Replacement . . . . .	0103 00-1
WP 0104 00 Marker Clearance Light Maintenance . . . . .	0104 00-1
WP 0105 00 Auxiliary Light Maintenance . . . . .	0105 00-1
WP 0106 00 Side Marker Light Replacement . . . . .	0106 00-1
WP 0107 00 Cab Interior Domelight Maintenance . . . . .	0107 00-1
WP 0108 00 Floodlight and Cab Backup Light Maintenance . . . . .	0108 00-1
WP 0109 00 Strobe Warning Light Maintenance . . . . .	0109 00-1
WP 0110 00 Rear Backup Light Replacement . . . . .	0110 00-1
WP 0111 00 Taillight Replacement . . . . .	0111 00-1
WP 0112 00 Diagnostic Connector Replacement . . . . .	0112 00-1
WP 0113 00 Trailer Electrical Connectors Replacement . . . . .	0113 00-1
WP 0114 00 Battery Maintenance . . . . .	0114 00-1
WP 0115 00 Battery Cables Replacement . . . . .	0115 00-1
WP 0116 00 Battery Box Maintenance . . . . .	0116 00-1
WP 0117 00 Battery Disconnect Switch Replacement . . . . .	0117 00-1
WP 0118 00 NATO Slave Receptacle Replacement . . . . .	0118 00-1
WP 0119 00 Capacitor and Capacitor Start Relay and Diodes Replacement . . . . .	0119 00-1
WP 0120 00 Electrical General Maintenance Instructions . . . . .	0120 00-1
WP 0121 00 Cab Tilt Latch Replacement . . . . .	0121 00-1
WP 0122 00 Cab Tilt Safety Prop and Release Cable Replacement . . . . .	0122 00-1
WP 0123 00 Cab Tilt Cylinder Replacement . . . . .	0123 00-1
WP 0124 00 Cab Tilt Pump Assembly Maintenance . . . . .	0124 00-1
WP 0125 00 Cab Tilt Hydraulic System Filling and Bleeding . . . . .	0125 00-1
WP 0126 00 Cab Tilt Hydraulic Hoses and Fittings Replacement . . . . .	0126 00-1
WP 0127 00 Fifth Wheel Lift Hydraulic Hoses and Fittings Replacement and Lift Cylinder Head Cap and Rod Packing Tightening . . . . .	0127 00-1
WP 0128 00 Hydraulic System Valves Replacement . . . . .	0128 00-1
WP 0129 00 Draining and Filling Hydraulic Reservoir . . . . .	0129 00-1
WP 0130 00 Hydraulic Reservoir Replacement . . . . .	0130 00-1
WP 0131 00 Hydraulic Filter Maintenance . . . . .	0131 00-1
WP 0132 00 Engine and Transmission Oil Sampling Valves, Hoses, and Fittings Replacement . . . . .	0132 00-1
WP 0133 00 Preparation for Storage or Shipment . . . . .	0133 00-1
WP 0134 00 General Maintenance Instructions . . . . .	0134 00-1
WP 0135 00 Air Conditioning System General Maintenance and Testing . . . . .	0135 00-1
WP 0136 00 Torque Limits . . . . .	0136 00-1
WP 0137 00 Diagrams . . . . .	0137 00-1

### CHAPTER 4 DIRECT SUPPORT MAINTENANCE

WP 0138 00 Powerpack Replacement . . . . .	0138 00-1
WP 0139 00 Transmission Replacement . . . . .	0139 00-1
WP 0140 00 Power Steering Hydraulic Pump Replacement . . . . .	0140 00-1
WP 0141 00 Cooling Fan and Fan Clutch Replacement . . . . .	0141 00-1
WP 0142 00 Radiator Assembly, Fan Shroud, and Charge Air Cooler Replacement . . . . .	0142 00-1

## Table of Contents - Continued

	<b>Page Number</b>
WP 0143 00 Front Axle Assembly Replacement . . . . .	0143 00-1
WP 0144 00 Front Springs Replacement . . . . .	0144 00-1
WP 0145 00 Rear Axle Assembly Replacement . . . . .	0145 00-1
WP 0146 00 Steering Gear, Drag Link, and Pitman Arm Replacement . . . . .	0146 00-1
WP 0147 00 Placing Cab In 90-Degree Tilt Position. . . . .	0147 00-1
WP 0148 00 Cab Windshield and Window Glass Replacement . . . . .	0148 00-1
WP 0149 00 Air Conditioning System Maintenance . . . . .	0149 00-1
WP 0150 00 Heater/AC Unit Replacement . . . . .	0150 00-1
WP 0151 00 AC Expansion Valve Replacement . . . . .	0151 00-1
WP 0152 00 AC Condenser Replacement . . . . .	0152 00-1
WP 0153 00 AC Fan Cycling (Trinary) Switch Replacement . . . . .	0153 00-1
WP 0154 00 AC Receiver-Drier Replacement . . . . .	0154 00-1
WP 0155 00 AC Compressor Replacement . . . . .	0155 00-1
WP 0156 00 Air Conditioning System Hose Replacement . . . . .	0156 00-1
WP 0157 00 Fifth Wheel Maintenance . . . . .	0157 00-1
WP 0158 00 Fifth Wheel Hydraulic Lift Cylinder Replacement . . . . .	0158 00-1
WP 0159 00 Alternator Repair . . . . .	0159 00-1
WP 0160 00 Power Take-Off (PTO) Replacement . . . . .	0160 00-1
WP 0161 00 Fifth Wheel Lift Hydraulic Pump Replacement . . . . .	0161 00-1

### CHAPTER 5 GENERAL SUPPORT MAINTENANCE

### CHAPTER 6 SUPPORTING INFORMATION

WP 0162 00 References . . . . .	0162 00-1
WP 0163 00 Maintenance Allocation Chart (MAC) Introduction . . . . .	0163 00-1
WP 0164 00 Maintenance Allocation Chart (MAC) . . . . .	0164 00-1
WP 0165 00 Expendable and Durable Items List . . . . .	0165 00-1
WP 0166 00 Tool Identification List . . . . .	0166 00-1
Index . . . . .	Index-1
Foldouts . . . . .	FO-1

### VOLUME 2

Group 020 - Engine

### VOLUME 3

Group 070 - Transmission  
 Group 080 - Front Axle (includes front axle steering components and front service brakes)  
 Group 090 - Rear Axle (includes rear service brakes)  
 Group 110 - Steering  
 Group 120 - Propshaft  
 Group 140 - Cab and Sheet Metal  
 Group 150 - Air Piping and Brake  
 Group 160 - Miscellaneous  
 Group 170 - Electrical

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# HOW TO USE THIS MANUAL

## NOTE

If at any time you are unsure how to use this manual or you cannot locate the information you need, notify your supervisor.

### INTRODUCTION

1. This manual is designed to help you perform Unit, Direct Support, and General Support Maintenance on the M878A2 Yard Tractor.
2. The *Repair Parts and Special Tools List (RPSTL)*, TM 9-2320-312-24P, is to be used in conjunction with this manual, to locate and obtain the repair parts and special tools needed to maintain this equipment.
3. This manual consists of three volumes: Volume 1 contains maintenance and troubleshooting for yard tractor components NOT covered in the Commercial Service Manuals. Volumes 2 and 3 are a compilation of Commercial off-the-Shelf (COTS) Service Manuals.
4. A *Table of Contents* at the front of Volume 1 lists the contents of all volumes of this publication. Each volume also contains a *Table of Contents* for that particular volume.
5. Volume 1 is written in work package format, in accordance with MIL-STD-40051A:
  - a. Chapters divide the manual into major categories of information (e.g. *Introductory Information with Theory of Operation, Troubleshooting Procedures, Unit Maintenance, Direct Support Maintenance, General Support Maintenance, and Supporting Information*).
  - b. Each Chapter is divided into work packages, which are identified by a 6-digit number (e.g. 0001 00, 0002 00, etc.) located on the upper right-hand corner of each page. The work package page number (e.g. 0001 00-1, 0001 00-2, etc.) is located centered at the bottom of each page.
  - c. If a Change Package is issued to this manual, added work packages use the 5<sup>th</sup> and 6<sup>th</sup> digits of their number to indicate new material. For instance, work packages inserted between WP 0001 00 and WP 0002 00 are numbered WP 0001 01, WP 0001 02, etc.
6. Volumes 2 and 3 are provided in commercial format.
7. Scan through all volumes of this manual to become familiar with their organization and contents before attempting to maintain the equipment.

### ORGANIZATION OF MATERIAL

1. Maintenance procedures in each volume are sequenced in accordance with the following major assembly groups, as outlined in the Maintenance Allocation Chart (MAC) in Volume 1:
  - a. Group 020—engine
  - b. Group 040—fuel
  - c. Group 050—exhaust
  - d. Group 060—cooling
  - e. Group 070—transmission
  - f. Group 080—front axle (includes front axle steering components and front service brakes)
  - g. Group 090—rear axle (includes rear service brakes)
  - h. Group 110—steering
  - i. Group 115—frame
  - j. Group 120—propshaft
  - k. Group 140—cab and sheet metal
  - l. Group 150—air piping and brake

**ORGANIZATION OF MATERIAL - CONTINUED**

- m. Group 160—miscellaneous
  - n. Group 170—electrical
  - o. Group 180—power take-off (PTO)
  - p. Group 190—oil piping (all fluid lines except air)
2. In the Commercial Service Manuals, troubleshooting is located in the same section as the maintenance procedures for that assembly group. For instance, engine troubleshooting is located within Group 020; transmission troubleshooting is located within Group 070.
  3. In the work package-formatted material, troubleshooting for ALL assembly group components is located in work package 0006 00. However, the Troubleshooting Symptom Index in WP 0005 00 contains a listing of ALL troubleshooting procedures, to include those contained in the Commercial Service Manuals.

**CONTENTS OF VOLUME I (WORK PACKAGE-FORMATTED MANUAL)**

1. A *Warning Summary* is located at the beginning of this volume. Become familiar with these warnings before performing troubleshooting or maintenance on the vehicle.
2. A *Table of Contents*, located in the front of this volume, lists all chapters and work packages in the publication, as well as the contents of Volumes 2 and 3.
  - a. The *Table of Contents* also provides *Reporting Errors and Recommending Improvements* information and DA Form 2028 addresses, for the submittal of corrections to this manual.
  - b. If you cannot find what you are looking for in the *Table of Contents*, refer to the alphabetical *Index* at the back of the manual.
3. Chapter 1, *Introductory Information with Theory of Information*, provides general information on the manual and the equipment.
4. Chapter 2, *Troubleshooting Procedures*, contains troubleshooting.
5. Chapter 3 covers all *Unit Maintenance*.
6. Chapter 4 covers all *Direct Support Maintenance*.
7. Chapter 5 covers all *General Support Maintenance*.
8. Chapter 6 covers *Supporting Information: References, Maintenance Allocation Chart (MAC) Introduction, Maintenance Allocation Chart (MAC), Expendable and Durable Items List, and Tool Identification List*.
9. There are electrical system *Foldouts* at the back of Volume 1.

**CONTENTS OF VOLUMES 2 AND 3 (COMMERCIAL SERVICE MANUALS)**

1. Volume 2 contains Group 020—engine.
2. Volume 3 contains:
  - a. Group 070—transmission.
  - b. Group 080—front axle
  - c. Group 090—rear axle
  - d. Group 110—steering
  - e. Group 120—propshaft
  - f. Group 140—cab and sheet metal
  - g. Group 150—air piping and brake
  - h. Group 160—miscellaneous

## FEATURES OF VOLUME I (WORK PACKAGE-FORMATTED MANUAL)

1. Because the major assembly groupings used in this manual do not correspond to military function group codes (FGC) and are unfamiliar to the soldier, maintenance tasks in Volume I include in their initial setups the following information:
  - a. MAC Reference (e.g., MAC Group 160)
  - b. RPSTL Reference (e.g., RPSTL Group 160, Figure 003)

This information will assist the user to locate appropriate MAC guidance and repair parts for the component being maintained.

2. WARNINGS, CAUTIONS, NOTES, subject headings, and other important information are highlighted in **BOLD** print as a visual aid.

### WARNING

A WARNING indicates a hazard that may result in death or serious injury.

### CAUTION

A CAUTION is a reminder of safety practices or directs attention to usage practices that may cause damage to equipment.

### NOTE

A NOTE is a statement containing information that will make the procedures easier to perform.

3. Statements and words of particular interest may be printed in CAPITAL LETTERS to create emphasis.
4. Within a procedural step, reference may be made to another work package in this volume of the manual or to another volume of this manual or another manual. These references indicate where you should look for more complete information.
  - a. If you are told: "Fill hydraulic reservoir (WP 0129 00)", go to work package 0129 00 in Volume 1 of this manual for instructions on filling the hydraulic reservoir.
  - b. If you are told: "Raise fifth wheel (TM 9-2320-312-10)", go to TM 9-2320-312-10 for complete instructions on raising the fifth wheel. Use the *Table of Contents* or alphabetical *Index* in TM 9-2320-312-10 to find the procedure.
  - c. If you are told "Repair transmission torque converter (Group 070 Commercial Service Manuals)", go to Group 070 in the Commercial Service Manuals (Volume 3) to find the procedure.
5. Illustrations are placed after, and as close to, the procedural steps to which they apply. Callouts placed on the art may be text or numbers, or both.
6. Numbers located at the lower right corner of the art (e.g. 376-001, 376-002, etc.) are art control numbers and are used for tracking purposes. Disregard these numbers.
7. Dasher leader lines used in illustrations indicate that called-out items are not visible in the view depicted (i.e. they are located within or behind the structure). In Lubrication Charts (WP 0008 00, *Unit PMCS Introduction*) and in *Unit PMCS* (WP 0009 00), dashed leader lines indicate a lubrication that is required on both sides of the equipment.
8. Technical instructions include metric units as well as standard units. For your reference, a *Metric Conversion Chart* is located on the inside back cover of the manual.

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**CHAPTER 1**  
**INTRODUCTORY INFORMATION WITH**  
**THEORY OF OPERATION**

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**GENERAL INFORMATION**

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0001 00

**SCOPE**

1. **Type of Manual.** This manual is for use in performing troubleshooting and Unit, Direct Support, and General Support Maintenance on the M878A2 Yard Tractor.
2. **Equipment Name and Model Number.** Truck, Tractor, Yard Type: 46,662 GVWR, DED, 4 X 2, M878A2.
3. **Purpose of Equipment.** The M878A2 is a 4 X 2 tractor used to move (“spot”) trailers within a terminal yard environment. It is also used in roll-on/roll-off (RO/RO) naval operations. Use of this vehicle on a public road or highway is NOT authorized.

**MAINTENANCE FORMS, RECORDS, AND REPORTS**

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, *Functional User’s Manual for the Army Maintenance Management System (TAMMS)*, as contained in the Maintenance Management Update.

**REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs)**

If your tractor needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don’t like about your equipment. Let us know why you don’t like the design or performance. Put it on an SF Form 368 (*Product Quality Deficiency Report*). Mail it to us at: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-LC-CIP-WT, Rock Island, Illinois 61299-7630. We’ll send you a reply.

**HAND RECEIPT MANUALS**

This manual has a companion document with a TM number followed by “-HR” (which stands for Hand Receipt). TM 9-2320-312-10-HR consists of preprinted hand receipts that list end item related equipment (i.e., COEI, BII, and AAL) that must be accounted for. As an aid to property accountability, additional HR manuals may be requisitioned through normal publication channels.

**CORROSION PREVENTION AND CONTROL (CPC)**

1. Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.
2. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.
3. If a corrosion problem is identified, it can be reported using SF Form 368 (*Product Quality Deficiency Report*). Use of key words such as “corrosion,” “rust,” “deterioration,” or “cracking” will ensure that the information is identified as a CPC problem. The form should be submitted to the address specified in DA Pam 738-750.

**DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE**

For destruction of Army materiel to prevent enemy use, refer to TM 750-244-6.

**PREPARATION FOR STORAGE OR SHIPMENT**

For preparation for storage or shipment procedures, refer to WP 0133 00.

**WARRANTY INFORMATION**

The M878A2 Yard Tractor is warranted by Crane Carrier Corporation in accordance with TB 9-2320-312-14. Warranty starts on the date found in block 23, DA Form 2408-9, *Equipment Control Log*. Report all defects in material or workmanship to your supervisor, who will take appropriate action.

**NOMENCLATURE CROSS-REFERENCE LIST**

<b>COMMON NAME</b>	<b>OFFICIAL NOMENCLATURE</b>
Differential Assembly . . . . .	Drive Head (Rear Axle Assembly)
Dipstick . . . . .	Oil Level Gauge
Engine Coolant . . . . .	Antifreeze, Ethylene Glycol Mixture
Gladhand . . . . .	Quick Disconnect Coupling
In Place (Installed) . . . . .	In Situ
Wheel Bearing Adjustment . . . . .	Hub End Float (Rear Axle Assembly)

**LIST OF ABBREVIATIONS**

**NOTE**

Refer to ASME Y14.38-1999 for standard abbreviations.

<b>ABBREVIATION</b>	<b>DEFINITION</b>
AAL . . . . .	Additional Authorization List
BII . . . . .	Basic Issue Items
C . . . . .	Centigrade or Celsius
CCC . . . . .	Crane Carrier Corporation
cfm . . . . .	Cubic Feet per Minute
cm . . . . .	Centimeter
COEI . . . . .	Components of End Item
ECM . . . . .	Electronic Control Module
ECU . . . . .	Electronic Control Unit
F . . . . .	Fahrenheit
GVWR . . . . .	Gross Vehicle Weight Rating
HEUI . . . . .	Hydraulic Electronic Unit Injector
IAP . . . . .	Injection Actuation Pressure
kg . . . . .	Kilogram
km . . . . .	Kilometer
kPa . . . . .	Kilopascal
kph . . . . .	Kilometers per Hour
L . . . . .	Liter
lb-ft . . . . .	Pound Foot
LCD . . . . .	Liquid Crystal Display
LED . . . . .	Light-Emitting Diode
lph . . . . .	Liters per Hour
mm . . . . .	Millimeter
Nm . . . . .	Newton Meter
PMCS . . . . .	Preventive Maintenance Checks and Services
RO/RO . . . . .	Roll-On/Roll-Off
SPORT . . . . .	Soldier's Portable On-System Repair Tool

**END OF WORK PACKAGE**



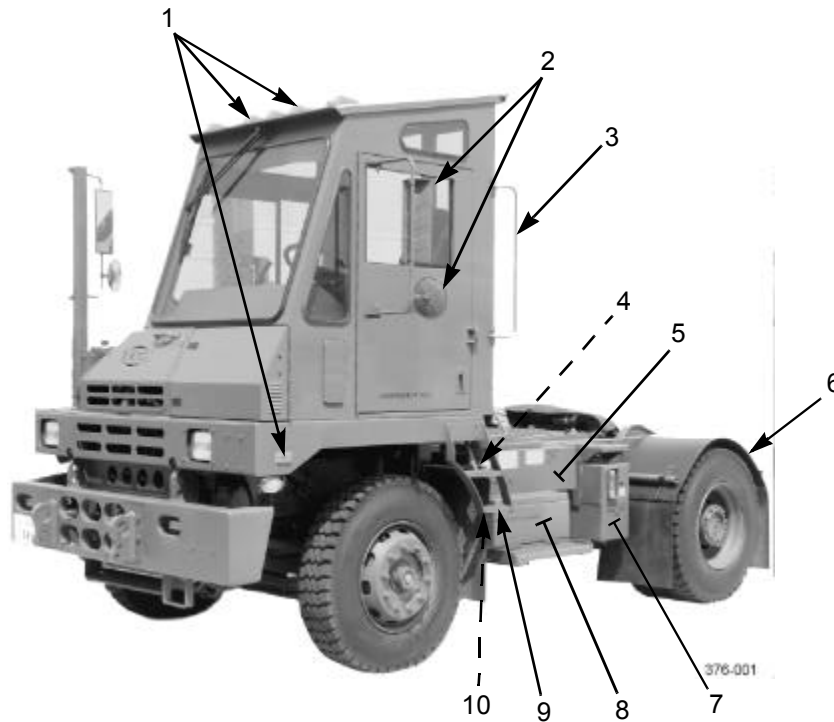
**EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES**1. **Characteristics.**

- a. The M878A2 Yard Tractor moves (“spots”) trailers in a terminal yard environment and in roll-on/roll-off (RO/RO) marine operations. Use of this vehicle on a public road or highway is NOT authorized.
- b. The M878A2 has a Gross Vehicle Weight Rating (GVWR) of 46,662 lb (21,185 kg).
- c. A hydraulically-controlled fifth wheel can be raised or lowered 32 in (81 cm), has a 70,000 lb (31,780 kg) vertical load capacity, and is compatible with a two-inch kingpin.
- d. A cab-controlled, air-operated latching cylinder unlocks fifth wheel coupler jaws from inside the cab.

2. **Capabilities and Features.**

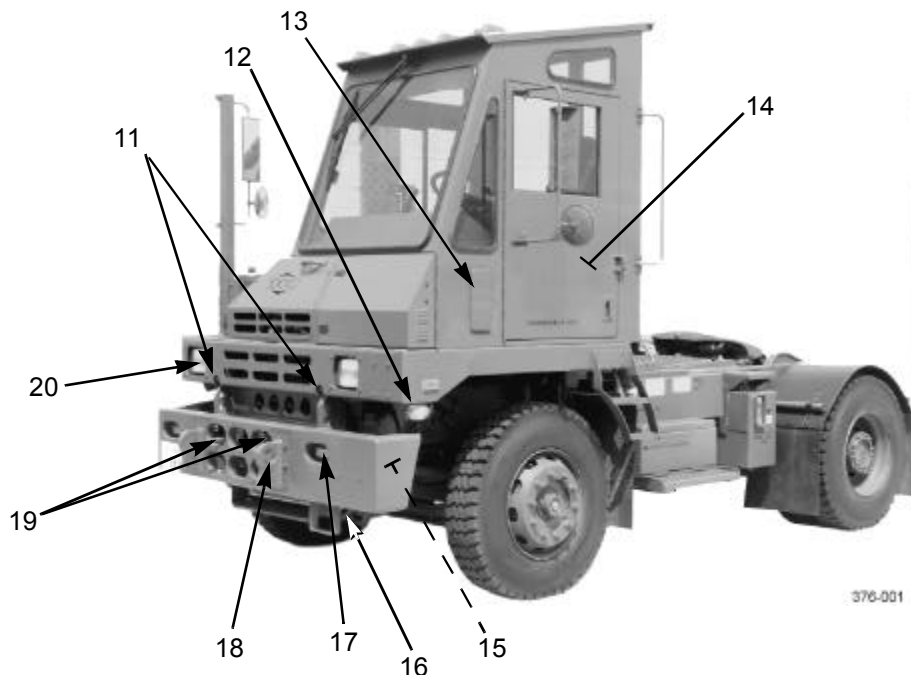
- a. The M878A2 has a wheelbase of 122.00 in (309.88 cm) and an overall length of 205.75 in (522.61 cm).
- b. The maximum speed of the M878A2 is 21 mph (34 kph). Maximum speed while towing is 15 mph (24 kph).
- c. The M878A2 is equipped with an instrument panel-mounted speedometer and tachometer that register vehicle forward speed and engine speed.
- d. The M878A2 has the following capabilities and features:
  - (1) Caterpillar 7.2L, electronically-controlled, turbocharged, 275 horsepower diesel engine;
  - (2) MD3560P Allison transmission with four (4) forward speeds, neutral, and reverse;
  - (3) Spicer 1710 propshaft;
  - (4) Eaton E-1460I front steering axle;
  - (5) Dana D90-14-2S single rear axle with dual wheels;
  - (6) front and rear air-activated s-cam brakes; rear axle spring-loaded parking brakes;
  - (7) Sheppard power steering gear;
  - (8) air conditioning system;
  - (9) backup lights and alarm;
  - (10) 45-degree cab tilt system;
  - (11) cab sliding rear door; and
  - (12) KBI 40 kJ Ultra Capacitor starting system.
- e. A fire extinguisher and an M16 rifle mount are located behind the driver’s seat inside the cab.
- f. An auxiliary arctic heater (TM 9-2320-312-10) is available for installation if tractor is to operate in temperatures below -25°F (-32°C).
- g. If installation of an auxiliary radio is desired, wiring is available behind the access panel located inside the cab above the sun visor.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS



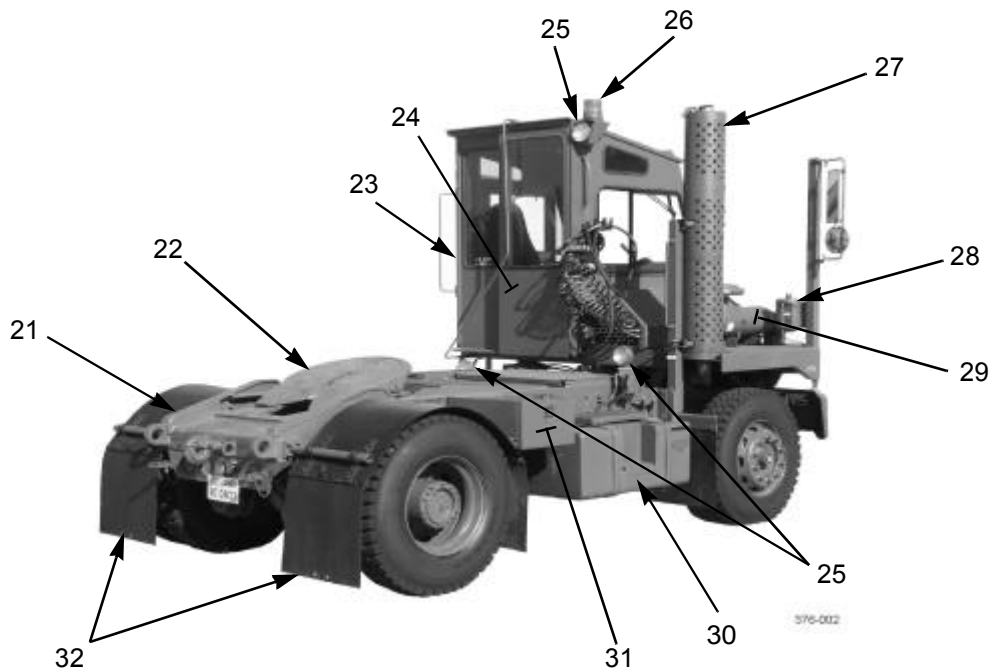
KEY	COMPONENT	DESCRIPTION
1	Marker Clearance Lights	Indicates outline of tractor.
2	Side Mirror and Spotter Mirror	Provide driver with a view to the rear of both sides of tractor and trailer, if towing.
3	Grabhandles	Provide a handhold for personnel climbing on tractor.
4	Slave Receptacle	Receptacle for NATO slave cable to slave start tractor.
5	Cab Tilt Controls	Includes pump, pump controls, and safety prop release cable used to operate cab tilt system.
6	Fender	Prevents water and debris from spraying.
7	Hydraulic Reservoir	Stores hydraulic fluid for operation of power steering system and fifth wheel lift. Contains sight gauge to determine level of fluid in reservoir.
8	Battery Box and Steps	Box holds vehicle batteries, capacitor(s), and 25A ignition system circuit breaker. Steps provide access to rear platform and cab.
9	Steps	Use only in an emergency to exit cab through side door.
10	Battery Disconnect Switch	Cuts off battery power from all vehicle electrical systems. Push in for ON. Pull out for OFF. Normally, leave switch in ON position. Place in OFF position under the following circumstances: <ul style="list-style-type: none"> <li>• in the event of an accident or other emergency, to prevent fire</li> <li>• for long-term (over 30 days) storage</li> <li>• to perform electrical system maintenance</li> </ul>

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED



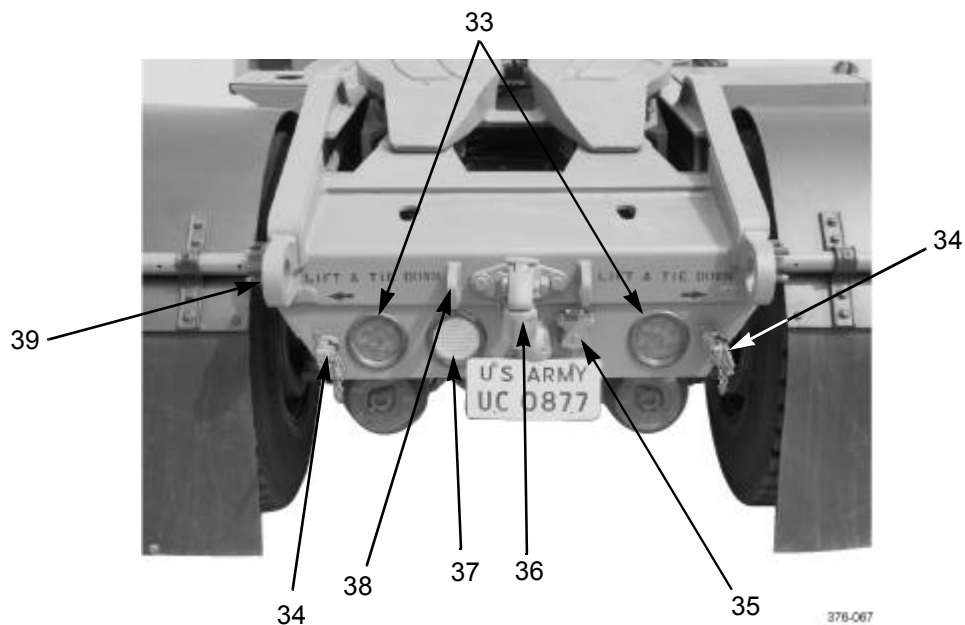
KEY	COMPONENT	DESCRIPTION
11	Cab Pivots	Front cab pivots allow for forward tilting of cab.
12	Auxiliary Lights	Assist visibility when turning, during night or low light operating conditions.
13	Cab Side Vent	Provides ventilation inside cab. Opens and closes from inside cab.
14	Side Door	To be used only in an emergency. Use rear sliding door under normal circumstances.
15	Windshield Washer Reservoir and Pump	Reservoir and pump supplies windshield washer fluid to windshield.
16	Tiedown Points	Used to tie tractor down when being shipped.
17	Turn Signals	When turned on, flash to indicate direction tractor is turning.
18	Lift and Tow Points	Provide attachment point for lifting and towing devices. Topmost eyes are for lifting; middle and bottommost eyes are for towing tractor.
19	Front Gladhands	Provide service and emergency air connections when tractor is towed from the front.
20	Headlights	Include high and low beam.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED



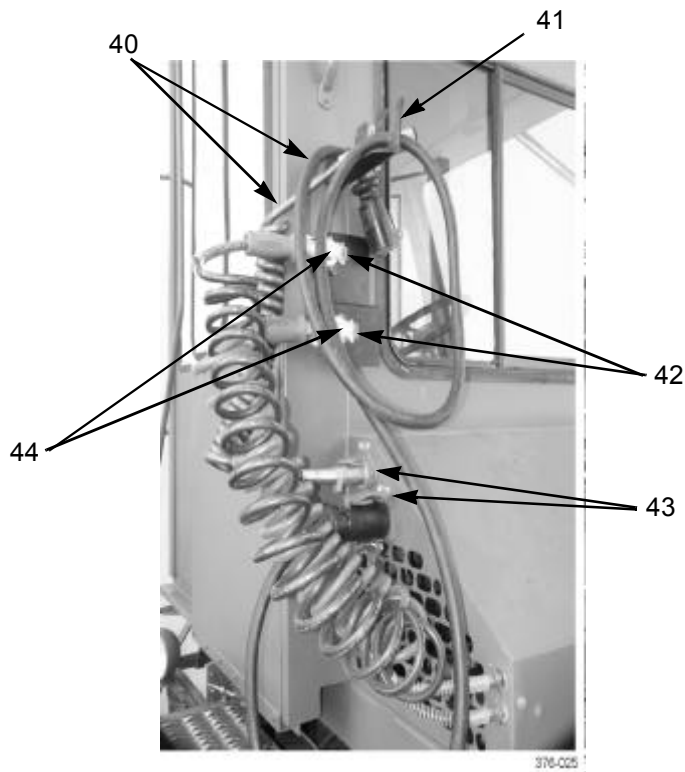
KEY	COMPONENT	DESCRIPTION
21	Ramp	Sloped surface serves as an approach to fifth wheel and facilitates trailer coupling to tractor.
22	Fifth Wheel	Adjustable-height coupling device for trailers with two-inch kingpins. Adjusts from a lowered height of 48 in (122 cm) to a fully raised height of 80 in (203 cm), as measured from top of fifth wheel plate to the ground.
23	Cab	Provides weatherproof enclosure for driver and driver controls.
24	Rear Door	Slides open to allow driver access into cab.
25	Floodlights	Illuminate area to rear of cab, specifically the fifth wheel/kingpin coupling. When floodlight switch is turned to REV, all floodlights also serve as backup lights, when tractor is in R (Reverse).
26	Strobe Warning Light	Flashes to alert other vehicles of presence of tractor.
27	Exhaust Muffler	Deadens noise of engine exhaust.
28	Coolant Overflow Bottle	Contains cooling system overflow. Provides means for operator to visually check coolant level and add coolant to system.
29	Engine Air Cleaner	Filters incoming air to engine intake manifold.
30	Fuel Tank and Steps	Stores fuel supply for vehicle. Steps mounted to tank provide access to cab and rear platform.
31	Stowage Compartment	Provide stowage for BII items and other items.
32	Mudflaps	Prevent water and debris from spraying. Mudflaps may be hooked up out of the way to prevent their damage, when negotiating steep ramps during RO/RO operations.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED



KEY	COMPONENT	DESCRIPTION
33	Taillights	Contain tail, stop, and turn signal lights.
34	Rear Gladhands	Provide service (blue) and emergency (red) air line connections to trailers with lunettes and airbrake systems. Emergency gladhand is also used when a yard tractor tire requires inflation.
35	24V Receptacle	Used when towing military trailers with lunettes.
36	Pintle Hook	Coupling device for trailers with lunettes.
37	Backup Light	Indicates tractor is in reverse gear. Backup alarm will also sound.
38	Safety Chain Stowage Eyes	Allow attachment of safety chains to rear of tractor, when towing trailers with lunettes.
39	Lift and Tiedown Points	Serve as both lift points and tiedown points.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED



KEY	COMPONENT	DESCRIPTION
40	Intervehicular Electrical Cables	Provide electrical connection to 12-volt (commercial) or 24-volt (military) trailers.
41	Intervehicular Electrical Cable Stowage Bracket	Provides stowage for 12V and 24V electrical cable connectors, when not in use.
42	Dummy Couplings	Provide stowage of trailer air line gladhands.
43	Intervehicular Receptacles Installation	Includes 12-volt and 24-volt electrical receptacles.
44	Intervehicular Gladhands	Provide service (blue) and emergency (red) air line connections to trailers with kingpins.

**EQUIPMENT DESCRIPTION AND DATA - CONTINUED**

**0002 00**

**EQUIPMENT DATA**

**Dimensions:**

**Standard (Metric)**

Length (Overall).....	205.75 in (522.61 cm)
Height (Overall).....	122.00 in (309.88 cm)
Width (Overall):	
Front .....	96.50 in (245.11 cm)
Rear .....	98.00 in (248.92 cm)
Wheelbase .....	122.00 in (309.88 cm)
Ground Clearance:	
Front .....	9.75 in (24.77 cm)
Rear .....	9.50 in (24.13 cm)
Angle of Approach.....	21.5°
Angle of Departure.....	61°

**Weights:**

GVWR .....	46,662 lb (21,185 kg)
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**Capacities:**

Engine Oil .....	24-27 qt (22.7-25.5 L)
Cooling System .....	27.5 qt (26.0 L)
Radiator .....	4.7 gal (17.8 L)
Coolant Recovery Bottle .....	1.5 gal (5.7 L)
Fuel Tank .....	50 gal (189.3 L)
Transmission .....	26 qt (25 L)
Rear Axle (Hub Wheel Ends and Differential) .....	41 pt (19.4 L)
Hydraulic Reservoir .....	12 gal (45.2 L)
Hydraulic System (Steering and Fifth Wheel Lift) .....	15 gal (56.8 L)
Cab Tilt Pump .....	2 qt (1.9 L)

**Engine:**

Manufacturer .....	Caterpillar
Type .....	Diesel, turbocharged
Model .....	3126E
Cylinders .....	6, in-line
Horsepower .....	275 hp @ 2400 rpm
Displacement .....	7.2 L (442 in <sup>3</sup> )
Oil Filter Type .....	Full flow, replaceable element
Air Compressor (cfm) .....	15.0 cfm
Weight (Dry) (With Standard Accessories) .....	1295 lb (588 kg)
Cold Start Aids.....	Air inlet manifold heater and automatic ether injection

**Fuel System:**

Type .....	Hydraulic Electronic Unit Injector (HEUI)
Fuel Filters .....	Primary fuel filter with fuel/water separator Secondary fuel filter with hand priming pump

**EQUIPMENT DESCRIPTION AND DATA - CONTINUED**

**0002 00**

**EQUIPMENT DATA - CONTINUED**

**Standard (Metric)**

**Air Cleaner:**

Manufacturer .....	Donaldson
Type .....	dry element
Quantity .....	1

**Cooling System:**

Radiator Working Pressure .....	7 psi (48 kPa)
---------------------------------	----------------

**Electrical System:**

Type .....	12V negative ground
Alternator .....	Niehoff, 100 amps, dual voltage 12V/24V
Starter .....	Leece Neville, 24V DC
Batteries:	
Quantity .....	2 or 4 (if equipped with auxiliary arctic heater)
Cables .....	Dual Path
Capacitor(s):	
Quantity .....	1 or 2 (if equipped with auxiliary arctic heater)
Storage Capacity .....	40kJ; 40 kJ and 120 kJ (if equipped with auxiliary arctic heater)

**Transmission:**

Manufacturer .....	Allison
Model .....	MD 3560P
Type .....	Automatic, 4-speed forward, neutral, reverse
Shift Selector .....	Power shift
Filter, Transmission-Mounted .....	Two, internal, bolt-on cover
Weight (Dry) .....	575 lb (260 kg)

**Front Axle:**

Manufacturer .....	Eaton
Type .....	E-1460I, left-hand steer, I-beam
Rated Capacity .....	16,500 lb (7,491 kg)

**Rear Axle:**

Manufacturer .....	Spicer
Type .....	D90-14-2S, double reduction planetary
Rated Capacity .....	70,000 lb (31,780 kg)

**Brake System:**

Actuation .....	Air-mechanical
Pressure Range .....	60-120 psi (414-827 kPa)
Airbrake Chambers .....	2 per axle



**EQUIPMENT DESCRIPTION AND DATA - CONTINUED**

**0002 00**

**EQUIPMENT DATA - CONTINUED**

**Standard (Metric)**

**Slack Adjusters:**

Front ..... Automatic  
 Rear ..... Manual

Brakeshoes ..... 16.5 in

Parking Brake, Rear Axle ..... Spring-loaded

**Wheels:**

Size ..... 22.5 x 8.25, 10 holes

**Tires:**

Type ..... Tubeless, radial

Size ..... 11R22.5, 14 Ply

Load Range ..... H

Inflation ..... 120 psi (827 kPa)

**Steering System:**

Power Steering Gear Manufacturer ..... R.H. Shepperd Co., Inc.

Capacity ..... 14,000 lb (6,356 kg)

Hydraulic Pump ..... Coupling driven (off engine)

14 gpm priority flow

Steering Wheel ..... Padded deluxe 18 in diameter,

2-spoke

Steering Column Style ..... Fixed

**Suspension:**

Front ..... 4 X 50 in 9-leaf springs, flat leaf,  
 with shock absorbers

Rear ..... CCC/solid mount

**Towing Attachments:**

**Fifth Wheel:**

Manufacturer ..... Holland Hitch Co.

Model ..... FW3500-03344

**Fifth Wheel Lift:**

Capacity (Vertical Load) ..... 70,000 lb (31,780 kg)

Lift Height ..... 32 in (81 cm)

PTO Type ..... Muncie, 10-bolt with 7/8-13T spline

Hydraulic Pump Manufacturer/Part Number ..... Tyrone/HP16-180C-2NS

Hydraulic Pump Type ..... 3.5 cu in/rev, 3200 psi rated pressure

Hydraulic Lift Cylinder Manufacturer ..... Cal-West Machining Inc.

Hydraulic Lift Cylinder Type ..... 2-stage, double acting, power  
 up/down

**Pintle Hook:**

Manufacturer ..... Holland Hitch Co., P/N PH760

Maximum Towing Load ..... 40,000 lb (18,160 kg)

Tow Loops (Front, Bumper Integrated) ..... 2

Tow Eyes (Rear, Frame Integrated) ..... 2

**Cab:**

Style ..... 1-passenger, half-cab, 45° tilt

Construction ..... Welded steel Galvanneal

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**EQUIPMENT DESCRIPTION AND DATA - CONTINUED**

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**0002 00**

***EQUIPMENT DATA - CONTINUED***

**Standard (Metric)**

**Accessories:**

Floodlights .....	Three, illuminate fifth wheel/rear of vehicle
Mirrors .....	2: 6 in x 16 in, west coast style 2: parabolic
Sliding Rear Door .....	Back of cab

**END OF WORK PACKAGE**

**INTRODUCTION**

1. The M878A2 Yard Tractor consists of the following functional systems:
  - a. drive train;
  - b. fuel system;
  - c. exhaust system;
  - d. cooling system;
  - e. electrical system;
  - f. air system;
  - g. brake system;
  - h. steering system;
  - i. fifth wheel system;
  - j. air conditioning system;
  - k. cab tilt system; and
  - l. optional auxiliary arctic heater system (Refer to *Additional Authorization List*, TM 9-2320-312-10).
2. This work package explains how the components and systems of the M878A2 work together. A functional description is provided for each major system.

**DRIVE TRAIN**

1. The drive train of the M878A2 consists of a Caterpillar 7.2L electronic engine and an Allison MD 3560P transmission, connected to a Spicer 1710 propshaft and Spicer D90-14-2S double reduction planetary rear axle.
2. The engine is diesel-fueled and turbocharged, with six in-line cylinders. It generates 275 horsepower at a governed speed of 2400 rpm. Coupled with the Allison automatic transmission, it provides power to handle all requirements of the yard tractor's mission, to include pulling up steep ramps with heavy loads in roll-on/roll-off (RO/RO) naval operations.
3. The engine is equipped with an air inlet manifold heater which assists in cold-weather starting. Heater turns on when sum of coolant temperature and air inlet temperature is less than 109°F (25°C). Heater shuts off when sum of temperatures exceeds 127°F (35°C).
4. An automatic ether cold start system assists in cold-weather starting below 32°F (0°C).
5. The transmission is a torque converter-type with four (4) forward speeds, a N (Neutral), and one R (Reverse) speed. A power take-off, mounted on the transmission, and a hydraulic pump provide hydraulic pressure to operate the hydraulic system for the fifth wheel lift.

**FUEL SYSTEM**

1. The fuel system uses a Hydraulic Electronic Unit Injector (HEUI) at each cylinder to deliver high-pressure fuel into the combustion chamber. The engine Electronic Control Module (ECM) controls the HEUI fuel system. The HEUI fuel system cannot be mechanically adjusted.
2. Fuel for combustion is supplied by the low-pressure fuel system. The low-pressure fuel system also supplies excess fuel flow to cool the HEUI injectors and to remove air from the system. Components of the low-pressure system are:
  - a. fuel tank with a capacity of 50 gal (189.3 L);
  - b. primary and secondary fuel filters;
  - c. fuel transfer pump; and
  - d. fuel pressure regulator—controls fuel flow back to the fuel tank.

**FUEL SYSTEM - CONTINUED**

3. The high-pressure fuel system consists of the following:
  - a. HEUI injectors at each cylinder;
  - b. hydraulic pump—pressurizes a portion of the engine lubricating oil to the injection actuation pressure that is required in order to power the HEUI injectors;
  - c. Injection Actuation Pressure (IAP) control valve—a high-precision valve that controls actuation pressure; and
  - d. IAP sensor—monitors actuation pressure and communicates this information to the engine ECM.
4. The 40-micron primary fuel filter also serves as a fuel/water separator. A hand priming pump is mounted to the secondary fuel filter.

**EXHAUST SYSTEM**

The exhaust system removes exhaust gases from the engine through the exhaust manifold. The gasses flow into exhaust pipes and a muffler to the atmosphere above and to the right side of the cab.

**COOLING SYSTEM**

1. The cooling system consists of a circulating pump, a standard modulating water temperature regulator (thermostat), a transmission oil cooler, charge air cooler, radiator, and an air-actuated engine fan clutch.
2. The cooling system cools the engine by circulating ethylene glycol-based coolant through the engine and radiator. Coolant is also directed to cool the engine air compressor.

**ELECTRICAL SYSTEM**

1. The electrical system consists of two 12-volt batteries and a 40kJ capacitor, a 100-amp alternator, and voltage regulator that supply power to the engine 24-volt starter and trailer receptacle connectors. Vehicles equipped with arctic heater use four 12-volt batteries and 40kJ and 120kJ capacitors.
2. The KAPower capacitor is an electrical storage device designed as an auxiliary power source. It is installed in parallel with vehicle's starting batteries. It derives its power from batteries or vehicle charging system and discharges this power when needed. In the event of discharged or low battery power, vehicle may be started with the isolated available power stored within the capacitor(s).
3. The yard tractor is equipped with commercial 12-volt lights to include the following: headlights, marker clearance lights, beacon warning light, floodlights, taillights, and backup light.

**AIR SYSTEM**

1. The air system supplies clean, dry compressed air to operate the tractor airbrake system and to control miscellaneous air-operated components (fifth wheel unlock and driver's seat). The system consists of an engine-mounted air compressor with governor, air dryer, three air reservoirs with pull-cord drain valves, and air lines and fittings.
2. A dual air pressure gauge on the instrument panel monitors air pressure in both primary and secondary air reservoirs.

**BRAKE SYSTEM**

1. The M878A2 is equipped with a standard dual airbrake system. Compressed air, generated by the engine-mounted air compressor, is stored in three air reservoirs and distributed, upon demand from the floor-mounted brake pedal, through air lines and valves to airbrake chambers at each wheel.
2. The airbrake system features the following:
  - a. floor-mounted brake pedal (two joined pedals) to operate the tractor (and trailer) brakes;
  - b. manually-operated parking brake control valve to apply and release the tractor parking brakes;
  - c. manually-operated trailer brake control valve to apply and release the trailer service brakes independently of the tractor brakes; and

**BRAKE SYSTEM - CONTINUED**

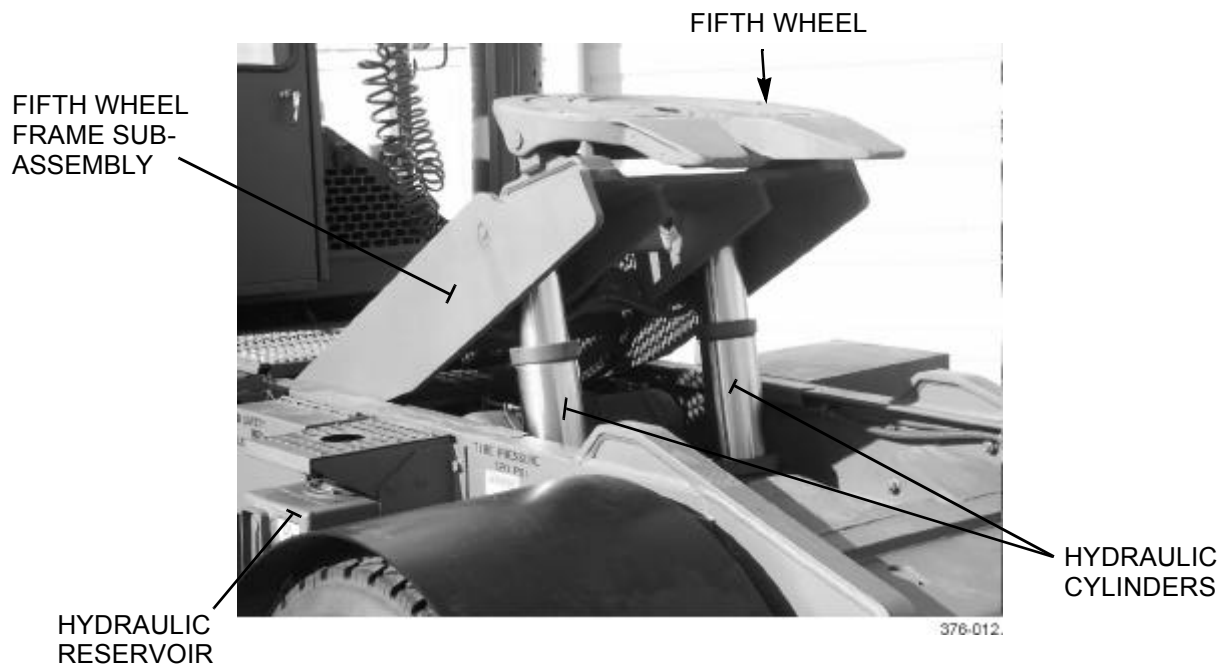
- d. manually-operated trailer air supply control valve to apply and release the trailer parking brakes.
3. The mechanical components of the brake system are automatically-adjusting slack adjusters on front axle, manual slack adjusters on rear axle, s-cam camshafts, and 16.5 in brakeshoes.

**STEERING SYSTEM**

1. The power steering system consists of a engine-mounted hydraulic pump, hydraulic reservoir, power steering gear, and hydraulic hoses. The hydraulic pump provides the power-assist for the steering system.
2. Steering linkage from the steering gear connects to the left side of the Eaton E-1460I front steer axle.

**FIFTH WHEEL SYSTEM**

1. The M878A2's fifth wheel can be hydraulically raised 32 in (81 cm), using a control lever on the instrument panel. This feature allows for the following:
  - a. adjustment of fifth wheel height to differing trailer coupling heights;
  - b. moving ("spotting") trailers without having to raise their landing gear; and
  - c. negotiating steep ramps during RO/RO procedures.



**FIFTH WHEEL SYSTEM - CONTINUED**

2. The fifth wheel hydraulic system consists of:
  - a. hydraulic pump mounted to transmission-driven PTO;
  - b. hydraulic reservoir (same as for the steering system);
  - c. two hydraulic cylinders mounted between vehicle frame and fifth wheel frame sub-assembly; and
  - d. instrument panel-mounted control valve and lever to raise and lower the fifth wheel from inside the cab.



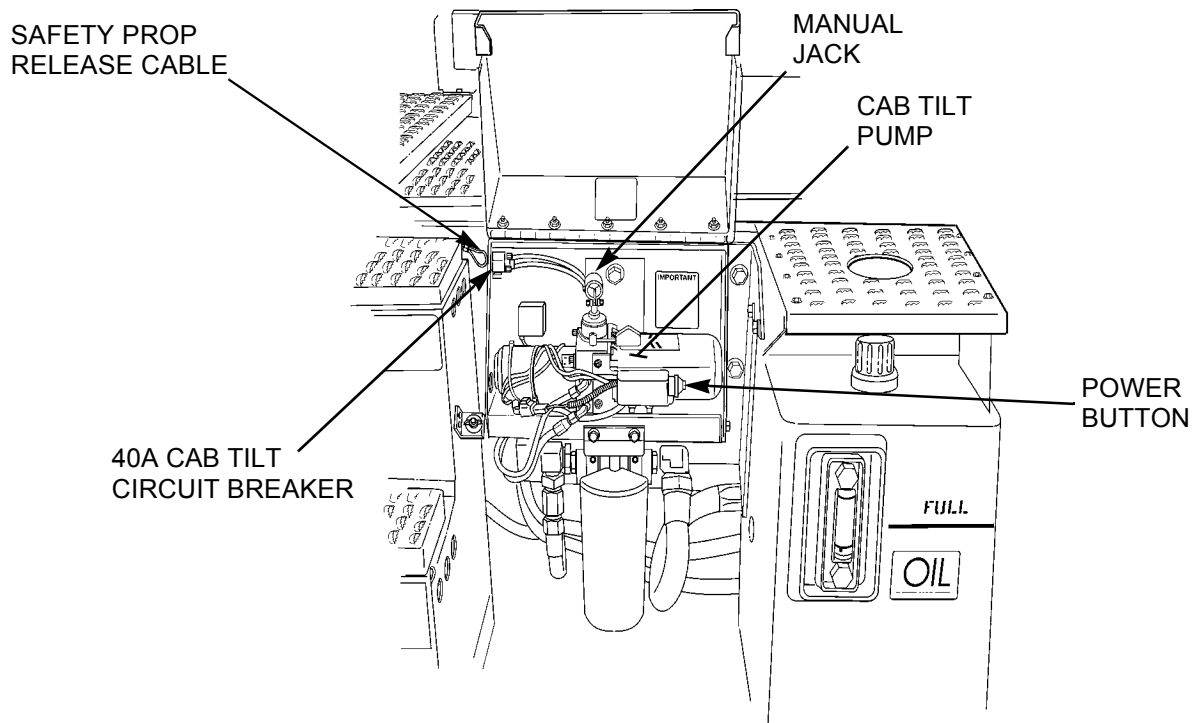
3. The fifth wheel/kingpin coupling is unlocked from inside the cab using an air-operated control lever on the instrument panel.
4. A load sensing gauge (liquid-filled) on the instrument panel indicates kingpin weight of trailer on fifth wheel.

**AIR CONDITIONING SYSTEM**

1. The air conditioning system consists of a belt-driven compressor, condenser, evaporator coil, and receiver-drier.
2. The system utilizes the cab heater, controls, and ductwork to direct cool air throughout the cab interior.

**CAB TILT SYSTEM**

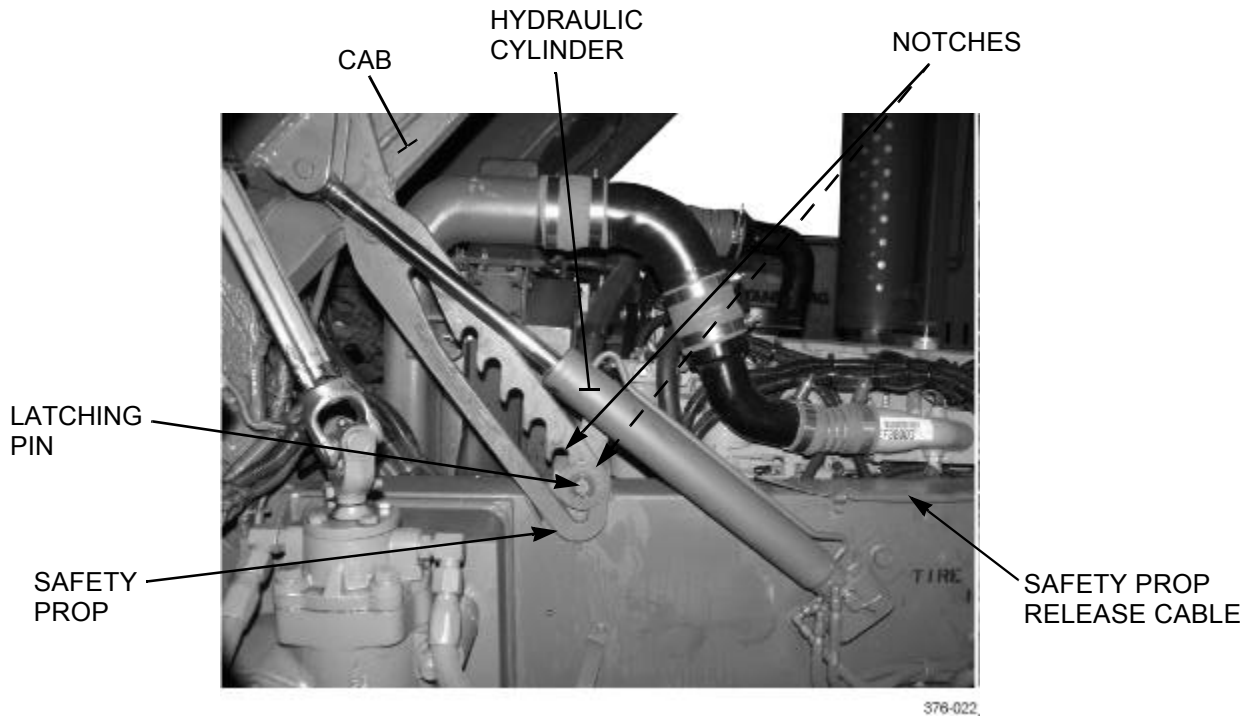
1. The cab is mounted on the frame with two pivots at the cab front corners and a latch at the left rear corner. The cab may be hydraulically tilted to a maximum of 45° forward to access under the cab for maintenance.
2. The cab tilt pump and controls are located on the left side of the vehicle, directly behind the battery box. Hydraulic fluid from the pump operates a hydraulic cylinder mounted between left side of the cab subframe and the vehicle frame.
3. In the event there is no electrical power to operate the pump, the cab can be manually tilted using a jack handle to operate the pump. When not in use, the handle is stowed inside the cab, behind the driver's seat.



376-003

**CAB TILT SYSTEM - CONTINUED**

4. The safety prop supports the cab when the safety prop latching pin engages notch in prop. When lowering the cab, the safety prop release cable must be pulled so that the safety prop pin will disengage from notch.



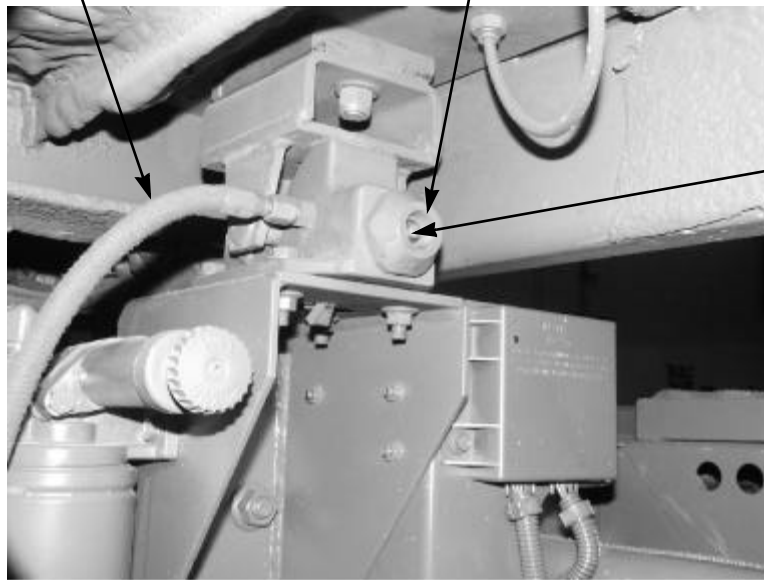


**CAB TILT SYSTEM - CONTINUED**

5. The cab is held in the down position by a spring-applied, hydraulically-released latch, at the left-rear corner of the cab.

HYDRAULIC PRESSURE  
RELEASES LATCH

LATCH



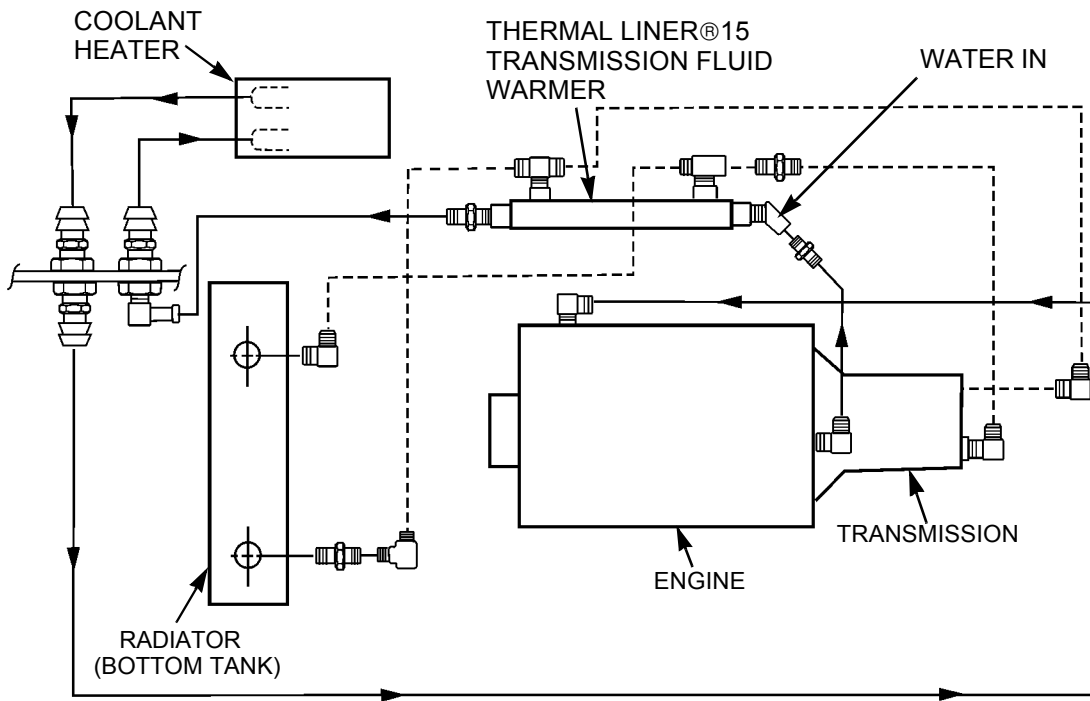
LOCK  
INDICATOR -  
PLUNGER IN =  
LATCHED

**CAB LOWERED**

376-021

**AUXILIARY ARCTIC HEATER SYSTEM (IF EQUIPPED)**

1. The auxiliary arctic heater system is available for installation on vehicles that will operate in temperatures below -25°F (-32°C). The system consists of the following major components:
  - a. diesel-fired coolant heater; and
  - b. Thermal Liner® 15 fluid warmer.
2. The coolant heater is mounted on the right frame rail at front of tractor. It is connected to the cooling system, electrical system, and fuel system of the vehicle. It functions to preheat the engine block. The heater pumps coolant from the engine, heats it, then returns it to the engine. A temperature regulating switch in the unit regulates the coolant temperature between a low of 154°F (68°C) and a high of 185°F (85°C), by automatically recycling the heater.
3. The Thermal Liner® 15 fluid warmer is installed in-line between the coolant heater and the transmission; it serves to heat transmission oil.

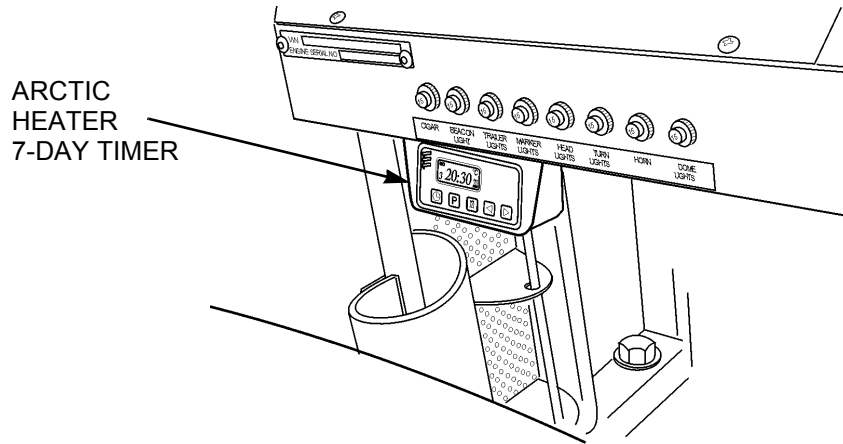


———— = COOLANT  
 - - - - - = TRANSMISSION FLUID

376-037

4. A 7-day timer, mounted under the left side of the instrument panel, operates the auxiliary arctic heater system and connects to the diagnostic circuit of the coolant heater to allow for troubleshooting capability.
  - a. The timer allows for pre-selection of turn-on time, up to seven (7) days in advance, as well as an option for run times up to 120 minutes before turning off automatically.
  - b. There is also an on/off switch for manual operation.

**AUXILIARY ARCTIC HEATER SYSTEM (IF EQUIPPED) - CONTINUED**



376-013

**END OF WORK PACKAGE**

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**CHAPTER 2**  
**TROUBLESHOOTING PROCEDURES**

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**GENERAL**

1. This manual contains troubleshooting procedures for identifying and correcting malfunctions that may develop while operating the M878A2 Yard Tractor.
2. Troubleshooting procedures are located as follows:

**NOTE**

Assembly group numbers for the yard tractor are listed and defined in *How to Use This Manual*.

- a. In the Commercial Service Manuals, procedures are found in the assembly group section for the component in question. For instance, troubleshooting for the engine is located within Group 020; troubleshooting for the transmission is located within Group 070.
  - b. Troubleshooting NOT covered by commercially-developed procedures can be found in WP 0006 00 of this volume.
  - c. For certain components, troubleshooting may be found in both locations, as referenced in a and b above.
3. In all cases, the *Troubleshooting Symptom Index* in WP 0005 00 should be consulted to assist in locating the required troubleshooting procedures. This alphabetical index lists common malfunctions or symptoms which may occur and refers you to either (or both) of the following:
    - a. troubleshooting located in the Commercial Service Manuals; or
    - b. troubleshooting found in a specific Table in WP 0006 00.
  4. It is not possible to list all malfunctions that may occur, nor all tests or inspections or corrective actions. If a malfunction is not listed, or is not corrected by the listed corrective actions, notify your supervisor.
  5. If you are unsure of the location of an item mentioned in troubleshooting, refer to WP 0002 00 of this manual or to TM 9-2320-312-10. In addition, Figures 1 and 2 at the end of this work package illustrate the location of electrical, hydraulic or other vehicle components that may be difficult to locate.
  6. As an aid to the user, air and hydraulic system diagrams are provided in WP 0137 00. Electrical schematics are contained as foldouts at the end of the manual.
  7. Before performing troubleshooting, read and follow all safety instructions found in the Warning Summary at the front of this manual.

**PRELIMINARY TROUBLESHOOTING PROCEDURES****NOTE**

Fluid leaks are classified as Class I, Class II or Class III:

- *Class I:* Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
  - *Class II:* Leakage of fluid great enough to form drops, but not enough to cause drops to drip from item being checked/inspected.
  - *Class III:* Leakage of fluid great enough to form drops that fall from item being checked/inspected.
1. Before beginning troubleshooting, perform the following:
    - a. Visually check for ruptured oil, coolant, fuel or hydraulic lines and for Class II or Class III leaks.
    - b. Check for mechanical jamming or binding caused by foreign matter.
    - c. Check fluid levels in subject area and service as required (TM 9-2320-312-10 or WP 0009 00 in this manual).
  2. Ensure all applicable Operator Troubleshooting has been performed before proceeding.

**EXPLANATION OF TROUBLESHOOTING TABLE COLUMNS****NOTE**

- The following column definitions do not necessarily apply to the troubleshooting format in the Commercial Service Manuals.
- Columns in WP 0006 00 troubleshooting tables are defined as follows:
  1. **MALFUNCTION**. Indicates fault that has occurred in system/equipment.
  2. **TEST OR INSPECTION**. Indicates test or inspection to be performed to isolate probable cause for fault symptom.
  3. **CORRECTIVE ACTION**. Indicates procedure to correct the problem.

**ELECTRICAL TROUBLESHOOTING—GENERAL INFORMATION****NOTE**

- Refer to *Electrical General Maintenance Instructions* (WP 0120 00) for instructions on using a multimeter to check for continuity or shorts and to perform voltage checks.
  - Refer to electrical schematics, in foldouts at end of manual, for assistance.
1. Analyze the symptoms and conditions to determine the most likely cause for the problem, then troubleshoot that circuit first. The more information you have concerning the problem, the easier it will be to troubleshoot.
  2. Isolate to the subsystem level (in cases where more than one subsystem is involved); next isolate the problem to a single circuit within the subsystem; then, isolate the problem to the faulty component using the *Troubleshooting Symptom Index* (WP 0005 00).
  3. Frayed, broken, loose or corroded wiring is a common source of problems in any electrical circuit. Always make visual inspections before starting detailed troubleshooting. Observe in particular contacts to ground. Components with case grounds are especially troublesome.

**CAUTION**

When making continuity checks, make sure test equipment is isolated from power source.

4. Most of the checks are made by voltage checks. Pay particular attention to the voltages being checked in the procedures. This equipment has a combination of 12- and 24-volts systems. Instructions prior to the step instruct to disconnect at test point from the potential malfunctioning component. Once the check has been made, either repair the component or go to the referenced step. If going to another step, reconnect connection or do as otherwise instructed, such as install and use jumper wires. When ready to make the prescribed check, apply power to the circuit (if required). A helper may be required if the switch or power source is out of reach. Release the power function before going on, to avoid damage to equipment.

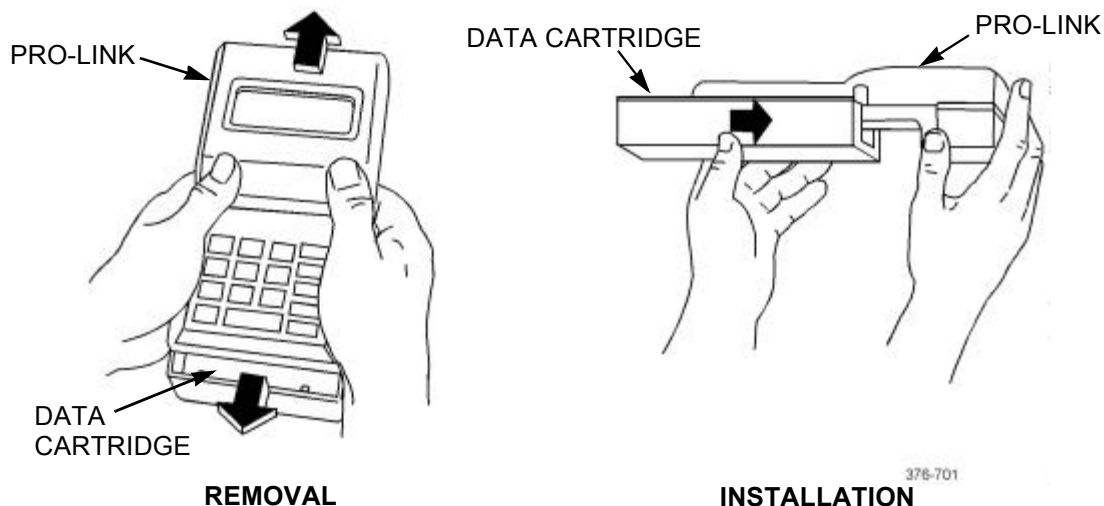
**TROUBLESHOOTING USING PRO-LINK**

1. The Pro-Link tester is used to perform engine and transmission troubleshooting. WP 0166 00 (*Tool Identification List*) contains a complete list of Pro-Link components required. Additional information can be found in Group 020 or Group 070 troubleshooting instructions in the Commercial Service Manuals.
2. To remove a data cartridge from Pro-Link tester, if one is installed, perform the following steps:
  - a. Hold tester with thumbs placed against slanted surface and grasp cartridge with fingers.
  - b. Push thumbs forward against slanted surface while squeezing tester and slide cartridge back at the same time. Retention latches will release the outer end.
  - c. Slide cartridge straight out until edgeboard is clear of connector in tester.



**TROUBLESHOOTING USING PRO-LINK - CONTINUED**

3. Install appropriate cartridge by pushing in until cartridge clicks into place.



4. Connect the appropriate power/data cable to Pro-Link tester. Connect appropriate adapter to other end of cable.

**CAUTION**

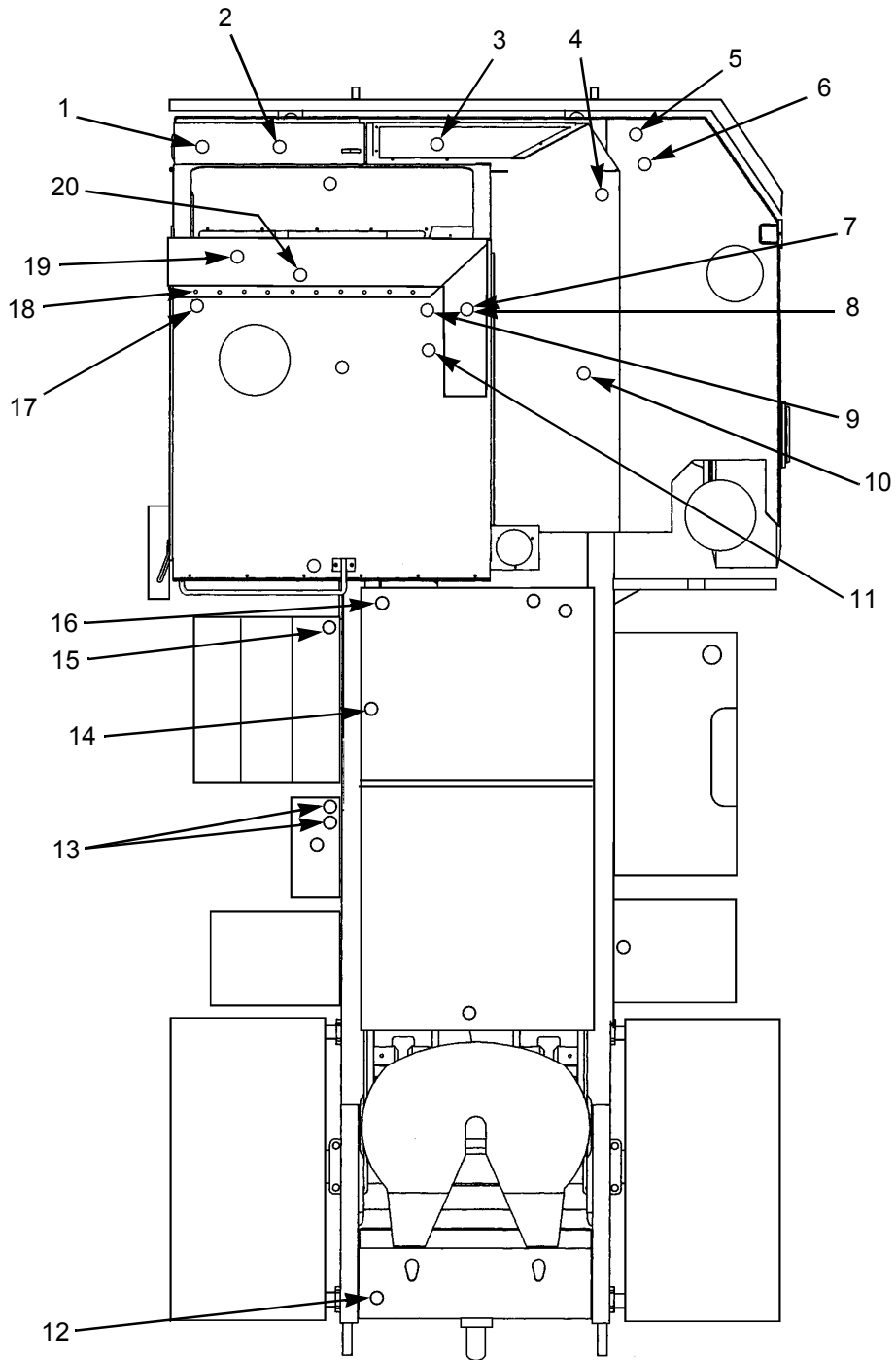
Vehicle ignition switch must be in OFF position prior to connecting Pro-Link tester to yard tractor's diagnostic connector, to prevent possible damage to Pro-Link.

5. Turn vehicle ignition switch to OFF position.
6. Connect Pro-Link tester cable adapter to diagnostic connector on left side of instrument panel.



7. Turn ignition switch to ON position to power up Pro-Link. Pro-Link will display copyright screen for several seconds.
8. Proceed with troubleshooting.

**COMPONENT LOCATIONS**



376-400

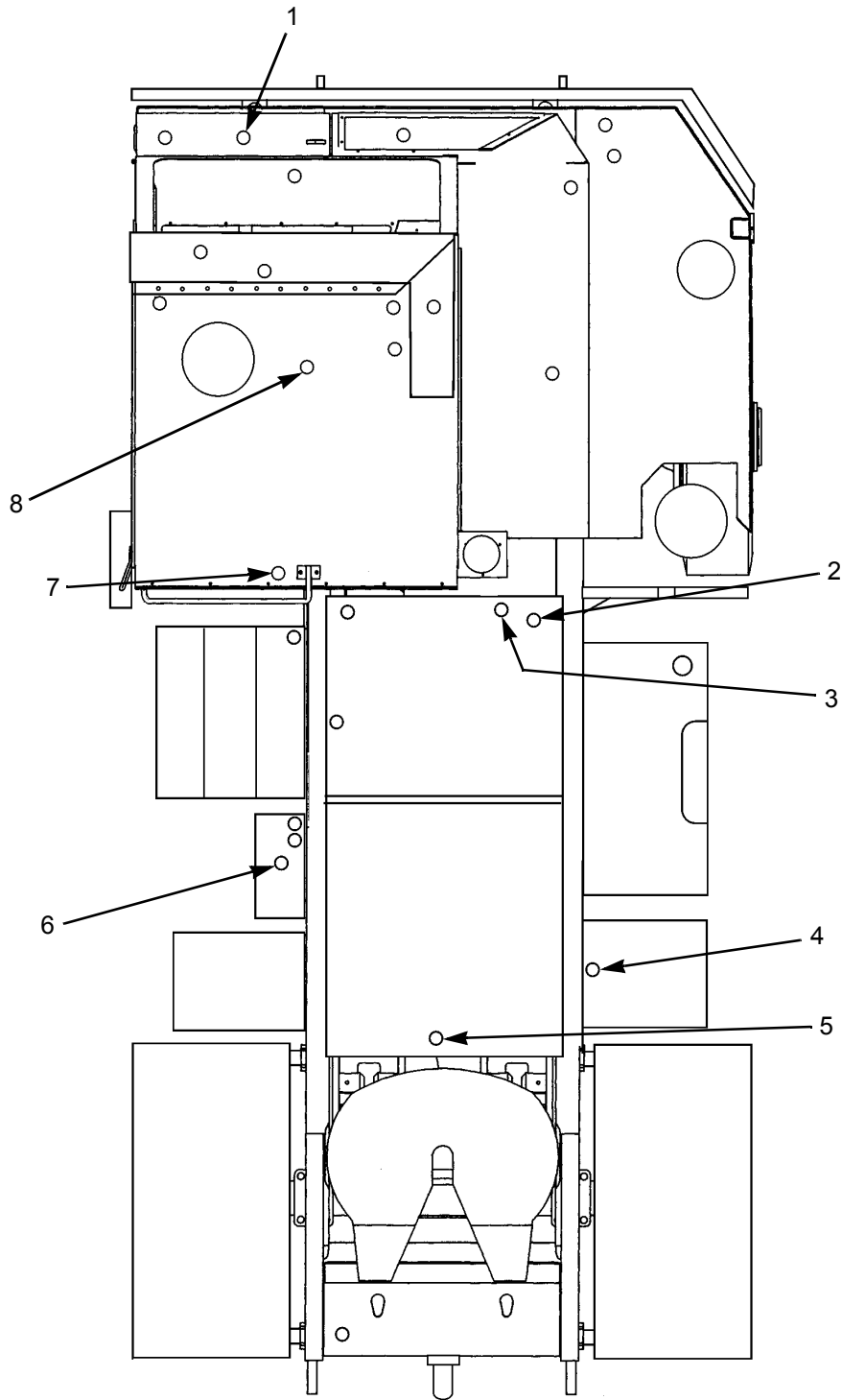
**Figure 1. Location of Electrical System Components.**

**COMPONENT LOCATIONS - CONTINUED****NOTE**

The location of engine and transmission sensors and sending units can be found in Group 020 and Group 070 of the Commercial Service Manuals.

KEY	COMPONENT	LOCATION
1	Trailer 24V Converter Box (8 Each Fuses and 6 Each Relays)	Underside of cab, left front.
2	Electric Horn	Underside of cab, left front.
3	Cab-to-Chassis Connectors (P1, P2, P3, and P4)	Front of cab under access cover.
4	AC Switch and Relay	Right side of radiator and air cleaner bracket.
5	ESPAR Heater 25A Circuit Breakers (If Equipped)	Right frame rail on ESPAR heater box.
6	ESPAR Heater Unit (If Equipped)	Right front frame rail.
7	Turn Signal Flasher Unit	Inside right-side instrument panel.
8	Truck Electrical System Relays (10 Each)	Inside right-side instrument panel.
9	Transmission 24V Power Unit	Under front instrument panel.
10	Fan Clutch Solenoid	Right frame rail to right of engine.
11	Transmission ECU	Under front instrument panel.
12	Backup Alarm	Left rear, behind taillight.
13	Cab Tilt System Relay and 40A Circuit Breaker	Inside cab tilt system compartment.
14	12V/24V Junction Box	At rear of battery box.
15	Ignition System 25A Circuit Breaker	Upper left side of battery box, above NATO slave receptacle.
16	Remote Start Solenoid	Left side of crossmember above transmission.
17	J1939 Diagnostic Connector	Under left of side instrument panel.
18	Electrical System Circuit Breakers	Lower instrument panel.
19	Emergency Start Switch	Lower-left instrument panel.
20	Brake Light Switches	Underside of cab, left front on brake treadle valve.

COMPONENT LOCATIONS - CONTINUED



376-400

Figure 2. Location of Miscellaneous Components.

**COMPONENT LOCATIONS - CONTINUED**

<b>KEY</b>	<b>COMPONENT</b>	<b>LOCATION</b>
1	Heater Water Control Valve	Front of cab under access door.
2	Hydraulic System Flow Control Valve	Right side of crossmember above transmission.
3	Fifth Wheel Lift Hydraulic Pump and Power Take-Off (PTO)	Right side of transmission.
4	Air Dryer and Filter	Right frame rail, under stowage compartment.
5	Fifth Wheel Lift Locking Valve	Mounted above propshaft under rear air reservoir.
6	Hydraulic Filter	Left frame rail, under cab tilt controls.
7	Ether Cold Start System	Left frame rail, at rear of cab.
8	Power Steering Pump	Left forward side of engine.

**END OF WORK PACKAGE**

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**System/Malfunction/Symptom Troubleshooting Procedure Page**

**AIR CONDITIONING SYSTEM**

- 1. AC Compressor Operates Too Often or Continuously ..... 0006 00-1
- 2. Little or No Airflow ..... 0006 00-1
- 3. Quick or Delayed Cycling of AC Compressor ..... 0006 00-2
- 4. Warm Airflow With Air Conditioner On ..... 0006 00-2
- 5. Water Leaking From Heater/AC Unit Inside Cab ..... 0006 00-2

**AIR SYSTEM**

**NOTE**

- For engine air compressor troubleshooting, refer to Group 020 Commercial Service Manuals.
- For engine air compressor governor troubleshooting, refer to Group 150 Commercial Service Manuals.
- For air dryer troubleshooting, refer to Group 150 Commercial Service Manuals.

- 1. Dual Air Pressure Gauge Inoperative ..... 0006 00-3
- 2. Fifth Wheel Lock Control Valve Inoperative..... 0006 00-3
- 3. Parking Brake Control Valve Inoperative ..... 0006 00-3
- 4. Trailer Air Supply Control Valve Inoperative ..... 0006 00-3
- 5. Trailer Brake Control Valve Inoperative ..... 0006 00-3

**ARCTIC HEATER SYSTEM (IF EQUIPPED)**

**NOTE**

For arctic heater system troubleshooting, refer to Group 140 Commercial Service Manuals.

**CAB TILT SYSTEM (MANUAL OPERATION)**

- 1. Cab Locking Latch Inoperative ..... 0006 00-4
- 2. Cab Will Not Lower ..... 0006 00-4
- 3. Cab Will Not Tilt ..... 0006 00-4

**CAB TILT SYSTEM (POWERED OPERATION)**

- Cab Will Not Tilt/Lower ..... 0006 00-5

**ELECTRICAL SYSTEM**

**Battery System**

- 1. Batteries Fail to Maintain Charge ..... 0006 00-5
- 2. Batteries Require Frequent Filling ..... 0006 00-6

**Charging System**

- 1. Alternator Overcharging ..... 0006 00-6
- 2. Alternator Undercharging ..... 0006 00-6
- 3. Charging System Not Charging ..... 0006 00-7

**System/Malfunction/Symptom**

**Troubleshooting Procedure Page**

**ELECTRICAL SYSTEM - CONTINUED**

**Horn and Backup Alarm Circuit**

- 1. Backup Alarm Inoperative . . . . . 0006 00-7
- 2. Horn Does Not Sound . . . . . 0006 00-8

**Instrument Panel Gauges and Controls**

- 1. Fuel Gauge Inoperative . . . . . 0006 00-8
- 2. Instrument and Warning Light Cluster Inoperative . . . . . 0006 00-9
- 3. Speedometer/Odometer Inoperative . . . . . 0006 00-9
- 4. Tachometer/Hourmeter Inoperative . . . . . 0006 00-10

**Instrument Panel Lights**

- 1. Check Engine (CHK ENG.) Light Inoperative . . . . . 0006 00-10
- 2. Check Transmission (CHECK TRANS) Light Inoperative . . . . . 0006 00-11
- 3. Headlight High Beam and Turn Signal Indicator Lights Inoperative . . . . . 0006 00-11

**Light Systems**

- 1. Brake Light(s) Inoperative . . . . . 0006 00-12
- 2. Domelight Inoperative . . . . . 0006 00-12
- 3. Floodlights Inoperative . . . . . 0006 00-12
- 4. Headlight(s) Inoperative . . . . . 0006 00-13
- 5. Marker Lights and Taillights Inoperative . . . . . 0006 00-13
- 6. Strobe Warning Light Inoperative . . . . . 0006 00-14
- 7. Trailer Lights Inoperative (12-Volt Trailer) . . . . . 0006 00-14
- 8. Trailer Lights Inoperative (24-Volt Trailer) . . . . . 0006 00-15
- 9. Turn Signal Lights Inoperative . . . . . 0006 00-16

**Windshield Washer and Wiper System**

- 1. Windshield Washer Inoperative . . . . . 0006 00-16
- 2. Windshield Wiper Inoperative . . . . . 0006 00-16

**ENGINE**

**NOTE**

For additional engine troubleshooting, refer to Group 020 Commercial Service Manuals.

- 1. Coolant Temperature Gauge (and Warning Light and Alarm) Indicate Engine is Overheating . . . . . 0006 00-17
- 2. Engine Runs Cold . . . . . 0006 00-18
- 3. Engine Runs Hot . . . . . 0006 00-20
- 4. Engine Turns Over Very Slowly, RPM's Too Slow to Start . . . . . 0006 00-21



System/Malfunction/Symptom

Troubleshooting Procedure Page

**FIFTH WHEEL**

**NOTE**

For fifth wheel troubleshooting, refer to Group 160 Commercial Service Manuals.

**FIFTH WHEEL HYDRAULIC SYSTEM**

- 1. Fifth Wheel Drifts Down/Will Not Support Load . . . . . 0006 00-22
- 2. Fifth Wheel Lowers Slowly . . . . . 0006 00-22
- 3. Fifth Wheel Moves Up/Down When Engine Is Started. . . . . 0006 00-22
- 4. Fifth Wheel Will Not Lift or Lower. . . . . 0006 00-22
- 5. Hydraulic Reservoir Overflows . . . . . 0006 00-23

**FRONT AXLE**

**NOTE**

For additional front axle troubleshooting, refer to Group 080 Commercial Service Manuals.

- 1. Front Wheels Shimmy or Vibrate . . . . . 0006 00-24
- 2. Hub Leaking Oil. . . . . 0006 00-24
- 3. Rapid or Uneven Tire Wear . . . . . 0006 00-24

**POWER TAKE-OFF (PTO)**

**NOTE**

For PTO troubleshooting, refer to Group 070 Commercial Service Manuals.

**PROPSHAFT**

**NOTE**

For propshaft troubleshooting, refer to Group 120 Commercial Service Manuals.

**REAR AXLE**

**NOTE**

For additional rear axle troubleshooting, refer to Group 090 Commercial Service Manuals.

- 1. Differential Overheating . . . . . 0006 00-25
- 2. Differential or Wheel Noise . . . . . 0006 00-25

**System/Malfunction/Symptom**

**Troubleshooting Procedure Page**

**SERVICE BRAKE SYSTEM**

**NOTE**

For additional service brake system troubleshooting, refer to Group 080 Commercial Service Manuals.

- 1. Front Brakes Locked or Overheated . . . . . 0006 00-25
- 2. Front/Rear Brakes Release Slowly or Will Not Release . . . . . 0006 00-26
- 3. Poor or Insufficient Braking Force to Stop Vehicle . . . . . 0006 00-26
- 4. Rear Brakes Locked or Overheated . . . . . 0006 00-26
- 5. Trailer Brakes Will Not Apply/Release . . . . . 0006 00-27
- 6. Uneven or Erratic Front Brakes . . . . . 0006 00-27
- 7. Uneven or Erratic Rear Brakes . . . . . 0006 00-27

**STEERING SYSTEM**

**NOTE**

For steering system troubleshooting, refer to Group 110 Commercial Service Manuals.

**SUSPENSION SYSTEM**

- 1. Suspension Bottoms Out During Hard Stops . . . . . 0006 00-28
- 2. Truck Vibrates Excessively During Bumps . . . . . 0006 00-28

**TRANSMISSION**

**NOTE**

For transmission troubleshooting, refer to Group 070 Commercial Service Manuals.

**END OF WORK PACKAGE**

Table 1. Air Conditioning System Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>1. AC Compressor Operates Too Often or Continuously.</b></p> <p><b>2. Little or No Airflow.</b></p>	<p>1. Check if ice has formed on evaporator coil.</p> <p>2. Check for dirt or debris clogging condenser fins.</p> <p>3. Use a multimeter to check operation of thermostatic switch.</p> <p>4. Perform AC system inspection and leak test (WP 0057 00).</p>	<p>Allow evaporator coil to defrost before resuming operation of AC system.</p> <p>Remove dirt or debris from condenser fins.</p> <p>Replace thermostatic switch (WP 0058 00).</p> <p>a. If leaks are found, notify DS Maintenance to replace leaking component(s).</p> <p>b. If no leaks are found, notify DS Maintenance.</p>
	<p>1. Inspect air ducts for blockage.</p> <p>2. Ensure heater/AC 25A circuit breaker is not tripped.</p> <p>3. Use multimeter to check operation of heater/AC fan switch (WP 0055 00).</p> <p>4. Use multimeter to check operation of AC ON/OFF switch (WP 0093 00).</p> <p>5. Use multimeter to check system wiring.</p> <p>6. Use multimeter to check for 12V at heater/AC unit connector, located inside cab behind right side of heater/AC unit.</p>	<p>Remove blockage.</p> <p>Reset circuit breaker.</p> <p>Replace failed switch (WP 0055 00).</p> <p>Replace failed switch (WP 0093 00).</p> <p>Repair or replace any damaged wiring or connectors (WP 0120 00).</p> <p>If voltage is present, notify DS Maintenance to replace heater/AC unit.</p>

Table 1. Air Conditioning System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>3. Quick or Delayed Cycling of AC Compressor.</b></p>	<p>Loss of refrigerant may be causing delayed cycling of AC compressor. Perform AC system inspection and leak test (WP 0057 00).</p>	<p>a. If leaks are found, notify DS Maintenance to replace leaking component(s).</p>
<p><b>4. Warm Airflow With Air Conditioner On.</b></p>	<p>1. Inspect air conditioner condenser for airflow restrictions.</p>	<p>b. If no leaks are found, notify DS Maintenance.</p>
<p><b>4. Warm Airflow With Air Conditioner On.</b></p>	<p>2. Check engine serpentine belt tension and condition.</p>	<p>Remove any obstructions.</p>
<p><b>4. Warm Airflow With Air Conditioner On.</b></p>	<p>3. Perform AC system leak test (WP 0057 00).</p>	<p>Replace engine serpentine belt as required (WP 0012 00).</p>
<p><b>4. Warm Airflow With Air Conditioner On.</b></p>	<p>4. Inspect system components for icing.</p>	<p>a. If leaks are found, notify DS Maintenance.</p>
<p><b>4. Warm Airflow With Air Conditioner On.</b></p>	<p>5. Remove AC compressor clutch relay, located on air cleaner mounting bracket. Use multimeter to test relay internal circuit.</p>	<p>b. Notify DS Maintenance to inspect, service, and repair as required air conditioning system.</p>
<p><b>4. Warm Airflow With Air Conditioner On.</b></p>	<p>4. Inspect system components for icing.</p>	<p>If icing is found, notify DS Maintenance.</p>
<p><b>4. Warm Airflow With Air Conditioner On.</b></p>	<p>5. Remove AC compressor clutch relay, located on air cleaner mounting bracket. Use multimeter to test relay internal circuit.</p>	<p>Replace failed relay.</p>
<p><b>5. Water Leaking From Heater/AC Unit Inside Cab.</b></p>	<p>Check for plugged drain or drain hose.</p>	<p>Remove obstruction.</p>

**NOTE**

- For engine air compressor troubleshooting, refer to Group 020 Commercial Service Manuals.
- For engine air compressor governor troubleshooting, refer to Group 150 Commercial Service Manuals.
- For air dryer troubleshooting, refer to Group 150 Commercial Service Manuals.

**Table 2. Air System Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>1. Dual Air Pressure Gauge Inoperative.</b>	1. Inspect gauge for signs of damage.	Replace dual air pressure gauge (WP 0071 00).
<b>2. Fifth Wheel Lock Control Valve Inoperative.</b>	2. Inspect air lines and fittings for leaks and signs of crimping or damage.	Tighten leaking lines and/or replace crimped or damaged lines and fittings (WP 0066 00).
<b>3. Parking Brake Control Valve Inoperative.</b>	1. Check control valve for free movement.	Replace control valve if frozen or binding (WP 0075 00).
<b>4. Trailer Air Supply Control Valve Inoperative.</b>	2. Inspect air lines and fittings for leaks and signs of crimping or damage.	Tighten leaking lines and/or replace crimped or damaged lines and fittings (WP 0066 00).
<b>5. Trailer Brake Control Valve Inoperative.</b>	1. Check control valve for free movement.	Replace control valve if frozen or binding (WP 0072 00).
<b>6. Trailer Air Supply Control Valve Inoperative.</b>	2. Inspect air lines and fittings for leaks and signs of crimping or damage.	Tighten leaking lines and/or replace crimped or damaged lines and fittings (WP 0066 00).
<b>7. Trailer Air Supply Control Valve Inoperative.</b>	1. Check control valve for free movement.	Replace control valve if frozen or binding (WP 0073 00).
<b>8. Trailer Air Supply Control Valve Inoperative.</b>	2. Inspect air lines and fittings for leaks and signs of crimping or damage.	Tighten leaking lines and/or replace crimped or damaged lines and fittings (WP 0066 00).
<b>9. Trailer Brake Control Valve Inoperative.</b>	1. Check control valve for free movement.	Replace control valve if frozen or binding (WP 0074 00).
<b>10. Trailer Brake Control Valve Inoperative.</b>	2. Inspect air lines and fittings for leaks and signs of crimping or damage.	Tighten leaking lines and/or replace crimped or damaged lines and fittings (WP 0066 00).

Table 3. Cab Tilt System Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>CAB TILT SYSTEM (MANUAL OPERATION)</b>		
1. Cab Locking Latch Inoperative.	Check cab latch for binding or obstructions.	Clean and adjust as required (WP 0121 00).
2. Cab Will Not Lower.	1. Remove and inspect check valve in oil fill cap for paint or clogging.	Clean cap check valve.
	2. Check for binding or obstructions at latch bracket locking bar on underside of cab. Check for binding or obstructions at safety prop release cable.	Clean locking bar.
3. Cab Will Not Tilt.	1. Inspect cab tilt hydraulic system hoses and fittings for signs of leaking or damage.	a. Tighten any loose or leaking fitting.
		b. Replace damaged hoses or fittings (WP 0126 00).
	2. Check hydraulic fluid level in cab tilt pump (WP 0125 00).	Add hydraulic fluid as required (WP 0125 00).
	3. Use multimeter to test 40A circuit breaker and relay located in cab tilt pump box.	Replace failed circuit breaker or relay (WP 0124 00).
	4. Operate hand pump and control valve.	Replace cab tilt motor and pump assembly if no pumping action is apparent (WP 0124 00).
	5. While operating hand pump, check for the following: cab tilt latch opening and tilt cylinder extending.	a. If cab tilt locking latch fails to open, replace latch (WP 0121 00).
		b. If cab tilt cylinder fails to extend, replace cylinder (WP 0123 00).

Table 3. Cab Tilt System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>CAB TILT SYSTEM (POWERED OPERATION)</b>		
<p><b>Cab Will Not Tilt/Lower.</b></p>	<ol style="list-style-type: none"> <li>1. Check hydraulic fluid level in cab tilt pump (WP 0125 00).</li> <li>2. Inspect cab tilt system hoses and fittings for signs of leaking or damage.</li> <li>3. Use multimeter to check wires and connectors between battery box and cab tilt electric motor.</li> <li>4. Use multimeter to test cab tilt motor switch (WP 0124 00).</li> <li>5. Use multimeter to test 40A circuit breaker and relay, located in cab tilt pump box.</li> </ol>	<p>Add hydraulic fluid as required (WP 0125 00).</p> <ol style="list-style-type: none"> <li>a. Tighten any loose or leaking fitting.</li> <li>b. Replace damaged hoses or fittings (WP 0126 00).</li> </ol> <p>Tighten, repair or replace loose, damaged or corroded wires and connectors (WP 0120 00).</p> <p>Replace cab tilt motor and pump assembly if no pumping action is apparent (WP 0124 00).</p> <ol style="list-style-type: none"> <li>a. Replace failed circuit breaker or relay (WP 0124 00).</li> <li>b. Replace cab tilt motor and pump assembly if no pumping action is apparent (WP 0124 00).</li> </ol>

Table 4. Electrical System Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>BATTERY SYSTEM</b>		
<p><b>1. Batteries Fail to Maintain Charge.</b></p>	<ol style="list-style-type: none"> <li>1. Check level of electrolyte in batteries.</li> <li>2. Check batteries posts and cables for corrosion.</li> <li>3. Inspect for loose or damaged battery cables.</li> </ol>	<p>Service batteries as required (WP 0114 00).</p> <p>Service batteries as required (WP 0114 00).</p> <ol style="list-style-type: none"> <li>a. Tighten loose battery cables (WP 0115 00).</li> <li>b. Replace damaged battery cables (WP 0115 00).</li> </ol>

Table 4. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>BATTERY SYSTEM - CONTINUED</b>		
<p><b>1. Batteries Fail to Maintain Charge - Continued.</b></p> <p><b>2. Batteries Require Frequent Filling.</b></p>	<p>4. Inspect for loose or damaged battery posts.</p> <p>1. Inspect battery cases for signs of leaking or damage.</p> <p>2. With engine running at 1200 rpm, monitor voltmeter. If indicator is above green area on gauge, refer to charging system (alternator) troubleshooting.</p>	<p>c. Service batteries as required (WP 0114 00).</p> <p>Replace batteries with damaged or loose posts (WP 0114 00).</p> <p>Replace leaking or damaged batteries (WP 0114 00).</p>
<b>CHARGING SYSTEM</b>		
<p><b>1. Alternator Overcharging.</b></p> <p><b>2. Alternator Undercharging.</b></p>	<p>1. Inspect for loose electrical connections at alternator/voltage regulator and batteries.</p> <p>2. If electrical system is still overcharging, test voltage regulator for 24 voltage output.</p> <p>3. If electrical system is still overcharging, notify DS Maintenance to test alternator assembly.</p> <p>1. Inspect for loose electrical connections at alternator/voltage regulator and batteries.</p> <p>2. Inspect condition and tension of serpentine belt.</p> <p>3. Inspect automatic belt tensioner for looseness or damage.</p> <p>4. If electrical system is still undercharging, test voltage regulator for 24 voltage output.</p>	<p>Tighten loose electrical connections (WP 0090 00 and WP 0115 00).</p> <p>Replace failed voltage regulator (WP 0091 00).</p> <p>Replace failed alternator assembly (WP 0090 00).</p> <p>Tighten loose electrical connections (WP 0090 00 and WP 0115 00).</p> <p>Replace worn or damaged serpentine belt (WP 0012 00).</p> <p>Replace belt tensioner (WP 0013 00).</p> <p>Replace failed voltage regulator (WP 0091 00).</p>



Table 4. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>CHARGING SYSTEM - CONTINUED</b>		
<p><b>2. Alternator Undercharging - Continued</b></p>	<p>5. If electrical system is still undercharging, notify DS Maintenance to test alternator assembly.</p>	<p>Replaced failed alternator assembly (WP 0090 00).</p>
<p><b>3. Charging System Not Charging</b></p>	<p>1. Inspect for loose electrical connections at alternator/voltage regulator and batteries.</p> <p>2. Inspect condition and tension of serpentine belt.</p> <p>3. Inspect automatic belt tensioner for looseness or damage.</p> <p>4. If electrical system is still not charging, test voltage regulator for 24 voltage output.</p> <p>5. If electrical system is still not charging, notify DS Maintenance to test alternator assembly.</p>	<p>Tighten loose electrical connections (WP 0090 00 and WP 0115 00).</p> <p>Replace worn or damaged serpentine belt (WP 0012 00).</p> <p>Replace belt tensioner (WP 0013 00)</p> <p>Replace failed voltage regulator (WP 0091 00).</p> <p>Replace failed alternator assembly (WP 0090 00).</p>
<b>HORN AND BACKUP ALARM CIRCUIT</b>		
<p><b>1. Backup Alarm Inoperative.</b></p>	<p>1. Ensure 10A buzzer and backup alarm circuit breaker is not tripped.</p> <p>2. Use multimeter to check for 12Vdc at backup alarm terminal, with transmission selector in (R) Reverse.</p> <p>3. Use multimeter to check wires and connectors between components of backup alarm circuit.</p>	<p>Reset circuit breaker.</p> <p>If multimeter indicates 12Vdc, replace backup alarm (WP 0082 00).</p> <p>Repair or replace damaged or corroded wires and connectors (WP 0120 00).</p>

Table 4. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>HORN AND BACKUP ALARM CIRCUIT - CONTINUED</b>		
<p><b>2. Horn Does Not Sound.</b></p>	<ol style="list-style-type: none"> <li>1. Ensure "HORN" 15A circuit breaker is not tripped.</li> <li>2. Use multimeter to check for 12Vdc at horn terminal, with horn button pressed.</li> <li>3. Use multimeter to check "HORN" 15A circuit breaker.</li> <li>4. Remove horn relay (WP 0095 00). Use multimeter to test relay internal circuit.</li> <li>5. Use multimeter to check wires and connectors between components of horn circuit.</li> </ol>	<p>Reset circuit breaker.</p> <p>If multimeter indicates 12Vdc, replace horn (WP 0089 00).</p> <p>Replace failed circuit breaker (WP 0095 00).</p> <p>Replace failed relay (WP 0095 00).</p> <p>Repair or replace damaged or corroded wires and connectors (WP 0120 00).</p>
<b>INSTRUMENT PANEL GAUGES AND CONTROLS</b>		
<p><b>1. Fuel Gauge Inoperative</b></p>	<ol style="list-style-type: none"> <li>1. Ensure "GAUGES" 10A circuit breaker is not tripped.</li> <li>2. Inspect wires at fuel tank sending unit for looseness or corrosion.</li> <li>3. Inspect front and rear of instrument and warning light cluster for signs of damage. Ensure harness connector is securely connected to cluster (WP 0094 00).</li> <li>4. Use multimeter to check for 12Vdc at instrument and warning light cluster harness connector.</li> </ol>	<p>Reset circuit breaker.</p> <p>Tighten, repair or replace damaged or corroded wires (WP 0120 00).</p> <p>Replace damaged instrument and warning light cluster (WP 0094 00).</p> <ol style="list-style-type: none"> <li>a. If voltage is present at harness connector, replace cluster (WP 0094 00).</li> <li>b. If voltage is not present, continue to check harness between instrument panel and fuel tank sending unit. Replace or repair wires or connectors found to be corroded or damaged (WP 0120 00).</li> </ol>

Table 4. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>INSTRUMENT PANEL GAUGES AND CONTROLS - CONTINUED</b>		
<p><b>1. Fuel Gauge Inoperative - Continued.</b></p>		<p>c. Replace fuel level sending unit (WP 0021 00).</p>
<p><b>2. Instrument and Warning Light Cluster Inoperative.</b></p>	<p>1. Ensure "GAUGES" 10A circuit breaker is not tripped.</p> <p>2. Inspect front and rear of instrument and warning light cluster for signs of damage. Ensure harness connector is securely connected to cluster (WP 0094 00).</p> <p>3. Use multimeter to check for 12Vdc at harness connector.</p>	<p>Reset circuit breaker.</p> <p>Replace instrument and warning light cluster if damaged. Reconnect harness to cluster as required (WP 0094 00).</p> <p>a. If voltage is present at harness connector, replace instrument and warning light cluster (WP 0094 00).</p> <p>b. If voltage is not present, continue to check instrument panel wiring for loose or disconnected wires.</p>
<p><b>3. Speedometer/Odometer Inoperative.</b></p>	<p>1. Ensure "GAUGES" 10A circuit breaker is not tripped.</p> <p>2. Inspect front and rear of gauge for signs of damage. Ensure harness connector is securely connected to gauge (WP 0093 00).</p> <p>3. Use multimeter to check for 12Vdc at harness connector.</p>	<p>Reset circuit breaker.</p> <p>Replace gauge if damaged. Reconnect harness to gauge as required (WP 0093 00).</p> <p>a. If voltage is present at harness connector, replace gauge (WP 0093 00).</p> <p>b. If voltage is not present, continue to check instrument panel wiring for loose or disconnected wires.</p>

Table 4. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>INSTRUMENT PANEL GAUGES AND CONTROLS - CONTINUED</b>		
<p><b>4. Tachometer/Hourmeter Inoperative.</b></p>	<ol style="list-style-type: none"> <li>1. Ensure "GAUGES" 10A circuit breaker is not tripped.</li> <li>2. Inspect front and rear of gauge for signs of damage. Ensure harness connector is securely connected to gauge (WP 0093 00).</li> <li>3. Use multimeter to check for 12Vdc at harness connector.</li> </ol>	<p>Reset circuit breaker.</p> <p>Replace gauge if damaged. Reconnect harness to gauge as required (WP0093 00).</p> <ol style="list-style-type: none"> <li>a. If voltage is present at harness connector, replace gauge (WP 0093 00).</li> <li>b. If voltage is not present, continue to check instrument panel wiring for loose or disconnected wires.</li> </ol>
<b>INSTRUMENT PANEL LIGHTS</b>		
<p><b>1. Check Engine (CHK ENG.) Light Inoperative.</b></p>	<ol style="list-style-type: none"> <li>1. Ensure "GAUGES" 10A circuit breaker is not tripped.</li> <li>2. Inspect front and rear of light for signs of damage (WP 0093 00).</li> <li>3. Ensure harness connector is securely connected to light (WP 0093 00).</li> <li>4. Use multimeter to check for 12Vdc at harness connector.</li> </ol>	<p>Reset circuit breaker.</p> <p>Replace light if damaged (WP 0093 00).</p> <p>Reconnect harness connector to light as required (WP 0093 00).</p> <ol style="list-style-type: none"> <li>a. If voltage is present at harness connector, replace light (WP 0093 00).</li> <li>b. If voltage is not present, continue to check instrument panel wiring for loose or disconnected wires.</li> <li>c. Refer to engine troubleshooting in Group 020 Commercial Service Manuals for more information.</li> </ol>

Table 4. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>INSTRUMENT PANEL LIGHTS- CONTINUED</b>		
<p><b>2. Check Transmission (CHECK TRANS) Light Inoperative.</b></p>	<ol style="list-style-type: none"> <li>1. Ensure "GAUGES" 10A circuit breaker is not tripped.</li> <li>2. Inspect front and rear of light for signs of damage. Ensure harness connector is securely connected to light (WP 0093 00).</li> <li>3. Use multimeter to check for 12Vdc at harness connector.</li> </ol>	<p>Reset circuit breaker.</p> <p>Replace light if damaged. Reconnect harness to light as required (WP 0093 00).</p> <ol style="list-style-type: none"> <li>a. If voltage is present at harness connector, replace light (WP 0093 00).</li> <li>b. If voltage is not present, continue to check instrument panel wiring for loose or disconnected wires.</li> <li>c. Refer to transmission troubleshooting in Group 070 Commercial Service Manuals for more information.</li> </ol>
<p><b>3. Headlight High Beam and Turn Signal Indicator Lights Inoperative.</b></p>	<ol style="list-style-type: none"> <li>1. Ensure 25A circuit breakers ("HEAD LIGHTS" and "TURN LIGHTS") are not tripped.</li> <li>2. Inspect front and rear of indicator lights for signs of damage (WP 0093 00).</li> <li>3. Ensure harness connector is securely connected to light (WP 0093 00).</li> <li>4. Use multimeter to check for 12Vdc at harness connector.</li> </ol>	<p>Reset circuit breakers.</p> <p>Replace light if damaged (WP 0093 00).</p> <p>Reconnect harness to light as required (WP 0093 00).</p> <ol style="list-style-type: none"> <li>a. If voltage is present at harness connector, replace light (WP 0093 00).</li> <li>b. If voltage is not present, continue to check instrument panel wiring for loose or disconnected wires.</li> </ol>

Table 4. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>LIGHT SYSTEMS</b>		
<p><b>1. Brake Light(s) Inoperative.</b></p>	<ol style="list-style-type: none"> <li>1. Ensure brake light 20A circuit breaker is not tripped.</li> <li>2. Check taillight(s) for damage.</li> <li>3. Use multimeter to test brake light switches on air treadle valve under cab.</li> <li>4. Use multimeter to check wires and connectors between components of brake light circuit.</li> </ol>	<p>Reset circuit breaker.</p> <p>Replace damaged taillight(s) (WP 0111 00).</p> <p>Replace failed brake light switch (WP 0065 00).</p> <p>Repair or replace damaged or corroded wires and connectors (WP 0120 00).</p>
<p><b>2. Domelight Inoperative.</b></p>	<ol style="list-style-type: none"> <li>1. Ensure "DOME LIGHTS" 10A circuit breaker is not tripped.</li> <li>2. Inspect bulb.</li> <li>3. Use multimeter to check domelight switch and dome light assembly.</li> <li>4. Use multimeter to check wires and connectors between components of domelight circuit.</li> </ol>	<p>Reset circuit breaker.</p> <p>Replace bulb if found to be defective (WP 0107 00).</p> <p>Replace failed domelight assembly (WP 0107 00).</p> <p>Repair or replace damaged or corroded wires and connectors (WP 0120 00).</p>
<p><b>3. Floodlights Inoperative.</b></p>	<ol style="list-style-type: none"> <li>1. Ensure ignition and floodlight switches are in ON position (TM 9-2320-312-10).</li> <li>2. Ensure "FLOOD LIGHT" 15A circuit breaker is not tripped.</li> <li>3. Remove floodlight cover(s) and check lamp.</li> <li>4. Use multimeter to check operation of floodlight switch.</li> <li>5. Remove floodlight relay (WP 0095 00). Use multimeter to test relay internal circuit.</li> </ol>	<p>Place switches in ON position.</p> <p>Reset circuit breaker.</p> <p>Replace failed lamp (WP 0108 00).</p> <p>Replace failed switch (WP 0093 00).</p> <p>Replace failed relay. (WP 0095 00).</p>

Table 4. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION	
<b>LIGHT SYSTEMS - CONTINUED</b>			
<b>3. Floodlights Inoperative - Continued.</b>	6. Use multimeter to test "FLOOD LIGHT" circuit breaker.	Replace failed circuit breaker(s) (WP 0095 00).	
<b>4. Headlight(s) Inoperative.</b>	7. Use multimeter to check wires and connectors between components of floodlight circuit.	Repair or replace damaged or corroded wires and connectors (WP 0120 00).	
	1. Ensure "HEAD LIGHTS" 25A circuit breaker is not tripped.	Reset circuit breaker.	
	2. Use multimeter to check both high and low beam terminals on each headlight.	Replace failed headlight(s) (WP 0101 00).	
	3. Use multimeter to check operation of headlight switch.	Replace failed switch (WP 0093 00).	
	4. Use multimeter to check "HEAD LIGHTS" 25A circuit breaker.	Replace failed circuit breaker (see WP 0095 00).	
	5. Use multimeter to check operation of headlight dimmer switch.	Replace failed switch (WP 0100 00).	
	6. Use multimeter to check operation of headlight dimmer relay.	Replace failed relay (WP 0095 00).	
	7. Use multimeter to check wires and connectors between components of headlight circuit.	Repair or replace damaged or corroded wires and connectors (WP 0120 00).	
	<b>5. Marker Lights and Taillights Inoperative.</b>	1. Ensure marker and taillight 15A circuit breaker is not tripped.	Reset circuit breaker.
		2. Check marker clearance light(s) and taillight(s) for damage.	Replace damaged light(s) (WP 0104 00 or WP 0111 00).
3. Use multimeter to check operation of marker and tail light switch.		Replace failed switch (WP 0093 00).	
4. Use multimeter to check 15A circuit breaker.		Replace failed circuit breaker (see WP 0095 00).	

Table 4. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>LIGHT SYSTEMS - CONTINUED</b>		
<b>5. Marker Lights and Taillights Inoperative - Continued.</b>	5. Use multimeter to check wires and connectors between components of marker and taillight circuit.	Repair or replace damaged or corroded wires and connectors (WP 0120 00).
<b>6. Strobe Warning Light Inoperative.</b>	1. Ensure "BEACON LIGHT" 15A circuit breaker is not tripped.	Reset circuit breaker.
	2. Remove strobe warning light cover and check lamp.	Replace failed lamp (WP 0109 00).
	3. Use multimeter to check operation of strobe warning light switch.	Replace failed switch (WP 0093 00).
	4. Use multimeter to check "BEACON LIGHT" 15A circuit breaker.	Replace failed circuit breaker (WP 0095 00).
	5. Use multimeter to check for 12 Vdc between 15A circuit breaker and strobe warning light switch.	If multimeter indicates no voltage, inspect and repair wire and connectors between circuit breaker and switch (WP 0120 00).
	6. Use multimeter to check for 12 Vdc between strobe warning light switch and strobe warning light unit.	a. If multimeter indicates no voltage, inspect and repair wire and connectors between switch and light (WP 0120 00).  b. If multimeter indicates 12 Vdc, replace strobe warning light (WP 0109 00).
<b>7. Trailer Lights Inoperative (12-Volt Trailer).</b>	1. Ensure tractor-to-trailer 12-volt cable is properly connected (TM 9-2320-312-10).	Reconnect cable.
	2. Inspect 12-volt cable and receptacles for bent or corroded pins.	a. Clean cable connections as required.  b. Repair bent or damaged pins (WP 0120 00).



Table 4. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>LIGHT SYSTEMS - CONTINUED</b>		
<p><b>7. Trailer Lights Inoperative (12-Volt Trailer) - Continued.</b></p>	<p>3. Check circuit breaker panel for any tripped circuit breakers.</p> <p>4. Use multimeter to check for 12Vdc of 7-pin trailer receptacle at pin K.</p> <p>5. Use multimeter to check wires and connectors between components of 12-volt trailer light circuit.</p>	<p>Reset circuit breaker(s).</p> <p>a. If 12Vdc is present, refer to trailer manual for troubleshooting instructions.</p> <p>b. If 12Vdc is not present, go to step 4.</p> <p>Repair or replace damaged or corroded wires and connectors (WP 0120 00).</p>
<p><b>8. Trailer Lights Inoperative (24-Volt Trailer).</b></p>	<p>1. Ensure tractor-to-trailer 24-volt cable is properly connected (TM 9-2320-312-10).</p> <p>2. Inspect 24-volt cable and receptacles for bent or corroded pins.</p> <p>3. Check for tripped circuit breakers in 24-volt converter box (WP 0099 00).</p> <p>4. Use multimeter to check for 24 Vdc at 12-pin trailer receptacle at pin K.</p> <p>5. Remove trailer relays located in 24-volt converter box (WP 0099 00). Use multimeter to test relay internal circuit.</p> <p>6. Use multimeter to test trailer circuit breakers, located in 24-volt converter box (WP 0099 00).</p>	<p>Reconnect cable.</p> <p>a. Clean cable connections as required.</p> <p>b. Repair bent or damaged pins (WP 0120 00).</p> <p>Reset circuit breaker(s).</p> <p>a. If 24Vdc is present, refer to trailer manual for troubleshooting instructions.</p> <p>b. If 24Vdc is not present, go to step 4.</p> <p>Replace failed relay(s) (WP 0099 00).</p> <p>Replace failed circuit breaker(s) (WP 0099 00).</p>

Table 4. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>LIGHT SYSTEMS - CONTINUED</b>		
<b>8. Trailer Lights Inoperative (24-Volt Trailer) - Continued.</b>	7. Use multimeter to check wires and connectors between components of 24-volt trailer light circuit.	Repair or replace damaged or corroded wires and connectors (WP 0120 00).
<b>9. Turn Signal Lights Inoperative.</b>	1. Ensure "TURN LIGHTS" 25A circuit breaker is not tripped.	Reset circuit breaker.
	2. Check turn signal light(s) for damage.	Replace damaged light(s) (WP 0103 00).
	3. Install known good turn signal light flasher unit.	Replace failed flasher unit if turn signals operate properly (WP 0100 00).
	4. Use multimeter to check wires and connectors between components of turn signal circuit.	a. Repair or replace damaged or corroded wires and connectors (WP 0120 00). b. Replace turn signal lever (WP 0100 00).
<b>WINDSHIELD WASHER AND WIPER SYSTEM</b>		
<b>1. Windshield Washer Inoperative.</b>	1. Ensure "WIPERS" 15A circuit breaker is not tripped.	Reset circuit breaker.
	2. Check windshield washer fluid level in reservoir.	Refill windshield washer reservoir as needed.
	3. Check if washer hose from windshield washer reservoir to windshield is plugged, disconnected or crimped.	Reconnect washer hose or replace damaged hose (WP 0059 00).
	4. Using multimeter to check for 12Vdc at washer pump harness connector with wiper/washer switch in on position.	If voltage is present, replace washer pump (WP 0059 00).
	5. Using multimeter to check wiper/washer control switch operations.	If switch is not operating properly in all positions, replace switch (WP 0093 00).
<b>2. Windshield Wiper Inoperative.</b>	1. Ensure "WIPERS" 15A circuit breaker is not tripped.	Reset circuit breaker.

Table 4. Electrical System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>WINDSHIELD WASHER AND WIPER SYSTEM - CONTINUED</b>		
<b>3. Windshield Wiper Inoperative.</b>	<ol style="list-style-type: none"> <li>1. Ensure "WIPERS" 15A circuit breaker is not tripped.</li> <li>2. Using multimeter to check wiper/washer control switch operations.</li> <li>3. Using multimeter to check for 12Vdc at wiper motor harness connector with wiper/washer switch in on position.</li> </ol>	<p>Reset circuit breaker.</p> <p>If switch is not operating properly in all positions, replace switch (WP 0093 00).</p> <p>If voltage is present, replace wiper motor (WP 0060 00).</p>

Table 5. Engine Troubleshooting Procedures.



MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>1. Coolant Temperature Gauge (and Warning Light and Alarm) Indicate Engine is Overheating.</b>	<div style="display: flex; align-items: center; justify-content: center;">  <div style="margin: 0 10px;"><b>WARNING</b></div>  </div> <p>DO NOT service cooling system unless engine has cooled to at least 120°F (50°C) as indicated on coolant temperature gauge. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.</p> <p>Wear effective eye, glove, and skin protection when handling coolants. Failure to do so may cause injury.</p> <ol style="list-style-type: none"> <li>1. Check coolant level (TM 9-2320-312-10).</li> <li>2. Check for loose engine serpentine belt. If belt is loose, inspect belt tensioner.</li> <li>3. Check for worn or damaged serpentine belt.</li> <li>4. Check cooling system for loose hoses, lines, tubes, clamps, or any signs of leaking (TM 9-2320-312-10).</li> <li>5. Check engine and transmission oil levels (TM 9-2320-312-10).</li> </ol>	<p>If low, add coolant (TM 9-2320-312-10).</p> <p>Replace failed belt tensioner (WP 0013 00).</p> <p>Replace worn or damaged serpentine belt (WP 0012 00).</p> <p>Tighten and/or replace any item found to be loose or leaking.</p> <p>a. If engine oil level is low, fill to correct level (TM 9-2320-312-10).</p>

Table 5. Engine Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>1. Coolant Temperature Gauge (and Warning Light and Alarm) Indicate Engine is Overheating - Continued).</b></p>	<p>6. Check cooling fan for secure mounting and/or damaged blades.</p> <p>7. Check engine diagnostic codes (Group 020 Commercial Service Manuals).</p>	<p>b. If transmission oil level is low, fill to correct level (TM 9-2320-312-10).</p> <p>a. If fan is loose, tighten mounting nuts to 26 lb-ft (35 Nm).</p> <p>b. If fan blades are damaged, notify Direct Support Maintenance to replace cooling fan.</p> <p>Perform required repairs.</p>
<p><b>2. Engine Runs Cold.</b></p>	<p>1. Check engine coolant level (TM 9-2320-312-10).</p> <p>2. Check engine diagnostic codes (Group 020 Commercial Service Manuals).</p>	<p>If low, add coolant (TM 9-2320-312-10).</p> <p>If problem persists, refer to step 3 below.</p>



**WARNING**



DO NOT service cooling system unless engine has cooled to at least 120°F (50°C) as indicated on coolant temperature gauge. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.

Wear effective eye, glove, and skin protection when handling coolants. Failure to do so may cause injury.

**WARNING**

DO NOT reach into fan area unless engine is shut down. With engine running, fan may turn on unexpectedly, causing serious injury.

**NOTE**

Perform the following test with engine OFF, system air pressure at 110-120 psi (758-827 kPa), and cab tilted (TM 9-2320-312-10).

Table 5. Engine Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>2. Engine Runs Cold - Continued.</p>	<p>3. Attempt to turn fan. If fan turns freely, perform the following test to check for air pressure to fan clutch.</p> <p style="text-align: center;"><b>NOTE</b></p> <p>Fan clutch solenoid is located on right frame rail to right of engine. Positive terminal is terminal closest to inside frame rail.</p> <p>a. Connect a jumper wire between 12V terminal on alternator and fan clutch solenoid positive (green wire) terminal. Fan clutch should move in and out as power is supplied and removed. A clicking sound should be heard from solenoid and air being expelled from valve side of solenoid.</p> <p>b. If fan clutch solenoid is operating properly, disconnect fan clutch air hose and check for required operating pressure of 90-120 psi (621-827 kPa), while actuating fan clutch solenoid using jumper wire.</p>	<p>If there is no clicking sound or air being expelled from fan clutch solenoid, replace fan clutch solenoid (WP 0098 00).</p> <p>a. If required air pressure is not present, replace fan clutch solenoid (WP 0098 00).</p> <p>b. If required air pressure is present and fan clutch does not move, notify Direct Support Maintenance to replace fan clutch.</p>

Table 5. Engine Troubleshooting Procedures - Continued.



MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>3. Engine Runs Hot.</b></p>	<div style="text-align: center;">  <p><b>WARNING</b></p> </div> <p>DO NOT service cooling system unless engine has cooled to at least 120°F (50°C) as indicated on coolant temperature gauge. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.</p> <p>Wear effective eye, glove, and skin protection when handling coolants. Failure to do so may cause injury.</p> <p>1. Refer to Malfunction Number 1 above.</p>	<div style="text-align: center;">  <p><b>WARNING</b></p> </div> <p>If problem persists, refer to step 2.</p> <p><b>WARNING</b></p> <p>DO NOT reach into fan area unless engine is shut down. With engine running, fan may turn on unexpectedly, causing serious injury.</p> <p><b>NOTE</b></p> <p>Perform the following test with engine OFF, system air pressure at 110-120 psi (758-827 kPa), and cab tilted (TM 9-2320-312-10).</p> <p>a. Connect a jumper wire between 12V terminal on alternator and fan clutch solenoid positive (green wire) terminal. Fan clutch should move in and out as power is supplied and removed. A clicking sound should be heard from solenoid and air being expelled from valve side of solenoid.</p> <p>b. If fan clutch solenoid is operating properly, disconnect fan clutch air hose and check for required operating pressure of 90-120 psi (621-827 kPa), while actuating fan clutch solenoid using jumper wire.</p>

Table 5. Engine Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>3. Engine Runs Hot - Continued</b></p> <p><b>4. Engine Turns Over Very Slowly, RPM's Too Slow to Start.</b></p>	<ol style="list-style-type: none"> <li>1. Using a multimeter, check charge condition of capacitor. Voltage should be 24Vdc or greater.</li> <li>2. Check operation of capacitor start relay, located in battery box. First place battery disconnect switch in ON position, then turn ignition switch to ON and OFF position. With emergency start switch in ON position, a clicking sound should be heard from relay each time ignition switch is turned ON.</li> <li>3. Use multi meter to check for continuity through emergency start switch.</li> <li>4. Using a multimeter, check alternator/voltage regulator output. Voltage should be 24Vdc or greater.</li> </ol>	<ol style="list-style-type: none"> <li>b. If required air pressure is present and fan clutch does not move, notify Direct Support Maintenance to replace fan clutch.</li> <li>c. If fan clutch is moving properly but fan will not turn, notify Direct Support Maintenance to replace fan clutch lining.</li> </ol> <p>If voltage is below 24Vdc, perform slave starting procedure, to recharge batteries/capacitor (TM 9-2320-312-10).</p> <p>If no sound is present, replace relay (WP 0119 00).</p> <ol style="list-style-type: none"> <li>1. If continuity is present, replace relay (WP 0119 00).</li> <li>2. If continuity is not present, replace emergency start switch (WP 0093 00).</li> </ol> <p>If voltage is below 24Vdc, see Charging System troubleshooting (WP 0005 00).</p>

Table 6. Fifth Wheel Hydraulic System Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>1. Fifth Wheel Drifts Down/Will Not Support Load.</b></p>	<p>Inspect hydraulic system hoses and fittings for signs of leaking hydraulic fluid.</p>	<p>a. Tighten or replace leaking or damaged hoses or fittings (WP 00127 00).</p> <p>b. Replace locking valve (WP 0128 00).</p>
<p><b>2. Fifth Wheel Lowers Slowly.</b></p>	<p>1. Check for dirty or clogged hydraulic reservoir fill cap.</p> <p>2. Check for clogged hydraulic system return filter element.</p>	<p>Remove and clean dirty or clogged fill cap (WP 0130 00).</p> <p>Replace hydraulic filter element (WP 0131 00).</p>
<p><b>3. Fifth Wheel Moves Up/Down When Engine Is Started.</b></p>	<p>Check fifth wheel lift control handle for any of the following conditions:</p> <p>a. Handle will not return to center position.</p> <p>b. Handle is frozen in place. Disconnect lift control handle from flow control valve. Determine if handle or cable has failed (WP 0030 00).</p>	<p>1. Replace fifth wheel lift control handle if handle will not center (WP 0030 00).</p> <p>2. Adjust and/or replace fifth wheel lift control cable (WP 0030 00).</p> <p>1. Replace lift control handle (WP 0030 00).</p> <p>2. Replace cable (WP 0030 00).</p> <p>3. Replace failed flow control valve (WP 0128 00).</p> <p>4. Notify DS Maintenance to troubleshoot the PTO.</p>
<p><b>4. Fifth Wheel Will Not Lift or Lower.</b></p>	<p>1. Inspect hydraulic system hoses and fittings for signs of leaking hydraulic fluid.</p> <p>2. Check hydraulic fluid level in reservoir.</p> <p>3. Inspect hydraulic system flow control valve and locking valve for signs of leaking hydraulic fluid.</p>	<p>Tighten or replace leaking or damaged hoses or fittings (WP 0127 00).</p> <p>Add hydraulic fluid as necessary (WP 0008 00 and WP 0009 00)</p> <p>Replace leaking valves (WP 0128 00).</p>



Table 6. Fifth Wheel Hydraulic System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>4. Fifth Wheel Will Not Lift or Lower - Continued.</b></p>	<p>4. Check fifth wheel lift control handle for any of the following conditions:</p> <ul style="list-style-type: none"> <li>a. Handle will not return to center position.</li> <li>b. Handle is frozen in place. Disconnect lift control handle cable from flow control valve and handle. Determine if handle or cable has failed (WP 0030 00).</li> </ul>	<ul style="list-style-type: none"> <li>1. Replace fifth wheel lift control handle if handle will not center (WP 0030 00).</li> <li>2. Adjust and/or replace fifth wheel lift control cable (WP 0030 00).</li> <li>1. Replace lift control handle (WP 0030 00).</li> <li>2. Replace cable (WP 0030 00).</li> <li>3. Replace failed flow control valve (WP 0128 00).</li> <li>4. Notify DS Maintenance to troubleshoot the PTO.</li> </ul>
<p><b>5. Hydraulic Reservoir Overflows.</b></p>	<p>With fifth wheel fully lowered, check hydraulic fluid level in reservoir. Fluid should be level with FULL line stencilled on reservoir.</p>	<p>Drain excess oil from hydraulic reservoir (WP 0129 00).</p>

**NOTE**

For additional front axle troubleshooting, refer to Group 080 Commercial Service Manuals.

**Table 7. Front Axle Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>1. Front Wheels Shimmy or Vibrate.</b></p>	<p>1. Check for loose or missing lug nuts at each wheel.</p> <p>2. Check front hub for proper level of gear lubricating oil in sight glass. Check for signs of leaking from hubcap assembly.</p> <p>3. Check for proper wheel bearing adjustment at front axle.</p> <p>4. Remove front wheels and hubs. Inspect for excessively worn or damaged components.</p>	<p>Replace missing lug nuts. Retorque lug nuts to 500 lb-ft (678 Nm).</p> <p>Add gear lubricating oil (WP 0008 00 and WP 0009 00). If leaks are evident, replace hubcap assembly components (WP 0033 00).</p> <p>Adjust wheel bearings as required (WP 0033 00).</p> <p>Replace worn or damaged components (WP 0033 00).</p>
<p><b>2. Hub Leaking Oil.</b></p>	<p>1. Inspect for oil on brakedrum.</p> <p>2. Inspect for oil leaking at axle hubcap assembly or hubcap window vent plug.</p>	<p>Disassemble wheel hub assembly and replace oil seal (WP 0033 00).</p> <p>Replace damaged components (WP 0033 00).</p>
<p><b>3. Rapid or Uneven Tire Wear.</b></p>	<p>Check air pressure in each front tire. Air pressure should be 120 psi (827 kPa).</p>	<p>Adjust tire pressure as required.</p>

**NOTE**

For additional rear axle troubleshooting, refer to Group 090 Commercial Service Manuals.

**Table 8. Rear Axle Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>1. Differential Overheating.</b></p> <p><b>2. Differential or Wheel Noise.</b></p>	<p>Remove differential fill plug and check fluid level.</p> <p>1. Check for loose or missing lug nuts at each wheel.</p> <p>2. Remove differential fill plug and check fluid level.</p> <p>3. Remove wheel end fill plugs and check fluid level.</p>	<p>a. Add fluid as required (WP 0008 00 and WP 0009 00).</p> <p>b. Notify DS Maintenance.</p> <p>Replace missing lug nuts. Retorque lug nuts to 500 lb-ft (678 Nm).</p> <p>a. Add fluid as required (WP 0008 00 and WP 0009 00).</p> <p>b. If fluid level is OK, notify DS Maintenance.</p> <p>a. Add fluid as required (WP 0008 00 and WP 0009 00).</p> <p>b. If fluid level is OK, notify DS Maintenance.</p>

**NOTE**

For additional service brake system troubleshooting, refer to Group 080 Commercial Service Manuals.

**Table 9. Service Brake System Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>1. Front Brakes Locked or Overheated.</b></p>	<p>1. Inspect slack adjusters, S-cams, and shafts for damage and proper adjustment.</p> <p>2. Remove front brakedrums and inspect brakeshoes and brake components for excessive wear and/or damage.</p> <p>3. Inspect front airbrake chambers and air hose for air leaks and damage.</p>	<p>If slack adjusters, S-cams or shafts are damaged, replace (Group 080 Commercial Service Manuals).</p> <p>Replace worn or damaged components (Group 080 Commercial Service Manuals).</p> <p>Replace leaking or damaged airbrake chambers or air hose (WP 0031 00 or WP 0066 00).</p>

Table 9. Service Brake System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>2. Front/Rear Brakes Release Slowly or Will Not Release.</b></p>	<ol style="list-style-type: none"> <li>1. Inspect service brake lines, hoses, and fittings for obstructions or crimping.</li> <li>2. Inspect slack adjusters, S-cams, brake chambers, and shafts for damage and proper adjustment.</li> <li>3. Remove brakedrums and inspect brakeshoes and brake components for excessive wear and/or damage.</li> </ol>	<p>If lines, hoses or fittings are damaged, replace (WP 0066 00).</p> <ol style="list-style-type: none"> <li>a. If slack adjusters, S-cams, chambers or shafts are damaged, replace (Group 080 or Group 090 Commercial Service Manuals).</li> <li>b. Adjust brakes (Group 080 or Group 090 Commercial Service Manuals).</li> </ol> <p>Replace worn or damaged components (Group 080 or Group 090 Commercial Service Manuals).</p>
<p><b>3. Poor or Insufficient Braking Force to Stop Vehicle.</b></p>	<ol style="list-style-type: none"> <li>1. Inspect for leaking or damaged airbrake system valves, lines, hoses, and fittings.</li> <li>2. Inspect front and rear airbrake chambers for leaks and damage.</li> <li>3. Remove brakedrum dust shields and inspect brakeshoes and drums for grease, oil or contamination.</li> <li>4. Remove brakedrums and inspect all brake components for excessive wear and/or damaged parts.</li> </ol>	<p>Replace any leaking or damaged airbrake system component.</p> <p>Replace leaking or damaged airbrake chambers (WP 0031 00).</p> <p>Clean brakedrums and replace contaminated brakeshoes (Group 080 or Group 090 Commercial Service Manuals).</p> <p>Replace all parts excessively worn or damaged (Group 080 or Group 090 Commercial Service Manuals).</p>
<p><b>4. Rear Brakes Locked or Overheated.</b></p>	<ol style="list-style-type: none"> <li>1. Inspect slack adjusters, S-cam, and shafts for damage and proper adjustment.</li> <li>2. Remove rear brakedrums and inspect brakeshoes and brake components for excessive wear and/or damage.</li> <li>3. Inspect rear airbrake chambers and air hoses for air leaks and damage.</li> </ol>	<p>If slack adjusters, S-cams or shafts are damaged, replace (Group 090 Commercial Service Manuals).</p> <p>Replace worn or damaged components (Group 090 Commercial Service Manuals).</p> <p>Replace leaking or damaged airbrake chambers or air hoses (WP 0031 00 or WP 0066 00).</p>

Table 9. Service Brake System Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>5. Trailer Brakes Will Not Apply/Release.</b></p>	<p>1. Check if intervehicular air lines are properly connected between tractor and trailer (TM 9-2320-312-10).</p>	<p>Reconnect air lines as required.</p>
	<p>2. Check if trailer air lines are leaking.</p>	<p>Refer to trailer technical manual to replace leaking air lines.</p>
<p><b>6. Uneven or Erratic Front Brakes.</b></p>	<p>1. Inspect slack adjusters, S-cams, and shafts for damage and proper adjustment.</p>	<p>a. If slack adjusters, S-cams or shafts are damaged, replace (Group 090 Commercial Service Manuals).</p>
		<p>b. Adjust brakes (Group 090 Commercial Service Manuals).</p>
	<p>2. Check for even brakedrum-to-lining clearance.</p>	<p>Adjust brakes (Group 080 Commercial Service Manuals).</p>
	<p>3. Remove front brakedrums and inspect brakeshoes and brake components for excessive wear and/or damage.</p>	<p>Replace worn or damaged components (Group 080 Commercial Service Manuals).</p>
<p><b>7. Uneven or Erratic Rear Brakes.</b></p>	<p>1. Inspect slack adjusters, S-cams, and shafts for damage and proper adjustment.</p>	<p>a. If slack adjusters, S-cams or shafts are damaged, replace (Group 090 Commercial Service Manuals).</p>
		<p>b. Adjust brakes (Group 090 Commercial Service Manuals).</p>
	<p>2. Check for even brakedrum-to-lining clearance.</p>	<p>Adjust brakes (Group 090 Commercial Service Manuals).</p>
	<p>3. Remove rear brakedrums and inspect brakeshoes and brake components for excessive wear and/or damage.</p>	<p>Replace worn or damaged components (Group 090 Commercial Service Manuals).</p>

Table 10. Suspension System Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>1. Suspension Bottoms Out During Hard Stops.</b></p> <p><b>2. Truck Vibrates Excessively During Bumps.</b></p>	<p>1. Inspect for leaking or damaged shock absorbers.</p>	<p>Replace leaking or damaged shock absorbers (WP 0032 00).</p>
	<p>2. Inspect for cracked or broken front leaf springs.</p>	<p>Notify DS Maintenance to replace failed leaf springs.</p>
	<p>1. Inspect for loose, worn or damaged shock absorber mounting.</p>	<p>a. Tighten loose mounting hardware (WP 0032 00).</p> <p>b. Replace worn or damaged bushings and mounting hardware (WP 0032 00).</p>
	<p>2. Inspect for leaking or damaged shock absorbers.</p>	<p>Replace leaking or damaged shock absorbers (WP 0032 00).</p>
	<p>3. Inspect for cracked or broken front leaf springs.</p>	<p>Notify DS Maintenance to replace failed leaf springs.</p>

END OF WORK PACKAGE

**CHAPTER 3**  
**UNIT MAINTENANCE**

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**GENERAL**

1. When a new, used or reconditioned M872A2 Yard Tractor is first received, determine whether it has been properly prepared for service and is in condition to perform its mission.
2. Follow the inspection and servicing instructions that follow.

**INSPECTION INSTRUCTIONS**

1. Read and follow all precautions and instructions on DD Form 1397.
2. Remove all packing and shipping material, such as tape, tiedowns, protective covers, and shipping seals.
3. Inspect equipment for any damage incurred during shipment. Check if equipment has been modified.
4. Check equipment against packing slip to ensure that shipment is complete. Report any discrepancies on SF Form 364.
5. Remove all Basic Issue Item (BII), Additional Authorization List (AAL), and Components of End Item (COEI) equipment and stow in accordance with TM 9-2320-312-10.

**SERVICING INSTRUCTIONS**

1. Service the vehicle in accordance with TM 9-2320-312-10 and Unit PMCS (WP 0008 00 and WP 0009 00). Schedule the next PMCS on DA Form 5986-E.
2. Refer to TM 9-2320-312-10 and perform functional checks of all major vehicle systems.

**END OF WORK PACKAGE**

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**UNIT PREVENTIVE MAINTENANCE CHECKS  
AND SERVICES (PMCS) INTRODUCTION**


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0008 00

**GENERAL**

1. To ensure that the M878A2 Yard Tractor is ready for operation at all times, it must be lubricated and inspected on a regular basis so that defects may be found before they result in serious damage, equipment failure or injury to personnel.
2. The *KEY* in this work package lists the types, amounts, and temperature ranges of the lubricants required for specified intervals.
3. Lubrication Charts at the end of this work package show all lubrication points.
4. Table 1 in WP 0009 00 contains systematic instructions on lubrications, inspections, adjustments, and corrections to be performed by Unit Maintenance to keep the tractor in good operating condition and ready for its primary mission.
  - a. While performing specific PMCS procedures, ensure items are correctly assembled, secure, serviceable, not worn, not leaking, and adequately lubricated as defined below:
    - (1) An item is **CORRECTLY ASSEMBLED** when all parts are present and in proper position.
    - (2) When wires, nuts, washers, hoses or attaching hardware cannot be moved by hand, wrench or prybar, they are **SECURE**.
    - (3) An item is **UNSERVICEABLE** if it is worn beyond established wear limits or is likely to fail before the next scheduled inspection.
    - (4) An item is **WORN** if there is play between joining parts or warning and caution plates are not readable.
  - b. Where the inspection “tighten” appears in a procedure, tighten with a wrench to given torque value even when item appears to be secure.
5. Tables 2 through 4 at the end of WP 0009 00 list PMCS mandatory replacement parts, by interval.
6. For information on Corrosion Prevention and Control (CPC), refer to WP 0001 00.

**EXPLANATION OF TABLE ENTRIES**

1. **Item Number (Item No.) Column.** Numbers in this column are for reference. When completing DA Form 2404 or DA Form 5988-E (*Equipment Inspection and Maintenance Worksheet*), include the item number for the check/service indicating a fault. Item numbers also appear in the order you must perform checks and services for the interval listed.
2. **Interval Column.** This column tells you when you must perform the procedure in the procedure column. Intervals are based on calendar dates, miles, and hours.
  - a. *Hourly* procedures must be done at hour interval indicated.
  - b. *Monthly* procedures must be done once each month.
  - c. *Semiannual/6,000 mi (9,654 km)* procedures must be done once every six months or 6,000 mi (whichever occurs first).
  - d. *Annual/12,000 mi (19,308 km)* procedures must be done once each year or 12,000 mi (whichever occurs first).
  - e. *3K/every 3,000 mi (4,827 km)* (no calendar interval).
  - f. *6K/every 6,000 mi (9,654 km)* (no calendar interval).
  - g. *12K/every 12,000 mi (19,308 km)* (no calendar interval).
3. **Item to be Checked or Serviced Column.** This column identifies the item to be checked or serviced.

**NOTE**

The **WARNINGS** and **CAUTIONS** appearing in your PMCS table should always be observed. **WARNINGS** and **CAUTIONS** appear before applicable procedures. These **WARNINGS** and **CAUTIONS** must be observed to prevent serious injury to yourself and others or to prevent your equipment from being damaged.

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**UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION - CONTINUED**


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0008 00

**EXPLANATION OF TABLE ENTRIES - CONTINUED**

4. **Procedures Column.** This column gives the procedure you must perform to check or service the item listed in the Item to Check/Service column, to know if the equipment is ready or available for its intended mission or for operation. You must perform the procedure at the time stated in the interval column.
5. **Equipment Not Ready/Available If: Column.** Information in this column tells you what fault will keep your equipment from being capable of performing its primary mission. If you perform check and service procedures that show faults listed in this column, the equipment is not mission-capable. Follow standard operating procedures for maintaining the equipment or reporting equipment failure.

**GENERAL LUBRICATION PROCEDURES****NOTE**

- Lubrication instructions contained in this PMCS are mandatory.
  - Refer to TM 9-2320-312-10 for Operator Maintenance level lubrication.
  - Dashed leader lines used in illustrations of lubrication points indicate that lubrication is required on both sides of the equipment.
1. Recommended intervals are based on normal conditions of operation, temperature, and humidity. When operating under extreme conditions, such as high or low temperatures or exposure to sand or dust, lubricants should always be changed more frequently. Lubricants that have become contaminated will be changed regardless of interval. When in doubt, notify your supervisor.
  2. Keep all lubricants in a closed container and store in a clean, dry place away from extreme heat. Keep container covers clean and do not allow dust, dirt or other foreign material to mix with lubricants. Keep all lubrication equipment clean and ready for use.
  3. Maintain a good record of all lubrication performed and report any problem noted during lubrication. Refer to DA Pam 738-750 for maintenance forms and procedures to record and report any findings.

**WARNING**

Dry cleaning solvent MIL-PRF-680 Type III is an environmentally compliant and low toxic material. However, it may be irritating to the eyes and skin. The use of protective gloves and goggles is suggested. Use in well-ventilated areas. Keep away from open flames and other sources of ignition.

4. Keep all external parts of equipment not requiring lubrication free of lubricants. Before lubrication, wipe lubrication fittings with a clean rag (Item 51, WP 0165 00) and dry cleaning solvent (Item 10, WP 0165 00). After lubrication, wipe off excess oil or grease to prevent accumulation of foreign matter.
5. Refer to FM 9-207 for lubrication instructions in cold weather.
6. Refer to AR 70-12 for use of standardized fuels and lubricants.
7. Engine and transmission oil filters shall be changed when:
  - a. they are known to be contaminated or clogged;
  - b. service is directed by Army Oil Analysis Program (AOAP) laboratory analysis; or
  - c. at prescribed hardtime intervals.
8. Engine oil and transmission and hydraulic system fluids must be sampled as prescribed by DA Pam 738-750.

**UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION - CONTINUED**

0008 00

**GENERAL LUBRICATION PROCEDURES - CONTINUED**

9. 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 (i.e., longer-than-usual operating hours, extended idling periods or extreme dust).

**GENERAL PMCS PROCEDURES**

1. Always perform PMCS in the same order so it gets to be a habit. Once you’ve had some practice, you’ll spot anything wrong in a hurry. If any deficiency is discovered, perform the appropriate troubleshooting task in Chapter 2 of this manual. If any component or system is not serviceable, or if the given service does not correct the deficiency, notify your supervisor.
2. Before performing preventive maintenance, read all the checks required for the applicable interval and prepare all tools needed to make all checks. Have several clean rags (Item 51, WP 0165 00) handy. Perform ALL inspections at the applicable interval.
  - a. **Keep It Clean.** Dirt, grease, oil, and debris get in the way and may cover up a serious problem. Clean as you work and as needed. Use detergent (Item 23, WP 0165 00) and water when you clean.
  - b. **Rust and Corrosion.** Check metal parts for rust and corrosion. If any bare metal or corrosion exists, clean and apply a light coat of lubricating oil (Item 41, WP 0165 00). Report it to your supervisor.
  - c. **Bolts, Nuts, and Screws.** Check bolts, nuts, and screws for obvious looseness, missing, bent or broken condition. You can’t try them all with a tool, but look for chipped paint, bare metal or rust around bolt heads. If you find one you think is loose, tighten it.
  - d. **Welds.** Look for loose or chipped paint, rust or gaps where parts are welded together. If you find a bad weld, report it to your supervisor.
  - e. **Electric Wires and Connectors.** Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and ensure that the wires are in good condition.
  - f. **Hydraulic Hoses and Lines.** Look for wear, damage, and signs of leaks. Ensure that clamps and fittings are tight. Wet spots indicate leaks, but a stain around a fitting or connector can also mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, correct it if authorized by the Maintenance Allocation Chart (WP 0164 00). If not authorized, notify your supervisor.
  - g. **Fluid Leakage.** It is necessary for you to know how fluid leakage affects the status of your tractor. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your tractor. Learn and be familiar with them, and remember - when in doubt, notify your supervisor.

**Leakage Definitions for PMCS**

Class I	Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
Class II	Leakage of fluid great enough to form drops, but not enough to cause drops to drip from item being checked/inspected.
Class III	Leakage of fluid great enough to form drops that fall from item being checked/inspected.

**CAUTION**

Operation is allowable with Class I and Class II leakage. **WHEN IN DOUBT, NOTIFY YOUR SUPERVISOR.** When operating with Class I or Class II leaks, check fluid levels more frequently. Class III leaks must be reported immediately to your supervisor. Failure to do this will result in damage to vehicle and/or components.

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**UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION - CONTINUED**

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0008 00

**PMCS INITIAL SETUP**1. **General.**

- a. This paragraph lists tools, materials, and personnel required for PMCS and lubrication.
- b. Mandatory replacement parts for PMCS and lubrication are listed in Tables 2 through 5 after Unit PMCS in WP 0009 00.

2. **Tools (WP 0166 00).**

- a. Common no. 1 shop set
- b. Common no. 2 shop set
- c. General mechanic's tool kit

3. **Materials (WP 0165 00).**

- a. Antifreeze
- b. AOAP sampling kit
- c. Cleaning compound, solvent
- d. Detergent
- e. Fluid, hydraulic, automatic transmission, Dexron III
- f. Fluid, hydraulic, petroleum base, MIL-H-5606
- g. Fluid, hydraulic, petroleum base, MIL-PRF-17672, Grade 32
- h. Grease, GAA
- i. Lubricating oil, OE/HDO 10
- j. Lubricating oil, OIE/HDO 10W/30
- k. Lubricating oil, OE/HDO 15W/40
- l. Lubricating oil, OEA
- m. Lubricating oil, GO 85W/140
- n. Lubricating oil, GO 80W/90
- o. Lubricating oil, GO 75
- p. Rags

4. **Personnel.**

- a. Driver/Operator
- b. Unit Maintenance Mechanic

- KEY -

LUBRICANT/ COMPONENT	REFILL CAPACITY	EXPECTED TEMPERATURES*			INTERVALS
		+6°F TO +122°F (-14°C TO +50°C)	-4°F TO +50°F (-20°C TO +10°C)	-67°F TO +32°F (-55°C TO 0°C)	
<b>OE/HDO</b> Lubricating Oil, ICE, Tactical					<b>HR - Hours</b> <b>M - Monthly</b> <b>S - Semiannual</b> <b>A - Annual</b>
<b>OEA</b> Lubricating Oil, ICE, Arctic					
<b>Engine Crankcase w/Filter</b>	3 Qt (2.8 L) Filter 24-27 Qt (22.7-25.5 L) System Capacity	See Chart A			
<b>Oil Can Points</b>	As Req'd	See Chart A			
<b>Dexron III</b> Hydraulic Fluid, Automatic Transmission					
<b>Transmission</b>	26 Qt (25 L)	All Temperatures			
<b>Cab Tilt Pump</b>	As Req'd	All Temperatures			
<b>OHA</b> Hydraulic Fluid, Petro- leum Base					
<b>Hydraulic Reservoir (Power Steering and Fifth Wheel Lift)</b>	1 Pt (0.5 L) Filter 12 Gal (45.2 L) Reservoir 15 Gal (56.8 L) System Capacity	See Chart B			
<b>GO</b> Lubricating Oil, Gear, Multipurpose					
<b>Front Axle Wheel Hubs</b>	As Req'd	See Chart C			
<b>Rear Axle Hub Wheel Ends and Differential</b>	41 Pt (19.4 L)	See Chart C			
<b>GAA</b> Grease, Automotive and Artillery		All Temperatures			
<b>ANTIFREEZE</b> Ethylene Glycol, Inhibited, Heavy Duty					
<b>ANTIFREEZE</b> Ethylene Glycol, Arctic Grade					
<b>Engine Radiator</b>	4.7 Gal (17.8 L) Radiator 27.5 Qt (26.0 L) System Capacity	See Chart D			
* For arctic operation, refer to FM 9-207.					

**CHART A — ENGINE AND OIL CAN POINTS**

Lubricant	EXPECTED TEMPERATURES																			
	°F	-70	-60	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+120
	°C	-57	-51	-46	-40	-34	-29	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32	+38	+49
OE/HDO	Lubricating Oil, ICE, Tactical																			
OEA	Lubricating Oil, ICE, Arctic																			
OE/HDO-15W/40																				
OE/HDO 10W/30																				
OE/HDO-10*																				
OEA *																				

\*If OEA lubricant is required to meet the low expected-temperature range, OEA lubricant is to be used in lieu of OE/HDO-10 lubricant for all expected temperatures where OE/HDO-10 is specified.

**CHART B—HYDRAULIC FLUID (POWER STEERING/FIFTH WHEEL LIFT)**

Lubricant	EXPECTED TEMPERATURES																			
	°F	-90	-80	-70	-60	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+90	+90
	°C	-68	-62	-57	-51	-46	-40	-34	-29	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32
OHA	Fluid, Hydraulic, Petroleum Base																			
OHA	Fluid, Hydraulic, Petroleum Base																			
MIL-PRF-1762																				
MIL-H-5606																				

**CHART C — FRONT AND REAR AXLE HUB ENDS AND REAR AXLE DIFFERENTIAL**

Lubricant	EXPECTED TEMPERATURES																			
	°F	-70	-60	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+120
	°C	-57	-51	-46	-40	-34	-29	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32	+38	+49
GO	Lubricating Oil, Gear, Multipurpose																			
GO-75																				
GO-80W/90																				
GO-85W/140																				



CHART D— ANTIFREEZE

Lubricant	EXPECTED TEMPERATURES																			
	°F	-90	-80	-70	-60	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90
	°C	-68	-62	-57	-51	-46	-40	-34	-29	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32
ANTIFREEZE	Antifreeze, Ethylene Glycol, Inhibited, Heavy Duty																			
ANTIFREEZE	Antifreeze, Arctic Grade																			
Antifreeze																				
Antifreeze, Arctic Grade																				

Lubricant • Interval

M878A2

Cooling System  
Check Level (C)

Coolant Filter/  
Conditioner  
Replace Filter Element (O)

Engine Crankcase  
Drain (O)

Engine Oil Filter  
Replace (O)

Engine Crankcase  
Fill (O)

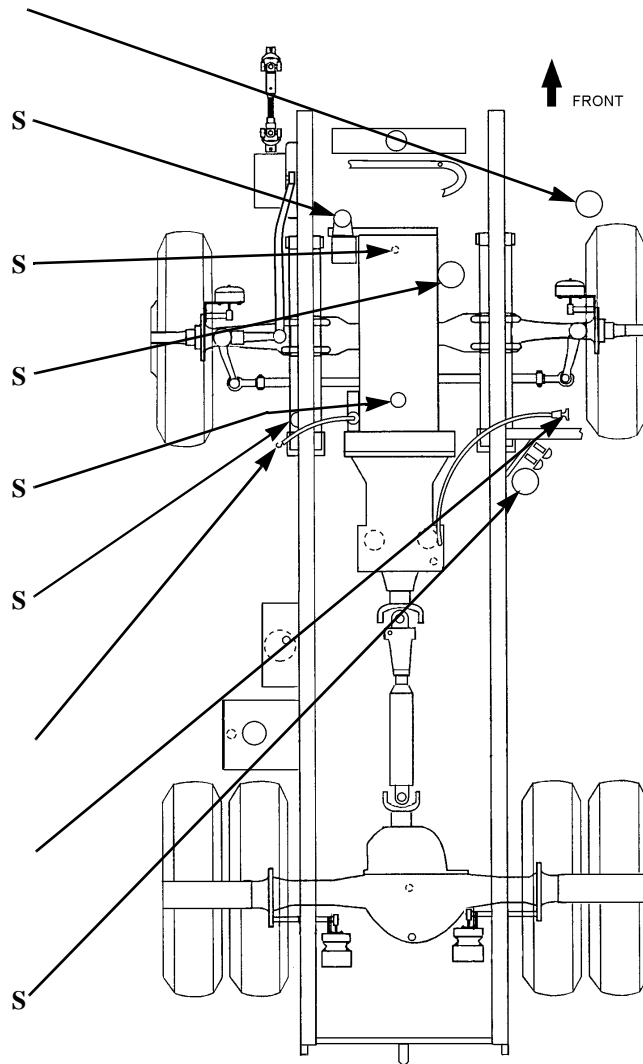
OE/HDO  
or OEA

Secondary Fuel Filter  
Replace Filter  
Element (O)

Engine Oil Dipstick  
Check Level (C)

Transmission Fluid  
Dipstick  
Check Level (C)

Primary Fuel Filter  
Replace Filter Element (O)



Lubricant • Interval

M878A2

Front Axle Wheel Hubs  
Drain/Refill (O)

Transmission  
Fill (O)

Transmission Filters  
Replace (O)

Transmission  
Drain (O)

Cab Tilt Pump Reservoir  
Fill (O)

Hydraulic Oil Filter  
Replace (O)

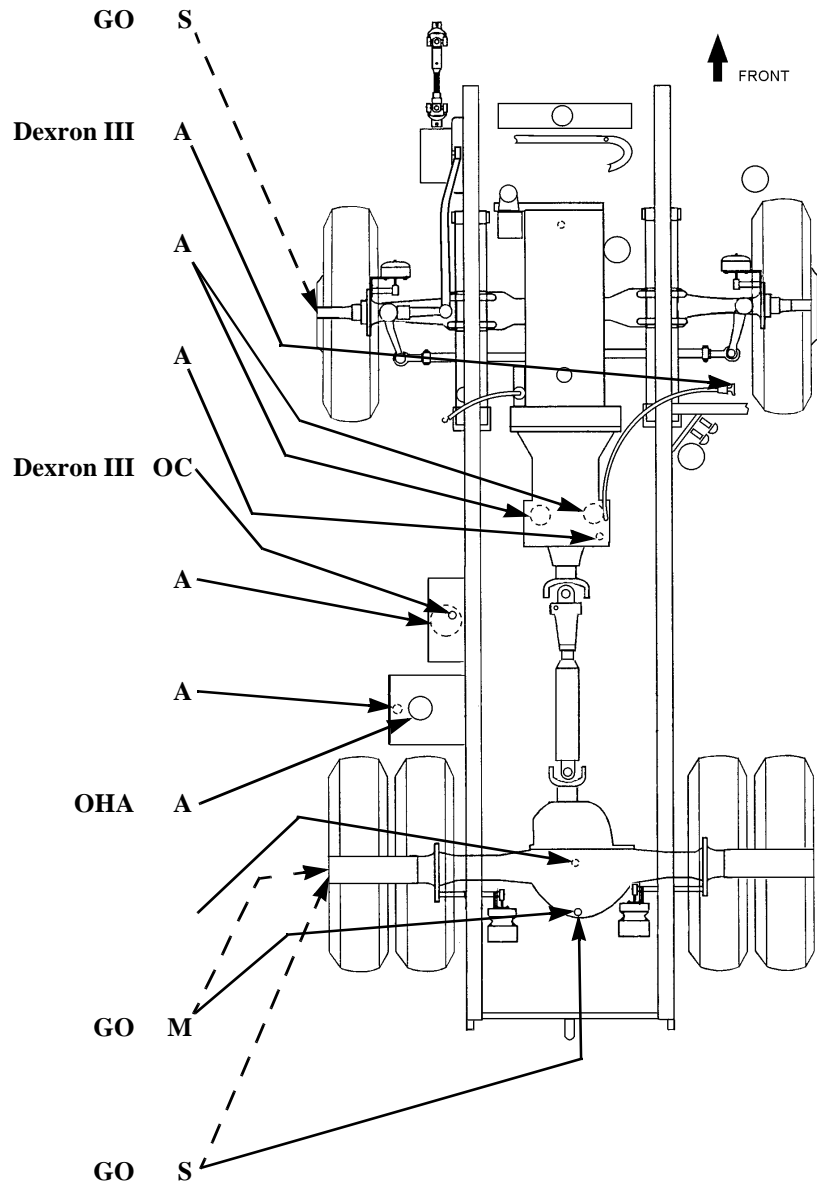
Hydraulic Reservoir  
Drain (O)

Hydraulic Reservoir  
Fill (O)

Rear Axle Differential  
Drain (O)

Rear Axle Hub Wheel  
Ends and Differential  
Check Level/Add (O)

Rear Axle Hub Wheel  
Ends and Differential  
Drain/Refill (O)



376-077

Lubricant • Interval

Steering Column  
U-Joints and Slip Joint  
Three Fittings (O)

GAA S

M878A2

Drag Link  
One Fitting Each End (O)

GAA S



Front Axle  
Slack Adjuster  
One Fitting Each Side (O)

GAA M

Front Axle  
Camshaft Bushing  
One Fitting Each Side (O)

GAA M

Steering Knuckle  
One Fitting Each,  
Top and Bottom (O)

GAA S

Tie-Rod Ends  
One Fitting Each Side (O)

GAA S

Propshaft  
Front U-Joint  
One Fitting (O)

GAA S

Propshaft Front Yoke  
One Fitting (O)

GAA S

Propshaft  
Rear U-Joint  
One Fitting (O)

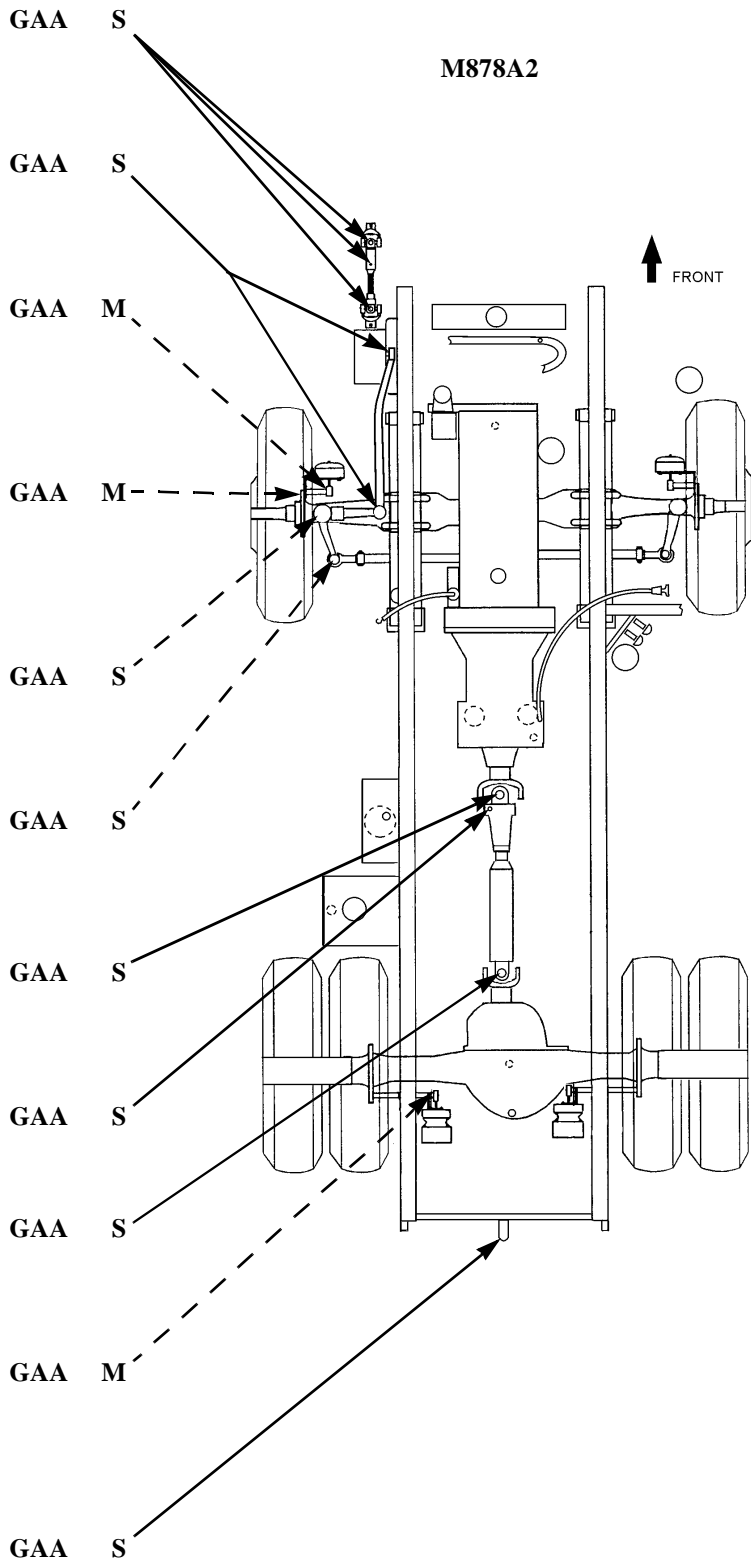
GAA S

Rear Axle  
Slack Adjuster and  
Camshaft Bushing  
One Fitting Each Side (O)

GAA M

Pintle Hook  
Two Fittings (O)

GAA S



Lubricant • Interval

M878A2

Fifth Wheel Plate,  
Front of Throat, and  
Locking Jaws (O)

GAA M

Fifth Wheel Plate  
Pivot Pins  
One Fitting Each Side (O)

GAA M

Release Arm Spring/  
Rod  
Cam Pivot/Travel Path (O)

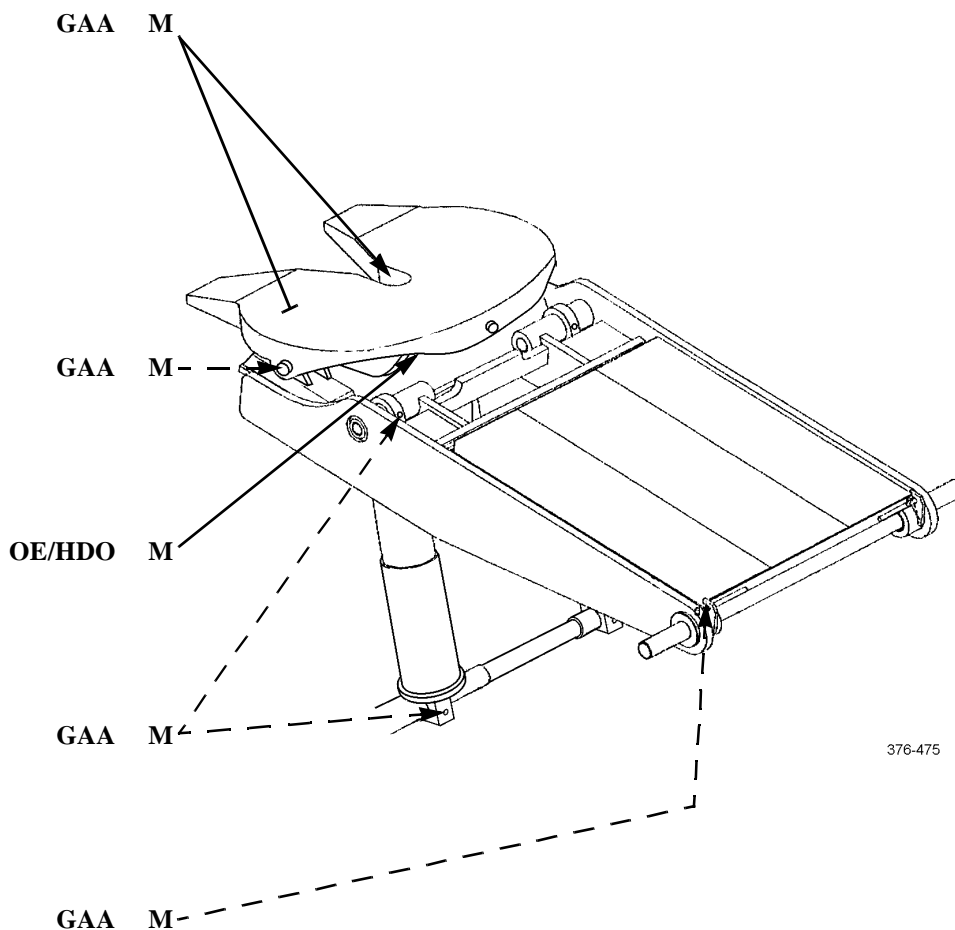
OE/HDO M

Fifth Wheel Lift  
Cylinders  
Two Fittings Each Side (O)

GAA M

Fifth Wheel Frame  
Sub-Assembly  
Anchor Pivots  
One Fitting Each Side (O)

GAA M



376-475

END OF WORK PACKAGE

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**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor.**

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
<b>WARNING</b>				
<p>Unless otherwise specified, perform all lubrication and PMCS with tractor on level ground, transmission in N (Neutral), parking brake applied, and engine off. Failure to follow this warning may result in injury to personnel.</p>				
<b>NOTE</b>				
<ul style="list-style-type: none"> <li>• Perform the following break-in services after initial 100 hours of operation:                             <ul style="list-style-type: none"> <li>a. Loosen and re-torque front axle spring assembly U-bolt nuts.</li> <li>b. Loosen and re-torque front and rear axle wheels nuts.</li> <li>c. Drain and refill rear axle hub wheel ends and differential.</li> <li>d. Inspect engine assembly.</li> <li>e. Change transmission fluid and replace fluid filters.</li> <li>f. Replace hydraulic system (power steering and fifth wheel lift) oil filter.</li> </ul> </li> <li>• After initial six months of operation, notify DS Maintenance to inspect/adjust engine valve lash.</li> <li>• Perform Operator PMCS prior to or in conjunction with Unit PMCS if:                             <ul style="list-style-type: none"> <li>a. There is a delay between daily operation of the equipment and Unit PMCS.</li> <li>b. The regular operator is not assisting.</li> </ul> </li> </ul>				
1	Initial 100 Hours	Front Axle Spring Assembly U-Bolt Nuts	Loosen spring assembly U-bolt nuts, then re-torque to 450 lb-ft (610 Nm).	
2	Initial 100 Hours	Front and Rear Axle Wheel Nuts	Check torque of front and rear axle wheel nuts, with wheel ends cold. Torque should be 500 lb-ft (678 Nm).	

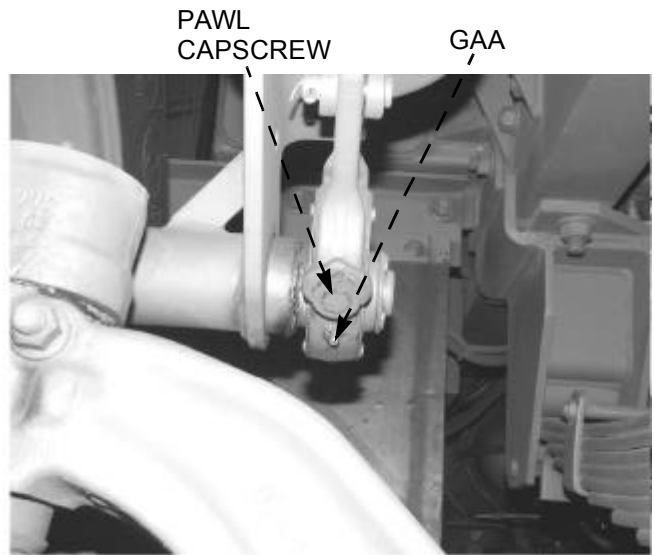
**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION  ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
3	Initial 100 Hours	Rear Axle Hub Wheel Ends and Differential	<b>NOTE</b> Rear axle assembly refill capacity is 41 pt (19.4 l).	
4	Initial 100 Hours	Engine Assembly	<p>While axle is still warm, drain oil from hub wheel ends and from differential (Group 090 Commercial Service Manuals). Refill with gear lubricating oil (Item 38, 39 or 40, WP 0165 00).</p> <p>a. Check oil, fuel, coolant, and air lines, hoses, and fittings for leaks and secure mounting.</p> <p>b. Check oil filter base, oil pan, and oil pan drain plug for leaks. Tighten or replace any damaged component.</p> <p>c. Check rocker arm cover for leaks. Tighten or replace any damaged component.</p> <p>d. Check engine accessories (e.g. AC compressor, etc.) mounting hardware for looseness. Tighten or replace any damaged component, if authorized.</p> <p>e. Check serpentine drive belt to ensure it is not missing. Check for looseness, tears, glazed or frayed condition or cracks. Replace if damaged (WP 0012 00).</p> <p>f. Check electrical harnesses for burnt or frayed wires, corrosion, loose or broken connections. If connections are loose, tighten. If corrosion is present, clean.</p>	<p>a. Class III oil or coolant leaks are evident. Any fuel leaks are evident.</p> <p>b. Class III leaks are evident.</p> <p>c. Class III leaks are evident.</p> <p>e. Serpentine belt is missing, broken, glazed or torn. Belt fiber has more than one crack 1/8 in. (3.2 mm) in depth or 50% or more is frayed more than 2 in. (5.1 mm) long.</p> <p>f. Wiring is burnt, frayed, split or missing.</p>



Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
5	Initial 100 Hours	Transmission and Transmission Oil Cooler Hoses	a. Inspect transmission for loose transmission mount or bolts, or evidence of transmission fluid leaks.  b. Check oil cooler lines at transmission for evidence of leaks. Tighten loose connections. Replace hoses if broken or leaking (WP 0029 00).  <p style="text-align: center;"><b>NOTE</b></p> Transmission refill capacity is 26 qt (25 L).  c. Change transmission fluid (Item 24, WP 0165 00) and replace transmission fluid filter (Group 070 Commercial Service Manuals).	a. Class III leaks are evident. Transmission mounting bolts are loose or missing.  b. Class III leaks are evident.
6	Initial 100 Hours	Hydraulic Oil Filter	Replace hydraulic (power steering and fifth wheel lift systems) oil filter (WP 0131 00).	
7	Monthly	Front and Rear Brake Camshaft Bushings and Slack Adjusters	a. At front axle, apply GAA grease (Item 30, WP 0165 00) to grease fitting at each cam bracket and slack adjuster. Ensure new grease flows from pressure relief valve in slack adjuster pawl capscrew.	




378-211.

**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**


ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
7 (Con't)	Monthly	Front and Rear Brake Camshaft Bushings and Slack Adjusters	b. At rear axle, apply GAA grease (Item 30, WP 0165 00) to slack adjuster grease fitting, until new grease flows from camshaft bracket lubricator and slack adjuster pawl capscrew.	



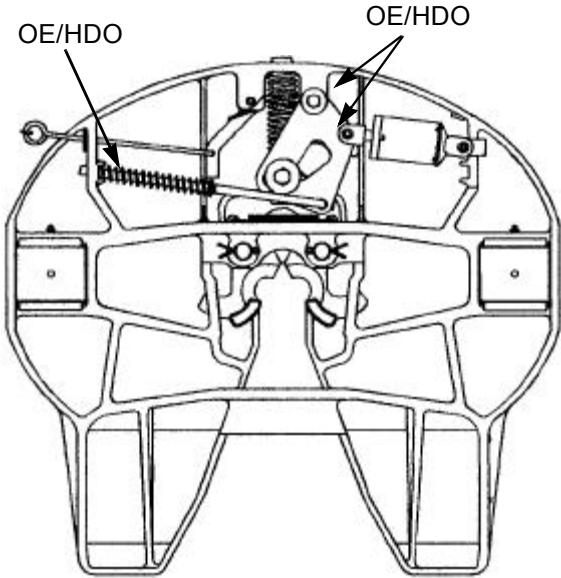
**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION  ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
8	Monthly	Rear Axle Hub Wheel Ends and Dif- ferential	Check level of oil in hub wheel ends and in differential: a. Position vehicle so that drain plug at hub wheel end is at 6 o'clock. b. Remove planet carrier level plug (marked "OIL LEVEL") at each hub wheel end.	
				


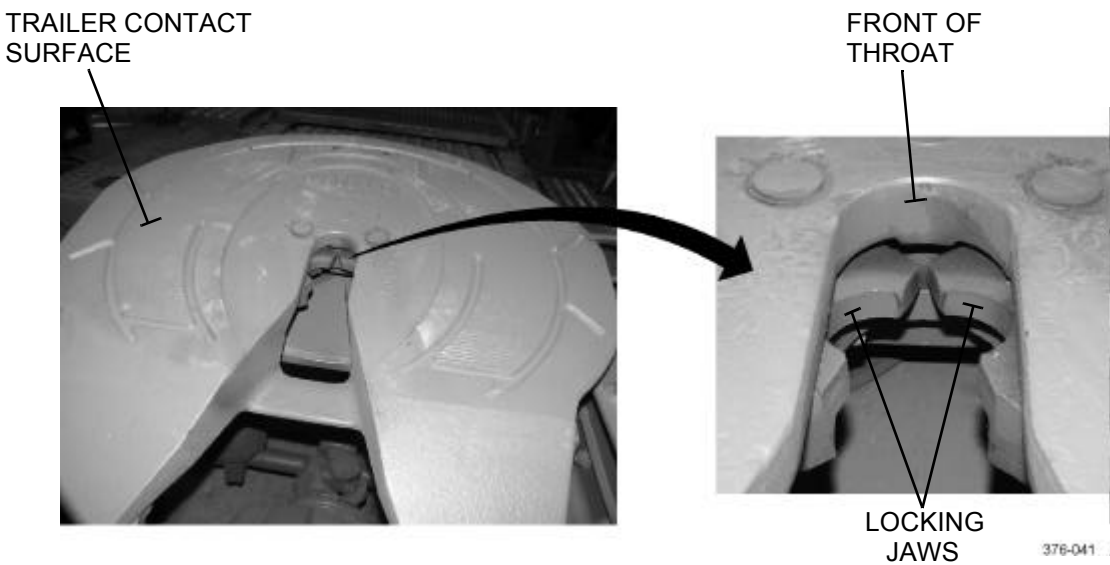
**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
8 (Con't)	Monthly	Rear Axle Hub Wheel Ends and Dif- ferential	c. Remove filler plug from differential.	
<p>FILLER PLUG</p>  <p>378-D48</p>				
9	Monthly	Fifth Wheel Assembly	<p>d. If oil level is 1 in (2.54 cm) below filler openings, add gear lubricating oil (Item 38, 39 or 40, WP 0165 00) to bring level up to maximum. Add oil first to each hub wheel end, then make a final level check at differential and add as required.</p> <p>e. Reinstall plugs.</p> <p>a. Steam clean surface of fifth wheel plate.</p> <p>b. Check for cracks in fifth wheel plate casting or in any other component.</p> <p>c. Check for bent, worn or broken parts.</p>	<p>b. Cracks in fifth wheel plate are noted.</p> <p>c. Parts are bent, worn or broken.</p>

**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
9 (Con't)	Monthly	Fifth Wheel Assembly	<p>d. Close fifth wheel locks (TM 9-2320-312-10). Verify that locks are properly closed around kingpin. Release locks and check that locks fully open. Repeat three times to verify proper operation.</p> <p>e. Lubricate release arm spring and rod and cam pivot and travel path, on underside of fifth wheel plate, with OE/HDO 10 (Item 41, WP 0165 00).</p>	d. Fifth wheel lock mechanism is inoperative.
				

**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
9 (Con't)	Monthly	Fifth Wheel Assembly	f. Lubricate two fifth wheel plate pivot grease fittings with GAA grease (Item 30, WP 0165 00).	
				
<p>g. Apply GAA grease (Item 30, WP 0165 00) to trailer contact surface of fifth wheel plate. Also apply grease to locking jaws and to front of throat.</p>				
				

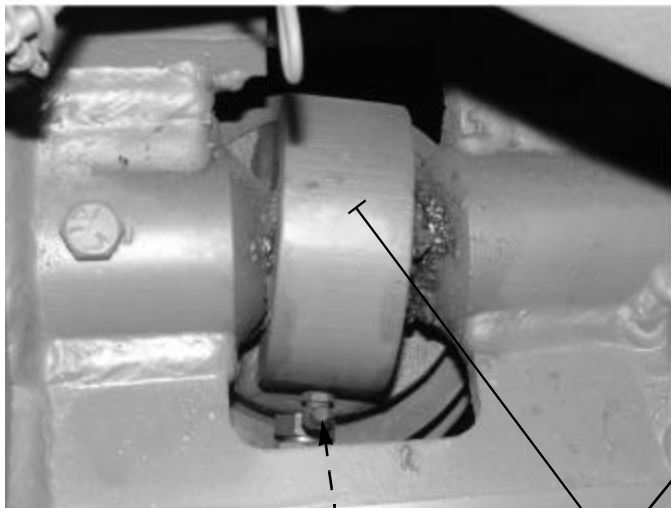
**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
10	Monthly	Fifth Wheel Lift Cylinders	a. Check for hydraulic fluid leaks caused by loose head caps and cylinder rod packings. If leakage is noted, tighten head caps (WP 0127 00).	a. Class III hydraulic fluid leaks are evident.



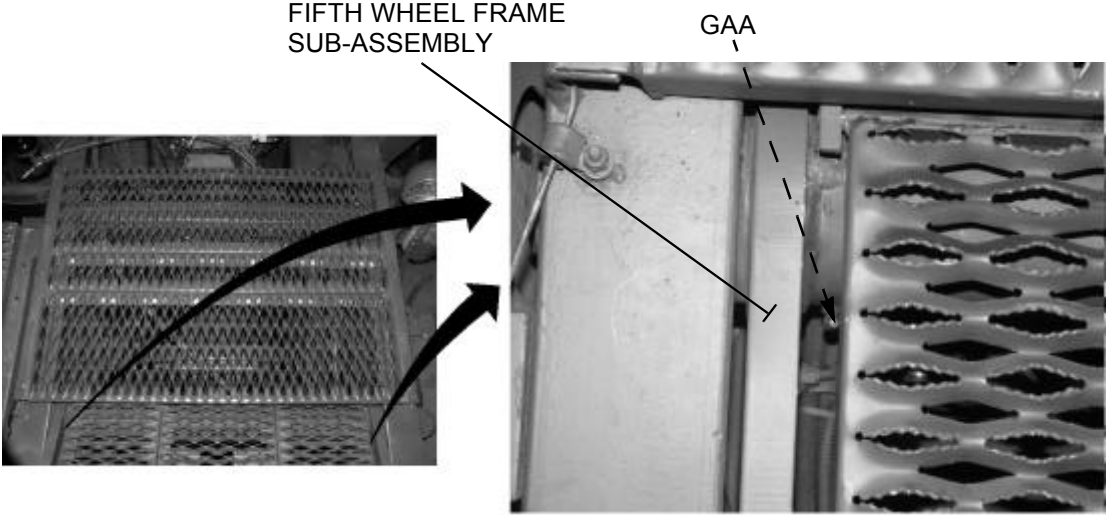
376-012.

b. Lubricate fitting at top and bottom of each lift cylinder with GAA grease (Item 30, WP 0165 00).



376-213

Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.

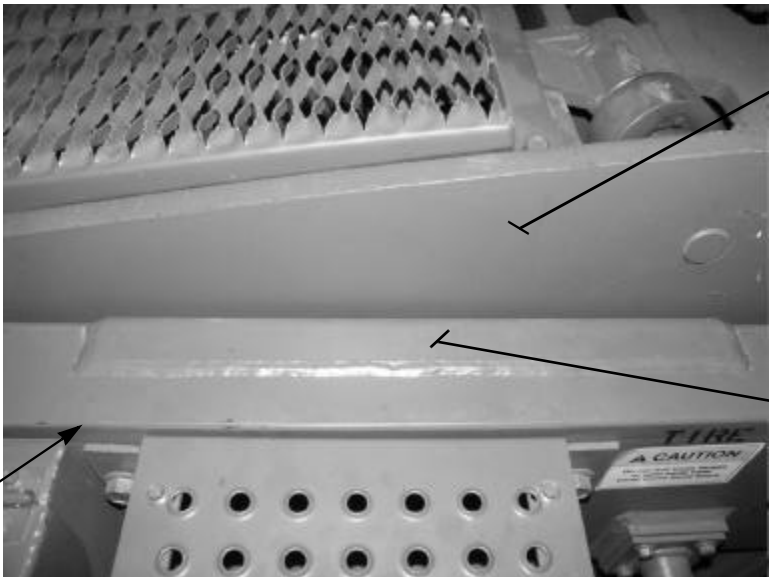

ITEM NO.	INTERVAL	LOCATION  ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
11	Monthly	Fifth Wheel Frame Sub-Assembly Pivot Bushings	Lubricate fitting on each side of fifth wheel frame sub-assembly pivot with GAA grease (Item 30, WP 0165 00).	
 <p>FIFTH WHEEL FRAME SUB-ASSEMBLY</p> <p>GAA</p> <p>376-219</p>				
12	Initial 6 Months	Engine Valve Lash	Notify DS Maintenance to inspect/adjust engine valve lash (Group 020 Commercial Service Manuals).	
<p><b>NOTE</b></p> <p>Item number checks 13 through 19 should be performed while testing operation of tractor.</p>				
13	Semiannual	Starter	While starting tractor, listen for unusual noises and difficult cranking of starter.	
14	Semiannual	Engine and Instrument Panel	<p>a. Listen for unusual noises, hesitation, and varying idle speed. Observe accelerator response.</p> <p>b. Ensure that engine does not exceed maximum governed speed (2400 rpm).</p> <p>c. Check instrument panel for proper operation of all switches, gauges, indicators, and warning lights and alarm (TM 9-2320-312-10).</p>	<p>a. Accelerator pedal is sticking or binding.</p>
15	Semiannual	Steering	Check vehicle response to steering wheel action. Tractor should respond quickly. With tractor on straight level ground, lightly hold steering wheel to check for pull or wander.	Steering wheel binds or is shimmying. Tractor pulls or wanders.



**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION  ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
16	Semiannual	Suspension	Observe how tractor responds to road shocks. Shifts, knocks or constant bouncing indicate possible malfunctions.	
17	Semiannual	Brakes	<p>a. Test braking response to brake pedal. Response should be immediate. Tractor should stop smoothly without noticeable side pull or chatter.</p> <p>b. After stopping tractor, with transmission in gear, release service brakes. Wheel brake release should be immediate.</p> <p>c. With tractor on downgrade and transmission in N (Neutral), set parking brake. Tractor should not move.</p> <p style="text-align: center;"><b>WARNING</b></p> <p>Cautiously feel each wheel hub and brakedrum. Wheel hubs and brakedrums may be hot. Failure to follow this warning may result in serious burns.</p> <p>d. Immediately after road test, carefully check and compare wheel hub and brakedrum for overheating, which could indicate a dragging brake. A cool wheel hub and brakedrum could mean improperly adjusted, defective or inoperative brakes.</p>	<p>a. Brakes do not operate properly.</p> <p>b. Brakes do not release</p>
18	Semiannual	Fifth Wheel Lift	Operate fifth wheel lift (TM 9-2320-312-10). Fifth wheel should raise and lower smoothly and without binding. Check for evidence of hydraulic fluid leaks.	Fifth wheel is binding. Class III leaks are evident.
19	Semiannual	Cab Tilt System	Tilt cab (TM 9-2320-312-10). Cab should tilt smoothly and without binding. Ensure safety prop is securely mounted and functions properly to support cab when tilted.	
20	Semiannual	Cab Tilt Latch and Cushion Mounts	<p>a. Check cab tilt latch at left-rear of cab for loose mounting or evidence of hydraulic fluid leaks. Replace any damaged component (WP 0121 00).</p> <p>b. Check latch bracket and vibration damper on underside of cab for loose mounting, damage or wear. Replace any damaged component (WP 0121 00).</p> <p>c. Check right-side cab rear mount for loose mounting, damage or wear. Replace if worn or damaged (WP 0041 00).</p> <p>d. Lower cab (TM 9-2320-312-10).</p>	<p>a. Damage or Class III leaks are evident.</p> <p>b. Loose mounting, damage or wear are evident.</p> <p>c. Loose mounting, damage or wear are evident.</p>



**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION  ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
21	Semiannual	Fifth Wheel Frame Sub-Assembly	Check welded angle iron on each side of frame for wear or evidence of contact with fifth wheel frame sub-assembly. If wear or contact is evident, notify Direct Support Maintenance to check condition of frame sub-assembly pivot bushings.	
<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>FIFTH WHEEL FRAME SUB-ASSEMBLY</p> <p>WELDED ANGLE IRON</p> <p>FRAME</p> </div> </div> <p style="text-align: right; margin-right: 50px;">376-550</p>				
22	Semiannual	Engine Oil and Filter	<p style="text-align: center;"><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• If AOAP results are available, engine oil should be changed and oil filter replaced as specified by AOAP.</li> <li>• Engine oil refill capacity is 24-27 qt (22.7-25.5 L).</li> </ul> <p>Change engine oil (Item 42, 43 or 44, WP 0165 00) and replace engine oil filter (WP 0011 00).</p>	
23	Semiannual	Fuel System	<div style="text-align: center;">  <p><b>WARNING</b></p> </div> <ul style="list-style-type: none"> <li>• DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.</li> <li>• Wear fuel-resistant gloves when handling fuels and promptly wash exposed skin and change fuel-soaked clothing.</li> </ul>	




**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
23 (Con't)	Semiannual	Fuel System	a. Inspect fuel lines, fuel tank, and fuel system components for leaks and damage. Tighten or replace any damaged component. b. Clean primary fuel filter/water separator and replace element (WP 0018 00). c. Replace secondary fuel filter (WP 0017 00).	a. Any fuel leaks are evident
24	Semiannual	Engine Air Compressor	Remove, clean or replace air compressor filter (Group 020 Commercial Service Manuals).	
25	Semiannual	Engine Crankcase Breather	Clean and inspect crankcase breather (Group 020 Commercial Service Manuals).	
26	Semiannual	Serpentine Drive Belt and Pulleys	a. Check for looseness, tears, glazed or frayed condition or cracks. Replace if damaged (WP 0012 00). b. Check alternator and air conditioning compressor mounting for looseness. Inspect brackets and attaching hardware for cracks, bends, and loose mounting. Replace damaged components as required. c. Check for cracked pulleys or pulleys out of alignment.	a. Serpentine belt is missing, broken, glazed or torn. Belt fiber has more than one crack 1/8 in (3.2 mm) in depth or 50% or more is frayed more than 2 in (5.1 mm) long. c. Cracked pulleys are noted.

**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION  ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
27	Semiannual	Cooling System	<div style="display: flex; justify-content: space-around; align-items: center;">  <div style="text-align: center;"> <p><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• DO NOT remove radiator cap unless engine has cooled to at least 120°F (50°C) as indicated on coolant temperature gauge. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.</li> <li>• Wear effective eye, glove, and skin protection when handling coolants. Failure to do so may cause injury.</li> </ul> <p style="text-align: center;"><b>NOTE</b></p> <p>Refer to Group 020 Commercial Service Manuals for cooling system service information.</p> <ol style="list-style-type: none"> <li>a. Test cooling system to ensure adequate freeze protection.</li> <li>b. Verify coolant contains no traces of transmission fluid, which would indicate a faulty oil cooler.</li> <li>c. Inspect radiator and charge air cooler for leaks, bent or broken fins, loose mounting, corrosion, and protruding objects.</li> <li>d. Inspect radiator hoses for cracks, bulges or soft spots. Ensure that hose clamps are tight.</li> <li>e. Inspect radiator cap, gaskets, and rubber isolator mounts and fan shroud for cracks and leaks.</li> <li>f. Replace coolant filter element (WP 0024 00).</li> <li>g. Inspect fan for cracks or looseness. Notify Direct Support maintenance if cracked or loose.</li> </ol> </div>  </div>	<ol style="list-style-type: none"> <li>c. Class III leaks are evident.</li> <li>e. Fan shroud is cracked. Class III leaks are evident.</li> <li>g. Fan is cracked, broken or loose.</li> </ol>

**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

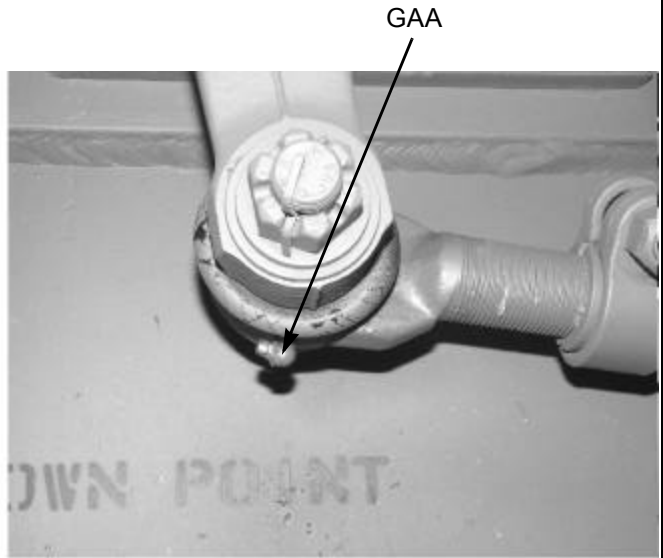
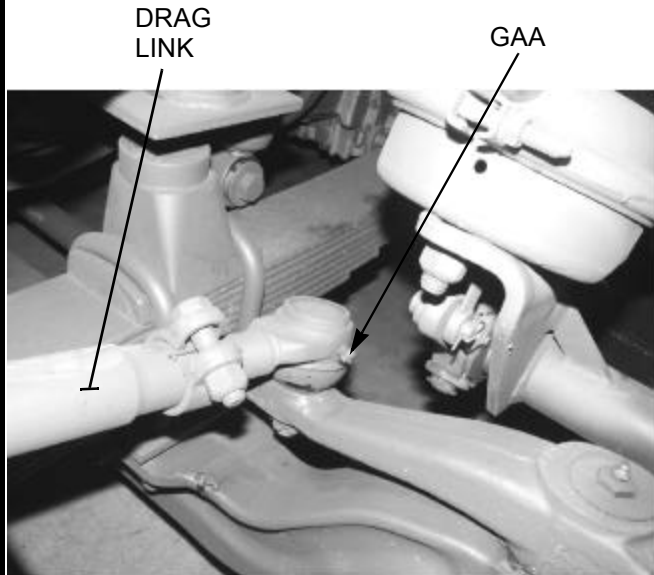
ITEM NO.	INTERVAL	LOCATION  ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
28	Semiannual	Batteries and Capacitor(s)	<div style="display: flex; justify-content: space-around; align-items: center;">   <div style="text-align: center;"> <p><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• To avoid injury, eye protection and acid-resistant gloves must be worn when working around batteries. Do not smoke, use open flame, make sparks or create other ignition sources around batteries. If a battery is giving off gases, it can explode and cause injury to personnel. Remove all jewelry such as rings, ID tags, watches, and bracelets. If jewelry or a tool contacts a battery terminal, a direct short will result in instant heating, damage to equipment, and injury to personnel.</li> <li>• To avoid injury, eye protection, protective clothing, and gloves must be worn when working around capacitors. Capacitors contain an electrolyte that is a potassium hydroxide solution. Potassium hydroxide is highly corrosive and can cause serious burns. If capacitor case becomes cracked, leaking electrolyte can result in fumes that are hazardous to inhale. If electrolyte makes contact with skin, eyes or clothing, take immediate action to stop the corrosive burning effects. Failure to follow these procedures may result in death or serious injury to personnel.</li> <li>• Remove all jewelry such as rings, ID tags, watches, and bracelets, when working around capacitors. If jewelry or a tool contacts a capacitor terminal, a direct short may result, causing instant heating and electric shock at the point of short circuit. Damage to equipment and injury to personnel could result.</li> </ul> <p style="text-align: center;"><b>CAUTION</b></p> <p>To reduce battery damage, do not remove batteries from battery box unless battery box is corroded (greenish/white powder) or during battery replacement. Do not jerk or pull on battery cables during inspection.</p> <ul style="list-style-type: none"> <li>a. Inspect battery box for evidence of corrosion. If box is corroded, remove batteries and capacitor(s) (WP 0114 00 and WP 0119 00). Clean battery box to remove all corrosion.</li> <li>b. Check batteries for damaged or missing filler caps.</li> <li>c. Check for damaged terminal posts.</li> <li>d. Check electrolyte level in batteries (TM 9-6140-200-14).</li> <li>e. Check and record specific gravity of each cell in all batteries (TM 9-6140-200-14).</li> <li>f. Inspect capacitor(s) for damaged terminal posts, corrosion, and cracked or leaking case.</li> <li>g. Check battery cables for looseness, frays, splits, and breaks. Replace any damaged cable (WP 0115 00).</li> </ul> </div>  </div>	<ul style="list-style-type: none"> <li>b. Battery is damaged or leaking.</li> <li>f. Case is cracked or leaking.</li> </ul>

**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
29	Semiannual	Air Conditioning System	Inspect/leak test AC system (WP 0057 00).	Any leaks are evident.
30	Semiannual	Air System, Brakes	a. Fully charge air system (TM 9-2320-312-10). b. Listen for sounds of leaks in all air lines and at valves and fittings. c. If air leaks are suspected, with air system fully pressurized, apply a solution of detergent (Item 23, WP 0165 00) and water to air lines, valves, and fittings. Tighten loose connections. Replace damaged components as required.	b. Any air leaks are evident.
31	Semiannual	Air Dryer	Replace air dryer desiccant cartridge (Group 150 Commercial Service Manuals).	
32	Semiannual	Front Axle Suspension	a. Inspect spring leaves for cracks and breaks. b. Inspect U-bolts, spring caps, and spring assembly attaching hardware for looseness, cracks or other damage. Tighten any loose component. c. Check shock absorbers for looseness or damage. Look for worn bushings and evidence of fluid leakage from shock absorber. If one shock absorber needs replacing replace both at the same time (WP 0032 00).	

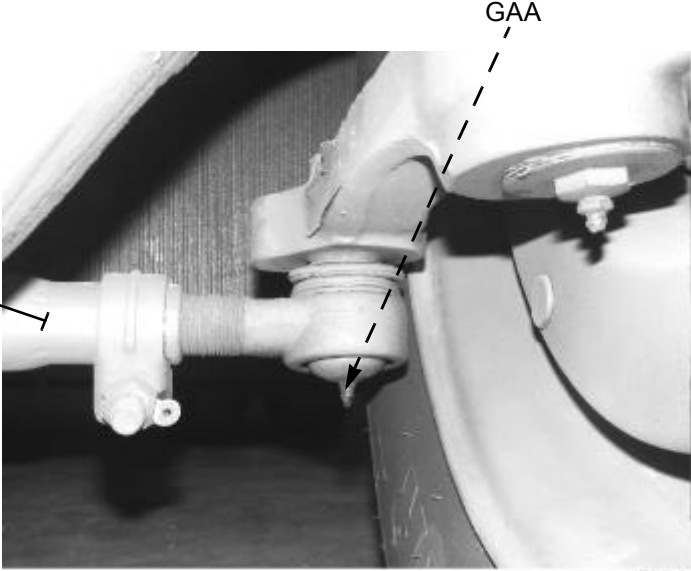
**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION  ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
33	Semiannual	Front Axle Steering Components	a. Move steering wheel and check for looseness in all steering column U-joints. There should be no play in U-joints. b. Check steering gear for leaks and loose mounting bolts and components. Tighten or replace damaged component. c. Check tie rod and drag link for movement by attempting to move by hand. Visually check ball joint ends for worn or damaged dust seals. Replace worn or damaged tie rod (Group 080 Commercial Service Manuals). If drag link is worn or damaged, notify Direct Support maintenance. d. Lubricate two drag link grease fittings with GAA grease (Item 30, WP 0165 00).	a. Play in U-joints is noted. b. Class III leaks are evident. c. Tie rod or drag link is worn or damaged.



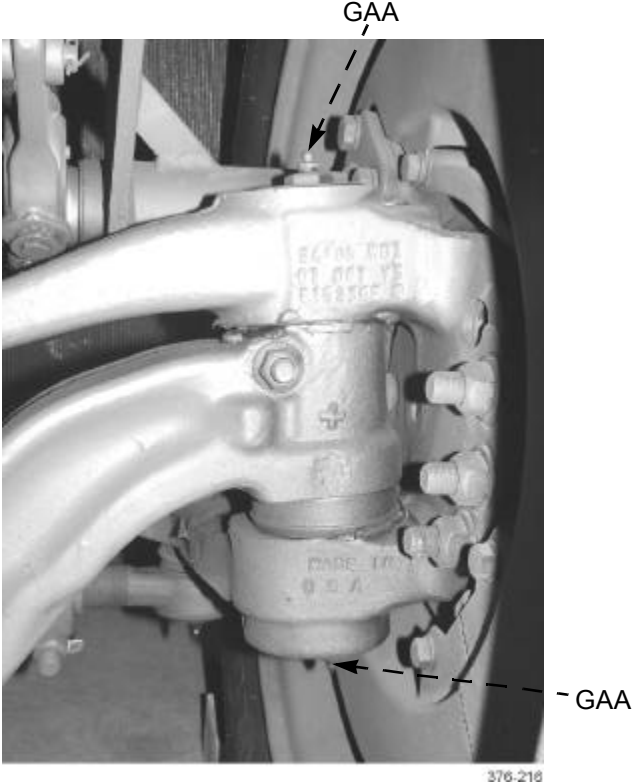
376-192

**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**



ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
33 (Con't)	Semiannual	Front Axle Steering Components	e. Lubricate two tie rod end grease fittings with GAA grease (Item 30, WP 0165 00).	
				




**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
33 (Con't)	Semiannual	Front Axle Steering Components	f. Lubricate top and bottom steering knuckle kingpin and thrust bearing grease fittings, on each end of steer axle. Use GAA grease (Item 30, WP 0165 00).	
				

**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
33 (Con't)	Semiannual	Front Axle Steering Components	g. Lubricate steering column U-joints and slip joint with GAA grease (Item 30, WP 0165 00). Observe purging from all seals until new grease comes out. If grease does not purge, manipulate U-joints until purging occurs.	
<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>STEERING COLUMN</p>  <p>INSIDE CAB</p> </div> <div style="text-align: center;"> <p>GAA</p>  <p>UNDER CAB</p> <p style="font-size: small;">378-217</p> </div> </div>				


**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
34	Semiannual	Front Axle Wheel Bearings	<p>a. Remove, clean, inspect, install, and adjust front axle wheel bearings (WP 0033 00).</p> <p>b. Refill hub ends with gear lubricating oil (Item 38, 39 or 40, WP 0165 00) until level of oil is at FULL line on sight glass (WP 0033 00).</p>	
 <p>FULL LINE</p>				
35	Semiannual	Front Brakes	Check brake adjustment at front axle. Adjust brakes as required (Group 080 Commercial Service Manuals).	
36	Semiannual	Propshaft	<p>a. Inspect condition of propshaft. Repair or replace propshaft as required (Group 120 Commercials Service Manuals).</p> <p>b. Ensure that lockstrap mounting screws are secure. If loose, tighten to 32-42 lb-ft (43-57 Nm) (Group 120 Commercial Service Manuals).</p> <p>c. Lubricate propshaft U-joints and front yoke (slip joint) with GAA grease (Item 30, WP 0165 00) (Group 120 Commercial Service Manuals).</p>	


**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION  ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
37	Semiannual	Rear Axle Assembly	<p style="text-align: center;"><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• Refer to Group 090 Commercial Service Manuals for instructions on performing the following maintenance.</li> <li>• Rear axle assembly refill capacity is 41 pt (19.4 L).</li> </ul> <p>a. While axle is still warm, drain oil from hub wheel ends and from differential.</p> <p>b. Perform scheduled <i>Routine Maintenance</i> as indicated in Section A, page A3 of the Commercial Service Manual.</p> <p>c. Remove and disassemble planet carrier unit and hub/annulus units. Perform a thorough inspection of all removed components.</p> <p>d. Inspect brake assembly components, to include brakeshoe lining thickness. Remove and repair components as required.</p> <p>e. Reassemble and install all removed components. Adjust wheel bearings (hub end float).</p> <p>f. Refill hub wheel ends and differential with gear lubricating oil (Item 38, 39 or 40, WP 0165 00).</p>	
38	Semiannual	Rear Brakes	Check brake adjustment at rear axle. Adjust brakes as required (Group 090 Commercial Service Manuals).	
39	Semiannual	Fifth Wheel Air Cylinder and Hose	<p>a. Inspect fifth wheel air cylinder and hose for looseness or damage. Replace any damaged component (WP 0083 00).</p> <p>b. With engine running and air system fully pressurized, operate fifth wheel lock and check for air leaks.</p> <p>b. Any leaks are evident.</p>	

**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION  ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
40	Semiannual	Pintle Hook	a. Lubricate two grease fittings with GAA grease (Item 30, WP 0165 00).  b. Check pintle hook for proper operation. Ensure that mounting hardware is tight and safety pin is present.	
				
41	Semiannual	Exhaust System	Inspect exhaust manifold, turbocharger, exhaust pipe, muffler, heat shields, clamps, and rain cap for looseness, damage or leaks. Replace damaged components as required.	Exhaust system is leaking.
42	Semiannual	Frame Assembly	Inspect frame assembly for cracks, breaks, bends, wear, deterioration, loose bolts, and broken welds.	Cracks, breaks, bends, wear, deterioration or broken or cracked welds are noted. Bolts are loose or missing.
43	Semiannual	Vehicle Exterior	a. Inspect for evidence of corrosion.  b. Inspect front bumper, cab glass and doors, fenders, mud flaps, rear platform, and steps for damage.	

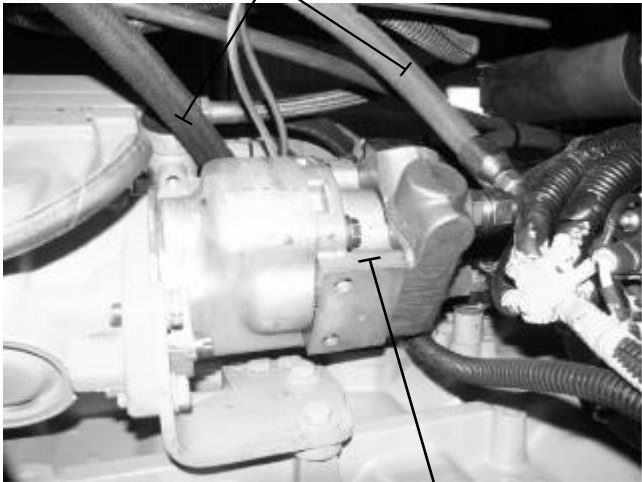
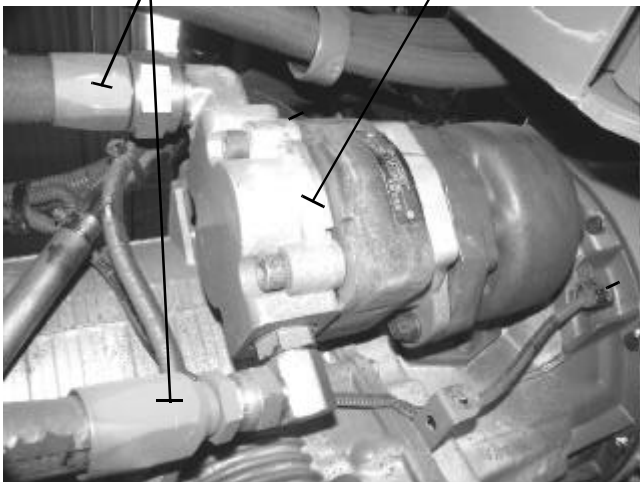
**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION  ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
44	Annual	Engine Electrical Components	a. Check electrical harnesses for burnt or frayed wires, corrosion, loose or broken connections. If connections are loose, tighten. If corrosion is present, clean.  b. Inspect, clean, and tighten cylinder head grounding stud located at left rear of engine. Coat with petrolatum (Item 48, WP 0165 00).	a. Wiring is burnt, frayed, split or missing.
<p>CYLINDER HEAD GROUNDING STUD</p>  <p style="text-align: right; font-size: small;">376-325</p>				
45	Annual	Starting Aid Relay and Capacitor	a. Check operation of capacitor start relay in battery box by first placing battery disconnect switch in ON position, then turning ignition switch to ON and OFF position. A clicking sound should be heard from relay each time ignition switch is turned ON. If no sound is present, perform troubleshooting (WP 0005 00).  b. Using a multimeter, check charge condition of capacitor. Voltage should be 24Vdc or greater. If voltage is not correct, perform troubleshooting (WP 0005 00).	
46	Annual	Aftercooler Core	Perform visual inspection of aftercooler (Group 020 Commercial Service Manuals).	

**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
47	Annual	Engine Vibration Damper	Perform maintenance check of vibration damper. Check for loss of alignment, cracks, deterioration of rubber, excess free movement, and fluid leakage from damper (Group 020 Commercial Service Manuals).	Vibration damper is loose, cracked or leaking.
48	Annual	Engine Mounts	Inspect engine mounts for looseness, cracks, bends or other damage.	Engine mounts are damaged or loose.
49	Annual	Transmission	a. Inspect transmission for the following: loose transmission mount or bolts, evidence of transmission fluid leaks, and electrical harnesses for burned or frayed wires, corrosion, loose or broken connections. b. Check oil cooler lines at transmission for evidence of leaks.	a. Loose or missing mounting bolts. Class III leaks are evident. b. Class III leaks are evident.
50	Annual	Hydraulic System (Power Steering and Fifth Wheel Lift)	<p style="text-align: center;"><b>NOTE</b></p> <p style="text-align: center;">Transmission refill capacity is 26 qt (25 L).</p> c. Change transmission fluid (Item 24, WP 0165 00) and replace transmission fluid filters (Group 070 Commercial Service Manuals).	
			<p style="text-align: center;"><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• Hydraulic system total capacity is 15 gal (56.8 L).</li> <li>• Hydraulic reservoir alone holds 12 gal (45.2 L).</li> </ul> a. Drain hydraulic reservoir (WP 0129 00). b. Replace hydraulic filter element (WP 0131 00). c. Refill hydraulic reservoir with hydraulic fluid (Item 25 or 26, WP 0165 00) (WP 0129 00).	

**Table 1. Unit Preventive Maintenance Checks and Services (PMCS)  
for the M878A2 Yard Tractor - Continued.**

ITEM NO.	INTERVAL	LOCATION  ITEM TO CHECK/ SERVICE	PROCEDURES	EQUIPMENT NOT READY/AVAILABLE IF:
50 (Con't)	Annual	Hydraulic System (Power Steering and Fifth Wheel Lift)	d. Inspect hoses, fittings, valves, and pumps of power steering and fifth wheel lift hydraulic system. Check for leaks and secure mounting. Tighten or replace any damaged component.	d. Class III leaks are evident.
<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>HYDRAULIC HOSES</p>  <p>376-214</p> <p>POWER STEERING PUMP - LEFT SIDE OF ENGINE</p> </div> <div style="text-align: center;"> <p>HYDRAULIC HOSES</p>  <p>376-652</p> <p>FIFTH WHEEL LIFT PUMP - RIGHT SIDE OF TRANSMISSION</p> </div> </div>				
51	Annual	Brake Pedals	Inspect service brake pedals for free travel, loose or broken parts or boot deterioration. Replace if worn or damaged (WP 0064 00).	
52	Annual	Front Axle	Check for signs of looseness at U-bolts. If looseness is noted, remove spring assembly U-bolt nuts, clean, reinstall, and apply torque of 450 lb-ft (610 Nm).	
53	Annual	Data Plates, Decals, and Stencils	Check data plates, decals, and stencils to ensure legibility. Replace as required (WP 0080 00).	



**Table 2. PMCS Mandatory Replacement Parts List - Initial 100 Hours (Break-In Service).**

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	102D-52		Filter Element, Hydraulic Filter (Power Steering and Fifth Wheel Lift Systems)	1
2	29540494	4330-01-425-7701	Parts Kit, Fluid Pressure Filter, Transmission	1

**Table 3. PMCS Mandatory Replacement Parts List - Semiannual.**

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	R950011	4440-01-443-9031	Cartridge, Dehydrator, Air Dryer	1
2	1R0739	2940-00-029-0388	Filter, Engine Oil	1
3	WC-2	2940-01-133-8301	Filter Element, Fluid, Coolant Filter	1
4	IN F830	4330-01-371-9777	Filter Element, Fuel/Water Separator	1
5	1R0751	2910-01-424-7315	Filter, Fuel, Secondary Fuel Filter	1
6	R8595/187		Oil Seal, Hub, Rear Axle	2
7	207.271.9706	5331-99-745-7876	O-Ring, Hub Extension, Rear Axle	2
8	R4875ML5391	5331-99-828-7212	O-Ring, Planet Carrier, Rear Axle	2
9	200-214-4460	5331-99-540-6838	O-Ring, Planet Pin, Rear Axle	6

**Table 4. PMCS Mandatory Replacement Parts List - Annual.**

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	102D-52		Filter Element, Hydraulic Filter (Power Steering and Fifth Wheel Lift Systems)	1
2	29540494	4330-01-425-7701	Parts Kit, Fluid Pressure Filter, Transmission	1

**END OF WORK PACKAGE**

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**ENGINE OIL DIPSTICK TUBE REPLACEMENT**

0010 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 020

**RPSTL Reference**

Appendix A

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Rag, wiping (Item 51, WP 0165 00)

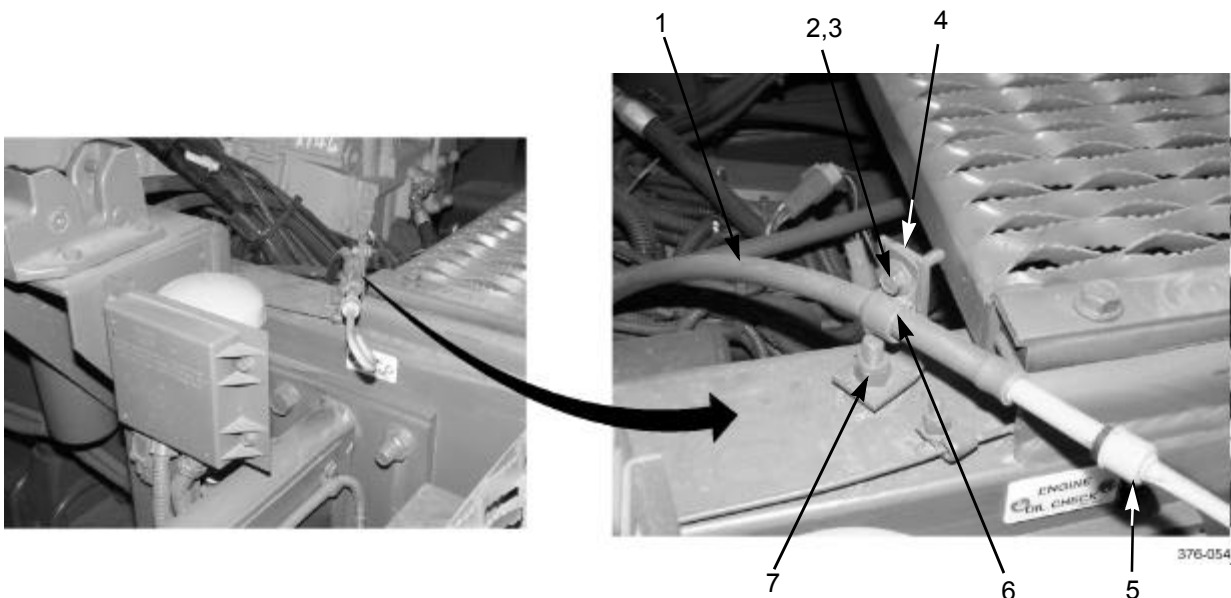
**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

**REMOVAL****CAUTION**

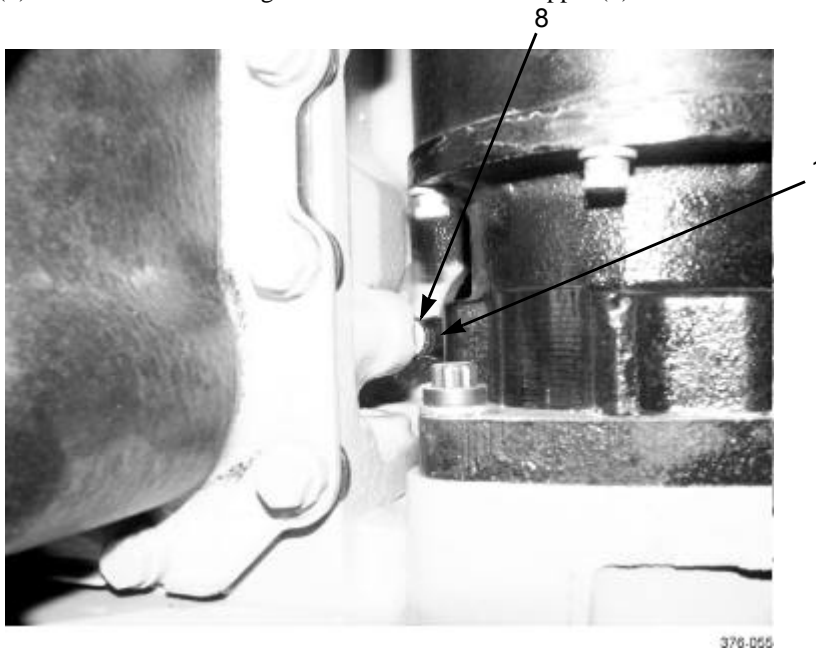
Wipe area around dipstick tube clean before removing, to prevent debris from entering the lubrication system.

1. Remove dipstick (5) from dipstick tube (1).
2. Remove nut (2), screw (3), clamp (6), and dipstick tube (1) from bracket (4).
3. If bracket (4) is damaged, remove nut (7) and bracket from frame.



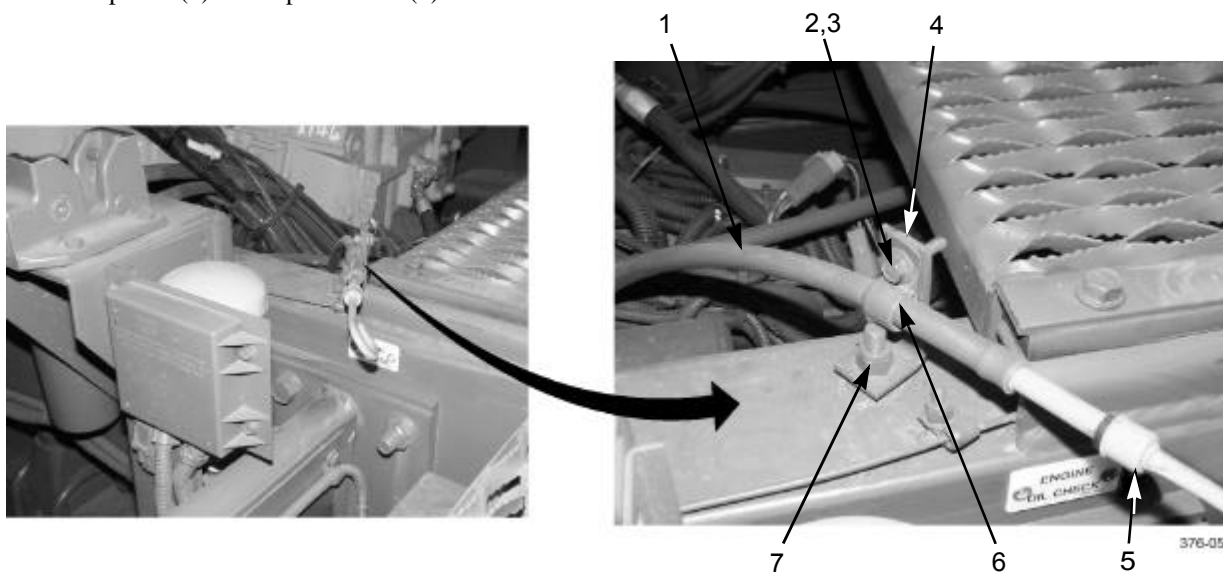
**REMOVAL - CONTINUED**

- Trace dipstick tube (1) toward left side of engine. Remove tube from nipple (8).



**INSTALLATION**

- Install dipstick tube (1) to nipple (8).
- If removed, install bracket (4) to stud on frame with nut (7).
- Install dipstick tube (1) and clamp (6) to bracket (4) with screw (3) and nut (2).
- Install dipstick (5) into dipstick tube (1).



- Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**ENGINE OIL AND OIL FILTER REPLACEMENT**

**0011 00**

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**THIS WORK PACKAGE COVERS**

Draining, Oil Filter Replacement, Filling

---

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 020

**RPSTL Reference**

Appendix A

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Oil, lubricating (Item 42, 43 or 44, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Filter, engine oil (P/N 1R0739)

Seal, o-ring (P/N 169-7487)

**References**

WP 0008 00

**Equipment Condition**

Vehicle parked on level surface

Cab tilted (TM 9-2320-312-10)



**WARNING**



- Some state and federal agencies have determined that used engine oil can be carcinogenic and can cause reproductive toxicity. Avoid inhalation of vapors, ingestion, and prolonged contact with used engine oil.
- Avoid direct contact of hot oil with your skin. Hot oil can cause serious burns.

**NOTE**

Use a drain pan with a capacity of at least 22 qt (21 L) to capture engine oil. Ensure all spills are cleaned up.

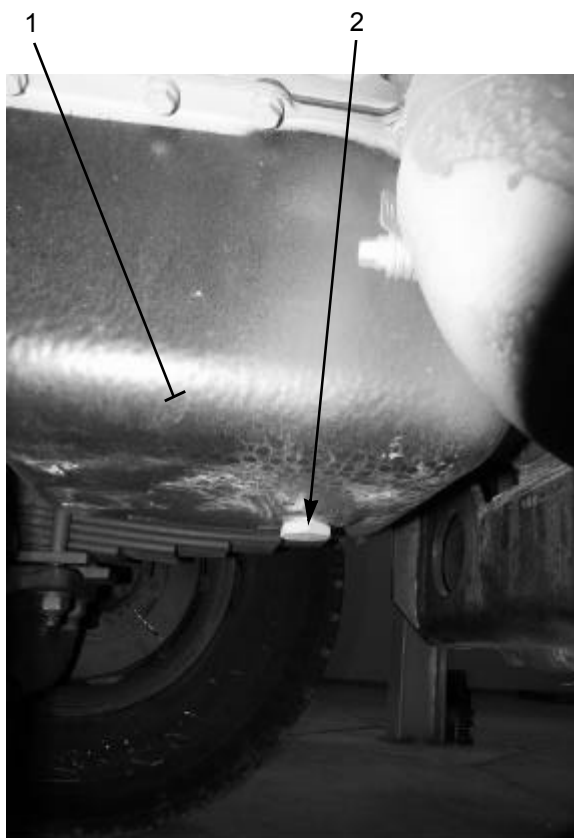
**DRAINING**

1. Operate engine until normal operating temperature is reached. Shut down engine (TM 9-2320-312-10).

**WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

2. Remove drain plug (2) and o-ring seal from oil pan (1). Allow all oil to drain. Dispose of oil in accordance with local policy and ordinances. Discard o-ring seal.
3. Clean drain plug (2) and inspect for damage. Reinstall new o-ring seal and drain plug and tighten to 20 lb-ft (27 Nm).



376-000

**OIL FILTER REPLACEMENT**

1. Clean area around filter base (3).

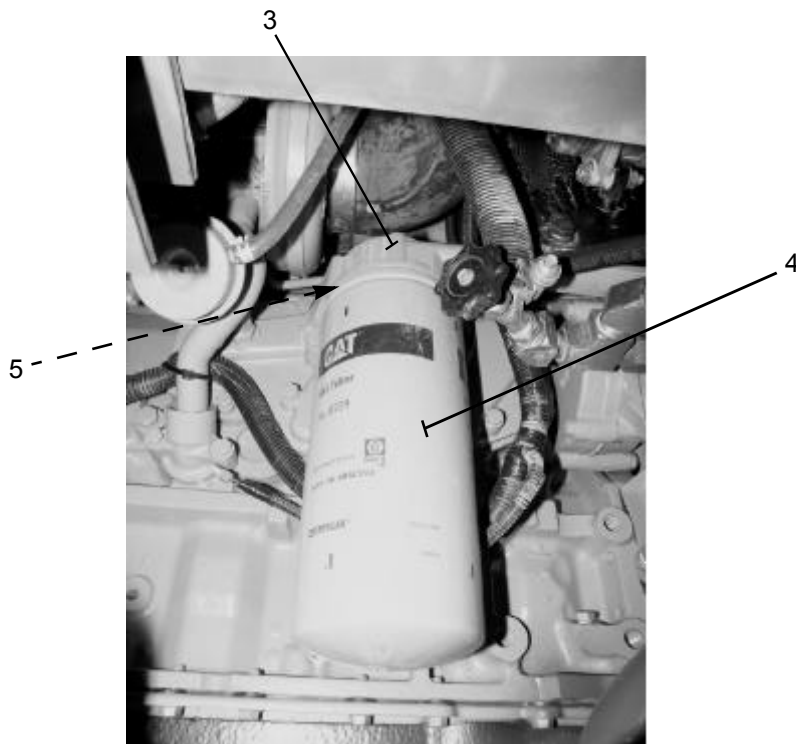
**WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

2. Use a strap wrench to remove oil filter (4). Discard filter.
3. Clean gasket sealing surface of filter base (3). Ensure all old gasket material is removed.
4. Apply a thin film of oil to new gasket (5) of new oil filter (4).

**CAUTION**

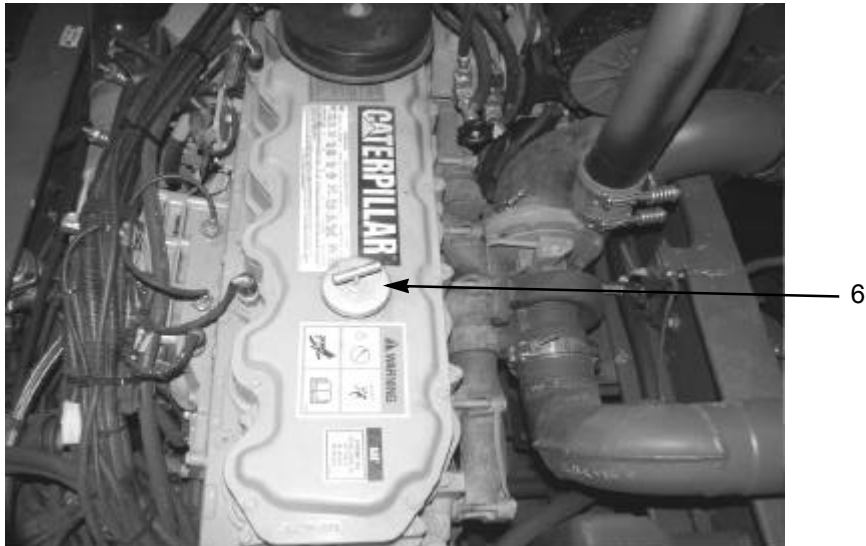
- DO NOT fill oil filter with oil before installing. Oil would not be filtered and could be contaminated. Contaminated oil can cause accelerated wear to engine components.
  - DO NOT use a strap wrench to tighten oil filter. Overtightening can damage oil filter and cause oil leaks.
5. Install oil filter (4) by hand until gasket (5) contacts filter base (3). Tighten an additional  $\frac{3}{4}$  turn, as specified by filter manufacturer. DO NOT overtighten oil filter.



378-061

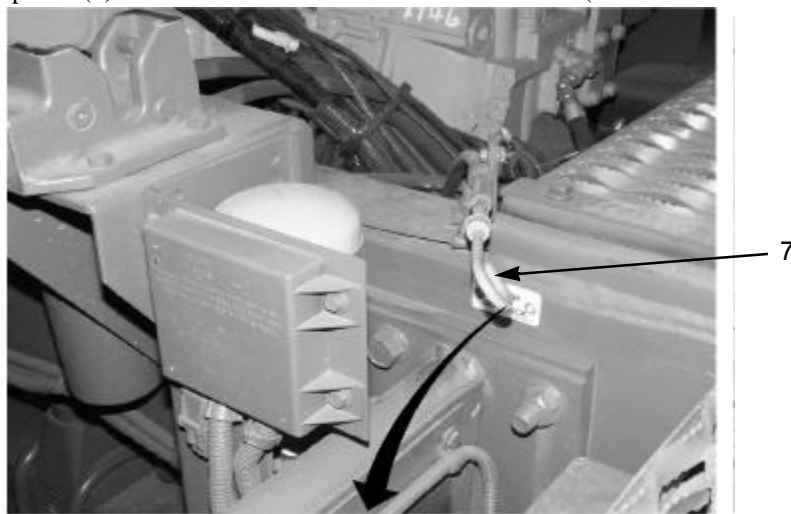
**FILLING**

1. Fill engine, through crankcase filler opening (6), with clean engine lubricating oil. Refer to lubrication *KEY* in WP 0008 00 for correct oil for expected temperature range.



376-039

2. Check level of oil on dipstick (7). Level should be within cross-hatched area (OPERATING RANGE) on dipstick.



376-082

3. Lower cab (TM 9-2320-312-10).
4. Start engine (TM 9-2320-312-10) and check for oil leaks. Recheck oil level on dipstick (7).
5. Shut down engine (TM 9-2320-312-10).

**END OF WORK PACKAGE**



**ENGINE SERPENTINE BELT REPLACEMENT**

**0012 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 020

**RPSTL Reference**

Group 020, Figure 6

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Equipment Condition**

Engine cool

Cab tilted (TM 9-2320-312-10)

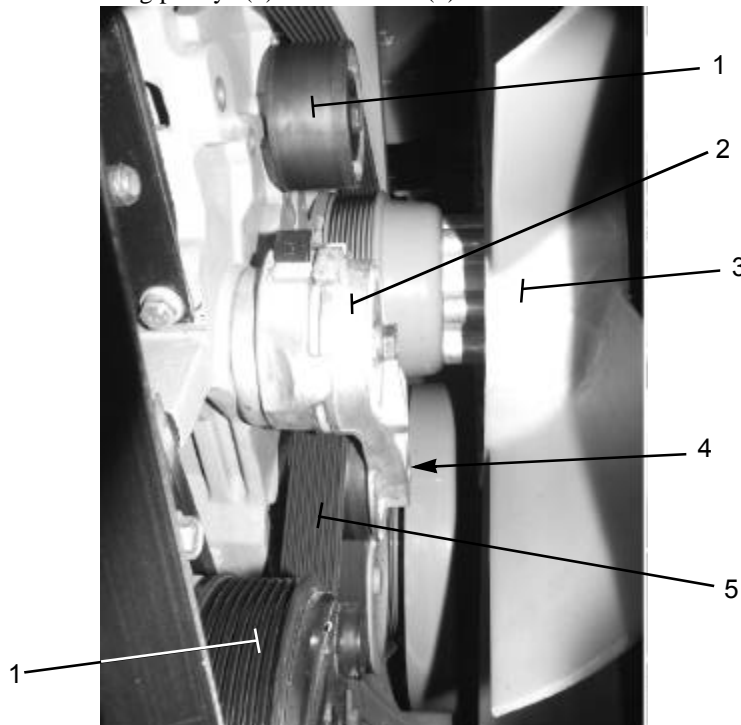
**REMOVAL**

1. Disconnect air line from fan clutch.
2. Using ½ in drive handle with no socket, insert square shaft of drive handle into square hole (4) of belt tensioner (2) at front of engine.
3. While rotating belt tensioner (2) clockwise to relieve tension in belt (5), remove belt from alternator pulley.
4. Gradually allow belt tensioner (2) to rotate to free position and remove drive handle.

**NOTE**

Note position of belt around pulleys for installation.

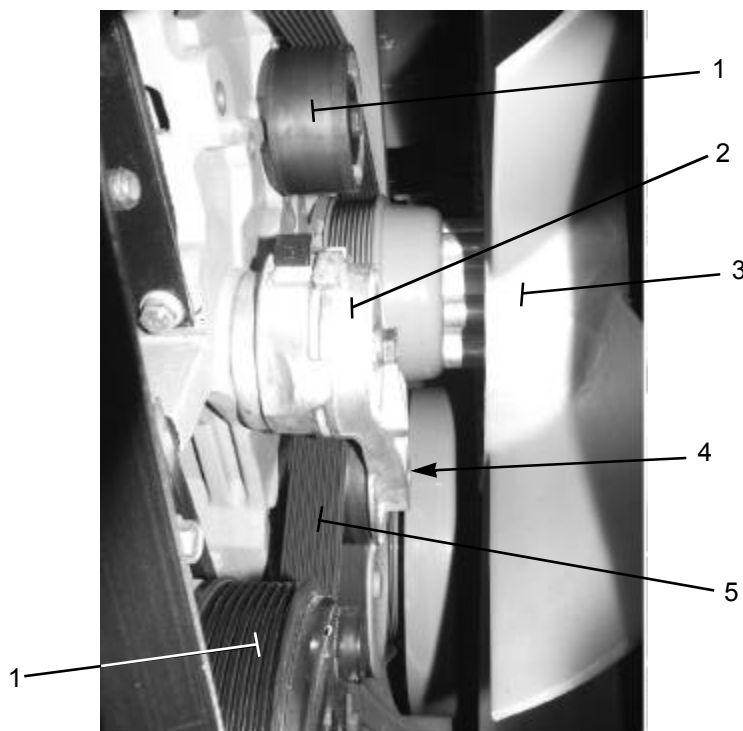
5. Remove belt (5) from six remaining pulleys (1) and from fan (3).



378-351

**INSTALLATION**

1. Position belt (5) over fan (3) to pulleys (1) at front of engine, except alternator pulley.
2. Insert square shaft of ½ in drive handle into square hole (4) of belt tensioner (2).
3. While rotating belt tensioner (2) clockwise, position belt (5) over alternator pulley.
4. Gradually allow pulley of belt tensioner (2) to contact belt (5) and remove drive handle from belt tensioner.



5. Connect air line to fan clutch.
6. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**BELT TENSIONER REPLACEMENT**

**0013 00**

---

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 020

**RPSTL Reference**

Appendix A

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Equipment Condition**

Engine serpentine belt removed (WP 0012 00)

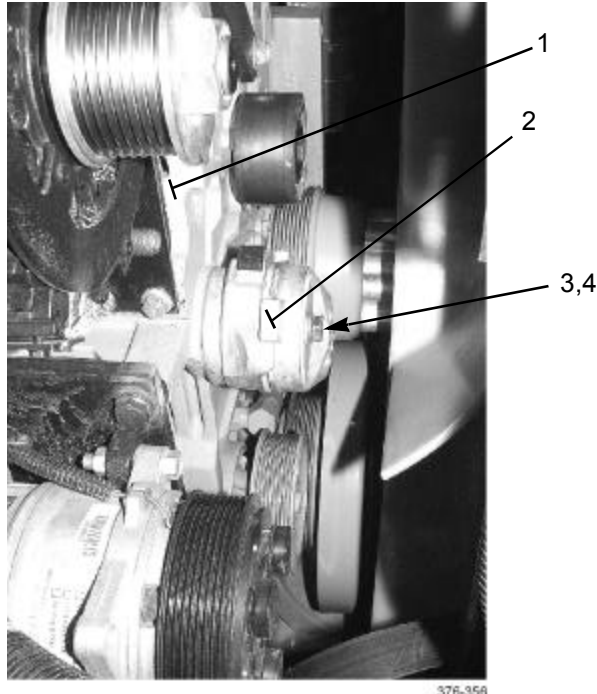
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**REMOVAL**

**NOTE**

Note position of belt tensioner on front of engine for installation.

Remove bolt (3), washer (4), and belt tensioner (2) from front of engine (1).



**INSTALLATION**

1. Install belt tensioner (2) to front of engine (1) with washer (4) and bolt (3).
2. Install engine serpentine belt (WP 0012 00).

**END OF WORK PACKAGE**

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**THROTTLE POSITION SENSOR (TPS) ASSEMBLY REPLACEMENT**

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0014 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 020

**RPSTL Reference**

Group 020, Figure 4

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Strap, tiedown (Item 57, WP 0165 00)

**Personnel Required**

Two

**References**

TM 9-2320-312-10

**WARNING**

Always check that cab safety prop is properly engaged before working under cab. Cab could fall and cause serious injury or death.

**NOTE**

Cut tiedown straps as required and discard. Use new tiedown straps on installation.

**REMOVAL**

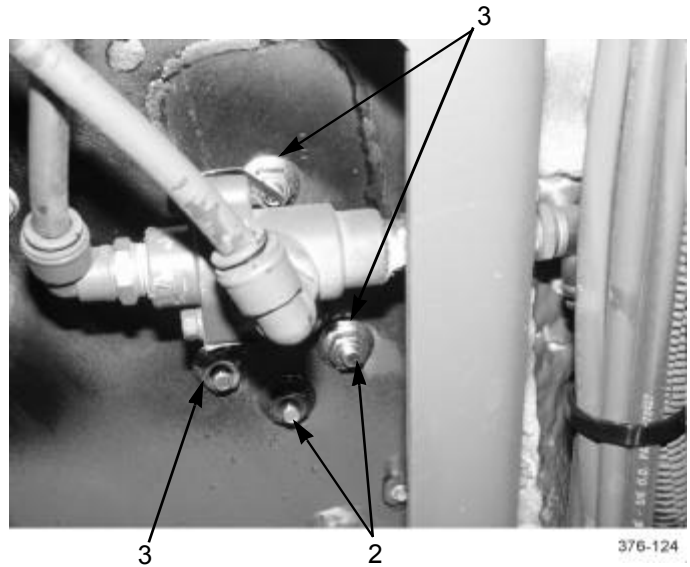
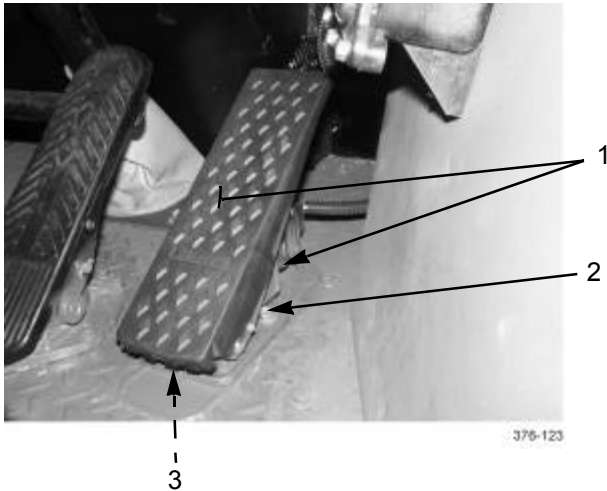
1. Tilt cab sufficiently to allow access to throttle position sensor mounting hardware under cab. Assistant must also be able to reach mounting hardware inside cab (TM 9-2320-312-10).
2. Place battery disconnect switch in OFF position.

**THROTTLE POSITION SENSOR (TPS) ASSEMBLY REPLACEMENT - CONTINUED**

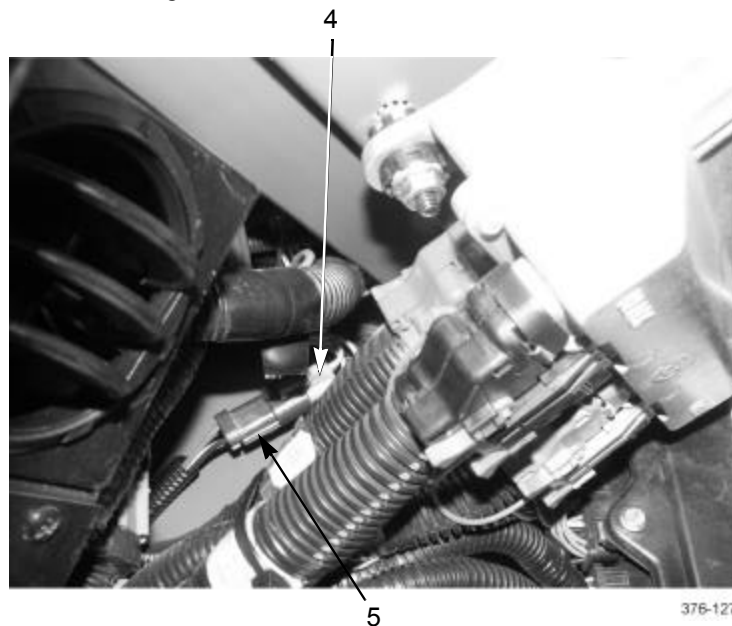
0014 00

**REMOVAL - CONTINUED**

3. Remove four nuts (3) from bolts (2) under cab.
4. Remove throttle position sensor assembly (1) from floor of cab.



5. Trace wiring harness of throttle position sensor assembly (1) back to connection point under instrument panel. Disconnect connector (5) from vehicle wiring harness connector (4).



**INSTALLATION**

1. Connect throttle position sensor assembly connector (5) to vehicle wiring harness connector (4).
2. Install throttle position sensor assembly (1) to floor of cab with four bolts (2) and nuts (3).
3. Place battery disconnect switch in ON position.
4. Lower cab (TM 9-2320-312-10).
5. Start engine (TM 9-2320-312-10). Ensure throttle position sensor assembly functions properly.

**END OF WORK PACKAGE**

**ENGINE AIR CLEANER AND AIR INTAKE TUBES AND HOSES REPLACEMENT**

0015 00

**THIS WORK PACKAGE COVERS**

Filter Element Replacement  
 Engine Air Cleaner: Removal, Installation  
 Air Intake Tubes and Hoses: Removal, Installation

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 020

**RPSTL Reference**

Group 020, Figure 2

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166  
 00)

**Materials/Parts**

Rag, wiping (Item 51, WP 0165 00)

Filter element (P/N P150692)

**References**

TM 9-2320-312-10

WP 0078 00

**Equipment Condition**

Engine shut down

**WARNING**

- If NBC exposure is suspected, personnel wearing protective equipment must handle all air cleaner media. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.
- NBC contaminated filters must be handled using adequate precautions (FM 21-40) and must be disposed of by trained personnel.

**CAUTION**

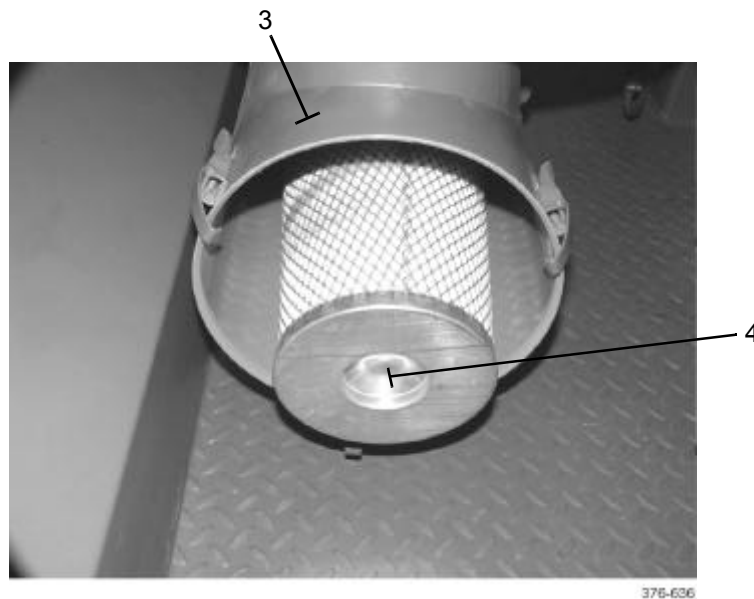
Service engine air cleaner and replace air intake tubes and hoses with engine shut down. Engine damage could result if service is performed with engine running.

***FILTER ELEMENT REPLACEMENT***

1. Release three clamps (2) and remove cover (1) from air cleaner housing (3).



2. Remove filter element (4) from housing (3). Discard filter element.
3. Wipe inside of housing (3) with a clean rag.
4. Install new filter element (4) inside housing (3), with smaller closed end facing outward.



5. Install cover (1) on housing (3) and secure with three clamps (2).

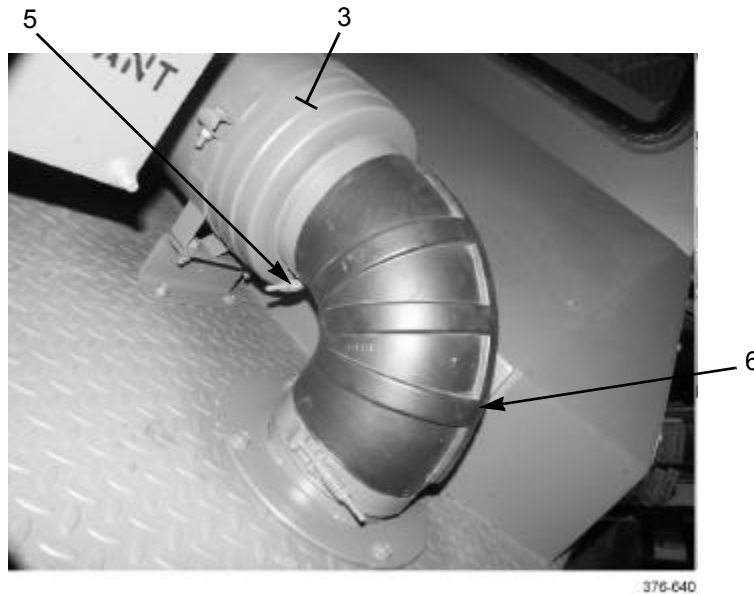


***FILTER ELEMENT REPLACEMENT - CONTINUED***

6. Reset air cleaner restriction indicator on instrument panel by pressing yellow reset button at bottom of gauge (TM 9-2320-312-10).
7. Start engine (TM 9-2320-312-10).
8. Ensure yellow band on air cleaner restriction indicator is in green zone on gauge.

***ENGINE AIR CLEANER REMOVAL***

1. Loosen clamp (5) and remove elbow (6) from air cleaner housing (3).



**ENGINE AIR CLEANER REMOVAL - CONTINUED**

- Remove two nuts (10), screws (11), and air cleaner from two clamps (9).

**NOTE**

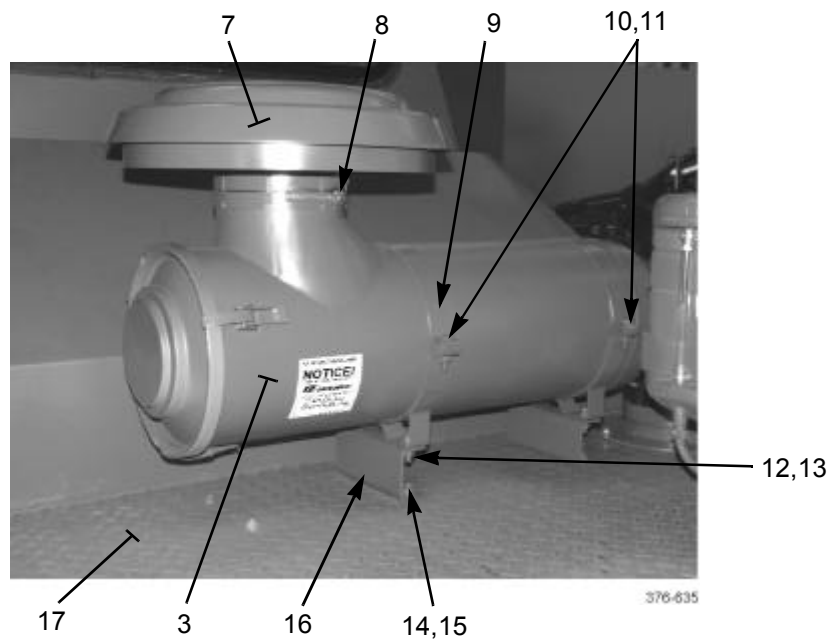
Perform steps 3 through 5 only as required to replace damaged components.

- Loosen clamp (8) and remove hood (7) from air cleaner housing (3).
- Remove two nuts (12), screws (13), and each clamp (9) from bracket (16).

**NOTE**

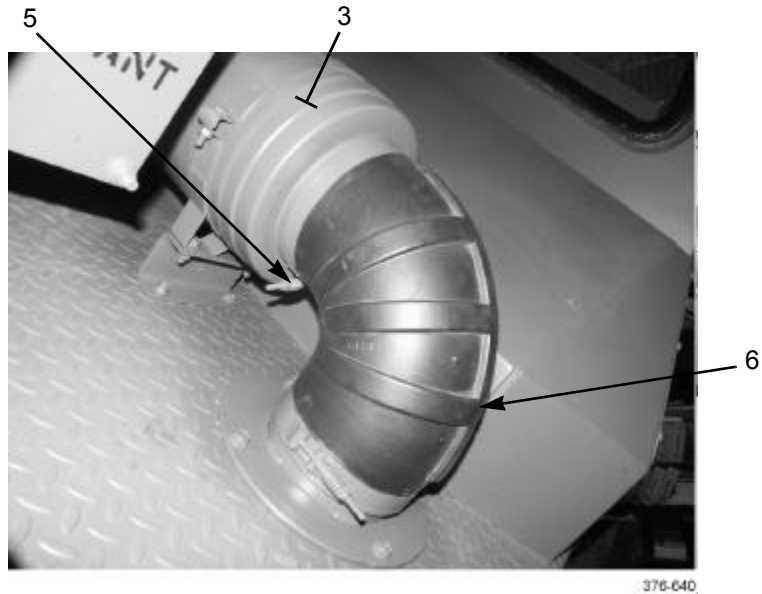
Cab must be tilted (TM 9-2320-312-10) to perform step 5.

- Remove two nuts (14), screws (15), and each bracket (16) from cab deck (17).

**ENGINE AIR CLEANER INSTALLATION**

- If removed, install each bracket (16) to cab deck (17) with two screws (15) and nuts (14). Lower cab (TM 9-2320-312-10).
- If removed, install each clamp (9) to bracket (16) with two screws (13) and nuts (12).
- If removed, install hood (7) to air cleaner housing (3) and tighten clamp (8).
- Position air cleaner inside two clamps (9). Secure each clamp with screw (11) and nut (10).
- Install elbow (6) to air cleaner housing (3) and tighten clamp (5).

**ENGINE AIR CLEANER INSTALLATION - CONTINUED**

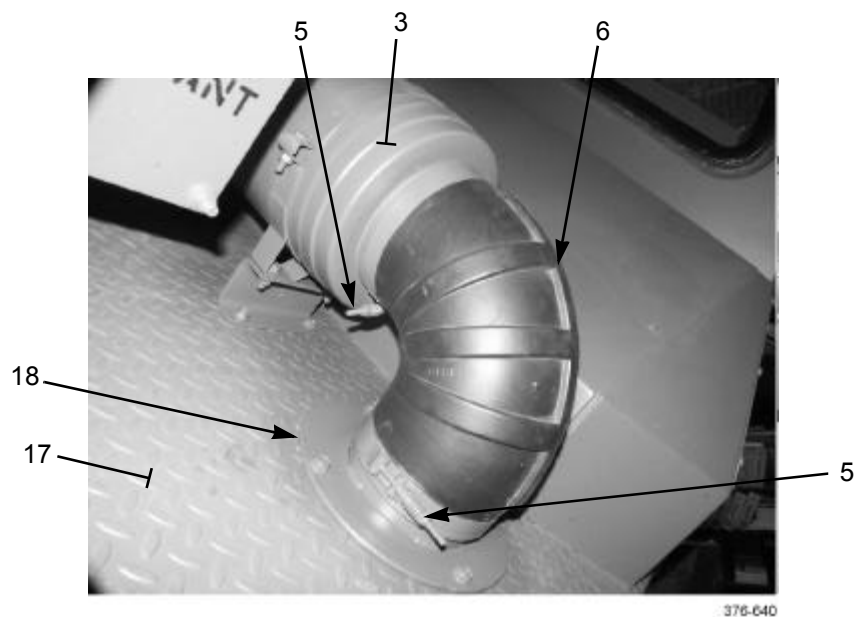


**AIR INTAKE TUBES AND HOSES REMOVAL**

**NOTE**

Note positioning of air intake tubes and hoses to ensure correct installation.

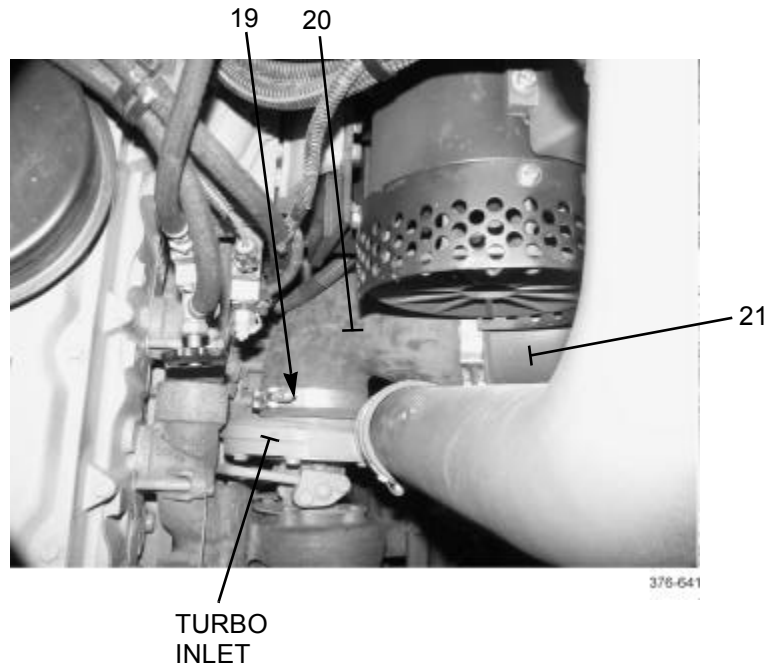
1. Tilt cab (TM 9-2320-312-10).
2. To remove elbow (6) above cab deck (17), loosen two clamps (5) and remove hose from air cleaner housing (3) and flange (18).



**AIR INTAKE TUBES AND HOSES REMOVAL - CONTINUED****NOTE**

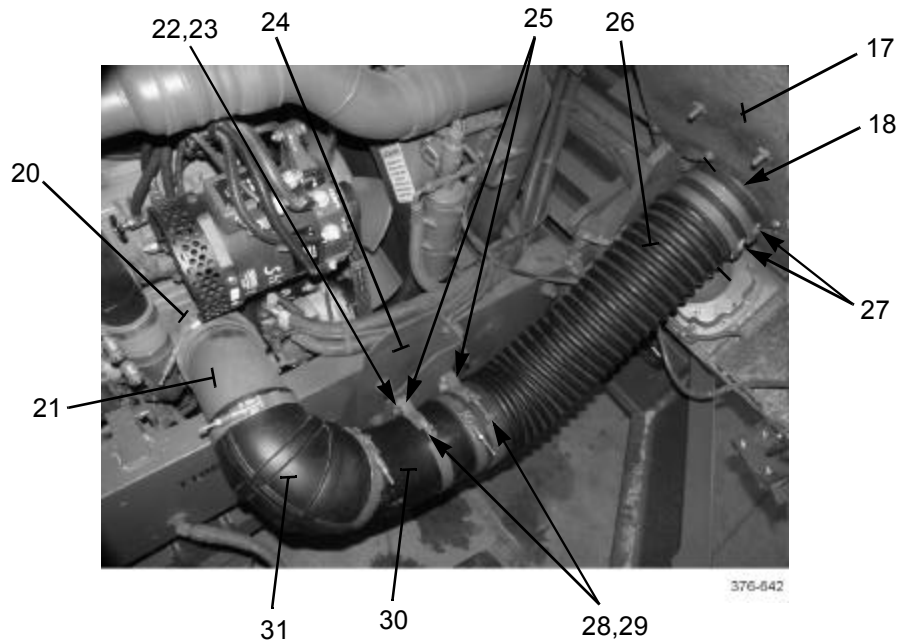
Two latches and retainer straps may be spread apart for ease in installing air cleaner.

3. At turbo inlet end under cab deck (17), loosen clamp (19) and disconnect elbow (20).
4. Remove air cleaner restriction indicator hose and fitting from tube (21) (WP 0078 00).

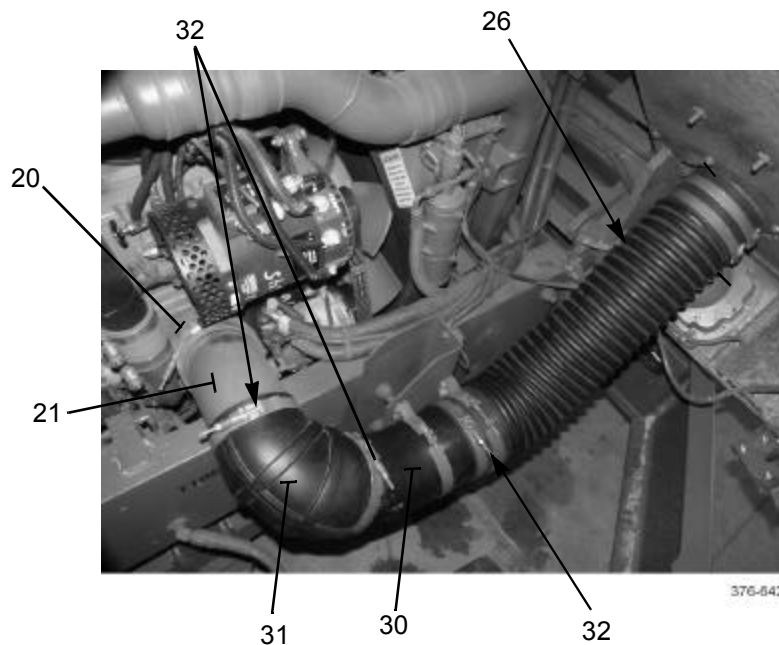


5. Loosen two clamps (27) and disconnect hose (26) from flange (18).
6. Remove two nuts (28) and screws (29) from two clamps (25). Release tube (30) and assembled hose (26) from attachment to frame bracket (24).
7. If clamps (25) are damaged, remove two nuts (22), screws (23), and each clamp from frame bracket (24).

**AIR INTAKE TUBES AND HOSES REMOVAL - CONTINUED**



8. Loosen four clamps (32) and separate elbow (20), tube (21), elbow (31), tube (30), and hose (26).

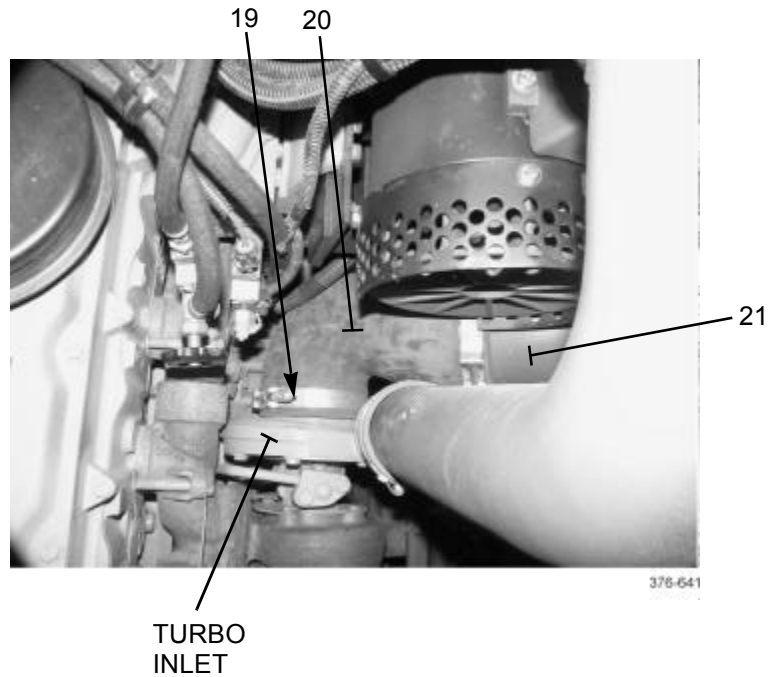


**AIR INTAKE TUBES AND HOSES INSTALLATION**

1. Assemble elbow (20), tube (21), elbow (31), tube (30), and hose (26) with four clamps (32). Do not fully tighten clamps.
2. If removed, install two clamps (25) to frame bracket (24) with two screws (23) and nuts (22) each clamp.
3. Secure tube (30) with assembled hose (26) to clamps (25) with two screws (29) and nuts (28).
4. Connect hose (26) to flange (18) and fully tighten two clamps (27).

**AIR INTAKE TUBES AND HOSES INSTALLATION - CONTINUED**

5. At turbo inlet, connect hose (20) and fully tighten clamp (19).
6. Install fitting and air cleaner restriction indicator hose to tube (21) (WP 0078 00).



7. Fully tighten all loose clamps.
8. Lower cab (TM 9-2320-312-10).
9. Reset air cleaner restriction indicator on instrument panel by pressing yellow reset button on gauge (TM 9-2320-312-10).
10. Start engine (TM 9-2320-312-10).
11. Ensure that air cleaner restriction indicator reads in yellow zone on gauge.

**END OF WORK PACKAGE**

**CHARGE AIR COOLING LINES REPLACEMENT**

**0016 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 020

**RPSTL Reference**

Group 020, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Detergent (Item 23, WP 0165 00)

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

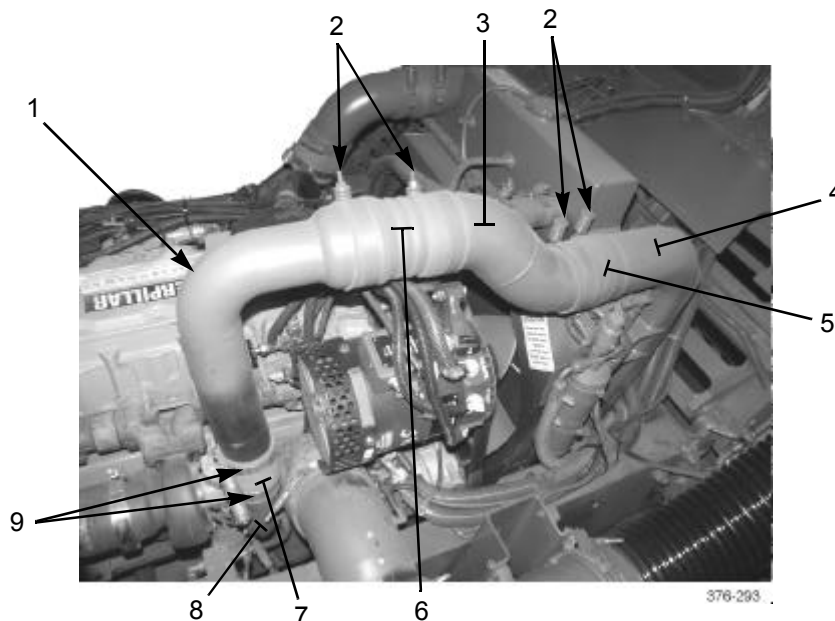
Engine cool

**REMOVAL**

**NOTE**

Perform steps 1 and 2 for charge air cooling lines at right side of engine.

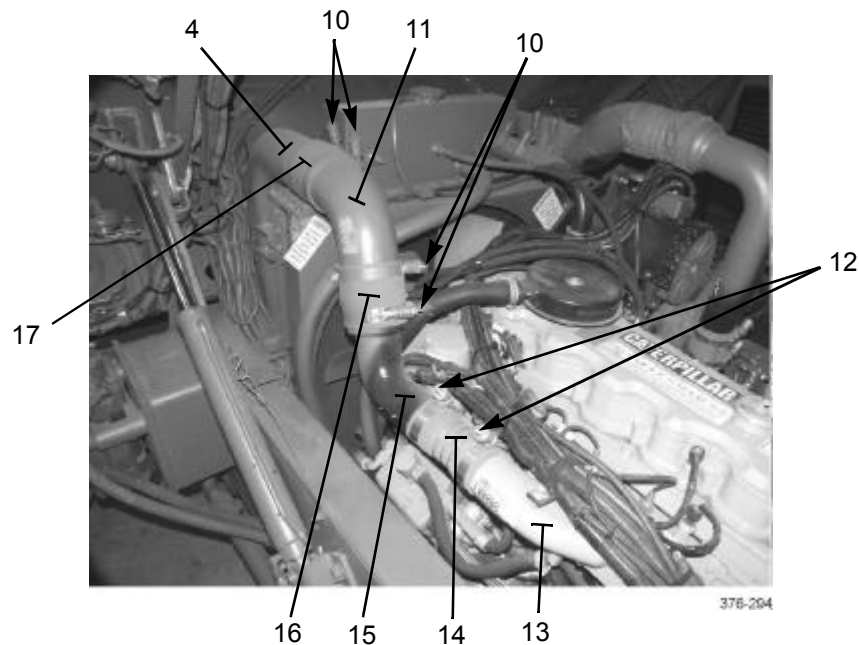
1. Starting at turbocharger (8), loosen and remove two hose clamps (9) and four hose clamps (2).
2. Remove small hose (7), elbow (1), hose (6), tube (3), and hose (5) from between turbocharger (8) and charge air cooler (4).



**REMOVAL - CONTINUED****NOTE**

Perform steps 3 and 4 for charge air cooling lines at left side of engine.

3. Starting at charge air cooler (4), loosen and remove four hose clamps (10) and two hose clamps (12).
4. Remove hose (17), elbow (11), hose (16), adapter (15), and small hose (14) from between charge air cooler (4) and engine intake manifold (13).

**INSTALLATION****NOTE**

- Perform steps 1 and 2 for charge air cooling lines at left side of engine.
  - Use a solution of detergent and water as necessary to lubricate hoses for ease in installation.
1. Position small hose (14), adapter (15), hose (16), elbow (11), and hose (17) between engine intake manifold (13) and charge air cooler (4).
  2. Install two hose clamps (12) and four hose clamps (10). Tighten clamps to 72 lb-in (8 Nm).

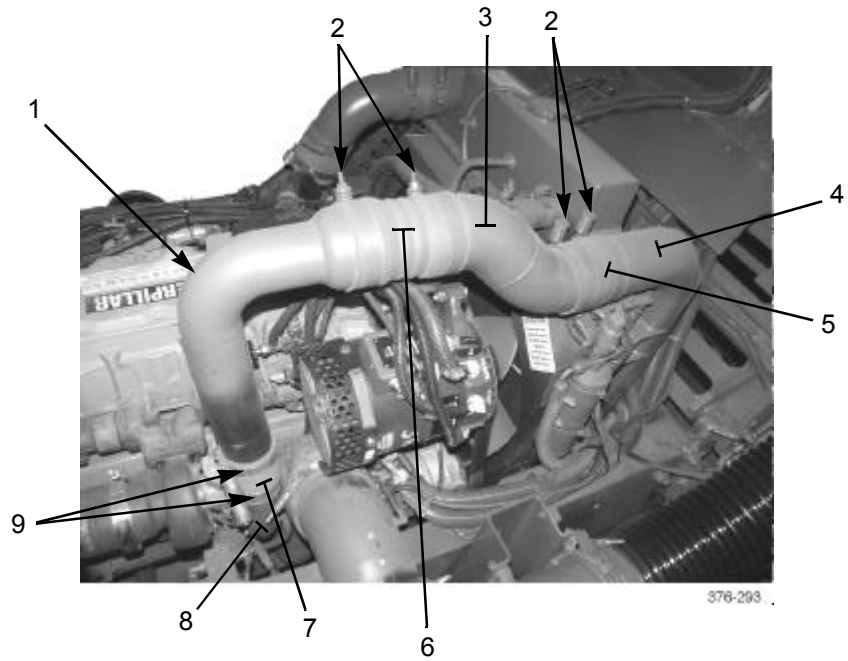
**NOTE**

Perform steps 3 and 4 for charge air cooling lines at right side of engine.

3. Position hose (5), tube (3), hose (6), elbow (1), and small hose (7) between charge air cooler (4) and turbocharger (8).
4. Install four hose clamps (2) and two hose clamps (9). Tighten clamps to 72 lb-in (8 Nm).



**INSTALLATION - CONTINUED**



- 5. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**THIS WORK PACKAGE COVERS**

Fuel Priming Pump Assembly: Removal, Installation

Secondary Fuel Filter Replacement

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 020

**RPSTL Reference**

Appendix A

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Fuel (Item 28, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Filter, fuel, secondary (P/N 1R0751)

Seal, o-ring (P/N 6V8397)

Washer, lock (P/N 9M-1974) (2)

**Equipment Condition**

Cab tilted (TM 9-2320-312-10).

Battery disconnect switch in OFF position



**WARNING**

- DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.
- Wear fuel-resistant gloves when handling fuels and promptly wash exposed skin and change fuel-soaked clothing.

**FUEL PRIMING PUMP ASSEMBLY REMOVAL****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

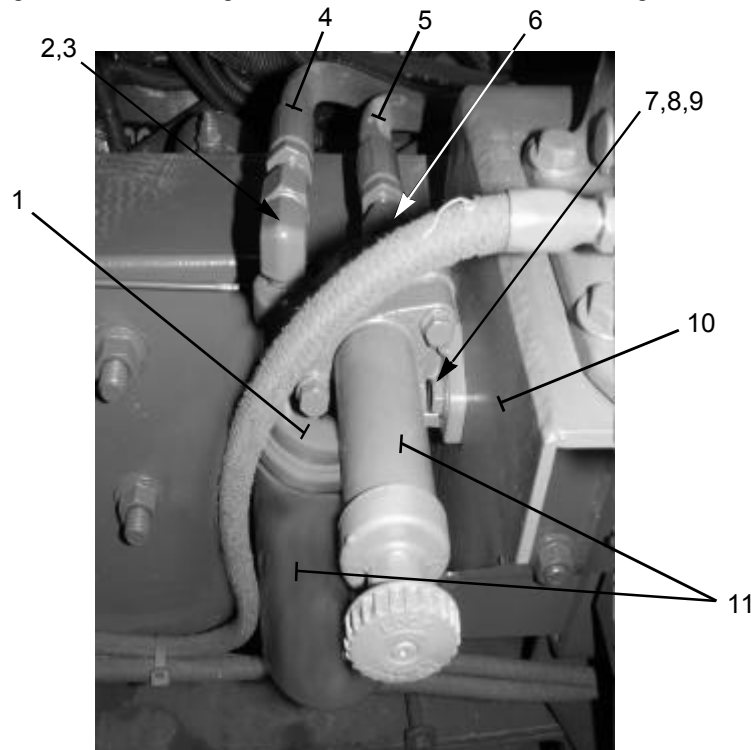
**CAUTION**

Wipe area clean around all fuel connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of fuel system could result in equipment failure.

**NOTE**

- Use a drain pan to capture any draining fuel. Dispose of fuel in accordance with local policy and ordinances. Ensure all spills are cleaned up.
- Tag fuel hoses to ensure correct installation.

1. Remove secondary fuel filter (Refer to *Secondary Fuel Filter Replacement*) and discard.
2. Disconnect outlet fuel hose (5) from fitting (6) at filter base (1).
3. Disconnect inlet fuel hose (4) from elbow (2).
4. Remove two nuts (7), screws (8), lockwashers (9), and fuel priming pump assembly (11) from cab tilt latch mounting bracket (10). Discard lockwashers.
5. Remove elbow (2), o-ring seal (3), and fitting (6) from filter base (1). Discard o-ring seal.



**FUEL PRIMING PUMP ASSEMBLY INSTALLATION**

1. Install fitting (6), new o-ring seal (3) and elbow (2) to filter base (1).
2. Install fuel priming pump assembly (11) to cab tilt latch mounting bracket (10) with two new lockwashers (9), screws (8), and nuts (7).
3. Connect inlet fuel hose (4) to elbow (2).
4. Connect outlet fuel hose (5) to fitting (6) at filter base (1).
5. Install a new secondary fuel filter (Refer to *Secondary Fuel Filter Replacement*), if not already installed.
6. Place battery disconnect switch in ON position.

**CAUTION**

DO NOT loosen fuel lines at fuel manifold when priming fuel system. Engine components may be damaged and/or loss of priming pressure may occur when fuel lines are loosened.

7. Prime fuel system (TM 9-2320-312-10).
8. Start engine (TM 9-2320-312-10) and check for fuel leaks.

**SECONDARY FUEL FILTER REPLACEMENT****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**CAUTION**

Wipe area clean around all fuel connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of fuel system could result in equipment failure.

**NOTE**

Use a drain pan to capture any draining fuel. Dispose of fuel in accordance with local policy and ordinances. Ensure all spills are cleaned up.

**SECONDARY FUEL FILTER REPLACEMENT - CONTINUED**

1. Use a strap wrench to remove fuel filter (12) from filter base (1). Discard filter.
2. Clean gasket sealing surface of filter base (1). Ensure all old gasket material is removed.
3. Apply clean fuel to gasket (13) of new fuel filter (12).

**CAUTION**

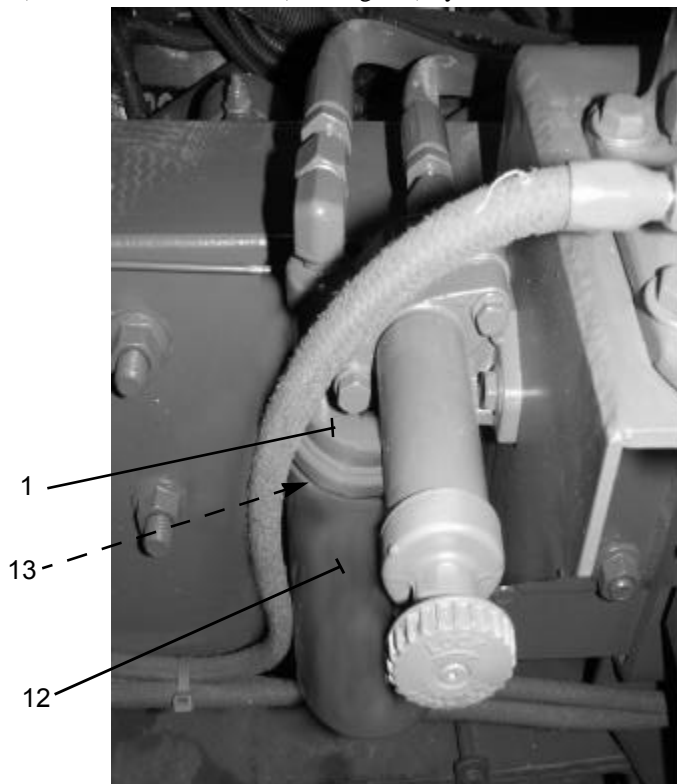
DO NOT fill fuel filter with fuel before installing. Fuel would not be filtered and could be contaminated. Contaminated fuel will cause accelerated wear to fuel system parts.

4. Install fuel filter (12) to filter base (1) until gasket (13) contacts base.

**CAUTION**

DO NOT use a strap wrench to tighten fuel filter. Overtightening will damage filter and cause fuel leaks.

5. Tighten fuel filter (12) an additional full turn (360 degrees) by hand.



6. Place battery disconnect switch in ON position.

**CAUTION**

DO NOT loosen fuel lines at fuel manifold when priming fuel system. Engine components may be damaged and/or loss of priming pressure may occur when fuel lines are loosened.

7. Prime fuel system (TM 9-2320-312-10).
8. Start engine (TM 9-2320-312-10) and check for fuel leaks.

**END OF WORK PACKAGE**

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**FUEL/WATER SEPARATOR MAINTENANCE**

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0018 00

**THIS WORK PACKAGE COVERS**

Fuel/Water Separator Assembly: Removal, Installation

Primary Fuel Filter Element: Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 040

**RPSTL Reference**

Group 040, Figure 2

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**Materials/Parts - Continued**

Element, filter (P/N IN F830)

Gasket (P/N 30965)

**References**

TM 9-2320-312-10

**Equipment Condition**

Battery disconnect switch in OFF position

**WARNING**

- DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.
- Wear fuel-resistant gloves when handling fuels and promptly wash exposed skin and change fuel-soaked clothing.

**FUEL/WATER SEPARATOR ASSEMBLY REMOVAL****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**NOTE**

Use a drain pan to capture any draining fuel. Dispose of fuel in accordance with local policy and ordinances. Ensure all spills are cleaned up.

1. Turn drain knob (6) clockwise and drain all fuel and water from sediment bowl into a drain pan.

**CAUTION**

Wipe area clean around all fuel connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of fuel system could result in equipment failure.

**NOTE**

Tag fuel hoses to ensure correct installation.

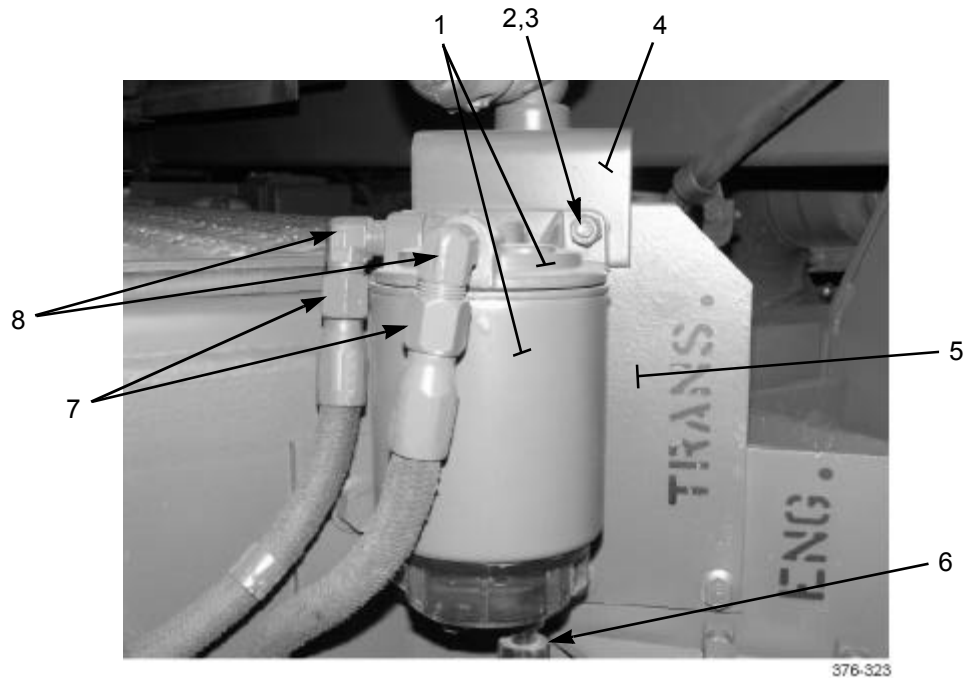
2. Disconnect two fuel hoses (7) from elbows (8).

**CAUTION**

Use caution not to damage floodlight.

3. Remove two nuts (2), screws (3), fuel/water separator assembly (1), and angle bracket (4) with floodlight from bracket (5).
4. Remove two elbows (8) from fuel/water separator assembly (1).



**FUEL/WATER SEPARATOR ASSEMBLY REMOVAL - CONTINUED****FUEL/WATER SEPARATOR ASSEMBLY INSTALLATION**

1. Install two elbows (8) to fuel/water separator assembly (1).
2. Install angle bracket (4) with floodlight and fuel/water separator assembly (1) to bracket (5) with two screws (3) and nuts (2).
3. Connect two fuel hoses (7) to elbows (8).
4. Place battery disconnect switch in ON position.

**CAUTION**

DO NOT loosen fuel lines at fuel manifold when priming fuel system. Engine components may be damaged and/or loss of priming pressure may occur when fuel lines are loosened.

5. Prime fuel system (TM 9-2320-312-10).
6. Start engine (TM 9-2320-312-10) and check for fuel leaks.

**PRIMARY FUEL FILTER ELEMENT REMOVAL****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

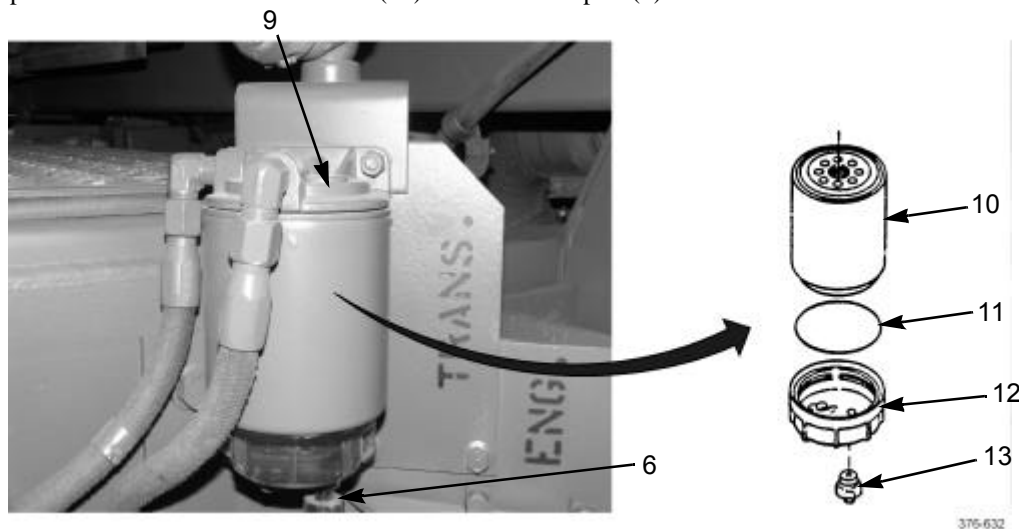
**CAUTION**

Wipe area clean around all fuel connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of fuel system could result in equipment failure.

**NOTE**

Use a drain pan to capture any draining fuel. Dispose of fuel in accordance with local policy and ordinances. Ensure all spills are cleaned up.

1. Turn drain knob (6) clockwise and drain fuel from sediment bowl (12) into a drain pan. If damaged, remove plug (13) from bowl.
2. Remove sediment bowl (12) and gasket (11) from filter element (10). Discard gasket.
3. Use a strap wrench to remove filter element (10) from filter adapter (9). Discard filter element.



**PRIMARY FUEL FILTER ELEMENT INSTALLATION**

1. Clean sediment bowl (12) with a clean rag. Inspect bowl for cracks, breaks or damaged threads.
2. Install new gasket (11) and plug (13), if removed, on sediment bowl (12).
3. Install sediment bowl (12) to new filter element (10).

**CAUTION**

- DO NOT fill fuel filter with fuel before installing. Fuel would not be filtered and could be contaminated. Contaminated fuel will cause accelerated wear to fuel system parts.
  - DO NOT use a strap wrench to tighten filter element. Overtightening will damage filter element and cause fuel leaks.
4. Install filter element (10) on filter adapter (9) until filter element sealing surface contacts adapter.
  5. Turn filter element (10) an additional full turn.
  6. Place battery disconnect switch in ON position.

**CAUTION**

DO NOT loosen fuel lines at fuel manifold when priming fuel system. Engine components may be damaged and/or loss of priming pressure may occur when fuel lines are loosened.

7. Prime fuel system (TM 9-2320-312-10).
8. Start engine (TM 9-2320-312-10) and check for leaks.

**END OF WORK PACKAGE**

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**FUEL TANK, RETAINING BANDS, AND BRACKETS REPLACEMENT**

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**0019 00**

**THIS WORK PACKAGE COVERS**

Fuel Tank: Removal, Installation

Fuel Tank Retaining Bands, Top Platform, and Mounting Brackets: Removal, Installation

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**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 040

**RPSTL Reference**

Group 040, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Cushion strip (P/N A207-2102)

Nut, lock (P/N 21NE108) (2)

Washer, lock (P/N A361-12) (2)

**Personnel Required**

Two

**Equipment Condition**

Fuel level sending unit removed (WP 0021 00)

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**WARNING**

- DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.
- Wear fuel-resistant gloves when handling fuels and promptly wash exposed skin and change fuel-soaked clothing.

**FUEL TANK REMOVAL****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

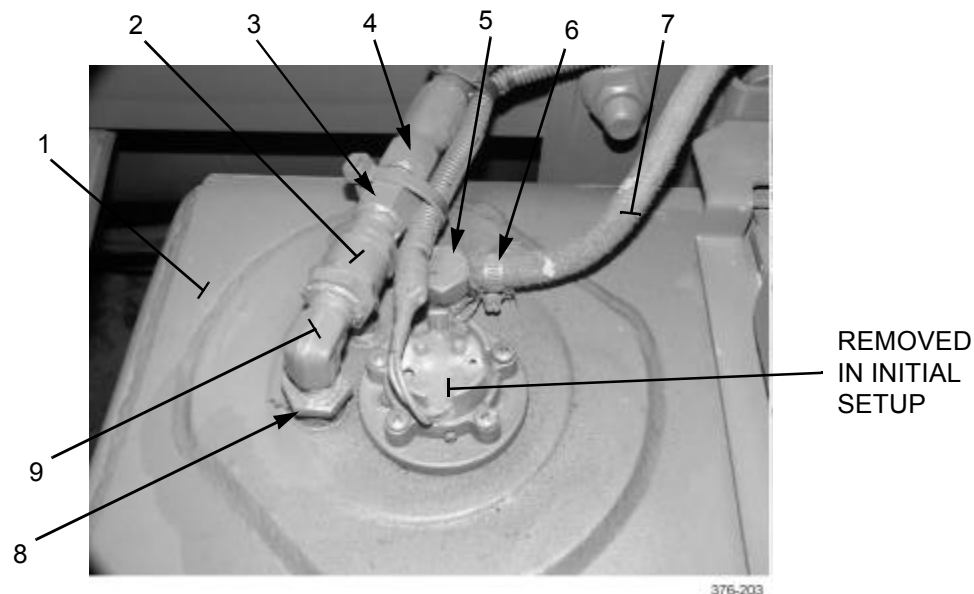
**CAUTION**

Wipe area clean around all fuel connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of fuel system could result in equipment failure.

**NOTE**

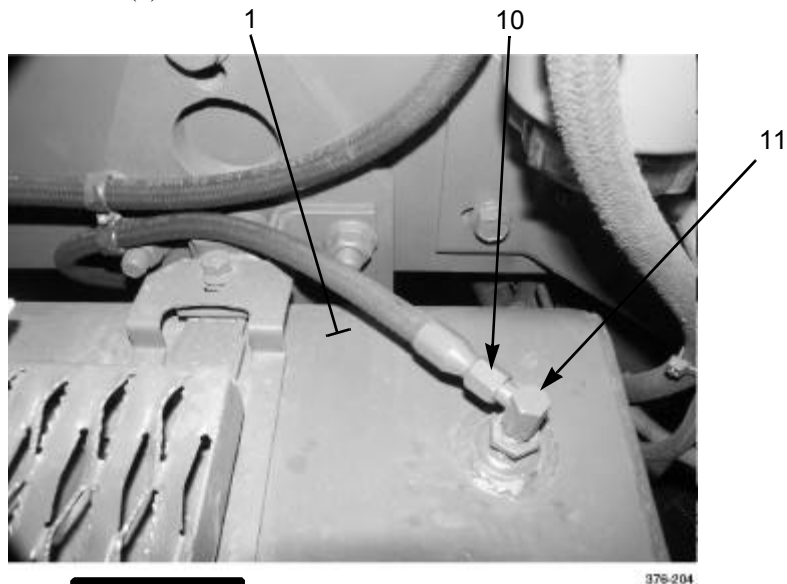
- Use a drain pan to capture any draining fuel. Dispose of fuel in accordance with local policy and ordinances. Ensure all spills are cleaned up.
- Fuel tank capacity is 50 gal (189.3 L).
- Remove and discard tiedown straps as necessary. Use new tiedown straps on installation.

1. Remove drain plug from underside of fuel tank (1) and drain fuel into a suitable container. Reinstall plug.
2. Loosen hose clamp (6) and disconnect breather hose (7) from vent valve (5).
3. Disconnect fuel supply hose (4) from adapter (3).
4. Remove adapter (3) and check valve (2) from elbow (9).
5. Remove vent valve (5) from fuel tank (1).
6. Remove elbow (9) and bushing (8) from fuel tank (1).



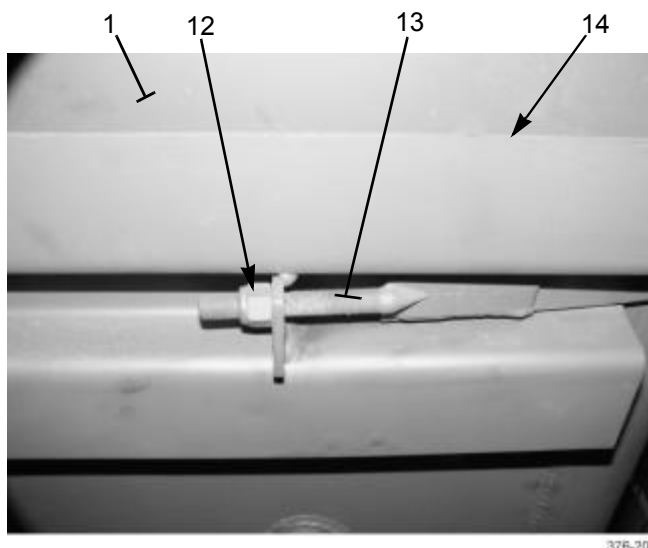
**FUEL TANK REMOVAL - CONTINUED**

7. Disconnect fuel return hose (10) from elbow (11).
8. Remove elbow (11) from fuel tank (1).

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

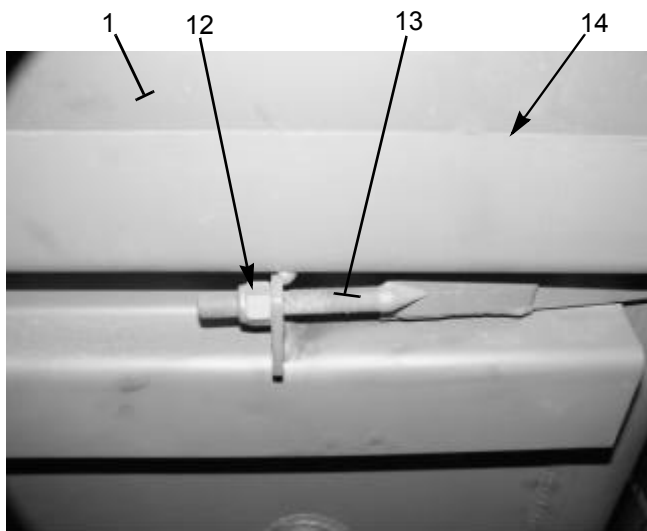
9. From underneath fuel tank (1), remove two locknuts (12) to release two fuel tank retaining bands (13). Discard locknuts.
10. With assistance, hold two fuel tank retaining bands (13) outward from vehicle and remove fuel tank (1) from mounting bracket (14).



**FUEL TANK INSTALLATION****WARNING**

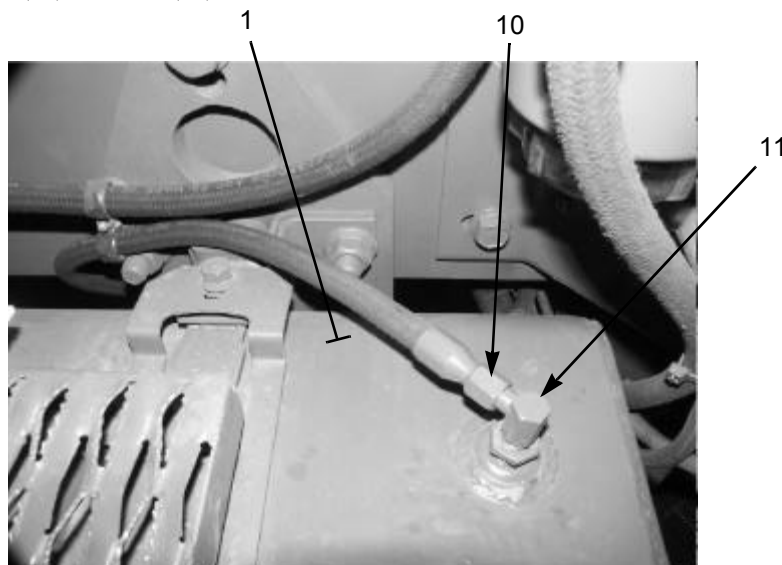
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

1. With assistance, hold two fuel tank retaining bands (13) outward from vehicle and position fuel tank.
2. From underneath fuel tank (1), install two fuel tank retaining bands (13) to mounting brackets (14) with two new lock-nuts (12).



376-205

3. Install an elbow (11) to top of fuel tank (1).
4. Connect fuel return hose (10) to elbow (11).

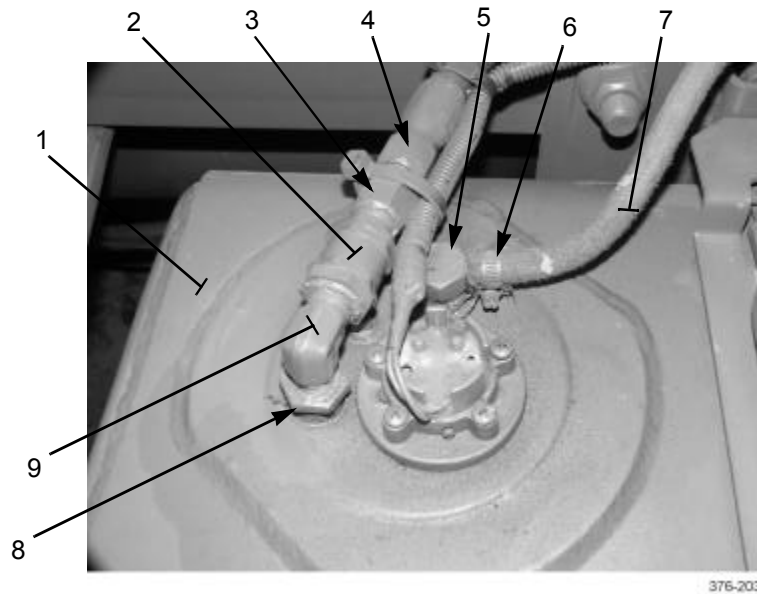


376-204



**FUEL TANK INSTALLATION - CONTINUED**

5. Install bushing (8) and elbow (9) to top of fuel tank (1).
6. Install vent valve (5) to fuel tank (1).
7. Install check valve (2) and adapter (3) to elbow (9).
8. Connect fuel supply hose (4) to adapter (3).
9. Connect breather hose (7) to vent valve (5) and tighten hose clamp (6).



10. Install fuel level sending unit (WP 0021 00).
11. Refuel fuel tank (TM 9-2320-312-10).

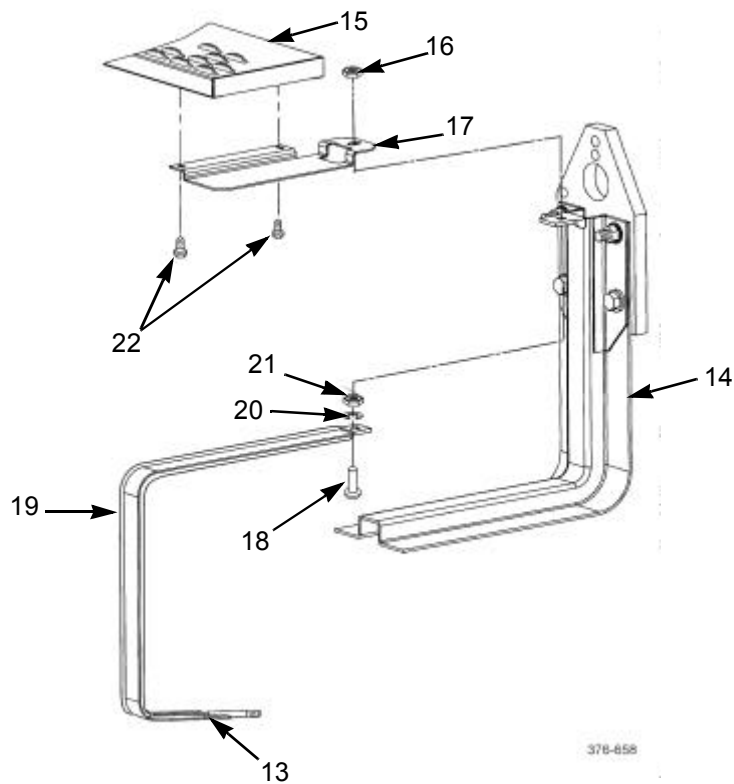
**CAUTION**

DO NOT loosen fuel lines at fuel manifold when priming fuel system. Engine components may be damaged and/or loss of priming pressure may occur when fuel lines are loosened.

12. Prime fuel system (TM 9-2320-312-10).
13. Start engine (TM 9-2320-312-10) and check for leaks.

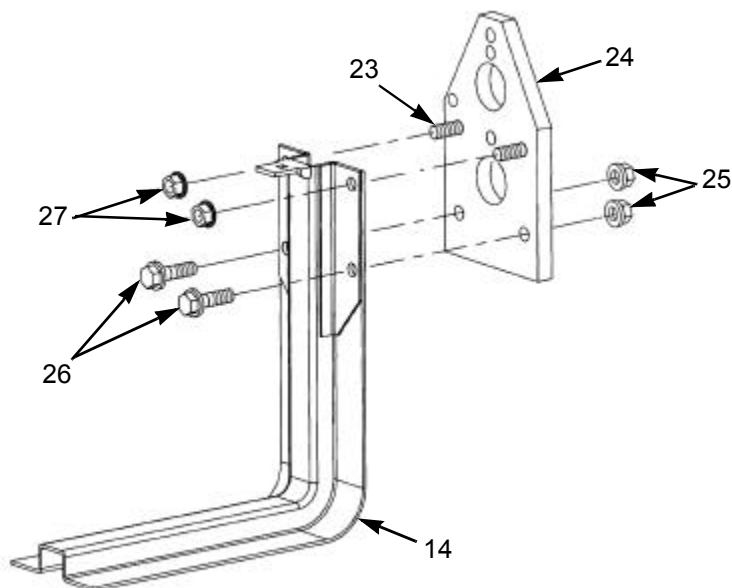
**FUEL TANK RETAINING BANDS, TOP PLATFORM, AND MOUNTING BRACKETS REMOVAL**

1. Remove fuel tank (Refer to *Fuel Tank Removal*).
2. At each mounting bracket (14), remove nut (16) from carriage bolt (18). Remove two step mounting brackets (17) with top platform (15) from mounting brackets.
3. Remove remaining nut (21) and lockwasher (20) from each carriage bolt (18) and remove two retaining bands (13) with cushion strips (19) from mounting brackets (14). Discard lockwashers.
4. Remove four screws (22) and top platform (15) from two step mounting brackets (17).



**FUEL TANK RETAINING BANDS, TOP PLATFORM, AND MOUNTING BRACKETS REMOVAL - CONTINUED**

5. If damaged, remove two nuts (27) from welded studs (23). Remove two nuts (25), bolts (26), and each mounting bracket (14) from frame bracket (24).



376-659

**FUEL TANK RETAINING BANDS, TOP PLATFORM, AND MOUNTING BRACKETS INSTALLATION**

1. If removed, install each mounting bracket (14) to frame bracket (24) with two bolts (26) and nuts (25), and two nuts (27) on welded studs (23).
2. Install top platform (15) to two step mounting brackets (17) with four screws (22).
3. Secure carriage bolt (18) to each retaining band (13) with new lockwasher (20) and nut (21).
4. Position cushion strip (19) to each retaining band (13). Pass band through square hole in step mounting bracket (17) and install to mounting bracket (14) with nut (16).
5. Install fuel tank (Refer to *Fuel Tank Installation*).

**END OF WORK PACKAGE**

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**FUEL LINES REPLACEMENT**

0020 00

**THIS WORK PACKAGE COVERS**

Secondary Fuel Filter-to-Engine Fuel Line Replacement  
 Fuel Injector Pump-to-Secondary Fuel Filter Fuel Line Replacement  
 Fuel/Water Separator-to-Fuel Injector Pump Fuel Line Replacement  
 Engine-to-Fuel Tank Fuel Return Line Replacement  
 Fuel Tank-to-Fuel/Water Separator Fuel Line Replacement  
 Fuel Tank Breather Line Replacement

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 020 and Group 040

**RPSTL Reference**

Appendix A

Group 040, Figure 2

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**Equipment Condition**

Cab tilted (TM 9-2320-312-10) (except for breather line replacement)

Battery disconnect switch in OFF position

**WARNING**

- DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.
- Wear fuel-resistant gloves when handling fuels and promptly wash exposed skin and change fuel-soaked clothing.
- When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**CAUTION**

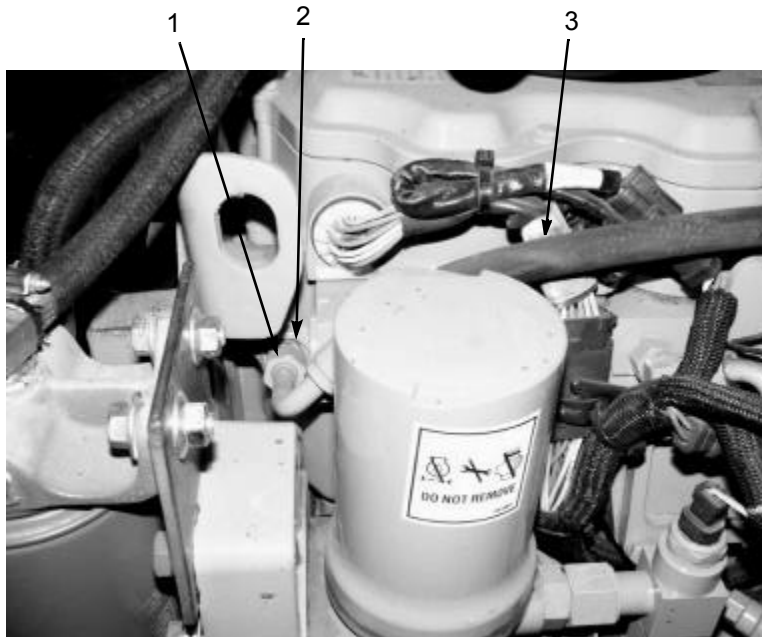
Wipe area clean around all fuel connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of fuel system could result in equipment failure.

**NOTE**

- Use a drain pan to catch residual fuel in lines when fuel lines are disconnected. Dispose of fuel in accordance with local policy and ordinances. Ensure all spills are cleaned up.
- If replacing more than one fuel line at a time, tag lines to ensure correct installation.
- Remove and discard tiedown straps as necessary. Use new tiedown straps on installation.

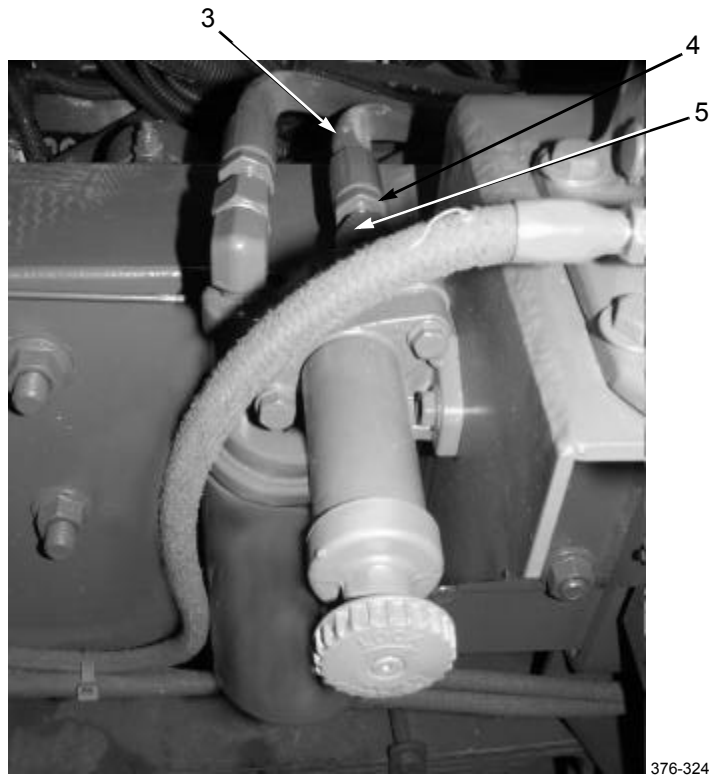
**SECONDARY FUEL FILTER-TO-ENGINE FUEL LINE REPLACEMENT**

1. Loosen nut (1) and disconnect fuel line (3) from fitting (2).



376-540

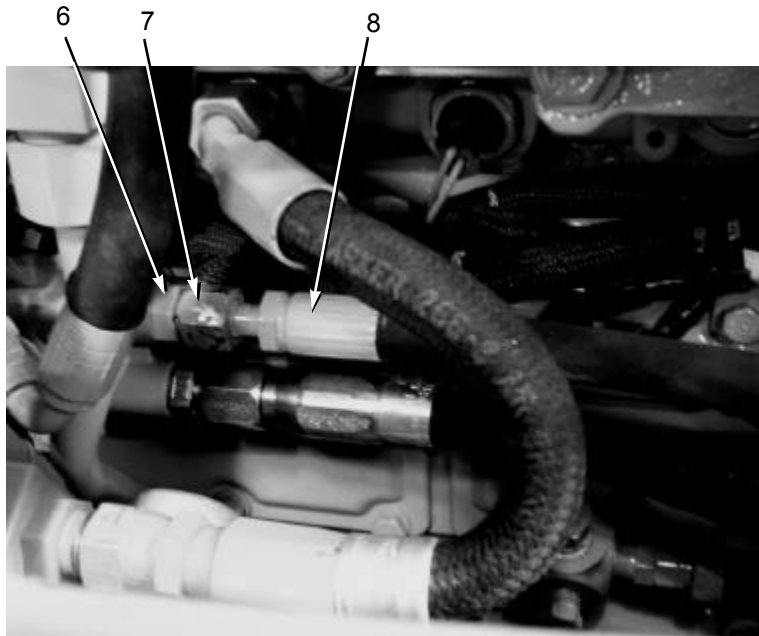
2. At other end of fuel line (3), loosen nut (4) and disconnect fuel line from fitting (5).
3. Release fuel line (3) from hose clamps as necessary and remove fuel line from vehicle.
4. Position fuel line (3) to vehicle.
5. Connect fuel line (3) to fitting (5) and tighten nut (4).

**SECONDARY FUEL FILTER-TO-ENGINE FUEL LINE REPLACEMENT - CONTINUED**

6. Connect other end of fuel line (3) to fitting (2) and tighten nut (1).
7. Secure fuel line (3) as necessary with hose clamps.
8. Place battery disconnect switch in ON position (TM 9-2320-312-10).
9. Lower cab (TM 9-2320-312-10).
10. Prime fuel system (TM 9-2320-312-10).

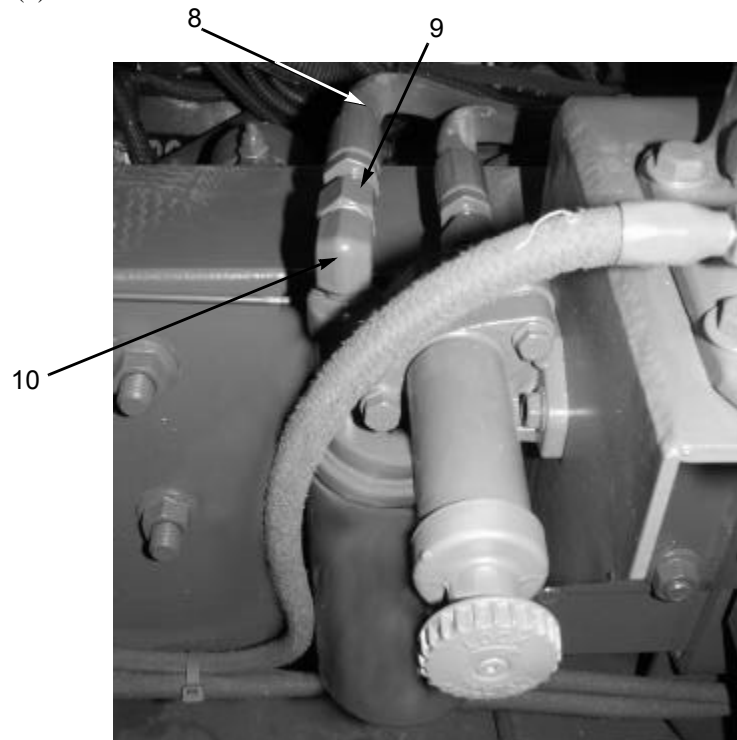
**FUEL INJECTOR PUMP-TO-SECONDARY FUEL FILTER FUEL LINE REPLACEMENT**

1. Loosen nut (7) and disconnect fuel line (8) from fitting (6).



376-542

2. At other end of fuel line (8), loosen nut (9) and disconnect fuel line from fitting (10).
3. Release fuel line (8) from hose clamps as necessary and remove fuel line from vehicle.
4. Position fuel line (8) to vehicle.



376-324

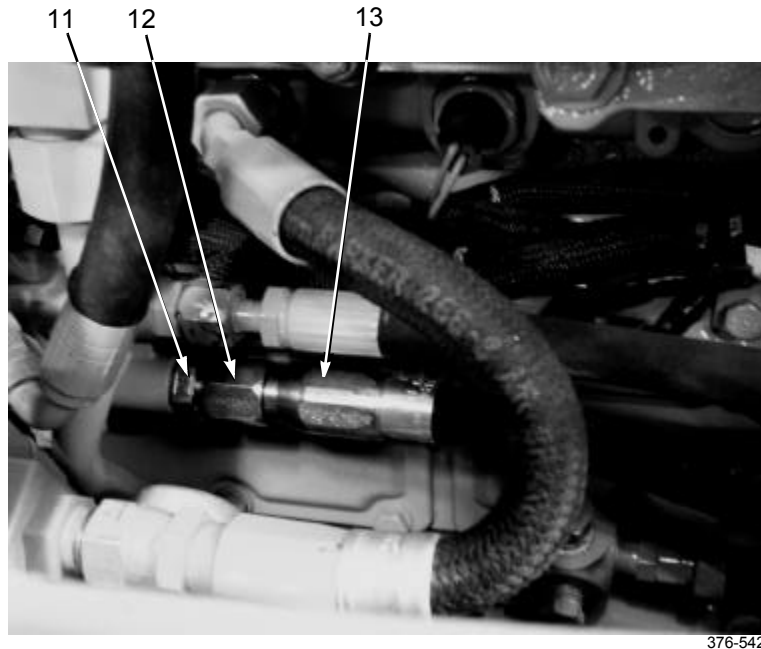


***FUEL INJECTOR PUMP-TO-SECONDARY FUEL FILTER FUEL LINE REPLACEMENT - CONTINUED***

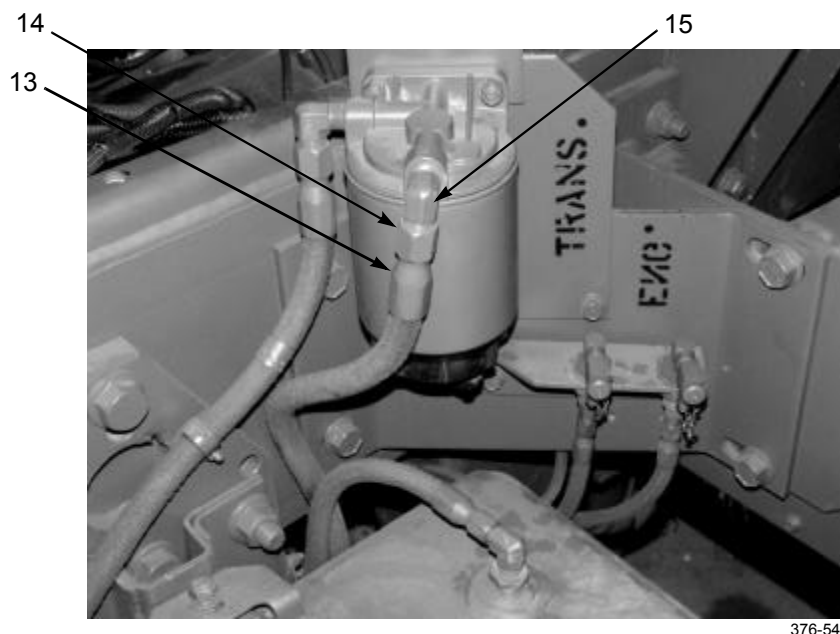
5. Connect fuel line (8) to fitting (10) and tighten nut (9).
6. Connect other end of fuel line (8) to fitting (6) and tighten nut (7).
7. Secure fuel line (8) as necessary with hose clamps.
8. Place battery disconnect switch in ON position (TM 9-2320-312-10).
9. Lower cab (TM 9-2320-312-10).
10. Prime fuel system (TM 9-2320-312-10).

**FUEL/WATER SEPARATOR-TO-FUEL INJECTOR PUMP FUEL LINE REPLACEMENT**

1. Loosen nut (12) and disconnect fuel line (13) from fitting (11).



2. At other end of fuel line (13), loosen nut (14) and disconnect fuel line from fitting (15).
3. Release fuel line (13) from hose clamps as necessary and remove fuel line from vehicle.

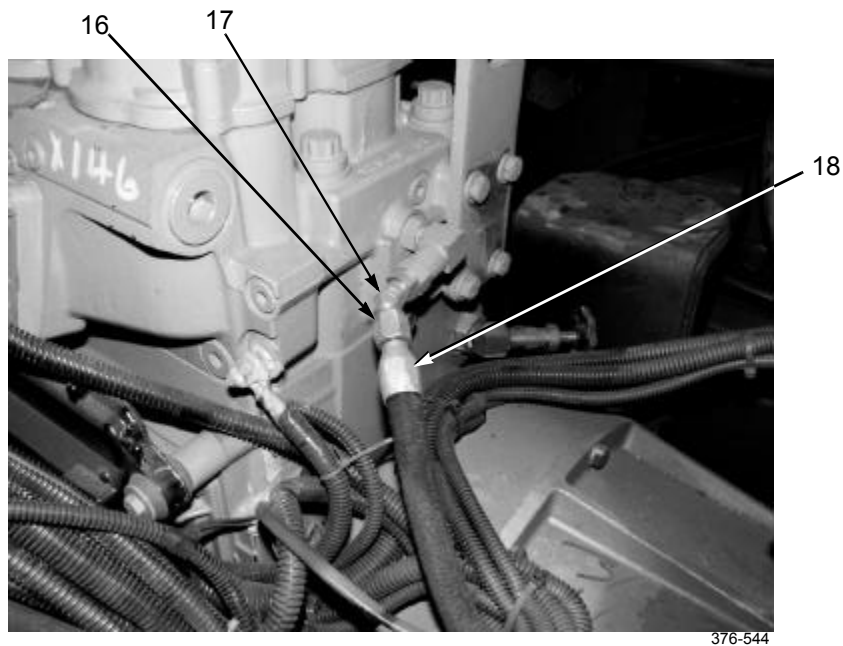


***FUEL/WATER SEPARATOR-TO-FUEL INJECTOR PUMP FUEL LINE REPLACEMENT - CONTINUED***

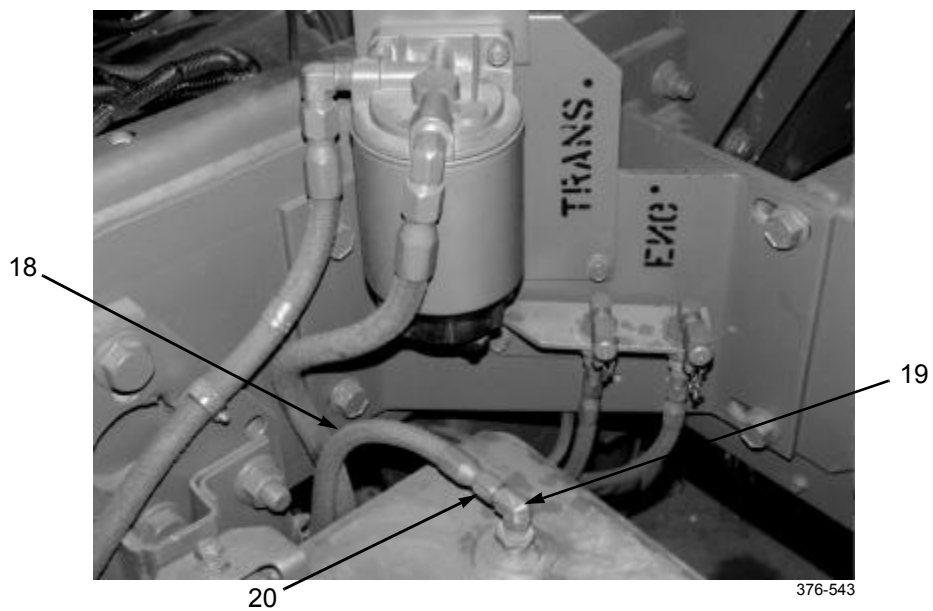
4. Position fuel line (13) to vehicle.
5. Connect fuel line (13) to fitting (15) and tighten nut (14).
6. Connect other end of fuel line (13) to fitting (11) and tighten nut (12).
7. Secure fuel line (13) as necessary with hose clamps.
8. Place battery disconnect switch in ON position (TM 9-2320-312-10).
9. Lower cab (TM 9-2320-312-10).
10. Prime fuel system (TM 9-2320-312-10).

**ENGINE-TO- FUEL TANK FUEL RETURN LINE REPLACEMENT**

1. Loosen nut (16) and disconnect fuel line (18) from fitting (17).



2. At other end of fuel line (18), loosen nut (20) and disconnect fuel line from fitting (19).
3. Release fuel line (18) from hose clamps as necessary and remove fuel line from vehicle.

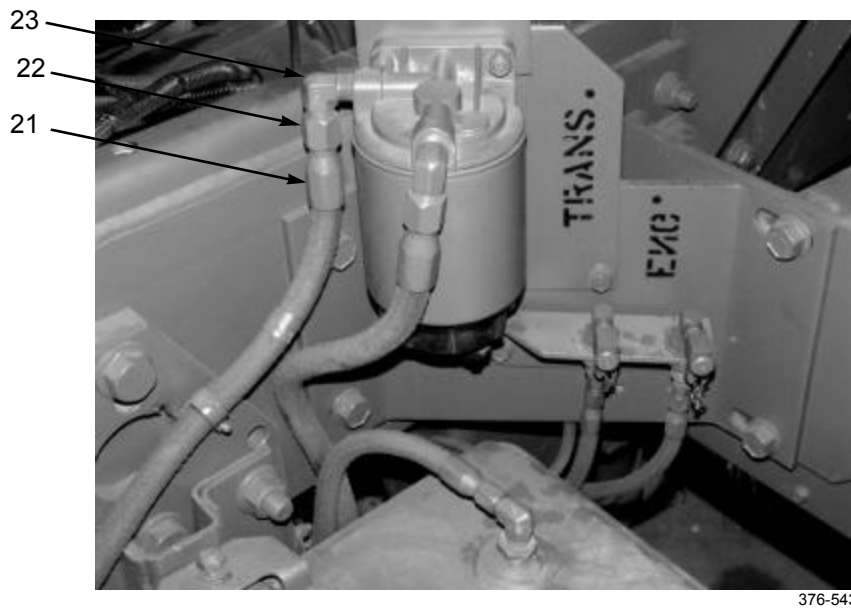


***ENGINE-TO- FUEL TANK FUEL RETURN LINE REPLACEMENT - CONTINUED***

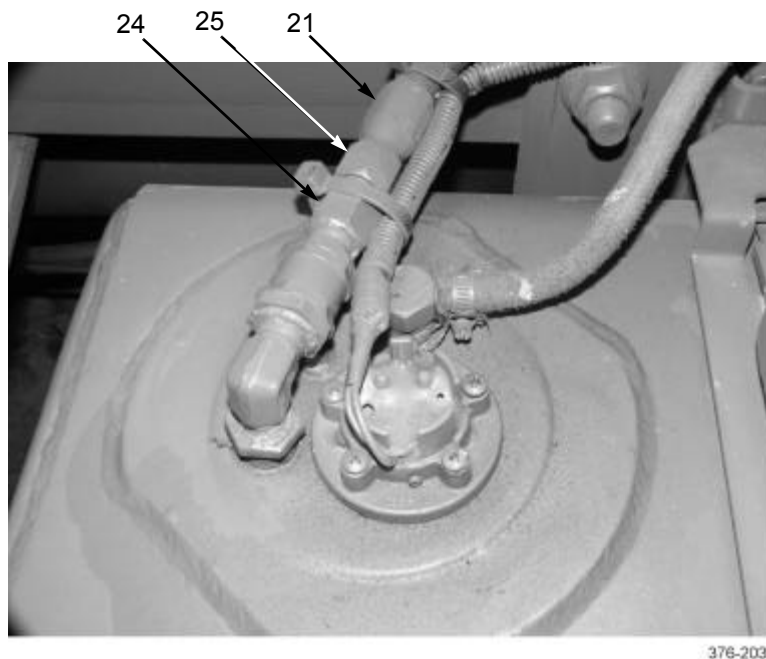
4. Position fuel line (18) to vehicle.
5. Connect fuel line (18) to fitting (19) and tighten nut (20).
6. Connect other end of fuel line (18) to fitting (17) and tighten nut (16).
7. Secure fuel line (18) as necessary with hose clamps.
8. Place battery disconnect switch in ON position (TM 9-2320-312-10).
9. Lower cab (TM 9-2320-312-10).

**FUEL TANK-TO- FUEL/WATER SEPARATOR FUEL LINE REPLACEMENT**

1. Loosen nut (22) and disconnect fuel line (21) from fitting (23).



2. At other end of fuel line (21), loosen nut (25) and disconnect fuel line from fitting (24).
3. Release fuel line (21) from hose clamps as necessary and remove fuel line from vehicle.

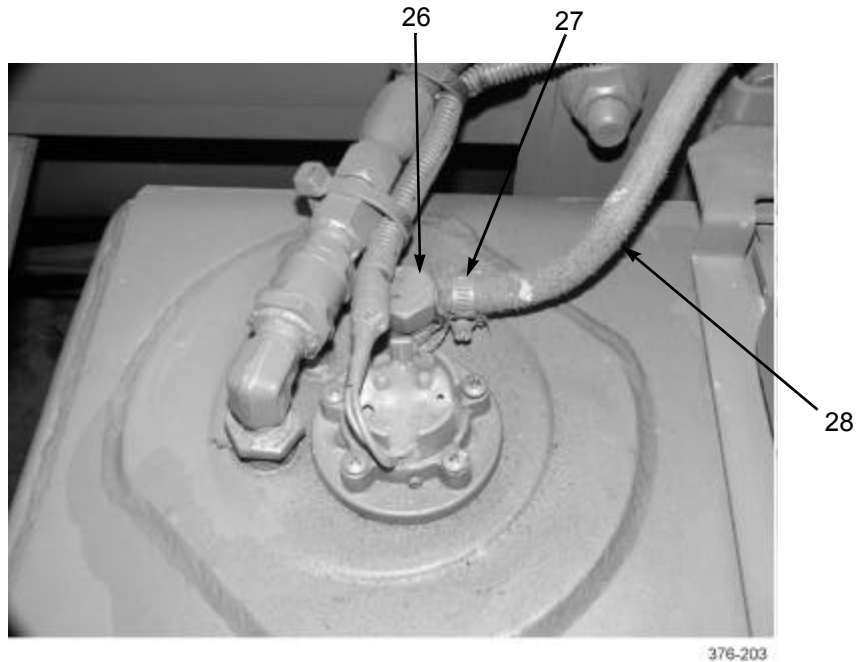


***FUEL TANK-TO- FUEL/WATER SEPARATOR FUEL LINE REPLACEMENT - CONTINUED***

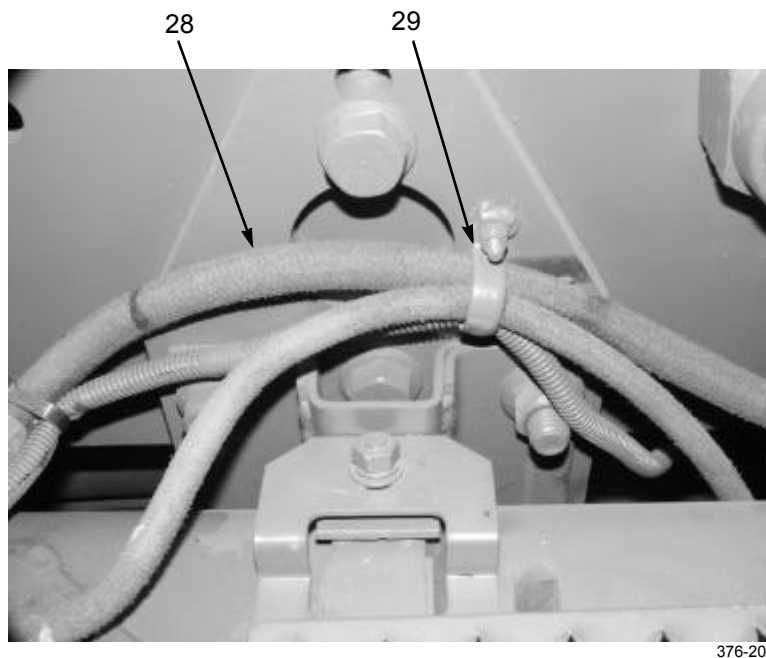
4. Position fuel line (21) to vehicle.
5. Connect fuel line (21) to fitting (24) and tighten nut (25).
6. Connect other end of fuel line (21) to fitting (23) and tighten nut (22).
7. Secure fuel line (21) as necessary with hose clamps.
8. Place battery disconnect switch in ON position (TM 9-2320-312-10).
9. Lower cab (TM 9-2320-312-10).
10. Prime fuel system (TM 9-2320-312-10).

**FUEL TANK BREATHER LINE REPLACEMENT**

1. Loosen hose clamp (27) and disconnect breather line (28) from fitting (26).



2. Release breather line (28) from hose clamp (29) at rear fuel tank mount and remove breather line from vehicle.



3. Compare length of damaged breather line (28) and cut new line to same length.



***FUEL TANK BREATHER LINE REPLACEMENT - CONTINUED***

4. Connect breather line (28) to fitting (26) and tighten hose clamp (27).
5. Secure breather line (28) at rear fuel tank mount with hose clamp (29).
6. Place battery disconnect switch in ON position (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**FUEL LEVEL SENDING UNIT REPLACEMENT**

---

0021 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 040

**RPSTL Reference**

Group 040, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Rag, wiping (Item 51, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Washer, lock (P/N 361-6) (2)

**Equipment Condition**

Battery disconnect switch in OFF position

**WARNING**

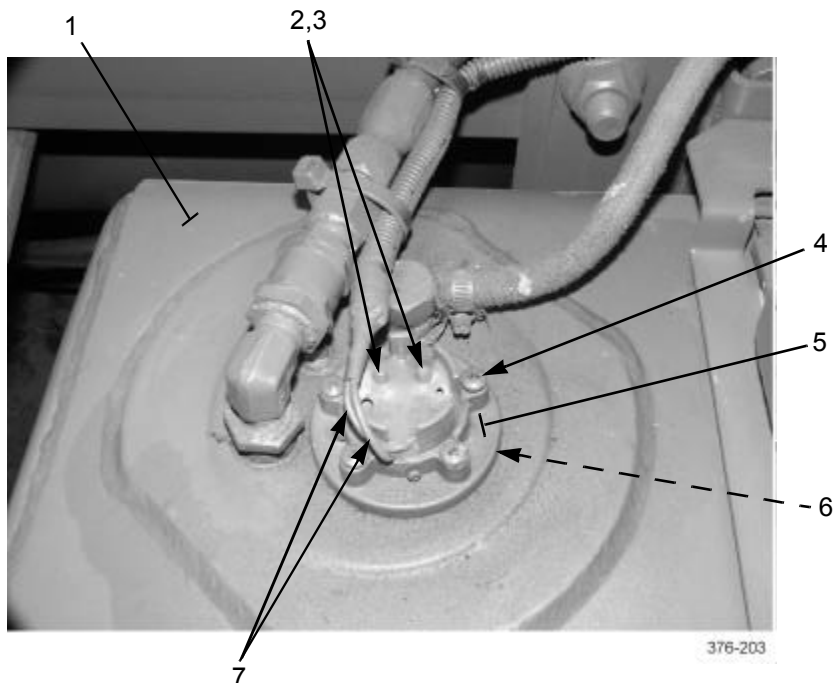
- DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.
- Wear fuel-resistant gloves when handling fuels and promptly wash exposed skin and change fuel-soaked clothing.

**REMOVAL****NOTE**

- Clean area surrounding fuel level sending unit to ensure no debris enters fuel tank when sending unit is removed.
- Tag wires to ensure correct installation.

**REMOVAL - CONTINUED**

1. Remove two nuts (2) and lockwashers (3) and disconnect two wires (7) of vehicle wiring harness from top of fuel level sending unit (5). Discard lockwashers.
2. Remove five screws (4) and fuel level sending unit (5) from top of fuel tank (1).
3. Remove gasket (6) from fuel level sending unit (5). Discard gasket.

**INSTALLATION****NOTE**

Replacement fuel level sending unit comes with new gasket.

1. Position new gasket (6) to fuel level sending unit (5).
2. Install fuel level sending unit (5) to top of fuel tank (1) with five screws (4).
3. Connect two wires (7) of vehicle wiring harness to top of fuel level sending unit (5) with two new lockwashers (3) and nuts (2).
4. Place battery disconnect switch in ON position. Turn ignition on and check that fuel gauge on instrument panel registers. Turn off ignition switch.

**END OF WORK PACKAGE**

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**MUFFLER AND EXHAUST PIPES REPLACEMENT**

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**0022 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

---

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 050

**RPSTL Reference**

Group 050, Figures 1 and 2

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166  
00)

**References**

TB 43-0209

**Personnel Required**

Two

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

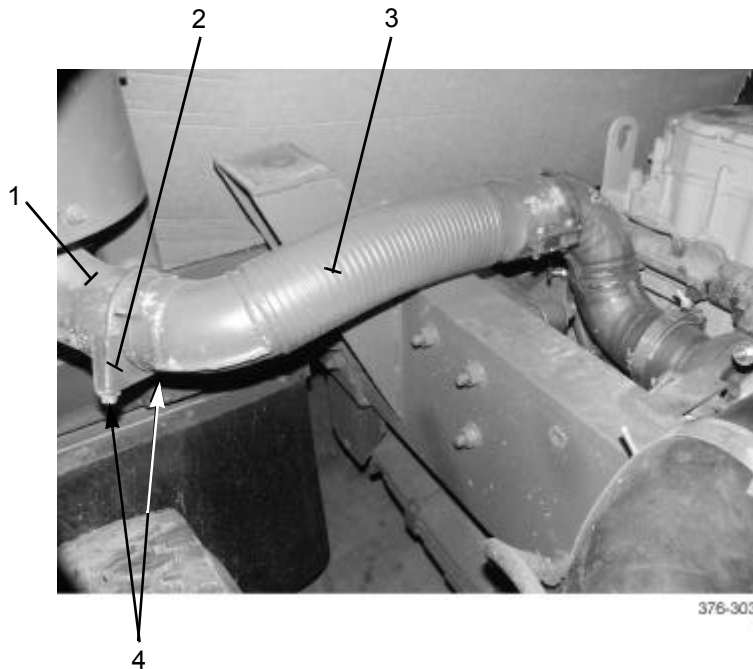
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**WARNING**

- Exhaust system components may be hot to the touch. Avoid contact with any part of exhaust system until sufficiently cool. Failure to do so could result in injury to personnel.
- Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

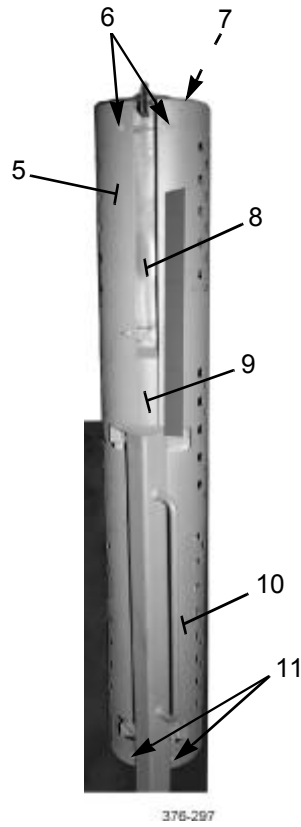
**REMOVAL**

1. Remove two nuts (4), clamp (2), and elbow (1) from flex pipe (3).

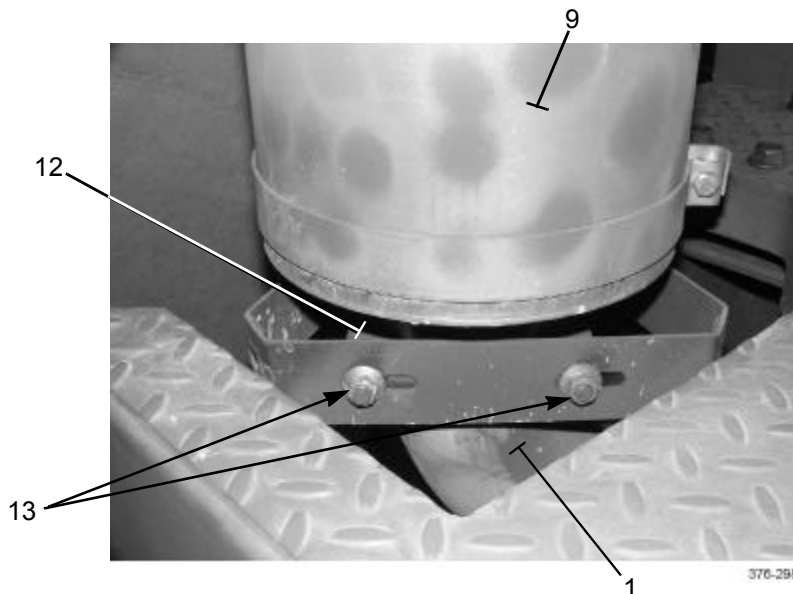


2. Remove 12 bolts (6) and upper heat shield (5) from muffler (9) assembly.
3. Attach a lifting sling to shield bracket (7) at top of exhaust pipe (8). Attach other end of sling to a suitable overhead lifting device.
4. Raise overhead lifting device to take up slack in sling.
5. Remove four bolts (11) and lower heat shield (10).

**REMOVAL - CONTINUED**



6. Mark position of upper and lower muffler clamp (12) on muffler (9). Transfer marks to new muffler.
7. Loosen two nuts (13) of muffler clamp (12) securing muffler (9) to elbow (1).



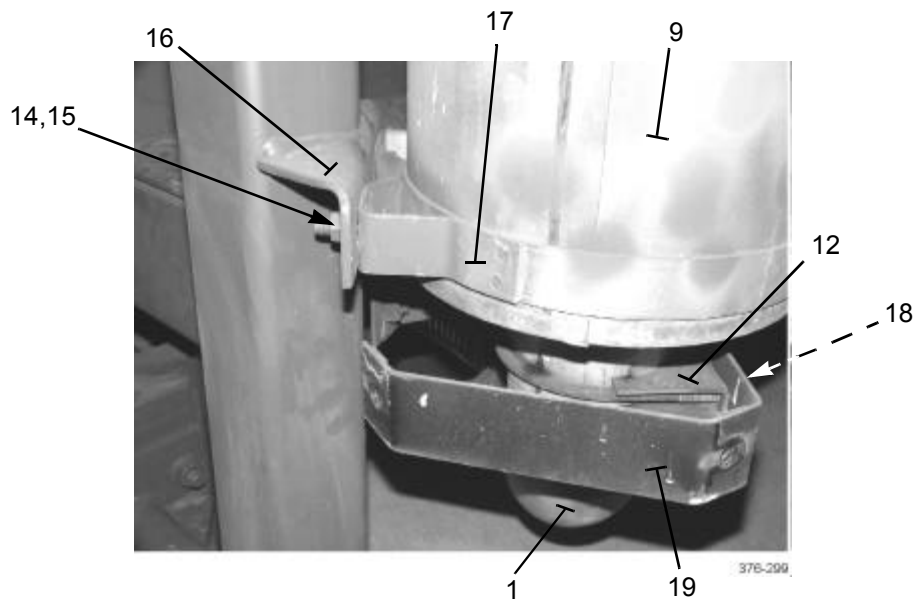
**REMOVAL - CONTINUED**

8. Remove four nuts (14) and bolts (15) holding two muffler support clamps (17) to muffler post (16).
9. Raise overhead lifting device to separate muffler (9) from elbow (1), and remove muffler from vehicle.
10. Remove overhead lifting device and sling.

**NOTE**

Perform step 11 to remove muffler clamp and shield bracket from lower end of muffler.

11. Remove two nuts (18), muffler clamp (12), and shield bracket (19) from muffler (9).





**REMOVAL - CONTINUED****NOTE**

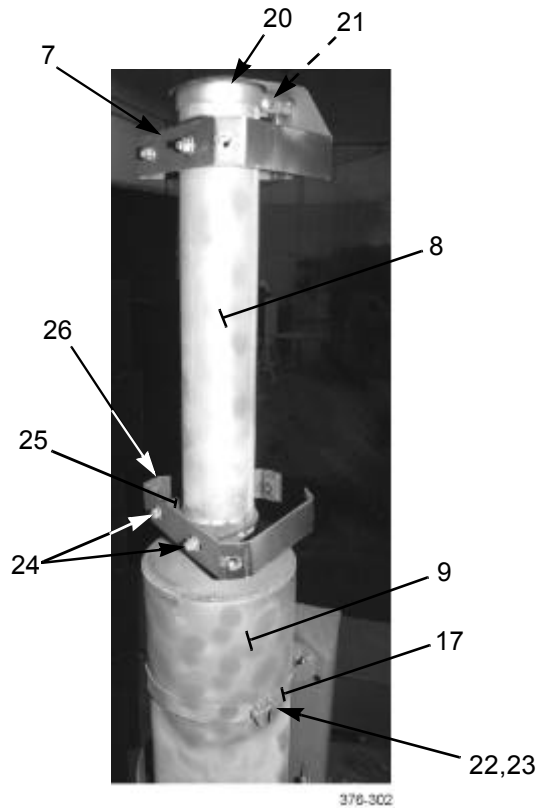
Perform step 12 to remove each of two muffler support clamps from muffler.

12. Remove nut (22), screw (23), and muffler support clamp (17) from muffler (9).

**NOTE**

Perform step 13 to remove each of two muffler clamps and shield brackets from exhaust pipe and upper end of muffler.

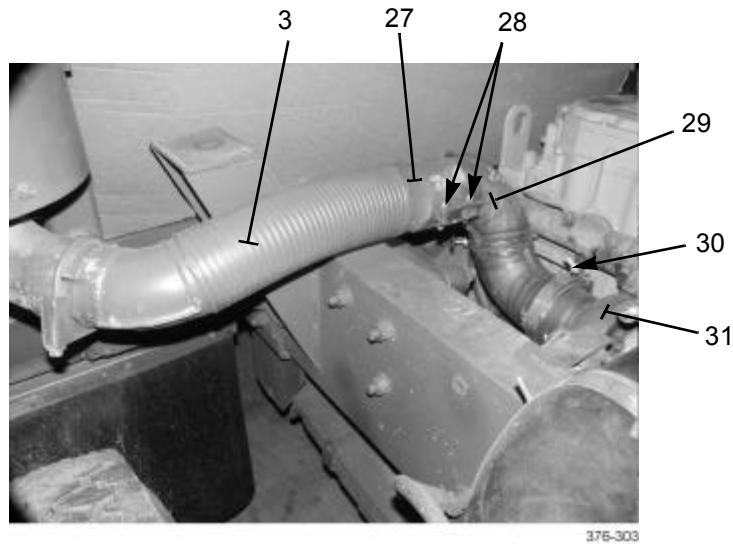
13. Remove two nuts (24), muffler clamp (25), and shield brackets (26 and 7).
14. Remove exhaust pipe (8) from muffler (9).
15. Loosen nut (21) and remove rain cap (20) from exhaust pipe (8).



**REMOVAL - CONTINUED****NOTE**

Perform steps 16 and 17 to remove flex and exhaust pipes from engine.

16. Loosen two screws (28) of clamp (27) and remove flex pipe (3) from exhaust pipe (29).
17. Loosen clamp (30) and remove exhaust pipe (29) from turbocharger (31).

**INSTALLATION****NOTE**

- Perform steps 1 and 2 to install exhaust and flex pipes to engine.
  - Clamps should be fully tightened after all pipes and elbow are installed.
1. Install exhaust pipe (29) to turbocharger (31) with clamp (30).
  2. Install flex pipe (3) to exhaust pipe (29) and with two screws (28) of clamp (27).
  3. Fully tighten clamp (30) and screws (28) of clamp (27).

**INSTALLATION - CONTINUED**

4. Install rain cap (20) to exhaust pipe (8) and tighten nut (21).
5. Install exhaust pipe (8) to muffler (9).

**NOTE**

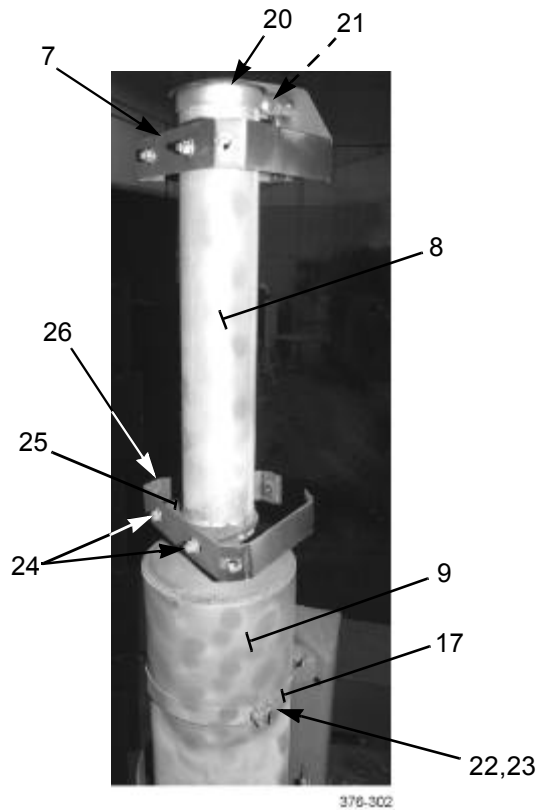
Perform step 6 to install each of two shield brackets and muffler clamps to upper end of muffler and exhaust pipe.

6. Install shield brackets (26 and 7) and muffler clamp (25) to muffler (9) with two nuts (24).

**NOTE**

Perform step 7 to install each of two muffler support clamps to muffler.

7. Install muffler support clamp (17) to muffler (9) with screw (23) and nut (22).



**INSTALLATION - CONTINUED****NOTE**

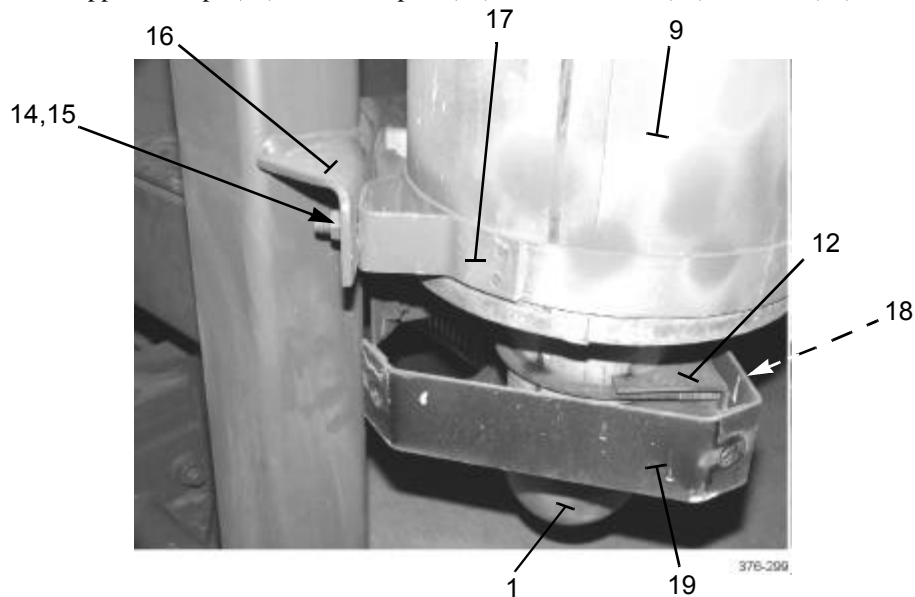
Perform step 8 to install shield bracket and muffler clamp to lower end of muffler.

8. Install shield bracket (19) and muffler clamp (12) to muffler (9) with two nuts (18).

**WARNING**

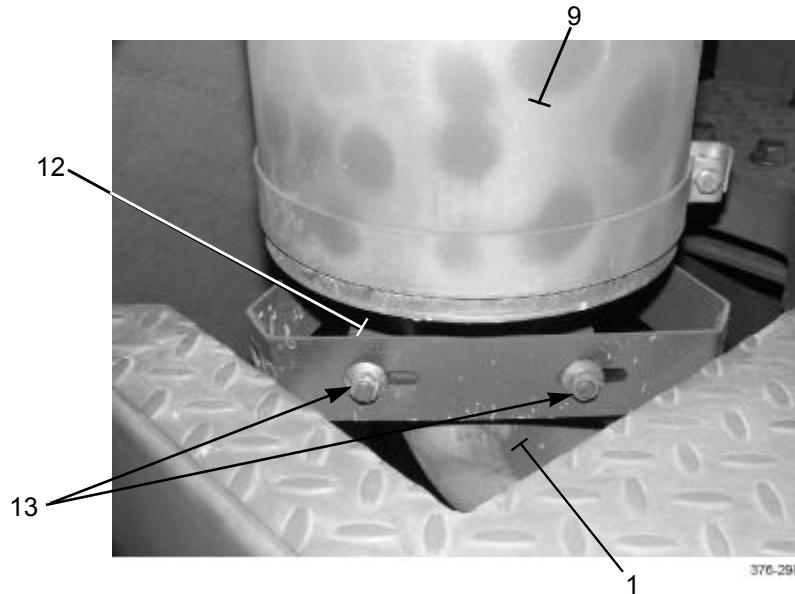
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

9. Attach a lifting sling to shield bracket (7) at top of exhaust pipe and to a suitable overhead lifting device.  
 10. Raise overhead lifting device and position muffler (9) assembly to vehicle.  
 11. Connect muffler (9) to elbow (1).  
 12. Install two muffler support clamps (17) to muffler post (16) with four bolts (15) and nuts (14).

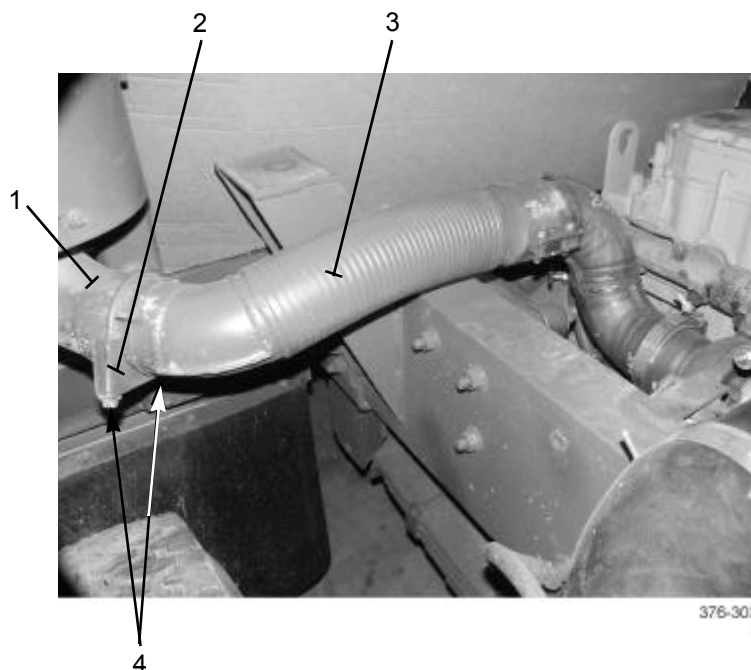


**INSTALLATION - CONTINUED**

13. Secure muffler (9) to elbow (1) by tightening two nuts (13) of lower muffler clamp (12).

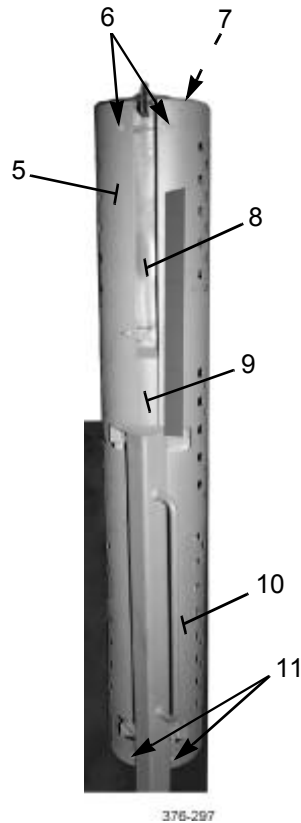


14. Install lower heat shield (10) with four bolts (11).
15. Remove sling from overhead lifting device and from shield bracket (7) at top of exhaust pipe (8).
16. Install upper heat shield (5) to muffler (9) assembly with 12 bolts (6).
17. Install elbow (1) to flex pipe (3) with clamp (2) and two nuts (4). Fully tighten nuts.
18. Lower cab (TM9-2320-312-10).



**INSTALLATION - CONTINUED**

19. Stencil "CAUTION HOT" on upper heat shield (5) and lower heat shield (10) in accordance with TM 9-2320-312-10 and TB 43-0209.



**END OF WORK PACKAGE**

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**DRAINING AND FILLING RADIATOR**

---

0023 00

**THIS WORK PACKAGE COVERS**

Draining, Filling

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 060

**RPSTL Reference**

Group 060, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Antifreeze (Item 4 or 5, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

**References**

Group 020 Commercial Service Manuals

TB 750-651

WP 0008 00

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

Engine cool

**WARNING**

- DO NOT remove radiator cap unless engine has cooled to at least of 120°F (50°C) as indicated on coolant temperature gauge. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.
- Wear effective eye, glove, and skin protection when handling coolants. Failure to do so may cause injury.

**CAUTION**

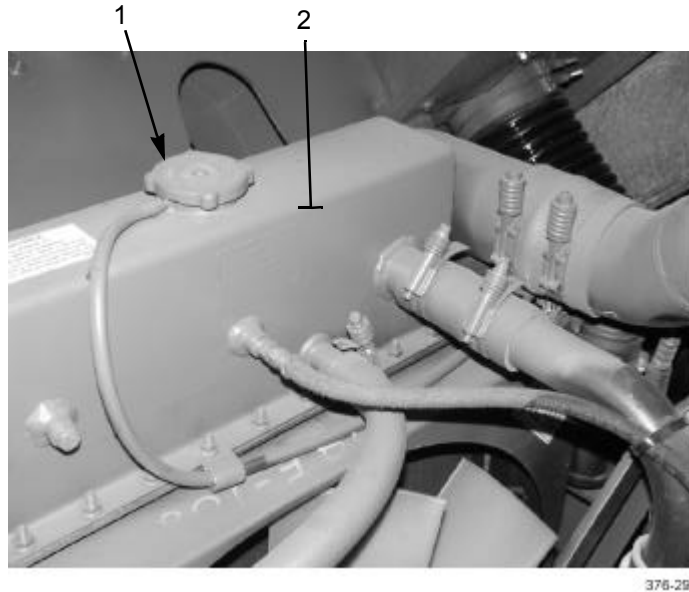
Never use water alone for coolant. Damage from corrosion can result.

**NOTE**

Cooling system capacity is 27.5 qt (26.0 L).

**DRAINING**

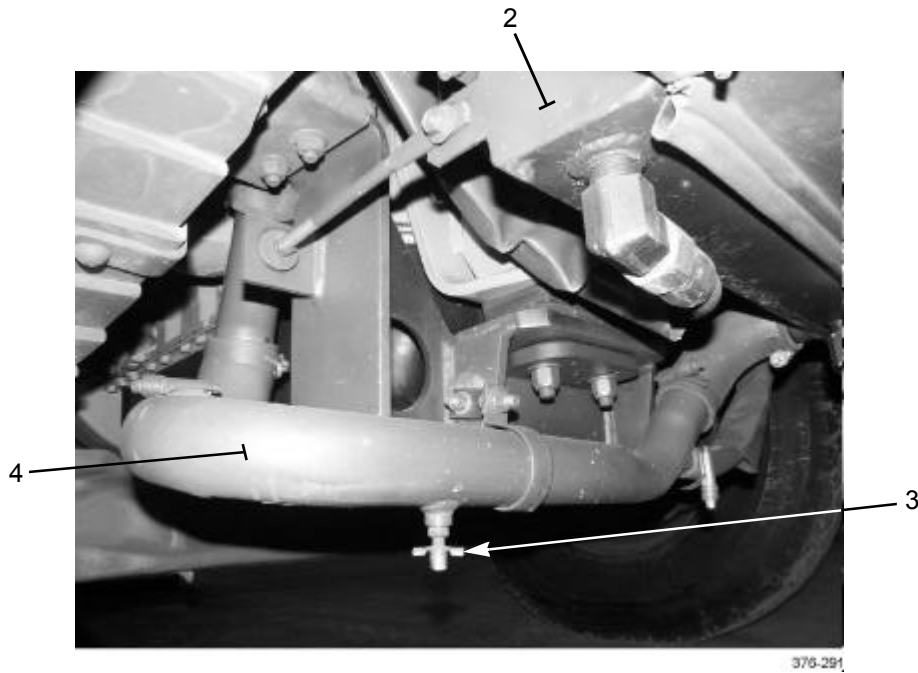
1. Perform an inspection of hoses and hose clamps to ensure there are no leaks. Check radiator (2) for leaks, damage or dirt buildup.
2. Remove radiator cap (1) from top of radiator (2).

**WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

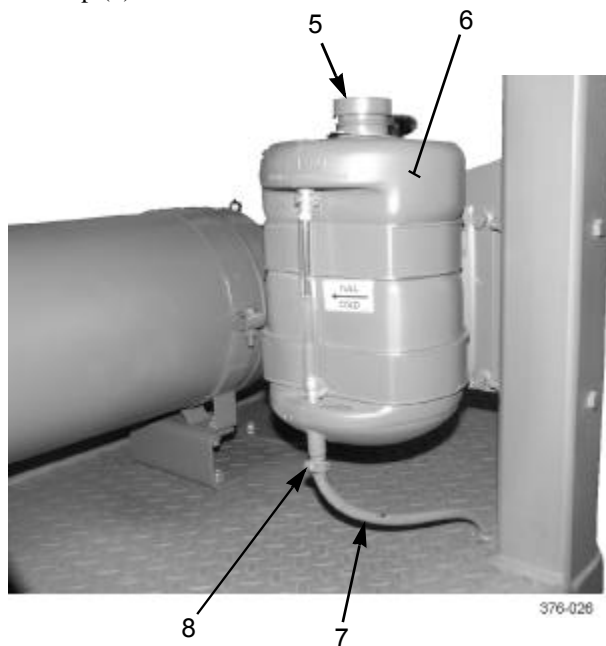
3. Place a suitable container under drain valve (3) of coolant tube (4) near bottom of radiator (2). Open drain valve and allow coolant to drain from cooling system into a suitable container. Dispose of coolant in accordance with local policy and ordinances. Ensure all spills are cleaned up.
4. Close drain valve (3).



**DRAINING - CONTINUED****NOTE**

Coolant overflow bottle capacity is 1.5 gal (5.7 L).

5. Place a suitable container under coolant overflow bottle (6). Remove cap (5). Loosen clamp (8), remove hose (7) from bottle, and drain coolant. Dispose of coolant in accordance with local policy and ordinances.
6. Reinstall hose (7) and tighten clamp (8).

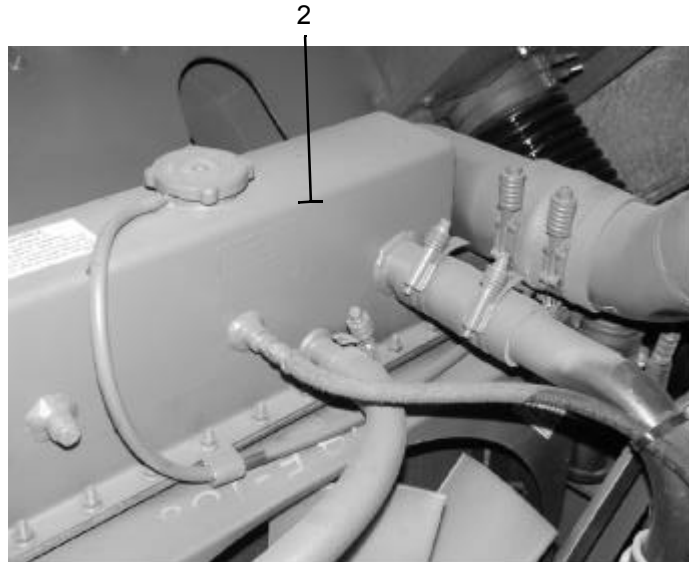


7. Clean or replace damaged components as necessary.

**FILLING****NOTE**

- Refer to TB 750-651 and Group 020 Commercial Service Manuals for cooling system service information.
- Refer to WP 0008 00, *Unit PMCS Introduction, Chart D*, to determine correct grade of antifreeze for expected temperatures.

1. Fill radiator (2) with coolant to approximately 2 in (5 cm) below bottom of radiator filler neck.



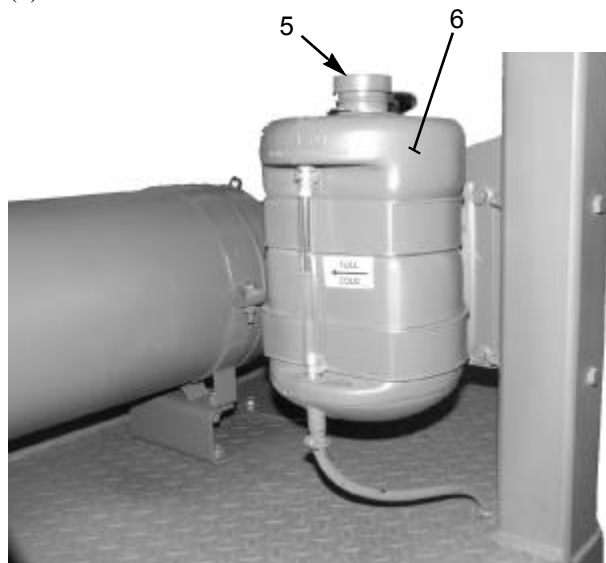
376-290

2. Lower cab (TM 9-2320-312-10).

**NOTE**

Coolant overflow bottle capacity is 1.5 gal (5.7 L).

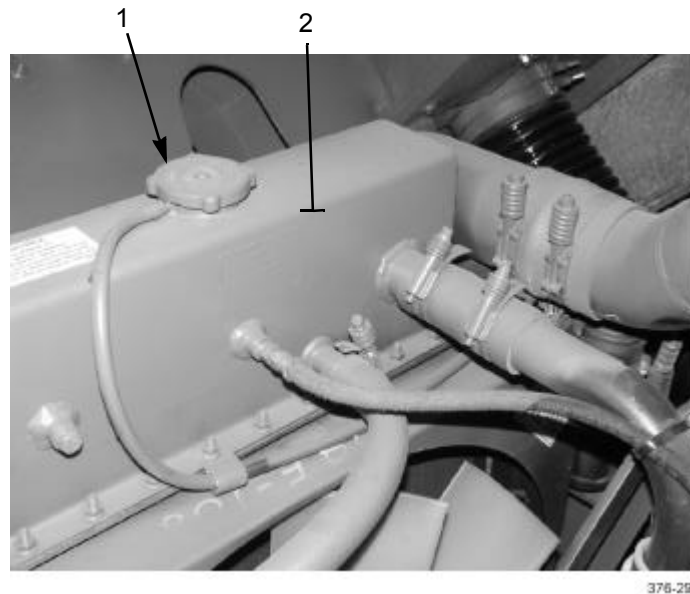
3. Fill coolant overflow bottle (6) with coolant to the FULL COLD line on bottle. Install cap (5).



376-028

***FILLING - CONTINUED***

4. Start engine (TM 9-2320-312-10) and allow engine to reach normal operating temperature. Be alert for evidence of coolant leaks.
5. Shut down engine (TM 9-2320-312-10) and allow cooling system to cool.
6. Check level of coolant in coolant overflow bottle (6). Level should be at or slightly above the FULL COLD line. Add coolant if necessary.
7. Recheck level of coolant in radiator (2). Install radiator cap (1).

**END OF WORK PACKAGE**

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**COOLANT FILTER AND HOSES MAINTENANCE**

**0024 00**

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**THIS WORK PACKAGE COVERS**

- Filter Head: Removal, Installation
- Filter Element: Removal, Installation
- Coolant Filter Hoses: Removal, Installation

---

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 060

**RPSTL Reference**

Group 060, Figure 4

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Antifreeze (Item 4 or 5, WP 0165 00)

Compound, pipe sealing (Item 20, WP 0165 00)

**Materials/Parts - Continued**

Oil, lubricating (Item 41, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Filter element, fluid (P/N WC-2)

Washer, lock (P/N 361-92) (2)

**References**

WP 0023 00

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

Engine cool



**WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**FILTER HEAD REMOVAL****NOTE**

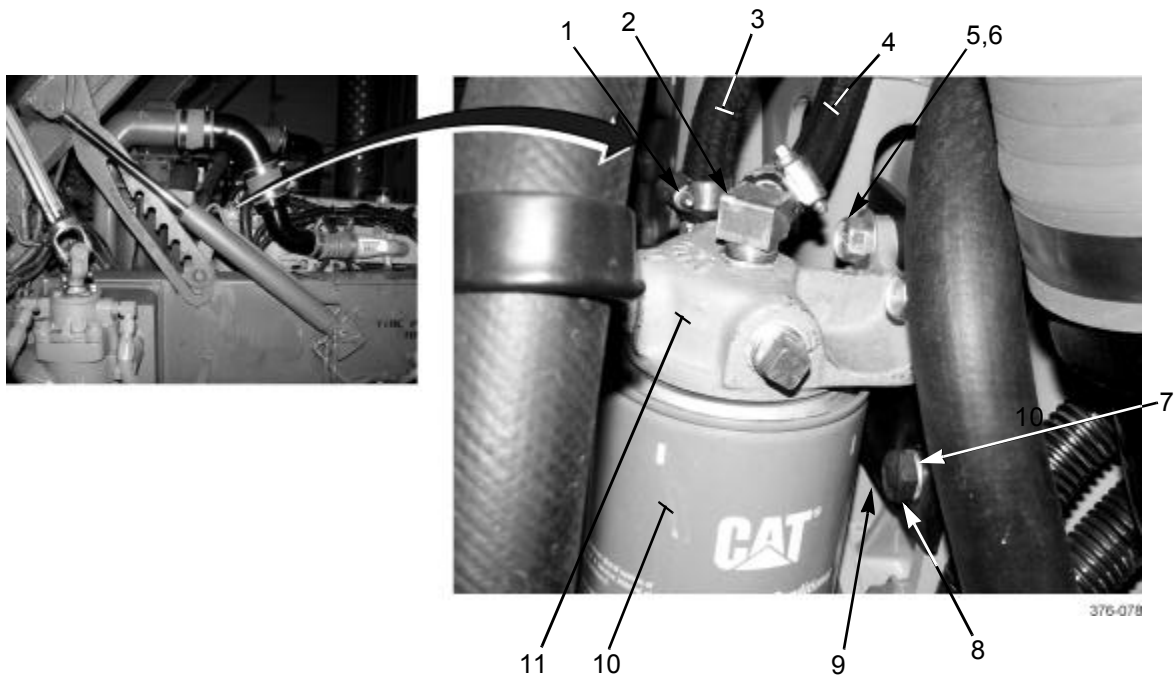
Use a drain pan to catch residual coolant. Dispose of coolant in accordance with local policy and ordinances. Ensure all spills are cleaned up.

1. Remove filter element (10) from filter head (11) (Refer to *Filter Element Removal*).

**NOTE**

Tag coolant hoses to ensure correct installation.

2. Loosen two hose clamps (1) and disconnect two hoses (3 and 4) from elbows (2).
3. Remove two nuts (5), screws (6), and filter head (11) from mounting bracket (9).
4. Remove two elbows (2) from filter head (11).
5. If damaged, remove two screws (8), lockwashers (7), and mounting bracket (9) from right front of engine. Discard lockwashers.

**FILTER HEAD INSTALLATION**

1. If removed, install mounting bracket (9) to engine with two new lockwashers (7) and screws (8).

**NOTE**

Apply pipe sealing compound to male threads of fittings.

2. Install two elbows (2) to filter head (11).
3. Install filter head (11) to mounting bracket (9) with two screws (6) and nuts (5).
4. Connect two hoses (3 and 4) to elbows (2) and tighten hose clamps (1).
5. Install filter element (10) to filter head (11) (Refer to *Filter Element Installation*).

**FILTER ELEMENT REMOVAL**

1. Close valve (12).

**WARNING**

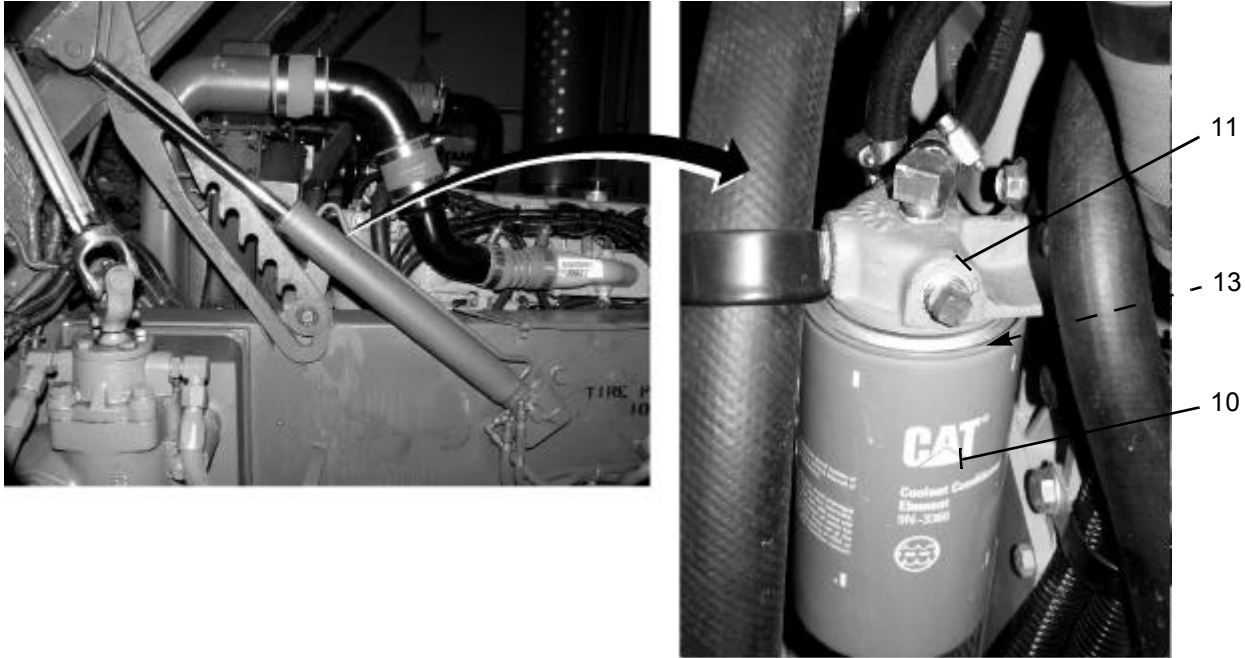
When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**NOTE**

Use a drain pan to catch residual coolant. Dispose of coolant in accordance with local policy and ordinances. Ensure all spills are cleaned up.

**FILTER ELEMENT REMOVAL - CONTINUED**

- Use a strap wrench to remove filter element (10) and gasket (13) from filter head (11). Discard filter element and gasket.



376-117.

**FILTER ELEMENT INSTALLATION****NOTE**

New filter element comes with a new gasket.

- Position new gasket (13) on top of new filter element (10). Lightly coat gasket with lubricating oil.
- Install filter element (10) and gasket (13) on filter head (11). Hand tighten until filter element gasket contacts filter head.

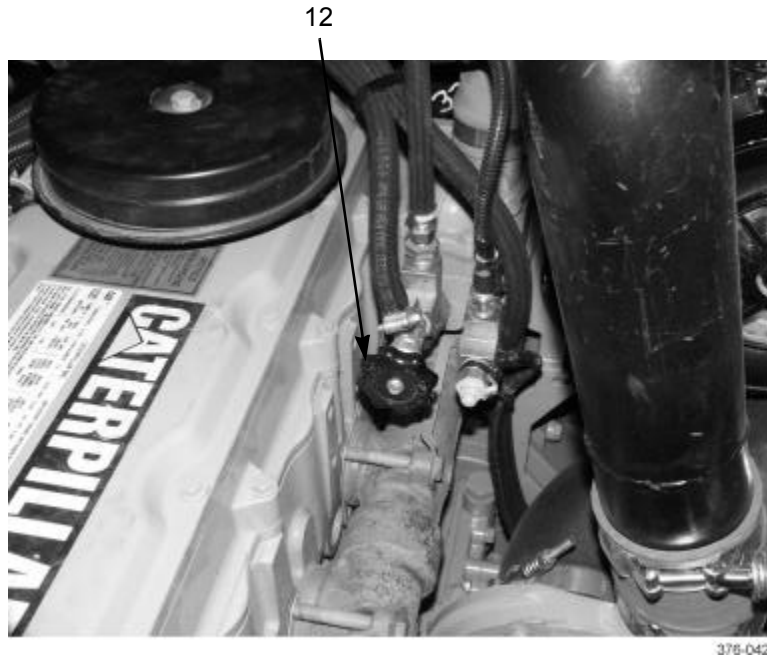
**CAUTION**

DO NOT use a filter wrench to tighten filter element. Failure to follow this caution may result in damage to filter element.

- Tighten filter element (10) an additional 3/4 turn.
- Open valve (12).



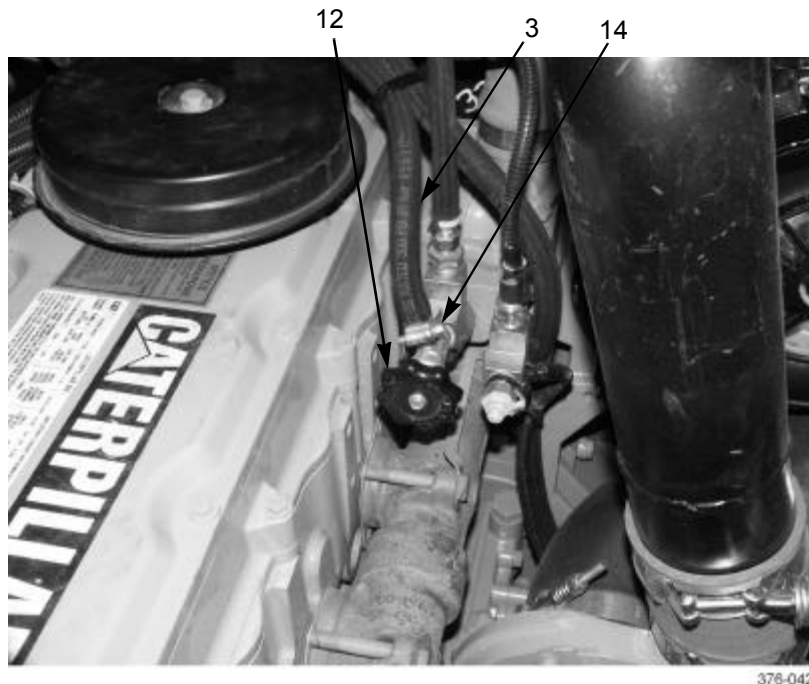
*FILTER ELEMENT INSTALLATION - CONTINUED*



5. Check coolant level and add antifreeze as required (WP 0023 00).
6. Lower cab (TM 9-2320-312-10).
7. Start engine (TM 9-2320-312-10) and check for leaks.

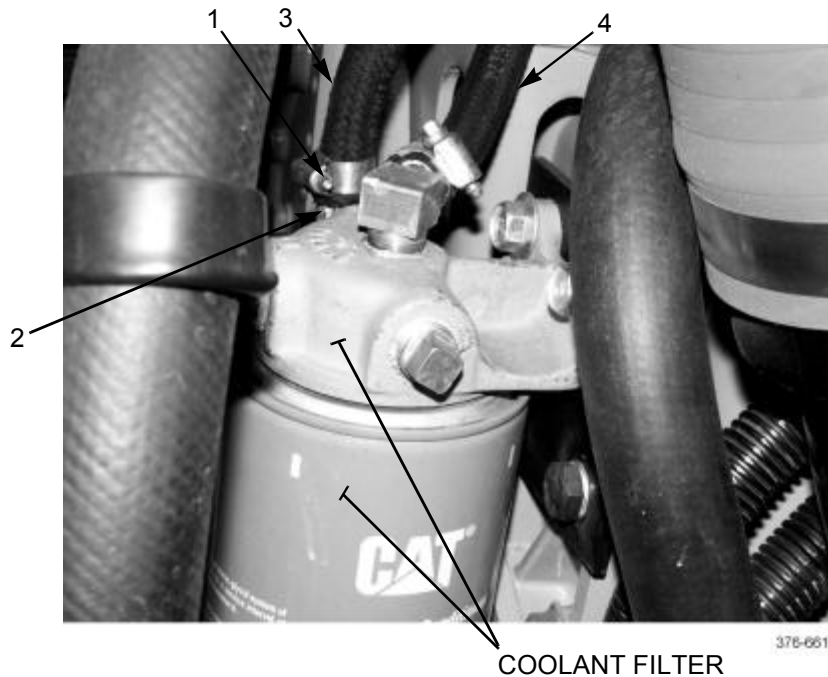
**COOLANT FILTER HOSES REMOVAL****NOTE**

- Use a drain pan to catch residual coolant. Dispose of coolant in accordance with local policy and ordinances. Ensure all spills are cleaned up.
  - To remove hose (3), perform steps 1-3.
  - To remove hose (4), perform steps 4-6.
  - Remove tiedown straps and discard. Use new tiedown straps on installation.
1. If removing hose (3), close valve (12).
  2. Loosen hose clamp (14) and disconnect hose (3) from valve (12).

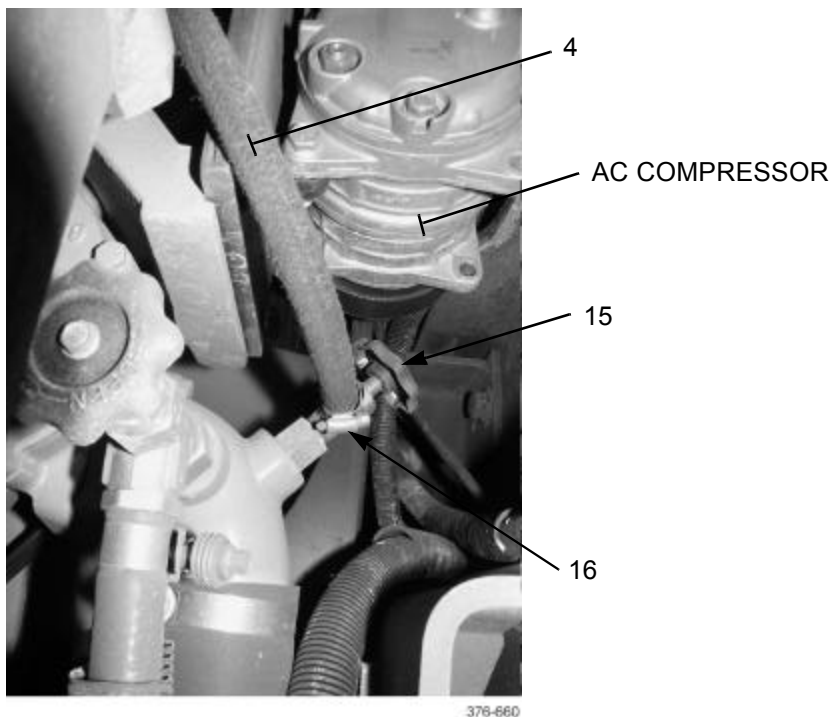


**COOLANT FILTER HOSES REMOVAL - CONTINUED**

3. At other end of hose (3), loosen hose clamp (1), disconnect hose from elbow (2), and remove hose. If a new hose is to be installed, retain old hose in order to measure correct length for new hose.

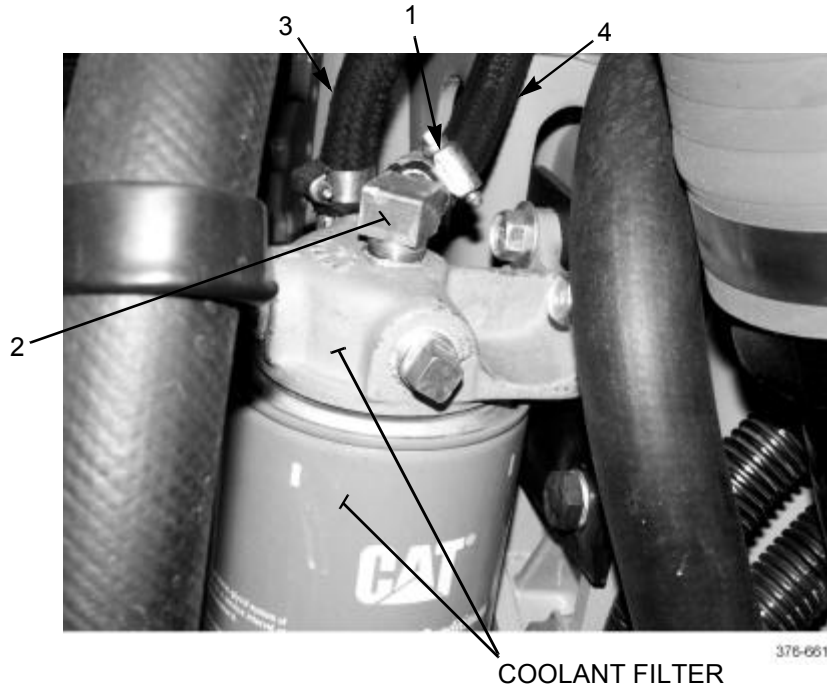


4. If removing hose (4), close valve (15), located directly under AC compressor on right side of engine.
5. Loosen hose clamp (16) and disconnect hose (4) from valve (15).



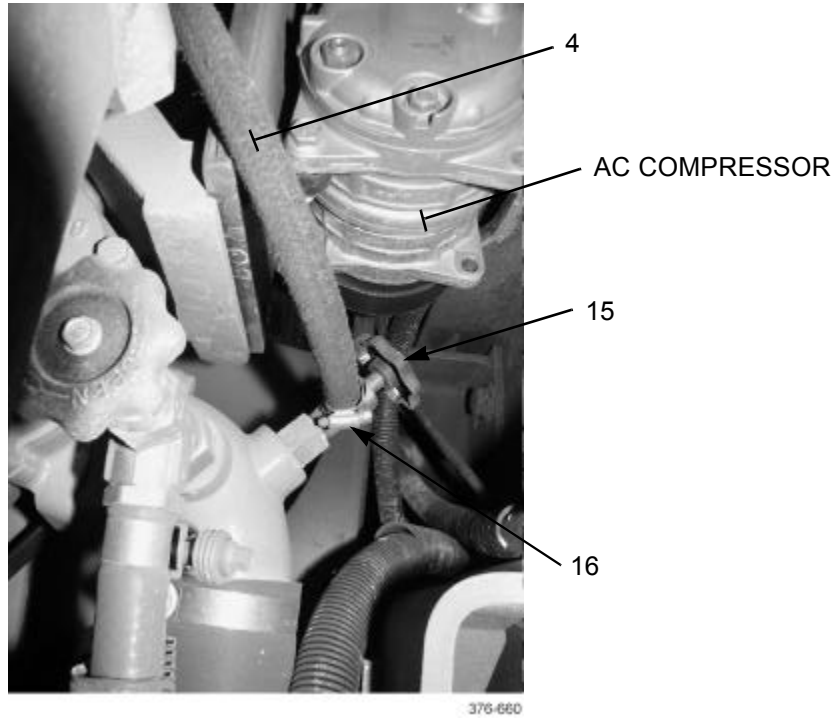
**COOLANT FILTER HOSES REMOVAL - CONTINUED**

6. At other end of hose (4), loosen hose clamp (1), disconnect hose from elbow (2), and remove hose. If a new hose is to be installed, retain old hose in order to measure correct length for new hose.

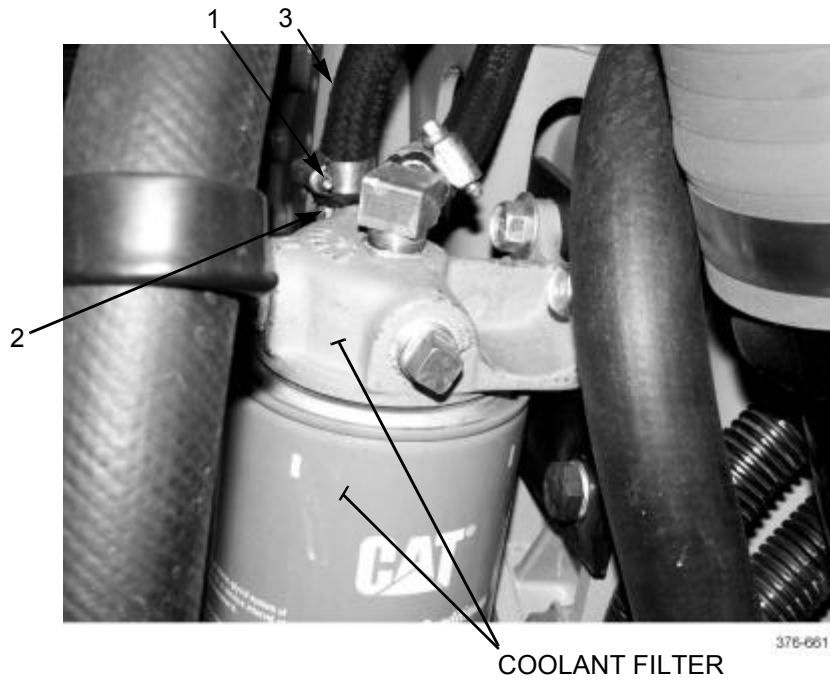
**COOLANT FILTER HOSES INSTALLATION****NOTE**

- To install hose (4), perform steps 1-4 and 8 and 9.
  - To install hose (3), perform steps 1 and 5-9.
1. If installing new hose (3 or 4), use old hose as a guide to cut correct length of new hose.
  2. At coolant filter, connect hose (4) to elbow (2) and tighten hose clamp (1).
  3. Route hose (4) to valve (15), located directly under AC compressor on right side of engine.
  4. Connect hose (4) to valve (15) and tighten hose clamp (16). Open valve.

COOLANT FILTER HOSES INSTALLATION - CONTINUED

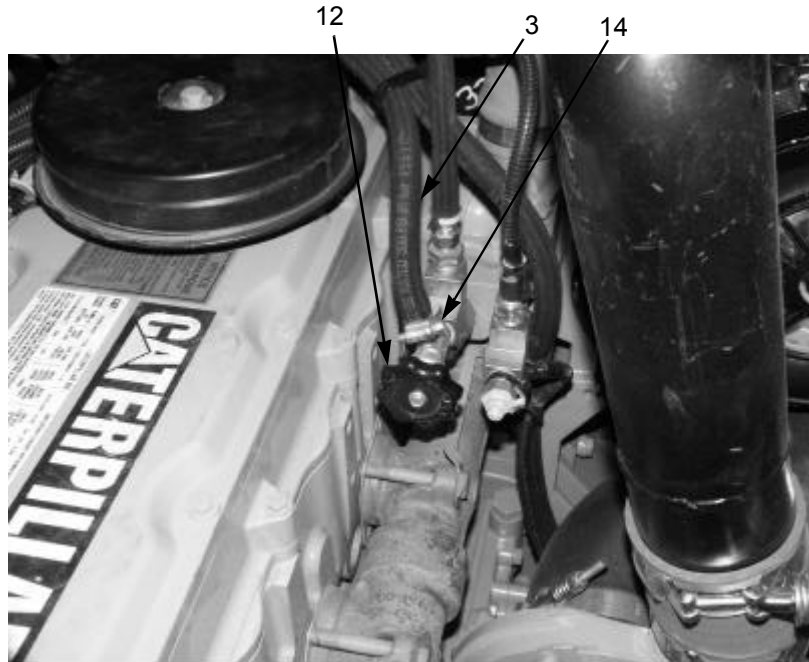


5. At coolant filter, connect hose (3) to elbow (2) and tighten hose clamp (1).



**COOLANT FILTER HOSES INSTALLATION - CONTINUED**

6. Route hose (3) to valve (12).
7. Connect hose (3) to valve (12) and tighten hose clamp (14). Open valve.



376-042

8. Check coolant level and add antifreeze as required (WP 0023 00).
9. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**RADIATOR HOSES REPLACEMENT**

---

**0025 00****THIS WORK PACKAGE COVERS**

Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 060

**RPSTL Reference**

Group 060, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Nut, lock (P/N 219-62)

**Equipment Condition**

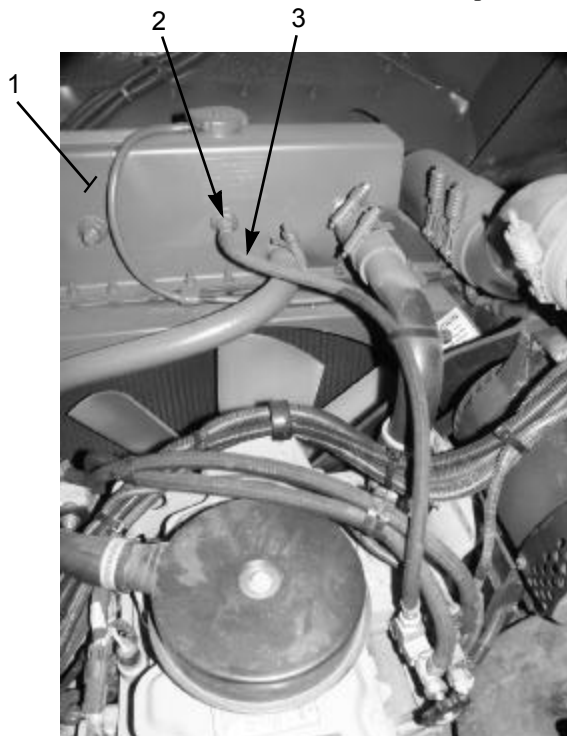
Radiator drained (WP 0023 00)

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**REMOVAL****NOTE**

Remove and discard tiedown strap as necessary.

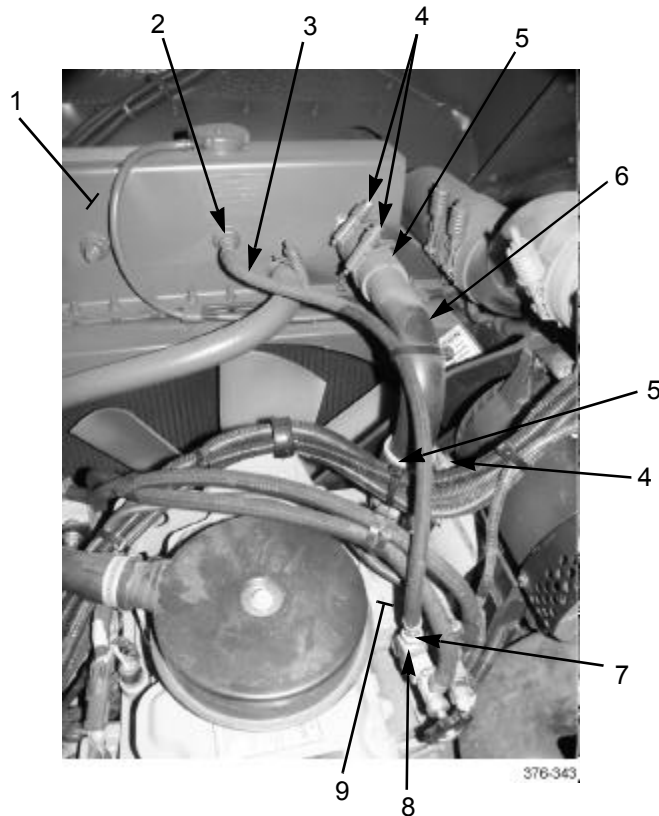
1. At top of radiator (1), disconnect coolant filter return hose (3) from adapter (2).



376-343

**REMOVAL - CONTINUED**

2. If damaged, remove adapter (2) from radiator (1).
3. At other end of coolant filter return hose (3), remove hose from adapter (7).
4. If damaged, remove adapter (7) from tee (8).
5. Remove four spring clamps (4), two upper radiator hoses (5), and tube (6) from between radiator (1) and thermostat housing (9).

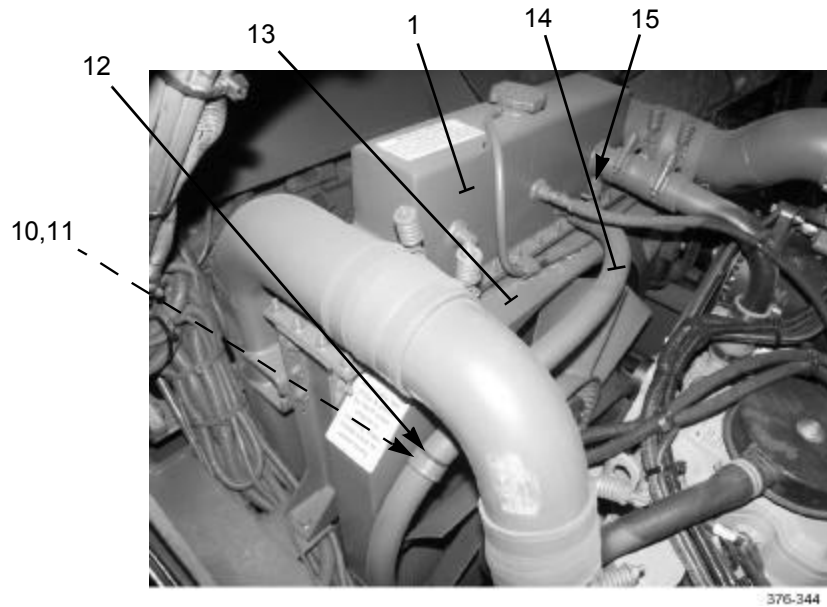
**NOTE**

Perform step 6 to remove each of two clamps at left side of fan shroud.

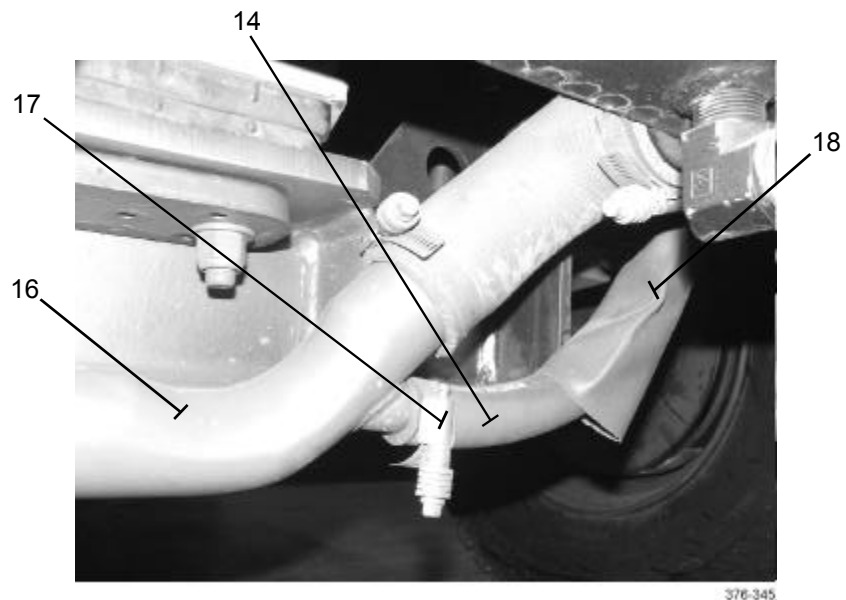
6. Remove nut (10), screw (11), and clamp (12) holding radiator hose (14) to fan shroud (13).
7. Remove hose clamp (15) and disconnect radiator hose (14) from radiator (1).



**REMOVAL - CONTINUED**

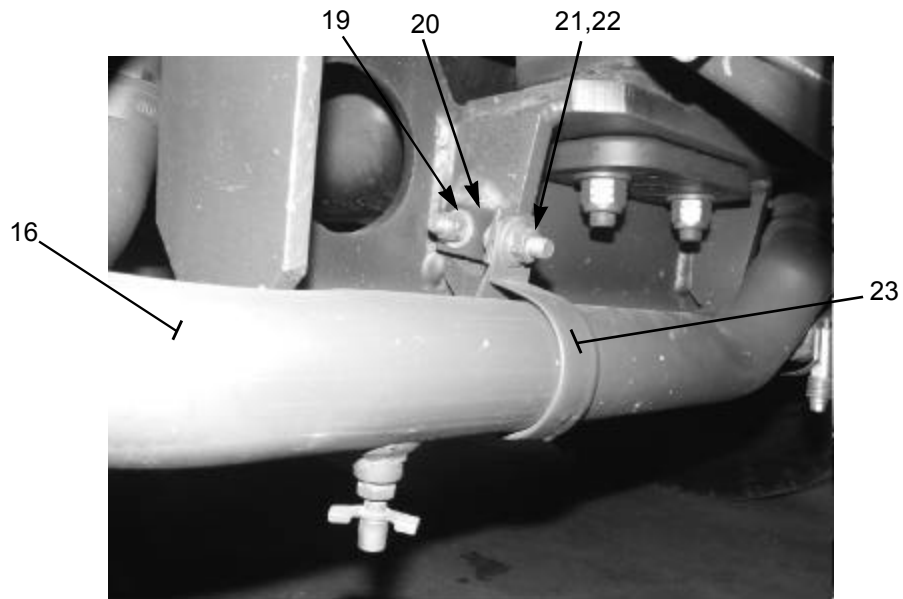


8. At other end of radiator hose (14) underneath vehicle, remove hose clamp (17) and remove radiator hose from coolant tube (16).
9. Remove protective sleeve (18) from radiator hose (14).



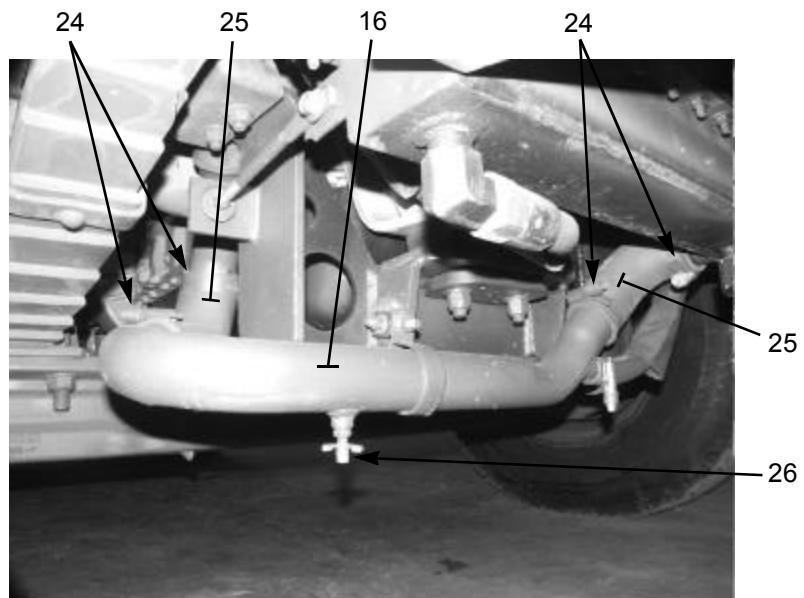
**REMOVAL - CONTINUED**

10. Remove locknut (21), screw (22), and clamp (23) holding coolant tube (16) to L-bracket (20) of vehicle crossmember. Discard locknut.
11. Remove nut (19) and L-bracket (20) from stud on crossmember.



376-346

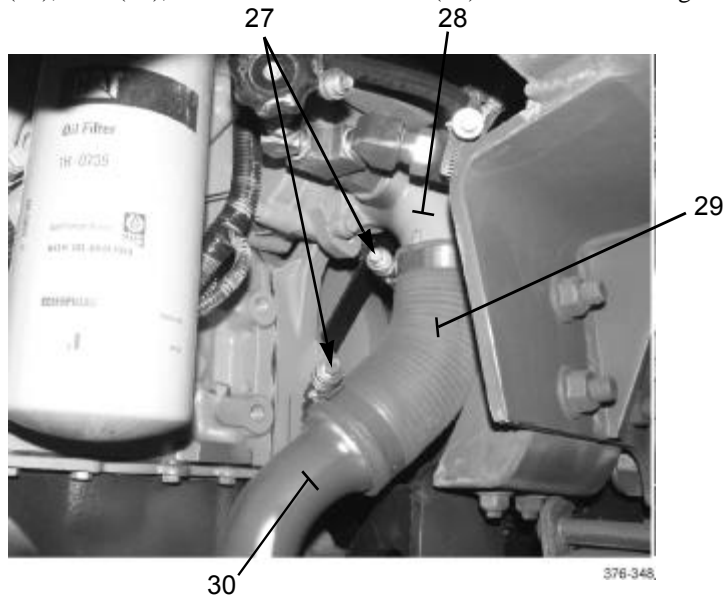
12. Remove four hose clamps (24), two radiator hoses (25), and coolant tube (16) from vehicle.
13. If damaged, remove drain fitting (26) from coolant tube (16).



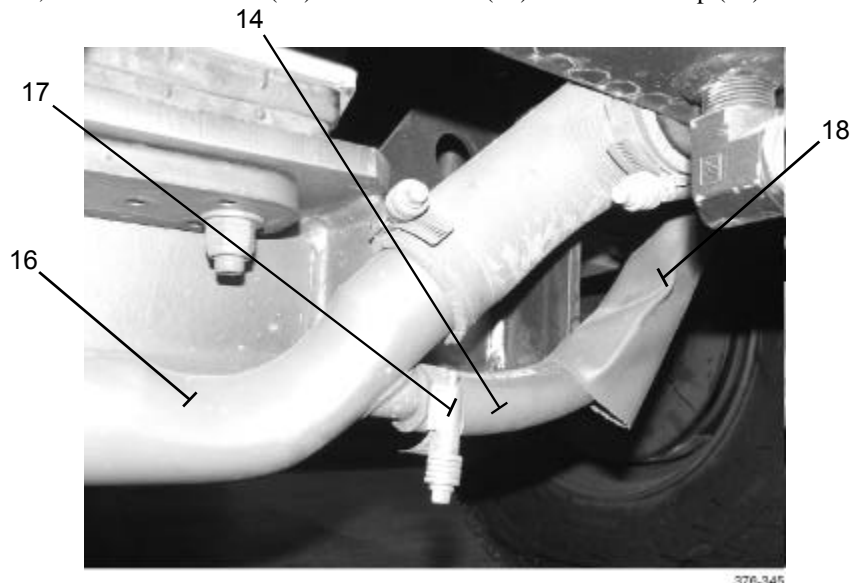
376-347

**RADIATOR HOSES REPLACEMENT - CONTINUED****0025 00****REMOVAL - CONTINUED**

14. Remove two hose clamps (27), tube (30), and lower radiator hose (29) from bottom of engine water pump (28).

**INSTALLATION**

1. Underneath vehicle, install lower radiator hose (29) and tube (30) to bottom of engine water pump (28) with two hose clamps (27).
2. If removed, apply a thin coat of sealing compound to pipe threads of drain fitting (26) and install to coolant tube (16).
3. Install coolant tube (16) and two radiator hoses (25) to vehicle with four hose clamps (24).
4. Install L-bracket (20) to stud on crossmember with new locknut (19).
5. Install coolant tube (16) to L-bracket (20) with clamp (23), screw (22), and nut (21).
6. Install protective sleeve (18) over radiator hose (14) and position radiator hose to vehicle.
7. Underneath vehicle, install radiator hose (14) to coolant tube (16) with hose clamp (17).



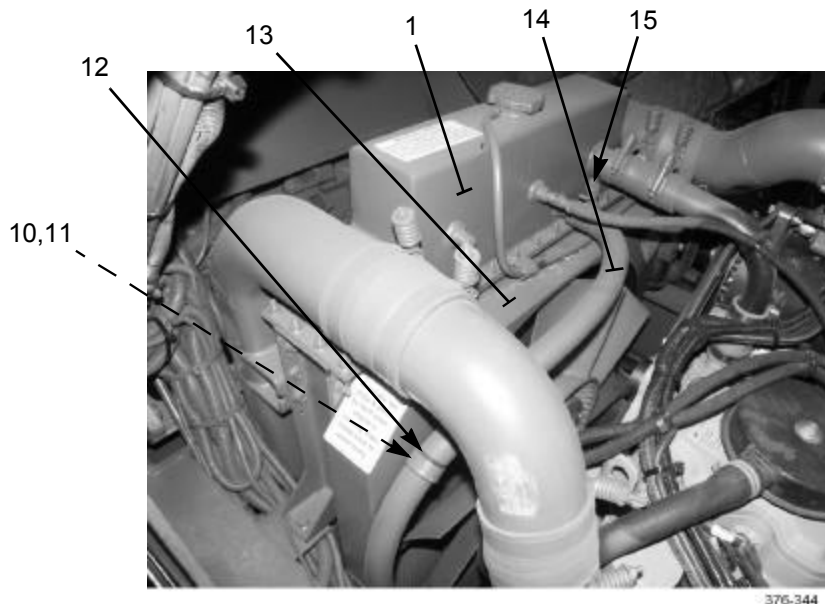
**INSTALLATION - CONTINUED**

8. At top of radiator (1), connect other end of radiator hose (14) to radiator with hose clamp (15).

**NOTE**

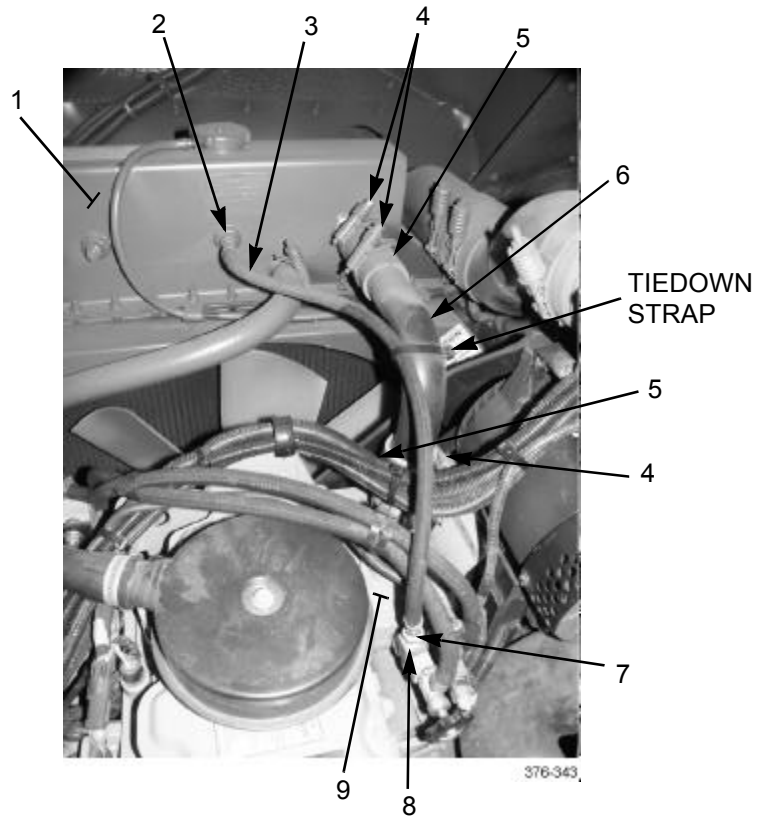
Perform step 9 to install each of two clamps at left side of fan shroud.

9. Install radiator hose (14) to fan shroud (13) with clamp (12), screw (11), and nut (10).



10. Install elbow (6) and two upper radiator hoses (5) between thermostat housing (9) and radiator (1) with four spring clamps (4).
11. If removed, apply a thin coat of sealing compound to pipe threads of adapter (7) and install adapter to tee (8).
12. Install coolant filter return hose (3) to adapter (7).
13. If removed, apply a thin coat of sealing compound to pipe threads of adapter (2) and install adapter to radiator (1).
14. Connect other end of coolant filter return hose (3) to adapter (2). Install new tiedown strap.

**INSTALLATION - CONTINUED**



15. Fill radiator (WP 0023 00).

**END OF WORK PACKAGE**

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**THIS WORK PACKAGE COVERS**

Air Recirculation Shield: Removal, Installation

Head Shields: Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 060

**RPSTL Reference**

Group 060, Figure 3

Group 140, Figure 14

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Wire, nonelectrical (Item 66, WP 0165 00)

Seal, nonmetallic (P/N 284A-0194-3)

**References**

TM 9-2320-312-10

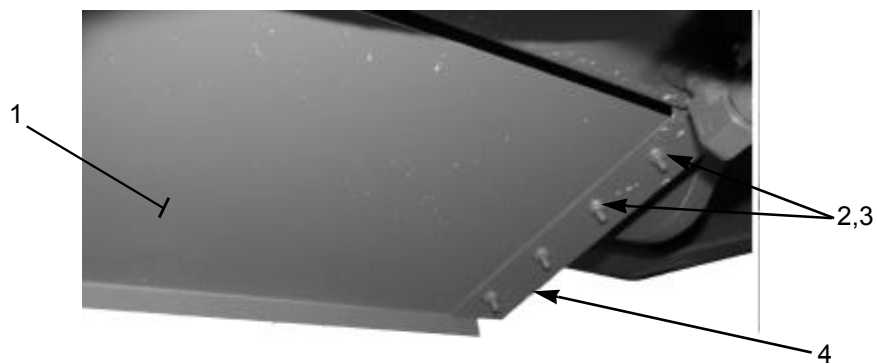
WP 0046 00

**Personnel**

Two (heat shields replacement)

**AIR RECIRCULATION SHIELD REMOVAL**

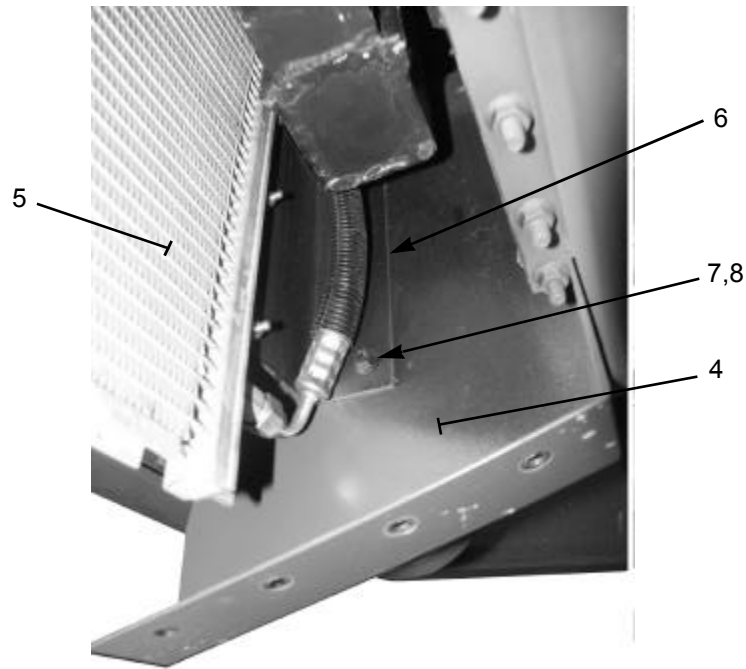
1. Remove eight nuts (2), screws (3), and bottom shield (1) from two side shields (4).



378-372

**AIR RECIRCULATION SHIELD REMOVAL - CONTINUED**

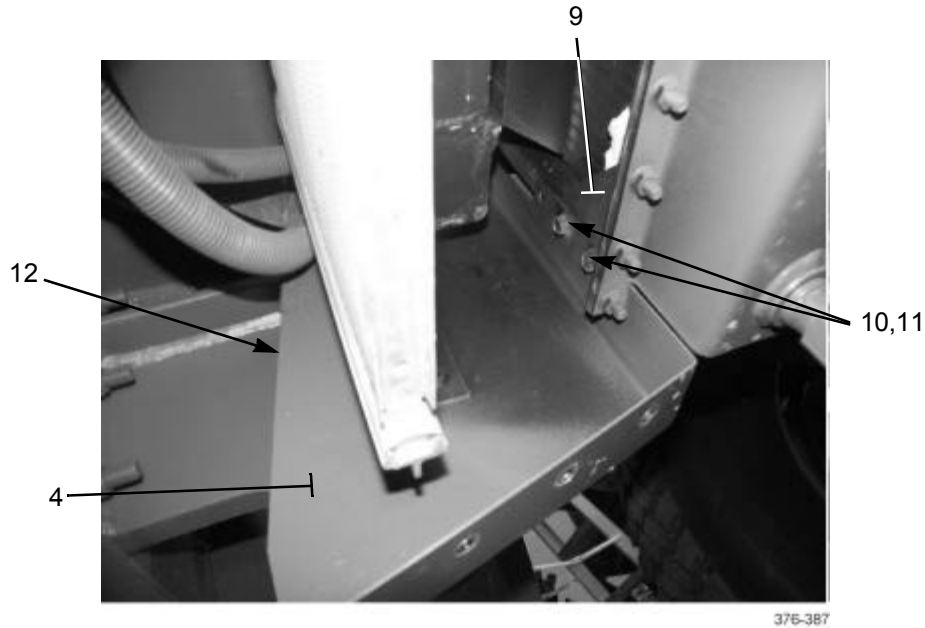
- Using wire, secure AC condenser (5) to front crossmember of vehicle.
- Remove six nuts (7) and bolts (8) to separate two angle brackets (6) of AC condenser (5) from two side shields (4).



376-373

- Remove four nuts (10), screws (11), and two side shields (4) from front of radiator (9).
- Remove seal (12) from two side shields (4). Retain seal in order to measure correct length for new seal.

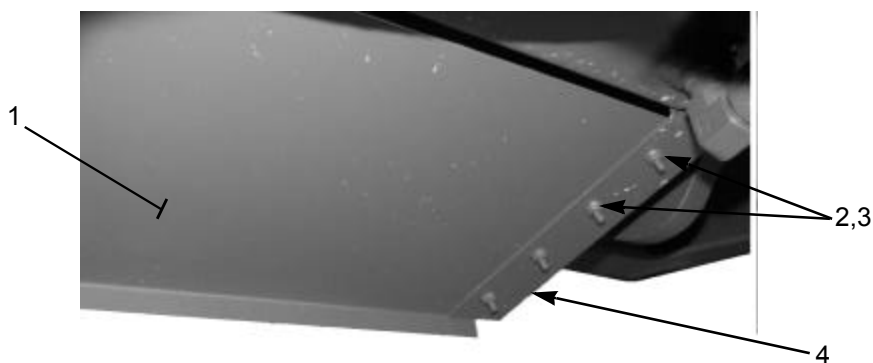


**AIR RECIRCULATION SHIELD REMOVAL - CONTINUED****AIR RECIRCULATION SHIELD INSTALLATION**

1. Use old seal (12) as a guide to cut correct length of new seal.
2. Install new seal (12) to two side shields (4).
3. Install two side shields (4) to front of radiator (9) with four screws (11) and nuts (10).
4. Install two angle brackets (6) of AC condenser (5) to two side shields (4) with six bolts (8) and nuts (7).
5. Remove wire from AC condenser (5).

**AIR RECIRCULATION SHIELD INSTALLATION - CONTINUED**

6. Install bottom shield (1) to two side shields (4) with eight screws (3) and nuts (2).



376-372

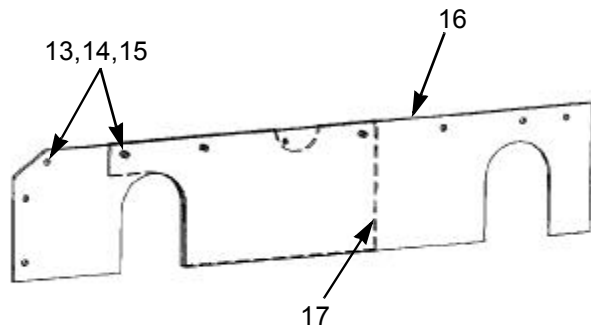
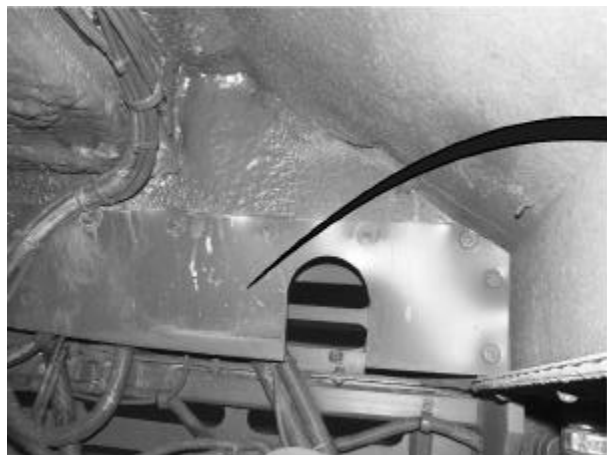
**HEAT SHIELDS REMOVAL**

1. Perform the following to access heat shields:
  - a. Remove front access panel from cab (WP 0046 00).
  - b. Tilt cab (TM 9-2320-312-10).
  - c. Open access door to heater/AC unit.

**NOTE**

Note position of two heat shields and routing of air and electrical lines between heat shields, to ensure correct installation.

2. Remove ten nuts (13), eight washers (14), ten screws (15) and heat shields (16 and 17) from underside of cab.



376-755

***HEAT SHIELDS INSTALLATION***

1. Position heat shields (16 and 17) at underside of cab, with air and electrical lines routed between heat shields. Install ten screws (15), eight washers (14), and ten nuts (13).
2. Close heater/AC unit access door.
3. Lower cab (TM 9-2320-312-10).
4. Install front access panel to cab (WP 0046 00).

**END OF WORK PACKAGE**

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**TRANSMISSION DIPSTICK AND FILL TUBE REPLACEMENT**

---

**0027 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 070

**RPSTL Reference**

Group 070, Figure 4

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Nut, lock (P/N 21NE064) (2)

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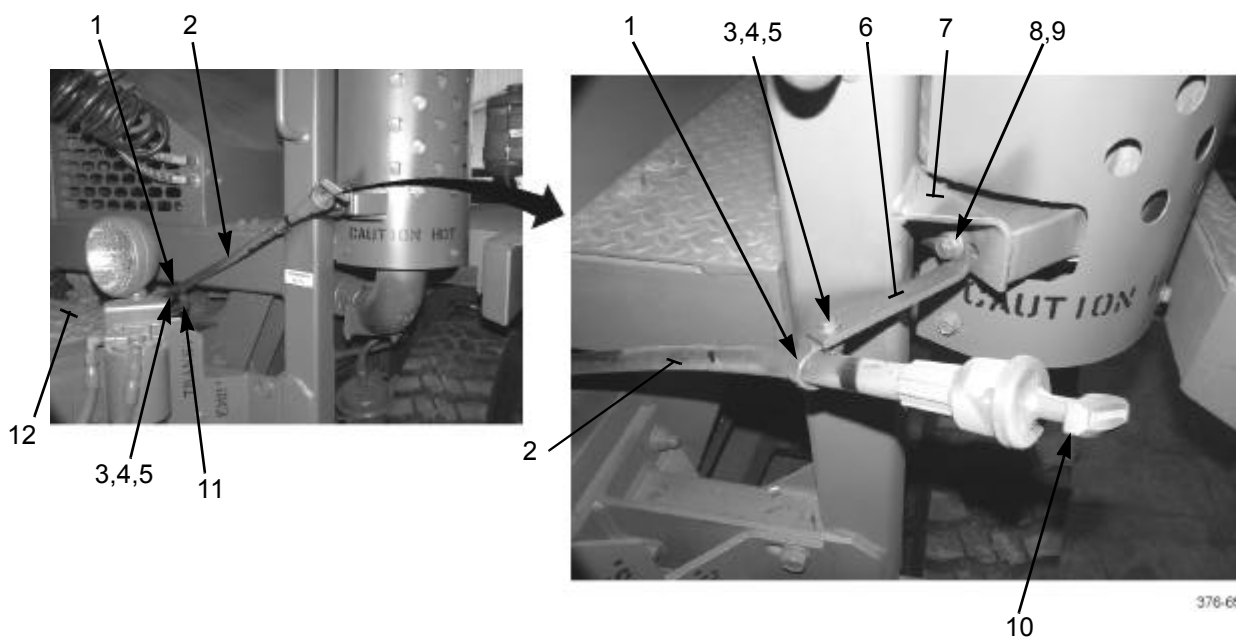
**CAUTION**

Wipe area around each end of dipstick tube clean before removing, to prevent debris from entering transmission.

**REMOVAL****NOTE**

Remove and discard tiedown straps as necessary. Use new tiedown straps on installation.

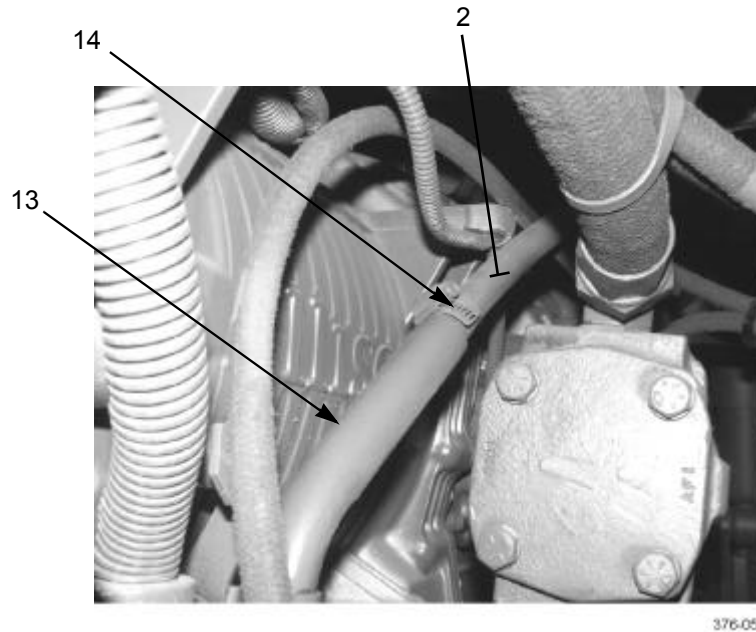
1. Remove dipstick (10) from dipstick tube (2).
2. Remove two locknuts (3), screws (4), washers (5), and clamps (1) from dipstick tube (2) and brackets (6 and 11). Discard locknuts.
3. If bracket (6) is damaged, remove nut (8), screw (9), and bracket from muffler post (7). If bracket (11) is damaged, remove screw and bracket from transmission access cover (12).



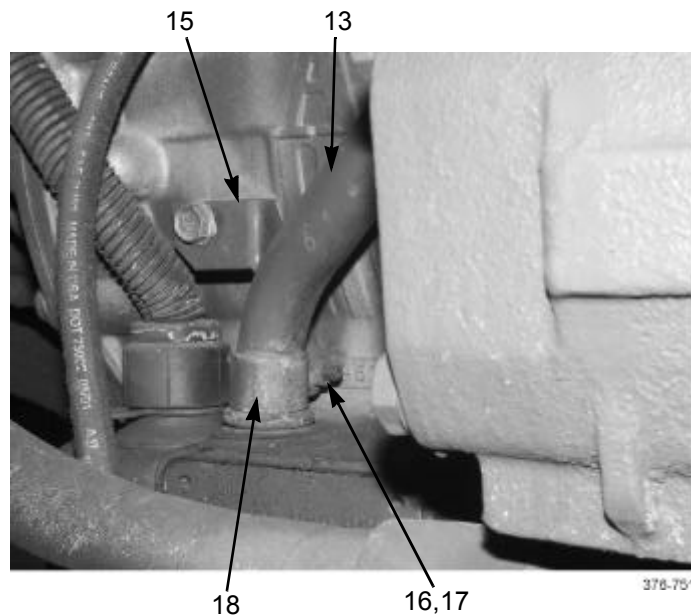
**REMOVAL - CONTINUED****NOTE**

Prior to removal, note length of dipstick tube (2), position of clamp (14) on tube, and how far tube is installed into transmission oil fill tube (13). This will ensure correct installation of dipstick tube and accurate transmission fluid level checks.

4. Remove hose clamp (14) and remove dipstick tube (2) from oil fill tube (13).

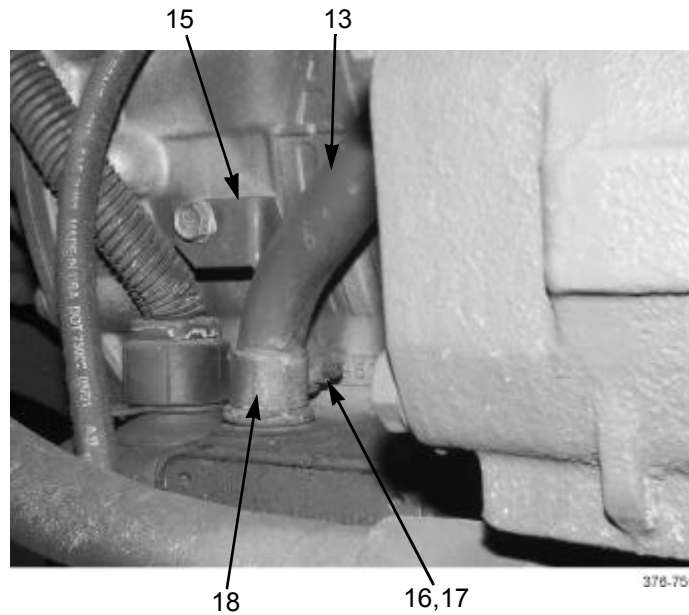


5. As required, remove nut (16), bolt (17), clamp (18), and oil fill tube (13) from transmission and bracket (15).

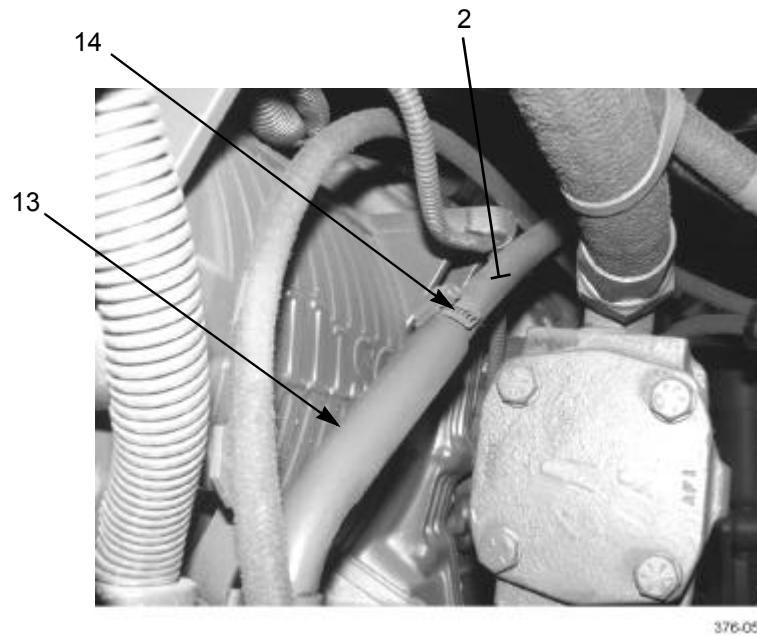


**INSTALLATION**

1. If removed, install oil fill tube (13) to transmission and bracket (15) with clamp (18), bolt (17), and nut (16).



2. Install dipstick tube (2) into oil fill tube (13), in same position as noted during removal, and install hose clamp (14).

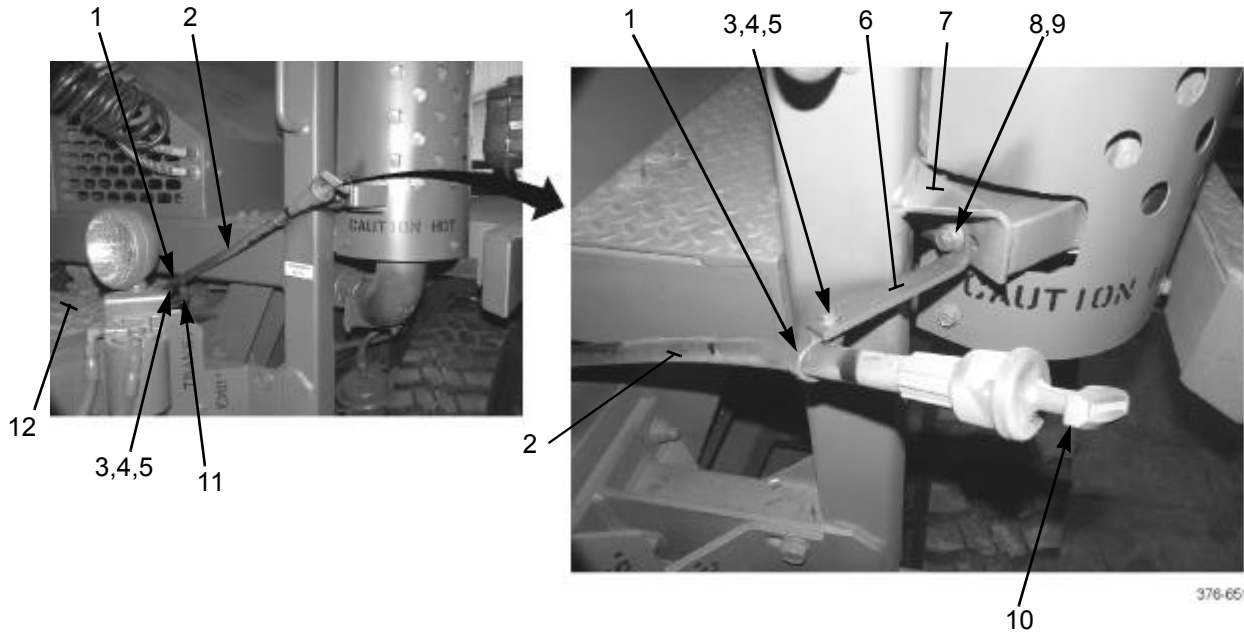




**TRANSMISSION DIPSTICK AND FILL TUBE REPLACEMENT - CONTINUED 0027 00**

**INSTALLATION - CONTINUED**

3. If removed, install bracket (11) to transmission access cover (12) with screw.
4. If removed, install bracket (6) to muffler post (7) with screw (9) and nut (8).
5. Install dipstick tube (2) to brackets (6 and 11) with two clamps (1), washers (5), screws (4), and new locknuts (3).
6. Install dipstick (10) into dipstick tube (2). Ensure dipstick is fully seated.



**END OF WORK PACKAGE**

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**TRANSMISSION RANGE SELECTOR LEVER REPLACEMENT**

**0028 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 070

**RPSTL Reference**

Group 070, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N 217F-9) (4)

**References**

TM 9-2320-312-10

WP 0030 00

**Equipment Condition**

Battery disconnect switch in OFF position

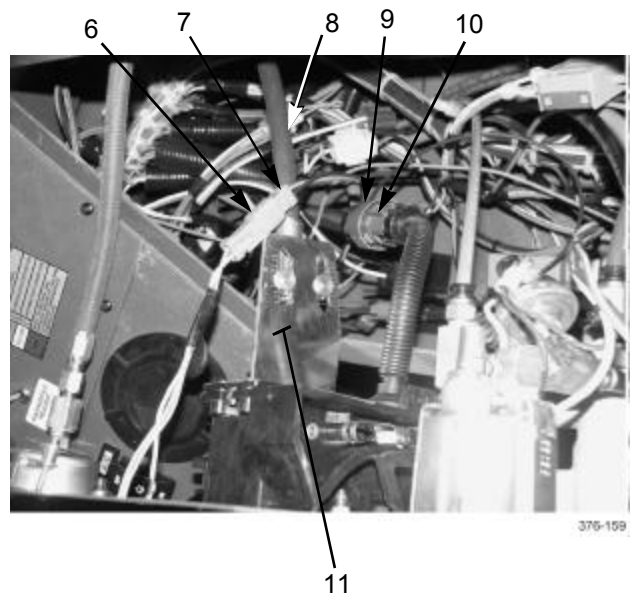
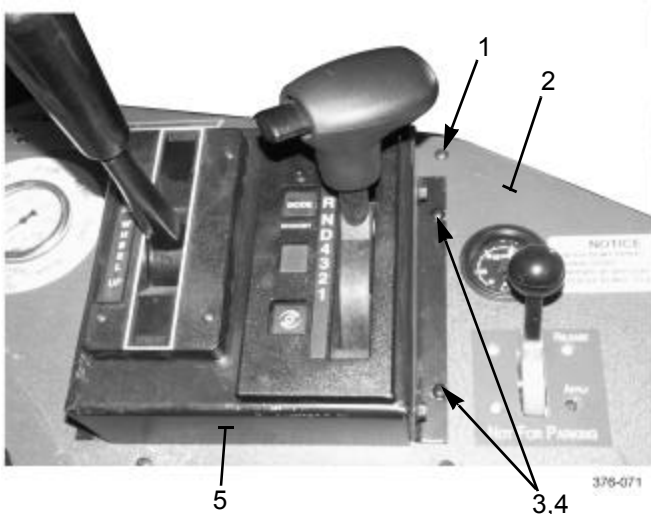
Fifth wheel fully lowered

**REMOVAL**

**NOTE**

Tag all connectors to ensure correct installation.

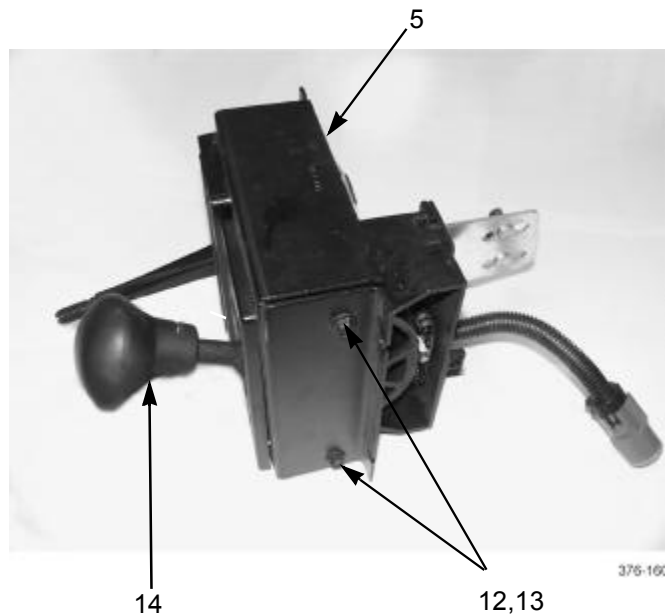
1. Remove eight screws (1) and lift right-side instrument panel (2) away from mounting on instrument panel frame.
2. Remove four locknuts (3), screws (4), and shift tower (5) from right-side instrument panel (2). Discard locknuts.
3. Disconnect transmission range selector lever connector (10) from vehicle wiring harness connector (9).
4. Disconnect fifth wheel lift control electrical connector (6) from vehicle wiring harness connector (7). Remove cable (8) from fifth wheel lift control (10) (WP 0030 00).
5. Remove shift tower (5), with both levers attached, from vehicle.



**REMOVAL - CONTINUED****NOTE**

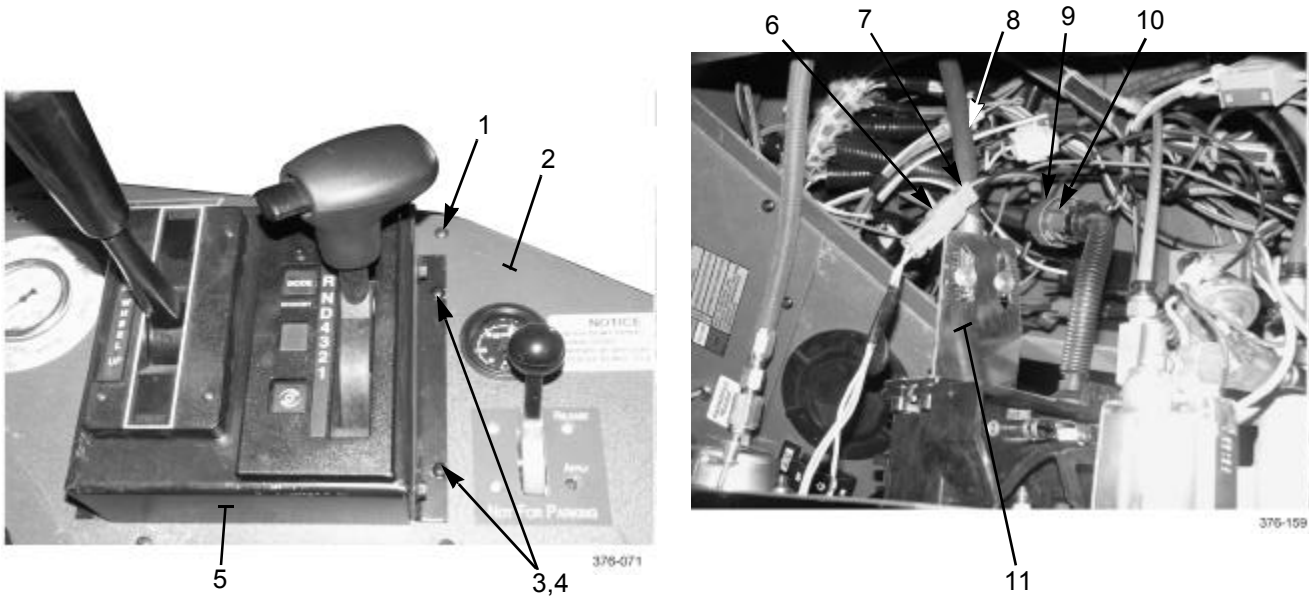
Note position of transmission range selector lever in shift tower to ensure correct installation.

6. Remove two nuts (12), screws (13) and transmission range selector lever (14) from shift tower (5).

**INSTALLATION**

1. Install transmission range selector lever (14) to shift tower (5) with two screws (13) and nuts (12).
2. Position shift tower (5), with both levers attached, to vehicle.
3. Install cable (8) to fifth wheel lift control (11) (WP 0030 00).
4. Connect fifth wheel lift control electrical connector (6) to vehicle wiring harness connector (7).
5. Connect transmission range selector lever connector (10) to vehicle wiring harness connector (9).
6. Install shift tower (5) to right-side instrument (2) with four screws (4) and new locknuts (3).
7. Install right-side instrument panel (2) with eight screws (1).

**INSTALLATION - CONTINUED**



8. Place battery disconnect switch in ON position. Check operation of transmission range selector lever (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**TRANSMISSION OIL COOLER HOSES REPLACEMENT**

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0029 00

**THIS WORK PACKAGE COVERS**

Vehicle Without Arctic Heater: Removal, Installation

Vehicle With Arctic Heater: Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 070

**RPSTL Reference**

Group 070, Figure 3

Group 140, Figures 15 and 16

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

**Materials/Parts - Continued**

Tag, marker (Item 58, WP 0165 00)

Wire, nonelectrical (Item 66, WP 0165 00) (vehicle with arctic heater)

Washer, lock (P/N 361-12) (4) (vehicle with arctic heater)

**Personnel Required**

Two

**References**

TM 9-2320-312-10

**Equipment Condition**

Engine air cleaner and intake tubes removed (WP 0015 00)

Transmission fluid drained (Group 070 Commercial Service Manuals)

**VEHICLE WITHOUT ARCTIC HEATER: REMOVAL****WARNING**

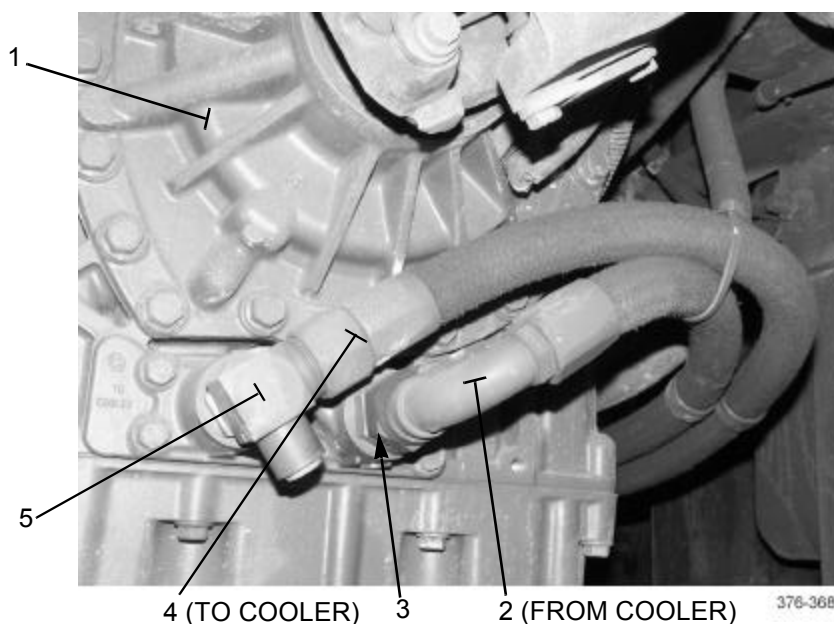
When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

- Use a suitable container to capture any residual fluid in hoses. Dispose of fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.
  - Remove and discard tiedown straps as necessary.
1. At rear of transmission (1), disconnect transmission oil cooler hose (4) from elbow (5).
  2. Disconnect transmission oil cooler hose (2) from adapter (3).

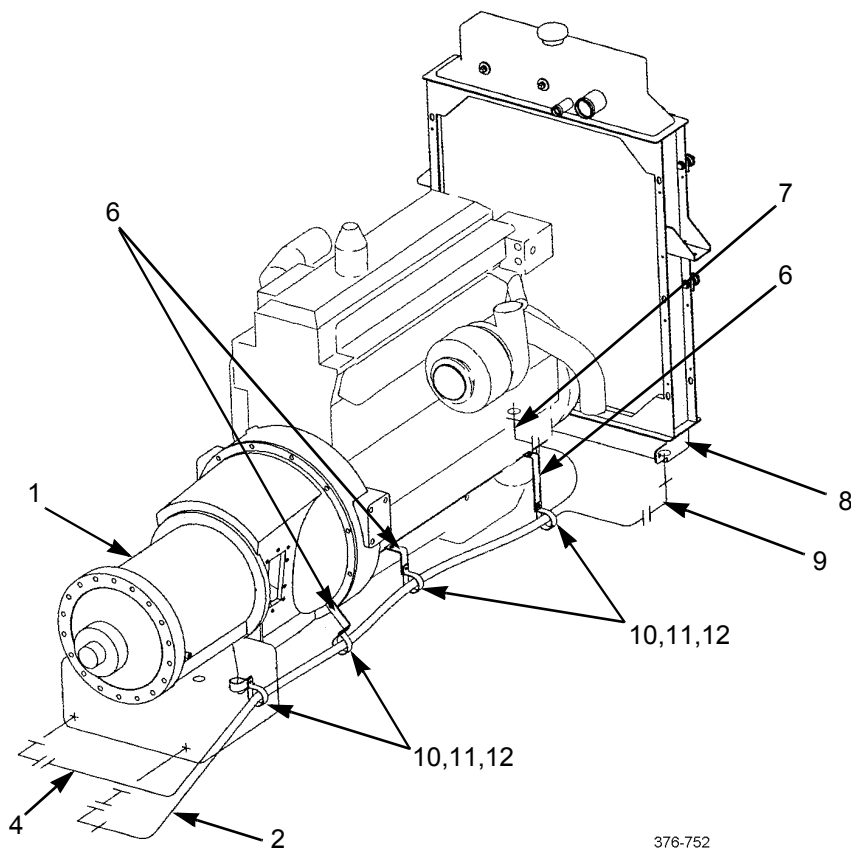




**VEHICLE WITHOUT ARCTIC HEATER: REMOVAL - CONTINUED****NOTE**

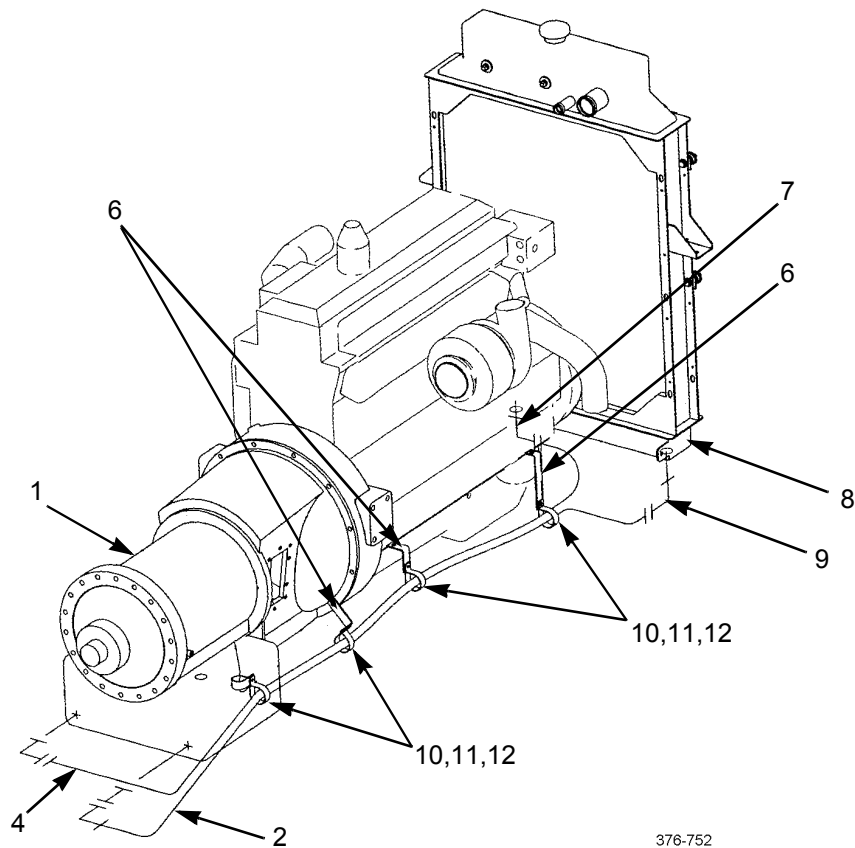
Note routing of transmission oil cooler hoses for ease in installation.

- Trace transmission oil cooler hoses (2 and 4) toward front of vehicle. Remove nut (10), bolt (11), and release hoses and clamps (12) from brackets (6) along right side of transmission (1) and engine. Remove clamps from hoses.
- Disconnect transmission oil cooler hose (4) from elbow (7) at radiator (8).
- Disconnect transmission oil cooler hose (2) from elbow (9).
- Remove transmission oil cooler hoses (2 and 4) from vehicle.



**VEHICLE WITHOUT ARCTIC HEATER: INSTALLATION**

1. Position transmission oil cooler hoses (2 and 4) to vehicle along right side of engine and transmission (1).
2. Connect transmission oil cooler hose (2) to elbow (9) at radiator (8).
3. Connect transmission oil cooler hose (4) to elbow (7) at radiator (8).
4. Along right side of engine and transmission (1), secure transmission oil cooler hoses (2 and 4) to brackets (6) with clamps (12), bolts (11), and nuts (10).

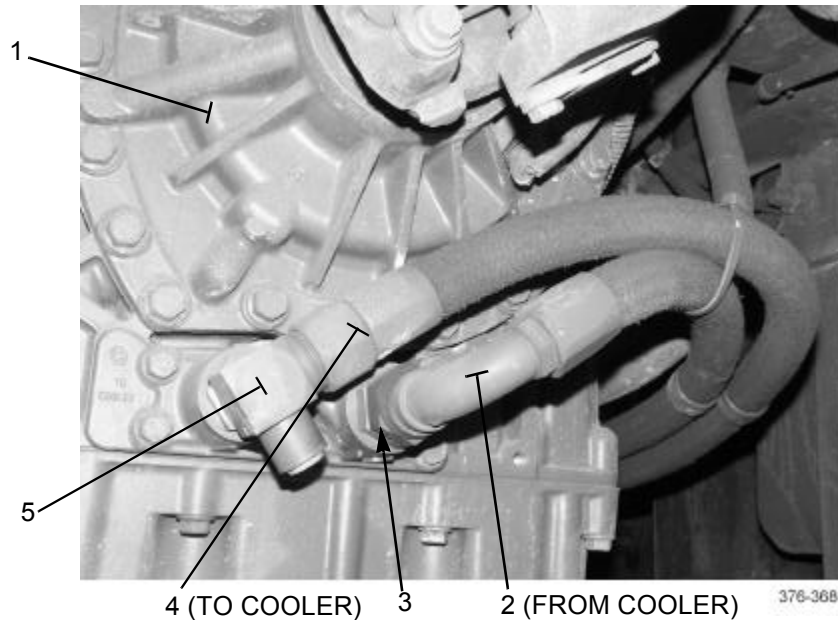


376-752

**VEHICLE WITHOUT ARCTIC HEATER: INSTALLATION - CONTINUED****NOTE**

Install new tiedown straps after transmission oil cooler hoses are installed.

5. At rear of transmission (1), connect transmission oil cooler hose (2) to adapter (3).
6. Connect transmission oil cooler hose (4) to elbow (5).



7. Install engine air cleaner and intake tubes (WP 0015 00).
8. Refill transmission fluid (Group 070 Commercial Service Manuals).
9. Start engine, operate transmission, and check for leaks (TM 9-2320-312-10).

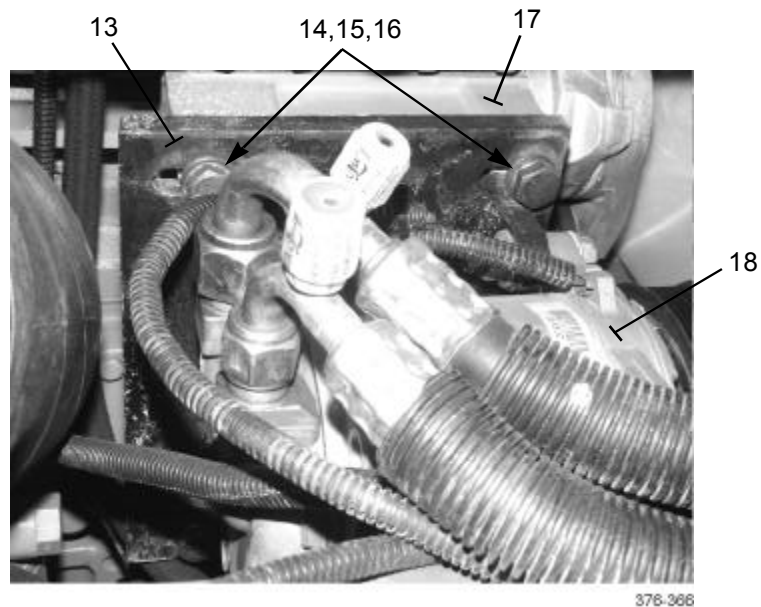
**VEHICLE WITH ARCTIC HEATER: REMOVAL****CAUTION**

Use care when removing AC compressor. Use proper support to avoid dropping AC compressor or damaging AC lines.

**NOTE**

Perform steps 1 and 2 to access transmission oil cooler hoses and transmission fluid warmer mounted along inside of right frame rail.

1. Remove four bolts (14), lockwashers (15), and washers (16) holding AC compressor bracket (13) to right side of engine (17). Discard lockwashers.
2. Lift AC compressor bracket (13), with AC compressor (18), from engine compartment and set aside. Using wire, secure AC compressor bracket to vehicle.



VEHICLE WITH ARCTIC HEATER: REMOVAL - CONTINUED



**WARNING**

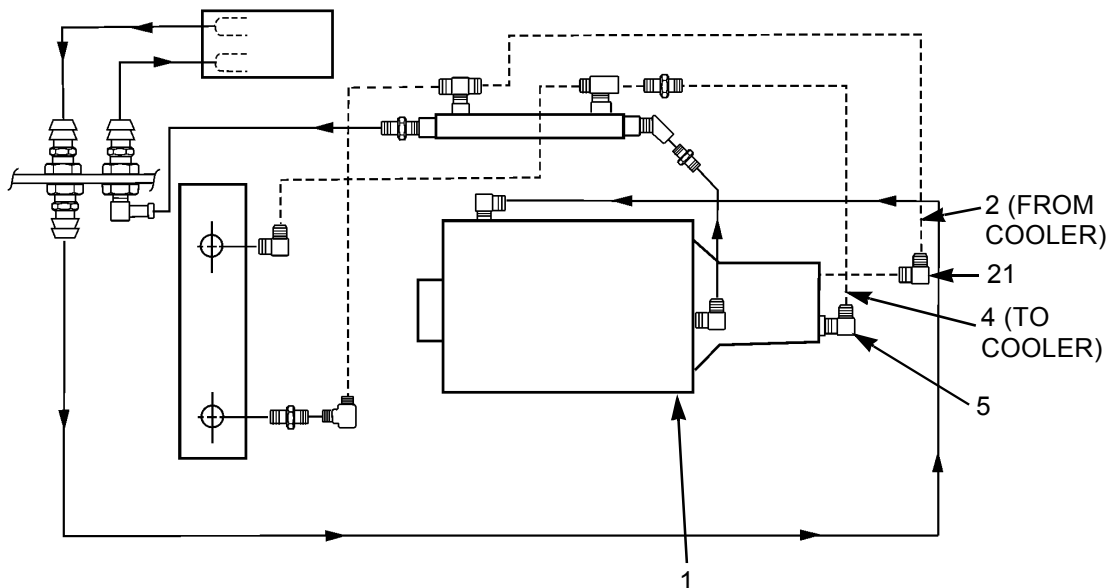
When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

- Use a suitable container to capture any residual fluid in hoses. Dispose of fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.
  - Remove and discard tiedown straps as necessary.
3. At rear of transmission (1), disconnect transmission oil cooler hose (4) from elbow (5).
  4. Disconnect transmission oil cooler hose (2) from elbow (21).



———— = COOLANT  
 - - - - - = TRANSMISSION FLUID

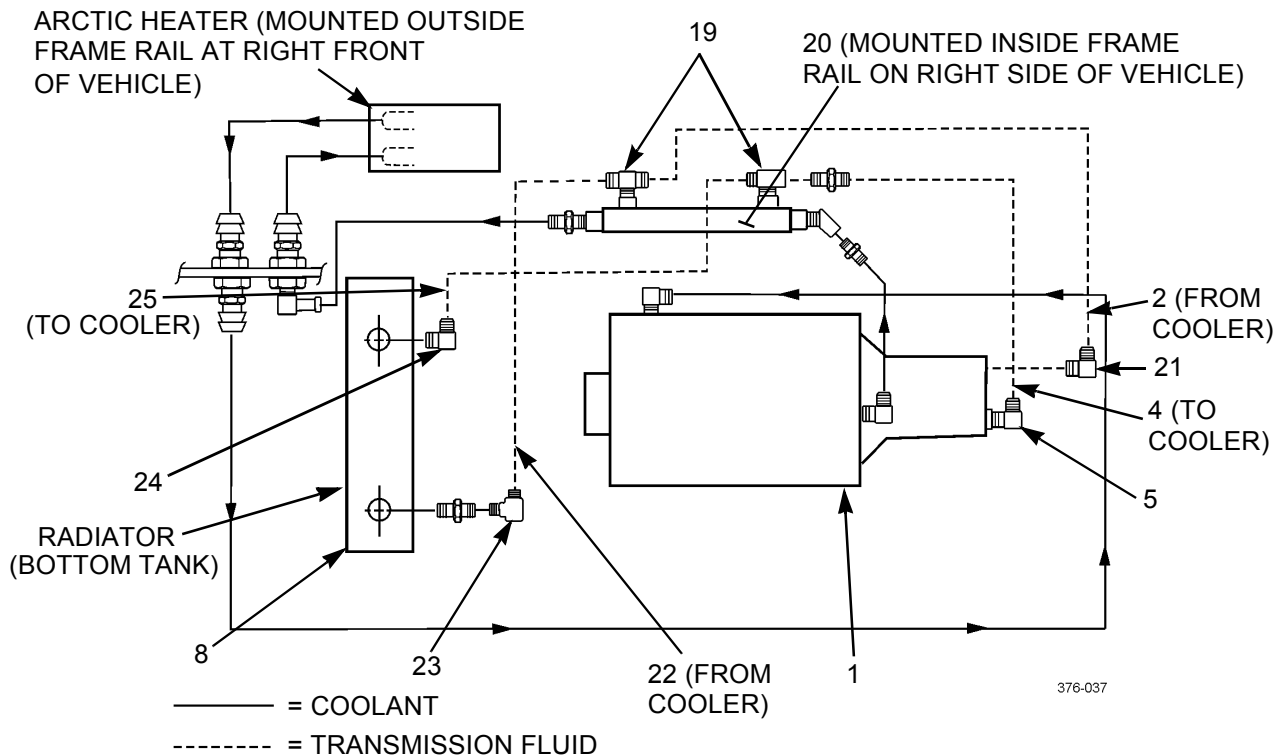
376-037

**VEHICLE WITH ARCTIC HEATER: REMOVAL - CONTINUED**

**NOTE**

Note routing of transmission oil cooler hoses for ease in installation.

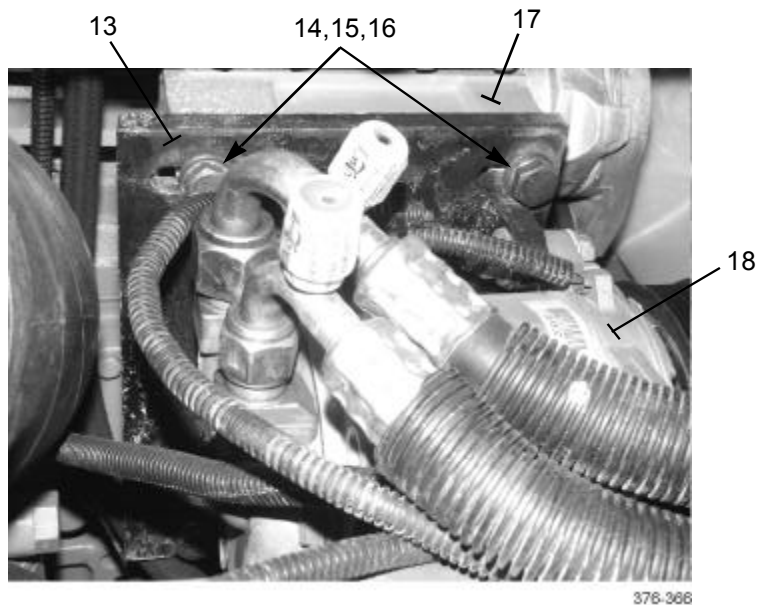
5. Trace transmission oil cooler hoses (2 and 4) toward front of vehicle. Release hoses from all brackets by removing nut, bolt, and clamp from each bracket and hoses.
6. Disconnect transmission oil cooler hoses (2 and 4) from fittings (19) at transmission fluid warmer (20), mounted on right side of vehicle inside frame rail. Remove hoses from vehicle.
7. Disconnect transmission oil cooler hoses (22 and 25) from fittings (19) at transmission fluid warmer (20).
8. Disconnect transmission oil cooler hose (25) from elbow (24) at radiator (8).
9. Disconnect transmission oil cooler hose (22) from elbow (23) at radiator (8).
10. Remove transmission oil cooler hoses (22 and 25) from vehicle.



**VEHICLE WITH ARCTIC HEATER: INSTALLATION****NOTE**

Install new tiedown straps after transmission oil cooler hoses and AC compressor are installed.

1. Position transmission oil cooler hoses (22 and 25) to vehicle.
2. Connect transmission oil cooler hose (22) to elbow (23) at radiator (8).
3. Connect transmission oil cooler hose (25) to elbow (24).
4. Route transmission oil cooler hoses (22 and 25) to transmission fluid warmer (20), mounted inside frame rail on right side of vehicle. Connect hoses to fittings (19).
5. Position transmission oil cooler lines (2 and 4) to vehicle and connect to fittings (19) at transmission fluid warmer (20).
6. Route transmission oil cooler hoses (2 and 4) to transmission (1), securing to brackets along right side of vehicle with clamps, bolts, and nuts.
7. At rear of transmission (1), connect transmission oil cooler hose (2) to elbow (21).
8. Connect transmission oil cooler hose (4) to elbow (5).
9. Position AC compressor bracket (13), with AC compressor (18), to right side of engine (17).
10. Install AC compressor bracket (13) with four washers (16), new lockwashers (15), and bolts (14).



11. Install engine air cleaner and intake tubes (WP 0015 00).
12. Refill transmission fluid (Group 070 Commercial Service Manuals).
13. Start engine, operate transmission, and check for leaks (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**FIFTH WHEEL LIFT CONTROL AND CABLE MAINTENANCE**

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**0030 00****THIS WORK PACKAGE COVERS**

Fifth Wheel Lift Control: Removal, Installation  
 Control Cable: Removal, Installation  
 Fifth Wheel Lift Control Light Bulb Replacement

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 070

**RPSTL Reference**

Group 070, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Caulk, strip (Item 7, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

**Materials/Parts - Continued**

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N 217F-9) (4)

Nut, lock (P/N 219-194) (4)

Screw, self-tapping (P/N 278-0056) (as required)

**References**

WP 0046 00

WP 0039 00

**Equipment Condition**

Fifth wheel fully lowered (TM 9-2320-312-10)

Battery disconnect switch in OFF position

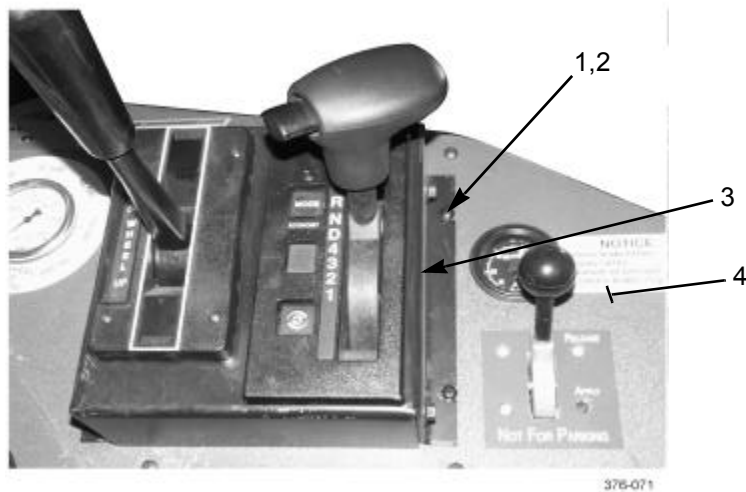
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**NOTE**

- This work package covers replacement of fifth wheel lift control on right-side instrument panel. It also covers replacement of control cable between lift control and flow control valve, located on right side of crossmember directly behind cab.
- Replacement of light bulbs at fifth wheel lift control is also described.

**FIFTH WHEEL LIFT CONTROL REMOVAL**

1. Remove eight screws and lift right-side instrument panel (4) away from mounting on instrument panel frame.
2. Remove four locknuts (2), screws (1), and shift tower (3), with both transmission range selector and fifth wheel lift control, from right-side instrument panel (4). Discard locknuts.

**NOTE**

Tag all connections to ensure correct installation.

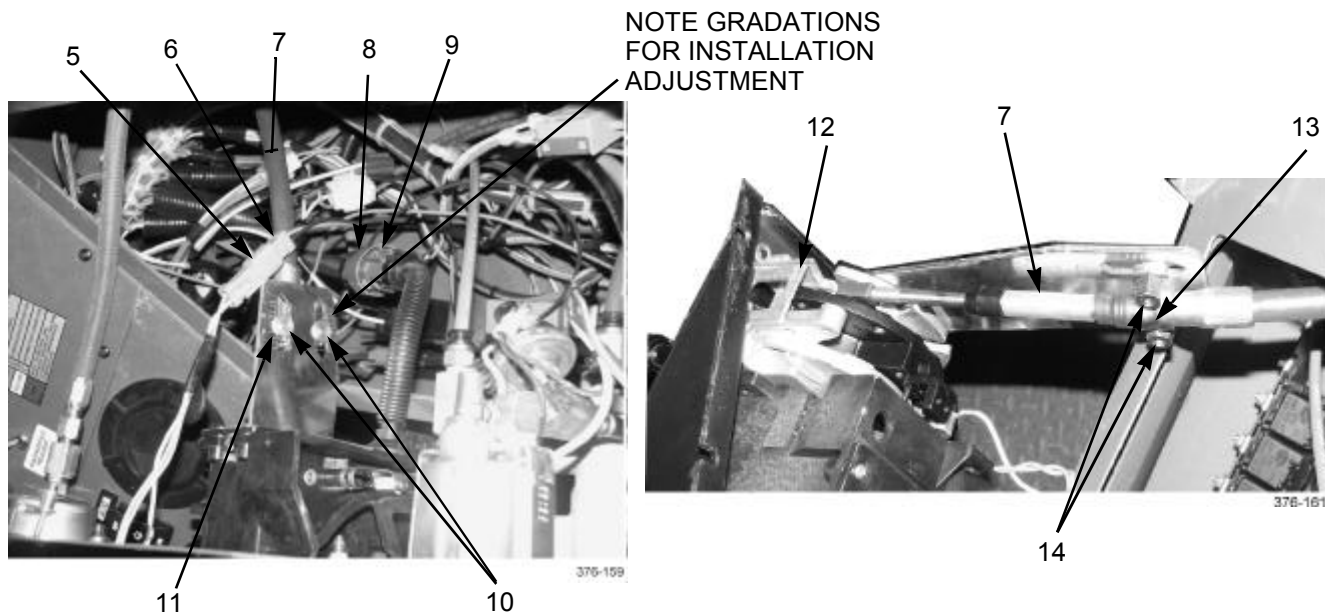
3. Disconnect fifth wheel lift control connector (5) from vehicle wiring harness connector (6).
4. Disconnect transmission range selector connector (9) from vehicle wiring harness connector (8).

**NOTE**

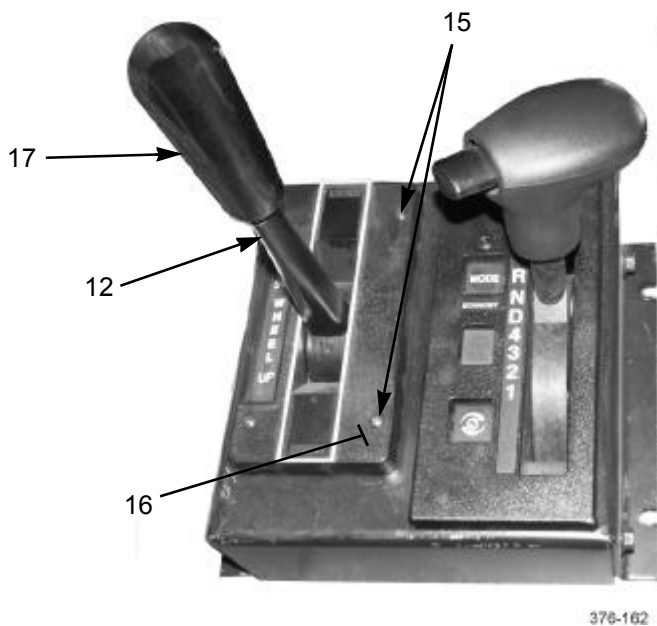
- Note position of cable clamp in relation to gradations on hanger plate to ensure proper adjustment of cable on installation.
- Note hole in handle unit actuator arc into which cable lug is installed (2nd hole).

5. Remove two nuts (14), screws (10), cable clamp (13), and shim (11) from cable (7).
6. Rotate handle unit (12) and remove lug of cable (7) from actuator arc.

FIFTH WHEEL LIFT CONTROL REMOVAL - CONTINUED

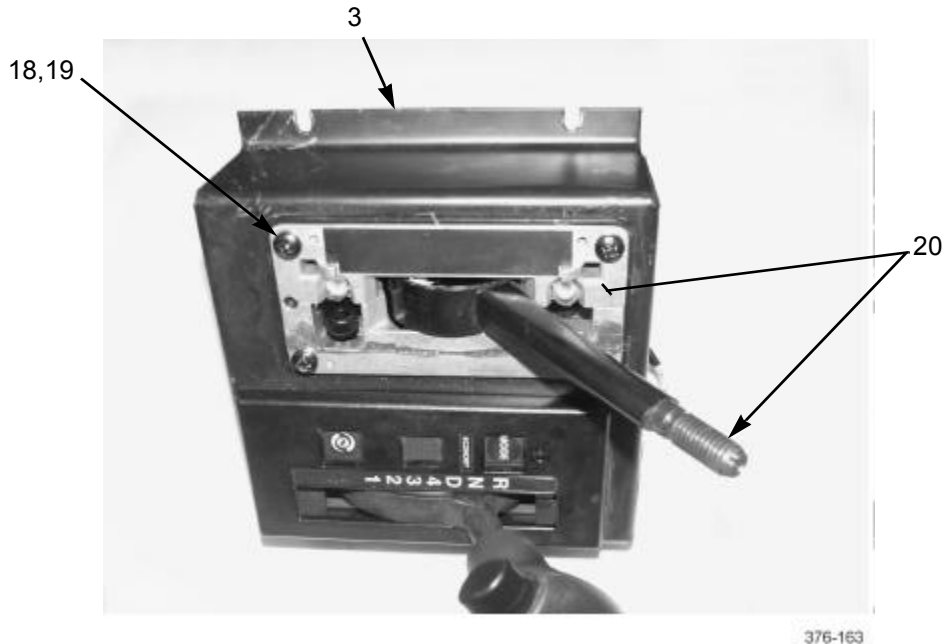


- 7. Remove knob (17) from handle unit (12).
- 8. Remove four screws (15) and plastic cover (16).



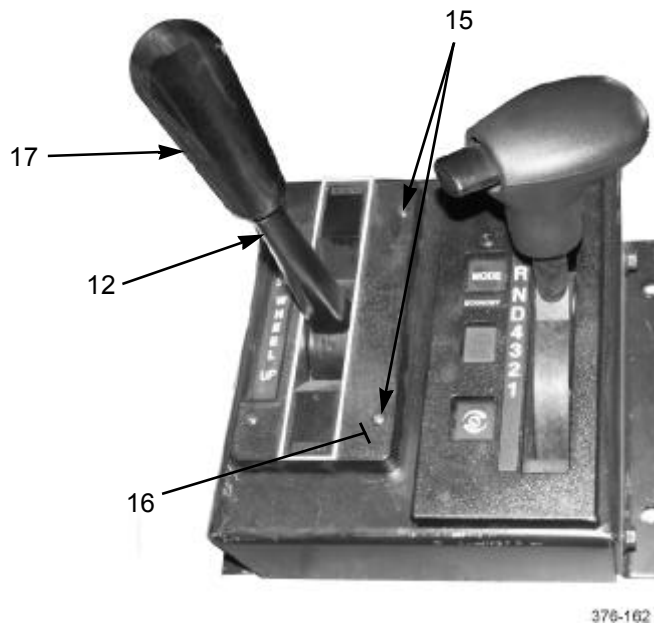
**FIFTH WHEEL LIFT CONTROL REMOVAL - CONTINUED**

9. Remove four locknuts (18), screws (19), and fifth wheel lift control (20) from shift tower (3). Discard locknuts.

**FIFTH WHEEL LIFT CONTROL INSTALLATION**

1. Install fifth wheel lift control (20) to shift tower (3) with four screws (19) and new locknuts (18).
2. Install plastic cover (16) with four screws (15).
3. Install knob (17) to handle unit (12).

**FIFTH WHEEL LIFT CONTROL INSTALLATION - CONTINUED**



**NOTE**

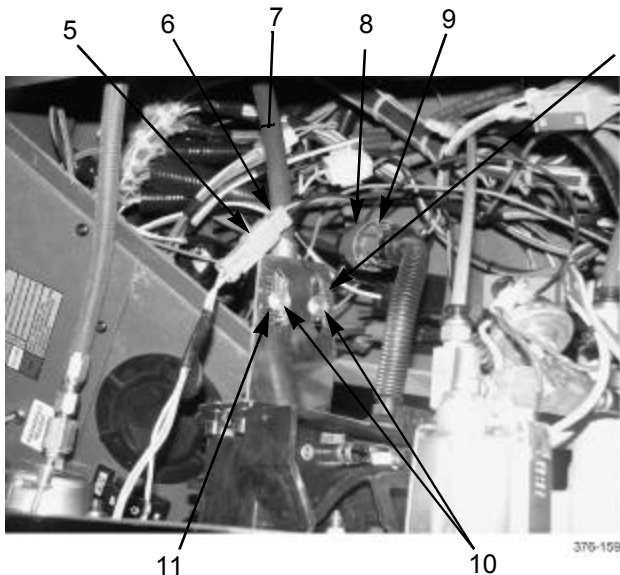
Ensure cable is installed in same position as noted during removal.

4. Install lug of cable (7) into handle unit (12), in 2nd hole in actuator arc of handle unit, as noted during removal.

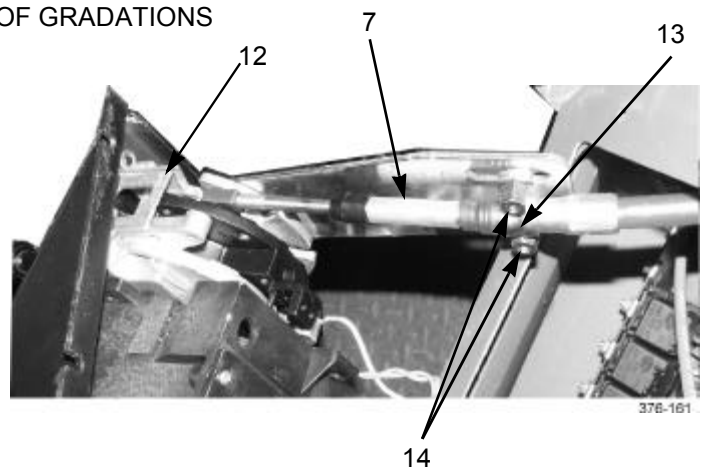
**NOTE**

Screws should be centered through line 6 of gradations on hanger.

5. Secure cable (7) with shim (11), cable clamp (13), two screws (10), and nuts (14).
6. Connect transmission range selector connector (9) to vehicle wiring harness connector (8).
7. Connect fifth wheel lift control connector (5) to vehicle wiring harness connector (6).

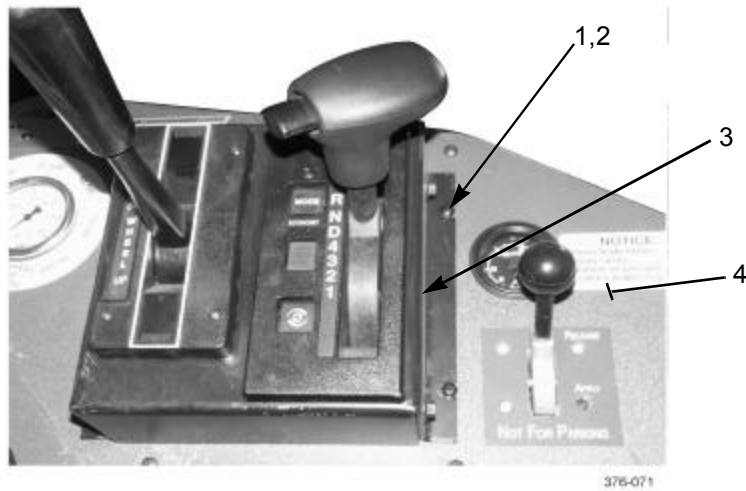


SCREWS CENTERED THROUGH LINE 6 OF GRADATIONS



**FIFTH WHEEL LIFT CONTROL INSTALLATION - CONTINUED**

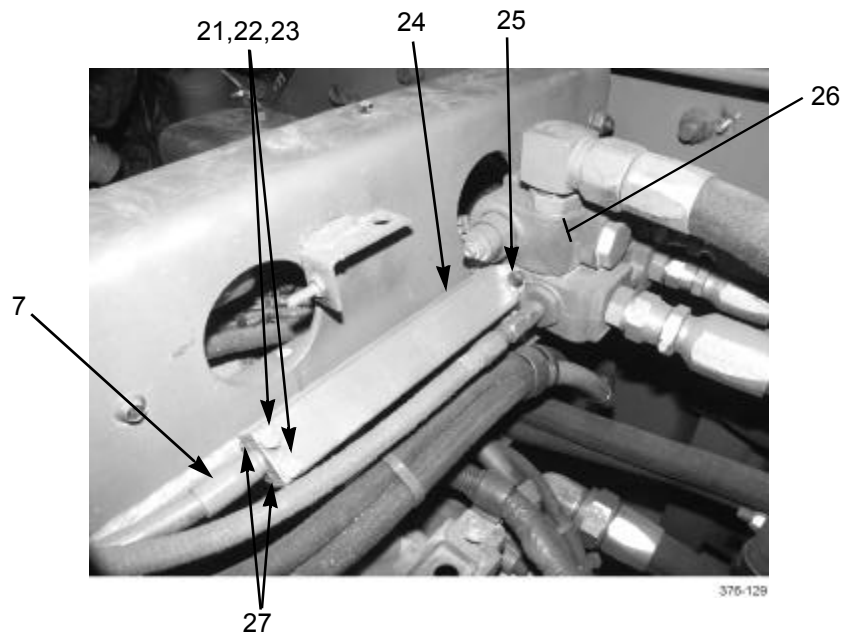
8. Install shift tower (3) to right-side instrument panel (4) with four screws (1) and new locknuts (2).



9. Install right-side instrument panel (4) with eight screws.
10. Place battery disconnect switch in ON position.
11. Start engine and check operation of fifth wheel lift control (TM 9-2320-312-10).

**CONTROL CABLE REMOVAL**

1. Disconnect cable (7) from fifth wheel lift control (Refer to *Fifth Wheel Lift Control Removal*).
2. Remove self-tapping screws and clamps to release cable (7) inside cab. Discard screws.
3. Remove front access cover from cab (WP 0046 00).
4. Remove transmission access cover (WP 0039 00).
5. At flow control valve (26) on right side of crossmember directly behind cab, remove two nuts (21), lockwashers (22), and screws (23) from end of cable guide (24).
6. Remove two screws (25), two halves of cable guide (24), and two spacers (27) from control valve (26) and cable (7).

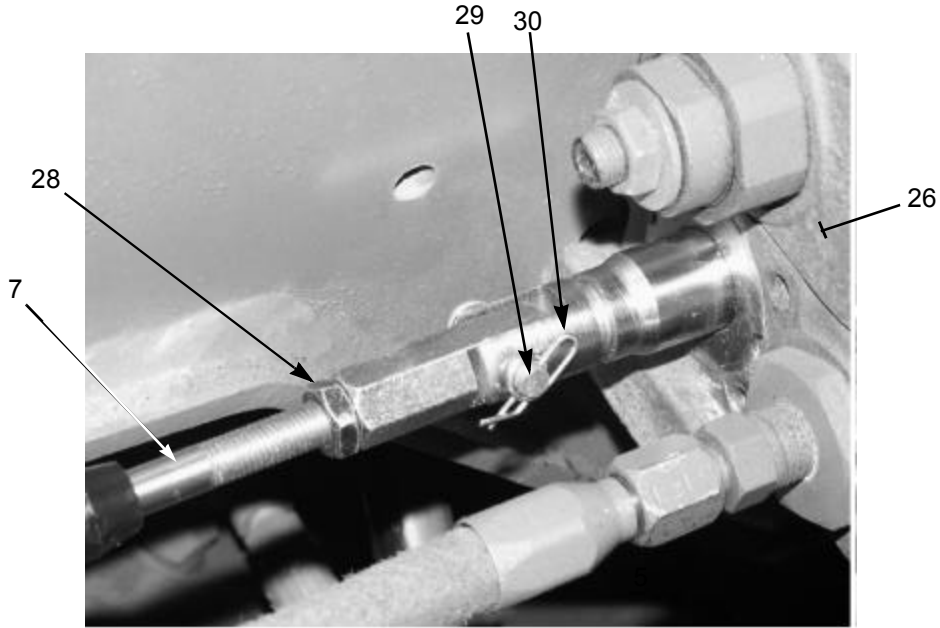


**CONTROL CABLE REMOVAL - CONTINUED**

**NOTE**

Count threads and note position of jamnut (28) to ensure proper cable adjustment on installation.

7. Remove wire clip (30) and pin (29) to disconnect cable (7) from control valve (26).



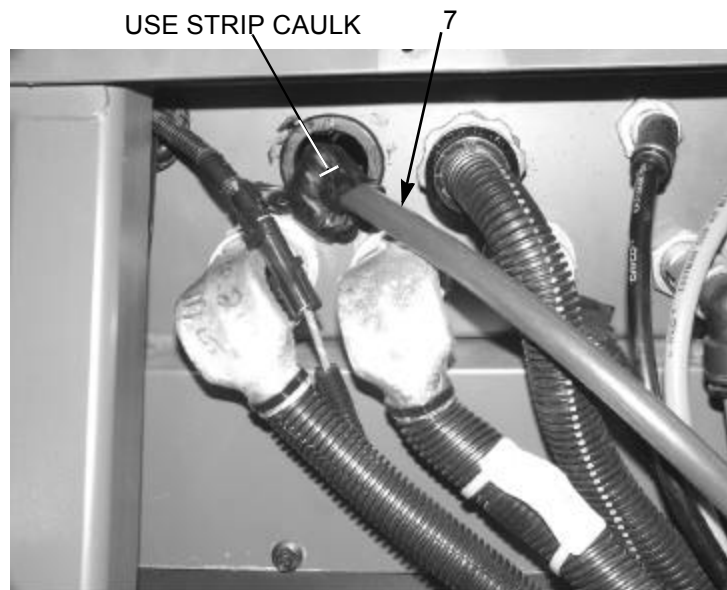
376-130

8. Place battery disconnect switch in ON position. Tilt cab (TM 9-2320-312-10).

**NOTE**

Note routing of cable to ensure correct installation.

9. Trace cable (7) forward toward front of cab, removing tiedown straps and other cable mounting hardware and protective covers from cable. Discard tiedown straps.
10. Remove cable (7) from vehicle.



FRONT OF CAB

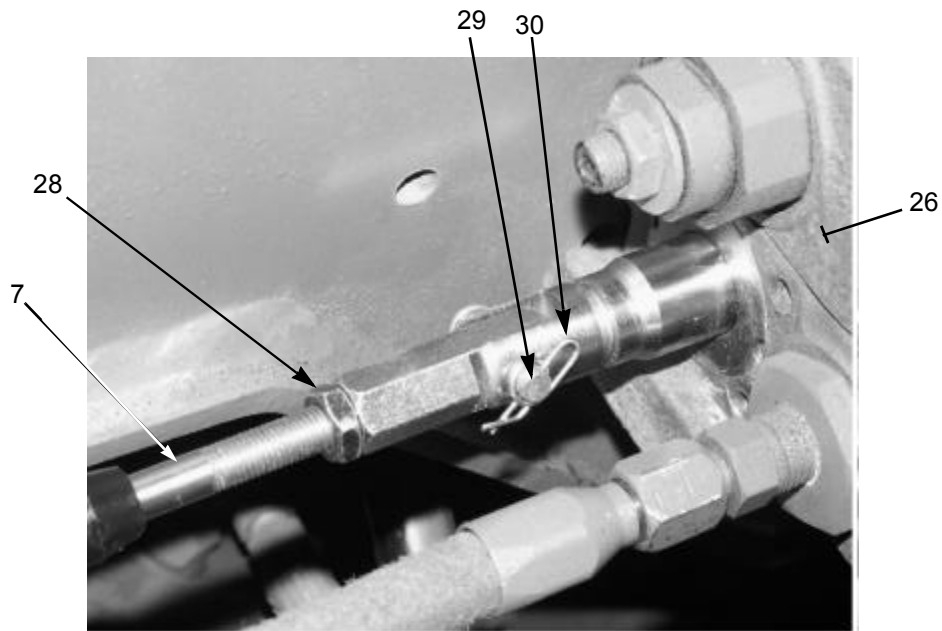
376-180



**CONTROL CABLE INSTALLATION****NOTE**

Use strip caulk to provide a seal at opening for cable into cab through bulkhead. Also use at cable guide at flow control valve, to assist in keeping spacers in position as they are installed.

1. Feed cable (7) through opening into cab. Route other end of cable to flow control valve (26) on right side of crossmember directly behind cab. Install new tiedown straps and other cable-mounting hardware and protective covers.
2. Ensure jamnut (28) is in same position as noted during removal. Connect cable (7) to control valve (26) with pin (29) and wire clip (30).



376-130

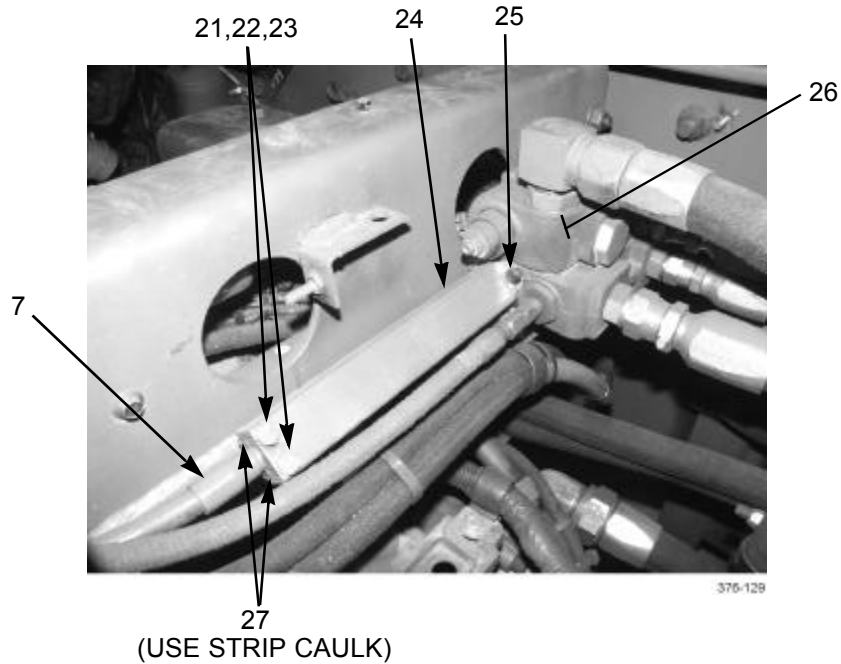
**CONTROL CABLE INSTALLATION - CONTINUED**

3. Install two spacers (27) and two halves of cable guide (24) to cable (7) and control valve (26) with two screws (25).

**NOTE**

Replacement cable guide comes with new lockwashers.

4. Install two screws (23), new lockwashers (22), and nuts (21) to end of cable guide (24).

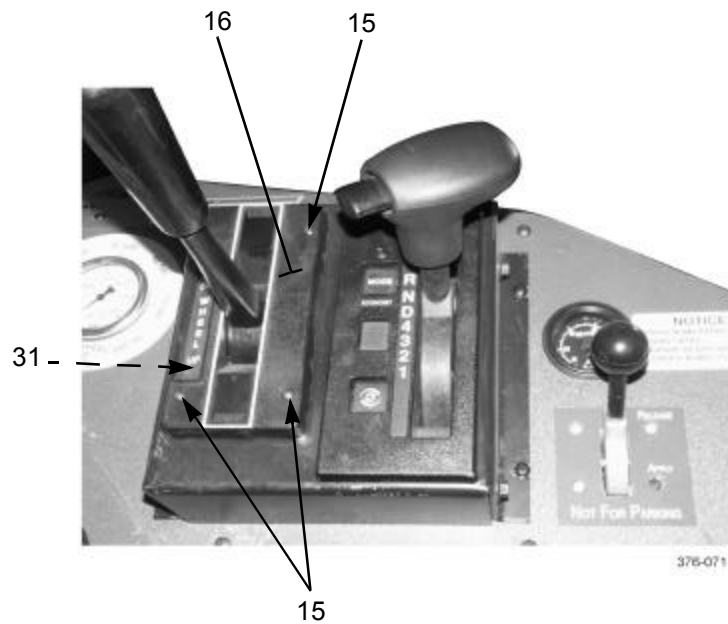


5. Install front access cover to cab (WP 0046 00).
6. Lower cab (TM 9-2320-312-10). Place battery disconnect switch in OFF position.
7. Secure cable (7) inside cab with clamps and new self-tapping screws.
8. Connect cable (7) to fifth wheel lift control (Refer to *Fifth Wheel Lift Control Installation*).
9. Place battery disconnect switch in ON position.
10. Start engine and check operation of fifth wheel lift control (TM 9-2320-312-10).
11. Install transmission access cover (WP 0039 00).

**FIFTH WHEEL LIFT CONTROL LIGHT BULB REPLACEMENT****NOTE**

There are two light bulbs under plastic cover of fifth wheel lift control.

1. Remove four screws (15) and plastic cover (16).
2. Remove light bulb (31) and obtain replacement.
3. Install new light bulb (31).
4. Install plastic cover (16) with four screws (15).

**END OF WORK PACKAGE**

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**FRONT AND REAR AIRBRAKE CHAMBERS REPLACEMENT**

---

0031 00

**THIS WORK PACKAGE COVERS**

Front Airbrake Chamber: Removal, Installation

Rear Airbrake Chamber: Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 080 and Group 090

**RPSTL Reference**

Group 080, Figure 1

Group 090, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

Detergent (Item 23, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**Equipment Condition**

Wheels blocked

Air system drained (TM 9-2320-312-10)

Cab tilted, if replacing front airbrake chamber (TM 9-2320-312-10)

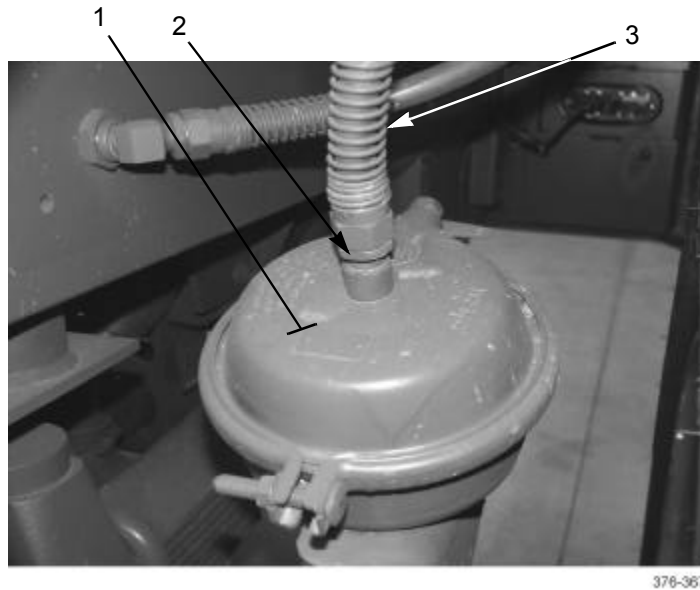
Brakes caged, if replacing rear airbrake chamber (TM 9-2320-312-10)

**WARNING**

DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

**FRONT AIRBRAKE CHAMBER REMOVAL**

1. Disconnect hose (3) from adapter (2) at airbrake chamber (1).
2. Remove adapter (2) from airbrake chamber (1).

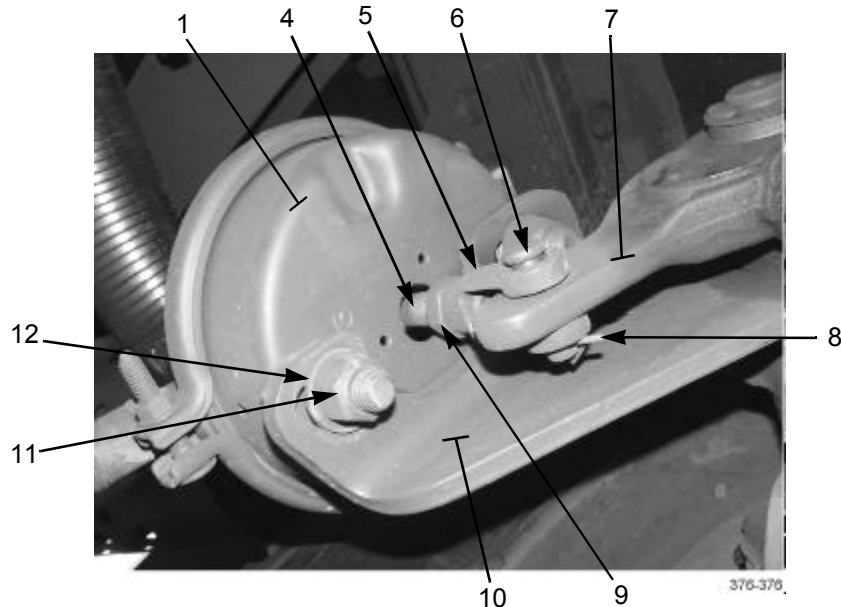


3. Remove cotter pin (8) and pin (6) to disconnect pushrod clevis (5) from slack adjuster (7). Discard cotter pin.
4. Remove two locknuts (11) and washers (12) to free airbrake chamber (1) from airbrake chamber bracket (10). Remove airbrake chamber from vehicle. Discard locknuts and washers.

**NOTE**

Note or mark position of clevis on pushrod for installation.

5. Loosen jamnut (9) and remove pushrod clevis (5) and jamnut from airbrake chamber pushrod (4).

**FRONT AIRBRAKE CHAMBER REMOVAL - CONTINUED****FRONT AIRBRAKE CHAMBER INSTALLATION**

1. Install jamnut (9) and pushrod clevis (5) to airbrake chamber pushrod (4), in same position as noted during removal. Tighten jamnut.

**NOTE**

Replacement airbrake chamber comes with new mounting hardware.

2. Install airbrake chamber (1) to airbrake chamber bracket (10) with two new washers (12) and new locknuts (11). Tighten locknuts to 133-155 lb-ft (180-210 Nm).
3. Connect pushrod clevis (5) to slack adjuster (7) with pin (6) and new cotter pin (8).

**NOTE**

Apply a thin coat of pipe sealing compound to male threads of adapter before it is installed.

4. Install adapter (2) to airbrake chamber (1).
5. Connect hose (3) to adapter (2).
6. Lower cab (TM 9-2320-312-10).
7. Start engine and fully pressurize air system (TM 9-2320-312-10).
8. Check for air leaks: apply a detergent and water solution to airbrake chamber and hose connection.

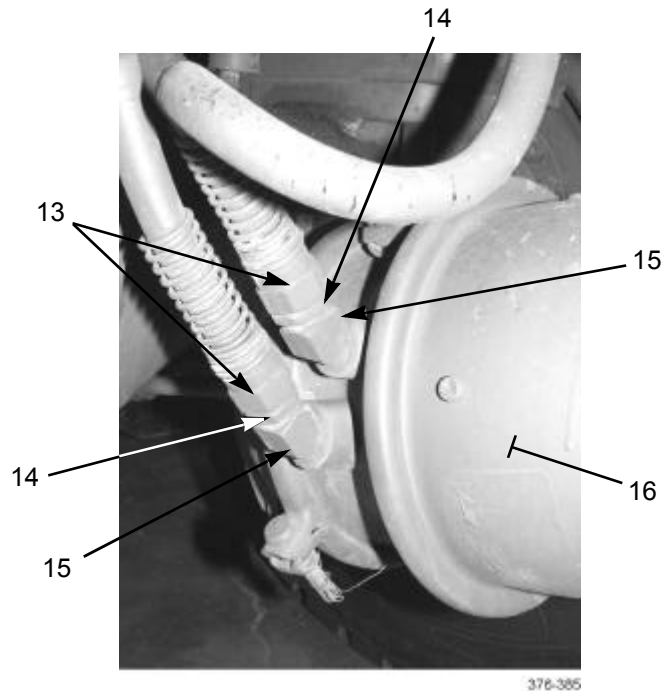
**REAR AIRBRAKE CHAMBER REMOVAL****WARNING**

- DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.
- DO NOT attempt to disassemble rear airbrake chamber. Spring inside chamber is compressed under great pressure. Failure to follow this warning may result in serious injury or death to personnel.

**NOTE**

Tag hoses to ensure correct installation.

1. Disconnect two hoses (13) from adapters (14) at airbrake chamber (16).
2. Remove two adapters (14) and elbows (15) from airbrake chamber (16).

**NOTE**

Note hole in slack adjuster from which pin is removed, to ensure correct installation.

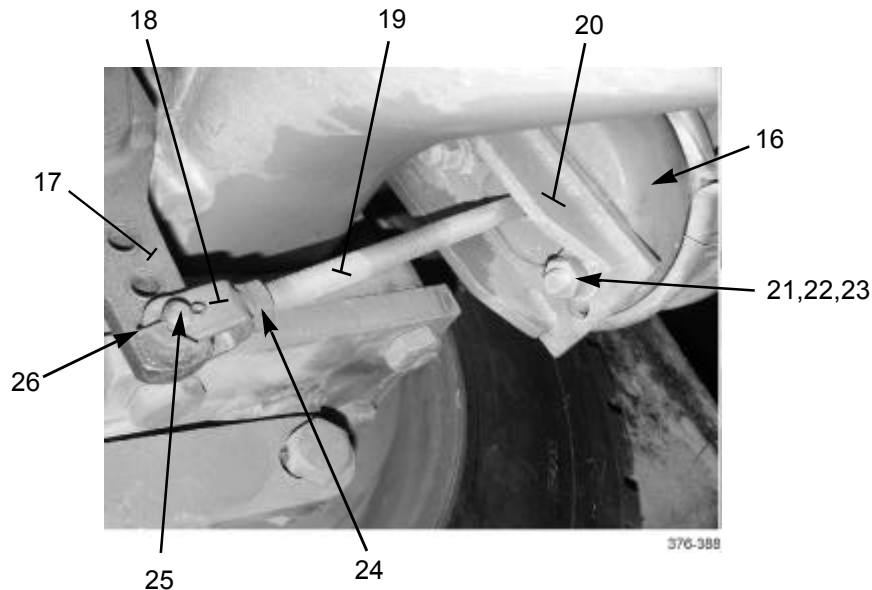
3. Remove cotter pin (26) and pin (25) to disconnect pushrod clevis (18) from slack adjuster (17). Discard cotter pin.
4. Remove two nuts (21), lockwashers (22), and washers (23) to free airbrake chamber (16) from airbrake chamber bracket (20). Remove airbrake chamber from vehicle. Discard nuts, lockwashers, and washers.

**NOTE**

Note or mark position of clevis on pushrod for installation.

5. Loosen jamnut (24) and remove pushrod clevis (18) and jamnut from brake chamber pushrod (19).



**REAR AIRBRAKE CHAMBER REMOVAL - CONTINUED****REAR AIRBRAKE CHAMBER INSTALLATION**

1. Install jamnut (24) and pushrod clevis (18) to airbrake chamber pushrod (19), in same position as noted during removal. Tighten jamnut.

**NOTE**

Replacement airbrake chamber comes with new mounting hardware.

2. Install airbrake chamber (16) to airbrake chamber bracket (20) with two new washers (23), new lockwashers (22), and new nuts (21). Tighten nuts to 133-155 lb-ft (180-210 Nm).
3. Connect pushrod clevis (18) to bottom hole in slack adjuster (17) with pin (25) and new cotter pin (26).

**NOTE**

Apply a thin coat of pipe sealing compound to male threads of fittings before they are installed.

4. Install two elbows (15) to airbrake chamber (16).
5. Install two adapters (14) to elbows (15).
6. Connect two hoses (13) to adapters (14).
7. Uncage brakes (TM 9-2320-312-10).
8. Start engine and fully pressurize air system (TM 9-2320-312-10).
9. Check for air leaks: apply a detergent and water solution to airbrake chamber and hose connections.

**END OF WORK PACKAGE**

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**SHOCK ABSORBER AND MOUNTING BRACKETS REPLACEMENT**

---

0032 00

**THIS WORK PACKAGE COVERS**

Shock Absorber: Removal, Inspection, Installation

Mounting Brackets: Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 080

**RPSTL Reference**

Group 080, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Nut, lock (P/N 21NE048)

Nut, lock (P/N A219-67) (2)

**References**

WP 0144 00

**Equipment Condition**Cab tilted (TM 9-2320-312-10)

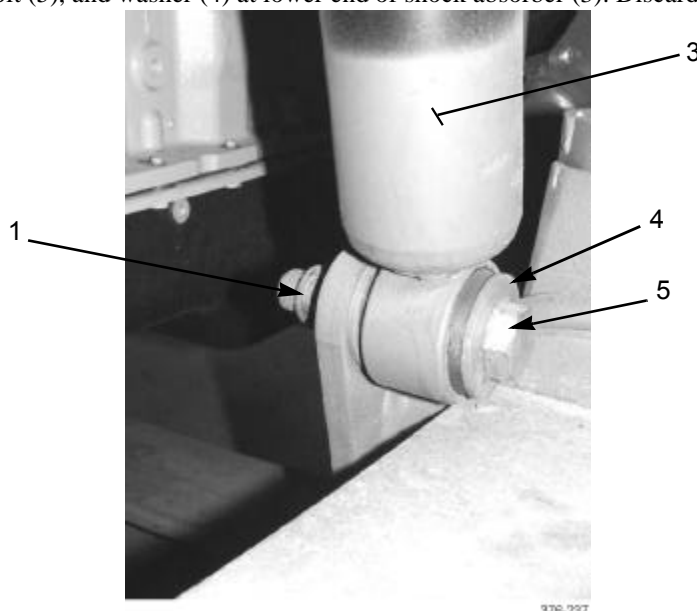
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**NOTE**

If one shock absorber is in need of replacement, replace both shock absorbers at the same time.

**SHOCK ABSORBER REMOVAL**

1. Remove locknut (1), bolt (5), and washer (4) at lower end of shock absorber (3). Discard locknut.



**SHOCK ABSORBER REMOVAL - CONTINUED**

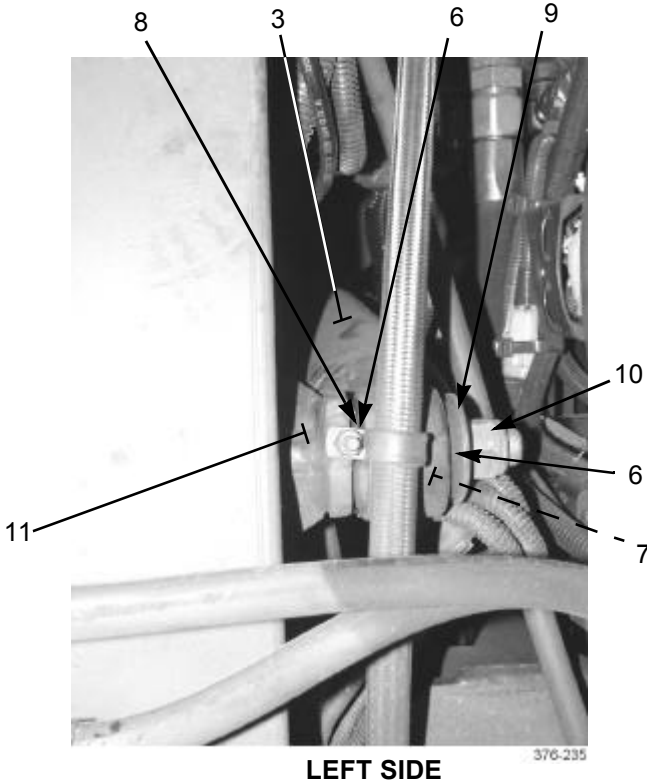
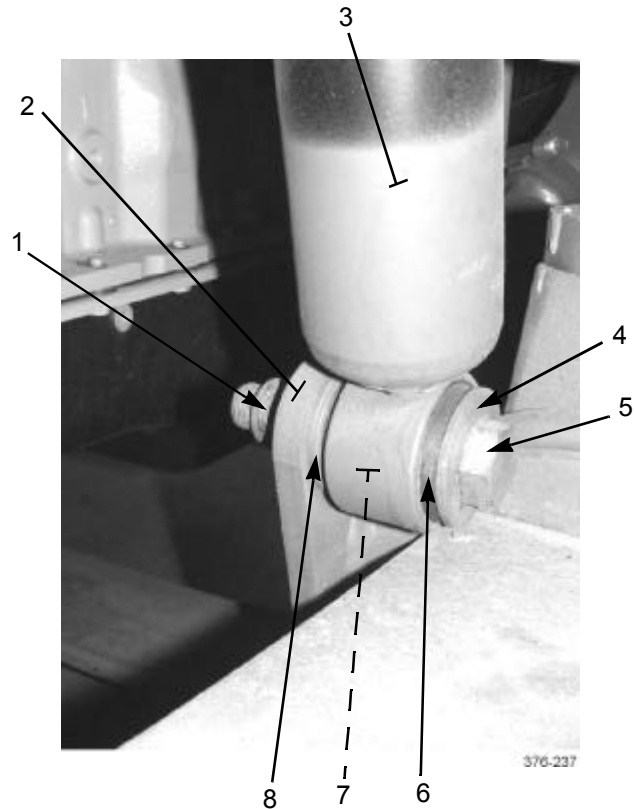
2. Remove locknut (10) and washer (9) at upper end of shock absorber (3). Discard locknut.
3. Remove shock absorber (3) and washer (8) from lower bracket (2) and upper bracket (11).

**SHOCK ABSORBER INSPECTION**

1. Inspect two bushings (6) and tube spacer (7) at each end of shock absorber for wear or deterioration. There should be no metal-to-metal contact. Replace bushings if damaged.
2. Inspect shock absorber for evidence of leaks. Compress and extend shock absorber. Movement should be smooth with constant resistance throughout stroke. If leaks are noted or if there is skipping, binding or unusual noises when shock absorber is compressed and extended, replace shock absorber.

**SHOCK ABSORBER INSTALLATION**

1. Position shock absorber (3) with four bushings (6), two tube spacers (7), and washer (8) to lower bracket (2) and upper bracket (11).
2. Install upper end of shock absorber (3) to upper bracket (11) with washer (9) and new locknut (10).
3. Install lower end of shock absorber (3) to lower bracket (2) with washer (4), bolt (5), and new locknut (1).
4. Tighten locknuts (1 and 10) to 225 lb-ft (305 Nm).



5. Lower cab (TM 9-2320-312-10).

**MOUNTING BRACKETS REMOVAL**

**NOTE**

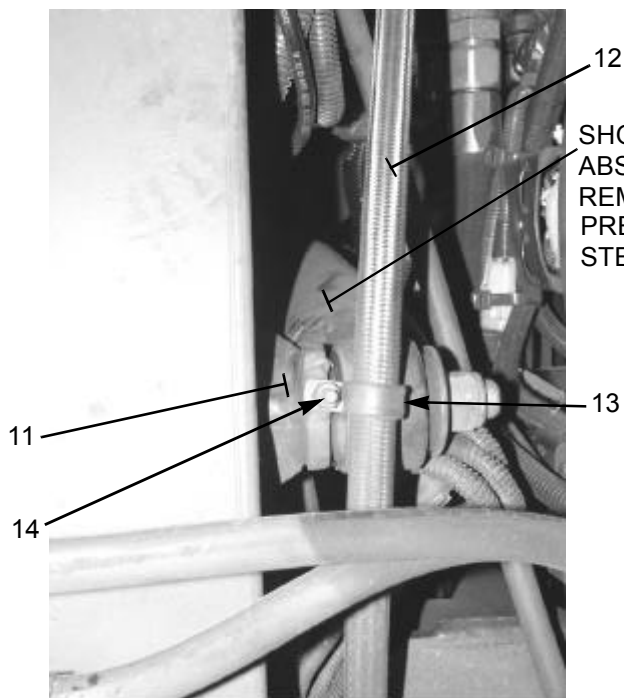
Removal of lower mounting brackets is covered in WP 0144 00, and must be performed by Direct Support Maintenance.

1. Remove shock absorber (Refer to *Shock Absorber Removal*).

**NOTE**

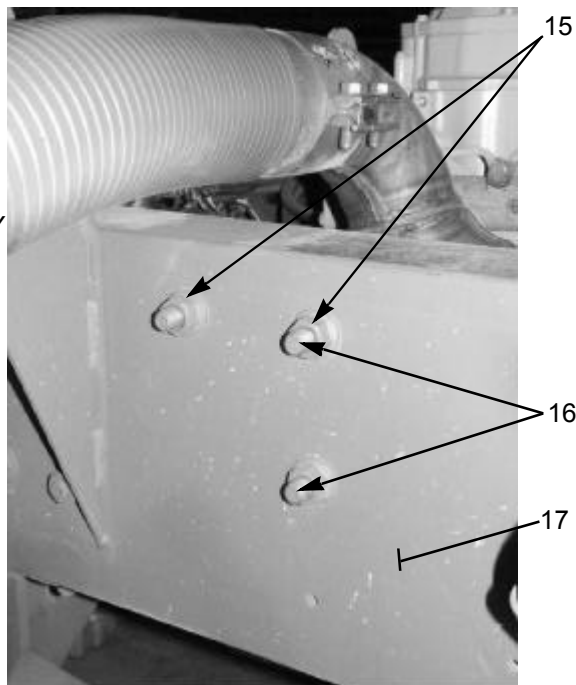
If removing right-side upper bracket, skip step 2.

2. Remove locknut (14), cable clamp (13), and hose (12) from welded stud on upper bracket (11). Discard locknut.
3. Remove three nuts (15), bolts (16), and upper bracket (11) from frame (17).



LEFT SIDE

376-235



RIGHT SIDE

376-236

**MOUNTING BRACKETS INSTALLATION**

**NOTE**

Installation of lower mounting brackets is covered in WP 0144 00, and must be performed by Direct Support Maintenance.

1. Install upper bracket (11) to frame (17) with three bolts (16) and nuts (15).

**NOTE**

If installing right-side upper bracket, skip step 2.

2. Secure cable clamp (13) with hose (12) to welded stud on upper bracket (11) with new locknut (14).
3. Install shock absorber (Refer to *Shock Absorber Installation*).

**END OF WORK PACKAGE**

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**FRONT AXLE HUB, DRUM, WHEEL BEARINGS, AND OIL SEAL REPLACEMENT**

---

**0033 00**

**THIS WORK PACKAGE COVERS**

Removal, Cleaning and Inspection, Installation and Wheel Bearing Adjustment

---

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 080

**RPSTL Reference**

Group 080, Figure 3

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cleaning compound, solvent (Item 10, WP 0165 00)

Oil, lubricating, gear oil (Item 38, 39 or 40, WP 0165 00)

**Materials/Parts - Continued**

Rag, wiping (Item 51, WP 0165 00)

Gasket (P/N 330-3009)

Seal (P/N 382-8064)

Washer, lock (P/N 361-10) (6)

**References**

Group 080 Commercial Service Manuals

TM 9-214

**Personnel Required**

Two

**Equipment Condition**

Wheel and tire assembly removed (TM 9-2320-312-10)



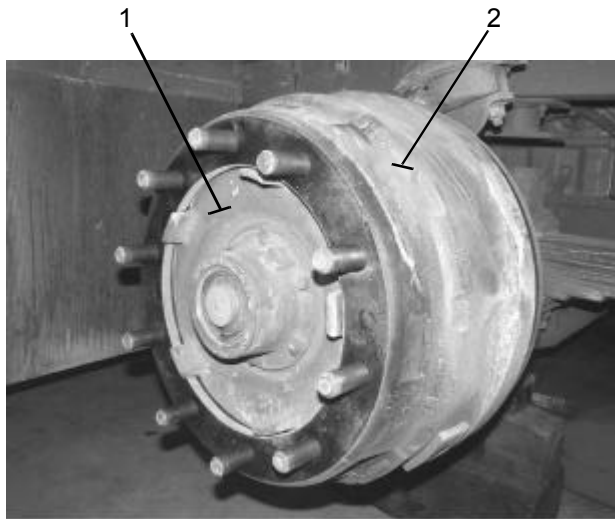
**WARNING**



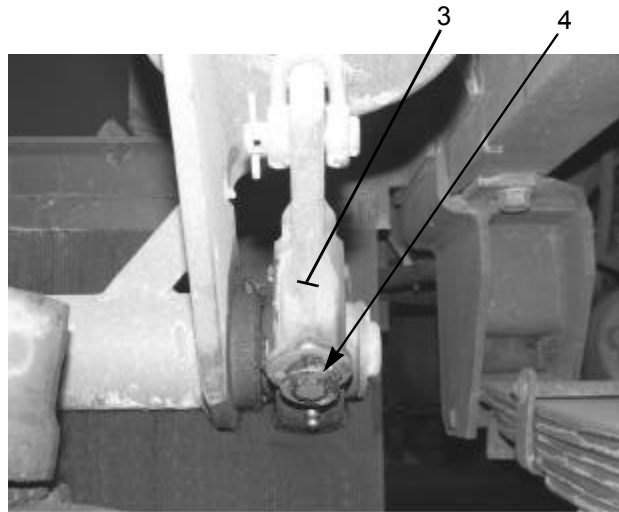
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

**REMOVAL**

1. Provide suitable support for drum (2) or have an assistant support drum prior to performing step 2.
2. Depress locking sleeve (4) at slack adjuster (3) and turn counterclockwise to back off brakes until drum (2) rotates freely.
3. Remove drum (2) from hub (1).



375-693



375-692

**WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

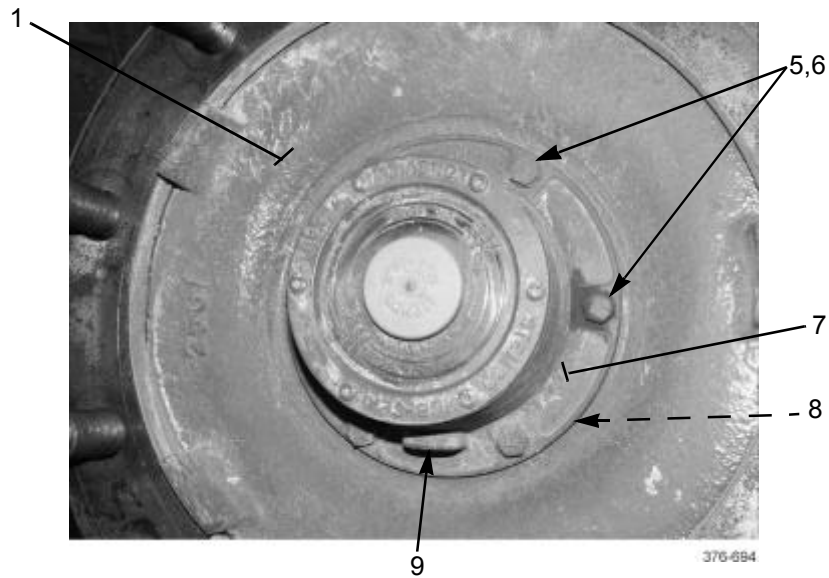
**NOTE**

Use a suitable container to capture draining oil. Dispose of oil in accordance with local policy and ordinances. Ensure all spills are cleaned.

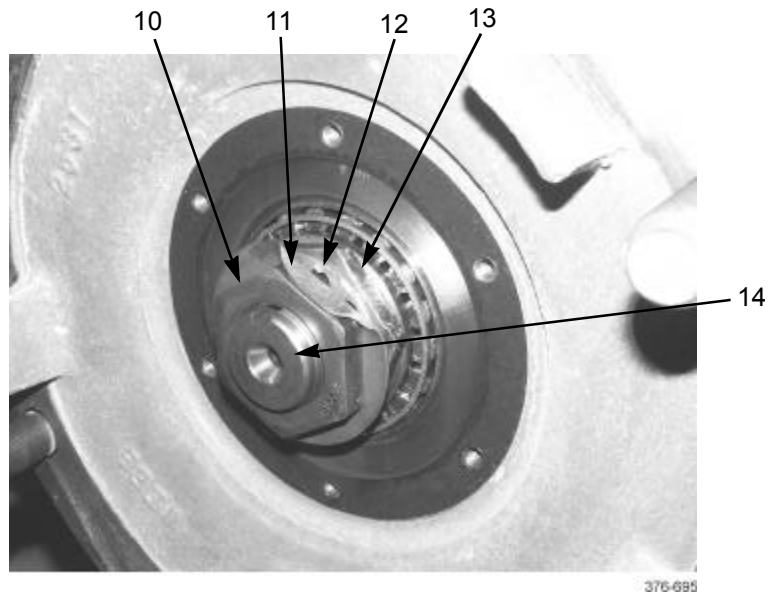
4. Remove plug (9), then rotate hub (1) and drain oil into a suitable container.
5. Remove six bolts (5), lockwashers (6), hubcap assembly (7), and gasket (8) from hub (1). Discard lockwashers and gasket.



**REMOVAL - CONTINUED**

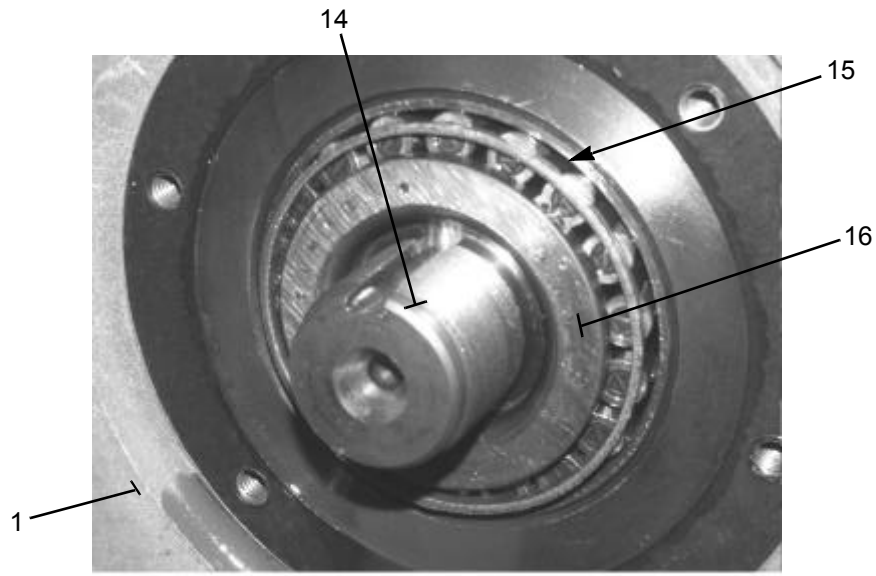


6. Bend back tab of retainer washer (11). Remove outer jamnut (10), retainer washer, washer (12), and adjusting nut (13) from axle spindle (14).

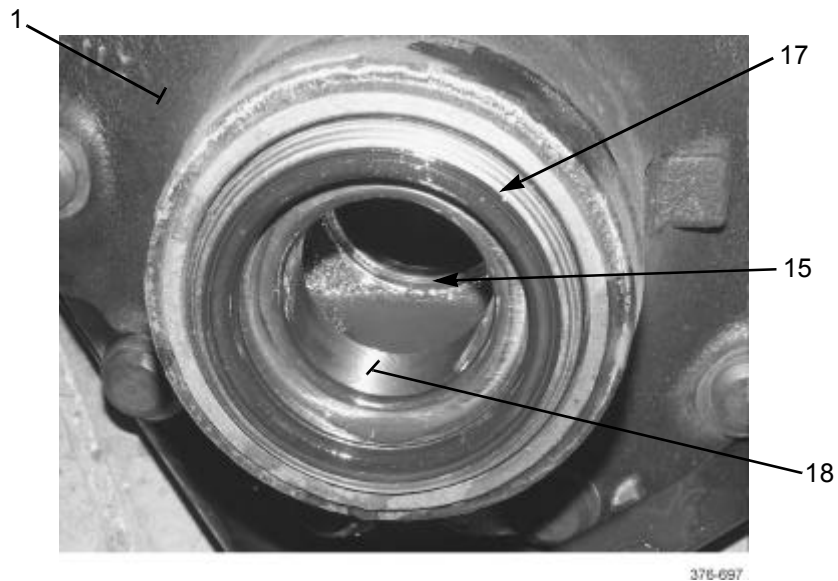


**REMOVAL - CONTINUED**

7. Remove hub (1) from axle spindle (14). Outer bearing (16) will come loose. Outer bearing cup (15) will remain in hub.



8. Turn hub (1) over, drain remaining oil, and remove oil seal (17) and inner bearing (18) from hub. Discard oil seal.



**CLEANING AND INSPECTION**

Dry cleaning solvent MIL-PRF-680 Type III is an environmentally compliant and low toxic material. However, it may be irritating to the eyes and skin. The use of protective gloves and goggles is suggested. Use in well-ventilated areas. Keep away from open flames and other sources of ignition.

1. Clean all removed components with cleaning solvent.
2. Inspect wheel bearings and inner and outer bearing cups (15) in hub (1) in accordance with TM 9-214. If wheel bearings need replacing, remove both bearing cups from bore of hub.
3. Inspect all other removed components for damage. If not damaged, retain for installation.

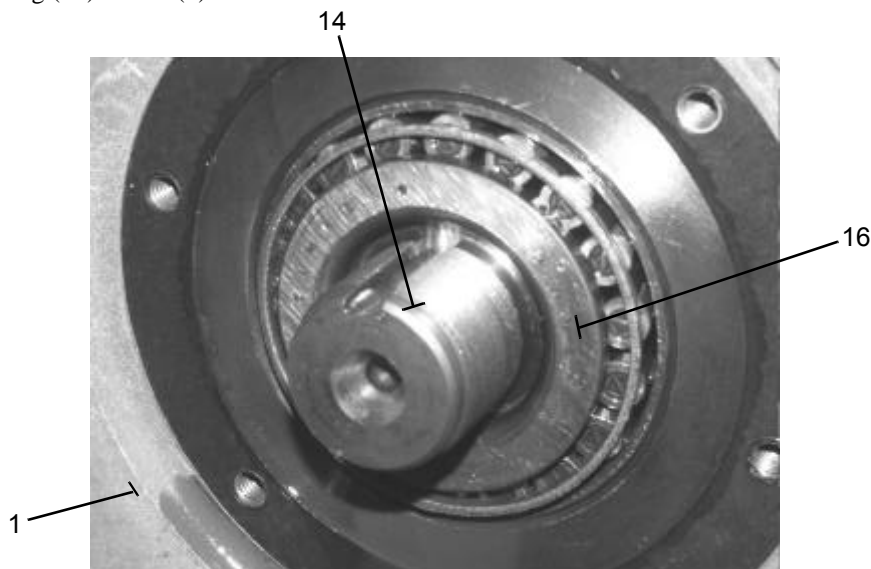
**INSTALLATION AND WHEEL BEARING ADJUSTMENT****NOTE**

- Perform step 1 if new bearings cups or bearings are being installed.
  - Coat components with clean gear lubricating oil before installation.
1. Install inner and outer bearing cups (15) squarely into bore of hub (1).
  2. Install inner bearing (18) and new oil seal (17) in hub (1).

**CAUTION**

Use caution not to damage oil seal as hub is placed onto axle spindle.

3. Coat axle spindle (14) with gear lubricating oil and mount hub (1) fully onto spindle.
4. Install outer bearing (16) in hub (1).



376-696

**INSTALLATION AND WHEEL BEARING ADJUSTMENT - CONTINUED**

5. Install adjusting nut (13) on axle spindle (14). Tighten nut sufficiently to secure hub.

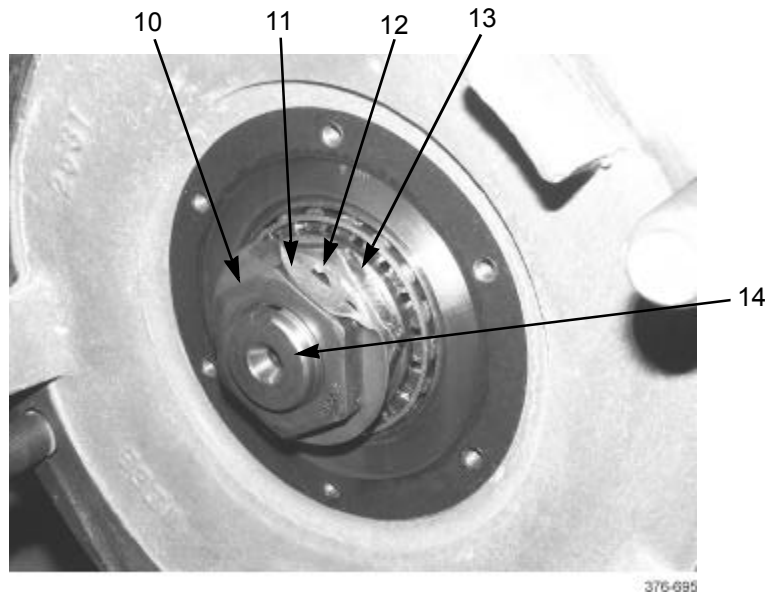


**WARNING**



Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

6. Install drum on hub (1).
7. Rotate wheel back and forth and tighten adjusting nut (13) to 200 lb-ft (271 Nm).
8. Back off adjusting nut (13) one full turn.
9. Rotate wheel back and forth and tighten adjusting nut (13) to 50 lb-ft (68 Nm).
10. Back off adjusting nut (13) 1/2 turn.
11. Install washer (12), retainer washer (11), and jamnut (10) on axle spindle (14).
12. Tighten jamnut (10) to 250 lb-ft (339 Nm).
13. Bend tab of retainer washer (11) over one flat on jamnut (10).

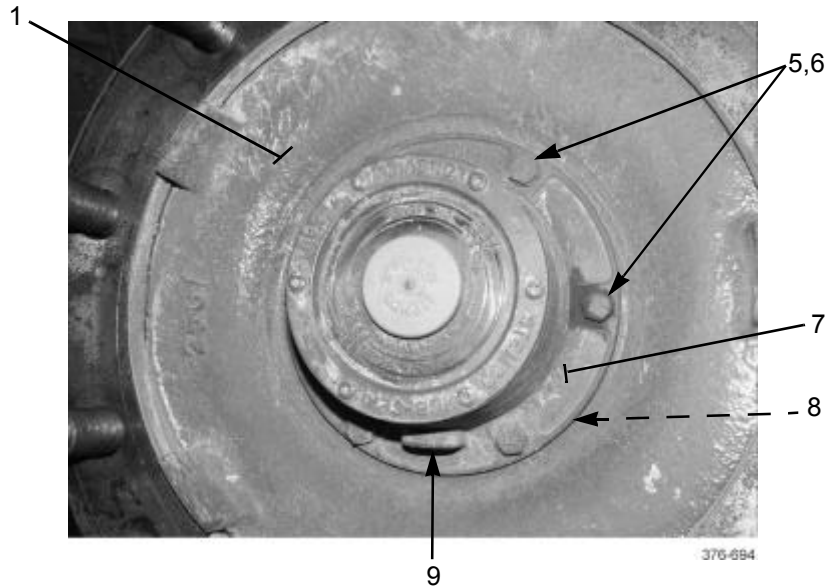


**INSTALLATION AND WHEEL BEARING ADJUSTMENT - CONTINUED**

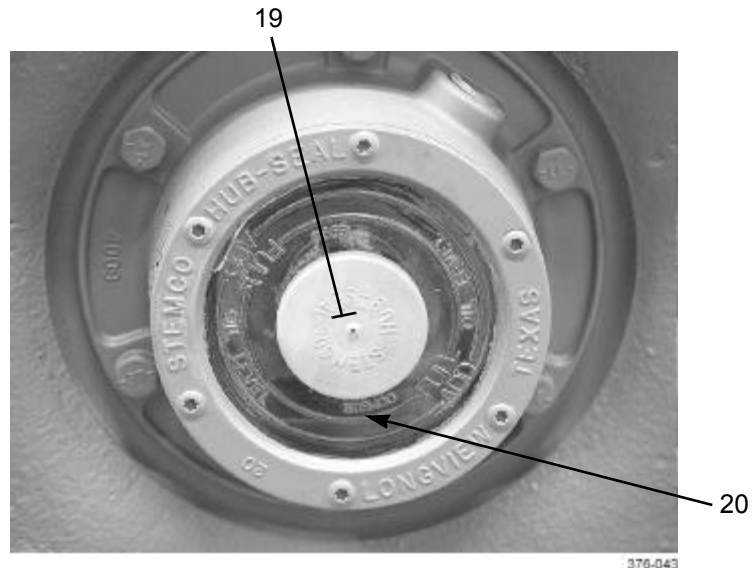
**CAUTION**

Do NOT overtighten bolts or damage to bolts will result.

14. Install new gasket (8) and hubcap assembly (7) on hub (1) with six new lockwashers (6) and bolts (5). Tighten bolts to 17 lb-ft (23 Nm).
15. Install plug (9) in hubcap assembly (7).

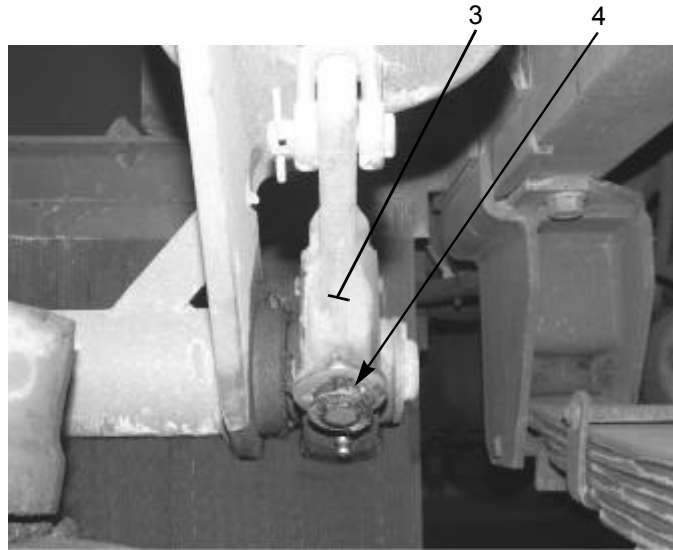


16. Remove vent plug (19) from hubcap window (20). Fill hub end with gear lubricating oil until level of oil is at FULL line on window. Reinstall vent plug.



***INSTALLATION AND WHEEL BEARING ADJUSTMENT - CONTINUED***

17. Rotate wheel and wait 5 minutes. Recheck level of oil and add as needed.
18. At slack adjuster (3), depress locking sleeve (4) and turn clockwise until a slight brakeshoe drag is felt on drum.



376-682

19. Install wheel and tire assembly (TM 9-2320-312-10).
20. Adjust brakes (Refer to Group 080 Commercial Service Manuals).

**END OF WORK PACKAGE**

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**STEERING WHEEL REPLACEMENT**

---

0034 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 110

**RPSTL Reference**

Group 110, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Equipment Condition**

Front wheels facing straight ahead

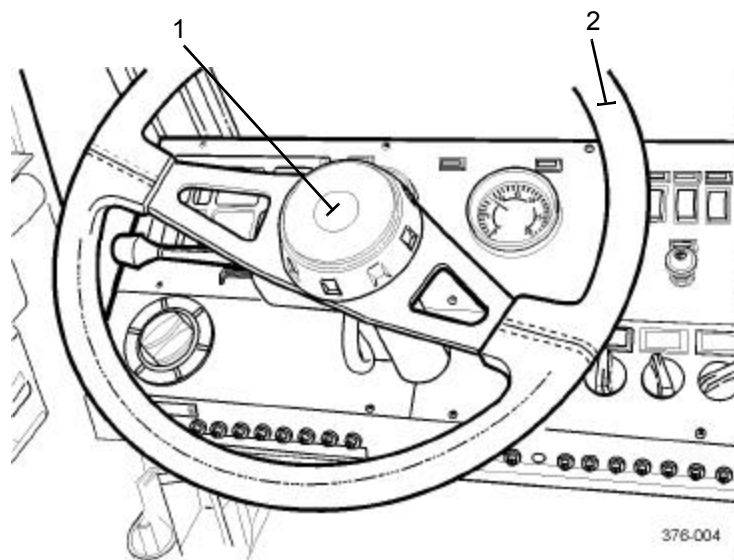
Battery disconnect switch in OFF position

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**REMOVAL****NOTE**

Note position of horn button switch in steering wheel for installation.

1. Gently pry horn button switch (1) out from center of steering wheel (2).



**REMOVAL - CONTINUED**

2. Remove nut (4) from steering column (3).

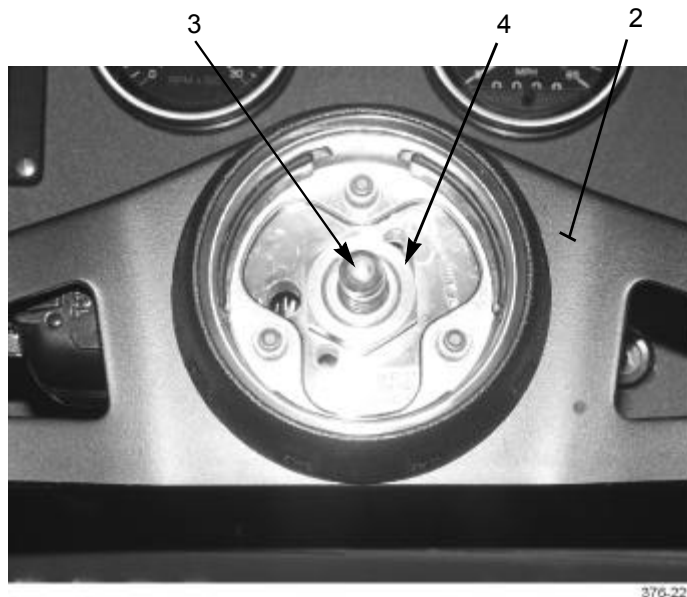
**CAUTION**

When using puller, use care to avoid damaging wires of steering column.

**NOTE**

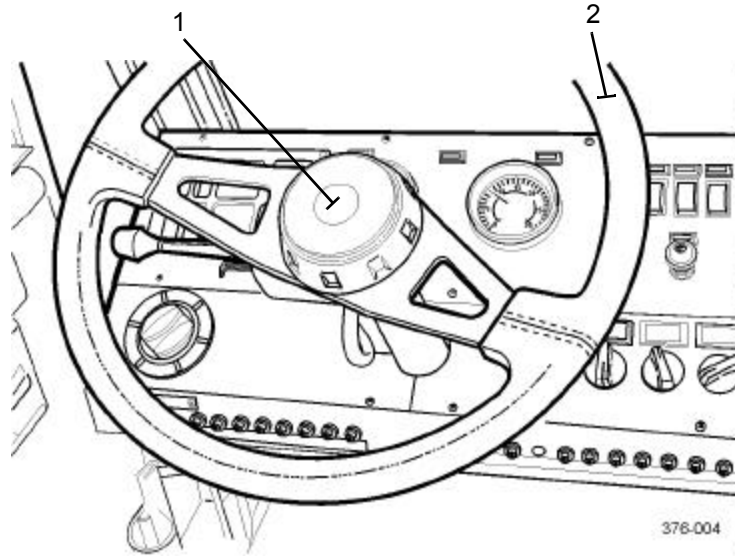
Note position of steering wheel on steering column for installation.

3. Using puller, remove steering wheel (2) from steering column (3).

**INSTALLATION**

1. Align steering wheel (2) with steering column (3) and press downward on steering wheel to partially seat onto steering column.
2. Install nut (4) to steering column (3) and tighten nut to seat steering wheel (2). Fully tighten nut.
3. Align horn button switch (1) with steering wheel (2) and press horn button switch into center of steering wheel.



**INSTALLATION - CONTINUED**

4. Place battery disconnect switch in ON position and check that horn button functions.

**END OF WORK PACKAGE**

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**THIS WORK PACKAGE COVERS**

- Upper Steering Column: Removal, Installation
- Lower Steering Column: Removal, Installation
- Horn Repair

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 110

**RPSTL Reference**

Group 110, Figures 1 and 3

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Grease, GAA (Item 30, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**References**

TM 9-2320-312-10

WP 0009 00

WP 0120 00

**Equipment Condition**

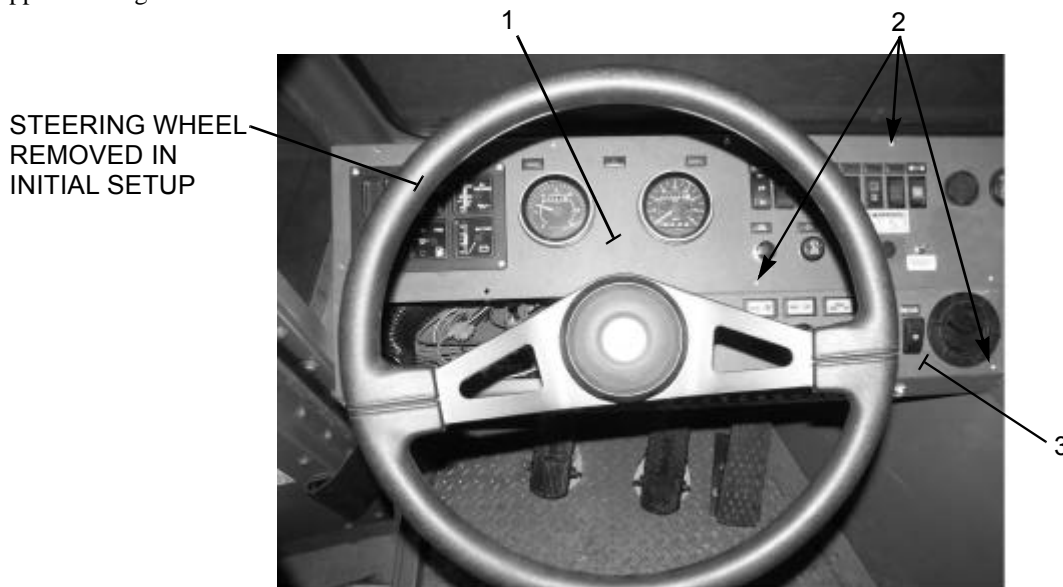
Front wheels facing straight ahead

Steering wheel removed, if replacing upper steering column (WP 0034 00)

Turn signal lever removed, if replacing upper steering column (WP 0100 00)

**UPPER STEERING COLUMN REMOVAL**

1. Remove remaining 14 screws (2) of 19 total screws and move two instrument panel plates (1 and 3) aside, for access to upper steering column.

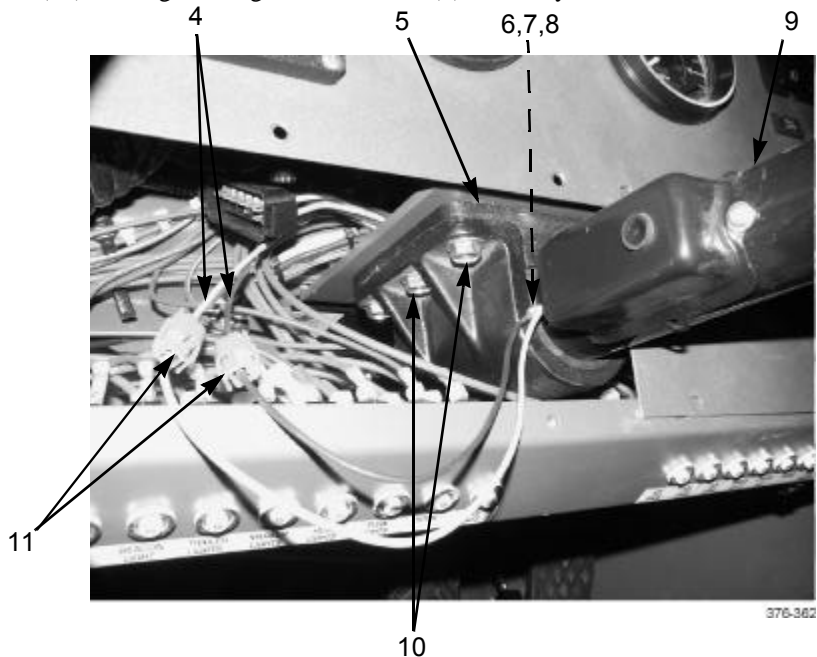


UPPER STEERING COLUMN REMOVAL - CONTINUED

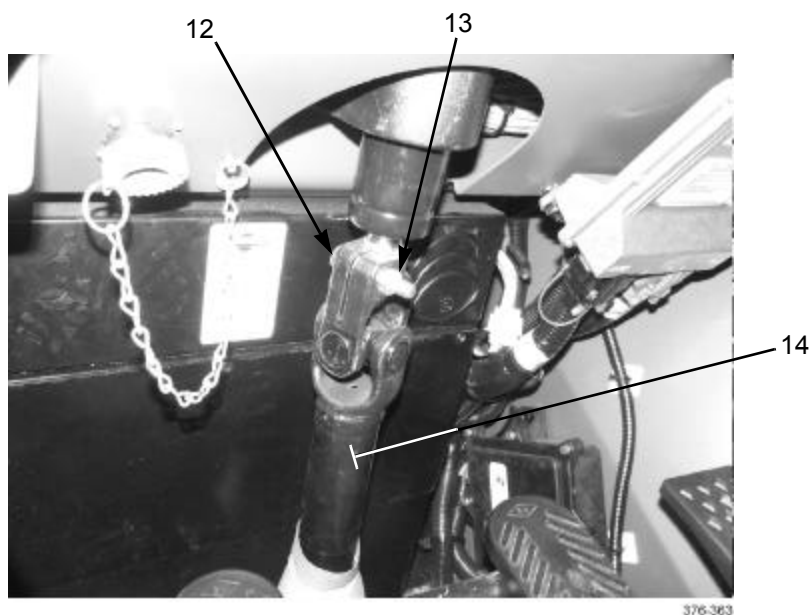
**NOTE**

Tag wires to ensure correct installation.

2. Disconnect two connectors (11) of upper steering column (9) from wires of cab wiring harness (4).
3. Remove screw (6), washer (7), and disconnect ground terminal (8) at upper steering column (9).
4. Remove six bolts (10) holding steering column mount (5) assembly to cab.

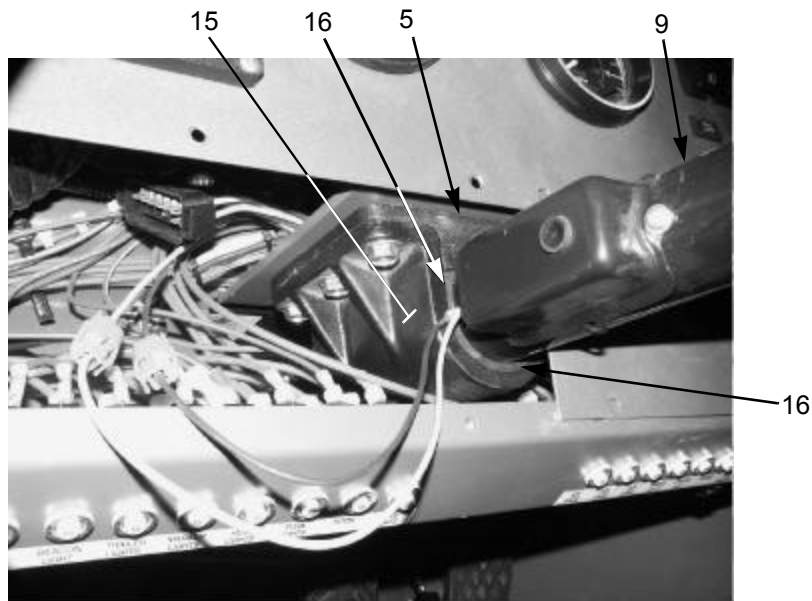


5. Remove nut (13) and screw (12) from yoke of lower steering column (14).



**UPPER STEERING COLUMN REMOVAL - CONTINUED**

6. Remove upper steering column (9) with mount (5) assembly from vehicle.
7. Remove cap (15), mount (5), and two vibration dampers (16) from upper steering column (9).



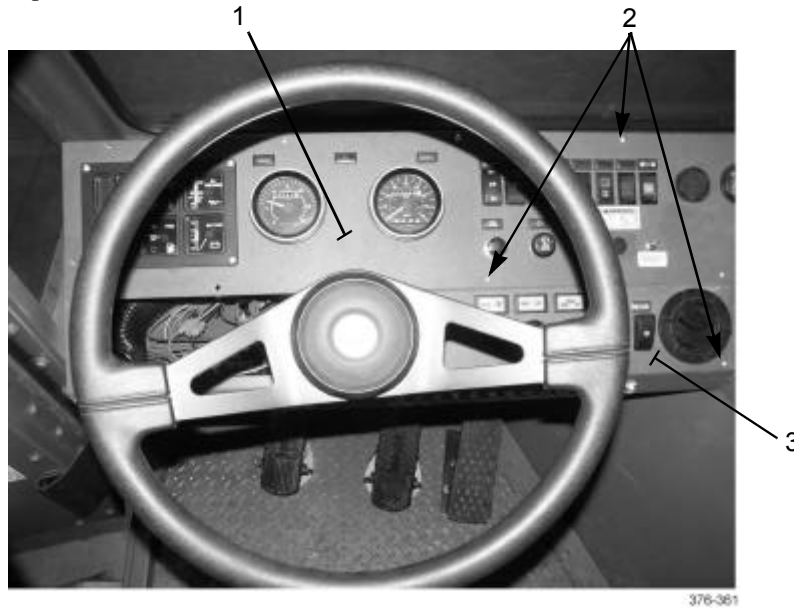
8. If damaged, replace upper steering column horn components (Refer to *Horn Repair* at end of work package).

**UPPER STEERING COLUMN INSTALLATION**

1. Position two vibration dampers (16), mount (5), and cap (15) to upper steering column (9).
2. Position upper steering column (9) with mount (5) assembly to cab.
3. Position upper steering column (9) to yoke of lower steering column (14) and install screw (12) and nut (13). Tighten nut to 26 lb-ft (35 Nm).
4. Connect ground terminal (8) at upper steering column (9) with washer (7) and screw (6).
5. Install mount (5) assembly to cab with six bolts (10). Tighten bolts to 31 lb-ft (42 Nm).
6. Connect two connectors (11) of upper steering column (9) to wires of cab wiring harness (4).

**UPPER STEERING COLUMN INSTALLATION - CONTINUED**

7. Install two instrument panel plates (1 and 3) with 14 screws (2).



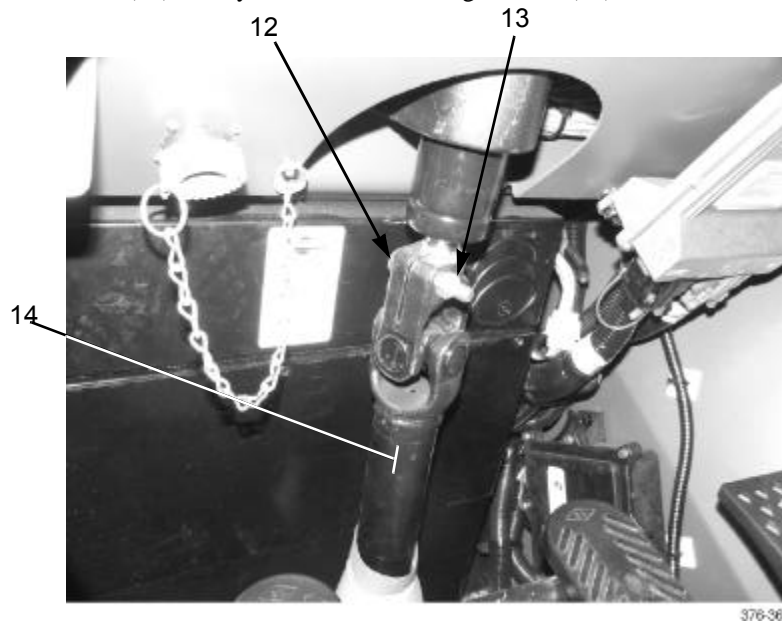
8. Install turn signal lever (WP 0100 00).
9. Install steering wheel (WP 0034 00).

**LOWER STEERING COLUMN REMOVAL**

**NOTE**

Skip step 1 if upper steering column has already been removed from vehicle.

1. Remove nut (13) and screw (12) from yoke of lower steering column (14).

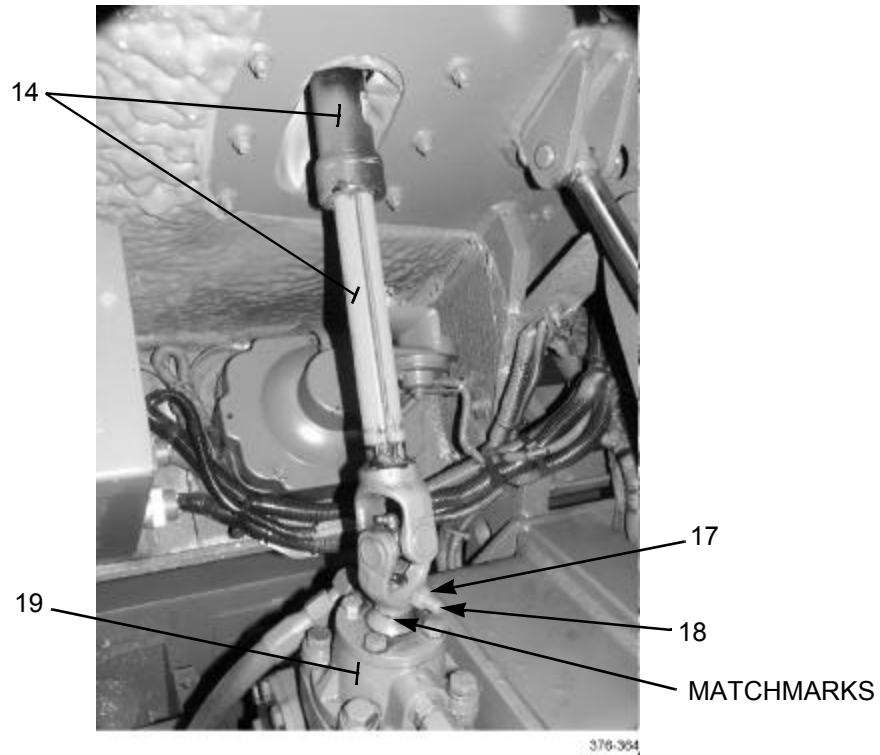


2. Tilt cab (TM 9-2320-312-10).

**LOWER STEERING COLUMN REMOVAL - CONTINUED****NOTE**

To assist in ease of installation, place matchmarks between yoke and shaft of steering gear.

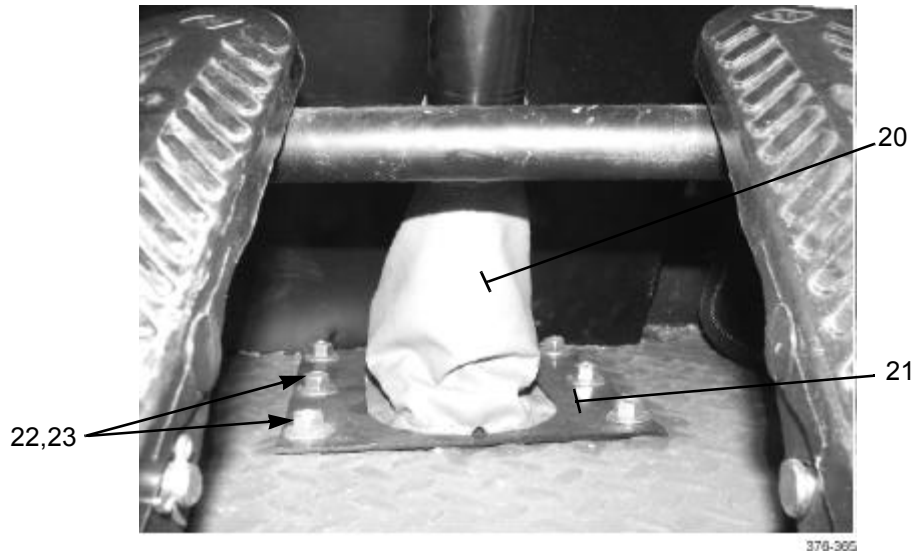
3. Remove nut (17) and screw (18) from yoke of lower steering column (14).
4. As an assembly, remove lower steering column (14) from shaft of steering gear (19) and from vehicle.



5. Lower cab (TM 9-2320-312-10).

**LOWER STEERING COLUMN REMOVAL - CONTINUED**

6. Remove six nuts (22), bolts (23), boot (20), and retainer (21) from floor of cab.

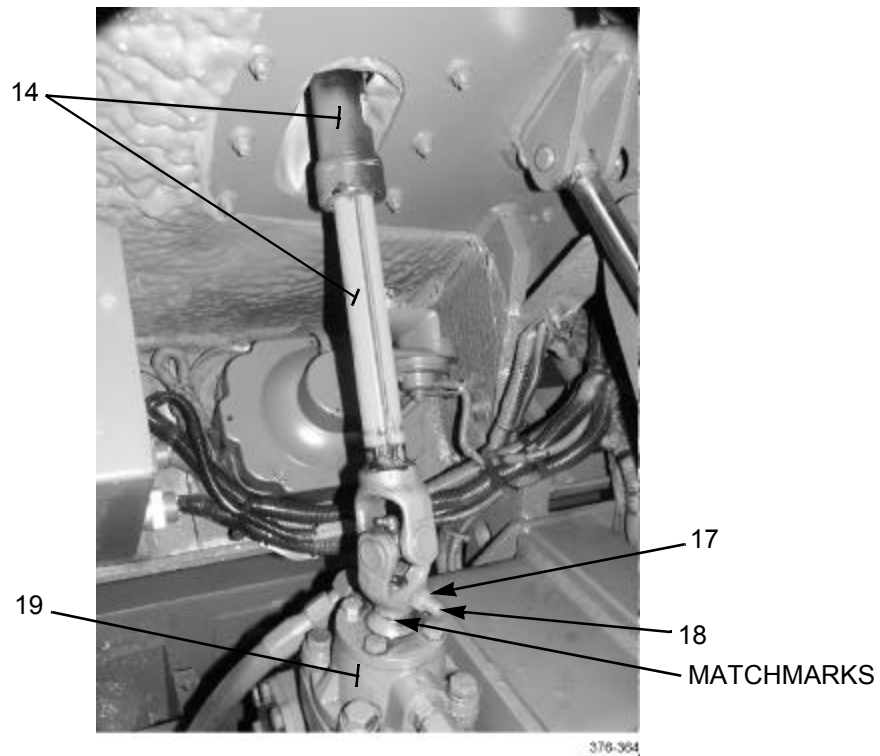
**LOWER STEERING COLUMN INSTALLATION**

1. Install boot (20) and retainer (21) to floor of cab with six bolts (23) and nuts (22). Tighten nuts to 31 lb-ft (42 Nm).
2. Tilt cab (TM 9-2320-312-10).



**LOWER STEERING COLUMN INSTALLATION - CONTINUED**

3. Apply a thin coat of grease to splines of lower steering column (14).
4. As an assembly, position lower steering column (14) to vehicle and to shaft of steering gear (19) with matchmarks aligned.
5. Install screw (18) and nut (17) to yoke of lower steering column (14). Tighten nut to 26 lb-ft (35 Nm).

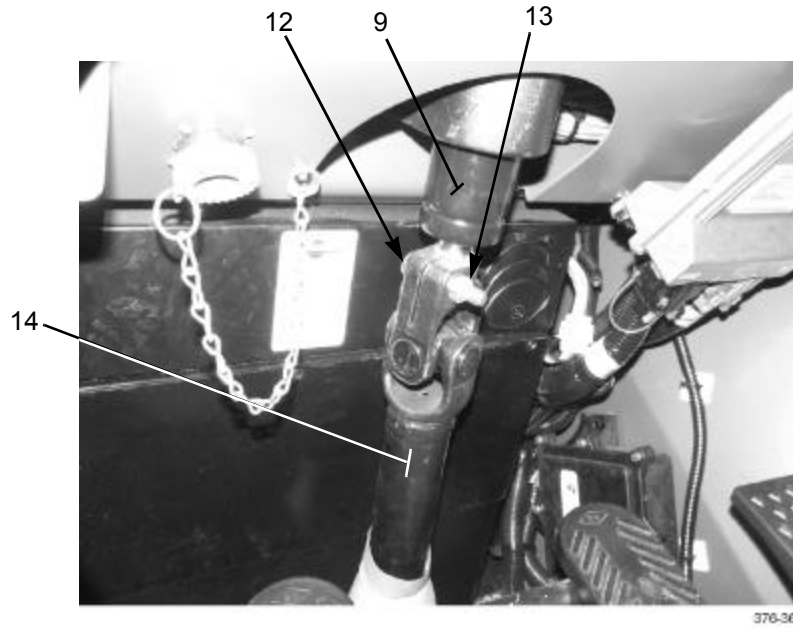


6. Lower cab (TM 9-2320-312-10).

**LOWER STEERING COLUMN INSTALLATION****NOTE**

Skip step 7 if upper steering column is not yet installed in vehicle

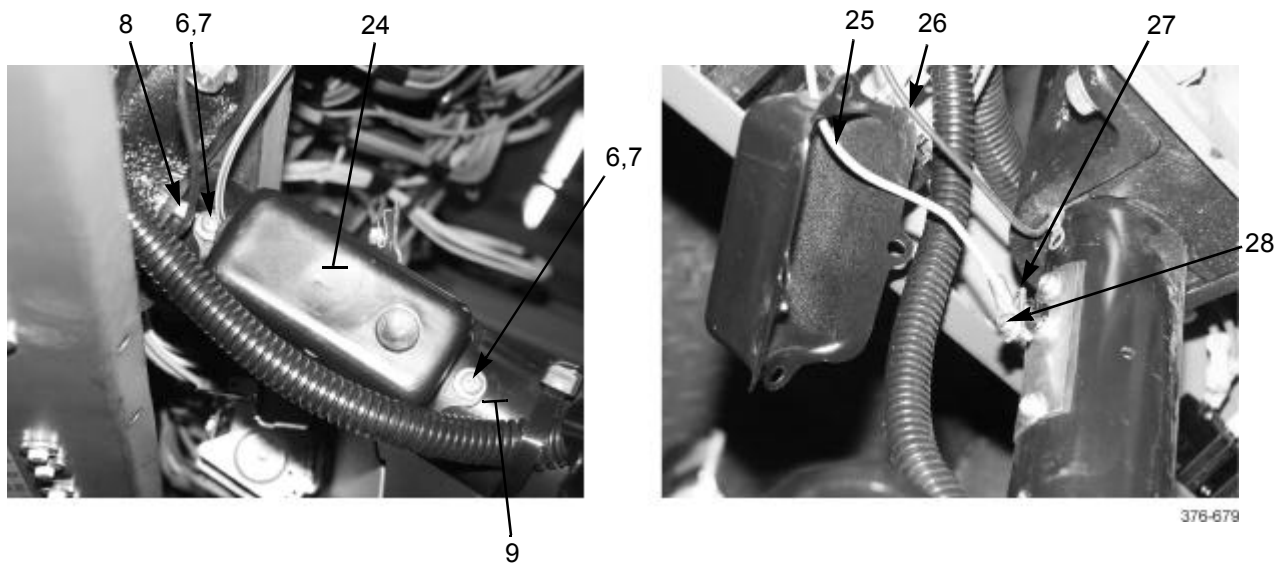
7. Install screw (12) and nut (13) to secure upper steering column (9) to yoke of lower steering column (14). Tighten nut to 26 lb-ft (35 Nm).



8. Lubricate lower steering column (WP 0009 00).

**HORN REPAIR**

1. Ensure battery disconnect switch is in OFF position.
2. Remove two screws (6), washers (7), and cover (24) from upper steering column (9).
3. Remove screw (28) to disconnect wire (25) from contact brush (27). Remove wire from cover (24).
4. Repair wires (25 and 26) or connectors in accordance with WP 0120 00 (*Electrical General Maintenance Instructions*).
5. Feed wire (25) through opening in cover (24) and connect to contact brush (27) with screw (28).
6. Install ground terminal (8) and cover (24) to upper steering column (9) with two washers (7) and screws (6).
7. Place battery disconnect switch in ON position.

**END OF WORK PACKAGE**

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**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 110

**RPSTL Reference**

Group 110, Figure 4

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Fluid, hydraulic, petroleum base (Item 25 or 26, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N NE11-048-21)

**References**

TM 9-2320-312-10

WP 0129 00

WP 0137 00



**WARNING**



- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
- At operating temperature, hydraulic fluid is hot. Allow hydraulic fluid to cool before disconnecting any hydraulic lines. Failure to do so could result in serious burns.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

**NOTE**

- This work package describes replacement of hydraulic hoses between power steering pump on left side of engine and power steering gear at left frame rail at front of vehicle.
- Diagram of power steering hydraulic system is located in Figure 3 in WP 0137 00 (*Diagrams*).

**REMOVAL****WARNING**

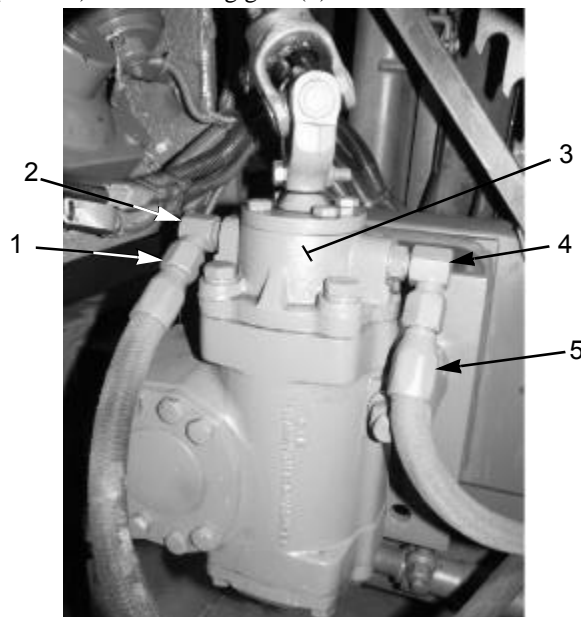
When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

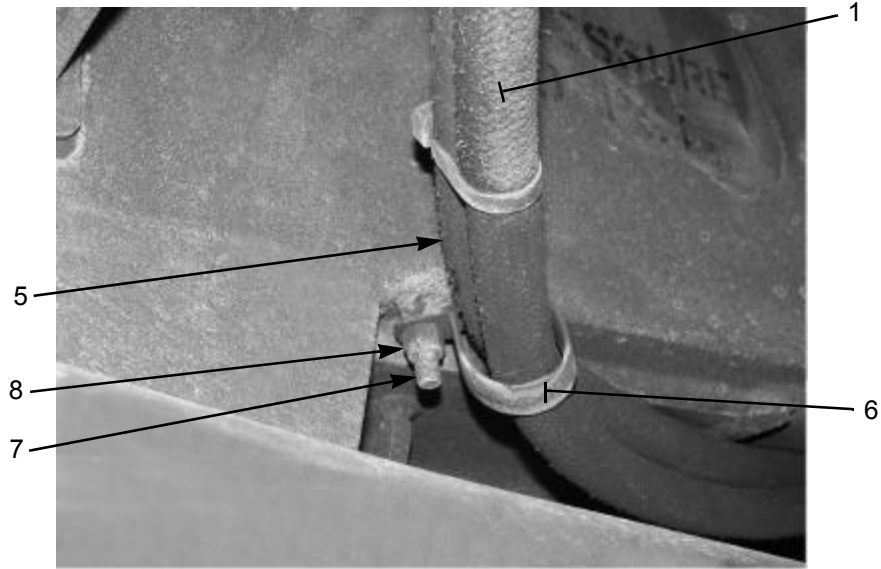
- Tag hydraulic hoses and note position of fittings to ensure correct installation.
  - Use a drain pan to capture hydraulic fluid in hoses. Dispose of hydraulic fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.
1. Ensure fifth wheel is fully lowered (TM 9-2320-312-10).
  2. Position steering wheel with wheels facing straight ahead.
  3. Shut down engine.
  4. Tilt cab (TM 9-2320-312-10).
  5. Place battery disconnect switch in OFF position.
  6. Disconnect hose (1) from elbow (2) at steering gear (3). Disconnect hose (5) from elbow (4).
  7. If damaged, remove elbows (2 and 4) from steering gear (3).



375-464

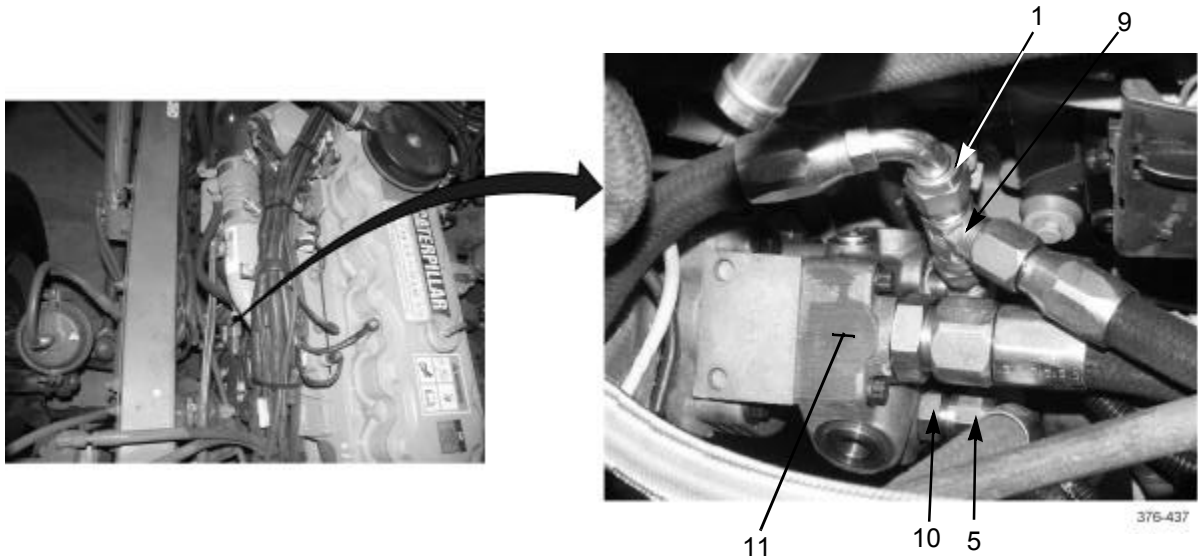
**REMOVAL - CONTINUED**

8. Trace hoses (1 and 5) back toward engine. Remove tiedown straps and discard. At left frame rail, remove locknut (8), clamp (6) and release hoses from welded stud (7). Discard locknut.



376-689

9. Disconnect hose (1) from tee (9) at power steering pump (11). Disconnect hose (5) from straight fitting (10).
10. If damaged, remove straight fitting (10) from power steering pump (11).



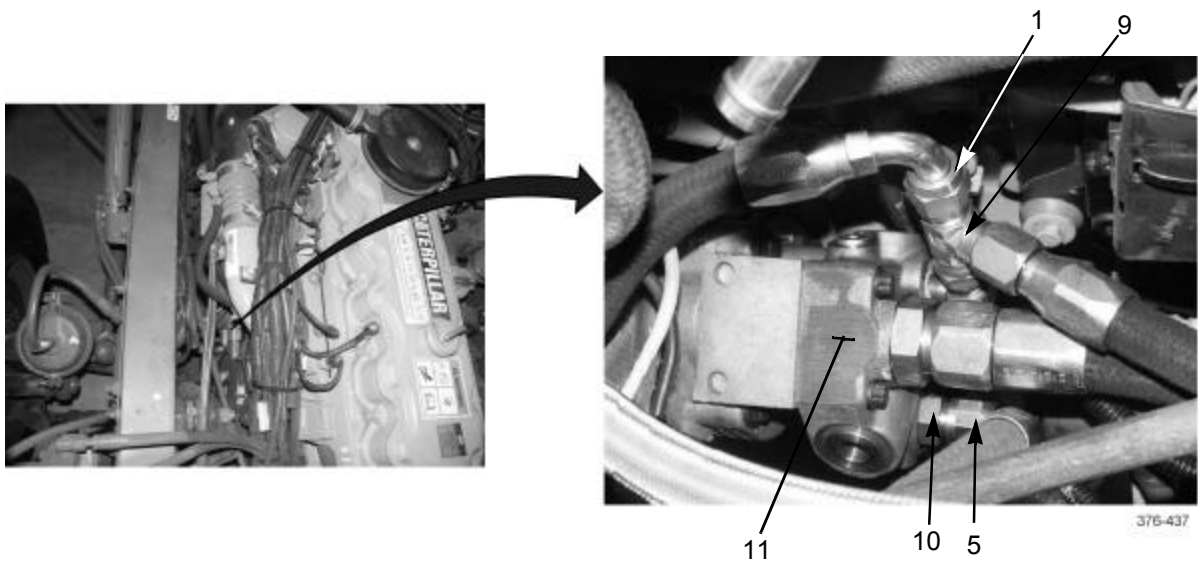
376-437

**INSTALLATION**

**NOTE**

Ensure new preformed packings, coated with hydraulic fluid, are used on all hydraulic fittings, prior to installation.

1. If removed, install straight fitting (10) to power steering pump (11).
2. Connect hose (5) to straight fitting (10). Connect hose (1) to tee (9).



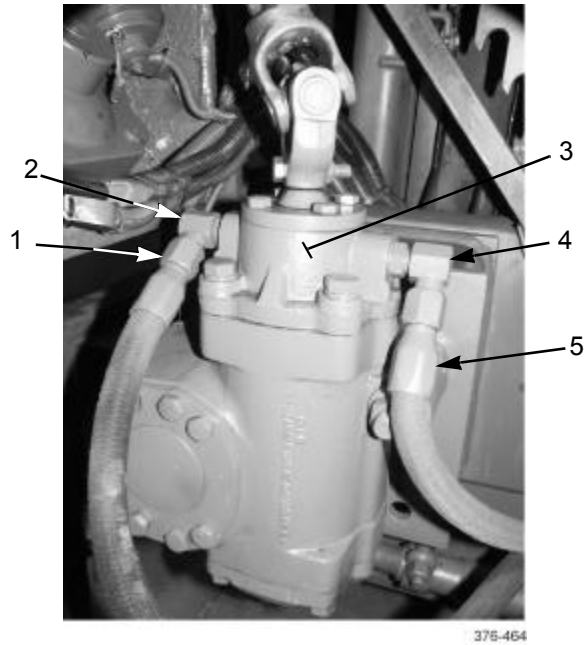
3. Secure hoses (1 and 5) to welded stud (7) at left frame rail with clamp (6) and new locknut (8).





**INSTALLATION - CONTINUED**

4. If removed, install elbows (2 and 4) to power steering gear (3).
5. Connect hose (5) to elbow (4). Connect hose (1) to elbow (2).



6. Install new tiedown straps.
7. Place battery disconnect switch in ON position.
8. Lower cab (TM 9-2320-312-10).
9. Fill hydraulic reservoir as required (WP 0129 00). Be alert for evidence of leaks.

**END OF WORK PACKAGE**

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**FRONT BUMPER REPLACEMENT**

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0037 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 115

**RPSTL Reference**

Group 115, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Tools and Special Tools - Continued**

Suitable lifting device with chains

**Personnel Required**

Two

**Equipment Condition**

Windshield washer reservoir removed (WP 0059 00)

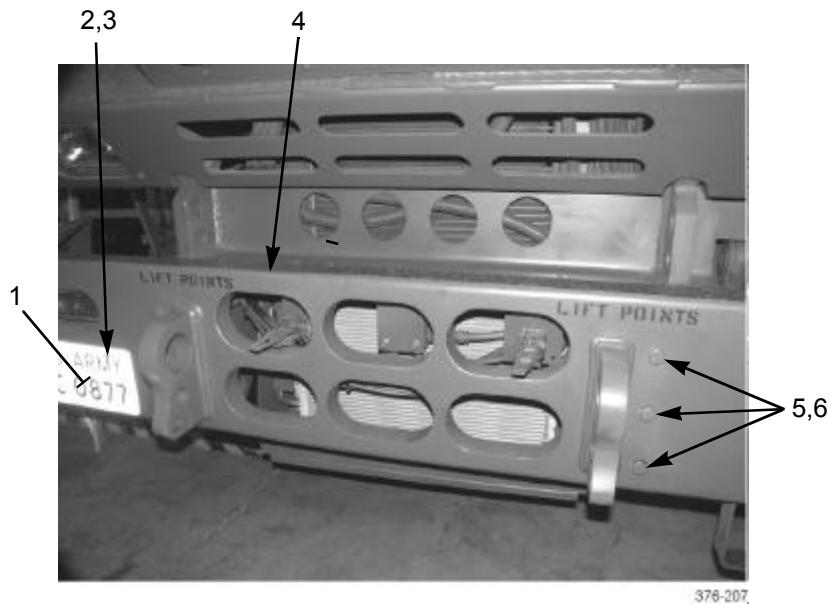
Front turn signal lights removed (WP 0103 00)

**WARNING**

- Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.
- To ensure a safe lift, lifting device capacity must be at least 1000 lb (454 kg).

**FRONT BUMPER REPLACEMENT - CONTINUED****0037 00****REMOVAL**

1. Remove two nuts (2), screws (3), and license plate (1), if equipped, from front bumper (4).
2. Attach chains to front bumper (4) and to overhead lifting device. Raise overhead lifting device to remove slack in chains.
3. Remove six nuts (5), bolts (6), and front bumper (4) from front of vehicle frame.

**INSTALLATION**

1. Using chains and overhead lifting device, position bumper (4) to front of vehicle frame.
2. Install bumper (4) with six bolts (6) and nuts (5). Tighten nuts to 240 lb-ft (325 Nm).
3. Remove chains and lifting device.
4. Install license plate (1), if equipped, to front bumper (4) with two screws (3) and nuts (2).
5. Install front turn signal lights (WP 0103 00).
6. Install windshield washer reservoir (WP 0059 00).

**END OF WORK PACKAGE**

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**CAB STEPS REPLACEMENT**

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0038 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 115

**RPSTL Reference**

Group 115, Figure 2

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

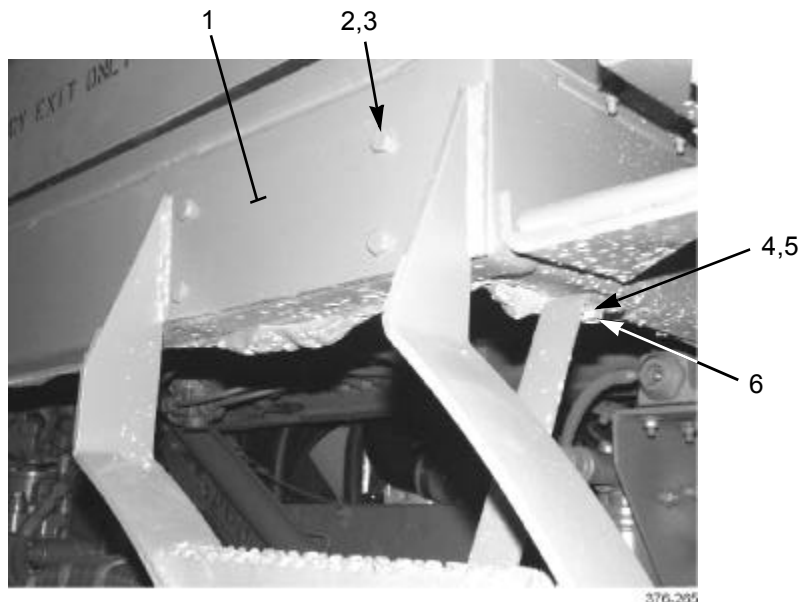
Plastic molding material (Item 49, WP 0165 00)

Nut, lock (P/N 21NE066) (4)

---

**REMOVAL**

1. Remove foam insulation to access mounting hardware.
2. Remove four locknuts (2), four bolts (3), nut (4), screw (6), and washer (5), and remove cab steps (1) from left side of cab. Discard locknuts.

**INSTALLATION**

1. Install cab steps (1) to left side of cab with screw (6), washer (5), nut (4), and four bolts (3) and four new locknuts (2).
2. Apply foam insulation in accordance with instructions from manufacturer.

**END OF WORK PACKAGE**

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**REAR PLATFORM MAINTENANCE**

0039 00

**THIS WORK PACKAGE COVERS**

Transmission Access Cover Replacement, Fifth Wheel Platform Replacement

**INITIAL SETUP****Maintenance Level**

Unit

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**MAC Reference**

Group 115

**Personnel Required**

Two

**RPSTL Reference**

Group 115, Figure 1

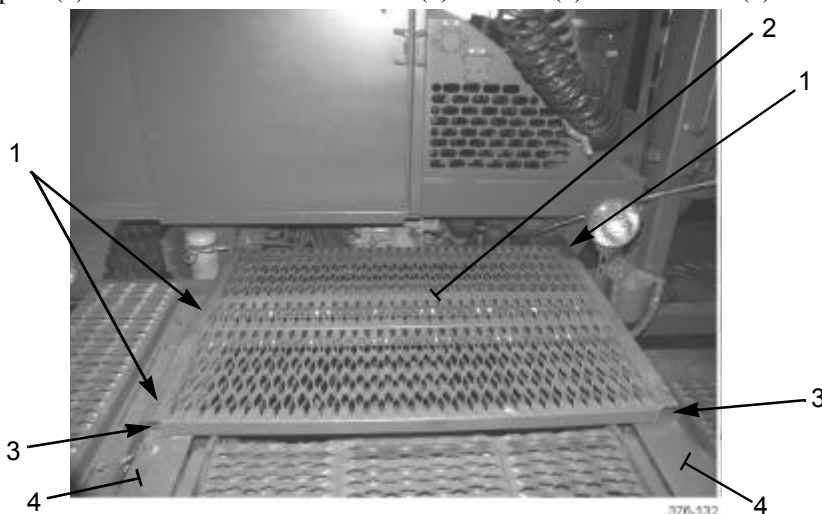
Group 160, Figure 6

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

**TRANSMISSION ACCESS COVER REPLACEMENT****NOTE**

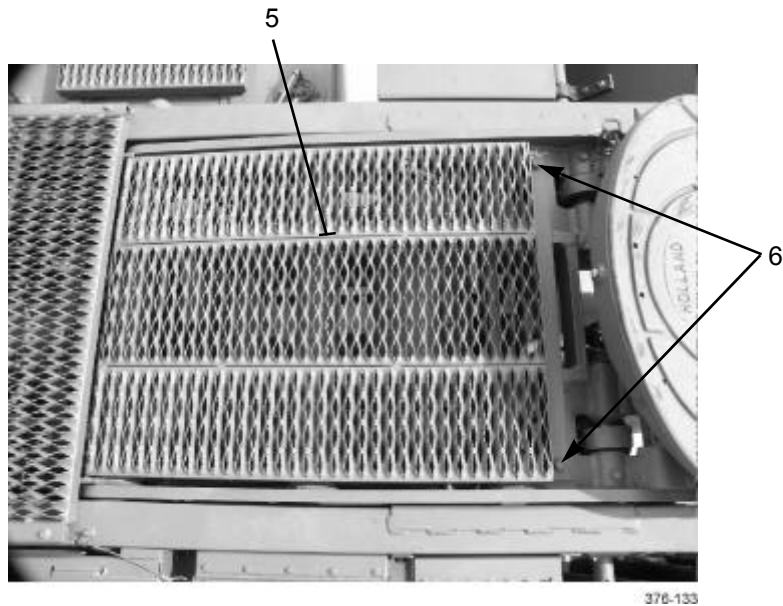
- Perform following steps to replace platform directly behind cab.
  - Right-front bolt also secures transmission dipstick tube mounting to platform.
1. Remove six bolts (1), transmission access cover (2), and two cushion pads (3) from frame (4) of vehicle.
  2. Install two cushion pads (3) and transmission access cover (2) to frame (4) with six bolts (1).



**FIFTH WHEEL PLATFORM REPLACEMENT****NOTE**

Perform following steps to replace platform on fifth wheel sub-frame assembly.

1. Remove two bolts (6) from rear of platform (5).
2. Slide platform (5) slightly toward rear of vehicle and remove from vehicle.
3. Position platform (5) to vehicle. Ensure that pins at front of platform engage platform retainers.
4. Secure rear of platform (5) with two bolts (6).



**END OF WORK PACKAGE**



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**PROPSHAFT GUARD REPLACEMENT**

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0040 00

**THIS WORK PACKAGE COVERS**

Replacement

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**INITIAL SETUP****Maintenance Level**

Unit

**RPSTL Reference**

Group 120, Figure 1

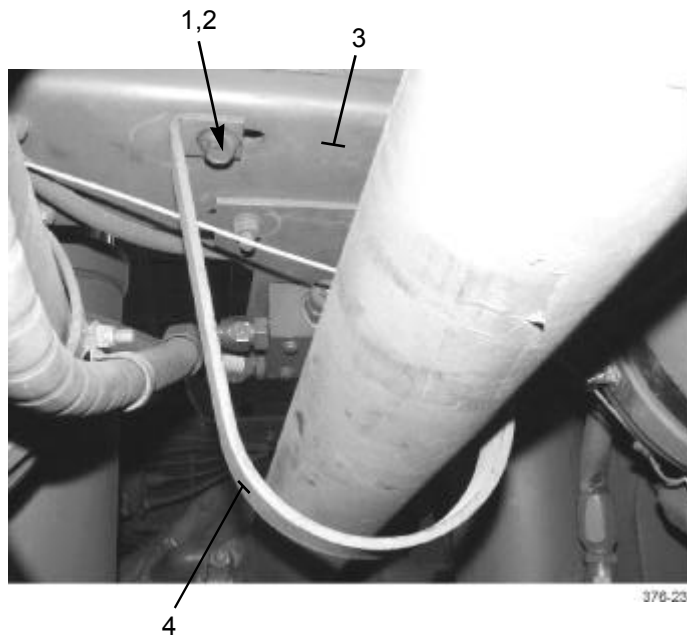
**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

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**REPLACEMENT**

1. Remove two nuts (1), bolts (2), and propshaft guard (4) from rear air reservoir mounting bracket (3).
2. Install propshaft guard (4) to rear air reservoir mounting bracket (3) with two bolts (2) and nuts (1).

**END OF WORK PACKAGE**

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**RIGHT-SIDE CAB REAR CUSHION MOUNT REPLACEMENT**

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**0041 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

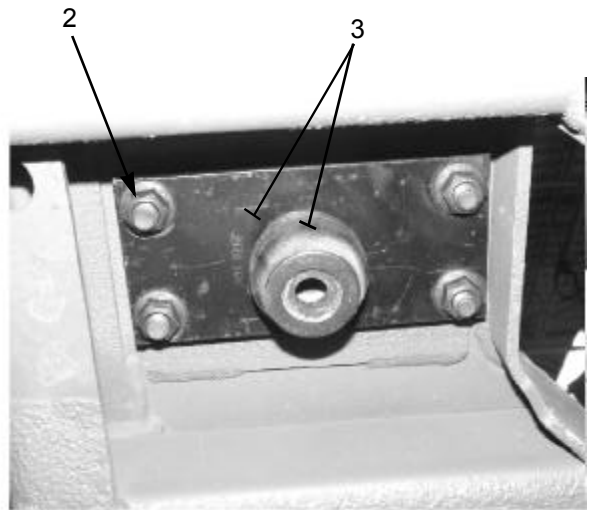
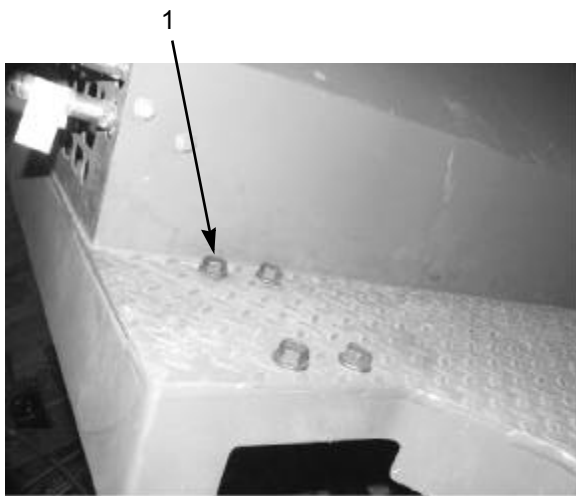
**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

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**REMOVAL**

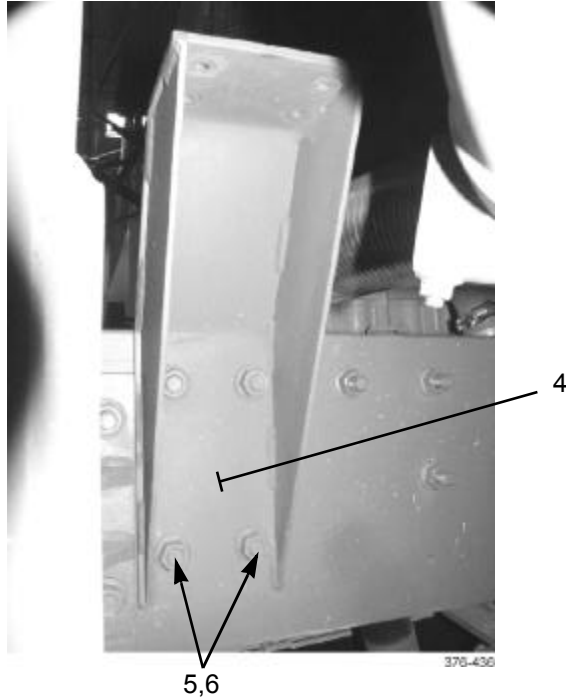
1. Remove four nuts (2), bolts (1), and cushion mount assembly (3) from underside of cab.



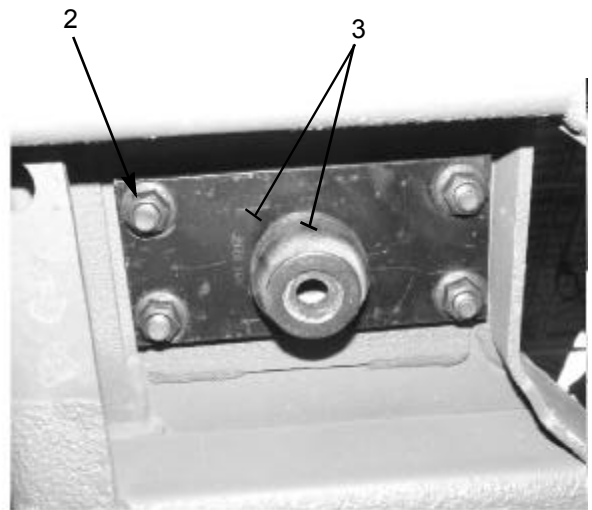
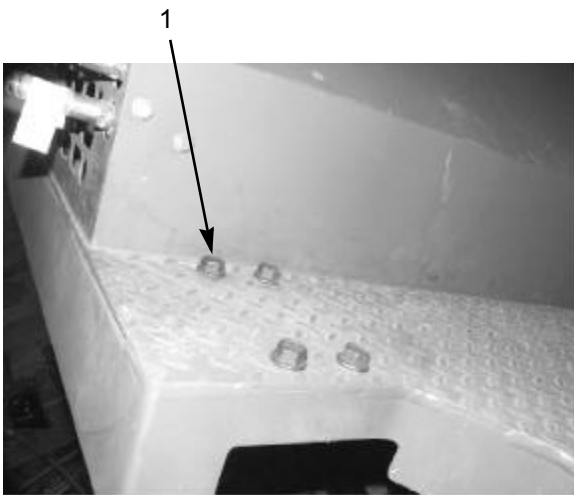
376-242 :

**REMOVAL - CONTINUED**

2. Remove four nuts (5), bolts (6), and rear cab mount (4) from frame.

**INSTALLATION**

1. Install rear cab mount (4) to frame with four bolts (6) and nuts (5). Tighten nuts to 210 lb-ft (285 Nm).
2. Install cushion mount assembly (3) to underside of cab with four screws (1) and nuts (2).



3. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

**THIS WORK PACKAGE COVERS**

Front Grabhandle Replacement, Corner Grabhandle Replacement, Rear Grabhandle Replacement, Side Grabhandle Replacement

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figures 1 and 2

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Plastic molding material (Item 49, WP 0165 00)

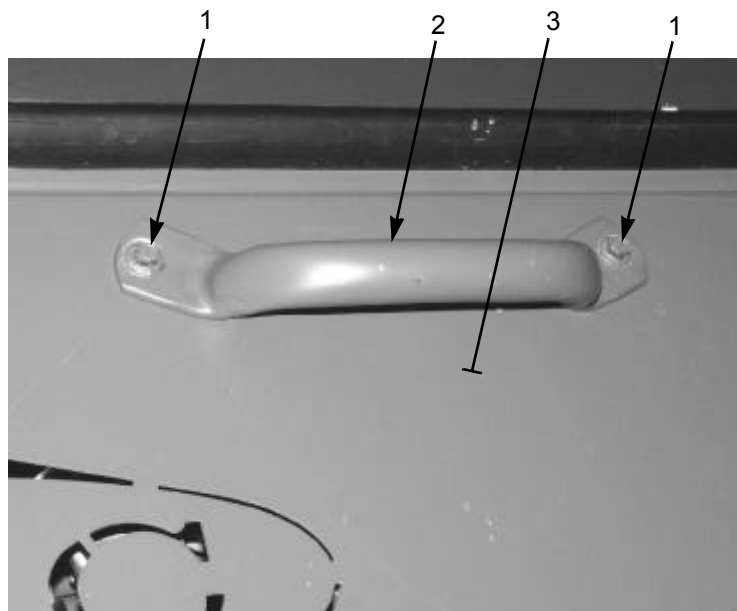
Nut, lock (P/N 219-61) (2)

Washer, lock (P/N 361-11) (2)

Washer, lock (P/N 361-10) (6)

**FRONT GRABHANDLE REPLACEMENT**

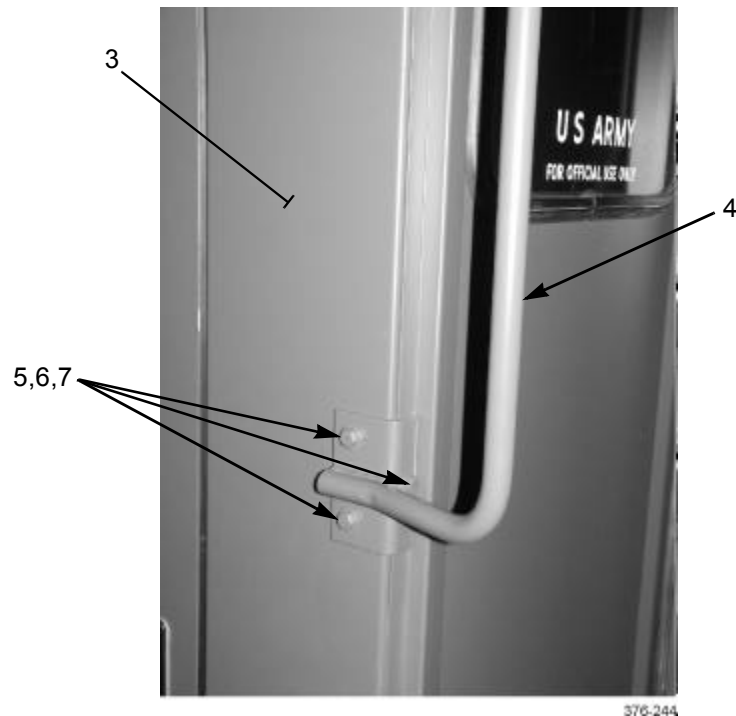
1. Remove two screws (1) and grabhandle (2) from access panel at front of cab (3).
2. Install grabhandle (2) to access panel at front of cab (3) with two screws (1).



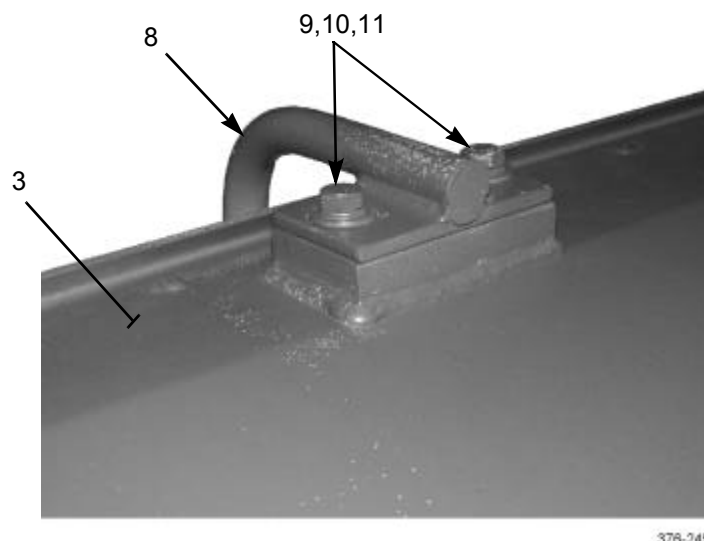
376-243

**CORNER GRABHANDLE REPLACEMENT**

1. Remove six screws (5), lockwashers (6), washers (7), and grabhandle (4) from left-rear corner of cab (3). Discard lockwashers.
2. Install grabhandle (4) to left-rear corner of cab (3) with six washers (7), new lockwashers (6), and screws (5).

**REAR GRABHANDLE REPLACEMENT**

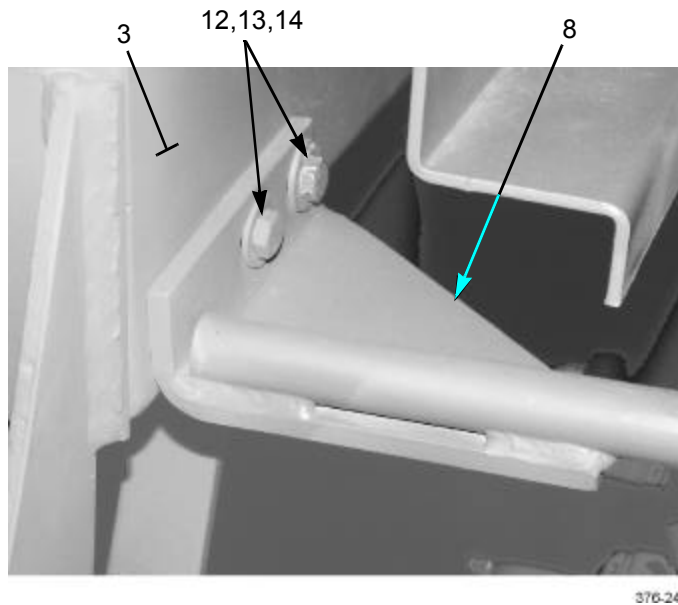
1. At top-rear of cab (3), remove two screws (9), lockwashers (10), and washers (11) holding grabhandle (8) to cab. Discard lockwashers.



**REAR GRABHANDLE REPLACEMENT - CONTINUED****NOTE**

Underside of cab is foam insulated. Remove foam insulation at two points at bottom-rear of cab, to provide access to remove locknut and washer.

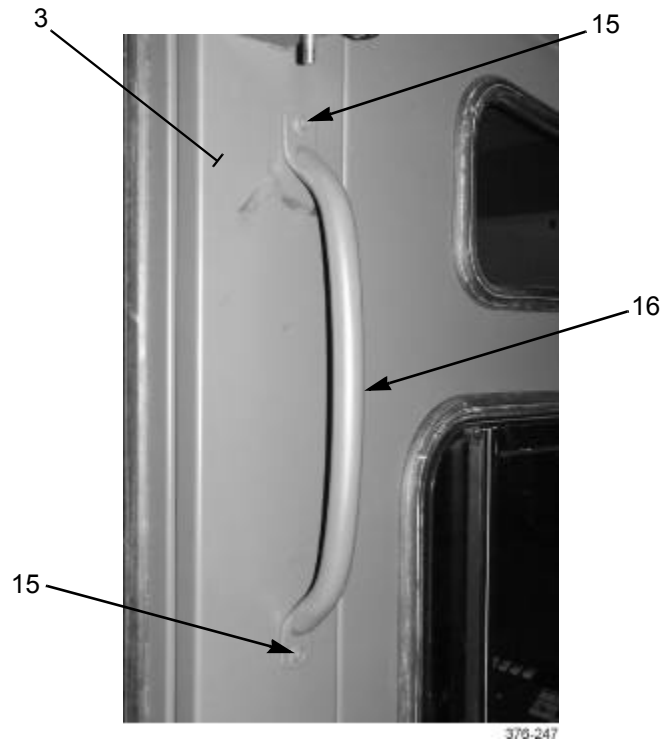
- At bottom-rear of cab (3), remove two locknuts (12), screws (13), washers (14), and grabhandle (8) from cab. Discard locknuts.



- At bottom-rear of cab (3), install grabhandle (8) to cab with two washers (14), screws (13), and new locknuts (12).
- At top-rear of cab (3), secure other end of grabhandle (8) to cab with two washers (11), new lockwashers (10), and screws (9).
- Apply foam insulation in accordance with instructions from manufacturer.

***SIDE GRABHANDLE REPLACEMENT***

1. Remove two screws (15) and grabhandle (16) from upper-right side of cab (3).
2. Install grabhandle (16) to upper-right side of cab (3) with two screws (15).

**END OF WORK PACKAGE**



**CAB SIDE VENT REPLACEMENT**

**0043 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 2

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

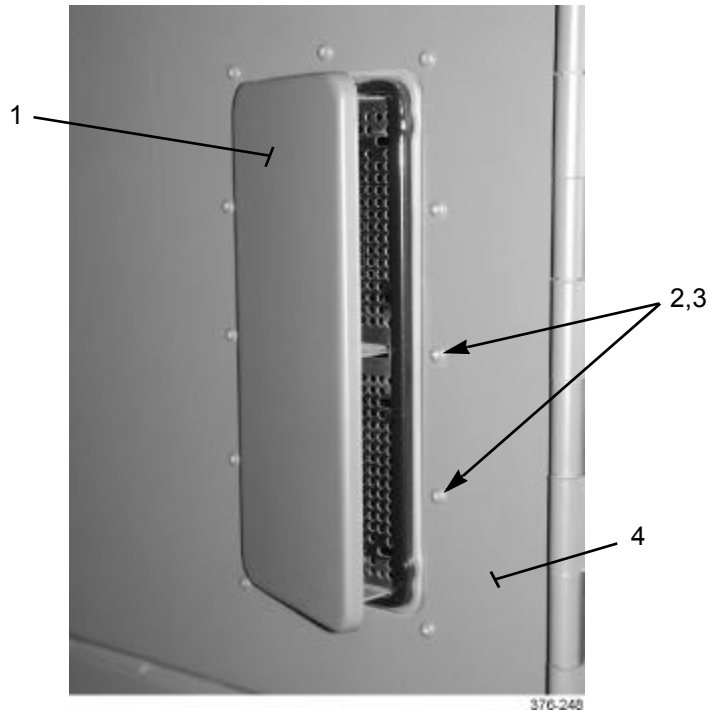
Nut, lock (P/N 219-163) (12)

**REMOVAL**

**NOTE**

Note position of cab side vent for installation.

1. Remove 12 locknuts (2) and screws (3) from left side of cab (4). Discard locknuts.
2. Remove cab side vent (1) from cab (4) by pushing cab side vent into cab.



1. Position cab side vent (1) to left side of cab (4).
2. Install cab side vent (1) with 12 screws (3) and new locknuts (2).

**END OF WORK PACKAGE**

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**CAB LEFT-SIDE DOOR ASSEMBLY MAINTENANCE**

0044 00

**THIS WORK PACKAGE COVERS**

Removal, Disassembly, Assembly, Installation

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figures 1, 2, and 4

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Seal, nonmetallic (P/N 284A-0055-15)

**Materials/Parts - Continued**

Washer, lock (P/N 361-10) (30)

**Personnel Required**

Two

**References**

TB 43-0209

TM 9-2320-312-10

WP 0080 00

**Equipment Condition**

Left mirror removed (WP 0051 00)

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

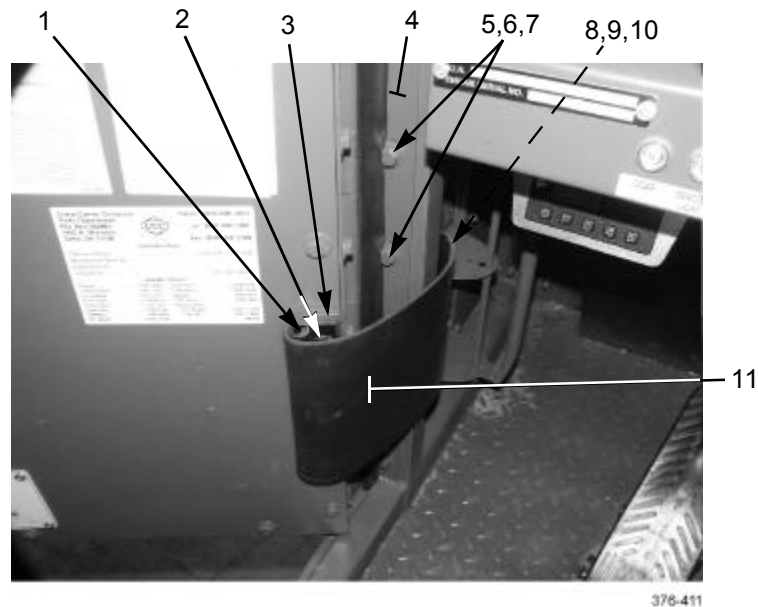
**REMOVAL**

1. Remove three screws (8), bracket (9), and bracket (10) to release door stop strap (11) from inside cab.
2. Remove three screws (2), bracket (1), door stop strap (11), and bracket (3) from door assembly.

**WARNING**

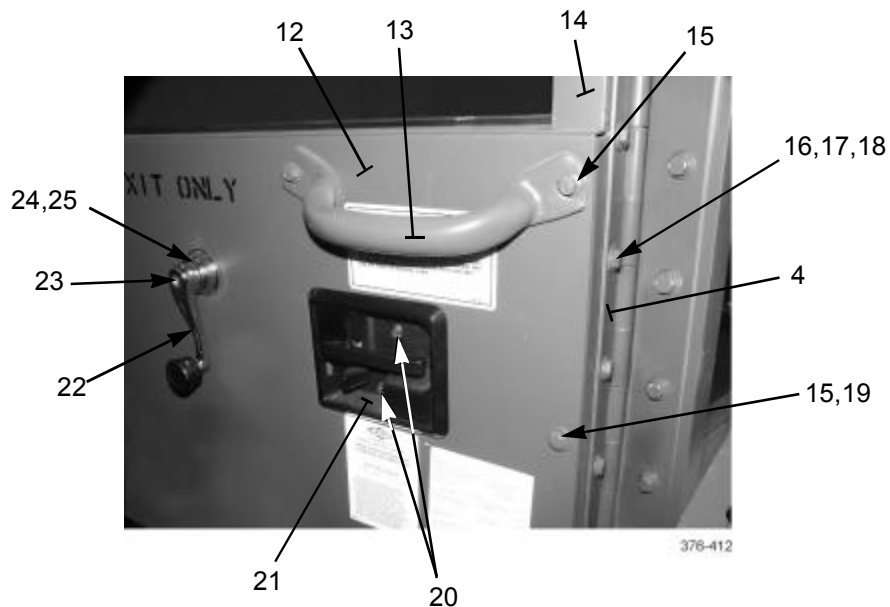
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

3. With window glass rolled down, install sling to top of door and attach sling to overhead lifting device. Take up slack in sling.
4. Remove 15 bolts (5), lockwashers (6), washers (7), and hinge (4) of door from cab. Remove door from vehicle. Discard lockwashers.

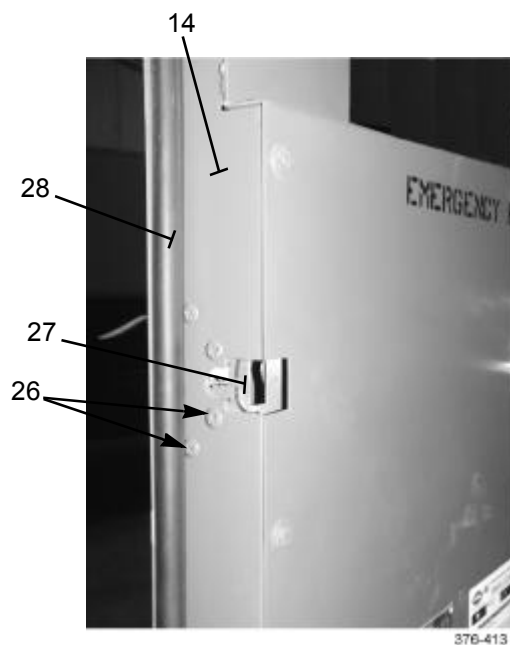
**DISASSEMBLY**

1. Remove two screws (15) and grabhandle (13) from inner door panel (12).
2. Remove screw (23), handle (22), spring (24), and ring (25) from window regulator.
3. Remove two screws (20) and latch release (21).
4. Remove 11 remaining screws (15), washers (19), and inner door panel (12) from door (14).
5. Remove 15 bolts (16), lockwashers (17), washers (18), and door hinge (4) from door (14). Discard lockwashers.

**DISASSEMBLY - CONTINUED**



6. Remove door weatherseal (28) from along top, side, and bottom lip of door (14).
7. At outer edge of door (14), remove four screws (26) and door latch (27).

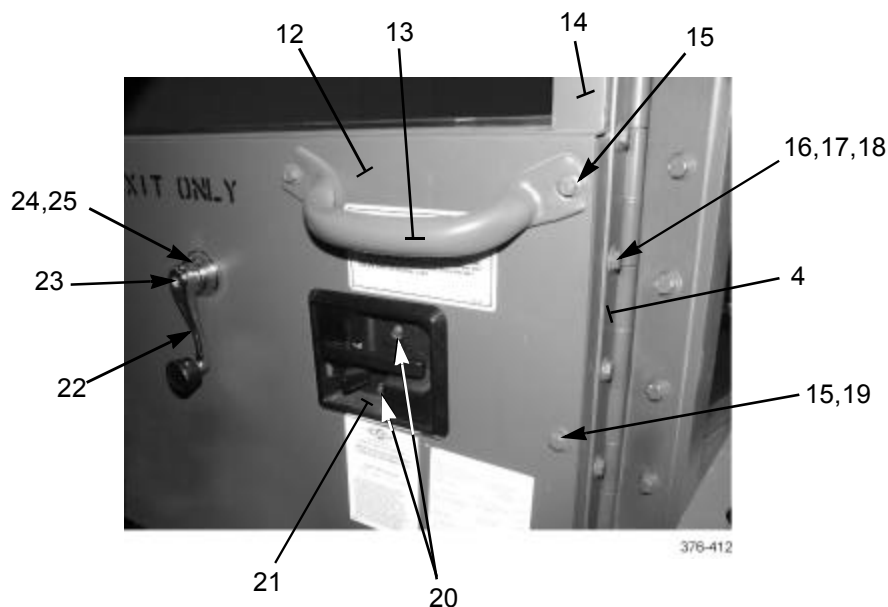


**ASSEMBLY**

1. At outer edge of door (14) install door latch (27) with four screws (26).
2. Install door weatherseal (28) along top, side, and lower lip of door (14).

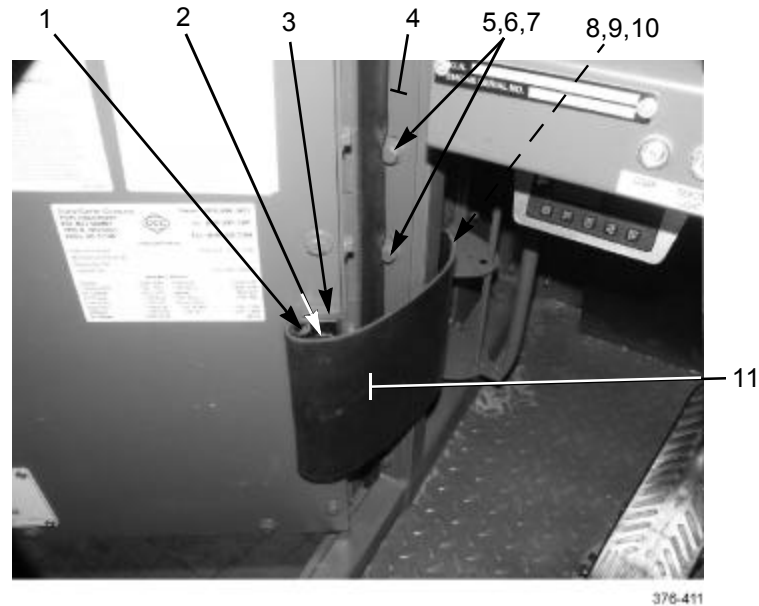
**ASSEMBLY - CONTINUED**

3. Install door hinge (4) to door (14) with 15 washers (18), new lockwashers (17), and bolts (16).
4. Install inner door panel (12) to door (14) with 11 washers (19) and screws (15).
5. Install latch release (21) with two screws (20).
6. Position ring (25) and spring (24) at window regulator and install handle (22) with screw (23).
7. Install grabhandle (13) with two remaining screws (15).

**INSTALLATION****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

1. Attach sling to top of door assembly and attach sling to overhead lifting device. Take up slack in sling.
2. Position door to vehicle and install hinge (4) of door to cab with 15 washers (7), new lockwashers (6), and bolts (5). Remove sling.
3. Install bracket (3), door stop strap (11), and bracket (1) to door assembly with three screws (2).
4. Install bracket (10), door stop strap (11), and bracket (9) to cab with three screws (8).

**INSTALLATION - CONTINUED**

5. Install left mirror (WP 0051 00).
6. Stencil "EMERGENCY EXIT ONLY" to inner door panel and outside surface of door assembly in accordance with TM 9-2320-312-10 and TB 43-0209.
7. Install decals and data plates to inner door panel in accordance with TM 9-2320-312-10 and WP 0080 00.

**END OF WORK PACKAGE**

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**THIS WORK PACKAGE COVERS**

Handle and Lock: Removal, Installation

Door Assembly: Removal, Disassembly, Assembly, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figures 1, 2, and 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Seal (P/N 284A-91-16)

Nut, lock (21NE-040) (4)

Washer, lock (P/N 361-7) (8)

**References**

WP 0042 00

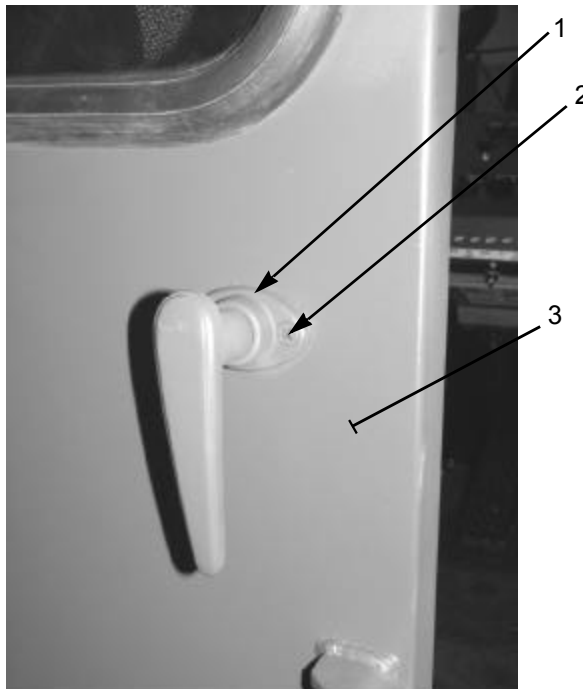
WP 0148 00

**Personnel Required**

Three

**HANDLE AND LOCK REMOVAL**

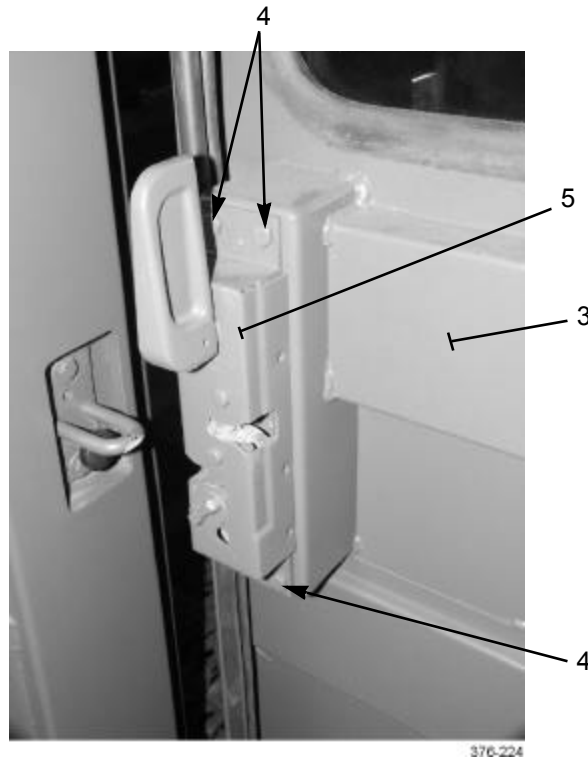
1. Remove two screws (2) and outside handle (1) from door assembly (3).



378-223

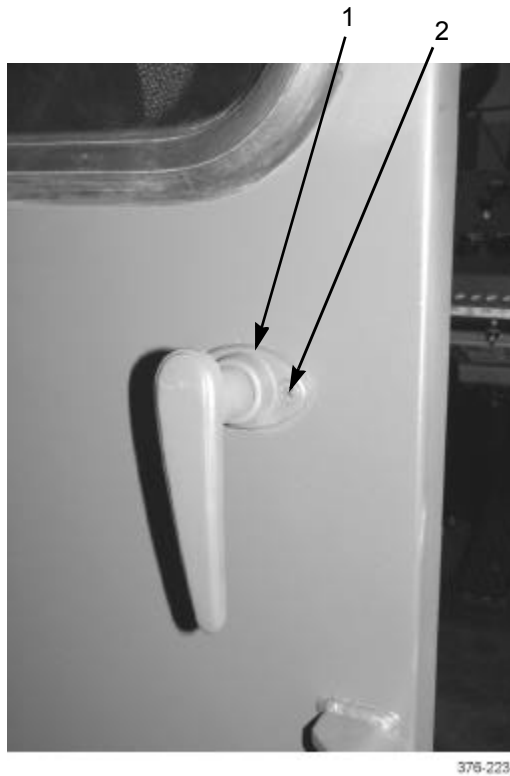
**HANDLE AND LOCK REMOVAL - CONTINUED**

2. Remove four bolts (4) and lock (5) from inside of door assembly (3).

**HANDLE AND LOCK INSTALLATION**

1. Install lock (5) to inside of door assembly (3) with four bolts (4).
2. Position outside handle (1) with shaft through opening in lock (5). Install two screws (2).

**HANDLE AND LOCK INSTALLATION - CONTINUED**



**DOOR ASSEMBLY REMOVAL**

1. Remove grabhandle from left-rear corner of cab (WP 0042 00).
2. Remove handle and lock (Refer to *Handle and Lock Removal*).

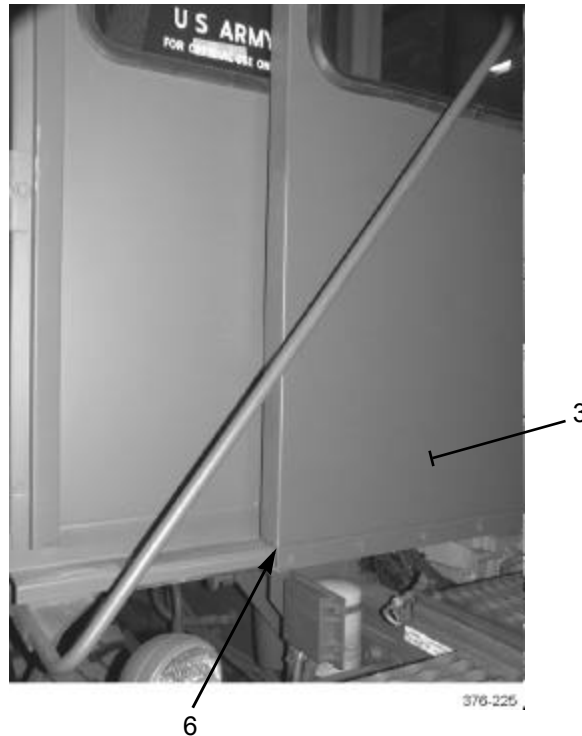
**DOOR ASSEMBLY REMOVAL - CONTINUED**

- Slide door assembly (3) all the way open.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

- With assistance, remove door assembly (3) from tracks (6) at top and bottom and remove door from vehicle.

**DOOR ASSEMBLY DISASSEMBLY**

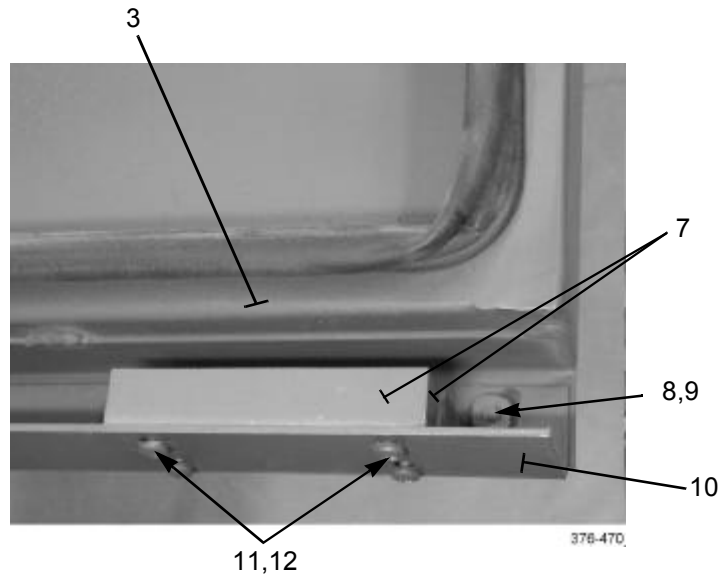
- At bottom of door assembly (3), remove six screws (8), washers (9), and lower roller guide (10).

**NOTE**

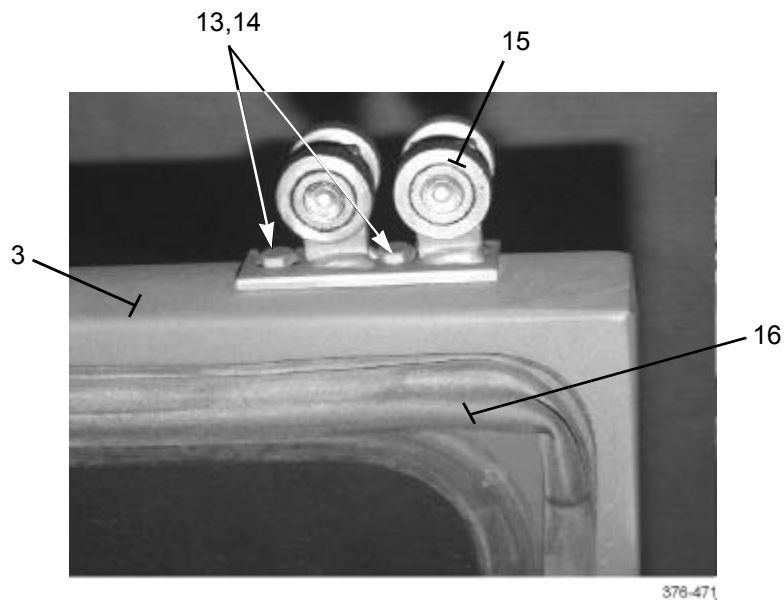
Note location of lower roller stops and top rollers to ensure correct installation.

- Remove eight screws (11), lockwashers (12), and four lower roller stops (7) from lower roller guide (10). Discard lockwashers.

**DOOR ASSEMBLY DISASSEMBLY - CONTINUED**



3. At top of door assembly (3), remove four locknuts (13), screws (14), and two top rollers (15). Discard locknuts.
4. If damaged, remove seal (16) from around inside of door assembly (3). Retain seal to use as a template to cut new length of seal.



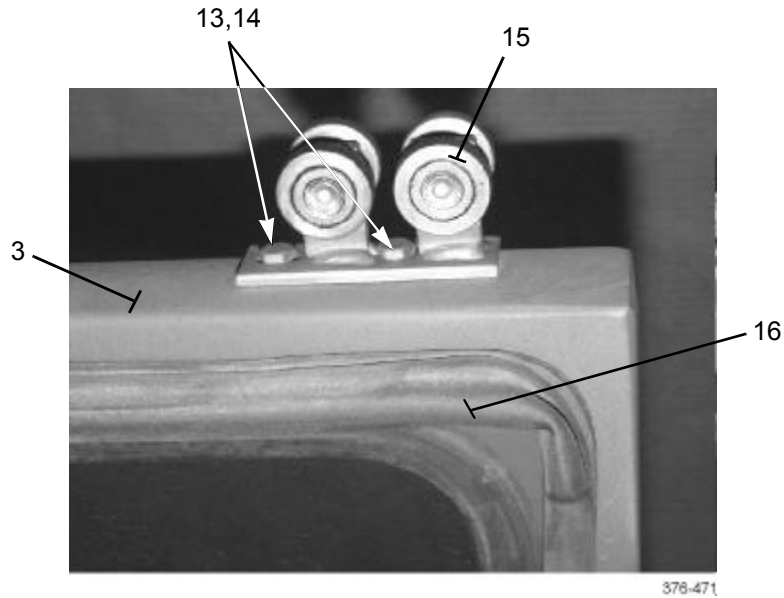
5. If damaged, remove window glass (WP 0148 00).

**DOOR ASSEMBLY ASSEMBLY**

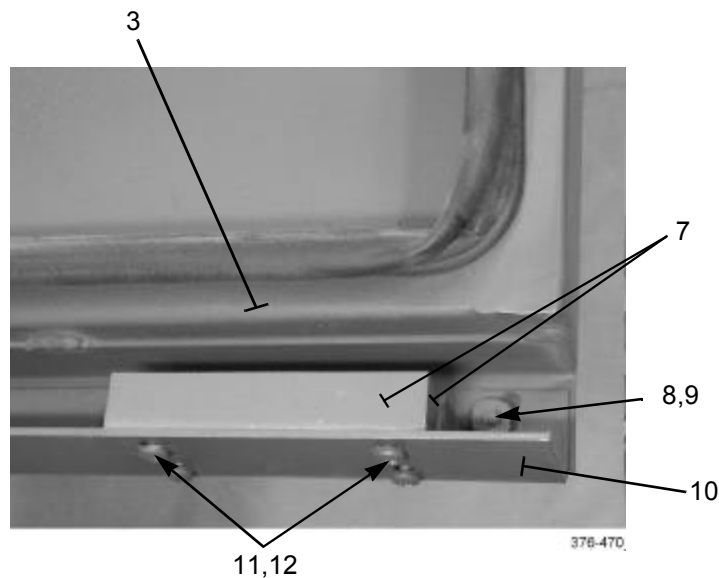
1. If removed, install window glass (WP 0148 00).

**DOOR ASSEMBLY - CONTINUED**

2. If removed, install new seal (16) around inside of door assembly (3). Use old seal as a guide to cut new seal to correct length. Discard old seal.
3. At top of door assembly (3), install two top rollers (15) with four screws (14) and new locknuts (13).



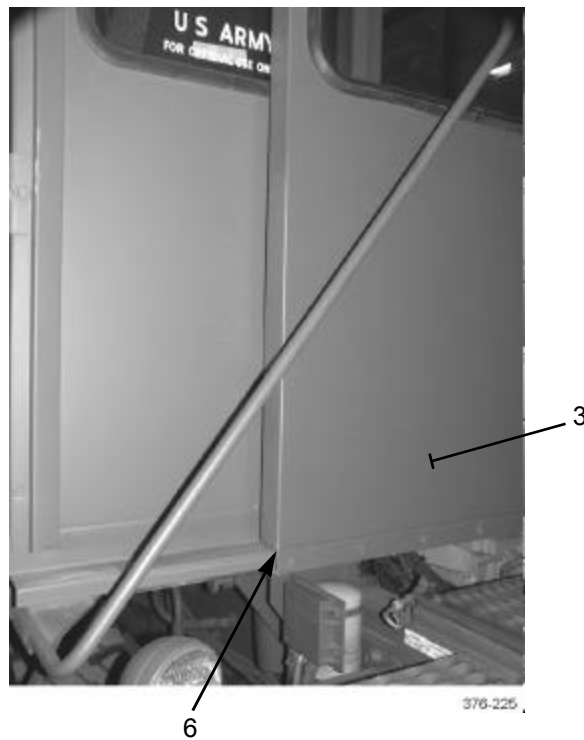
4. Install four lower roller stops (7) to lower roller guide (10) with eight new lockwashers (12) and screws (11).
5. At bottom of door assembly (3), install lower roller guide (10) with six washers (9) and screws (8).



**DOOR ASSEMBLY INSTALLATION****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

1. With assistance, position door assembly (3) at top and bottom tracks (6) and slide to the right to install.



2. Install handle and lock (Refer to *Handle and Lock Installation*).
3. Install grabhandle to left-rear corner of cab (WP 0042 00).

**END OF WORK PACKAGE**

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**CAB FRONT ACCESS PANEL REPLACEMENT**

**0046 00**

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**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figures 1 and 3

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Seal, nonmetallic (P/N 284A-59-5)

**Equipment Condition**

Front grabhandle removed (WP 0042 00)

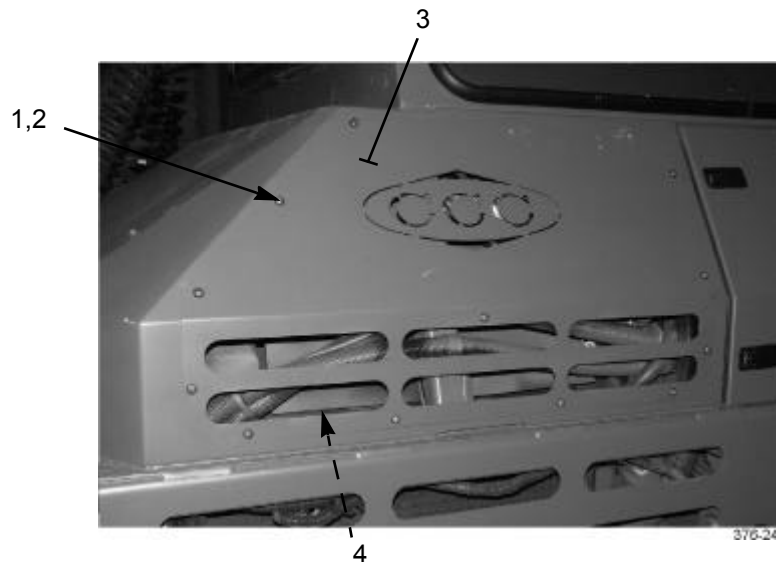
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**REMOVAL**

1. Remove 12 remaining screws (1), washers (2), and front access panel (3) from cab.
2. If damaged, remove seal (4) from mounting surface and discard.

**INSTALLATION**

1. If removed, apply new seal (4) to mounting surface of cab.
2. Install front access panel (3) to cab with 12 washers (2) and screws (1).
3. Install front grabhandle (WP 0042 00).



**END OF WORK PACKAGE**

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**CAB HEATER/AIR CONDITIONING (AC) UNIT ACCESS DOOR REPLACEMENT**

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**0047 00****THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figures 3 and 12

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Adhesive (Item 2, WP 0165 00)

Washer, lock (P/N 361-10) (9)

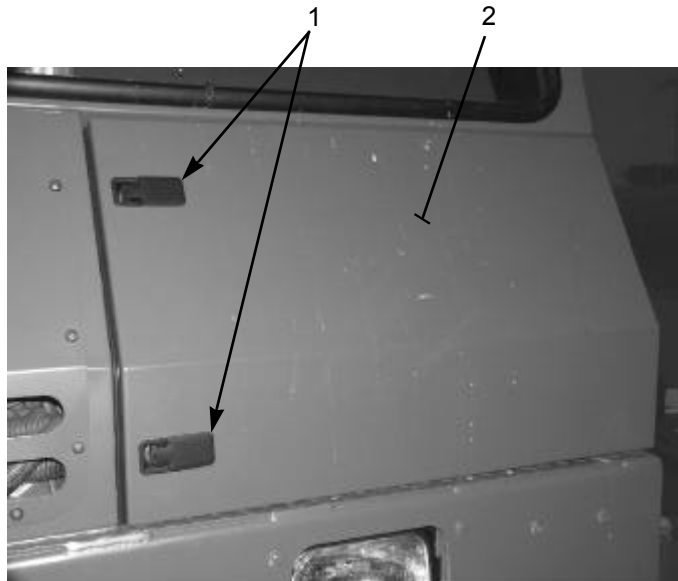
Seal, nonmetallic, hinge (P/N 284A-257-2)

Trim, edge (P/N 207-0853-24)

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**REMOVAL**

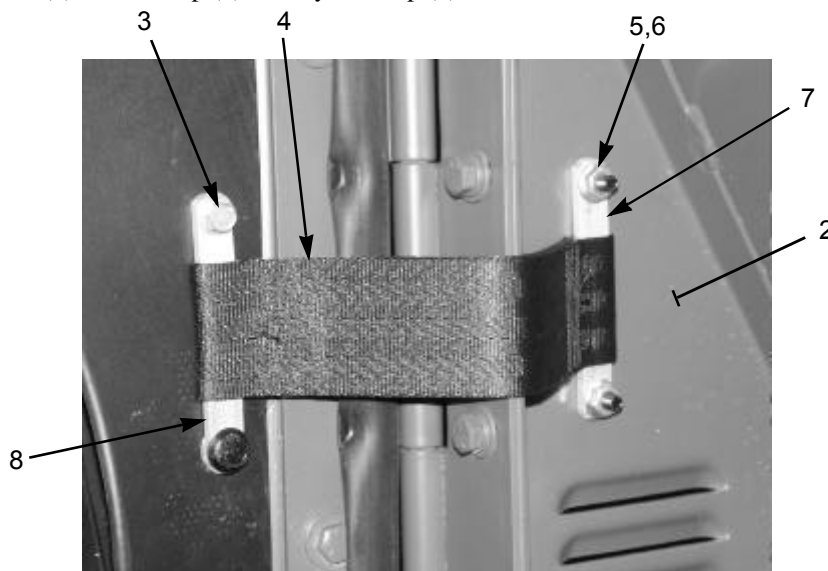
1. Pull outward on two latch assembly handles (1) and rotate handles 90 degrees counterclockwise to open access door (2).



376-250

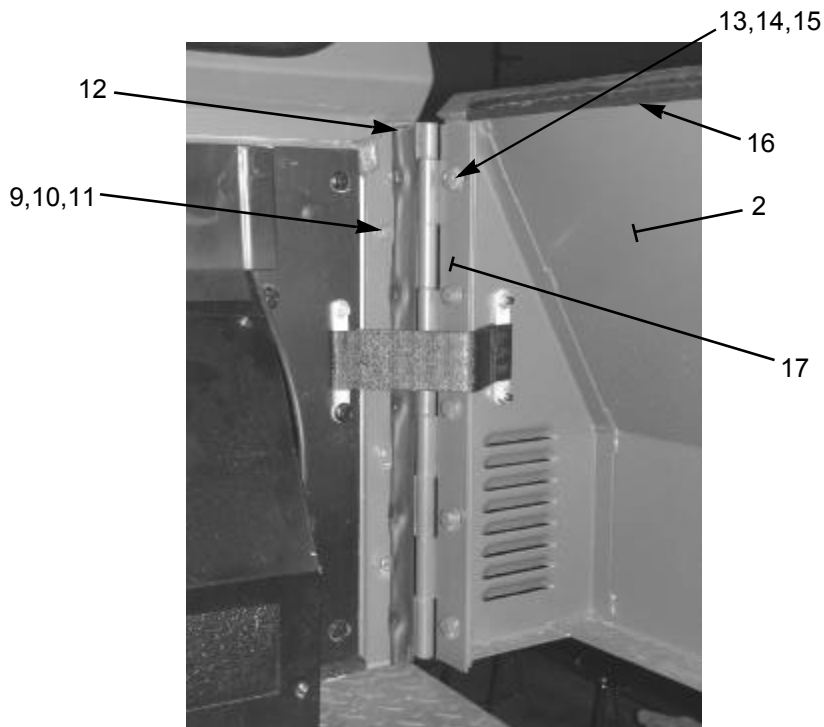
**REMOVAL - CONTINUED**

2. Remove two nuts (5), screws (6), and metal strap (7) from access door (2).
3. Remove two screws (3), metal strap (8), and nylon strap (4) from vehicle.



376-251

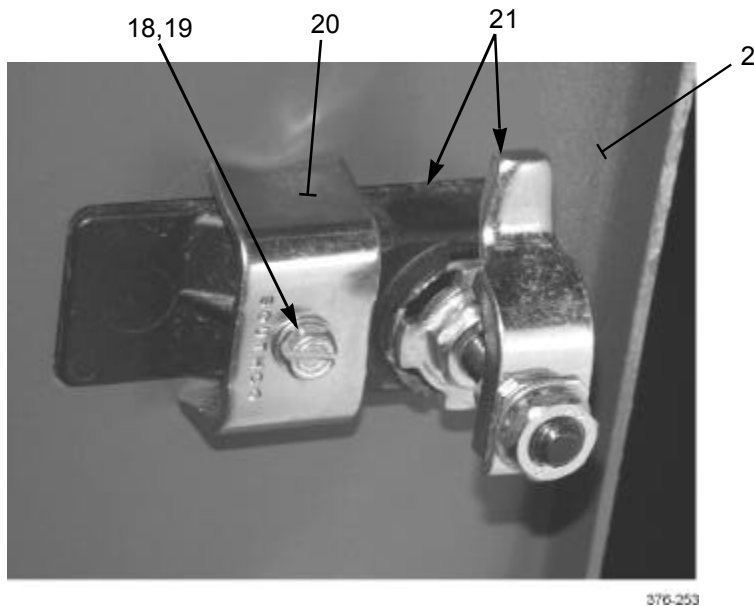
4. Remove five screws (13), lockwashers (14), washers (15), and access door (2) from hinge (17). Discard lockwashers.
5. Remove weatherseal (12), four screws (9), lockwashers (10), washers (11), and hinge (17) from front of cab. Discard weatherseal and lockwashers.
6. Remove edge trim (16) from edge of access door (2). Discard edge trim.



376-252

**REMOVAL - CONTINUED**

7. Remove screw (18), lockwasher (19), bracket (20), and latch assembly (21) from access door (2).

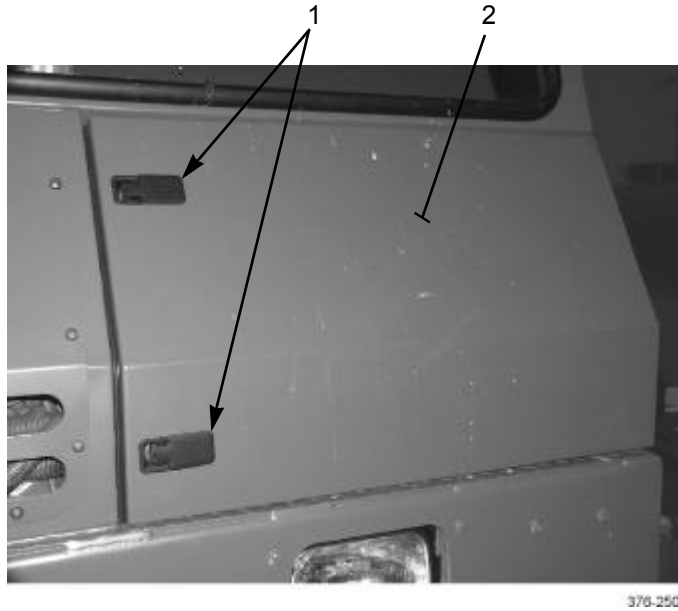
**INSTALLATION****NOTE**

Replacement latch assembly comes with mounting hardware.

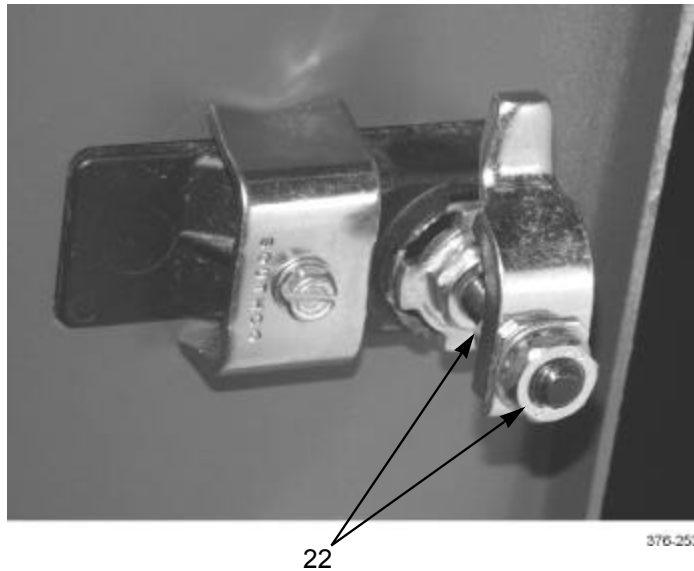
1. Install latch assembly (21) to access door (2) with bracket (20), lockwasher (19), and screw (18).
2. Install new edge trim (16) to edge of access door (2).
3. Install hinge (17) to front of cab with four washers (11), new lockwashers (10), and screws (9).
4. Use adhesive to install new weatherseal (12) over hinge (17).
5. Install access door (2) to hinge (17) with five washers (15), new lockwashers (14), and screws (13).
6. Install nylon strap (4) to vehicle with metal strap (8) and two screws (3).
7. Install other end of nylon strap (4) to access door (2) with metal strap (7), two screws (6), and nuts (5).

**INSTALLATION - CONTINUED**

8. Close access door (2) by pressing inward on door, rotating latch assembly handle (1) 90 degrees clockwise, and pushing inward on two latch handles.



9. Adjust position of jamnuts (22), as necessary, to ensure firm door closure, then fully tighten jamnuts.



**END OF WORK PACKAGE**

**MUDFLAPS REPLACEMENT**

**0048 00**

**THIS WORK PACKAGE COVERS**

Left-Front Mudflap Replacement, Right-Front Mudflap Replacement, Rear Mudflap Replacement

**INITIAL SETUP**

**Maintenance Level**

Unit

**RPSTL Reference**

Group 140, Figures 6 and 7

**MAC Reference**

Group 140

**Tools and Special Tools**

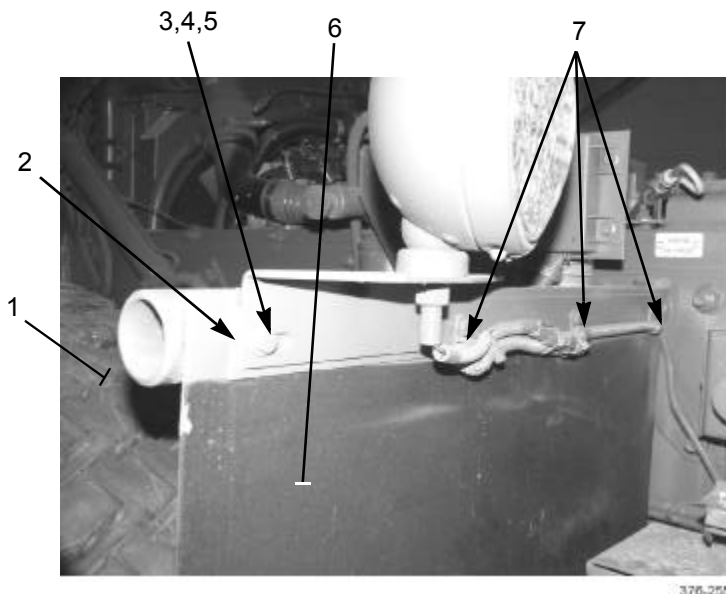
Tool kit, general mechanic's (Item 35, WP 0166 00)

**LEFT-FRONT MUDFLAP REPLACEMENT**

**NOTE**

Floodlight bracket with floodlight is removed as mudflap is removed. Set floodlight and bracket aside.

1. Remove four nuts (3), flatwashers (4), bolts (5), three cable clamps (7), retainer (2), and mudflap (6) from mudflap support bracket (1).



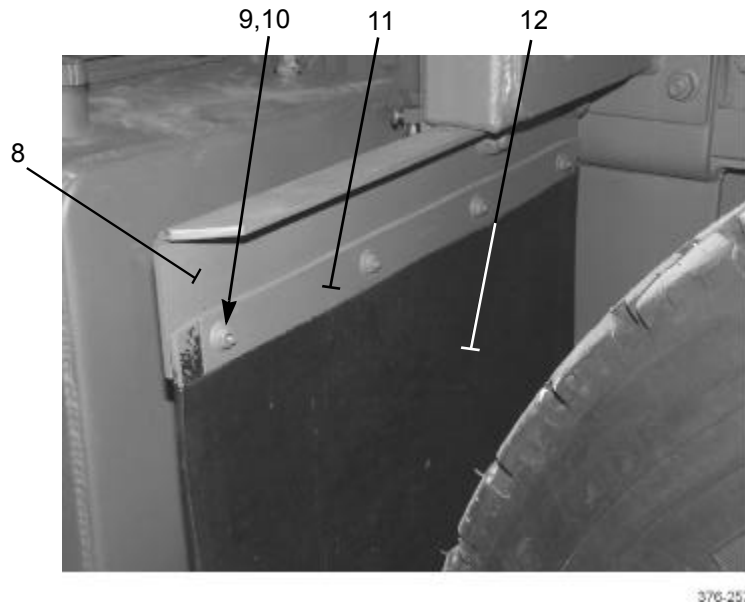
**NOTE**

Floodlight bracket with floodlight is installed as mudflap is installed.

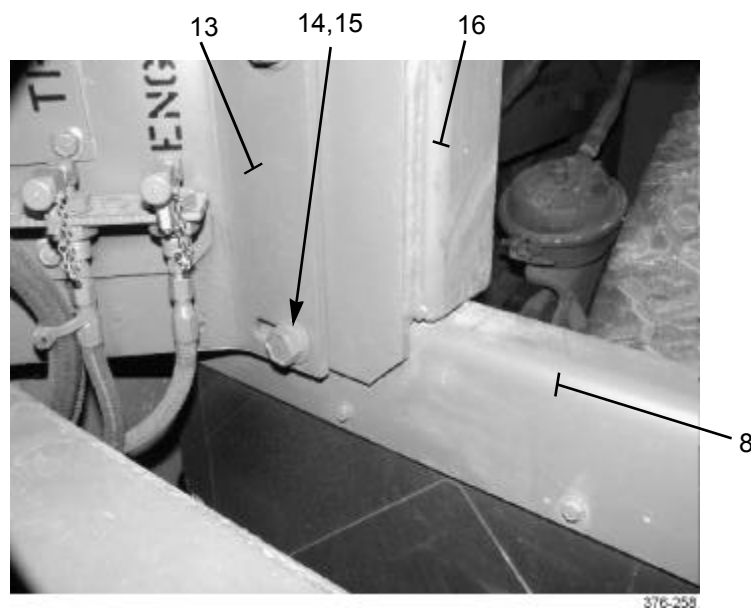
2. Install mudflap (6) and retainer (2) to mudflap support bracket (1) with three cable clamps (7), four bolts (5), flatwashers (4), and nuts (3).

**RIGHT-FRONT MUDFLAP REPLACEMENT**

1. Remove four nuts (9), bolts (10), retainer (11), and mudflap (12) from mudflap support bracket (8).



2. Remove two nuts (14), screws (15), and mudflap support bracket (8) from muffler support post (16) and bracket (13).



3. Install mudflap support bracket (8) to muffler support post (16) and bracket (13) with two screws (15) and nuts (14).
4. Install mudflap (12) and retainer (11) to mudflap support bracket (8) with four bolts (10) and nuts (9).



**REAR MUDFLAP REPLACEMENT**

**NOTE**

Perform the following steps for each of four rear mudflaps.

1. Remove six nuts (20), bolts (21), back-up plate (19), and mudflap (18) from rear fender (17).

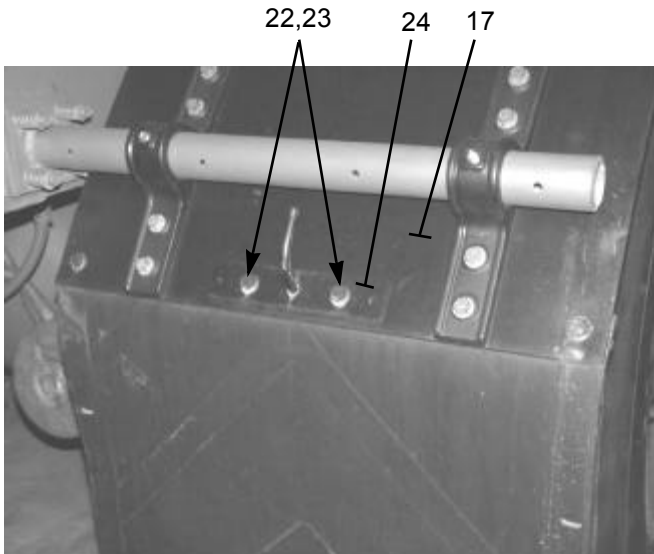


376-258

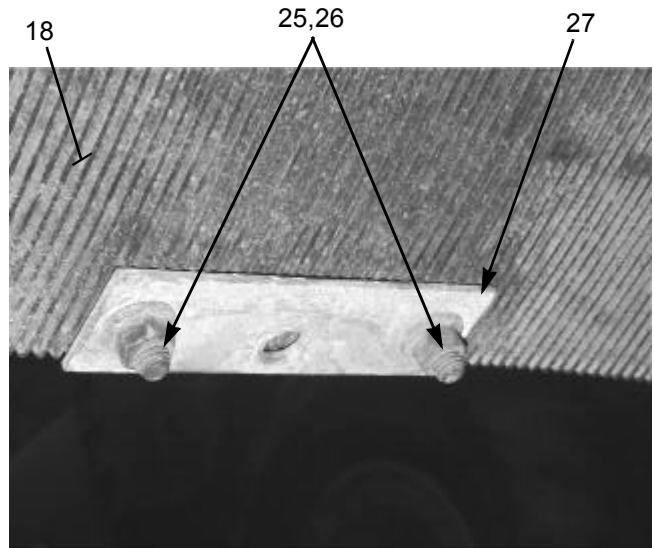
**NOTE**

Perform steps 2 through 5 for two rear mudflaps equipped with retainer hook brackets.

2. Remove two nuts (22), bolts (23), and bracket (24) from rear fender (17).
3. Remove two nuts (25), bolts (26), and bracket (27) from mudflap (18).



360-260



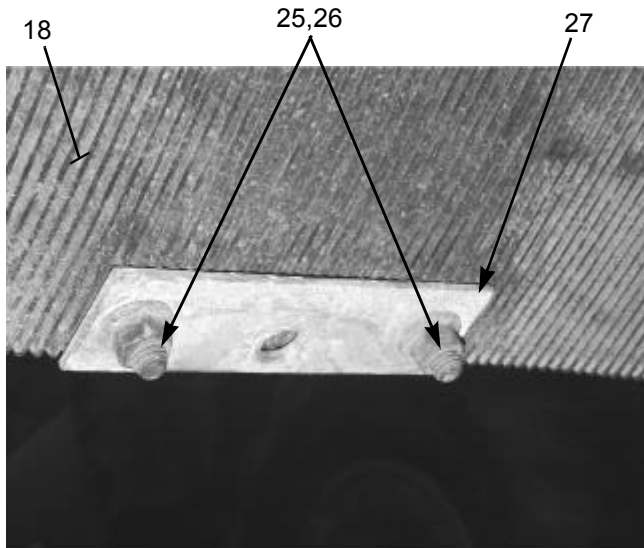
378-753

**MUDFLAPS REPLACEMENT - CONTINUED**

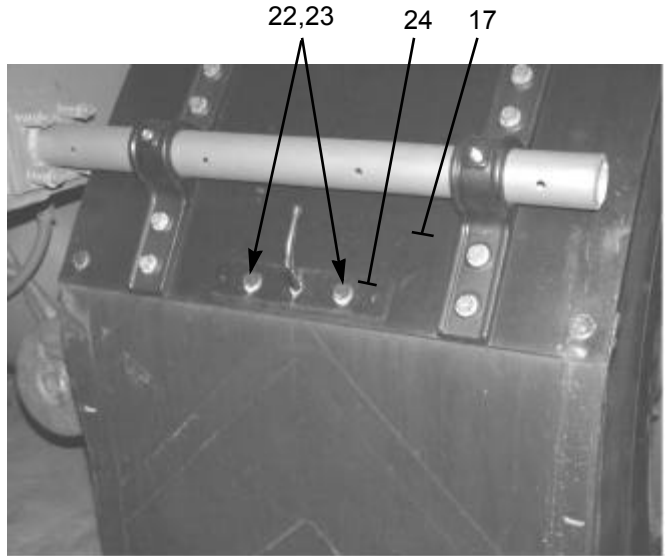
**0048 00**

**REAR MUDFLAP REPLACEMENT - CONTINUED**

4. Install bracket (27) to mudflap (18) with two bolts (26) and nuts (25).
5. Install bracket (24) to rear fender (17) with two bolts (23) and nuts (22).



376-753



360-260

6. Install mudflap (18) and back-up plate (19) to rear fender (17) with six bolts (21) and nuts (20).



376-259

**END OF WORK PACKAGE**

**REAR FENDER REPLACEMENT**

**0049 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 6

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Equipment Condition**

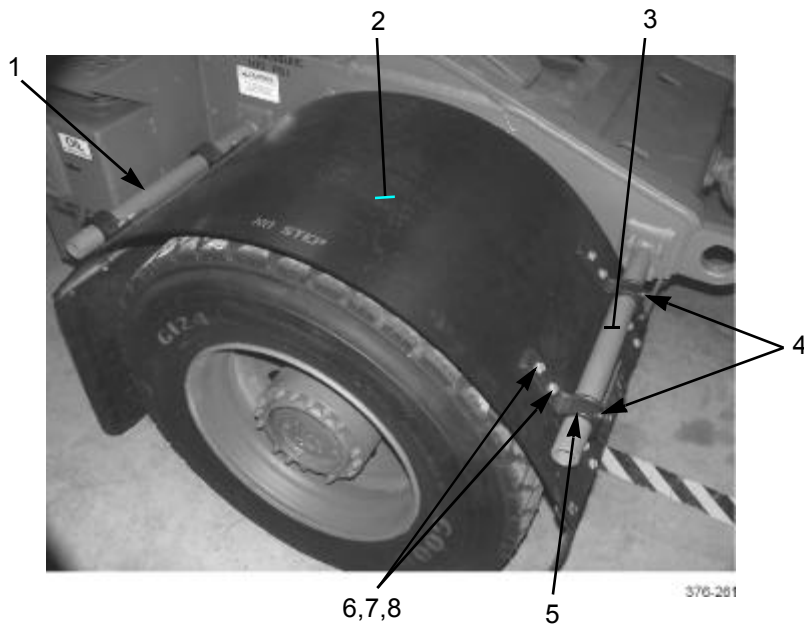
Rear mudflaps removed (WP 0048 00)

**REMOVAL**

**NOTE**

Note position of fender on fender mount brackets for installation.

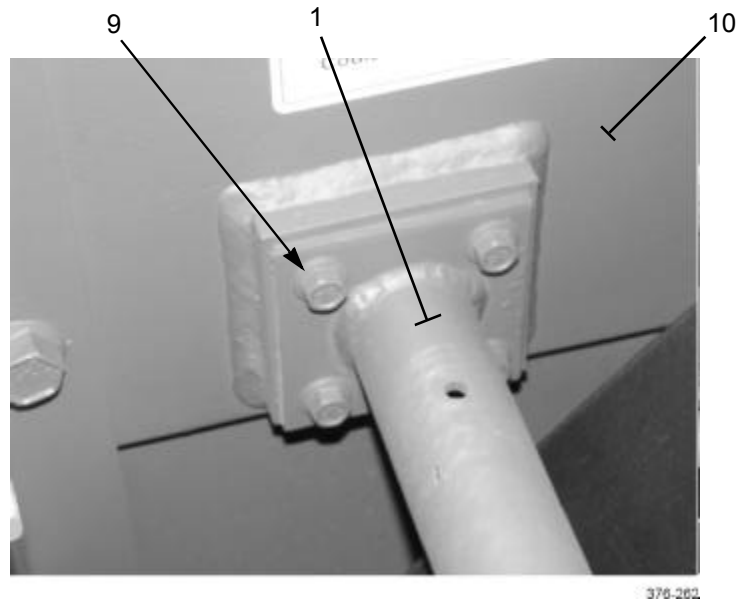
1. Remove four socket head screws (4) and slide fender (2) assembly off front fender mount bracket (1) and rear fender mount bracket (3).
2. Remove 16 nuts (6) and bolts (7), four spacers (8), and four brackets (5) from fender (2).



**REMOVAL - CONTINUED****NOTE**

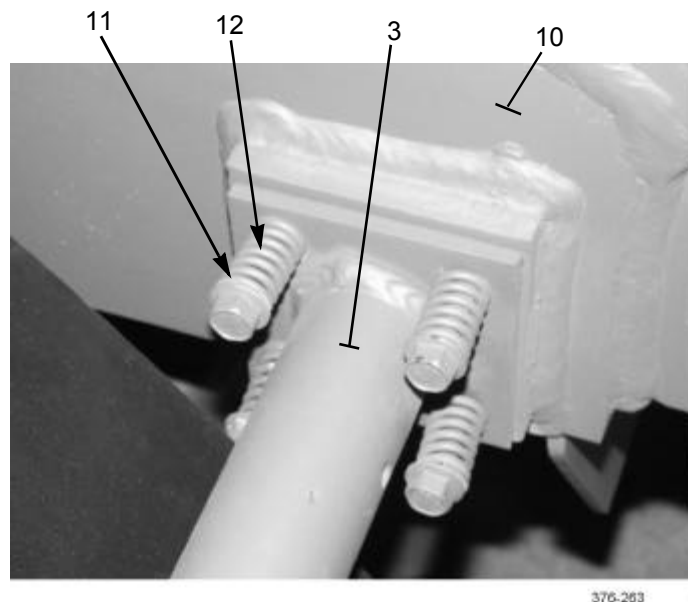
Perform step 3 to remove front fender mount bracket.

3. Remove four bolts (9) and front fender mount bracket (1) from frame (10).

**NOTE**

Perform step 4 to remove rear fender mount bracket.

4. Remove four bolts (11), springs (12), and rear fender mount bracket (3) from frame (10).



**INSTALLATION****NOTE**

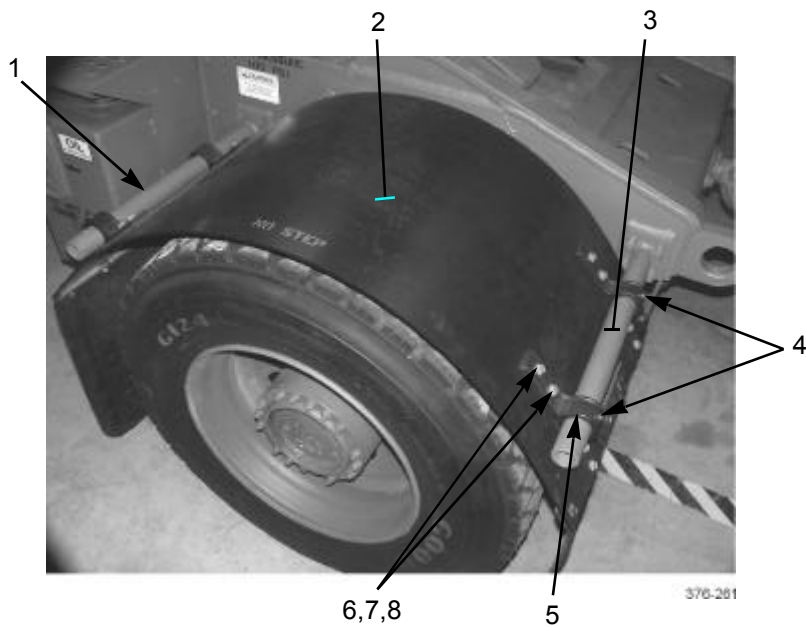
Perform step 1 to install rear fender mount bracket.

1. Install rear fender mount bracket (3) to frame (10) with four springs (12) and bolts (11).

**NOTE**

Perform step 2 to install front fender mount bracket.

2. Install front fender mount bracket (1) to frame (10) with four bolts (9).
3. Install four brackets (5) and four spacers (8) to fender (2) with 16 bolts (7) and nuts (6).
4. Slide fender (2) assembly on front fender mount bracket (1) and rear fender mount bracket (3). Center fender assembly over dual wheels and install four socket head screws (4).



5. Install rear mudflaps (WP 0048 00).

**END OF WORK PACKAGE**

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**HYDRAULIC RESERVOIR STEP REPLACEMENT**

0050 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP****Maintenance Level**

Unit

**RPSTL Reference**

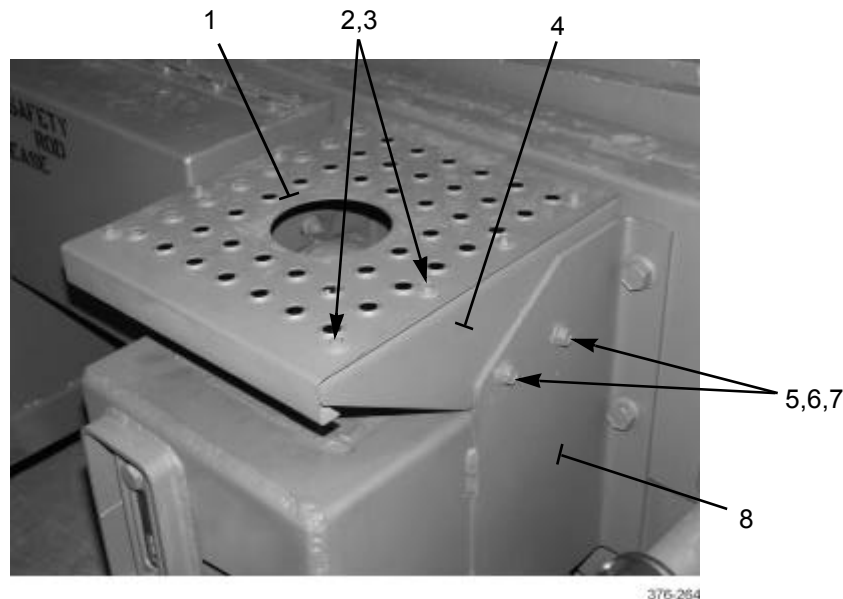
Group 140, Figure 8

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**REMOVAL**

1. Remove four nuts (5), washers (6), bolts (7), and two step brackets (4), with hydraulic reservoir step (1), from hydraulic reservoir (8).
2. Remove eight nuts (2), bolts (3), and hydraulic reservoir step (1) from two step brackets (4).

**INSTALLATION**

1. Install hydraulic reservoir step (1) to two step brackets (4) with eight bolts (3) and nuts (2).
2. Install two step brackets (4), with hydraulic reservoir step (1), to hydraulic reservoir (8) with four bolts (7), washers (6), and nuts (5).

**END OF WORK PACKAGE**

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**MIRRORS REPLACEMENT****0051 00****THIS WORK PACKAGE COVERS**

Spotter Mirror Replacement, Rectangular Mirror Replacement, Mirror Mounting Bracket Replacement

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 9

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Washer, lock (P/N 158-10) (2)

Washer, lock (P/N 361-10)

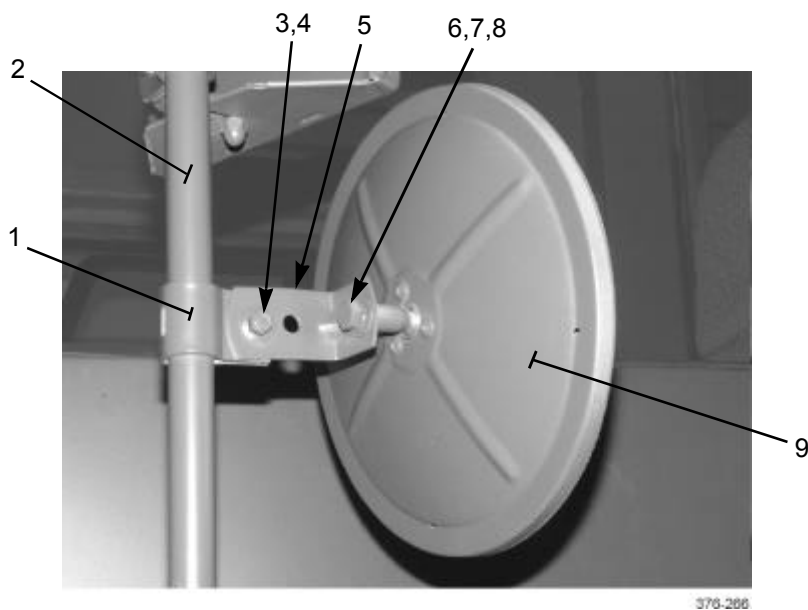
Washer, lock (P/N Z-158-5) (2)

**NOTE**

Mirrors on cab door and on mirror post are replaced the same way.

**SPOTTER MIRROR REPLACEMENT**

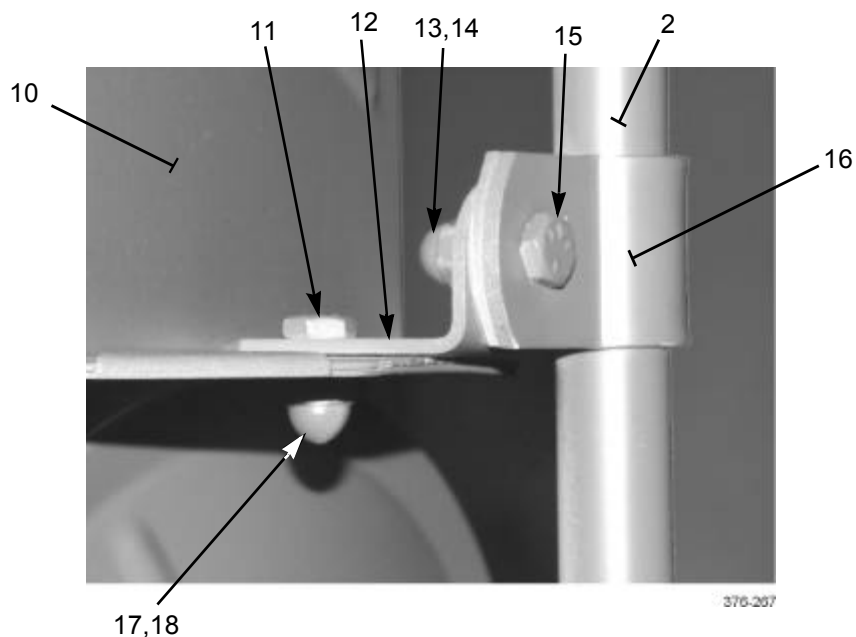
1. Remove screw (6), lockwasher (7), washer (8), and spotter mirror (9) from bracket (5). Discard lockwasher.
2. Remove nut (3), screw (4), angle bracket (5), and 2-piece clamp (1) from mirror mounting bracket (2).
3. Install 2-piece clamp (1) and angle bracket (5) to mirror mounting bracket (2) with screw (4) and nut (3).
4. Install spotter mirror (9) to bracket (5) with washer (8), new lockwasher (7), and screw (6).



376-266

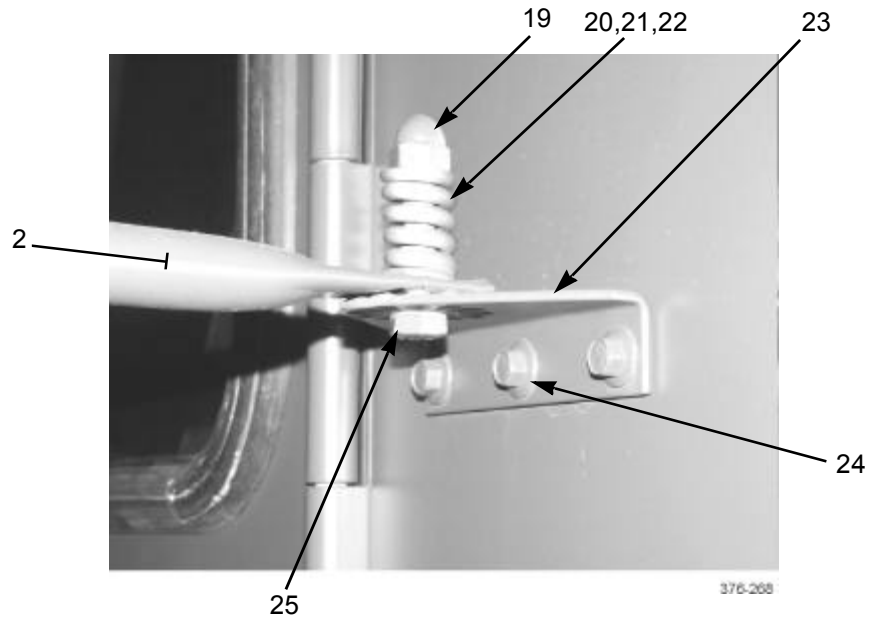
**RECTANGULAR MIRROR REPLACEMENT**

1. At top and bottom of rectangular mirror (10), remove acorn nut (17), lockwasher (18), screw (11), and rectangular mirror from bracket (12). Discard lockwasher.
2. Remove two acorn nuts (13), lockwashers (14), screws (15), brackets (12), and two 2-piece clamps (16) from mirror mounting bracket (2). Discard lockwashers.
3. Install two 2-piece clamps (16) and two brackets (12) to mirror mounting bracket (2) with two screws (15), new lockwashers (14), and acorn nuts (13).
4. Install rectangular mirror (10) to each of two brackets (12) with screw (11), new lockwasher (18), and acorn nut (17).

**MIRROR MOUNTING BRACKET REPLACEMENT**

1. Remove six screws (24) and mirror mounting bracket (2) from vehicle.
2. At top and bottom of mirror mounting bracket (2), remove acorn nut (19), washer (20), spring (21), washer (22), screw (25), and mirror mounting bracket from bracket (23).
3. Install mirror mounting bracket (2) to each of two brackets (23) with screw (25), washer (22), spring (21), washer (20), and acorn nut (19).
4. Install mirror mounting bracket (2) to vehicle with six screws (24).

*MIRROR MOUNTING BRACKET REPLACEMENT - CONTINUED*



END OF WORK PACKAGE

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**SEAT REPLACEMENT**

**0052 00**

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**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 10

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**References**

WP 0066 00

**Equipment Condition**

Wheels blocked

Air system drained (TM 9-2320-312-10)

Seat belt removed (WP 0054 00)

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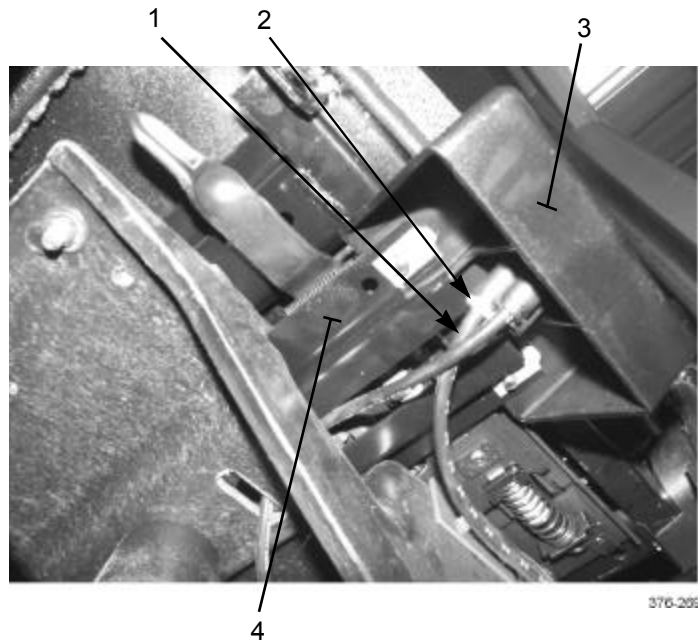
**WARNING**

DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

**REMOVAL****NOTE**

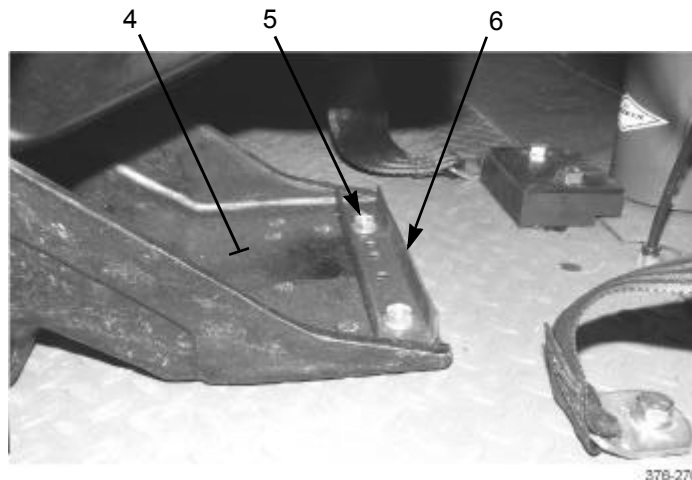
- Fitting of air line is accessible from rear of air control switch at left side of seat.
- Refer to WP 0066 00 for instructions on removing and installing air line to push-in fitting.

1. Disconnect air line (1) from fitting (2) at air control switch (3).
2. Remove air line (1) from seat (4).

**NOTE**

Seat brackets are part of seat.

3. Remove four bolts (5), two seat brackets (6), and seat (4) from floor of cab.



***INSTALLATION***

1. Install seat (4) and two seat brackets (6) to floor of cab with four bolts (5).
2. Position air line (1) to seat (4).
3. Connect air line (1) to fitting (2) at air control switch (3).
4. Start engine (TM 9-2320-312-10) to fully pressurize air system. Check operation of seat.
5. Install seat belt (WP 0054 00).

**END OF WORK PACKAGE**

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**SEAT REPAIR****0053 00**

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**THIS WORK PACKAGE COVERS**

Seat Back and Cushion Assembly: Removal, Installation

Seat Adjuster: Removal, Installation

Air Valve: Removal, Installation

Shock Absorber: Removal, Installation

Air Spring: Removal, Installation

Upper Housing: Removal, Installation

Lower Housing: Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 11

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Compound, sealing, pipe (Item 20, WP 0165 00)

Grease, silicone (Item 33, WP 0165 00)

**Materials/Parts - Continued**

Oil, lubricating (Item 41, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**Personnel Required**

Two

**References**

TM 9-2320-312-10

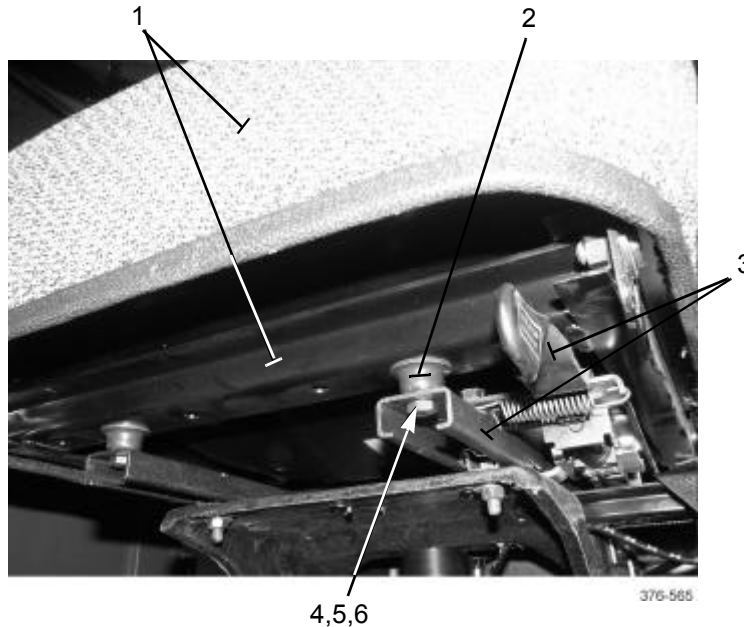
WP 0052 00

WP 0054 00

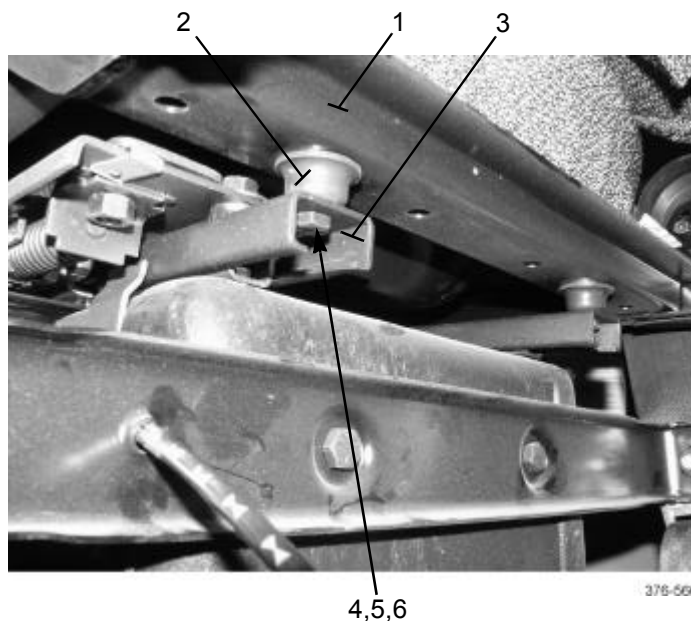
**SEAT BACK AND CUSHION ASSEMBLY REMOVAL****NOTE**

Pull rear of seat cushion upward to access four nuts and washers under seat cushion.

1. With seat adjuster (3) moved fully forward, remove two locknuts (4), washers (5), screws (6), and spacers (2) securing seat back and cushion assembly (1) to front of seat adjuster.



2. With seat adjuster (3) moved to the rear, remove an additional two locknuts (4), washers (5), screws (6), and spacers (2) securing seat back and cushion assembly (1) to rear of seat adjuster. Remove seat back and cushion assembly from seat adjuster.

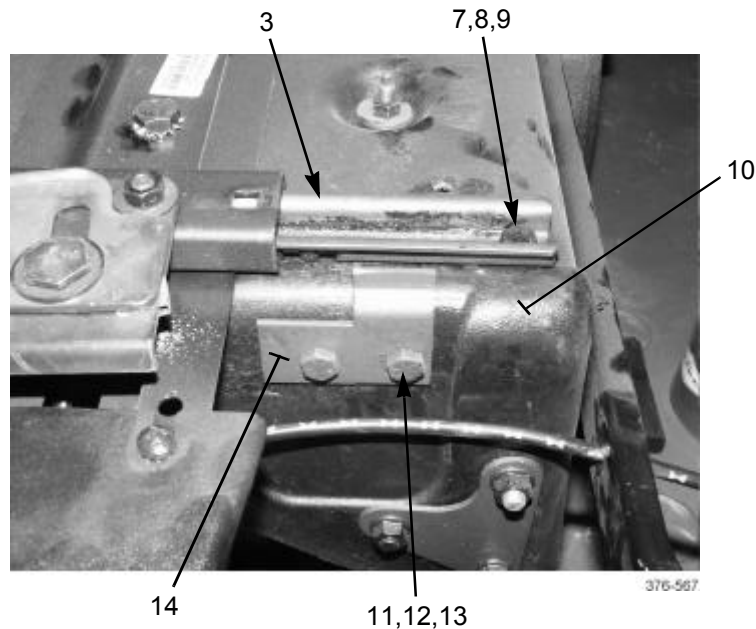


**SEAT BACK AND CUSHION ASSEMBLY INSTALLATION**

1. With seat adjuster (3) at the rear position, install two spacers (2) and seat back and cushion assembly (1) to seat adjuster with two screws (6), washers (5), and locknuts (4).
2. With seat adjuster (3) moved forward, install seat back and cushion assembly (1) to front of seat adjuster with an additional two spacers (2), screws (6), washers (5), and locknuts (4).

**SEAT ADJUSTER REMOVAL**

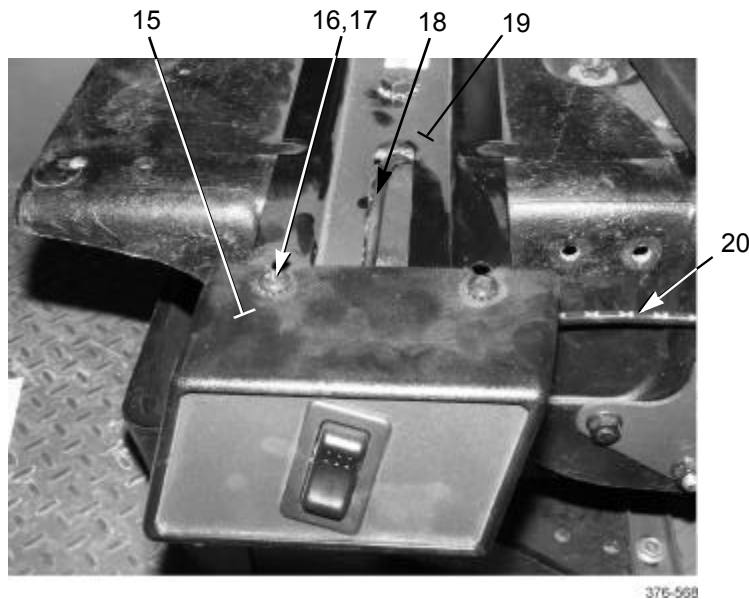
1. Remove seat back and cushion assembly (Refer to *Seat Back and Cushion Assembly Removal*).
2. Remove four locknuts (7), washers (8), screws (9), and left rail of seat adjuster (3) and right rail of seat adjuster from upper housing (10).
3. Remove two locknuts (11), washers (12), screws (13), and stop bracket (14) from left side of upper housing (10).

**SEAT ADJUSTER INSTALLATION**

1. Install stop bracket (14) to left side of upper housing (10) with two screws (13), washers (12), and locknuts (11).
2. Install right rail of seat adjuster (3) and left rail of seat adjuster to upper housing (10) with four screws (9), washers (8), and locknuts (7).
3. Apply grease to seat adjuster rails and slide seat forward and rearward to evenly distribute grease. Wipe clean any excess grease.
4. Install seat back and cushion assembly (Refer to *Seat Back and Cushion Assembly Installation*).

**AIR VALVE REMOVAL**

1. Drain air system (TM 9-2320-312-10).
2. Remove two screws (16) and lockwashers (17) securing valve panel (15) to bracket plate (19). Pull valve panel away from bracket plate for access to two air tubes (18 and 20).



3. Remove two clip nuts (21) from bracket plate (19).

**NOTE**

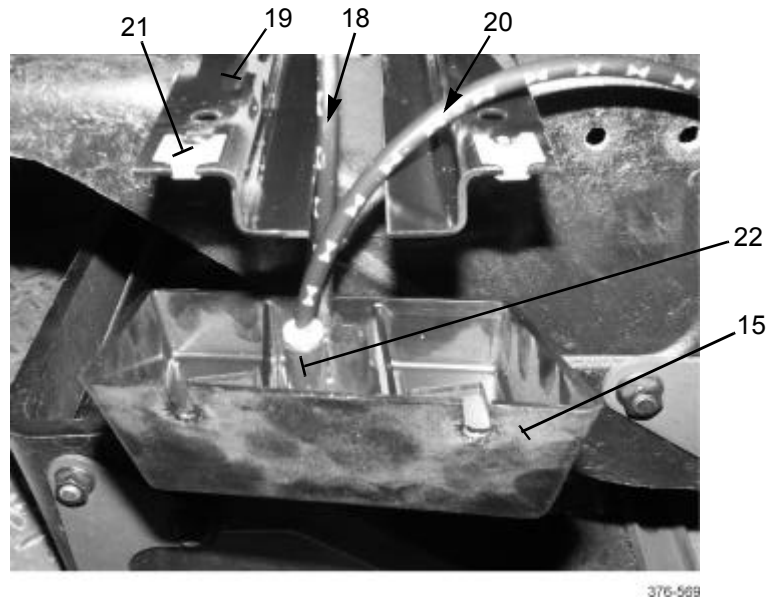
Refer to WP 0066 00 for information on removing and installing air tubes to push-in fittings.

4. Tag and disconnect two air tubes (18 and 20) from air valve (22).

**NOTE**

Note position of air valve in valve panel for installation.

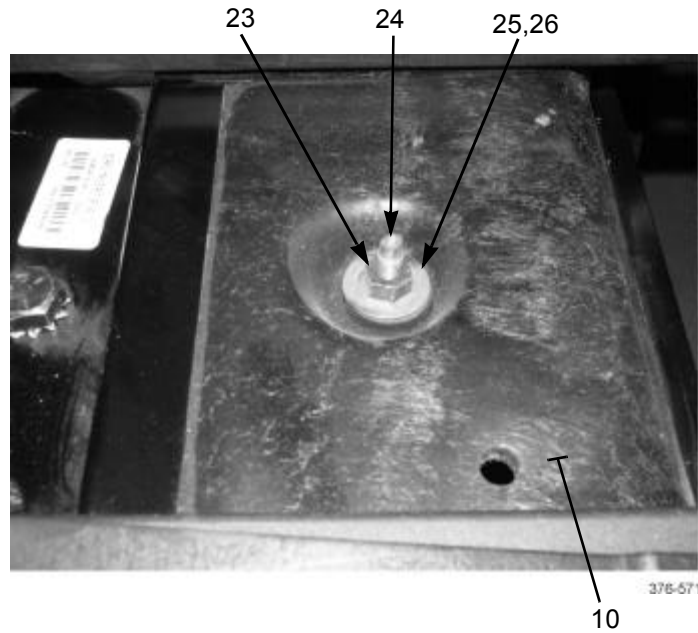
5. Remove air valve (22) from valve panel (15).

**AIR VALVE REMOVAL - CONTINUED****AIR VALVE INSTALLATION**

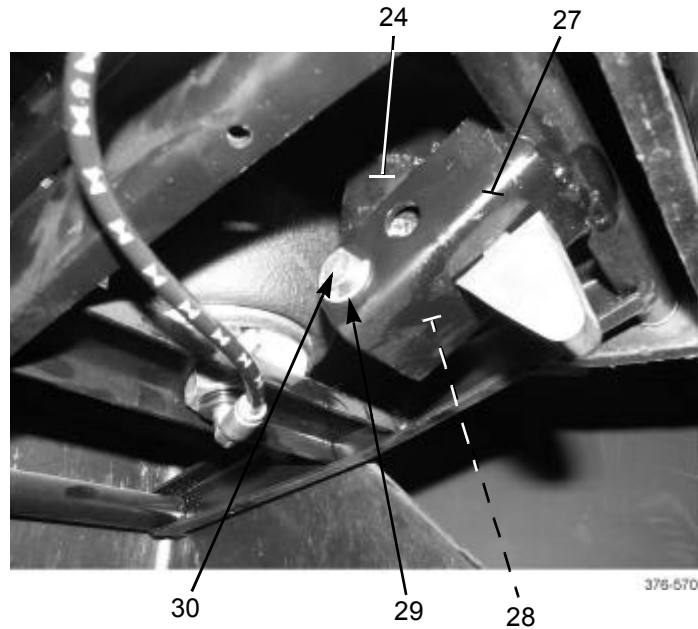
1. Install air valve (22) to valve panel (15).
2. Connect two air tubes (18 and 20) to air valve (22).
3. Install two clip nuts (21) to bracket plate (19).
4. Install valve plate (15) to bracket plate (19) with two lockwashers (17) and screws (16).

**SHOCK ABSORBER REMOVAL**

1. Remove seat from vehicle (WP 0052 00).
2. Remove seat back and cushion assembly (Refer to *Seat Back and Cushion Seat Assembly Removal*).
3. Remove locknut (23), two washers (25), and two rubber bushings (26) securing rod of shock absorber (24) to upper housing (10).



4. Remove retaining ring (29), pivot pin (30), and bearing (28) securing lower end of shock absorber (24) to lower linkage (27).
5. Remove shock absorber (24) from seat suspension.

**SHOCK ABSORBER REMOVAL - CONTINUED****SHOCK ABSORBER INSTALLATION**

1. Position shock absorber (24) to seat suspension.
2. Install lower end of shock absorber (24) and bearing (28) to lower linkage (27) with pivot pin (30) and retaining ring (29).
3. Install rod of shock absorber (24) to upper housing (10) with two rubber bushings (26), two washers (25), and locknut (23).
4. Install seat back and cushion assembly (Refer to *Seat Back and Cushion Seat Assembly Installation*).
5. Install seat (WP 0052 00).

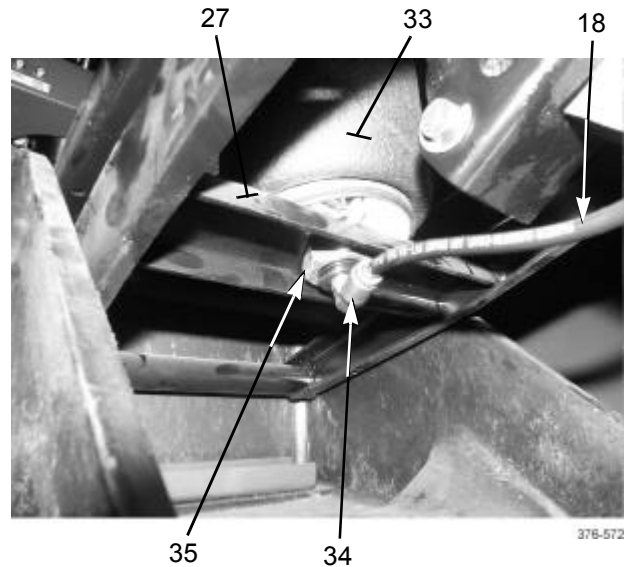
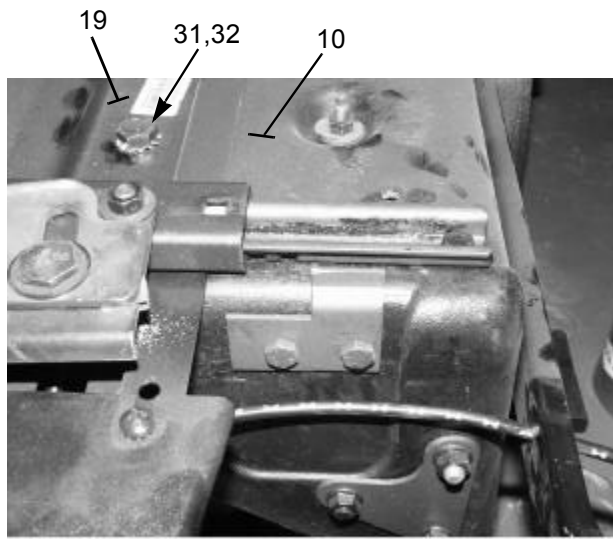
**AIR SPRING REMOVAL**

1. Remove seat from vehicle (WP 0052 00).
2. Remove seat back and cushion assembly (Refer to *Seat Back and Cushion Assembly Removal*).
3. Use wood cribbing to support seat suspension in fully raised position.
4. Use air valve height adjustment lever to release air from air spring (TM 9-2320-312-10).
5. Remove screw (31) and lockwasher (32) securing top of air spring (33) to bracket plate (19) and upper housing (10).

**NOTE**

Refer to WP 0066 00 for information on removing and installing air tube to push-in fitting.

6. Disconnect air tube (18) from elbow (34) at bottom of air spring (33).
7. Remove elbow (34) and nut (35) from air spring (33).
8. Remove air spring (33) from lower linkage (27).

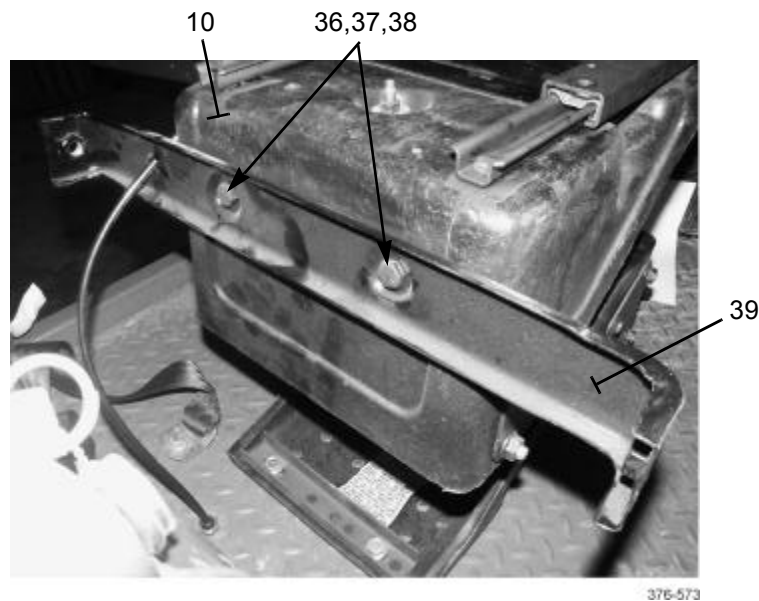
**AIR SPRING INSTALLATION**

1. Position air spring (33) to lower linkage (27) and install nut (35).
2. Apply a thin coat of pipe sealing compound to pipe threads of elbow (34) and install elbow to bottom of air spring (33).
3. Connect air tube (18) to elbow (34).
4. Install top of air spring (33) to upper housing (10) and bracket plate (19) with lockwasher (32) and screw (31).
5. Remove wood cribbing.
6. Install seat back and cushion assembly (Refer to *Seat Back and Cushion Assembly Installation*).
7. Install seat (WP 0052 00).



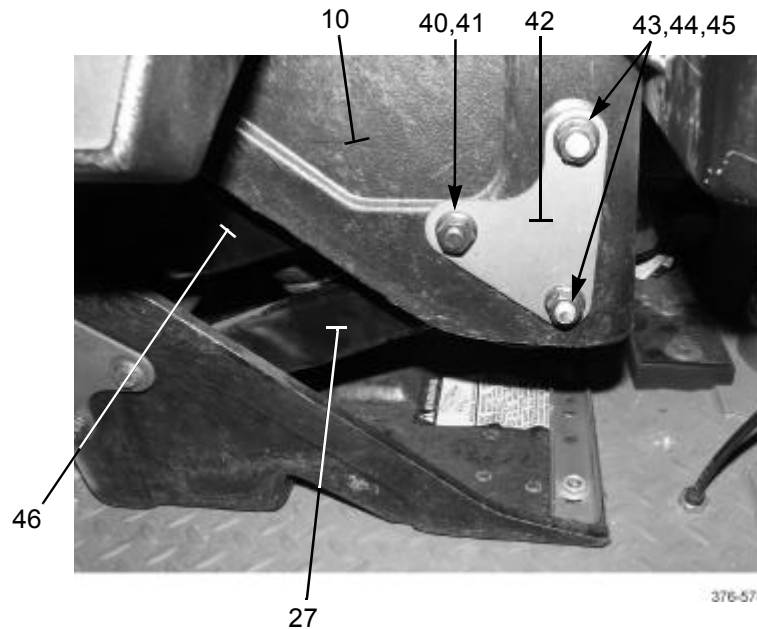
**UPPER HOUSING REMOVAL**

1. Remove seat belt (WP 0054 00).
2. Remove seat from vehicle (WP 0052 00).
3. Remove seat back and cushion assembly (Refer to *Seat Back and Cushion Assembly Removal*).
4. Remove seat adjuster (Refer to *Seat Adjuster Removal*).
5. Remove air valve (Refer to *Air Valve Removal*).
6. Remove shock absorber (Refer to *Shock Absorber Removal*).
7. Remove air spring (Refer to *Air Spring Removal*).
8. Remove two locknuts (36), washers (37), screws (38), and tether bar (39) from rear of upper housing (10).



**UPPER HOUSING REMOVAL - CONTINUED**

9. Remove two locknuts (43) from each side of upper housing (10).
10. Remove two bearing shafts (44) and upper housing (10) from upper linkage (46) and lower linkage (27).
11. Remove two bearings (45) from upper linkage (46) and two bearings (45) from lower linkage (27).
12. Remove locknut (40), screw (41), and reinforcing plate (42) from each side of upper housing (10).

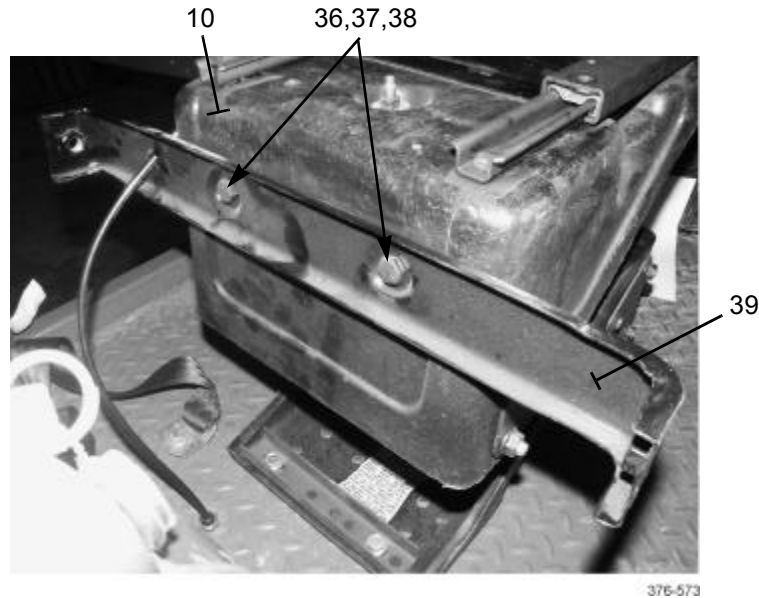
**UPPER HOUSING INSTALLATION**

1. Install reinforcing plate (42) to each side of upper housing (10) with screw (41) and locknut (40).

**NOTE**

Apply a thin coat of lubricating oil of inside of bearing surface before installing bearings. Wipe clean any excess oil.

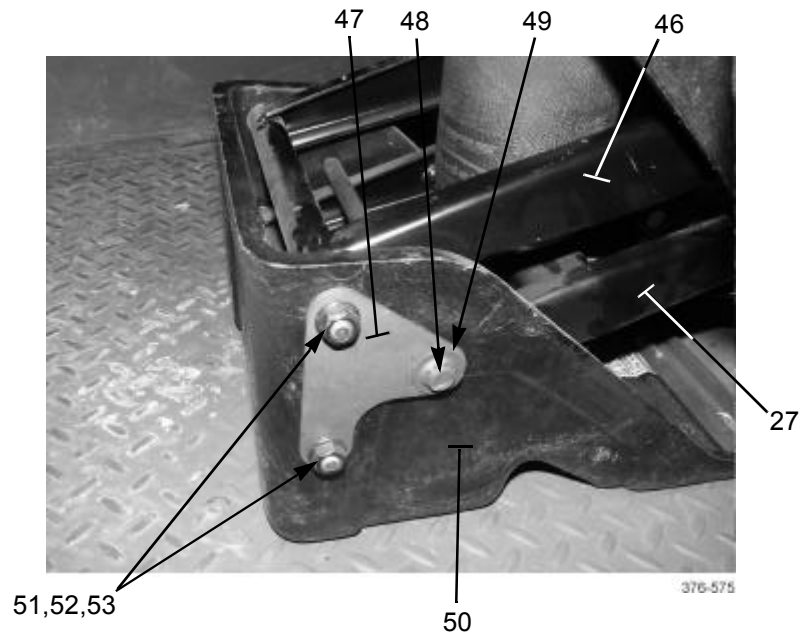
2. Install two bearings (45) to upper linkage (46) and two bearings (45) to lower linkage (27).
3. Install upper linkage (46) and lower linkage (27) to upper housing (10) with two bearing shafts (44).
4. Install two locknuts (43) to each side of upper housing (10).
5. Install tether bar (39) to rear of upper housing (10) with two screws (38), washers (37), and locknuts (36).

**UPPER HOUSING INSTALLATION - CONTINUED**

6. Install air spring (Refer to *Air Spring Installation*).
7. Install shock absorber (Refer to *Shock Absorber Installation*).
8. Install air valve (Refer to *Air Valve Installation*).
9. Install seat adjuster (Refer to *Seat Adjuster Installation*).
10. Install seat back and cushion assembly (Refer to *Seat Back and Cushion Assembly Installation*).
11. Install seat (WP 0052 00).
12. Install seat belt (WP 0054 00).

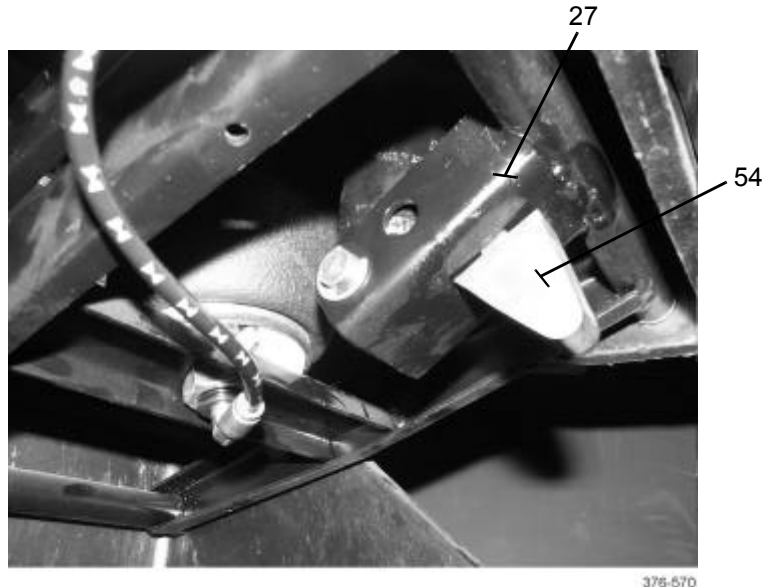
**LOWER HOUSING REMOVAL**

1. Remove seat from vehicle (WP 0052 00).
2. Remove shock absorber (Refer to *Shock Absorber Removal*).
3. Remove air spring (Refer to *Air Spring Removal*).
4. Remove two locknuts (51) from each side of lower housing (50).
5. Remove two bearing shafts (52) and lower housing (50) from upper linkage (46) and lower linkage (27).
6. Remove two bearings (53) from upper linkage (46) and two bearings (53) from lower linkage (27).
7. Remove two press-on retainers (49), rod (48), and two reinforcing plates (47) from lower housing (10).



**LOWER HOUSING REMOVAL - CONTINUED**

8. Remove rubber bumper (54) from lower linkage (27).

**LOWER HOUSING INSTALLATION**

1. Install rubber bumper (54) to lower linkage (27).
2. Install two reinforcing plates (47), rod (48), and two press-on retainers (49) to lower housing (50).

**NOTE**

Apply a thin coat of lubricating oil of inside of bearing surface before installing bearings. Wipe clean any excess oil.

3. Install two bearings (53) to lower linkage (27) and two bearings (53) to upper linkage (46).
4. Install lower linkage (27) and upper linkage (46) to lower housing (50) with two bearing shafts (52).
5. Install two new locknuts (51) to each side of lower housing (50).
6. Install air spring (Refer to *Air Spring Installation*).
7. Install shock absorber (Refer to *Shock Absorber Installation*).
8. Install seat (WP 0052 00).

**END OF WORK PACKAGE**

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**SEAT BELT REPLACEMENT**

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0054 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 10

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

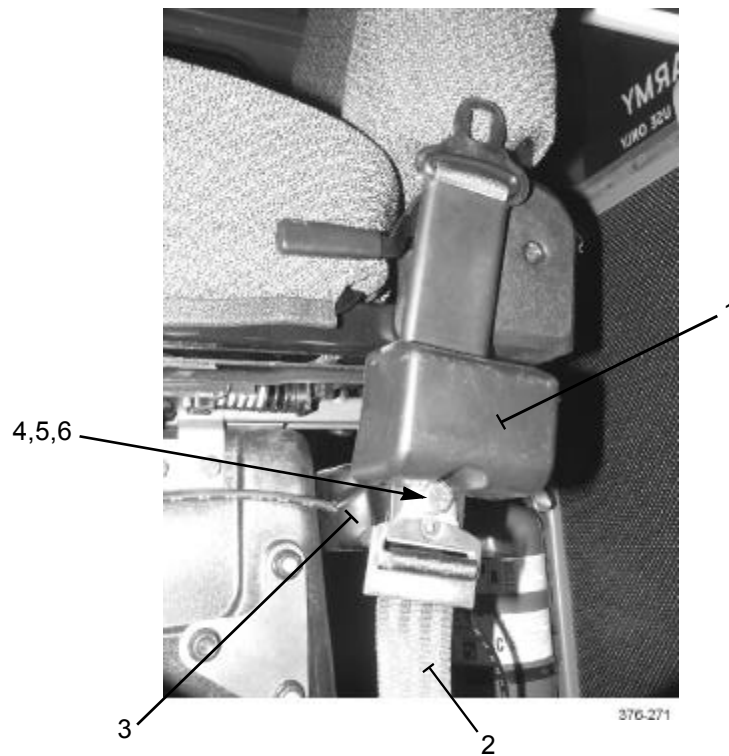
Nut, lock (P/N 21NE070) (2)

Washer, lock (P/N 361-12) (2)

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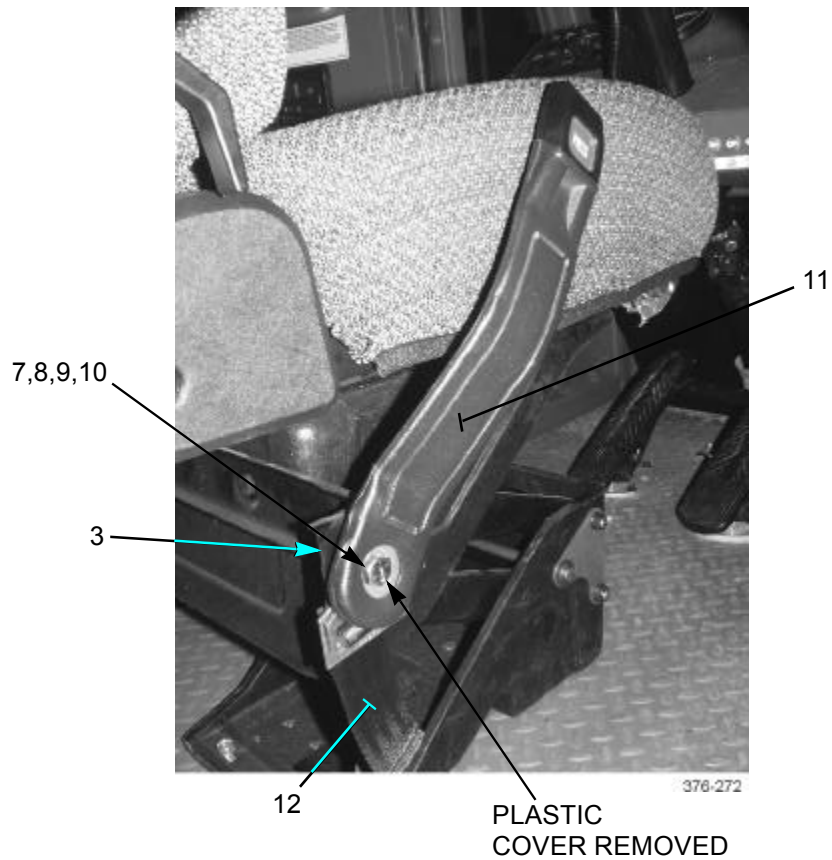
**REMOVAL**

1. Remove locknut (4), bolt (5), lockwasher (6), tether strap (2), and seat belt retractor (1) from bracket (3) on left side of seat. Discard locknut and lockwasher.



**REMOVAL - CONTINUED**

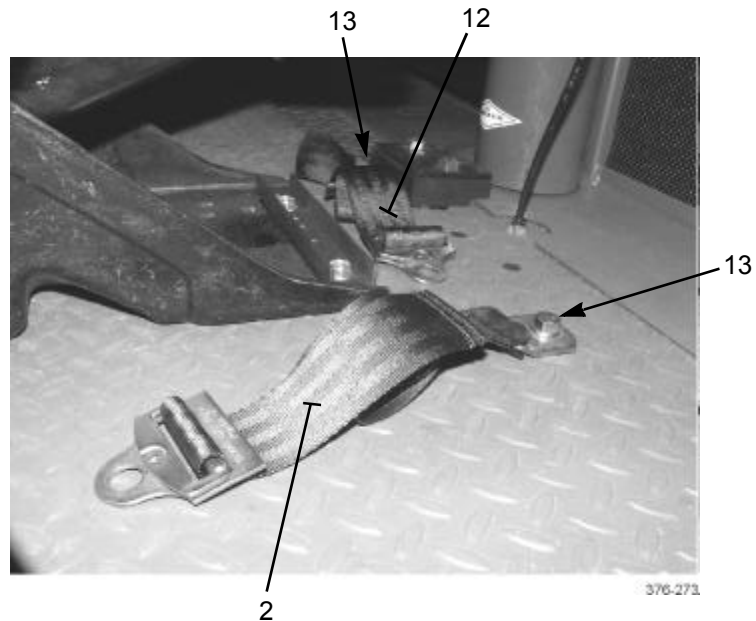
- Remove plastic cover to access mounting hardware. Remove locknut (7), bolt (8), lockwasher (9), tether strap (12), bushing (10), and seat belt buckle (11) from bracket (3) on right side of seat. Discard locknut and lockwasher.





**REMOVAL - CONTINUED**

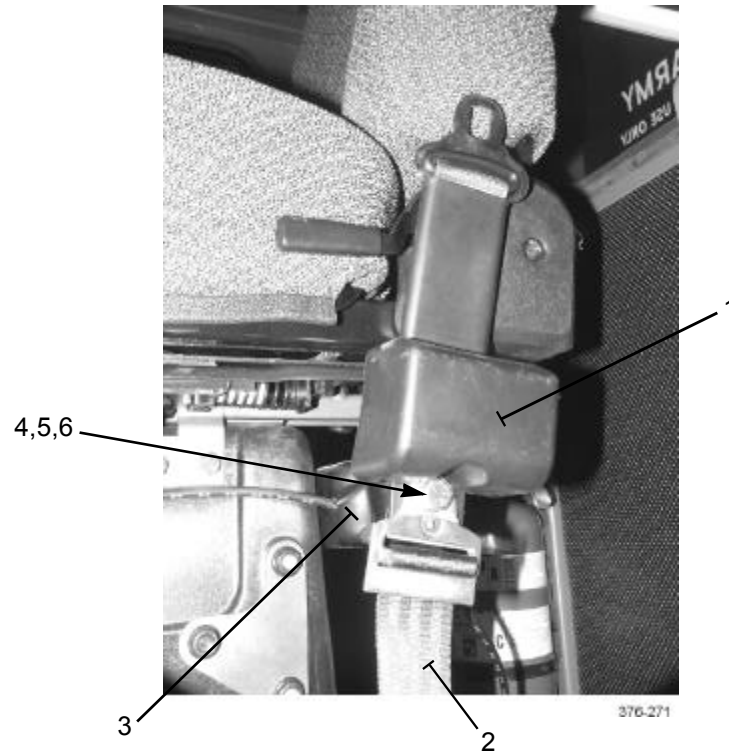
3. Remove two bolts (13) and tether straps (2 and 12) from floor of cab.

**INSTALLATION**

1. Install two tether straps (2 and 12) to floor of cab with two bolts (13).
2. On right side of seat, install seat belt buckle (11), bushing (10), and tether strap (12) to seat bracket (3) with new lock-washer (9), bolt (8), and new locknut (7). Install plastic cover to seat belt buckle.

**INSTALLATION - CONTINUED**

3. On left side of seat, install seat belt retractor (1) and tether strap (2) to seat bracket (3) with new lockwasher (6), bolt (5), and new locknut (4).

**END OF WORK PACKAGE**

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**HEATER/AC CONTROLS REPLACEMENT**

---

0055 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 12

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Equipment Condition**

Battery disconnect switch in OFF position

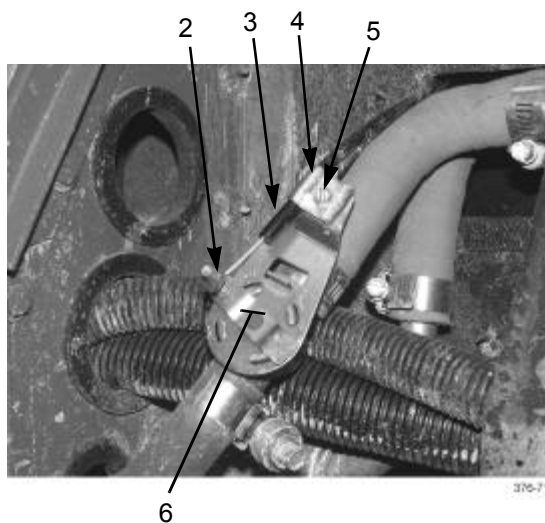
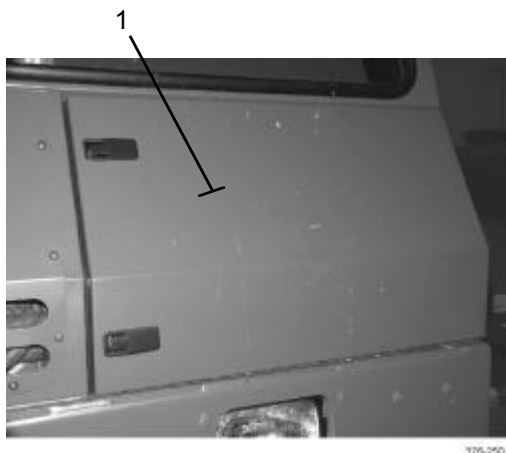
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**NOTE**

- Replacement of heater/AC controls (heater temperature control, defroster/heater control or fresh/recirculate air control) at instrument panel is the same. Replacement differs only in location of connection point of control cable at heater/AC unit.
- This work package describes replacement of heater temperature control. Control on instrument panel connects, by cable, to water shutoff valve of heater/AC unit.

**REMOVAL**

1. Open heater/AC unit access door (1) at front of cab.
2. At valve (6), remove screw (5) from clamp (4) and valve.
3. Remove retainer nut (2) and disconnect cable (3) from shaft of valve (6).



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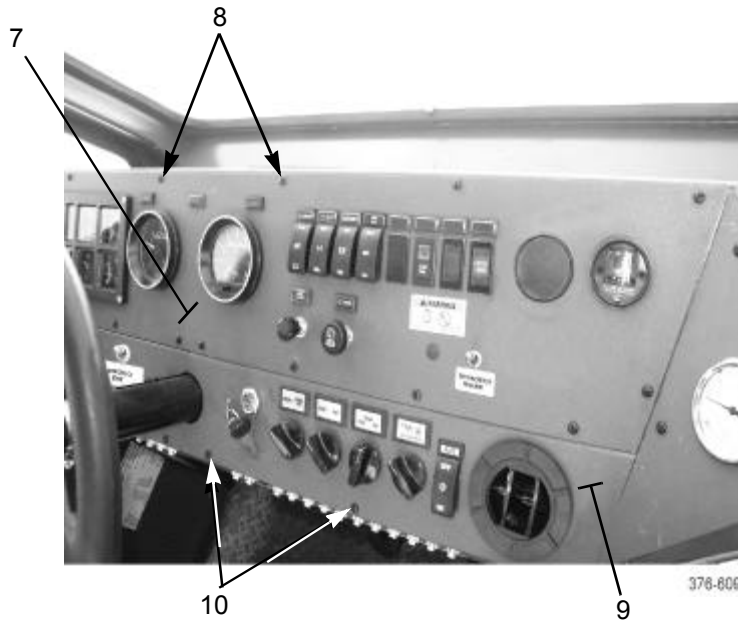
**HEATER/AC CONTROLS REPLACEMENT - CONTINUED**

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0055 00

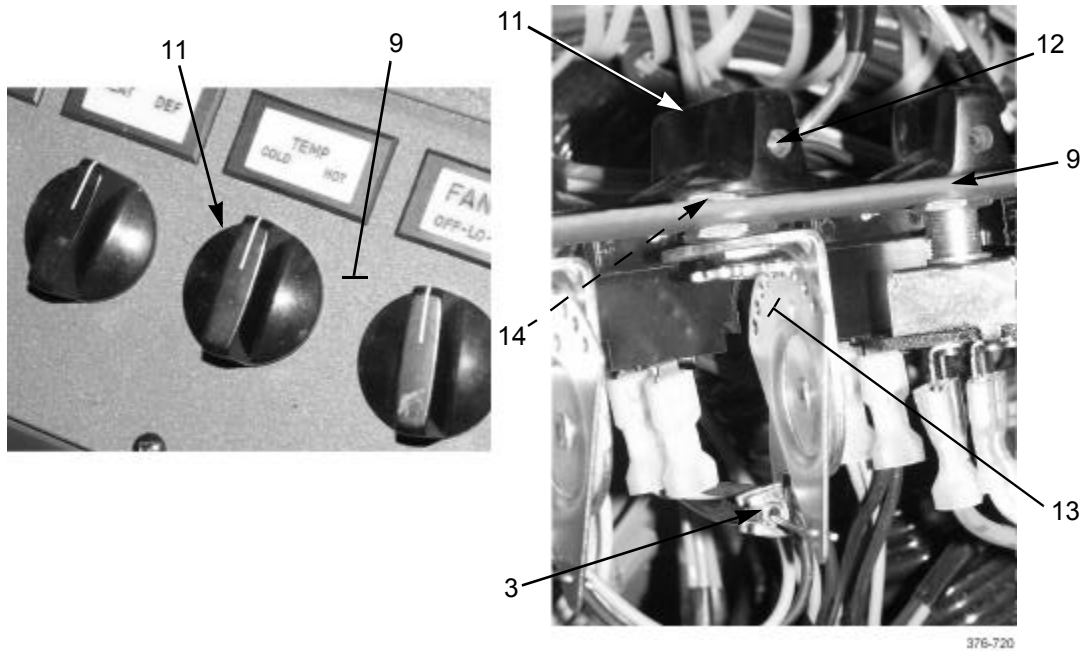
**REMOVAL - CONTINUED**

4. Inside cab, remove 14 screws (8) and top-front instrument panel (7).
5. Remove three screws (10) and lower-right instrument panel (9).

**NOTE**

Note orientation of knob and control at instrument panel to ensure correct installation.

6. Remove setscrew (12) from knob (11). Remove knob from control (13).
7. Remove nut (14) and control (13) and cable (3) assembly from lower-right instrument panel (9).

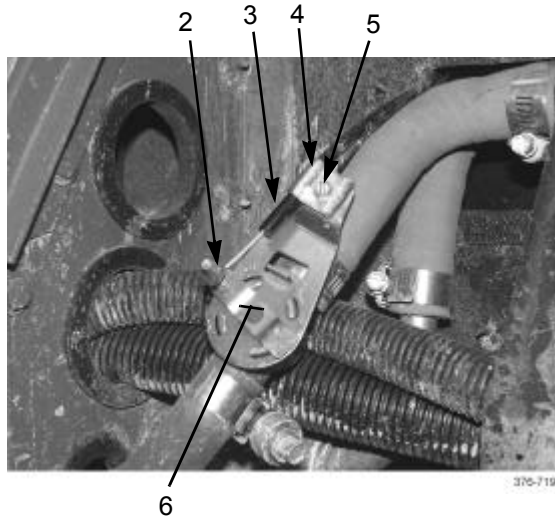
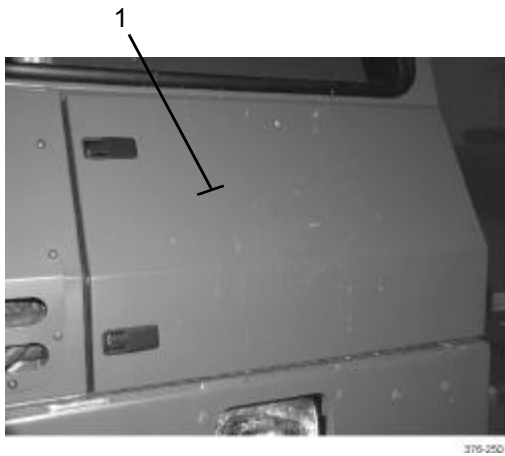
**REMOVAL - CONTINUED****INSTALLATION****NOTE**

Ensure that control and knob are installed in same orientation as noted during removal.

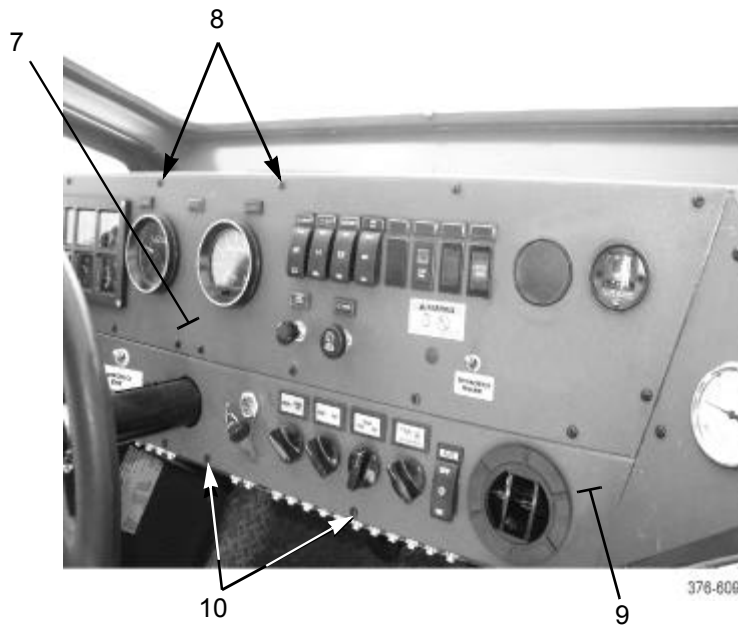
1. Position control (13) and cable (3) assembly at lower-right instrument panel (9) and secure with nut (14).
2. Position knob (11) on control (13), with white indicator line on knob facing up. Install and tighten setscrew (12).
3. Feed cable (3) through opening at front of cab into heater/AC unit enclosure.

**INSTALLATION - CONTINUED**

4. Connect cable (3) to shaft of valve (6) and secure with retainer nut (2).
5. Secure cable (3) to valve (6) with clamp (4) and screw (5).
6. Rotate knob (11) on instrument panel and verify cable (3) functions properly to open and close valve (6).
7. Close heater/AC unit access door (1).



8. Install lower-right instrument panel (9) with three screws (10).
9. Install top-front instrument panel (7) with 14 screws (8).



10. Place battery disconnect switch in ON position.

**END OF WORK PACKAGE**

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**CAB HEATER HOSES REPLACEMENT**

**0056 00**

---

**THIS WORK PACKAGE COVERS**

Removal, Installation

---

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 020, Figure 6

Group 140, Figure 12

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Antifreeze (Item 4 or 5, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**References**

TM 9-2320-312-10

WP 0023 00

**Equipment Condition**

Engine cool

Cab front access panel removed (WP 0046 00)

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**WARNING**

Do NOT replace cab heater hoses unless engine has cooled. Failure to follow this warning may result in serious burns from hot engine coolant.

**REMOVAL**

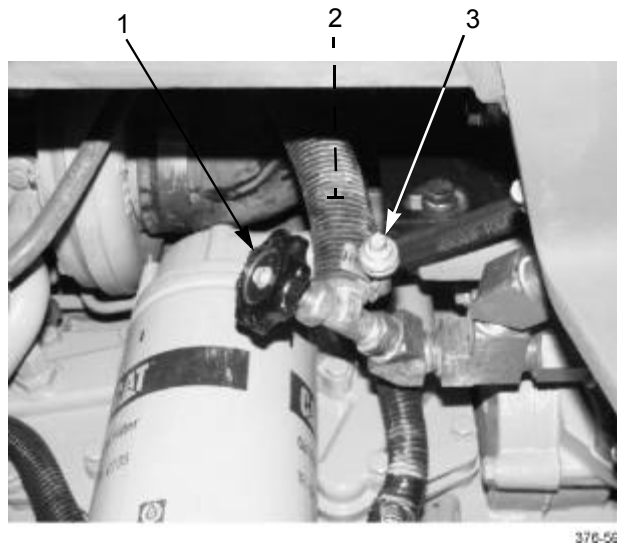
1. At underside of vehicle at right-front of engine, close valve (1).

**WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**NOTE**

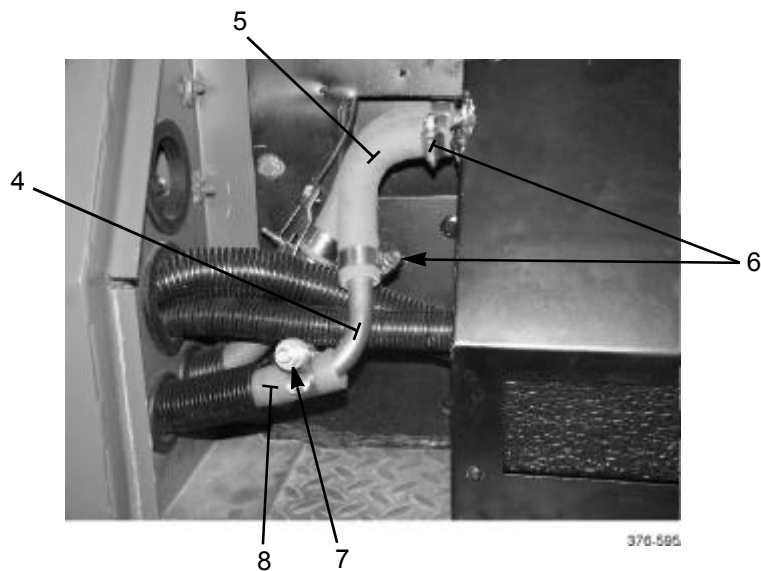
- Use a suitable container to catch residual coolant. Dispose of coolant in accordance with local policy and ordinances. Ensure all spills are cleaned up.
  - Tag hoses to ensure correct installation.
2. Remove spring clamp (3) and disconnect heater hose (2) from valve (1).



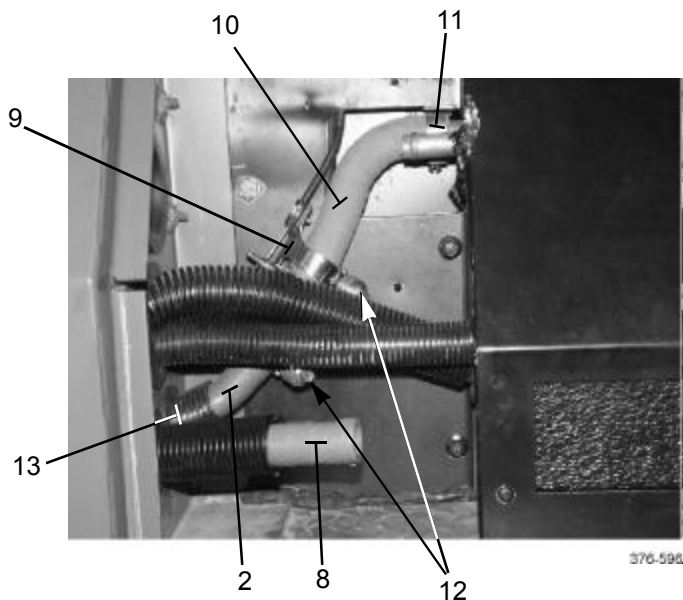


**REMOVAL - CONTINUED**

3. At front of cab, open cab heater/AC unit access door (TM 9-2320-312-10).
4. At cab heater/AC unit, remove two hose clamps (6), spring clamp (7), heater hose (5), and tube (4) from between heater/AC unit and heater hose (8).

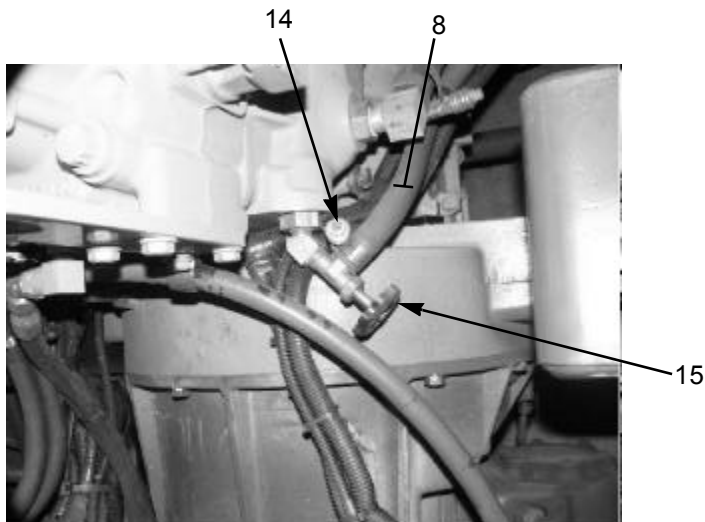


5. Remove hose clamp (11), two spring clamps (12), heater hose (10), and temperature control valve (9) from between heater/AC unit and heater hose (2).
6. At front of vehicle, remove clamps and tiedown straps holding heater hoses (2 and 8) to vehicle. Discard tiedown straps.
7. Tilt cab (TM 9-2320-312-10).
8. Along right frame rail of vehicle, remove additional tiedown straps holding heater hoses (2 and 8) to vehicle. Discard tiedown straps.
9. Remove heater hose (2) from vehicle and remove wire loom (13) from heater hose.



**CAB HEATER HOSES REPLACEMENT - CONTINUED****0056 00****REMOVAL - CONTINUED**

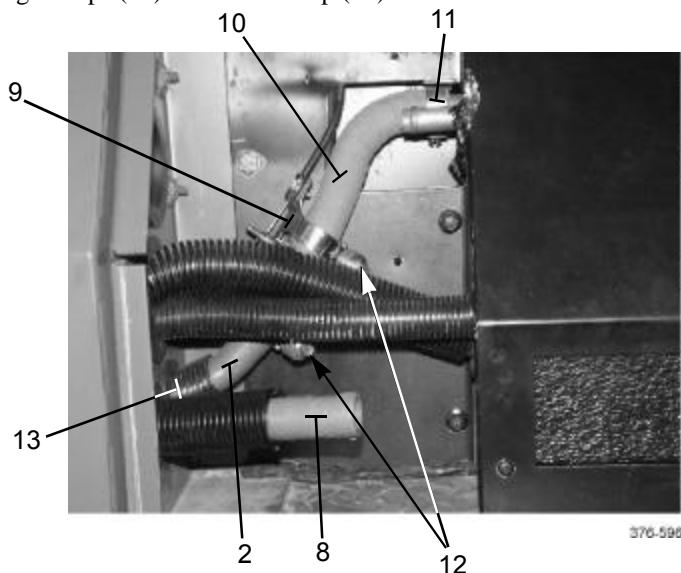
10. At right-rear of engine, close valve (15).
11. Remove spring clamp (14) and disconnect heater hose (8) from valve (15).
12. Remove heater hose (8) from vehicle and remove wire loom from heater hose.



376-597.

**INSTALLATION**

1. Install wire loom to heater hose (8) and position heater hose to vehicle.
2. At right-rear of engine, connect heater hose (8) to valve (15) with spring clamp (14).
3. Open valve (15).
4. Install wire loom (13) to heater hose (2) and position heater hose to vehicle.
5. Along right frame rail of vehicle, install tiedown straps to hold heater hoses (2 and 8) to vehicle.
6. At front of vehicle, install clamps, locknuts, and additional tiedown straps to hold heater hoses (2 and 8) to vehicle.
7. At cab heater/AC unit, install temperature control valve (9) and heater hose (10) between heater hose (2) and cab heater/AC unit with two spring clamps (12) and hose clamp (11).



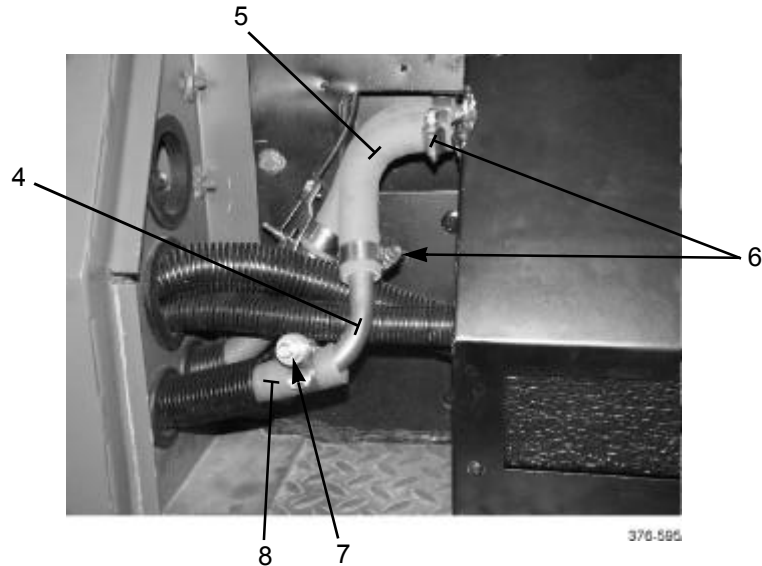
376-598.

**CAB HEATER HOSES REPLACEMENT - CONTINUED**

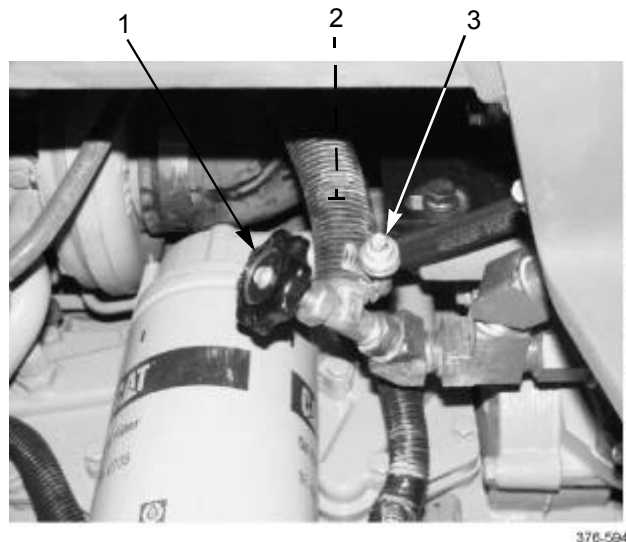
**0056 00**

**INSTALLATION - CONTINUED**

8. Install tube (4) and heater hose (5) between heater hose (8) and cab heater/AC unit with spring clamp (7) and two hose clamps (6).
9. Close cab heater/AC unit access door (TM 9-2320-312-10).



10. At underside of vehicle at right-front of engine, connect heater hose (2) to valve (1) with spring clamp (3).
11. Open valve (3).



12. Check coolant level and add antifreeze as required (WP 0023 00).
13. Lower cab (TM 9-2320-312-10).
14. Install cab front access panel (WP 0046 00).

**END OF WORK PACKAGE**

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**AIR CONDITIONING (AC) SYSTEM INSPECTION AND LEAK TEST****0057 00****THIS WORK PACKAGE COVERS**

Inspection, Leak Test

**INITIAL SETUP****Maintenance Level**

Unit

**Tools and Special Tools**

Leak detector, refrigerant (Item 20, WP 0166 00)

**MAC Reference**

Group 140

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

**WARNING**

- Liquid refrigerant, when exposed to air, quickly evaporates and will freeze skin or eye tissue. Use care to prevent refrigerant from touching your skin or eyes. Serious injury or blindness may result if you come in contact with liquid refrigerant.
- Refrigerant R-134a air conditioning systems should not be leak tested with compressed air. Combustible mixtures of R-134a and air may form, resulting in fire or explosion. Failure to follow this warning may result in injury to personnel.

**INSPECTION****NOTE**

- Refrigerant is odorless. It may leak away and not be noticed until air conditioning system stops cooling. All vehicle refrigerant systems lose some refrigerant depending on the condition of the system. High loss rates indicate a need to locate and repair the source of leak.
  - Leaks are most often found at hose connections to the compressor and at fittings and joints. Refrigerant can be lost through hose permeation if unapproved replacement hoses are installed.
1. Inspect air conditioning system for lubricant leakage, corrosion, and damage to hoses and components.
  2. Inspect the lowest point of hoses and fittings for lubricant leakage that may collect and indicate a leak above.

**LEAK TEST**

1. Use a leak detector, in accordance with manufacturer's instruction manual, to check for leaks at hose connections, fittings, and air conditioning components. If leaks are found, notify Direct Support Maintenance.
2. If no leaks are found, lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 12

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Adhesive (Item 1, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**References**

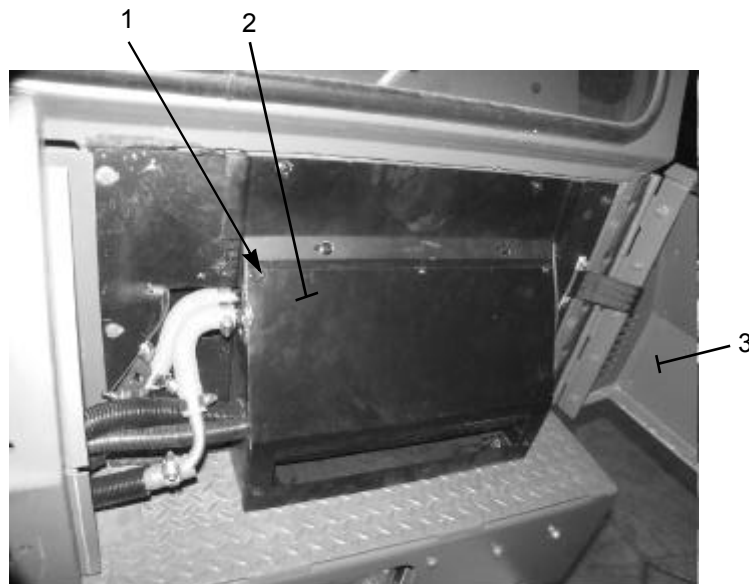
TM 9-2320-312-10

**Equipment Condition**

Battery disconnect switch in OFF position

**REMOVAL**

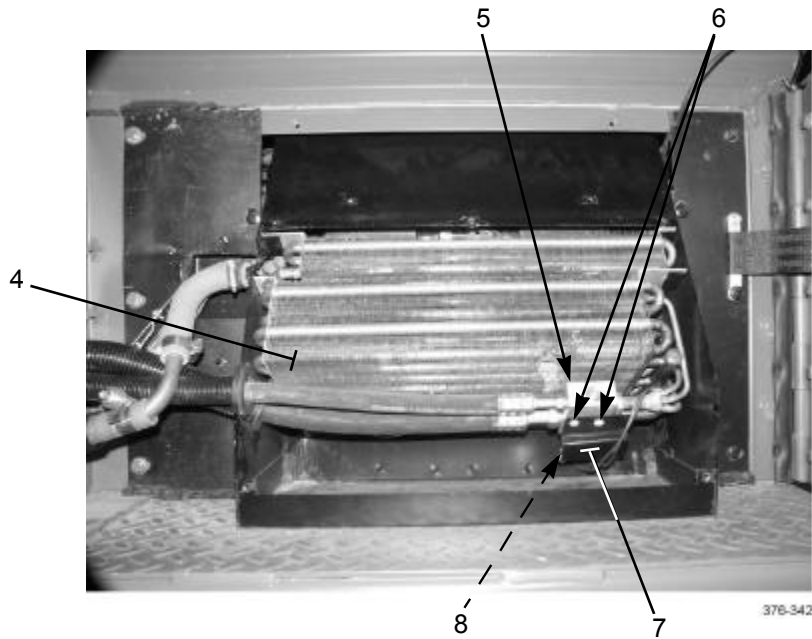
1. Open heater/AC unit access door (3) at front of cab.
2. Remove five screws (1) and front panel (2) from heater/AC unit.



378-341

**REMOVAL - CONTINUED**

3. Gently pull out on evaporator (4) to gain access to two screws (6).
4. Remove two screws (6) and mounting plate (7) with switch (8) from expansion valve (5).



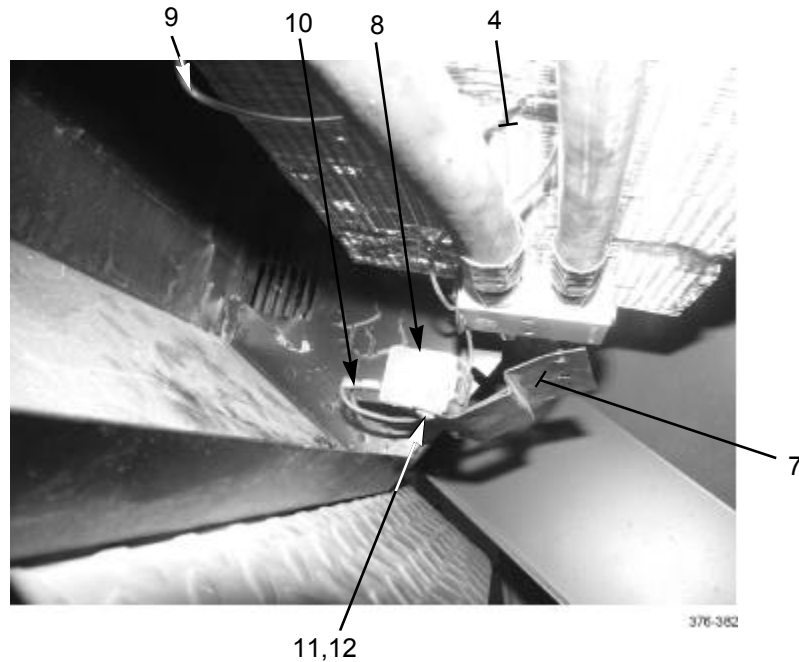
5. Tag and disconnect two heater/AC unit connectors (10) from switch (8).

**NOTE**

Note how deep tube is installed in evaporator.

6. Remove switch sensor tube (9) from evaporator (4).
7. Remove two nuts (11), screws (12), and switch (8) from mounting plate (7).



**REMOVAL - CONTINUED****INSTALLATION**

1. Install switch (8) to mounting plate (7) with two screws (12) and nuts (11).

**CAUTION**

Use care when installing tube in evaporator. Using too much force will damage tube or evaporator coil fins.

2. Insert sensor tube (9) in evaporator (4). Tube must be in contact with an evaporator coil fin and inserted to a sufficient depth as noted in removal.
3. Connect two heater/AC unit connectors (10) to switch (8).

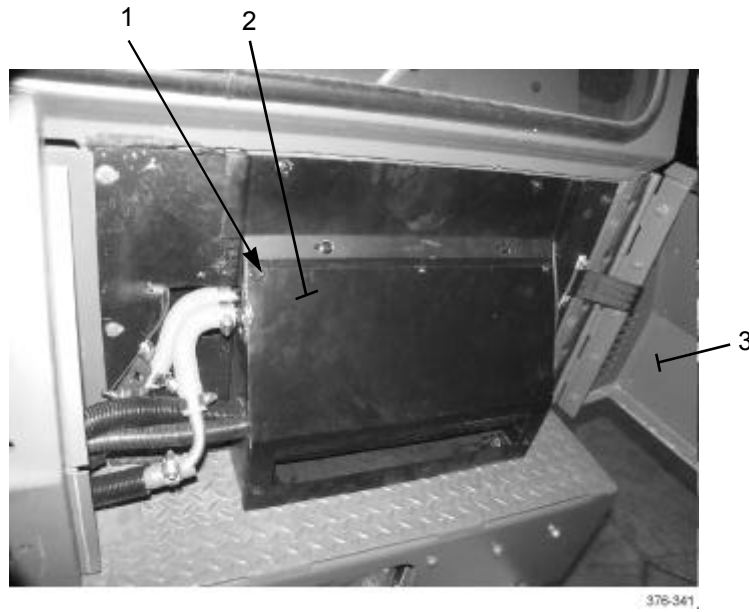
**NOTE**

Apply loctite adhesive to screws before they are installed.

4. Position mounting plate (7) with switch (8) at expansion valve (5). Install two screws (6).
5. Gently push in on evaporator (4) to return it to original position in heater/AC unit housing.
6. Place battery disconnect switch in ON position. Check operation of air conditioning system, to ensure fan turns on as required (TM 9-2320-312-10).

**INSTALLATION - CONTINUED**

7. Install front panel (2) to heater/AC unit with five screws (1).
8. Close heater/AC unit access door (3).

**END OF WORK PACKAGE**

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**WINDSHIELD WASHER RESERVOIR MAINTENANCE**

**0059 00**

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**THIS WORK PACKAGE COVERS**

Reservoir and Pump Unit: Removal, Installation  
 Windshield Washer Hoses: Removal, Installation

---

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figures 18 and 19

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Compound, cleaning, windshield (Item 14, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Wire, non-electrical (Item 66, WP 0165 00)

Nut, lock (P/N 21NE048) (4)

**Personnel Required**

Two (washer hoses replacement)

**References**

WP 0046 00

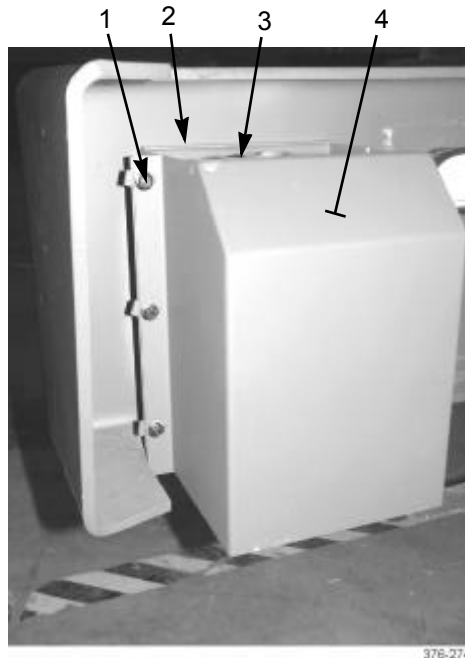
---

**RESERVOIR AND PUMP UNIT REMOVAL**

**NOTE**

Remove and discard tiedown straps as required. Use new tiedown straps on installation.

1. Place battery disconnect switch in OFF position.
2. Remove six screws (1) and cover (4) from bracket (2) of reservoir (3).



376-274

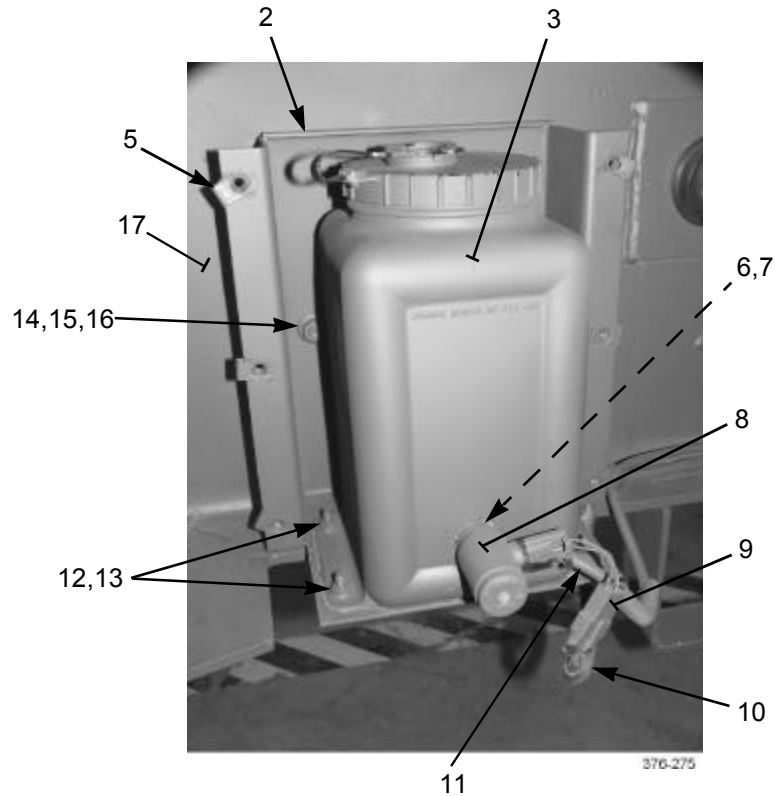
**RESERVOIR AND PUMP UNIT REMOVAL - CONTINUED**

3. Remove six clip-on nuts (5) from bracket (2).
4. Disconnect connector (9) of pump unit (8) from wiring harness connector (10).
5. Remove four nuts (12), screws (13), and reservoir (3) from bracket (2).
6. Remove hose (11) from pump unit (8).
7. Empty reservoir by pouring windshield cleaning compound into a suitable container. Retain for reuse.
8. Remove plastic retainer (6), grommet (7), and pump unit (8) from reservoir (3).

**NOTE**

Perform step 9 to remove bracket from rear of front bumper.

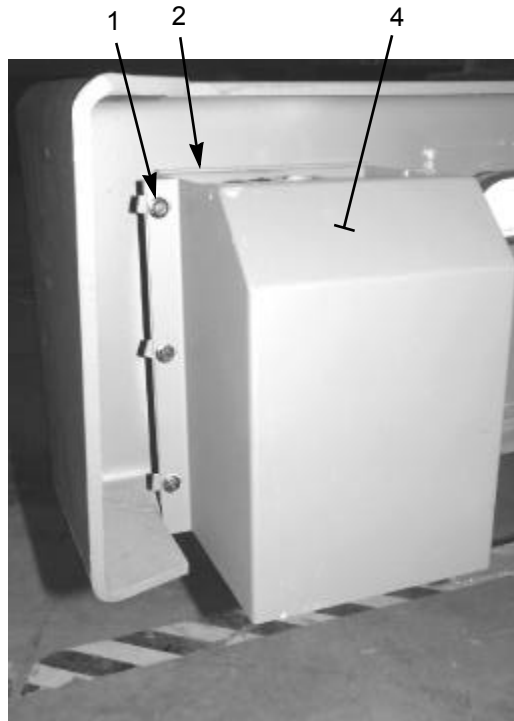
9. Remove two nuts (14), screws (15), washers (16), and bracket (2) from bumper (17).



**RESERVOIR AND PUMP UNIT INSTALLATION****NOTE**

Perform step 1 to install bracket to rear of front bumper.

1. Install bracket (2) to bumper (17) with two washers (16), screws (15), and nuts (14).
2. Install pump unit (8) to reservoir (3):
  - a. Insert grommet (7) into hole of reservoir (3) and attach plastic retainer (6) from inside reservoir.
  - b. Screw pump unit (8) into retainer (6) five full turns or until sealed water tight.
3. Install hose (11) to pump unit (8).
4. Install reservoir (3) to bracket (2) with four screws (13) and nuts (12).
5. Connect connector (9) of pump unit (8) to wiring harness connector (10).
6. Install six slip-on nuts (5) to bracket (2).
7. Install cover (4) to bracket (2) with six screws (1).



376-274

8. Fill windshield washer reservoir with windshield cleaning compound.
9. Place battery disconnect switch in ON position.

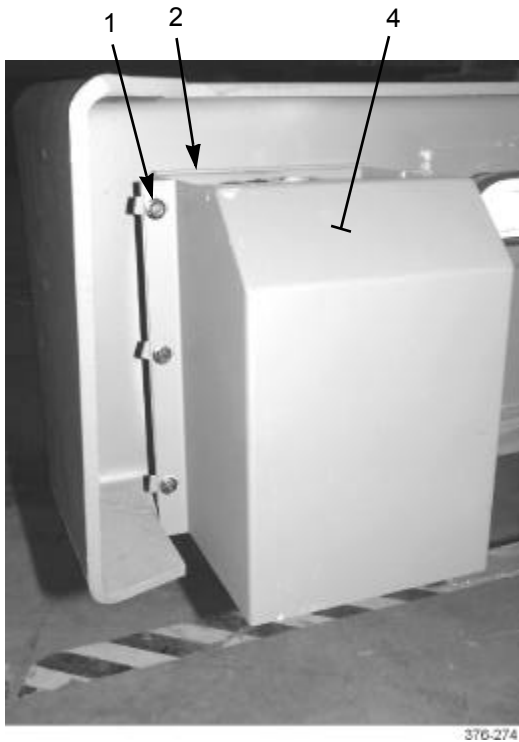
**WINDSHIELD WASHER HOSES REMOVAL**

1. Remove six screws (1) and cover (4) from bracket (2).

**NOTE**

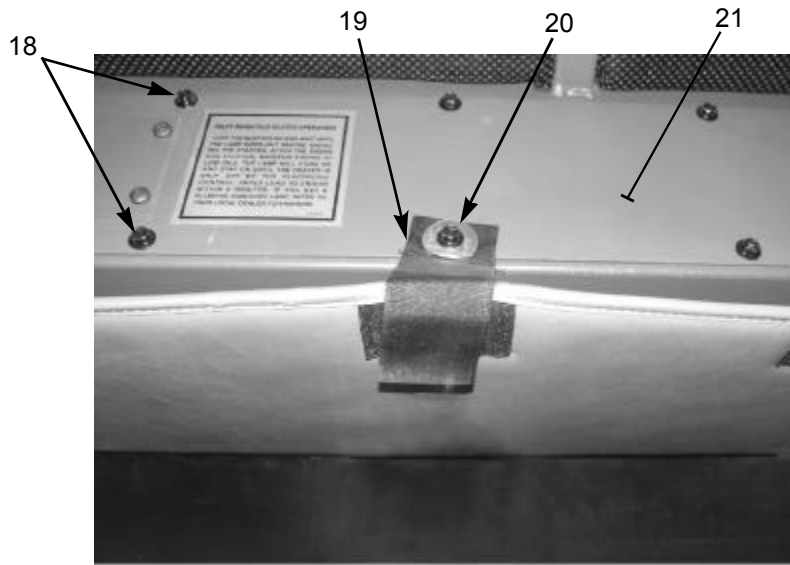
Place a suitable container under pump unit to catch any draining windshield cleaning compound. Ensure all spills are cleaned up.

2. Remove hose (11) from pump unit (8).



**WINDSHIELD WASHER HOSES REMOVAL - CONTINUED**

3. Remove cab front access panel (WP 0046 00).
4. Inside cab, remove 14 screws (18), washer (20), sun visor strap (19), and access panel (21).



376-488

5. Remove hose (11) from elbow fitting (22) to left of windshield wiper motor.



376-666

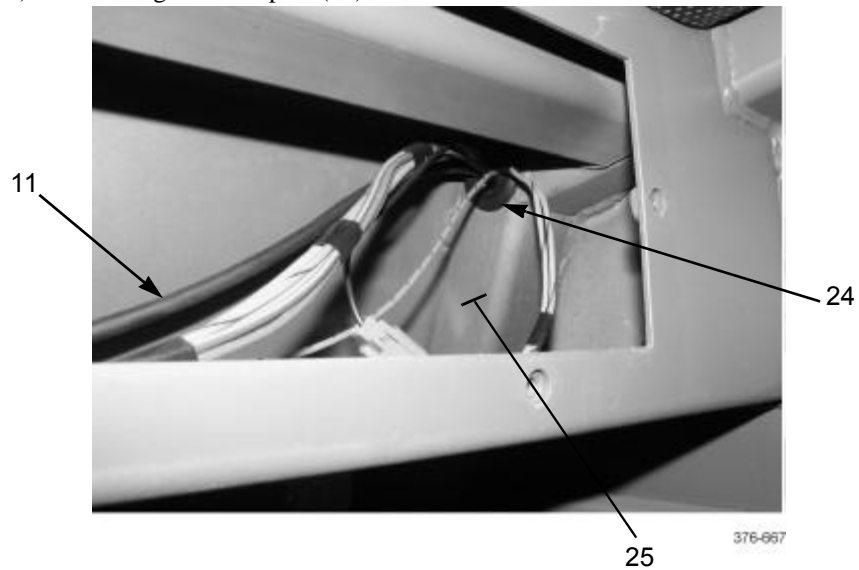
**WINDSHIELD WASHER HOSES REMOVAL - CONTINUED**

6. Remove grommet (24) from hole in cab right corner post (25).

**NOTE**

Damaged hose may be cut and removed in pieces.

7. Remove hose (11) from cab right corner post (25).

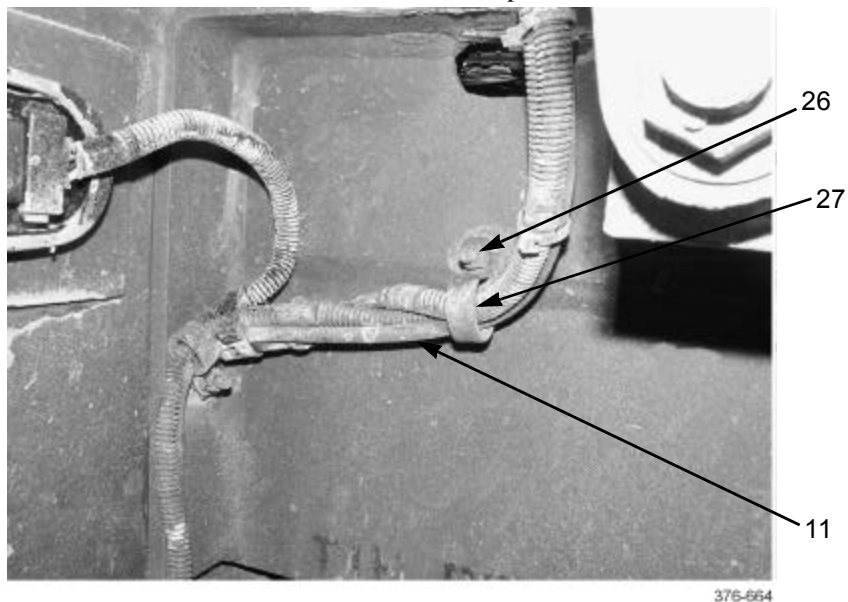


8. Tilt cab (TM 9-2320-312-10) to assist in accessing hose (11) for removal.

**NOTE**

Note routing of hose to ensure correct installation.

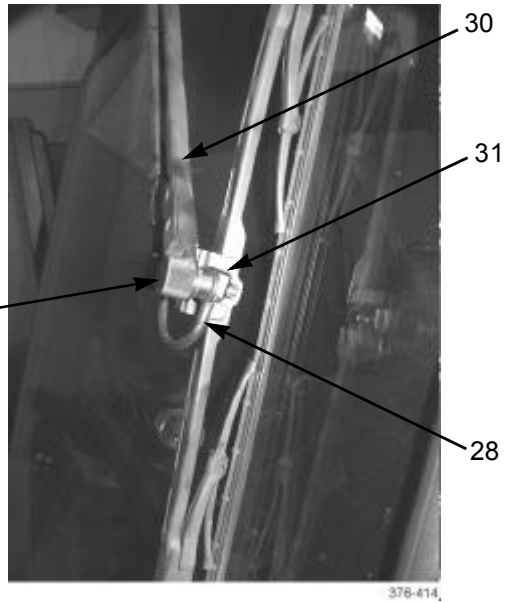
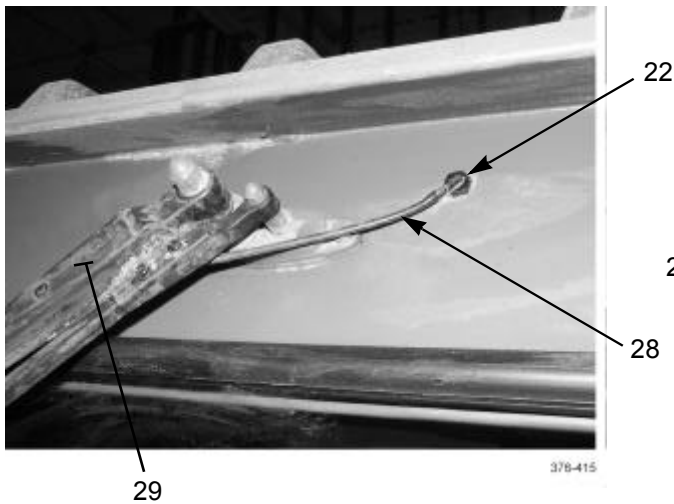
9. Trace hose (11) back toward windshield washer reservoir, removing all tiedown straps, four locknuts (26), and clamps (27). Remove hose from vehicle. Discard locknuts and tiedown straps.





**WINDSHIELD WASHER HOSES REMOVAL - CONTINUED**

10. Remove hose (28) from elbow fitting (22) above windshield.
11. Remove clips (30) to release hose (28) from wiper arm (29).
12. Remove hose (28) from nozzle (31) and remove from vehicle.



13. If elbow fitting (22) is damaged, lower cab (TM 9-2320-312-10), then remove nut (23), rubber washer, and fitting from cab.



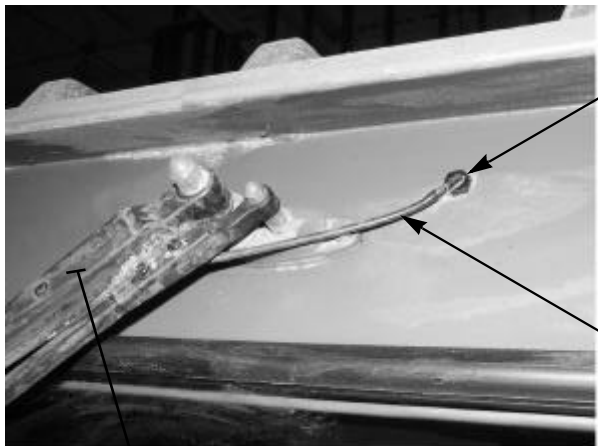
**WINDSHIELD WASHER HOSES INSTALLATION**

1. If removed, install elbow fitting (22) to cab with rubber washer and nut (23).

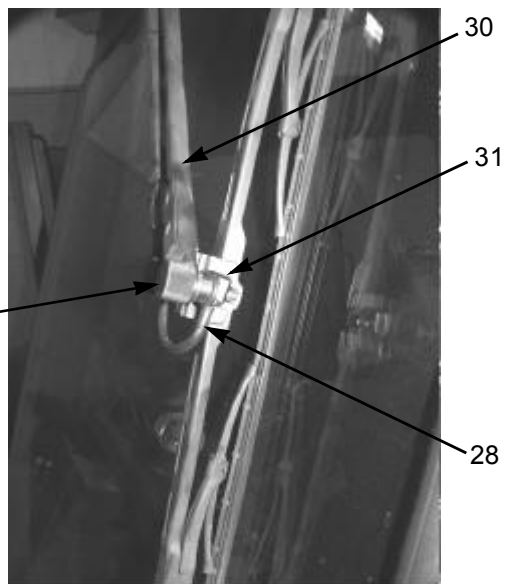


376-666

2. Install hose (28) to nozzle (31) at end of wiper arm (29).
3. Install hose (28) to elbow fitting (22).
4. Secure hose (28) to wiper arm (29) with clips (30).



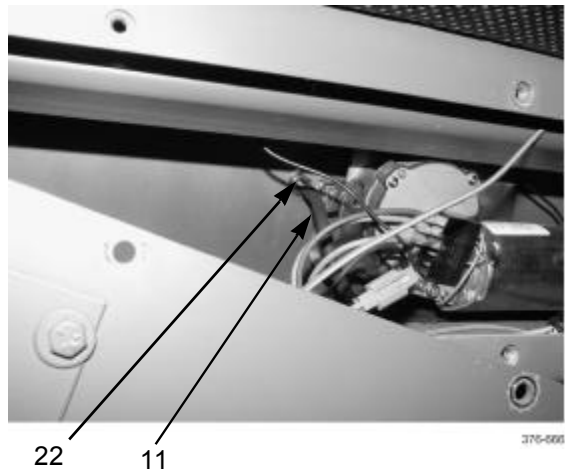
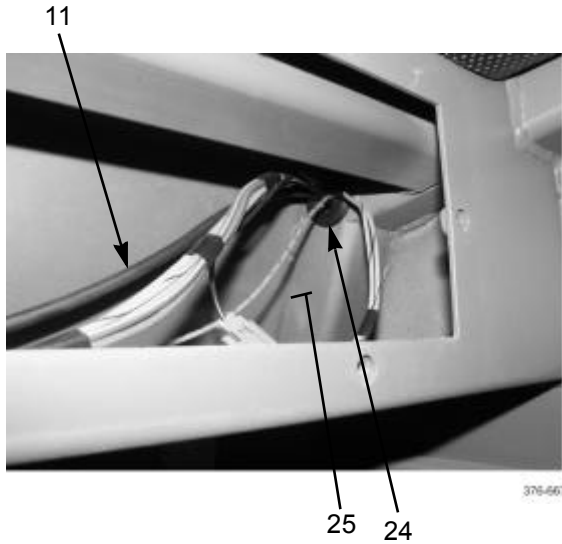
376-415



376-414

**WINDSHIELD WASHER HOSES INSTALLATION - CONTINUED**

5. Starting inside cab, feed hose (11) down cab right corner post (25). Use lacing wire to pull hose through.
6. Install hose (11) to elbow fitting (22) to left of windshield wiper motor.
7. Seat grommet (24) into hole in cab right corner post (25).

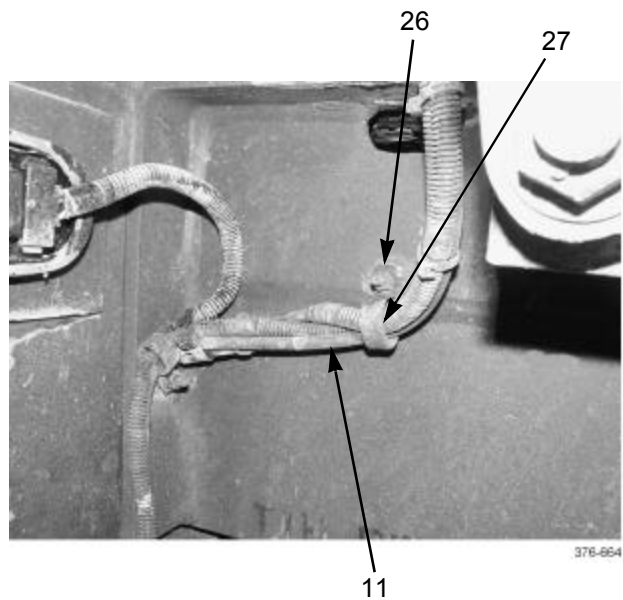


8. Tilt cab (TM 9-2320-312-10).
9. Route hose (11) back to windshield washer reservoir and install to pump unit (8).

**NOTE**

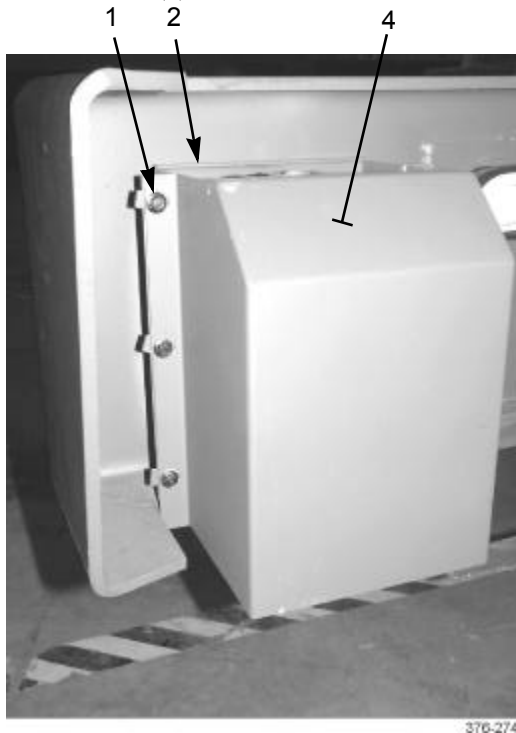
Ensure hose does not become pinched. Fluid will not reach windshield if hose is pinched.

10. Secure hose (11) to electrical harness along front bumper and outside of left frame rail with four clamps (27) and new locknuts (26). Install new tiedown straps.



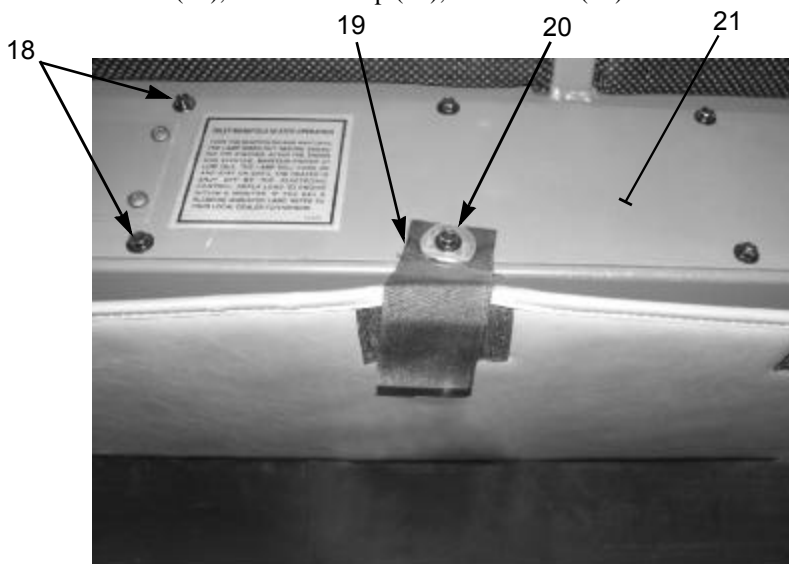
**WINDSHIELD WASHER HOSES INSTALLATION - CONTINUED**

11. Install cover (4) to bracket (2) with six screws (1).



376-274

12. Lower cab (TM 9-2320-312-10).  
 13. Fill windshield washer reservoir with windshield cleaning compound.  
 14. Check operation of windshield washers (TM 9-2320-312-10).  
 15. Install cab front access panel (WP 0046 00).  
 16. Inside cab, install access cover (21), sun visor strap (19), and washer (20) with 14 screws (18).



376-468

**END OF WORK PACKAGE**

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**WINDSHIELD WIPER MAINTENANCE**

---

0060 00

**THIS WORK PACKAGE COVERS**

Wiper Blade Assembly Replacement  
Wiper Arm and Motor: Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 19

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Tag, marker (Item 58, WP 0165 00)

**Equipment Condition**

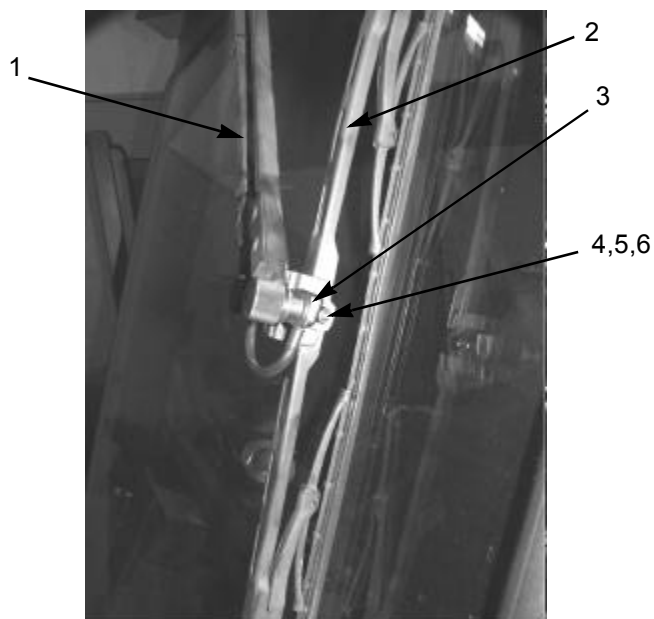
Battery disconnect switch in OFF position (wiper arm and motor replacement)

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**WIPER BLADE ASSEMBLY REPLACEMENT****NOTE**

Replacement mounting hardware for wiper blade assembly is part of wiper arm assembly.

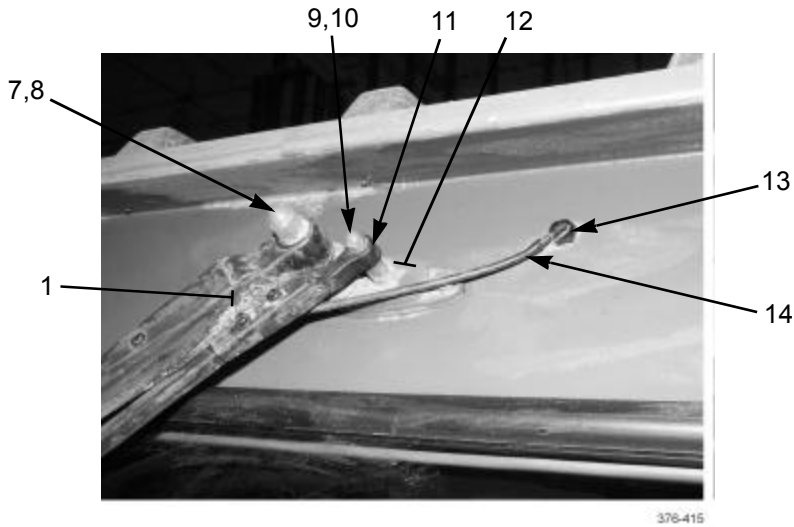
1. Remove locknut (4), screw (5), washer nozzle (3), wiper blade assembly (2), and clear plastic spacer (6) from wiper arm (1). Discard locknut.
2. Install clear plastic spacer (6), wiper blade assembly (2), and washer nozzle (3) to wiper arm (1) with screw (5) and new locknut (4).



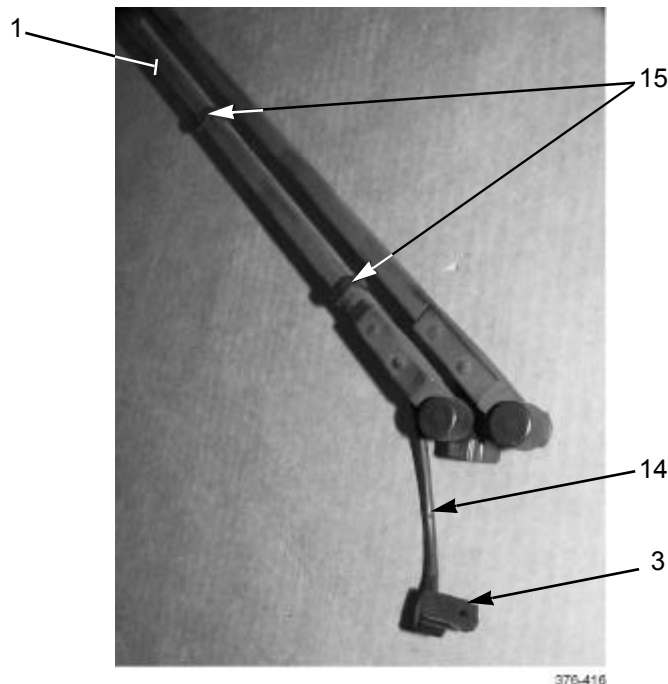
375-414,

**WIPER ARM AND MOTOR REMOVAL**

1. As required, remove wiper blade assembly (Refer to *Wiper Blade Assembly Replacement*).
2. Remove acorn nut (9), washer (10), and disconnect wiper support arm (11) from shaft of outer mounting plate (12).
3. Disconnect washer hose (14) from cowl fitting (13).
4. Remove acorn nut (7), washer (8), and wiper arm (1) assembly from motor shaft.

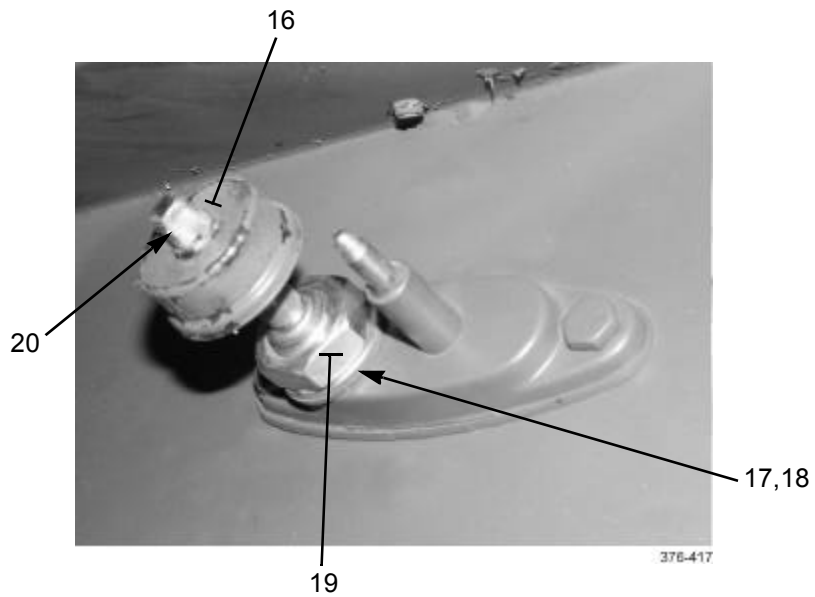


5. Pull washer hose (14) out from spring of wiper arm (1) and three plastic clips (15).
6. Disconnect washer nozzle (3) from washer hose (14).

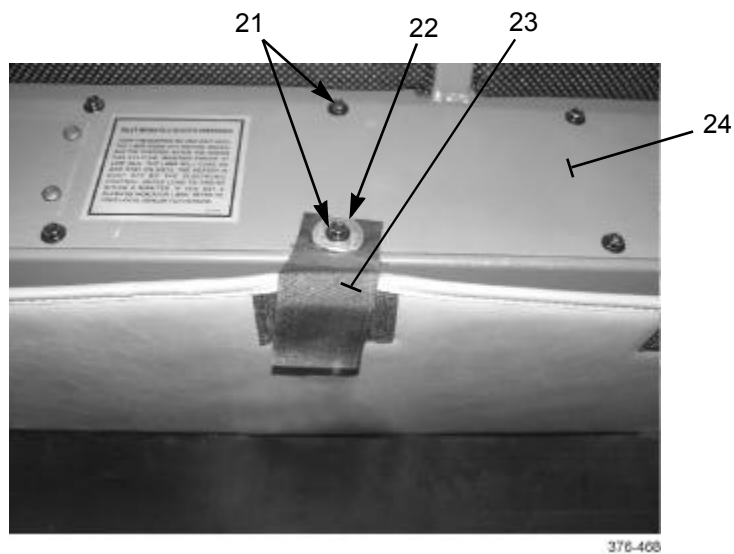


**WIPER ARM AND MOTOR REMOVAL - CONTINUED**

7. Remove rubber cap (16), nut (19), outer washer (17), and inner washer (18) from shaft of windshield wiper motor (20).



8. From inside cab, remove 14 screws (21), washer (22), sun visor strap (23), and access cover (24).

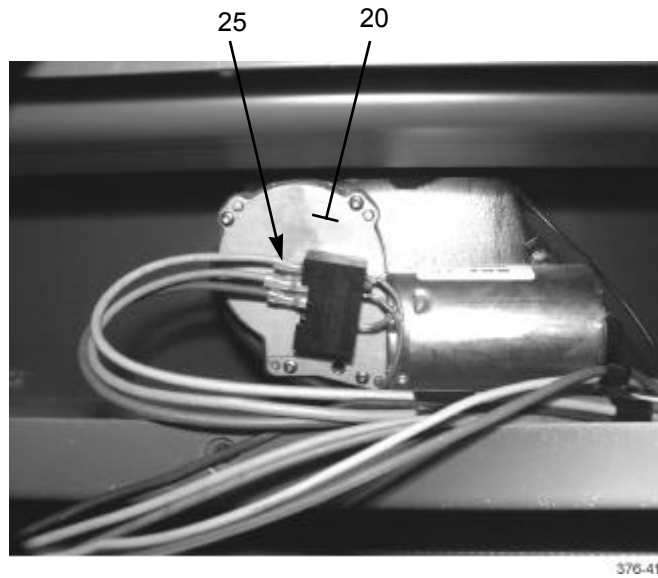


WIPER ARM AND MOTOR REMOVAL - CONTINUED

**NOTE**

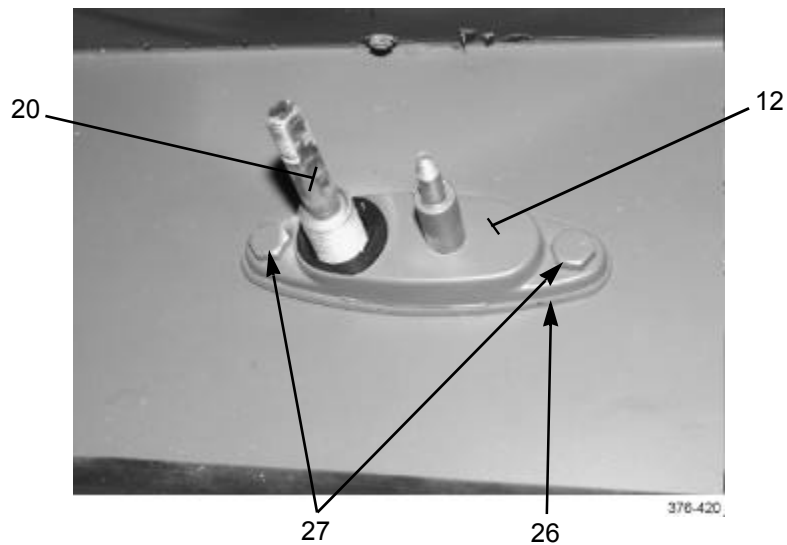
Tag wires to ensure correct installation.

9. Disconnect three wires (25) of wiring harness from windshield wiper motor (20).



376-419

10. Remove two screws (27), outer mounting plate (12), gasket (26), and windshield wiper motor (20) from cab. Discard gasket.



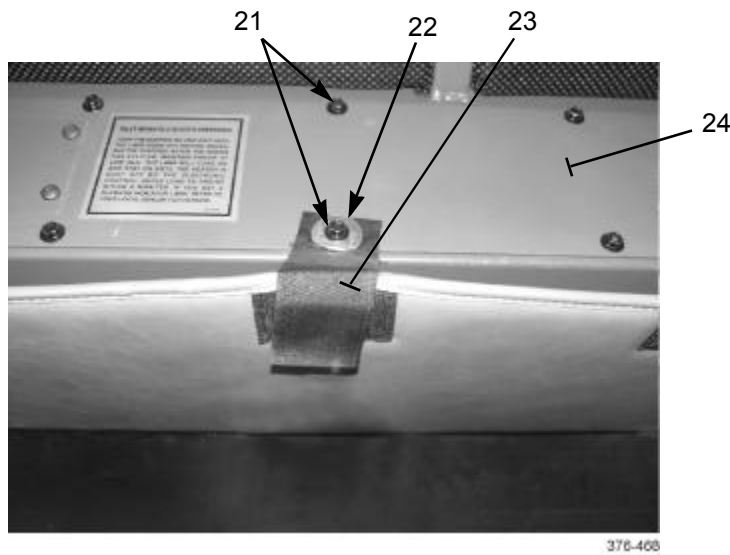
376-420



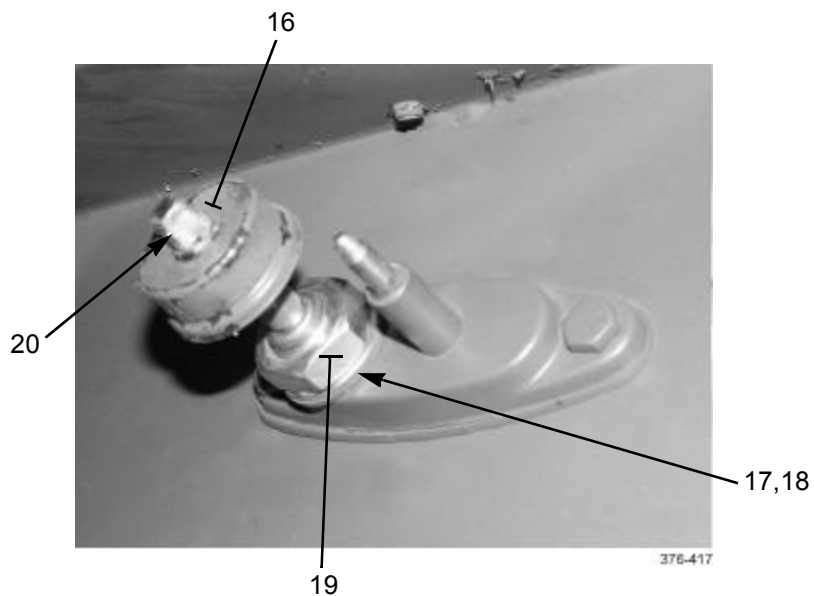
**WIPER ARM AND MOTOR INSTALLATION****NOTE**

Replacement outer mounting plate comes with new gasket.

1. Install new gasket (26), outer mounting plate (12), and windshield wiper motor (20) to cab with two screws (27).
2. Connect three wires (25) of wiring harness to windshield wiper motor (20).
3. Install access cover (24), sun visor strap (23), and washer (22) to cab with 14 screws (21).

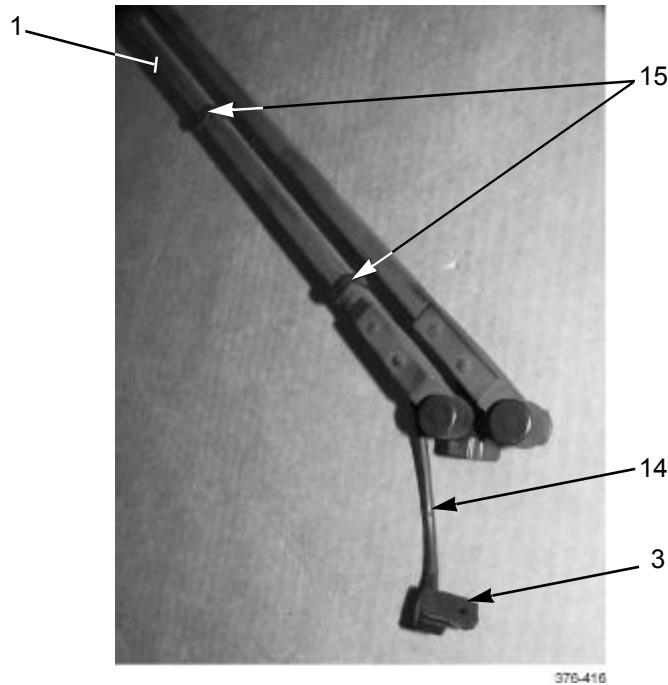


4. From outside cab, install inner washer (18), outer washer (17), nut (19), and rubber cap (16) to shaft of windshield wiper motor (20).

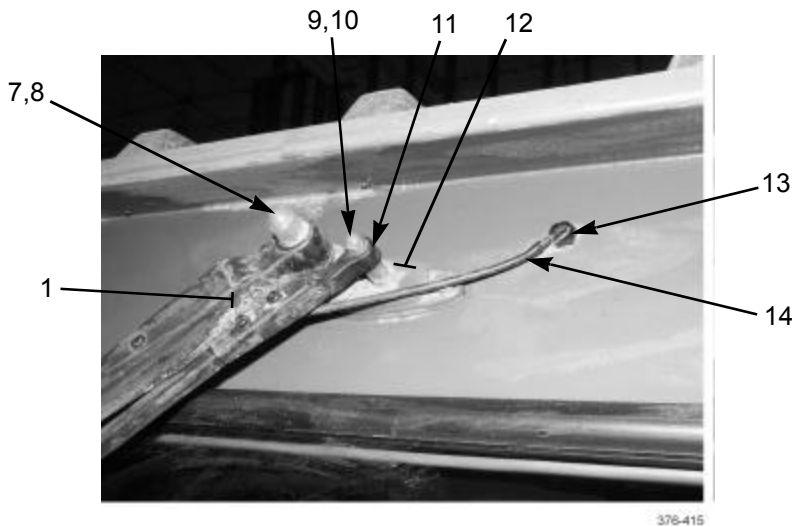


**WIPER ARM AND MOTOR INSTALLATION - CONTINUED**

5. Connect washer nozzle (3) to washer hose (14).
6. Install washer hose (14) through three plastic clips (15) and spring of wiper arm (1).



7. Install wiper arm (1) assembly to motor shaft with washer (8) and acorn nut (7).
8. Connect washer hose (14) to cowl fitting (13).
9. Connect wiper support arm (11) to shaft of outer mounting plate (12) with washer (10) and acorn nut (9).



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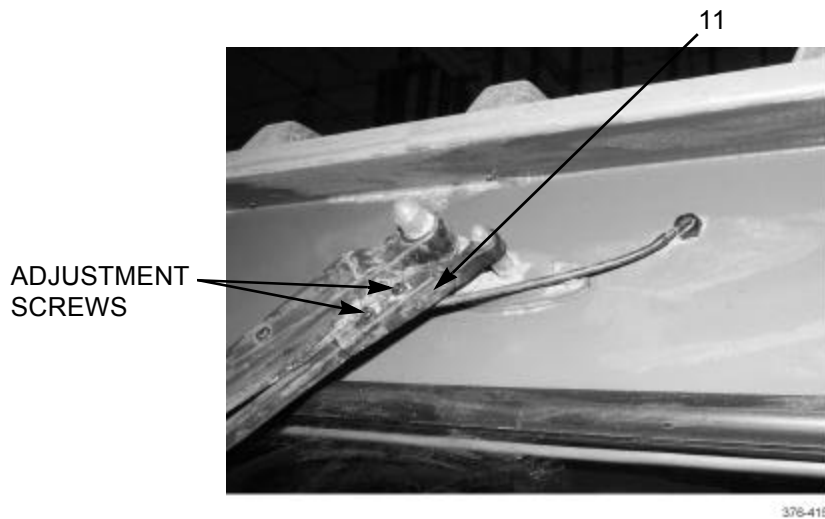
**WINDSHIELD WIPER MAINTENANCE - CONTINUED**

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0060 00

**WIPER ARM AND MOTOR INSTALLATION - CONTINUED**

10. If removed, install wiper blade assembly (Refer to *Wiper Blade Assembly Replacement*).
11. Place battery disconnect switch in ON position.
12. Check operation of windshield wipers (TM 9-2320-312-10).
13. If wiper blade assembly is not properly positioned against windshield, adjust angle of blade by making an adjustment at wiper support arm (11). Loosen adjustment screws, length or shorten wiper support arm until wiper blade angle against windshield is correct, then tighten adjustment screws.

**END OF WORK PACKAGE**

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**AIR DRYER REPLACEMENT**0061 00

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**THIS WORK PACKAGE COVERS**Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 150

**RPSTL Reference**

Group 150, Figure 3

Group 190, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

**Materials/Parts - Continued**

Strap, tiedown (Item 57, WP 0165 00) (3)

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N 21NE048)

Washer, lock (P/N 361-13) (3)

**References**

Group 150 Commercial Service Manuals

WP 0066 00

**Equipment Condition**

Wheels blocked

Air system drained (TM 9-2320-312-10)

Battery disconnect switch in OFF position

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**WARNING**

DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

**NOTE**

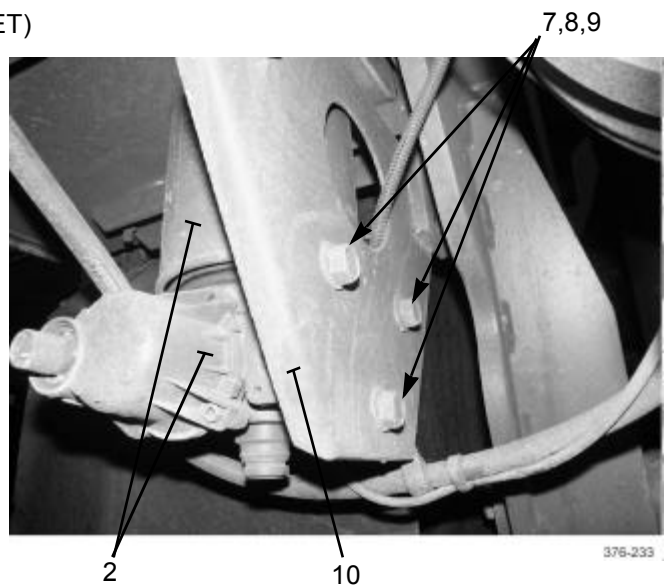
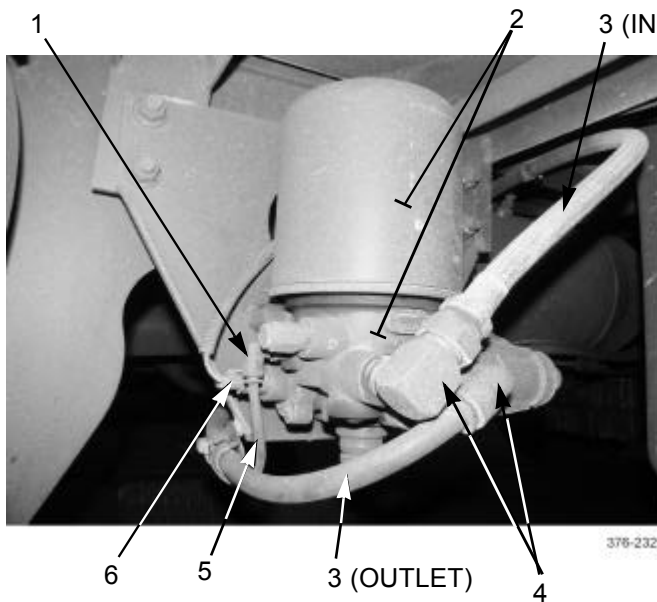
Refer to Group 150 Commercial Service Manuals for troubleshooting and maintenance of air dryer.

**REMOVAL**

**NOTE**

- Tag air lines and note position of fittings to ensure correct installation.
- Remove tiedown straps as necessary and discard. Use new tiedown straps on installation.
- Refer to WP 0066 00 for instructions on removing and installing air lines to push-in fittings.

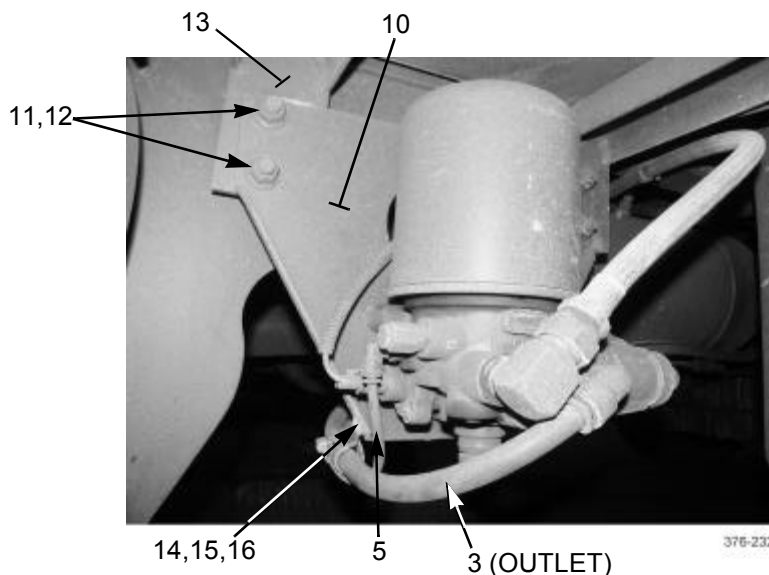
1. Disconnect wiring harness connector (6) from air dryer (2).
2. Disconnect two air lines (3) from two elbows (4).
3. Disconnect air line (5) from elbow (1).
4. Remove three screws (7), lockwashers (8), washers (9), and air dryer (2) from air dryer bracket (10). Discard lockwashers.
5. Remove two elbows (4) from air dryer (2).
6. Remove elbow (1) from air dryer (2).



**REMOVAL - CONTINUED****NOTE**

Perform steps 7 and 8 as needed to remove air dryer bracket.

7. Remove locknut (14), screw (15), and clamp (16), with air hoses (3 and 5) from air dryer bracket (10). Discard locknut.
8. Remove four nuts (11), screws (12), and air dryer bracket (10) from two mounting brackets (13).

**INSTALLATION**

1. If removed, install air dryer bracket (10) to two mounting brackets (13) with four screws (12) and nuts (11).
2. Install clamp (16), with air hoses (3 and 5), to air dryer bracket (10) with screw (15) and new locknut (14).

**NOTE**

Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.

3. Install elbow (1) to air dryer (2).
4. Install two elbows (4) to air dryer (2).
5. Install air dryer (2) to air dryer bracket (10) with three washers (9), new lockwashers (8), and screws (7).
6. Connect air line (5) to elbow (1).
7. Connect two air lines (3) to two elbows (4).
8. Connect wiring harness connector (6) to air dryer (2).
9. Place battery disconnect switch in ON position.

**END OF WORK PACKAGE**

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**AIR RESERVOIR ASSEMBLIES REPLACEMENT****0062 00****THIS WORK PACKAGE COVERS**

Wet Tank: Removal, Installation

Front Air Reservoir: Removal, Installation

Rear Air Reservoir: Removal, Installation

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 150

**RPSTL Reference**

Group 150, Figures 1, 3, and 4

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

Detergent (Item 23, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**Materials/Parts - Continued**

Nut, lock (P/N 21NE-040) (2) (wet tank)

Nut, lock (P/N 21NE-040) (3/2) (front/rear air reservoir)

Washer, lock (P/N 361-11) (2)

**References**

WP 0066 00

**Personnel Required**

Two

**Equipment Condition**

Fifth wheel raised (TM 9-2320-312-10)

Wheels blocked

Air system drained (TM 9-2320-312-10)

**WARNING**

DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

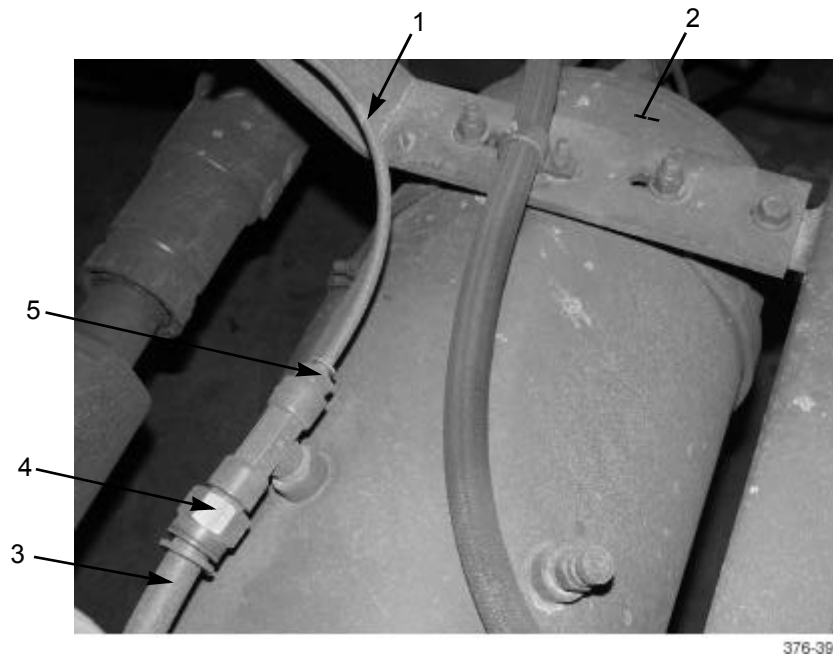
**NOTE**

- Tag air lines and note position of all fittings to ensure correct installation.
- Remove tiedown straps as required and discard. Ensure new tiedown straps are used on installation, to ensure air lines are properly supported.
- Refer to WP 0066 00 for instructions on removing and installing air lines to push-in fittings.

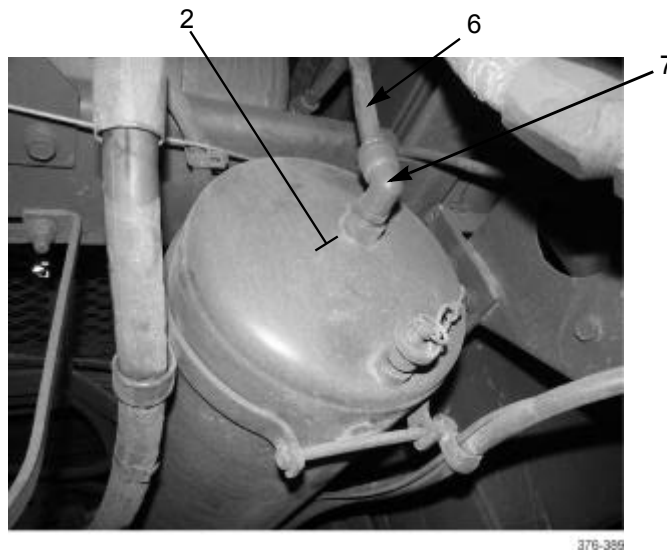
**WET TANK REMOVAL****NOTE**

Wet tank is located inside right frame rail.

1. On top of tank (2), disconnect air hoses (1 and 3) from push-in straight fittings (5 and 4).



2. At rear of tank (2), disconnect air hose (6) from push-in elbow fitting (7).

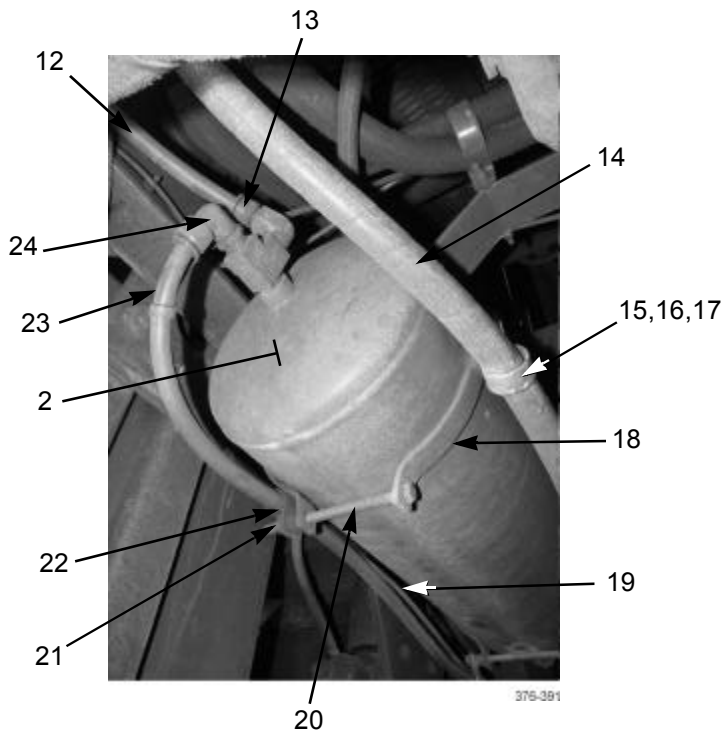


**WET TANK REMOVAL - CONTINUED**

3. Remove two locknuts (8) and clamps (10) from welded studs (9) on stowage compartment mounting bracket and release drain valve cable pulls (11). Discard locknuts.



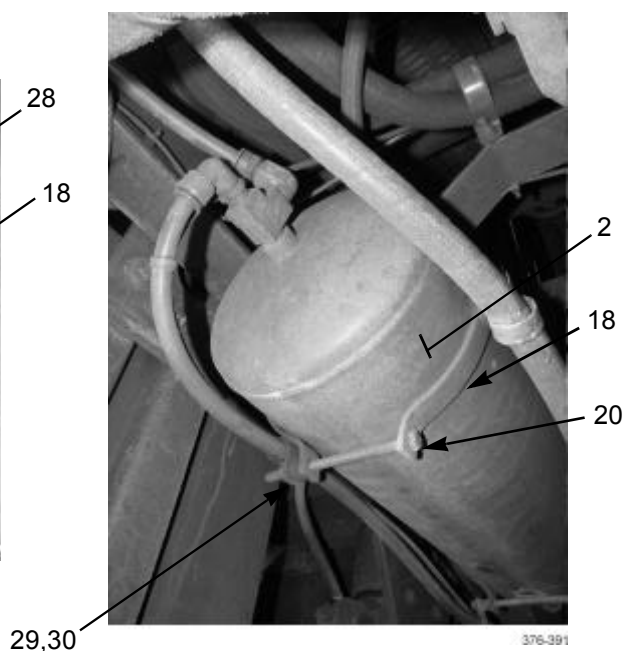
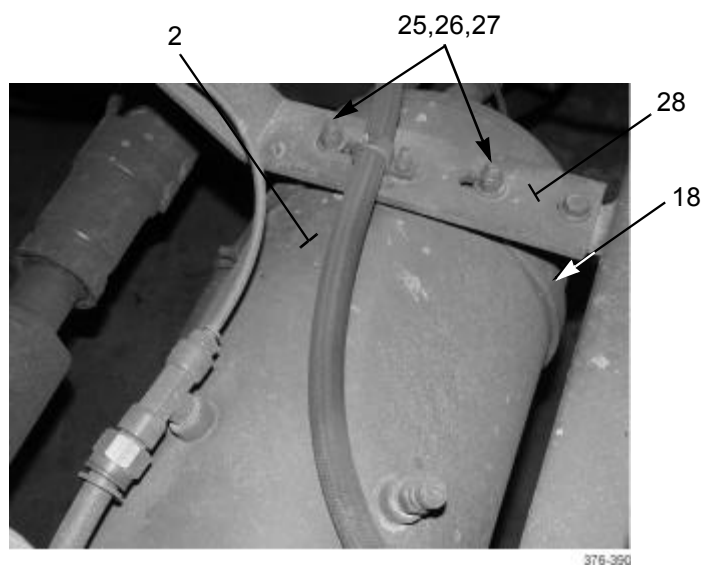
4. At front of tank (2), disconnect air hose (23) from push-in elbow fitting (24). Disconnect air hose (12) from push-in straight fitting (13).
5. On left side of tank (2), remove two nuts (15) and clamps (16) securing hydraulic hose (14) to welded studs (17) on mounting straps (18).
6. On right side of tank (2), remove two nuts (21) and clamps (22) securing air hoses (19 and 23) to mounting strap screws (20).



**WET TANK REMOVAL - CONTINUED****WARNING**

Wet tank is awkward to handle. Use assistance when removing to avoid injury to personnel.

7. Remove four nuts (25), bolts (27), and tank (2) with two mounting straps (18) and spacers (26) from front and rear air reservoir mounting brackets (28).
8. Remove two nuts (29), lockwashers (30), screws (20), and mounting straps (18) from tank (2). Discard lockwashers.

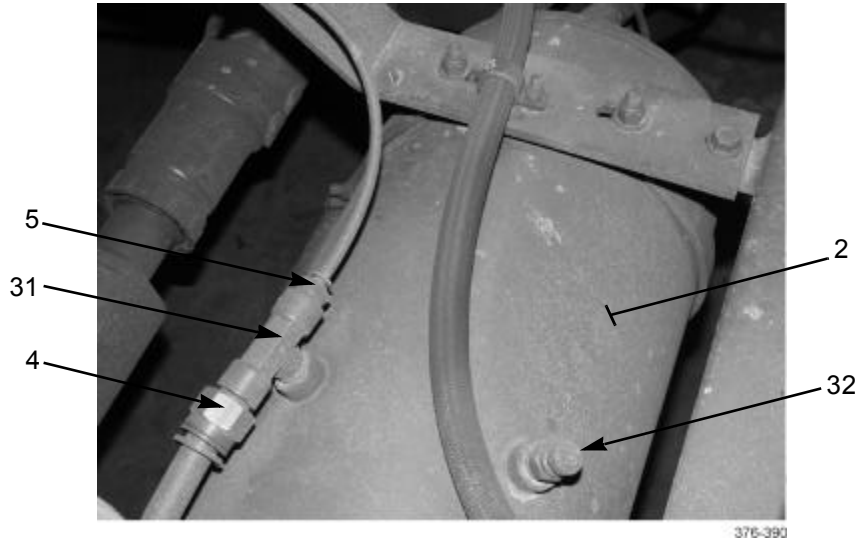


**WET TANK REMOVAL - CONTINUED**

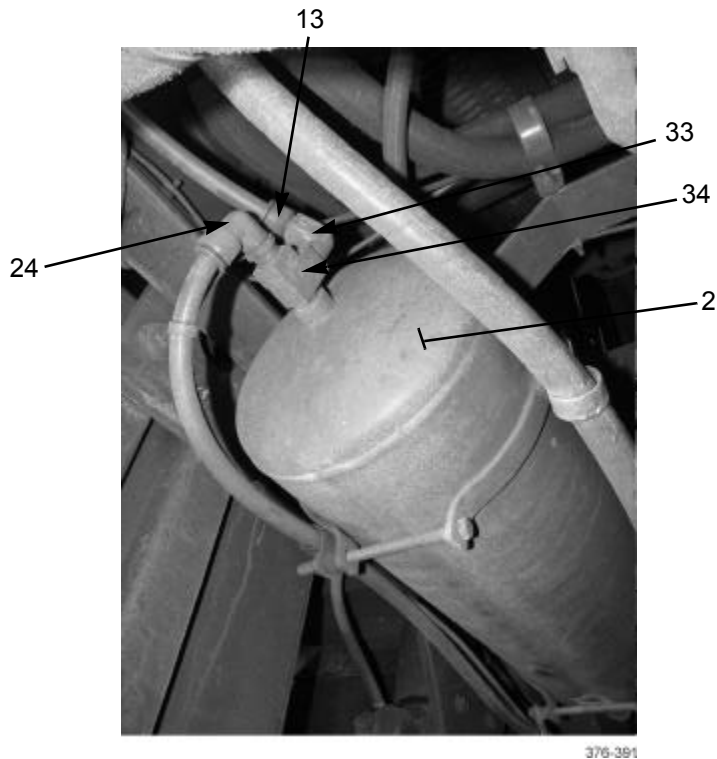
**NOTE**

Perform steps 9 through 13 as required to remove fittings from wet tank.

9. Remove push-in straight fittings (4 and 5) and tee (31) from top of tank (2). Remove safety valve (32).

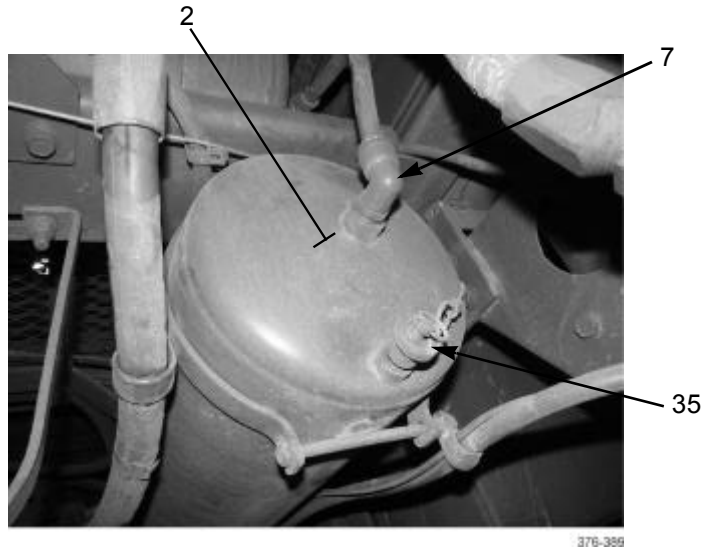


10. Remove push-in elbow fitting (24) from tee (34). Remove push-in straight fitting (13) from check valve (33).
11. Remove check valve (33) and tee (34) from tank (2).



**WET TANK REMOVAL - CONTINUED**

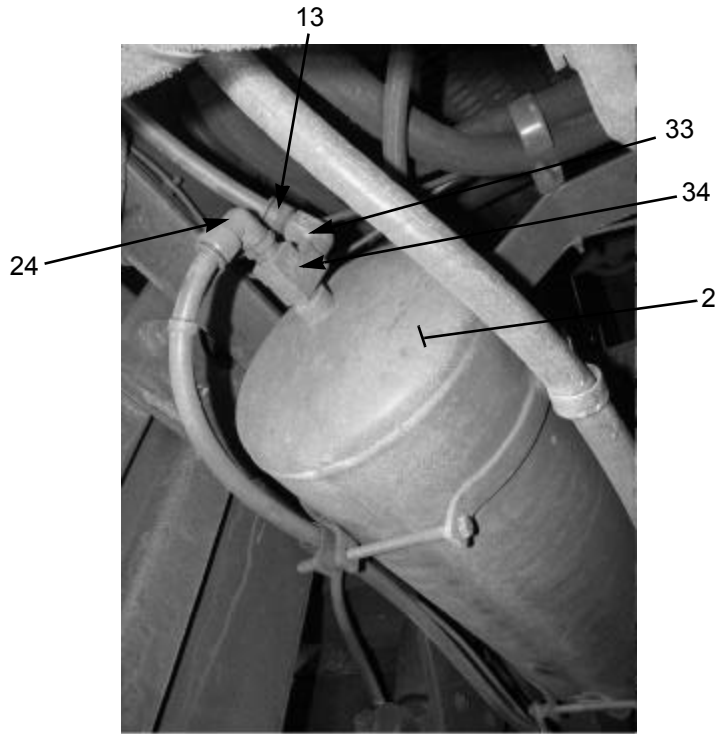
12. Remove push-in elbow fitting (7) from rear of tank (2).
13. Remove drain valve (35).

**WET TANK INSTALLATION****NOTE**

- Perform steps 1 through 5 as required to install fittings to wet tank.
  - Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.
1. Install drain valve (35) to rear of tank (2).
  2. Install push-in elbow fitting (7).

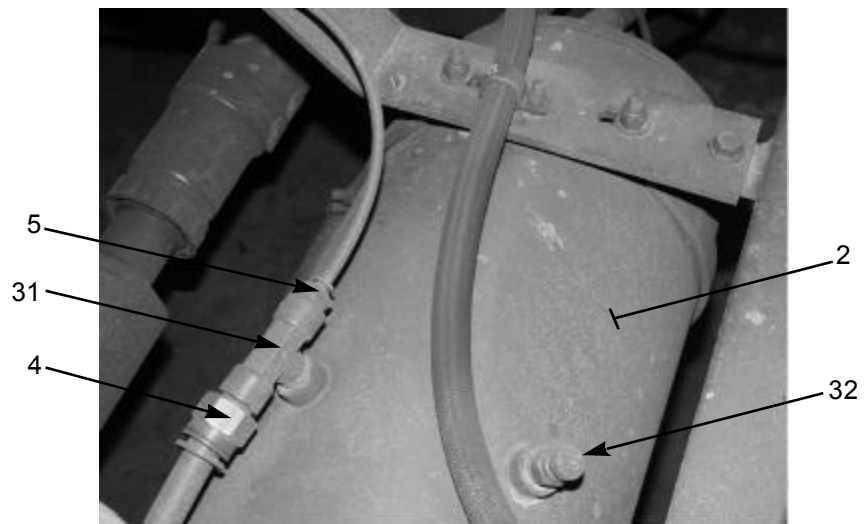
**WET TANK INSTALLATION - CONTINUED**

3. Install tee (34) and check valve (33) to front of tank (2).
4. Install push-in straight fitting (13) to check valve (33). Install push-in elbow fitting (24) to tee (34).



376-391

5. Install tee (31) and two push-in straight fittings (4 and 5) to top of tank (2). Install safety valve (32).

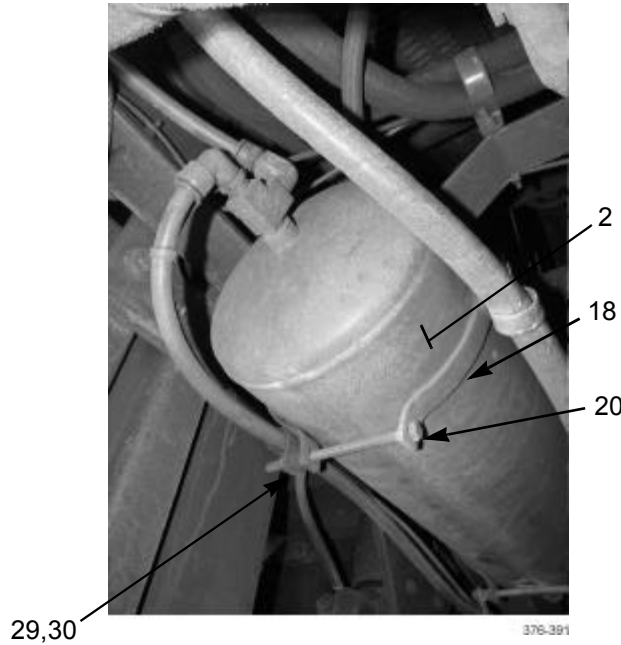


376-390

**WET TANK INSTALLATION - CONTINUED****NOTE**

If new mounting straps are being installed, Direct Support Maintenance must weld studs to straps for hydraulic hose installation.

6. Position two mounting straps (18) around tank (2) and install two screws (20), new lockwashers (30), and nuts (29).

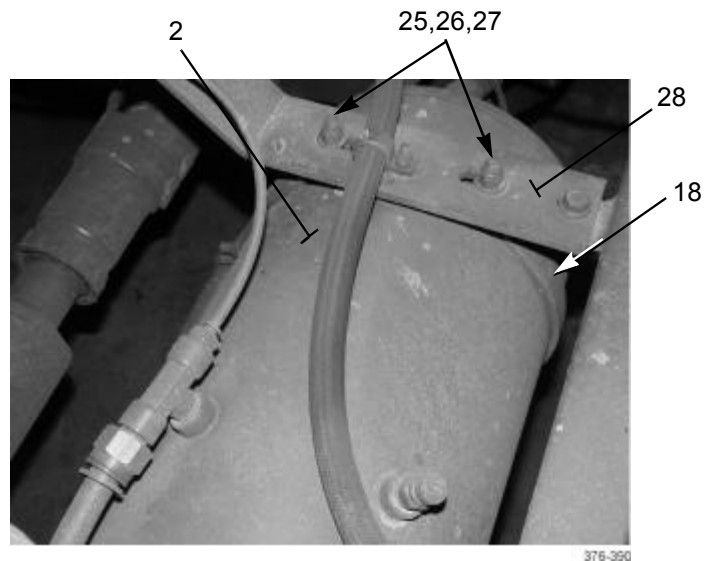




**WET TANK INSTALLATION - CONTINUED****WARNING**

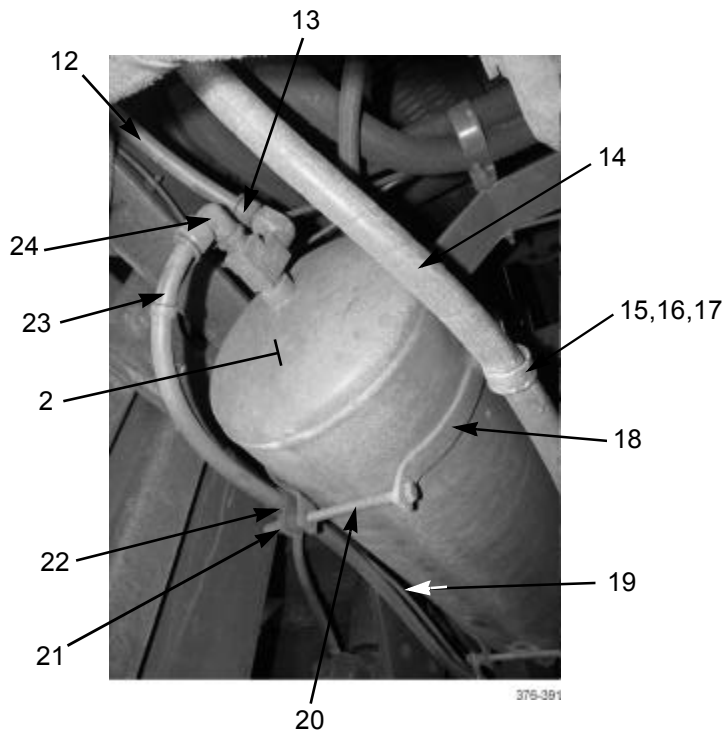
Wet tank is awkward to handle. Use assistance when installing to avoid injury to personnel.

7. Position tank (2) with spacers (26) and two mounting straps (18) to front and rear air reservoir mounting brackets (28). Secure with four bolts (27) and nuts (25).



**WET TANK INSTALLATION - CONTINUED**

8. On right side of tank (2), secure air hoses (19 and 23) to mounting strap screws (20) with two clamps (22) and nuts (21).
9. On left side of tank (2), secure hydraulic hose (14) to welded studs (17) on mounting straps (18) with two clamps (16) and nuts (15).
10. At front of tank (2), connect air hose (12) to push-in straight fitting (13). Connect air hose (23) to push-in elbow fitting (24).

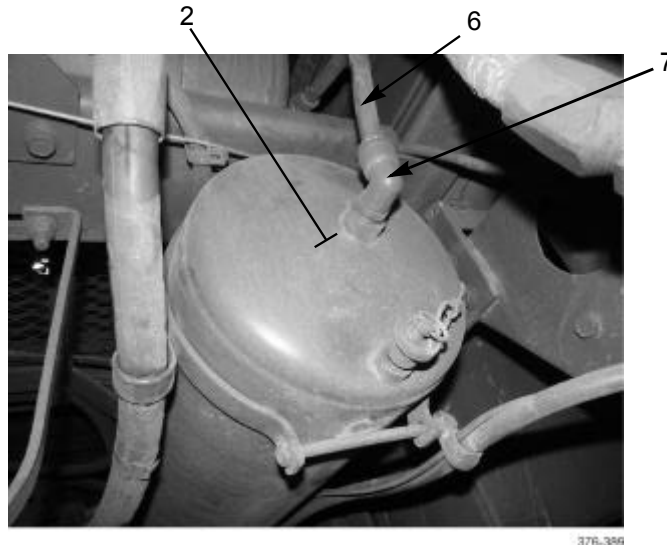


11. Secure drain valve cable pulls (11) to welded studs (9) on stowage compartment mounting bracket with two clamps (10) and new locknuts (8).

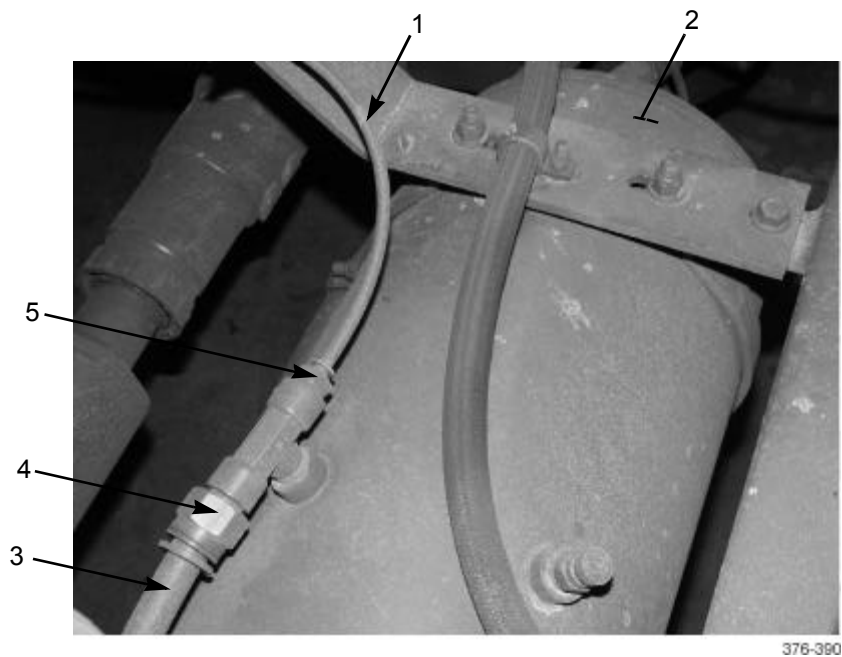


**WET TANK INSTALLATION - CONTINUED**

12. At rear of tank (2), connect air hose (6) to push-in elbow fitting (7).



13. At top of tank (2), connect air hoses (1 and 3) to push-in straight fittings (5 and 4).



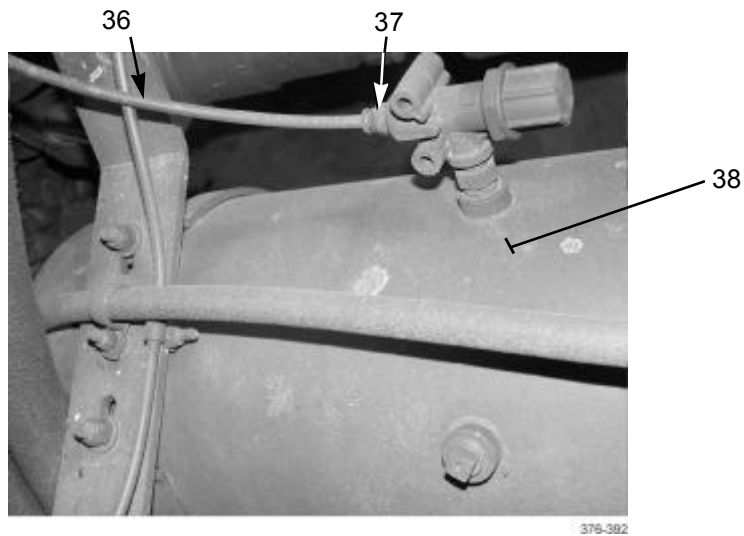
14. Start engine and fully pressurize air system (TM 9-2320-312-10).
15. Check for air leaks: Apply a detergent and water solution to check for leaks at air connections.
16. Lower fifth wheel (TM 9-2320-312-10).

**FRONT AIR RESERVOIR REMOVAL**

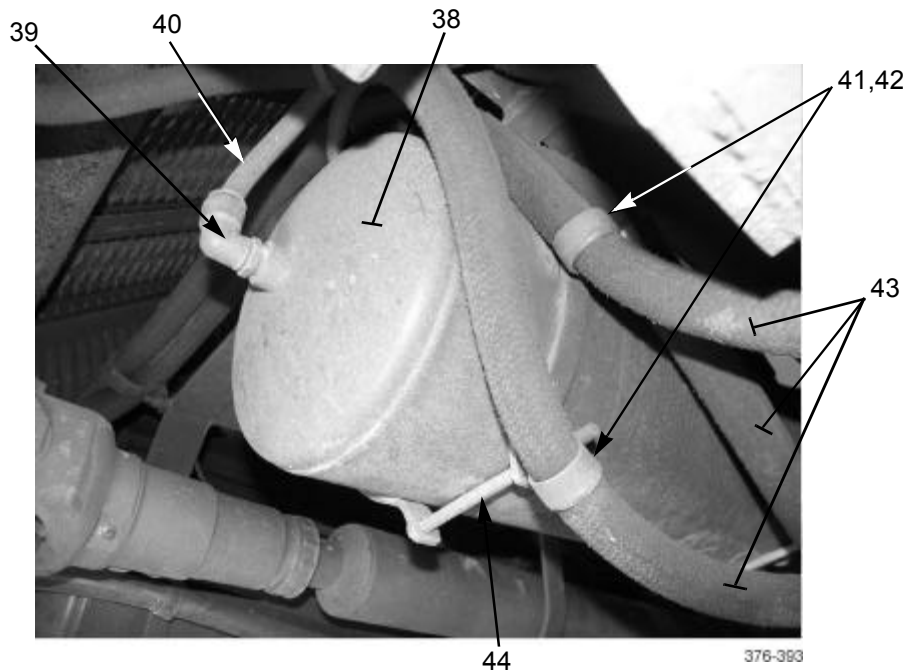
**NOTE**

Front air reservoir is located inside left frame rail.

1. On top of air reservoir (38), disconnect air hose (36) from push-in straight fitting (37).

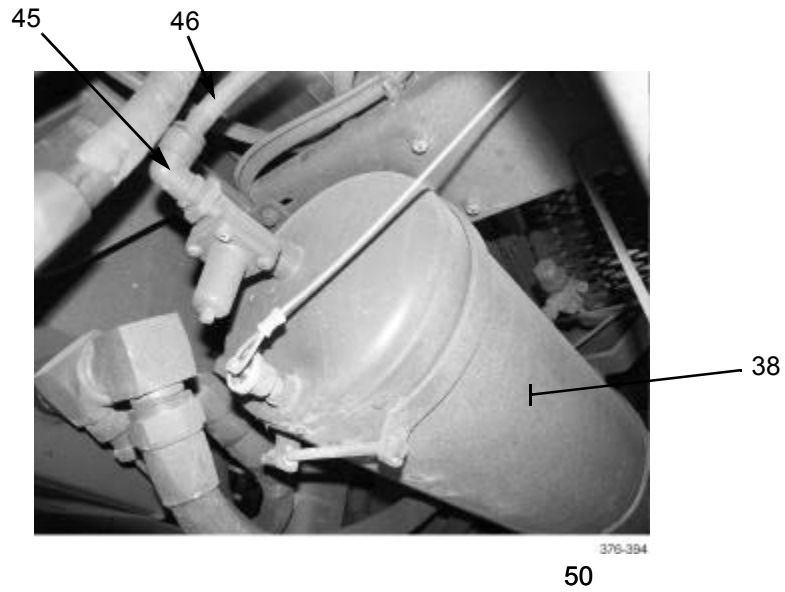


2. At front of air reservoir (38), disconnect air hose (40) from push-in elbow fitting (39).
3. On left side of air reservoir (38), remove two nuts (41) and release three clamps (42) securing three hydraulic hoses (43) to front mounting strap screw (44) and to welded stud on front mounting strap.

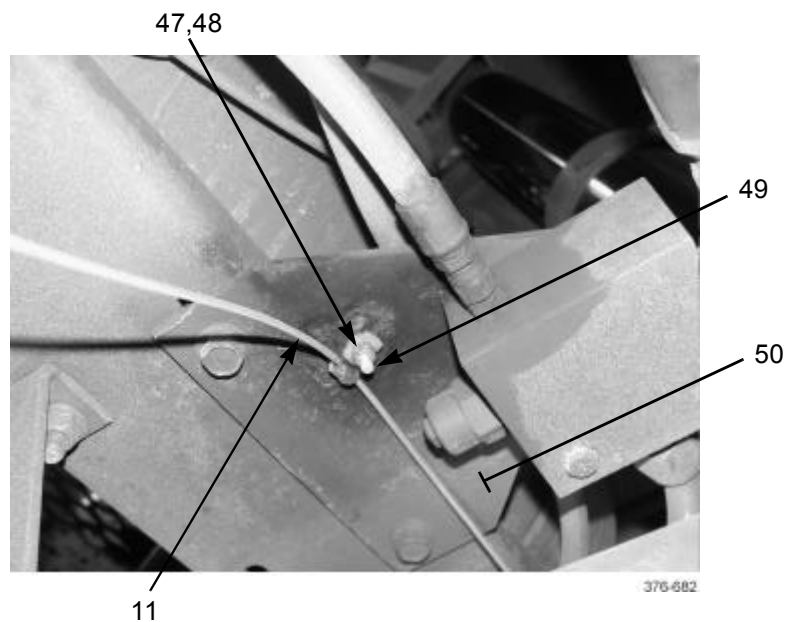


**FRONT AIR RESERVOIR REMOVAL - CONTINUED**

4. At rear of air reservoir (38), disconnect air hose (46) from push-in elbow fitting (45).



5. Remove locknut (47) and release clamp (48) and securing drain valve cable pull (11) to welded stud (49) on locking valve mounting bracket (50). Discard locknut.



**FRONT AIR RESERVOIR REMOVAL - CONTINUED**

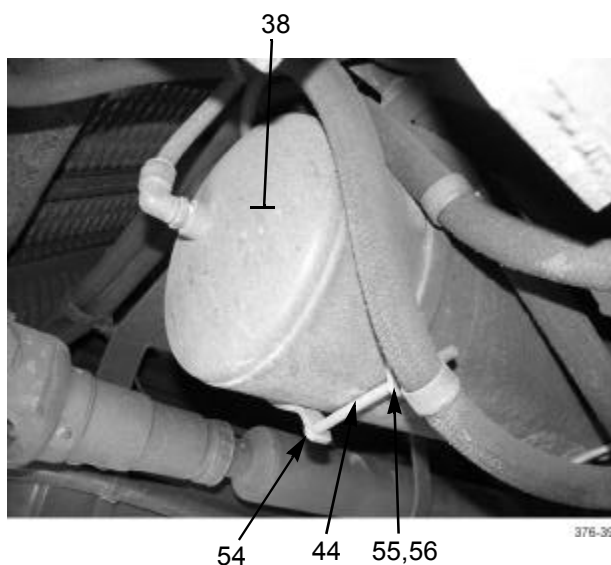
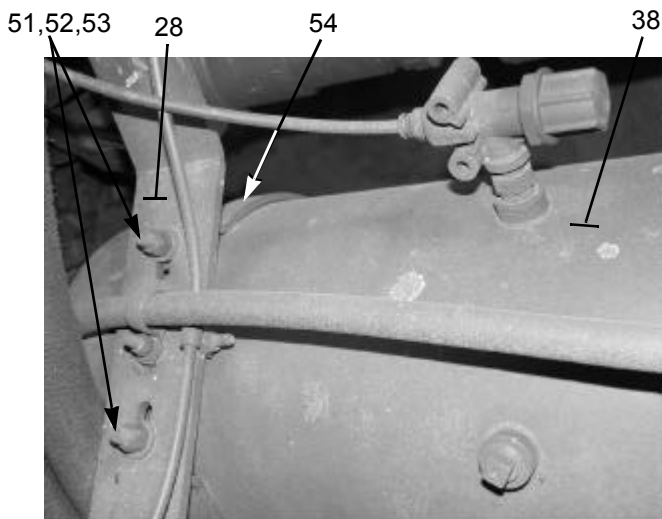
- Remove two locknuts (8) and clamps (10) from welded studs (9) on stowage compartment mounting bracket and release drain valve cable pulls (11). Discard locknuts.



**WARNING**

Front air reservoir is awkward to handle. Use assistance when removing to avoid injury to personnel.

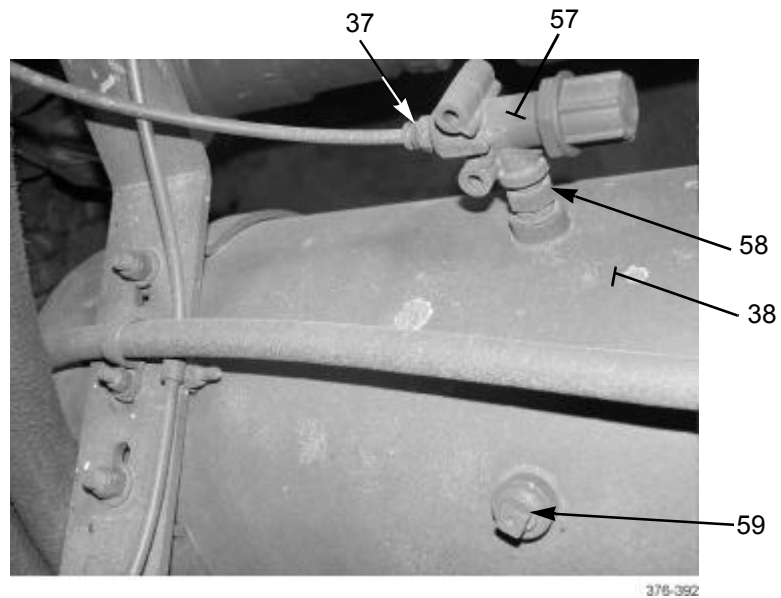
- Remove four nuts (51), bolts (53), and air reservoir (38) with two mounting straps (54) and spacers (52) from front and rear air reservoir mounting brackets (28).
- Remove two nuts (55), lockwashers (56), screws (44), and mounting straps (54) from air reservoir (38). Discard lockwashers.



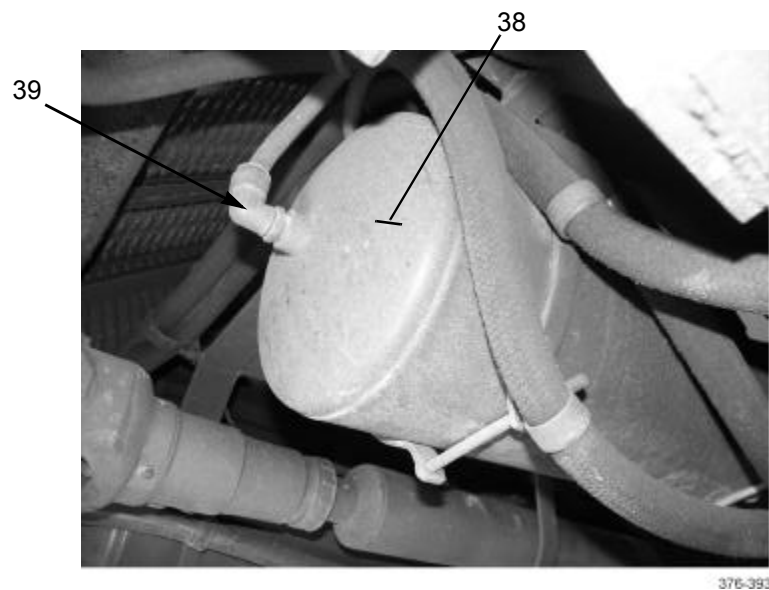
**FRONT AIR RESERVOIR REMOVAL - CONTINUED****NOTE**

Perform steps 9 through 13 as required to remove fittings from front air reservoir.

9. Remove push-in straight fitting (37), pressure regulator (57), and bushing (58) from top of air reservoir (38).
10. Remove plug (59).

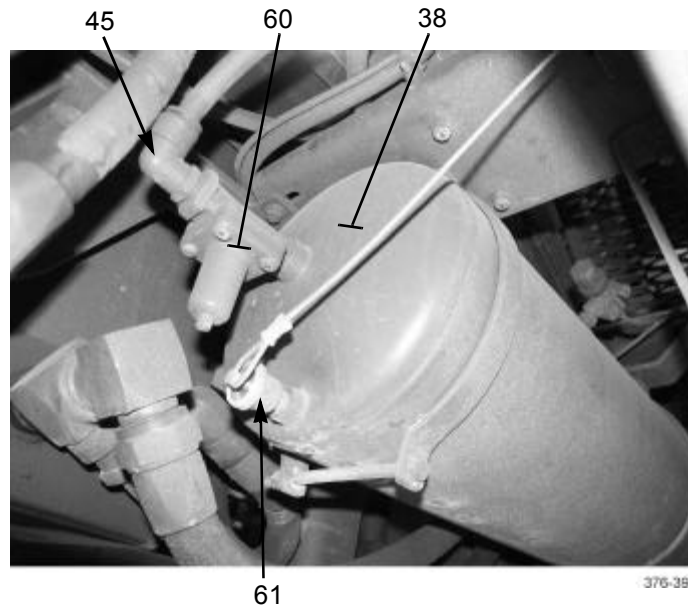


11. Remove push-in elbow fitting (39) from front of air reservoir (38).



**FRONT AIR RESERVOIR REMOVAL - CONTINUED**

12. Remove push-in elbow fitting (45) and check valve (60) from rear of air reservoir (38).
13. Remove drain valve (61).

**FRONT AIR RESERVOIR INSTALLATION****NOTE**

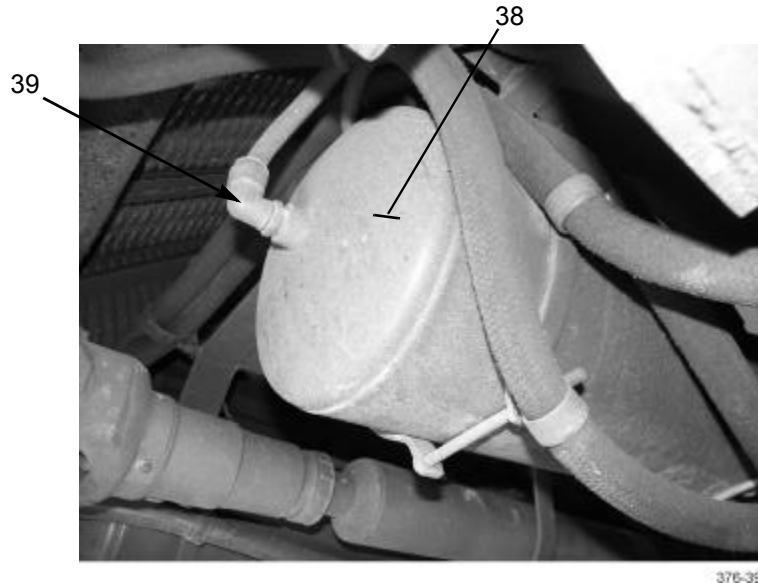
- Perform steps 1 through 5 to install fittings to front air reservoir.
- Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.

1. Install drain valve (61) to rear of air reservoir (38).
2. Install check valve (60) and push-in elbow fitting (45).

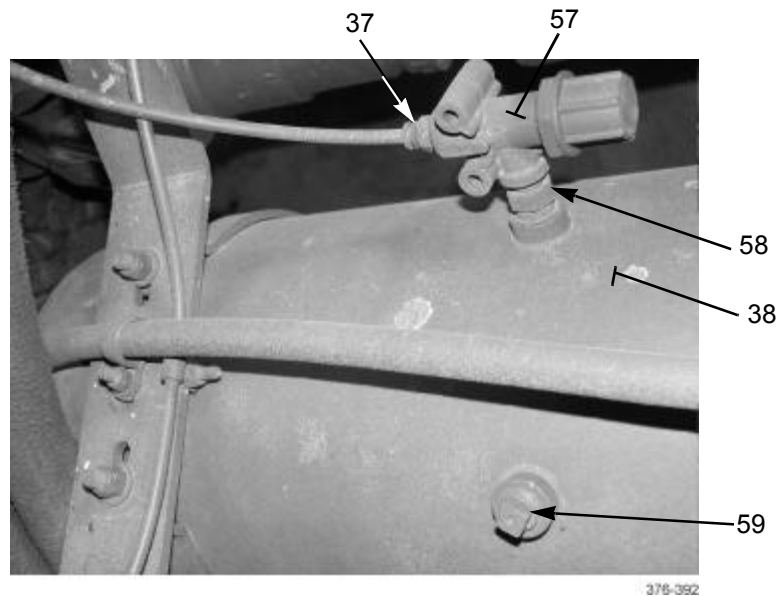


**FRONT AIR RESERVOIR INSTALLATION - CONTINUED**

3. Install push-in elbow fitting (39) to front of air reservoir (38).



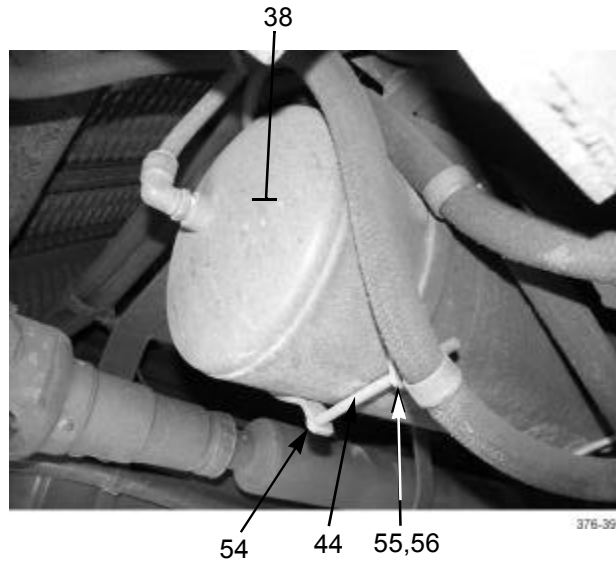
4. Install plug (59) to top of air reservoir (38).
5. Install bushing (58), pressure regulator (57), and push-in straight fitting (37).



**FRONT AIR RESERVOIR INSTALLATION - CONTINUED****NOTE**

If new mounting straps are being installed, Direct Support Maintenance must weld stud to front most mounting strap for installation of hydraulic hoses.

6. Position two mounting straps (54) around air reservoir (38) and install two screws (44), new lockwashers (56), and nuts (55).



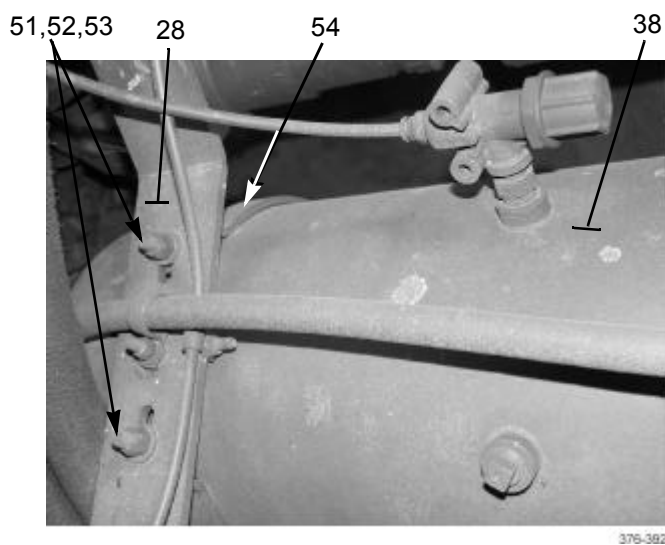
FRONT AIR RESERVOIR INSTALLATION - CONTINUED



**WARNING**

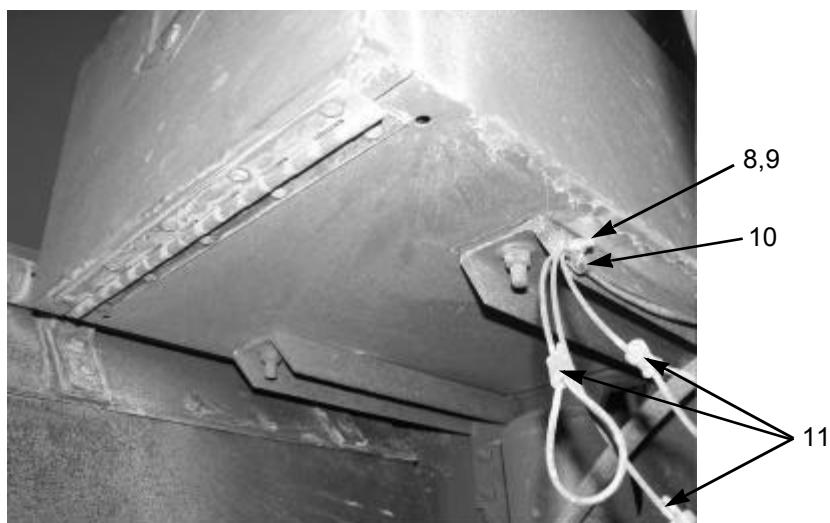
Front air reservoir is awkward to handle. Use assistance when installing to avoid injury to personnel.

7. Position air reservoir (38) with spacers (52) and two mounting straps (54) to front and rear air reservoir mounting brackets (28). Secure with four bolts (53), and nuts (51).



376-392

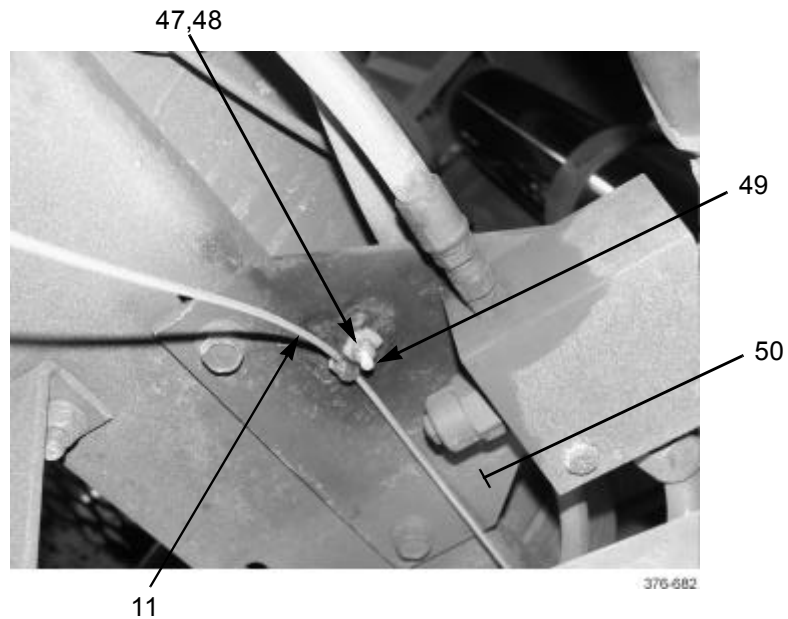
8. Secure drain valve cable pulls (11) to welded studs (9) on stowage compartment mounting bracket with two clamps (10) and new locknuts (8).



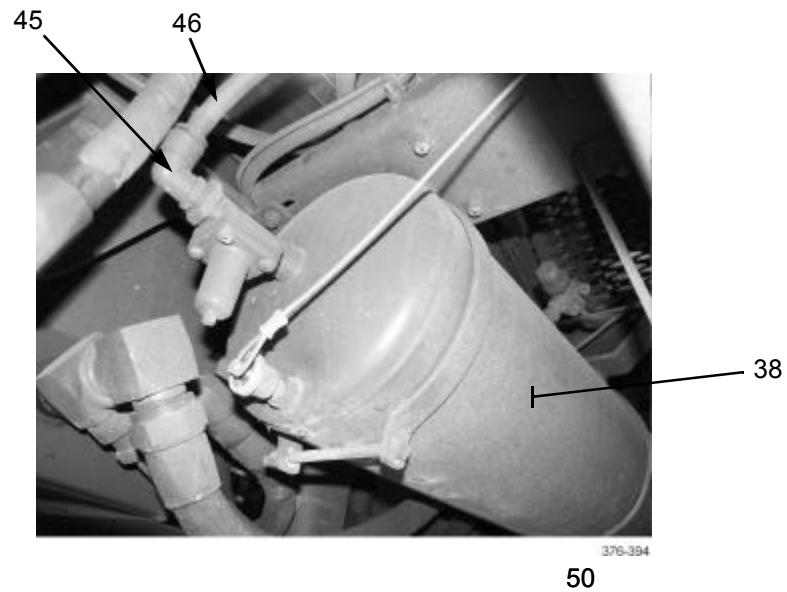
376-461

**FRONT AIR RESERVOIR INSTALLATION - CONTINUED**

9. Secure drain valve cable pull (11) to welded stud (49) on locking valve mounting bracket (50) with clamp (48) and new locknut (47).

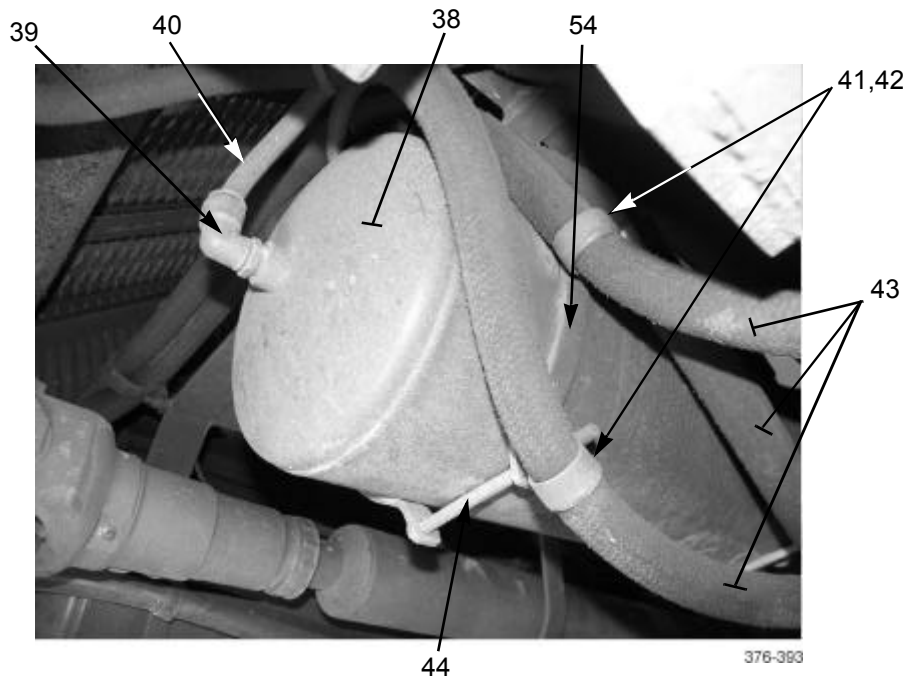


10. At rear of air reservoir (38) connect air hose (46) to push-in elbow fitting (45).

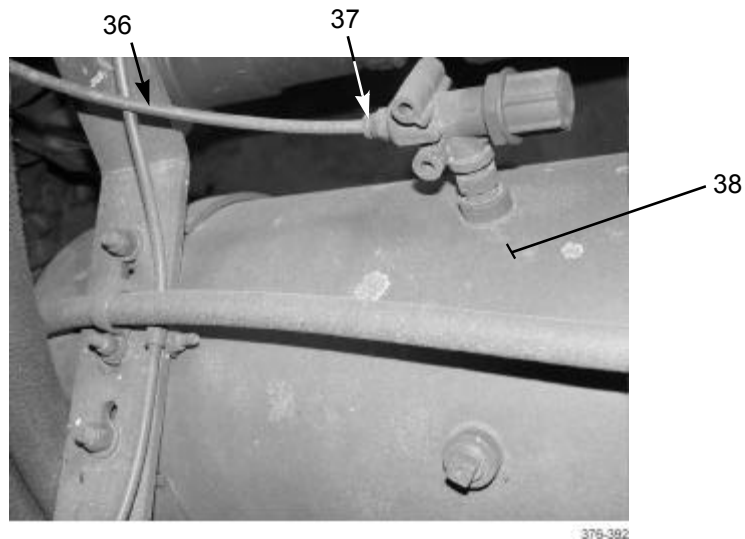


**FRONT AIR RESERVOIR INSTALLATION - CONTINUED**

11. On left side of air reservoir (38), secure three hydraulic hoses (43) to welded stud on front mounting strap (54) and to front mounting strap screw (44) with three clamps (42) and two nuts (41).
12. At front of air reservoir (38), connect air hose (40) to push-in elbow fitting (39).



13. At top of air reservoir (38), connect air hose (36) to push-in straight fitting (37).



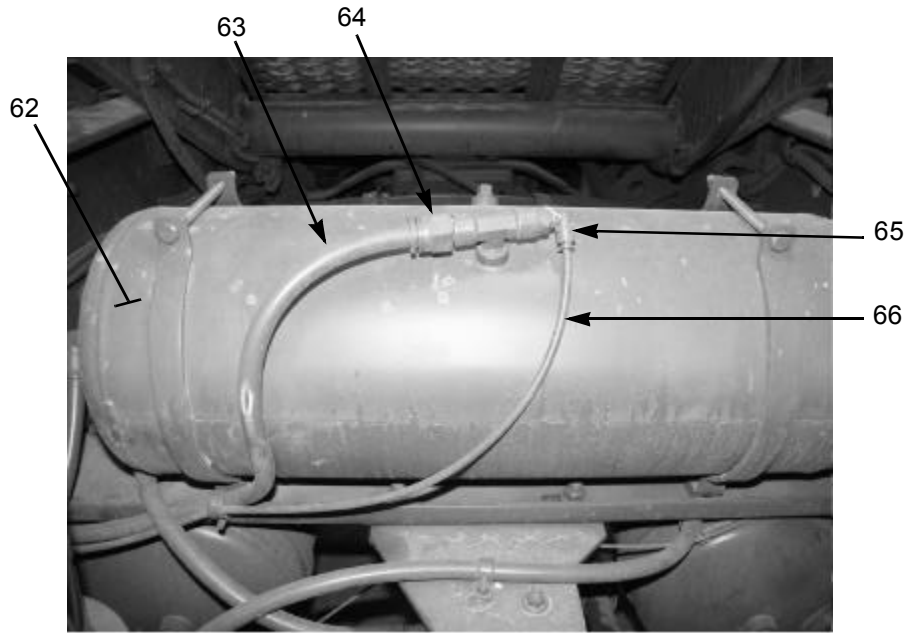
14. Start engine and fully pressurize air system (TM 9-2320-312-10).
15. Check for air leaks: Apply a detergent and water solution to check for leaks at air connections.
16. Lower fifth wheel (TM 9-2320-312-10).

**REAR AIR RESERVOIR REMOVAL**

**NOTE**

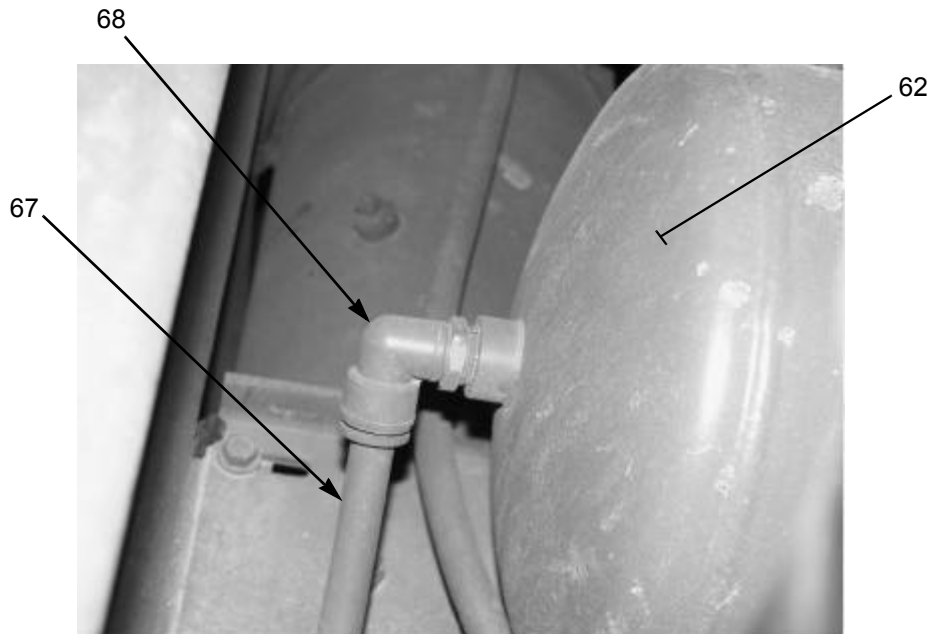
Rear air reservoir is mounted crosswise between frame rails, above wet tank and front air reservoir.

1. At top of air reservoir (62), disconnect air hoses (63 and 66) from push-in straight fitting (64) and push-in elbow fitting (65).



376-418

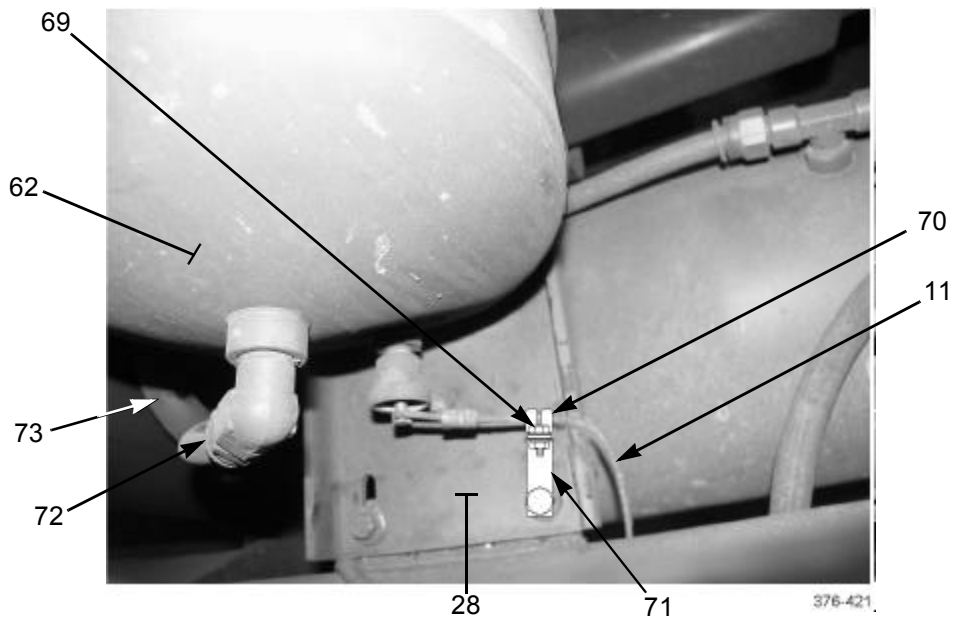
2. Disconnect air hose (67) from push-in elbow fitting (68) on left side of air reservoir (62).



376-683

**REAR AIR RESERVOIR REMOVAL - CONTINUED**

3. On right side of air reservoir (62), disconnect air hose (73) from push-in straight fitting (72).
4. Remove bolt (69), nut, and clamp (70), and release drain valve cable pull (11) from stand-off bracket (71) at rear air reservoir mounting bracket (28).



5. Remove two locknuts (8) and clamps (10) from welded studs (9) on stowage compartment mounting bracket and release drain valve cable pulls (11). Discard locknuts.



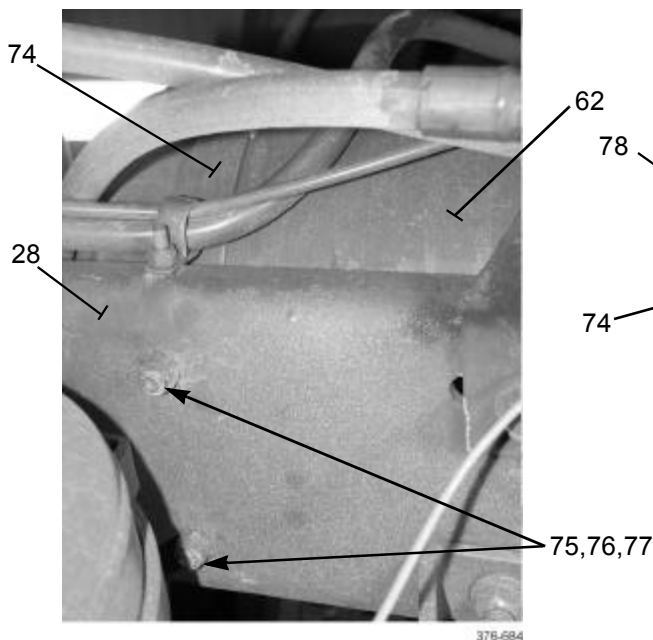
REAR AIR RESERVOIR REMOVAL - CONTINUED



**WARNING**

Rear air reservoir is awkward to handle. Use assistance when removing to avoid injury to personnel.

6. Remove four nuts (75), bolts (77), and air reservoir (62) with spacers (76) and two mounting straps (74) from rear air reservoir mounting bracket (28).
7. Remove two nuts (79), lockwashers (80), screws (78), and mounting straps (74) from air reservoir (62). Discard lockwashers.

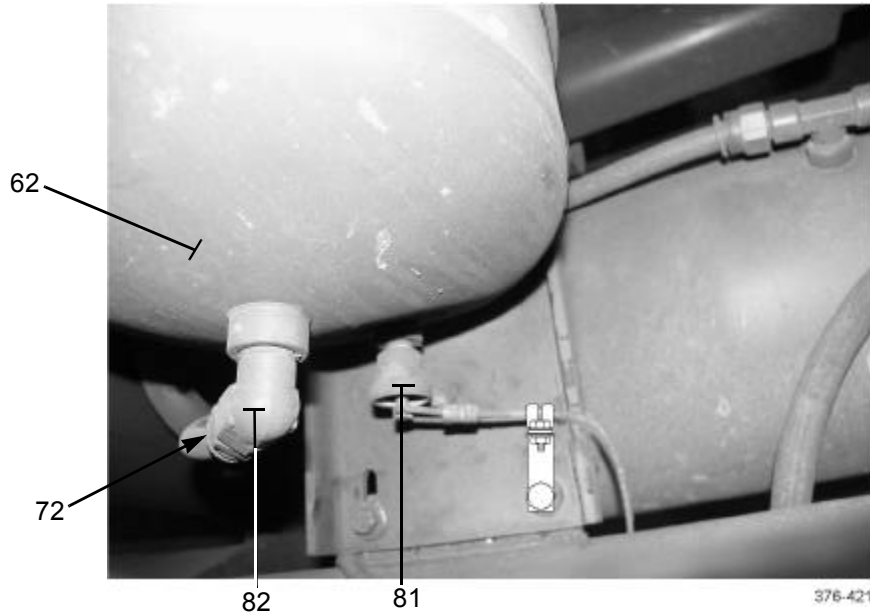




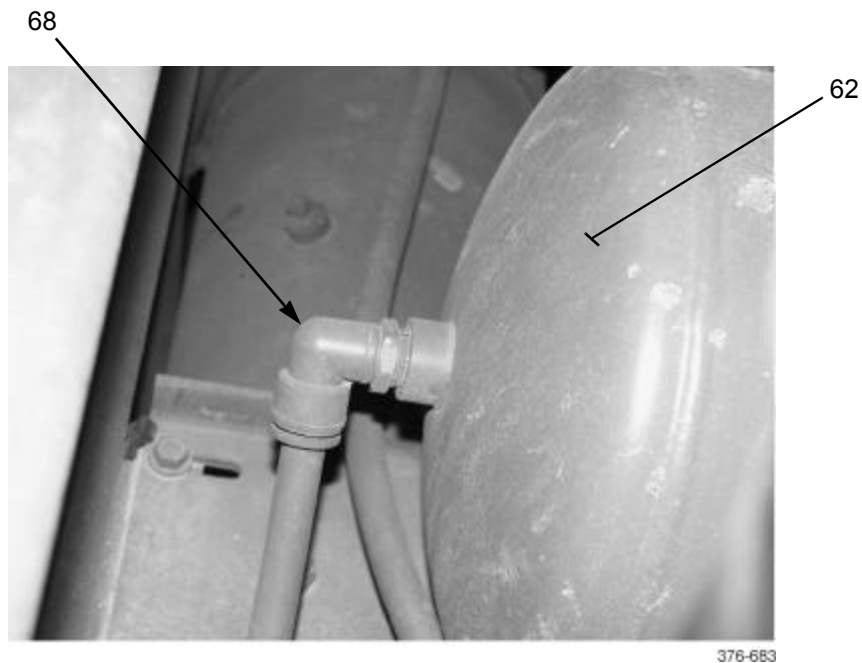
**REAR AIR RESERVOIR REMOVAL - CONTINUED****NOTE**

Perform steps 8 through 12 as required to remove fittings from rear air reservoir.

8. Remove drain valve (81) from right side of air reservoir (62).
9. Remove push-in straight fitting (72) and check valve (82) from air reservoir (62).

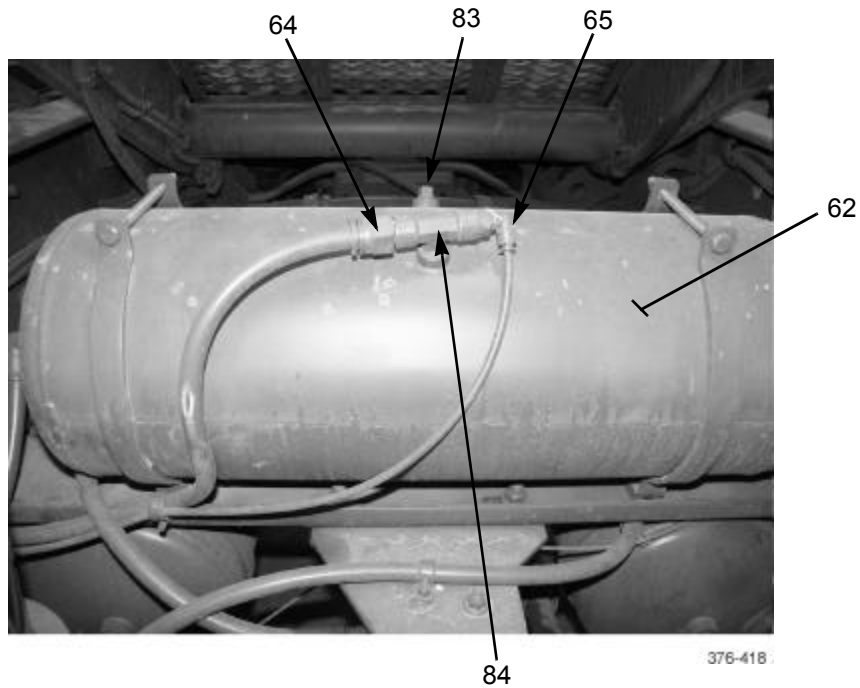


10. Remove push-in elbow fitting (68) from left side of air reservoir (62).



**REAR AIR RESERVOIR REMOVAL - CONTINUED**

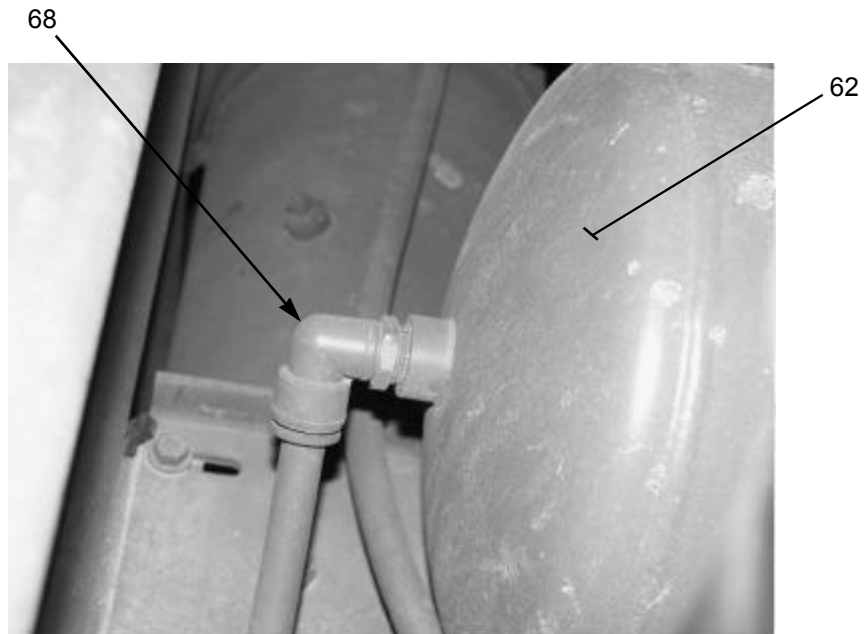
11. Remove push-in straight fitting (64), push-in elbow fitting (65), and tee (84) from top of air reservoir (62).
12. Remove plug (83).

**REAR AIR RESERVOIR INSTALLATION****NOTE**

- Perform steps 1 through 5 as required to install fittings to rear air reservoir.
  - Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.
1. Install plug (83).
  2. Install tee (84), push-in elbow fitting (65), and push-in straight fitting (64) to top of air reservoir (62).

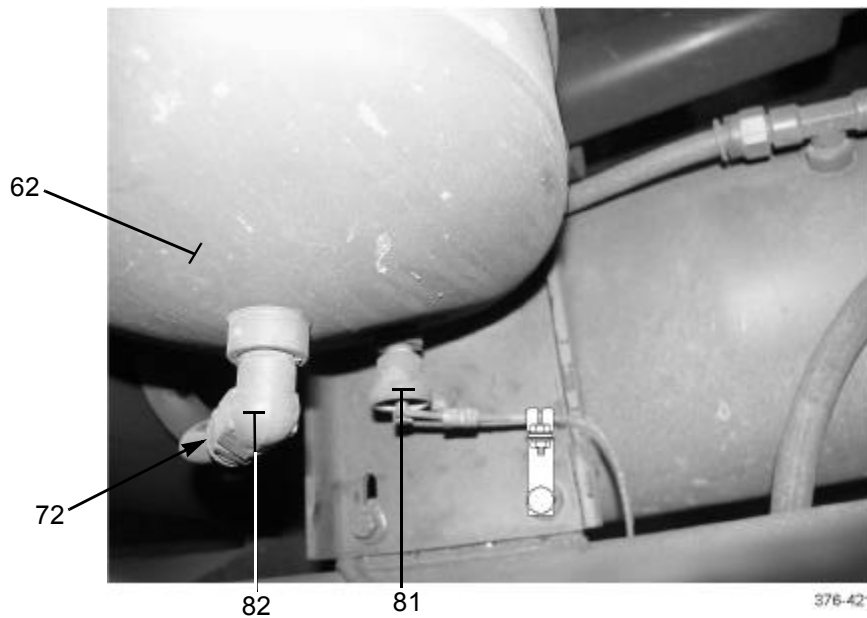
**REAR AIR RESERVOIR INSTALLATION - CONTINUED**

3. Install push-in elbow fitting (68) to left side of air reservoir (62).



376-683

4. Install check valve (82) and push-in straight fitting (72) to right side of air reservoir (62).
5. Install drain valve (81).



376-421

**REAR AIR RESERVOIR INSTALLATION - CONTINUED**

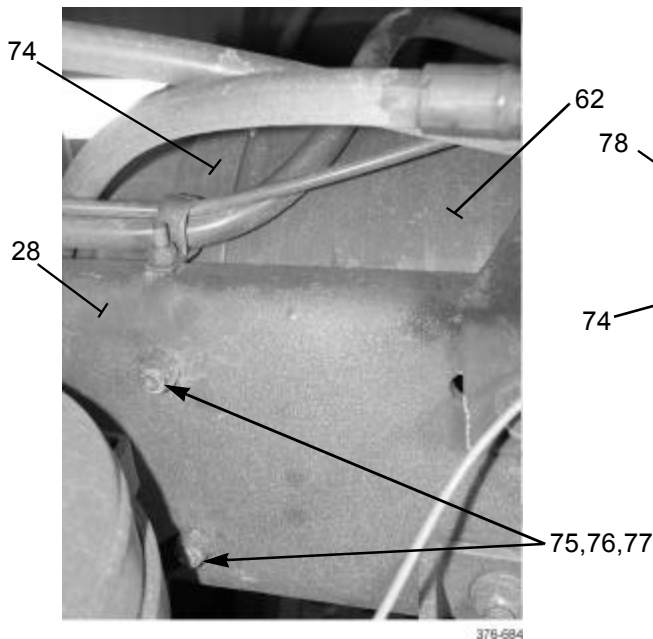
6. Position two mounting straps (74) around air reservoir (62) and install two screws (78), new lockwashers (80), and nuts (79).



**WARNING**

Rear air reservoir is awkward to handle. Use assistance when installing to avoid injury to personnel.

7. Position air reservoir (62) with two spacers (76) and mounting straps (74) to rear air reservoir mounting bracket (28). Secure with four bolts (77) and nuts (75).

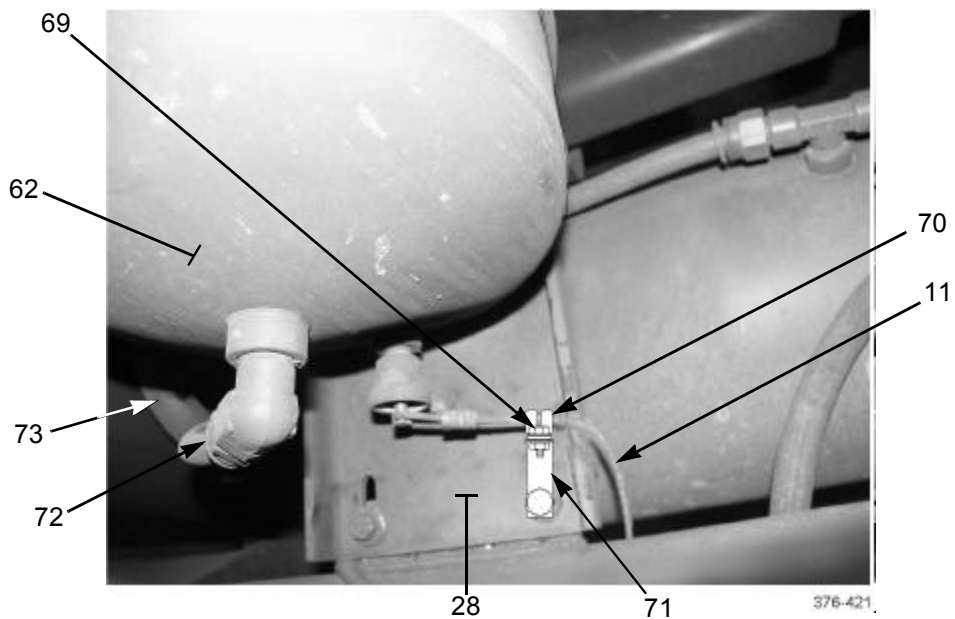


**REAR AIR RESERVOIR INSTALLATION - CONTINUED**

8. Secure drain valve cable pulls (11) to welded studs (9) on stowage compartment mounting bracket with two clamps (10) and new locknuts (8).

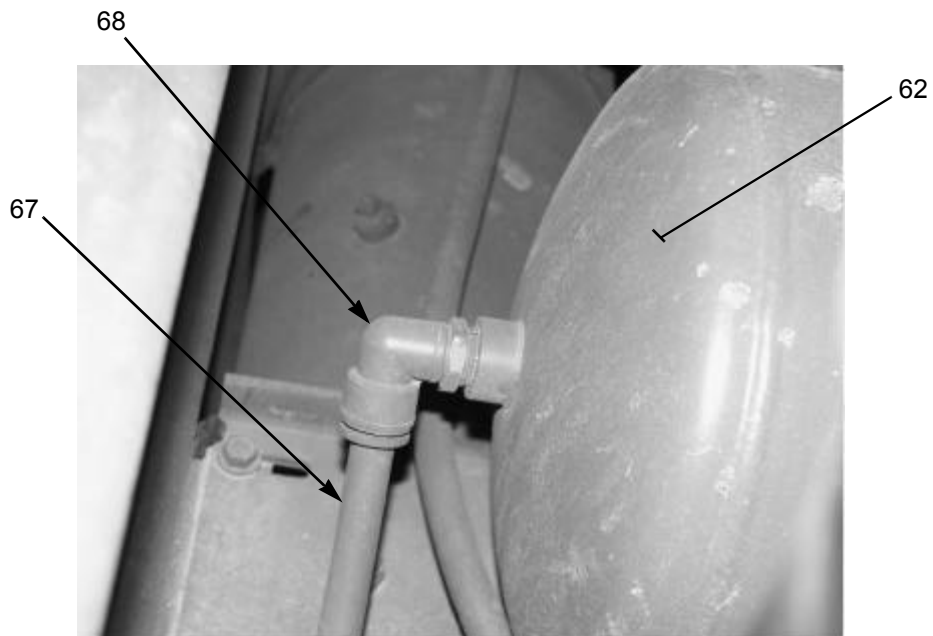


9. Secure drain valve cable pull (11) to stand-off bracket (71) at rear air reservoir mounting bracket (28) with clamp (70), bolt (69), and nut.
10. Connect air hose (73) to push-in straight fitting (72).



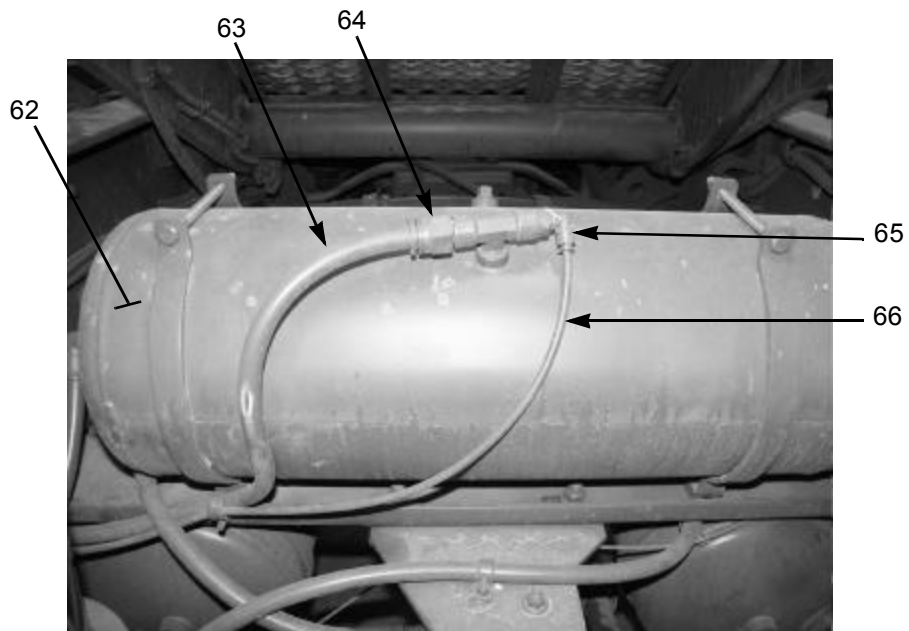
**REAR AIR RESERVOIR INSTALLATION - CONTINUED**

11. Connect air hose (67) to push-in elbow fitting (68) on left side of air reservoir (62).



376-6B3

12. At top of air reservoir (62), connect air hoses (66 and 63) to push-in elbow fitting (65) and push-in straight fitting (64).



376-418

***REAR AIR RESERVOIR INSTALLATION - CONTINUED***

13. Start engine and fully pressurize air system (TM 9-2320-312-10).
14. Check for air leaks: Apply a detergent and water solution to check for leaks at air connections.
15. Lower fifth wheel (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**AIRBRAKE SYSTEM VALVES REPLACEMENT**

**0063 00**

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**THIS WORK PACKAGE COVERS**

Cab-Mounted Tractor Protection Valve: Removal, Installation

Rear Tractor Protection Valve: Removal, Installation

Front Brake Relay Valve: Removal, Installation

Rear Brake Relay Valve: Removal, Installation

SR-1 Modulating Valve: Removal, Installation

Emergency Brake Relay Valve: Removal, Installation

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**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 150

**RPSTL Reference**

Group 150, Figures 3, 4, and 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

Detergent (Item 23, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

**Materials/Parts - Continued**

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N 21NE048) (2) (rear brake relay valve)

Nut, lock (P/N 21NE048) (2) (SR-1 modulating valve)

Washer, lock (P/N 361-10) (2) (either tractor protection valve)

**References**

WP 0066 00

**Equipment Condition**

Wheels blocked

Air system drained (TM 9-2320-312-10)

---



**WARNING**

DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

**NOTE**

- Tag air lines and note position of all fittings to ensure correct installation.
- Remove tiedown straps as required and discard. Ensure new tiedown straps are used on installation, to properly support air lines.
- Refer to WP 0066 00 for information on removing and installing air lines to push-in fittings.

**CAB-MOUNTED TRACTOR PROTECTION VALVE REMOVAL**

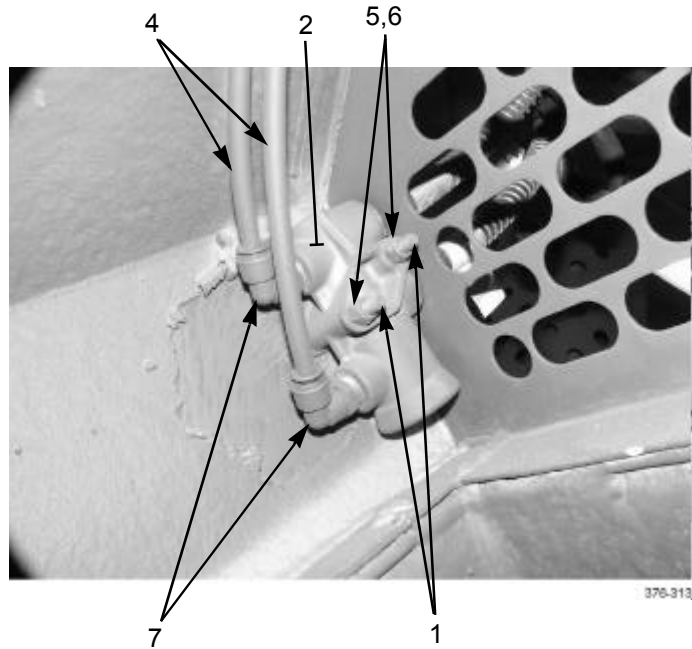
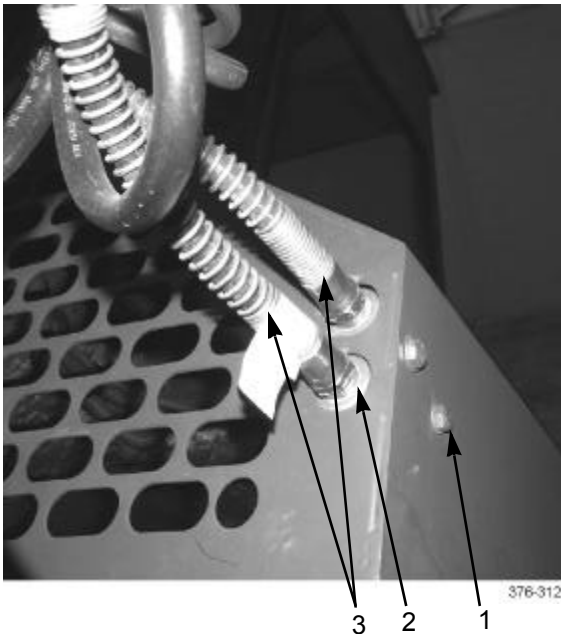
1. Tilt cab (TM 9-2320-312-10).

**NOTE**

Top port of valve is marked EMERGENCY. Bottom port is SERVICE.

**CAB-MOUNTED TRACTOR PROTECTION VALVE REMOVAL - CONTINUED**

2. Disconnect two intervehicular hose assemblies (3) from valve (2) at right rear of cab.
3. Disconnect two air lines (4) from elbows (7).
4. Remove two nuts (5), lockwashers (6), screws (1), and valve (2) from cab. Discard lockwashers.
5. Remove two elbows (7) from valve (2).



**CAB-MOUNTED TRACTOR PROTECTION VALVE INSTALLATION**

**NOTE**

Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.

1. Install two elbows (7) to valve (2).
2. Position valve (2) to right rear of cab, with top EMERGENCY port facing up. Secure valve with two screws (1), new lockwashers (6), and nuts (5).
3. Connect two air lines (4) to elbows (7).

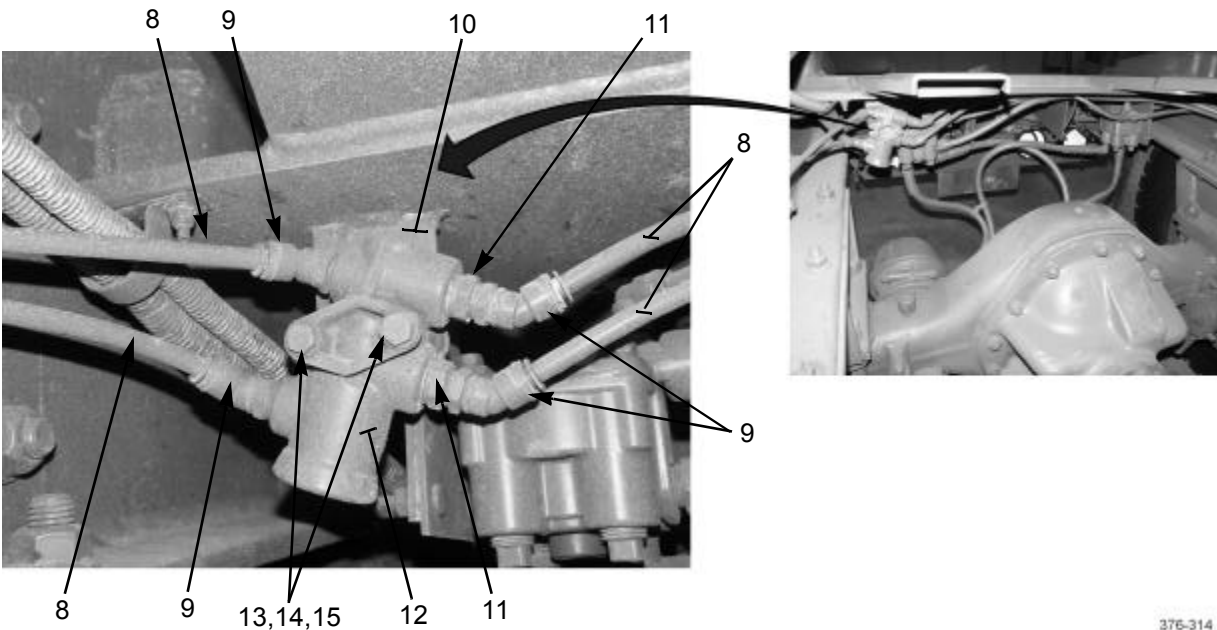
**NOTE**

Ensure emergency intervehicular hose assembly is connected to top EMERGENCY port of valve.

4. Connect two intervehicular hose assemblies (3) to valve (2).
5. Lower cab (TM 9-2320-312-10).
6. Start engine and fully pressurize air system (TM 9-2320-312-10).
7. Check for air leaks: Tilt cab sufficiently to access valve (2). Apply a detergent and water solution to check for leaks at air connections.

**REAR TRACTOR PROTECTION VALVE REMOVAL**

1. Raise fifth wheel to access valve (12) at right rear of vehicle (TM 9-2320-312-10).
2. Disconnect four air lines (8) from 45° elbows (9).
3. Remove two nuts (13), lockwashers (14), screws (15), and valve (12) from bracket (10). Discard lockwashers.
4. Remove four 45° elbows (9) and two bushings (11) from valve (12).

**REAR TRACTOR PROTECTION VALVE INSTALLATION****NOTE**

Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.

1. Install two bushings (11) and four 45° elbows (9) to valve (12).
2. Install valve (12) to bracket (10) with top EMERGENCY port facing up. Secure valve with two screws (15), new lockwashers (14), and nuts (13).

**NOTE**

Ensure air line from rear emergency gladhand is connected to top EMERGENCY port of valve.

3. Connect four air lines (8) to 45° elbows (9).
4. Start engine and fully pressurize air system (TM 9-2320-312-10).
5. Check for air leaks: Apply a detergent and water solution to check for leaks at air connections.
6. Lower fifth wheel (TM 9-2320-312-10).

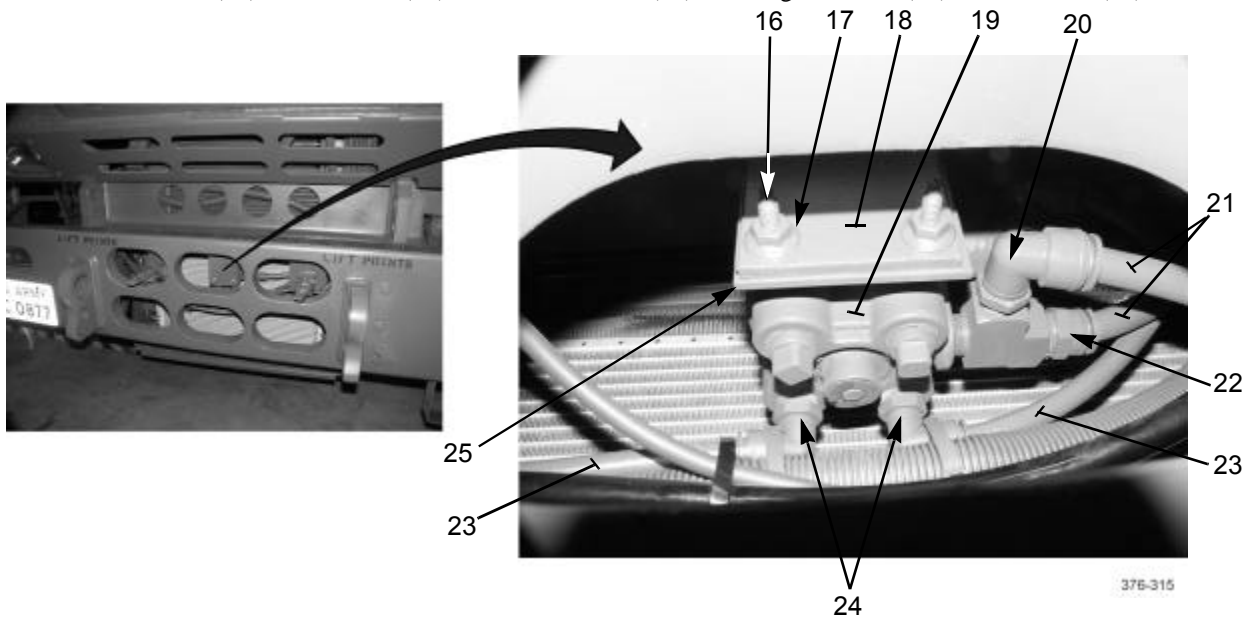
**FRONT BRAKE RELAY VALVE REMOVAL**

1. Remove tiedown straps from bundle of lines and move lines out of the way. Discard tiedown straps.
2. Disconnect two air lines (23) from elbows (24) on underside of valve (19).
3. Disconnect four air lines (21) from two elbows (20) and two straight fittings (22) on side of valve (19).

**NOTE**

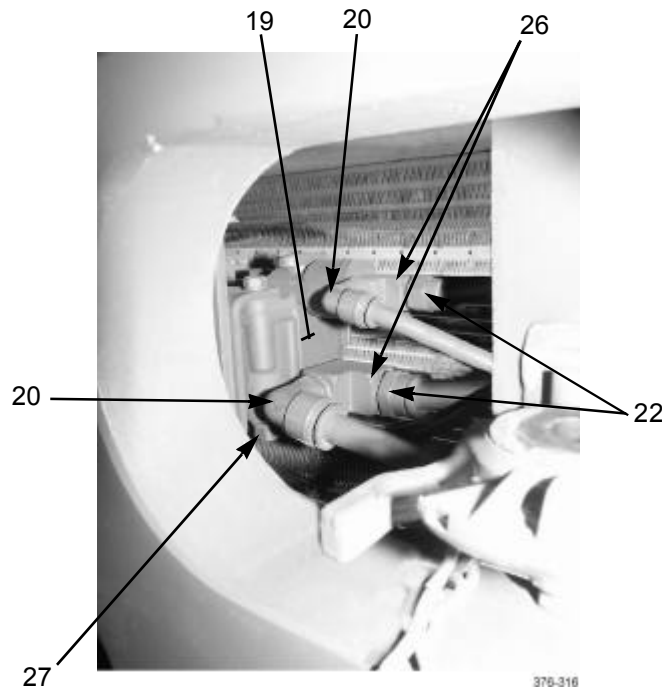
Front brake relay valve comes assembled to angle bracket.

4. Remove two nuts (17) from screws (16) and remove valve (19) with angle bracket (25) from bracket (18).



**FRONT BRAKE RELAY VALVE REMOVAL - CONTINUED**

- Remove two elbows (24), elbows (20), straight fittings (22), tees (26), and plugs (27) from valve (19).

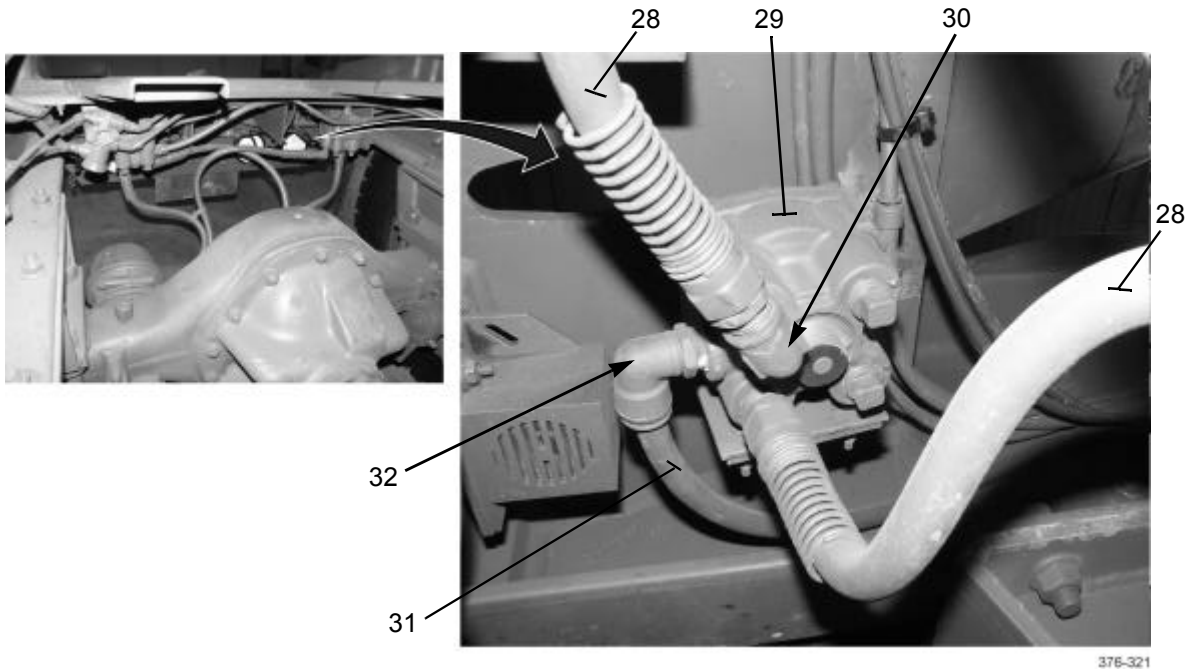
**FRONT BRAKE RELAY VALVE INSTALLATION****NOTE**

Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.

- Install two elbows (24), tees (26), straight fittings (22), elbows (20), and plugs (27) to valve (19).
- Install angle bracket (25) with valve (19) to bracket (18) with two nuts (17) on screws (16).
- Connect four air lines (21) to two elbows (20) and two straight fittings (22).
- Connect two air lines (23) to elbows (24).
- Start engine and fully pressurize air system (TM 9-2320-312-10).
- Check for air leaks: Apply a detergent and water solution to check for leaks at air connections.
- Reposition bundle of lines at valve (19) and secure with new tiedown straps.

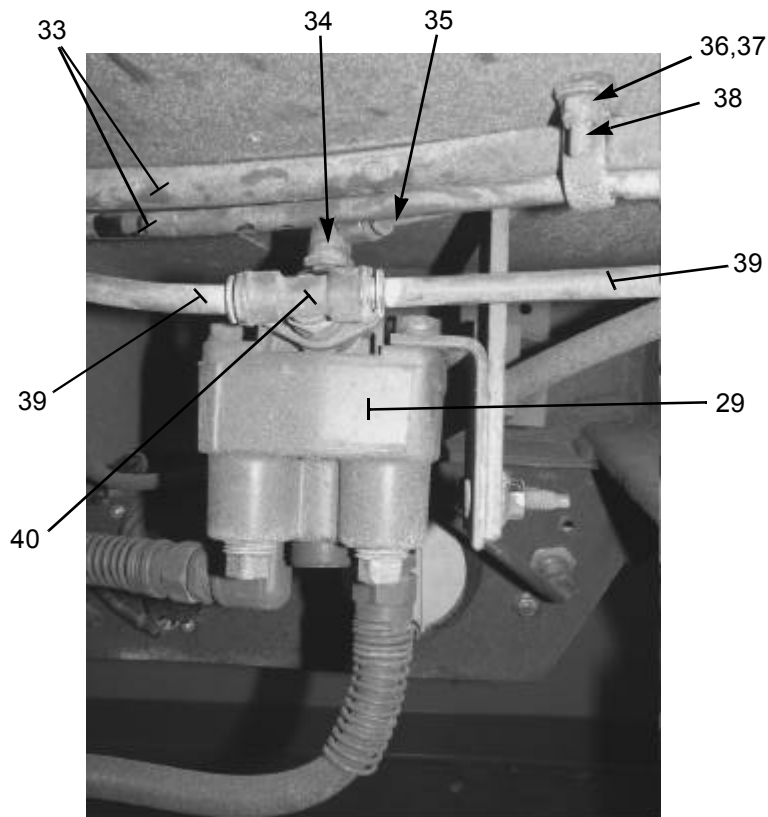
**REAR BRAKE RELAY VALVE REMOVAL**

1. Raise fifth wheel to access valve (29) at left rear of vehicle (TM 9-2320-312-10).
2. Remove two airbrake chamber hoses (28) from elbow (30) and from underside of valve (29).
3. Disconnect air line (31) from elbow (32) at rear of valve (29).



**REAR BRAKE RELAY VALVE REMOVAL - CONTINUED**

4. Remove locknut (36), clamp (37), and release air lines (33) from welded stud (38) under frame. Move air lines out of the way. Discard locknut.
5. Disconnect airline (35) from elbow (34) at top of valve (29).
6. Disconnect two air lines (39) from tee (40) at top of valve (29).

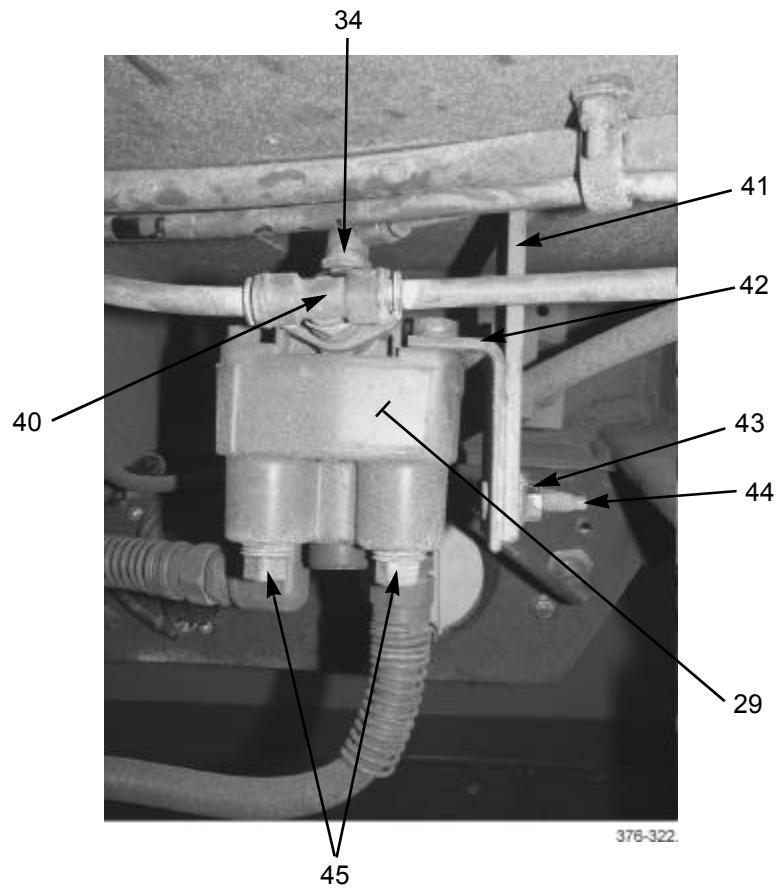


376-322.

**REAR BRAKE RELAY VALVE REMOVAL - CONTINUED****NOTE**

Rear brake relay valve comes assembled to angle bracket.

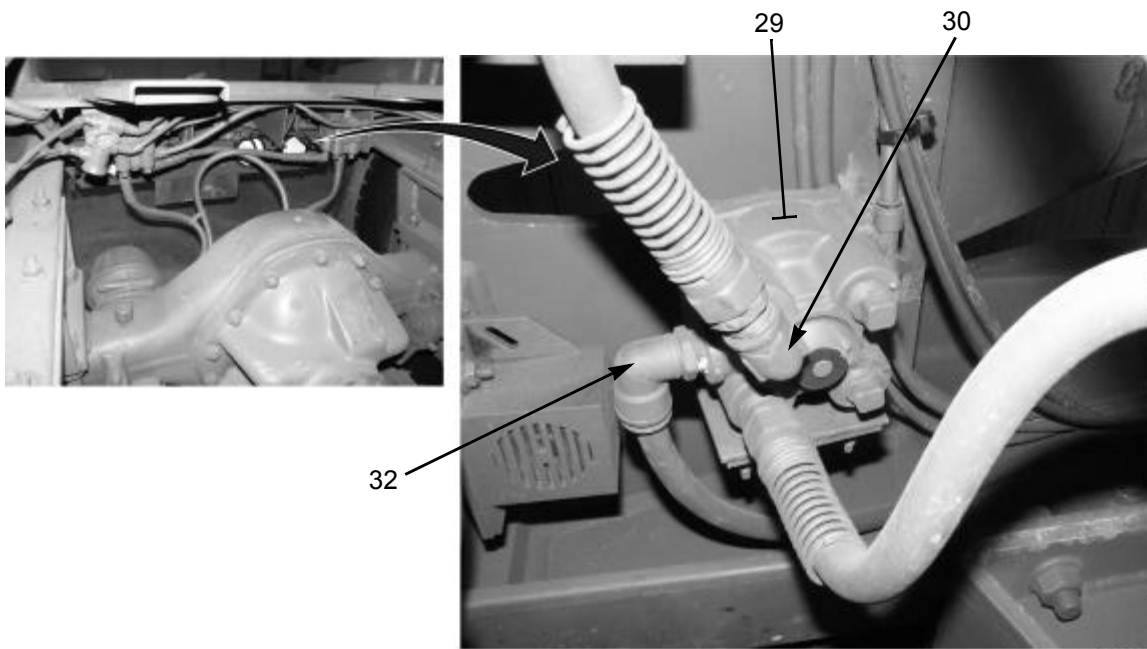
7. Remove two nuts (43) from screws (44) and remove angle bracket (42) with valve (29) from bracket (41).
8. Remove elbow (34) and tee (40) from top of valve (29).
9. Remove two plugs (45).





**REAR BRAKE RELAY VALVE REMOVAL - CONTINUED**

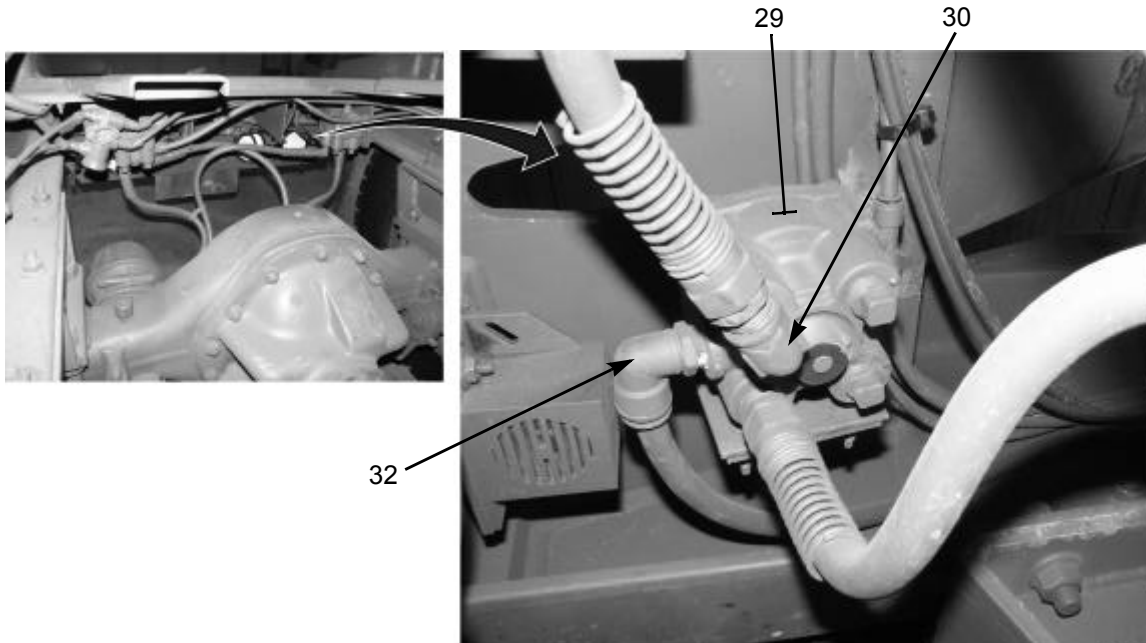
10. Remove elbows (30 and 32) from valve (29).



**REAR BRAKE RELAY VALVE INSTALLATION****NOTE**

Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.

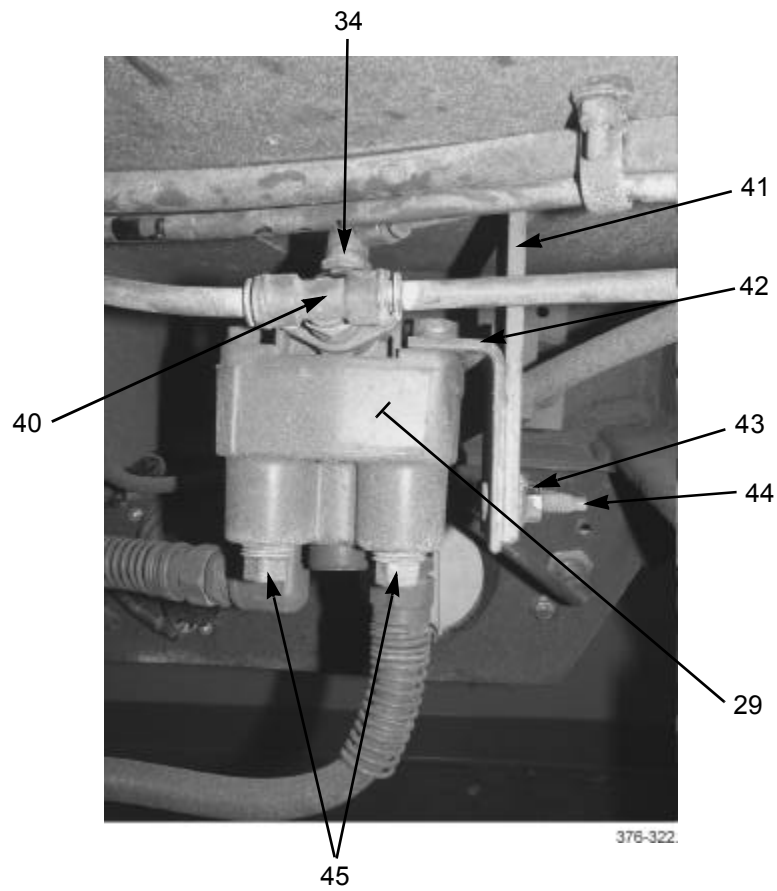
1. Install elbows (30 and 32) to valve (29).



376-321

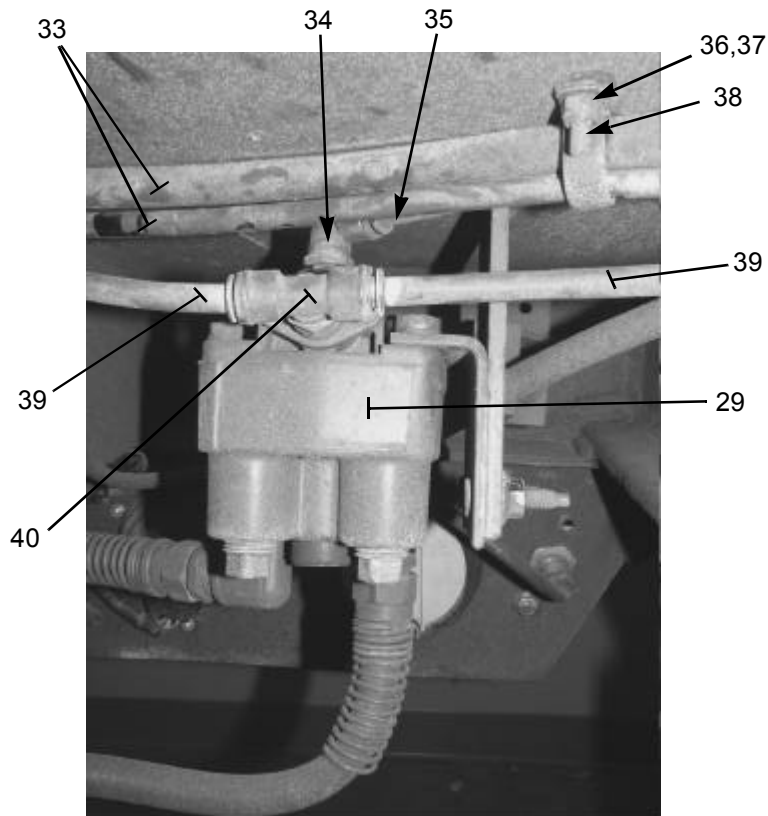
**REAR BRAKE RELAY VALVE INSTALLATION - CONTINUED**

2. Install two plugs (45) to underside of valve (29).
3. Install elbow (34) and tee (40) to top of valve (29).
4. Install angle bracket (42) with valve (29) to bracket (41) with two nuts (43) on screws (44).



**AIRBRAKE SYSTEM VALVES REPLACEMENT - CONTINUED****0063 00****REAR BRAKE RELAY VALVE INSTALLATION - CONTINUED**

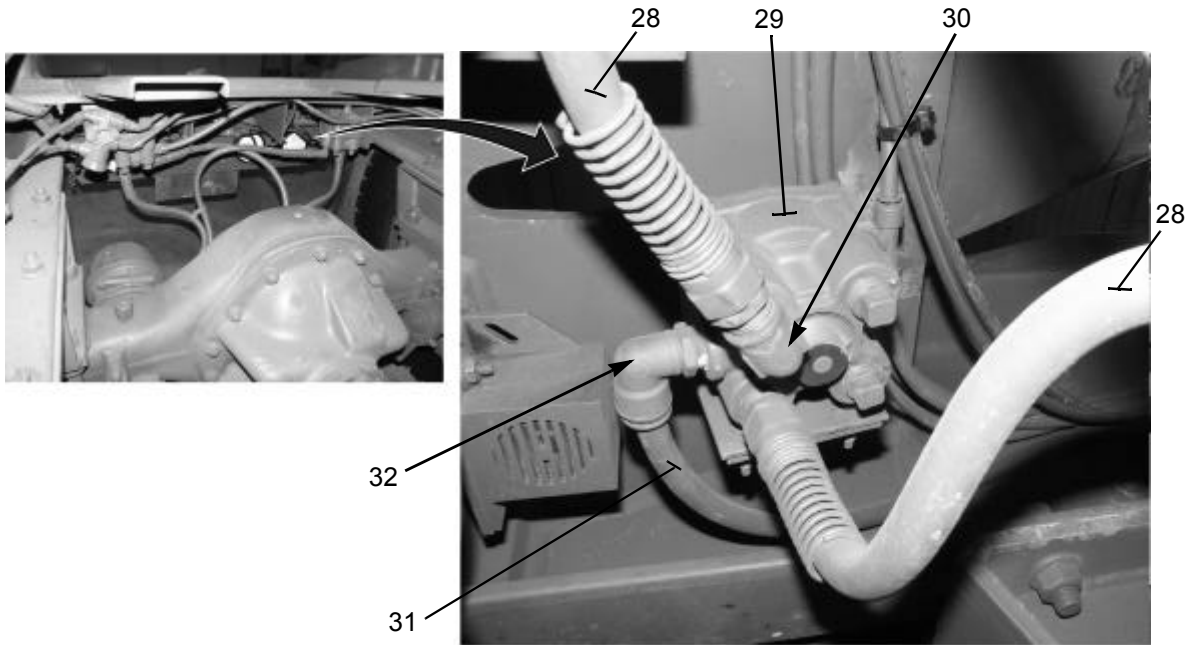
5. Connect two air lines (39) to tee (40) at top of valve (29).
6. Connect air line (35) to elbow (34).
7. Reposition air lines (33) and secure to welded stud (38) with clamp (37) and new locknut (36).



376-322.

**REAR BRAKE RELAY VALVE INSTALLATION - CONTINUED**

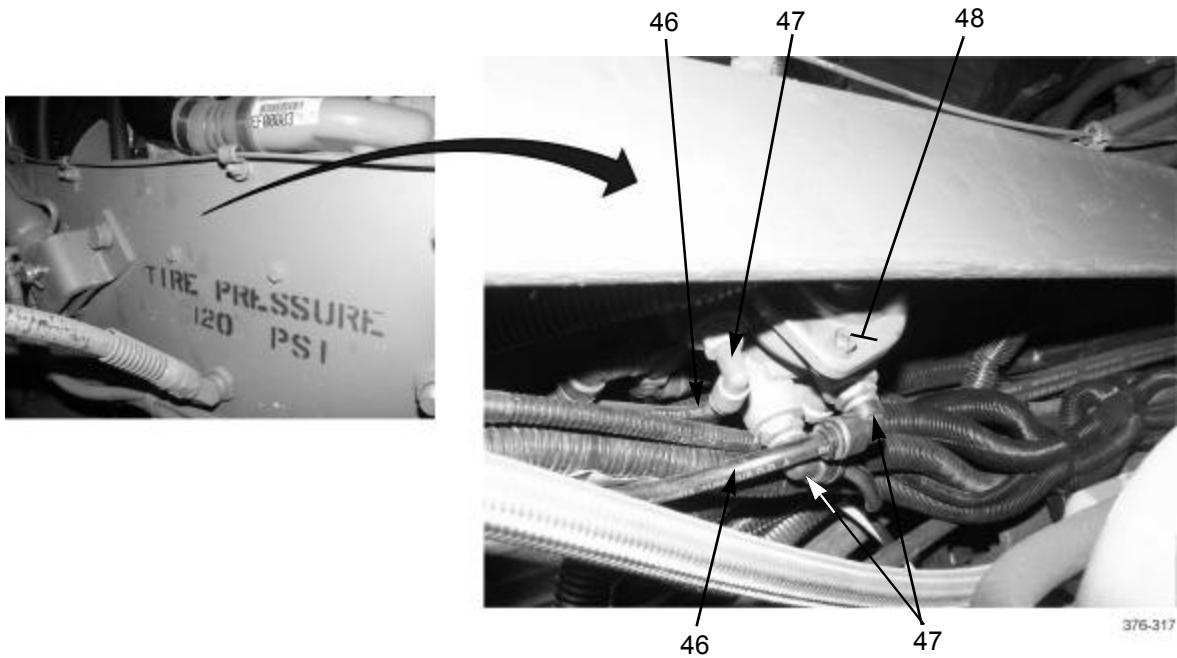
8. Install two airbrake chamber hoses (28) to elbow (30) and to underside of valve (29).
9. Connect air line (31) to elbow (32).



10. Start engine and fully pressurize air system (TM 9-2320-312-10).
11. Check for air leaks: Apply a detergent and water solution to check for leaks at air connections.
12. Lower fifth wheel (TM 9-2320-312-10).

**SR-1 MODULATING VALVE REMOVAL**

1. Tilt cab (TM 9-2320-312-10) to access valve (48) inside left frame rail.
2. Remove tiedown straps and move bundle of wiring harnesses clear of valve (48). Discard tiedown straps.
3. Disconnect five air lines (46) from elbows (47).

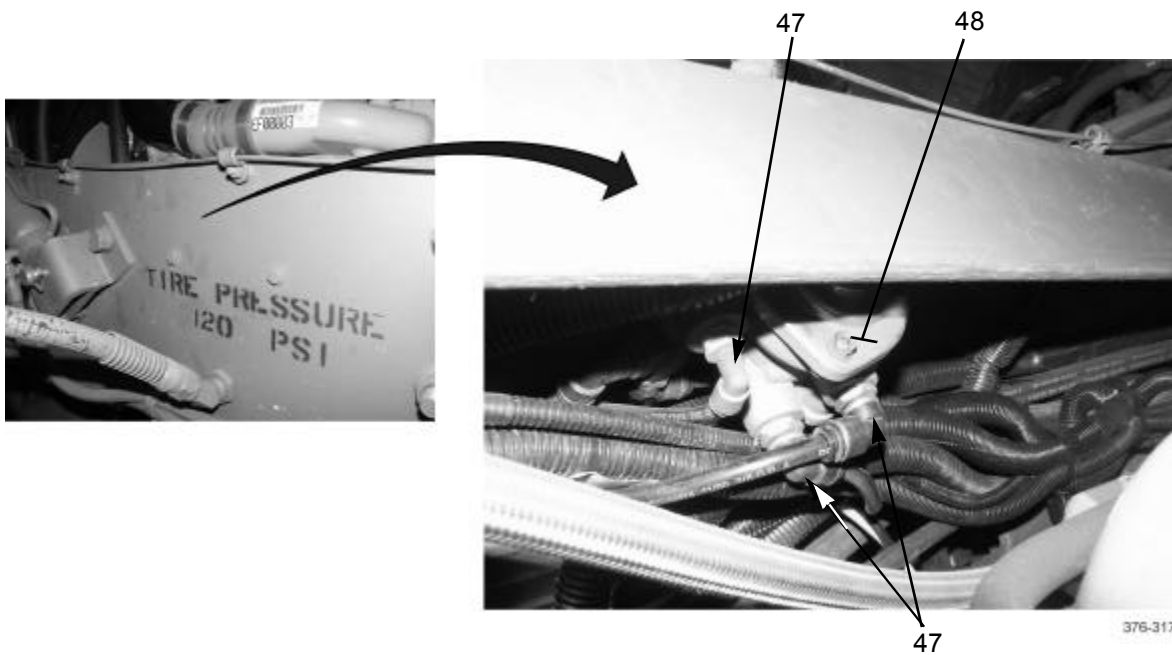


**SR-1 MODULATING VALVE REMOVAL - CONTINUED**

4. Remove two locknuts (49), bolts (50), four washers (51), and valve (48). Discard locknuts.



5. Remove five elbows (47), tee, and plug from valve (48).

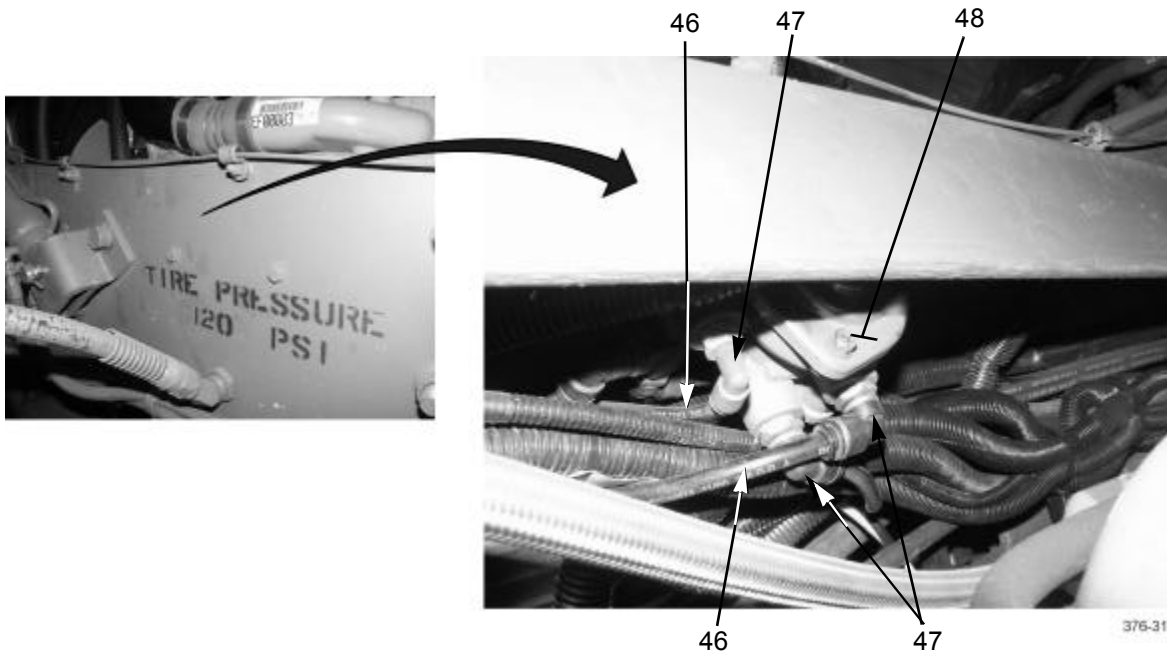


**SR-1 MODULATING VALVE INSTALLATION**

**NOTE**

Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.

1. Install plug, tee, and five elbows (47) to valve (48).



2. Install valve (48) to inside of left frame rail with two bolts (50), four washers (51), and two new locknuts (49).



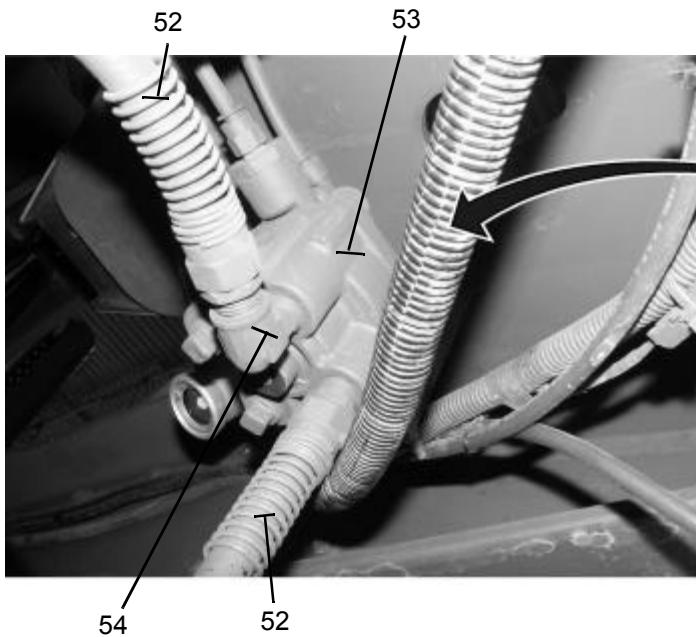


**SR-1 MODULATING VALVE INSTALLATION - CONTINUED**

3. Connect five air lines (46) to elbows (47).
4. Lower cab (TM 9-2320-312-10).
5. Start engine and fully pressurize air system (TM 9-2320-312-10).
6. Check for air leaks: Tilt cab sufficiently to access valve (48). Apply a detergent and water solution to check for leaks at air connections.
7. Reposition bundle of wiring harnesses and secure with new tiedown straps.

**EMERGENCY BRAKE RELAY VALVE REMOVAL**

1. Raise fifth wheel to access valve (53) at right rear of vehicle (TM 9-2320-312-10).
2. Remove two airbrake chamber hoses (52) from elbow (54) and from underside of valve (53).



376-319

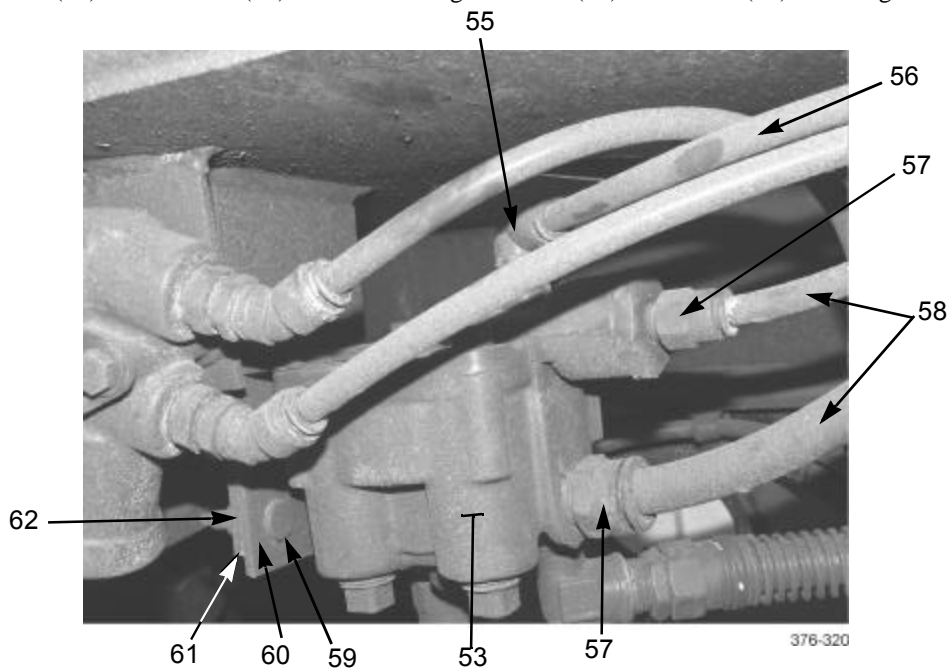
**EMERGENCY BRAKE RELAY VALVE REMOVAL - CONTINUED**

3. Disconnect air line (56) from elbow (55) at top of valve (53).
4. Disconnect two air lines (58) from straight fittings (57).

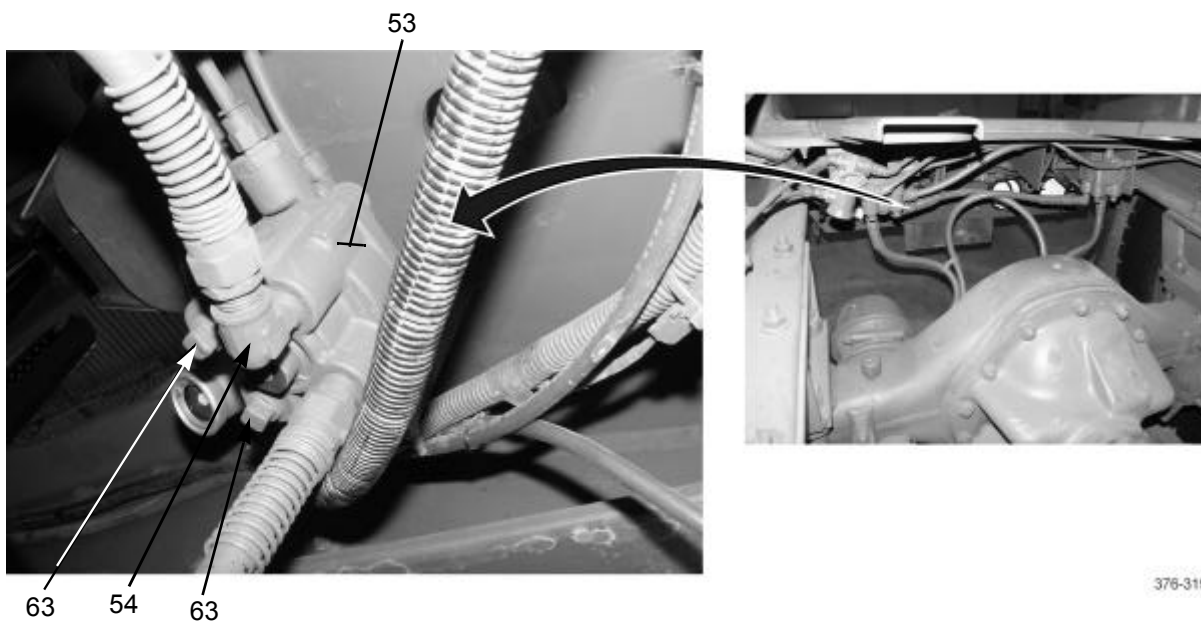
**NOTE**

Emergency brake relay valve comes assembled to angle bracket.

5. Remove two nuts (62) from screws (59) and remove angle bracket (60) with valve (53) from angle bracket (61).

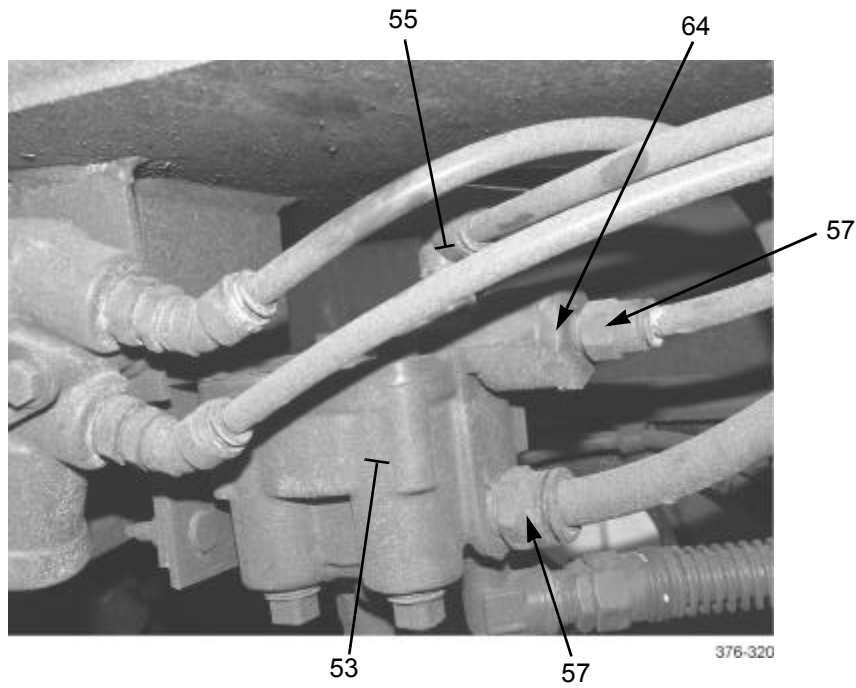


6. Remove elbow (54) and two plugs (63) from valve (53).



**EMERGENCY BRAKE RELAY VALVE REMOVAL - CONTINUED**

7. Remove elbow (55), two straight fittings (57), and bushing (64) from valve (53).

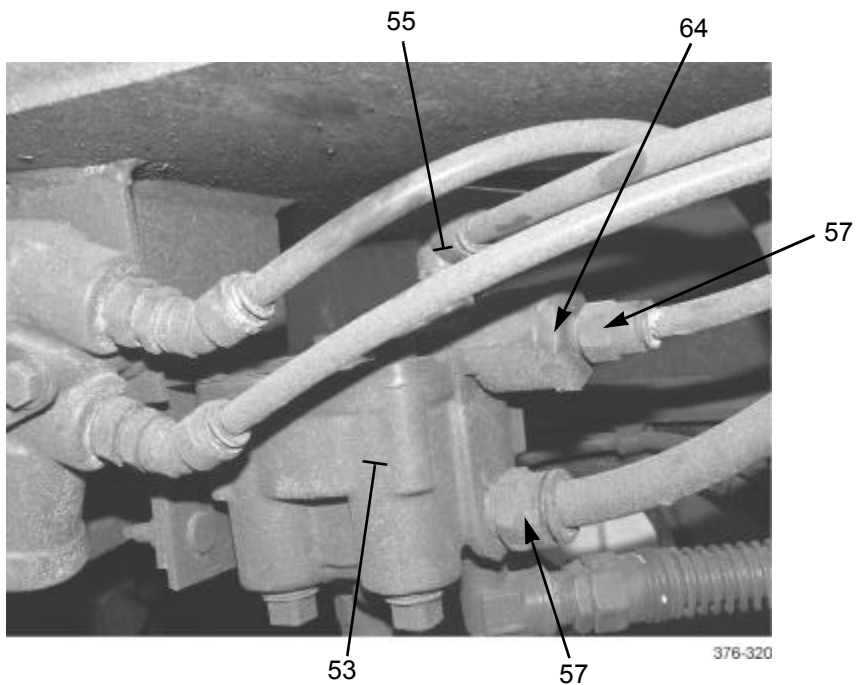


**EMERGENCY BRAKE RELAY VALVE INSTALLATION**

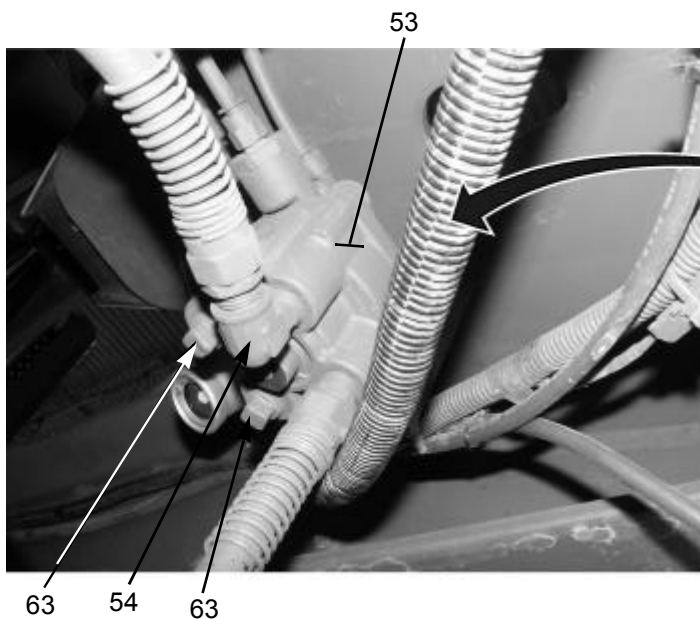
**NOTE**

Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.

1. Install bushing (64), two straight fittings (57), and elbow (55) to valve (53).



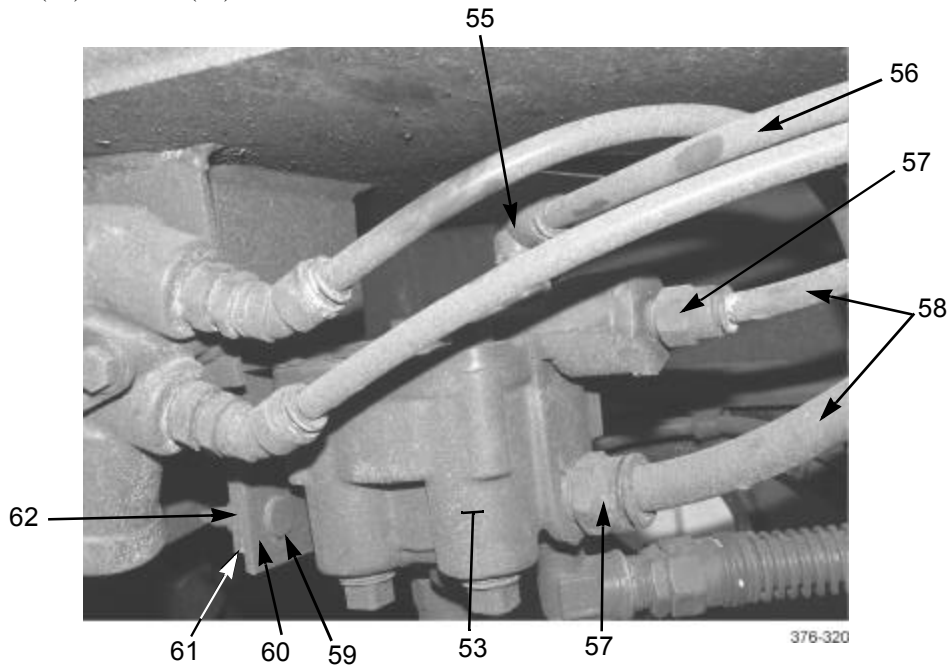
2. Install elbow (54) and two plugs (63) to valve (53).



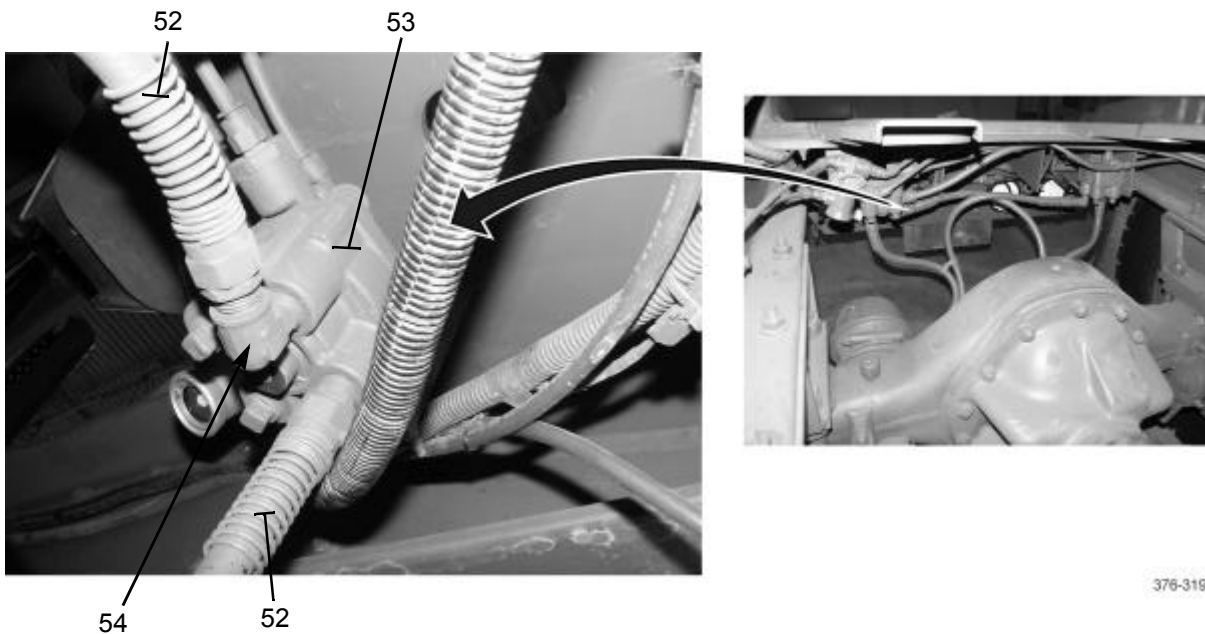
376-319

**EMERGENCY BRAKE RELAY VALVE INSTALLATION - CONTINUED**

3. Install angle bracket (60) with valve (53) to bracket (61) with two nuts (62) on screws (59).
4. Connect two air lines (58) to straight fittings (57).
5. Connect air line (56) to elbow (55).



6. Install two airbrake chamber hoses (52) to elbow (54) and to underside of valve (53).



7. Start engine and fully pressurize air system (TM 9-2320-312-10).
8. Check for air leaks: Apply a detergent and water solution to check for leaks at air connections.
9. Lower fifth wheel (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**BRAKE PEDALS AND AIR TREADLE VALVE REPLACEMENT****0064 00****THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 150 and Group 160

**RPSTL Reference**

Group 150, Figure 5

Group 160, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Adhesive, silicone rubber (Item 3, WP 0165 00)

Compound, pipe sealing (Item 20, WP 0165 00)

Detergent (Item 23, WP 0165 00)

**Materials/Parts - Continued**

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N 31WLF1420) (4)

Pin, spring (P/N MS16562-131) (2)

Washer, lock (P/N 202982) (3)

**References**

WP 0066 00

**Personnel Required**

Two

**Equipment Condition**

Cab tilted to minimum angle, to allow access both under cab and inside cab (TM 9-2320-312-10)

Wheels blocked

Air system drained (TM 9-2320-312-10)

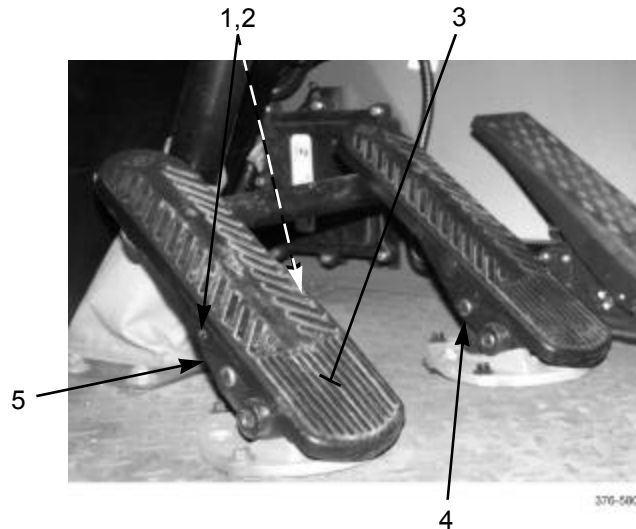
Battery disconnect switch in OFF position

**WARNING**

DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

**REMOVAL**

1. Remove two retaining screws (1), washers (2), and rubber tread (3) from each of two brake pedals (4 and 5).

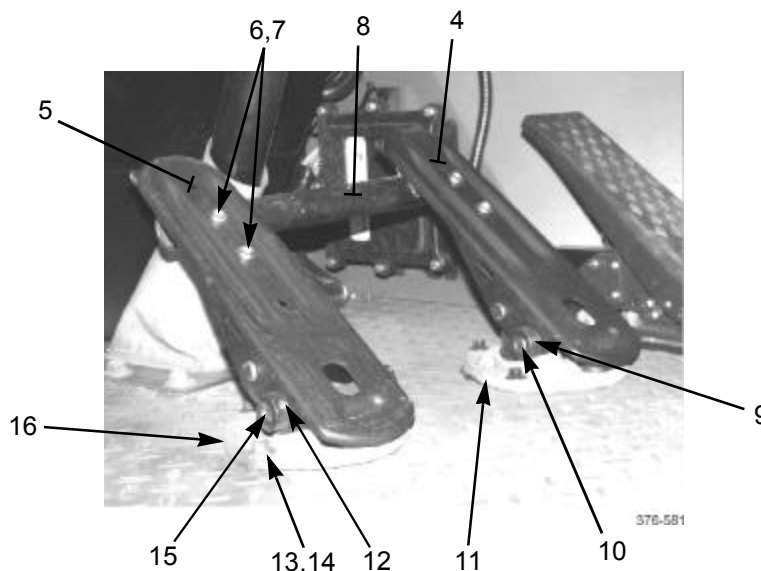


2. Remove four locknuts (6), screws (7), and interconnect bar (8) from two brake pedals (4 and 5). Discard locknuts
3. At left brake pedal (5), remove spring pin (12), pin (15), and left brake pedal from left mounting plate (16). Discard spring pin.

**NOTE**

There is no air treadle valve under left brake pedal. There is only a mounting plate without the valve.

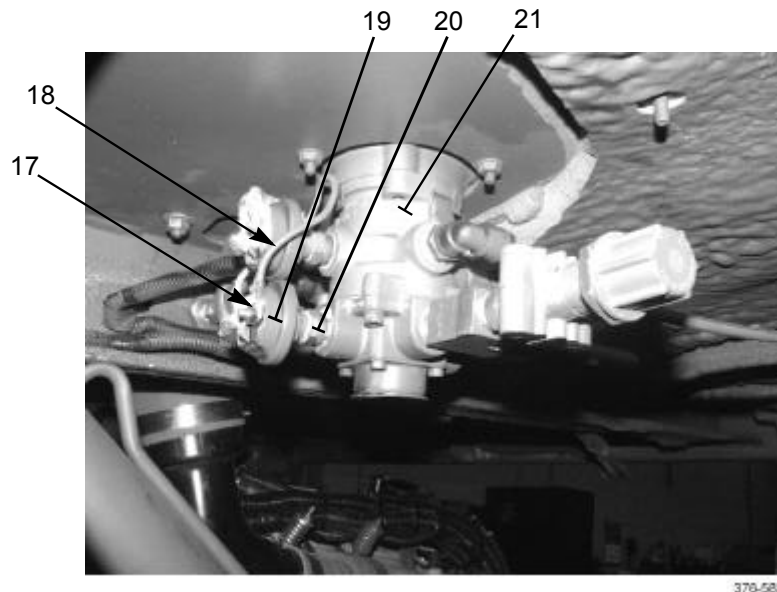
4. Remove three nuts (13), screws (14), and left mounting plate (16) from floor of cab.
5. At right brake pedal (4), remove spring pin (9), pin (10), and right brake pedal from right mounting plate (11). Discard spring pin.





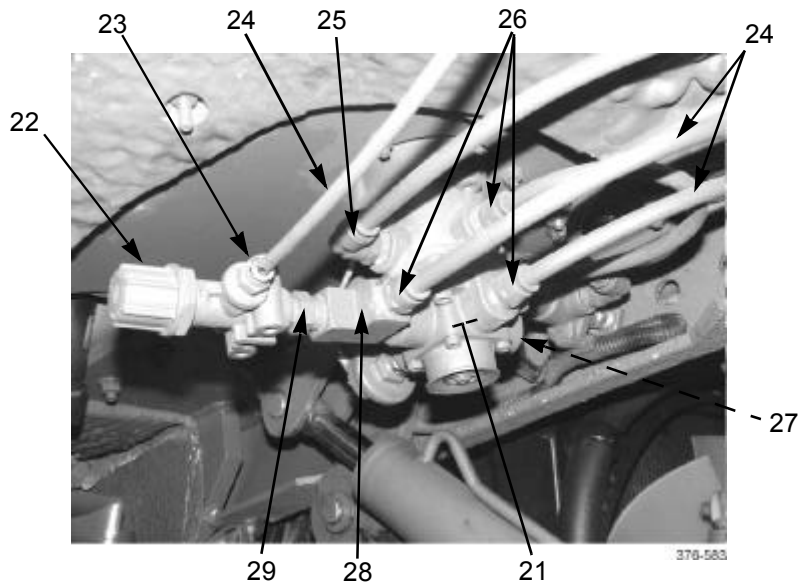
**REMOVAL - CONTINUED****NOTE**

- Tag all wires, fittings, and air lines to ensure correct installation.
  - Refer to WP 0066 00 for information on removing and installing air lines to push-in fittings.
6. At air treadle valve (21) under cab floor, cut tiedown straps and discard. Remove four nuts (17) and starwashers and disconnect two wires (18) from one brake light switch (19) and four wires from second brake light switch.
  7. Remove two brake light switches (19) and bushings (20) from air treadle valve (21).

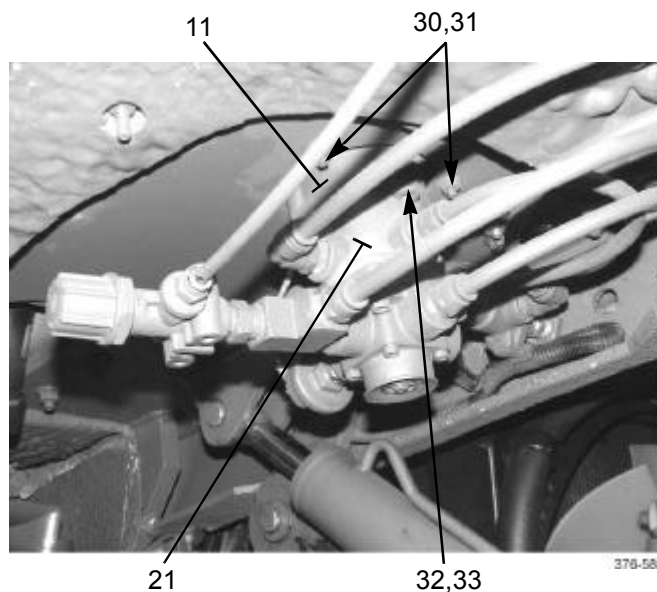


**REMOVAL - CONTINUED**

8. Disconnect five air lines (24) from air treadle valve (21) and from valve fittings.
9. Remove three straight fittings (26) and elbow (25) from trendle valve (21).
10. Remove straight fitting (23) from pressure regulator valve (22).
11. Remove pressure regulator valve (22), adapter (29), and tee (28) from air treadle valve (21).
12. Remove two plugs (27) from air treadle valve (21).



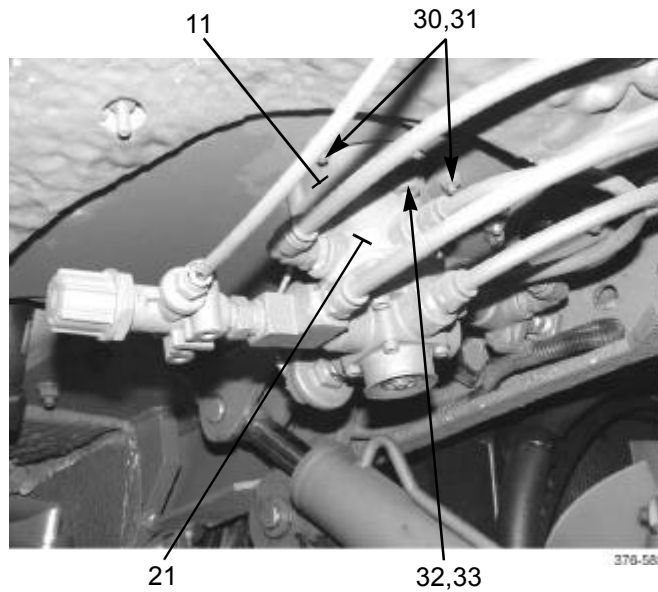
13. Remove three nuts (30), screws (31), and right mounting plate (11) from vehicle.
14. With assistance, remove three screws (32), lockwashers (33), and air treadle valve (21) from right mounting plate (11). Discard lockwashers.



**INSTALLATION****NOTE**

Ensure mounting surface for right mounting plate is free of old adhesive.

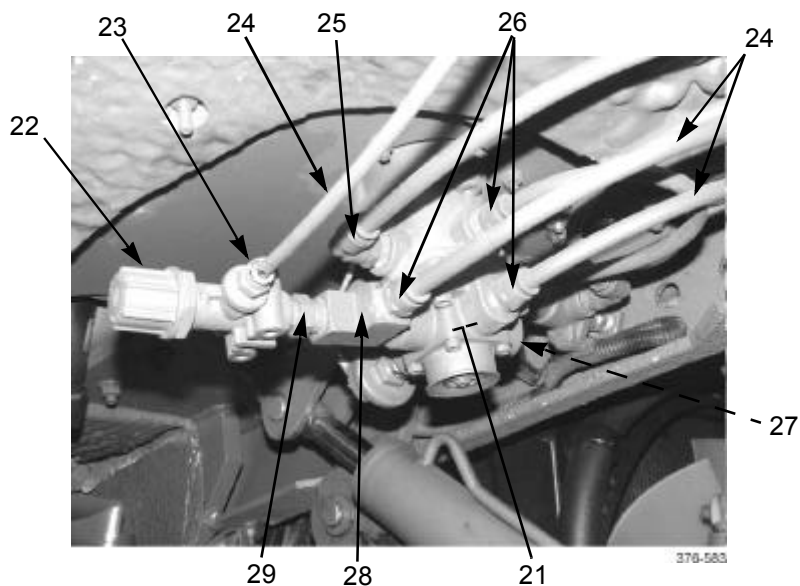
1. Apply adhesive to mating surfaces of cab floor and right mounting plate (11). Install mounting plate to cab floor with three screws (31) and nuts (30).
2. With assistance, install air treadle valve (21) to right mounting plate (11) with three new lockwashers (33) and screws (32).



**INSTALLATION - CONTINUED****NOTE**

Apply a thin coat of pipe sealing compound to male threads of fittings.

3. Install two plugs (27) to air treadle valve (21).
4. Install tee (28), adapter (29), and pressure regulator valve (22) to air treadle valve (21).
5. Install straight fitting (23) to pressure regulator valve (22).
6. Install elbow (25) and three straight fittings (26) to treadle valve (21).



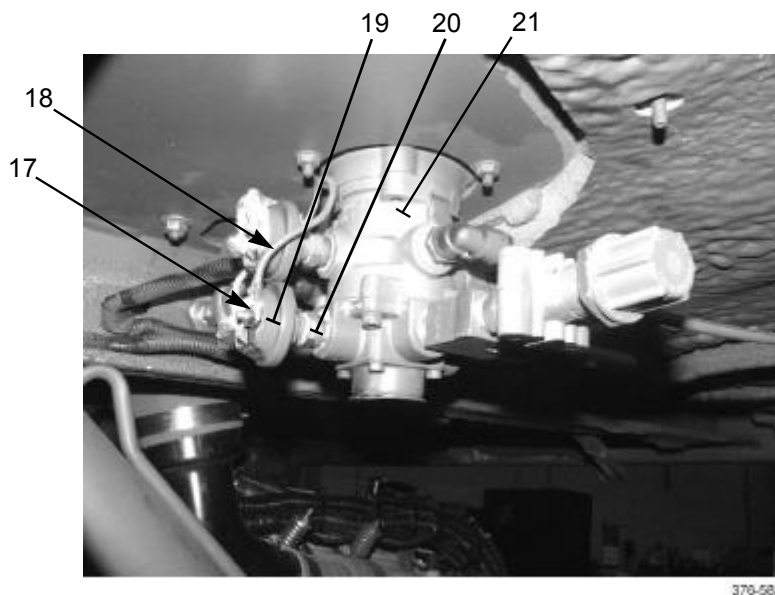
7. Connect five air lines (24) to air treadle valve (21) and valve fittings.
8. Install two bushings (20) and brake light switches (19) to air treadle valve (21).

**NOTE**

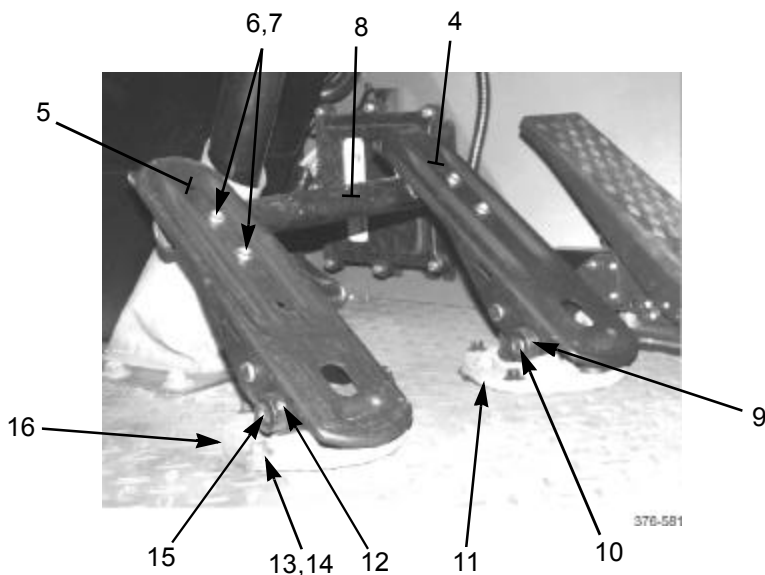
Replacement brake light switch comes with terminal nuts and starwashers.

9. Connect two wires (18) to one brake light switch (19) and four wires to second switch with four starwashers and nuts (17). Secure wires with new tiedown straps.

**INSTALLATION - CONTINUED**

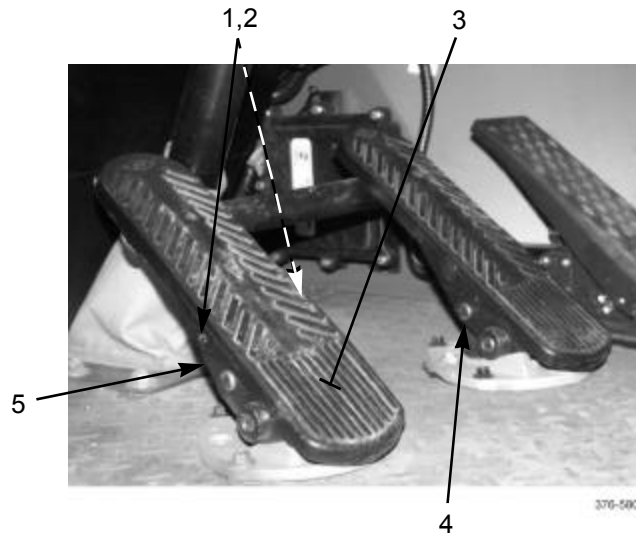


10. Install right brake pedal (4) to right mounting plate (11) with pin (10) and new spring pin (9).
11. Install left mounting plate (16) to floor of cab with three screws (14) and nuts (13).
12. Install left brake pedal (5) to left mounting plate (16) with pin (15) and new spring pin (12).
13. Install interconnect bar (8) to two brake pedals (4 and 5) with four screws (7) and new locknuts (6).



**INSTALLATION - CONTINUED**

14. Install rubber tread (3) to each of two brake pedals (4 and 5) with two washers (2) and retaining screws (1).



15. Place battery disconnect switch in ON position. Lower cab (TM 9-2320-312-10).
16. Start engine and fully pressurize air system (TM 9-2320-312-10). Depress brake pedals and check operation of service brakes.
17. Check for air leaks: Apply a detergent and water solution to check for leaks at air connections.

**END OF WORK PACKAGE**

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**BRAKE LIGHT SWITCH REPLACEMENT**

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**0065 00****THIS WORK PACKAGE COVERS**Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 150

**RPSTL Reference**

Group 150, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

Battery disconnect switch in OFF position

Wheels blocked

Air system drained (TM 9-2320-312-10)

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**NOTE**

There are two brake light switches at brake treadle valve. Each is replaced the same way except for number of wires at switch. Top switch has two wires. Bottom switch has four wires.

**REMOVAL****NOTE**

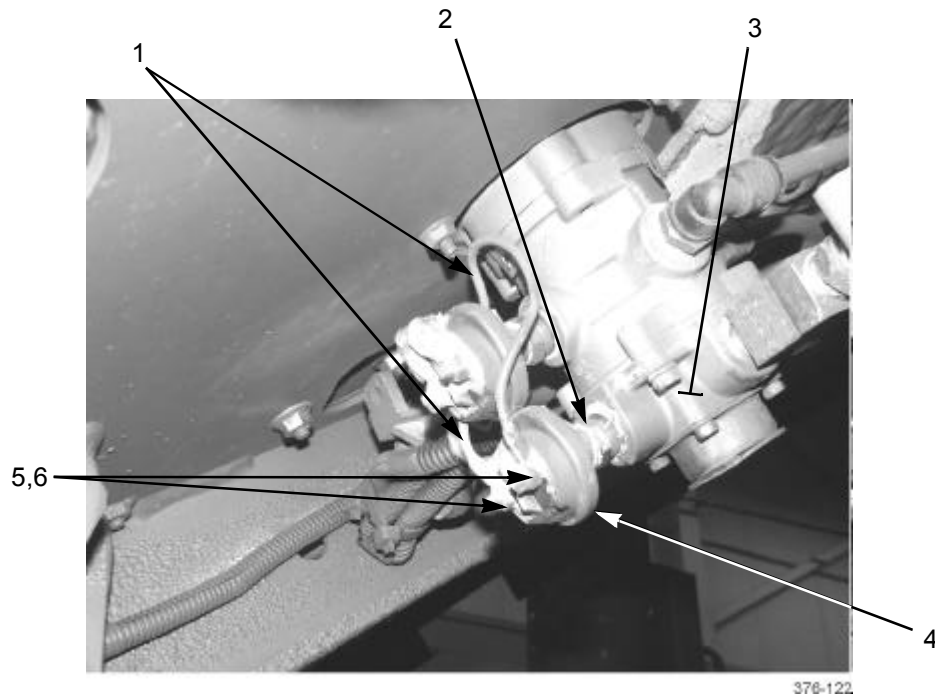
- Tag wires to ensure correct installation.
- Cut tiedown straps as required and discard. Use new tiedown straps on installation.

**BRAKE LIGHT SWITCH REPLACEMENT - CONTINUED**

0065 00

**REMOVAL - CONTINUED**

1. Remove two nuts (5) and starwashers (6) and disconnect two or four wires (1) from terminals of switch (4).
2. Remove switch (4) from bushing (2).
3. Remove bushing (2) from treadle valve (3).

**INSTALLATION****NOTE**

- Apply a thin coat of pipe sealing compound to male threads of bushing and switch before they are installed.
- Replacement switch comes with terminal nuts and starwashers.

1. Install bushing (2) to treadle valve (3).
2. Install switch (4) to bushing (2).
3. Connect two or four wires (1) to terminals of switch (4) with two starwashers (6) and nuts (5).
4. Place battery disconnect switch in ON position.
5. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**



**THIS WORK PACKAGE COVERS**

General Replacement Procedures  
 Push-In Fitting: Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 150

**RPSTL Reference**

Group 150, Figures 2, 3, 5, and 6

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

Detergent (Item 23, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**References**

WP 0046 00

**Equipment Condition**

Wheels blocked

Air system drained (TM 9-2320-312-10)



**WARNING**

DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

**NOTE**

- Air system lines and fittings are color-coded for ease in matching proper diameter air line with a specific fitting. Each of various air line diameters is represented by a different color.
- When replacing an air line, always replace with the same size, to ensure proper performance. Check carefully for restrictions such as kinking or bending, and ensure that air lines are properly supported.
- Some air lines use conventional compression fittings with tube nuts. Other air lines use plastic push-in fittings. The following *General Replacement Procedures* apply to both type fittings.

**GENERAL REPLACEMENT PROCEDURES**

1. If replacing more than one air line at a time, tag lines to ensure correct installation.

**NOTE**

As required, to gain access to air lines routed into front of cab, remove front access panel (WP 0046 00).

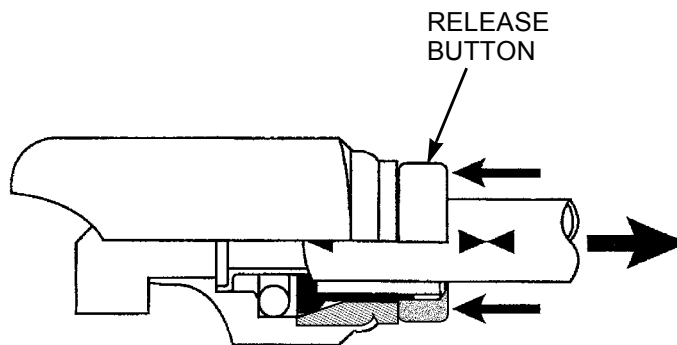
2. Disconnect air line from component at each end of air line. Refer to *Push-In Fitting Removal* below for instructions on disconnecting air lines and removing fittings that have push-in type fitting ends.

**GENERAL REPLACEMENT PROCEDURES - CONTINUED**

3. Remove hose clamps or tiedown straps from air lines, as required. Discard tiedown straps.
4. Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.
5. Connect air line, as tagged, to component at each end of line.
6. Secure air line with hose clamps and new tiedown straps, as required.
7. Start engine and fully pressurize air system (TM 9-2320-312-10).
8. Check for air leaks: Apply a detergent and water solution to check for leaks at air connections.

**PUSH-IN FITTING REMOVAL**

1. Press release button, hold release button against fitting body, then pull air line out from push-in fitting.
2. To remove push-in fitting, loosen jamnut and remove fitting from component.
3. Repeat steps 1 and 2 at other end of air line.



376-047  
**DEPRESS BUTTON TO DISCONNECT AIR LINE**

**PUSH-IN FITTING INSTALLATION****NOTE**

Ensure push-in fittings are clean and dry before they are installed.

1. Apply a thin coat of pipe sealing compound to any male threads of push-in fitting. Install push-in fitting to component. Tighten jamnut.

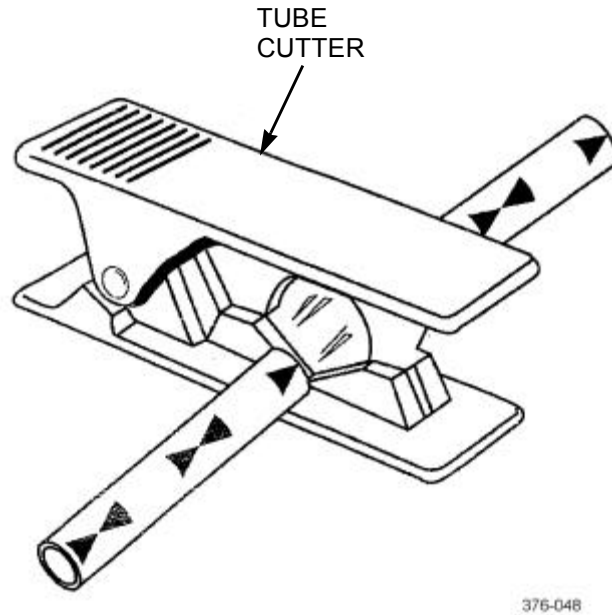
**CAUTION**

DO NOT cut new air line shorter than damaged air line. It is permissible to cut new air line slightly longer than damaged air line.

**NOTE**

- Cut new air line squarely. A maximum 15-degree angle is permissible. If using Parker premarked tubing, cut should be in center of "bowtie" symbol.
  - Perform step 2 if fabricating a new line.
2. Compare length of damaged air line to bulk air line and cut new air line to same length. Cut tubing squarely.

**PUSH-IN FITTING INSTALLATION - CONTINUED**



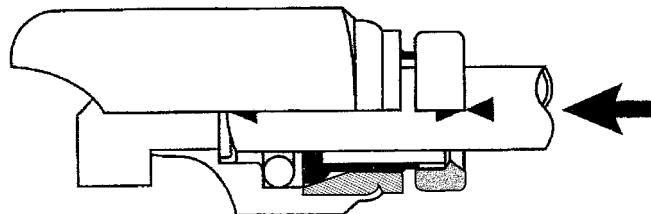
376-048

3. Position new air line to vehicle. Check that port or mating part is clean and free of debris.

**NOTE**

Perform steps 4 and 5 at each end of air line.

4. Insert air line into push-in fitting until it bottoms. Push twice to ensure that air line is inserted past collet and o-ring.
5. Confirm that air line is fully installed to push-in fitting by pulling on air line. Air line should not pull out of push-in fitting.



**INSERT AIR LINE UNTIL IT BOTTOMS**

376-049

**END OF WORK PACKAGE**

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**FRONT GLADHANDS REPLACEMENT**

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0067 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 150

**RPSTL Reference**

Group 150, Figure 2

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

Detergent (Item 23, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Packing, preformed (P/N 1509)

**References**

WP 0066 00

**Equipment Condition**

Wheels blocked

Air system drained (TM 9-2320-312-10)

**WARNING**

DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

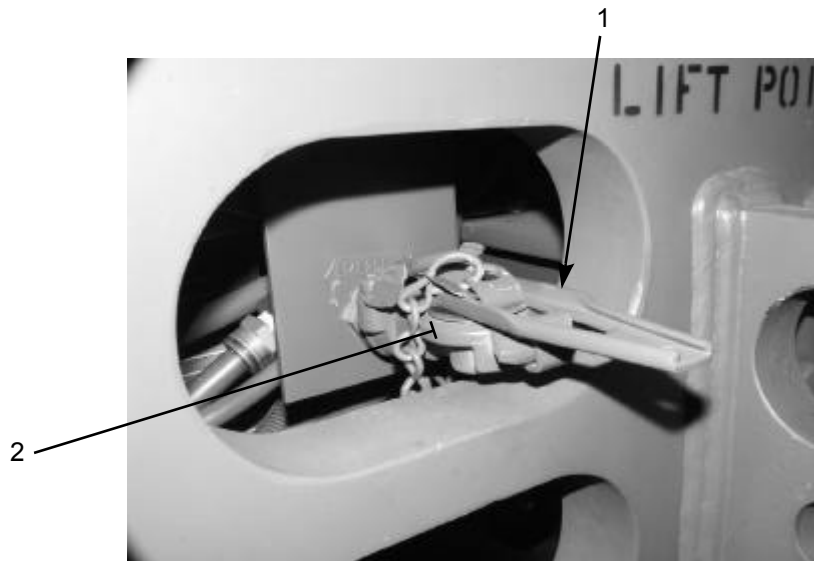
**NOTE**

Replacement of service and emergency gladhands at front of vehicle is the same, except for configuration of fittings at gladhand. Emergency gladhand at left front of bumper is illustrated.

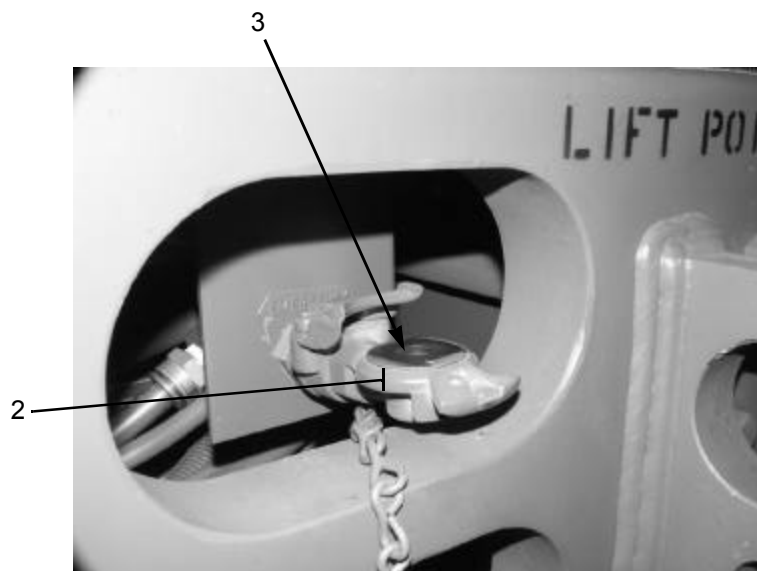
**REMOVAL****NOTE**

To remove gladhand preformed packing, perform steps 1 and 2.

1. Remove dummy coupling (1) from stowage on gladhand (2).



2. Inspect preformed packing (3) for damage. If damaged, remove from gladhand (2) and discard.



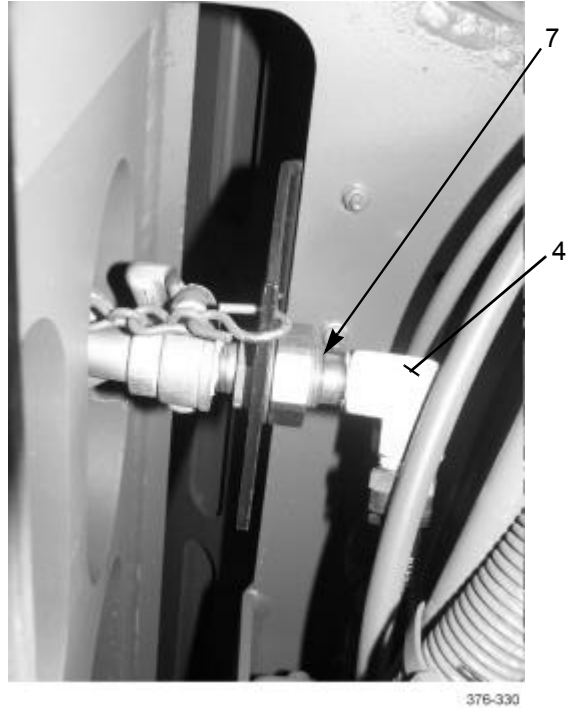
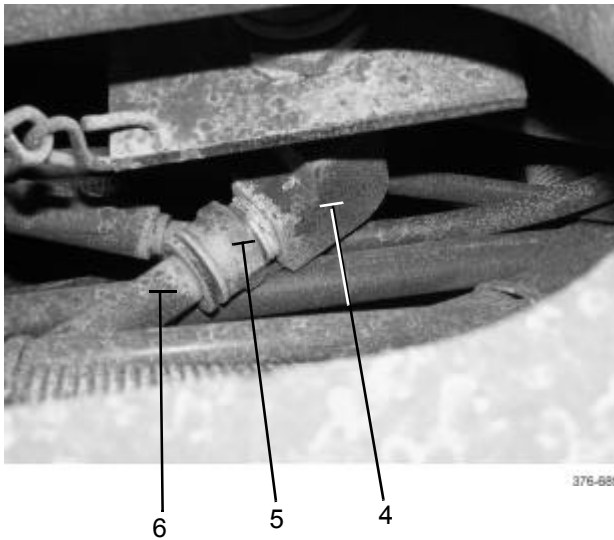
3. To access gladhand (2) and fittings, remove tiedown straps from bundle of lines and move lines aside. Discard tiedown straps.

**NOTE**

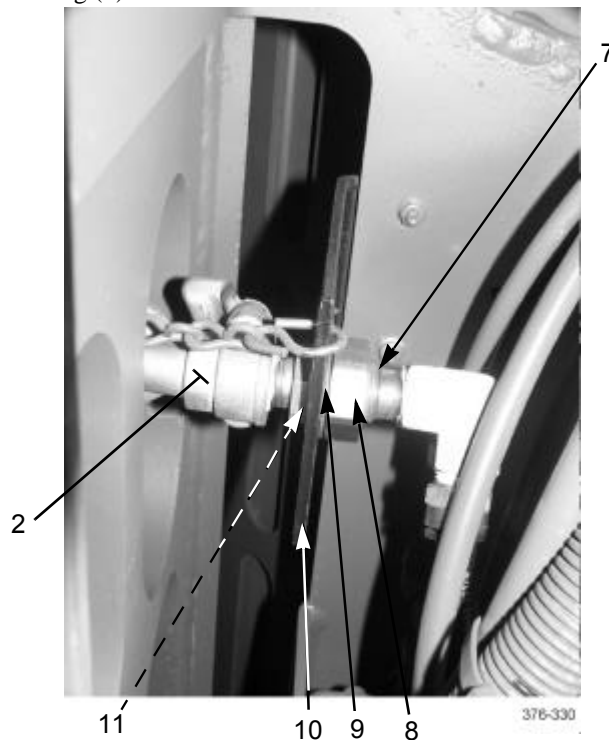
Refer to WP 0066 00 for information on removing and installing air line to push-in fitting.

**REMOVAL - CONTINUED**

4. Disconnect air line (6) from push-in straight fitting (5).
5. Remove push-in straight fitting (5) and elbow (4) from fitting (7).

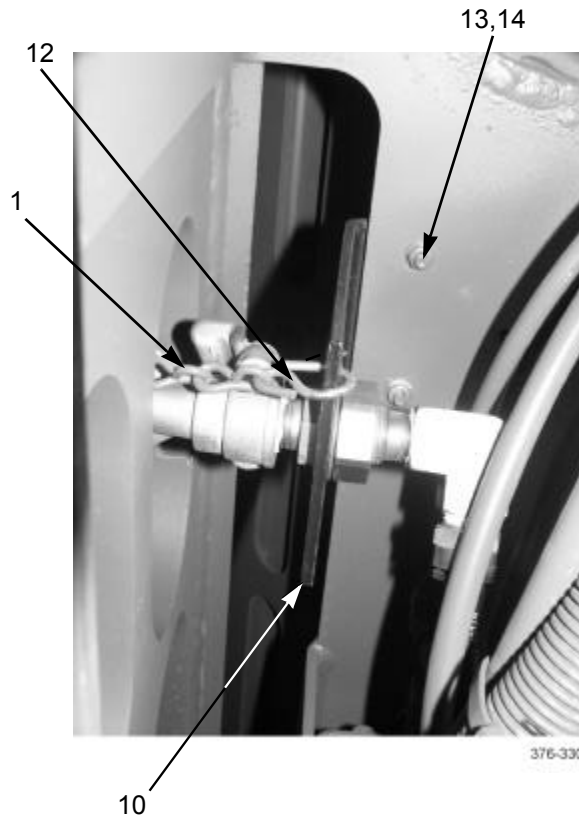


6. Remove nut (8), washer (9), fitting (7), and ID plate (11) from bracket (10).
7. Remove gladhand (2) from fitting (7).



**REMOVAL - CONTINUED**

8. Open S-hook (12) and remove dummy coupling (1) from bracket (10).
9. If damaged, remove two nuts (13), screws (14), and bracket (10) from frame.

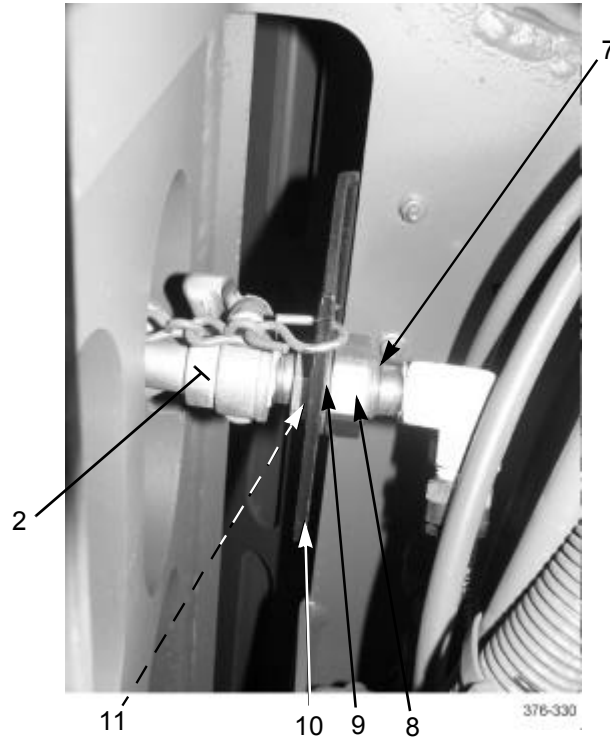
**INSTALLATION****NOTE**

- To install gladhand preformed packing, perform steps 9 and 10.
  - Apply a thin coat of pipe sealing compound to male fitting threads before they are installed.
1. If removed, install bracket (10) to frame with two screws (14) and nuts (13).
  2. Install dummy coupling (1) to bracket (10) and close S-hook (12).



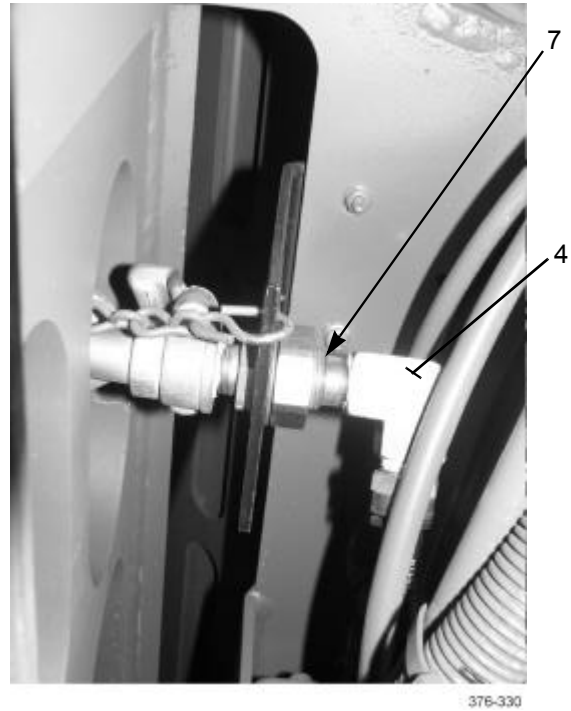
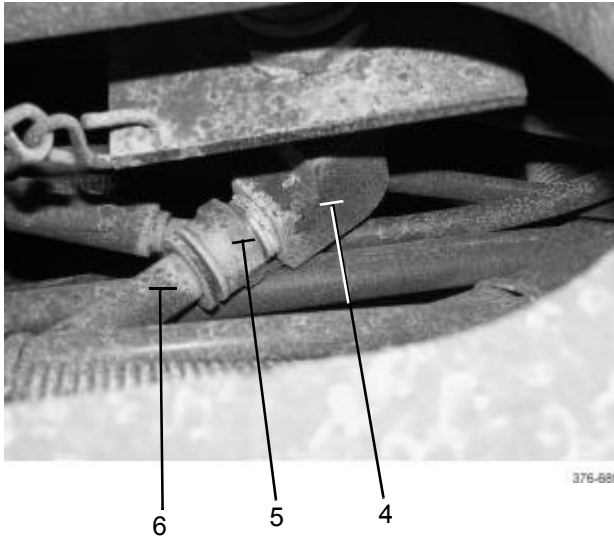
**INSTALLATION - CONTINUED**

3. Install gladhand (2) to fitting (7).
4. Position ID plate (11) and fitting (7) with gladhand (2) through hole in bracket (10).
5. Install washer (9) and nut (8).

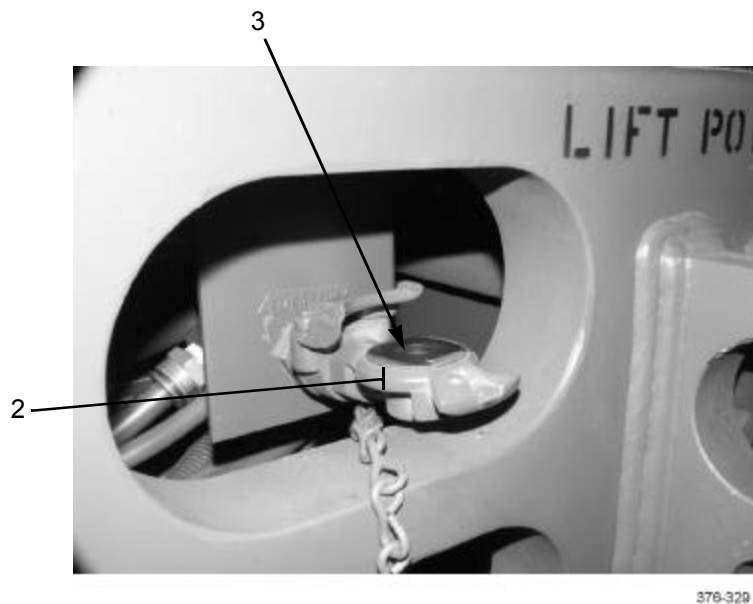


**INSTALLATION - CONTINUED**

6. Install elbow (4) and push-in straight fitting (5) to fitting (7).
7. Connect air line (6) to push-in straight fitting (5).

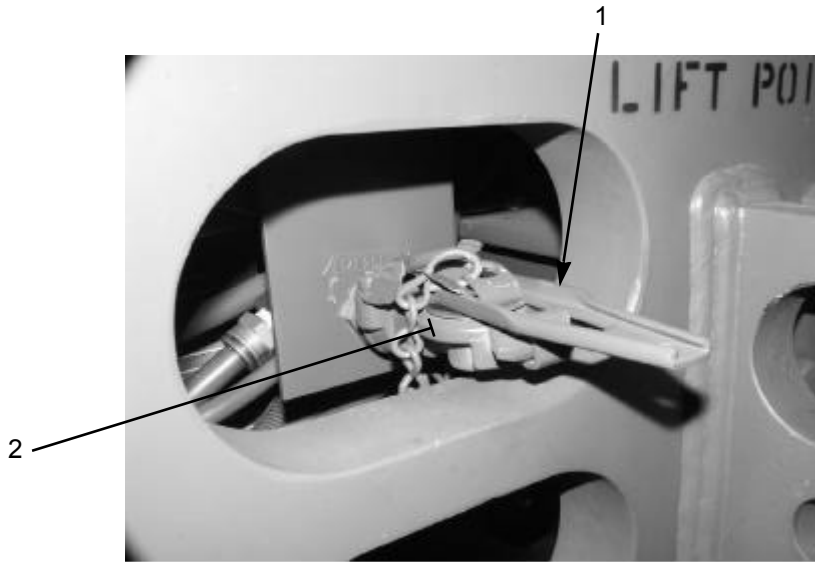


8. Position bundle of lines and install new tiedown straps.
9. If removed, install new preformed packing (3) to gladhand (2).



**INSTALLATION - CONTINUED**

10. Stow dummy coupling (1) on gladhand (2).



11. Start engine and fully pressurize air system (TM 9-2320-312-10).
12. Check for air leaks: Apply a detergent and water solution to check for leaks at fittings. Shut down engine.
13. Remove wheel blocks.

**END OF WORK PACKAGE**

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**REAR GLADHANDS REPLACEMENT**

**0068 00**

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**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 150

**RPSTL Reference**

Group 150, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

Detergent (Item 23, WP 0165 00)

Packing, preformed (P/N 1509)

**References**

WP 0066 00

**Equipment Condition**

Wheels blocked

Air system drained (TM 9-2320-312-10)

---



**WARNING**

DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

**NOTE**

Replacement of service and emergency gladhands at rear of vehicle is the same. Service gladhand is shown.

**REMOVAL****NOTE**

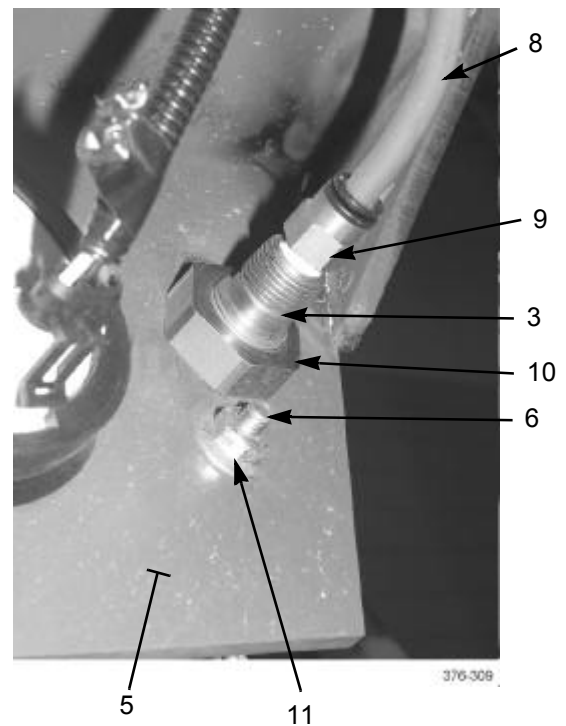
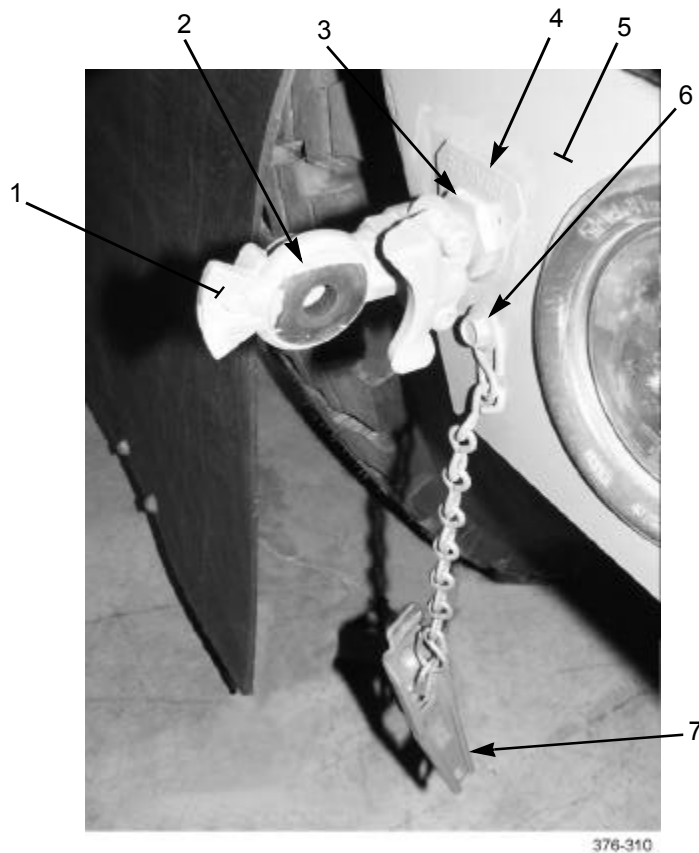
To remove gladhand preformed packing, perform steps 1 and 2.

1. Remove dummy coupling (7) from stowage on gladhand (1).
2. Inspect preformed packing (2) for damage. If damaged, remove and discard.

**NOTE**

Refer to WP 0066 00 for information on removing and installing air line to push-in fitting.

3. Disconnect air line (8) from push-in fitting (9).
4. Remove push-in fitting (9) from fitting (3).
5. Remove nut (10), fitting (3), and ID plate (4) from tailboard (5).
6. Separate gladhand (1) from fitting (3).
7. Remove nut (11), screw (6), and dummy coupling (7) from tailboard (5).



**INSTALLATION****NOTE**

- To install gladhand preformed packing only, perform steps 7 and 8.
  - Apply a thin coat of pipe sealing compound to male fitting threads
1. Install dummy coupling (7) to tailboard (5) with screw (6) and nut (11).
  2. Install gladhand (1) to fitting (3).
  3. Position ID plate (4) and fitting (3) with gladhand (1) through hole in tailboard (5).
  4. Install nut (10) on fitting (3).
  5. Install push-in fitting (9) to fitting (3).
  6. Connect air line (8) to push-in fitting (9).
  7. If removed, install new preformed packing (2) to gladhand (1).
  8. Stow dummy coupling (7) on gladhand (1).
  9. Start engine and fully pressurize air system (TM 9-2320-312-10).
  10. Check for air leaks: Apply a detergent and water solution to check for leaks at fittings. Shut down engine.
  11. Remove wheel blocks.

**END OF WORK PACKAGE**

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**INTERVEHICULAR AIR HOSE ASSEMBLY MAINTENANCE**

**0069 00**

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**THIS WORK PACKAGE COVERS**

Removal, Disassembly, Assembly, Installation

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**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 150

**RPSTL Reference**

Group 150, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

Detergent (Item 23, WP 0165 00)

Packing, preformed (P/N 1509)

**Equipment Condition**

Wheels blocked

Air system drained (TM 9-2320-312-10)

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**WARNING**

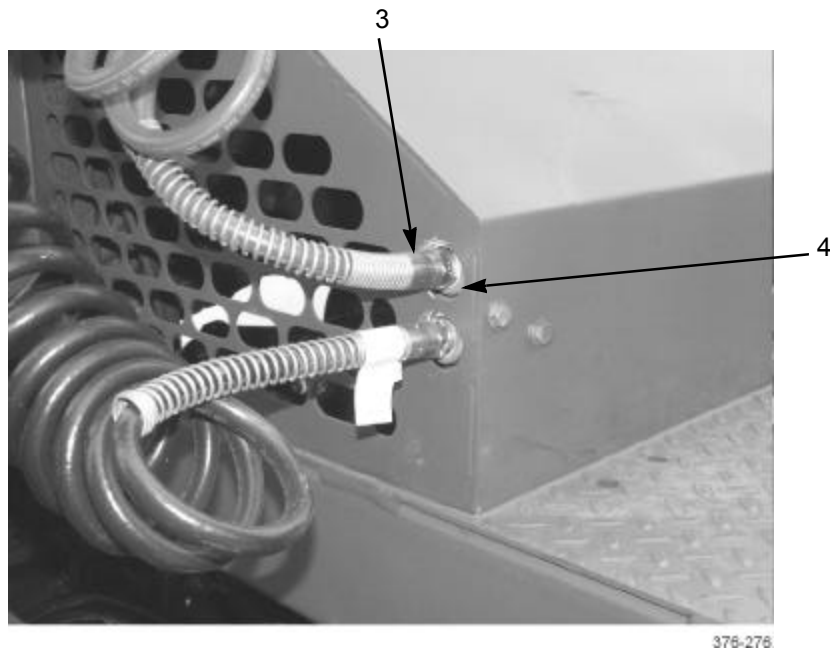
DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

**REMOVAL**

1. Remove hose assembly gladhand (1) from stowage on dummy coupling (2).

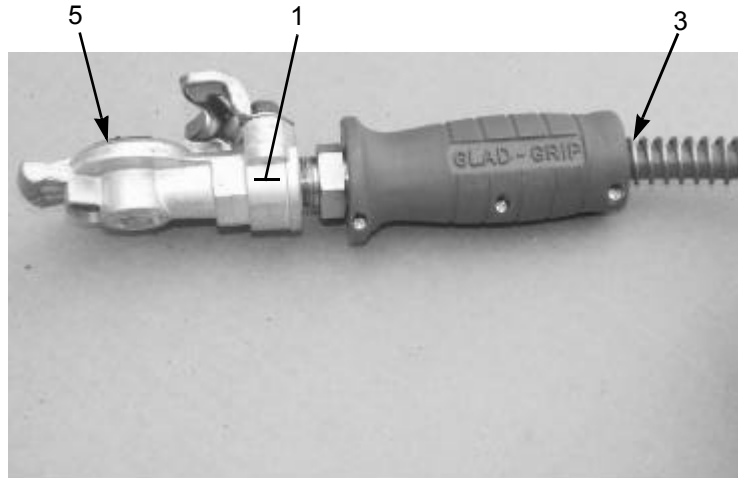


2. Disconnect other end of hose assembly (3) from cab-mounted tractor protection valve (4) and remove hose assembly from vehicle.



**DISASSEMBLY**

1. If damaged, remove preformed packing (5) from gladhand (1) and discard.
2. Remove gladhand (1) from end of hose assembly (3).



376-277.

**ASSEMBLY****NOTE**

Apply a thin coat of pipe sealing compound to threads of male fitting before connections are made.

1. Install gladhand (1) to end of hose assembly (3).
2. If removed, install new preformed packing (5) to gladhand (1).

**INSTALLATION****NOTE**

- Top port of valve is EMERGENCY port. Bottom port is SERVICE.
- Apply a thin coat of pipe sealing compound to threads of hose assembly before connections are made.

1. Connect hose assembly (3) to cab-mounted tractor protection valve (4) at rear of cab.
2. Stow hose assembly gladhand (1) on dummy coupling (2).
3. Start engine and fully pressurize air system (TM 9-2320-312-10). Release trailer brakes to pressurize hose assembly (3).
4. Check for air leaks: Use a detergent and water solution to check for leaks at air connections. Shut down engine (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**DUMMY COUPLING REPLACEMENT**

---

0070 00

**THIS WORK PACKAGE COVERS**

Replacement

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**INITIAL SETUP****Maintenance Level**

Unit

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**RPSTL Reference**

Group 150, Figure 7

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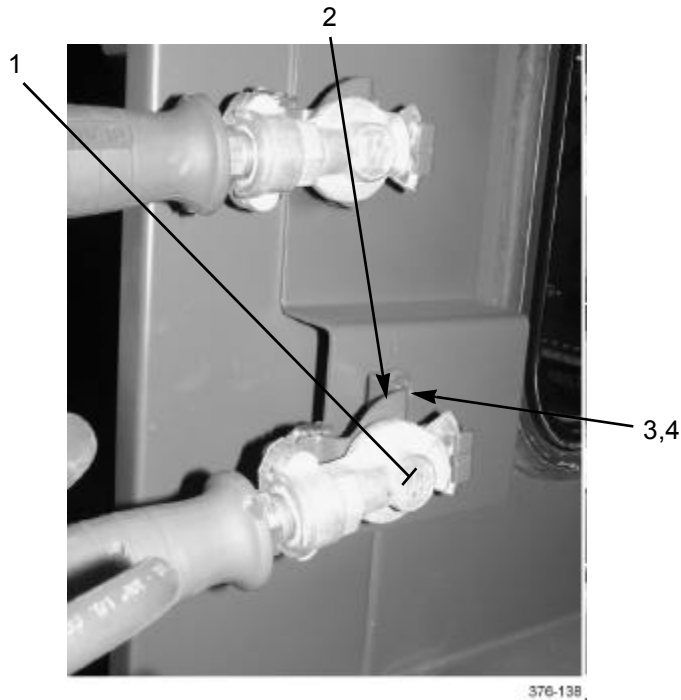
**REPLACEMENT**

1. Remove gladhand (1) from stowage on dummy coupling (2).

**NOTE**

Only bottom dummy coupling is mounted with locknuts.

2. Remove two nuts (3), bolts (4), and dummy coupling (2) from right side of cab.



3. Install dummy coupling (2) to right side of cab with two bolts (4) and nuts (3).
4. Stow gladhand (1) on dummy coupling (2).

**END OF WORK PACKAGE**

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**DUAL AIR PRESSURE GAUGE AND LOW AIR PRESSURE SWITCHES REPLACEMENT**

---

0071 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 150

**RPSTL Reference**

Group 150, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

Detergent (Item 23, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**References**

WP 0066 00

**Equipment Condition**

Wheels blocked

Air system drained (TM 9-2320-312-10)

Battery disconnect switch in OFF position

**WARNING**

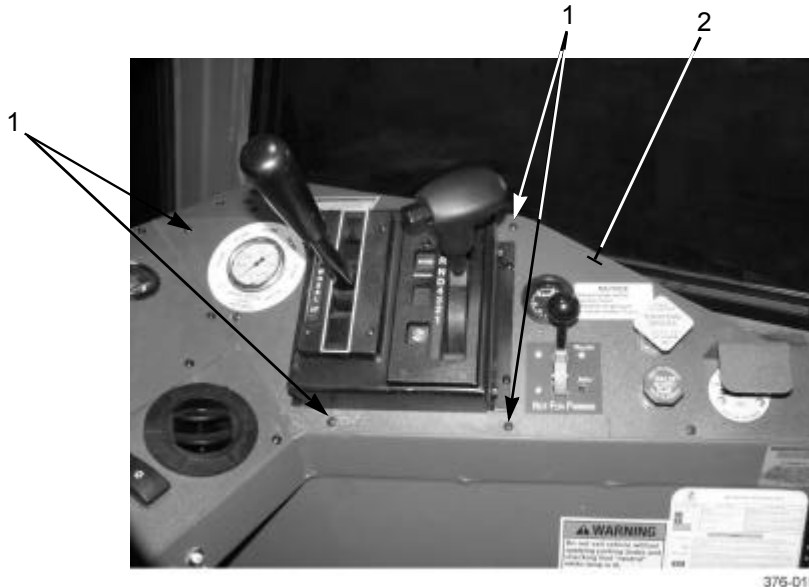
DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

**DUAL AIR PRESSURE GAUGE AND LOW AIR PRESSURE SWITCHES  
REPLACEMENT - CONTINUED**

0071 00

**REMOVAL**

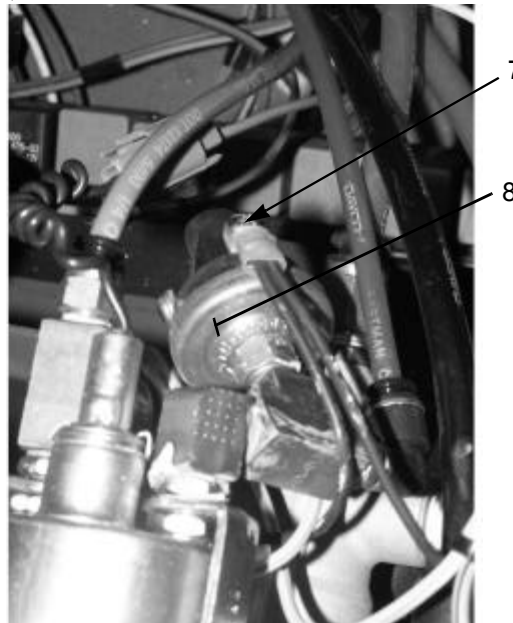
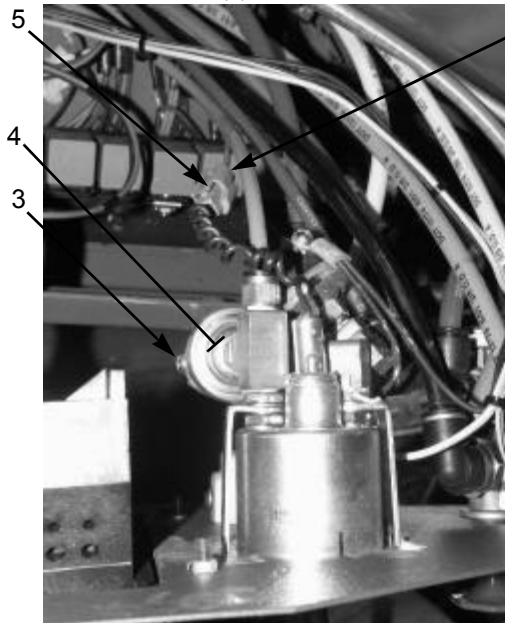
1. Remove eight screws (1) and lift right-side instrument panel (2) away from instrument panel frame.



**NOTE**

- Tag wires, connector, and air lines and note position of all fittings to ensure correct installation.
- Remove tiedown straps and discard. Use new tiedown straps on installation.
- Refer to WP 0066 00 for instructions on removing and installing air lines to push-in fittings.

2. Disconnect gauge connector (5) from instrument panel wiring harness connector (6).
3. Remove two screws (3) and disconnect three wires from switch (4).
4. Remove two screws (7) and disconnect three wires from switch (8).



376-209

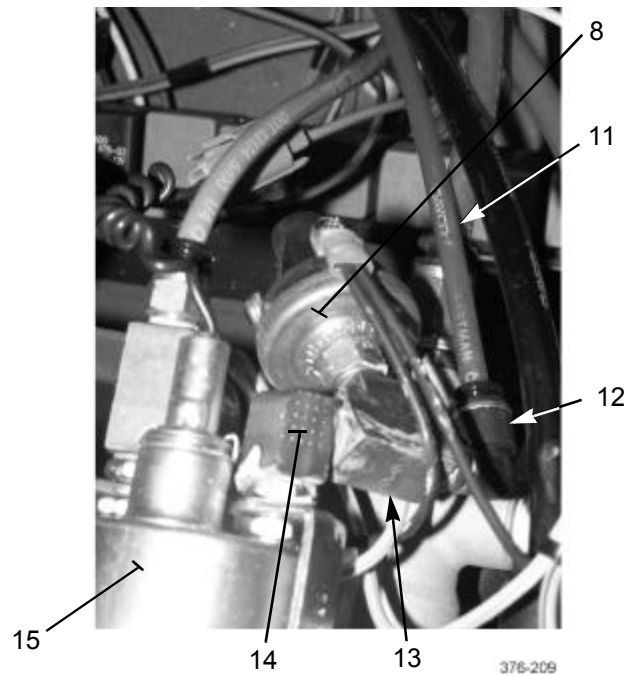
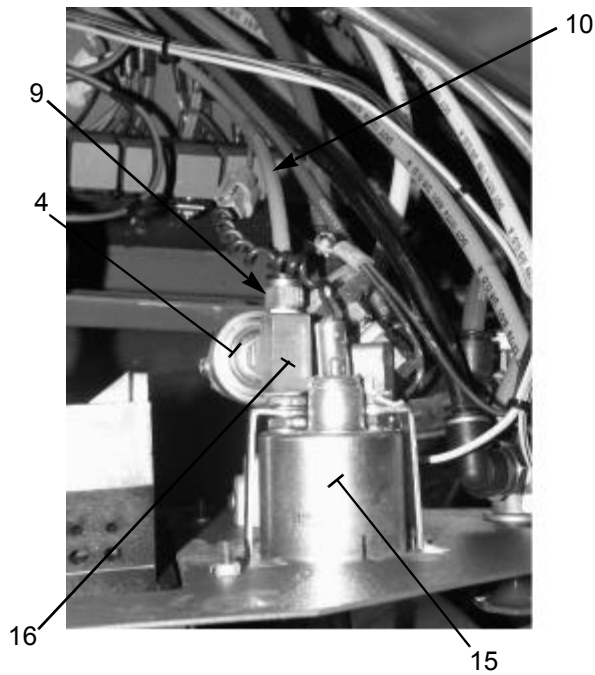


**DUAL AIR PRESSURE GAUGE AND LOW AIR PRESSURE SWITCHES  
REPLACEMENT - CONTINUED**

0071 00

**REMOVAL - CONTINUED**

5. Disconnect air line (10) from straight adapter (9).
6. Disconnect air line (11) from elbow (12).
7. Remove straight adapter (9) and switch (4) from tee (16).
8. Remove tee (16) from valve (15).
9. Remove elbow (12) and switch (8) from tee (13).
10. Remove tee (13) and elbow (14) from valve (15).



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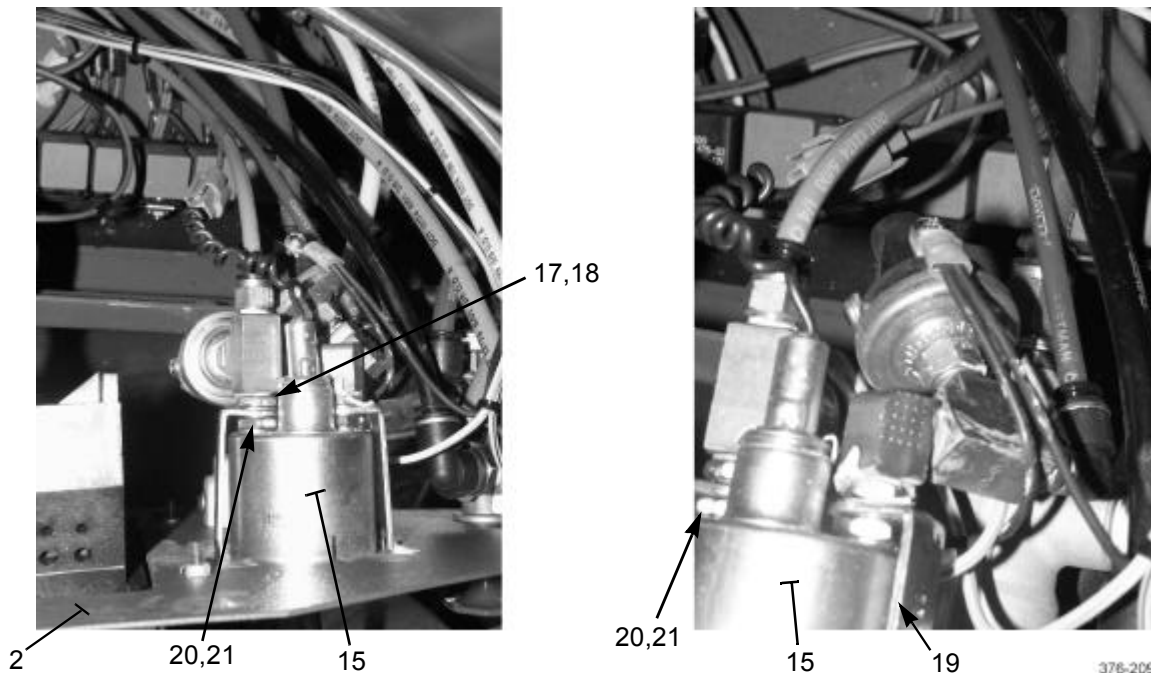
**DUAL AIR PRESSURE GAUGE AND LOW AIR PRESSURE SWITCHES  
REPLACEMENT - CONTINUED**


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0071 00

**REMOVAL - CONTINUED**

11. Remove two nuts (17), starwashers (18), bracket (19), two nuts (20), starwashers (21), and gauge (15) from right-side instrument panel (2).

**INSTALLATION****NOTE**

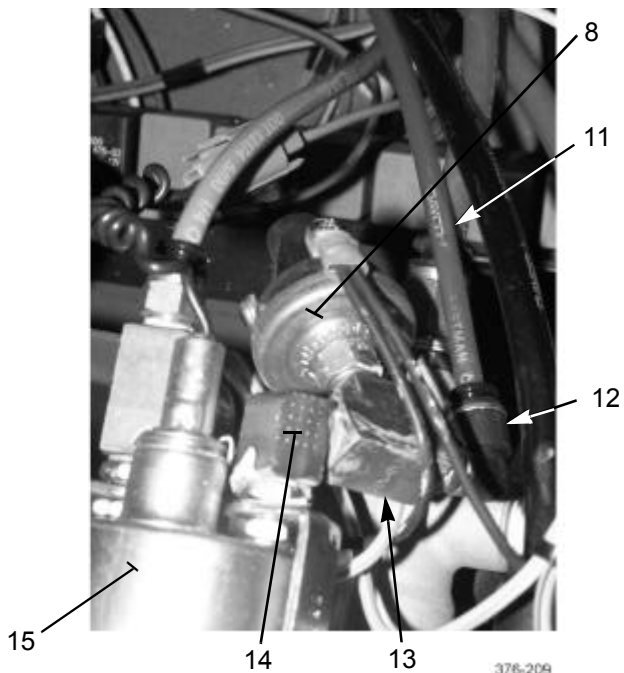
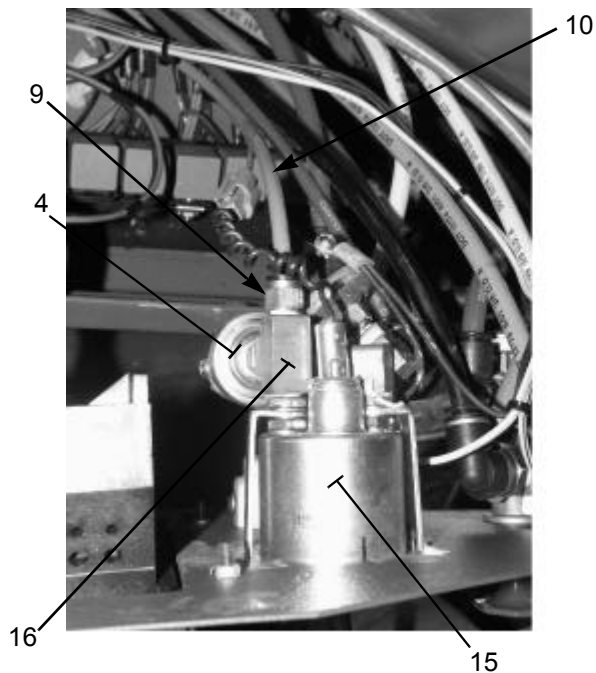
- New dual air pressure gauge comes with new mounting hardware.
- Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.

1. Install gauge (15) to right-side instrument panel (2) with two starwashers (21), nuts (20), bracket (19), two starwashers (18), and nuts (17).
2. Install elbow (14) and tee (13) to valve (15).
3. Install switch (8) and elbow (12) to tee (13).
4. Install tee (16) to valve (15).
5. Install switch (4) and straight adapter (9) to tee (16).
6. Connect air line (11) to elbow (12).
7. Connect air line (10) to straight adapter (9).

**DUAL AIR PRESSURE GAUGE AND LOW AIR PRESSURE SWITCHES  
REPLACEMENT - CONTINUED**

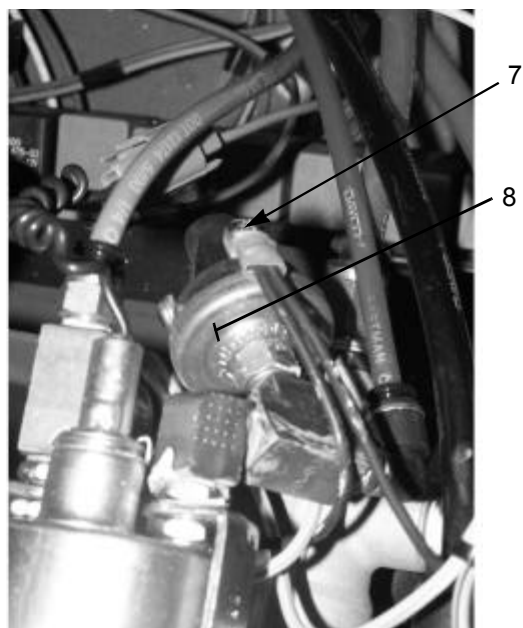
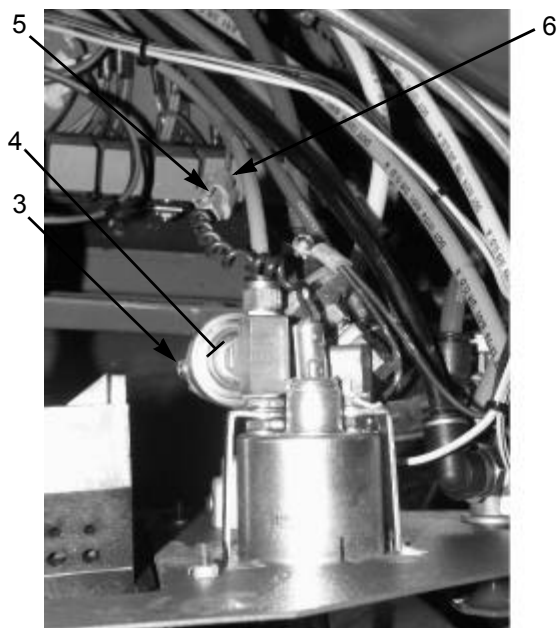
0071 00

**INSTALLATION - CONTINUED**



376-209

8. Install three wires to switch (8) with two screws (7).
9. Install three wires to switch (4) with two screws (3).
10. Connect gauge connector (5) to instrument panel wiring harness connector (6).



376-209

**DUAL AIR PRESSURE GAUGE AND LOW AIR PRESSURE SWITCHES  
REPLACEMENT - CONTINUED**

0071 00

**INSTALLATION - CONTINUED**

11. Place battery disconnect switch in ON position.
12. Start engine and fully pressurize air system (TM 9-2320-312-10). Ensure low air pressure warning buzzer turns off when dual air pressure gauge registers 65 psi (448 kPa) for both primary and secondary brake systems.
13. Check for air leaks: Apply a detergent and water solution to check for leaks at air connections.
14. Install right-side instrument panel (2) with eight screws (1).

**END OF WORK PACKAGE**

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**PARKING BRAKE CONTROL VALVE REPLACEMENT**

---

0072 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 150

**RPSTL Reference**

Group 150, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

Detergent (Item 23, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Pin, spring (P/N 236022)

**References**

WP 0066 00

**Equipment Condition**

Wheels blocked

Air system drained (TM 9-2320-312-10)

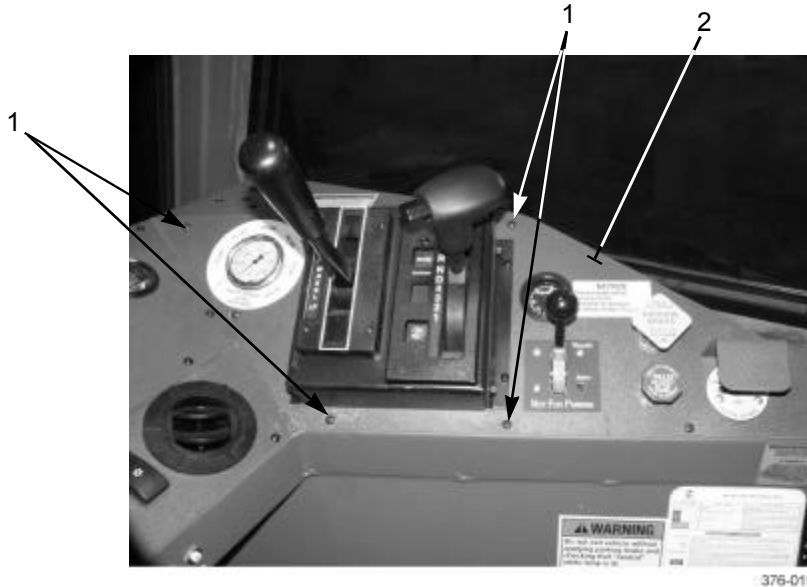
Battery disconnect switch in OFF position

**WARNING**

DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

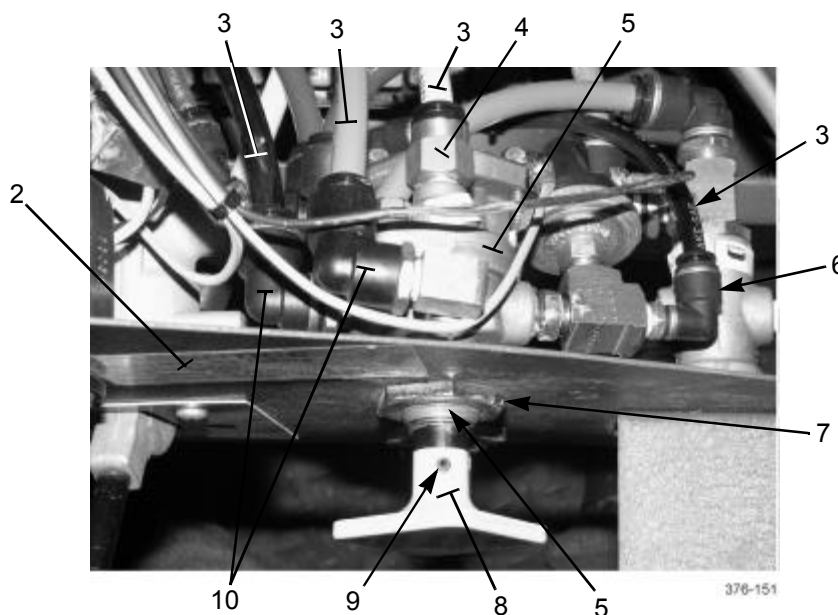
**REMOVAL**

1. Remove eight screws (1) and lift right-side instrument panel (2) away from instrument panel frame.



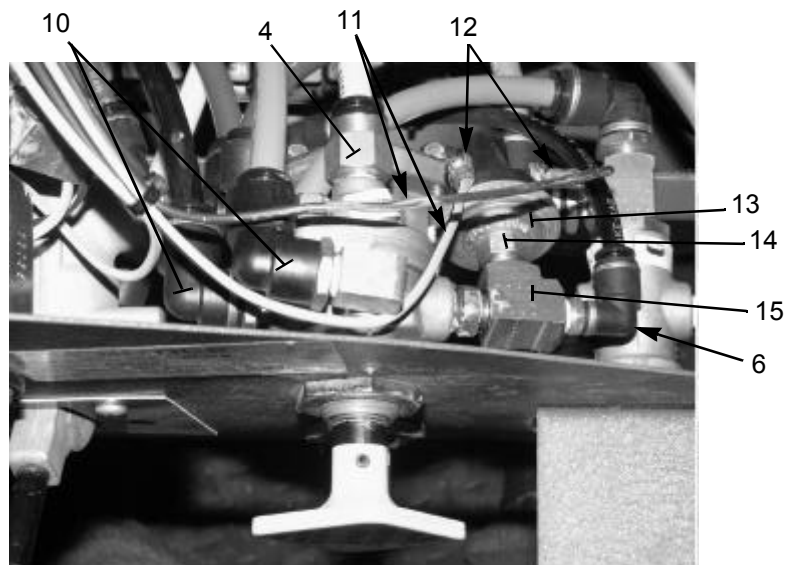
**NOTE**

- Remove tiedown straps and discard. Use new tiedown straps on installation.
  - Tag air lines and wires, and note position of parking brake control valve, switch, and all fittings to ensure correct installation.
  - Refer to WP 0066 00 for instructions on removing and installing air lines to push-in fittings.
2. Remove spring pin (9) and knob (8) from valve (5). Discard spring pin.
  3. Remove nut (7) and valve (5) from right-side instrument panel (2).
  4. Disconnect four air lines (3) from two elbows (10), elbow (6), and straight adapter (4).



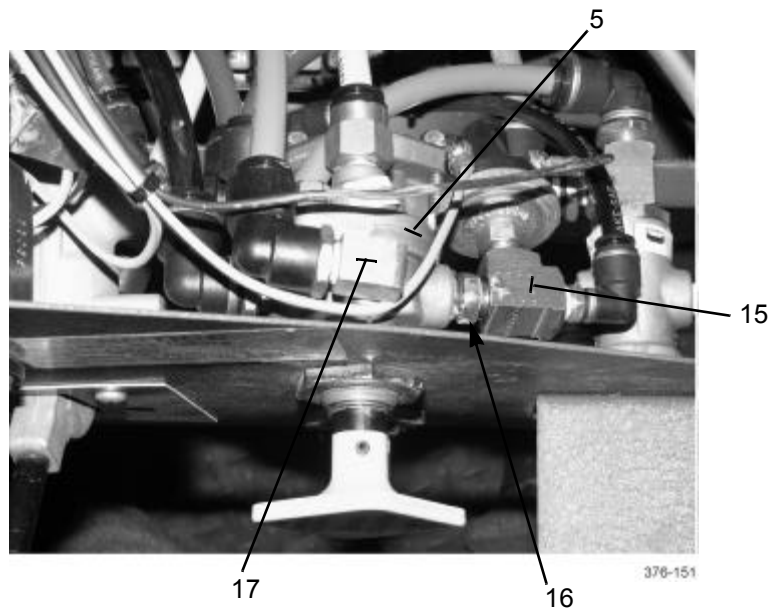
**REMOVAL - CONTINUED**

5. Remove two screws (12) and disconnect two wires (11) from switch (13).
6. Remove switch (13) and straight adapter (14) from tee (15). Separate switch and straight adapter.
7. Remove two elbows (10) and elbow (6). Remove straight adapter (4).



376-151

8. Remove elbow (17), tee (15), and straight adapter (16).

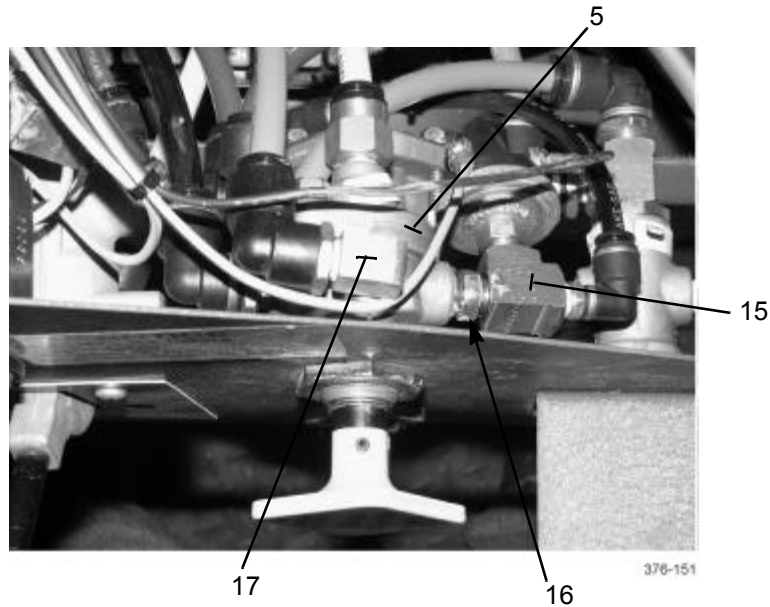


376-151

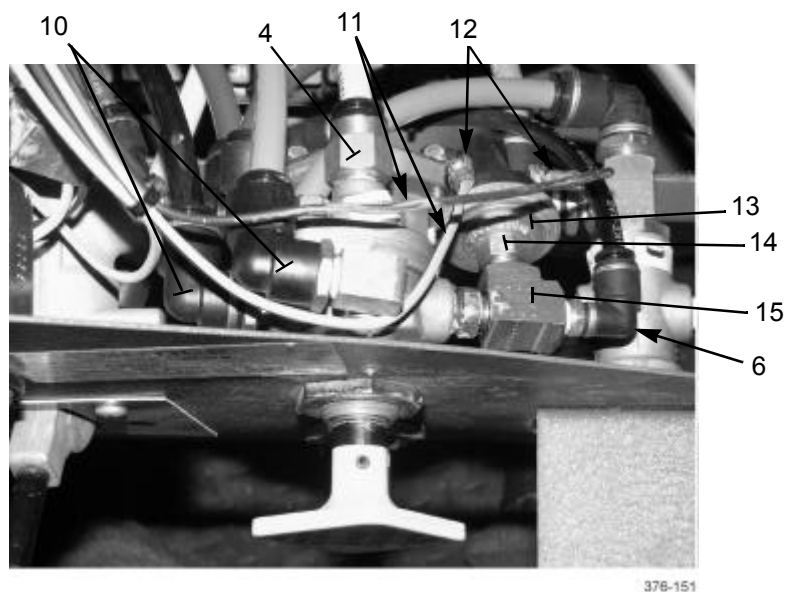
**INSTALLATION****NOTE**

Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.

1. Install straight adapter (16) and elbow (17) to valve (5). Install tee (15) to straight adapter.



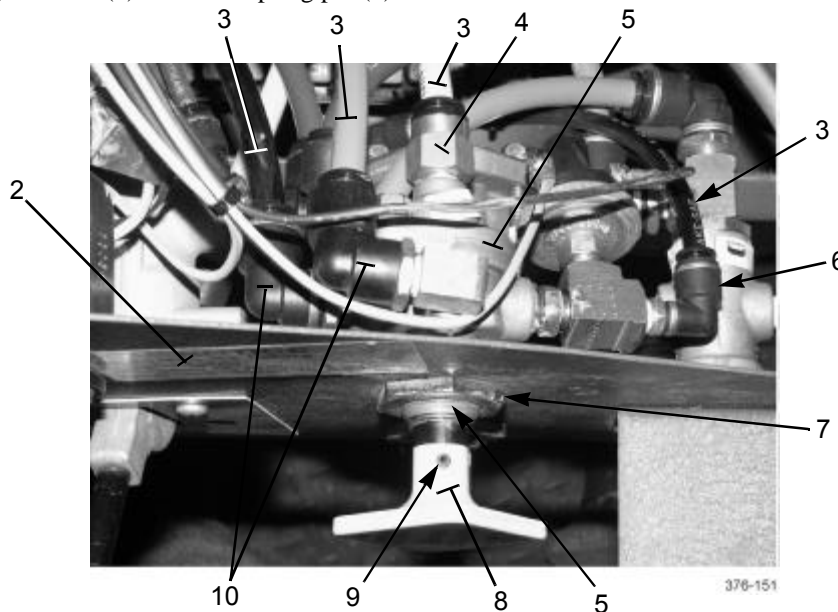
2. Install two elbows (10) and elbow (6).
3. Assemble straight adapter (14) to switch (13). Install straight adapter with switch to tee (15).
4. Connect two wires (11) to switch (13) with two screws (12).



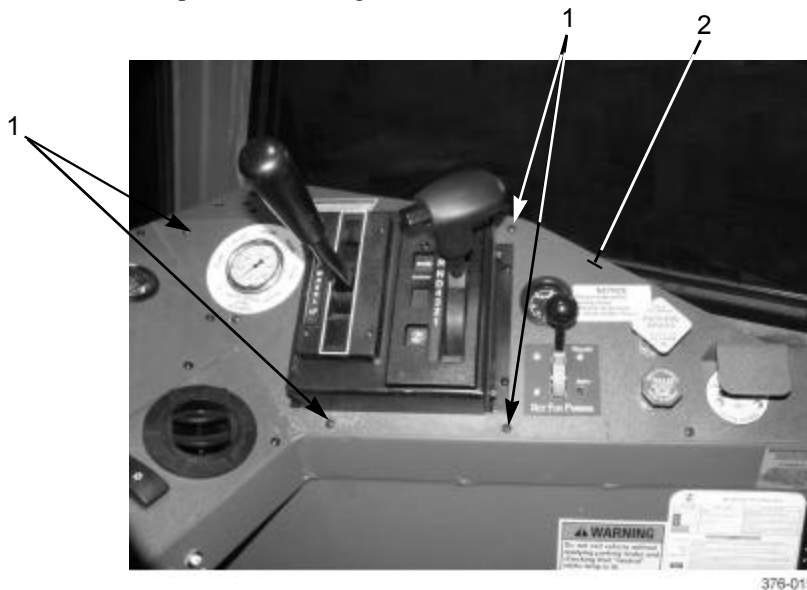


**INSTALLATION - CONTINUED**

5. Connect four air lines (3) to two elbows (10), elbow (6), and straight adapter (4).
6. Install valve (5) to right-side instrument panel (2) with nut (7).
7. Install knob (8) to valve (5) with new spring pin (9).



8. Place battery disconnect switch in ON position.
9. Start engine and fully pressurize air system (TM 9-2320-312-10).
10. Check for air leaks: Apply a detergent and water solution to air connections.
11. Install right-side instrument panel (2) with eight screws (1).



**END OF WORK PACKAGE**

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**TRAILER AIR SUPPLY CONTROL VALVE REPLACEMENT**

**0073 00**

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**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 150

**RPSTL Reference**

Group 150, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

Detergent (Item 23, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Pin, spring (P/N 238379)

**References**

WP 0066 00

**Equipment Condition**

Wheels blocked

Air system drained (TM 9-2320-312-10)

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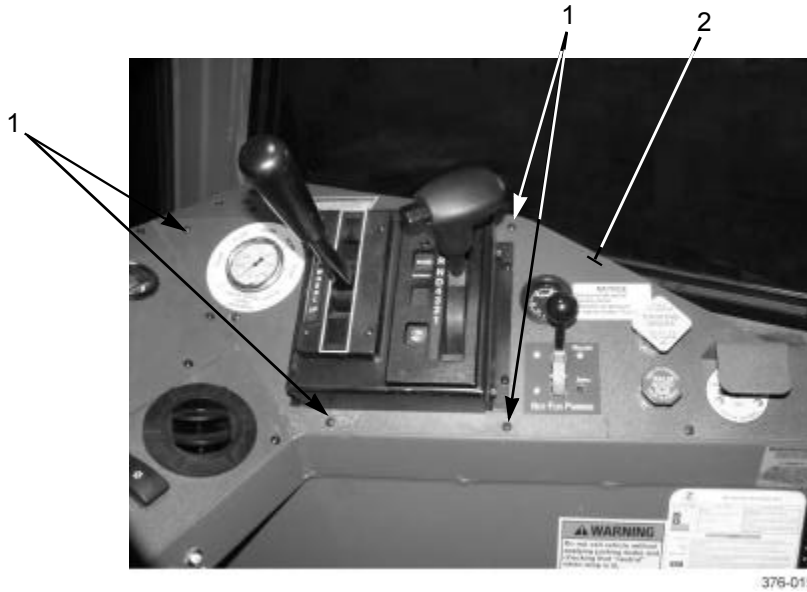


**WARNING**

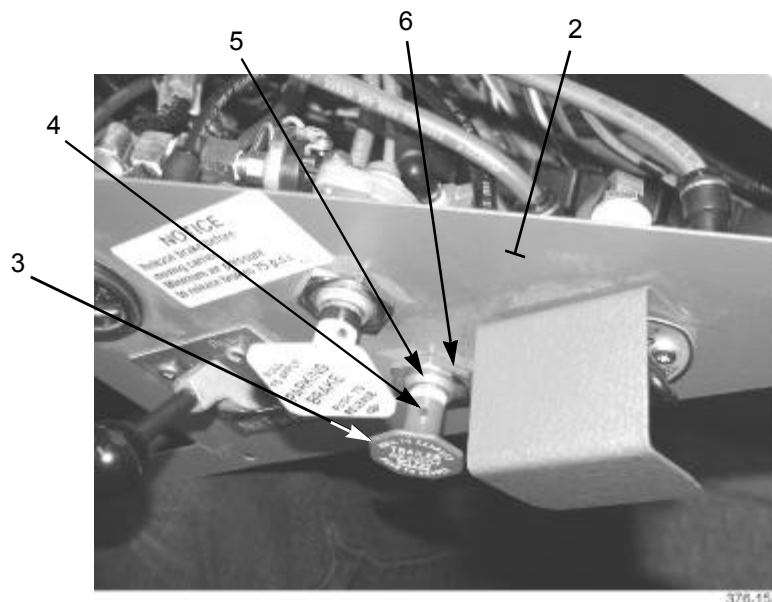
DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

**REMOVAL**

1. Remove eight screws (1) and lift right-side instrument panel (2) away from instrument panel frame.

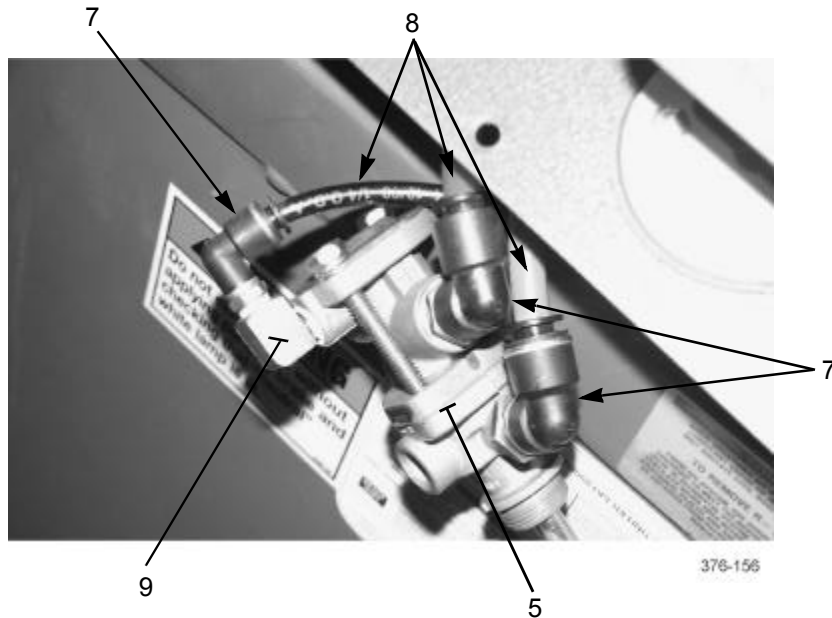
**NOTE**

- Tag air lines and note position of trailer air supply control valve and all fittings to ensure correct installation.
  - Refer to WP 0066 00 for instructions on removing and installing air lines to push-in fittings.
2. Remove spring pin (4) and knob (3) from valve (5). Discard spring pin.
  3. Remove nut (6) and valve (5), with all air lines attached, from right-side instrument panel (2).



**REMOVAL**

4. Disconnect three air lines (8) from three elbows (7). Remove valve (5).
5. Remove three elbows (7) and elbow (9) from valve (5).

**INSTALLATION****NOTE**

Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.

6. Install elbow (9) and three elbows (7) to valve (5).
7. Connect three air lines (8) to three elbows (7).
8. Install valve (5) to right-side instrument panel (2) with nut (6).
9. Install knob (3) to valve (5) with new spring pin (4).
10. Start engine and fully pressurize air system (TM 9-2320-312-10).
11. Check for air leaks: Apply a detergent and water solution to air connections.
12. Install right-side instrument panel (2) with eight screws (1).

**END OF WORK PACKAGE**

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**TRAILER BRAKE CONTROL VALVE REPLACEMENT**

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0074 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 150

**RPSTL Reference**

Group 150, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

Detergent (Item 23, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**References**

WP 0066 00

**Equipment Condition**

Wheels blocked

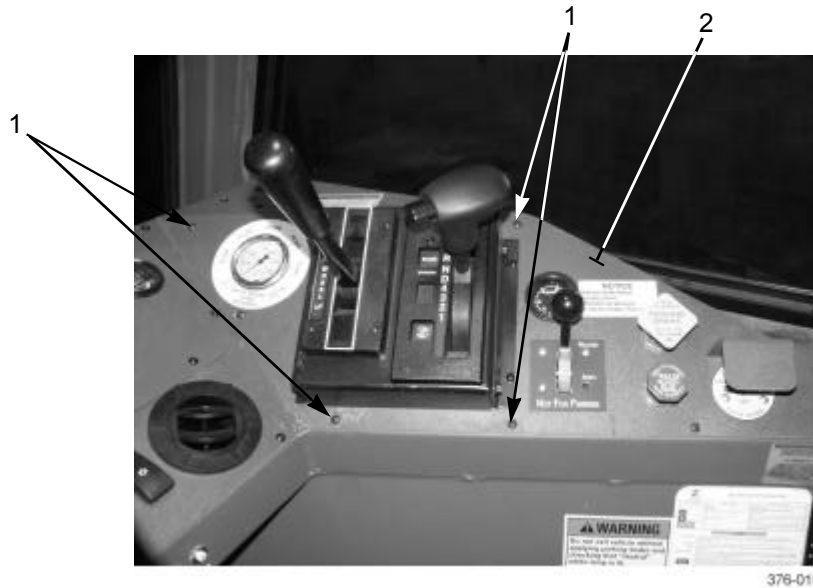
Air system drained (TM 9-2320-312-10)

**WARNING**

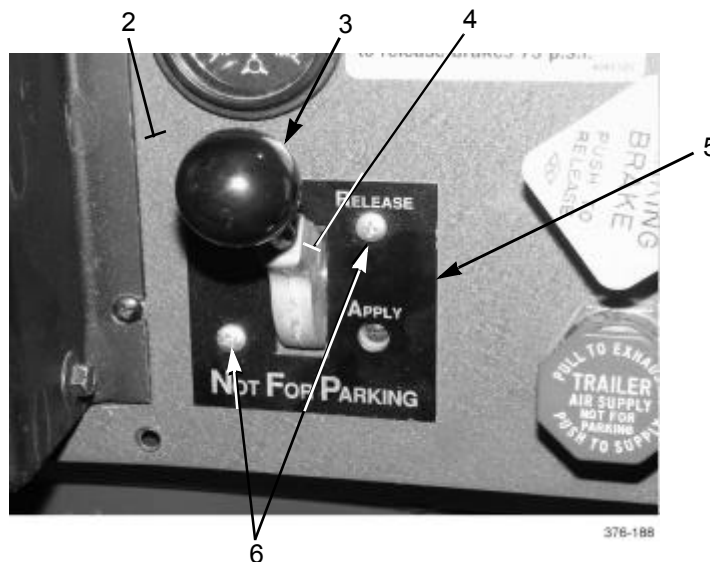
DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

**REMOVAL**

1. Remove eight screws (1) and lift right-side instrument panel (2) away from instrument panel frame.

**NOTE**

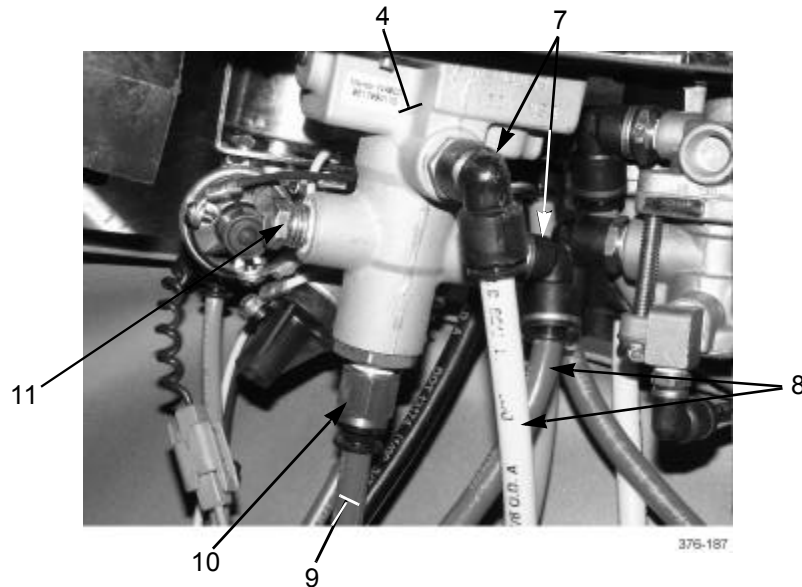
- Tag air lines and note position of trailer brake control valve and all fittings to ensure correct installation.
  - Refer to WP 0066 00 for instructions on removing and installing air lines to push-in fittings.
2. Remove knob (3) from valve (4).
  3. Remove three screws (6), plate (5), and valve (4) from right-side instrument panel (2).





**REMOVE - CONTINUED**

4. Disconnect two air lines (8) from two elbows (7). Disconnect air line (9) from straight adapter (10).
5. Remove two elbows (7), straight adapter (10), and plug (11) from valve (4).

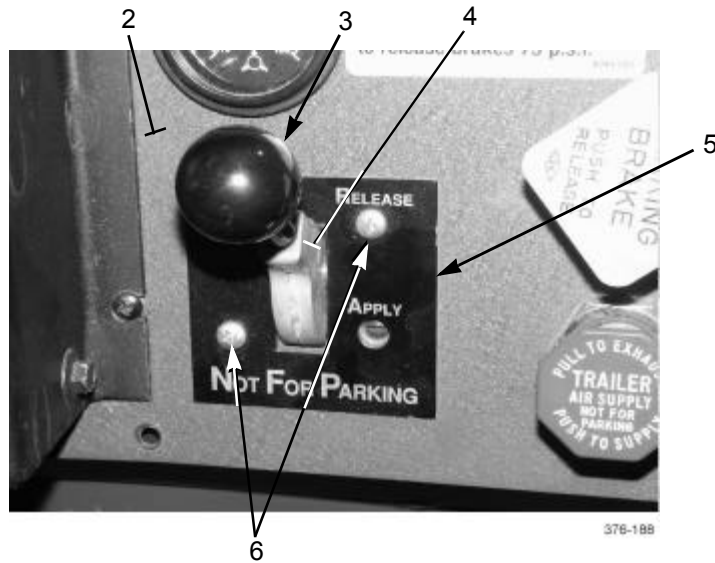
**INSTALLATION****NOTE**

Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.

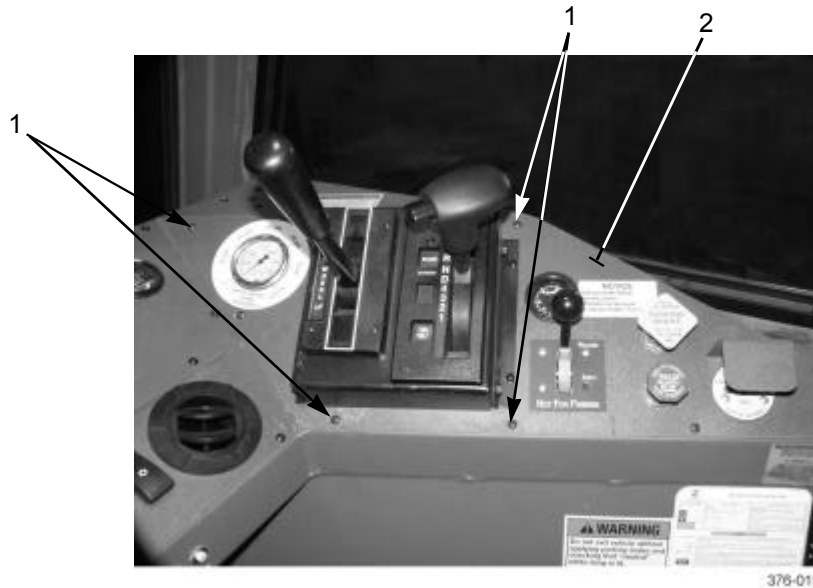
1. Install plug (11), straight adapter (10), and two elbows (7) to valve (4).
2. Connect two air lines (8) to two elbows (7). Connect air line (9) to straight adapter (10).

**INSTALLATION - CONTINUED**

3. Install valve (4) and plate (5) to right-side instrument panel (2) with three screws (6).
4. Install knob (3) to valve (4).



5. Start engine and fully pressurize air system (TM 9-2320-312-10).
6. Check for air leaks: Apply a detergent and water solution to air connections.
7. Install right-side instrument panel (2) with eight screws (1).



**INSTALLATION - CONTINUED**

8. Operation of trailer brake control valve lever may be adjusted, as required, using adjustment screw.



ADJUST LEVER HERE

376-188

**END OF WORK PACKAGE**

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**FIFTH WHEEL LOCK CONTROL VALVE REPLACEMENT**

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0075 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 150

**RPSTL Reference**

Group 150, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

Detergent (Item 23, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**References**

WP 0066 00

**Equipment Condition**

Wheels blocked

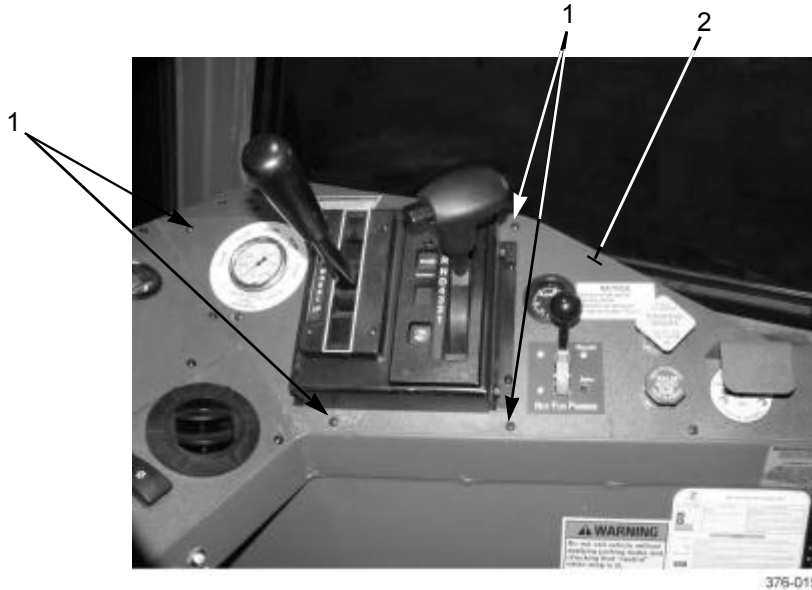
Air system drained (TM 9-2320-312-10)

**WARNING**

DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

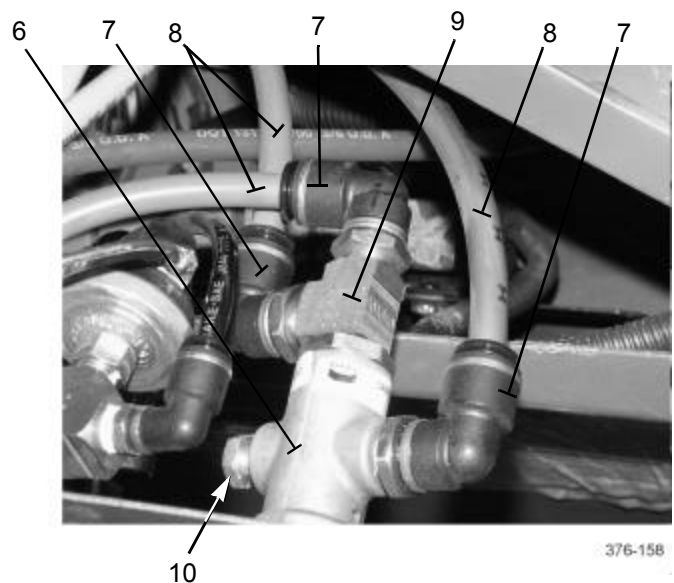
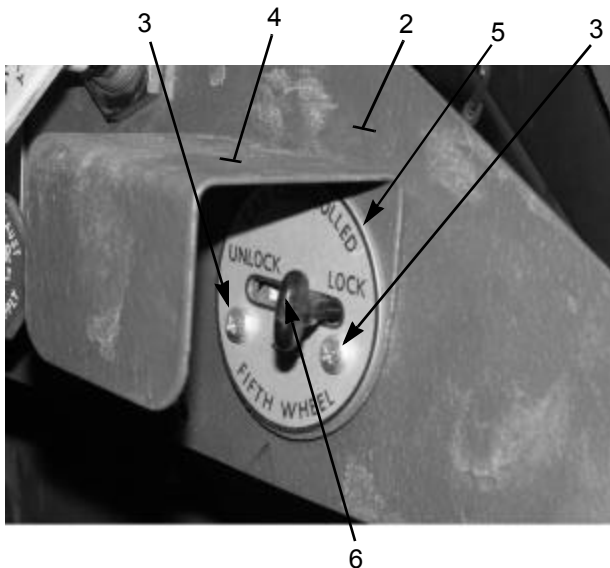
**REMOVAL**

1. Remove eight screws (1) and lift right-side instrument panel (2) away from instrument panel frame.



**NOTE**

- Tag air lines and note position of fifth wheel lock control valve and all fittings to ensure correct installation.
  - Refer to WP 0066 00 for instructions on removing and installing air lines to push-in fittings.
2. Remove two screws (3), plate (5), guard (4), and valve (6) from right-side instrument panel (2).
  3. Disconnect three air lines (8) from three elbows (7).
  4. Remove three elbows (7), tee (9), and plug (10) from valve (6).



**INSTALLATION****NOTE**

Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.

1. Install plug (10), tee (9), and three elbows (7) to valve (6).
2. Connect three air lines (8) to three elbows (7).
3. Install valve (6), guard (4), and plate (5) to right-side instrument panel (2) with two screws (3).
4. Start engine and fully pressurize air system (TM 9-2320-312-10).
5. Check for air leaks: Apply a detergent and water solution to air connections.
6. Install right-side instrument panel (2) with eight screws (1).

**END OF WORK PACKAGE**

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**WHEEL AND TIRE ASSEMBLY MAINTENANCE**

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**0076 00**

**THIS WORK PACKAGE COVERS**

Disassembly, Repair, Assembly

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**INITIAL SETUP**

**Maintenance Level**

Unit

**RPSTL Reference**

Group 160, Figure 11

**MAC Reference**

Group 160

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**NOTE**

- Refer to TM 9-2320-312-10 for wheel and tire assembly replacement procedures.
- Refer to TM 9-2610-200-14, *Operator's, Unit, Direct Support and General Support Maintenance Manual for Care, Maintenance, Repair and Inspection of Pneumatic Tires and Inner Tubes*, for instructions on dismounting tire from wheel and repairing tire.

**END OF WORK PACKAGE**

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**ETHER COLD START SYSTEM MAINTENANCE**

**0077 00**

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**THIS WORK PACKAGE COVERS**

Ether Cylinder: Removal, Installation

Ether Fuel Lines: Removal, Installation

Electronic Control Relay: Removal, Installation

1A Fuse and Fuse Holder: Removal, Installation

Solenoid Valve: Removal, Installation

---

**INITIAL SETUP**

**Maintenance Level**

Unit

**Materials/Parts**

Rag, wiping (Item 51, WP 0165 00)

**MAC Reference**

Group 160

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**RPSTL Reference**

Group 160, Figure 1

Cylinder, ether fluid (P/N 20000)

**References**

WP 0048 00

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

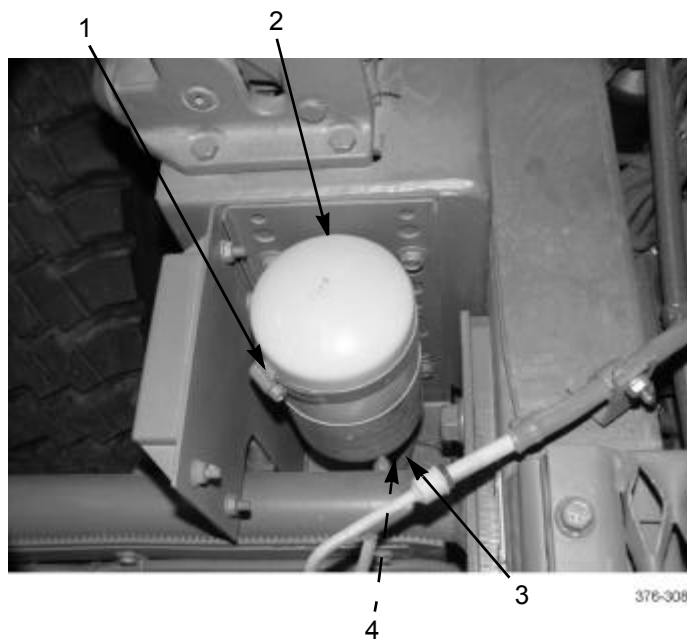
Magnet

Battery disconnect switch in OFF position

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**ETHER CYLINDER REMOVAL****WARNING**

- Ether fuel is extremely flammable and toxic. DO NOT smoke and make sure you are in a well-ventilated area away from heat, open flames or sparks. Wear eye protection. Avoid contact with skin and eyes and avoid breathing ether fumes. If fluid enters or fumes irritate the eyes, wash immediately with large quantities of clean water for 15 minutes. Seek medical attention immediately if ether is inhaled or causes eye irritation. Failure to follow this warning may cause death or serious injury to personnel.
  - When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.
1. Loosen clamp (1) and unscrew cylinder (2) from solenoid valve (3). Dispose of cylinder in accordance with local policy and ordinances.
  2. Remove gasket (4) from solenoid valve (3). Discard gasket.



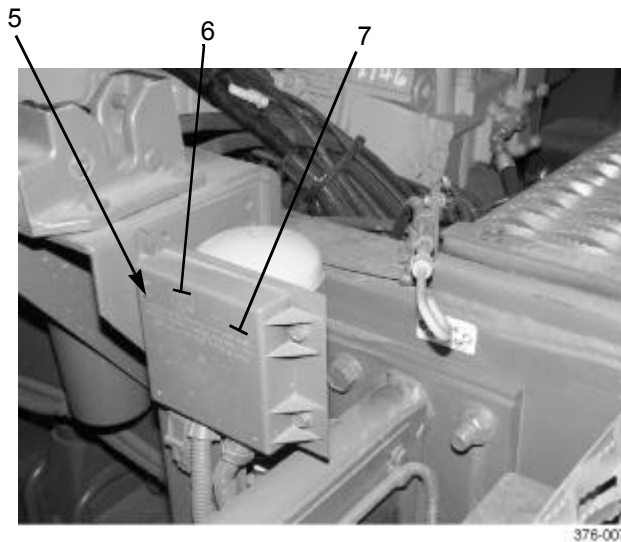
**ETHER CYLINDER INSTALLATION****CAUTION**

Always use new gasket when replacing ether cylinder. Using an old or worn gasket can cause solenoid valve to discharge entire contents of cylinder into intake manifold. Failure to follow this caution can result in severe engine damage.

**NOTE**

Replacement cylinder comes with a new gasket.

1. Apply a thin coat of lubricating oil to new gasket (4) and threads of new cylinder (2).
2. Position gasket (4) and cylinder (2) to solenoid valve (3) and tighten until cylinder stops turning. Hand tighten ONLY.
3. Tighten clamp (1).
4. Place battery disconnect switch in ON position. Lower cab (TM 9-2320-312-10).
5. Turn on ignition (TM 9-2320-312-10). Red indicator light (5) on electronic control relay (7) should be on.
6. Pass a magnet over RESET AREA (6) on electronic control relay (7). Indicator light (5) will flash to indicate system is reset, then turn off.



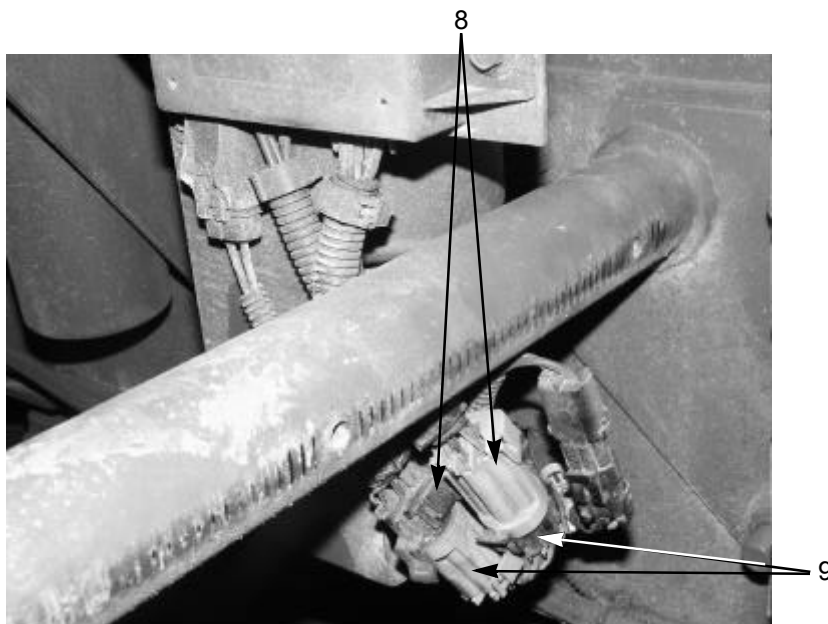
**ELECTRONIC CONTROL RELAY REMOVAL****WARNING**

Ether fuel is extremely flammable and toxic. DO NOT smoke and make sure you are in a well-ventilated area away from heat, open flames or sparks. Wear eye protection. Avoid contact with skin and eyes and avoid breathing ether fumes. If fluid enters or fumes irritate the eyes, wash immediately with large quantities of clean water for 15 minutes. Seek medical attention immediately if ether is inhaled or causes eye irritation. Failure to follow this warning may cause death or serious injury to personnel.

1. Remove left-front mudflap (WP 0048 00).

**NOTE**

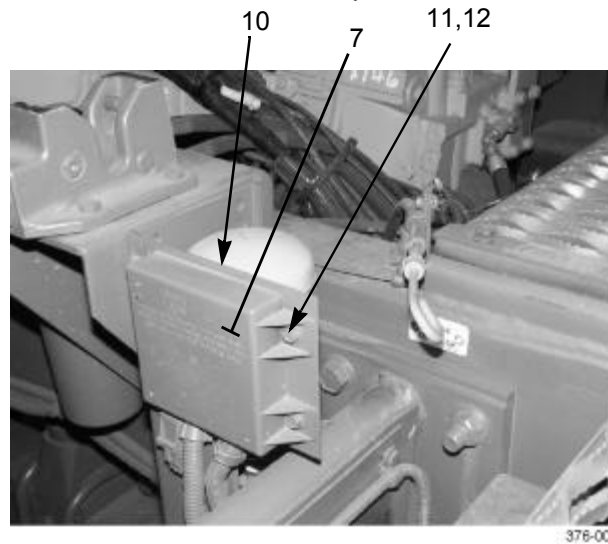
- Tag connectors to ensure correct installation.
  - Remove tiedown straps and discard. Use new tiedown straps on installation.
2. Disconnect two relay harness connectors (8) from ether cold start system harness connectors (9).



376-717

***ELECTRONIC CONTROL RELAY REMOVAL - CONTINUED***

3. Remove four nuts (11), bolts (12), and electronic control relay (7) from bracket (10).

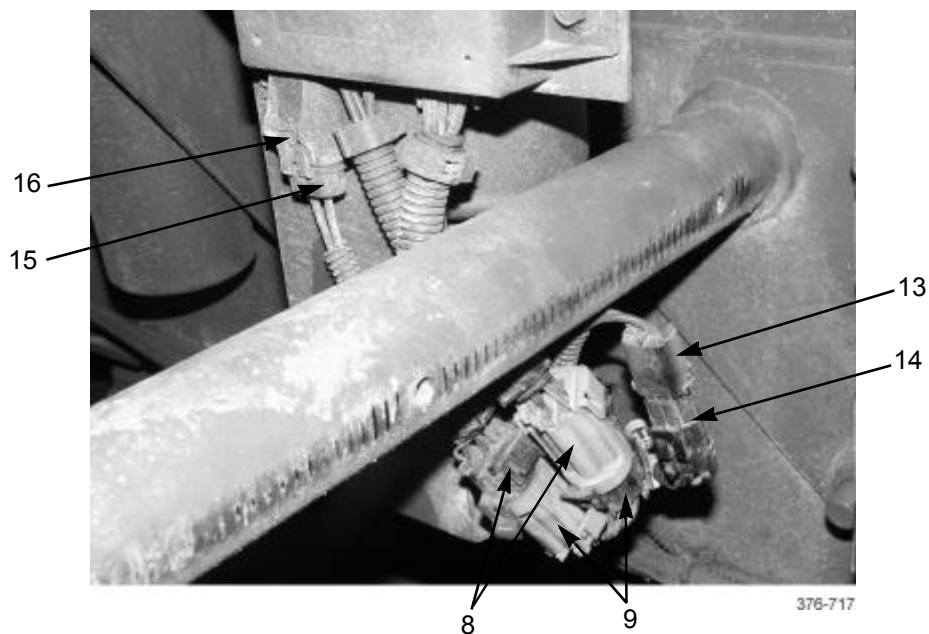
***ELECTRONIC CONTROL RELAY INSTALLATION***

1. Install electronic control relay (7) to bracket (10) with four bolts (12) and nuts (11).
2. Connect two relay harness connectors (8) to ether cold start system harness connectors (9).
3. Place battery disconnect switch in ON position. Lower cab (TM 9-2320-312-10).
4. Install left-front mudflap (WP 0048 00).

**SOLENOID VALVE REMOVAL****WARNING**

Ether fuel is extremely flammable and toxic. DO NOT smoke and make sure you are in a well-ventilated area away from heat, open flames or sparks. Wear eye protection. Avoid contact with skin and eyes and avoid breathing ether fumes. If fluid enters or fumes irritate the eyes, wash immediately with large quantities of clean water for 15 minutes. Seek medical attention immediately if ether is inhaled or causes eye irritation. Failure to follow this warning may cause death or serious injury to personnel.

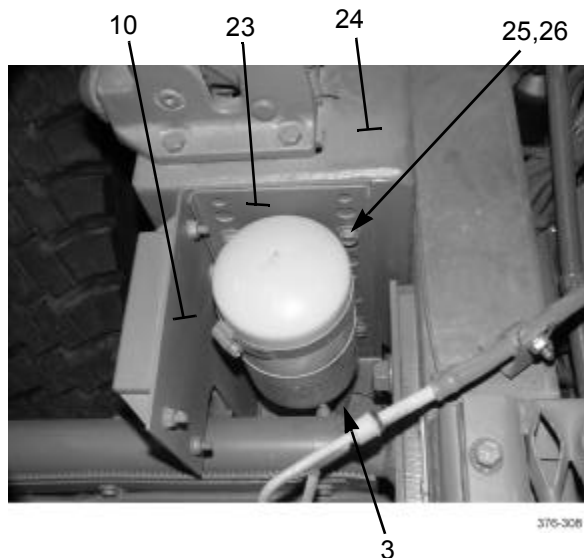
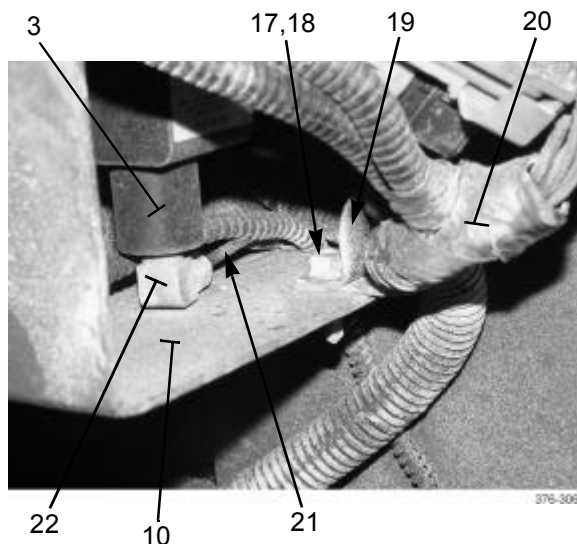
1. Remove left-front mudflap (WP 0048 00).
2. Remove ether cylinder (Refer to *Ether Cylinder Removal*).
3. Disconnect two relay harness connectors (8) from ether cold start system harness connectors (9).
4. Disconnect connector (15) from 1A fuse holder (16).
5. Disconnect solenoid valve connector (14) from ether cold start system harness connector (13).





**SOLENOID VALVE REMOVAL - CONTINUED**

6. Disconnect ether fuel line (21) from elbow (22) on underside of solenoid valve (3).
7. Remove nut (17), screw (18), and clamp (19) with ether cold start system harness (20) from bracket (10).
8. Remove four nuts (25), screws (26), bracket (10), and solenoid valve (3) with mounting bracket (23) from cab tilt latch mount (24).
9. Remove elbow (22) from solenoid valve (3).

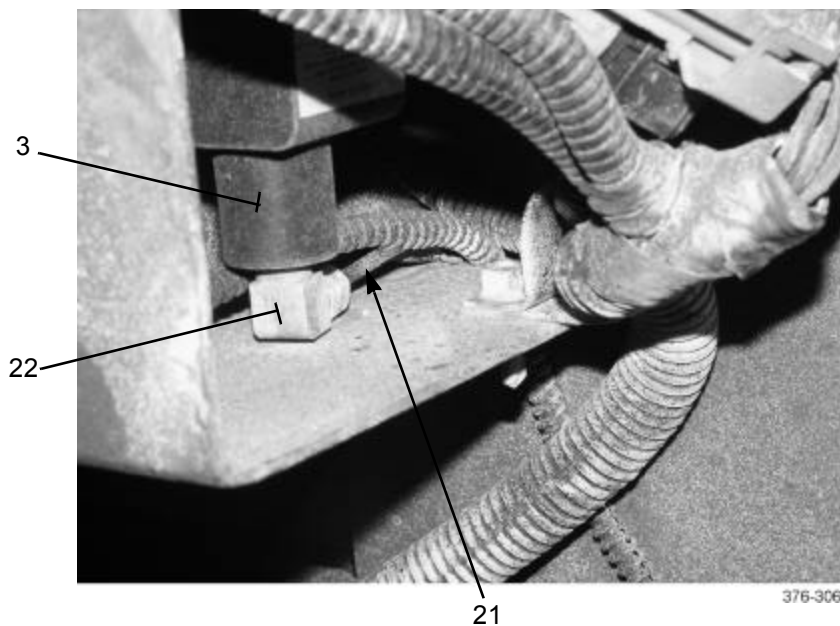
**SOLENOID VALVE INSTALLATION**

1. Install elbow (22) (right-hand threads) to solenoid valve (3) finger tight. Tighten an additional 1-2 turns.
2. Install solenoid valve (3) with mounting bracket (23) and bracket (10) to cab tilt latch mount (24) with four screws (26) and nuts (25).
3. Connect ether fuel line (21) to elbow (22).
4. Secure ether cold start system harness (20) to bracket (10) with clamp (19), screw (18), and nut (17).
5. Connect solenoid valve connector (14) to ether cold start system harness connector (13).
6. Connect connector (15) to 1A fuse holder (16).
7. Connect two relay harness connectors (8) to ether cold start system harness connectors (9).
8. Install ether cylinder (Refer to *Ether Cylinder Installation*).
9. Install left-front mudflap (WP 0048 00).

**ETHER FUEL LINES REMOVAL****WARNING**

Ether fuel is extremely flammable and toxic. DO NOT smoke and make sure you are in a well-ventilated area away from heat, open flames or sparks. Wear eye protection. Avoid contact with skin and eyes and avoid breathing ether fumes. If fluid enters or fumes irritate the eyes, wash immediately with large quantities of clean water for 15 minutes. Seek medical attention immediately if ether is inhaled or causes eye irritation. Failure to follow this warning may cause death or serious injury to personnel.

1. Remove left-front mudflap (WP 0048 00).
2. Disconnect ether fuel line (21) from elbow (22) on underside of solenoid valve (3).

**NOTE**

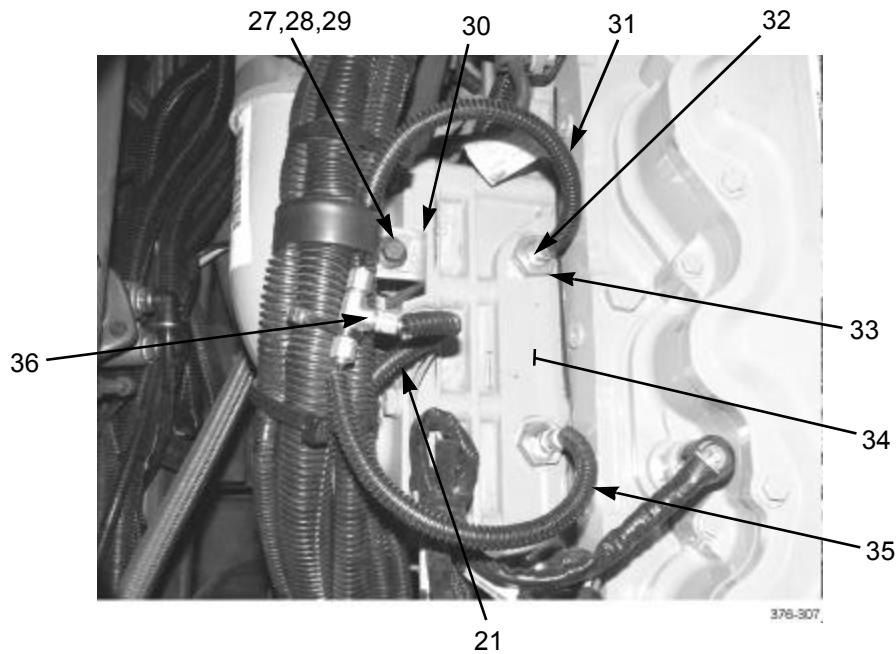
Note routing of ether line from solenoid valve to left side at top of engine.

3. Trace ether fuel line (21) to tee (36) on left side of engine. Remove all tiedown straps and discard.
4. Disconnect ether fuel line (21) from tee (36).
5. Remove nut (27), screw (28), and clamp (29) from bracket (30) to release ether fuel line (31).
6. Disconnect ether fuel line (31) from nozzle (32) and tee (36).

**ETHER FUEL LINES REMOVAL - CONTINUED****NOTE**

Note orientation of red dot on hex of nozzle to ensure correct installation.

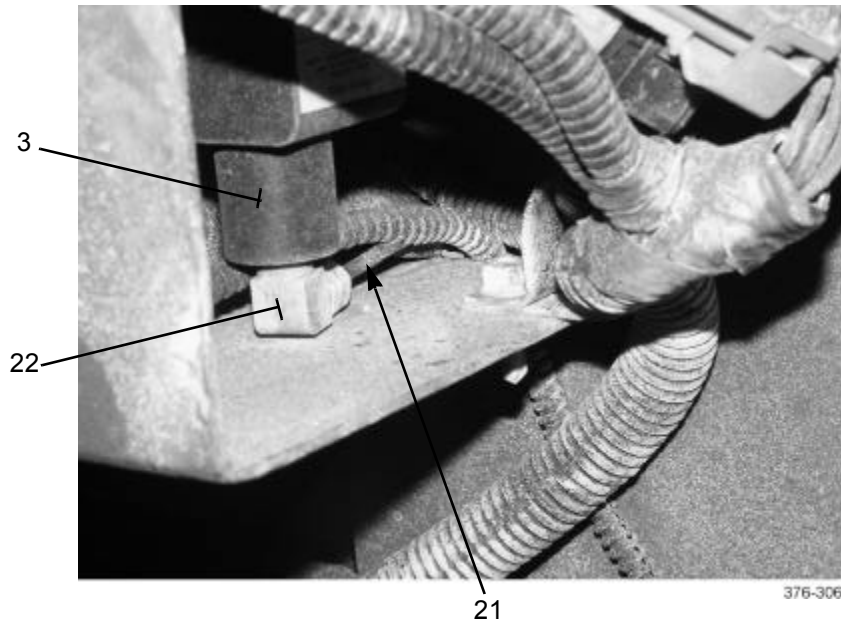
7. Remove nozzle (32) and adapter (33) from intake manifold (34).
8. Repeat steps 6 and 7 to remove ether fuel line (35).
9. As required, remove conduit from ether fuel lines (21, 31, and 35).

**ETHER FUEL LINES INSTALLATION**

1. If removed, install conduit to ether fuel lines (21, 31, and 35).
2. Install adapter (33) and nozzle (32) to intake manifold (34). Ensure red dot on hex of nozzle is oriented in same direction as noted during removal.
3. Connect ether fuel line (31) to nozzle (32) and tee (36).
4. Repeat steps 2 and 3 to install ether fuel line (35).
5. Secure ether fuel line (31) to bracket (30) with clamp (29), screw (28), and nut (27).
6. Connect ether fuel line (21) to tee (36).

**ETHER FUEL LINES INSTALLATION - CONTINUED**

7. Route ether fuel line (21) from engine to solenoid valve (3). Install new tiedown straps.
8. Connect ether fuel line (21) to elbow (22) on underside of solenoid valve (3).

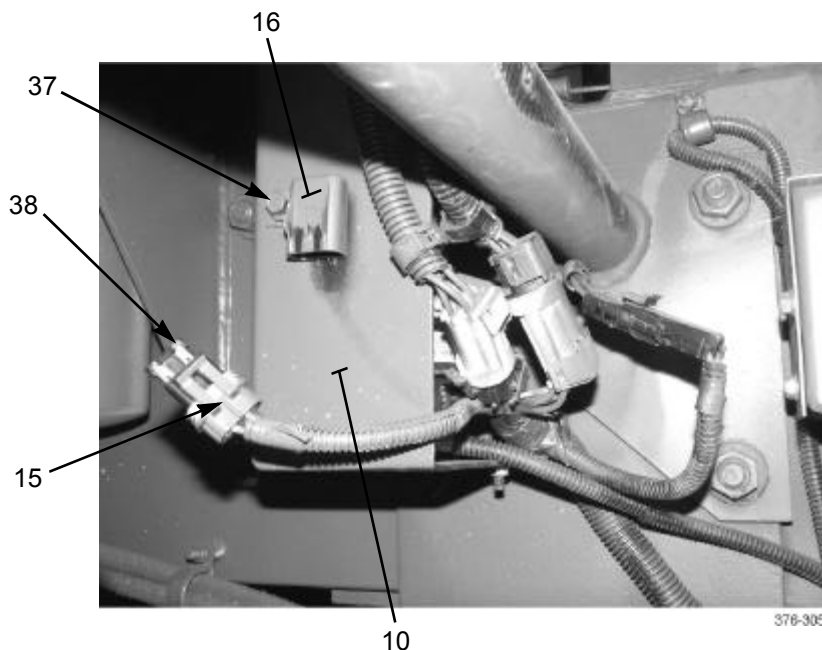


9. Place battery disconnect switch in ON position. Lower cab (TM 9-2320-312-10).
10. Install left-front mudflap (WP 0048 00).

**1A FUSE AND FUSE HOLDER REMOVAL****WARNING**

Ether fuel is extremely flammable and toxic. DO NOT smoke and make sure you are in a well-ventilated area away from heat, open flames or sparks. Wear eye protection. Avoid contact with skin and eyes and avoid breathing ether fumes. If fluid enters or fumes irritate the eyes, wash immediately with large quantities of clean water for 15 minutes. Seek medical attention immediately if ether is inhaled or causes eye irritation. Failure to follow this warning may cause death or serious injury to personnel.

1. Disconnect connector (15) to open fuse holder (16).
2. Remove fuse (38).
3. Remove self-tapping screw (37) and fuse holder (16) from bracket (10).

**1A FUSE AND FUSE HOLDER INSTALLATION**

1. Install fuse holder (16) to bracket (10) with self-tapping screw (37).
2. Insert fuse (38) in slot in connector (15).
3. Connect connector (15) to close fuse holder (16).
4. Place battery disconnect switch in ON position. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 160

**RPSTL Reference**

Group 160, Figure 13

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Strap, tiedown (Item 57, WP 0165 00)

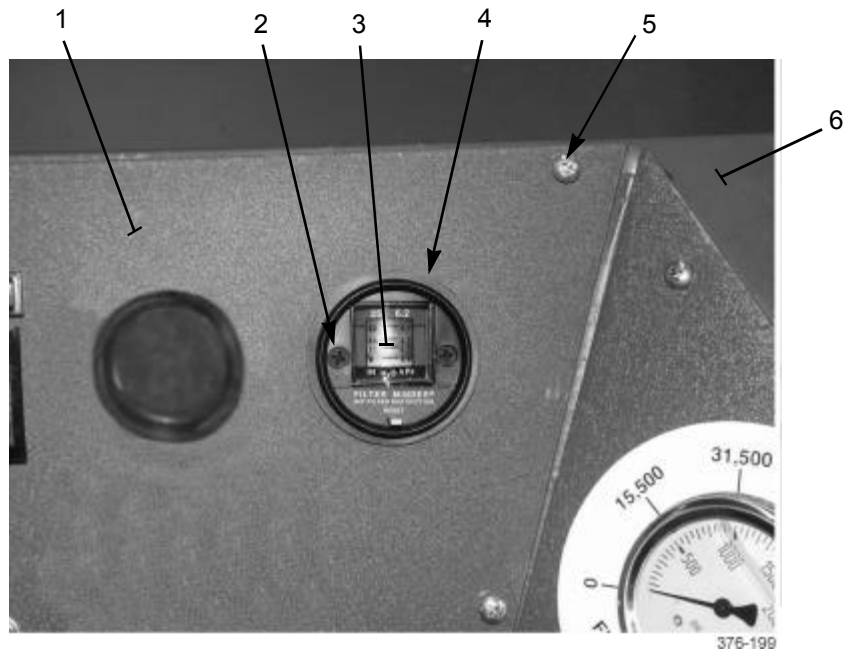
**References**

TM 9-2320-312-10

WP 0046 00

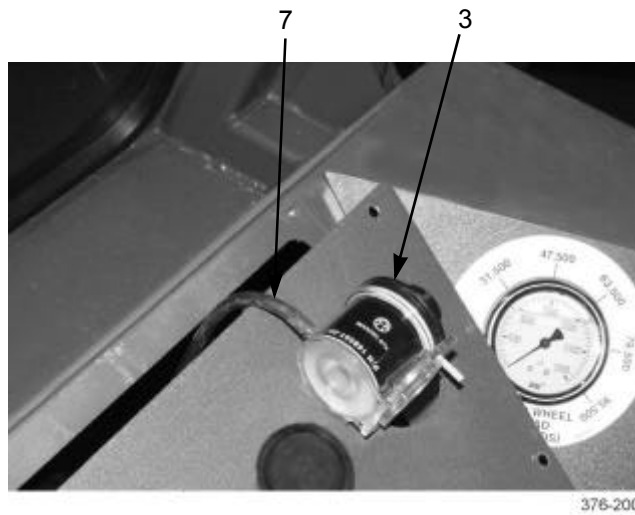
**REMOVAL**

1. Remove 14 screws (5) to free upper instrument panel (1) from instrument panel frame (6).
2. Remove two screws (2), cover (4), and gauge (3) from upper instrument panel (1).



**REMOVAL - CONTINUED**

3. Remove hose (7) from back of gauge (3).

**NOTE**

Perform steps 4 through 14 to remove lengths of hose between gauge and air intake tube.

4. Remove front access panel from cab (WP 0046 00).
5. Tilt cab (TM 9-2320-312-10).
6. Remove tiedown straps and discard.
7. Remove hose (7) from adapter (10).
8. Remove hose (7) from cab through opening in front of cab.
9. Disconnect hose (8) from adapter (9).
10. As required, separate adapter (9) from adapter (10).

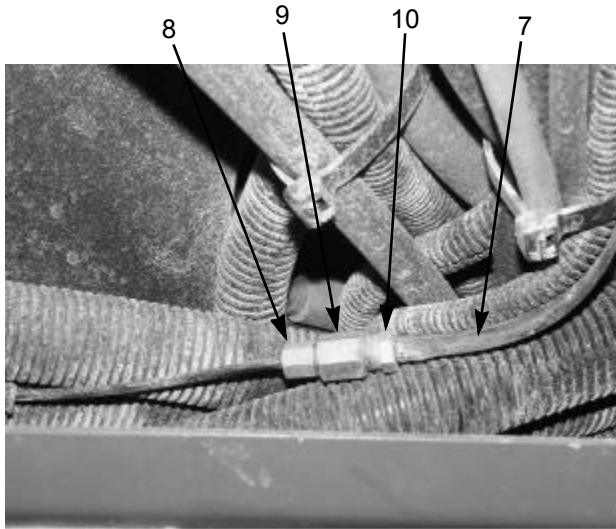
**NOTE**

Note routing of hose to ensure correct installation.

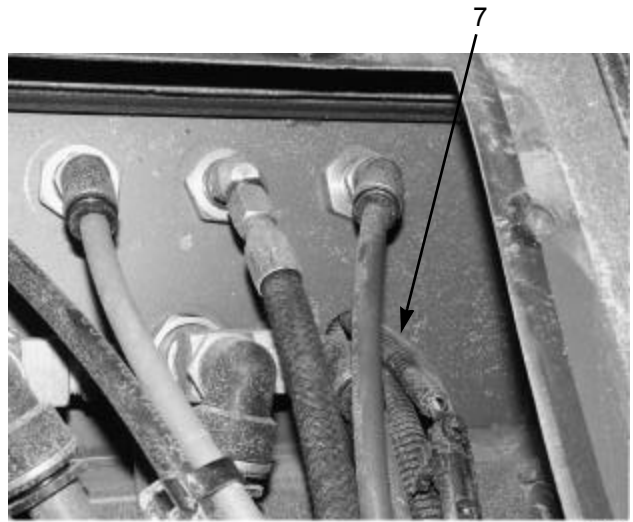
11. Trace hose (8) back to engine, removing and discarding all tiedown straps.



**REMOVAL - CONTINUED**

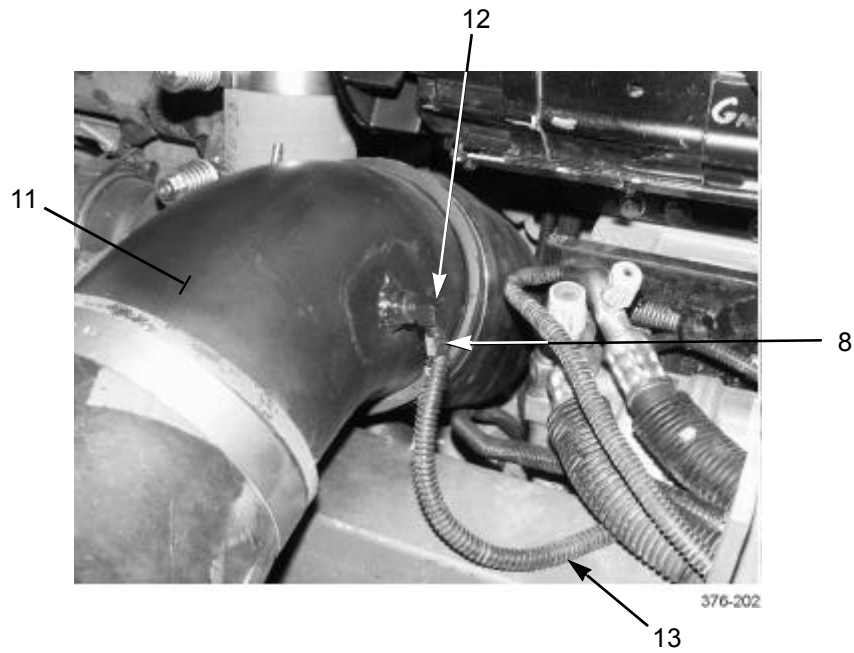


376-201



376-680

12. At air intake tube (11), disconnect hose (8) from elbow (12).
13. Remove hose (8) with wire loom (13) from vehicle. Remove wire loom from hose.
14. As required, remove elbow (12) from air intake tube (11).



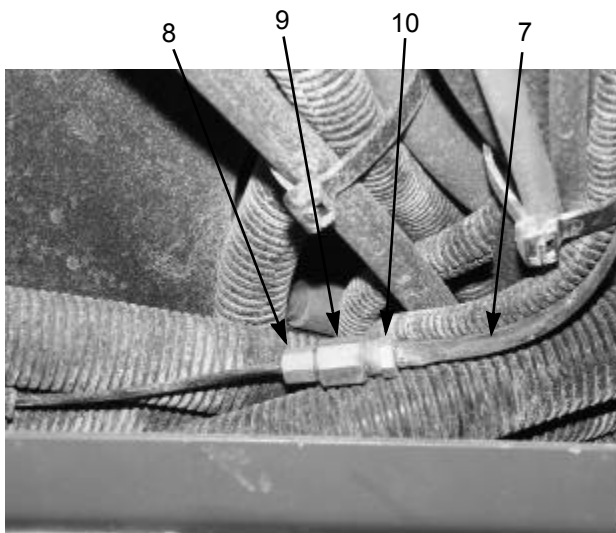
376-202

**INSTALLATION**

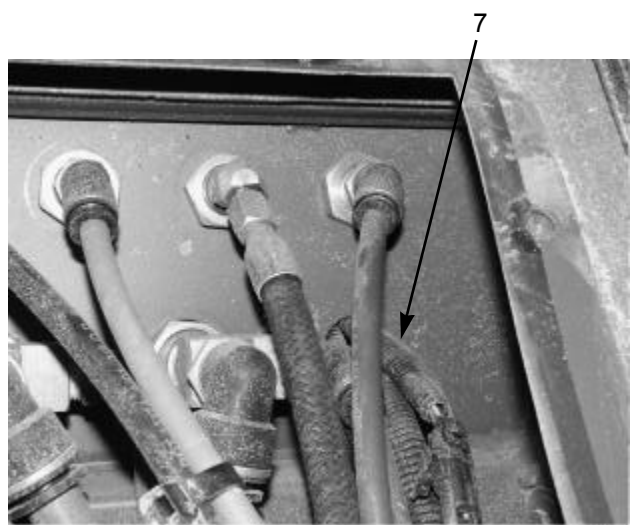
1. If removed, install elbow (12) to air intake tube (11).
2. Install wire loom (13) to hose (8).
3. Connect hose (8) to elbow (12) at air intake tube (11).

**INSTALLATION - CONTINUED**

4. Route hose (8) to front of cab.
5. As required, assemble adapter (9) and adapter (10).
6. Connect hose (8) to adapter (9).
7. Secure hose (8) with new tiedown straps.
8. Install hose (7) to adapter (10).
9. Route hose (7) into cab through opening at front of cab. Secure hose with new tiedown straps.

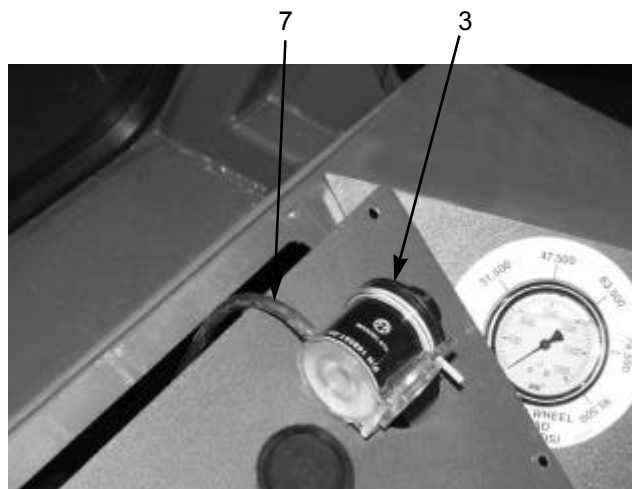


376-201



376-680

10. Lower cab (TM 9-2320-312-10).
11. Install hose (7) to back of gauge (3).

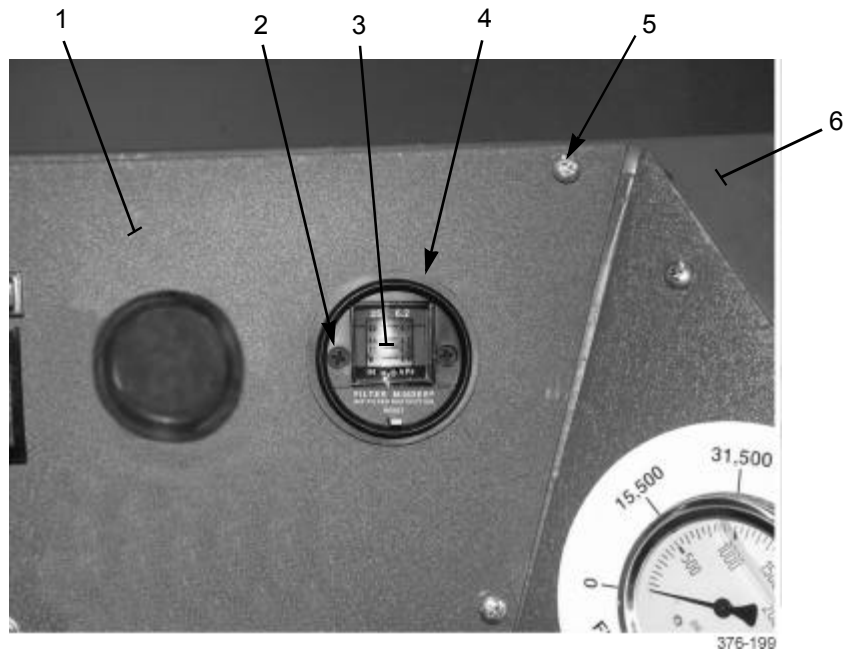


376-200

**INSTALLATION - CONTINUED****CAUTION**

DO NOT overtighten mounting screws or gauge will crack.

12. Install gauge (3) and cover (4) to upper instrument panel (1) with two screws (2).
13. Install upper instrument panel (1) with 14 screws (5).
14. Start engine (TM 9-2320-312-10). Check that gauge (3) registers.



15. Install front access panel to cab (WP 0046 00).

**END OF WORK PACKAGE**

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**PINTLE HOOK REPLACEMENT**

0079 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 160

**RPSTL Reference**

Group 160, Figure 9

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

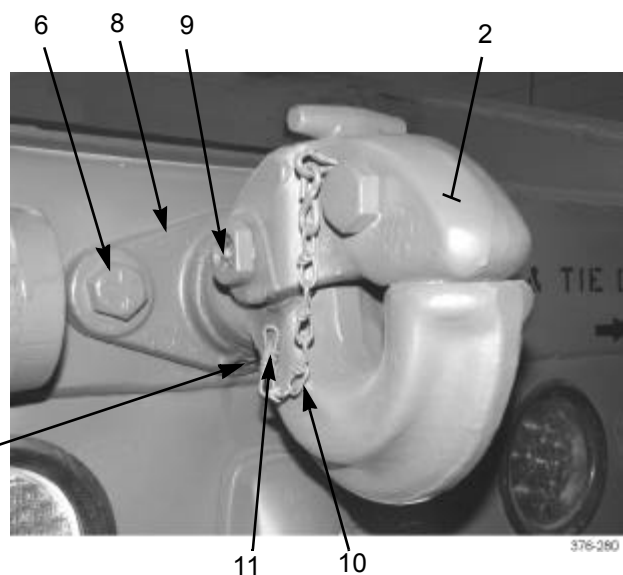
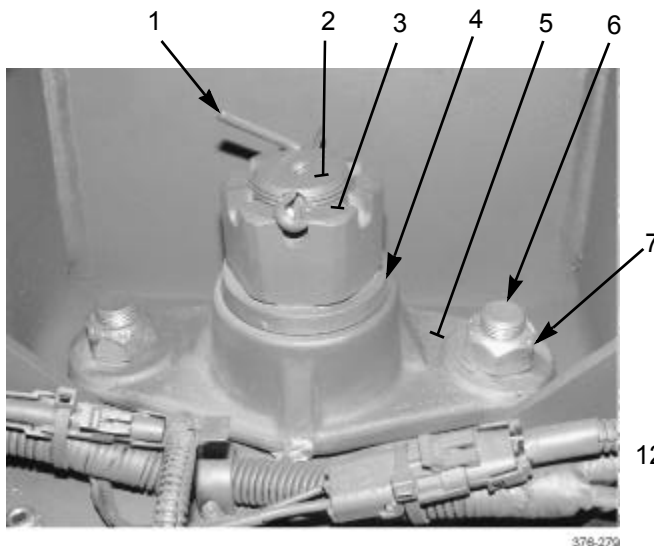
Grease, GAA (Item 30, WP 0165 00)

Nut, lock (P/N XB-769) (2)

Pin, cotter (P/N MS24665-628)

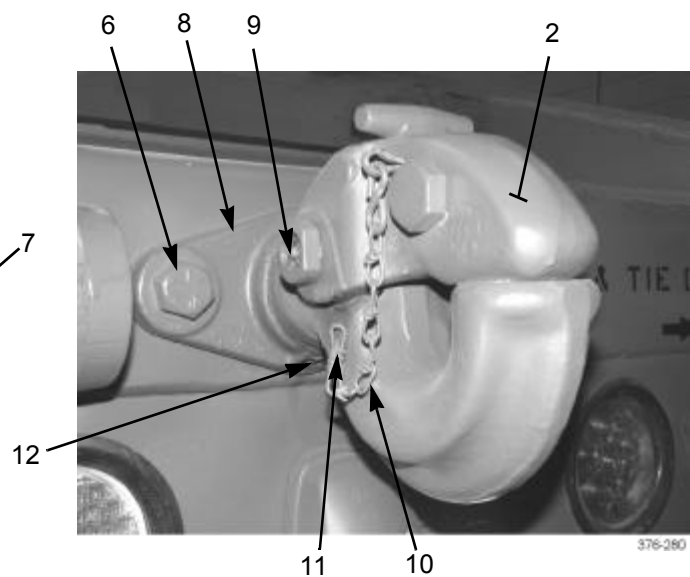
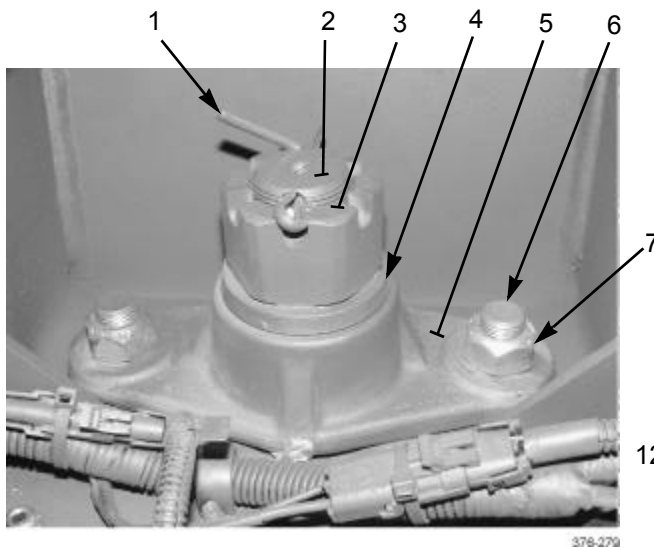
**REMOVAL**

1. Remove cotter pin (1), castle nut (3), washer (4), and pintle hook (2) from rear of vehicle. Discard cotter pin.
2. Remove two locknuts (7), flange (5), flange (8), and two screws (6). Discard locknuts.
3. Remove grease fitting (9) from pintle hook (2).
4. Remove grease fitting (12) from flange (8).
5. If chain assembly (10) is damaged, remove drive screw (11) and chain assembly.



**PINTLE HOOK REPLACEMENT - CONTINUED****0079 00****INSTALLATION**

1. If removed, install chain assembly (10) with drive screw (11).
2. Install grease fitting (12) to flange (8).
3. Install grease fitting (9) to pintle hook (2).
4. Install flange (8) and flange (5) to rear of vehicle with two screws (6) and new locknuts (7).
5. Install pintle hook (2) to vehicle with washer (4), castle nut (3), and new cotter pin (1). Ensure that pintle hook is free to rotate.
6. Lubricate grease fittings (9 and 12) with GAA grease.

**END OF WORK PACKAGE**

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**DATA PLATE AND DECAL REPLACEMENT**

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0080 00

**THIS WORK PACKAGE COVERS**

Data Plate: Removal, Installation

Decal: Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 160

**RPSTL Reference**

Group 160, Figure 2

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cleaning compound, solvent, Type III (Item 10, WP 0165 00)

Detergent (Item 23, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Rivets (as required)

**References**

TM 9-2320-312-10

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**DATA PLATE REMOVAL****WARNING**

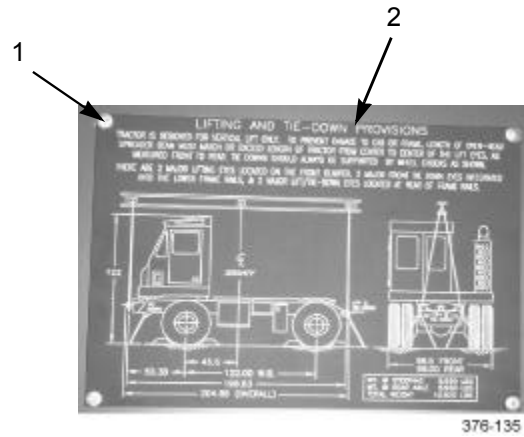
Wear eye protection when drilling out rivets. Failure to do so could result in serious eye injury.

**CAUTION**

Avoid using a twist drill with an excessively large diameter when drilling out rivets. Failure to follow this caution could result in enlarged holes in vehicle, too large for rivet size needed.

**DATA PLATE REMOVAL - CONTINUED**

1. Drill out four rivets (1) from data plate (2). Discard rivets.
2. Remove data plate (2) from vehicle.



**DATA PLATE INSTALLATION**

1. Position data plate (2) to existing holes in vehicle.
2. Install data plate (2) with four new rivets (1).

**DECAL REMOVAL**

1. Remove decal (3) from surface of vehicle.





**DECAL REMOVAL - CONTINUED****WARNING**

Dry cleaning solvent MIL-PRF-680 Type III is an environmentally compliant and low toxic material. However, it may be irritating to the eyes and skin. The use of protective gloves and goggles is suggested. Use in well-ventilated areas. Keep away from open flame and other sources of ignition.

2. If necessary, use a pocketknife and dry cleaning solvent to remove all traces of decal and adhesive.

**DECAL INSTALLATION**

1. Determine correct location for new decal (3) (TM 9-2320-312-10).
2. Ensure mounting surface on vehicle is clean and dry. Use detergent and water to clean surface, if necessary. Dry thoroughly.
3. Remove backing paper from decal (3) and press decal into position. Ensure all corners of decal are firmly affixed.

**END OF WORK PACKAGE**

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**COOLANT OVERFLOW BOTTLE REPLACEMENT**

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0081 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 160

**RPSTL Reference**

Group 160, Figure 3

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Antifreeze (Item 4 or 5, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Washer, lock (P/N 361-5) (8)

**References**

WP 0023 00

**Equipment Condition**

Engine cold

**WARNING**

- DO NOT service cooling system unless engine has cooled to 120°F (50°C) as indicated on coolant temperature gauge. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.
- Wear effective eye, glove, and skin protection when handling coolants. Failure to do so may cause injury.

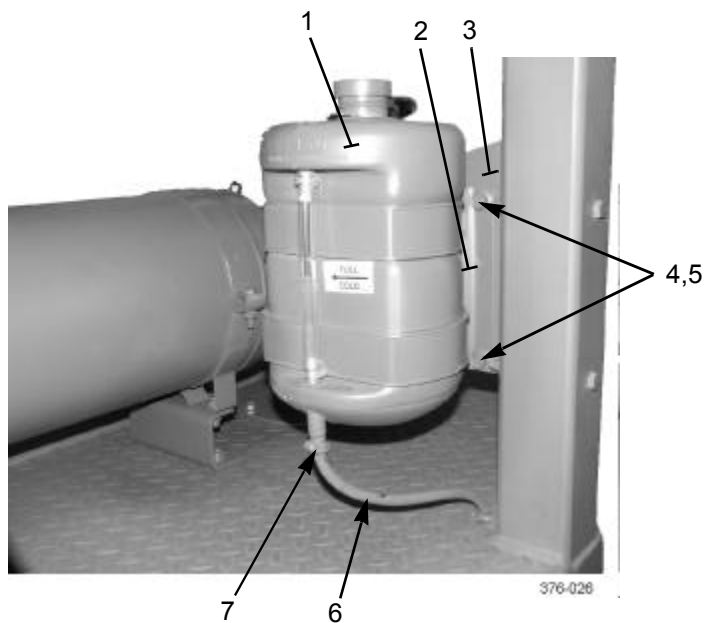
**REMOVAL****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**NOTE**

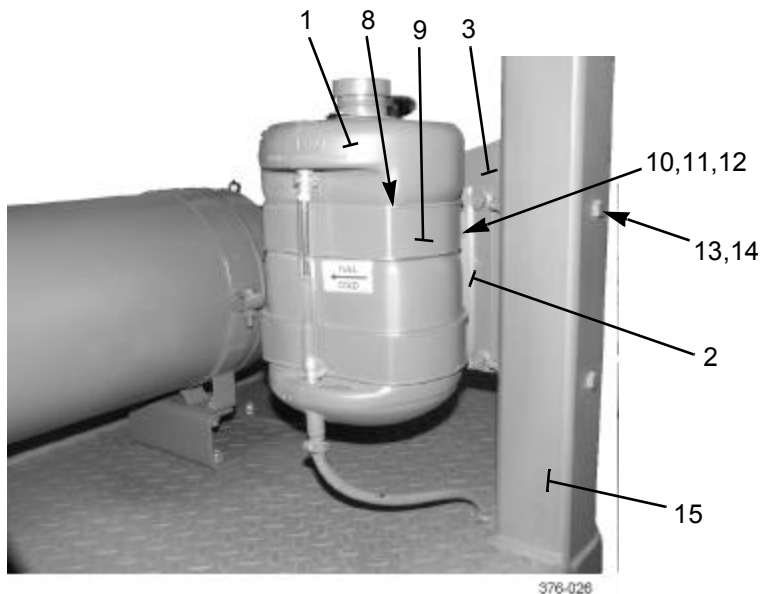
Coolant overflow bottle capacity is 1.5 gal (5.7 L).

1. Loosen hose clamp (7) at bottom of bottle (1).
2. Disconnect rubber hose (6) and drain coolant from bottle (1) into a drain pan. Dispose of coolant in accordance with local policy and ordinances. Clean up all coolant spills.
3. Remove four nuts (4), screws (5), and back plate (2), with bottle (1), from mounting bracket (3).



**COOLANT OVERFLOW BOTTLE REPLACEMENT - CONTINUED****0081 00****REMOVAL - CONTINUED**

4. As required, remove eight nuts (10), screws (11), lockwashers (12), two mounting brackets (9), cushion straps (8), and bottle (1) from back plate (2). Discard lockwashers.
5. If damaged, remove two nuts (13), screws (14), and mounting bracket (3) from mirror post (15).

**INSTALLATION**

1. If removed, install mounting bracket (3) to mirror post (15) with two screws (14) and nuts (13).
2. As required, assemble bottle (1) to back plate (2) with two cushion straps (8), mounting brackets (9), eight new lockwashers (12), screws (11), and nuts (10).
3. Install back plate (2), with bottle (1), to mounting bracket (3) with four screws (5) and nuts (4).
4. Connect rubber hose (6) to bottom of bottle (1) and tighten hose clamp (7).
5. Fill cooling system as needed (WP 0023 00).

**END OF WORK PACKAGE**

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**BACKUP ALARM REPLACEMENT**

**0082 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 160

**RPSTL Reference**

Group 160, Figure 10

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Strap, tiedown (Item 57, WP 0165 00)

Washer, lock (P/N 361-6) (2)

**Equipment Condition**

Battery disconnect switch in OFF position

**NOTE**

- Backup alarm is located under left rear of tractor.
- Remove and discard tiedown straps. Use new tiedown straps on installation.

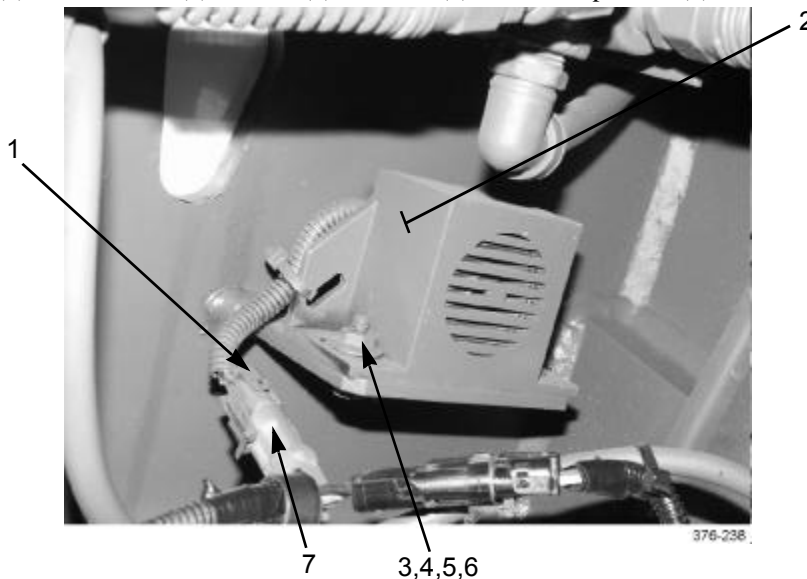
**REMOVAL**

1. Disconnect connector (1) of backup alarm cable from vehicle wiring harness connector (7).

**NOTE**

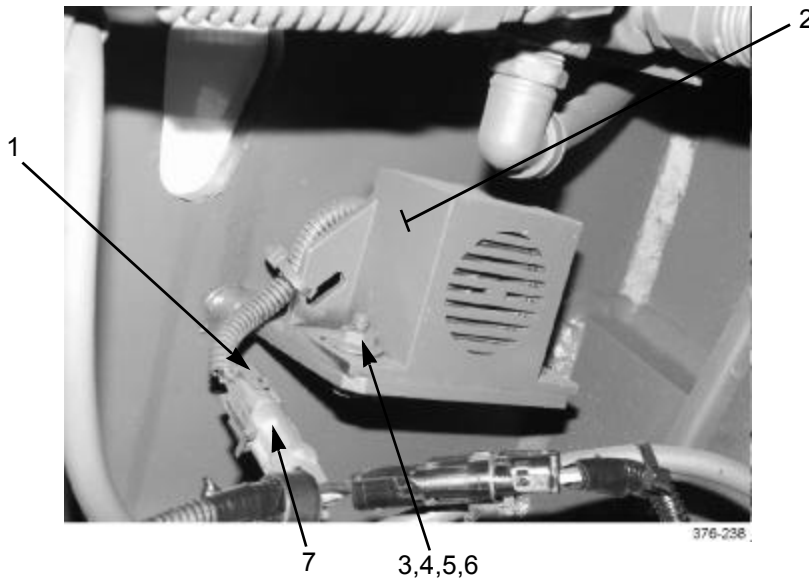
Note position of backup alarm for installation.

2. Remove two nuts (3), lockwashers (4), screws (5), washers (6), and backup alarm (2) from vehicle.



**INSTALLATION**

1. Install backup alarm (2) to vehicle with two washers (6), screws (5), new lockwashers (4), and nuts (3).
2. Connect connector (1) of backup alarm cable to vehicle wiring harness connector (7).



3. Place battery disconnect switch in ON position.

**END OF WORK PACKAGE**



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**FIFTH WHEEL AIR CYLINDER AND HOSE REPLACEMENT**

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**0083 00****THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 150 and Group 160

**RPSTL Reference**

Group 150, Figure 5

Group 160, Figure 7

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

Detergent (Item 23, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Nut, lock (P/N XB-T69A) (2)

Nut, lock (P/N 21NE048) (4)

**References**

WP 0046 00

WP 0066 00

**Equipment Condition**

Fifth wheel partially raised (TM 9-2320-312-10)

Wheels blocked

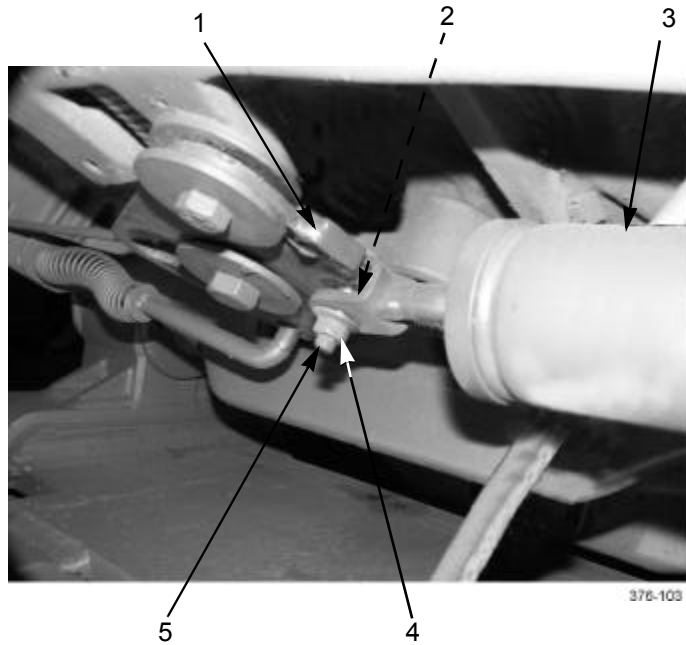
Air system drained (TM 9-2320-312-10)

**WARNING**

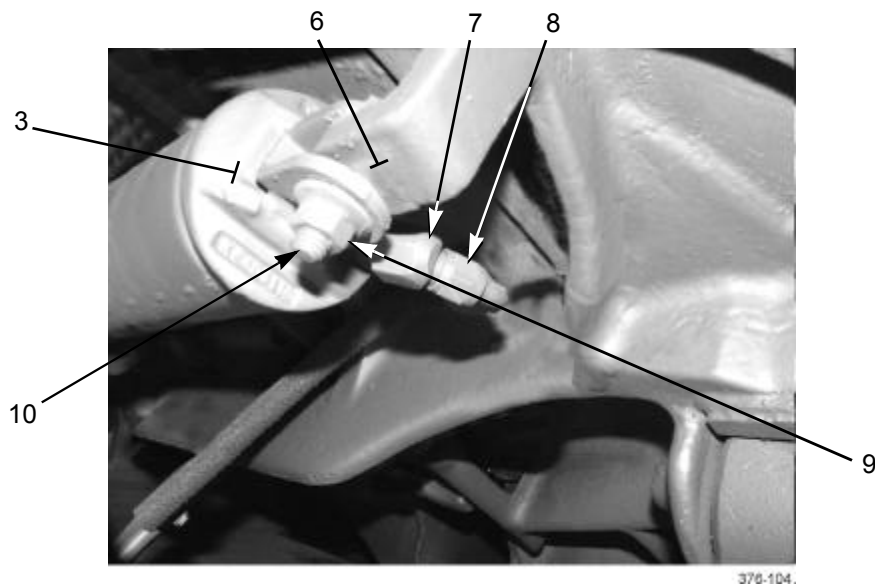
DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

**REMOVAL**

1. Remove locknut (4), shoulder bolt (5), and washer (2) to free yoke of air cylinder (3) from cam plate (1) of fifth wheel. Discard locknut.

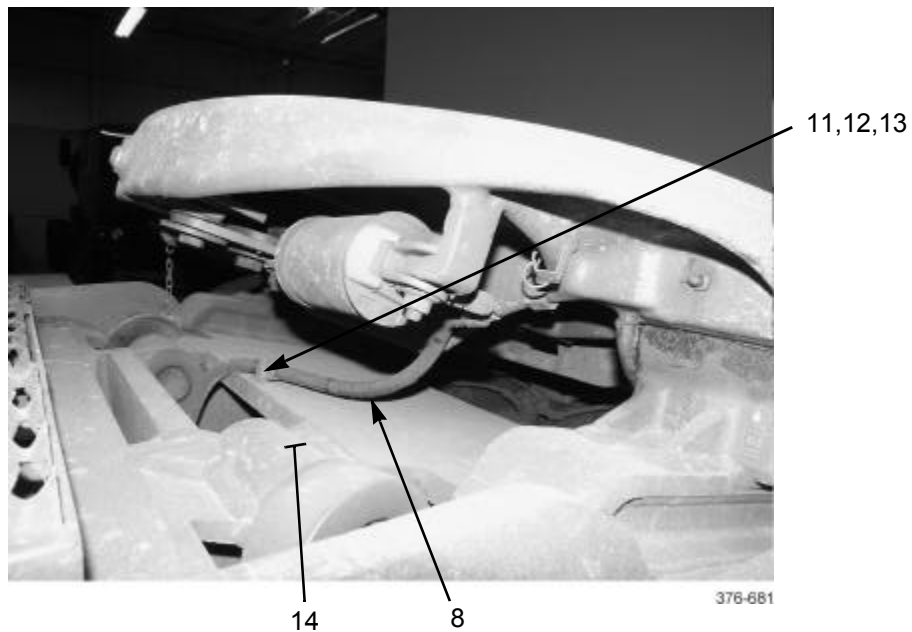


2. Disconnect fifth wheel air cylinder hose (8) from elbow (7).
3. Remove locknut (9), shoulder bolt (10), and air cylinder (3) from tab (6) of fifth wheel casting. Discard locknut.
4. Remove elbow (7) from air cylinder (3).



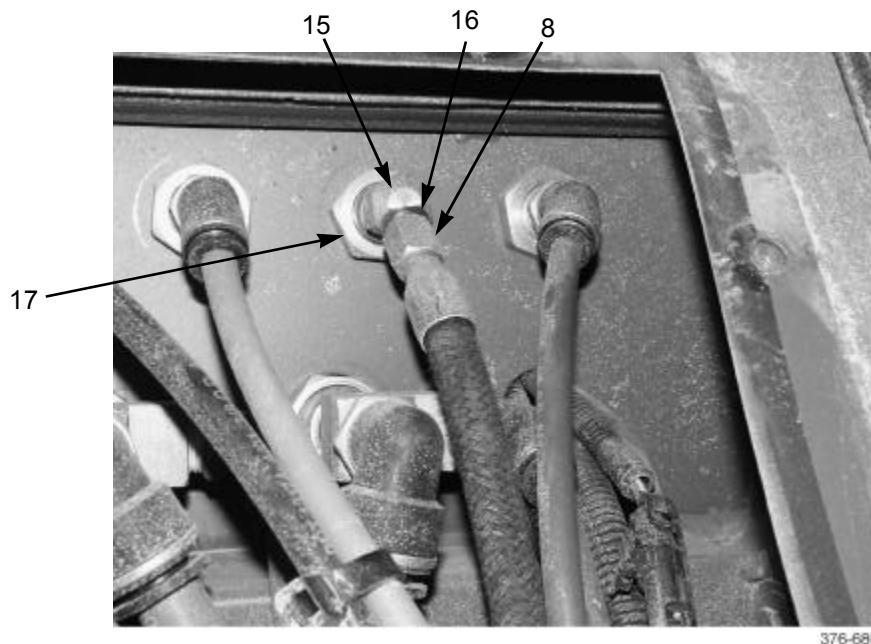
**REMOVAL - CONTINUED****NOTE**

- Perform steps 5 through 10 to remove fifth wheel air cylinder hose between fifth wheel and front of cab, if hose is damaged.
  - Note routing of hose to ensure correct installation.
  - Remove and discard all tiedown straps.
5. Remove locknut (11) and clamp (12) from welded stud (13) on fifth wheel frame subassembly (14) and release fifth wheel air cylinder hose (8). Discard locknut.
  6. Remove three locknuts (11) and clamps (12) from welded studs (13) along left frame rail and release fifth wheel air cylinder hose (8) from frame. Discard locknuts.



**REMOVAL - CONTINUED**

7. At front of cab, remove access cover (WP 0046 00).
8. Tilt cab (TM 9-2320-312-10).
9. Disconnect fifth wheel air cylinder hose (8) from straight adapter (16) at elbow (15).
10. Remove fifth wheel air cylinder hose (8) from vehicle.
11. Refer to WP 0066 00 to remove hose inside cab between bulkhead fitting (17) and fifth wheel lock control valve on right-side instrument panel.

**INSTALLATION**

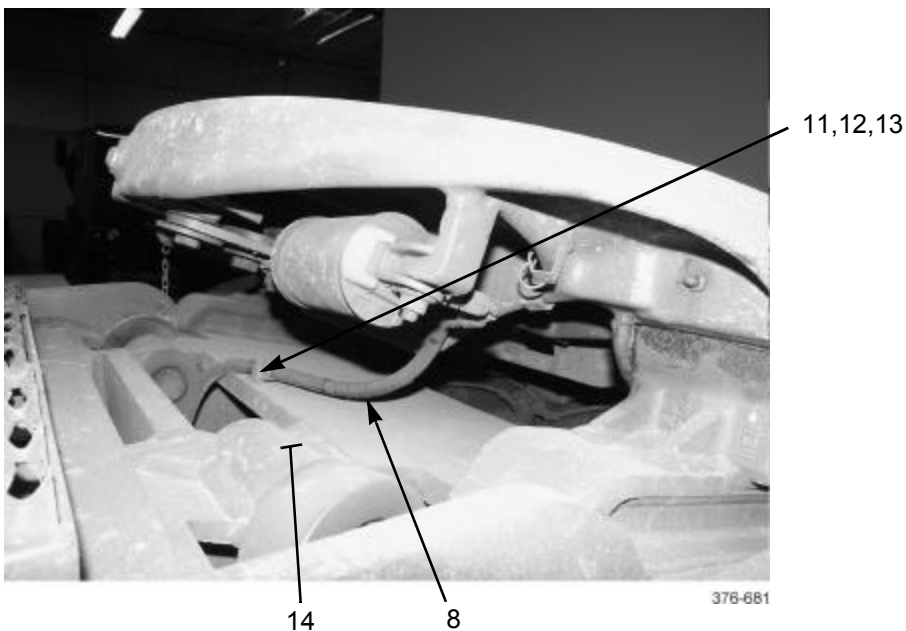
1. Refer to WP 0066 00 to install hose inside cab between bulkhead fitting (17) and fifth wheel lock control valve on right-side instrument panel.

**NOTE**

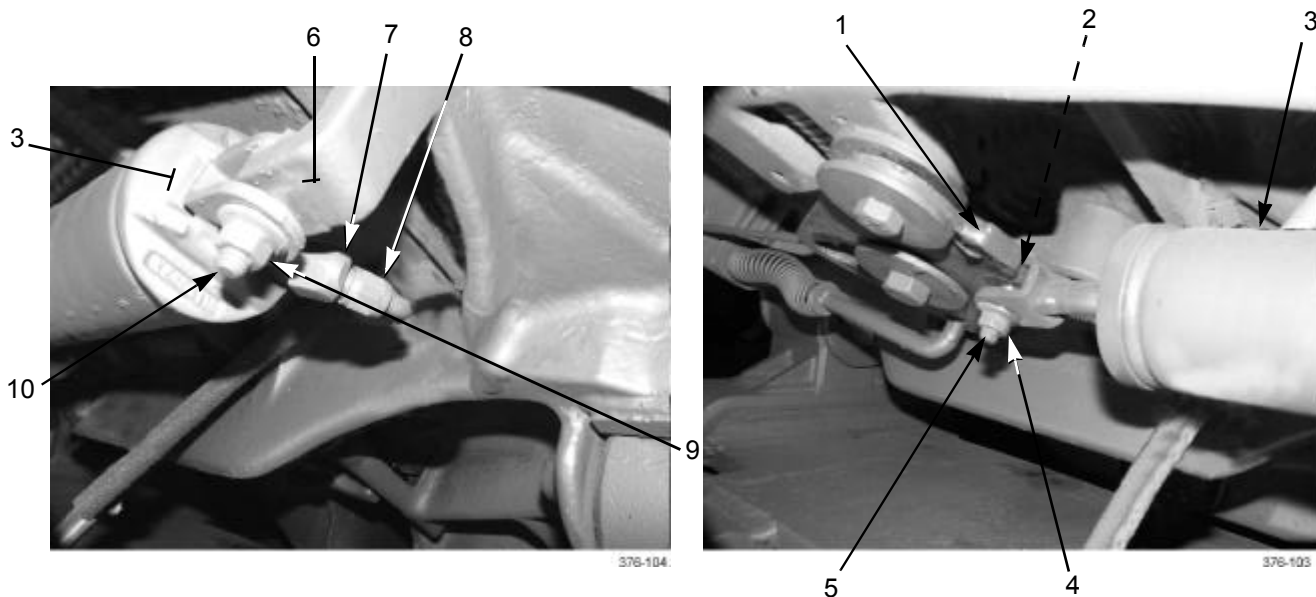
- If removed, perform steps 2 through 5 to install fifth wheel air cylinder hose between fifth wheel and front of cab.
  - Apply a thin coat of pipe sealing compound to male threads of fittings before connections are made.
2. Position fifth wheel air cylinder hose (8) to vehicle.
  3. At front of cab, connect fifth wheel air cylinder hose (8) to straight adapter (16) at elbow (15).
  4. Route hose (8) toward rear of vehicle, installing new tiedown straps.

**REMOVAL - CONTINUED**

5. Install four clamps (12) and new locknuts (11) to secure fifth wheel air cylinder hose (8) to three welded studs along left frame rail and welded stud (13) on fifth wheel frame sub-assembly (14).



6. Install elbow (7) to air cylinder (3).
7. Install air cylinder (3) to tab (6) of fifth wheel casting with shoulder bolt (10) and new locknut (9). Tighten locknut to 45 lb-ft (61 Nm).



8. Install yoke of air cylinder (3) to cam plate (1) of fifth wheel with washer (2), shoulder bolt (5), and new locknut (4). Tighten locknut to 45 lb-ft (61 Nm).
9. Connect fifth wheel air hose (8) to elbow (7).

***INSTALLATION - CONTINUED***

10. Lower cab (TM 9-2320-312-10).
11. Start engine and fully pressurize air system (TM 9-2320-312-10).
12. Lower fifth wheel (TM 9-2320-312-10).
13. Operate fifth wheel lock control (TM 9-2320-312-10). Ensure that air cylinder functions properly to unlock fifth wheel.
14. Check for air leaks with fifth wheel lock control activated: Use a detergent and water solution to check for leaks at all air connections.
15. Install access cover to front of cab (WP 0046 00).

**END OF WORK PACKAGE**

**LOAD SENSING GAUGE AND HOSES REPLACEMENT****0084 00****THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 160

**RPSTL Reference**

Group 160, Figure 12

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Fluid, hydraulic, petroleum base (Item 25 or 26, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

**References**

0039 00

0129 00

**Equipment Condition**

Fifth wheel fully lowered (TM 9-2320-312-10)

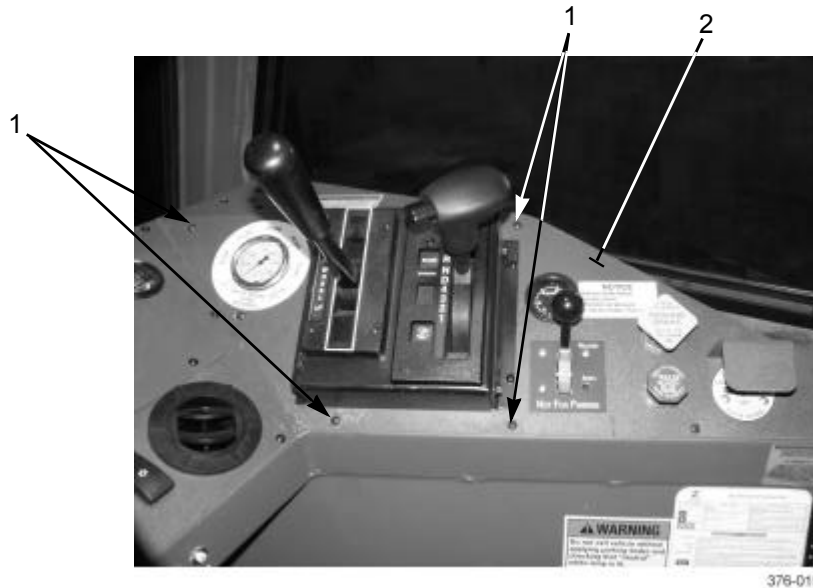
Engine shut down

**WARNING**

- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
- At operating temperature, hydraulic fluid is hot. Allow hydraulic fluid to cool before disconnecting any hydraulic lines. Failure to do so could result in serious burns.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

**REMOVAL**

1. Remove eight screws (1) and lift right-side instrument panel (2) from instrument panel frame.

**WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

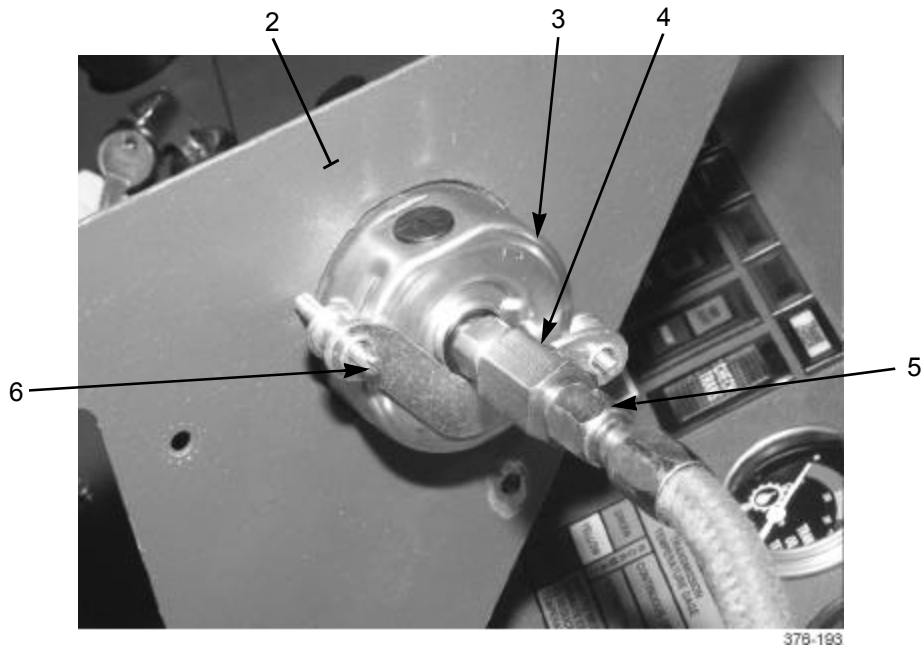
**NOTE**

Use a suitable container to capture any residual hydraulic fluid in hoses. Dispose of fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.



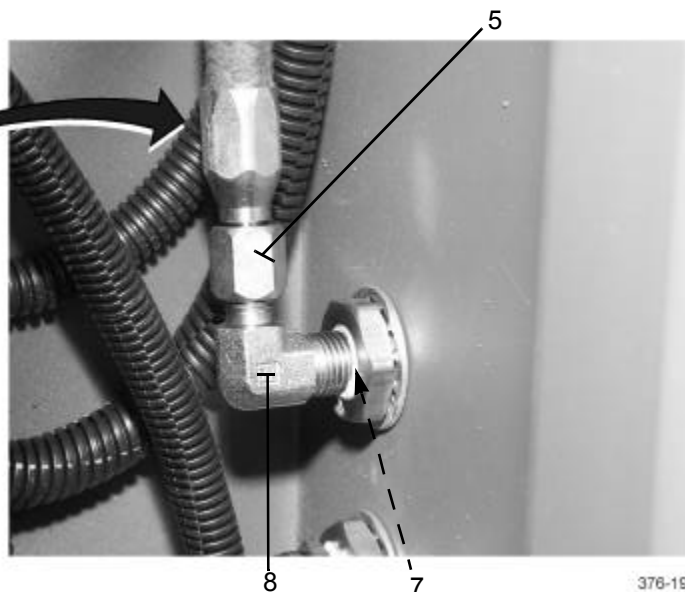
**REMOVAL - CONTINUED**

2. Disconnect hose (5) from coupling (4).
3. Remove coupling (4) from gauge (3).
4. Loosen two screws (6) and remove gauge (3) from right-side instrument panel (2).



**REMOVAL - CONTINUED**

5. Trace hose (5) to bulkhead fitting (7) on right side, inside cab.
6. Disconnect hose (5) from elbow (8).
7. Remove elbow (8) from bulkhead fitting (7).

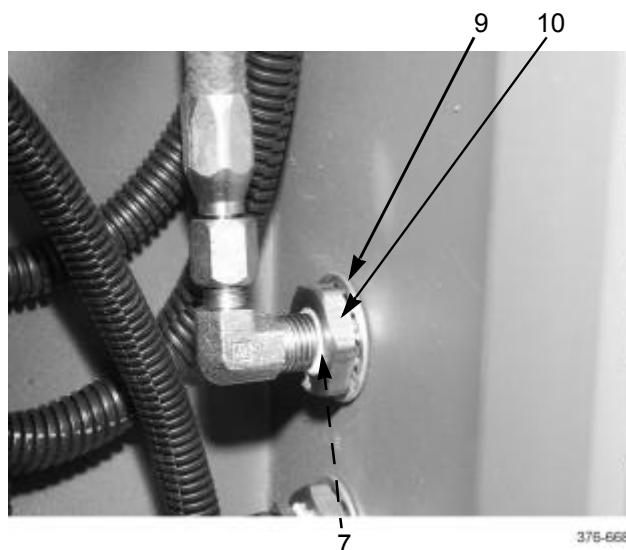


376-194

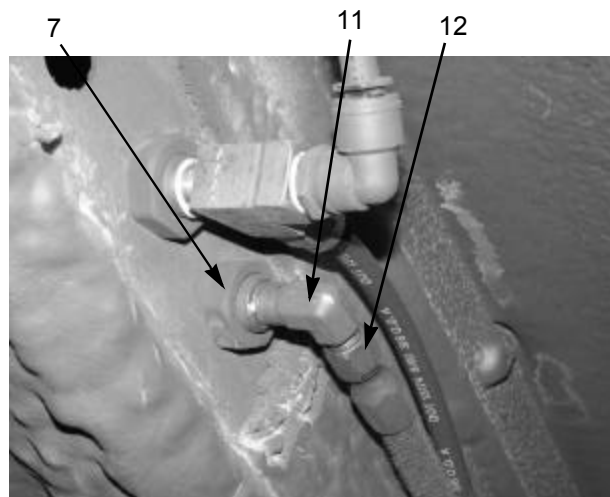
**NOTE**

Perform steps 8 through 14 to remove hose from between underside of cab and flow control valve, on right side of crossmember directly behind cab.

8. Tilt cab (TM 9-2320-312-10).
9. Disconnect hose (12) from elbow (11).
10. Remove elbow (11) from bulkhead fitting (7).
11. Remove nut (10), washer (9), and bulkhead fitting (7) from cab.



376-668



376-195

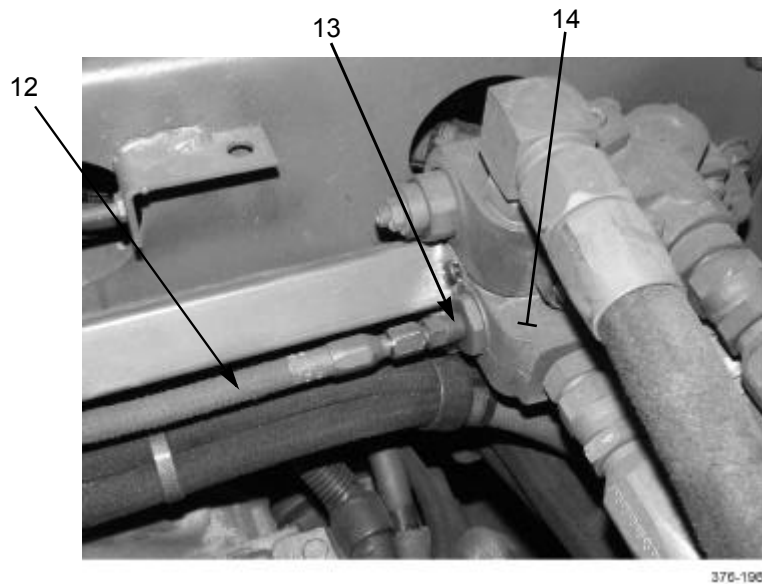
**REMOVAL - CONTINUED**

12. To gain access to remove hose (12), between bulkhead fitting and flow control valve (14), remove transmission access cover (WP 0039 00).

**NOTE**

Note routing of hose and location of tiedown straps, hose clamps, and protective wire looms, to ensure correct installation.

13. Trace hose (12) back to flow control valve (14). Remove tiedown straps and clamps securing hose in bundle under cab and along left frame rail. Discard tiedown straps.
14. Disconnect hose (12) from straight fitting (13) and remove hose from vehicle. Remove wire looms from hose.



376-195

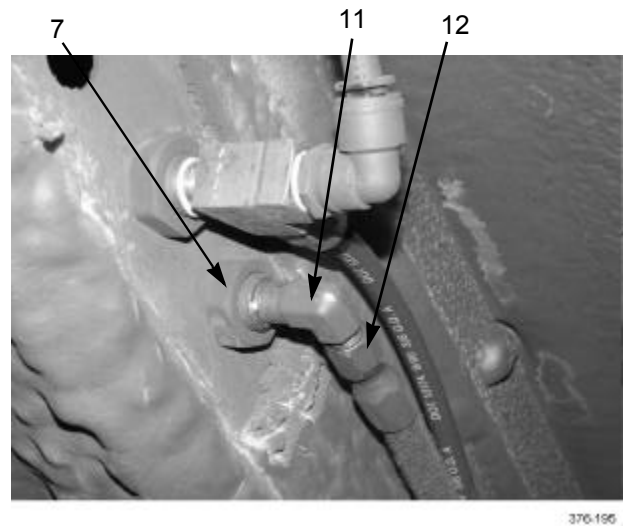
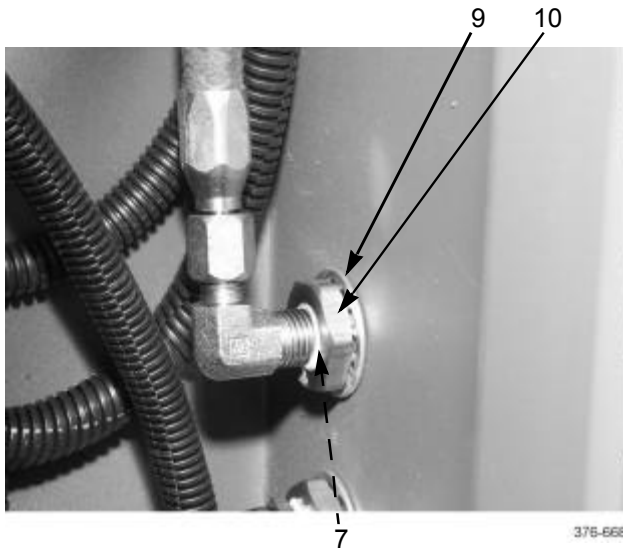
**INSTALLATION****NOTE**

Perform steps 1 through 6 to install hose between bulkhead fitting at underside of cab and flow control valve, located on right side of crossmember directly behind cab.

1. Position wire looms onto hose (12) and position hose between points of installation.
2. Connect hose (12) to straight fitting (13) at flow control valve (14).

**INSTALLATION - CONTINUED**

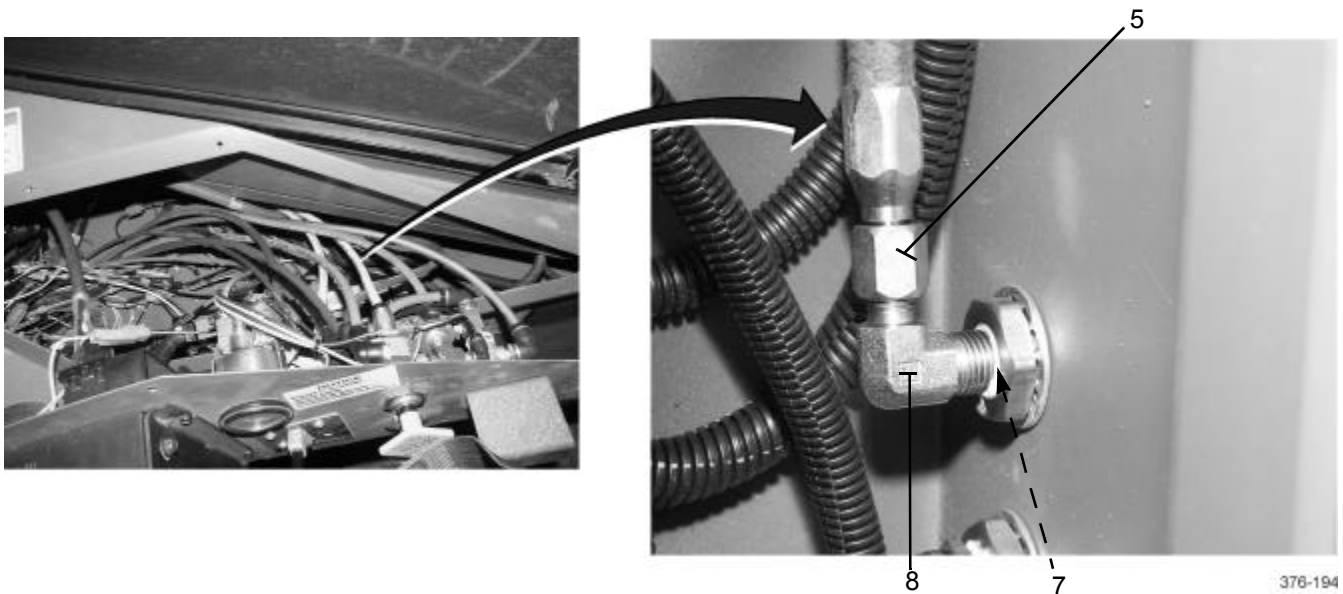
3. Install bulkhead fitting (7) to underside of cab with washer (9) and nut (10).
4. Install elbow (11) to bulkhead fitting (7).
5. Connect hose (12) to elbow (11).



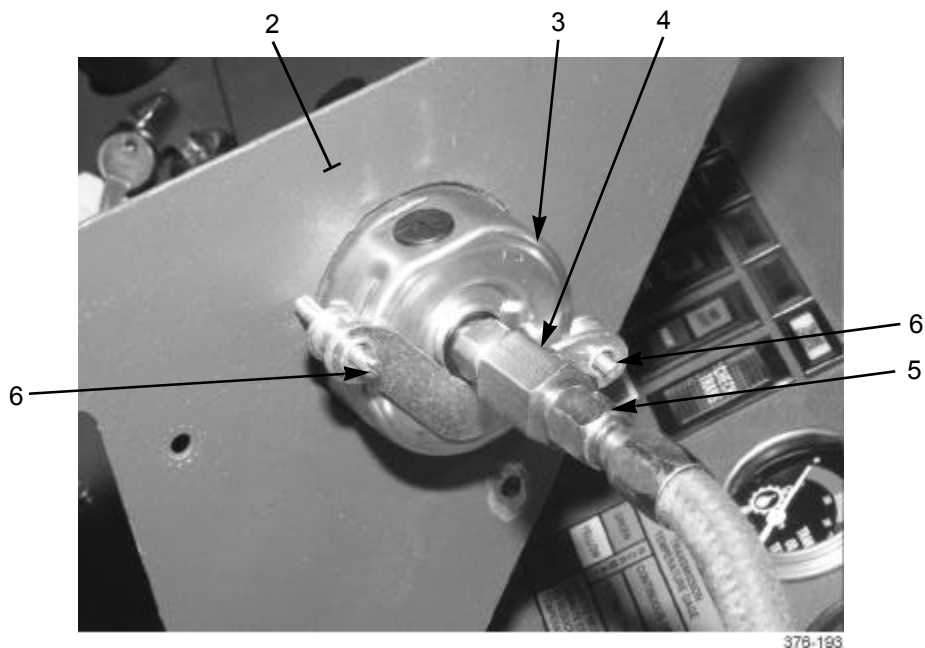
6. Lower cab (TM 9-2320-312-10).

**INSTALLATION - CONTINUED**

7. Install elbow (8) to bulkhead fitting (7).
8. Connect hose (5) to elbow (8).

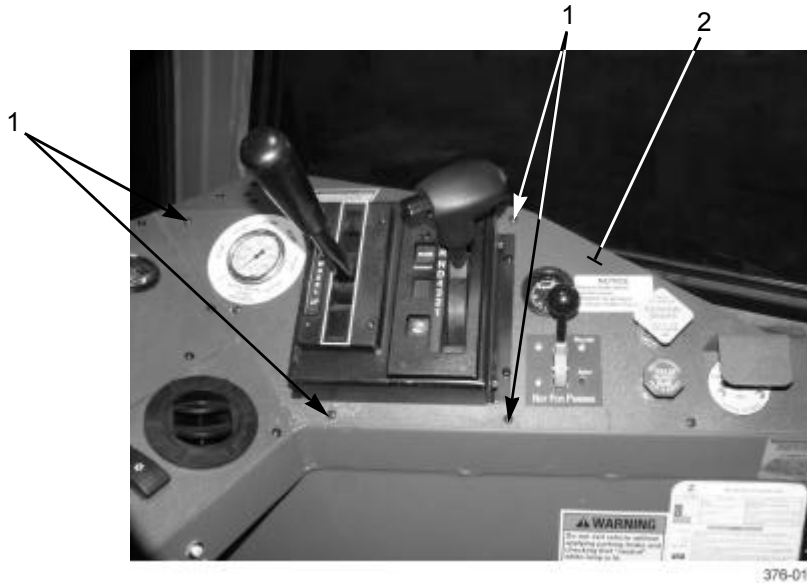


9. Position gauge (3) through opening in right-side instrument panel (2). Tighten two screws (6) on gauge mounting bracket to secure gauge.
10. Install coupling (4) to gauge (3).
11. Connect hose (5) to coupling (4).



**INSTALLATION- CONTINUED**

12. Check hydraulic fluid level in reservoir and add as required (WP 0129 00). Be alert of evidence of leaks.
13. Install right-side instrument panel (2) with eight screws (1).



14. Install transmission access cover (WP 0039 00).

**END OF WORK PACKAGE**

---

**STOWAGE COMPARTMENT REPLACEMENT**

---

0085 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 160

**RPSTL Reference**

Group 150, Figure 1

Group 160, Figure 4

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Nut, lock (P/N 21NE-040) (2)

Rivet (P/N 273-20) (10)

Seal, nonmetallic (P/N 184A-194-7)

**Personnel Required**

Two

**Equipment Condition**

Fifth wheel raised (TM 9-2320-312-10)

Air dryer and bracket removed (WP 0061 00)

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

**REMOVAL**

1. Remove two locknuts (5), clamps (7), and release three air reservoir cable pulls (8) from welded studs (6) on mounting bracket (2). Discard locknuts.

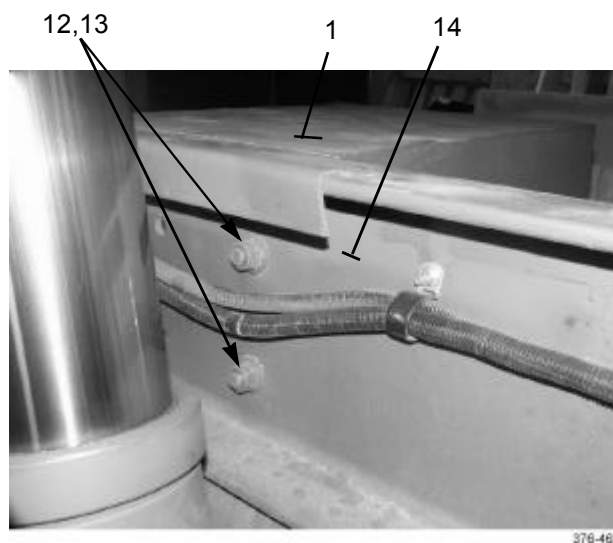
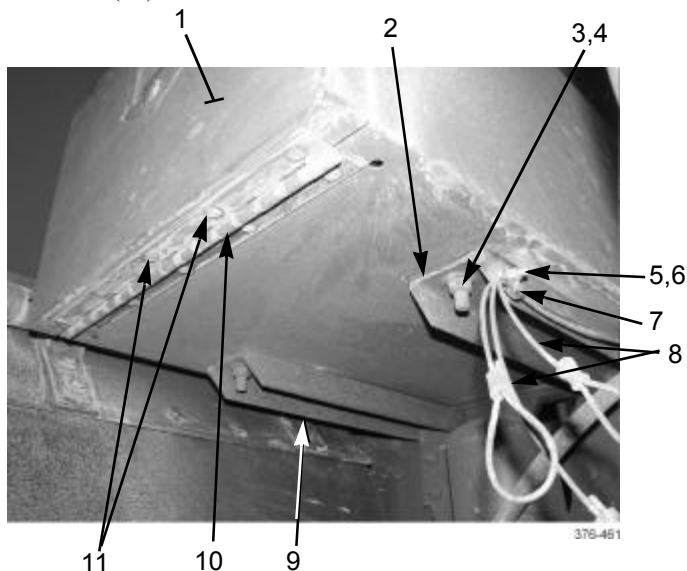


**WARNING**



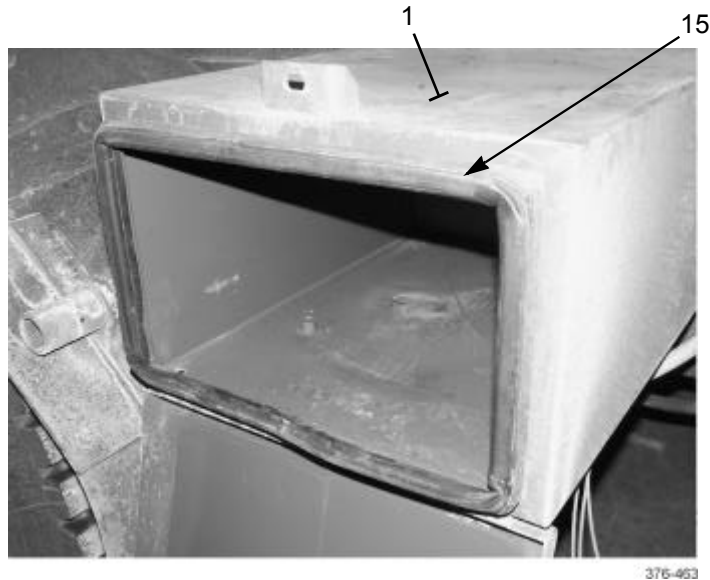
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

2. Remove four nuts (12), bolts (13), and two mounting brackets (2 and 9) with stowage compartment (1) from right frame rail (14).



3. Remove two nuts (3), bolts (4) and two mounting brackets (2 and 9) from stowage compartment (1).
4. If damaged, remove ten rivets (11) and hinge (10). Discard rivets.
5. If damaged, remove weatherseal (15). Retain removed weatherseal to use as a template to cut correct length of new weatherseal.



**REMOVAL - CONTINUED****INSTALLATION**

1. If removed, install new weatherseal (15) to lip of stowage compartment (1).
2. If removed, install hinge (10) with ten new rivets (11).
3. Install two mounting brackets (2 and 9) to bottom of stowage compartment (1) with two bolts (4) and nuts (3). Do not fully tighten nuts.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

4. Install two mounting brackets (2 and 9), with stowage compartment (1), to right frame rail (14) with four bolts (13) and nuts (12).
5. Tighten four nuts (12) to 375 lb-ft (508 Nm).
6. Tighten two nuts (3) to 105 lb-ft (142 Nm).
7. Secure two clamps (7), with three air reservoir cable pulls (8), to two welded studs (6) of mounting bracket (2) with new locknuts (5).
8. Install air dryer and bracket (WP 0061 00).
9. Lower fifth wheel (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**CAB SUN VISOR REPLACEMENT**

---

0086 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

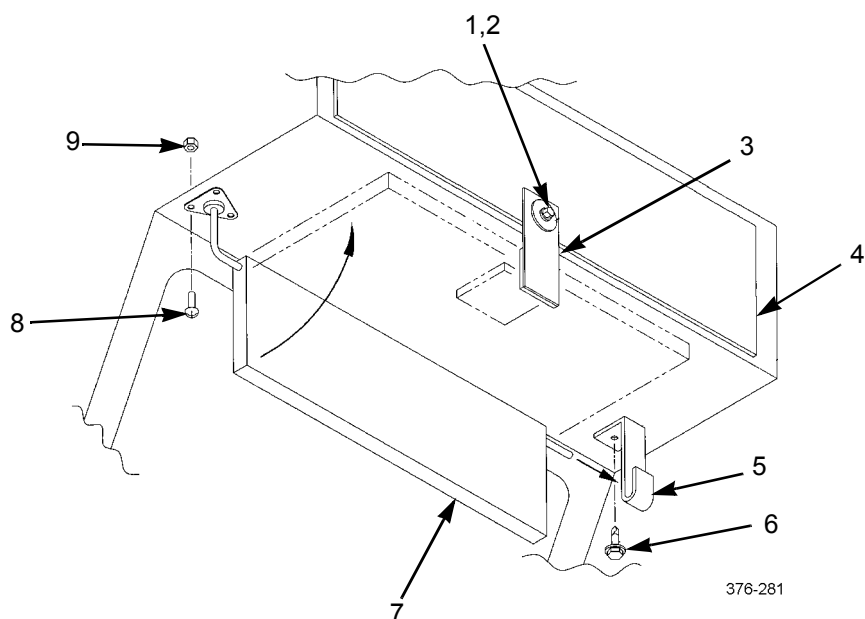
**RPSTL Reference**

Group 160, Figure 14

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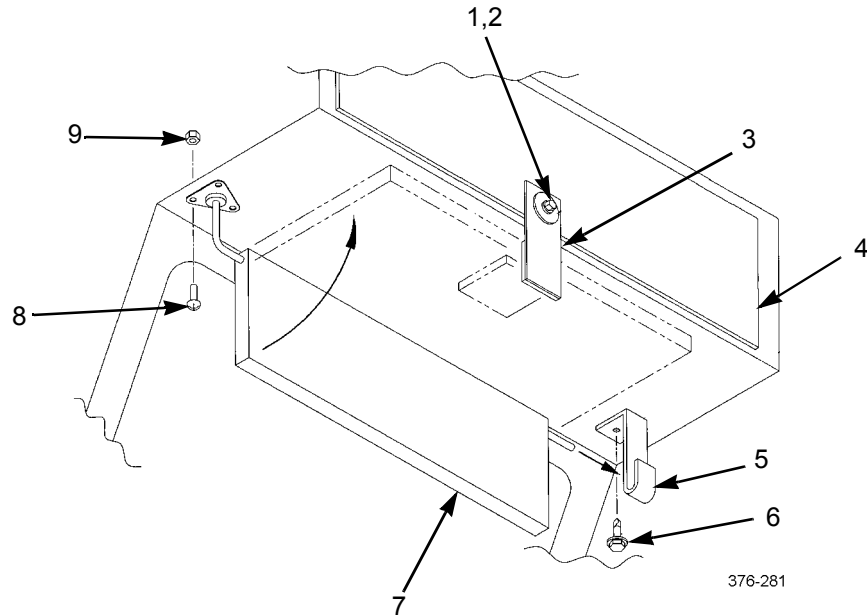
**REMOVAL**

1. Remove four screws and auxiliary radio access panel from overhead panel (4).
2. Pull retainer loop (3) away from sun visor (7). Move sunvisor clear of bracket (5).
3. Remove screw (1), washer (2), and retainer loop (3) from overhead panel (4).
4. Remove three nuts (9), screws (8), and sunvisor (7).
5. As required, remove screw (6) and bracket (5).



**INSTALLATION**

1. If removed, install bracket (5) with screw (6).
2. Install sun visor (7) to cab with three screws (8) and nuts (9).
3. Install retainer loop (3) to overhead panel (4) with washer (2) and screw (1).
4. Secure sun visor (7) in bracket (5). Raise sun visor and attach retainer loop (3) to sun visor.

**END OF WORK PACKAGE**

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**M16 RIFLE MOUNTING BRACKET REPLACEMENT**

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0087 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**RPSTL Reference**

Group 160, Figure 8

**MAC Reference**

Group 160

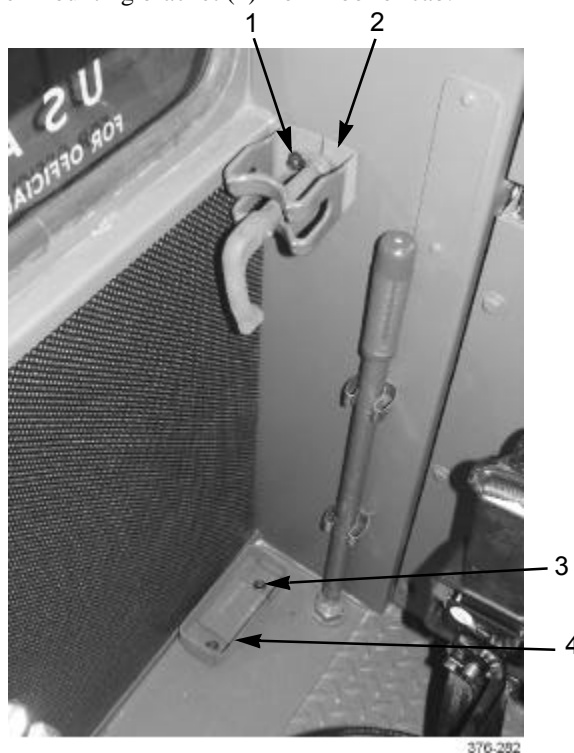
**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

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**REMOVAL**

1. Remove M16 rifle from rifle mounting bracket.
2. Remove two screws (1) and upper mounting bracket (2) from side of cab.
3. Remove two screws (3) and lower mounting bracket (4) from floor of cab.

**INSTALLATION**

1. Install lower mounting bracket (4) to floor of cab with two screws (3).
2. Install upper mounting bracket (2) to side of cab with two screws (1).
3. Stow M16 rifle in rifle mounting bracket.

**END OF WORK PACKAGE**

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**CAB-TO-FRAME GROUND STRAP REPLACEMENT**

**0088 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**RPSTL Reference**

Group 170, Figure 16

**Tools and Special Tools**

Tools kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Washer, lock (P/N 361-11) (2)

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

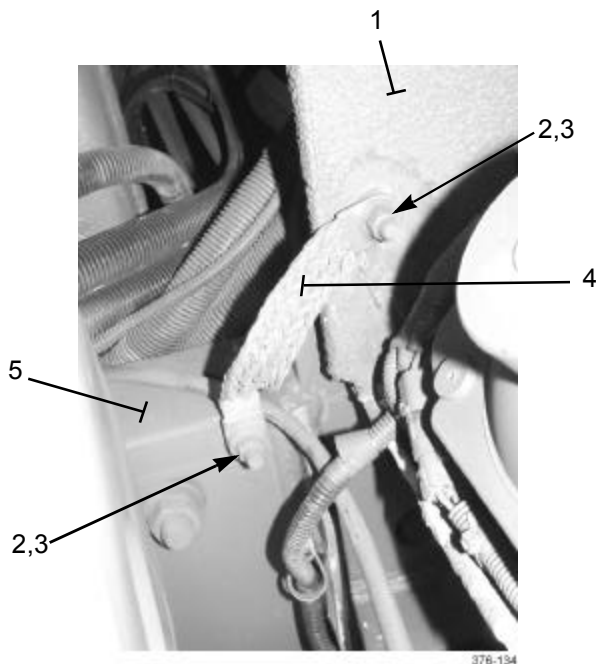
Battery disconnect switch in OFF position

**REMOVAL**

**NOTE**

- Perform following steps underneath right-front corner of cab.
- Underside of cab is insulated and painted. Remove insulation and paint as necessary.

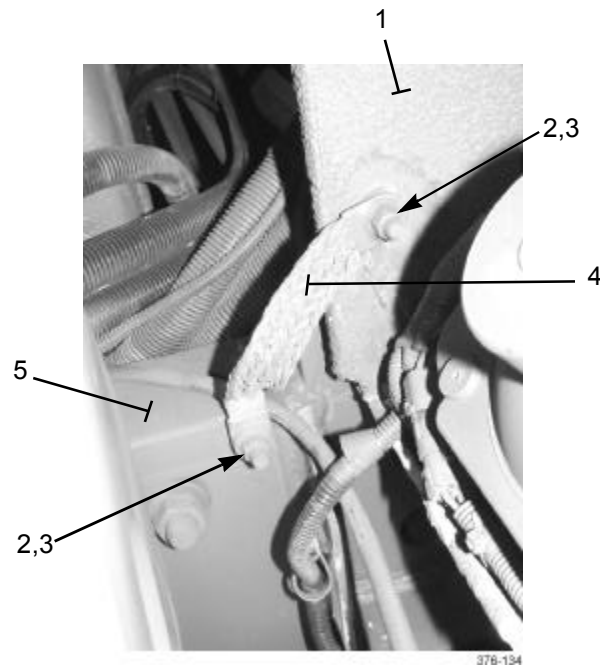
Remove two nuts (2), lockwashers (3), and ground strap (4) from between threaded stud of cab (1) and threaded stud of right frame rail (5). Discard lockwashers.



**INSTALLATION****NOTE**

Ensure metal-to-metal contact.

1. Install ground strap (4) between threaded stud of right frame rail (5) and threaded stud of cab (1) with two new lock-washers (3) and nuts (2).
2. Place battery disconnect switch in ON position.
3. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**



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**HORN REPLACEMENT**

---

0089 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 6

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Strap, tiedown (Item 57, WP 0165 00)

Nut, lock (P/N A219-61)

Washer, lock (P/N 361-10)

**Equipment Condition**

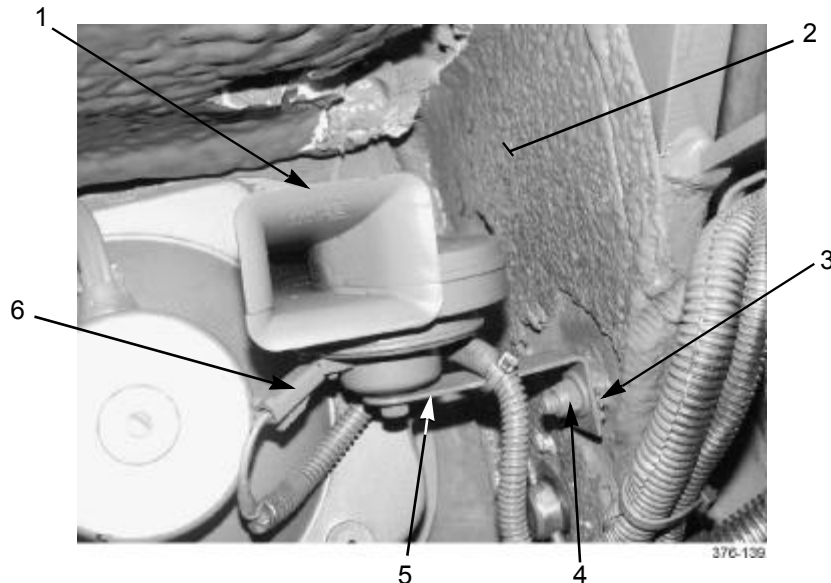
Battery disconnect switch in OFF position

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**REMOVAL****NOTE**

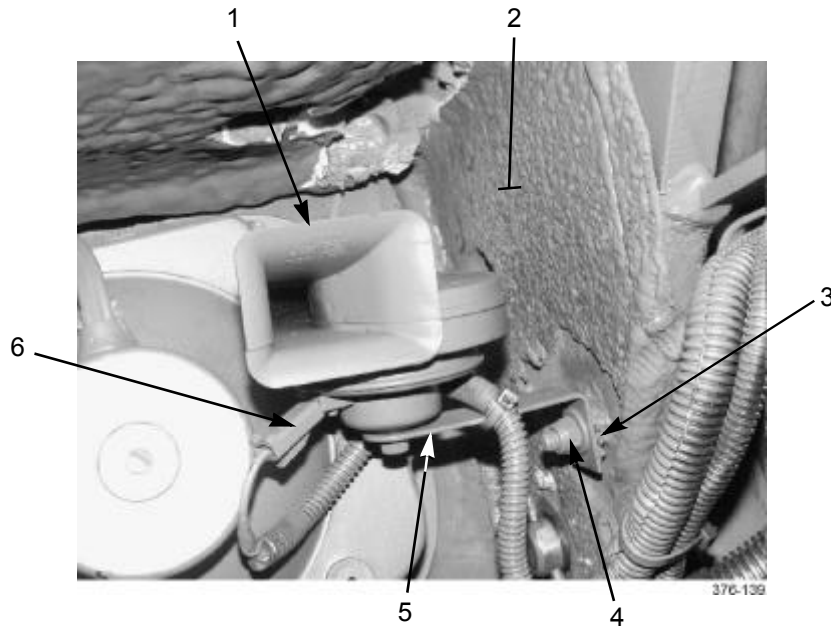
- Note position of horn for installation.
- Remove tiedown strap and discard. Use new tiedown strap on installation.

1. Disconnect wiring harness connector (6) from horn (1).
2. Remove locknut (4), lockwasher (3), and bracket (5) of horn (1) from welded stud at underside of cab (2). Discard locknut and lockwasher.



**INSTALLATION**

1. Install bracket (5) of horn (1) to welded stud at underside of cab (2) with new lockwasher (3) and new locknut (4).
2. Connect wiring harness connector (6) to horn (1).



3. Place battery disconnect switch in ON position. Check operation of horn.

**END OF WORK PACKAGE**

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**ALTERNATOR REPLACEMENT**

**0090 00**

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**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figures 2 and 3

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Insulating varnish, electrical, dielectric (Item 34, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

**Materials/Parts - Continued**

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N 21NE-040)

Nut, lock (P/N N9416)

Nut, lock (P/N 21NE083) (2)

Washer, lock (P/N N9015)

Washer, lock (P/N 361-9)

Washer, lock (P/N 361-10) (2)

**Personnel Required**

Two

**References**

TM 9-2320-312-10

WP 0091 00

**Equipment Condition**

Battery cables disconnected (WP 0115 00)

Engine serpentine belt removed (WP 0012 00)



**WARNING**

Remove all jewelry, watches, rings, etc. prior to disconnecting cables from batteries or other electrical source. Items can come in contact with battery or electrical source and cause electrical shock. Failure to follow this warning may result in personnel injury or death.

**REMOVAL****NOTE**

- Tag wires and cables to ensure correct installation.
  - Remove tiedown straps as required and discard. Use new tiedown straps on installation.
  - Terminals are coated with insulation and paint. Remove insulation and paint for access to terminals.
1. Remove locknut (3), lockwasher (4), and disconnect wire (5) from terminal stud of voltage regulator (2). Discard locknut and lockwasher.
  2. Along right side of alternator (1), remove screw (18), lockwasher (19), washer (20), and ground cable (21) from alternator GND. Discard lockwasher.
  3. Remove nut, lockwasher, 12-volt cable (6), and two washers from 12-volt terminal stud. Discard lockwasher.
  4. Remove nut, lockwasher, 24-volt cable (7), and two washers from 24-volt terminal stud. Discard lockwasher.
  5. Remove nut (8) and bolt (9) to separate tensioner arm (12) from top of alternator (1).

**WARNING**

Alternator weighs approximately 50 lb (23 kg). Assistance is required to safely replace alternator.

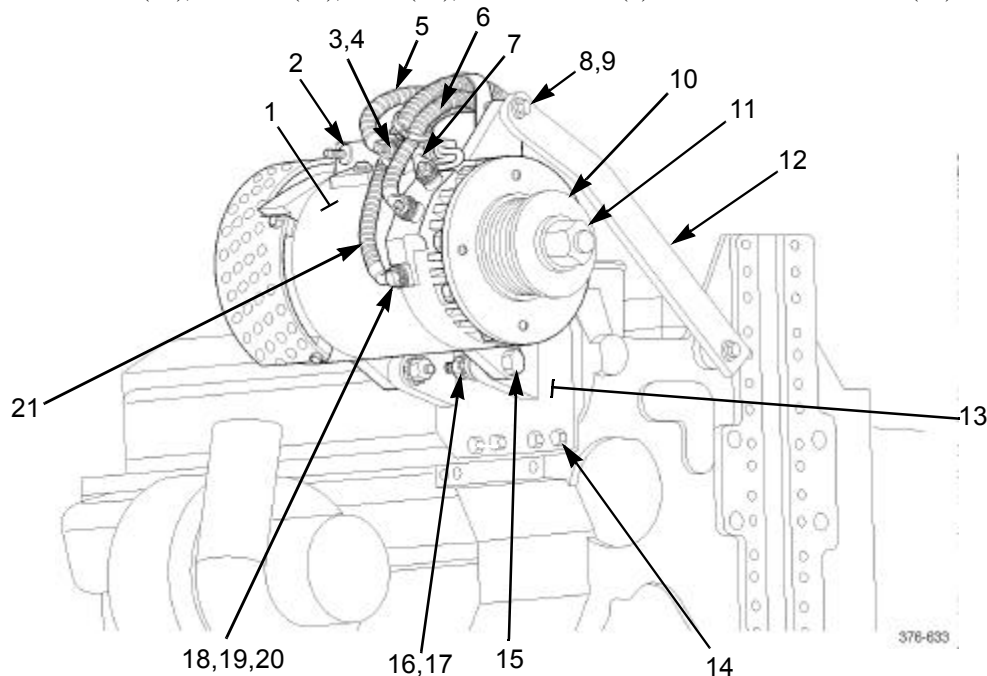
**CAUTION**

When removing alternator from vehicle, use care to avoid damaging air conditioner lines and fittings.

**NOTE**

It may be necessary to loosen screw from tensioner arm at engine.

6. Remove two locknuts (15), washers (16), bolts (17), and alternator (1) from alternator bracket (13). Discard locknuts.



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**ALTERNATOR REPLACEMENT - CONTINUED**

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0090 00

**REMOVAL - CONTINUED****NOTE**

For proper serpentine belt alignment with alternator pulley, alternator bracket may be adjusted slightly forward or backward. Mark position of alternator bracket on engine to ensure accurate installation.

7. If alternator bracket (13) is damaged, remove eight bolts (14) and alternator bracket (13) from engine (19).
8. Place alternator (1) in a soft-jawed vise to loosen locknut (11). Use a puller to remove locknut, alternator pulley (10), and key from shaft of alternator. Inspect key for damage. Replace key if damaged.
9. Remove voltage regulator (WP 0091 00).

**INSTALLATION**

1. Install voltage regulator (WP 0091 00)
2. Install key, alternator pulley (10), washer, and new locknut (11) on shaft of alternator (1). Place alternator in a soft-jawed vise and tighten locknut to 120 lb-ft (163 Nm).

**NOTE**

For proper serpentine belt alignment with alternator pulley, alternator bracket may be adjusted slightly forward or backward.

3. If removed, install alternator bracket (13) to engine with eight bolts (14).

**WARNING**

Alternator weighs approximately 50 lb (23 kg). Assistance is required to safely replace alternator.

**CAUTION**

When installing alternator to vehicle, use care to avoid damaging air conditioner lines and fittings.

4. Install alternator (1) to alternator bracket (13) with two bolts (17), washers (16), and new locknuts (15). Do not fully tighten locknuts.
5. Install tensioner arm (12) to top of alternator (1) with bolt (9) and nut (8). Tighten nut to 26 lb-ft (35 Nm).
6. Tighten two locknuts (15) to 60 lb-ft (81 Nm).
7. If loosened, tighten screw at tensioner arm (12) attachment to engine.
8. Install two washers, 24-volt cable (6), new lockwasher, and nut to 24-volt terminal stud. Tighten nut to 80 lb-in (9 Nm).
9. Install two washers, 12-volt cable (7), new lockwasher, and nut to 12-volt terminal stud. Tighten nut to 80 lb-in (9 Nm).
10. Install ground cable (21) to GND of alternator (1) with washer (20), new lockwasher (19), and screw (18). Tighten screw to 80 lb-in (9 Nm).
11. At top of alternator (1), install wire (5) to terminal stud of voltage regulator (2) with new lockwasher (4) and new locknut (3). Tighten locknut to 30 lb-in (3.4 Nm).

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**ALTERNATOR REPLACEMENT - CONTINUED**

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**0090 00**

***INSTALLATION - CONTINUED***

12. Apply one or more coats of insulating varnish to alternator electrical connections.
13. Install engine serpentine belt (WP 0012 00).
14. Connect battery cables (WP 0115 00).
15. Check operation of alternator (TM 9-2320-312-10).

**END OF WORK PACKAGE**

**VOLTAGE REGULATOR REPLACEMENT**

0091 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figures 2 and 3

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Insulating varnish, electrical, dielectric (Item 34, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N 21NE-040)

Washer, lock (P/N 361-9)

Washer, lock (P/N N9459) (2)

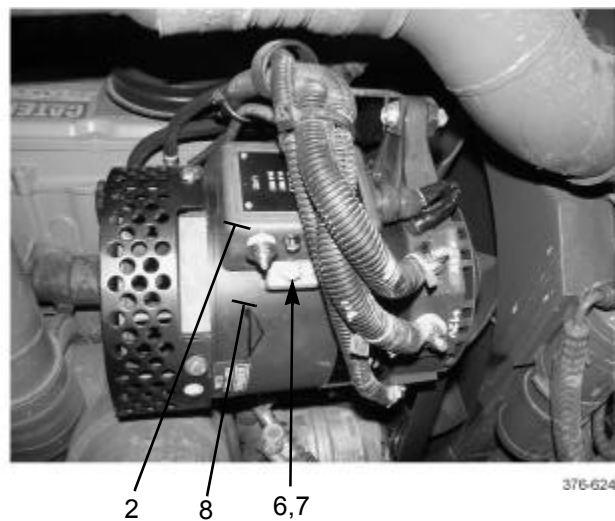
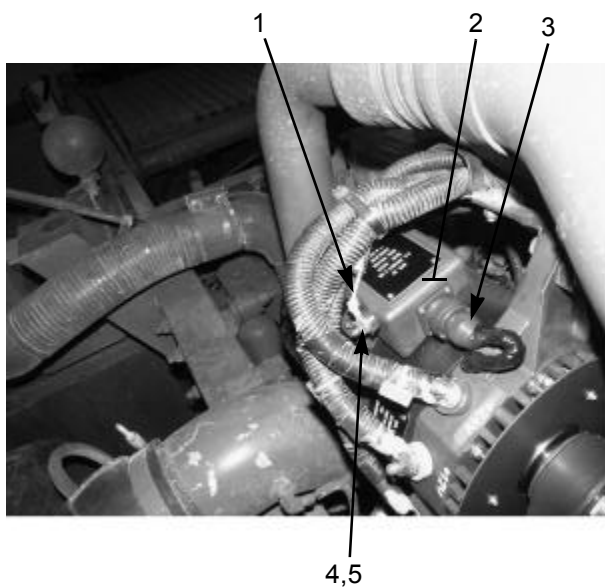
**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

Battery cables disconnected (WP 0115 00)

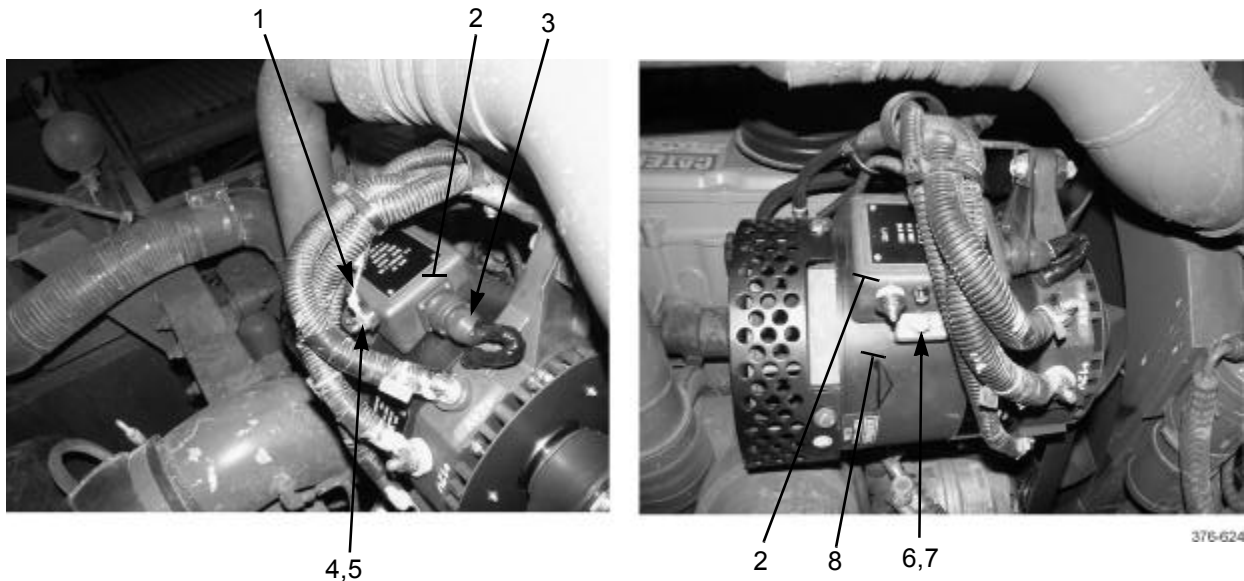
**REMOVAL**

1. Remove locknut (4), lockwasher (5), and wire (1) from terminal of voltage regulator (2). Discard locknut and lockwasher.
2. Disconnect connector (3) from voltage regulator (2).
3. Remove two screws (6), lockwashers (7), and voltage regulator (2) from alternator (8). Discard lockwashers.



**VOLTAGE REGULATOR REPLACEMENT - CONTINUED****0091 00****INSTALLATION**

1. Install voltage regulator (2) on alternator (8) with two new lockwashers (7) and screws (6). Tighten screws to 75 lb-in (8.5 Nm).
2. Connect connector (3) to voltage regulator (2).
3. Install wire (1) to terminal of voltage regulator (2) with new lockwasher (5) and new locknut (4). Tighten locknut to 30 lb-in (3.4 Nm).
4. Apply one or more coats of insulating varnish to terminal lug connection.



5. Connect battery cables (WP 0115 00).
6. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**



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**STARTER REPLACEMENT**0092 00

---

**THIS WORK PACKAGE COVERS**Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 9

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Insulating varnish, electrical, dielectric (Item 34, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Washer, lock (P/N 361-7)

Washer, lock (P/N 361-13) (2)

Washer, lock (P/N 361-92) (3)

**Personnel Required**

Two

**Equipment Condition**Battery cables disconnected (WP 0115 00)

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**WARNING**

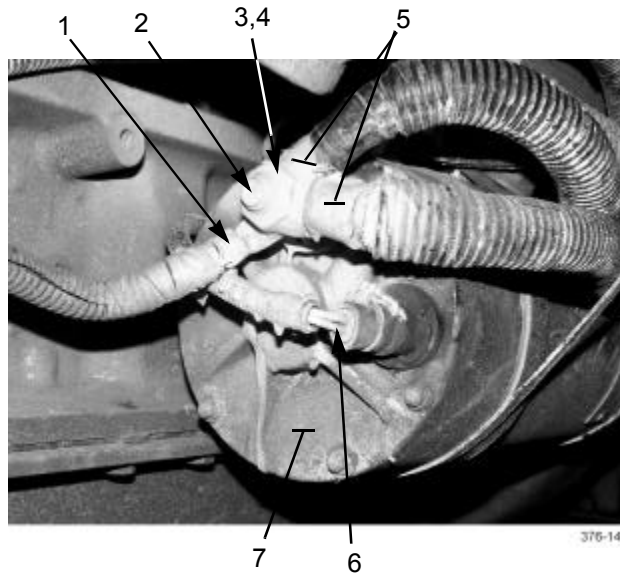
Remove all jewelry, watches, rings, etc. prior to disconnecting cables from batteries or other electrical source. Items can come in contact with battery or electrical source and cause electrical shock. Failure to follow this warning may result in personnel injury or death.

**REMOVAL**

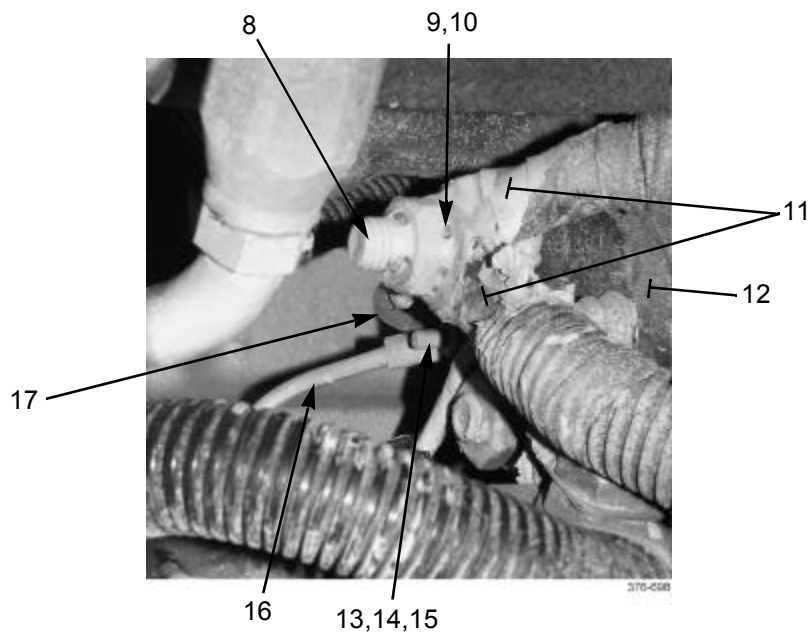
**NOTE**

- Tag wires and cables to ensure correct installation.
- Remove tiedown straps and discard.
- Terminals are coated with insulation and paint. Remove insulation and paint for access to terminals.

1. Underneath vehicle on left side of engine, remove nut (3), lockwasher (4), and disconnect two ground cables (5) and ground wire (1) from terminal (2) of starter (7). Discard lockwasher.
2. Disconnect connector (6) from starter (7).



3. Remove nut (9), lockwasher (10), and disconnect two cables (11) and red wire (17) from terminal (8) of starter solenoid (12). Discard lockwasher.
4. Remove nut (13), lockwasher (14), and disconnect white wire (16) from terminal (15) of starter solenoid (12). Discard lockwasher.



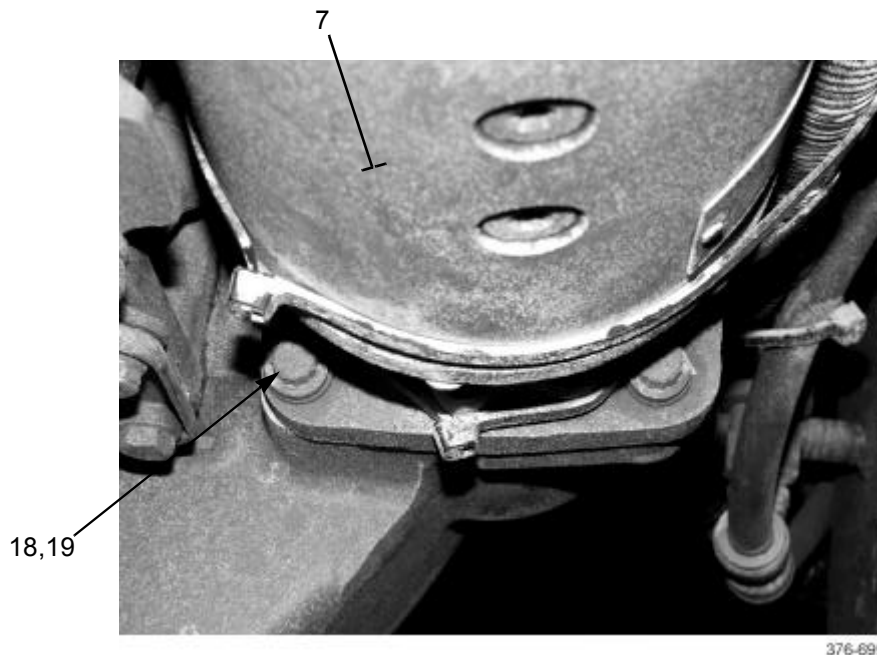
**REMOVAL - CONTINUED****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

**NOTE**

Starter weighs approximately 65 lb (30 kg).

5. Remove three capscrews (18), lockwashers (19 and 20), starter (7) from engine flywheel housing. Discard lockwashers.

**INSTALLATION****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

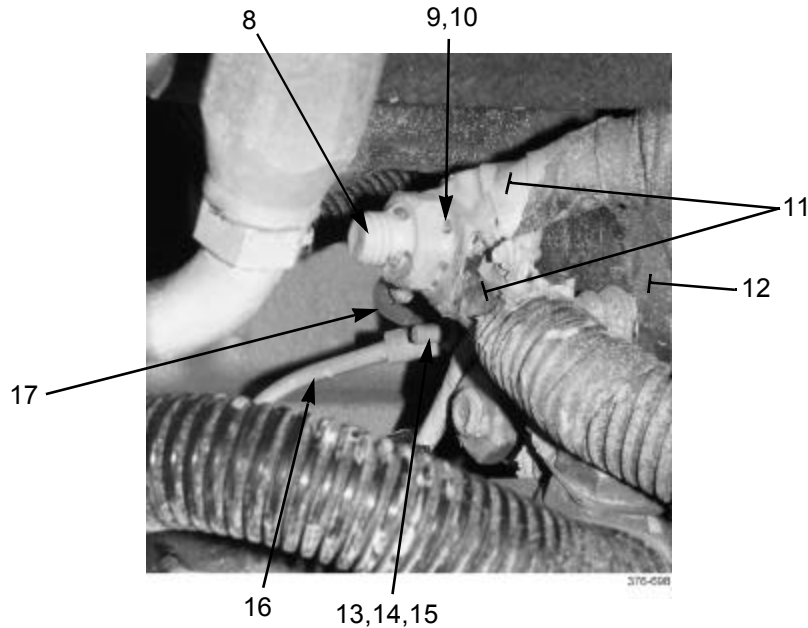
**NOTE**

Starter weighs approximately 65 lb (30 kg).

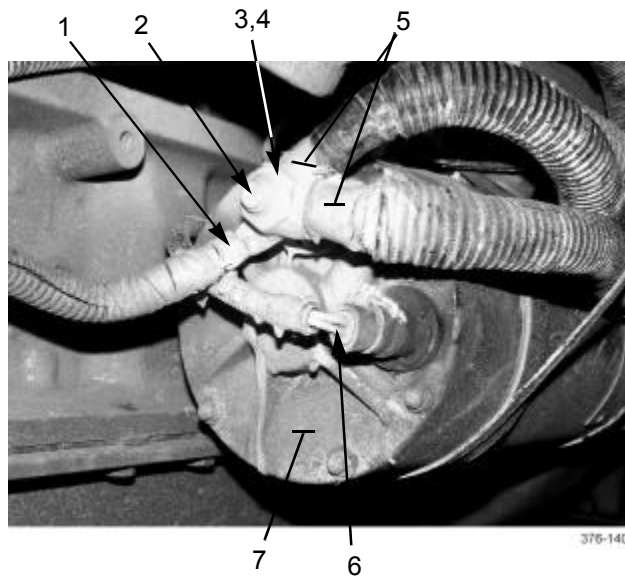
1. Install starter (7) to engine flywheel housing with three new lockwashers (19) and capscrews (18). Tighten capscrews to 32 lb-ft (43 Nm).

**INSTALLATION - CONTINUED**

2. Connect white wire (16) to terminal (15) of starter solenoid (12) with new lockwasher (14) and nut (13).
3. Connect red wire (17) and two cables (11) to terminal (8) with nut (9) and new lockwasher (8).



4. Connect connector (6) to starter (7).
5. Connect ground wire (1) and two ground cables (5) to terminal (2) of starter (7) with new lockwasher (4) and nut (3).



6. Apply one or more coats of insulating varnish to starter and starter solenoid electrical connections.
7. Connect battery cables (WP 0115 00).

**END OF WORK PACKAGE**

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**FRONT INSTRUMENT PANEL GAUGES AND SWITCHES REPLACEMENT**

---

0093 00

**THIS WORK PACKAGE COVERS**

Front Instrument Panel Replacement	Ignition Switch Replacement
Tachometer and Speedometer Replacement	Panel Lights Switch Replacement
Lights and AC Rocker Switches Replacement	Wiper/Washer Switch Replacement
Diagnostics Request and Emergency Start Switches Replacement	

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 7

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Tag, marker (Item 58, WP 0165 00)

**References**

TM 9-2320-312-10

WP 0055 00

WP 0078 00

WP 0094 00

**Equipment Condition**

Battery disconnect switch in OFF position

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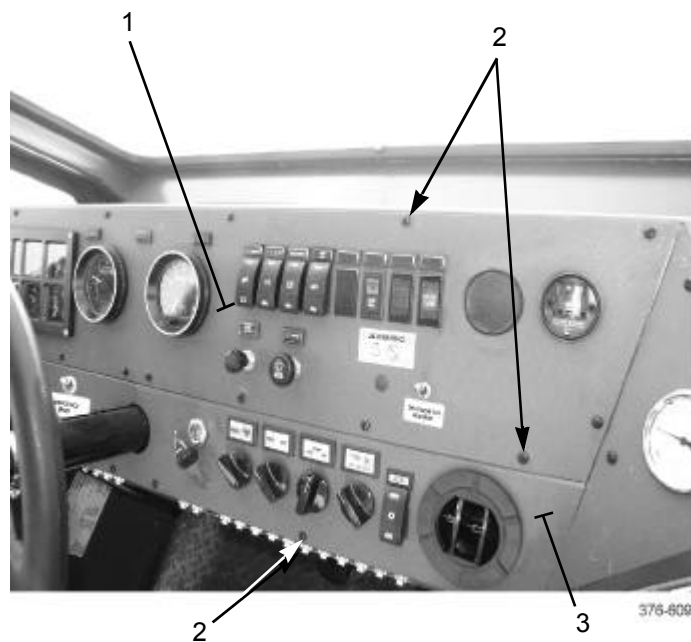
**NOTE**

- This work package describes replacement of gauges and switches on front instrument panel. To replace a gauge or switch not specifically covered, refer to replacement of a similar-configuration gauge or switch.
- Heater/AC controls replacement is covered in WP 0055 00.
- Air cleaner restriction indicator replacement is covered in WP 0078 00.
- Instrument and warning light cluster is covered in WP 0094 00.
- Tag wires and connectors as required to ensure correct installation.

**FRONT INSTRUMENT PANEL REPLACEMENT****NOTE**

Perform step 1, and step 2 as necessary, to separate two front instrument panels from cab for access to gauges and switches.

1. Remove 14 screws (2) to separate upper-front instrument panel (1) from cab.
2. Remove three additional screws (2) to separate lower-right instrument panel (3) from cab.

**NOTE**

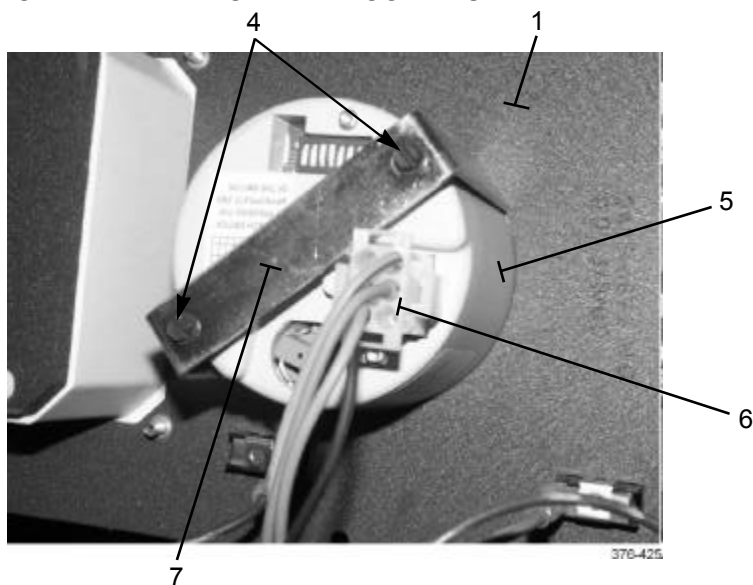
Perform step 3, and step 4 as necessary, to install two front instrument panels to cab.

3. Install lower-right instrument panel (3) to cab with three screws (2).
4. Install upper-front instrument panel (1) to cab with 14 additional screws (2).

**TACHOMETER AND SPEEDOMETER REPLACEMENT****NOTE**

Tachometer and speedometer are replaced the same way. Tachometer is shown.

1. At rear of upper-front instrument panel (1), disconnect connector (6) of cab wiring harness from tachometer (5).
2. Remove two screws (4), retainer (7), and tachometer (5) from instrument panel (1).

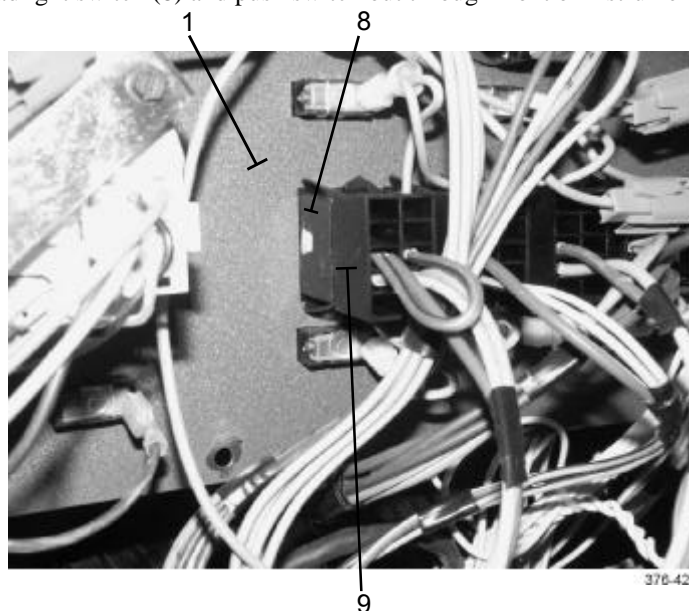
**TACHOMETER AND SPEEDOMETER REPLACEMENT - CONTINUED**

3. Install tachometer (5) to instrument panel (1) with retainer (7) and two screws (4).
4. Connect connector (6) of cab wiring harness to tachometer (5).
5. Place battery disconnect switch in ON position. Check operation of gauge (TM 9-2320-312-10).

**LIGHTS AND AC ROCKER SWITCHES REPLACEMENT****NOTE**

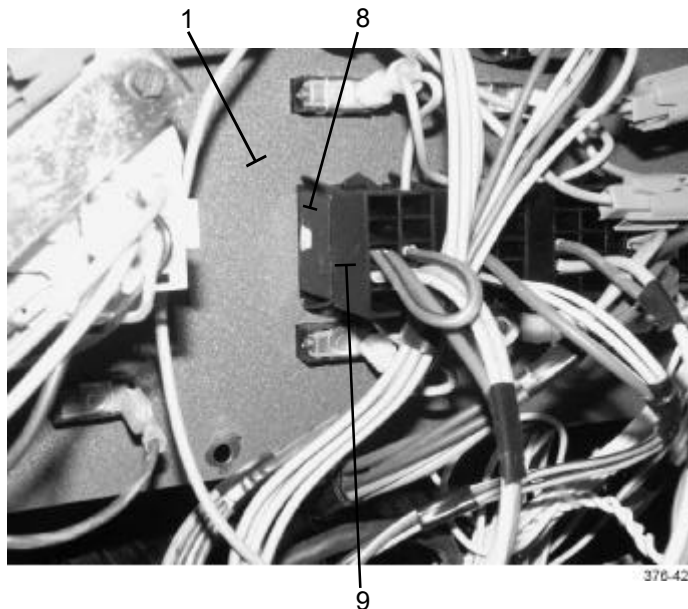
Each of five rocker switches is replaced the same way. Headlight switch is shown.

1. At rear of upper-front instrument panel (1), disconnect connector (9) of cab wiring harness from headlight switch (8).
2. Depress four tabs of headlight switch (8) and push switch out through front of instrument panel (1).



**LIGHTS AND AC ROCKER SWITCHES REPLACEMENT - CONTINUED**

3. Install headlight switch (8) through front of instrument panel (1).
4. Connect connector (9) of cab wiring harness to headlight switch (8).



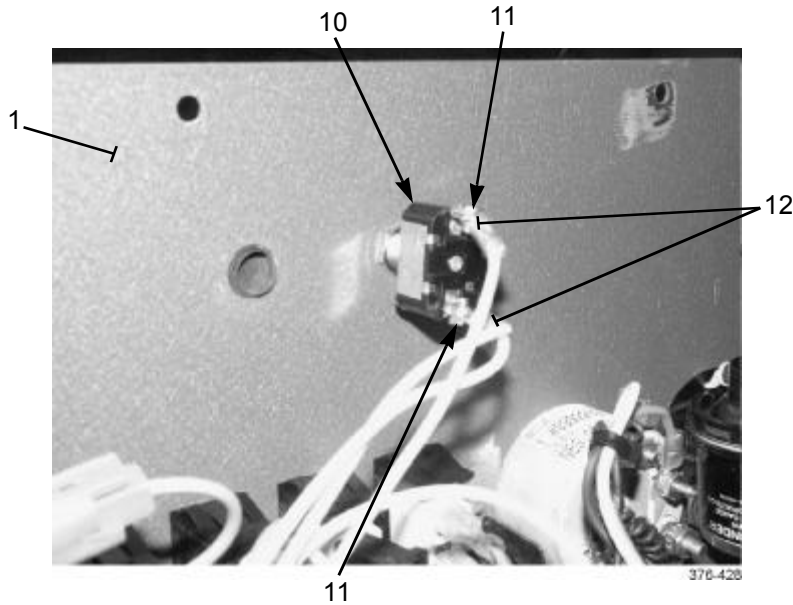
5. Place battery disconnect switch in ON position. Check operation of switch (TM 9-2320-312-10).

**DIAGNOSTICS REQUEST AND EMERGENCY START SWITCHES REPLACEMENT****NOTE**

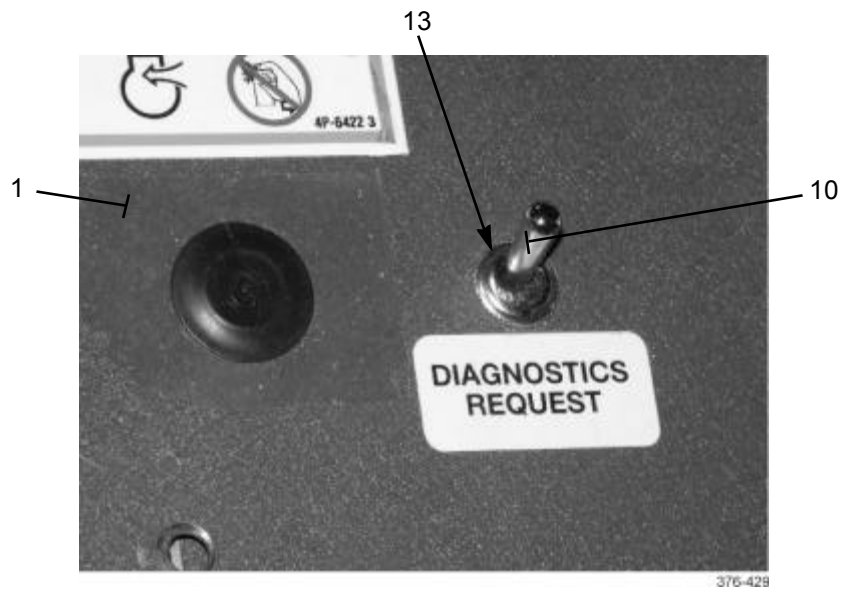
- Diagnostics request and emergency start switches are replaced the same. Diagnostics request switch is illustrated.
  - Note position of switch to ensure correct installation.
1. At rear of upper-front instrument panel (1), remove two screws (11) and disconnect two terminals (12) of cab wiring harness from switch (10).



**DIAGNOSTICS REQUEST AND EMERGENCY START SWITCHES REPLACEMENT - CONTINUED**



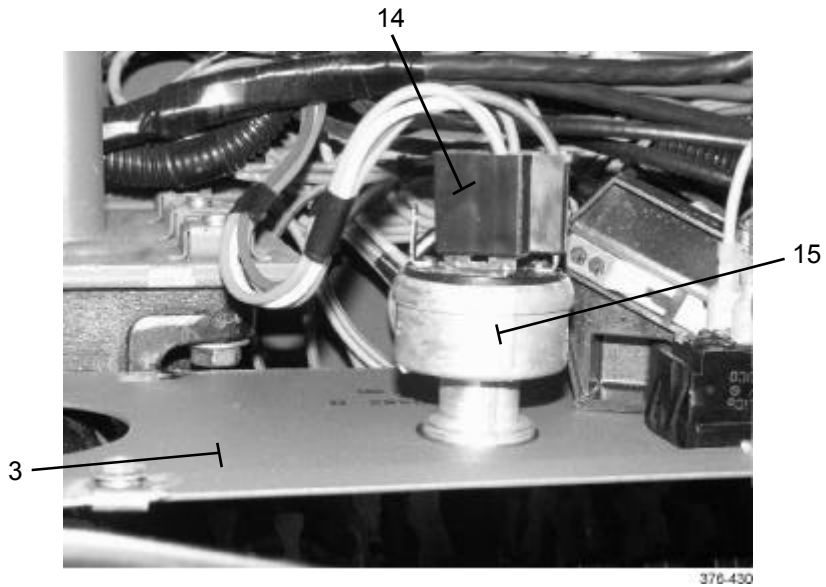
2. At front of instrument panel (1), remove ring (13) and switch (10) from rear of instrument panel.



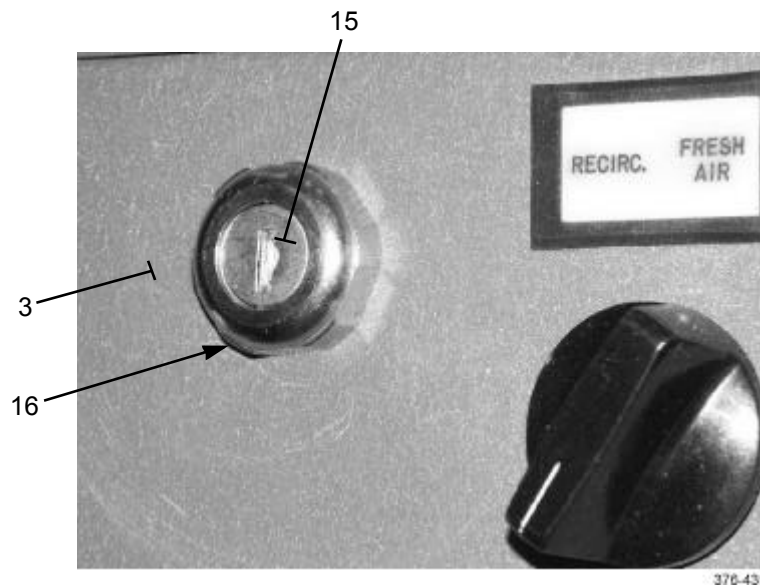
3. Install switch (10) to instrument panel (1) with ring (13).
4. Connect two terminals (12) of cab wiring harness to switch (10) with two screws (11).
5. Place battery disconnect switch in ON position. Check operation of switch.

**IGNITION SWITCH REPLACEMENT**

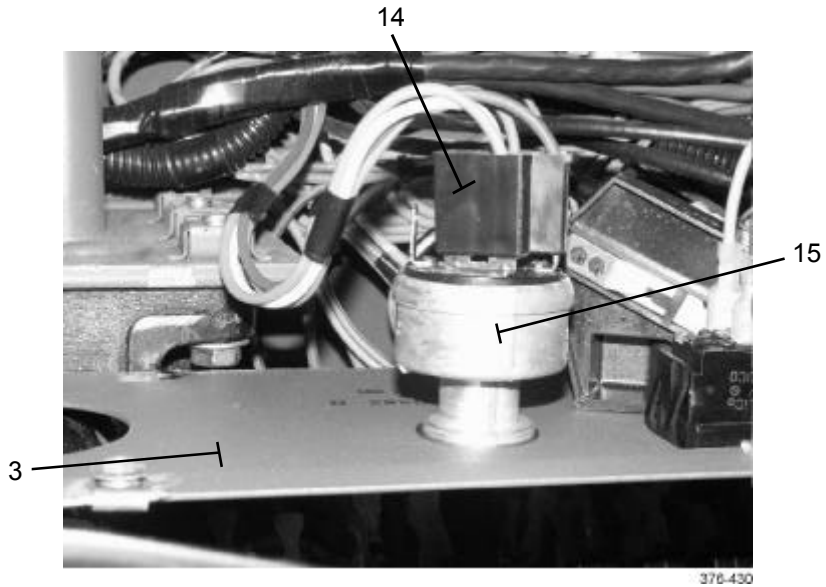
1. At rear of lower-right instrument panel (3), disconnect connector (14) of cab wiring harness from ignition switch (15).



2. At front of instrument panel (3), remove ring (16) and switch (15) from rear of instrument panel (3).



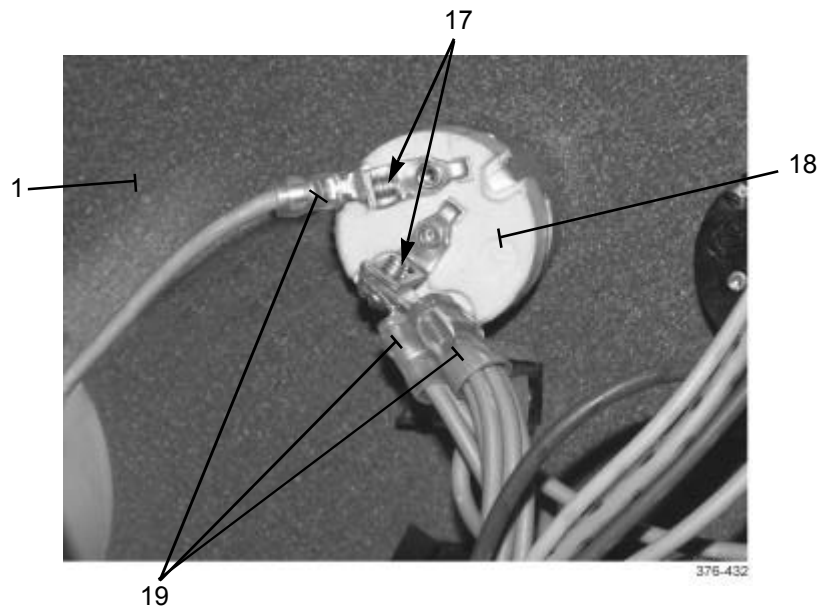
3. Install ignition switch (15) to instrument panel (3) with ring (16).
4. Connect connector (14) of cab wiring harness to switch (15).

**IGNITION SWITCH REPLACEMENT - CONTINUED**

5. Place battery disconnect switch in ON position. Check operation of ignition switch (TM 9-2320-312-10).

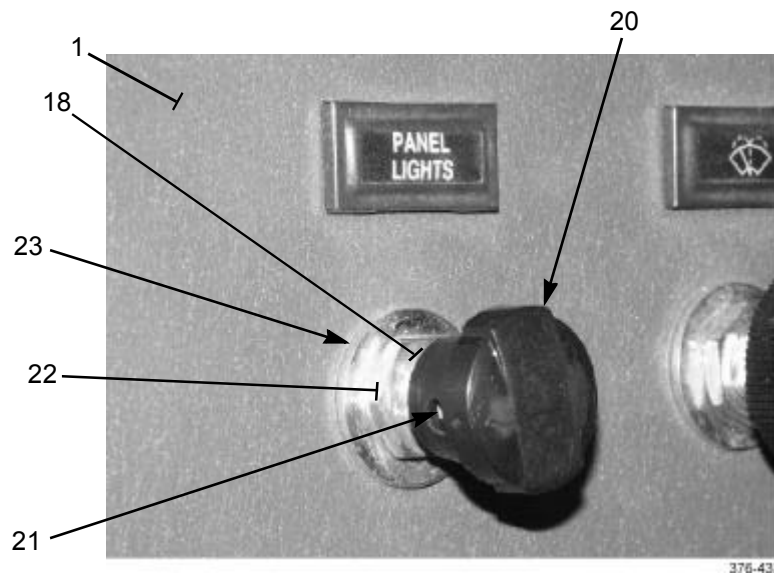
**PANEL LIGHTS SWITCH REPLACEMENT**

1. At rear of upper-front instrument panel (1), remove two screws (17) and disconnect three terminals (19) of cab wiring harness from panel lights switch (18).

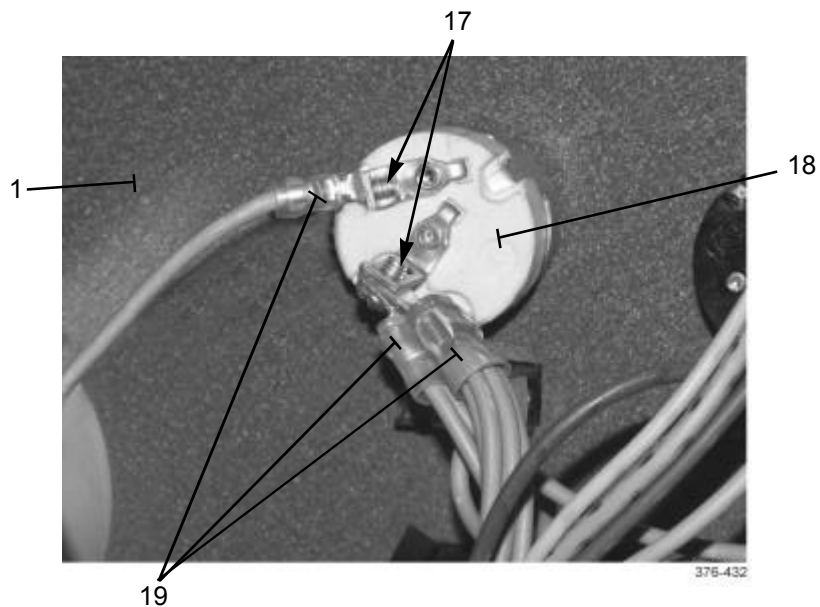


**PANEL LIGHTS SWITCH REPLACEMENT - CONTINUED**

2. At front of instrument panel (1), loosen screw (21) and remove knob (20).
3. Remove jamnut (22), washer (23), and switch (18) from instrument panel (1).



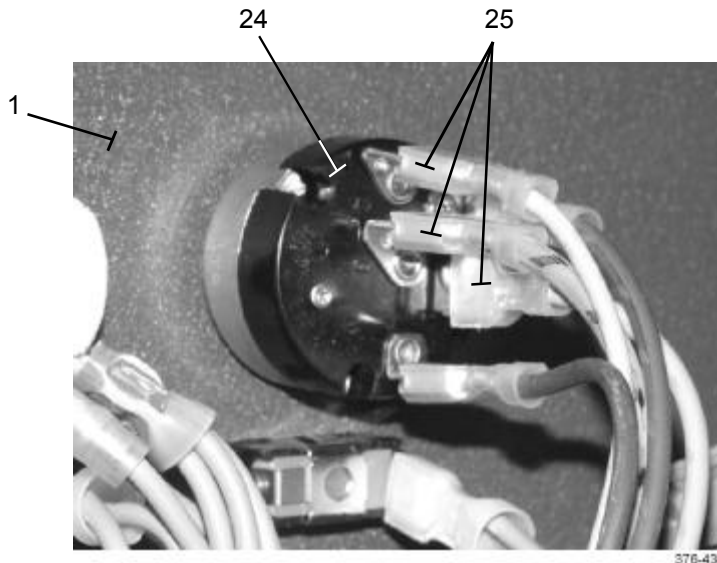
4. Install panel lights switch (18) to instrument panel (1) with washer (23) and jamnut (22).
5. Install knob (20) and tighten screw (21).
6. Connect three terminals (19) of cab wiring harness to switch (18) with two screws (17).



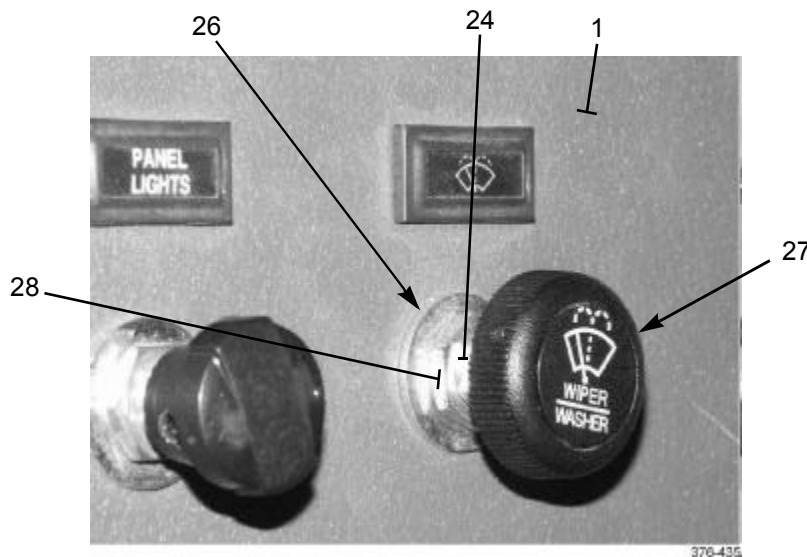
7. Place battery disconnect switch in ON position. Check operation of switch (TM 9-2320-312-10).

**WIPER/WASHER SWITCH REPLACEMENT**

1. At rear of upper-front instrument panel (1), disconnect five wires (25) of cab wiring harness from wiper/washer switch (24).



2. At front of instrument panel (1), remove knob (27).
3. Remove jamnut (28), washer (26), and switch (24) from instrument panel (1).



4. Install switch (24) to instrument panel (1) with washer (26) and jamnut (28).
5. Install knob (27).
6. Connect five wires (25) of cab wiring harness to switch (24).
7. Place battery disconnect switch in ON position. Check operation of switch (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**INSTRUMENT AND WARNING LIGHT CLUSTER REPLACEMENT**

---

**0094 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

---

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 7

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

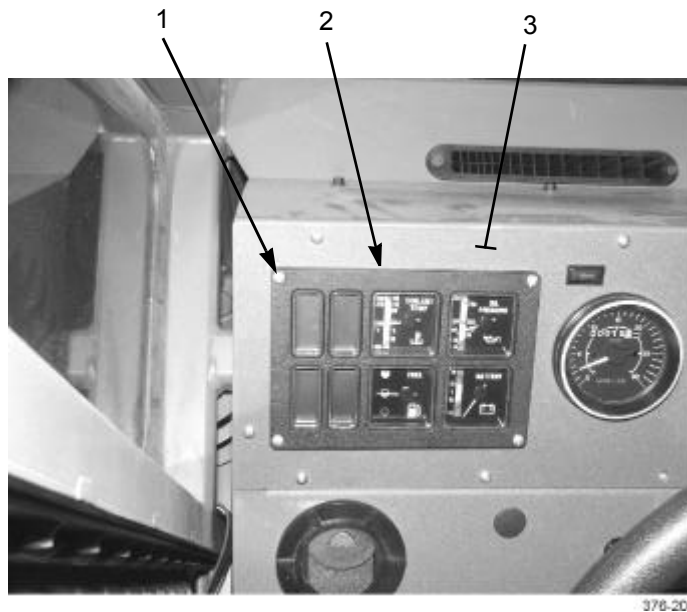
**Equipment Condition**

Battery disconnect switch in OFF position

---

**REMOVAL**

1. Remove four screws (1) and lift instrument and warning light cluster (2) away from upper instrument panel (3).

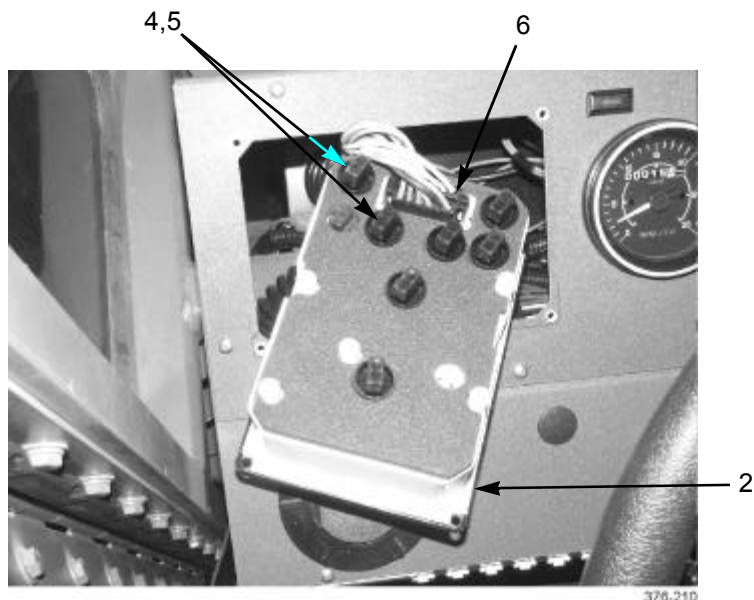


**INSTRUMENT AND WARNING LIGHT CLUSTER REPLACEMENT - CONTINUED**

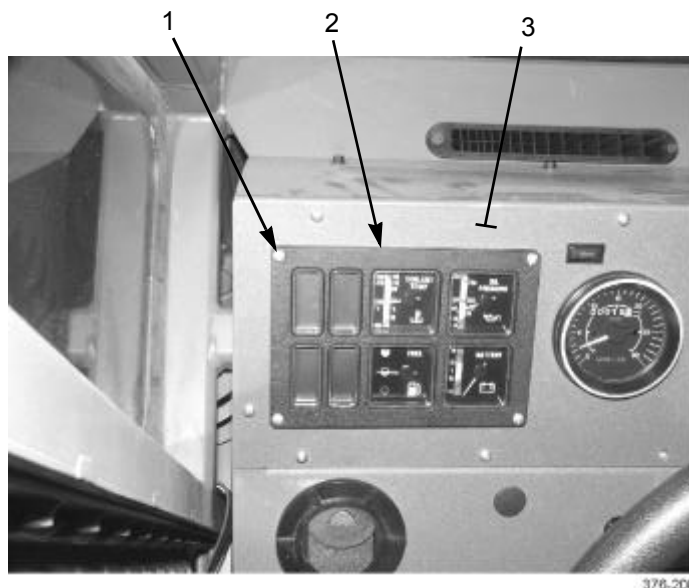
0094 00

**REMOVAL CONTINUED**

2. Disconnect instrument panel wiring harness connector (6) back of instrument and warning light cluster (2).
3. If any lamp is burned out, remove appropriate lamp holder (4) from back of instrument and warning light cluster (2).
4. Remove lamp (5) from lamp holder (4).

**INSTALLATION**

1. Install lamp (5) to lamp holder (4).
2. Install lamp holder (4) to back of instrument and warning light cluster (2).
3. Connect instrument panel wiring harness connector (6) to back of instrument and warning light cluster (2).
4. Install instrument and warning light cluster (2) to upper instrument panel (3) with four screws (1).



5. Place battery disconnect switch in ON position.

**END OF WORK PACKAGE**



**THIS WORK PACKAGE COVERS**

Circuit Breaker: Removal, Installation

Relay: Removal, Installation

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 7

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Tag, marker (Item 58, WP 0165 00)

**References**

Electrical Schematics--Foldouts

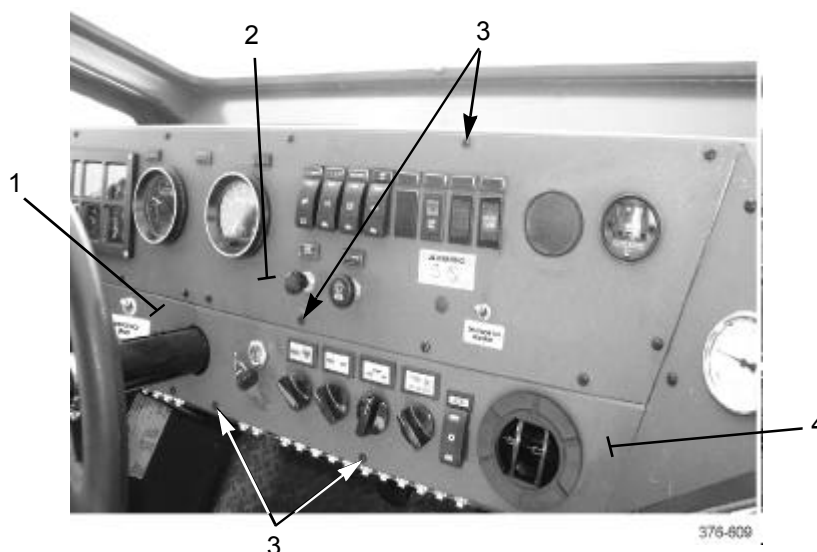
**Equipment Condition**

Battery disconnect switch in OFF position

**CIRCUIT BREAKER REMOVAL****NOTE**

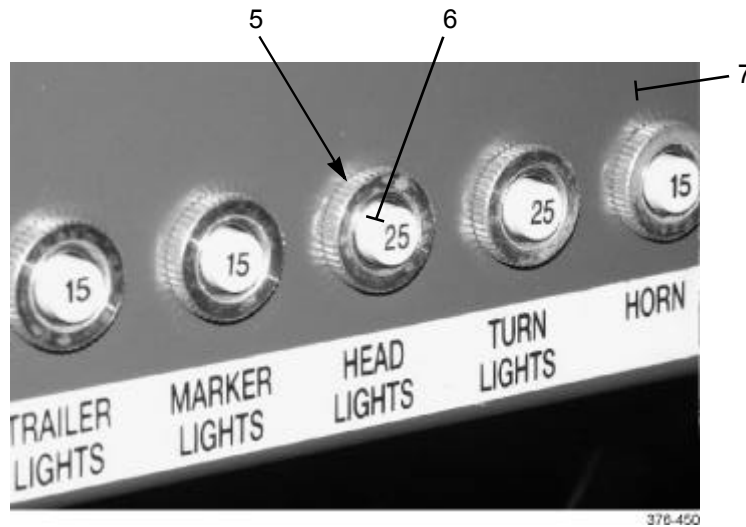
- Tag wires and electrical components to ensure correct installation.
- As required, refer to wiring diagrams in foldouts in back of this manual for assistance in performing this task.

1. Remove 19 screws (3) to free three instrument panels (1, 2, and 4) from instrument panel frame.

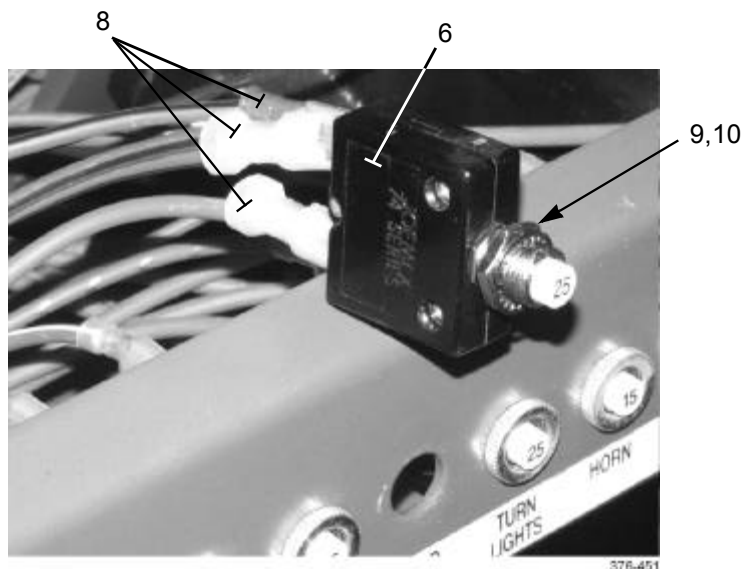


**CIRCUIT BREAKER REMOVAL - CONTINUED****NOTE**

- Circuit breakers at edge of instrument panel frame are replaced the same way, but may have either two or three wires attached. Perform the following steps to replace each of 22 circuit breakers. "HEAD LIGHTS" circuit breaker is shown.
  - Ensure that circuit breaker is replaced with circuit breaker of the SAME capacity.
2. Remove ring (5) from front of circuit breaker (6) and pull circuit breaker out from rear of instrument panel frame (7).

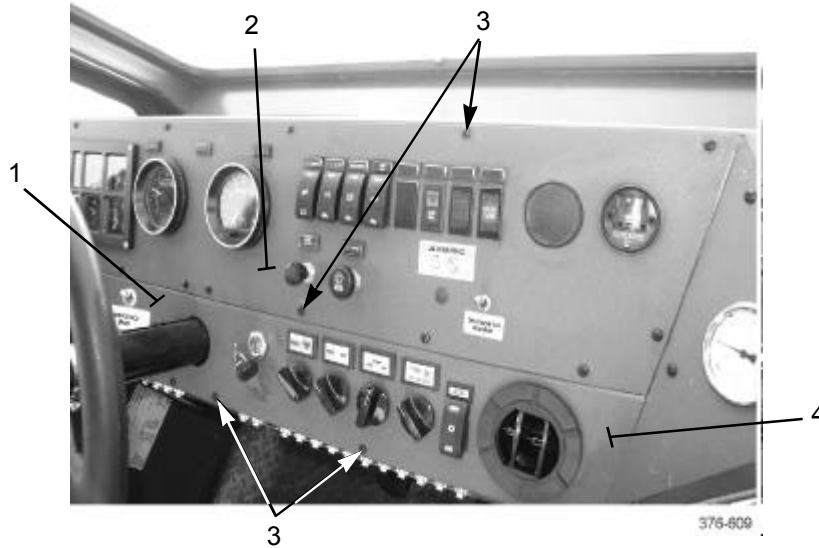


3. Remove lockwasher (9) and nut (10) from circuit breaker (6).
4. Disconnect three wires (8) of cab wiring harness from rear of circuit breaker (6).



**CIRCUIT BREAKER INSTALLATION**

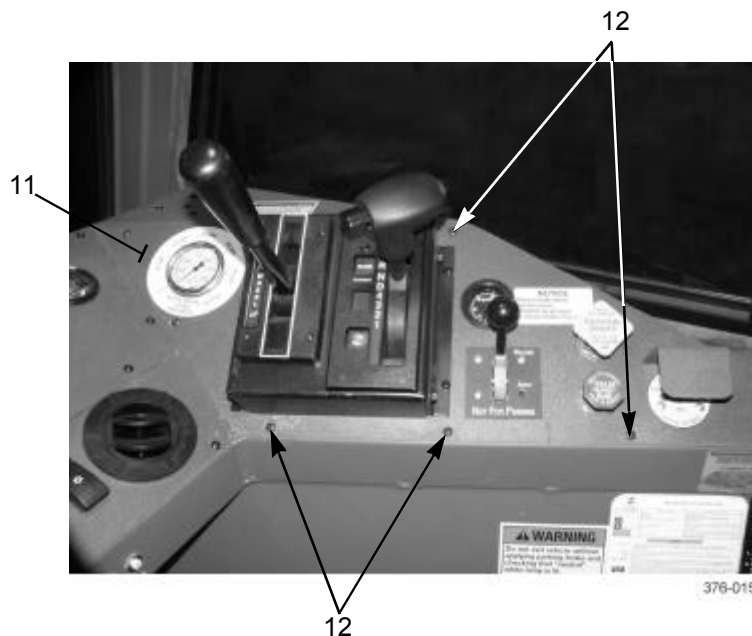
1. Connect three wires (8) of cab wiring harness to rear of circuit breaker (6).
2. Position nut (10) and lockwasher (9) to circuit breaker (6).
3. Install circuit breaker (6) into rear of instrument panel frame (7) and install ring (5).
4. Install three instrument panels (1, 2, and 4) with 19 screws (3).



5. Place battery disconnect switch in ON position.

**RELAY REMOVAL**

1. Remove eight screws (12) to free right-side instrument panel (11) from instrument panel frame.

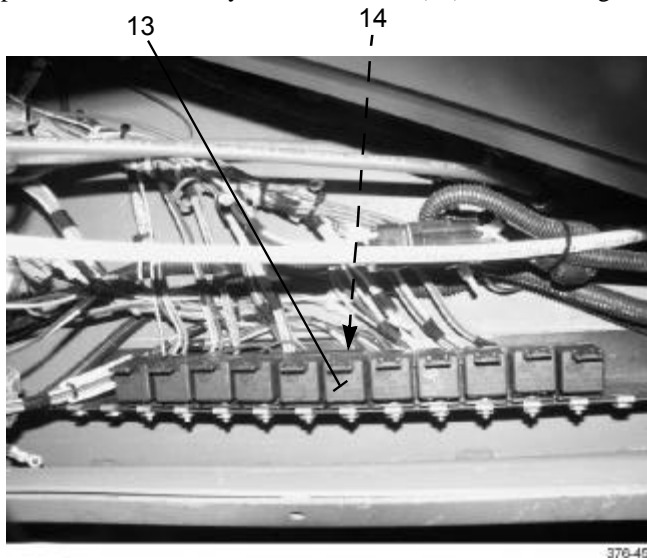


**RELAY REMOVAL - CONTINUED**

**NOTE**

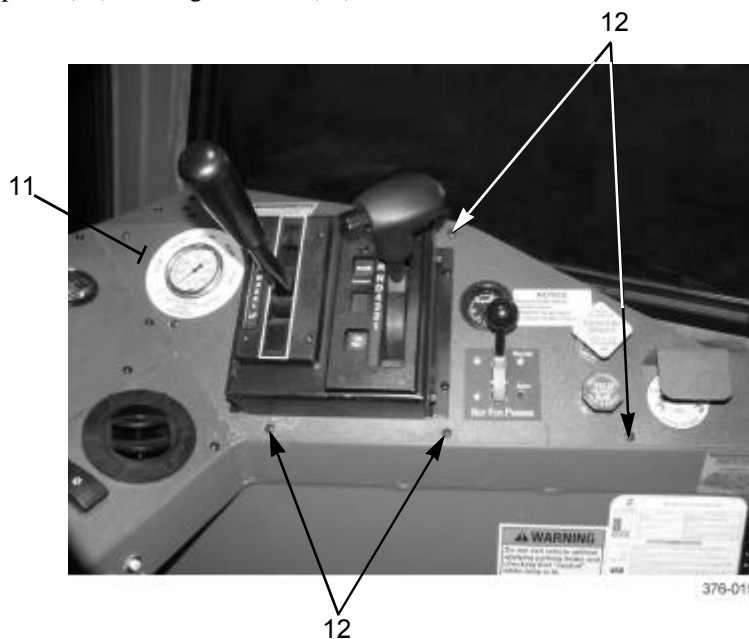
Relays are replaced the same way.

2. Carefully pry relay (13) upward to remove relay from connector (14) of cab wiring harness.



**RELAY INSTALLATION**

1. Install relay (13) to connector (14) of cab wiring harness.
2. Install instrument panel (11) with eight screws (12).



3. Place battery disconnect switch in ON position.

**END OF WORK PACKAGE**

**INLET AIR HEATER 120A CIRCUIT BREAKER REPLACEMENT**

**0096 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 11

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Insulating varnish, electrical dielectric (Item 34, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N 21NE048) (2)

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

Battery disconnect switch in OFF position

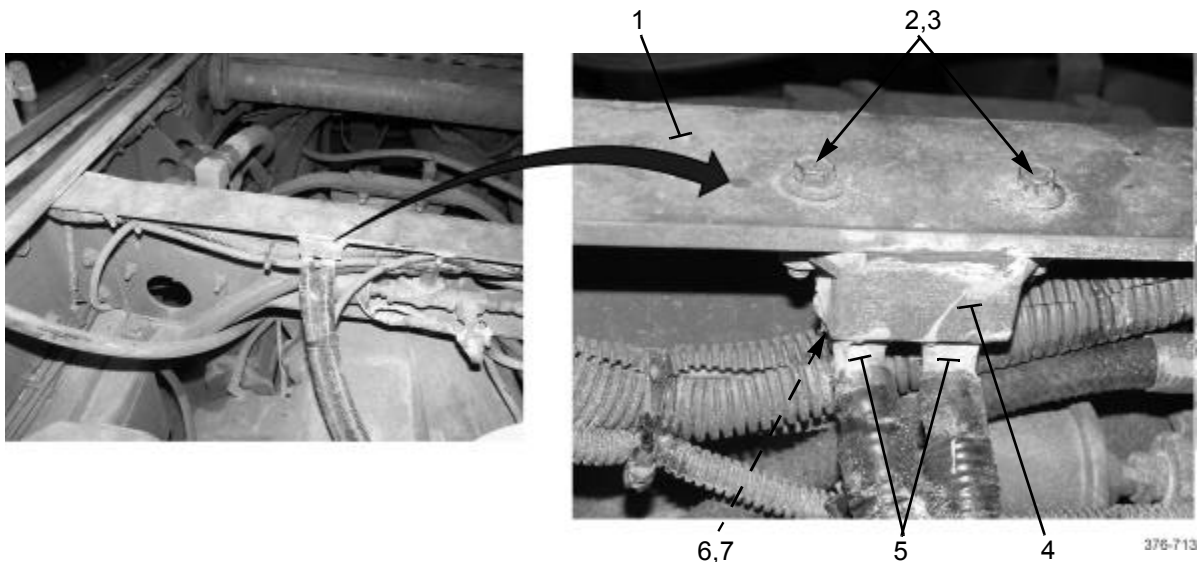
Transmission access cover removed (WP 0039 00)

**REMOVAL**

**NOTE**

- Tag cables to ensure correct installation.
- Remove and discard tiedown straps as necessary. Use new tiedown straps on installation.
- Terminals are coated with insulating varnish and paint. Remove insulating varnish and paint to access terminals.

1. Remove two nuts (6) and starwashers (7) and disconnect two cables (5) from circuit breaker (4).
2. Remove two locknuts (2), screws (3), and circuit breaker (4) from crossmember (1). Discard locknuts.



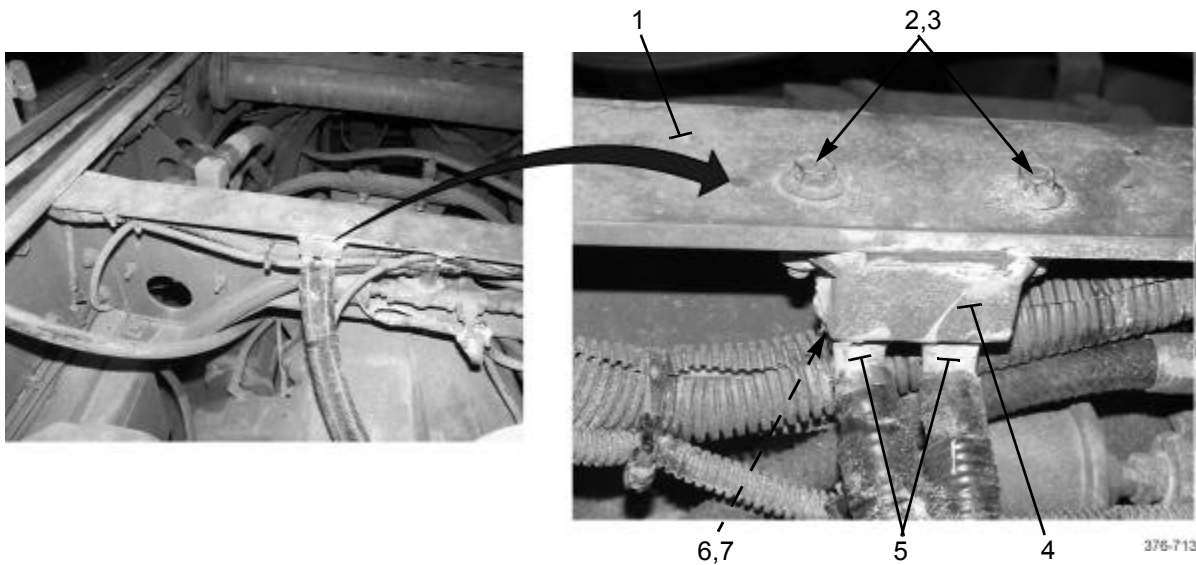
**INSTALLATION**

1. Install circuit breaker (4) to crossmember (1) with two screws (3) and new locknuts (2).

**NOTE**

Replacement circuit breaker comes with new terminal starwashers and nuts.

2. Connect two cables (5) to circuit breaker (4) with two starwashers (7) and nuts (6).
3. Coat terminals of circuit breaker (4) with insulating varnish.



4. Install transmission access cover (WP 0039 00).
5. Place battery disconnect switch in ON position.
6. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

**THIS WORK PACKAGE COVERS**

Switch: Removal, Installation  
 Sender: Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 11

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Insulating varnish, electrical dielectric (Item 34, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

Battery disconnect switch in OFF position

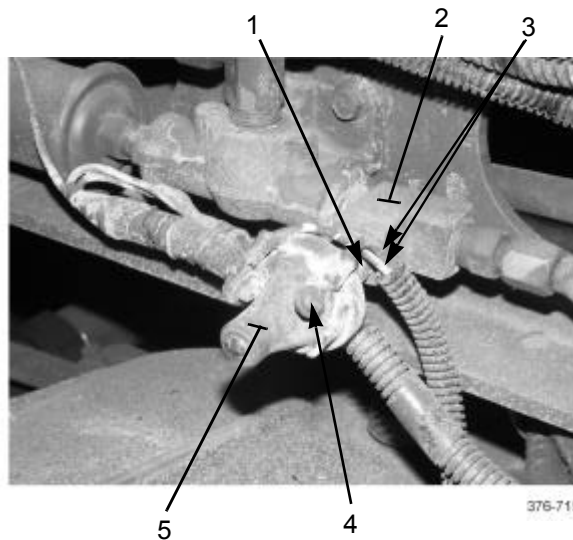
Transmission access cover removed (WP 0039 00)

**SWITCH REMOVAL**

**NOTE**

- Tag wires to ensure correct installation.
- Remove and discard tiedown straps as necessary. Use new tiedown straps on installation.
- Terminals are coated with insulating varnish and paint. Remove insulating varnish and paint to access terminals.

1. Remove two terminal screws (4) and disconnect two wires (3) from switch (5).
2. Remove switch (5) from bushing (1) at tee (2).



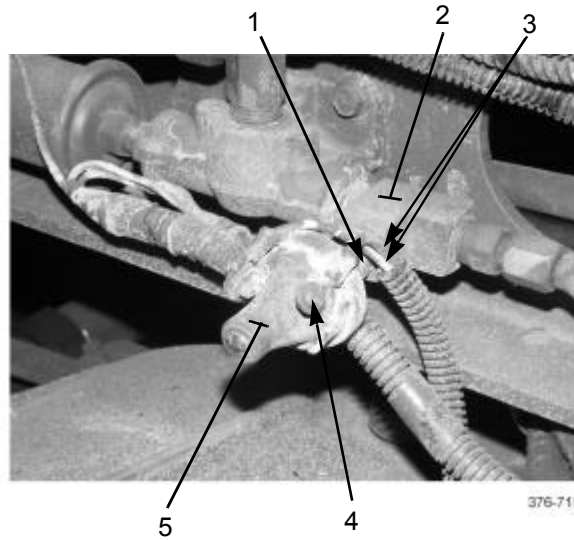
**SWITCH INSTALLATION**

1. Install switch (5) to bushing (1) at tee (2).

**NOTE**

Replacement switch comes with new terminal screws.

2. Connect two wires (3) to switch (5) with two terminal screws (4).
3. Coat terminals of switch (5) with insulating varnish.



4. Install transmission access cover (WP 0039 00).
5. Place battery disconnect switch in ON position.
6. Lower cab (TM 9-2320-312-10).

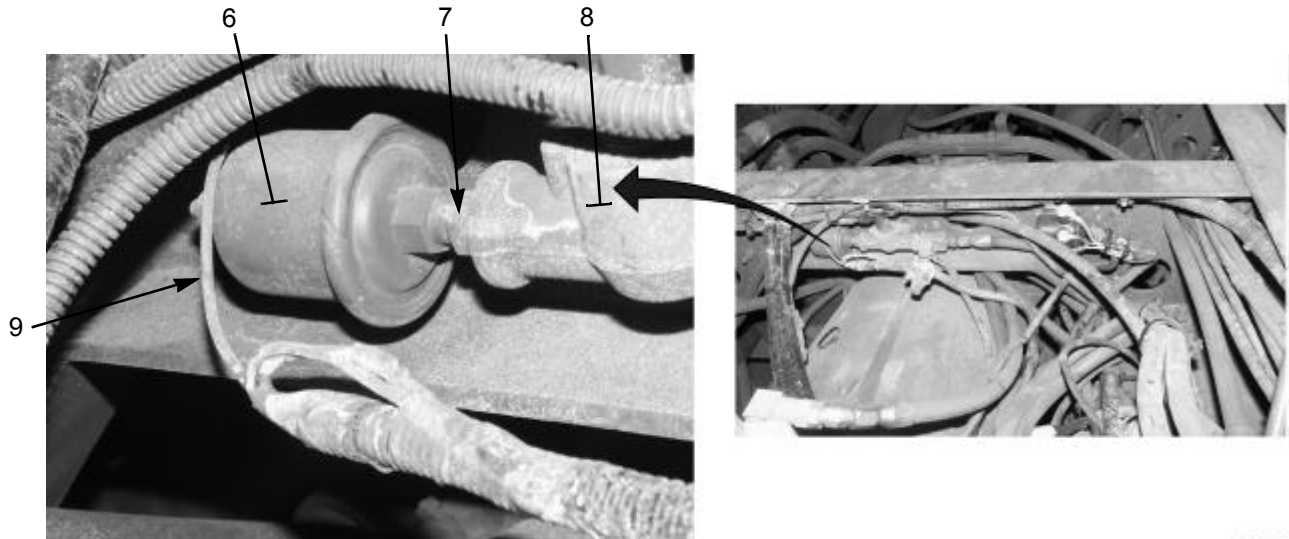
**SENDER REMOVAL**

**NOTE**

- Remove and discard tiedown straps as necessary. Use new tiedown straps on installation.
- Terminal is coated with insulating varnish and paint. Remove insulating varnish and paint to access terminal.

1. Remove nut and starwasher and disconnect wire (9) from sender (6).
2. Remove sender (6) from bushing (7) at tee (8).



**SENDER REMOVAL - CONTINUED**

376-716

**SENDER INSTALLATION**

1. Install sender (6) to bushing (7) at tee (8).

**NOTE**

Replacement sender comes with new terminal starwasher and nut.

2. Connect wire (9) to sender (6) with starwasher and nut.
3. Coat terminal of sender (6) with insulating varnish.
4. Install transmission access cover (WP 0039 00).
5. Place battery disconnect switch in ON position.
6. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**REMOTE START AND FAN CLUTCH SOLENOIDS REPLACEMENT**

---

0098 00

**THIS WORK PACKAGE COVERS**

Remote Start Solenoid: Removal, Installation

Fan Clutch Solenoid: Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 020, Figure 6

Group 170, Figure 7

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Insulating varnish, electrical dielectric (Item 34, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

**Materials/Parts - Continued**

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N 21NE048) (2)

Washer, lock (P/N 361-7) (4)

Washer, lock (P/N 361-10) (2)

**References**

WP 0066 00

**Equipment Condition**

Air system drained (TM 9-2320-312-10) (fan clutch solenoid replacement)

Cab tilted (TM 9-2320-312-10)

Battery disconnect switch in OFF position

Transmission access cover removed (WP 0039 00) (remote start solenoid replacement)

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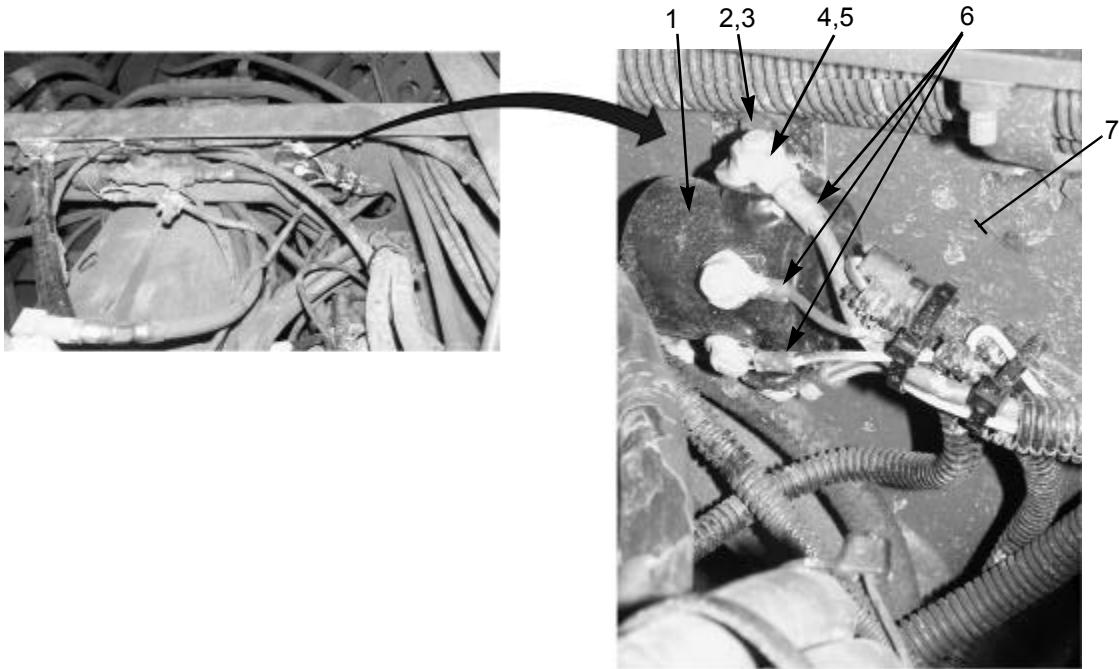
**NOTE**

- Tag wires or air lines to ensure correct installation.
- Terminals are coated with insulating varnish and paint. Remove insulating varnish and paint to access terminals.

**REMOTE START SOLENOID REMOVAL****NOTE**

Remove and discard tiedown straps as necessary. Use new tiedown straps on installation.

1. Remove four nuts (4) and lockwashers (5) and disconnect four wires (6) from solenoid (1). Discard lockwashers.
2. Remove two locknuts (2), screws (3), and solenoid (1) from crossmember (7). Discard locknuts.



375-714

**REMOTE START SOLENOID INSTALLATION**

1. Install solenoid (1) to crossmember (7) with two screws (3) and new locknuts (2).
2. Connect four wires (6) to solenoid (1) with four new lockwashers (5) and nuts (4).
3. Coat terminals of solenoid (1) with insulating varnish.
4. Install transmission access cover (WP 0039 00).
5. Place battery disconnect switch in ON position.
6. Lower cab (TM 9-2320-312-10).

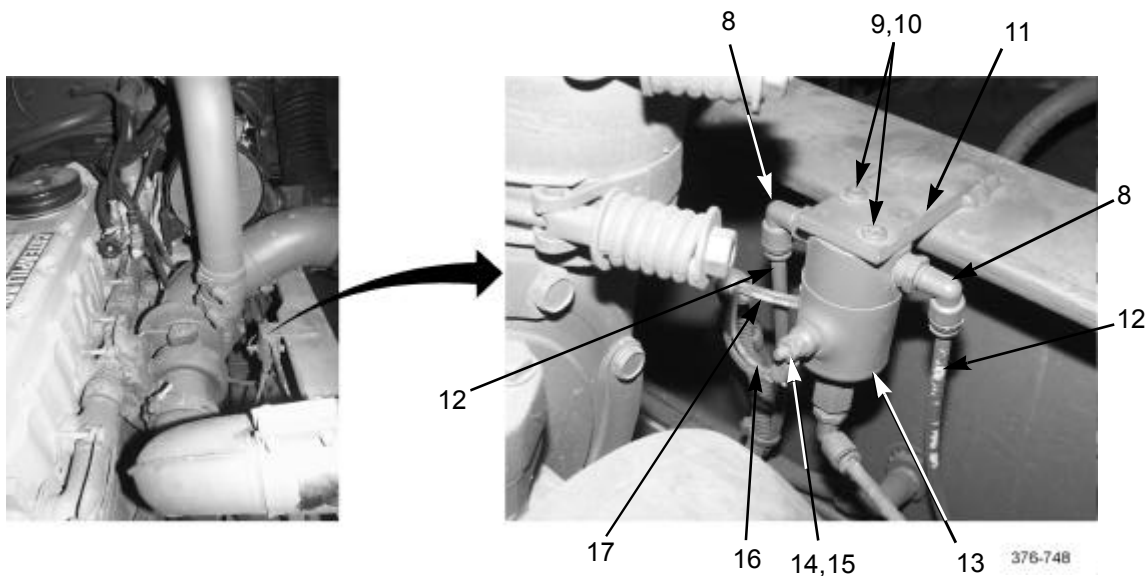
**FAN CLUTCH SOLENOID REMOVAL****WARNING**

DO NOT disconnect any air lines or fittings unless engine is shut down and air system pressure is relieved. Failure to follow this warning could result in serious injury to personnel.

**NOTE**

- Refer to WP 0066 00 for information on removing and installing air lines to push-in fittings.
- Note position of fan clutch solenoid and connection points of wires and air lines, to ensure correct installation.

1. Disconnect two air lines (12) from elbows (8).
2. Remove nut (14), lockwasher (15), and disconnect two wires (16) from solenoid (13) terminal closest to engine. Discard lockwasher.
3. Remove two screws (9), lockwashers (10), and remove solenoid (13) from frame bracket (11). Discard lockwashers.
4. Remove nut (14), lockwasher (15), and disconnect two wires (17) from other terminal of solenoid (13). Discard lockwasher.
5. Remove two elbows (8) from solenoid (13).

**FAN CLUTCH SOLENOID INSTALLATION**

1. Apply a thin coat of pipe sealing compound to male threads and install two elbows (8) to solenoid (13).
2. Position solenoid (13) and connect two wires (17) with new lockwasher (15) and nut (14).
3. Install solenoid (13) to frame bracket (11) with two new lockwashers (10) and screws (9).
4. Connect two wires (16) to solenoid (13) terminal closest to engine with new lockwasher (15) and nut (14).
5. Connect two air lines (12) to two elbows (8).

***FAN CLUTCH SOLENOID INSTALLATION - CONTINUED***

6. Place battery disconnect switch in ON position.
7. Lower cab (TM 9-2320-312-10).
8. Start engine (TM 9-2320-312-10) and build up air system pressure. Check operation of fan and fan clutch.

**END OF WORK PACKAGE**

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**TRAILER 24V CONVERTER BOX MAINTENANCE**

---

0099 00

**THIS WORK PACKAGE COVERS**

Fuses and Fuse Block: Removal, Installation

Relays: Removal, Installation

Converter Box: Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Strip, rubber (P/N 284A59)

Washer, lock (P/N 361-56)

**References**

Electrical Schematics--Foldouts

**Equipment Condition**Battery disconnect switch in OFF position

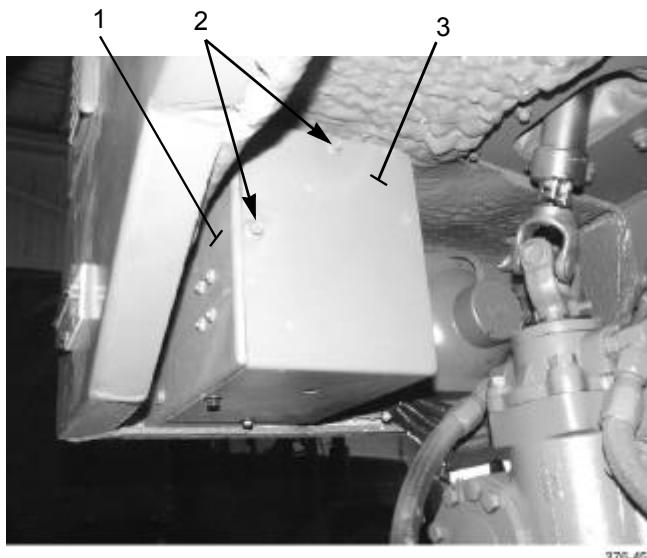
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**NOTE**

- Tag wires and electrical components to ensure correct installation.
- As required, refer to wiring diagrams in foldouts in back of manual for assistance in performing this task.

**FUSES AND FUSE BLOCK REMOVAL**

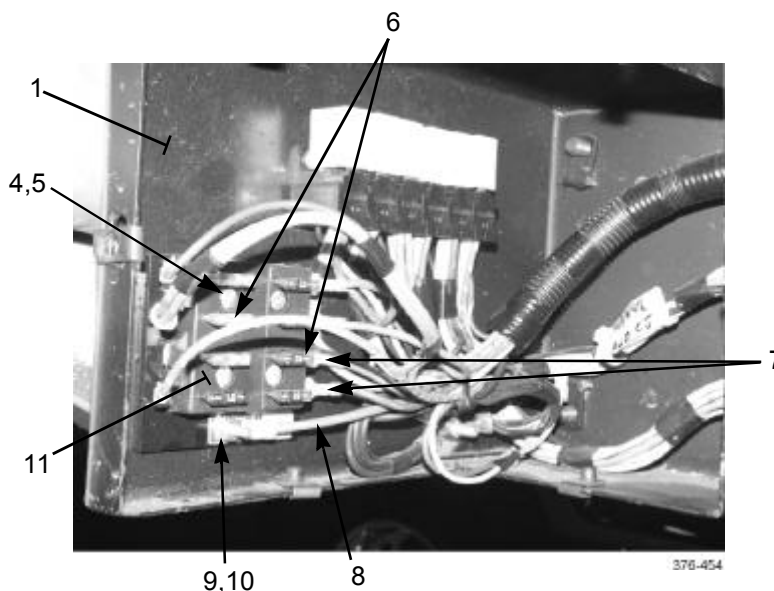
1. Remove six screws (2) from cover (3) and converter box (1). Remove rubber strip material wrapped around cover, then remove cover.



**FUSES AND FUSE BLOCK REMOVAL - CONTINUED****NOTE**

Note position and amp capacity of fuses for installation.

2. Remove eight fuses (6) from fuse block (11).
3. Disconnect seven wire connectors (7) from terminals of fuse block (11).
4. Remove four nuts (4), screws (5), and fuse block (11) from side of converter box (1).
5. Remove nut (9), screw (10), and red wire (8) of cab wiring harness from fuse block (11).

**FUSES AND FUSE BLOCK INSTALLATION**

1. Install red wire (8) of cab wiring harness to fuse block (11) with screw (10) and nut (9).
2. Install fuse block (11) to side of converter box (1) with four screws (5) and nuts (4).
3. Connect seven wire connectors (7) to terminals of fuse block (11).

**NOTE**

Spare fuses are taped to inside of converter box and may be used as needed.

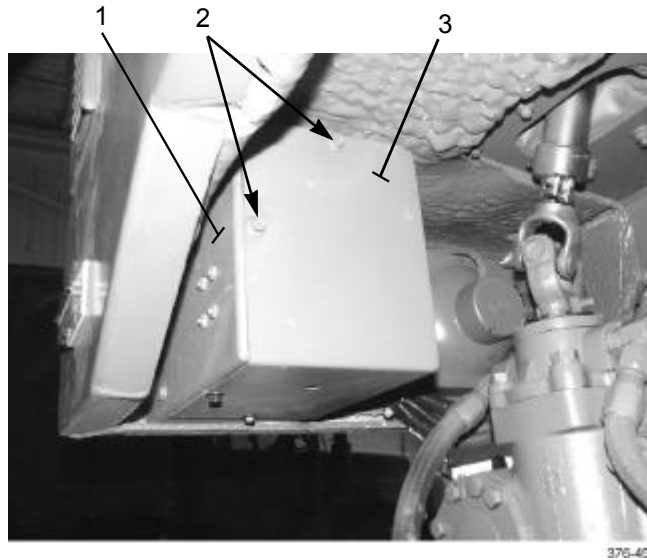
4. Install eight fuses (6) to fuse block (11).

**NOTE**

Ensure screws are engaged into clip nuts to securely install cover.

5. Install cover (3) to converter box (1) with six screws (2).
6. Seal cover (3) on converter box (1) with rubber strip material wrapped all the way around cover.

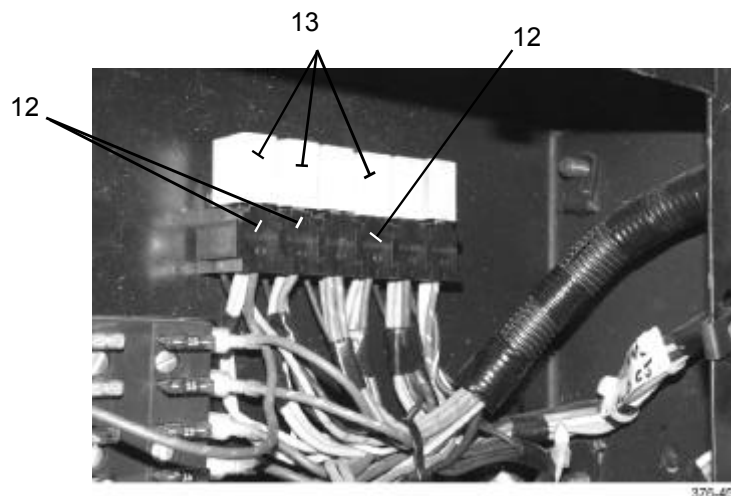


**FUSES AND FUSE BLOCK INSTALLATION - CONTINUED**

7. Place battery disconnect switch in ON position.

**RELAYS REMOVAL**

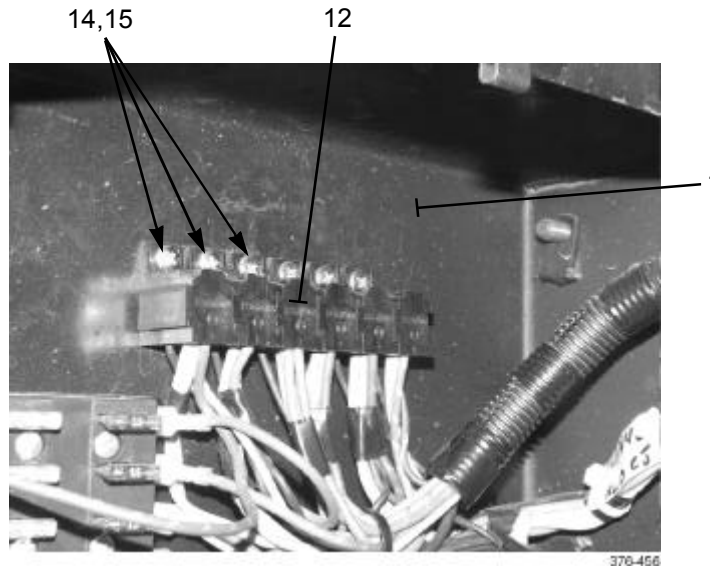
1. Remove cover (Refer to *Fuses and Fuse Block Removal*).
2. Remove six relays (13) from relay connectors (12).

**RELAYS INSTALLATION**

1. Install six relays (13) to relay connectors (12).
2. Install cover (Refer to *Fuses and Fuse Block Installation*).

**CONVERTER BOX REMOVAL**

1. Remove cover, fuses, and fuse block (Refer to *Fuses and Fuse Block Removal*).
2. Remove relays (Refer to *Relays Removal*).
3. Remove six nuts (14), screws (15), and relay connectors (12) from side of converter box (1).



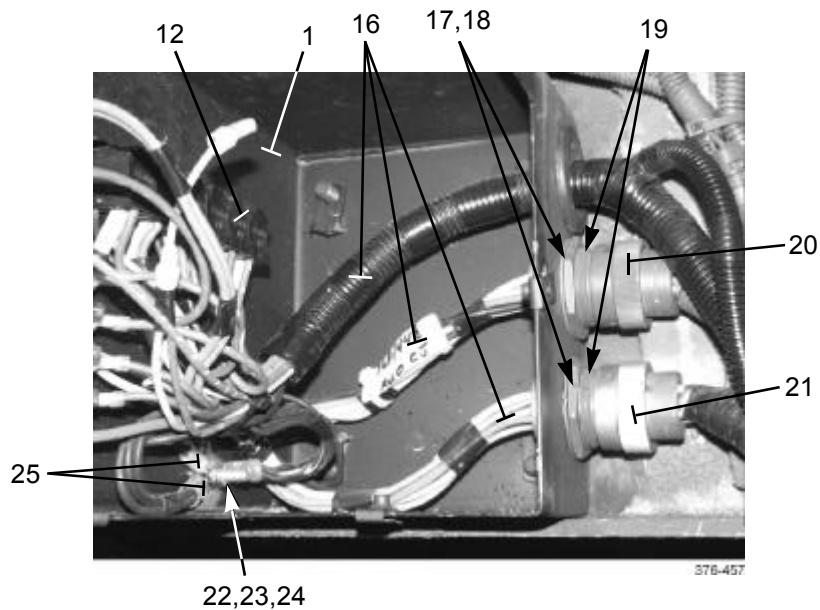
4. Remove nut (22), screw (23), and lockwasher (24) to disconnect three ground terminals (25) from converter box (1). Discard lockwasher.
5. Disconnect connector (20) of cab trailer wiring harness and connector (21) of chassis trailer wiring harness from two connectors (19) of 24V converter wiring harness (16).
6. Remove two jamnuts (17) and washers (18) to free two connectors (19) from converter box (1).

**NOTE**

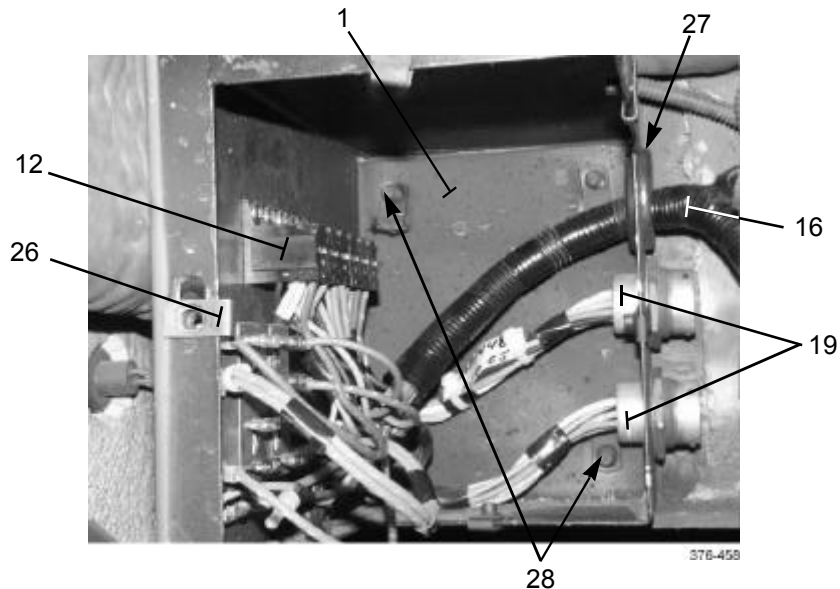
Remove and discard tiedown straps as necessary. Use new tiedown straps on installation.

7. Remove 24V converter wiring harness (16) with two connectors (19) and relay connectors (12) from converter box (1).

**CONVERTER BOX REMOVAL - CONTINUED**



8. Remove four screws (28) and converter box (1) from under cab.
9. Remove six clip nuts (26) and rubber grommet (27).

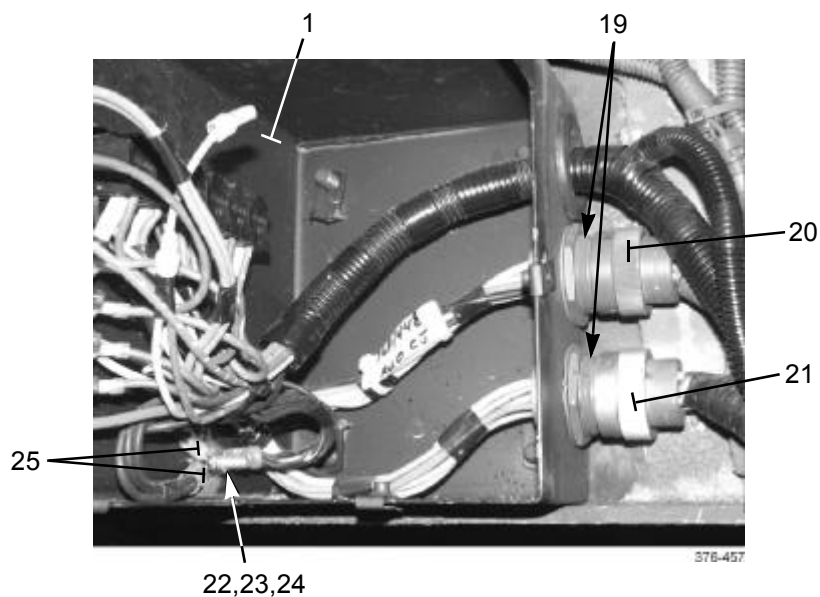


**CONVERTER BOX INSTALLATION**

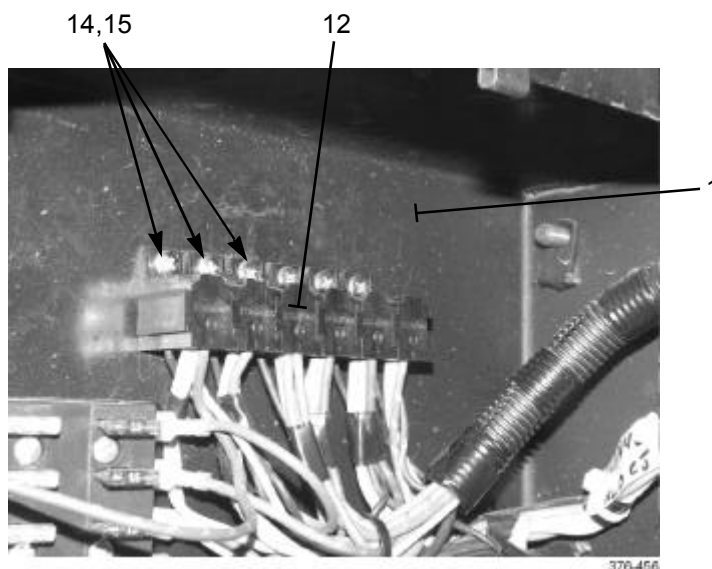
1. Install rubber grommet (27) and six clip nuts (26) to converter box (1).
2. Install converter box (1) to cab with four screws (28).
3. Position 24V converter wiring harness (16) with two connectors (19) and relay connectors (12) into converter box (1).
4. Install two connectors (19) to converter box (1) with two washers (18) and jamnuts (17).

**CONVERTER BOX INSTALLATION - CONTINUED**

5. Connect connector (20) of cab trailer wiring harness and connector (21) of chassis trailer wiring harness to two connectors (19).
6. Connect three ground terminals (25) to converter box (1) with screw (23), new lockwasher (24), and nut (22).



7. Install relay connectors (12) to side of converter box (1) with six screws (15) and nuts (14).



8. Install relays (Refer to *Relays Installation*).
9. Install fuse block, fuses, and cover (Refer to *Fuses and Fuse Block Installation*).

**END OF WORK PACKAGE**

**TURN SIGNAL LEVER AND TURN SIGNAL FLASHER UNIT REPLACEMENT**

**0100 00**

**THIS WORK PACKAGE COVERS**

Turn Signal Lever: Removal, Installation

Flasher Unit: Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 070, Figure 5

Group 170, Figure 7

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Washer, lock (P/N A361-0007) (4) (flasher unit replacement)

**Equipment Condition**

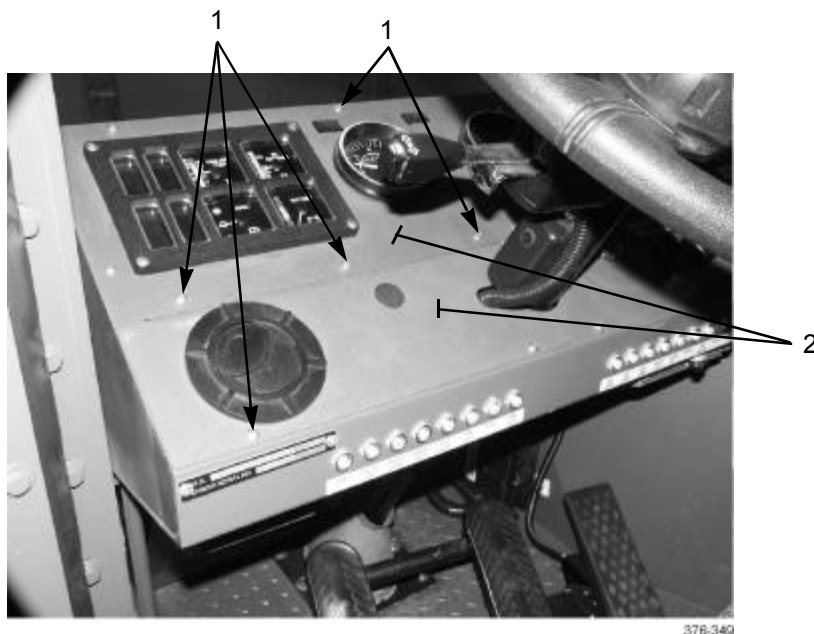
Battery disconnect switch in OFF position

**TURN SIGNAL LEVER REMOVAL**

**NOTE**

Air duct will be removed from rear of grille as lower-left instrument panel is removed.

1. Remove 16 screws (1) and lower-left and upper-front instrument panels (2) from instrument panel frame.



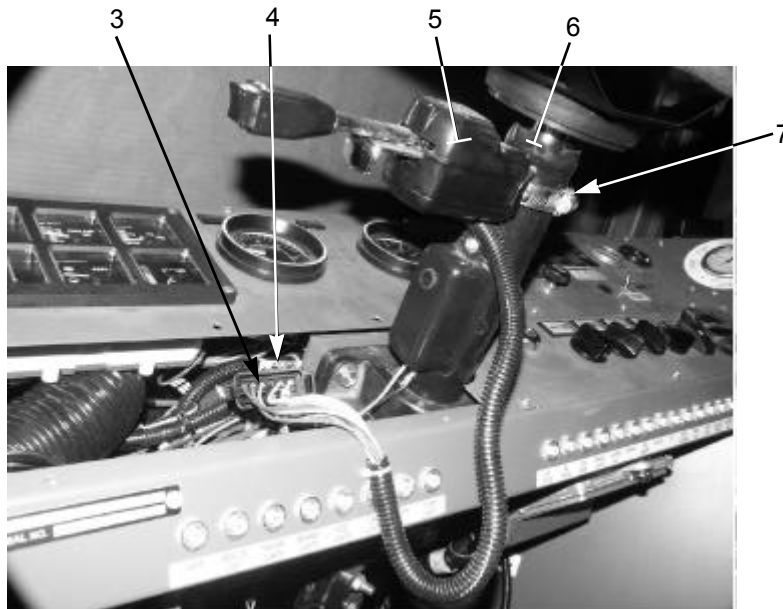
**TURN SIGNAL LEVER REMOVAL - CONTINUED**

2. Disconnect connector (3) of turn signal lever (5) wiring from cab wiring harness (4).

**NOTE**

- Remove tiedown strap and discard. Ensure new tiedown strap is used on installation.
- Note position of turn signal lever on steering column for installation.

3. Remove clamp (7) and turn signal lever (5) from steering column (6).



378-350

**TURN SIGNAL LEVER INSTALLATION**

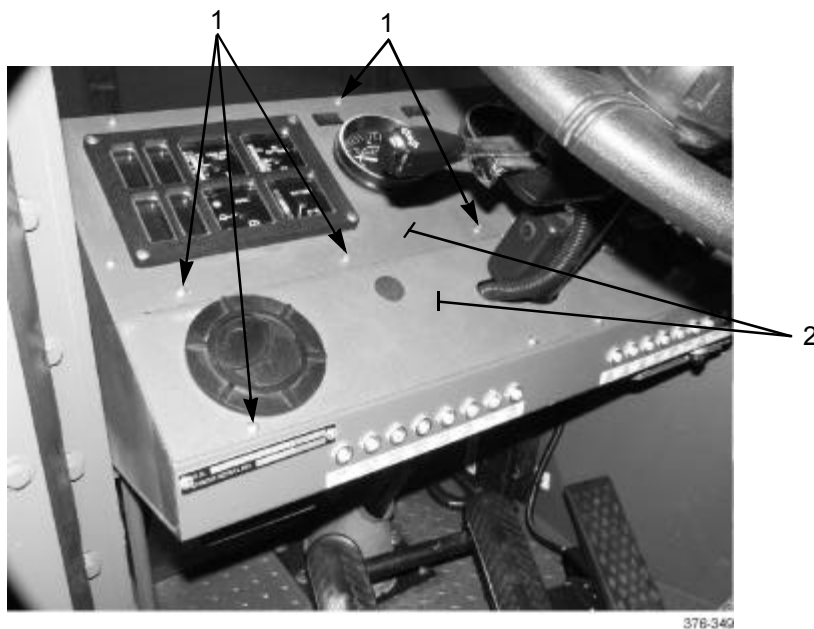
1. Install turn signal lever (5) to steering column (6) with clamp (7).
2. Connect connector (3) of turn signal lever (5) wiring to cab wiring harness (4).

**NOTE**

Install air duct to rear of grille as lower-left instrument panel is installed.

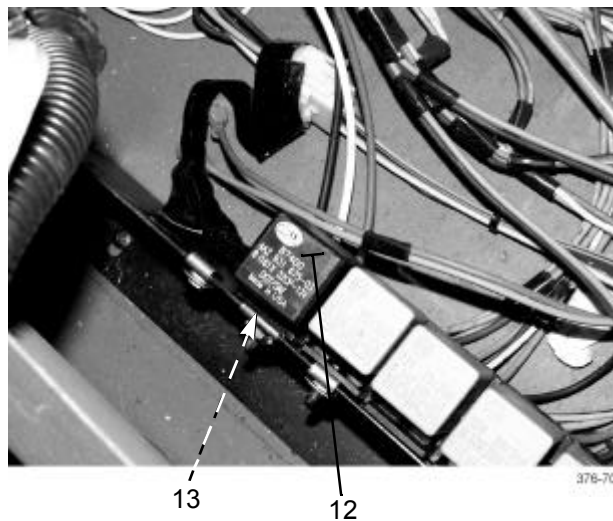
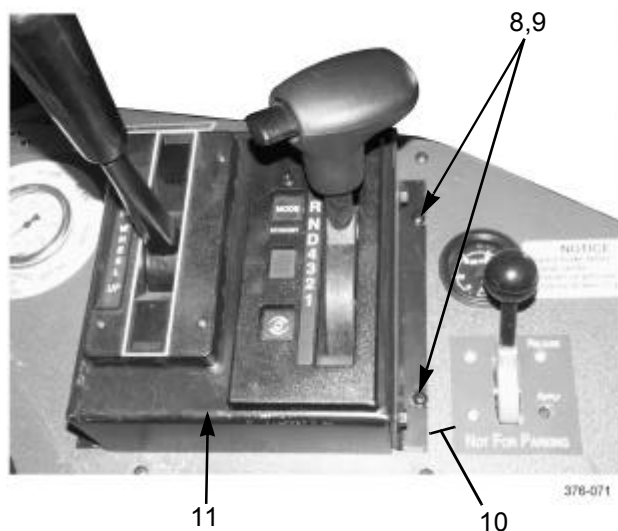
3. Install lower-left and upper-front instrument panels (2) to instrument panel frame with 16 screws (1).
4. Place battery disconnect switch in ON position.

**TURN SIGNAL LEVER INSTALLATION - CONTINUED**



**FLASHER UNIT REMOVAL**

1. Remove four screws (8), lockwashers (9), and shift tower (11) from right-side instrument panel (10).
2. Remove flasher unit (12) from terminal strip (13).



**FLASHER UNIT INSTALLATION**

1. Install flasher unit (12) to terminal strip (13).
2. Install shift tower (11) to right-side instrument panel (10) with four new lockwashers (9) and screws (8).
3. Place battery disconnect switch in ON position.

**END OF WORK PACKAGE**

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---

**HEADLIGHT REPLACEMENT**0101 00

---

**THIS WORK PACKAGE COVERS**Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 17

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**References**

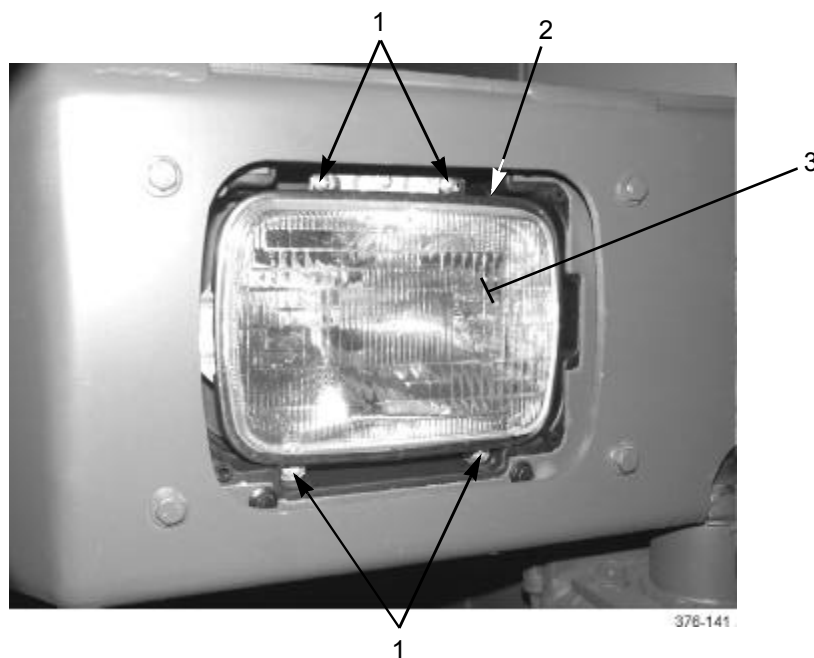
WP 0102 00

**Equipment Condition**Battery disconnect switch in OFF position

---

**REMOVAL**

1. Remove four screws (1) from tabs of lamp retainer (2) and remove lamp retainer from lamp (3).

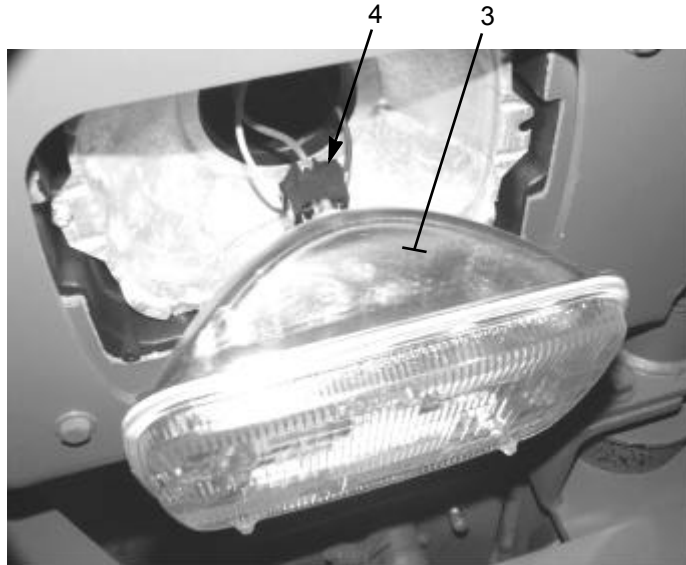


**HEADLIGHT REPLACEMENT - CONTINUED**

0101 00

**REMOVAL - CONTINUED**

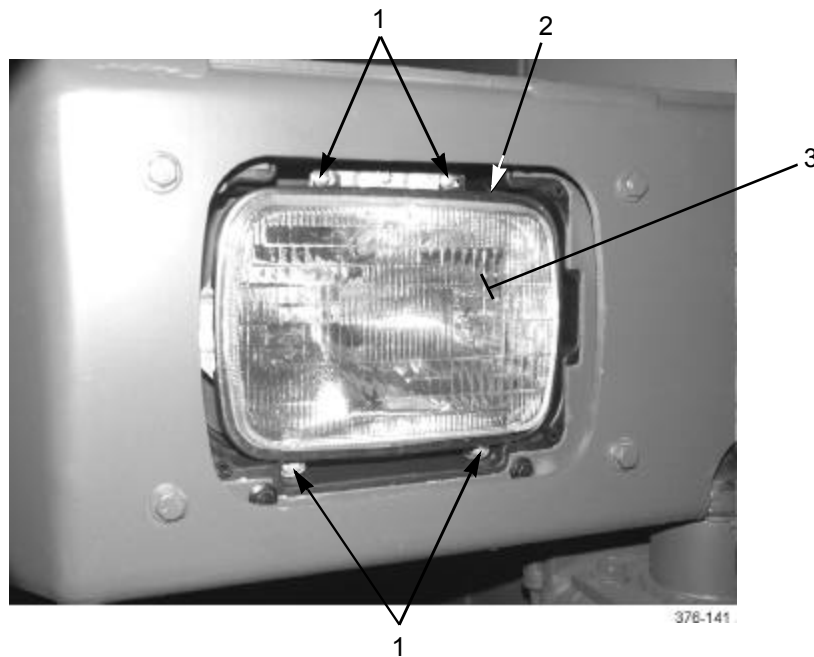
2. Pull lamp (3) outward and disconnect connector (4) of wiring harness from rear of lamp.



376-142

**INSTALLATION**

1. Connect connector (4) of wiring harness to rear of lamp (3).
2. Position lamp retainer (2) to lamp (3) and install lamp retainer with four screws (1).



376-141

3. Place battery disconnect switch in ON position.
4. Adjust headlight (WP 0102 00).

**END OF WORK PACKAGE**

---

**HEADLIGHT ADJUSTMENT**

---

**0102 00****THIS WORK PACKAGE COVERS**

Adjustment

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 17

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 2 (Item 29, WP 0166 00)

**Personnel Required**

Two

**References**TM 9-2320-312-10

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**NOTE**

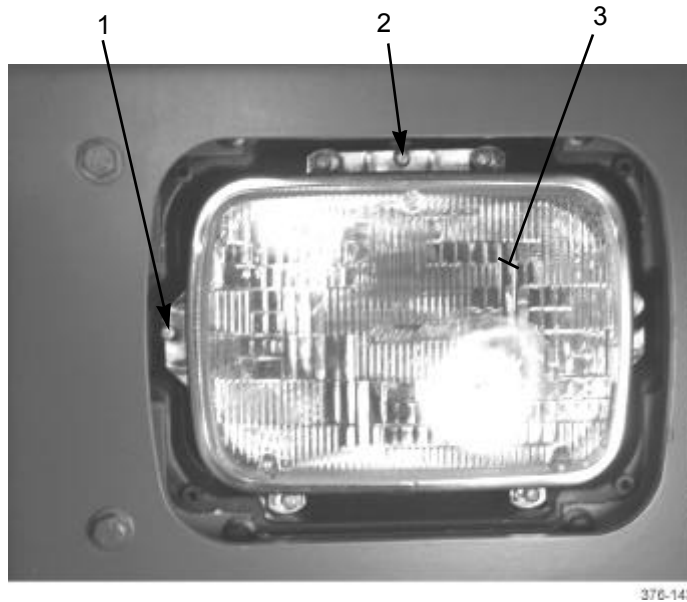
- Perform adjustment procedures with vehicle on a flat surface and without any load on vehicle.
- Ensure that all vehicle tires are inflated to 120 psi (827 kPa).

**ADJUSTMENT**

1. At front bumper of vehicle, use measuring tape to determine center of vehicle.
2. Place a vertical mark on bumper at center of vehicle.
3. Drive up to a light-colored wall with both front lifting brackets of bumper almost touching wall and bumper parallel to wall. Front wheels must be facing straight ahead.
4. Transfer vertical mark on bumper to wall.
5. Back up vehicle in a STRAIGHT line away from wall until vehicle is 25 ft (7.6 m) from wall. Apply parking brake and shut down engine (TM 9-2320-312-10).
6. Extend mark on wall upward approximately 36 in (91.4 cm) and also downward to floor. This line is vehicle's center-line.
7. On vehicle center line, measure upward 48 in (121.9 cm) from floor. Make a horizontal line parallel to floor.
8. Determine headlamp centers by measuring outward 29.5 in (74.9 cm) on each side of vehicle center line. Mark headlamp centers.
9. With environment sufficiently dark, switch LOW-BEAM headlights on (TM 9-2320-312-10).
10. Note area of highest headlight intensity on wall.

**ADJUSTMENT - CONTINUED**

11. Adjust each of two headlamps (3) until entire area of highest intensity is slightly to the RIGHT and slightly BELOW headlamp centers marked on wall:
  - a. To adjust intensity area up or down, rotate CENTER adjusting screw (2) left or right.
  - b. To adjust intensity area left or right, rotate SIDE adjusting screw (1) left or right.



12. Remove mark from bumper.

**END OF WORK PACKAGE**

---

**FRONT TURN SIGNAL LIGHT REPLACEMENT**

---

**0103 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

---

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 17

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

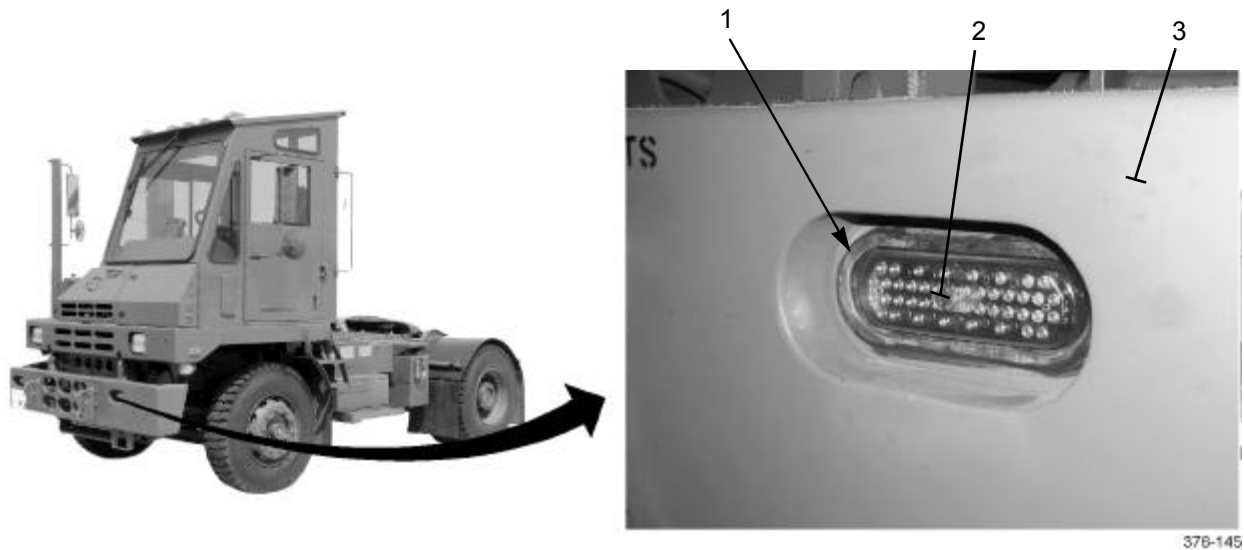
**Equipment Condition**

Battery disconnect switch in OFF position

---

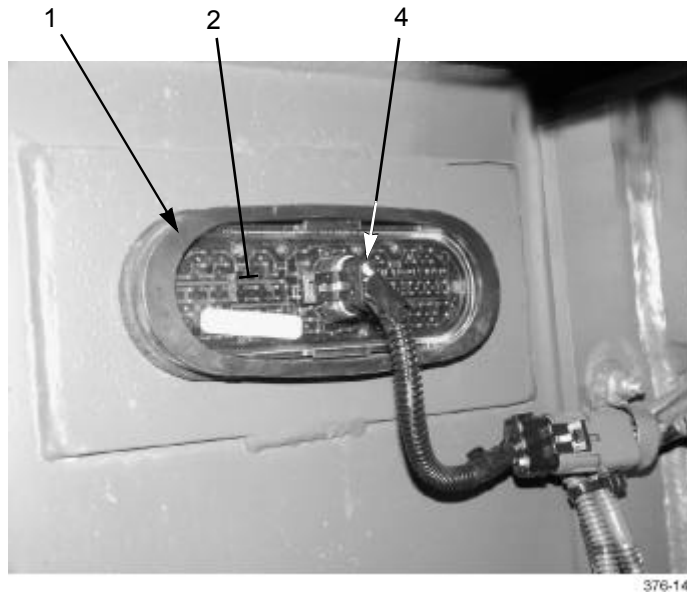
**REMOVAL**

1. While constricting edges of rubber ring (1), push inward on front turn signal light (2) to remove light from bumper (3).



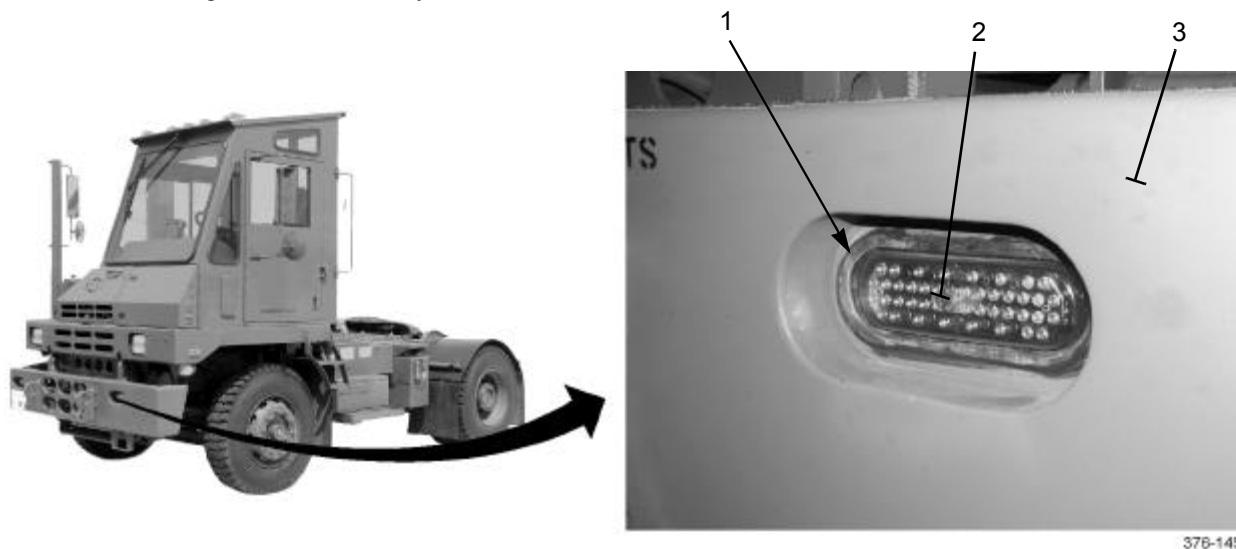
**REMOVAL - CONTINUED**

2. Disconnect connector (4) of front turn signal light cable from light (2).
3. Remove light (2) from rubber ring (1).



**INSTALLATION**

1. Install rubber ring (1) to light (2).
2. Connect connector (4) of front turn signal light cable to light (2).
3. While constricting edges of rubber ring (1), push outward on front turn signal light (2) until light is secured to bumper (3) and rubber ring is flared out evenly.



4. Place battery disconnect switch in ON position.

**END OF WORK PACKAGE**

---

**MARKER CLEARANCE LIGHT MAINTENANCE**

**0104 00**

---

**THIS WORK PACKAGE COVERS**

Lamp: Removal, Installation

Marker Clearance Light: Removal, Installation

---

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 15

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**References**

WP 0120 00

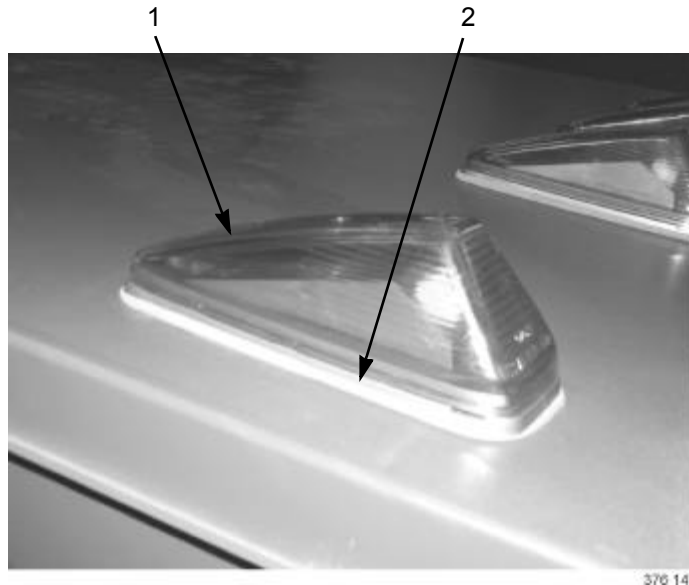
**Equipment Condition**

Battery disconnect switch in OFF position

---

**LAMP REMOVAL**

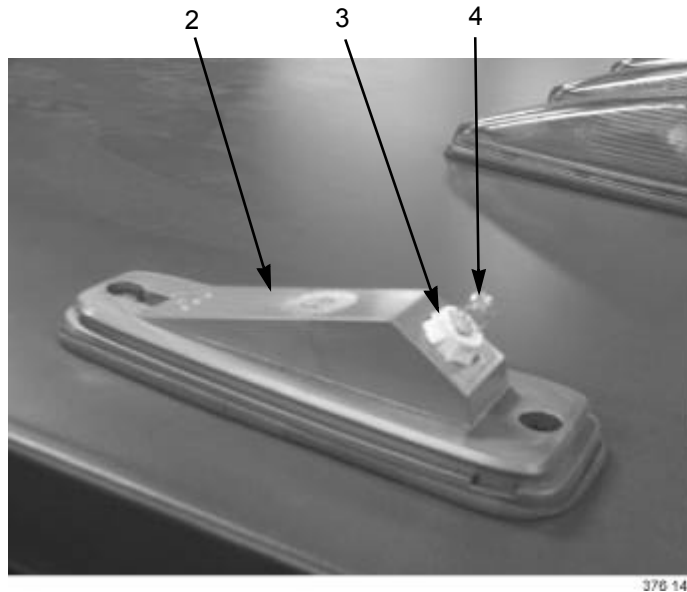
- Carefully pry off lens (1) of light (2).



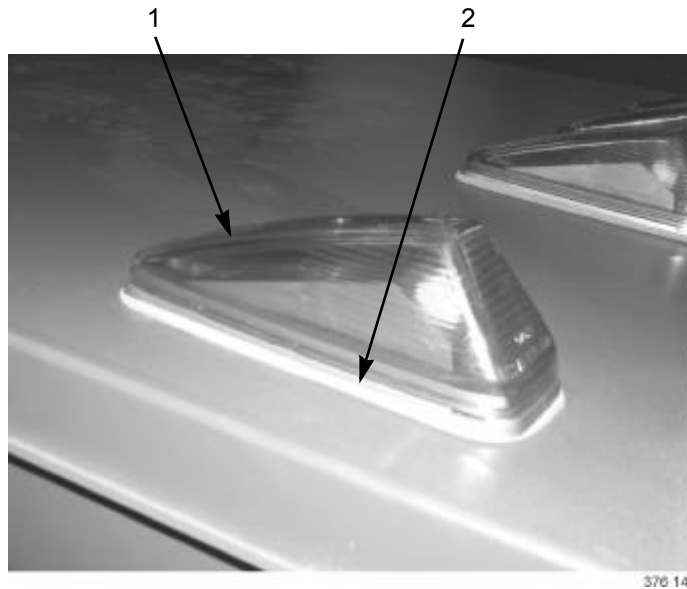
376 147

**LAMP REMOVAL - CONTINUED**

- Remove lamp (4) from socket (3) of light (2).

**LAMP INSTALLATION**

- Install lamp (4) to socket (3) of light (2).
- Install lens (1) to light (2).

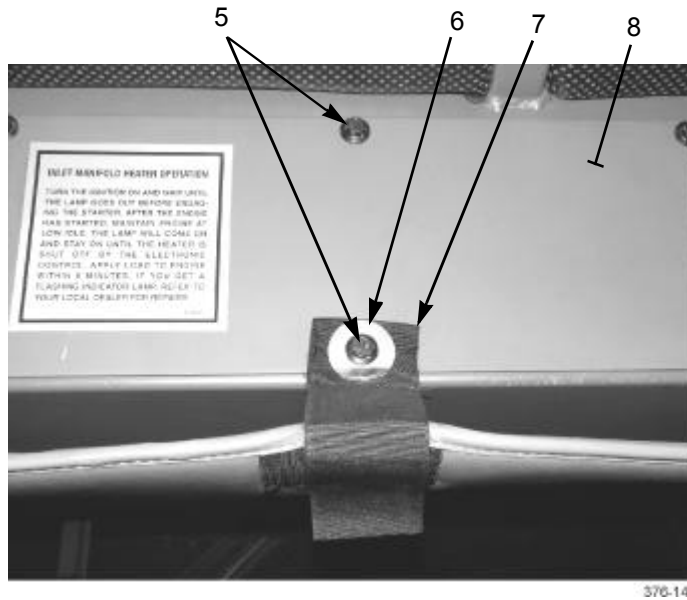


- Place battery disconnect switch in ON position.

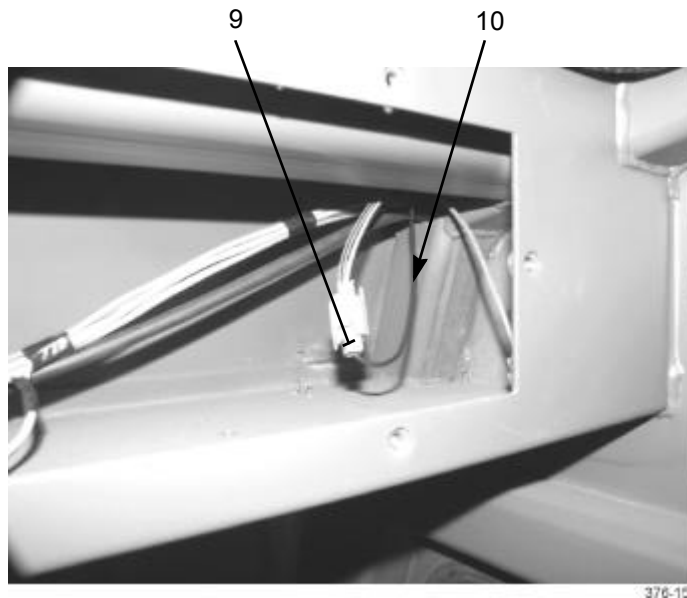


**MARKER CLEARANCE LIGHT REMOVAL**

1. Remove lamp (Refer to *Lamp Removal*).
2. Remove 14 screws (5), washer (6), strap (7), and access panel (8) from inside cab.

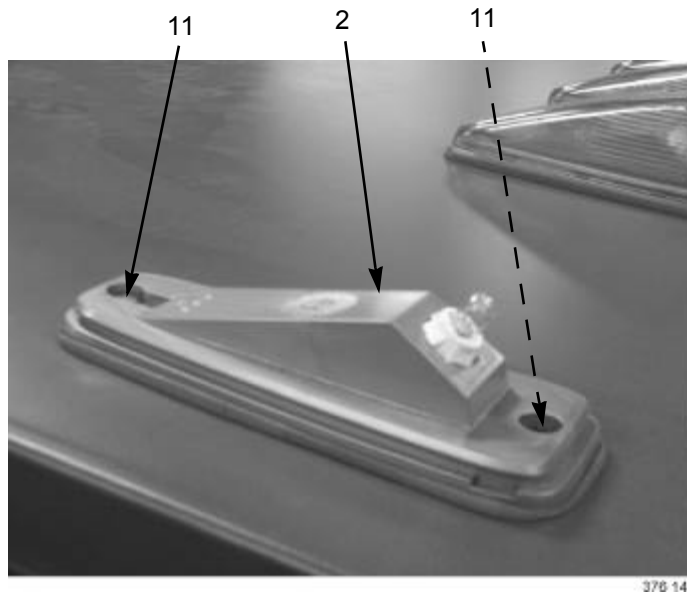


3. Disconnect connector (9). Remove black light wire (10) from connector (WP 0120 00).

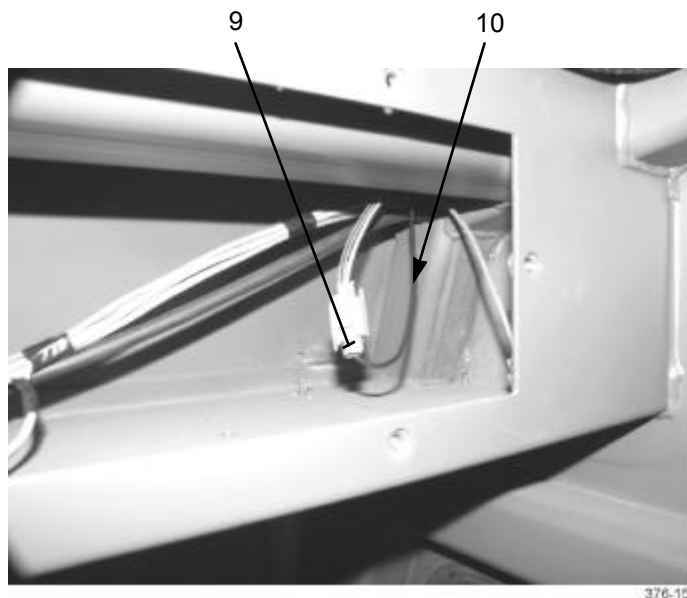


**MARKER CLEARANCE LIGHT REMOVAL - CONTINUED**

4. Remove two screws (11) and light (2) from top of cab.

**MARKER CLEARANCE LIGHT INSTALLATION**

1. Push light wire (10) through top of cab.
2. Install light wire (10) to connector (9) inside cab (WP 0120 00). Connect connector.

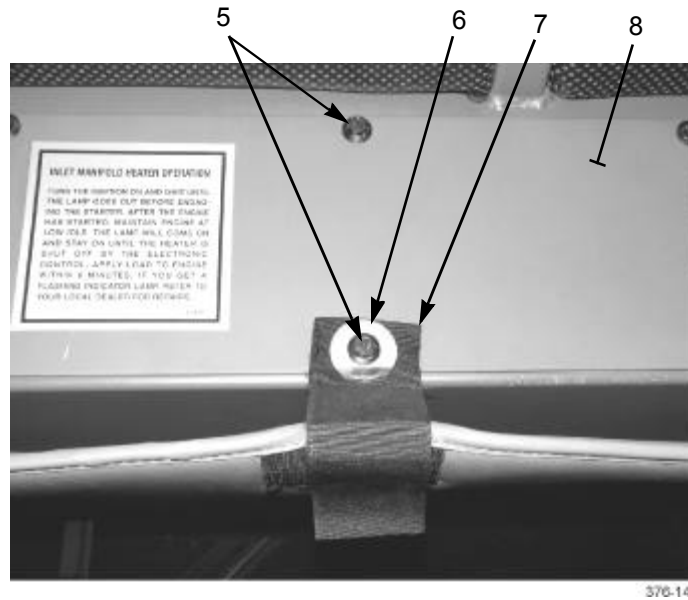


**MARKER CLEARANCE LIGHT MAINTENANCE - CONTINUED**

0104 00

**MARKER CLEARANCE LIGHT INSTALLATION - CONTINUED**

3. Install access panel (8), strap (7), and washer (6) to cab with 14 screws (5).



4. Install light (2) to top of cab with two screws (11).
5. Install lamp (Refer to *Lamp Installation*).

**END OF WORK PACKAGE**

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---

**AUXILIARY LIGHT MAINTENANCE**

**0105 00**

---

**THIS WORK PACKAGE COVERS**

Lamp: Removal, Installation

Auxiliary Light: Removal, Installation

---

**INITIAL SETUP**

**Maintenance Level**

Unit

**RPSTL Reference**

Group 170, Figure 14

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Nut, lock (P/N 219-74) (4)

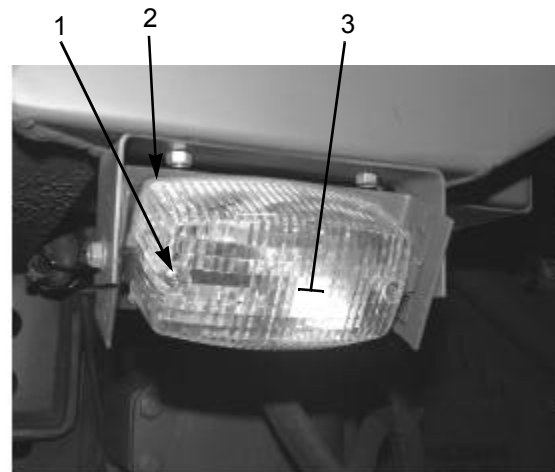
**Equipment Condition**

Battery disconnect switch in OFF position

---

**LAMP REMOVAL**

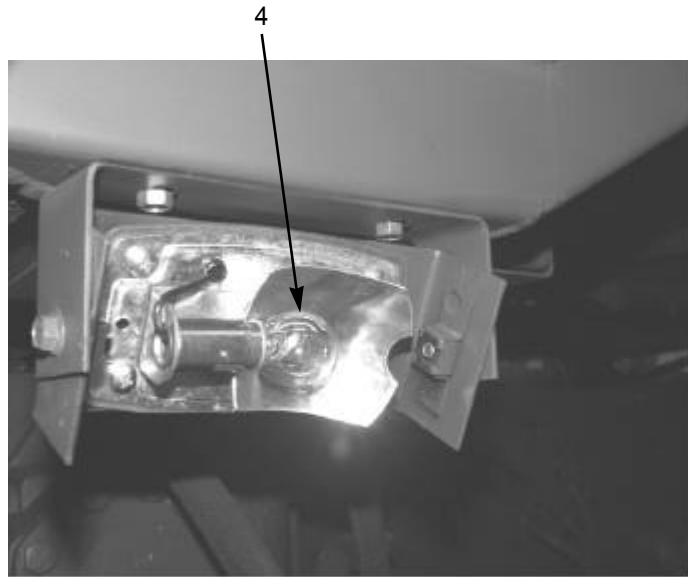
1. Remove two screws (1) and lens (3) from auxiliary light (2).



376-644

**LAMP REMOVAL - CONTINUED**

- Remove lamp (4) from socket.



376-645

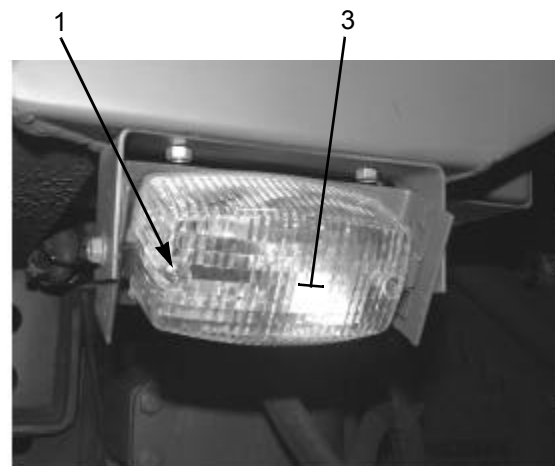
**LAMP INSTALLATION**

- Install lamp (4) in socket.

**CAUTION**

Do NOT overtighten screws or damage to lens may result.

- Install lens (3) with two screws (1).



376-644

**AUXILIARY LIGHT MAINTENANCE - CONTINUED**

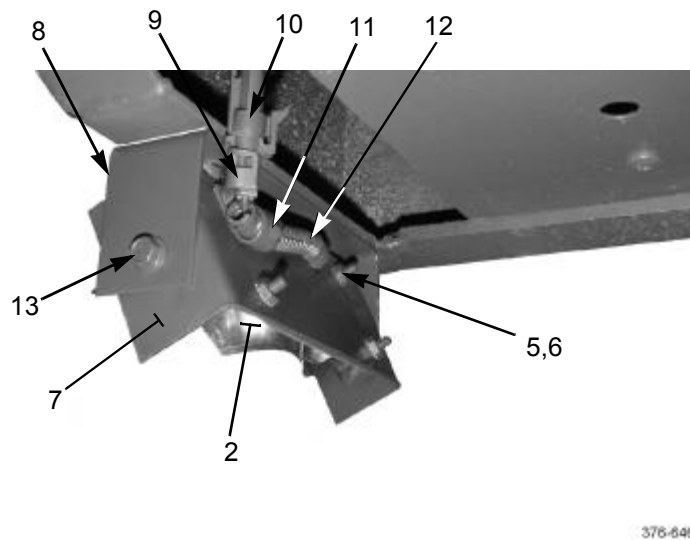
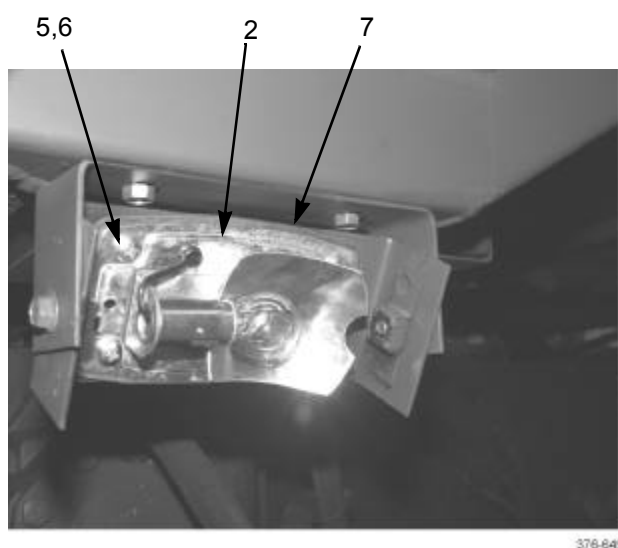
0105 00

**LAMP INSTALLATION - CONTINUED**

- Place battery disconnect switch in ON position.

**AUXILIARY LIGHT REMOVAL**

- Remove lamp (Refer to *Lamp Removal*).
- Remove four locknuts (5), screws (6), and light (2) from bracket (7).
- Disconnect light connector (9) from wiring harness connector (10) and remove light (2) from vehicle.
- If bracket (7) is damaged, remove two screws (13) and bracket from bracket (8).

**AUXILIARY LIGHT INSTALLATION**

- If removed, install bracket (7) to bracket (8) with two screws (13). Adjust angle of bracket (7) as required, for best auxiliary lighting coverage, then fully tighten screws.
- Position conduit (12) and clamp (11) on auxiliary light wire and connect light connector (9) to wiring harness connector (10).
- With light (2) and clamp (11) positioned at bracket (7), install four screws (6), and new locknuts (5).
- Install lamp (Refer to *Lamp Installation*).
- Place battery disconnect switch in ON position.

**END OF WORK PACKAGE**

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**SIDE MARKER LIGHT REPLACEMENT**

**0106 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 14

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**References**

TM 9-2320-312-10

**Equipment Condition**

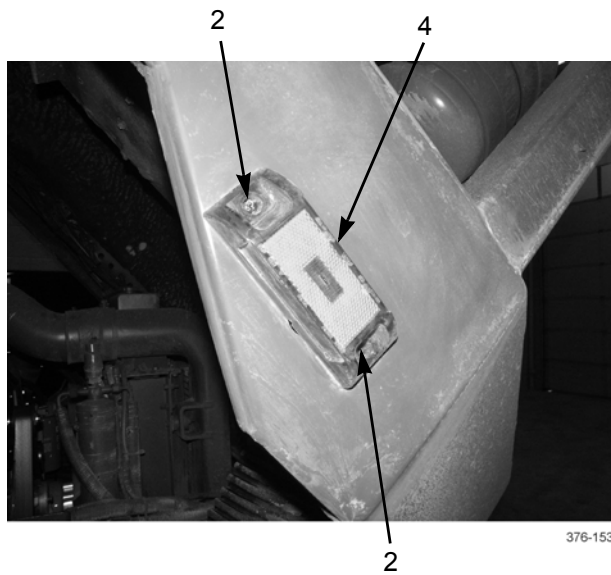
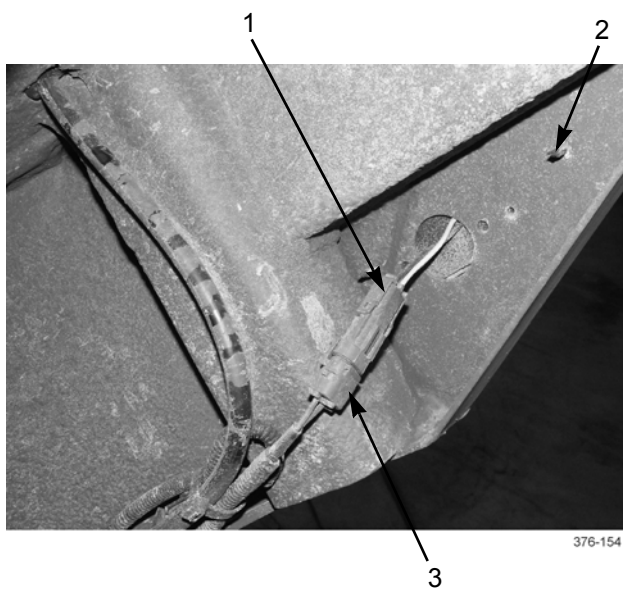
Battery disconnect switch in OFF position

**REMOVAL**

**NOTE**

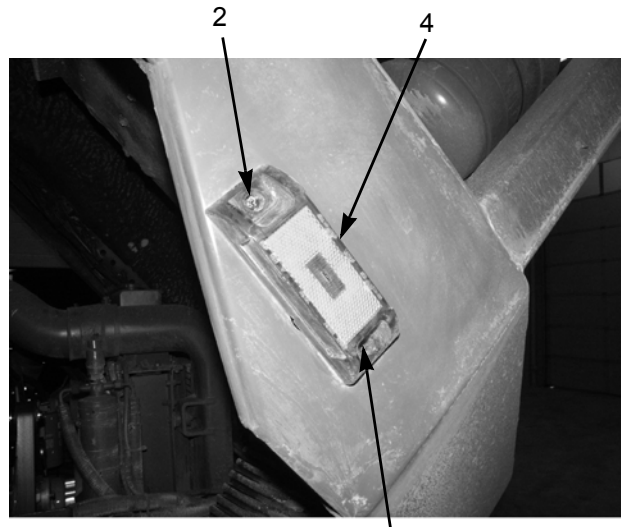
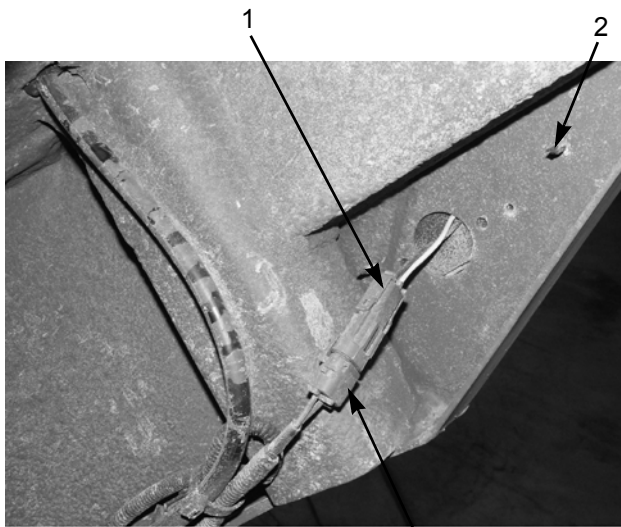
Cab may be tilted (TM 9-2320-312-10) to improve visibility and access to side marker light wiring.

1. Disconnect connector (1) of side marker light (4) from wiring harness connector (3).
2. Remove two drive screws (2) and side marker light (4) from vehicle.



**SIDE MARKER LIGHT REPLACEMENT - CONTINUED****0106 00****INSTALLATION**

1. Position side marker light (4) to vehicle with wires and connector (1) fed through hole in cab decking.
2. Install side marker light (4) to vehicle with two drive screws (2).
3. Connect connector (1) of side marker light to wiring harness connector (3).



4. Place battery disconnect switch in ON position.
5. If tilted, lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

---

**CAB INTERIOR DOMELIGHT MAINTENANCE**

---

0107 00

**THIS WORK PACKAGE COVERS**

Lamp: Removal, Installation

Domelight: Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 15

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

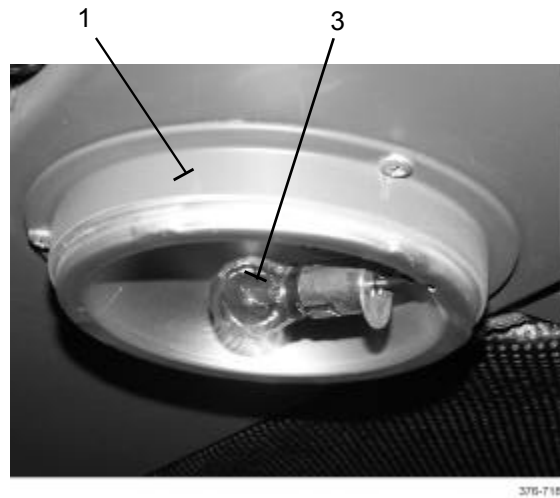
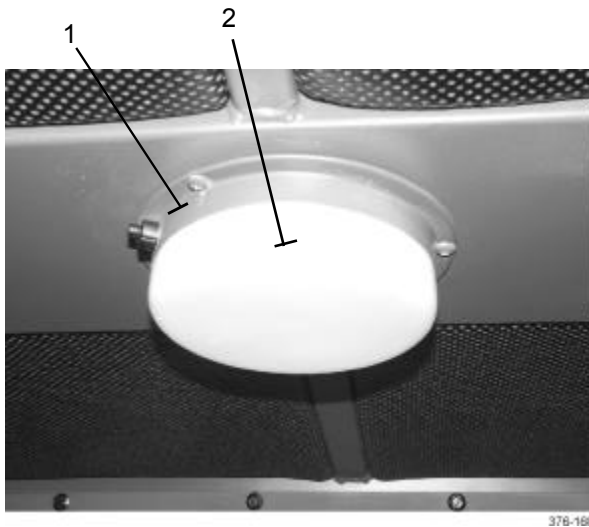
**Equipment Condition**

Battery disconnect switch in OFF position

---

**LAMP REMOVAL**

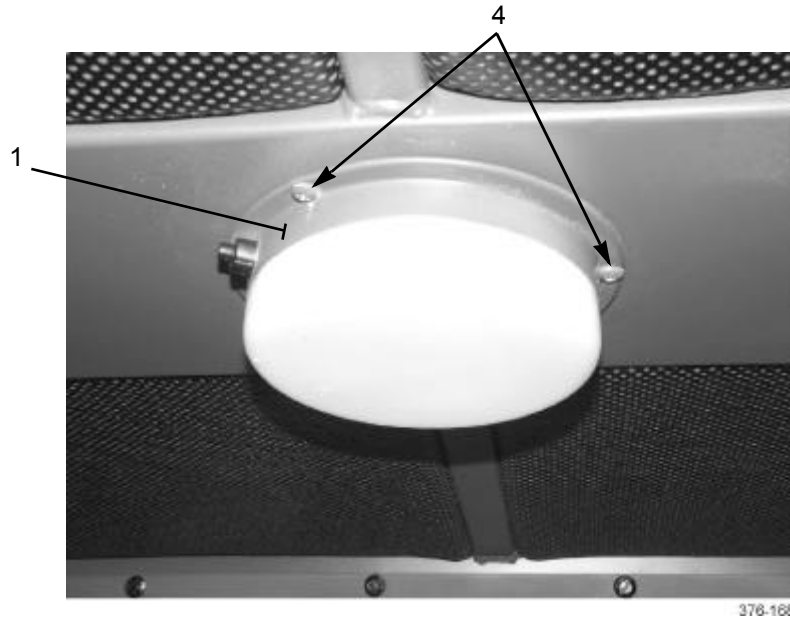
1. Carefully pry lens (2) from domelight (1).
2. Remove lamp (3) from socket of domelight (1).

**LAMP INSTALLATION**

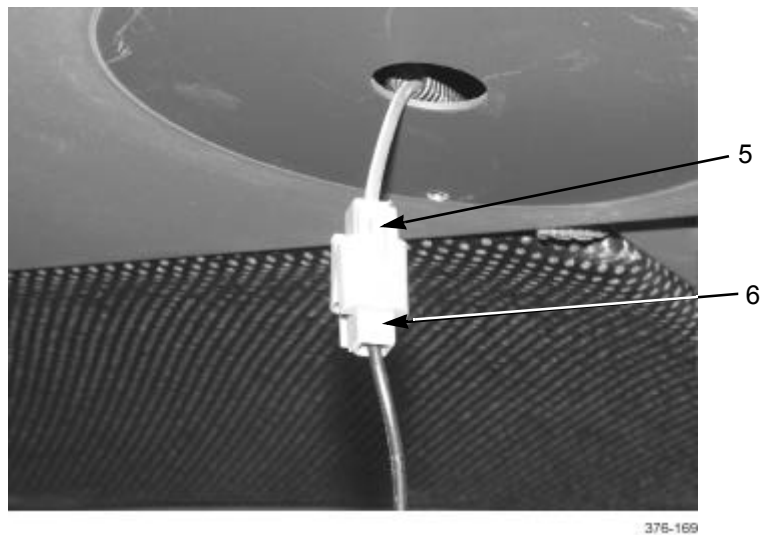
1. Install lamp (3) to socket of domelight (1).
2. Install lens (2) to domelight (1).
3. Place battery disconnect switch in ON position.

**DOMELIGHT REMOVAL**

1. Remove three screws (4) and domelight (1) from ceiling of cab.



2. Pull domelight wiring out from ceiling until wire connectors are exposed. Disconnect domelight connector (6) from cab wiring harness connector (5) and remove domelight (1).

**DOMELIGHT INSTALLATION**

1. Connect domelight connector (6) to cab wiring harness connector (5). Push domelight wiring back into ceiling of cab.
2. Install domelight (1) to ceiling of cab with three screws (4).
3. Place battery disconnect switch in ON position.

**END OF WORK PACKAGE**

**FLOODLIGHT AND CAB BACKUP LIGHT MAINTENANCE**

**0108 00**

**THIS WORK PACKAGE COVERS**

- Lamp Replacement
- Floodlight: Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Strap, tiedown (Item 57, WP 0165 00)

Tape, insulation, electrical (Item 61, WP 0165 00)

**Equipment Condition**

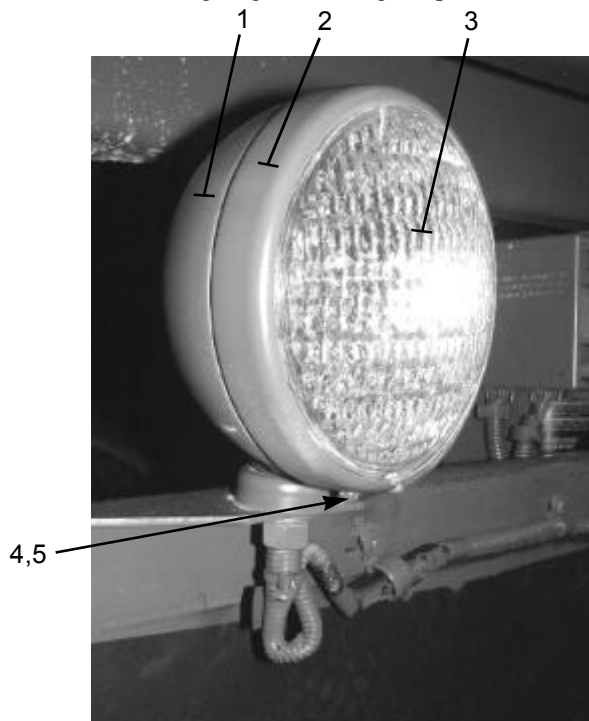
Battery disconnect switch in OFF position

**NOTE**

Each of two floodlights and cab backup light are replaced the same way. Floodlight at left side of vehicle is shown.

**LAMP REPLACEMENT**

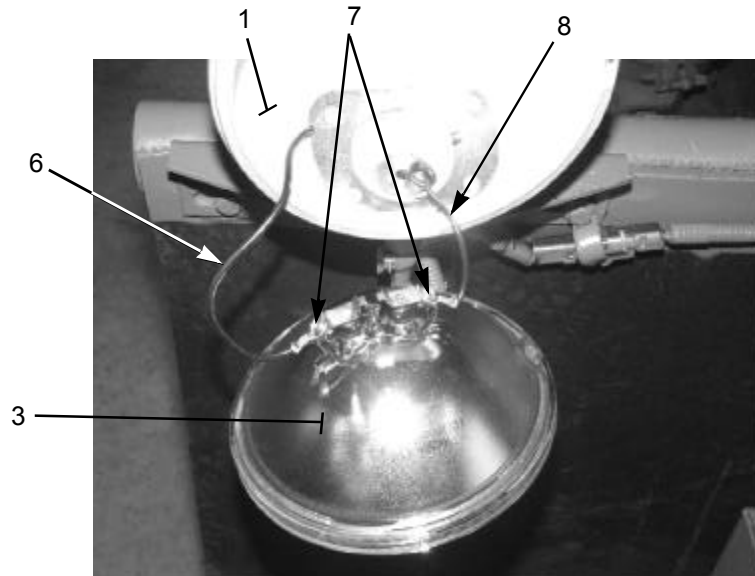
1. Remove screw (4), washer (5), and retaining ring (2) holding lamp (3) to floodlight housing (1).



376-438

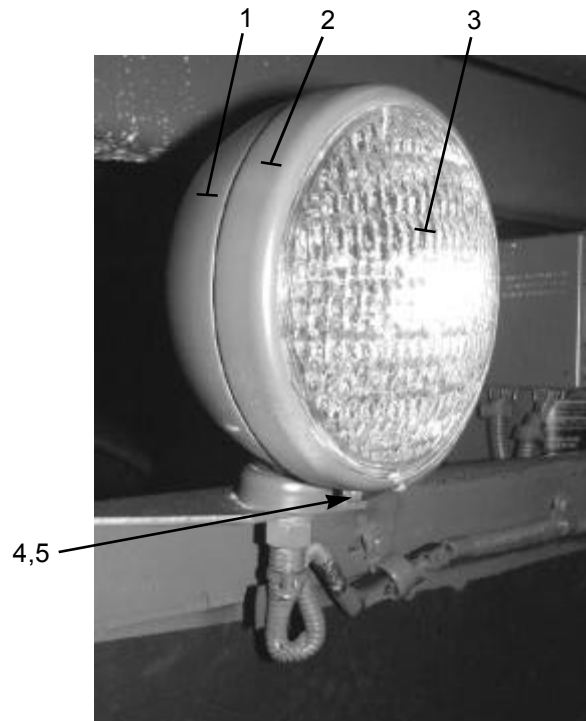
**LAMP REPLACEMENT - CONTINUED**

2. Pull lamp (3) out from floodlight housing (1).
3. Loosen two screws (7) and disconnect two wires (6 and 8) from rear of lamp (3).



376-439

4. Connect two wires (6 and 8) to rear of lamp (3) and tighten two screws (7).
5. Position lamp (3) to floodlight housing (1).
6. Install retaining ring (2) to floodlight housing (1) with washer (5) and screw (4).



376-439

**LAMP REPLACEMENT - CONTINUED**

- Place battery disconnect switch in ON position.

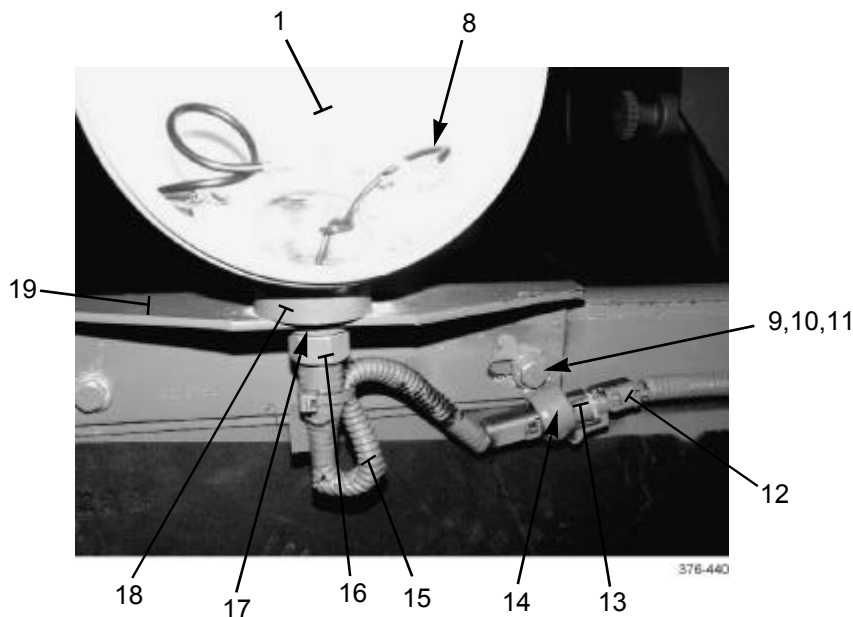
**FLOODLIGHT REMOVAL**

- Remove lamp (Refer to *Lamp Replacement*).

**NOTE**

Remove and discard tiedown strap.

- Remove nut (9), washer (10), and screw (11) to release wire (8) and clamp (14) from bracket (19) and mudflap support bracket.
- Remove tape and loom (15) from wire (8) of floodlight housing (1).
- Disconnect connector (13) of wire (8) from chassis wiring harness (12).
- Untie knot in wire (8) and pull wire out from floodlight housing (1).
- Remove nut (16), washer (17), floodlight housing (1), and support ring (18) from bracket (19).

**FLOODLIGHT INSTALLATION**

- Install support ring (18) and floodlight housing (1) to bracket (19) with washer (17) and nut (16).
- Push wire (8) into floodlight housing (1) and tie knot in wire.
- Connect connector (13) of wire (8) to chassis wiring harness (12).
- Install loom (15) to wire (8) with electrical tape.
- Secure wire (8) with loom (15) to bracket (19) and muffler support bracket with clamp (14), screw (11), washer (10), and nut (9).
- Install lamp (Refer to *Lamp Replacement*).

**END OF WORK PACKAGE**

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**STROBE WARNING LIGHT MAINTENANCE**

---

0109 00

**THIS WORK PACKAGE COVERS**

Lamp: Removal, Installation

Strobe Warning Light: Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

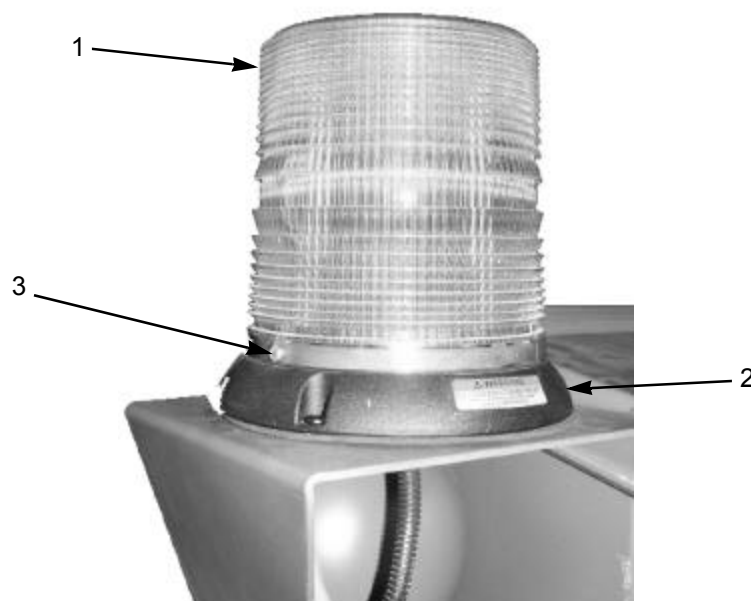
**Equipment Condition**Battery disconnect switch in OFF position

---

**LAMP REMOVAL****NOTE**

- Remove tiedown strap, as necessary, and discard.
- Tag connectors to ensure correct installation.

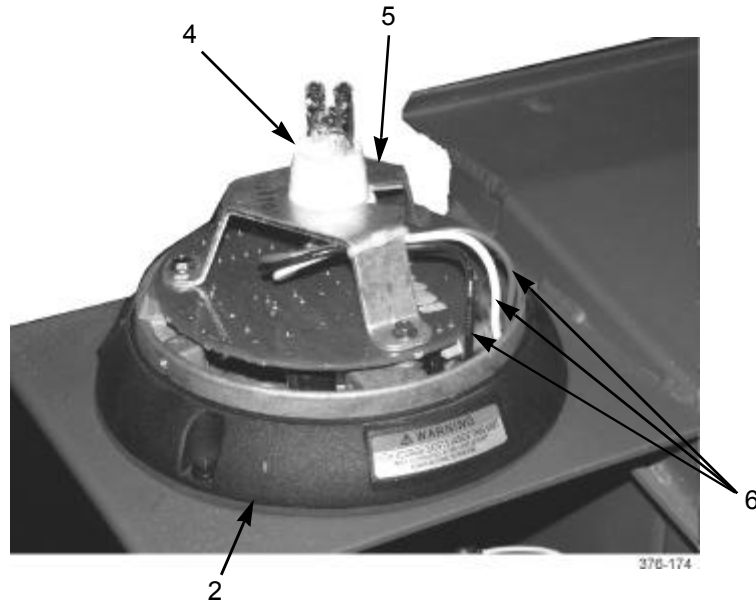
1. Remove two screws (3) and amber lens (1) from base (2) of strobe warning light.



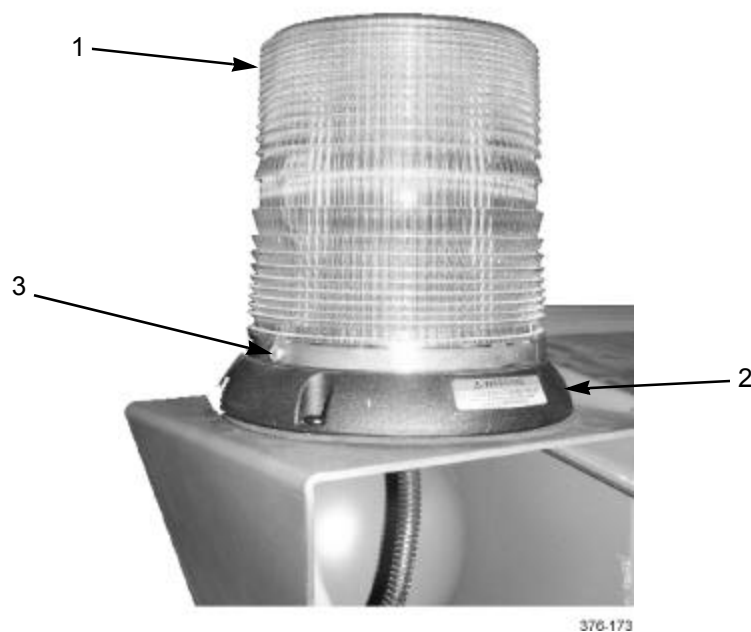
376-173

**LAMP REMOVAL - CONTINUED**

2. Disconnect three wires (6) of lamp (4) from base (2).
3. Slide white rubber base of lamp (4) out from bracket (5).

**LAMP INSTALLATION**

1. Slide white rubber base of lamp (4) into bracket (5).
2. Connect three wires (6) of lamp (4) to base (2).
3. Install new tiedown strap as necessary.
4. Install amber lens (1) to base (2) of strobe warning light with two screws (3).



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**STROBE WARNING LIGHT MAINTENANCE - CONTINUED**

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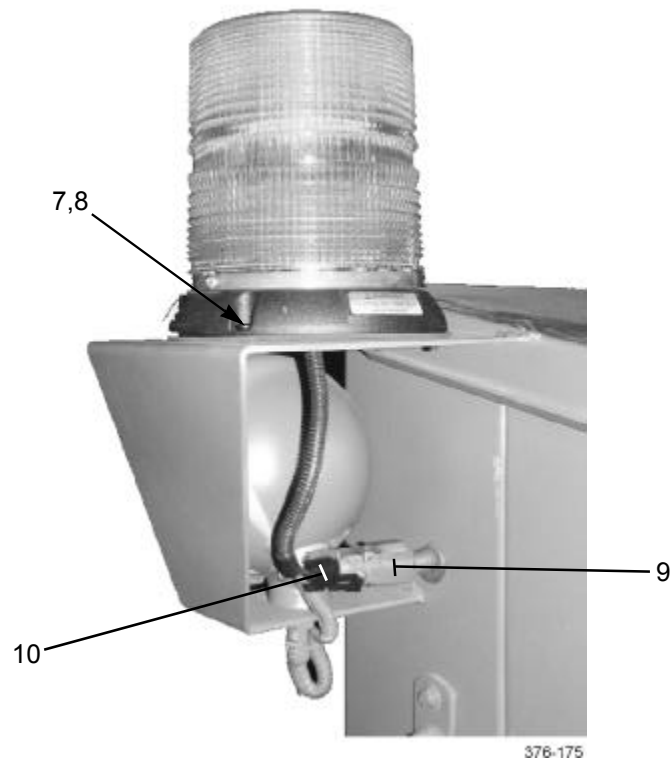
0109 00

**LAMP INSTALLATION - CONTINUED**

5. Place battery disconnect switch in ON position.

**STROBE WARNING LIGHT REMOVAL**

1. Disconnect connector (10) of light cable from cab wiring harness (9).
2. Remove three nuts (7), screws (8), and strobe warning light from cab.

**STROBE WARNING LIGHT INSTALLATION**

1. Install strobe warning light to cab with three screws (8) and nuts (7).
2. Connect connector (10) of light cable to cab wiring harness (9).
3. Place battery disconnect switch in ON position.

**END OF WORK PACKAGE**

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**REAR BACKUP LIGHT REPLACEMENT**

0110 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 14

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Strap, tiedown (Item 57, WP 0165 00)

Nut, assembled washer (P/N 219-411) (3)

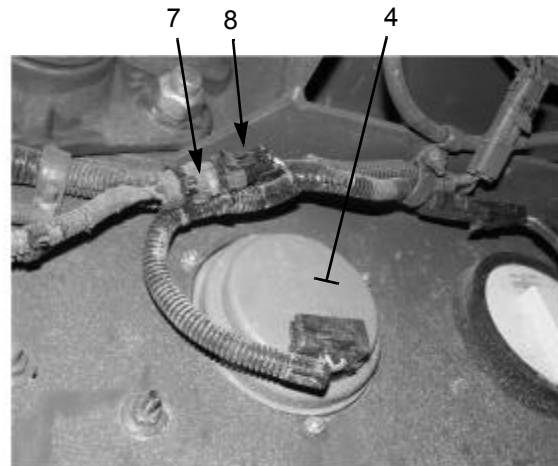
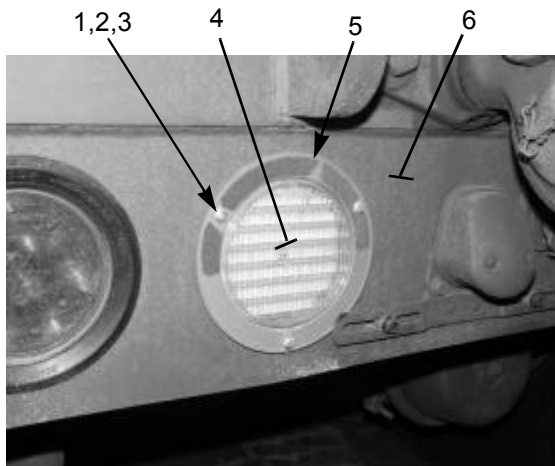
**Equipment Condition**

Battery disconnect switch in OFF position

**REMOVAL****NOTE**

Remove tiedown straps and discard. Use new tiedown straps on installation.

1. Disconnect backup light connector (8) from chassis wiring harness connector (7).
2. Remove three nuts (1), starwashers (2), screws (3), backup light (4), and flange (5) from tailboard (6). Discard nuts and starwashers.



376-563

**INSTALLATION**

1. Position backup light (4) with flange (5) at tailboard (6) and install three screws (3), new starwashers (2), and new nuts (1).
2. Connect backup light connector (8) to chassis wiring harness connector (7).
3. Place battery disconnect switch in ON position.

**END OF WORK PACKAGE**

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**TAILLIGHT REPLACEMENT**

0111 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 14

**Tools and Special Tools**

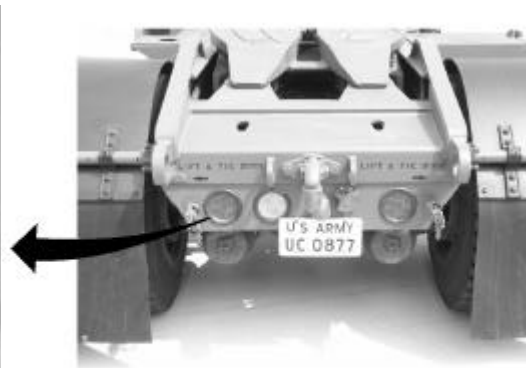
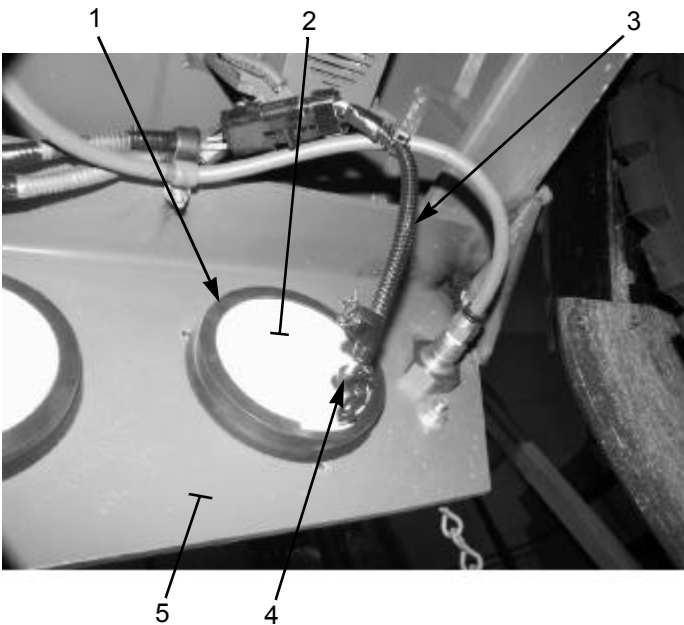
Tool kit, general mechanic's (Item 35, WP 0166 00)

**Equipment Condition**

Battery disconnect switch in OFF position

**REMOVAL**

1. While constricting edges of rubber ring (1), push inward on taillight (2) to free taillight from tailboard (5).
2. Disconnect connector (4) of taillight cable (3) from rear of taillight (2).
3. Remove rubber ring (1) from taillight (2).



376-177

**INSTALLATION**

1. Install rubber ring (1) to taillight (2).
2. Connect connector (4) of taillight cable (3) to taillight (2).
3. While constricting edges of rubber ring (1), push outward on taillight (2) until taillight is secured to tailboard (5).
4. Place battery disconnect switch in ON position.

**END OF WORK PACKAGE**

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**DIAGNOSTIC CONNECTOR REPLACEMENT**

---

0112 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**RPSTL Reference**

Group 170, Figure 7

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Strap, tiedown (Item 57, WP 0165 00)

**Materials/Parts-Continued**

Tag, marker (Item 58, WP 0165 00)

Washer, lock (P/N 361-88) (4)

**References**

Electrical Schematics—Foldouts

WP 0100 00

WP 0120 00

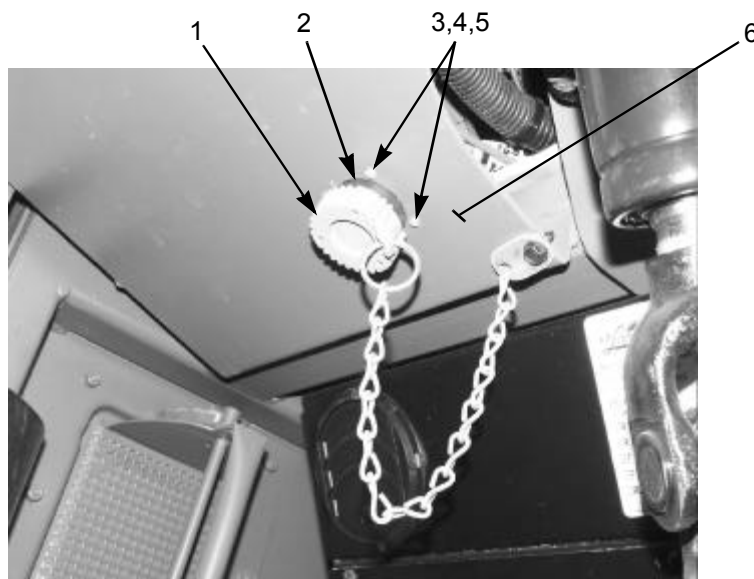
**Equipment Condition**

Battery disconnect switch in OFF position

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**REMOVAL**

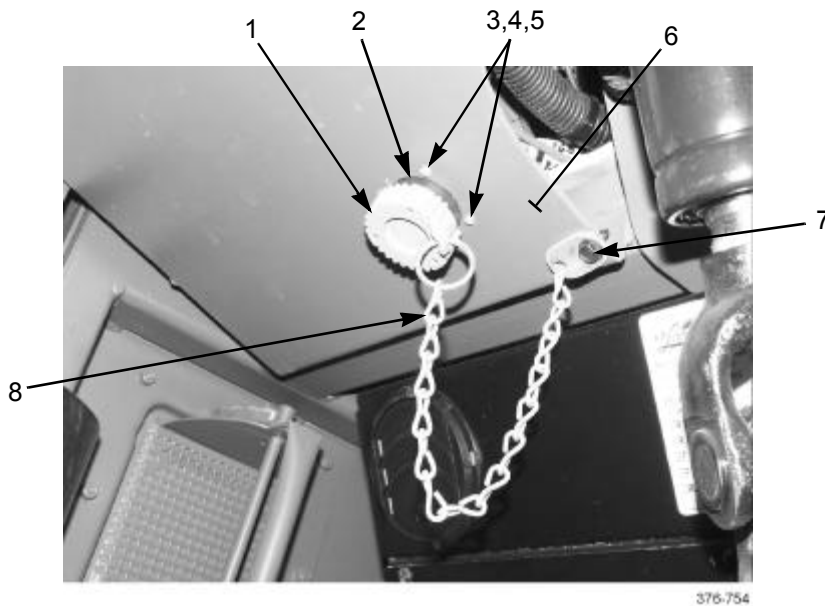
1. Remove cap (1) from diagnostic connector (2).
2. Remove upper-front and lower-left instrument panel plates, to gain access to diagnostic connector wiring (WP 0100 00).
3. Remove four nuts (3), lockwashers (4), and screws (5) and pull diagnostic connector (2) free from panel (6). Discard lockwashers.



376-754

**REMOVAL - CONTINUED****NOTE**

- Refer to vehicle wiring schematics at back of manual for assistance in identifying wires.
  - Remove tiedown straps as required and discard. Use new tiedown straps on installation.
4. Tag and disconnect wires from diagnostic connector (2), in accordance with WP 0120 00, and remove connector.
  5. As required, remove cap (1) from retaining chain (8). Remove screw (7) and retaining chain from panel (6).

**INSTALLATION**

1. If removed, install retaining chain (8) to panel (6) with screw (7). Install cap (1) to retaining chain.
2. Connect wires to diagnostic connector (2), in accordance with WP 0120 00, and remove tags.
3. Install diagnostic connector (2) to panel (6) with four screws (5), new lockwashers (4), and nuts (3).
4. Install cap (1) on diagnostic connector (2).
5. Install upper-front and lower-left instrument panel plates (WP 0100 00).
6. Place battery disconnect switch in ON position.

**END OF WORK PACKAGE**

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**TRAILER ELECTRICAL CONNECTORS REPLACEMENT**

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**0113 00**

**THIS WORK PACKAGE COVERS**

- 24V Electrical Connector Replacement
- 12V Electrical Connector Replacement

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**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 12

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**References**

WP 0120 00

**Equipment Condition**

Cab tilted (TM 9-2320-312-10), only for access to two connectors at rear of cab

Battery disconnect switch in OFF position

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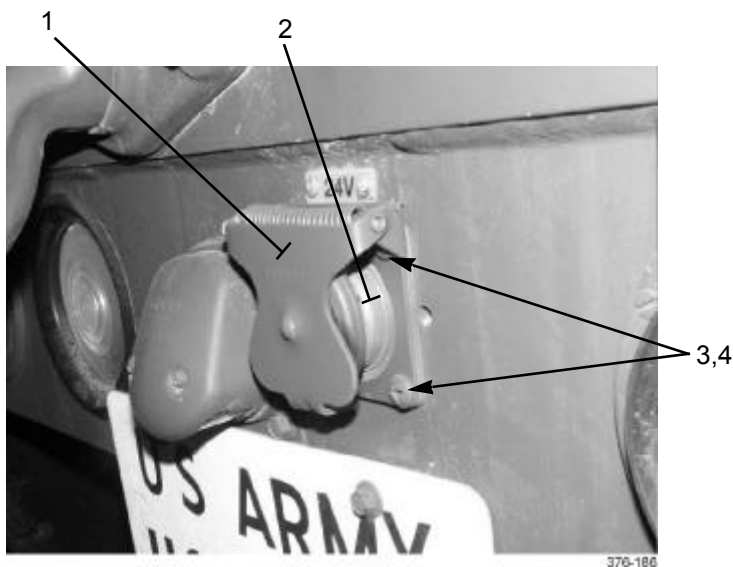
**NOTE**

- This work package covers replacement of 24V electrical connector at rear of vehicle and 12V and 24V electrical connectors at rear of cab.
- Remove and discard tiedown straps as necessary. Use new tiedown straps on installation.

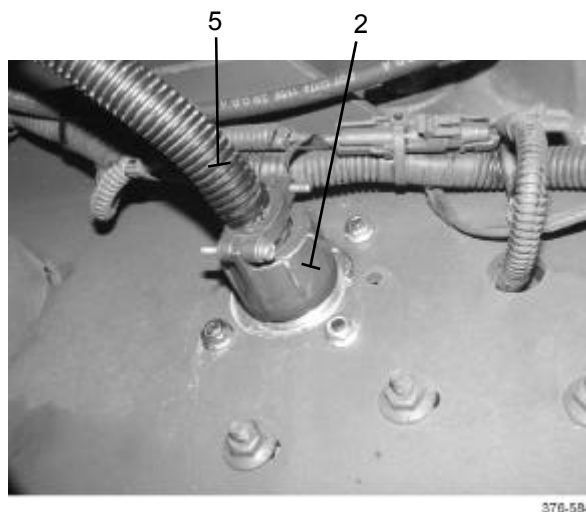
**24V ELECTRICAL CONNECTOR REPLACEMENT****NOTE**

Perform following steps to replace 24V connector at rear of vehicle or at rear of cab. Connector at rear of vehicle is shown.

1. Remove four nuts (3), screws (4), and cover (1) from trailer electrical connector (2).
2. Pull trailer electrical connector (2) outward from rear of vehicle for access to rear of connector.



3. Disconnect wires of wiring harness (5) from rear of trailer electrical connector (2) in accordance with instructions in WP 0120 00.

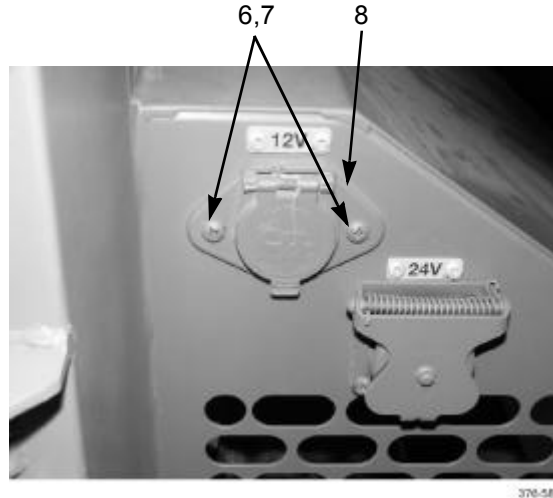


4. Connect wires of wiring harness (5) to rear of trailer electrical connector (2) (WP 0120 00).
5. Position trailer electrical connector (2) to rear of vehicle.
6. Install trailer electrical connector (2) and cover (1) to vehicle with four screws (4) and nuts (3).
7. Place battery disconnect switch in ON position.

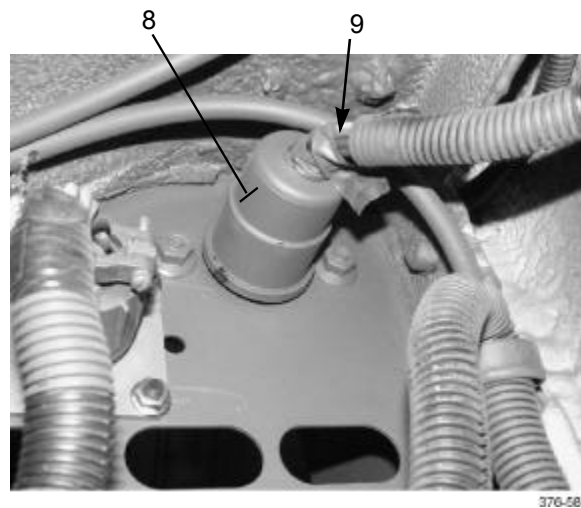
**12V ELECTRICAL CONNECTOR REPLACEMENT****NOTE**

Perform following steps to replace 12V trailer electrical connector at rear of cab.

1. Remove two nuts (6) and screws (7) from trailer electrical connector (8).
2. Pull trailer electrical connector (8) outward from rear of cab for access to rear of connector.



3. Disconnect wires of wiring harness (9) from rear of trailer electrical connector (8) in accordance with instructions in WP 0120 00.



4. Connect wires of wiring harness (9) to rear of trailer electrical connector (8) (WP 0120 00).
5. Position trailer electrical connector (8) to rear of cab.
6. Install trailer electrical connector (8) to cab with two screws (7) and nuts (6).
7. Place battery disconnect switch in ON position.
8. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**BATTERY MAINTENANCE**

0114 00

**THIS WORK PACKAGE COVERS**

Removal, Service, Installation

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 4

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**References**

TM 9-6140-200-14

**Equipment Condition**

Battery cables removed (WP 0115 00)

**WARNING**

- To avoid eye injury, eye protection and acid-resistant gloves are required when working around batteries. Do not smoke, use open flame, make sparks or create other ignition sources around batteries. If a battery is giving off gases, it can explode and cause injury to personnel. Remove all jewelry such as rings, ID tags, watches, and bracelets. If jewelry or a tool contacts a battery terminal, a direct short will result in instant heating, damage to equipment, and injury to personnel.
- Sulfuric acid contained in batteries can cause serious burns. If battery corrosion or electrolyte makes contact with skin, eyes or clothing, take immediate action to stop the corrosive burning effects. Failure to follow these procedures may result in death or serious injury to personnel.
- When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**REMOVAL****NOTE**

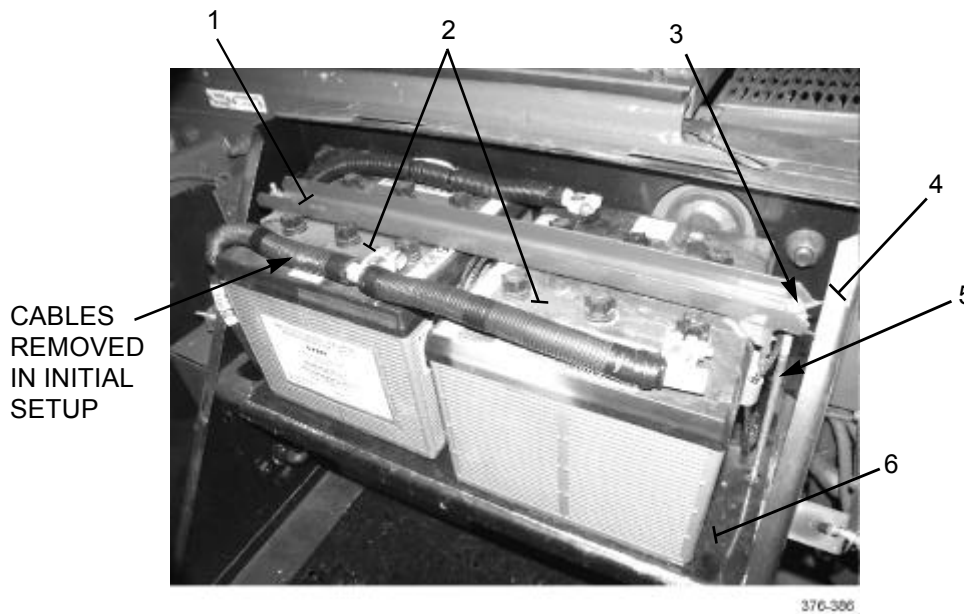
- Perform following steps to remove two batteries from top shelf of battery box.
- Vehicle equipped with auxiliary arctic heater has two additional batteries on bottom shelf of battery box. These two batteries are removed the same way.

1. Remove two nuts (3) and battery hold-down bar (1) from across two batteries (2).

**WARNING**

Note position of batteries in battery box. Each battery terminal is marked with a (+) or a (-) to designate POSITIVE or NEGATIVE polarity. When replacing batteries, ensure that batteries are installed into battery box in the SAME position as removed. Failure to follow this warning may result in damage to equipment and injury to personnel.

2. Remove two batteries (2) from battery box (4).
3. Remove two hold-down rods (5) and pad (6) from battery box (4).

**SERVICE**

Service batteries in accordance with TM 9-6140-200-14.



***INSTALLATION***

**NOTE**

- Perform following steps to install two batteries to top shelf of battery box.
  - Vehicle equipped with auxiliary arctic heater has two additional batteries on bottom shelf of battery box. These two batteries are installed the same way.
1. Position pad (6) and two hold-down rods (5) to battery box (4).
  2. Position two batteries (2) to battery box (4).
  3. Install battery hold-down bar (1) across batteries (2) with two nuts (3).
  4. Install battery cables (WP 0115 00).

**END OF WORK PACKAGE**

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**BATTERY CABLES REPLACEMENT**

**0115 00**

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**THIS WORK PACKAGE COVERS**

Removal, Installation

---

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figures 12 and 13

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**Materials/Parts - Continued**

Tape, insulation, electrical (Item 61, WP 0165 00)

Conduit, loom, black (P/N 48-02217-075)

**References**

WP 0092 00

WP 0117 00

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

Battery disconnect switch in OFF position.

Battery box open and top cover removed (TM 9-2320-312-10)

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**WARNING**

- To avoid eye injury, eye protection and acid-resistant gloves are required when working around batteries. Do not smoke, use open flame, make sparks or create other ignition sources around batteries. If a battery is giving off gases, it can explode and cause injury to personnel. Remove all jewelry such as rings, ID tags, watches, and bracelets. If jewelry or a tool contacts a battery terminal, a direct short will result in instant heating, damage to equipment, and injury to personnel.
- Sulfuric acid contained in batteries can cause serious burns. If battery corrosion or electrolyte makes contact with skin, eyes or clothing, take immediate action to stop the corrosive burning effects. Failure to follow these procedures may result in death or serious injury to personnel.
- To avoid injury, eye protection, protective clothing, and gloves must be worn when working around capacitors. Capacitors contain an electrolyte that is a potassium hydroxide solution. Potassium hydroxide is highly corrosive and can cause serious burns. If capacitor case becomes cracked, leaking electrolyte can result in fumes that are hazardous to inhale. If electrolyte makes contact with skin, eyes or clothing, take immediate action to stop the corrosive burning effects. Failure to follow these procedures may result in death or serious injury to personnel.
- Remove all jewelry such as rings, ID tags, watches, and bracelets, when working around capacitors. If jewelry or a tool contacts a capacitor terminal, a direct short may result, causing instant heating and electric shock at the point of short circuit. Damage to equipment and injury to personnel could result.

**NOTE**

- Tag cables to ensure correct installation.
- Remove and discard tiedown straps. Use new tiedown straps on installation.

**REMOVAL****NOTE**

- Perform steps 1 and 13 to safely disconnect battery and capacitor cables in order to perform vehicle electrical maintenance.

1. Loosen two nuts (4) and disconnect battery cable (6) from two batteries (5).

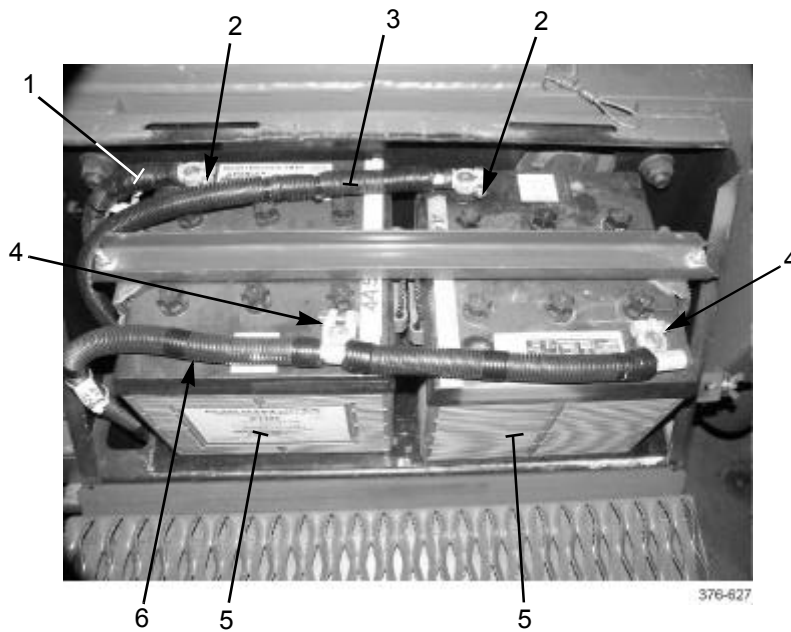
**NOTE**

Battery cable (6) is routed through side of battery box.

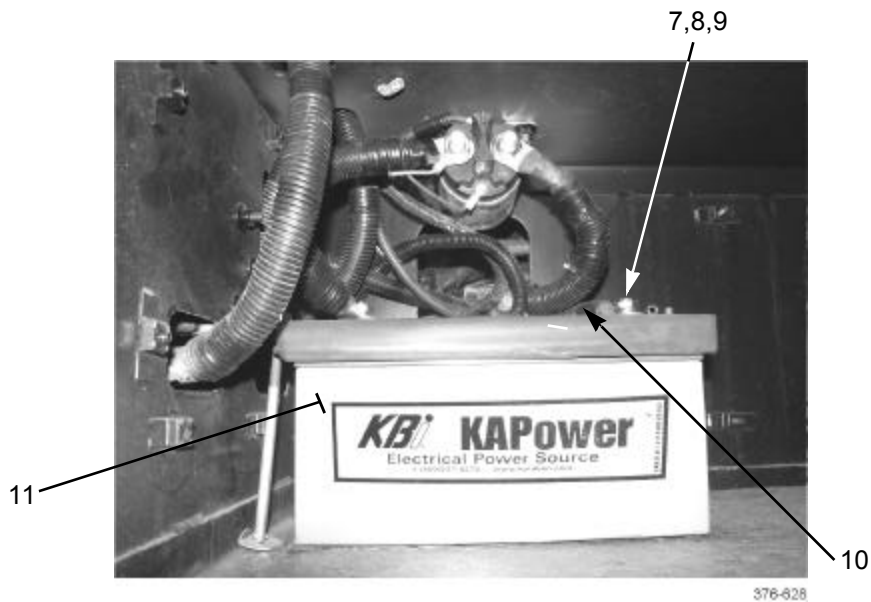
2. Disconnect battery cable (6) from battery disconnect switch (WP 0117 00).
3. Remove battery cable (6) from vehicle.

**REMOVAL - CONTINUED**

- Loosen two nuts (2) and disconnect two battery cables (1 and 3) from two batteries (5).



- Using a 17 mm wrench, remove nut (7), lockwasher (8), washer (9), and disconnect battery cable (10) from capacitor (11).



**REMOVAL - CONTINUED****NOTE**

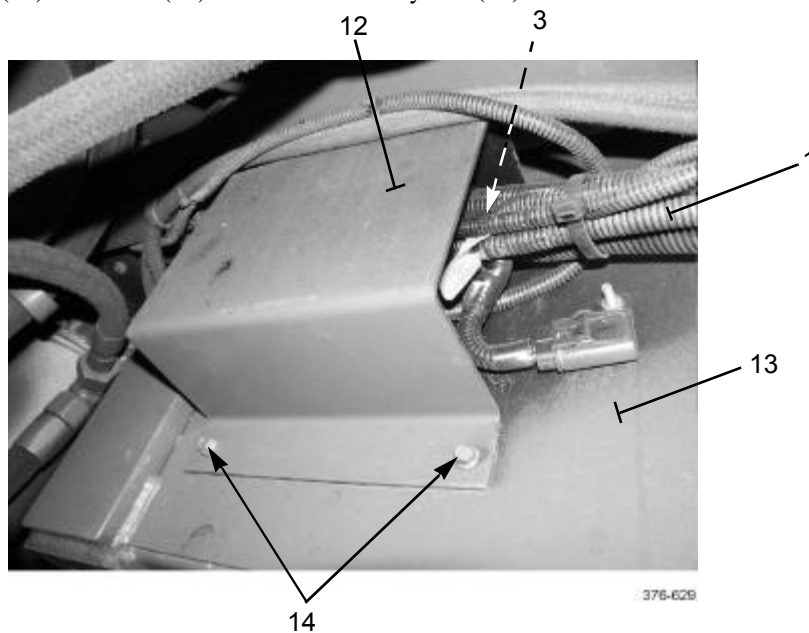
Battery cable (1) is routed through rear of battery box, along left side of engine, to rear of starter.

6. Disconnect battery cable (1) from starter (WP 0092 00).
7. Remove battery cable (1) from vehicle.

**NOTE**

Battery cable (3) is routed through rear of battery box, to upper terminal stud at rear of battery box.

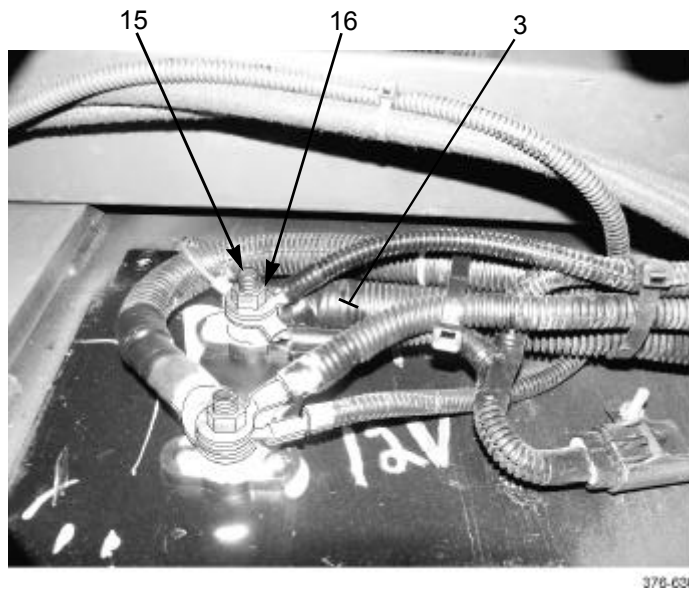
8. Remove four screws (14) and cover (12) from rear of battery box (13).



**REMOVAL - CONTINUED****NOTE**

- Three wires are also removed as battery cable (3) is removed.
- Note condition of upper and lower terminal studs. Replace if damaged.

9. Remove nut (16) and battery cable (3) from upper terminal stud (15).
10. Remove battery cable (3) from vehicle.



**REMOVAL - CONTINUED****NOTE**

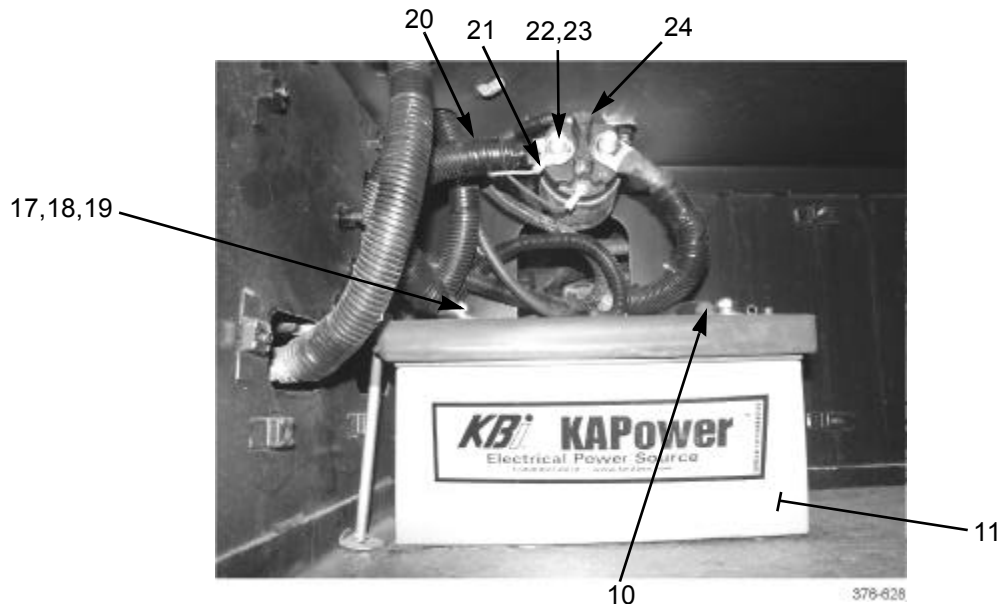
Battery cable (10) is routed through rear of battery box, along left side of engine, to starter solenoid.

11. Disconnect battery cable (10) from starter solenoid (WP 0092 00).
12. Remove battery cable (10) from vehicle.

**NOTE**

Battery cable (20) is routed to capacitor start relay within battery box.

13. Using a 17 mm wrench, remove nut (17), lockwasher (18), washer (19), and disconnect battery cable (20) from capacitor (11).
14. At capacitor start relay (24), remove nut (22), washer (23), and remove battery cable (20) and electrical lead (21) from capacitor start relay.
15. Remove battery cable (20) from vehicle.
16. Remove tape and conduit from all battery cables.

**INSTALLATION****NOTE**

Perform steps 4 and 16 to safely connect battery and capacitor cables after performing vehicle electrical maintenance.

1. Install conduit and tape to all battery cables.

**NOTE**

Battery cable (20) is routed to capacitor start relay within battery box.

2. Position battery cable (20) to vehicle.



**INSTALLATION - CONTINUED****CAUTION**

The KAPower module (capacitor) is polarity sensitive. Polarity must be strictly observed or damage to capacitor will result.

3. Install battery cable (20) and electrical lead (21) to capacitor start relay (24) with washer (23) and nut (22).
4. Connect battery cable (20) to capacitor (11) with washer (19), lockwasher (18), and nut (17).

**NOTE**

Battery cable (10) is routed through rear of battery box, along left side of engine, to starter solenoid.

5. Position battery cable (10) to vehicle.
6. Install battery cable (10) to starter solenoid (WP 0092 00).

**NOTE**

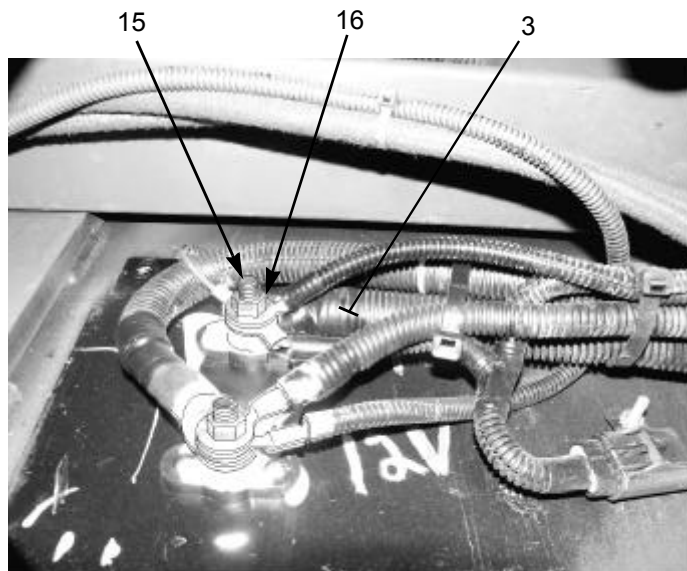
Battery cable (3) is routed through rear of battery box, to upper terminal stud at rear of battery box.

7. Position battery cable (3) to vehicle.

**NOTE**

Three wires are also installed as battery cable (3) is installed.

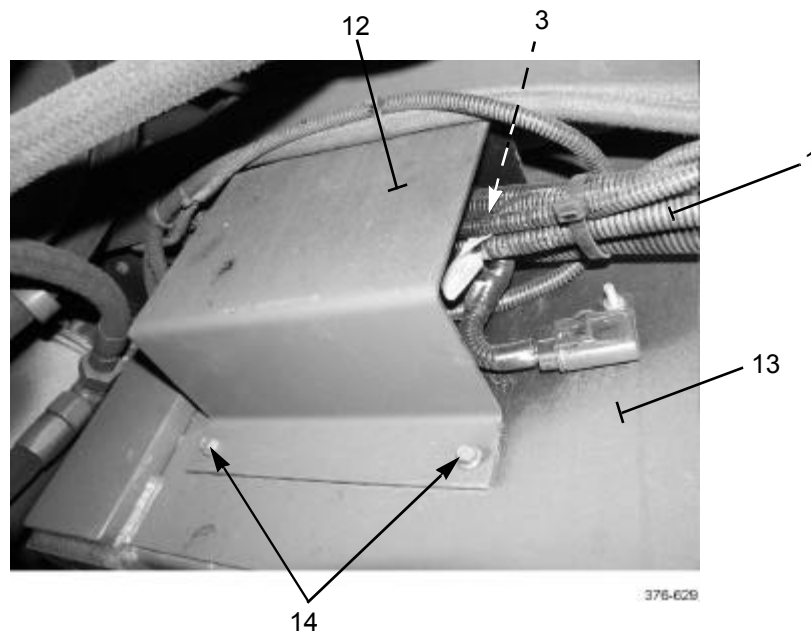
8. Install battery cable (3) to upper terminal stud (15) with nut (16).



376-630

**INSTALLATION - CONTINUED**

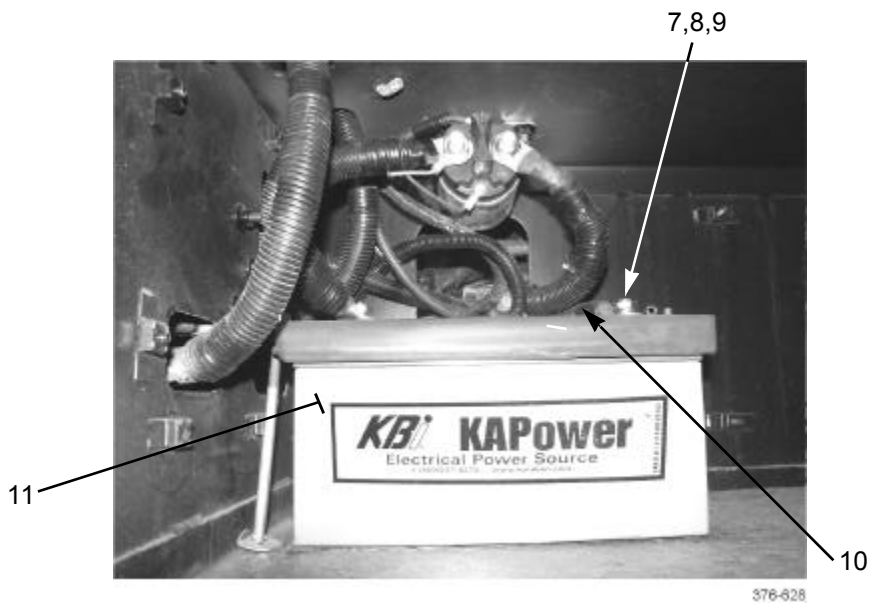
9. Install cover (12) to rear of battery box (13) with four screws (14).

**NOTE**

Battery cable (1) is routed through rear of battery box, along left side of engine, to rear of starter.

10. Position battery cable (1) to vehicle.  
11. Connect battery cable (1) to starter (WP 0092 00).  
12. Connect battery cable (10) to capacitor (11) with washer (9), lockwasher (8), and nut (7).

**INSTALLATION - CONTINUED**

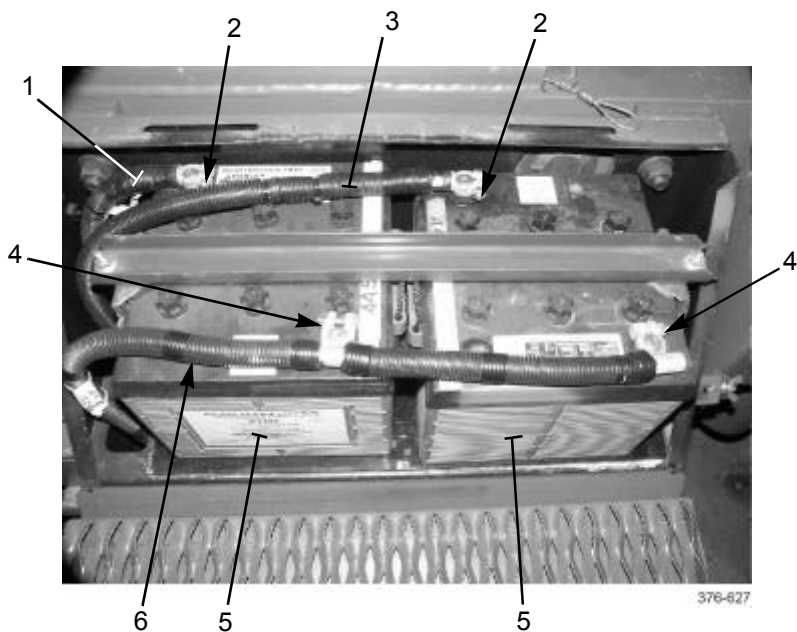


13. Connect two battery cables (1 and 3) to two batteries (5) and tighten two nuts (2).

**NOTE**

Battery cable (6) is routed through side of battery box to battery disconnect switch.

14. Position battery cable (6) to vehicle.
15. Connect battery cable (6) to battery disconnect switch (WP 0117 00).
16. Connect battery cable (6) to two batteries (5) and tighten two nuts (4).



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**BATTERY CABLES REPLACEMENT - CONTINUED**

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**0115 00**

***INSTALLATION - CONTINUED***

17. Install battery box top cover and close battery box (TM 9-2320-312-10).
18. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

**BATTERY BOX MAINTENANCE**

**0116 00**

**THIS WORK PACKAGE COVERS**

Removal, Cleaning, Painting, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 4

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Detergent (Item 23, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

**References**

TM 43-0139

**Equipment Condition**

Batteries removed (WP 0114 00)

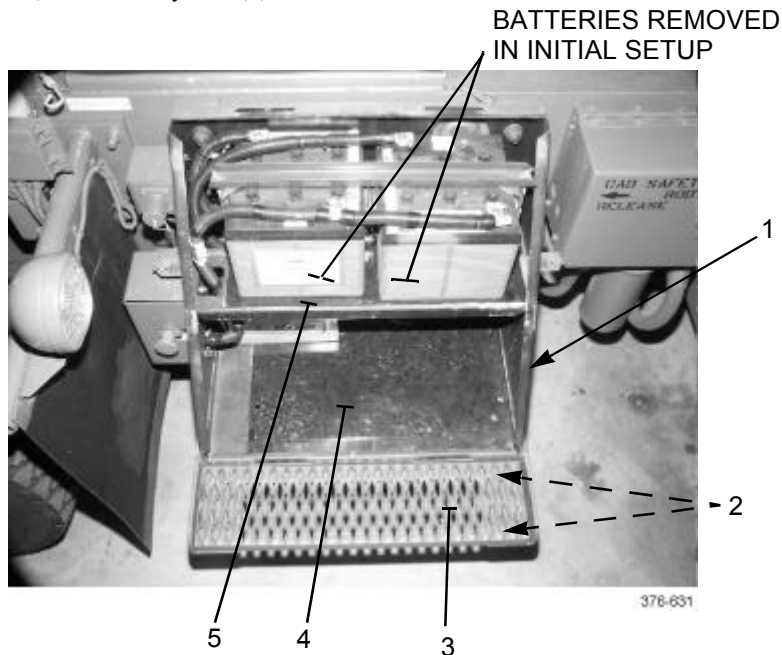
Capacitor and capacitor start relay removed (WP 0119 00)

**REMOVAL**

**NOTE**

Perform step 1 to remove each of three grip steps from battery box and battery box covers.

1. Remove four screws (2) and grip step (3) from battery box (1) and battery box covers.
2. Remove two pads (4 and 5) from battery box (1).



**BATTERY BOX MAINTENANCE - CONTINUED****0116 00****CLEANING**

1. Using detergent and water, clean accumulated dirt, rust, and corrosion from inside battery box.
2. Remove any corrosion with a wire brush, as required.
3. Allow battery box to dry.

**PAINTING**

Prime and paint bare metal surfaces of inside of battery box (TM 43-0139).

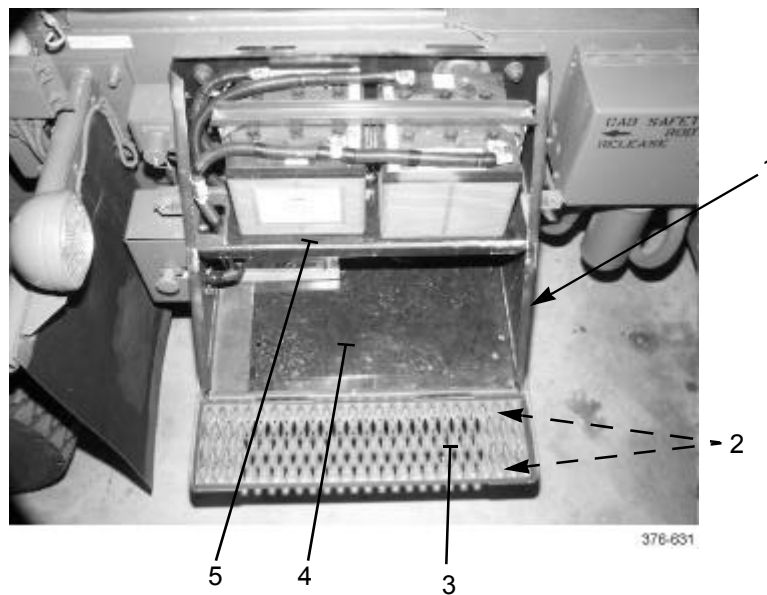
**INSTALLATION**

1. Place two pads (4 and 5) inside battery box (1).

**NOTE**

Perform step 2 to install each of three grip steps to battery box and battery box covers.

2. Install grip step (3) to battery box covers and battery box (1) with four screws (2).



3. Install capacitor and capacitor start relay (WP 0119 00).
4. Install batteries (WP 0114 00).

**END OF WORK PACKAGE**

---

**BATTERY DISCONNECT SWITCH REPLACEMENT**

---

0117 00

**THIS WORK PACKAGE COVERS**Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 4

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Insulating varnish, electrical, dielectric (Item 34, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N 21NE048) (7)

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

Battery cables disconnected (WP 0115 00)

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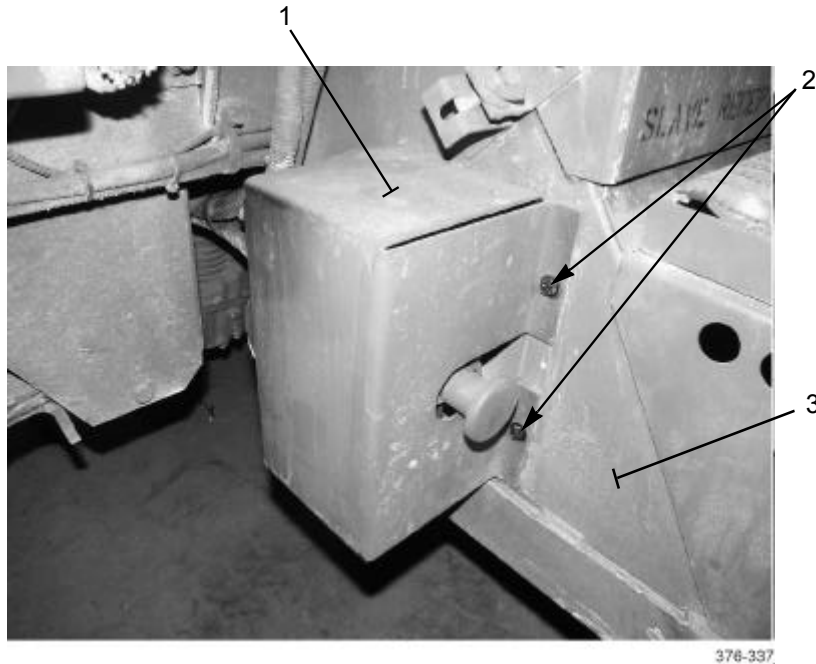
**WARNING**

Remove all jewelry, watches, rings, etc. prior to disconnecting cables from batteries or other electrical source. Items can come in contact with battery or electrical source and cause electrical shock. Failure to follow this warning may result in personnel injury or death.

**REMOVAL****NOTE**

Left-front mudflap may be lifted upward and over left-front tire for easier access to battery disconnect switch.

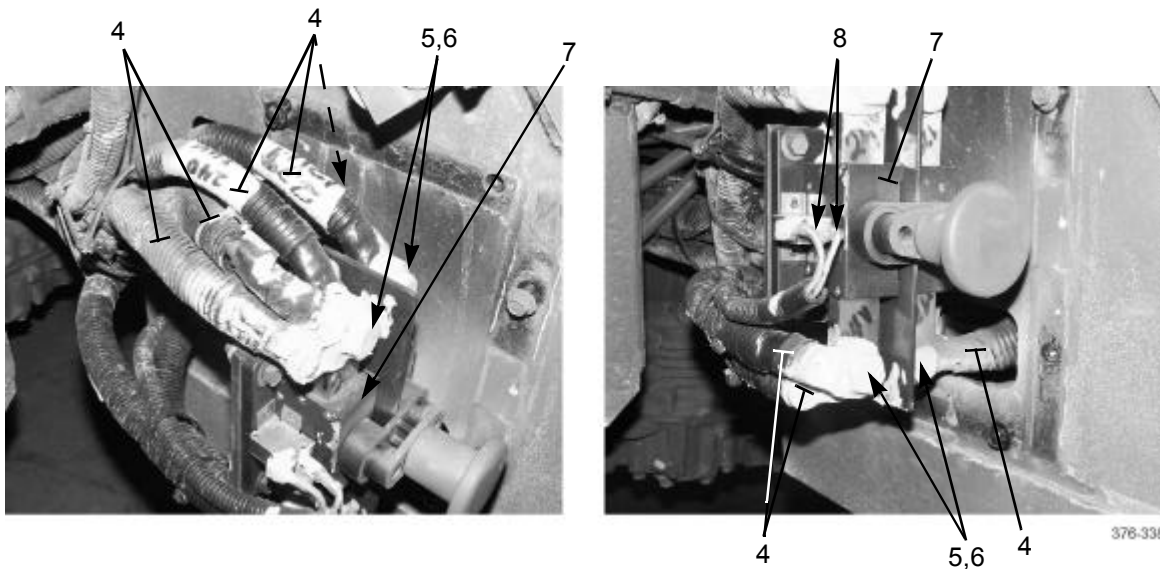
1. Remove four screws (2) and cover (1) from side of battery box (3).

**NOTE**

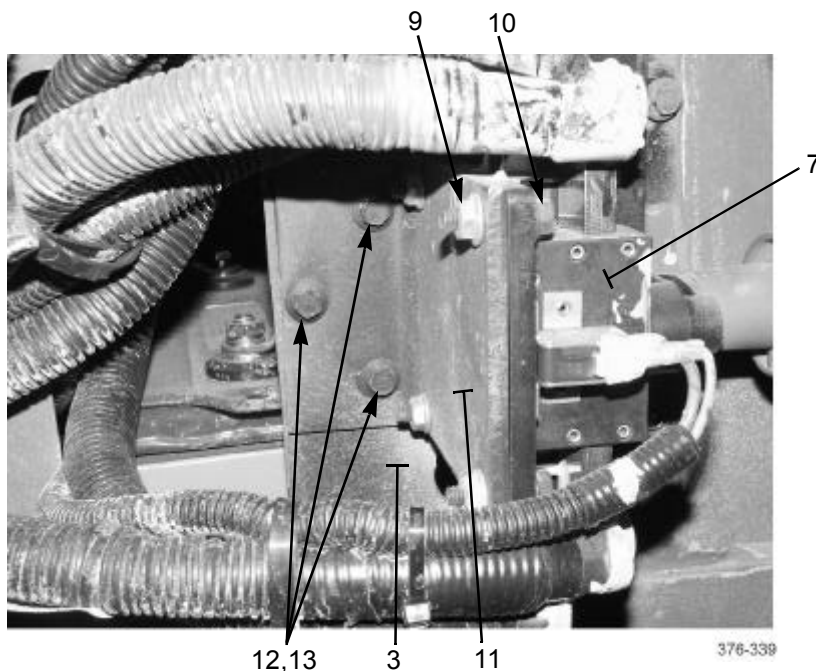
- Tag wires and cables to ensure correct installation.
  - Remove and discard tiedown straps as necessary. Use new tiedown straps on installation.
  - Terminals are coated with insulating varnish and paint. Remove insulating varnish and paint for access to terminals.
2. Remove four locknuts (5) and eight cables (4) from four screws (6) at terminals of switch (7).
  3. Disconnect two wires (8) from blade terminals on side of switch (7).



**REMOVAL - CONTINUED**



4. Remove four locknuts (9), screws (10), and switch (7) from L-bracket (11). Discard locknuts.
5. If damaged, remove three locknuts (12), screws (13), and L-bracket (11) from side of battery box (3). Discard locknuts.



**INSTALLATION**

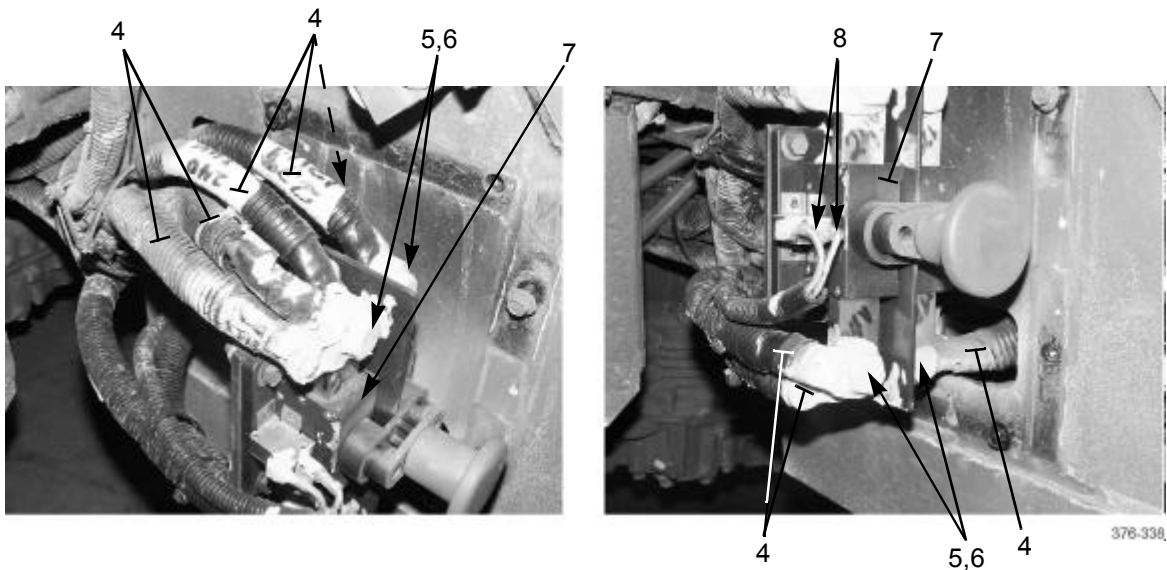
1. If removed, install L-bracket (11) to side of battery box (3) with three screws (13) and new locknuts (12).
2. Install switch (7) to L-bracket (11) with four screws (10) and new locknuts (9).
3. Connect two wires (8) to blade terminals on side of switch (7).

**INSTALLATION - CONTINUED**

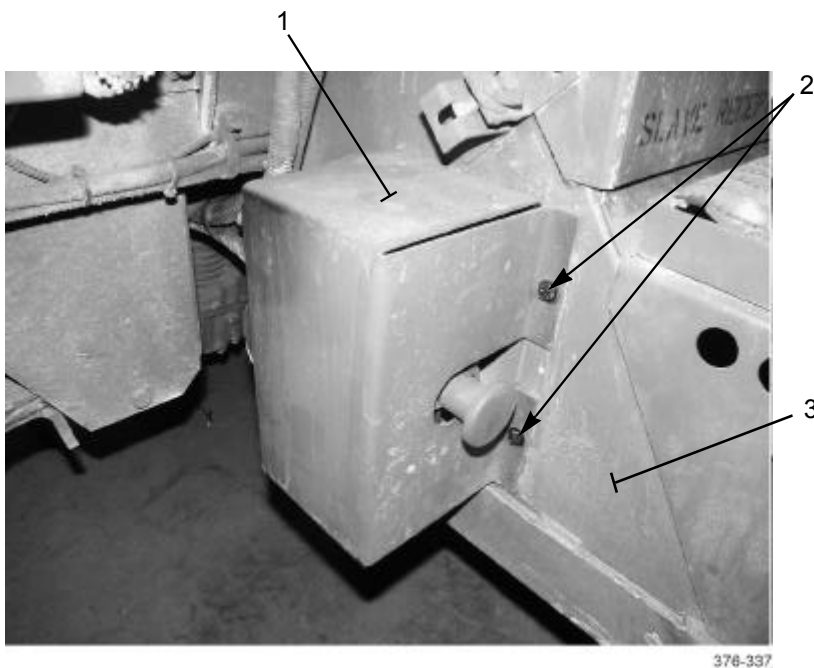
**NOTE**

Replacement switch comes with new terminal screws and locknuts.

4. Install eight cables (4) to four screws (6) at terminals of switch (7) with four locknuts (5).
5. Apply one or more coats of insulating varnish to switch electrical connections.



6. Install cover (1) to side of battery box (3) with four screws (2).



7. Connect battery cables (WP 0115 00).

**END OF WORK PACKAGE**

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**NATO SLAVE RECEPTACLE REPLACEMENT**

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**0118 00****THIS WORK PACKAGE COVERS**Removal, Installation

---

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 4

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Tag, marker (Item 58, WP 0165 00)

Gasket (P/N 11674729)

Washer, lock (P/N H2525M) (2)

Washer, lock (P/N 361-7) (4)

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

Battery cables disconnected (WP 0115 00)

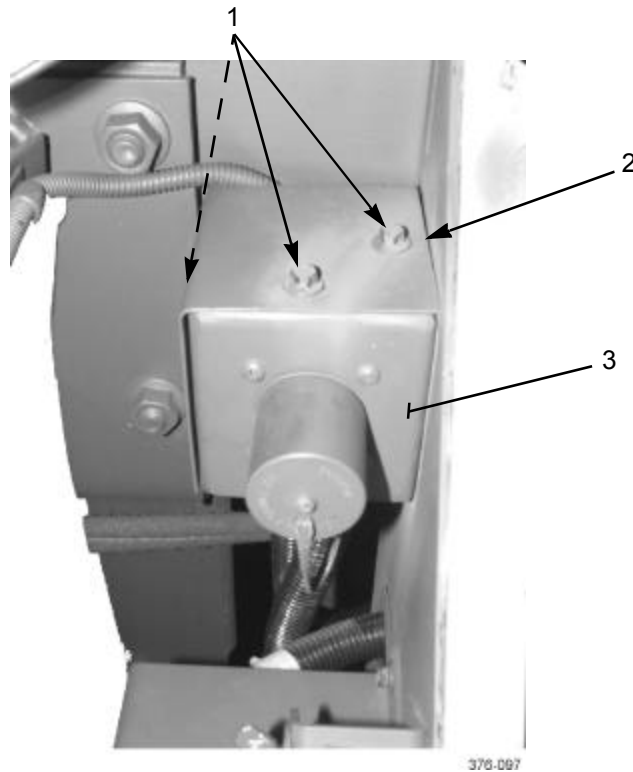
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**WARNING**

Remove all jewelry, watches, rings, etc. prior to disconnecting cables from batteries or other electrical source. Items can come in contact with battery or electrical source and cause electrical shock. Failure to follow this warning may result in personnel injury or death.

**REMOVAL**

1. Remove four bolts (1) and cover (2) from slave receptacle mounting box (3).



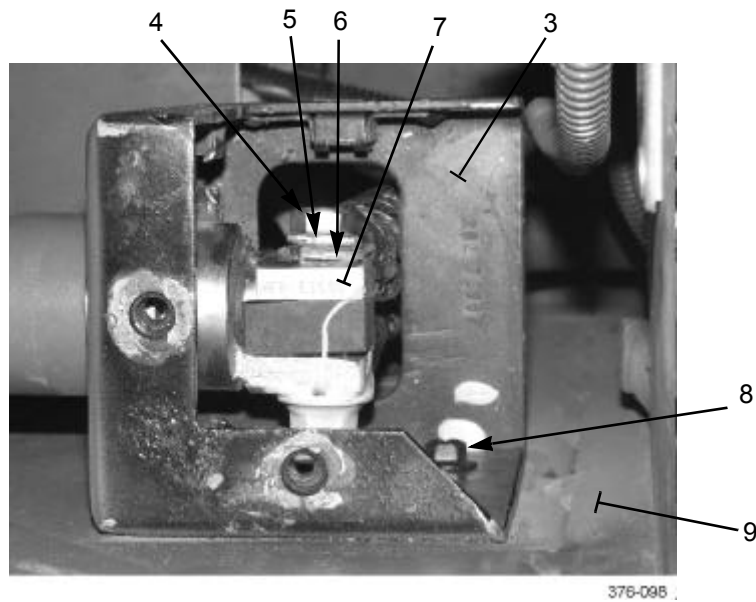
2. Remove two screws (8) to free slave receptacle mounting box (3) from battery box support bracket (9).

**NOTE**

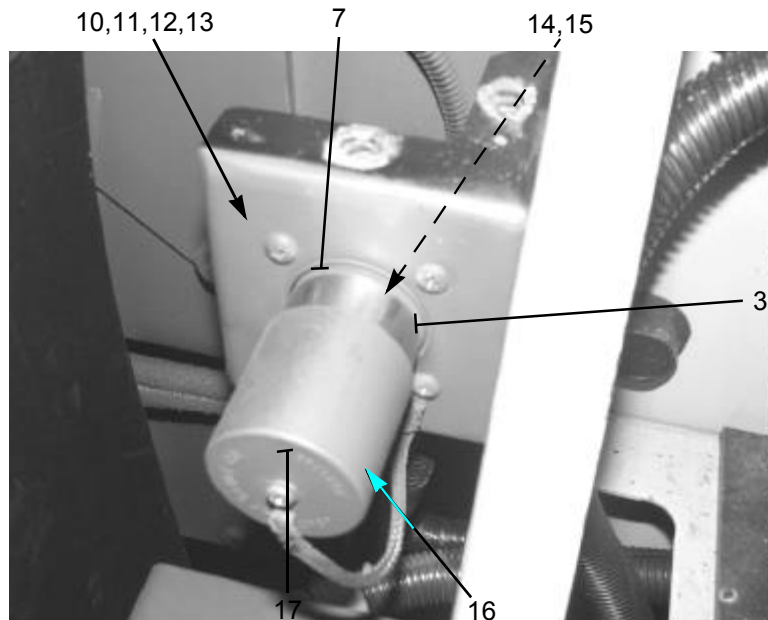
Tag cables to ensure correct installation.

3. Remove two screws (4) and lockwashers (5) and disconnect battery cables (6) from slave receptacle (7). Discard lockwashers.

**REMOVAL - CONTINUED**



4. Remove four nuts (10), lockwashers (11), screws (12), washers (13), cord (16), and cap (17) from slave receptacle (7). Discard lockwashers.
5. Remove insulator (14), slave receptacle (7), and gasket (15) from slave receptacle mounting box (3). Discard gasket.

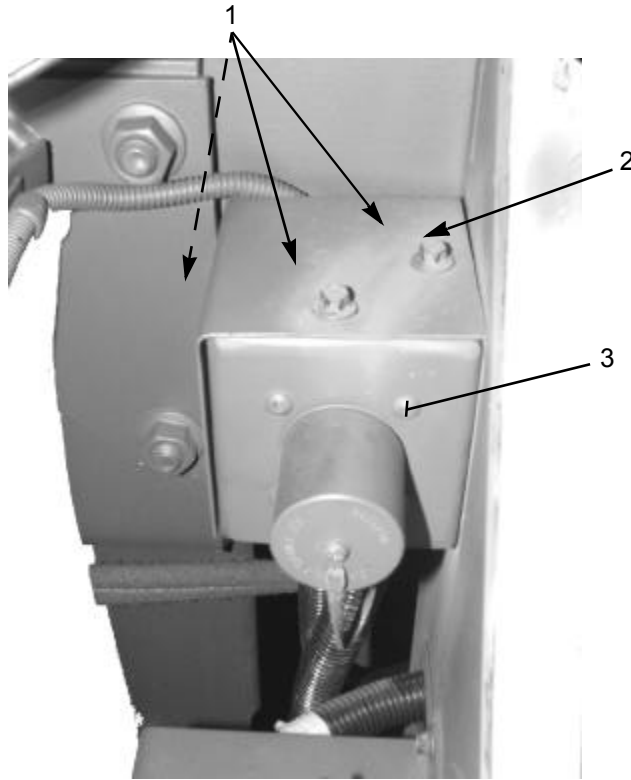


**INSTALLATION**

1. Position new gasket (15), slave receptacle (7), and insulator (14) to slave receptacle mounting box (3).
2. Install cap (17), cord (16), four washers (13), screws (12), new lockwashers (11), and nuts (10) to slave receptacle (7).
3. Install two battery cables (6) to slave receptacle (7) with two new lockwashers (5) and screws (4).
4. Install slave receptacle mounting box (3) to battery box support bracket (9) with two screws (8).

**INSTALLATION - CONTINUED**

5. Install cover (2) to slave receptacle mounting box (3) with four bolts (1).



6. Connect battery cables (WP 0115 00).
7. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

**CAPACITOR AND CAPACITOR START RELAY REPLACEMENT****0119 00****THIS WORK PACKAGE COVERS**

Capacitor: Removal, Installation

Relay: Removal, Installation

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figures 4 and 12

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Insulating varnish, electrical, dielectric (Item 34, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**References**

WP 0114 00

**Equipment Condition**

Battery cables disconnected (WP 0115 00)

**WARNING**

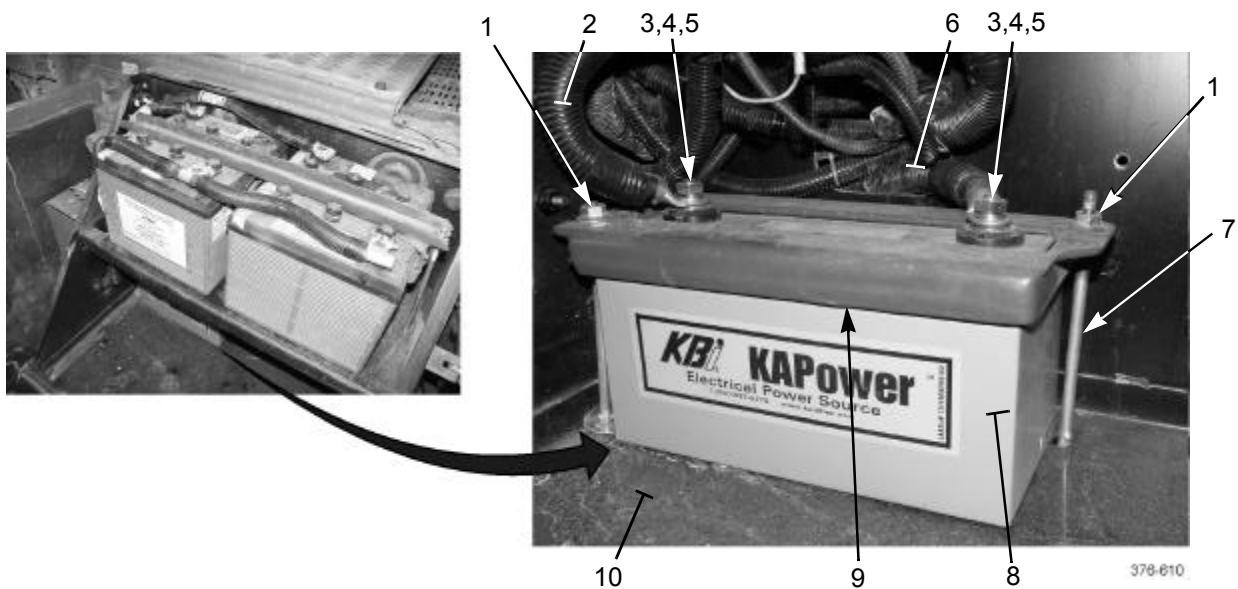
- To avoid injury, eye protection, protective clothing, and gloves must be worn when working around capacitors. Capacitors contain an electrolyte that is a potassium hydroxide solution. Potassium hydroxide is highly corrosive and can cause serious burns. If capacitor case becomes cracked, leaking electrolyte can result in fumes that are hazardous to inhale. If electrolyte makes contact with skin, eyes or clothing, take immediate action to stop the corrosive burning effects. Failure to follow these procedures may result in death or serious injury to personnel.
- Remove all jewelry such as rings, ID tags, watches, and bracelets, when working around capacitors. If jewelry or a tool contacts a capacitor terminal, a direct short may result, causing instant heating and electric shock at the point of short circuit. Damage to equipment and injury to personnel could result.
- When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.
- Do NOT perform capacitor maintenance without first disconnecting battery cables. Failure to follow this warning will result in electrical shock.

**CAPACITOR REMOVAL****CAUTION**

Protect external case of capacitor from physical impact to avoid damaging plastic shells of individual capacitors.

**NOTE**

- Tag cables and wires to ensure correct installation.
  - Remove tiedown straps as required and discard. Use new tiedown straps on installation.
1. Remove nut (3), lockwasher (4), washer (5), and disconnect cable (2) from negative terminal of capacitor (8).
  2. Remove nut (3), lockwasher (4), washer (5), and disconnect cable (6) from positive terminal of capacitor (8).
  3. Remove two nuts (1), hold-down (9), capacitor (8), and two J-bolts (7) from battery pad (10) on bottom shelf of battery box.

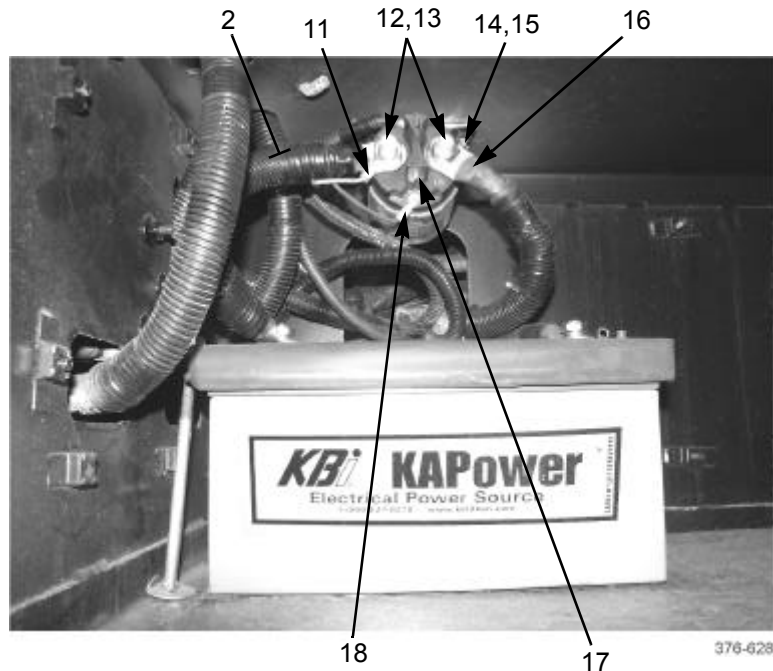
**CAPACITOR INSTALLATION****CAUTION**

- Protect external case of capacitor from physical impact to avoid damaging plastic shells of individual capacitors.
  - Prior to installation, ensure capacitor case has no trace of damage, cracks or electrolyte leakage.
1. Remove two protective caps from terminals of replacement capacitor (8). Install caps on capacitor that was removed from vehicle.
  2. Position capacitor (8) on battery pad (10) on bottom shelf of battery box. Secure with two J-bolts (7), hold-down (9), and two nuts (1).
  3. Connect cable (6) to positive terminal of capacitor (8) with washer (5), lockwasher (4), and nut (3).
  4. Connect cable (2) to negative terminal of capacitor (8) with washer (5), lockwasher (4), and nut (3).
  5. Connect battery cables (WP 0115 00).



**RELAY REMOVAL**

1. Remove two batteries from top shelf of battery box (WP 0114 00).
2. Remove two nuts (12), washers (13), and disconnect two cables (2 and 16) and electrical lead (11) from terminals of relay (17). Disconnect electrical lead (18) from relay.
3. Remove four nuts (14), screws (15), and relay (17) from battery box.

**RELAY INSTALLATION**

1. Install relay (17) to battery box with four screws (15) and nuts (14).
2. Connect electrical lead (18) to relay (17). Connect electrical lead (11) and cables (2 and 16) to terminals of relay with two washers (13) and nuts (12).
3. Install two batteries to top shelf of battery box (WP 0114 00).
4. Connect battery cables (WP 0115 00).
5. Apply one or more coats of insulating varnish to relay electrical connections.

**END OF WORK PACKAGE**

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**THIS WORK PACKAGE COVERS**

Ring Terminal Repair

Sealed Connector Repair

Electrical Connector Repair

Splicing Wires

Electrical Ground Points

Multimeter Usage

Relay Inspection and Testing

Circuit Breaker Inspection and Testing

Wiring Harness Replacement

**INITIAL SETUP**

**Maintenance Level**

Unit

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cloth, abrasive (Item 11, WP 0165 00)

Detergent (Item 23, WP 0165 00)

Flux, soldering (Item 27, WP 0165 00)

Grease, electrically conductive (Item 32, WP 0165 00)

Insulating varnish, electrical, dielectric (Item 34, WP 0165 00)

**Materials/Parts - Continued**

Insulation sleeving, electrical (Item 35, WP 0165 00)

Solder (Item 56, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Tape, insulation, electrical (Item 61, WP 0165 00)

**References**

Electrical Schematics—Foldouts

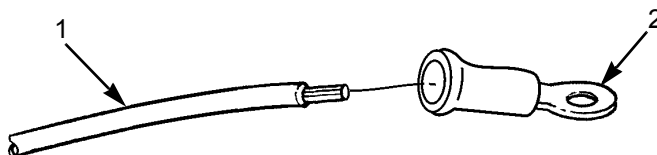
TB SIG 222

**Equipment Condition**

Battery disconnect switch in OFF position

**RING TERMINAL REPAIR**

1. Remove ring terminal (2) from wire (1) by cutting through wire just behind ring terminal.
2. Using wire stripping tool, strip insulation of wire (1) to expose length of metal strands suitable for size of ring terminal (2).
3. Insert wire (1) into ring terminal (2) and crimp ring terminal to wire.



376-587

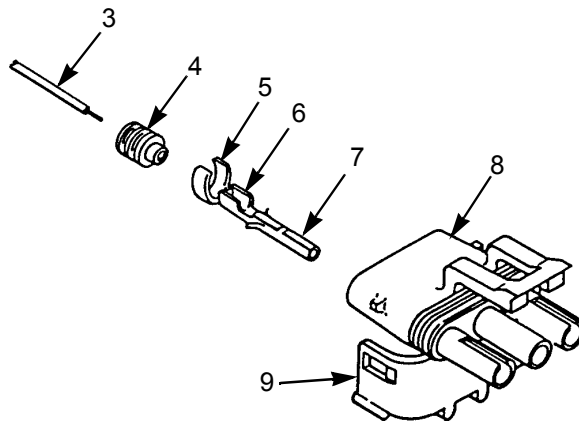
**SEALED CONNECTOR REPAIR**

1. Open hinged cover (9) of connector (8) for access to rear of connector.

**NOTE**

- Perform steps 2 through 9 for each wire of connector.
- Tag and mark position of wires in sealed connector to ensure correct installation.

2. Using pin removal tool, position tool over pin (7) and push inward to retract two barbs of pin.
3. Remove wire (3), with pin (7) and seal (4) attached, from rear of connector (8).
4. If defective, remove pin (7) and seal (4) from wire (3) by opening tabs (5 and 6) of pin.
5. Position new seal (4) and pin (7) on wire (3).
6. Using crimping tool, securely crimp tabs (6) of pin (7) over metal strands of wire (3).
7. Slide seal (4) next to pin (7) and crimp tabs (5) of pin over end of seal.
8. Push pin (7) into rear of connector (8) until fully seated.
9. Close hinged cover (9) of connector (8).



376-588

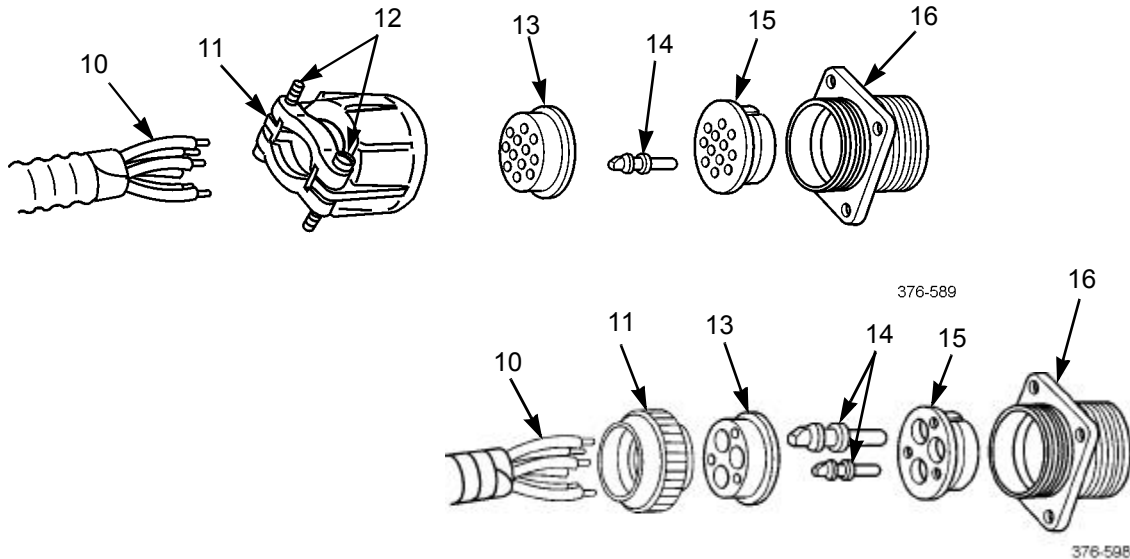
**ELECTRICAL CONNECTOR REPAIR****NOTE**

Tag and mark position of wires in electrical connector to ensure correct installation.

1. If repairing a trailer electrical connector, loosen two screws (12) of nut (11).
2. Unscrew nut (11) from shell (16) and slide nut back over wires (10).
3. Push grommet (13) back on wires (10).
4. Using pin extractor, push pins (14) out through rear of insert (15).
5. Push insert (15) out through rear of shell (16).
6. Unsolder wires (10) from pins (14).
7. Position wires (10) into solder wells of pins (14) and solder (TB SIG 222).

**ELECTRICAL CONNECTOR REPAIR - CONTINUED**

8. Push insert (15) into shell (16) from rear until seated. Groove in insert must be aligned with guide in shell to ensure proper fit
9. Push pins (14) into insert (15) from rear until seated.
10. Push grommet (13) down wires (10) and over solder wells of pins (14).
11. Install nut (11) onto shell (16).
12. If repairing a trailer electrical connector, tighten two screws (12).

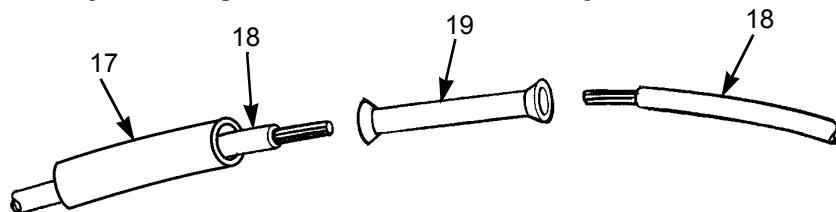


**SPLICING WIRES**

**NOTE**

The use of high quality splice connectors is essential to ensure optimum electrical integrity. Use the type and size connector best suited to the application.

1. Inspect each end of wire (18). Trim wire back, as necessary, to ensure undamaged ends.
2. Using wire stripping tool, strip insulation of wires (18) to expose length of metal strands suitable for size of splice connector (19).
3. Cut length of insulation sleeving (17) at least 3/4 in longer than length of splice connector (19) and slide insulation sleeving over one wire (18).
4. Insert each wire (18) into splice connector (19) and crimp connector to metal strands AND insulation of wire.
5. Center insulation sleeving (17) over splice connector (19) and use heat gun to shrink insulation sleeving.



**ELECTRICAL GROUND POINTS****NOTE**

Good electrical ground points are essential for the proper functioning of the electrical system. Ground points on electrical components and the frame of vehicle must be maintained in a clean and secure condition to minimize electrical problems.

1. Remove nut, locknut, lockwasher, screw etc. connecting ground wire or ground cable to ground point on electrical component or threaded stud on vehicle frame.
2. If necessary, clean dirt from ring terminal, surface of electrical component, ground point, and all mounting hardware with detergent, water, and a scrub brush.
3. Remove any corrosion or rust with a wire brush and abrasive cloth.
4. Replace defective mounting hardware. Replace defective ring terminal. (Refer to *Ring Terminal Repair*).
5. Install ground wire or ground cable to ground point with mounting hardware and tighten securely.
6. Apply one or more coats of insulating varnish to ground connections.

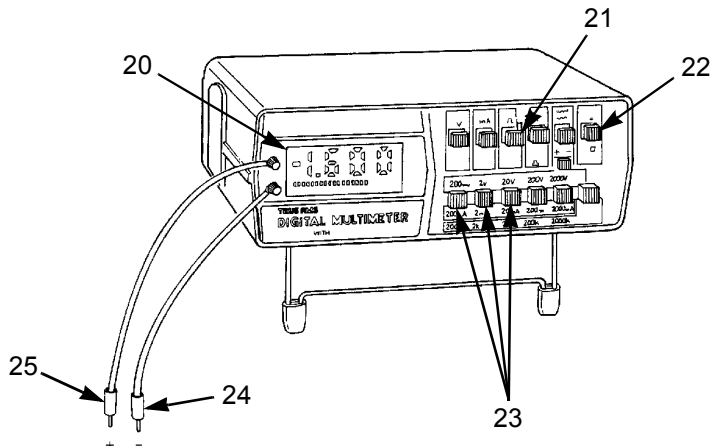
**MULTIMETER USAGE**

1. **General.** The digital multimeter is used to troubleshoot the electrical system of the vehicle. The multimeter's ohms scale is used to test for continuity, shorts, and resistance and the voltmeter scale is used to test voltage levels at any point in the electrical system.
2. **Continuity Tests.** Continuity tests are performed to check for breaks in a circuit (such as a fuse, switch, light bulb or electrical cable).

**NOTE**

If digital readout will not zero properly, replace batteries and repeat zeroing procedure. If digital readout will not zero after batteries have been replaced, notify your supervisor.

- a. **Zero the Multimeter.**
  - (1) Set multimeter ON/OFF switch (22) to ON position.
  - (2) Press OHMS FUNCTION switch (21).
  - (3) Press LOWEST VOLTAGE/OHMS selector switch (23).
  - (4) Touch black and red probes (24 and 25) together and check for a zero reading on digital readout (20).



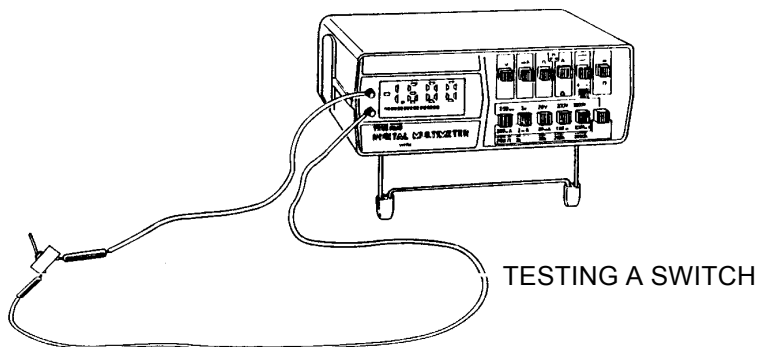
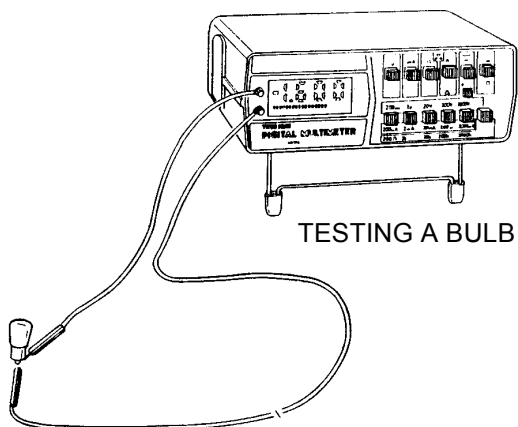
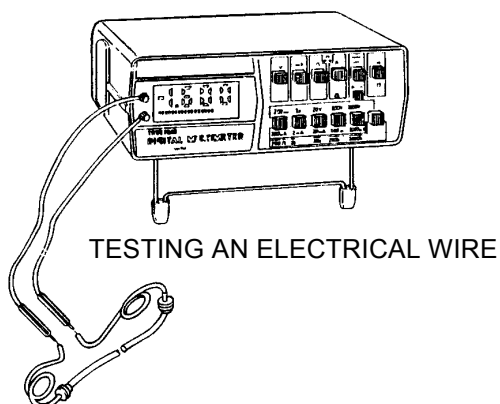
376-591

**MULTIMETER USAGE - CONTINUED****CAUTION**

Before performing a continuity test, always turn battery disconnect switch to OFF position and disconnect circuit to be tested. Failure to follow this caution may damage multimeter.

**b. Testing for Continuity.**

- (1) Zero multimeter.
- (2) Connect black and red probes (24 and 25) to both terminals to circuit being tested.
- (3) Read digital readout (20) and interpret results as follows:
  - (a) If digital readout indicates 0 (zero), circuit has continuity.
  - (b) If digital readout indicates resistance, circuit is open.



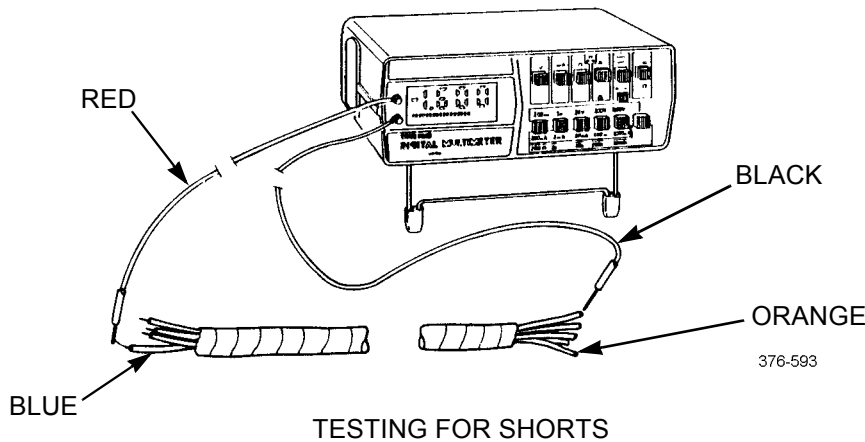
376-592

MULTIMETER USAGE - CONTINUED

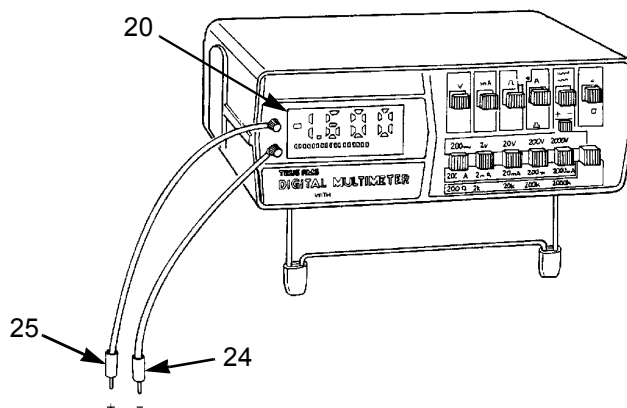
**CAUTION**

Before performing a continuity test, always turn battery disconnect switch to OFF position and disconnect circuit to be tested. Failure to follow this caution may damage multimeter.

- c. **Testing for Shorts.** A short (or short circuit) occurs when two circuits that should not be connected have metal-to-metal contact with each other. A short also occurs when a circuit that should not touch ground has metal-to-metal contact with ground.



- (1) Zero multimeter.
- (2) Connect black probe (24) to one circuit and red probe (25) to either a ground or another circuit.
- (3) Read digital readout (20) and interpret results as follows:
  - (a) If digital readout indicates 0 (zero), circuits are shorted or circuit is grounded if testing to ground.
  - (b) If digital readout does not indicate 0 (zero), circuits are not shorted.
  - (c) If digital readout jumps or flickers, circuits are shorted or grounded intermittently.





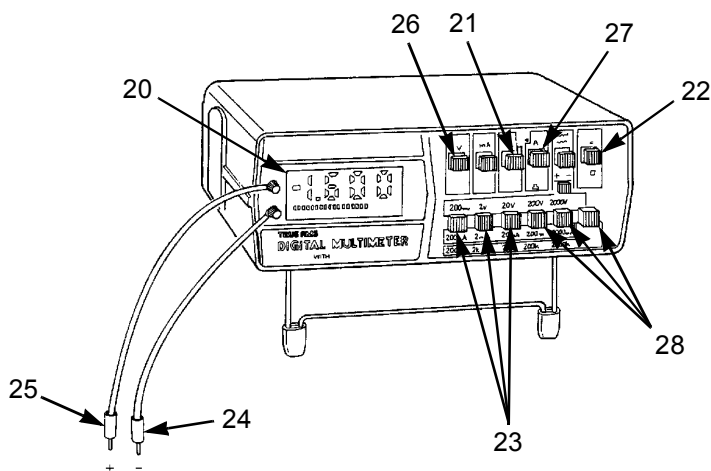
**MULTIMETER USAGE - CONTINUED****CAUTION**

Before performing a continuity test, always turn battery disconnect switch to OFF position and disconnect circuit to be tested. Failure to follow this caution may damage multimeter.

- d. **Testing for Resistance.** Allowable resistance readings depend on circuit being tested. Refer to the particular section dealing with that circuit or component for allowable readings.
  - (1) Zero multimeter.
  - (2) Press OHMS FUNCTION switch (21).
  - (3) Press LOWEST VOLTAGE/OHMS selector switch (23). If test calls for ohms range other than RX1, set RANGE SELECTOR switch (28) to required range.
  - (4) Connect black and red probes (24 and 25) across circuit to be tested.
  - (5) Read digital readout (20) and interpret results as circuit resistance.

3. **Measuring DC Voltage.**

- a. Set multimeter ON/OFF switch (22) to ON position.
- b. Press VOLTS FUNCTION switch (26).
- c. Set AC/DC selector switch (27) to DC.
- d. Select and press LOWEST VOLTAGE/OHMS selector switch (23) for voltage range higher than volts to be measured.
- e. Connect red probe (25) to positive (+) side of circuit and black probe (24) to negative (-) side of circuit.
- f. Read digital readout (20) and interpret results as DC voltage in circuit being tested.



376-591

**RELAY INSPECTION AND TESTING**

1. With relay removed from vehicle, inspect relay for damaged or corroded terminals.
2. Inspect relay for burned or damaged plastic case.
3. If any of these conditions are evident, install new relay. If none of these conditions are evident, test relay. (Refer to step 4).

**RELAY INSPECTION AND TESTING - CONTINUED****NOTE**

When testing a relay, refer to the circuit diagram on relay case.

4. Using a multimeter, test for continuity across relay coil. Coil should have continuity. If not, replace relay.
5. Using a multimeter, test for closed contacts within relay. Contacts should be open (no continuity). If contacts are stuck closed, replace relay.

**CIRCUIT BREAKER INSPECTION AND TESTING****NOTE**

Circuit breakers may be inspected and tested while installed in vehicle.

1. Inspect circuit breaker for damaged or corroded terminals.
2. Inspect circuit breaker for burned or damaged housing or reset button.
3. If any of these conditions are evident, replace circuit breaker. If none of these conditions are evident, test circuit breaker. (Refer to step 4)
4. With reset button in the fully outward position, depress reset button to “reset” circuit breaker. Reset button should remain depressed. If not, circuit breaker is defective or an electrical problem exists in another part of the electrical circuit.
5. Isolate circuit breaker by disconnecting one wire from rear of circuit breaker. Again depress reset button. If reset button does not remain depressed, replace circuit breaker.

**WIRING HARNESS REPLACEMENT****NOTE**

- Wiring harnesses are composed of multiple wires enclosed in a protective wire loom with one or more connectors of varying configurations at each end. When damaged, wiring harnesses can be repaired by replacing connectors or by splicing wires. If damage is extensive, entire wiring harness should be replaced.
  - Perform the following steps to replace a typical wiring harness. Refer to electrical schematics in fold-outs at back of manual for assistance.
  - Tag wire leads and connectors to ensure correct installation.
1. Provide access to wiring harness, as necessary, by removing instrument panel, tilting cab, raising fifth wheel, removing rear platform etc.
  2. Place battery disconnect switch in OFF position.
  3. Remove mounting hardware (nut, locknut, lockwasher, screw etc.) or disconnect connector(s) of wiring harness to disconnect wiring harness from electrical component at one end of wiring harness.
  4. Trace length of wiring harness and remove tiedown straps and clamps, as necessary. Discard tiedown straps.
  5. Repeat step 3 at other end of wiring harness.
  6. Remove wiring harness from vehicle.

**NOTE**

Ensure wire loom is installed over wiring harness as required prior to installation.

7. Position wiring harness to vehicle.

***WIRING HARNESS REPLACEMENT - CONTINUED***

8. Connect connector(s) of wiring harness or install mounting hardware (nut, locknut, lockwasher, screw etc.) to connect wiring harness to electrical component at one end of wiring harness.
9. Repeat step 8 at other end of wiring harness.
10. Install clamps and new tiedown straps along length of wiring harness.
11. Place battery disconnect switch in ON position.
12. Install rear platform, lower fifth wheel, lower cab, install instrument panel etc., as necessary.

**END OF WORK PACKAGE**

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**CAB TILT LATCH REPLACEMENT****0121 00****THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 190

**RPSTL Reference**

Group 140, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Fluid, hydraulic, automatic transmission, Dexron III (Item 24, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

**References**

TM 9-2320-312-10

WP 0125 00

**WARNING**

- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
- At operating temperature, hydraulic fluid is hot. Allow hydraulic fluid to cool before disconnecting any hydraulic line. Failure to do so could result in serious burns.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.
- DO NOT work under cab unless cab is properly supported. Cab could fall and cause serious injury to personnel.

**REMOVAL**

1. Tilt cab (TM 9-2320-312-10).
2. Place battery disconnect switch in OFF position.

**WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

Use a drain pan to capture hydraulic fluid in hose. Dispose of hydraulic fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.

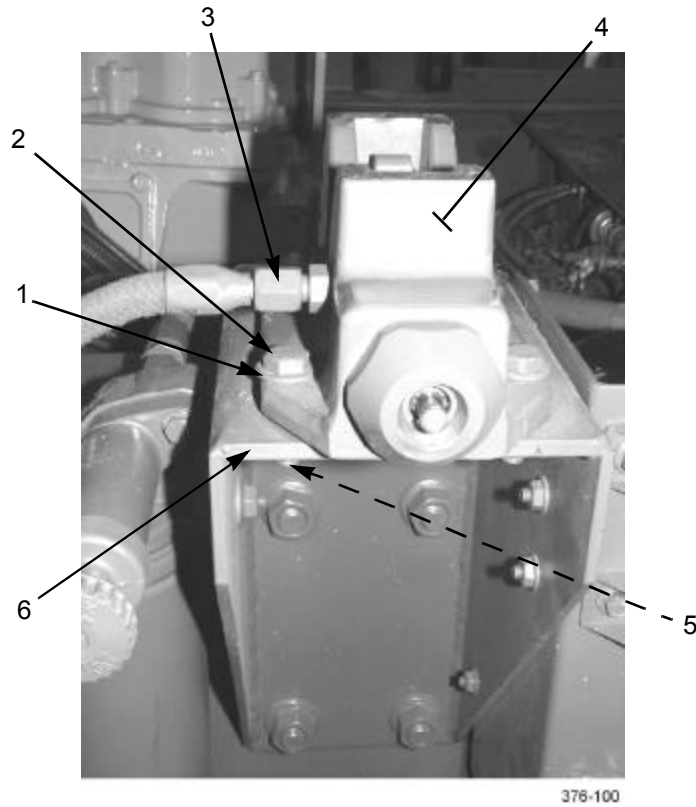
3. Disconnect hydraulic hose (3) from latch (4).

**CAUTION**

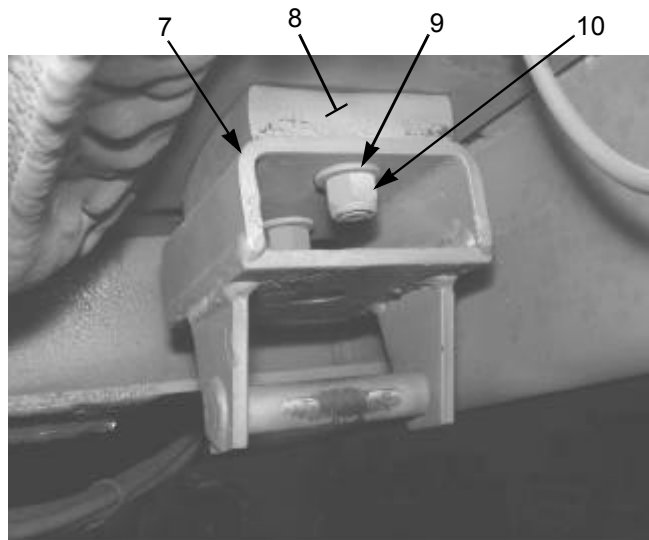
Failure to mark location of cab latch on frame bracket could cause latch to be incorrectly installed. Damage to cab or latch could result if cab is lowered onto an improperly located latch.

4. Place witness marks to mark location of latch (4) at frame bracket (6). Remove four nuts (5), screws (2), washers (1), and latch from frame bracket.

**REMOVAL - CONTINUED**



5. Remove two nuts (10), washers (9), latch bracket (7), and vibration damper (8) from underside of cab.



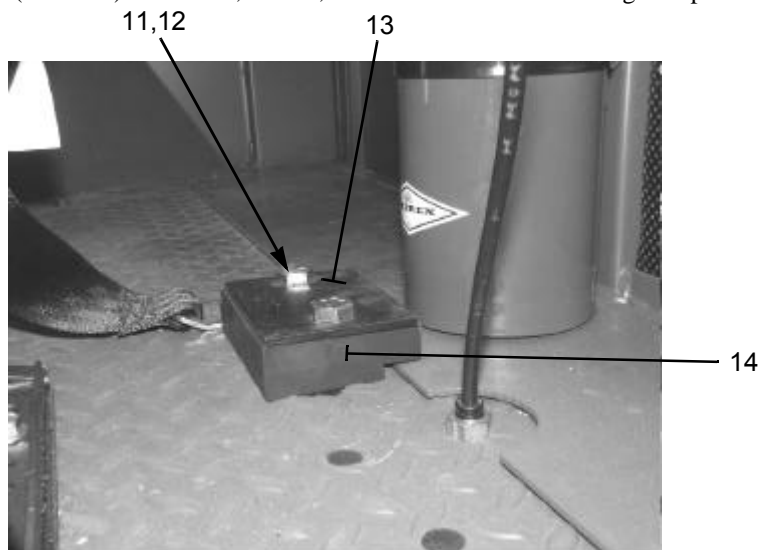
376-101

**CAB TILT LATCH REPLACEMENT - CONTINUED**

0121 00

**REMOVAL - CONTINUED**

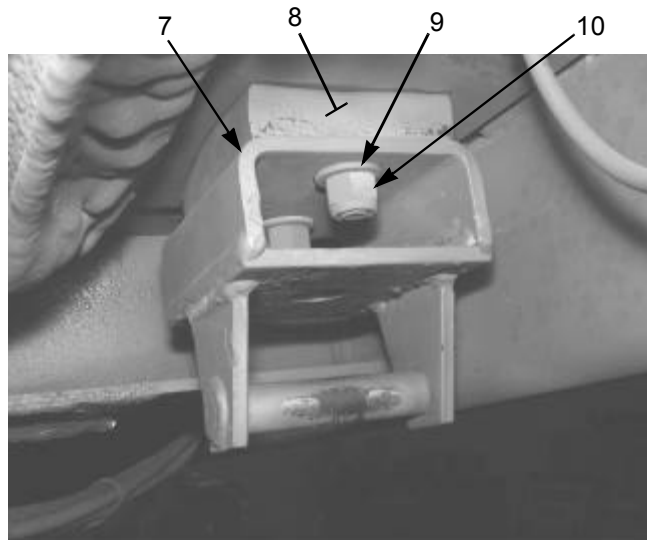
6. Remove two screws (11), washers (12), plate (13), and vibration damper (14) from inside cab.
7. Inspect vibration dampers (8 and 14) for cracks, breaks, deterioration or other damage. Replace if damaged.



376-102.

**INSTALLATION**

1. Position vibration damper (14) and plate (13) to inside of cab and install two washers (12) and screws (11).
2. Position vibration damper (8) and latch bracket (7) to underside of cab and secure with two washers (9) and nuts (10).

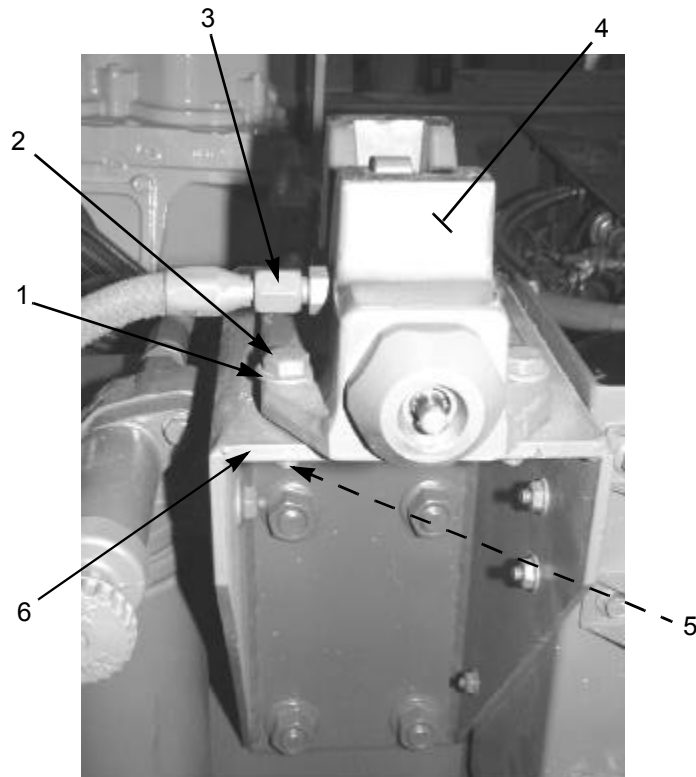


376-101



**INSTALLATION - CONTINUED**

3. Align witness marks and install latch (4) to frame bracket (6) with four washers (1), screws (2), and nuts (5).
4. Connect hydraulic hose (3) to latch (4).



376-100

5. Lower cab (TM 9-2320-312-10).
6. Fill and bleed cab tilt hydraulic system (WP 0125 00).

**END OF WORK PACKAGE**

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**THIS WORK PACKAGE COVERS**

Safety Prop: Removal, Installation

Release Cable: Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 190

**RPSTL Reference**

Group 190, Figure 2

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Pin, cotter (P/N 60-78)

Pin, cotter (P/N MS24665-515)

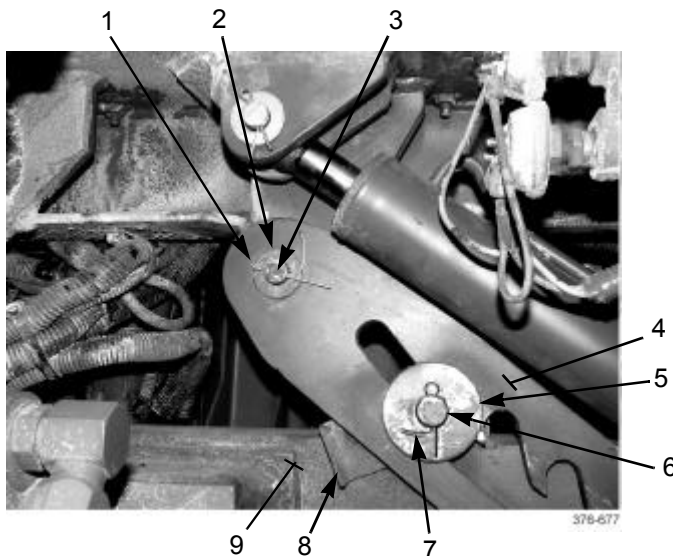
**References**

TM 9-2320-312-10

WP 0039 00

**SAFETY PROP REMOVAL**

1. Remove cotter pin (1), washer (2), and pin (3) to free upper end of safety prop (4) from underside of cab. Discard cotter pin.
2. Open S-hook and disconnect release cable from prop release bracket (8).
3. Remove cotter pin (7), washer (5), pin (6), safety prop (4), and prop release bracket (8) from left frame rail (9). Discard cotter pin.



**SAFETY PROP INSTALLATION****NOTE**

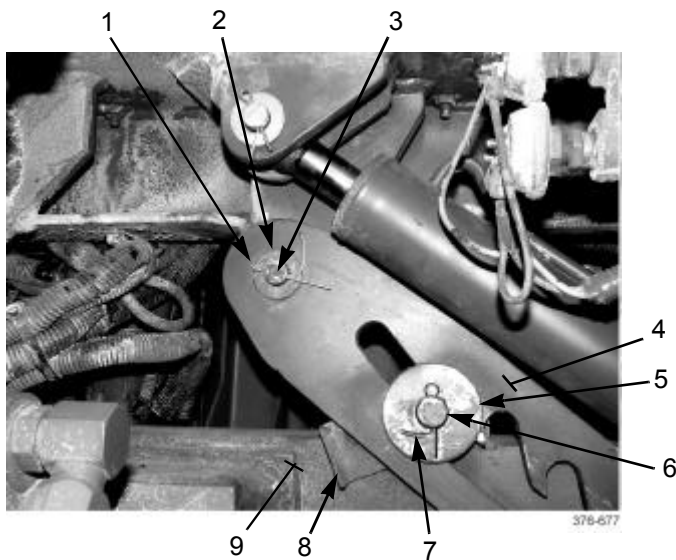
Ensure tab of prop release bracket is positioned in front of safety prop, as shown.

1. Position prop release bracket (8) and safety prop (4) to left frame rail (9) and install pin (6), washer (5), and new cotter pin (7).
2. Connect release cable to prop release bracket (8) and close S-hook.
3. Install upper end of safety prop (4) to underside of cab with pin (3), washer (2), and new cotter pin (1).

**WARNING**

DO NOT work under cab unless cab is properly supported. Cab could fall and cause serious injury to personnel.

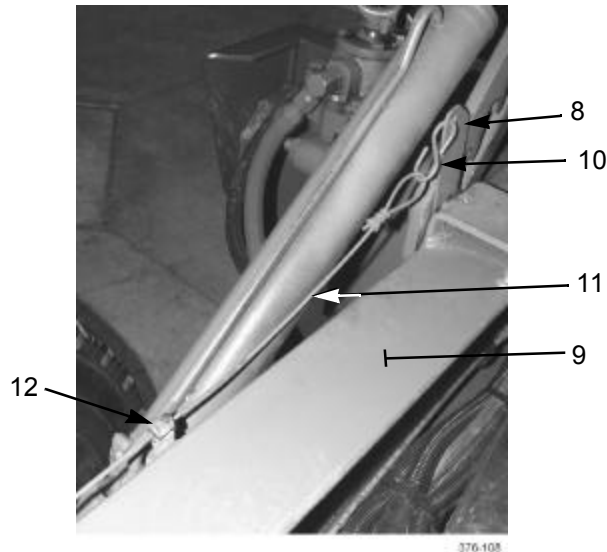
4. Tilt cab and rest cab on safety prop (4) to check operation of prop (TM 9-2320-312-10).
5. Lower cab (TM 9-2320-312-10).



**RELEASE CABLE REMOVAL****WARNING**

DO NOT work under cab unless cab is properly supported. Cab could fall and cause serious injury to personnel.

1. Tilt cab and rest on safety prop (TM 9-2320-312-10).
2. Remove transmission access cover (WP 0039 00).
3. Open S-hook (10) and disconnect release cable (11) from prop release bracket (8).
4. Release cable (11) from clamps (12) at five welded studs along frame rail (9) and remove cable from vehicle.

**RELEASE CABLE INSTALLATION**

1. Connect release cable (11) to prop release bracket (8) and close S-hook (10).
2. Install release cable (11) with clamps (12) to five welded studs along frame rail (9).
3. Install transmission access cover (WP 0039 00).
4. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**CAB TILT CYLINDER REPLACEMENT****0123 00****THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 190

**RPSTL Reference**

Group 190, Figure 2

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Fluid, hydraulic, automatic transmission, Dexron III (Item 24, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Pin, cotter (P/N 60-78) (2)

**References**

TM 9-2320-312-10

WP 0125 00

**WARNING**

- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
- At operating temperature, hydraulic fluid is hot. Allow hydraulic fluid to cool before disconnecting any hydraulic lines. Failure to do so could result in serious burns.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

**REMOVAL**

1. Turn wheel full left, to gain better access to cylinder (2).

**WARNING**

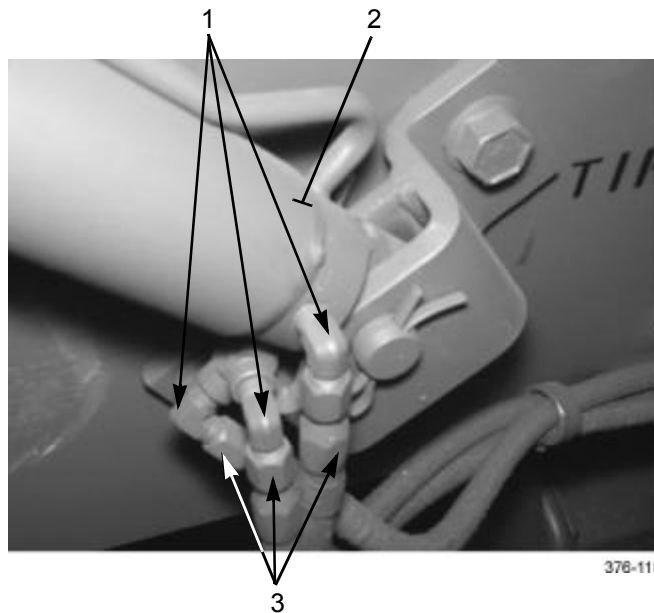
When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

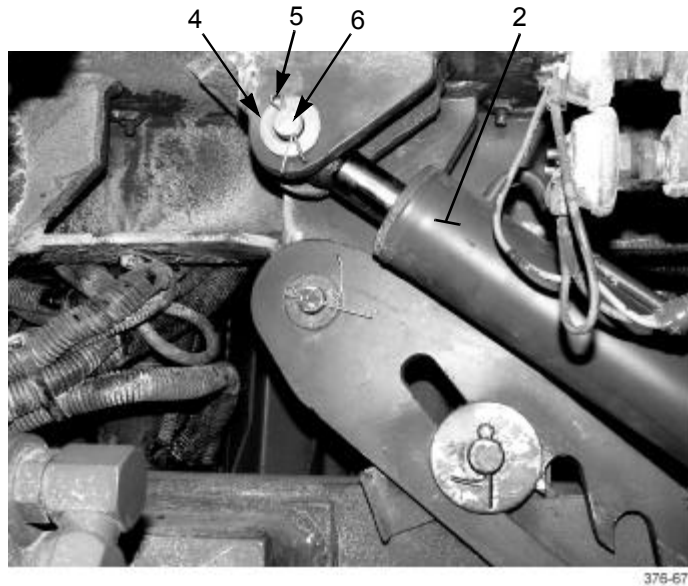
- Use a drain pan to capture hydraulic fluid in hoses. Dispose of hydraulic fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.
  - Tag hydraulic hoses to ensure correct installation.
2. Disconnect three hoses (3) from three elbows (1) at lower end of cylinder (2).





**REMOVAL - CONTINUED**

3. Remove cotter pin (5), washer (4), and pin (6) and disconnect upper end of cylinder (2) from underside of cab. Discard cotter pin.

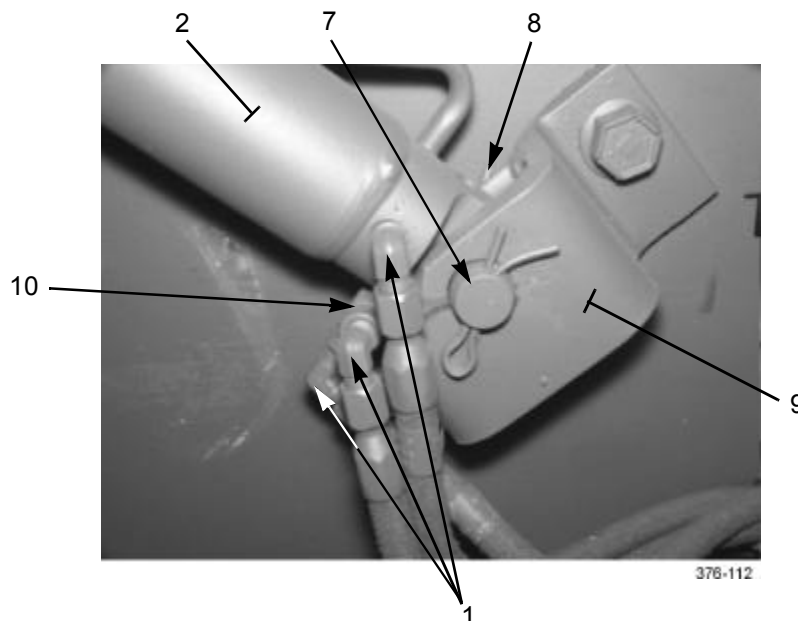


4. Remove cotter pin (8), pin (7), and cylinder (2) from bracket (9). Discard cotter pin.

**NOTE**

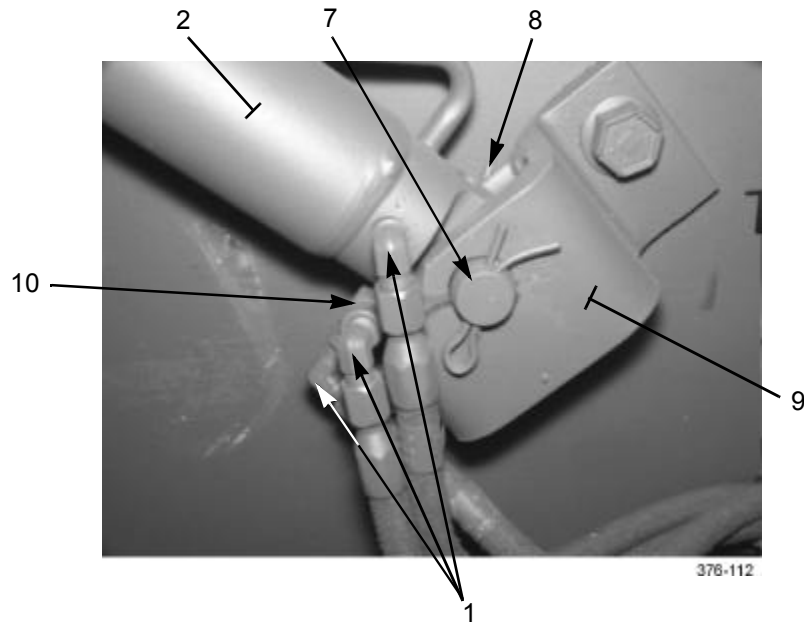
Note position of fittings for installation.

5. Remove three elbows (1) and tee (10) from cylinder (2).

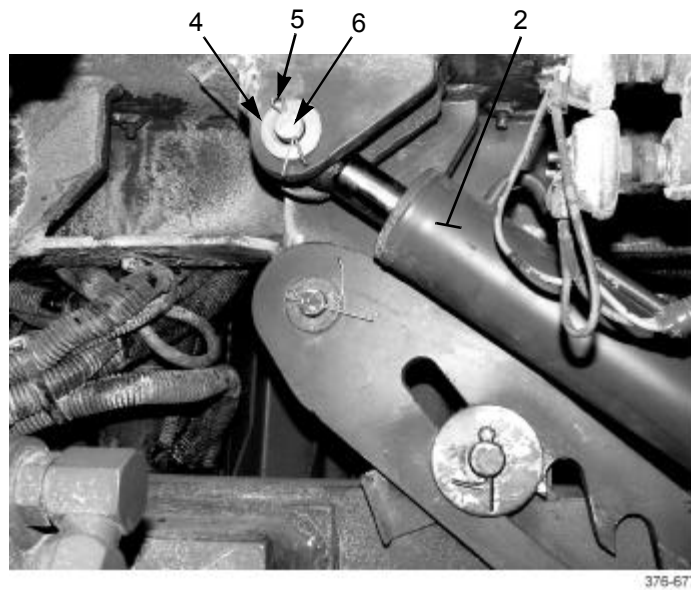


**INSTALLATION**

1. Install tee (10) and three elbows (1) to cylinder (2).
2. Install cylinder (2) into bracket (9) with pin (7) and new cotter pin (8).

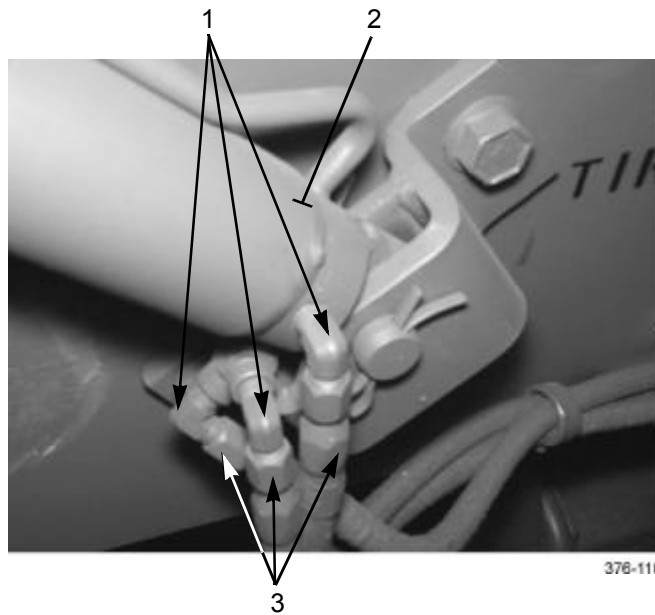


3. Install upper end of cylinder (2) to underside of cab with pin (6), washer (4), and new cotter pin (5).



**INSTALLATION - CONTINUED**

4. Connect three hoses (3) to three elbows (1) at lower end of cylinder (2).



5. Fill and bleed cab tilt hydraulic system (WP 0125 00).

**END OF WORK PACKAGE**

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**THIS WORK PACKAGE COVERS**

Pump Assembly: Removal, Installation

Relay: Removal, Installation

Circuit Breaker: Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 190

**RPSTL Reference**

Group 190, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Fluid, hydraulic, automatic transmission, Dexron III (Item 24, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

**Materials/Parts - Continued**

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N NE11-048-21) (2)

Nut, lock (P/N 219-61) (2)

Nut, lock (P/N 219-74) (2)

Washer, lock (P/N 361-7) (2)

Washer, lock (P/N 361-9) (2)

Washer, lock (P/N 361-10) (2)

Washer, lock (P/N 361-11) (2)

**References**

WP 0125 00

**Equipment Condition**

Battery disconnect switch in OFF position



**WARNING**

- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.

**WARNING**

- At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

***PUMP ASSEMBLY REMOVAL***

1. Raise cover (1) to open pump box (2).
2. Cut tiedown straps as needed to access wiring. Discard tiedown straps.

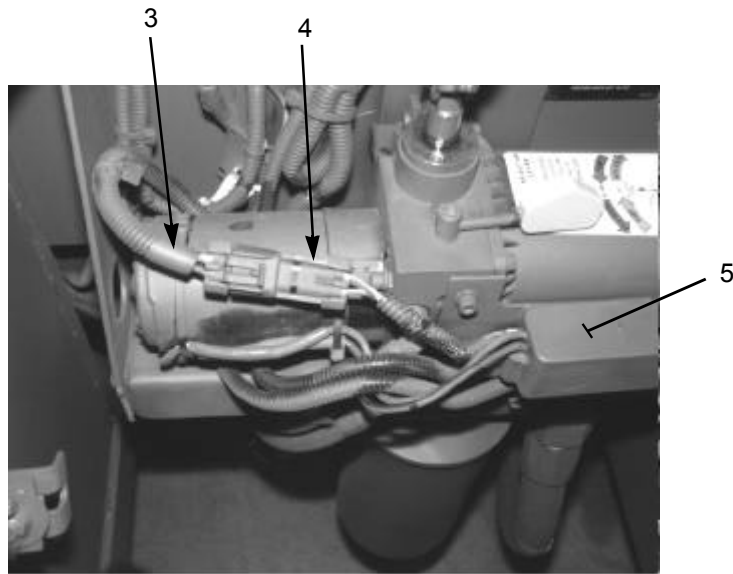


376-113

**PUMP ASSEMBLY REMOVAL - CONTINUED****NOTE**

Tag wires and hoses to ensure correct installation.

3. Disconnect connector (4) of pump actuator switch (5) from relay cable (3).



376-114.

**PUMP ASSEMBLY REMOVAL - CONTINUED**

4. Remove two locknuts (7) and lockwashers (8) from bottom of pump actuator switch (5) and disconnect two wires (9) from switch. Discard locknuts and lockwashers.

**WARNING**

- When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

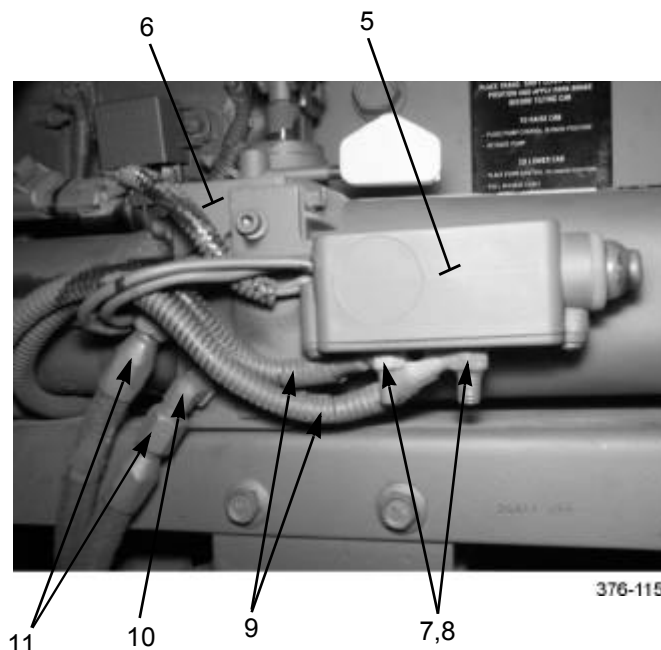
**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

Use a drain pan to capture hydraulic fluid in hoses. Dispose of fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.

5. Disconnect two hoses (11) from two elbows (10) at pump (6).

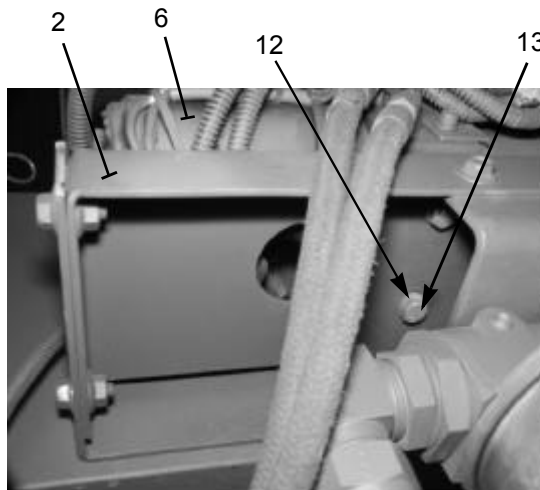


376-115



**PUMP ASSEMBLY REMOVAL - CONTINUED**

- Remove two screws (13), lockwashers (12), and pump (6) from pump box (2). Discard lockwashers.



376-116.

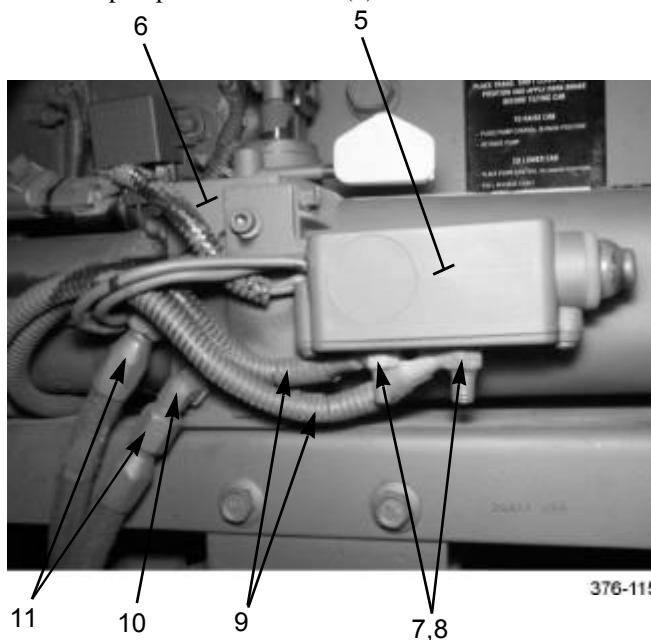
**NOTE**

Note position of fittings for installation.

- Remove two elbows (10) from pump (6).

**PUMP ASSEMBLY INSTALLATION**

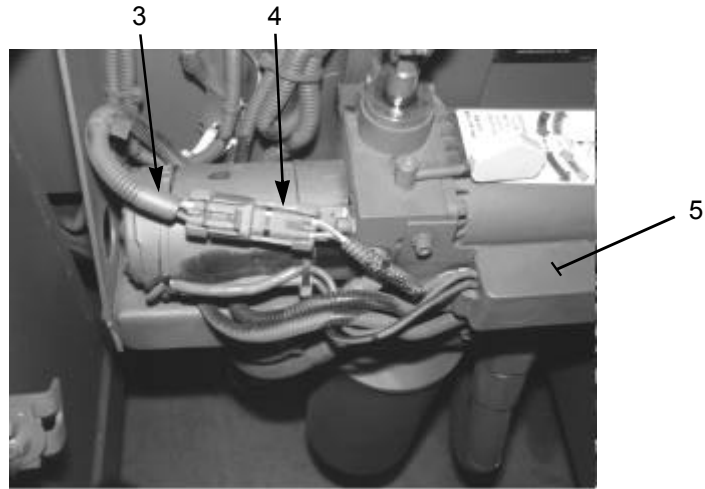
- Install two elbows (10) to pump (6).
- Install pump (6) to pump box (2) with two new lockwashers (12) and screws (13).
- Connect two hoses (11) to two elbows (10) at pump (6).
- Connect two wires (8) to bottom of pump actuator switch (5) and install two new lockwashers (8) and new locknuts (7).



376-115

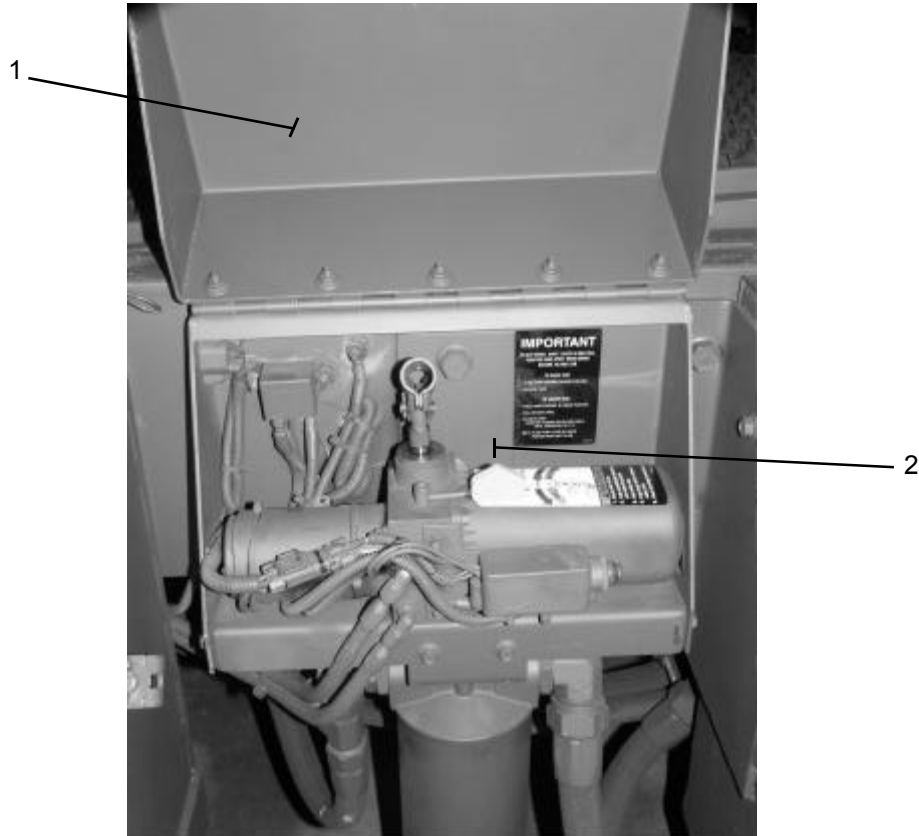
**PUMP ASSEMBLY INSTALLATION - CONTINUED**

5. Connect connector (4) of pump actuator switch (5) to relay cable (3).



376-114.

6. Place battery disconnect switch in ON position.
7. Fill and bleed cab tilt hydraulic system (WP 0125 00).
8. Secure wiring with new tiedown straps.
9. Close cover (1) of pump box (2).



376-113

**RELAY REMOVAL****NOTE**

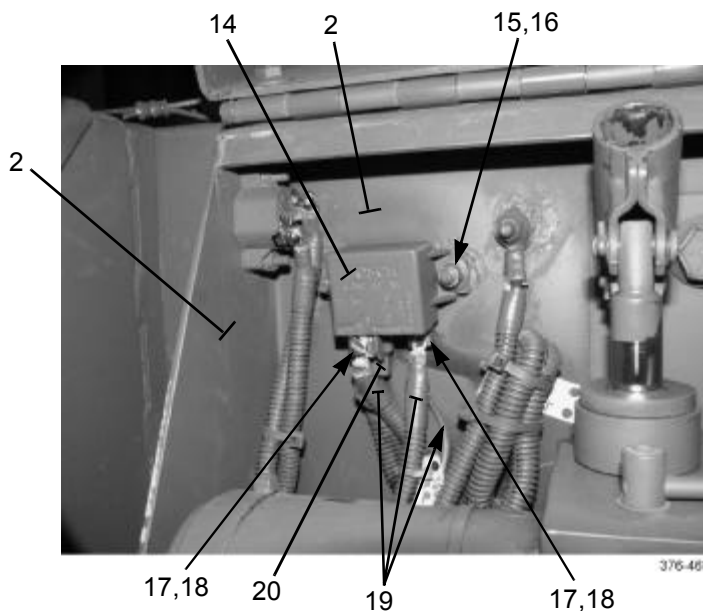
- Tag wires to ensure correct installation.
- Remove tiedown straps as needed and discard. Use new tiedown straps on installation.

1. Open pump box (2).
2. Remove two locknuts (15) and lockwashers (16) to separate relay (14) from two studs of pump box (2). Discard locknuts and lockwashers.

**NOTE**

Replacement relay comes with new attaching hardware for wires.

3. Remove two nuts (17) and screws (18) to disconnect three wires (19) from bottom of relay (14).
4. Disconnect connector (20) from relay (14).

**RELAY INSTALLATION**

1. Connect connector (20) to bottom of relay (14).
2. Connect three wires (19) to relay (14) with two screws (18) and nuts (17).
3. Install relay (14) to two studs of pump box (2) with two new lockwashers (16) and new locknuts (15).
4. Close pump box (2).
5. Place battery disconnect switch in ON position.

**CIRCUIT BREAKER REMOVAL****NOTE**

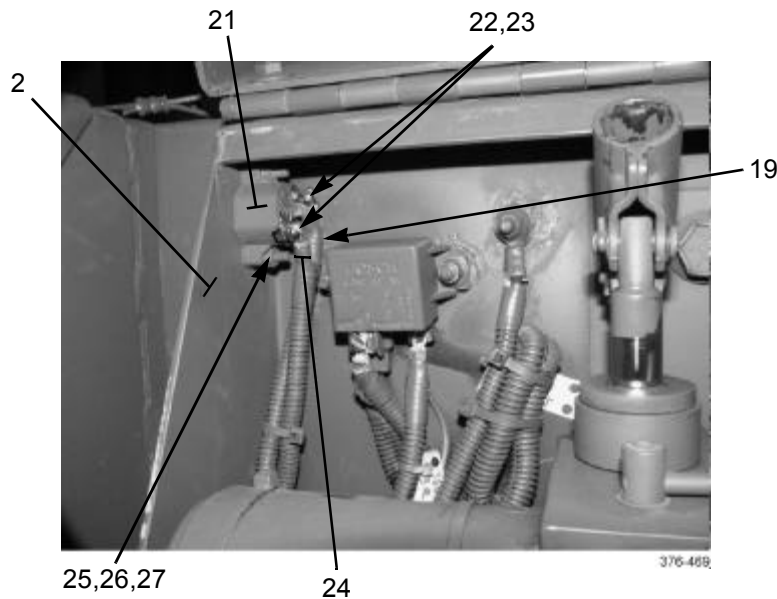
- Tag wires to ensure correct installation.
- Remove tiedown straps as needed and discard. Use new tiedown straps on installation.

1. Open pump box (2).
2. Remove two screws (25), lockwashers (26), and locknuts (27) to separate circuit breaker (21) from side of pump box (2). Discard locknuts and lockwashers.

**NOTE**

Replacement circuit breaker comes with new attaching hardware for wires.

3. Remove two screws (22) and lockwashers (23) to disconnect wire (19) and wire (24) from rear of circuit breaker (21).

**CIRCUIT BREAKER INSTALLATION**

1. Connect wire (19) and wire (24) to rear of circuit breaker (21) with two new lockwashers (23) and screws (22).
2. Install circuit breaker (21) to side of pump box (2) with two screws (25), new lockwashers (26), and new locknuts (27).
3. Close pump box (2).
4. Place battery disconnect switch in ON position.

**END OF WORK PACKAGE**

**CAB TILT HYDRAULIC SYSTEM FILLING AND BLEEDING****0125 00****THIS WORK PACKAGE COVERS**

Filling and Bleeding

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 190

**RPSTL Reference**

Group 190, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Fluid, hydraulic, automatic transmission, Dexron III (Item 24, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

**Equipment Condition**

Cab fully lowered (TM 9-2320-312-10)

**WARNING**

- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
- At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

**FILLING AND BLEEDING****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

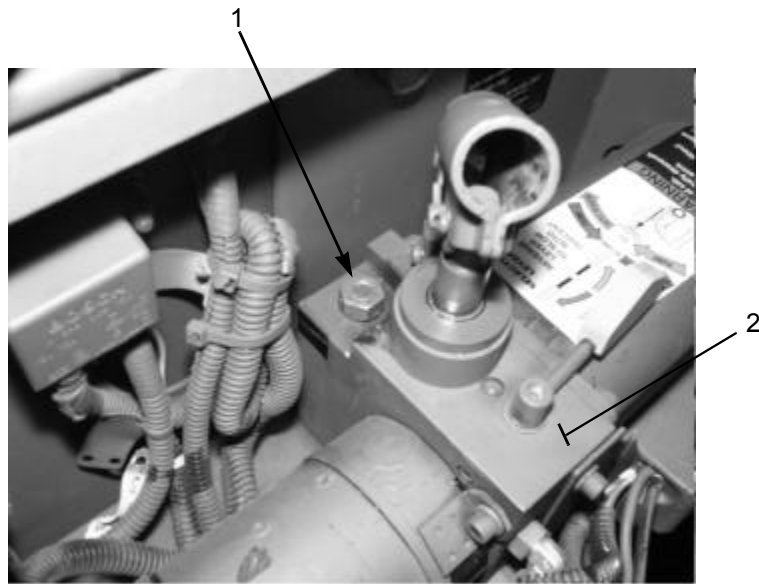
**CAUTION**

Wipe area clean around filler plug opening prior to removing plug. Cap or plug opening after removing plug. Contamination of hydraulic system could result in equipment failure.

**NOTE**

Rotate pump handle socket at top of cab tilt pump for access to filler plug.

1. Remove filler plug (1) from top of cab tilt pump (2).
2. Fill cab tilt pump (2) to within  $\frac{1}{2}$  in (12.7 mm) of top surface of pump. Loosely install filler plug (1).

**NOTE**

- If cab stops in a partially tilted position, release cab tilt button.
  - Tilting and lowering cab will bleed air from cab tilt hydraulic system.
3. Tilt cab (TM 9-2320-312-10) to fully tilted position or as far as cab will tilt. Lower cab (TM 9-2320-312-10).
  4. Repeat step 3.
  5. Remove filler plug (1) and check fluid level in cab tilt pump (2) by inserting a “dipstick” down through filler opening until it touches bottom. Level should be approximately  $\frac{1}{4}$  in (6.4 mm) to  $\frac{1}{2}$  in (12.7 mm) on “dipstick”.
  6. Add hydraulic fluid, as necessary, and repeat steps 3 through 5.
  7. When fluid level has stabilized at correct level (step 5), install and tighten filler plug (1).

**END OF WORK PACKAGE**

**THIS WORK PACKAGE COVERS**

Pump-to-Tilt Cylinder Hoses: Removal, Installation

Cab Tilt Latch Hose: Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 190

**RPSTL Reference**

Group 190, Figure 2

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Fluid, hydraulic, automatic transmission, Dexron III (Item 24, WP 0165 00)

**Materials/Parts - Continued**

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N 21NE048) (1) (cab tilt latch hose)

Nut, lock (P/N 21NE048) (4) (pump-to-cylinder hoses)

**References**

WP 0125 00

**Equipment Condition**

Cab lowered

Wheel turned full left

Battery disconnect switch in OFF position



**WARNING**



- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
- At operating temperature, hydraulic fluid is hot. Allow hydraulic fluid to cool before disconnecting any hydraulic lines. Failure to do so could result in serious burns.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

**PUMP-TO-TILT CYLINDER HOSES REMOVAL****WARNING**

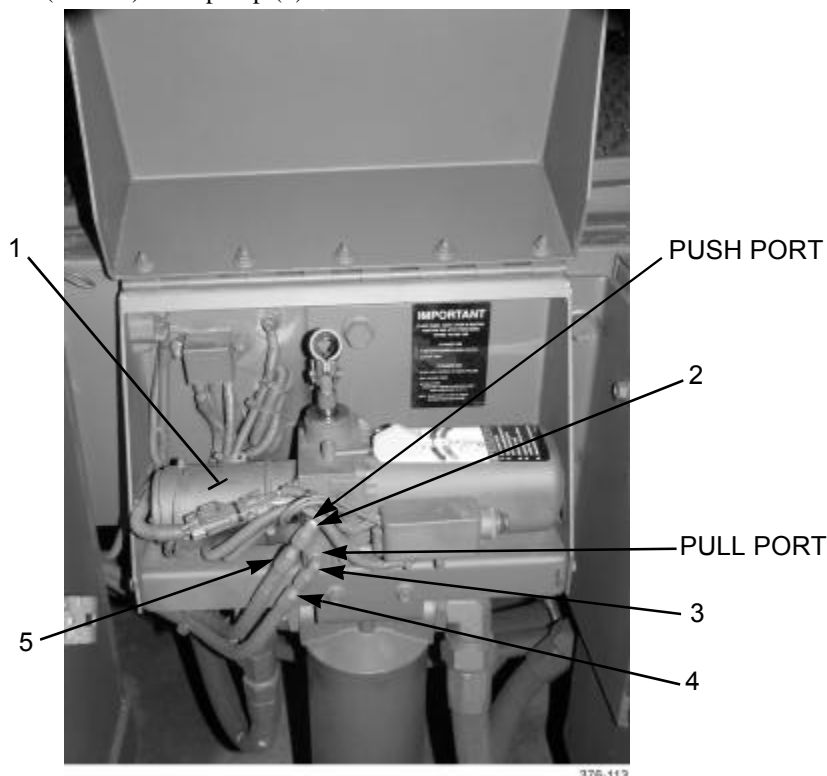
When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

- Use a drain pan to capture hydraulic fluid in hoses. Dispose of hydraulic fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.
  - Tag hydraulic hoses and note position of fittings to ensure correct installation.
  - Replacement of hydraulic hoses to and from pump and cab tilt cylinder is the same.
1. Open pump cover. Disconnect hose (4) from elbow (3) at bottom (pull) port of pump (1). Disconnect hose (5) from elbow (2) at top (push) port.
  2. If damaged, remove elbows (2 and 3) from pump (1).





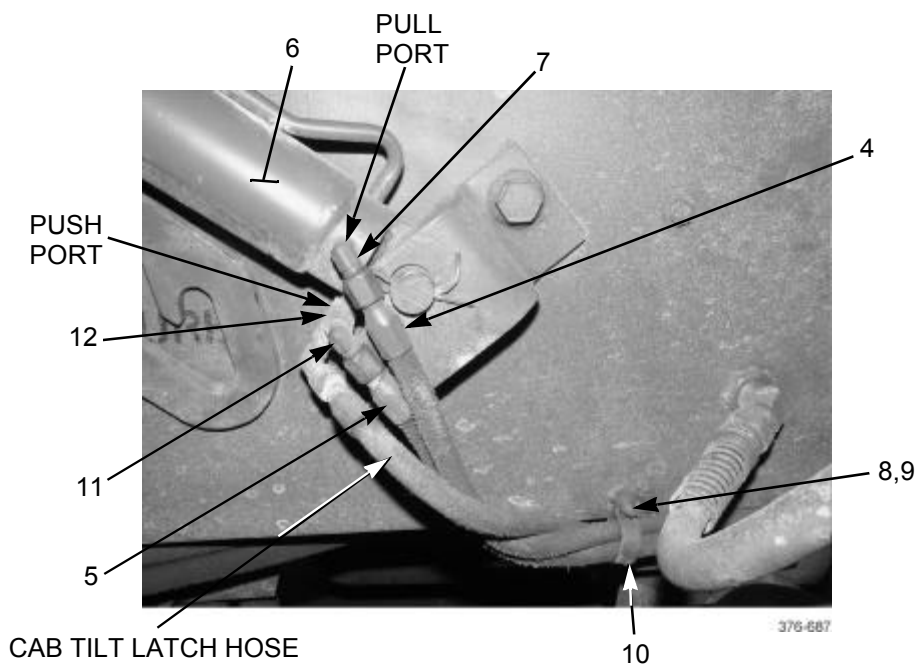
**PUMP-TO-TILT CYLINDER HOSES REMOVAL - CONTINUED**

- Trace hoses (4 and 5) to cylinder (6). Pay close attention to how hose is routed. Remove all tiedown straps and discard.

**NOTE**

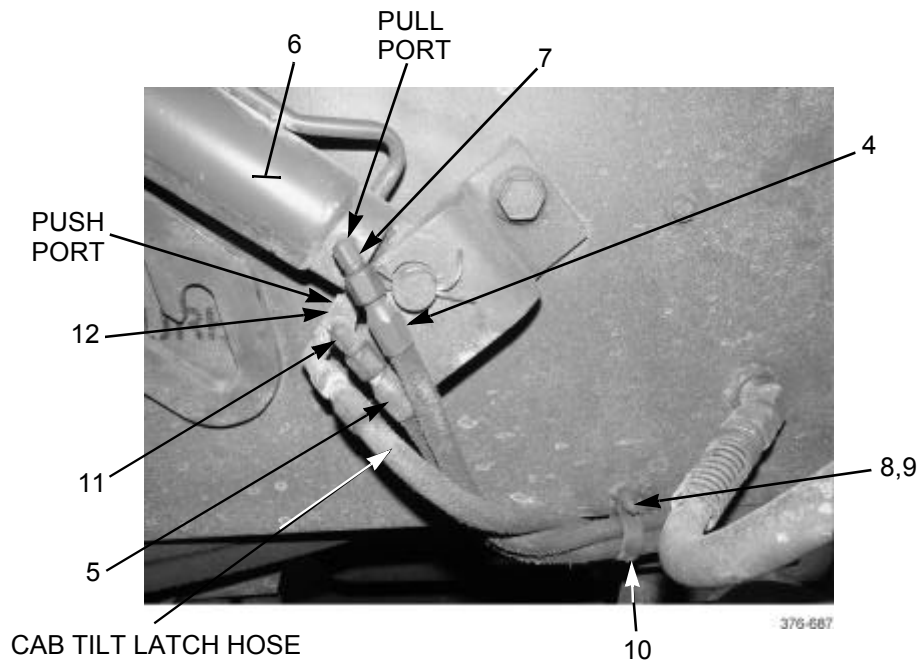
Cab tilt latch hose is released along with hoses (4 and 5), at clamp location closest to cab tilt cylinder.

- Remove four locknuts (8), clamps (10), and release hoses (4 and 5) from welded studs (9) on frame rail. Discard locknuts.
- At cylinder (6), disconnect hose (4) from elbow (7) at pull port of cylinder. Disconnect hose (5) from elbow (11) at push port. Remove hoses from vehicle.
- If damaged, remove elbow (7) from cylinder (6) and elbow (11) from tee (12).



**PUMP-TO-TILT CYLINDER HOSES INSTALLATION**

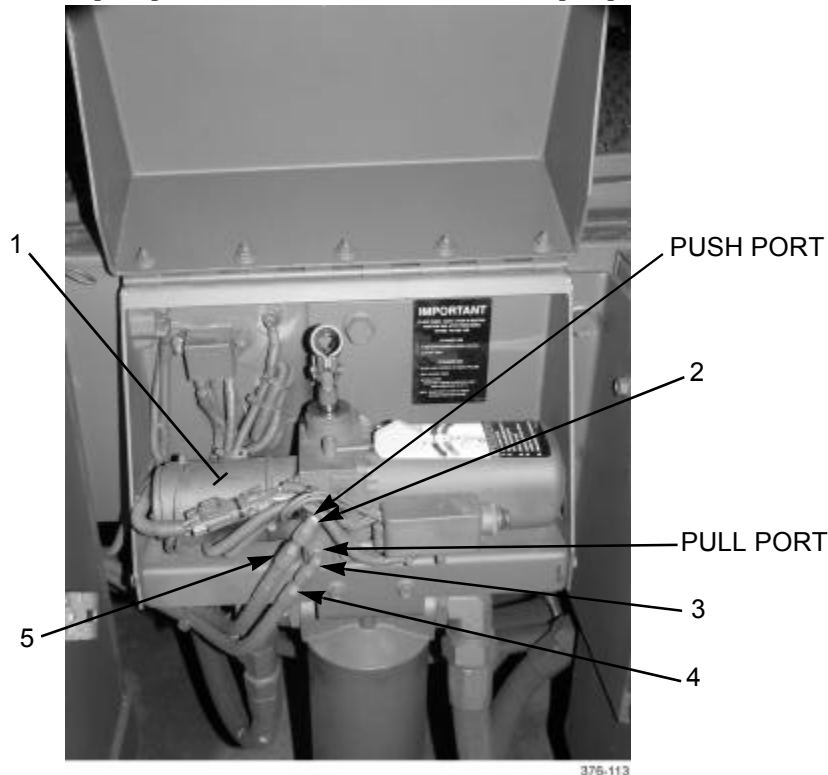
1. If removed, install elbow (11) to tee (12) and elbow (7) to cylinder (6).
2. Connect hose (5) to elbow (11) at push port of cylinder (6). Connect hose (4) to elbow (7) at pull port.



**PUMP-TO-TILT CYLINDER HOSES INSTALLATION - CONTINUED****NOTE**

Cab tilt latch hose is secured along with hoses (4 and 5), at clamp location closest to cab tilt cylinder.

3. Route hoses (4 and 5) to pump (1). Secure hoses to welded studs (9) on frame rail with four clamps (10) and new lock-nuts (8). Install new tiedown straps.
4. If removed, install elbows (2 and 3) to pump (1).
5. Connect hose (5) to elbow (2) at push port. Connect hose (4) to elbow (3) at pull port.



6. Place battery disconnect switch in ON position.
7. Fill cab tilt pump reservoir as required, and bleed air from system (WP 0125 00).

**CAB TILT LATCH HOSE REMOVAL****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

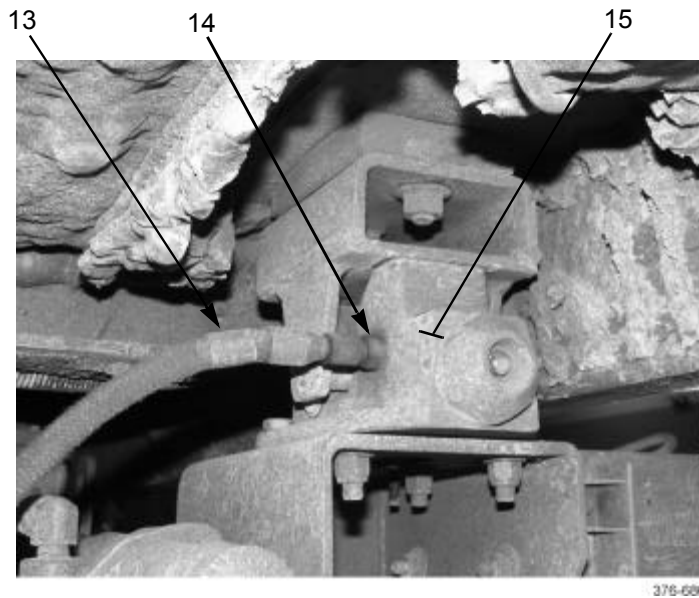
**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

***CAB TILT LATCH HOSE REMOVAL - CONTINUED*****NOTE**

Use a drain pan to capture hydraulic fluid in hose. Dispose of hydraulic fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.

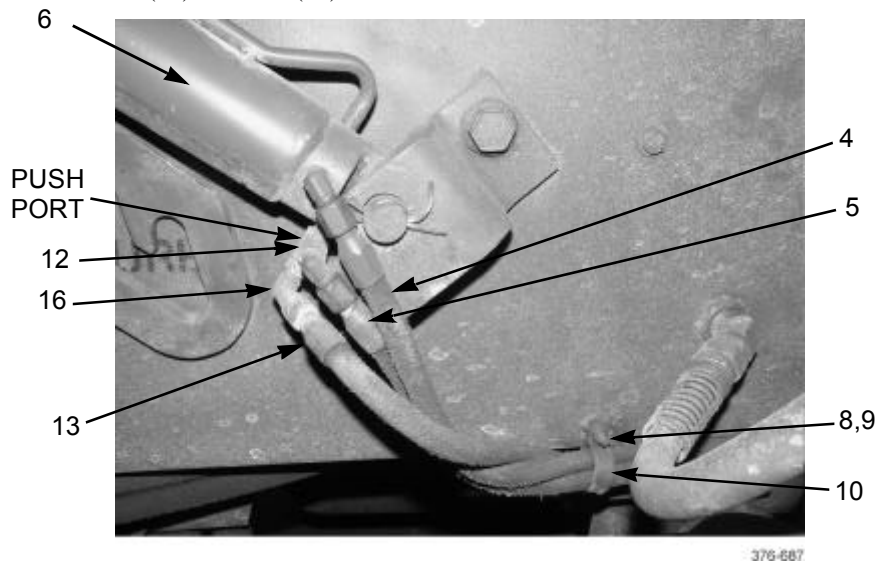
1. Disconnect hose (13) from straight fitting (14) at cab tilt latch (15).
2. If damaged, remove straight fitting (14) from cab tilt latch (15).



**CAB TILT LATCH HOSE REMOVAL - CONTINUED****NOTE**

Pump-to-cab tilt cylinder hoses (4 and 5) are released along with hose (13).

3. Remove locknut (8), clamp (10), and release hose (13) from welded stud (9) at frame rail. Discard locknut.
4. At cylinder (6), disconnect hose (13) from elbow (16) at push port.
5. If damaged, remove elbow (16) from tee (12).

**CAB TILT LATCH HOSE INSTALLATION**

1. If removed, install elbow (16) to tee (12).
2. Connect hose (13) to elbow (16) at push port of cylinder (6).

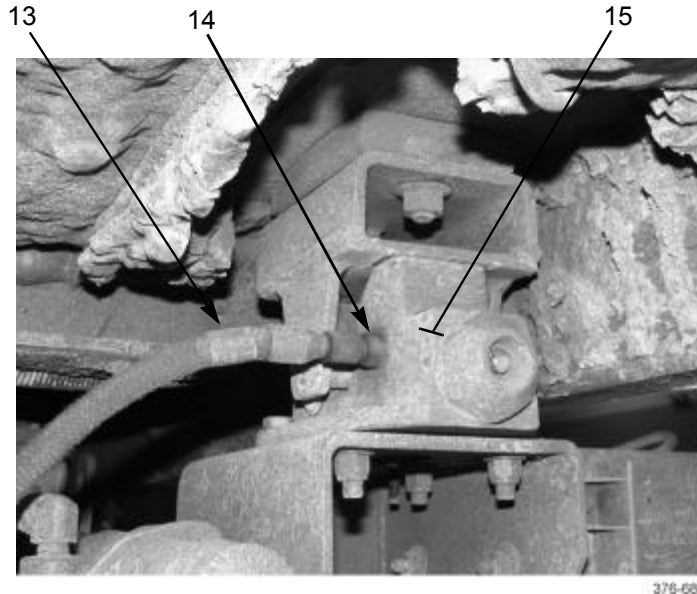
**NOTE**

Pump-to-cab tilt cylinder hoses (4 and 5) are secured along with hose (13).

3. Secure hose (13) to welded stud (9) on frame rail with clamp (10) and new locknut (8).

***CAB TILT LATCH HOSE INSTALLATION - CONTINUED***

4. If removed, install straight fitting (14) to cab tilt latch (15).
5. Connect hose (13) to straight fitting (14).



6. Place battery disconnect switch in ON position.
7. Fill cab tilt pump reservoir as required, and bleed air from system (WP 0125 00).

**END OF WORK PACKAGE**

**FIFTH WHEEL LIFT HYDRAULIC HOSES AND FITTINGS REPLACEMENT  
AND LIFT CYLINDER HEAD CAP AND ROD PACKING TIGHTENING**

**0127 00**

**THIS WORK PACKAGE COVERS**

Hose: Removal, Installation

Tightening Lift Cylinder Head Cap and Rod Packing

**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 190

**RPSTL Reference**

Group 190, Figure 3

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

Wrench, spanner (Item 37, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Fluid, hydraulic, petroleum base (Item 25 or 26, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N 21NE048) (2)

**References**

TM 9-2320-312-10

WP 0039 00

WP 0129 00

WP 0137 00



**WARNING**



- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
- At operating temperature, hydraulic fluid is hot. Allow hydraulic fluid to cool before disconnecting any hydraulic lines. Failure to do so could result in serious burns.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

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**FIFTH WHEEL LIFT HYDRAULIC HOSES AND FITTINGS REPLACEMENT  
AND LIFT CYLINDER HEAD CAP AND ROD PACKING TIGHTENING - CONTINUED**

---

0127 00

**NOTE**

- Replacement of hydraulic hoses between hydraulic reservoir, filter, power steering pump, flow control valve, fifth wheel lift cylinder locking valve, and fifth wheel lift cylinders is similar. The procedures differ only in specifics: quantity of clamps supporting hoses, routing of hoses, and fittings at end of hoses.
- This work package describes replacement of a representative length of hose: between flow control valve, located at crossmember above transmission, and right-side fifth wheel lift cylinder.
- Diagram of fifth wheel lift hydraulic system is located in Figure 2 in WP 0137 00 (*Diagrams*).

**HOSE REMOVAL**

1. Position steering wheel with wheels facing straight ahead.
2. Ensure fifth wheel is fully lowered (TM 9-2320-312-10).
3. Shut down engine.
4. Place battery disconnect switch in OFF position.
5. Remove rear platform grating and transmission access cover to access full length of hose (WP 0039 00).

**WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

- Tag hydraulic hoses and note position of fittings to ensure correct installation.
- Use a drain pan to capture hydraulic fluid in hoses. Dispose of hydraulic fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.

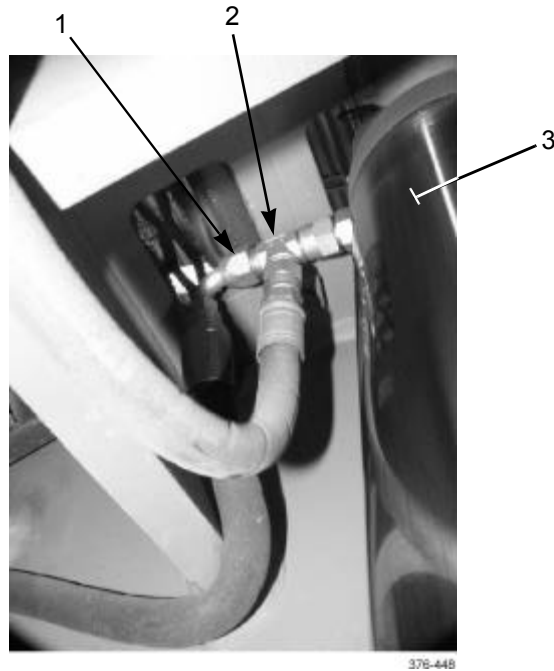


**FIFTH WHEEL LIFT HYDRAULIC HOSES AND FITTINGS REPLACEMENT  
AND LIFT CYLINDER HEAD CAP AND ROD PACKING TIGHTENING - CONTINUED**

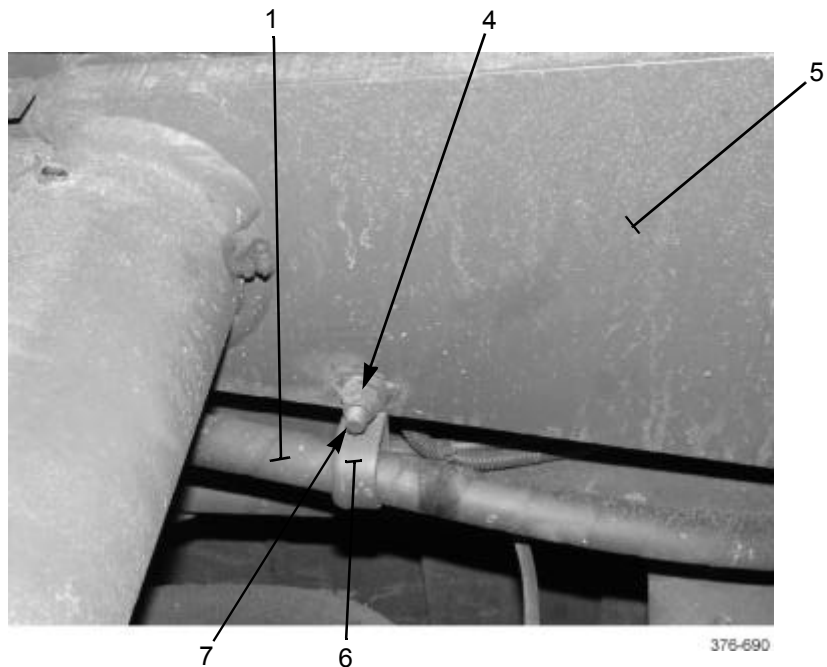
0127 00

**HOSE REMOVAL - CONTINUED**

6. At right-side lift cylinder (3), disconnect hose (1) from tee (2).



7. Remove two locknuts (4) and clamps (6) from welded studs (7). Release hose (1) from fifth wheel frame sub-assembly (5). Discard locknuts.



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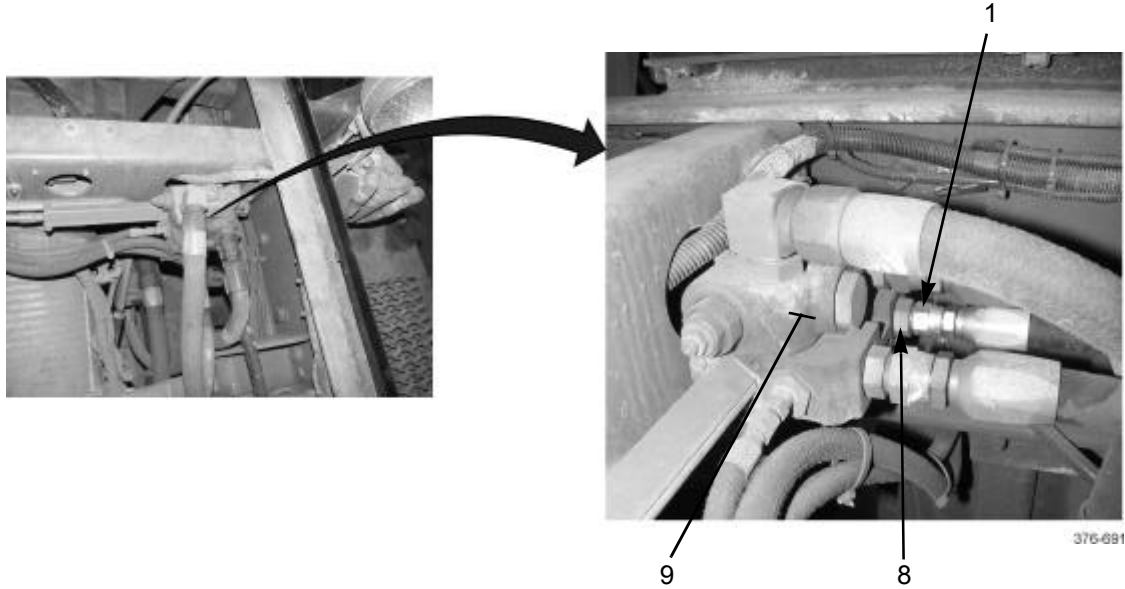
**FIFTH WHEEL LIFT HYDRAULIC HOSES AND FITTINGS REPLACEMENT  
AND LIFT CYLINDER HEAD CAP AND ROD PACKING TIGHTENING - CONTINUED**

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0127 00

***HOSE REMOVAL - CONTINUED***

8. At flow control valve (9), disconnect hose (1) from straight fitting (8) and remove hose from vehicle.
9. If damaged, remove straight fitting (8) from flow control valve (9).



**FIFTH WHEEL LIFT HYDRAULIC HOSES AND FITTINGS REPLACEMENT  
AND LIFT CYLINDER HEAD CAP AND ROD PACKING TIGHTENING - CONTINUED**

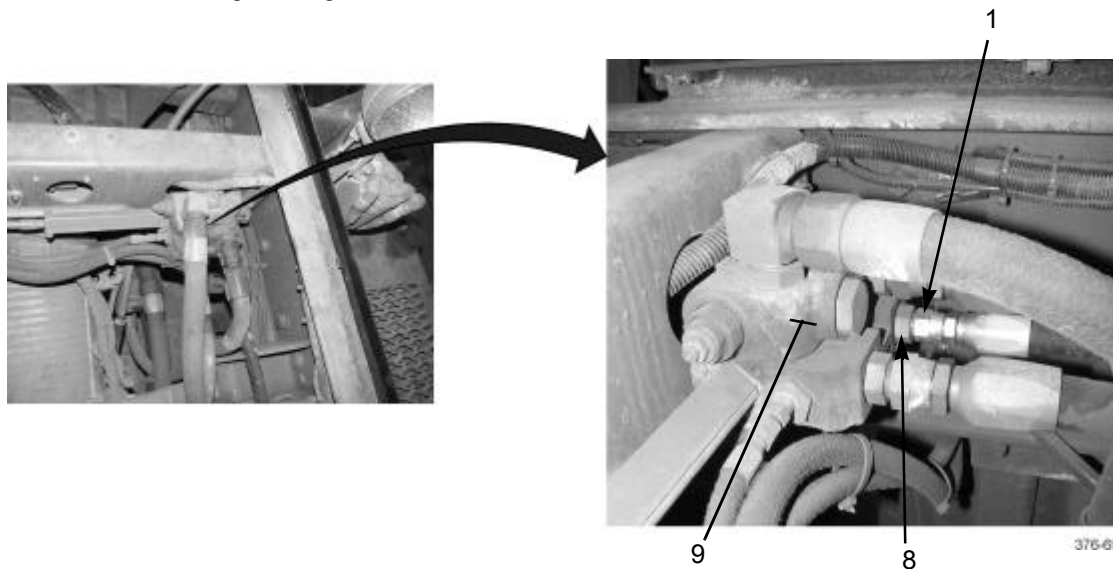
0127 00

**HOSE INSTALLATION**

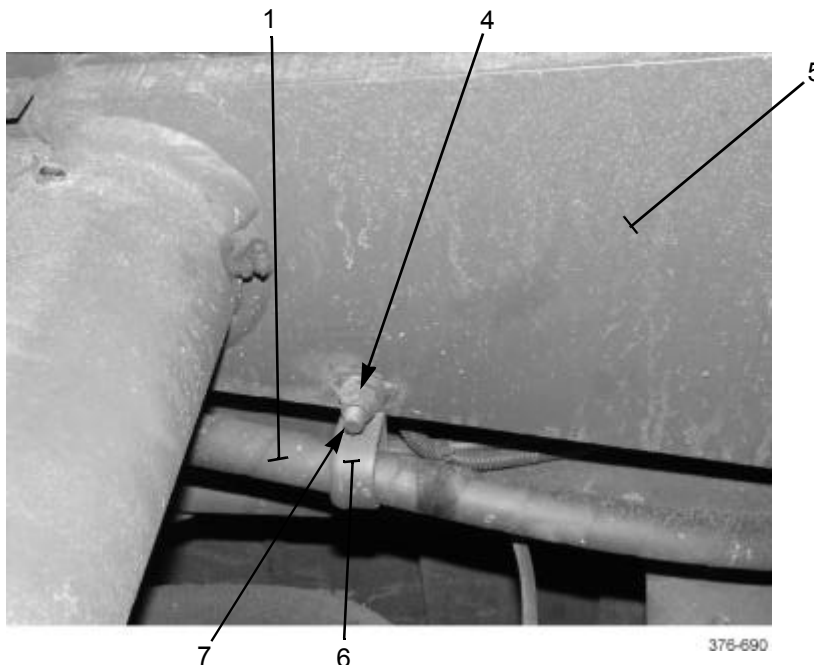
**NOTE**

Ensure new preformed packings, coated with hydraulic fluid, are used on all hydraulic fittings, prior to installation.

1. If removed, install straight fitting (8) to flow control valve (9).
2. Connect hose (1) to straight fitting (8).



3. Secure hose (1) to two welded studs (7) along fifth wheel frame sub-assembly (5) with two clamps (6) and new locknuts (4).

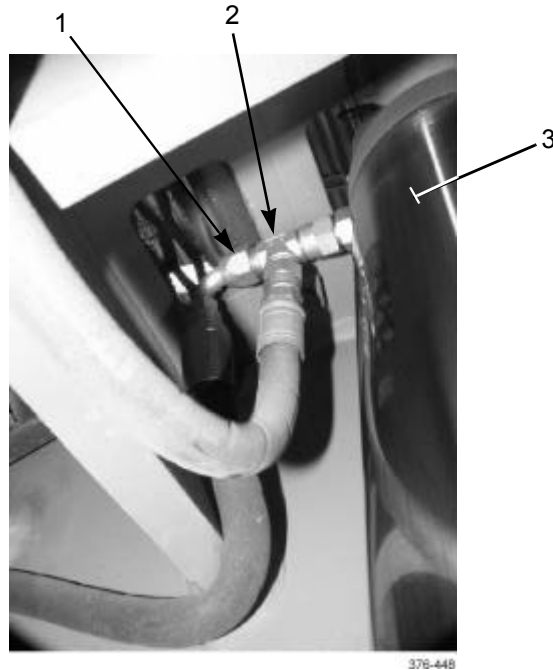


**FIFTH WHEEL LIFT HYDRAULIC HOSES AND FITTINGS REPLACEMENT  
AND LIFT CYLINDER HEAD CAP AND ROD PACKING TIGHTENING - CONTINUED**

0127 00

***HOSE INSTALLATION - CONTINUED***

4. Connect hose (1) to tee (2) at right-side lift cylinder (3).



5. Place battery disconnect switch in ON position.
6. Fill hydraulic reservoir as required (WP 0129 00). Be alert for evidence of leaks.
7. Install transmission access cover and rear platform grating (WP 0039 00).

***TIGHTENING LIFT CYLINDER HEAD CAP AND ROD PACKING***

**NOTE**

If the following procedure does not eliminate leakage from lift cylinder head caps, cylinder will require replacement.

1. Fully raise fifth wheel (TM 9-2320-312-10).

**CAUTION**

Ensure block of wood is placed so as not to come in contact with fittings at top of rear air reservoir. Failure to do so may damage fittings.

2. Place a block of wood across frame, to provide support for fifth wheel frame sub-assembly (13). Lower fifth wheel frame sub-assembly onto block of wood.
3. Shut down engine. Operate fifth wheel lift control to relieve hydraulic pressure in cylinders (TM 9-2320-312-10).
4. Back out setscrew (10) on cap (11) a few turns.
5. Use a strap wrench to hold rod sleeve.
6. Insert blade of spanner wrench into cap spanner slot (12). Tighten clockwise until there is no looseness in cap (11).

**FIFTH WHEEL LIFT HYDRAULIC HOSES AND FITTINGS REPLACEMENT  
AND LIFT CYLINDER HEAD CAP AND ROD PACKING TIGHTENING - CONTINUED**

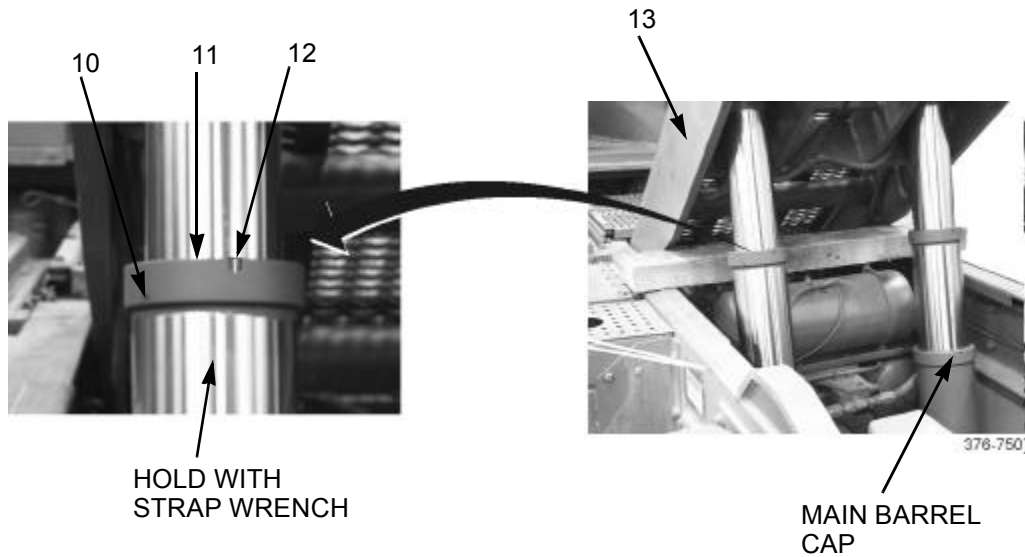
0127 00

**TIGHTENING LIFT CYLINDER HEAD CAP AND ROD PACKING - CONTINUED**

**CAUTION**

Failure to back off cap may damage rod packing and result in leaks.

7. Back cap (11) off 1/8th of a turn.
8. Tighten setscrew (10).



9. Repeat steps to tighten main barrel cap, except that use of strap wrench is not needed.

**END OF WORK PACKAGE**

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**HYDRAULIC SYSTEM VALVES REPLACEMENT**

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0128 00

**THIS WORK PACKAGE COVERS**

Cylinder Locking Valve: Removal, Installation

Flow Control Valve: Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 190

**RPSTL Reference**

Group 190, Figure 3

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Caulk, strip (Item 7, WP 0165 00)

Fluid, hydraulic, petroleum base (Item 25 or 26, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

**Materials/Parts - Continued**

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Nut, lock (locking valve) (P/N 21NE066) (2)

**References**

WP 0129 00

**Personnel Required**

Two (flow control valve replacement)

**Equipment Condition**

Fifth wheel fully lowered (TM 9-2320-312-10)

Engine shut down

Rear platform grating removed, if replacing cylinder locking valve (WP 0039 00)

Cab tilted, if replacing flow control valve (TM 9-2320-312-10)

Transmission access cover removed, if replacing flow control valve (WP 0039 00)

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**WARNING**

- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
- At operating temperature, hydraulic fluid is hot. Allow hydraulic fluid to cool before disconnecting any hydraulic lines. Failure to do so could result in serious burns.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

**CYLINDER LOCKING VALVE REMOVAL****WARNING**

- Ensure fifth wheel is fully lowered when removing locking valve. A raised fifth wheel will travel downward when hydraulic hoses are disconnected, causing injury or death to personnel.
- When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

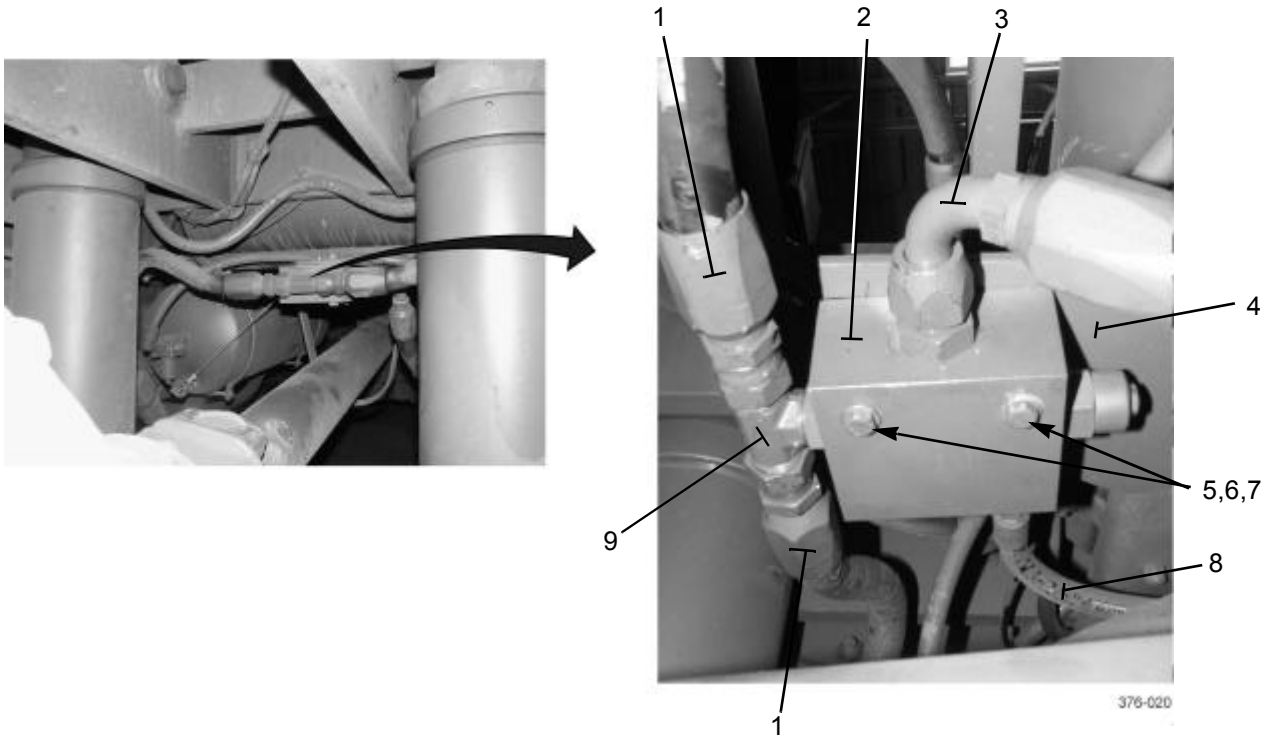
- Use a drain pan to capture hydraulic fluid in hoses. Dispose of hydraulic fluid in accordance with local policy and ordinances. To minimize hydraulic fluid loss, tie up each hydraulic hose as high as possible to frame or crossmembers. Clean up all spills.
- Tag hydraulic hoses and note position of valve fittings to ensure correct installation.

1. Disconnect two hydraulic hoses (1) from tee (9) at locking valve (2).
2. Disconnect hydraulic hose (3) from right side of locking valve (2).
3. Disconnect hydraulic hose (8) from left side of locking valve (2).



**CYLINDER LOCKING VALVE REMOVAL - CONTINUED**

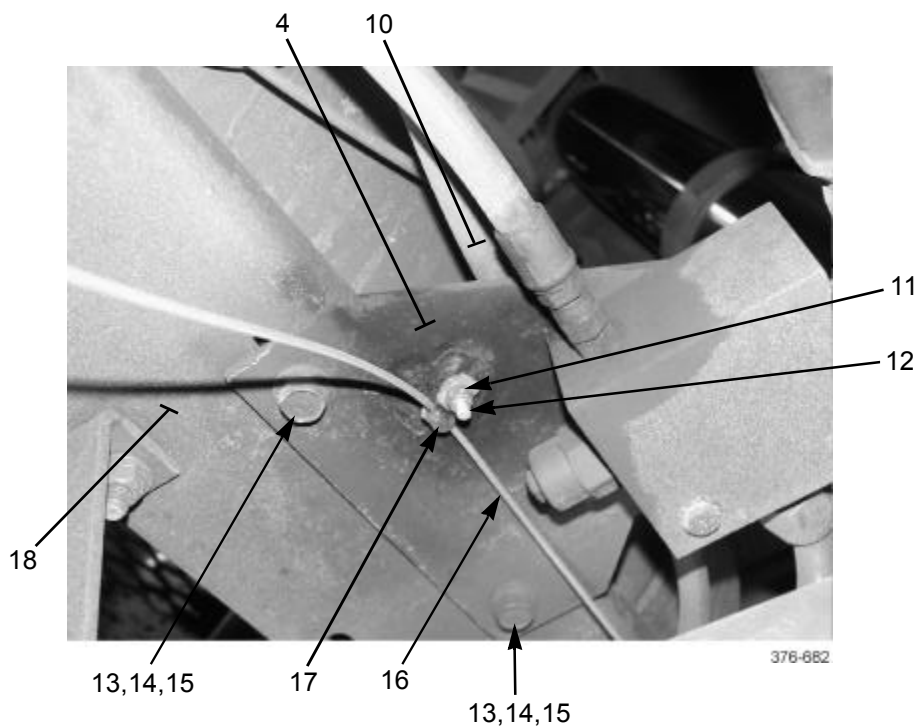
4. Remove two locknuts (5), bolts (6), flatwashers (7), and locking valve (2) from mounting bracket (4). Discard locknuts.
5. Remove tee (9) from locking valve (2).



**CYLINDER LOCKING VALVE REMOVAL - CONTINUED****NOTE**

If damaged, perform steps 6 and 7 to remove mounting bracket.

6. Remove nut (11) and clamp (17) from welded stud (12) and release drain valve cable pull (16) from mounting bracket (4). Repeat to release air hose (10).
7. Remove two nuts (13), flatwashers (14), bolts (15), and mounting bracket (4) from air reservoir mounting bracket (18).

**CYLINDER LOCKING VALVE INSTALLATION****NOTE**

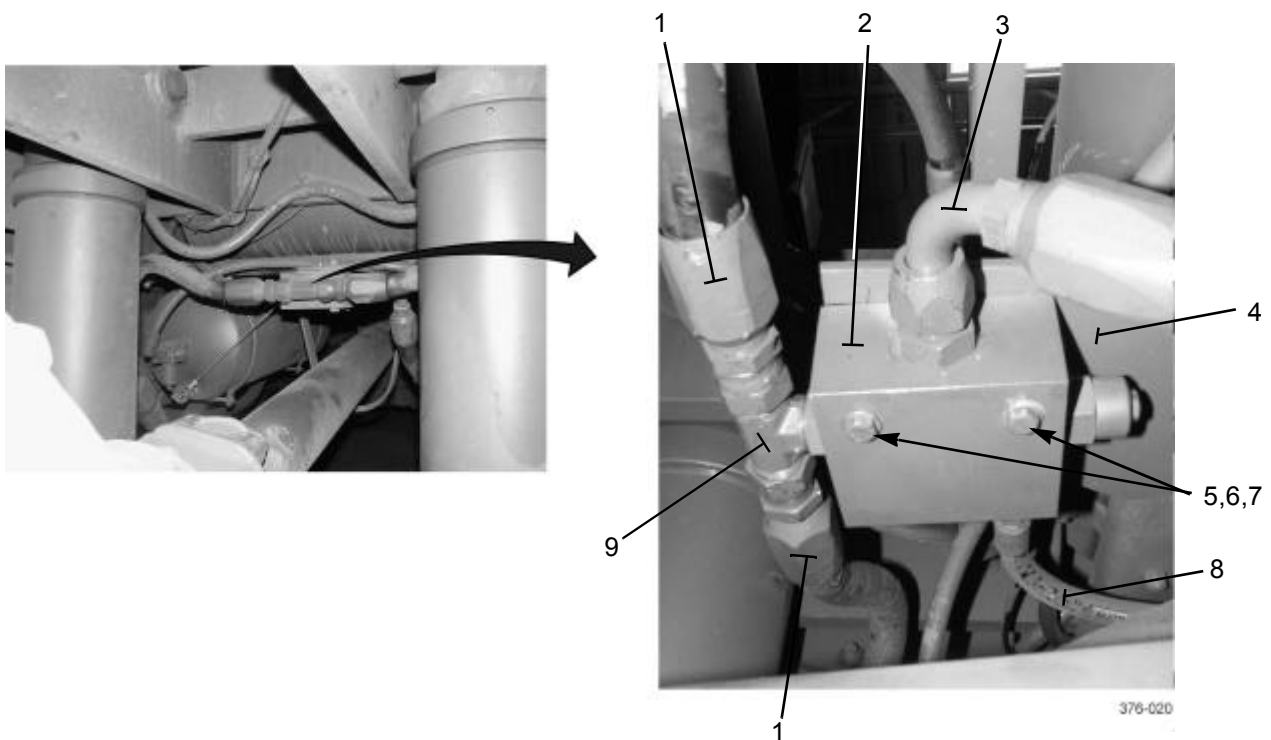
Perform steps 1 and 2 to install mounting bracket.

1. Install mounting bracket (4) to air reservoir mounting bracket (18) with two bolts (15), flatwashers (14), and nuts (13).
2. Install clamp (17) with drain valve cable pull (16) to welded stud (12) on mounting bracket (4) with nut (11). Repeat to secure air hose (10) to mounting bracket.

**CYLINDER LOCKING VALVE INSTALLATION - CONTINUED****NOTE**

Ensure new preformed packings, coated with hydraulic fluid, are used on hydraulic fittings prior to installation.

3. Install tee (9) to locking valve (2).
4. Install locking valve (2) to mounting bracket (4) with two flatwashers (7), bolts (6), and new locknuts (5).
5. At left side of locking valve (2), connect hydraulic hose (8).
6. At right side of locking valve (2), connect hydraulic hose (3).
7. Connect two hydraulic hoses (1) to tee (9).



8. Fill hydraulic reservoir with hydraulic fluid (WP 0129 00).
9. Install rear platform grating (WP 0039 00).

**FLOW CONTROL VALVE REMOVAL****WARNING**

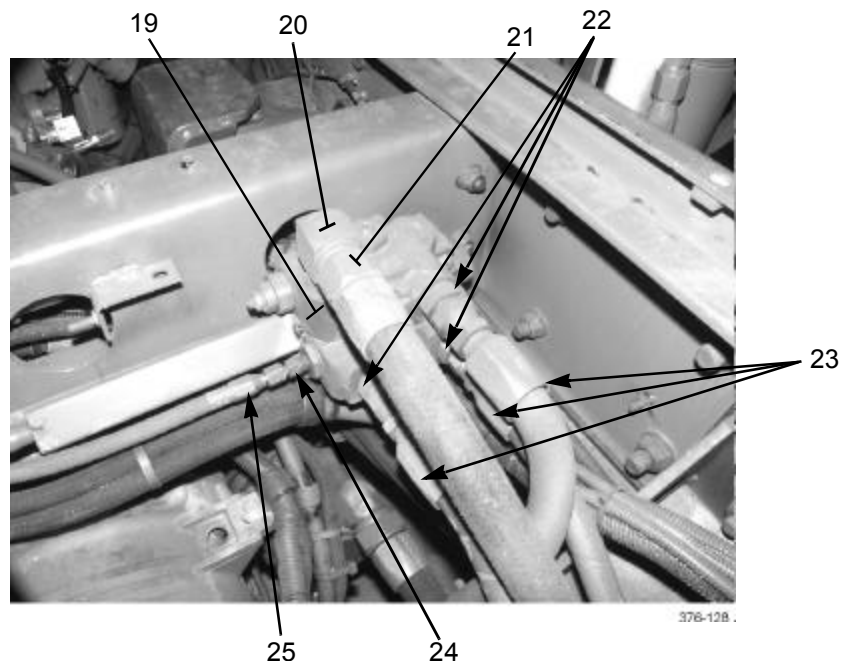
When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

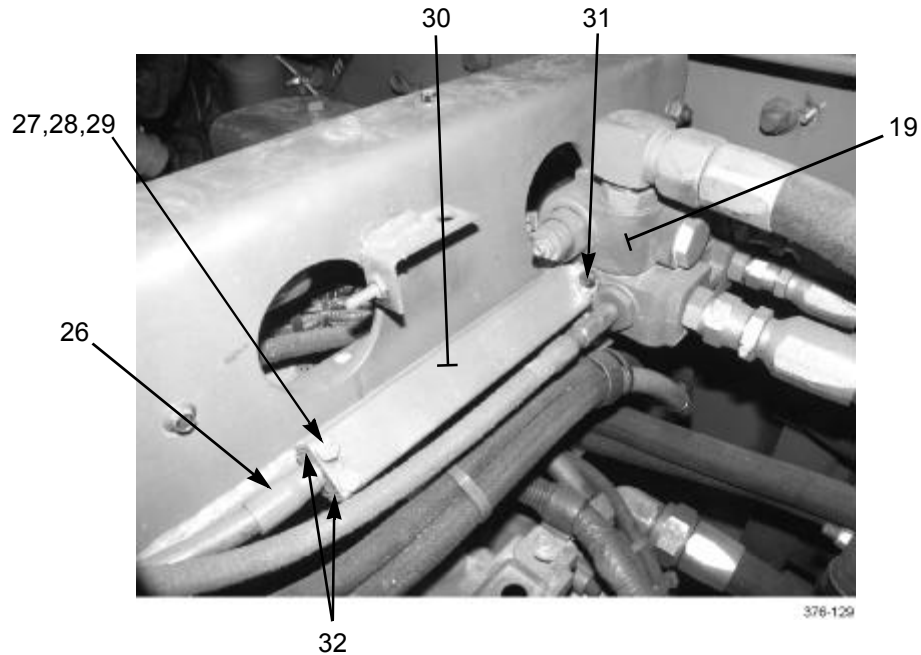
**NOTE**

- Use a drain pan to capture hydraulic fluid in hoses. Dispose of hydraulic fluid in accordance with local policy and ordinances. To minimize hydraulic fluid loss, tie up each hydraulic hose as high as possible to frame or crossmembers.
  - Tag hydraulic hoses and note position of valve fittings to ensure correct installation.
1. Disconnect three hydraulic hoses (23) from straight fittings (22) at control valve (19).
  2. Disconnect hydraulic hose (21) from elbow (20) at control valve (19).
  3. Disconnect load sensing gauge hose (25) from straight fitting (24).

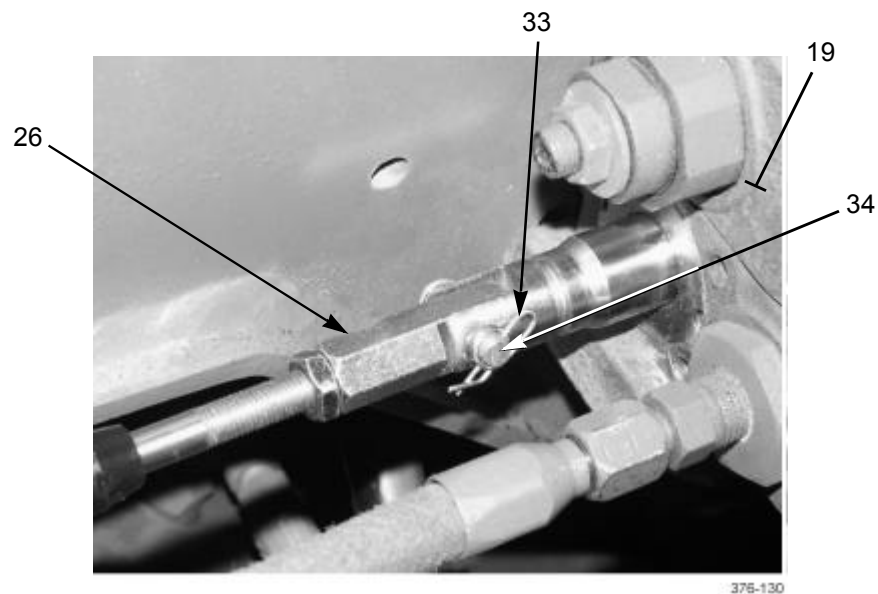


**FLOW CONTROL VALVE REMOVAL - CONTINUED**

4. Remove two nuts (27), lockwashers (28), and screws (29) from end of cable guide (30).
5. Remove two screws (31), two halves of cable guide (30), and two spacers (32) from control valve (19) and control cable (26).



6. Remove wire clip (33) and pin (34) to disconnect control cable (26) from control valve (19).



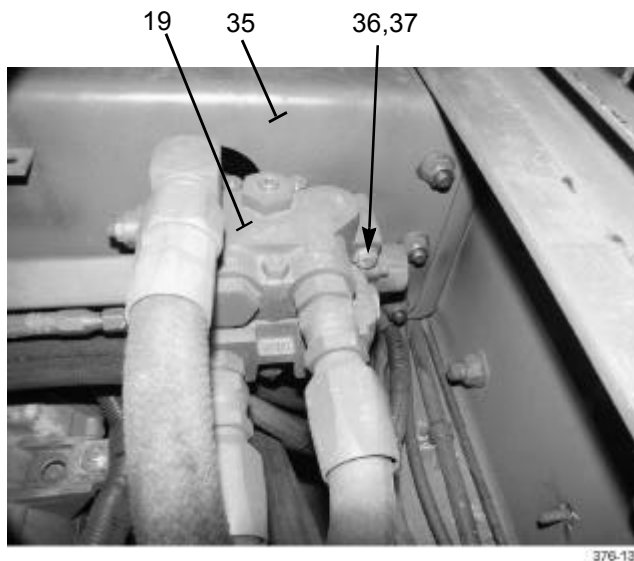
**FLOW CONTROL VALVE REMOVAL - CONTINUED**



**WARNING**

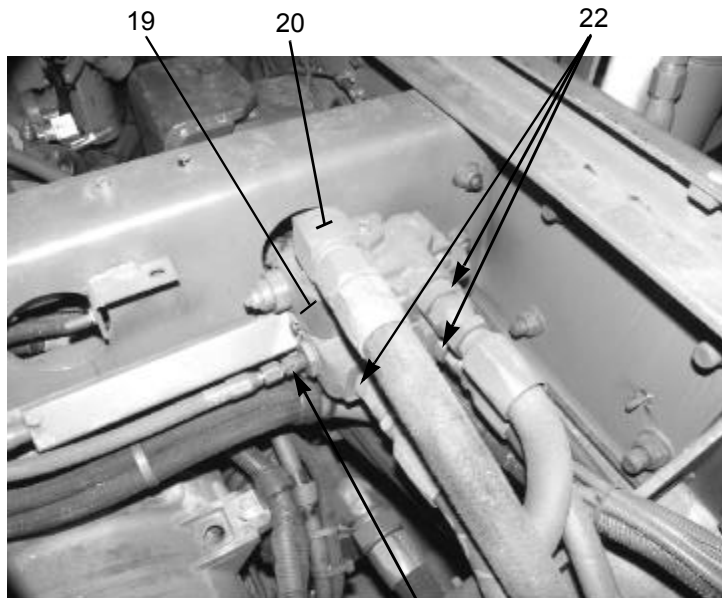
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

7. Remove three nuts (36), bolts (37), and control valve (19) from crossmember (35).



376-131

8. Remove straight fitting (24), elbow (20), and three straight fittings (22) from control valve (19).



376-128

24

**FLOW CONTROL VALVE INSTALLATION****NOTE**

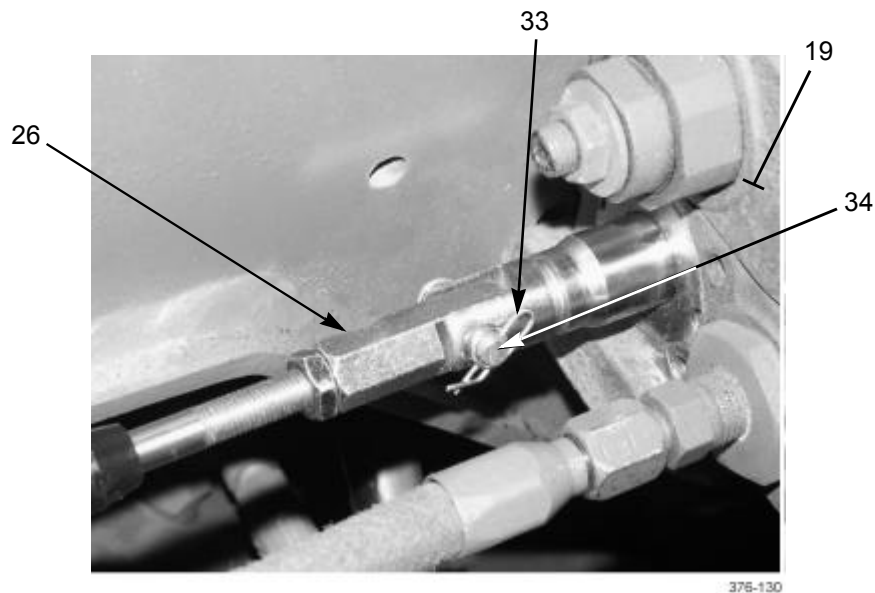
Ensure new preformed packings, coated with hydraulic fluid, are used on hydraulic fittings prior to installation.

1. Install three straight fittings (22), elbow (20), and straight fitting (24) to control valve (19).

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

2. Install control valve (19) to crossmember (35) with three bolts (37) and nuts (36).
3. Connect control cable (26) to control valve (19) with pin (34) and wire clip (33).



**FLOW CONTROL VALVE INSTALLATION - CONTINUED****NOTE**

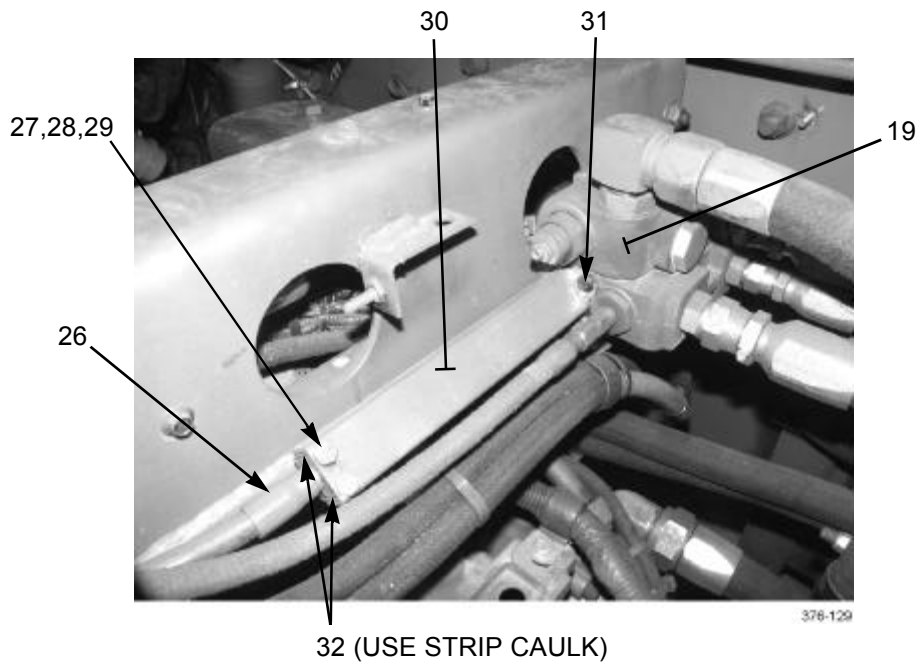
Use strip caulk at cable guide to assist in keeping spacers in position as they are installed.

4. Install two spacers (32) and two halves of cable guide (30) to control cable (26) and control valve (19) with two screws (31).

**NOTE**

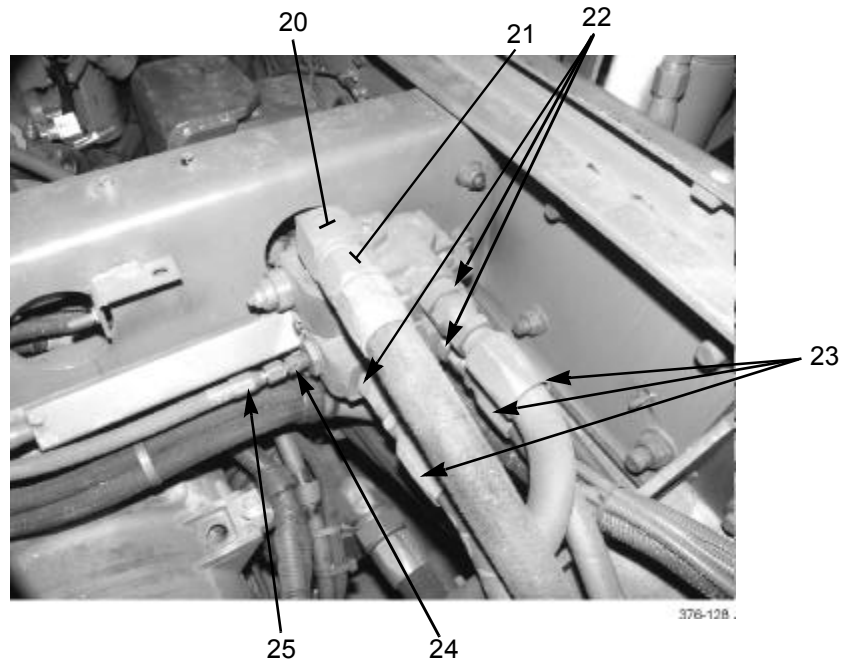
Replacement cable guide comes with new lockwashers.

5. Install two screws (29), lockwashers (28), and nuts (27) to end of cable guide (30).



6. Connect load sensing gauge hose (25) to straight fitting (24).
7. Connect hydraulic hose (21) to elbow (20).
8. Connect three hydraulic hoses (23) to straight fittings (22).



**FLOW CONTROL VALVE INSTALLATION - CONTINUED**

9. Install new tiedown straps as required.
10. Fill hydraulic reservoir with hydraulic fluid (WP 0129 00).
11. Install transmission access cover (WP 0039 00).
12. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**DRAINING AND FILLING HYDRAULIC RESERVOIR**

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0129 00

**THIS WORK PACKAGE COVERS**

Draining, Filling

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**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 190

**RPSTL Reference**

Group 190, Figure 3

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Fluid, hydraulic, petroleum base (Item 25 or 26, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

**Equipment Condition**

Fifth wheel fully lowered (TM 9-2320-312-10)

Engine shut down

**WARNING**

- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
- At operating temperature, hydraulic fluid is hot. Allow hydraulic fluid to cool before disconnecting any hydraulic lines. Failure to do so could result in serious burns.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

**DRAINING****WARNING**

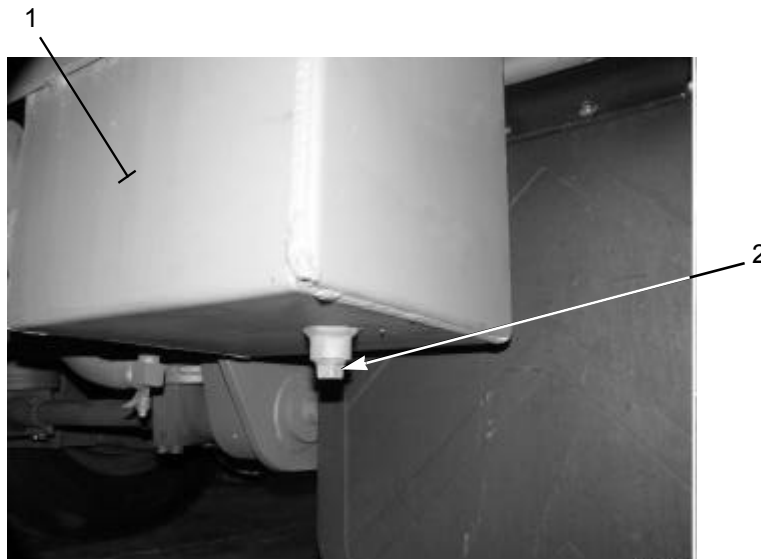
When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

- Use a suitable container to capture draining hydraulic fluid. Dispose of fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.
  - Total hydraulic system capacity is 15 gal (56.8 L).
  - Hydraulic reservoir alone has a capacity of 12 gal (45.2 L).
1. Remove drain plug (2) from bottom of hydraulic reservoir (1) and allow hydraulic fluid to drain into a suitable container.
  2. Reinstall drain plug (2).



376-226

**FILLING****CAUTION**

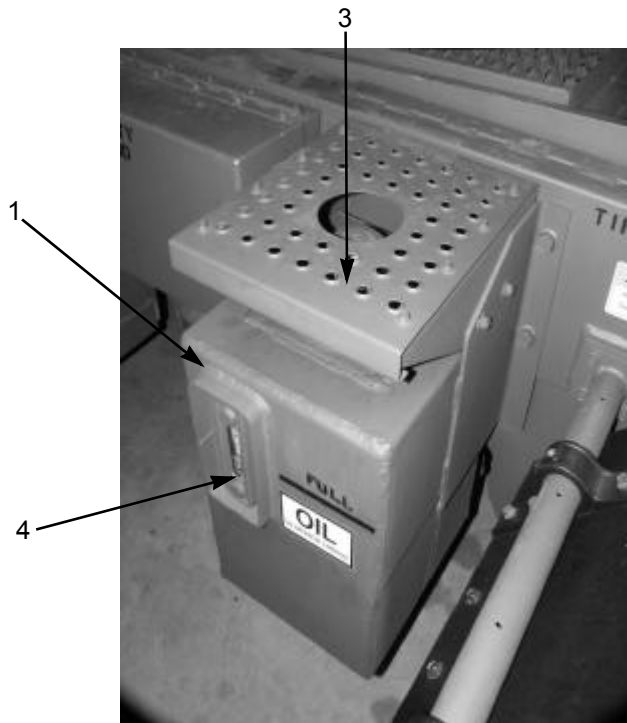
Wipe area clean around filler cap prior to removing cap. Contamination of hydraulic system could result in equipment failure.

1. Remove filler cap (3) from hydraulic reservoir (1).

**WARNING**

Avoid overfilling hydraulic reservoir. Expansion of hydraulic fluid during vehicle operation may cause hydraulic fluid to overflow hydraulic reservoir, creating a slipping hazard. Failure to follow this warning may cause injury to personnel and damage to equipment.

2. Inspect screen at filler opening to ensure it is clean and free of debris. Add hydraulic fluid until sight gauge (4) shows fluid at bottom of gauge. Install filler cap (3).
3. Start engine (TM 9-2320-312-10). Cycle steering from left to right and return, making three complete cycles. Raise and lower fifth wheel to circulate hydraulic fluid and allow fluid to warm up and expand.
4. With fifth wheel fully lowered and steering centered, check fluid level on sight gauge (4). Level of hydraulic fluid should be even with FULL line stenciled on side of hydraulic reservoir (1).
5. If no hydraulic fluid shows on sight gauge, remove filler cap (3) and add hydraulic fluid until level of fluid is as specified in step 4 above. Reinstall filler cap.



376-227

**END OF WORK PACKAGE**

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**HYDRAULIC RESERVOIR REPLACEMENT**

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**0130 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 190

**RPSTL Reference**

Group 190, Figure 3

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Fluid, hydraulic, petroleum base (Item 25 or 26, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**Personnel Required**

Two

**Equipment Condition**

Hydraulic reservoir drained (WP 0129 00)

Hydraulic reservoir step removed (WP 0050 00)

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**REMOVAL****WARNING**

- When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

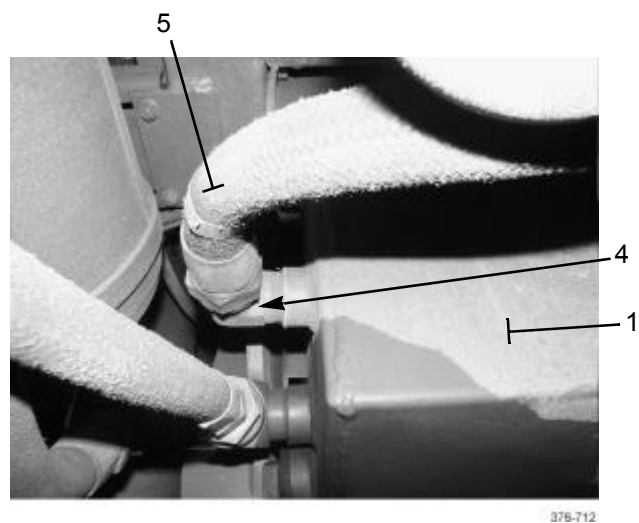
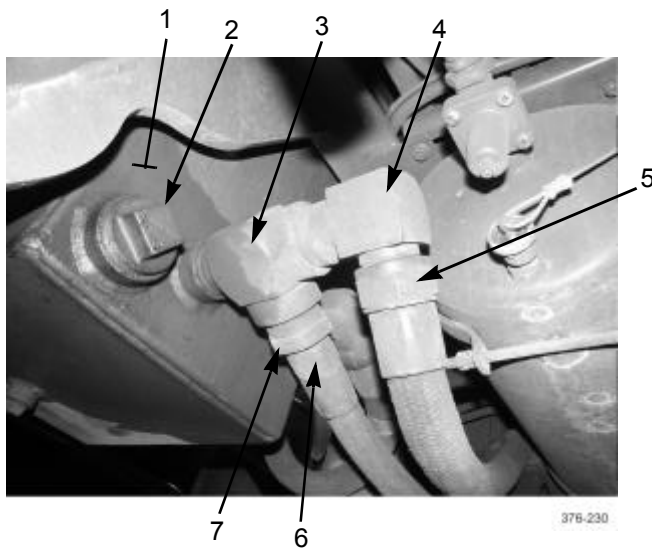
**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

- Use a suitable container to capture any residual hydraulic fluid in hoses. Dispose of fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.
- Tag hydraulic hoses and note position of fittings on reservoir, to ensure correct installation.

1. Disconnect two hydraulic hoses (5) from elbows (4) at hydraulic reservoir (1).
2. Disconnect hydraulic hose (6) from straight fitting (7).





**REMOVAL - CONTINUED**

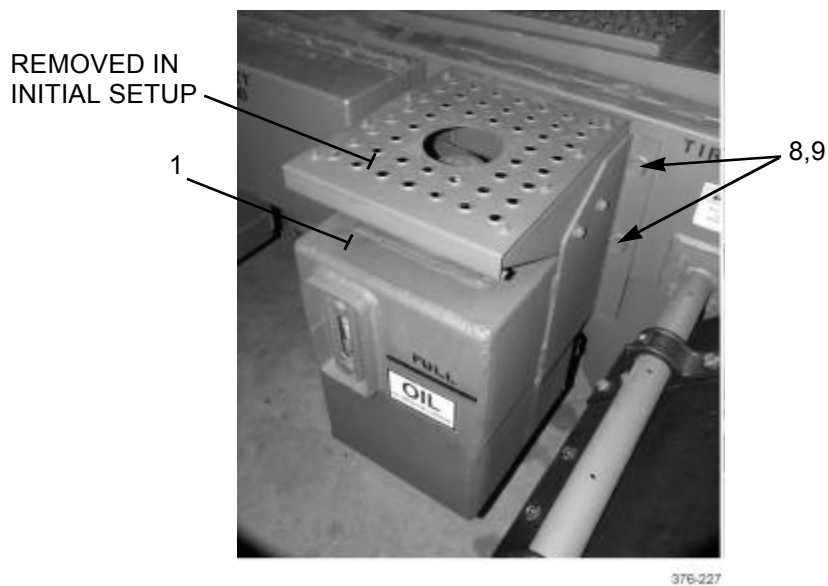


**WARNING**



Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

3. Place a hydraulic jack, with a block of wood, centered under hydraulic reservoir (1) to provide support.
4. Remove four nuts (8), bolts (9), and hydraulic reservoir (1) from left frame rail.



5. Remove two elbows (4), straight fitting (7), tee (3), plug (2), and drain plug (10) from hydraulic reservoir (1).



**INSTALLATION**

**NOTE**

Ensure new preformed packings, coated with hydraulic fluid, are used on hydraulic fittings prior to installation.

1. Install drain plug (10), plug (2), tee (3), straight fitting (7), and two elbows (4) to hydraulic reservoir (1).

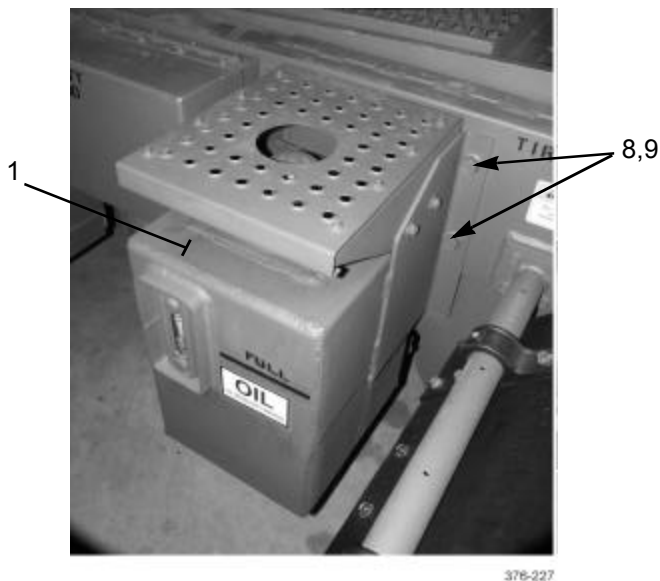


**WARNING**



Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

2. Place hydraulic jack, with a block of wood, centered under hydraulic reservoir (1) to provide support.
3. Install hydraulic reservoir (1) to left frame rail with four bolts (9) and nuts (8).

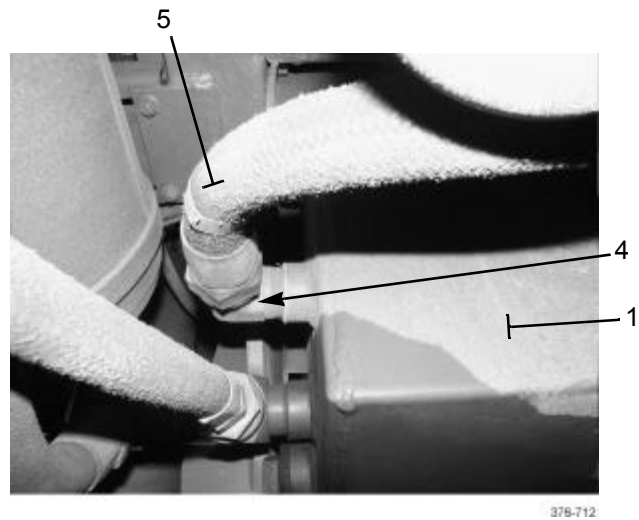
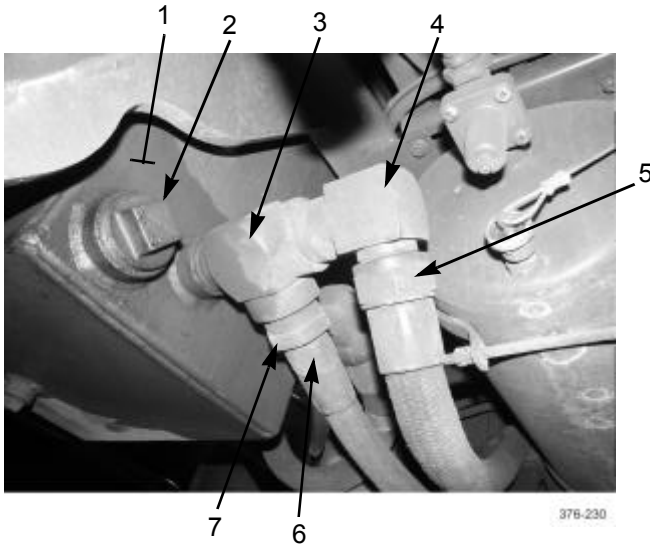


**HYDRAULIC RESERVOIR REPLACEMENT - CONTINUED**

0130 00

**INSTALLATION - CONTINUED**

4. Connect hydraulic hose (6) to straight fitting (7).
5. Connect two hydraulic hoses (5) to elbows (4).



6. Fill hydraulic reservoir (WP 0129 00).
7. Install hydraulic reservoir step (WP 0050 00).

**END OF WORK PACKAGE**

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**HYDRAULIC FILTER MAINTENANCE****0131 00****THIS WORK PACKAGE COVERS**

Filter Element Replacement

Filter Head: Removal, Installation

**INITIAL SETUP****Maintenance Level**

Unit

**MAC Reference**

Group 190

**RPSTL Reference**

Group 190, Figure 3

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Fluid, hydraulic, petroleum base (Item 25 or 26, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Filter element, fluid (P/N 102D-52)

**References**

WP 0129 00

**Equipment Condition**

Fifth wheel fully lowered (TM 9-2320-312-10)

Engine shut down

**WARNING**

- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
- At operating temperature, hydraulic fluid is hot. Allow hydraulic fluid to cool before disconnecting any hydraulic lines. Failure to do so could result in serious burns.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

**FILTER ELEMENT REPLACEMENT****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

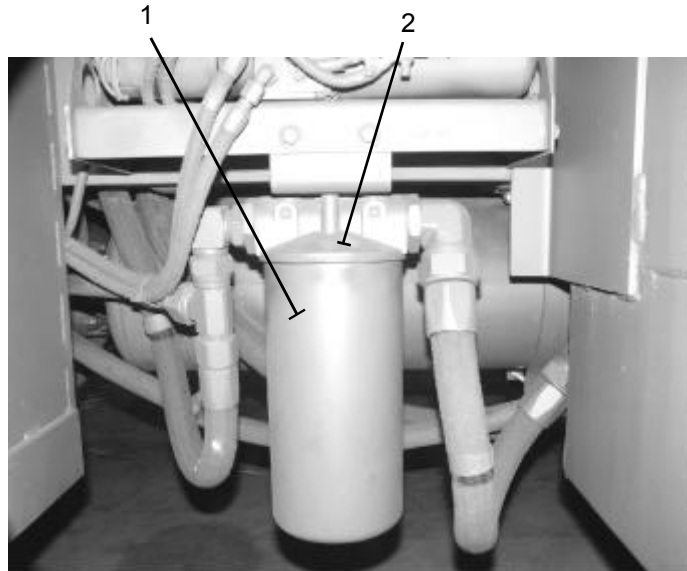
**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

Hydraulic filter element is filled with hydraulic fluid. Dispose of filter element and hydraulic fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.

1. Using strap wrench, remove filter element (1) from filter head (2).
2. Coat gasket sealing surface of new filter element (1) with hydraulic fluid. Fill filter element with hydraulic fluid.
3. Install filter element (1) to filter head (2) and tighten with strap wrench.



376-228

**FILTER HEAD REMOVAL****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

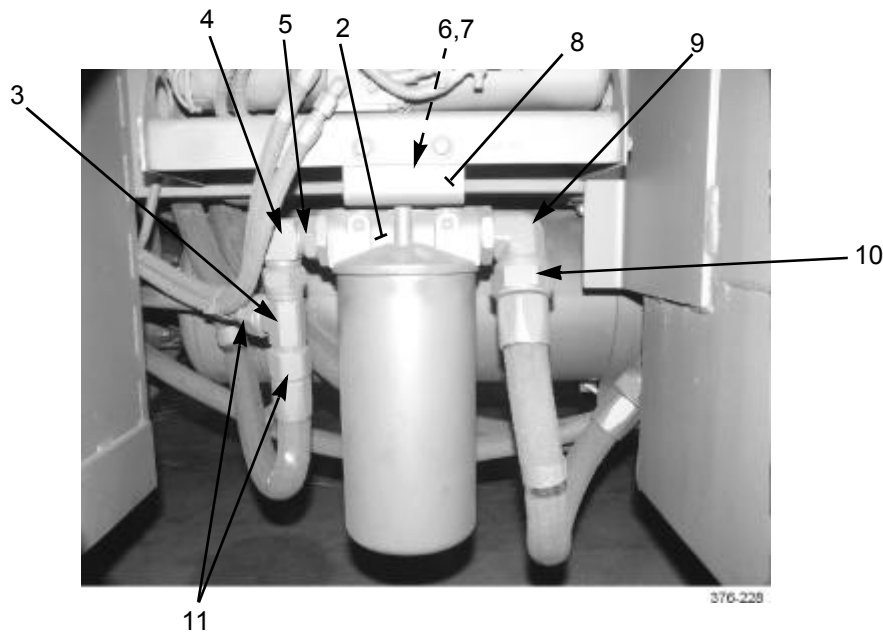
**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

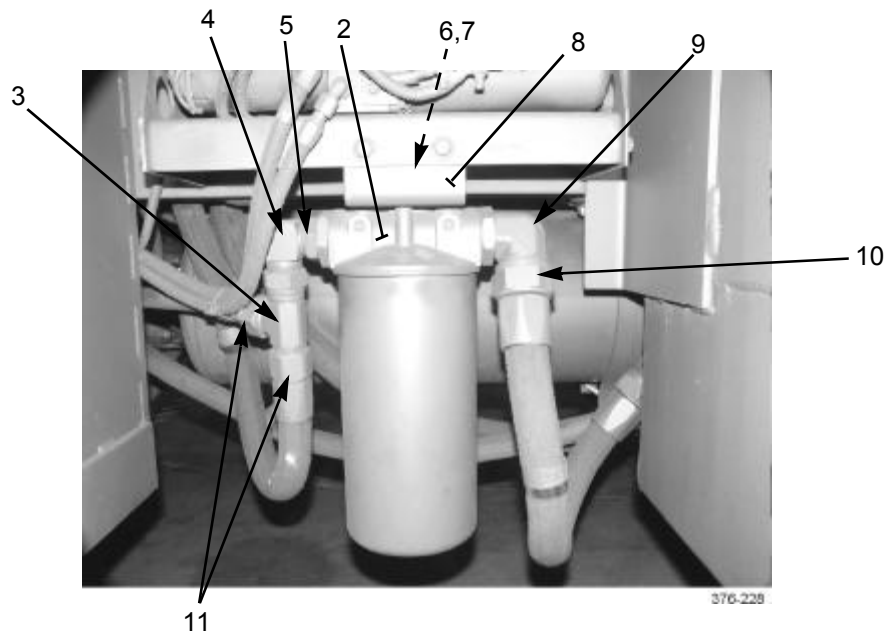
- Use a drain pan to capture hydraulic fluid in hydraulic hoses. Dispose of hydraulic fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.
- Tag hydraulic hoses and note position of filter head and fittings to ensure correct installation.
- Cut tiedown strap and discard. Use new tiedown strap on installation.

1. Remove filter element (Refer to *Filter Element Replacement*).
2. Disconnect two hydraulic hoses (11) from tee (3).
3. Disconnect hydraulic hose (10) from elbow (9).
4. Remove two screws (6), washers (7), and filter head (2) from bracket (8).
5. Remove tee (3), elbow (4), and adapter (5) from inlet to filter head (2).
6. Remove elbow (9) from outlet to filter head (2).



**FILTER HEAD INSTALLATION**

1. Install elbow (9) to outlet of filter head (2).
2. Install adapter (5), elbow (4), and tee (3) to inlet of filter head (2).
3. Install filter head (2) to bracket (8) with two washers (7) and screws (6).
4. Connect hydraulic hose (10) to elbow (9).
5. Connect two hydraulic hoses (11) to tee (3).
6. Install filter element (Refer to *Filter Element Replacement*).
7. Fill hydraulic reservoir, as necessary (WP 0129 00).

**END OF WORK PACKAGE**



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**ENGINE AND TRANSMISSION OIL SAMPLING VALVES, HOSES, AND FITTINGS REPLACEMENT 0132 00**

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**THIS WORK PACKAGE COVERS**

- Oil Sampling Valve Replacement
- Engine Oil Sampling Valve Hoses and Fittings: Removal, Installation
- Transmission Oil Sampling Valve Hose and Fittings: Removal, Installation

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**INITIAL SETUP**

**Maintenance Level**

Unit

**MAC Reference**

Group 190

**RPSTL Reference**

Group 190, Figure 4

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, common no. 1 (Item 28, WP 0166 00)

**Materials/Parts**

Compound, pipe sealing (Item 20, WP 0165 00)

Fluid, hydraulic, automatic transmission, Dexron III (Item 24, WP 0165 00)

Oil, lubricating (Item 42, 43 or 44, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

**References**

TM 9-2320-312-10

WP 0039 00

**Equipment Condition**

Engine shut down and cool

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**CAUTION**

Wipe area around fittings and hoses clean before disconnecting, to prevent debris from entering engine or transmission lubrication system.

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**ENGINE AND TRANSMISSION OIL SAMPLING VALVES, HOSES,  
AND FITTINGS REPLACEMENT - CONTINUED**

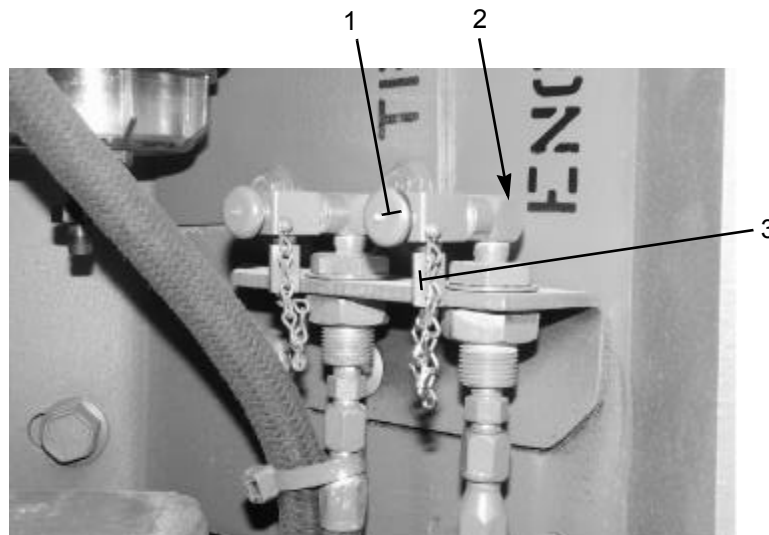

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0132 00

**OIL SAMPLING VALVE REPLACEMENT****NOTE**

Engine and transmission oil sampling valves are replaced the same way. Engine oil sampling valve is shown.

1. Remove oil sampling valve (1) from elbow (2).
2. Install oil sampling valve (1) to elbow (2). Ensure valve is positioned with discharge port (3) facing down.



376-078

**ENGINE OIL SAMPLING VALVE HOSES AND FITTINGS REMOVAL****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**NOTE**

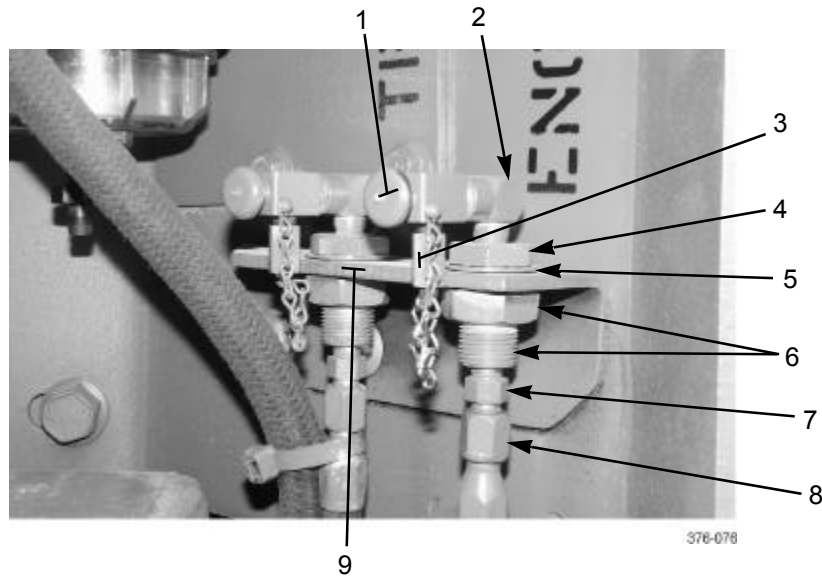
- Use a drain pan to capture any residual oil in hoses. Dispose of oil in accordance with local policy and ordinances. Ensure all spills are cleaned up.
  - Note routing of hoses to ensure correct installation.
  - Pipe sealing compound is used at certain fittings to ensure a leak-free seal. Note where pipe sealing compound is used.
1. Tilt cab (TM 9-2320-312-10).
  2. Disconnect hose (8) from straight fitting (7) at oil sampling valve (1).
  3. As required, remove the following fittings at oil sampling valve (1):

**ENGINE AND TRANSMISSION OIL SAMPLING VALVES, HOSES, AND FITTINGS REPLACEMENT - CONTINUED**

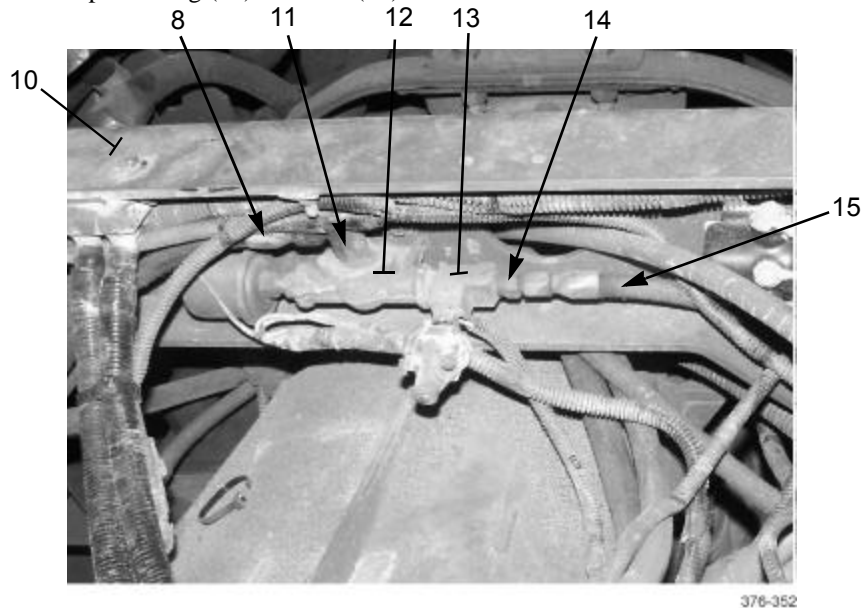
0132 00

**ENGINE OIL SAMPLING VALVE HOSES AND FITTINGS REMOVAL - CONTINUED**

- a. Remove straight fitting (7) from bulkhead fitting (6).
- b. Remove oil sampling valve (1) from elbow (2).
- c. Remove elbow (2) from bulkhead fitting (6).
- d. Remove nut (4), starwasher (5), and bulkhead fitting (6) from bracket (9).



4. Remove transmission access cover (WP 0039 00).
5. Trace hose (8) back to crossmember (10) directly behind cab. Remove tiedown straps and discard.
6. Disconnect hose (8) from elbow (11) and remove hose from vehicle.
7. As required, remove elbow (11) from tee (12).
8. Disconnect hose (15) from adapter fitting (14).
9. As required, remove adapter fitting (14) from tee (13).



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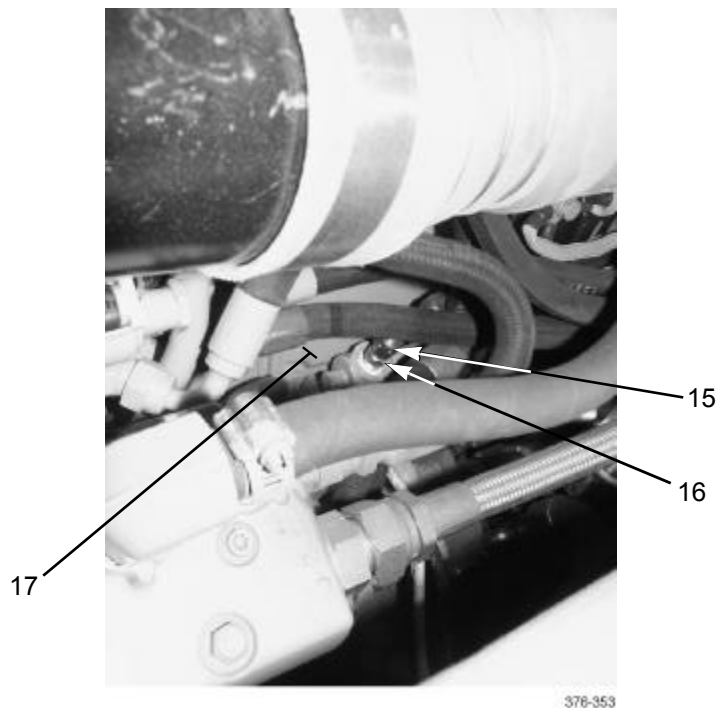
**ENGINE AND TRANSMISSION OIL SAMPLING VALVES, HOSES,  
AND FITTINGS REPLACEMENT - CONTINUED**

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0132 00

**ENGINE OIL SAMPLING VALVE HOSES AND FITTINGS REMOVAL - CONTINUED**

10. Trace hose (15) to left side of engine (17). Remove tiedown straps and discard.
11. Disconnect hose (15) from adapter fitting (16) and remove hose from vehicle.
12. As required, remove adapter fitting (16) from engine (17).

**ENGINE OIL SAMPLING VALVE HOSES AND FITTINGS INSTALLATION****NOTE**

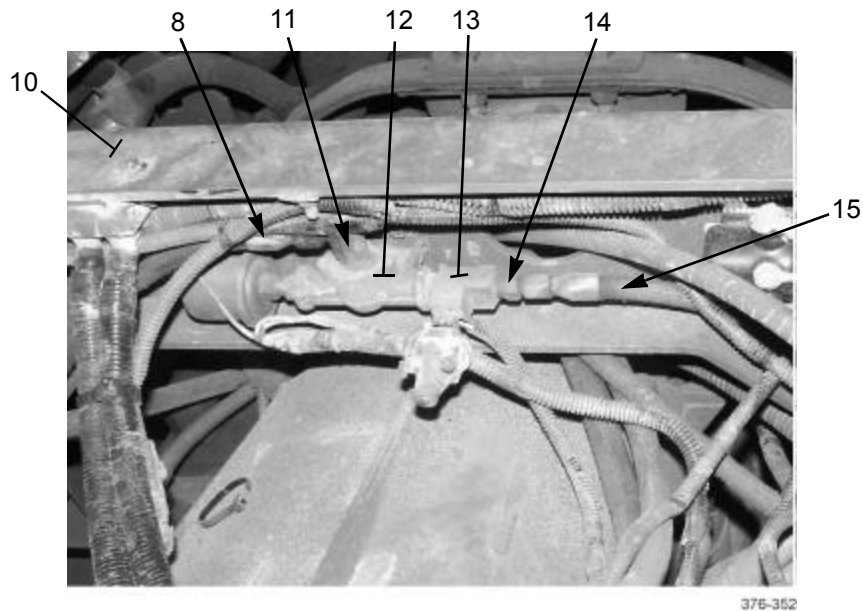
- Route hoses between points of installation as was noted during removal. Ensure new tiedown straps are installed to support hoses after all connections are made.
- Apply pipe sealing compound to male threads of fittings where use of pipe sealing compound was noted during removal.

1. If removed, install adapter fitting (16) to engine (17).
2. Position hose (15) between points of installation. Connect hose to adapter fitting (16).
3. If removed, install adapter fitting (14) to tee (13) at crossmember (10).
4. Connect hose (15) to adapter fitting (14).
5. If removed, install elbow (11) to tee (12).
6. Position hose (8) between points of installation. Connect hose to elbow (11).

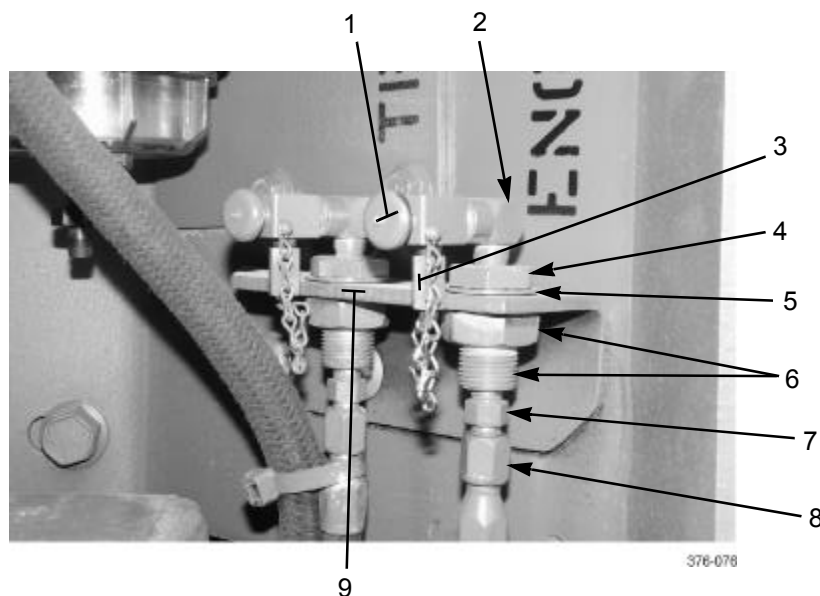
**ENGINE AND TRANSMISSION OIL SAMPLING VALVES, HOSES, AND FITTINGS REPLACEMENT - CONTINUED**

0132 00

**ENGINE OIL SAMPLING VALVE HOSES AND FITTINGS INSTALLATION - CONTINUED**



7. If removed, install the following fittings:
  - a. Install bulkhead fitting (6) to bracket (9) with starwasher (5) and nut (4).
  - b. Install elbow (2) to bulkhead tee (6).
  - c. Install oil sampling valve (1) to elbow (2). Ensure discharge port (3) of valve is facing down.
  - d. Install straight fitting (7) to bulkhead fitting (6).
8. Connect hose (8) to straight fitting (7).



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**ENGINE AND TRANSMISSION OIL SAMPLING VALVES, HOSES,  
AND FITTINGS REPLACEMENT - CONTINUED**


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0132 00

**ENGINE OIL SAMPLING VALVE HOSES AND FITTINGS INSTALLATION - CONTINUED**

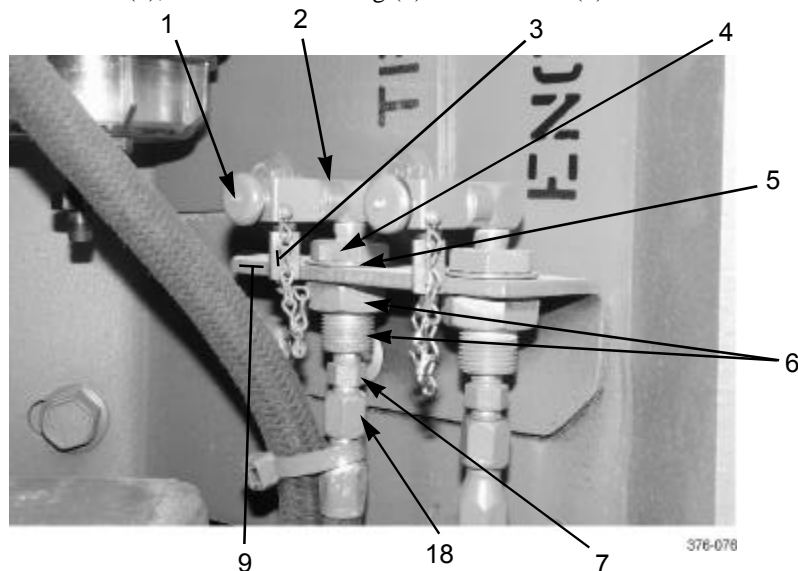
9. Lower cab (TM 9-2320-312-10).
10. Check engine oil level on dipstick. Add engine lubricating oil as required (TM 9-2320-312-10).
11. Install transmission access cover (WP 0039 00).

**TRANSMISSION OIL SAMPLING VALVE HOSE AND FITTINGS REMOVAL****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**NOTE**

- Use a drain pan to capture any residual oil in hose. Dispose of oil in accordance with local policy and ordinances. Ensure all spills are cleaned up.
  - Note routing of hose to ensure correct installation.
  - Pipe sealing compound is used at certain fittings to ensure a leak-free seal. Note where pipe sealing compound is used.
1. Remove transmission access cover (WP 0039 00).
  2. Disconnect hose (18) from straight fitting (7) at oil sampling valve (1).
  3. As required, remove the following fittings at oil sampling valve (1):
    - a. Remove straight fitting (7) from bulkhead fitting (6).
    - b. Remove oil sampling valve (1) from elbow (2).
    - c. Remove elbow (2) from bulkhead fitting (6).
    - d. Remove nut (4), starwasher (5), and bulkhead fitting (6) from bracket (9).



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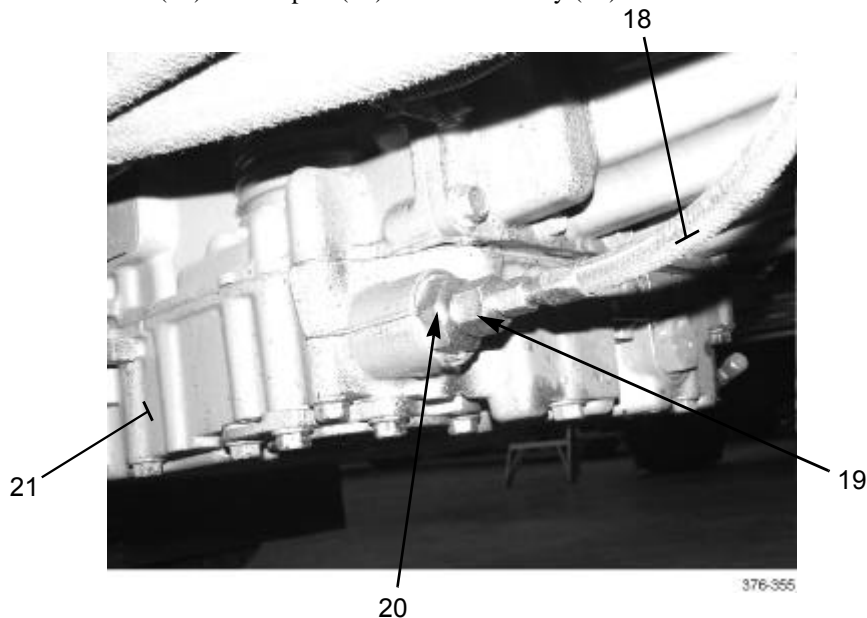
**ENGINE AND TRANSMISSION OIL SAMPLING VALVES, HOSES,  
AND FITTINGS REPLACEMENT - CONTINUED**


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0132 00

**TRANSMISSION OIL SAMPLING VALVE HOSE AND FITTINGS REMOVAL - CONTINUED**

4. Trace hose (18) to right-front corner of valve body (21) on underside of transmission. Remove tiedown straps and discard.
5. Disconnect hose (18) from reducer (19) and remove from vehicle.
6. As required, remove reducer (19) and adapter (20) from valve body (21).

**TRANSMISSION OIL SAMPLING VALVE HOSE AND FITTINGS INSTALLATION****NOTE**

- Route hose between points of installation as noted during removal. Ensure new tiedown straps are installed to support hose after all connections are made.
  - Apply pipe sealing compound to male threads of fittings where use of pipe sealing compound was noted during removal.
1. If removed, install adapter (20) and reducer (19) to valve body (21).
  2. Position hose (18) between points of installation. Connect hose to reducer (19).
  3. If removed, install the following fittings:
    - a. Install bulkhead fitting (6) to bracket (9) with starwasher (5) and nut (4).
    - b. Install elbow (2) to bulkhead fitting (6).
    - c. Install oil sampling valve (1) to elbow (2). Ensure discharge port (3) of valve is facing down.
    - d. Install straight fitting (7) to bulkhead fitting (6).
  4. Connect hose (18) to straight fitting (7).
  5. Check transmission fluid level on dipstick. Add transmission fluid as required (TM 9-2320-312-10).
  6. Install transmission access cover (WP 0039 00).

**END OF WORK PACKAGE**

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**GENERAL**

1. This work package contains requirements and procedures for administrative storage of equipment that is issued to and in use by Army activities worldwide.
2. The requirements specified herein are necessary to maintain equipment in administrative storage in such a way as to achieve the maximum readiness condition.
3. Equipment that is placed in administrative storage should be capable of being readied to perform its mission within a 24-hour period or as otherwise may be prescribed by the approving authority. Before equipment is placed in administrative storage, a current Preventive Maintenance Checks and Services (PMCS) should be completed and deficiencies corrected.
4. Report equipment in administrative storage as prescribed for all reportable equipment.
5. Perform inspections, maintenance services, and lubrication as specified herein.
6. Records and reports to be maintained for equipment in administrative storage are those prescribed by DA Pam 738-750 for equipment in use.
7. A 10% variance is acceptable on time used to determine the required maintenance actions.
8. Accomplishment of applicable PMCS, as mentioned throughout this work package, will be on a semi-annual basis.

**DEFINITION OF ADMINISTRATIVE STORAGE**

The placement of equipment in administrative storage can be for short periods of time when a shortage of maintenance effort exists. Items should be ready for use within the time factors as determined by the directing authority. During the storage period, appropriate maintenance records will be kept.

**PREPARATION OF EQUIPMENT FOR ADMINISTRATIVE STORAGE**

1. **Storage Site.**
  - a. Select the best available site for administrative storage. Separate stored equipment from equipment in use. Conspicuously mark the area "Administrative Storage".
  - b. Covered space is preferred.
  - c. Open sites should be improved hardstand, if available. Unimproved sites should be firm, well-drained, and free of excessive vegetation.
2. **Storage Plan.**
  - a. Store equipment so as to provide maximum protection from the elements and to provide access for inspection, maintenance, and exercising. Anticipate removal or deployment problems and take suitable precautions.
  - b. Take into consideration environmental conditions, such as extreme heat or cold; high humidity; blowing sand, dust or loose debris; soft ground; mud; heavy snows; or any combination thereof, and take adequate precautions.
  - c. Establish a fire plan and provide for adequate fire fighting equipment and personnel.
3. **Maintenance Services and Inspections.**

**NOTE**

Ensure yard tractor in administrative storage is left with fifth wheel fully lowered.

- (1) **Maintenance Services.** Prior to storage, perform the next scheduled PMCS.
  - (2) **Inspection.** Inspect and approve the equipment prior to storage. Do not place nonmission-capable equipment in storage.
4. **Correction of Shortcomings and Deficiencies.** Correct all shortcomings and deficiencies prior to storage, or obtain a deferment from the approving authority.

**PREPARATION OF EQUIPMENT FOR ADMINISTRATIVE STORAGE - CONTINUED**

5. **Lubrication.** Lubricate equipment in accordance with WP 0008 00 and WP 0009 00.
6. **General Cleaning, Painting, and Preservation.**

**CAUTION**

DO NOT direct water under pressure against unsealed electrical systems or any exterior opening. Failure to follow this caution may result in damage to equipment.

- a. **Cleaning.** Clean the equipment of dirt, grease, and other contaminants, but do not use vapor degreasing.
- b. **Painting.** Remove rust and damaged paint by scraping, wire brushing, sanding or buffing. Sand to a smooth finish and spot paint as necessary (TB 43-0209).
- c. **Preservation.** After cleaning and drying, immediately coat unpainted metal surfaces with oil or grease, as appropriate.

**CARE OF EQUIPMENT IN ADMINISTRATIVE STORAGE**

1. **Maintenance Services.** After equipment has been placed in administrative storage, inspect, service, and exercise as specified herein.
2. **Inspection.** Inspection will usually be visual and must consist of at least a walkaround examination of all equipment to detect any deficiencies. Inspect equipment in open storage weekly and equipment in covered storage monthly. Inspect all equipment immediately after any severe storm or environmental change. The following are examples of things to look for during a visual inspection:
  - a. low or flat tires
  - b. coolant, fuel, hydraulic or oil leaks
  - c. condition of preservatives, seals, and wraps
  - d. corrosion or other deterioration
  - e. missing or damaged parts
  - f. water in compartments
  - g. any other readily recognizable shortcomings or deficiencies
3. **Repair During Administrative Storage.** Keep equipment in an optimum state of readiness. Accomplish the required services and repairs as quickly as possible. Whenever possible, perform all maintenance on-site.
4. **Exercising.** Exercise equipment in accordance with the following instructions.
  - a. **Vehicle Major Exercise.** Depreserve equipment by removing only that material restricting exercise. Close all drains, remove blocks, and perform all BEFORE operational checks. Make several right and left 90° turns. Make several hard braking stops without skidding. While exercising, and when it is safe and convenient, operate all other functional components and perform all DURING and AFTER operational checks.
  - b. **Scheduled Services.** Scheduled services will include inspection per subparagraph 2 and will be conducted in accordance with Unit Preventive Maintenance Checks and Services (PMCS). Lubricate in accordance with instructions in Unit PMCS (WP 0008 00 and WP 0009 00).
  - c. **Corrective Action.** Immediately take action to correct shortcomings and deficiencies noted. After exercising, restore the preservation to the original condition. Replenish lubricants used during exercising.
5. **Rotation.** Rotate items in accordance with any rotational plan that will keep the equipment in an operational condition and reduce the maintenance effort.

**PROCEDURES FOR COMMON COMPONENTS AND MISCELLANEOUS ITEMS**

1. **Tires.** Visually inspect tires during each walkaround inspection. This inspection includes checking tires with a tire gauge. Inflate, repair or replace as necessary those found to be low, damaged or excessively worn. Mark inflated and repaired tires with a crayon for checking at the next inspection.
2. **Batteries and Capacitor(s).** Leave batteries and capacitor(s) in place in equipment. Disconnect battery cables (WP 0115 00). Ensure that batteries and capacitor(s) are fully charged when equipment is stored and are returned to a full charge during each equipment exercising.
3. **Seals.** Seals may develop leaks during storage or shortly thereafter. If leaking persists, refer to the applicable maintenance section in this manual for corrective maintenance procedures.

**REMOVAL OF EQUIPMENT FROM ADMINISTRATIVE STORAGE**

1. **Activation.** Restore the equipment to normal operating condition in accordance with the instructions contained in WP 0007 00.
2. **Servicing.** Resume the maintenance service schedule in effect at the commencement of storage or service the equipment before the scheduled dates in order to produce a staggered maintenance workload.

**PREPARATION OF EQUIPMENT FOR SHIPMENT**

1. Vehicles that have been removed from storage for shipment do not have to be reprocessed if they will reach their destination within the administrative storage period. Reprocess only if inspection reveals any corrosion or if anticipated in-transit weather conditions make it necessary.
2. When a vehicle is received and has already been processed for domestic shipment, as indicated on DD Form 1397, it does not have to be reprocessed for storage unless corrosion and deterioration are found during the inspection upon receipt. List on SF Form 364 all discrepancies found because of poor preservation, packaging, packing, marking, handling, loading, storage or excessive preservation. Repairs that cannot be handled by the receiving unit must have tags attached listing needed repairs. A report of these conditions will be submitted by the unit commander for action by an ordnance maintenance unit.

**END OF WORK PACKAGE**

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**GENERAL****NOTE**

Refer to WP 0120 00 for *Electrical General Maintenance Instructions*.

1. These general maintenance instructions contain general shop practices and specific methods you must be familiar with to properly maintain the M878A2 Yard Tractor. You should read and understand these practices and methods before performing any Unit Maintenance procedures.
2. Before beginning a task, find out how much repair, modification or replacement is needed to fix the equipment. Sometimes the reason for equipment failure can be seen right away and complete teardown is not necessary. Disassemble equipment only as far as necessary to repair or replace damaged parts.
3. In some cases, a part may be damaged during removal. If the part appears to be good, and other parts behind it are not defective, leave it in place and continue with the procedure. Here are a few simple rules:
  - a. Do not remove dowel pins or studs unless loose, bent, broken or otherwise damaged.
  - b. Do not remove bearings or bushings unless damaged. If you need to remove them to access parts behind, carefully pull out bearings and bushings.
  - c. Replace all gaskets, lockwashers, locknuts, seals, cotter pins, and o-rings.
4. All tags and forms attached to the equipment must be checked to learn the reason for removal of equipment from service. Modification Work Orders (MWOs) and Technical Bulletins (TBs) must also be checked for equipment changes and updates.

**WORK SAFETY**

1. Before beginning a procedure, think about the safety risks and hazards to yourself and to others. Wear protective gear such as safety goggles or lenses, safety shoes, rubber apron or gloves.
2. Before beginning a procedure, ensure that the following conditions have been observed, unless otherwise specified:
  - a. Vehicle must be parked on level ground with parking brake applied and wheels blocked.
  - b. Transmission must be in N (Neutral).
  - c. Engine must be off.
  - d. Components must be at operating temperature to be tested.
  - e. Components which are hot at operating temperatures (i.e., cooling, exhaust, and hydraulic systems) must cool down before they are removed.
  - f. Battery disconnect switch must be in OFF position when performing electrical system maintenance.
  - g. Air system pressure must be relieved before disconnecting air lines or fittings.

**WORK SAFETY - CONTINUED****WARNING**

- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
  - Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
3. DO NOT disconnect any power steering or fifth wheel lift hydraulic line or fitting unless fifth wheel is fully lowered and engine is shut down.
  4. DO NOT disconnect any cab tilt hydraulic system line or fitting unless battery disconnect switch is in OFF position.
  5. Immediately clean up spilled fluids to avoid slipping.
  6. When lifting heavy parts, have someone help you. Ensure that lifting equipment or jack is working properly, that it meets weight requirement of part being lifted, and that it is securely fastened to part.
  7. Always use power tools carefully.
  8. Observe all WARNINGS and CAUTIONS.

**CLEANING INSTRUCTIONS****WARNING**

Improper cleaning methods and use of unauthorized cleaning liquids or solvents can injure personnel and damage equipment. To prevent this, refer to TM 9-247 for further instructions.

1. **General.** Cleaning instructions will be the same for the majority of parts and components which make up the tractor. The following applies to all cleaning operations:
  - a. Clean all parts before inspection, after repair, and before assembly.
  - b. Keep hands free of grease which can collect dust, dirt, and grit.
  - c. After cleaning, all parts should be covered or wrapped to protect them from dust and dirt. Parts that are subject to rust should be lightly oiled after cleaning.
2. **Castings, Forgings, and Machined Metal Parts.**

**WARNING**

Dry cleaning solvent MIL-PRF-680 Type III is an environmentally compliant and low toxic material. However, it may be irritating to the eyes and skin. The use of protective gloves and goggles is suggested. Use in well-ventilated areas. Keep away from open flames and other sources of ignition.

- a. Clean inner and outer surfaces with detergent (Item 23, WP 0165 00) or dry cleaning solvent (Item 10, WP 0165 00) and dry with clean rags (Item 51, WP 0165 00).
- b. Remove grease and accumulated deposits with a scrub brush.

**CLEANING INSTRUCTIONS - CONTINUED****WARNING**

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid injury to personnel.

- c. Clear all threaded holes with compressed air to remove dirt and cleaning fluids.

**CAUTION**

DO NOT wash oil seals, electrical cables, and flexible hoses with dry cleaning solvent or mineral spirits. Serious damage or destruction of material will result.

3. **Oil Seals, Electrical Cables, and Flexible Hoses.** Wash oil seals, electrical cables, and flexible hoses with a solution of detergent (Item 23, WP 0165 00) and water, and wipe dry with a clean rag (Item 51, WP 0165 00).
4. **Bearings.** Clean bearings in accordance with TM 9-214.

**PRESERVATION OF PARTS**

Unpainted metal parts that will not be installed immediately after cleaning may be covered with a thin coat of lubricating oil (Item 41, WP 0165 00).

**PAINTING**

On painted areas where paint has been removed, paint in accordance with procedures outlined in TM 43-0139 and TB 43-0209.

**INSPECTION INSTRUCTIONS****NOTE**

All damaged areas should be marked for repair or replacement.

1. All components and parts must be carefully checked to determine if they are serviceable for use, can be repaired or must be scrapped.
2. Inspect drilled and tapped (threaded) holes for the following:
  - a. Wear, distortion, cracks, and any other damage in or around holes.
  - b. Threaded areas for wear distortion (stretching) and evidence of cross-threading.
3. Inspect metal lines, flexible lines or hoses, and metal fittings and connectors for the following:
  - a. Metal lines for sharp kinks, cracks, bad bends, and dents.
  - b. Flexible lines or hoses for fraying, evidence of leakage, and loose metal fittings or connectors.
  - c. Metal fittings and connectors for thread damage and worn or rounded hex heads.
4. Inspect castings, forgings, and machined metal parts for the following:
  - a. Machined surfaces for nicks, burrs, raised metal wear, and other damage.
  - b. Inner and outer surfaces for breaks and cracks.
5. Inspect bearings in accordance with TM 9-214.

**DISASSEMBLY AND ASSEMBLY INSTRUCTIONS**

1. Keep major components together whenever possible and practical.
2. Tag hoses, electrical wires, cables, and harnesses to identify them and aid during installation.
3. Keep related parts together for identification purposes.
4. Temporarily install attaching hardware such as screws, bolts, washers, and nuts to prevent loss.
5. Only disassemble to the point of the problem.
6. Ensure that parts are clean and lubricated before assembly.

**REPAIR INSTRUCTIONS****CAUTION**

Before welding, the following components must be disconnected to avoid damage to electronic components:

- Engine ECU
- Transmission ECU
- Auxiliary arctic heater (if equipped)

For more information on welding procedures and precautions, refer to decal under right-side instrument panel inside cab.

1. Repair castings, forgings, and machined parts using the following instructions:
  - a. Repair minor cracked castings or forgings in accordance with TM 9-237.
  - b. Repair minor damage to machined surfaces with an abrasive cloth dipped in detergent (Item 23, WP 0165 00).
  - c. Replace any deeply nicked machined surface that could affect the assembly operation.
  - d. Repair minor damage to threaded capscrew holes with thread tap of same size to prevent cutting oversize.
2. After repair, thoroughly clean all parts to prevent dirt, metal chips or other foreign material from entering any working parts.

**LUBRICATION INSTRUCTIONS****NOTE**

Refer to TM 9-2320-312-10 and to Unit PMCS (WP 0008 00 and WP 0009 00) for detailed, illustrated instructions on proper lubrication. Some general practices to remember:

1. Use the correct lubricant.
2. Keep lubricants clean.
3. Clean all fittings prior to lubrication.
4. Lubricate clean disassembled and new parts to prevent rust.

**APPLICATION OF ADHESIVES AND SEALING COMPOUNDS**

1. **General.** Adhesives are recommended in some tasks to ensure and strengthen seals. Sealing compounds are used to seal parts against moisture. The following information describes their correct use and application.
2. **Adhesive.** Adhesive provides a seal against leakage and a resistance to loosening when used in the assembly of threaded, slip-fitted or press-fitting parts. Always use grade of adhesive specified and never use when other retaining means are provided, such as lockwires, lockwashers, lockplates, and fasteners.



**APPLICATION OF ADHESIVES AND SEALING COMPOUNDS - CONTINUED****3. Sealing Compound.**

- a. Any time a seal is broken, the part must be thoroughly cleaned to remove any remaining sealing compound and dirt.
- b. Thoroughly clean surface before applying sealing compound.
- c. When applying sealing compound, ensure that the area is completely covered. Press sealing compound into and around parts as necessary.
- d. Refer to manufacturer's instructions for time needed to set sealing compound.

**STANDARD TOOL REQUIREMENTS**

1. The following are general practices regarding the use of tools:
  - a. Always use the proper tool kit and tools for the procedure being performed.
  - b. Ensure that tools are clean and lubricated to reduce wear and to prevent rust.
  - c. Keep track of tools. Do not be careless with them.
  - d. Return tools to toolbox when finished with repair or maintenance.
  - e. Return toolboxes and tools to tool storage when not in use.
  - f. Inventory tools before and after each use.
2. Some maintenance tasks may require special or fabricated tools. The "Initial Setup" of the procedure will specify any special or fabricated tools needed to perform that procedure. Use these special tools only for the maintenance procedures for which they are designed or called out. If you are unfamiliar with a required tool, see your supervisor.

**TAGGING WIRES AND HOSES**

1. Use marker tags (Item 58, WP 0165 00) to identify all electrical wires, fuel, oil, coolant, and hydraulic lines, and any other parts which may be hard to identify or replace later. Fasten tags to parts during removal by wrapping wire fasteners around or through parts and twisting ends together. Position tags to be out of the way during cleaning, inspection, and repair. Mark tags with a pencil, pen or marker.
2. Whenever possible, identify electrical wires with the number of the terminal or wire to which it connects. If no markings can be found, tag both wires or wire and terminal, and use the same identifying mark for both. If you cannot tag a wire because it must fit through a small hole or you cannot reach it, write down the description of the wire and the point to which it connects or draw a simple diagram on paper. Be sure to write down enough information so you will be able to properly connect the wires during assembly. If you need to identify a loose wire, look for identifying number near end of the wire, stamped on a permanent metal tag. Compare the number to wire numbers on the appropriate electrical schematic.
3. Identify fuel, oil, coolant, and hydraulic lines when you are taking off more than one line at the same time. Mark tags with points to which lines and hoses must be connected. If it is not obvious which end of a line goes where, tag each end of the line.
4. Identify and tag other parts as required by name and installed location.

**LINES AND PORTS**

To keep dirt from contaminating fluid systems when removing and installing fuel, oil, coolant, and hydraulic lines, perform the following steps:

- a. Clean fittings and surrounding area before disconnecting lines.
- b. Cover, cap, plug (Item 6, WP 0165 00) or tape lines and ports after disconnecting lines. When these are not available, use plastic bags and rubber bands, clean rags (Item 51, WP 0165 00), duct tape (Item 60, WP 0165 00) or other similar materials to prevent dirt from entering system.
- c. Ensure that new and used parts are clean before installing.
- d. Wait to remove cover, cap, plug or tape from lines and ports until just before installing lines.

**FLUID DISPOSAL****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

Dispose of contaminated drained fluids in accordance with the Standard Operating Procedures (SOP) of your unit.

**END OF WORK PACKAGE**

**PRELIMINARY CHECKS**

Before testing operation of air conditioning system, make the following checks:

1. Ensure AC compressor drive belt is not damaged and is under proper tension. Check compressor mountings for tightness.
2. Check for broken, burst, and cut hoses. Check for loose fittings on all parts.
3. Check for road debris buildup on condenser coil fins. Using air pressure and a whiskbroom or a soapy spray of water, carefully clean condenser, using care not to bend fins.
4. Check color in moisture indicator sight glass. If color is a deep cobalt blue, refrigerant charge is dry. If moisture indicator is *not* blue, system is contaminated with moisture. Notify your supervisor.
5. If there is not enough airflow, ensure that leaves and other debris has not entered fresh air ports under windshield. If debris is present, it could clog fins of evaporator core and block airflow. Ensure that all ducts are connected to dash louvers and air-control flaps in heater housing are moving properly.

**SAFETY PRECAUTIONS**

1. Whenever repairs are made to any air conditioner parts that hold refrigerant, it is necessary to discharge, purge or flush (if contaminated), evacuate, charge, and leak test system. In a good system, refrigerant lines are always under pressure and should be disconnected only after air conditioning system has been discharged to a refrigerant recovery unit through service valves on compressor.
2. Refrigerants are safe when used under proper conditions. Always wear safety goggles and non-leather gloves while discharging, purging, flushing, evacuating, charging, and leak testing system. **DO NOT** wear leather gloves. When refrigerant gas or liquid contacts leather, leather will stick to skin.

**WARNING**

Liquid refrigerant, when exposed to the air, quickly evaporates and will freeze skin or eye tissue. Use care to prevent refrigerant from touching your skin or eyes. Serious injury or blindness result if you come in contact with liquid refrigerant.

3. Refrigerant splashed in eyes should first be treated with a few drops of sterile mineral oil in eyes, and rinsed with a weak boric acid solution. **DO NOT** rub eyes. Seek medical attention immediately.
4. Refrigerant splashed on skin should be treated the same as frostbite. Gently pour cool water on area, but do not rub skin. Keep skin warm with layers of soft, sterile cloth. Seek medical attention immediately.
5. Even though refrigerant does not burn, when it contacts extreme heat or flame, poisonous phosgene gas is created. This gas is also produced when an open flame leak detector is used. Phosgene fumes have an acrid (bitter) smell.

**WARNING**

**DO NOT** work in an area where refrigerant may contact an open flame or any burning material such as a cigarette. When refrigerant contacts extreme heat, refrigerant breaks down into poisonous phosgene gas which, if breathed, causes severe respiratory irritation. **DO NOT** breathe fumes from an open flame leak detector.

6. You must work in an area where there is a constant flow of fresh air when system is discharged, flushed, charged, and leak tested using an open flame leak detector.

**SAFETY PRECAUTIONS - CONTINUED**

7. Changes in both federal and state laws will affect the way dealerships service air conditioning systems. Under current federal laws, refrigerant must be recovered and recycled by all users to protect environment, and not released into atmosphere. Many service operations not directly involving the air conditioning system require release of refrigerant charge. Under new regulations, dealerships not having required recovery and recycling equipment (and properly trained and certified personnel) will not be allowed to do any of this service work.
8. Because of its very low boiling point, refrigerant must be stored under pressure. To prevent refrigerant cans from exploding, never expose to temperatures higher than 125°F (52°C). Never leave refrigerant cans in the sun, and DO NOT store them in sun-exposed areas where heat can build up.

**PERFORMANCE TESTS**

Following is a brief description of symptoms or conditions that could exist if something goes wrong with a refrigerant part.

1. **Receiver-Drier.**
  - a. The receiver-drier is normally at outside temperature. To the touch, entire length of unit should be same temperature. If noticeable cool spots exist, notify your supervisor.
  - b. A blockage at receiver-drier inlet will cause high head pressures. Blockages at receiver-drier outlet will cause low head pressures and little or no cooling.
  - c. If moisture indicator color is pink or white (showing system is wet), receiver-drier is saturated with moisture and must be replaced. Notify your supervisor.
2. **Cooling System.**
  - a. Although not physically connected, a close tie exists between vehicle air conditioner and cooling system. Poor air conditioner cooling can be the result of a problem in the cooling system.
  - b. If cooling system does not work correctly, heat of engine will rise to abnormal levels. The added heat will transfer to the air conditioner, other underhood parts, and may make its way into the cab. The added heat makes it necessary for air conditioner to work harder and, at the same time, reduces air conditioner ability to cool down air in cab. Also, if water regulating valve is not closing fully, heat will enter cab, giving the impression that the air conditioning system is not working.
3. **Expansion Valve.**
  - a. Problems that start in expansion valve show up as follows:
    - (1) When expansion valve is stuck closed, evaporator coil and expansion valve will be at outside temperature.
    - (2) When expansion valve is stuck open, both coil and valve will be extremely cold with frost or ice buildup.
  - b. Because expansion valve channels are very small, blockages in system tend to be found here (valve is very sensitive to contamination). Usually, contaminant is water. Less than a drop of water is all it takes to make valve inoperative. When water reaches valve, extreme cold that results from pressure drop freezes water, forming a block of ice in valve. After system shuts down and valve warms up, the ice melts and valve operates again, only to freeze up when moisture returns.
  - c. On-and-off operation of expansion valve means that receiver-drier is not removing moisture from system. These contaminants should cause moisture indicator element to turn white and then pink.
4. **AC Compressor.**
  - a. Compressor problems usually show in one of four ways: abnormal noise; seizure; leakage; or low suction and discharge pressures.
  - b. Resonant compressor noises are not causes for alarm. Irregular noise or rattles are likely to be caused by broken parts.

**PERFORMANCE TESTS - CONTINUED**5. **Evaporator.**

- a. Evaporator coils are basically trouble-free when air flow over fins is not blocked. External or, less often, internal blockages will cause low suction pressure as well as little or no cooling.
- b. If a leak exists in system and cannot be traced to other parts or fittings, suspect damage to one of evaporator coils. Notify your supervisor.

6. **Condenser.**

- a. The condenser is usually trouble-free. Normally, temperature of condenser outlet line is noticeably cooler than inlet line. However, when road debris (such as leaves or dirt buildup) builds up, air flow over condenser fins is blocked and air is not able to absorb enough heat to turn hot refrigerant gas into a liquid. High head pressures will result. In this case, carefully clean outer surfaces of the condenser with compressed air or soap and water solution using care not to bend fins.
- b. High head pressures also occur if the condenser tubing is abnormally bent, blocking flow of refrigerant. Frost will appear at point where flow is restricted.
- c. Less common internal blockages (bits of foreign material or metallic grit buildup) will stop the flow of refrigerant.
- d. A quick test to check if poor system performance is caused by condenser is to direct a spray of water onto condenser while system is running. If the air conditioner cools better because of the assist provided by water, the condenser is not working.
- e. When troubleshooting a suspected condenser problem, remember that the problem may be caused by radiator transferring high levels of heat to condenser.

7. **Thermostatic Switch.****NOTE**

- Before troubleshooting thermostatic switch, notify your supervisor to check for a full charge of refrigerant in system. Compressor will not operate or will cycle too often if there is not enough refrigerant in the system.
  - Quick or delayed cycling of compressor may be caused by a thermostatic switch that is working, but is out of adjustment. If, after performing tests below, switch seems to be out of adjustment, replace switch (the thermostatic switch cannot be recalibrated).
- a. Ensure that compressor clutch is operating properly.
  - b. Expose evaporator coil.
  - c. Start engine. Place air conditioner control at coldest setting and turn on air conditioner and fan.
  - d. Place an accurate thermometer in contact with a tube on evaporator coil. Ensure that thermometer is in good contact with tube or incorrect reading will result. When temperature drops below 31-36°F (-1-2°C), compressor clutch should disengage and remain this way until temperature rises to 39-44°F (4 -7°C).
  - e. If the compressor did not engage when temperature was above accepted high range, perform the following test:
    - (1) Connect voltmeter or test light from one terminal on thermostatic switch to ground. Repeat this test with other terminal on switch.
    - (2) With engine running and air conditioner and blower on, both terminals will show voltage when compressor should be engaged. One terminal will show voltage when compressor should be disengaged. If voltage is not present, there is a problem in electrical system from batteries to thermostatic switch. Check all circuits for cause, and repair or replace necessary wiring or parts. In all other cases where compressor is not engaging and disengaging properly, thermostatic switch is cause. Replace thermostatic switch.

***PERFORMANCE TESTS - CONTINUED*****8. Line Restrictions.**

- a. A restricted suction line causes low suction pressure at compressor and little or no cooling. A restriction in a line between compressor and expansion valve can cause high discharge and low suction pressure and insufficient cooling.
- b. Usually, areas of ice or frost buildup mean a blockage. Parts that often freeze up are probably corroded or inoperative and should be replaced. Parts (such as expansion valve) that freeze up once in a while may do so because of moisture in system, which will cause the moisture indicator element to turn white or pink. If this happens, notify your supervisor.

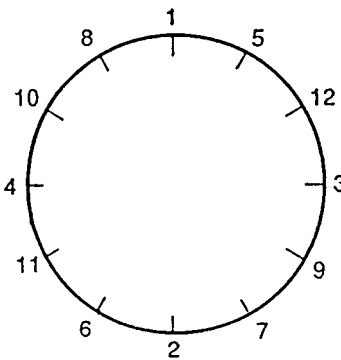
**END OF WORK PACKAGE**

**SCOPE**

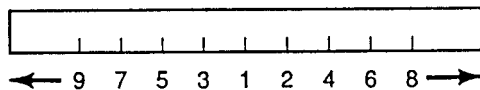
This work package lists standard torque values and provides general information for applying torque. Special torque values and tightening sequences are indicated in the maintenance procedures for applicable components.

**GENERAL**

1. Always use torque values listed in Tables 1 through 3 when a maintenance procedure does not give a specific torque value.
  - a. Table 1 provides torque limits for SAE standard fasteners.
  - b. Table 2 provides torque limits for metric fasteners.
  - c. Table 3 provides torque limits for refrigerant lines.
2. Unless otherwise indicated, standard torque tolerance shall be  $\pm 10\%$ .
3. Torque values listed are based on clean, dry threads. Reduce torque by 10% when engine oil is used as a lubricant. Reduce torque by 20% if new plated capscrews are used.
4. If the maintenance procedures do not specify a tightening order, use the following guides:
  - a. Unless otherwise specified, lubricate threads of fasteners with oil (OE/HDO-10 or OEA).
  - b. When tightening fasteners above 30 lb-ft (41 Nm), use the torque pattern but only tighten to 70 percent of final value (multiply final value by 0.7). Repeat pattern until final value is reached.
  - c. Tighten circular patterns using circular torque pattern and tighten straight patterns using straight torque pattern.



CIRCULAR TORQUE PATTERN



STRAIGHT TORQUE PATTERN

**CAUTION**

If replacement capscrews are of higher grade than originally supplied, use torque specifications for the original. This will prevent equipment damage due to overtightening.

Table 1. Torque Limits - SAE Standard Fasteners.




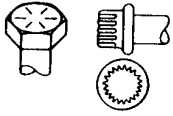

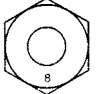

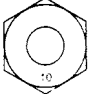
CURRENT USAGE	MUCH USED	MUCH USED	USED AT TIMES	USED AT TIMES
QUALITY OF MATERIAL	INDETERMINATE	MINIMUM COMMERCIAL	MEDIUM COMMERCIAL	BEST COMMERCIAL
SAE Grade Number	1 or 2	5	6 or 7	8
Cap Screw Head Markings				
Manufacturer's marks may vary				
These are all SAE Grade 5 (3 line)				
CAP SCREW BODY SIZE INCHES - THREAD	TORQUE LB-FT (NM)	TORQUE LB-FT (NM)	TORQUE LB-FT (NM)	TORQUE LB-FT (NM)
1/4 20	5 (7)	8 (11)	10 (14)	12 (16)
28	6 (8)	10 (14)		14 (19)
5/16 18	11 (15)	17 (23)	19 (26)	24 (33)
24	13 (18)	19 (26)		27 (37)
3/8 16	18 (24)	31 (42)	34 (46)	44 (60)
24	20 (27)	35 (47)		49 (66)
7/16 14	28 (38)	49 (66)	55 (75)	70 (95)
20	30 (41)	55 (75)		78 (106)
1/2 13	39 (53)	75 (102)	85 (115)	105 (142)
20	41 (56)	85 (115)		120 (163)
9/16 12	51 (69)	110 (149)	120 (163)	155 (210)
18	55 (75)	120 (163)		170 (231)
5/8 11	83 (113)	150 (203)	167 (226)	210 (285)
18	95 (129)	170 (231)		240 (325)
3/4 10	105 (142)	270 (366)	280 (380)	375 (508)
16	115 (156)	295 (400)		420 (569)
7/8 9	160 (217)	395 (536)	440 (597)	605 (820)
14	175 (237)	435 (590)		675 (915)
1 8	235 (319)	590 (800)	660 (895)	910 (1234)
14	250 (339)	660 (895)		990 (1342)



Table 2. Torque Limits - Metric Fasteners.

TORQUE VALUES FOR METRIC THREAD FASTENERS WITH LUBRICATED* OR PLATED THREADS†				
Thread Diameter-Pitch				
	Class 8.8 Bolt	Class 8 Nut	Class 10.9 Bolt	Class 10 Nut
	Torque: lb-ft (Nm)		Torque: lb-ft (Nm)	
M6	5 (7)		7 (9)	
M8	12 (16)		17 (23)	
M8 x 1	13 (18)		18 (24)	
M10	24 (33)		34 (46)	
M10 x 1.25	27 (37)		38 (52)	
M12	42 (57)		60 (81)	
M12 x 1.5	43 (58)		62 (84)	
M14	66 (89)		95 (129)	
M14 x 1.5	72 (98)		103 (140)	
M16	103 (140)		148 (201)	
M16 x 1.5	110 (149)		157 (213)	
M18	147 (199)		203 (275)	
M18 x 1.5	165 (224)		229 (310)	
M20	208 (282)		288 (390)	
M20 x 1.5	213 (313)		320 (434)	
M22	283 (384)		392 (531)	
M22 x 1.5	315 (427)		431 (584)	
M24	360 (488)		498 (675)	
M24 x 2	392 (531)		542 (735)	
M27	527 (715)		729 (988)	
M27 x 2	569 (771)		788 (1068)	
M30	715 (969)		990 (1342)	
M30 x 2	792 (1074)		1096 (1486)	

\* All plated and unplated fasteners should be coated with oil before installation.

† Use these torque values if either the bolt or nut is lubricated or plated (zinc-phosphate conversion-coated, cadmium-plated, or waxed).

**Table 3. Refrigerant Line Torque Specifications.**

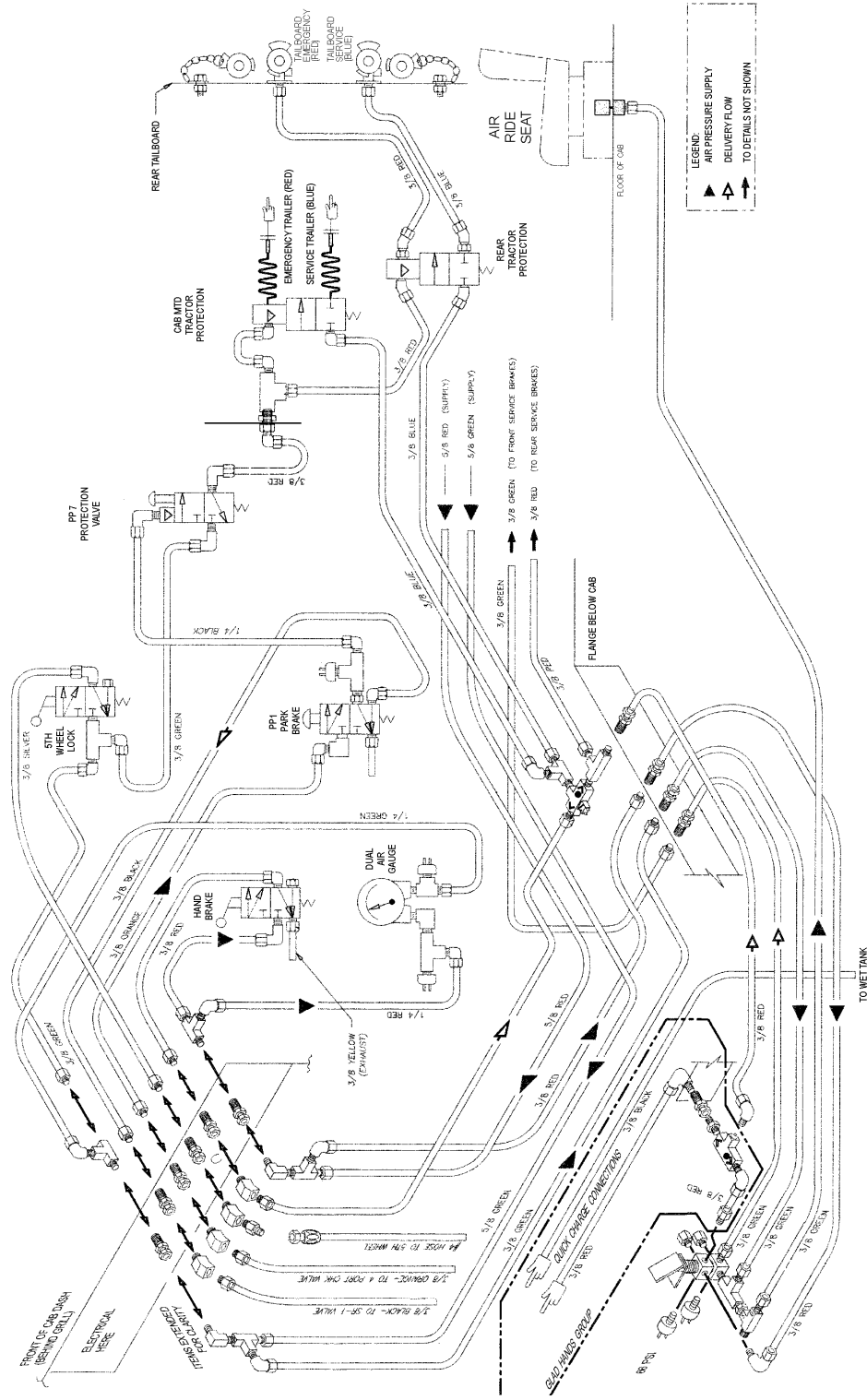
OUTSIDE DIAMETER OF METAL TUBE (IN)	TORQUE FOR STEEL TUBES* LB-FT (NM)	TORQUE FOR ALUMINUM OR COPPER* TUBES
1/4	10-15 (14-20)	60-80 (680-940)
3/8	30-35 (41-47)	11-13 (15-18)
1/2	30-35 (41-47)	15-20 (20-27)
5/8	30-35 (41-47)	21-27 (28-37)
3/4	30-35 (41-47)	28-33 (38-45)

\* When tightening fittings, always use torque reading for softer metal when unlike metals are used.

**END OF WORK PACKAGE**

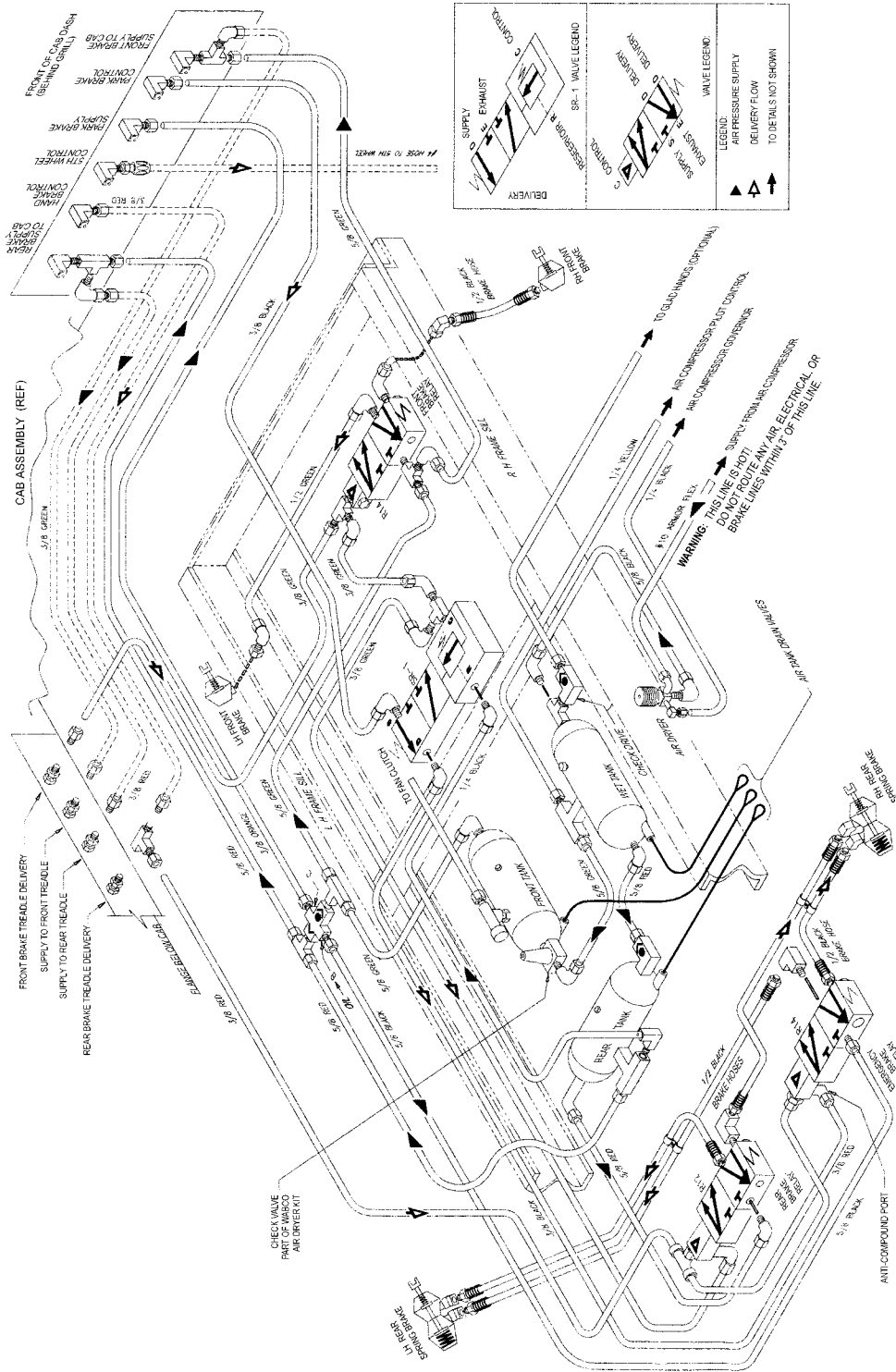
**NOTE**

- The following figures illustrate the M878A2 Yard Tractor air and hydraulic systems.
- All electrical schematics for the yard tractor are located as foldouts at the back of this volume.



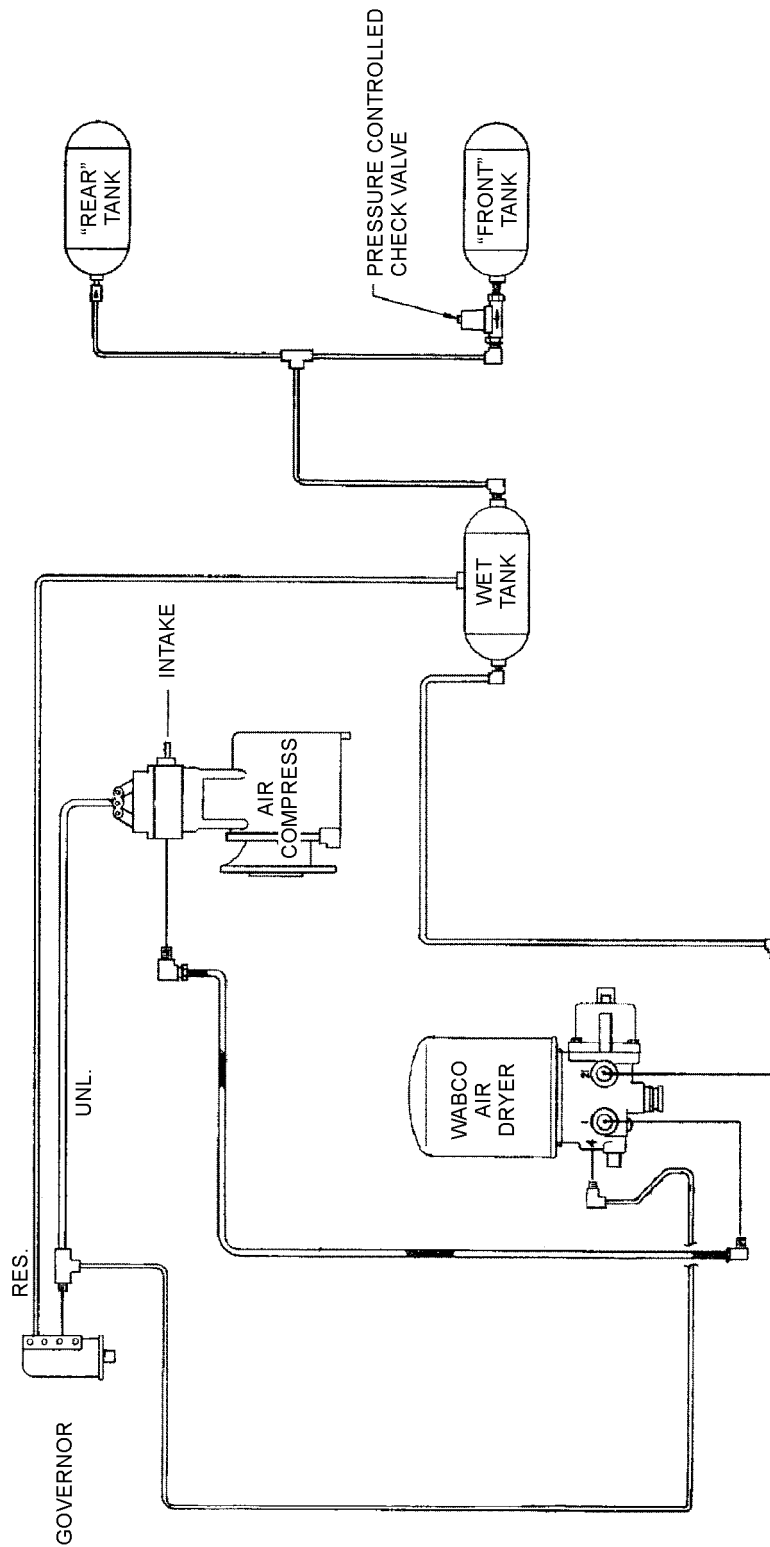
376-292

Figure 1. Air System (Sheet 1 of 3).



376-304

Figure 1. Air System (Sheet 2 of 3).



376-311

Figure 1. Air System (Sheet 3 of 3).

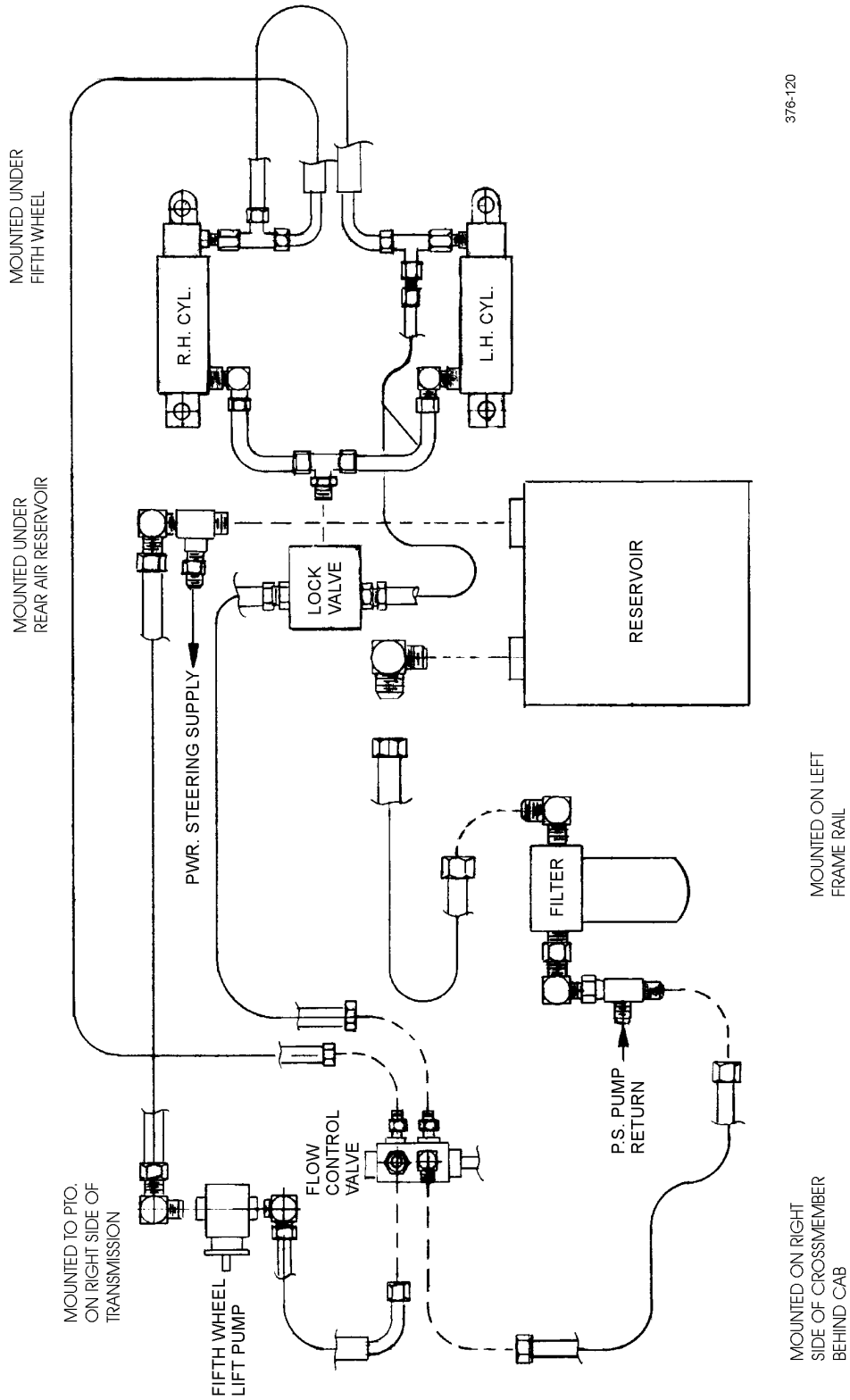


Figure 2. Hydraulic System - Fifth Wheel Lift.

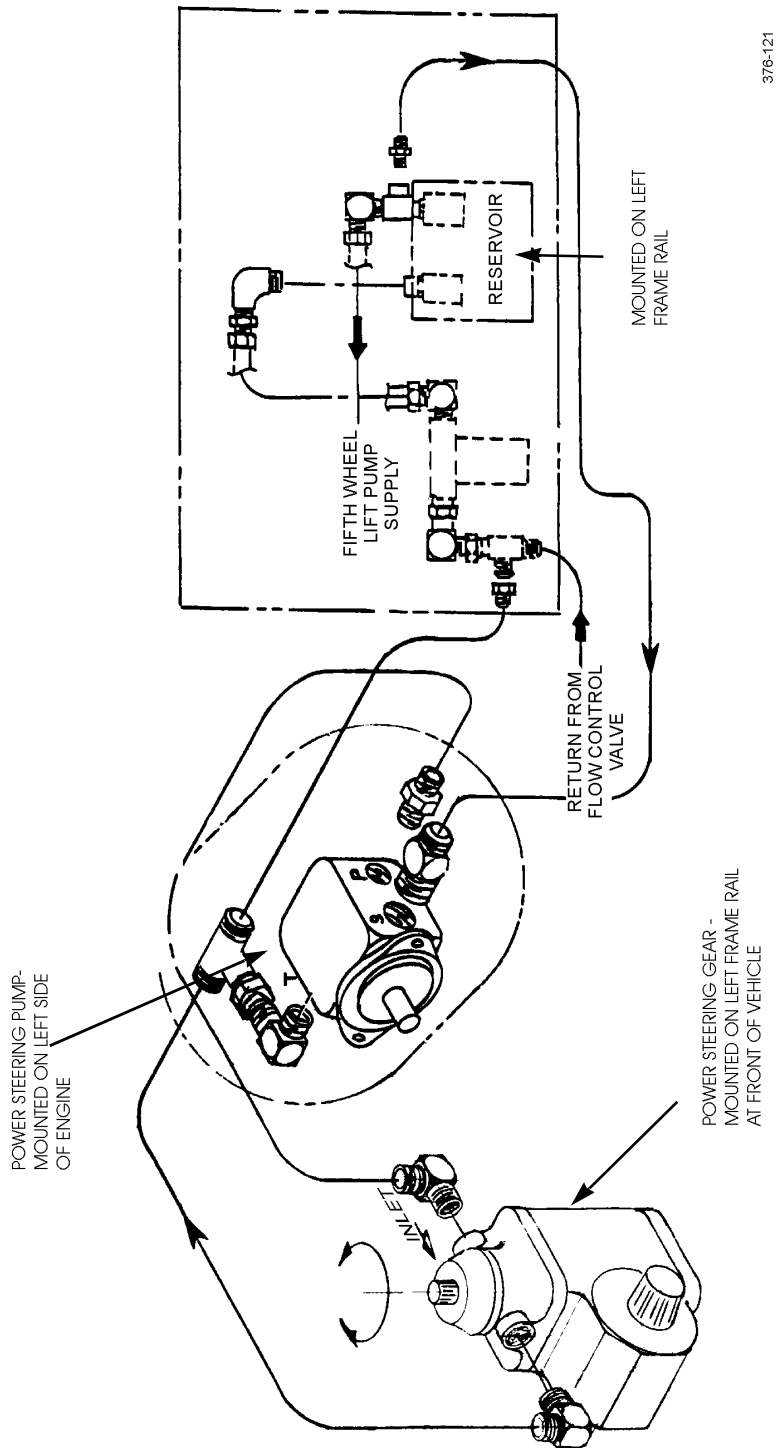


Figure 3. Hydraulic System - Power Steering Circuit.

END OF WORK PACKAGE



**CHAPTER 4**  
**DIRECT SUPPORT MAINTENANCE**

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**POWERPACK REPLACEMENT****0138 00****THIS WORK PACKAGE COVERS**

Removal, Inspection of Engine Mounts, Installation

**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 020 and Group 070

**RPSTL Reference**

Group 020, Figure 1

Group 070, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, field maintenance (Item 27, WP 0166 00)

Suitable overhead lifting device with chains

**Materials/Parts**

Adhesive (Item 1, WP 0165 00)

Antifreeze (Item 4 or 5, WP 0165 00)

Cap set, protective (Item 6, WP 0165 00)

Fluid, automatic transmission, Dexron III (Item 24, WP 0165 00)

Fluid, hydraulic, petroleum base (Item 25 or 26, WP 0165 00)

Oil, lubricating (Item 42, 43 or 44, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N 21NE108) (2)

Nut, lock (P/N 21NE070) (8)

Washer, lock (P/N 361-14) (8)

**References**

WP 0128 00

WP 0139 00

**Personnel Required**

Three

**Equipment Condition**

Tractor on level ground with wheels blocked front and rear

Air system drained (TM 9-2320-312-10)

Cab placed in 90-degree tilt position (WP 0147 00)

Battery cables disconnected and battery box covers closed (WP 0115 00)

Transmission access cover and rear platform grating removed (WP 0039 00)

Cooling system drained (WP 0023 00)

Engine oil drained (WP 0011 00)

Transmission fluid drained (Group 070 Commercial Service Manuals)

Hydraulic system fluid drained (WP 0129 00)

Air intake tubes removed (WP 0015 00)

Engine charge air cooling hoses and tubes removed (WP 0016 00)

Exhaust tubing between turbocharger and muffler removed (WP 0022 00)

AC receiver-drier removed from mounting to radiator and moved out of the way (WP 0154 00)

Upper and lower engine-to-radiator hoses removed (WP 0025 00)

Radiator air recirculation bottom shield removed (WP 0026 00)

Radiator assembly, fan shroud, and charge air cooler removed (WP 0142 00)

Cab heater hoses disconnected from engine (WP 0056 00)

Secondary fuel filter-to-engine fuel line disconnected (WP 0020 00)

Fuel injector pump-to-secondary fuel filter fuel line disconnected (WP 0020 00)

Fuel/water separator-to-fuel injector pump fuel line disconnected (WP 0020 00)

Engine-to-fuel tank return line disconnected (WP 0020 00)

Oil sampling valve hoses disconnected from engine and transmission (WP 0132 00)

Engine oil dipstick tube removed from attachment to frame (WP 0010 00)

Transmission fill dipstick tube removed from attachment to muffler support post (WP 0027 00)

Transmission oil cooler hoses disconnected from transmission and removed from attachment to underside of engine (WP 0029 00)

## INITIAL SETUP- CONTINUED

## Equipment Condition - Continued

- Hydraulic hoses disconnected from power steering hydraulic pump (WP 0140 00)
- Hydraulic hoses disconnected from fifth wheel lift hydraulic pump (WP 0161 00)
- Air hoses disconnected from air compressor and governor (WP 0066 00)
- Alternator and alternator bracket removed (WP 0090 00)
- AC compressor and mounting bracket removed and placed out of the way (WP 0155 00)

## Equipment Condition - Continued

- Electrical cables and wires disconnected from starter (WP 0092 00)
- Wiring harnesses and electrical leads disconnected from engine and transmission and from engine and transmission sensors and sending units (WP 0120 00 and Group 020 and Group 070 Commercial Service Manuals)
- Ether lines disconnected from intake manifold (WP 0077 00)
- Propshaft disconnected from transmission and supported with straps out of the way (Group 120 Commercial Service Manuals)

**WARNING**

- DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.
- Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.
- Engine with standard accessories has a dry weight of approximately 1295 lb (588 kg). Transmission dry weight is approximately 575 lb (260 kg). Ensure lifting device capacity is sufficient to lift powerpack combined weight of approximately 1860 lb (849 kg). Failure to do so could result in damage to equipment or injury or death to personnel.
- When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.
- Spilled fuel, engine oil, coolant or hydraulic fluid is very slippery. Immediately wipe up any spills. Dispose of spilled material in accordance with local policy and ordinances. Failure to follow this warning may result in injury to personnel.

**CAUTION**

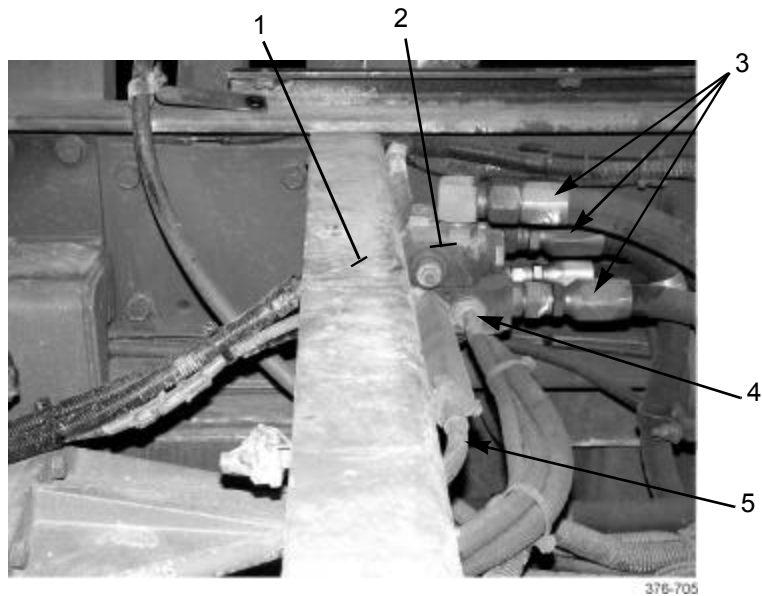
Wipe area clean around all fluid connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of fluid systems could result in equipment failure.

**NOTE**

- Tag all fluid lines and fittings and electrical harnesses and connectors, to ensure correct installation.
- Remove all clamps and tiedown straps required to release fluid and air lines and electrical wiring. Discard tiedown straps. Use new tiedown straps on installation.

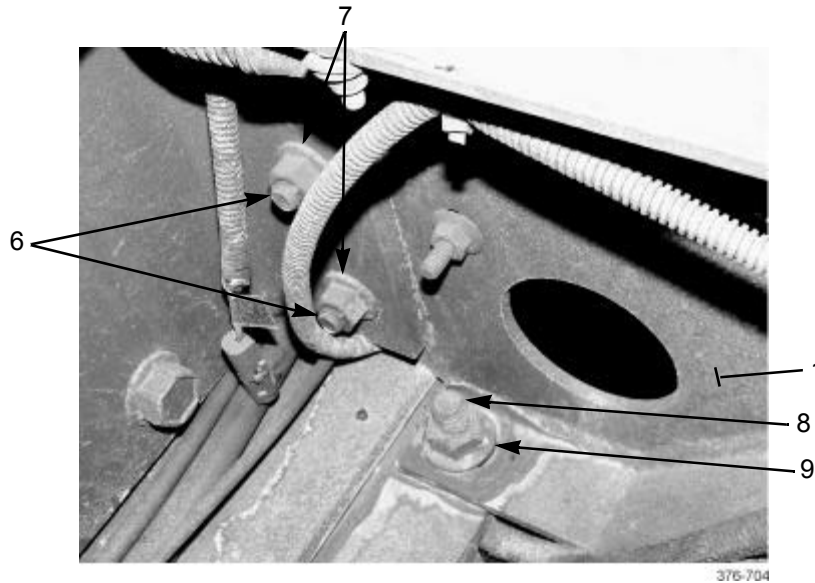
**REMOVAL**

1. If vehicle is equipped with auxiliary arctic heater, disconnect coolant hoses from engine.
2. Remove crossmember (1) from between frame rails and reposition against left frame rail as follows:
  - a. Disconnect engine oil sampling valve hose from elbow at crossmember (1) (WP 0132 00).
  - b. Disconnect hydraulic hoses (3) from flow control valve (2) (WP 0128 00). DO NOT disconnect load sensing gauge hose (4) or fifth wheel lift control cable (5) from valve.
  - c. Remove flow control valve (2) with attached components from crossmember (1) and place out of the way along left side of vehicle (WP 0128 00).



**REMOVAL - CONTINUED**

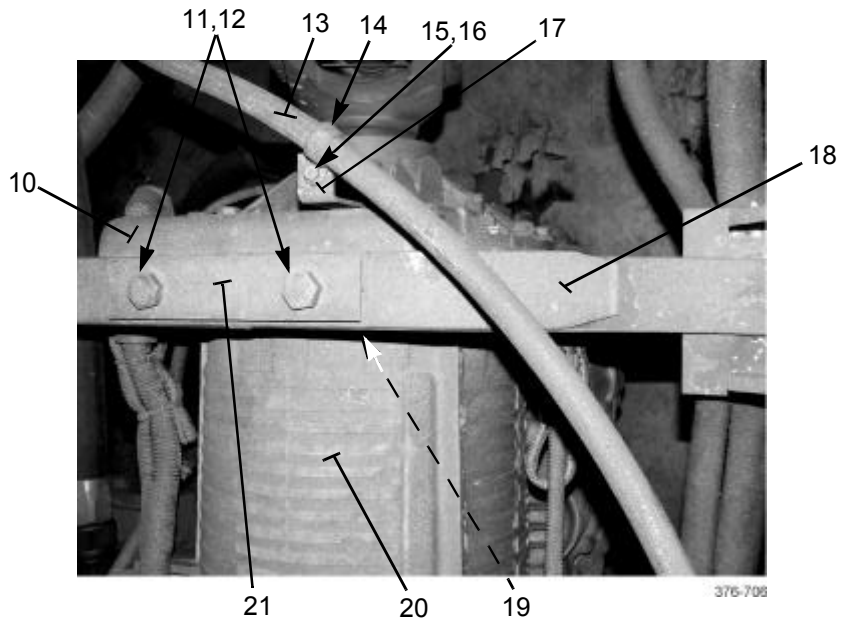
- d. On each side of crossmember (1), remove three nuts (7) and bolts (6). Remove nut (9) and bolt (8).

**NOTE**

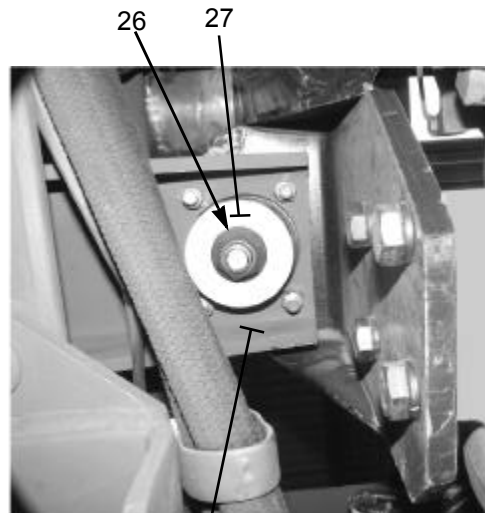
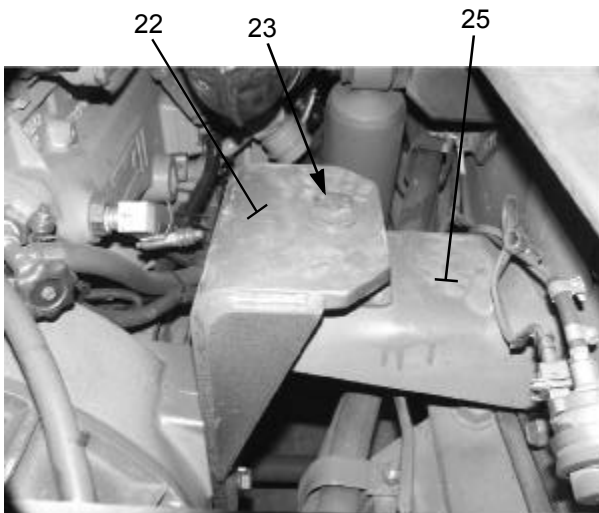
If any air or fluid hose or electrical wiring interferes with positioning of crossmember against left frame rail, disconnect to free up crossmember.

- e. Remove crossmember (1) from between frame rails and reposition out of the way against left frame rail.
3. Prepare suitable cribbing to support powerpack after removal from vehicle.
  4. Place a suitable support under transmission (20) and raise so that transmission is fully supported.
  5. Remove two locknuts (11), bolts (12), spring cap (21), tail shaft support spring (18), and spacers (19) from transmission mounting bracket (10). Discard locknuts.
  6. Remove nut (15), bolt (16), clamp (14), and release air dryer-to-compressor air hose (13) from attachment to standoff bracket (17).
  7. Position suitable overhead lifting device over powerpack and rig for lifting:
    - a. Attach a three-point lifting device to lift points at front left and right rear of engine and to transmission mounting bracket (10).
    - b. Check to ensure powerpack is securely rigged with rigging positioned to ensure a safe and balanced lift.
    - c. Take up all slack in rigging until powerpack is supported by lifting device.

REMOVAL - CONTINUED



8. On each side at rear of engine, remove nut (26), special washer (27), and bolt (23) from engine mount bracket (22) and engine mount bracket (25).

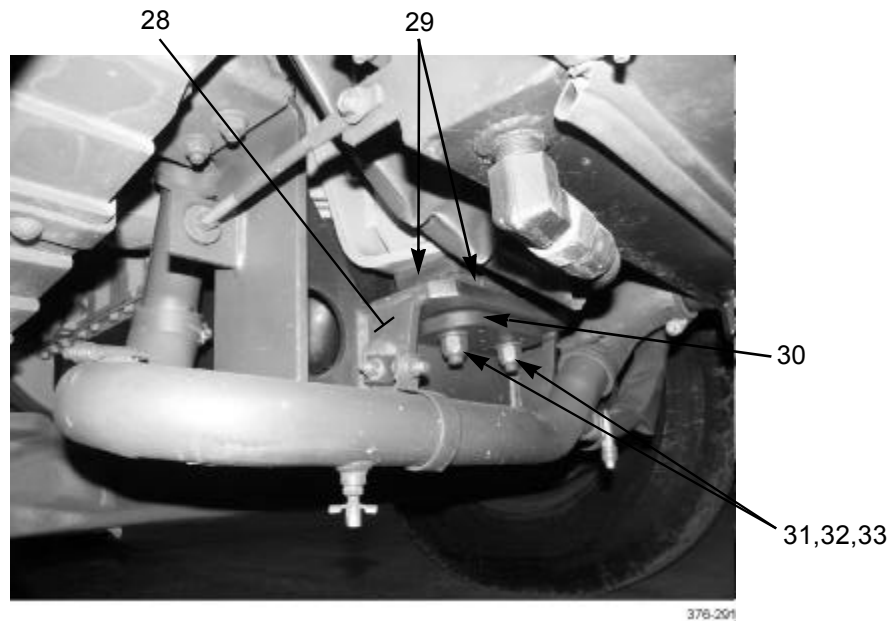


376-397

**REMOVAL - CONTINUED****NOTE**

Two bolts (33) and washers (32) at front engine mount, and bushings (29) between engine and top of mount cannot be removed until after powerpack has been lifted clear.

9. At front of engine, remove two nuts (31) and washers (32) from bolts (33). Remove bushing (30) from front engine mount (28).





**REMOVAL - CONTINUED****WARNING**

- Use extreme caution when lifting powerpack. Proceed slowly and be alert for any component not being removed that is interfering with lift. Do NOT allow powerpack to swing free. Keep it under control at all times. Failure to follow this warning may cause damage to equipment or injury or death to personnel.

**CAUTION**

During lift, ensure all fuel, oil, coolant, hydraulic, AC, and electrical lines are clear.

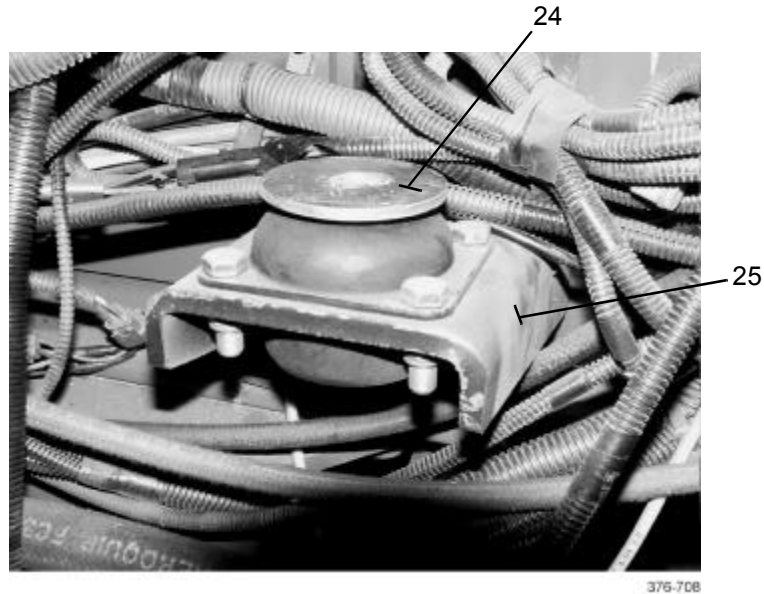
10. Raise powerpack with lifting device just enough to ensure lift is secure and balanced. If adjustment in rigging is needed, lower powerpack onto mounts and make corrections.
11. Resume lift and remove powerpack from vehicle.
12. Place powerpack on prepared cribbing.
13. Retrieve two front engine mount bolts (33) and washers (32) from engine.



376-201

**REMOVAL - CONTINUED**

14. Retrieve special washer (24) from each engine mount bracket (25).

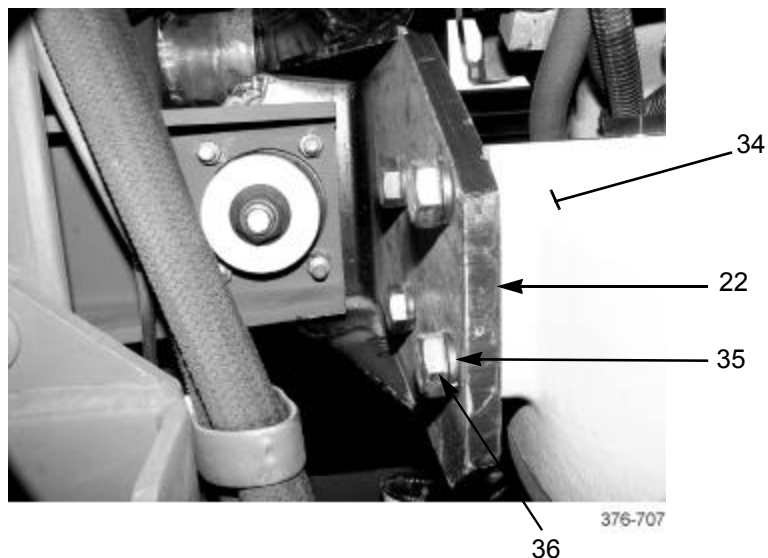


15. Remove transmission from engine in accordance with instructions in WP 0139 00.

**NOTE**

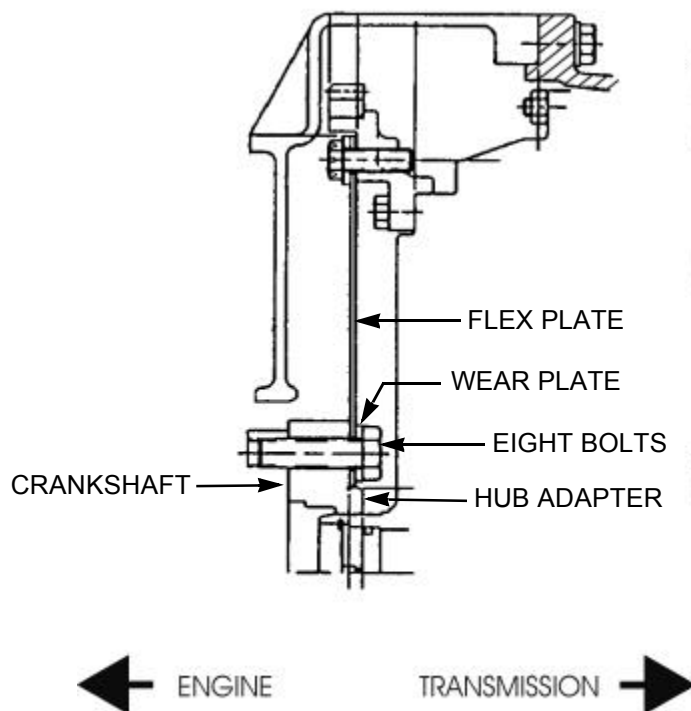
If a new engine or transmission is being installed, thoroughly inspect old engine or transmission and compare to the new. Ensure all components on old that need to be transferred to the new have been identified and are removed.

16. If replacing engine with a new engine, perform the following steps:
- Remove four bolts (36), lockwashers (35), and engine mount bracket (22) from engine bell housing (34). Discard lockwashers. Inspect removed engine mount bracket to ensure it is in good condition to be installed on new engine.



**REMOVAL - CONTINUED**

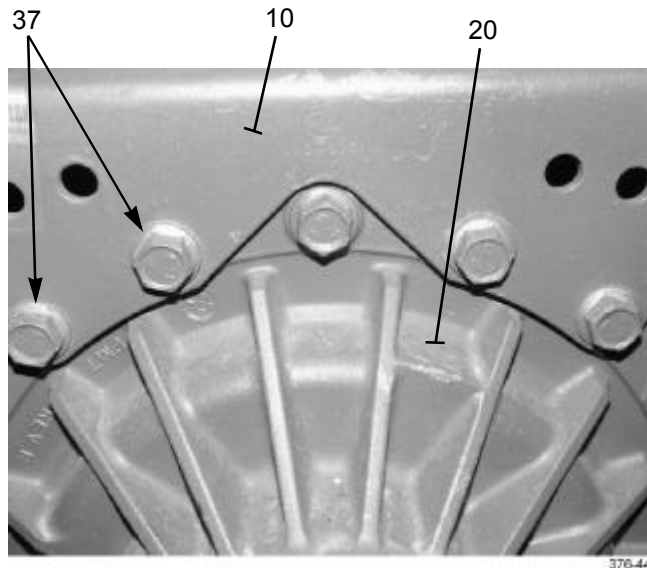
- b. Remove starter (WP 0092 00).
- c. Remove power steering hydraulic pump (WP 0140 00).
- d. Remove engine sensors and sending units (Group 020 Commercial Service Manuals).
- e. Remove engine oil dipstick tube and fittings (WP 0010 00).
- f. Remove engine oil sampling valve hose fittings (WP 0132 00).
- g. Remove ether cold start system fittings from intake manifold (WP 0077 00).
- h. Remove cooling fan and fan clutch (WP 0141 00).
- i. Remove all other hoses, lines, and fittings that must be transferred to new engine.
- j. Remove eight bolts and hub adapter with wear plate and flex plate from engine crankshaft.



376-700

**REMOVAL - CONTINUED**

17. If replacing transmission with a new transmission, perform the following steps:
- Remove four bolts (37) and transmission mounting bracket (10) from transmission (20).



- Remove rear yoke (Group 070 Commercial Service Manuals).
- Remove nut, bolt, and wiring harness connector anchor bracket from right rear of transmission.

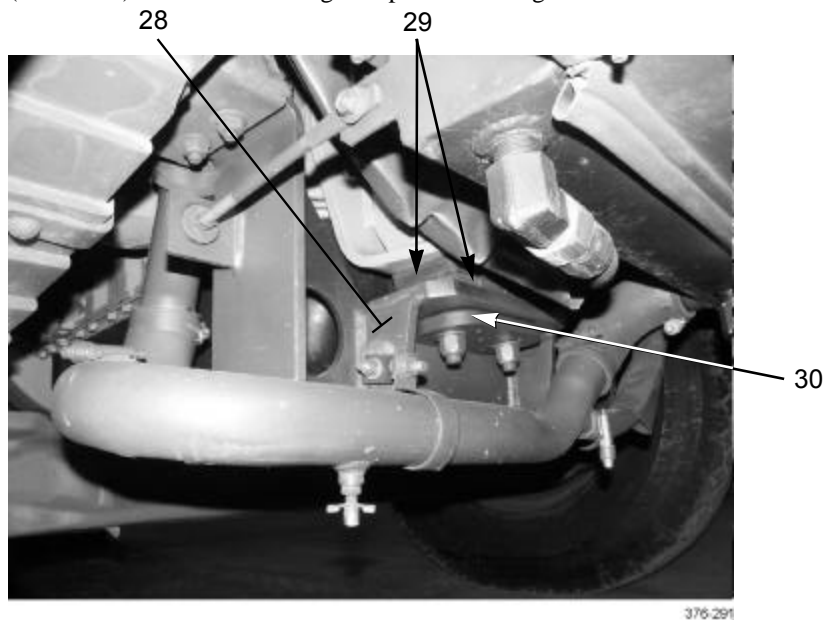
**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

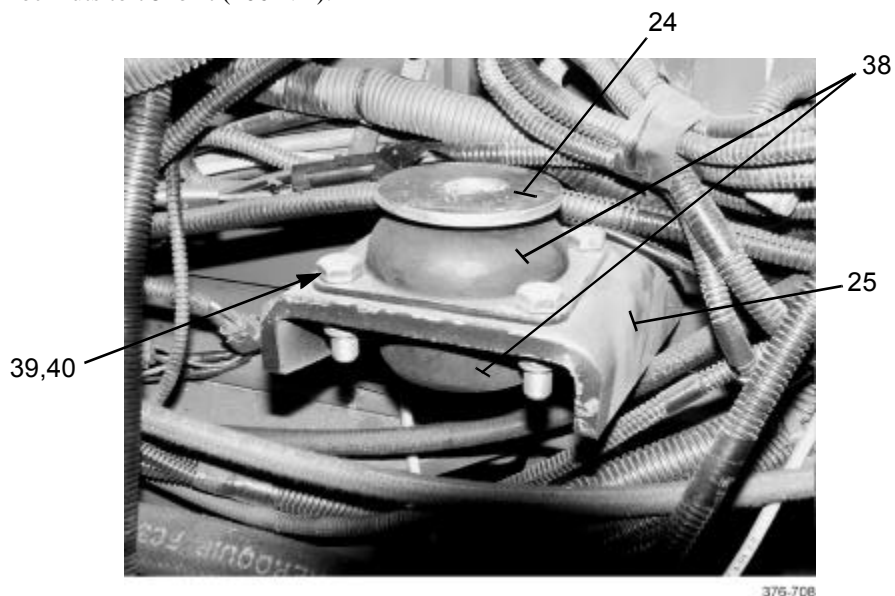
- Remove fifth wheel lift hydraulic pump (WP 0161 00).
- Remove PTO and PTO hose from transmission (Group 070 Commercial Service Manuals).
- Remove transmission sensors and sending units (Group 070 Commercial Service Manuals).
- Remove transmission fill dipstick tube and fittings (WP 0027 00).
- Remove transmission oil sampling valve hose fittings (WP 0132 00).
- Remove transmission oil cooler fittings (WP 0029 00).
- Remove all other hoses, lines, and fittings that must be transferred to new transmission.

**INSPECTION OF ENGINE MOUNTS**

1. At front engine mount (28), perform the following steps:
  - a. Remove two bushings (29).
  - b. Inspect bushings (29 and 30) for wear or damage. Replace if damaged.



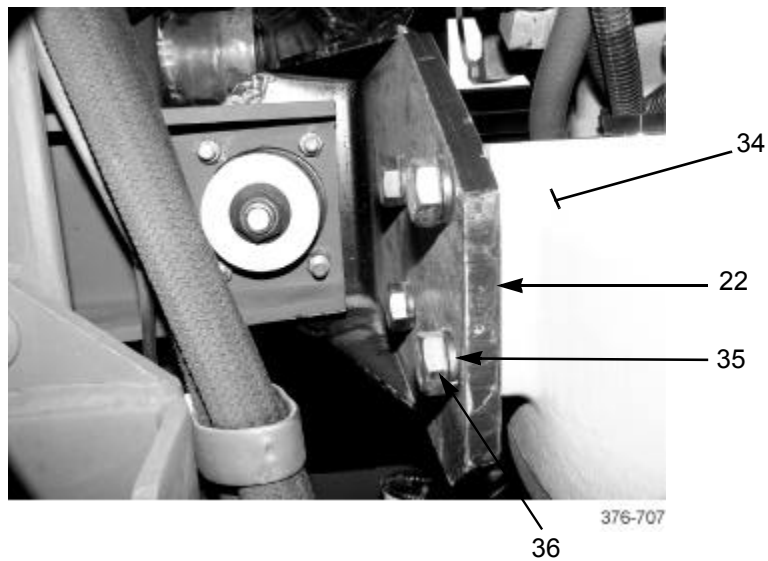
2. On each side of vehicle at rear engine mounts, perform the following steps:
  - a. Inspect special washer (24) and resilient mount (38) for wear or damage.
  - b. If resilient mount (38) is damaged, remove four locknuts (39), bolts (40), and mount from engine mount bracket (25). Discard locknuts.
  - c. Install replacement resilient mount (38) at engine mount bracket (25) with four bolts (40) and new locknuts (39). Tighten locknuts to 78 lb-ft (106 Nm).



**INSPECTION OF ENGINE MOUNTS - CONTINUED****NOTE**

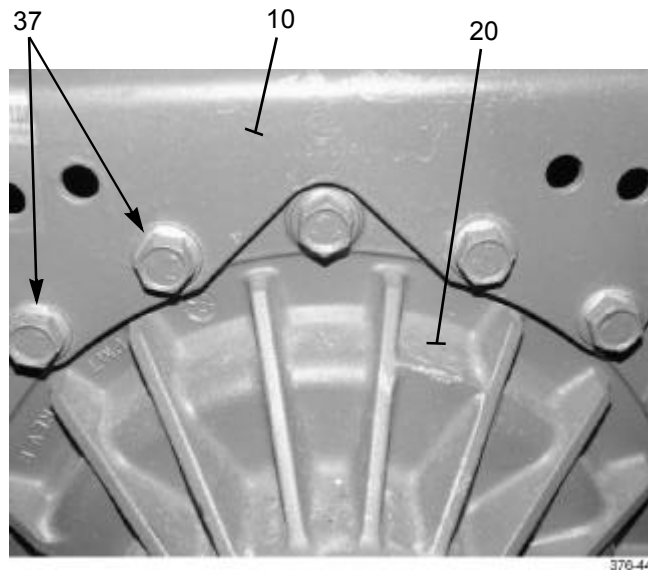
Perform step 3 only if engine mount bracket has not already been removed from engine.

3. On each side of engine, perform the following steps:
  - a. Inspect engine mount bracket (22) for damage.
  - b. If damaged, remove four bolts (36), lockwashers (35), and engine mount bracket (22) from engine bell housing (34). Discard lockwashers.
  - c. Install replacement engine mount bracket (22) to engine bell housing (34) with four new lockwashers (35) and bolts (36). Tighten bolts to 80-85 lb-ft (108-115 Nm).



**INSTALLATION**

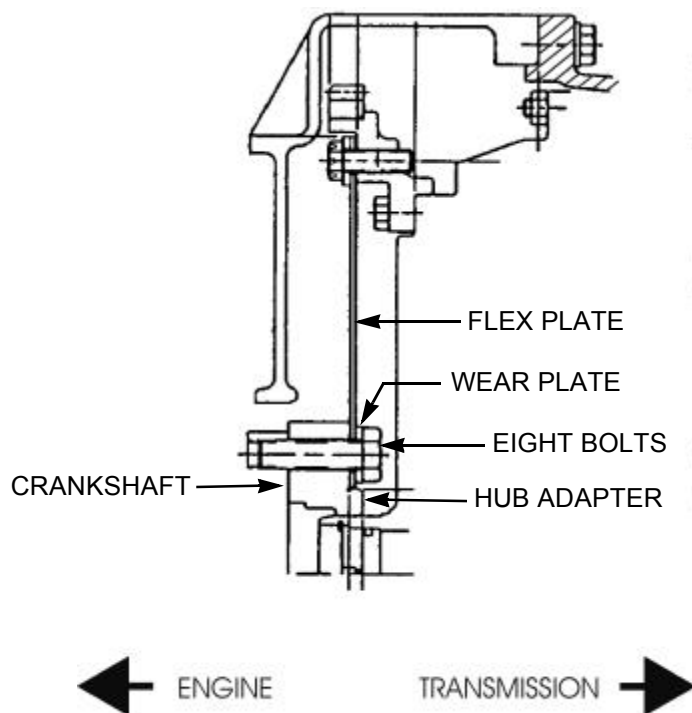
1. If installing a new transmission, perform the following steps:
  - a. Remove all shipping plugs and PTO cover plate and transfer them to old transmission to seal old transmission for storage or shipment.
  - b. Install transmission rear support bracket (10) to transmission (20) with four bolts (37). Tighten bolts to 66-81 lb-ft (90-110 Nm).



- c. Install anchor bracket for wiring harness connector to right rear of transmission with bolt and nut.
  - d. Install rear yoke (Group 070 Commercial Service Manuals).
  - e. Install fifth wheel lift hydraulic pump (WP 0161 00).
  - f. Install PTO and PTO hose to transmission (Group 070 Commercial Service Manuals).
  - g. Install transmission sensors and sending units (Group 070 Commercial Service Manuals).
  - h. Install transmission fill dipstick tube (WP 0027 00).
  - i. Install transmission oil sampling valve hose fittings (WP 0132 00).
  - j. Install transmission oil cooler fittings (WP 0029 00).
  - k. Install all other hoses, lines, and fittings that must be transferred to new transmission.
  - l. Remove torque converter shipping restraint bar from torque converter bell housing. Transfer restraint bar to old transmission.
2. If installing a new engine, perform the following steps:
  - a. Remove all shipping plugs and transfer them to old engine to seal old engine for storage or shipment.
  - b. Install engine mount bracket (22) to bell housing (34) of new engine with four new lockwashers (35) and bolts (36). Tighten bolts to 315 lb-ft (427 Nm).

**INSTALLATION - CONTINUED**

- c. Install power steering hydraulic pump (WP 0140 00).
- d. Install engine sensors and sending units (Group 020 Commercial Service Manuals).
- e. Install engine oil dipstick tube and fittings (WP 0010 00).
- f. Install engine oil sampling valve hose fittings (WP 0132 00).
- g. Install ether cold start system fittings to intake manifold (WP 0077 00).
- h. Install cooling fan and fan clutch (WP 0141 00).
- i. Install hub adapter with flex plate and wear plate to engine crankshaft with eight bolts. Tighten bolts to 75 lb-ft (102 Nm).

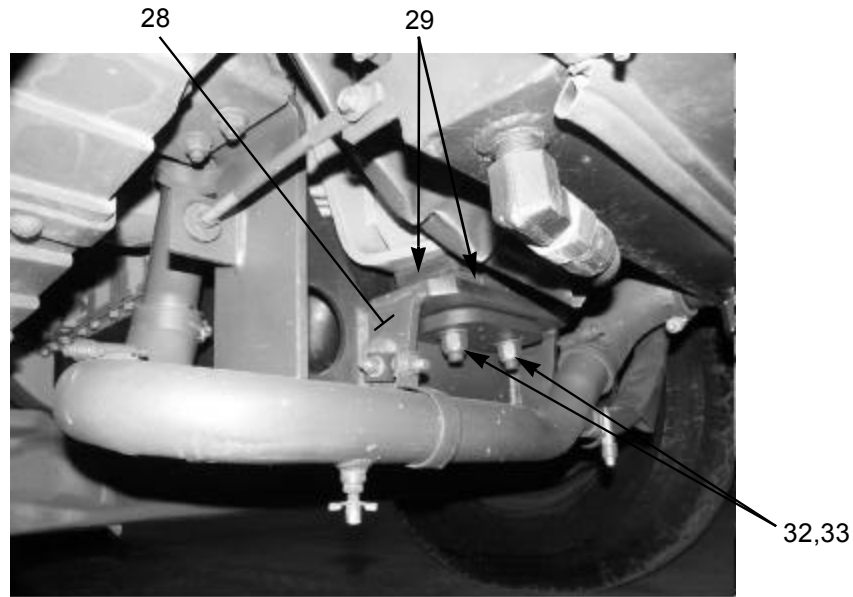


- j. Install all other hoses, lines, and fittings that must be transferred to new engine.
3. Install transmission to engine in accordance with instructions in WP 0139 00.
  4. Ensure all fuel, oil, coolant, hydraulic, AC, and electrical lines on vehicle are clear, so that powerpack can be lowered into position without damage to lines.



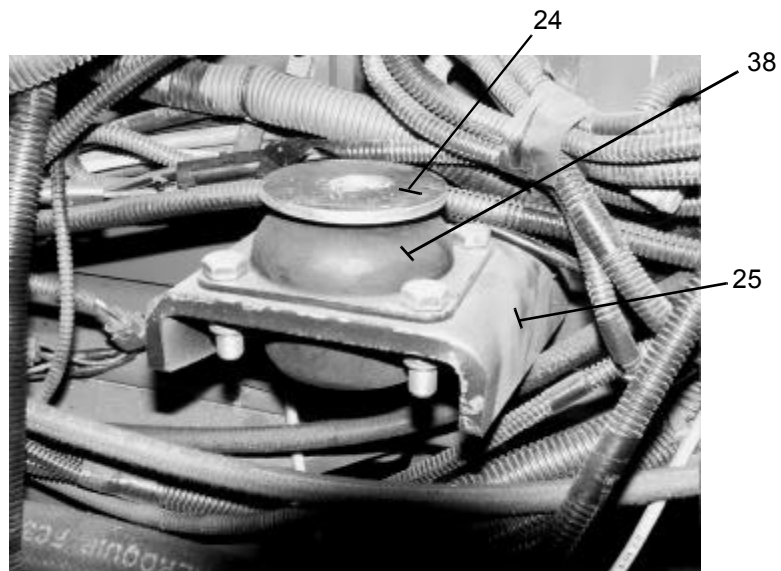
**INSTALLATION - CONTINUED**

5. Position two bushings (29) on front engine mount (28) at vehicle.
6. Position two washers (32) and front engine mount bolts (33) through mounting bolt holes at engine.



376-291

7. Position special washer (24) on resilient mount (38) at each engine mount bracket (25).



376-708

**INSTALLATION - CONTINUED****WARNING**

- Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.
- Engine with standard accessories has a dry weight of approximately 1295 lb (588 kg). Transmission dry weight is approximately 575 lb (260 kg). Ensure lifting device capacity is sufficient to lift powerpack combined weight of approximately 1860 lb (849 kg). Failure to do so could result in damage to equipment or injury or death to personnel.

8. Position suitable overhead lifting device over powerpack and rig for lifting:
  - a. Attach a three-point lifting device to lift points at front left and right rear of engine and to transmission mounting bracket.
  - b. Check to ensure powerpack is securely rigged with rigging positioned to ensure a safe and balanced lift.
  - c. Take up all slack in rigging until powerpack is supported by lifting device.

**WARNING**

Use extreme caution when lifting powerpack. Proceed slowly and be alert for any component on vehicle that may interfere with powerpack's placement on engine mounts. Do NOT allow powerpack to swing free. Keep it under control at all times. Failure to follow this warning may cause damage to equipment or injury or death to personnel.

9. Raise powerpack with lifting device just enough to ensure lift is secure and balanced. If adjustment in rigging is needed, lower powerpack onto cribbing and make adjustments.
10. Lift powerpack off cribbing and move to vehicle.

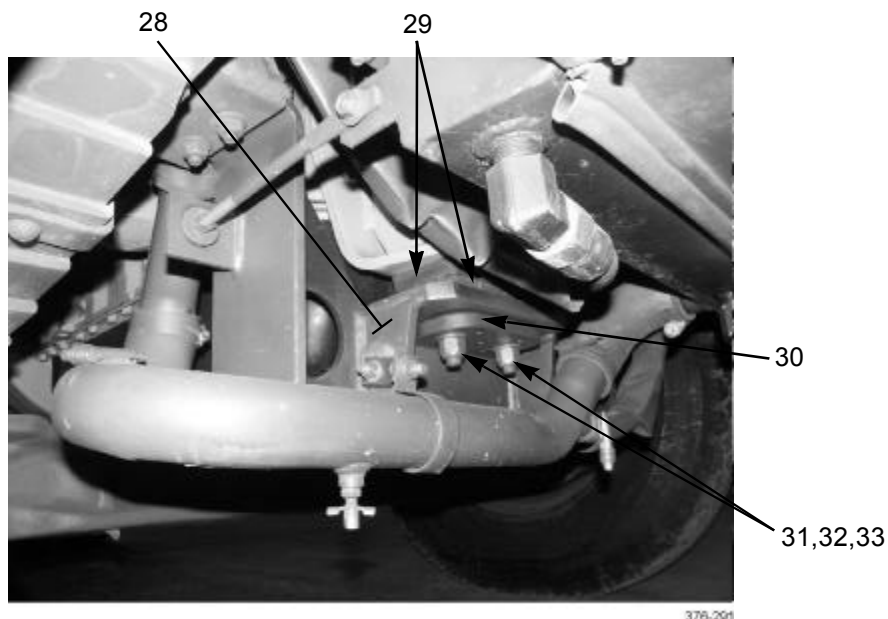
**CAUTION**

As powerpack is lowered into vehicle, ensure all fuel, oil, coolant, hydraulic, AC, and electrical lines are clear.

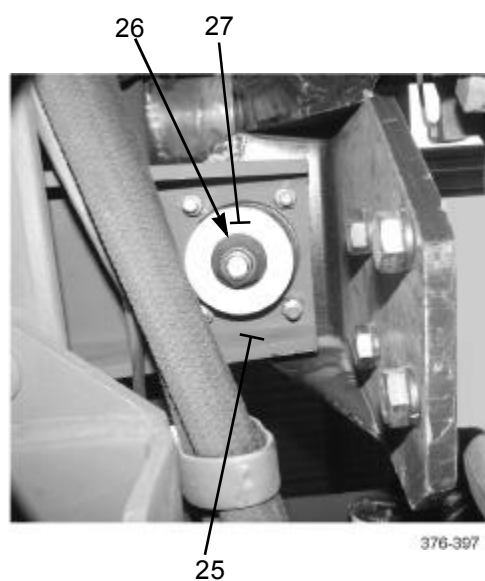
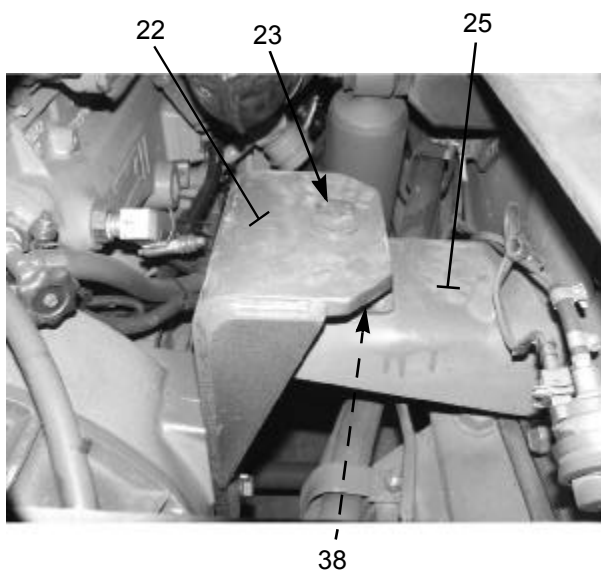
11. Position powerpack and lower into vehicle until engine rests on front and rear engine mounts and transmission is resting on suitable support.

**INSTALLATION - CONTINUED**

12. At front of engine, position bushing (30) under front engine mount (28) and install two washers (32) and nuts (31) on bolts (33). Do NOT fully tighten nuts.

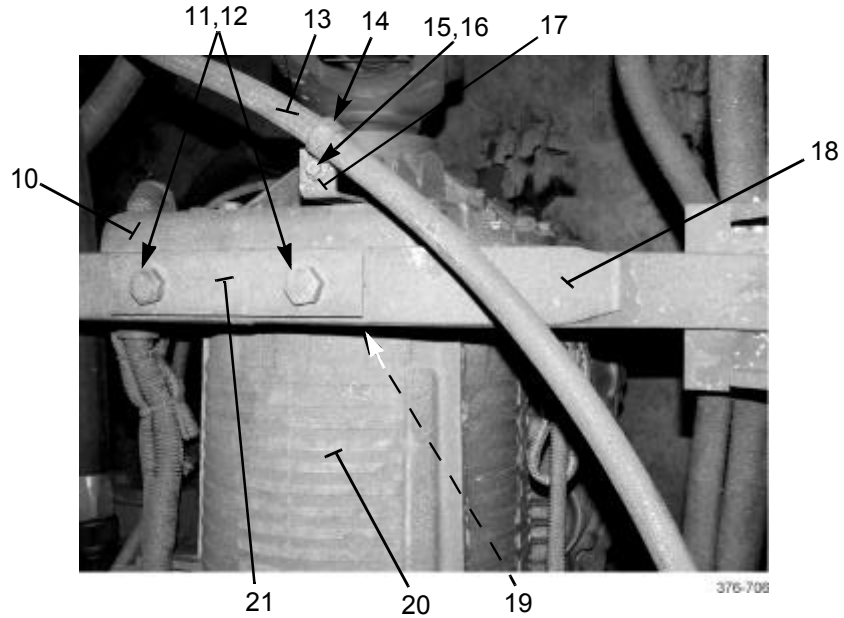


13. On each side at rear of engine, install bolt (23) through engine mount bracket (22), resilient mount (38), and engine mount bracket (25). Install special washer (27) and nut (26). Do NOT fully tighten nuts.
14. Tighten two nuts (31) at front engine mount (28) to 375 lb-ft (508 Nm).
15. Tighten two nuts (26) at rear engine mounts to 375 lb-ft (508 Nm).



**INSTALLATION - CONTINUED**

16. At transmission (20), position spacers (19), tail shaft support spring (18), and spring cap (21) at transmission mounting bracket (10). Install two bolts (12) and new locknuts (11). Tighten locknuts to 240 lb-ft (325 Nm).
17. Secure air dryer-to-air compressor air hose (13) to standoff bracket (17) with clamp (14), bolt (16), and nut (15).
18. Remove support from under transmission (20).

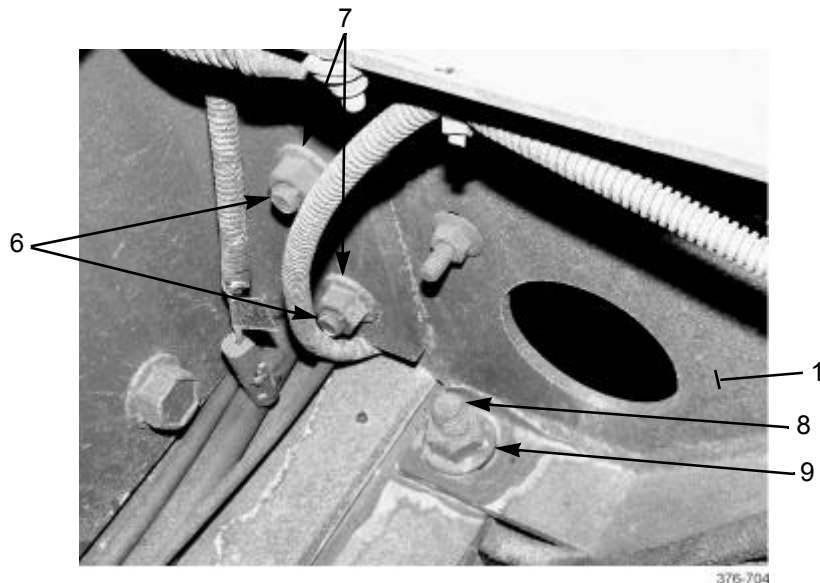


19. Install crossmember (1) between vehicle frame rails as follows:

**NOTE**

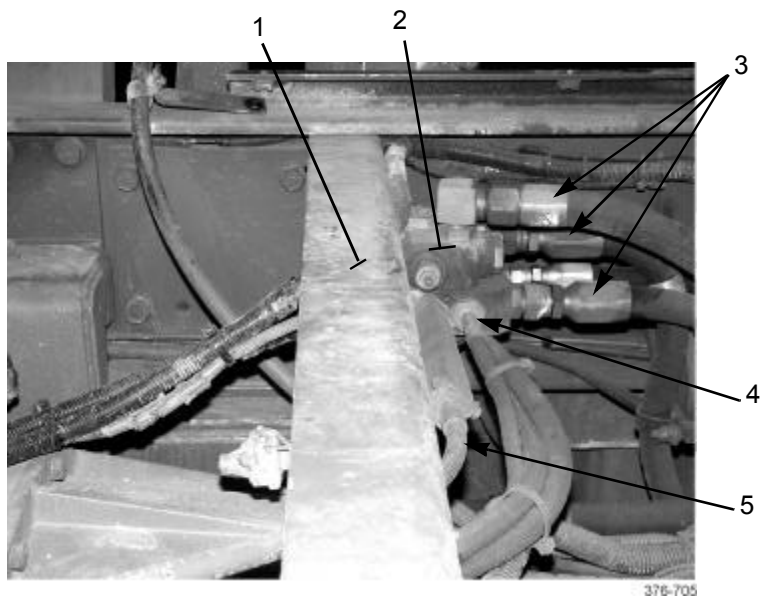
Reposition and connect any air or fluid hose or electrical wiring at crossmember as required.

- a. Reposition crossmember (1) between left and right frame rails.
- b. On each side, install crossmember (1) to frame with three bolts (6) and nuts (7). Install bolt (8) and (9).



**INSTALLATION - CONTINUED**

- c. Reposition flow control valve (2) with attached components at crossmember (1) and install (WP 0128 00).
- d. Connect hydraulic hoses (3) to flow control valve (2) (WP 0128 00).
- e. Connect engine oil sampling valve hose to elbow fitting at crossmember (1) (WP 0132 00).



20. If equipped with auxiliary arctic heater, connect coolant hoses to engine.
21. Connect propshaft to transmission (Group 120 Commercial Service Manuals).
22. Connect ether lines to intake manifold (WP 0077 00).
23. Connect wiring harnesses and electrical leads to engine and transmission and to engine and transmission sensors and sending units (WP 0120 00 and Group 020 and Group 070 Commercial Service Manuals).
24. Connect electrical cables and wires to starter (WP 0092 00).
25. Install AC compressor and mounting bracket (WP 0155 00).
26. Install alternator bracket and alternator (WP 0090 00).
27. Connect air hoses to air compressor and governor (WP 0066 00).
28. Connect hydraulic hoses to fifth wheel lift hydraulic pump (WP 0161 00).
29. Connect hydraulic hoses to power steering hydraulic pump (WP 0140 00).
30. Connect transmission oil cooler hoses to transmission and secure to underside of engine (WP 0029 00).
31. Secure transmission fill dipstick tube to muffler support post (WP 0027 00).
32. Install engine oil dipstick tube to frame (WP 0010 00).
33. Connect oil sampling valve hoses to engine and transmission (WP 0132 00).
34. Connect engine-to-fuel tank return line (WP 0020 00).
35. Connect fuel/water separator-to-fuel injector pump fuel line (WP 0020 00).
36. Connect fuel injector pump-to-secondary fuel filter fuel line (WP 0020 00).
37. Connect secondary fuel filter-to-engine fuel line (WP 0020 00).
38. Connect cab heater hoses to engine (WP 0056 00).

**INSTALLATION - CONTINUED**

39. Install radiator assembly, fan shroud, and charge air cooler (WP 0142 00).
40. Install AC receiver-drier to radiator (WP 0154 00).
41. Install upper and lower engine-to-radiator hoses (WP 0025 00).
42. Install radiator air recirculation bottom shield (WP 0026 00).
43. Install exhaust tubing between turbocharger and muffler (WP 0022 00).
44. Install engine charge air cooling hoses and tubes (WP 0016 00).
45. Install air intake tubes (WP 0015 00).
46. Ensure all fluid and air lines and electrical wiring are gathered into bundles and secured with new tiedown straps. Ensure all removed clamps have been installed. Ensure all components are fully installed and properly supported.
47. Fill hydraulic system oil reservoir (WP 0129 00).
48. Fill engine oil (WP 0011 00).
49. Fill transmission fluid (Group 070 Commercial Service Manuals).
50. Fill cooling system (WP 0023 00).
51. Connect battery cables (WP 0115 00).
52. Return cab to 45-degree tilt position (WP 0147 00).
53. Lower cab (TM 9-2320-312-10).
54. Start engine (TM 9-2320-312-10). Check for leaks.
55. Recheck levels of engine oil, transmission fluid, engine coolant, and hydraulic system fluid. Add as required.
56. Install transmission access cover and rear platform grating (WP 0039 00).
57. Remove wheel blocks.

**NOTE**

If a new engine or transmission was installed, refer to Group 020 or Group 070 Commercial Service Manuals for information on ECU programming.

**END OF WORK PACKAGE**

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**TRANSMISSION REPLACEMENT**

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0139 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 070

**RPSTL Reference**

Group 020, Figure 1

Group 070, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, field maintenance (Item 27, WP 0166 00)

Pinion turning tool (Item 22, WP 0166 00)

**Materials/Parts**

Adhesive (Item 1, WP 0165 00)

Cap set, protective (Item 6, WP 0165 00)

Fluid, automatic transmission, Dexron III (Item 24, WP 0165 00)

Fluid, hydraulic, petroleum base (Item 25 or 26, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N 21NE108) (2)

Washer, lock (P/N 361-92) (12)

**Personnel Required**

Two

**Equipment Condition**

Tractor on level ground with front wheels blocked

Air system drained (TM 9-2320-312-10)

Cab tilted (TM 9-2320-312-10)

Battery cables disconnected and battery box covers closed (WP 0115 00)

Transmission access cover and rear platform grating removed (WP 0039 00)

Propshaft disconnected and supported with straps out of the way (Group 120 Commercial Service Manuals)

Transmission fluid drained (Group 070 Commercial Service Manuals)

Hydraulic system fluid drained (WP 0129 00)

Transmission oil cooler hoses disconnected from transmission (WP 0029 00)

Oil sampling valve hose disconnected from transmission (WP 0132 00)

Transmission fill dipstick tube removed (WP 0027 00)

Hydraulic hoses disconnected from fifth wheel lift hydraulic pump (WP 0161 00)

Wiring harnesses and electrical leads disconnected from transmission and from transmission sensors and sending units (WP 0120 00 and Group 070 Commercial Service Manuals)

**WARNING**

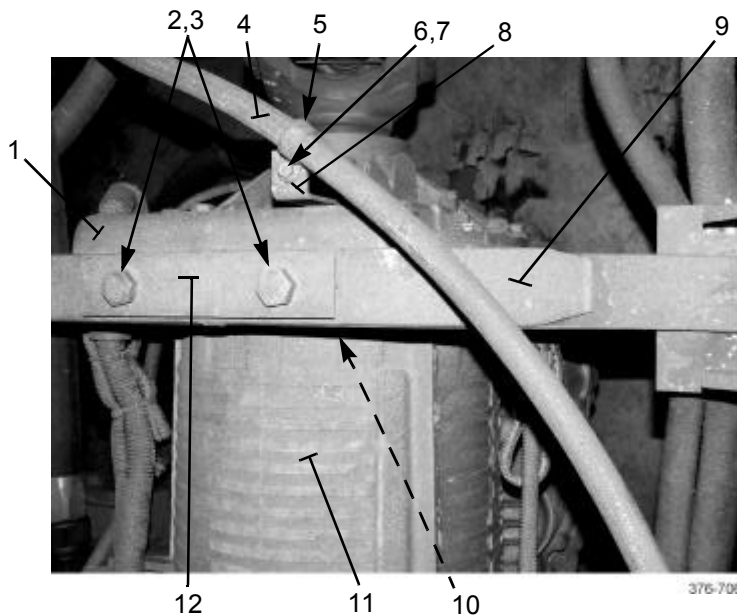
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

**NOTE**

Transmission dry weight is approximately 575 lb (260 kg).

**REMOVAL**

1. Place transmission lift directly under and centered on transmission (11). Raise lift into position and support transmission.
2. Remove two locknuts (2), bolts (3), spring cap (12), tail shaft support spring (9), and spacers (10) from transmission mounting bracket (1). Discard locknuts.
3. Remove nut (6), bolt (7), clamp (5), and release air dryer-to-air compressor hose (4) from standoff bracket (8).



4. Remove access plug (13) from right side of engine bell housing (14) to access transmission drive plate bolts.

**WARNING**

Do not place finger in hole in engine bell housing while engine is being barred over. Failure to follow this warning could result in injury.



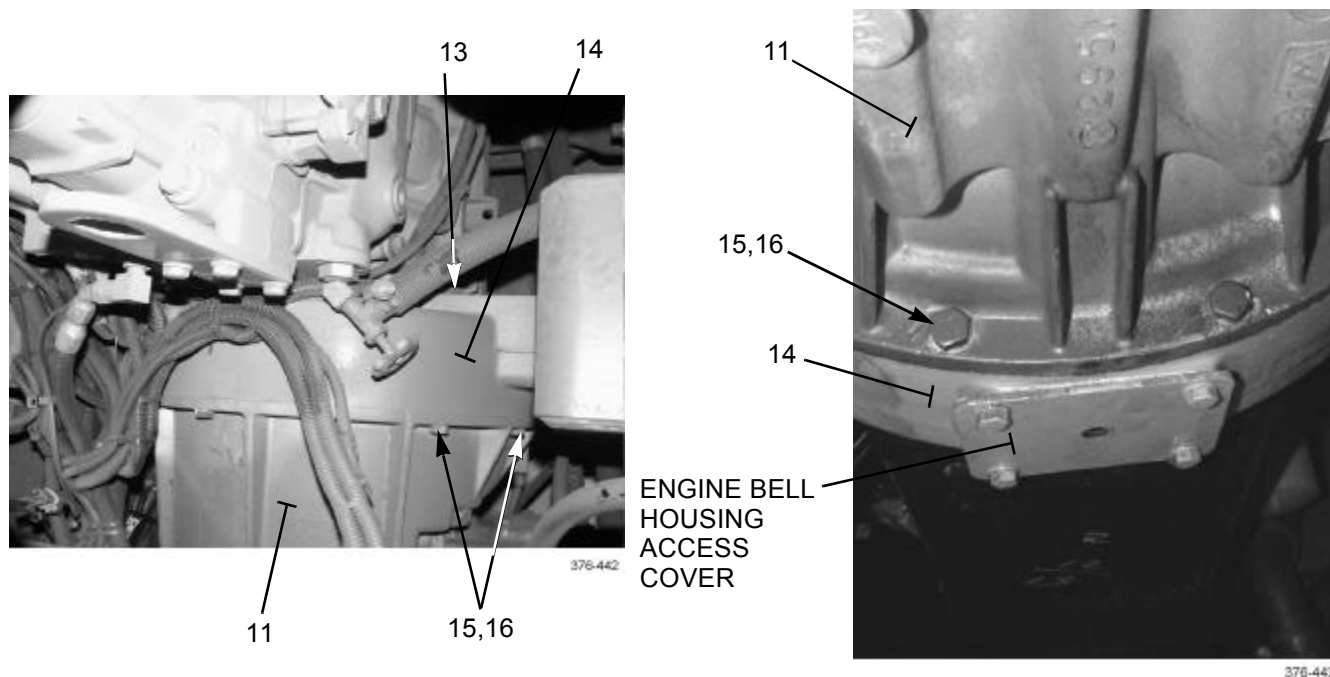
**REMOVAL - CONTINUED****CAUTION**

- Step 5 must be followed to bar engine over. Any other method may damage engine.
- If bolts are dropped in engine bell housing, retrieve immediately by removing four bolts and access cover at bottom of engine bell housing. Failure to do so could result in damage to equipment.

**NOTE**

Crankshaft rotation is counterclockwise, as viewed from flywheel end of engine.

5. Have an assistant bar engine over in a counterclockwise direction, using pinion turning tool on four crankshaft pulley bolts. Locate and remove transmission drive plate bolt through hole in engine bell housing (14). Repeat until six bolts have been removed.
6. Remove 12 bolts (15) and lockwashers (16) securing transmission (11) to engine bell housing (14). Discard lockwashers.



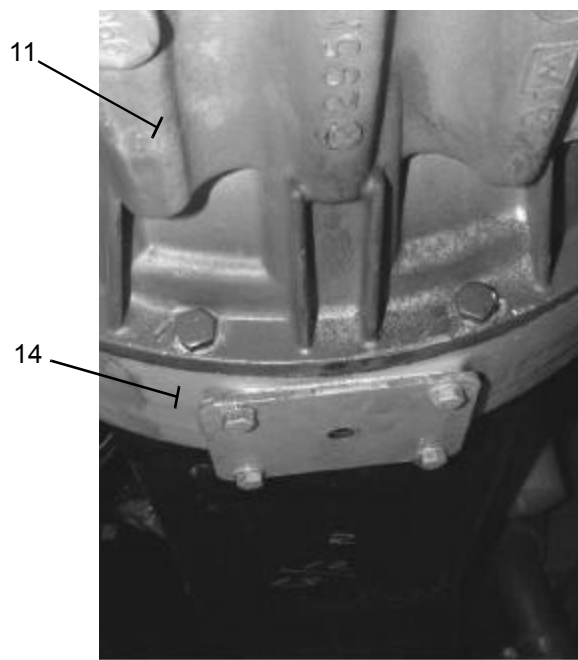
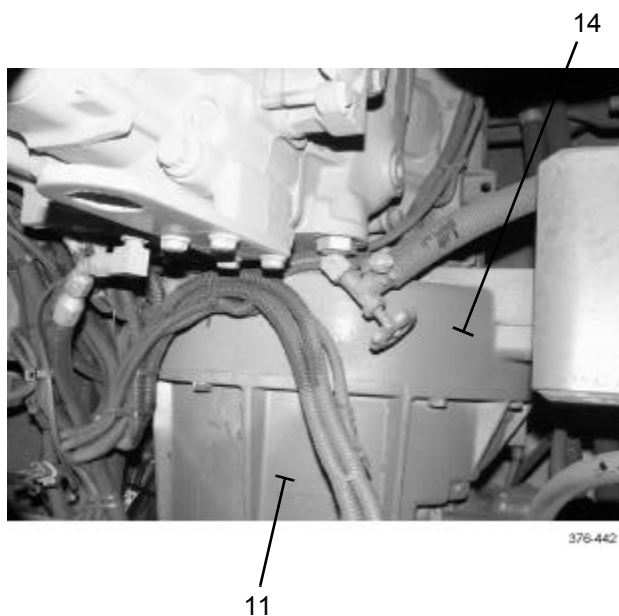
**REMOVAL - CONTINUED****WARNING**

- Use caution when separating transmission from engine to ensure torque converter does not fall free and cause injury to personnel or damage to torque converter.
- When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Dispose of spilled fluid in accordance with local policy and ordinances. Failure to follow this warning may result in injury to personnel.

**NOTE**

Torque converter contains oil and is subject to spillage.

7. With assistance, slide transmission (11) rearward on jack until clear of engine bell housing (14).
8. Place floor jack under rear axle differential and raise rear of vehicle until there is sufficient clearance to remove transmission (11).
9. Lower transmission (11) on jack and remove from under vehicle.

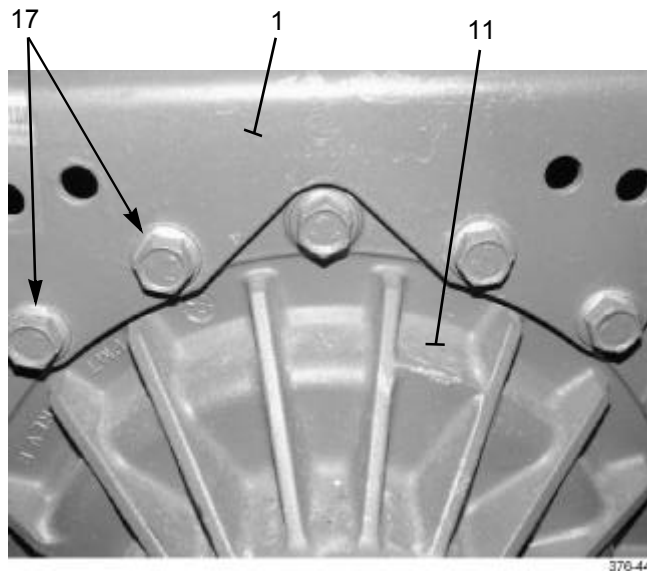


10. Lower rear of vehicle to the ground.

**REMOVAL - CONTINUED****NOTE**

If a new engine or transmission is being installed, thoroughly inspect old engine or transmission and compare to the new engine or transmission. Ensure all components on old engine or transmission that need to be transferred to the new have been identified and are removed.

11. If replacing transmission with a new transmission, perform the following steps:
  - a. Remove four bolts (17) and transmission mounting bracket (1) from transmission (11).



- b. Remove rear yoke (Group 070 Commercial Service Manuals).
- c. Remove nut, bolt, and wiring harness connector anchor bracket from right rear of transmission.

**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

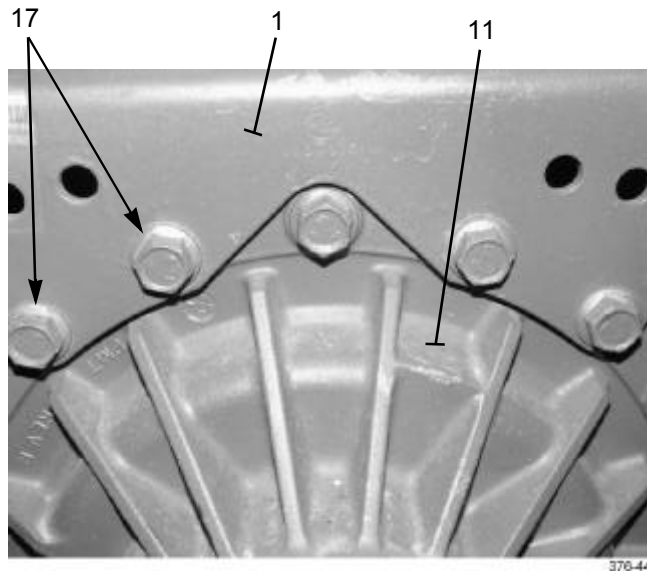
- d. Remove fifth wheel lift hydraulic pump (WP 0161 00).
- e. Remove PTO and PTO hose from transmission (Group 070 Commercial Service Manuals).
- f. Remove transmission sensors and sending units (Group 070 Commercial Service Manuals).
- g. Remove transmission oil sampling valve hose fittings (WP 0132 00).
- h. Remove transmission oil cooler fittings (WP 0029 00).
- i. Remove all other hoses, lines, and fittings that must be transferred to new transmission.

**INSTALLATION**

1. If installing new transmission, perform the following steps:
  - a. Remove all shipping plugs and PTO cover plate and transfer them to old transmission to seal old transmission for storage or shipment.

**INSTALLATION - CONTINUED**

- b. Install transmission mounting bracket (1) to transmission (11) with four bolts (17). Tighten bolts to 66-81 lb-ft (90-110 Nm).



- c. Install anchor bracket for wiring harness connector to right rear of transmission with bolt and nut.
- d. Install rear yoke (Group 070 Commercial Service Manuals).
- e. Install fifth wheel lift hydraulic pump (WP 0161 00).
- f. Install PTO and PTO hose to transmission (Group 070 Commercial Service Manuals).
- g. Install transmission sensors and sending units (Group 070 Commercial Service Manuals).
- h. Install transmission oil sampling valve hose fittings (WP 0132 00).
- i. Install transmission oil cooler fittings (WP 0029 00).
- j. Install all other hoses, lines, and fittings that must be transferred to new transmission.
- k. Remove torque converter shipping restraint bar from torque converter bell housing. Transfer restraint bar to old transmission.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

2. If torque converter was removed, insert torque converter on input shaft inside transmission bell housing. Push in and rotate until seated.

**INSTALLATION - CONTINUED**

3. Use a floor jack under rear axle differential to raise rear of vehicle until there is sufficient clearance to position transmission (11) under vehicle.

**CAUTION**

Transmission must be seated squarely against engine bell housing to prevent damage to equipment.

**NOTE**

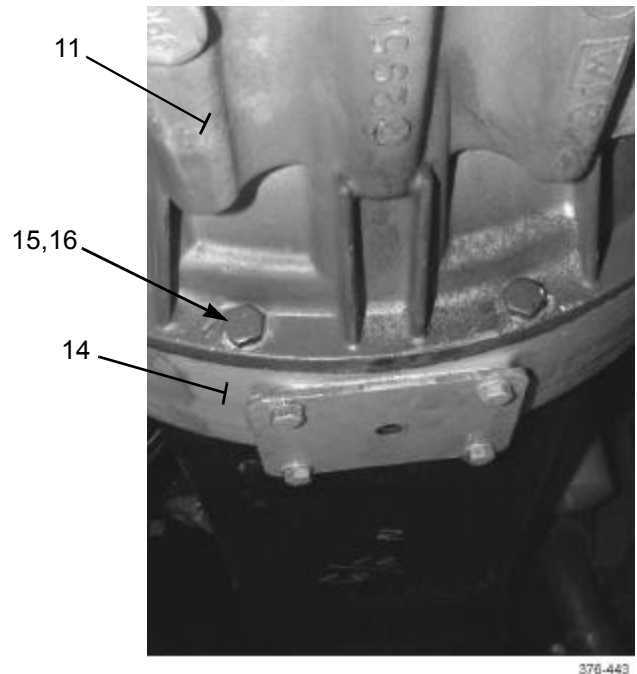
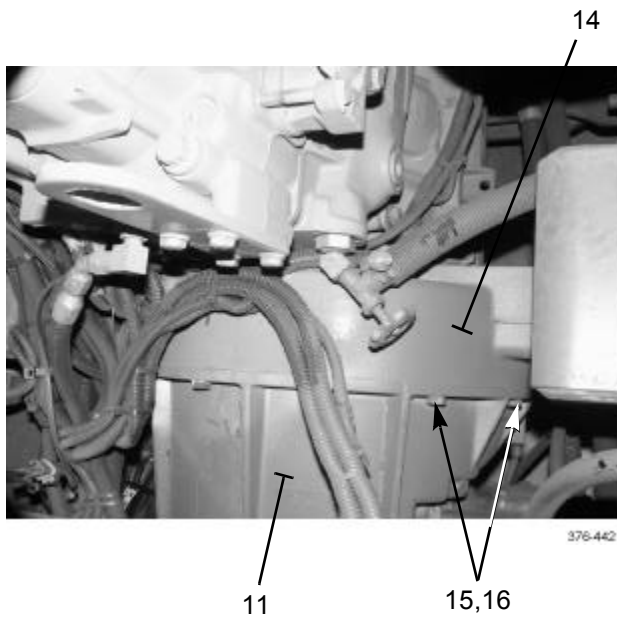
Ensure mating surfaces are clean and dry.

4. With transmission (11) supported on transmission lift, position transmission squarely behind engine bell housing (14).

**NOTE**

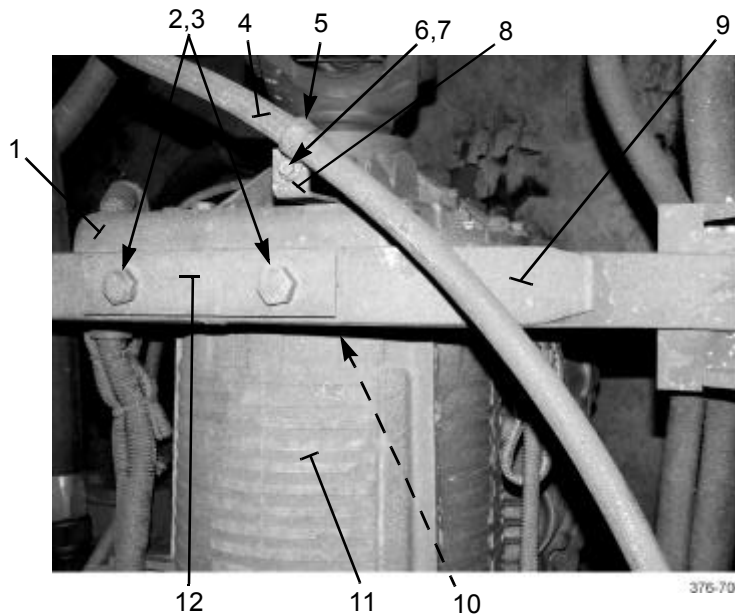
Loctite adhesive should be used on bolts before they are installed.

5. Install, but do NOT fully tighten, 12 new lockwashers (16) and bolts (15).



**INSTALLATION - CONTINUED**

6. Position spacers (10), tail shaft support spring (9), and spring cap (12) at transmission mounting bracket (1). Install two bolts (3) and new locknuts (2). Tighten locknuts to 240 lb-ft (325 Nm).
7. Secure air dryer-to-air compressor hose (4) to standoff bracket (8) with clamps (5), bolt (7), and nut (6).



8. Tighten 12 bolts (15) to 38 lb-ft (52 Nm).

**WARNING**

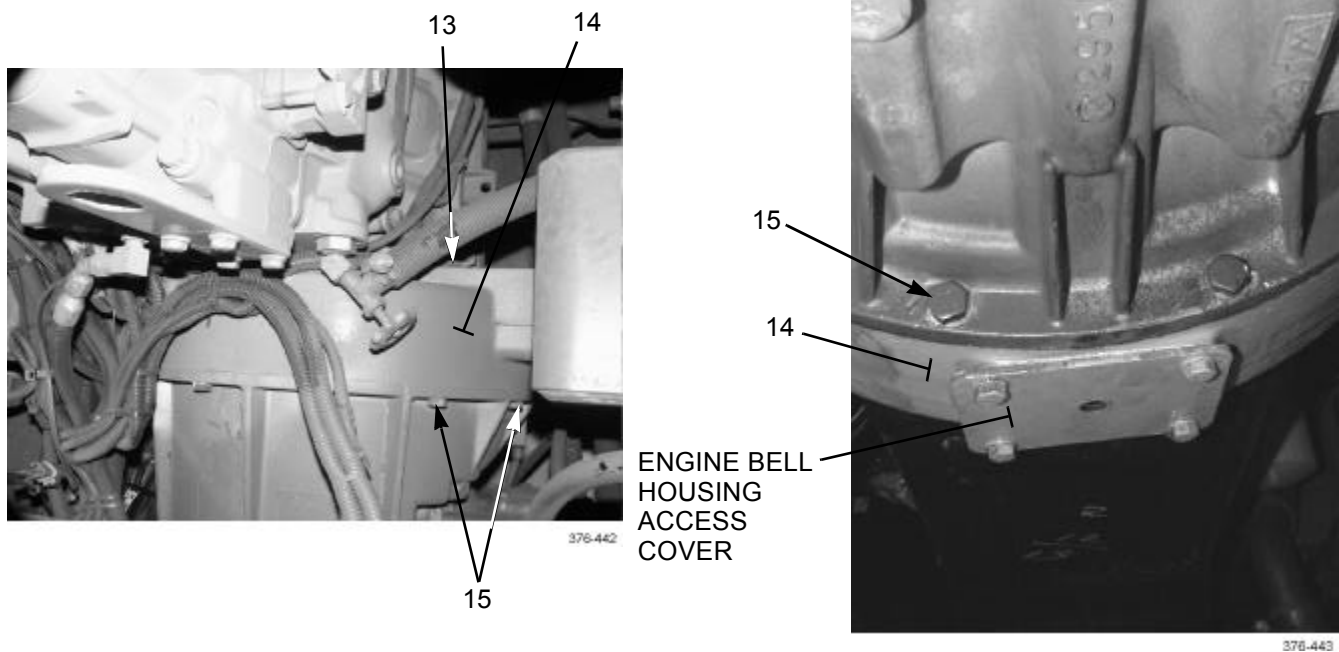
Do not place finger in hole in engine bell housing while engine is being barred over. Failure to follow this warning could result in injury.

**CAUTION**

- Step 9 must be followed to bar engine over. Any other method may damage engine.
- If bolts are dropped in engine bell housing, retrieve immediately by removing four bolts and access cover at bottom of engine bell housing. Failure to do so could result in damage to equipment.

**NOTE**

- Crankshaft rotation is counterclockwise, as viewed from flywheel end of engine.
  - Do NOT fully tighten transmission drive plate bolts until all bolts have been installed.
9. Have an assistant bar engine over in a counterclockwise direction, using crankshaft turning socket on four crankshaft pulley bolts. When first bolt hole becomes visible through hole in engine bell housing (14), install transmission drive plate bolt. Repeat until six bolts have been installed.
  10. Repeat step 9 and fully tighten six transmission drive plate bolts to 50 lb-ft (68 Nm).
  11. Install access plug (13) to right side of engine bell housing (14).

**INSTALLATION - CONTINUED**

12. Remove transmission lift.
13. Connect wiring harnesses and electrical leads to transmission and to transmission sensors and sending units (WP 0120 00 and Group 070 Commercial Service Manuals).
14. Connect hydraulic hoses to fifth wheel lift hydraulic pump (WP 0161 00).
15. Install transmission fill dipstick tube (WP 0027 00).
16. Connect oil sampling valve hose to transmission (WP 0132 00).
17. Connect transmission oil cooler hoses to transmission (WP 0029 00).
18. Connect propshaft (Group 120 Commercial Service Manuals).
19. Fill hydraulic system fluid (WP 0129 00).
20. Fill transmission fluid (Group 070 Commercial Service Manuals).
21. Ensure all fluid and air lines and electrical wiring are gathered into bundles and secured with new tiedown straps. Ensure all removed clamps have been installed. Ensure all components are fully installed and properly supported.
22. Connect battery cables (WP 0115 00).
23. Lower cab (TM 9-2320-312-10).
24. Start engine (TM 9-2320-312-10). Check for leaks.
25. Recheck levels of transmission fluid, and hydraulic system fluid. Add as required.
26. Install transmission access cover and rear platform grating (WP 0039 00).

**NOTE**

If a new transmission was installed, refer to Group 070 Commercial Service Manuals for information on ECU programming.

**END OF WORK PACKAGE**

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**POWER STEERING HYDRAULIC PUMP REPLACEMENT****0140 00****THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 020

**RPSTL Reference**

Group 020, Figure 6

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, field maintenance (Item 27, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Fluid, hydraulic, petroleum base (Item 25 or 26, WP 0165 00)

**Materials/Parts - Continued**

Rag, wiping (Item 51, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Bolt (P/N 25-735) (2)

Gasket (P/N A128-161)

**References**

WP 0129 00

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

Fifth wheel fully lowered (TM 9-2320-312-10)

Engine shut down

Battery disconnect switch in OFF position

**WARNING**

- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
- At operating temperature, hydraulic fluid is hot. Allow hydraulic fluid to cool before disconnecting any hydraulic lines. Failure to do so could result in serious burns.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

**REMOVAL****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

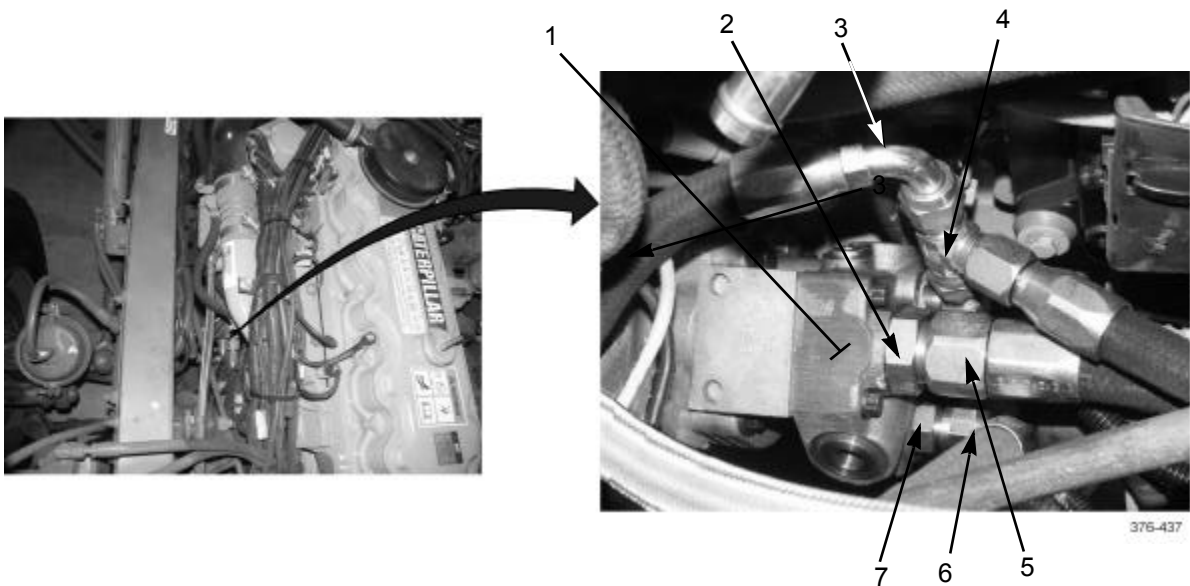
**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

- Use a drain pan to capture any residual hydraulic fluid in hoses. Dispose of hydraulic fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.
- Tag hydraulic hoses and note position of all fittings to ensure correct installation.

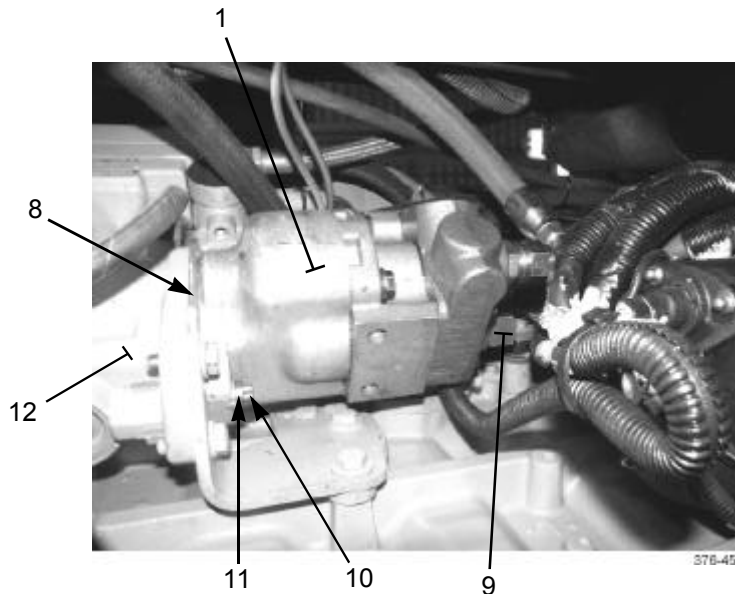
1. At top of power steering hydraulic pump (1) on left side of engine, disconnect two hoses (3) from tee (4).
2. Disconnect hose (5) from straight fitting (2).
3. Disconnect hose (6) from straight fitting (7).



**REMOVAL - CONTINUED****WARNING**

Power steering hydraulic pump is heavy. Use caution when handling to avoid injury.

- Remove two bolts (10), washers (11), pump (1), gasket, and adapter plate (8) from engine (12). Discard bolts and gasket.



- Remove straight fittings (2 and 7) from pump (1).
- Remove tee (4) and elbow (9) from pump (1).

**INSTALLATION****NOTE**

Ensure new preformed packings, coated with hydraulic fluid, are used on hydraulic fittings prior to installation.

- Install elbow (9) and tee (4) to pump (1).
- Install two straight fittings (2 and 7) to pump (1).

**WARNING**

Power steering hydraulic pump is heavy. Use caution when handling to avoid injury.

- Install adapter plate (8), new gasket, and pump (1) to engine (12) with two washers (11) and new bolts (10).
- Connect hose (6) to straight fitting (7).
- Connect hose (5) to straight fitting (2).
- Connect two hoses (3) to tee (4).

***INSTALLATION - CONTINUED***

7. Place battery disconnect switch in ON position.
8. Lower cab (TM 9-2320-312-10).
9. Fill hydraulic reservoir (WP 0129 00).

**END OF WORK PACKAGE**

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**COOLING FAN AND FAN CLUTCH MAINTENANCE**

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**0141 00**

**THIS WORK PACKAGE COVERS**

Fan Clutch Lining: Removal, Installation  
 Cooling Fan and Fan Clutch: Removal, Installation  
 Air Cylinder: Removal, Installation

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**INITIAL SETUP**

**Maintenance Level**

Direct Support

**MAC Reference**

Group 020

**RPSTL Reference**

Group 020, Figures 3 and 6

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)  
 Shop equipment, field maintenance (Item 27, WP 0166 00)

**References**

TM 9-2320-312-10

WP 0142 00

**Materials/Parts**

Tape, antiseizing (cooling fan and fan clutch replacement) (Item 59, WP 0165 00)  
 Parts kit, cylinder, fan clutch (P/N 4043-41130-01)  
 Parts kit, lining (P/N 1033-083250-01)  
 Washer, lock (cooling fan and fan clutch replacement) (P/N 3059-00870-06) (6)

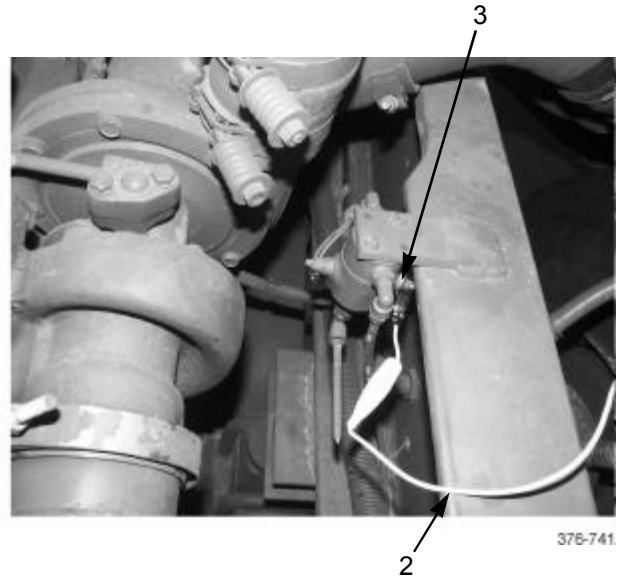
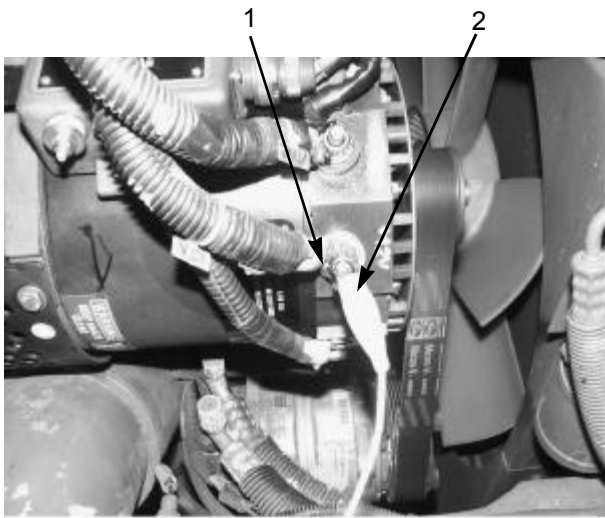
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**FAN CLUTCH LINING REMOVAL**

**NOTE**

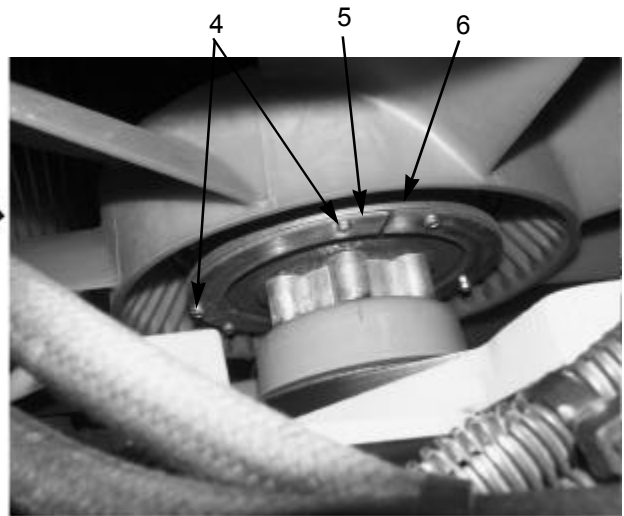
Fan clutch lining replacement is performed on vehicle.

1. As required, depress service brake pedal until reading on dual air pressure gauge on instrument panel is 90 psi (621 kPa).
2. Start engine (TM 9-2320-312-10) and charge air system until gauge reads 120 psi (827 kPa). Shut down engine.
3. Tilt cab (TM 9-2320-312-10).
4. Connect a jumper wire (2) between 12V terminal (1) of alternator and fan clutch solenoid terminal (3), closest to right frame rail. When jumper connection is made, fan clutch will disengage and fan will spin freely. Leave jumper wire in place.



376-741

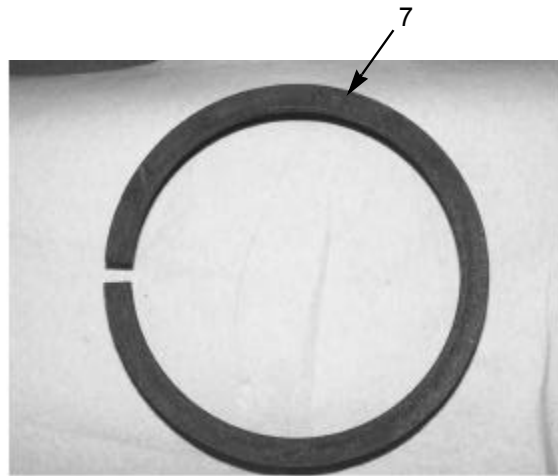
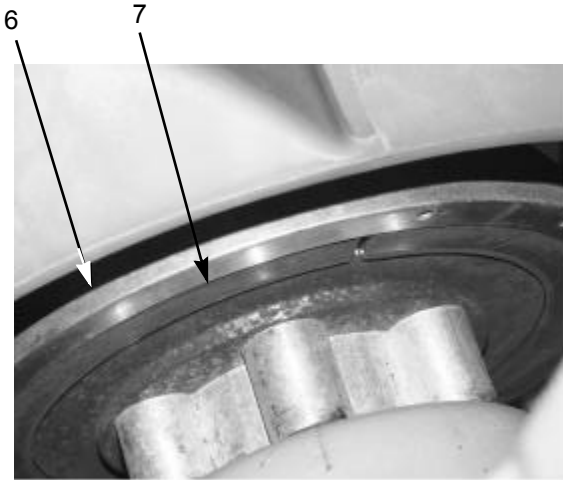
5. Remove six screws (4) and three mounting plates (5) from housing of fan clutch (6). Discard screws.



376-740

**FAN CLUTCH LINING REMOVAL - CONTINUED**

6. Remove friction lining (7) from fan clutch (6). Discard friction lining.



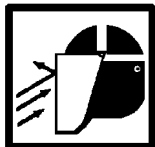
376-742

**FAN CLUTCH LINING INSTALLATION**

1. Install new friction lining (7) into fan clutch (6), with angled surface of lining facing forward.
2. Install three mounting plates (5) with six new screws (4). Tighten screws to 30 lb-in (3 Nm).
3. Remove jumper wire (2).
4. Lower cab (TM 9-2320-312-10).
5. Start engine (TM 9-2320-312-10) and bring up to operating temperature. Check for proper operation of fan clutch.

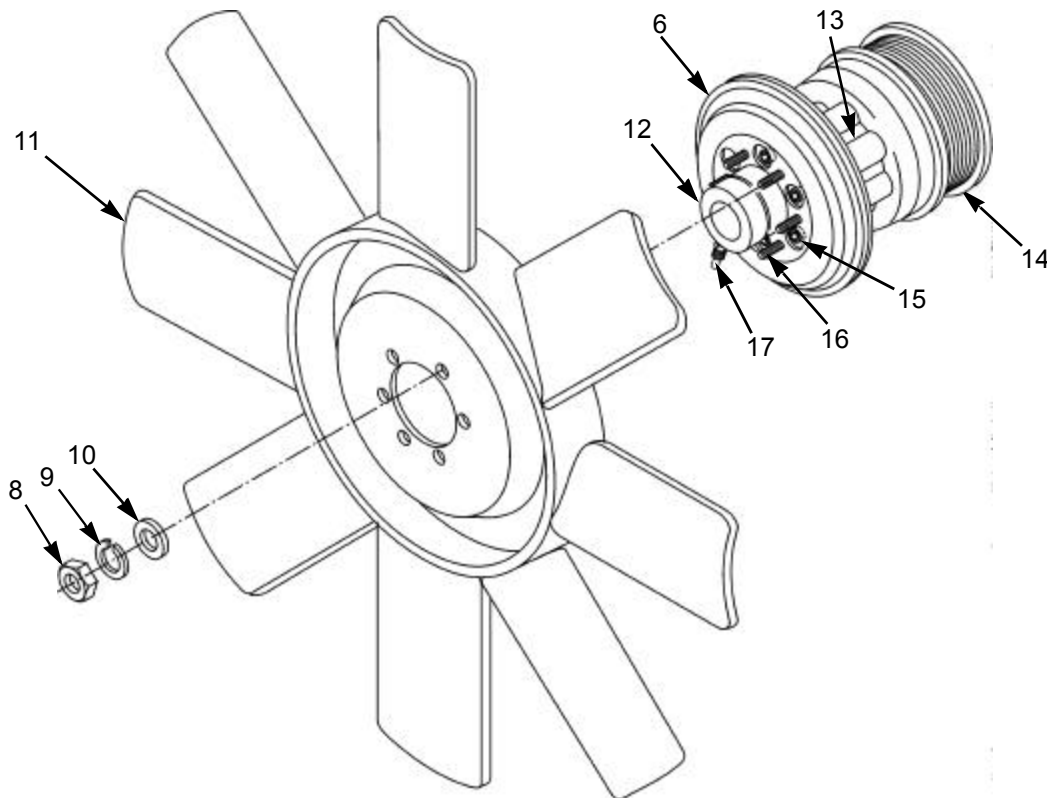
**COOLING FAN AND FAN CLUTCH REMOVAL**

1. Drain air system (TM 9-2320-312-10).
2. Remove radiator (WP 0142 00).
3. Remove fitting (17) from cylinder (12) at front of fan clutch (6).
4. Remove six nuts (8), lockwashers (9), washers (10), and fan (11) from studs (16) of fan clutch (6). Discard lockwashers.

**WARNING**

Always wear eye protection when applying air pressure to air cylinder at fan clutch. Residual air can be expelled containing flying particles. Failure to follow this warning may result in serious eye injury.

5. Apply 90-120 psi (621-827 kPa) air pressure to inlet of cylinder (12) and rotate housing of fan clutch (6) until six holes of housing are centered around heads of six capscrews (15). Release air pressure.
6. Remove six bolts (15), fan clutch (6), and spacer (13) from pulley (14) at front of engine.





**COOLING FAN AND FAN CLUTCH INSTALLATION**

1. Install spacer (13) and fan clutch (6) to pulley (14) at front of engine with six bolts (15). Tighten bolts to 45 lb-ft (61 Nm).
2. Install fan (11) to studs (16) of fan clutch (6) with six washers (10), new lockwashers (9), and nuts (8). Tighten nuts to 26 lb-ft (35 Nm).
3. Apply antiseizing tape to fitting (17) and install fitting to cylinder (12).
4. Install radiator (WP 0142 00).
5. Check clearance between outer edge of fan and fan shroud. Clearance on RIGHT SIDE should be at least 1 in (25 mm). Clearance on top, bottom, and left side should be at least  $\frac{3}{4}$  in (19 mm). Adjust position of fan shroud if necessary.

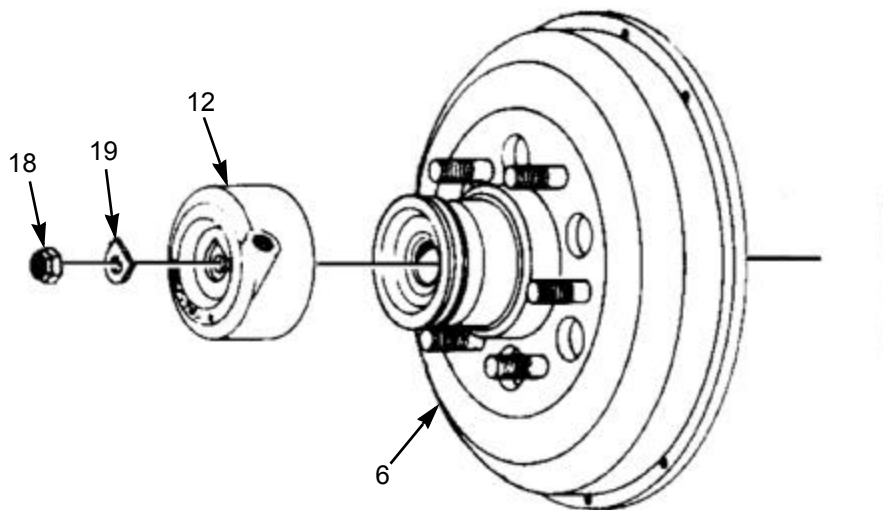
**CAUTION**

Too much slack in air line at fan clutch may result in air line being cut by fan.

6. Check tension in air line to cylinder (12) at front of fan clutch (6). Front-to-rear play should not be greater than  $\frac{1}{2}$  in (13 mm). Adjust tension of air line, if necessary, by loosening and tightening air line clamp at right side of fan shroud.

**AIR CYLINDER REMOVAL**

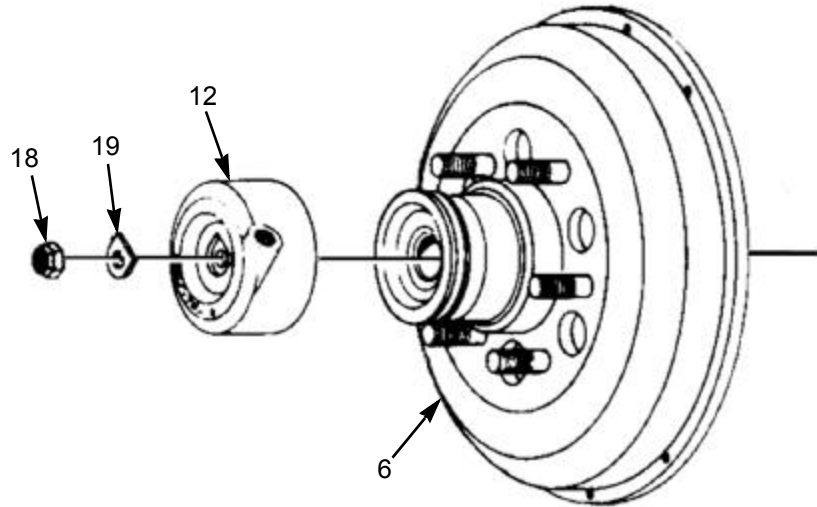
1. Drain air system (TM 9-2320-312-10).
2. Remove radiator (WP 0142 00).
3. Remove locknut (18) and tab washer (19) from cylinder (12). Discard locknut, tab washer, and cylinder.
4. Remove cylinder (12) from fan clutch (6).



376-743

**AIR CYLINDER INSTALLATION**

1. Place new tab washer (19) inside cavity of new cylinder (12). Align tab and keyway in clutch piston rod and push cylinder onto fan clutch (6).
2. Install new locknut (18). Hold cylinder (12) from turning and tighten locknut to 84 lb-in (9.5 Nm).
3. Apply 90-120 psi (621-827 kPa) air pressure to inlet of cylinder (12) and checks for leaks.



376-743

4. Install radiator (WP 0142 00).

**END OF WORK PACKAGE**

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**RADIATOR ASSEMBLY, FAN SHROUD, AND CHARGE AIR COOLER REPLACEMENT**

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0142 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 060

**RPSTL Reference**

Group 060, Figures 1 and 2

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, field maintenance (Item 27, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Compound, pipe sealing (Item 20, WP 0165 00)

**Materials/Parts - Continued**

Rag, wiping (Item 51, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**Personnel Required**

Two

**References**

TM 750-254

**Equipment Condition**

Transmission oil drained (Group 070 Commercial Service Manuals)

Radiator hoses removed (WP 0025 00)

Charge air cooling lines removed (WP 0016 00)

Radiator air recirculation shield removed (WP 0026 00)

Cab in 90-degree tilt position (WP 0147 00)

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel

**RADIATOR ASSEMBLY, FAN SHROUD, AND CHARGE AIR COOLER  
REPLACEMENT - CONTINUED**

0142 00

**REMOVAL**

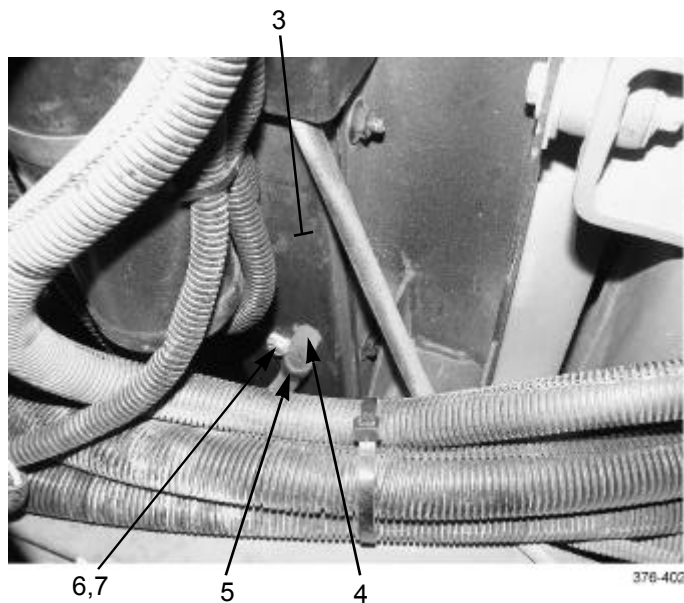
1. At front of engine, disconnect air line (2) from fitting of fan clutch (1).



**NOTE**

Air line is covered with a protective rubber hose.

2. At right side of fan shroud (3), remove nut (6), screw (7), and clamp (5) holding hose (4) to fan shroud.
3. Pull hose (4), with air line, out from hole in fan shroud (3) and set air line aside.

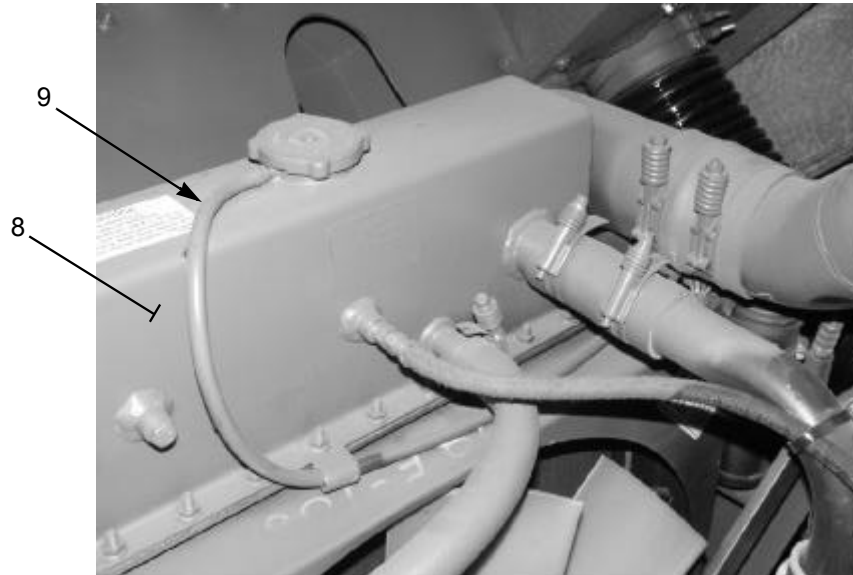


**RADIATOR ASSEMBLY, FAN SHROUD, AND CHARGE AIR COOLER  
REPLACEMENT - CONTINUED**

0142 00

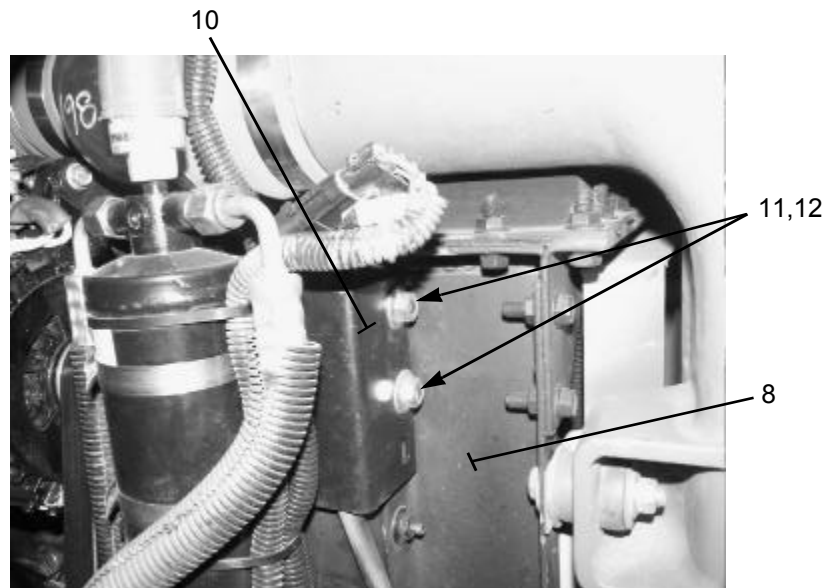
**REMOVAL - CONTINUED**

4. Disconnect overflow hose (9) from filler neck of radiator (8). Remove hose from radiator, plug hose, and set hose aside.



376-290

5. At upper-right side of radiator (8), remove two nuts (11), screws (12), and AC receiver-drier bracket (10). Set AC receiver-drier bracket, with AC receiver-drier, aside.



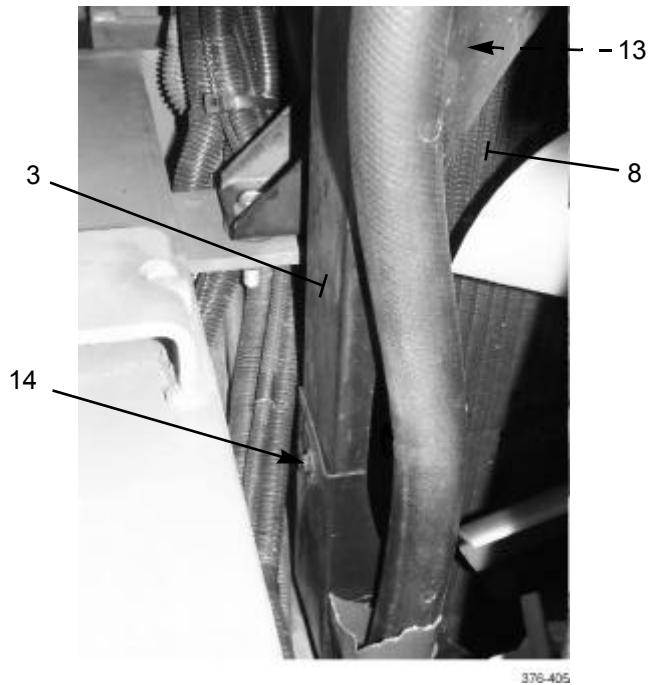
376-404

**RADIATOR ASSEMBLY, FAN SHROUD, AND CHARGE AIR COOLER  
REPLACEMENT - CONTINUED**

0142 00

**REMOVAL - CONTINUED**

6. At each side of fan shroud (3), remove two screws (14).
7. Remove eight nuts and screws (13), separate upper half and lower half of fan shroud (3), and remove fan shrouds from radiator (8). Secure shrouds with wire if necessary.

**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

- Use a drain pan to catch residual transmission fluid. Dispose of fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.
- Tag hoses to ensure correct installation.

8. At bottom of radiator (8), disconnect two transmission oil cooler hoses (15) from two elbows (16).

**NOTE**

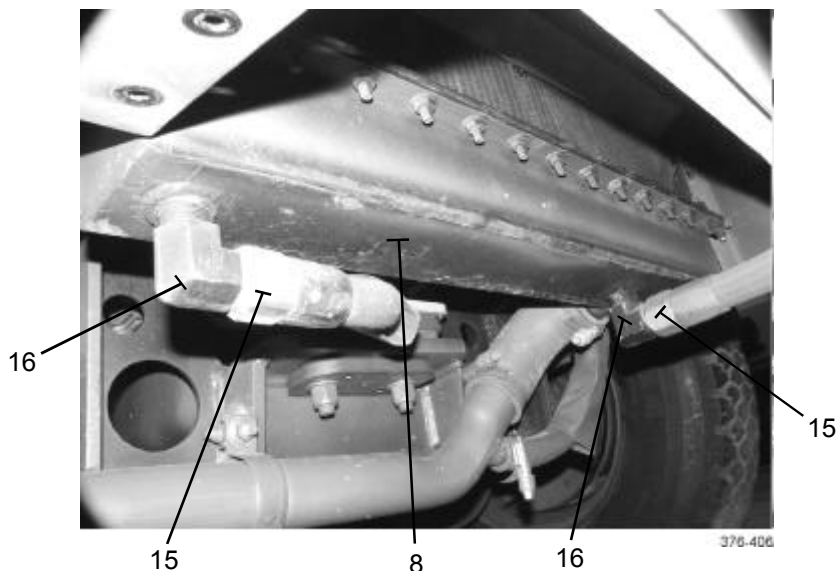
Note position of two elbows for installation.

9. Remove two elbows (16) from bottom of radiator (8).

**RADIATOR ASSEMBLY, FAN SHROUD, AND CHARGE AIR COOLER  
REPLACEMENT - CONTINUED**

0142 00

**REMOVAL - CONTINUED**

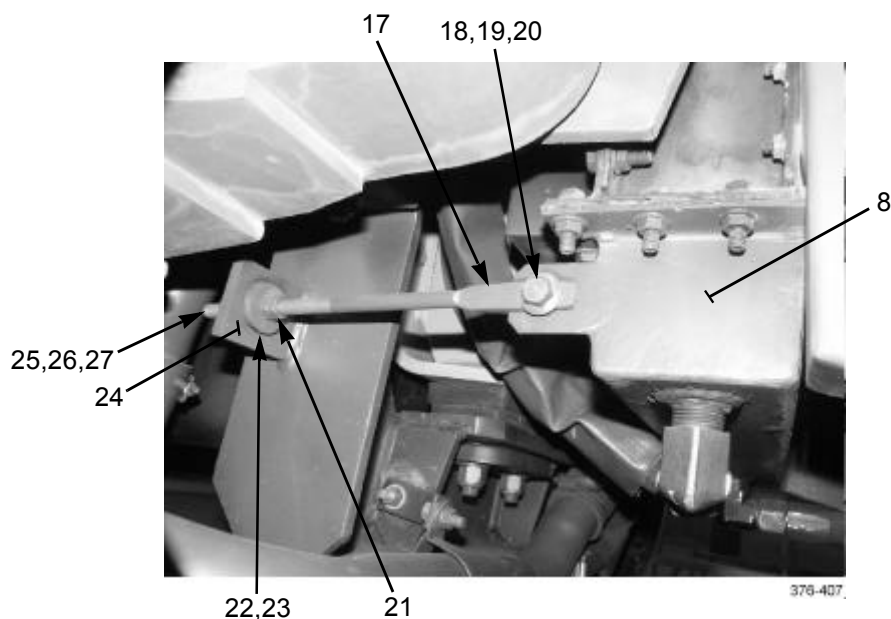


10. Remove two nuts (18), washers (19), and screws (20) to separate bottom of radiator (8) from two radiator stabilizer studs (17).

**NOTE**

Note position of jamnuts on stabilizer stud to ensure correct installation.

11. If stabilizer stud (17) is damaged, remove jamnut (25), washer (26), vibration damper (27), and stud from welded bracket (24). Remove vibration damper (22), washer (23), and jamnut (21) from stud.



**RADIATOR ASSEMBLY, FAN SHROUD, AND CHARGE AIR COOLER  
REPLACEMENT - CONTINUED**

0142 00

**REMOVAL - CONTINUED****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel

**NOTE**

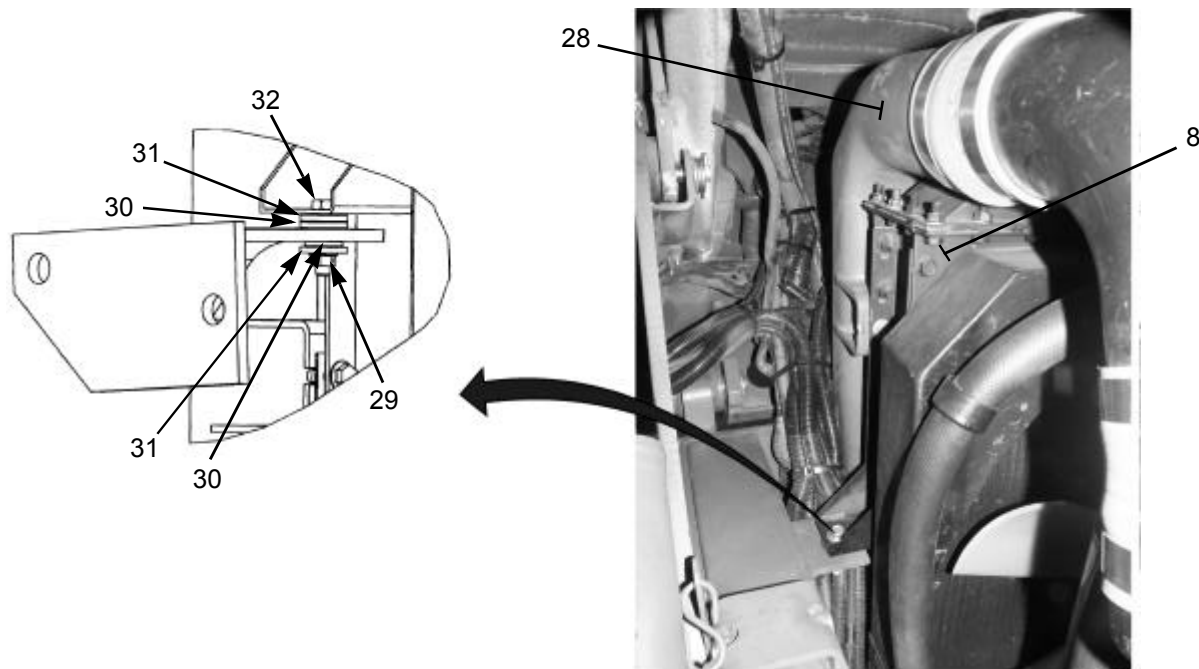
Radiator, air duct, and charge air cooler are removed from vehicle as an assembly.

12. Attach a sling to each side of charge air cooler (28). Attach other end of slings to overhead lifting device.
13. Raise overhead lifting device to take up slack in slings.
14. At each side of radiator (8), remove nut (29), washer (31), and vibration damper (30) from underside of bolt (32).

**CAUTION**

Use caution when lifting radiator assembly not to damage electrical harnesses or other components.

15. Carefully lift radiator (8) assembly from vehicle.
16. Remove two bolts (32), four washers (31), and two vibration dampers (30) from radiator (8).



376-408

17. Remove overhead lifting device and slings.



**RADIATOR ASSEMBLY, FAN SHROUD, AND CHARGE AIR COOLER  
REPLACEMENT - CONTINUED**

0142 00

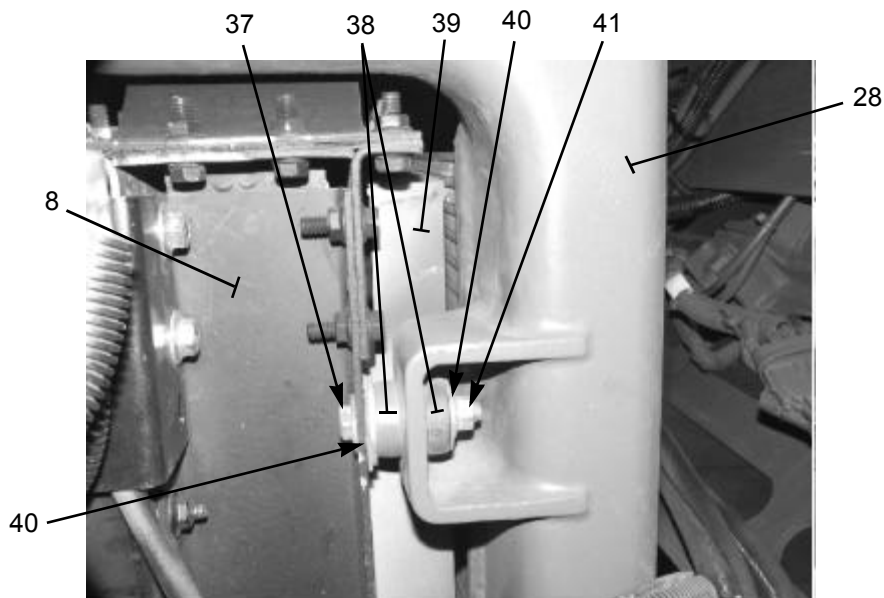
**REMOVAL - CONTINUED**

18. Remove fan shrouds from vehicle.
19. On left side of radiator (8), remove two nuts (33), washers (34), snubbing washers (35), and bolts (36).



**LEFT SIDE**

20. On right side of radiator (8), remove two nuts (41), four snubbing washers (40), four isolators (38), and two bolts (37).
21. Remove charge air cooler (28) and shroud (39) from front of radiator (8).



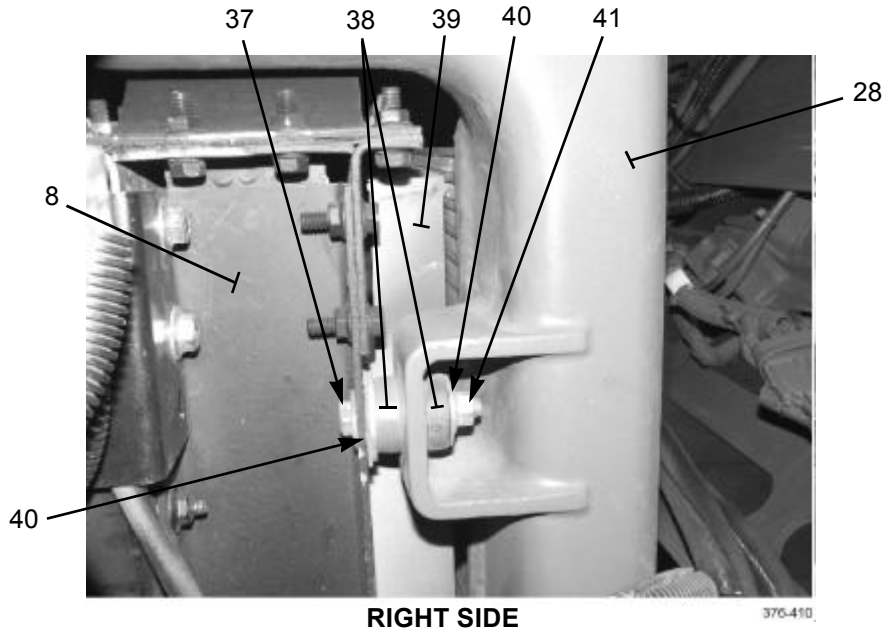
**RIGHT SIDE**

**RADIATOR ASSEMBLY, FAN SHROUD, AND CHARGE AIR COOLER  
REPLACEMENT - CONTINUED**

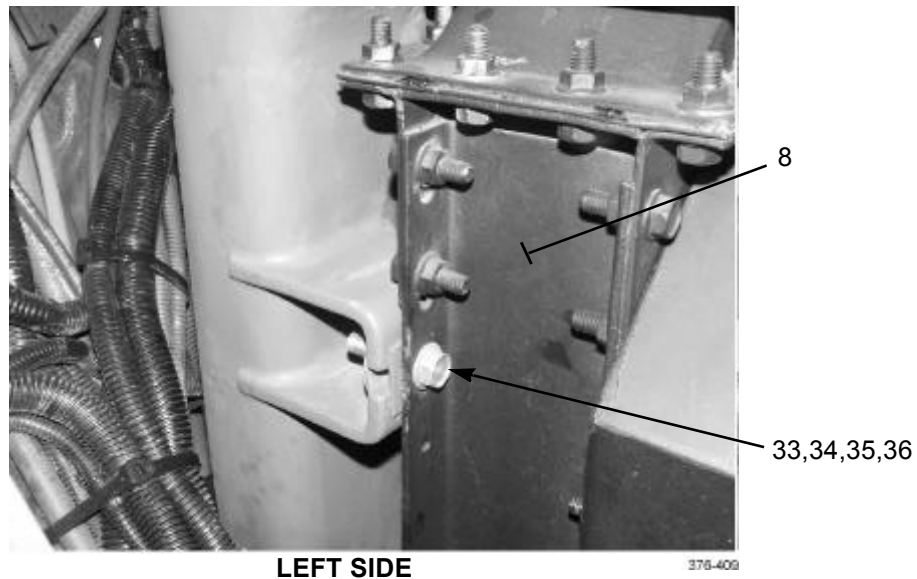
0142 00

**INSTALLATION**

1. Position shroud (39) and charge air cooler (28) to front of radiator (8).
2. Install two bolts (37), four isolators (38), four snubbing washers (40), and two nuts (41) to right side of radiator (8).



3. Install two bolts (36), snubbing washers (35), washers (34), and nuts (33) to left side of radiator (8).
4. Position fan shrouds to front of vehicle. Secure shrouds with wire if necessary.



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**RADIATOR ASSEMBLY, FAN SHROUD, AND CHARGE AIR COOLER  
REPLACEMENT - CONTINUED**


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0142 00

**INSTALLATION - CONTINUED****WARNING**

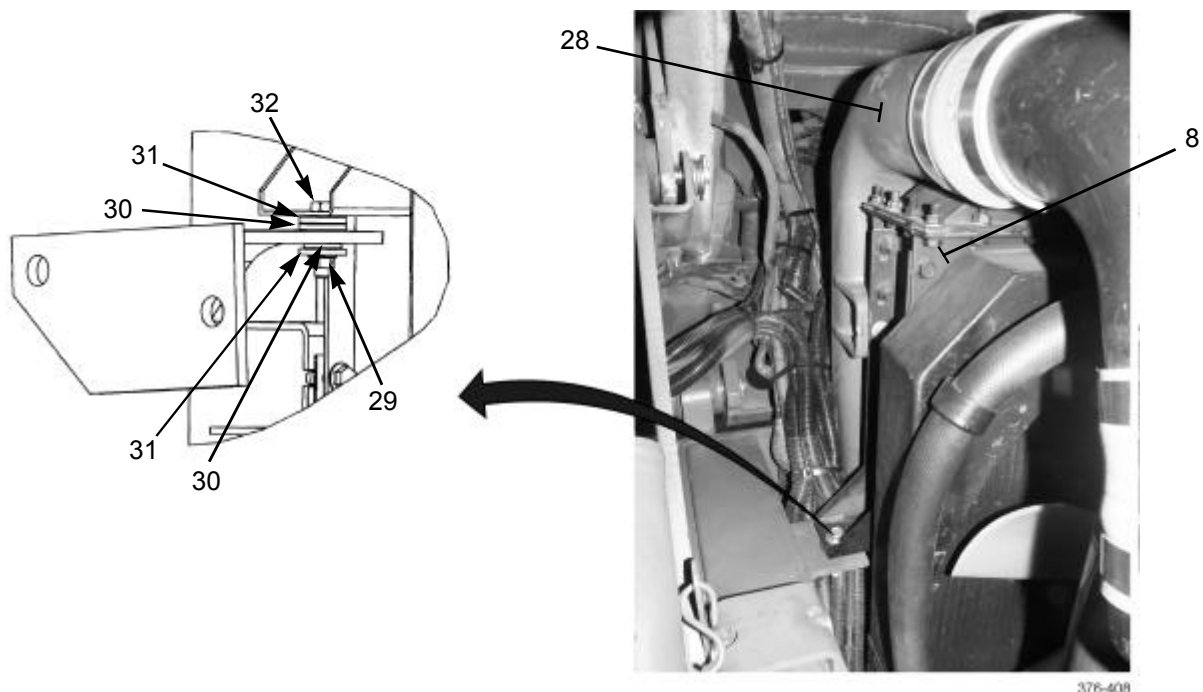
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel

5. Attach a sling to each side of charge air cooler (28). Attach other end of slings to overhead lifting device.
6. Position two vibration dampers (30), four washers (31), and two bolts (32) to radiator (8).

**CAUTION**

Use caution when lifting radiator assembly not to damage electrical harnesses or other components.

7. Carefully position radiator (8) assembly to vehicle.
8. At each side of radiator (8), install vibration damper (30), washer (31), and nut (29) to underside of bolt (32).
9. Remove overhead lifting device and slings.

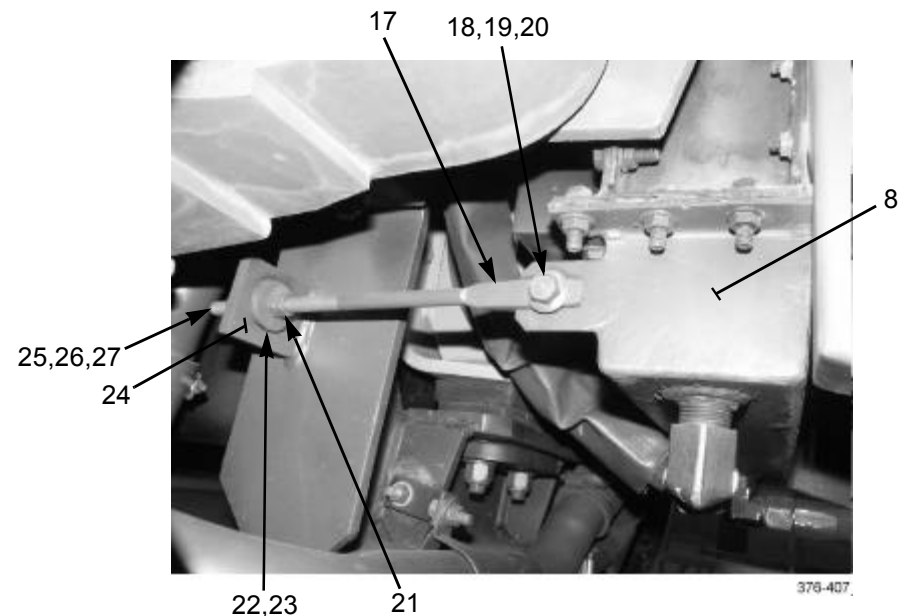


**RADIATOR ASSEMBLY, FAN SHROUD, AND CHARGE AIR COOLER  
REPLACEMENT - CONTINUED**

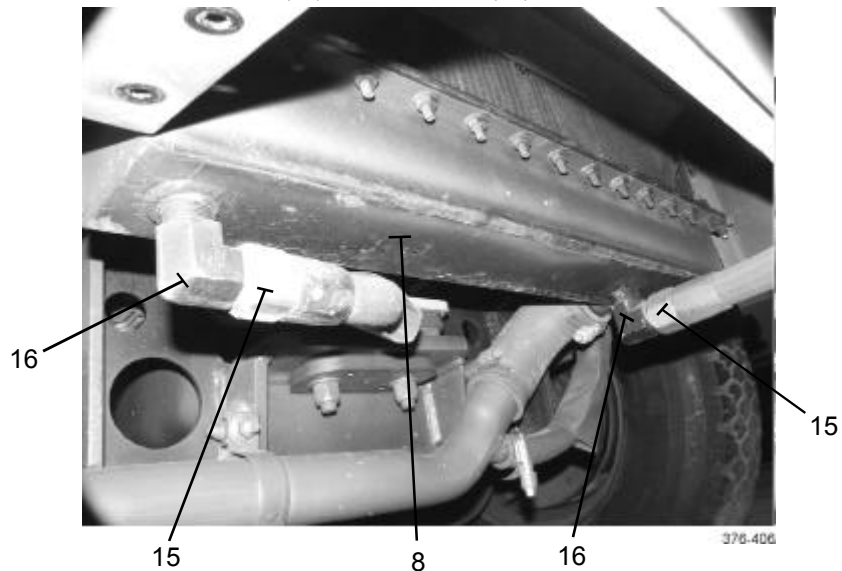
0142 00

**INSTALLATION - CONTINUED**

10. If removed, install vibration damper (22), washer (23), and jamnut (21) on radiator stabilizer stud (17). Install stud to welded bracket (24) and install vibration damper (27), washer (26), and jamnut (25).
11. Install bottom of radiator (8) to two radiator stabilizer studs (17) with two screws (20), washers (19), and nuts (18).



12. Apply a thin coat of sealing compound to pipe threads of two elbows (16) and install two elbows to bottom of radiator (8).
13. Connect two transmission oil cooler hoses (15) to two elbows (16).



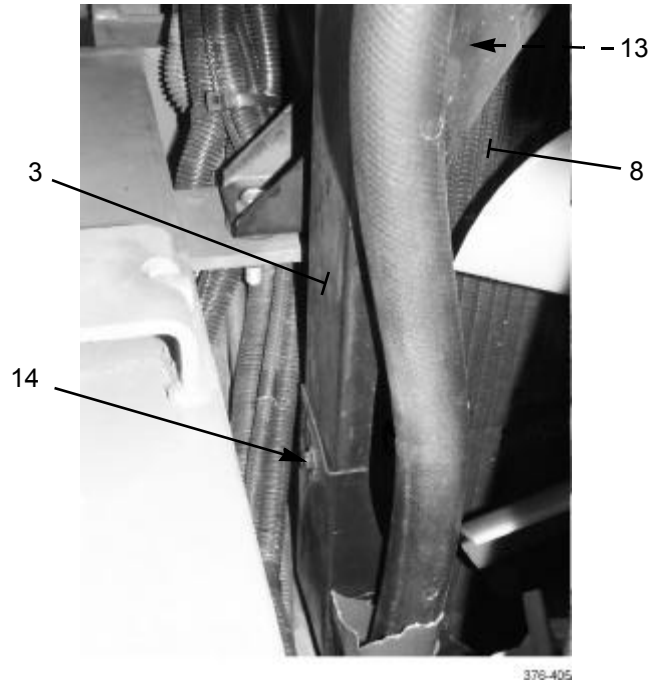
14. Remove wire securing fan shrouds and position upper and lower halves of fan shroud (3) against radiator (8).
15. Install upper half of fan shroud (3) to radiator (8) with eight screws (13) and nuts.

**RADIATOR ASSEMBLY, FAN SHROUD, AND CHARGE AIR COOLER  
REPLACEMENT - CONTINUED**

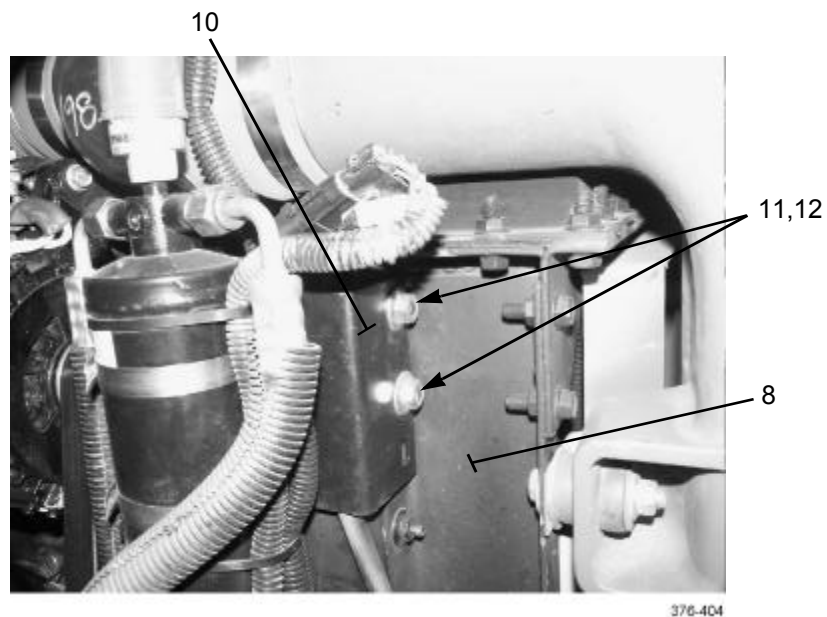
0142 00

**INSTALLATION - CONTINUED**

16. At each side of fan shroud (3) install lower half of fan shroud to upper half of fan shroud with two screws (14).



17. At upper-right side of radiator (8), install AC receiver-drier bracket (10), with AC receiver-drier, with two screws (12) and nuts (11).



**RADIATOR ASSEMBLY, FAN SHROUD, AND CHARGE AIR COOLER  
REPLACEMENT - CONTINUED**

0142 00

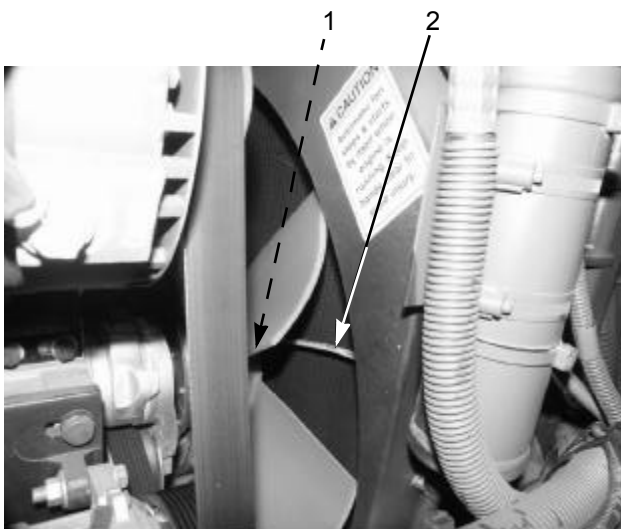
**INSTALLATION - CONTINUED**

18. Position overflow hose (9) to radiator (8), unplug hose, and connect hose to filler neck of radiator.

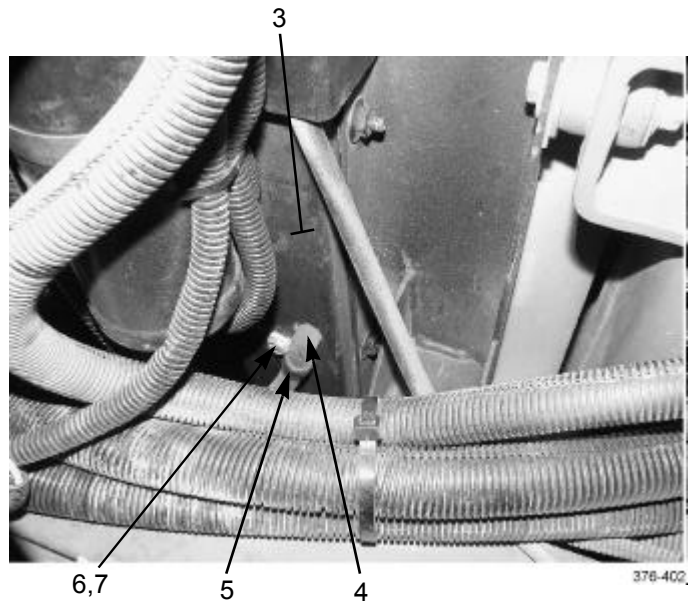


376-290

19. Push hose (4), with air line (2) inside hose, through hole in fan shroud (3).  
20. Connect air line (2) to fitting of fan clutch (1).



376-401



376-402

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**RADIATOR ASSEMBLY, FAN SHROUD, AND CHARGE AIR COOLER  
REPLACEMENT - CONTINUED**

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**0142 00**

***INSTALLATION - CONTINUED***

21. Install hose (4) to fan shroud (3) with clamp (5), screw (7), and nut (6).
22. Check slack in air line (2) to ensure fan blade will not cut it. If adjustment is necessary, loosen clamp (5) and pull air line back.
23. Return cab to 45-degree tilt position (WP 0147 00).
24. Install radiator air recirculation shield (WP 0026 00).
25. Install charge air cooling lines (WP 0016 00).
26. Install radiator hoses (WP 0025 00).
27. Fill transmission (Group 070 Commercial Service Manuals).

**END OF WORK PACKAGE**

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**FRONT AXLE ASSEMBLY REPLACEMENT**

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0143 00

**THIS WORK PACKAGE COVERS**Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 080

**RPSTL Reference**

Group 080, Figures 1 and 5

Group 110, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, field maintenance (Item 27, WP 0166 00)

**Materials/Parts**

Grease, GAA (Item 30, WP 0165 00)

Wire, nonelectrical (Item 66, WP 0165 00)

Pin, cotter (P/N 60-96)

**Personnel Required**

Two

**References**

Group 080 Commercial Service Manuals

TM 9-2320-312-10

WP 0008 00

WP 0009 00

**Equipment Condition**Lower ends of two shock absorbers disconnected  
(WP 0032 00)Front airbrake chambers removed (WP 0031 00)

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**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

**REMOVAL**

1. Block rear wheels.
2. At left side of vehicle, remove cotter pin (2) and castle nut (3) securing rear end of drag link (1) to steering arm (4). Discard cotter pin.
3. Disconnect drag link (1) from steering arm (4) and secure drag link in raised position with nonelectrical wire.
4. Loosen, but do not remove, eight nuts (7) from four U-bolts (6).
5. At each of two front wheels, loosen, but do not remove, ten lug nuts (TM 9-2320-312-10).

**WARNING**

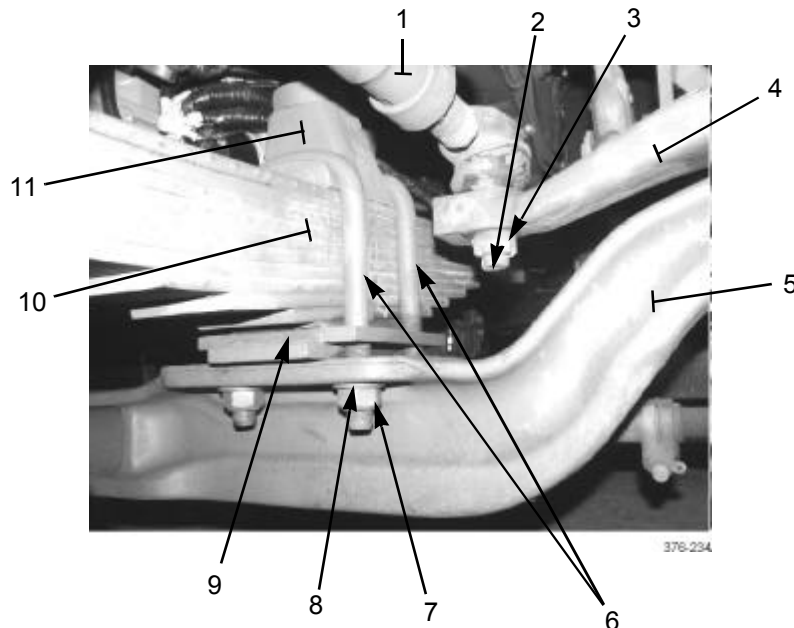
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

6. Place one hydraulic jack under left and right frame rails just behind locations stenciled "TIE DOWN POINT".
7. Raise hydraulic jacks until both front tires just clear the ground. Place jackstands under front bumper to secure vehicle in raised position.
8. Remove front wheel and tire assemblies (TM 9-2320-312-10).
9. Place one floor jack centered under front axle assembly (5). Raise floor jack to support front axle assembly.
10. Remove eight nuts (7), washers (8), four U-bolts (6), and two spring caps (11) to separate front axle assembly (5) from two springs (10).

**NOTE**

It may be necessary to further raise front of vehicle to gain adequate clearance to remove front axle assembly. Use wood blocks as required with jackstands at front bumper.

11. Lower floor jack and remove front axle assembly (5) and two shock absorber mounting brackets (9) from side of vehicle.

**REMOVAL - CONTINUED**

12. Remove front axle steering and brake components as required (Group 080 Commercial Service Manuals).

**INSTALLATION**

1. Install front axle steering and brake components as required (Group 080 Commercial Service Manuals).

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

2. Using floor jack centered under front axle assembly (5), position front axle assembly under vehicle, from the side of vehicle.
3. Position two shock absorber mounting brackets (9) on each end of axle assembly (5). Raise axle assembly until mounting brackets contact underside of two springs (10).
4. Install two spring caps (11), four U-bolts (6), washers (8), and nuts (7). DO NOT fully tighten nuts.
5. As required, slightly raise two hydraulic jacks so that two wheel and tire assemblies can be installed. Remove floor jack from under front axle assembly (5).
6. Install front wheel and tire assemblies (TM 9-2320-312-10), but do not fully tighten ten lug nuts.
7. Remove all supports from front bumper and place tires on the ground.
8. Fully tighten wheel and tire assembly lug nuts to 500 lb-ft (678 Nm) (TM 9-2320-312-10).
9. Fully tighten eight nuts (7) to 450 lb-ft (610 Nm).
10. Remove nonelectrical wire and connect drag link (1) to steering arm (4).
11. Install castle nut (3). Tighten castle nut to 250 lb-ft (339 Nm). Install new cotter pin (2).

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**FRONT AXLE ASSEMBLY REPLACEMENT - CONTINUED**

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**0143 00**

***INSTALLATION - CONTINUED***

12. Install front airbrake chambers (WP 0031 00).
13. Connect lower ends of two shock absorbers (WP 0032 00).
14. As required, lubricate front axle assembly steering components (WP 0008 00 and WP 0009 00).
15. Remove wheel blocks.
16. Check steering stop adjustment (Group 080 Commercial Service Manuals).
17. Perform front end alignment (Group 080 Commercial Service Manuals).

**END OF WORK PACKAGE**

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**FRONT SPRINGS REPLACEMENT**

---

0144 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 080

**RPSTL Reference**

Group 080, Figure 5

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, field maintenance (Item 27, WP 0166 00)

**Materials/Parts**

Adhesive (Item 2, WP 0165 00)

**References**

TM 9-2320-312-10

**Personnel Required**

Two

**Equipment Condition**

Rear wheels blocked

Shock absorber disconnected from lower mounting bracket (WP 0032 00)

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

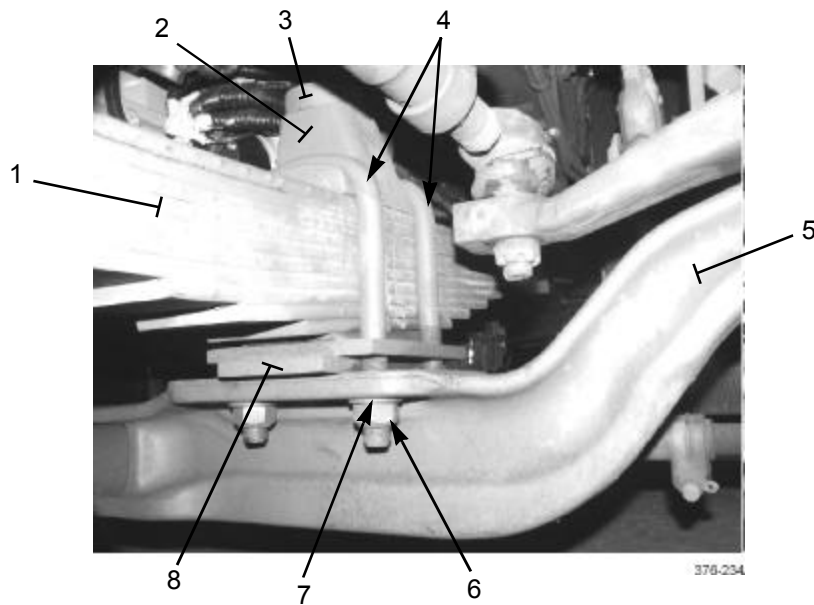
**REMOVAL**

1. Loosen lug nuts on wheel and tire assembly, on same side of vehicle as spring (1) to be removed.
2. At front of vehicle, place one hydraulic jack under each side of frame rail just behind location stenciled "TIE DOWN POINT". Raise vehicle and support with jackstands under front bumper.
3. Remove wheel and tire assembly (TM 9-2320-312-10).
4. Position a floor jack centered under front axle assembly (5) for support.

**NOTE**

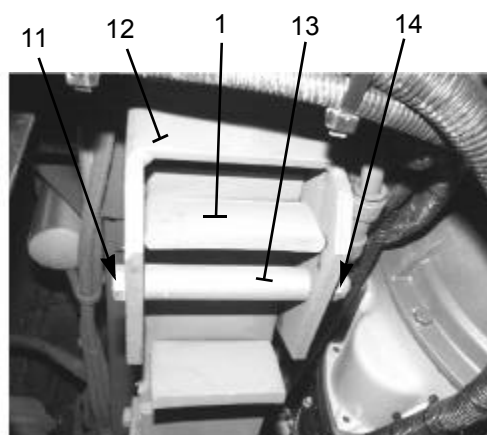
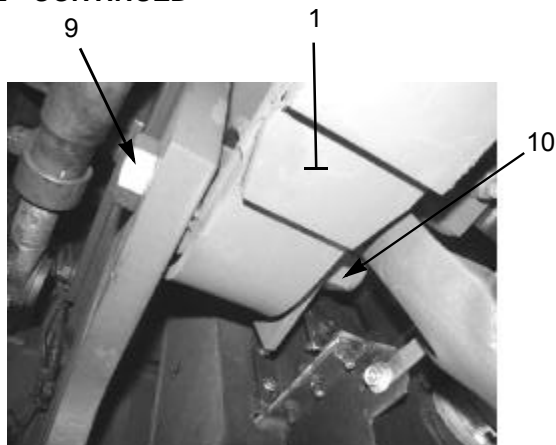
Note position of spring cap for installation.

5. Remove four nuts (6), washers (7), two U-bolts (4), and spring cap (2) from spring (1).



6. At front of spring (1), remove nut (10) and bolt (9) from spring and frame.
7. At rear of spring (1), remove nut (14), bolt (11), and spacer (13) from spring hanger (12).
8. Lower floor jack sufficiently to allow spring (1) to clear spring hanger (12) and other vehicle components.

**REMOVAL - CONTINUED**



376-449



**WARNING**

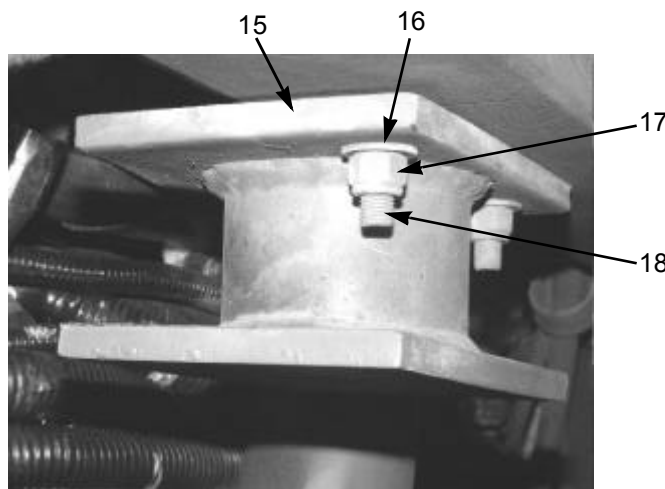


Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

**NOTE**

Note position of shock absorber lower mounting bracket, to ensure correct installation.

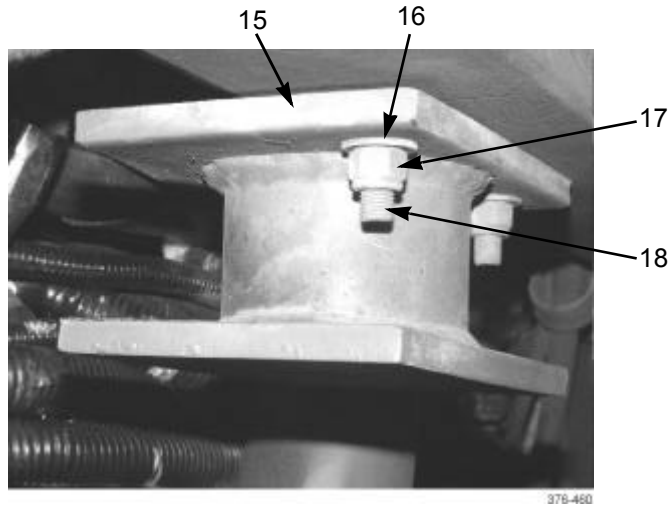
9. With assistance, remove spring (1) and lower mounting bracket (8) from front axle (5).
10. If loose, excessively worn or damaged, remove bump block (3) from spring cap (2).
11. If cracked or otherwise damaged, remove two nuts (17), washers (16), bolts (18), and bump block (15) from underside of frame rail.



376-460

**INSTALLATION**

1. If removed, install bump block (15) to underside of frame rail with two bolts (18), washers (16), and nuts (17).



2. If removed, use adhesive to install bump block (3) to spring cap (2).

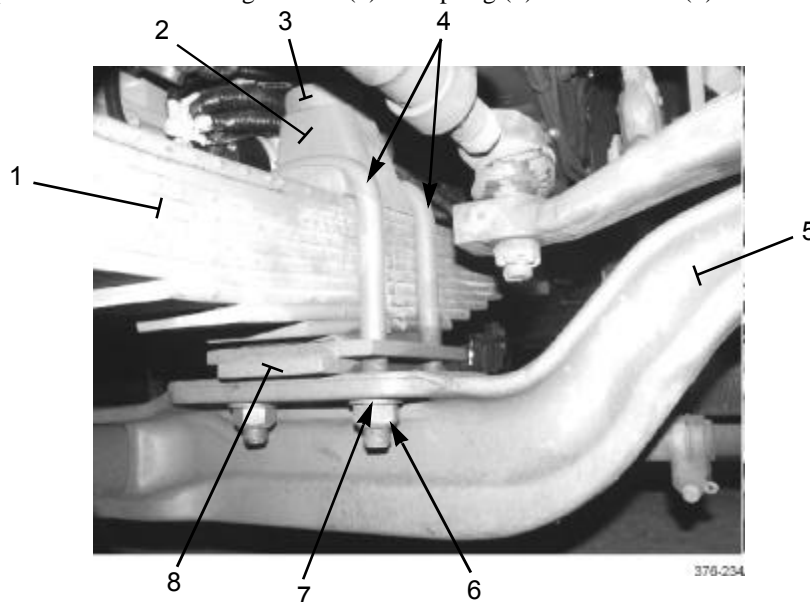


**WARNING**



Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

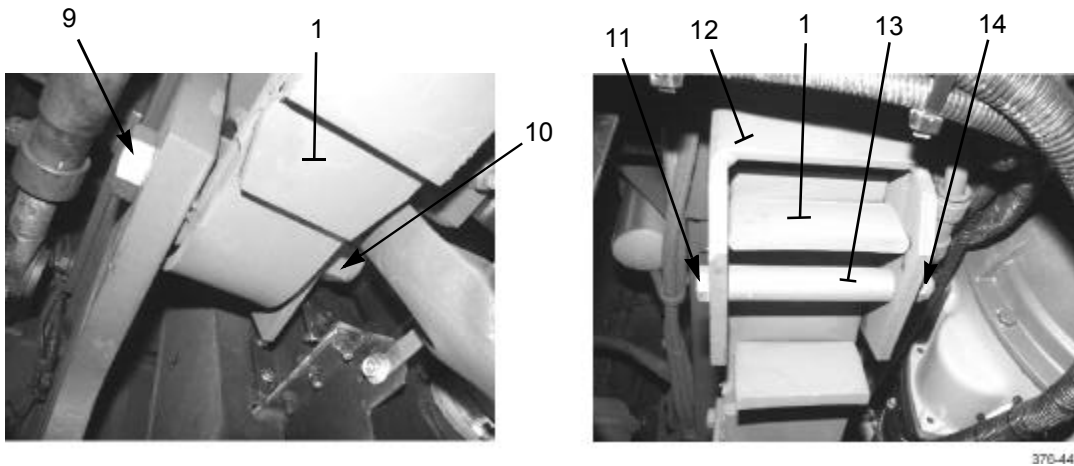
3. With assistance, position lower mounting bracket (8) and spring (1) on front axle (5).





**FRONT SPRINGS REPLACEMENT - CONTINUED****0144 00****INSTALLATION - CONTINUED**

4. Using floor jack, raise front axle assembly (5) sufficiently to align spring (1) with mounting locations at front and rear of spring.
5. At front of spring (1), install spring to frame with bolt (9) and nut (10). DO NOT fully tighten nut.
6. At rear of spring (1), install spacer (13), bolt (11), and nut (14) to spring hanger (12). DO NOT fully tighten nut.



7. Position spring cap (2) and two U-bolts (4) at spring (1), with U-bolts passed through lower mounting bracket (8).
8. Lower floor jack to place weight on spring (1).
9. Install four washers (7) and nuts (6) on two U-bolts (4). Tighten U-bolt nuts to 450 lb-ft (610 Nm).
10. At front of spring (1), tighten nut (10) to 975 lb-ft (1322 Nm).
11. At rear of spring (1), tighten nut (14) to 120 lb-ft (163 Nm).
12. Install wheel and tire assembly (TM 9-2320-312-10).
13. Remove jackstands from front bumper and lower vehicle to the ground. Remove floor jack from under front axle.
14. Tighten wheel and tire assembly lug nuts to 500 lb-ft (678 Nm), using appropriate tightening pattern (TM 9-2320-312-10).
15. Connect shock absorber to lower mounting bracket (WP 0032 00).

**END OF WORK PACKAGE**

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**REAR AXLE ASSEMBLY REPLACEMENT****0145 00****THIS WORK PACKAGE COVERS**

Removal, Cleaning and Inspection, Installation

**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 090

**RPSTL Reference**

Group 090, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, field maintenance (Item 27, WP 0166 00)

**Materials/Parts**

Oil, lubricating (Item 38, 39 or 40, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Bolt (P/N 024-0160) (4)

**Materials/Parts - Continued**

Bolt (P/N 025-0421) (8)

Nut (P/N 219-0103) (12)

**Personnel Required**

Three

**References**

WP 0008 00

WP 0009 00

WP 0031 00

**Equipment Condition**

Vehicle on level ground

Front wheels blocked

Air system drained (TM 9-2320-312-10)

Fifth wheel raised (TM 9-2320-312-10)

Propshaft disconnected from rear axle differential  
(Group 120 Commercial Service Manuals)**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

**REMOVAL**

1. Tag and disconnect two air lines from each brake chamber (WP 0031 00).
2. Loosen all lug nuts on rear dual wheels.
3. Raise rear of vehicle sufficiently to allow removal of rear dual wheels and achieve vertical clearance to remove rear axle assembly (1).
4. Place a jackstand or suitable cribbing under each side of frame, outboard of fifth wheel lift cylinder pivot tube.



SUPPORT EACH SIDE  
OF VEHICLE WITH JACKSTAND  
OR CRIBBING AT THIS LOCATION

5. Remove rear dual wheels (TM 9-2320-312-10).
6. Place a floor jack under rear axle differential. Raise jack sufficiently to support rear axle assembly (1) at differential.
7. At each end of rear axle assembly (1), cut with torch and remove nut (7) and bolt (8) securing stabilizer bar (6) to frame (9). Discard nuts and bolts.
8. Cut with torch and remove nut (4) and bolt (5) securing stabilizer bar (6) to lower axle mounting cap (10). Discard nuts and bolts.
9. Cut with torch and remove eight nuts (2), bolts (3), and two lower axle mounting caps (10) securing rear axle assembly (1) to frame (9). Discard nuts and bolts.

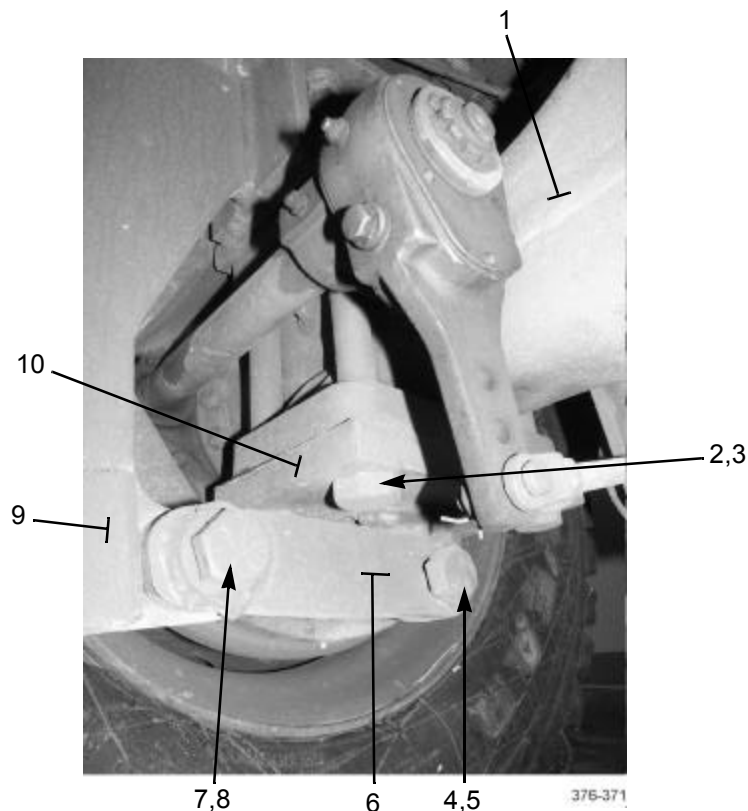
**REMOVAL - CONTINUED****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

**NOTE**

It may be necessary to raise vehicle frame more so that differential will have adequate clearance.

10. Lower floor jack under differential and remove rear axle assembly (1) from under rear of vehicle.
11. Place rear axle assembly (1) on suitable cribbing.
12. Remove brake chambers (WP 0031 00).

**CLEANING AND INSPECTION**

1. Clean axle seats of rear axle assembly to ensure they are clean and smooth.
2. Clean and inspect all mounting hardware. Replace if cracked, bent or otherwise damaged.
3. Inspect replacement axle assembly against removed axle to inventory all axle parts.

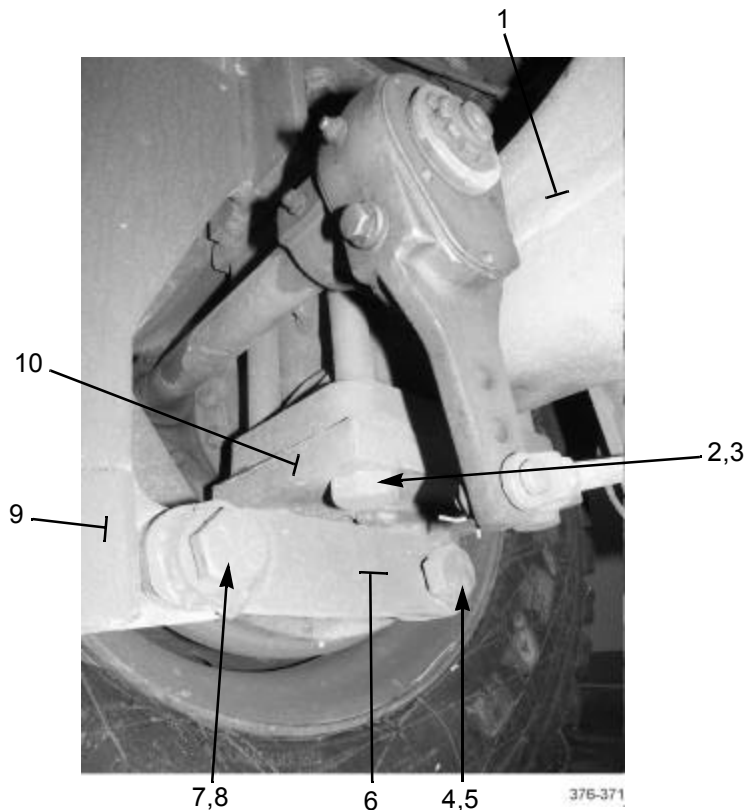
**INSTALLATION**

1. Install brake chambers (WP 0031 00).

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

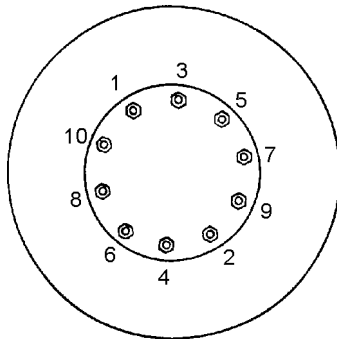
2. Remove rear axle assembly (1) from cribbing. Using floor jack placed under differential, position rear axle assembly under rear of vehicle.
3. Raise rear axle assembly (1) until axle seats contact underside of frame (9).
4. Position two lower axle mounting caps (10) and secure rear axle assembly (1) to frame (9) by loosely and evenly installing eight new bolts (3) and new nuts (2). Do NOT fully tighten bolts.
5. Install each stabilizer bar (6) to lower axle mounting cap (10) with new bolt (5) and new nut (4). Do NOT fully tighten nuts.
6. On each side, install stabilizer bar (6) to frame (9) with new bolt (8) and new nut (7).
7. Fully and evenly tighten eight bolts (3) to 730 lb-ft (990 Nm).
8. Fully tighten two nuts (7) and two nuts (4) to 730 lb-ft (990 Nm).



**INSTALLATION - CONTINUED****NOTE**

Lug nuts cannot be fully tightened until vehicle is lowered to the ground.

9. Install rear dual wheels (TM 9-2320-312-10).
10. Raise floor jack sufficiently to remove jackstands or cribbing from each side of frame (9). Lower vehicle to the ground.
11. Fully and evenly tighten lug nuts on rear dual wheels to 500 lb-ft (678 Nm), according to tightening pattern shown.



376-035

**WHEEL NUT TIGHTENING PATTERN**

12. Connect two air lines to each brake chamber (WP 0031 00).
13. Connect drive shaft to rear axle differential (Group 120 Commercial Service Manuals).
14. Check fluid level in rear axle differential and in wheel hub ends. Refer to *Unit PMCS Introduction* and *Unit PMCS*, WP 0008 00 and WP 0009 00, for appropriate lubricating oil, capacities, and procedures.
15. Lower fifth wheel (TM 9-2320-312-10).
16. Remove wheel blocks.

**END OF WORK PACKAGE**

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**STEERING GEAR, DRAG LINK, AND PITMAN ARM REPLACEMENT****0146 00****THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 110

**RPSTL Reference**

Group 110, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, field maintenance (Item 27, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Fluid, hydraulic, petroleum base (Item 25 or 26, WP 0165 00)

**Materials/Parts - Continued**

Grease, GAA (Item 30, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Pin, cotter (P/N 60-96) (2)

**Personnel Required**

Two

**References**

Group 110 Commercial Service Manuals

WP 0009 00

WP 0129 00

**Equipment Condition**

Fifth wheel fully lowered (TM 9-2320-312-10)

Engine shut down

Cab tilted (TM 9-2320-312-10)

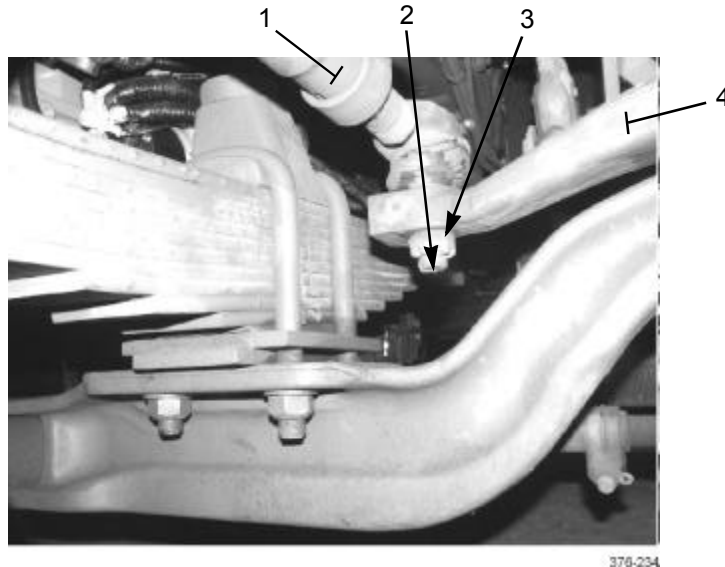
**WARNING**

- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
- At operating temperature, hydraulic fluid is hot. Allow hydraulic fluid to cool before disconnecting any hydraulic lines. Failure to do so could result in serious burns.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

**REMOVAL****NOTE**

Note position of drag link to ensure correct installation.

1. Remove cotter pin (2) and castle nut (3) and disconnect rear end of drag link (1) from steering arm (4). Discard cotter pin.

**NOTE**

To assist in ease of installation, place matchmarks between yoke of lower steering column and shaft of steering gear.

2. Remove nut (7) and screw (5) and separate yoke (6) at lower end of lower steering column from shaft of steering gear (10).

**WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**REMOVAL - CONTINUED**

**NOTE**

- Use a drain pan to capture hydraulic fluid in hoses. Dispose of fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.
  - Tag hydraulic hoses to ensure correct installation.
3. Disconnect two hydraulic hoses (9) from two elbows (8) of steering gear (10).

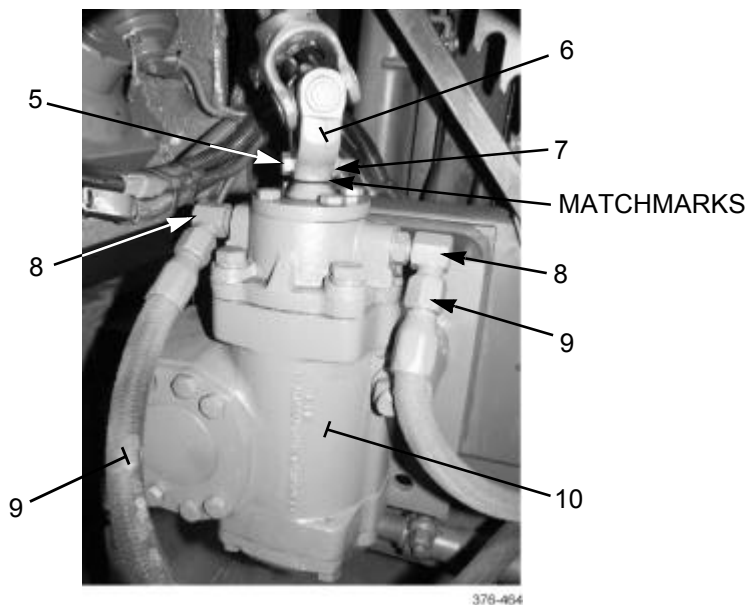


**WARNING**



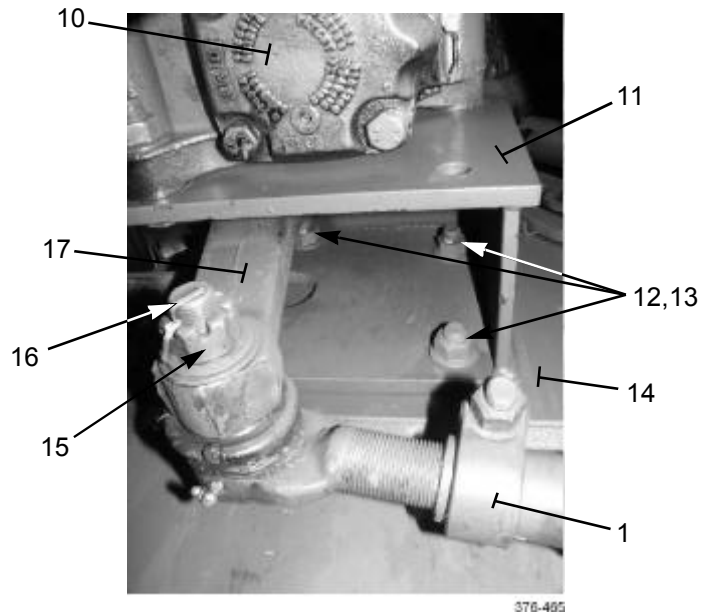
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

4. Place a hydraulic floor jack with blocks of wood centered under steering gear (10). Raise floor jack and support steering gear.

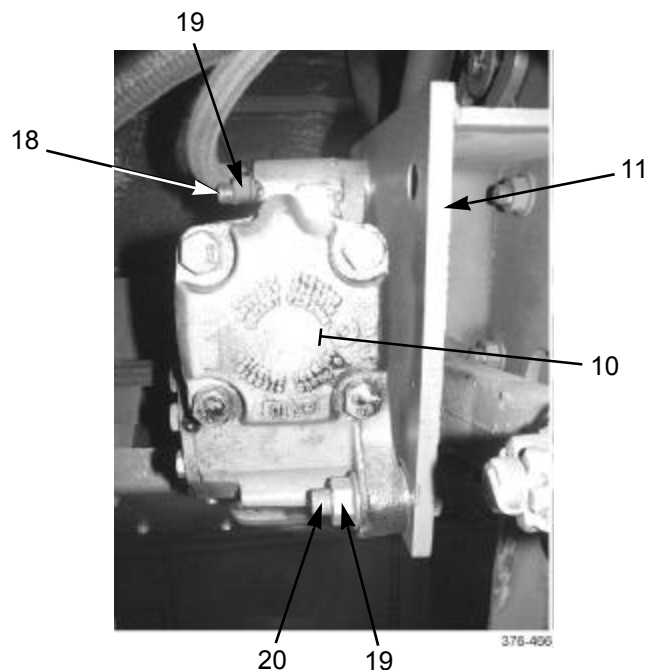


**REMOVAL - CONTINUED**

5. Remove four nuts (12), bolts (13), and steering gear bracket (11) with attached steering gear (10), drag link (1), and pitman arm (17) from left frame rail (14).
6. Place steering gear (10) with attached pitman arm (17) and drag link (1) on a clean work surface.
7. Remove cotter pin (16) and castle nut (15) and disconnect drag link (1) from pitman arm (17). Discard cotter pin.
8. Remove pitman arm (17) from steering gear (10) (Group 110 Commercial Service Manuals).

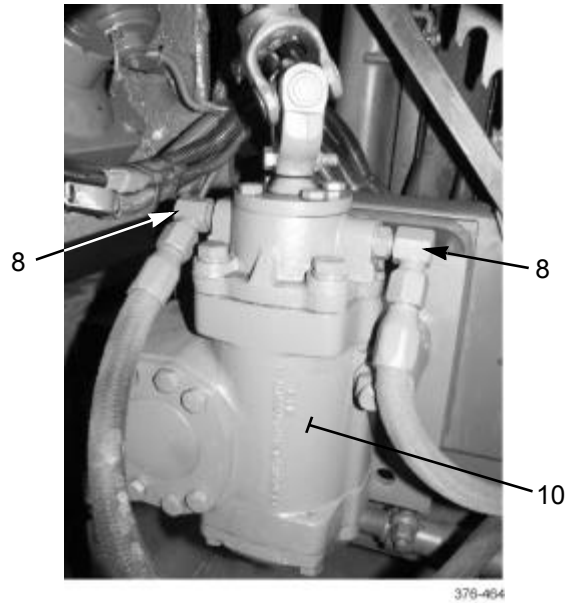


9. Remove three nuts (19), long bolt (18), two short bolts (20), and steering gear (10) from steering gear bracket (11).

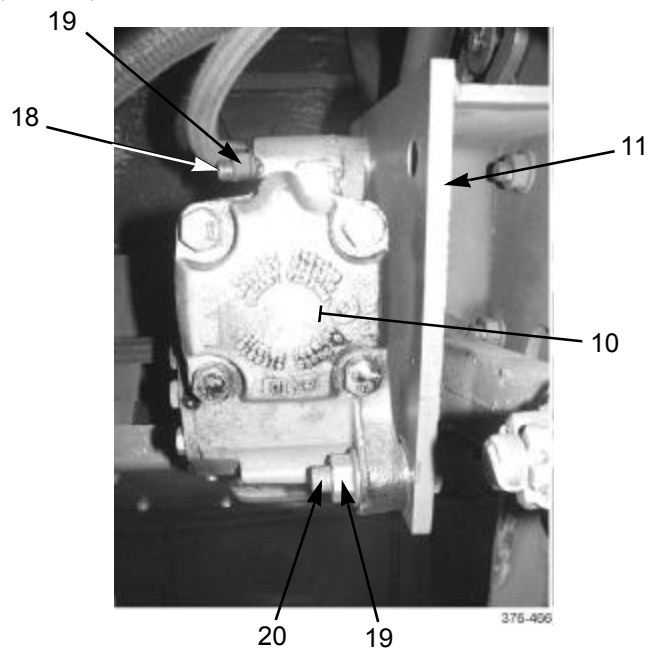


**REMOVAL - CONTINUED**

10. Remove two elbows (8) from steering gear (10).

**INSTALLATION**

1. Install two elbows (8) to steering gear (10).
2. Install steering gear (10) to steering gear bracket (11) with long bolt (18), two short bolts (20), and three nuts (19). Tighten nuts to 280 lb-ft (380 Nm).



**INSTALLATION - CONTINUED**

3. Install pitman arm (17) to steering gear (10) (Group 110 Commercial Service Manuals).

**NOTE**

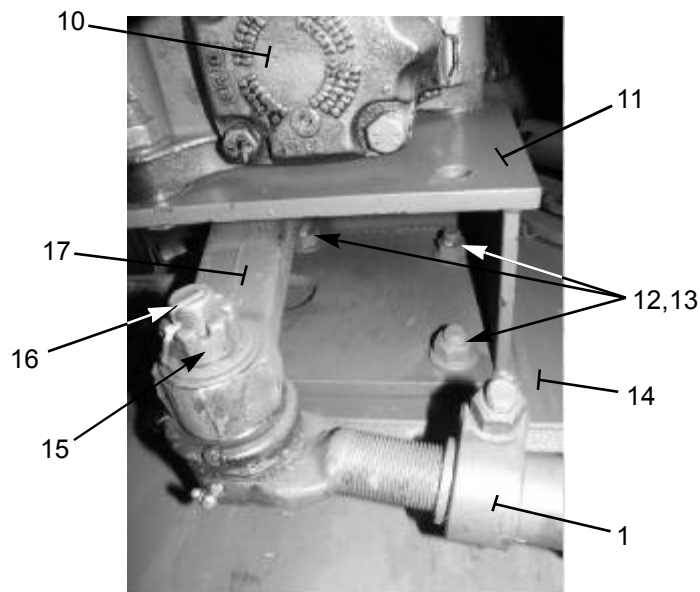
If installing a new drag link, length of drag link should be adjusted to 34 in (86.36 cm) from center-to-center of ball joint ends.

4. Connect drag link (1) to pitman arm (17) with castle nut (15). Tighten castle nut to 250 lb-ft (339 Nm). Install new cotter pin (16).

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

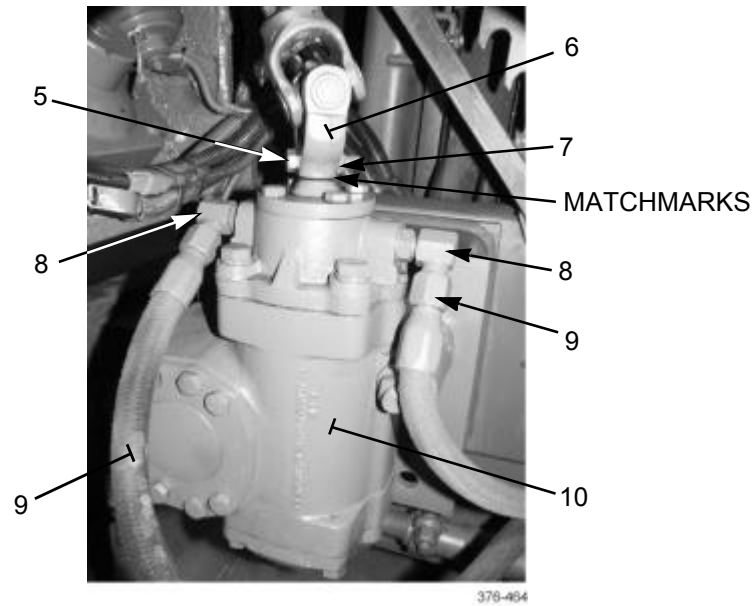
5. Place steering gear bracket (11) with attached steering gear (10), drag link (1), and pitman arm (17) centered on blocks of wood and hydraulic floor jack. Raise floor jack and position steering gear bracket against left frame rail (14).
6. Install steering gear bracket (11) to left frame rail (14) with four bolts (13) and nuts (12). Tighten nuts to 280 lb-ft (380 Nm).



376-495

**INSTALLATION - CONTINUED**

7. Connect two hydraulic hoses (9) to two elbows (8).
8. Align matchmarks and install yoke (6) of lower steering column to shaft of steering gear (10) with screw (5) and nut (7). Tighten nut to 26 lb-ft (35 Nm).

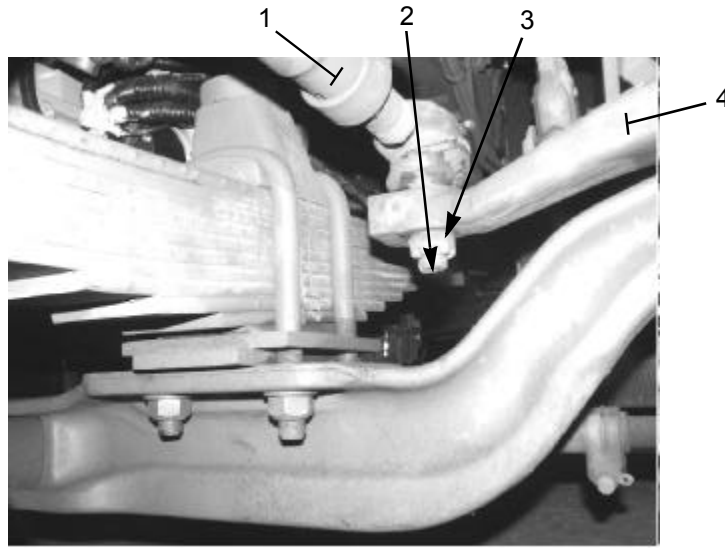


9. Fill hydraulic reservoir (WP 0129 00).

**INSTALLATION - CONTINUED****NOTE**

Perform bleeding procedure if steering gear has been disassembled or replaced.

10. Bleed air from steering gear (Group 110 Commercial Service Manuals).
11. Connect rear end of drag link (1) to steering arm (4) and install castle nut (3). Tighten castle nut to 500 lb-ft (678 Nm). Install new cotter pin (2).



12. Lubricate grease fittings at drag link ends and at lower steering column with GAA grease (WP 0009 00).
13. If steering gear was disassembled or replaced, check steering gear relief plunger adjustment (Group 110 Commercial Service Manuals).
14. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**



**THIS WORK PACKAGE COVERS**

Placing Cab in 90-Degree Tilt Position, Returning Cab to 45-Degree Tilt Position

**INITIAL SETUP****Maintenance Level**

Direct Support

**RPSTL Reference**

Group 020, Figure 2

Group 110, Figure 1

Group 140, Figure 1

Group 170, Figures 10 and 16

Group 190, Figure 2

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, field maintenance (Item 27, WP 0166 00)

Overhead lift with braking device (3-ton capacity)

Lifting chains, 3/8 in, Grade 30 or equivalent

Two clevises

Wood cribbing, 6 in (15.2 cm)

**Materials/Parts**

Strap, tiedown (Item 57, WP 0165 00)

Nut, lock (P/N 21NE048)

Pin, cotter (P/N 60-78) (2)

Washer, lock (P/N 361-11)

**References**

TM 9-2320-312-10

**Personnel Required**

Two

**Equipment Condition**

Vehicle positioned on level surface under overhead lift

Wheels blocked

**WARNING**

- DO NOT work under cab unless cab is properly supported. Cab could fall and cause serious injury to personnel.
- Always check that cab tilt safety prop is properly engaged before working under cab. Cab could fall and cause serious injury or death.
- Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

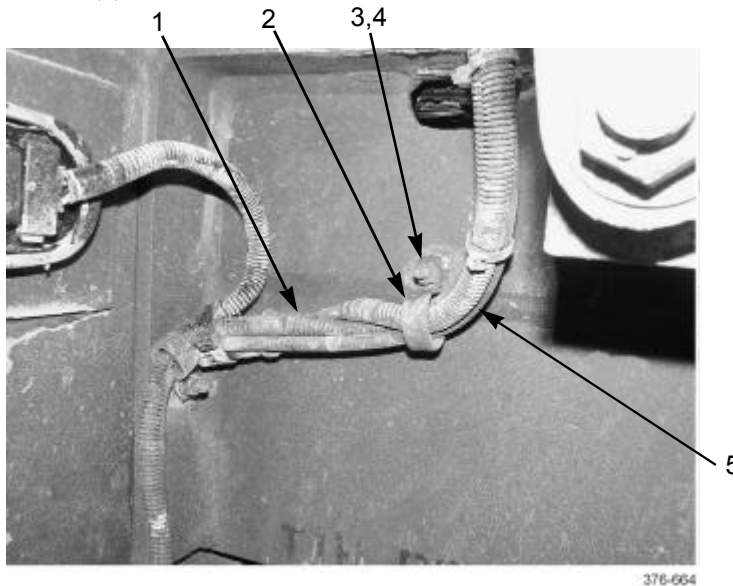
**PLACING CAB IN 90-DEGREE TILT POSITION**

1. Ensure there is adequate clearance in front of cab to allow for 90-degree tilt.

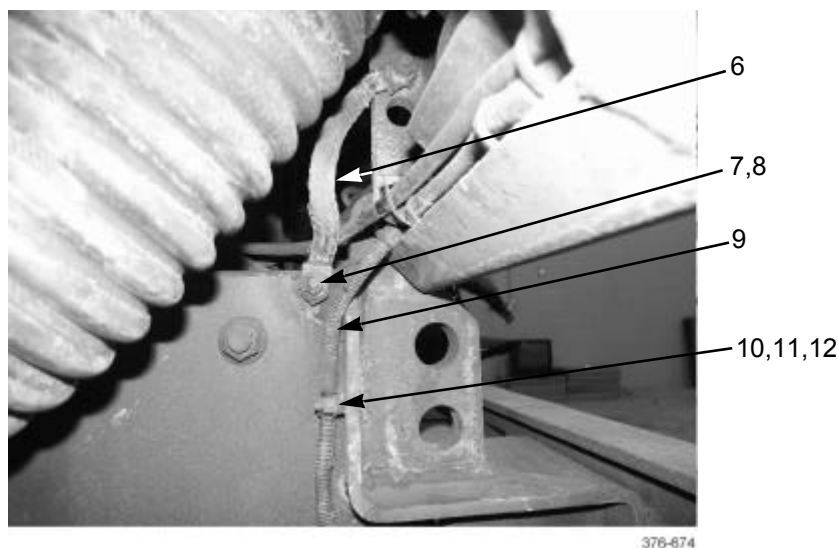
**WARNING**

Ensure that tools and supplies are removed from cab and that cab doors are securely closed before tilting cab. Failure to do so may result in serious injury or death to personnel.

2. Ensure there are no loose items or tools inside cab. Close cab doors securely.
3. Tilt cab to 45-degree position using cab tilt pump. Ensure cab is securely supported by safety prop (TM 9-2320-312-10).
4. At front of tractor on left side, remove locknut (3) and clamp (2) from welded stud (4) to release two wiring harnesses (1) and windshield washer hose (5) from attachment to frame. Discard locknut.

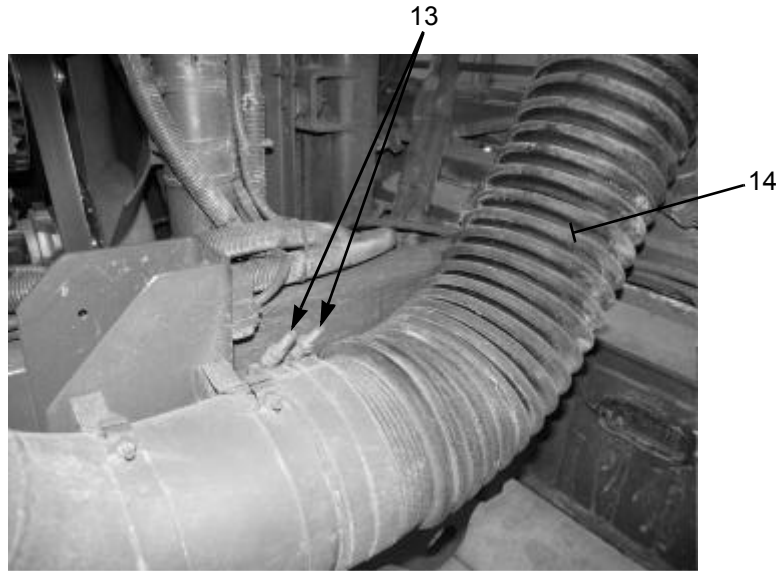


5. On right side, remove nut (7), lockwasher (8), and release ground strap (6) from frame. Discard lockwasher.
6. Remove locknut (10) and clamp (11) from welded stud (12) to release wiring harness (9) from attachment to frame. Discard locknut.



**PLACING CAB IN 90-DEGREE TILT POSITION - CONTINUED**

7. Loosen two clamps (13) and remove air intake tube (14).

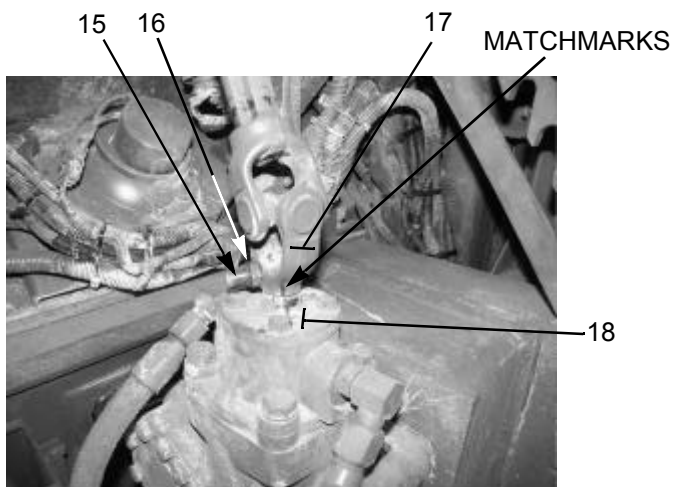


376-675

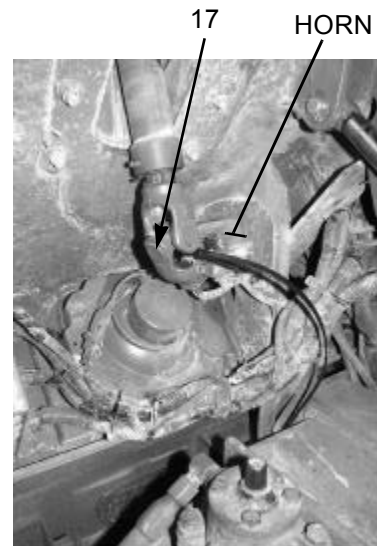
**NOTE**

To assist in ease of installation, place matchmarks between yoke of lower steering column and shaft of steering gear.

8. Remove nut (16) and screw (15) and separate yoke (17) of lower steering column from shaft of steering gear (18). Telescope lower steering column and secure yoke to horn with tiedown strap.



376-673



376-613

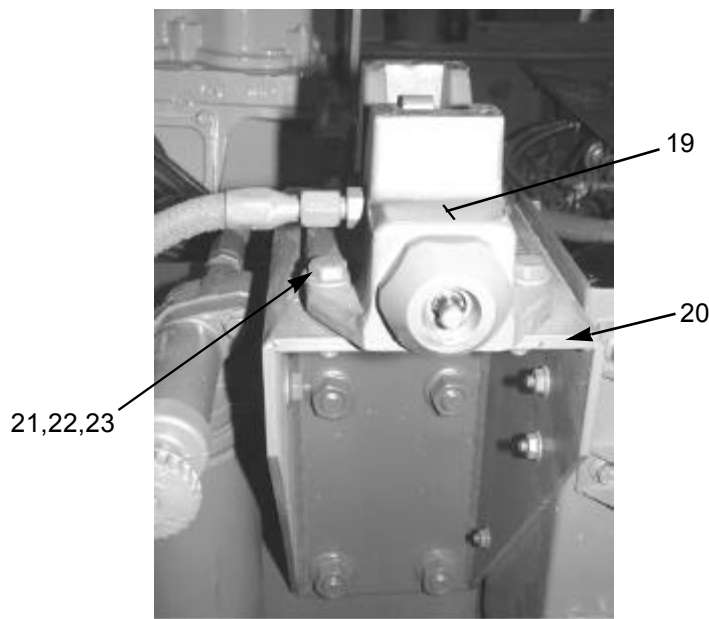
**PLACING CAB IN 90-DEGREE TILT POSITION - CONTINUED****CAUTION**

Failure to mark location of cab latch on frame bracket could cause latch to be incorrectly installed. Damage to cab or latch could result if cab is lowered onto an improperly located latch.

9. Place witness marks to mark location of cab tilt latch (19) at frame bracket (20).

**NOTE**

- Cab tilt latch **MUST** be removed at this time. In steps 11 and 12 that follow, cab will be lowered and cab tilt cylinder disconnected. With cylinder disconnected, there will be no hydraulic pressure available to unlock cab from latch, so that cab can be lifted free of frame.
  - Do **NOT** disconnect hydraulic hose from latch.
10. Remove four nuts (21), screws (22), washers (23), and cab tilt latch (19) from frame bracket (20). Set latch aside out of the way.

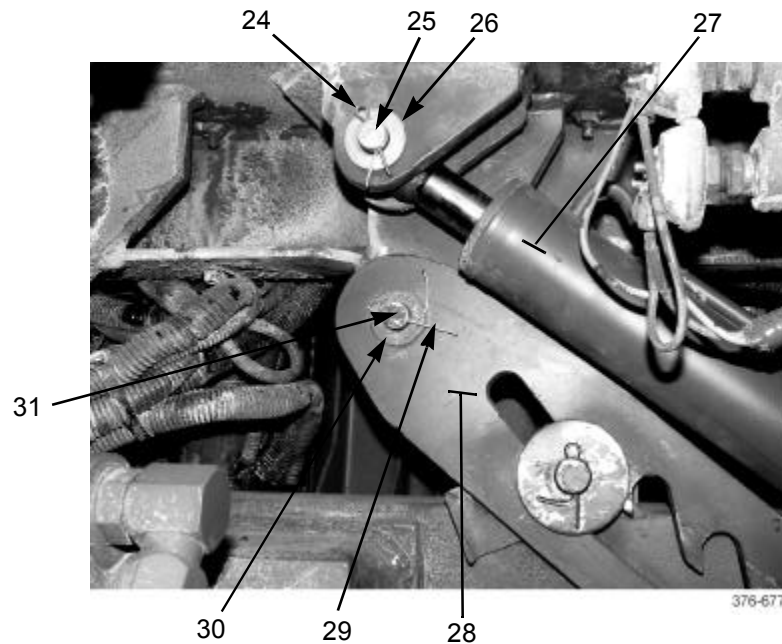


376-100

**PLACING CAB IN 90-DEGREE TILT POSITION - CONTINUED****CAUTION**

Stop periodically to ensure that all wiring harnesses and miscellaneous lines and hoses at front of cab are clear and do not become pinched. Failure to follow this caution may cause equipment damage.

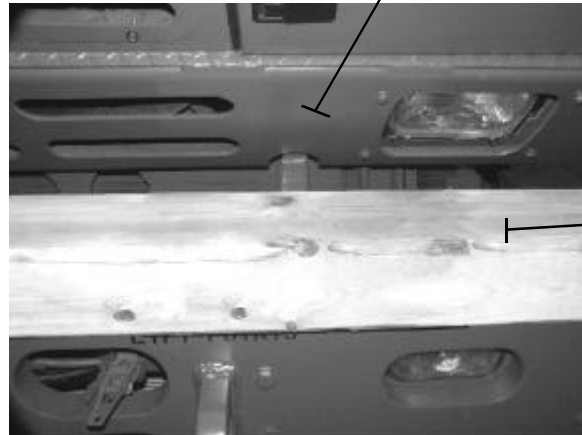
11. Lower cab using cab tilt pump (TM 9-2320-312-10).
12. Remove cotter pin (24), washer (26), and pin (25) to disconnect tilt cylinder (27) from underside of cab. Discard cotter pin.
13. Remove cotter pin (29), two washers (30), and pin (31) to disconnect safety prop (28) from underside of cab. Discard cotter pin.
14. Retract lift cylinder (27) slightly to allow cylinder to come free, using cab tilt pump (TM 9-2320-312-10).



***PLACING CAB IN 90-DEGREE TILT POSITION - CONTINUED***

15. Place battery disconnect switch in OFF position.
16. Place 6 in (15.2 cm) of wood cribbing along full length of front bumper.

AT 90-DEGREE TILT, THIS  
SURFACE WILL REST ON CRIBBING



6 IN (15.2 CM)  
OF WOOD  
CRIBBING

378-578.

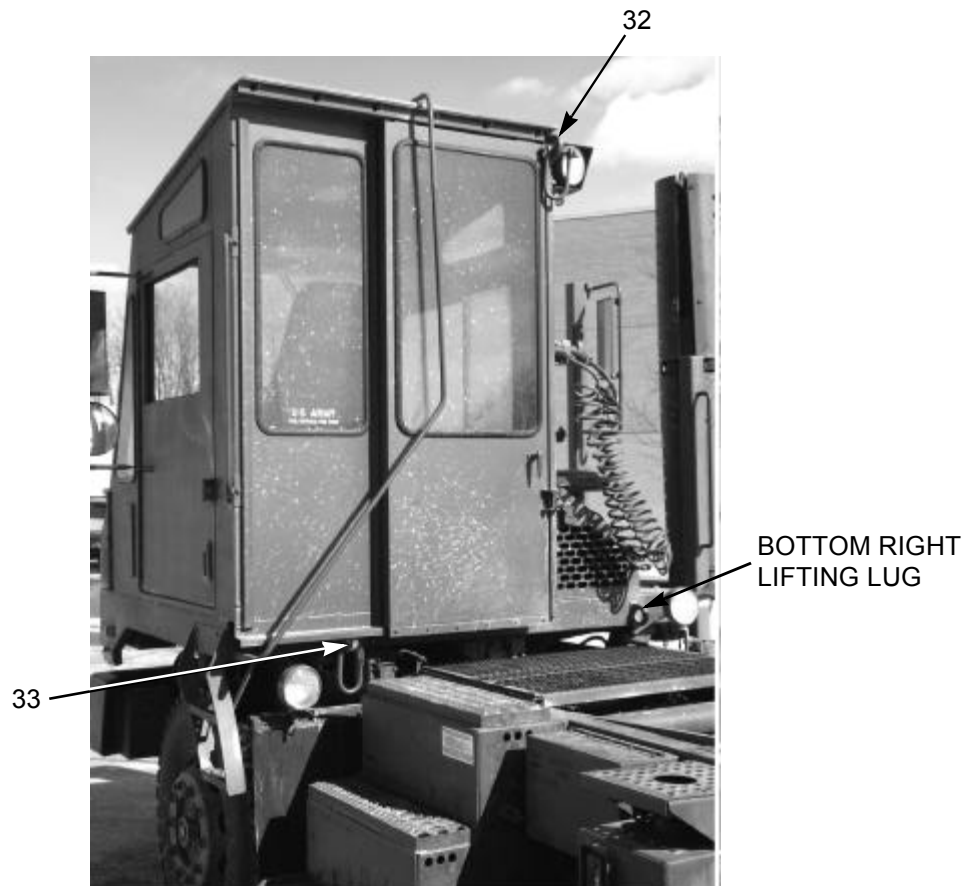
**PLACING CAB IN 90-DEGREE TILT POSITION - CONTINUED****WARNING**

- This procedure must be performed using an overhead lift that has minimum 3-ton capacity. Overhead lift **MUST** have braking capability. As cab is tilted to 90 degrees, cab is brought forward beyond its balance point. Without brakes, overhead lift could lose control of cab descent. Serious injury or death to personnel and damage to equipment could result.
- **DO NOT** use an A-frame as an overhead lift.

**NOTE**

Depending on available lift, it may be advisable to rig a chain for overhead lift to **BOTH** lifting lug at top of cab and to bottom right lifting lug.

17. Rig clevis to lifting lug (32) at top of cab. Attach hook of overhead lift to clevis.
18. Rig clevis to lifting lug (33) at bottom left of cab.

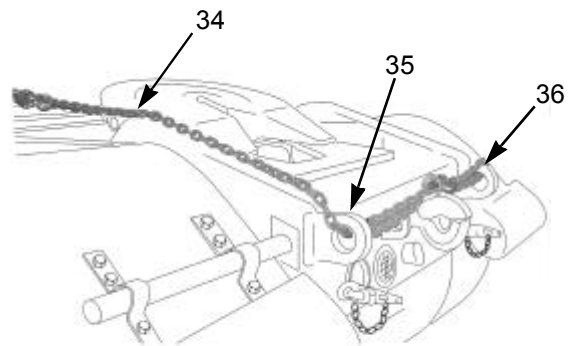


378-670

**PLACING CAB IN 90-DEGREE TILT POSITION - CONTINUED****NOTE**

Approximately 24 ft (7.3 m) of chain is needed to rig chain between bottom left lifting lug and rear of tractor.

19. Rig chain (34) to clevis at lifting lug (33). Rig other end of chain through two lift/tiedown lugs (35 and 36) at rear of tractor. Pass chain to left of fifth wheel.
20. Adjust slack in chain (34) so that there is approximately 17.3 ft (5.3 m) of chain between midpoint of lifting lug (33) at rear of cab and midpoint of lift/tiedown lug (35) at rear of tractor. Secure chain.



376-671



**PLACING CAB IN 90-DEGREE TILT POSITION - CONTINUED****WARNING**

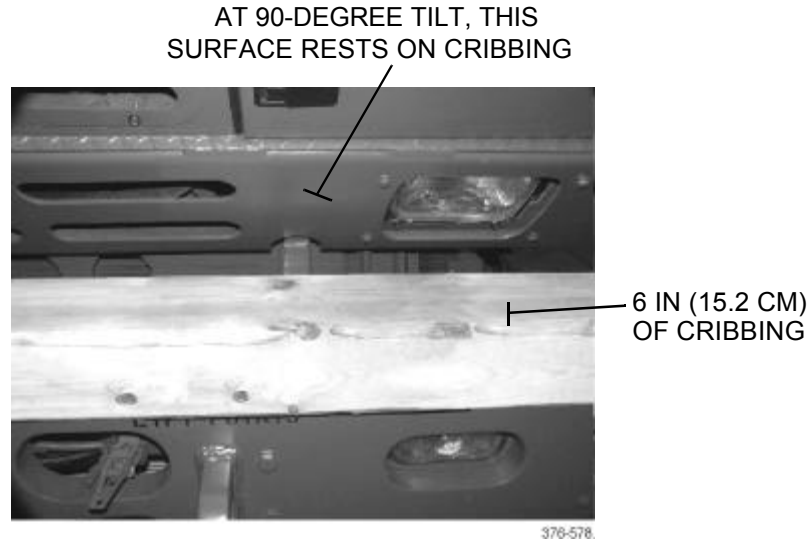
- All personnel must stand clear of front of cab when safety prop is disconnected. As long as safety prop remains disconnected, stay clear of front of cab. Failure to follow this warning could result in injury or death to personnel.
  - DO NOT place body under cab when cab is supported only by overhead lift.
  - Ensure cab's forward tilting movement is controlled at all times by overhead lift's braking capability. Proceed slowly and with great caution. Failure to follow this warning could cause loss of control of cab, resulting in injury or death to personnel and damage to cab.
  - Watch chain that is rigged between rear of cab and rear of tractor. Ensure it does not become tangled or caught up on any component as cab is tilted. If chain becomes hung up, it could damage component or injure personnel if chain breaks free suddenly.
21. Begin to lift and tilt cab with overhead lift.

**NOTE**

As cab reaches 90-degree tilt position, chain that is rigged between rear of cab and rear of tractor will tighten.

22. Continue to slowly lift and tilt cab with overhead lift. Alternate between lifting cab and moving overhead lift forward as cab's center of gravity shifts toward balance point.
23. When cab reaches balance point, slowly lower cab until 90-degree tilt is reached. Front surface of cab will be resting on front bumper cribbing, and supported by chain rigged to rear of tractor.

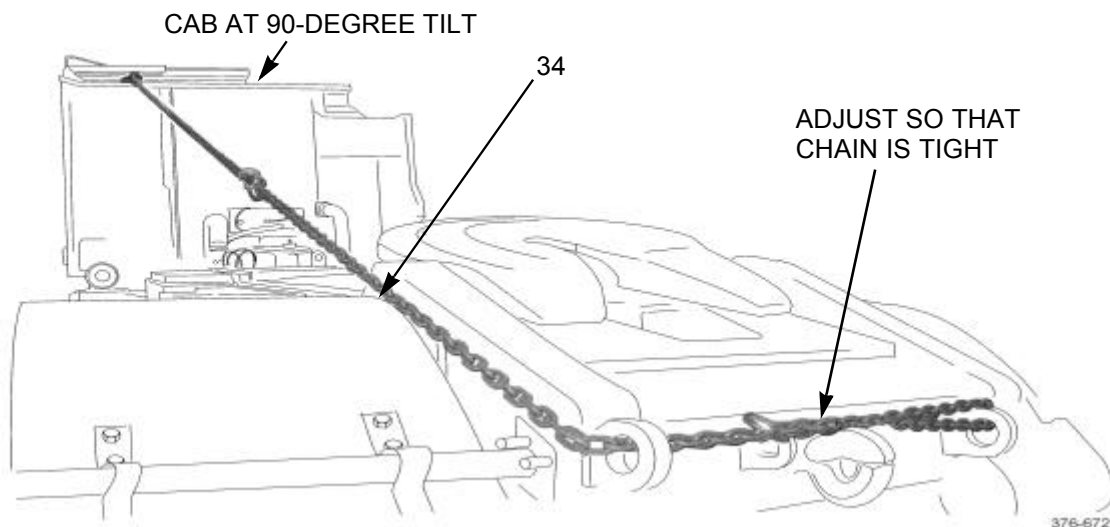
**PLACING CAB IN 90-DEGREE TILT POSITION - CONTINUED**



**NOTE**

Chain that is rigged between rear of cab and rear of tractor is intended to serve as an additional safety support for cab in 90-degree tilt position. To achieve this, it must be tight.

24. Check that chain (34) is tight when cab has reached 90-degree tilt position. Verify cab is resting securely on cribbing. **DO NOT** remove overhead lift until cab is secure.
  - a. If chain not tight, raise cab slightly with overhead lift, decrease chain length, then lower cab onto wood cribbing.
  - b. If chain tightens before cab rests on front bumper cribbing, raise cab, increase chain length, then lower cab onto cribbing.



**PLACING CAB IN 90-DEGREE TILT POSITION - CONTINUED**

25. Remove overhead lift from clevis at top of cab.

**WARNING**

All personnel must stand clear of front of cab when safety prop is disconnected. As long as safety prop remains disconnected, stay clear of front of cab. Failure to follow this warning could result in injury or death to personnel.

26. DO NOT remove chain (34). Chain is to remain on tractor as long as safety prop is disconnected from cab.

**RETURNING CAB TO 45-DEGREE TILT POSITION****WARNING**

- All personnel must stand clear of front of cab when safety prop is disconnected. As long as safety prop remains disconnected, stay clear of front of cab. Failure to follow this warning could result in injury or death to personnel.
- DO NOT place body under cab when cab is supported only by overhead lift.
- Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.
- This procedure must be performed using an overhead lift that has minimum 3-ton capacity. Overhead lift MUST have braking capability. As cab is returned to 45-degree tilt, cab is brought rearward beyond its balance point. Without brakes, overhead lift could lose control of cab descent. Serious injury or death to personnel and damage to equipment could result.
- DO NOT use an A-frame as an overhead lift.
- Ensure cab's rearward tilting movement is controlled at all times by overhead lift's braking capability. Proceed slowly and with great caution. Failure to follow this warning could cause loss of control of cab, resulting in injury or death to personnel and damage to cab.

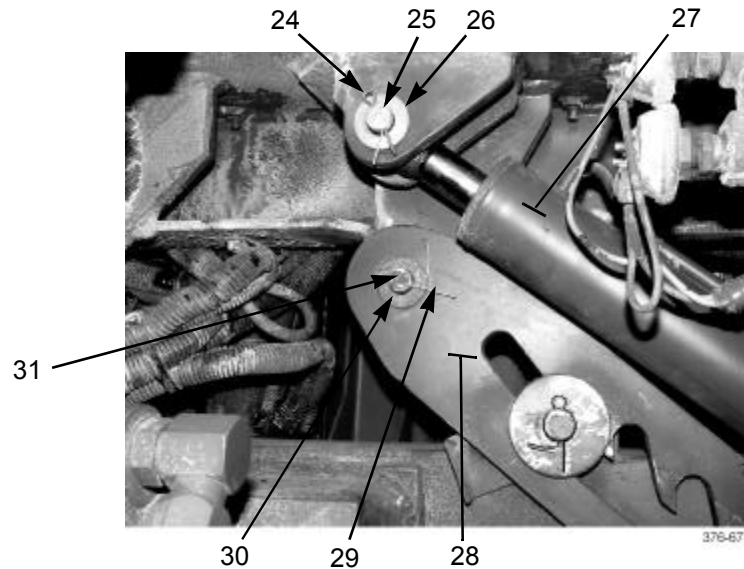
**NOTE**

Depending on available lift, it may be advisable to rig a chain for overhead lift to BOTH lifting lug at top of cab and to bottom right lifting lug.

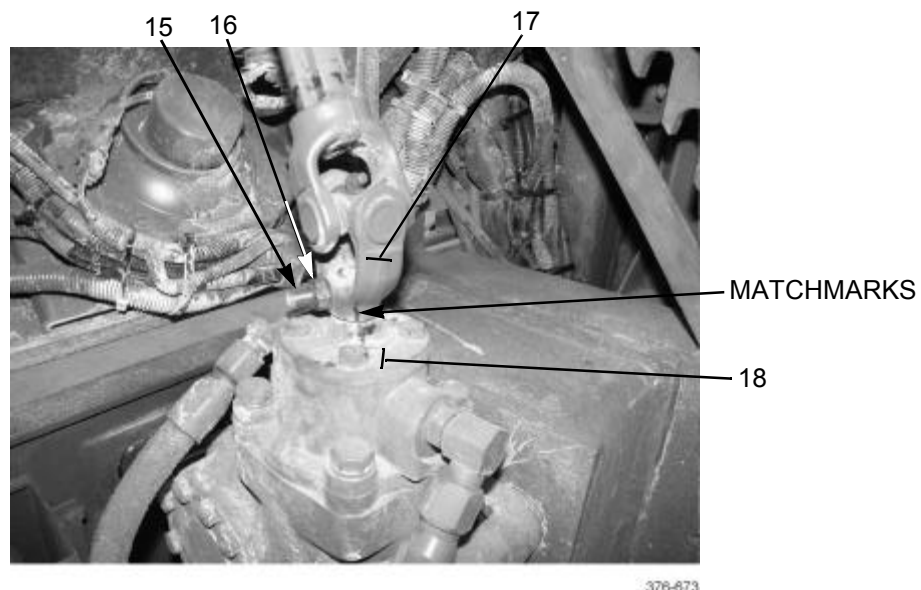
1. Attach hook of overhead lift to clevis at lifting lug at top of cab.
2. Slowly lift and tilt cab rearward, using overhead lift. Alternate between lifting cab and moving overhead lift rearward as cab's center of gravity shifts toward balance point.

**RETURNING CAB TO 45-DEGREE TILT POSITION - CONTINUED**

3. When cab reaches balance point, continue to slowly tilt and lower cab. Stop when cab is fully lowered.
4. Remove overhead lift, clevises, chains, and wood cribbing.
5. Connect safety prop (28) to underside of cab with pin (31), two washers (30), and new cotter pin (29).
6. Connect tilt cylinder (27) to underside of cab with pin (25), washer (26), and new cotter pin (24).

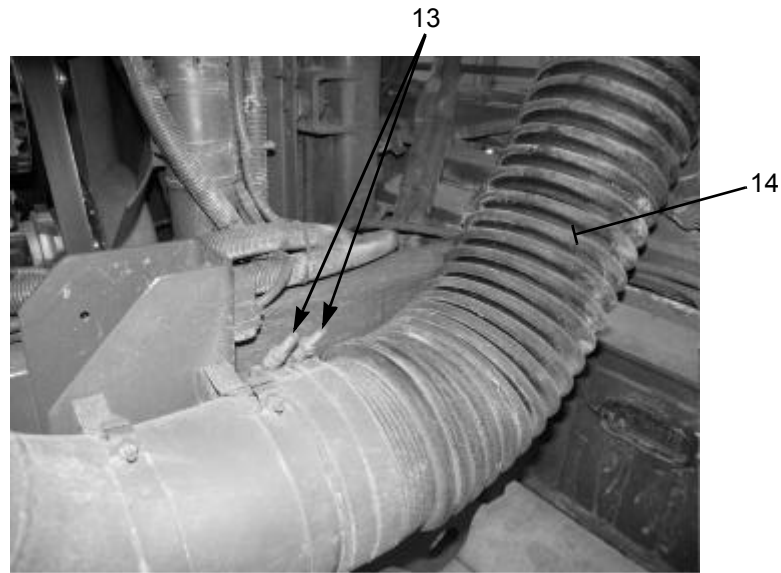


7. Place battery disconnect switch to ON position.
8. Tilt cab to 45-degree position using cab tilt pump. Ensure cab is securely supported by safety prop (TM 9-2320-312-10).
9. Cut tiedown strap and release lower steering column from attachment to horn. Discard tiedown strap. Align matchmarks and install yoke (17) of lower steering column to shaft of steering gear (18). Install screw (15) and nut (16). Tighten nut to 26 lb-ft (35 Nm).



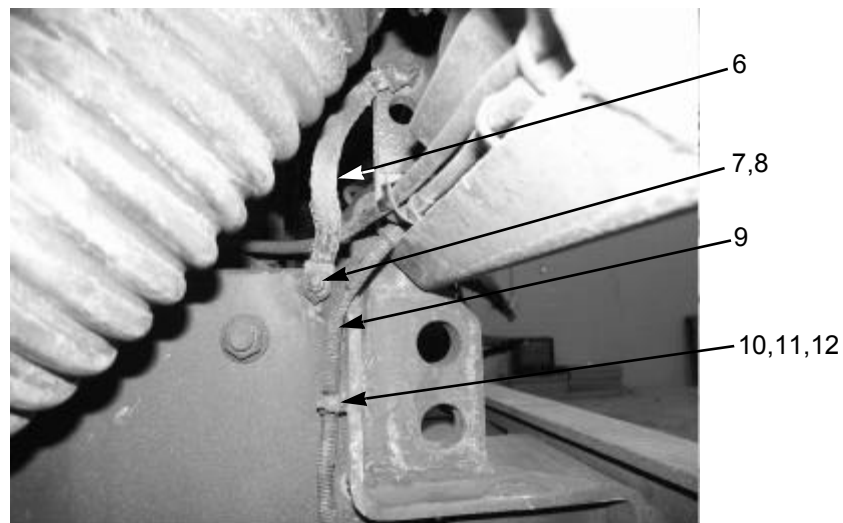
**RETURNING CAB TO 45-DEGREE TILT POSITION - CONTINUED**

10. On right side of tractor, install air intake tube (14) and tighten two clamps (13).



376-675

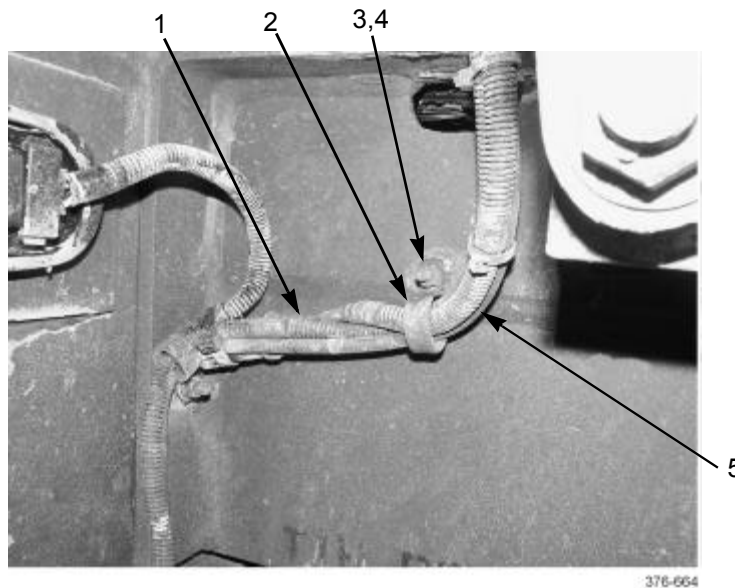
11. Secure clamp (11) with wiring harness (9) to welded stud (12) with nut (10).
12. Install ground strap (6) to frame with new lockwasher (8) and nut (7).



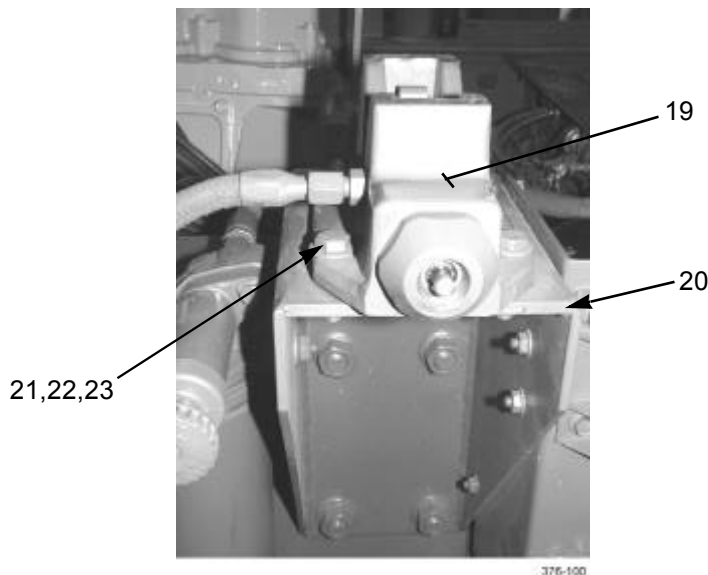
376-674

**RETURNING CAB TO 45-DEGREE TILT POSITION - CONTINUED**

13. On left side of tractor, secure clamp (2) with two wiring harnesses (1) and windshield washer hose (5) to welded stud (4) with new locknut (3).



14. Reattach any other clamps that were removed, to secure all wiring harnesses, lines or hoses at front of tractor. Install new tiedown straps as needed.
15. Align witness marks and install cab tilt latch (19) to frame bracket (20) with four washers (23), screws (22), and nuts (21).



**CAUTION**

Be alert for any interference or pinching problem with wiring harnesses, lines or hoses at front of cab.

16. Lower cab using cab tilt pump (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**CAB WINDSHIELD AND WINDOW GLASS REPLACEMENT**

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0148 00

**THIS WORK PACKAGE COVERS**

Removal, Cleaning and Inspection, Installation

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**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Adhesive, hi-strength (Item 2, WP 0165 00)

Compound, cleaning, solvent, Type III (Item 10, WP 0165 00)

**Materials/Parts - Continued**

Detergent (Item 23, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Seal, adhesive backed bulb, side door (P/N 284A-0055)

Seal, nonmetallic (P/N 284A-0051)

Seal, nonmetallic (P/N 284A-0185)

**Personnel Required**

Two

**Equipment Condition**

Windshield wiper removed, if replacing windshield (WP 0060 00)

**WARNING**

Wear suitable hand and eye protection when handling glass. Failure to do so may result in injury to personnel.

**NOTE**

Perform following replacement steps for each of seven windows including windshield and cab rear sliding door.

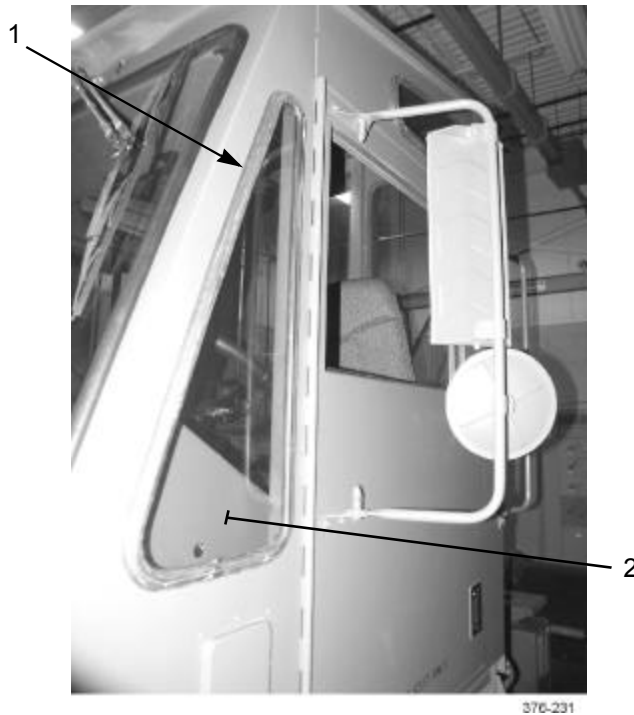
**REMOVAL**

1. If window glass (2) is being replaced due to any cause other than being hit by a flying object, mark edge of seal (1) or cab sheet metal at location of crack.
2. At outside of vehicle cab, cut through adhesive at seal (1), at bottom-center of window glass (2).
3. Using flat or pointed tool, insert tool in separation slot at middle of seal (1) and pull outer half of seal down and away from inner half of seal to “unlock” seal.
4. Continue “unlocking” outer half of seal (1) around entire length of seal.

**NOTE**

One person may gently push outward on window glass from inside cab as step 4 is performed.

5. Gently and evenly pry window glass (2) away from seal (1) and remove window glass from cab.
6. Remove seal (1) from cab. Retain seal to use as a template to cut correct length of new seal.





**CLEANING AND INSPECTION****WARNING**

Dry cleaning solvent MIL-PRF-680 Type III is an environmentally compliant and low toxic material. However, it may be irritating to the eyes and skin. The use of protective gloves and goggles is suggested. Use in well-ventilated areas. Keep away from open flames and other sources of ignition.

1. Clean window glass opening in cab of dust, dirt, and seal deposits. If any adhesive residue is noted, remove with dry cleaning solvent. Dry surfaces thoroughly.
2. If window glass has been removed under criteria outlined in *Removal* step 1, inspect area where crack originated for foreign objects. Inspect mounting flange of cab for irregularities. DO NOT attempt to install new window glass unless damaged areas are repaired.

**INSTALLATION**

1. Compare length of old seal (1) to new bulk seal and cut new seal to same length.

**NOTE**

Lubricate surface of seal and opening in cab with a detergent and water solution to aid installation.

2. Starting at bottom-center of cab opening, install seal (1) to cab opening. Ensure that both ends of seal meet firmly and evenly.

**CAUTION**

When handling window glass, use care not to nick or chip edge of glass. A damaged edge could cause cracking later.

3. Starting at one bottom corner of window glass (2), pull back inner half of seal (1) and insert window glass into groove of seal.
4. Continue to pull inner half of seal (1) back, and gradually insert window glass (2) to seal. Allow inner half of seal to overlap window glass.
5. Starting at either end of seal (1), position edge of inner half of seal UNDER edge of outer half of seal to "lock" seal to window glass (2).
6. Continue "locking" seal (1) around entire length of seal.
7. Apply adhesive over ends of seal (1), following manufacturer's instructions for application of adhesive.
8. If removed, install windshield wiper (WP 0060 00).

**END OF WORK PACKAGE**

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**AIR CONDITIONING SYSTEM MAINTENANCE****0149 00****THIS WORK PACKAGE COVERS**

Recovery, Evacuating/Recycling, Purging, Flushing, Charging

**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 13

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Reclaimer, refrigerant, R134a (Item 25, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Oil, refrigerant (Item 45, WP 0165 00)

Refrigerant, R-134a (Item 63, WP 0165 00)

**References**

WP 0057 00

WP 0154 00

WP 0155 00

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

**WARNING**

- Use care to prevent refrigerant from touching your skin or eyes. Liquid refrigerant, when exposed to air, quickly evaporates and will freeze skin or eye tissue. Serious injury or blindness may result if you come in contact with liquid refrigerant.
- When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.
- Handle cylinders that contain gas under high pressure as high-energy sources and therefore as potential explosives. Follow these safety rules to avoid serious injury or death to personnel:
  - (a) Wear eye protection and gloves when handling cylinders.
  - (b) Prior to use, inspect cylinders for damage or evidence of leaks.
  - (c) Keep cylinders capped when not in use.
  - (d) Secure cylinders when handling or moving them to ensure they do not fall. Do not drop, drag or roll cylinders.
  - (e) Do not expose cylinders to temperatures higher than 125°F (52°C). Keep in well-ventilated areas away from heat sources, combustible gases or highly combustible materials, and contact with electrical circuits.
  - (f) Never use a cylinder that you cannot positively identify its contents.

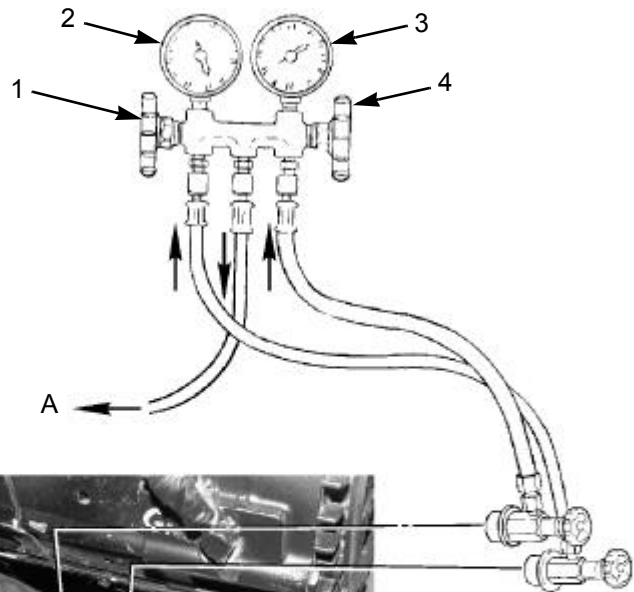
**RECOVERY**

1. Remove caps from suction (S) valve (5) and discharge (D) valve (6) on AC compressor (7) on right side of engine.
2. Wearing protective goggles and non-leather gloves, attach recovery/recycling station's hoses to valves (5 and 6) as follows:

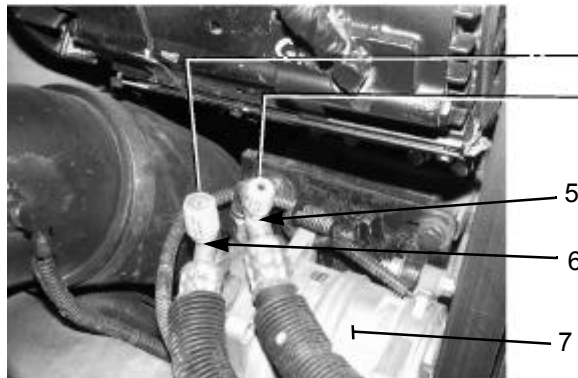
**NOTE**

Push down firmly on hose connectors until a clicking sound is heard. This will ensure coupler is locked.

- a. Ensure recovery/recycling station's valves are closed.
- b. Connect red hose to discharge valve (6).
- c. Connect blue hose to suction valve (5).
- d. Turn knob clockwise on each coupler to open valves (5 and 6).



- A To Recovery Station
- 1 Manifold Suction Hand Valve (Open)
  - 2 Low-Side Gauge
  - 3 High-Side Gauge
  - 4 Manifold Discharge Hand Valve (Open)
  - 5 Suction Valve
  - 6 Discharge Valve
  - 7 AC Compressor



376-058

3. Follow recovery/recycling manufacturer's instructions and recover all refrigerant from system.

**NOTE**

- Always comply with all local regulations regarding refrigerant disposal. You may be subject to substantial penalties for improper disposal.
- Anytime air conditioning system refrigerant is evacuated, replace receiver-drier.

4. Replace receiver-drier (WP 0154 00).

**RECOVERY - CONTINUED****NOTE**

If system is contaminated with moisture, compressor oil must be replaced with clean oil. If system is heavily contaminated with desiccant or grit, replace compressor and expansion valve.

5. Replace air conditioner compressor (WP 0155 00).

**EVACUATING/RECYCLING****NOTE**

System must have been recovered and compressor filled with correct amount of refrigerant oil. Replace receiver-drier if system is opened.

1. Wearing protective goggles and rubber gloves, attach recovery/recycling station's hoses to valves (5 and 6) as follows:

**NOTE**

Push down firmly on hose connectors until a clicking sound is heard. This will ensure coupler is locked.

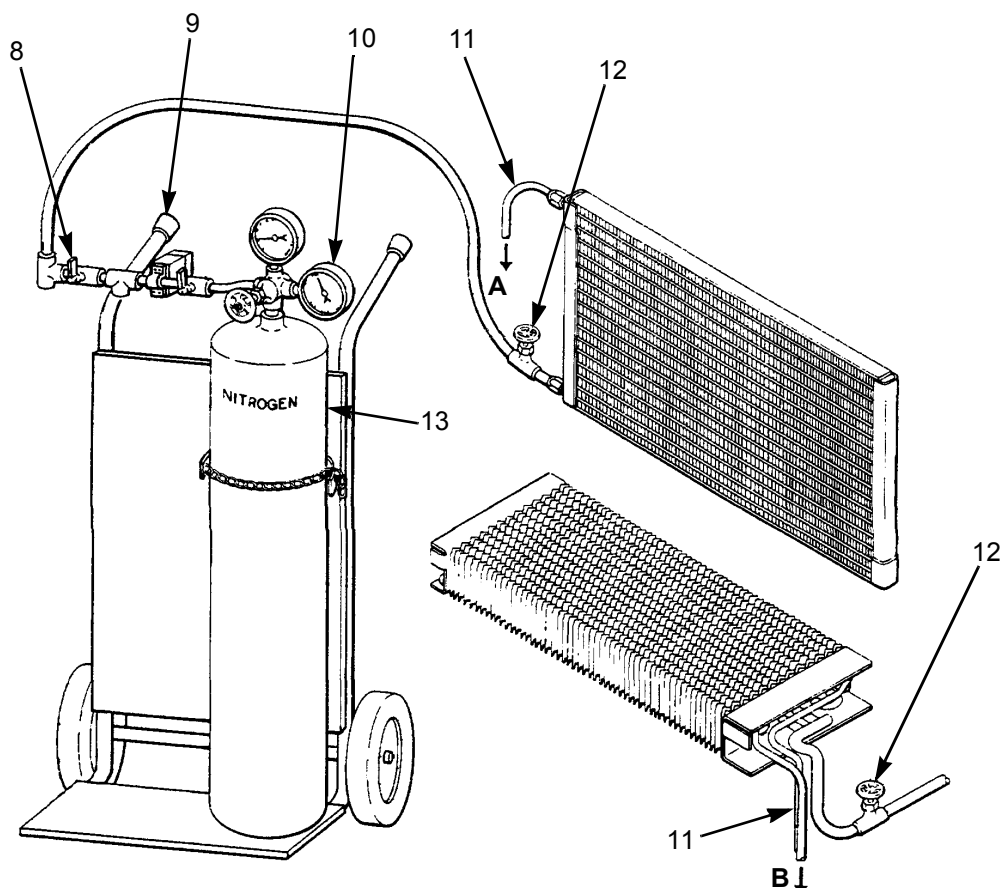
- a. Ensure recovery/recycling station's valves are closed.
  - b. Connect red hose to discharge (D) valve (6).
  - c. Connect blue hose to suction (S) valve (5).
  - d. Turn knob clockwise on each coupler to open valves (5 and 6).
2. Follow recovery/recycling manufacturer's instructions and evacuate/recycle refrigerant system.

**PURGING**

**NOTE**

Dry nitrogen gas is recommended for purging. A pressure regulator is required to regulate between 0 to 200 psi (0-1379 kPa). Commercial cylinders of nitrogen contain pressures in excess of 2000 psi (13,780 kPa); this pressure **MUST** be reduced to 200 psi (1379 kPa) for purging.

1. Recover system refrigerant (Refer to *Recovery*).
2. Disconnect both ends of line or part being purged. Tightly cap rest of system.
3. Ensure valves (9, 8, and 12) are closed.



376-059

<p><b>A</b></p> <p>8 Purging Control Valve</p> <p>9 Nitrogen Bottle Control Valve</p> <p>10 Nitrogen Bottle Regulator/Gauge</p>	<p><b>B</b></p> <p>11 Drain Line</p> <p>12 Supply Line Valve</p> <p>13 Nitrogen Bottle</p>
<p><b>To Waste Container</b></p>	<p><b>To Recycling System Container</b></p>

4. Connect supply line valve (12) to outlet end of part or line.
5. Connect drain line (11) to inlet end of part or line.
6. Place outlet of drain line into a recycling system container.

**PURGING - CONTINUED**

7. Adjust nitrogen bottle control valve (10) to 200 psi (1379 kPa). Open nitrogen bottle control valve (9) and purging control valve (8). Then, slowly open supply line valve (12). Check drain line (11) for gas flow.
8. Let nitrogen flow at 200 psi (1379 kPa) and let it flow for 1 to 2 minutes. If part or line was very wet, allow it to flow until there is no trace of refrigerant oil or solid bits of dirt or grit flowing from drain tube.
9. Close nitrogen bottle control valve (9) and purging control valve (8) first, then close supply line valve (12).
10. Disconnect supply line valve (12) and drain line (11). Tightly cap both ends of part or line.

**FLUSHING**

1. Recover refrigerant system (Refer to *Recovery*).
2. Disconnect both ends of component or line being flushed. Tightly cap lines to rest of system.
3. Heat R-134a refrigerant in a dial-a-charge or pressurize refrigerant in accordance with manufacturer's instructions provided with refrigerant reclaimer.
4. Connect dial-a-charge outlet hose to outlet side of system. This will ensure that R-134a will flow in reverse direction of normal flow.
5. Connect a line from inlet side of system to recovery/recycling station.

**NOTE**

If system is extremely contaminated, install a receiver-drier inline as a pre-filter for recovery/recycling station.

6. Turn on recovery/recycling station and open outlet valve for dial-a-charge. Allow about 2 pounds (1 kilogram) of R-134a to flow through system.
7. Close supply line valve and wait for recovery station to shut off.
8. Disconnect supply line and drain line from dial-a-charge and recovery station. Connect lines to nitrogen bottle.
9. Purge system and check collection bottle for contaminants. Repeat process if needed.
10. Disconnect lines from component and tightly cap both ends of component.

**CHARGING****NOTE**

Before charging, system must be recovered and evacuated with recovery and recycling station connected to service and discharge port connections.

1. Obtain enough refrigerant to fully charge system. Set tank on a scale and weigh for correct amount of refrigerant to enter system. This prevents overcharging, which could cause damage to compressor.
2. Charge refrigerant system:

**NOTE**

If equipped with a recovery, recycling, and recharging system, charge system on high side following manufacturer's instructions. If charging from a bulk container, perform following steps:

- a. Turn tank (bulk container) upside down. With engine off, open high side hand valve. DO NOT open low side hand valve.
- b. Allow refrigerant to enter system until correct charge (by weight) has entered. Close high side hand valve.

**CHARGING - CONTINUED**

- c. Start engine and run it at 1500 rpm. Set cab air conditioner controls at maximum cooling and fan speed; refrigerant compressor must engage.
- d. If a charge did not enter system, place tank (bulk container) in upright position, then open LOW SIDE valve to draw vapor into system; leave valve open until correct weight of refrigerant has entered system, then close low side valve.

**NOTE**

If refrigerant is slow to enter system because of low outside temperatures, vaporization can be quickened by placing refrigerant tank in a tub of warm water, no warmer than 125°F (52°C).

3. Disconnect high side hose. With engine running, open low side and high side hose valves to recover refrigerant from lines.
4. Shut down engine.

**WARNING**

Refrigerant R-134a air conditioning systems should not be pressure tested or leak tested with compressed air. Combustible mixtures of air and R-134a may form, resulting in a fire or explosion, which could cause personnel injury or death.

5. Leak test air conditioning system (WP 0057 00).
6. Check operation of air conditioning system (TM 9-2320-312-10).
7. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**



**HEATER/AC UNIT REPLACEMENT****0150 00****THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 12

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, field maintenance (Item 27, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Caulk, strip (Item 7, WP 0165 00)

**Materials/Parts - Continued**

Oil, refrigerant (Item 45, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Seal (P/N 284A172)

Strip, rubber (P/N 284A59)

**References**

WP 0057 00

WP 0154 00

WP 0156 00

**Personnel Required**

Two

**Equipment Condition**

Engine coolant drained (WP 0023 00)

Air conditioning system recovered (WP 0149 00)

Battery disconnect switch in OFF position

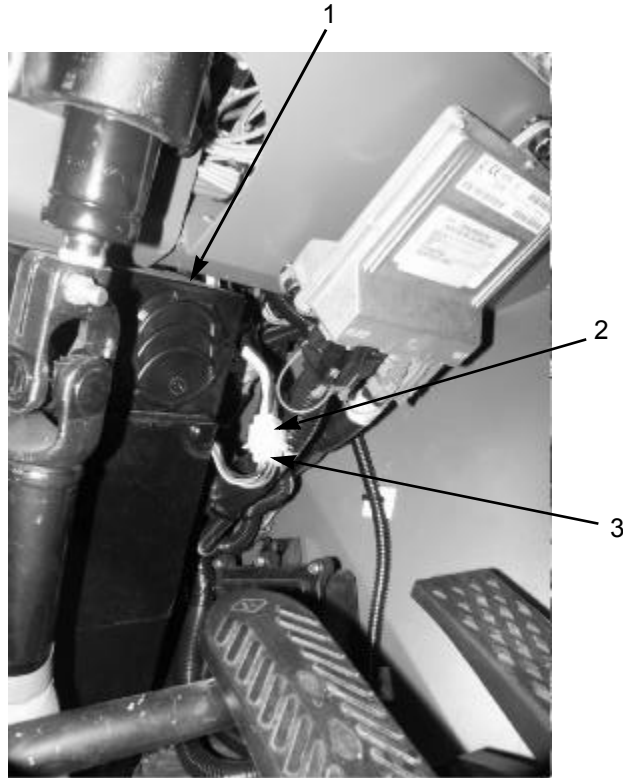
Defroster control cable disconnected from heater/AC unit (WP 0055 00)

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

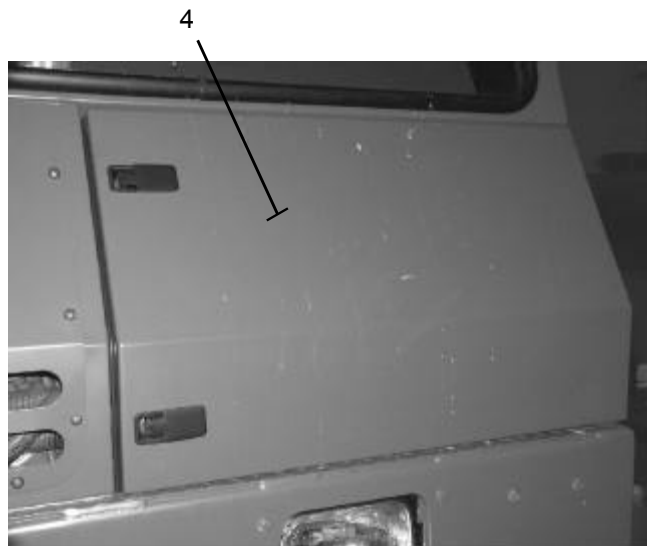
**REMOVAL**

1. Locate heater/AC unit wiring behind right side of heater/AC unit (1) inside cab. Disconnect heater/AC unit connector (3) from cab wiring harness connector (2).



376-340

2. Open heater/AC unit access door (4) at front of cab.



376-256

**REMOVAL - CONTINUED****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

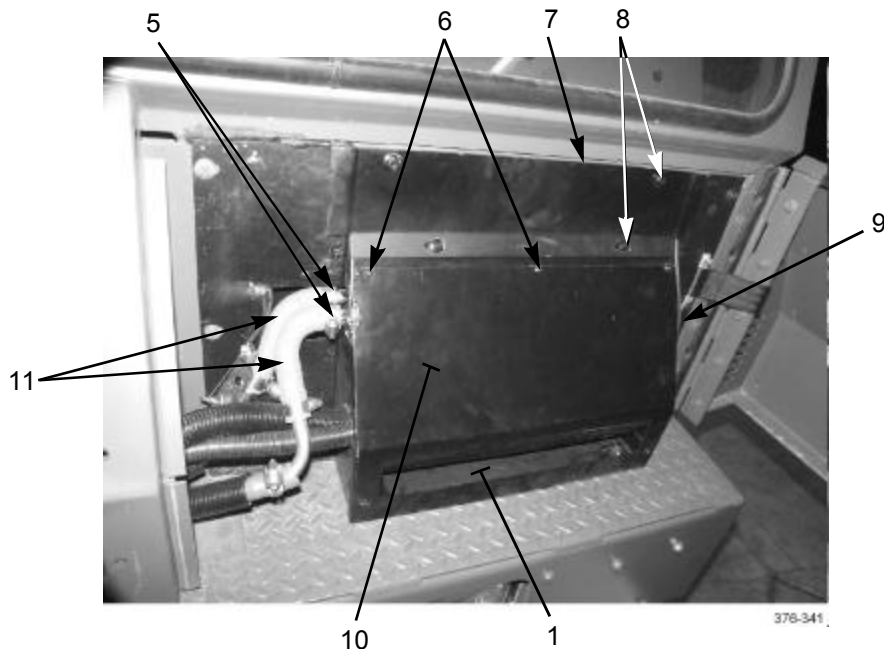
**NOTE**

- Tag coolant hoses to ensure correct installation.
  - Ensure any coolant spills are cleaned up and disposed of in accordance with local policy and ordinances.
3. Loosen two hose clamps (5) and disconnect two coolant hoses (11) from heater/AC unit (1).

**CAUTION**

Use caution not to damage evaporator coil fins.

4. Remove five screws (6) and front cover (10) from heater/AC unit (1).
5. Disconnect fresh air control cable (9).
6. Remove four screws (8) and upper panel (7).



**REMOVAL - CONTINUED****CAUTION**

Water and dirt can damage refrigerant system. Refrigerant lines should be capped after disconnection to avoid contamination.

**NOTE**

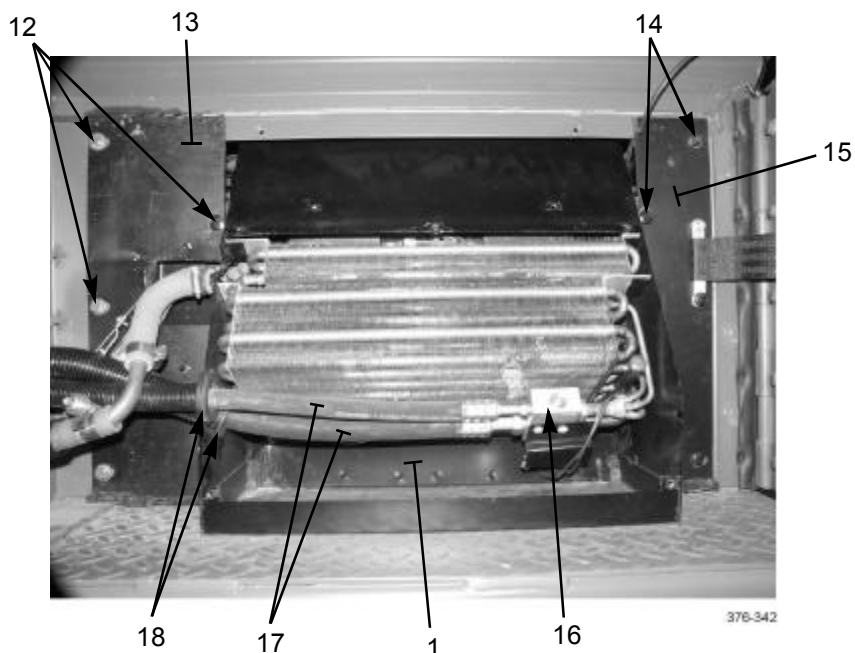
- Refer to WP 0156 00 for instructions on properly disconnecting/connecting AC lines.
- Tag AC hoses to ensure correct installation.

7. Disconnect two A/C lines (17) from expansion valve (16).
8. Remove two A/C lines (17) and grommets (18) from housing of heater/AC unit (1).
9. Remove six screws (12) and panel (13).
10. Remove six screws (14) and panel (15).

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

11. With assistance, lift heater/AC unit (1) from cab and remove.



**INSTALLATION**

1. Remove all traces of old strip caulk, sealing material, and rubber strip material before installing heater/AC unit (1).

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

2. With assistance, position heater/AC unit (1) through opening in front of cab.
3. Install panel (15) with six screws (14).
4. Install panel (13) with six screws (12).
5. Position two grommets (18) and A/C lines (17) through slotted openings in housing of heater/AC unit (1).

**NOTE**

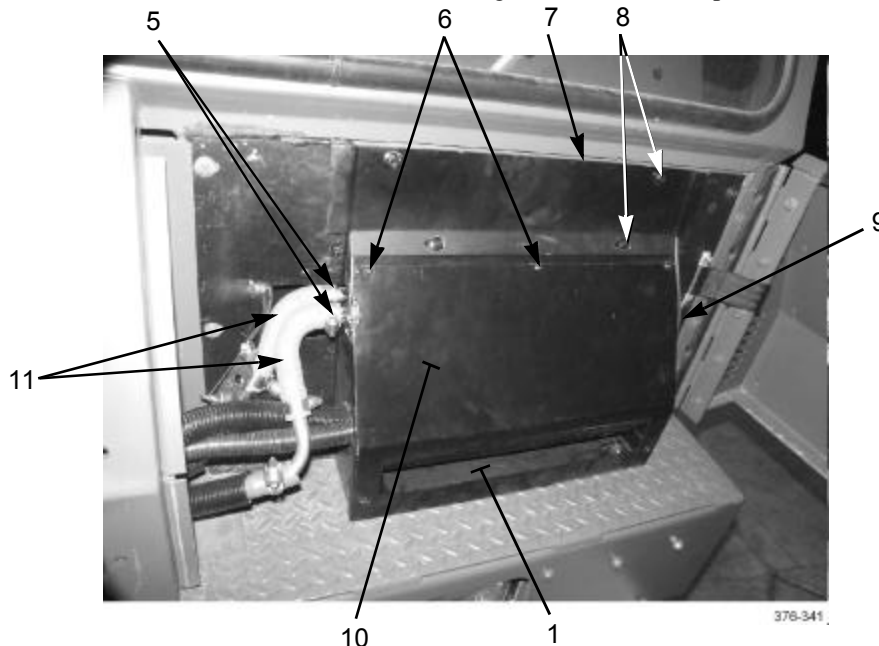
Apply refrigerant oil to preformed packings of A/C lines before they are connected. Do NOT reuse preformed packings.

6. Connect two A/C lines (17) to expansion valve (16).
7. Install upper panel (7) with four screws (8).
8. Connect fresh air control cable (9).

**CAUTION**

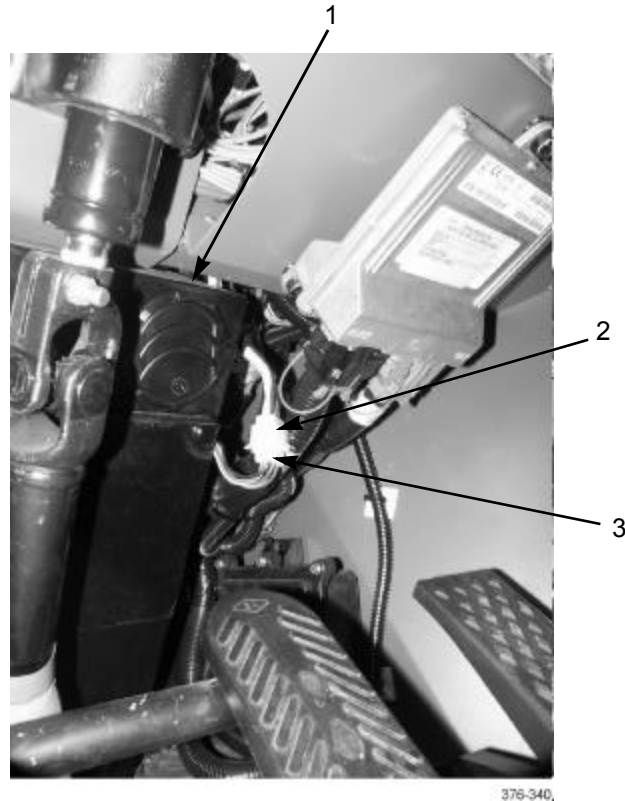
- Use caution not to damage evaporator coil fins.
- Ensure fresh air control cable is free to function and is not pinched.

9. Install front cover (10) with five screws (6).
10. Connect two coolant hoses (11) to heater/AC unit (1) and tighten two hose clamps (5).



**INSTALLATION - CONTINUED**

11. Apply strip caulk around all hoses. Apply rubber strip material around base of heater/AC unit (1) and cab. Use butyl rubber sealing material to seal around gaps in panels.
12. Inside cab, connect heater/AC unit connector (3) to cab wiring harness connector (2). Position wiring behind heater/AC unit (1).



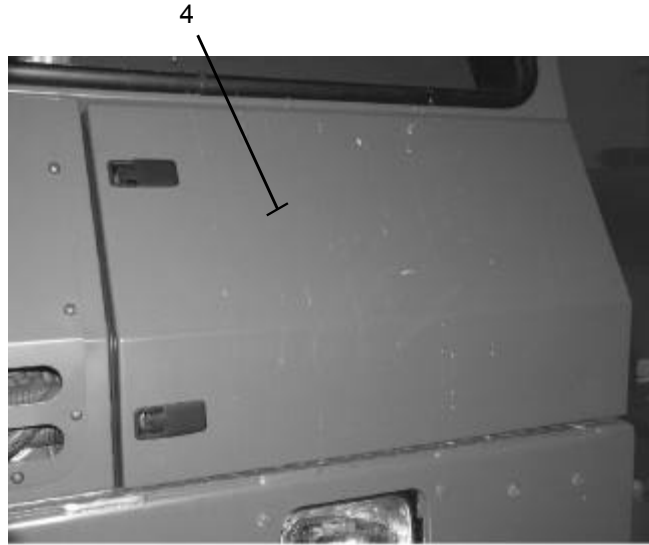
13. Connect defroster control cable to heater/AC unit (WP 0055 00).
14. Fill cooling system (WP 0023 00).

**NOTE**

Any time air conditioning system refrigerant is evacuated, replace receiver-drier.

15. Replace receiver-drier (WP 0154 00).
16. Place battery disconnect switch in ON position.
17. Charge air conditioning system (WP 0149 00).
18. Leak test air conditioning system (WP 0057 00).
19. Check operation of heater/AC unit (TM 9-2320-312-10). Check for leaks.
20. Close heater/AC unit access door (4).

*INSTALLATION - CONTINUED*



376-250

**END OF WORK PACKAGE**

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**AC EXPANSION VALVE REPLACEMENT**

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0151 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 13

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Oil, refrigerant (Item 45, WP 0165 00)

**Materials/Parts - Continued**

Rag, wiping (Item 51, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**References**

WP 0057 00

WP 0058 00

WP 0154 00

WP 0156 00

**Equipment Condition**

Air conditioning system recovered (WP 0149 00)

Battery disconnect switch in OFF position

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**REMOVAL**

1. Open heater/AC unit access door (3) at front of cab.
2. Remove five screws (1) and front panel (2) from heater/AC unit.



378-341

**REMOVAL - CONTINUED**

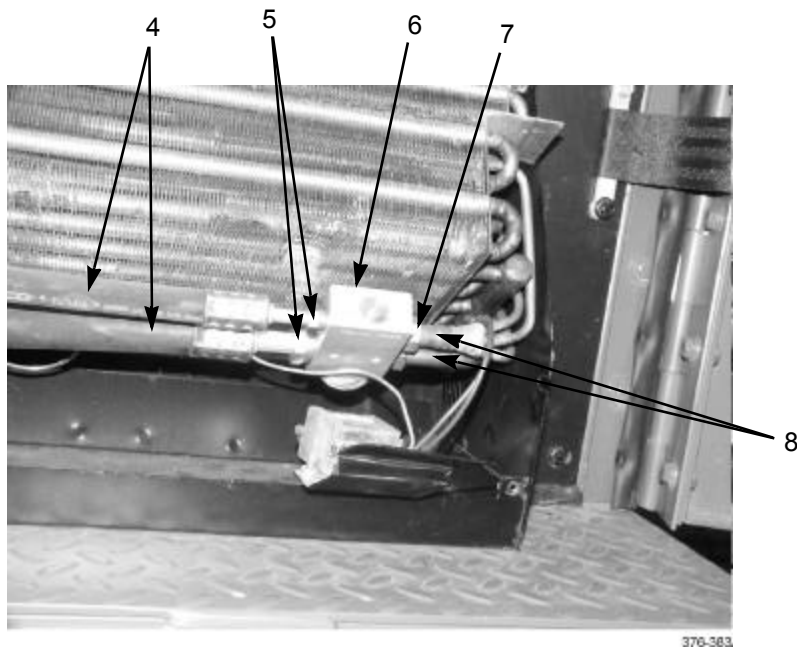
- Remove mounting plate with thermostatic switch from expansion valve (6) (WP 0058 00).

**CAUTION**

- Water and dirt can damage refrigerant system. Refrigerant lines should be capped after disconnection to avoid contamination.
- DO NOT disconnect refrigerant fittings using only one wrench. Hold one fitting in place using a wrench and turn other fitting with a second wrench.

**NOTE**

- Tag refrigerant lines to ensure correct installation.
  - Refer to WP 0156 00 for instructions on properly disconnecting/connecting AC lines.
- Loosen two fitting nuts (5) and disconnect two hoses (4) from expansion valve (6).
  - Loosen two fitting nuts (7) and remove expansion valve (6) from two refrigerant pipes (8).

**INSTALLATION****CAUTION**

DO NOT connect refrigerant fittings using only one wrench. Hold one fitting in place using a wrench and turn other fitting with a second wrench.

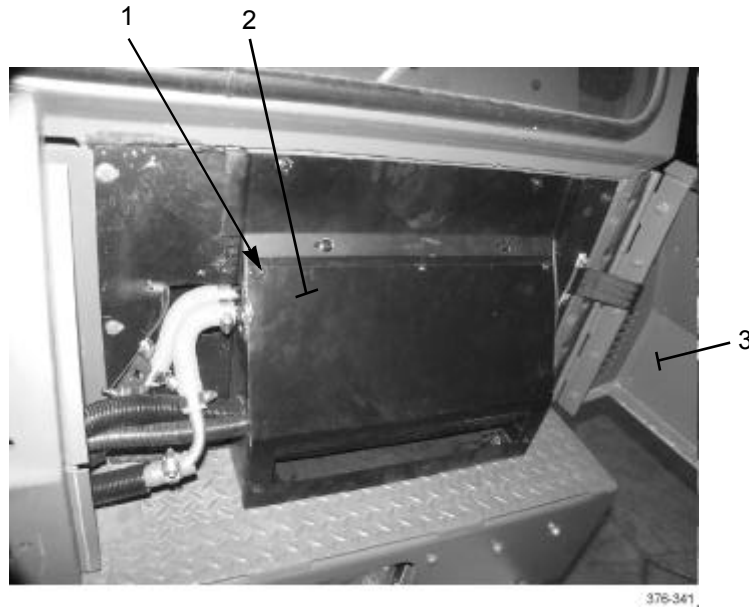
**NOTE**

Apply refrigerant oil to preformed packings of AC lines before they are connected. Do NOT reuse preformed packings.

- Position expansion valve (6) to two refrigerant pipes (8) and tighten fitting nuts (7).

**INSTALLATION - CONTINUED**

2. Connect two hoses (4) to expansion valve (6) and tighten two fitting nuts (4).
3. Install mounting plate with thermostatic switch to expansion valve (6) (WP 0058 00).
4. Install front panel (2) to heater/AC unit with five screws (1).
5. Close heater/AC unit access door (3).



6. Replace receiver-drier (WP 0154 00).
7. Place battery disconnect switch in ON position.
8. Charge air conditioning system (WP 0149 00).
9. Leak test air conditioning system (WP 0057 00).

**END OF WORK PACKAGE**

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**AC CONDENSER REPLACEMENT**

**0152 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP**

**Maintenance Level**

Direct Support

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 14

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Oil, refrigerant (Item 45, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

**Materials/Parts - Continued**

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N 219-74) (6)

**Personnel Required**

Two

**References**

WP 0057 00

WP 0154 00

WP 0156 00

**Equipment Condition**

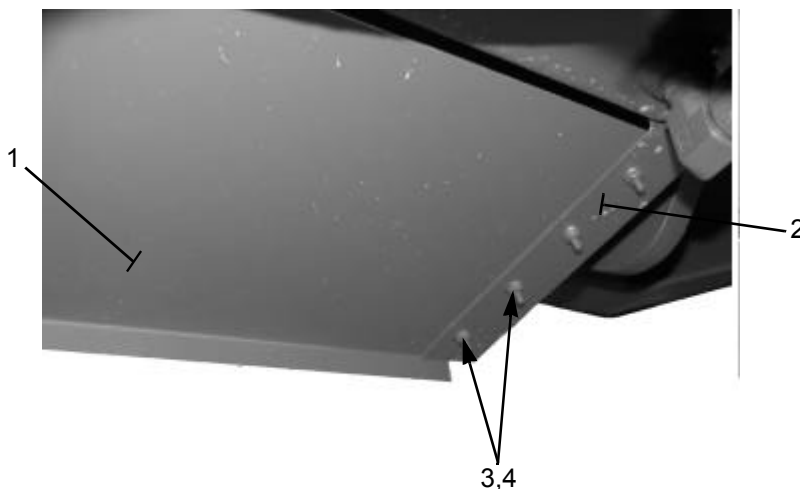
Cab tilted (TM 9-2320-312-10)

Air conditioning system recovered (WP 0149 00)

Battery disconnect switch in OFF position

**REMOVAL**

1. Remove eight nuts (3), screws (4), and bottom recirculation shield (1) from two side recirculation shields (2).



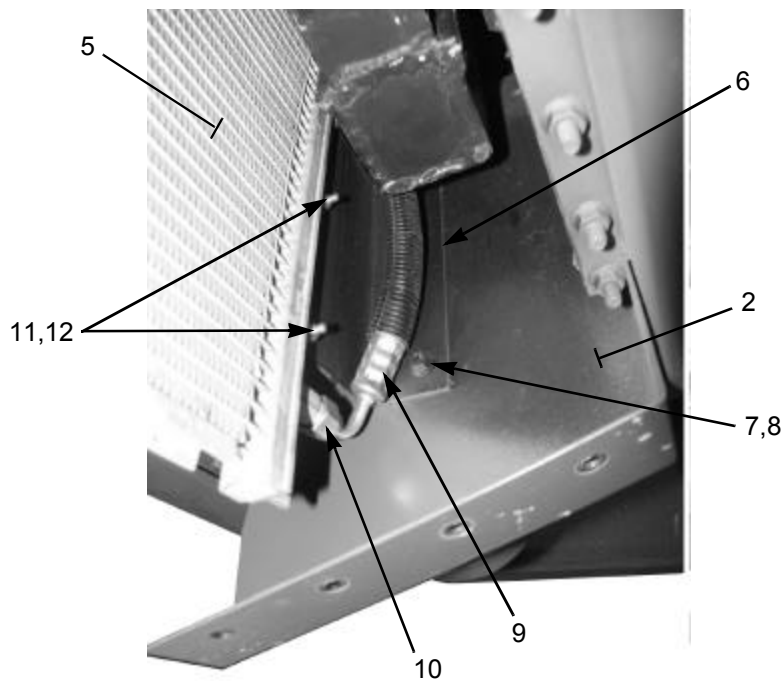
375-372

**REMOVAL - CONTINUED****CAUTION**

- Water and dirt can damage refrigerant system. Refrigerant lines should be capped after disconnection to avoid contamination.
- Use two wrenches when loosening fitting nuts to avoid twisting tubes of condenser.

**NOTE**

- Tag condenser hoses to ensure correct installation.
  - Refer to WP 0156 00 for instructions on properly disconnecting/connecting AC lines.
2. Loosen fitting nuts (10) and disconnect two hoses (9) from side of condenser (5).
  3. Remove six nuts (7), screws (8), and condenser (5) with two angle brackets (6) from side recirculation shields (2).
  4. Remove six locknuts (11) and screws (12) and separate condenser (5) from two angle brackets (6). Discard locknuts.



376-373

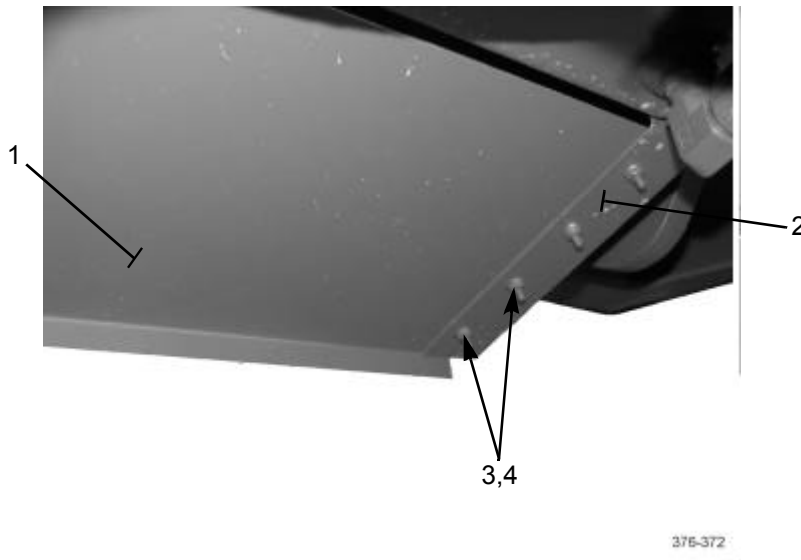
**INSTALLATION**

1. Install condenser (5) to two angle brackets (6) with six screws (12) and new locknuts (11).
2. Position condenser (5) with two angle brackets (6) to side recirculation shields (2) and install six screws (8) and nuts (7).

**INSTALLATION - CONTINUED****NOTE**

Apply refrigerant oil to preformed packings of condenser hoses before they are connected. Do NOT reuse preformed packings.

3. Connect two hoses (9) to side of condenser (5) and tighten two fitting nuts (10).
4. Install bottom recirculation shield (1) to two side recirculation shields (2) with eight screws (4) and nuts (3).

**NOTE**

Any time air conditioning system refrigerant is evacuated, replace receiver-drier.

5. Replace receiver-drier (WP 0154 00).
6. Place battery disconnect switch in ON position.
7. Charge air conditioning system (WP 0149 00).
8. Leak test air conditioning system (WP 0057 00).
9. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**AC FAN CYCLING (TRINARY) SWITCH REPLACEMENT****0153 00****THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP****Maintenance Level**

Direct Support

**RPSTL Reference**

Group 140, Figure 13

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Oil, refrigerant (Item 45, WP 0165 00)

**Materials/Parts - Continued**

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

**References**

WP 0057 00

WP 0154 00

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

Air conditioning system recovered (WP 0149 00)

Battery disconnect switch in OFF position

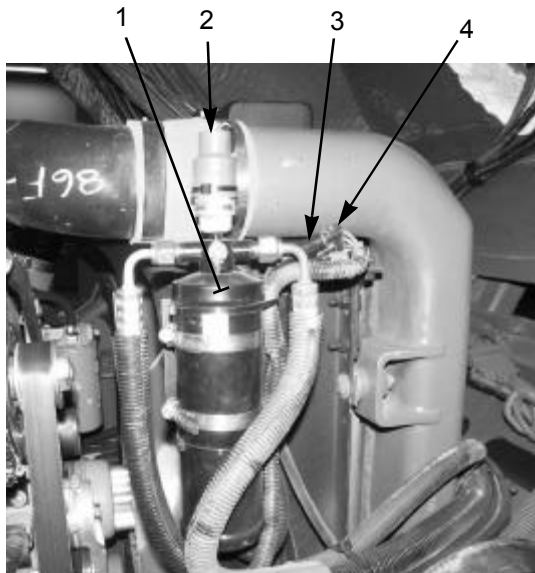
**REMOVAL****CAUTION**

Water and dirt can damage refrigerant system. Refrigerant lines should be capped after disconnection to avoid contamination.

**NOTE**

Remove and discard tiedown straps as necessary. Ensure new tiedown straps are used on installation.

1. Disconnect switch connector (3) from wiring harness connector (4).
2. Remove switch (2) from receiver-drier (1).



376-374

**INSTALLATION****NOTE**

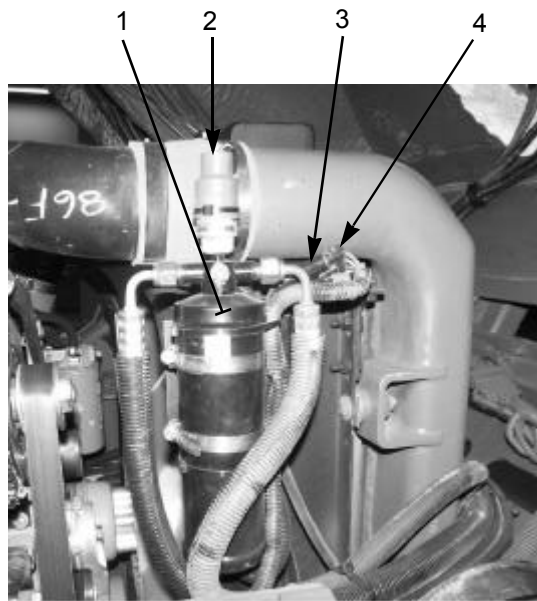
Any time air conditioning system refrigerant is evacuated, replace receiver-drier.

1. Replace receiver-drier (1) (WP 0154 00).

**NOTE**

Apply refrigerant oil to preformed packing of switch before it is installed. Do NOT reuse preformed packing.

2. Install switch (2) to receiver-drier (1).
3. Connect switch connector (3) to wiring harness connector (4).



376-374

4. Place battery disconnect switch in ON position.
5. Charge air conditioning system (WP 0149 00).
6. Leak test air conditioning system (WP 0057 00).
7. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**AC RECEIVER-DRIER REPLACEMENT**

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**0154 00****THIS WORK PACKAGE COVERS**Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 13

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Oil, refrigerant (Item 45, WP 0165 00)

**Materials/Parts - Continued**

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

**References**

WP 0057 00

WP 0156 00

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

Air conditioning system recovered (WP 0149 00)

Fan cycling (trinary) switch removed (WP 0153 00)

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**REMOVAL****CAUTION**

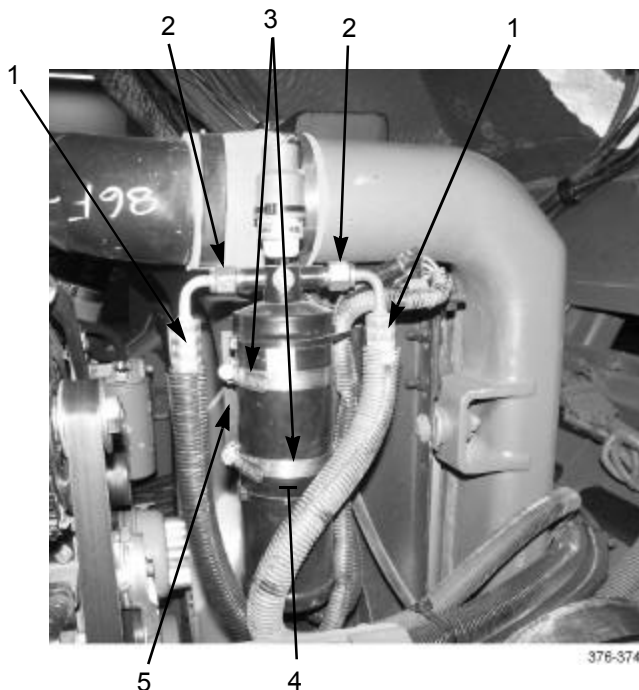
Water and dirt can damage refrigerant system. Refrigerant lines should be capped after disconnection to avoid contamination.

**NOTE**

- Refer to WP 0156 00 for instructions on properly disconnecting/connecting AC lines.
- Remove and discard tiedown straps as necessary. Ensure new tiedown straps are used on installation.
- Tag receiver-drier hoses to ensure correct installation.

**REMOVAL - CONTINUED**

1. Loosen fitting nuts (2) and disconnect two receiver-drier hoses (1) from receiver-drier (4).
2. Loosen and remove two band clamps (3) and receiver-drier (4) from bracket (5) at right side of radiator.

**INSTALLATION**

1. Position receiver-drier (4) and two band clamps (3) to bracket (5) at right side of radiator. Tighten clamps.

**NOTE**

Apply refrigerant oil to preformed packings of receiver-drier hoses before they are connected. Do NOT reuse preformed packings.

2. Connect two receiver-drier hoses (1) to receiver-drier (4) and tighten fitting nuts (2).
3. Install fan cycling (trinary) switch (WP 0153 00).
4. Place battery disconnect switch in ON position.
5. Charge air conditioning system (WP 0149 00).
6. Leak test air conditioning system (WP 0057 00).
7. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**

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**AC COMPRESSOR REPLACEMENT**

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0155 00

**THIS WORK PACKAGE COVERS**

Removal, Installation

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**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figures 13 and 15

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Oil, refrigerant (Item 45, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Washer, lock (P/N 361-12) (4)

**References**

WP 0057 00

WP 0120 00

WP 0154 00

WP 0156 00

**Personnel Required**

Two

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

Battery disconnect switch in OFF position

Engine air intake tubes and hoses removed (WP 0015 00)

Engine serpentine belt removed (WP 0012 00)

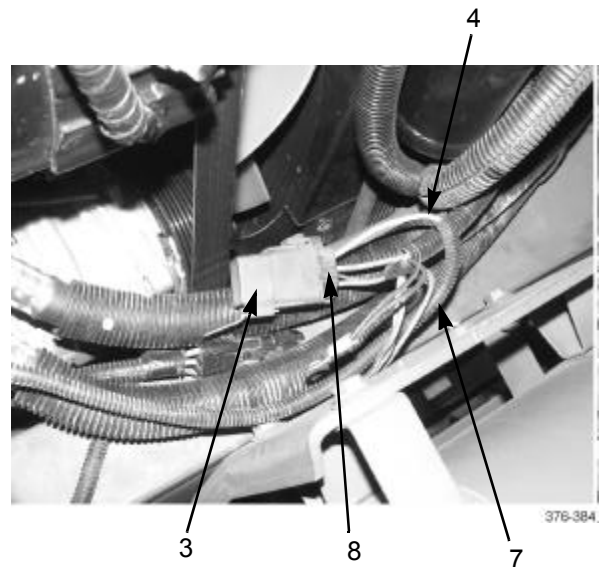
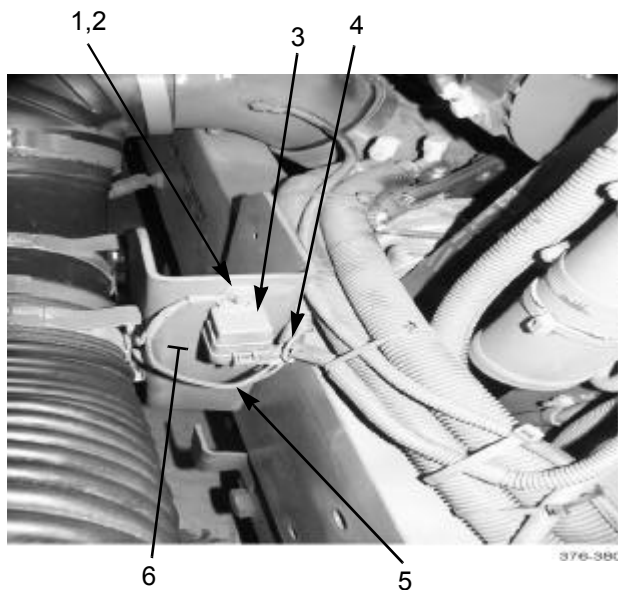
Air conditioning system recovered (WP 0149 00)

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

**REMOVAL**

1. Remove nut (1), screw (2), relay (3), and ground wires (5) from bracket (6) on right side of frame.
2. Disconnect relay connector (8) from relay (3).
3. Remove compressor wire (4) from relay connector (8) (WP 0120 00).
4. Remove tiedown straps from compressor wire (4) and discard. Remove wire loom (7) from compressor wire.



**CAUTION**

- Water and dirt can damage refrigerant system. Refrigerant lines should be capped after disconnection to avoid contamination.
- Use two wrenches when loosening fitting nuts to avoid twisting tubes.

**NOTE**

- Tag AC compressor hoses to ensure correct installation.
- Refer to WP 0156 00 for instructions on properly disconnecting/connecting AC lines.

5. Disconnect two AC hoses (16) from AC compressor (15).



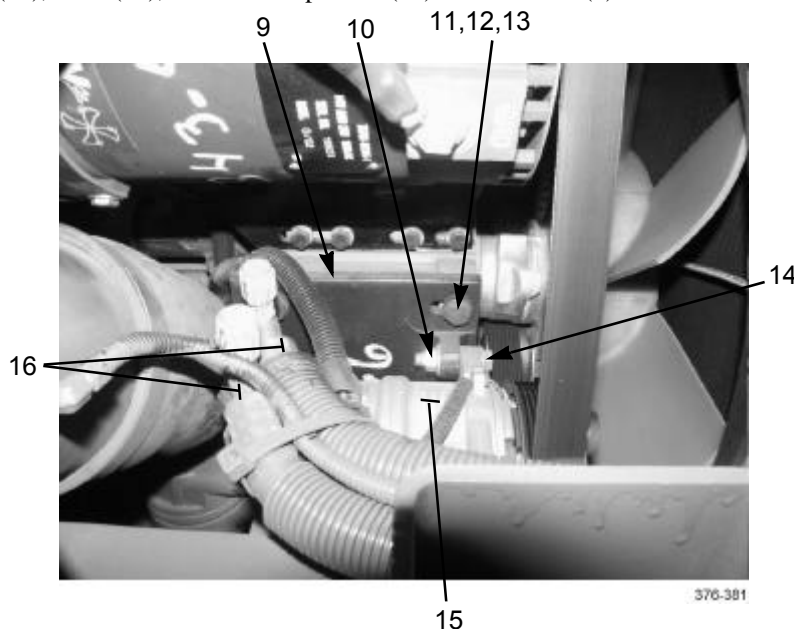
**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

**REMOVAL - CONTINUED****NOTE**

AC compressor mounting bracket has slotted mounting holes to allow for adjustment when installed. This adjustment ensures proper serpentine belt alignment. Note position of bracket prior to removal to ensure correct installation.

6. Remove four bolts (11), washers (12), lockwashers (13), and bracket (9) with AC compressor (15) from engine. Discard lockwashers.
7. Remove four nuts (10), bolts (14), and AC compressor (15) from bracket (9).

**INSTALLATION****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Failure to follow this warning may result in injury to personnel.

1. Install AC compressor (15) to bracket (9) with four bolts (14) and nuts (10).
2. Install bracket (9) with AC compressor (15) to right side of engine with four new lockwashers (13), washers (12), and bolts (11). Do NOT fully tighten bolts.

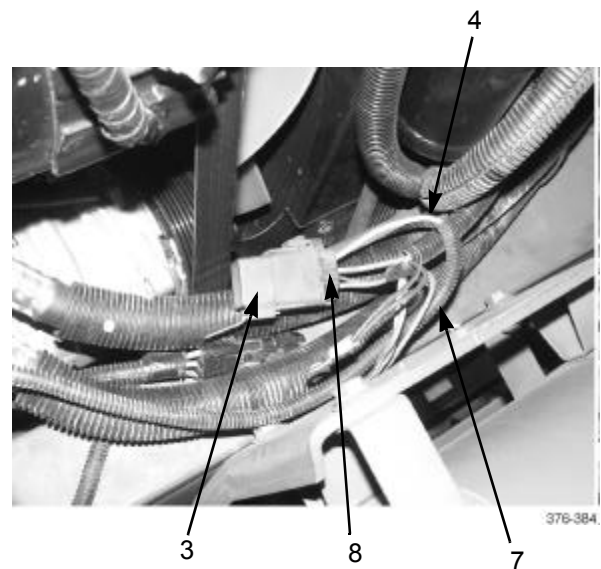
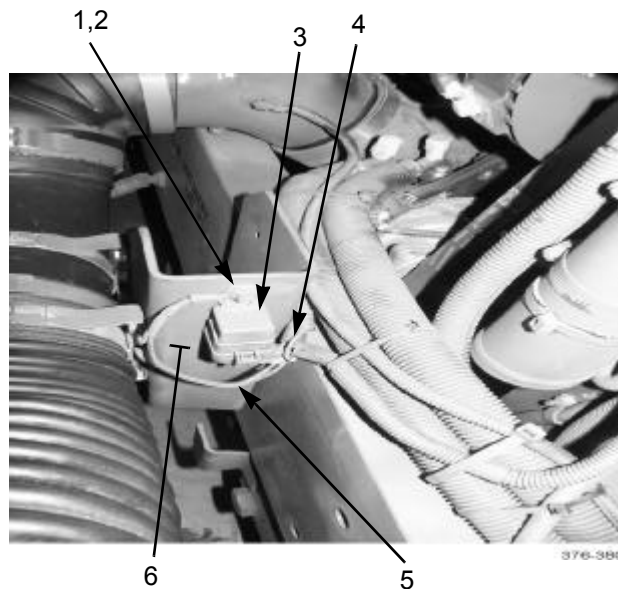
**NOTE**

Apply refrigerant oil to preformed packings of AC hoses before they are connected. DO NOT reuse preformed packings.

3. Connect two AC hoses (16) to AC compressor (15).
4. Position engine serpentine belt (WP 0012 00). Check belt for square alignment. Belt should be vertically straight and perpendicular with frame.
5. Fully tighten four bolts (11).

**INSTALLATION - CONTINUED**

6. Install engine serpentine belt (WP 0012 00).
7. Install wire loom (7) to compressor wire (4) and route wire to relay (3) at right frame rail.
8. Install compressor wire (4) to relay connector (8) (WP 0120 00).
9. Connect relay connector (8) to relay (3).
10. Install relay (3) and ground wires (5) to bracket (6) with screw (2) and nut (1).
11. Install new tiedown straps to secure compressor wire (4).
12. Install engine air intake tubes and holes (WP 0015 00).

**NOTE**

Any time air conditioning system refrigerant is evacuated, replace receiver-drier.

13. Replace receiver-drier (WP 0154 00).
14. Place battery disconnect switch in ON position.
15. Charge air conditioning system (WP 0149 00).
16. Leak test air conditioning system (WP 0057 00).
17. Lower cab (TM 9-2320-312-10).

**END OF WORK PACKAGE**



**AIR CONDITIONING SYSTEM HOSE REPLACEMENT****0156 00****THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 140

**RPSTL Reference**

Group 140, Figure 13

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, field maintenance (Item 27, WP 0166 00)

**Materials/Parts**

Adhesive, loctite (Item 1, WP 0165 00)

**Materials/Parts - Continued**

Cap set (Item 6, WP 0165 00)

Oil, refrigerant (Item 45, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

O-ring pack (P/N ORPK6810)

**References**

WP 0057 00

WP 0136 00

WP 0154 00

**Equipment Condition**

Refrigerant recovered (WP 0149 00)

Battery disconnect switch in OFF position

**WARNING**

- Use care to prevent refrigerant from touching your skin or eyes. Liquid refrigerant, when exposed to air, quickly evaporates and will freeze skin or eye tissue. Serious injury or blindness may result if you come in contact with liquid refrigerant.
- Refrigerant R-134a air conditioning systems should not be pressure tested or leak tested with compressed air. Combustible mixtures of air and R-134a may form, resulting in a fire or explosion, which could cause personnel injury or death.

**NOTE**

If more than one hose is being replaced at the same time, tag hoses to ensure correct installation.

**REMOVAL**

1. The following air conditioning system hoses can be replaced:
  - a. Compressor-to-expansion valve
  - b. Compressor-to-condenser
  - c. Receiver-drier-to-condenser
  - d. Receiver-drier-to-expansion valve

**REMOVAL - CONTINUED****CAUTION**

DO NOT disconnect or connect refrigerant fittings using only one wrench. Hold one fitting in place using a wrench and turn other fitting with a second wrench. Failure to follow this caution may damage fittings.

2. Disconnect each end of hose (1).

**CAUTION**

Water and dirt can damage refrigerant system. Five minutes of not being capped is the limit for any hose or component. DO NOT blow shop air through refrigerant hoses. Shop air is wet (humid).

3. Cap opening where hose (1) was disconnected.

**NOTE**

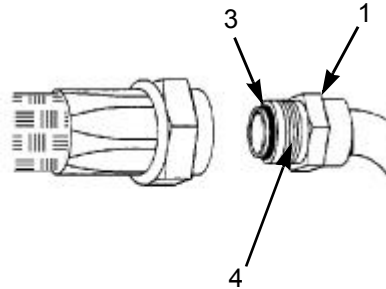
Remove and discard tiedown straps as required. Use new tiedown straps on installation.

4. Remove hose (1) from vehicle.
5. Remove conduit (2) from hose (1).

**INSTALLATION****NOTE**

Any time air conditioning system refrigerant is evacuated, replace receiver-drier.

1. Replace receiver-drier (WP 0154 00).
2. Install conduit (2) to hose (1).
3. Position hose (1) to vehicle.
4. Lubricate new o-ring (3) with refrigerant oil and install to hose (1).
5. Apply loctite to male threads (4) and connect each end of hose (1). Tighten connections in accordance with WP 0136 00.

**INSTALLATION - CONTINUED**

376-474

6. Place battery disconnect switch in ON position.
7. Charge air conditioning system (WP 0149 00).
8. Leak test air conditioning system (WP 0057 00).

**END OF WORK PACKAGE**

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**FIFTH WHEEL MAINTENANCE****0157 00****THIS WORK PACKAGE COVERS**

Removal, Cleaning and Inspection, Repair, Installation

**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 160

**RPSTL Reference**

Group 160, Figures 6 and 7

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, field maintenance (Item 27, WP 0166 00)

Overhead lifting device with chains

Tester, kingpin lock (Item 33, WP 0166 00)

**Materials/Parts**

Cleaning compound, solvent, Type III (Item 10, WP 0165 00)

Detergent (Item 23, WP 0165 00)

Grease, GAA (Item 30, WP 0165 00)

**Materials/Parts - Continued**

Oil, lubricating (Item 41, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Pin, spring (P/N XB-21-S-375-1750) (2)

**References**

Group 160 Commercial Service Manuals

WP 0009 00

**Personnel Required**

Two

**Equipment Condition**

Vehicle on level ground

Wheels blocked

Air system drained (TM 9-2320-312-10)

Fifth wheel raised (TM 9-2320-312-10)

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

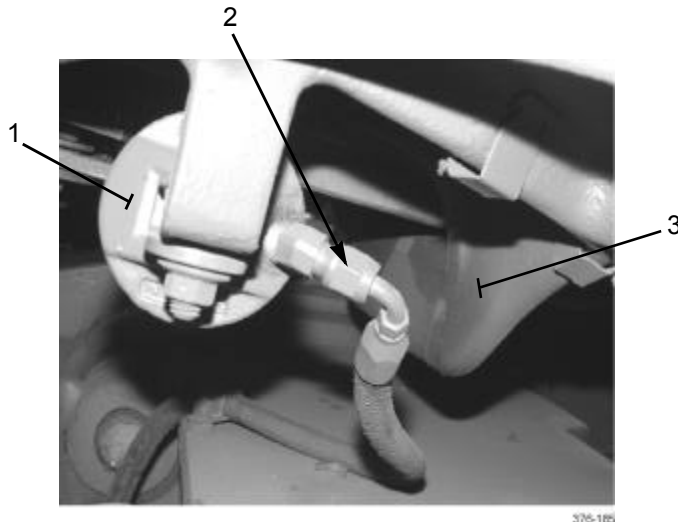
**NOTE**

Fifth wheel weighs approximately 320 lb (145 kg).

**REMOVAL****NOTE**

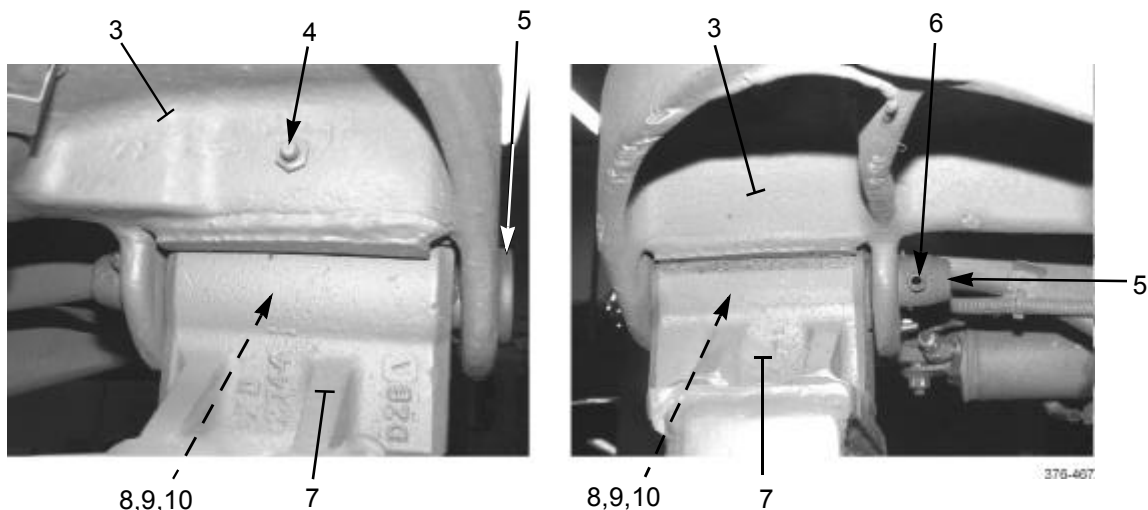
Remove tiedown straps and discard. Use new tiedown straps on installation.

1. Disconnect air hose (2) from fitting at air cylinder (1) at fifth wheel (3).

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

2. Attach lifting chains to fifth wheel (3) and attach chains to overhead lifting device. Take up slack in chains to support fifth wheel.
3. Remove two spring pins (6) and pins (5) from fifth wheel (3) and fifth wheel frame sub-assembly (7). Discard spring pins.
4. Remove fifth wheel (3) from vehicle. Place fifth wheel upside down on a flat work surface.
5. Remove grease fitting (4) from each side of fifth wheel (3).
6. Remove two bearing stop blocks (8), bearing (9), and rubber bushing (10) from each side of fifth wheel frame sub-assembly (7).

**REMOVAL - CONTINUED****CLEANING AND INSPECTION**

1. Clean rubber bushings in detergent and water solution. Wipe dry with a clean rag.

**WARNING**

Dry cleaning solvent MIL-PRF-680 Type III is an environmentally compliant and low toxic material. However, it may be irritating to the eyes and skin. The use of protective gloves and goggles is suggested. Use in well-ventilated areas. Keep away from open flames and other sources of ignition.

2. Use dry cleaning solvent to remove dirt, debris, and grease from all other removed components. Clean thoroughly both fifth wheel mounting area and mounting area on fifth wheel frame sub-assembly. Wipe dry with a clean rag.
3. Inspect for wear, cracks, breaks, bends or other damage.
4. Inspect rubber bushings for wear, deterioration, tears or other damage.
5. Replace all damaged parts.

**REPAIR**

Refer to Group 160 Commercial Service Manuals to repair fifth wheel.

**INSTALLATION****NOTE**

When fifth wheel is installed, grease fitting on each side of fifth wheel must align with hole in bearing.

1. Position bearing (9) and rubber bushing (10) on each side of fifth wheel frame sub-assembly (7). Secure with two bearing stop blocks (8).
2. Install grease fitting (4) on each side of fifth wheel (3).
3. Apply a thin coat of grease to bearing surfaces of two pins (5).

**INSTALLATION - CONTINUED**



**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

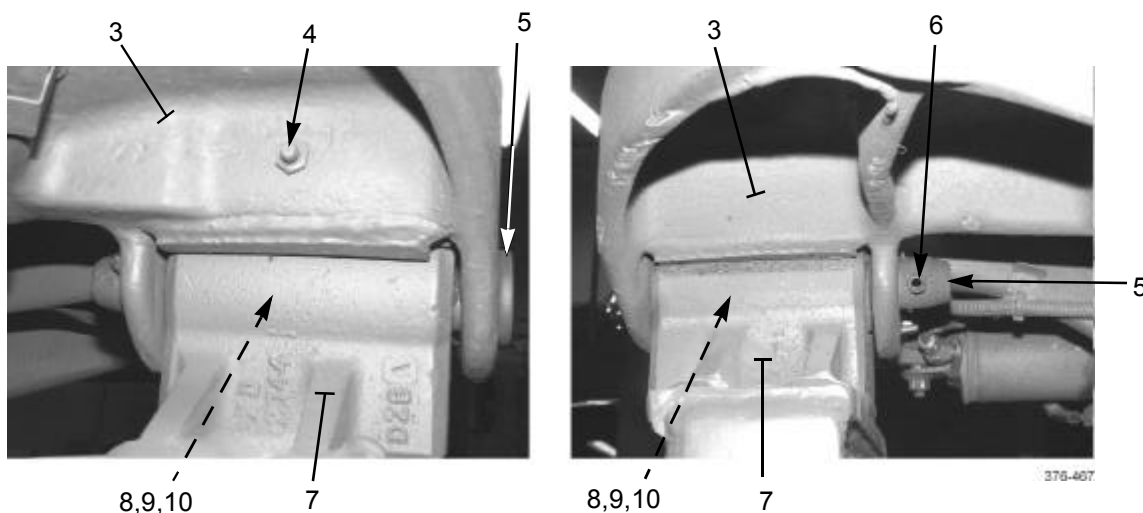
4. Attach lifting chains to fifth wheel (3) and attach chains to overhead lifting device. Take up slack in chains to support fifth wheel.



**WARNING**

DO NOT put hand between fifth wheel and frame sub-assembly when fifth wheel is being positioned. Failure to follow this warning could cause serious injury.

5. Lift fifth wheel (3) and position at fifth wheel frame sub-assembly (7).
6. Install pin (5) and new spring pin (6) through each side of fifth wheel (3) and fifth wheel frame sub-assembly (7).

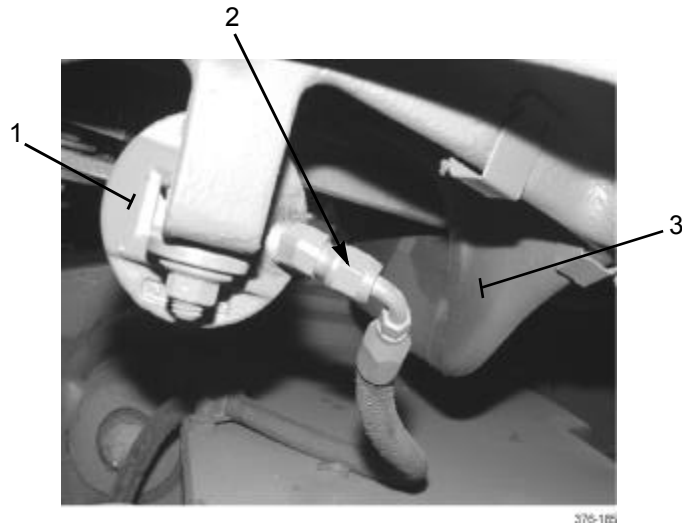


7. Remove overhead lift and chains from fifth wheel (3).
8. Connect air hose (2) to fitting at air cylinder (1).
9. Lubricate each grease fitting (4) and fifth wheel plate with GAA grease (WP 0009 00).



**INSTALLATION - CONTINUED**

10. Lubricate moving parts on underside of fifth wheel (3) with OE/HDO 10 (WP 0009 00).



11. Start engine and pressurize air system (TM 9-2320-312-10).
12. Lower fifth wheel (TM 9-2320-312-10).
13. Check operation of fifth wheel air cylinder (TM 9-2320-312-10).
14. Use kingpin lock tester to check fifth wheel operation (Group 160 Commercial Service Manuals).

**END OF WORK PACKAGE**

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**FIFTH WHEEL HYDRAULIC LIFT CYLINDER REPLACEMENT****0158 00****THIS WORK PACKAGE COVERS**

Removal, Cleaning and Inspection, Installation

**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 160

**RPSTL Reference**

Group 160, Figure 6

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, field maintenance (Item 27, WP 0166 00)

Suitable overhead lifting devices with chains

4 X 8 wood block, 4 ft (122 cm) long

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Cleaning compound, solvent, Type III (Item 10, WP 0165 00)

Fluid, hydraulic, petroleum base (Item 25 or 26, WP 0165 00)

**Materials/Parts - Continued**

Grease, GAA (Item 30, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N21NE083)

Washer, lock (P/N CW423560) (4)

**References**

TM 9-2320-312-10

WP 0129 00

**Personnel Required**

Three

**Equipment Condition**

Vehicle on level ground

Wheels blocked

Rear platform grating removed (WP 0039 00)

**WARNING**

- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
- At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

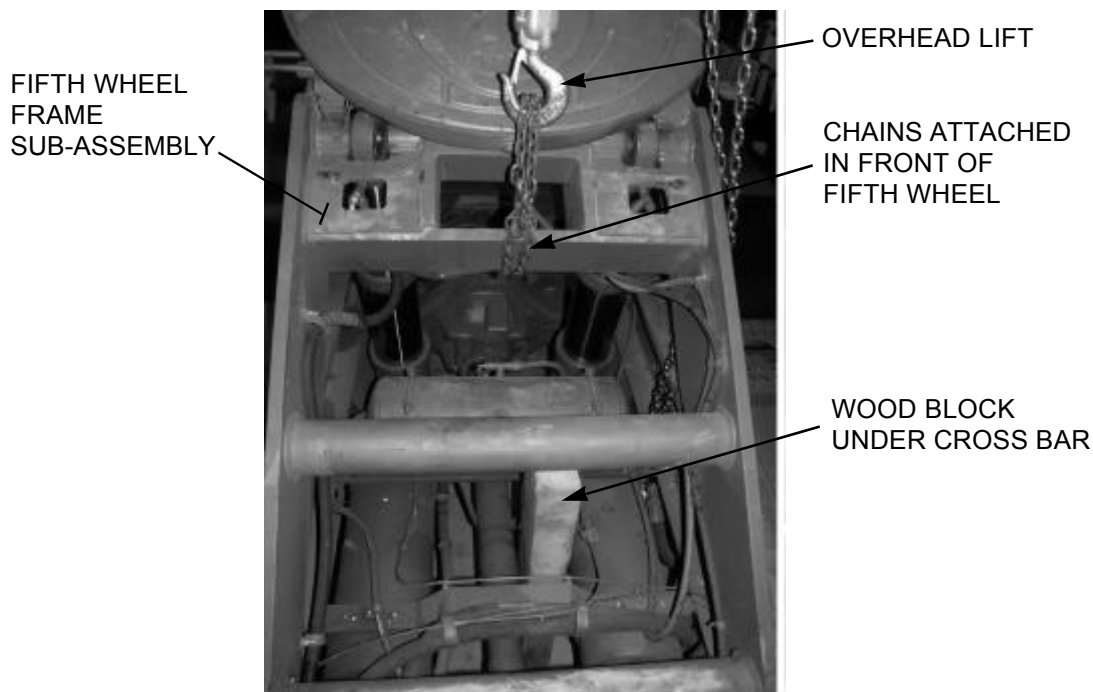
**NOTE**

- Replacement of right or left hydraulic cylinder is the same.
- Right cylinder replacement is described.

**REMOVAL****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

1. Position overhead lift above fifth wheel and attach lifting chains to frame sub-assembly in front of fifth wheel. Take up slack in chains.



376-546

2. Fully raise fifth wheel (TM 9-2320-312-10). Follow with overhead lift. Take up slack in chains.
3. Position a 4 X 8 wood block, approximately 4 ft (122 cm) long, between ground and cross bar of fifth wheel frame sub-assembly.
4. Lower fifth wheel until weight of frame sub-assembly is resting on wood block. Shut down engine (TM 9-2320-312-10).

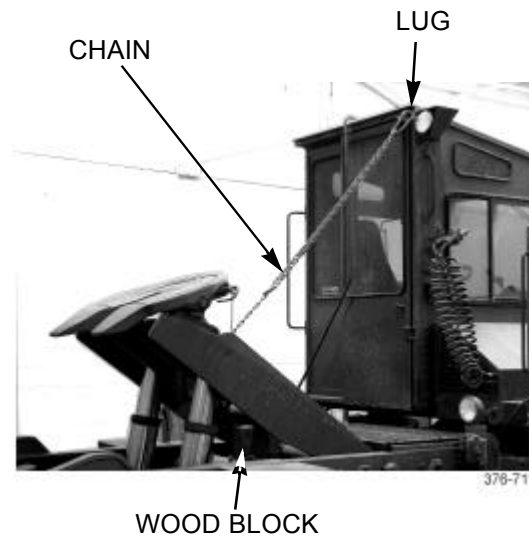
**REMOVAL - CONTINUED**

5. Rig chain between fifth wheel frame sub-assembly and lug at top right corner of cab.

**CAUTION**

DO NOT power down cylinder(s) to remove slack from chain. Damage to cab could result.

6. Adjust chain to remove all slack, using overhead lift. Adjust wood block under cross bar as needed.
7. Remove overhead lift when chain is tight and wood block is secure under cross bar.

FIFTH WHEEL FRAME  
SUB-ASSEMBLY

8. Drain hydraulic reservoir (WP 0129 00).

**REMOVAL - CONTINUED****WARNING**

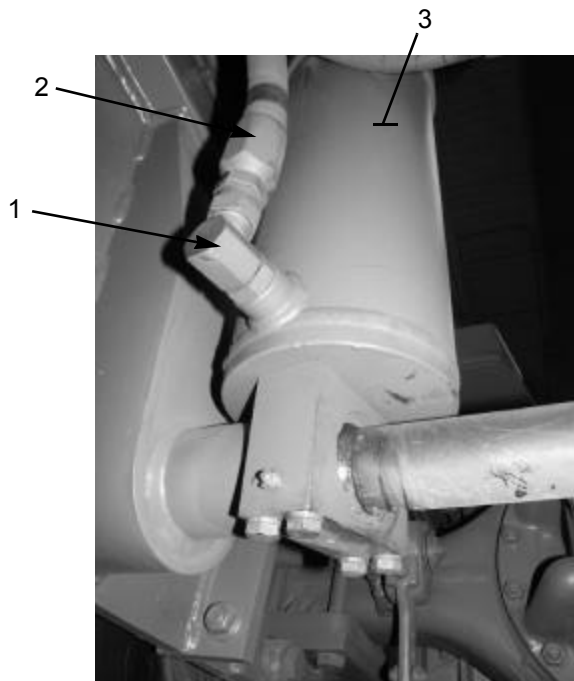
- DO NOT work under fifth wheel frame sub-assembly unless supported by BOTH overhead lift and wood block under cross bar. Failure to follow this warning may result in serious injury or death to personnel.
- When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

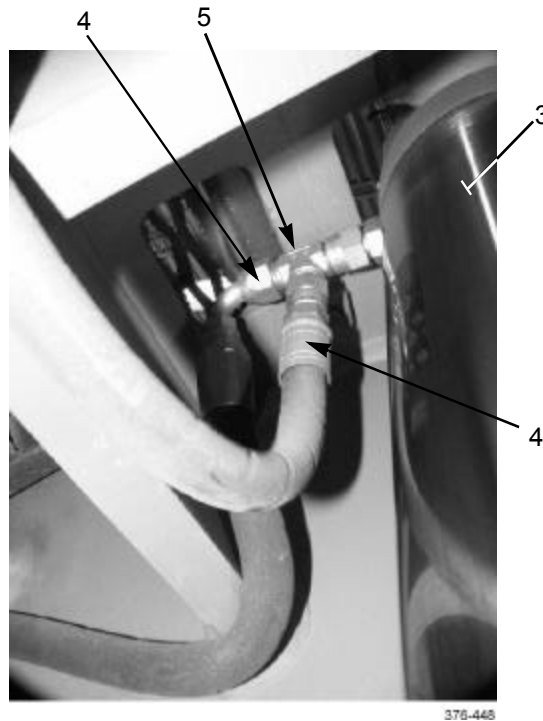
- Tag hydraulic hoses and note position of hydraulic cylinder fittings to ensure correct installation.
  - Use a drain pan to capture any residual hydraulic fluid in hoses. Dispose of fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.
9. At large stage end of cylinder (3), disconnect hydraulic hose (2) from elbow (1).



376-447

**REMOVAL - CONTINUED**

10. Disconnect hydraulic hoses (4) from tee (5) at small stage end of cylinder (3).

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

11. Attach a suitable lifting device and sling to cylinder (3). Take up slack in sling.

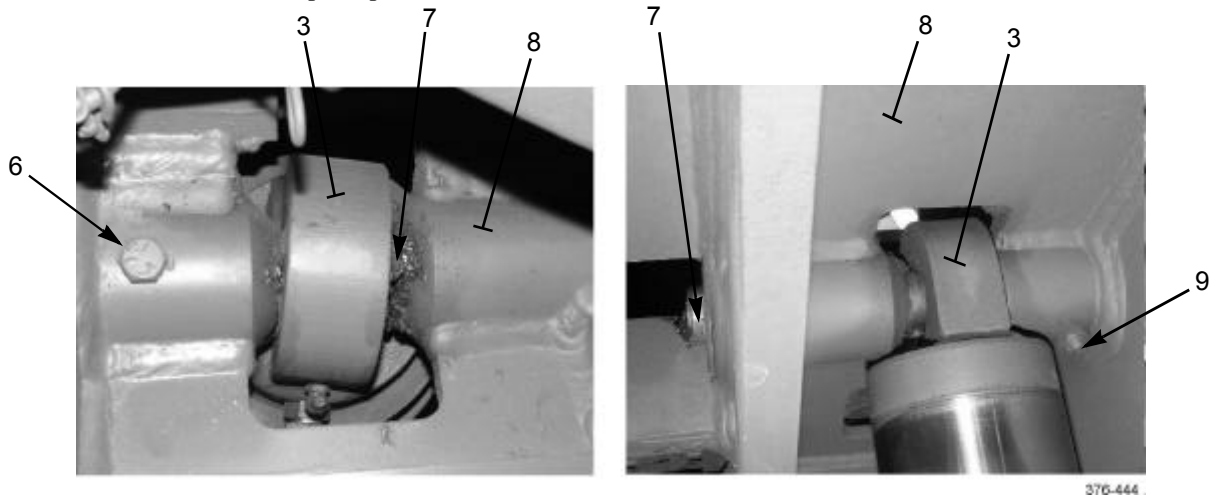
**REMOVAL - CONTINUED**

12. At small stage end of cylinder (3), remove locknut (9) and screw (6) from fifth wheel frame sub-assembly (8) and cylinder. Discard locknut.

**NOTE**

Note position of pivot pin for installation.

13. Use a brass drift to drive out pivot pin (7) and remove.

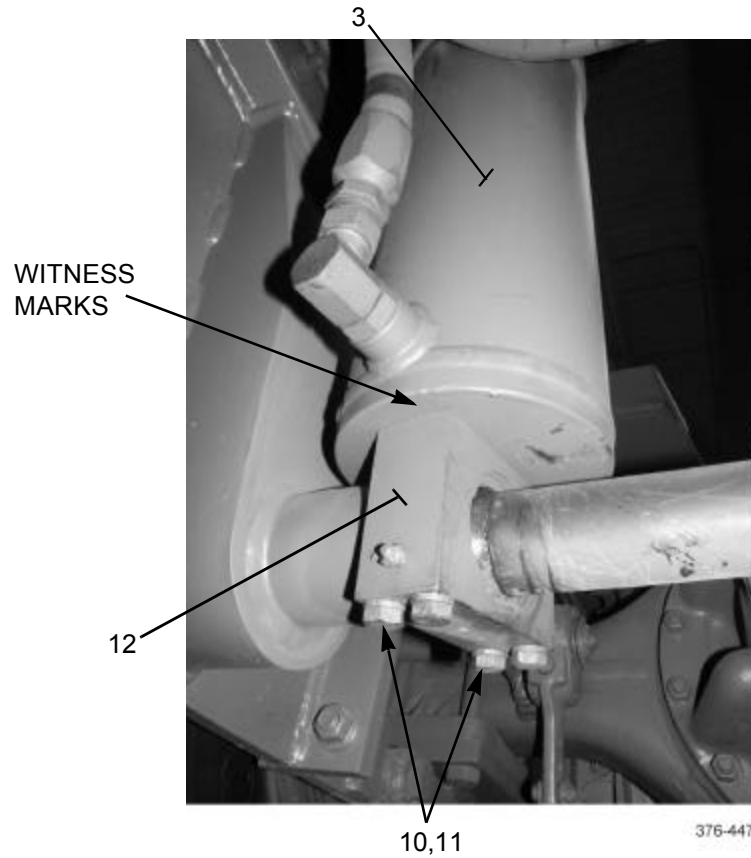




**REMOVAL - CONTINUED****NOTE**

Place a witness mark on cylinder and cylinder base to assist in installation.

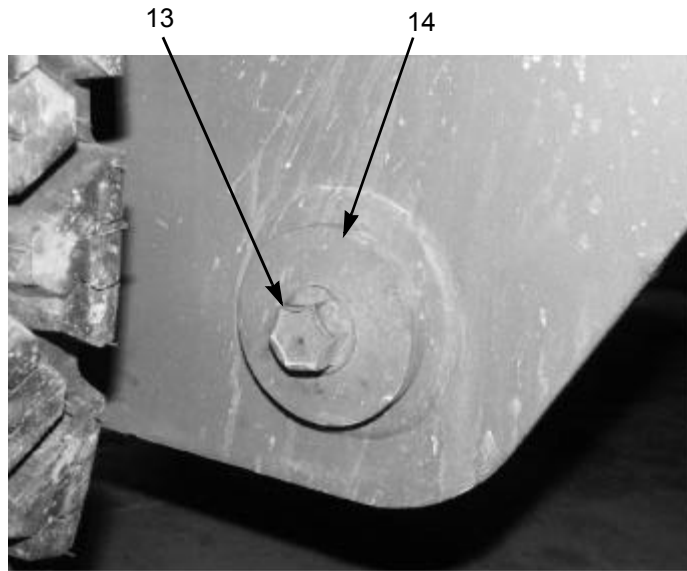
14. Remove four bolts (10), lockwashers (11), and base (12) from large stage end of cylinder (3). Discard lockwashers.
15. Lift cylinder (3) and remove from vehicle. Remove sling from cylinder.



**REMOVAL - CONTINUED****NOTE**

Perform the following steps to remove cylinder base from pivot bar.

16. Remove dual wheels (TM 9-2320-312-10).
17. Remove bolt (13) and spacer (14) on each side of frame.

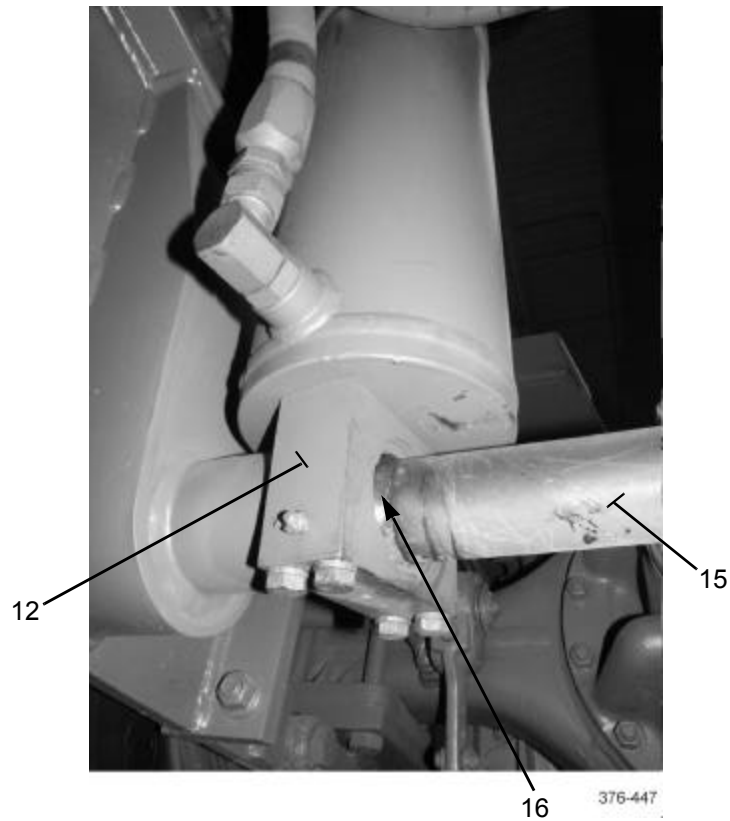


376-445

**REMOVAL - CONTINUED****NOTE**

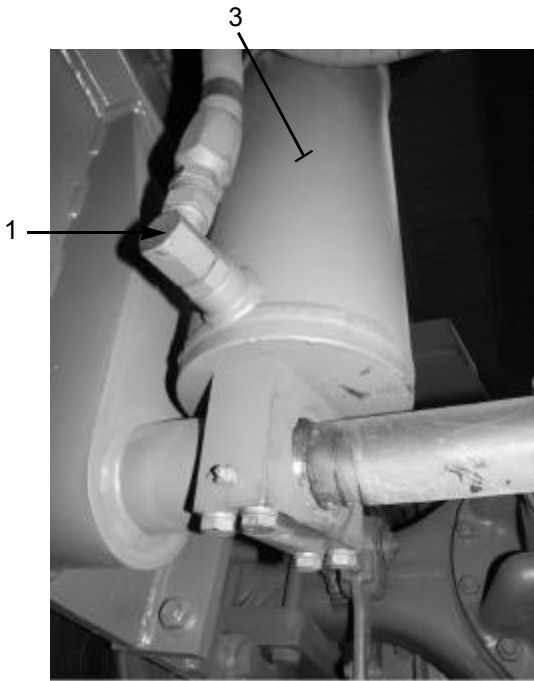
DO NOT withdraw pivot bar more than what is required to clear cylinder being removed.

18. Working from left side of vehicle (to remove right cylinder), use a puller to remove pivot bar (16) toward left side of vehicle. Stop when bar is clear of base (12). Remove base.
19. If damaged, continue to remove pivot bar (16) until spacer (15) and bar are removed from vehicle.

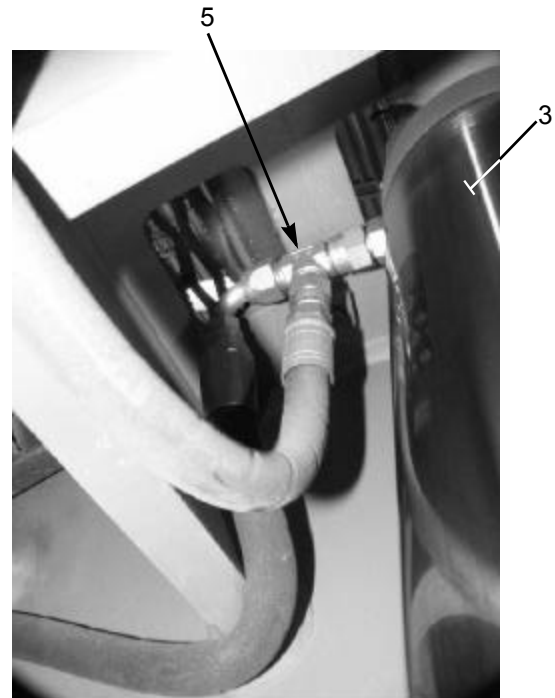


**REMOVAL - CONTINUED**

20. Remove elbow (1) from large stage end of cylinder (3). Remove tee (5) from other end.



376-447



376-448

**CLEANING AND INSPECTION****WARNING**

Dry cleaning solvent MIL-PRF-680 Type III is an environmentally compliant and low toxic material. However, it may be irritating to the eyes and skin. The use of protective gloves and goggles is suggested. Use in well-ventilated areas. Keep away from open flames and other sources of ignition.

1. Use dry cleaning solvent to remove dirt, debris, and grease from all removed components and from cylinder attachment points on vehicle. Ensure bearing surfaces on cylinder are clean and smooth. Dry with a clean rag.
1. Inspect bushing and two bushing retainers in cylinder base for looseness, wear, cracks or other damage. Replace cylinder if damaged.
2. Inspect bearing and two bearing retainers at small-stage end of cylinder for looseness, wear, cracks or other damage. Replace cylinder if damaged.
3. Inspect pivot bar for damage. If damaged, replace bar.
4. Inspect cylinder grease fittings for damage. Replace if damaged.

**INSTALLATION****WARNING**

- DO NOT work under fifth wheel frame sub-assembly unless supported by BOTH overhead lift and wood block under cross bar. Failure to follow this warning may result in serious injury or death to personnel.

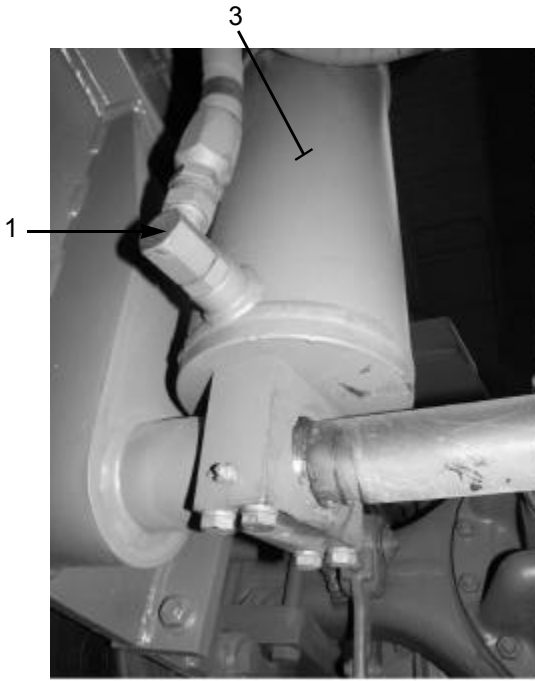
**NOTE**

Ensure new preformed packings, coated with hydraulic fluid, are used on hydraulic fittings prior to installation.

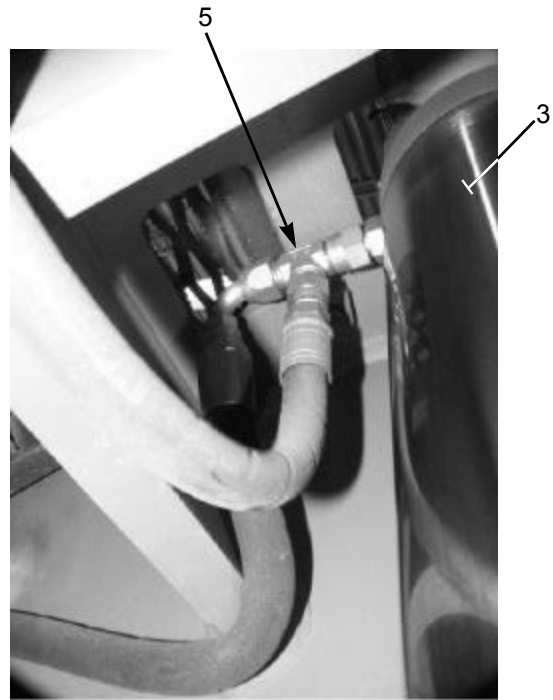
1. If installing a new cylinder, remove all shipping plugs from cylinder.

**INSTALLATION - CONTINUED**

2. Install elbow (1) to large stage end of cylinder (3). Install tee (5) at other end.



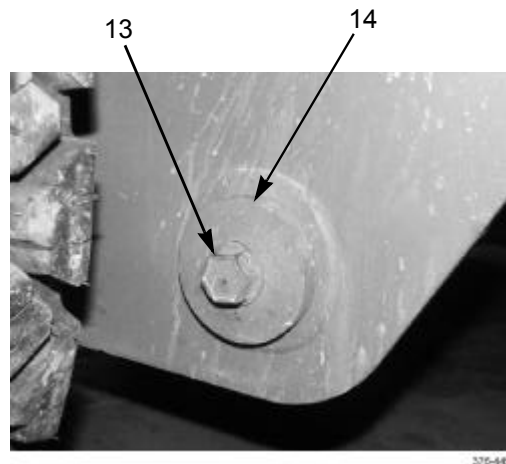
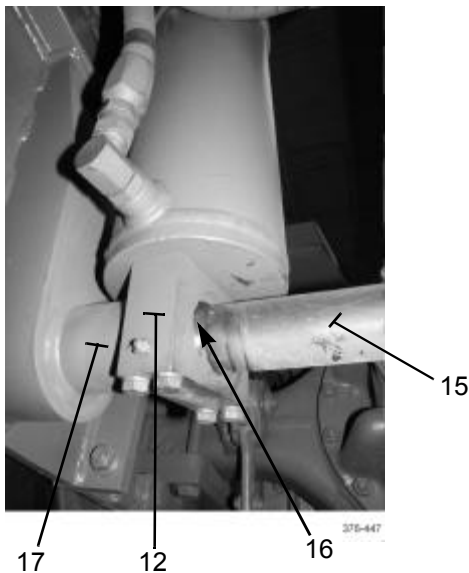
375-447



375-448

**INSTALLATION - CONTINUED****NOTE**

- Ensure spacer (15) is in position on pivot bar.
  - Apply grease to bushing surface of base prior to installation.
3. Working from left side of vehicle (to install right cylinder), use a block of wood and hammer to drive pivot bar (16) inward while positioning cylinder base (12) in line with travel of bar. Continue to drive pivot bar through base and pivot bar tube (17) until fully installed.
  4. Install spacer (14) and bolt (13) on each side of frame.



5. Install dual wheels (TM 9-2320-312-10).

**WARNING**

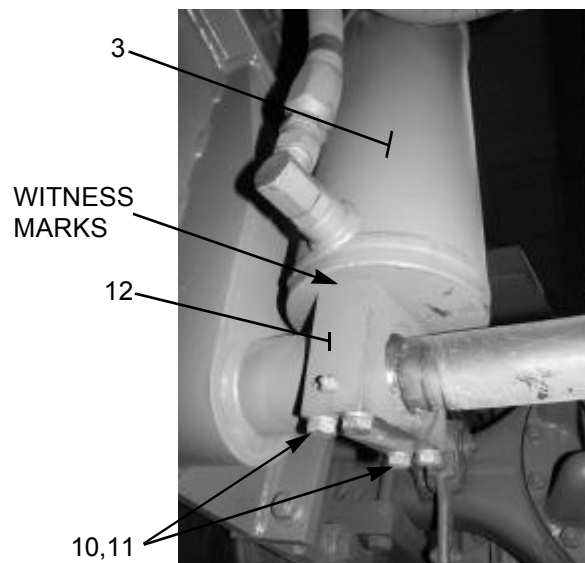
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

6. Attach a sling to cylinder (3) and attach sling to overhead lifting device. Raise overhead lifting device to take up slack in sling and support cylinder.
7. Position cylinder (3) at vehicle. Ensure cylinder is oriented with fittings facing toward front of vehicle.

**INSTALLATION - CONTINUED****WARNING**

DO NOT put hand between base and cylinder when cylinder is being positioned. Failure to follow this warning could cause serious injury.

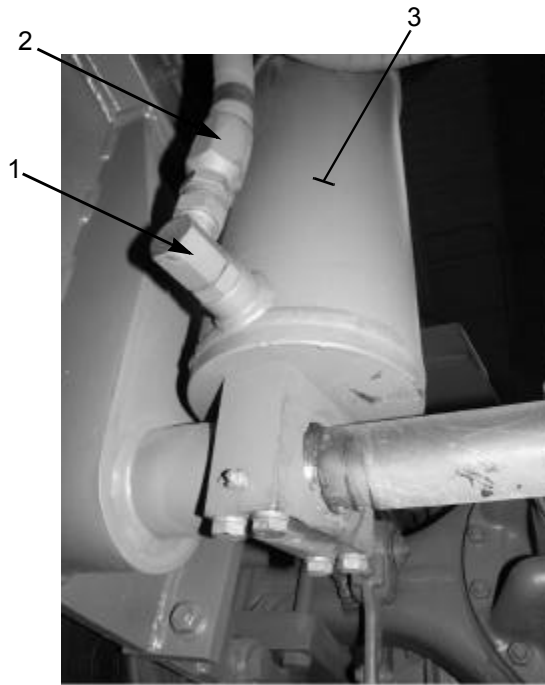
8. Move large stage end of cylinder (3) into position at base (12) and align for installation, using witness marks. When aligned, install four new lockwashers (11) and bolts (12). Do NOT remove support from cylinder.



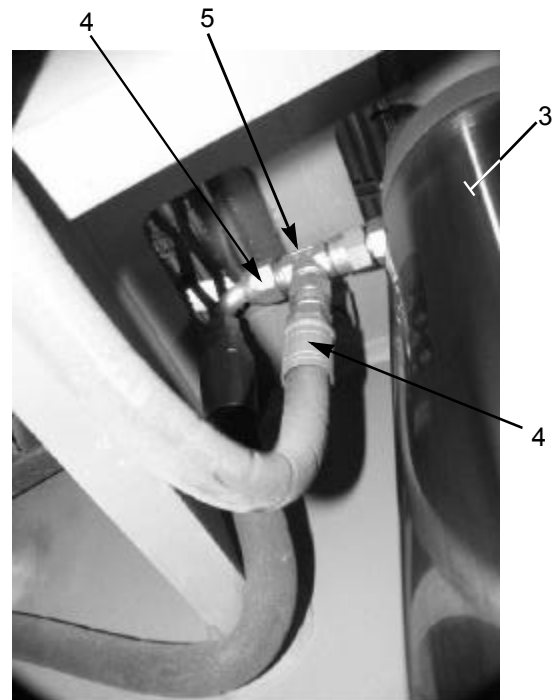


**INSTALLATION - CONTINUED**

9. At large stage end of cylinder (3), connect hydraulic hose (2) to elbow (1).
10. At small stage end of cylinder (3), connect hydraulic hoses (4) to tee (5).



376-447



376-448

11. Fill hydraulic reservoir with hydraulic fluid (WP 0129 00).

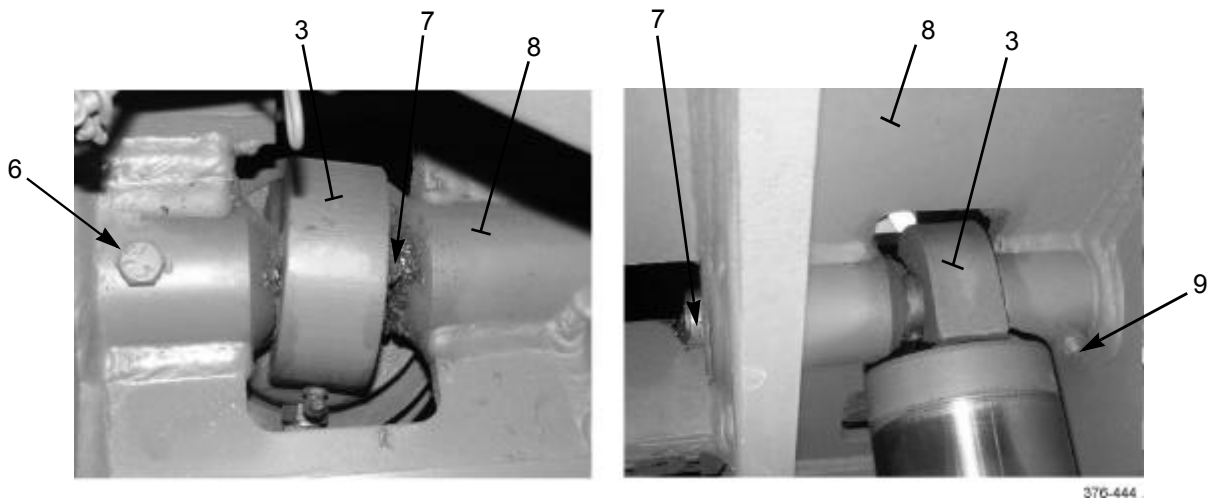
**INSTALLATION - CONTINUED**

12. Have an assistant operate hydraulics to extend cylinder (TM 9-2320-312-10).
13. While continuing to support cylinder (3), move small stage end of cylinder into position at fifth wheel frame sub-assembly (8).
14. Apply a thin coat of grease to pivot pin (7) and to bearing surface at small stage end of cylinder (3).

**NOTE**

Ensure pivot pin is installed so that end with hole is oriented to outside of vehicle.

15. Use a brass drift to install pivot pin (7) through cylinder (3) and fifth wheel frame sub-assembly (8). Install screw (6) and new locknut (9).
16. Remove sling and lifting device from cylinder (3).

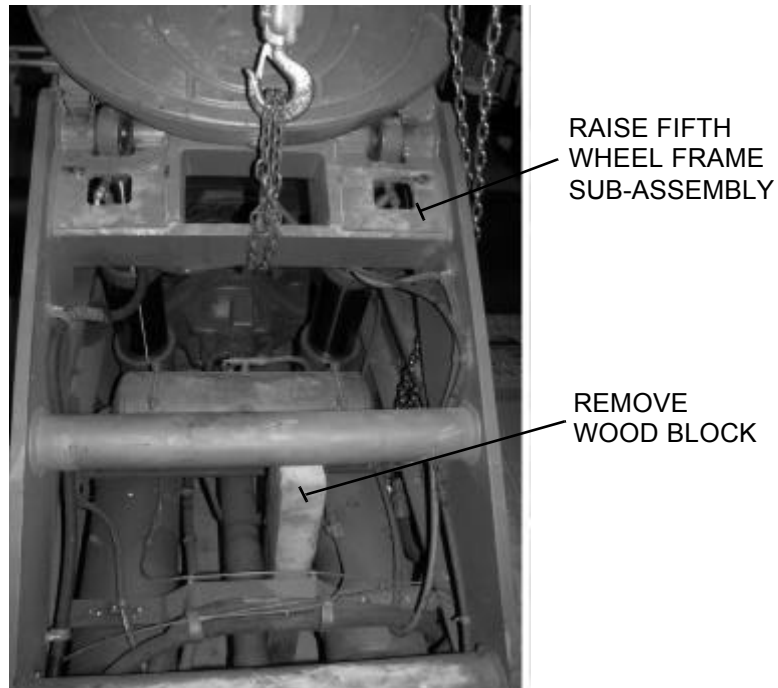
**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in injury or death to personnel.

17. Position overhead lift above fifth wheel and attach lifting chains to frame sub-assembly in front of fifth wheel. Take up slack in chains.

**INSTALLATION - CONTINUED**

18. Use overhead lift to raise fifth wheel frame sub-assembly so that wood block under cross bar can be removed. Remove wood block.
19. Remove chain rigged between fifth wheel frame sub-assembly and lug at top right corner of cab.
20. Fully lower fifth wheel frame sub-assembly. Remove lifting chains and overhead lift.



376-546

21. Raise and lower fifth wheel, and repeat as necessary, to purge air from hydraulic system and achieve proper fluid level on hydraulic reservoir sight gauge (WP 0129 00).
22. Apply GAA grease to cylinder grease fittings.
23. Install rear platform grating (WP 0039 00).

**END OF WORK PACKAGE**

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**ALTERNATOR REPAIR**

**0159 00**

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**THIS WORK PACKAGE COVERS**

Disassembly, Cleaning and Inspection, Assembly

---

**INITIAL SETUP**

**Maintenance Level**

Direct Support

**MAC Reference**

Group 170

**RPSTL Reference**

Group 170, Figure 2

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, field maintenance (Item 27, WP 0166 00)

**Materials/Parts**

Compound, RTV, conformal coating (Item 16, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Nut, lock (P/N N9416)

Nut, lock (P/N N9092)

Nut, lock (P/N N9099) (18)

**References**

TM 9-214

WP 0134 00

**Equipment Condition**

Voltage regulator removed from alternator (WP 0091 00)

Alternator removed from vehicle (WP 0090 00)

---

**DISASSEMBLY****CAUTION**

To prevent damage to alternator components, alternator should be placed in a soft-jawed vise during disassembly.

1. Remove four screws (25), washers (24), and fan guard (28) from end housing (30).
2. Remove locknut (26), washer (27), and fan (29) from core/shaft assembly (18). Discard locknut.
3. Remove locknut (1) and washer (2) from other end of core/shaft assembly (18). Remove pulley (3). Discard locknut.
4. Remove woodruff key (17) and pulley bushing (4) from core/shaft assembly (18).
5. Scribe marks on side of shell (21) and end housing (30) to assist in assembly.
6. Remove nine locknuts (33) and remove end housing (30) from shell (21). Discard locknuts.
7. Remove six screws (23) and rotor (22) from core/shaft assembly (18).
8. Remove four screws (5) and cover plate (6) from front housing (13).

**NOTE**

- Tag phase leads and field coil leads to ensure correct assembly.
  - Note wire routing through slots in front housing, to assist in assembly.
9. Remove six nuts (9), six phase leads (19), six washers (10), and six insulators (11), to disconnect phase leads from diode studs at front housing (13).
  10. Remove two nuts (9), two field coil leads (20), two washers (10), and two insulators (11), to disconnect field coil leads.
  11. Scribe marks on side of shell (21) and front housing (13) to assist in assembly.
  12. Remove nine locknuts (12) and remove front housing (13) with core/shaft assembly (18) from shell (21). Discard locknuts.

**WARNING**

Retaining rings are under tension and can act as projectiles when released, causing severe eye injury. Wear eye protection and use caution when removing retaining rings. Failure to do so may result in injury.

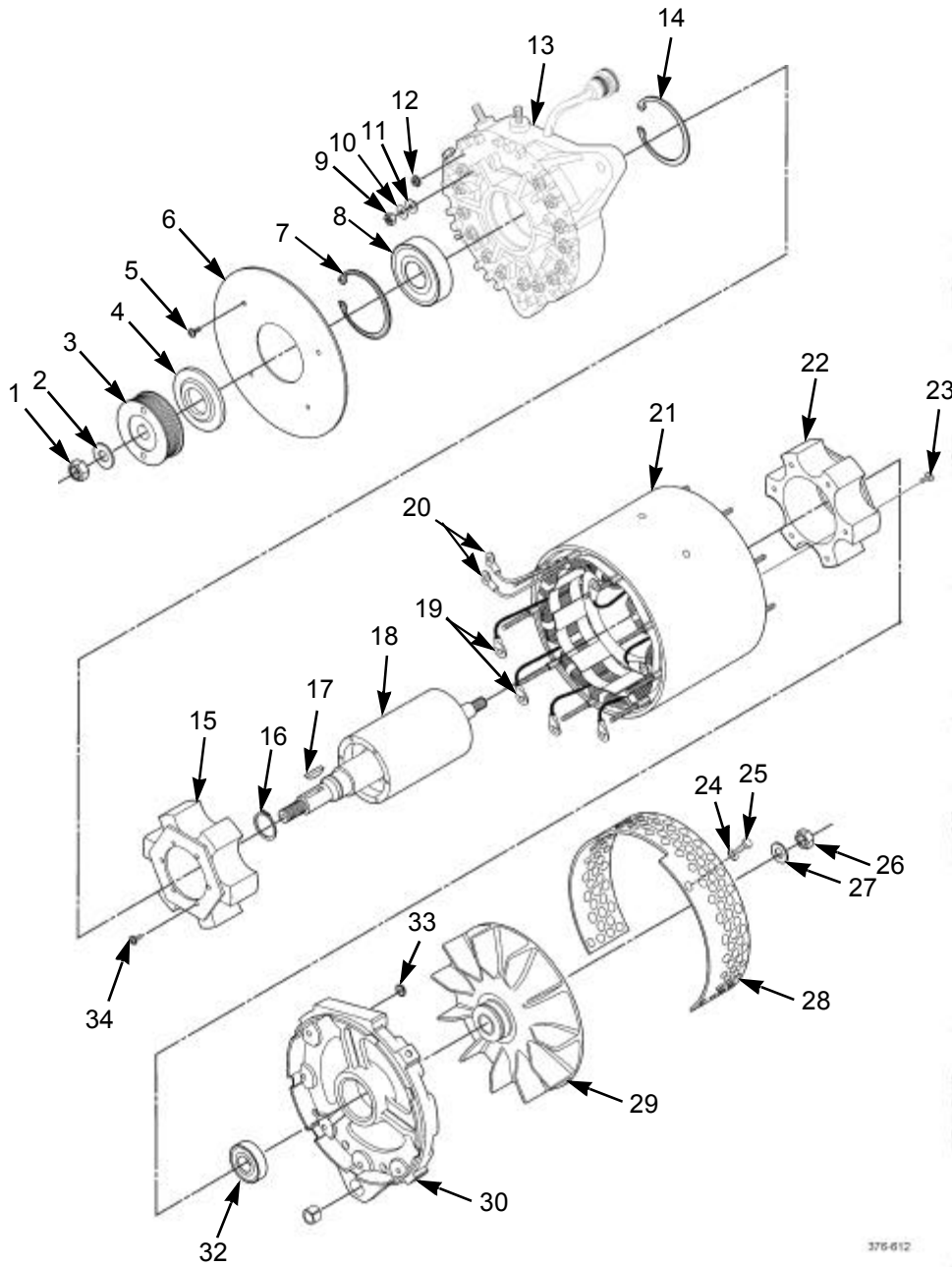
13. Remove small retaining ring (16) and press core/shaft assembly (18) from front housing (13).

**NOTE**

Press bearing from the inside out.

14. Remove inner and outer bearing retaining rings (7 and 14) and press bearing (8) out of front housing (13).
15. Press bearing (32) from core/shaft assembly (18).
16. If required, remove six screws (34) and rotor (15) from core/shaft assembly (18).

DISASSEMBLY - CONTINUED



376-612

**CLEANING AND INSPECTION**

1. Clean and inspect bearings in accordance with TM 9-214.
2. Clean and inspect all other components in accordance with WP 0134 00, *General Maintenance Instructions*.
3. Inspect bushing (31) in end housing (30). If scored or worn, replace bushing.
4. Replace any worn or damaged component.

**ASSEMBLY****WARNING**

- Sealing compound can damage your eyes. Wear eye protection when using. Avoid contact with eyes. If sealant contacts eyes, flush eyes with water and get immediate medical attention. Failure to follow this warning may cause injury.
- Retaining rings are under tension and can act as projectiles when released, causing severe eye injury. Wear eye protection and use caution when installing retaining rings. Failure to do so may result in injury.

**CAUTION**

To prevent damage to alternator components, alternator should be placed in a soft-jawed vise during assembly.

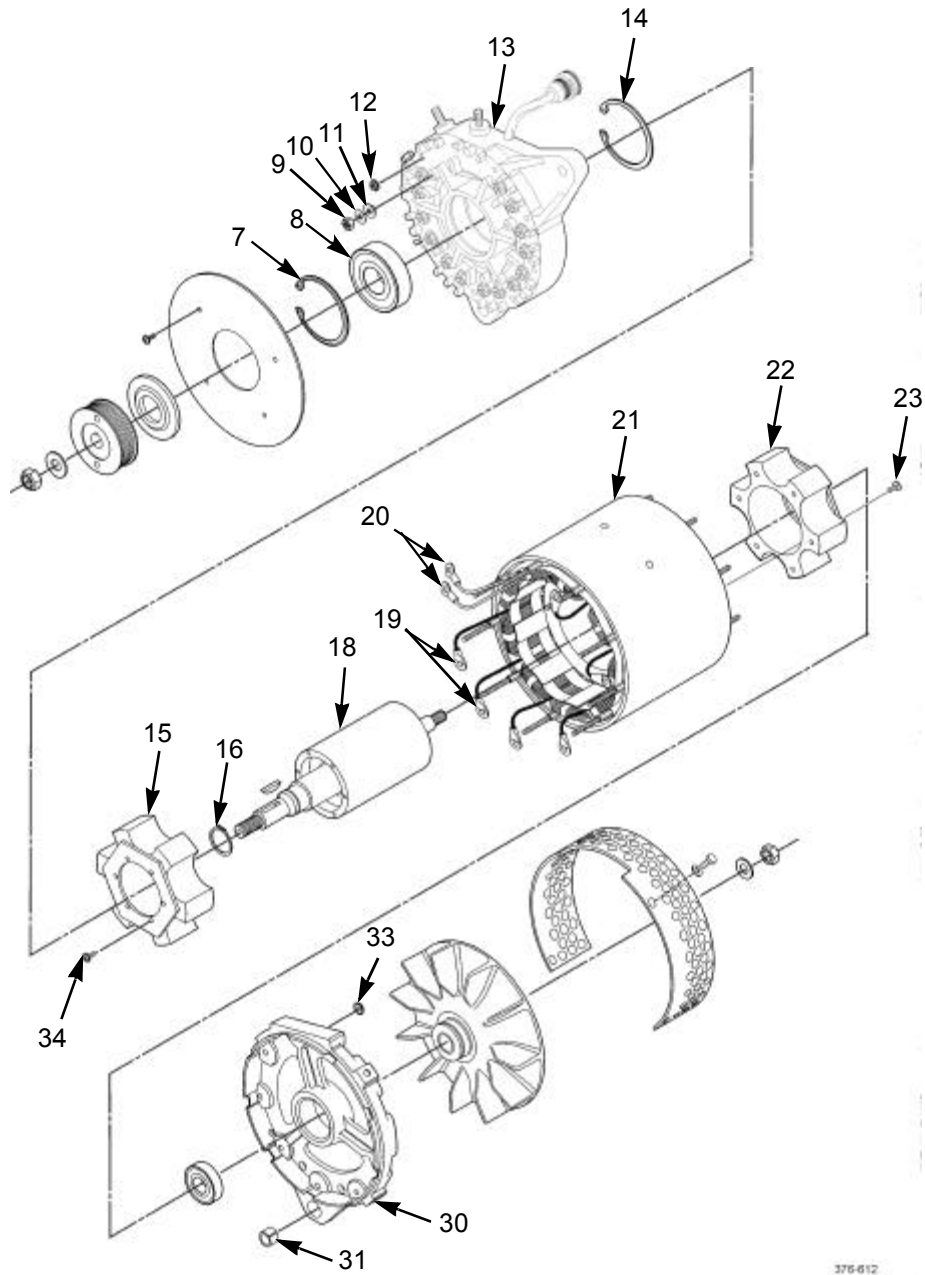
**NOTE**

Use sealing compound on all fasteners except the following: phase and field coil lead hardware, pulley, and fan hardware.

1. Install inner (square) retaining ring (14) in front housing (13).
2. Press bearing (8) into bearing bore in front housing (13). Press **ONLY** on outside race.
3. Install outer (beveled) retaining ring (7) in front housing (13).
4. If removed, install drive end rotor (15) to core/shaft assembly (18) with six screws (34). Tighten screws to 65 lb-in (7.3 Nm).
5. Press on inner race of bearing (8) to install front housing (13) on core/shaft assembly (18).
6. Install small retaining ring (16) on core/shaft assembly (18) in front of bearing (8).
7. Position front housing (13) and core/shaft assembly (18) in shell (21), aligning scribe marks.
8. Thread six phase leads (19) and two field coil leads (20) through appropriate slots in front housing (13). Lower front housing on shell (21), guiding shell studs through front housing.
9. Connect six phase leads (19) to diode studs: Position insulators (11), washers (10), phase leads, and nuts (9) on studs. Tighten nuts to 30 lb-in (3.4 Nm).
10. Connect two field coil leads (20): Position insulators (11), washers (10), field coil leads, and nuts (9). Tighten nuts to 30 lb-in (3.4 Nm).
11. Secure front housing (13) to shell (21) with nine new locknuts (12). Tighten locknuts to 45 lb-in (5.1 Nm).
12. Center rotor (22) and install to core/shaft assembly (18) with six screws (23). Tighten screws to 65 lb-in (7.3 Nm).
13. Position end housing (30) at shell (21), with scribed marks aligned. Secure end housing to shell with nine new locknuts (33). Tighten locknuts to 45 lb-in (5.1 Nm).



ASSEMBLY - CONTINUED

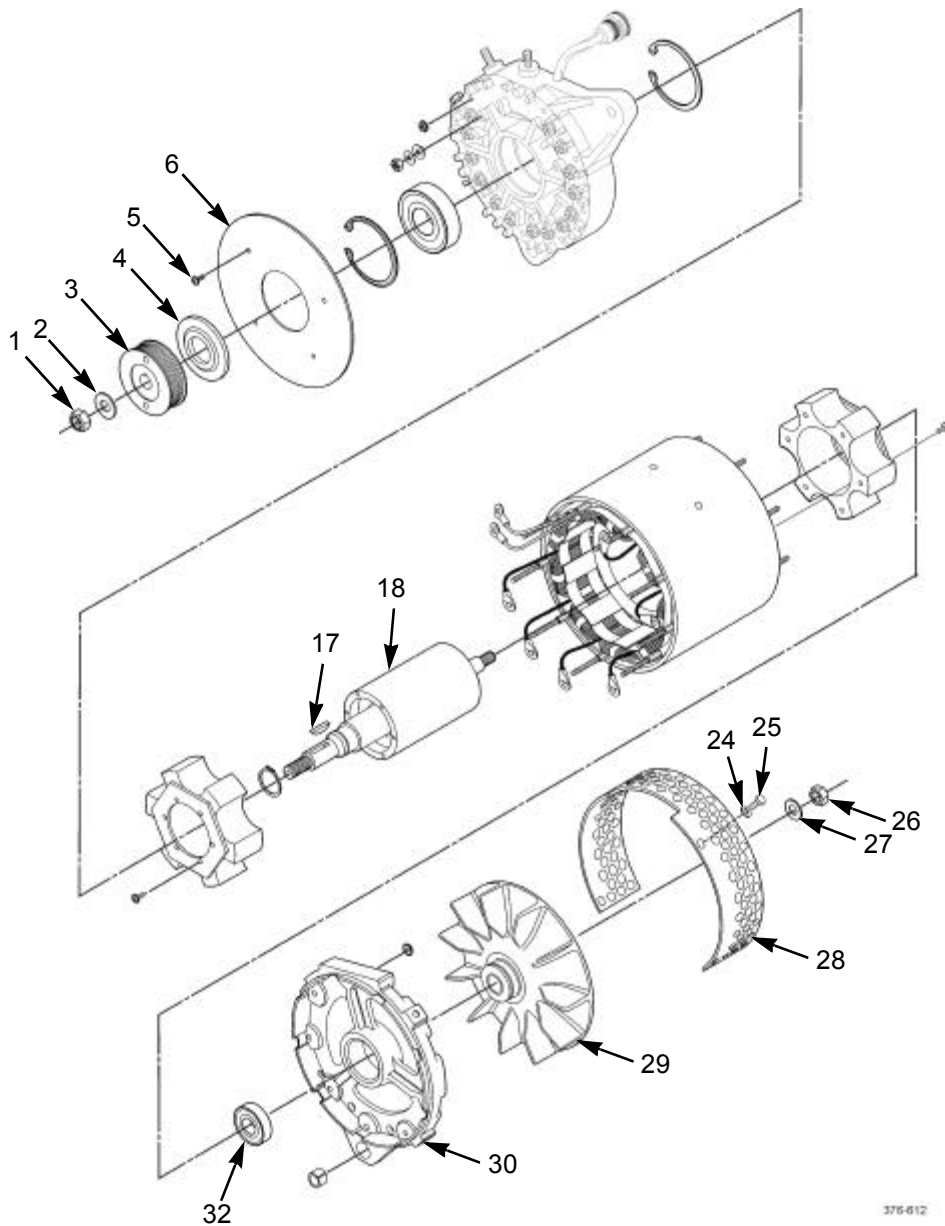


376-612

**ASSEMBLY - CONTINUED**

14. Press on inner race of bearing (32) to install bearing onto core/shaft assembly (18), through bearing bore in end housing (30).
15. Install fan (29) on core/shaft assembly (18) with washer (27) and new locknut (26). Tighten locknut to 50 lb-ft (68 Nm).
16. Install fan guard (28) with four washers (24) and screws (25). Tighten screws to 45 lb-in (5.1 Nm).
17. Coat phase lead diode studs and field coil studs with conformal coating RTV. Allow time to set, in accordance with manufacturer's instructions.
18. Install cover plate (6) with four screws (5). Tighten screws to 30 lb-in (3.4 Nm).
19. Install pulley bushing (4).
20. Install woodruff key (17).
21. Slide pulley (3) on core/shaft assembly (18) and install washer (2) and new locknut (1). Tighten locknut to 120 lb-ft (163 Nm).

ASSEMBLY - CONTINUED



22. Install voltage regulator to alternator (WP 0091 00).
23. Install alternator to vehicle (WP 0090 00).

**END OF WORK PACKAGE**

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**POWER TAKE-OFF (PTO) REPLACEMENT**

---

**0160 00**

**THIS WORK PACKAGE COVERS**

Removal, Installation

---

**INITIAL SETUP**

**Maintenance Level**

Direct Support

**MAC Reference**

Group 180

**RPSTL Reference**

Group 070, Figure 16

Group 180, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, field maintenance (Item 27, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Cleaning compound, solvent, Type III (Item 10, WP 0165 00)

Fluid, hydraulic, petroleum base (Item 25 or 26, WP 0165 00)

Rag, wiping (Item 51, WP 0165 00)

Bolt (P/N DIN933-M10X25-8.8-B3B) (10)

Gasket (P/N 23048037)

**Equipment Condition**

Cab tilted (TM 9-2320-312-10)

Fifth wheel lift hydraulic pump removed (WP 0161 00)

Battery disconnect switch in OFF position

---

**REMOVAL****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

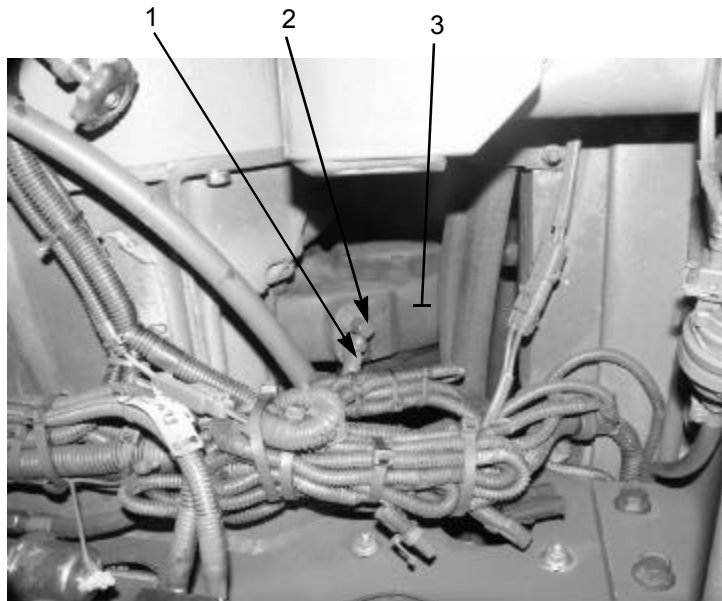
**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

**NOTE**

Use a drain pan to capture hydraulic fluid in hose. Dispose of fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.

1. Disconnect hydraulic hose (1) from elbow (2) at top of PTO (3).



376-326

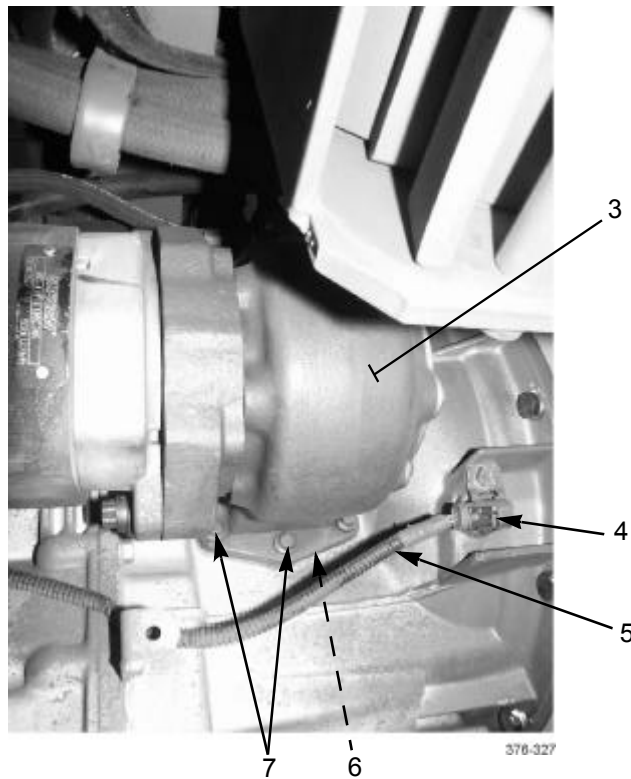
**REMOVAL - CONTINUED**

2. Disconnect electrical lead (5) from fuse holder (4) on right side of transmission bell housing. Move electrical lead out of the way.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support while removing. Failure to follow this warning may result in injury to personnel.

3. Remove ten bolts (7), PTO (3), and gasket (6) from right side of transmission. Discard bolts.



4. Remove elbow (2) from PTO (3).

**INSTALLATION****WARNING**

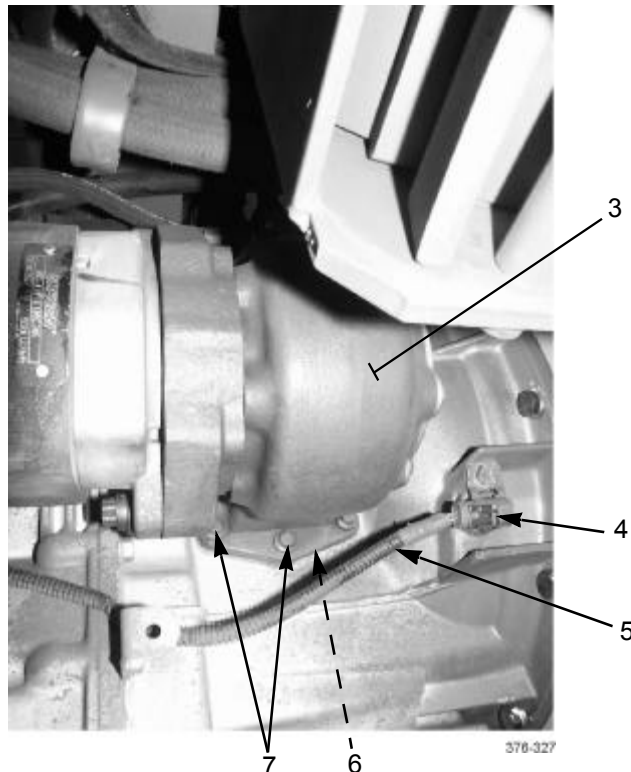
Dry cleaning solvent MIL-PRF-680 Type III is an environmentally compliant and low toxic material. However, it may be irritating to the eyes and skin. The use of protective gloves and goggles is suggested. Use in well-ventilated areas. Keep away from open flames and other sources of ignition.

1. Ensure mounting surfaces of transmission and PTO (3) are clean. Use dry cleaning solvent as needed to remove all traces of old gasket material.
2. Install elbow (2) to PTO (3).

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support while installing. Failure to follow this warning may result in injury to personnel.

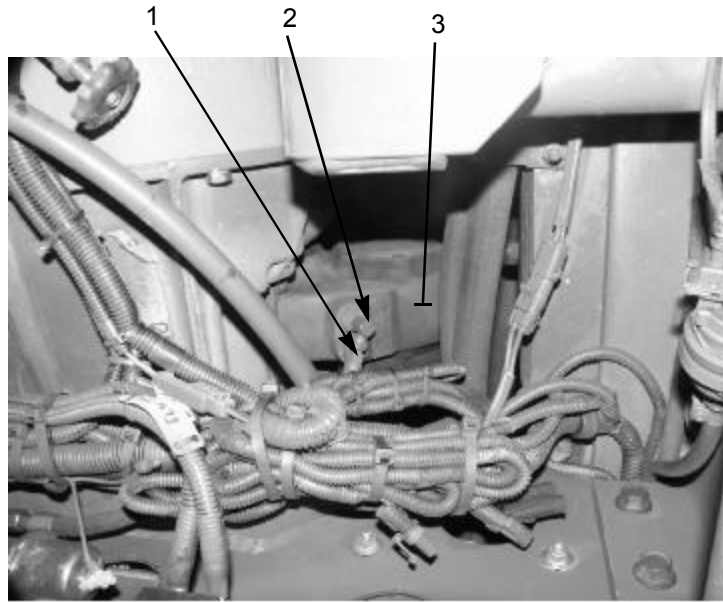
3. Position new gasket (6) and PTO (3) to right side of transmission.
4. Install ten new bolts (7). Tighten bolts to 38-45 lb-ft (51-61 Nm).
5. Connect electrical lead (5) to fuse holder (4).





**INSTALLATION - CONTINUED**

6. Connect hydraulic hose (1) to elbow (2) at top of PTO (3).



376-326

7. Install fifth wheel lift hydraulic pump (WP 0161 00).
8. Place battery disconnect switch in ON position.
9. Lower cab (TM 9-2320-312-10).
10. Start engine and operate fifth wheel lift control (TM 9-2320-312-10). Check for leaks.

**END OF WORK PACKAGE**

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**THIS WORK PACKAGE COVERS**

Removal, Installation

**INITIAL SETUP****Maintenance Level**

Direct Support

**MAC Reference**

Group 180

**RPSTL Reference**

Group 180, Figure 1

**Tools and Special Tools**

Tool kit, general mechanic's (Item 35, WP 0166 00)

Shop equipment, field maintenance (Item 27, WP 0166 00)

**Materials/Parts**

Cap set, protective (Item 6, WP 0165 00)

Fluid, hydraulic, petroleum base (Item 25 or 26, WP 0165 00)

**Materials/Parts - Continued**

Rag, wiping (Item 51, WP 0165 00)

Strap, tiedown (Item 57, WP 0165 00)

Tag, marker (Item 58, WP 0165 00)

Bolt (P/N 025K-0004) (2)

Washer, lock (P/N 361-13) (2)

**References**

WP 0129 00

**Equipment Condition**

Fifth wheel fully lowered (TM 9-2320-312-10)

Engine shut down

**WARNING**

- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
- At operating temperature, hydraulic fluid is hot. Allow hydraulic fluid to cool before disconnecting any hydraulic lines. Failure to do so could result in serious burns.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

**REMOVAL****WARNING**

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.

**CAUTION**

Wipe area clean around all hydraulic connections prior to disconnecting. Cap or plug all openings after disconnecting. Contamination of hydraulic system could result in equipment failure.

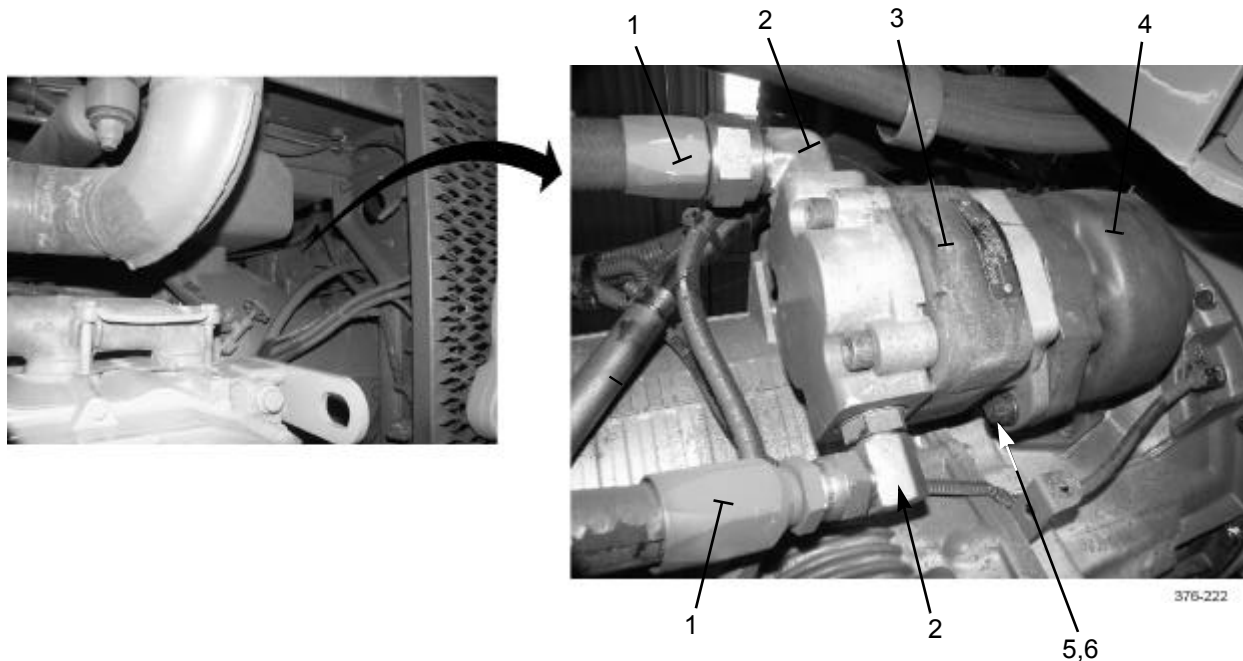
**NOTE**

- Use a drain pan to capture hydraulic fluid in hoses. Dispose of fluid in accordance with local policy and ordinances. Ensure all spills are cleaned up.
  - Tag hydraulic hoses and note position of all fittings to ensure correct installation.
  - Remove and discard tiedown straps as necessary to gain free movement in hydraulic hoses. Use new tiedown straps on installation.
1. Disconnect two hydraulic hoses (1) from two elbows (2) of fifth wheel lift hydraulic pump (3).

**WARNING**

Fifth wheel lift hydraulic pump is heavy. Use caution when handling to avoid injury.

2. Remove two bolts (5), lockwashers (6), and fifth wheel lift hydraulic pump (3) from PTO (4). Discard bolts and lockwashers.
3. Remove two elbows (2) from fifth wheel lift hydraulic pump (3).

**REMOVAL - CONTINUED****INSTALLATION****NOTE**

Ensure new preformed packings, coated with hydraulic fluid, are used on hydraulic fittings prior to installation.

1. Install two elbows (2) to fifth wheel lift hydraulic pump (3).

**WARNING**

Fifth wheel lift hydraulic pump is heavy. Use caution when handling to avoid injury.

2. Install fifth wheel lift hydraulic pump (3) to PTO (4) with two new lockwashers (6) and new bolts (5). Tighten bolts to 105 lb-ft (142 Nm).
3. Connect two hydraulic hoses (1) to two elbows (2).
4. Fill hydraulic reservoir (WP 0129 00).

**END OF WORK PACKAGE**

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## **CHAPTER 5 GENERAL SUPPORT MAINTENANCE**

### **NOTE**

All General Support Maintenance for the M878A2 Yard Tractor is located in the Commercial Service Manuals.

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**CHAPTER 6**  
**SUPPORTING INFORMATION**

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**REFERENCES****0162 00****SCOPE**

This work package lists all forms, field manuals, technical bulletins, technical manuals, and other publications referenced in this manual and which apply to Unit, Direct Support, and General Support Maintenance of the M878A2 Yard Tractor.

**PUBLICATIONS INDEXES**

The following indexes 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
Consolidated Publication of Component Lists . . . . .	EM 0074
Functional User's Manual for the Army Maintenance Management System . . . . .	DA Pam 738-750

**FORMS**

Refer to DA Pam 738-750, *The Army Maintenance Management System (TAMMS)*, for instructions on the use of maintenance forms.

Equipment Inspection and Maintenance Worksheet . . . . .	DA Form 2404, DA Form 5988-E
Equipment Log Assembly (Records) . . . . .	DA Form 2408
Maintenance Request Form . . . . .	DA Form 5990-E
Preventive Maintenance Schedule and Record . . . . .	DA Form 5986-E
Processing and Deprocessing Record for Shipment, Storage and Issue of Vehicles and Spare Engines . . . . .	DD Form 1397
Product Quality Deficiency Report . . . . .	SF Form 368
Recommended Changes to Equipment Technical Publications . . . . .	DA Form 2028-2
Recommended Changes to Publications and Blank Forms . . . . .	DA Form 2028
Report of Discrepancy (ROD) . . . . .	SF Form 364
Request for AOAP . . . . .	DD Form 2026, DA Form 5991-E

**FIELD MANUALS**

Basic Cold Weather Manual . . . . .	FM 31-70
First Aid for Soldiers . . . . .	FM 21-11
Northern Operations . . . . .	FM 31-71
Operation and Maintenance of Ordnance Material in Extreme Cold Weather (0°F to -65°F) . . . . .	FM 9-207

**TECHNICAL BULLETINS AND SUPPLY BULLETINS**

Color, Marking, and Camouflage Painting of Military Vehicles, Construction Equipment, and Materials Handling Equipment . . . . .	TB 43-0209
Solder and Soldering . . . . .	TB SIG 222
Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling Systems . . . . .	TB 750-651
Warranty Bulletin for M878A2 Yard Tractor . . . . .	TB 9-2320-312-14

**TECHNICAL MANUALS**

Chemical, Biological, Radiological, and Nuclear Defense . . . . .	TM 3-220
Cooling Systems: Tactical Vehicles . . . . .	TM 750-254
Inspection, Care, and Maintenance of Antifriction Bearings . . . . .	TM 9-214

**REFERENCES - CONTINUED**

**0162 00**

**TECHNICAL MANUALS - CONTINUED**

Joint Oil Analysis Program Laboratory Manual Vol. I, Introduction, Theory, Benefits,  
 Customer Sampling Procedures, Programs and Reports (TD 33-1-37-1; NAVAIR 17-15-50.1) . . . . . TM 38-301-1

Materials Used for Cleaning, Preserving, Abrading and Cementing Ordnance  
 Materiel and Related Materials, Including Chemicals . . . . . TM 9-247

Operator's Manual for M878A2 Yard Tractor . . . . . TM 9-2320-312-10

Operator's Manual for Welding Theory and Application . . . . . TM 9-237

Operator's, Organizational, Direct Support, and General Support Maintenance  
 Manual for Lead-Acid Storage Batteries . . . . . TM 9-6140-200-14

Operator's, Unit, Direct Support and General Maintenance Manual for  
 Care, Maintenance, Repair and Inspection of Pneumatic Tires and Inner Tubes . . . . . TM 9-2610-200-14

Painting Instruction for Field Use . . . . . TM 43-0139

Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use. . . . . TM 750-244-6

Repair Parts and Special Tools Lists for M878A2 Yard Tractor. . . . . TM 9-2320-312-24P

**OTHER PUBLICATIONS**

Abbreviations and Acronyms . . . . . ASME Y1438-1999

Army Medical Department Expendable/Durable Items . . . . . CTA 8-100

Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items) . . . . . CTA 50-970

Maintenance of Supplies and Equipment Army Modification Program. . . . . AR 750-10

**END OF WORK PACKAGE**

**THE ARMY MAINTENANCE SYSTEM MAC**

1. This introduction provides a general explanation of all maintenance and repair functions authorized at the various maintenance levels under the standard Army Maintenance System concept.
2. The MAC immediately following the introduction 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 shall be consistent with the capacities and capabilities of the designated maintenance levels, which are shown in the MAC (WP 0164 00) in column (4) as:
  - Unit - includes two subcolumns, C (Operator/Crew) and O (Organizational) Maintenance
  - Direct Support - includes an F subcolumn
  - General Support - includes an H subcolumn
  - Depot - includes a D subcolumn
3. The tools and test equipment requirements (immediately following the MAC) list the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from the MAC.
4. The remarks (immediately following the tools and test equipment requirements) contain supplemental instructions and explanatory notes for a particular maintenance function.

**MAINTENANCE FUNCTIONS**

Maintenance functions are limited to and defined as follows:

1. **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).
2. **Test.** To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis, i.e., load testing of lift devices and hydrostatic testing of pressure hoses.
3. **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, chemical fluids, or gases.
4. **Adjust.** To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.
5. **Align.** To adjust specified variable elements of an item to bring about optimum or desired performance.
6. **Calibrate.** To determine and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons 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.
7. **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.
8. **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 third position code of the Source, Maintenance and Recoverability (SMR) code.
9. **Repair.** The application of maintenance services, including fault location/troubleshooting, removal/installation, 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.

**MAINTENANCE FUNCTIONS - CONTINUED****NOTE**

The following definitions are applicable to the "repair" maintenance function:

- Services - Inspect, test, service, adjust, align, calibrate, and/or replace.
  - Fault location/troubleshooting - The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or Unit Under Test (UUT).
  - Disassembly/assembly - The step-by-step breakdown (taking apart) of a spare/functional group coded item and 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).
  - Actions - Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.
10. **Overhaul.** That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.
11. **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 materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

**EXPLANATION OF COLUMNS IN THE MAC, TABLE 1**

1. **Column (1) - Group Number.** Column (1) lists Group numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).
2. **Column (2) - Component/Assembly.** Column (2) contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.
3. **Column (3) - Maintenance Function.** Column (3) lists the functions to be performed on the item listed in Column (2). (For a detailed explanation of these functions refer to "Maintenance Functions" outlined above).
4. **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 as manhours 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 varies 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. 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 MAC. The symbol designations for the various maintenance levels are as follows:

C . . . . Operator or Crew Maintenance  
 O . . . . Organizational Maintenance  
 F . . . . Direct Support Maintenance  
 L . . . . Specialized Repair Activity (SRA)  
 H . . . . General Support Maintenance  
 D . . . . Depot Maintenance

**EXPLANATION OF COLUMNS IN THE MAC, TABLE 1 - CONTINUED****NOTE**

The "L" maintenance level is not included in column (4) of the MAC. Functions to this level of maintenance are identified by a work time figure in the "H" column of column (4), and an associated reference code is used in the REMARKS CODE column (6). This code is keyed to the remarks and the SRA complete repair application is explained there.

5. **Column (5) - Tools and Equipment Reference Code.** Column (5) specifies, by code, those common tool sets (not individual tools), common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE, and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.
6. **Column (6) - Remarks Code.** When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks table entries (Table 3).

**EXPLANATION OF COLUMNS IN THE TOOLS AND TEST EQUIPMENT REQUIREMENTS, TABLE 2**

1. **Column (1) - Tool or Test Equipment Reference Code.** The tool and test equipment reference code correlates with a code used in column (5) of the MAC.
2. **Column (2) - Maintenance Level.** The lowest level of maintenance authorized to use the tool or test equipment.
3. **Column (3) - Nomenclature.** Name or identification of the tool or test equipment.
4. **Column (4) - National Stock Number (NSN).** The NSN of the tool or test equipment.
5. **Column (5) - Tool Number.** The manufacturer's part number, model number, or type number.

**EXPLANATION OF COLUMNS IN THE REMARKS, TABLE 3**

1. **Column (1) - Remarks Code.** The code recorded in column (6) of the MAC.
2. **Column (2) - Remarks.** This column lists information pertinent to the maintenance function being performed as indicated in the MAC.

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Table 1. MAC for the M878A2 Yard Tractor.

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
020	ENGINE Engine Assembly	Inspect	0.5						A
		Test		1.5	2.0			1,4,5,18,21,30, 31,32	
	Service Replace		2.0					28	
		Repair	4.0	4.0	36.0	95.5		22,27,35	
	Engine Mounts	Inspect	0.2						
		Replace			2.0			27,35	
	Transmission Mount	Replace			2.0			27,35	
	Cylinder Block	Repair				30.0		2,27,35	
	Cylinder Head Assembly	Replace			2.0			27,35	
		Repair			8.0			17,24,35	
	Crankshaft	Replace				8.0		11,12,27,35	
	Main Seals	Replace			8.0			27,35	
	Vibration Damper	Inspect	0.2						
		Replace			2.0			27,35	
	Flywheel	Replace			8.0			27,35	
	Flywheel Housing	Replace			8.0			27,35	
	Pistons, Pins, and Rings	Replace				8.0		27,35	
	Connecting Rods and Bearings	Replace				8.0		27,35	
	Rocker Arm Assemblies	Inspect			1.0				
		Replace			4.0			27,35	
	Rocker Arm Cover	Inspect	0.2						
		Replace		1.0				35	
	Camshaft Assembly	Replace				8.0		27,35	
Camshaft Drive Gear	Replace				4.0		27,35		
Cam Follower	Replace				8.0		27,35		
Valves	Adjust			2.0			27,35		
Engine Breather	Service		0.5				28,35		

Table 1. MAC for the M878A2 Yard Tractor- Continued.

(1)  GROUP NUMBER	(2)  COMPONENT/ ASSEMBLY	(3)  MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5)  TOOLS AND EQUIPMENT	(6)  REMARKS			
			UNIT		DS	GS	DEPOT					
			C	O	F	H	D					
020 (Con't)	Oil Pan	Inspect Replace		0.2						27,35		
	Oil Filter	Inspect Replace	0.1	0.5						28,35		
	Oil Filter Head	Replace		1.0						28,35		
	Oil Pump Assembly	Replace					4.0				27,35	
		Repair					2.0				27,35	
	Oil Hoses, Tubes, and Fittings	Inspect		0.2								
		Replace		2.0							28,35	
	Oil Dipstick Tube	Replace		0.5							35	
	Exhaust Manifold	Replace				3.0					27,35	
	Intake Manifold	Replace				3.0					27,35	
	Front Cover	Replace				4.0					27,35	
	Idler/Drive Gears	Replace					4.0				27,35	
	Fuel Injectors	Test				0.3					27	
		Replace				1.0					15,16,23,27,35	
	Unit Injector	Replace		1.0							3,6,7,35,36	
	Hydraulic Pump											
	Air Cleaner Assembly	Service		0.2								
		Replace			0.5						35	
	Turbocharger	Replace				1.0					27,35	
	Charge Air Cooling Lines	Inspect			0.1							
		Replace			0.5						28,35	
	Fuel Priming Pump Assembly/Secondary	Service			0.5						28	
		Replace			1.0						28,35	
	Fuel Filter											
	Throttle Position Sensor (Accelerator Pedal)	Replace			0.5						35	
	Water Temperature Regulator	Replace			1.0						28,35	
	Water Pump	Replace			2.5						28,35	
Repair						1.0				13,27,35		
Fan and Fan Clutch	Replace					9.5				27,35		
	Repair					2.0				27,35		
Drive Belt, Serpentine	Inspect		0.2	0.2								
	Replace			1.0						35		

Table 1. MAC for the M878A2 Yard Tractor- Continued.

(1)  GROUP NUMBER	(2)  COMPONENT/ ASSEMBLY	(3)  MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5)  TOOLS AND EQUIPMENT	(6)  REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
<b>020</b> <b>(Con't)</b>	Belt Tensioner	Replace		1.0				35	
	Power Steering Pump	Inspect	0.2	0.2					
		Replace			1.5			27,35	
	Air Compressor	Inspect		0.2					
		Replace		2.0				28,35	
Repair				4.0			27,35		
Engine Harnesses	Replace		1.0				35		
	Repair		1.0				19,26,28,35		
<b>040</b>	<b>FUEL</b>								
Fuel Filter/Water Separator	Inspect		0.1						
	Service		0.2	0.5			28,35		
	Replace			1.0			28,35		
Fuel Tank	Inspect		0.1	0.2					
	Replace			2.0			28,35		
Fuel Level Sending Unit	Replace			0.5			35		
Fuel Lines and Fittings	Inspect			0.2					
	Replace			1.0			28,35		
<b>050</b>	<b>EXHAUST</b>								
Muffler, Exhaust Pipe, Clamps, and Shields	Inspect		0.2	0.2					
	Replace			2.0			35		
<b>060</b>	<b>COOLING</b>								
Coolant Filter and Head	Service			0.3			28		
	Replace			0.5			28,35		
Radiator Assembly	Inspect		0.2	0.2					
	Service			1.0			28,35		
	Replace				8.0		27,35		
	Repair				4.0		27	A	
Air Recirculation Shield Assembly	Replace			1.0			35		
Fan Shroud	Replace			2.0			35		
Radiator Hoses	Replace			0.5			35		
Charge Air Cooler	Replace				8.0		27,35		

Table 1. MAC for the M878A2 Yard Tractor- Continued.

(1) <b>GROUP NUMBER</b>	(2) <b>COMPONENT/ ASSEMBLY</b>	(3) <b>MAINTENANCE FUNCTION</b>	(4) <b>MAINTENANCE LEVEL</b>					(5) <b>TOOLS AND EQUIPMENT</b>	(6) <b>REMARKS</b>
			<b>UNIT</b>		<b>DS</b>	<b>GS</b>	<b>DEPOT</b>		
			<b>C</b>	<b>O</b>	<b>F</b>	<b>H</b>	<b>D</b>		
<b>070</b>	<b>TRANSMISSION</b>								
	Range Selector Lever	Replace		1.0				35	
	Torque Converter	Replace			16.0			22,27,35	
	Transmission Assembly	Inspect	0.5	0.5					
		Test		1.0				1,4,18,21	
		Service	0.5	1.0				28,35	
		Replace			16.0			22,27,35	
		Repair				24.0		9,10,14,27,35	
	Oil Filters	Replace		1.5				28,35	
	Oil Cooler Hoses	Replace		3.5				28,35	
	Dipstick and Fill Tube	Replace		0.1				35	
	Transmission Harnesses	Replace		2.0				35	
		Repair		2.0				28,35	
	Fifth Wheel Lift Control	Replace		1.0				35	
	Fifth Wheel Lift Control Cable	Replace		3.0				35	
<b>080</b>	<b>FRONT AXLE</b>								
	Front Axle Assembly	Inspect	0.2	0.2					
		Service		2.0				28,35	
		Align		1.0				28,35	
		Replace			4.0			27,35	
	Steering Knuckle	Service		0.2				28	
		Replace			1.0			27,35	
		Repair			1.0			27,35	
	Tie Rod	Service		0.2				28	
		Align		0.3				28,35	
		Replace		1.5				28,35	
		Repair		1.0				28,35	
	Front Axle Service Brakes	Inspect		0.5					
		Replace		3.0				28,35	
		Repair		4.0				28,35	
S-Cam Camshafts	Service		0.2				28		
	Replace		1.0				35		
Slack Adjusters	Inspect		0.2						
	Service		0.2				28		
	Adjust		0.3				35		
	Replace		0.5				35		

Table 1. MAC for the M878A2 Yard Tractor- Continued.

(1) <b>GROUP NUMBER</b>	(2) <b>COMPONENT/ ASSEMBLY</b>	(3) <b>MAINTENANCE FUNCTION</b>	(4) <b>MAINTENANCE LEVEL</b>					(5) <b>TOOLS AND EQUIPMENT</b>	(6) <b>REMARKS</b>
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
<b>080 (Con't)</b>	Front Airbrake Chambers	Inspect Replace	0.2	0.2 0.6				28,35	D
	Front Hub, Bearings, and Drum	Adjust		0.5				28,35	
		Replace		0.5				28,35	
		Repair		0.5	1.0			27,35	
	Springs	Inspect	0.1	0.2					
		Replace			2.0			27,35	
Shock Absorbers	Inspect		0.2						
	Replace		1.0				28,35		
<b>090</b>	<b>REAR AXLE</b>								
Rear Axle Assembly	Inspect	0.2	0.5						
	Replace			8.0			27,35		
Rear Differential	Inspect	0.1							
	Service		0.5				28,35		
	Replace				4.0		27,35		
Rear Axle Services Brakes	Repair				10.0		27,35		
	Inspect		0.5						
	Replace		3.0				28,35		
S-Cam Camshafts	Repair		4.0				28,35		
	Service		0.2				28		
	Replace		1.0				35		
Slack Adjusters	Inspect		0.2						
	Service		0.2				28		
	Adjust		0.3				35		
	Replace		0.5				35		
Rear Airbrake Chambers	Inspect	0.2	0.2						
	Replace		0.6				28,35		
Rear Hub, Bearings, and Drum	Inspect	0.2	1.0						
	Service	0.3	1.0				28,35		
	Adjust		1.0				28,35		
	Replace		1.0				28,35		
	Repair		1.0	1.0					

Table 1. MAC for the M878A2 Yard Tractor- Continued.

(1) <b>GROUP NUMBER</b>	(2) <b>COMPONENT/ ASSEMBLY</b>	(3) <b>MAINTENANCE FUNCTION</b>	(4) <b>MAINTENANCE LEVEL</b>					(5) <b>TOOLS AND EQUIPMENT</b>	(6) <b>REMARKS</b>
			<b>UNIT</b>		<b>DS</b>	<b>GS</b>	<b>DEPOT</b>		
			<b>C</b>	<b>O</b>	<b>F</b>	<b>H</b>	<b>D</b>		
<b>110</b>	<b>STEERING</b> Power Steering Gear Assembly	Inspect	0.2	0.2					
		Replace			1.5			27,35	
		Repair			2.5			27,35	
	Pitman Arm	Replace			2.0			27	
		Drag Link	Service		0.2			28	
	Adjust				1.0			27,35	
	Replace				1.5			27,35	
	Steering Wheel	Replace		0.5			28,35		
	Steering Column Assembly	Inspect		0.2					
		Service		0.2				28	
		Replace		2.0				28,35	
Power Steering Hoses and Fittings	Inspect	0.2	0.2						
	Replace		0.5				28,35		
<b>115</b>	<b>FRAME</b> Frame Components Rear Platform Front Bumper Cab Steps	Inspect	0.3	0.3					
		Replace		0.5				35	
		Replace		1.5				28,35	
				1.0				35	
<b>120</b>	<b>PROPSHAFT</b> Propshaft Universal Joints	Inspect	0.2	0.2					
		Replace		1.5				35	
		Inspect		0.2					
		Service		0.3				28	
	Replace		1.0				28,35		
<b>140</b>	<b>CAB AND SHEET METAL</b> Cab Rear Cushion Mount, Right Side Cab Doors	Inspect	0.2	0.2					
		Replace		1.0				28,35	
		Replace		1.0				35	
		Repair		1.0				35	

Table 1. MAC for the M878A2 Yard Tractor- Continued.

(1)  GROUP NUMBER	(2)  COMPONENT/ ASSEMBLY	(3)  MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5)  TOOLS AND EQUIPMENT	(6)  REMARKS	
			UNIT		DS	GS	DEPOT			
			C	O	F	H	D			
<b>140 (Con't)</b>	Cab Front Access	Replace		0.5				35		
	Panels and Access Doors	Repair		0.3				35		
	Side Vent	Replace		0.3				35		
	Windshield and Window Glass	Replace			1.5			35		
	Grabhandles	Replace		0.2				35		
	Fenders	Replace		0.5				35		
	Mudflaps	Replace		0.5				35		
	Seat Assembly	Inspect		0.2						
		Replace			0.5				35	
		Repair			1.5				35	
	Seat Belt Assembly	Inspect		0.2						
		Replace			0.5				35	
	Mirrors	Inspect		0.2						
		Adjust		0.2						
		Replace			0.2				35	
	Heater/Air Conditioning Unit	Replace			4.0			27,35		
	Heater Hoses and Ducts	Replace		0.5				28,35		
	Heater/AC Controls	Replace		0.3				35		
	Air Conditioning System	Inspect		0.5	0.5					
		Test			2.0				20	
		Service				2.0			25,35	
	AC Thermostatic Switch	Replace		1.0				35		
	AC Compressor	Replace			3.0			35		
	AC Valves and Lines	Replace			3.5			27,35		
	Condenser	Replace			2.5			35		
	Receiver-Drier	Replace			3.0			35		
	AC System Hoses	Replace			1.5			35		
Auxiliary Arctic Heater	Inspect		0.2	0.2					E	
Windshield Wiper and Motor	Replace			0.5			35			

Table 1. MAC for the M878A2 Yard Tractor- Continued.

(1)  GROUP NUMBER	(2)  COMPONENT/ ASSEMBLY	(3)  MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5)  TOOLS AND EQUIPMENT	(6)  REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
140 (Con't)	Windshield Washer Reservoir, Pump Unit, and Hoses	Service Replace	0.2	0.5				35	
	<b>150 AIR PIPING AND BRAKE</b>								
	Air Dryer	Service Replace Repair		0.2 1.0 0.5				28 35 35	
	Air Lines, Valves, and Fittings	Inspect Replace	0.2	0.2 0.5				35	
	Front and Rear Gladhands	Replace		0.5				35	
	Dummy Coupling	Inspect Replace Repair							
	Air Reservoirs	Inspect Service Replace	0.2 0.2	0.2 1.0				35	
	Treadle Valve	Replace		1.0				35	
	Brake Light Switches	Replace		0.2				35	
	Intervehicular Air Hoses	Replace Repair		0.5 0.5				35 35	
	Air Pressure Gauges	Inspect Replace	0.2	0.5				35	
160	<b>MISCELLANEOUS</b>								
	Wheel Assembly	Inspect Replace	0.2	0.2 1.0				28	
	Tires	Inspect Service Replace	0.2 0.3	0.2 1.0				28	F
	Brake Pedals with Interconnecting Arm	Replace		1.0				35	
	Ether Cold Start System	Repair		1.0				35	
	Pintle Hook	Inspect Service Replace	0.2	0.2 0.3				28 28,35	



Table 1. MAC for the M878A2 Yard Tractor- Continued.

(1)  GROUP NUMBER	(2)  COMPONENT/ ASSEMBLY	(3)  MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5)  TOOLS AND EQUIPMENT	(6)  REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
<b>160</b> <b>(Con't)</b>	Decals and Data Plates	Replace		0.2				28,35	
	Air Cleaner	Inspect	0.2						
	Restriction Indicator and Hoses	Replace		0.5				35	
	Load Sensing Gauge and Hoses	Inspect	0.2						
		Replace		0.5				28,35	
	Coolant Overflow Bottle	Service	0.2						
		Replace		1.0				28,35	
	Backup Alarm	Replace		0.3				35	
	Fifth Wheel	Inspect	0.2	0.3					
		Service	0.3	0.3				28	
		Replace			2.0			27,33,35	
		Repair			2.0			27,33,35	
	Fifth Wheel Air Cylinder	Replace		0.5				35	
	Fifth Wheel Frame Sub-Assembly	Inspect		0.2					
		Service		0.2				28	
	Fifth Wheel Lift Cylinders	Service		0.2				28	
		Replace			4.0			27,35,37	
Stowage Compartment	Replace		0.5				28,35		
	Repair		0.5				28		
Rifle Mounting Kit	Replace		0.2				35		
<b>170</b>	<b>ELECTRICAL</b>								
	Alternator Assembly	Test		0.3					
		Replace		1.5				28,35	
		Repair			2.0			27,35	
	Voltage Regulator	Replace		0.3				28,35	
	Starter Assembly	Replace		1.0				28,35	
	Remote Start Solenoid	Replace		0.5				35	
	Instrument Panel	Inspect	0.2						
	Switches, Gauges, and Indicator Lights	Replace		0.5				35	
	Fuses, Relays, and Circuit Breakers	Replace		0.2				35	
24V Converter Box	Replace		0.5				35		
	Repair		1.0				35		

Table 1. MAC for the M878A2 Yard Tractor- Continued.

(1) <b>GROUP NUMBER</b>	(2) <b>COMPONENT/ ASSEMBLY</b>	(3) <b>MAINTENANCE FUNCTION</b>	(4) <b>MAINTENANCE LEVEL</b>					(5) <b>TOOLS AND EQUIPMENT</b>	(6) <b>REMARKS</b>	
			UNIT		DS	GS	DEPOT			
			C	O	F	H	D			
<b>170 (Con't)</b>	Trailer Electrical Connector, 12V or 24V	Replace		0.5				28,35		
	Diagnostic Connector	Replace		0.5				28,35		
	Turn Signal Lever	Inspect	0.2							
		Replace		0.5				35		
	Temperature and Pressure Sensors/ Switches	Replace		1.5				35		
	Electronic Control Modules	Replace		2.0				35		
	Headlights	Adjust		0.2				29,35		
		Replace		0.3				35		
	Taillights, Marker Clearance, and Turn Signal Lights	Replace		0.3				35		
		Repair		0.2				35		
	Floodlights	Replace		0.3				35		
		Repair		0.2				35		
	Strobe Warning Light	Replace		0.3				35		
		Repair		0.3				35		
	Interior Domelight	Replace		0.3				35		
		Repair		0.2				35		
	Cab Backup Light	Replace		0.3				35		
		Repair		0.2				35		
	Warning Sensors and Lights	Replace		0.5				35		
	Engine and Transmission Sensors	Replace		1.5				28,35		
	Electric Horn	Replace		0.2				35		
	Batteries	Inspect	0.2	0.2						G
		Test		0.6				28		
		Service	0.5	1.0				28		
		Replace		1.5				35		
	Battery Box	Repair		2.0				35		
	Battery Cables	Inspect	0.4	0.4						
		Replace		1.0				28,35		
Capacitor	Inspect		0.2							
	Test		0.5				35			
	Replace		1.0				35			

Table 1. MAC for the M878A2 Yard Tractor- Continued.

(1) <b>GROUP NUMBER</b>	(2) <b>COMPONENT/ ASSEMBLY</b>	(3) <b>MAINTENANCE FUNCTION</b>	(4) <b>MAINTENANCE LEVEL</b>					(5) <b>TOOLS AND EQUIPMENT</b>	(6) <b>REMARKS</b>
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
<b>170 (Con't)</b>	Battery Disconnect Switch	Replace		1.0				35	
	NATO Slave Receptacle	Replace		1.0				35	
	Instrument Panel	Replace		4.0				35	
	Wiring Harness	Repair		1.5				28,35	
	Cab Wiring Harness	Replace		4.0				35	
		Repair		2.5				28,35	
	Chassis Wiring Harness	Replace		4.0				35	
Repair			2.5				28,35		
<b>180</b>	<b>POWER TAKE-OFF (PTO)</b>								
	Power Take-Off	Replace			2.0			27,35	
	Fifth Wheel Lift Hydraulic Pump	Replace			1.5			27,35	
<b>190</b>	<b>OIL PIPING</b>								
	Cab Tilt Motor and Pump Assembly	Service		0.3				28,35	
		Replace		1.0				28,35	
		Repair		0.5				35	
	Cab Tilt Cylinder	Replace		1.0				28,35	
	Cab Tilt Latch	Replace		1.0				28,35	
	Cab Tilt Safety Prop and Release Cable	Replace		1.0				35	
	Cab Tilt Hoses and Fittings	Inspect	0.2	0.2					
		Replace		0.5				28,35	
	Hydraulic System Valves	Replace		2.0				28,35	
	Hydraulic Oil Filter and Head	Replace		1.0				28	
		Repair		1.0				28,35	
	Hydraulic Reservoir	Inspect	0.2	0.2					
		Service	0.2	0.5				28	
		Replace		1.5				28,35	
	Fifth Wheel Lift Hydraulic Hoses and Fittings	Inspect	0.2	0.2					
Replace			1.5				28,35		
Engine Oil Sampling Valve and Hoses	Replace		0.5				28,35		
Transmission Oil Sampling Valve and Hose	Replace		0.5				28,35		

Table 2. Tools and Test Equipment Requirements for the M878A2 Yard Tractor.

(1) TOOLS OR TEST EQUIPMENT REFERENCE CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL/NATO STOCK NUMBER	(5) TOOL NUMBER
1	O	Adapter, Connector	5935-01-494-8321	J38500-90
2	H	Bore, Gauge GP	TBD	TBD
3	O	Bushing, Reducer	3120-01-127-5376	4M5317
4	O	Cable Assembly, Special Purpose, Electrical	6150-01-353-9708	J 38500-2
5	O	Cartridge, Engine		J38500-909
6	O	Filter, Fluid Fuel Flow Tube	2910-01-343-8535	2P8278
7	O	Fitting	2520-01-052-3926	8J7844
8	H	Guide, Valve Stem	3415-01-298-9475	7N1819
9	H	Insertor, Bearing and Bushing	5120-01-388-7835	J-38565
10	H	Insertor, Bearing and Bushing	5120-01-354-7398	J38566
11	H	Insertor, Seal	5120-01-362-2026	1U7430
12	H	Insertor, Seal	5120-01-362-2027	1U7598
13	F	Insertor, Seal	5120-01-423-2179	5P9722
14	H	Installation Set, Bearing and Seal	5120-01-475-1904	J35921
15	F	Installer, Fuel Injector		152-1057
16	F	Installer, Seal		149-2956
17	F	Installer, Sleeve		150-3152
18	O	Interface Unit, Data Transfer	7025-01-482-8761	J38500-1500C
19	O	Kit, Connector Repair		4C-3406
20	O	Leak Detector, Refrigerant	4940-01-387-0948	16500
21	O	Memory Card, Personal Computer	7025-01-482-8961	J-38500-1800A
22	F	Pinion Turning Tool	3020-01-250-1610	9S9082
23	F	Protector, Seal		149-2955
24	F	Reamer		9U-6101
25	F	Reclaimer, Refrigerant, R128a	4250-01-396-8928	EEEAC304A
26	O	Remover, Pin	5120-01-486-7830	1U5805
27	F	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power	4910-00-754-0705	SC4910-95CLA31

Table 2. Tools and Test Equipment Requirements for the M878A2 Yard Tractor.

(1) TOOLS OR TEST EQUIPMENT REFERENCE CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL/NATO STOCK NUMBER	(5) TOOL NUMBER
28	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No. 1	4910-00-754-0654	SC4910-95CLA74
29	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No. 2	4910-00-754-0650	SC4910-95CLA72
30	F	Swivel, Eye and Jaw (Adapter, Probe)	4030-01-476-1735	5P-2720
31	F	Swivel, Eye and Jaw (Adapter, Probe)	4030-01-476-1733	5P-2725
32	O	Tester, Internal Combustion Engine	4910-01-491-0701	J38500-1A
33	O	Tester, Kingpin Lock	4910-01-157-3571	TFTLN5001
34	F	Tool, Injector Sleeve		151-4832
35	O	Tool Kit, General Mechanic's: Automotive	5180-01-483-0249	12B470000-1
36	F	Tool, Removal		180-0186
37	O	Wrench, Spanner	5120-01-434-5051	C474B

Table 3. Remarks for the M878A2 Yard Tractor.

(1) REFERENCE CODE	(2) REMARKS
A	Cab must be tilted to 90 degrees to perform this maintenance.
B	Refer to TM 750-254 (cooling systems) for additional information.
C	Refer to Group 070 Commercial Service Manuals for transmission stall test procedures.
D	Repair of brakedrum consists of refacing brakedrum braking surface with a brakedrum lathe.
E	Refer to Group 140 Commercial Service Manuals for maintenance of auxiliary arctic heater.
F	Refer to TM 9-2610-200-14 (tires) for additional information.
G	Refer to TM 9-6140-200-14 (batteries) for additional information.

END OF WORK PACKAGE

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**EXPENDABLE AND DURABLE ITEMS LIST**

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**0165 00****SCOPE**

This work package lists expendable and durable items you will need to maintain the M872A2 Yard Tractor. 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*.

**EXPLANATION OF COLUMNS**

1. **Column (1) - Item Number.** This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item [e.g., Use adhesive (Item 1, WP 0165 00)].
2. **Column (2) - Level.** This column identifies the lowest level of maintenance that requires the listed item.
  - C - Operator/Crew
  - O - Organizational Maintenance
  - F - Direct Support Maintenance
  - H - General Support Maintenance
3. **Column (3) - National Stock Number (NSN).** This is the NSN assigned to the item which you can use to requisition it.
4. **Column (4) - Description, Item Name, Commercial and Government Entity Code (CAGEC), and Part Number (P/N).** This provides the other information you need to identify the item.
5. **Column (5) - Unit of Measure (U/M).** This code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

Table 1. Expendable and Durable Items List.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
1	O	8040-01-250-3969	ADHESIVE (05972) 242	OZ
2	F		ADHESIVE: Hi-Strength (1A9T3) 90	
		8040-01-194-3457	24 Ounce Aerosol Can	OZ
3	O	8040-00-142-9823	ADHESIVE: Silicone Rubber (01139) RTV109	OZ
4	C		ANTIFREEZE: Permanent: Arctic Grade (58536) A-A-52624	
		6850-01-441-3248	55 Gallon Drum	GAL
5	C		ANTIFREEZE: Permanent, Ethylene Glycol, Inhibited (58536) A-A-52624	
		6850-01-441-3218	1 Gallon Bottle	GAL
		6850-00-181-7933	(81349) MILA46153 5 Gallon Can	GAL
		6850-01-441-3223	(58536) A-A-52624 55 Gallon Drum	GAL
6	O	5340-00-450-5718	CAP SET, PROTECTIVE: Dust and Moisture Seal (19207) 10935405	EA
7	O		CAULK, STRIP (75037) 08578	
			60 Strips, 1 Foot Long Each, Black	EA
8	F		CLEANER: Component (11083) 138-8440	OZ
9	F		CLEANER: Component (11083) 8T-9011	OZ
10	C		CLEANING COMPOUND: Solvent, Type III (81349) MIL-PRF-680	
		6850-01-474-2320	5 Gallon Can	GAL
		6850-01-474-2321	55 Gallon Drum	GAL
11	O		CLOTH: Abrasive, Emery, Fine (80204) ANSI B74.18	
		5350-00-584-4654	50 Sheet Package	EA
12	F		COMPOUND: Antiseize (11083) 4C-5593	OZ



Table 1. Expendable and Durable Items List - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
13	F	8030-01-451-1403	COMPOUND: Antiseize (11083) 5P3931	OZ
14	C		COMPOUND: Cleaning, Windshield (0FTT5) 0854000	
		6850-00-926-2275	16 Ounce Bottle	OZ
15	O		COMPOUND: Retaining (11083) 4C-9507	OZ
16	F		COMPOUND: RTV, Conforming Coating (71984) 1-2577	OZ
17	O		COMPOUND: Sealing (05972) 22221	
		8030-01-054-3968	10 cc Bottle, Box of 10 Bottles	CC
18	O		COMPOUND: Sealing (05972) 640-31	
		8030-00-111-6404	50 CC Bottle	CC
			(05972) 60921	
		8030-00-180-6150	Box of 10 Bottles, 10 CC Each	CC
19	O		COMPOUND: Sealing (05972) 277	OZ
20	O		COMPOUND: Sealing, Pipe (05972) 079-21	
		8030-00-081-2327	10 cc Bottle	CC
		8030-00-081-2286	50 cc Bottle	CC
21	F		COMPOUND: Thread-Locking (11083) 154-9731	OZ
22	F		COMPOUND: Thread-Locking (11083) 9S-3263	OZ
23	C		DETERGENT: General Purpose, Liquid (83421) 7930-00-282-9699	
		7930-00-282-9699	1 Gallon Can	GAL
24	C		FLUID: Hydraulic, Automatic Transmission (24617) Dexron III	
		9150-00-698-2382	1 Quart Can	QT
		9150-01-114-9968	55 Gallon Drum	GAL
25	C		FLUID: Hydraulic, Petroleum Base (81349) MIL-H-5606	
		9150-00-223-4134	1 Gallon Can	GAL
		9150-00-082-7524	10 Gallon Can	GAL

Table 1. Expendable and Durable Items List - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M	
26	C	9150-00-985-7231	FLUID: Hydraulic, Petroleum Base (81349) MIL-PRF-17672, Grade 32 1 Quart Can	QT	
		9150-00-985-7232	5 Gallon Can	GAL	
		9150-00-985-7233	55 Gallon Drum	GAL	
27	O	3439-00-255-9935	FLUX: Soldering (58536) A-A-51145 TY 1 FORM A		
			1 Pound Can	LB	
28	C	9130-01-031-5816	FUEL, TURBINE: Aviation (81349) MILT83133 GR JP8	GAL	
29	F	5210-00-640-6176	GAGE: Bearing Clearance 0.004-0.009 Inch Clearance Range Blue Color, Box of 12 (77220) PLASTIGAGEPB1	EA	
			5210-00-640-6177		0.001-0.003 Inch Clearance Range Green Color, Box of 12 (77220) PG-1
			5210-00-640-6178		0.002-0.006 Inch Clearance Range Red Color, Box of 12 (77220) PLASTIGAGEPR1
30	C	9150-01-197-7688	GREASE: Automotive and Artillery, GAA (81349) M-10924-A 2-1/4 Ounce Tube	OZ	
			9150-01-197-7690	(81349) M-10924-C 1-3/4 Pound Can	LB
			9150-01-197-7692	(81349) M-10924-E 35 Pound Can	LB
			9150-01-197-7693	(81349) M-10924-B 14 Ounce Cartridge	OZ
31	F	9150-01-123-5103	GREASE: Ball and Roller Bearing (81230) POLYUREA EP GREASE		
			14 Ounce Cartridge	OZ	
32	O	9150-01-361-8919	GREASE: Electrically Conductive (53711) 5190179	OZ	
33	O	9150-01-066-1823	GREASE: Silicone (71984) MOLYKOTE 55M 5.3 OZ TUBE		
			Box of 12 Tubes, 5.3 Ounces Each Tube	OZ	
34	O	5970-00-476-6717	INSULATING VARNISH: Electrical, Dielectric (75037) 1602		
			13 Ounce Can, Aerosol Spray	OZ	

Table 1. Expendable and Durable Items List - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
35	O	5970-00-815-1295	INSULATION SLEEVING: Electrical (81349) M23053/5-106-0 250 Foot Spool	FT
36	F		LUBRICANT (11083) 8T-2998	OZ
37	O		LUBRICANT: DS-ES (15434) 3822934	OZ
38	C	9150-01-035-5390 9150-01-035-5391	OIL: Lubricating, GO 75 (81349) MIL-PRF-2105 1 Quart Can 5 Gallon Can	QT GAL
39	C	9150-01-035-5392 9150-00-001-9395 9150-01-035-5394	OIL: Lubricating, GO 80W/90 (81349) MIL-PRF-2105 1 Quart Can 5 Gallon Can 55 Gallon Drum	QT GAL GAL
40	O	9150-01-048-4591 9150-01-035-5395 9150-01-035-5396	OIL: Lubricating, GO 85W/140 (81349) MIL-PRF-2105 1 Quart Can 5 Gallon Can 55 Gallon Drum	QT GAL GAL
41	C	9150-00-189-6727 9150-00-186-6668 9150-00-191-2772	OIL: Lubricating, OE/HDO 10 (81349) MIL-PRF-2104 1 Quart Can 5 Gallon Can 55 Gallon Can	QT GAL GAL
42	C	9150-00-247-0481	OIL: Lubricating, OE/HDO 10W/30 (81349) MIL-L-2104	QT
43	C	9150-01-152-4117 9150-01-152-4118 9150-01-152-4119	OIL: Lubricating, OE/HDO 15W/40 (81349) MIL-PRF-2104 1 Quart Can 5 Gallon Can 55 Gallon Drum	QT GAL GAL
44	C	9150-00-402-4478 9150-00-402-2372 9150-00-491-7197	OIL: Lubricating, OEA, Arctic (81349) MIL-L-46167 1 Quart Can (81349) MIL-PRF-46167 5 Gallon Can (81349) MIL-PRF-46167 55 Gallon Drum	QT GAL GAL

Table 1. Expendable and Durable Items List - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
45	O	9150-01-410-8972	OIL: Lubricating, Refrigerant Compressor, Synthetic Ester (59595) CAPELLA HFC-68NA 1 Quart Can	QT
46	F		PAD: Hand, Scotch Brite (11083) 8T-7765	EA
47	F	8010-01-329-6150	PASTE: Prussian Blue, Bearing Surface, Permatex (10670) 35V 2 Ounce Tube	OZ
48	O	9150-00-250-0926	PETROLATUM: Technical (82146) 14P1 1.75 Pound Can	LB
49	O	9330-01-141-4504	PLASTIC MOLDING MATERIAL (81349) MIL-P-21929	
50	O	9330-01-141-4504	1 Quart Can PRIMER: Quick Cure (11083) 4C-9500	QT OZ
51	C	7920-00-205-1711	RAG: Wiping (80244) 7920-00-205-1711 50 Pound Bale	LB
52	F		ROLL: Cut and Polish, Scotch Brite (11083) 1U-5512	EA
53	F		SEALANT: Liquid Gasket (11083) 1U-8846	OZ
54	O		SEALANT: Silicone (11083) 4C-9612	OZ
55	F	5330-01-485-8999	SEALER: High Temperature (11083) 2P2333	OZ
56	O	3439-00-555-4629	SOLDER: Lead-Tin Alloy, Rosin Core (81348) QQ-S-571 1 Pound Spool	LB
57	O	5975-00-935-5946	STRAP: Tiedown, Electrical Components (96906) MS3367-2-1 13.35 Inch Minimum Length, Brown Package of 100	EA
		5975-00-903-2284	(96906) MS3367-4-0 4 Inch Length, Black Package of 100	EA

Table 1. Expendable and Durable Items List - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
58	O	5975-00-984-6582	(96906) MS3367-1-0 6 Inch Length, Black Package of 100 TAG: Marker (64067) 9905-00-537-8954	EA
59	F	9905-00-537-8954	Pack of 50	EA
60	O	8030-00-889-3535	TAPE: Antiseizing, ½ Inch Width (84180) 16030A 260 Inch Spool	IN
61	O	5640-00-103-2254	TAPE: Duct, 2 Inches Wide (39482) 1791K70 60 Yard Roll	YD
62	O	5970-00-989-1485	TAPE: Insulation, Electrical (75037) 33 260 Inch Roll	IN
63	F	7510-00-266-6709	TAPE: Pressure-Sensitive, Adhesive, Masking, 1.5 Inches Wide (52170) 232 1-1/2 IN. 60 Yard Roll	YD
64	F	6830-01-439-0614	TETRAFLUOROETHANE: Technical Refrigerant, R-134A (4V886) R134A 43 Pound Cylinder	LB
65	F	8010-00-160-5787 8305-01-301-1031	THINNER: Paint Products (58536) A-A-857 1 Gallon Can WIPES: Lint-Free (28480) 92193W	GAL EA
66	O	9905-00-596-0191	WIRE: Nonelectrical (81346) ASTM A641 5 Pound Coil	LB

END OF WORK PACKAGE

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**SCOPE**

This work package lists all common tools and supplements and special tools/fixtures needed to maintain the M878A2 Yard Tractor.

**EXPLANATION OF COLUMNS IN THE TOOL IDENTIFICATION LIST**

1. **Column (1) - Item Number (No.)**. This number is assigned to the entry in the list and is referenced in the initial setup to identify the item (e.g., Adapter, connector, Item 1, WP 0166 00).
2. **Column (2) - Item Name**. This column lists the item by noun nomenclature and other descriptive features (e.g., Cutter, tube).
3. **Column (3) - National Stock Number**. This is the National Stock Number (NSN) assigned to the item; use it to requisition the item.
4. **Column (4) - Part Number/CAGEC**. Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity) which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items. The manufacturer's Commercial and Government Entity Code (CAGEC) is also included.
5. **Column (5) - Reference**. This column identifies the authorizing supply catalog or RPSTL for selected tool.

## TOOL IDENTIFICATION LIST - CONTINUED

0166 00

## TOOL IDENTIFICATION LIST

Table 1. Tool Identification List.

(1) ITEM NO.	(2) ITEM NAME	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER/ CAGEC	(5) REFERENCE
1	Adapter, Connector	5935-01-494-8321	J38500-90 (45225)	TM 9-2320-312-24P
2	Bore, Gauge GP	TBD	TBD	TM 9-2320-312-24P
3	Bushing, Reducer	3120-01-127-5376	4M5317 (11083)	TM 9-2320-312-24P
4	Cable Assembly, Special Purpose, Electrical	6150-01-353-9708	J38500-2 (33287)	TM 9-2320-312-24P
5	Cartridge, Engine		J38500-909 (33287)	TM 9-2320-312-24P
6	Filter, Fluid Fuel Flow Tube	2910-01-343-8535	2P8278 (11083)	TM 9-2320-312-24P
7	Fitting	2520-01-052-3926	8J7844 (11083)	TM 9-2320-312-24P
8	Guide, Valve Stem	2815-01-298-9475	7N1819 (11083)	TM 9-2320-312-24P
9	Insertor, Bearing and Bushing	5120-01-388-7841	J-38565 (33287)	TM 9-2320-312-24P
10	Insertor, Bearing and Bushing	5120-01-414-7398	J38566 (33287)	TM 9-2320-312-24P
11	Insertor, Seal	5120-01-362-2026	1U7430 (11083)	TM 9-2320-312-24P
12	Insertor, Seal	5120-01-362-2027	1U7598 (11083)	TM 9-2320-312-24P
13	Insertor, Seal	5120-01-423-2179	5P9722 (11083)	TM 9-2320-312-24P
14	Installation Set, Bearing and Seal	5120-01-475-1904	J35921 (33287)	TM 9-2320-312-24P
15	Installer, Fuel Injector		152-1057 (11083)	TM 9-2320-312-24P
16	Installer, Seal		149-2956 (11083)	TM 9-2320-312-24P
17	Installer, Sleeve		150-3152 (11083)	TM 9-2320-312-24P
18	Interface Unit, Data Transfer	7025-01-482-8761	J38500-1500C (45225)	TM 9-2320-312-24P
19	Kit, Connector Repair		4C-3406 (11083)	TM 9-2320-312-24P
20	Leak Detector, Refrigerant	4940-01-387-0948	16500 (07295)	TM 9-2320-312-24P
21	Memory Card, Personal Computer	7025-01-482-8961	J-38500-1800A (45225)	TM 9-2320-312-24P
22	Pinion Turning Tool	3020-01-250-1610	9S9082 (11083)	TM 9-2320-312-24P
23	Protector, Seal		149-2955 (11083)	TM 9-2320-312-24P
24	Reamer		9U-6101 (11083)	TM 9-2320-312-24P
25	Reclaimer, Refrigerant, R134a	4250-01-396-8928	EEEAC304A (55719)	GSA Catalog
26	Remover, Pin	5120-01-486-7830	1U5805 (11083)	TM 9-2320-312-24P
27	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power	4910-00-754-0705	SC4910-95CLA31 (19204)	EM 0074
28	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No. 1	4910-00-754-0654	SC4910-95CLA74 (19204)	EM 0074



**Table 1. Tool Identification List - Continued.**

(1) ITEM NO.	(2) ITEM NAME	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER/ CAGEC	(5) REFERENCE
29	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No. 2	4910-00-754-0650	SC4910-95CLA72 (19204)	EM 0074
30	Swivel, Eye and Jaw (Adapter, Probe)	4030-01-476-1735	5P-2720 (11083)	TM 9-2320-312-24P
31	Swivel, Eye and Jaw (Adapter, Probe)	4030-01-476-1733	5P-2725 (11083)	TM 9-2320-312-24P
32	Tester, Internal Combustion Engine	4910-01-491-0701	J38500-1A (33287)	TM 9-2320-312-24P
33	Tester, Kingpin Lock	4910-01-157-3571	TFTLN5001 (74410)	TM 9-2320-312-24P
34	Tool, Injector Sleeve		151-4832 (11083)	TM 9-2320-312-24P
35	Tool Kit, General Mechanic's: Automotive	5180-01-483-0249	12B470000-1 (59678)	EM 0074
36	Tool, Removal		180-0186 (11083)	TM 9-2320-312-24P
37	Wrench, Spanner	5120-01-428-5051	C474B (1CV05)	TM 9-2320-312-24P
<p><b>NOTE</b></p> <p>The following tool kits contain all special tools required to maintain the yard tractor at each maintenance level.</p>				
	Tool kit, General Mechanic's: Organization Maintenance Special Tools	5180-01-507-1432	57K4568 TBD-ORG KIT (19207)	
	Tool kit, General Mechanic's: Direct Support Maintenance Special Tools	5180-01-507-1447	57K4567 TBD-DIR KIT (19207)	
	Tool kit, General Mechanic's: General Support Maintenance Special Tools	5180-01-507-1449	57K4566 (19207)	

**END OF WORK PACKAGE**

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# INDEX

<u>Subject</u>	<u>WP Sequence No. - Page No.</u>
<b>A</b>	
Abbreviations, List of .....	0001 00-2
Access Panel Replacement, Cab Front .....	0046 00-1
Air	
Cooler Replacement, Charge .....	0142 00-1
Cooling Lines Replacement, Charge .....	0016 00-1
Dryer Replacement .....	0061 00-1
Hose Assembly Maintenance, Intervehicular .....	0069 00-1
Intake Tubes and Hoses Replacement .....	0015 00-1
Recirculation Shield Replacement, Radiator .....	0026 00-1
Reservoir Assemblies Replacement .....	0062 00-1
System Lines and Fittings Replacement .....	0066 00-1
Treadle Valve Replacement .....	0064 00-1
Air Cleaner	
Replacement .....	0015 00-1
Restriction Indicator and Hoses Replacement .....	0078 00-1
Air Conditioning (AC) System	
Compressor Replacement .....	0155 00-1
Condenser Replacement .....	0152 00-1
Expansion Valve Replacement .....	0151 00-1
Fan Cycling (Trinary) Switch .....	0153 00-1
General Maintenance and Testing .....	0135 00-1
Hose Replacement .....	0156 00-1
Inspection and Leak Test .....	0057 00-1
Maintenance .....	0149 00-1
Receiver-Drier Replacement .....	0154 00-1
Thermostatic Switch Replacement .....	0058 00-1
Air Conditioning System, Theory of Operation .....	0003 00-5
Air System, Theory of Operation .....	0003 00-2
Airbrake Chambers Replacement, Front and Rear .....	0031 00-1
Alarm Replacement, Backup .....	0082 00-1
Alternator	
Repair .....	0159 00-1
Replacement .....	0090 00-1
Auxiliary Arctic Heater System (If Equipped), Theory of Operation .....	0003 00-8
Auxiliary Light Maintenance .....	0105 00-1
Axle Assembly Replacement	
Front .....	0143 00-1
Rear .....	0145 00-1

# INDEX - Continued

<u>Subject</u>	<u>WP Sequence No. - Page No.</u>
<b>B</b>	
Backup	
Alarm Replacement .....	0082 00-1
Light Maintenance, Cab .....	0108 00-1
Light Replacement, Rear .....	0110 00-1
Battery	
Box Maintenance .....	0116 00-1
Cables Replacement .....	0115 00-1
Maintenance .....	0114 00-1
Battery Disconnect Switch Replacement .....	0117 00-1
Belt	
Replacement, Engine, Serpentine .....	0012 00-1
Replacement, Seat .....	0054 00-1
Replacement, Tensioner .....	0013 00-1
Brake Light Switch Replacement .....	0065 00-1
Brake Pedals Replacement .....	0064 00-1
Brake System, Theory of Operation .....	0003 00-2
Bumper Replacement, Front .....	0037 00-1
<b>C</b>	
Cab	
Backup Light Maintenance .....	0108 00-1
Front Access Panel Replacement .....	0046 00-1
Heater Hoses Replacement .....	0056 00-1
Left-Side Door Assembly Maintenance .....	0044 00-1
Rear Sliding Door Assembly Maintenance .....	0045 00-1
Right-Side Rear Cushion Mount Replacement .....	0041 00-1
Side Vent Replacement .....	0043 00-1
Steps Replacement .....	0038 00-1
Sun Visor Replacement .....	0086 00-1
Windshield and Window Glass Replacement .....	0148 00-1
Cab Interior Domelight Maintenance .....	0107 00-1
Cab Tilt	
Cylinder Replacement .....	0123 00-1
Hydraulic Hoses and Fittings Replacement .....	0126 00-1
Hydraulic System Filling and Bleeding .....	0125 00-1
Latch Replacement .....	0121 00-1
Placing in 90-Degree Tilt Position .....	0147 00-1
Pump Assembly Maintenance .....	0124 00-1
Safety Prop and Release Cable Replacement .....	0122 00-1
Cab Tilt System, Theory of Operation .....	0003 00-5
Cables, Battery, Replacement .....	0115 00-1

# INDEX - Continued

<u>Subject</u>	<u>WP Sequence No. - Page No.</u>
<b>C - Continued</b>	
Cab-to-Frame Ground Strap Replacement .....	0088 00-1
Capacitor Replacement .....	0119 00-1
Charge Air Cooling Lines Replacement .....	0016 00-1
Circuit Breakers	
Cab .....	0095 00-1
Cab Tilt Pump Assembly .....	0124 00-1
Cold Start System Maintenance, Ether .....	0077 00-1
Compressor Replacement, AC System .....	0155 00-1
Condenser Replacement, AC System .....	0152 00-1
Control Valve Replacement	
Fifth Wheel Lock .....	0075 00-1
Parking Brake .....	0072 00-1
Trailer Air Supply .....	0073 00-1
Trailer Brake .....	0074 00-1
Coolant Filter	
Hoses Replacement .....	0024 00-1
Maintenance .....	0024 00-1
Coolant Overflow Bottle Replacement .....	0081 00-1
Cooling Fan and Fan Clutch Maintenance .....	0141 00-1
Cooling System, Theory of Operation .....	0003 00-2
Corrosion Prevention and Control (CPC) .....	0001 00-1
Cylinder Replacement	
Air, Fifth Wheel .....	0083 00-1
Cab Tilt .....	0123 00-1
Fan Clutch .....	0141 00-1
Fifth Wheel Hydraulic Lift .....	0158 00-1
<b>D</b>	
Data Plate Replacement .....	0080 00-1
Decal Replacement .....	0080 00-1
Description and Data, Equipment .....	0002 00-1
Destruction of Army Materiel to Prevent Enemy Use .....	0001 00-1
Diagnostic Connector Replacement .....	0112 00-1
Diagrams .....	0137 00-1
Dipstick and Fill Tube Replacement, Transmission .....	0027 00-1
Dipstick Tube, Engine Oil .....	0010 00-1
Door Assembly Maintenance	
Cab Left-Side .....	0044 00-1
Cab Rear Sliding .....	0045 00-1

# INDEX - Continued

**Subject** **WP Sequence No. - Page No.**

## D - Continued

Drag Link Replacement .....	0146 00-1
Draining and Filling Hydraulic Reservoir .....	0129 00-1
Drive Train, Theory of Operation .....	0003 00-1
Drum Replacement, Front Axle .....	0033 00-1
Dryer, Air, Replacement .....	0061 00-1
Dummy Coupling Replacement .....	0070 00-1

## E

Electrical Connectors Replacement	
12V Trailer .....	0113 00-1
24V Trailer .....	0113 00-1
Electrical General Maintenance Instructions .....	0120 00-1
Electrical System, Theory of Operation .....	0003 00-2
Engine	
Air Cleaner and Air Intake Tubes and Hoses Replacement .....	0015 00-1
Oil and Oil Filter Replacement .....	0011 00-1
Oil Sampling Valve and Hoses Replacement .....	0132 00-1
Serpentine Belt Replacement .....	0012 00-1
Starter Replacement .....	0092 00-1
Engine Oil Pressure Switch and Sender Replacement .....	0097 00-1
Equipment Description and Data .....	0002 00-1
Equipment Improvement Recommendation (EIRs), Reporting .....	0001 00-1
Ether	
Cylinder Replacement .....	0077 00-1
Electronic Control Relay Replacement .....	0077 00-1
Fuel Lines Replacement .....	0077 00-1
IA Fuse and Fuse Holder .....	0077 00-1
Solenoid Valve Replacement .....	0077 00-1
Exhaust Pipes Replacement .....	0022 00-1
Exhaust System, Theory of Operation .....	0003 00-2
Expansion Valve Replacement, AC System .....	0151 00-1
Expendable and Durable Items List .....	0165 00-1

## F

Fan and Fan Clutch Replacement, Cooling .....	0141 00-1
Fan Cycling (Trinary) Switch Replacement, AC System .....	0153 00-1
Fan Shroud Replacement .....	0142 00-1

# INDEX - Continued

<u>Subject</u>	<u>WP Sequence No. - Page No.</u>
<b>F - Continued</b>	
Fan Clutch:	
Cylinder Replacement .....	0141 00-1
Lining Replacement .....	0141 00-1
Solenoid Replacement .....	0098 00-1
Fender Replacement, Rear .....	0049 00-1
Fifth Wheel	
Air Cylinder and Hose Replacement .....	0083 00-1
Hydraulic Lift Cylinder Replacement .....	0158 00-1
Lift Control and Cable Maintenance .....	0030 00-1
Lift Hydraulic Hoses and Fittings Replacement .....	0127 00-1
Lift Hydraulic Pump Replacement .....	0161 00-1
Lock Control Valve Replacement .....	0075 00-1
Maintenance .....	0157 00-1
Fifth Wheel System, Theory of Operation .....	0003 00-3
Filter Maintenance	
Coolant .....	0024 00-1
Hydraulic .....	0131 00-1
Flasher Unit Replacement, Turn Signal .....	0100 00-1
Floodlight Maintenance .....	0108 00-1
Front	
Access Panel Replacement, Cab .....	0046 00-1
Airbrake Chambers Replacement .....	0031 00-1
Axle Assembly Replacement .....	0143 00-1
Bumper Replacement .....	0037 00-1
Gladhands Replacement .....	0067 00-1
Spring Replacement .....	0144 00-1
Turn Signal Light Replacement .....	0103 00-1
Front Axle Hub Replacement .....	0033 00-1
Fuel	
Level Sending Unit Replacement .....	0021 00-1
Lines Replacement .....	0020 00-1
Priming Pump Assembly Replacement .....	0017 00-1
Secondary Filter Maintenance .....	0017 00-1
Fuel System	
Theory of Operation .....	0003 00-1
Fuel Tank	
Mounting Brackets Replacement .....	0019 00-1
Straps Replacement .....	0019 00-1
Top Platform Replacement .....	0019 00-1
Fuel/Water Separator Maintenance .....	0018 00-1

# INDEX - Continued

**Subject**

**WP Sequence No. - Page No.**

## F - Continued

Fuses Replacement	
Ether Cold Start System .....	0077 00-1
Trailer 24V Converter Box .....	0099 00-1

## G

Gauges Replacement	
Dual Air Pressure .....	0071 00-1
Front Instrument Panel .....	0093 00-1
Load Sensing .....	0084 00-1
Speedometer .....	0093 00-1
Tachometer .....	0093 00-1
General Lubrication Procedures .....	0008 00-2
General Maintenance Instructions .....	0134 00-1
General Maintenance Instructions, Electrical .....	0120 00-1
Gladhands Replacement	
Front .....	0067 00-1
Rear .....	0068 00-1
Grabhandle Replacement .....	0042 00-1
Ground Strap Replacement, Cab-to-Frame .....	0088 00-1

## H

Headlight	
Adjustment .....	0102 00-1
Replacement .....	0101 00-1
Heat Shields Replacement, Radiator .....	0026 00-1
Heater/AC Controls Replacement .....	0055 00-1
Heater/Air Conditioning (AC) Unit	
Access Door Replacement .....	0047 00-1
Replacement .....	0150 00-1
Horn Replacement .....	0089 00-1
Hose Assembly Maintenance, Intervehicular .....	0069 00-1
Hoses Replacement	
AC System .....	0156 00-1
Air Cleaner Restriction Indicator .....	0078 00-1
Cab Heater .....	0056 00-1
Coolant Filter .....	0024 00-1
Engine Oil Sampling Valve .....	0132 00-1
Load Sensing Gauge .....	0084 00-1
Radiator .....	0025 00-1
Transmission Oil Cooler .....	0029 00-1
Transmission Oil Sampling Valve .....	0132 00-1



# INDEX - Continued

<u>Subject</u>	<u>WP Sequence No. - Page No.</u>
<b>H - Continued</b>	
Hoses Replacement - Continued	
Windshield Washer .....	0059 00-1
Hydraulic Filter Maintenance .....	0131 00-1
Hydraulic Pump Replacement	
Fifth Wheel Lift .....	0161 00-1
Power Steering .....	0140 00-1
Hydraulic Reservoir	
Draining and Filling .....	0129 00-1
Replacement .....	0130 00-1
Step Replacement .....	0050 00-1
Hydraulic System	
Cab Tilt, Filling and Bleeding .....	0125 00-1
Valves Replacement .....	0128 00-1
<b>I</b>	
Ignition Switch Replacement .....	0093 00-1
Inlet Air Heater 120A Circuit Breaker Replacement .....	0096 00-1
Instrument and Warning Light Cluster Replacement .....	0094 00-1
Intervehicular Air Hose Assembly Maintenance .....	0069 00-1
Introduction, Theory of Operation .....	0003 00-1
<b>L</b>	
Latch Replacement, Cab Tilt .....	0121 00-1
Leak Test, Air Conditioning System .....	0057 00-1
Lift Control and Cable Maintenance, Fifth Wheel .....	0030 00-1
Lights	
Auxiliary .....	0105 00-1
Backup, Rear .....	0110 00-1
Cab Backup .....	0108 00-1
Floodlight .....	0108 00-1
Front Turn Signal Light .....	0103 00-1
Headlight .....	0101 00-1
Marker Clearance Light .....	0104 00-1
Strobe Warning Light .....	0109 00-1
Taillight .....	0111 00-1
Lines and Fittings Replacement, Air System .....	0066 00-1
List	
Abbreviations .....	0001 00-2
Expendable and Durable Items .....	0165 00-1
Nomenclature Cross-Reference .....	0001 00-2

# INDEX - Continued

**Subject** **WP Sequence No. - Page No.**

## L - Continued

List - Continued	
Tool Identification .....	0166 00-1
Load Sensing Gauge and Hoses Replacement .....	0084 00-1
Location and Description of Major Components .....	0002 00-2
Lubrication Procedures, General .....	0008 00-2

## M

M16 Rifle Mounting Bracket Replacement .....	0087 00-1
Maintenance Allocation Chart (MAC)	
Introduction .....	0163 00-1
Table .....	0164 00-1
Maintenance Forms, Records, and Reports .....	0001 00-1
Maintenance Instructions, General .....	0134 00-1
Major Components, Location and Description of .....	0002 00-2
Marker Clearance Light Maintenance .....	0104 00-1
Mirrors Replacement .....	0051 00-1
Mount Replacement, Cab, Right-Side Rear, Cushion .....	0041 00-1
Mudflaps Replacement .....	0048 00-1
Muffler and Exhaust Pipes Replacement .....	0022 00-1

## N

NATO Slave Receptacle Replacement .....	0118 00-1
Nomenclature Cross-Reference List .....	0001 00-2

## O

Overflow Bottle Replacement, Coolant .....	0081 00-1
--	-----------

## P

Parking Brake Control Valve Replacement .....	0072 00-1
Pintle Hook Replacement .....	0079 00-1
Pitman Arm Replacement .....	0146 00-1
Platform Grating Replacement, Rear .....	0039 00-1
PMCS	
Introduction .....	0008 00-1
Procedures .....	0009 00-1
Power Steering	
Gear Replacement .....	0146 00-1
Hydraulic Hoses and Fittings Replacement .....	0036 00-1
Hydraulic Pump Replacement .....	0140 00-1

# INDEX - Continued

**Subject**

**WP Sequence No. - Page No.**

## P - Continued

Power Take-Off (PTO) Replacement .....	0160 00-1
Powerpack Replacement .....	0138 00-1
Preparation for Storage and Shipment .....	0133 00-1
Propshaft Guard Replacement .....	0040 00-1
Pump Assembly Maintenance, Cab Tilt .....	0124 00-1
Pump Unit Replacement, Windshield Washer .....	0059 00-1

## R

Radiator	
Air Recirculation Shield Replacement .....	0026 00-1
Assembly, Fan Shroud, and Charge Air Cooler Replacement .....	0142 00-1
Heat Shields Replacement .....	0026 00-1
Hoses Replacement .....	0025 00-1
Range Selector Lever Replacement, Transmission .....	0028 00-1
Rear	
Airbrake Chambers Replacement .....	0031 00-1
Axle Assembly Replacement .....	0145 00-1
Backup Light Replacement .....	0110 00-1
Fender Replacement .....	0049 00-1
Gladhands Replacement .....	0068 00-1
Platform Maintenance .....	0039 00-1
Receiver-Drier Replacement, AC System .....	0154 00-1
References .....	0162 00-1
Relay Valve Replacement	
Emergency Brake .....	0063 00-1
Front Brake .....	0063 00-1
Rear Brake .....	0063 00-1
Relays Replacement	
Cab .....	0095 00-1
Cab Tilt Pump Assembly .....	0124 00-1
Capacitor Start .....	0119 00-1
Trailer 24V Converter Box .....	0099 00-1
Release Cable, Cab Tilt Safety Prop Replacement .....	0122 00-1
Remote Start Solenoid Replacement .....	0098 00-1
Reporting Equipment Improvement Recommendations (EIRs) .....	0001 00-1
Reservoir Replacement	
Front Air .....	0062 00-1
Hydraulic .....	0130 00-1
Rear Air .....	0062 00-1

# INDEX - Continued

<u>Subject</u>	<u>WP Sequence No. - Page No.</u>
<b>R - Continued</b>	
Reservoir Replacement - Continued	
Wet Tank .....	0062 00-1
Restriction Indicator and Hoses Replacement, Air Cleaner .....	0078 00-1
Rifle Mounting Bracket Replacement, M16 .....	0087 00-1
<b>S</b>	
Safety Prop, Cab Tilt, Replacement .....	0122 00-1
Seat	
Belt Replacement .....	0054 00-1
Replacement .....	0052 00-1
Seat Repair .....	0053 00-1
Sending Unit Replacement, Fuel .....	0021 00-1
Service Upon Receipt .....	0007 00-1
Shock Absorber and Mounting Brackets Replacement .....	0032 00-1
Side Marker Light Replacement .....	0106 00-1
Slave Receptacle Replacement, NATO .....	0118 00-1
Speedometer Replacement .....	0093 00-1
Springs, Front, Replacement .....	0144 00-1
SR-1 Modulating Valve Replacement .....	0063 00-1
Starter Replacement .....	0092 00-1
Steering	
Column Assembly Replacement .....	0035 00-1
Wheel Replacement .....	0034 00-1
Steering Gear, Drag Link, and Pitman Arm Replacement .....	0146 00-1
Steering System, Theory of Operation .....	0003 00-3
Step Replacement, Hydraulic Reservoir .....	0050 00-1
Steps Replacement, Cab .....	0038 00-1
Storage and Shipment, Preparation for .....	0133 00-1
Stowage Compartment Replacement .....	0085 00-1
Strobe Warning Light Maintenance .....	0109 00-1
Sun Visor Replacement, Cab .....	0086 00-1
Switches Replacement	
AC Fan Cycling (Trinary) .....	0153 00-1
Brake Light .....	0065 00-1
Diagnostics Request .....	0093 00-1
Emergency Start .....	0093 00-1
Ignition .....	0093 00-1
Low Air Pressure .....	0071 00-1

# INDEX - Continued

**Subject** **WP Sequence No. - Page No.**

## S - Continued

Switches Replacement - Continued	
Panel Lights .....	0093 00-1
Rocker, Lights and AC .....	0093 00-1
Thermostatic, AC .....	0058 00-1
Switches Replacement - Continued	
Wiper/Washer .....	0093 00-1

## T

Tachometer Replacement .....	0093 00-1
Taillight Replacement .....	0111 00-1
Tensioner, Belt, Replacement .....	0013 00-1
Testing Air Conditioning System .....	0135 00-1
Theory of Operation	
Air Conditioning System .....	0003 00-5
Air System .....	0003 00-2
Auxiliary Arctic Heater System (If Equipped) .....	0003 00-8
Brake System .....	0003 00-2
Cab Tilt System .....	0003 00-5
Cooling System .....	0003 00-2
Drive Train .....	0003 00-1
Electrical System .....	0003 00-2
Exhaust System .....	0003 00-2
Fifth Wheel System .....	0003 00-3
Fuel System .....	0003 00-1
Introduction .....	0003 00-1
Steering System .....	0003 00-3
Thermostatic Switch Replacement, AC .....	0058 00-1
Throttle Position Sensor (TPS) Assembly Replacement .....	0014 00-1
Tool Identification List .....	0166 00-1
Torque Limits .....	0136 00-1
Tractor Protection Valve Replacement	
Cab-Mounted .....	0063 00-1
Rear .....	0063 00-1
Trailer	
24V Converter Box Maintenance .....	0099 00-1
Air Supply Control Valve Replacement .....	0073 00-1
Brake Control Valve Replacement .....	0074 00-1
Electrical Connectors Replacement .....	0113 00-1

# INDEX - Continued

**Subject**

**WP Sequence No. - Page No.**

## T - Continued

Transmission

Access Cover Replacement .....	0039 00-1
Dipstick and Fill Tube Replacement .....	0027 00-1
Oil Cooler Hoses Replacement .....	0029 00-1
Oil Sampling Valve and Hoses Replacement .....	0132 00-1
Range Selector Lever Replacement .....	0028 00-1
Replacement .....	0139 00-1

Troubleshooting

Introduction .....	0004 00-1
Procedures .....	0006 00-1
Symptom Index .....	0005 00-1

Turn Signal

Flasher Unit Replacement .....	0100 00-1
Lever Replacement .....	0100 00-1

## V

Valve Replacement, Airbrake System

Emergency Brake Relay .....	0063 00-1
Front Brake Relay .....	0063 00-1
Rear Brake Relay .....	0063 00-1
SR-1 Modulating .....	0063 00-1
Tractor Protection Cab-Mounted .....	0063 00-1
Tractor Protection, Cab-Mounted .....	0063 00-1
Tractor Protection, Rear .....	0063 00-1

Valves Replacement

AC Expansion Valve .....	0151 00-1
Air Treadle .....	0064 00-1
Fifth Wheel Lock Control .....	0075 00-1
Flow Control .....	0128 00-1
Hydraulic Cylinders Locking .....	0128 00-1
Parking Brake Control .....	0072 00-1
Trailer Air Supply Control .....	0073 00-1
Trailer Brake Control .....	0074 00-1

Vent Replacement, Cab Side .....

0043 00-1

## W

Warranty Information .....	0001 00-1
Wheel and Tire Assembly Maintenance .....	0076 00-1
Wheel Bearings Replacement, Front Axle .....	0033 00-1
Window Glass Replacement .....	0148 00-1

# INDEX - Continued

## W- Continued

Windshield	
Cab, Replacement .....	0148 00-1
Washer Hoses Replacement .....	0059 00-1
Washer Pump Unit Replacement .....	0059 00-1
Washer Reservoir Maintenance .....	0059 00-1
Wiper Maintenance .....	0060 00-1
Wiper, Windshield, Maintenance .....	0060 00-1
Wiper/Washer Switch .....	0093 00-1

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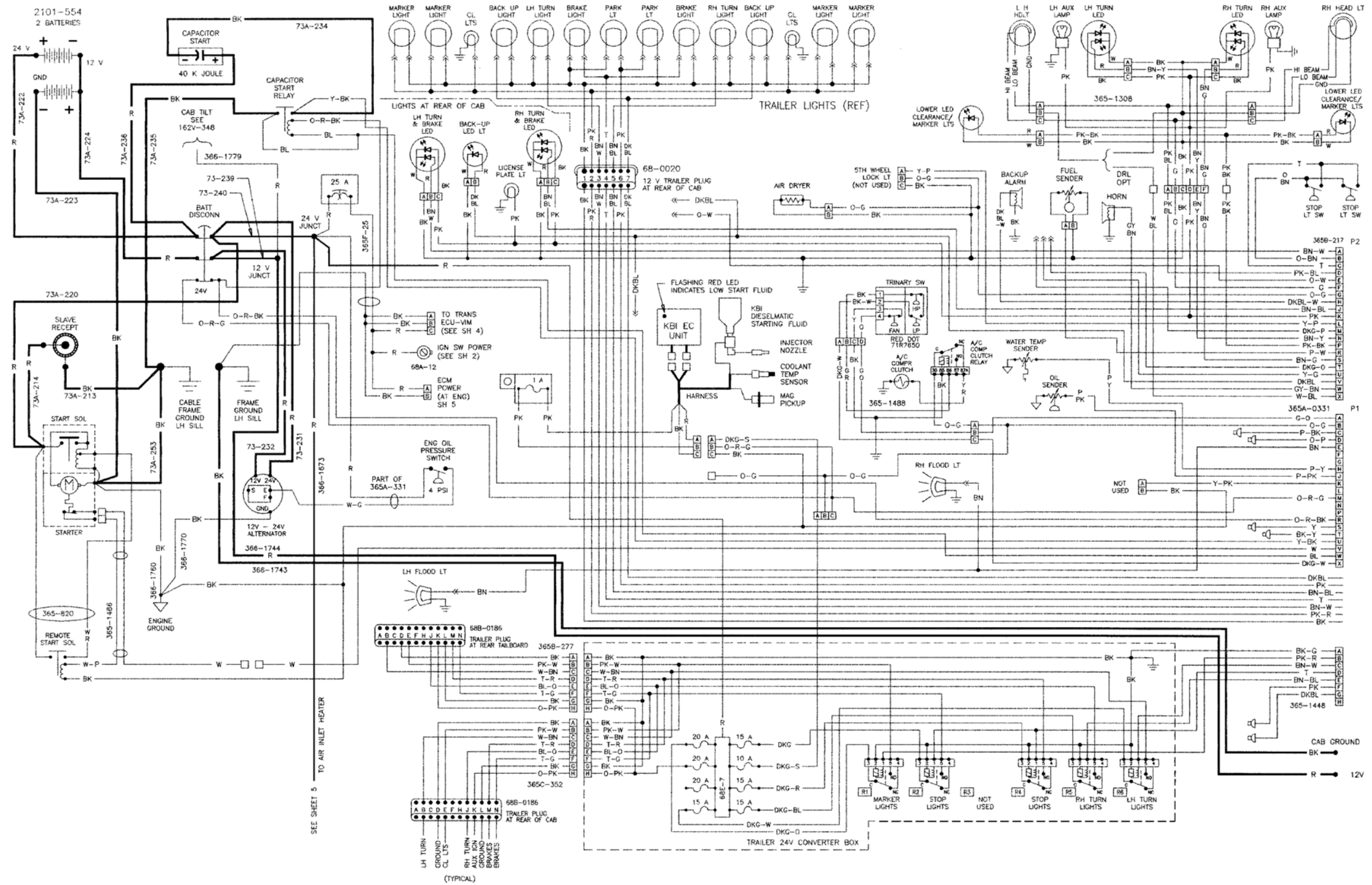


Figure 1. Vehicle Electrical System (Sheet 1 of 6).



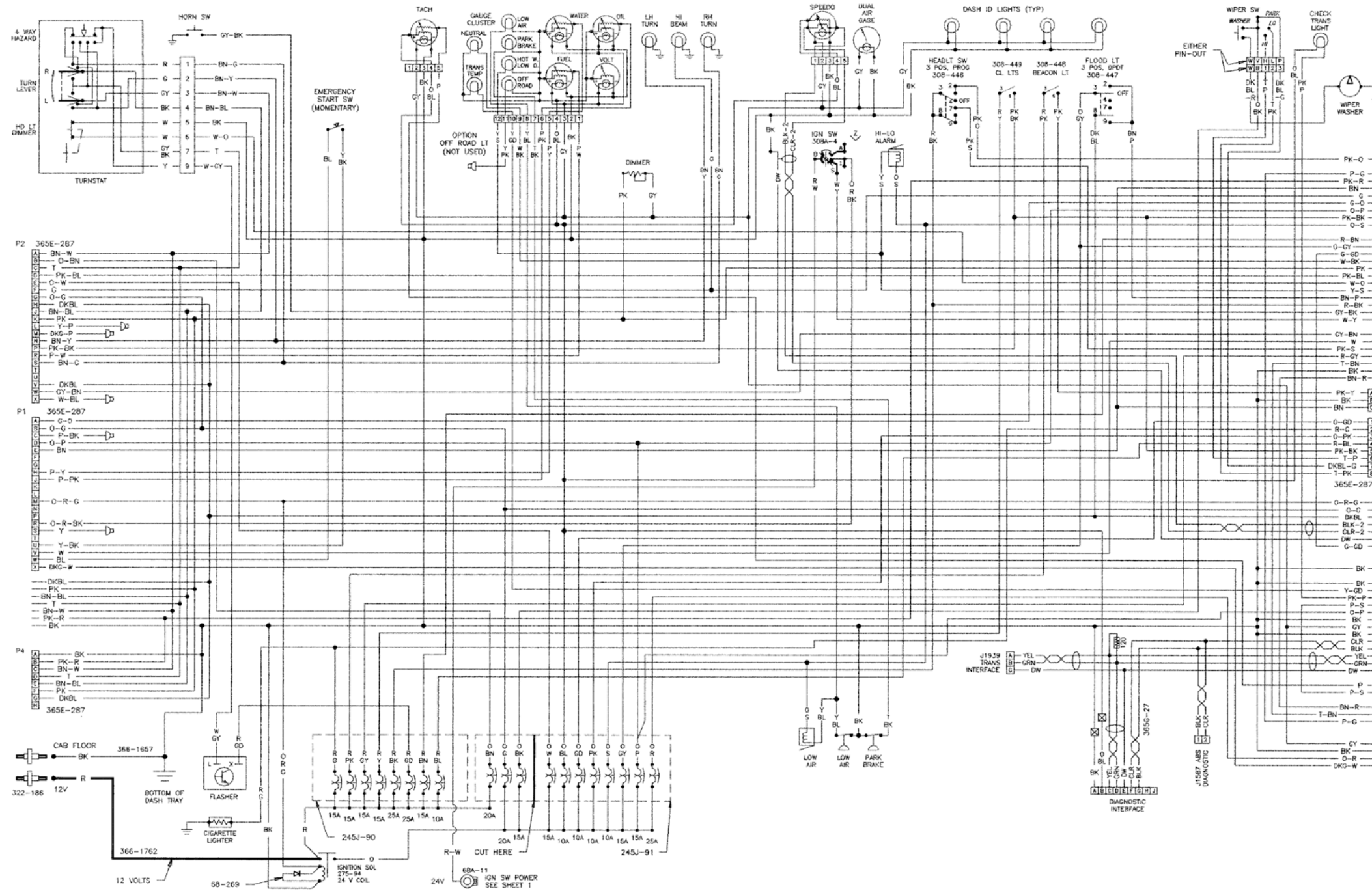


Figure 1. Vehicle Electrical System (Sheet 2 of 6).



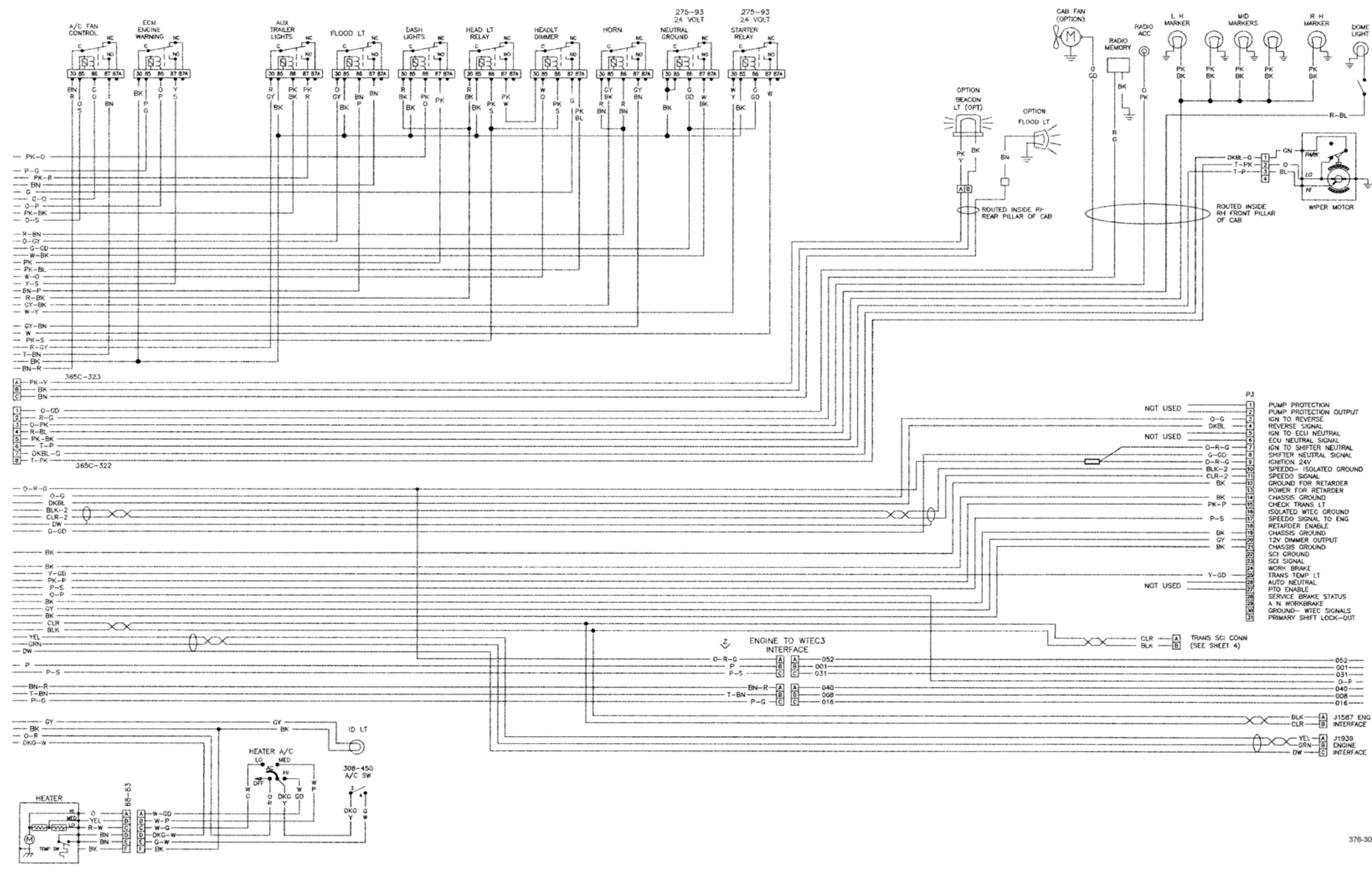


Figure 1. Vehicle Electrical System (Sheet 3 of 6).



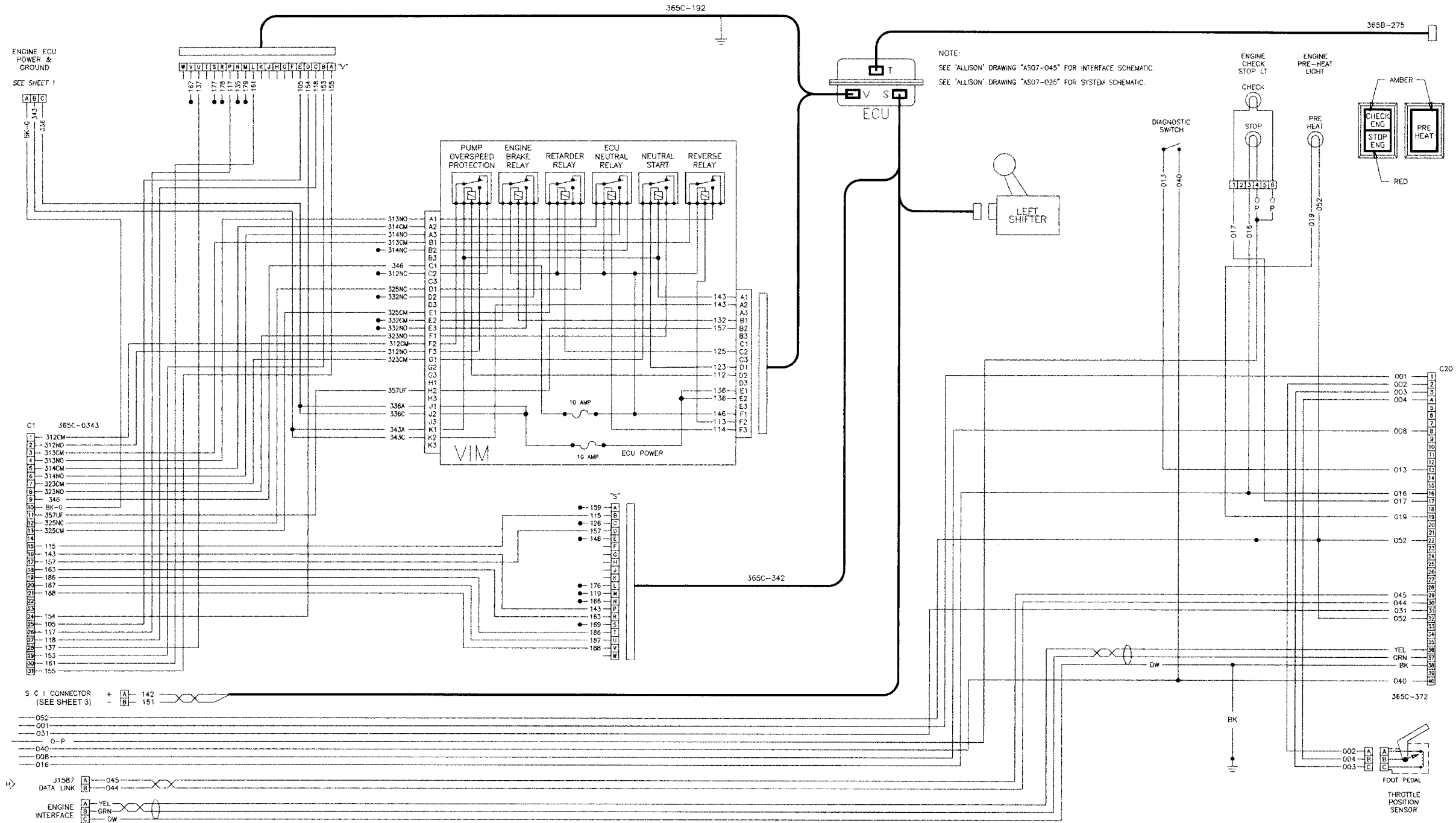
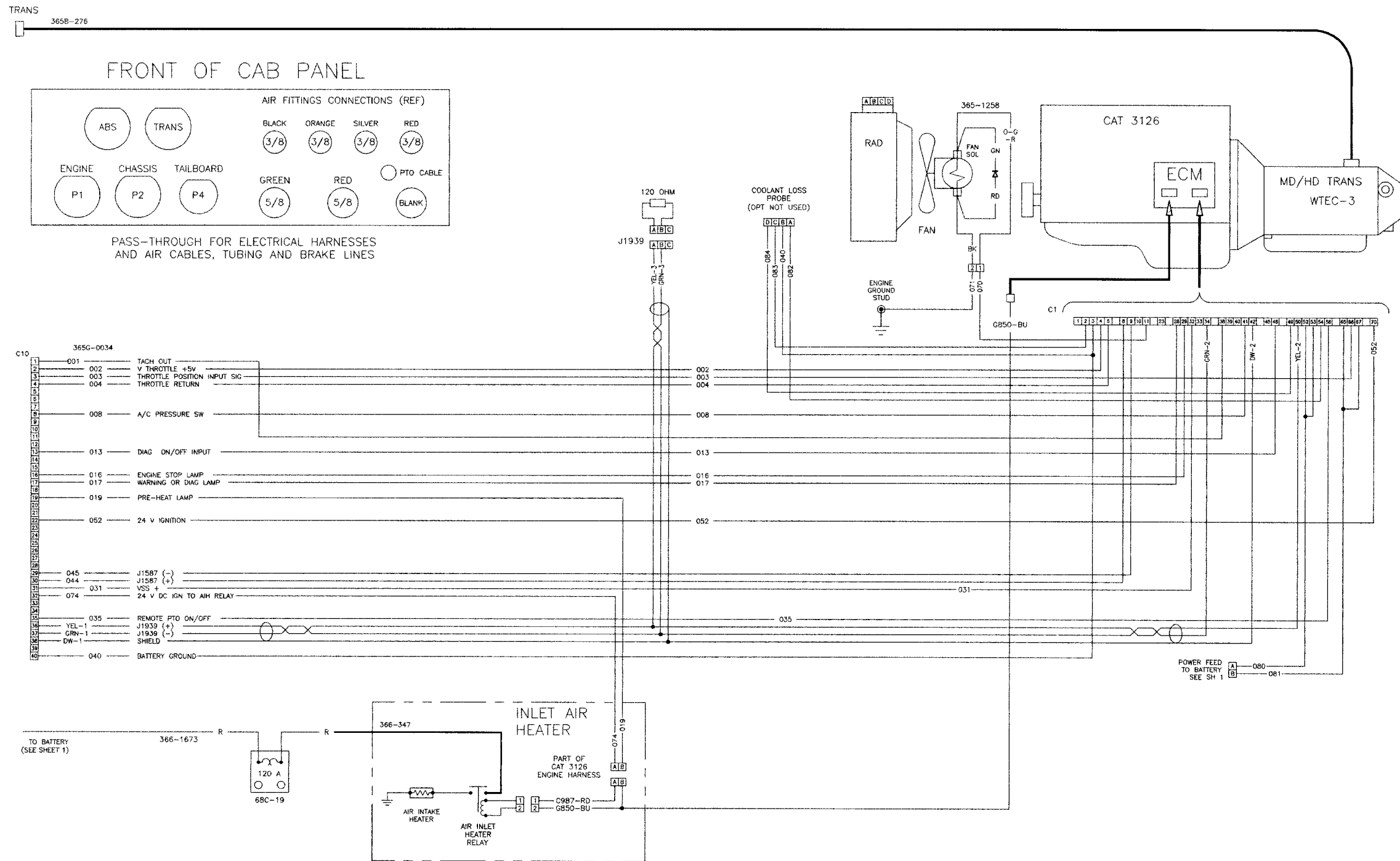


Figure 1. Vehicle Electrical System (Sheet 4 of 6).







376-354

Figure 1. Vehicle Electrical System (Sheet 5 of 6).



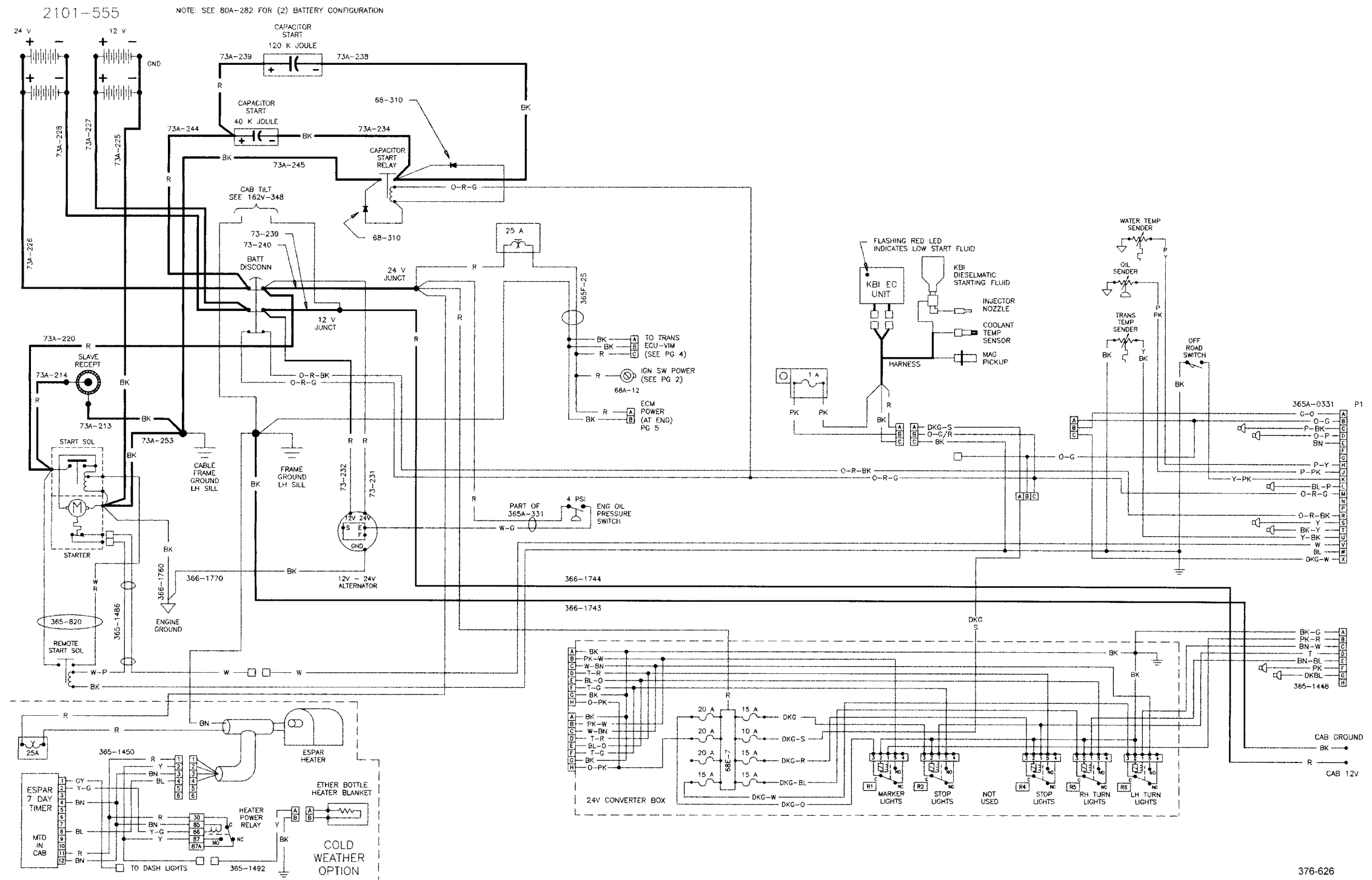
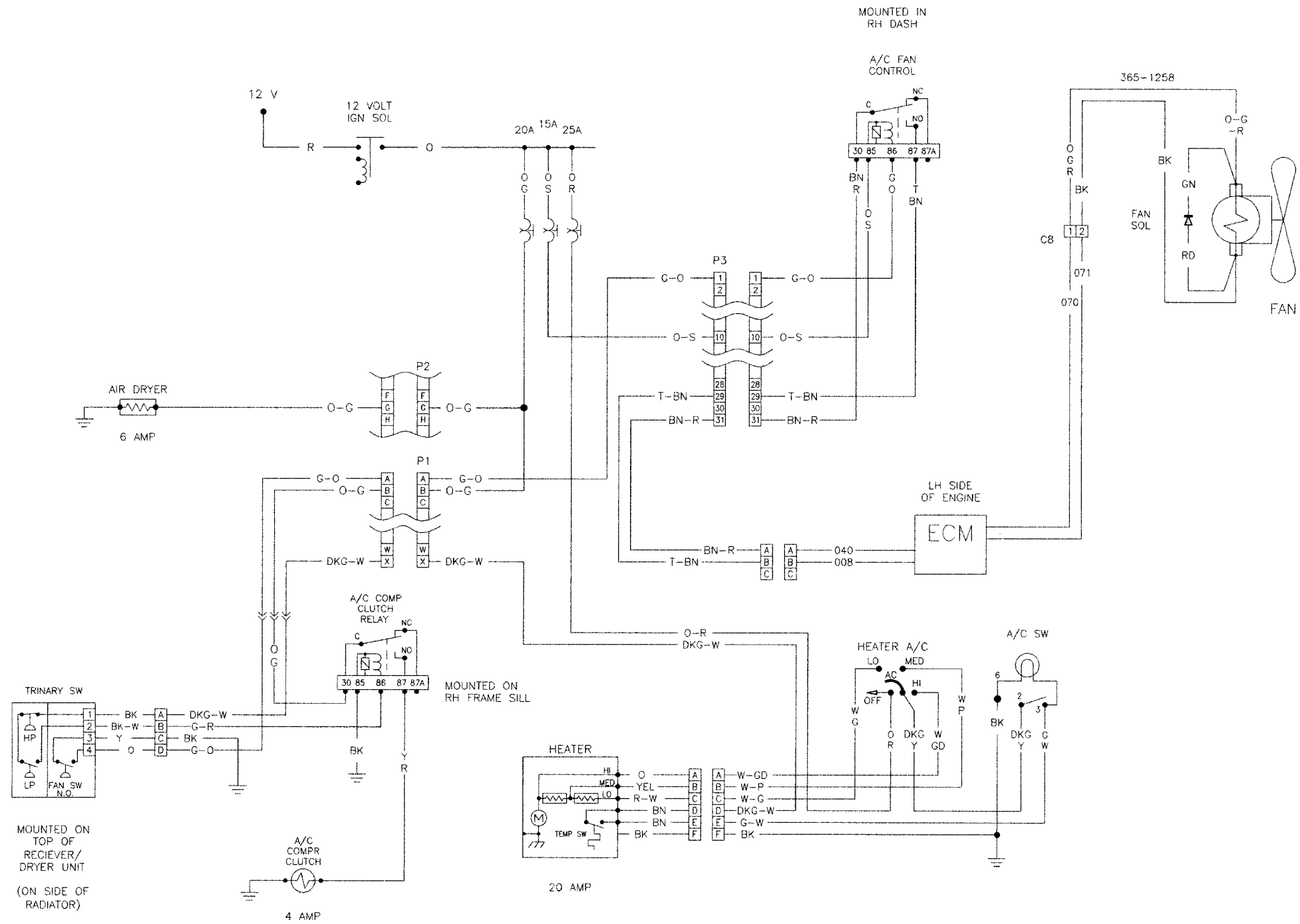


Figure 1. Vehicle Electrical System (Sheet 6 of 6).

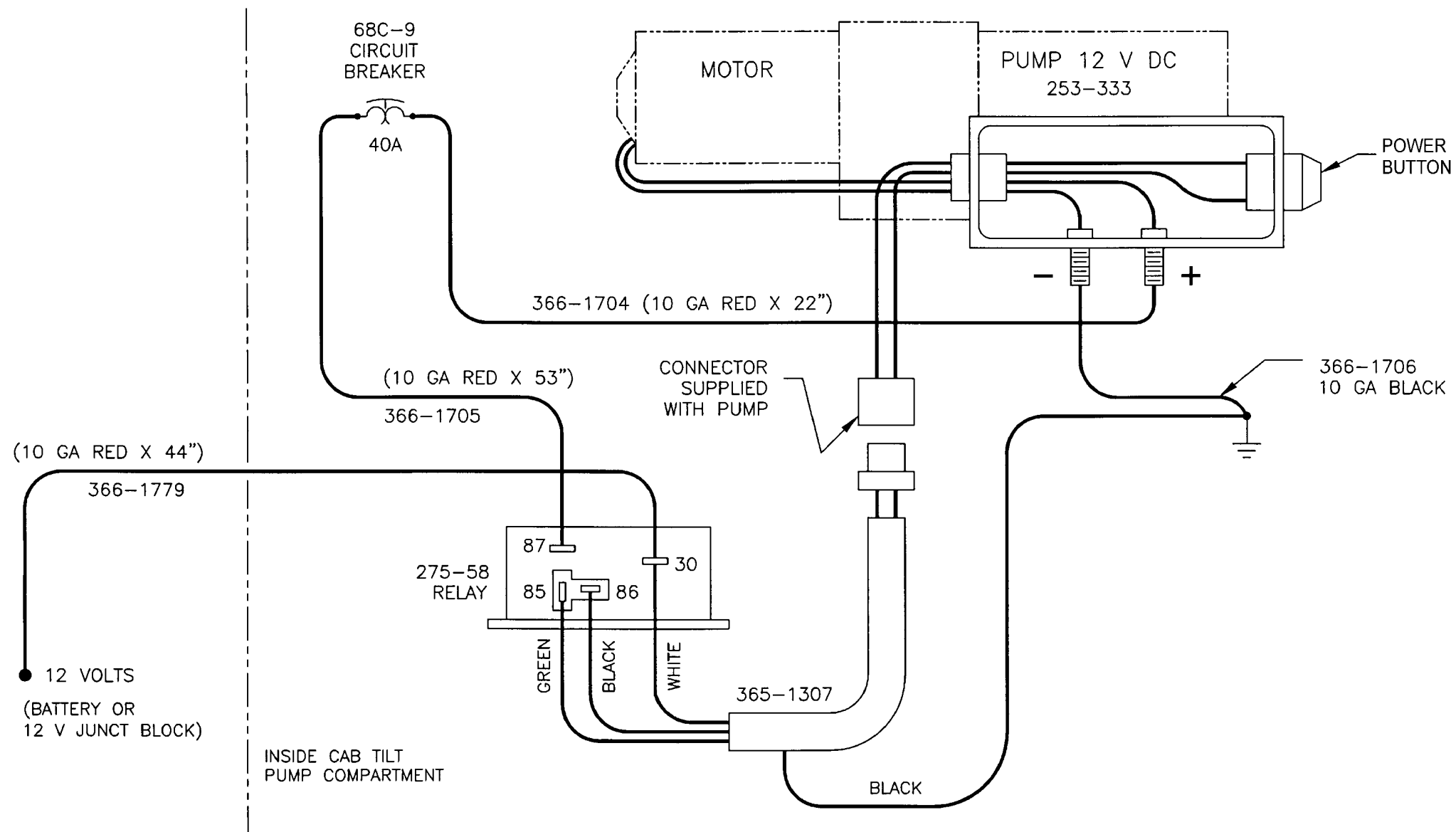




376-399

Figure 2. Air Conditioning System.



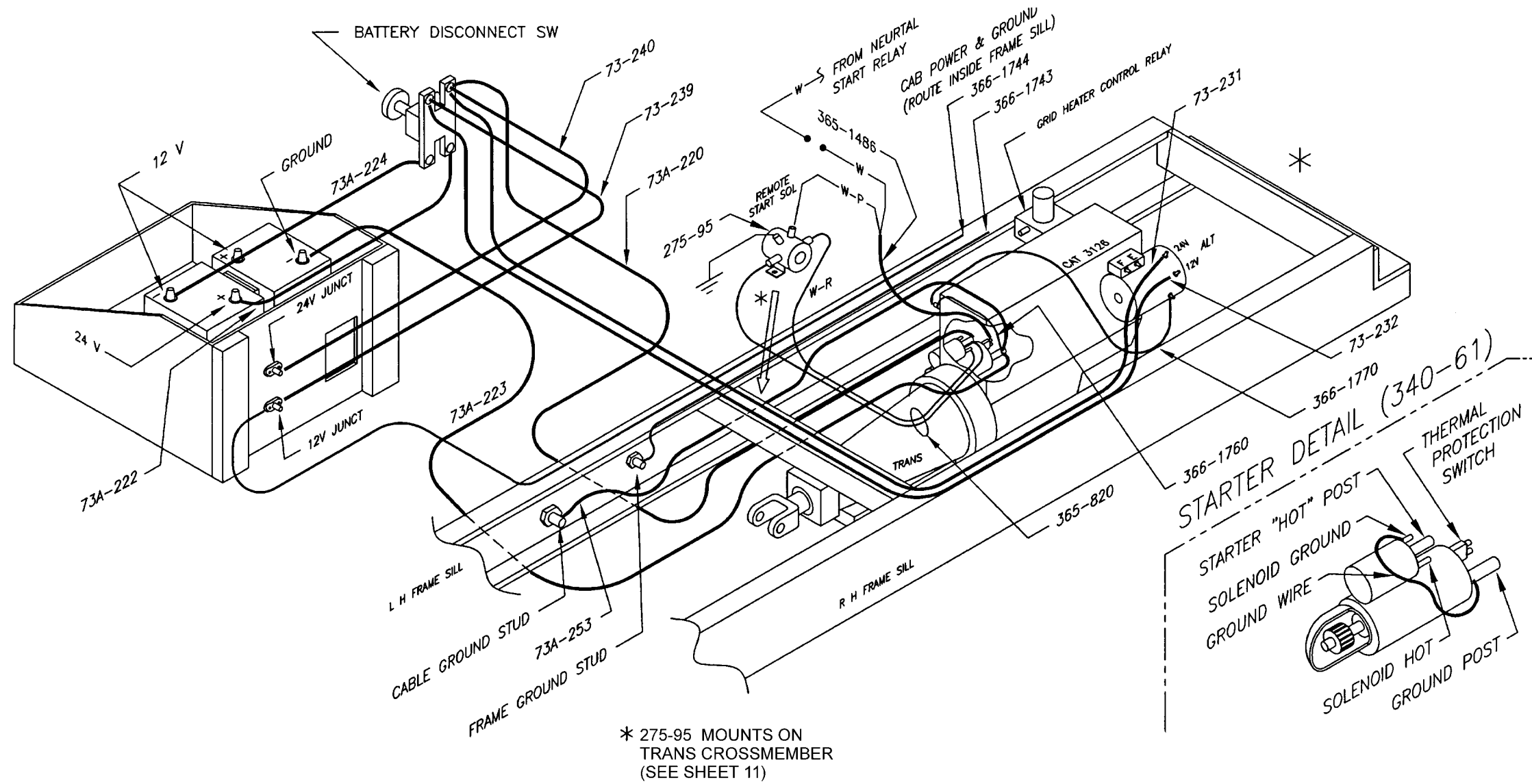


376-398

Figure 3. Cab Tilt Pump Circuit.



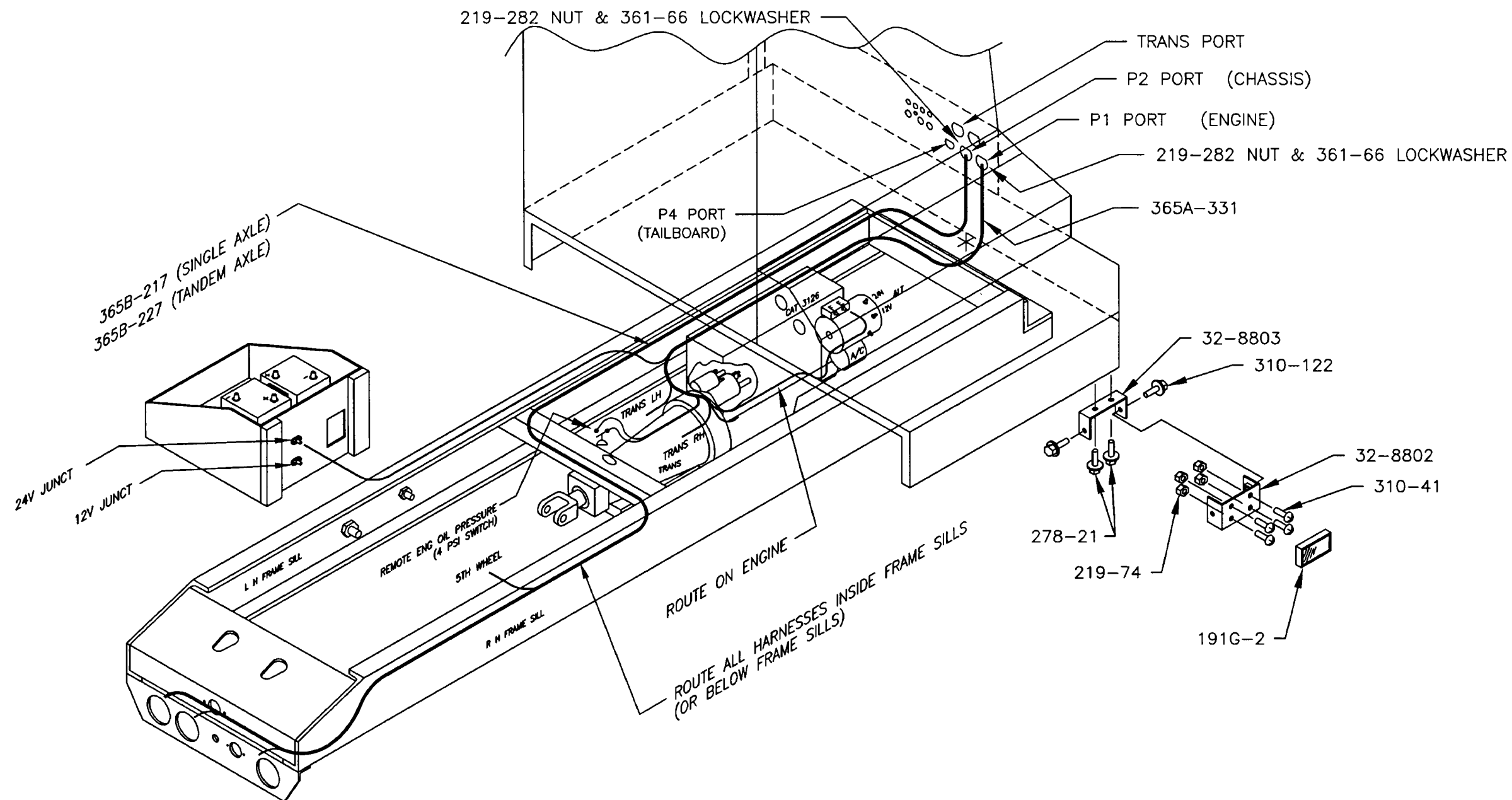




376-599

Figure 4. Vehicle Electrical Cable Routing (Sheet 1 of 11).





376-600

Figure 4. Vehicle Electrical Cable Routing (Sheet 2 of 11).



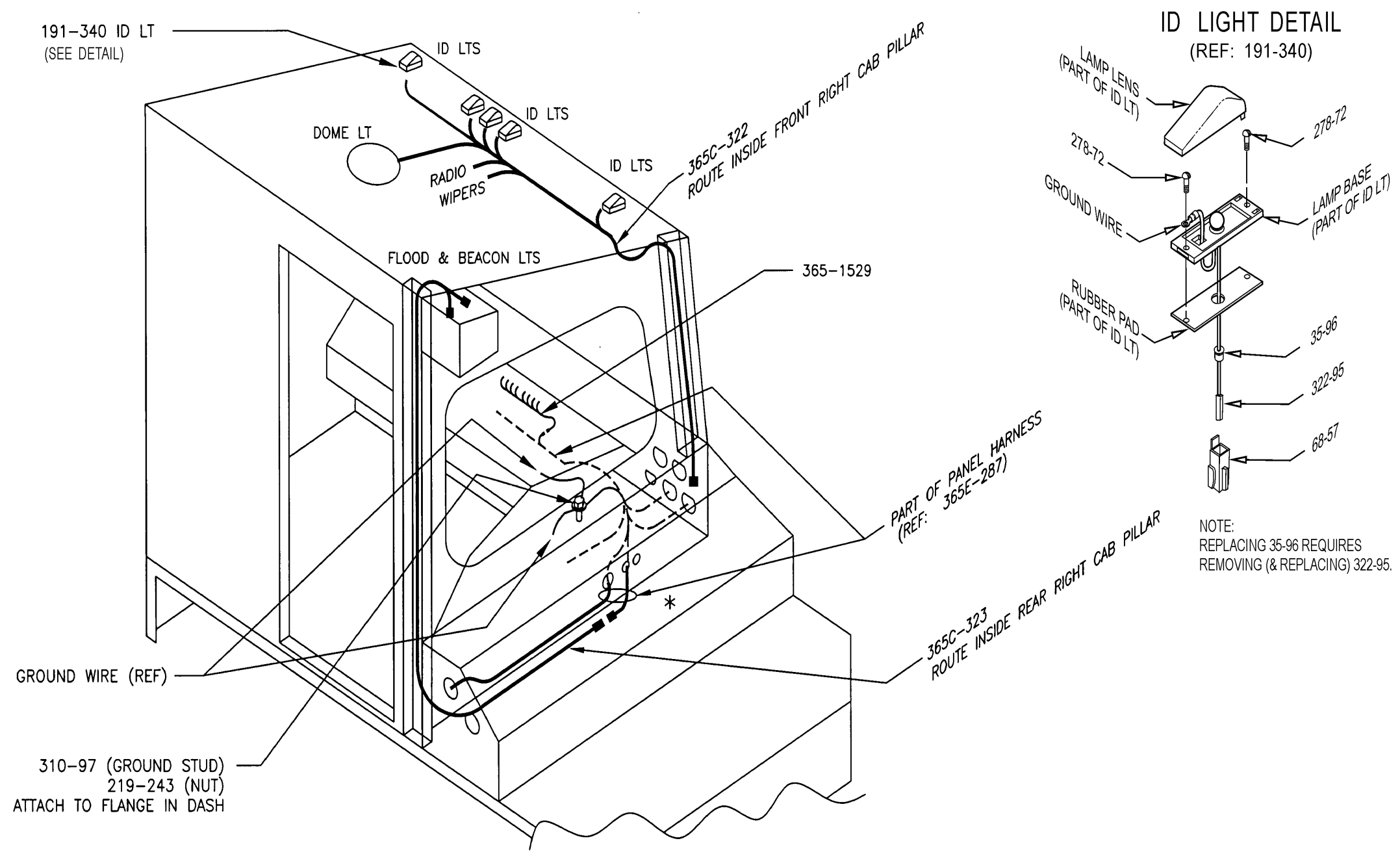
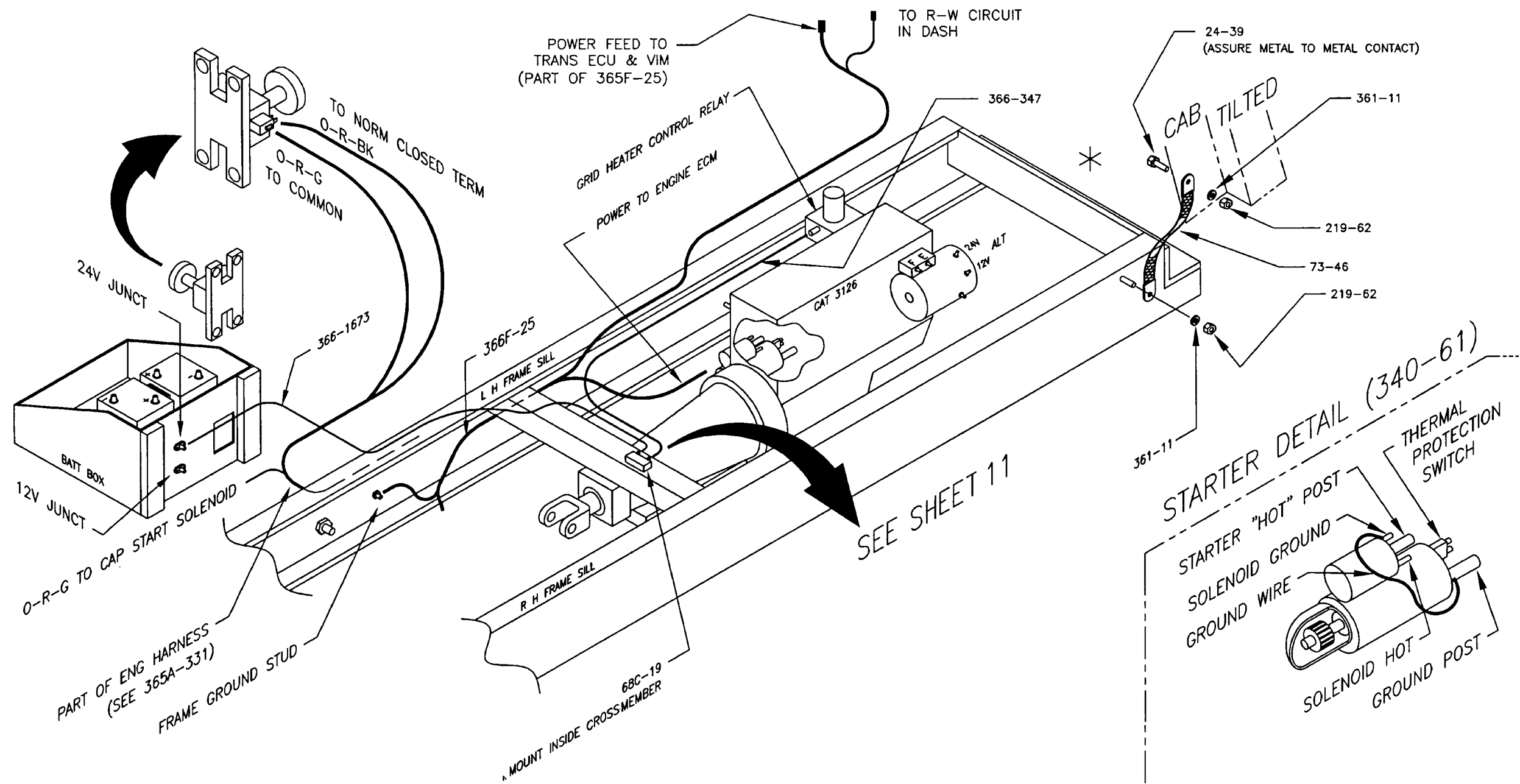


Figure 4. Vehicle Electrical Cable Routing (Sheet 3 of 11).



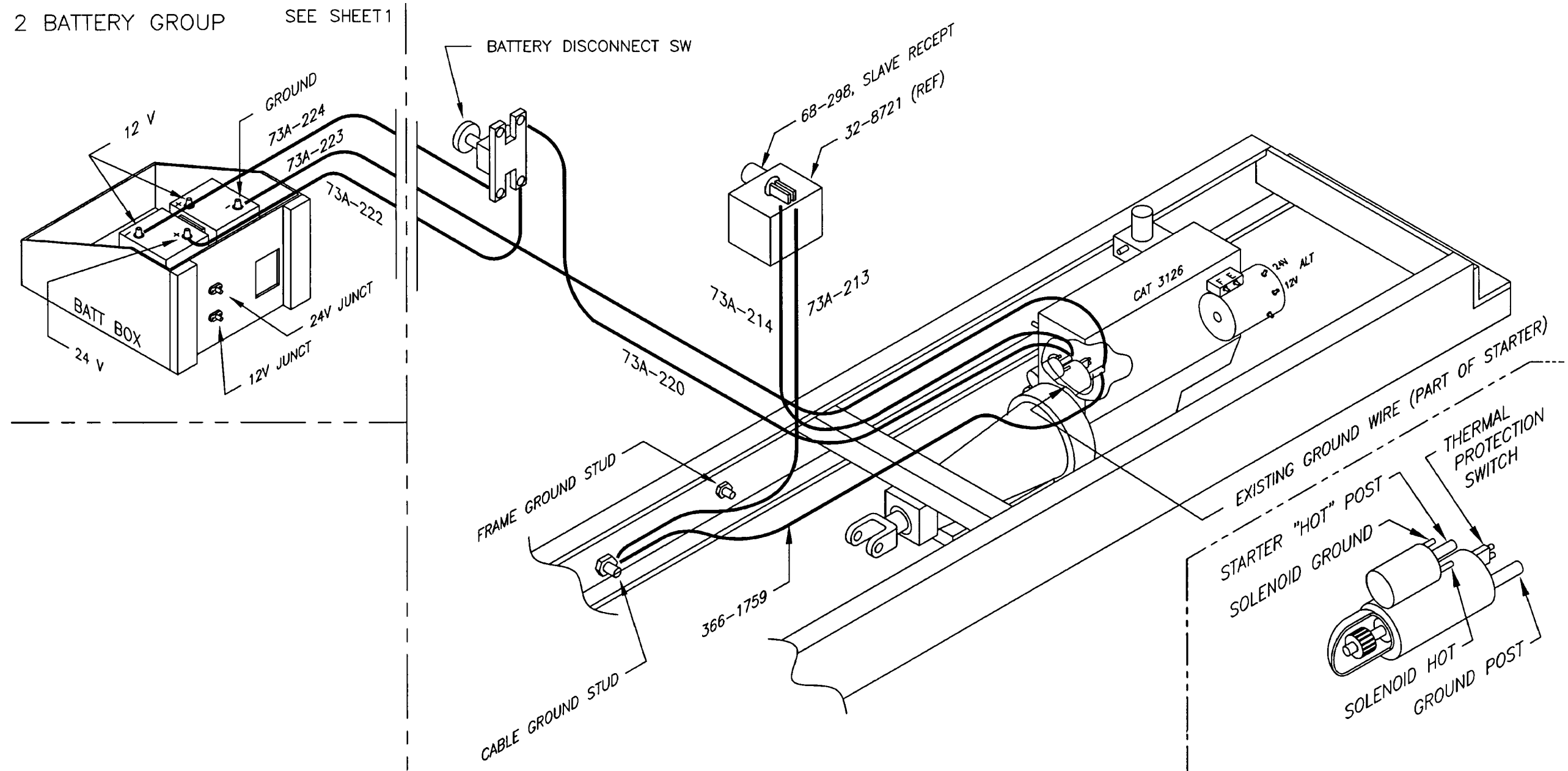


376-602

Figure 4. Vehicle Electrical Cable Routing (Sheet 4 of 11).



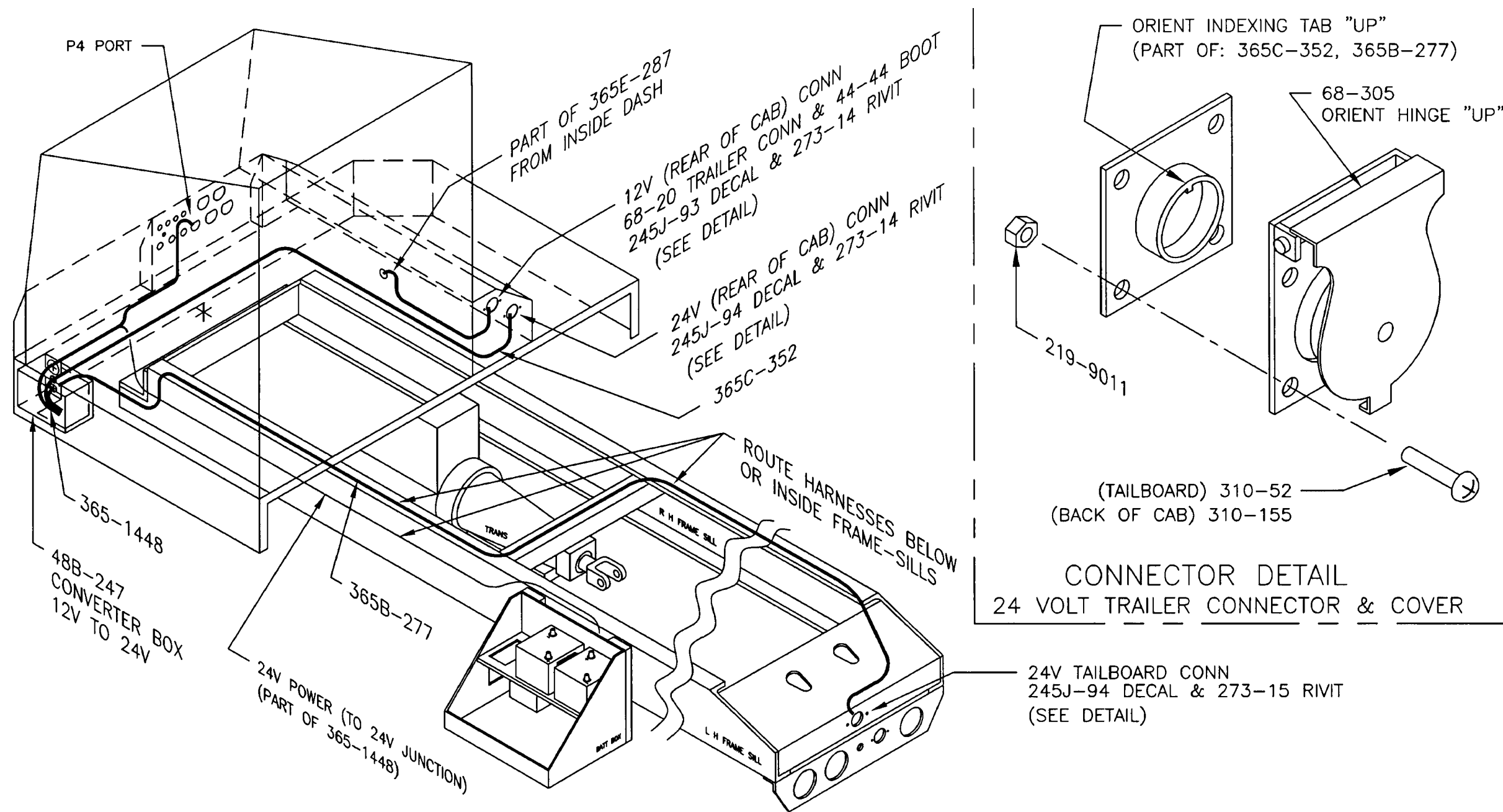




376-603

Figure 4. Vehicle Electrical Cable Routing (Sheet 5 of 11).





376-604

Figure 4. Vehicle Electrical Cable Routing (Sheet 6 of 11).



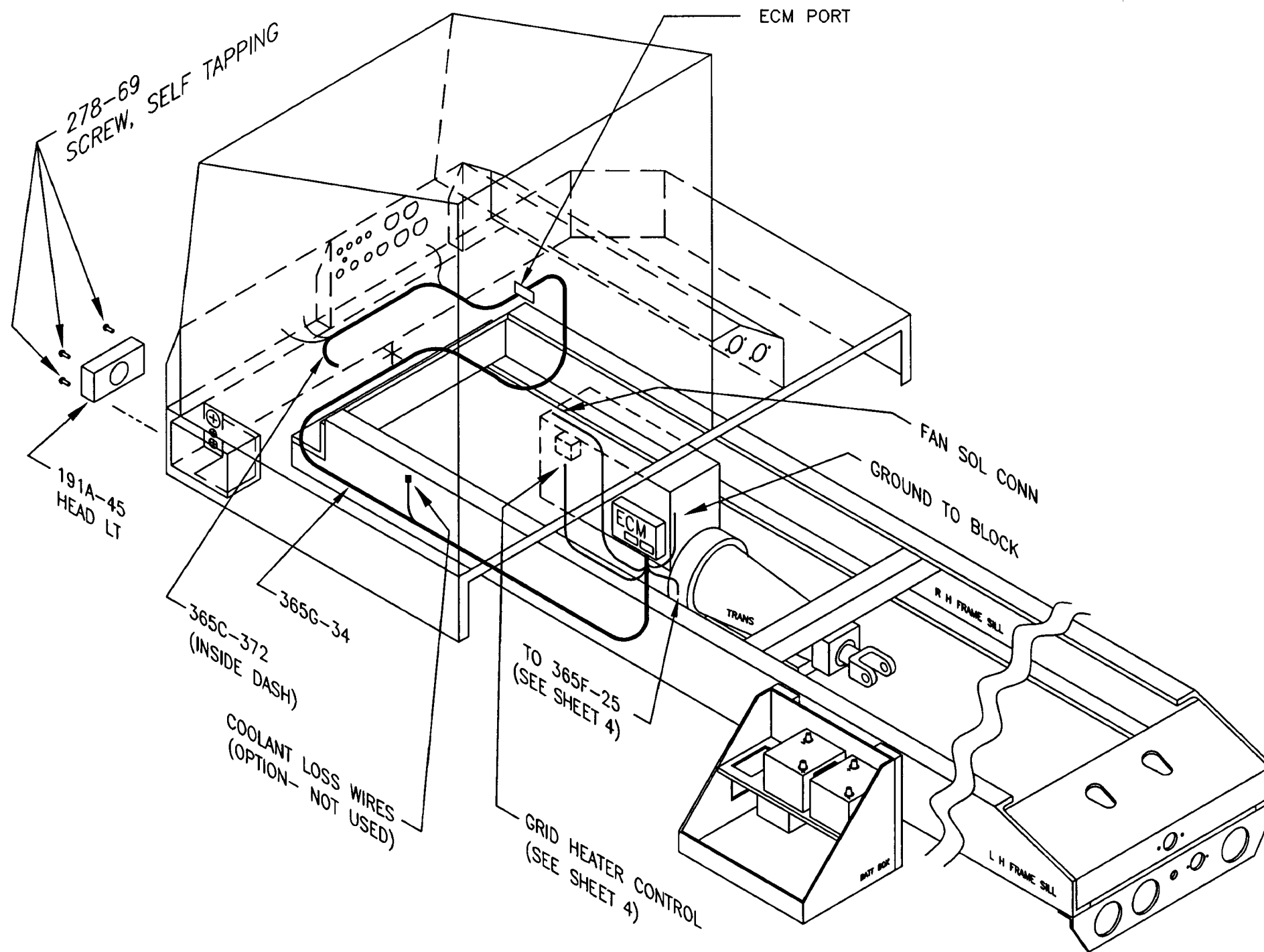
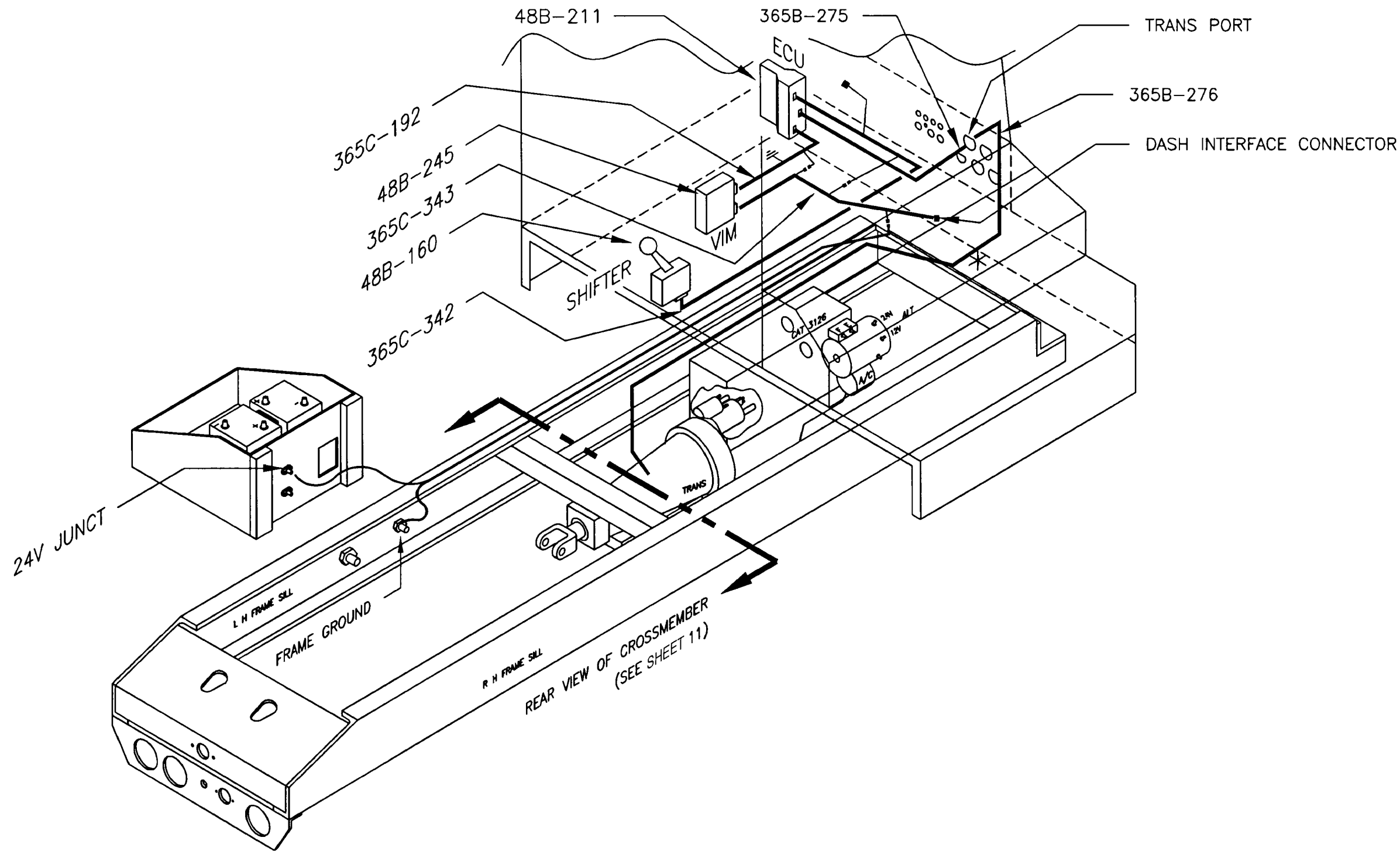


Figure 4. Vehicle Electrical Cable Routing (Sheet 7 of 11).



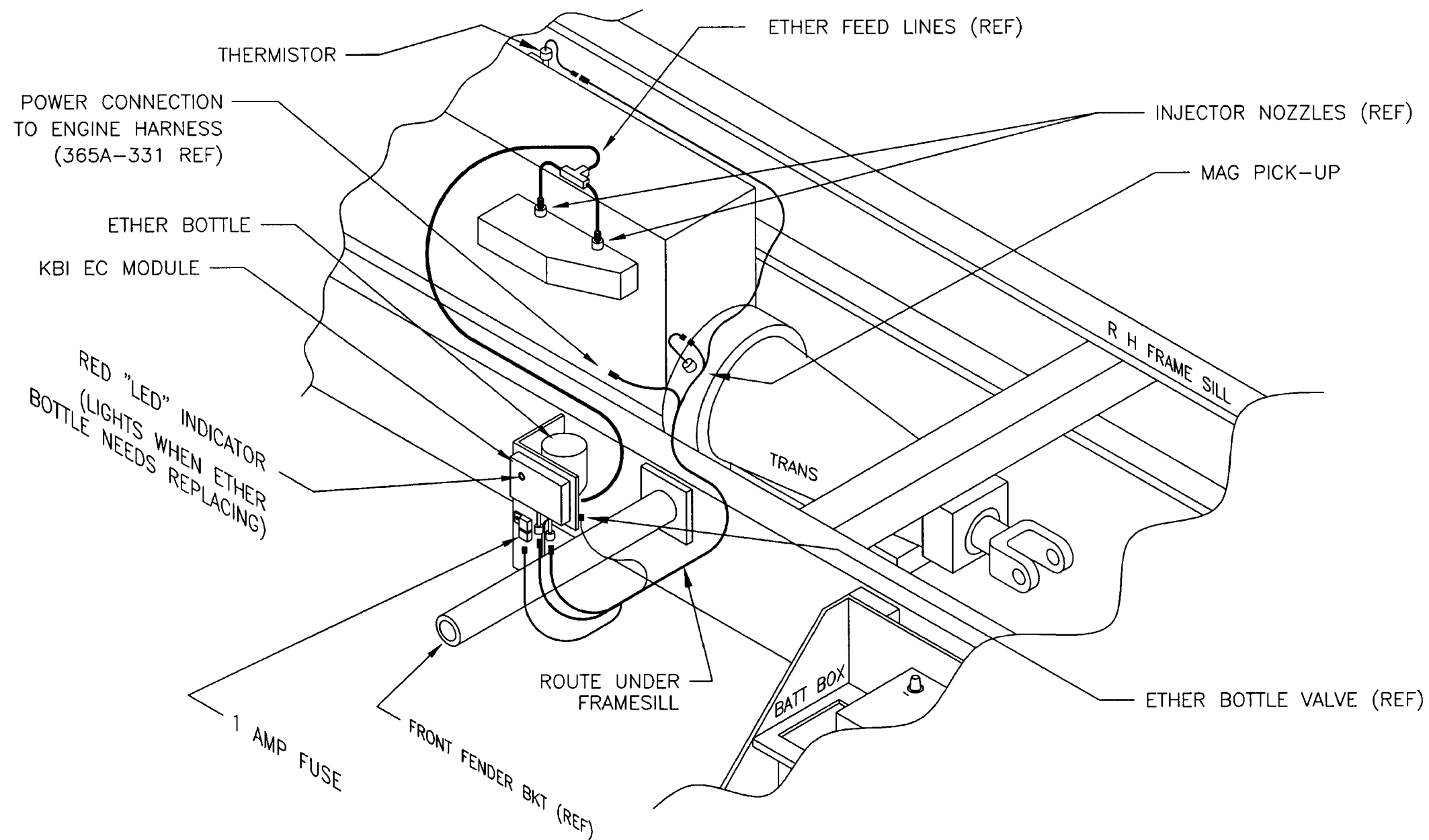


376-606

Figure 4. Vehicle Electrical Cable Routing (Sheet 8 of 11).







376-607

Figure 4. Vehicle Electrical Cable Routing (Sheet 9 of 11).



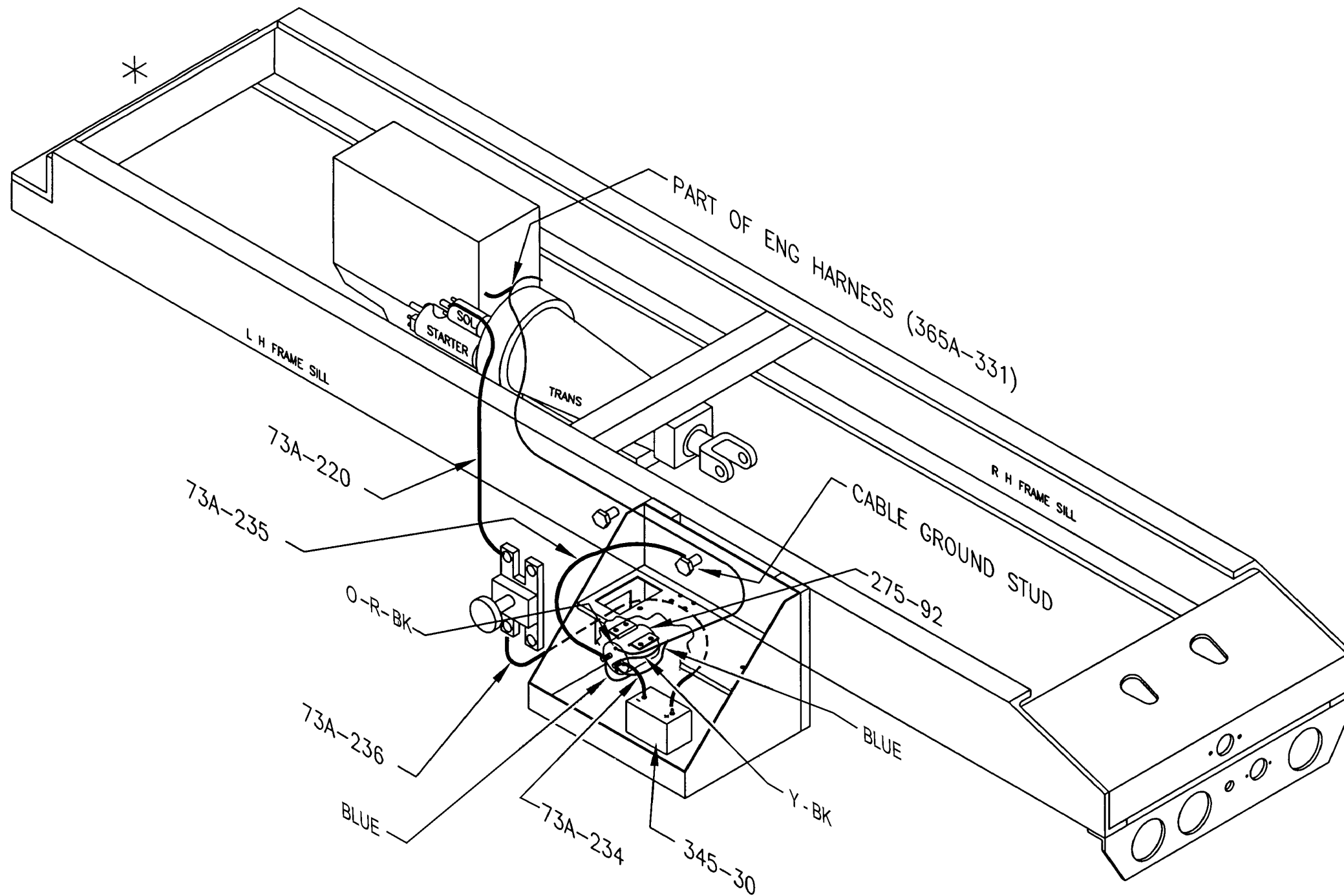
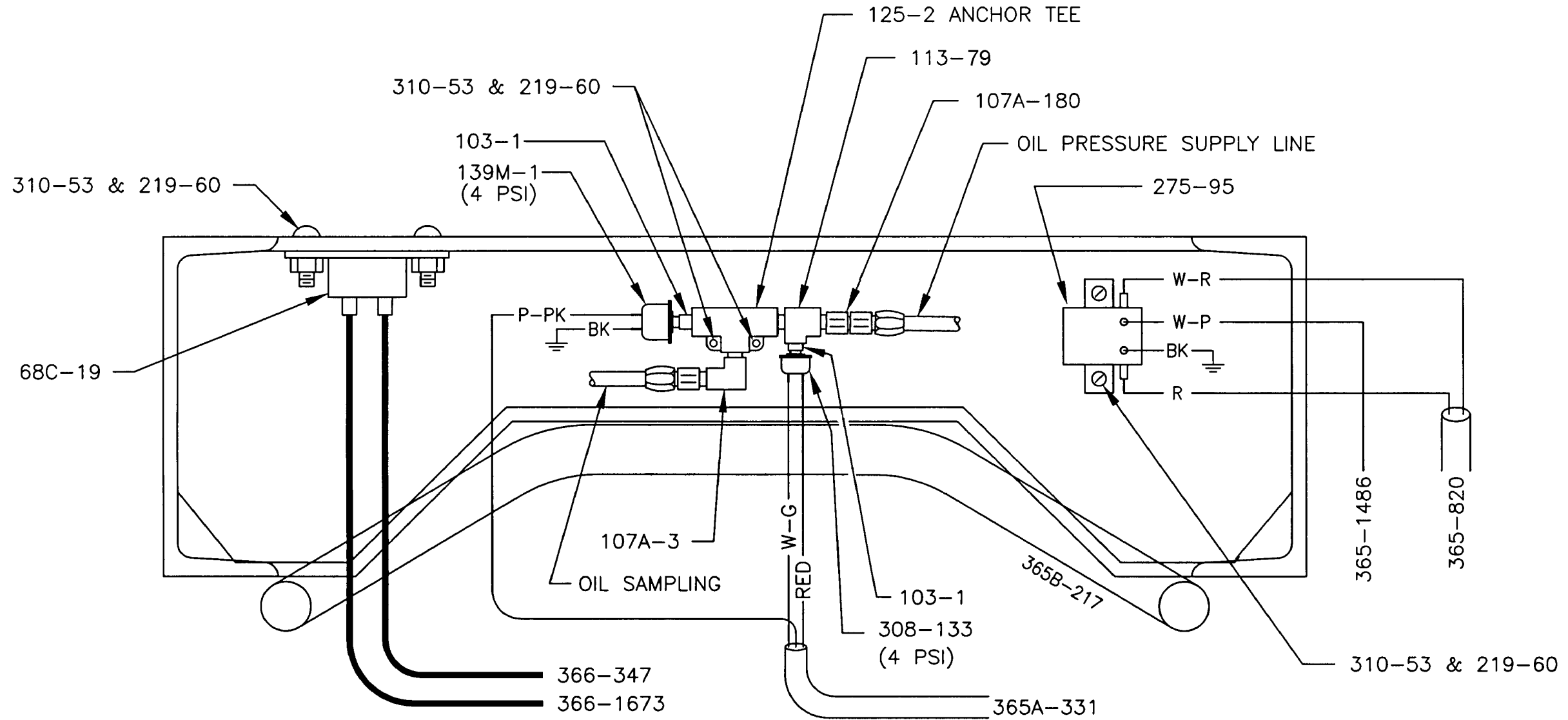


Figure 4. Vehicle Electrical Cable Routing (Sheet 10 of 11).





TRANSMISSION CROSSMEMBER  
(VIEWED FROM ENGINE AREA)


Figure 4. Vehicle Electrical Cable Routing (Sheet 11 of 11)



By Order of the Secretary of the Army:

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

Official:

  
JOEL B. HUDSON  
*Administrative Assistant to the*  
*Secretary of the Army*  
0310004

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Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).

DATE

20 Dec 03

TO: (Forward to proponent of publication or form) (Include ZIP Code)  
 AMSTA-LC-CI/TECH PUBS, TACOM-RI  
 1 Rock Island Arsenal  
 Rock Island, IL 61299-7630

FROM: (Activity and location) (Include ZIP Code)  
 125th Transportation Company  
 ATTN: Motor SGT (SGT Wilson)  
 Ft. Riley, KA 78665-4000

**PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS**

PUBLICATION/FORM NUMBER TM 9-2320-312-24-1	DATE 17 July 2003	TITLE Unit, Direct Support, and General Support Maintenance Manual for M878A2 Yard Tractor
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ITEM	PAGE	PARA-	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON
	0017 00-2					Part number supplied for item 2 is incorrect.

**SAMPLE**

\* Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE Johnny Wilson, E-5, MOTOR SGT	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION DSN 867-7967	SIGNATURE
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DATE  
16 December 2003

**TO:** (Forward to proponent of publication or form) (Include ZIP Code)  
AMSTA-LC-CI/TECH PUBS  
1 Rock Island Arsenal  
Rock Island, IL 61299-7630

**FROM:** (Activity and location) (Include ZIP Code)  
158<sup>th</sup> Transportation Company  
ATTN: Motor SGT (SGT Wilson)  
Ft. Riley, KA 78665-4000

**PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS**

PUBLICATION/FORM NUMBER

DATE

TITLE

TM 9-2320-312-24-1

17 December 2003

Unit, Direct Support, and General Support Maintenance Manual for M878A2 Yard Tractor

ITEM	PAGE	PARA	LINE	FIGURE NO.	TABLE
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RECOMMENDED CHANGES AND REASON

0018-00-5

Part number supplied for item 5 is wrong

**SAMPLE**

\* Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE

TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION

SIGNATURE

Johnny Wilson, E-5, MOTOR SGT

DSN 867-7967

<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is ODISC4.						Use Part II ( <i>reverse</i> ) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
TO: ( <i>Forward to proponent of publication or form</i> ) ( <i>Include ZIP Code</i> ) AMSTA-LC-CI / TECH PUBS, TACOM-RI 1 Rock Island Arsenal, Rock Island, IL 61299-7630						FROM: ( <i>Activity and location</i> ) ( <i>Include ZIP Code</i> )	
<b>PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS</b>							
PUBLICATION/FORM NUMBER TM 9-2320-312-24-1						DATE 17 December 2003	TITLE Unit, Direct Support, and General Support M878A2
ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <i>(Provide exact wording of recommended changes, if possible).</i>	
<i>* Reference to line numbers within the paragraph or subparagraph.</i>							
TYPED NAME, GRADE OR TITLE						TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

<b>TO:</b> <i>(Forward direct to addressee listed in publication)</i> AMSTA-LC-CI/TECH PUBS, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630	<b>FROM:</b> <i>(Activity and location) (Include ZIP Code)</i>	<b>DATE</b>
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**PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS**

<b>PUBLICATION NUMBER</b> TM 9-2320-312-24-1	<b>DATE</b> 17 Dec 2003	<b>TITLE</b> Unit, Direct Support, and General Support Maintenance Manual for M878A2 Yard Tractor
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PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

**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.)*

<b>TYPED NAME, GRADE OR TITLE</b>	<b>TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION</b>	<b>SIGNATURE</b>

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## THE METRIC SYSTEM AND EQUIVALENTS

<p><b>Linear Measure</b></p> <p>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</p> <p><b>Weights</b></p> <p>1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces          1 Kilogram = 1000 Grams = 2.2 Pounds          1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons</p> <p><b>Liquid Measure</b></p> <p>1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces          1 Liter = 1000 Milliliters = 33.82 Fluid Ounces</p>	<p><b>Square Measure</b></p> <p>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</p> <p><b>Cubic Measure</b></p> <p>1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches          1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet</p> <p><b>Temperature</b></p> <p><math>5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}</math>          212° Fahrenheit is equivalent to 100° Celsius          90° Fahrenheit is equivalent to 32.2° Celsius          32° Fahrenheit is equivalent to 0° Celsius  <math>9/5 \text{ C}^{\circ} + 32 = \text{F}^{\circ}</math></p>
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## APPROXIMATE CONVERSION FACTORS

To Change	To	Multiply By
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Sq Inches	Sq Centimeters	6.451
Sq Feet	Sq Meters	0.093
Sq Yards	Sq Meters	0.836
Sq Miles	Sq Kilometers	2.590
Acres	Sq Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Sq Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

To Change	To	Multiply By
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Sq Centimeters	Sq Inches	0.155
Sq Meters	Sq Feet	10.764
Sq Meters	Sq Yards	1.196
Sq Kilometers	Sq Miles	0.386
Sq Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Sq Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621

