

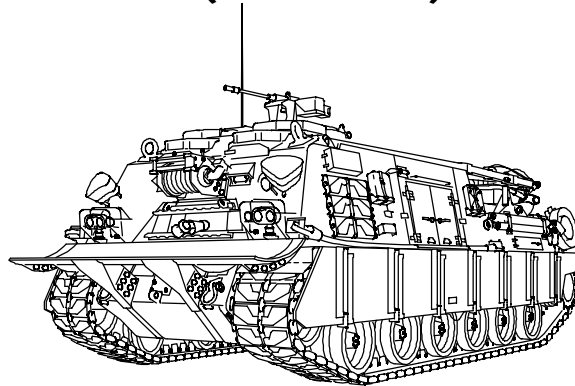
TM 9-2350-292-34
MARINE CORPS TM 07769B-34/3

TECHNICAL MANUAL

**DIRECT SUPPORT AND GENERAL
SUPPORT MAINTENANCE MANUAL**

FOR

**RECOVERY VEHICLE, HEAVY,
FULL-TRACKED: M88A2
(NSN 2350-01-390-4683)
(EIC: ACQ)**



This manual supercedes TM 9-2350-292-34 dated 1 October 2000.
Distribution Statement A: Approved for public release; distribution is unlimited.

01 JANUARY 2002
HEADQUARTERS, DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. MARINE CORPS

WARNING SUMMARY



CARBON MONOXIDE POISONING IS DEADLY

Carbon monoxide is a colorless, odorless, DEADLY POISONOUS gas and when breathed deprives the body of oxygen and causes SUFFOCATION. Breathing air with carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, a sleepy feeling, and coma. Permanent BRAIN DAMAGE or DEATH can result from severe exposure.

The following precautions MUST be followed to ensure personnel are safe whenever the personnel heater, main, or auxiliary engine of any vehicle is operated for any purpose.

DO NOT operate personnel heater or engine of vehicle in enclosed area without adequate ventilation.

DO NOT idle engine for long periods without ventilator blower operation. If tactical situation permits, open hatches.

DO NOT drive any vehicle with inspection plates, cover plates, or engine compartment doors removed unless necessary for maintenance purposes.

NEVER sleep in a vehicle when the heater is operating or engine is idling.

BE ALERT at all times during vehicle operation for exhaust odors and exposure symptoms. If either are present, IMMEDIATELY EVACUATE AND VENTILATE the area. Affected personnel treatment shall be: expose to fresh air; keep warm; DO NOT PERMIT PHYSICAL EXERCISE; if necessary, administer artificial respiration as described in FM 21-11 and get medical attention.

BE AWARE; neither the gas particulate filter unit nor field protection mask for nuclear-biological-chemical protection will protect you from carbon monoxide poisoning.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS ADEQUATE VENTILATION



EXHAUST GASES CAN KILL

Brain damage or death can result from heavy exposure. Precautions must be followed to ensure crew safety when personnel heater, main, or auxiliary engine of any vehicle is operated for any purpose.

- 1 Do not operate vehicle engine in enclosed areas.
 - 2 Do not idle vehicle engine with vehicle windows closed.
 - 3 Be alert at all times for exhaust odors.
 - 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 open air.
 - Keep person warm.
 - Do not permit physical exercise.
 - Administer artificial respiration, if necessary*
 - Seek immediate medical attention.
- *For artificial respiration, refer to FM 21-11.
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 EXHAUST POISONING IS ADEQUATE VENTILATION



CHEMICAL AGENT RESISTANT COATING (CARC) PAINTING HAZARD

CARC paint contains isocyanate (HDI) which is highly irritating to skin and respiratory system. High concentrations of HDI can produce symptoms of itching and reddening of skin, a burning sensation in throat and nose and watering of the eyes. In extreme concentrations, HDI can cause cough, shortness of breath, pain during respiration, increased sputum production, and chest tightness. The following precautions must be taken whenever using CARC paint:

ALWAYS use air line respirators when using CARC paint unless air sampling shows exposure to be below standards. Use chemical cartridge respirator if air sampling is below standards.

DO NOT let skin or eyes come in contact with CARC paint. Always wear protective equipment (gloves, ventilation mask, safety goggles, etc.).

DO NOT use CARC paint without adequate ventilation.

NEVER weld or cut CARC-coated materials.

DO NOT grind or sand painted equipment without high-efficiency air purifying respirators in use.

BE AWARE of CARC paint exposure symptoms; symptoms can occur a few days after initial exposure. Seek medical help immediately if symptoms are detected.



NOISE HAZARD

Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Wear approved hearing protection devices when working in high noise level areas. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with DA PAM 40-501. Hearing loss occurs gradually but becomes permanent over time.



FALLING EQUIPMENT HAZARDS

Never crawl under equipment when performing maintenance unless equipment is securely blocked. Equipment may fall and cause serious injury or death to personnel.

Keep clear of equipment when it is being raised or lowered. Equipment may fall and cause serious injury or death to personnel.

Do not work on any item supported by only lift jacks or hoist. Always use blocks or proper stands to support the item prior to work. Equipment may fall and cause serious injury or death to personnel.

Do not allow heavy components to swing while suspended by lifting device. Equipment may strike personnel and cause injury.

Exercise extreme caution when working near a cable or chain under tension. A snapped cable, shifting or swinging load may result in injury or death to personnel.

All personnel must stand clear during lifting operations. A swinging or shifting load may cause injury or death to personnel.

Unless otherwise specified, perform all maintenance procedures with all equipment lowered to the ground, transmission in neutral, parking/emergency brake applied, and the engine stopped to prevent possible injury to personnel due to falling equipment or rolling vehicle (ref FM 21-11).



FIRE HAZARD

Diesel fuel and combustible materials are used in operation and maintenance of this equipment. Do not smoke or allow open flames or sparks in areas where diesel fuel and combustible materials are used or stored. DEATH or severe injury may result if personnel fail to observe this precaution. If you are burned, seek medical aid immediately (ref FM 21-11).

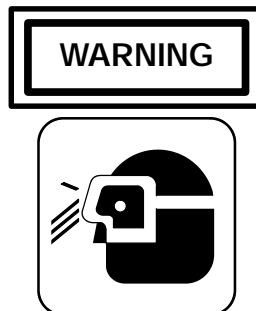


DO NOT USE MINERAL SPIRITS OR PAINT THINNER

TO CLEAN THE M88 HRV.

Mineral spirits and paint thinners are highly toxic and combustible. Prolonged breathing can cause dizziness, nausea, and even death (ref FM 21-11).

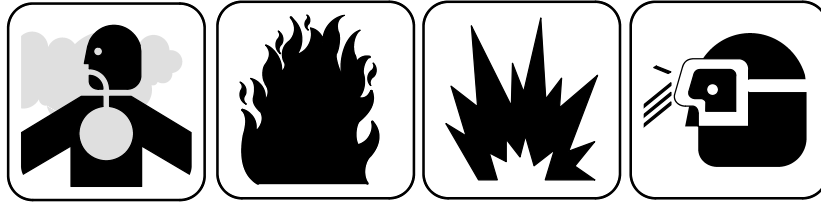
DO NOT USE THESE MATERIALS



Use care when removing snap and retaining rings. Snap and retaining rings are under spring tension and can act as projectiles when released and could cause severe eye injury.

Use care when cutting lockwire. Wire can act as a projectile when cut and could cause severe eye injury.

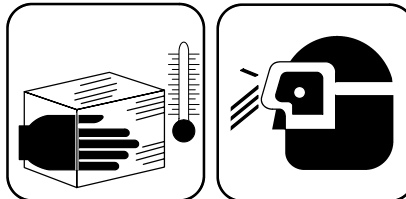
WARNING



DRY-CLEANING SOLVENT

Dry-cleaning solvent (P-D-680) used to clean parts, is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat. Do not smoke when using solvent. Failure to do so could cause **SERIOUS INJURY**. If you become dizzy while using dry-cleaning solvent, get fresh air immediately, and if necessary, get medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash with water immediately, and obtain medical aid (ref FM 21-11).

WARNING



FIRE EXTINGUISHING SYSTEM HAZARDS

Fire bottles can discharge and injure personnel. Insert antirecoil plugs, lock pins, and cotter pins before working on or near bottles.

CO² can cause frostbite or eye injury. Wear protective clothing and goggles to avoid contact. If CO² contacts hands, hold hands under armpits or in warm water until warmed. If CO² contacts eyes, flush with large amounts of water and get medical attention immediately.

WARNING

FASTENERS AND ATTACHING HARDWARE HAZARD

Always use the same fastener part number (or equivalent) when replacing fasteners. Do not risk using a fastener of less quality; do not mix metric and inch (customary) fasteners. Mismatched or incorrect fasteners can result in damage, malfunction, or injury.



NBC EXPOSURE AND VEHICLE AIR FILTER HAZARDS

NBC-contaminated air filters must be handled and disposed of only by authorized and trained personnel. The unit commander or senior officer in charge of maintenance personnel must ensure that prescribed protective clothing (FM 3-4) is used, and prescribed safety measures and decontamination procedures (FM 3-5) are followed. The local unit SOP is responsible for final disposal of contaminated air filters. Failure to comply may cause severe injury or death to personnel.

The NBC protection filters use a type of carbon that contains Chromium VI. This a known carcinogen if inhaled or swallowed. Damaged or unusable filters are classified as hazardous waste.

- a. Do not throw away damaged or unusable filters as trash.
- b. Turn in damaged or unusable filters to your Hazardous Waste Management Office or Defense Reutilization and Marketing Office (DRMO).

Filters are completely safe to handle and use if they are not damaged in such a way that carbon leaks from them. If carbon does leak, use protection such as a dust respirator to cover nose and mouth and put carbon in container such as self-sealing plastic bag; turn in to Hazardous Waste Management Office or DRMO. Disposal of hazardous waste is restricted by law. Violation is subject to criminal penalties.

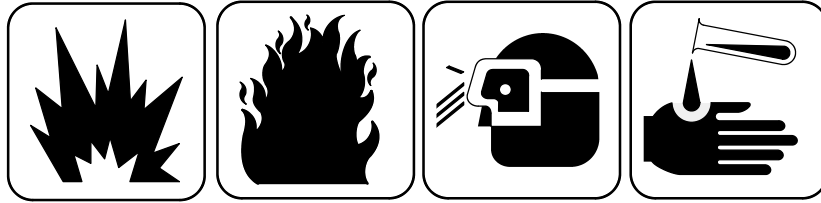


ELECTRICAL HAZARDS

Be certain vehicle MASTER switch is OFF when working on vehicle electrical system to prevent injury due to electrical shock (ref FM 21-11).

Remove rings, bracelets, wristwatches and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

WARNING



BATTERY HAZARDS

Lead-acid gasses can explode. Do not smoke, have open flames, or make sparks around a battery, especially if caps are off. If a battery is gassing, it can explode and cause injury to personnel.

- a. Ventilate when charging or using in a enclosed space.
- b. Wear safety goggles and acid-proof gloves when battery cover must be removed or when adding electrolyte.
- c. Avoid electrolyte contact with skin, eyes, or clothing. If battery electrolyte spills, take immediate action to stop burning effects:

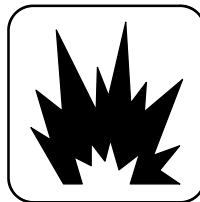
External: Immediately flush with cold running water to remove all acid.

Eyes: Flush with cold water for at least 15 minutes. Seek immediate medical attention.

Internal: Drink large amounts of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Seek immediate medical attention.

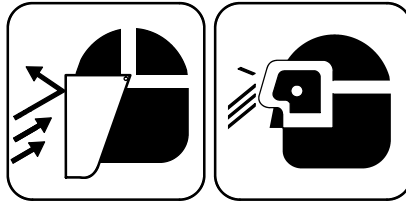
Clothing or Vehicle: Wash at once with cold water. Neutralize with baking soda or household ammonia solution.

WARNING



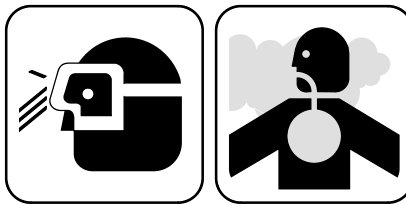
EXPLOSION HAZARD

Cylinders containing compressed gasses must not be dropped, struck or subjected to any temperature above +140°F (+60°C). This could result in an explosion and injury to personnel (ref FM 21-11).



COMPRESSED AIR HAZARD

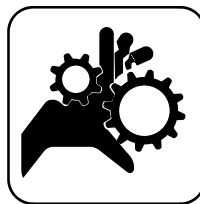
Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).



ADHESIVE HAZARDS

Adhesive causes immediate bonding on contact with eyes, skin, or clothing and also gives off harmful vapors. Wear protective goggles and use it in a well-ventilated area. If adhesive gets in eyes, try to keep eyes open; flush eyes with water for 15 minutes and get immediate medical attention.

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



ROTATION HAZARD

When working on a running engine, provide shielding for exposed rotating parts. Tools, clothing, or hands can get caught and cause serious injury to personnel.



FIRE RETARDANT HYDRAULIC OIL (FRH)

FRH hydraulic fluid may contain Tricresyl Phosphate which if taken internally, can cause paralysis. Hydraulic fluid may be absorbed through the skin. Follow these precautions.

Wear long sleeves, gloves, goggles, and face shield when using FRH.

If FRH contacts eyes, immediately flush eyes with water and get immediate medical attention.

If FRH contacts skin, thoroughly wash with soap and water.

Wash hands thoroughly before eating or smoking after using FRH.



To avoid personal injury, use an assistant when lifting parts or components that weigh more than 40 lbs (23 kg). Failure to comply may cause injury to personnel.



Never disconnect any hydraulic line or fitting without first dropping pressure to zero. High-pressure hydraulics operate this equipment. Refer to vehicle operator and maintenance manuals for hydraulic oil pressure. A high-pressure oil stream can pierce body and cause severe injury to personnel.

Diesel or hydraulic fluid leaks under pressure may not be visible. Use a piece of wood or cardboard to find leaks, DO NOT use a bare hand. Wear safety goggles for protection. Failure to comply may result in injury to personnel.

TM 9-2350-292-34

INSERT LATEST CHANGED PAGES/WORK PACKAGES. DESTROY SUPERSEDED DATA.

LIST OF EFFECTIVE PAGES/WORK PACKAGES

Note: This manual supercedes TM 9-2350-292-34 dated 01 October 2000.

Date of issue for original and changed pages/work packages are:

Original 01 JANUARY 2002

TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 54. TOTAL NUMBER OF WORK PACKAGES IS 91 CONSISTING THE FOLLOWING:

Page/WP No.	*Change No.
Cover	0
Copyright	0
a - j	0
A	0
B blank	0
i - v	0
vi blank	0
WP 0001-00 - WP 091 00 ..	0
2028 Sample	0
2028 (2 copies)	0
Index-1 - Index-4	0
FP1 - FP28	0
Conversion Table	0
Measurement Page	0
Back Cover	0

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TECHNICAL MANUAL
DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL
FOR
RECOVERY VEHICLE, HEAVY
FULL TRACKED: M88A2
(NSN 2350-01-390-4683) (EIC: ACQ)

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028 (Recommended Changes to Equipment Technical Publications), through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is <http://aeprs.ria.army.mil>. If you need a password, scroll down and click on "ACCESS REQUEST FORM". The DA Form 2028 is located in the ON-LINE FORMS PROCESSING section of the AEPS. Fill out the form and click on SUBMIT. Using this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax or email your letter, DA Form 2028, direct to: Technical Publication Information Office, TA-COM-RI, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The email address is TACOM-TECH-PUBS@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

Marine Corps users submit NAVMC Form 10772 directly to: Commanding General, Marine Corps Logistics Base (Code 850), Albany GA 31704-5000.

A reply will be furnished directly to you

TABLE OF CONTENTS

WP Sequence No.

WARNING SUMMARY

HOW TO USE THIS MANUAL

General Information 0001 00

CHAPTER 1 – DESCRIPTION AND THEORY OF OPERATION

Equipment Description and Data 0002 00

Principles of Operation 0003 00

CHAPTER 2 – TROUBLESHOOTING PROCEDURES

Troubleshooting Instructions and Quick Guide to Troubleshooting (Symptom/Malfunction) Index ... 0004 00

Engine Overview 0005 00

Engine Cranks But Will Not Start in Cold Weather 0006 00

Engine Has Low Stall RPM, Does Not Develop Full Power, and Has Excessive Smoke From One
or Both Banks of Cylinders 0007 00

Engine Has Low Stall RPM, Does Not Develop Full Power, But Exhaust Smoke is Normal 0008 00

Engine Has Excessive White Smoke 0009 00

Hydraulics System Overview 0010 00

Main Hydraulics System Fails to Operate (No Components Function). Main Hydraulic Pump Fails
to Engage 0011 00

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TABLE OF CONTENTS – Continued

WP Sequence No.

CHAPTER 2 – TROUBLESHOOTING PROCEDURES – Continued

Main Hydraulics Pump Fails to Disengage	0012 00
Main Hydraulics System is Noisy	0013 00
Main Winch Fails to Operate	0014 00
Main Winch Operates Slowly or Lacks Power	0015 00
Main Winch Inhauls But Will Not Payout	0016 00
Main Winch Will Payout But Will Not Inhaul	0017 00
Main Winch Will Not Hold Load	0018 00
Main Winch Power is Not Reduced When Winch Override Switch is in Override Position	0019 00
Main Winch Level Winder Fails to Operate	0020 00
Auxiliary Winch Fails to Operate	0021 00
Auxiliary Winch Will Payout But Will Not Inhaul	0022 00
Auxiliary Winch Will Inhaul But Will Not Payout	0023 00
Auxiliary Winch Creeps in Either Direction With Control Handle in Neutral	0024 00
Spade Fails to Operate	0025 00
Spade Will Not Hold Position	0026 00
Hoist Boom Fails to Operate or Only Operates Partially	0027 00
Hoist Boom Will Not Hold in Any Position (Hoist Boom Creeps)	0028 00
Hoist Boom Live Operation Does Not Function (Hoist Boom Will Not Stop Automatically, Stayline Cables Go Slack During Operation or Hoist Boom Can Be Stowed Without Activating the Hoist Boom Safety Valve Control Lever)	0029 00
Hoist Winch Fails to Operate	0030 00
Hoist Winch Will Raise But Will Not Lower	0031 00
Hoist Winch Will Lower But Will Not Raise	0032 00
Hoist Winch Creeps With Control in Neutral	0033 00
Auxiliary Hydraulics System Fails to Operate or Does Not Develop Sufficient Pressure	0034 00

CHAPTER 3 – GENERAL MAINTENANCE

General Maintenance Instructions	0035 00
--	---------

CHAPTER 4 – POWERPACK

Removal and Installation of Engine and Transmission and Related Components	0036 00
Separation of Engine and Transmission Assemblies	0037 00

CHAPTER 5 – FUEL SYSTEM

Electrical Fuel Pump Repair	0038 00
Right Fuel Tank Replacement	0039 00
Left Fuel Tank Replacement	0040 00
Front Fuel Tank Replacement	0041 00
Fuel Tank Repair	0042 00

CHAPTER 6 – ELECTRICAL SYSTEM

Wiring Harness and Cable Repair	0043 00
---------------------------------------	---------

CHAPTER 7 – TRANSMISSION

Transmission Control Assembly Repair	0044 00
--	---------

CHAPTER 8 – WINCHES, SPADE AND HOIST BOOM

Hoist Winch Assembly and Supports Replacement	0045 00
Hoist Winch Hydraulic Motor Replacement	0046 00
Main Winch Replacement	0047 00
Main Winch Repair	0048 00
Main Winch Layer Sensor Adjustment	0049 00
Main Winch Side Mounting Brackets Replacement	0050 00

TABLE OF CONTENTS – Continued

WP Sequence No.

CHAPTER 8 – WINCHES, SPADE AND HOIST BOOM – Continued

Main Winch Roller Spring Assembly Replacement	0051 00
Main Winch Upper Roller Replacement	0052 00
Main Winch Lower Roller Replacement	0053 00
Main Winch Manifold, Tubes, Fittings, and Flange Replacement	0054 00
Level Winder Hydraulic Cylinder Replacement	0055 00
Level Winder Control Valve Replacement	0056 00
Level Winder Check Valve Replacement	0057 00
Roller Mounting Bracket Replacement	0058 00
Level Winder Plate Assembly Replacement	0059 00
Auxiliary Winch Assembly Repair	0060 00
Spade Lock Assembly Repair	0061 00
Spade Cylinder and Link Replacement	0062 00
Main Winch and Spade Hydraulic Hoses, Fittings, Adapters, and Valve Assemblies Replacement ..	0063 00
Hoist Boom Assembly Replacement	0064 00
Hoist Boom Actuating Cylinder and Boom Foot Boot Replacement	0065 00
Stayline Actuating Cylinder Replacement	0066 00
Boom Lever Replacement	0067 00

CHAPTER 9 – SPECIAL PURPOSE KITS

Bilge Pump Assembly Repair	0068 00
----------------------------------	---------

CHAPTER 10 – HYDRAULIC SYSTEM

Main Hydraulic Pump Support Replacement	0069 00
Power Take-off (PTO) Shaft Repair	0070 00
Main Hydraulic Pump Assembly Repair	0071 00
Main/Hoist Winch Directional Control Valve Assembly Repair	0072 00
Main Winch Power Reduction Manifold Assembly Repair	0073 00
Hydraulic Control Valve Manifold Assembly Repair	0074 00
RV2 Relief Valve Adjustment	0075 00
Load Test	0076 00
Boom Limit Valve Repair	0077 00
Hydraulic Reservoir Assembly Repair	0078 00

CHAPTER 11 – AUXILIARY GENERATOR AND ENGINE AND CONTROLS (APU)

Auxiliary Power Unit Engine Replacement	0079 00
Auxiliary Power Unit Engine Replacement (HATZ)	0080 00
Auxiliary Power Unit Chain Case, Chain, and Sprockets Repair	0081 00
Auxiliary Power Unit Chain Case, Chain, and Sprockets Repair (HATZ)	0082 00

CHAPTER 12 – CHEMICAL, BIOLOGICAL AND RADIOLOGICAL (CBR) EQUIPMENT

M2A2 Air Purifier Repair	0083 00
Air Purifier Control Unit Enclosure Assembly Repair	0084 00

CHAPTER 13 – WHEELS AND TRACKS

Adjusting Link and Components (New Configuration) Repair	0085 00
--	---------

CHAPTER 14 – SUPPORTING INFORMATION

References	0086 00
Expandable and Durable Items List	0087 00
Manufactured Items List	0088 00
Torque Limits	0089 00
Tool Identification List	0090 00
Mandatory Replacement Parts List	0091 00

TABLE OF CONTENTS – Continued

ALPHABETICAL INDEX INDEX-1
ELECTRICAL SCHEMATICS FP-1
HYDRAULIC SCHEMATICS FP-23

HOW TO USE THIS MANUAL

This manual was designed to provide you with the information you will need to perform DS/GS maintenance on the M88A2 HRV.

The information contained in this manual is presented in chapters and work packages. Each chapter is divided into work packages to cover the replacement and repair of the M88A2 HRV and its components. Where references are made to tables, figures, and work packages, refer to those portions of the text.

To find information relating to a specific component or system:

- Determine the specific name or function of the component/system.
- Find the name or function in the Index Listing, located in the back of this manual.
- Refer to appropriate work package(s) called out in the Index Listing.

To find information pertaining to a broader range of information (such as engine troubleshooting, component repair, and component descriptions):

- Identify the desired topic.
- Find the general topic in the Table of Contents, located in the front of this manual.
- Refer to appropriate work package(s) called out in the Table of Contents.

IMPORTANT

You must read and understand this manual BEFORE working on the M88A2 HRV.

MAINTENANCE

Maintenance procedures are to be performed in the sequence shown in the text and illustrations. Step 1 must be performed before step 2 and so on.

Equipment illustrations use numbers to identify parts of the system/components.

Throughout this manual the words WARNING, CAUTION, and NOTE will appear. There is a reason for every one of them.

GENERAL INFORMATION

0001 00

THIS WORK PACKAGE COVERS:General Information

SCOPE

Type of manual: Direct Support and General Support Maintenance.

Model number and equipment name: M88A2, Recovery Vehicle, Heavy.

Purpose of equipment: To provide for battlefield recovery (hoist/winch/tow) of vehicles up to and including the M1 series tank.

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, The Army Maintenance Management System (TAMMS) as contained in the Maintenance Management Update.

Accidents involving injury to personnel or damage to materiel will be reported on DA Form 285 (Accident Reporting) in accordance with AR 385-40.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS

If your M88A2 HRV needs improvement, let us know. Send us an Equipment Improvement Recommendation (EIR). You, the user, are the only one who can tell us what you don't like about our equipment. Let us know why you don't like the design or performance. Put it on a SF 368 (Product Quality Deficiency Report). Mail it to the address specified in DA PAM 738-750.

CORROSION PREVENTION AND CONTROL

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problem with the HRV be reported so that improvements can be made to prevent the problem in the future. 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. If a corrosion problem is identified, it can be reported using SF 368, (Product Quality Deficiency Report). Use of keywords such as "corrosion", "rust", "deterioration", or "cracking" will ensure that the information is identified as a CPC problem. SF 368 should be submitted to the address specified in DA PAM 738-750.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Refer to TM 750-244-6 for procedures on how to destroy the M88A2 HRV.

Below are some general guidelines to follow in destruction of equipment to prevent enemy use.

Destruction of the vehicle and equipment, when subject to capture or abandonment in a combat zone, will be undertaken only when such action is necessary in accordance with orders of, or policy established by, the Army commander.

In general, destruction of essential parts, followed by burning, will usually be sufficient to render the vehicle, and equipment useless. Time is usually critical.

Materiel must be damaged so that it cannot be restored to usable condition by either repair or cannibalization. If lack of time or personnel prevents destruction of all parts, give priority to destruction of parts hardest to replace. It is important that the same parts be destroyed on all vehicles to prevent construction of one complete vehicle from several damaged ones.

The procedure outlined below requires the use of demolition materials and explosives which normally may not be authorized items of issue to the using organization. The issue of these and related materials, and conditions under which destruction will be effected, are command decisions in each case, according to the tactical situation.

GENERAL INFORMATION - CONTINUED**0001 00****DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE - CONTINUED**

Varying degrees of damage to the armament and other equipment may be expected during destruction of the vehicle as outlined below:

1. Remove and empty portable fire extinguishers and discharge the fixed fire extinguisher system.
2. Smash all vital elements such as auxiliary power unit, batteries, switches, instruments, hydraulic valves, coupling devices, mechanical transmission, hydraulic pumps, and all accessible engine and transmission components. Slash hydraulic lines, electrical cables and harnesses.
3. Drain fuel and hydraulic oil tanks or puncture them as near the bottom as possible.
4. For the engine compartment, transmission, tracks, winches, and boom, prepare eleven, 2-pound demolition charges. Use 1-pound TNT blocks or equivalent together with the necessary detonating cord to make up the required charges. Place the required charges as follows:

Set the first charge on the accessory drive housing at the forward end of the engine.

Set the second and third charges on the engine, one on the left side and one on the right side.

Set the fourth charge between the engine and transmission.

Set the fifth and sixth charges on the track drive sprockets, one on the left side and one on the right side.

Set the seventh charge on the main winch motor.

Set the eighth and ninth charges on the hoisting boom at the boom crankarms, one on the left side and one on the right side.

Set the tenth and eleventh charges on the hoisting boom stayline crankarms, one on the left side and one on the right side.

Connect all eleven charges for simultaneous detonation with detonating cord.

5. Provide for dual priming to minimize the possibility of a misfire. For complete details on the use of demolition materials and methods of priming and detonating demolition charges, refer to FM 5-250. Training and careful planning are essential. The danger area is estimated to be 500 yards; elapsed time is approximately 10 minutes.

PREPARATION FOR STORAGE OR SHIPMENT

Refer to TM 9-2350-292-20-2 for the requirements for Administrative Storage and requirements for vehicle shipment.

WARRANTY INFORMATION

Refer to TB 9-2350-292-15 for warranty information pertaining to the M88A2 HRV.

GENERAL INFORMATION - CONTINUED**0001 00****NOMENCLATURE CROSS-REFERENCE LIST**

Nomenclature in this manual was chosen in accordance with the terms used for provisioning as they appear in the Repair Parts and Special Tools List (RPSTL) and Maintenance Allocation Chart (MAC).

A few tools and components are, however, referred to by names more common than those in the RPSTL. In many cases the more common name is a shorter name for the same component.

<u>OFFICIAL PROVISIONING NOMENCLATURE</u>	<u>MORE COMMON NAME</u>
Cable assembly	Wiring harness
Gauge rod	Dipstick, Bayonet gauge
Safety wire	Lockwire
Socket head screw key	Hex key

LIST OF ABBREVIATIONS

AAL	Additional Authorized List
AOAP	Army Oil Analysis Program
ATE	Automatic Test Equipment
BDAR	Battlefield Damage Assessment and Repair
BII	Basic Issue Item
_C	Degree Centigrade
CAGEC	Contract and Government Entity Code
CAM	Chemical Agent Monitor
CAR	Corrective Action Report
CARC	Chemical Agent Resistant Coating
CCW	Counterclockwise
CM	Centimeters
COEI	Component Of End Item
CPC	Corrosion Prevention and Control
CTA	Common Table of Allowances
CW	Clockwise
DC	Direct Current
DCA	Diagnostic Connector Assembly
DMWR	Depot Maintenance Work Order
DOD	Department of Defense
DS	Direct Support
EIR	Equipment Improvement Recommendation
_F	Degree Fahrenheit
FMC	Fully Mission Capable
FOV	Family of Vehicles
FRH	Fire Resistant, Rust Inhibited Hydraulic Fluid
FWD	Forward
GND	Ground
GS	General Support
HRV	Heavy Recovery Vehicle
KG	Kilogram
KPH	Kilometer Per Hour

GENERAL INFORMATION - CONTINUED**0001 00****LIST OF ABBREVIATIONS - CONTINUED**

L	Liter
LRU	Line Replaceable Unit
M	Meter
MM	Milimeter
MAC	Maintenance Allocation Chart
MAX	Maximum
MIN	Minimum
MOS	Military Occupational Specialties
MPH	Miles Per Hour
MTOE	Modified Table of Organization and Equipment
N	Neutral
NBC	Nuclear, Biological, Chemical
NSN	National Stock Number
PMCS	Preventative Maintenance Checks and Services
PSI	Pounds Per Square Inch
PWR	Power
QA	Quality Assurance
QDR	Quality Deficiency Report
R	Reverse
RPM	Revolutions Per Minute
RPSTL	Repair Parts and Special Tools List
SPORT	Soldier's Portable On-system Repair Tool
STE	Special Test Equipment
STE/ICE-R	Simplified Test Equipment for Internal Combustion Engines Reprogrammable
TB	Technical Bulletin
TM	Technical Manual
TAMMS	The Army Maintenance Management System
TMDE	Test, Measurement, Diagnostic Equipment
TOE	Tables of Equipment
VIS	Vehicle Intercommunications System

QUALITY ASSURANCE (QA)

No particular quality assurance manual pertains specifically to the M88A2 HRV.

Defective material received through the supply system should be reported on Quality Deficiency Report (QDR) SF 368. Instructions for preparing QDR's are provided in AR 702-7, Reporting of Quality Deficiency Data. QDR's should be mailed directly to:

Commander
U.S. Army Tank-automotive and Armament Command
ATTN: AMSTA-QRT
Warren, MI 48397-5000

A reply will be furnished directly to you.

GENERAL INFORMATION - CONTINUED

0001 00**COMMON TOOLS AND EQUIPMENT**

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE), CTA 50-970; or CTA 8-100, as applicable to your unit.

The tool kit (box) assigned to the mechanic (on a 1-per-mechanic-by MOS basis) shall be identified in the individual maintenance work package by nomenclature, item number and work package. No tool in the kit shall be further identified. Other tools required for performance of all tasks for the maintenance levels covered in the manual shall be identified in the setup and shall be referenced to the Tool identification List, WP 0090 00. "Other tools" includes tools which are part of the components of shop sets authorized to section/teams; tools authorized by RPSTL and CTA 50-970; special and fabricated tools; and items of TMDE.

SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special tools and equipment listed and illustrated in TM 9-2350-292-24P are the only special tools and equipment necessary to perform operations described in this manual. TM 9-2350-292-24P is the authority for requisitioning special tools and equipment for supporting maintenance use. All special tools required in this technical manual are listed in WP 0090 00 of this manual. Fabricated tools are identified in the initial setup; manufacturing instructions for fabricated tools are found in WP 0088 00.

REPAIR PARTS

Repair parts are listed and illustrated in the repair parts and special tools list covering direct support general support maintenance for this equipment (TM 9-2350-292-24P). All mandatory replacement parts identified in the initial setup are listed in WP 0091 00 of this manual.

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END OF TASK

CHAPTER 1

DESCRIPTION AND THEORY OF OPERATION

EQUIPMENT DESCRIPTION AND DATA

0002 00

THIS WORK PACKAGE COVERS:

Equipment Description and Data

EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES

Characteristics - Refer to TM 9-2350-292-10 for Characteristics of the M88A2 HRV.

Capabilities and Features - Refer to TM 9-2350-292-10 for Capabilities and Features of the M88A2 HRV.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

Refer to TM 9-2350-292-10 for Location and Description of Major Components of the M88A2 HRV.

DIFFERENCES BETWEEN MODELS

There is currently only one model of the M88A2 HRV.

EQUIPMENT DATA

Refer to TM 9-2350-292-10 and TM 9-2350-292-20-1 for Equipment Data relative to the M88A2 HRV.

END OF TASK

PRINCIPLES OF OPERATION

0003 00

THIS WORK PACKAGE COVERS:

Principles of Operations

EQUIPMENT OPERATION AND DESCRIPTION

Refer to TM 9-2350-292-10 and TM 9-2350-292-20-1 for Equipment Operation and Description of the M88A2 HRV.

END OF TASK

CHAPTER 2

TROUBLESHOOTING PROCEDURES

**TROUBLESHOOTING INSTRUCTIONS AND QUICK GUIDE TO
TROUBLESHOOTING (SYMPTOM/MALFUNCTION) INDEX**

0004 00

THIS WORK PACKAGE COVERS:

Troubleshooting Instructions, Troubleshooting Sample, and Quick Guide to Troubleshooting (Symptom/Malfunction) Index

TROUBLESHOOTING INSTRUCTIONS

This work package contains a "Quick Guide to Troubleshooting (Symptom/Malfunction) Index". The "Quick Guide to Troubleshooting (Symptom/Malfunction) Index" is the master reference table for locating troubleshooting information. The guide contains a list of various malfunctions which may occur during operation or inspection and provides a reference to the troubleshooting information or a solution. The troubleshooting work packages provide function description and step-by-step instructions for isolating and correcting malfunctions. Remember, troubleshooting should always be performed with common sense and two personnel.



Throughout troubleshooting of the electrical system or electrical components, be certain vehicle MASTER switch is OFF between every step unless otherwise directed. Remove all jewelry and metal objects when working on the electrical system to prevent injury due to electrical shock.

Electrical troubleshooting in this chapter provides schematic diagrams and pictorial diagrams to give insight to the harnesses involved. Refer to the electrical schematics (FP-1 through FP-21) when performing the troubleshooting on the electrical system.

When troubleshooting any electrical system or component, exercise extreme care to prevent electrical shock.

TROUBLESHOOTING INSTRUCTIONS AND QUICK GUIDE TO TROUBLESHOOTING (SYMPTOM/MALFUNCTION) INDEX – CONTINUED

0004 00

TROUBLESHOOTING SAMPLE

To effectively troubleshoot the M88A2 HRV, follow these steps:

- a Determine the symptom.
- b Locate the symptom (1) in the Quick Guide to Troubleshooting (Symptom/Malfunction) Index.
- c Locate the troubleshooting work package (2) for your symptom.
- d Turn to the procedure (3) identified in the Quick Guide to Troubleshooting (Symptom/Malfunction) Index.
- e Study the function description, pictorial view, and/or schematic located in the particular system overview work package.
- f Perform the corrective action (4) as required by troubleshooting procedure (3).
- g Verify that the corrective action eliminated the symptom.

QUICK GUIDE TO TROUBLESHOOTING (SYMPTOM/MALFUNCTION) INDEX -CONTINUED

SYMPTOM ← (1)	ACTION OR WP REF
BILGE PUMP	
BILGE PUMP FAILS TO OPERATE.	WP 0030 00 ← (2)

BILGE PUMP FAILS TO OPERATE ← (3)

0030 00

THIS WORK PACKAGE COVERS:

Bilge Pump Fails to Operate.

INITIAL SETUP:

Tools and special Tools

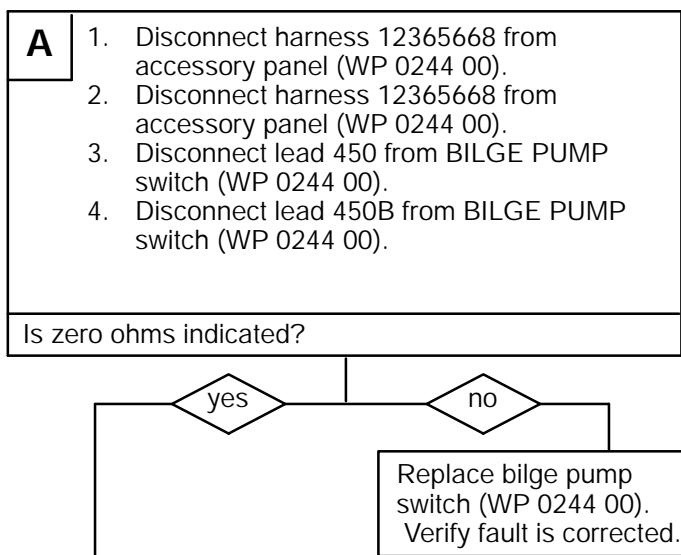
- General mechanic's tool kit (item 1, WP 0717 00)
- Multimeter (item 84, WP 0717 00)

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-292-10)

Personnel Required

Three



TROUBLESHOOTING INSTRUCTIONS AND QUICK GUIDE TO TROUBLESHOOTING (SYMPTOM/MALFUNCTION) INDEX – CONTINUED

0004 00

QUICK GUIDE TO TROUBLESHOOTING (SYMPTOM/MALFUNCTION) INDEX.

SYMPTOM	ACTION OR WP REF
AUXILIARY POWER UNIT	
AUXILIARY POWER UNIT FAILS TO KEEP RUNNING.	TM 9-2815-221-34&P
AUXILIARY POWER UNIT ENGINE OVERHEATING.	Perform oil cooler and cylinder air housing repair IAW TM 9-2815-221-34&P
AUXILIARY POWER UNIT ENGINE HARD TO START IN COLD WEATHER.	Perform manifold heater test and glow plug test IAW TM 9-2815-221-34&P
AUXILIARY POWER UNIT ENGINE FAILS TO START.	TM 9-2815-221-34&P
AUXILIARY POWER UNIT ENGINE IS HARD TO START.	TM 9-2815-221-34&P
AUXILIARY POWER UNIT ENGINE MISFIRES.	TM 9-2815-221-34&P
AUXILIARY POWER UNIT ENGINE LACKS POWER.	TM 9-2815-221-34&P
AUXILIARY POWER UNIT ENGINE DISCHARGES BLACK SMOKE.	TM 9-2815-221-34&P
AUXILIARY POWER UNIT ENGINE KNOCKS.	TM 9-2815-221-34&P
AUXILIARY POWER UNIT ENGINE USES EXCESSIVE OIL.	TM 9-2815-221-34&P
AUXILIARY POWER UNIT HIGH AIR TEMPERATURE INDICATOR IS LIT.	See auxiliary power unit engine overheating
AUXILIARY POWER UNIT LOW OIL PRESSURE INDICATOR IS LIT.	TM 9-2815-221-34&P
AUXILIARY POWER UNIT OIL PRESSURE GAUGE INDICATES OIL PRESSURE TOO HIGH OR TOO LOW.	TM 9-2815-221-34&P
BATT/GEN GAUGE READS IN YELLOW OR LOWER RED REGION WITH APU RUNNING AND APU GEN SWITCH ON.	TM 9-2815-221-34&P
APU CONTROL BOX HIGH AIR TEMP INDICATOR DOES NOT LIGHT WHEN APU ENGINE OVERHEATS.	TM 9-2815-221-34&P
APU CONTROL BOX LOW OIL PRESSURE INDICATOR DOES NOT LIGHT WHEN APU OIL PRESSURE IS LOW.	TM 9-2815-221-34&P
APU CONTROL BOX OIL PRESSURE GAUGE READS ZERO WITH APU ENGINE RUNNING.	Replace APU oil pressure sending unit TM 9-2815-221-34&P
AUXILIARY POWER UNIT (HATZ)	
AUXILIARY POWER UNIT FAILS TO KEEP RUNNING.	TM 9-2815-250-24&P
AUXILIARY POWER UNIT ENGINE HARD TO START IN COLD WEATHER.	TM 9-2815-250-24&P
BATT/GEN GAUGE READS IN YELLOW OR LOWER RED WITH APU RUNNING AND APU GEN SWITCH ON.	TM 9-2815-250-24&P
APU CONTROL BOX HIGH AIR TEMP INDICATOR DOES NOT LIGHT.	TM 9-2815-250-24&P
BILGE PUMP	
BILGE PUMP FAILS TO OPERATE.	WP 0068 00

**TROUBLESHOOTING INSTRUCTIONS AND QUICK GUIDE TO
TROUBLESHOOTING (SYMPTOM/MALFUNCTION) INDEX – CONTINUED**

0004 00

QUICK GUIDE TO TROUBLESHOOTING (SYMPTOM/MALFUNCTION) INDEX – Continued

DRIVER'S CONTROLS	
VEHICLE WILL NOT STEER OR WILL ONLY STEER IN ONE DIRECTION.	TM 9-2520-215-34
ENGINE DOES NOT RESPOND PROPERLY TO THROTTLE CONTROLS.	TM 9-2815-247-34
ENGINE	
ENGINE CRANKS AT NORMAL SPEED BUT WILL NOT START.	TM 9-2815-247-34
ENGINE CRANKS BUT WILL NOT START IN COLD WEATHER.	WP 0006 00
ENGINE FAILS TO SHUT OFF WHEN FUEL SHUTOFF SWITCH IS ACTIVATED.	TM 9-2815-247-34
ENGINE HAS LOW STALL RPM, DOES NOT DEVELOP FULL POWER, AND HAS EXCESSIVE SMOKE FROM ONE OR BOTH BANKS OF CYLINDERS.	WP 0007 00
ENGINE HAS LOW STALL RPM, DOES NOT DEVELOP FULL POWER, BUT EXHAUST SMOKE IS NORMAL.	WP 0008 00
ENGINE HAS EXCESSIVE WHITE SMOKE.	WP 0009 00
ENGINE RUNS ROUGH OR MISFIRES AND/OR KNOCKS.	TM 9-2815-247-34
ENGINE USES EXCESSIVE FUEL.	TM 9-2815-247-34
ENGINE HAS LOW POWER AND EXCESSIVE BLACK SMOKE.	TM 9-2815-247-34
ENGINE OVERSPEEDS.	TM 9-2815-247-34
HYDRAULICS SYSTEM	
MAIN HYDRAULICS SYSTEM OIL PRESSURE IS INSUFFICIENT.	Replace front pump WP 0071 00
MAIN HYDRAULICS SYSTEM FAILS TO OPERATE (NO COMPONENTS FUNCTION). MAIN HYDRAULIC PUMP FAILS TO ENGAGE.	WP 0011 00
MAIN HYDRAULICS PUMP FAILS TO DISENGAGE.	WP 0012 00
MAIN HYDRAULICS SYSTEM IS NOISY.	WP 0013 00
MAIN WINCH BRAKE FAILS TO RELEASE.	Replace main winch WP 0053 00
MAIN WINCH FAILS TO OPERATE.	WP 0014 00
MAIN WINCH OPERATES SLOWLY OR LACKS POWER.	WP 0015 00
MAIN WINCH INHAULS BUT WILL NOT PAYOUT.	WP 0016 00
MAIN WINCH WILL PAYOUT BUT WILL NOT INHAUL.	WP 0017 00
MAIN WINCH WILL NOT HOLD LOAD.	WP 0018 00
MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION	WP 0019 00
MAIN WINCH LEVEL WINDER FAILS TO OPERATE.	WP 0020 00
MAIN WINCH CREEPS WITH CONTROL LEVER IN NEUTRAL POSITION.	Replace main winch pilot valve WP 0074 00
AUXILIARY WINCH FAILS TO OPERATE.	WP 0021 00
AUXILIARY WINCH WILL PAYOUT BUT WILL NOT INHAUL.	WP 0022 00

TROUBLESHOOTING INSTRUCTIONS AND QUICK GUIDE TO TROUBLESHOOTING (SYMPTOM/MALFUNCTION) INDEX – CONTINUED

0004 00

QUICK GUIDE TO TROUBLESHOOTING (SYMPTOM/MALFUNCTION) INDEX – Continued

HYDRAULICS SYSTEM - CONTINUED	
AUXILIARY WINCH WILL INHAUL BUT WILL NOT PAYOUT.	WP 0023 00
AUXILIARY WINCH CREEPS IN EITHER DIRECTION WITH CONTROL HANDLE IN NEUTRAL.	WP 0024 00
SPADE FAILS TO OPERATE.	WP 0025 00
SPADE WILL NOT HOLD POSITION.	WP 0026 00
HOIST BOOM FAILS TO OPERATE OR ONLY OPERATES PARTIALLY.	WP 0027 00
HOIST BOOM WILL NOT HOLD IN ANY POSITION (HOIST BOOM CREEPS).	WP 0028 00
HOIST BOOM LIVE OPERATION DOES NOT FUNCTION (HOIST BOOM WILL NOT STOP AUTOMATICALLY, STAYLINE CABLES GO SLACK DURING OPERATION OR HOIST BOOM CAN BE STOWED WITHOUT ACTIVATING THE HOIST BOOM SAFETY VALVE CONTROL LEVER).	WP 0029 00
HOIST WINCH FAILS TO OPERATE.	WP 0030 00
HOIST WINCH WILL RAISE BUT WILL NOT LOWER.	WP 0031 00
HOIST WINCH WILL LOWER BUT WILL NOT RAISE.	WP 0032 00
HOIST WINCH CREEPS WITH CONTROL IN NEUTRAL.	WP 0033 00
HOIST WINCH WILL NOT HOLD LOAD.	Replace hoist winch WP 0045 00. Verify fault is corrected.
AUXILIARY HYDRAULICS SYSTEM FAILS TO OPERATE OR DOES NOT DEVELOP SUFFICIENT PRESSURE.	WP 0034 00
MASTER RELAY AND SLAVE RECEPTACLE	
NO POWER AT SLAVE RECEPTACLE.	Repair or replace leads 49 in harness 3W214 (TM 9-2350-292-20) or WP 0043 00
MONITORING SYSTEM	
TIME TOTALIZING METER FAILS TO OPERATE (Replace time totalizing meter).	TM 9-2815-247-34
POWER TAKEOFF ELECTRICAL SYSTEM	
PTO CLUTCH DOES NOT ENGAGE, INDICATOR IS NOT LIT AND GOVERNOR DOES NOT OPERATE PROPERLY (Replace engine governor solenoid).	TM 9-2815-247-34
RADIO INTERFERENCE SYSTEM	
EXCESSIVE INTERFERENCE. MAIN ENGINE AND APU NOT RUNNING.	Notify Commo
EXCESSIVE INTERFERENCE WITH APU RUNNING AND APU GENERATOR SWITCH ON. MAIN ENGINE IS OFF AND VEHICLE IS STATIONARY.	Notify Commo
EXCESSIVE INTERFERENCE WHEN VEHICLE IS TRAVELING	Notify Commo
TRANSMISSION	
VEHICLE STEERS BUT WILL NOT DRIVE ANY RANGE (TRANSMISSION WILL NOT OPERATE IN ANY RANGE).	TM 9-2520-215-34

END OF TASK

ENGINE OVERVIEW**0005 00**

THIS WORK PACKAGE COVERS:Engine Overview

The engine is a 12-cylinder, 90 degree, V-type, air cooled turbosupercharged diesel engine. The engine features a fuel injection system and a turbosupercharged air induction system which obtains optimum engine performance. The engine is equipped with a 28 volt, 650 ampere oil cooled alternator (generator) and a 24-volt solenoid activated starter. The engine is also equipped with two intake manifold heaters and purge pump, time totalizing meter, fuel/water separator and smoke generating system. A monitoring system indicates engine oil pressure, engine oil temperature, fuel level and the status of the turbocharger dust detectors. The generator, smoke generating system and the monitoring systems are each described in separate sections.

The main engine starter system consists of the starter, starter solenoid, a starter low voltage protective module, a park position switch (neutral safety switch), a START switch, a 20-amp circuit breaker, and related electrical wiring.

Operating voltage (+24 V dc) for the starter is supplied from the batteries through the starter solenoid to the starter motor. The low voltage protective module prevents starter activation with improperly charged batteries. The low voltage protective module also shuts the starter off when the engine starts and prevents the starter from engaging when the engine is running. When the MASTER switch is ON, system power (+24 V dc) is supplied through the 20-amp circuit breaker to the START switch. When the START switch is pressed, system power is applied through the park position switch to the low voltage protective module which, in turn, energizes the starter solenoid. Battery power (+24 V dc) is then applied through the solenoid to the starter motor and the engine is cranked. The park position switch prevents cranking the engine when the transmission shift selector is not in the neutral position.

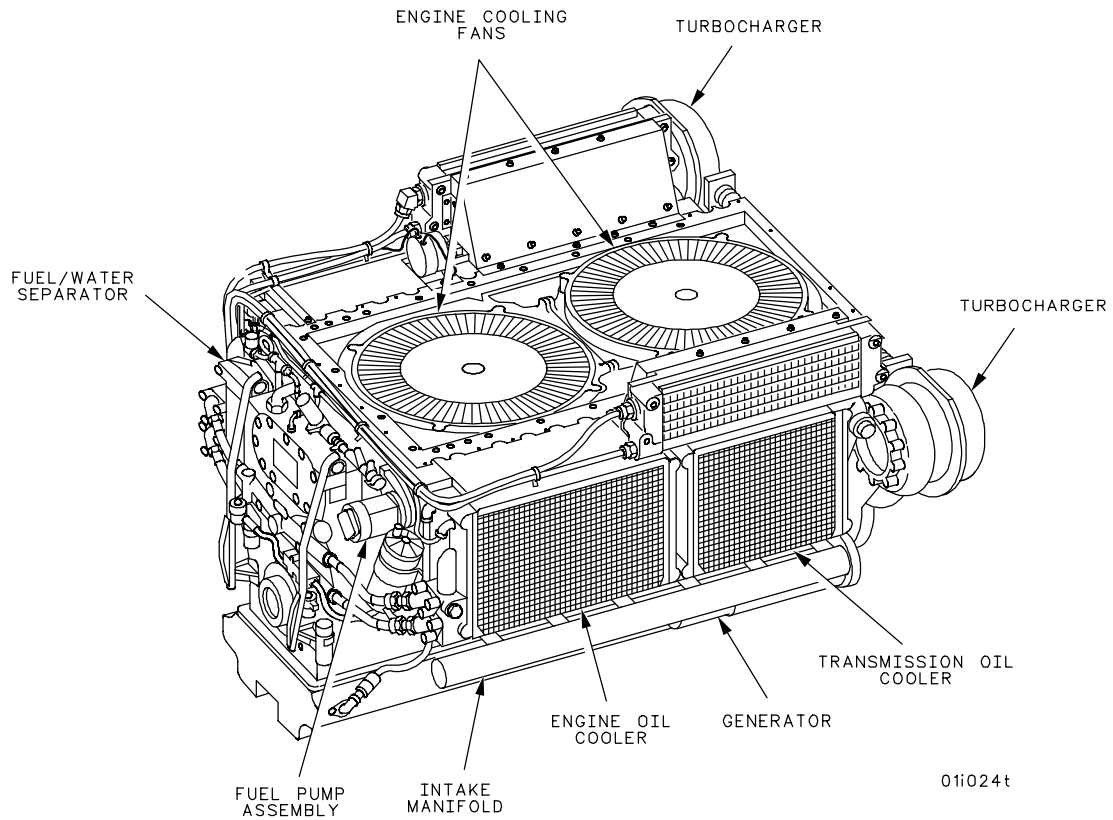
The main engine manifold preheater and purge pump system consists of an ENGINE PREHEAT ON/OFF switch, a 20-amp circuit breaker, two manifold preheater coils, the preheater spark plugs, two fuel solenoids, a purge solenoid, a purge pump, and related electrical wiring.

The main engine manifold preheater and purge pump system provides the capability to start and sustain main engine operation in cold weather conditions. The heaters, when operated, preheat the air entering the cylinders to facilitate cold weather starting and cold weather idle operation. The purge pump and solenoid allow air to be purged from the fuel and manifold air induction heater systems in order to fill the systems with fuel. When the MASTER switch is ON, the manifold preheaters are turned on whenever the ENGINE PREHEAT switch is held in the ON position. Likewise, the purge pump and purge solenoid are also turned on as long as the ENGINE PREHEAT switch is held in the ON position. When the engine reaches normal operating temperatures, the ENGINE PREHEAT switch can be set to OFF to shut down manifold preheater and purge operations.

The main engine fuel supply electrical system consists of the electric fuel pump, the fuel shutoff solenoid, the fire extinguisher fuel line interlock switch, the FUEL PUMP switch, the ENG FUEL SHUT OFF switch, two 15-amp circuit breakers, the FIRE EXTINGUISHER ENGINE SHUTOFF indicator, and related electrical wiring.

System power (+24 - 28 V dc) is supplied to the FUEL PUMP switch and ENG FUEL SHUT OFF switch through separate 15-amp circuit breakers. When the MASTER switch is ON, the fuel pump operates to supply fuel to the main engine whenever the FUEL PUMP switch is set to ON. If either the FUEL SHUTOFF switch is ON or the fire extinguisher fuel line interlock switch is activated, the fuel solenoid is energized and fuel is shut off to the engine injector pump. In addition, the FIRE EXTINGUISHER ENGINE SHUTOFF indicator will light.

The fuel/water separator consists of a control module and solenoid valve. The separator system operates automatically whenever the engine is running to detect and remove water from the fuel system. A time totalizing meter records elapsed main engine running time. Both the fuel/water separator and the time totalizing meter operate from the main engine generator output (+28 V dc); thus, these accessories operate whenever the main engine is running.



END OF TASK

ENGINE CRANKS BUT WILL NOT START IN COLD WEATHER

0006 00

THIS WORK PACKAGE COVERS:

Engine Cranks But Will Not Start In Cold Weather

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- Safety goggles (item 48, WP 0087 00)

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Engine deck removed (TM 9-2350-292-20)

Personnel Required

Two

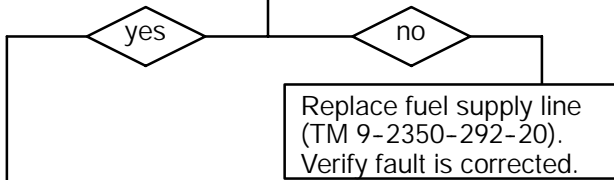


WARNING

A

1. Crack open fuel supply line from fuel metering pump (TM 9-2815-247-34).
2. Turn vehicle MASTER switch ON and attempt to start engine (TM 9-2350-292-10) and check for fuel flowing from fuel supply line.
3. Turn vehicle MASTER switch OFF (TM 9-2350-292-10).

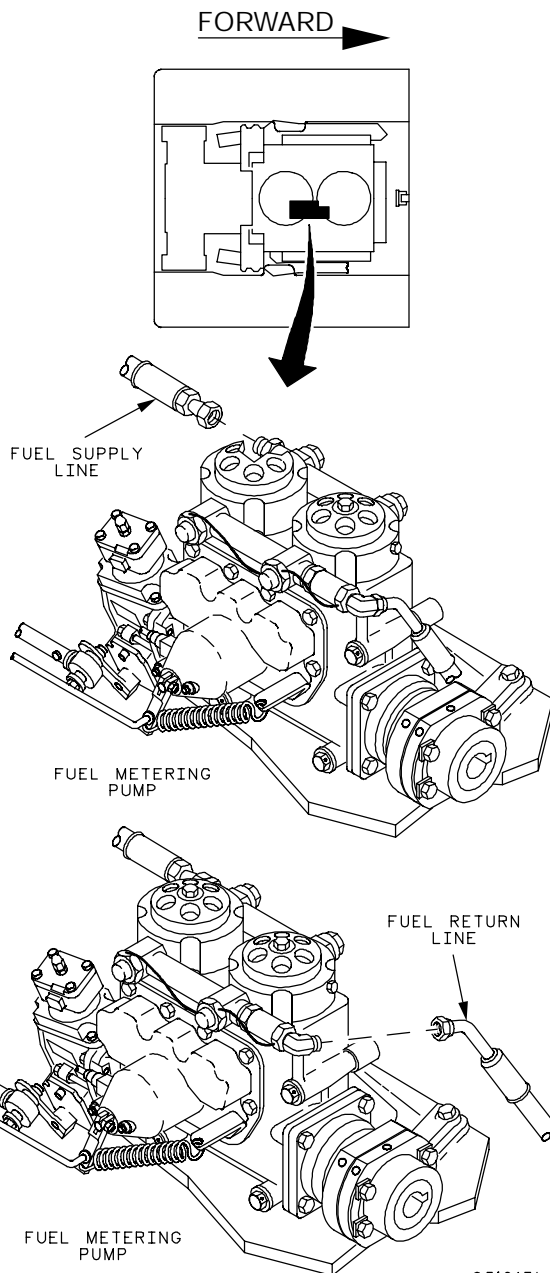
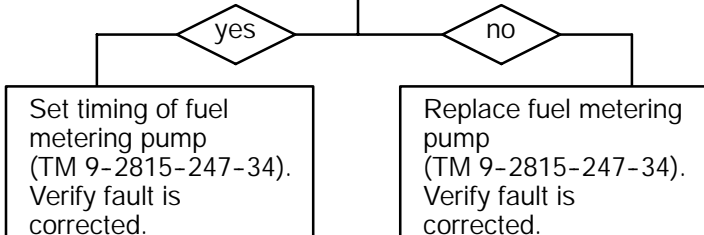
Did fuel flow from fuel supply line?



B

1. Reconnect fuel supply line to fuel metering pump (TM 9-2350-292-20).
2. Crack open fuel return line of fuel metering pump (TM 9-2350-292-20).
3. Turn vehicle MASTER switch ON and attempt to start vehicle (TM 9-2350-292-10) and check for fuel flowing from fuel metering pump.
4. Turn MASTER switch OFF (TM 9-2350-292-10).

Did fuel flow from fuel metering pump?



03i013t

END OF TASK

ENGINE HAS LOW STALL RPM, DOES NOT DEVELOP FULL POWER, AND HAS EXCESSIVE SMOKE FROM ONE OR BOTH BANKS OF CYLINDERS

0007 00

THIS WORK PACKAGE COVERS:

Engine Has Low Stall RPM, Does Not Develop Full Power, and Has Excessive Smoke From One or Both Banks of Cylinders

INITIAL SETUP:

Tools and Special Tools

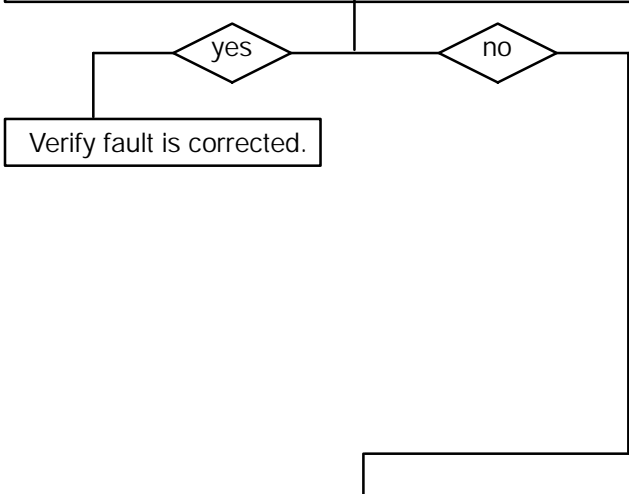
- General mechanic's tool kit (item 1, WP 0090 00)
- Engine ground hop kit (item 69, WP 0090 00)

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Front engine deck grilles removed (TM 9-2350-292-10)

WARNING
Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

- A**
1. Start engine (TM 9-2350-292-10).
 2. Attempt to adjust low idle engine cross shaft idle screw to 825-875 rpm (TM 9-2815-247-34).
 3. Shut down engine (TM 9-2350-292-10).
- Can low idle be adjusted?



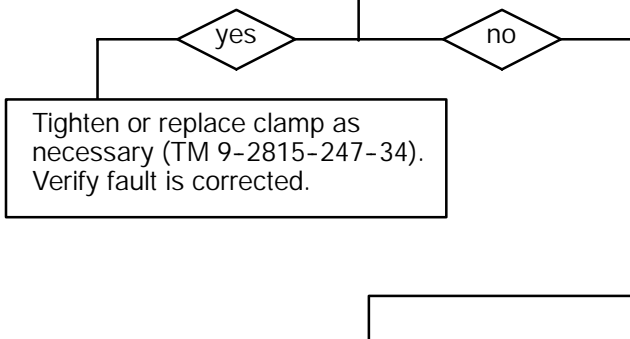
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ENGINE HAS LOW STALL RPM, DOES NOT DEVELOP FULL POWER, AND HAS EXCESSIVE SMOKE FROM ONE OR BOTH BANKS OF CYLINDERS - CONTINUED

0007 00

CONTINUED FROM STEP A

B	1. Remove engine deck (TM 9-2350-292-20).
	2. Inspect turbocharger compressor housing clamp for looseness and damage.
Is clamp loose or damaged?	



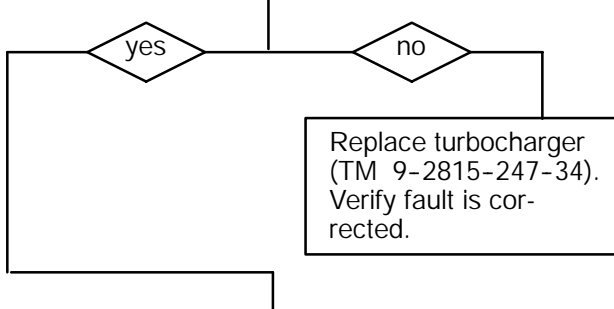
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ENGINE HAS LOW STALL RPM, DOES NOT DEVELOP FULL POWER, AND HAS EXCESSIVE SMOKE FROM ONE OR BOTH BANKS OF CYLINDERS - CONTINUED

0007 00

CONTINUED FROM STEP B

C	Inspect turbocharger for defective or worn bearings, seals or damaged impeller (TM 9-2815-247-34).
Is turbocharger free of defective and/or worn parts and damaged impeller?	

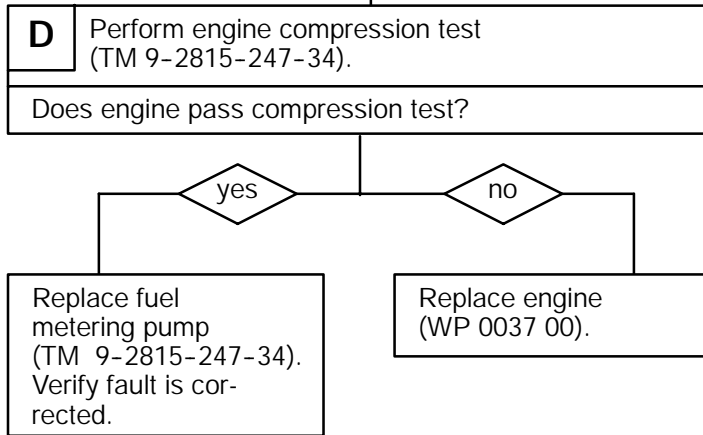


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ENGINE HAS LOW STALL RPM, DOES NOT DEVELOP FULL POWER, AND HAS EXCESSIVE SMOKE FROM ONE OR BOTH BANKS OF CYLINDERS - CONTINUED

0007 00

CONTINUED FROM STEP C



END OF TASK

ENGINE HAS LOW STALL RPM, DOES NOT DEVELOP FULL POWER, BUT EXHAUST SMOKE IS NORMAL

0008 00

THIS WORK PACKAGE COVERS:

Engine Has Low Stall RPM, Does Not Develop Full Power, But Exhaust Smoke is Normal

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- Engine ground hop kit (item 69, WP 0090 00)

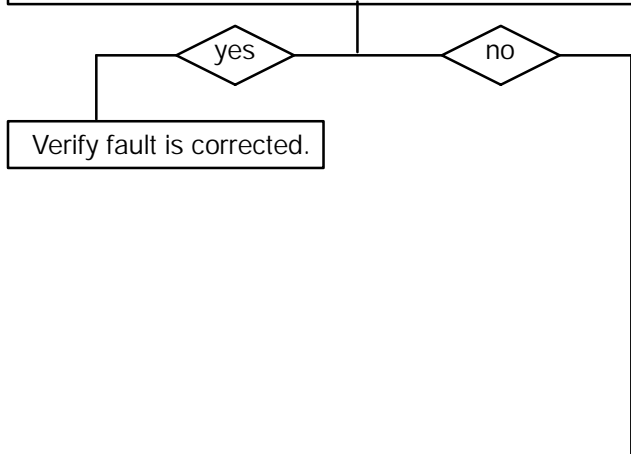
Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Front engine deck grilles removed (TM 9-2350-292-10)

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

- | | |
|---------------------------|--|
| A | <ol style="list-style-type: none"> 1. Start engine (TM 9-2350-292-10). 2. Attempt to adjust low idle engine cross shaft idle screw to 825-875 rpm (TM 9-2815-247-34). 3. Shut down engine (TM 9-2350-292-10). |
| Can low idle be adjusted? | |

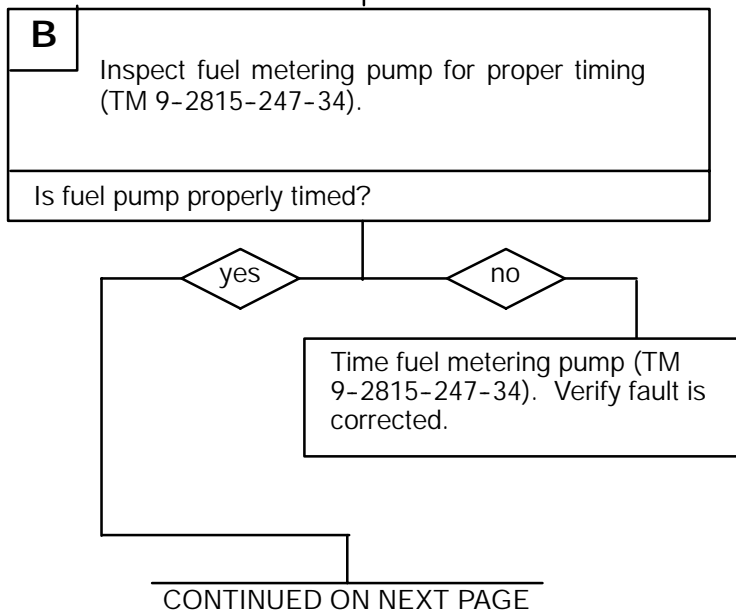


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ENGINE HAS LOW STALL RPM, DOES NOT DEVELOP FULL POWER, BUT EXHAUST SMOKE IS NORMAL - CONTINUED

0008 00

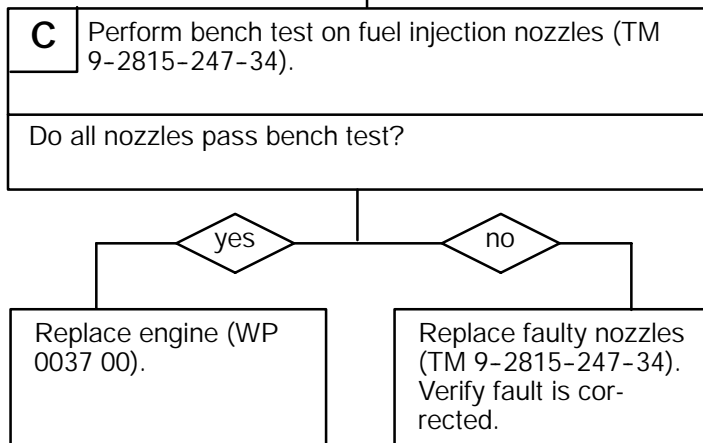
CONTINUED FROM STEP A



ENGINE HAS LOW STALL RPM, DOES NOT DEVELOP FULL POWER, BUT EXHAUST SMOKE IS NORMAL - CONTINUED

0008 00

CONTINUED FROM STEP B



END OF TASK

ENGINE HAS EXCESSIVE WHITE SMOKE

0009 00

THIS WORK PACKAGE COVERS:

Engine Has Excessive White Smoke

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0090 00)

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-292-10)

Engine cooling fans removed (TM 9-2350-292-20)

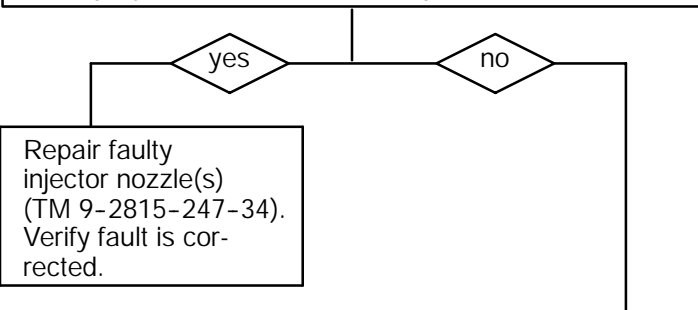
Personnel Required

Two

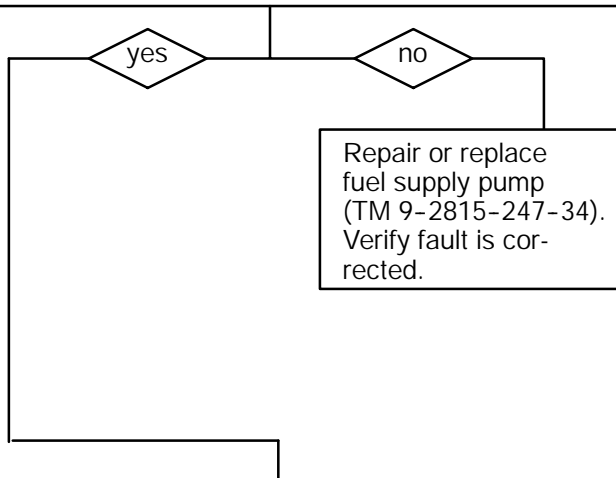
WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

- A**
1. Start engine (TM 9-2350-292-10).
 2. While engine is at idle, observe injector nozzles for movement at cylinders.
 3. Shut engine down (TM 9-2350-292-10).
- Do any injector nozzles move at cylinder?



- B**
- Inspect engine fuel supply pump shaft for leaks at seal (TM 9-2815-247-34).
- Is fuel supply pump free of leaks?

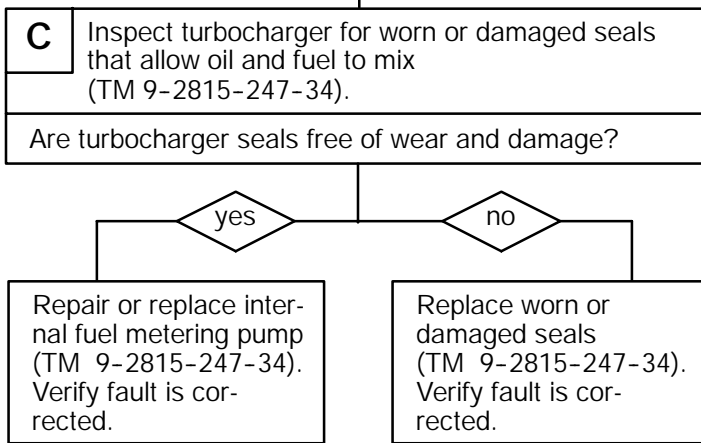


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ENGINE HAS EXCESSIVE WHITE SMOKE - CONTINUED

0009 00

CONTINUED FROM STEP B



END OF TASK

HYDRAULICS SYSTEM OVERVIEW**0010 00****THIS WORK PACKAGE COVERS:**

Hydraulics System Overview

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-292-10)

Engine cooling fans removed (TM 9-2350-292-20)

Personnel Required

Two

The hydraulics system consists of the hydraulic reservoir, the main hydraulic pump assembly, the power take-off (PTO) clutch, the auxiliary hydraulic pump, the main winch, the auxiliary winch, the hoist winch, a filter valve manifold, the main and hoist winch directional control valves, the operator's control manifold with all major hydraulic controls, the spade lock, two spade cylinders, two boom cylinders, two stayline cylinders, the level winder, a spade lock control valve, a boom shutoff valve, two boom limit valves, the refuel pump motor and controls, the impact wrench with controls, and related lines and connections.

In the main hydraulics system, oil is pumped from the hydraulic reservoir by a charge pump through the charge filter to two variable displacement pumps: one for the spade, boom, and auxiliary winch; the other for the main winch and hoist winch. The charge pump and variable displacement pumps make up the main hydraulic pump assembly and are driven by main engine power. An electromagnetic PTO clutch is used to connect the main pump assembly to the engine. When the hydraulic pump assembly is operating, pressures of 400 to 4400 psi are supplied to the hydraulic components. All hydraulic components can be operated by main hydraulic pump pressures except the fuel transfer pump and the impact wrench. Hydraulic oil is returned to the reservoir by way of a return filter and hydraulic oil cooler.

The auxiliary hydraulic pump is driven by the auxiliary power unit (APU). The pump delivers 1600 psi and can operate all hydraulic components in a no load condition. The auxiliary hydraulic pump is also the only source of pressure for operation of the fuel transfer pump and the impact wrench.

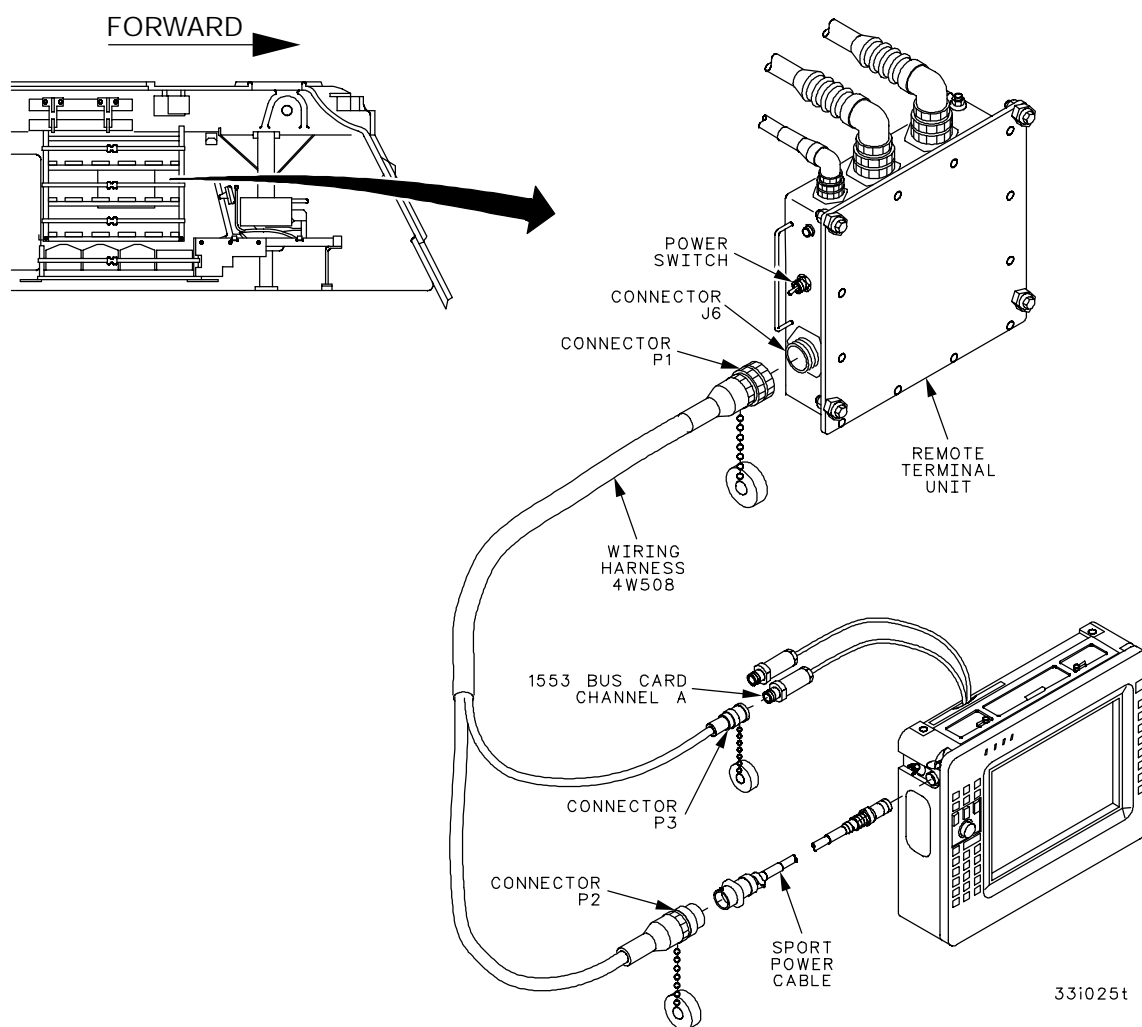
For the relationship of the various hydraulic components refer to FP-23 through FP-27.

The Enhanced Diagnostic System (EDS) aids the maintainer with hydraulic troubleshooting. The EDS consists of 32 hydraulic pressure transducers, five switches, eight wiring harnesses and a remote terminal unit which are permanently mounted in the vehicle. The transducers and switches are mounted in the hydraulic system in places where the maintainer would normally have to insert gauges to gather pressure data. The hydraulic pressure data gathered by the transducers and switches is sent to the remote terminal (RT) unit where it is transmitted via a 1553 data bus to the Soldiers' Portable On-system Repair Tool (SPORT). The EDS software program running on the SPORT receives the pressure data from the 1553 data bus and displays it for the maintainer in an easily readable graphical user interface (GUI) that runs in a Microsoft Windows 95 environment.

HYDRAULIC SYSTEM OVERVIEW - CONTINUED**0010 00**

Enhanced Diagnostics System Setup:

1. Connect wiring harness 4W508 connector P1 to remote terminal (RT) unit connector J6.
2. Connect wiring harness 4W508 connector P3 to SPORT 1553 data bus wire branch A.
3. Connect one end of SPORT power cable (part number 54418/711967) to wiring harness 4W508 connector P2 and other end to SPORT power connector.
4. Turn vehicle MASTER switch ON.
5. Turn RT unit circuit breaker switch ON. Power light will indicate RT unit is powered up.
6. Turn on SPORT.
7. Using the mouse, click on the START button in the taskbar.
8. Using the mouse, click on PROGRAMS, then on Eds, then on Eds again.
9. The Enhanced Diagnostics System program will open and display the selftest results then proceed to the troubleshooting symptoms screen.
10. Click on Test in the menu then on Selftest on the dropdown menu to view the selftest results. Click the close button to close the Selftest screen.
11. Select the symptom to troubleshoot with either the mouse or the arrow keys.
12. The hydraulic pressure data screen for that symptom will be displayed and ready for use in conjunction with the technical manual troubleshooting procedures.

**END OF TASK**

MAIN HYDRAULICS SYSTEM FAILS TO OPERATE (NO COMPONENTS FUNCTION). MAIN HYDRAULIC PUMP FAIL TO ENGAGE

0011 00

THIS WORK PACKAGE COVERS:

Main Hydraulics System Fails to Operate (No Components Function). Main Hydraulic Pump Fail To Engage

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0090 00)

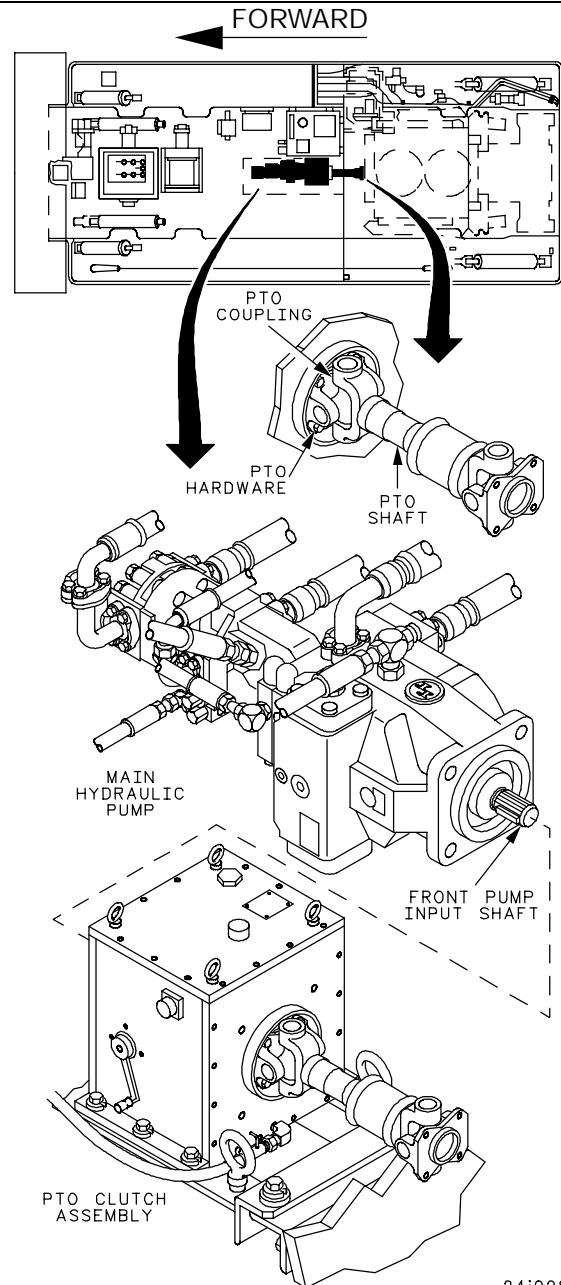
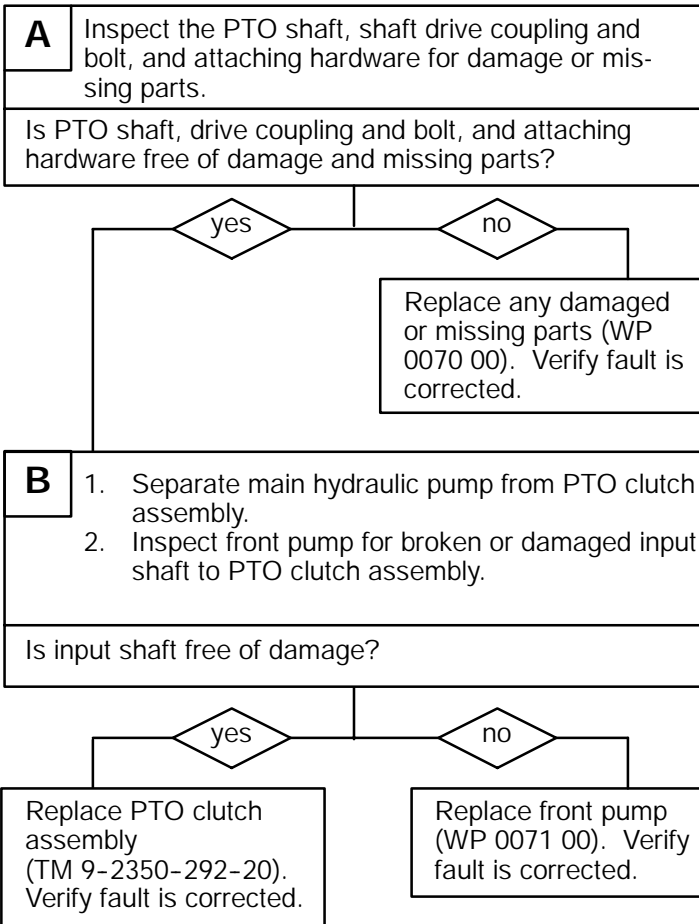
Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- PTO clutch receiving electrical power
- Subfloor plates 20, 26, and 27 removed (TM 9-2350-292-20)
- Forward air intake grilles open (TM 9-2350-292-10)

Personnel Required

Two

WARNING
Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



24i028t

END OF TASK

MAIN HYDRAULICS PUMP FAILS TO DISENGAGE

0012 00

THIS WORK PACKAGE COVERS:

Main Hydraulics Pump Fails to Disengage

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0090 00)

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-292-10)
 Subfloor plates 20, 26, and 27 removed (TM 9-2350-292-20)

Personnel Required

Two

WARNING
 Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

A Make sure PTO clutch is not manually engaged.
 Is PTO clutch manually engaged?



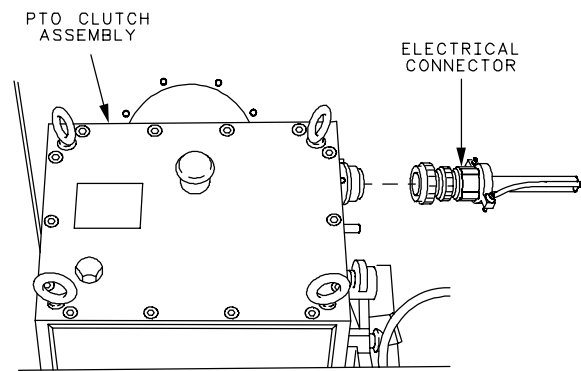
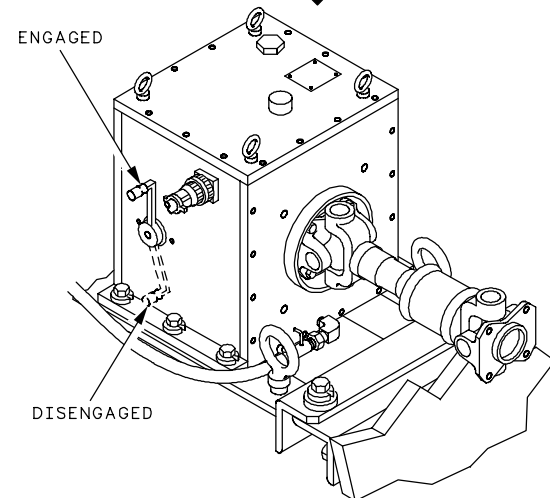
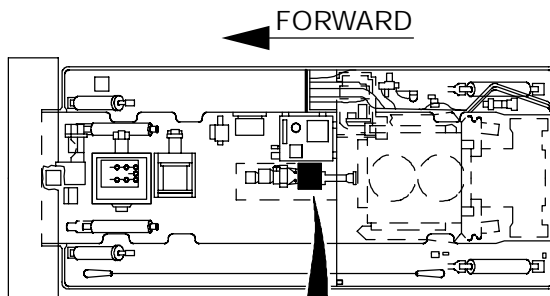
Disengage PTO clutch (TM 9-2350-292-10).
 Verify fault is corrected.

B Disconnect electrical connector from PTO clutch assembly.
 Does PTO clutch disengage?



Go to TM 9-2350-292-20.

Replace PTO clutch assembly (TM 9-2350-292-20).
 Verify fault is corrected.



241029t

END OF TASK

MAIN HYDRAULICS SYSTEM IS NOISY

0013 00

THIS WORK PACKAGE COVERS:

Main Hydraulics System is Noisy

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- 0-300 psi dial pressure gauge (item 42, WP 0090 00)
- Safety goggles (item 48, WP 0087 00)

*Not required if vehicle is equipped with Enhanced Diagnostics System

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Subfloor plates 10, 12, 18, 20, 22, 26, and 27 removed (TM 9-2350-292-20)
- Forward air intake grilles removed (TM 9-2350-292-10)
- Hydraulic control valve manifold shields removed (TM 9-2350-292-20)

Personnel Required

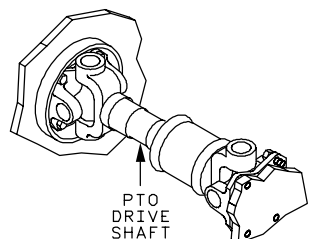
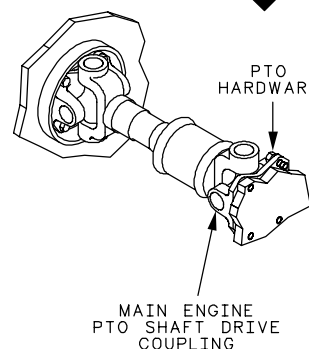
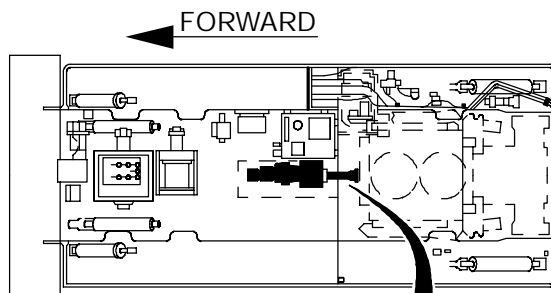
Two

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



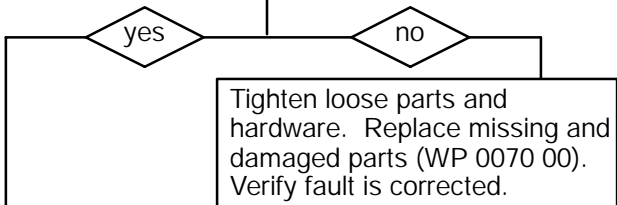
WARNING



24i030t

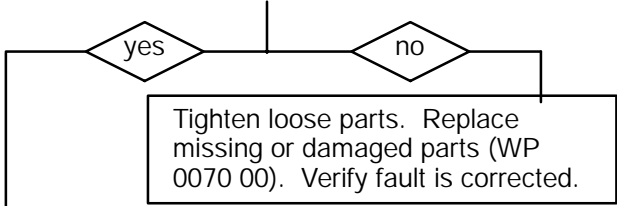
A Inspect main engine PTO shaft drive coupling and bolt for loose, damaged or missing parts, and side play.

Is shaft coupling and bolt free of side play and loose, damaged, or missing parts?



B Inspect PTO drive shaft for loose, damaged, or missing parts.

Is PTO drive shaft free of loose, damaged, or missing parts?



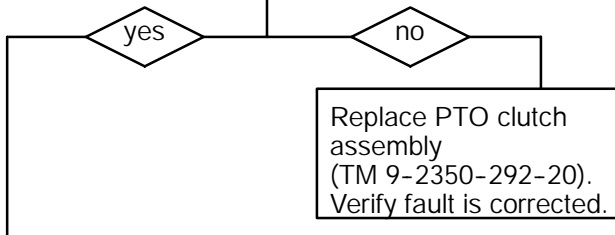
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MAIN HYDRAULICS SYSTEM IS NOISY - CONTINUED

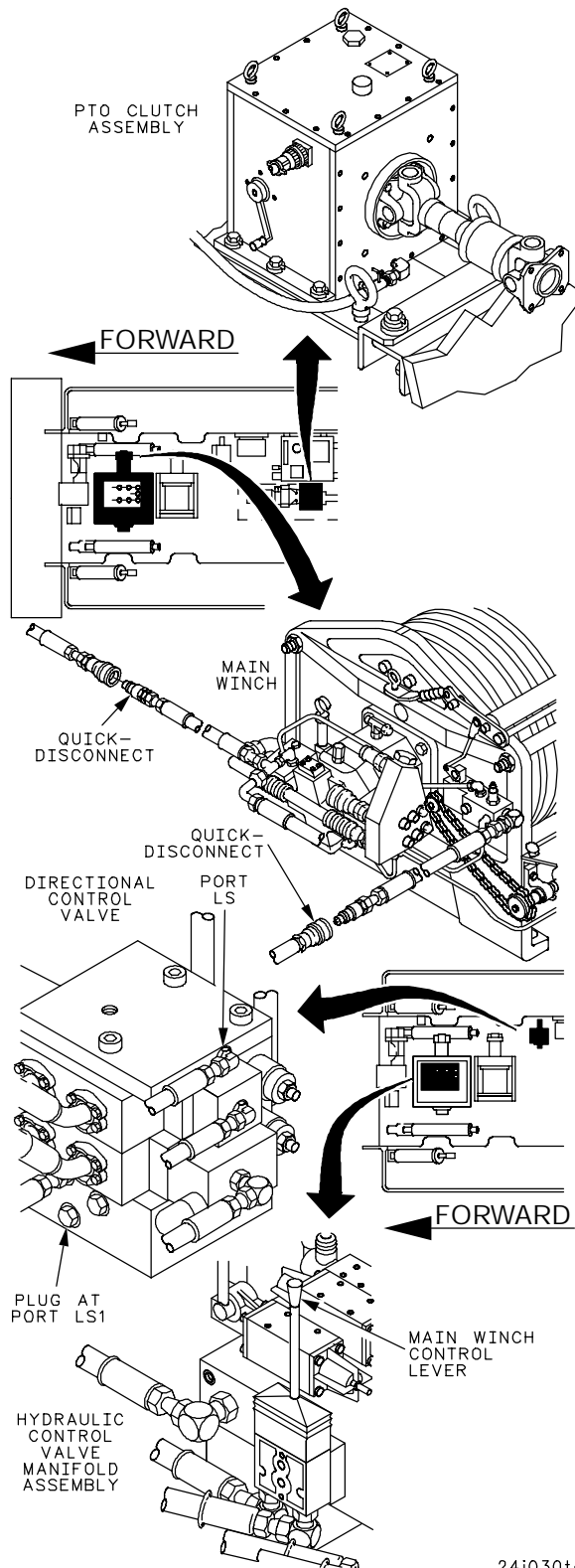
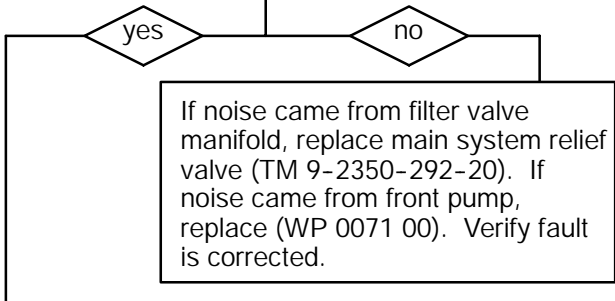
0013 00

CONTINUED FROM STEP B

- C**
1. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10).
 2. Listen for unusual noise from PTO clutch assembly.
 3. Shut down hydraulics and main engine (TM 9-2350-292-10).
- Is PTO clutch assembly free of unusual noise?



- D**
-
- WARNING**
1. Disconnect main winch quick-disconnect at main winch manifold.
 2. Disconnect hose and fitting from main and hoist winch directional control valve port LS1.
 3. Remove plug from main and hoist winch directional control valve top plate LS and install plug in port LS1. Install hose and fitting from LS1 into port LS.
 4. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10).
 5. Place main winch control lever in inhaul position and listen for unusual noise or chatter from front pump and filter valve manifold.
 6. Shut down hydraulics and main engine (TM 9-2350-292-10).
- Is front pump and filter valve free of noise and chatter?



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24i030ta

MAIN HYDRAULICS SYSTEM IS NOISY - CONTINUED

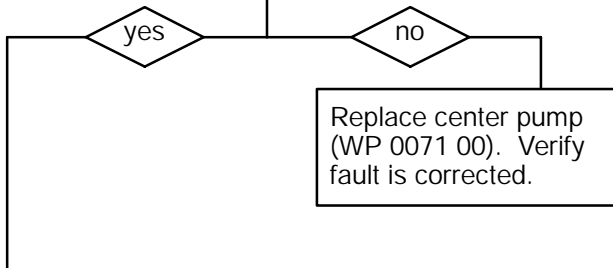
0013 00

CONTINUED FROM STEP D

E

1. Disconnect quick-disconnects at auxiliary winch.
2. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
3. Place auxiliary winch control lever in inhaul position and listen for unusual noise from center pump.
4. Shut down hydraulics and main engine (TM 9-2350-292-10).

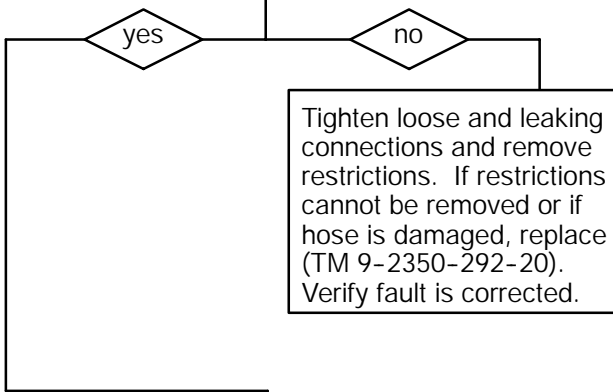
Is center pump free of unusual noise?



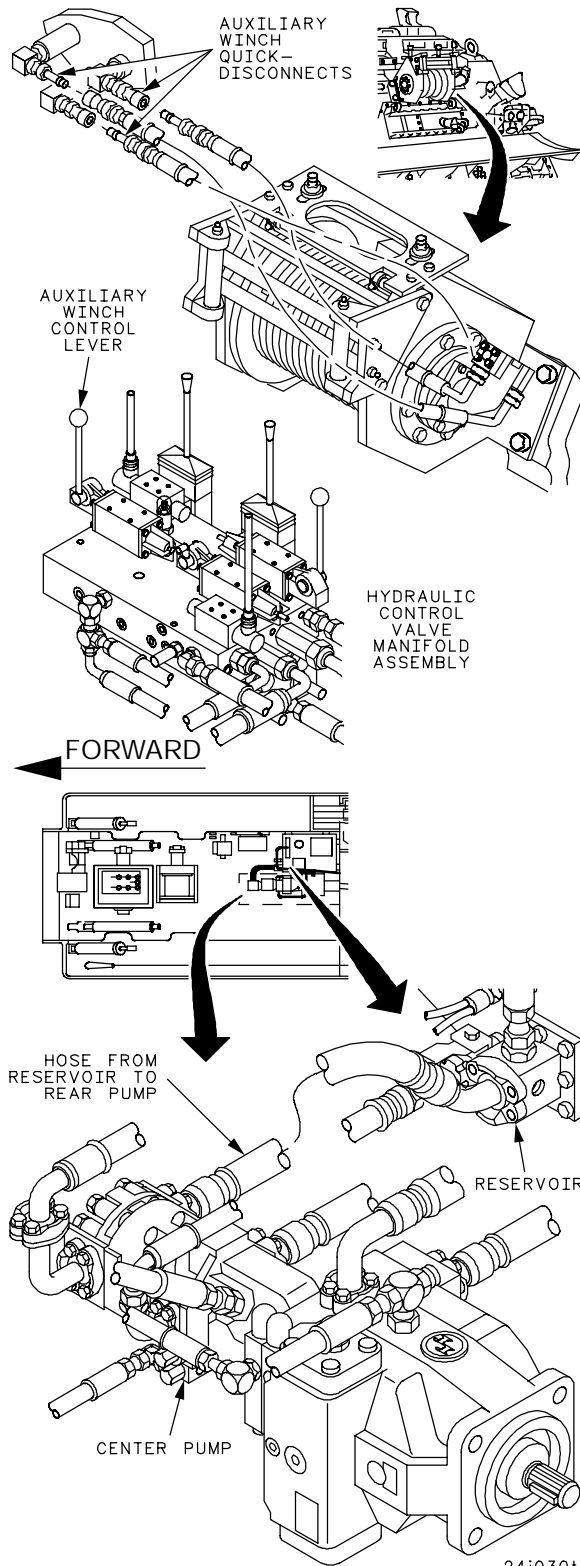
F

Inspect hoses and connections from reservoir to rear pump for leaking and loose connections, restrictions, and damage.

Are hoses and connections free of leaks, looseness, restrictions, and damage?



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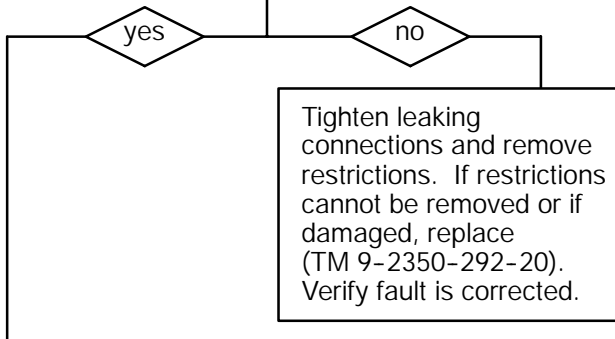
MAIN HYDRAULICS SYSTEM IS NOISY - CONTINUED

0013 00

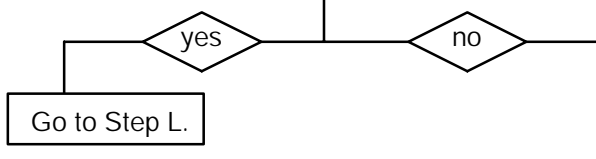
CONTINUED FROM STEP F

G Inspect charge hoses and connections from filter valve manifold check valve CH1 to rear pump port A1, filter valve manifold port CH2 to front pump port S1 and from filter valve manifold port CH2 to center pump port S2 for leaks, restrictions, and damage.

Are hoses and connections free of leaks, restrictions, and damage?



H Is vehicle equipped with Enhanced Diagnostics System?

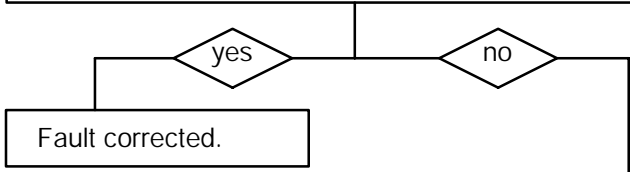


I

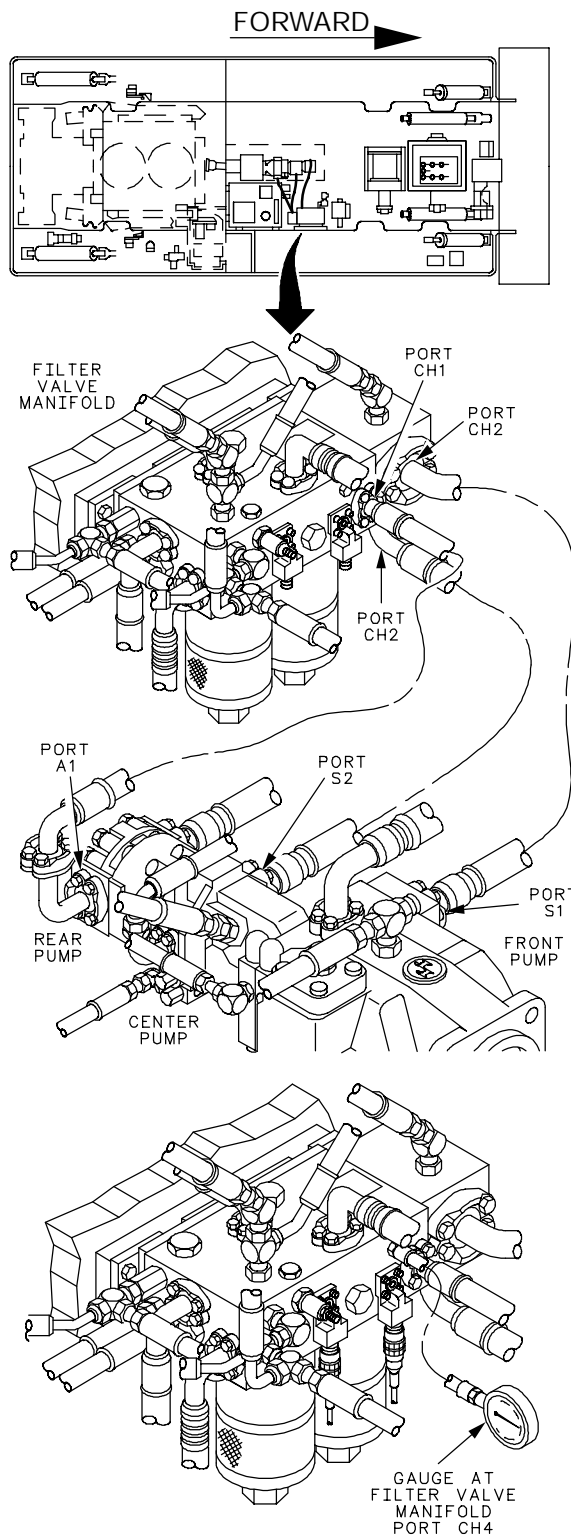
WARNING

1. Install 0-300 psi dial pressure gauge in filter valve manifold port CH4.
2. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10). Observe gauge.
3. Shut down hydraulics and main engine (TM 9-2350-292-10).

Is gauge pressure reading 80-140 psi?



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24i030tc

MAIN HYDRAULICS SYSTEM IS NOISY - CONTINUED

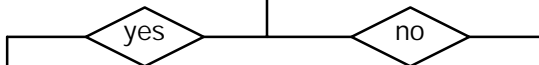
0013 00

CONTINUED FROM STEP I

J

1. Start APU (TM 9-2350-292-10).
2. Place system selector valve in the AUX position and observe gauge at port CH4 of filter valve manifold.
3. Shut down APU (TM 9-2350-292-10).

Is gauge pressure reading 80-140 psi?



yes

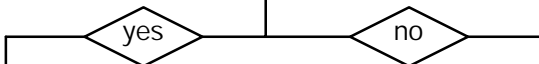
Replace rear pump (WP 0071 00). Verify fault is corrected.

FROM STEP M

K

Inspect hoses and connections from crossport relief/anticavitation valve port C to port AWR on hydraulic control valve manifold assembly from port AWR on hydraulic control valve manifold assembly to filter valve manifold port CH2 and from port R of hoist and main winch directional control valve to filter valve manifold port CH3 for leaks, restrictions, and damage.

Are hoses and connections free of leaks, restrictions, and damage?

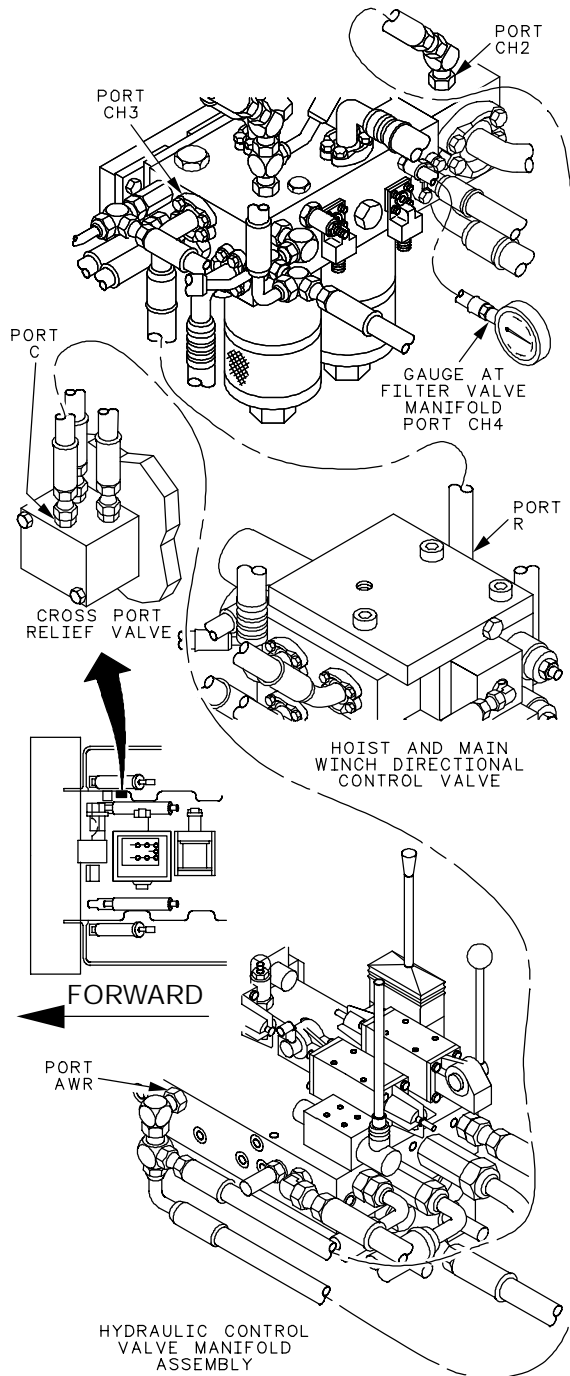


yes

Replace filter valve manifold charge relief valve (TM 9-2350-292-20). Verify fault is corrected.

no

Tighten leaking connections and remove restrictions. If restrictions cannot be removed or if damaged, replace (TM 9-2350-292-20). Verify fault is corrected.



24i030td

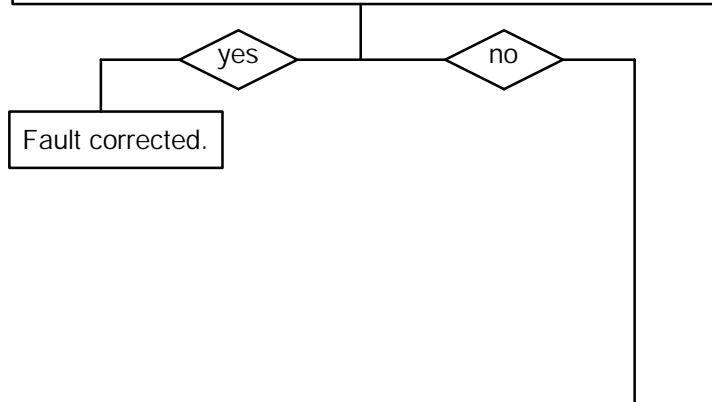
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MAIN HYDRAULICS SYSTEM IS NOISY - CONTINUED

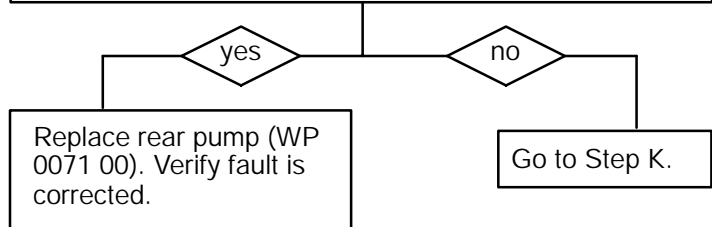
0013 00

CONTINUED FROM STEP H

L	<ol style="list-style-type: none"> 1. Start Enhanced Diagnostics Program (WP 0010 00) and select symptom #3. 2. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10). Record pressure at filter valve manifold port CH4. 3. Shut down hydraulics and main engine (TM 9-2350-292-10).
Is pressure 80-140 psi?	



M	<ol style="list-style-type: none"> 1. Start APU (TM 9-2350-292-10). 2. Place system selector valve in the AUX position and record pressure at port CH4 of filter valve manifold. 3. Shut down APU (TM 9-2350-292-10).
Is pressure 60-140 psi?	



END OF TASK

MAIN WINCH FAILS TO OPERATE

0014 00

THIS WORK PACKAGE COVERS:

Main Winch Fails to Operate

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- 0-4000 psi dial testing gauge assembly (3) (item 43, WP 0090 00)*
- 1/4-inch tee (2) (item 39, WP 0087 00)
- 1/4-inch cap (5) (item 28, WP 0087 00)
- 1/4-inch plug (3) (item 34, WP 0087 00)
- 3/8-inch plug (item 35, WP 0087 00)
- 3/8-inch cap (item 29, WP 0087 00)
- Safety goggles (item 48, WP 0087 00)

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Hydraulic control valve manifold removed (TM 9-2350-292-20)

Personnel Required

Three

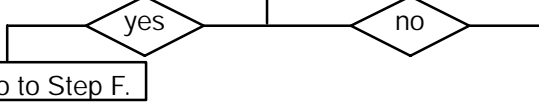
*Not required if vehicle is equipped with Enhanced Diagnostics System

WARNING
Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



WARNING

B Is vehicle equipped with Enhanced Diagnostics System?

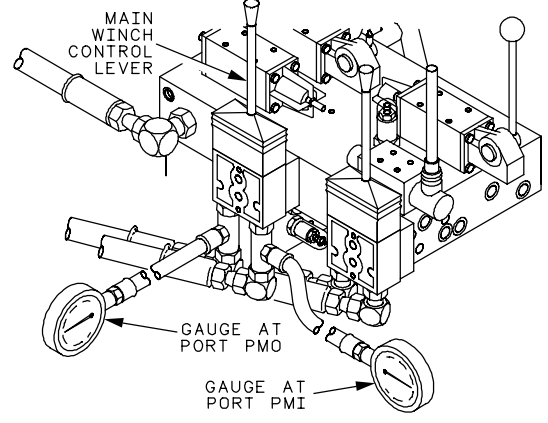
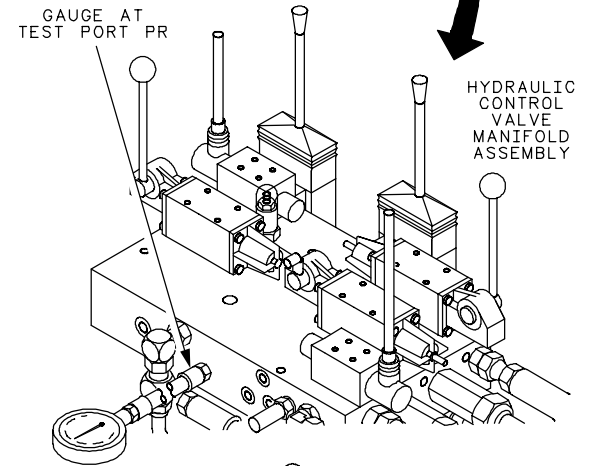
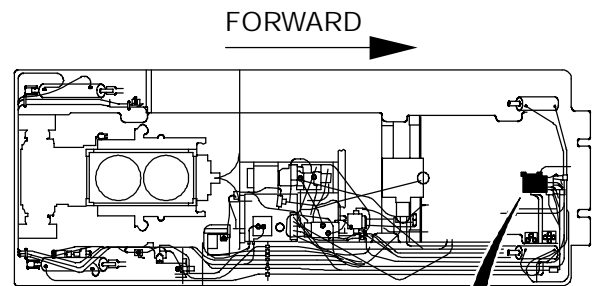


A

WARNING

1. Install 0-4000 psi testing gauge assembly in hydraulic control valve manifold assembly test port PR.
2. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between hydraulic control valve manifold assembly port PMO and attaching hose.
3. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between hydraulic control valve manifold assembly port PMI and attaching hose.
4. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10).
5. Place main winch control lever in hold position and record gauge readings.
6. Shut down hydraulics and main engine (TM 9-2350-292-10).

Does port PR gauge read 385-470 psi and do ports PMI and PMO gauges read 50 psi or less?



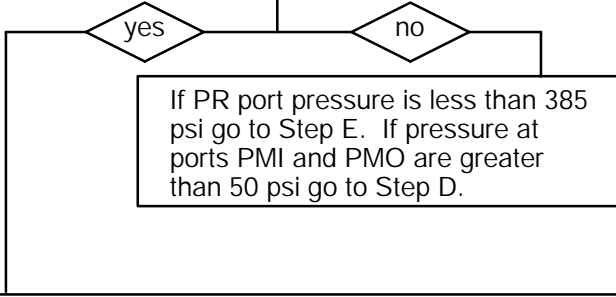
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24i051t

MAIN WINCH FAILS TO OPERATE - CONTINUED

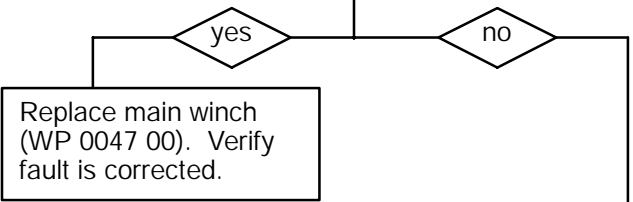
0014 00

CONTINUED FROM STEP B



- C**
1. Perform Step B with main winch control lever in the payout position. Record gauge readings.
 2. Perform Step B with main winch control lever in the inhaul position. Record gauge readings.

In payout position, does PMO gauge read 385-470 psi and PMI gauge read 50 psi or less; and in inhaul position, does PMI gauge read 385-470 psi and PMO gauge read 50 psi or less?



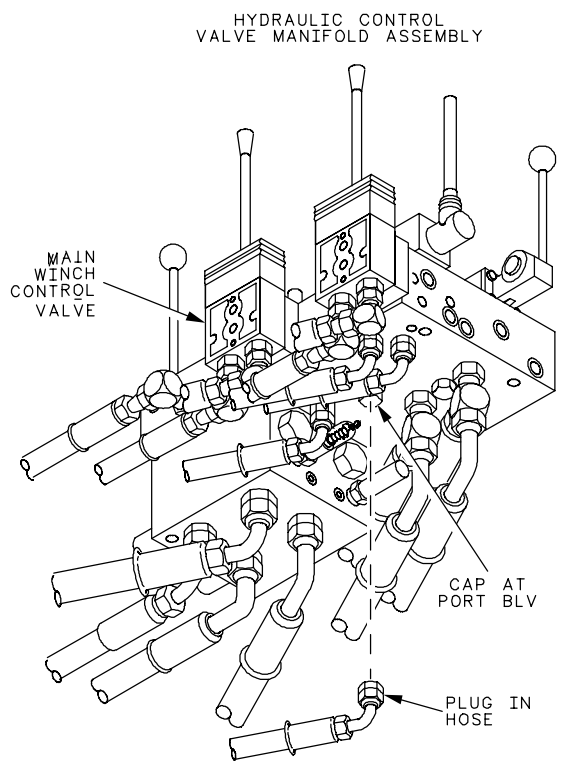
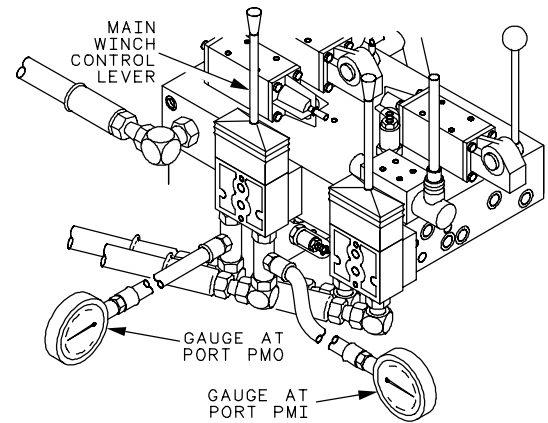
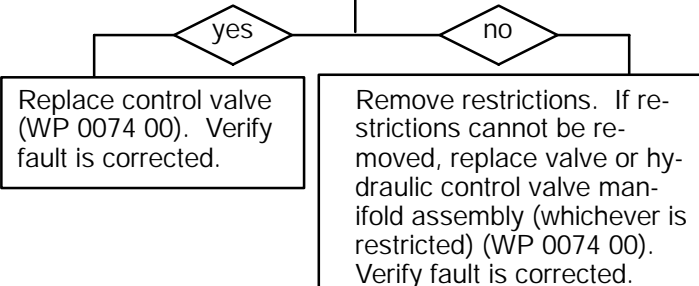
CONTINUED FROM STEP B

D

WARNING

Remove the main winch control valve from the hydraulic control valve manifold assembly and inspect valve and manifold valve port for restrictions.

Is the pilot valve and port free of restrictions?



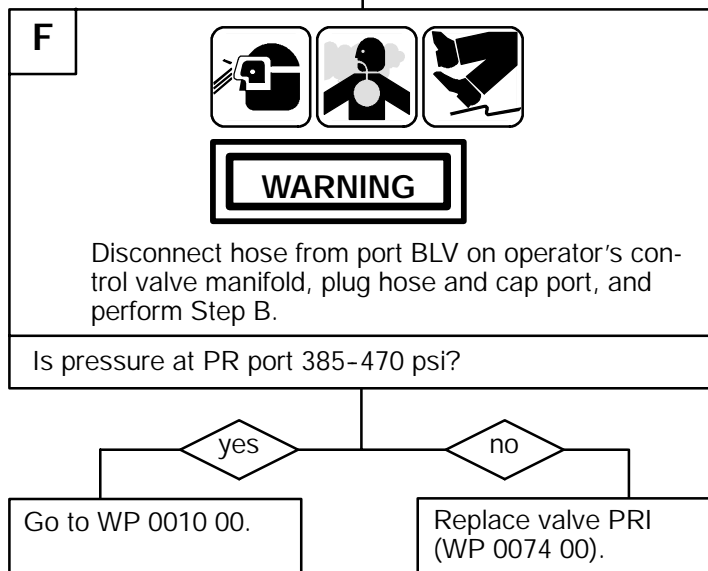
24i051ta

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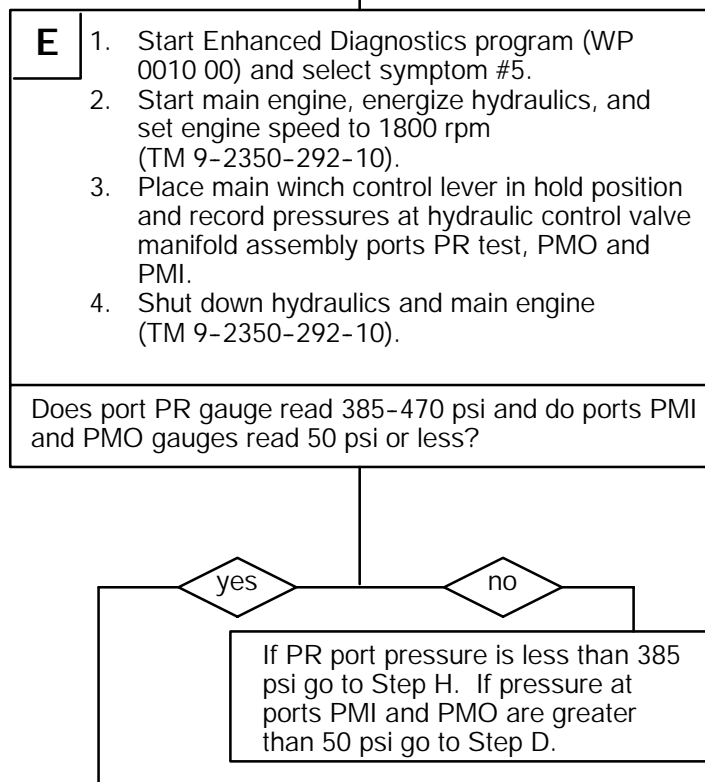
MAIN WINCH FAILS TO OPERATE - CONTINUED

0014 00

CONTINUED FROM STEP B



CONTINUED FROM STEP A



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MAIN WINCH FAILS TO OPERATE - CONTINUED

0014 00

CONTINUED FROM STEP F

G

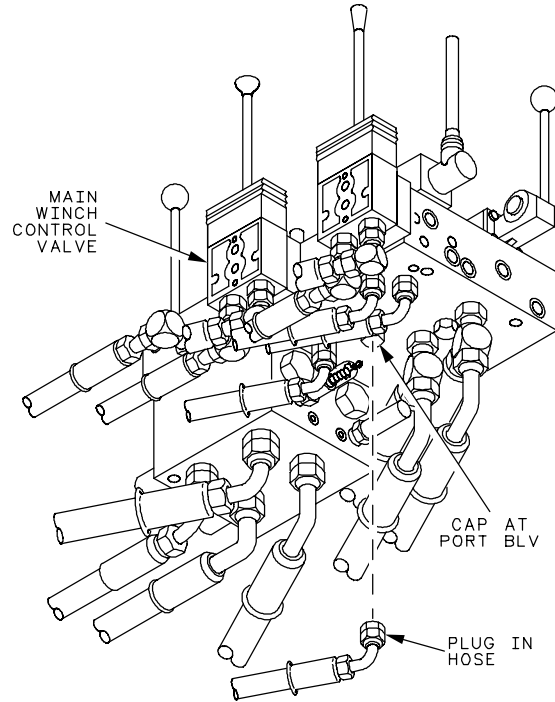
1. Perform Step F with main winch control lever in the payout position. Record pressures.
2. Perform Step F with main winch control lever in the inhaul position. Record pressures.

In payout position, is pressure at PMO port 385-470 psi and PMI port 50 psi or less; and in inhaul position, is PMI port pressure 385-470 psi and PMO port pressure 50 psi or less?

yes

no

Replace main winch (WP 0047 00). Verify fault is corrected.



24i051tc

H

WARNING

Disconnect hose from port BLV on operator's control valve manifold, plug hose and cap port, and perform Step F.

Is pressure at PR port 385-470 psi?

yes

no

Go to WP 0010 00.

Replace valve PRI (WP 0074 00).

END OF TASK

MAIN WINCH OPERATES SLOWLY OR LACKS POWER

0015 00

THIS WORK PACKAGE COVERS:

Main Winch Fails to Operate

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- 0-4000 psi dial testing gauge assembly (3) (item 43, WP 0090 00)*
- 1/4-inch tee (2) (item 39, WP 0087 00)
- 1/4-inch cap (5) (item 28, WP 0087 00)
- 1/4-inch plug (3) (item 34, WP 0087 00)
- 3/8-inch plug (item 35, WP 0087 00)
- 3/8-inch cap (item 29, WP 0087 00)
- Safety goggles (item 48, WP 0087 00)

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Hydraulic control valve manifold removed (TM 9-2350-292-20)

Personnel Required

Three

*Not required if vehicle is equipped with Enhanced Diagnostics System

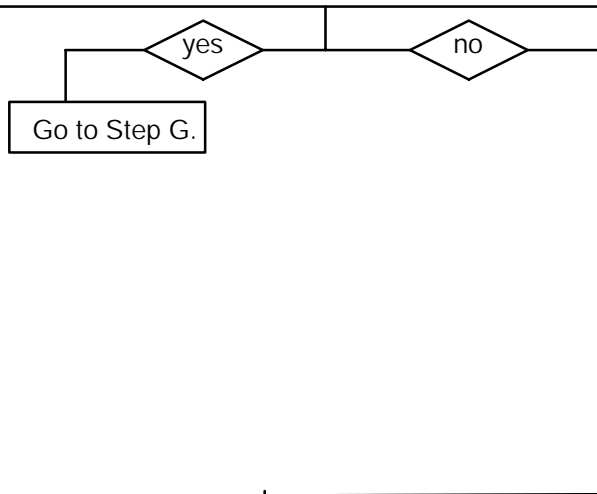
WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



WARNING


A Is vehicle equipped with Enhanced Diagnostics System?



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CONTINUED FROM STEP A

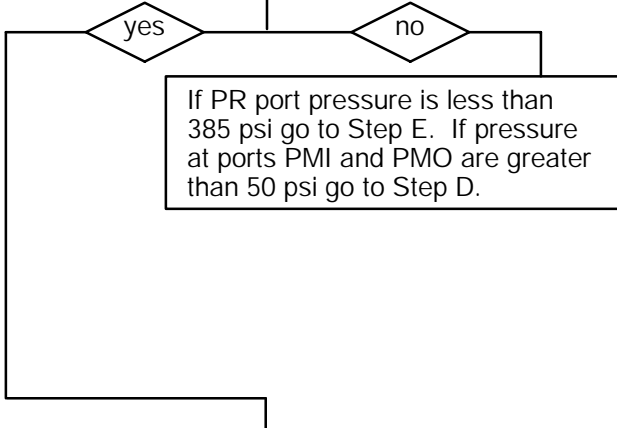
B



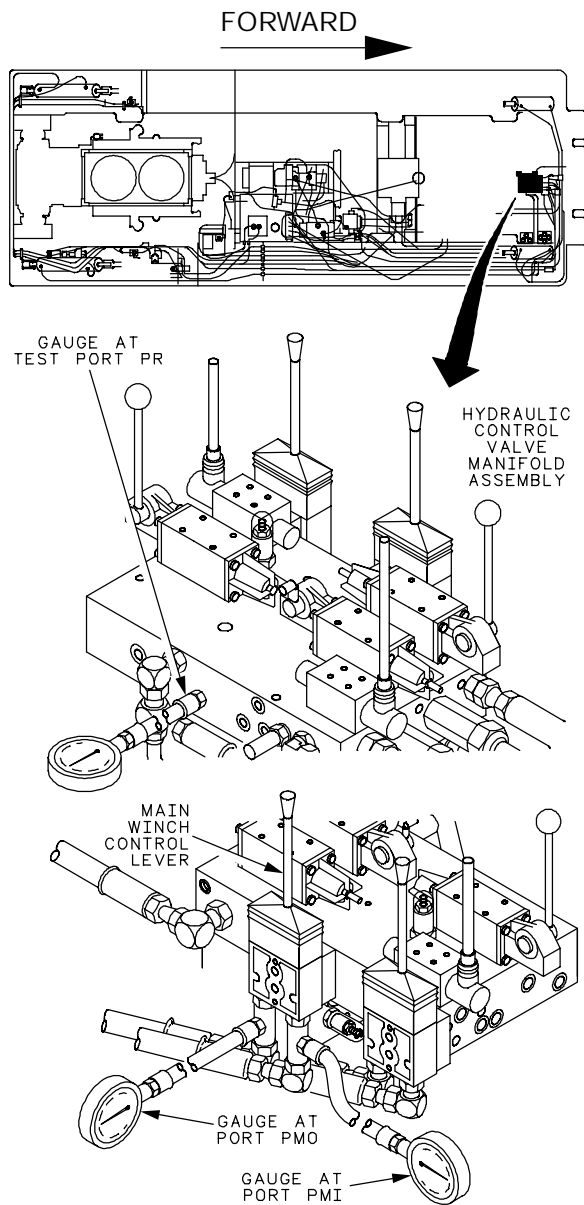
WARNING

1. Install 0-4000 psi testing gauge assembly in hydraulic control valve manifold assembly test port PR.
2. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between hydraulic control valve manifold assembly port PMO and attaching hose.
3. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between hydraulic control valve manifold assembly port PMI and attaching hose.
4. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
5. Place main winch control lever in hold position and record gauge readings.
6. Shut down hydraulics and main engine (TM 9-2350-292-10).

Does port PR gauge read 385-470 psi and do ports PMI and PMO gauges read 50 psi or less?



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24i052t

MAIN WINCH OPERATES SLOWLY OR LACKS POWER - CONTINUED

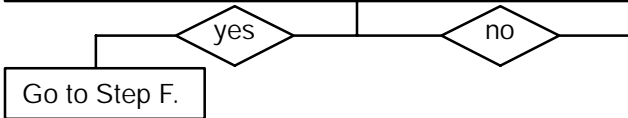
0015 00

CONTINUED FROM STEP B

C

1. Perform Step B with main winch control lever in the payout position. Record gauge readings.
2. Perform Step B with main winch control lever in the inhaul position. Record gauge readings.

In payout position, does PMO gauge read 385-470 psi and PMI gauge read 50 psi or less; and in inhaul position, does PMI gauge read 385-470 psi and PMO gauge read 50 psi or less?



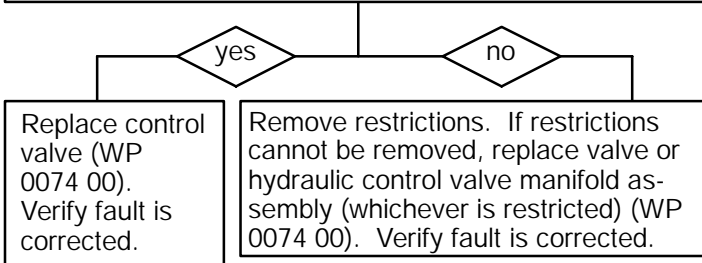
CONTINUED FROM STEP B

D

WARNING

Remove the main winch control valve from the hydraulic control valve manifold assembly and inspect valve and manifold valve port for restrictions (WP 0074 00).

Is the pilot valve and port free of restrictions?



CONTINUED FROM STEP B

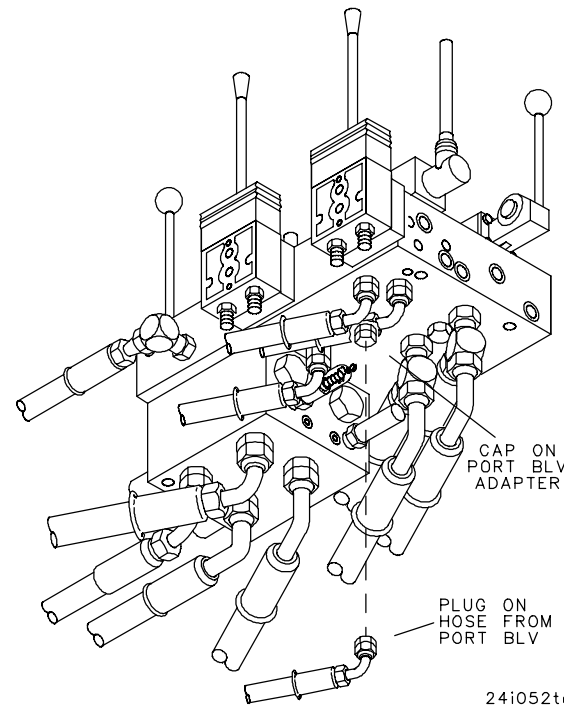
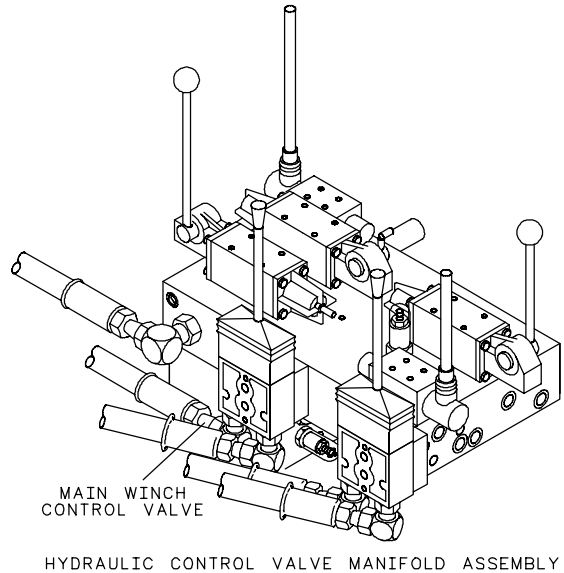
E

WARNING

Disconnect hose from port BLV on hydraulic control valve manifold assembly, plug hose and cap port, and perform Step B.

Is pressure at PR port 385-470 psi?

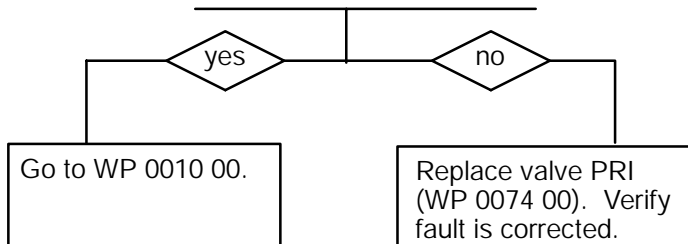
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MAIN WINCH OPERATES SLOWLY OR LACKS POWER - CONTINUED

0015 00

CONTINUED FROM STEP E



CONTINUED FROM STEP C

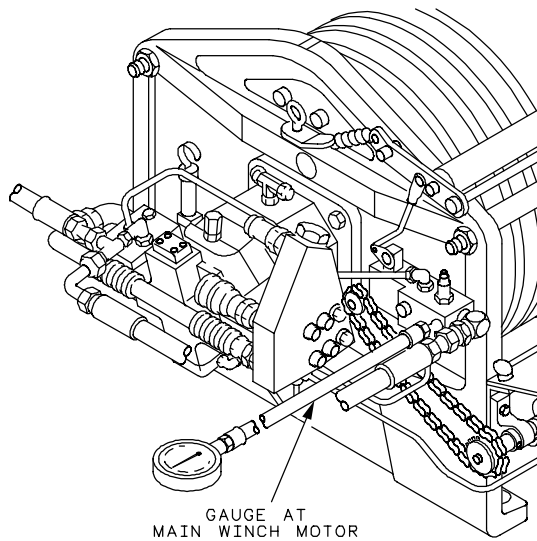
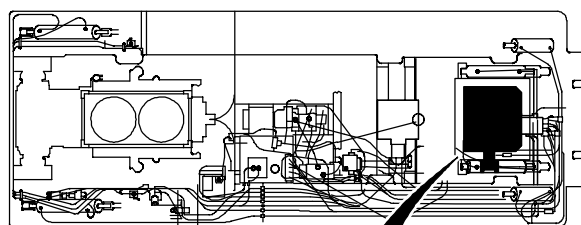
F

WARNING

1. Remove subfloor plates 10, 11, 12 and 15 (TM 9-2350-292-20).
2. Install 0-4000 psi testing gauge assembly in main winch motor layer sensor manifold port X1.
3. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10).
4. Payout main winch cable and attach a load weight greater than 50,000 pounds.
5. Payin cable at full speed and record gauge readings while cable is on first layer on drum, first wrap of second layer on drum, and third layer on drum.
6. Shut down hydraulics and main engine (TM 9-2350-292-10).

Does pressure gauge read 0 to 15 psi while wrapping first layer of cable onto drum and 90 to 170 psi when first wrap of second layer goes onto drum and 280 to 380 psi when first wrap of third layer goes onto drum?

FORWARD →



GAUGE AT MAIN WINCH MOTOR LAYER SENSOR PORT X1

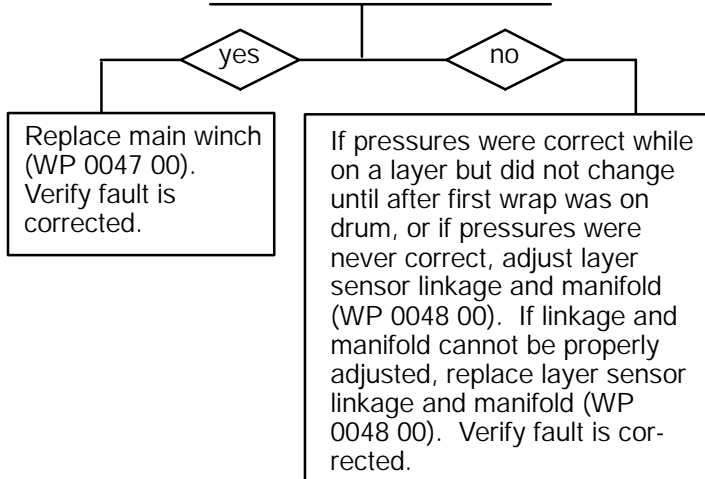
24i052tb

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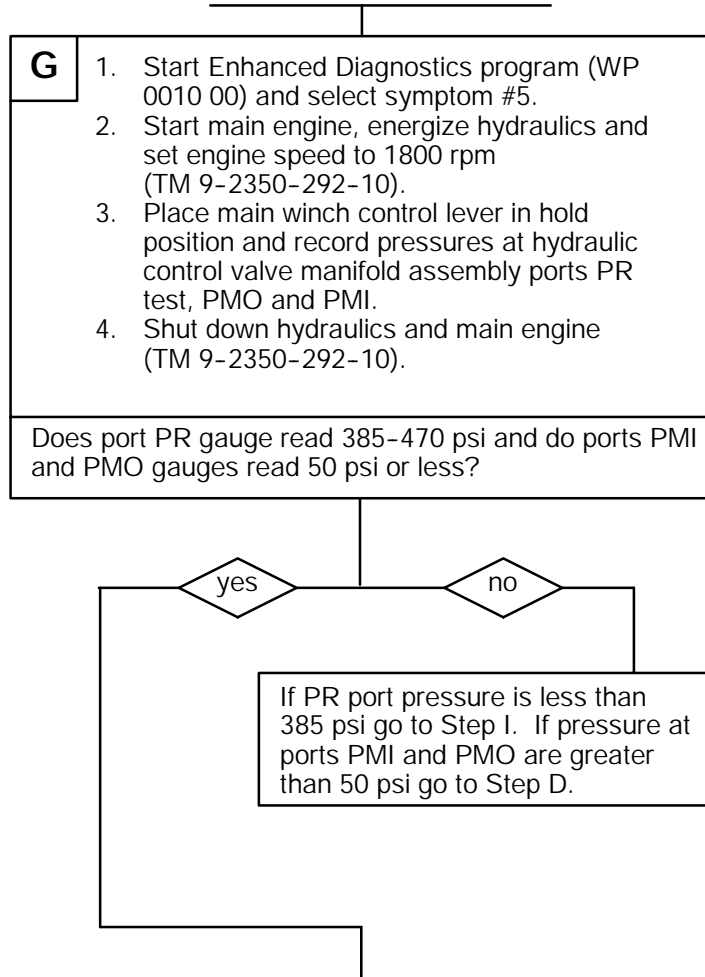
MAIN WINCH OPERATES SLOWLY OR LACKS POWER - CONTINUED

0015 00

CONTINUED FROM STEP F



CONTINUED FROM STEP A



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MAIN WINCH OPERATES SLOWLY OR LACKS POWER - CONTINUED

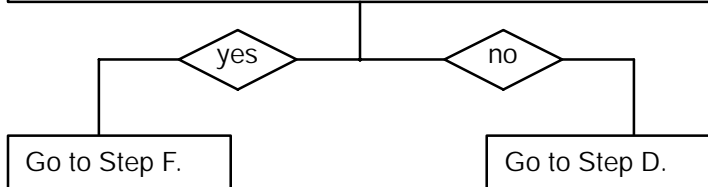
0015 00

CONTINUED FROM STEP G

H

1. Perform Step G with main winch control lever in the payout position. Record pressures.
2. Perform Step G with main winch control lever in the inhaul position. Record pressures.

In payout position, is PMO pressure 385-470 psi and PMI pressure 50 psi or less; and in inhaul position, is PMI pressure 385-470 psi and PMO pressure 50 psi or less?



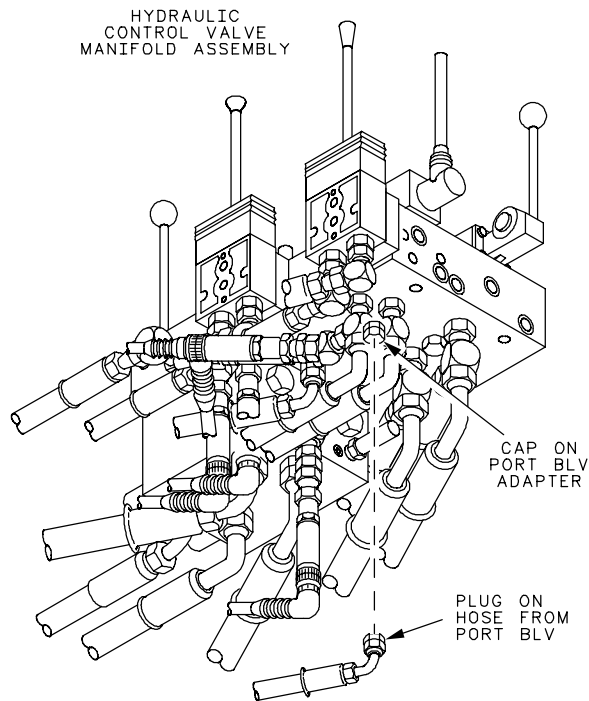
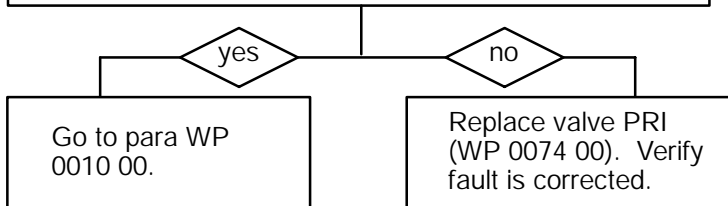
CONTINUED FROM STEP G

I

WARNING

Disconnect hose from port BLV on hydraulic control valve manifold assembly, plug hose and cap port, and perform Step G.

Is pressure at PR port 385-470 psi?



24i052td

END OF TASK

MAIN WINCH INHAULS BUT WILL NOT PAYOUT

0016 00

THIS WORK PACKAGE COVERS:

Main Winch Inhauls But Will Not Payout

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- 0-5000 psi dial pressure gauge (3)
- (item 44, WP 0090 00) (1 required if vehicle is equipped with Enhanced Diagnostics System)
- 0-4000 psi dial testing gauge assembly (3) (item 43, WP 0090 00)*
- 1/4-inch tee (2) (item 39, WP 0087 00)
- 3/8-inch plug (item 35, WP 0087 00)
- 3/8-inch cap (item 29, WP 0087 00)
- Safety goggles (item 48, WP 0087 00)

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Hydraulic control valve manifold shields removed (TM 9-2350-292-20)

Personnel Required

Two

*Not required if vehicle is equipped with Enhanced Diagnostics System

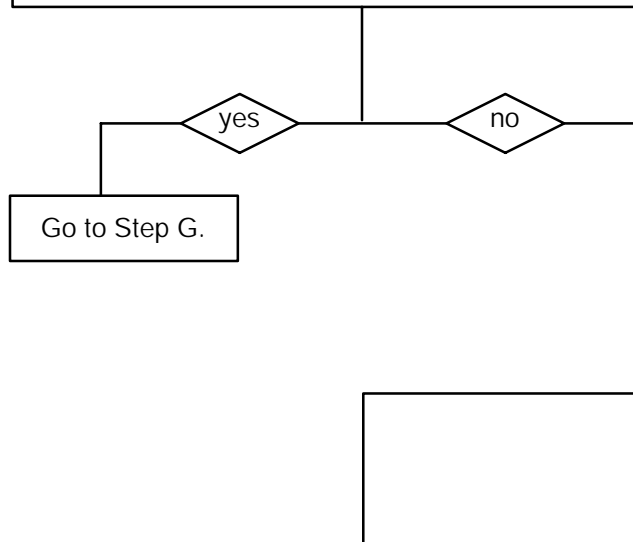
WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



WARNING


A Is vehicle equipped with Enhanced Diagnostics System?



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CONTINUED FROM STEP A

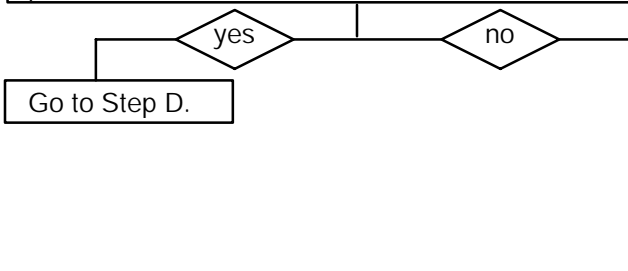
B



WARNING

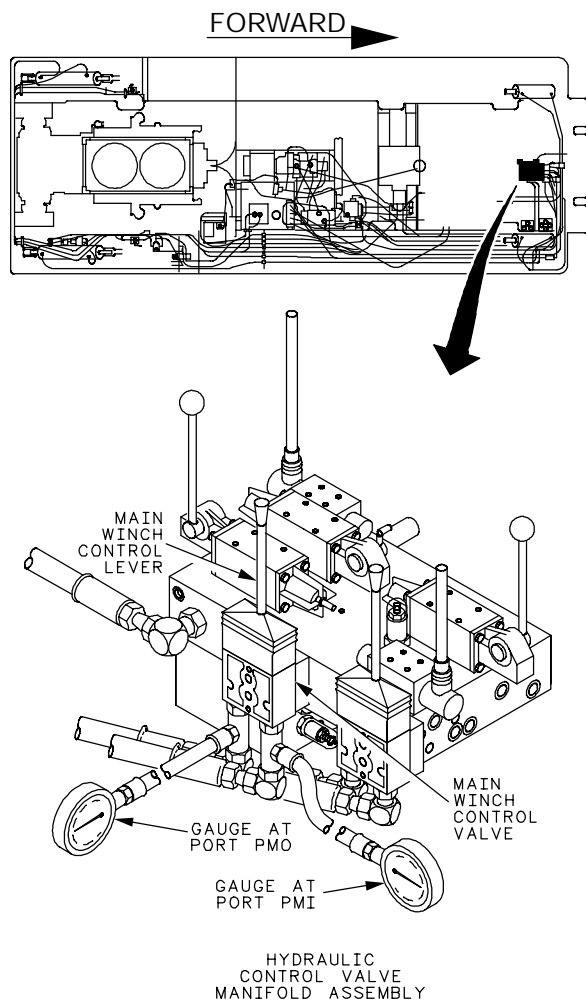
1. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between the hydraulic control valve manifold assembly port PMO and attaching hose.
2. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between the hydraulic control valve manifold assembly port PMI and attaching hose.
3. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
4. Attempt to payout main winch and record gauge readings.
5. Shut down hydraulics and main engine (TM 9-2350-292-10).

Is PMO pressure 385-470 psi and is PMI pressure 50 psi or less?



C Remove main winch control valve from hydraulic control valve manifold assembly and inspect valve for restrictions.

Is pilot valve free of restrictions?



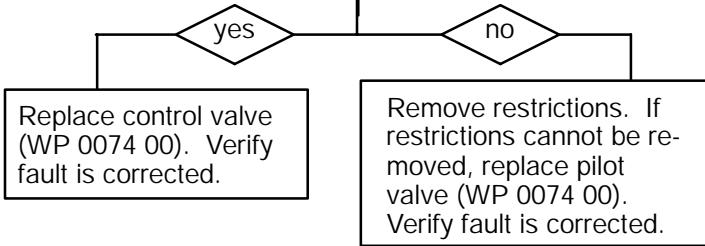
24i053t

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MAIN WINCH INHAULS BUT WILL NOT PAYOUT - CONTINUED

0016 00

CONTINUED FROM STEP C



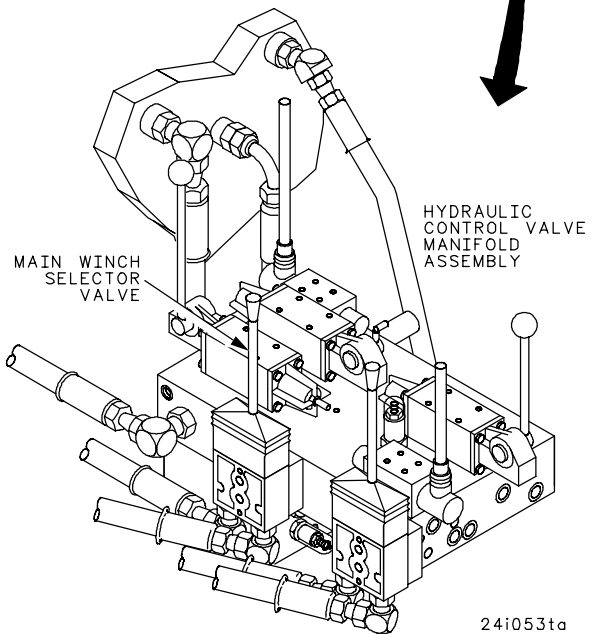
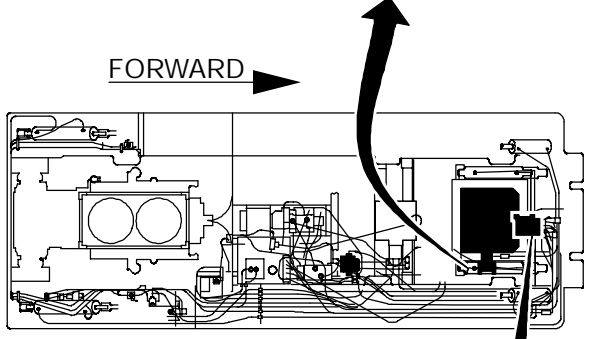
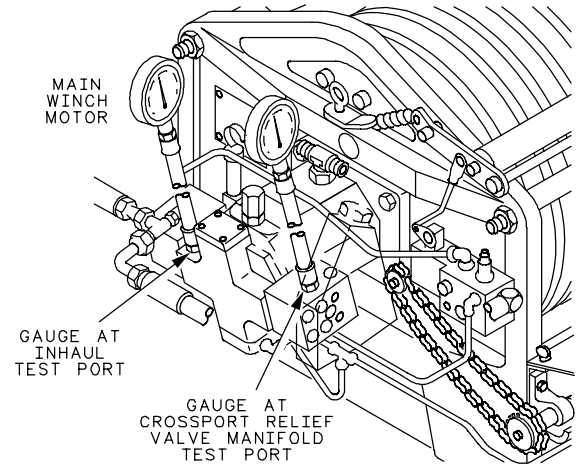
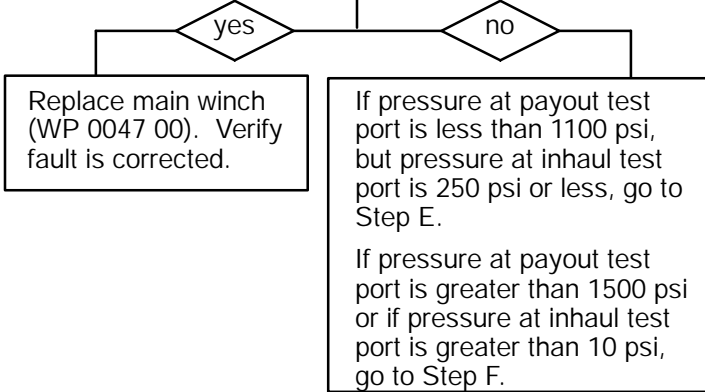
CONTINUED FROM STEP B

D

WARNING

1. Remove subfloor plates 10, 11, 12 and 15 (TM 9-2350-292-20).
2. Install 0-5000 psi dial pressure gauge in the main winch motor crossport relief valve manifold payout test port.
3. Install 0-5000 psi dial pressure gauge in the main winch motor inhaul test port.
4. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10).
5. Attempt to payout main winch and place main winch selector valve in full payout position. Record gauge readings.
6. Shut down hydraulics and main engine (TM 9-2350-292-10).

Is pressure at manifold payout test port 1100-1500 psi and is pressure at motor inhaul test port 250 psi or less?




24i053ta

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CONTINUED FROM STEP D

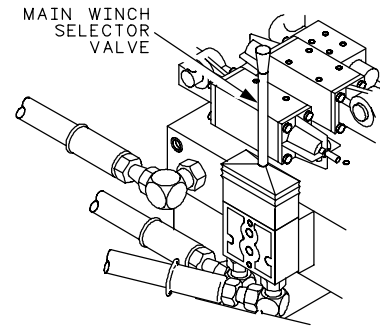
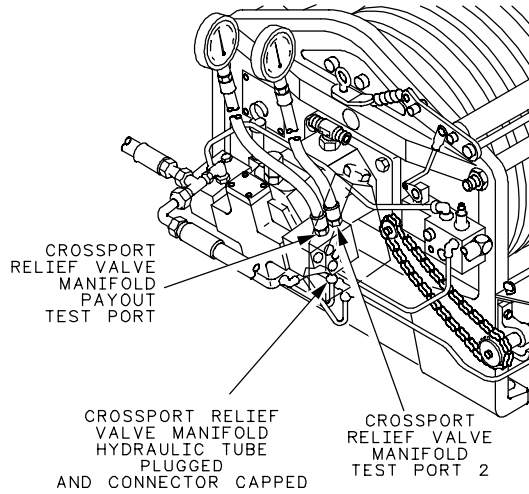
E



WARNING

1. Remove 0-5000 psi dial pressure gauge from main winch motor inhaul test port.
2. Install 0-5000 psi dial pressure gauge in crossport relief valve manifold test port number 2.
3. Disconnect hydraulic tube from crossport relief valve manifold, plug tube and cap manifold connector.
4. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10).
5. Slowly move main winch control lever from hold position to payout position. Observe gauges and do not allow a pressure greater than 2500 psi on either gauge.
6. Shut down hydraulics and main engine (TM 9-2350-292-10).

Do both gauges read approximately the same pressures?




yes

no

Replace crossport relief valve manifold (WP 0048 00). Verify fault is corrected.

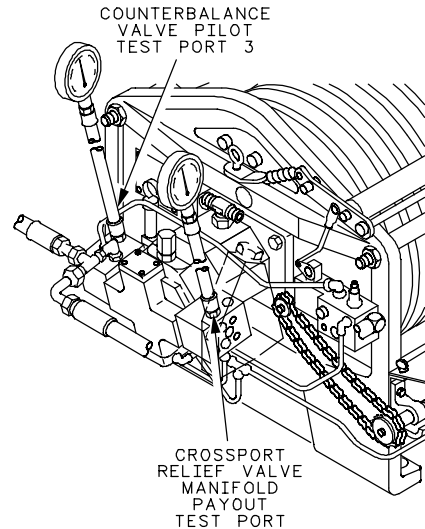
F



WARNING

1. Remove 0-5000 psi dial pressure gauge from main winch motor test port.
2. Install 0-5000 psi dial pressure gauge in counterbalance valve pilot test port number 3.
3. Perform Step D steps 4 through 6.

Do both gauges read approximately the same pressures?



yes

no

Replace counterbalance valve (WP 0048 00). Verify fault is corrected.

Replace main winch (WP 0047 00). Verify fault is corrected.

CONTINUED ON NEXT PAGE

24i053tb

MAIN WINCH INHAULS BUT WILL NOT PAYOUT - CONTINUED

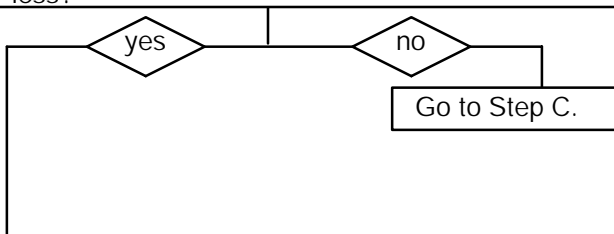
0016 00

CONTINUED FROM STEP A

G

1. Start Enhanced Diagnostics Program (WP 0010 00) and select symptom #6.
2. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
3. Attempt to payout main winch and record pressures at hydraulic control valve manifold assembly ports PMO and PMI.
4. Shut down hydraulics and main engine (TM 9-2350-292-10).

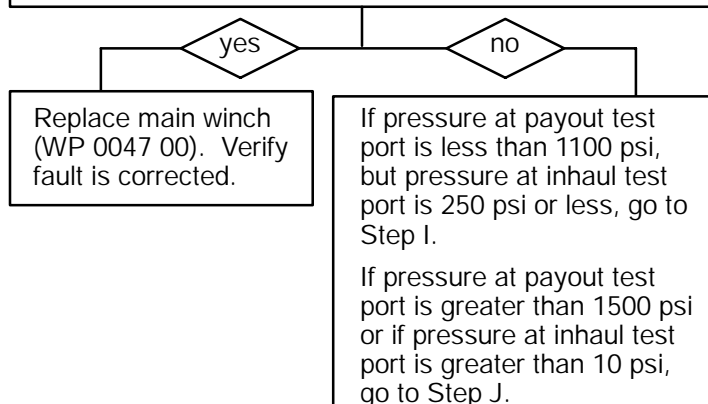
Is PMO pressure 385-470 psi and is PMI pressure 50 psi or less?



H

1. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10).
2. Attempt to payout main winch and place main winch selector valve in full payout position. Record pressures at main winch motor inhaul test port and main winch motor crossport relief valve manifold payout test port.
3. Shut down hydraulics and main engine (TM 9-2350-292-10).

Is pressure at manifold payout test port 1100-1500 psi and is pressure at motor inhaul test port 250 psi or less?




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MAIN WINCH INHAULS BUT WILL NOT PAYOUT - CONTINUED

0016 00

CONTINUED FROM STEP H

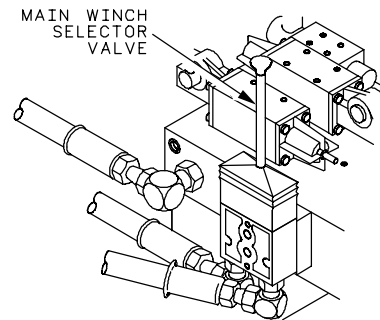
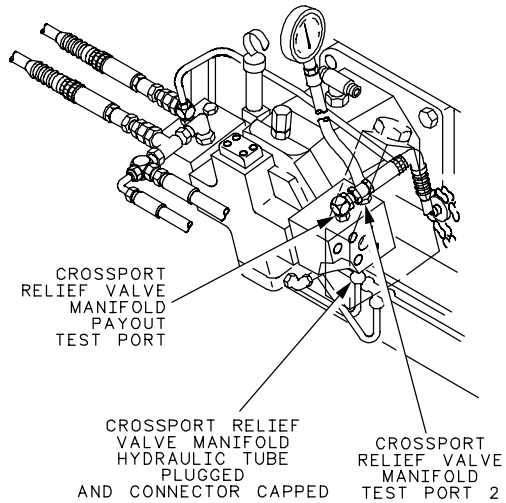
I



WARNING

1. Remove subfloor plates 10, 11, 12, and 15.
2. Install 0-5000 psi dial pressure gauge in crossport relief valve manifold test port number 2.
3. Disconnect hydraulic tube from crossport relief valve manifold, plug tube and cap manifold connector.
4. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10).
5. Slowly move main winch control lever from hold position to payout position. Observe gauge pressure at main winch motor inhaul test port and do not allow a pressure greater than 2500 psi on either port.
6. Shut down hydraulics and main engine (TM 9-2350-292-10).

Do both gauges read approximately the same pressures?




yes

no

Replace crossport relief valve manifold (WP 0048 00). Verify fault is corrected.

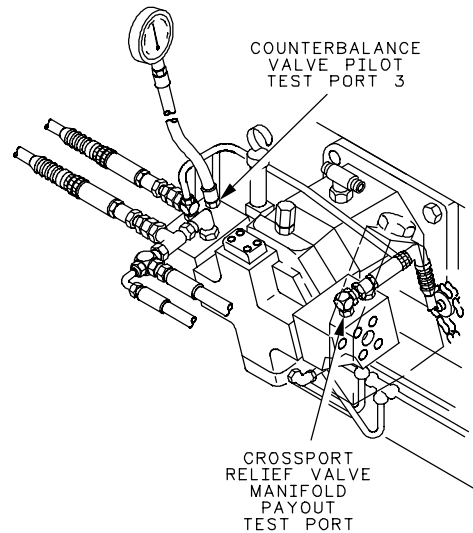
J



WARNING

1. Remove 0-5000 psi dial pressure gauge from main winch motor test port number 2.
2. Install 0-5000 psi dial pressure gauge in counterbalance valve pilot test port number 3.
3. Perform Step I steps 4 through 6.

Do both gauges read approximately the same pressures?



yes

no

Replace counterbalance valve (WP 0048 00). Verify fault is corrected.

Replace main winch (WP 0047 00). Verify fault is corrected.

24i053te

END OF TASK

MAIN WINCH WILL PAYOUT BUT WILL NOT INHAUL

0017 00

THIS WORK PACKAGE COVERS:

Main Winch Will Payout But Will Not Inhaul

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- 0-4000 psi dial testing gauge assembly (3) (item 43, WP 0090 00)*
- 1/4-inch tee (2) (item 39, WP 0087 00)
- 1/4-inch tee (4) (item 39, WP 0087 00)
- 1/4-inch tee (2) (item 39, WP 0087 00)
- 3/8-inch plug (item 35, WP 0087 00)
- 3/8-inch cap (item 29, WP 0087 00)
- Safety goggles (item 48, WP 0087 00)

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Hydraulic control valve manifold shields removed (TM 9-2350-292-20)

Personnel Required

Two

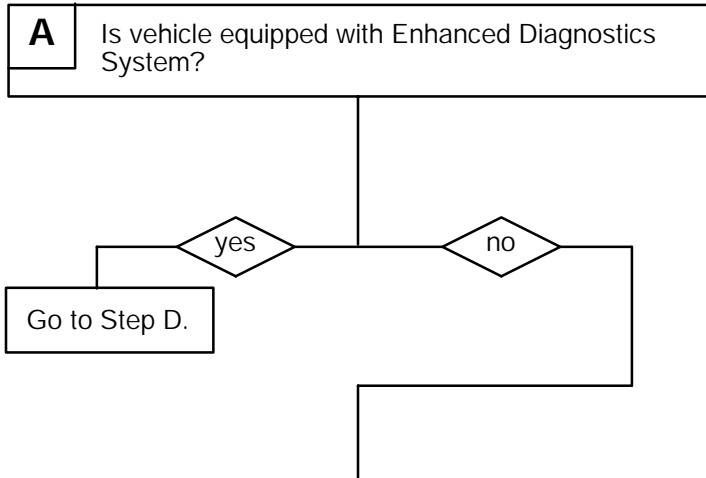
*Not required if vehicle is equipped with Enhanced Diagnostics System

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.




WARNING



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CONTINUED FROM STEP A

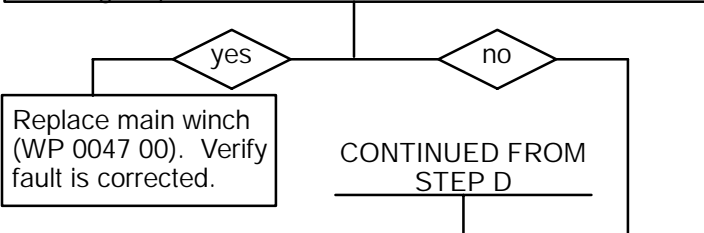
B



WARNING

1. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between the hydraulic control valve manifold assembly port PMO and attaching hose.
2. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between hydraulic control valve manifold assembly port PMI and attaching hose.
3. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10).
4. Attempt to inhaul main winch and record gauge readings.
5. Shut down hydraulics and main engine (TM 9-2350-292-10).

Is PMI gauge reading 385-470 psi and PMO gauge reading 50 psi or less?



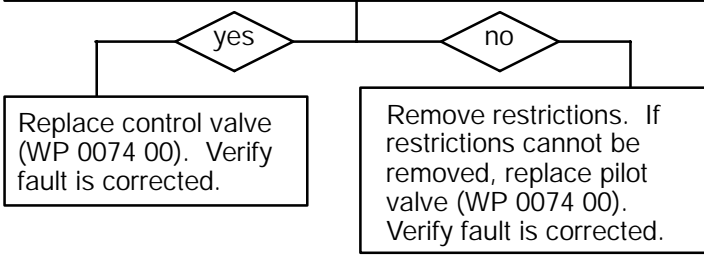
C



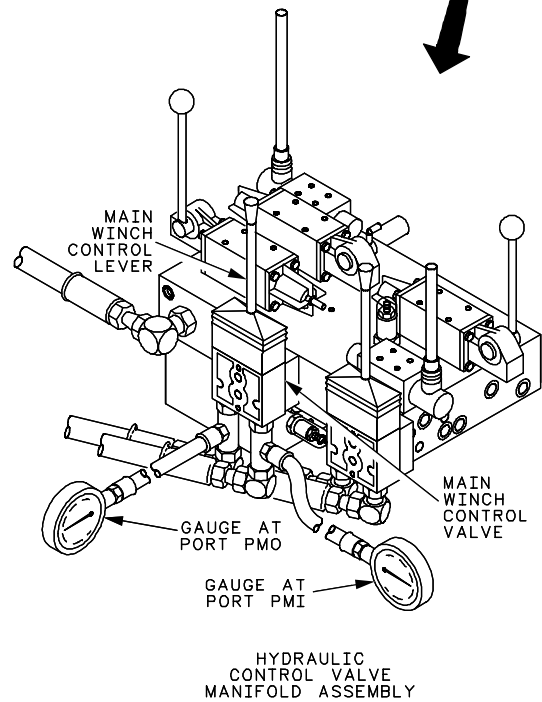
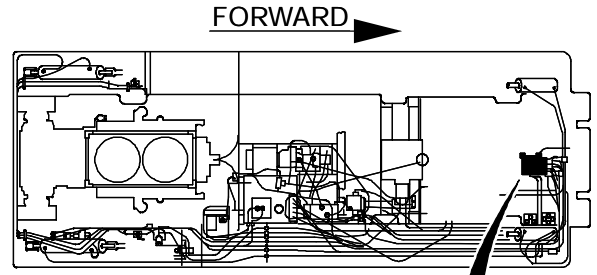
WARNING

Remove main winch control valve from hydraulic control valve manifold assembly and inspect valve for restrictions (WP 0074 00).

Is pilot valve free of restrictions?

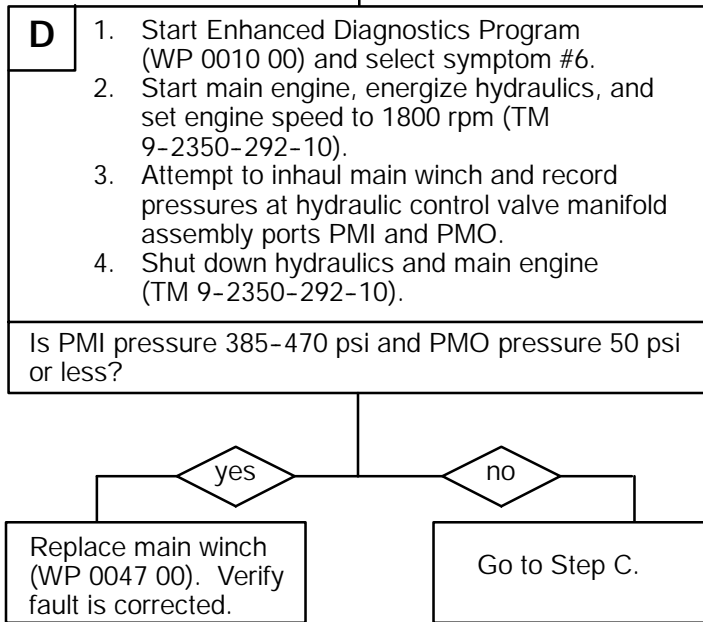


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24i053t

CONTINUED FROM STEP A



END OF TASK

MAIN WINCH WILL NOT HOLD LOAD

0018 00

THIS WORK PACKAGE COVERS:

Main Winch Will Not Hold Load

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- 0-4000 psi dial testing gauge assembly (2) (item 43, WP 0090 00)*
- 1/4-inch tee (2) (item 39, WP 0087 00)
- Safety goggles (item 48, WP 0087 00)

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Hydraulic control valve manifold shields removed (TM 9-2350-292-20)

Personnel Required

Two

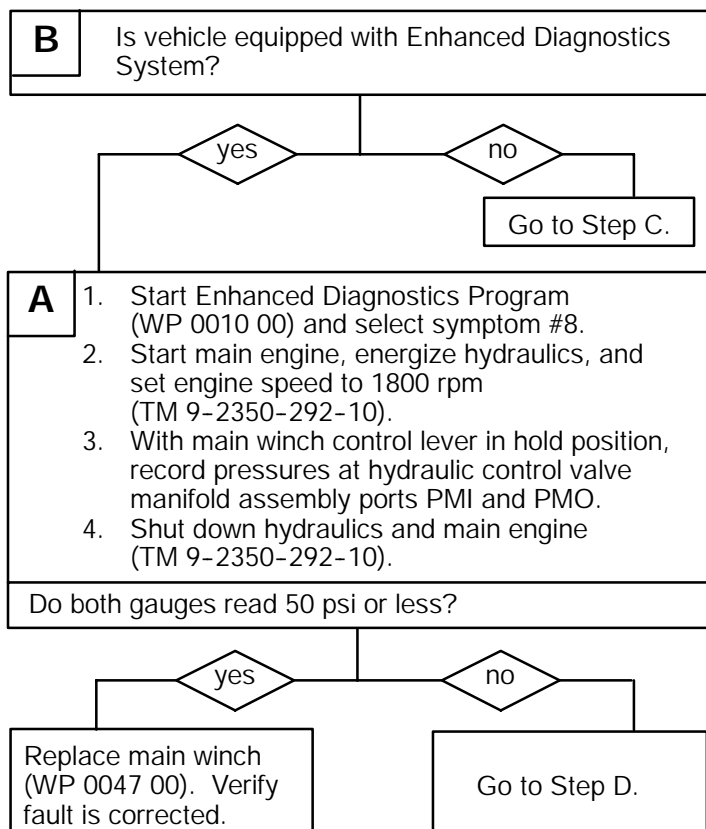
*Not required if vehicle is equipped with Enhanced Diagnostics System

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.




WARNING



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CONTINUED FROM STEP A

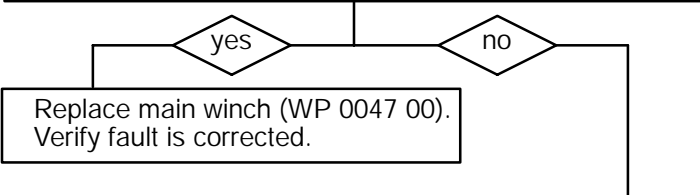
C




WARNING

1. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between the hydraulic control valve manifold assembly port PMO and attaching hose.
2. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between the hydraulic control valve manifold assembly port PMI and attaching hose.
3. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10).
4. With main winch control lever in hold position, record gauge readings.
5. Shut down hydraulics and main engine (TM 9-2350-292-10).

Do both gauges read 50 psi or less?



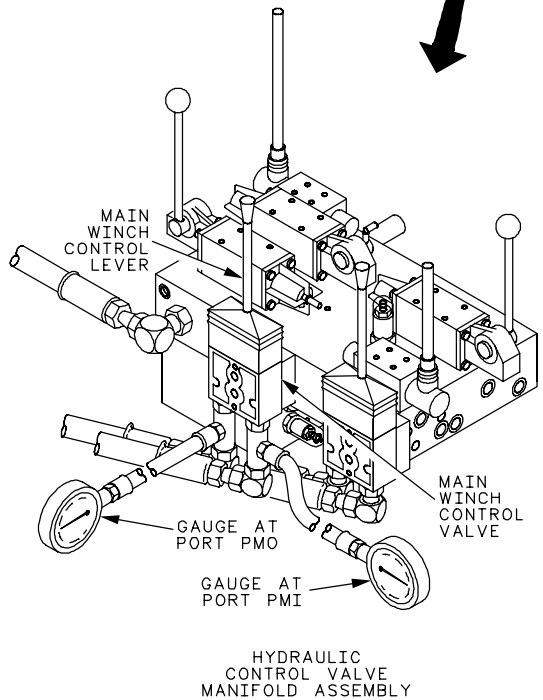
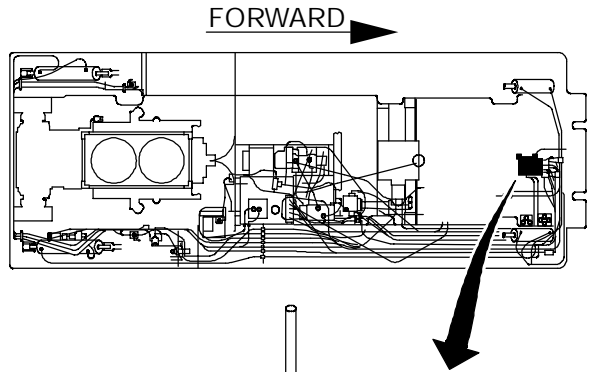
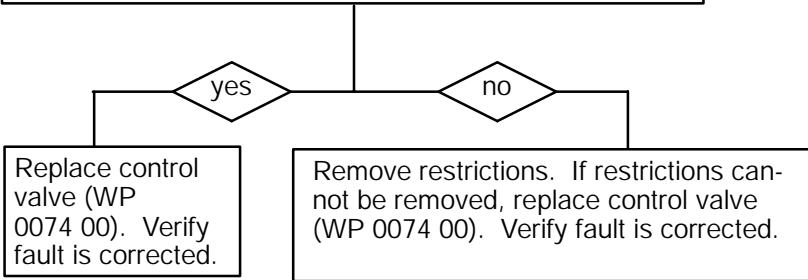
D



WARNING

Remove main winch control valve from hydraulic control valve manifold assembly and inspect valve for restrictions.

Is control valve free of restrictions?



24i053t

END OF TASK

MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION

0019 00

THIS WORK PACKAGE COVERS:

Main Winch Power is Not Reduced When Winch Override Switch is in Override Position

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- 0-5000 psi dial gauge assembly (item 44, WP 0090 00)
- 0-4000 psi dial testing gauge assembly (2) (item 43, WP 0090 00)*
- 1/4-inch tee (2) (item 39, WP 0087 00)

Equipment Conditions

- Main engine shut down (TM 9-2350-292-10)
- Subfloor plate #18 removed (TM 9-2350-292-20)*

Equipment Conditions - Continued

Hydraulic control valve manifold shields removed (TM 9-2350-292-20)

Personnel Required

Two

References

- TM 9-2350-292-10
- TM 9-2350-292-10

*Not required if vehicle is equipped with Enhanced Diagnostics System

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

A

Is vehicle equipped with Enhanced Diagnostics System?

yes

no

Go to Step Q.

Go to Step B.

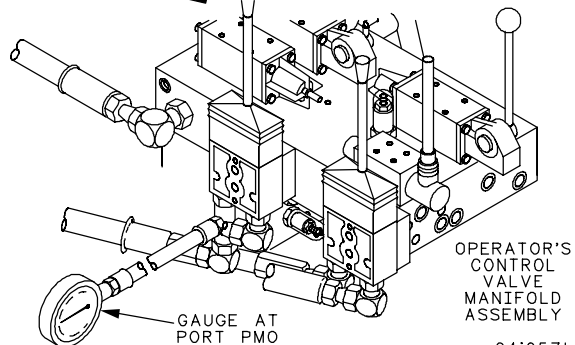
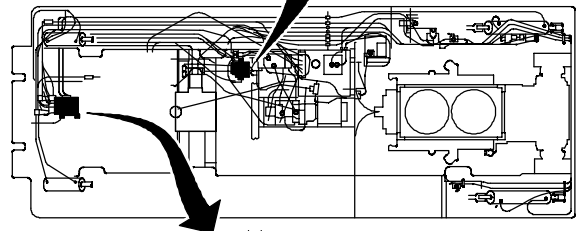
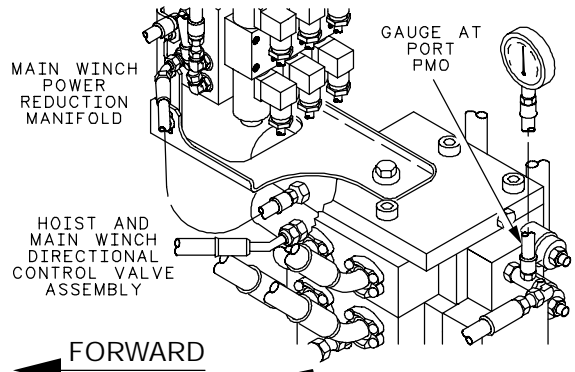
B



WARNING

1. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between hoist and main winch directional control valve assembly port PMO and attaching hose.
2. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between operator's control valve manifold assembly port PMO and attaching hose.
3. Start main engine, energize hydraulics and set engine speed to 1800 rpm. (TM 9-2350-292-10).
4. Payout main winch and record pressure at both gauges.
5. Shutdown hydraulics and main engine (TM 9-2350-292-10).

Is pressure on both gauges equal ± 5 psi?



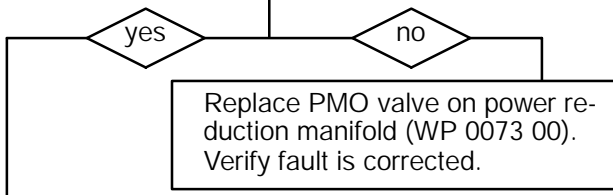
24i057t

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MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION - CONTINUED

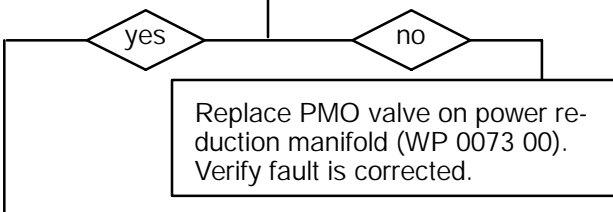
0019 00

CONTINUED FROM STEP B



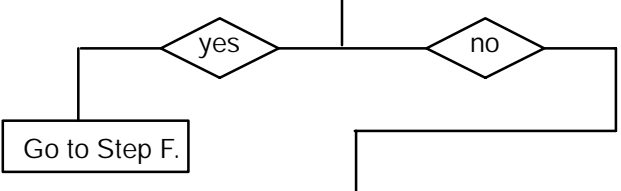
- C**
1. Start main engine, energize hydraulics and set engine speed to 1800 rpm. (TM 9-2350-292-10).
 2. Move WINCH TEST switch to TEST position and hold.
 3. Payout main winch and record pressure at both gauges.
 4. Shutdown hydraulics and main engine (TM 9-2350-292-10).

Is pressure at operator's control valve manifold assembly port PMO 385-470 psi and pressure at hoist and main winch directional control valve assembly port PMO 0 ± 5 psi?

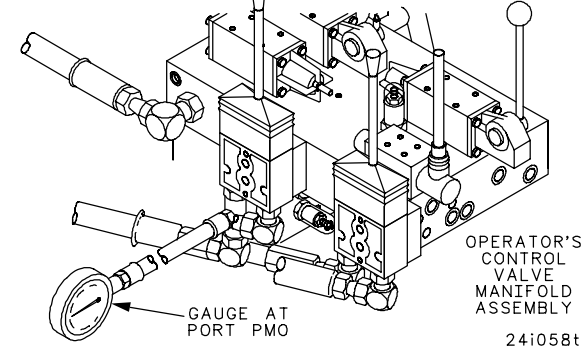
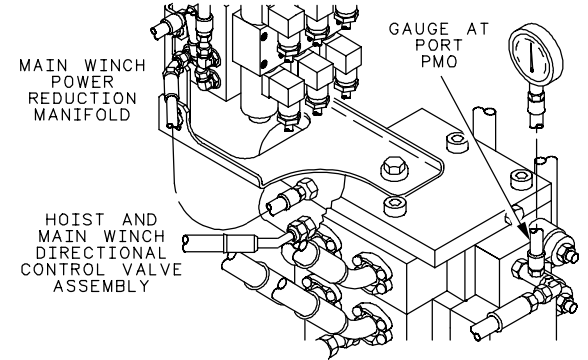
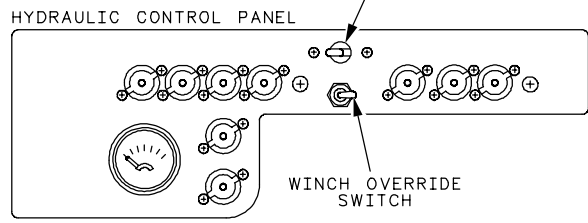
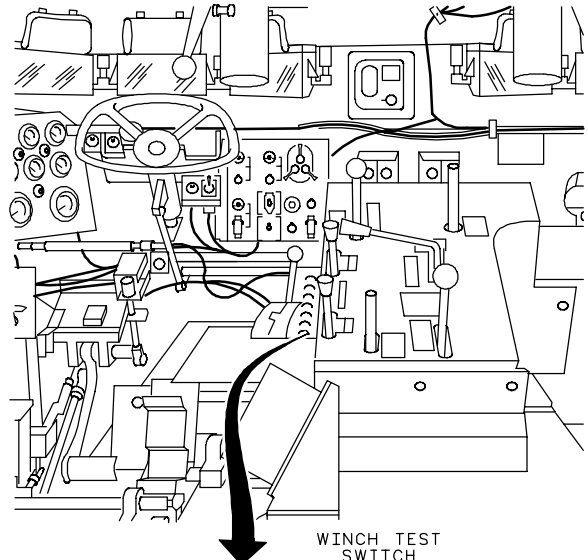


- D**
1. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 2. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold.
 3. Payout main winch and record pressure at both gauges.
 4. Shutdown hydraulics and main engine (TM 9-2350-292-10).

Is pressure at operator's control valve manifold assembly port PMO 385-470 psi and pressure at hoist and main winch directional control valve assembly port PMO 215 to 225 psi?



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24i058t

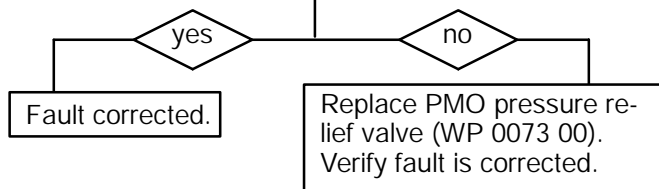
MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION - CONTINUED

0019 00

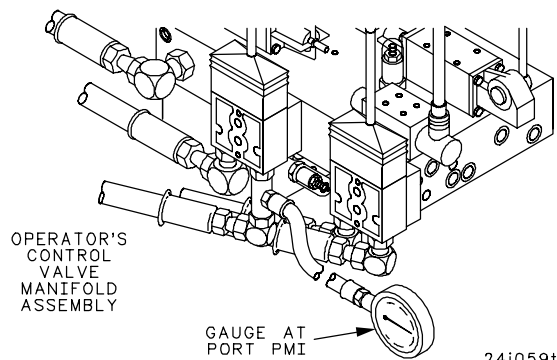
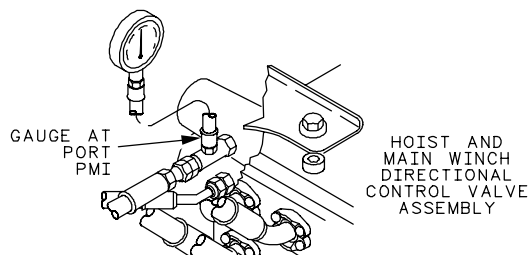
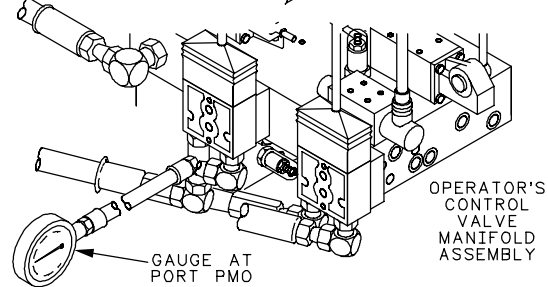
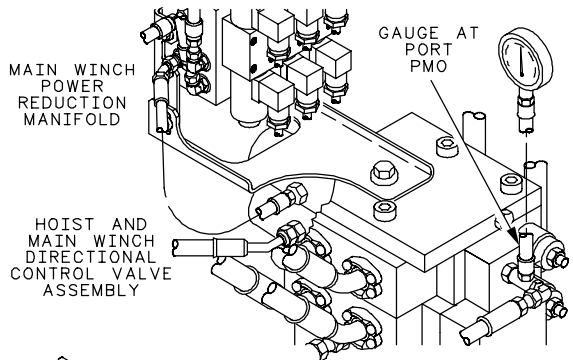
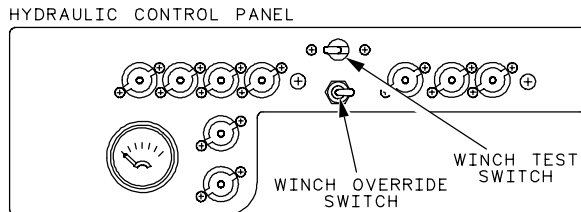
CONTINUED FROM STEP D

- E**
1. Replace PMO valve on power reduction manifold (WP 0073 00).
 2. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 3. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold.
 4. Payout main winch and record pressure at both gauges.
 5. Shutdown hydraulics and main engine (TM 9-2350-292-10).

Is pressure at operator's control valve manifold assembly port PMO 385-470 psi and pressure at hoist and main winch directional control valve assembly port PMO 215 to 225 psi?



- F**
- WARNING**
1. Remove gauges from hoist and main winch directional control valve assembly port PMO and operator's control valve manifold assembly port PMO.
 2. Install 0-4000 psi testing gauge assembly with ¼-inch tee between hoist and main winch directional control valve assembly port PMI and attaching hose.
 3. Install 0-4000 psi testing gauge assembly with ¼-inch tee between operator's control valve manifold assembly port PMI and attaching hose.
 4. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 5. Payin main winch and record pressure at both gauges.
 6. Shutdown hydraulics and main engine (TM 9-2350-292-10).
- Is pressure on both gauges equal ± 5 psi?



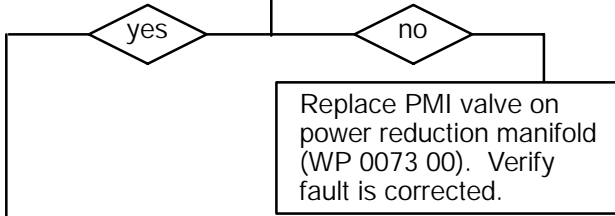
24i059t

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MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION - CONTINUED

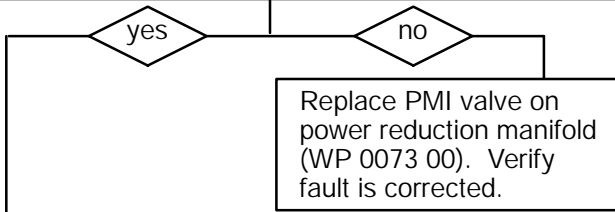
0019 00

CONTINUED FROM STEP F



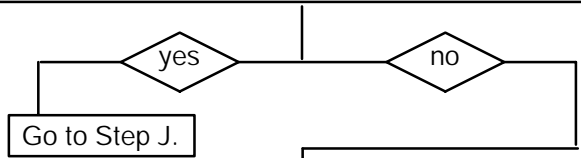
- G**
1. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 2. Move WINCH TEST switch to TEST position and hold.
 3. Payin main winch and record pressure at both gauges.
 4. Shutdown hydraulics and main engine (TM 9-2350-292-10).

Is pressure at operator's control valve manifold assembly port PMI 385-470 psi and pressure at hoist and main winch directional control valve assembly port PMI 0±5 psi?



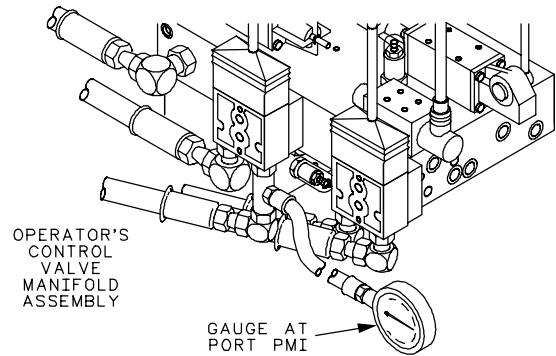
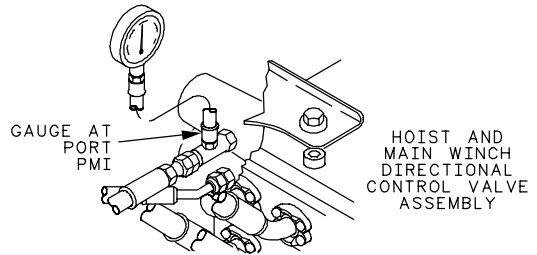
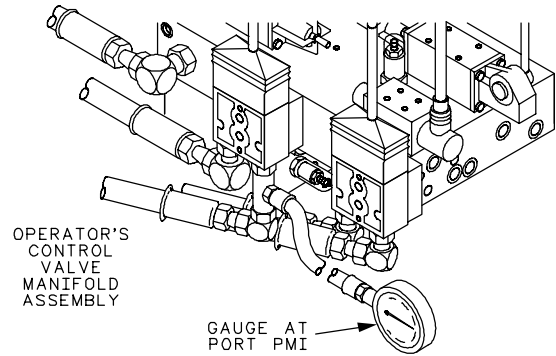
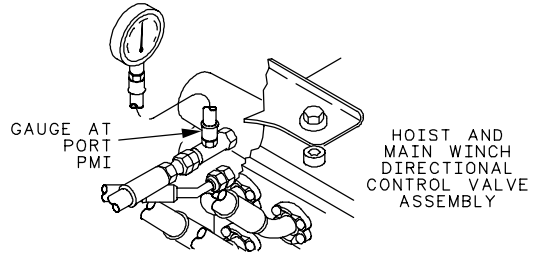
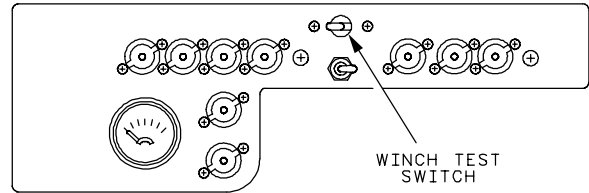
- H**
1. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 2. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold.
 3. Payin main winch and record pressure at both gauges.
 4. Shutdown hydraulics and main engine (TM 9-2350-292-10).

Is pressure at operator's control valve manifold assembly port PMI 385-470 psi and pressure at hoist and main winch directional control valve assembly port PMI 215 to 225 psi?



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HYDRAULIC CONTROL PANEL



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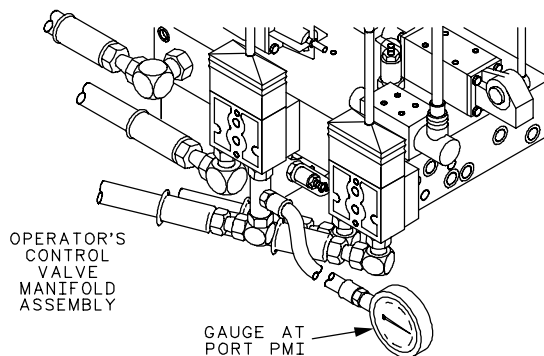
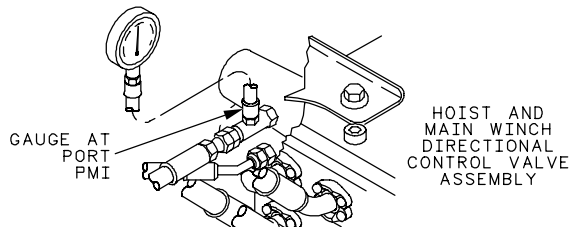
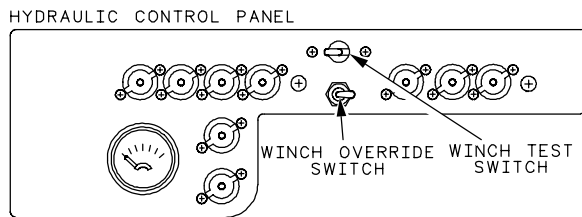
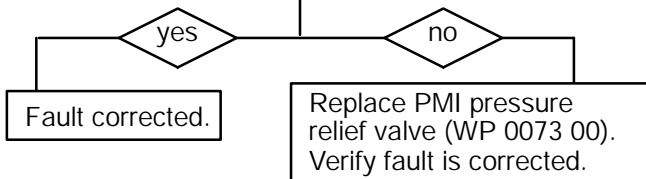
MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION - CONTINUED

0019 00

CONTINUED FROM STEP H

- | | |
|----------|---|
| I | <ol style="list-style-type: none"> 1. Replace PMI valve on power reduction manifold (WP 0073 00). 2. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10). 3. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold. 4. Payin main winch and record pressure at both gauges. 5. Shutdown hydraulics and main engine (TM 9-2350-292-10). |
|----------|---|

Is pressure at operator's control valve manifold assembly port PMI 385-470 psi and pressure at hoist and main winch directional control valve assembly port PMI 215 to 225 psi?



24i061t


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MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION - CONTINUED

0019 00

CONTINUED FROM STEP H

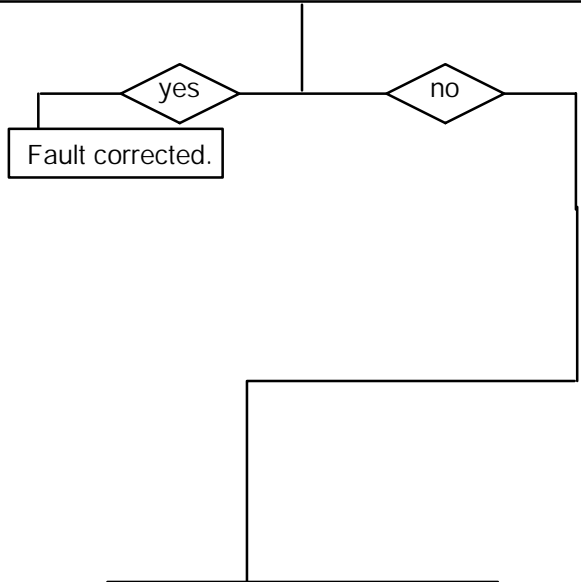
J



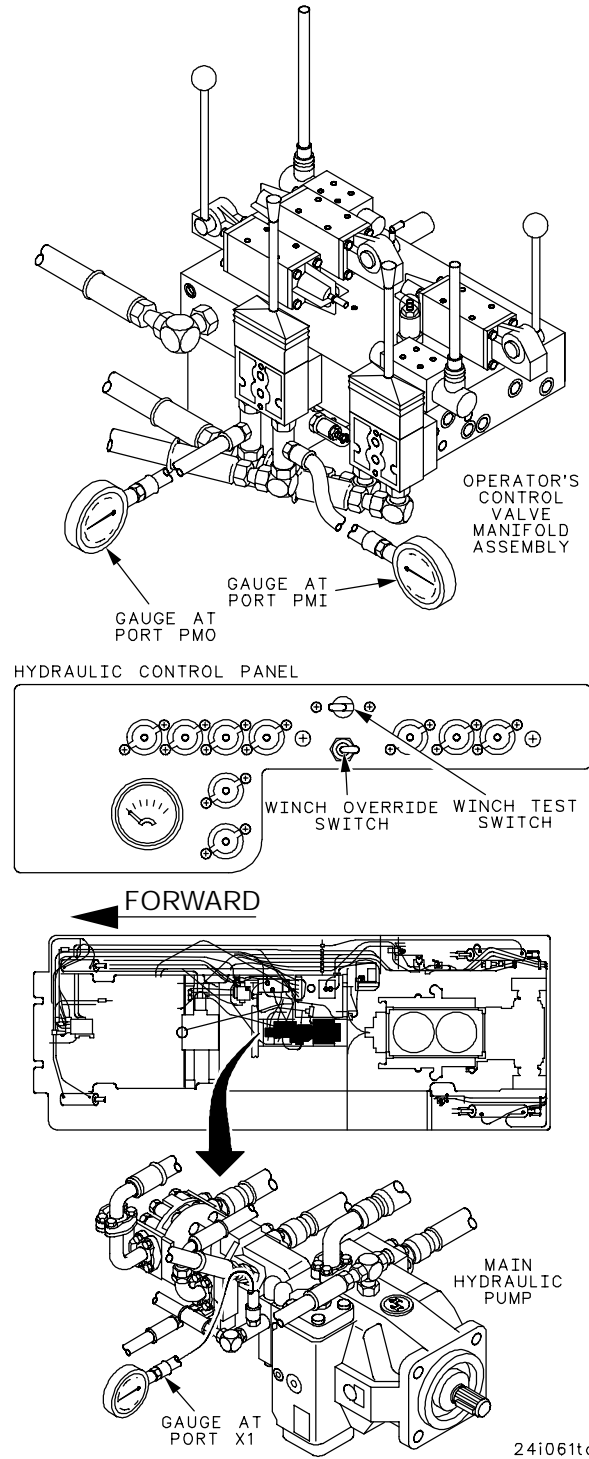
WARNING

1. Remove gauge from hoist and main winch directional control valve assembly port PMI and install it with ¼-inch tee between operator's control valve manifold assembly port PMO and attaching hose.
2. Install 0-5000 psi dial pressure gauge with 3/8-inch tee between front pump port X1 and attaching hose.
3. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
4. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold.
5. Payout main winch so that pressure on gauge in operator's control valve manifold assembly port PMO is greater than 126 psi. Record pressure on gauge in front pump port X1.
6. Payin main winch so that pressure on gauge in operator's control valve manifold assembly port PMI is greater than 126 psi. Record pressure on gauge in front pump port X1.
7. Shutdown hydraulics and main engine (TM 9-2350-292-10).

Does pressure on gauge in front pump port X1 remain less than 750 psi during payout and less than 530 psi during payin?



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24i061ta

MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION - CONTINUED

0019 00

CONTINUED FROM STEP J

K Was pressure on gauge in front pump port X1 greater than 750 psi during payout and less than 530 psi during payin?

yes

no

Go to step M.

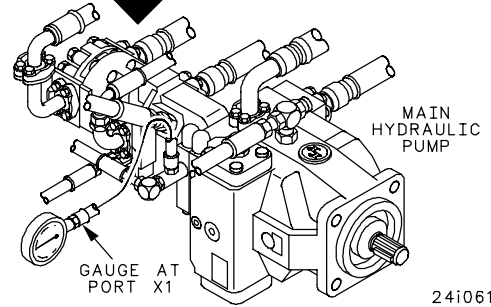
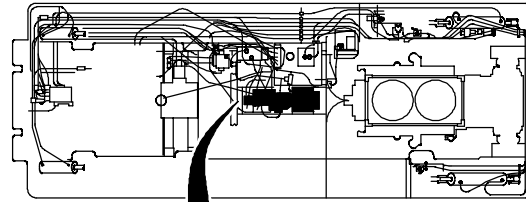
L Was pressure on gauge in front pump port X1 greater than 530 psi during payin and less than 750 psi during payout?

yes

no

Go to step O.

Replace main winch load sense directional control valve on power reduction manifold (WP 0073 00). Verify fault is corrected.



24i061ta

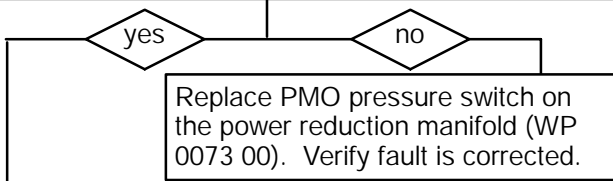
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MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION - CONTINUED

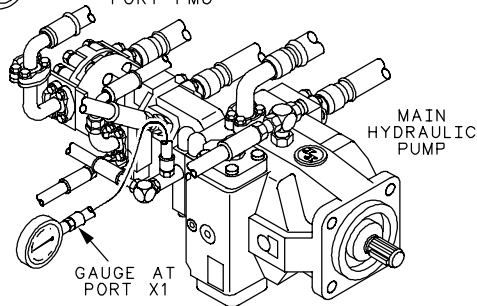
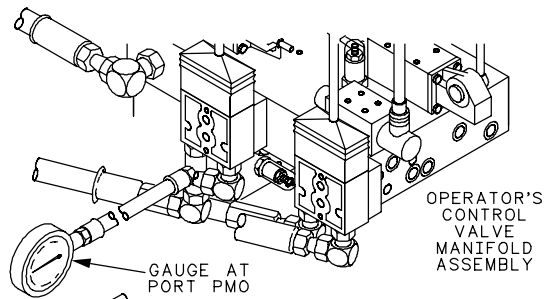
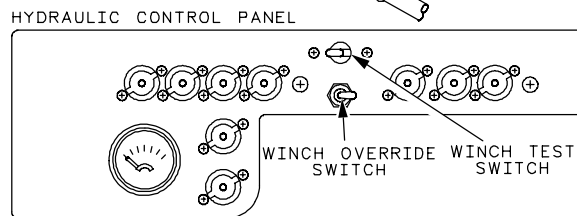
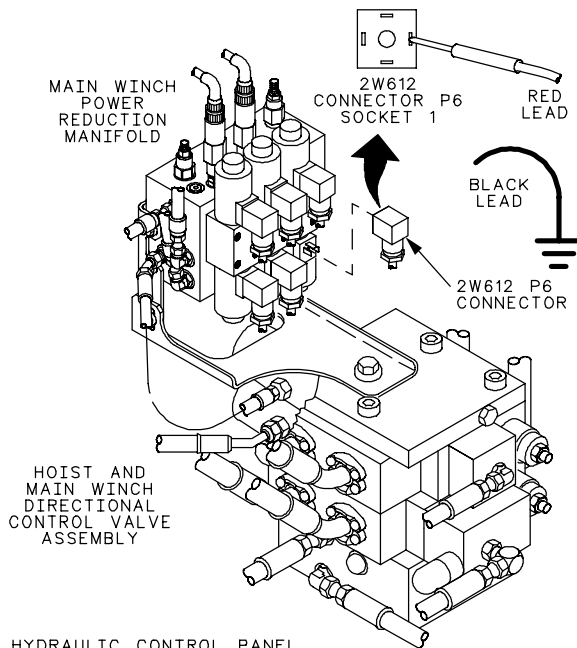
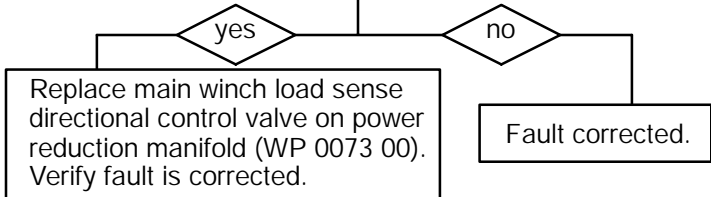
0019 00

CONTINUED FROM STEP L

- M**
1. Remove wiring harness 2W612 connector P6 from main winch load sense directional control valve on the power reduction manifold.
 2. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 3. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold (TM 9-2350-292-10).
 4. Payout main winch so that pressure on gauge in operator's control valve manifold assembly port PMO is greater than 126 psi.
 5. Place multimeter red lead on wiring harness 2W612 connector P6 socket 1 and black lead to ground. Check for voltage.
 6. Shutdown hydraulics and main engine (TM 9-2350-292-10).
- Is 24 V dc present?



- N**
1. Replace payout relief valve in the power reduction manifold (WP 0073 00).
 2. Reconnect wiring harness 2W612 connector P6 to main winch load sense directional control valve on power reduction manifold.
 3. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 4. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold.
 5. Payout main winch so that pressure on gauge in operator's control valve manifold assembly port PMO is greater than 126 psi.
 6. Record pressure on gauge in front pump port X1.
 7. Shut down hydraulics and main engine (TM 9-2350-292-10).
- Was pressure on gauge in front pump port X1 greater than 750 psi during payout?



24i062t

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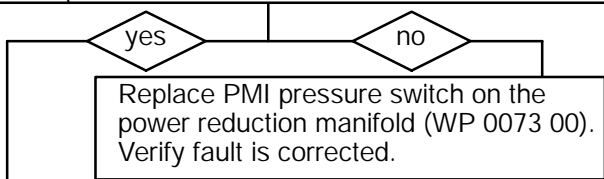
MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION - CONTINUED

0019 00

CONTINUED FROM STEP N

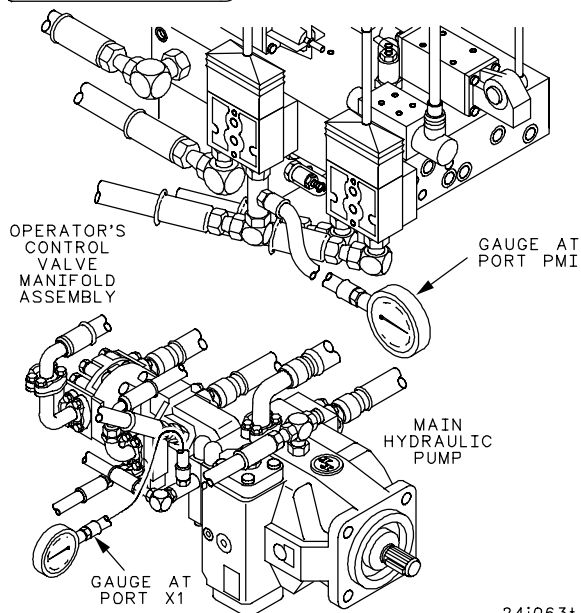
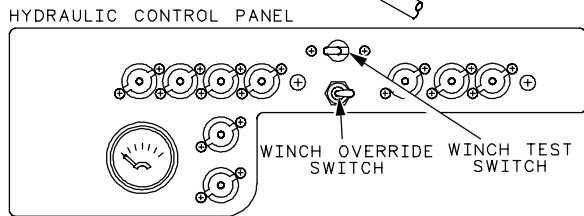
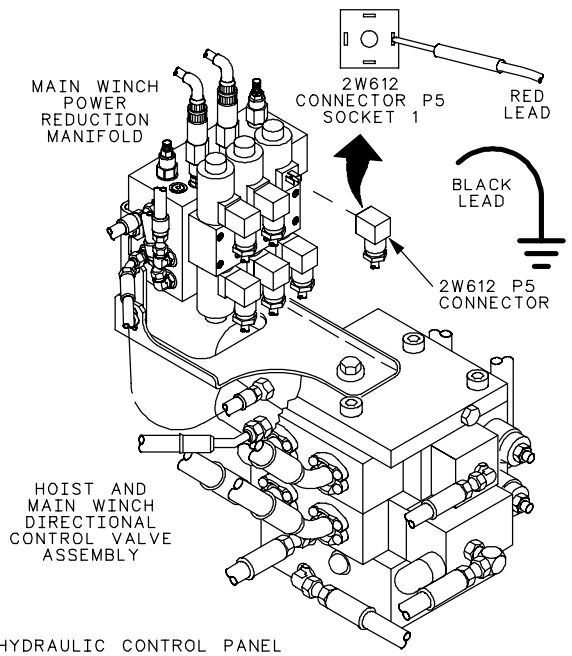
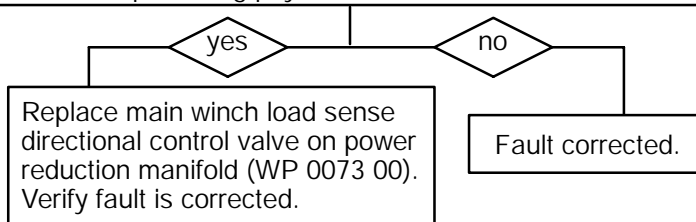
- O**
1. Remove wiring harness 2W612 connector P5 from main winch load sense directional control valve on power reduction manifold.
 2. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 3. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold.
 4. Payin main winch so that pressure on gauge in operator's control valve manifold assembly port PMI is greater than 126 psi.
 5. Place multimeter red lead on wiring harness 2W612 connector P5 socket 1 and black lead to ground. Check for voltage.
 6. Shutdown hydraulics and main engine (TM 9-2350-292-10).

Is 24 V dc present?



- P**
1. Replace payin relief valve in the power reduction manifold (WP 0073 00).
 2. Reconnect wiring harness 2W612 connector P5 to main winch load sense directional control valve on power reduction manifold.
 3. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 4. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold.
 5. Payin main winch so that pressure on gauge in operator's control valve manifold assembly port PMI is greater than 126 psi.
 6. Record pressure on gauge in front pump port X1.
 7. Shut down hydraulics and main engine (TM 9-2350-292-10).

Was pressure on gauge in front pump port X1 greater than 530 psi during payout?



24i063t

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MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION - CONTINUED

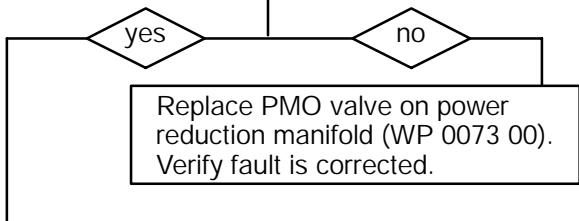
0019 00

CONTINUED FROM STEP A

Q

1. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
2. Start Enhanced Diagnostics Program (WP 0010 00) and select symptom 5.
3. Payout main winch and record pressure at hoist and main winch directional control valve assembly port PMO and operator's control valve manifold assembly port PMO.
4. Shutdown hydraulics and main engine (TM 9-2350-292-10).

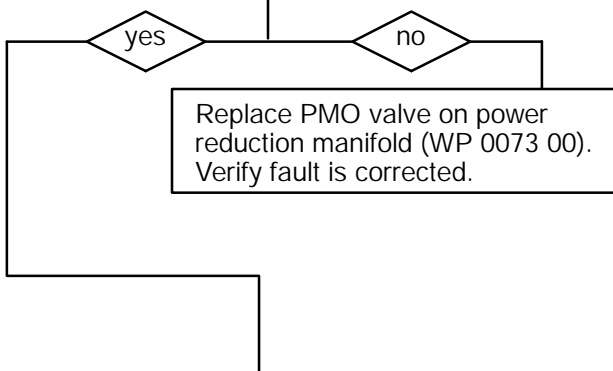
Are both pressures equal ± 5 psi?



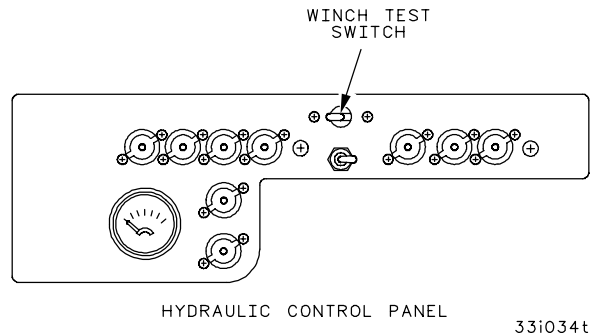
R

1. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
2. Move WINCH TEST switch to TEST position and hold.
3. Payout main winch and record pressure at hoist and main winch directional control valve assembly port PMO and operator's control valve manifold assembly port PMO.
4. Shutdown hydraulics and main engine (TM 9-2350-292-10).

Is pressure at operator's control valve manifold assembly port PMO 385-470 psi and pressure at hoist and main winch directional control valve assembly port PMO 0 ± 5 psi?



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MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION - CONTINUED

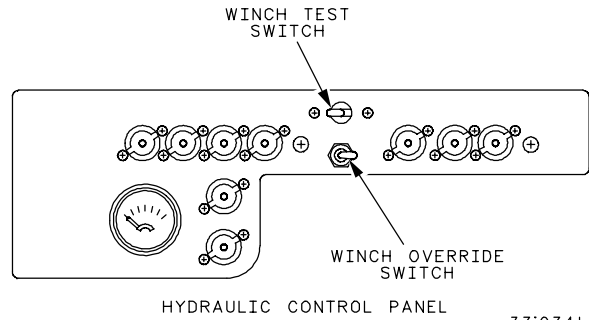
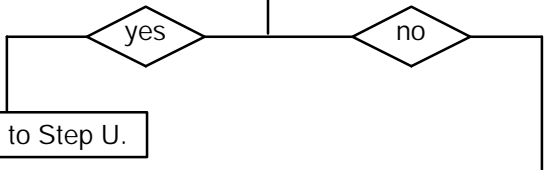
0019 00

CONTINUED FROM STEP R

S

1. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
2. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold.
3. Payout main winch and record pressure at hoist and main winch directional control valve assembly port PMO and operator's control valve manifold assembly port PMO.
4. Shutdown hydraulics and main engine (TM 9-2350-292-10).

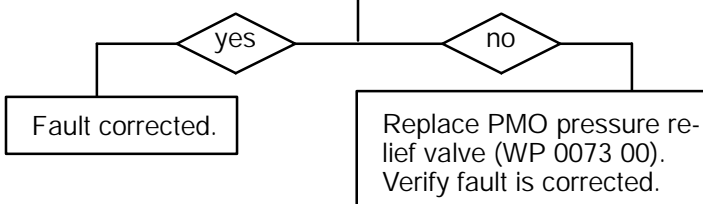
Is pressure at operator's control valve manifold assembly port PMO 385-470 psi and pressure at hoist and main winch directional control valve assembly port PMO 215-225 psi?



T

1. Replace PMO valve on power reduction manifold (WP 0073 00).
2. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
3. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold.
4. Payout main winch and record pressure at hoist and main winch directional control valve assembly port PMO and operator's control valve manifold assembly port PMO.
5. Shutdown hydraulics and main engine (TM 9-2350-292-10).

Is pressure at operator's control valve manifold assembly port PMO 385-470 psi and pressure at hoist and main winch directional control valve assembly port PMO 215-225 psi?



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MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION - CONTINUED

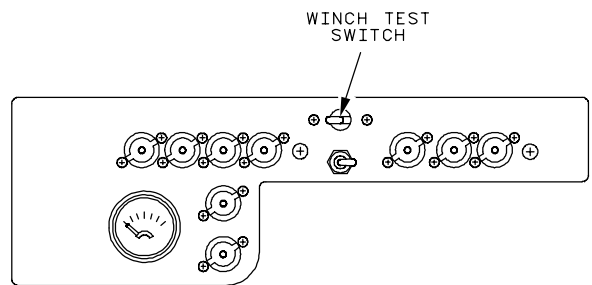
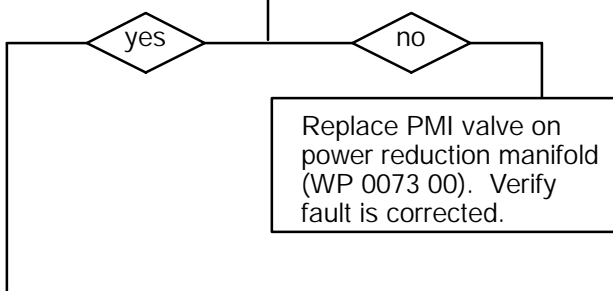
0019 00

CONTINUED FROM STEP S

U

1. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
2. Payin main winch and record pressure at hoist and main winch directional control valve assembly port PMI and operator's control valve manifold assembly port PMI.
3. Shutdown hydraulics and main engine (TM 9-2350-292-10).

Are both pressures equal ± 5 psi?



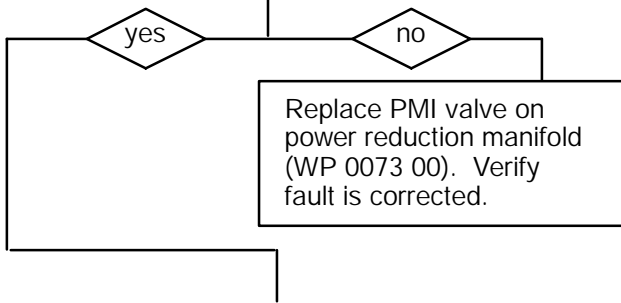
HYDRAULIC CONTROL PANEL

33i034t

V

1. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
2. Move WINCH TEST switch to TEST position and hold.
3. Payin main winch and record pressure at hoist and main winch directional control valve assembly port PMI and operator's control valve manifold assembly port PMI.
4. Shutdown hydraulics and main engine (TM 9-2350-292-10).

Is pressure at operator's control valve manifold assembly port PMI 385-470 psi and pressure at hoist and main winch directional control valve assembly port PMI 0 ± 5 psi?



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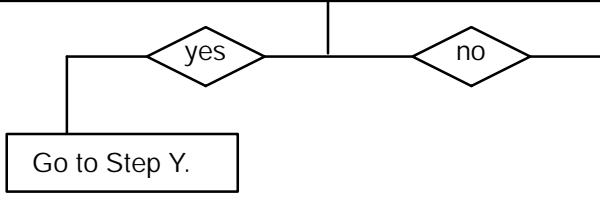
MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION - CONTINUED

0019 00

CONTINUED FROM STEP V

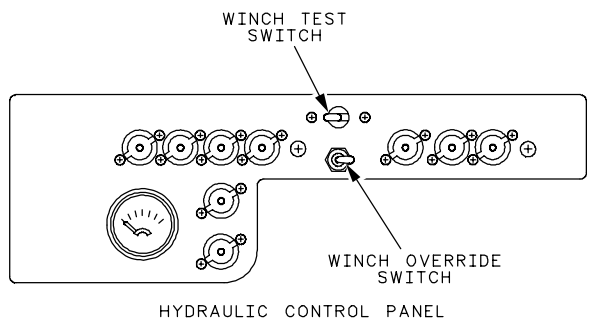
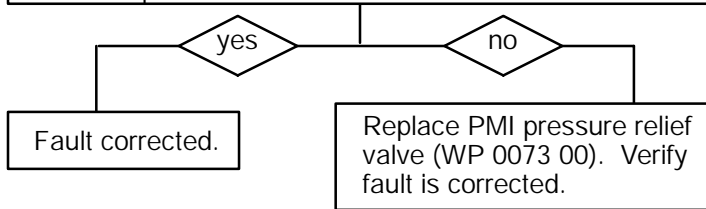
- W**
1. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 2. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold.
 3. Payin main winch and record pressure at hoist and main winch directional control valve assembly port PMI and operator's control valve manifold assembly port PMI.
 4. Shutdown hydraulics and main engine (TM 9-2350-292-10).

Is pressure at operator's control valve manifold assembly port PMI 385-470 psi and pressure at hoist and main winch directional control valve assembly port PMI 215-225 psi?



- X**
1. Replace PMI valve on power reduction manifold (WP 0073 00).
 2. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 3. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold.
 4. Payin main winch and record pressure at hoist and main winch directional control valve assembly port PMI and operator's control valve manifold assembly port PMI.
 5. Shutdown hydraulics and main engine (TM 9-2350-292-10).

Is pressure at operator's control valve manifold assembly port PMI 385-470 psi and pressure at hoist and main winch directional control valve assembly port PMI 215-225 psi?



HYDRAULIC CONTROL PANEL 33i034ta

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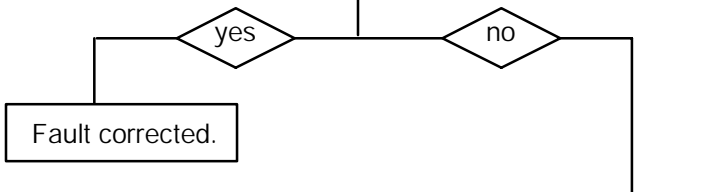
MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION - CONTINUED

0019 00

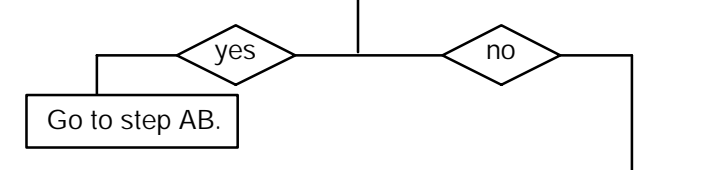
CONTINUED FROM STEP W

- Y**
1. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 2. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold.
 3. Payout main winch so that pressure at operator's control valve manifold assembly port PMO is greater than 126 psi. Record pressure at front pump port X1.
 4. Payin main winch so that pressure at operator's control valve manifold assembly port PMI is greater than 126 psi. Record pressure at front pump port X1.
 5. Shutdown hydraulics and main engine (TM 9-2350-292-10).

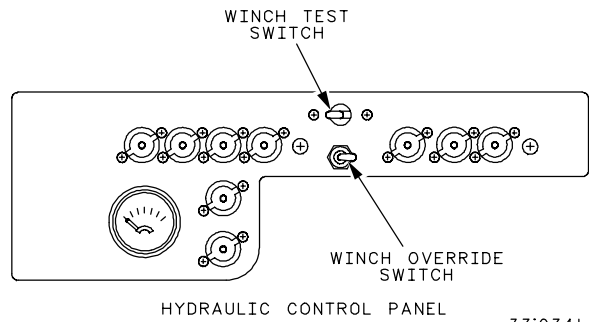
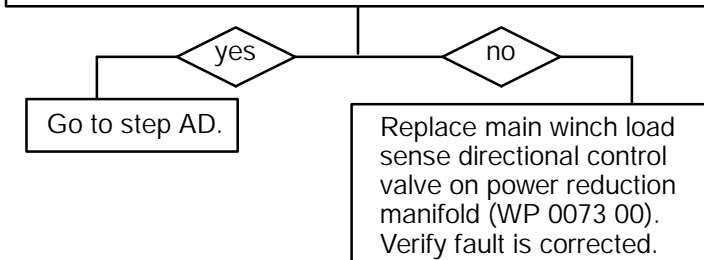
Does pressure at front pump port X1 remain less than 750 psi during payout and less than 530 psi during payin?



Z Was pressure at front pump port X1 greater than 750 psi during payout and less than 530 psi during payin?



AA Was pressure at front pump port X1 greater than 530 psi during payin and less than 750 psi during payout?



33i034ta

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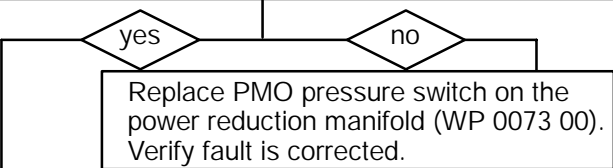
MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION - CONTINUED

0019 00

CONTINUED FROM STEP Z

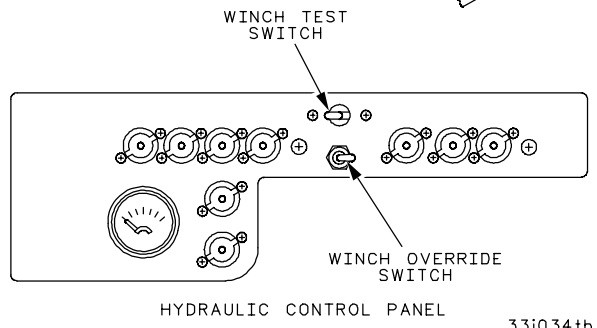
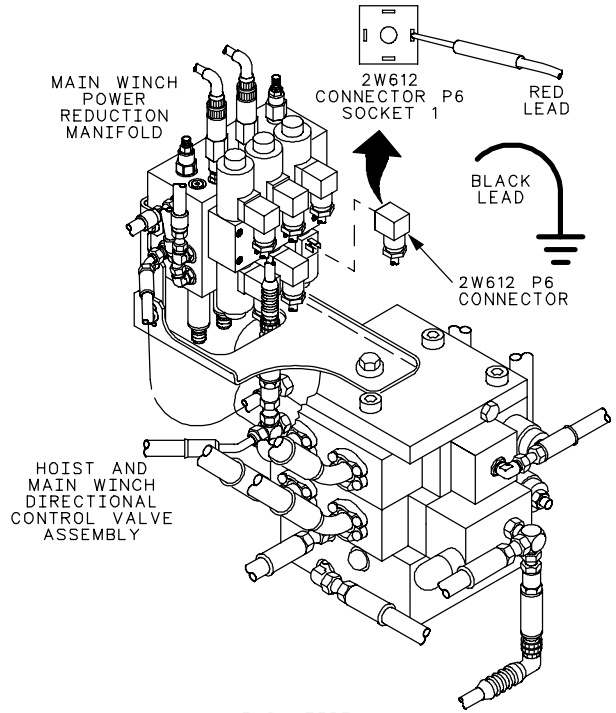
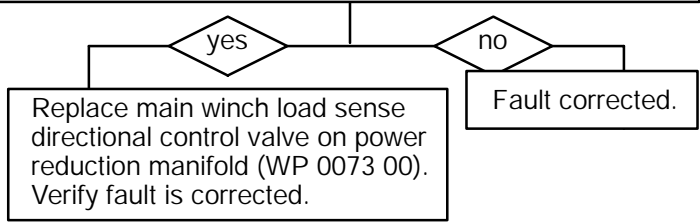
- AB**
1. Remove wiring harness 2W612 connector P6 from main winch load sense directional control valve on power reduction manifold.
 2. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 3. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold.
 4. Payout main winch so that pressure at operator's control valve manifold assembly port PMO is greater than 126 psi.
 5. Place multimeter red lead on wiring harness 2W612 connector P6 socket 1 and black lead to ground. Check for voltage.
 6. Shutdown hydraulics and main engine (TM 9-2350-292-10).

Is 24 V dc present?



- AC**
1. Replace payout relief valve in the power reduction manifold (WP 0073 00).
 2. Reconnect wiring harness 2W612 connector P6 to main winch load sense directional control valve.
 3. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 4. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold.
 5. Payout main winch so that pressure at operator's control valve manifold assembly port PMO is greater than 126 psi.
 6. Record pressure at front pump port X1.
 7. Shut down hydraulics and main engine (TM 9-2350-292-10).

Was pressure at front pump port X1 greater than 750 psi during payout?



33i034tb

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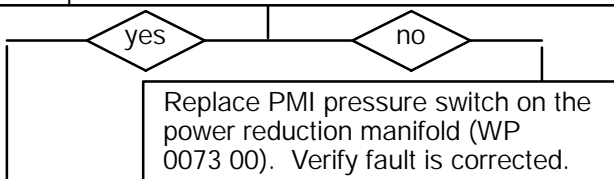
MAIN WINCH POWER IS NOT REDUCED WHEN WINCH OVERRIDE SWITCH IS IN OVERRIDE POSITION - CONTINUED

0019 00

CONTINUED FROM STEP AA

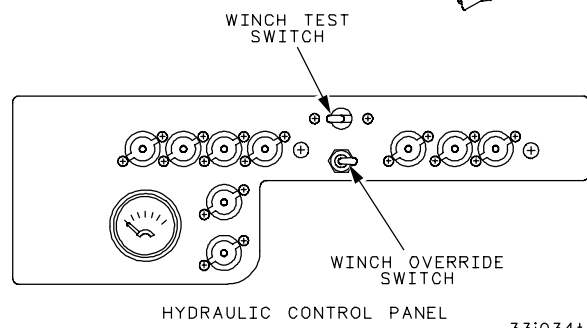
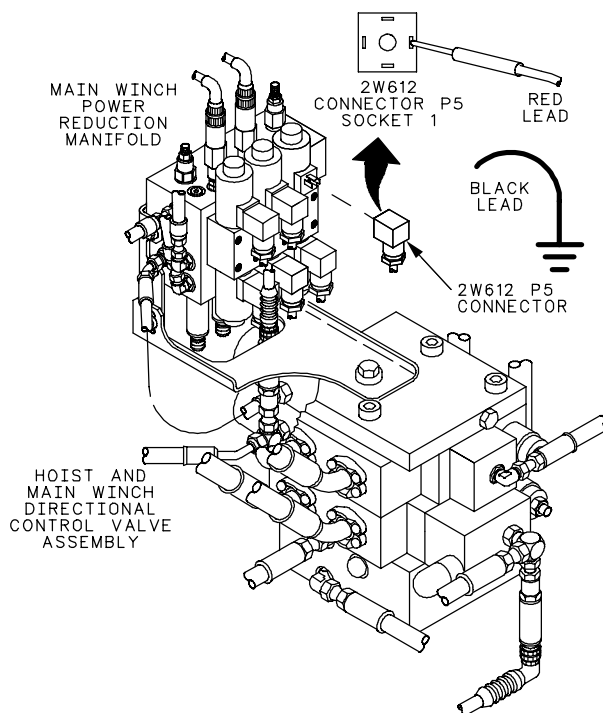
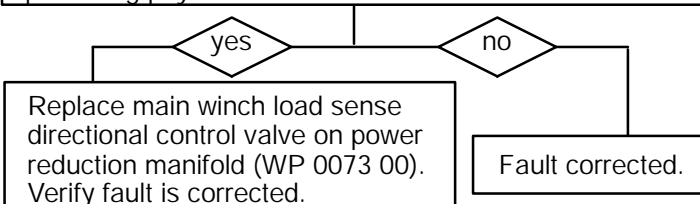
- AD**
1. Remove wiring harness 2W612 connector P5 from main winch load sense directional control valve on power reduction manifold.
 2. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 3. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold.
 4. Payin main winch so that pressure at operator's control valve manifold assembly port PMI is greater than 126 psi.
 5. Place multimeter red lead on wiring harness 2W612 connector P5 socket 1 and black lead to ground. Check for voltage.
 6. Shutdown hydraulics and main engine (TM 9-2350-292-10).

Is 24 V dc present?



- AE**
1. Replace payin relief valve in the power reduction manifold (WP 0073 00).
 2. Reconnect wiring harness 2W612 connector P5 to main winch load sense directional control valve.
 3. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 4. Move WINCH TEST switch to TEST, move WINCH OVERRIDE switch to OVERRIDE position and hold.
 5. Payin main winch so that pressure at operator's control valve manifold assembly port PMI is greater than 126 psi.
 6. Record pressure at front pump port X1.
 7. Shut down hydraulics and main engine (TM 9-2350-292-10).

Was pressure at front pump port X1 greater than 530 psi during payout?



33i034tc

END OF TASK

MAIN WINCH LEVEL WINDER FAILS TO OPERATE

0020 00

THIS WORK PACKAGE COVERS:

Main Winch Level Winder Fails to Operate

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0090 00)

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-292-10)

Vehicle nose piece removed (TM 9-2350-292-20)

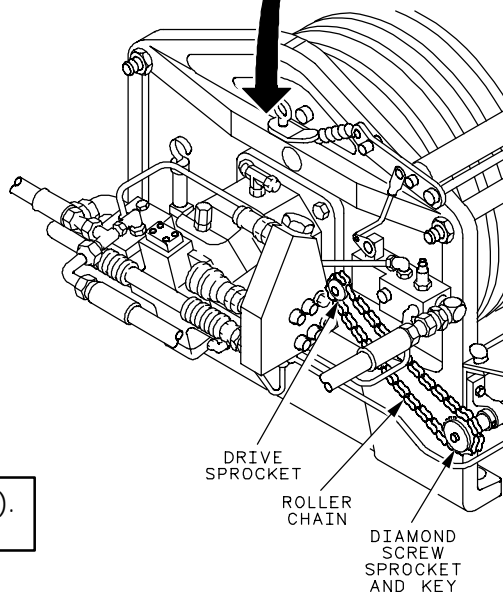
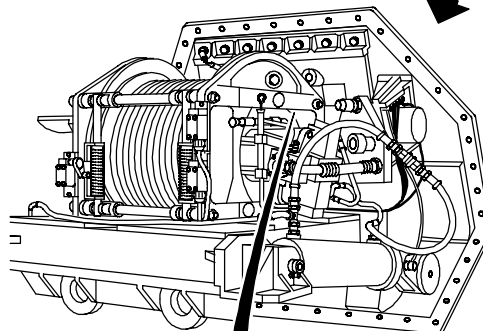
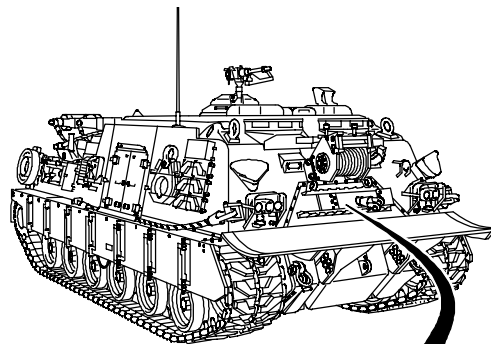
Personnel Required

Two

WARNING
Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



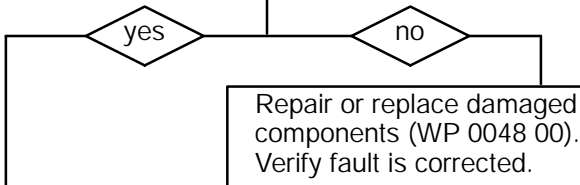
WARNING



241031t

A Inspect all level winder drive components (roller chain, drive sprocket, diamond screw sprocket, and sprocket keys) for damage.

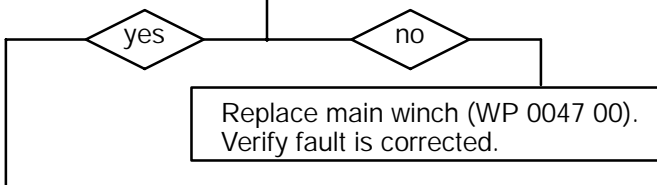
Are all drive components free of damage?



B

1. Start main engine and main hydraulics (TM 9-2350-292-10).
2. Payin and payout winch while watching level wind shaft sprocket for movement direction and movement smoothness.
3. Shut down main hydraulics and main engine (TM 9-2350-292-10).

Does sprocket move in both directions smoothly?



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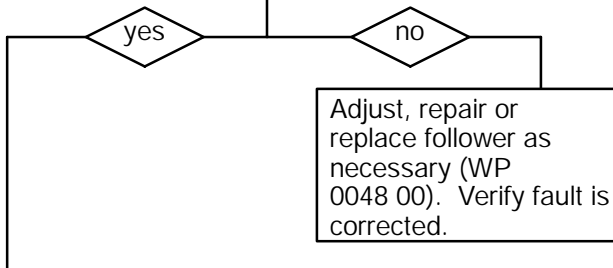
MAIN WINCH LEVEL WINDER FAILS TO OPERATE - CONTINUED

0020 00

CONTINUED FROM STEP B

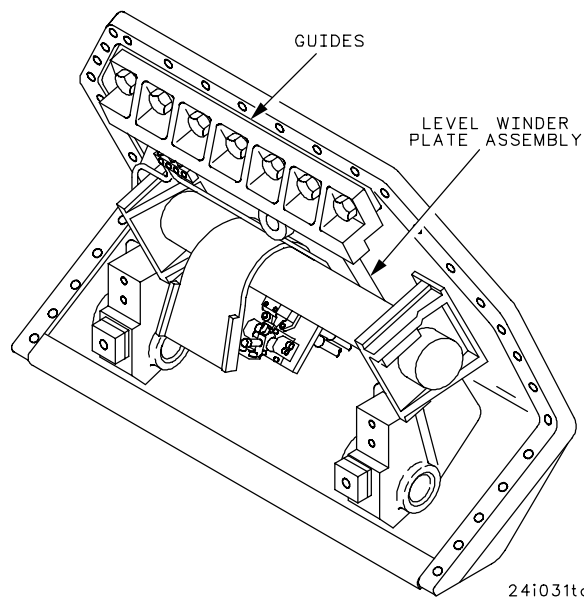
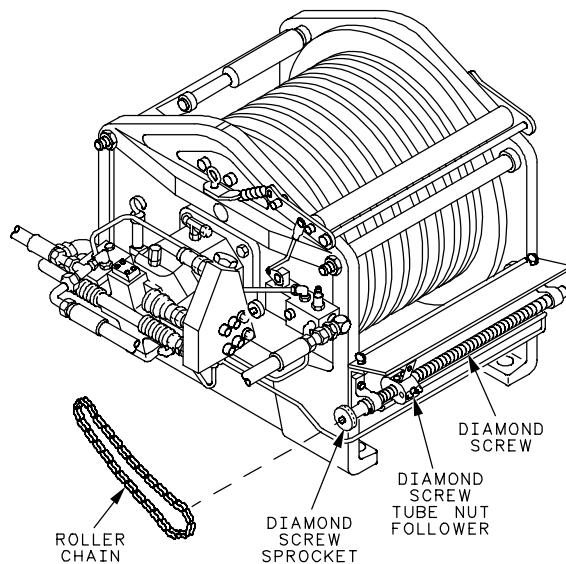
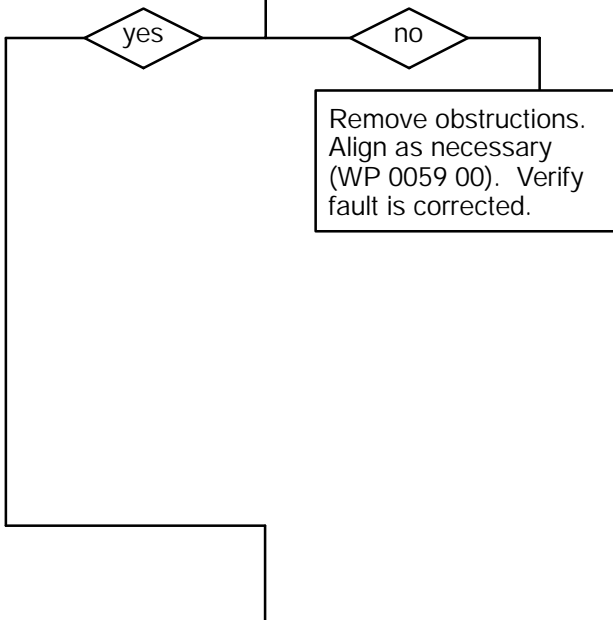
C 1. Remove roller chain from diamond screw sprocket.
2. Turn diamond screw and watch diamond screw tube nut follower to make sure it moves evenly on diamond screw.

Does follower move evenly?



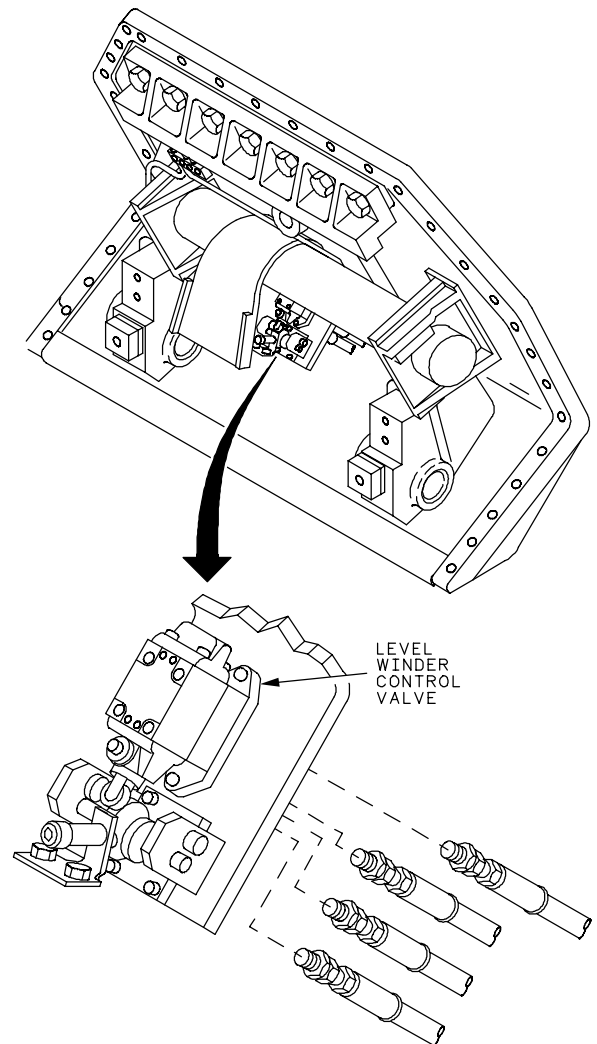
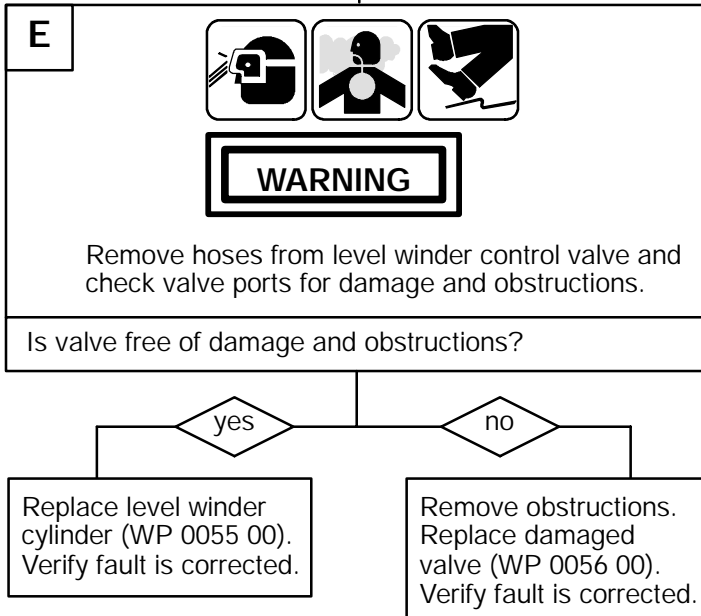
D Check alignment of level winder plate assembly and guides. Also check for obstructions.

Are plate assembly and guides properly aligned and free of obstructions?



CONTINUED ON NEXT PAGE

CONTINUED FROM STEP D



241031tb

END OF TASK

AUXILIARY WINCH FAILS TO OPERATE

0021 00

THIS WORK PACKAGE COVERS:

Auxiliary Winch Fails to Operate

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0090 00)

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-292-10)

Vehicle nose piece removed (TM 9-2350-292-20)

Personnel Required

Two

WARNING
Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



WARNING



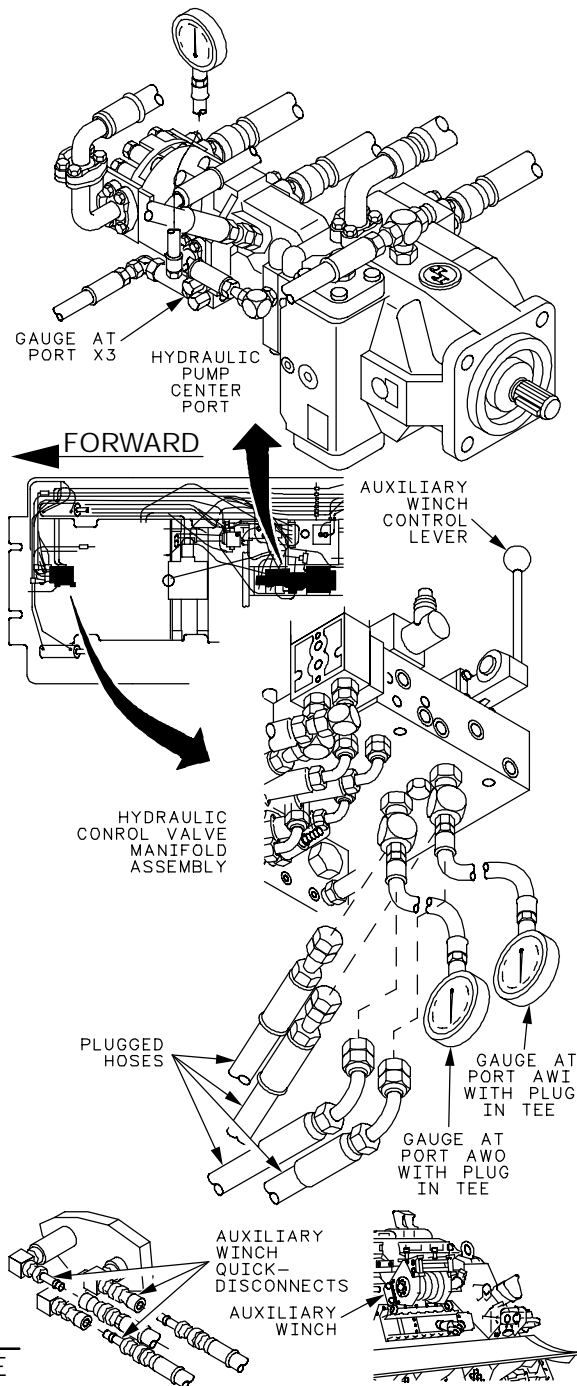
WARNING

- A**
1. Disconnect hose from port X3 of center pump and install 0-5000 psi dial pressure gauge with 1/4-inch tee. Reconnect hose to tee.
 2. Disconnect and plug hoses from ports AWI and AWO tees on hydraulic control valve manifold assembly and cap both tee side connectors.
 3. Install two 0-5000 psi dial pressure gauges, one in AWI port tee and one in AWO port tee.
 4. Disconnect all quick-disconnects from auxiliary winch.
 5. Start main engine, energize hydraulic system and set engine speed to 1800 rpm (TM 9-2350-292-10).
 6. Place auxiliary winch control lever in the payout position. Record gauge readings.
 7. Place auxiliary winch control lever in the inhaul position. Record gauge readings.
 8. Shut down hydraulic system and main engine (TM 9-2350-292-10).
- In the payout position, is AWO reading 3900-4100 psi, AWI reading 80-120 psi, and in inhaul position is AWO reading 80-120 psi, AWI reading 3900-4100 psi and is reading at center pump 3900-4100 for both positions?



Replace auxiliary winch (TM 9-2350-292-20). Verify fault is corrected.

CONTINUED ON NEXT PAGE



24i032t

AUXILIARY WINCH FAILS TO OPERATE - CONTINUED

0021 00

CONTINUED FROM STEP A

If the pressure at AWO was approximately 480 psi and AWI pressure was 80-120 psi in payout and AWO was 80-120 psi and AWI pressure was approximately 480 psi in inhaul, go to Step B.

If the pressure at AWO or AWI was 0 psi in either payout or inhaul go to Step F.

If the pressure at AWO was greater than 120 psi in inhaul and greater than 120 psi at AWI in payout, go to Step H.

CONTINUED FROM STEP A

B



WARNING

Remove auxiliary winch compensator from hydraulic control valve manifold assembly and inspect it for restrictions and damage.

Is compensator free of restrictions and damage?

yes

no

Remove restrictions. If restrictions cannot be removed or if compensator is damaged, replace (WP 0074 00). Verify fault is corrected.

C



WARNING

1. Remove auxiliary manifold body assembly.
2. Remove and inspect the load sense shuttles from the hydraulic control valve manifold assembly auxiliary body assembly for restrictions and damage.

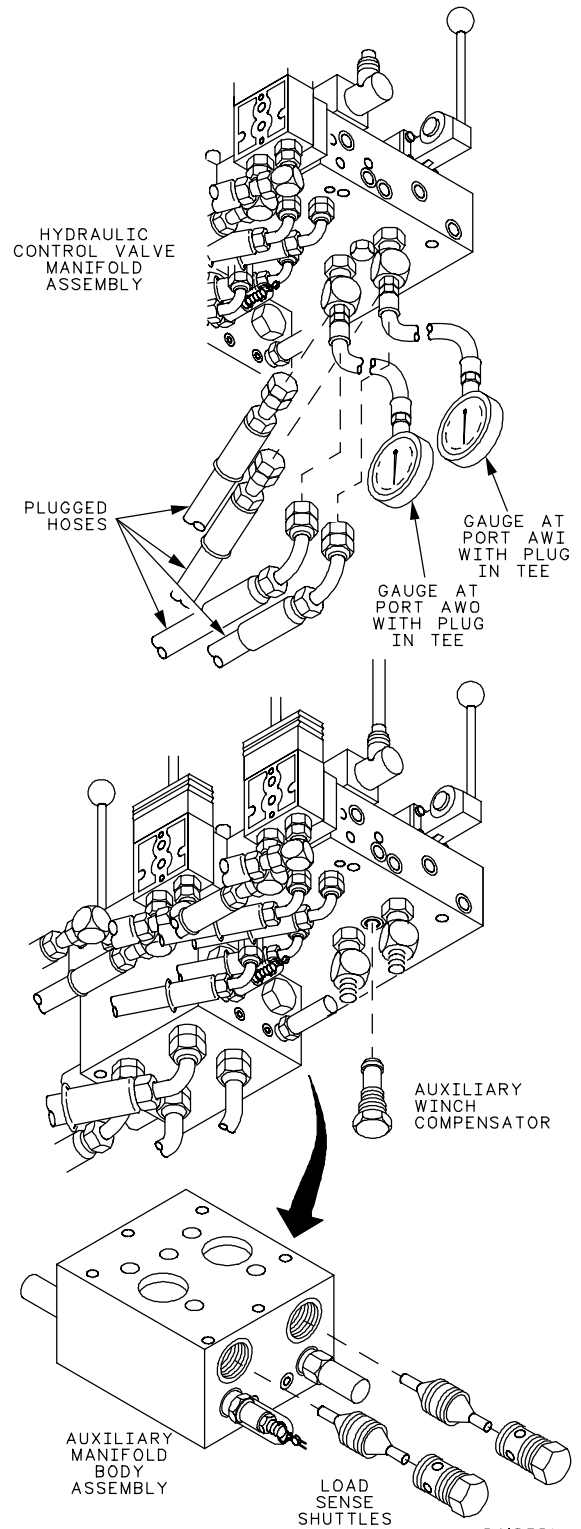
Are shuttles free of restrictions and damage?

yes

no

Remove restrictions. If restrictions cannot be removed or if shuttles are damaged, replace auxiliary manifold body assembly (WP 0074 00). Verify fault is corrected.

CONTINUED ON NEXT PAGE



24i032ta

AUXILIARY WINCH FAILS TO OPERATE - CONTINUED

0021 00

CONTINUED FROM STEP C

D



WARNING

Remove and inspect the auxiliary winch directional control valve for restrictions and damage.

Is directional control valve free of restrictions and damage?

yes

no

Remove restrictions. If restrictions cannot be removed or if directional control valve is damaged, replace (WP 0074 00). Verify fault is corrected.

E

Inspect auxiliary winch directional control valve load sense port LS on front of hydraulic control valve manifold assembly for restrictions.

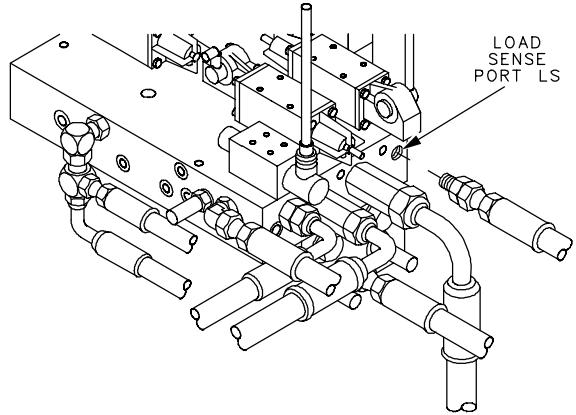
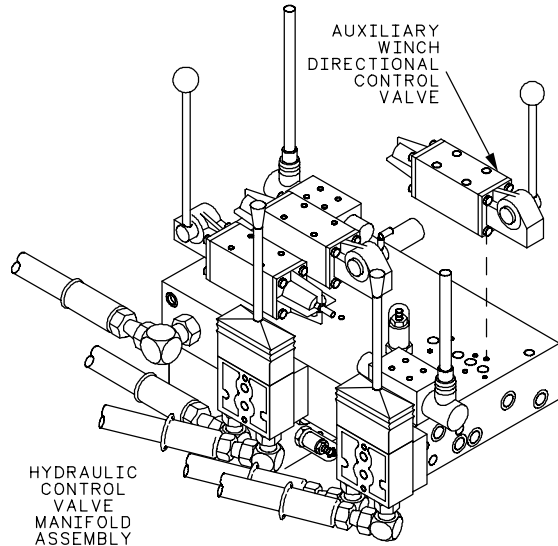
Is port free of restrictions and damage?

yes

no

Replace auxiliary winch (TM 9-2350-292-20). Verify fault is corrected.

Remove restrictions. If restrictions cannot be removed replace hydraulic control valve manifold assembly (WP 0074 00). Verify fault is corrected.



CONTINUED FROM STEP A

F



WARNING

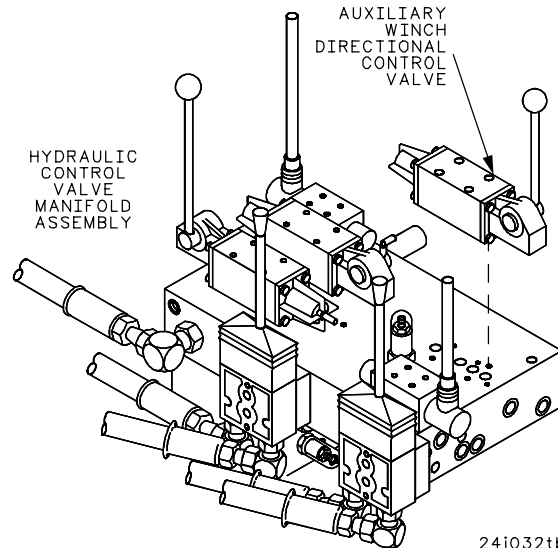
Remove and inspect the auxiliary winch directional control valve for restrictions and damage.

Is directional control valve free of restrictions and damage?

yes

no

Remove restrictions. If restrictions cannot be removed or if directional control valve is damaged, replace (WP 0074 00). Verify fault is corrected.



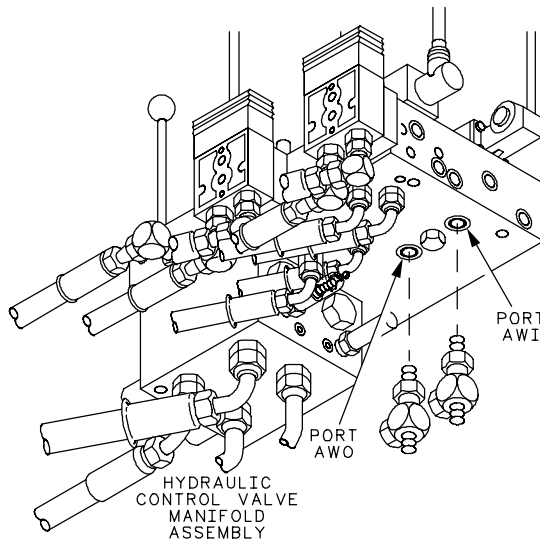
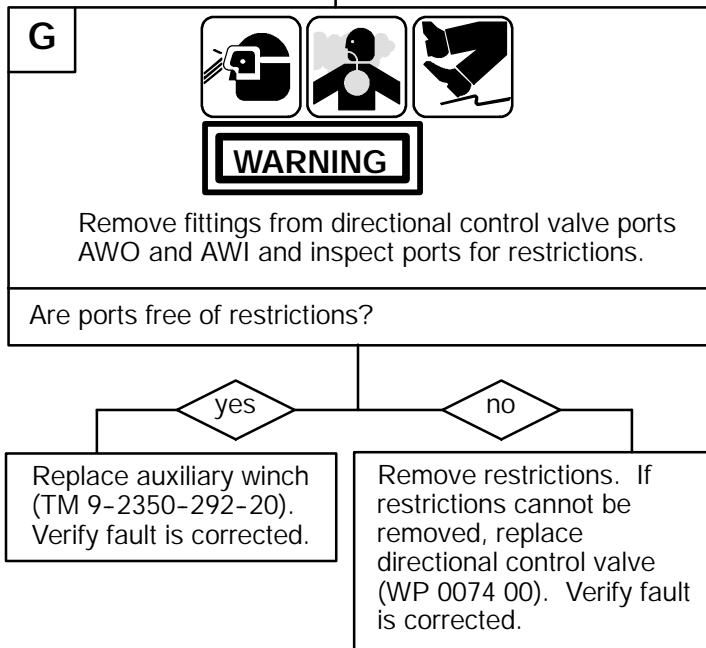
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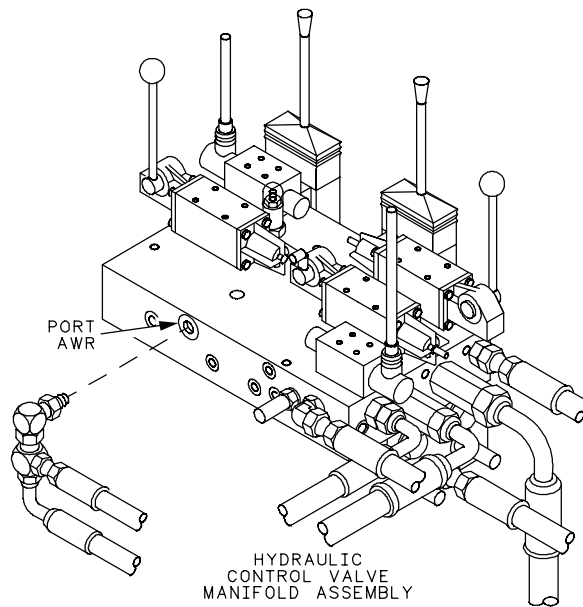
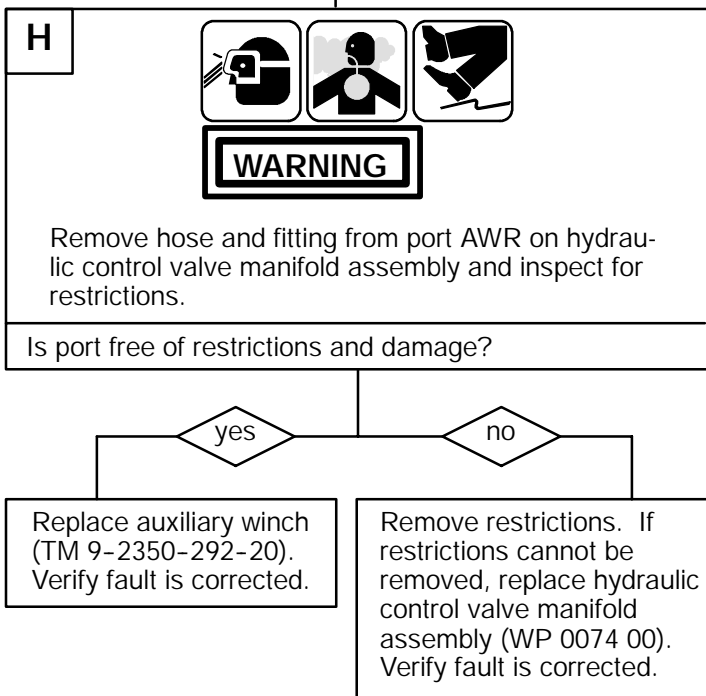
AUXILIARY WINCH FAILS TO OPERATE - CONTINUED

0021 00

CONTINUED FROM STEP F



CONTINUED FROM STEP A



24i032tc

END OF TASK

AUXILIARY WINCH WILL PAYOUT BUT WILL NOT INHAUL

0022 00

THIS WORK PACKAGE COVERS:

Auxiliary Winch Will Payout But Will Not Inhaul

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0090 00)
1/2-inch plug (2) (item 36, WP 0087 00)
Safety goggles (item 48, WP 0087 00)

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-292-10)
Subfloor plates 9, 10, 11, and 12 removed (TM
9-2350-292-20)
Hydraulic control valve manifold assembly shields
removed (TM 9-2350-292-20)

Personnel Required

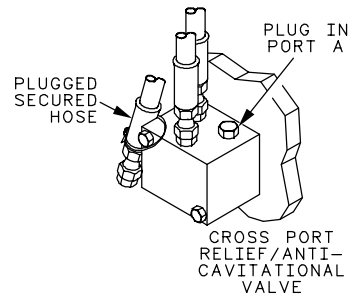
Two

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



WARNING



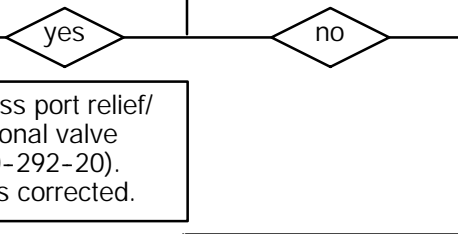
A



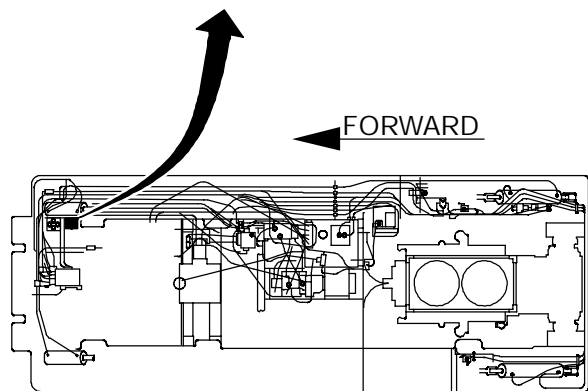
WARNING

1. Disconnect hose from port A of the cross port relief/anti-cavitation valve.
2. Plug hose and secure hose to valve.
3. Plug port A of valve.
4. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
5. Payout auxiliary winch and attempt to inhaul (TM 9-2350-292-10).
6. Shut down hydraulic system and main engine (TM 9-2350-292-10).

Did winch inhaul?




CONTINUED ON NEXT PAGE



24i035t

CONTINUED FROM STEP A

B



WARNING

1. Remove plugs and reconnect hose to cross port relief/anti-cavitation valve.
2. Disconnect payout hose from tee on hydraulic control valve manifold assembly at AWO port and disconnect inhaul hose from tee on hydraulic control valve manifold assembly at AWI port.
3. Connect payout hose to tee on hydraulic control valve manifold assembly at AWI port and connect inhaul hose to tee on hydraulic control valve manifold assembly at AWO port.
4. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
5. Attempt to payout and inhaul auxiliary winch.
6. Shut down hydraulic system and main engine (TM 9-2350-292-10).

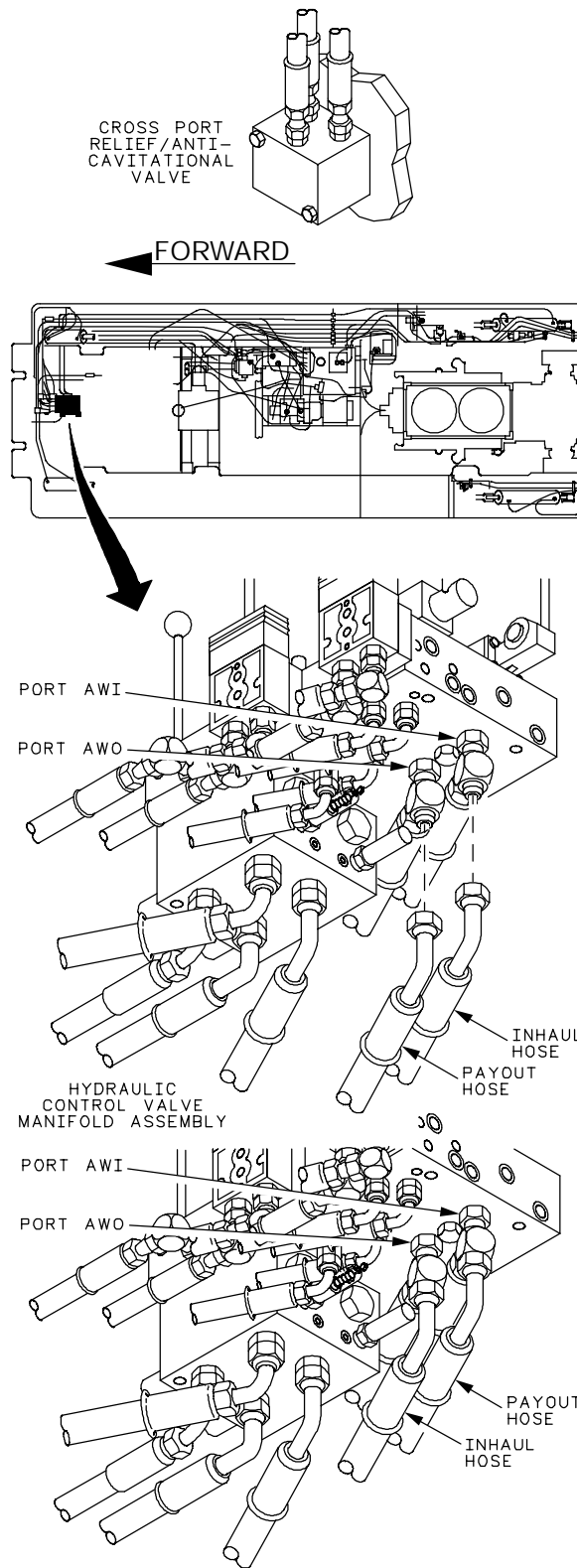
Did winch operate properly?

yes

no

Replace hydraulic control valve manifold assembly (WP 0074 00). Verify fault is corrected.

If winch would payout but not inhaul, replace the auxiliary winch (TM 9-2350-292-20). If winch would inhaul but not payout, replace the directional control valve (WP 0074 00). Verify fault is corrected.



24i033ta

END OF TASK

AUXILIARY WINCH WILL INHAUL BUT WILL NOT PAYOUT

0023 00

THIS WORK PACKAGE COVERS:

Auxiliary Winch Will Inhaul But Will Not Payout

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- 1/2-inch plug (2) (item 36, WP 0087 00)
- Safety goggles (item 48, WP 0087 00)

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Subfloor plates 9, 10, 11, and 12 removed (TM 9-2350-292-20)
- Hydraulic control valve manifold assembly shields removed (TM 9-2350-292-20)

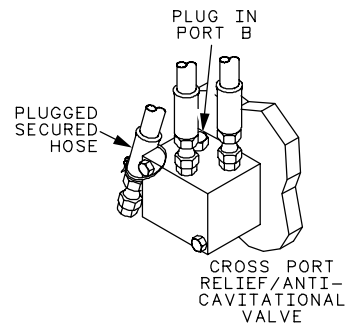
Personnel Required

Two

WARNING
Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



WARNING

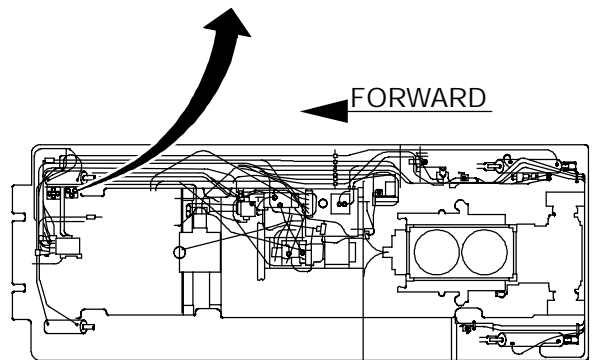


A

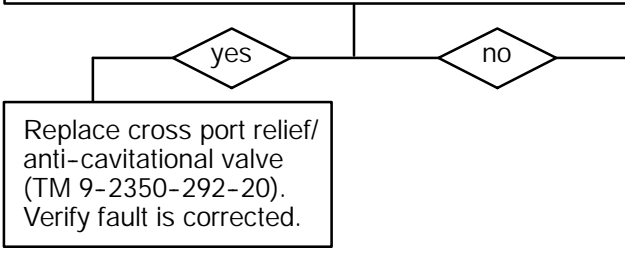
WARNING

1. Disconnect hose from port B of the cross port relief/anti-cavitation valve.
2. Plug port B and plug hose and secure hose to valve.
3. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
4. Attempt to payout the winch.
5. Shut down hydraulics and main engine (TM 9-2350-292-10).

Did winch payout?




24i033t



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CONTINUED FROM STEP A

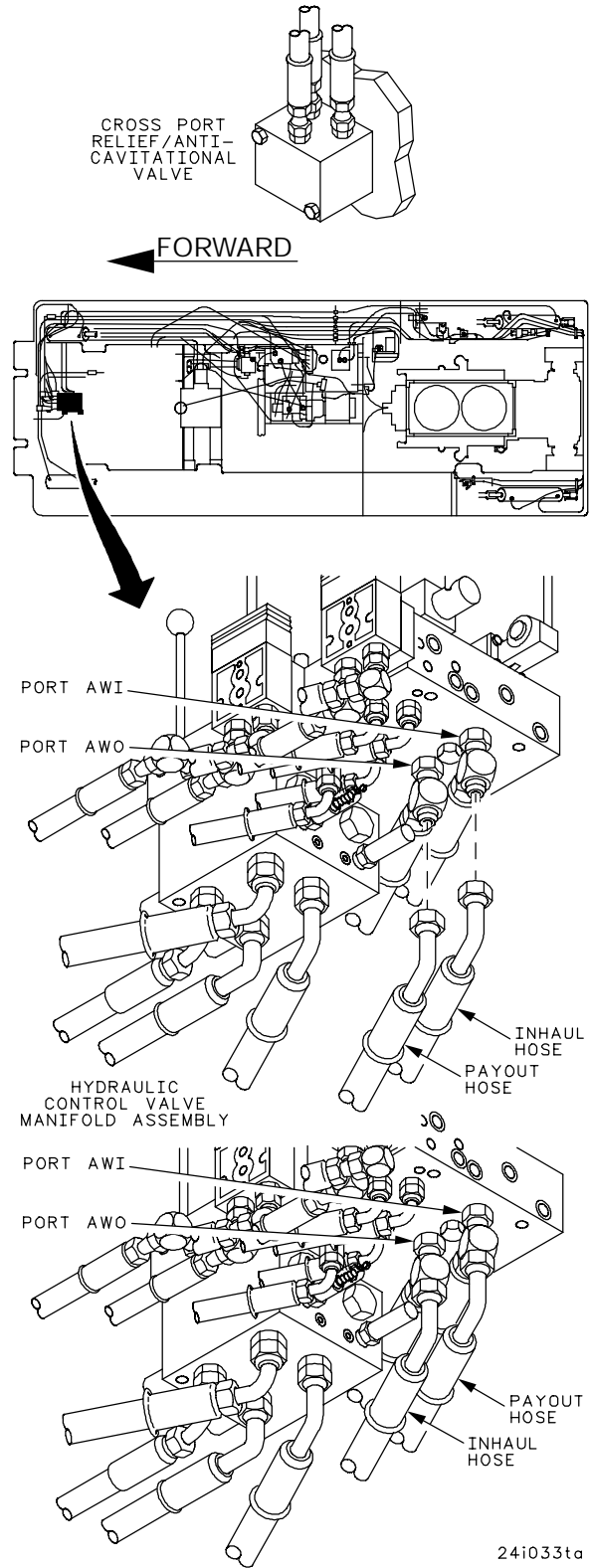
B



WARNING

1. Remove plugs and reconnect hose to cross port relief/anti-cavitation valve.
2. Disconnect payout hose from tee on hydraulic control valve manifold assembly at AWO port and disconnect inhaul hose from tee on hydraulic control valve manifold assembly port AWI.
3. Connect payout hose to tee on hydraulic control valve manifold assembly at AWI port and connect inhaul hose to tee on hydraulic control valve manifold assembly at AWO port.
4. Start main engine, energize hydraulic system and set engine speed to 1800 rpm (TM 9-2350-292-10).
5. Attempt to payout and inhaul auxiliary winch.
6. Shut down hydraulic system and main engine (TM 9-2350-292-10).

Did winch operate properly?



24i033ta

END OF TASK

AUXILIARY WINCH CREEPS IN EITHER DIRECTION WITH CONTROL HANDLE IN NEUTRAL

0024 00

THIS WORK PACKAGE COVERS:

Auxiliary Winch Creeps in Either Direction with Control Handle in Neutral

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0090 00)

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-292-10)

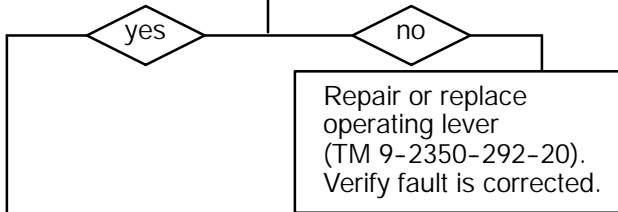
Personnel Required

Two

WARNING
Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

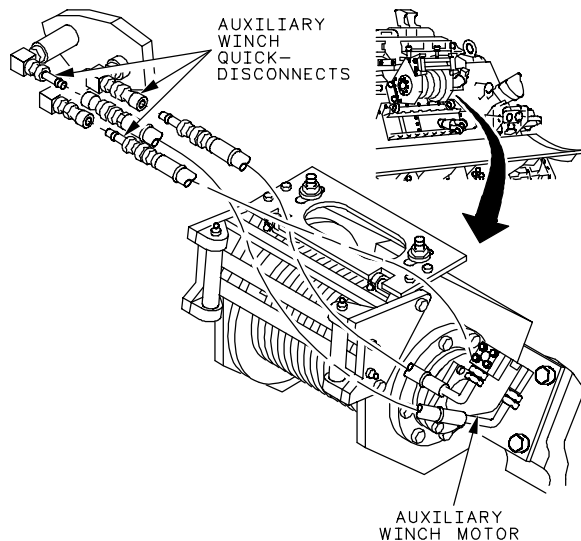
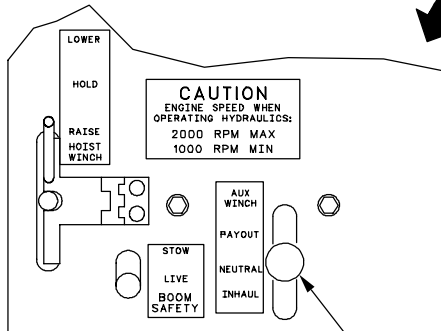
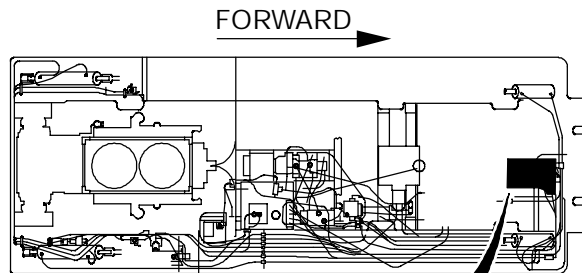
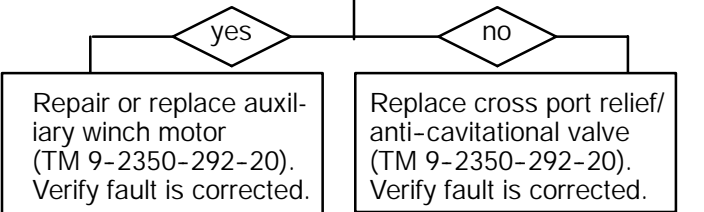
- A**
1. Place operating lever in the payout position and release handle.
 2. Place operating lever in the inhaul position and release handle.

Does lever return freely to the hold position?



- B**
1. Start main engine, energize hydraulics and set engine speed to 1000 rpm (TM 9-2350-292-10).
 2. Payout auxiliary winch and place under a load not to exceed 6000 pounds.
 3. Shut down hydraulics and main engine (TM 9-2350-292-10).
 4. Disconnect quick-disconnects at auxiliary winch motor.

Does winch slip?



24i036t

END OF TASK

SPADE FAILS TO OPERATE

0025 00

THIS WORK PACKAGE COVERS:

Spade Fails To Operate

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- 0-4000 psi testing gauge assembly (3) (item 43, WP 0090 00)
- 1/2-inch adapter (2) (item 31, WP 0087 00)
- 1/4-inch tee (item 39, WP 0087 00)
- 3/4-inch cap (3) (item 30, WP 0087 00)
- 3/4-inch plug (3) (item 37, WP 0087 00)
- 1/2-inch plug (2) (item 36, WP 0087 00)
- 1/4-inch plug (2) (item 34, WP 0087 00)

Tools and Special Tools - Continued

- 3/4-inch adapter (2) (item 32, WP 0087 00)
- Safety goggles (item 48, WP 0087 00)

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Hydraulic control valve manifold assembly shields removed (TM 9-2350-292-20)

Personnel Required

Two

WARNING
Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



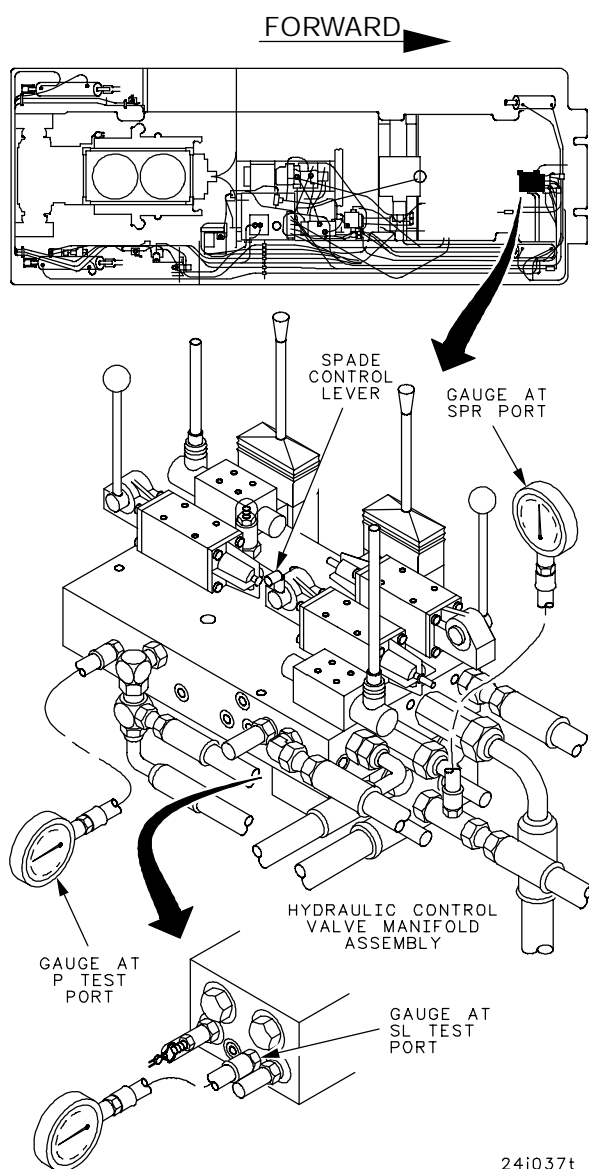
WARNING

A

WARNING

1. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between SPR port on hydraulic control valve manifold assembly and connecting hose.
2. Install 0-4000 psi testing gauge assembly in SL test port of hydraulic control valve manifold assembly.
3. Install 0-4000 psi testing gauge assembly in P test port of hydraulic control valve manifold assembly.
4. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
5. Place spade control lever to raise position and record gauge readings.
6. Place spade control lever to lower position and record gauge readings.
7. Shut down hydraulics and main engine (TM 9-2350-292-10).

In raise position, is SL test port gauge reading 50 psi or less and are readings at SPR and P test ports 2000-2300 psi; in lower position is SPR port reading 50 psi or less and are readings at SL and P test ports 2000-2300 psi?



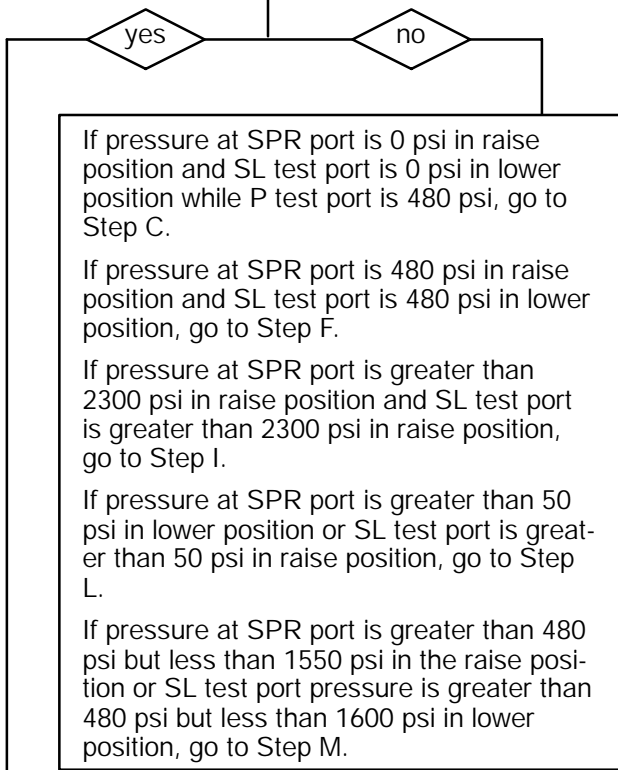
24i037t

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SPADE FAILS TO OPERATE - CONTINUED

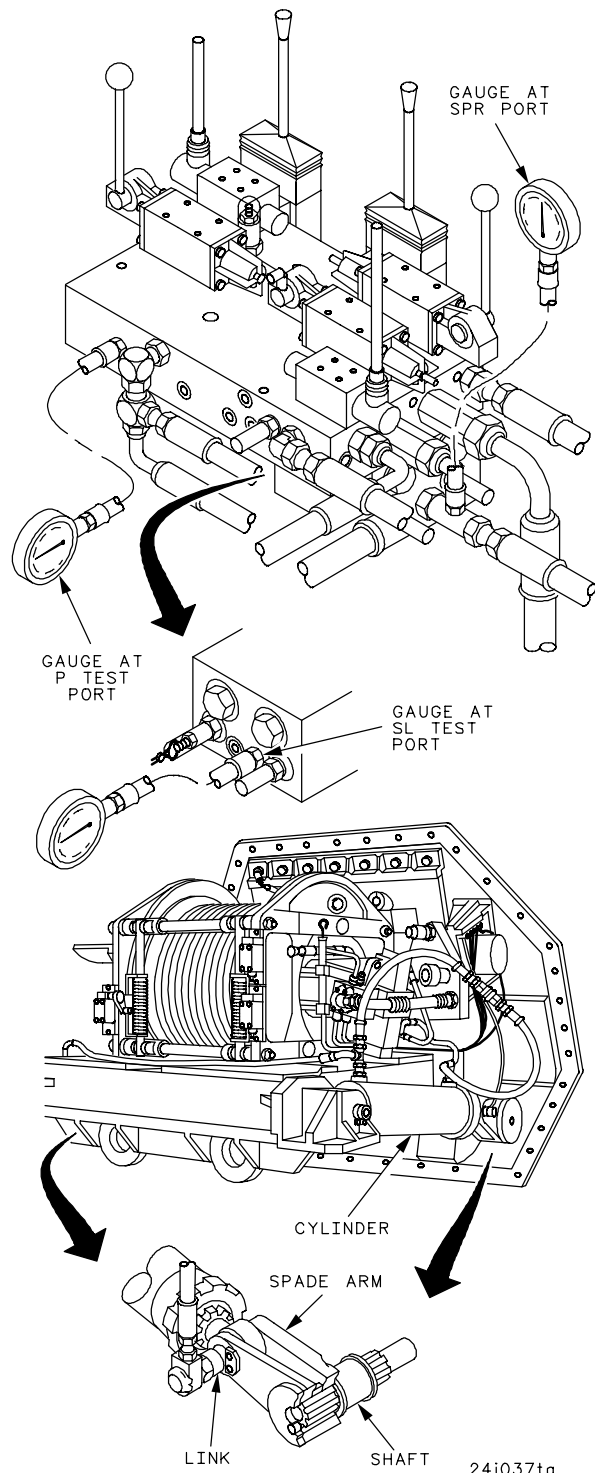
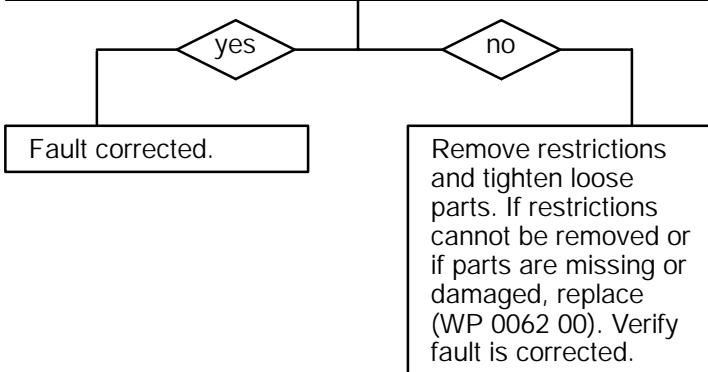
0025 00

CONTINUED FROM STEP A



- B**
1. Remove vehicle nose piece (TM 9-2350-292-20).
 2. Inspect spade arms, shafts, cylinders, and links for restrictions, loose, or missing parts and damage.

Are all components free of restrictions, loose or missing parts, and damage?




CONTINUED ON NEXT PAGE

SPADE FAILS TO OPERATE - CONTINUED

0025 00

CONTINUED FROM STEP A

C



WARNING

1. Remove auxiliary body manifold from hydraulic control valve manifold assembly.
2. Remove and inspect spade compensator from hydraulic control valve manifold assembly for restrictions and damage.

Is compensator free of restrictions and damage?

yes no

Remove restrictions. If restrictions cannot be removed or if compensator is damaged, replace (WP 0074 00). Verify fault is corrected.

D

1. Disconnect hose from P port of hydraulic control valve manifold assembly and plug hose.
2. Remove port fitting and inspect manifold port for restrictions.

Is port free of restrictions?

yes no

Remove restrictions. If restrictions cannot be removed, replace manifold (WP 0074 00). Verify fault is corrected.

E

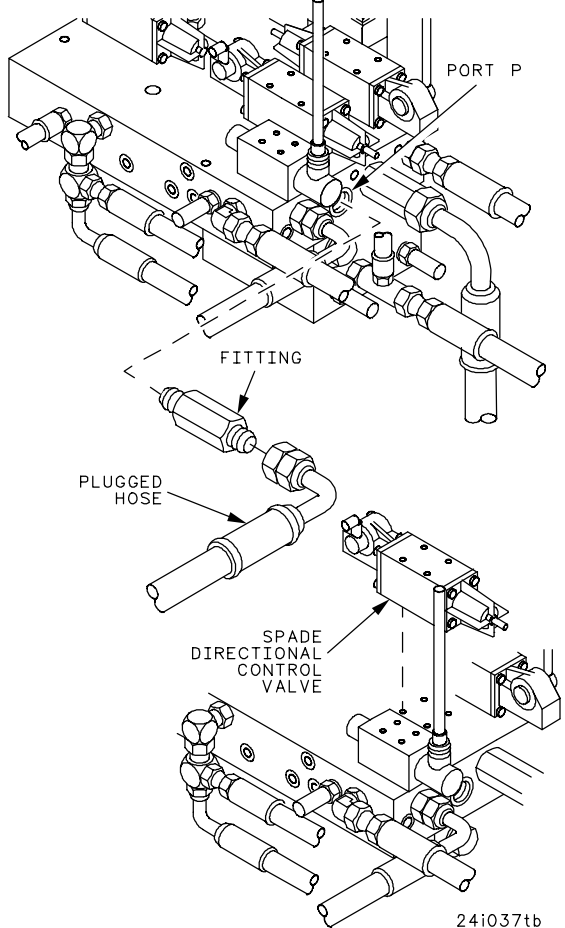
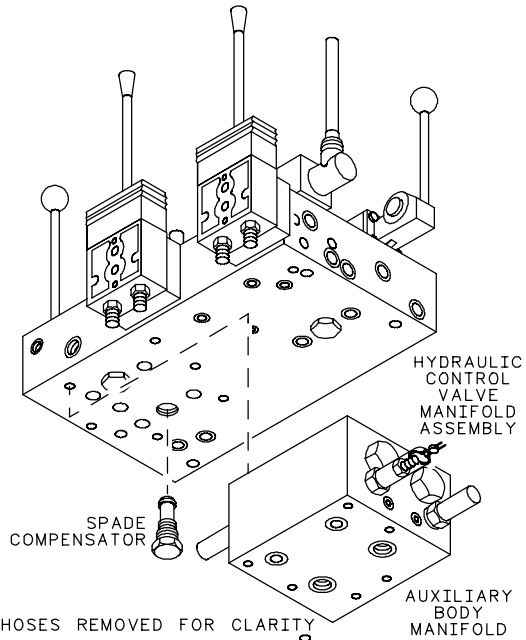
Remove and inspect spade directional control valve for restrictions and damage.

Is spade directional control valve free of restrictions and damage?

yes no

Fault corrected.

Remove restrictions. If restrictions cannot be removed or if valve is damaged, replace (WP 0074 00). Verify fault is corrected.



24i037tb

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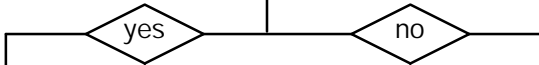
SPADE FAILS TO OPERATE - CONTINUED

0025 00

CONTINUED FROM STEP A

F Remove and inspect spade directional control valve for restrictions and damage.

Is spade directional control valve free of damage and restrictions?



Remove restrictions. If restrictions cannot be removed or if valve is damaged, replace (WP 0074 00). Verify fault is corrected.

G 1. Remove auxiliary body manifold.
2. Remove and inspect the spade load sense shuttle valve for restrictions and damage.

Is load sense shuttle valve free of restrictions and damage?



Remove restrictions. If restrictions cannot be removed or if valve is damaged, replace (WP 0074 00). Verify fault is corrected.

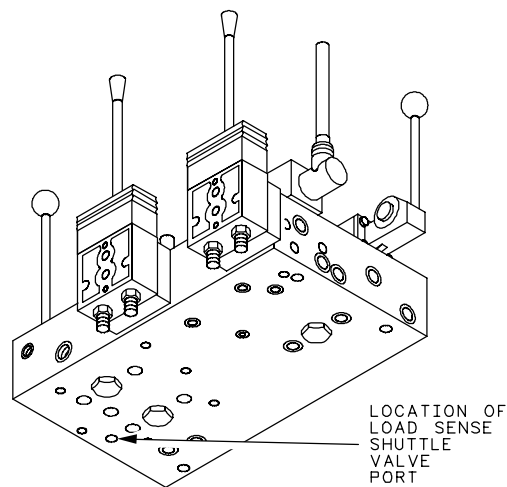
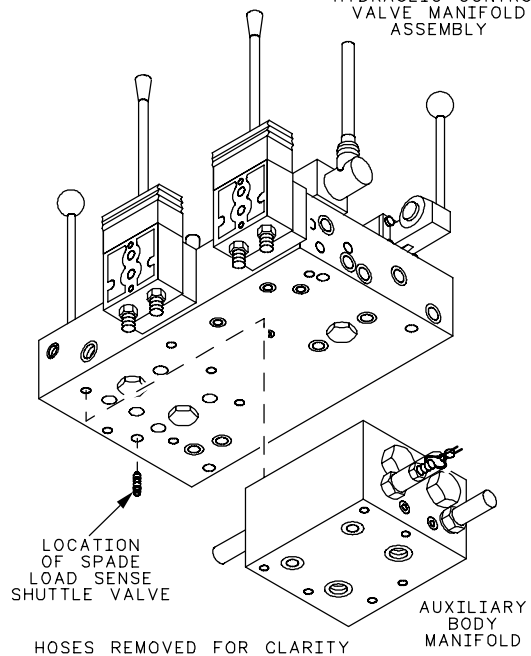
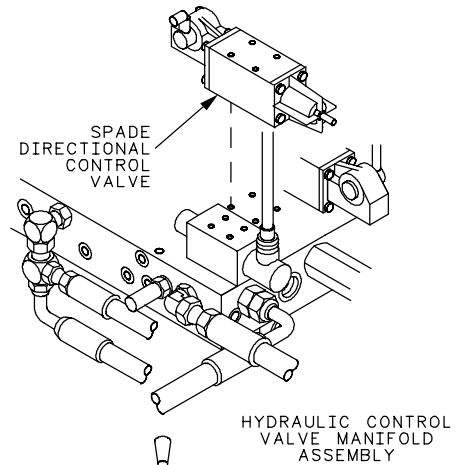
H Inspect the load sense shuttle valve port passage in the hydraulic control valve manifold assembly for restrictions.

Is passage free of restrictions?



Fault corrected.

Remove restrictions. If restrictions cannot be removed or if valve is damaged, replace (WP 0074 00). Verify fault is corrected.



24i037tg

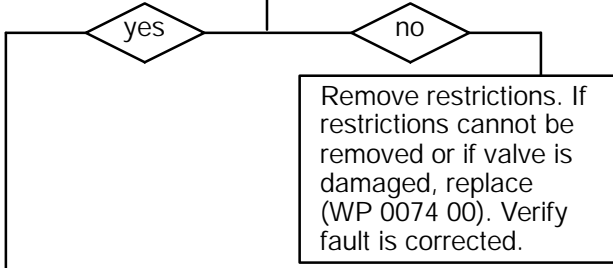
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SPADE FAILS TO OPERATE - CONTINUED

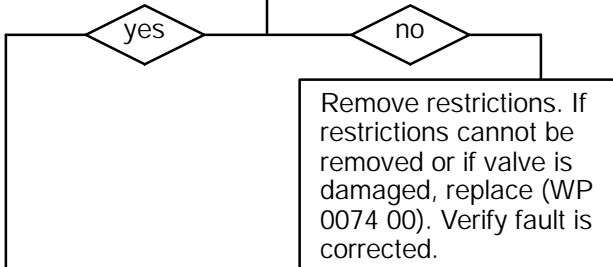
0025 00

CONTINUED FROM STEP A

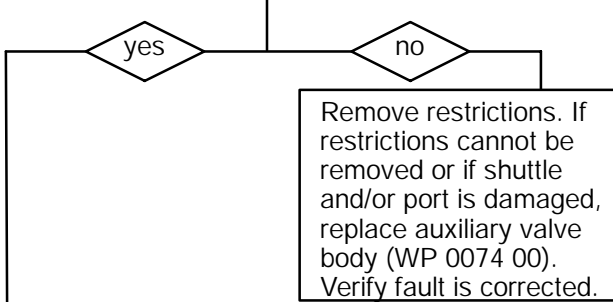
I Remove and inspect spade directional control valve for restrictions and damage.
Is directional control valve free of restrictions and damage?



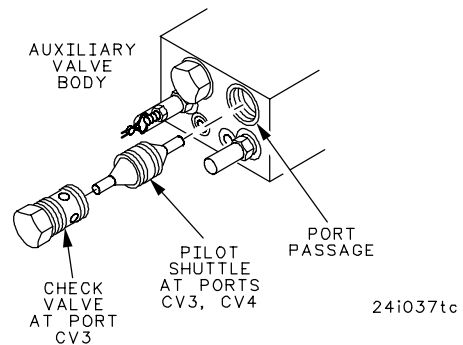
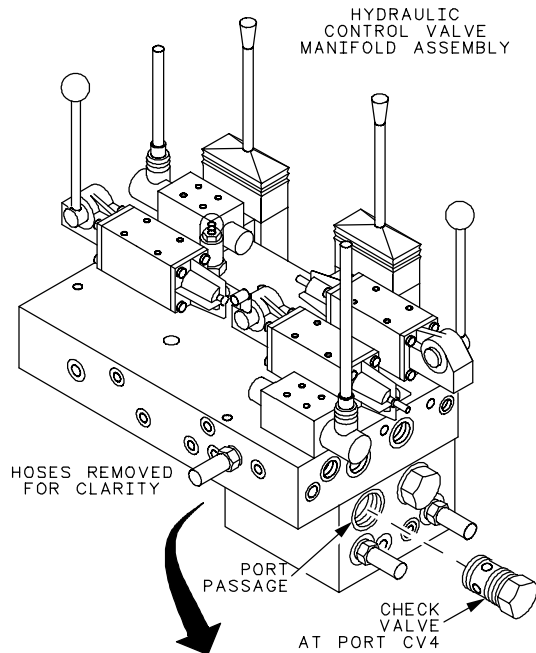
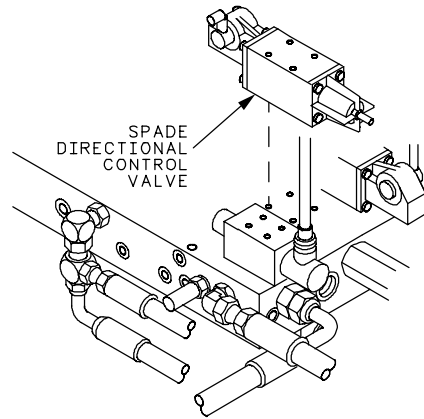
J Remove and inspect check valves CV3 and CV4 from hydraulic control valve manifold assembly for restrictions and damage.
Are valves free of restrictions and damage?



K Inspect CV3 and CV4 pilot shuttle and port passage in auxiliary valve body for restrictions and damage.
Is shuttle and passage free of restrictions and damage?



CONTINUED ON NEXT PAGE




SPADE FAILS TO OPERATE - CONTINUED

0025 00

CONTINUED FROM STEPS A AND K

L



WARNING

1. If not removed, remove spade directional control valve and relief valves RV3 and RV4.
2. Disconnect hose from port R on hydraulic control valve manifold assembly and plug hose.
3. Remove port fitting from manifold.
4. Inspect hydraulic control valve manifold assembly R port passage to the spade return port for restrictions.

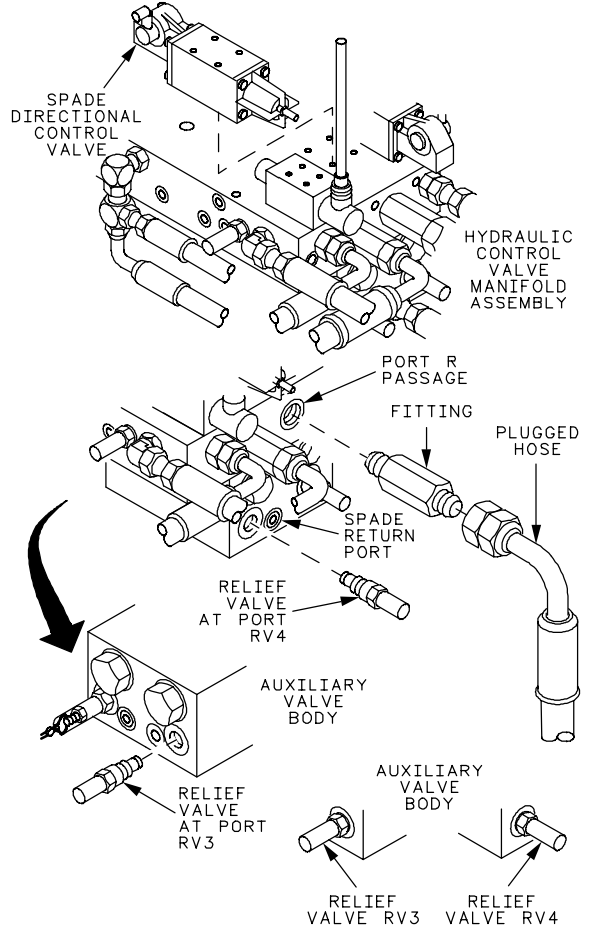
Is passage free of restrictions?

yes

no


Fault is corrected.

Remove restrictions. If restrictions cannot be removed, replace hydraulic control valve manifold assembly (WP 0074 00). Verify fault is corrected.



CONTINUED FROM STEP A

M



WARNING

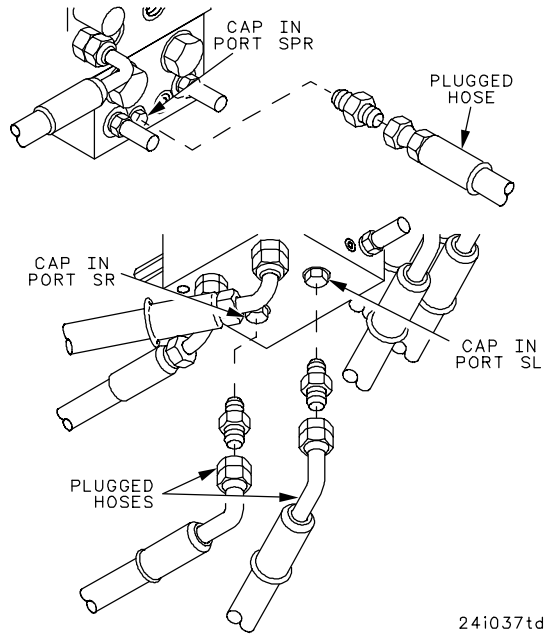
1. Remove hoses from hydraulic control valve manifold assembly ports SPR, SR, and SL and cap ports and plug hoses.
2. Perform Step A, steps 4 through 7.

Is pressure at SPR test port 2000-2300 psi in raise position and is pressure at SL test port 2000-2300 psi in lower position?

yes

no

Replace valves RV3 and RV4 (WP 0074 00). Verify fault is corrected.




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24i037td

CONTINUED FROM STEP M

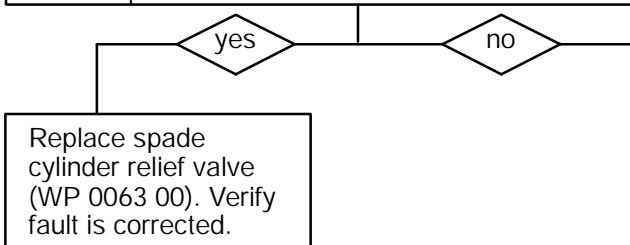
N




WARNING

1. Remove vehicle nose piece (TM 9-2350-292-20).
2. Install main winch ground hop kit (TM 9-2350-292-20).
3. Disconnect hoses from tee on spade cylinder relief valve.
4. Using 1/2 inch adapters connect both hoses on each side together.
5. Perform Step A, steps 4 through 7.

Is pressure at SPR test port 2000-2300 psi in raise position and is pressure at SL test port 2000-2300 psi in lower position?



O

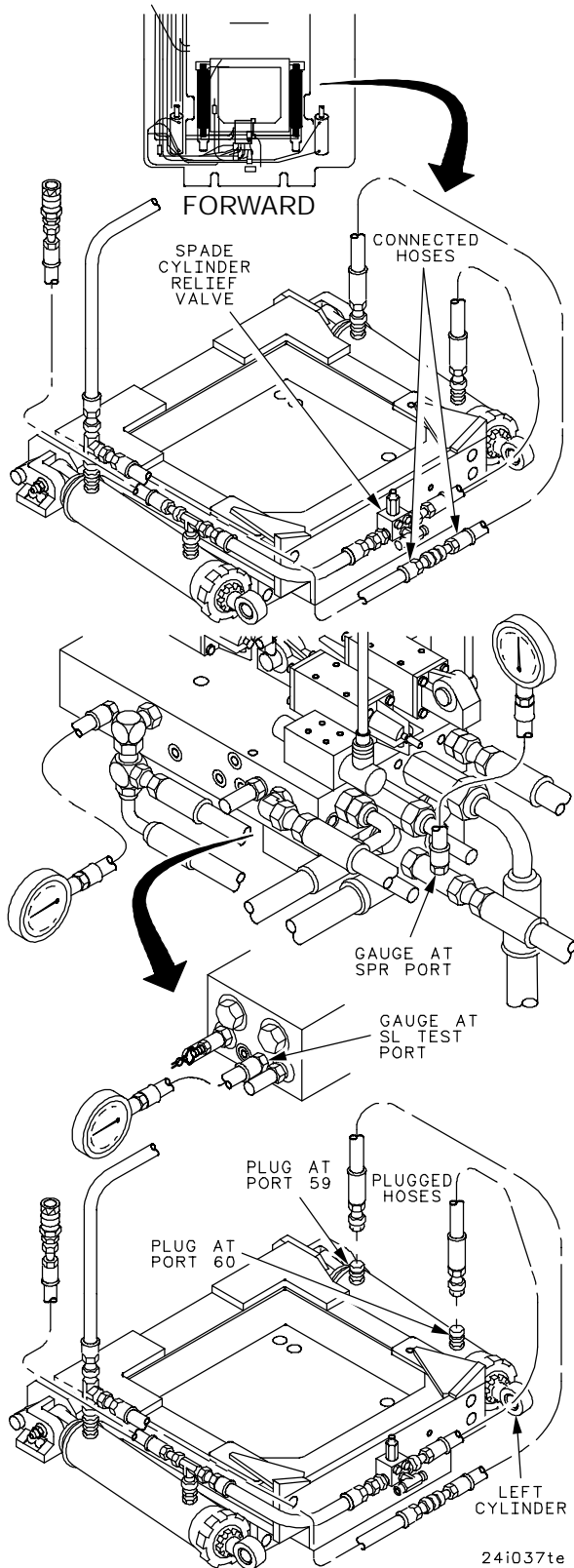


WARNING

1. Disconnect and plug left hoses from left spade cylinder.
2. Plug ports 59 and 60 on left spade cylinder.
3. Perform Step A, steps 4 through 7.

Is pressure at SPR test port 2000-2300 psi in raise position and is pressure at SL test port 2000-2300 psi in lower position?

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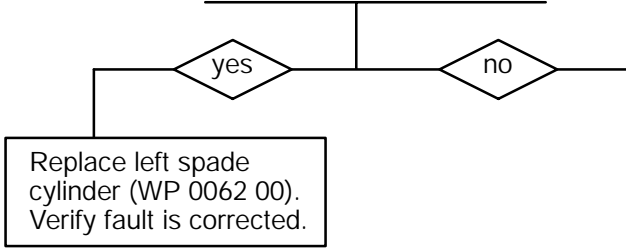


24i037te

SPADE FAILS TO OPERATE - CONTINUED

0025 00

CONTINUED FROM STEP O

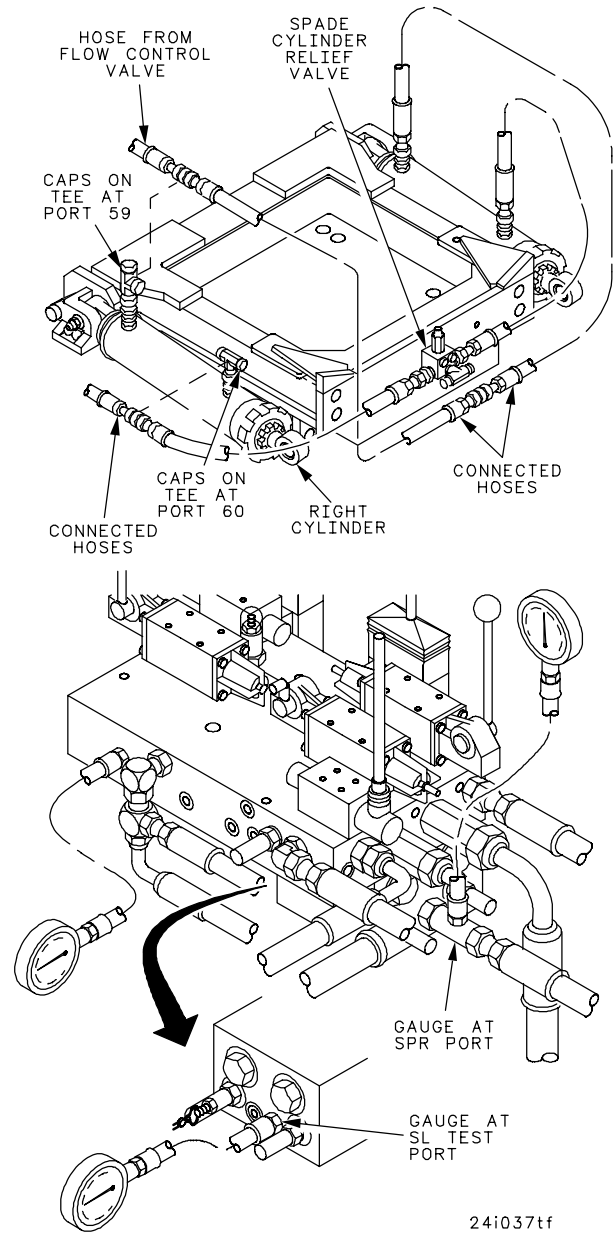
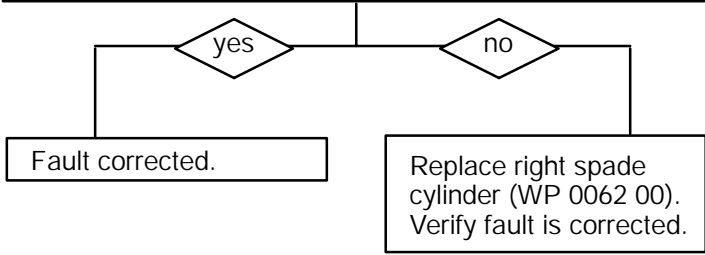


P

WARNING

1. Reconnect left spade cylinder.
2. Disconnect hoses from right spade cylinder and cap tees.
3. Connect hose from flow control valve to hose from front of cylinder relief valve and connect hose from hydraulic control valve manifold assembly to hose from rear of cylinder relief valve.
4. Perform Step A, steps 4 through 7.
5. Remove main winch ground hop kit (TM 9-2350-292-20).

Is pressure at SPR test port 2000-2300 psi in raise position and is pressure at SL test port 2000-2300 psi in lower position?



24i037tf

END OF TASK

SPADE WILL NOT HOLD POSITION

0026 00

THIS WORK PACKAGE COVERS:

Spade Will Not Hold Position

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- 0-4000 psi testing gauge assembly (3) (item 43, WP 0090 00)
- 1/2-inch adapter (2) (item 31, WP 0087 00)
- 1/4-inch tee (item 39, WP 0087 00)
- Safety goggles (item 48, WP 0087 00)

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Vehicle nose piece removed (TM 9-2350-292-20)
- Main winch ground hop kit installed (TM 9-2350-292-20)
- Hydraulic control valve manifold assembly shields removed (TM 9-2350-292-20)

Personnel Required

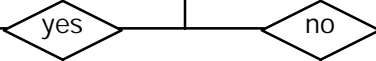
Two

WARNING
Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



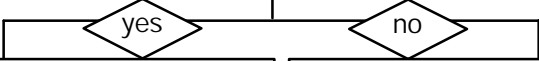
WARNING

- A**
1. Place spade in mid-range position (TM 9-2350-292-10).
 2. Disconnect both spade cylinder quick-disconnects.
- Does spade hold position?



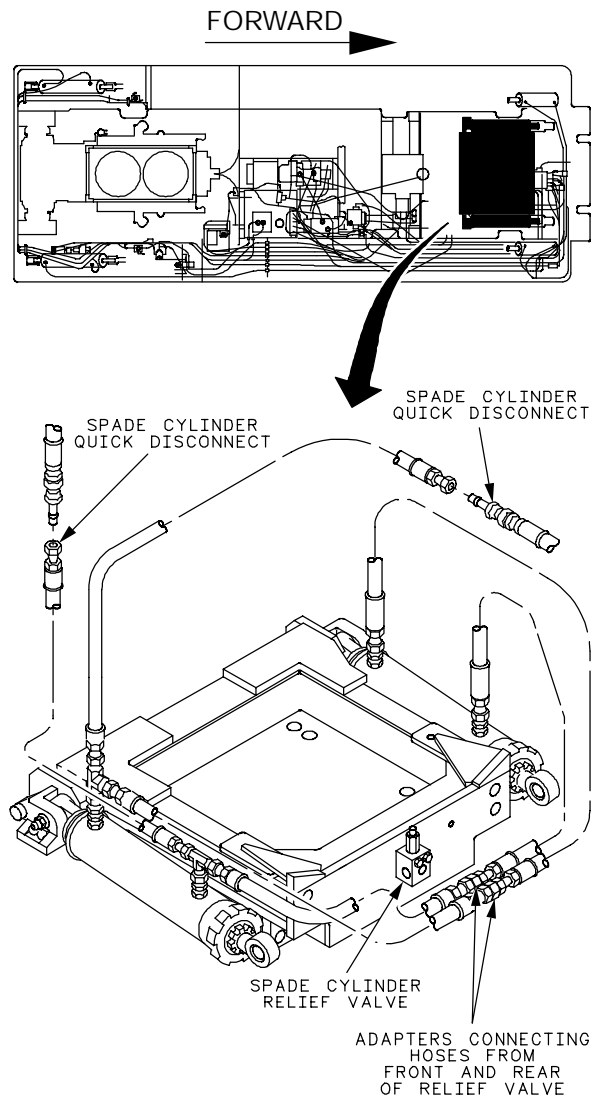
Go to Step C.

- B**
-
- WARNING**
1. Disconnect hoses from spade cylinder relief valve.
 2. Connect two hoses from front of relief valve together using 1/2-inch adapter and connect two hoses from rear of relief valve together using 1/2 inch adapter.
 3. Perform Step A.
- Does spade hold position?



Replace spade cylinder relief valve (WP 0063 00).
Verify fault is corrected.

Replace spade cylinders (WP 0062 00).
Verify fault is corrected.




24i034t

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CONTINUED FROM STEP A

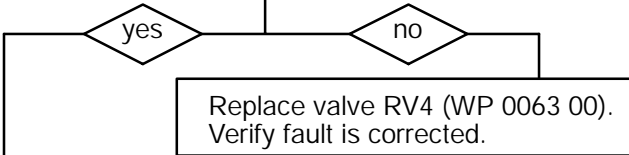
C



WARNING

1. Install 0-4000 psi testing gauge assembly with 1/4-tee between spade release check valve and connecting hose.
2. Start main engine, energize hydraulics system, and set engine speed to 1800 rpm (TM 9-2350-292-10).
3. Place spade control lever to raise position and observe gauge.
4. Shut down hydraulics and main engine (TM 9-2350-292-10).

Is pressure gauge reading 2000-2300 psi?



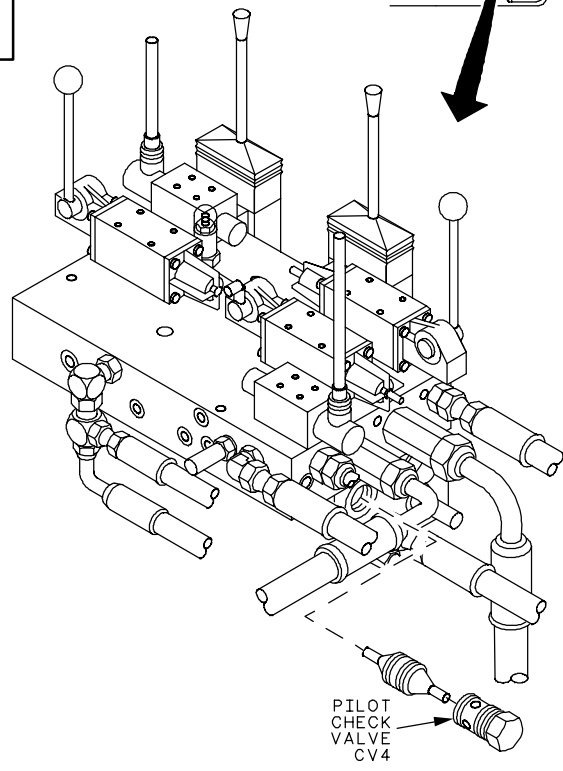
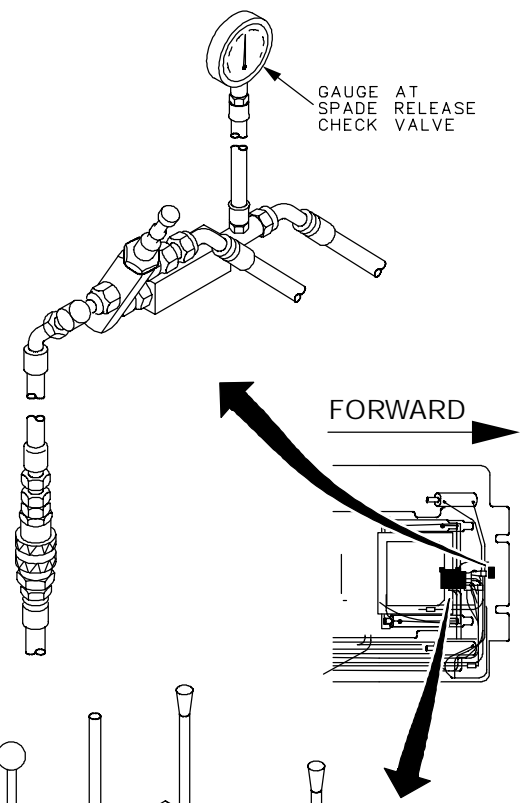
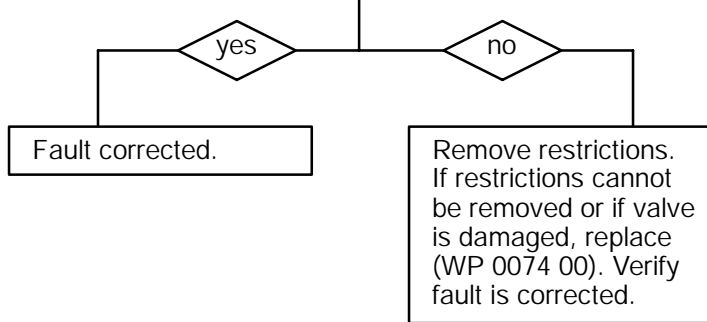
D



WARNING

Remove spade raise pilot check valve CV4 from hydraulic control valve manifold assembly and inspect the valve for restrictions and damage.

Is valve free of restrictions and damage?



HYDRAULIC CONTROL VALVE MANIFOLD ASSEMBLY

24i034ta

END OF TASK

HOIST BOOM FAILS TO OPERATE OR ONLY OPERATES PARTIALLY

0027 00

THIS WORK PACKAGE COVERS:

Hoist Boom Fails to Operate or Only Operates Partially

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- 3/8-inch plug (2) (item 35, WP 0087 00)
- 1/2-inch plug (2) (item 36, WP 0087 00)
- Safety goggles (item 48, WP 0087 00)
- 0-4000 psi testing gauge assembly (2) (item 43, WP 0090 00)

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Hydraulic control valve manifold assembly shields removed (TM 9-2350-292-20)

Personnel Required

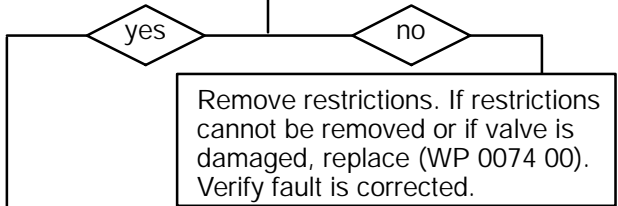
Two

WARNING
Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

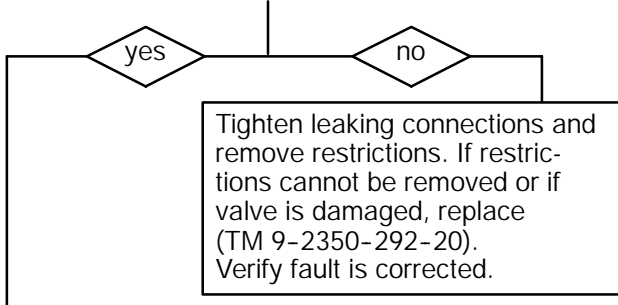


WARNING

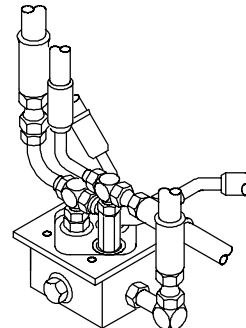
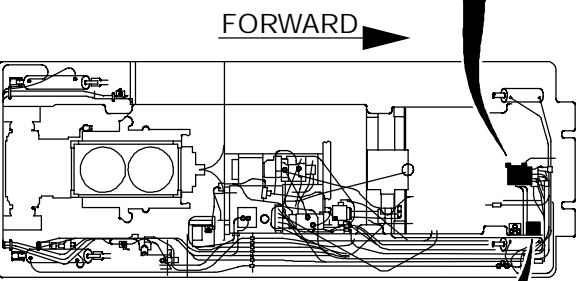
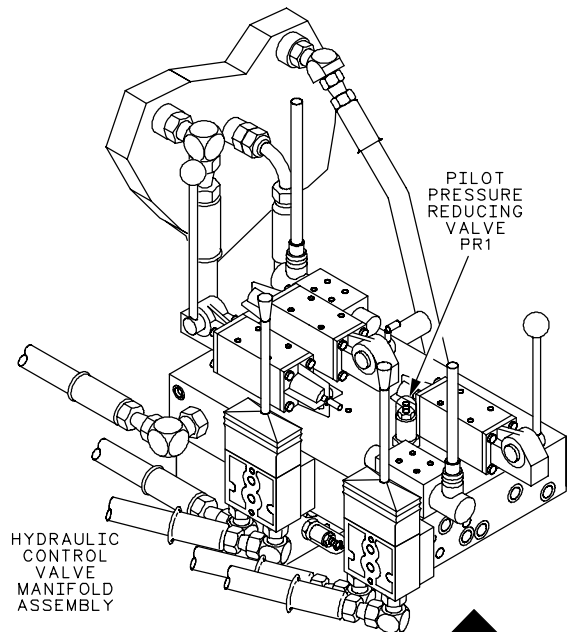
A Inspect boom pilot pressure reducing valve PR1 for restrictions and damage.
Is valve free of restrictions and damage?



B 1. Remove subfloor plates 10, 11 and 12 (TM 9-2350-292-20).
2. Inspect boom shutoff valve for leaks, restrictions, and damage.
Is valve free of leaks, restrictions, and damage?



CONTINUED ON NEXT PAGE



BOOM SHUTOFF VALVE

24i039t

HOIST BOOM FAILS TO OPERATE OR ONLY OPERATES PARTIALLY - CONTINUED

0027 00

CONTINUED FROM STEP B

C Inspect the boom safety valve for leaks, restrictions, and damage.

Is valve free of leaks, restrictions, and damage?

yes no

Tighten leaking connections and remove restrictions. If restrictions cannot be removed or if valve is damaged, replace (WP 0074 00). Verify fault is corrected.


D 1. Remove engine deck grilles over left and right boom limit valves (TM 9-2350-292-20).
2. Inspect boom limit valves and subplates for leaks, restrictions, and damage.

Are valves and subplates free of leaks, restrictions, and damage?

yes no

Tighten leaking connections and remove restrictions. If restrictions cannot be removed or if valves (WP 0077 00) and/or subplates are damaged, replace (TM 9-2350-292-20). Verify fault is corrected.

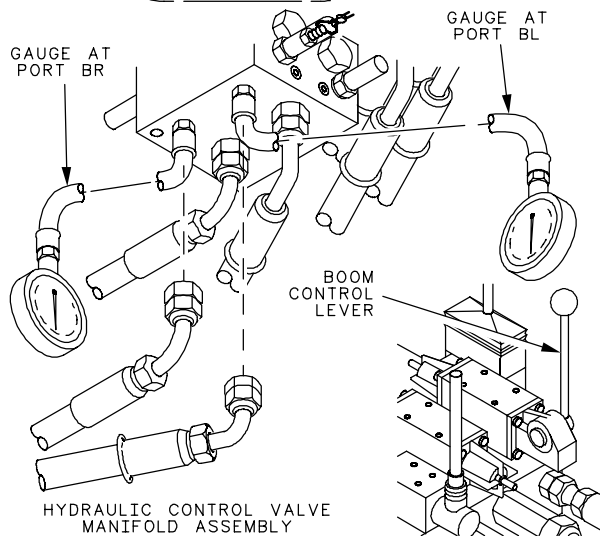
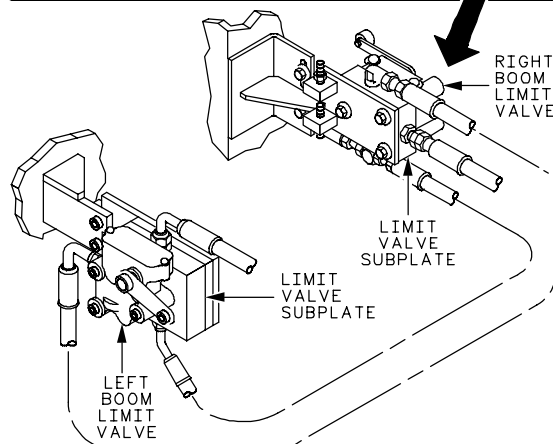
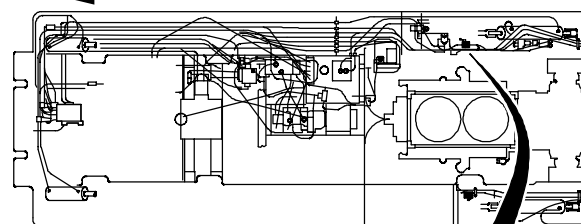
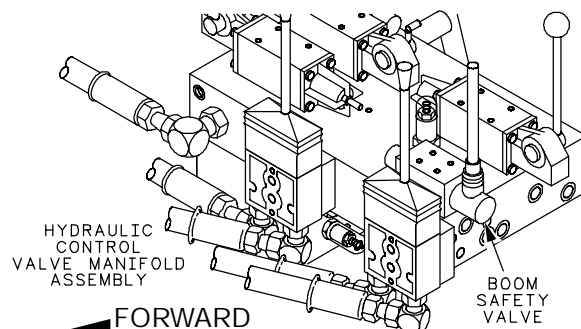
E



WARNING

1. Stow and secure boom.
2. Remove and plug hoses from hydraulic control valve manifold assembly ports BL and BR.
3. Install 0-4000 psi testing gauge assembly in each port.
4. Start main engine, energize hydraulics system and set engine speed to 1800 rpm (TM 9-2350-292-10).
5. Place boom control lever in BL position and record gauge reading. Place boom control lever in BR position and record gauge reading.
6. Shut down hydraulics and main engine (TM 9-2350-292-10).

Is pressure at BR port 1550-1650 psi and BL port less than 50 psi in raise position and is pressure at BL port 1600-1700 psi and BR port less than 50 psi in lower position?



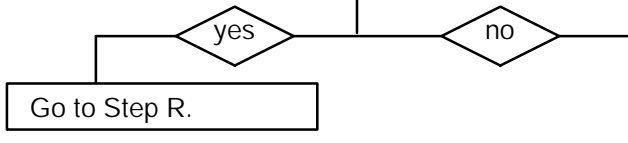
24i039ta

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**HOIST BOOM FAILS TO OPERATE OR ONLY OPERATES PARTIALLY -
CONTINUED**

0027 00

CONTINUED FROM STEP E



WARNING

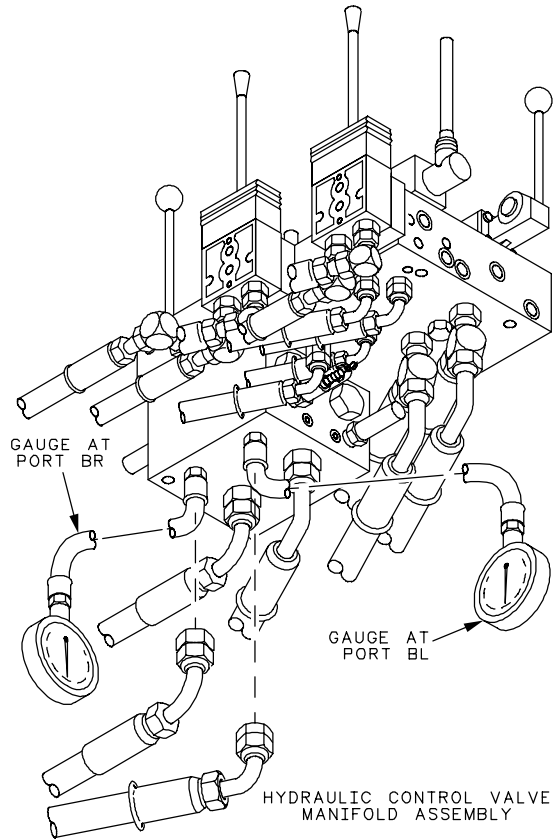
If pressure at BR port is 0 psi in raise position and pressure at BL port is 0 psi in lower position, go to Step F.

If pressure at BR port is 480 psi in raise position and pressure at BL port is 480 psi in lower position, go to Step I.

If pressure at BL port is 0 psi in raise position and pressure at BR port is 0 psi in lower position, go to Step L.

If pressure at BR port is greater than 480 psi but less than 1550 psi in raise position or pressure at BL port is greater than 480 psi but less than 1600 psi in lower position, go to Step O.

If pressure at BL port is greater than 50 psi in raise position or pressure at BR port is greater than 50 psi in lower position, go to Step P.



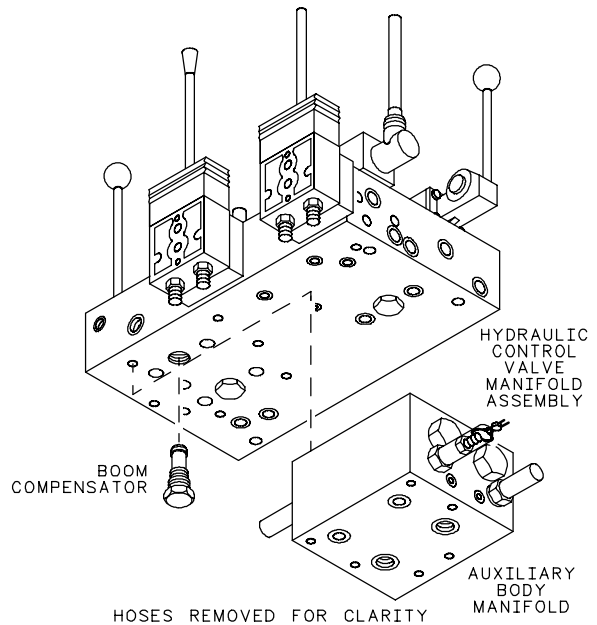
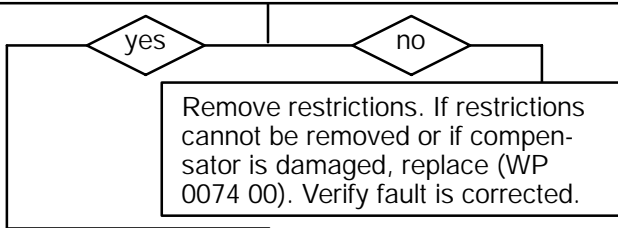
CONTINUED FROM STEP E

F

WARNING

1. Remove auxiliary body manifold from hydraulic control valve manifold assembly.
2. Remove boom compensator from hydraulic control valve manifold assembly and inspect compensator for restrictions and damage.

Is compensator free of restrictions and damage?



CONTINUED ON NEXT PAGE

24i039tb

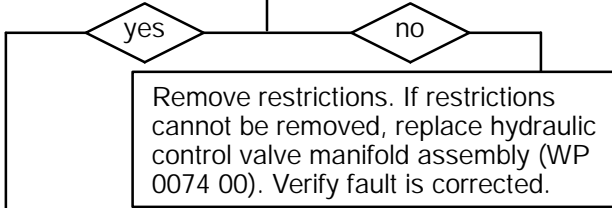
HOIST BOOM FAILS TO OPERATE OR ONLY OPERATES PARTIALLY - CONTINUED

0027 00

CONTINUED FROM STEP F

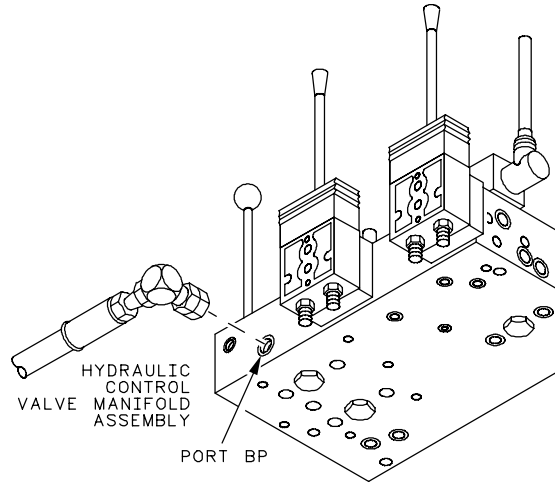
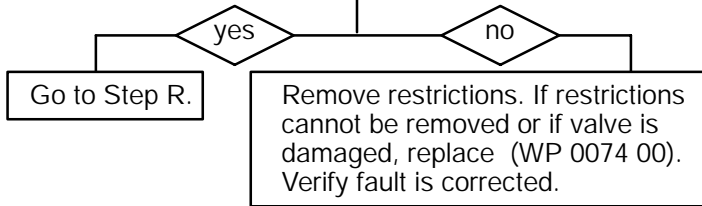
G Remove and plug hose from BP port of hydraulic control valve manifold assembly and inspect port for restrictions.

Is port free of restrictions?



H Remove and inspect boom directional control valve for restrictions and damage.

Is valve free of restrictions and damage?



ALL OTHER HOSES REMOVED FOR CLARITY

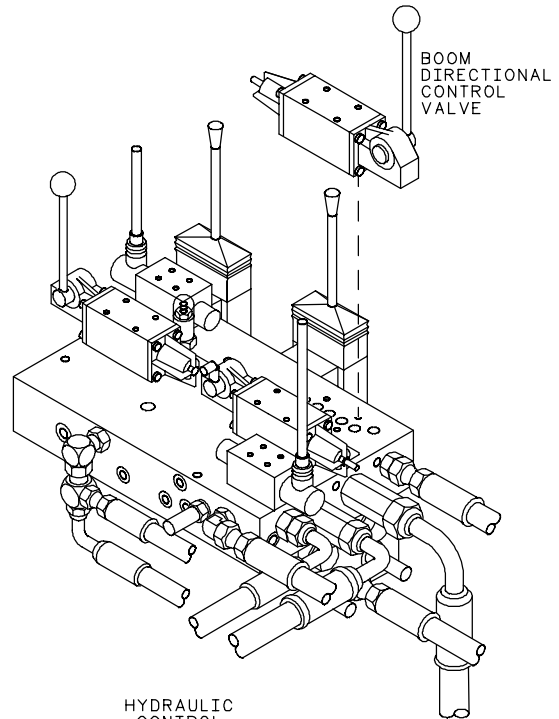
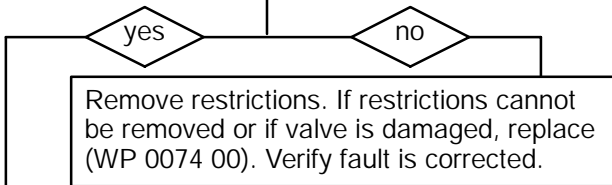
CONTINUED FROM STEP E

I

WARNING

Remove and inspect boom directional control valve for restrictions and damage.

Is valve free of restrictions and damage?



24i039tc

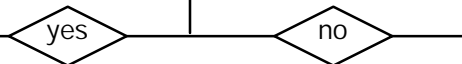
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**HOIST BOOM FAILS TO OPERATE OR ONLY OPERATES PARTIALLY -
CONTINUED**

0027 00

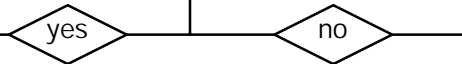
CONTINUED FROM STEP I

K Remove and inspect boom load sense shuttle valve for restrictions and damage (WP 0074 00).
Is valve free of restrictions and damage?



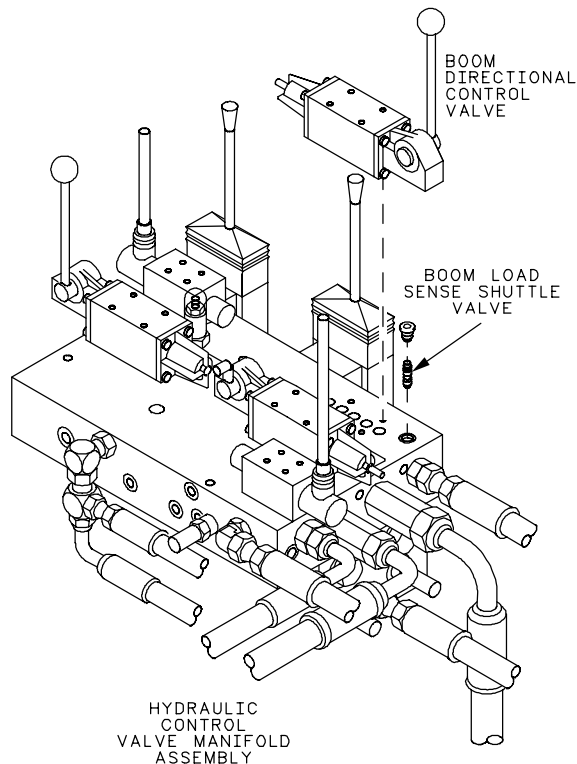
Remove restrictions. If restrictions cannot be removed or if valve is damaged, replace (WP 0074 00). Verify fault is corrected.

J Inspect boom load sense shuttle valve port in hydraulic control valve manifold assembly for restrictions.
Is port free of restrictions?



Go to WP 0010 00.

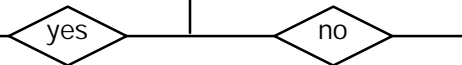
Remove restrictions. If restrictions cannot be removed, replace hydraulic control valve manifold assembly (WP 0074 00). Verify fault is corrected.



24i039td

CONTINUED FROM STEP E

L 
WARNING
Remove and inspect boom directional control valve for restrictions and damage.
Is valve free of restrictions and damage?



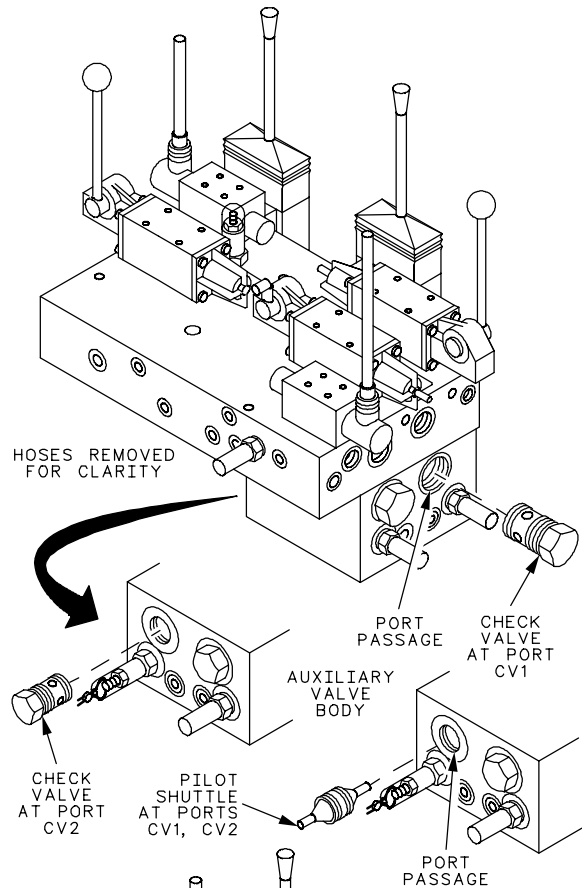
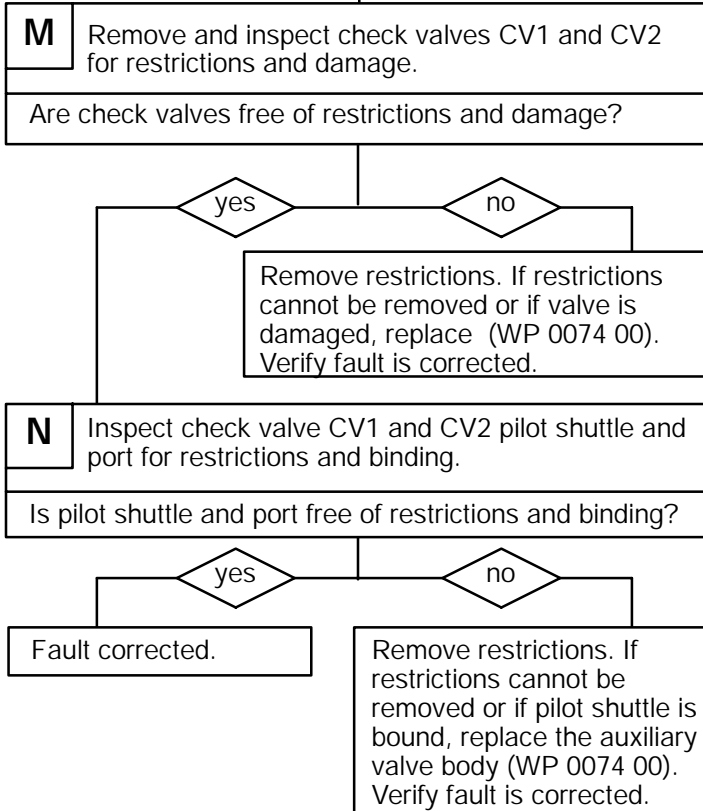
Remove restrictions. If restrictions cannot be removed or if valve is damaged, replace (WP 0074 00). Verify fault is corrected.

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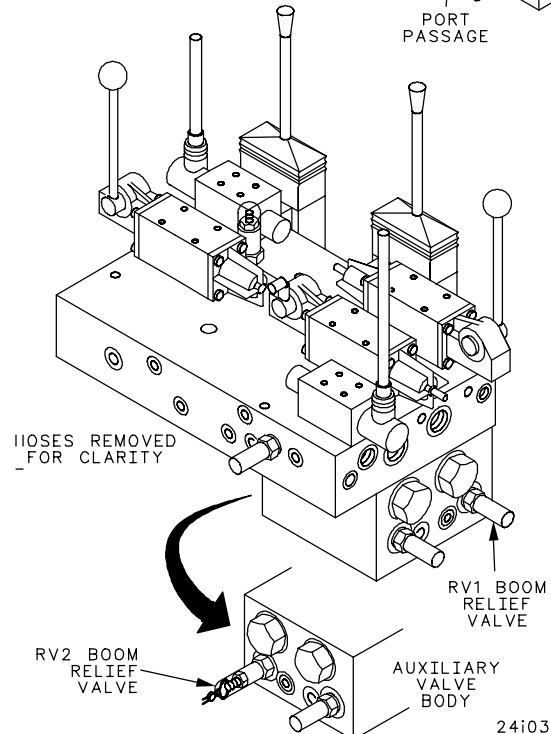
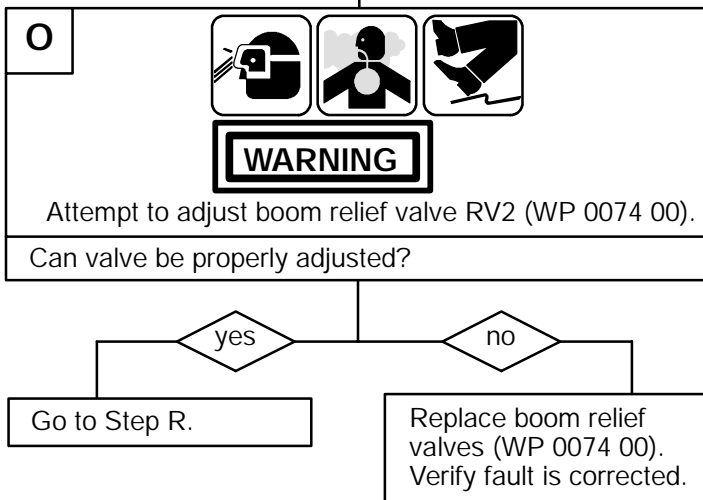
**HOIST BOOM FAILS TO OPERATE OR ONLY OPERATES PARTIALLY -
CONTINUED**

0027 00

CONTINUED FROM STEP L



CONTINUED FROM STEP E



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24i039te

**HOIST BOOM FAILS TO OPERATE OR ONLY OPERATES PARTIALLY -
CONTINUED**

0027 00

CONTINUED FROM STEP E

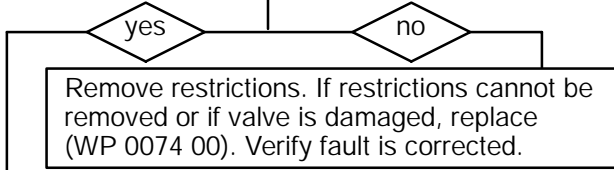
P



WARNING

Remove and inspect the boom directional control valve for restrictions and damage.

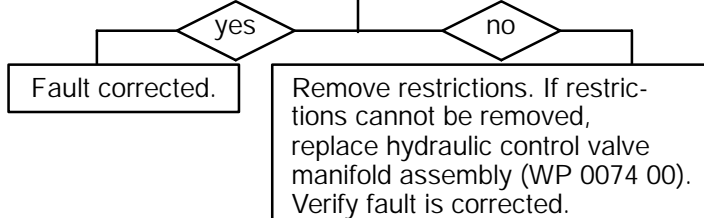
Is valve free of restrictions and damage?



Q


Inspect the return port of the auxiliary valve body and the manifold body of the hydraulic control valve manifold assembly for restrictions.

Are ports free of restrictions?



CONTINUED FROM STEPS E, H AND O

R

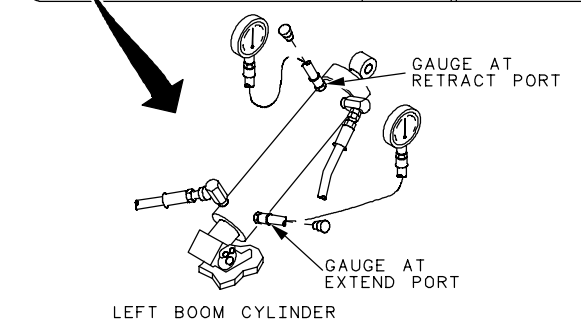
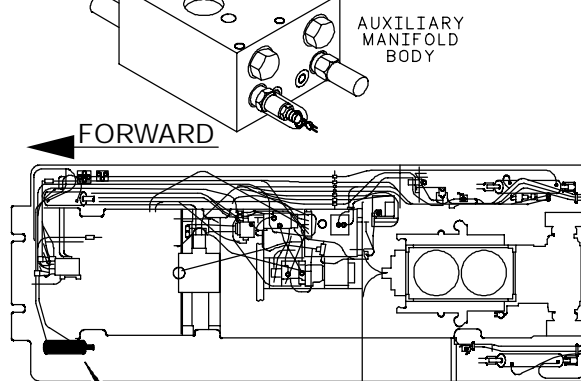
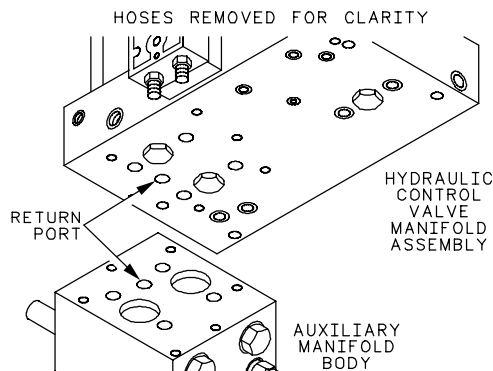
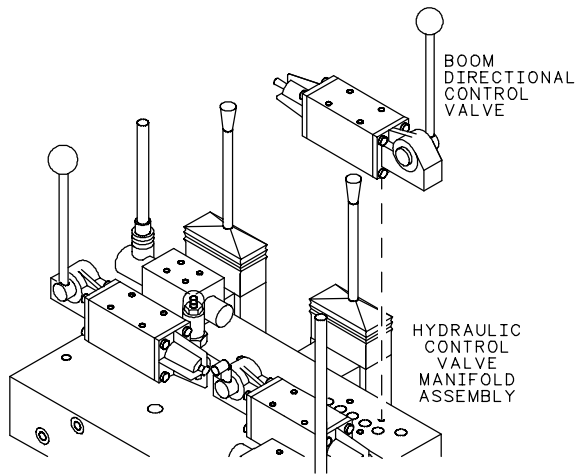


WARNING

1. Remove plug from the extend port and the retract port of left boom cylinder port.
2. Install 0-4000 psi testing gauges assembly in each port.
3. Start main engine, energize hydraulics system, and set engine speed to 1800 rpm (TM 9-2350-292-10).
4. If boom is in stow position, place boom safety valve in stow position and place boom control handle in forward position. Hold for one minute and return handle to original position. Observe gauges for one minute and record readings. If boom is in live range place control handle to retract position and hold for one minute, then return handle to original position. Observe gauges for one minute and record readings.
5. Shut down hydraulics and main engine (TM 9-2350-292-10).

Can valves be properly adjusted?

CONTINUED ON NEXT PAGE

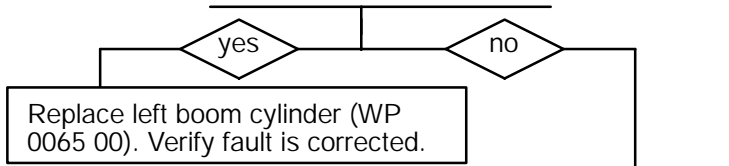


241039tf

HOIST BOOM FAILS TO OPERATE OR ONLY OPERATES PARTIALLY - CONTINUED

0027 00

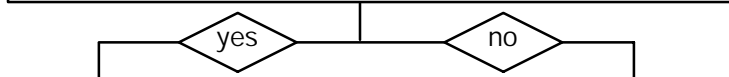
CONTINUED FROM STEP R



Replace left boom cylinder (WP 0065 00). Verify fault is corrected.

S Perform Step R on right boom cylinder.

Is pressure on both gauges equal?



Replace right boom cylinder (WP 0065 00). Verify fault is corrected.

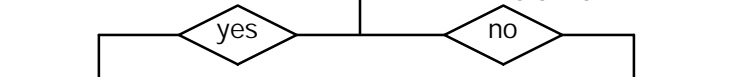
NOTE
If boom failed in the retract position only, perform the following steps.

T

WARNING

1. Remove plug from extend port of left boom stayline cylinder and install 0-4000 psi testing gauge assembly.
2. Start main engine, energize hydraulics system, and set engine speed to 1800 rpm (TM 9-2350-292-10).
3. Hold boom control handle in retract position for one minute. Release handle and observe gauge for one minute. Record reading.
4. Shut down hydraulics and main engine (TM 9-2350-292-10).

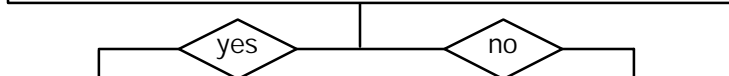
Does pressure decrease while observing gauge?



Replace left boom stayline cylinder (WP 0066 00). Verify fault is corrected.

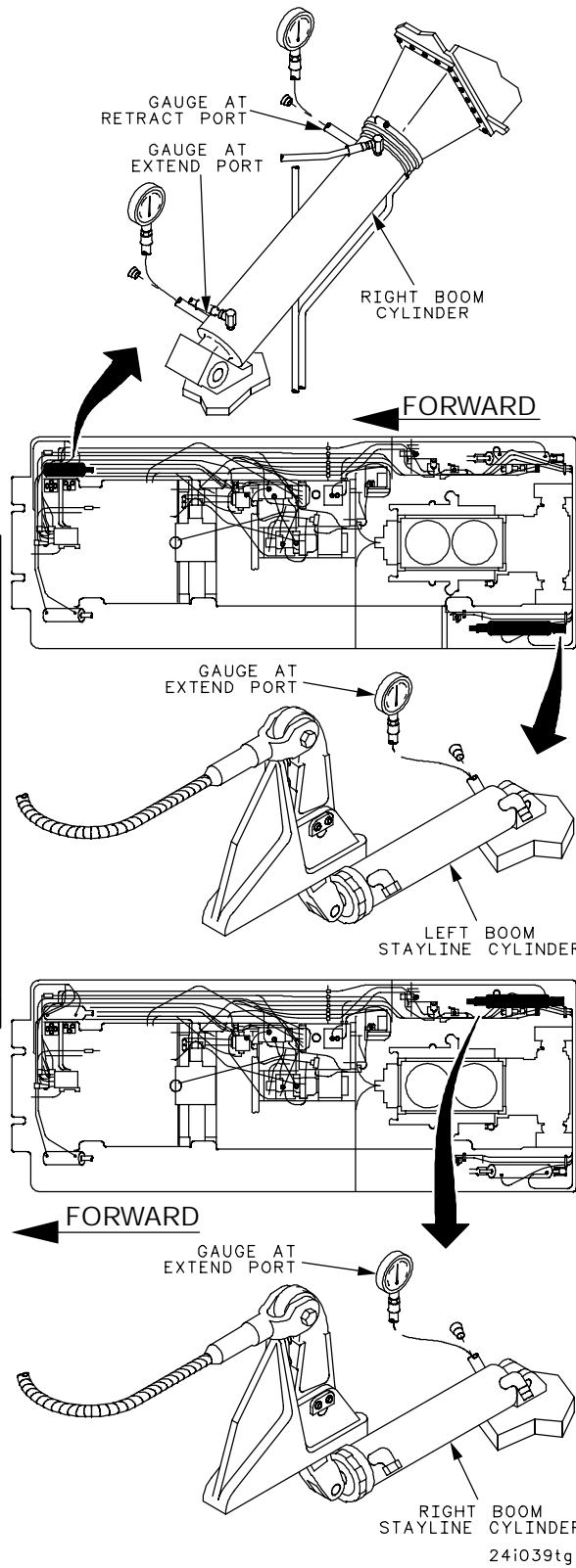
U Perform Step T on right boom stayline cylinder.

Does pressure decrease while observing gauge?



Replace right boom stayline cylinder (WP 0066 00). Verify fault is corrected.

Fault corrected.



24i039tg

END OF TASK

HOIST BOOM WILL NOT HOLD IN ANY POSITION (HOIST BOOM CREEPS)**0028 00****THIS WORK PACKAGE COVERS:**

Hoist Boom Will Not Hold in Any Position (Hoist Boom Creeps)

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
 Safety goggles (item 48, WP 0087 00)
 0-4000 psi testing gauge assembly (2) (item 43, WP 0090 00)

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-292-10)

Personnel Required

Two

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

**NOTE**

Use the pressure readings recorded in Steps F, H, I and K of troubleshooting (WP 0098 00) in TM 9-2350-292-20-1 to determine the starting point for this troubleshooting task.

If pressure at BR TEST port of hydraulic control valve manifold is more than 1500 psi, start at Step A.

If pressure at BR TEST port of hydraulic control valve manifold is less than 1500 psi, start at Step C.

If pressure at BL TEST port of hydraulic control valve manifold is more than 1600 psi, start at Step B.

If pressure at BL TEST port of the hydraulic control valve manifold is less than 1600 psi, start at Step E.

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HOIST BOOM WILL NOT HOLD IN ANY POSITION (HOIST BOOM CREEPS) - CONTINUED

0028 00

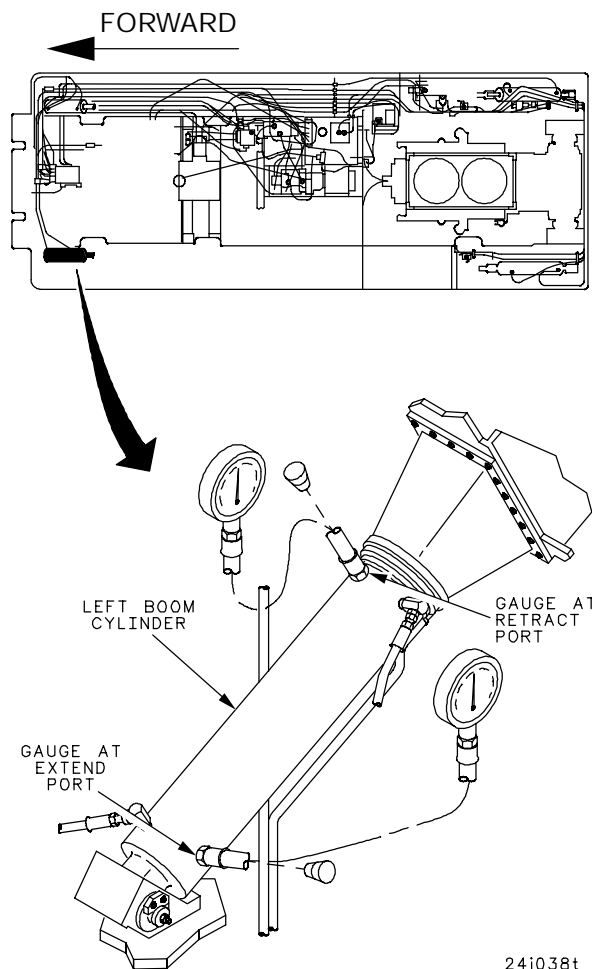
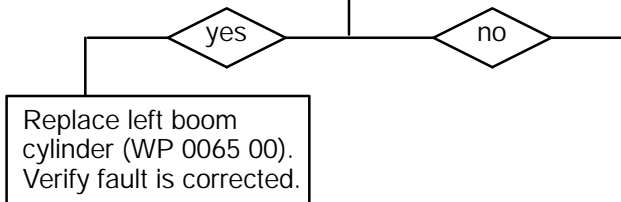
A



WARNING

1. With boom in stowed position, remove plugs from the extend and retract ports of left boom cylinder.
2. Install a 0-4000 psi testing gauge assembly in each port.
3. Start main engine, energize hydraulics system and set engine speed to 1800 rpm (TM 9-2350-292-10).
4. Raise boom out of travel lock and release control lever to hold position.
5. Observe pressure on both gauges.
6. Raise boom to the live position and release lever to hold position.
7. Observe pressure on both gauges.
8. Return boom to travel lock, shut down hydraulics system and main engine (TM 9-2350-292-10).

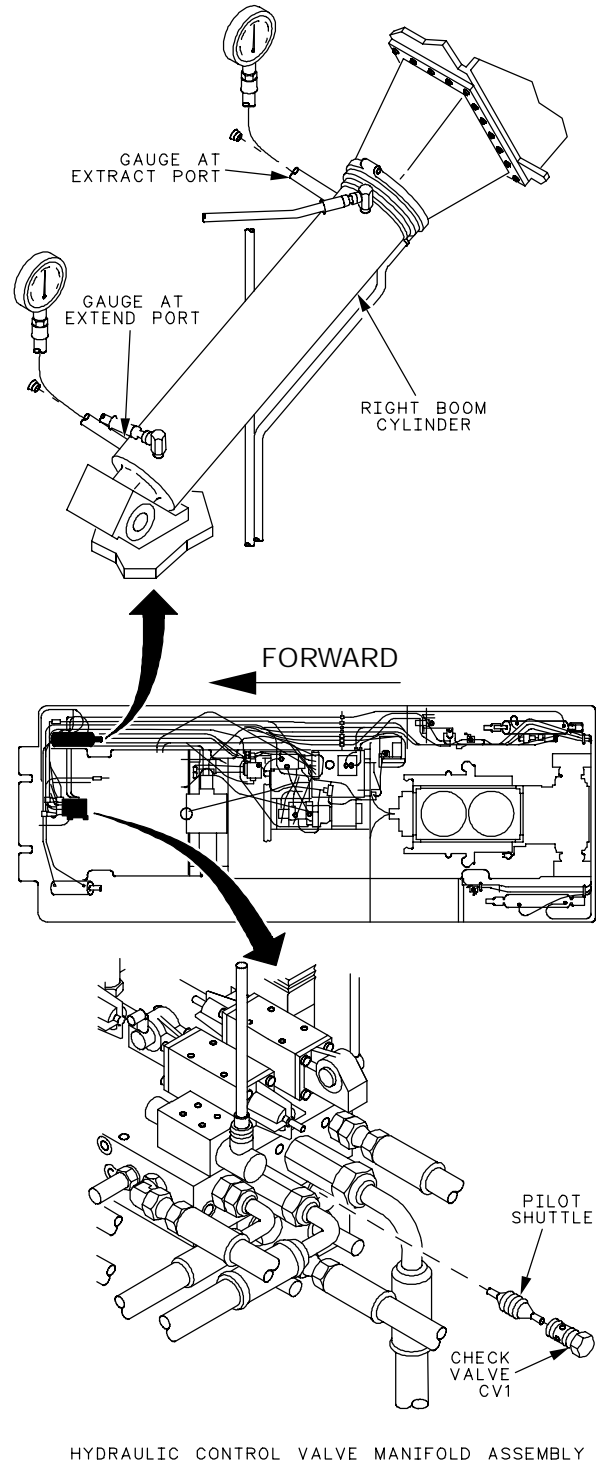
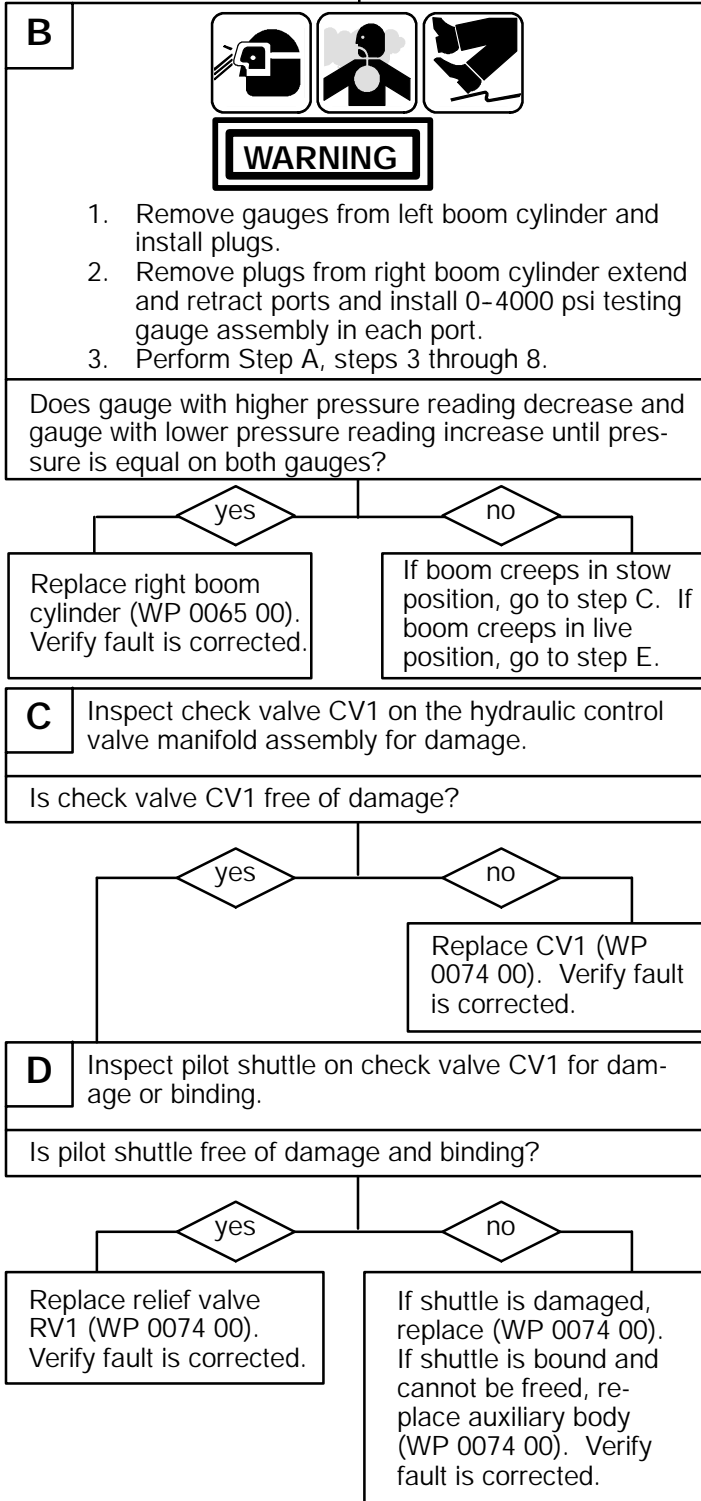
Does gauge with higher pressure reading decrease and gauge with lower pressure reading increase until pressure is equal on both gauges?



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HOIST BOOM WILL NOT HOLD IN ANY POSITION (HOIST BOOM CREEPS) - 0028 00
CONTINUED

CONTINUED FROM STEP A



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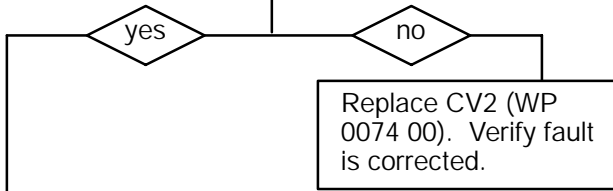
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HOIST BOOM WILL NOT HOLD IN ANY POSITION (HOIST BOOM CREEPS) - CONTINUED

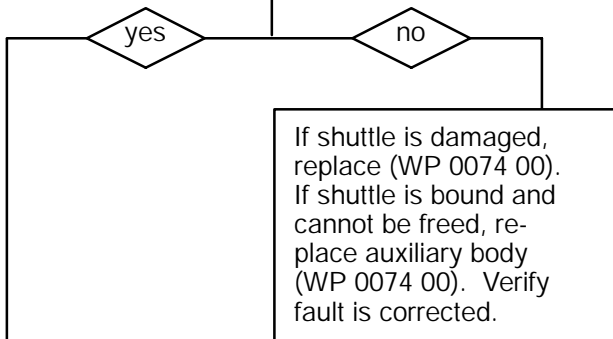
0028 00

CONTINUED FROM STEP B

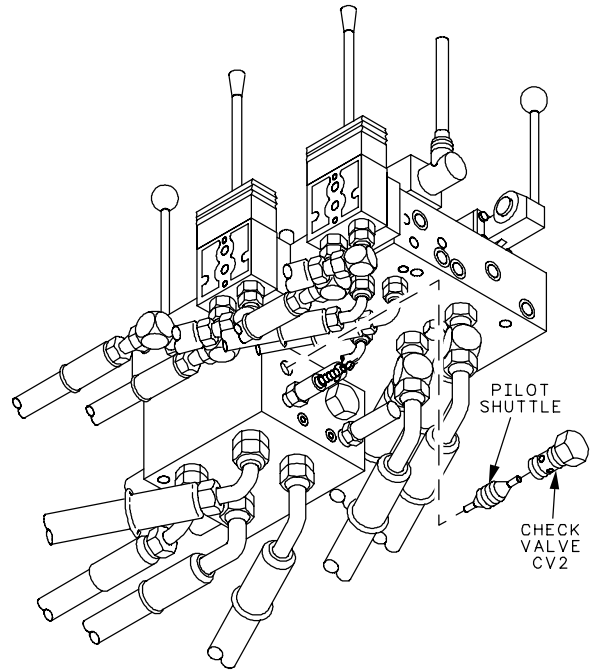
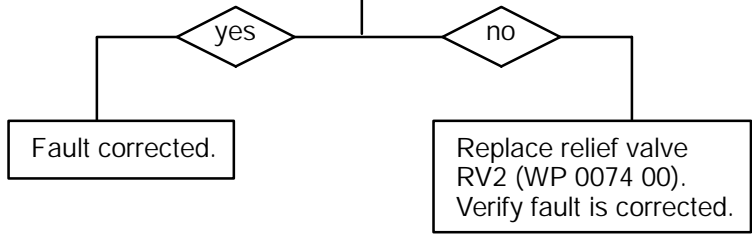
E Inspect check valve CV2 on the hydraulic control valve manifold assembly for damage.
Is check valve CV2 free of damage?



F Inspect pilot shuttle on check valve CV2 for damage or binding.
Is pilot shuttle free of damage and binding?



G Attempt to adjust relief valve RV2 (WP 0075 00).
Can relief valve RV2 be properly adjusted?



HYDRAULIC CONTROL VALVE MANIFOLD ASSEMBLY

24i038tb

END OF TASK

HOIST BOOM LIVE OPERATION DOES NOT FUNCTION (HOIST BOOM WILL NOT STOP AUTOMATICALLY, STAYLINE CABLES GO SLACK DURING OPERATION OR HOIST BOOM CAN BE STOWED WITHOUT ACTIVATING THE HOIST BOOM SAFETY VALVE CONTROL LEVER) 0029 00

THIS WORK PACKAGE COVERS:

Hoist Boom Live Operation Does Not Function (Hoist Boom Will Not Stop Automatically, Stayline Cables Go Slack During Operation or Hoist Boom Can Be Stowed Without Activating The Hoist Boom Safety Valve Control Lever)

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- Safety goggles (item 48, WP 0087 00)
- 0-4000 psi testing gauge assembly (2) (item 43, WP 0090 00)

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Hydraulic control valve manifold assembly shields removed (TM 9-2350-292-20)

Personnel Required

Two

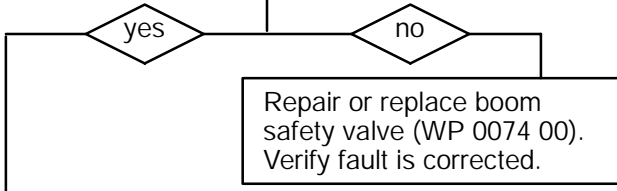
WARNING
Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



WARNING

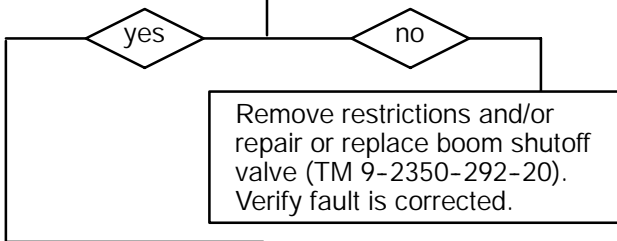
A Check boom safety valve for damage and for binding lever.

Is boom safety valve free of damage and binding?

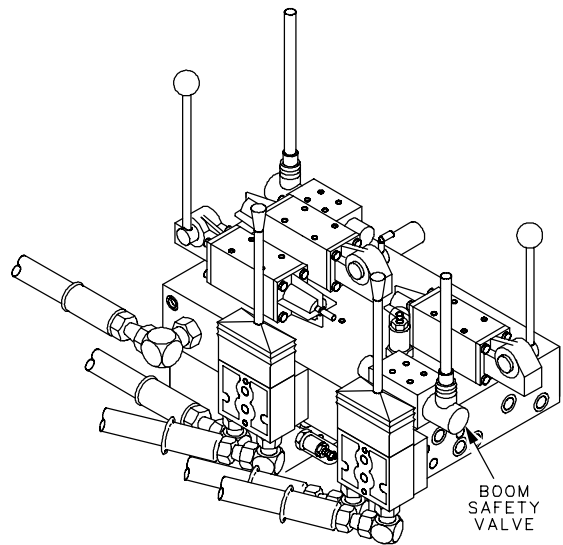


B 1. Remove subfloor plates 10, 11 and 12 (TM 9-2350-292-20).
2. Check ports of boom shutoff valve for damage and restrictions.

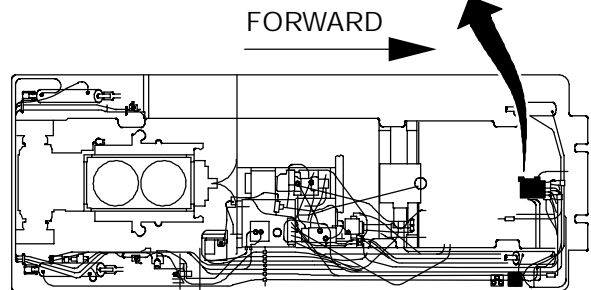
Is boom shutoff valve free of damage and restrictions?



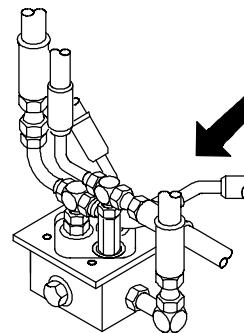
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HYDRAULIC CONTROL VALVE MANIFOLD ASSEMBLY



FORWARD



BOOM SHUTOFF VALVE

241040t

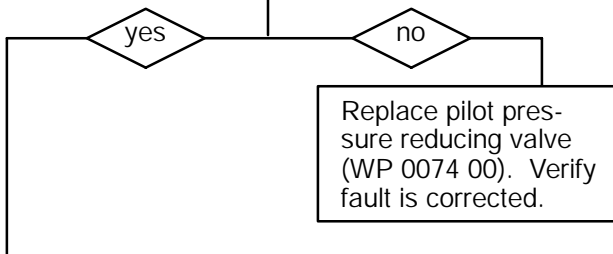
HOIST BOOM LIVE OPERATION DOES NOT FUNCTION (HOIST BOOM WILL NOT STOP AUTOMATICALLY, STAYLINE CABLES GO SLACK DURING OPERATION OR HOIST BOOM CAN BE STOWED WITHOUT ACTIVATING THE HOIST BOOM SAFETY VALVE CONTROL LEVER) - CONTINUED

0029 00

CONTINUED FROM STEP B

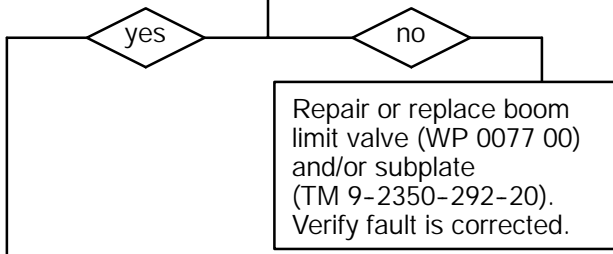
C Check the boom pilot pressure reducing valve PR1 for damage and restrictions.

Is boom pilot pressure reducing valve free of damage and restrictions?



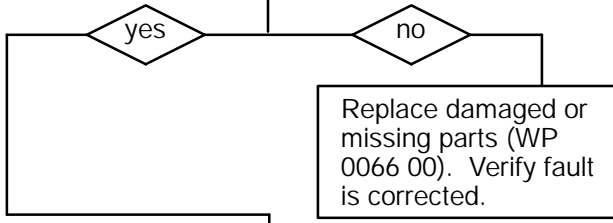
D 1. Remove engine deck grilles above right and left boom limit valves (TM 9-2350-292-20).
2. Check boom limit valves and subplates for damaged parts and restrictions.

Is boom limit valves and subplates free of damage and restrictions?

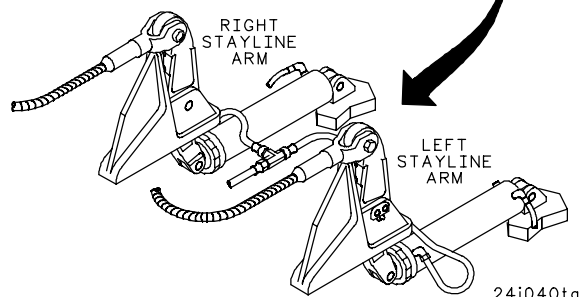
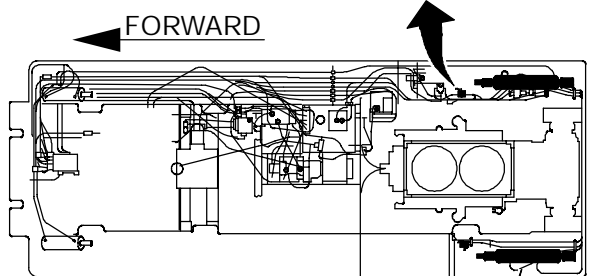
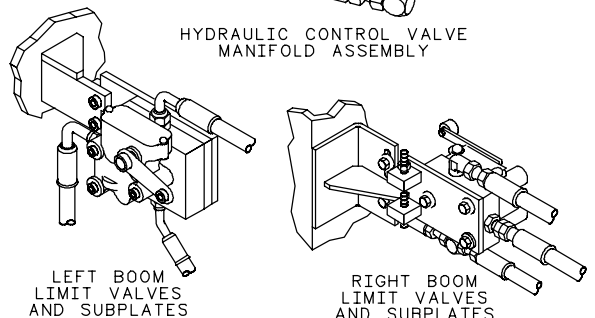
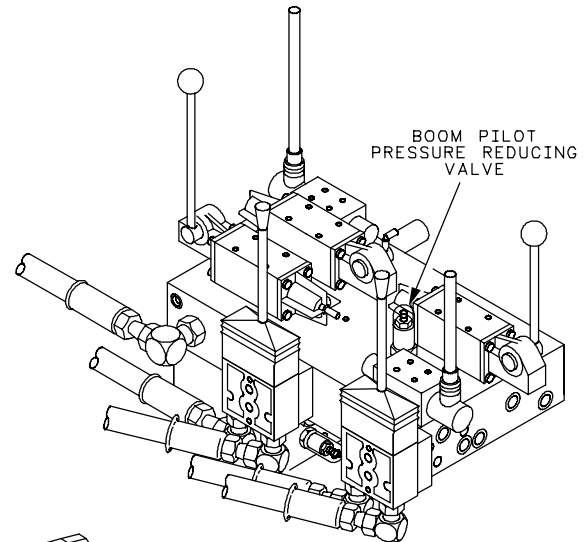


E Check stayline arms, pivot pins and cylinder mounting pins for damaged or missing parts.

Are arms, pivot pins, and mounting pins free of damaged or missing parts?



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24i040ta

HOIST BOOM LIVE OPERATION DOES NOT FUNCTION (HOIST BOOM WILL NOT STOP AUTOMATICALLY, STAYLINE CABLES GO SLACK DURING OPERATION OR HOIST BOOM CAN BE STOWED WITHOUT ACTIVATING THE HOIST BOOM SAFETY VALVE CONTROL LEVER) - CONTINUED 0029 00

CONTINUED FROM STEP E

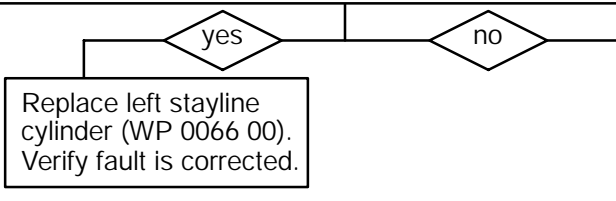
F




WARNING

1. If boom failed during restriction, remove the plug from port 62 of left stayline cylinder and install 0-4000 psi testing gauge assembly in port.
2. Start main engine, energize hydraulic system and set engine speed to 1800 rpm (TM 9-2350-292-10).
3. Place boom control handle in retract position and hold for one minute.
4. Return control handle to hold position and observe gauge for one minute.
5. Shut down hydraulic system and main engine (TM 9-2350-292-10).

Does pressure on gauge decrease in one minute?



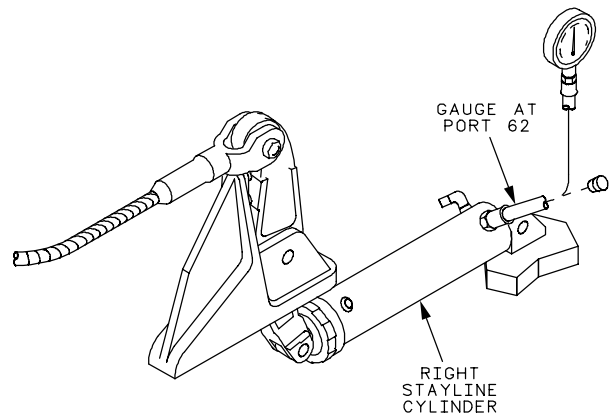
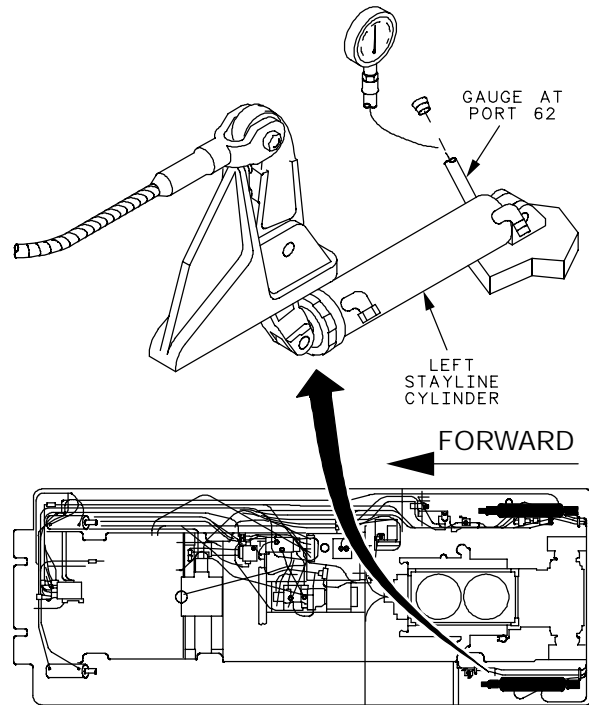
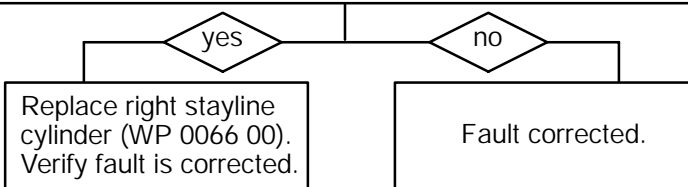
G



WARNING

1. Remove gauge from port 62 and install plug in port.
2. Remove plug from port 62 of right stayline cylinder and install 0-4000 psi testing gauge assembly in port.
3. Perform Step F, steps 2 through 5.

Does pressure on gauge decrease in one minute?



24i040tb

END OF TASK

HOIST WINCH FAILS TO OPERATE

0030 00

THIS WORK PACKAGE COVERS:

Hoist Winch Fails To Operate

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- 0-4000 psi testing gauge assembly (2) (item 43, WP 0090 00)
- 1/4-inch tee (2) (item 39, WP 0087 00)
- 1-inch flange plug (2) (item 66, WP 0090 00)
- 0-5000 psi dial pressure gauge (item 44, WP 0090 00)
- Safety goggles (item 48, WP 0087 00)

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Subfloor plates 10, 15, and 18 removed (TM 9-2350-292-20)

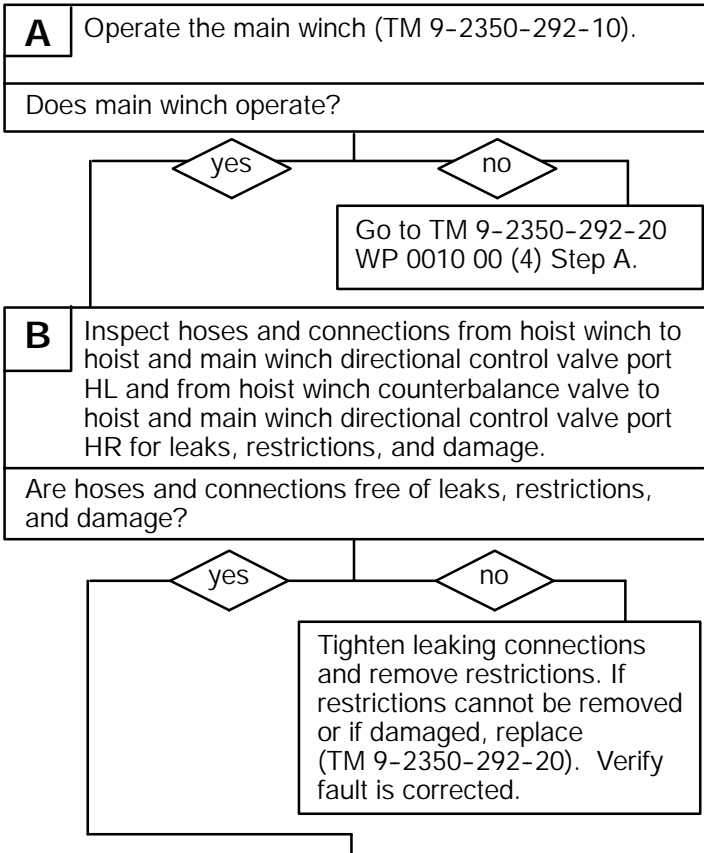
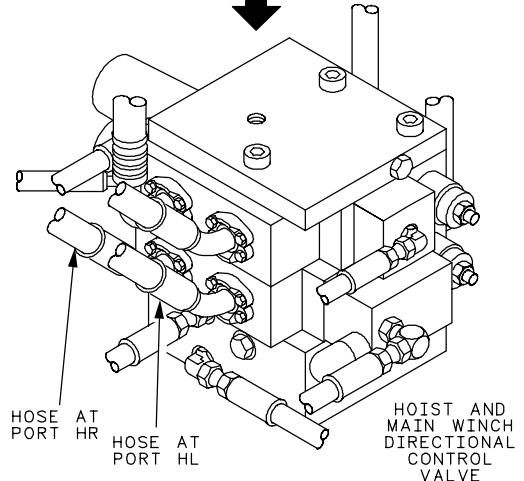
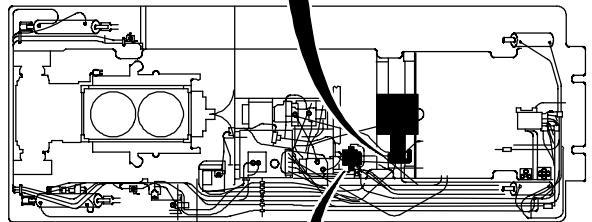
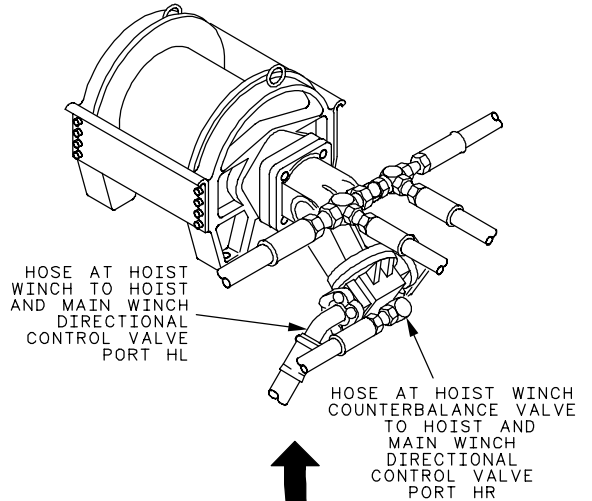
Personnel Required

Two

WARNING
Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



WARNING



CONTINUED ON NEXT PAGE

24i044t

HOIST WINCH FAILS TO OPERATE - CONTINUED

0030 00

CONTINUED FROM STEP B

C Is vehicle equipped with Enhanced Diagnostics System?

yes

no

Go to Step H.

D



WARNING

1. Install 0-4000 psi testing gauge assembly with 1/4 inch tee between hoist and main winch directional control valve port PHR and attaching hose.
2. Install 0-4000 psi testing gauge assembly with 1/4 inch tee between hoist and main winch directional control valve port PHL and attaching hose.
3. Start main engine, energize and set engine speed to 1800 rpm (TM 9-2350-292-10).
4. Place hoist control valve lever in the lower position and record pressures.
5. Place hoist control valve lever in the raise position and record pressures.
6. Shut down hydraulics and main engine (TM 9-2350-292-10).

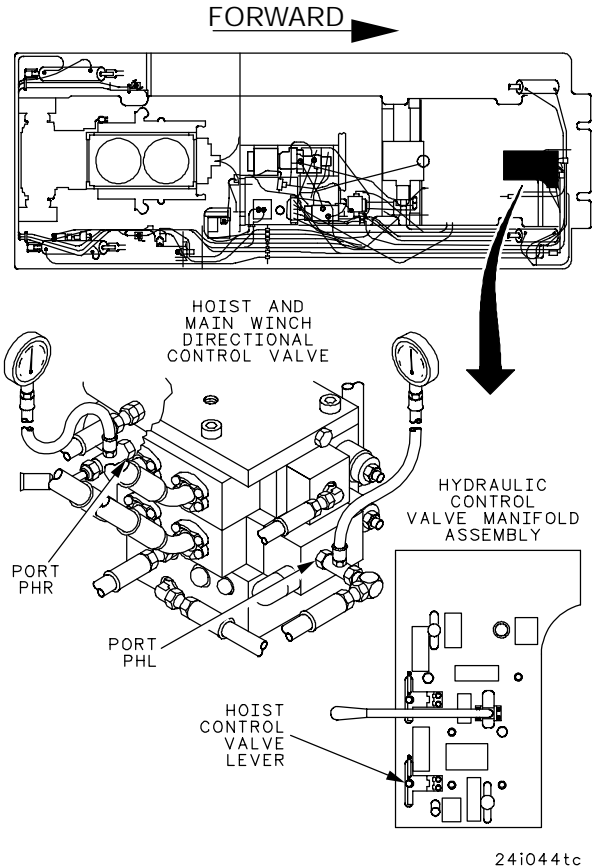
Is pressure at PHR port 385-470 psi and at PHL port less than 50 psi when in raise position, and is pressure at PHL port 385-470 psi and at PHR port less than 50 psi in lower position?

yes

no

Go to Step G.

CONTINUED ON NEXT PAGE






HOIST WINCH FAILS TO OPERATE - CONTINUED

0030 00

CONTINUED FROM STEP D

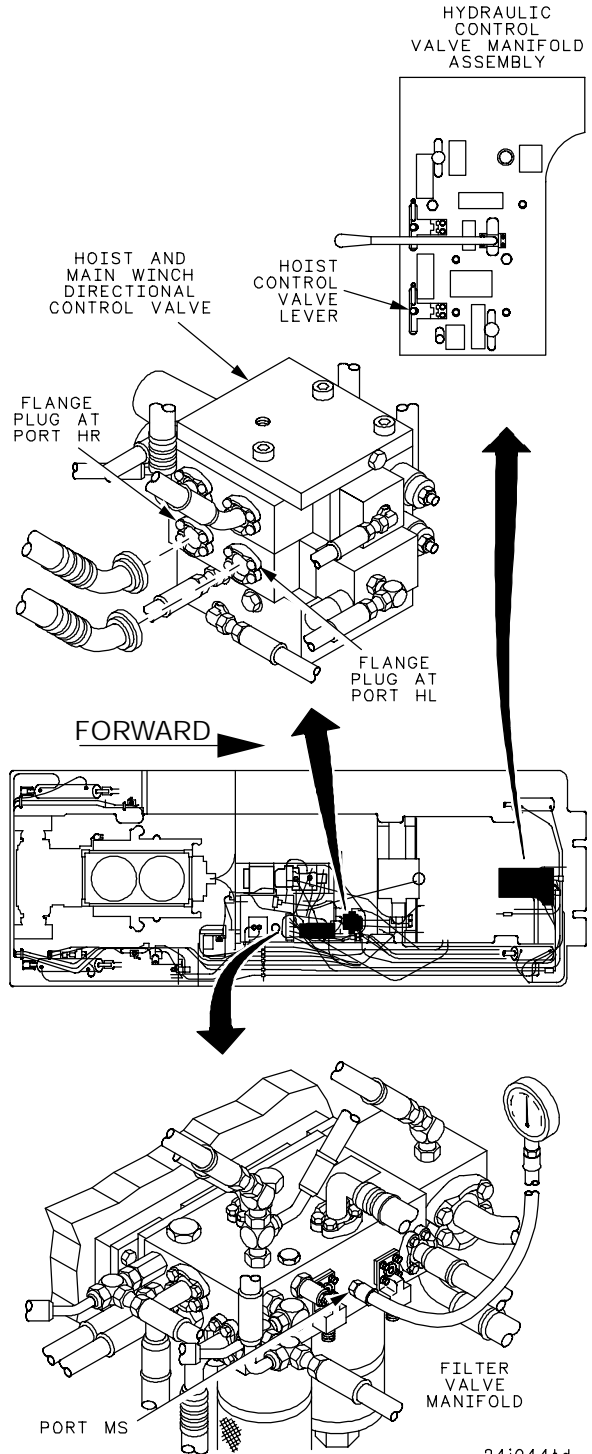
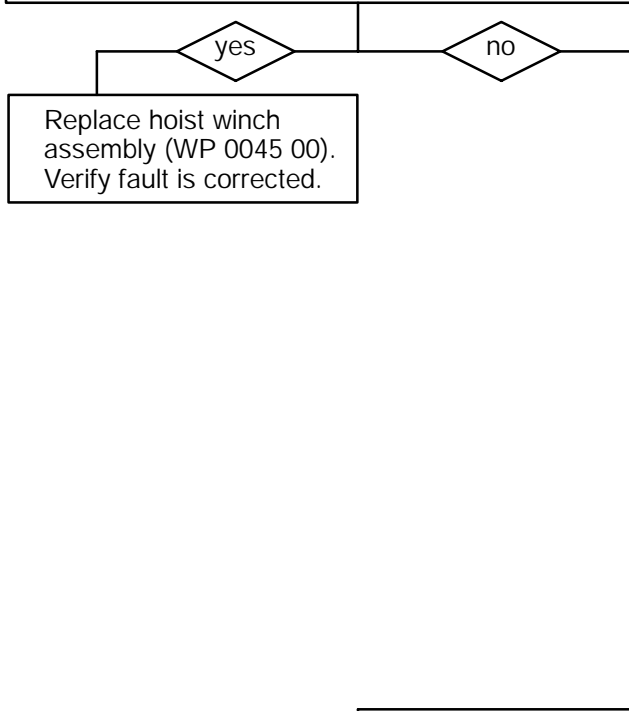
E

WARNING

1. Remove hoses from ports HL and HR of hoist main winch directional control valve and install flange plugs in ports and secure with hose split flanges.
2. Install 0-5000 psi dial pressure gauge in port MS of filter valve manifold.
3. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
4. Place hoist control valve lever in the raise position. Record pressure.
5. Place hoist control valve lever in the lower position. Record pressure.
6. Shut down hydraulics and main engine (TM 9-2350-292-10).

Are both pressures 3600-3700 psi?



CONTINUED ON NEXT PAGE

HOIST WINCH FAILS TO OPERATE - CONTINUED

0030 00

CONTINUED FROM STEP E and I

F Inspect the hoist and main winch directional control valve, the directional control valve shuttle valves, and the directional control valve LS port for loose and leaking connections.

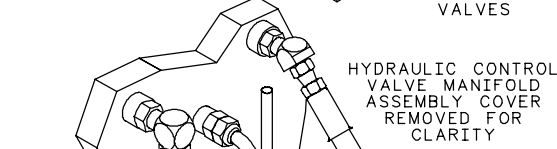
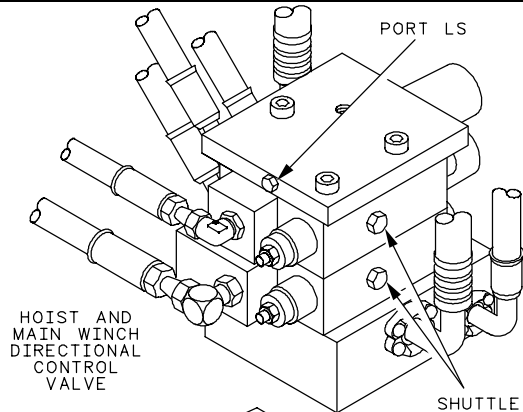
Is directional control valve, shuttle valves, and LS port free of loose and leaking connections?

yes

no

Replace hoist winch directional control valve (WP 0072 00). Verify fault is corrected.

Tighten loose and leaking connections. If leaks cannot be stopped, replace hoist winch directional control valve (WP 0072 00). Verify fault is corrected.



CONTINUED FROM STEP D

G Inspect hoses and connections from operator's control valve manifold ports PHL and PHR to hoist and main winch directional control valve ports PHL and PHR for loose and leaking connections, restrictions, and damage.

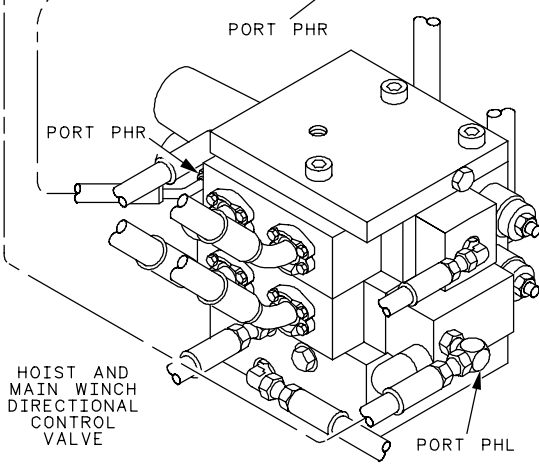
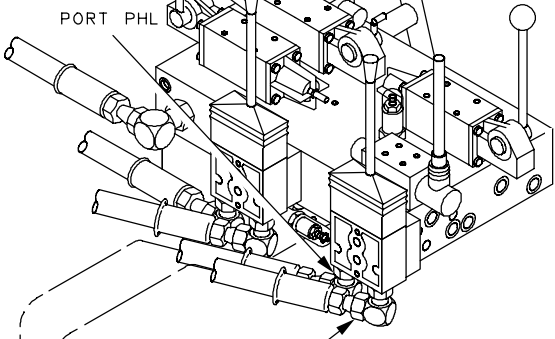
Are both hoses free of loose and leaking connections, restrictions, and damage?

yes

no

Replace hoist winch pilot valve on hydraulic control valve manifold assembly (WP 0074 00). Verify fault is corrected.

Tighten leaking connections and remove restrictions. If restrictions cannot be removed or if damaged, replace (TM 9-2350-292-20). Verify fault is corrected.



CONTINUED ON NEXT PAGE

24i044tb

HOIST WINCH FAILS TO OPERATE - CONTINUED

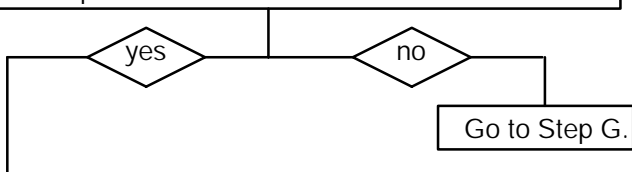
0030 00

CONTINUED FROM STEP D

H

1. Start Enhanced Diagnostics Program (WP 0010 00) and select symptom #5.
2. Start main engine, energize and set engine speed to 1800 rpm (TM 9-2350-292-10).
3. Place hoist control valve lever in the lower position and record pressures at hoist and main winch directional control valve port PHL and hoist and main winch directional control valve port PHR.
4. Place hoist control valve lever in the raise position and record pressures again.
5. Shut down hydraulics and main engine (TM 9-2350-292-10).

Is pressure at PHR port 385-470 psi and at PHL port less than 50 psi when in raise position, and is pressure at PHL port 385-470 psi and at PHR port less than 50 psi in lower position?

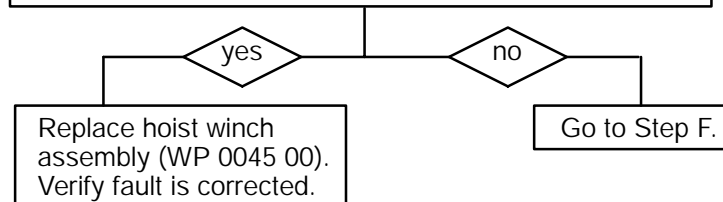


I

WARNING

1. Remove hoses from ports HL and HR of hoist main winch directional control valve and install flange plugs in ports and secure with hose split flanges.
2. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
3. Place hoist control valve lever in the raise position. Record pressure at port MS of filter valve manifold.
4. Place hoist control valve lever in the lower position. Record pressure again.
5. Shut down hydraulics and main engine (TM 9-2350-292-10).

Are both pressure readings 3600-3700 psi?



END OF TASK

HOIST WINCH WILL RAISE BUT WILL NOT LOWER

0031 00

THIS WORK PACKAGE COVERS:

Hoist Winch Will Raise But Will Not Lower

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- 0-5000 psi dial pressure gauge (item 44, WP 0090 00)*
- 0-4000 psi testing gauge assembly (2) (item 43, WP 0090 00)**
- 1/4-inch tee (2) (item 39, WP 0089 00)
- 1-inch flange plug (2) (item 66, WP 0090 00)
- Safety goggles (item 48, WP 0087 00)
- *Not required if vehicle is equipped with Enhanced Diagnostics System

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Hydraulic control valve manifold assembly shields removed (TM 9-2350-292-20)
- Subfloor plates 10, 15, 18, and 22 removed (TM 9-2350-292-20)

Personnel Required

- Two
- ** Only one is required if vehicle is equipped with Enhanced Diagnostics System

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



WARNING

A Is vehicle equipped with Enhanced Diagnostics System?

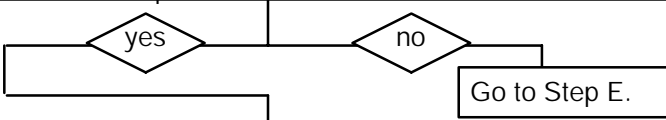


B

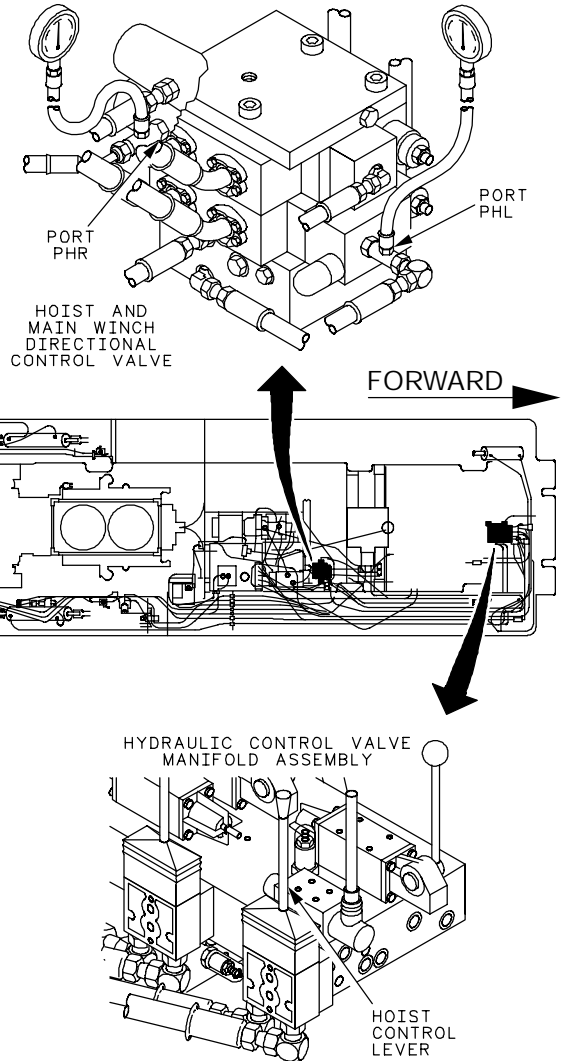
WARNING

1. Install a 0-4000 psi testing gauge assembly with 1/4-inch tee between hoist and main winch directional control valve port PHR and attaching hose.
2. Install a 0-4000 psi testing gauge assembly with 1/4-inch tee between hoist and main winch directional control valve port PHL and attaching hose.
3. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10).
4. Raise the boom and place hoist control lever in lower position. Record gauge pressures.
5. Shut down hydraulics and main engine (TM 9-2350-292-10).

Is pressure at port PHL 385-470 psi and is pressure at port PHR less than 50 psi?



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24i045t

HOIST WINCH WILL RAISE BUT WILL NOT LOWER - CONTINUED

0031 00

CONTINUED FROM STEP B

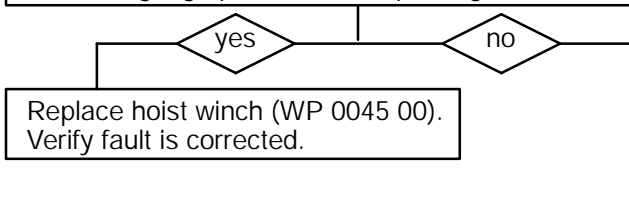
C



WARNING

1. Remove 0-4000 psi testing gauge assembly with tee from port PHR and install gauge in hoist motor outlet manifold test port hoses from ports HL and HR of hoist and main winch directional control valve.
2. Remove 0-4000 psi testing gauge assembly with tee from port PHL and install gauge and tee between hoist motor brake inlet hose and winch motor.
3. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
4. Place hoist control lever in lower position and record gauge pressures.
5. Shut down hydraulics and main engine (TM 9-2350-292-10).

Are both gauge pressures 550 psi or greater?



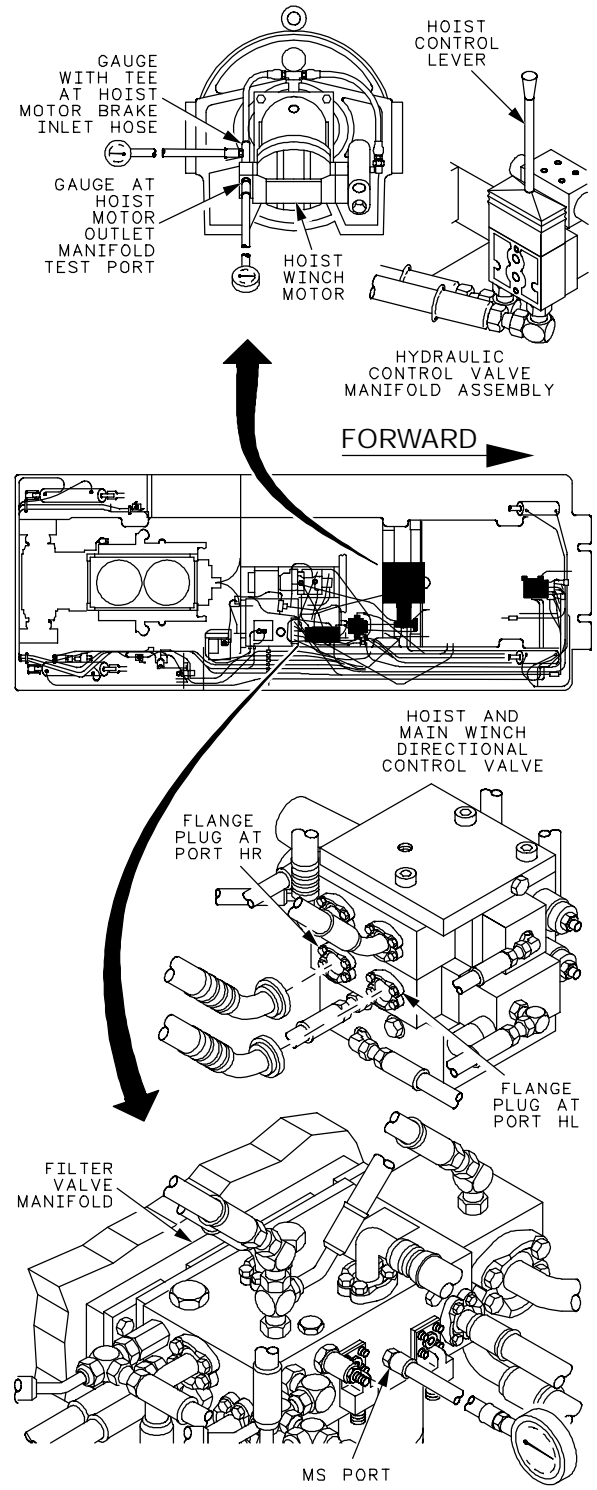
D



WARNING

1. Remove hoses from ports HL and HR of hoist and main winch directional control valve.
2. Install flange plugs into ports HL and HR and secure with hose split flanges.
3. Install 0-5000 psi dial pressure gauge in MS port of filter valve manifold.
4. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10).
5. Place hoist control lever in lower position and record gauge pressure.
6. Shut down hydraulics and main engine (TM 9-2350-292-10).

Is gauge pressure 3600-3700 psi?



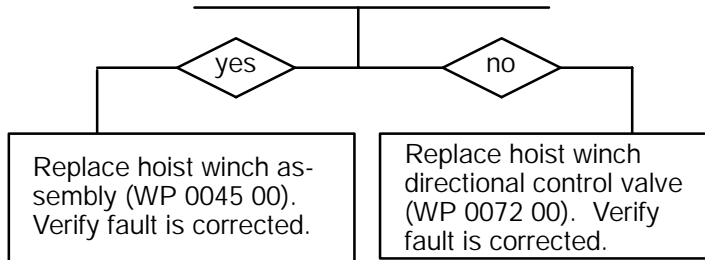
24i045tc

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HOIST WINCH WILL RAISE BUT WILL NOT LOWER - CONTINUED

0031 00

CONTINUED FROM STEP D



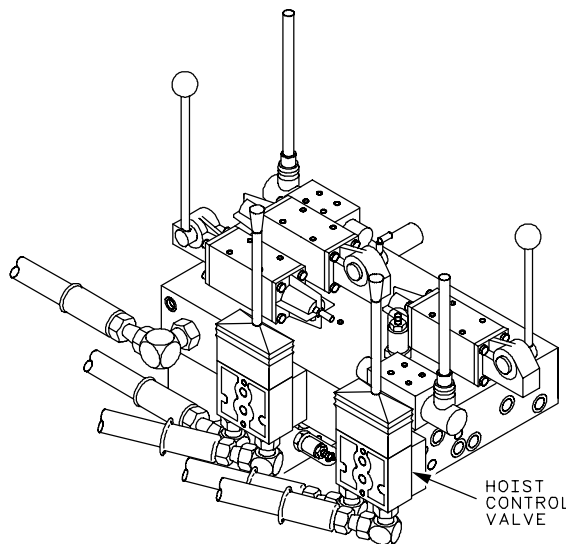
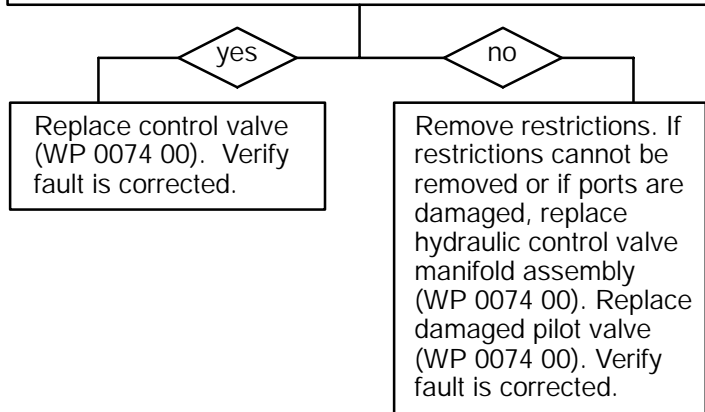
CONTINUED FROM STEP B and F

E

WARNING

Remove hoist control valve from hydraulic control valve manifold assembly and inspect valve and valve's pressure and return ports for restrictions and damage.

Are pilot ports and control valve free of restrictions and damage?



HYDRAULIC CONTROL VALVE MANIFOLD ASSEMBLY

24i045tb

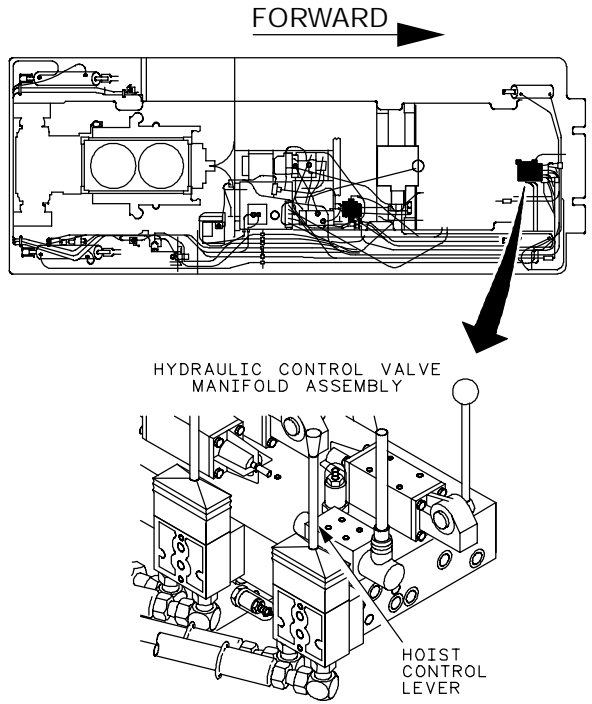
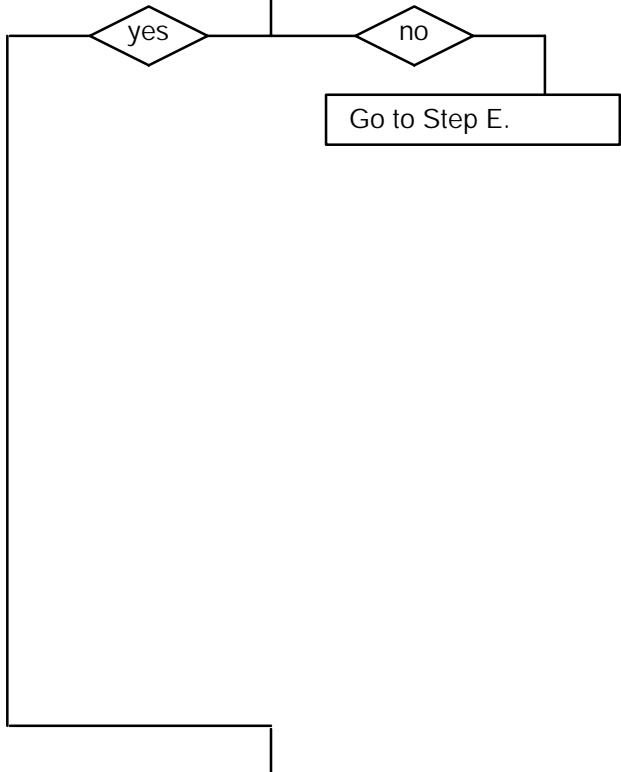
CONTINUED ON NEXT PAGE

HOIST WINCH WILL RAISE BUT WILL NOT LOWER- CONTNUED

0031 00

CONTINUED FROM STEP A

- F**
1. Start Enhanced Diagnostics Program (WP 0010 00) and select symptom #14.
 2. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10).
 3. Raise the boom and place hoist control lever in lower position. Record pressures at hoist and main winch directional control valve ports PHL and PHR.
 4. Shut down hydraulics and main engine (TM 9-2350-292-10).
- Is pressure at port PHL 385-470 psi and is pressure at port PHR less than 50 psi?



24i045td

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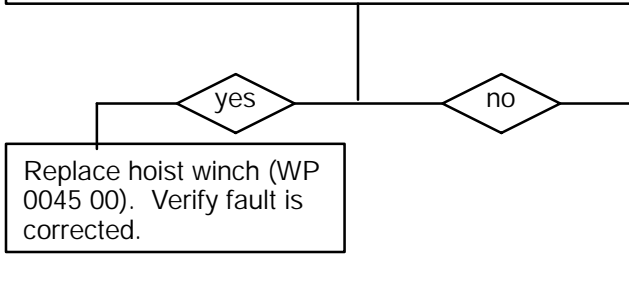
HOIST WINCH WILL RAISE BUT WILL NOT LOWER - CONTINUED

0031 00

CONTINUED FROM STEP B

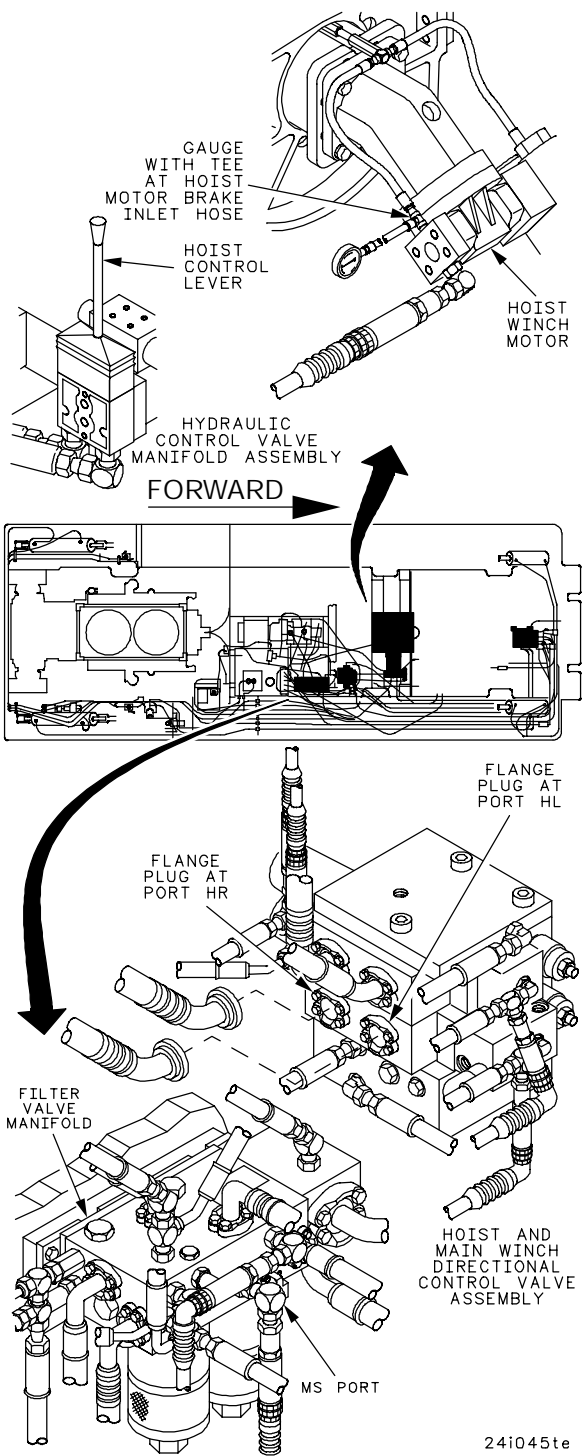
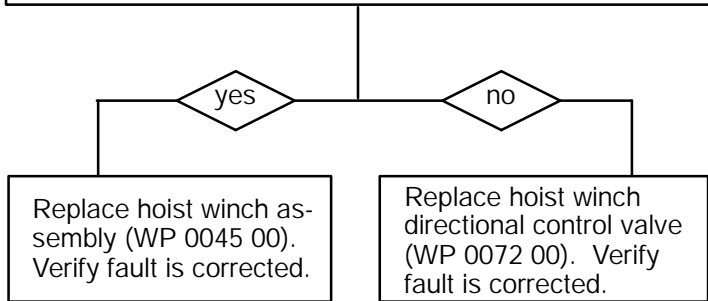
- G**
1. Install 0-4000 psi testing gauge assembly and 1/4" tee between hoist motor brake inlet hose and winch motor.
 2. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
 3. Place hoist control lever in lower position and record gauge pressure and pressure at hoist motor outlet manifold test port.
 4. Shut down hydraulics and main engine (TM 9-2350-292-10).

Are both pressure readings 550 psi or greater?



- H**
-
- WARNING**
1. Remove hoses from ports HL and HR of hoist and main winch directional control valve.
 2. Install flange plugs into ports HL and HR and secure with hose split flanges.
 3. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10).
 4. Place hoist control lever in lower position and record pressure at MS port of filter valve manifold.
 5. Shut down hydraulics and main engine (TM 9-2350-292-10).

Is gauge pressure 3600-3700 psi?



24i045te

END OF TASK

HOIST WINCH WILL LOWER BUT WILL NOT RAISE - CONTINUED

0032 00

THIS WORK PACKAGE COVERS:

Hoist Winch Will Lower But Will Not Raise

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- 0-5000 psi dial pressure gauge (item 44, WP 0090 00)*
- 0-4000 psi testing gauge assembly (2) (item 43, WP 0090 00)*
- 1/4-inch tee (2) (item 39, WP 0087 00)*
- 1-inch flange plug (2) (item 66, WP 0090 00)
- Safety Goggles (item 48, WP 0087 00)

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Hydraulic control valve manifold assembly shields removed (TM 9-2350-292-20)
- Subfloor plates 18 and 22 removed (TM 9-2350-292-20)

Personnel Required

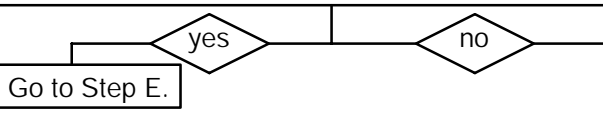
- Two
- * Not required if vehicle is equipped with Enhanced Diagnostics System

WARNING
Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



WARNING

A Is vehicle equipped with Enhanced Diagnostics System?

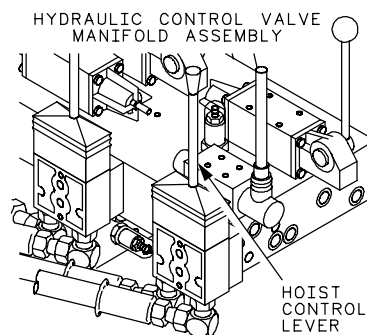
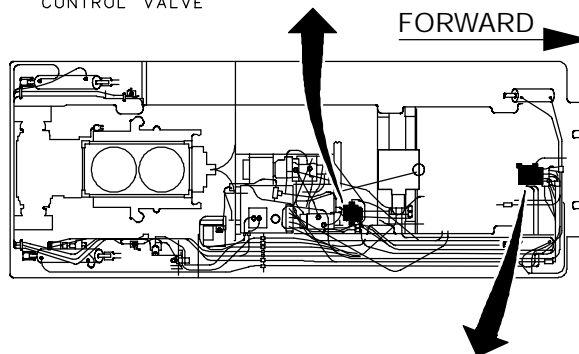
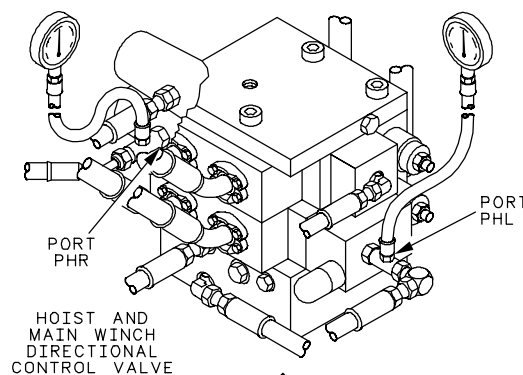


B



WARNING

1. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between hoist and main winch directional control valve port PHR and attaching hose.
2. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between hoist and main winch directional control valve port PHL and attaching hose.
3. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
4. Raise the boom and place hoist control lever in raise position. Record gauge pressures.
5. Shut down hydraulics and main engine (TM 9-2350-292-10).



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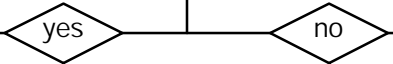
24i045t

HOIST WINCH WILL LOWER BUT WILL NOT RAISE - CONTINUED

0032 00

CONTINUED FROM STEP B

Is pressure at port PHR 385-470 psi and is pressure at port PHL less than 50 psi?



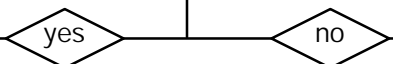
Go to Step D.

C

WARNING

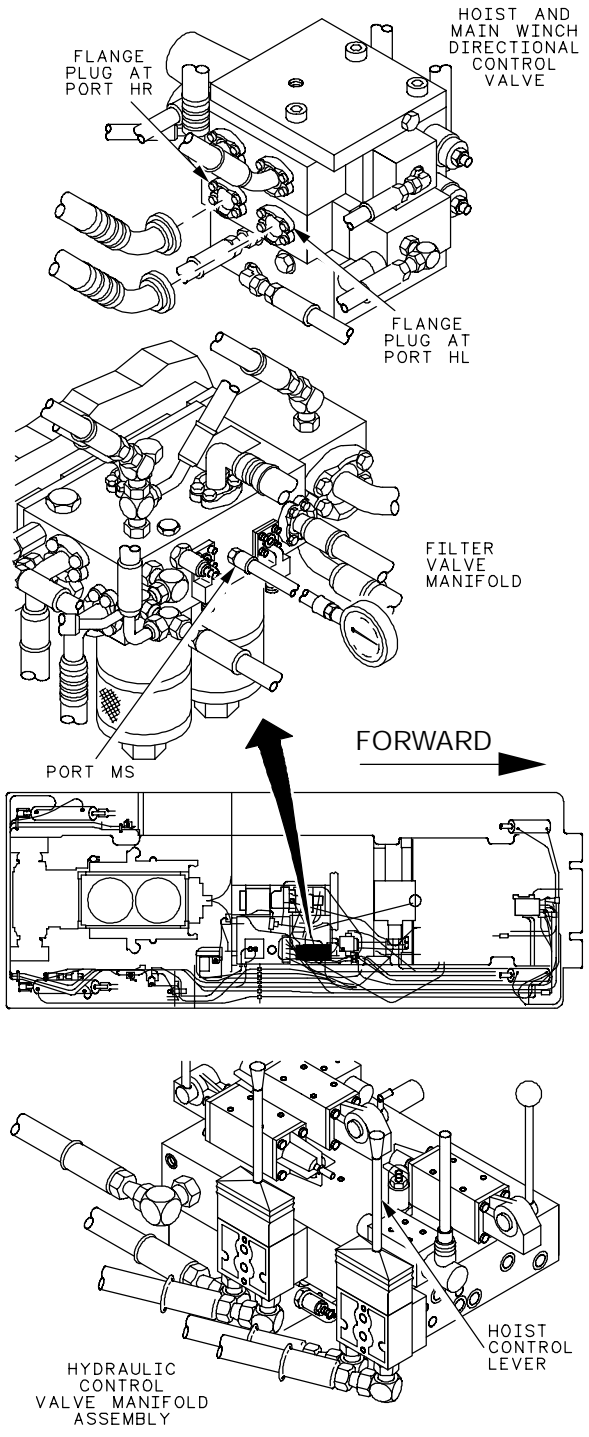
1. Remove hoses from ports HL and HR of hoist and main winch directional control valve.
2. Install flange plugs into ports HL and HR and secure with hose split flanges.
3. Install 0-5000 psi dial pressure gauge in MS port of filter valve manifold.
4. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10).
5. Place hoist control lever in raise position. Record gauge pressure.
6. Shut down hydraulics and main engine (TM 9-2350-292-10).

Is gauge pressure 3600-3700 psi?



Replace hoist winch assembly (WP 0045 00). Verify fault is corrected.

Replace hoist winch directional control valve (WP 0072 00). Verify fault is corrected.




24i046ta

CONTINUED ON NEXT PAGE

CONTINUED FROM STEP B

D



WARNING

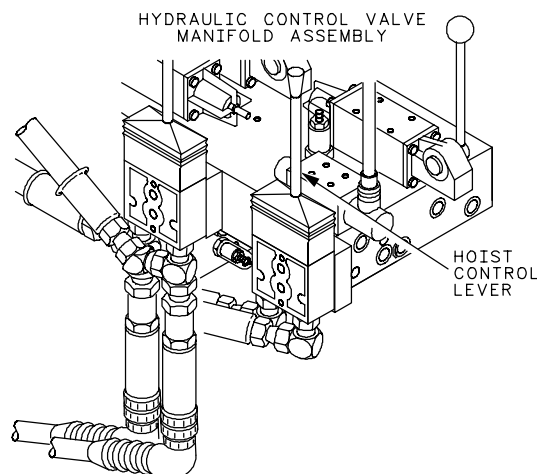
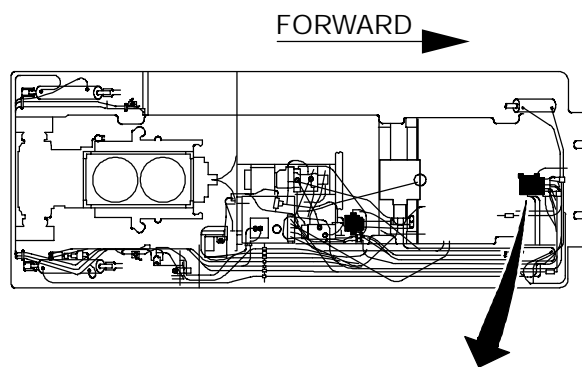
Remove hoist control valve from hydraulic control valve manifold assembly and inspect valve and valve's pressure and return ports for restrictions and damage.

Are pilot ports and pilot valve free of restrictions and damage?



Replace hoist control valve (WP 0074 00). Verify fault is corrected.

Remove restrictions. If restrictions cannot be removed or if ports are damaged, replace hydraulic control valve manifold assembly (WP 0074 00). Replace damaged pilot valve (WP 0074 00). Verify fault is corrected.



24i045tf

CONTINUED FROM STEP A

E

1. Start Enhanced Diagnostics Program (WP 0010 00) and select symptom #14.
2. Start main engine, energize hydraulics and set engine speed to 1800 rpm (TM 9-2350-292-10).
3. Raise the boom and place hoist control lever in raise position. Record pressures at hoist and main winch directional control valve ports PHL and PHR.
4. Shut down hydraulics and main engine (TM 9-2350-292-10).

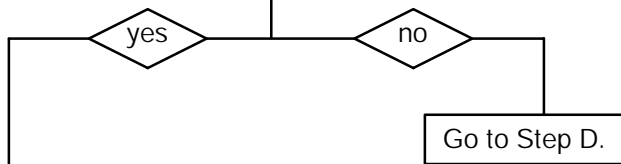
Is pressure at port PHR 385-470 psi and is pressure at port PHL less than 50 psi?

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HOIST WINCH WILL LOWER BUT WILL NOT RAISE - CONTINUED

0032 00

CONTINUED FROM STEP E

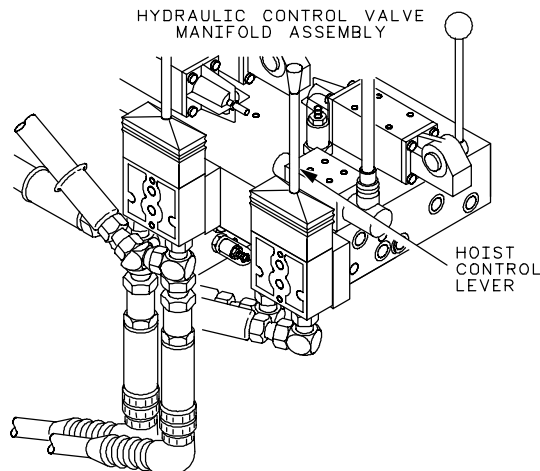
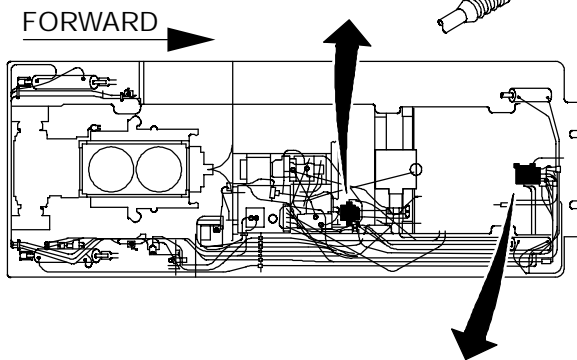
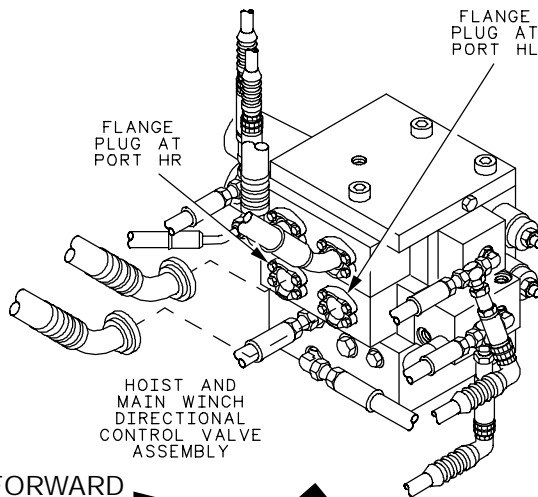
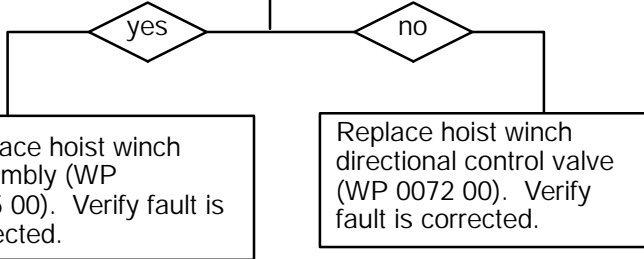


F

WARNING

1. Remove hoses from ports HL and HR of hoist and main winch directional control valve.
2. Install flange plugs into ports HL and HR and secure with hose split flanges.
3. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10).
4. Place hoist control lever in raise position. Record pressure at MS port of filter valve manifold.
5. Shut down hydraulics and main engine (TM 9-2350-292-10).

Is gauge pressure 3600-3700 psi?



24i046tb

END OF TASK

HOIST WINCH CREEPS WITH CONTROL IN NEUTRAL

0033 00

THIS WORK PACKAGE COVERS:

Hoist Winch Creeps With Control In Neutral

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- 0-300 psi dial pressure gauge (item 42, WP 0090 00)
- 0-5000 psi dial pressure gauge (item 44, WP 0090 00)*
- 0-4000 psi testing gauge assembly (2) (item 43, WP 0090 00)*
- 1/4-inch tee (2) (item 39, WP 0087 00)*
- Safety Goggles (item 48, WP 0087 00)

Equipment Conditions

- Vehicle MASTER switch OFF (TM 9-2350-292-10)
- Subfloor plates 15, 18, and 22 removed (TM 9-2350-292-20)

Personnel Required

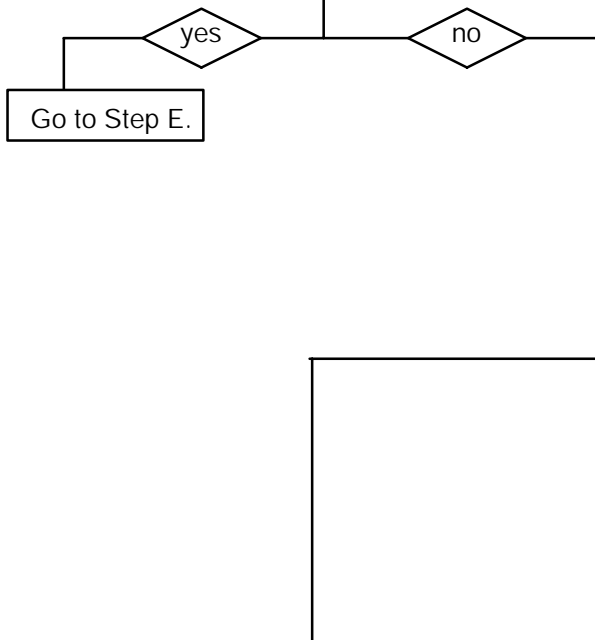
- Two
- * Not required if vehicle is equipped with Enhanced Diagnostics System

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



A Is vehicle equipped with Enhanced Diagnostics System?




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HOIST WINCH CREEPS WITH CONTROL IN NEUTRAL - CONTINUED

0033 00

CONTINUED FROM STEP A

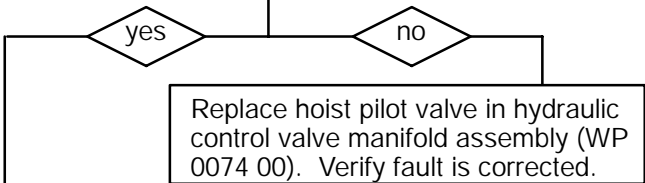
B




WARNING

1. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between hoist and main winch directional control valve port PHR and attaching hose.
2. Install 0-4000 psi testing gauge assembly with 1/4-inch tee between hoist and main winch directional control valve port PHL and attaching hose.
3. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10). Observe gauges.
4. Shut down hydraulics and main engine (TM 9-2350-292-10).

Are pressures at both ports less than 50 psi?



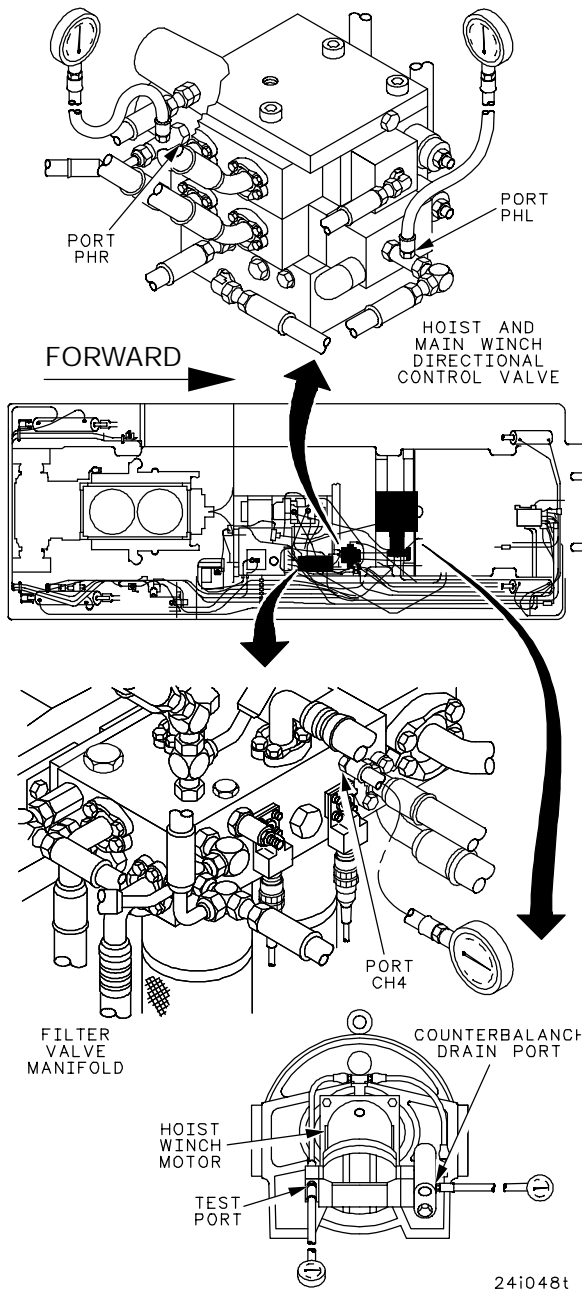
C



WARNING

1. Install 0-300 psi dial pressure gauge in port CH4 of filter valve manifold.
2. Install 0-5000 dial pressure gauge in hoist winch motor outlet manifold test port.
3. Install 0-5000 psi dial pressure gauge in hoist winch motor counterbalance drain port.
4. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10). Record gauge readings.
5. Shut down hydraulics and main engine (TM 9-2350-292-10).

Do all pressure gauges read 140 psi or less?

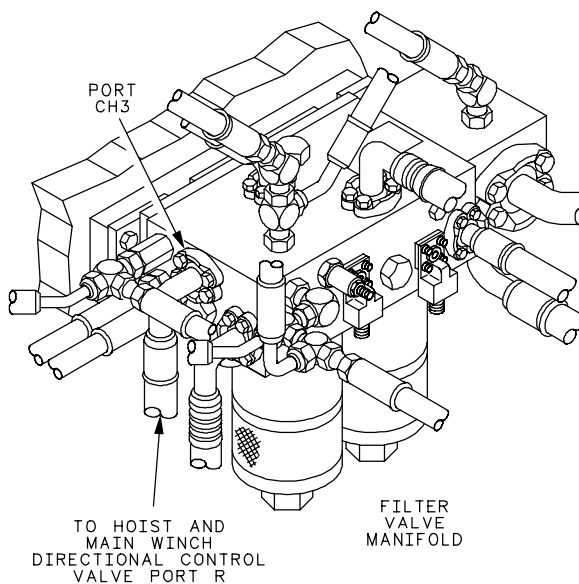
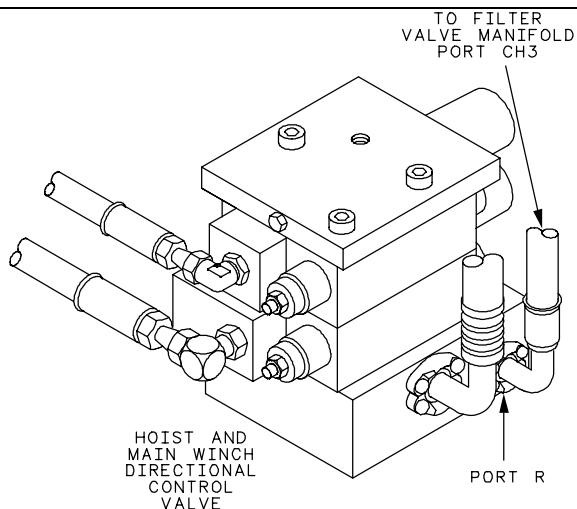
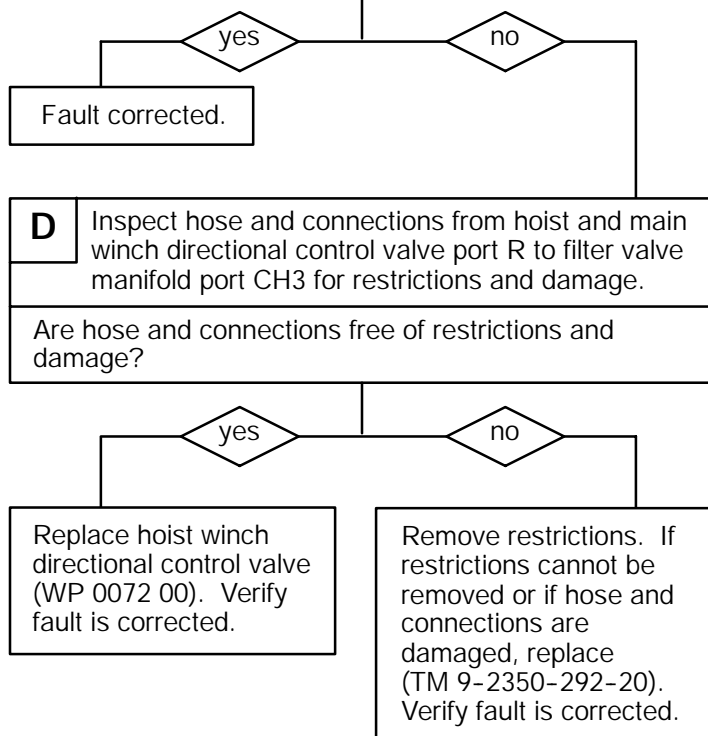


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HOIST WINCH CREEPS WITH CONTROL IN NEUTRAL - CONTINUED

0033 00

CONTINUED FROM STEP C and F



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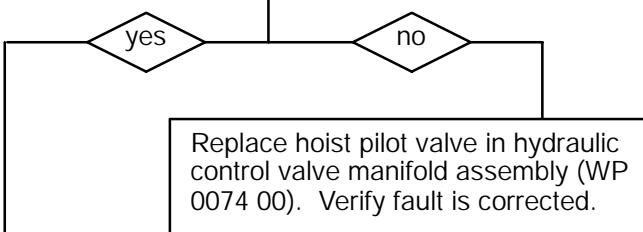
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HOIST WINCH CREEPS WITH CONTROL IN NEUTRAL - CONTINUED

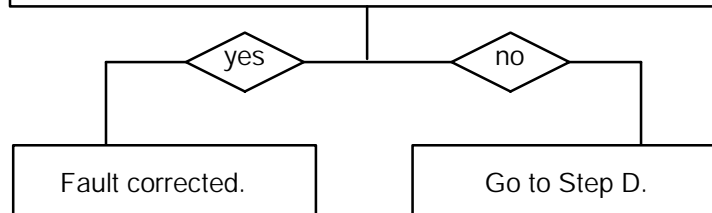
0033 00

CONTINUED FROM STEP A

E	<ol style="list-style-type: none"> 1. Start Enhanced Diagnostics Program (WP 0010 00) and select symptom #15. 2. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10). Record pressures at hoist and main winch directional control valve ports PHL and PHR. 3. Shut down hydraulics and main engine (TM 9-2350-292-10).
<p>Are pressures at both ports less than 50 psi?</p>	



F	<ol style="list-style-type: none"> 1. Start main engine, energize hydraulics, and set engine speed to 1800 rpm (TM 9-2350-292-10). Record pressures at hoist winch motor counterbalance drain port, hoist winch motor test port, and filter valve manifold port CH4. 2. Shut down hydraulics and main engine (TM 9-2350-292-10).
<p>Do all pressures read 140 psi or less?</p>	



END OF TASK

AUXILIARY HYDRUALICS SYSTEM FAILS TO OPERATE OR DOES NOT DEVELOP SUFFICIENT PRESSURE

0034 00**THIS WORK PACKAGE COVERS:**Auxiliary Hydraulics System Fails to Operate or Does Not Develop Sufficient Pressure

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
0-4000 psi testing gauge assembly (2) (item 43, WP 0090 00)
1/2-inch plug (4) (item 36, WP 0087 00)
APU ground hop kit (item 41, WP 0090 00)
1/2-inch dust protective caps (4) (item 42, WP 0087 00)
Safety goggles (item 48, WP 0087 00)

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-292-10)
Hydraulic control valve manifold assembly shields removed (TM 9-2350-292-20)

Personnel RequiredTwo

WARNING
 Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



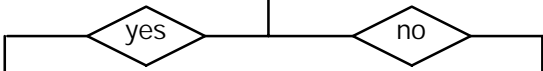
WARNING

A

WARNING

1. Disconnect hoses from operator's control valve manifold ports AUX and FT and plug hoses and cap ports.
2. Install 0-4000 psi testing gauge assembly in APU test port on hydraulic control valve manifold assembly.
3. Start APU (TM 9-2350-292-10).
4. Place the system selector valve in the AUX position and record pressure on gauge.
5. Shift system selector valve to the FT position and record pressure on gauge.
6. Shut down APU (TM 9-2350-292-10).

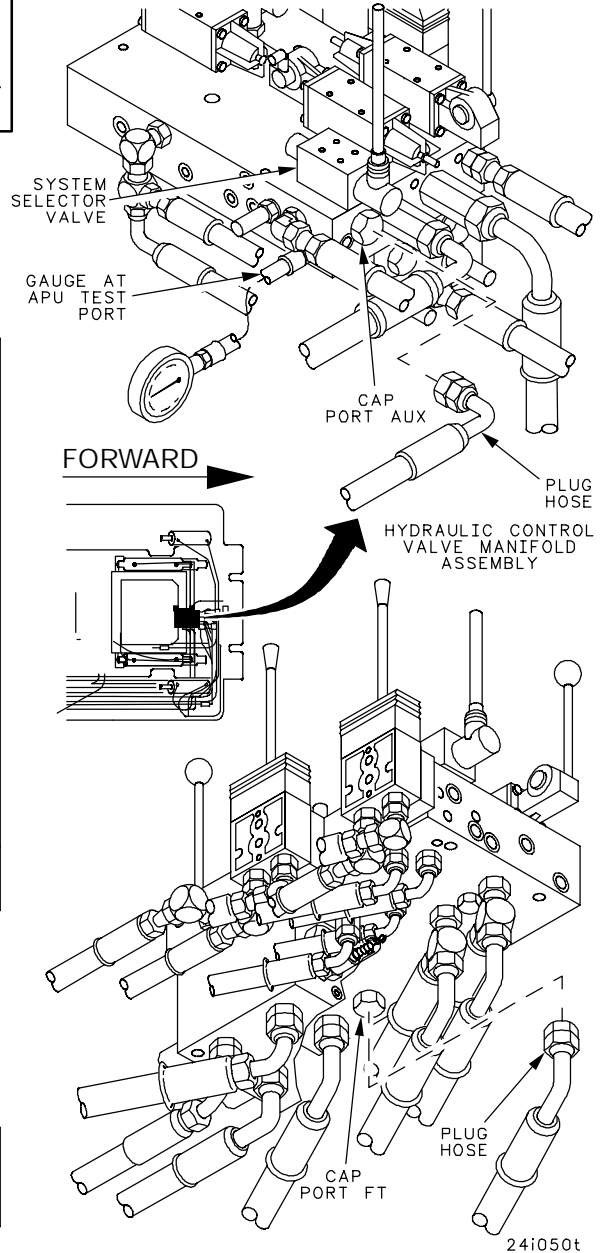
Were both pressure readings greater than 0 but less than 1650 psi?



Replace pressure regulator valve (WP 0074 00). Verify fault is corrected.

Is pressure at one position 1650-1750 psi and at other position greater than 0 but less than 1650 psi?

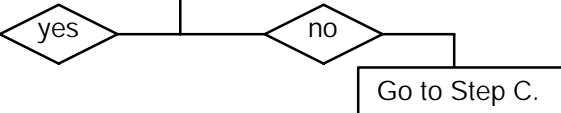
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AUXILIARY HYDRAULICS SYSTEM FAILS TO OPERATE OR DOES NOT DEVELOP SUFFICIENT PRESSURE - CONTINUED

0034 00

CONTINUED FROM STEP A

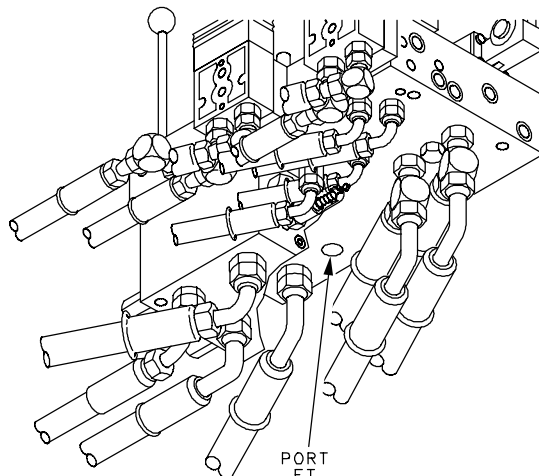


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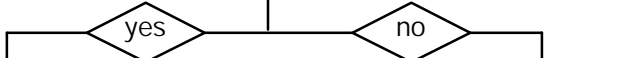
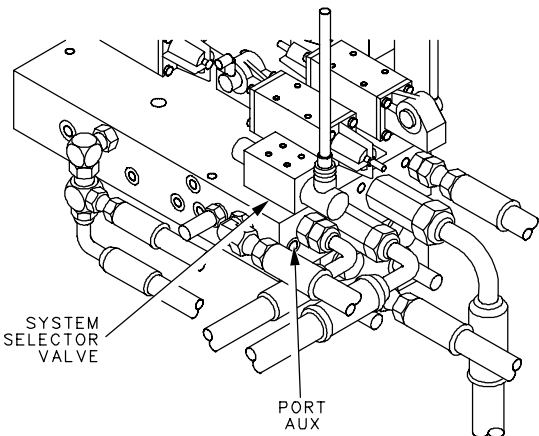
WARNING

1. Remove fittings from hydraulic control valve manifold assembly ports FT and AUX.
2. Remove system selector valve.
3. Inspect the ports of the hydraulic control valve manifold assembly and the system selector valve for obstructions and damage.

Are hydraulic control valve manifold assembly and system selector valve ports free of obstructions and damage?



HYDRAULIC CONTROL VALVE MANIFOLD ASSEMBLY



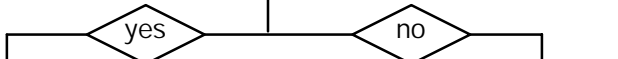
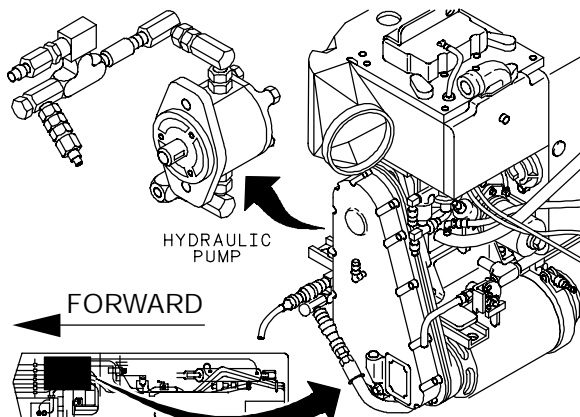
Remove obstructions. If obstructions can not be removed or if ports are damaged, replace hydraulic control valve manifold assembly (WP 0074 00) and/or system selector valve (WP 0074 00). Verify fault is corrected.

CONTINUED FROM STEP A

C

1. Remove the APU (TM 9-2350-292-20).
2. Remove APU hydraulic pump (TM 9-2350-292-20).
3. Inspect hydraulic pump for damage.

Is hydraulic pump free of damage?



Replace hydraulic pump (TM 9-2350-292-20). Verify fault is corrected.

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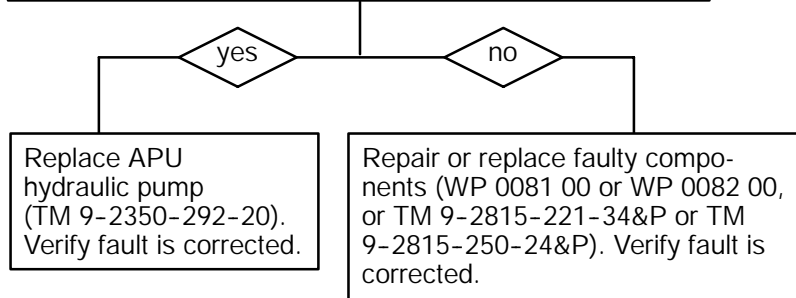
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AUXILIARY HYDRAULICS SYSTEM FAILS TO OPERATE OR DOES NOT DEVELOP SUFFICIENT PRESSURE - CONTINUED

0034 00

CONTINUED FROM STEP C

D	<ol style="list-style-type: none"> 1. Connect APU ground hop kit to APU (TM 9-2350-292-20). 2. Start the APU (TM 9-2350-292-10). 3. Carefully watch all APU drive components. 4. Shut down APU (TM 9-2350-292-10).
Do all APU drive components operate properly?	



END OF TASK

CHAPTER 3

GENERAL MAINTENANCE INSTRUCTIONS

GENERAL MAINTENANCE INSTRUCTIONS

0035 00**THIS WORK PACKAGE COVERS:**General Maintenance Instructions

GENERAL MAINTENANCE INSTRUCTIONS

This work package provides general maintenance instructions and basic guidance for performing required maintenance functions. References are also provided for maintenance-related procedures not within the scope of this manual.

DISASSEMBLY AND ASSEMBLY PROCEDURES

Complete disassembly of a component is not always necessary to make a required repair or replacement. Good judgment should be used to keep disassembly operations to a minimum.

In disassembling a unit, first follow basic inspection procedures, then remove only necessary components and sub-assemblies. These components may then be reduced, as necessary, into individual parts.

During disassembly, tag critical parts such as shims, bearings and electrical harnesses and leads, to facilitate reassembly. This is especially important for electrical equipment if circuit number tags are illegible or missing.

CAUTION

Never scribe-mark bearing surfaces.

Mark gears on mating teeth by scribe marks, or with dye, indelible ink or paint to be certain of correct positioning at assembly. The use of chalk or crayon for marking should be avoided because of lack of permanence.

During assembly, subassemblies should be assembled first, combined into major components where possible and then installed to form a complete component.

Records to provide repair and replacement data and statistics should be carefully prepared and maintained according to DA PAM 738-750.

REPLACEMENT OF PARTS

Unserviceable and unrepairable assemblies will be broken down into items of issue and serviceable parts will be returned to stock. Parts or assemblies which cannot be repaired or reconditioned will be salvaged and new parts will be used to replace them.

When assembling components and assemblies, replace damaged keys with new ones. If screws, washers or nuts are damaged, they must be replaced.

Gaskets, packings, preformed packings, seals, lockwashers, locknuts, self-locking nuts, self-locking screws, cotter pins and spring pins must be replaced. Bushings must be replaced only if removed.

Springs must be replaced if broken, kinked, cracked or do not conform to standards specified in the repair data.

If a required part is not available, reconditioning of the old part is necessary. Such parts should be inspected carefully after reconditioning to determine their suitability and probable service life. Replacement parts should be requisitioned immediately.

BALL AND ROLLER BEARINGS

Refer to TM 9-214, "Inspection and Care of Bearings," for cleaning, inspection and lubrication of bearings and instructions for evaluation of bearing life.

GENERAL MAINTENANCE INSTRUCTIONS - CONTINUED**0035 00****REMOVING BURRS, SCRATCHES AND RAISED METAL****WARNING**

Use a fine mill file, soft stone or abrasive cloth (item 18, WP 0087 00) dipped in dry-cleaning solvent (item 1, WP 0087 00) to remove burrs, scratches or raised metal.

SCREW THREAD INSERTS (ONE PIECE TYPE)

When determined feasible by inspection, damaged threads should be repaired by rethreading, use of thread restorer, tap die or by "chasing" on lathe.

Tapping holes for screw thread inserts that have mutilated threads may be repaired by drilling and tapping hole oversize and installing larger inserts or by filling tapped hole by welding, redrilling and tapping hole to original size.

Refer to Table 1 for drill size and depth.

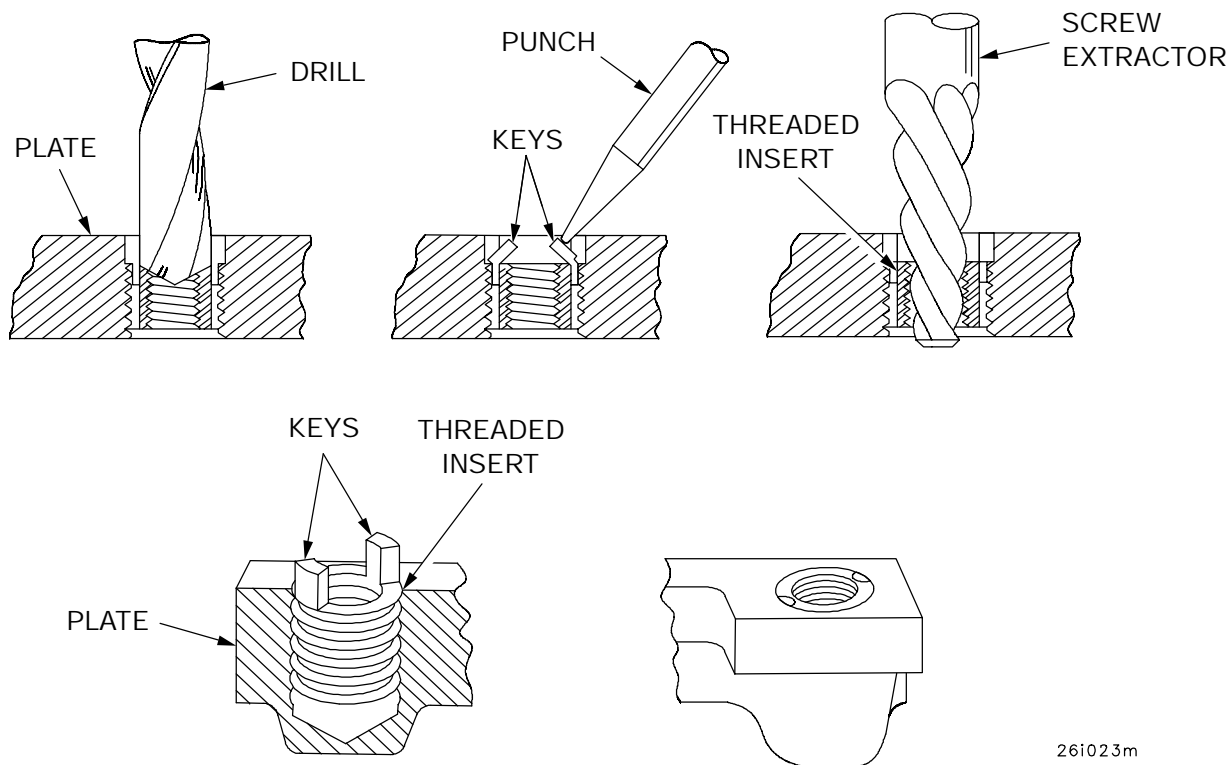
Table 1 Thread Inserts: Drill Size And Depth

THREAD INSERT				REMOVAL DRILL	
INTERNAL THREADS	EXTERNAL THREADS	TAP DRILL DIAMETER	COUNTERSINK DIAMETER	DIAMETER	DRILLING DEPTH
10-24 10/32	3/8-16	Q (0.332)	25/64	9/32	1/4
1/4-20 1/4-28	7/16-14	X (0.397)	29/64	11/32	1/4
5/16-18 5/16-24	1/2-13	29/64	33/64	13/32	1/4
3/8-16 3/8-24	9/16-12	33/64	37/64	15/32	1/4
7/16-14 7/16-20	5/8-11	37/64	41/64	17/32	1/4
1/2-13 1/2-20	11/16-11	41/64	45/64	19/32	1/4

GENERAL MAINTENANCE INSTRUCTIONS - CONTINUED**0035 00****SCREW THREAD INSERTS (ONE PIECE TYPE) - CONTINUED**

Use the following procedure to remove and install screw thread inserts:

1. Drill thread insert. Refer to Table 1 for drill size and depth.
2. Deflect keys inward and break off.
3. Remove remainder of thread insert with a screw extractor.
4. Install screw thread insert until 0.010 to 0.030 in. (0.25 to 0.76 mm) below surface of plate.
5. Drive keys flush in with plate.



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REMOVAL AND INSTALLATION OF SELF-LOCKING STUDS**Removal of Self-Locking Studs**

Position stud remover/setter over stud to be replaced. Remove and discard stud.

Installation of Self-Locking Studs

Install new stud and tighten with remover/setter.

WELDING

For welding instructions and welding materials, refer to TC 9-237.

ELECTRICAL TEST EQUIPMENT AND ELECTRICAL TESTING

To use electrical test equipment, refer to TM 9-2350-292-20.

SHAFTS, GEARS AND BEARINGS

Gears, bearings, sleeves and other components may be installed on shafts as tight fits. The use of arbor press, gear pullers or other appropriate tools for removal and installation may be required.

GENERAL MAINTENANCE INSTRUCTIONS - CONTINUED

0035 00**CLEANING**

Procedures for cleaning are the same for a great percentage of parts and components. Refer to TM 9-247 for instructions on cleaning and necessary cleaning materials. Refer to this TM and TM 9-2350-292-20 for specific areas to be cleaned.

Clean all parts before inspection, after repair and before assembly.

Hands should be kept free of grease which can collect dust and dirt.

After cleaning, all parts should be covered to protect them from dust and dirt.

PAINTING

Refer to TM 43-0139 and TB 43-0147 for information on painting.

LUBRICATION

Refer to TM 9-2350-292-20 for lubrication instructions.

END OF TASK

CHAPTER 4

POWERPACK

**REMOVAL AND INSTALLATION OF ENGINE AND TRANSMISSION AND
RELATED COMPONENTS**

0036 00

THIS WORK PACKAGE COVERS:Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)

Equipment Conditions

Powerpack removed (TM 9-2350-292-20)

Personnel Required

Two

ReferencesTM 9-2350-292-20

WARNING

Make sure powerpack is evenly balanced and stable on blocks or stand. Severe injury or equipment damage may result if powerpack falls from supporting device.

NOTE

These procedures are general in nature. Some steps may not be required to remove or replace a particular component.

Removal

1. Remove oil analysis system from transmission (TM 9-2350-292-20).
2. Remove required transmission and brake linkage (TM 9-2350-292-20).
3. Remove air intake elbows from left and right side of engine (TM 9-2350-292-20).
4. Remove engine mount (TM 9-2350-292-20).
5. Remove exhaust pipes from left and right side of engine (TM 9-2350-292-20).
6. Remove turbocharger and exhaust manifold covers (TM 9-2350-292-20).
7. Remove hydraulic oil coolers and related parts (TM 9-2350-292-20).
8. Remove transmission oil cooler lines, clamp and fittings from transmission (TM 9-2350-292-20).
9. Remove transmission oil temperature and pressure sending units (TM 9-2350-292-20).
10. Remove powerpack guide bracket from left and right side of transmission (TM 9-2350-292-20).
11. Remove powerpack electrical quick-disconnect bracket from transmission (TM 9-2350-292-20).
12. Remove air intake seal assemblies from top of engine (TM 9-2350-292-20).
13. Remove engine quick-disconnect fuel input and return hoses and adapters (TM 9-2350-292-20).
14. Inspect parts for damage and replace as required.
15. To separate transmission from engine, follow procedures of WP 0037 00.

**REMOVAL AND INSTALLATION OF ENGINE AND TRANSMISSION AND
RELATED COMPONENTS - CONTINUED**

0036 00

Installation**NOTE**

The following instructions will complete the engine assembly process performed in WP 0037 00. After following these procedures, the powerpack will be ready to install in the vehicle.

1. To join transmission and engine, follow procedures of WP 0037 00.
2. Install engine quick-disconnect fuel input and return hoses and adapters (TM 9-2350-292-20).
3. Install air intake seal assemblies on top of engine (TM 9-2350-292-20).
4. Install powerpack electrical quick-disconnect bracket on transmission (TM 9-2350-292-20).
5. Install powerpack guide brackets on left and right side of transmission (TM 9-2350-292-20).
6. Install transmission oil temperature and pressure sending units (TM 9-2350-292-20).

CAUTION

If transmission is being replaced flush the oil coolers, oil cooler lines and final drives to prevent contaminants and metal shavings damaging new transmission.

7. Install transmission oil cooler lines, clamp and fittings on transmission (TM 9-2350-292-20).
8. Install hydraulic oil coolers and related parts (TM 9-2350-292-20).
9. Install turbocharger and exhaust manifold covers (TM 9-2350-292-20).
10. Install exhaust pipes on left and right side of engine (TM 9-2350-292-20).
11. Install engine mount (TM 9-2350-292-20).
12. Install air intake elbows on left and right side of engine (TM 9-2350-292-20).
13. Install required transmission and brake linkage (TM 9-2350-292-20).
14. Install oil analysis system on transmission (TM 9-2350-292-20).
15. Fill engine or transmission with lubricant (TM 9-2350-292-20).
16. Perform engine ground hop check of transmission and engine prior to installation of powerpack (TM 9-2350-292-20).

NOTE**FOLLOW-ON MAINTENANCE:**

Install powerpack (TM 9-2350-292-20)

END OF TASK

REMOVAL AND INSTALLATION OF ENGINE AND TRANSMISSION AND RELATED COMPONENTS

0036 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)

Equipment Conditions

Powerpack removed (TM 9-2350-292-20)

Personnel Required

Two

ReferencesTM 9-2350-292-20

WARNING

Make sure powerpack is evenly balanced and stable on blocks or stand. Severe injury or equipment damage may result if powerpack falls from supporting device.

NOTE

These procedures are general in nature. Some steps may not be required to remove or replace a particular component.

Removal

1. Remove oil analysis system from transmission (TM 9-2350-292-20).
2. Remove required transmission and brake linkage (TM 9-2350-292-20).
3. Remove air intake elbows from left and right side of engine (TM 9-2350-292-20).
4. Remove engine mount (TM 9-2350-292-20).
5. Remove exhaust pipes from left and right side of engine (TM 9-2350-292-20).
6. Remove turbocharger and exhaust manifold covers (TM 9-2350-292-20).
7. Remove hydraulic oil coolers and related parts (TM 9-2350-292-20).
8. Remove transmission oil cooler lines, clamp and fittings from transmission (TM 9-2350-292-20).
9. Remove transmission oil temperature and pressure sending units (TM 9-2350-292-20).
10. Remove powerpack guide bracket from left and right side of transmission (TM 9-2350-292-20).
11. Remove powerpack electrical quick-disconnect bracket from transmission (TM 9-2350-292-20).
12. Remove air intake seal assemblies from top of engine (TM 9-2350-292-20).
13. Remove engine quick-disconnect fuel input and return hoses and adapters (TM 9-2350-292-20).
14. Inspect parts for damage and replace as required.
15. To separate transmission from engine, follow procedures of WP 0037 00.

**REMOVAL AND INSTALLATION OF ENGINE AND TRANSMISSION AND
RELATED COMPONENTS - CONTINUED**

0036 00

Installation**NOTE**

The following instructions will complete the engine assembly process performed in WP 0037 00. After following these procedures, the powerpack will be ready to install in the vehicle.

1. To join transmission and engine, follow procedures of WP 0037 00.
2. Install engine quick-disconnect fuel input and return hoses and adapters (TM 9-2350-292-20).
3. Install air intake seal assemblies on top of engine (TM 9-2350-292-20).
4. Install powerpack electrical quick-disconnect bracket on transmission (TM 9-2350-292-20).
5. Install powerpack guide brackets on left and right side of transmission (TM 9-2350-292-20).
6. Install transmission oil temperature and pressure sending units (TM 9-2350-292-20).

CAUTION

If transmission is being replaced flush the oil coolers, oil cooler lines and final drives to prevent contaminants and metal shavings damaging new transmission.

7. Install transmission oil cooler lines, clamp and fittings on transmission (TM 9-2350-292-20).
8. Install hydraulic oil coolers and related parts (TM 9-2350-292-20).
9. Install turbocharger and exhaust manifold covers (TM 9-2350-292-20).
10. Install exhaust pipes on left and right side of engine (TM 9-2350-292-20).
11. Install engine mount (TM 9-2350-292-20).
12. Install air intake elbows on left and right side of engine (TM 9-2350-292-20).
13. Install required transmission and brake linkage (TM 9-2350-292-20).
14. Install oil analysis system on transmission (TM 9-2350-292-20).
15. Fill engine or transmission with lubricant (TM 9-2350-292-20).
16. Perform engine ground hop check of transmission and engine prior to installation of powerpack (TM 9-2350-292-20).

NOTE**FOLLOW-ON MAINTENANCE:**

Install powerpack (TM 9-2350-292-20)

END OF TASK

SEPARATION OF ENGINE AND TRANSMISSION ASSEMBLIES**0037 00****THIS WORK PACKAGE COVERS:**

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

- General mechanic's tool kit (item 1, WP 0090 00)
- Hoisting beam (item 32, WP 0090 00)
- Suitable lifting device (15,000 lbs (6,810 kg) min cap)

Materials/Parts

- Lockwashers (26) (item 41, WP 0087 00)
- Nonmetallic round seal (item 59, 0087 00)
- Marker tags (item 26, WP 0087 00)

Equipment Conditions

- Powerpack removed (TM 9-2350-292-20)
- Transmission oil breather tube removed (TM 9-2350-292-20)
- Transmission oil cooler lines removed (TM 9-2350-292-20)

Equipment Conditions-Continued

- Drain engine or transmission oil (TM 9-2350-292-20)
- Engine related components removed (TM 9-2815-247-34)
- Transmission related components removed (TM 9-2520-215-34)

Personnel Required

Three

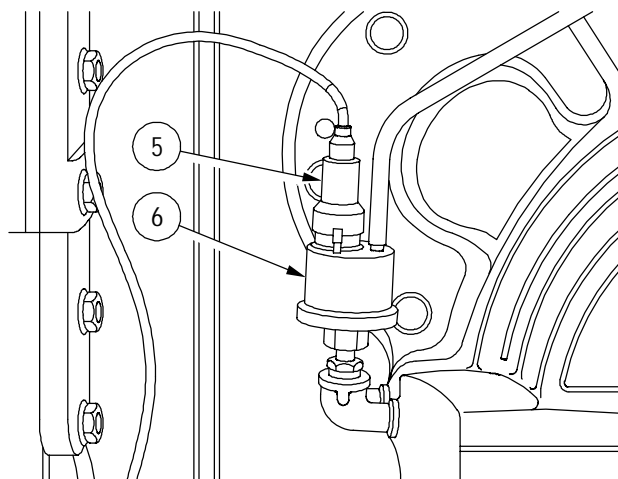
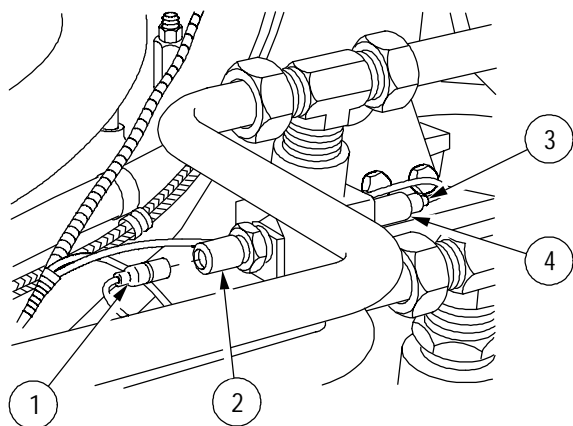
References

- TM 9-2350-292-20
- TM 9-2520-215-34
- TM 9-2815-247-34

Removal**NOTE**

Tag all electrical connections and electrical leads prior to removal to aid in installation.

1. Disconnect wiring harness 3W202 wire 324 (1) from transmission oil temperature transmitter (2).
2. Disconnect wiring harness 3W202 wire 509 (3) from transmission oil temperature switch (4).
3. Disconnect wiring harness 3W202 wire 321 (5) from transmission oil pressure transmitter (6).



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**SEPARATION OF ENGINE AND TRANSMISSION ASSEMBLIES -
CONTINUED**

0037 00

Removal-Continued

4. Disconnect wiring harness 3W202 wire 310/GND connector (7) from oil filter bypass switch (8).
5. Remove two screws (9), two lockwashers (10) and electrical connector panel bracket (11). Discard lockwashers.

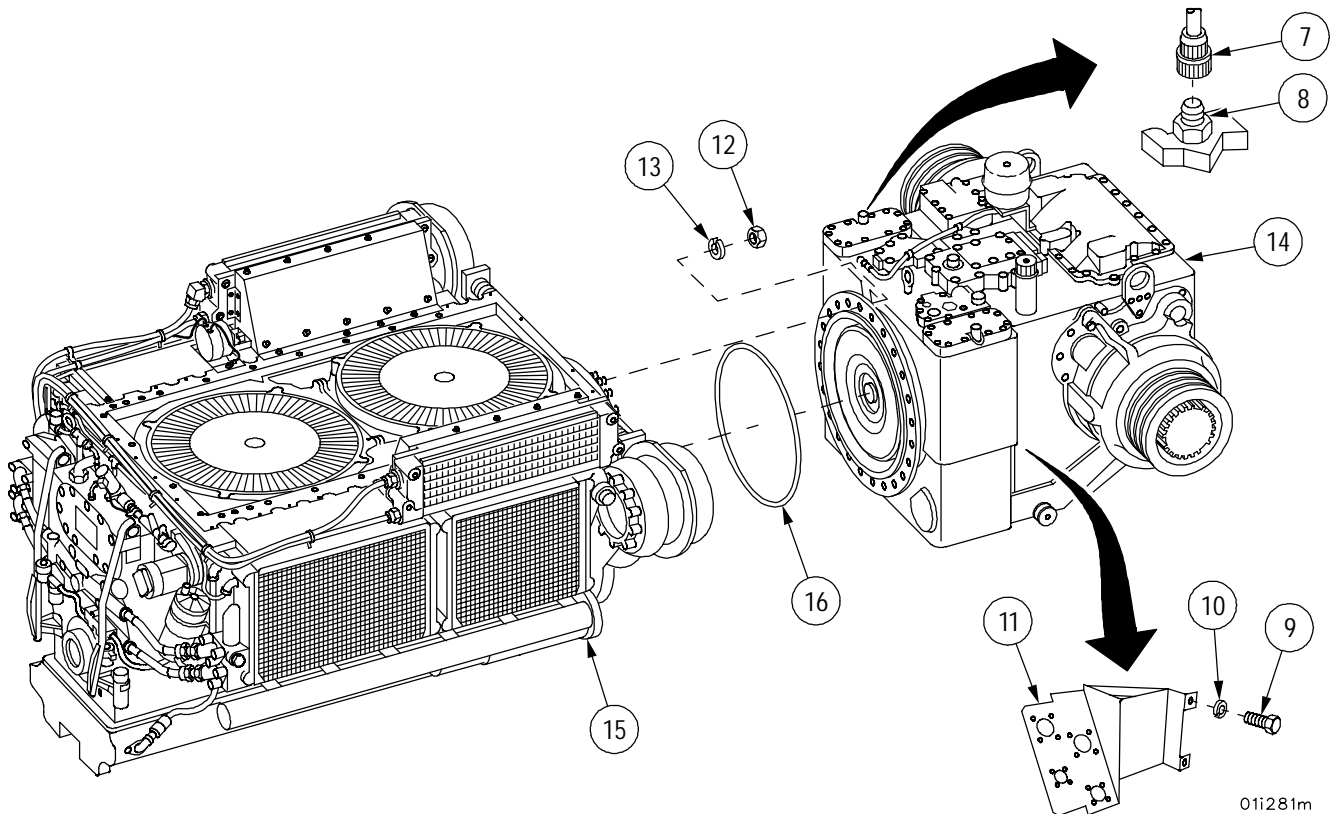


WARNING

CAUTION

Prior to separating transmission from engine, install hoisting beam and suitable lifting device and take up slack. Failure to comply with instructions may result in equipment damage.

6. Remove 24 nuts (12), 24 lockwashers (13) and separate transmission (14) from engine (15) using hoisting beam and suitable lifting device. Discard lockwashers.
7. Remove nonmetallic round seal (16). Discard nonmetallic round seal.
8. Inspect parts for damage and replace as required.



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**SEPARATION OF ENGINE AND TRANSMISSION ASSEMBLIES -
CONTINUED**

0037 00

Installation

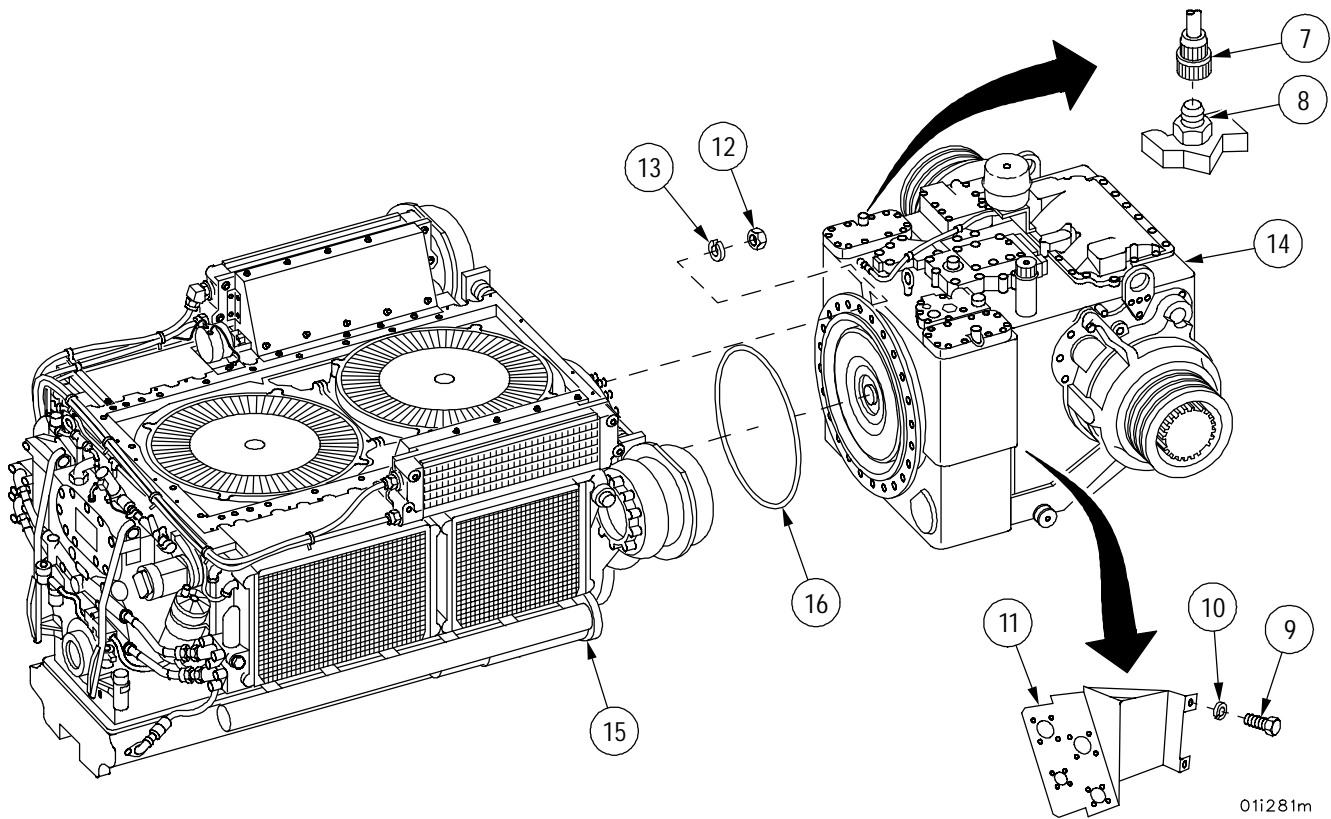


1. Join transmission (14) with new nonmetallic round seal (16) to engine (15) using hoisting beam and suitable lifting device.

NOTE

Do not tighten 24 nuts until all nuts have been installed.

2. Secure transmission (14) to engine (15) with 24 new lockwashers (13) and 24 nuts (12).
3. Install electrical connector panel bracket (11) with two screws (9) and two new lockwashers (10).
4. Connect wiring harness 3W202 wire 310/GND connector (7) from oil filter bypass switch (8).



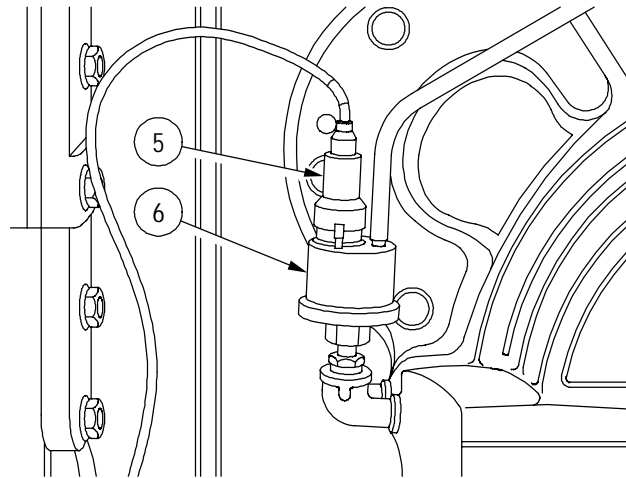
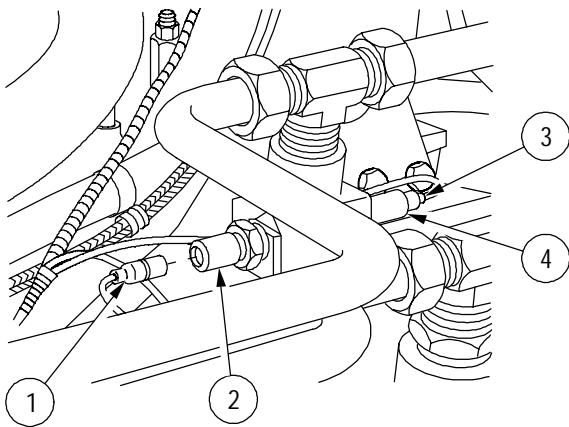
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SEPARATION OF ENGINE AND TRANSMISSION ASSEMBLIES - CONTINUED

0037 00

Installation-Continued

5. Connect wiring harness 3W202 wire 321 (5) to transmission oil pressure transmitter (6).
6. Connect wiring harness 3W202 wire 509 (3) to transmission oil temperature switch (4).
7. Connect wiring harness 3W202 wire 324 (1) to transmission oil temperature transmitter (2).



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NOTE

FOLLOW-ON MAINTENANCE:

- Install transmission related components
(TM 9-2520-215-34)
- Install engine related components
(TM 9-2815-247-34)
- Install transmission oil cooler lines
(TM 9-2350-292-20)
- Install transmission oil breather tube
(TM 9-2350-292-20)
- Service engine or transmission
(TM 9-2350-292-20)
- Install powerpack (TM 9-2350-292-20)

END OF TASK

CHAPTER 5

FUEL SYSTEM

ELECTRIC FUEL PUMP REPAIR**0038 00****THIS WORK PACKAGE COVERS:**

Inspection, Testing, Disassembly, Assembly

INITIAL SETUP:**Tools and Special Tools**

Automotive fuel and electrical tool kit (item 11, WP 0090 00)

Equipment Conditions

Electric fuel pump removed from vehicle (TM 9-2350-292-20)

Materials/Parts

Lockwasher (item 19, WP 0091 00)
 Lockwasher (item 21, WP 0091 00)
 Lockwashers (11) (item 20, WP 0091 00)
 Lockwashers (4) (item 24, WP 0091 00)
 Gasket (item 22, WP 0091 00)
 Preformed packing (item 23, WP 0091 00)
 Dry-cleaning solvent (item 1, WP 0087 00)

References

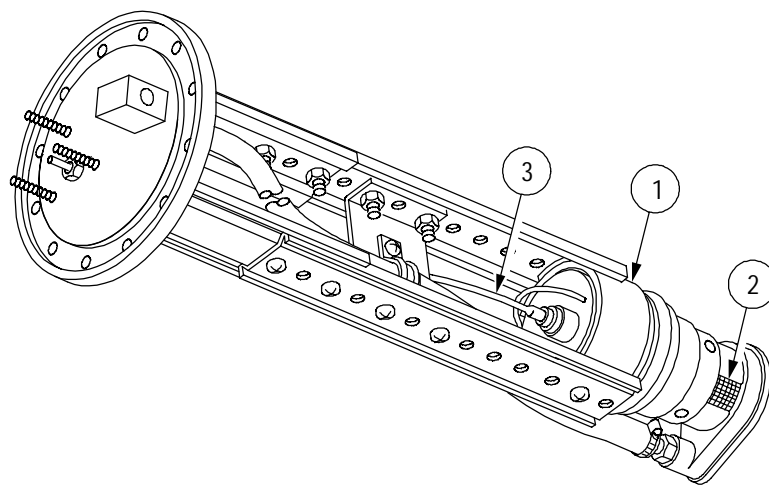
TM 9-2350-292-20

Inspection

1. Inspect fuel pump (1) housing. Replace if damaged or defective.



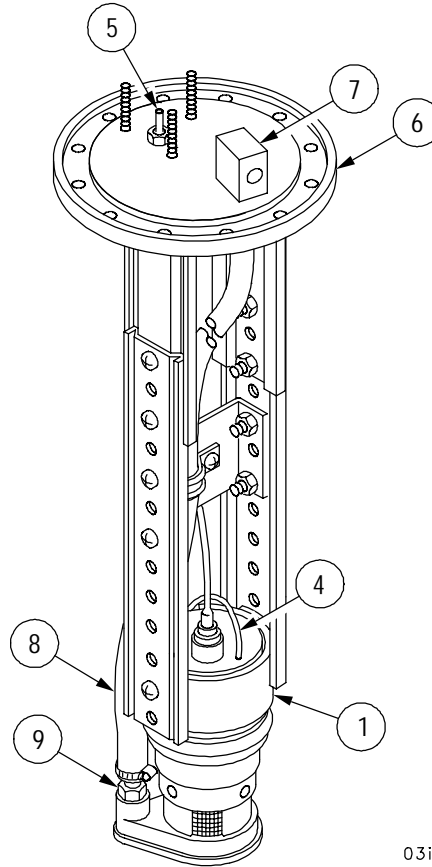
2. Inspect fuel pump inlet screens (2). Clean with dry-cleaning solvent if clogged.
3. Inspect electrical cable (3). Replace pump if frayed or damaged.
4. Disconnect and test electrical cable (3) for continuity. Replace pump if shorted or defective.



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ELECTRIC FUEL PUMP REPAIR - CONTINUED**Inspection-Continued**

5. Test ground lead (4) for continuity. Replace if defective.
6. Inspect connector assembly (5). Replace if damaged or deteriorated.
7. Test connector assembly (5) for continuity. Replace if shorted or defective.
8. Inspect access cover (6). Replace if cracked or defective.
9. Inspect discharge fitting (7). Replace if damaged or defective.
10. Inspect hose (8) and adapter (9). Replace if cracked or deteriorated.
11. Inspect all other components for damage. Replace if damaged.



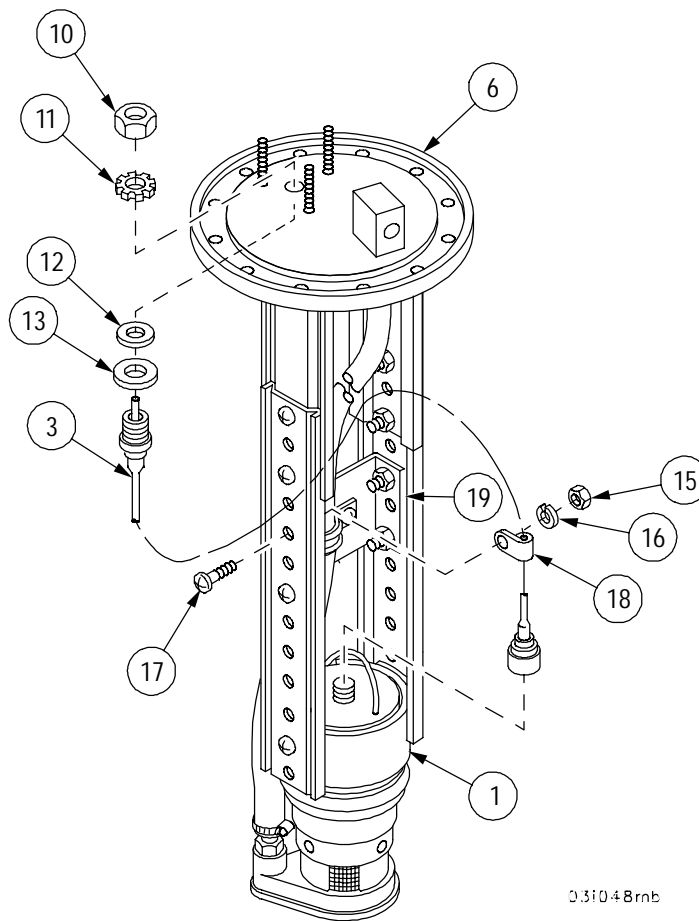
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ELECTRIC FUEL PUMP REPAIR - CONTINUED**0038 00****Testing**

1. Connect fuel pump assembly to test stand.
2. Operate fuel pump 30 seconds. Measure the amount of fuel pumped into a three-gallon container. One and a half gallons of fuel (container half full), which is equal to a flow rate of three gallons per minute, is satisfactory. Replace pump (1) if rate of flow is less than three gallons per minute.

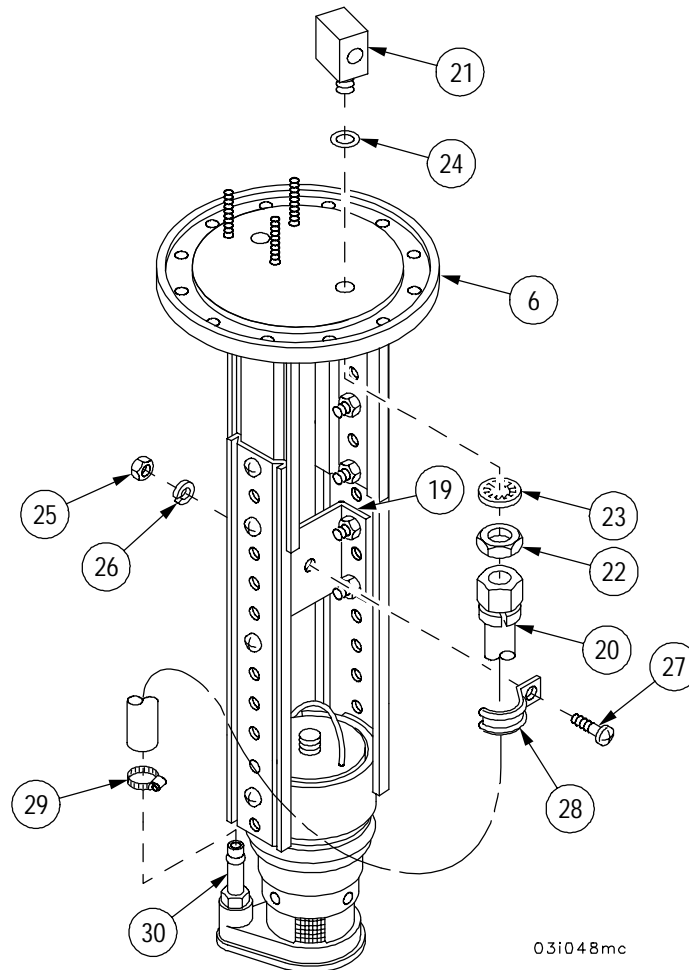
Disassembly

1. Remove nut (10) and lockwasher (11) from electrical wire (3). Discard lockwasher.
2. Remove gasket (12), recessed washer (13) and electrical wire (3) from access cover (6) and fuel pump (1). Discard gasket.
3. Remove nut (15), lockwasher (16), screw (17) and cable clamp (18) securing electrical wire (3) to brace (19). Discard lockwasher.



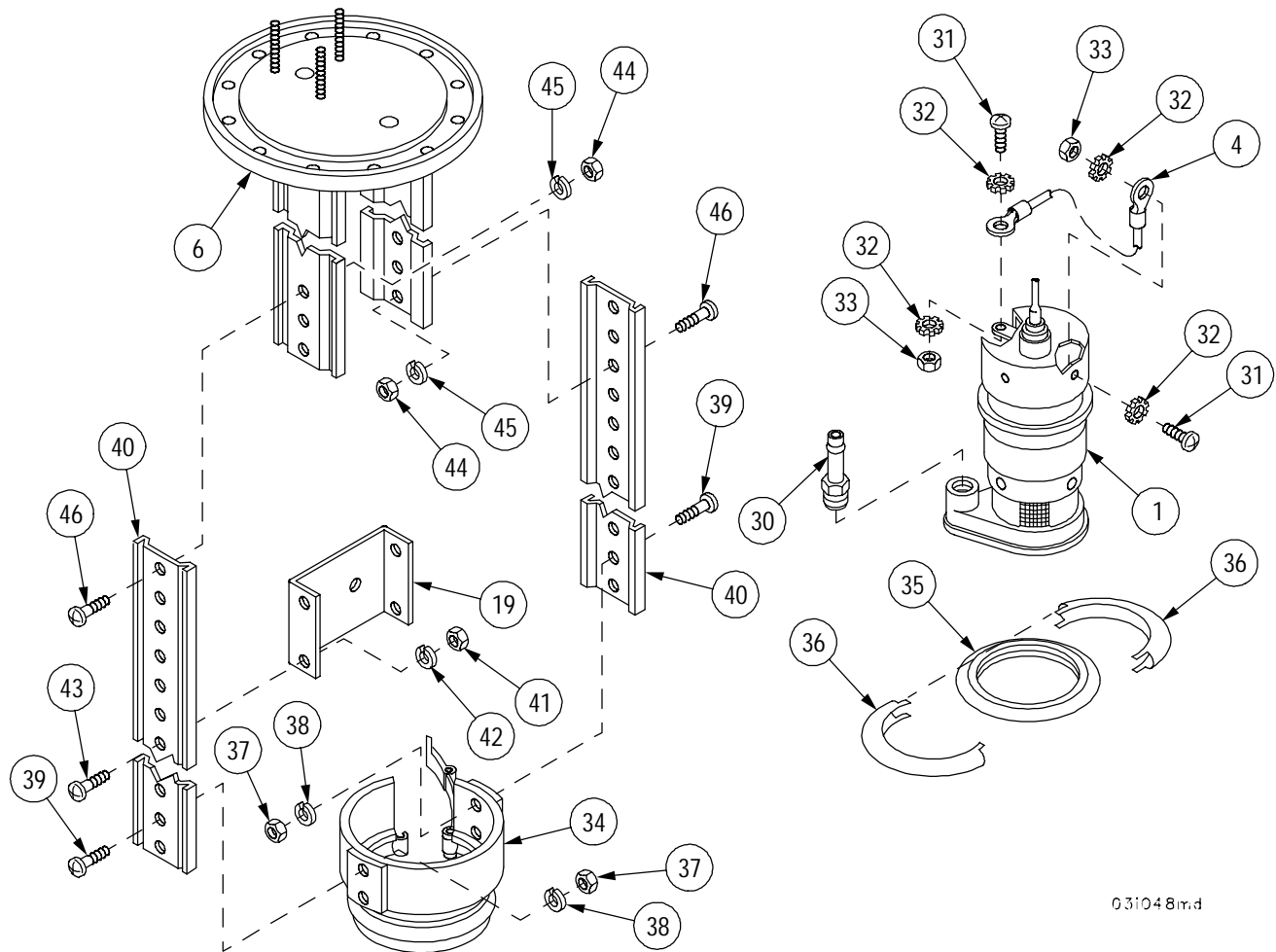
ELECTRIC FUEL PUMP REPAIR - CONTINUED**Disassembly-Continued**

4. Remove hose assembly (20) from discharge fitting (21).
5. Remove nut (22), lockwasher (23), discharge fitting (21) and preformed packing (24) from access cover (6). Discard lockwasher and preformed packing.
6. Remove nut (25), lockwasher (26), screw (27) and retaining strap (28) securing hose assembly (20) to brace (19). Discard lockwasher.
7. Loosen hose clamp (29), remove hose assembly (20) and hose clamp (29) from adapter (30).



ELECTRIC FUEL PUMP REPAIR - CONTINUED**Disassembly-Continued**

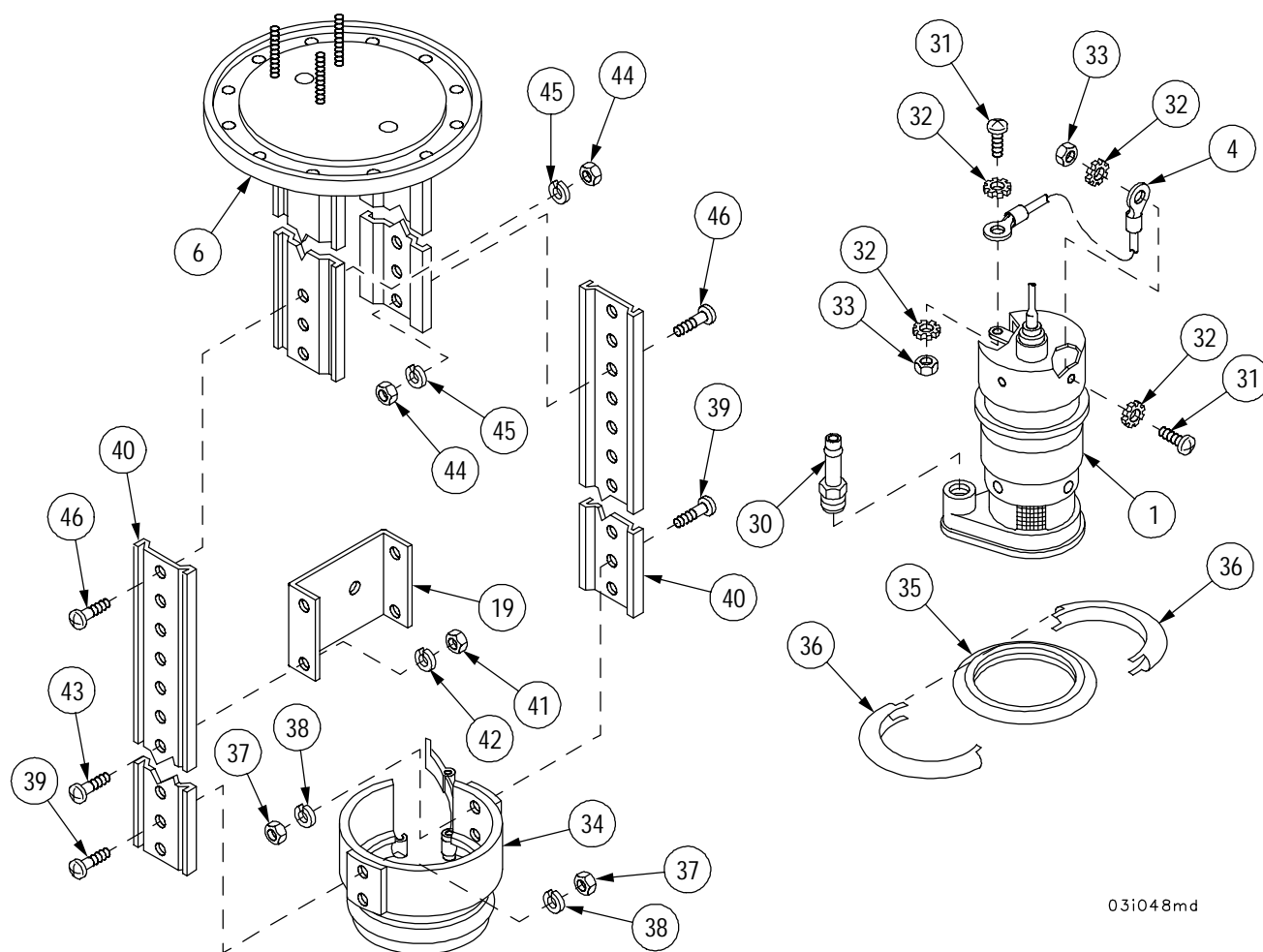
8. Remove two screws (31), four lockwashers (32), two nuts (33) and ground strap (4) from fuel pump (1). Discard lockwashers.
9. Release clamp assembly (34) and remove fuel pump (1).
10. Remove cushion retainer (35) and two bumper halves (36) from fuel pump (1).
11. Remove adapter (30) from fuel pump (1).
12. Remove two nuts (37), two lockwashers (38), two screws (39) and clamp assembly (34) from two mount extensions (40). Discard lockwashers.
13. Remove three nuts (41), three lockwashers (42), three screws (43) and brace (19) from two mount extensions (40). Discard lockwashers.
14. Remove four nuts (44), four lockwashers (45), four screws (46) and two mount extensions (40) from access cover (6). Discard lockwashers.
15. Inspect parts for damage and replace as required.



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ELECTRIC FUEL PUMP REPAIR - CONTINUED**0038 00****Assembly**

1. Install two mount extensions (40) on access cover (6) with four screws (46), four new lockwashers (45) and four nuts (44).
2. Install brace (19) between two mount extensions (40) with three screws (43), three new lockwashers (42) and three nuts (41).
3. Install clamp assembly (34) between two mount extensions (40) with two screws (39), two new lockwashers (38) and two nuts (37).
4. Install adapter (30) on fuel pump assembly (1).
5. Install cushion retainer (35) and two bumper halves (36) on fuel pump (1).
6. Install fuel pump (1) in clamp assembly (34).
7. Install ground strap (4) on fuel pump (1) with two screws (31), four new lockwashers (32) and two nuts (33).



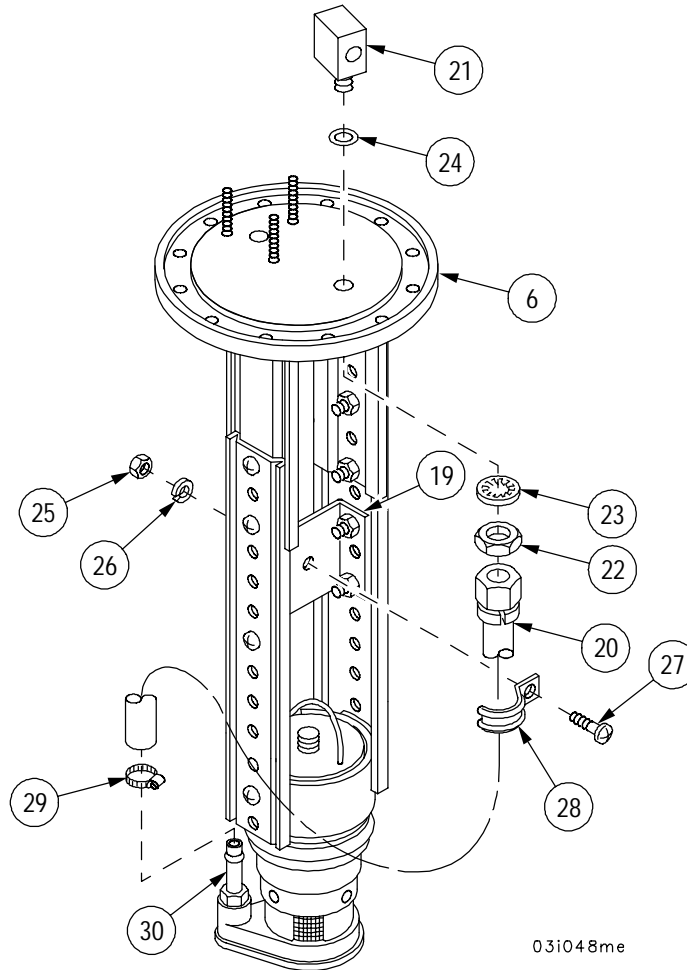
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ELECTRIC FUEL PUMP REPAIR - CONTINUED

0038 00

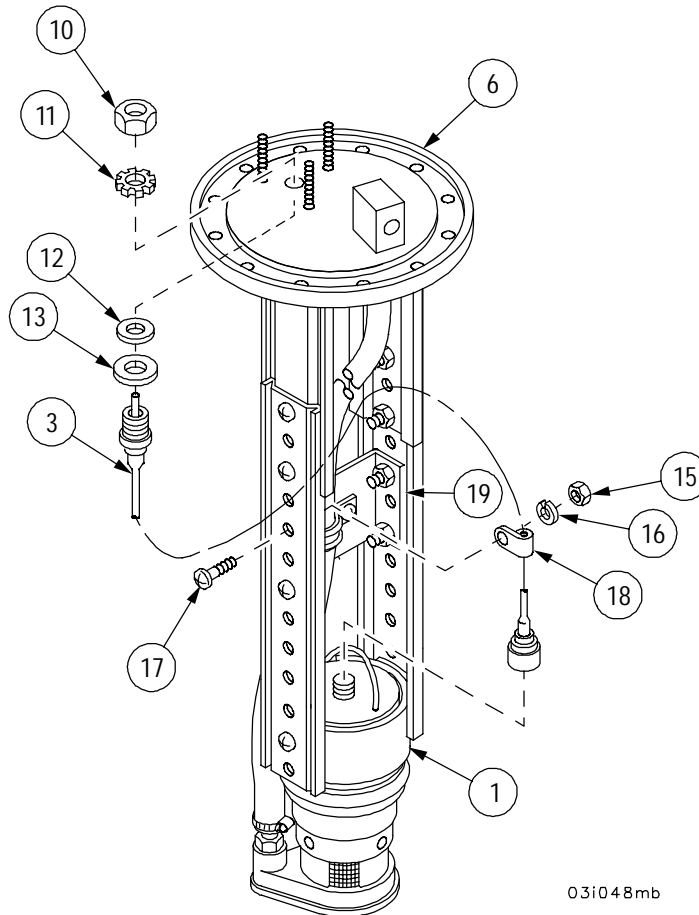
Assembly-Continued

8. Install hose assembly (20) and hose clamp (29) on adapter (30).
9. Install retaining strap (28) securing hose assembly (20) to brace (19) with screw (27), new lockwasher (26) and nut (25).
10. Install discharge fitting (21) and new preformed packing (24) on access cover (6) with new lockwasher (23) and nut (22).
11. Install hose assembly (20) on discharge fitting (21).



ELECTRIC FUEL PUMP REPAIR - CONTINUED**Assembly-Continued**

12. Install cable clamp (18) securing electric wire (3) on brace (19) with screw (17), new lockwasher (16) and nut (15).
13. Install electric wire (3) on fuel pump (1) and in access cover (6) with recessed washer (13), new gasket (12), new lockwasher (11) and nut (10).

**NOTE**

FOLLOW-ON MAINTENANCE:
Install electric fuel pump (TM 9-2350-292-20)

END OF TASK

RIGHT FUEL TANK REPLACEMENT**0039 00****THIS WORK PACKAGE COVERS:**

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

- General mechanic's tool kit (item 1, WP 0090 00)
- Lifting sling (item 9, WP 0090 00)
- Suitable lifting device(500 lbs (227 kg) min cap)

Materials/Parts

- Sealing compound (item 53, WP 0087 00)
- Lockwashers (3) (item 30, WP 0091 00)
- Lockwashers (3) (item 28, WP 0091 00)
- Lockwashers (11) (item 20, WP 0091 00)
- Hardwood lumber (item 4, WP 0087 00)
- Lockwashers (3) (item 102, WP 0091 00)

Equipment Conditions

- Fuel tanks drained (TM 9-2350-292-10)
- Fuel level transmitter removed from right fuel tank (TM 9-2350-292-20)

Equipment Conditions - Continued

- Fuel hose assemblies and fittings removed from right fuel tank (TM 9-2350-292-20)
- APU removed (TM 9-2350-292-20)
- Right fuel valve control rod removed (TM 9-2350-292-20)
- Fire control system plumbing removed to gain access to right fuel tank (TM 9-2350-292-20)
- Fuel tank ground strap removed (TM 9-2350-292-20)
- APU engine oil drain hose removed (TM 9-2350-292-20)

Personnel Required

Two

References

- TM 9-2350-292-10
- TM 9-2350-292-20

**NOTE**

For ventilation purposes, before tank is removed, leave tank line and transmitter opening open to allow fuel vapors to escape. Perform work outdoors whenever possible.

Prior to removal use tape or other material to cover tank opening. Do not stuff with rags.

RIGHT FUEL TANK REPLACEMENT - CONTINUED

0039 00

Removal

NOTE

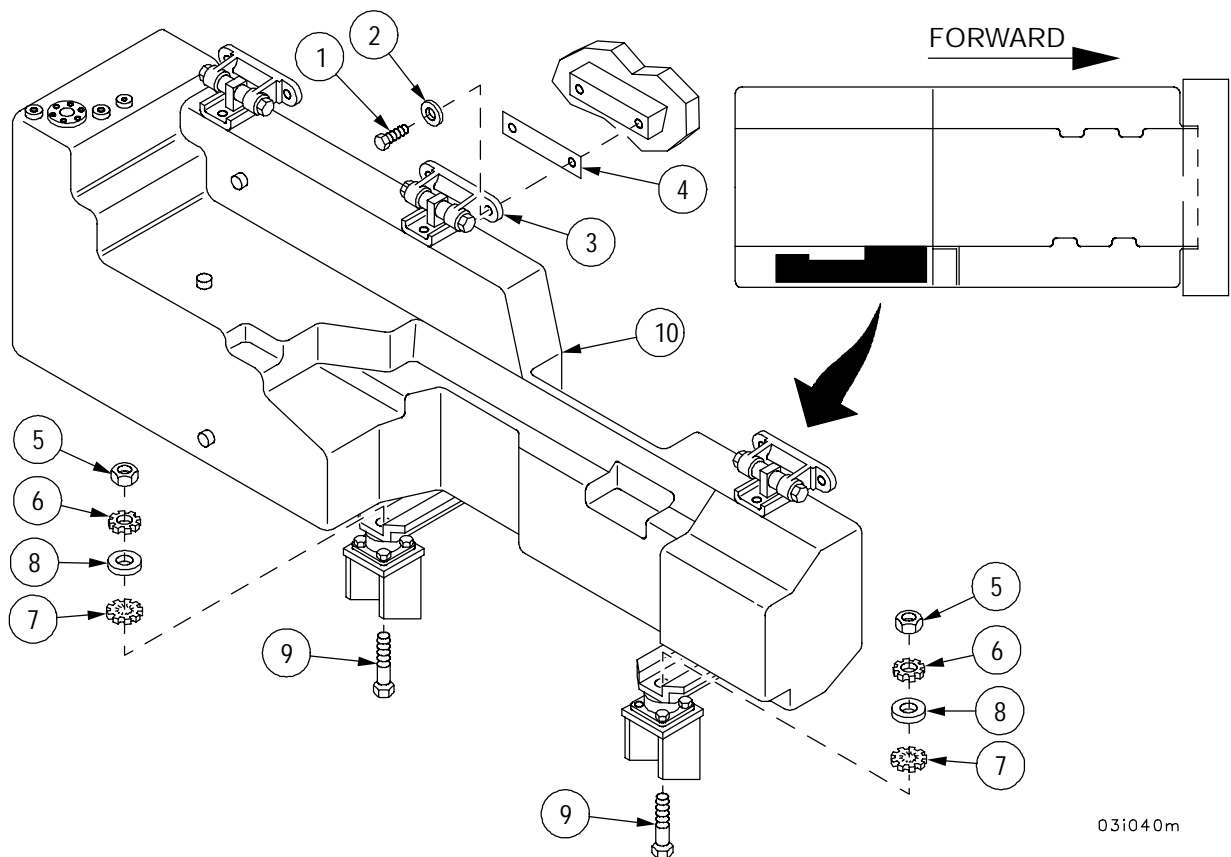
Note the quantity and position of shim(s) and length of screws being removed to ensure shim(s) and screws are installed in the same position.

1. Remove six screws (1), six flat washers (2), three brackets (3) and shim(s) (4) from hull.
2. Attach lifting sling to three brackets (3).
3. Attach lifting sling to suitable lifting device, take up slack.
4. Remove two nuts (5), three lockwashers (6), three lockwashers (7) and three flat washers (8) from three screws (9). Discard lockwashers.

NOTE

Move fuel tank rearward, swing front away from vehicle wall, and keep level while lifting straight up.

5. Remove fuel tank (10) from hull, place on wood blocks, remove lifting sling.



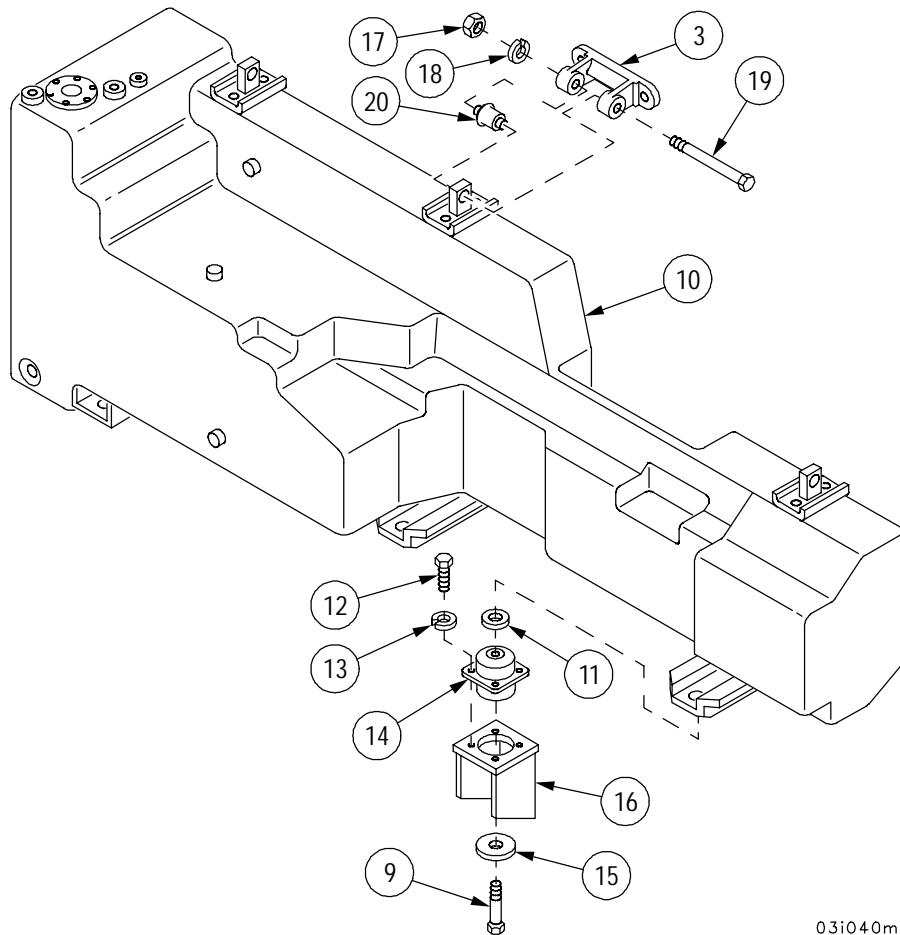
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RIGHT FUEL TANK REPLACEMENT - CONTINUED**0039 00****Removal - Continued**

6. Remove three flat washers (11) from three screws (9).
7. Remove 11 screws (12), 11 lockwashers (13), three mounts (14), three flat washers (15) and three screws (9) from three supports (16). Discard lockwashers.
8. Remove three nuts (17), three lockwashers (18), three screws (19), three brackets (3) and three mounts (20) from fuel tank (10). Discard lockwashers.
9. Inspect parts for damage and replace as required.

Installation

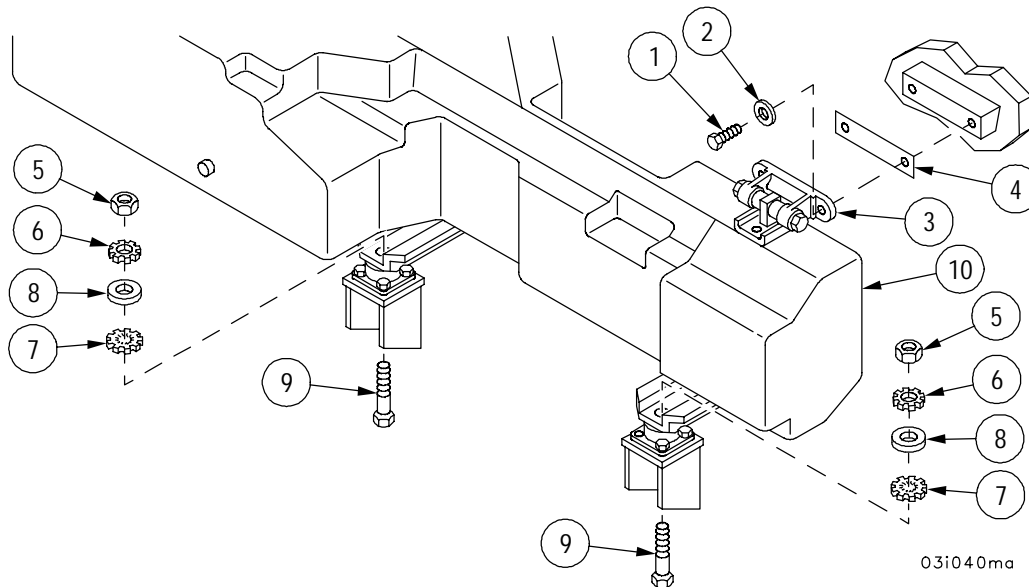
1. Install three mounts (20) and three brackets (3) on fuel tank (10) with three screws (19), three new lockwashers (18) and three nuts (17).
2. Install three flat washers (15), three screws (9) and three mounts (14) on three supports (16) with 11 new lockwashers (13) and 11 screws (12).
3. Install three flat washers (11) on three screws (9).



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RIGHT FUEL TANK REPLACEMENT - CONTINUED**Installation-Continued**

4. Attach lifting sling to three brackets (3).
5. Attach lifting sling to suitable lifting device.
6. Install fuel tank (10) in hull on three screws (9).
7. Install three flat washers (8), three new lockwashers (7), three new lockwashers (6) and two nuts (5) on three screws (9).
8. Apply sealing compound to threads of six screws (1).
9. Install three brackets (3) and shims (4) on hull with six flat washers (2) and six screws (1).

**NOTE****FOLLOW-ON MAINTENANCE:**

- Install APU engine oil drain hose (TM 9-2350-292-20)
- Install fuel tank ground strap (TM 9-2350-292-20)
- Install fire control system plumbing (TM 9-2350-292-20)
- Install right fuel valve control rod (TM 9-2350-292-20)
- Install APU (TM 9-2350-292-20)
- Install fuel hose assemblies and fittings on right fuel tank (TM 9-2350-292-20)
- Install fuel level transmitter in right fuel tank (TM 9-2350-292-20)
- Fill fuel tanks (TM 9-2350-292-10)

END OF TASK

LEFT FUEL TANK REPLACEMENT**0040 00****THIS WORK PACKAGE COVERS:**

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

- General mechanic's tool kit (item 1, WP 0090 00)
- Lifting sling (item 9, WP 0090 00)
- Suitable lifting device (500 lbs (227 kg) min cap)

Materials/Parts

- Sealing compound (item 53, WP 0087 00)
- Lockwashers (3) (item 30, WP 0091 00)
- Lockwashers (3) (item 28, WP 0091 00)
- Lockwashers (11) (item 20, WP 0091 00)
- Hardwood lumber (item 4, WP 0087 00)
- Lockwashers (3) (item 102, WP 0091 00)

Equipment Conditions

- Fuel tanks drained (TM 9-2350-292-10)
- Fuel filler tube and strainer assembly removed (TM 9-2350-292-20)
- Fuel hose assemblies and fittings removed from left fuel tank (TM 9-2350-292-20)
- Fuel tank ground strap removed (TM 9-2350-292-20)

Equipment Conditions-Continued

- Left fuel valve control rod removed (TM 9-2350-292-20)
- Rear steering control linkage removed (TM 9-2350-292-20)
- Rear shift control linkage removed (TM 9-2350-292-20)
- Rear brake control rods removed (TM 9-2350-292-20)
- Rear accelerator linkage removed (TM 9-2350-292-20)
- Rear drain valve cable removed (TM 9-2350-292-20)
- Brake cable and bracket removed (TM 9-2350-292-20)

Personnel Required

Three

References

- TM 9-2350-292-10
- TM 9-2350-292-20

**NOTE**

For ventilation purposes, before tank is removed, leave tank vents and filler cap open to allow fuel vapors to escape. Perform work outdoors whenever possible.

Prior to removal, use tape or other material to cover tank openings. Do not stuff with rags.

LEFT FUEL TANK REPLACEMENT - CONTINUED**Removal****NOTE**

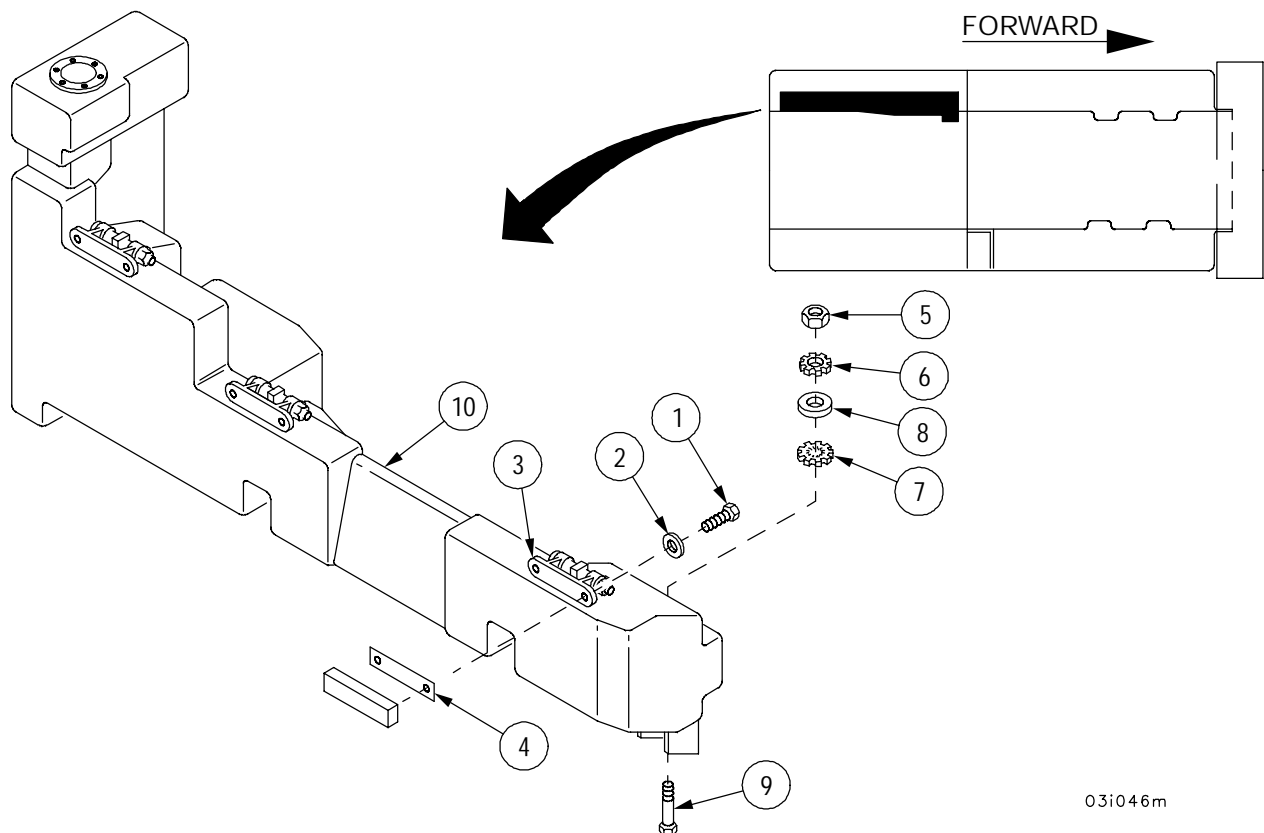
Note the quantity and position of shim(s) and length of screws being removed to ensure shim(s) and screws are installed in the same position.

1. Remove six screws (1), six flat washers (2), three brackets (3) and shim(s) (4) from hull.
2. Attach lifting sling to three brackets (3).
3. Attach lifting sling to suitable lifting device, take up slack.
4. Remove two nuts (5), three lockwashers (6), three lockwashers (7) and three flat washers (8) from three screws (9). Discard lockwashers.

NOTE

Move tank rearward, swing front away from vehicle wall, and keep level while lifting straight up.

5. Remove fuel tank (10) from hull, place on wood blocks, remove lifting sling.



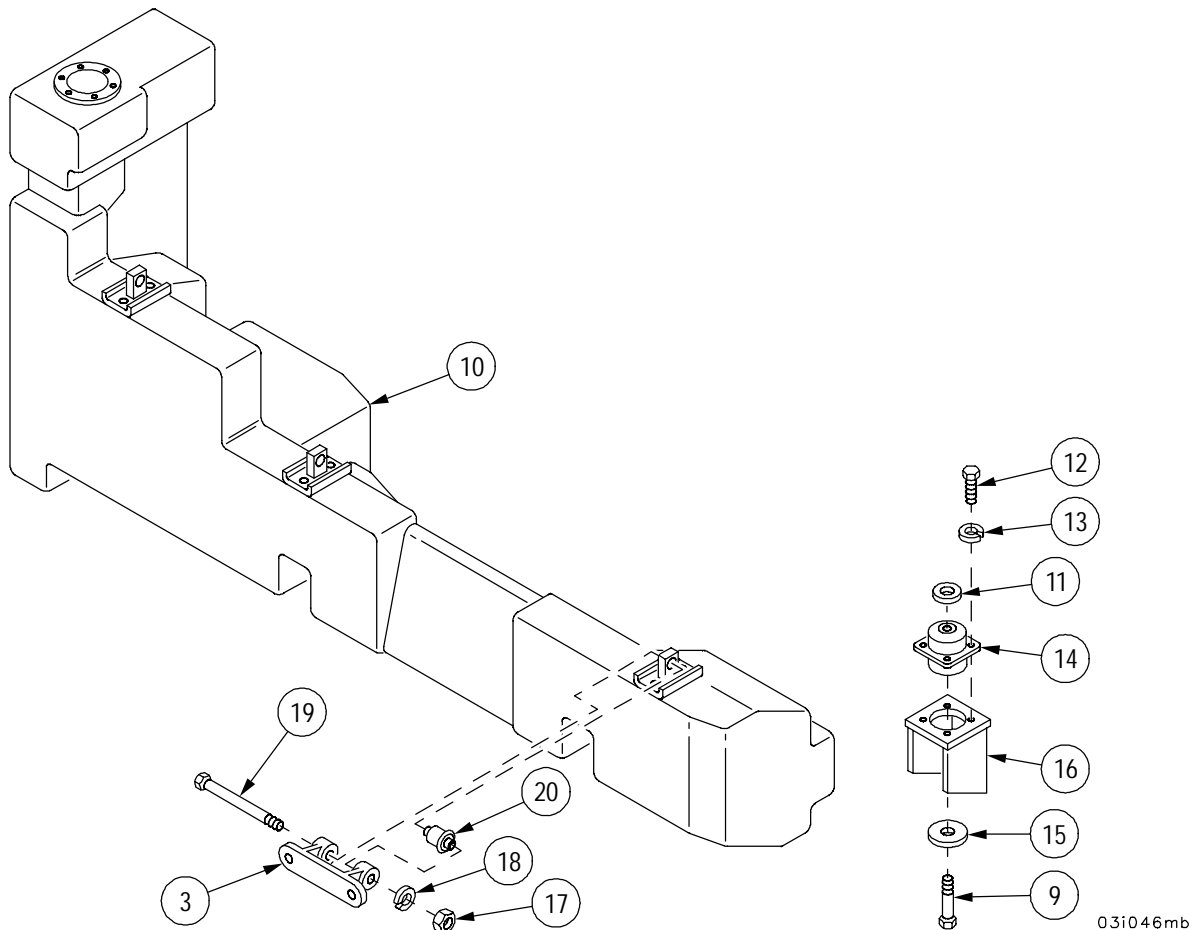
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LEFT FUEL TANK REPLACEMENT - CONTINUED**Removal-Continued**

6. Remove three flat washers (11) from three screws (9).
7. Remove 11 screws (12), 11 lockwashers (13), three mounts (14), three flat washers (15) and three screws (9) from three supports (16). Discard lockwashers.
8. Remove three nuts (17), three lockwashers (18), three screws (19), three brackets (3) and three mounts (20) from fuel tank (10). Discard lockwashers.
9. Inspect parts for damage and replace as required.

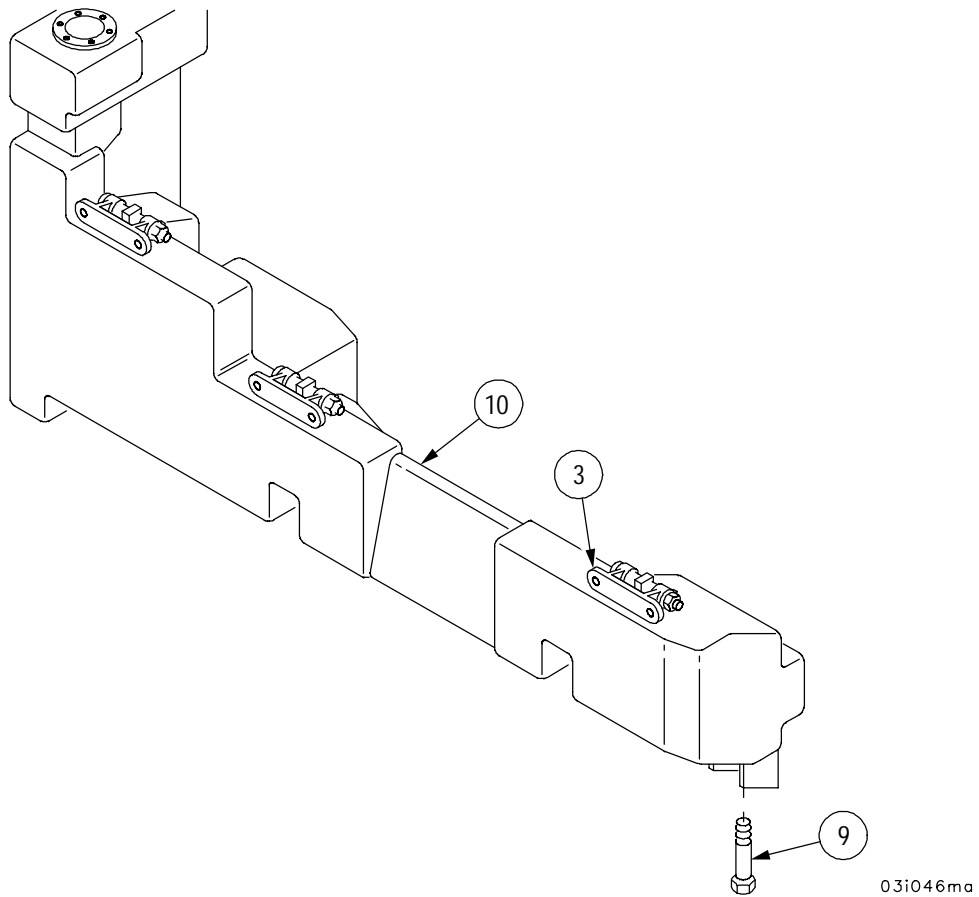
Installation

1. Install three mounts (20) and three brackets (3) on fuel tank (10) with three screws (19), three new lockwashers (18) and three nuts (17).
2. Install three flat washers (15), three screws (9) and three mounts (14) on three supports (16) with 11 new lockwashers (13) and 11 screws (12).
3. Install three flat washers (11) on three screws (9).



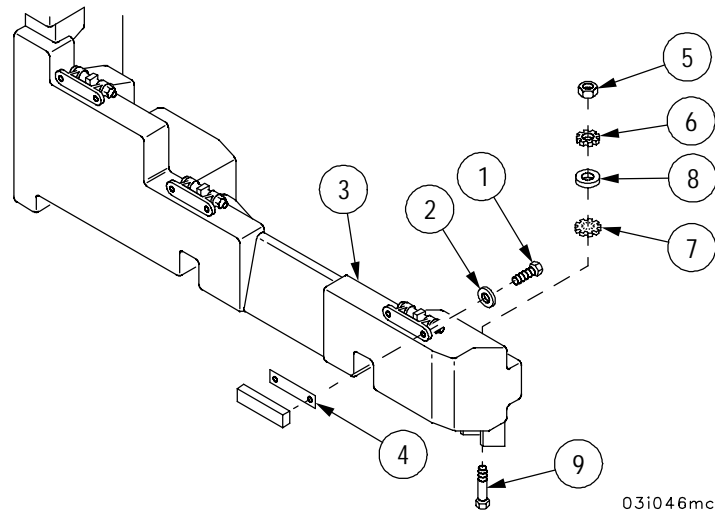
LEFT FUEL TANK REPLACEMENT - CONTINUED**Installation-Continued**

4. Attach lifting sling to three brackets (3).
5. Attach lifting sling to suitable lifting device.
6. Install fuel tank (10) in hull on three screws (9).



LEFT FUEL TANK REPLACEMENT - CONTINUED**Installation-Continued**

7. Install three flat washers (8), three new lockwashers (7), three new lockwashers (6) and two nuts (5) on three screws (9).
8. Apply sealing compound to threads of six screws (1).
9. Install three brackets (3) and shim(s) (4) on hull with six flat washers (2) and six screws (1).

**NOTE****FOLLOW-ON MAINTENANCE:**

- Install brake cable and bracket (TM 9-2350-292-20)
- Install rear drain valve cable (TM 9-2350-292-20)
- Install rear accelerator linkage (TM 9-2350-292-20)
- Install rear brake control rods (TM 9-2350-292-20)
- Install rear shift control linkage (TM 9-2350-292-20)
- Install rear steering control linkage (TM 9-2350-292-20)
- Install left fuel valve control rod (TM 9-2350-292-20)
- Install fuel tank ground strap (TM 9-2350-292-20)
- Install fuel hose assemblies and fittings on left fuel tank (TM 9-2350-292-20)
- Install fuel filler tube and strainer assembly (TM 9-2350-292-20)
- Fill fuel tanks (TM 9-2350-292-10)

END OF TASK

FRONT FUEL TANK REPLACEMENT**0041 00****THIS WORK PACKAGE COVERS:**

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

- General mechanic's tool kit (item 1, WP 0090 00)
- Lifting sling (item 9, WP 0090 00)
- Suitable lifting device (850 lbs (385.9 kg) min cap)

Materials/Parts

- Sealing compound (item 53, WP 0087 00)
- Lockwashers (4) (item 30, WP 0091 00)
- Lockwashers (3) (item 28, WP 0091 00)
- Lockwashers (15) (item 20, WP 0091 00)
- Lockwashers (4) (item 2, WP 0091 00)
- Hardwood lumber (item 4, WP 0087 00)
- Lockwashers (4) (item 102, WP 0091 00)

Equipment Conditions

- Fuel tanks drained (TM 9-2350-292-10)
- Hoist winch assembly and supports removed (WP 0045 00)
- Fuel hose assemblies and fittings removed from left fuel tank (TM 9-2350-292-20)
- Fuel level transmitter removed (TM 9-2350-292-20)
- Fuel pump and mount assembly removed (TM 9-2350-292-20)
- Fuel tank ground strap removed (TM 9-2350-292-20)
- Main winch side mounting brackets removed (WP 0050 00)
- Brake plate removed (TM 9-2350-292-20)
- Brake cable removed (TM 9-2350-292-20)

Equipment Conditions-Continued

- Floor support braces removed (TM 9-2350-292-20)
- Subfloor plates #1, #2, #3 and #4 removed (TM 9-2350-292-20)
- Front drain valve cable and bracket removed (TM 9-2350-292-20)
- Hydraulic reservoir drain hose removed (TM 9-2350-292-20)
- Front fire extinguisher tubes and brackets removed (TM 9-2350-292-20)
- Hydraulic pump assembly support removed (TM 9-2350-292-20)
- Tachometer cable disconnected from bulkhead (TM 9-2350-292-20)
- Brake return spring linkage and bell crank assembly removed (TM 9-2350-292-20)
- Wiring harness 4W103 removed from top of fuel tank (TM 9-2350-292-20)

Personnel Required

Three

References

- TM 9-2350-292-10
- TM 9-2350-292-20

**NOTE**

For ventilation purposes, before tank is removed, leave tank vents and filler cap open to allow fuel vapors to escape. Perform work outdoors whenever possible.

Prior to removal, use tape or other material to cover tank openings. Do not stuff with rags.

FRONT FUEL TANK REPLACEMENT - CONTINUED**Removal****NOTE**

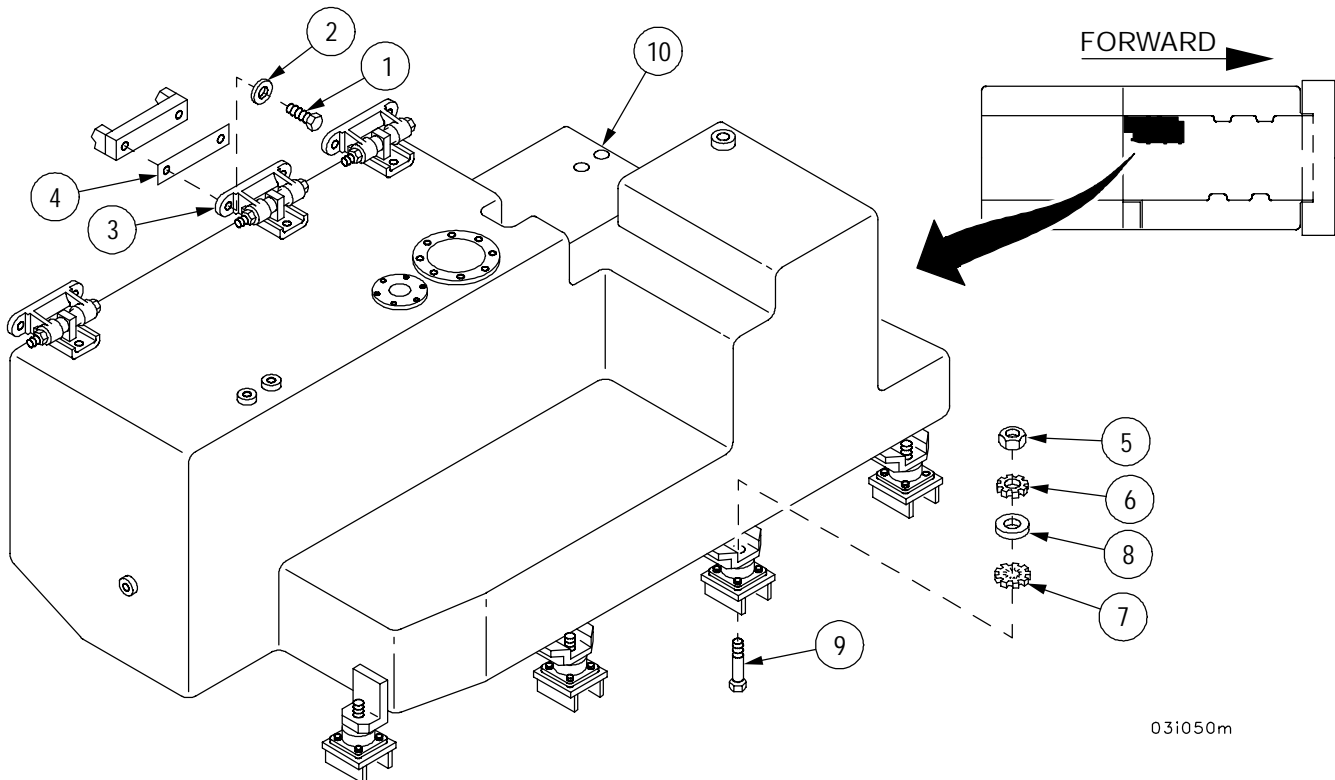
Note the quantity and position of shim(s) and length of screws being removed to ensure shim(s) and screws are installed in the same position.

1. Remove six screws (1), six flat washers (2), three brackets (3) and shim(s) (4) from hull.
2. Remove three nuts (5), four lockwashers (6), four lockwashers (7) and four flat washers (8) from four screws (9).

WARNING

Fuel tank weighs approximately 150 lb (69 Kg). Use suitable lifting device or at least three personnel to lift fuel tank. Failure to comply may result in injury to personnel.

3. Move fuel tank (10) onto wooden skid, then slide it to the front of vehicle.
4. Remove fuel tank (10) from hull and place on wood blocks.



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FRONT FUEL TANK REPLACEMENT - CONTINUED

0041 00

Removal-Continued

5. Remove four flat washers (11) from four screws (9).
6. Remove 15 screws (12), 15 lockwashers (13), four mounts (14), four flat washers (15) and four screws (9) from four supports (16). Discard lockwashers.
7. Remove three nuts (17), three lockwashers (18), three screws (19), three brackets (3) and three mounts (20) from fuel tank (10). Discard lockwashers.
8. Remove four nuts (21), four lockwashers (22), four screws (23) and four cushions (24) from four supports (25). Discard lockwashers.
9. Inspect parts for damage and replace as required.

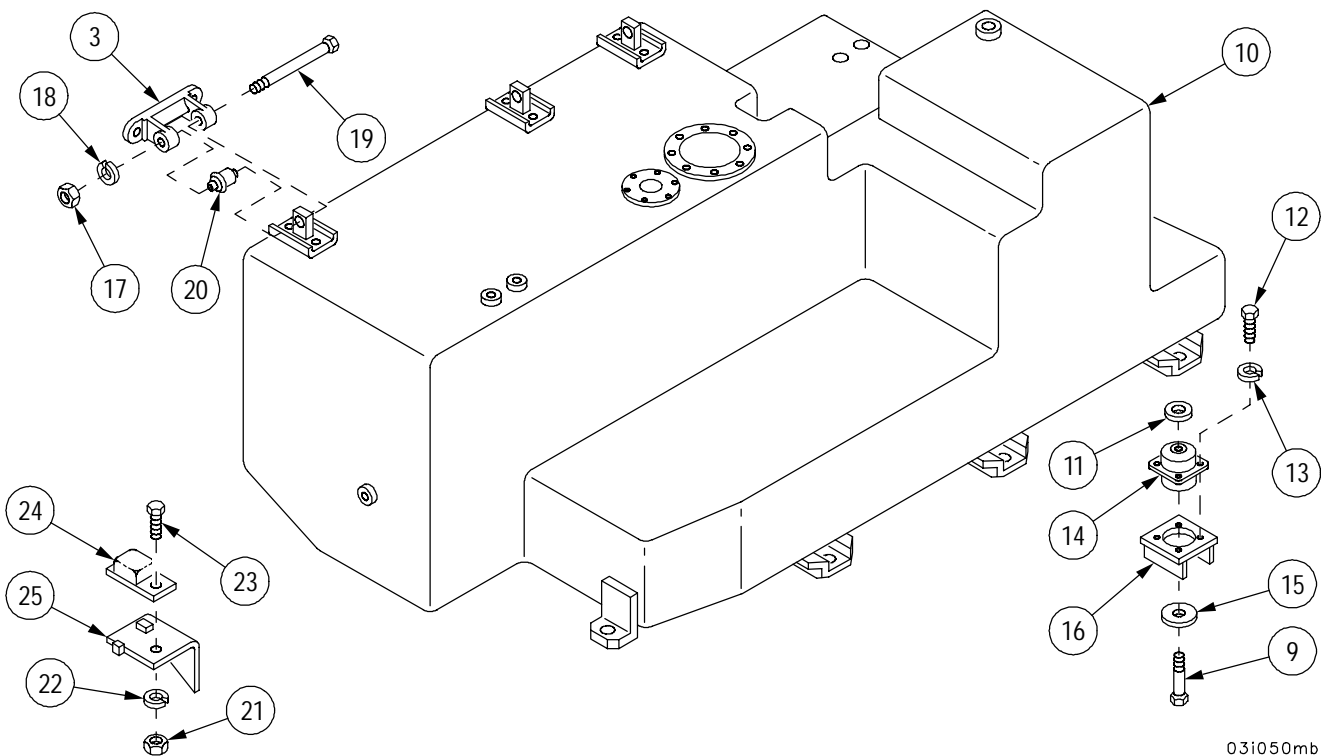
Installation

1. Install four cushions (24) on four supports (25) with four screws (23), four new lockwashers (22) and four nuts (21).
2. Install three mounts (20) and three brackets (3) on fuel tank (10) with three screws (19), three new lockwashers (18) and three nuts (17).

NOTE

One screw is longer than the other three screws. Longer screw is installed on the rear most mounting bracket.

3. Install four flat washers (15), four screws (9) and four mounts (14) on four supports (16) with 15 screws (12) and 15 new lockwashers (13).
4. Install four flat washers (11) on four screws (9).

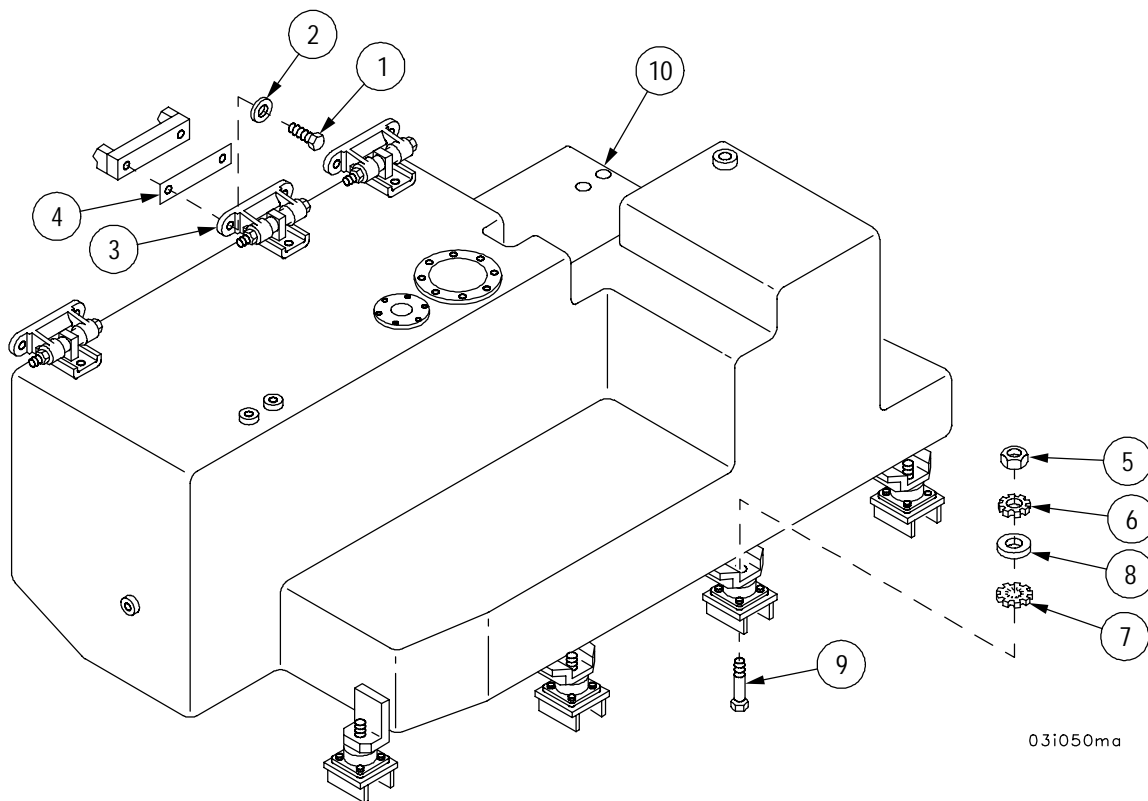


03i050mb

FRONT FUEL TANK REPLACEMENT - CONTINUED**Installation-Continued****WARNING**

Fuel tank weighs approximately 150 lb (69 Kg). Use suitable lifting device or at least three personnel to lift fuel tank. Failure to comply may result in injury to personnel.

5. Position fuel tank (10) on wooden skid, then slide it to rear of hull.
6. Install fuel tank (10) on four screws (9).
7. Install four flat washers (8), four new lockwashers (7), four new lockwashers (6) and three nuts (5) on four screws (9).
8. Apply sealing compound to threads of six screws (1).
9. Install three brackets (3) and shim(s) (4) on hull with six flat washers (2) and six screws (1).



FRONT FUEL TANK REPLACEMENT - CONTINUED

Installation-Continued

NOTE**FOLLOW-ON MAINTENANCE:**

Install wiring harness 4W103 on top of fuel tank
(TM 9-2350-292-20)

Install brake return spring linkage and bell crank
assembly (TM 9-2350-292-20)

Connect tachometer cable to bulkhead
(TM 9-2350-292-20)

Install hydraulic pump assembly support (WP 0069 00)

Install front fire extinguisher tubes and brackets
(TM 9-2350-292-20)

Install hydraulic reservoir drain hose
(TM 9-2350-292-20)

Install front drain valve cable and bracket
(TM 9-2350-292-20)

Install subfloor plates #1, #2, #3 and #4
(TM 9-2350-292-20)

Install floor support braces
(TM 9-2350-292-20)

Install brake cable
(TM 9-2350-292-20)

Install brake plate (TM 9-2350-292-20)

Install main winch side mounting brackets
(WP 0050 00)

Install fuel tank ground strap
(TM 9-2350-292-20)

Install fuel pump and mount assembly
(TM 9-2350-292-20)

Install fuel level transmitter
(TM 9-2350-292-20)

Install fuel hose assemblies and fittings on left fuel tank
(TM 9-2350-292-20)

Install hoist winch assembly and supports
(WP 0045 00)

Fill fuel tanks (TM 9-2350-292-10)

END OF TASK

FUEL TANK REPAIR**0042 00****THIS WORK PACKAGE COVERS:**

Repair

INITIAL SETUP:**Tools and Special Tools**

Welding shop equipment (TRL MTD) (item 16, WP 0090 00)
 Air filter respirator (item 17, WP 0090 00)
 Nonmetallic hose assembly (item 18, WP 0090 00)
 Oil and water separator (item 19, WP 0090 00)
 Air compressor (item 20, WP 0090 00)
 Paint spray gun (item 21, WP 0090 00)
 Paint spray cup (item 22, WP 0090 00)
 Industrial goggles (item 23, WP 0090 00)
 Pressure steam cleaner (item 24, WP 0090 00)

Materials/Parts

Welding electrode (AR) (item 14, WP 0087 00)
 Epoxy primer coating (item 15, WP 0087 00)
 Epoxy coating kit (item 16, WP 0087 00)
 General purpose detergent (item 19, WP 0087 00)

Equipment Conditions

Fuel tanks drained (TM 9-2350-292-10)
 Engine deck removed (TM 9-2350-292-20)
 For left or right fuel tank
 Subfloor plates removed (TM 9-2350-292-20)
 For front tank

Personnel Required

Two

References

TM 9-2350-292-10
 TM 9-2350-292-20
 TB 750-1047
 MIL-R- 5031B
 MIL-STD 2219
 TT-C-490
 MIL-P 53030 or MIL-P-53022

NOTE

If fuel leak cannot be detected or repaired with power-pack installed in vehicle, it may be necessary to remove powerpack (TM 9-2350-292-20), and/or remove the fuel tank. Refer to WP 0040 00 for left fuel tank, WP 0039 00 for right fuel tank or WP 0041 00 for front fuel tank.

Repair

1. Flush tank interior with chemical cleaners as specified in TB 750-1047, Elimination of Combustibles from Interiors of Metal or Plastic Gasoline and Diesel Fuel Tanks, to remove residual fuel, dirt, sediment and other foreign matter. Drain and dry fuel tank.
2. Inspect tank inlets and outlets for thread damage and repair with thread chaser as required.

FUEL TANK REPAIR - CONTINUED**0042 00**

Repair-Continued

WARNING

Protect yourself and others. Fumes and gases can be dangerous to your health. Arc rays can injure eyes and burn skin. Electric shock can kill.

Keep your head out of the fumes.

Use enough ventilation, exhaust at the arc, or both, to keep fumes and gases away from your breathing zone and the general area.

Wear correct eye, ear and body protection.

Do not touch live electrical parts.

3. Inspect tank for any obvious cracks or open seams. Inspect mounting brackets, mounts and cushions for cracks and breaks. Weld assembly and components as required in accordance with MIL-STD-2219, Fusion Welding for Aerospace Applications using electrode class 16 per MIL-R-5031 Rods and Wire, Welding, Corrosion and Heat Resistant Alloys.

**WARNING**

4. Close all openings with temporary plugs or other closures, apply 3-4 psi internal air pressure.
5. Apply soapy water solution, consisting of general purpose detergent diluted with 20 -40% water, to all exterior surfaces of tank, inspect for air bubble formation.
6. Mark location of any bubble formation, rinse and dry tank, weld the marked area(s).
7. Repeat steps 3, 4 and 5, if required.

**WARNING**

8. Clean tank exterior and interior, allow to air dry.

FUEL TANK REPAIR - CONTINUED

0042 00

Repair-Continued

NOTE

Prepare surfaces in accordance with specification TT-C-490, Cleaning Methods and Pretreatment of Ferrous Surfaces for Organic Coatings, Method II.

9. All holes, threads and machined or mating surfaces are to be masked before painting (prime exterior only per MIL-P-53030 or MIL-P-53022), apply top coat color.
10. Plug or cap all openings if tank is not being installed in vehicle.

NOTE**FOLLOW-ON MAINTENANCE:**

Install subfloor plates, if removed
(TM 9-2350-292-20)
Install engine deck, if removed
(TM 9-2350-292-20)
Fill fuel tanks (TM 9-2350-292-10)

END OF TASK

CHAPTER 6
ELECTRICAL SYSTEM

WIRING HARNESS AND CABLE REPAIR

0043 00**THIS WORK PACKAGE COVERS:**Disassembly, Assembly

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
Electrical maintenance kit (item 65, WP 0090 00)
Electrical gun-type heater (item 13, WP 0090 00)
Soldering gun (item 10, WP 0090 00)
Multimeter (item 12, WP 0090 00)

References

TB-SIG 222

Materials/Parts

Electrical connectors
Heat shrink insulation tubing
Electrical insulation tape (item 9, WP 0087 00)
Tin alloy solder (item 7, WP 0087 00)
Soldering flux (item 8, WP 0087 00)
Adhesive (item 47, WP 0087 00)
Epoxy (item 49, WP 0087 00)
Adhesive (item 56, WP 0087 00)
Sealing compound (item 57, WP 0087 00)
Insulation sleeving (item 58, WP 0087 00)

NOTE

When removing more than one wire from a multiple wire receptacle, record which wire was removed from which pin hole.

Before proceeding, see detailed instructions on soldering and solder (TB SIG 222).

Cable identifiers are attached to cables. These tags are embossed with the cable identification number. Cable identifier numbers are shown on the systems wiring diagram.

Wire identifiers are embossed with the same individual wire number. Wire identifier numbers are also shown on systems wiring diagram.

If cable or wires are replaced, remove tags from old wire and place them on new wire.

All pins (male connectors) and sockets (female connectors) are alphabetically coded. Coded identification starts at connector key or groove.

Male connectors' identifying letters run clockwise.

Female connectors' identifying letters run counterclockwise.

Do continuity checks upon completion of cable or harness repair.

When replacing connectors or gaskets on wiring harnesses 3W180, 3W702, 3W704, 3W710, 3W711 or 4W136 refer to instructions and tabulation matrix.

WIRING HARNESS AND CABLE REPAIR - CONTINUED

Disassembly - Heat Shrink Insulation Sleeving

Cut and discard insulation sleeving.

Assembly - Heat Shrink Insulation Sleeving**NOTE**

Insulation sleeving tubing should be twice the diameter of the part over which it will be shrunk.

1. Slide sleeving over wire and terminal.

NOTE

Remove electrical gun-type heater from sleeving as soon as sleeving forms to shape of wire and terminal.

2. Hold electrical gun-type heater 4 or 5 inches (101.6 - 127.0 mm) away from sleeving and apply heat for about 30 seconds.
3. Let sleeving cool 30 seconds before handling.

Disassembly - Wire Contacts

1. Cut and discard contacts.
2. Strip about 1/2 inch (12.7 mm) of insulation from end of the wire.

Assembly - Wire Contacts**NOTE**

Color bands on contacts indicate wire size. For example, contacts with green color bands are for 22-gauge to 26-gauge wire. Contacts with red color bands are for 20-gauge to 24-gauge wire.

1. Place contacts in the crimping tool with the color band toward the rear
2. Place bare wire in the contact and squeeze the crimping tool.
3. Remove crimped contact out of the tool and check the crimp by looking in the inspection hole. Verify the end of the bare wire is visible.

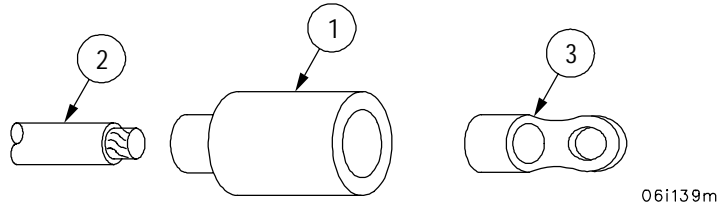
WIRING HARNESS AND CABLE REPAIR - CONTINUED

Disassembly - Terminal - Type Cable Connectors

Cut and discard connector.

Assembly - Terminal - Type Cable Connectors

1. Strip cable insulation equal to depth of terminal well.
2. Slide insulator (1) over cable (2).
3. Insert cable (2) into terminal (3) well and crimp.
4. Slide insulator (1) over crimped end of terminal (3).

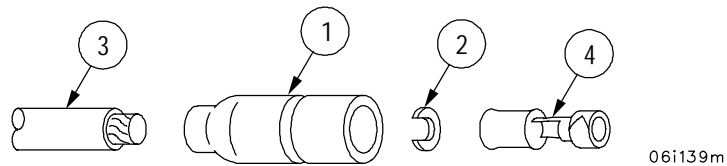


Disassembly - Female Cable Connector with Washer

Cut and discard connector.

Assembly - Female Cable Connector with Washer

1. Strip cable insulation approximately 1/8 inch (3.2 mm).
2. Slide shell (1) and washer (2) over cable (3).
3. Place cable (3) in cylinder end of terminal (4).
4. Slide shell (1) and washer (2) over terminal (4).

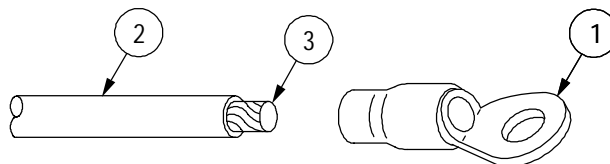


Disassembly - Crimped Terminals

Cut and discard terminal (1).

WIRING HARNESS AND CABLE REPAIR - CONTINUED**0043 00****Assembly - Crimped Terminals**

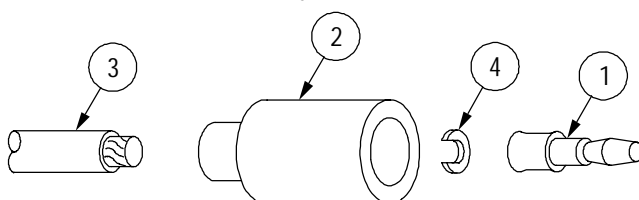
1. Strip cable insulation equal to depth of terminal (1) well.
2. Push cable (2) against end of terminal (1) well and crimp.
3. Apply epoxy to exposed end of wire (3)

**Disassembly - Male Cable Connector with Washer**

Cut and discard connector.

Assembly - Male Cable Connector with Washer

1. Strip cable insulation equal to depth of terminal (1) well.
2. Slide shell (2) over cable (3).
3. Insert cable (3) into terminal (1) well and crimp.
4. Place C-washer (4) over cable (3) at crimped junction and slide shell (2) over C-washer (4) and terminal (1).



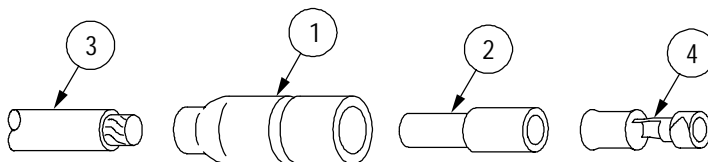
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Disassembly - Female Cable Connector with Sleeve

Cut and discard connector.

Assembly - Female Cable Connector with Sleeve

1. Strip cable insulation approximately 1/8 inch (3.2 mm).
2. Slide shell (1) and sleeve (2) over cable (3).
3. Place cable (3) in cylinder end of terminal (4) and crimp.
4. Slide shell (1) and sleeve (2) over terminal (4).



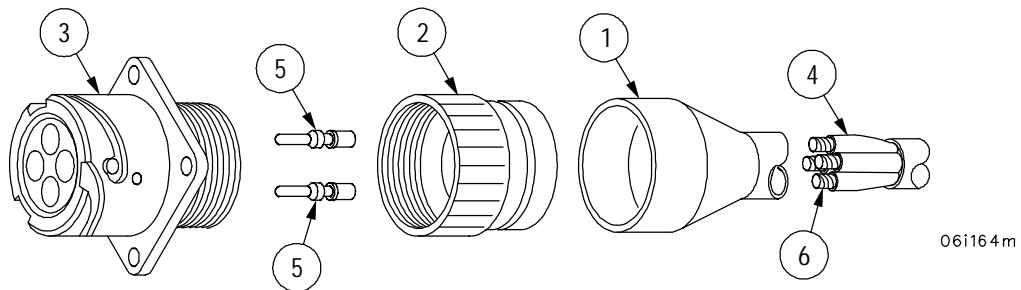
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WIRING HARNESS AND CABLE REPAIR - CONTINUED**Disassembly - Typical Male - Type Panel Mounting Receptacle**

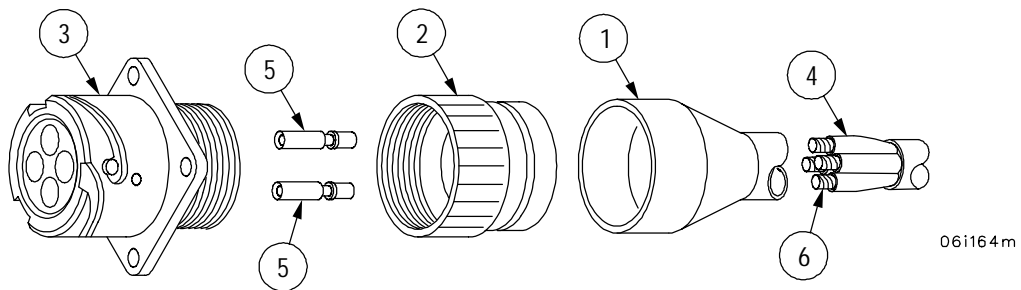
1. Heat and remove boot (1) from rear of nut (2).
2. Remove nut (2) from shell (3) and slide nut (2) over cable (4).
3. Drive pin contacts (5) out through rear of shell (3) with pin extractors.
4. Unsolder or cut pin contacts (5) from cable leads (6).

Assembly - Typical Male - Type Panel Mounting Receptacle

1. Strip leads (6) insulation equal to depth of wells in pin contacts (5).
2. Insert leads (6) into wells in pin contacts (5) and solder or crimp leads (6) to pin contacts (5).
3. Push pin contacts (5) into shell (3) from rear until seated.
4. Install nut (2) on shell (3).
5. Apply a thin coat of adhesive to boot (1).
6. Install boot (1) on nut (2).

**Disassembly - Typical Female - Type Panel Mounting Receptacle**

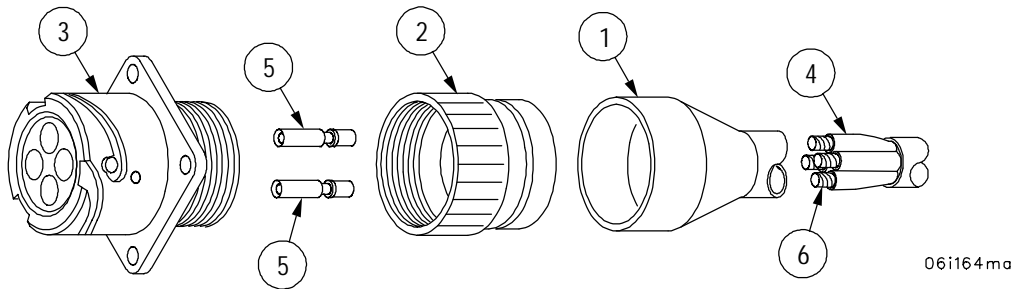
1. Heat and remove boot (1) from rear of nut (2).
2. Remove nut (2) from shell (3) and slide nut (2) over cable (4).
3. Drive socket contacts (5) out through rear of shell (3) with socket extractors.
4. Unsolder or cut socket contacts (5) from cable leads (6).



WIRING HARNESS AND CABLE REPAIR - CONTINUED

Assembly - Typical Female - Type Panel Mounting Receptacle

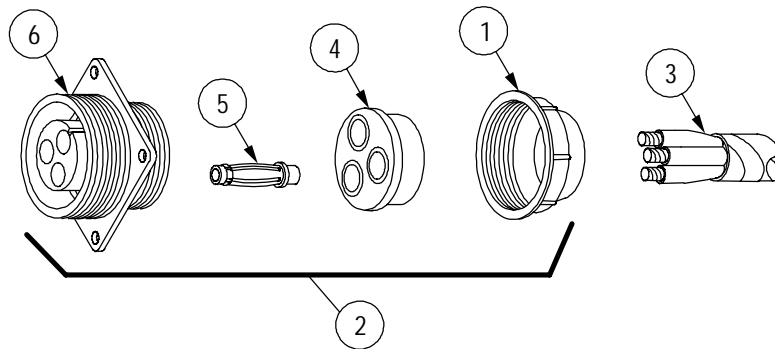
1. Strip leads (6) insulation equal to depth of wells in socket contacts (5).
2. Insert leads (6) into wells in socket contacts (5) and solder or crimp leads (6) to contacts (5).
3. Push socket contacts (5) into shell (3) from rear until seated.
4. Install nut (2) on shell (3).
5. Apply a thin coat of adhesive to boot (1).
6. Install boot (1) on nut (2).



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Disassembly - Typical Female - Type Panel Mounting Receptacle with Ridged Locking Nut

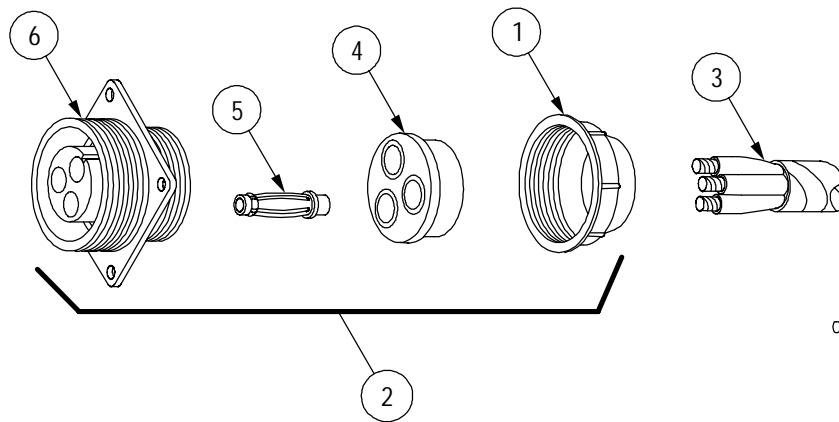
1. Unscrew nut (1) from shell assembly (2) and slide back on cable (3).
2. Slide grommet (4) back on cable (3) leads.
3. Drive socket contacts (5) out through rear of shell (6) with socket extractors.
4. Unsolder leads from socket contacts (5).



06i164ma

WIRING HARNESS AND CABLE REPAIR - CONTINUED**Assembly - Typical Female - Type Panel Mounting Receptacle with Ridged Locking Nut**

1. Strip cable (3) insulation equal to depth of wells in socket contacts (5).
2. Slide nut (1) onto cable (3).
3. Slide grommet (4) over cable (3) leads.
4. Insert cable (3) leads into wells of socket contacts (5) and solder.
5. Push socket contacts (5) into shell (6) from rear until seated.
6. Push grommet (4) down cable (3) leads and over wells of socket contacts (5).
7. Screw nut (1) onto shell assembly (2).



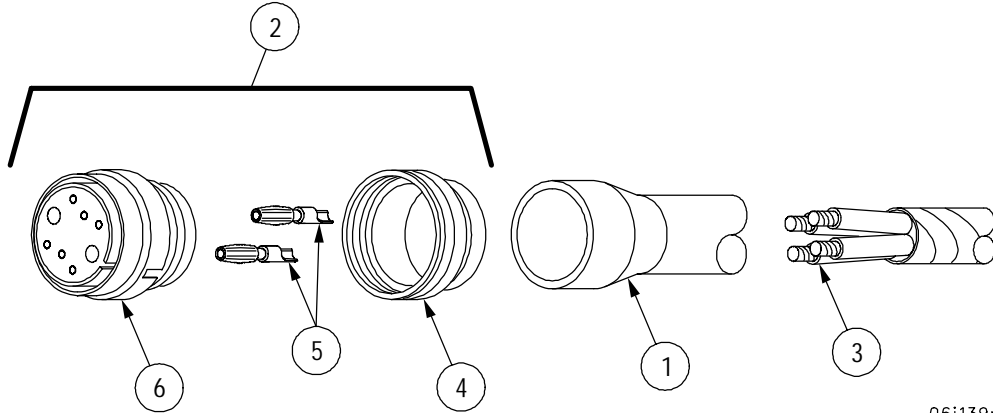
06i164mb

WIRING HARNESS AND CABLE REPAIR - CONTINUED**Disassembly - Typical Female - Type Plug with Ridged Locking Nut**

1. Heat boot (1) on shell assembly (2) and roll back on cable (3).
2. Unscrew nut (4) from shell assembly (2) and slide back on cable (3).
3. Drive socket contacts (5) out through rear of shell (6) with socket extractors.
4. Unsolder or cut leads from socket contacts (5).

Assembly - Typical Female - Type Plug with Ridged Locking Nut

1. Strip cable (3) insulation equal to depth of wells in socket contacts (5).
2. Slide nut (4) onto cable (3).
3. Insert cable (3) leads into wells of socket contacts (5) and solder or crimp.
4. Push socket contacts (5) into shell (6) from rear until seated.
5. Screw nut (4) onto shell assembly (2).
6. Apply a thin even layer of adhesive to shell assembly (2) and roll boot (1) onto shell assembly (2).



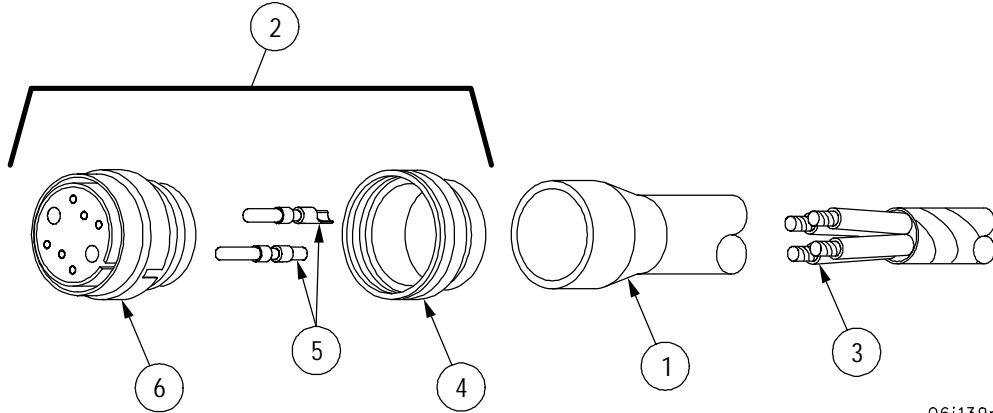
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WIRING HARNESS AND CABLE REPAIR - CONTINUED**Disassembly - Typical Male - Type Plug with Ridged Locking Nut**

1. Heat boot (1) on shell assembly (2) and roll back on cable (3).
2. Unscrew nut (4) from shell assembly (2) and slide back on cable (3).
3. Drive pin contacts (5) out through rear of shell (6) with pin extractors.
4. Unsolder or cut cable (3) leads from pin contacts (5).

Assembly - Typical Male - Type Plug with Ridged Locking Nut

1. Strip cable (3) insulation equal to depth of wells in pin contacts (5).
2. Slide nut (4) onto cable (3).
3. Insert cable (3) leads into wells of pin contacts (5) and solder or crimp.
4. Push pin contacts (5) into shell (6) from rear until seated.
5. Screw nut (4) onto shell assembly (2).
6. Apply a thin even layer of adhesive to shell assembly (2) and roll boot (1) onto shell assembly (2).



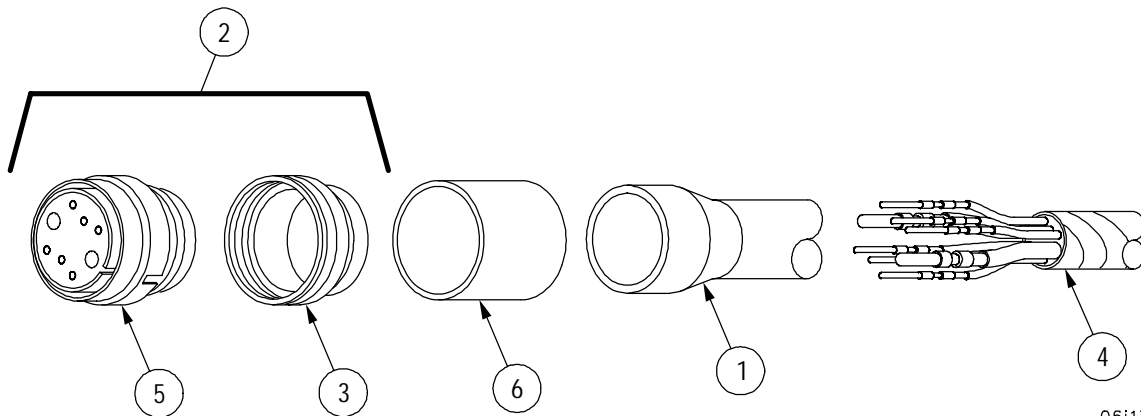
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WIRING HARNESS AND CABLE REPAIR - CONTINUED**0043 00****Disassembly - Waterproofing Connectors on Wiring Harnesses 3W200, 3W201, 3W206, 3W207, 5W902 and 5W903**

1. Heat boot (1) on shell assembly (2) and roll back on cable (4).
2. Unscrew nut (3) from connector (5) and slide back on cable (4).

Assembly - Waterproofing Connectors on Wiring Harnesses 3W200, 3W201, 3W206, 3W207, 5W902 and 5W903

1. Apply sealing compound on threads of shell assembly (2).
2. Screw nut (3) onto connector (5).
3. Apply an even layer of adhesive (item 56, WP 0087 00) on the shell assembly (2) and roll boot (1) onto shell assembly (2). Ensure the cavity between the shell assembly (2) and the boot (1) is filled with adhesive (item 56, WP 0087 00).
4. Place a three-inch long heat shrinkable sleeving (6) over at least a quarter of the nut (3) to half way down the boot assembly (1).
5. Using a heat gun, heat sleeving (6) until a water tight fit is achieved. Shim sleeving as needed to attain a water tight fit.



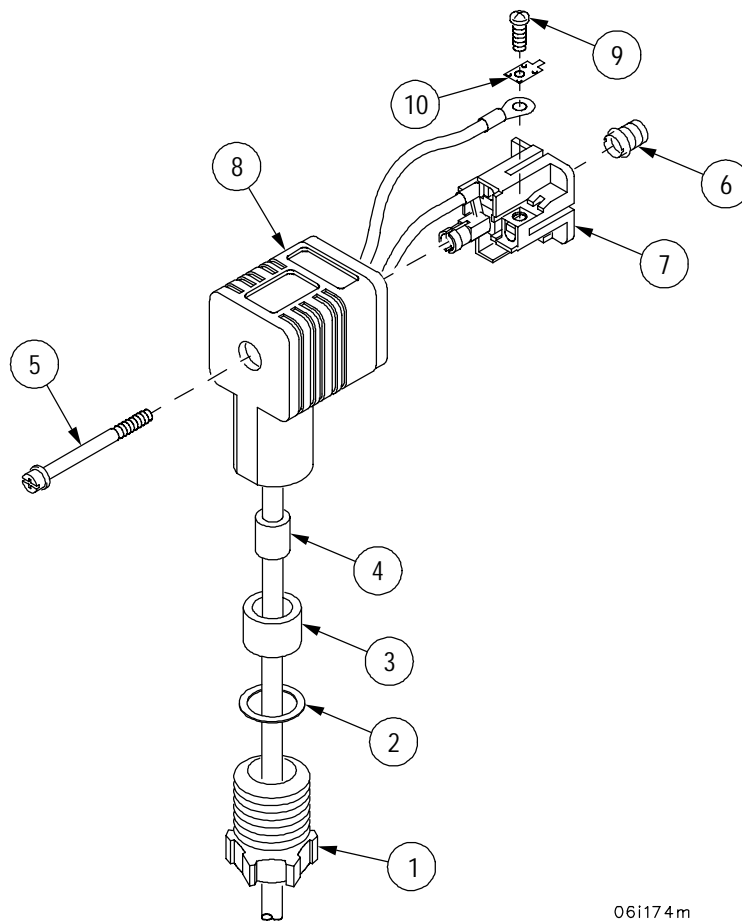
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WIRING HARNESS AND CABLE REPAIR - CONTINUED**Disassembly - Connector Repair Instructions for Connector 12477603**

1. Unscrew retaining plug (1) and slide plug (1), washer (2) and rubber gaskets (3 and 4) back about 6 inches on the cable lead.
2. Remove screw (5) and nut (6).
3. Slide connector body (7) out of connector housing (8) until terminals are exposed.
4. Remove screw (9) and washer (10) to remove connector leads.

Assembly - Connector Repair Instructions for Connector 12477603

1. Install connector leads on terminals with washer (10) and screw (9).
2. Slide terminals into connector body (7) and secure connector body to connector housing with screw (5) and nut (6).
3. Slide cable leads into rubber gaskets (3 and 4) and install washer (2) into retaining plug (1).



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WIRING HARNESS AND CABLE REPAIR - CONTINUED

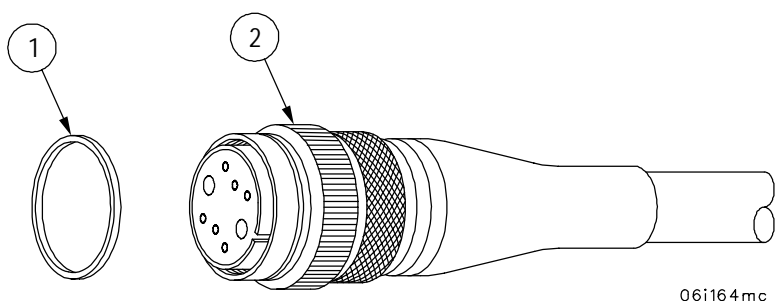
0043 00

Connector Gasket Replacement Instruction and Tabulation For Wiring Harnesses 3W180, 3W702, 3W704, 3W710, 3W711 and 4W136.

NOTE

This information pertains only to connectors MS3459W16-12S, MS3459W22-23S, MS3459W32-51P, MS3459W32-15S, MS3459W22-2S, MS3459W16-11P, and MS3459W16-10S installed on the above listed wiring harnesses.

1. Remove gasket (1) from connector (2). Discard gasket.
2. See tabulation matrix below for connector and gasket replacement information.
3. Install new gasket (1) on connector (2). Ensure that new gasket has no bends or kinks after installation.



TABULATION MATRIX				
NEW CONNECTOR PART NUMBER	SHELL SIZE	CONNECTOR	REPLACEMENT GASKET	WIRING HARNESS PART NUMBER
1266884-1	16	MS3459W16-12S	12366883-1	12366218
1266884-2	22	MS3459W22-23S	12366883-2	12448200
1266884-3	32	MS3459W32-15P	12366883-3	12448201 12448208
1266884-4	32	MS3459W32-15S	12366883-3	12448207
1266884-5	22	MS3459W22-2S	12366883-2	12366218
1266884-6	16	MS3459W16-11P	12366883-1	12448201
1266884-7	16	MS3459W16-10S	12366883-1	12448202

END OF TASK

CHAPTER 7

TRANSMISSION

TRANSMISSION CONTROL ASSEMBLY REPAIR**0044 00****THIS WORK PACKAGE COVERS:**

Disassembly, Assembly

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)

Hand arbor press (item 2, WP 0090 00)

Materials/Parts

Lockwashers (3) (item 2, WP 0091 00)

Lockwasher (item 1, WP 0091 00)

Seal (item 4, WP 0091 00)

Cotter pin (item 3, WP 0091 00)

Equipment Conditions

Transmission control assembly removed

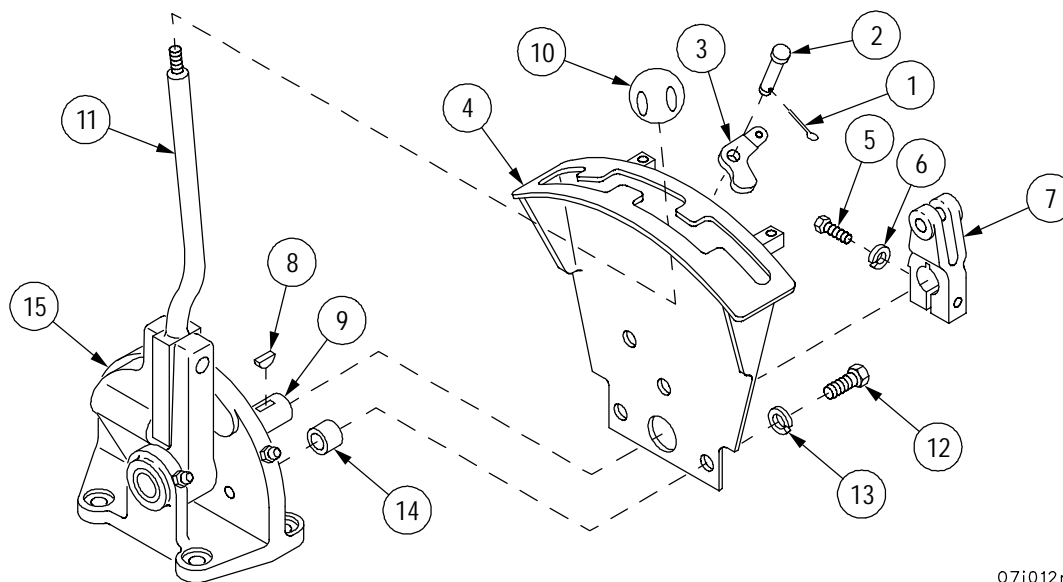
(TM 9-2350-292-20)

References

TM 9-2350-292-20

Disassembly

1. Remove cotter pin (1) from straight headed pin (2). Discard cotter pin.
2. Remove straight headed pin (2) and remote control lever (3) from guide control assembly (4).
3. Remove screw (5) and lockwasher (6) from remote control lever (7). Discard lockwasher.
4. Remove remote control lever (7) and woodruff key (8) from control assembly shaft (9).
5. Remove knob assembly (10) from transmission lever (11).
6. Remove three screws (12), three lockwashers (13), guide control assembly (4) and three sleeve spacers (14) from base assembly (15). Discard lockwashers.



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TRANSMISSION CONTROL ASSEMBLY REPAIR - CONTINUED**0044 00****Disassembly-Continued**

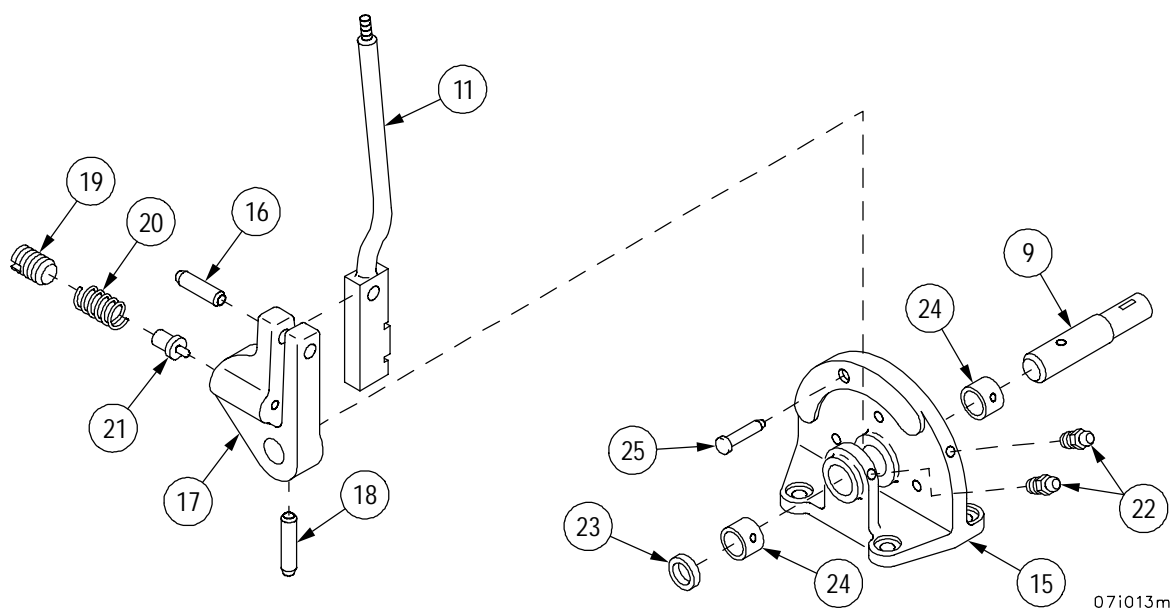
7. Remove headless pin (16) from transmission lever (11).
8. Remove transmission lever (11) from segment assembly (17).
9. Remove headless pin (18) from segment assembly (17).
10. Remove control assembly shaft (9) and segment assembly (17) from base assembly (15).
11. Remove setscrew (19), spring (20) and detent plunger (21) from segment assembly (17).
12. Remove two lubrication fittings (22) from base assembly (15).
13. Remove seal (23), two sleeve bearings (24) and headed pin (25) from base assembly (15). Discard seal.
14. Inspect parts for damage and replace as required.

Assembly**NOTE**

Components must be replaced if worn, pitted, cracked or if any damage is evident.

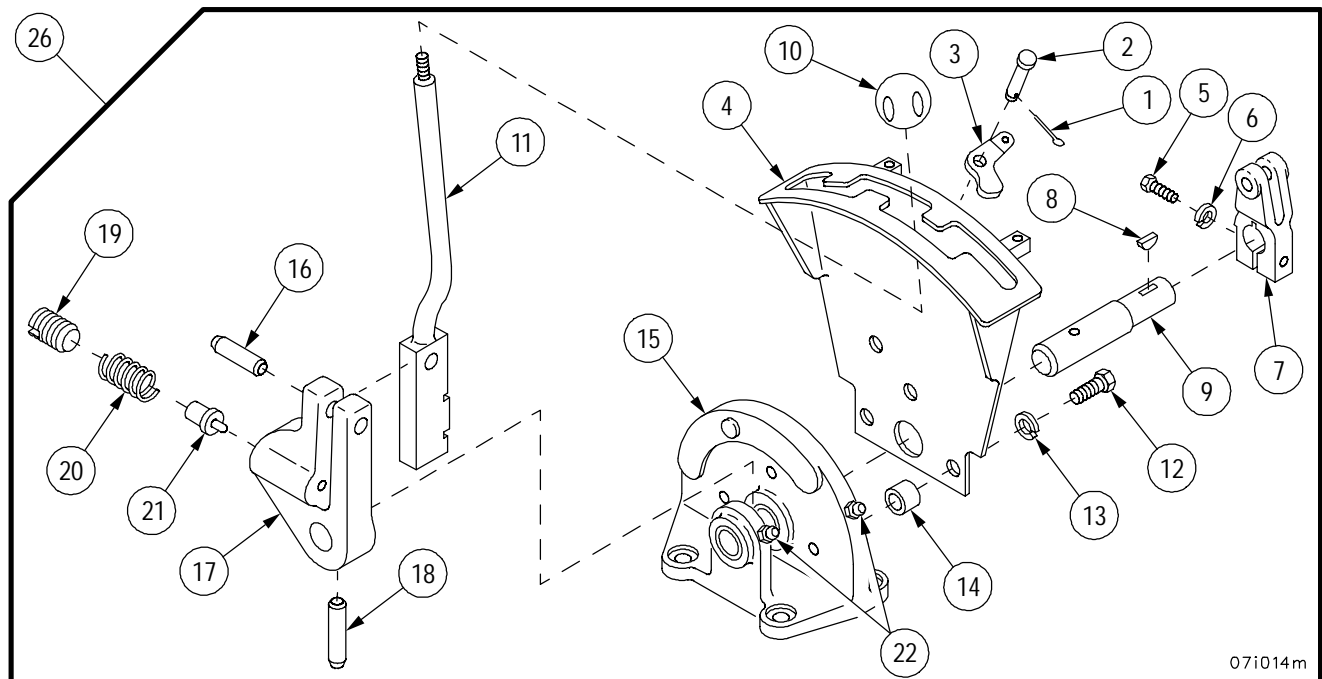
Seal must be installed with rubber lip facing outward from base.

1. Install headed pin (25), two sleeve bearings (24) and new seal (23) in base assembly (15).
2. Install two lubrication fittings (22) in base assembly (15).



TRANSMISSION CONTROL ASSEMBLY REPAIR - CONTINUED**0044 00****Assembly-Continued**

3. Install detent plunger (21), spring (20) and setscrew (19) in segment assembly (17).
4. Install segment assembly (17) in base assembly (15) with control assembly shaft (9).
5. Install headless pin (18) in segment assembly (17).
6. Install transmission lever (11) in segment assembly (17) with headless pin (16).
7. Install guide control assembly (4) on base assembly (15) with three screws (12), three new lockwashers (13) and three sleeve spacers (14).
8. Install knob assembly (10) on transmission lever (11).
9. Install woodruff key (8) and remote control lever (7) on control assembly shaft (9) with screw (5) and new lockwasher (6).
10. Install remote control lever (3) in guide control assembly (4) with straight headed pin (2) and new cotter pin (1).
11. Lubricate transmission control assembly (26) in accordance with TM 9-2350-292-20.

**NOTE**

FOLLOW-ON MAINTENANCE:
Install transmission control assembly
(TM 9-2350-292-20)

END OF TASK

CHAPTER 8

WINCHES, SPADE AND HOIST BOOM

HOIST WINCH ASSEMBLY AND SUPPORTS REPLACEMENT

0045 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- Socket wrench handle (item 4, WP 0090 00)
- Socket wrench handle (item 5, WP 0090 00)
- Socket wrench extension (item 6, WP 0090 00)
- Socket wrench socket (item 7, WP 0090 00)
- Socket wrench socket (item 8, WP 0090 00)
- Endless sling (item 30, WP 0090 00)
- Suitable lifting device (1,500 lbs (681 kg) min cap)
- Socket wrench socket (item 53, WP 0090 00)
- Torque wrench (item 38, WP 0090 00)
- Torque wrench multiplier (item 39, WP 0090 00)

Materials/Parts

- Lockwashers (4) (item 27, WP 0091 00)
- Lockwashers (20) (item 26, WP 0091 00)

Equipment Conditions

- Commander's cupola and mounting plate removed (TM 9-2350-292-20)
- Commander's seat removed (TM 9-2350-292-20)
- Wire rope shield removed (TM 9-2350-292-20)
- Subfloor plates removed (TM 9-2350-292-20)
- Interior stowage baskets and supports removed (TM 9-2350-292-20)
- Hoist winch light removed (TM 9-2350-292-20)

Equipment Conditions-Continued

- Smoke grenade launcher control box removed (TM 9-2350-292-20)
- Commander's intercom box removed (TM 11-5820-890-20-1)
- Hoist winch hydraulic hoses removed (TM 9-2350-292-20)
- Cable from boom and 35-ton hook block rigging removed (TM 9-2350-292-10)
- Main winch and spade assembly removed (TM 9-2350-292-20)
 - For maintenance of front support
- Fire extinguisher lines disconnected (TM 9-2350-292-20)
- Brake linkage disconnected (TM 9-2350-292-20)
- Brake pump, brake cylinder and accumulator removed (TM 9-2350-292-20)
 - For maintenance of front and rear supports

Personnel Required

Four

References

- TM 9-2350-292-10
- TM 9-2350-292-20
- TM 11-5820-890-20-1

NOTE

Perform Removal steps 1, 2 and 8 and Installation steps 6 through 8 for maintenance of hoist winch.

Perform Removal steps 1 through 5 and 8 and Installation steps 3 through 8 for maintenance of front support.

Perform Removal steps 1 through 3, 6 through 8 and Installation steps 1, 2, 5 and 6 through 8 for maintenance of rear support.

HOIST WINCH ASSEMBLY AND SUPPORTS REPLACEMENT - CONTINUED

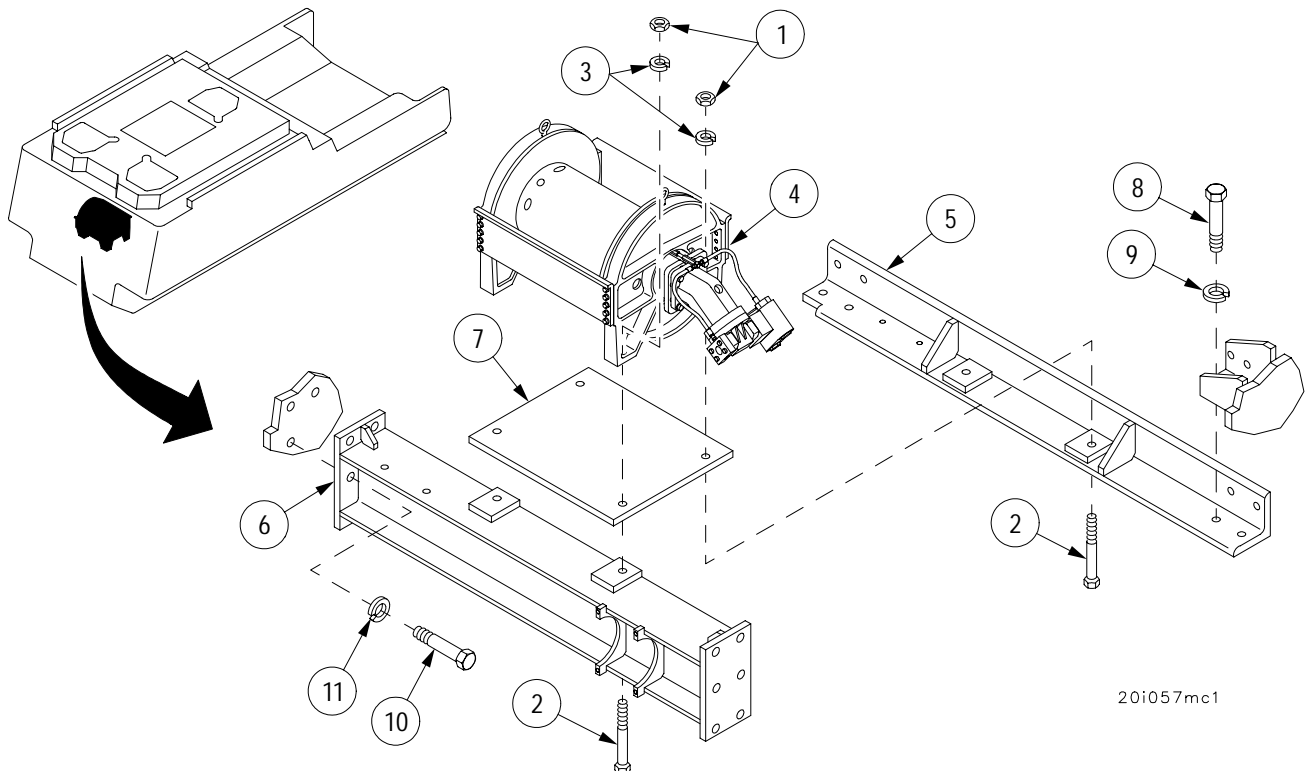
0045 00

Removal

1. Remove four nuts (1), four screws (2) and four lockwashers (3) securing hoist winch (4) to supports (5 and 6) and plate (7). Discard lockwashers.



2. Using endless sling and suitable lifting device, remove hoist winch (4) from supports (5 and 6) and plate (7).
3. Remove plate (7) from supports (5 and 6).
4. Remove eight screws (8) and eight lockwashers (9) securing front support (5) to hull. Discard lockwashers.
5. Using endless sling and suitable lifting device, remove front support (5) from vehicle.
6. Remove 12 screws (10) and 12 lockwashers (11) securing rear support (6) to hull. Discard lockwashers.
7. Using endless sling and suitable lifting device, remove rear support (6) from vehicle.
8. Inspect parts for damage and replace as required.

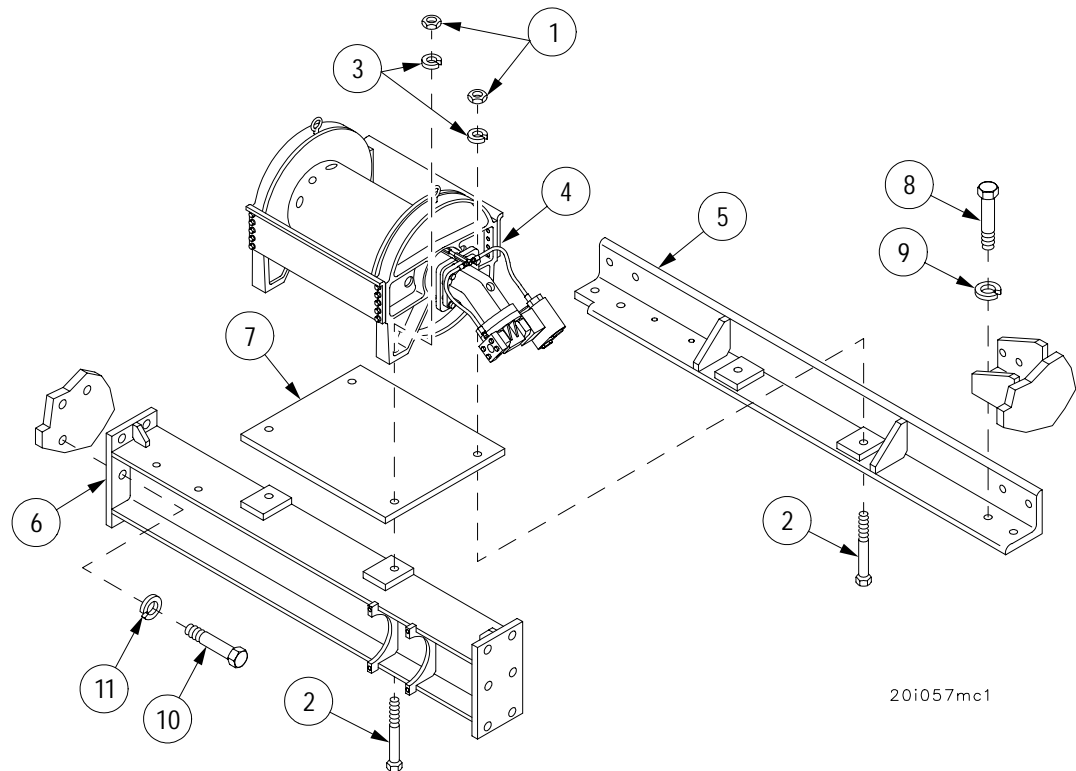


20i057mc1

Installation



1. Using endless sling and suitable lifting device, install rear support (6) in vehicle.
2. Secure rear support (6) to hull with 12 screws (10) and 12 new lockwashers (11).
3. Using endless sling and suitable lifting device, install front support (5) in vehicle.
4. Secure front support (5) to hull with eight screws (8) and eight new lockwashers (9).
5. Install plate (7) on supports (5 and 6).
6. Using endless sling and suitable lifting device, install hoist winch (4) in vehicle.
7. Secure hoist winch (4) to supports (5 and 6) and plate (7) with four screws (2), four new lockwashers (3) and four nuts (1). Torque four nuts to 600-700 lb-ft (814-949.2 Nsm).
8. Check and fill hydraulic reservoir (TM 9-2350-292-20).



20i057mc1

HOIST WINCH ASSEMBLY AND SUPPORTS REPLACEMENT - CONTINUED**Installation-Continued****NOTE****FOLLOW-ON MAINTENANCE:**

Install brake pump, brake cylinder and accumulator, if removed (TM 9-2350-292-20)
Connect brake linkage, if disconnected (TM 9-2350-292-20)
Connect fire extinguisher lines, if disconnected (TM 9-2350-292-20)
Install main winch and spade assembly, if removed (TM 9-2350-292-20)
Install hoist winch hydraulic hoses (TM 9-2350-292-20)
Operate hoist winch and check for proper operation (TM 9-2350-292-10)
Install cable on boom and 35-ton hook block rigging (TM 9-2350-292-10)
Install commander's intercom box (TM 11-5820-890-20-1)
Install smoke grenade launcher control box (TM 9-2350-292-20)
Install hoist winch light (TM 9-2350-292-20)
Install interior stowage baskets and supports (TM 9-2350-292-20)
Install subfloor plates (TM 9-2350-292-20)
Install wire rope shield (TM 9-2350-292-20)
Install commander's seat (TM 9-2350-292-20)
Install commander's cupola and mounting plate (TM 9-2350-292-20)

END OF TASK

HOIST WINCH HYDRAULIC MOTOR REPLACEMENT**0046 00****THIS WORK PACKAGE COVERS:**

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)

Materials/Parts

Lockwashers (4) (item 63, WP 0091 00)

Lubricant (item 5, WP 0091 00)

Preformed packing (item 64, WP 0087 00)

Fibrous rope (item 46, WP 0087 00)

Equipment Conditions

Hoist winch assembly removed (WP 0045 00)

Hoist winch hose assemblies, fittings, adapters and manifolds removed (TM 9-2350-292-20)

Personnel Required

Two

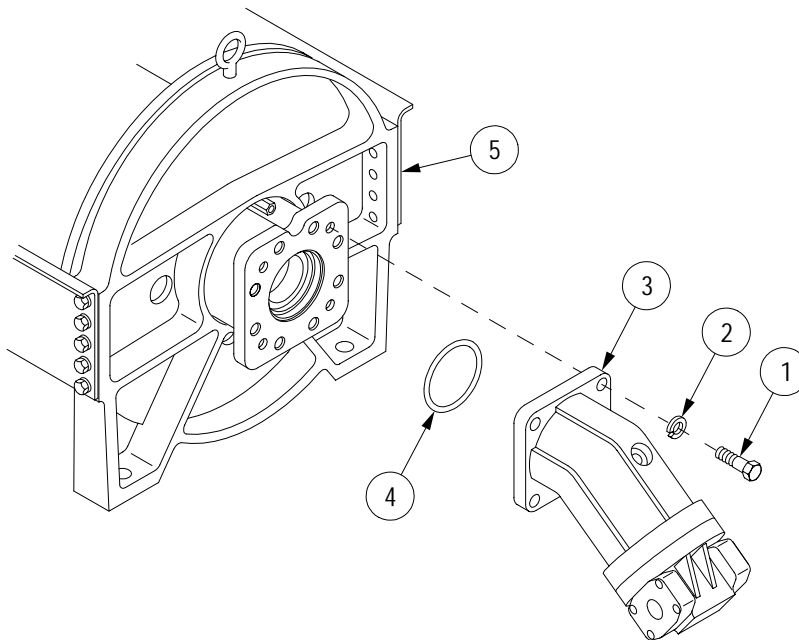
References

TM 9-2350-292-20

Removal**NOTE**

Secure motor with fibrous rope for ease of removal.

1. Remove four screws (1), four lockwashers (2), hoist winch motor (3) and preformed packing (4) from hoist winch (5). Discard lockwashers and preformed packing.
2. Drain lubricant from hoist winch motor (3).
3. Inspect parts for damage and replace as required.

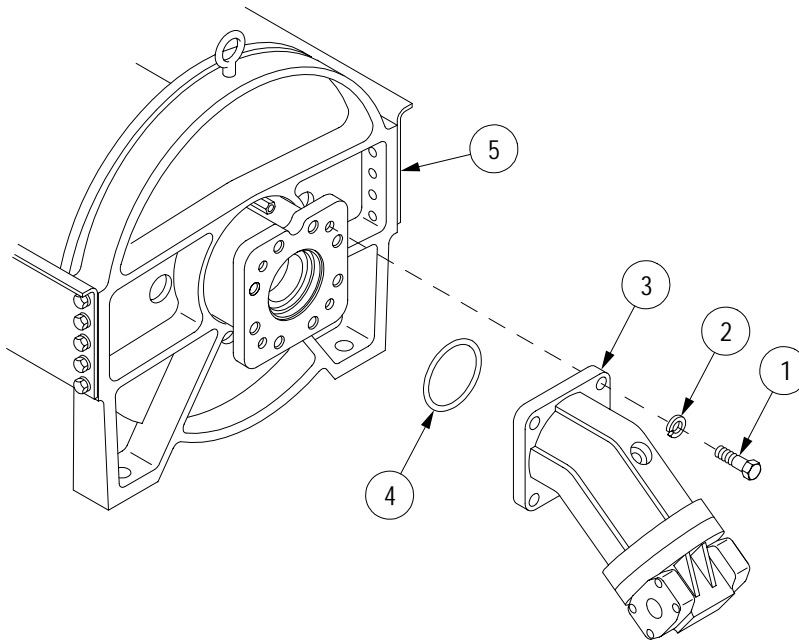


20i058mc1

HOIST WINCH HYDRAULIC MOTOR REPLACEMENT - CONTINUED**0046 00****Installation****NOTE**

Secure motor with fibrous rope for ease of installation.

Install hoist winch motor (3) with new preformed packing (4) on hoist winch (5) with four screws (1) and four new lock-washers (2).



20i058mc1

NOTE**FOLLOW-ON MAINTENANCE:**

Install hoist winch hose assemblies, fittings, adapters and manifolds (TM 9-2350-292-20)

Install hoist winch assembly (WP 0045 00)

END OF TASK

MAIN WINCH REPLACEMENT

0047 00**THIS WORK PACKAGE COVERS:**

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit(item 1, WP 0090 00)
Torque wrench multiplier (item 39, WP 0090 00)
Torque wrench (item 38, WP 0090 00)
Lifting sling (item 9, WP 0090 00)
Nose piece stands (fabricated) (2) (item 54,
WP 0090 00)
Suitable lifting device (5,000 lbs (2,270 kg) min cap)
Socket wrench socket set (item 72, WP 0090 00)

Materials/Parts

Lubricant (item 27, WP 0087 00)
Hardwood lumber (item 45, WP 0087 00)

Equipment Conditions

Main winch wire rope removed(TM 9-2350-292-20)
Main winch and spade assembly removed
(TM 9-2350-292-20)
Hydraulic hoses from main winch removed
(WP 0063 00)

Personnel Required

Three

References

TM 9-2350-292-20

**WARNING****CAUTION**

Main winch components may be damaged during maintenance operations. Use care during replacement to prevent damage to equipment.

MAIN WINCH REPLACEMENT - CONTINUED**0047 00****Removal****CAUTION**

Make sure main winch and spade assembly is supported by lifting device when tilted forward.

1. Tilt main winch and spade assembly (1) forward onto nose piece to gain access to eight screws (2).

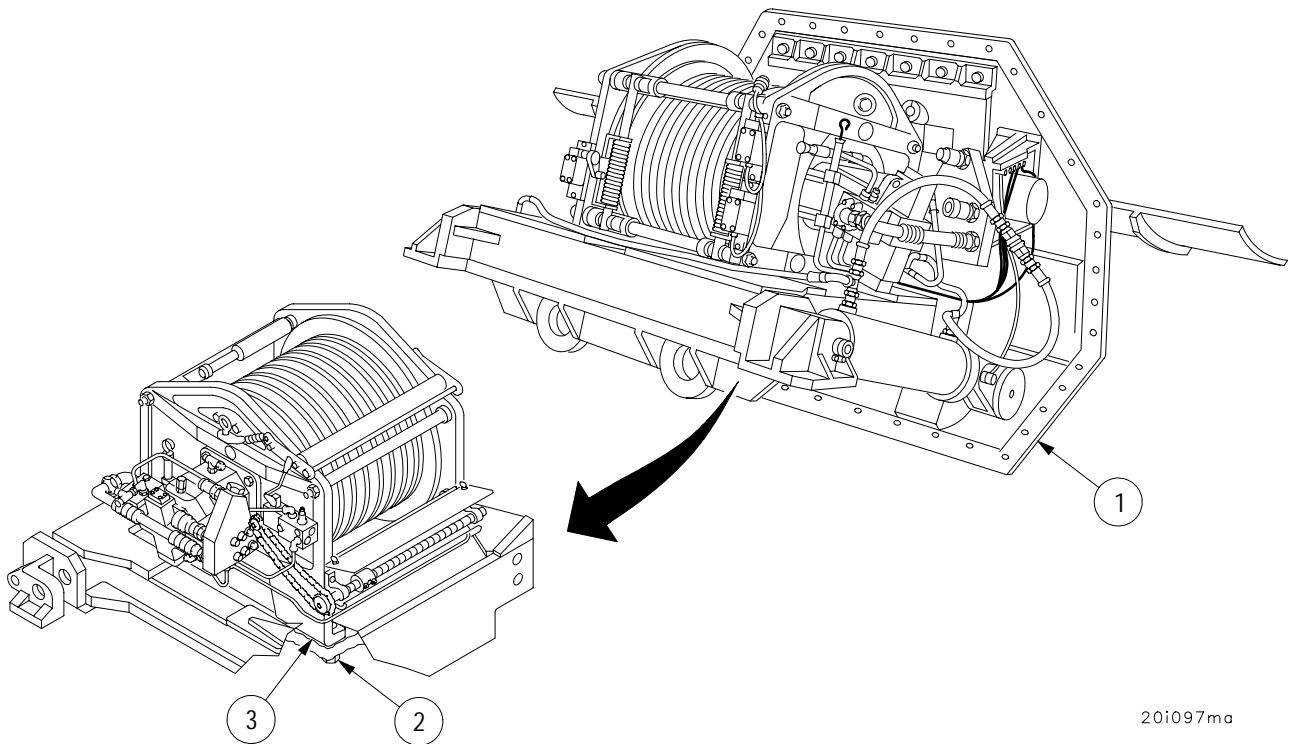
WARNING

Do not remove eight screws with winch and spade assembly in tilted position. Main winch will slide if screws are fully removed. Failure to comply could result in damage to equipment or injury to personnel.

NOTE

Eight screws are torqued to 1970-2100 lb-ft (2671-2848 NSm). Use torque wrench multiplier to loosen screws.

2. Loosen eight screws (2) from underside of main winch rails (3).



20i097ma

MAIN WINCH REPLACEMENT - CONTINUED**Removal-Continued****NOTE**

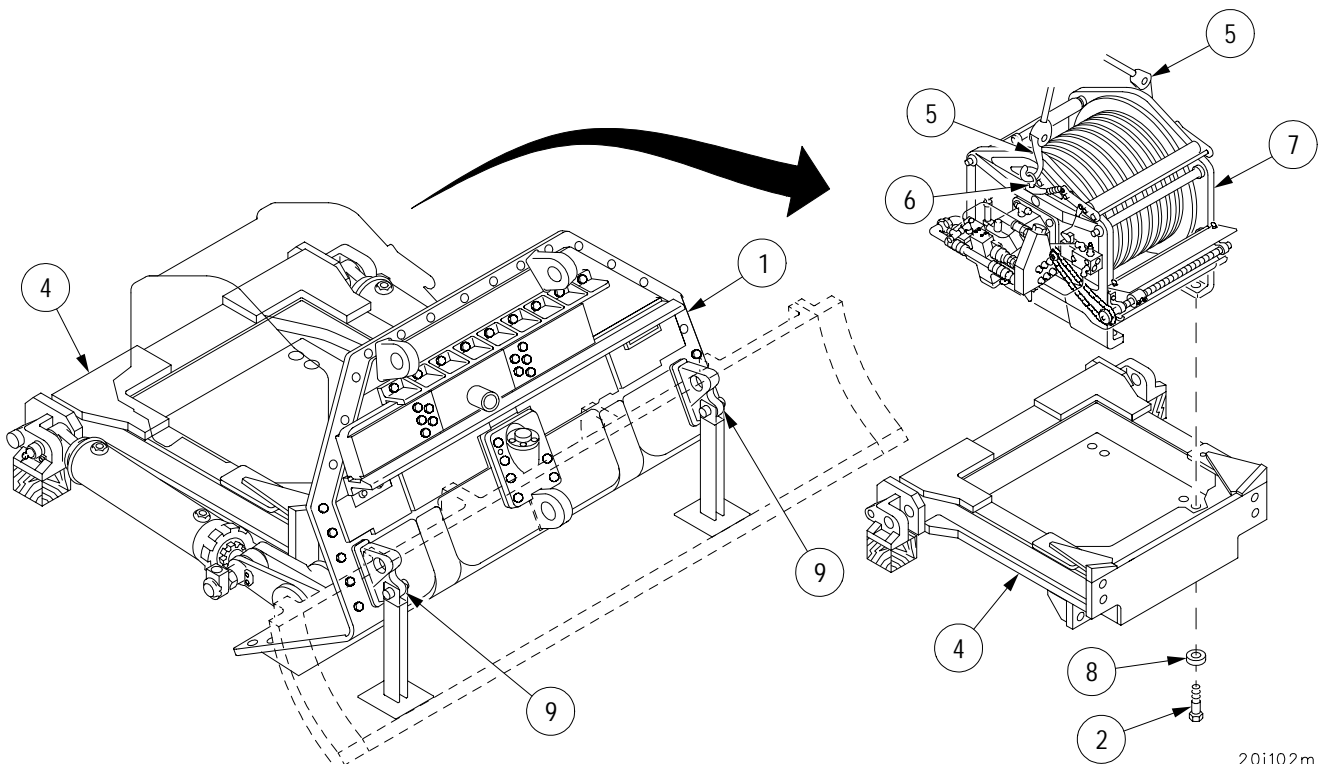
Main winch should be horizontal to floor before eight screws are removed.

3. Lift main winch and spade assembly (1), set blocks on outside corners of main winch support (4).
4. Connect sling lifting hooks (5) to two lifting eyes (6) on main winch (7).
5. Remove eight screws (2) and eight flat washers (8) from underside of main winch (7) and main winch support (4).

WARNING

To prevent injury to personnel and damage to main winch and spade assembly, block assembly to prevent tilting.

6. Install two nose piece stands on nose piece towing eyes (9).
7. Remove main winch (7) from main winch support (4).
8. Inspect parts for damage and replace as required.



20i102m

MAIN WINCH REPLACEMENT - CONTINUED

0047 00**Installation**

1. Connect lifting sling hooks (5) to two lifting eyes (6) on main winch (7).
2. Set main winch (7) on main winch support (4).
3. Apply lubricant to threads of eight screws (2), install eight screws (2) and eight flat washers (8) in main winch (7) through main winch support (4).
4. Remove nose piece fabricated stands from nose piece towing eyes (9).
5. Tilt main winch and spade assembly (1) forward onto blocks to access eight screws (2). Torque screws (2) to 1970-2100 lb-ft (2671-2848 Nsm).

NOTE**FOLLOW-ON MAINTENANCE:**

Install main winch hydraulic hoses (WP 0063 00)
Install main winch ground hop kit (TM 9-2350-292-20)
Perform main winch and cable guide synchronization adjustment (TM 9-2350-292-20)
Perform main winch drum and diamond screw synchronization adjustment (TM 9-2350-292-20)
Perform diamond screw centering adjustment (TM 9-2350-292-20)
Perform level wind limit switches adjustment (TM 9-2350-292-20)
Perform payout limit switch adjustment (TM 9-2350-292-20)
Perform layer limit switches adjustment (TM 9-2350-292-20)
Install main winch and spade assembly (TM 9-2350-292-20)

END OF TASK

MAIN WINCH REPAIR**0048 00****THIS WORK PACKAGE COVERS:**

Disassembly, Assembly

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
 Socket wrench set (item 33, WP 0090 00)
 Open-end wrench (item 46, WP 0090 00)
 Portable electric drill (item 67, WP 0090 00)
 Twist drill set (item 68, WP 0090 00)
 Retaining pliers set (item 3, WP 0090 00)

Materials/Parts

Lubricant (item 5, WP 0087 00)
 Sealing compound (item 20, WP 0087 00)
 Marker tags (AR) (item 26, WP 0087 00)
 Safety goggles (item 48, WP 0087 00)
 Headed pins (4) (item 85, WP 0091 00)
 Cotter pins (2) (item 86, WP 0091 00)
 Bushings (2) (item 91, WP 0091 00)
 Retaining ring (item 87, WP 0091 00)
 Preformed packings (2) (item 88, WP 0091 00)
 Preformed packing (item 89, WP 0091 00)
 Woodruff keys (2) (item 90, WP 0091 00)
 Lockwashers (2) (item 100, WP 0091 00)

Equipment Conditions

Main winch and spade assembly removed
 (TM 9-2350-292-20)
 Main winch wire rope removed
 (TM 9-2350-292-20)
 Roller mounting bracket removed (WP 0058 00)
 Main winch roller spring assembly
 removed (WP 0051 00)
 Main winch upper roller removed (WP 0052 00)
 Main winch lower roller removed (WP 0053 00)
 Main winch manifold, tubes, fittings and
 flange removed (WP 0054 00)

Personnel Required

Two

References

TM 9-2350-292-20

NOTE

Perform Disassembly step 1 and 45 and Assembly step 46 for maintenance of data plate.

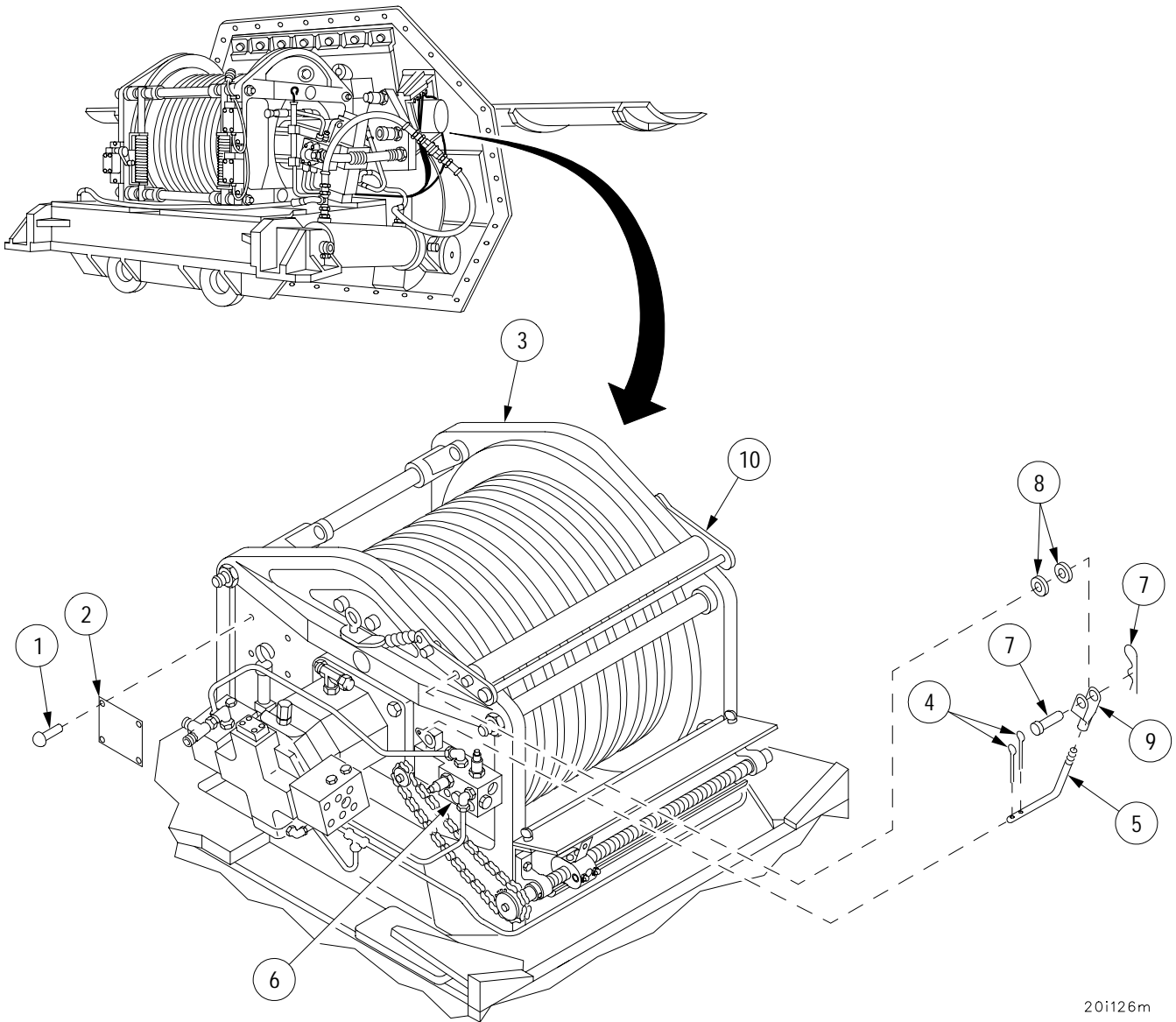
Perform Disassembly steps 2 through 8 and 45 and Assembly steps 39 through 45 for maintenance of lever assembly.

Perform Disassembly steps 9 through 15 and 45 and Assembly steps 32 through 38 for maintenance of diamond screw.

Perform Disassembly step 2 and steps 16 through 22 and 45 and Assembly steps 2, 25 through 31 and step 44 for maintenance of valve assembly.

MAIN WINCH REPAIR - CONTINUED**0048 00****Disassembly**

1. Remove four headed pins (1) and data plate (2) from main winch (3). Discard headed pins.
2. Remove two cotter pins (4) from linkage rod (5) and valve assembly (6). Discard cotter pins.
3. Remove headed pin assembly (7), two flat washers (8) and clevis (9) with linkage rod (5) from lever assembly (10) and valve assembly (6).



20i126m

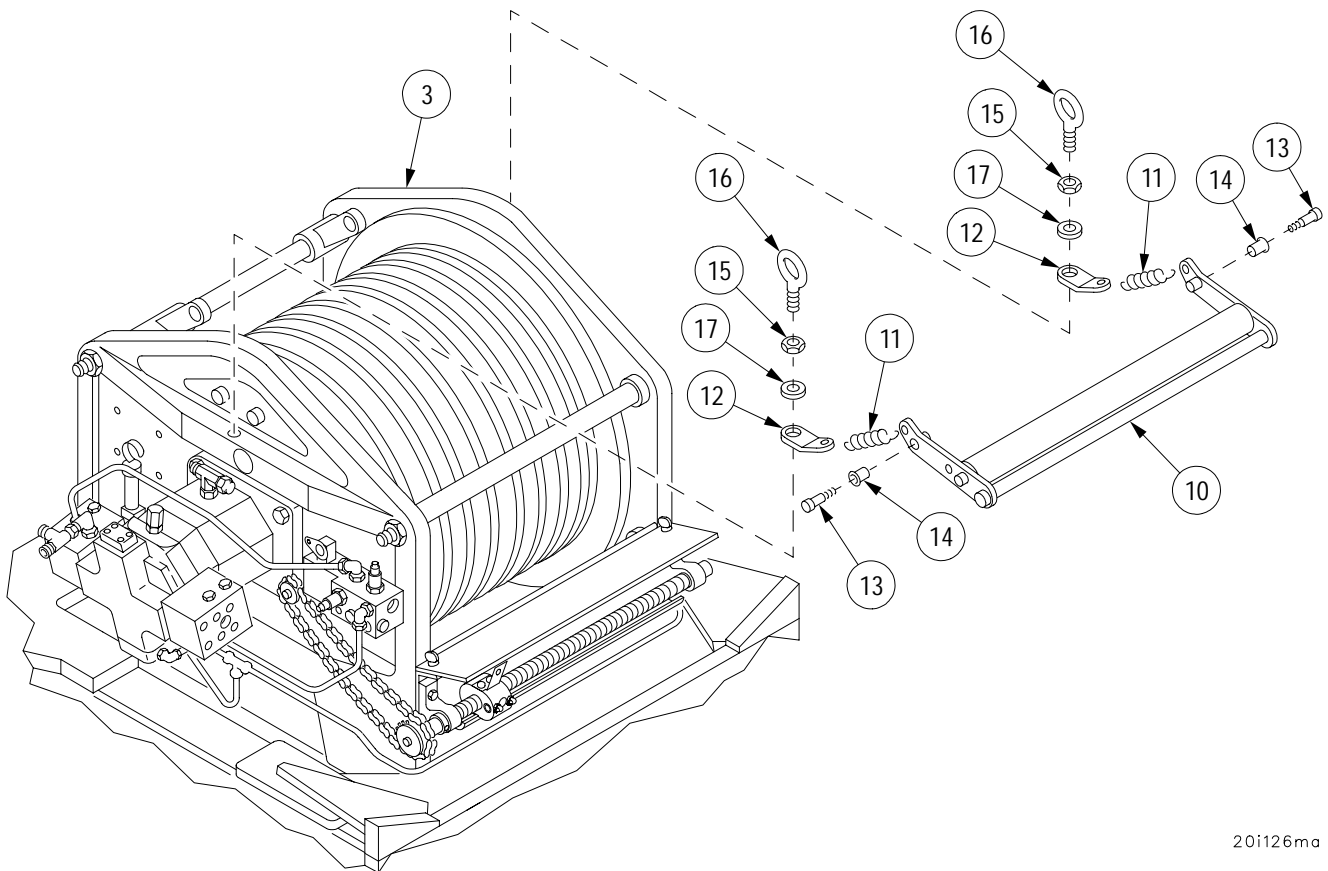
MAIN WINCH REPAIR - CONTINUED

Disassembly-Continued



Springs are under tension and can act as projectiles when released. Exercise extreme care when releasing spring tension. Failure to comply could cause injury or death to personnel.

4. Disconnect two springs (11) from lever assembly (10) and two plates (12).
5. Remove two screws (13), two bushings (14) and lever assembly (10) from main winch (3). Discard bushings.
6. Loosen two jam nuts (15).
7. Remove two eye bolts (16), two jam nuts (15), two flat washers (17) and two plates (12) from main winch (3).
8. Separate two eye bolts (16) from two jam nuts (15).



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MAIN WINCH REPAIR - CONTINUED

0048 00

Disassembly-Continued

9. Remove pin and clip (18) from drive chain (19), remove drive chain (19) from upper sprocket (20) and lower sprocket (21).
10. Remove setscrew (22), woodruff key (23) and upper sprocket (20) from main winch (3). Discard woodruff key.
11. Remove setscrew (24), woodruff key (25) and lower sprocket (21) from diamond screw (26). Discard woodruff key.
12. Remove two thumbscrews (27) from nutguard (28) cover and raise cover.
13. Remove four screws (29), four flat washers (30), two pillow blocks (31), diamond screw (26) and nut guard (28) from main winch (3).
14. Loosen two setscrews (32) and remove two pillow blocks (31) from diamond screw (26).



NOTE

Do not remove lubrication fittings and setscrews unless damaged.

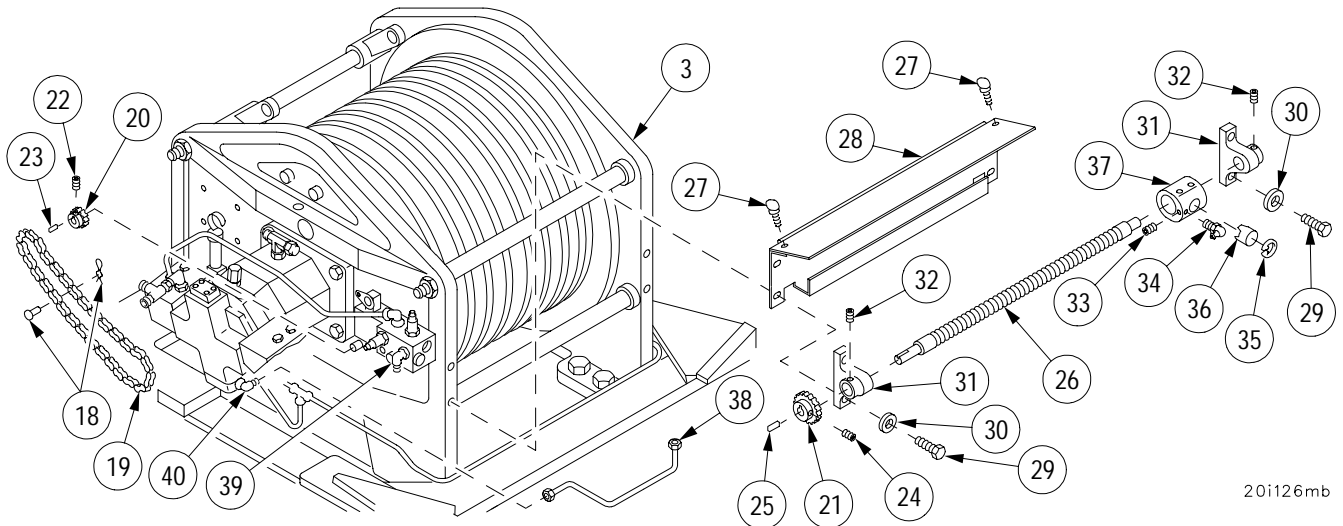
Note positions of lubrication fittings prior to removal to aid in installation.

15. Remove two setscrews (33) and two lubrication fittings (34) if damaged, retaining ring (35), follower nut (36) and tube follower (37) from diamond screw (26). Discard retaining ring.

NOTE

Tag all tube assemblies before disconnecting to aid in installation.

16. Disconnect tube (38) from elbow (39) and elbow (40).

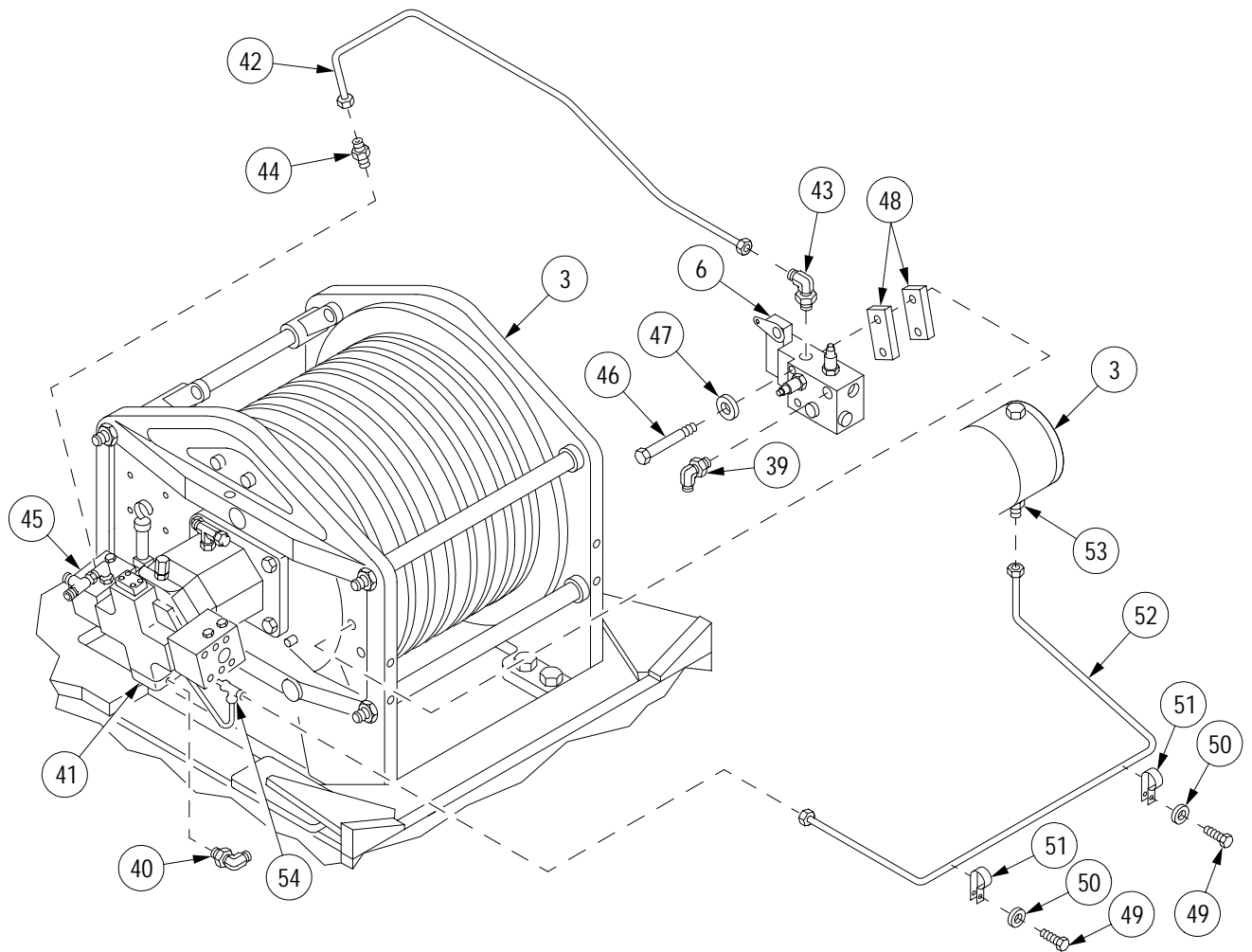


20i126mb

MAIN WINCH REPAIR - CONTINUED

Disassembly-Continued

17. Remove elbow (39) from valve assembly (6).
18. Remove elbow (40) from hydraulic motor (41).
19. Disconnect tube (42) from elbow (43) and connector (44).
20. Remove elbow (43) from valve assembly (6).
21. Remove connector (44) from counter-balance valve (45).
22. Remove two screws (46), two flat washers (47), valve assembly (6) and two spacers (48) from main winch (3).
23. Remove two screws (49), two flat washers (50) and two loop clamps (51) from tube (52).
24. Disconnect tube (52) from adapter (53) and tee (54).

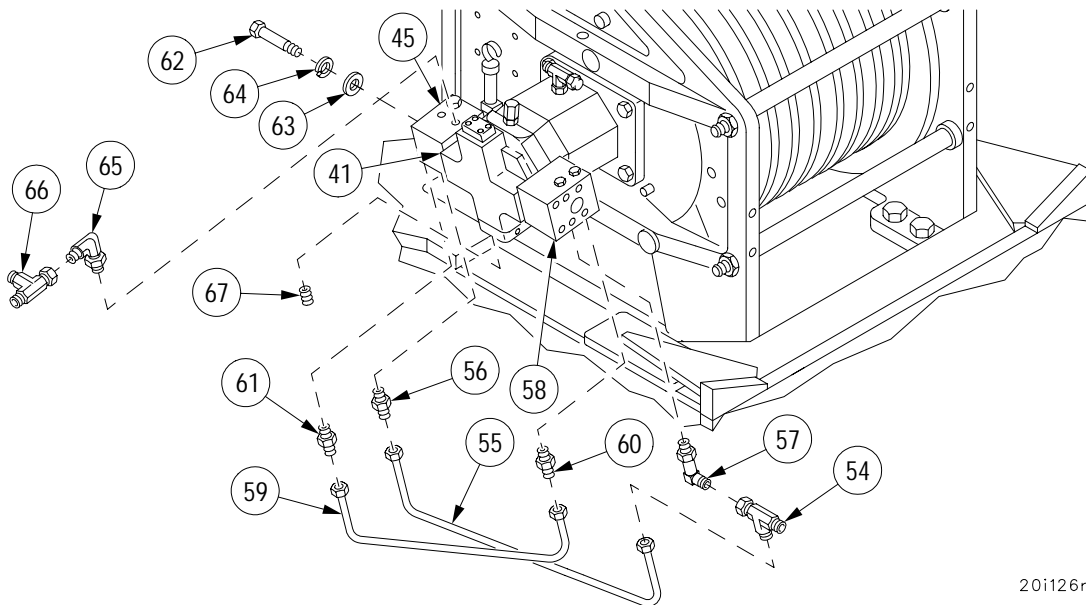


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MAIN WINCH REPAIR - CONTINUED

Disassembly-Continued

25. Remove tube (55) from tee (54) and connector (56).
26. Remove tee (54) from elbow (57).
27. Remove elbow (57) from relief valve (58).
28. Remove connector (56) from counter-balance valve (45).
29. Disconnect tube (59) from connector (60) and connector (61). Remove tube (59).
30. Remove connector (60) from relief valve (58).
31. Remove connector (61) from counter-balance valve (45).
32. Remove two screws (62), two flat washers (63), two lockwashers (64) and counterbalance valve (45). Discard lockwashers.
33. Remove elbow (65) from counter-balance valve (45).
34. Remove tee (66) from elbow (65).
35. Remove plug (67) from hydraulic motor (41).

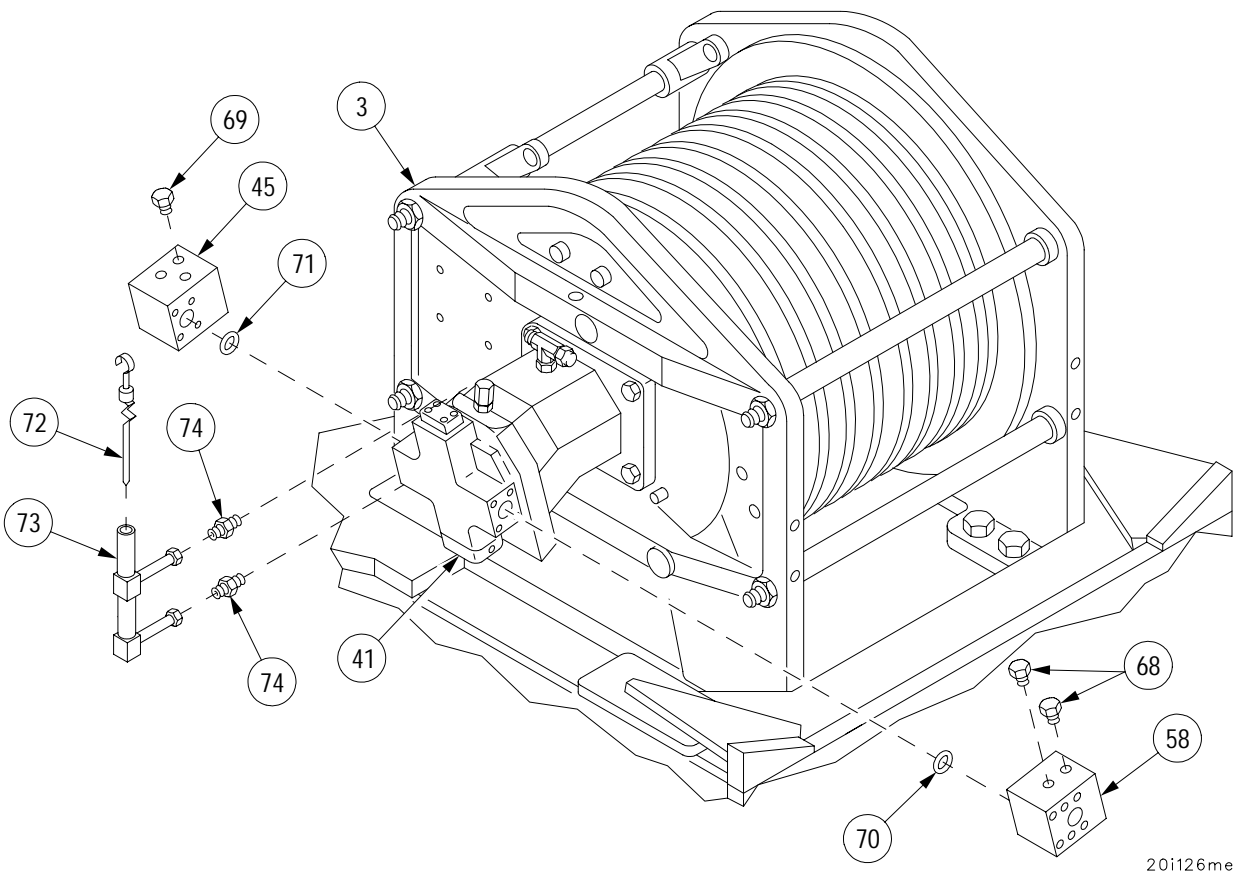


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MAIN WINCH REPAIR - CONTINUED

Disassembly-Continued

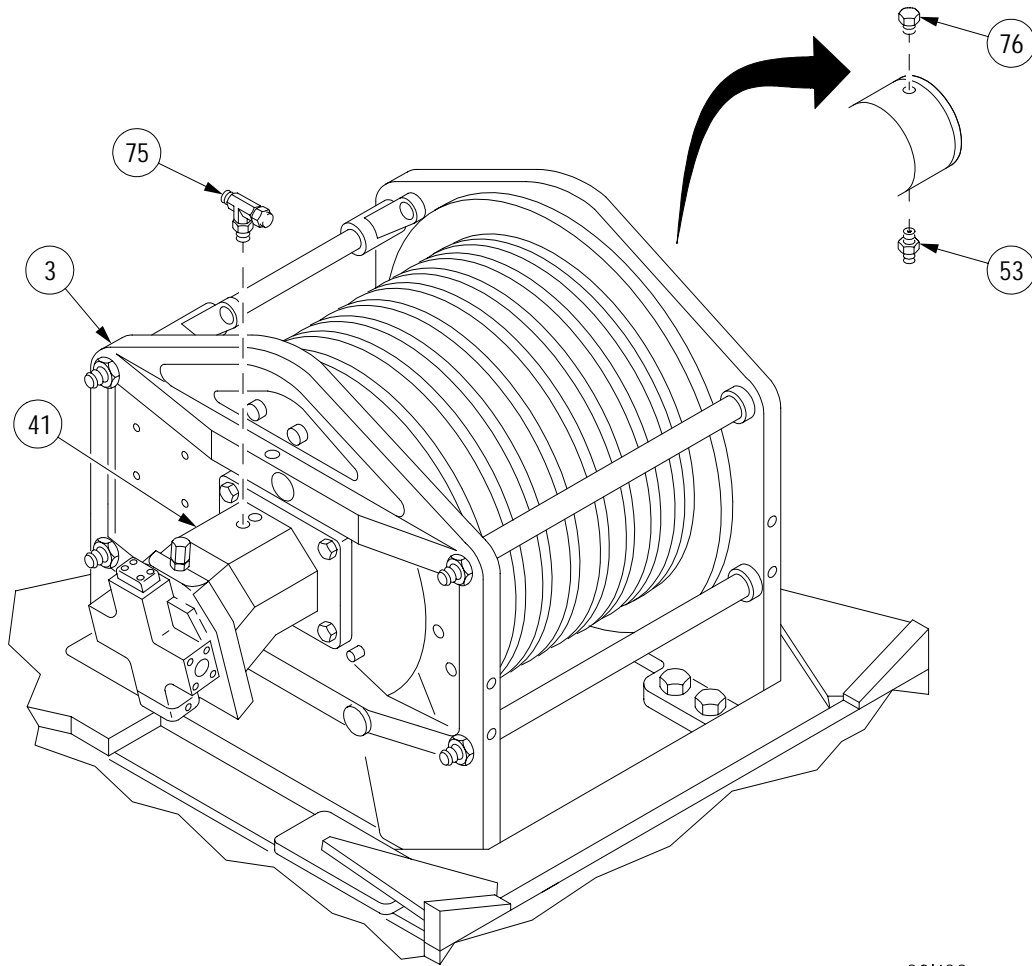
36. Remove two plugs (68) from relief valve (58).
37. Remove plug (69) from counter-balance valve (45).
38. Remove preformed packing (70) from hydraulic motor (41). Discard preformed packing.
39. Remove preformed packing (71) from hydraulic motor (41). Discard preformed packing.
40. Remove dipstick (72) from tube assembly (73).
41. Remove tube assembly (73) from two adapters (74).
42. Remove two adapters (74) from main winch (3).



20i126me

MAIN WINCH REPAIR - CONTINUED**0048 00****Disassembly-Continued**

43. Remove tee (75) from hydraulic motor (41).
44. Remove plug (76) and adapter (53) from main winch (3).
45. Inspect parts for damage and replace as required.

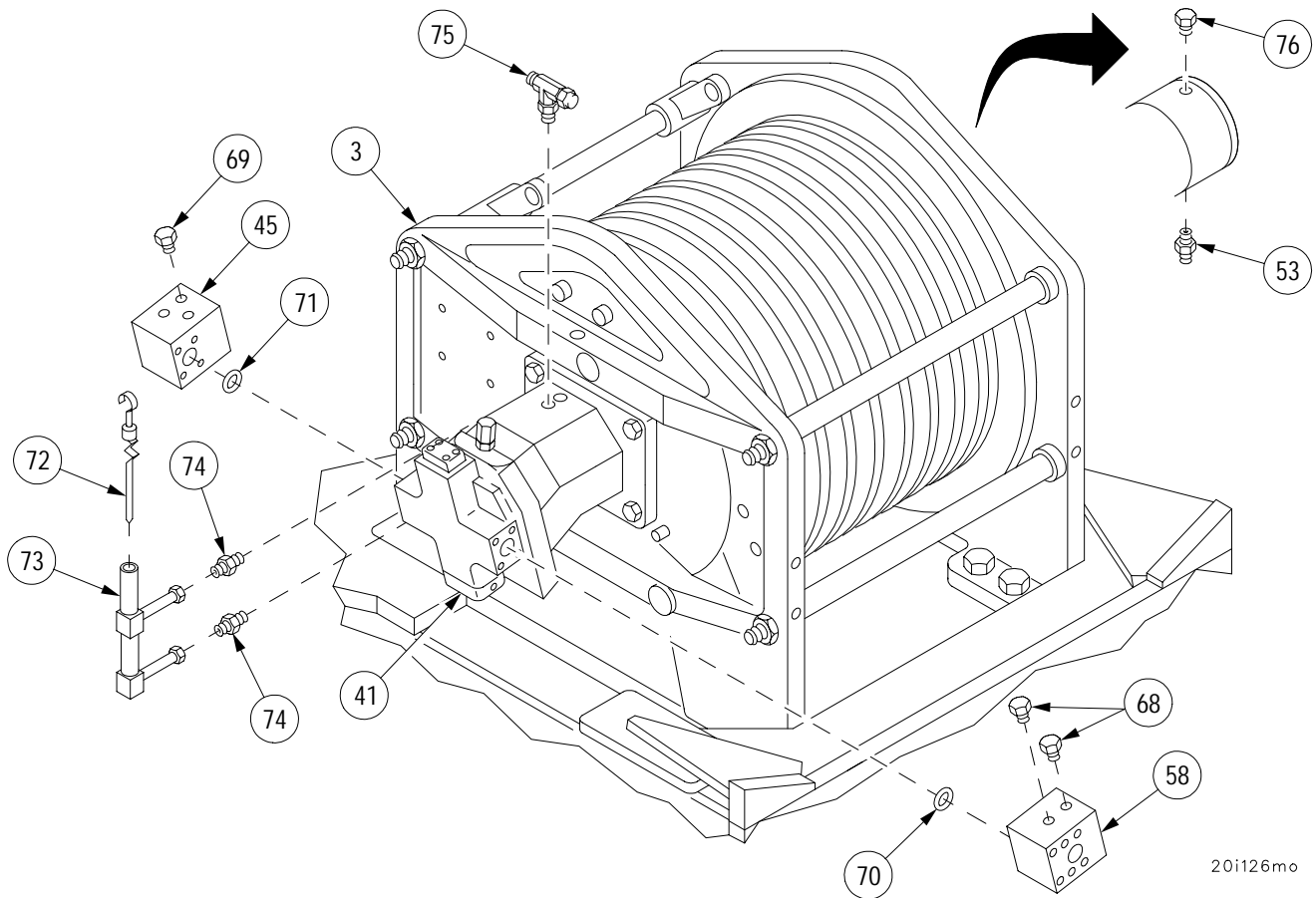


20i126mn

MAIN WINCH REPAIR - CONTINUED

Assembly

1. Install plug (76) and adapter (53) in main winch (3).
2. Apply sealing compound to all tube/fitting connections prior to installation.
3. Install tee (75) in hydraulic motor (41).
4. Install two adapters (74) in main winch (3).
5. Install tube assembly (73) on two adapters (74).
6. Install dipstick (72) in tube assembly (73).
7. Apply lubricant to all new preformed packings prior to installation.
8. Install new preformed packing (71) in hydraulic motor (41).
9. Install new preformed packing (70) in hydraulic motor (41).
10. Install plug (69) in counter-balance valve (45).
11. Install two plugs (68) in relief valve (58).

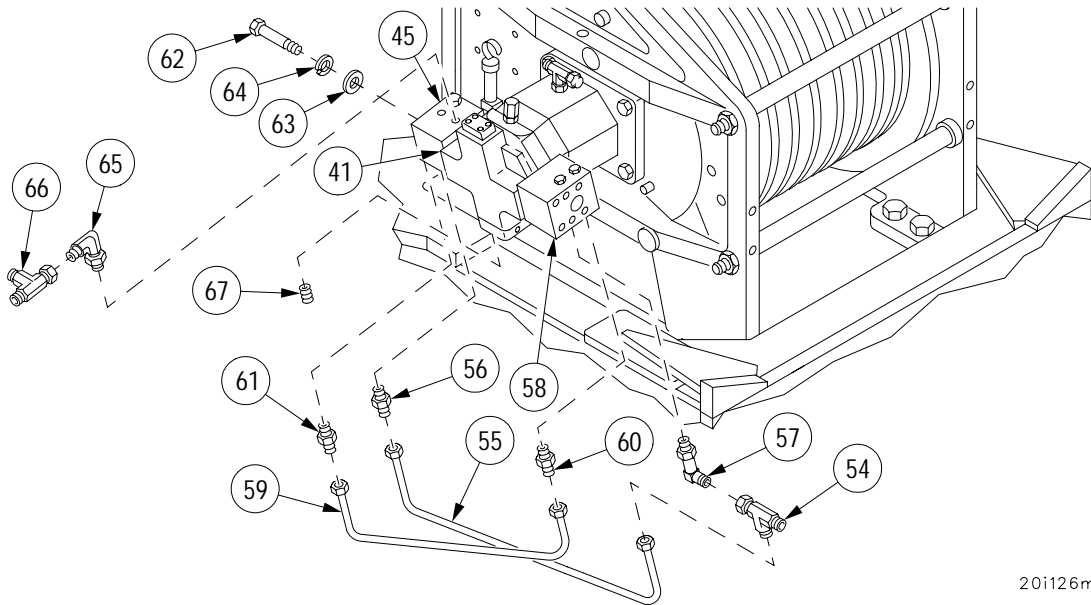


20i126mo

MAIN WINCH REPAIR - CONTINUED

Assembly-Continued

12. Install plug (67) in hydraulic motor (41).
13. Install elbow (65) in counter-balance valve (45).
14. Install tee (66) on elbow (65).
15. Install counter-balance (45) on hydraulic motor (41) with two screws (62), two new lockwashers (64) and two flat washers (63).
16. Install connector (61) in counter-balance valve (45).
17. Install connector (60) in relief valve (58).
18. Connect tube (59) to connector (60) on relief valve (58) and connector (61) on counter-balance valve (45).
19. Install connector (56) in counter-balance valve (45).
20. Install elbow (57) in relief valve (58).
21. Install tee (54) on elbow (57).
22. Install tube (55) on tee (54) and connector (56).

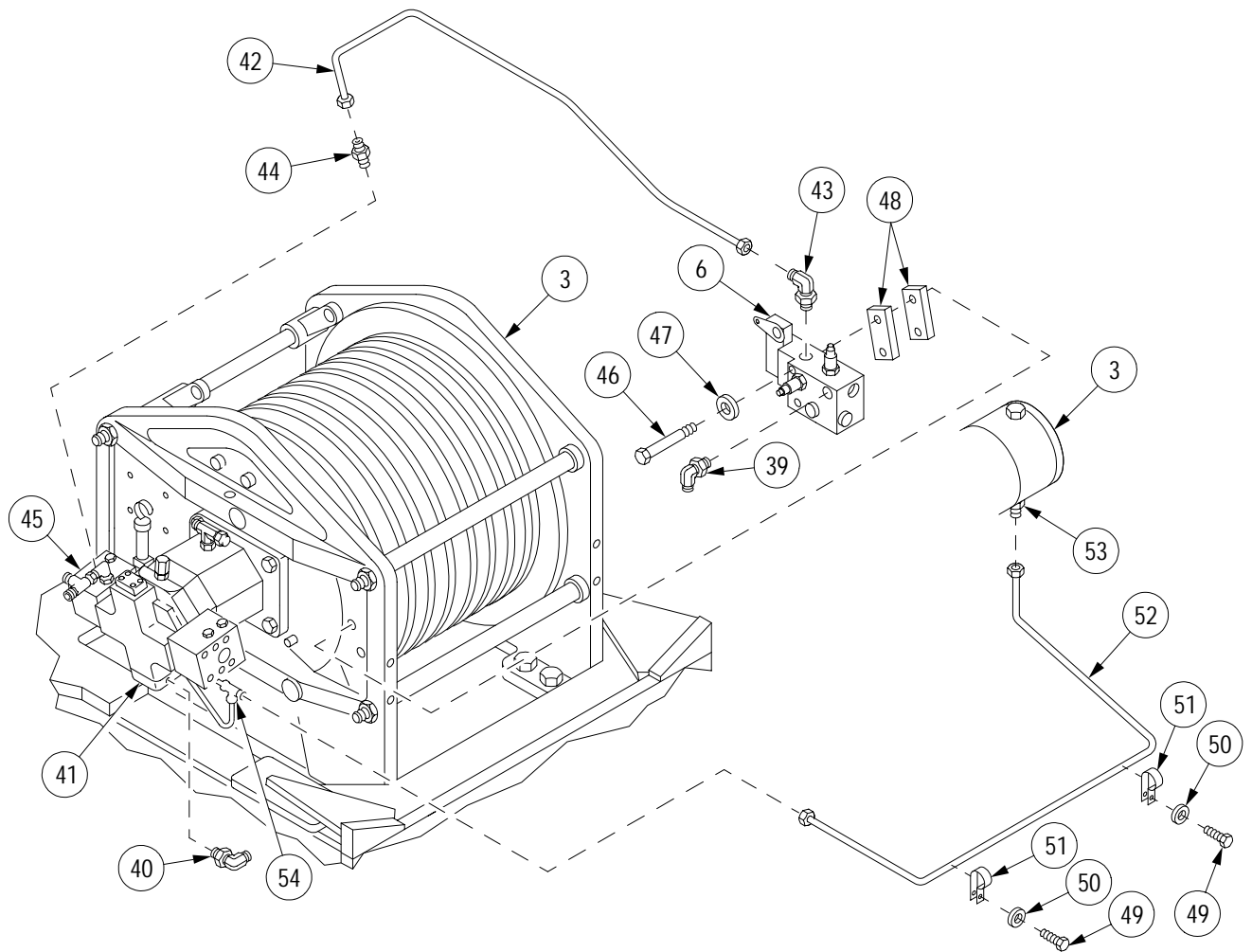


20i126md

MAIN WINCH REPAIR - CONTINUED

Assembly-Continued

23. Connect tube (52) to adapter (53) and tee (54).
24. Install two loop clamps (51) on tube (52) with two screws (49) and two flat washers (50).
25. Install two spacers (48) and valve assembly (6) on main winch (3) with two screws (46) and two flat washers (47).
26. Install connector (44) in counter-balance valve (45).
27. Install elbow (43) in valve assembly (6).
28. Connect tube (42) to elbow (43) and connector (44).
29. Install elbow (39) in valve assembly (6).
30. Install elbow (40) in hydraulic motor (41).



20i126mc

Assembly-Continued

31. Connect tube (38) to elbow (39) and elbow (40).



NOTE

The lubrication fitting on the chain side of diamond screw must be positioned horizontally with diamond screw. The second lubrication fitting must be positioned at a 45_ angle with diamond screw.

32. Install tube follower (37) on diamond screw (26) with follower nut (36), new retaining ring (35) and two lubrication fittings (34) and two setscrews (33), if removed. Make sure lubrication fittings (34) are positioned as stated in note and shown on illustration.

33. Install two pillow blocks (31) on diamond screw (26).

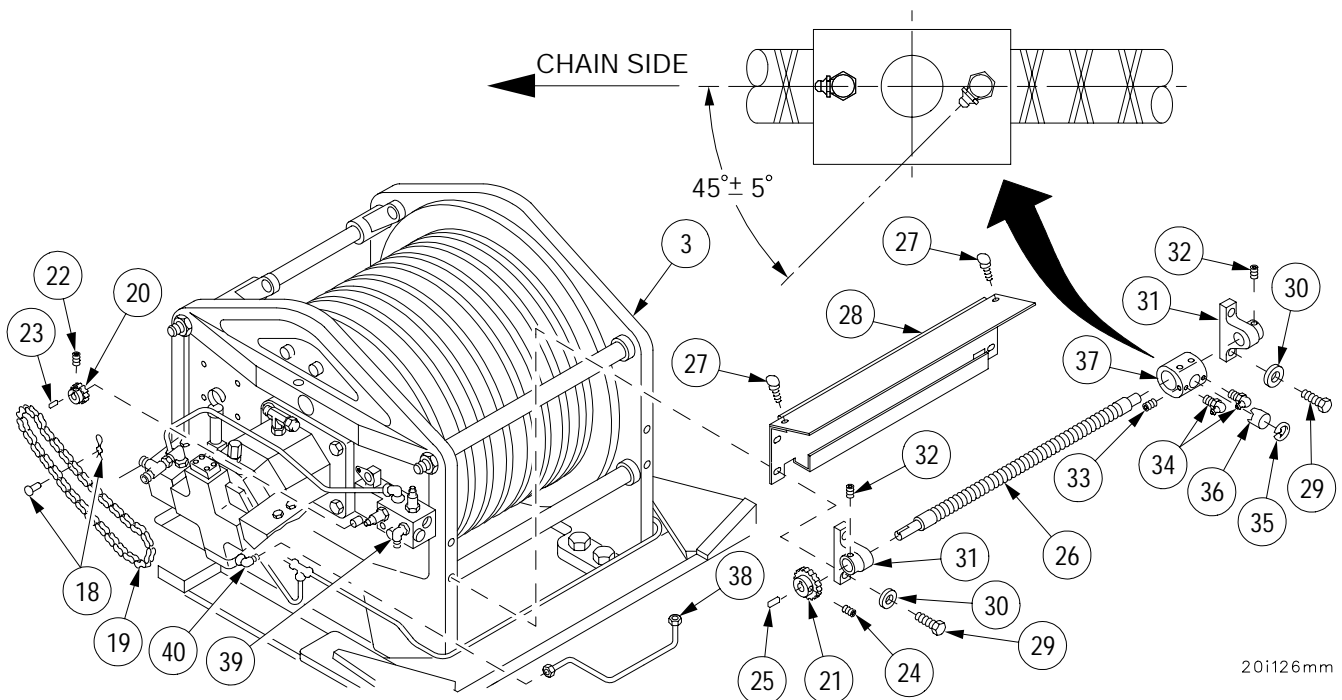
34. Install diamond screw (26) with two pillow blocks (31) and nut guard (28) on main winch (3) with four screws (29) and four flat washers (30). Do not tighten two setscrews (32).

35. Close nut guard (28) cover and secure with two thumbscrews (27).

36. Install lower tooth sprocket (21) on diamond screw (26) with new woodruff key (25) and setscrew (24).

37. Install upper sprocket (20) on main winch (3) with new woodruff key (23) and setscrew (22).

38. Install drive chain (19) on upper sprocket (20) and lower sprocket (21) with pin and clip (18).



MAIN WINCH REPAIR - CONTINUED

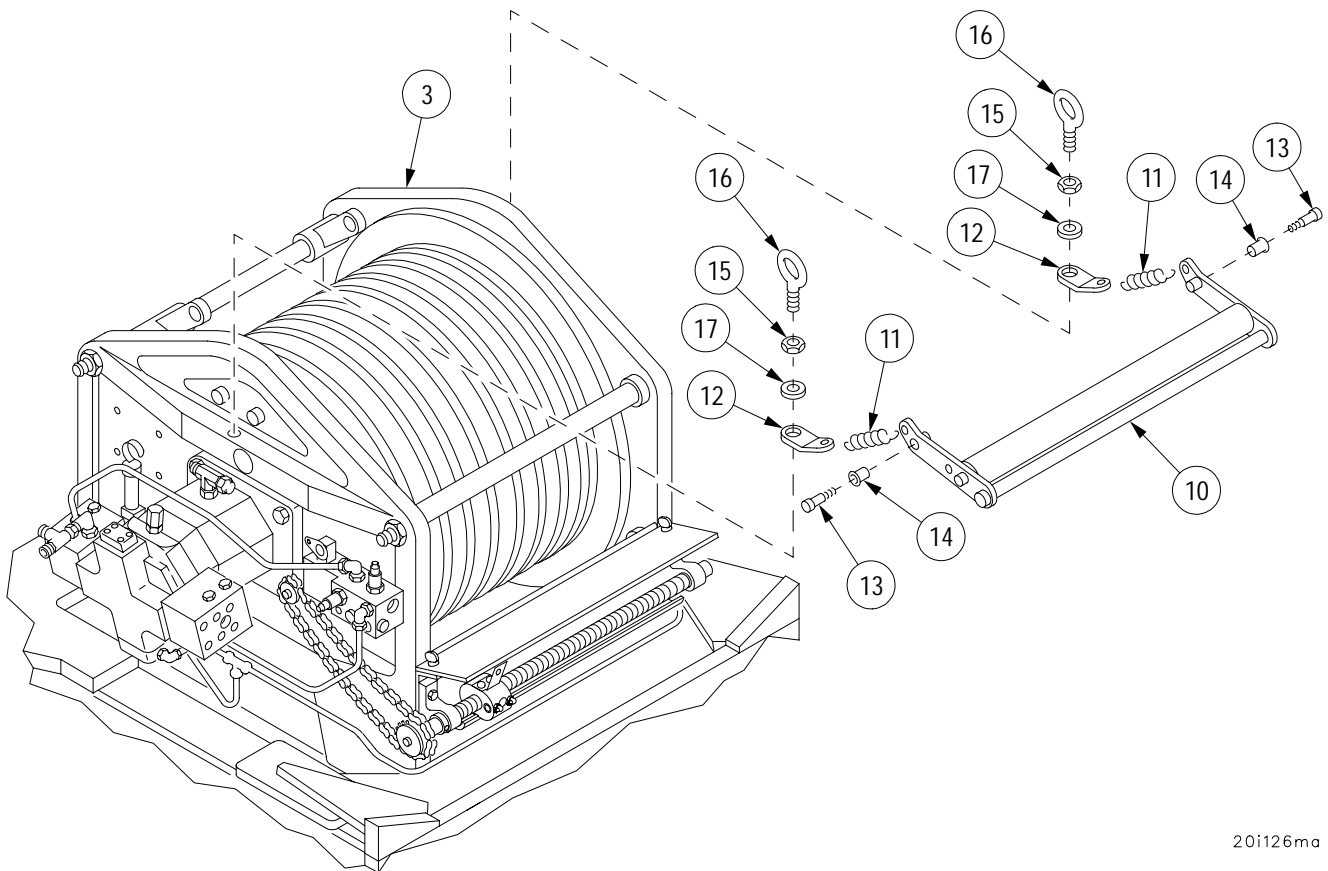
Assembly-Continued

- 39. Install two jam nuts (15) on two eye bolts (16).
- 40. Install two plates (12) on main winch (3) with two eye bolts (16) and two flat washers (17).
- 41. Tighten two jam nuts (15).
- 42. Install lever assembly (10) on main winch (3) with two screws (13) and two new bushings (14).



Springs are under tension and can act as projectiles when released. Exercise extreme care when releasing spring tension. Failure to comply could cause injury or death to personnel.

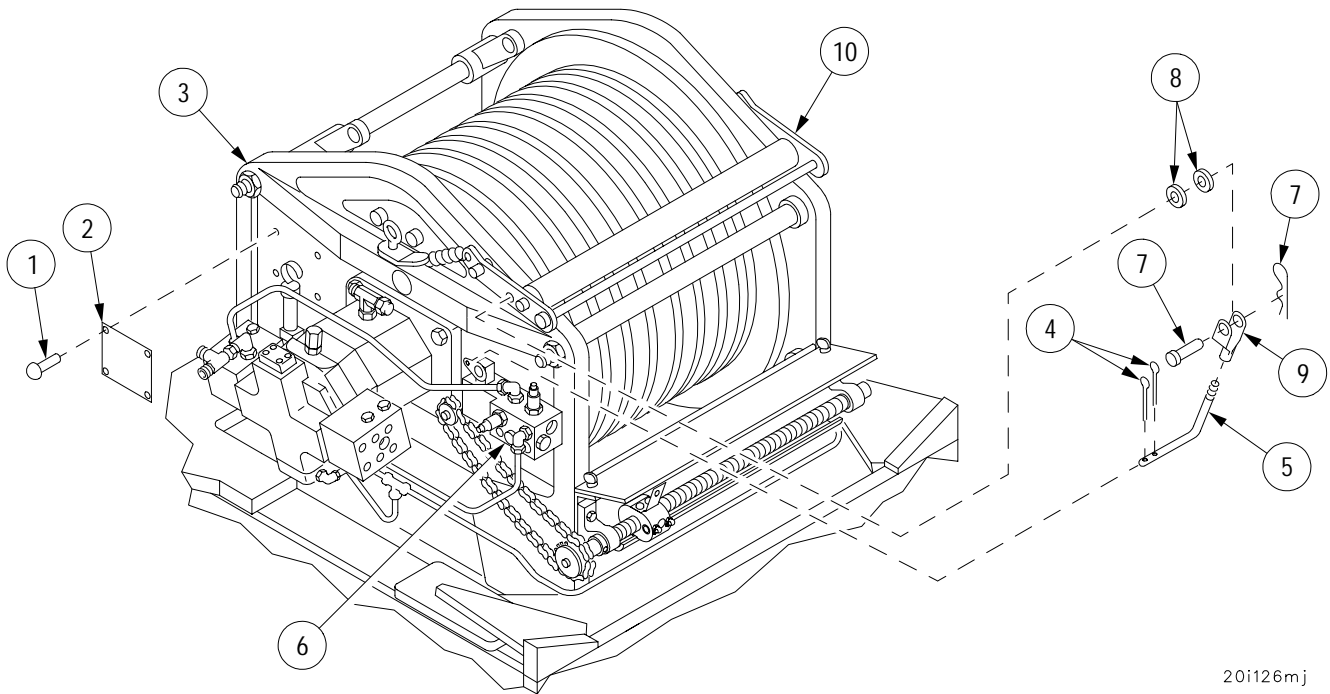
- 43. Connect two springs (11) to lever assembly (10) and two plates (12).



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MAIN WINCH REPAIR - CONTINUED**Assembly-Continued**

44. Install linkage rod (5) to lever assembly (10) with clevis (9), headed pin assembly (7) and two flat washers (8).
45. Connect linkage rod (5) to valve assembly (6) with two new cotter pins (4).
46. Install data plate (2) on main winch (3) with four new headed pins (1).



20i126mj

NOTE**FOLLOW-ON MAINTENANCE:**

- Install main winch manifold, tubes lines, fittings and flange (WP 0054 00)
- Install main winch lower roller (WP 0053 00)
- Install main winch upper roller (WP 0052 00)
- Install main winch roller spring assembly (WP 0051 00)
- Perform diamond screw centering adjustment (TM 9-2350-292-20)
- Perform diamond screw synchronization adjustment (TM 9-2350-292-20)
- Service main winch hydraulic motor (TM 9-2350-292-20)
- Install roller mounting bracket (WP 0058 00)
- Install main winch wire rope (TM 9-2350-292-20)
- Install main winch and spade assembly (TM 9-2350-292-20)

END OF TASK

MAIN WINCH LAYER SENSOR ADJUSTMENT**0049 00****THIS WORK PACKAGE COVERS:**

Adjustment

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
 Torque wrench (item 31, WP 0090 00)
 Pressure gauge, dial 0-5000 psi (item 44, WP 0090 00)
 Weight cell (50,000 lbs) (22,700 kg)

Materials/Parts

Safety goggles (item 48, WP 0087 00)

Equipment Conditions

Payout main winch wire rope leaving one layer of wire rope on winch drum
 (TM 9-2350-292-10)
 Main winch and spade assembly removed
 (TM 9-2350-292-20)

Personnel Required

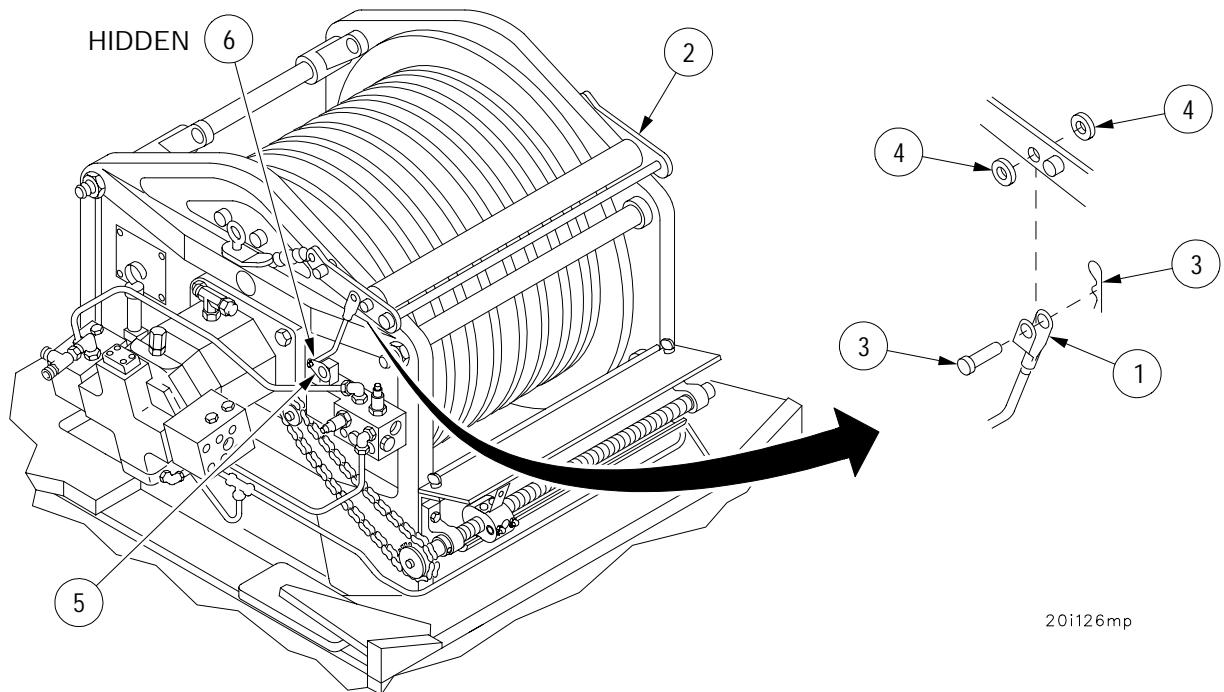
Two

References

TM 9-2350-292-20
 TM 9-2350-292-10

Adjustment

1. Disconnect clevis (1) from layer sensor roller arm (2) by removing headless pin assembly (3) and two flat washers (4).
2. There are three detent valve positions. Move the detent valve lever arm (5) to first layer (lowest position).
3. With detent valve lever arm (5) in first position, loosen clamp nut (6) on detent valve lever arm (5) and rotate detent valve lever arm (5) to the horizontal position. Torque clamp nut (6) to 20 lb in (2.26 N•m).
4. Position layer sensor roller arm (2) exactly as it would track with high line pull (straight rope) on the first rope layer.



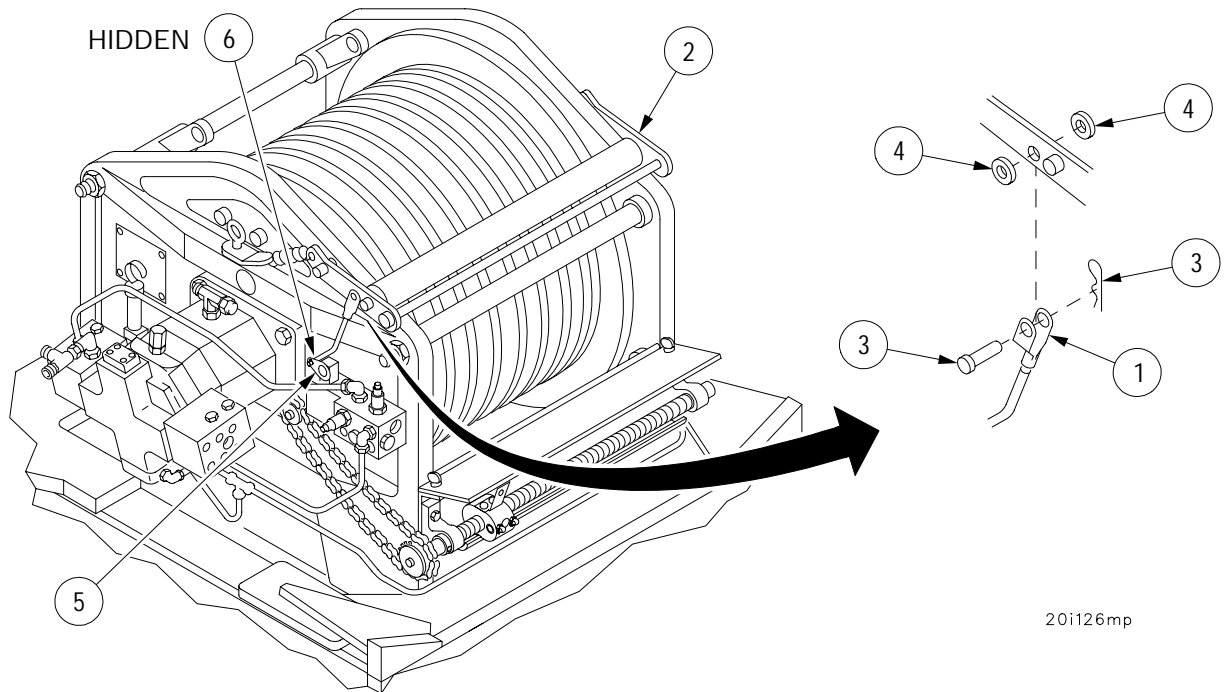
20i126mp

MAIN WINCH LAYER SENSOR ADJUSTMENT - CONTINUED

0049 00

Adjustment- Continued

5. Turn clevis (1) on its threads such that hole in clevis (1) lines up with the hole in layer sensor roller arm (2). DO NOT ROTATE THE DETENT VALVE LEVER ARM (5) FOR ADJUSTMENT.
6. Install on layer sensor roller arm (2) with two flat washers (4) and headless pin assembly (3).
7. Install main winch and spade (TM9-2350-292-20).
8. Open main winch visibility cover (TM 9-2350-292-10)

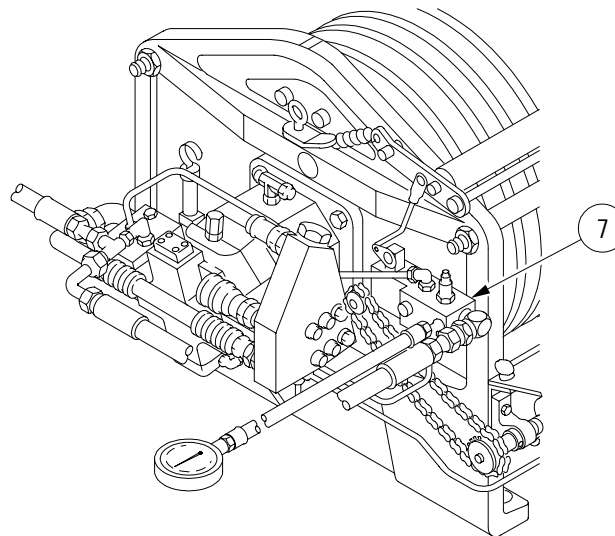


MAIN WINCH LAYER SENSOR ADJUSTMENT - CONTINUED

Adjustment-Continued



9. Install 5000 psi pressure gauge between hydraulic line and port X1 on detent valve (7).
10. Connect main winch wire rope to a 50,000 lbs (22,700 kg) load cell.
11. Payout main winch wire rope until one layer of wire rope remain on winch drum (TM 9-2350-292-10).
12. Inhaul main winch wire rope (TM 9-2350-292-10).
13. Under high line pull (straight line) the pressure at port X1 on detent valve (7) should indicate as follows.
 - a) First layer – 0 psi.
 - b) Second layer 150 -165 psi.
 - c) Third layer 350-365 psi.
14. Remove 5000 psi pressure gauge from detent valve (7), and reconnect hydraulic line.
15. Close main winch visibility cover (TM 9- 2350-292-10).



20i126mq

END OF TASK

MAIN WINCH SIDE MOUNTING BRACKETS REPLACEMENT**0050 00****THIS WORK PACKAGE COVERS:**

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
 Torque wrench multiplier (item 39, WP 0090 00)
 Torque wrench (item 38, WP 0090 00)
 Socket wrench socket (item 55, WP 0090 00)
 Socket wrench handle (item 4, WP 0090 00)
 Socket wrench handle (item 63, WP 0090 00)
 Socket wrench extension (item 61, WP 0090 00)

Equipment Conditions

Main winch and spade assembly removed (TM 9-2350-292-20)

Personnel Required

Two

References

TM 9-2350-292-20

Materials/Parts

Lockwashers (8) (item 77, WP 0091 00)

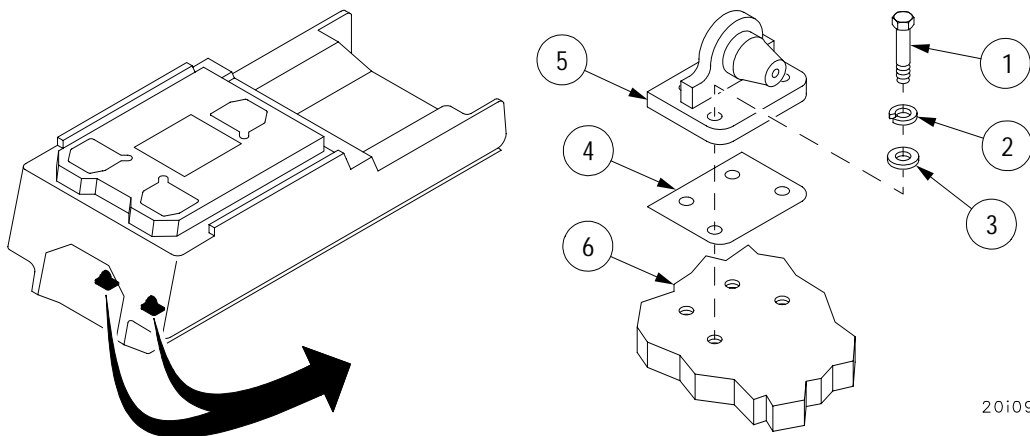
Removal**NOTE**

Match mark base of mounting bracket to vehicle floor to aid in installation.

Quantity and location of flat washers may vary. Note quantity and location of flat washers during removal to aid in installation.

Quantity and thickness of shim(s) may vary. Note quantity and location of shim(s) during removal to aid in installation.

1. Remove four screws (1), four lockwashers (2), flat washers (3) and shim(s) (4) from left side mounting bracket (5) and vehicle floor (6). Discard lockwashers.
2. Remove four screws (1), four lockwashers (2), flat washers (3) and shim(s) (4) from right side mounting bracket (5) and vehicle floor (6). Discard lockwashers.
3. Inspect parts for damage and replace as required.

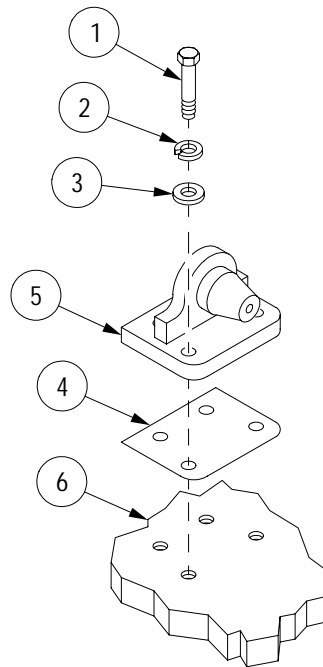


20i099m

Installation**NOTE**

Make sure that the quantity and location of shim(s) and flatwashers identified during Removal are returned to their original positions during Installation to ensure proper engagement of main winch support.

1. Position shim(s) (4) and right side mounting bracket (5) to match mark on vehicle floor (6).
2. Install right side mounting bracket (5) to vehicle floor (6) with four screws (1), four new lockwashers (2) and flat washers (3).
3. Position shim(s) (4) and left side mounting bracket (5) to match mark on vehicle floor (6).
4. Install left side mounting bracket (5) to vehicle floor (6) with four screws (1), four new lockwashers (2) and flat washers (3).
5. Torque eight screws (1) to 900-1100 lb-ft (1220-1492 NSm).



20i099ma

NOTE

FOLLOW-ON MAINTENANCE:
Install main winch and spade assembly
(TM 9-2350-292-20)

END OF TASK

MAIN WINCH ROLLER SPRING ASSEMBLY REPLACEMENT**0051 00****THIS WORK PACKAGE COVERS:**

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)

Materials/Parts

Cotter pins (2) (item 83, WP 0091 00)

Lubricant (item 2, WP 0087 00)

Equipment Conditions

Wire rope removed (TM 9-2350-292-20)

Main winch and spade assembly removed
(TM 9-2350-292-20)**Personnel Required**

Two

References

TM 9-2350-292-20

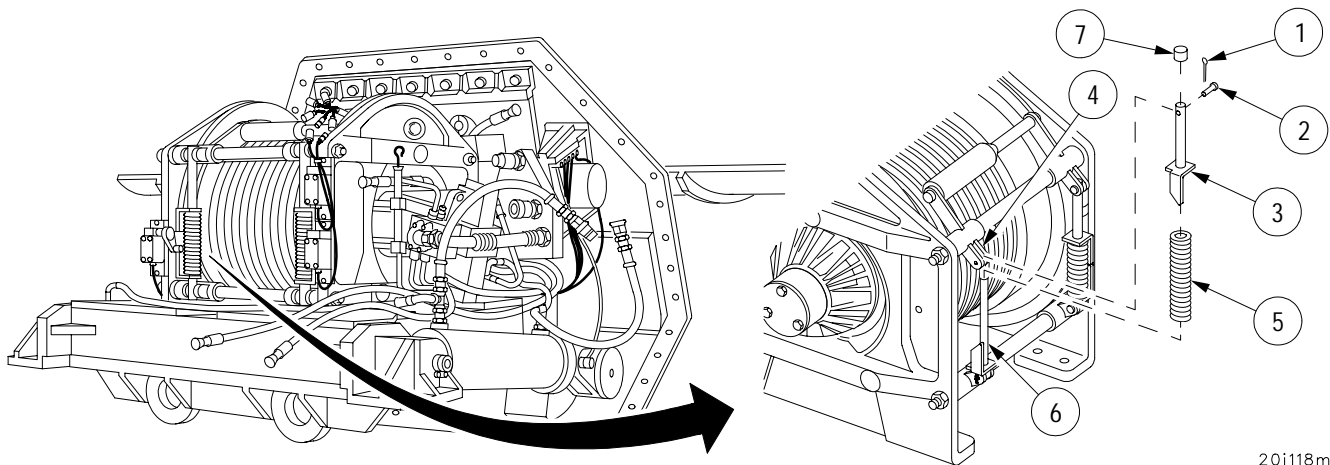
NOTE

There are two roller spring assemblies. Both roller spring assemblies are replaced in the same manner. This task replaces only one roller spring assembly.

Removal**WARNING**

Spring is under tension. Hold downward pressure on guide to compress spring and slowly release pressure upon removal of clevis pin. Failure to comply may result in injury to personnel.

1. Remove cotter pin (1), clevis pin (2) and guide (3) from upper clevis (4). Discard cotter pin.
2. Remove guide (3) and spring (5) from spring guide shaft (6).
3. Remove protective cap (7) from guide (3).



20118m

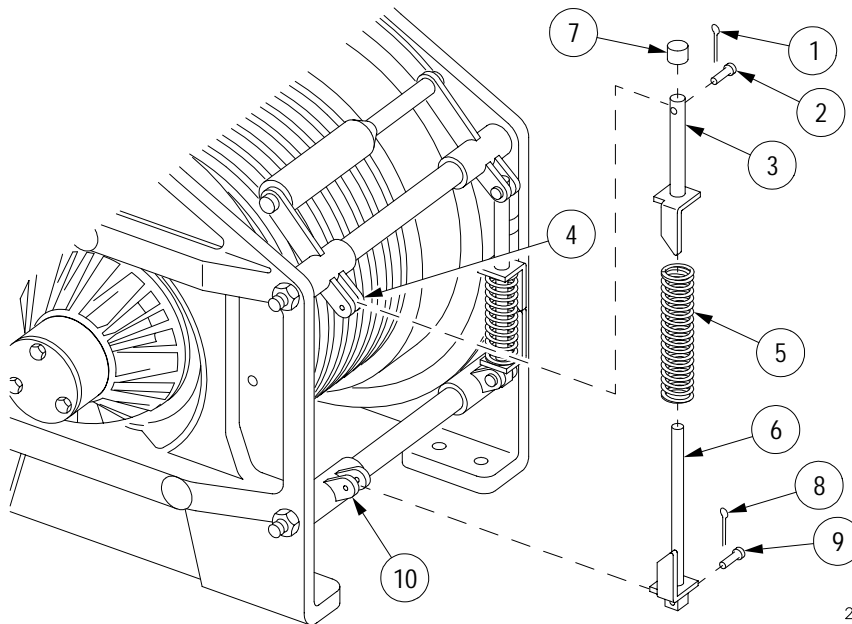
MAIN WINCH ROLLER SPRING ASSEMBLY REPLACEMENT - CONTINUED**0051 00****Removal-Continued**

4. Remove cotter pin (8), clevis pin (9) and spring guide shaft (6) from lower clevis (10). Discard cotter pin.
5. Inspect parts for damage and replace as required.

Installation**NOTE**

Make sure spring guide shaft and guide are installed with chamfer facing drum.

1. Install spring guide shaft (6) in lower clevis (10) with clevis pin (9) and new cotter pin (8).
2. Apply lubricant to spring guide shaft (6).
3. Install protective cap (7) on guide (3).
4. Install spring (5) and guide (3) on spring guide shaft (6).
5. Compress spring (5), install guide (3) in upper clevis (4) with clevis pin (2) and new cotter pin (1).



20i118ma

NOTE

FOLLOW-ON MAINTENANCE:
 Install main winch and spade assembly
 (TM 9-2350-292-20)
 Install wire rope (TM 9-2350-292-20)

END OF TASK

MAIN WINCH UPPER ROLLER REPLACEMENT

0052 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- Retaining pliers set (item 3, WP 0090 00)

Materials/Parts

- Upper roller kit (item 84, WP 0091 00)
- Safety goggles (item 48, WP 0087 00)

Equipment Conditions

- Wire rope removed (TM 9-2350-292-20)
- Main winch and spade assembly removed (TM 9-2350-292-20)
- Roller spring assemblies disconnected (WP 0051 00)

References

TM 9-2350-292-20

Removal

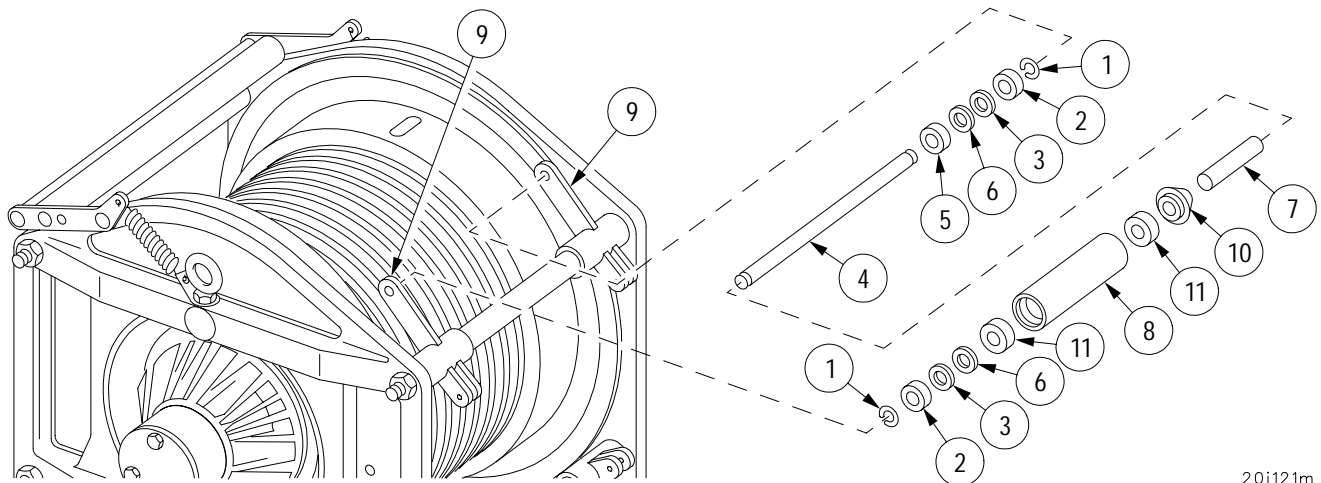


1. Remove two retaining rings (1), two bearings (2) and two flat washers (3) from shaft (4). Discard retaining rings.

NOTE

Roller tube and flat washers are unsupported when shaft is removed.

2. Remove shaft (4), bearing (5), two flat washers (6), tube (7) and roller tube (8) from roller arms (9).
3. Remove bearing retaining plate (10) from roller tube (8).
4. Remove two bearings (11) from roller tube (8).
5. Inspect parts for damage and replace as required.



20i121m

MAIN WINCH UPPER ROLLER REPLACEMENT - CONTINUED

0052 00

Installation

1. Install two bearings (11) in roller tube (8).
2. Install bearing retaining plate (10) on roller tube (8).

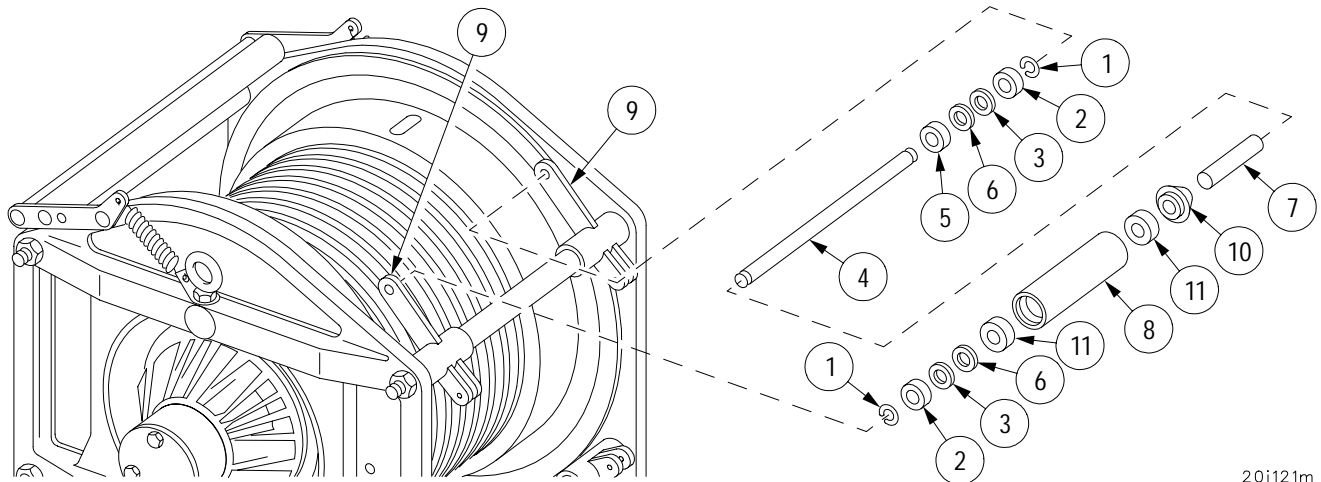
NOTE

Flat washers must be placed to ensure that shaft and roller end play is less than 0.036 inch (0.900 mm).

3. Install shaft (4) with roller tube (8), tube (7), bearing (5) and two flat washers (6) on roller arms (9).



4. Install two flat washers (3), two bearings (2) and two new retaining rings (1) on shaft (4).



20i121m

NOTE

FOLLOW-ON MAINTENANCE:

- Install roller spring assemblies (WP 0051 00)
- Install main winch and spade assembly (TM 9-2350-292-20)
- Install wire rope (TM 9-2350-292-20)

END OF TASK

MAIN WINCH LOWER ROLLER REPLACEMENT

0053 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- Retaining pliers set (item 3, WP 0090 00)

Materials/Parts

- Lower roller kit (item 104 WP 0091 00)
- Safety goggles, (item 48, WP 0087 00)

Equipment Conditions

- Main winch removed from support assembly (WP 0047 00)
- Roller spring assemblies disconnected (WP 0051 00)

Removal

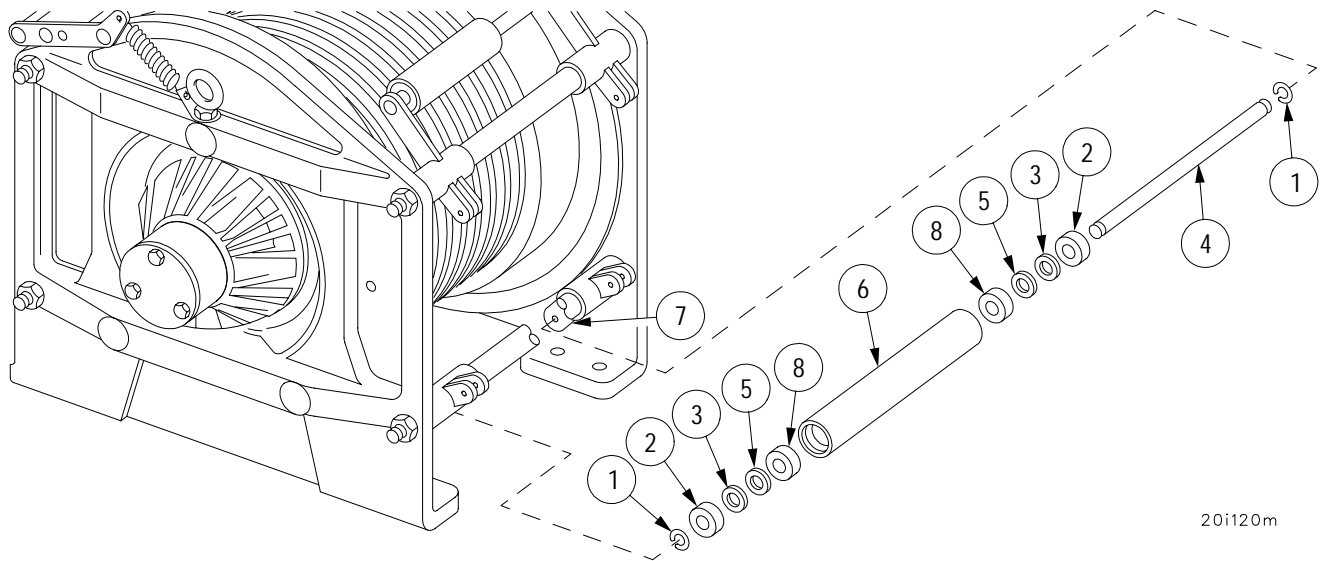


1. Remove two retaining rings (1), two bearings (2) and two flat washers (3) from shaft (4). Discard retaining rings.

NOTE

Roller tube and flat washers are unsupported when shaft is removed.

2. Remove shaft (4), two flat washers (5) and roller tube (6) from roller arms (7).
3. Remove two bearings (8) from roller tube (6).
4. Inspect parts for damage and replace as required.



20i120m

MAIN WINCH LOWER ROLLER REPLACEMENT - CONTINUED

0053 00

Installation

1. Install two bearings (8) in roller tube (6).

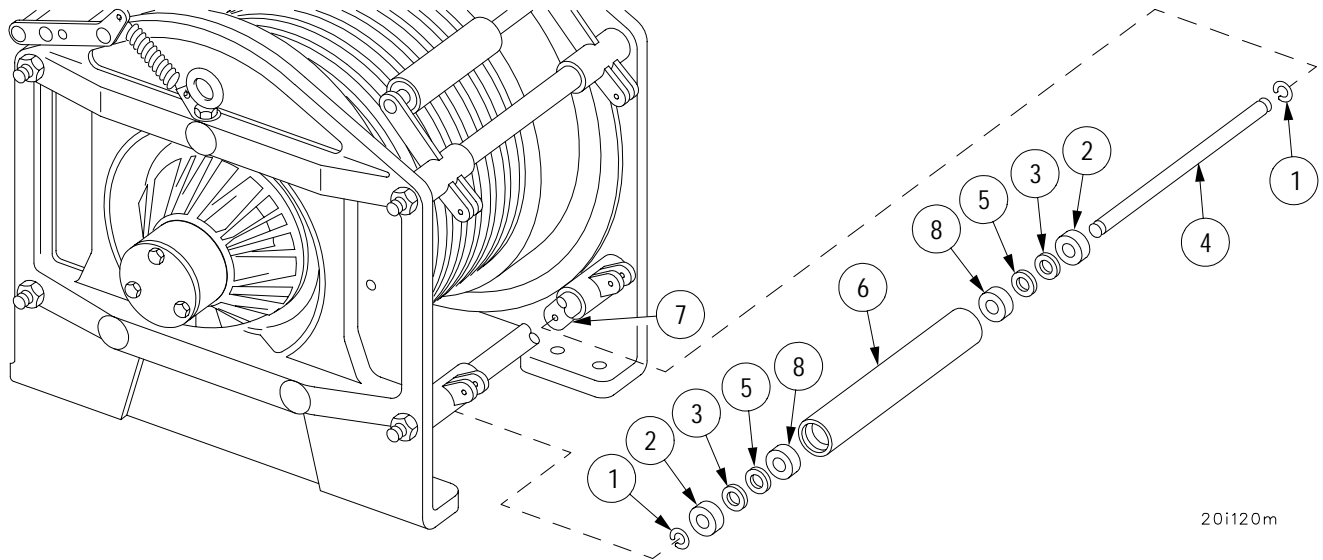
NOTE

Flat washers must be placed to ensure that shaft and roller end play is less than 0.036 inch (0.900 mm).

2. Install shaft (4) with roller tube (6) and two flat washers (5) on roller arms (7).



3. Install two flat washers (3), two bearings (2) and two new retaining rings (1) on shaft (4).



20i120m

NOTE

FOLLOW-ON MAINTENANCE:
 Install roller spring assemblies (WP 0051 00)
 Install main winch on support assembly
 (WP 0047 00)

END OF TASK

MAIN WINCH MANIFOLD, TUBES, FITTINGS AND FLANGE REPLACEMENT**0054 00****THIS WORK PACKAGE COVERS:**

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

- General mechanic's tool kit (item 1, WP 0090 00)
- Suitable container (5.0 gal (18.9 L) min cap)
- Automotive adjustable wrench (item 50, WP 0090 00)

Materials/Parts

- Lubricant (item 3, WP 0087 00)
- Sealing compound (item 20, WP 0087 00)
- Dust protective plugs (15) (item 22, WP 0087 00)
- Marker tags (AR) (item 26, WP 0087 00)
- Wiping rags (AR) (item 6, WP 0087 00)
- Performed packings (4) (item 78, WP 0091 00)
- Performed packing (item 42, WP 0091 00)
- Performed packings (2) (item 79, WP 0091 00)
- Performed packing (item 80, WP 0091 00)
- Performed packings (2) (item 81, WP 0091 00)
- Lockwashers (6) (item 41, WP 0091 00)
- Lockwashers (4) (item 100, WP 0091 00)
- Preformed packings (5) (item 103, WP 0091 00)

Equipment Conditions

Main winch and spade assembly removed(TM
9-2350-292-20)

Personnel Required

Two

References

TM 9-2350-292-20

CAUTION

Cap all hydraulic lines and plug all hydraulic ports to prevent contamination. Failure to comply may result in damage to hydraulic system.

NOTE

All hydraulic lines and components must be tagged before removal for identification during installation.

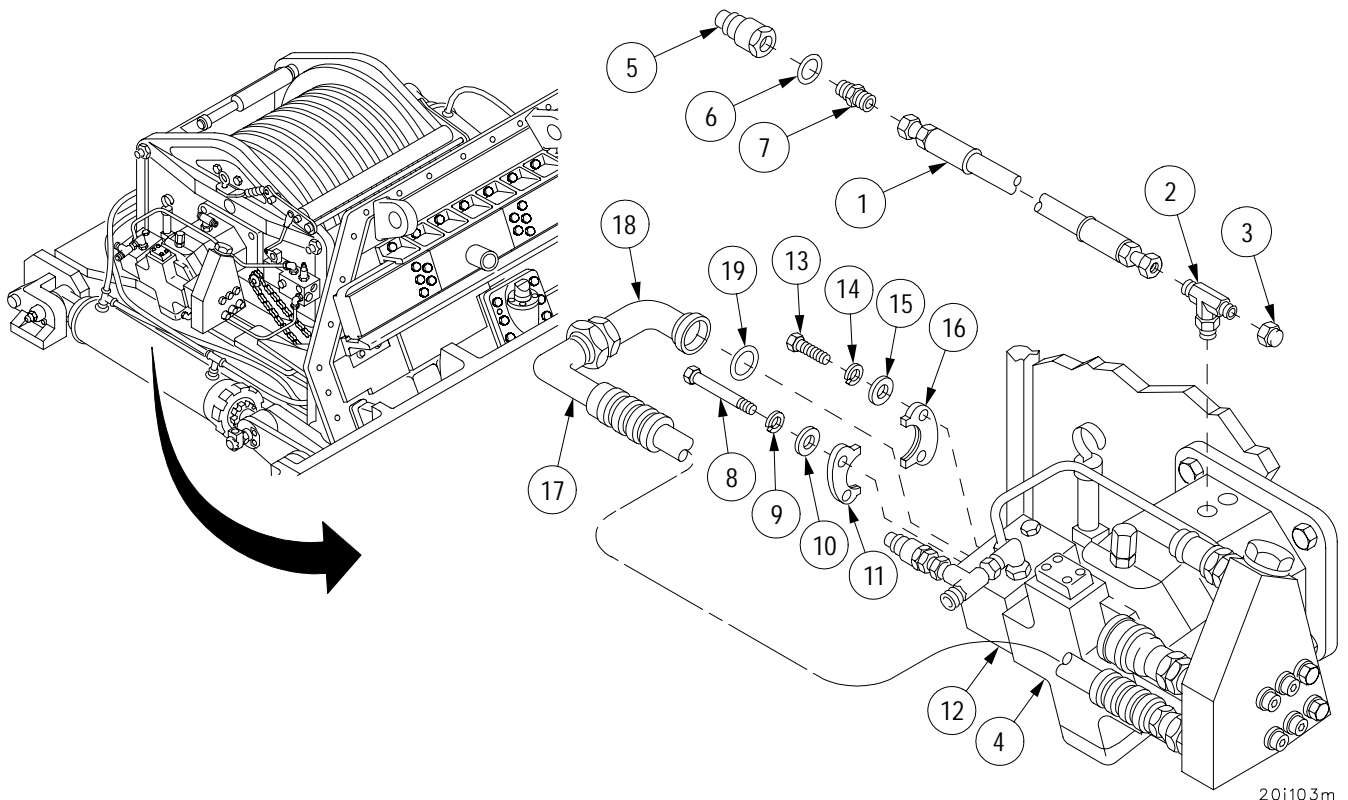
Place rags under hydraulic connections to catch any hydraulic fluid that spills during maintenance. Dispose of fluid soaked rags in accordance with standard operating procedure.

MAIN WINCH MANIFOLD, TUBES, FITTINGS AND FLANGE REPLACEMENT - CONTINUED

0054 00

Removal

1. Disconnect hydraulic hose 27D (1) from tee (2).
2. Remove cap (3) from tee (2).
3. Remove tee (2) from hydraulic motor (4).
4. Remove quick-disconnect coupling (5) and preformed packing (6) from adapter (7). Discard preformed packing.
5. Remove adapter (7) from hydraulic hose assembly 27D (1).
6. Remove two screws (8), two lockwashers (9), two flat washers (10) and right side split flange (11) from left counter-balance valve (12). Discard lockwashers.
7. Remove two screws (13), two lockwashers (14), two flat washers (15) and left side split flange (16) from left counter-balance valve (12). Discard lockwashers.
8. Remove hydraulic hose assembly 48B (17), elbow (18) and preformed packing (19) from left counter-balance valve (12). Discard preformed packing.



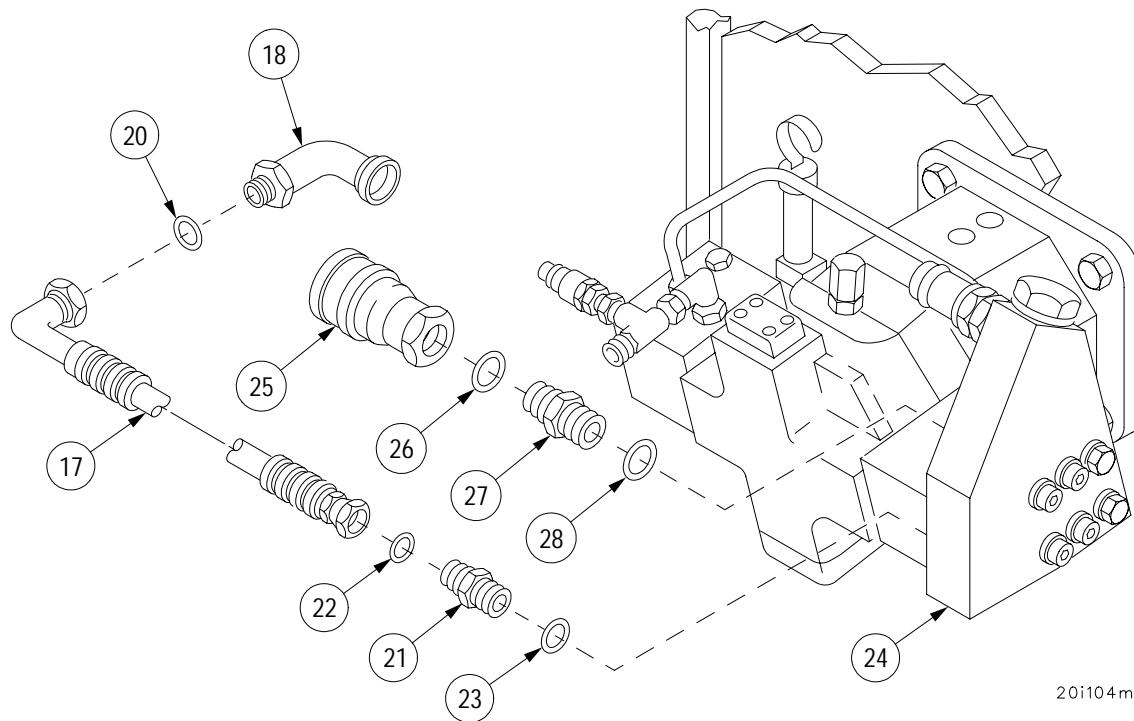
20i103m

**MAIN WINCH MANIFOLD, TUBES, FITTINGS AND FLANGE REPLACEMENT
- CONTINUED**

0054 00

Removal-Continued

9. Disconnect hydraulic hose assembly 48B (17) from elbow (18).
10. Remove preformed packing (20) from elbow (18). Discard preformed packing.
11. Disconnect hydraulic hose assembly 48B (17) from adapter (21).
12. Remove preformed packing (22) from adapter (21). Discard preformed packing.
13. Remove adapter (21) and preformed packing (23) from manifold (24). Discard preformed packing.
14. Remove quick-disconnect coupling (25) and preformed packing (26) from adapter (27). Discard preformed packing.
15. Remove adapter (27) and preformed packing (28) from manifold (24). Discard preformed packing.



MAIN WINCH MANIFOLD, TUBES, FITTINGS AND FLANGE REPLACEMENT - CONTINUED

0054 00

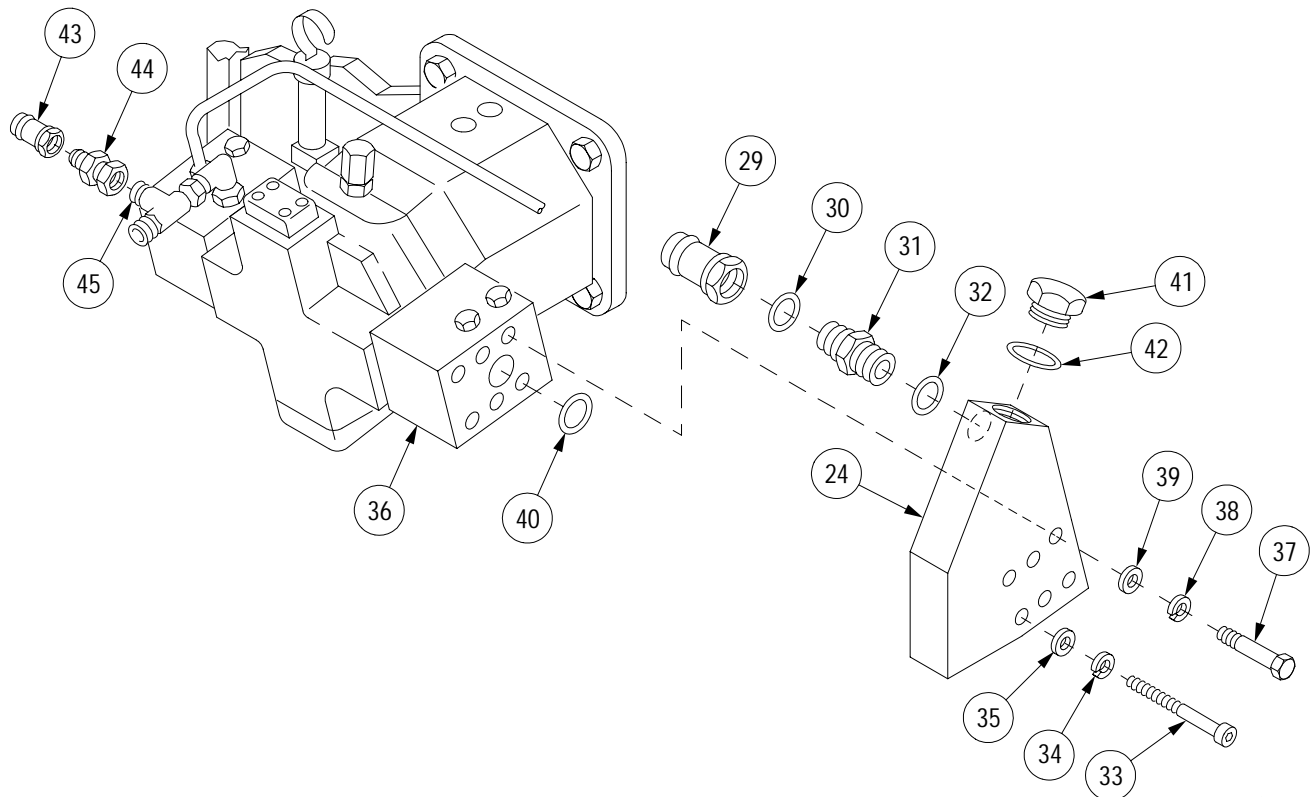
Removal-Continued

16. Remove quick-disconnect coupling (29) and preformed packing (30) from adapter (31). Discard preformed packing.
17. Remove adapter (31) and preformed packing (32) from manifold (24). Discard preformed packing.
18. Remove four screws (33), four lockwashers (34) and four flat washers (35) from manifold (24) and right counter-balance valve (36). Discard lockwashers.
19. Remove two screws (37), two lockwashers (38) and two flat washers (39) from manifold (24) and right counter-balance valve (36). Discard lockwashers.
20. Remove manifold (24) and preformed packing (40) from right counter-balance valve (36). Discard preformed packing.
21. Remove four plugs (41) and four preformed packings (42) from manifold (24). Discard preformed packings.

NOTE

Perform step 22 only if vehicle is equipped with main winch power reduction manifold.

22. Remove quick-disconnect coupling (43) and adapter (44) from tee (45).
23. Inspect parts for damage and replace as required.



201108m

MAIN WINCH MANIFOLD, TUBES, FITTINGS AND FLANGE REPLACEMENT - CONTINUED

0054 00

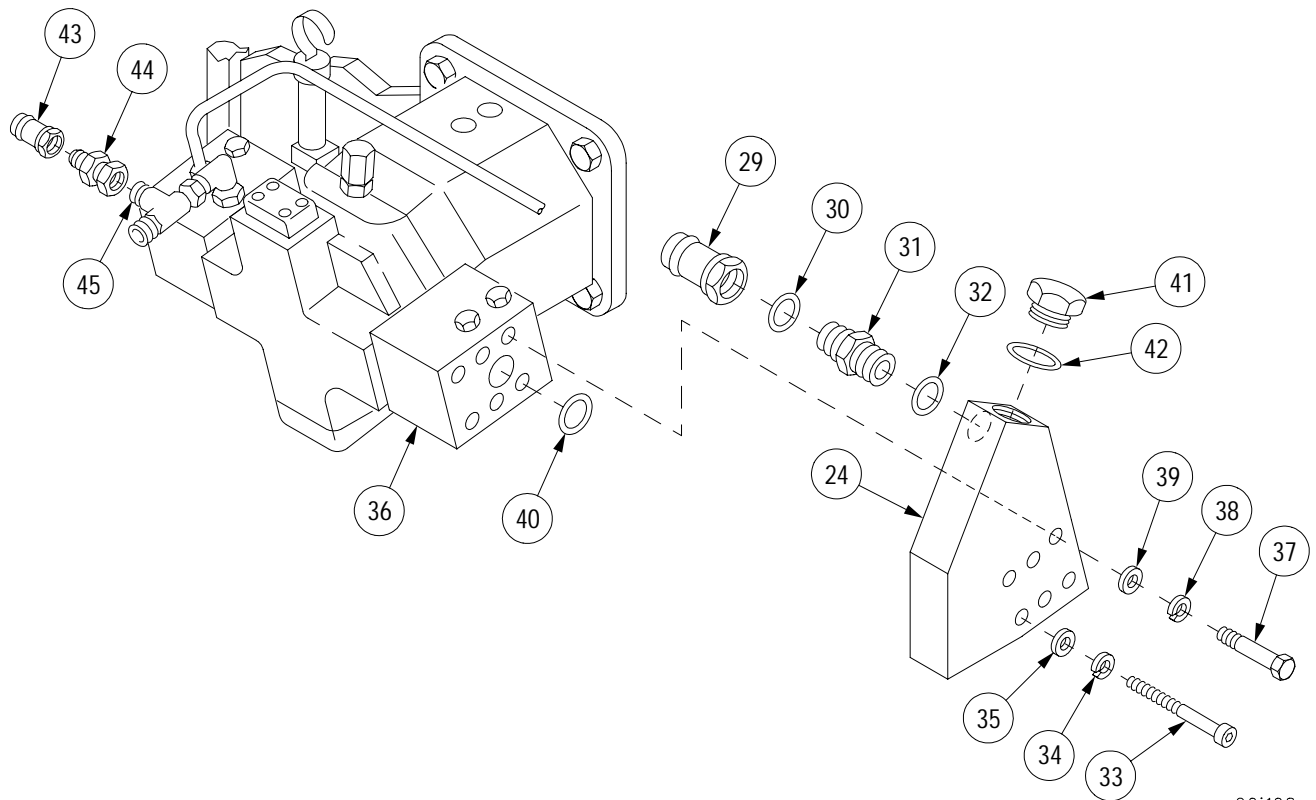
Installation

1. Apply lubricant to all adapter threads and preformed packings prior to installation.
2. Apply sealing compound to all pipe threads prior to installation.

NOTE

Perform step 3 only if vehicle is equipped with main winch power reduction manifold.

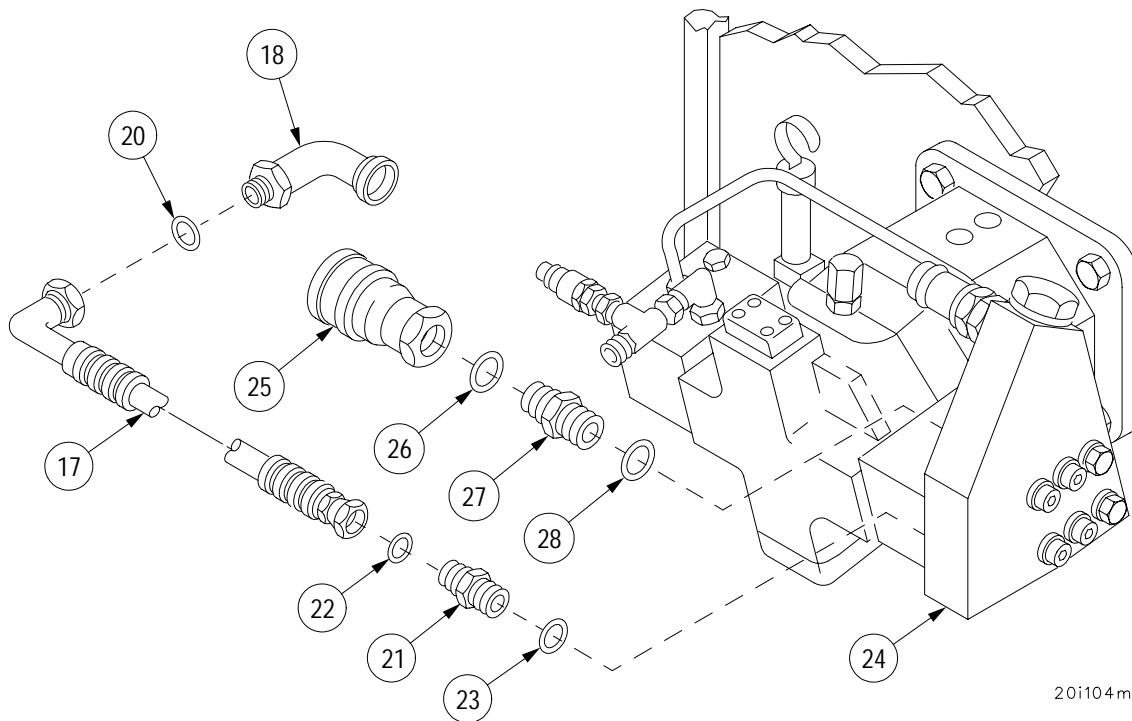
3. Install adapter (44) and quick-disconnect coupling (43) on tee (45).
4. Install four new preformed packings (42) and four plugs (41) in manifold (24).
5. Install manifold (24) and new preformed packing (40) on right counter-balance valve (36) with two screws (37), two new lockwashers (38) and two flat washers (39).
6. Secure manifold (24) to right counter-balance valve (36) with four screws (33), four new lockwashers (34) and four flat washers (35).
7. Install new preformed packing (32) and adapter (31) in manifold (24).
8. Install new preformed packing (30) and quick-disconnect coupling (29) on adapter (31).



201108m

**MAIN WINCH MANIFOLD, TUBES, FITTINGS AND FLANGE REPLACEMENT
- CONTINUED****0054 00****Installation-Continued**

9. Install new preformed packing (28) and adapter (27) in manifold (24).
10. Install new preformed packing (26) and quick-disconnect coupling (25) on adapter (27).
11. Install new preformed packing (23) and adapter (21) in manifold (24).
12. Install new preformed packing (22) on adapter (21).
13. Connect hydraulic hose assembly 48B (17) to adapter (21).
14. Install new preformed packing (20) on elbow (18).
15. Connect hydraulic hose assembly 48B (17) to elbow (18).

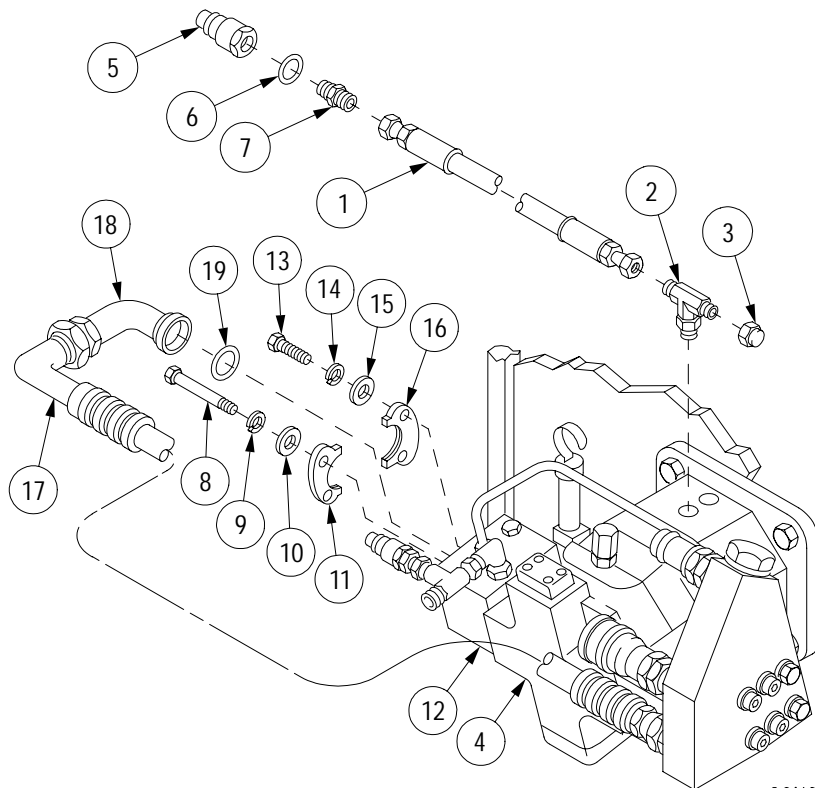


MAIN WINCH MANIFOLD, TUBES, FITTINGS AND FLANGE REPLACEMENT - CONTINUED

0054 00

Installation-Continued

16. Position new preformed packing (19), elbow (18) and hydraulic hose assembly 48B (17) in left side of split flange (16) and left counter-balance valve (12).
17. Secure left side of split flange (16) and elbow (18) to left counter-balance valve (12) with two screws (13), two new lockwashers (14) and two flat washers (15).
18. Secure right side split flange (11) and elbow (18) to left counter-balance valve (12) with two screws (8), two new lockwashers (9) and two flat washers (10).
19. Install adapter (7) on hydraulic hose assembly 27D (1).
20. Install new preformed packing (6) and quick-disconnect coupling (5) on adapter (7).
21. Install tee (2) on hydraulic motor (4).
22. Install cap (3) on tee (2).
23. Connect hydraulic hose assembly 27D (1) to tee (2).



20i103mb

NOTE

FOLLOW-ON MAINTENANCE:

Install main winch and spade
assembly (TM 9-2350-292-20)

END OF TASK

LEVEL WINDER HYDRAULIC CYLINDER REPLACEMENT

0055 00**THIS WORK PACKAGE COVERS:**Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
Spanner wrench (item 45, WP 0090 00)
Endless slings (2) (item 30, WP 0090 00)
Suitable lifting device (250 lbs (113.5 kg) min cap)
Crowbar (item 51, WP 0090 00)
Socket wrench socket (item 59, WP 0090 00)
Socket wrench extension (item 60, WP 0090 00)
Socket wrench handle (item 4, WP 0090 00)
Socket wrench extension (item 61, WP 0090 00)
Socket wrench extension (item 6, WP 0090 00)

Materials/Parts

Lubricant (item 3, WP 0087 00)
Dust protective plugs (2) (item 22, WP 0087 00)
Dust protective plugs (2) (item 43, WP 0087 00)
Marking tags (item 26, WP 0087 00)
Wiping rags (item 6, WP 0087 00)
Lockwashers (2) (item 20, WP 0091 00)
Lockwashers (4) (item 57, WP 0091 00)
Preformed packings (2) (item 53, WP 0091 00)

Equipment Conditions

Main winch wire rope assembly removed
(TM 9-2350-292-20)
Main winch and spade assembly removed
(TM 9-2350-292-20)
Roller bracket assembly removed
(TM 9-2350-292-20)
Spade assembly lubrication adapter block removed
(TM 9-2350-292-20)

Personnel Required

Three

ReferencesTM 9-2350-292-20

CAUTION

Cap all hydraulic lines and plug all hydraulic ports to prevent contamination. Failure to comply may result in damage to hydraulic system.

NOTE

All hydraulic lines and components must be tagged before removal for identification during installation.

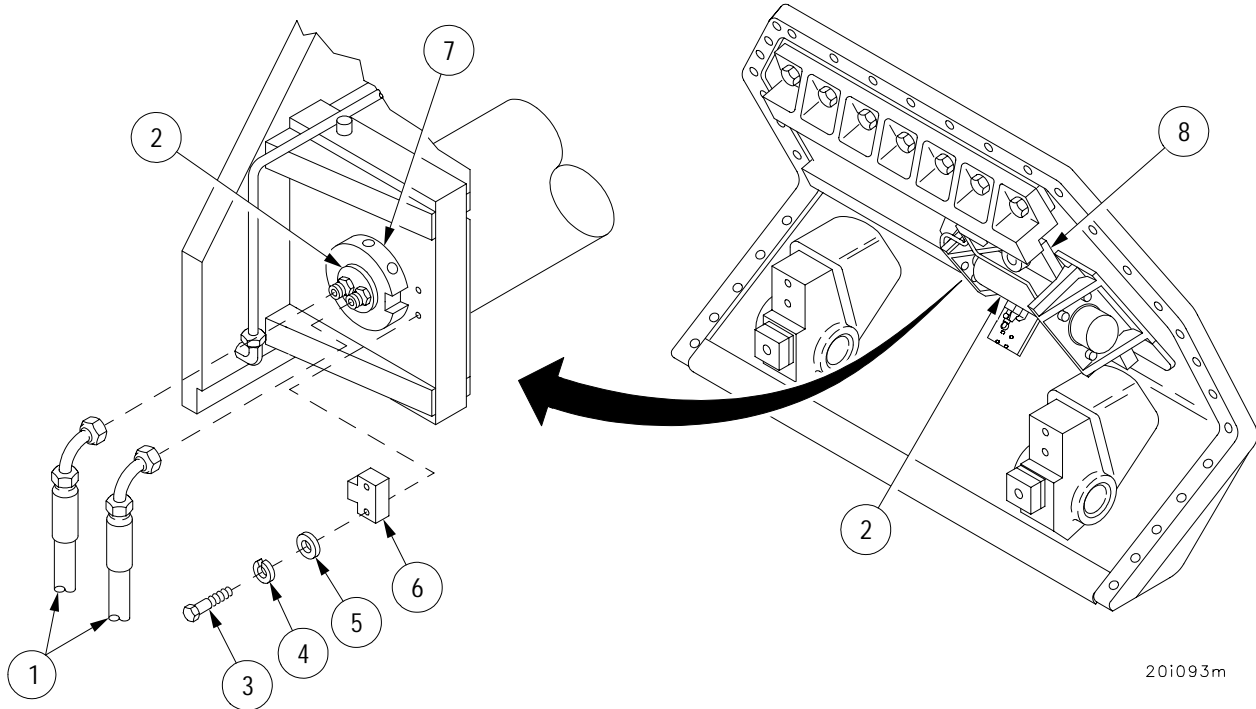
Place rags under hydraulic connections to catch any hydraulic fluid that spills during maintenance. Dispose of fluid soaked rags in accordance with standard operating procedure.

LEVEL WINDER HYDRAULIC CYLINDER REPLACEMENT - CONTINUED**0055 00****Removal**

1. Disconnect two hydraulic hoses (1) from hydraulic cylinder (2).
2. Remove two screws (3), two lockwashers (4), two flat washers (5) and key (6) from level winder nut (7). Discard lockwashers.



3. Attach endless slings and support level winder hydraulic cylinder (2) with suitable lifting device.
4. Remove level winder nut (7) from level winder hydraulic cylinder (2) using spanner wrench.
5. Slide level winder plate assembly (8) to extended position.



201093m

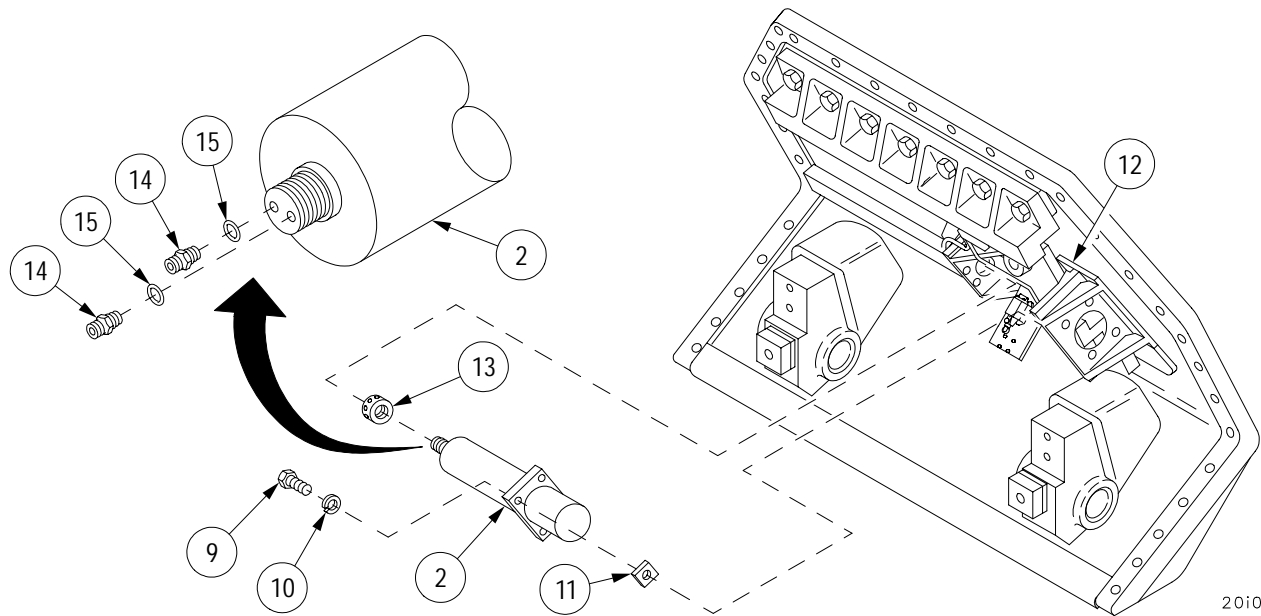
LEVEL WINDER HYDRAULIC CYLINDER REPLACEMENT - CONTINUED**Removal-Continued****NOTE**

Note the quantity and position of shims(s) being removed to ensure shims(s) are installed in the same position.

6. Remove four screws (9), four lockwashers (10), level winder hydraulic cylinder (2) and shims(s) (11) from support plate (12). Discard lockwashers.
7. Remove level winder hydraulic cylinder (2) from support plate (12).
8. Remove level winder cylinder mounting plate (13) from level winder hydraulic cylinder (2) using spanner wrench.
9. Remove two adapters (14) and two preformed packings (15) from level winder hydraulic cylinder (2). Discard preformed packings.
10. Inspect parts for damage and replace as required.

Installation

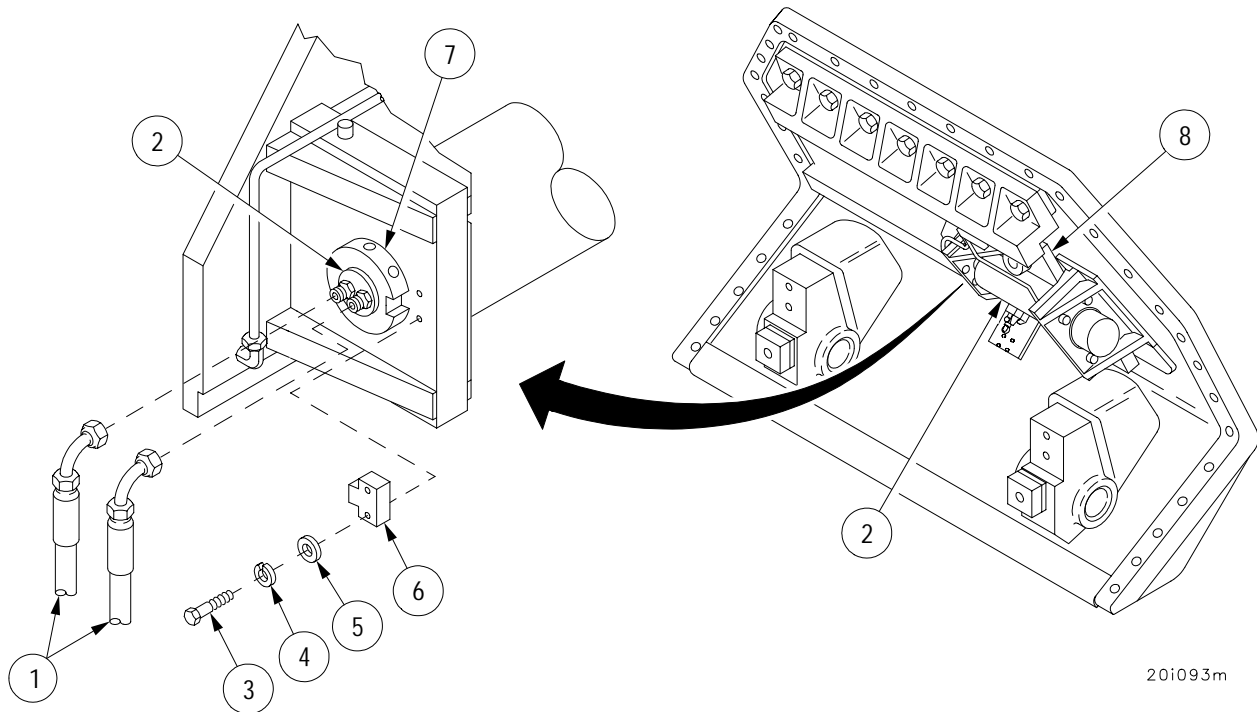
1. Apply lubricant to threads of two adapters (14) and two new preformed packings (15).
2. Install two adapters (14) with two new preformed packings (15) in level winder hydraulic cylinder (2).
3. Install level winder cylinder mounting plate (13) on level winder hydraulic cylinder (2) using spanner wrench.
4. Install level winder hydraulic cylinder (2) with shims(s) (11) in support plate (12) with four screws (9) and four new lockwashers (10).



20i092ma

LEVEL WINDER HYDRAULIC CYLINDER REPLACEMENT - CONTINUED**0055 00****Installation-Continued**

5. Slide level winder plate assembly (8) to retract position.
6. Install level winder cylinder nut (7) on level winder hydraulic cylinder (2) with key (6), two screws (3), two new lockwashers (4) and two flat washers (5) using spanner wrench.
7. Connect two hydraulic hoses (1) to level winder hydraulic cylinder (2).



201093m

NOTE**FOLLOW-ON MAINTENANCE:**

- Install spade assembly lubrication adapter block (TM 9-2350-292-20)
- Install roller bracket assembly (TM 9-2350-292-20)
- Install main winch and spade assembly (TM 9-2350-292-20)
- Install main winch wire rope assembly (TM 9-2350-292-20)

END OF TASK

LEVEL WINDER CONTROL VALVE REPLACEMENT

0056 00**THIS WORK PACKAGE COVERS:**Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)

Equipment ConditionsRoller bracket assembly removed(TM
9-2350-292-20)**Materials/Parts**

Lubricant (item 3, WP 0087 00)

Dust protective caps (4) (item 42, WP 0087 00)

Marker tags (AR) (item 26, WP 0087 00)

Wiping rags (AR) (item 6, WP 0087 00)

Dust protective plugs (4) (item 43, WP 0087 00)

Lockwashers (2) (item 20, WP 0091 00)

Preformed packings (4) (item 54, WP 0091 00)

ReferencesTM 9-2350-292-20

CAUTION

Cap all hydraulic lines and plug all hydraulic ports to prevent contamination. Failure to comply may result in damage to hydraulic system.

NOTE

All hydraulic lines and components must be tagged before removal for identification during installation.

Place rags under hydraulic connections to catch any hydraulic fluid that spills during maintenance. Dispose of fluid soaked rags in accordance with standard operating procedure.

LEVEL WINDER CONTROL VALVE REPLACEMENT - CONTINUED

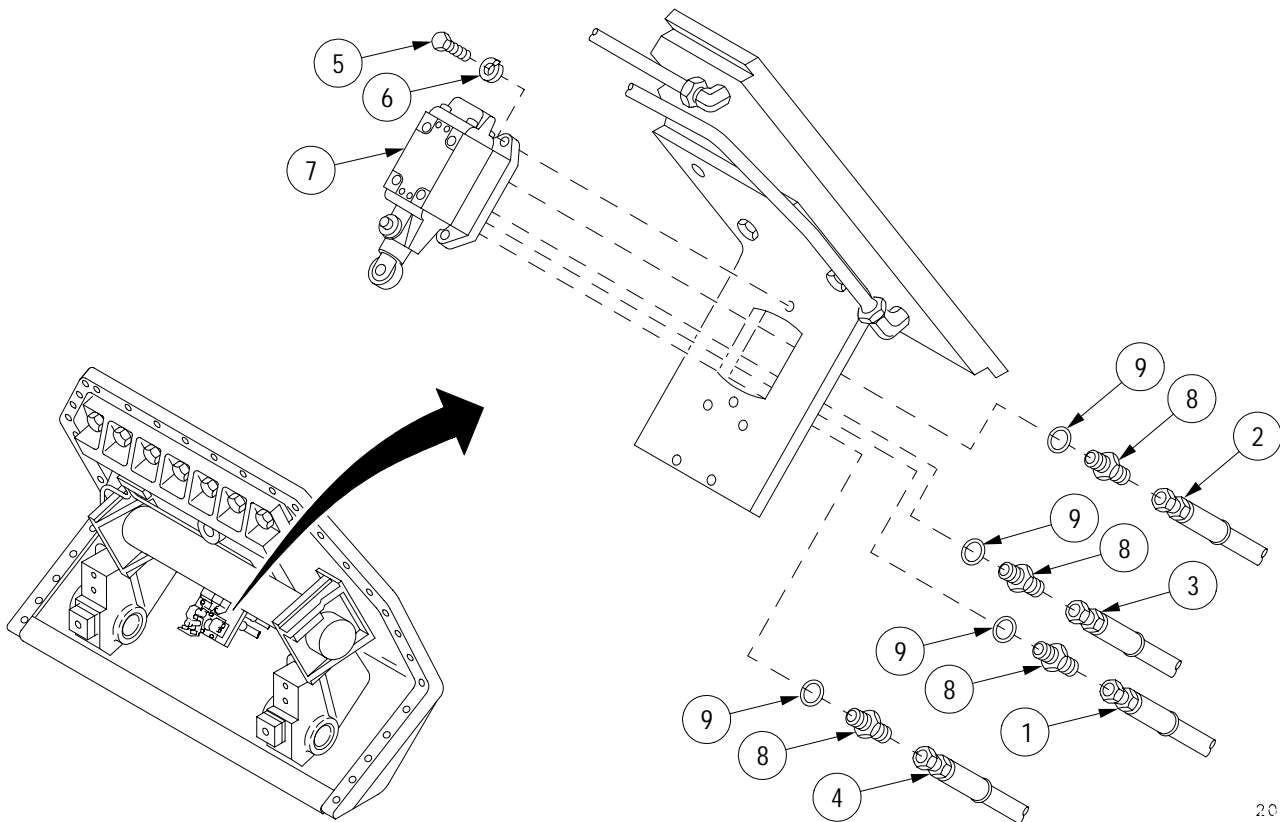
0056 00

Removal

1. Disconnect four hydraulic hoses at the following points on level winder control valve:

ITEM NO.	HOSE ASSEMBLY	CONTROL VALVE PORT	TO COMPONENTS
1	12365278-43	T	Tank return QD
2	12365278-116	A	Port V2 of check valve
3	12365278-85	P	Port G of main winch
4	12365278-120	B	Port V1 of check valve

2. Remove two screws (5), two lockwashers (6) and level winder control valve (7). Discard lockwashers.
3. Remove four adapters (8) and four preformed packings (9) from level winder control valve (7). Discard preformed packings.
4. Inspect parts for damage and replace as required.

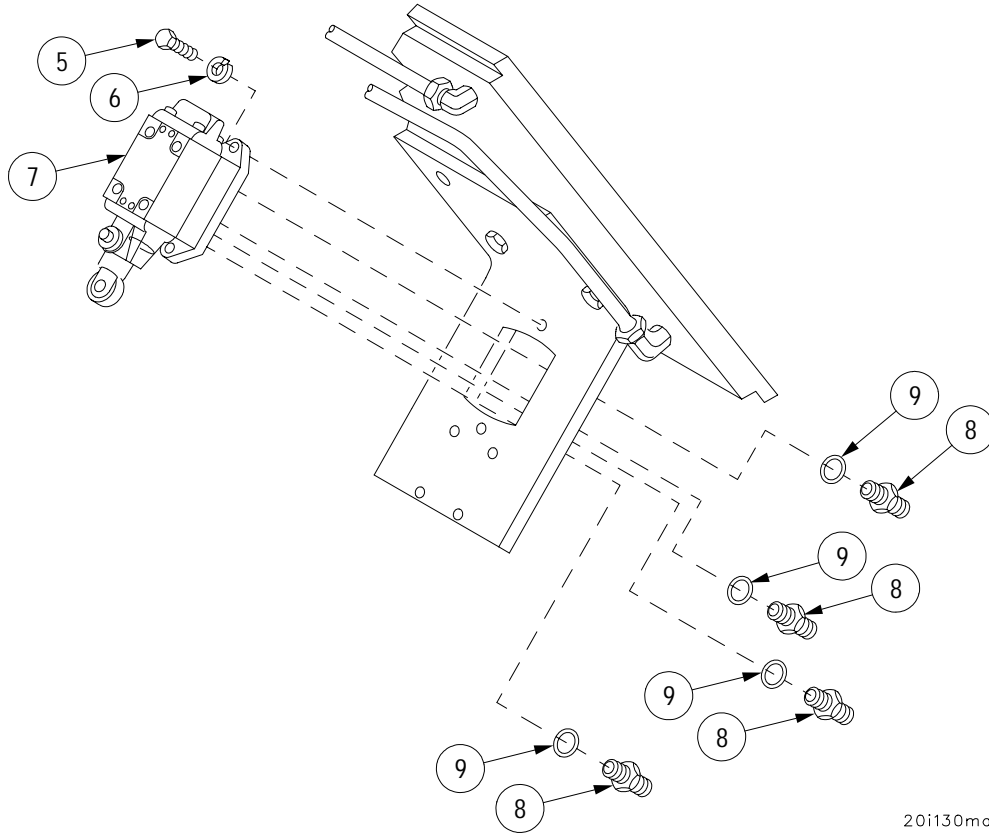


201130m

LEVEL WINDER CONTROL VALVE REPLACEMENT - CONTINUED**0056 00****Installation****NOTE**

Adapter with both ends of the same diameter is installed in port T of level winder control valve.

1. Apply lubricant to all adapter threads and new preformed packings prior to installation.
2. Install four adapters (8) and four new preformed packings (9) in level winder control valve (7).
3. Install level winder control valve (7) with two screws (5) and two new lockwashers (6).

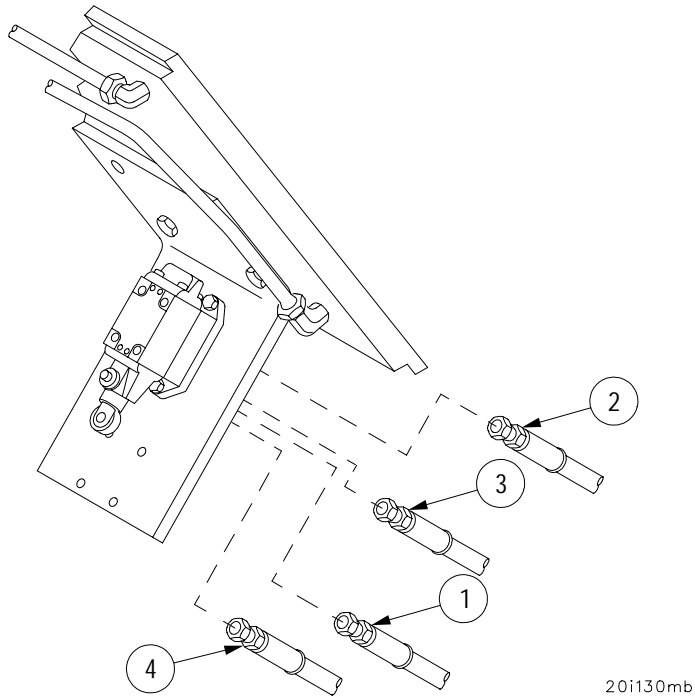


LEVEL WINDER CONTROL VALVE REPLACEMENT - CONTINUED

Installation-Continued

4. Connect four hydraulic hoses at the following points on level winder control valve:

ITEM NO.	HOSE ASSEMBLY	CONTROL VALVE PORT	TO COMPONENTS
4	12365278-120	B	Port V1 of check valve
3	12365278-85	P	Port G of main winch
2	12365278-116	A	Port V2 of check valve
1	12365278-43	T	Tank return QD



NOTE

FOLLOW-ON MAINTENANCE:

Install roller bracket assembly
(TM 9-2350-292-20)

END OF TASK

LEVEL WINDER CHECK VALVE REPLACEMENT

0057 00**THIS WORK PACKAGE COVERS:**Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
Machinist's vise (item 62, WP 0090 00)

Equipment Conditions

Level winder guard removed (TM 9-2350-292-20)

References

TM 9-2350-292-20

Materials/Parts

Dust protective plugs (8) (item 44, WP 0087 00)
Marker tags (AR) (item 26, WP 0087 00)
Wiping rags (AR) (item 6, WP 0087 00)
Lockwashers (2) (item 2, WP 0091 00)
Preformed packings (4) (item 53, WP 0091 00)

CAUTION

Cap all hydraulic lines and plug all hydraulic ports to prevent contamination. Failure to comply may result in damage to hydraulic system.

NOTE

All hydraulic lines and components must be tagged before removal for identification during installation.

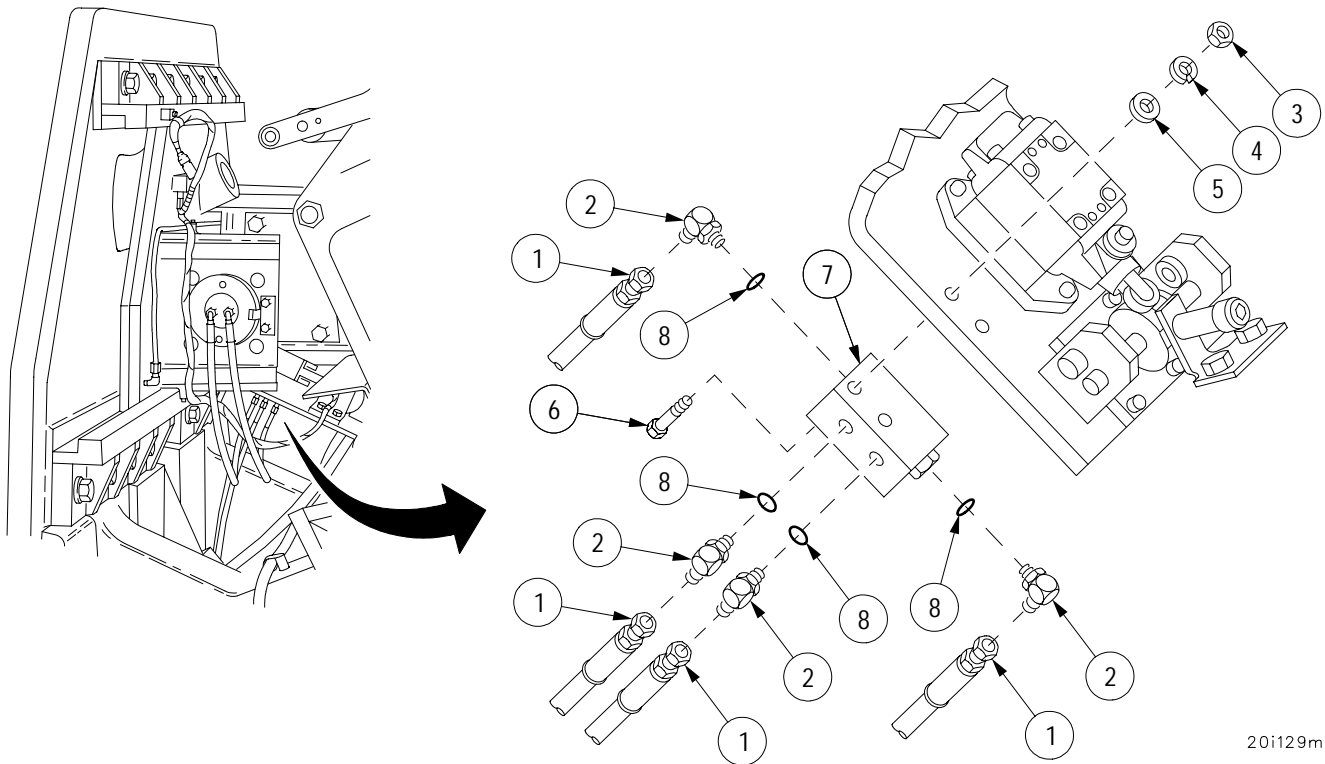
Place rags under hydraulic connections to catch any hydraulic fluid that spills during maintenance. Dispose of fluid soaked rags in accordance with standard operating procedure.

LEVEL WINDER CHECK VALVE REPLACEMENT - CONTINUED**0057 00****Removal**

1. Disconnect four hydraulic hoses (1) from four elbows (2).
2. Remove two nuts (3), two lockwashers (4), two flat washers (5), two screws (6) and valve (7). Discard lockwashers.
3. Remove four elbows (2) and four preformed packings (8) from valve (7). Discard preformed packings.
4. Inspect parts for damage and replace as required.

Installation

1. Install four elbows (2) with four new preformed packings (8) on valve (7).
2. Install valve (7) with two screws (6), two new lockwashers (4), two flat washers (5) and two nuts (3).
3. Connect four hydraulic hoses (1) to valve (7).



20i129m

NOTE

FOLLOW-ON MAINTENANCE:
Install level winder guard (TM 9-2350-292-20)

END OF TASK

ROLLER MOUNTING BRACKET REPLACEMENT**0058 00****THIS WORK PACKAGE COVERS:**

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)

Materials/Parts

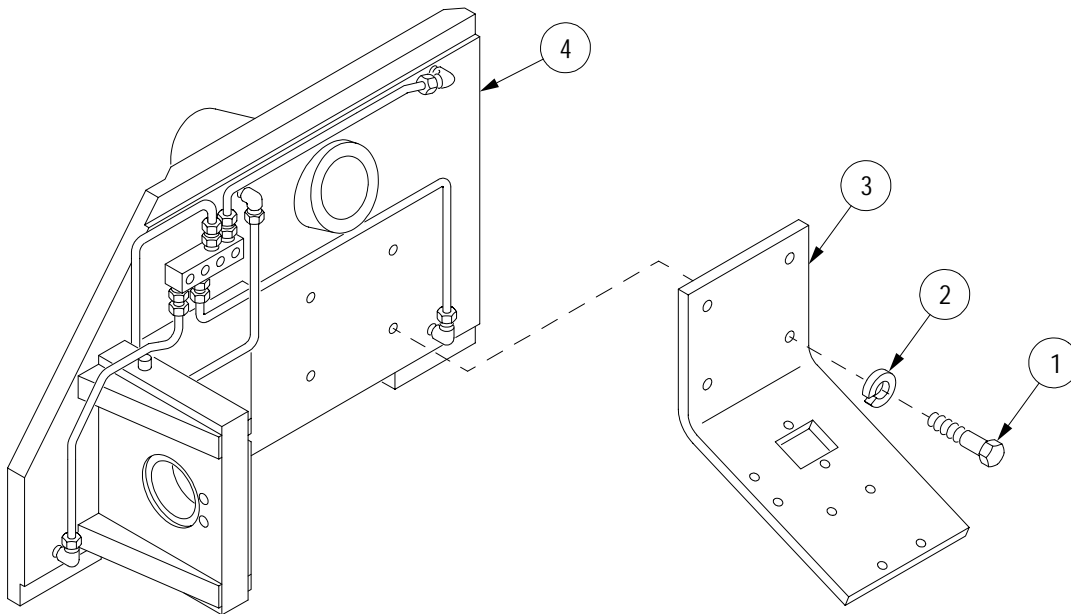
Lockwashers (2) (item 20, WP 0091 00)

Equipment ConditionsLevel winder control valve removed
(WP 0056 00)Level winder check valve removed
(WP 0057 00)**Removal**

1. Remove two screws (1), two lockwashers (2) and mounting bracket (3) from plate assembly (4). Discard lockwashers.
2. Inspect parts for damage and replace as required.

Installation

Install mounting bracket (3) on plate assembly (4) with two screws (1) and two new lockwashers (2).



20i128m

NOTE**FOLLOW-ON MAINTENANCE:**

Install level winder check valve (WP 0057 00)

Install level winder control valve (WP 0056 00)

END OF TASK

LEVEL WINDER PLATE ASSEMBLY REPLACEMENT

0059 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- Lifting sling (item 9, WP 0090 00)
- Torque wrench (item 38, WP 0090 00)
- Suitable lifting device (500 lbs (227 kg) min cap)
- Socket wrench handle (item 4, WP 0090 00)
- Socket wrench extension (item 6, WP 0090 00)
- Socket wrench socket (item 52, WP 0090 00)
- Crowbars (2) (item 51, WP 0090 00)

Materials/Parts

- Lockwashers (15) (item 82, WP 0091 00)

Equipment Conditions

- Main winch cable armor plates and guides removed (TM 9-2350-292-20)
- Spade assembly lubrication lines and fittings removed (TM 9-2350-292-20)
- Level winder hydraulic cylinder removed (WP 0055 00)
- Roller mounting bracket removed (WP 0058 00)

Personnel Required

Three

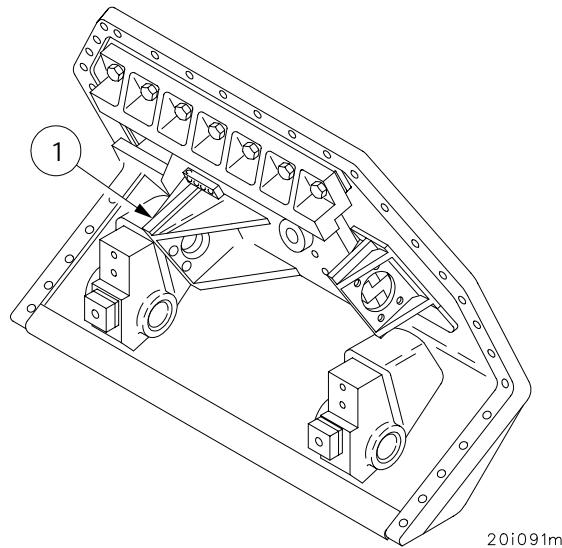
References

TM 9-2350-292-20



Removal

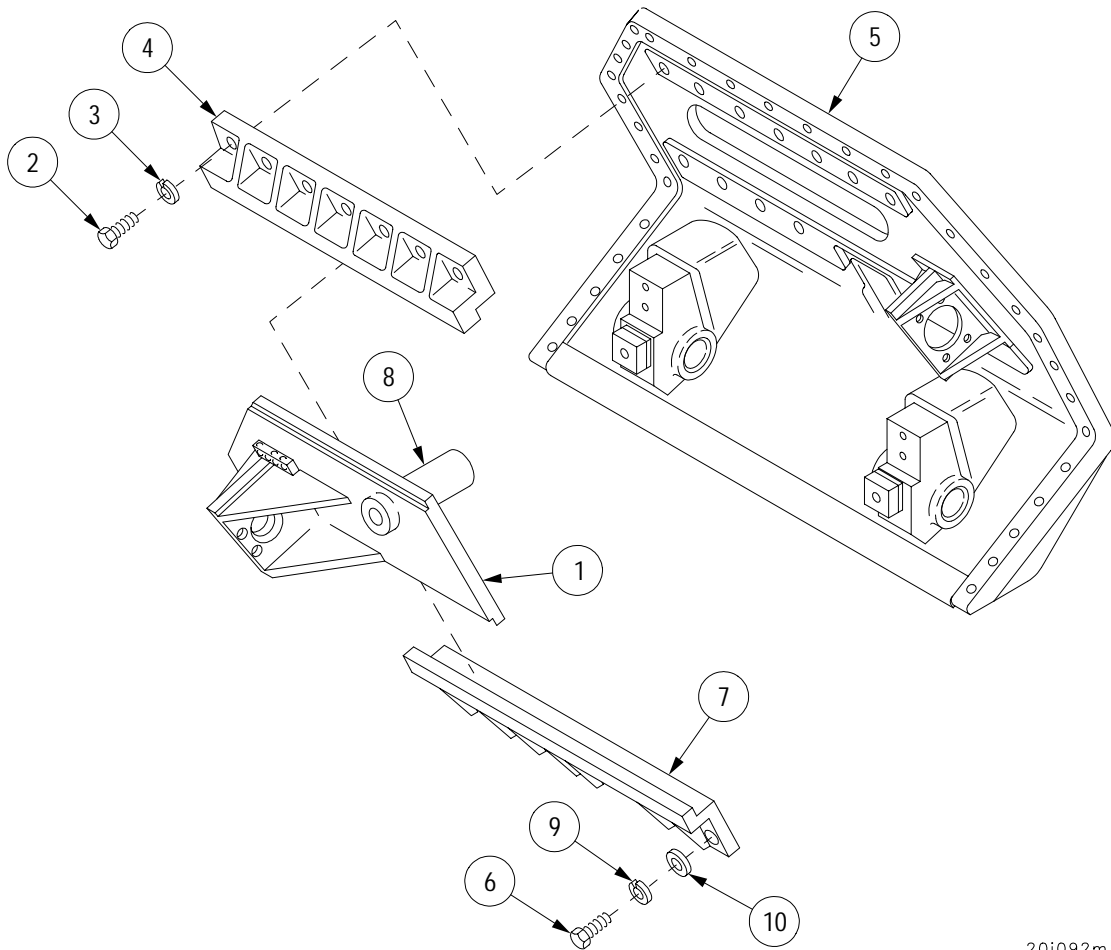
1. Attach lifting sling and suitable lifting device to level winder plate (1).



20i091m

LEVEL WINDER PLATE ASSEMBLY REPLACEMENT - CONTINUED**0059 00****Removal-Continued**

2. Remove seven screws (2), seven lockwashers (3) and upper guide (4) from hull front cover (5). Discard lockwashers.
3. Loosen eight screws (6) securing lower guide (7) to hull front cover (5), approximately four turns.
4. Tilt level winder plate (1) backward until trumpet (8) clears hull front cover (5).
5. Remove level winder plate (1) from lower guide (7) and hull front cover (5).
6. Remove eight screws (6), eight lockwashers (9), eight flat washers (10) and lower guide (7) from hull front cover (5). Discard lockwashers.
7. Inspect parts for damage and replace as required.

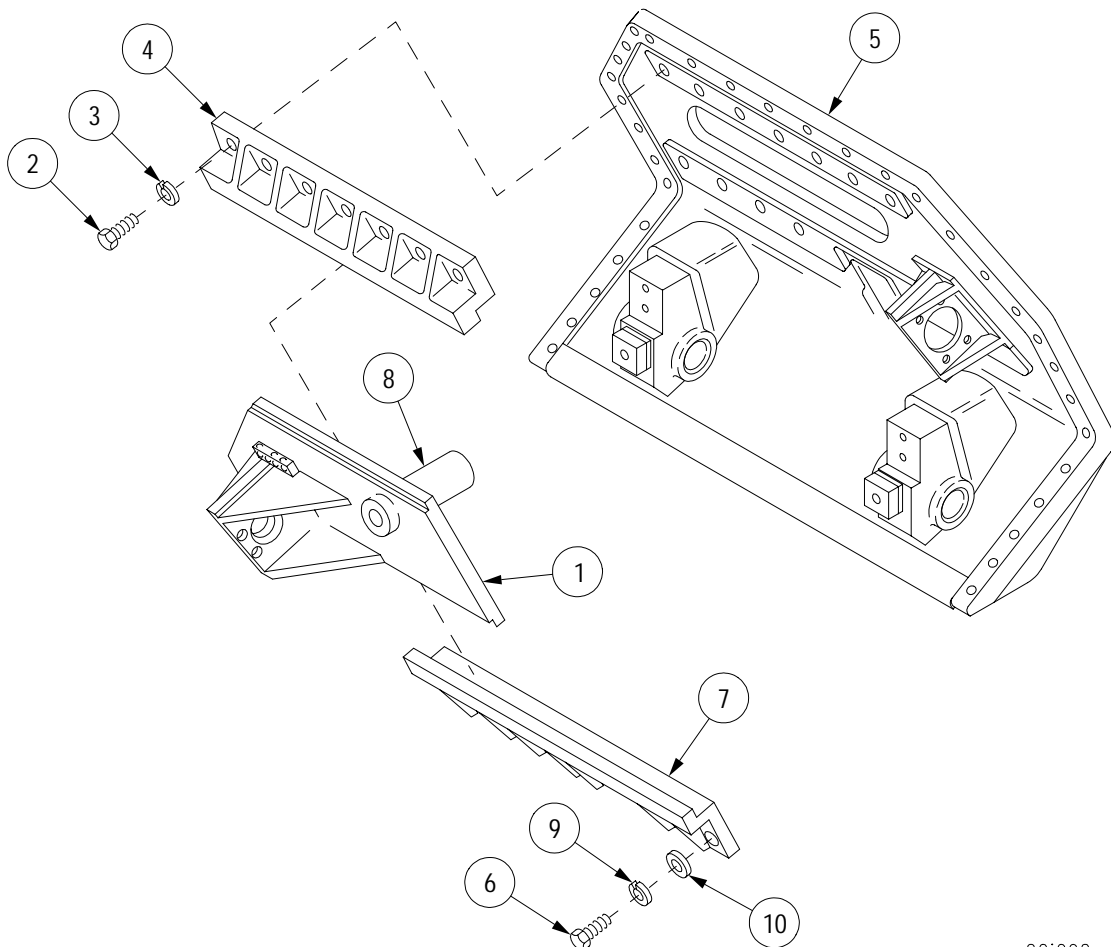


20i092m

LEVEL WINDER PLATE ASSEMBLY REPLACEMENT - CONTINUED**Installation****NOTE**

Do not tighten eight screws securing lower guide to hull front cover until trumpet on level winder plate clears the hull front cover.

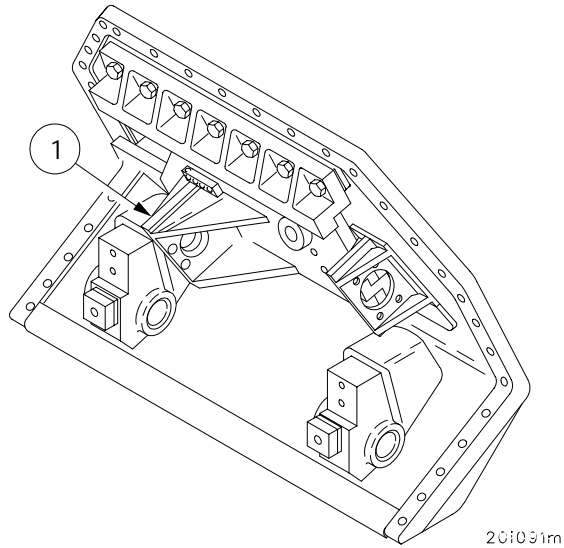
1. Install lower guide (7) on hull front cover (5) with eight screws (6), eight new lockwashers (9) and eight flat washers (10).
2. Position level winder plate (1) in lower guide (7).
3. Tilt level winder plate (1) backward to align trumpet (8) with opening in hull front cover (5).
4. Install upper guide (4) and level winder plate (1) with seven screws (2) and seven new lockwashers (3). Torque screws to 320-400 lb-ft (437-546 NSm).
5. Secure lower guide (7) to hull front cover (5) with eight screws (6). Torque screws to 320-400 lb-ft (437-546 NSm).



20i092m

LEVEL WINDER PLATE ASSEMBLY REPLACEMENT - CONTINUED**Installation-Continued**

6. Remove lifting sling from level winder plate (1).

**NOTE****FOLLOW-ON MAINTENANCE:**

- Install roller mounting bracket (WP 0058 00)
- Install level winder hydraulic cylinder (WP 0055 00)
- Install spade assembly lubrication lines and fittings (TM 9-2350-292-20)
- Install main winch cable armor plates and guides (TM 9-2350-292-20)

END OF TASK

AUXILIARY WINCH ASSEMBLY REPAIR**0060 00****THIS WORK PACKAGE COVERS:**

Disassembly, Assembly

INITIAL SETUP:**Tools and Special Tools**

- General mechanic's tool kit (item 1, WP 0090 00)
- Retaining pliers set (item 3, WP 0090 00)

Materials/Parts

- Lubricant (item 3, WP 0087 00)
- Dry-cleaning solvent (item 1, WP 0087 00)
- Weldless chain (item 11, WP 0087 00)
- Safety goggles (item 48, WP 0087 00)
- Spring pins (6) (item 5, WP 0087 00)
- Seal (item 6, WP 0091 00)
- Seal (item 7, WP 0091 00)
- Retaining ring (item 8, WP 0091 00)
- Thrust washer (item 9, WP 0091 00)
- Thrust washer (item 10, WP 0091 00)
- Thrust washers (6) (item 15, WP 0091 00)
- Lockwashers (20) (item 11, WP 0091 00)
- Preformed packing (item 12, WP 0091 00)
- Preformed packing (item 13, WP 0091 00)
- Preformed packing (item 14, WP 0091 00)

Equipment Conditions

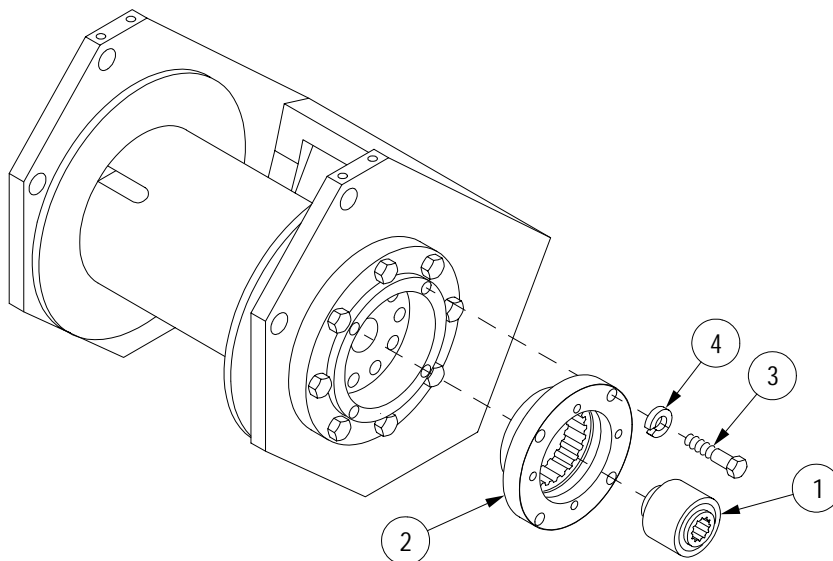
- Auxiliary winch assembly removed (TM 9-2350-292-20)
- Auxiliary winch hydraulic motor assembly removed (TM 9-2350-292-20)
- Auxiliary winch roller bracket assembly removed (TM 9-2350-292-20)

References

- TM 9-2350-292-20

Disassembly

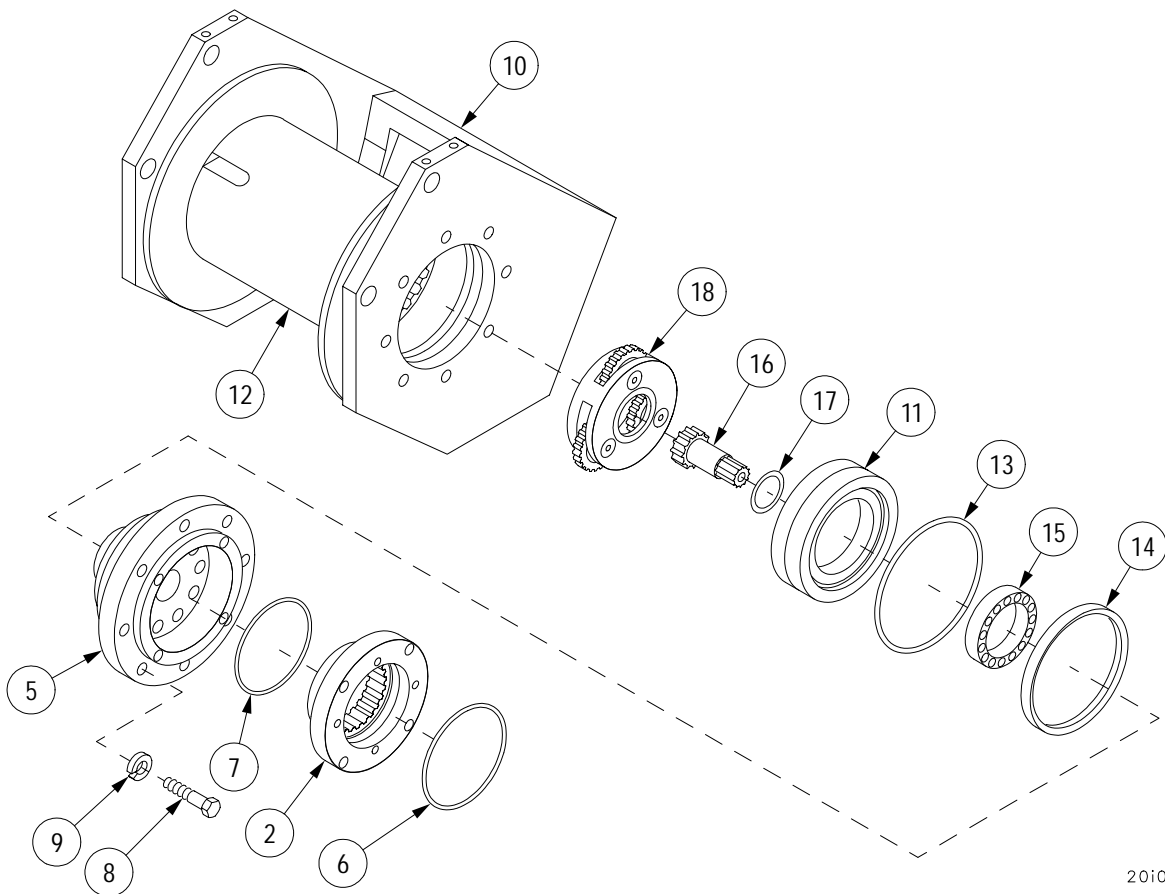
1. Remove clutch assembly (1) from motor support (2).
2. Remove four screws (3) and four lockwashers (4) from motor support (2). Discard lockwashers.
3. Fasten short piece of weldless chain to motor support (2) with two screws (3).



20i028m

AUXILIARY WINCH ASSEMBLY REPAIR - CONTINUED**0060 00****Disassembly-Continued**

4. Using weldless chain as handle, lift motor support (2) from actuating cylinder (5).
5. Remove preformed packing (6) from motor support (2) and preformed packing (7) from actuating cylinder (5). Discard preformed packings.
6. Remove eight screws (8) and eight lockwashers (9) from actuating cylinder (5). Discard lockwashers.
7. Fasten a short piece of weldless chain to actuating cylinder (5) with two screws (8).
8. Using weldless chain as handle, lift actuating cylinder (5) from winch base (10).
9. Remove drum closure (11) from drum (12).
10. Remove preformed packing (13) from drum closure (11). Discard preformed packing.
11. Remove oil seal (14) and ball bearing (15) from inside drum closure (11). Discard oil seal.
12. Remove spur gearshaft (16) and thrust washer (17) from primary planet carrier (18).
13. Remove primary planet carrier (18) from drum (12).



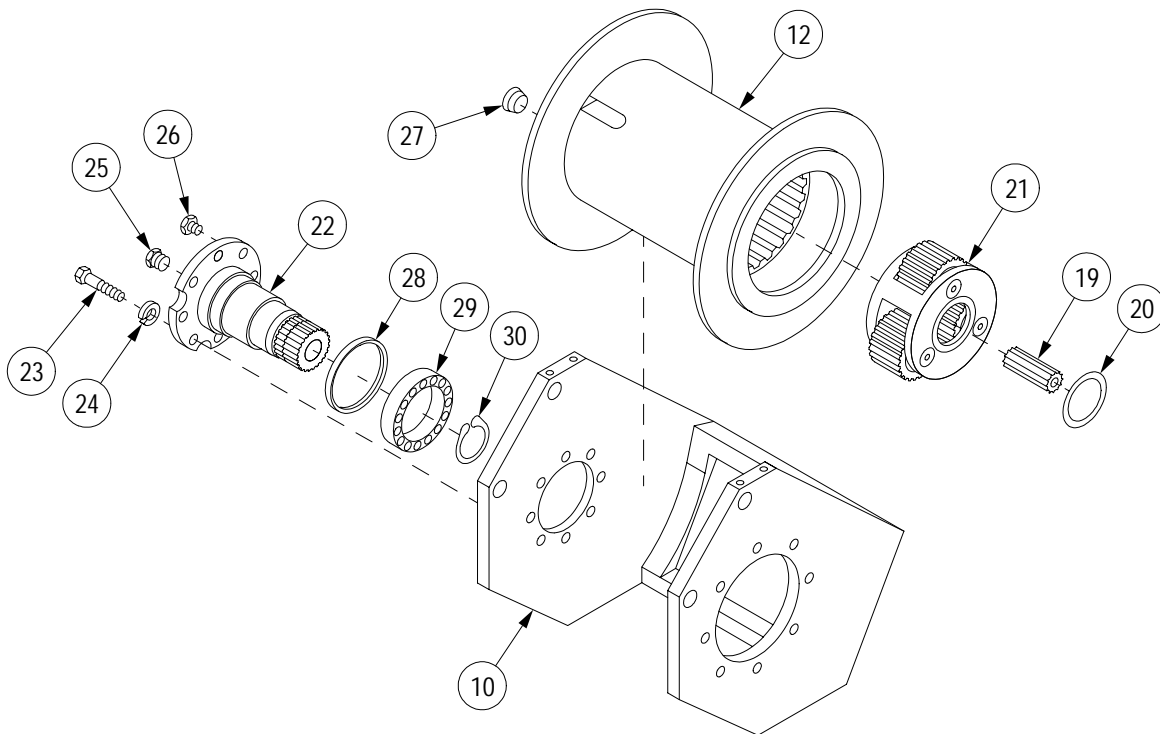
20i030m

AUXILIARY WINCH ASSEMBLY REPAIR - CONTINUED**Disassembly-Continued**

14. Remove spur gear (19) and thrust washer (20) from output planet carrier (21).
15. Remove output planet carrier (21) from drum (12).
16. Stand winch on motor end with packing retainer (22) up.
17. Remove eight screws (23) and eight lockwashers (24) from packing retainer (22). Discard lockwashers.
18. Remove vent plug (25) and plug (26) from packing retainer (22).
19. Remove packing retainer (22) from drum (12).
20. Remove drum (12) from winch base (10).
21. Remove drain plug (27), oil seal (28) and ball bearing (29) from drum (12).

**WARNING**

22. Remove retaining ring (30) from packing retainer (22). Discard retaining ring.



20i038m

AUXILIARY WINCH ASSEMBLY REPAIR - CONTINUED**Disassembly-Continued****NOTE**

Each planet carrier has three planet gear assemblies.
This task disassembles only one planet gear assembly.

The procedures for disassembly of the output and primary planet carriers are similar. Differences between output planet carrier and primary planet carrier have been noted.

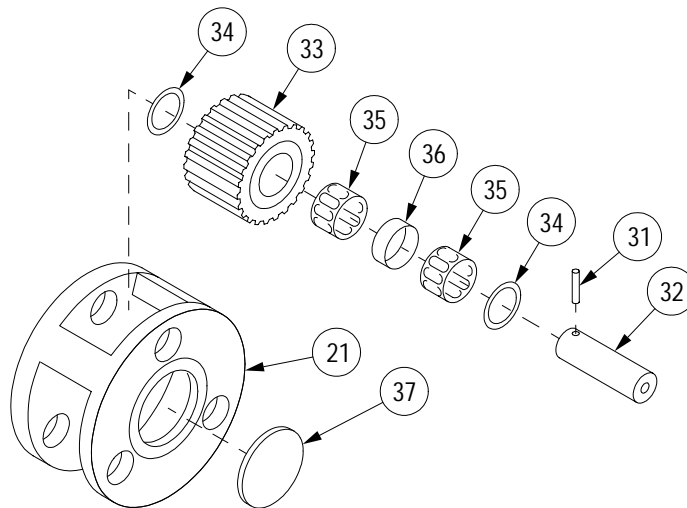
23. Drive spring pin (31) into center of output planet shaft (32).
24. Remove output planet shaft (32) from output planet carrier (21).
25. Remove spring pin (31) from output planet shaft (32). Discard spring pin.
26. Remove output planet gear (33) from output planet carrier (21).

NOTE

The primary planet carrier has only one ball bearing for each gear and has no bearing spacer.

The primary planet carrier has two thrust washers for each gear.

27. Remove two bearing washers (34), two roller bearings (35) and bearing spacer (36) from output planet gear (33).
28. Remove thrust plate (37) from output planet carrier (21).



20i039m

AUXILIARY WINCH ASSEMBLY REPAIR - CONTINUED**Disassembly-Continued**

29. Clean all parts with dry cleaning solvent.

NOTE

All worn, contaminated, or damaged parts must be replaced.

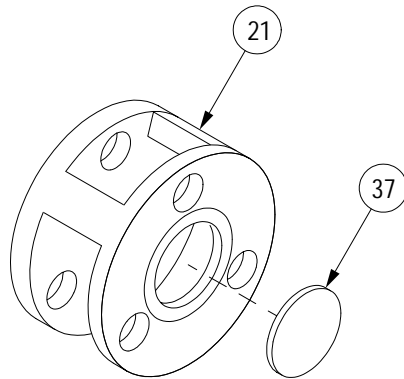
30. Check all parts for wear, cracks, contamination, pitted surfaces or any other damage.

Assembly**NOTE**

Each planet carrier has three planet gear assemblies. This task assembles only one planet gear assembly.

Procedure for assembly of the output and primary planet carriers are similar. Differences between output and primary planet carriers have been noted.

1. Position output planet carrier (21) with spliced coupling side down.
2. Install thrust plate (37) in center of output planet carrier (21).



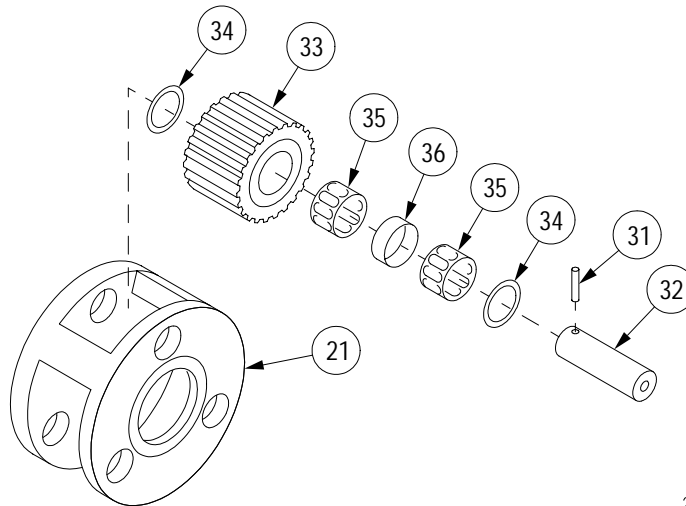
20i042m

AUXILIARY WINCH ASSEMBLY REPAIR - CONTINUED**Assembly-Continued****NOTE**

The primary planet carrier has only one ball bearing for each gear and has no bearing spacer.

The primary planet carrier has two thrust washers for each gear.

3. Insert two roller bearings (35) and bearing spacer (36) in output planet gear (33). Bearing spacer (36) is positioned between two roller bearings (35).
4. Position two bearing washers (34), one on each side of output planet gear (33) and place bearing washers (34) and output planet gear (33) in opening of output planet carrier (21).
5. Insert output planet shaft (32) through output planet carrier (21), bearing washers (34) and output planet gear (32).
6. Align pin hole in output planet carrier (21) with hole in output planet shaft (32) and install new spring pin (31).
7. Stake output planet carrier (21) next to spring pin (31), so spring pin (31) does not back out.



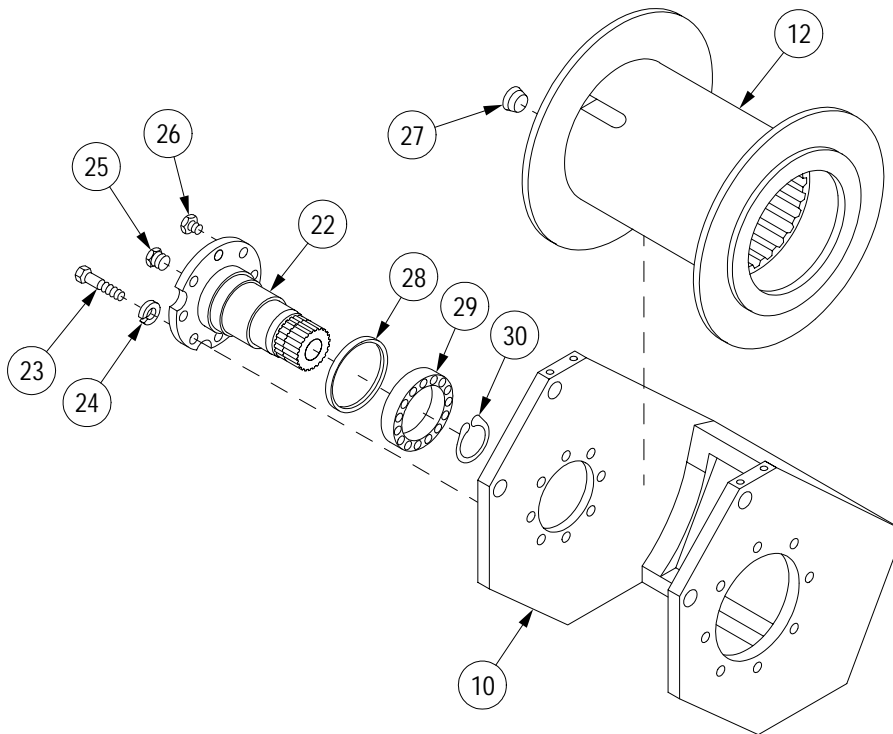
20i043m

AUXILIARY WINCH ASSEMBLY REPAIR - CONTINUED

Assembly-Continued



8. Install new retaining ring (30) on packing retainer (22).
9. Position winch base (10) on side with packing retainer (22) end up.
10. Install drain plug (27) in drum (12).
11. Install new oil seal (28) and ball bearing (29) inside drum (12).
12. Install drum (12) in winch base (10).
13. Center drum (12) in opening on winch base (10), and install packing retainer (22) in winch base (10).
14. Install vent plug (25) and plug (26) in packing retainer (22).
15. Secure packing retainer (22) to winch base (10) with eight screws (23) and eight new lockwashers (24).
16. Stand winch base (10) on packing retainer (22) end.



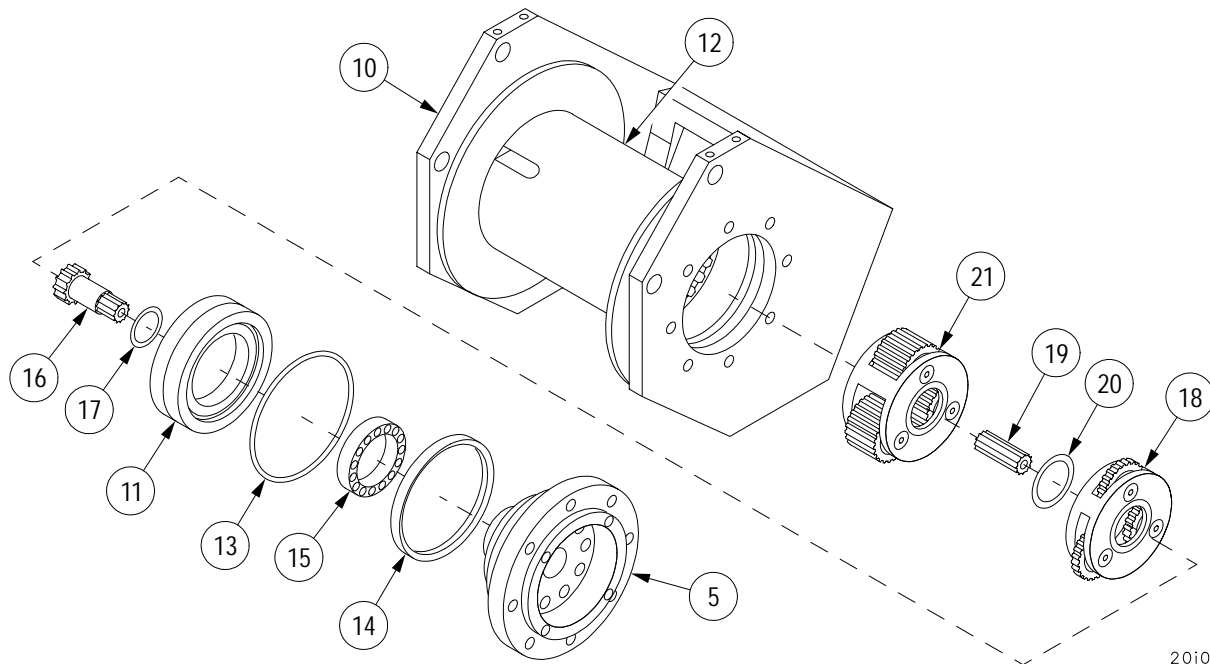
20i044m

AUXILIARY WINCH ASSEMBLY REPAIR - CONTINUED**Assembly-Continued****NOTE**

When installing output planet carrier in drum, mesh planet gears with ring gears and planet housing with the packing retainer.

When installing primary planet carrier, mesh planet gears with ring gear and planet housing with spur gear.

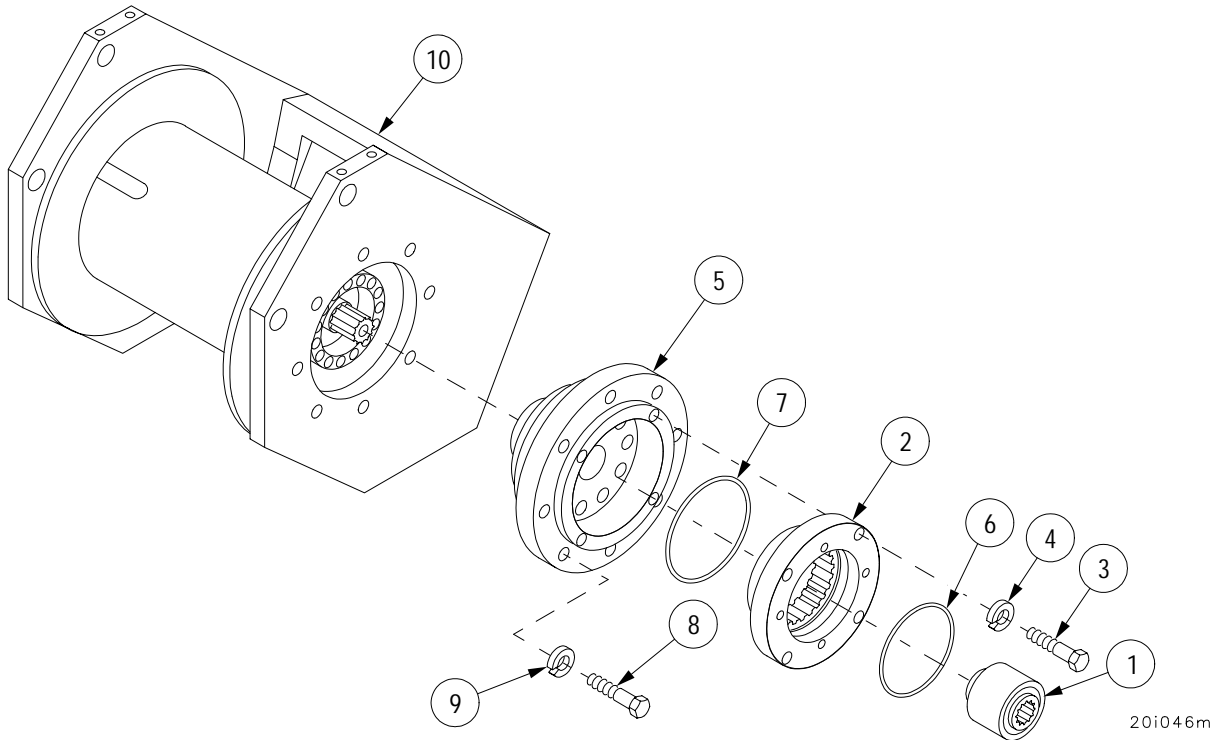
17. Install output planet carrier (21) in drum (12).
18. Install thrust washer (20) and spur gear (19) in output planet carrier (21).
19. Install thrust washer (17) and spur gearshaft (16) in primary planet carrier (18).
20. Install primary planet carrier (18) in drum (12).
21. Install new oil seal (14) and bearing (15) inside drum closure (11).
22. Install new preformed packing (13) on drum closure (11).
23. Lubricate preformed packing (13) and drum closure (11) with lubricant, then install drum closure (11) in drum (12).
24. Lubricate oil seal (14) and bearing surfaces with lubricant, and install actuating cylinder (5) on winch base (10).



20i045m

AUXILIARY WINCH ASSEMBLY REPAIR - CONTINUED**Assembly-Continued**

25. Secure actuating cylinder (5) to winch base (10) with eight screws (8) and eight new lockwashers (9).
26. Install new preformed packing (7) in actuating cylinder (5) and new preformed packing (6) in motor support (2).
27. Install motor support (2) in actuating cylinder (5) with four screws (3) and four new lockwashers (4).
28. Install clutch assembly (1) in motor support (2).

**NOTE****FOLLOW-ON MAINTENANCE:**

- Install auxiliary winch roller bracket assembly
(TM 9-2350-292-20)
- Install auxiliary winch hydraulic motor assembly
(TM 9-2350-292-20)
- Install auxiliary winch assembly
(TM 9-2350-292-20)

END OF TASK

SPADE LOCK ASSEMBLY REPAIR

0061 00**THIS WORK PACKAGE COVERS:**Dissassembly, Assembly

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
Hand arbor press (item 2, WP 0090 00)

Materials/Parts

Lubricant (item 5, WP 0087 00)
Sealing compound (item 20, WP 0087 00)
Safety goggles (item 48, WP 0087 00)
Lockwashers (14) (item 1, WP 0091 00)
Preformed packing (item 96, WP 0091 00)
Headless straight pins (2) (item 97, WP 0091 00)
Cotter pin (item 34, WP 0091 00)
Machine key (item 98, WP 0091 00)
Preformed packing (item 99, WP 0091 00)

Equipment Conditions

Spade lock assembly removed (TM 9-2350-292-20)

Personnel Required

Two

ReferencesTM 9-2350-292-20

**WARNING****CAUTION**

Hydraulic lines and ports must be capped to prevent contaminants from entering the hydraulic system and causing internal damage to hydraulic components.

SPADE LOCK ASSEMBLY REPAIR - CONTINUED**Disassembly****NOTE**

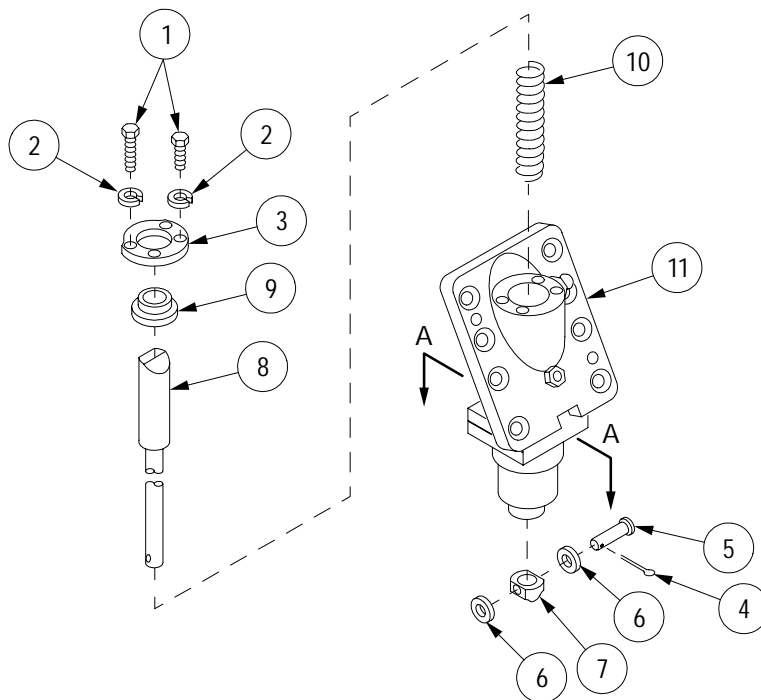
Note different length screws being removed for proper installation. The shorter screws are installed on the inside toward the vehicle hull front cover assembly.

1. Remove four screws (1) and four lockwashers (2) from grease seal retainer (3). Discard lockwashers.

WARNING

Spring is under tension. Hold downward pressure using hand arbor press on detent plunger to compress spring and slowly release pressure for disassembly. Failure to comply may result in personnel injury.

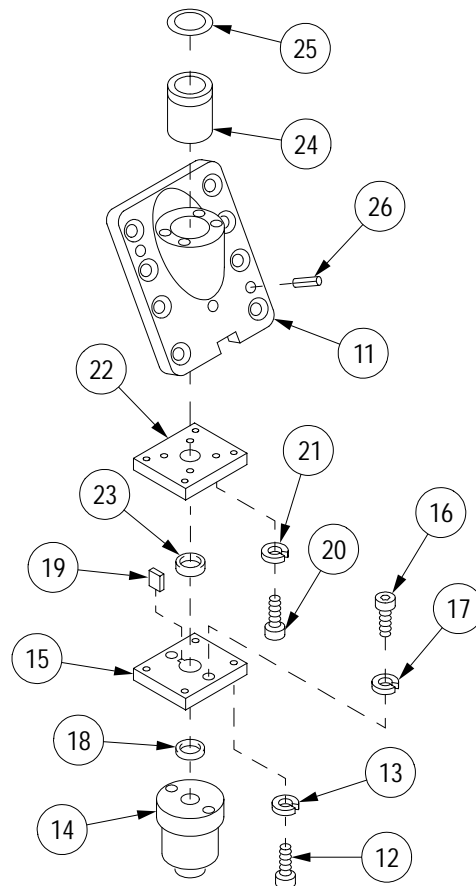
2. Remove cotter pin (4), headed straight pin (5), two flat washers (6) and shaft collar (7) from detent plunger (8). Discard cotter pin.
3. Remove detent plunger (8), preformed packing (9) and spring (10) from spade lock housing (11). Discard preformed packing.



20i116m

SPADE LOCK ASSEMBLY REPAIR - CONTINUED**0061 00****Disassembly-Continued**

4. Remove four socket head screws (12) and four lockwashers (13) from hydraulic cylinder (14) and plate (15). Discard lockwashers.
5. Remove two socket head screws (16), two lockwashers (17), hydraulic cylinder (14) and flat washer (18) from plate (15). Discard lockwashers.
6. Remove machine key (19) from plate (15). Discard machine key.
7. Remove four socket head screws (20), four lockwashers (21) and plate (22) from spade lock housing (11). Discard lockwashers.
8. Remove bearing (23) from plate (22).
9. Remove bushing (24) from spade lock housing (11).
10. Remove preformed packing (25) from bushing (24). Discard preformed packing.
11. Remove two headless straight pins (26) from spade lock housing (11). Discard headless straight pins.
12. Inspect all parts for damage and replace as required.



20i116mb

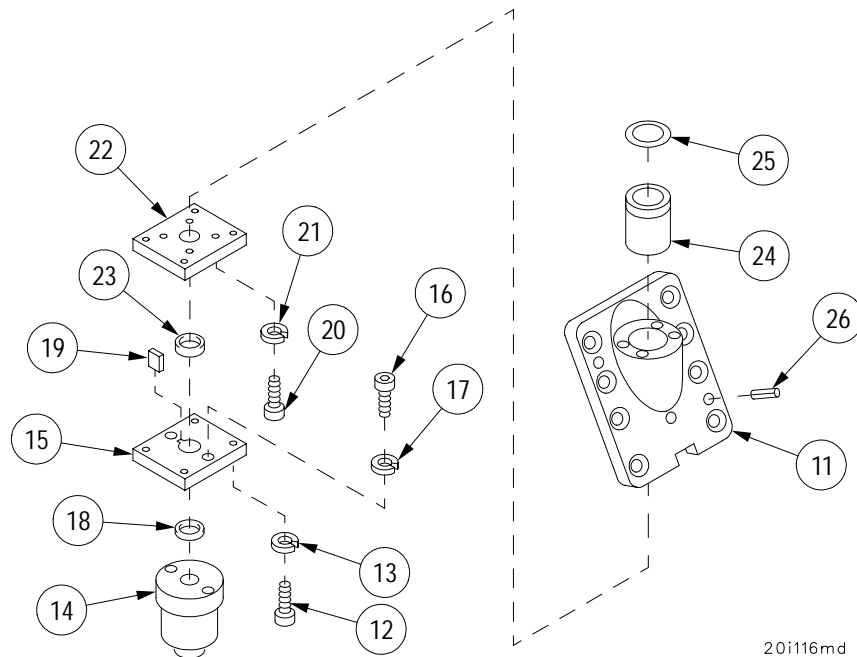
SPADE LOCK ASSEMBLY REPAIR - CONTINUED**0061 00****Assembly**

1. Install two new headless straight pins (26) in spade lock housing (11).
2. Apply a thin even coat of clean lubricant to all new preformed packings prior to installation.
3. Install preformed packing (25) in spade lock housing (11).
4. Install bushing (24) in spade lock housing (11).
5. Install bearing (23) in plate (22).
6. Install plate (22) on spade lock housing (11) with four socket head screws (20) and four new lockwashers (21).
7. Install new machine key (19) in plate (15).

NOTE

When installing plate with machine key and hydraulic cylinder, position plate with machine key and hydraulic cylinder port facing away from vehicle hull front cover assembly.

8. Install hydraulic cylinder (14) and flat washer (18) on plate (15) with two socket head screws (16) and two new lockwashers (17).
9. Install plate (15) and hydraulic cylinder (14) on spade lock housing (11) with four screws (12) and four new lockwashers (13).



SPADE LOCK ASSEMBLY REPAIR - CONTINUED

0061 00

Assembly-Continued

- Slide detent plunger (8) with spring (10) and new preformed packing (9) in spade lock housing (11). Make sure detent plunger (8) keyway slot is aligned with machine key (19) in plate (15).



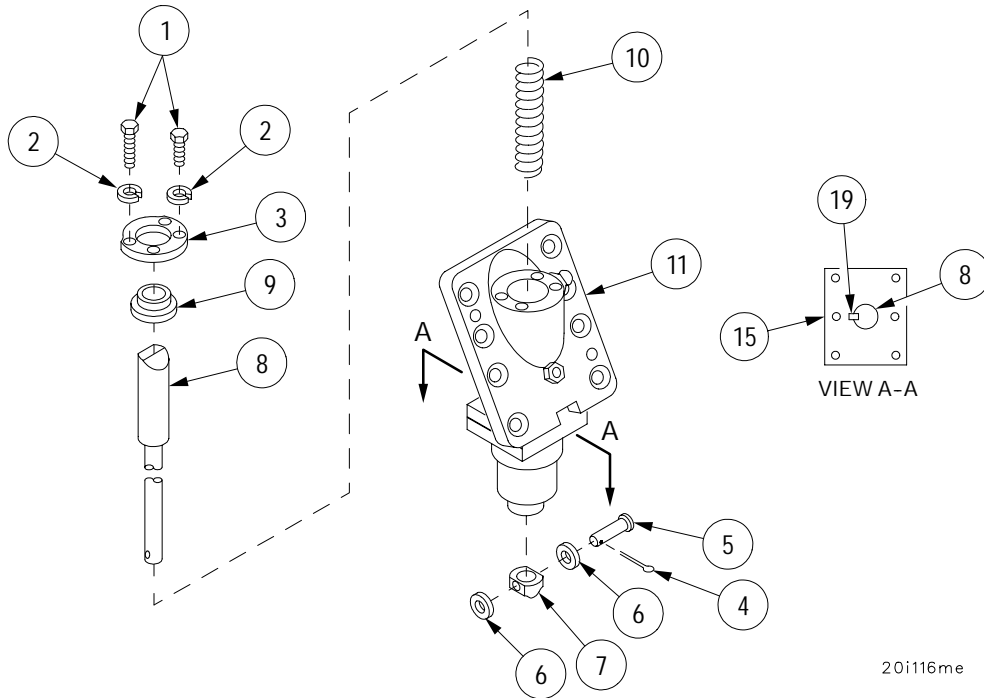
Spring is under tension. Hold downward pressure using arbor press on detent plunger to compress spring and slowly release pressure for assembly. Failure to comply may result in personnel injury.

- Install shaft collar (7) on detent plunger (8) with two flat washers (6), headed straight pin (5) and new cotter pin (11).

NOTE

Shorter screws are installed on the inside toward vehicle hull front cover assembly.

- Install grease seal retainer (3) with four screws (1) and four new lockwashers (2).



NOTE

FOLLOW-ON MAINTENANCE:

- Install spade lock assembly
(TM 9-2350-292-20)
- Lubricate spade lock
(TM 9-2350-292-20)

END OF TASK

SPADE CYLINDER AND LINK REPLACEMENT**0062 00****THIS WORK PACKAGE COVERS:**

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
 Slide hammer puller assembly (item 14, WP 0090 00)
 Universal puller kit (item 56, WP 0090 00)
 Lifting slings (2) (item 9, WP 0090 00)
 Shaft guide (item 36, WP 0090 00)
 Manual control handle (item 40, WP 0090 00)
 Suitable lifting device (2) (275 lbs (124.8 kg) min cap)

Materials/Parts

Lubricant (item 2, WP 0087 00)
 Bushings (2) (item 55, WP 0091 00)
 Bushings (2) (item 56, WP 0091 00)
 Lockwashers (8) (item 1, WP 0091 00)
 Lockwashers (2) (item 57, WP 0091 00)
 Straight headless pins (4) (item 74, WP 0091 00)
 Plain seals (2) (item 75, WP 0091 00)
 Plain seals (2) (item 76, WP 0091 00)
 Lockwashers (4) (item 41, WP 0091 00)

Equipment Conditions

Spade assembly lubrication hoses and tubes removed
 (TM 9-2350-292-20)
 Main winch and spade cylinder hydraulic hoses
 removed (WP 0063 00)

Personnel Required

Three

References

TM 9-2350-292-20

**NOTE**

Main winch and spade assembly weighs approximately 9000 pounds. Use lifting equipment capable of holding at least that capacity.

Perform Removal steps 1 through 24 and 27 and Installation step 2 through 13, 16 through 19 and 20 through 25 for maintenance of spade links.

Perform Removal steps 1 through 18 and 27 and Installation steps 1 through 23 for maintenance of spade cylinders.

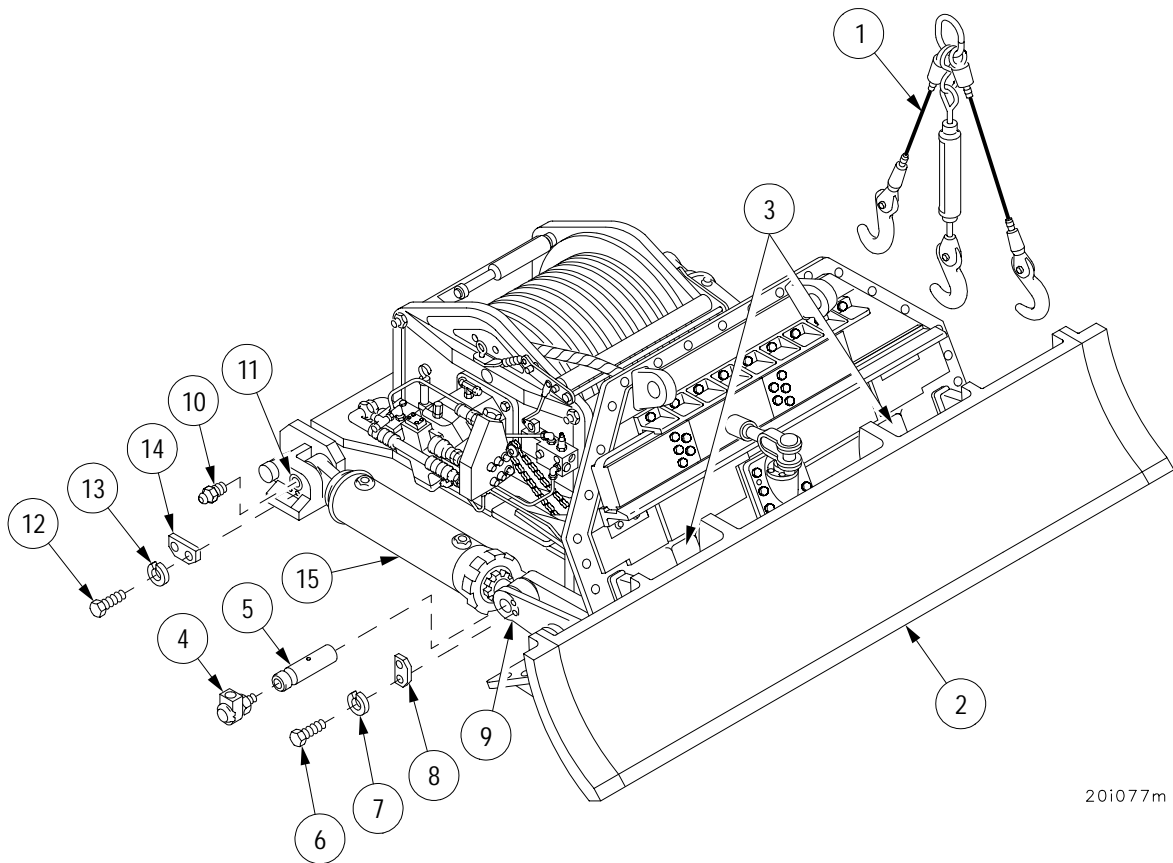
SPADE CYLINDER AND LINK REPLACEMENT - CONTINUED**0062 00****Removal**

1. Connect lifting sling (1) around spade assembly (2) on outside of spade arms (3).
2. Remove slack from lifting sling (1) using a suitable lifting device.

NOTE

Spade cylinders must be supported. Use lifting sling and suitable lifting device to support right and left spade cylinders during removal procedures.

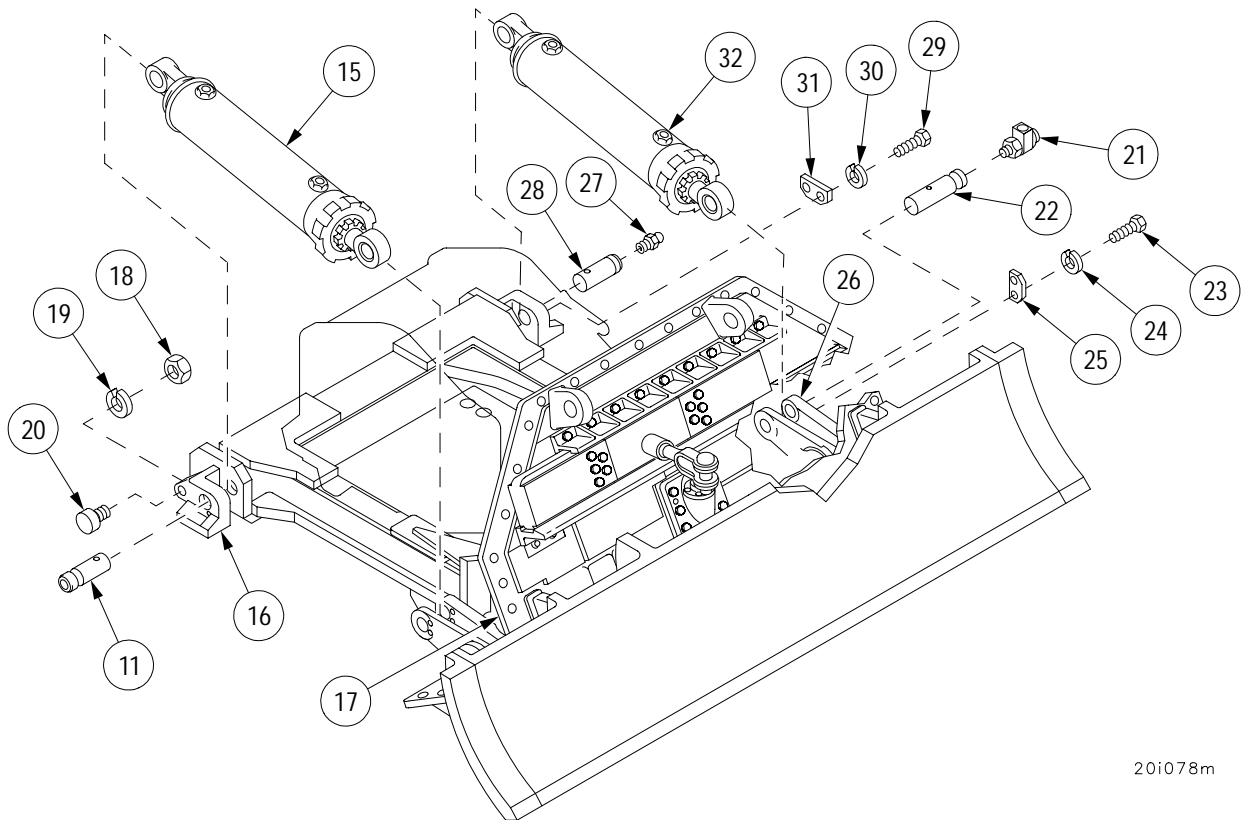
3. Remove lubrication fitting (4) from straight shaft (5).
4. Remove two screws (6), two lockwashers (7) and pin retainer (8) from right spade link (9). Discard lockwashers.
5. Remove lubrication fitting (10) from straight shaft (11).
6. Remove two screws (12), two lockwashers (13) and pin retainer (14). Discard lockwashers.
7. Remove straight shaft (5) from right spade cylinder (15) and spade link (9).



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SPADE CYLINDER AND LINK REPLACEMENT - CONTINUED**0062 00****Removal-Continued**

8. Remove straight shaft (11) from right spade cylinder (15) and main winch support rails (16).
9. Remove right spade cylinder (15) from hull front cover (17).
10. Remove nut (18), lockwasher (19) and roller (20) from main winch support rails (16). Discard lockwasher.
11. Remove lubrication fitting (21) from straight shaft (22).
12. Remove two screws (23), two lockwashers (24) and pin retainer (25) from left spade link (26). Discard lockwasher.
13. Remove lubrication fitting (27) from straight shaft (28).
14. Remove two screws (29), two lockwashers (30) and pin retainer (31). Discard lockwashers.
15. Remove straight shaft (22) from left spade cylinder (32) and left spade link (26).
16. Remove straight shaft (28) from left spade cylinder (32) and main winch support rails (16).
17. Remove left spade cylinder (32) from hull front cover (17).



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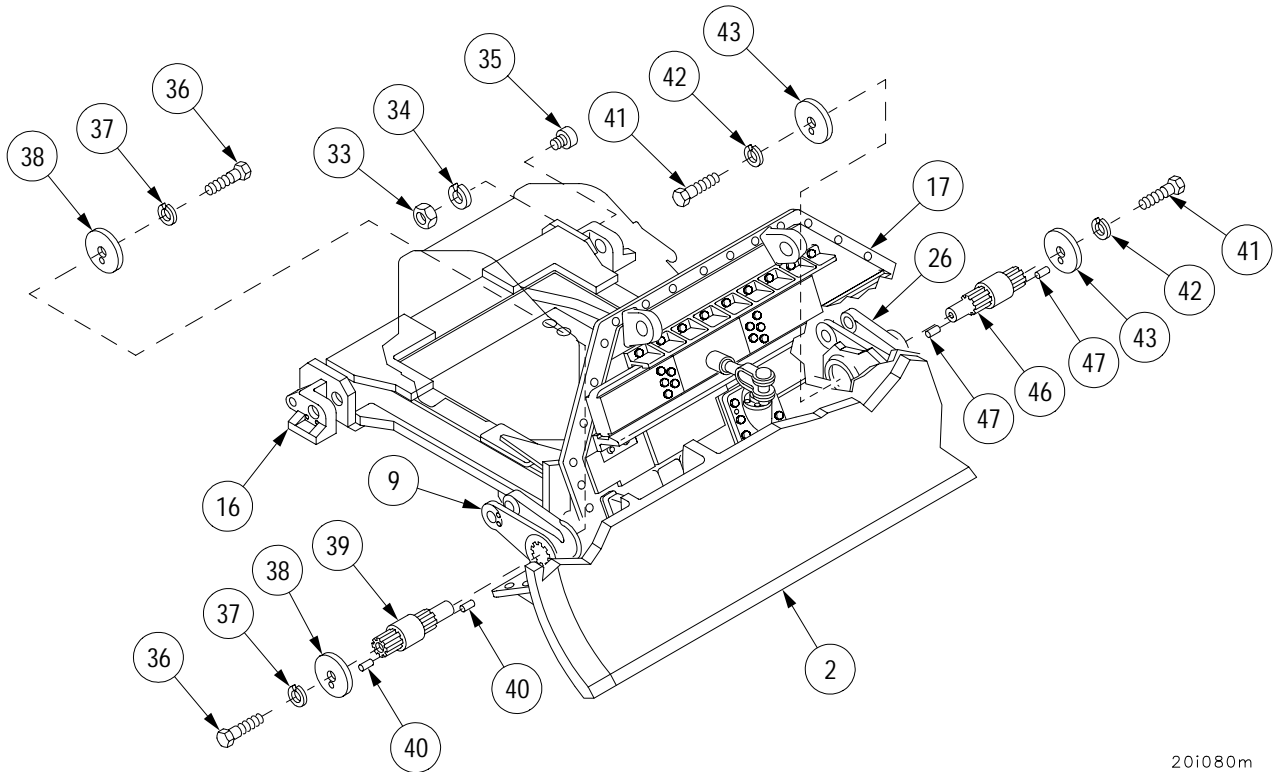
SPADE CYLINDER AND LINK REPLACEMENT - CONTINUED**0062 00****Removal-Continued**

18. Remove nut (33), lockwasher (34) and roller (35) from main winch support rails (16). Discard lockwasher.
19. Remove two screws (36), two lockwashers (37) and two retainers (38) from right spade shaft (39). Discard lockwashers.
20. Remove two headless straight pins (40) from spade shaft (39). Discard pins.
21. Remove two screws (41), two lockwashers (42) and two retainers (43) from left spade shaft (46). Discard lockwashers.
22. Remove two headless straight pins (47) from left spade shaft (46). Discard pins.

NOTE

It may be necessary to lift or lower the spade while tapping on spade shaft in outward direction.

23. Remove spade shaft (39) from right spade link (9).
24. Remove spade shaft (46) from left spade link (26).
25. Remove spade assembly (2) from hull front cover (17).



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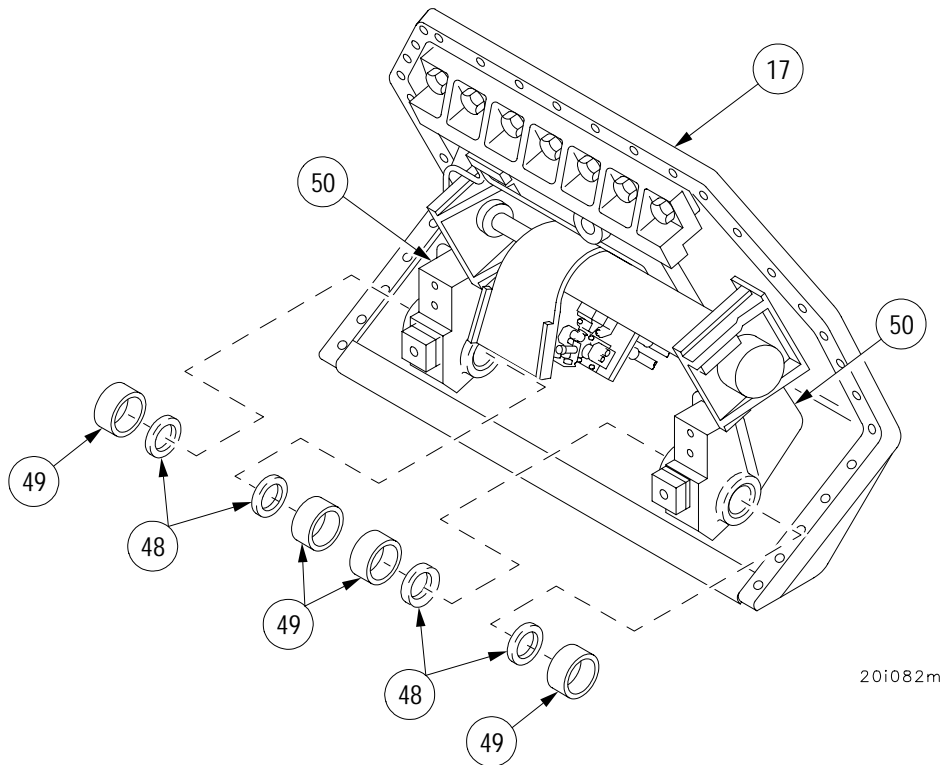
SPADE CYLINDER AND LINK REPLACEMENT - CONTINUED**0062 00****Removal-Continued**

26. Remove two seals (48) and two bushings (49) each from both left and right spade mounts (50) in hull front cover (17). Discard seals and bushings.
27. Inspect all parts for damage and replace as required.

Installation**NOTE**

Lips of seals must face inward toward center. Use suitable driver to slowly tap seals in place.

1. Install two new bushings (49) and two new seals (48) each in both right and left spade mounts (50) in hull front cover (17).

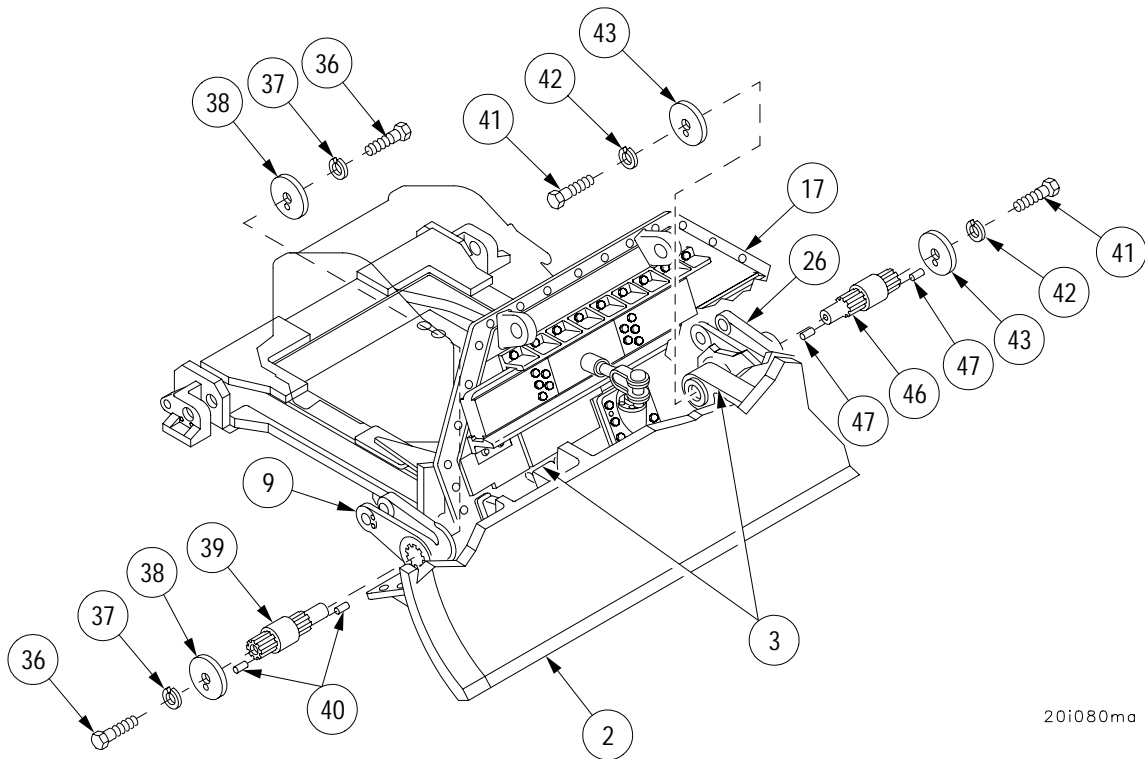


SPADE CYLINDER AND LINK REPLACEMENT - CONTINUED

0062 00

Installation-Continued

2. Apply lubricant to right spade shaft (39) and left spade shaft (46).
3. Lift and align spade assembly (2) in hull front cover (17).
4. Place shaft guide over splined end of left spade shaft (46). Lock in place with manual control handle.
5. Install left spade shaft (46) in spade link (26) and spade shaft arm (3). Remove shaft guide.
6. Place shaft guide over splined end of right spade shaft (39). Lock in place with manual control handle.
7. Install shaft (39) in spade link (9) and spade shaft arm (3). Remove shaft guide.
8. Install two new headless straight pins (47) in left spade shaft (46).
9. Install two retainers (43) with two screws (41) and two new lockwashers (42) in left shaft (46).
10. Install two new headless straight pins (40) in right spade shaft (39).
11. Install two retainers (38) with two screws (36) and two new lockwashers (37) in right spade shaft (39).



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SPADE CYLINDER AND LINK REPLACEMENT - CONTINUED**0062 00****Installation-Continued**

12. Install roller (35) on left side main winch support rails (16) with nut (33) and new lockwasher (34). Torque nut (33) to 65-75 lb-ft (88-102 NSm).
13. Install roller (20) on right side main winch support rails (16) with nut (18) and new lockwasher (19). Torque nut (18) to 65-75 lb-ft (88-102 NSm).

NOTE

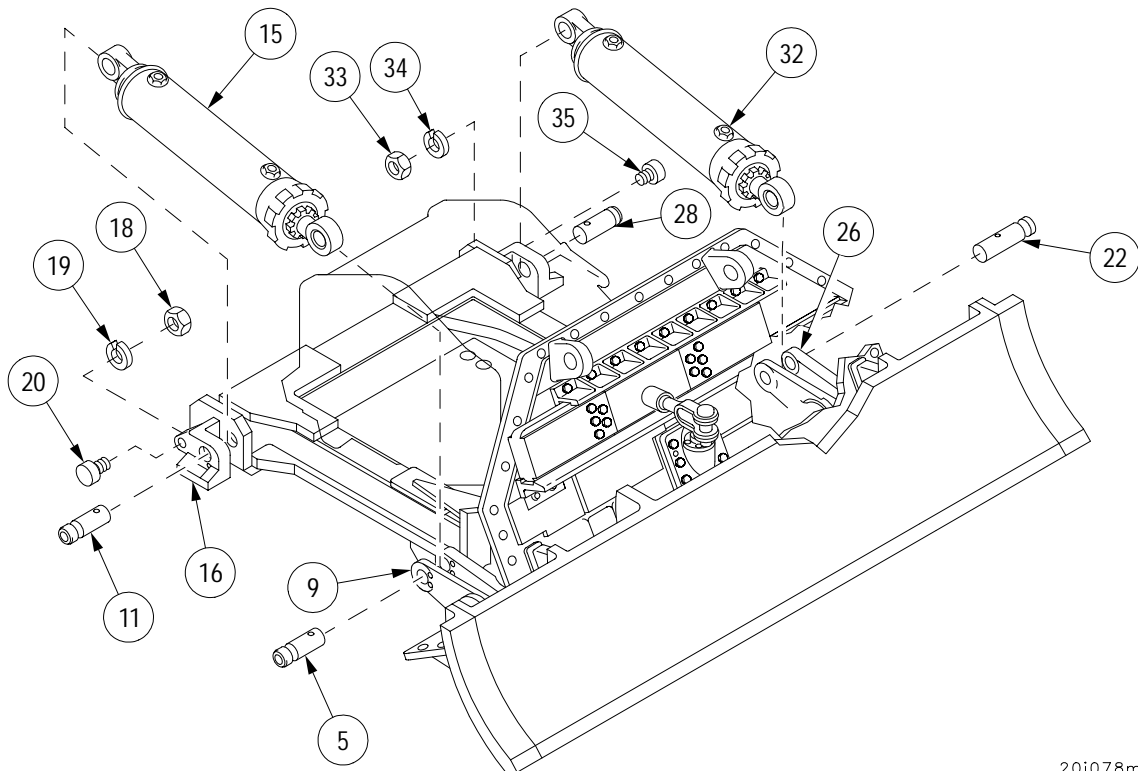
Left spade cylinder must be supported. Use lifting sling and suitable lifting device to support left spade cylinder until it is secured by hardware.

14. Install left spade cylinder (32) on main winch support rails (16) and spade link (26) with straight shaft (28) and straight shaft (22).

NOTE

Right spade cylinder must be supported. Use lifting sling and suitable lifting device to support right spade cylinder until it is secured by hardware.

15. Install right spade cylinder (15) on main winch support rails (16) and spade link (9) with straight shaft (11) and straight shaft (5).



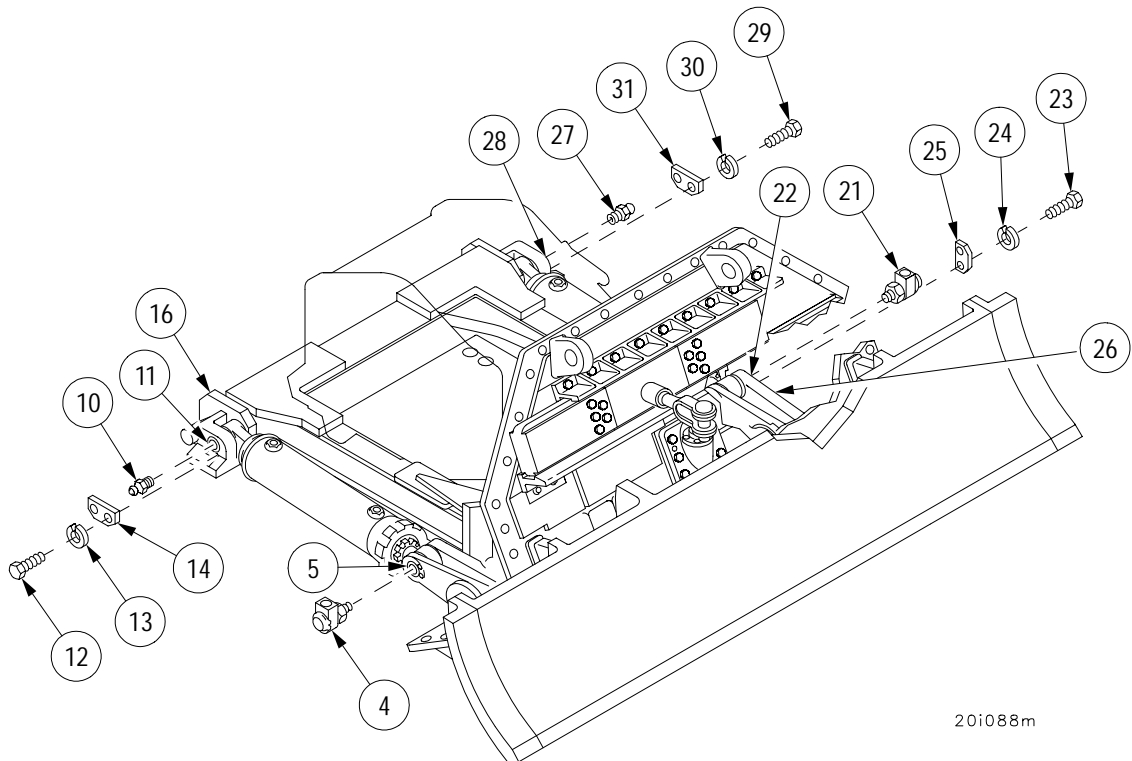
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SPADE CYLINDER AND LINK REPLACEMENT - CONTINUED

0062 00

Installation-Continued

16. Install lubrication fitting (27) on straight shaft (28).
17. Install lubrication fitting (21) on straight shaft (22).
18. Install pin retainer (31) on left main winch support rails (16) with two screws (29) and two new lockwashers (30).
19. Install pin retainer (25) on left spade link (26) with two screws (23) and two new lockwashers (24).
20. Install lubrication fitting (10) on straight shaft (11).
21. Install lubrication fitting (4) on straight shaft (5).
22. Install pin retainer (14) on right main winch support rails (16) with two screws (12) and two new lockwashers (13).



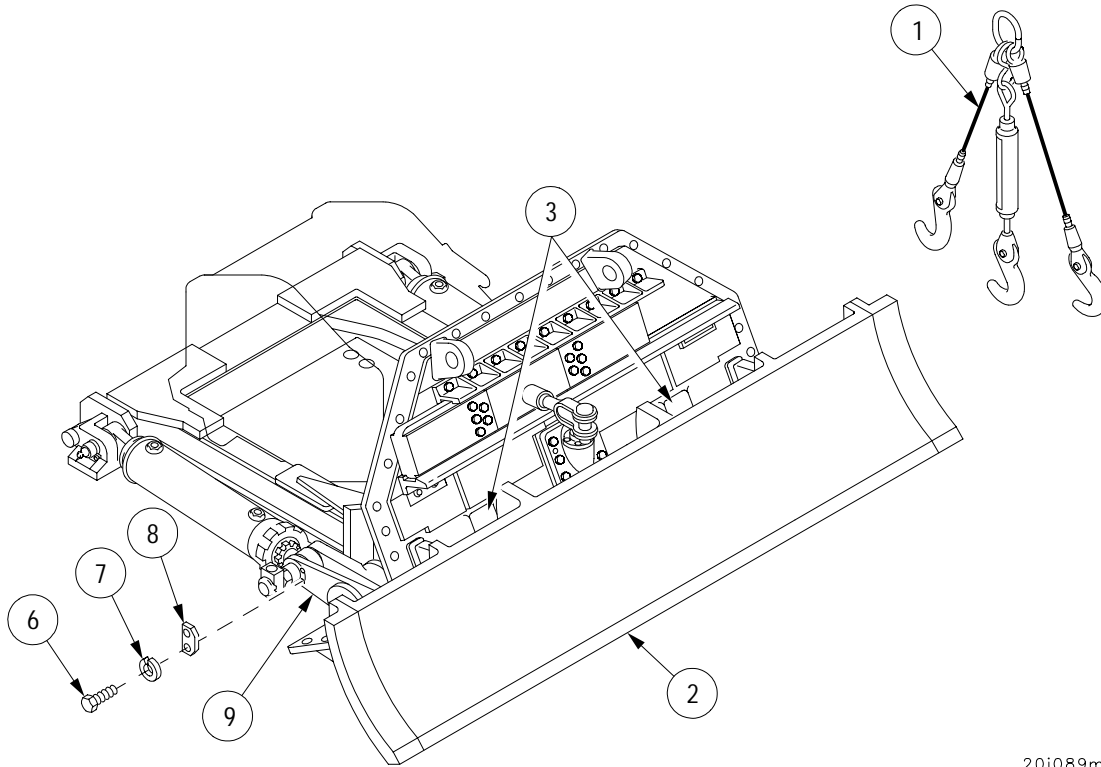
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SPADE CYLINDER AND LINK REPLACEMENT - CONTINUED

0062 00

Installation-Continued

23. Install pin retainer (8) on right spade link (9) with two screws (6) and two new lockwashers (7).
24. Release lifting sling (1) on outside of spade arms (3) around spade assembly (2).



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NOTE

FOLLOW-ON MAINTENANCE:

- Install main winch and spade cylinder hydraulic hoses (WP 0063 00)
- Install spade assembly lubrication hoses and tubes (TM 9-2350-292-20)
- Lubricate cylinder mounting pins (TM 9-2350-292-20)
- Synchronize main winch drum and diamond screw (TM 9-2350-292-20)

END OF TASK

MAIN WINCH AND SPADE HYDRAULIC HOSES, FITTINGS, ADAPTERS AND VALVE ASSEMBLIES REPLACEMENT

0063 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
 Combination wrench (item 49, WP 0090 00)
 Open-end wrench (item 46, WP 0090 00)
 Adjustable automotive wrench (item 50, WP 0090 00)
 Shaft guide (item 36, WP 0090 00)
 Manual control handle (item 40, WP 0090 00)
 Suitable lifting device (2) (275 LB (124.8 kg) min cap)

Materials/Parts

Lubricant (item 3, WP 0087 00)
 Electrical tie-down straps (AR) (item 25, WP 0087 00)
 Sealing compound (item 20, WP 0087 00)
 Dust protective plugs (AR) (item 43, WP 0087 00)
 Dust protective plugs (AR) (item 22, WP 0087 00)
 Marker tags (AR) (item 26, WP 0087 00)
 Preformed packing (item 47, WP 0091 00)
 Preformed packings (3) (item 42, WP 0091 00)
 Preformed packings (3) (item 53, WP 0091 00)
 Preformed packings (4) (item 54, WP 0091 00)
 Lockwashers (4) (item 2, WP 0091 00)

Equipment Conditions

Main winch and spade assembly removed (TM 9-2350-292-20)
 Level winder control valve hydraulic hoses disconnected (WP 0056 00)

Personnel Required

Two

References

TM 9-2350-292-20

**NOTE**

Perform Removal steps 8, 19, 21, 23, 26, 27, 28 and 43 and Installation steps 1, 2, 16 through 20 and 24, 26 and 37 for maintenance of pressure control valve.

Perform Removal steps 31, 32 and 35 through 43 and Installation steps 1 and 10 for maintenance of level winder check valve.

Tag all hose assemblies before disconnecting to aid in installation.

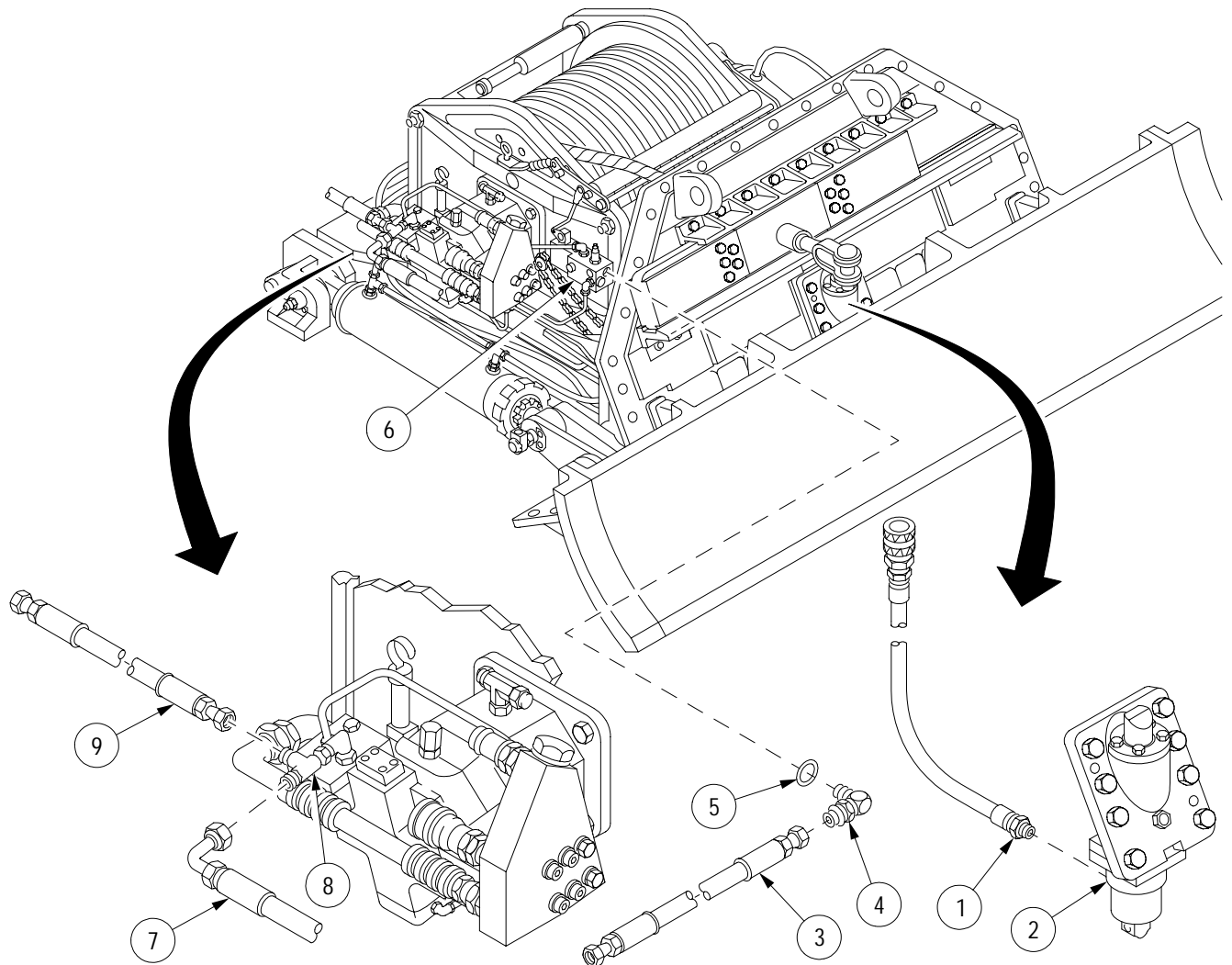
Cap all hydraulic ports and hose assemblies to prevent contamination.

MAIN WINCH AND SPADE HYDRAULIC HOSES, FITTINGS, ADAPTERS AND VALVE ASSEMBLIES REPLACEMENT - CONTINUED

0063 00

Removal

1. Disconnect hydraulic hose assembly 67 (1) from spade lock assembly hydraulic cylinder (2).
2. Disconnect hydraulic hose assembly 413 (3) from elbow adapter (4).
3. Remove elbow adapter (4) and preformed packing (5) from valve (6). Discard preformed packing.
4. Disconnect hydraulic hose assembly 59 (7) from tee (8).
5. Disconnect hydraulic hose assembly 414 (9) from tee (8).



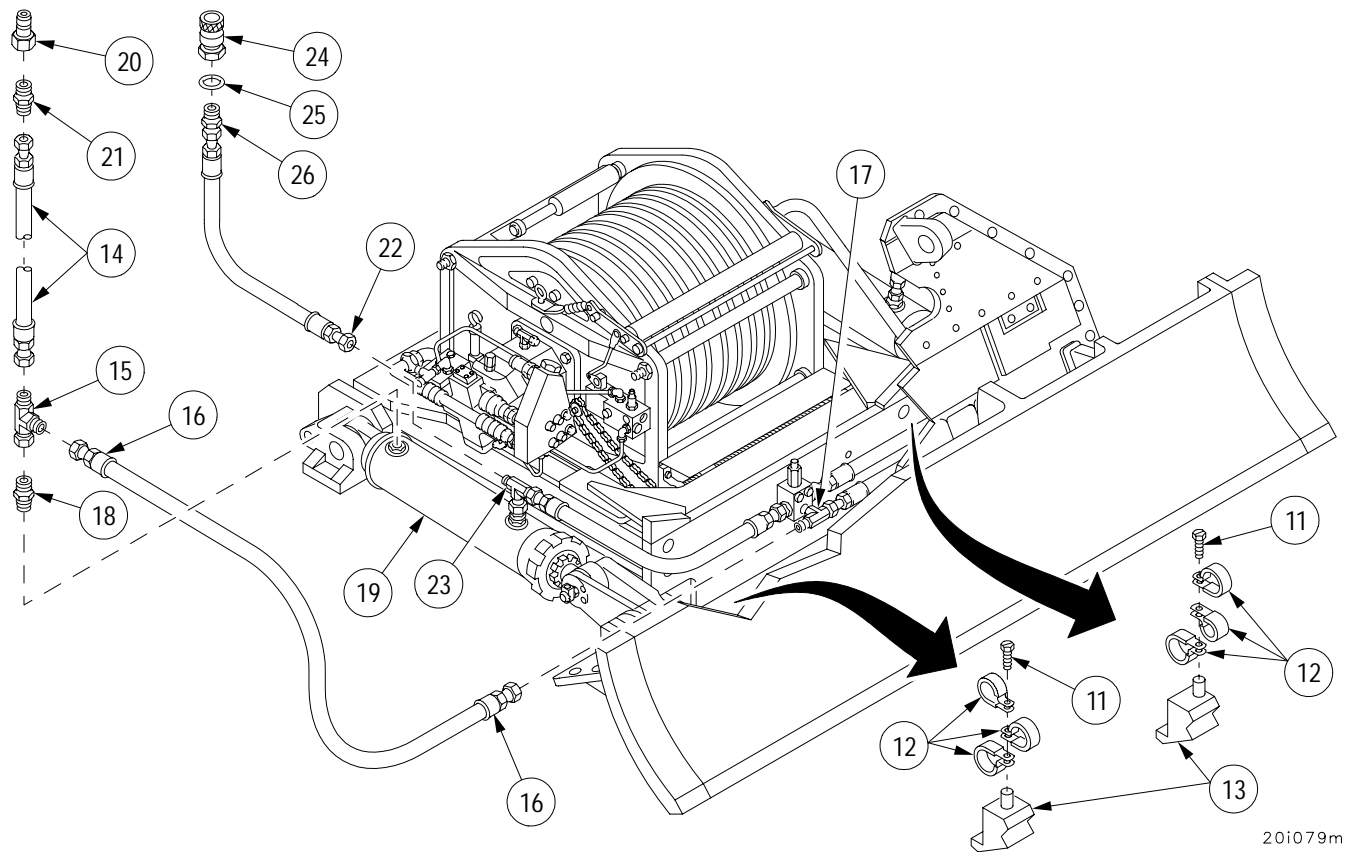
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MAIN WINCH AND SPADE HYDRAULIC HOSES, FITTINGS, ADAPTERS AND VALVE ASSEMBLIES REPLACEMENT - CONTINUED

0063 00

Removal-Continued

6. Remove two screws (11) and six loop clamps (12) from hydraulic hose assemblies and main winch support (13).
7. Disconnect hydraulic hose assembly 57B (14) from tube tee (15).
8. Disconnect hydraulic hose assembly 60D (16) from tube tee (15) and tee (17).
9. Remove tube tee (15) from adapter (18).
10. Remove adapter (18) from right spade cylinder (19).
11. Remove quick-disconnect coupling (20) from straight adapter (21).
12. Remove straight adapter (21) from hydraulic hose assembly 57B (14).
13. Disconnect hydraulic hose assembly 60B (22) from tube tee (23).
14. Remove quick-disconnect coupling (24) and preformed packing (25) from straight adapter (26). Discard preformed packing.



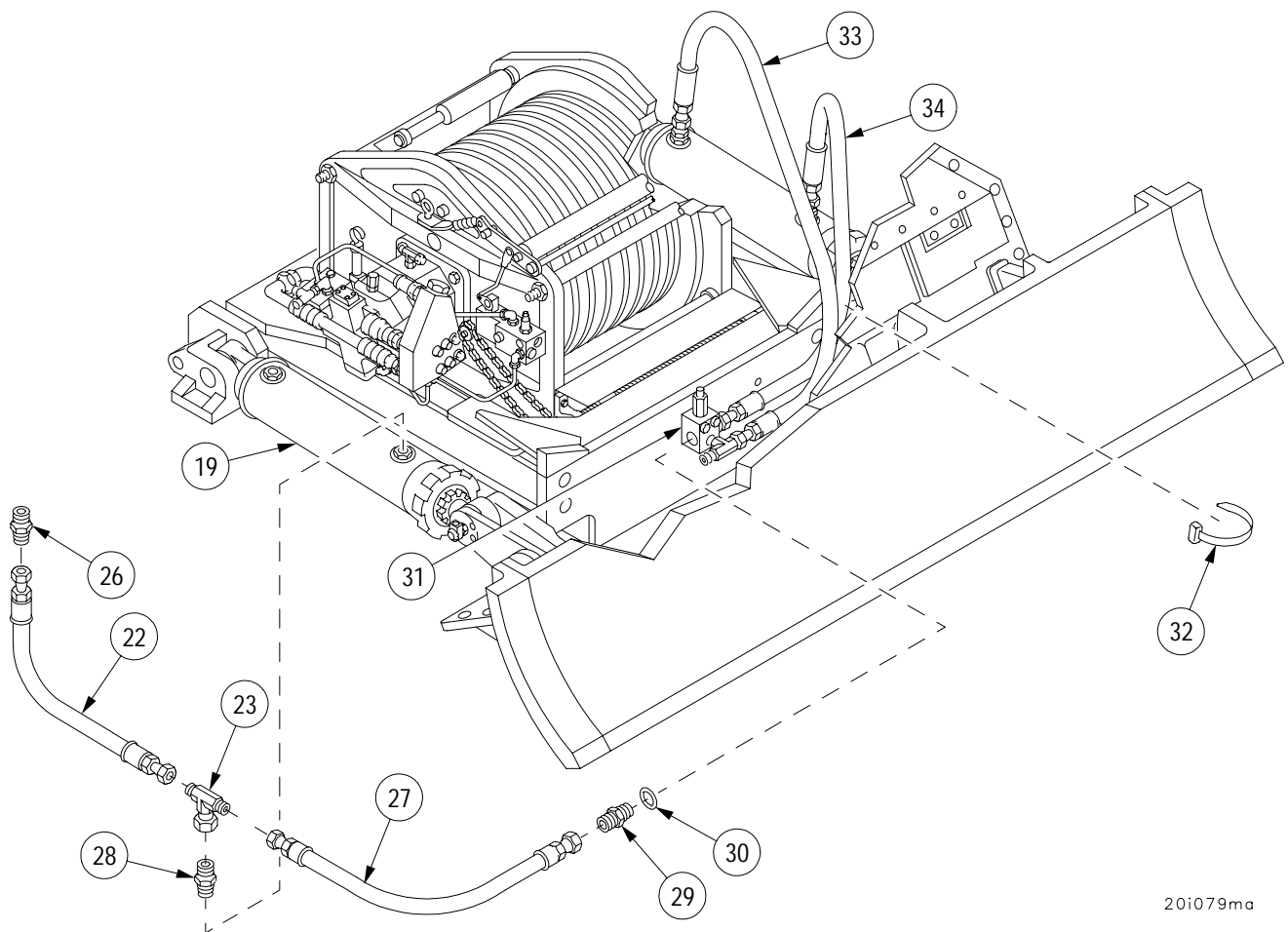
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MAIN WINCH AND SPADE HYDRAULIC HOSES, FITTINGS, ADAPTERS AND VALVE ASSEMBLIES REPLACEMENT - CONTINUED

0063 00

Removal-Continued

15. Remove straight adapter (26) from hydraulic hose assembly 60B (22).
16. Disconnect hydraulic hose assembly 400 (27) from tube tee (23).
17. Remove tube tee (23) from straight adapter (28).
18. Remove straight adapter (28) from right spade cylinder (19).
19. Disconnect hydraulic hose assembly 400 (27) from adapter (29).
20. Remove adapter (29) and preformed packing (30) from pressure control valve (31). Discard preformed packing.
21. Remove electrical tie-down straps (32) from hydraulic hose assemblies 57D (33) and 399 (34). Discard electrical tie-down straps.



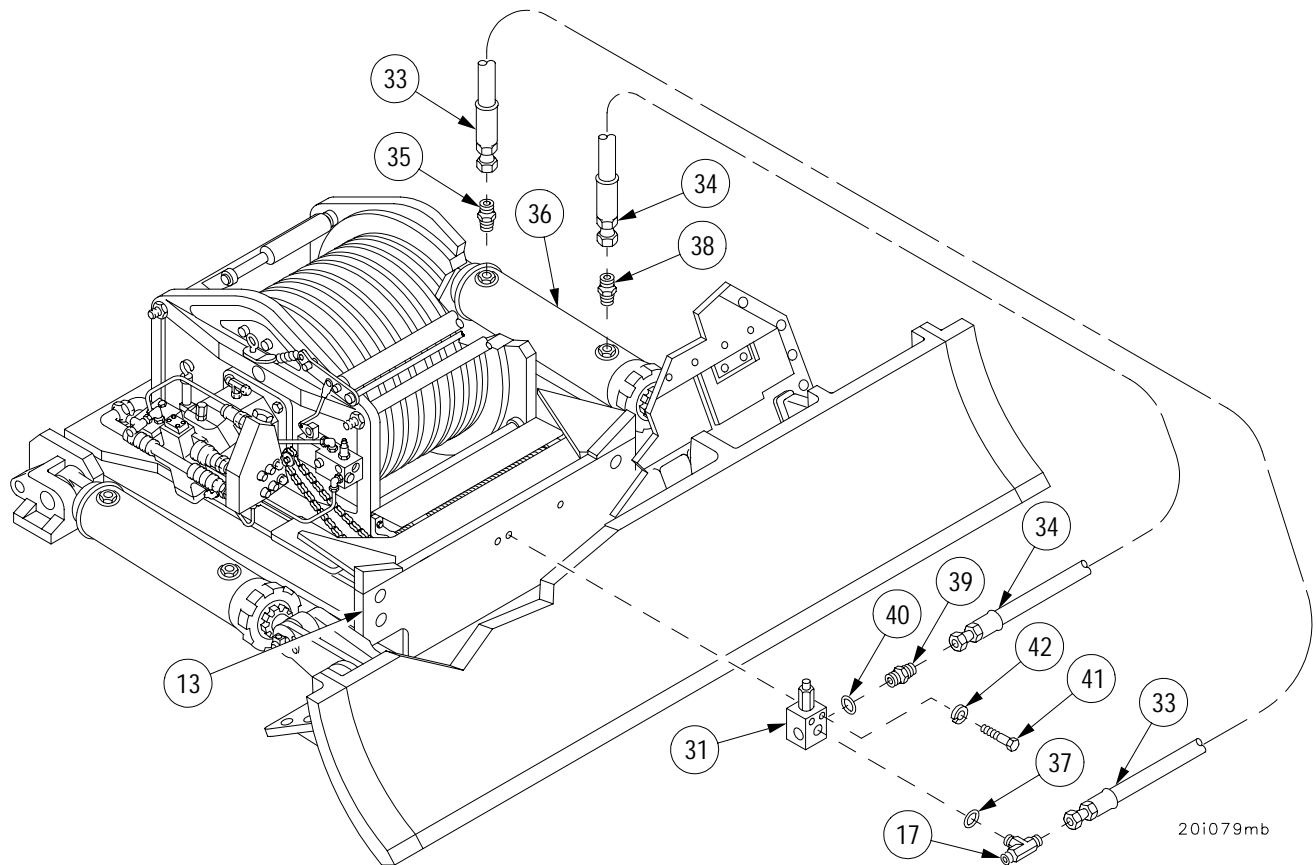
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MAIN WINCH AND SPADE HYDRAULIC HOSES, FITTINGS, ADAPTERS AND VALVE ASSEMBLIES REPLACEMENT - CONTINUED

0063 00

Removal-Continued

22. Disconnect hydraulic hose assembly 57D (33) from straight adapter (35) and tee (17).
23. Remove straight adapter (35) from left spade cylinder (36).
24. Remove tee (17) and preformed packing (37) from pressure control valve (31). Discard preformed packing.
25. Disconnect hydraulic hose assembly 399 (34) from straight adapter (38).
26. Remove straight adapter (38) from left spade cylinder (36).
27. Disconnect hydraulic hose assembly 399 (34) from adapter (39).
28. Remove adapter (39) and preformed packing (40) from pressure control valve (31). Discard preformed packing.
29. Remove two screws (41), two lockwashers (42) and pressure control valve (31) from main winch support (13). Discard lockwashers.

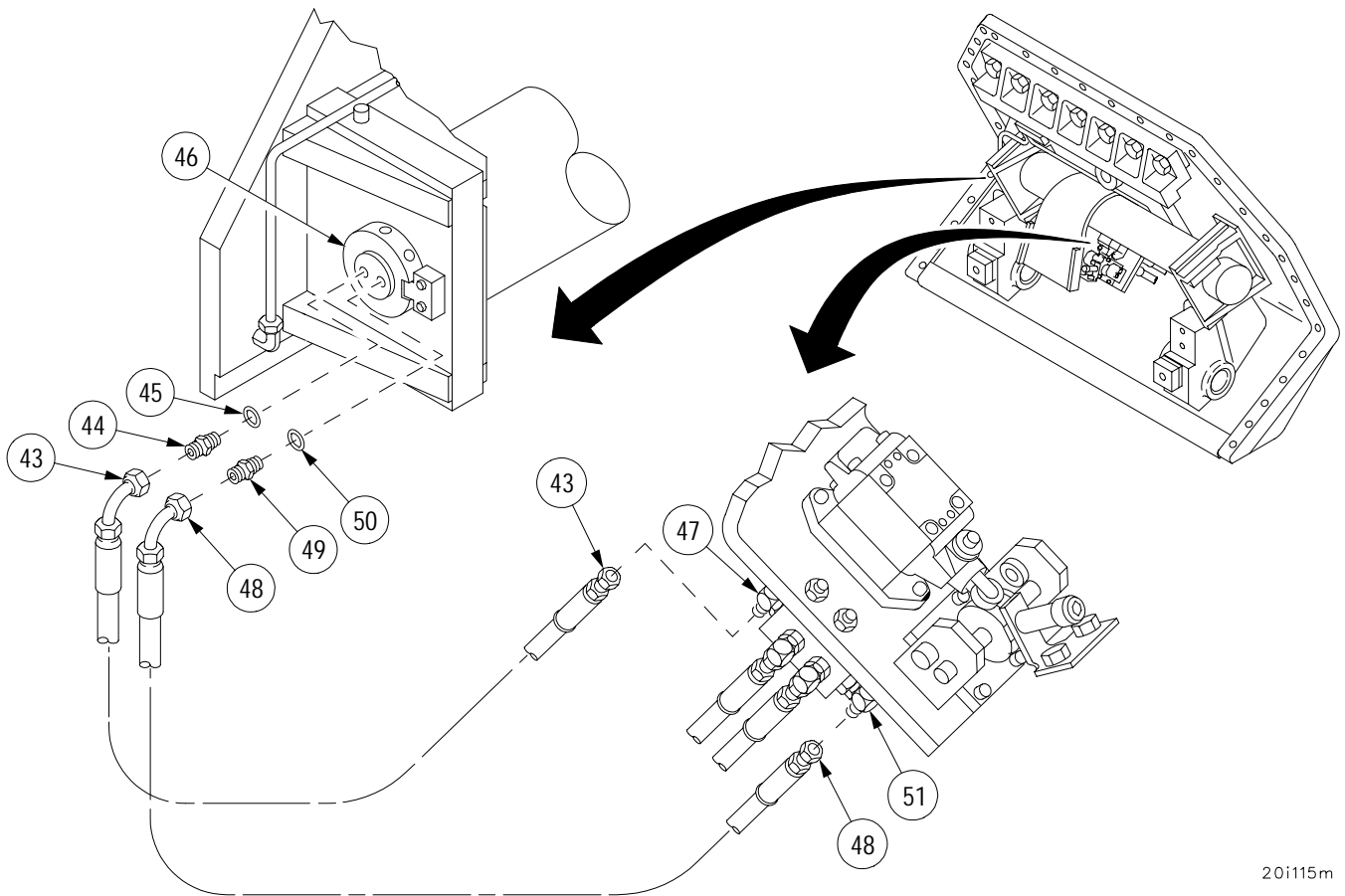


MAIN WINCH AND SPADE HYDRAULIC HOSES, FITTINGS, ADAPTERS AND VALVE ASSEMBLIES REPLACEMENT - CONTINUED

0063 00

Removal-Continued

30. Disconnect hydraulic hose assembly 60 (43) from adapter (44).
31. Remove adapter (44) and preformed packing (45) from level winder cylinder (46). Discard preformed packing.
32. Disconnect hydraulic hose assembly 60 (43) from elbow (47).
33. Disconnect hydraulic hose assembly 61 (48) from adapter (49).
34. Remove adapter (49) and preformed packing (50) from level winder cylinder (46). Discard preformed packing.
35. Disconnect hydraulic hose assembly 61 (48) from elbow (51).



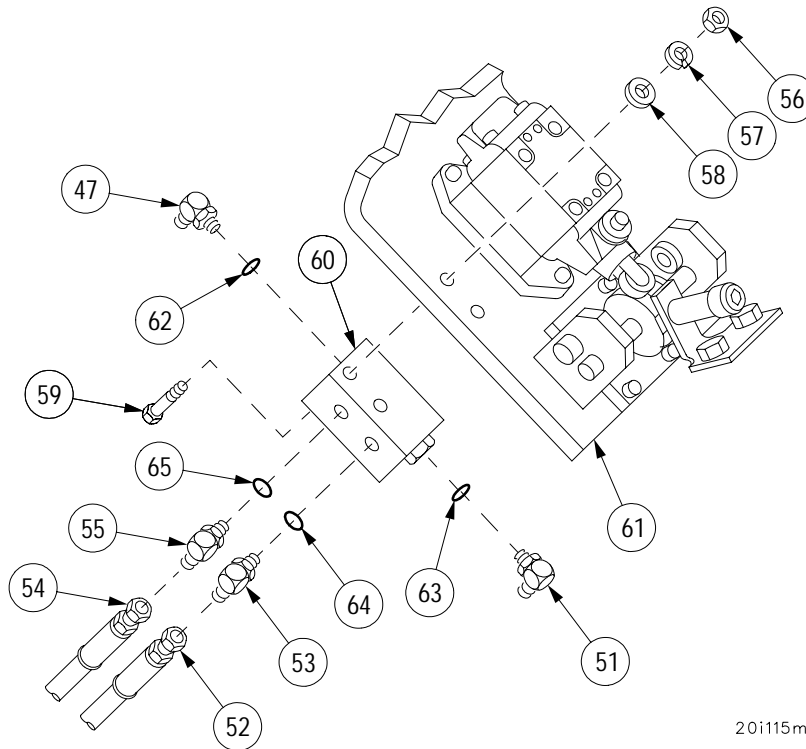
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**MAIN WINCH AND SPADE HYDRAULIC HOSES, FITTINGS, ADAPTERS AND
VALVE ASSEMBLIES REPLACEMENT - CONTINUED**

0063 00

Removal-Continued

36. Disconnect hydraulic hose assembly 397 (52) from elbow (53).
37. Disconnect hydraulic hose assembly 401 (54) from elbow (55).
38. Remove two nuts (56), two lockwashers (57), two flat washers (58), two screws (59) and check valve (60) from mounting plate (61). Discard lockwashers.
39. Remove elbow (47) and preformed packing (62) from check valve (60) port C2. Discard preformed packing.
40. Remove elbow (51) and preformed packing (63) from check valve (60) port C1. Discard preformed packing.
41. Remove elbow (53) and preformed packing (64) from check valve (60) port V1. Discard preformed packing.
42. Remove elbow (55) and preformed packing (65) from check valve (60) port V2. Discard preformed packing.
43. Inspect parts for damage and replace as required.



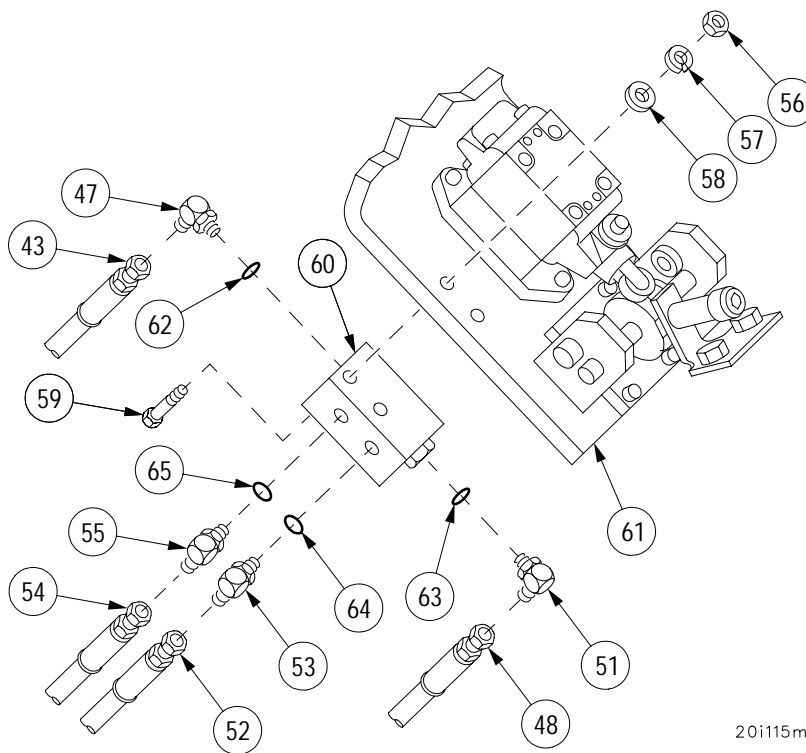
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MAIN WINCH AND SPADE HYDRAULIC HOSES, FITTINGS, ADAPTERS AND VALVE ASSEMBLIES REPLACEMENT - CONTINUED

0063 00

Installation

1. Apply lubricant to all preformed packings prior to installation.
2. Apply sealing compound to threads of adapter/hose connection prior to installation.
3. Install new preformed packing (65) and elbow (55) in check valve (60) port V2.
4. Install new preformed packing (64) and elbow (53) in check valve (60) port V1.
5. Install new preformed packing (63) and elbow (51) in check valve (60) port C1.
6. Install new preformed packing (62) and elbow (47) in check valve (60) port C2.
7. Secure check valve (60) to mounting plate (61) with two screws (59), two new lockwashers (57), two flat washers (58) and two nuts (56).
8. Connect hydraulic hose assembly 401 (54) to elbow (55) in check valve (60) port V2.
9. Connect hydraulic hose assembly 397 (52) to elbow (53) in check valve (60) port V1.
10. Connect hydraulic hose assembly 61 (48) to elbow (51) in check valve (60) port C1.
11. Connect hydraulic hose assembly 60 (43) to elbow (47) in check valve (60) port C2.



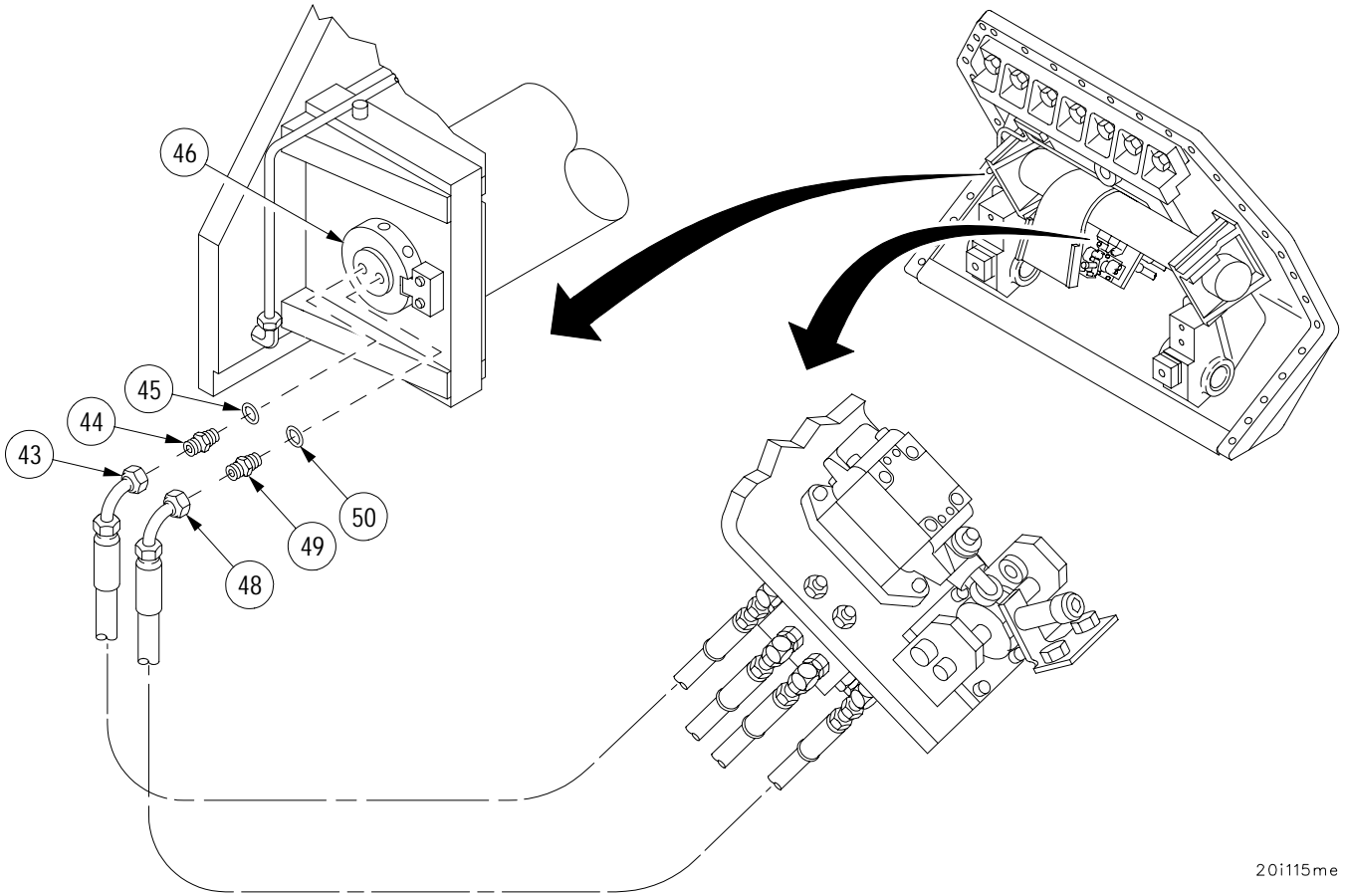
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MAIN WINCH AND SPADE HYDRAULIC HOSES, FITTINGS, ADAPTERS AND VALVE ASSEMBLIES REPLACEMENT - CONTINUED

0063 00

Installation-Continued

12. Install new preformed packing (50) and adapter (49) in level winder cylinder (46).
13. Connect hydraulic hose assembly 61 (48) to adapter (49).
14. Install new preformed packing (45) and adapter (44) in level winder cylinder (46).
15. Connect hydraulic hose assembly 60 (43) to adapter (44).



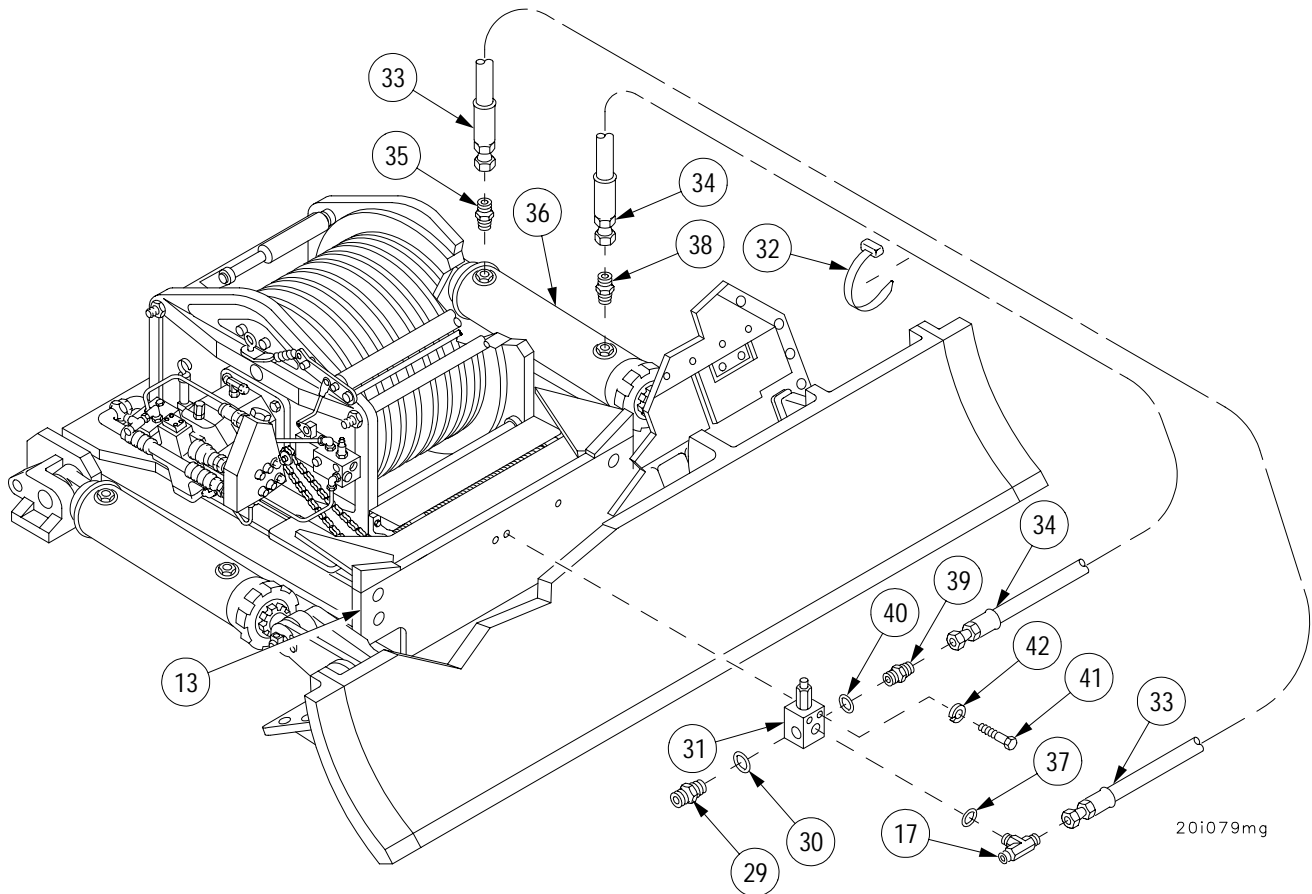
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MAIN WINCH AND SPADE HYDRAULIC HOSES, FITTINGS, ADAPTERS AND VALVE ASSEMBLIES REPLACEMENT - CONTINUED

0063 00

Installation-Continued

16. Install pressure control valve (31) on main winch support (13) with two screws (41) and two new lockwashers (42).
17. Install new preformed packing (40) and adapter (39) in pressure control valve (31).
18. Install new preformed packing (30) and adapter (29) in pressure control valve (31).
19. Install new preformed packing (37) and tee (17) in pressure control valve (31).
20. Connect hydraulic hose 399 (34) to adapter (39) in pressure control valve (31).
21. Install straight adapter (38) in left spade cylinder (36).
22. Connect hydraulic hose 399 (34) to straight adapter (38) in left spade cylinder (36).
23. Install straight adapter (35) in left spade cylinder (36).
24. Connect hydraulic hose 57D (33) to straight adapter (35) in left spade cylinder (36) and tee (17).
25. Install new electrical tie-down straps (32) around hydraulic hose assemblies 57D (33) and 399 (34).

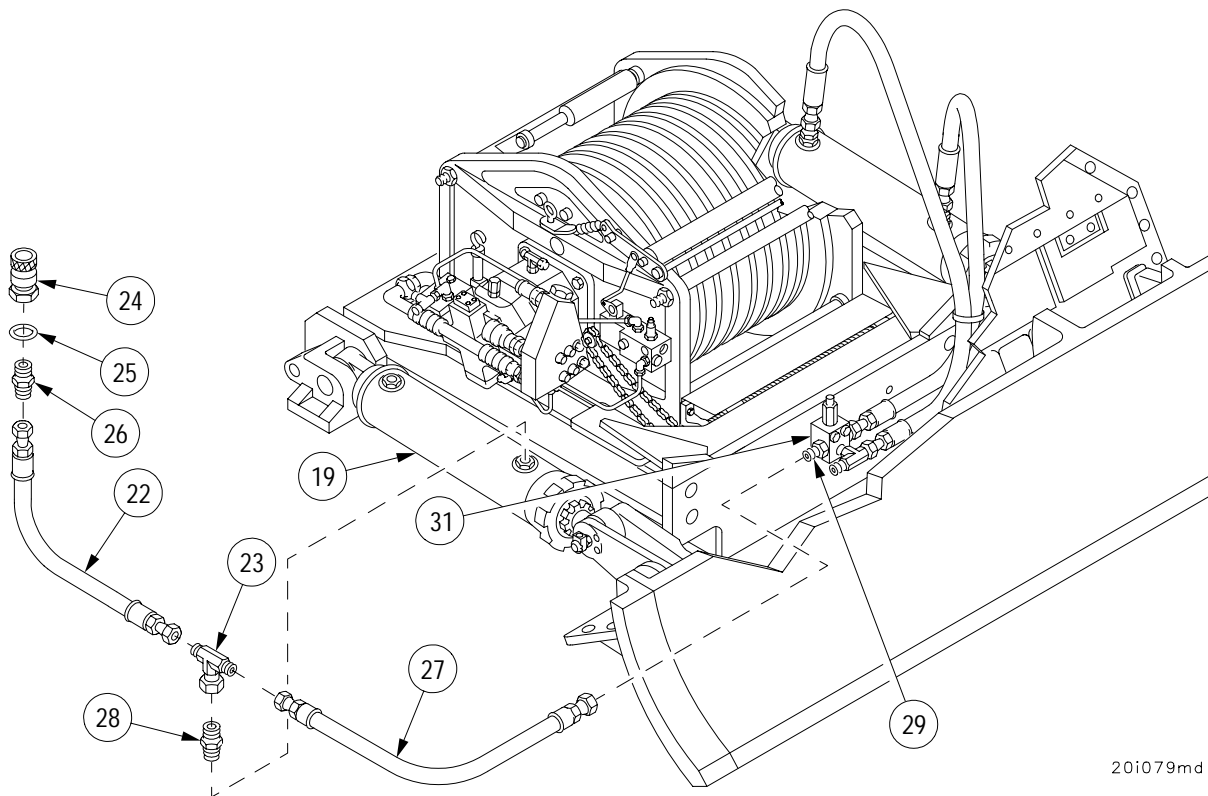


MAIN WINCH AND SPADE HYDRAULIC HOSES, FITTINGS, ADAPTERS AND VALVE ASSEMBLIES REPLACEMENT - CONTINUED

0063 00

Installation-Continued

26. Connect hydraulic hose 400 (27) to adapter (29) in pressure control valve (31).
27. Install straight adapter (28) in right spade cylinder (19).
28. Install tube tee (23) on straight adapter (28) in right spade cylinder (19).
29. Connect hydraulic hose 400 (27) to tube tee (23).
30. Install straight adapter (26) in hydraulic hose assembly 60B (22).
31. Install new preformed packing (25) and quick-disconnect coupling (24) on straight adapter (26) in hydraulic hose 60B (22).



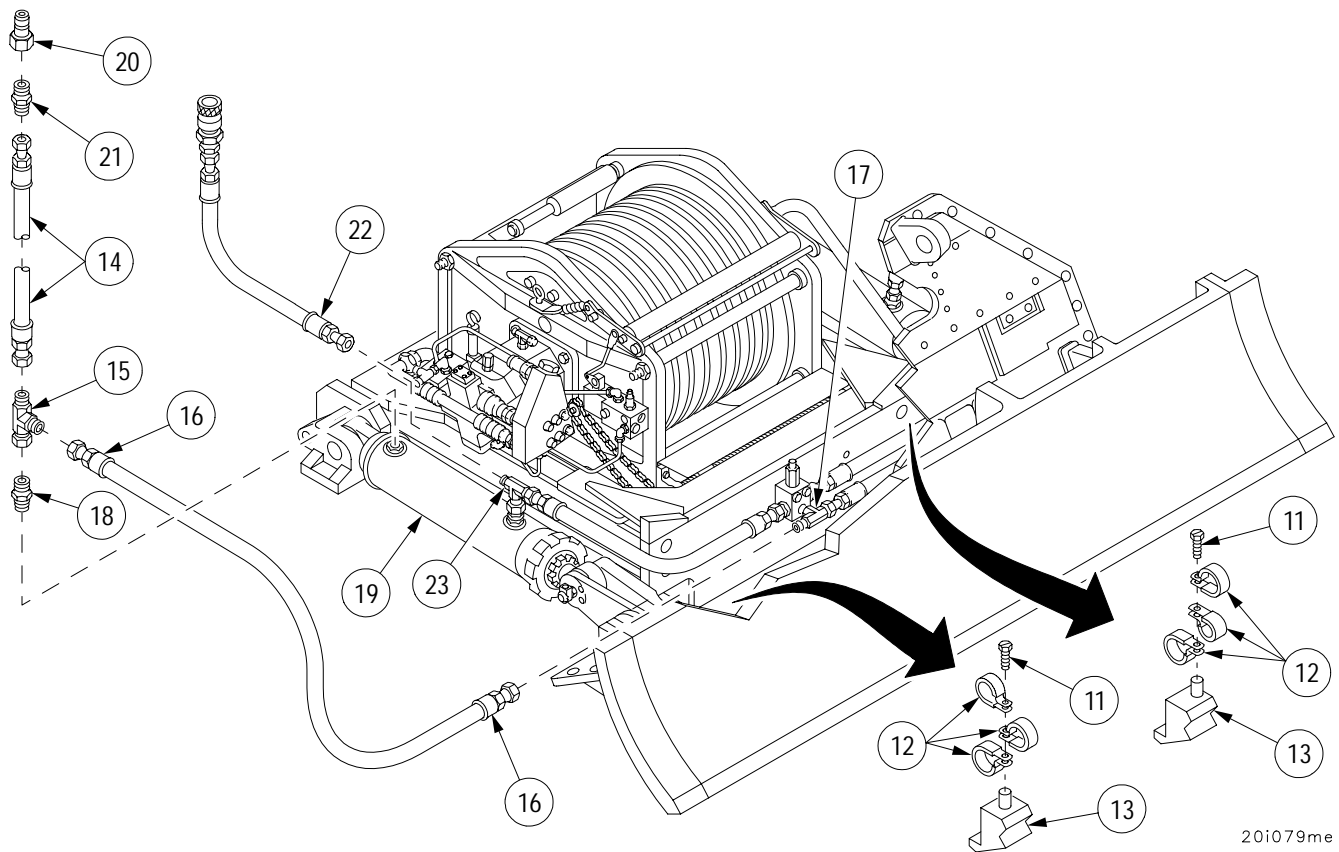
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MAIN WINCH AND SPADE HYDRAULIC HOSES, FITTINGS, ADAPTERS AND VALVE ASSEMBLIES REPLACEMENT - CONTINUED

0063 00

Installation-Continued

32. Connect hydraulic hose 60B (22) to tube tee (23).
33. Install straight adapter (21) in hydraulic hose assembly 57B (14).
34. Install quick-disconnect coupling (20) on straight adapter (21) in hydraulic hose assembly 57B.
35. Install adapter (18) in right spade cylinder (19).
36. Install tube tee (15) on adapter (18) in right spade cylinder (19).
37. Connect hydraulic hose assembly 60D (16) to tube tee (15) and tee (17).
38. Connect hydraulic hose assembly 57B (14) to tube tee (15).
39. Secure hydraulic hose assemblies to main winch support (13) with six loop clamps (12) and two screws (11).



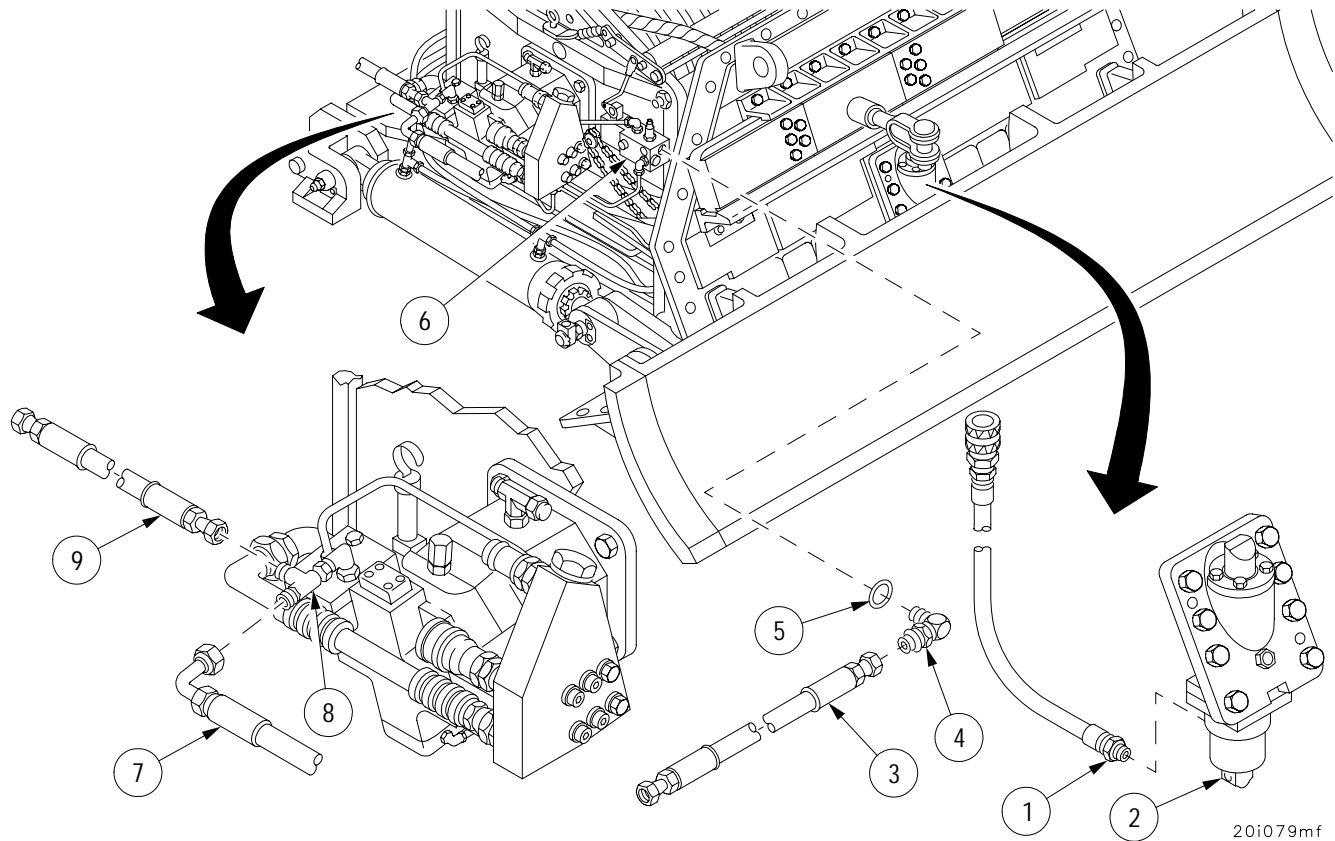
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MAIN WINCH AND SPADE HYDRAULIC HOSES, FITTINGS, ADAPTERS AND VALVE ASSEMBLIES REPLACEMENT - CONTINUED

0063 00

Installation-Continued

40. Connect hydraulic hose assembly 414 (9) to tee (8).
41. Connect hydraulic hose assembly 59 (7) to tee (8).
42. Install new preformed packing (5) and elbow adapter (4) to valve (6).
43. Connect hydraulic hose assembly 413 (3) to elbow adapter (4).
44. Connect hydraulic hose assembly 67 (1) to spade lock assembly hydraulic cylinder (2).



NOTE

FOLLOW-ON MAINTENANCE:

Connect level winder control valve hydraulic hoses (WP 0056 00)
 Install main winch and spade assembly (TM 9-2350-292-20)

END OF TASK

HOIST BOOM ASSEMBLY REPLACEMENT**0064 00****THIS WORK PACKAGE COVERS:**

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
 Mechanical adapter (item 15, WP 0090 00)
 Slide hammer puller assembly (item 14, WP 0090 00)
 Endless slings (2) (item 30, WP 0090 00)
 Lifting sling (item 64, WP 0090 00)
 Suitable lifting device (5,000 lbs (2,270 kg) min cap)
 Shackle (item 70, WP 0090 00)

Materials/Parts

Fibrous rope (20 ft.) (item 46, WP 0087 00)
 Pressure sensitive tape (item 51, WP 0087 00)
 Sealing compound (item 52, WP 0087 00)
 Lockwashers (18) (item 20, WP 0091 00)
 Lockwashers (8) (item 1, WP 0091 00)
 Lockwashers (6) (item 35, WP 0091 00)

Equipment Conditions

Boom latch unlocked (TM 9-2350-292-10)
 Tackle block tray removed (TM 9-2350-292-20)
 Boom pulleys removed (TM 9-2350-292-20)
 Driver's and mechanic's seat removed
 (TM 9-2350-292-20)

Personnel Required

Four

References

TM 9-2350-292-10
 TM 9-2350-292-20
 WP 0075 00

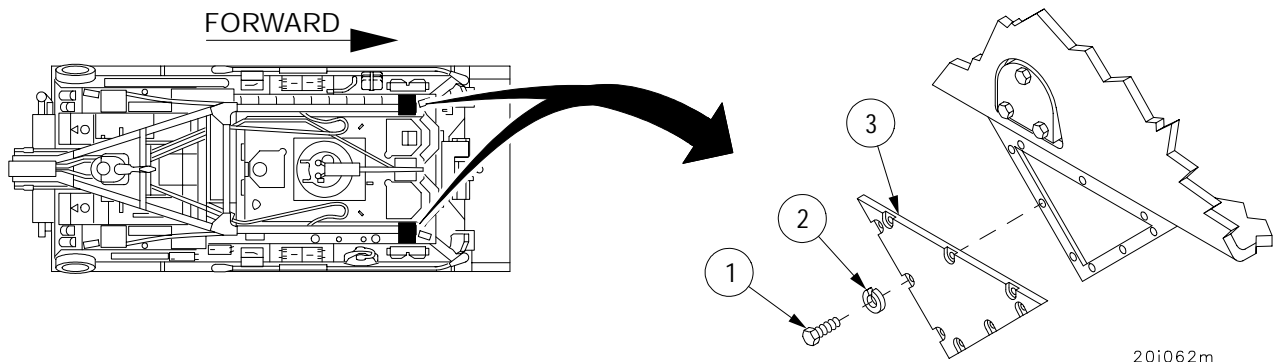
WARNING

Load testing of hoist boom is mandatory prior to use under any of the following conditions:

- a. When new.
- b. Following any repairs, disassembly and assembly, adjustment, or parts replacement.
- c. When modifications are made that could affect the strength or lifting capabilities of the vehicle.

Removal

1. Remove 18 screws (1), 18 lockwashers (2) and two covers (3). Discard lockwashers.



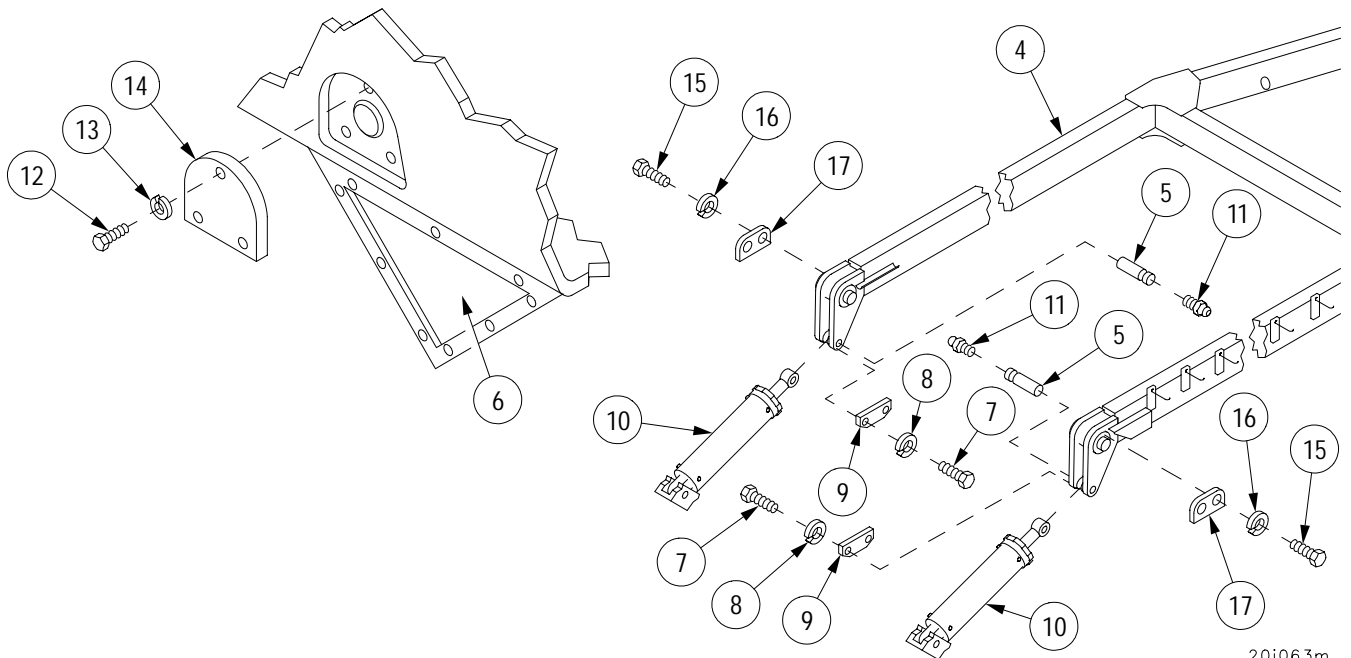
HOIST BOOM ASSEMBLY REPLACEMENT - CONTINUED**Removal-Continued**

2. Raise boom (4) enough to access cylinder pins (5) through access (6).
3. Secure boom (4) with lifting slings and suitable lifting device.
4. Remove four screws (7), four lockwashers (8) and two retaining plates (9). Discard lockwashers.

WARNING

Hoist boom cylinder is heavy. Make sure hoist boom cylinders are securely tied prior to removing cylinder pins. Failure to comply may cause equipment damage or injury to personnel.

5. Tie fibrous rope around boom cylinders (10) and secure fibrous rope to front vehicle lifting eyes.
6. Remove two lubrication fittings (11) from two cylinder pins (5).
7. Install mechanical adapter and slide hammer puller assembly where two fittings (11) were removed, remove two cylinder pins (5) from two boom cylinders (10) and boom (4).
8. Remove six screws (12), six lockwashers (13) and two cover plates (14). Discard lockwashers.
9. Remove four screws (15), four lockwashers (16) and two retaining plates (17). Discard lockwashers.
10. Start APU and retract boom cylinders (TM 9-2350-292-10).



201063m

HOIST BOOM ASSEMBLY REPLACEMENT - CONTINUED**Removal-Continued**

11. Lower boom (4) (TM 9-2350-292-10).
12. Remove two lubrication fittings (18) from two pivot pins (19).

NOTE

Quantity of flat washers will vary. Note location and quantity of flat washers to aid in installation.

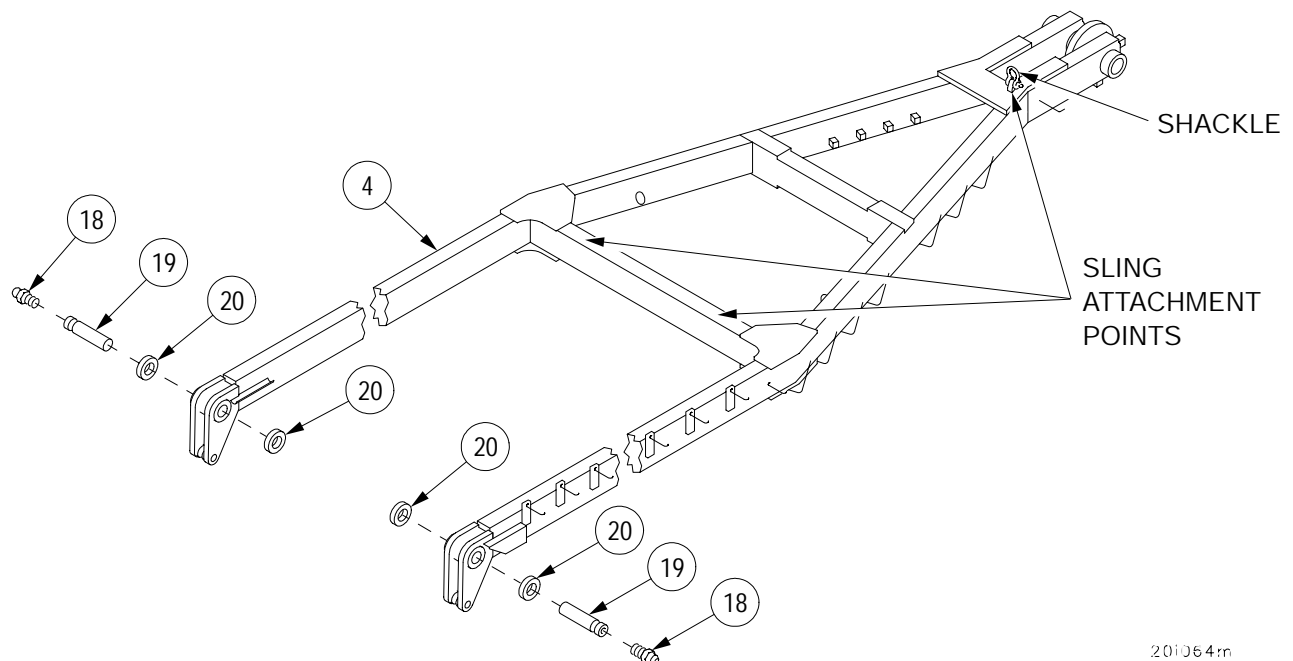
13. Install mechanical adapter and slide hammer puller assembly where two fittings (18) were removed, remove two pivot pins (19) and flat washers (20) from mounting anchors.

WARNING

Hoist boom is extremely heavy. Make sure all hoist equipment is in good condition and of sufficient capacity. Ensure slings are positioned correctly. Failure to comply may result in damage to equipment and injury or death to personnel.

All personnel must stand clear during lifting operations. A swinging or shifting load may cause injury or death to personnel.

14. Attach shackle to forward sling point, attach slings and using suitable lifting device, remove boom (4).
15. Inspect parts for damage and replace as required.



20i064.m

HOIST BOOM ASSEMBLY REPLACEMENT - CONTINUED**Installation****WARNING**

Hoist boom is extremely heavy. Make sure all hoist equipment is in good condition and of sufficient capacity. Ensure slings are positioned correctly. Failure to comply may result in damage to equipment and injury or death to personnel.

All personnel must stand clear during lifting operations. A swinging or shifting load may cause injury or death to personnel.

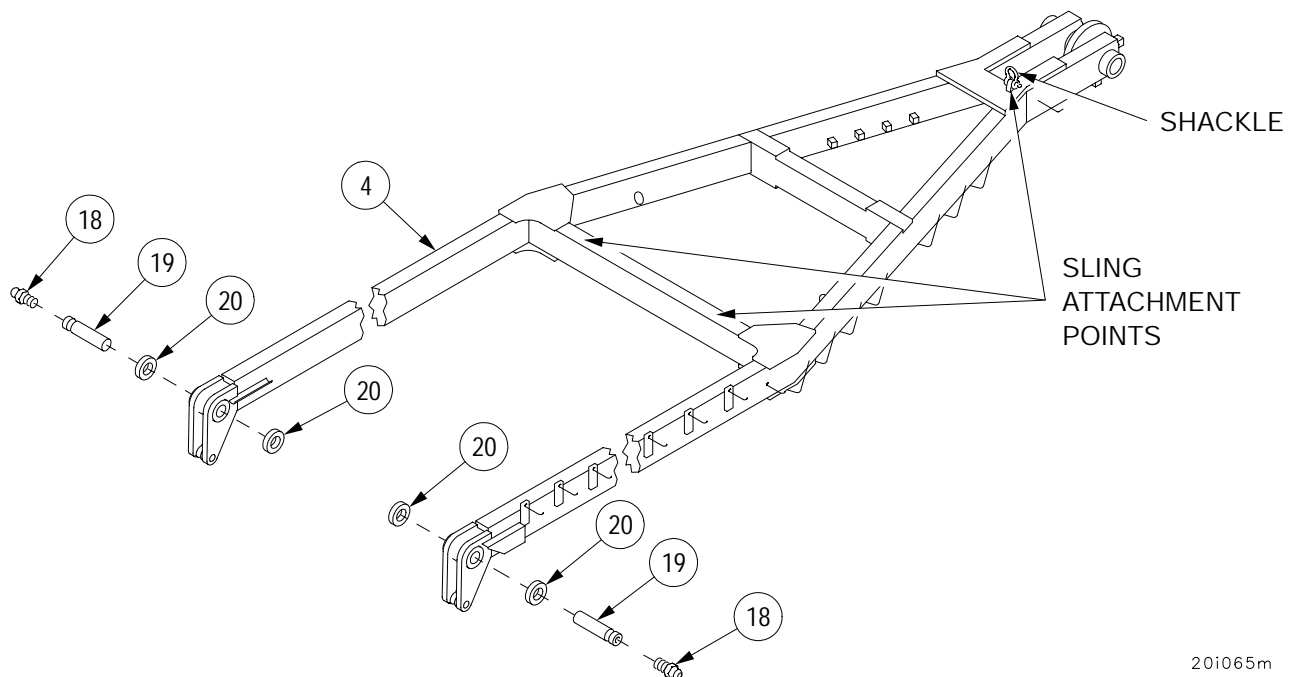
- Using slings, shackle and suitable lifting device, position hoist boom (4) on vehicle.

NOTE

When installing hoist boom pivot pins, make sure pins are installed with lubrication fitting facing retaining plates.

Quantity of flat washers will vary. Use enough flat washers to minimize side play of hoist boom.

- Install flat washers (20) and two pivot pins (19) on mounting anchors.
- Install two lubrication fittings (18) on two pivot pins (19).

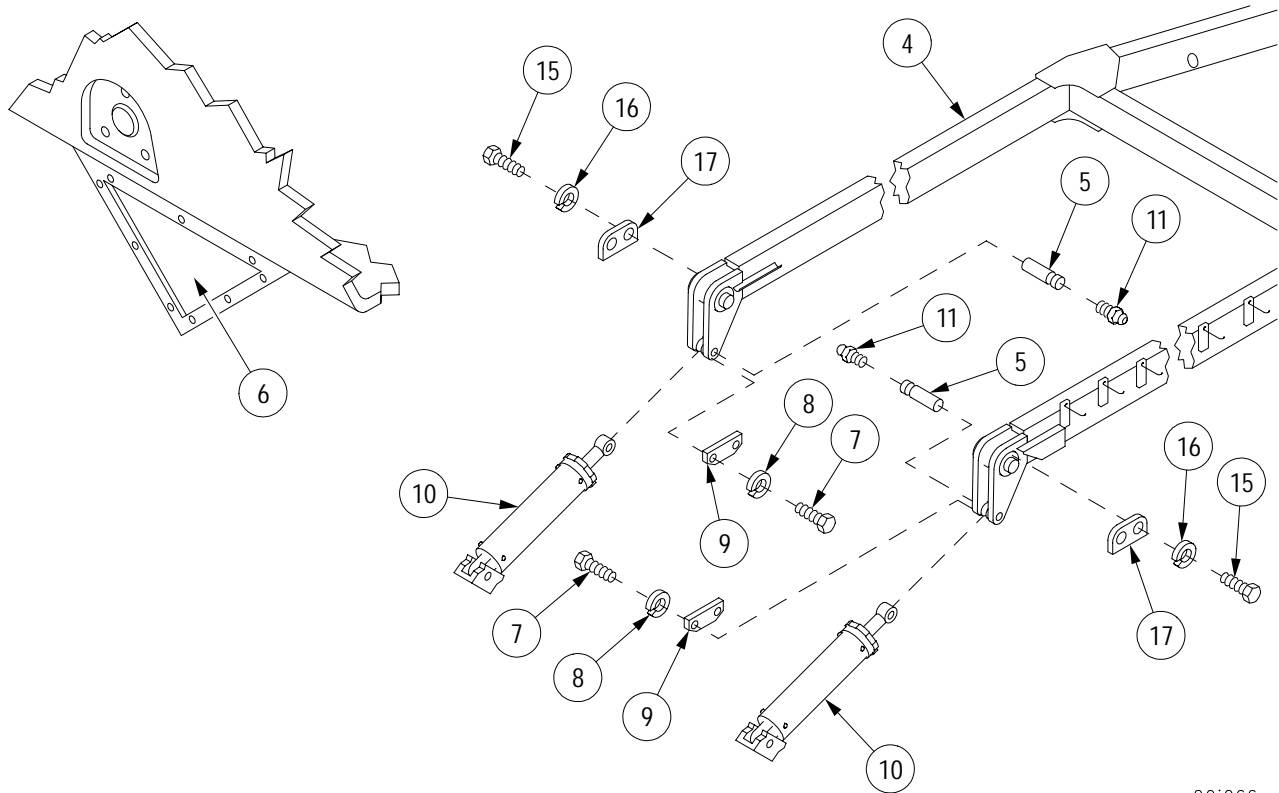


20i065m

HOIST BOOM ASSEMBLY REPLACEMENT - CONTINUED

Installation-Continued

4. Install two retaining plates (17) with four screws (15) and four new lockwashers (16).
5. Raise boom (4) with lifting device until cylinder pins (5) can be inserted through access (6).
6. Start APU and exercise boom cylinders (10) until cylinder eyes align with boom.
7. Secure two hoist boom cylinders (10) to boom (4) with two cylinder pins (5) and remove fibrous rope securing boom cylinders (10) from front vehicle lifting eyes.
8. Install two lubrication fittings (11) in two cylinder pins (5).
9. Install two retaining plates (9) with four screws (7) and four new lockwashers (8).
10. Lubricate hoist boom and hoist boom cylinder pins (TM 9-2350-292-20).

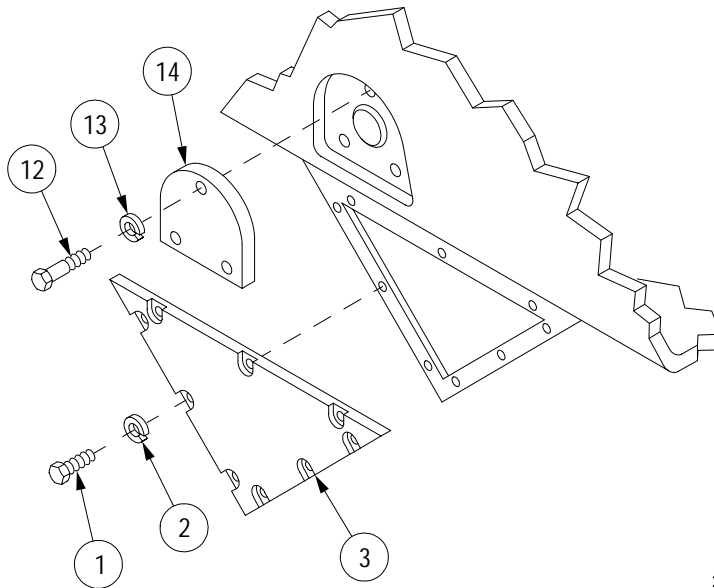


20i066m

HOIST BOOM ASSEMBLY REPLACEMENT - CONTINUED**Installation-Continued****CAUTION**

Do not apply pressure sensitive tape when ambient temperature is below 45° F (7.2° C). Failure to comply may cause loss of screw torque and equipment damage.

11. Apply pressure sensitive tape or sealing compound to two covers (3) and mating surfaces. Ensure covers (3), mating surfaces and mounting holes are free of all old sealing compound.
12. Install two covers (3) with 18 screws (1) and 18 new lockwashers (2).
13. Install two cover plates (14) with six screws (12) and six new lockwashers (13).
14. Operate hoist boom (TM 9-2350-292-10).



20i066ma

NOTE**FOLLOW-ON MAINTENANCE:**

- Install boom pulleys (TM 9-2350-292-20)
- Install tackle block tray (TM 9-2350-292-20)
- Lock boom latch (TM 9-2350-292-10)
- Install driver's and mechanic's seats (TM 9-2350-292-20)
- Perform RV2 relief valve adjustment (WP 0075 00)

END OF TASK

HOIST BOOM ACTUATING CYLINDER AND BOOM FOOT BOOT REPLACEMENT

0065 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0090 00)
 Mechanical adapter (item 15, WP 0090 00)
 Slide hammer puller assembly (item 14, WP 0090 00)
 Endless sling (item 30, WP 0090 00)
 Suitable lifting device (500 lb (227 kg) min cap)

Materials/Parts

Safety goggles (item 48, WP 0087 00)
 Lockwashers (4) (item 1, WP 0091 00)
 Lockwashers (20) (item 2, WP 0091 00)

Equipment Conditions

Driver's seat removed (TM 9-2350-292-20)
 Mechanic's seat removed (TM 9-2350-292-20)
 Subfloor plates #10, #11, and #12 removed for maintenance of right cylinder only (TM 9-2350-292-20)
 Hydraulic lines disconnected and plugged (TM 9-2350-292-20)

Equipment Conditions - Continued

Main winch and spade assembly removed (TM 9-2350-292-20)
 Hull drain control handle removed (TM 9-2350-292-20)
 Oddment tray removed (TM 9-2350-292-20)
 Subfloor plate #1 removed for maintenance of left cylinder only (TM 9-2350-292-20)
 Drain hose and attaching hardware removed (TM 9-2350-292-20)
 Engine deck grilles removed (TM 9-2350-292-20)
 Rear boom support removed (TM 9-2350-292-20)

Personnel Required

Three

References

TM 9-2350-292-10
 TM 9-2350-292-20
 WP 0075 00

NOTE

There are two hoist boom actuating cylinders and boom foot boots. Both cylinders and boots are replaced the same way. This task only replaces one.



WARNING

WARNING

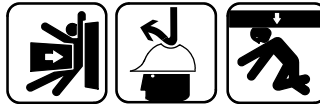
Do not attempt to loosen, tighten, or remove hydraulic fitting or lines when system is pressurized. Ensure that the hoist boom is in a stowed position before doing any maintenance on the hydraulic system. A high pressure oil stream can cause severe injury to personnel.

HOIST BOOM ACTUATING CYLINDER AND BOOM FOOT BOOT REPLACEMENT - CONTINUED

0065 00

Removal

1. Remove clamp (1) securing boot (2) to boom actuating cylinder (3).
2. Remove twenty screws (4), twenty lockwashers (5), flange (6) and boot (2) from hull. Discard lockwashers.
3. Remove four screws (7), four lockwashers (8) and two retaining plates (9) from boom lever (10) and hull. Discard lockwashers
4. Lower boom (TM 9-2350-292-10).
5. Remove two lubrication fittings (11) from two cylinder pins (12).

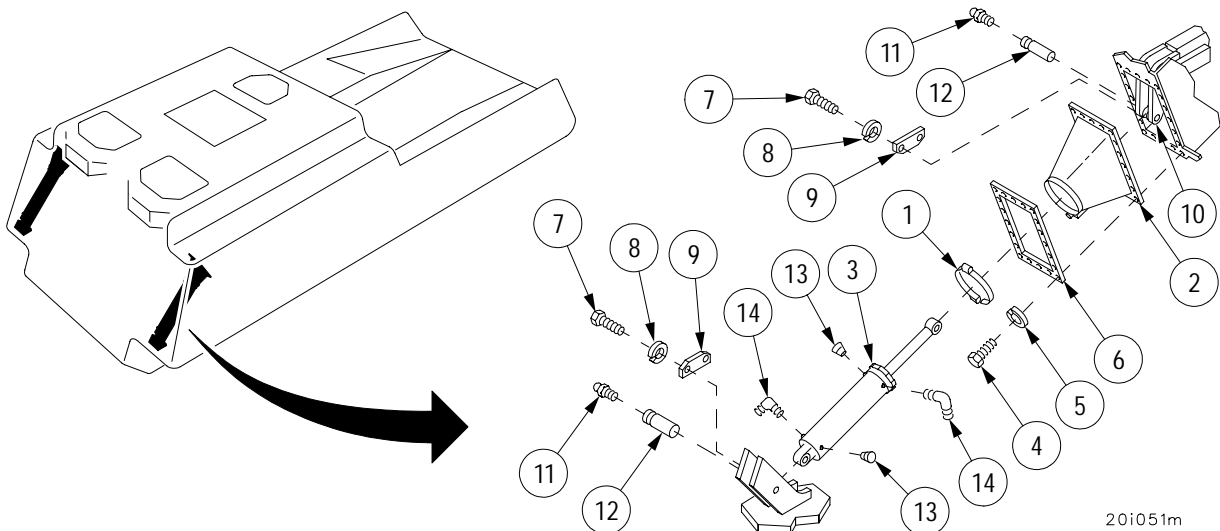


WARNING

WARNING

Hoist boom cylinder is heavy. Make sure hoist boom cylinder is securely tied or blocked prior to removing cylinder pins. Failure to comply may cause equipment damage or injury to personnel.

6. Attach endless sling and suitable lifting device to boom actuating cylinder (3).
7. Install adapter and puller where two lubrication fittings (11) were removed, remove two cylinder pins (12) from boom lever (10) and hull.
8. Remove boot (2) and flange (6) from boom cylinder (3).
9. Remove boom cylinder (3) from vehicle.
10. Remove two plugs (13) and two elbows (14) from cylinder (3). Note the location of plugs (13) and elbows (14) to aid in installation.
11. Inspect part for damage and replace as required.



20i051m

**HOIST BOOM ACTUATING CYLINDER AND BOOM FOOT BOOT
REPLACEMENT - CONTINUED**

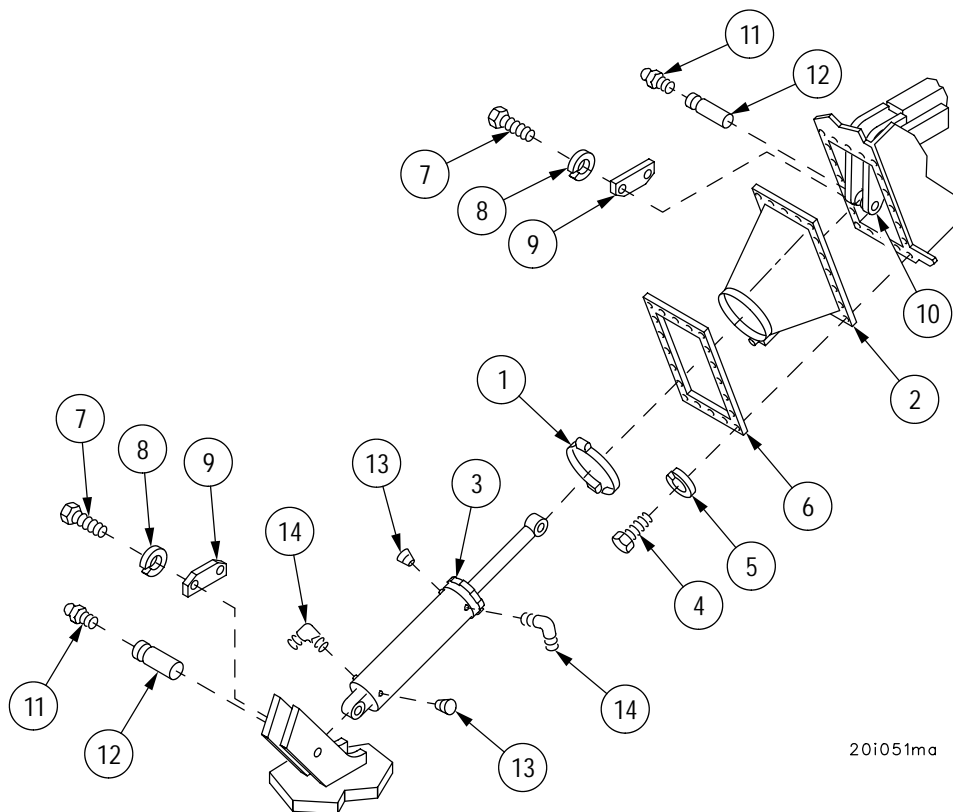
0065 00

Installation

1. Install two elbows (14) and two plugs (13) in cylinder (3).



2. Using endless sling and suitable lifting device, install boom cylinder (3) in hull.
3. Install boot (2) and flange (6) on boom cylinder (3).
4. Secure boom cylinder (3) to boom lever (10) and hull with two cylinder pins (12).
5. Install two lubrication fittings (11) in two cylinder pins (12).
6. Install boot (2) and flange (6) on hull with twenty screws (4) and twenty new lockwashers (5).
7. Install two retaining plates (9) on boom lever (10) and hull with four screws (7) and four new lockwashers (8).
8. Secure boot (2) to boom cylinder (3) with clamp (1).
9. Raise boom (TM 9-2350-292-10).



20i051ma

**HOIST BOOM ACTUATING CYLINDER AND BOOM FOOT BOOT
REPLACEMENT - CONTINUED**

0065 00

Installation - Continued

NOTE**FOLLOW-ON MAINTENANCE:**

Lubricate boom cylinder pins (TM 9-2350-292-20)
Install rear boom support (TM 9-2350-292-20)
Install engine deck grilles (TM 9-2350-292-20)
Install drain hose and attaching hardware
(TM 9-2350-292-20)
Connect hydraulic lines (TM 9-2350-292-20)
Install subfloor plate #1, if removed
(TM 9-2350-292-20)
Install mechanic's seat (TM 9-2350-292-20)
Install driver's seat (TM 9-2350-292-20)
Install subfloor plates #10, #11 and #12, if removed
(TM 9-2350-292-20)
Install hull drain handle (TM 9-2350-292-20)
Install oddment tray (TM 9-2350-292-20)
Install main winch and spade assembly
(TM 9-2350-292-20)
Perform RV2 relief valve adjustment (WP 0075 00)

END OF TASK

STAYLINE ACTUATING CYLINDER REPLACEMENT**0066 00****THIS WORK PACKAGE COVERS:**

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

- General mechanic's tool kit (item 1, WP 0090 00)
- Mechanical adapter (item 15, WP 0090 00)
- Slide hammer puller assembly (item 14, WP 0090 00)
- Endless sling (item 30, WP 0090 00)
- Suitable lifting device (500 lbs (227 kg) min cap)

Materials/Parts

- Lockwashers (4) (item 1, WP 0091 00)

Equipment Conditions

- Powerpack removed (TM 9-2350-292-20)
- Refuel/defuel pump removed (TM 9-2350-292-20)
 - For right cylinder only
- Vehicle voltage regulator removed (TM 9-2350-292-20)
 - For left cylinder only

Equipment Conditions - Continued

- APU voltage regulator removed (TM 9-2350-292-20)
 - For left cylinder only
- Master relay removed (TM 9-2350-292-20)
 - For left cylinder only
- Voltage regulator splash shield removed (TM 9-2350-292-20)
 - For left cylinder only
- Hydraulic lines disconnected and plugged (TM 9-2350-292-20)
- Engine deck grille doors opened (TM 9-2350-292-10)

Personnel Required

Three

References

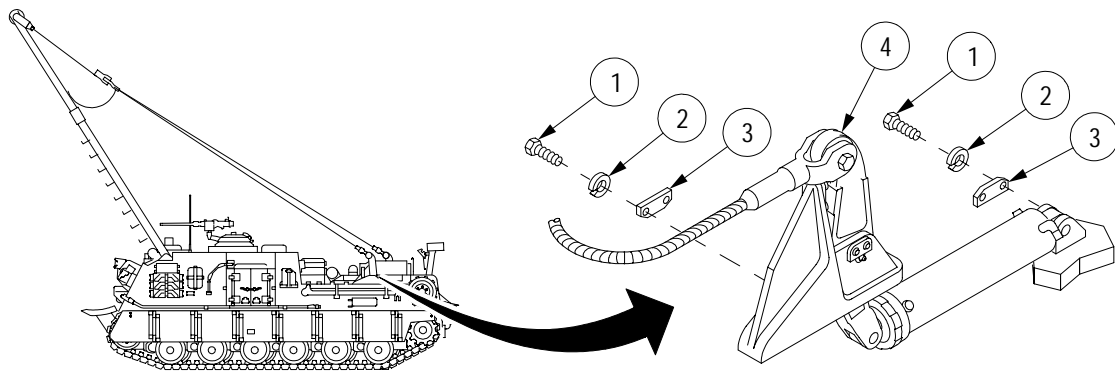
- TM 9-2350-292-10
- TM 9-2350-292-20
- WP 0075 00

NOTE

There are two stayline actuating cylinders. Both cylinders are replaced the same way. This task replaces only one cylinder.

Removal

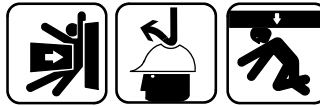
1. Remove four screws (1), four lockwashers (2) and two retaining plates (3) from lever (4) and hull. Discard lockwashers.



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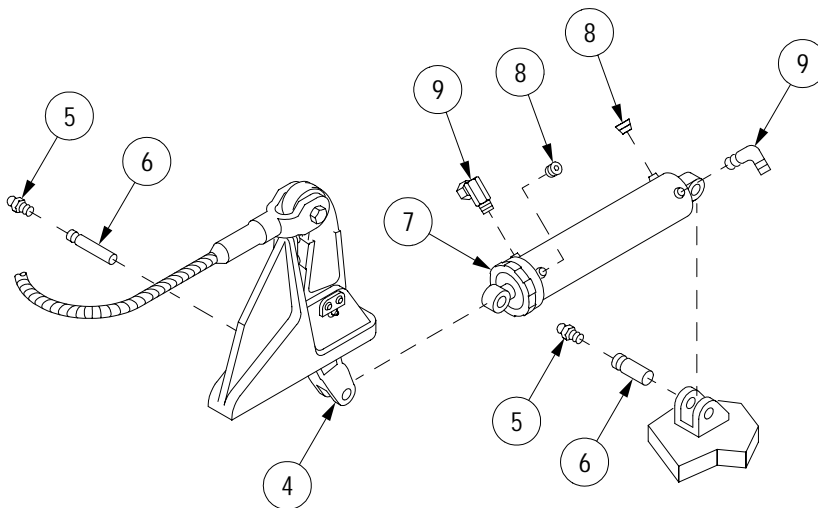
STAYLINE ACTUATING CYLINDER REPLACEMENT - CONTINUED

Removal-Continued

**WARNING****WARNING**

Stayline actuating cylinder is heavy. Make sure stayline actuating cylinder is securely tied or blocked prior to removing cylinder pins. Failure to comply may cause equipment damage or injury to personnel.

2. Remove two lubrication fittings (5) from two cylinder pins (6).
3. Install endless sling and suitable lifting device to stayline cylinder (7).
4. Install mechanical adapter and slide hammer puller assembly where two lubrication fittings (5) were removed, and remove two pins (6) from boom lever (4) and hull.
5. Using endless sling and suitable lifting device, remove stayline cylinder (7) from vehicle.
6. Remove two plugs (8) and two elbows (9) from cylinder (7).
7. Inspect parts for damage and replace as required.



20i048ma

STAYLINE ACTUATING CYLINDER REPLACEMENT - CONTINUED

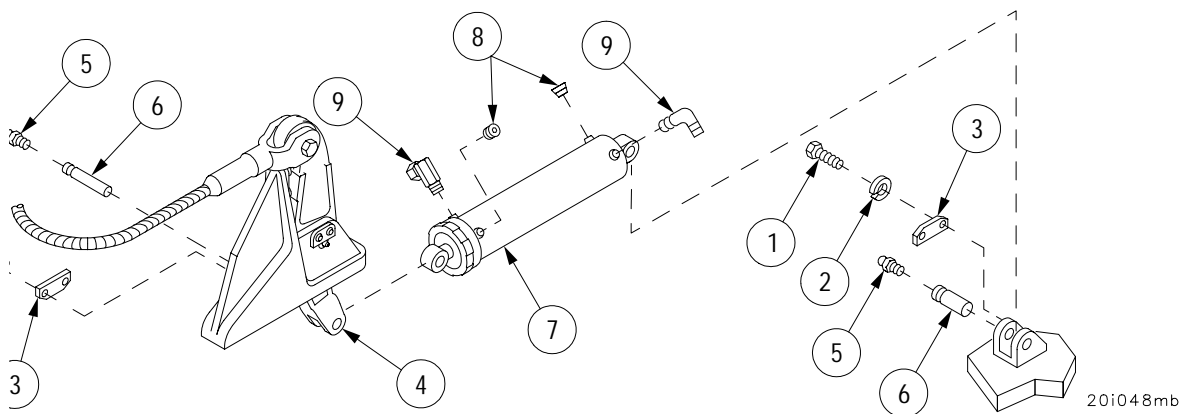
0066 00

Installation

1. Install two elbows (9) and two plugs (8) in cylinder (7).



2. Using suitable lifting device and endless sling, position stayline cylinder (7) on vehicle.
3. Secure cylinder (7) to lever (4) and hull with two cylinder pins (6).
4. Install two lubrication fittings (5) on two cylinder pins (6).
5. Install two retaining plates (3) with four screws (1) and four new lockwashers (2).

**NOTE****FOLLOW-ON MAINTENANCE:**

- Lubricate stayline cylinder pins
(TM 9-2350-292-20)
- Connect hydraulic lines (TM 9-2350-292-20)
- Install refuel/defuel pump, if removed
(TM 9-2350-292-20)
- Install APU voltage regulator, if removed
(TM 9-2350-292-20)
- Install voltage regulator, if removed
(TM 9-2350-292-20)
- Install voltage regulator splash shield, if removed
(TM 9-2350-292-20)
- Install master relay, if removed
(TM 9-2350-292-20)
- Install power pack (TM 9-2350-292-20)
- Close engine deck grille doors
(TM 9-2350-292-10)
- Perform RV2 relief valve adjustment
(WP 0075 00)

END OF TASK

BOOM LEVER REPLACEMENT**0067 00****THIS WORK PACKAGE COVERS:**

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
 Suitable lifting device (500 lb (227 kg) capacity minimum)
 Mechanical adapter (item 15, WP 0090 00)
 Slide hammer puller assembly (item 14, WP 0090 00)
 Socket wrench sockets (2) (item 58, WP 0090 00)
 Socket wrench handle (item 4, WP 0090 00)
 Socket wrench handle (item 5, WP 0090 00)
 Lifting sling (item 80, WP 0090 00)
 Chain hoist (500 lbs (227 kg) capacity minimum) (BII)
 Suitable container (5 gallons minimum capacity)

Materials/Parts

Lockwashers (12) (item 1, WP 0091 00)
 Hose 3/4 inch ID 8ft long (item 56, WP 0087 00)
 Hose clamp 1.5 inch (item 57, WP 0087 00)

Equipment Conditions

Three batteries closest to boom lever removed (TM 9-2350-292-20)
 For maintenance of left side boom.
 Hydraulic compartment rear access cover removed (TM 9-2350-292-20)
 For maintenance of right side boom lever.
 Right or left stayline cylinder access cover removed (TM 9-2350-292-20)
 Engine deck grilles next to stayline arm removed (TM 9-2350-292-20)

Personnel Required

Two

References

TM 9-2350-292-10
 TM 9-2350-292-20

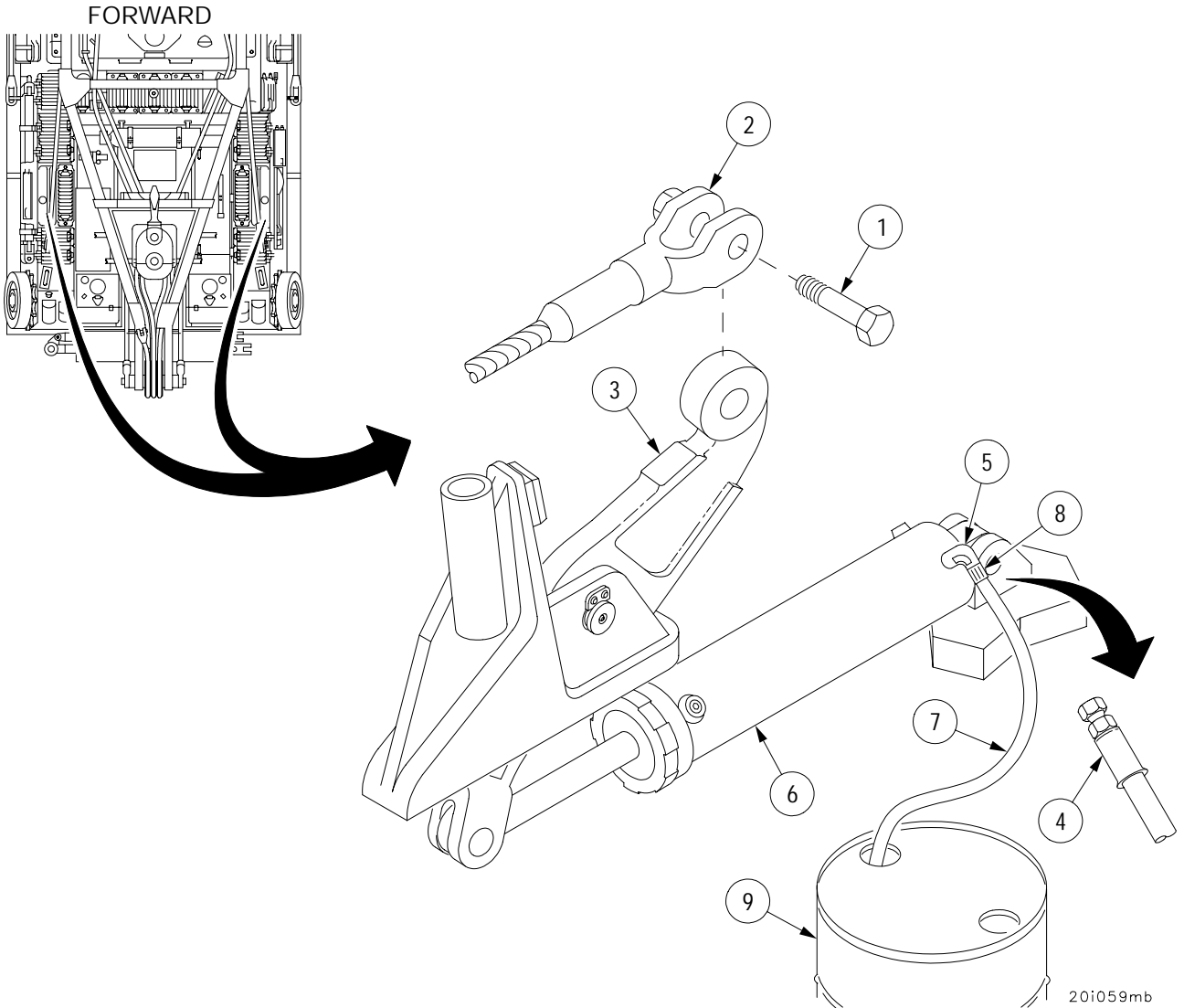
NOTE

There are two boom levers. Both boom levers are replaced in the same manner. Equipment conditions are different. This task replaces only one boom lever.

BOOM LEVER REPLACEMENT - CONTINUED

Removal

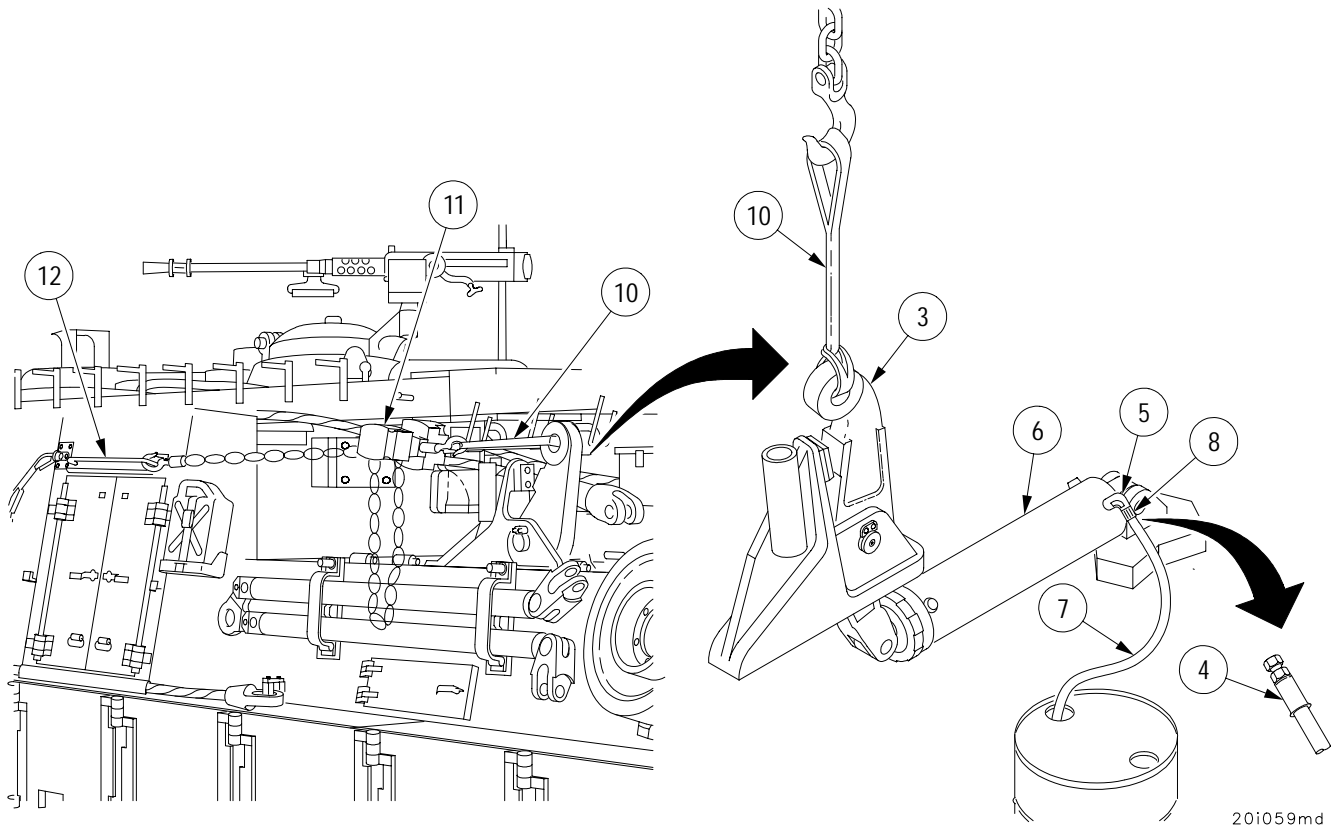
1. Remove bolt (1) and stayline cable (2) from boom lever (3).
2. Disconnect hydraulic line (4) from fitting (5) on stayline cylinder (6)
3. Install hose (7) on fitting (5) with clamp (8). Insert hose (7) in suitable container (9).



BOOM LEVER REPLACEMENT - CONTINUED**Removal-Continued****NOTE**

To remove boom lever stayline cylinder must be fully retracted. (closed).

4. Attach lifting sling (10) to boom lever (3) and a suitable lifting device. Raise up slowly on boom lever (3) to vertical position. This will partially bleed hydraulic fluid from stayline cylinder (6).
5. Disconnect lifting sling (10) from suitable lifting device.
6. Attach chain hoist (11) to lifting sling (10) and handrail above crew compartment door (12).
7. Pull boom lever (3) forward slowly to bleed remaining hydraulic fluid from stayline cylinder (6) and fully retract stayline cylinder (6). Discard hydraulic fluid IAW local SOP.
8. Remove clamp (8) and hose (7) from fitting (5)
9. Reconnect hydraulic line (4) to fitting (5).
10. Remove roller from boom lever (3) limit switch (TM 9-2350-292-20).
11. Disconnect chain hoist (11) from lifting sling (10) and handrail (12).



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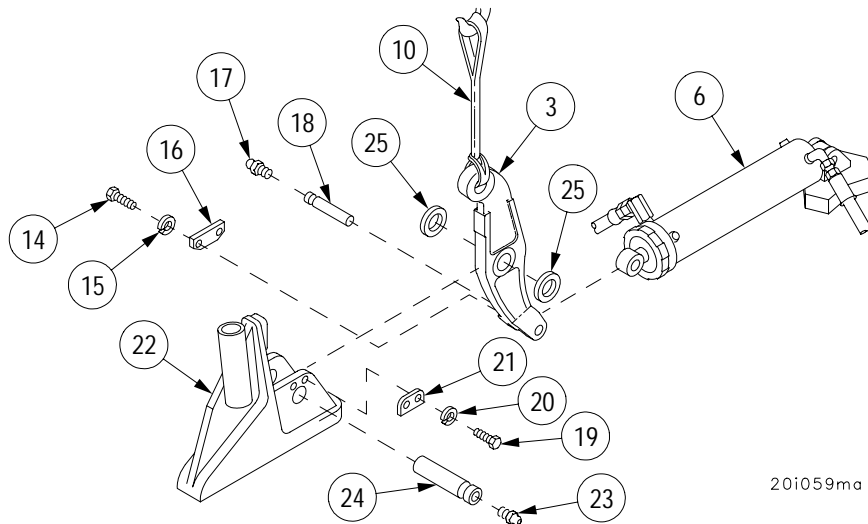
BOOM LEVER REPLACEMENT - CONTINUED**Removal-Continued**

12. Connect lifting sling (10) to a suitable lifting device and support weight of boom lever (3).
13. Remove two screws (14), two lockwashers (15) and retaining plate (16) from boom lever (3). Discard lockwashers.
14. Remove lubrication fitting (17) from cylinder mount pin (18).
15. Install mechanical adapter and slide hammer puller assembly in cylinder pin (18), remove cylinder pin (18) and cylinder (6) from boom lever (3).
16. Remove two screws (19), two lockwashers (20) and retaining plate (21) from mounting anchor (22). Discard lockwashers.
17. Remove lubrication fitting (23) from headless pin (24).

**NOTE**

Quantity of flat washer (s) will vary. Note location and quantity of flat washer (s) to aid in installation.

18. Install mechanical adapter and slide hammer puller assembly in headless pin (24), remove headless pin (24), flat washer (s) (25) and boom lever (3) from mounting anchor (22).



20i059ma

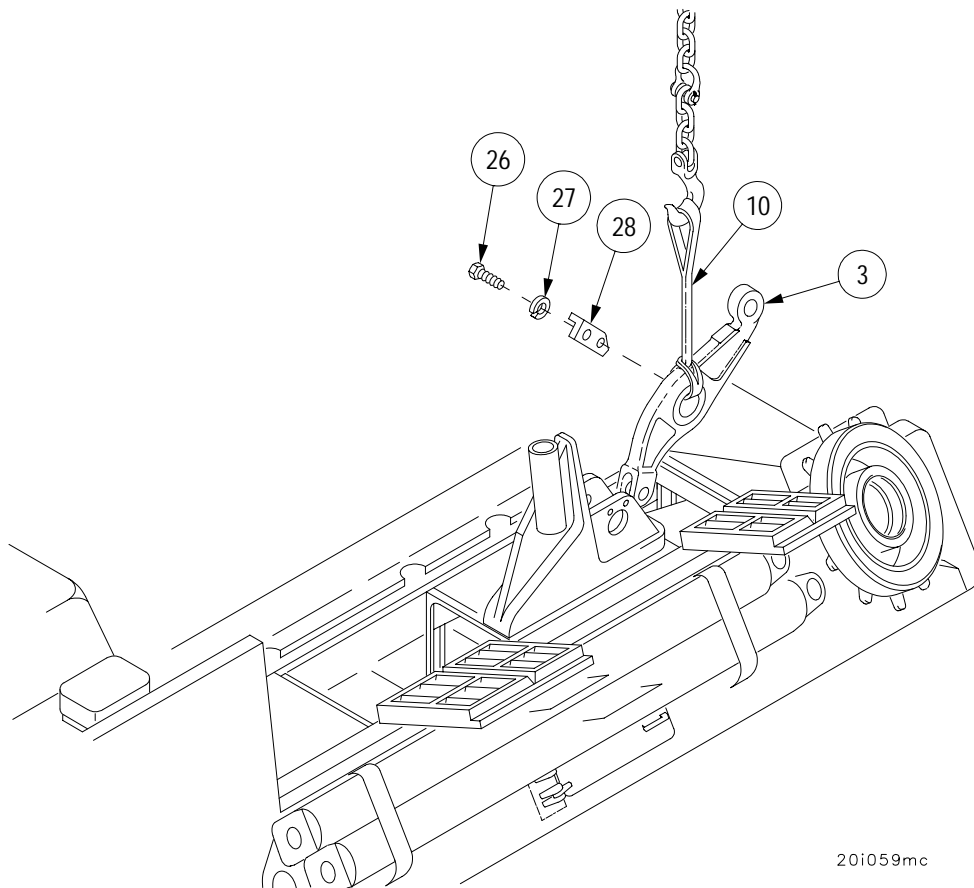
BOOM LEVER REPLACEMENT - CONTINUED

Removal-Continued

NOTE

Left side stayline boom lever must be lowered into and removed through battery box. Right side stayline boom lever is lowered into the hydraulic compartment and removed through grille opening.

19. Lower boom lever (3) slowly forward into battery box (left side) or hydraulic compartment (right side). Reposition sling (10) to middle hole in boom lever (3) and reconnect lifting sling (10) to suitable lifting device.
20. Remove boom lever (3) from vehicle.
21. Remove two screws (26), two lockwashers (27) and bracket (28) from boom lever (3). Discard lockwashers.
22. Inspect parts for damage and replace as required.



20i059mc

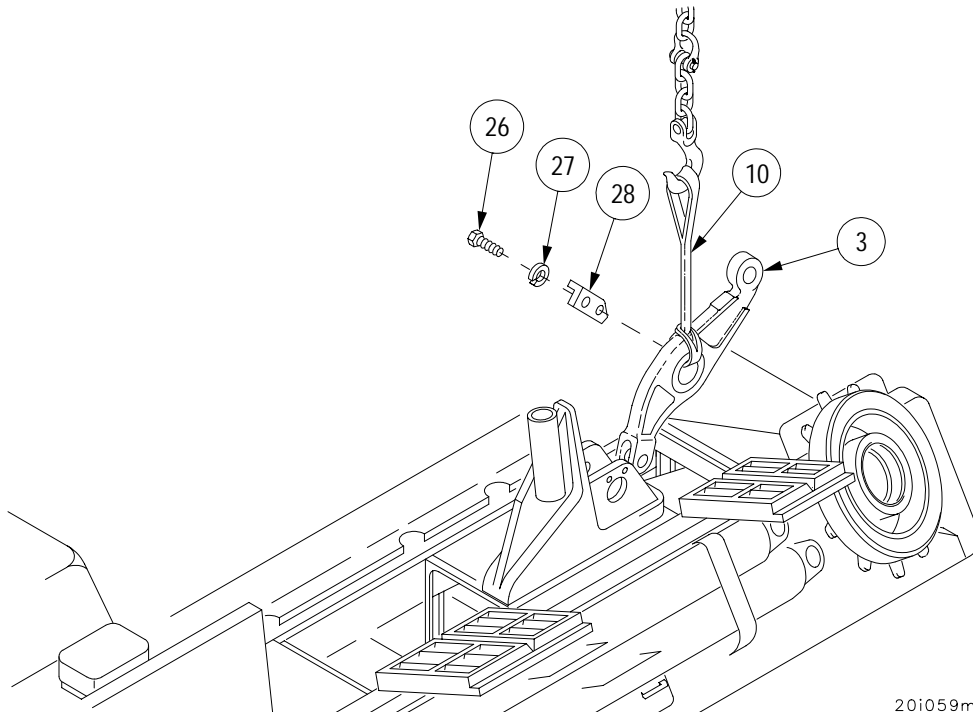
BOOM LEVER REPLACEMENT - CONTINUED**Installation**

1. Install bracket (28) on boom lever (3) with two screws (26) and two new lockwashers (27).

**NOTE**

Left side stayline boom lever must be lowered into and installed through battery box. Right side stayline boom lever is installed through grille opening and lowered into the hydraulic compartment.

2. Insert lifting sling (10) through the middle hole in boom lever (3). Connect lifting sling (10) to a suitable lifting device.
3. Lower boom lever (3) into battery box (left side) or hydraulic compartment (right side).
4. Reposition lifting sling (10) through top hole in boom lever (3) and lift into position.



BOOM LEVER REPLACEMENT - CONTINUED

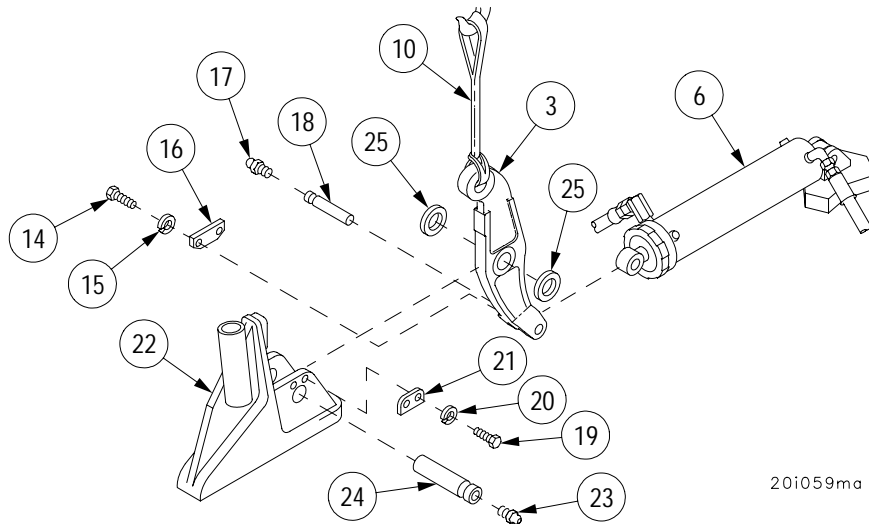
Installation - Continued



NOTE

Quantity of flat washer (s) will vary. Note location and quantity of flat washer (s) to aid in installation.

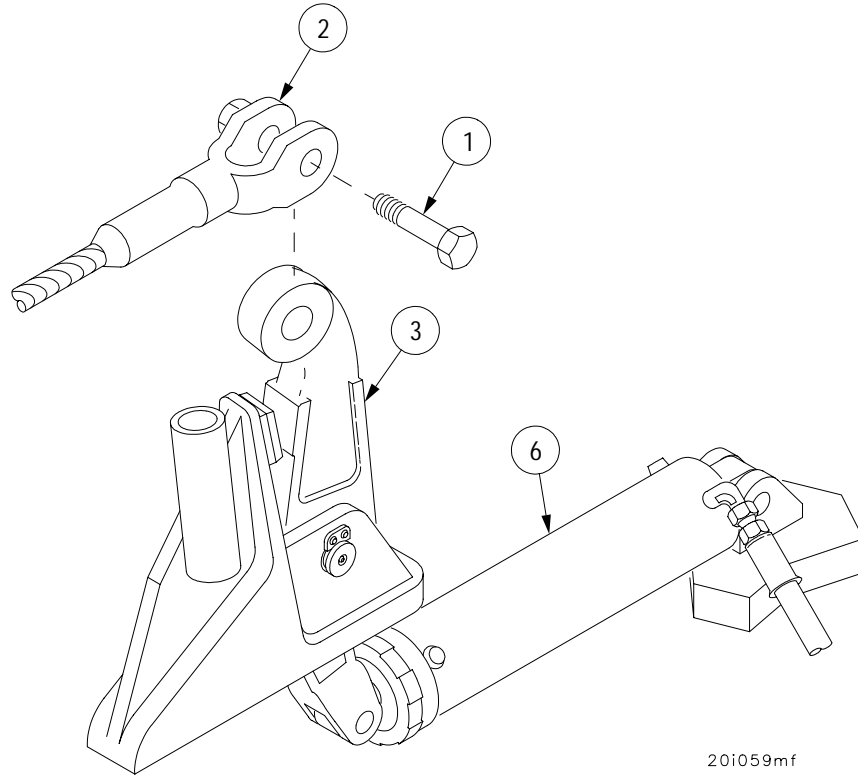
5. Install boom lever (3) on mounting anchor (22) with flat washer (s) (25) and headless pin (24).
6. Install lubrication fitting (23) in headless pin (24).
7. Install retaining plate (21) on mounting anchor (22) with two screws 19) and two new lockwashers (20).
8. Install cylinder (6) to boom lever (3) with cylinder pin (18).
9. Install lubrication fitting (17) in cylinder mounting pin (18).
10. Install retaining plate (16) on boom lever (3) with two screws (14) and two new lockwashers (15).



20i059ma

BOOM LEVER REPLACEMENT - CONTINUED**Installation-Continued**

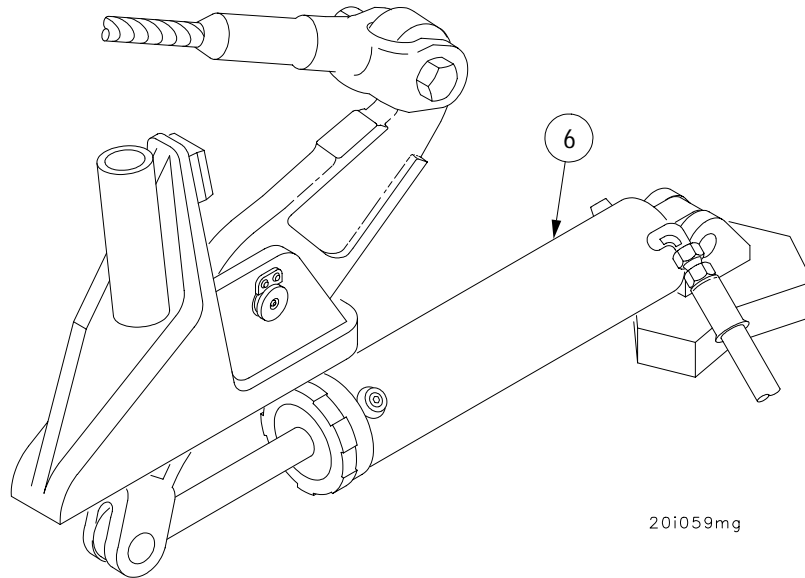
11. Connect stayline cable (2) to boom lever (3) with bolt (1).
12. Refill and charge hydraulic reservoir (TM 9-2350-292-10).
13. Install rollers on boom lever (3) limit switch, and adjust boom lever (3) limit switch (TM 9-2350-292-20).
14. Lubricate boom lever (3) (TM 9-2350-292-20).
15. Check cylinder (6) for leaks.



20i059mf

BOOM LEVER REPLACEMENT - CONTINUED**0067 00****Installation-Continued**

16. Raise hoist boom to full forward position and exercise hoist boom backward and forward in the live boom position 5 or 6 times to bleed air from system (TM 9-2350-292-10).
17. Check cylinder (6) for leaks.

**NOTE****FOLLOW-ON MAINTENANCE:**

- Install batteries (TM 9-2350-292-20), if removed.
- Install hydraulic compartment rear access cover (TM 9-2350-292-20), if removed
- Install left or right stayline cylinder access cover (TM 9-2350-292-20)
- Install engine deck grille next to stayline arm (TM 9-2350-292-20).

END OF TASK

CHAPTER 9

SPECIAL PURPOSE KITS

BILGE PUMP ASSEMBLY REPAIR

0068 00**THIS WORK PACKAGE COVERS:**Disassembly, Inspection, Assembly

INITIAL SETUP:**Tools and Special Tools**

Fuel and electrical tool kit (item 11, WP 0090 00)
Multimeter (item 12, WP 0090 00)
Soldering gun (item 10, WP 0090 00)
Spanner face wrench socket (item 29, WP 0090 00)
Armature test set (item 26, WP 0090 00)
Retaining pliers set (item 3, WP 0090 00)
Mechanical puller (item 28, WP 0090 00)
Wire twisting pliers (item 27, WP 0090 00)
Torque wrench (item 31, WP 0090 00)

References

TB SIG 222

Materials/Parts

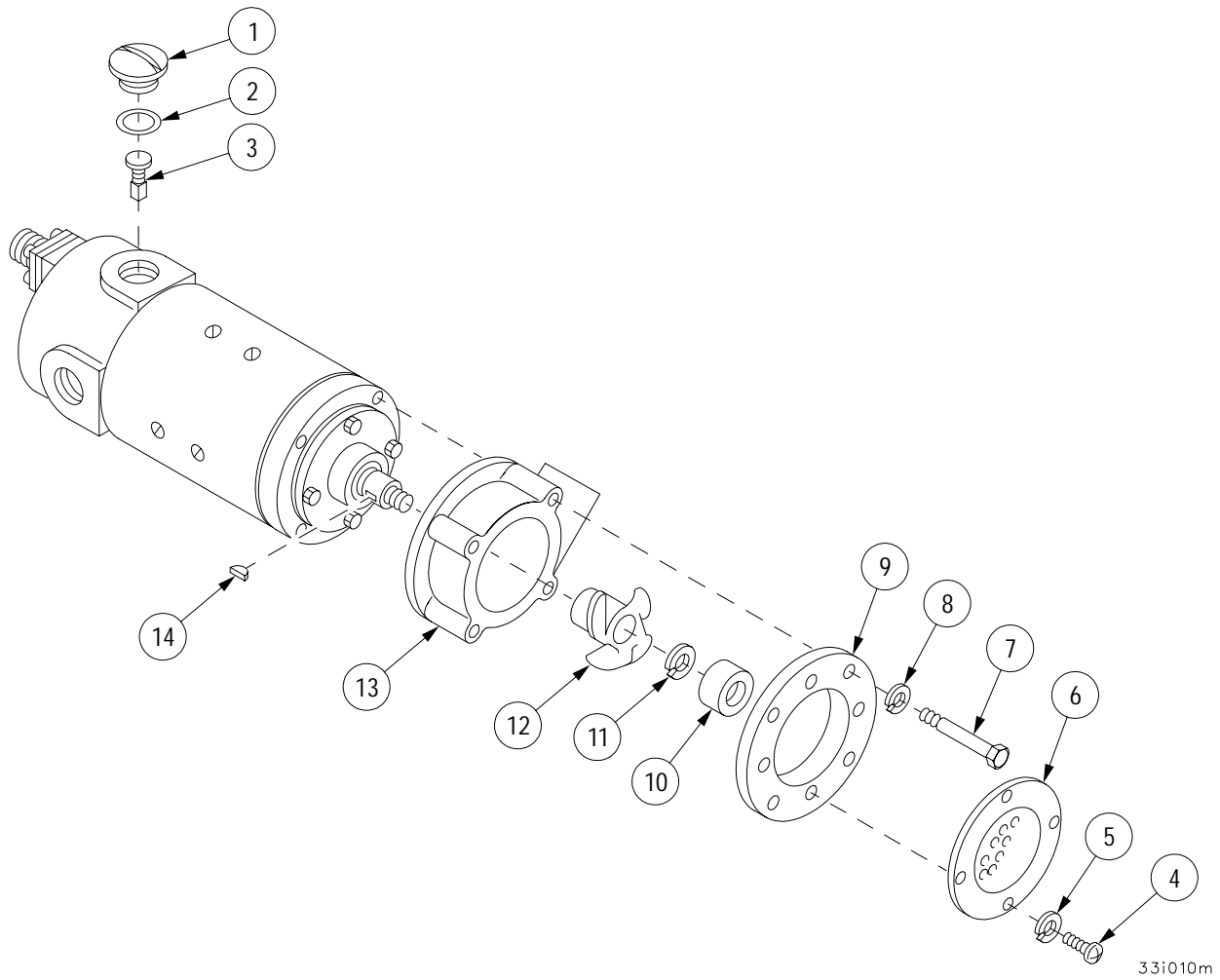
Tin alloy solder (item 7, WP 0087 00)
Soldering flux (item 8, WP 0087 00)
Safety glasses (item 48, WP 0087 00)
Lockwashers (8) (item 20, WP 0091 00)
Lockwasher (item 31, WP 0091 00)
Lockwashers (8) (item 49, WP 0091 00)
Lockwashers (4) (item 33, WP 0091 00)
Lockwasher (item 48, WP 0091 00)
Nonelectrical wire (item 50, WP 0091 00)
Parts kit (item 51, WP 0091 00)
Parts kit (item 52, WP 0091 00)

BILGE PUMP ASSEMBLY REPAIR - CONTINUED

0068 00

Disassembly

1. Remove four brush caps (1), four preformed packings (2) and four brushes (3). Discard preformed packings and brushes.
2. Remove four screws (4), four lockwashers (5) and inlet screen (6). Discard lockwashers.
3. Remove four bolts (7), four lockwashers (8) and impeller cover (9). Discard lockwashers.
4. Remove round nut (10), lockwasher (11) and impeller (12). Discard lockwasher.
5. Remove impeller housing (13) and key (14).



BILGE PUMP ASSEMBLY REPAIR - CONTINUED

0068 00

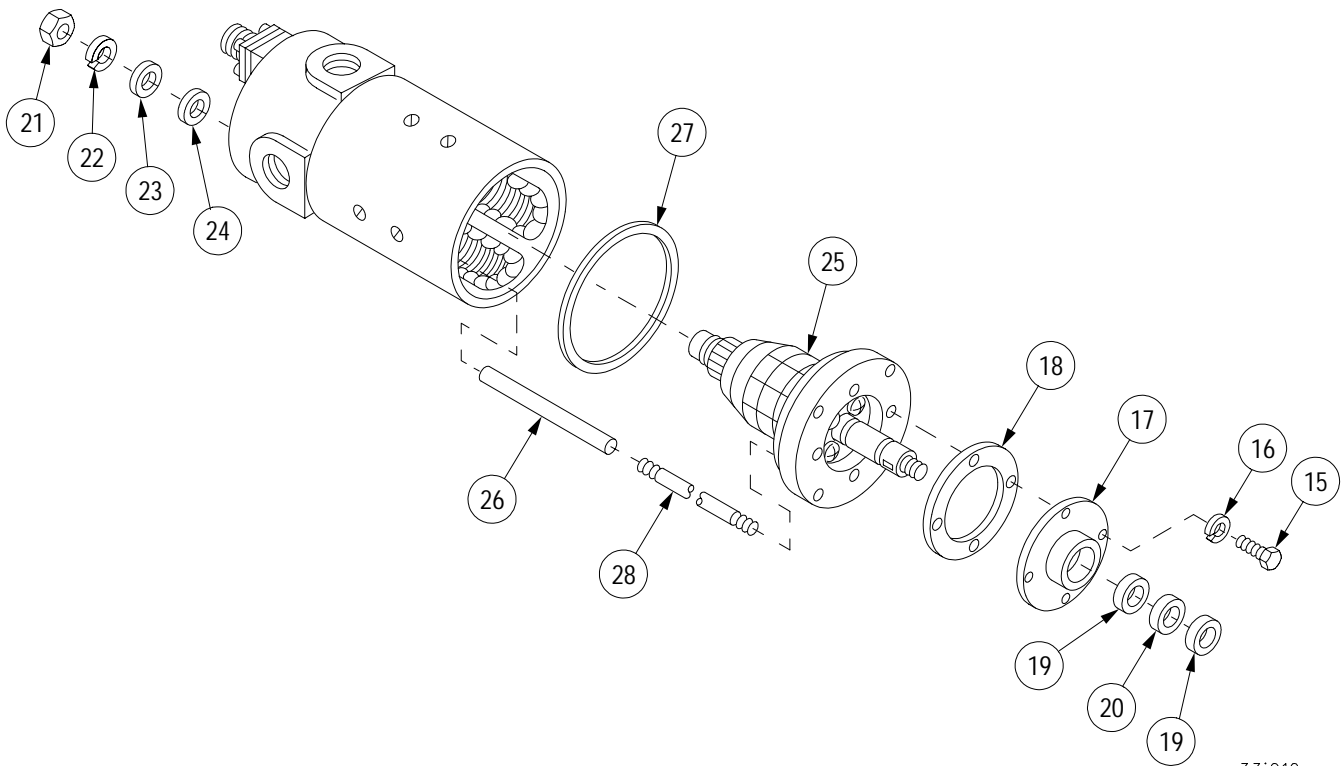
Disassembly-Continued

6. Remove four screws (15), four lockwashers (16), seal cover (17) and gasket (18). Discard lockwashers and gaskets.
7. Remove two seals (19) and seal (20) from seal cover (17). Discard seals.
8. Remove four nuts (21), four lockwashers (22), four flat washers (23) and four gaskets (24). Discard lockwashers and gasket.
9. Remove drive end assembly including armature (25), four insulation sleeves (26) and gasket (27). Discard gasket.

NOTE

Note depth of four studs in drive end assembly during removal to ensure studs are not installed beyond that depth during assembly.

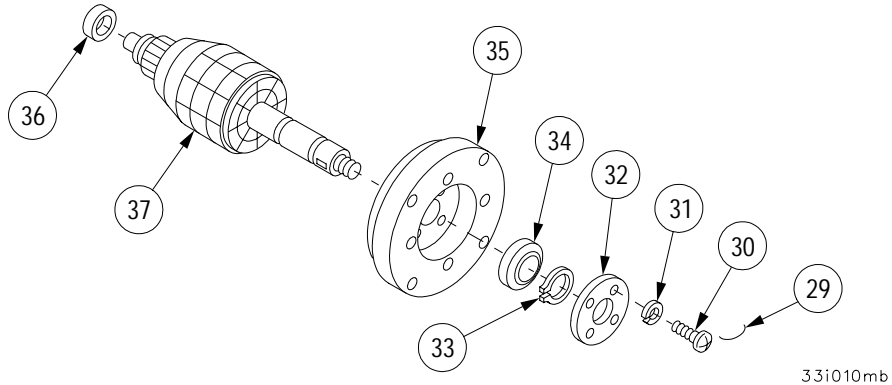
10. Remove four studs (28) from drive end assembly (25).



33i010ma

BILGE PUMP ASSEMBLY REPAIR - CONTINUED**Disassembly-Continued****WARNING**

11. Remove nonelectrical wire (29), four screws (30), four lockwashers (31), retainer plate (32) and retaining ring (33). Discard nonelectrical wire, retaining ring and lockwashers.
12. Remove bearing (34), drive end (35) and bearing (36) from armature (37). Discard bearings.

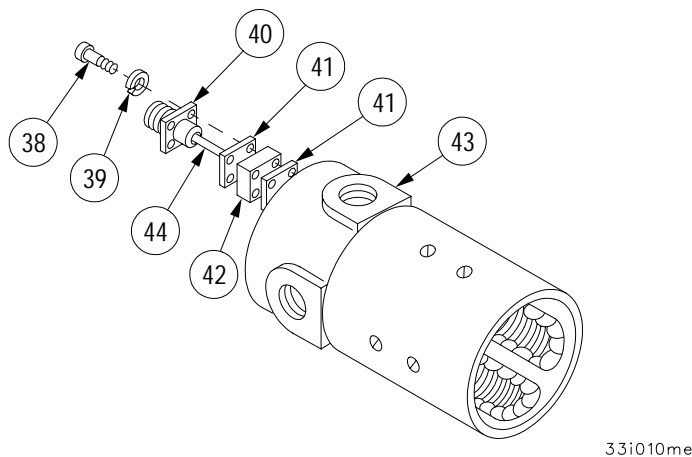


13. Remove four screws (38) and four lockwashers (39) securing capacitor (40). Discard lockwashers.
14. Pull capacitor (40), two gaskets (41) and spacer (42) from end bell (43). Discard gaskets.

NOTE

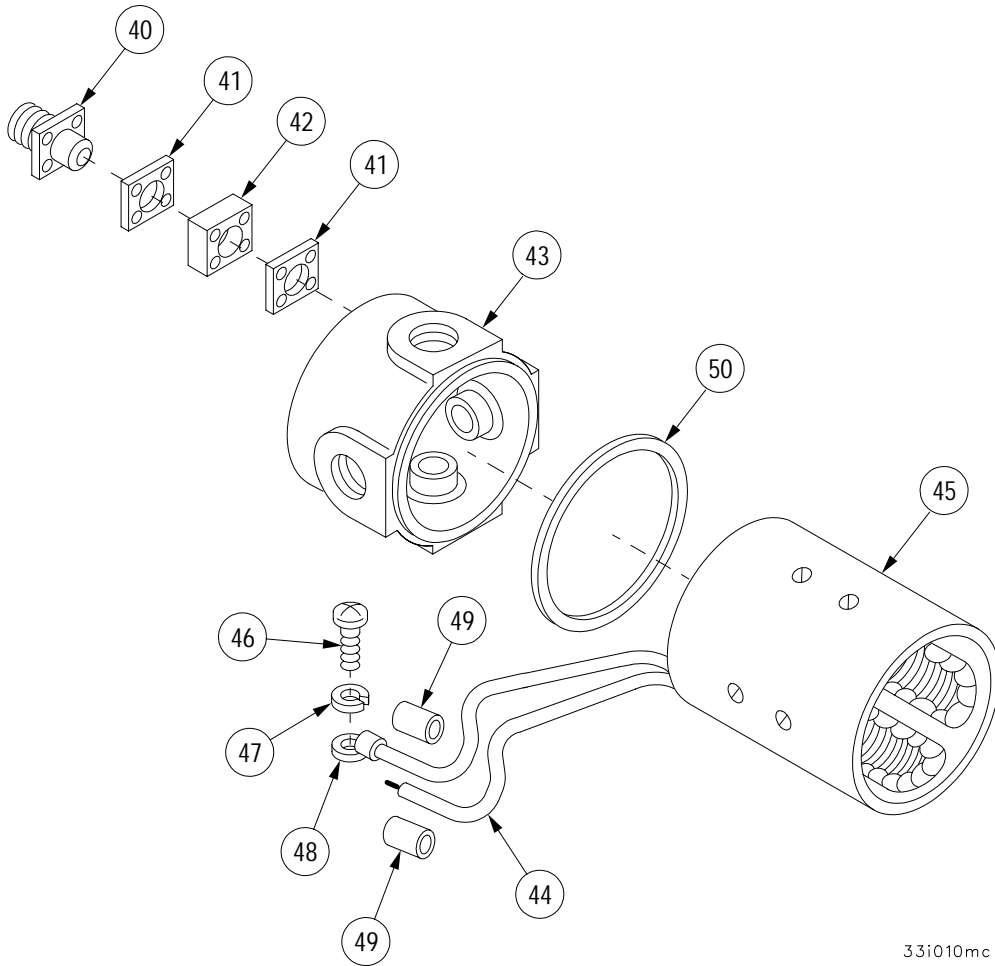
Before proceeding, see detailed instructions on soldering and solder (TB SIG 222).

15. Unsolder wire (44) from capacitor (40) using soldering gun.



BILGE PUMP ASSEMBLY REPAIR - CONTINUED**Disassembly-Continued**

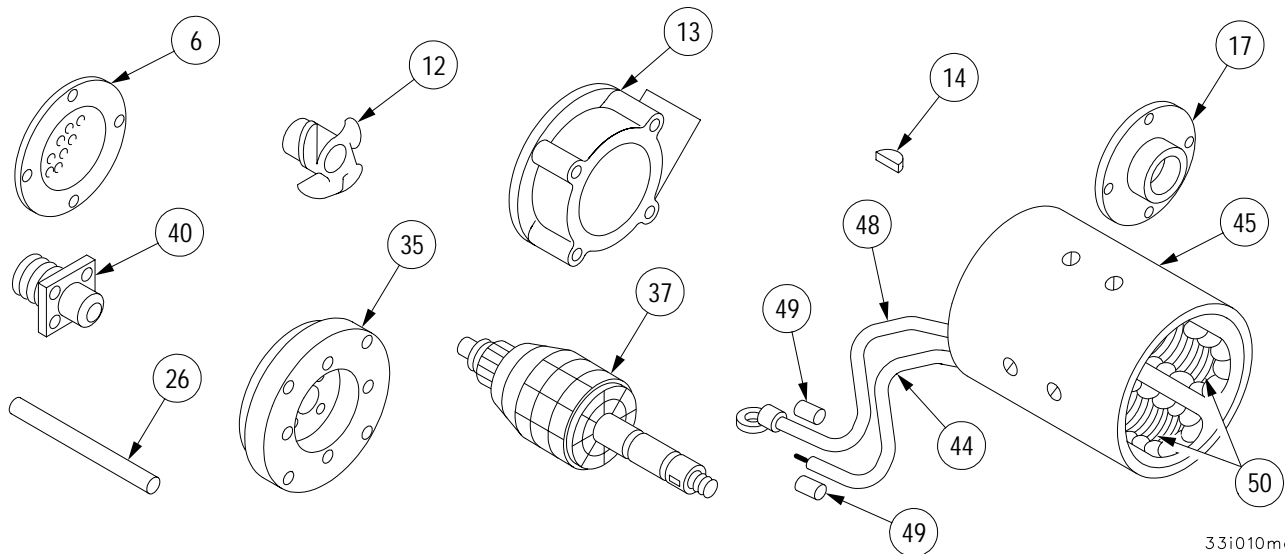
16. Remove capacitor (40), two gaskets (41) and spacer (42). Discard gaskets.
17. Pull stator assembly (45) away from end bell (43).
18. Remove screw (46), lockwasher (47) and wire (48) from inside of end bell (43). Discard lockwasher.
19. Remove insulation sleeves (49) from electrical wires (44 and 48) only if necessary.
20. Remove stator assembly (45) and gasket (50). Discard gasket.



33i010mc

BILGE PUMP ASSEMBLY REPAIR - CONTINUED**Inspection**

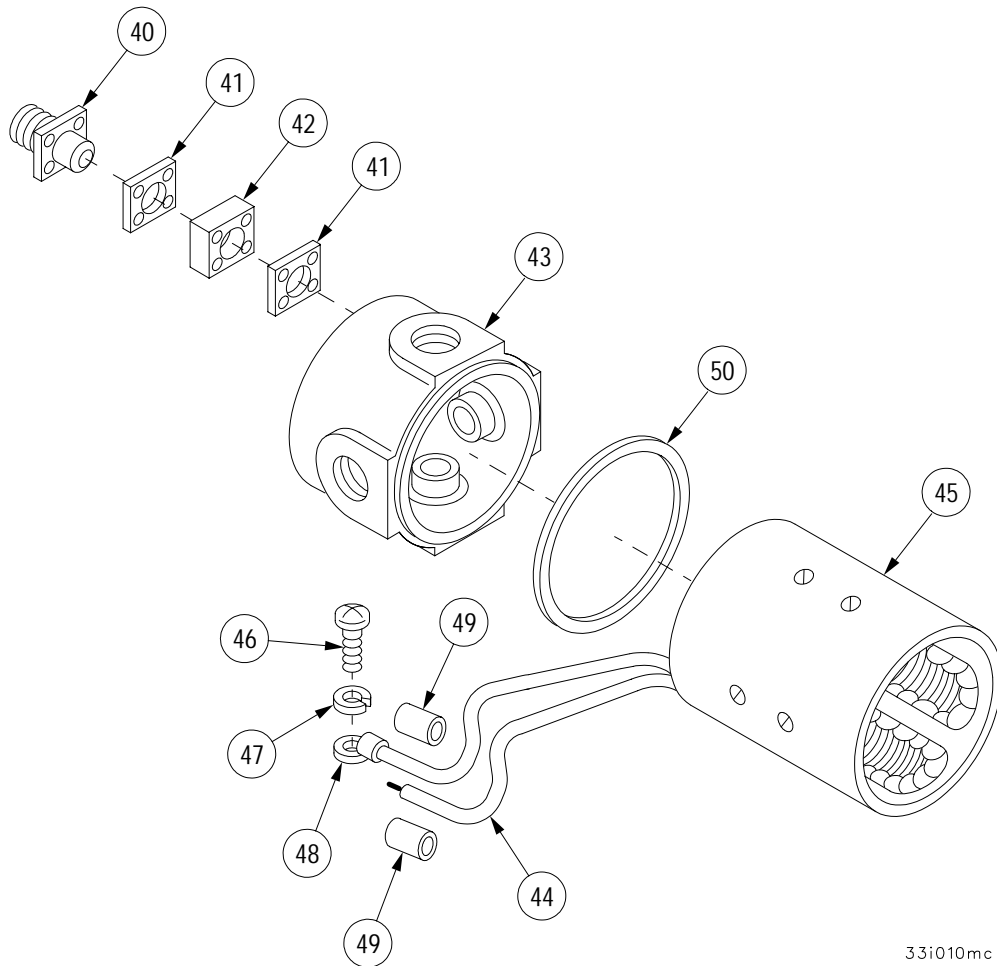
1. Clean and inspect inlet screen (6). Blow out mesh with compressed air. Replace if torn.
2. Inspect impeller (12) for damage and defects. Smooth out nicks and burrs with soft stone or fine mill file. Replace if damaged or defective.
3. Inspect impeller housing (13) for cracks, warped mating surface or other damage. Replace if damaged or defective.
4. Inspect key (14) for damage. Replace if necessary.
5. Inspect seal cover (17) for cracks, warped mating surface and other damage. Replace if damaged or defective.
6. Inspect insulation sleeves (26 and 49) if frayed or torn, replace as necessary.
7. Inspect drive end (35) for cracks, defects and warped mating surfaces. Replace if defective.
8. Test armature (37) using armature test set. Replace if defective.
9. Test continuity of field coils (50) using multimeter on wires (44 and 48). If defective, replace stator assembly (45).
10. Test capacitor (40) for continuity using multimeter. If resistance value is shown on multimeter, replace capacitor (40).



BILGE PUMP ASSEMBLY REPAIR - CONTINUED

Assembly

1. Install sleeves (49) over wires (44 and 48), if removed.
2. Insert two wires (44 and 48) through new gasket (50) and attach wire (48) to inside of end bell (43) with screw (46) and new lockwasher (47).
3. Install stator assembly (45) and new gasket (50) on end bell (43) making sure wire (44) goes through opening of end bell (43).
4. Assemble capacitor (40), two new gaskets (41) and spacer (42).



33i010mc

BILGE PUMP ASSEMBLY REPAIR - CONTINUED**Assembly-Continued****NOTE**

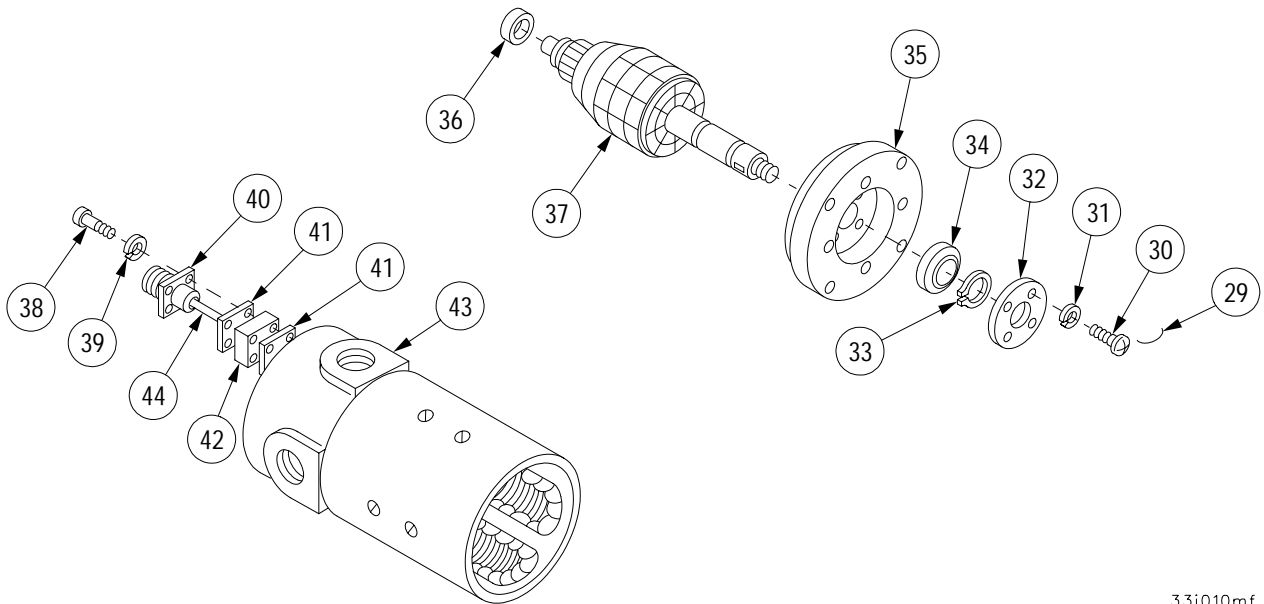
Before proceeding, see detailed instructions on soldering and solder (TB SIG 222).

5. Solder wire (44) to capacitor (40) using solder flux and soldering gun.
6. Install capacitor (40), two new gaskets (41), and spacer (42) on end bell (43) with four screws (38) and four new lockwashers (39). Torque four screws to 9-12 lb-in. (1-2 NSm).

**NOTE**

Bearings are different sizes. Make sure bearings are installed at location as shown. Do not reverse installation of bearings.

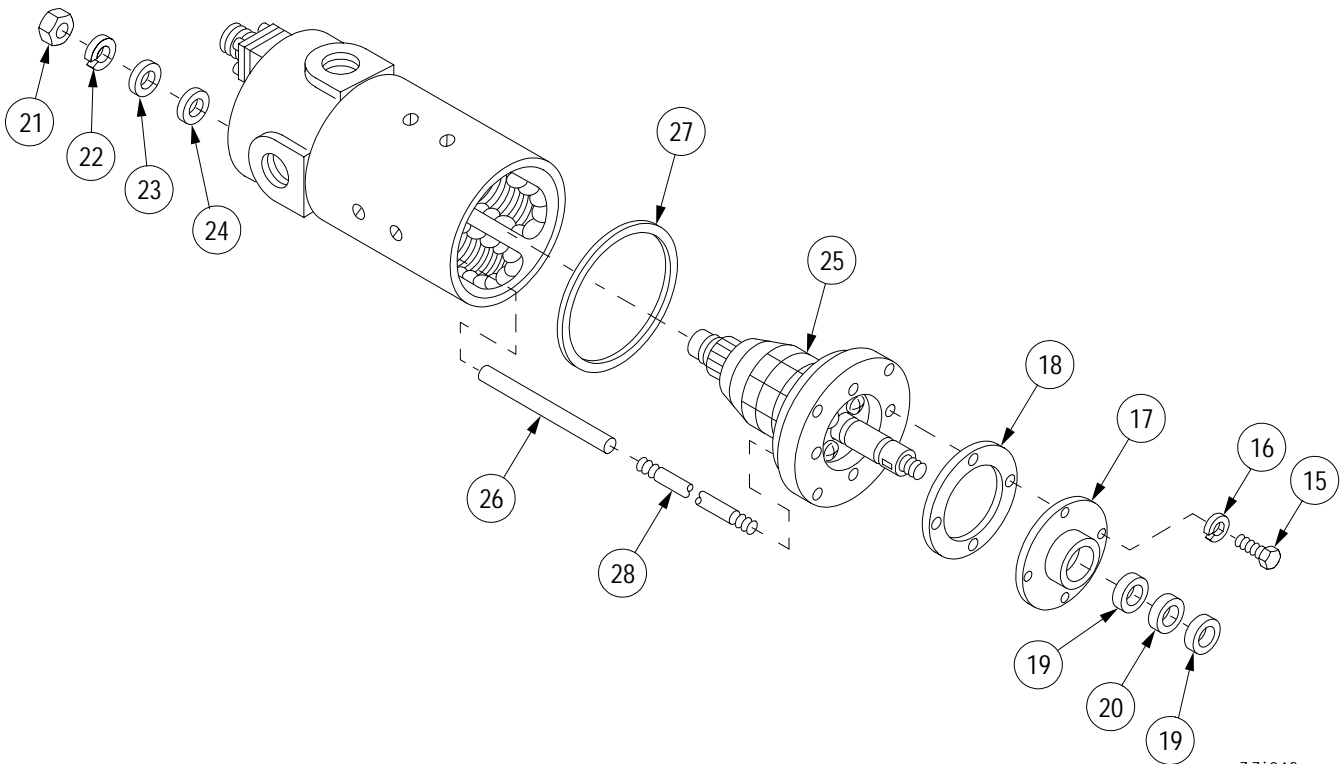
7. Install drive end (35), new bearing (34) and new retaining ring (33) on armature (37).
8. Install retainer plate (32) with four screws (30), four new lockwashers (31) and new nonelectrical wire (29).
9. Install new bearing (36) on armature (37).



33i010mf

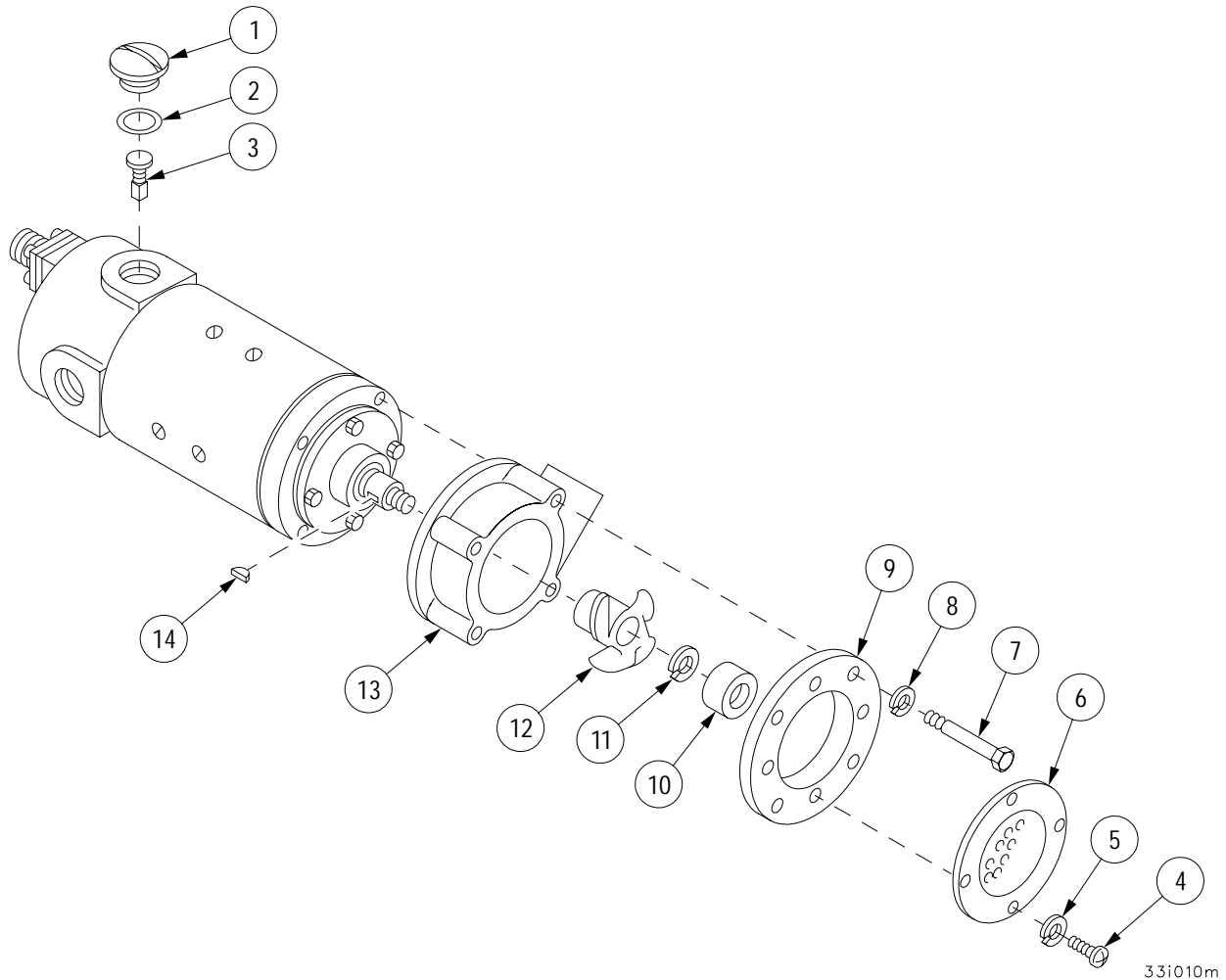
BILGE PUMP ASSEMBLY REPAIR - CONTINUED**0068 00****Assembly-Continued**

10. Install four studs (28) and four insulation sleeves (26) on drive end assembly (25).
11. Install drive end assembly (25) and new gasket (27) in stator assembly (45), secure with four new gaskets (24), four flat washers (23), four new lockwashers (22) and four nuts (21).
12. Install two new seals (19) and new seal (20) in seal cover (17).
13. Install seal cover (17) with new gasket (18), four screws (15) and four new lockwashers (16).



BILGE PUMP ASSEMBLY REPAIR - CONTINUED**0068 00****Assembly-Continued**

14. Install key (14) and impeller housing (13).
15. Install impeller (12) in impeller housing (13) with new lockwasher (11) and round nut (10). Torque round nut (10) to 60-80 lb-in. (6-9 NSm).
16. Install impeller cover (9) with four bolts (7) and four new lockwashers (8). Torque four bolts (7) to 50-70 lb-in. (7-9 NSm).
17. Install inlet screen (6) with four screws (4) and four new lockwashers (5).
18. Install four new brushes (3), four new preformed packings (2) and four brush caps (1).
19. Test operation of bilge pump using 24 volt power source.

**END OF TASK**

CHAPTER 10

HYDRAULIC SYSTEM

MAIN HYDRAULIC PUMP SUPPORT REPLACEMENT

0069 00

THIS WORK PACKAGE COVERS:

Removal, Installaiton

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0090 00)

Materials/Parts

Lockwashers (7) (item 41, WP0091 00)

Antiseize compound (item 50, WP 0087 00)

Equipment Conditions

Main hydraulic pump assembly and power take-off (PTO) clutch removed(TM 9-2350-292-20)

Personnel Required

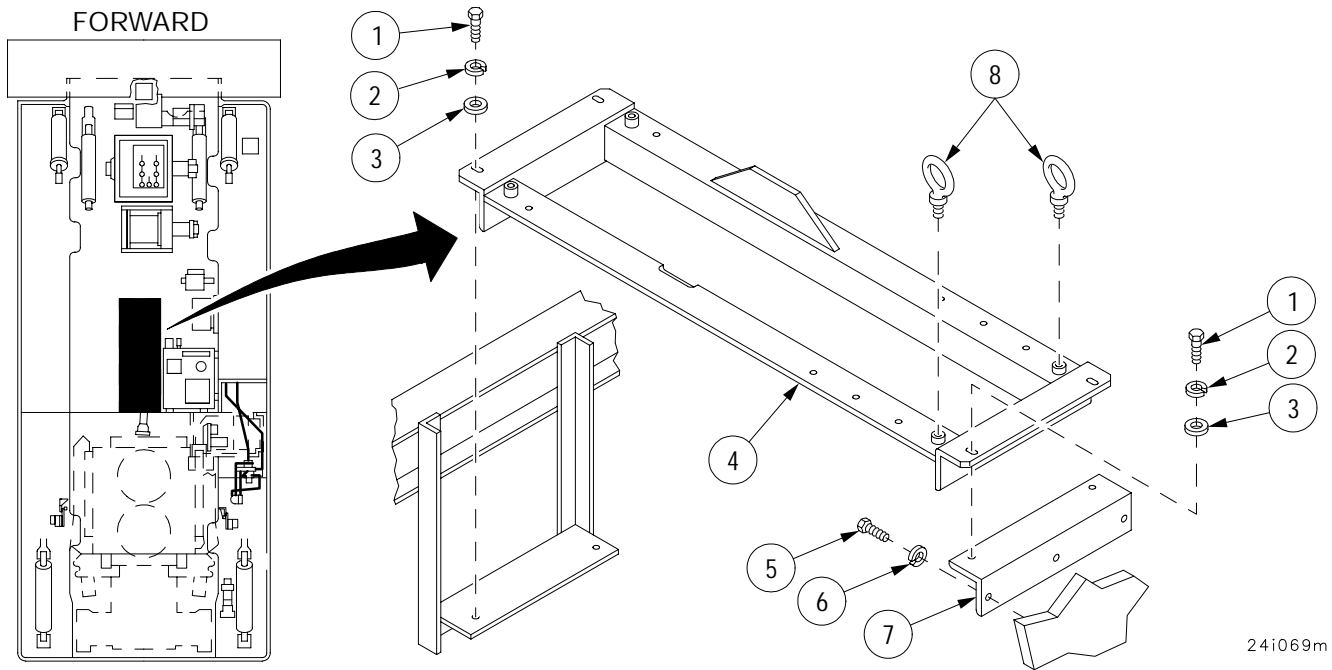
Two

References

TM 9-2350-292-20

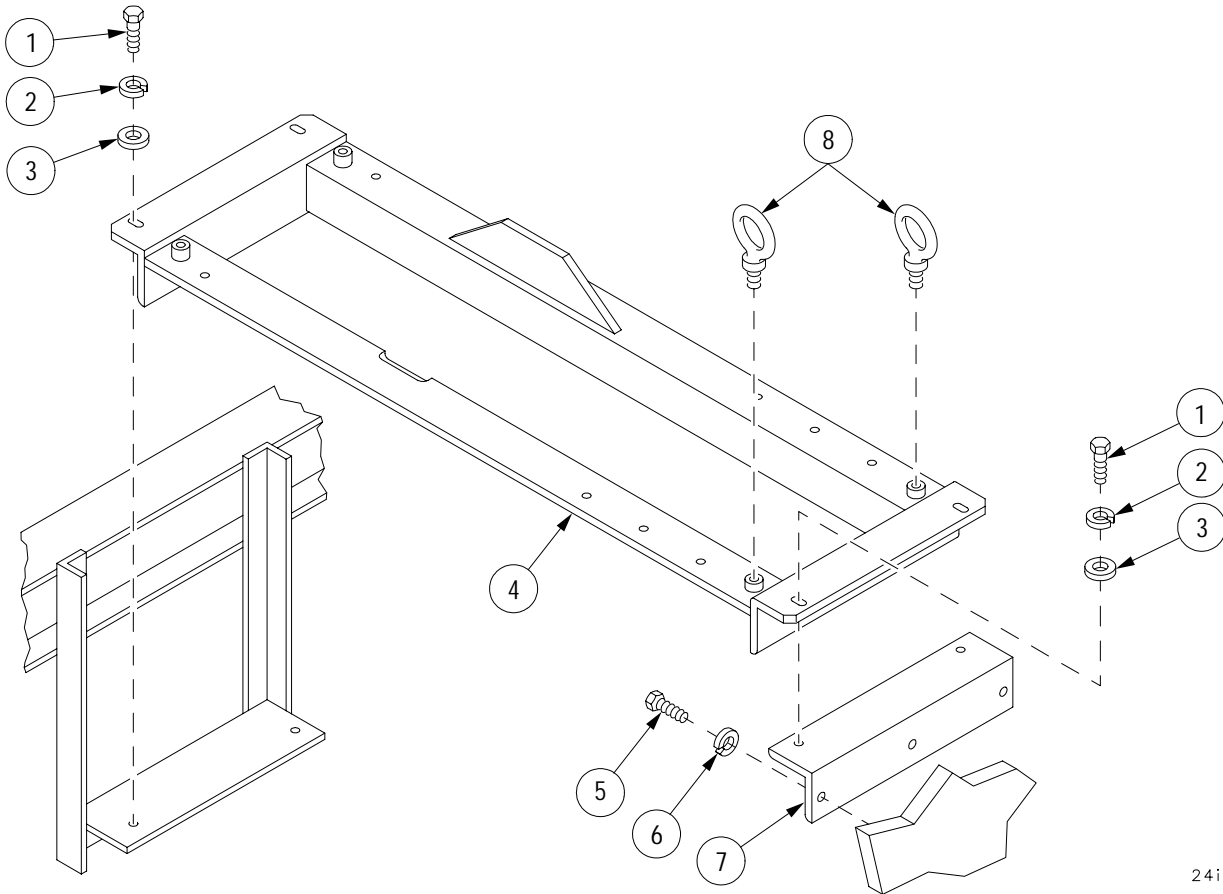
Removal

1. Remove four screws (1), four lockwashers (2) and four flat washers (3). Discard lockwashers.
2. Remove support (4) from vehicle through either personnel doors.
3. Remove three screws (5), three lockwashers (6) and support mount (7). Discard lockwashers
4. Remove four eye bolts (8) from support (4).
5. Inspect parts for damage and replace as required.



MAIN HYDRAULIC PUMP SUPPORT REPLACEMENT - CONTINUED**0069 00****Installation**

1. Apply antiseize compound to threads of four eye bolts (8) and mounting holes in support (4).
2. Install four eye bolts (8) in support (4).
3. Install support mount (7) with three screws (5) and three new lockwashers (6).
4. Install support (4) with four screws (1), four new lockwashers (2) and four flat washers (3).



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NOTE**FOLLOW-ON MAINTENANCE:**

Install power take-off (PTO) clutch
assembly and main hydraulic pump assembly
(TM 9-2350-292-20)

END OF TASK

POWER TAKE-OFF (PTO) SHAFT REPAIR

0070 00**THIS WORK PACKAGE COVERS:**Disassembly, Inspection, Assembly

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
Arbor hand press (item 2, WP 0090 00)
Retaining pliers set (item 3, WP 0090 00)

Equipment Conditions

PTO shaft removed (TM 9-2350-292-20)

References

TM 9-2350-292-20

Materials/Parts

Safety goggles (item 48, WP 0087 00)
Journal cross kits (2) (item 72, WP 0091 00)
Dust kit (item 73, WP 0091 00)

Disassembly

1. Loosen special cap (1), slide special cap (1) onto male slip yoke (2) and separate male slip yoke (2) from universal joint yoke (3).
2. Remove and discard special cap (1), split washer (4) and packing (5).

**NOTE**

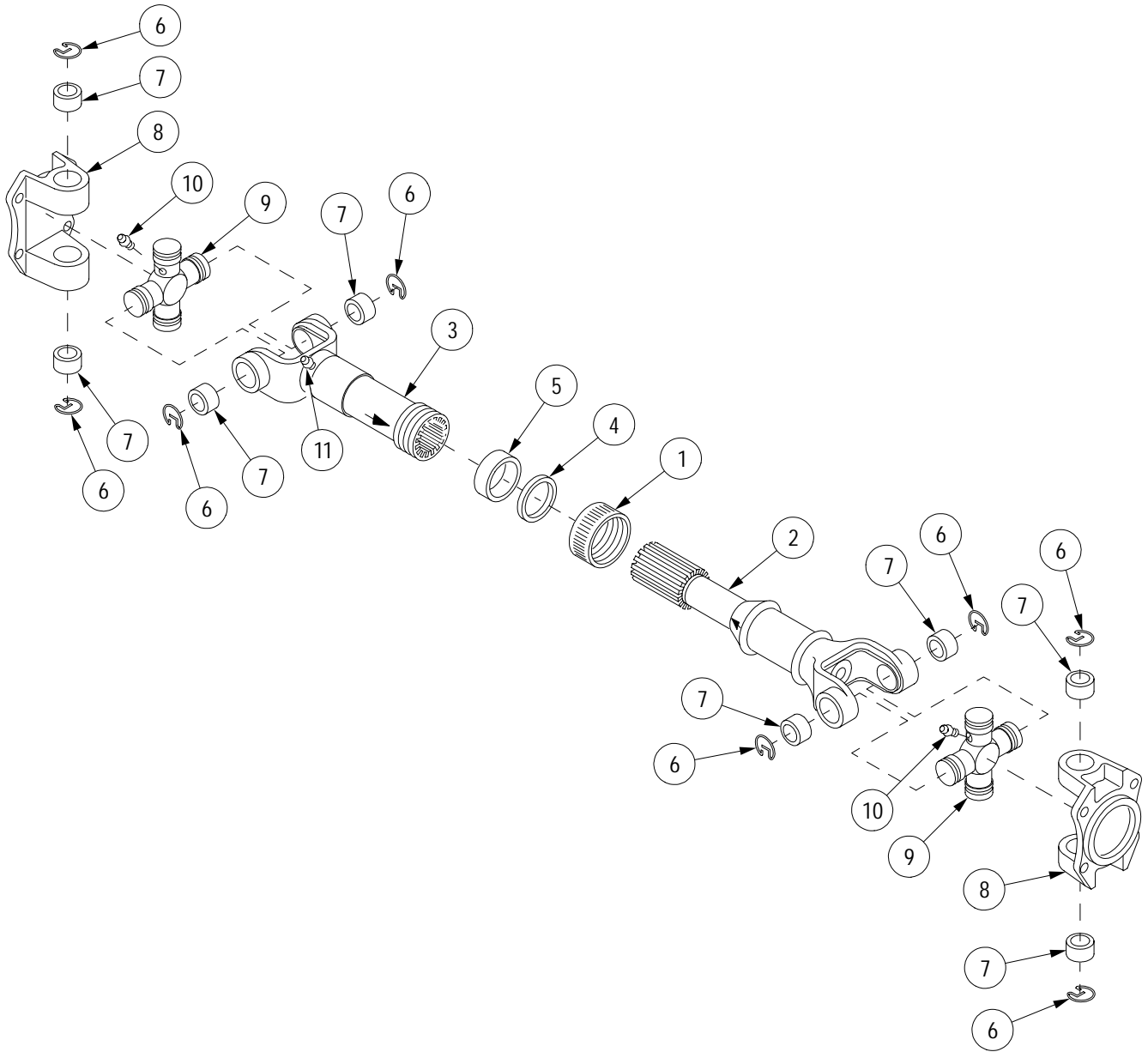
Disassembly of universal joints are the same for both slip yokes.

3. Remove and discard four retaining rings (6).
4. Remove four bearing caps (7) using arbor press; two from rear yoke (8) and two from male slip yoke (2) or universal joint yoke (3). Discard bearing caps.
5. Remove cross (9), rear yoke (8) and male slip yoke (2) or universal joint yoke (3).
6. Remove lubrication fitting (10) from cross (9) and lubrication fitting (11) from universal joint yoke (3). Discard cross.

POWER TAKE-OFF (PTO) DRIVE SHAFT REPAIR - CONTINUED

0070 00

Disassembly - Continued



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POWER TAKE-OFF (PTO) DRIVE SHAFT REPAIR - CONTINUED**0070 00****Inspection**

Inspect rear yoke (8), male slip yoke (2) and universal joint yoke (3). Replace any that show excessive wear or damage.

Assembly**NOTE**

Assembly of universal joints are the same for both slip yokes.

1. Install new cross (9) supplied from universal kit in male slip yoke (2) or universal joint yoke (3) and rear yoke (8).
2. Install four new bearing caps (7) from universal kit using arbor press; two in rear yoke (8) and two in male slip yoke (2) or universal joint yoke (3).
3. Install lubrication fitting (10) in new cross (9) and lubrication fitting (11) in universal joint yoke.(3).

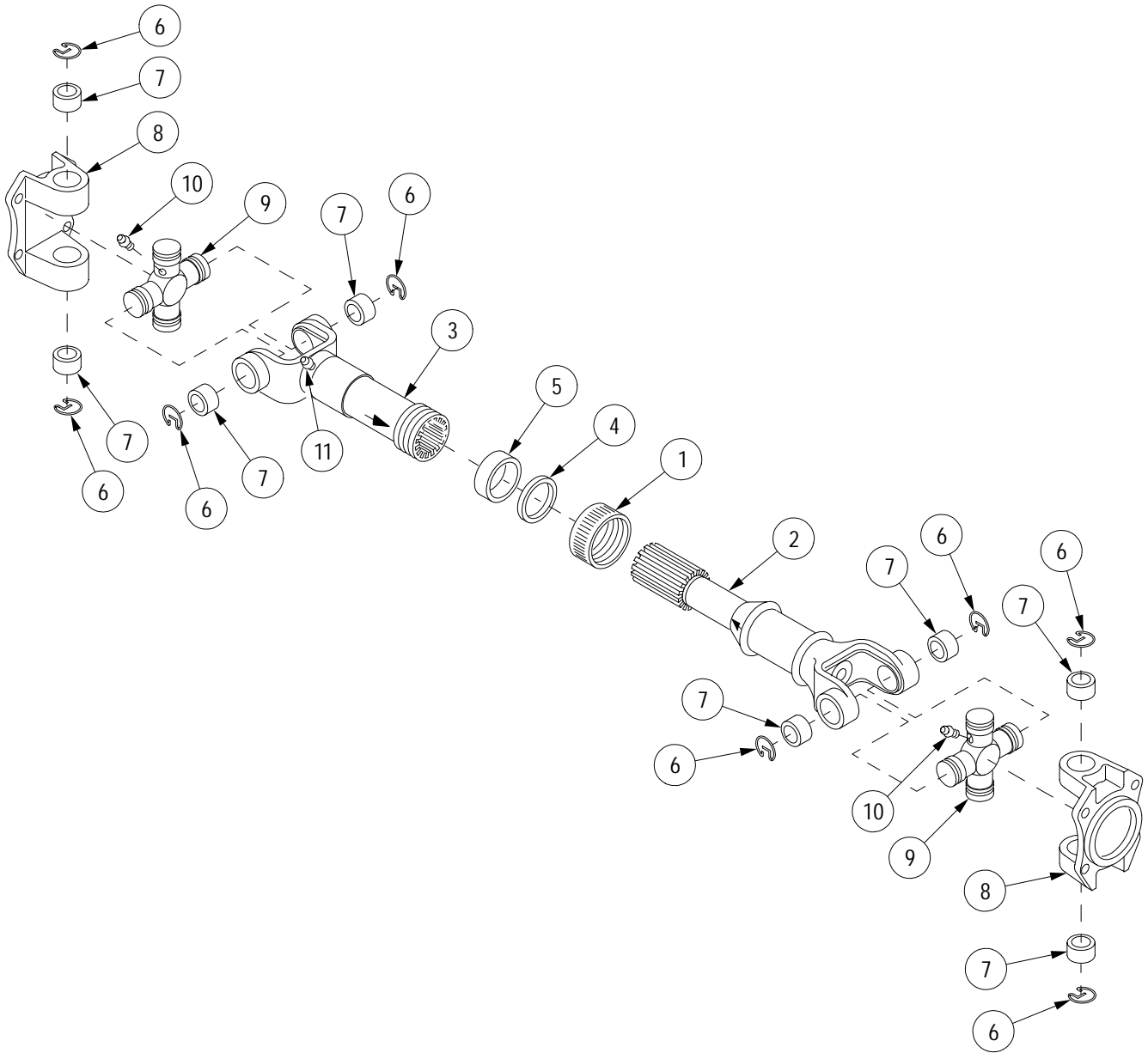


4. Secure new cross (9) to rear yoke (8) and male slip yoke (2) or universal joint yoke (3) with four new retaining rings (6) from universal kit.
5. Install new packing (5), new split washer (4) and new special cap (1) obtained from dust kit, on male slip yoke (2) shaft.
6. Align arrow on universal joint yoke (3) with arrow on male slip yoke (2) and slide male slip yoke (2) and universal joint yoke (3) together.
7. Slide new packing (5) and new split washer (4) against universal joint yoke (3) and hand-tighten new special cap (1).
8. Lubricate both universal joints at two lubrication fittings (10) in accordance with TM 9-2350-292-20.
9. Lubricate male slip yoke (2) and universal joint yoke (3) at lubrication fitting (11) on universal joint yoke (3) in accordance with TM 9-2350-292-20.

POWER TAKE-OFF (PTO) DRIVE SHAFT REPAIR - CONTINUED

0070 00

Assembly - Continued



24i070ma

NOTE

FOLLOW-ON MAINTENANCE:
Install PTO shaft (TM 9-2350-292-20)

END OF TASK

MAIN HYDRAULIC PUMP ASSEMBLY REPAIR

0071 00**THIS WORK PACKAGE COVERS:**Disassembly, Assembly

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
Endless sling (item 30, WP 0090 00)
Suitable lifting device (500 lbs (227 kg) min cap)
Torque wrench (item 25, WP 0090 00)

Materials/Parts

Hardwood lumber (item 10, WP 0087 00)
Lubricant (item 2, WP 0087 00)
Seals (2) (item 95, WP 0091 00)

Equipment Conditions

Main hydraulic pump assembly removed from PTO
clutch assembly (TM 9-2350-292-20)

Personnel Required

Two

References

TM 9-2350-292-20

NOTE

Place main hydraulic pump assembly on blocks or stands to aid Disassembly and Assembly process.

Retain all attaching hardware for aid in installation.

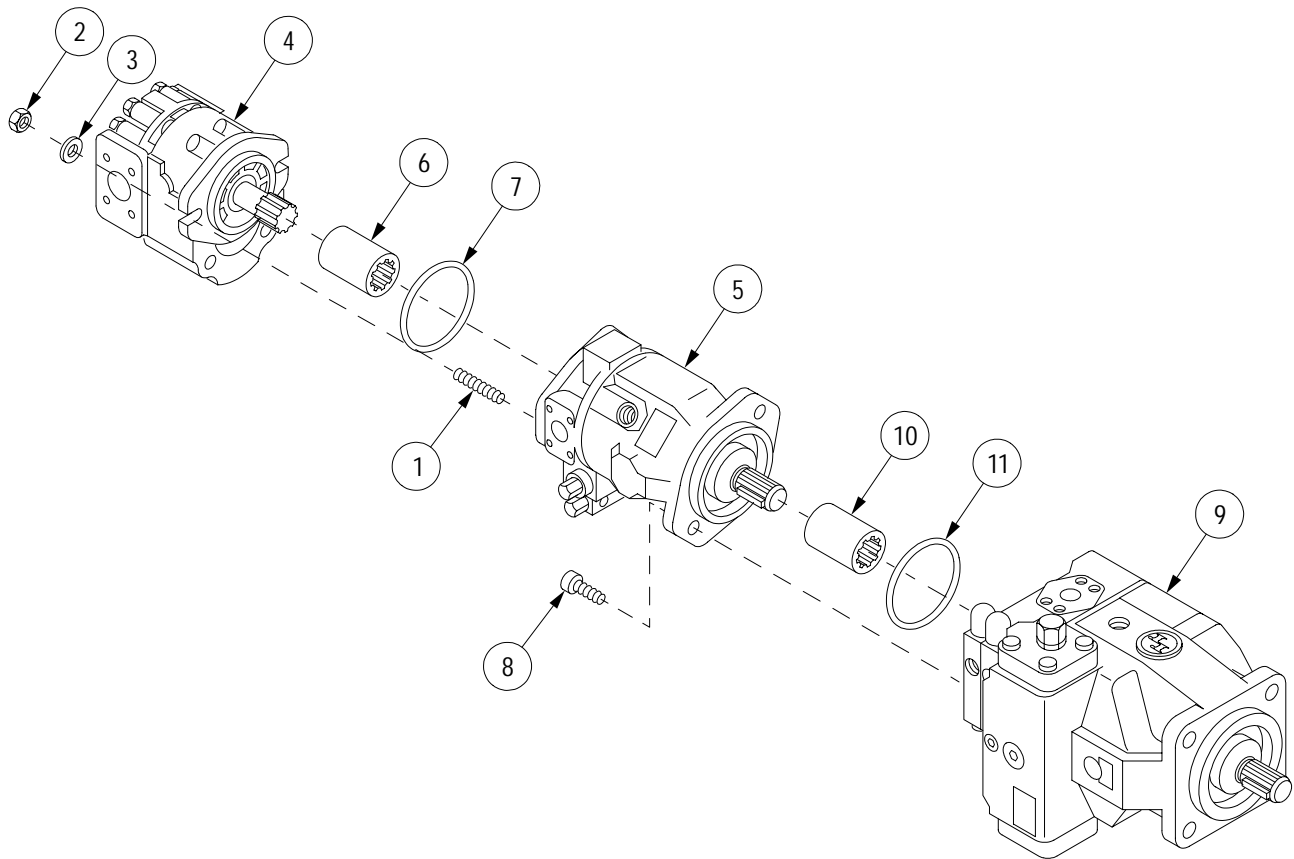
Perform Disassembly steps 1, 2 and 6 and Assembly steps 3 through 7 for maintenance of rear hydraulic pump.

Perform Disassembly steps 3, 4 and 6 and Assembly steps 1 and 2 for maintenance of front hydraulic pump.

Perform Disassembly steps 1 through 6 and Assembly steps 1 through 7 for maintenance of center hydraulic pump.

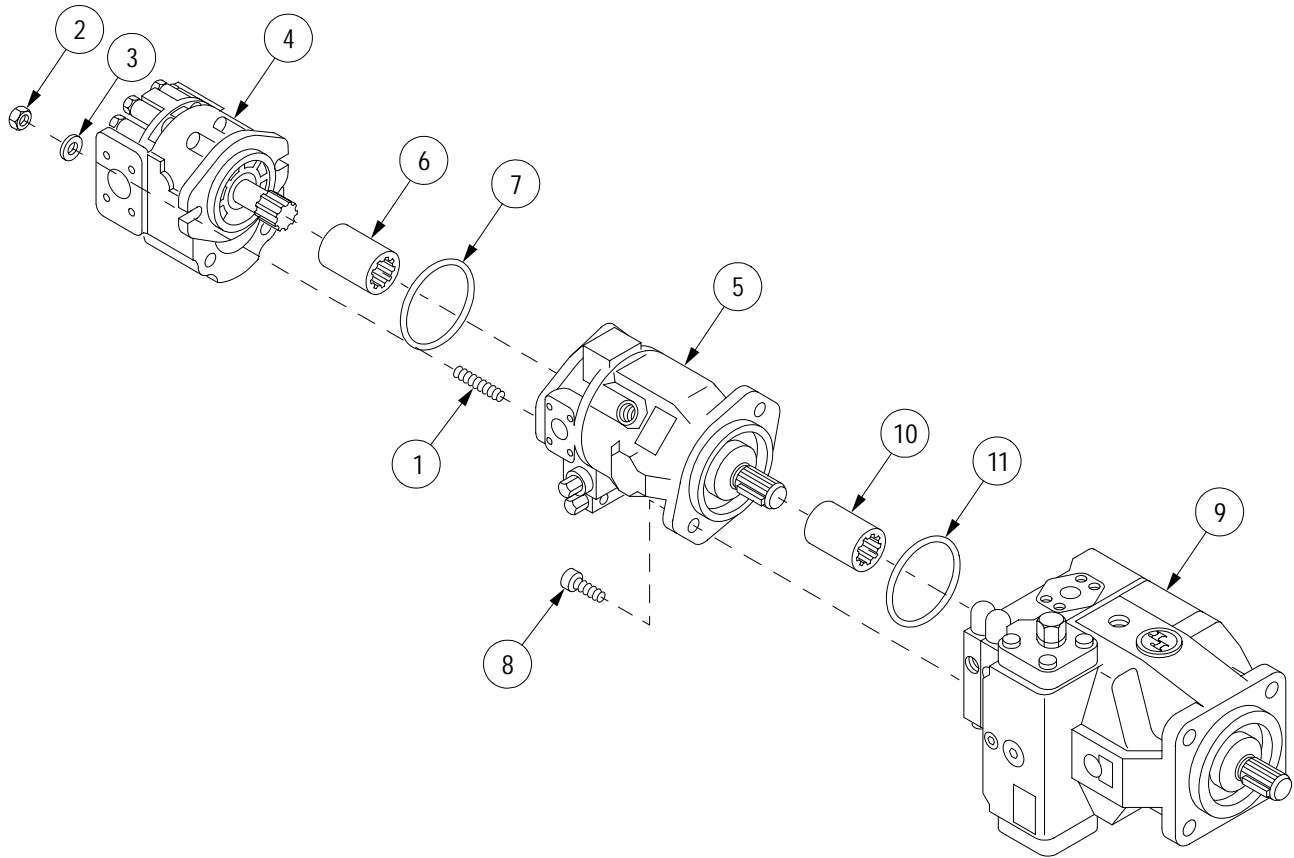
MAIN HYDRAULIC PUMP ASSEMBLY REPAIR - CONTINUED**0071 00****Disassembly**

1. Remove two studs (1), two nuts (2) and two flat washers (3) securing rear pump (4) to center pump (5).
2. Separate rear pump (4) from center pump (5), remove rear pump (4), coupling (6) and seal (7). Discard seal.
3. Remove two bolts (8) securing center pump (5) to front pump (9).
4. Separate center pump (5) from front pump (9), remove coupling (10) and seal (11) from front pump (9). Discard seal.
5. Remove center pump (5).
6. Inspect parts for damage and replace as required.



MAIN HYDRAULIC PUMP ASSEMBLY REPAIR - CONTINUED**0071 00****Assembly**

1. Install new seal (11) and coupling (10) in front pump (9). Align shaft of center pump (5) to hub of front pump (9).
2. Secure center pump (5) to front pump (9) with two bolts (8).
3. Install new seal (7) and coupling (6) in center pump (5). Align shaft of rear pump (4) to hub of center pump (5).
4. Apply lubricant to threads of two studs (1).
5. Secure rear pump (4) to center pump (5) with two bolts (1), two nuts (2) and two flat washers (3). Do not tighten studs (1).
6. Hand tighten two studs (1), until studs bottom out, then back two studs (1) out 0.25 to 2.5 turns.



24i074mc1

7. Torque two nuts (2) to 28-32 lb-ft (38-43.4 NSm).

NOTE**FOLLOW-ON MAINTENANCE:**

Install main hydraulic pump assembly on PTO clutch assembly (TM 9-2350-292-20)

END OF TASK

MAIN/HOIST WINCH DIRECTIONAL CONTROL VALVE ASSEMBLY REPAIR**0072 00****THIS WORK PACKAGE COVERS:**

Disassembly, Assembly

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
 Torque wrench (item 25, WP 0090 00)
 Socket wrench socket (item 57, WP 0090 00)

Equipment Conditions

Main/hoist winch directional control valve assembly
 removed (TM 9-2350-292-20)

Materials/Parts

Parts kit (item 62, WP 0091 00)
 Lubricant (item 5, WP 0087 00)
 Cleaning cloth (item 21, WP 0087 00)
 Dry-cleaning solvent (item 1, WP 0091 00)

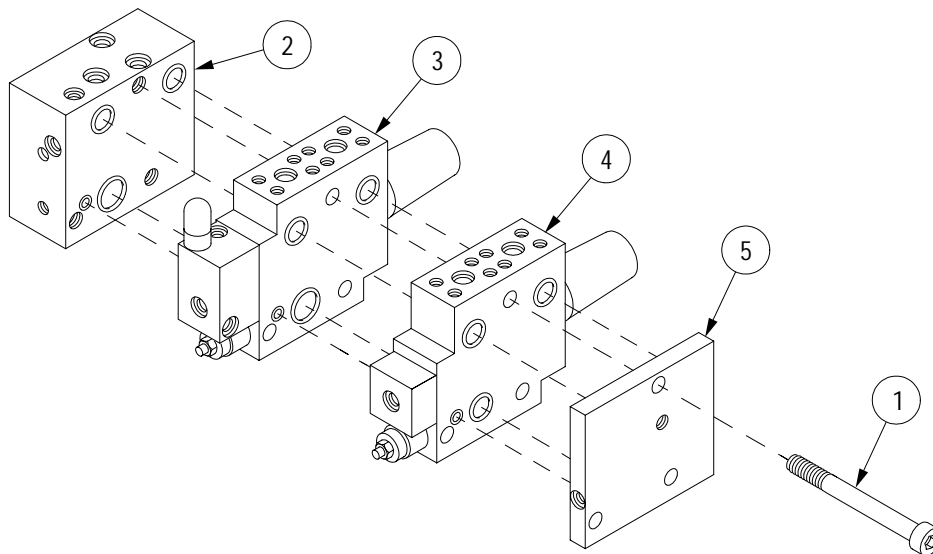
Disassembly**CAUTION**

Do not place machined surfaces of valve assembly segments on rough surfaces. Protect machined surfaces. Failure to comply may result in hydraulic component failure.

NOTE

Scribe alignment marks on valve assembly segments prior to disassembly to aid during installation.

1. Remove three screws (1), separate valve block (2), control valve (3), control valve (4) and end plate (5).



24i054m

**MAIN/HOIST WINCH DIRECTIONAL CONTROL VALVE ASSEMBLY REPAIR -
CONTINUED**

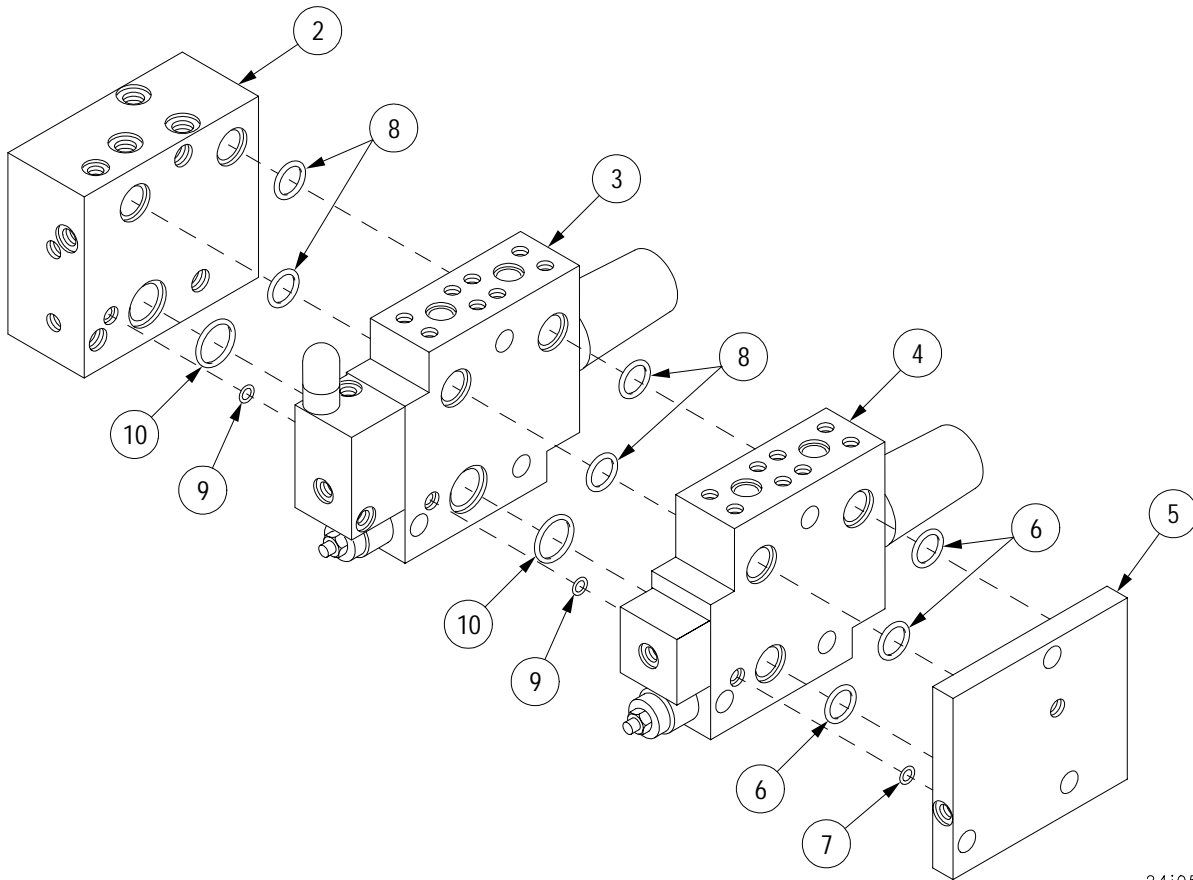
0072 00

Disassembly-Continued

2. Remove three preformed packings (6), preformed packing (7), four preformed packings (8), two preformed packings (9) and two preformed packings (10) from valve block (2), control valve (3), control valve (4) and end plate (5). Discard preformed packings.



3. Clean machined surfaces of valve block (2), control valve (3), control valve (4) and end plate (5) with cleaning cloth and dry-cleaning solvent.
4. Inspect parts for damage and replace as required.



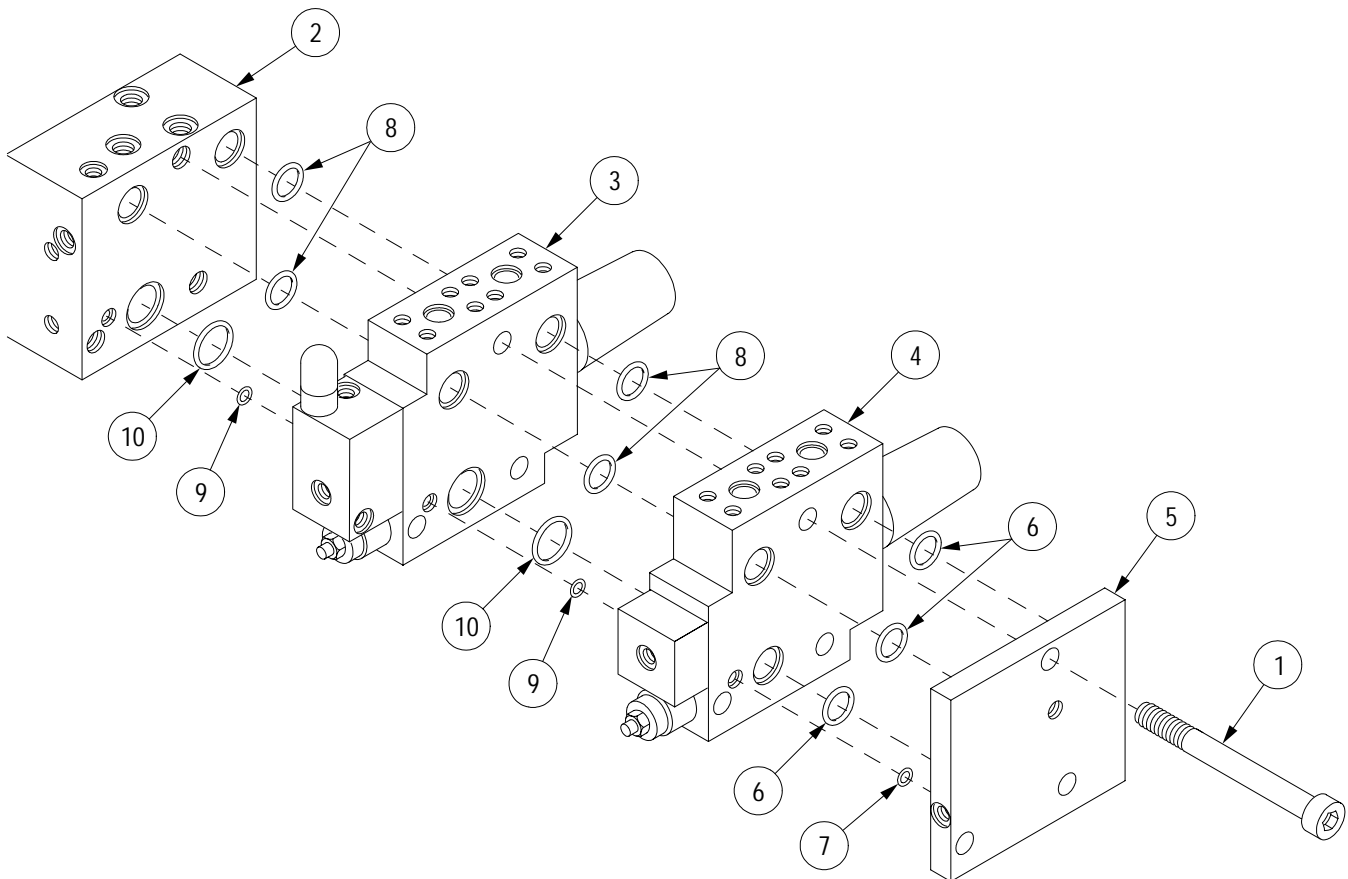
24i055m

MAIN/HOIST WINCH DIRECTIONAL CONTROL VALVE ASSEMBLY REPAIR - CONTINUED

0072 00

Assembly

1. Apply a thin coat of lubricant to all new preformed packings.
2. Install two new preformed packings (10), two new preformed packings (9), four new preformed packings (8), new preformed packing (7) and three new preformed packings (6) in grooves of end plate (5), control valve (4), control valve (3) and valve block (2).
3. Using alignment marks, assemble control valve (4), control valve (3), valve block (2) and end plate (5).
4. Secure valve block (2), control valve (3) and control valve (4) to end plate (5) with three screws (1). Torque three screws to 75 lb-ft (102 NSm).



24i056m

NOTE

FOLLOW-ON MAINTENANCE:

Install main/hoist winch directional control valve assembly (TM 9-2350-292-20)

END OF TASK

MAIN WINCH POWER REDUCTION MANIFOLD ASSEMBLY REPAIR

0073 00**THIS WORK PACKAGE COVERS:**Disassembly, Assembly

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
Torque wrench (item 25, WP 0090 00)
Socket wrench socket (item 57, WP 0090 00)

Equipment Conditions

Main winch power reduction manifold removed
(TM 9-2350-292-20)

Materials/Parts

Lubricant (item 5, WP 0087 00)
Cleaning cloth (item 21, WP 0087 00)
Dry-cleaning solvent (item 1, WP 0087 00)
Lockwashers (12) (item 110, WP 0091 00)
Preformed packings (15) (item 112, WP 0091 00)
Preformed packings (4) (item 111, WP 0091 00)

Disassembly

CAUTION

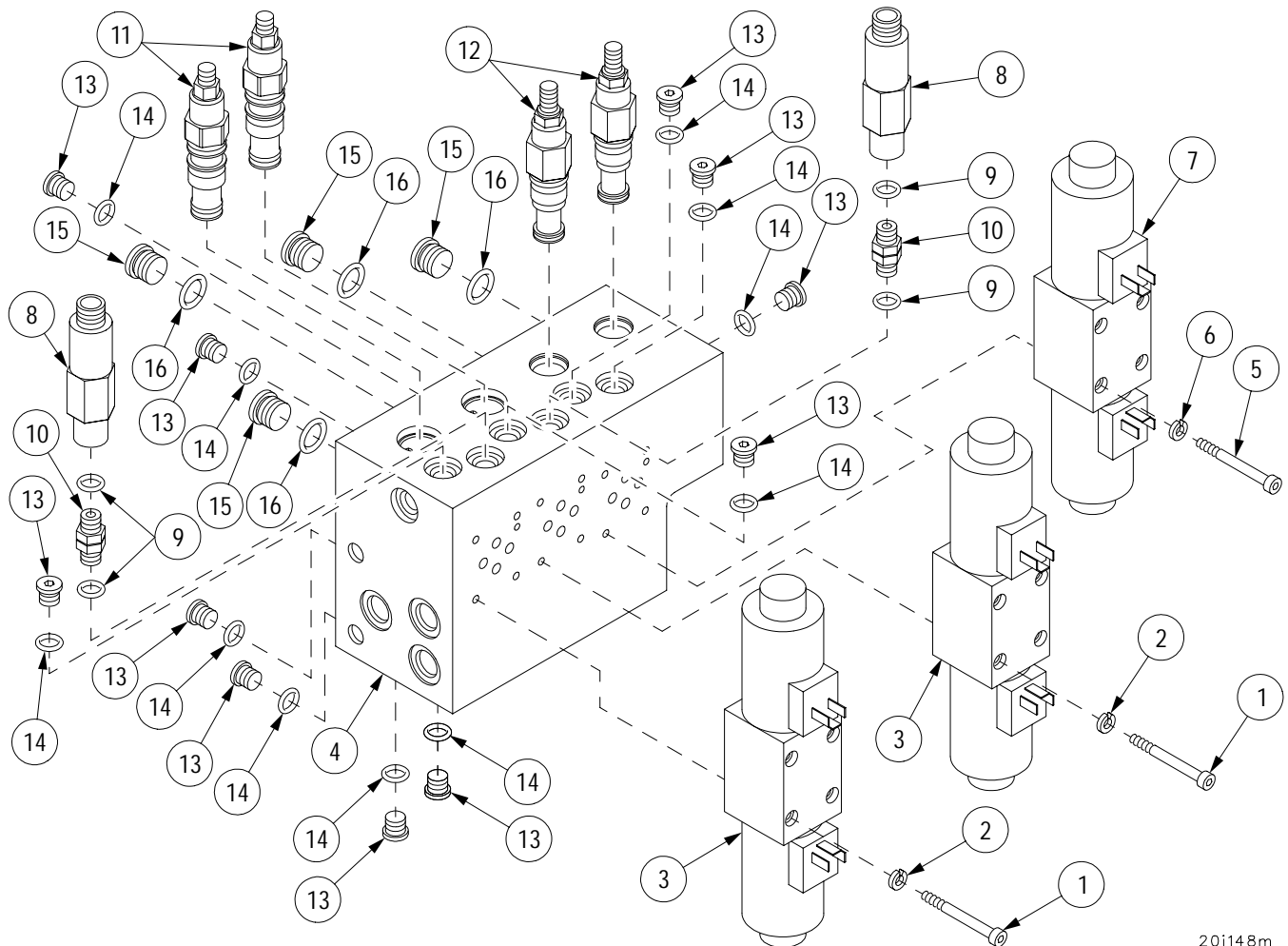
Do not place machined surfaces of manifold assembly segments on rough surfaces. Protect machined surfaces. Failure to comply may result in hydraulic component failure.

**MAIN WINCH POWER REDUCTION MANIFOLD ASSEMBLY REPAIR -
CONTINUED**

0073 00

Disassembly-Continued

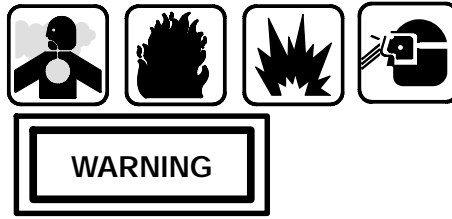
- 1 Remove eight screws (1), eight lockwashers (2), and two valves (3) from main winch power reduction manifold (4). Discard lockwashers.
- 2 Remove four screws (5), four lockwashers (6), and valve 7) from main winch power reduction manifold (4). Discard lockwashers.
- 3 Remove two pressure switches (8), four preformed packings (9), and two adapters (10) from main winch power reduction manifold (4). Discard preformed packings.
- 5 Remove two pressure relief valves (11) from main winch power reduction manifold (4).
- 6 Remove two pressure relief valves (12) from main winch power reduction manifold (4)
- 7 Remove 11 plugs (13) and 11 preformed packings (14) from main winch power reduction manifold (4). Discard preformed packings .
- 8 Remove four plugs (15) and four preformed packings (16) from main winch power reduction manifold (4). Discard preformed packings.



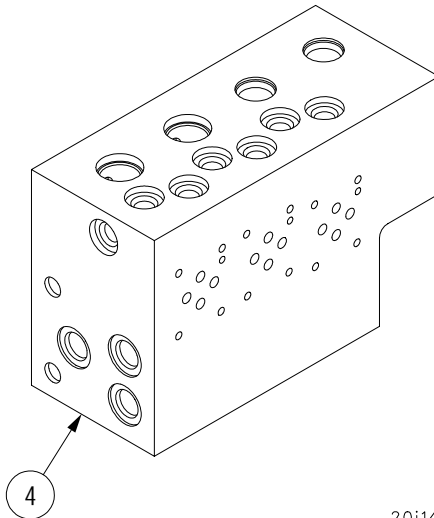
201148m

**MAIN WINCH POWER REDUCTION MANIFOLD ASSEMBLY REPAIR -
CONTINUED**

0073 00

Disassembly-Continued

- 9 Clean machined surfaces of Main winch power reduction manifold (4) with cleaning cloth and dry-cleaning solvent.
- 10 Inspect parts for damage and replace as required.



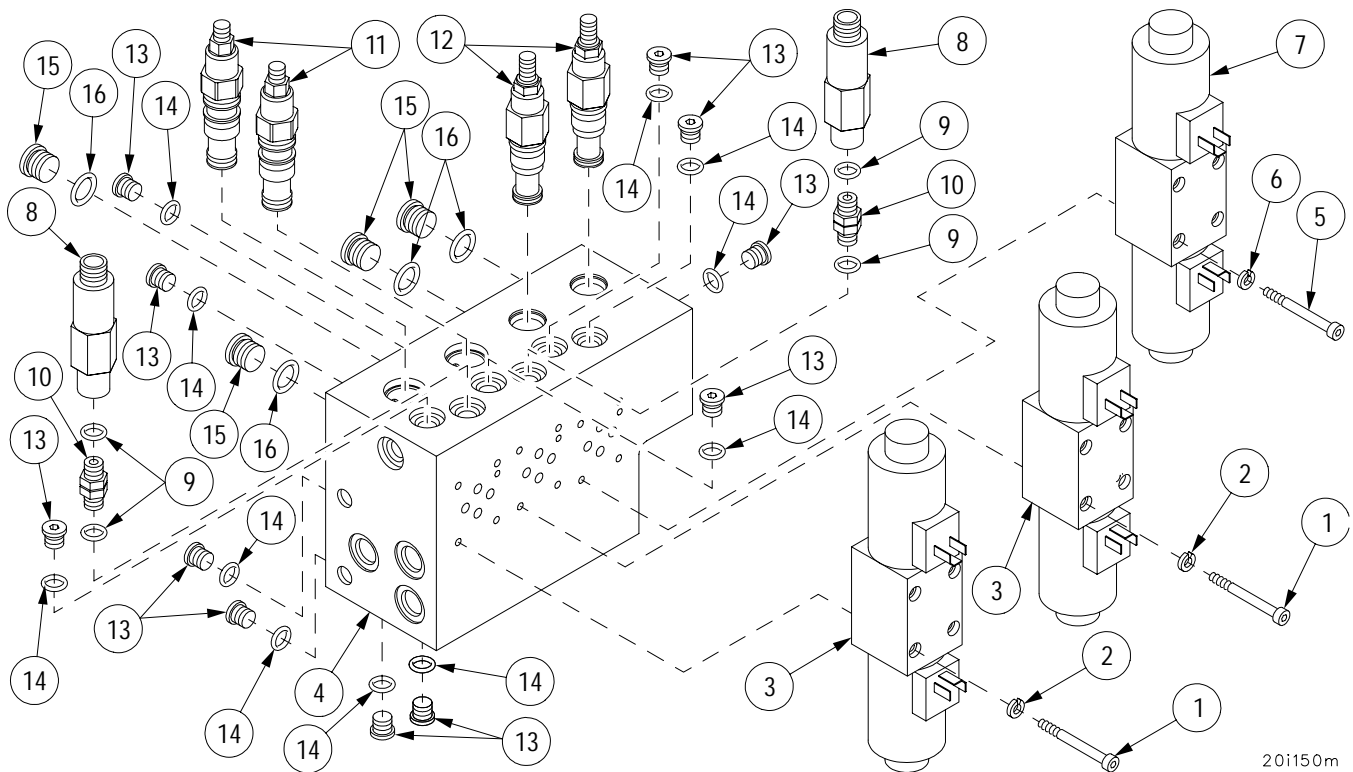
20i149m

MAIN WINCH POWER REDUCTION MANIFOLD ASSEMBLY REPAIR - CONTINUED

0073 00

Assembly

- 1 Apply a thin coat of lubricant to all new preformed packings.
- 2 Install four new preformed packings (16) and four plugs (15) in main winch power reduction manifold (4). Torque four plugs (15) to 530- 570 lb in (60-64 N•m)
- 3 Install 11 new preformed packings (14) and 11 plugs (13) in main winch power reduction manifold (4). Torque 11 plugs (13) 125-145 lb in (14.1-16.4 N•m).
- 4 install two pressure relief valves (12) in main winch power reduction manifold (4).
- 5 Install two pressure relief valves (11) in main winch power relief manifold (4).
- 6 Install two adapters (10), four new preformed packings (9), and two pressure switches (8) in main winch power reduction manifold (4).
- 7 Install valve (7) on main winch power reduction manifold (4) with four screws (5) and four new lockwashers (6).
- 8 Install two valves (3) on main winch power reduction manifold (4) with eight screws (1) and eight new lockwashers (2).



20i150m

NOTE

FOLLOW-ON MAINTENANCE:

Install main/hoist winch directional control valve assembly (TM 9-2350-292-20)

END OF TASK

HYDRAULIC CONTROL VALVE MANIFOLD ASSEMBLY REPAIR**0074 00****THIS WORK PACKAGE COVERS:**

Removal, Disassembly, Assembly, Installation

INITIAL SETUP:**Tools and Special Tools**

- General mechanic's tool kit (item 1, WP 0090 00)
- Eye bolts (2) (item 37, WP 0090 00)
- Lifting sling (item 9, WP 0090 00)
- Suitable lifting device (200 lbs (90.8 kg) min cap)
- Open-end wrench (item 48, WP 0090 00)

Materials/Parts

- Cleaning cloth (item 21, WP 0087 00)
- Lubricant (item 5, WP 0087 00)
- Dry-cleaning solvent (item 1, WP 0087 00)
- Lockwashers (6) (item 41, WP 0091 00)
- Spring pin (item 71, WP 0091 00)
- Preformed packings (15) (item 66, WP 0091 00)
- Preformed packings (12) (item 67, WP 0091 00)
- Preformed packings (8) (item 68, WP 0091 00)
- Preformed packings (4) (item 69, WP 0091 00)
- Preformed packings (4) (item 70, WP 0091 00)
- Preformed packings (4) (item 101, WP 0091 00)

Equipment Conditions

- Hydraulic control valve manifold shields and spade control valve rod and handle removed (TM 9-2350-292-20)
- Hydraulic hoses and fittings removed from hydraulic control valve manifold assembly (TM 9-2350-292-20)
- Mechanic's seat removed (TM 9-2350-292-20)
- Auxiliary power unit control box removed (TM 9-2350-292-20)
- Transmission shift control removed (TM 9-2350-292-20)

Personnel Required

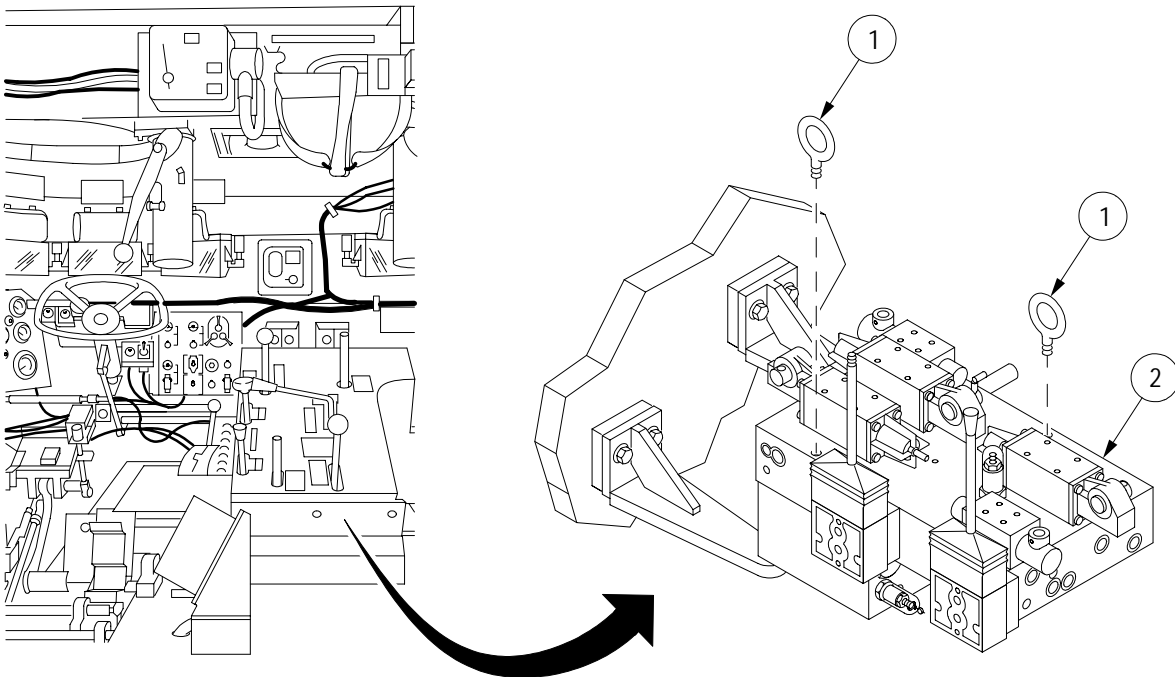
Three

References

- TM 9-2350-292-10
- TM 9-2350-292-20
- WP 0075 00

Removal

1. Install two eye bolts (1) on manifold assembly (2).



24i068m

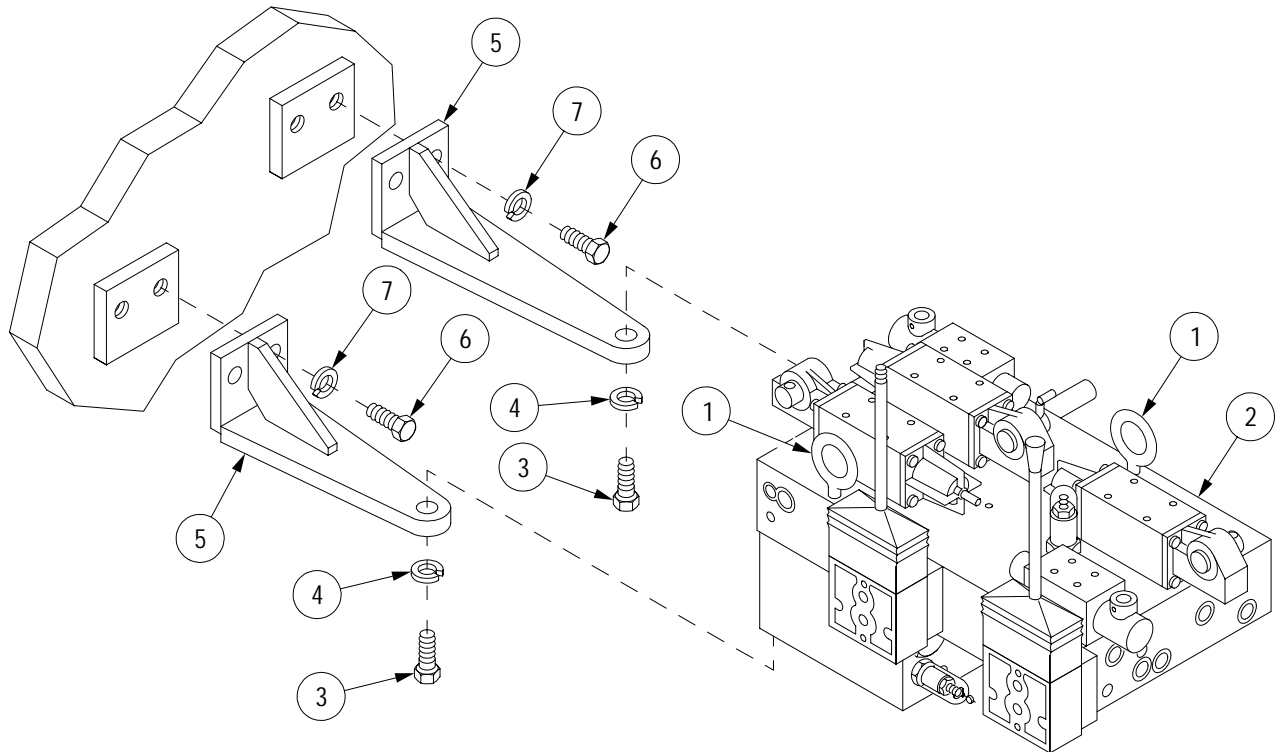
**HYDRAULIC CONTROL VALVE MANIFOLD ASSEMBLY REPAIR -
CONTINUED**

0074 00

Removal - Continued



2. Lower suitable lifting device and lifting sling through mechanic's hatch, attach lifting sling and suitable lifting device to two eyebolts (1) on manifold assembly (2).
3. Remove two screws (3), two lockwashers (4) and manifold assembly (2) from two brackets (5). Discard lockwashers.
4. Remove two eyebolts (1) from manifold assembly (2).
5. Remove four screws (6), four lockwashers (7) and two brackets (5) from hull. Discard lockwashers.



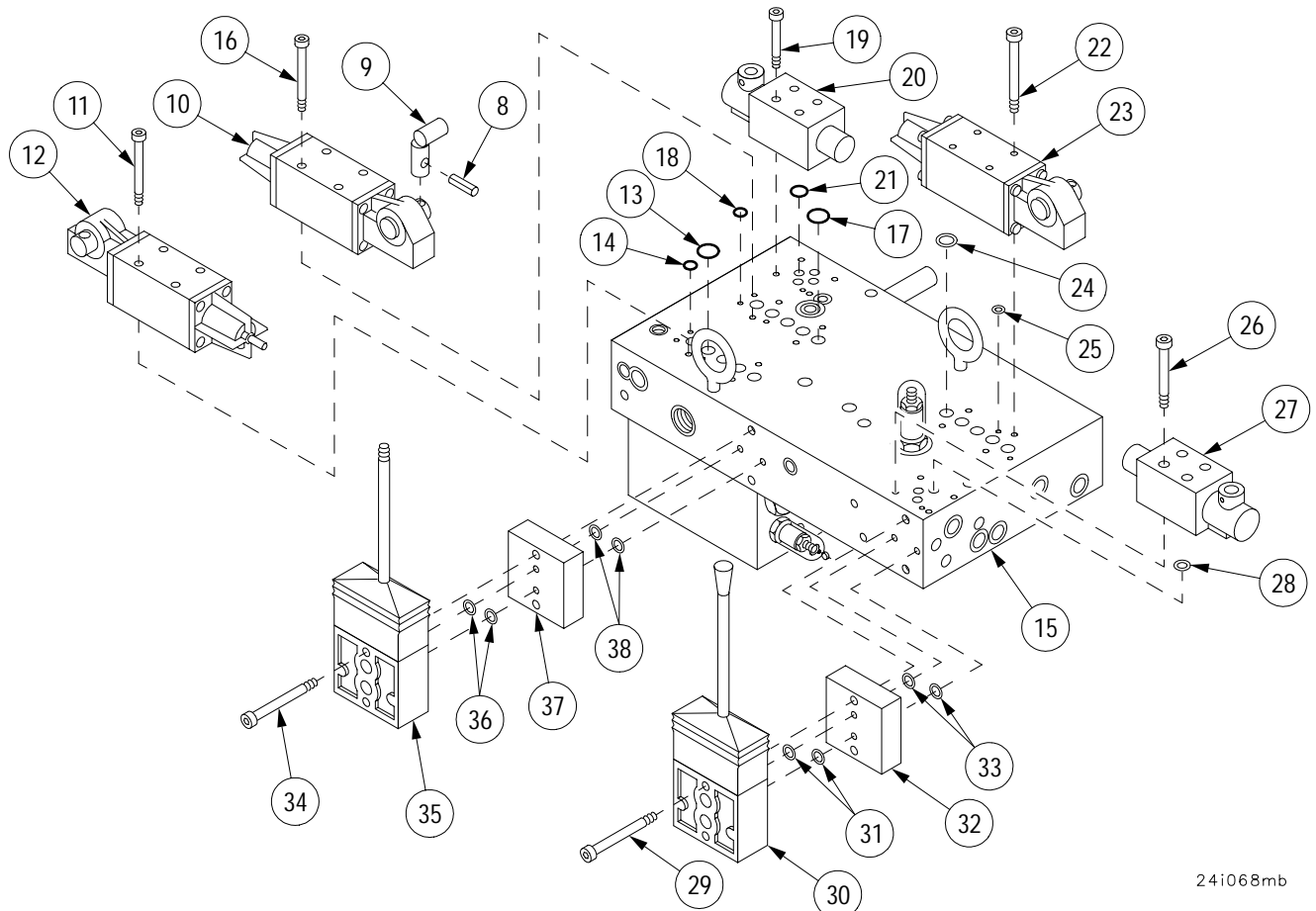
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HYDRAULIC CONTROL VALVE MANIFOLD ASSEMBLY REPAIR - CONTINUED

0074 00

Disassembly

1. Remove spring pin (8) and lever (9) from spade DCV valve (10). Discard spring pin.
2. Remove four screws (11), boom DCV valve (12), five preformed packings (13) and four preformed packings (14) from manifold (15). Discard preformed packings.
3. Remove four screws (16), spade DCV valve (10), five preformed packings (17) and four preformed packings (18) from manifold (15). Discard preformed packings.
4. Remove four screws (19), DCV selector valve (20), and four preformed packings (21) from manifold (15).
5. Remove four screws (22), lead winch DCV valve (23), five preformed packings (24) and four preformed packings (25) from manifold (15). Discard preformed packings.
6. Remove four screws (26), boom DCV safety valve (27) and four preformed packings (28) from manifold (15). Discard preformed packings.
7. Remove two screws (29), pilot control valve (30), two preformed packings (31), adapter (32) and two preformed packings (33) from manifold (15). Discard preformed packings.
8. Remove two screws (34), pilot control valve (35), two preformed packings (36), adapter (37) and two preformed packings (38) from manifold (15). Discard preformed packings.



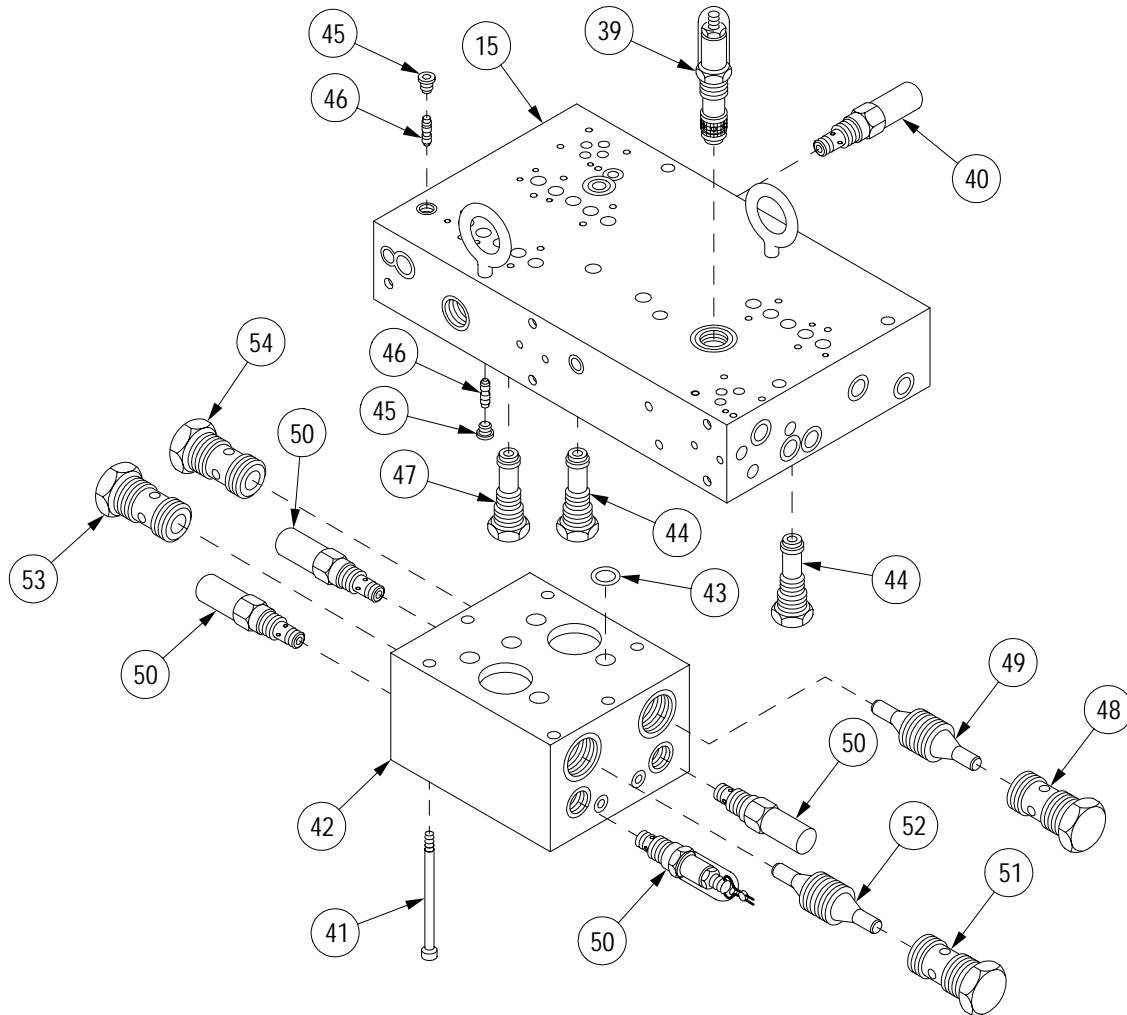
241068mb

**HYDRAULIC CONTROL VALVE MANIFOLD ASSEMBLY REPAIR -
CONTINUED**

0074 00

Disassembly - Continued

9. Remove pressure reducer (39) from manifold (15).
10. Remove relief cartridge (40) from manifold (15).
11. Remove six screws (41), auxiliary manifold (42) and four preformed packings (43) from manifold (15). Discard preformed packings.
12. Remove two fatigue proof spools (44), two plugs (45), two check valves (46) and fatigue proof spool (47) from manifold (15).
13. Remove check valve (48) and pilot shuttle (49) from auxiliary manifold (42).
14. Remove four relief cartridges (50) from auxiliary manifold (42).
15. Remove check valve (51) and pilot shuttle (52) from auxiliary manifold (42).
16. Remove check valve (53) from auxiliary manifold (42).
17. Remove check valve (54) from auxiliary manifold (42).
18. Inspect parts for damage and replace as required.



24i068mc

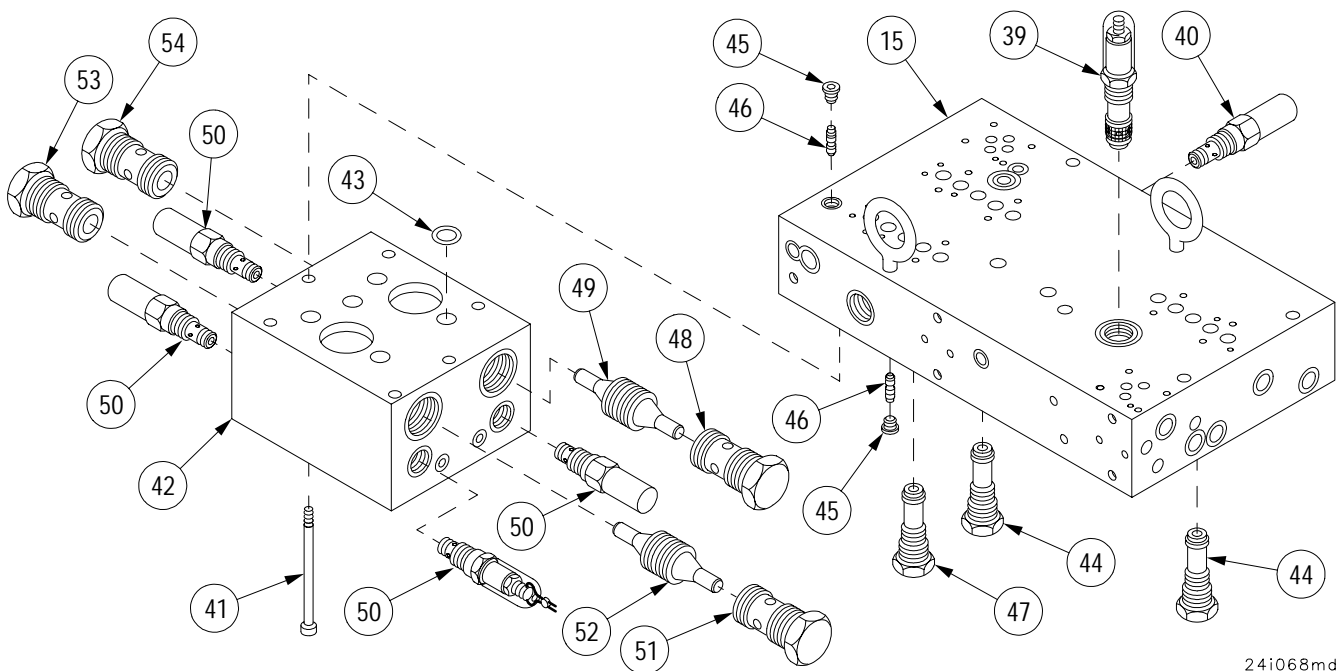
HYDRAULIC CONTROL VALVE MANIFOLD ASSEMBLY REPAIR - CONTINUED

0074 00

Assembly



1. Clean all metal surfaces with cleaning cloth and dry-cleaning solvent.
2. Install check valve (54) on auxiliary manifold (42).
3. Install check valve (53) on auxiliary manifold (42).
4. Install pilot shuttle (52) on auxiliary manifold (42).
5. Install check valve (51) on auxiliary manifold (42).
6. Install check valve (50) on auxiliary manifold (42).
7. Install four relief cartridges (50) on auxiliary manifold (42).
8. Install pilot shuttle (49) and check valve (48) on auxiliary manifold (42).
9. Install fatigue proof spool (47), two check valves (46), two plugs (45), and two fatigue proof spools (44) on manifold (15).
10. Apply a thin coating of lubricant to all new preformed packings.
11. Install four new preformed packings (43) on auxiliary manifold (42).
12. Install auxiliary manifold (42) and six screws (41) on manifold (15).
13. Install relief cartridge (40) on manifold (15).
14. Install pressure reducer (39) on manifold (15).



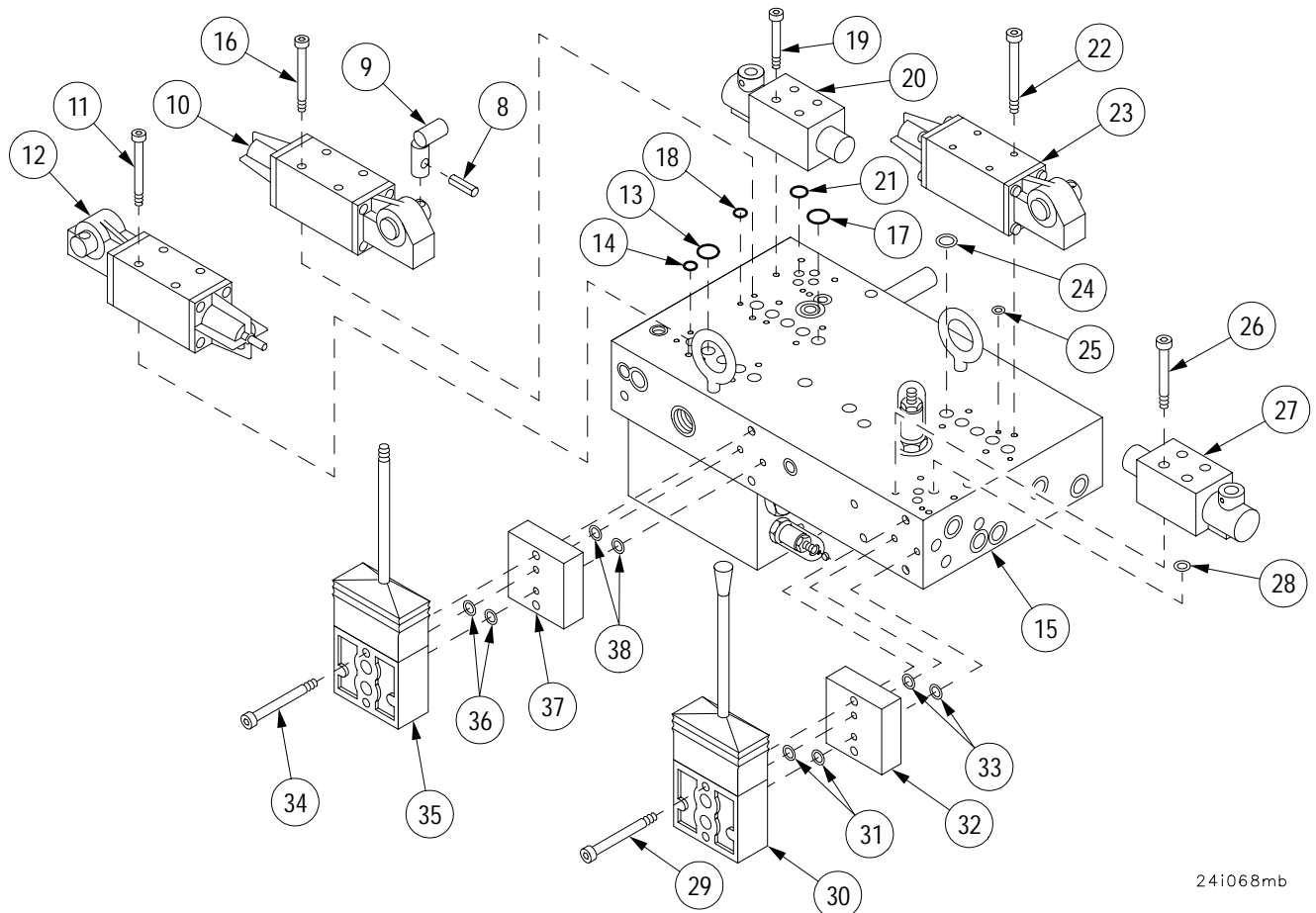
24i068md

**HYDRAULIC CONTROL VALVE MANIFOLD ASSEMBLY REPAIR -
CONTINUED**

0074 00

Assembly - Continued

15. Install pilot control valve (35), two new preformed packings (36), adapter (37) and two new preformed packings (38) on manifold (15) with two screws (34).
16. Install pilot control valve (30), two new preformed packings (31), adapter (32) and two new preformed packings (33) on manifold (15) with two screws (29).
17. Install boom DCV safety valve (27) and four new preformed packings (28) on manifold (15) with four screws (26).
18. Install lead winch DCV valve (23), four new preformed packings (25) and five new preformed packings (24) on manifold (15) with four screws (22).
19. Install DCV selector valve (20) and four new preformed packings (21) on manifold (15) with four screws (19).
20. Install spade DCV valve (10), four new preformed packings (18) and five new preformed packings (17) on manifold (15) with four screws (16).
21. Install boom DCV valve (12), four new preformed packings (14) and five new preformed packings (13) on manifold (15) with four screws (11).
22. Install lever (9) with new spring pin (8) on spade DCV valve (10).



241068mb

**HYDRAULIC CONTROL VALVE MANIFOLD ASSEMBLY REPAIR -
CONTINUED**

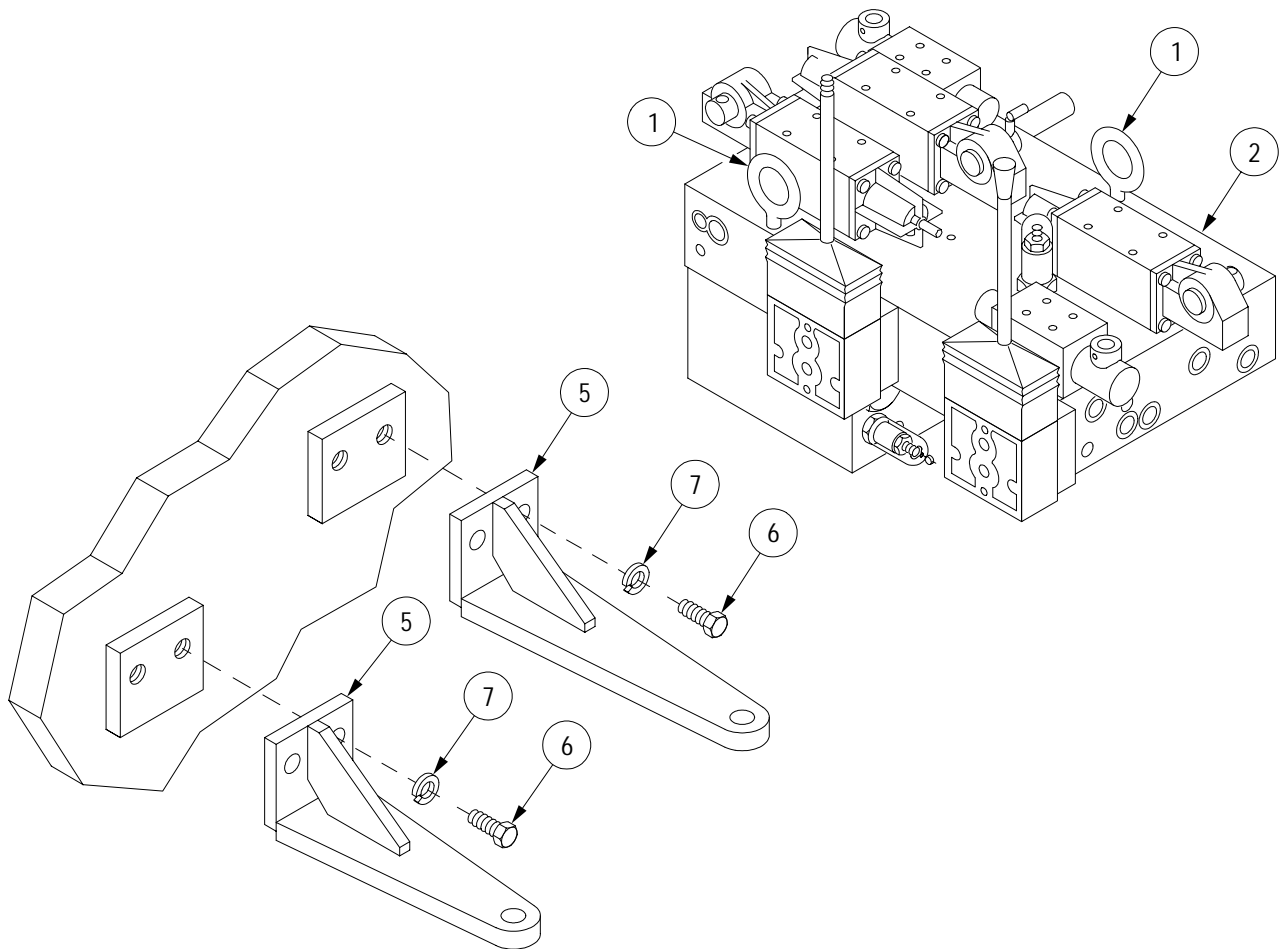
0074 00

Installation

1. Install two brackets (5) on hull with four screws (6) and four new lockwashers (7).
2. Install two eye bolts (1) on manifold assembly (2).



3. Attach lifting sling and suitable lifting device to two eye bolts (1) on manifold assembly (2), lower manifold assembly (2) through mechanic's hatch.



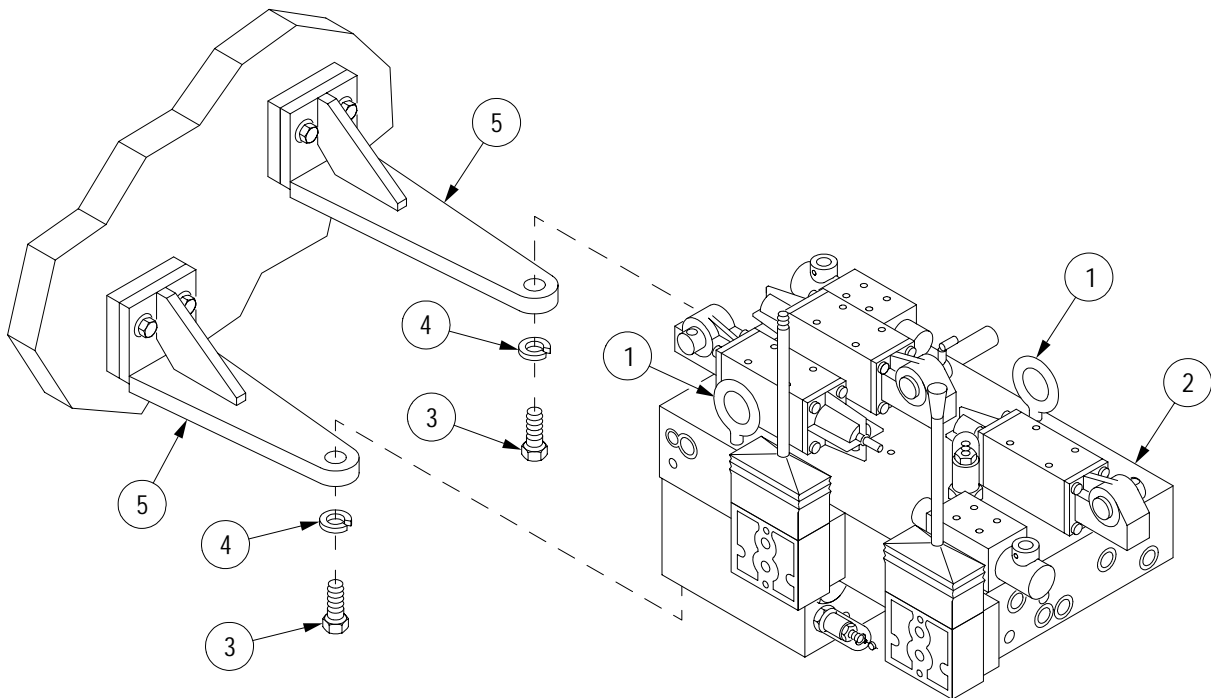
241068me

HYDRAULIC CONTROL VALVE MANIFOLD ASSEMBLY REPAIR - CONTINUED

0074 00

Installation - Continued

4. Install manifold assembly (2) on two brackets (5) with two screws (3) and two new lockwashers (4).
5. Remove two eyebolts (1) from manifold assembly (2). Place eyebolts in vehicle stowage.
6. Install hydraulic hoses and fittings on hydraulic control valve manifold assembly (TM 9-2350-292-20).
7. Install transmission shift control (TM 9-2350-292-20).
8. Install hydraulic control valve handles (TM 9-2350-292-20) and spade control valve rod and handle (TM 9-2350-292-20).
9. Start engine, operate hydraulic controls and check for leaks (TM 9-2350-292-10).
10. Remove hydraulic control valve handles (TM 9-2350-292-20) and spade control valve rod and handle (TM 9-2350-292-20).



24i068mf

NOTE

FOLLOW-ON MAINTENANCE:

- Install auxiliary power unit control box (TM 9-2350-292-20)
- Install mechanic's seat (TM 9-2350-292-20)
- Install hydraulic control valve manifold shields and spade control valve rod and handle (TM 9-2350-292-20)
- Operate hydraulic components to ensure proper operation (TM 9-2350-292-10)
- Perform RV2 relief valve adjustment (WP 0075 00)

END OF TASK

RV2 RELIEF VALVE ADJUSTMENT

0075 00

THIS WORK PACKAGE COVERS:

Adjustment

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- 70,000 lb (31,780 kg) fabricated weight
- 75,000 lb (34,050 kg) fabricated weight

Materials/Parts

- Antipilferage seal with safety wire (item 89, WP 0091 00)

Equipment Conditions

- Mechanic's side hydraulic control valve side shield removed (TM 9-2350-292-20)
- Vehicle on spade (TM 9-2350-292-10)

Personnel Required

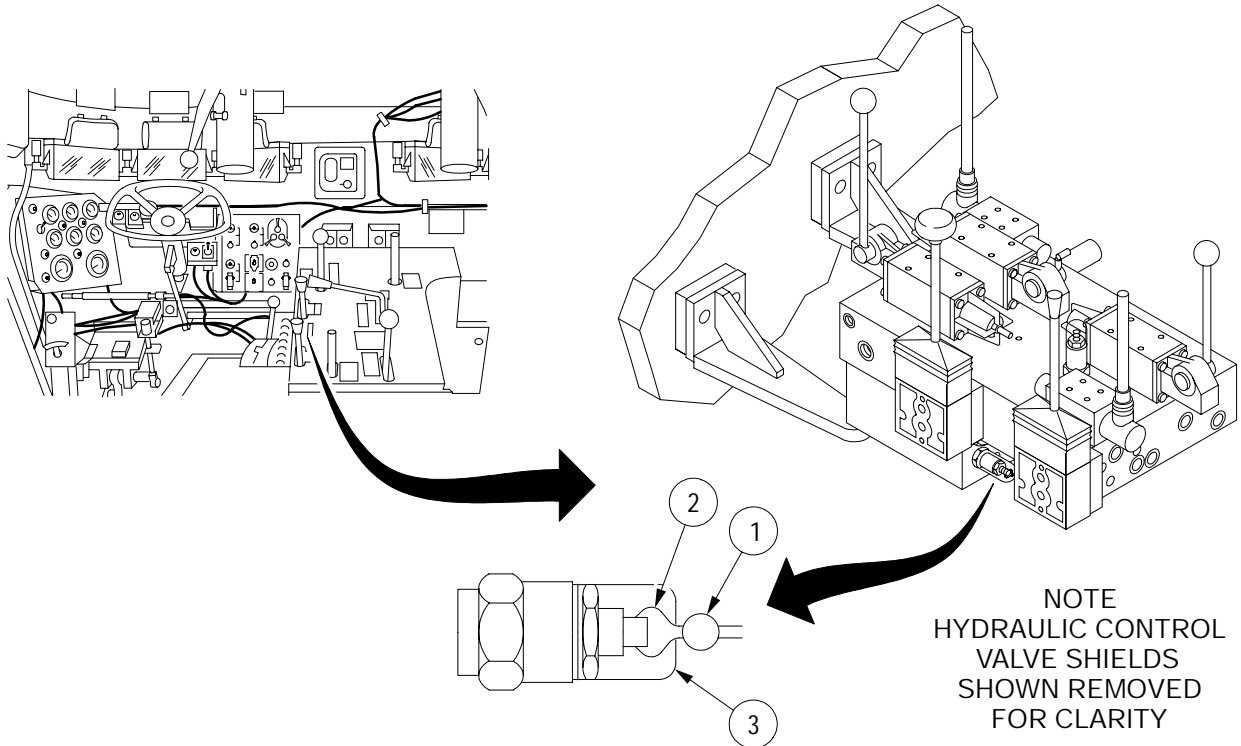
Three

References

- TM 9-2350-292-10
- TM 9-2350-292-20

Adjustment

1. Remove antipilferage seal (1) and safety wire (2). Discard antipilferage seal (1) and safety wire (2).
2. Remove tamper resistant cover (3).
3. Raise boom (TM 9-2350-292-10) to full-forward position and attach hoist winch cable to 70,000 lb (31,780 kg) fabricated weight. Lift fabricated weight approximately 2 to 4 feet (0.61 - 1.22m) using hoist winch.



24i087m

RV2 RELIEF VALVE ADJUSTMENT - CONTINUED**0075 00****Adjustment - Continued****NOTE**

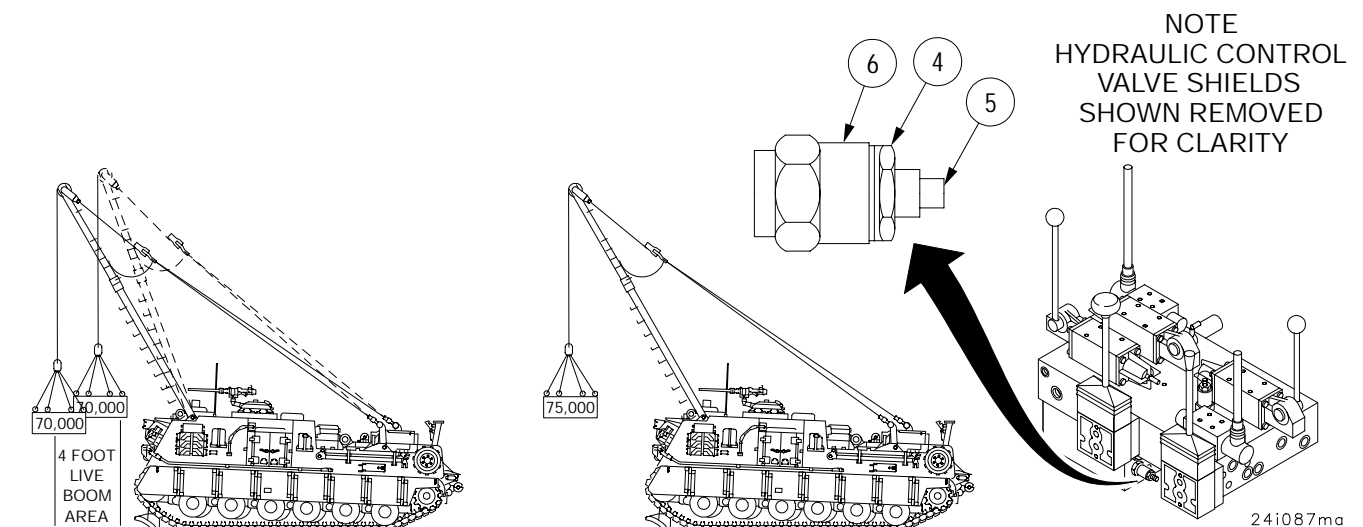
Turning RV2 adjusting stem in (clockwise) will increase hydraulic relief pressure. Turning RV2 adjusting stem out (counter-clockwise) will decrease hydraulic relief pressure.

- Attempt to move hanging 70,000 lb (31,780 kg) fabricated weight using live boom. If boom will not move 70,000 lb (31,780 kg) fabricated weight, loosen locknut (4) and adjust RV2 relief valve stem (5) clockwise or counter-clockwise until a hanging load of 70,000 lbs (31,780 kg) can be moved with live boom and hook through a fore and aft distance of 4 feet (1.2 m) (live boom area of operation). Tighten locknut (4).

NOTE

The purpose of this adjustment is to reduce the chance of inadvertent overload of the boom. For this adjustment, a load of 75,000 lbs (34,050 kg) may be lifted. The normal lifting limit for the boom/hoist system is 70,000 lbs (31,780 kg).

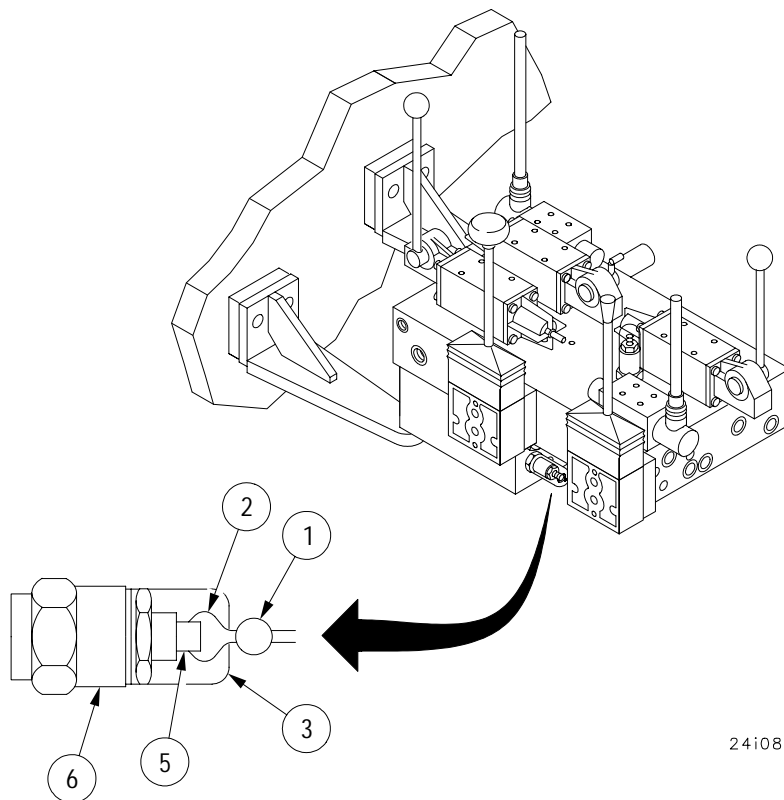
- Disconnect 70,000 lb (31,780 kg) fabricated weight from hoist winch cable and attach hoist winch cable to 75,000 lb (34,050 kg) fabricated weight (Boom in full-forward position). Lift fabricated weight approximately 2 to 4 feet (0.61 - 1.22 m) using hoist winch.
- Attempt to move hanging load of 75,000 lb (34,050 kg) fabricated weight using live boom. If boom will not move 75,000 lb (34,050 kg) fabricated weight, RV2 relief valve (6) is adjusted properly. If boom does move 75,000 lb (34,050 kg) fabricated weight, loosen locknut (4) and adjust RV2 relief valve stem (5) clockwise or counter-clockwise until movement of hanging load of 75,000 lbs (34,050 kg) cannot be achieved. Tighten locknut (4).
- Repeat step 4 to verify that the 70,000 lb (31,780 kg) RV2 relief valve (6) adjustment was not affected by the 75,000 lb (34,050 kg) adjustment in step 6. Steps 4 and 6 may need to be repeated several times until RV2 relief valve (6) is adjusted properly.



RV2 RELIEF VALVE ADJUSTMENT - CONTINUED**Adjustment - Continued**

8. Install safety wire (2) through RV2 relief valve stem (5), install safety wire (2) through tamper resistant cover (3) and secure tamper resistant cover (3) to RV2 relief valve (6). Install and secure lead antipilferage seal (1) on safety wire (2). Antipilferage seal (1) should be secured to prevent the removal of the tamper resistant cover (3).
9. Lower boom (TM 9-2350-292-10).

NOTE
HYDRAULIC CONTROL
VALVE SHIELDS
SHOWN REMOVED
FOR CLARITY



24i087mb

NOTE**FOLLOW-ON MAINTENANCE:**

Install mechanic's side hydraulic control valve side shield
(TM 9-2350-292-20)
Raise spade (TM 9-2350-292-10)

END OF TASK

LOAD TEST**0076 00****THIS WORK PACKAGE COVERS:**

Load Testing

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
 70,000 lb (31,780 kg) fabricated weight
 75,000 lb (34,050 kg) fabricated weight

Equipment Conditions

Vehicle on spade (TM 9-2350-292-10)

Personnel Required

Three

References

TM 9-2350-292-10
 TM 9-2350-292-20

Load Test**WARNING**

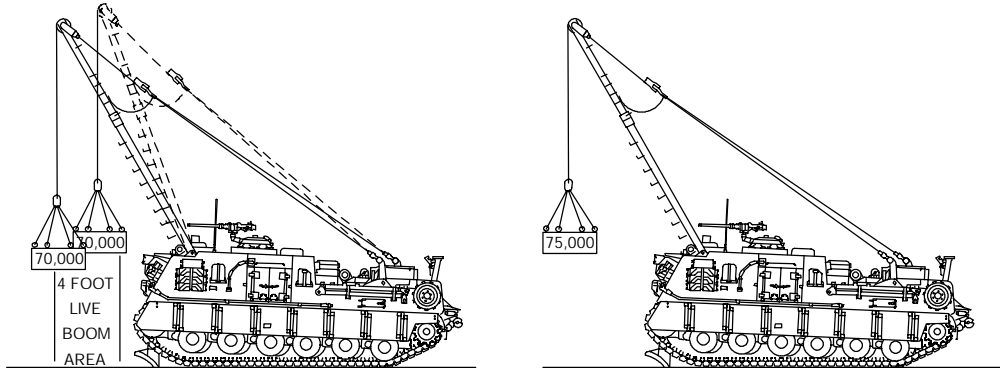
Use TB 43-0142 to determine the requirement to load test the M88A2 and all lifting devices. Do not use the lifting parameters in the TB to load test the M88A2. Use only the weights requirements in this work package and WP 0075 00. Failure to comply could result in serious injury or even death to personnel and severe damage to the equipment.

**WARNING****NOTE**

To reduce the chance of boom overload, the M88A2 boom/hoist system should be able to live boom 70,000 lbs (31,000 kg), but should not live boom 75,000 lb (34,000 kg).

LOAD TEST - CONTINUED**Load Test - Continued**

1. Raise boom (TM 9-2350-292-10) to full-forward position and attach hoist winch cable to 70,000 lb (31,780 kg) fabricated weight. Lift fabricated weight approximately 2 to 4 feet (0.61 - 1.22m) using hoist winch.
2. Attempt to move hanging 70,000 lb (31,780 kg) fabricated weight using live boom. If boom will not move 70,000 lb (31,780 kg) fabricated weight through a fore and aft distance of 4 feet (1.2 m) (live boom area of operation), adjust RV2 relief valve (WP 0075 00).
3. Disconnect 70,000 lb (31,780 kg) fabricated weight from hoist winch cable and attach hoist winch cable to 75,000 lb (34,050 kg) fabricated weight (Boom in full-forward position). Lift fabricated weight approximately 2 to 4 feet (0.61 - 1.22 m) using hoist winch.
4. Attempt to move hanging load of 75,000 lb (34,050 kg) fabricated weight using live boom. Boom should not move 75,000 lb (34,050 kg) fabricated weight. If boom does move 75,000 lb (34,050 kg) fabricated weight, adjust RV2 relief valve (WP 0075 00).
5. Lower boom (TM 9-2350-292-10).



24i087md

NOTE

FOLLOW-ON MAINTENANCE:
Raise spade (TM 9-2350-292-10)

END OF TASK

BOOM LIMIT VALVE REPAIR**0077 00****THIS WORK PACKAGE COVERS:**

Removal, Disassembly, Assembly, Installation, Adjustment

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)

Materials/Parts

Lockwashers (5) (item 1, WP 0087 00)
 Preformed packings (3) (item 60, WP 0091 00)
 Spring pin (item 61, WP 0091 00)
 Sealing compound (item 20, WP 0087 00)
 Marker tags (item 26, WP 0087 00)
 Safety goggles (item 48, WP 0087 00)

Equipment Conditions

Boom in stowed position
 For adjustment of boom limit valve
 Boom in stowed position
 For repair of boom limit valve
 (TM 9-2350-292-10)
 Engine deck grilles removed
 (TM 9-2350-292-20)

Personnel Required

Two

References

TM 9-2350-292-10
 TM 9-2350-292-20



Hydraulic system may be under pressure. Activate hydraulic controls several times, with engine and auxiliary power unit OFF, to relieve residual pressure from hydraulic system. Failure to follow warning procedures may result in severe injury.

NOTE

Perform only those steps necessary to replace the defective parts.

The procedure applies to both left and right boom limit valves. The left side boom limit valve has three hydraulic lines attached, the right side has four hydraulic lines attached.

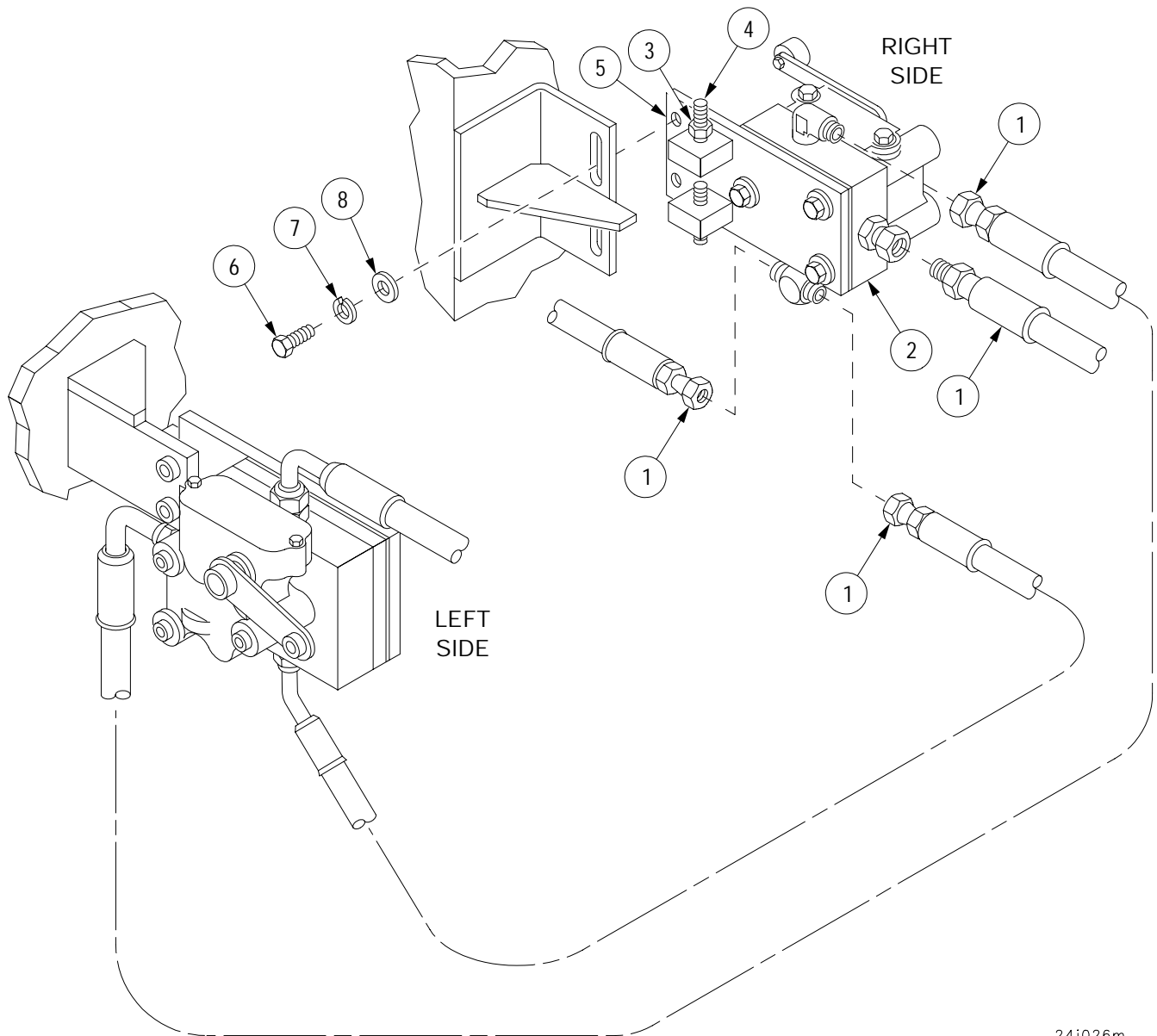
Cap all hydraulic lines and plug all hydraulic ports to prevent contamination. Place suitable container under connections to catch spillage.

BOOM LIMIT VALVE REPAIR - CONTINUED

0077 00

Removal

1. Disconnect hydraulic hoses (1) from boom limit valve assembly (2).
2. Loosen two jam nuts (3) and two set screws (4) on mounting bracket (5).
3. Remove two screws (6), two lockwashers (7), two flat washers (8) and boom limit valve assembly (2). Discard lockwashers.



24i026m

BOOM LIMIT VALVE REPAIR - CONTINUED**0077 00****Disassembly****NOTE**

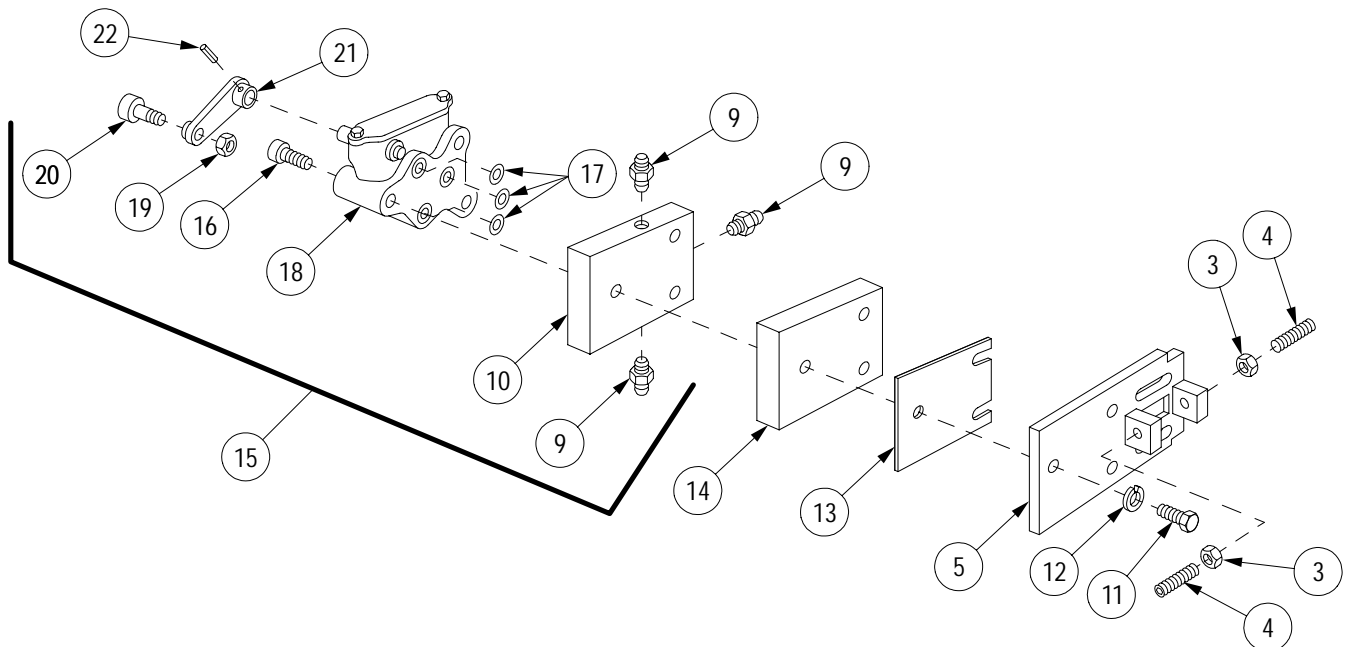
Right side valve has elbow, union, tee fittings and no spacer plate.

1. Remove two jam nuts (3) and two set screws (4) from mounting bracket (5).
2. Remove three adapters (9) from valve subplate (10).

NOTE

Note length of screws and quantity of shims during disassembly to ensure proper placement during assembly.

3. Remove three screws (11), three lockwashers (12), mounting bracket (5), shim(s) (13), spacer plate (14) and valve subplate assembly (15). Discard lockwashers.
4. Remove three socket head screws (16), valve subplate (10), three preformed packings (17) and pilot valve (18). Discard preformed packings.
5. Remove nut (19) and cam follower (20) from valve actuating arm (21).
6. Remove spring pin (22) and valve actuating arm (21) from pilot valve (18). Discard spring pin.
7. Inspect parts for damage and replace as required.



24i026ma

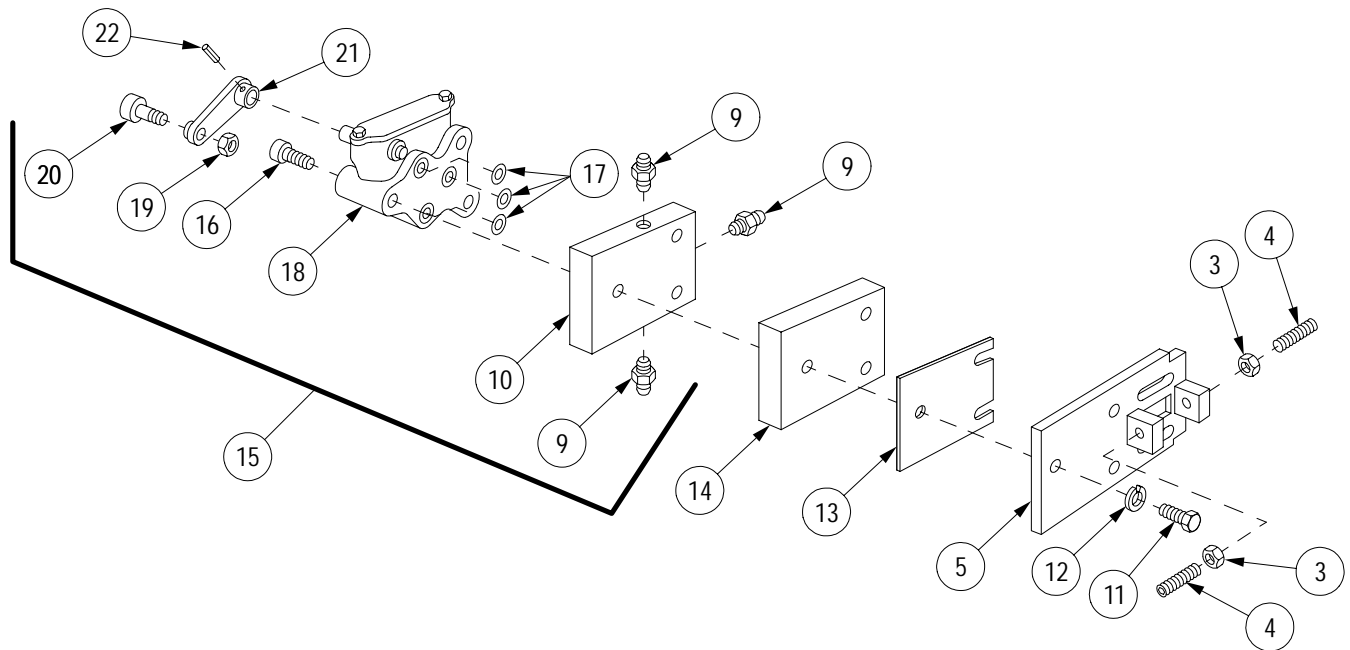
BOOM LIMIT VALVE REPAIR - CONTINUED**0077 00****Assembly**

1. Install valve actuating arm (21) on pilot valve (18) with new spring pin (22).
2. Install cam follower (20) on valve actuating arm (21) with nut (19).
3. Install pilot valve (18), three new preformed packings (17) and valve subplate (10) with three socket head screws (16).
4. Install shim(s) (13), spacer plate (14) and mounting bracket (5) on valve subplate assembly (15) with three screws (11) and three new lockwashers (12).

NOTE

Apply sealing compound to all pipe threads prior to installation.

5. Install three adapters (9) in valve subplate (10).
6. Install two set screws (4) and two jam nuts (3) on mounting bracket (5) loosely for adjustment.

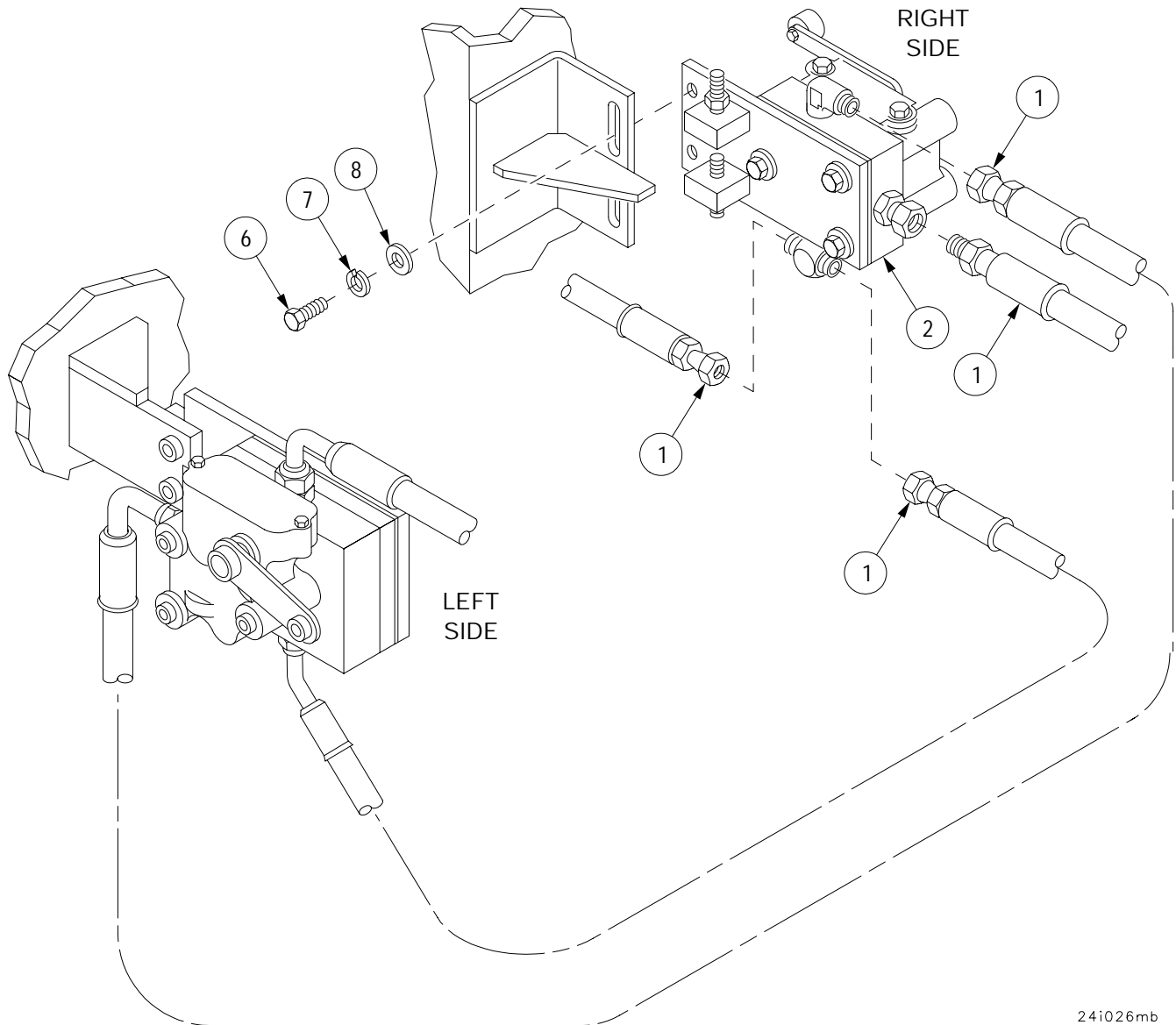


24i026ma

BOOM LIMIT VALVE REPAIR - CONTINUED**Installation****NOTE**

Do not tighten boom limit valve mounting screws until adjustment is made to valve lever roller.

1. Install boom limit valve assembly (2) with two screws (6), two new lockwashers (7) and two flat washers (8).
2. Connect hydraulic hoses (1) to boom limit valve assembly (2).



24i026mb

BOOM LIMIT VALVE REPAIR - CONTINUED

0077 00

Adjustment

NOTE

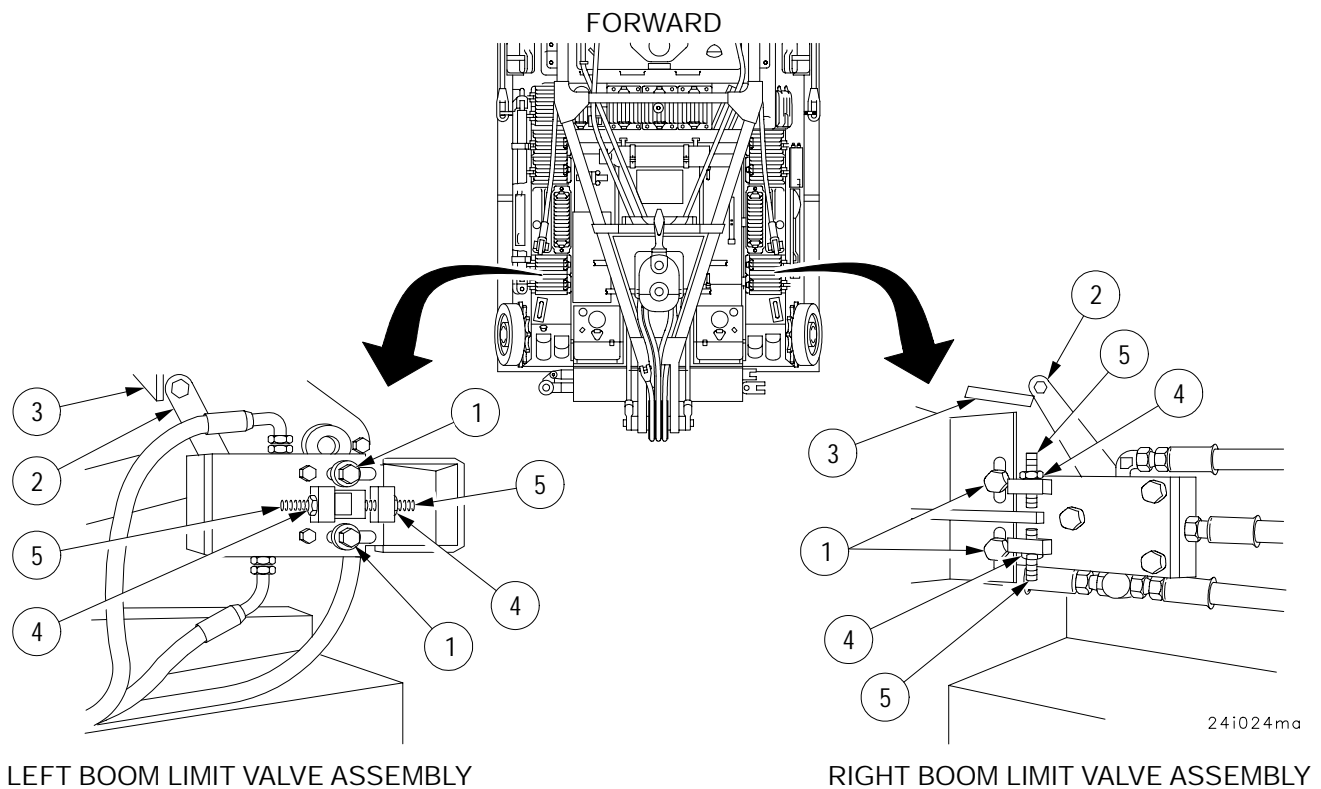
Left and right boom limit valves are adjusted in the same manner.

1. Loosen two screws (1) to adjust valve lever roller (2) on cam follower bracket (3).

NOTE

During adjustment, valve lever roller must ride squarely and freely on upper side of cam follower bracket.

2. If necessary, loosen jamnuts (4) and adjust screws (5) to position lever roller (2).



NOTE

FOLLOW-ON MAINTENANCE:
 Install engine deck grilles
 (TM 9-2350-292-20)

END OF TASK

HYDRAULIC RESERVOIR ASSEMBLY REPAIR**0078 00****THIS WORK PACKAGE COVERS:**

Removal, Disassembly, Assembly, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
 Endless sling (item 30, WP 0090 00)
 Suitable lifting device (600 lbs (272.4 kg) min cap)
 Torque wrench (item 73, WP 0090 00)
 Torque wrench (item 25, WP 0090 00)

Materials/Parts

Lockwashers (5) (item 41, WP 0091 00)
 Lockwashers (23) (item 1, WP 0091 00)
 Gasket (item 25, WP 0091 00)
 Preformed packing (item 42, WP 0091 00)
 Lockwashers (14) (item 20, WP 0091 00)
 Gasket (item 43, WP 0091 00)
 Gasket (item 44, WP 0091 00)
 Gasket (item 45, WP 0091 00)
 Gasket (item 46, WP 0091 00)
 Sealing compound (item 17, WP 0087 00)

Equipment Conditions

Wiring harness 2W601 wires 10, 354, 664, 663 and 663A removed from oil level sensor, oil temperature sending unit and high oil temperature switch (TM 9-2350-292-20)
 Hydraulic reservoir lines and fittings removed (TM 9-2350-292-20)
 Personnel heater removed (TM 9-2350-292-20)
 Personnel heater fuel pump removed (TM 9-2350-292-20)
 Personnel heater fuel supply line adapter removed from bulkhead (TM 9-2350-292-20)
 Fire extinguisher tubes disconnected from bulkhead (TM 9-2350-292-20)
 Main hydraulic pumps and PTO clutch assembly removed (TM 9-2350-292-20)

Personnel Required

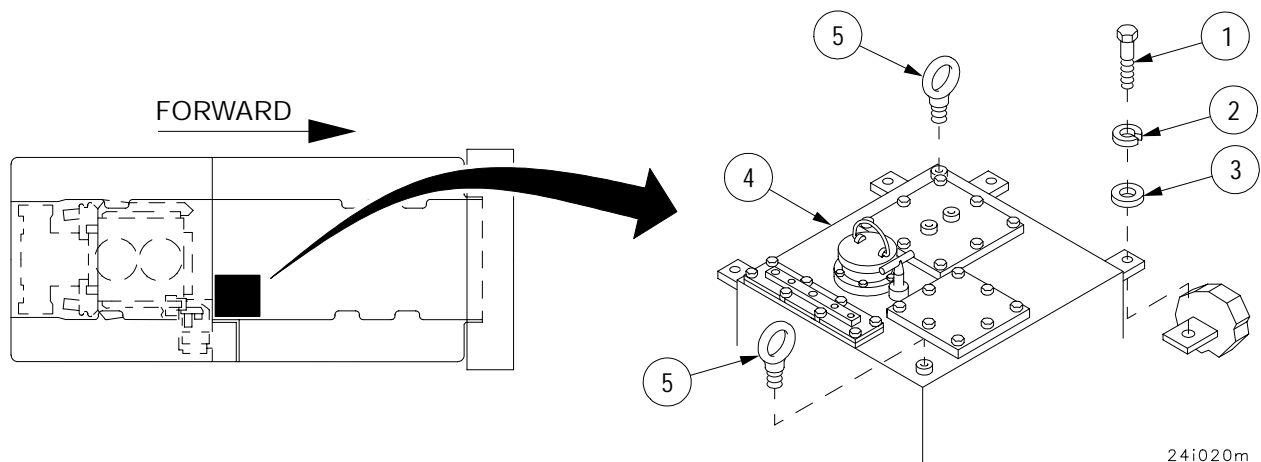
Three

References

TM 9-2350-292-20

Removal

1. Remove five screws (1), five lockwashers (2), and five flat washers (3) securing hydraulic reservoir (4) to hull. Discard lockwashers.
2. Install two eyebolts (5) (from storage box) on hydraulic reservoir (4).



HYDRAULIC RESERVOIR ASSEMBLY REPAIR - CONTINUED

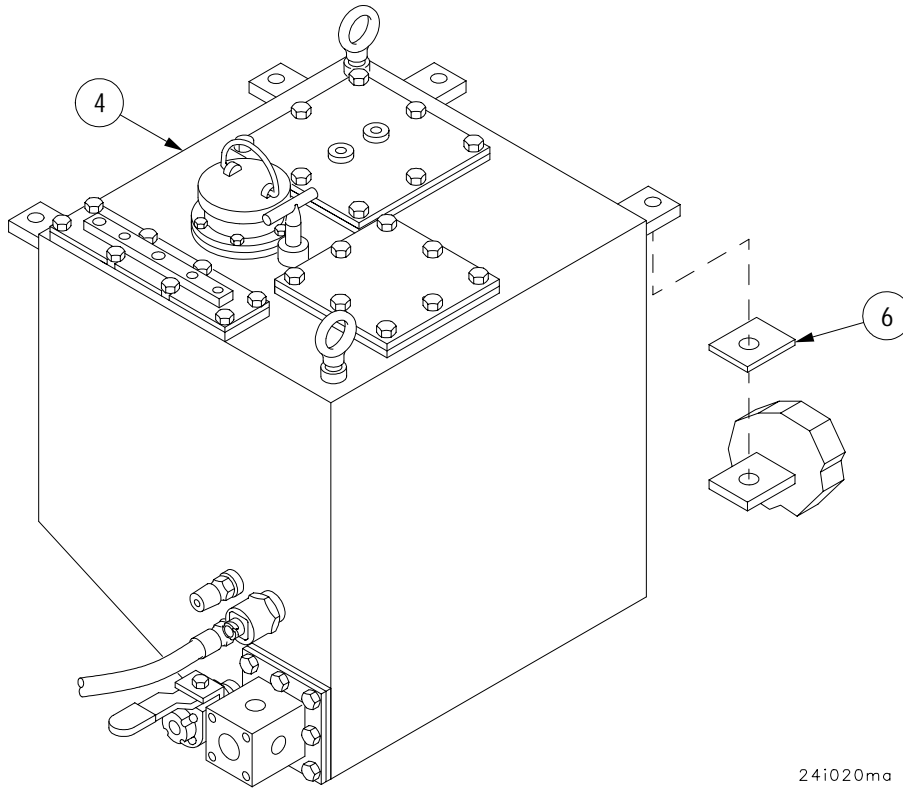
Removal-Continued



NOTE

Note the quantity and position of shim(s) being removed to ensure shim(s) are installed in the same position.

- Using endless sling and suitable lifting device, remove hydraulic reservoir (4) through commander's cupola opening. Remove shim(s) (6).



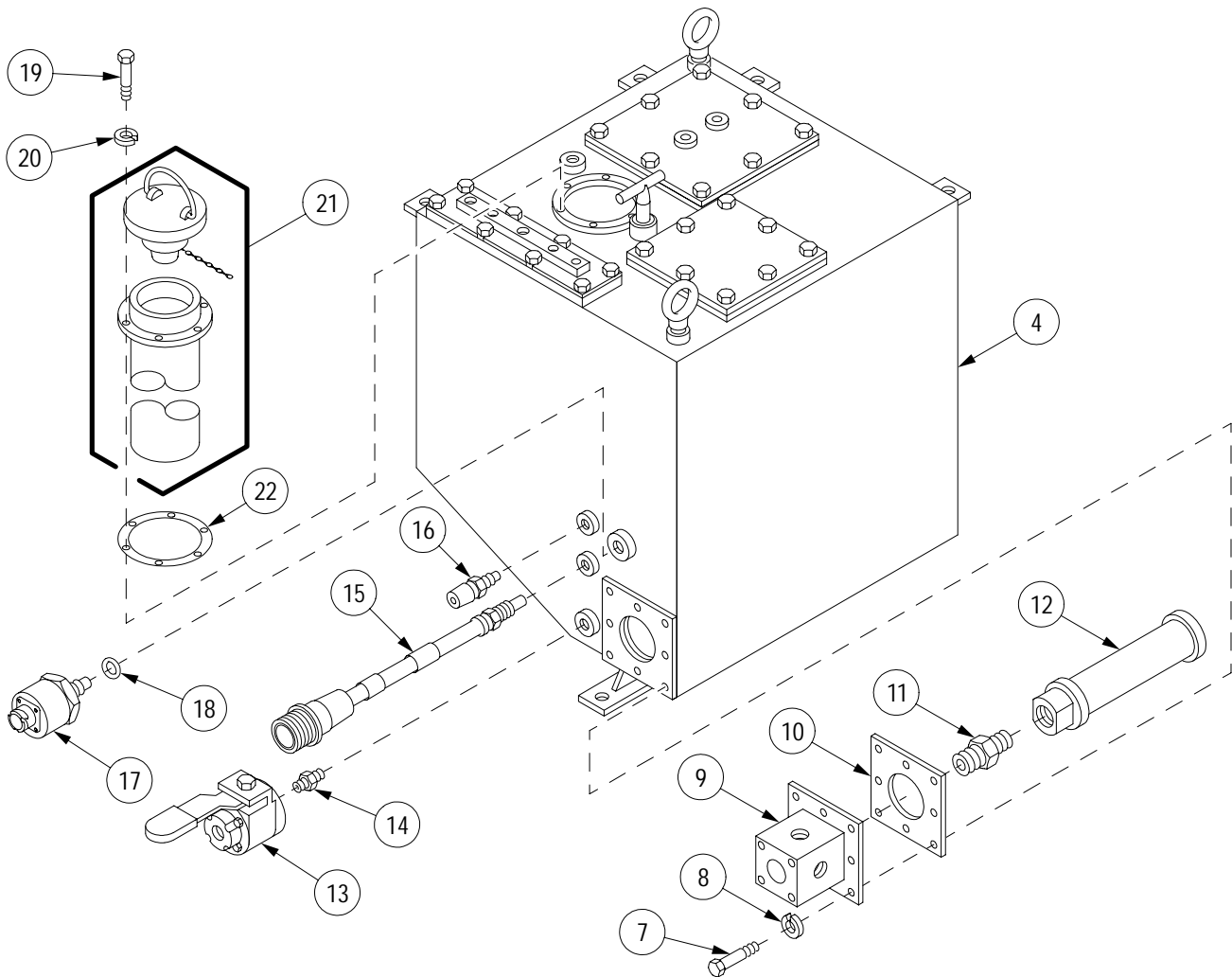
24i020ma

HYDRAULIC RESERVOIR ASSEMBLY REPAIR - CONTINUED

0078 00

Disassembly

1. Remove seven screws (7), seven lockwashers (8), manifold (9), gasket (10), nipple (11) and strainer (12) from hydraulic reservoir (4). Discard lockwashers and gasket.
2. Remove valve (13) and nipple (14) from hydraulic reservoir (4).
3. Remove high temperature switch (15) from hydraulic reservoir (4).
4. Remove temperature sending unit (16) from hydraulic reservoir (4).
5. Remove fluid level sensor (17) and preformed packing (18) from hydraulic reservoir (4). Discard preformed packing.
6. Remove six screws (19), six lockwashers (20), filler neck assembly (21) and gasket (22) from hydraulic reservoir (4). Discard lockwashers and gasket.



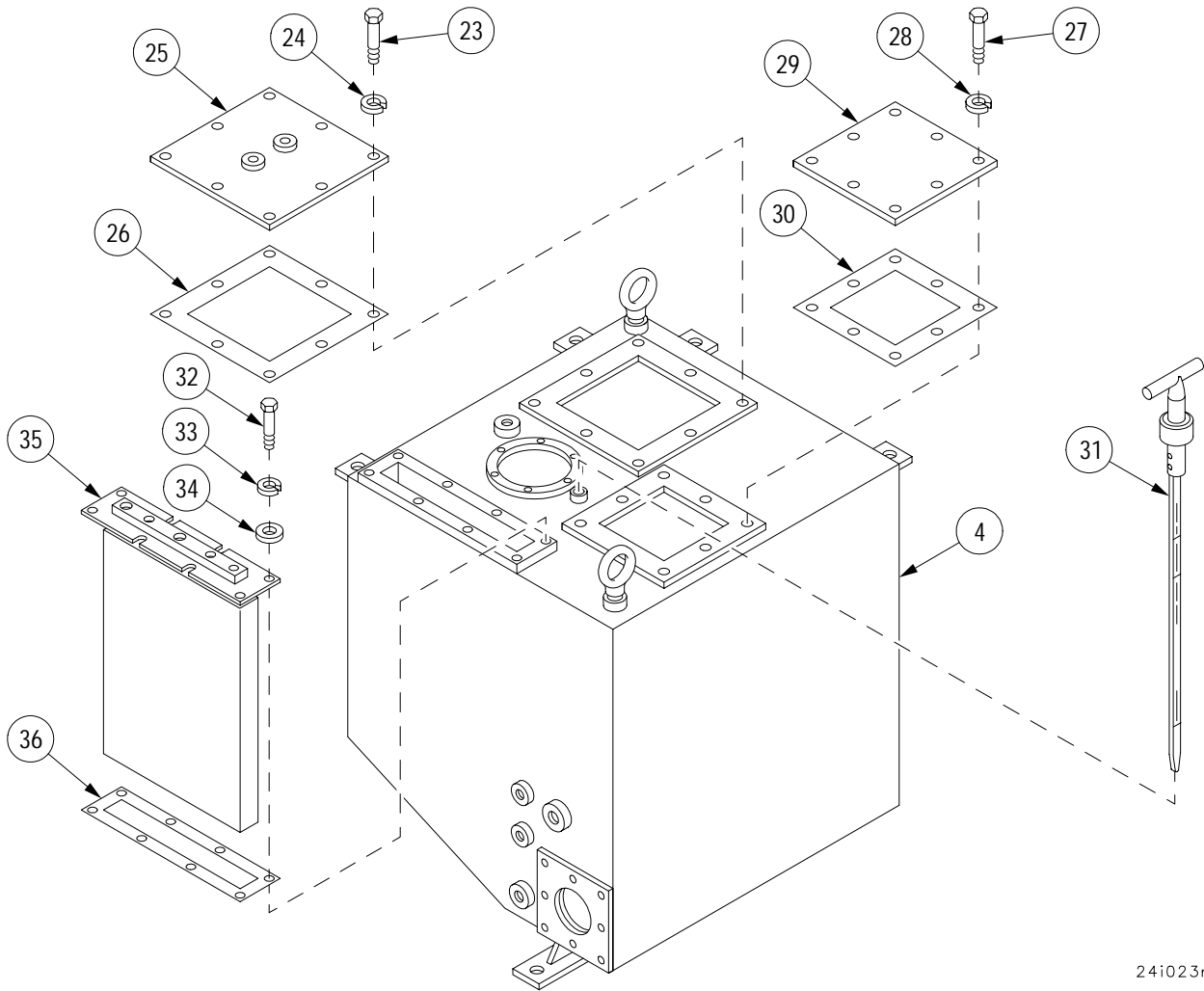
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HYDRAULIC RESERVOIR ASSEMBLY REPAIR - CONTINUED

0078 00

Disassembly-Continued

7. Remove eight screws (23), eight lockwashers (24), access plate (25) and gasket (26) from hydraulic reservoir (4). Discard lockwashers and gasket.
8. Remove eight screws (27), eight lockwashers (28), access plate (29) and gasket (30) from hydraulic reservoir (4). Discard lockwashers and gasket.
9. Remove gauge rod (31) from hydraulic reservoir (4).
10. Remove eight screws (32), eight lockwashers (33), eight flat washers (34), manifold (35) and gasket (36) from hydraulic reservoir (4). Discard lockwashers and gasket.
11. Inspect parts for damage and replace as required.



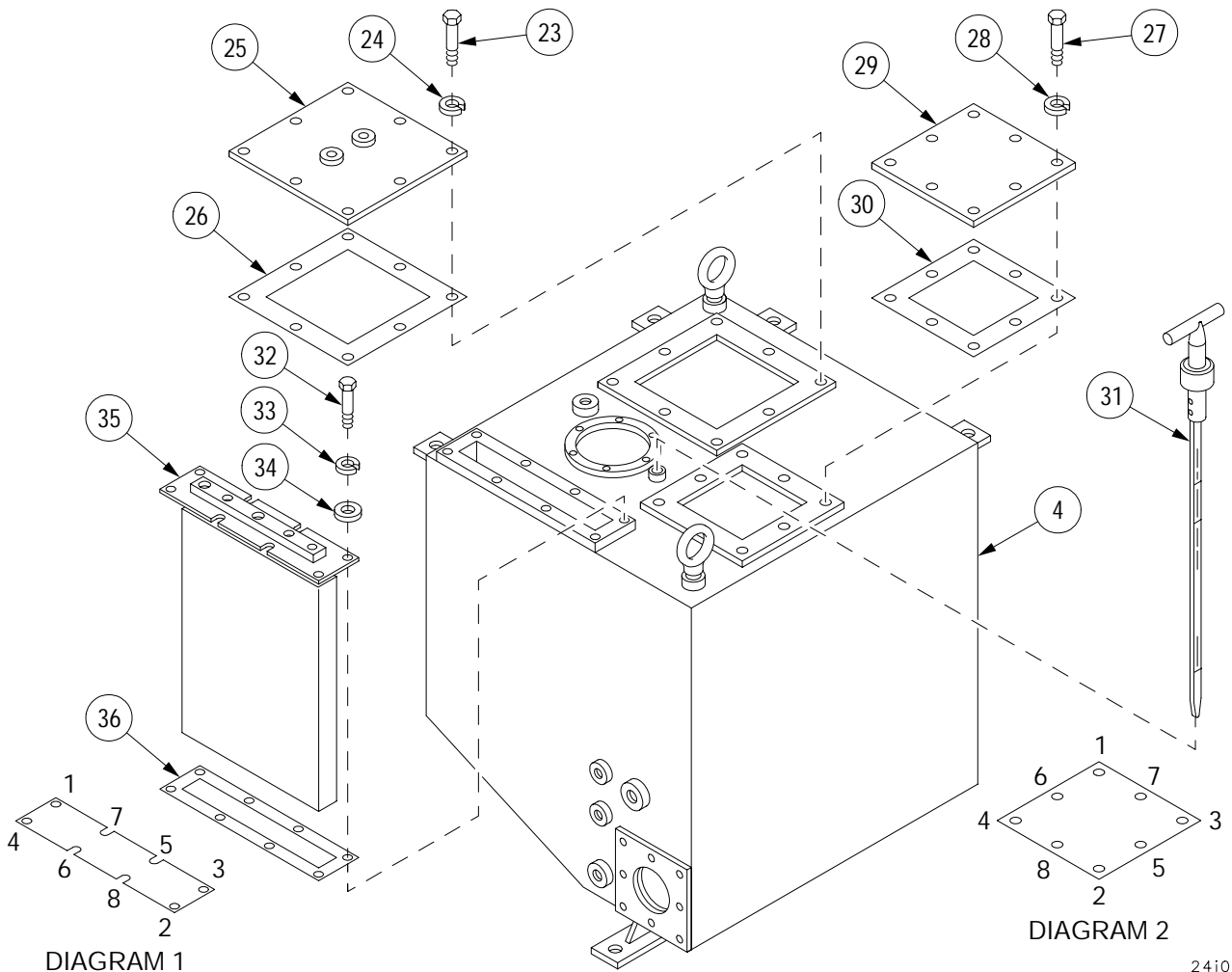
24i023m

HYDRAULIC RESERVOIR ASSEMBLY REPAIR - CONTINUED

0078 00

Assembly

1. Apply sealing compound to all pipe threads at hoses and fittings.
2. Install new gasket (36), manifold (35), eight flat washers (34), eight new lockwashers (33) and eight screws (32) on hydraulic reservoir (4). Torque screws to 120 lb-in (13.56 NSm) using torque wrench (item 73, WP 0090 00) in accordance with torque sequence diagram 1.
3. Install gauge rod (31) in hydraulic reservoir (4).
4. Install new gasket (30) and access plate (29) with eight new lockwashers (28) and eight screws (27) on hydraulic reservoir (4). Torque screws to 44 lb-ft (59.66 NSm) using torque wrench (item 25, WP 0090 00) in accordance with torque sequence diagram 2.
5. Install new gasket (26) and access plate (25) with eight new lockwashers (24) and eight screws (23) on hydraulic reservoir (4). Torque screws to 44 lb-ft (59.66 NSm) using torque wrench (item 25, WP 0090 00) in accordance with torque sequence diagram 2.



24i023ma

HYDRAULIC RESERVOIR ASSEMBLY REPAIR - CONTINUED

0078 00

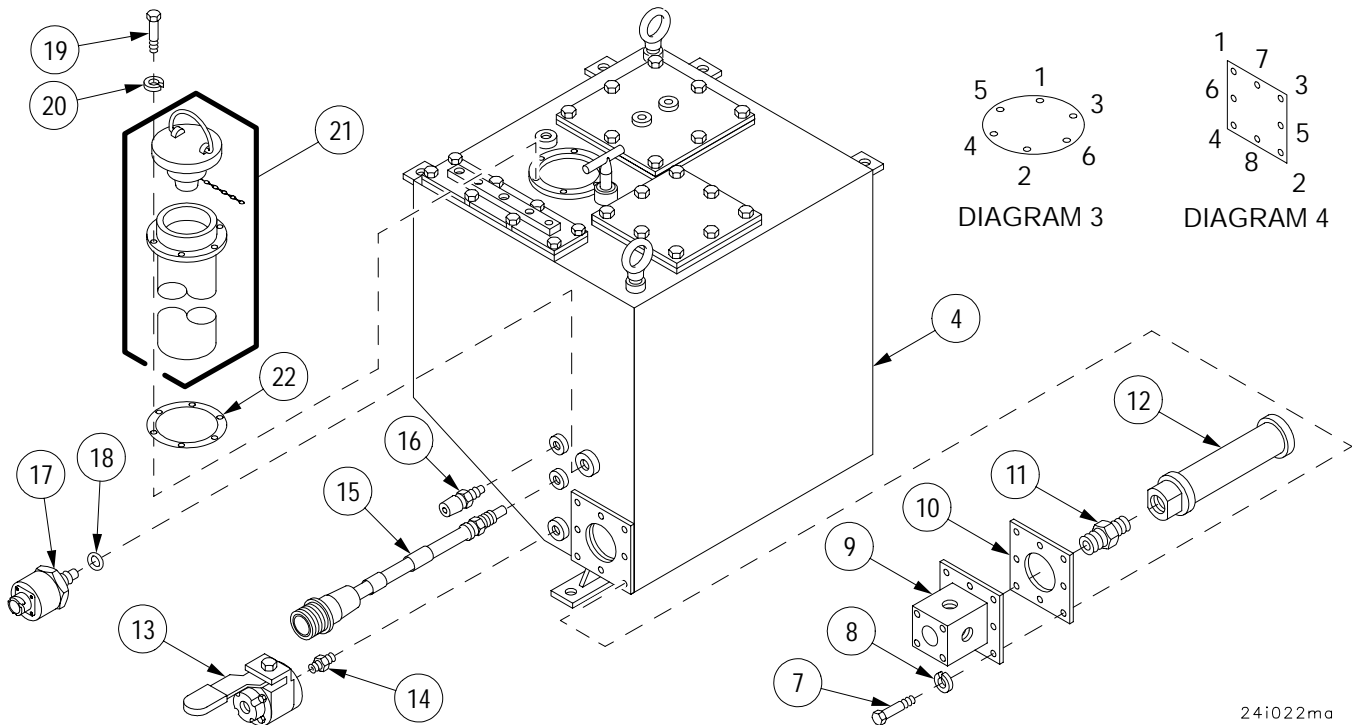
Assembly-Continued

6. Install new gasket (22) and filler neck assembly (21) with six new lockwashers (20) and six screws (19) on hydraulic reservoir (4). Torque screws to 168.0 lb-in (18.98 NSm) using torque wrench (item 73, WP 0090 00) in accordance with torque sequence diagram 3.
7. Install new preformed packing (18) and fluid level sensor (17) in hydraulic reservoir (4).
8. Install temperature sending unit (16) in hydraulic reservoir (4).
9. Install high temperature switch (15) in hydraulic reservoir (4).
10. Install nipple (14) and valve (13) in hydraulic reservoir (4).

CAUTION

Make sure that all eight screws are torqued to 44 lb-ft (59.66 NSm) after installing wiring harness 2W601 lead on manifold. Failure to comply could result in damage to equipment.

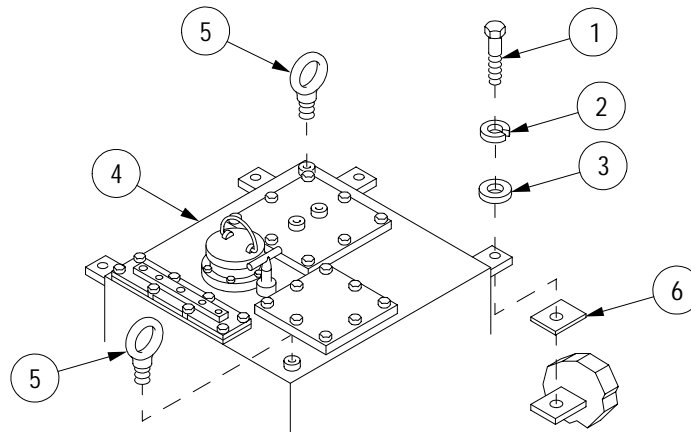
11. Install strainer (12), nipple (11), new gasket (10), manifold (9), seven new lockwashers (8) and seven screws (7) on hydraulic reservoir (4). Torque screws to 44 lb-ft (59.66 NSm) using torque wrench (item 25, WP 0090 00) in accordance with torque sequence diagram 4.



24i022ma

HYDRAULIC RESERVOIR ASSEMBLY REPAIR - CONTINUED**Installation**

1. Using endless sling and suitable lifting device, install hydraulic reservoir (4) and shim(s) (6) through commander's cupola opening and into hydraulic compartment of hull.
2. Secure hydraulic reservoir (4) to hull with five flat washers (3), five new lockwashers (2) and five screws (1).
3. Remove two eyebolts (5) from hydraulic reservoir (4) and store in storage box.



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NOTE**FOLLOW-ON MAINTENANCE:**

Install main hydraulic pumps and PTO clutch assembly (TM 9-2350-292-20)
 Install hydraulic reservoir lines and fittings (TM 9-2350-292-20)
 Install personnel heater fuel supply line adapter into bulkhead (TM 9-2350-292-20)
 Install personnel heater (TM 9-2350-292-20)
 Install personnel heater fuel pump (TM 9-2350-292-20)
 Connect fire extinguisher tubes to bulkhead (TM 9-2350-292-20)
 Install wiring harness 2W601 wires 10, 354, 664, 663 and 663A to oil level sensor, oil temperature sending unit and high oil temperature switch (TM 9-2350-292-20)

END OF TASK

CHAPTER 11

AUXILIARY GENERATOR AND ENGINE AND CONTROLS (APU)

AUXILIARY POWER UNIT ENGINE REPLACEMENT

0079 00**THIS WORK PACKAGE COVERS:**

Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
APU test stand (item 47, WP 0090 00)

Materials/Parts

Lockwasher (item 58, 0091 00)
Sealing compound (item 20, 0087 00)

Equipment Conditions

APU removed from vehicle (TM 9-2350-292-20)

Personnel Required

Two

References

TM 9-2350-292-20
TM 9-2815-221-34&P
TM 9-2920-224-34&P

NOTE

Replacement of APU engine can only be accomplished with APU assembly removed from vehicle and mounted in a suitable holding or lifting device. Most work can be performed with APU assembly mounted on the APU Test Stand. The following steps include procedures or references to separate procedures that remove designated parts of the APU assembly until the remaining configuration is the APU engine.

Removal

1. Remove APU engine duct (TM 9-2350-292-20).
2. Remove LH and RH APU engine shrouds (TM 9-2350-292-20).
3. Remove APU wiring harness cable clamps (TM 9-2350-292-20).
4. Remove APU wiring harness 3W711 (TM 9-2350-292-20).
5. Remove APU wiring harness 3W704 (TM 9-2350-292-20).
6. Remove APU lead assembly 3W705 (TM 9-2350-292-20).
7. Remove APU lead assembly 3W706 (TM 9-2350-292-20).
8. Remove APU lead assemblies 3W728 (TM 9-2350-292-20).
9. Remove APU diode and mounting plate (TM 9-2350-292-20).

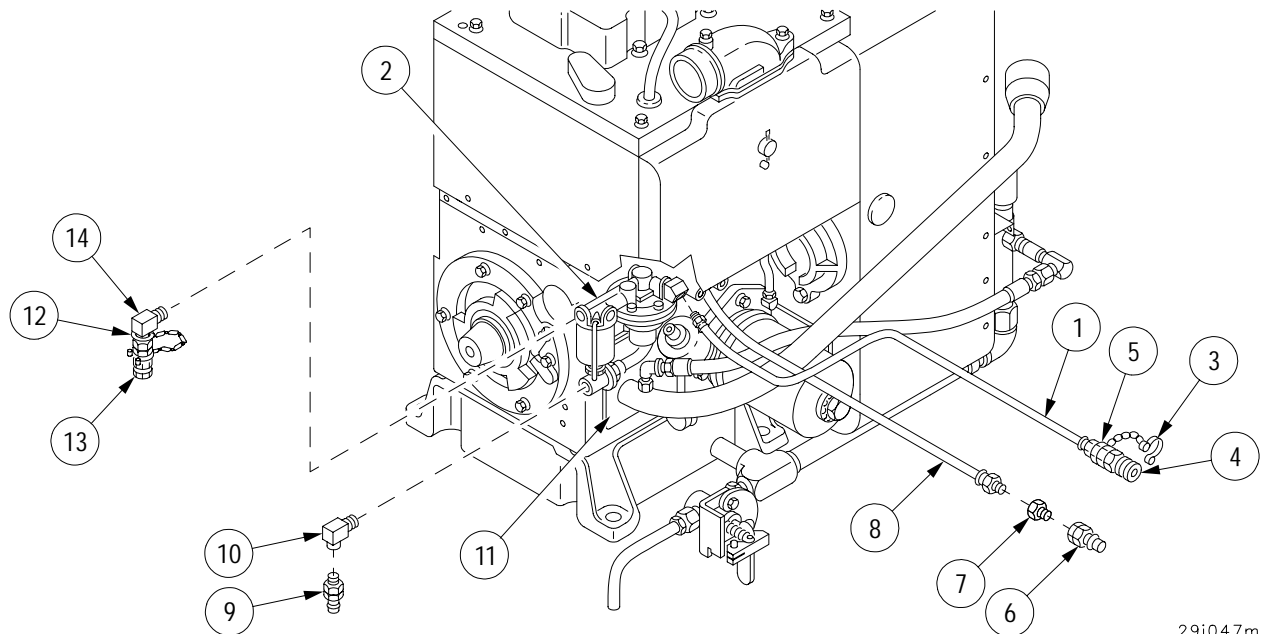
AUXILIARY POWER UNIT ENGINE REPLACEMENT - CONTINUED**0079 00****Removal-Continued**

10. Remove APU relay and mounting bracket (TM 9-2350-292-20).
11. Remove APU hydraulic pump (TM 9-2350-292-20).
12. Remove APU generator (TM 9-2350-292-20). Refer to TM 9-2920-224-34&P for maintenance instructions.
13. Remove APU chain case, chain and sprockets (WP 0081 00).

NOTE

Perform the following procedures to remove fuel lines and fittings from APU engine.

14. Remove hose assembly (1) from fuel transfer pump (2). Do not disconnect connecting ring (3), coupler (4) or pipe bushing (5) from hose assembly (1).
15. Remove coupler (6) and connector (7) from hose (8). Do not disconnect hose (8).
16. Remove coupler (9) from elbow (10).
17. Remove elbow (10) from oil filter tube assembly (11).
18. Remove connecting ring (12), coupler (13) and elbow (14) as an assembly from fuel transfer pump (2).



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AUXILIARY POWER UNIT ENGINE REPLACEMENT - CONTINUED**Removal-Continued****NOTE**

Perform the following procedures to remove crankcase oil drain line tube and oil drain line clamp from APU engine.

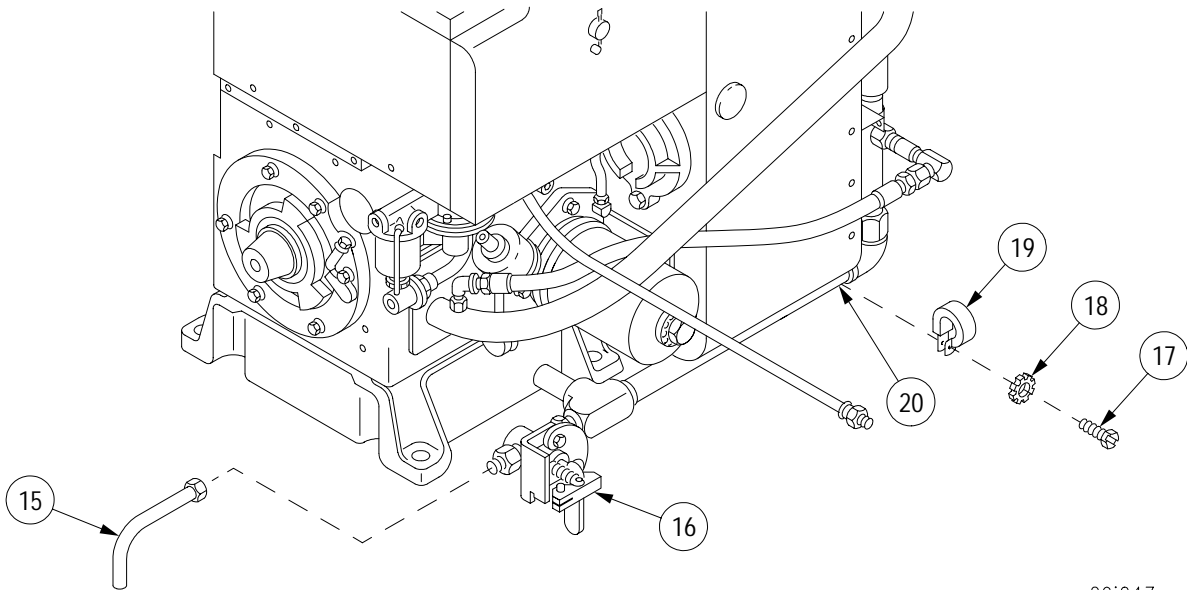
19. Remove tube (15) from drain valve (16).
20. Remove screw (17), lockwasher (18) and clamp (19) at drain pipe nipple (20). Discard lockwasher.
21. Inspect parts for damage and replace as required.

NOTE

The assembly remaining represents the APU engine that is repairable or replaceable at this maintenance level. Refer to TM 9-2815-221-34&P for maintenance instructions.

Installation

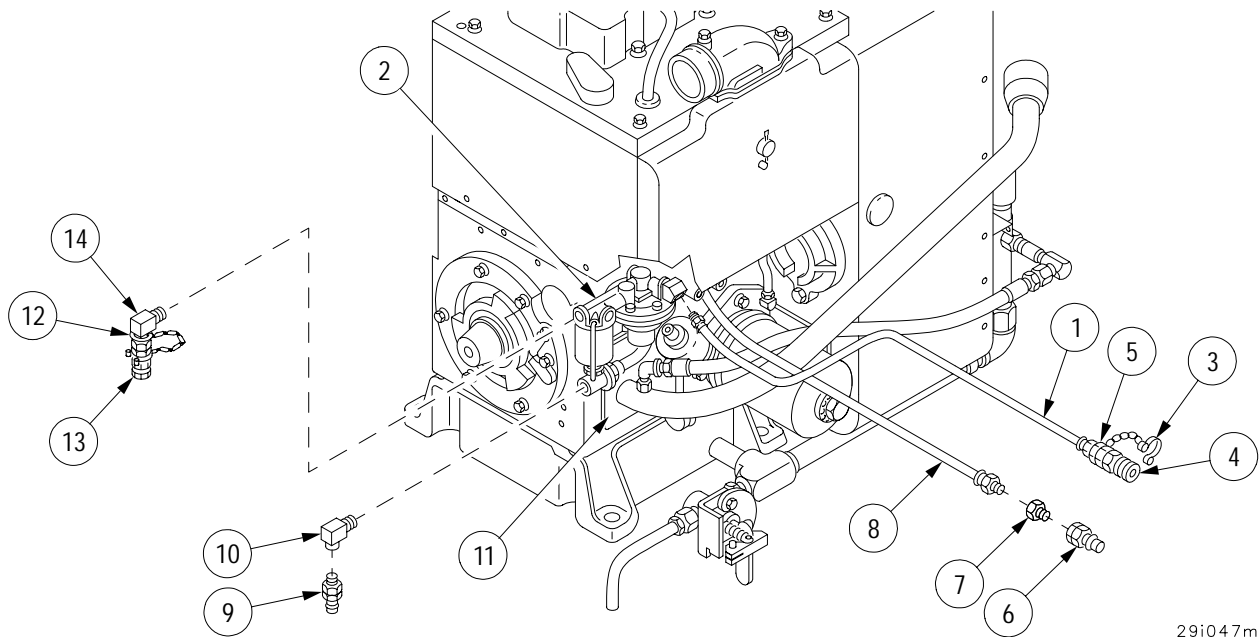
1. Apply sealing compound to all pipe threads prior to installation.
2. Install screw (17), new lockwasher (18) and clamp (19) at drain pipe nipple (20).
3. Install tube (15) on drain valve (16).



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AUXILIARY POWER UNIT ENGINE REPLACEMENT - CONTINUED**0079 00****Installation-Continued**

4. Install elbow (14), coupler (13) and connecting ring (12) as an assembly on fuel transfer pump (2).
5. Install elbow (10) on oil filter tube assembly (11).
6. Install coupler (9) on elbow (10).
7. Install connector (7) on hose (8).
8. Install coupler (6) on connector (7).
9. Install hose assembly (1) with pipe bushing (5), coupler (4) and connecting ring (3) on fuel transfer pump (2).



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AUXILIARY POWER UNIT ENGINE REPLACEMENT - CONTINUED

0079 00**Installation-Continued**

10. Install APU chain case, chain and sprockets (WP 0081 00).
11. Install APU generator (TM 9-2350-292-20).
12. Install APU hydraulic pump (TM 9-2350-292-20).
13. Install APU relay and mounting bracket (TM 9-2350-292-20).
14. Install APU diode and mounting plate (TM 9-2350-292-20).
15. Install APU lead assemblies 3W728 (TM 9-2350-292-20).
16. Install APU lead assembly 3W706 (TM 9-2350-292-20).
17. Install APU lead assembly 3W705 (TM 9-2350-292-20).
18. Install APU wiring harness 3W704 (TM 9-2350-292-20).
19. Install APU wiring harness 3W711 (TM 9-2350-292-20).
20. Install APU wiring harness cable clamps (TM 9-2350-292-20).
21. Install LH and RH APU engine shrouds (TM 9-2350-292-20).
22. Install APU engine duct (TM 9-2350-292-20).

NOTE**FOLLOW-ON MAINTENANCE:**

Install APU in vehicle (TM 9-2350-292-20)

END OF TASK

AUXILIARY POWER UNIT ENGINE REPLACEMENT (HATZ)

0080 00**THIS WORK PACKAGE COVERS:**Removal, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
APU test stand (item 47, WP 0090 00)

Equipment Conditions

APU assembly (HATZ) removed from vehicle
(TM 9-2350-292-20)

Personnel Required

Two

ReferencesTM 9-2350-292-20

NOTE

Replacement of APU engine can only be accomplished with APU assembly removed from vehicle and mounted in a suitable holding or lifting device. Most work can be performed with APU assembly mounted on the APU Test Stand. The following steps include procedures or references to separate procedures that remove designated parts of the APU assembly until the remaining configuration is the APU engine.

Removal

1. Remove APU engine duct (HATZ) (TM 9-2350-292-20).
2. Remove APU wiring harness 3W704 (HATZ) (TM 9-2350-292-20).
3. Remove APU lead assembly 3W706 (HATZ) (TM 9-2350-292-20).
4. Remove APU lead assembly 3W711 (HATZ) (TM 9-2350-292-20).
5. Remove APU lead assembly 3W727 (HATZ) (TM 9-2350-292-20).
6. Remove APU lead assemblies 3W728(HATZ) (TM 9-2350-292-20).
7. Remove APU lead assembly 3W730 (HATZ) (TM 9-2350-292-20).
8. Remove APU lead assembly 3W733 (HATZ) (TM 9-2350-292-20).
9. Remove APU starter relay (HATZ) (TM 9-2350-292-20).

AUXILIARY POWER UNIT ENGINE REPLACEMENT (HATZ) - CONTINUED**Removal-Continued**

10. Remove APU relay box assembly (HATZ) (TM 9-2350-292-20).
11. Remove APU vanaxial fan, screens, and bracket (HATZ) (TM 9-2350-292-20).
12. Remove APU fuel system lines and fittings (HATZ) (TM 9-2350-292-20).
13. Remove APU fuel pumps (HATZ) (TM 9-2350-292-20).
14. Remove APU fuel/water separator (HATZ) (TM 9-2350-292-20).
15. Remove APU engine support data plate, decal and door fan air scoop (HATZ) (TM 9-2350-292-20).
16. Remove APU chain case, chain and sprockets (HATZ) (WP 0082 00).
17. Inspect all parts for damage and replace as required.

Installation

1. Install APU chain case, chain and sprockets (HATZ) (WP 0082 00).
2. Install APU engine support data plate, decal and door fan air scoop (HATZ) (TM 9-2350-292-20).
3. Install APU fuel/water separator (HATZ) (TM 9-2350-292-20).
4. Install APU fuel pumps (HATZ) (TM 9-2350-292-20).
5. Install APU fuel system lines and fittings (HATZ) (TM 9-2350-292-20).
6. Install APU vanaxial fan, screens, and bracket (HATZ) (TM 9-2350-292-20).
7. Install APU relay box assembly (HATZ) (TM 9-2350-292-20).
8. Install APU starter relay (HATZ) (TM 9-2350-292-20).
9. Install APU lead assembly 3W733 (HATZ) (TM 9-2350-292-20).
10. Install APU lead assembly 3W730 (HATZ) (TM 9-2350-292-20).
11. Install APU lead assemblies 3W728(HATZ) (TM 9-2350-292-20).
12. Install APU lead assembly 3W727 (HATZ) (TM 9-2350-292-20).
13. Install APU lead assembly 3W711 (HATZ) (TM 9-2350-292-20).
14. Install APU engine duct (HATZ) (TM 9-2350-292-20).
15. Install APU lead assembly 3W706 (HATZ) (TM 9-2350-292-20).
16. Install APU wiring harness 3W704 (HATZ) (TM 9-2350-292-20).

NOTE

FOLLOW-ON MAINTENANCE:
Install APU assembly (HATZ) in vehicle
(TM 9-2350-292-20)

END OF TASK

AUXILIARY POWER UNIT CHAIN CASE, CHAIN, AND SPROCKETS REPAIR

0081 00

THIS WORK PACKAGE COVERS:

Removal, Disassembly, Cleaning, Inspection, Assembly, Alignment, Installation

INITIAL SETUP:

Tools and Special Tools

- General mechanic's tool kit (item 1, WP 0090 00)
- Alignment gauge (item 35, WP 0090 00)
- Mechanical puller (item 34, WP 0090 00)
- Hand arbor press (item 2, WP 0090 00)
- Torque wrench (item 25, WP 0090 00)
- Torque wrench (item 31, WP 0090 00)
- Socket wrench attachment (item 71, WP 0090 00)

Materials/Parts

- Dry-cleaning solvent (item 1, WP 0087 00)
- Lubricant (item 12, WP 0087 00)
- Adhesive (item 13, WP 0087 00)
- Lockwasher (item 28, WP 0091 00)
- Lockwashers (15) (item 36, WP 0091 00)

Materials/Parts-Continued

- Lockwashers (4) (item 37, WP 0091 00)
- Gasket (item 38, WP 0091 00)
- Gasket (item 39, WP 0091 00)
- Seal (item 40, WP 0091 00)

Equipment Conditions

- APU chaincase oil drained (TM 9-2350-292-20)
- APU generator removed (TM 9-2350-292-20) For maintenance of lower sprockets and retainers

Personnel Required

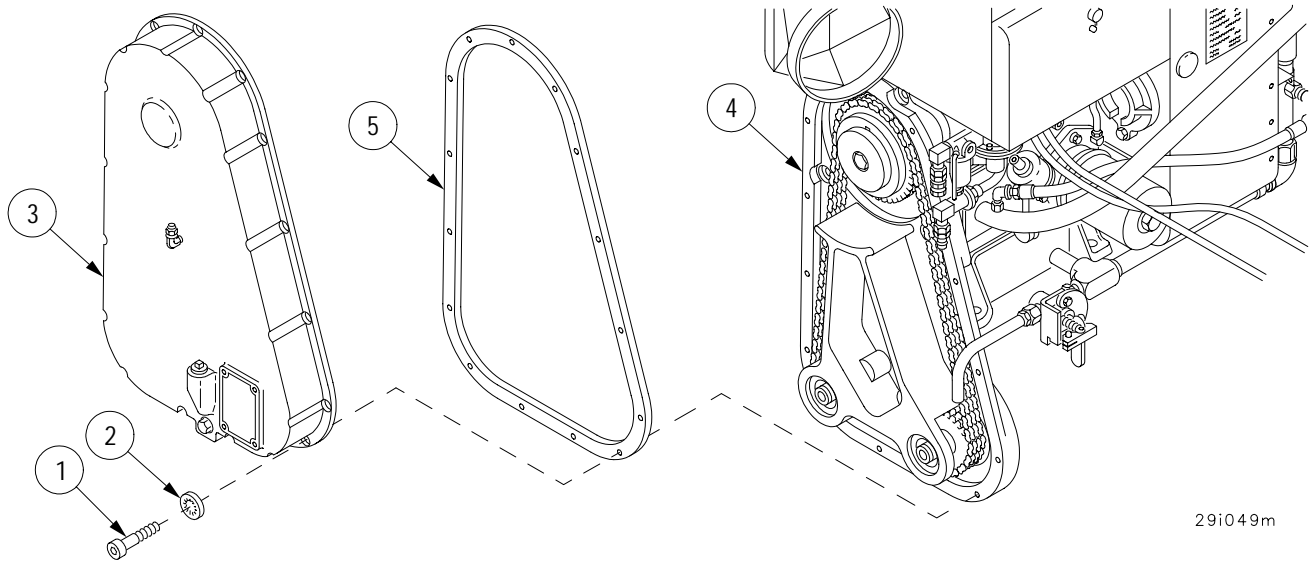
Two

References

TM 9-2350-292-20

Removal

1. Remove 15 screws (1), 15 lockwashers (2) and cover (3) from chain case (4). Discard lockwashers.
2. Remove gasket (5) from chain case cover (3). Discard gasket.



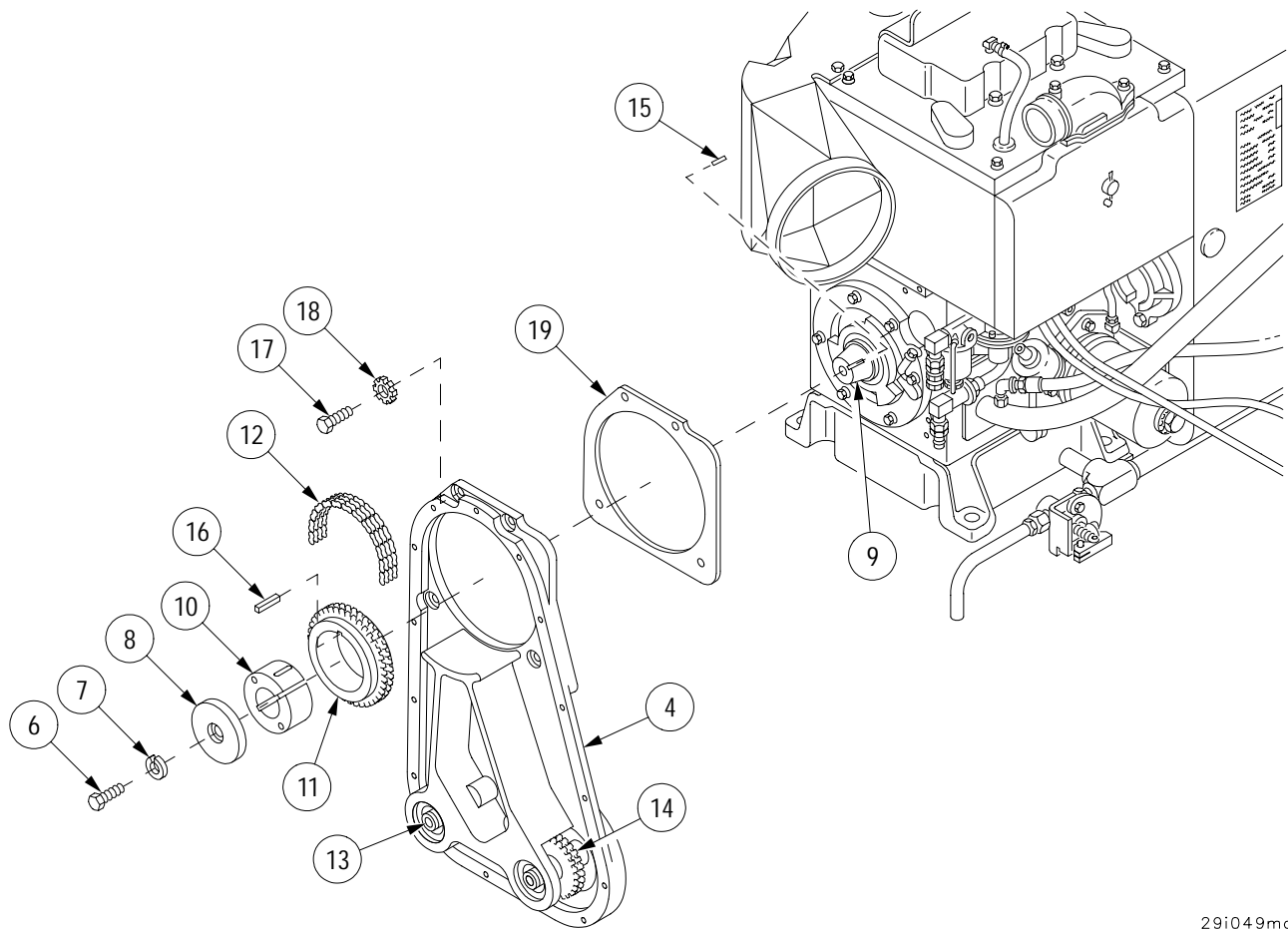
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**AUXILIARY POWER UNIT CHAIN CASE, CHAIN, AND SPROCKETS REPAIR -
CONTINUED**

0081 00

Removal-Continued

3. Remove screw (6), lockwasher (7) and plate (8) from shaft (9). Discard lockwasher.
4. Attach screws of mechanical puller to bushing (10) and pull bushing (10) and sprocket (11) from shaft (9) and separate chain (12) from sprocket (11).
5. Remove chain (12) from sprockets (13 and 14).
6. Remove key (15) from shaft (9).
7. Using suitable driver and hand arbor press, separate bushing (10) from sprocket (11) and remove key (16).
8. Remove four screws (17), four lockwashers (18) and chain case (4) from APU assembly. Discard lockwashers.
9. Remove gasket (19) from APU assembly. Discard gasket.

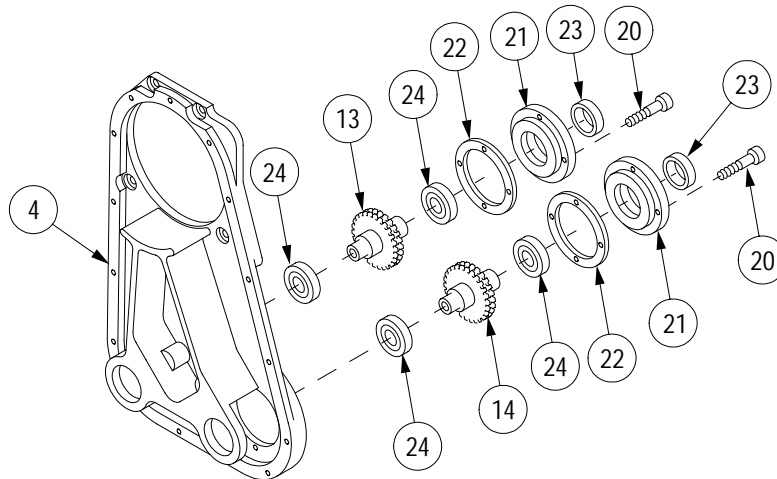


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**AUXILIARY POWER UNIT CHAIN CASE, CHAIN, AND SPROCKETS REPAIR -
CONTINUED****0081 00****Disassembly****NOTE**

Perform the following steps to remove either or both sprockets.

1. Remove four screws (20) from retainer (21).
2. Install two 1/4 -20UNC-2B screws in two small threaded holes in retainer (21) and pull retainer from chain case (4).
3. Remove sprocket (13 or 14) from chain case (4).
4. Remove gasket (22) from chain case (4). Discard gasket.
5. Remove seal (23) from retainer (21). Discard seal.
6. Using suitable driver and hand arbor press, remove bearings (24) from retainer (21) and chain case (4).



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Cleaning

1. Clean all parts with dry-cleaning solvent.
2. Remove all gasket material from mounting surfaces.

AUXILIARY POWER UNIT CHAIN CASE, CHAIN, AND SPROCKETS REPAIR - CONTINUED

0081 00

Inspection

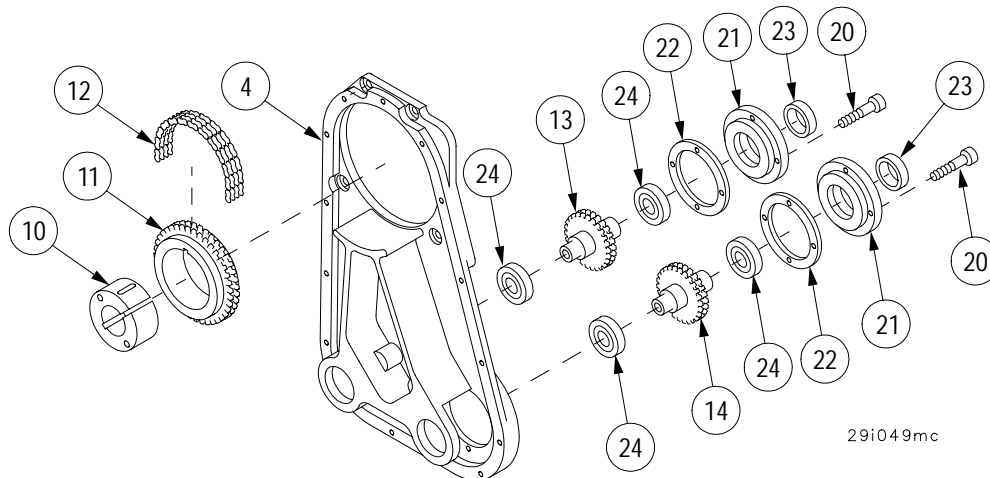
1. Inspect bushing (10), replace if worn or grooved.
2. Inspect sprockets (11, 13 and 14), replace if worn, cracked, missing teeth or distorted.
3. Inspect chain (12), replace if worn or stretched.
4. Inspect each bearing (24), replace if worn, scored, pitted or broken.
5. Inspect remaining parts, replace any that are unserviceable.

Assembly

NOTE

Perform steps 1 and 2 to install each bearing.

1. Reduce bearing (24) by freezing.
2. Immediately position bearing (24) squarely on bore of chain chase (4) or retainer (21), press in place.
3. Install new seal (23) in each retainer (21) with wide inner diameter side of seal (23) facing out from bearing (21). Lubricate seal inner diameter with lubricant.
4. Apply adhesive to surfaces of two new gaskets (22), position gaskets on retainers (21).
5. Install sprockets (13 and 14) into bearings (24) in chain case (4) with internal splined-end of sprocket facing outward.
6. Apply adhesive to threads of four screws (20).
7. Install each of two retainers (21) in chain case (4) with four screws (20).

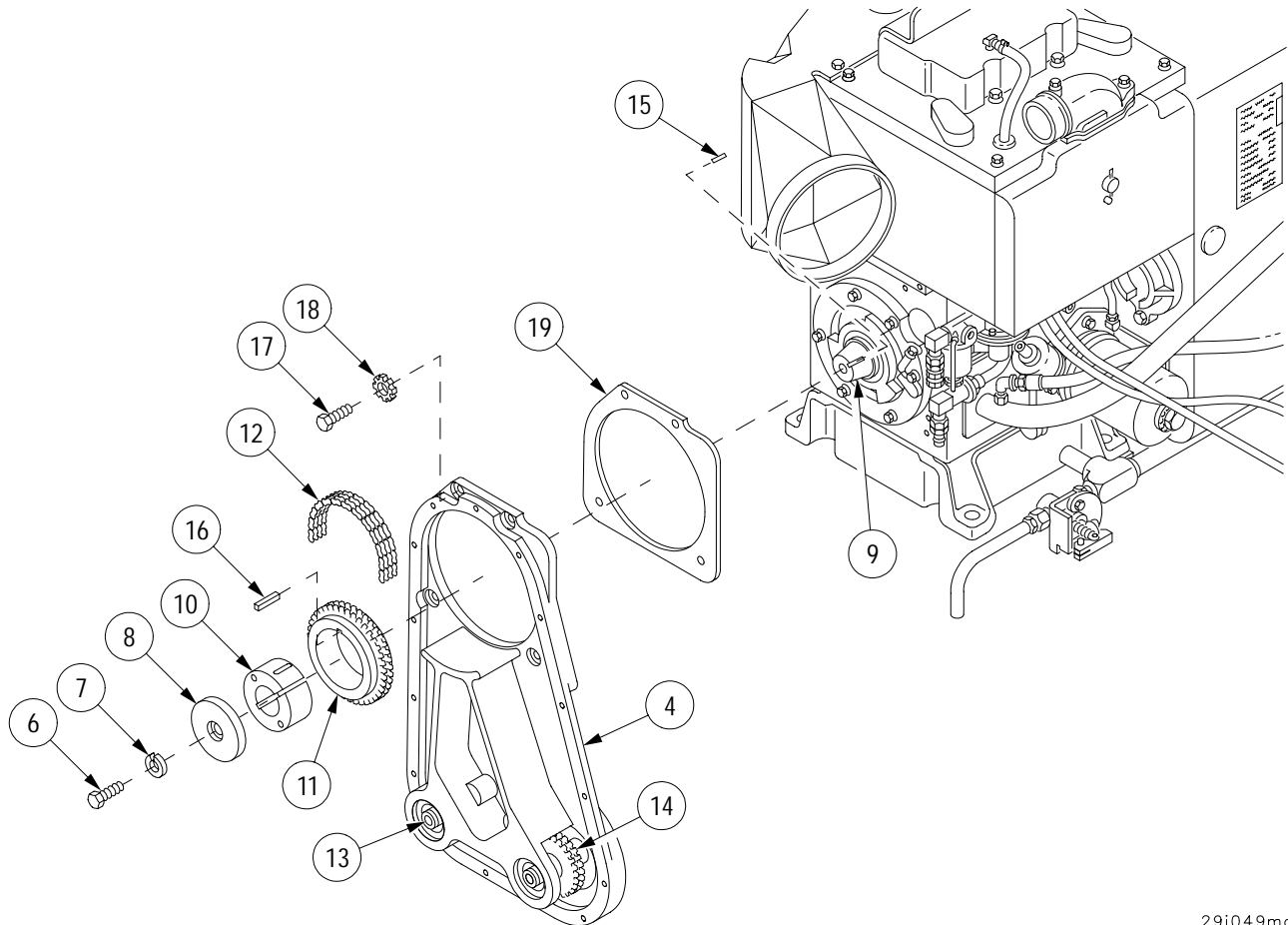


AUXILIARY POWER UNIT CHAIN CASE, CHAIN, AND SPROCKETS REPAIR - CONTINUED

0081 00

Assembly-Continued

8. Apply adhesive to surfaces of new gasket (19).
9. Insert four screws (17) and four new lockwashers (18) in chain case (4), position gasket (19) over four screws (17) on chain case (4) surface.
10. Install chain case (4) on APU assembly, tighten four screws (17).
11. Position key (16) in slot in bushing (10), press bushing into sprocket (11) until flush with sprocket (11).
12. Install key (15) into slot of shaft (9).
13. Install chain (12) on sprockets (13 and 14). Fit chain on sprocket (11) with holes in bushing (10) facing outward. Align sprocket keyway with key (15).
14. Install sprocket (11) on shaft (9).
15. Install plate (8) to shaft (9) with screw (6) and new lockwasher (7). Do not tighten screw (6).



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AUXILIARY POWER UNIT CHAIN CASE, CHAIN, AND SPROCKETS REPAIR - CONTINUED

0081 00

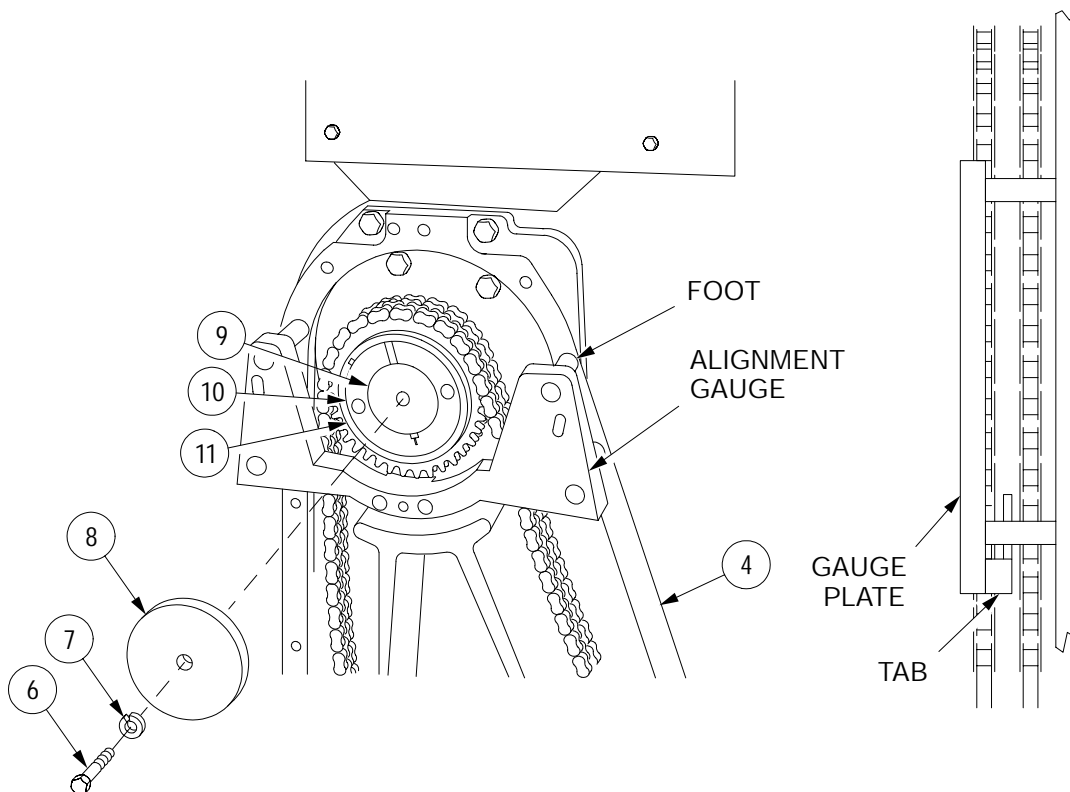
Alignment

1. Install alignment gauge so that feet of gauge seat flat against machined surface of chain case (4) and gauge tab seats between drive teeth of sprocket (11).
2. While holding alignment gauge in place, torque screw (6) to 50-55 lb-ft (68-75 NSm). Alignment gauge tab should not touch either row of teeth and feet must be flat on chain case surface.

NOTE

Improper alignment of sprocket may result from worn bushing. In this case, replace bushing.

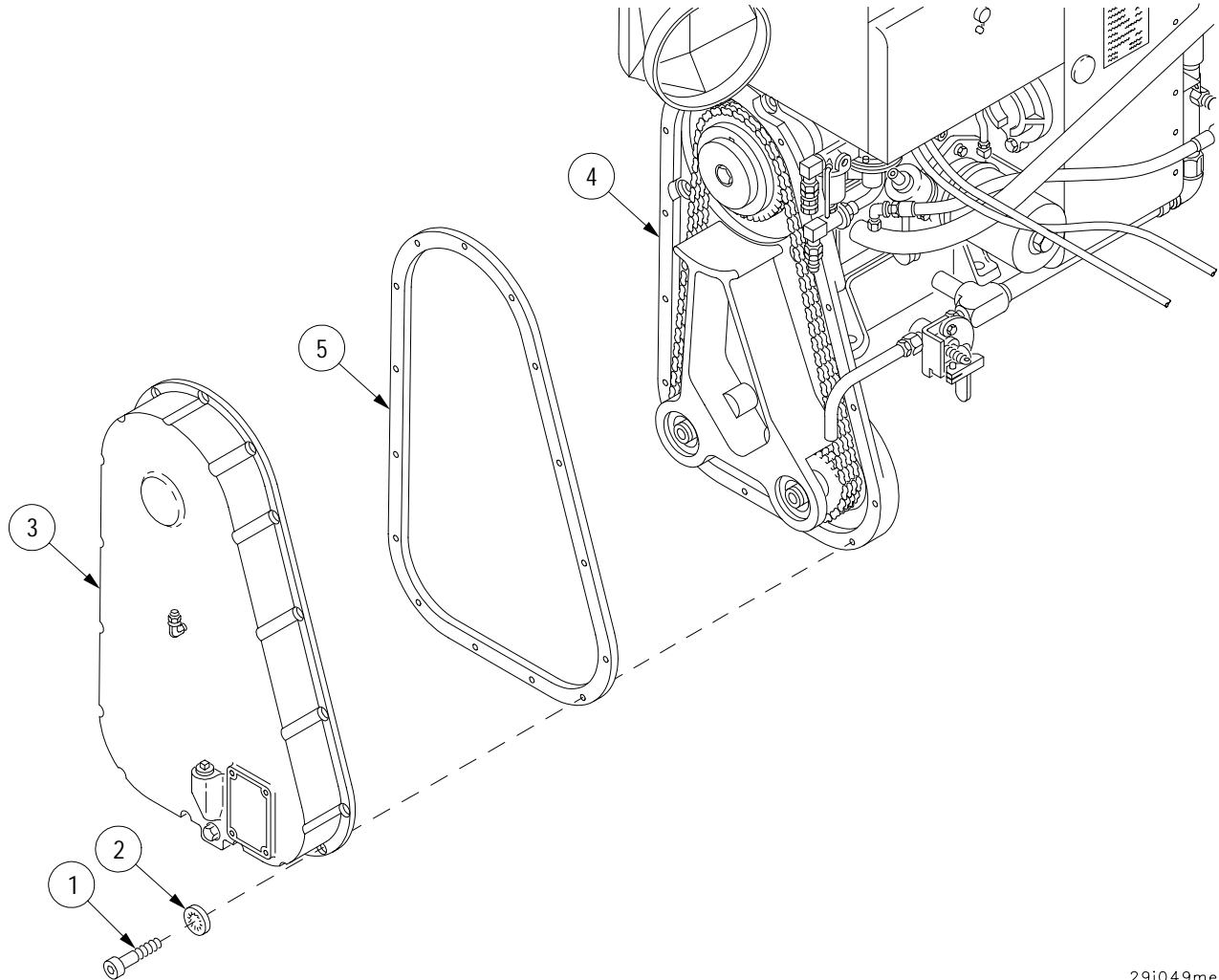
3. If alignment gauge tab touches either row of teeth on sprocket (11), remove screw (6), lockwasher (7) and plate (8). Loosen sprocket (11) and bushing (10) from shaft (9) using mechanical puller.
4. Reinstall screw (6), new lockwasher (7) and plate (8) on shaft (9) but do not tighten screw (6). Repeat alignment procedures.



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**AUXILIARY POWER UNIT CHAIN CASE, CHAIN, AND SPROCKETS REPAIR -
CONTINUED****0081 00****Installation**

1. Apply adhesive to surfaces of new gasket (5), position gasket on chain case cover (3).
2. Install cover (3) on chain case (4) with 15 screws (1) and 15 new lockwashers (2). Torque screws to 35-40 lb-in. (3.96-4.52 NSm).



29i049me

NOTE**FOLLOW-ON MAINTENANCE:**

Install APU generator, if removed (TM 9-2350-292-20)

Fill APU chain case with oil (TM 9-2350-292-20)

END OF TASK

**AUXILIARY POWER UNIT CHAIN CASE, CHAIN AND SPROCKETS REPAIR
(HATZ)****0082 00****THIS WORK PACKAGE COVERS:**

Removal, Disassembly, Cleaning, Inspection, Assembly, Alignment, Installation

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
 Alignment gauge (item 35, WP 0090 00)
 Mechanical puller (item 34, WP 0090 00)
 Hand arbor press (item 2, WP 0090 00)
 Torque wrench (item 25, WP 0090 00)
 Torque wrench (item 31, WP 0090 00)
 Socket wrench attachment (item 71, WP 0090 00)

Materials/Parts

Dry-cleaning solvent (item 1, WP 0087 00)
 Lubricant (item 12, WP 0087 00)
 Adhesive (item 13, WP 0087 00)
 Lockwashers (15) (item 36, WP 0091 00)

Materials/Parts-Continued

Lockwashers (4) (item 37, WP 0091 00)
 Gasket (item 38, WP 0091 00)
 Gasket (item 39, WP 0091 00)
 Seal (item 40, WP 0091 00)

Equipment Conditions

APU chain case oil drained (TM 9-2350-292-20)
 APU generator removed (TM 9-2350-292-20)
 For maintenance of lower sprockets and retainers

Personnel Required

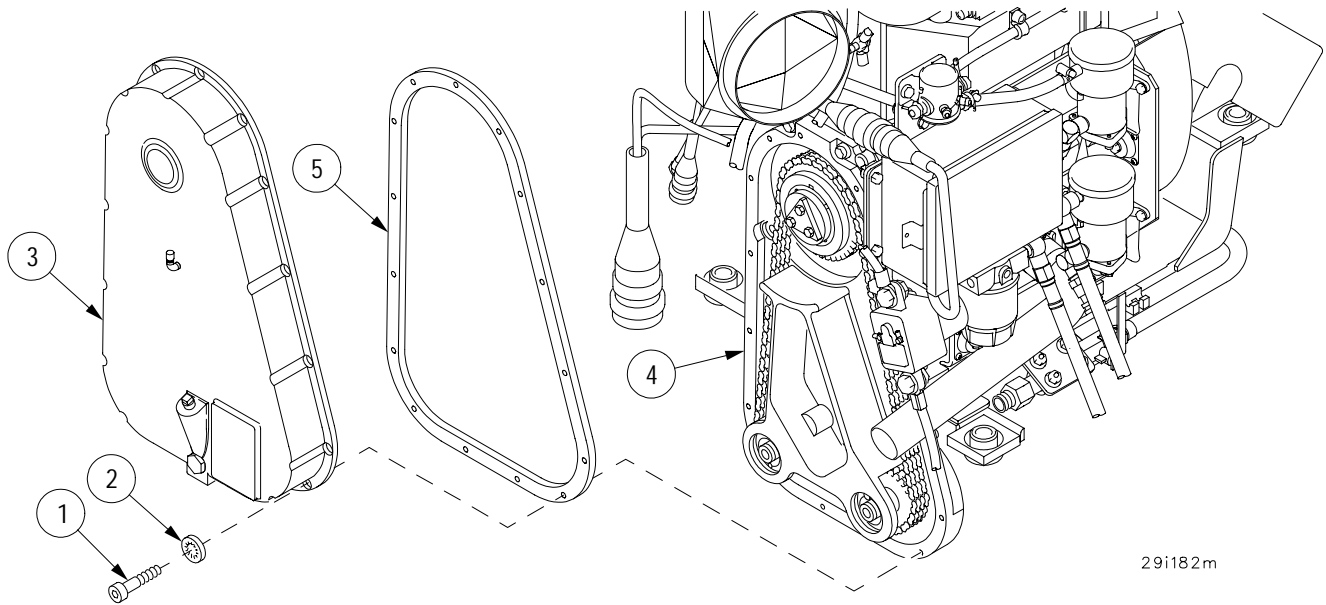
Two

References

TM 9-2350-292-20

Removal

1. Remove 15 screws (1), 15 lockwashers (2) and cover (3) from chain case (4). Discard lockwashers.
2. Remove gasket (5) from chain case cover (3). Discard gasket.



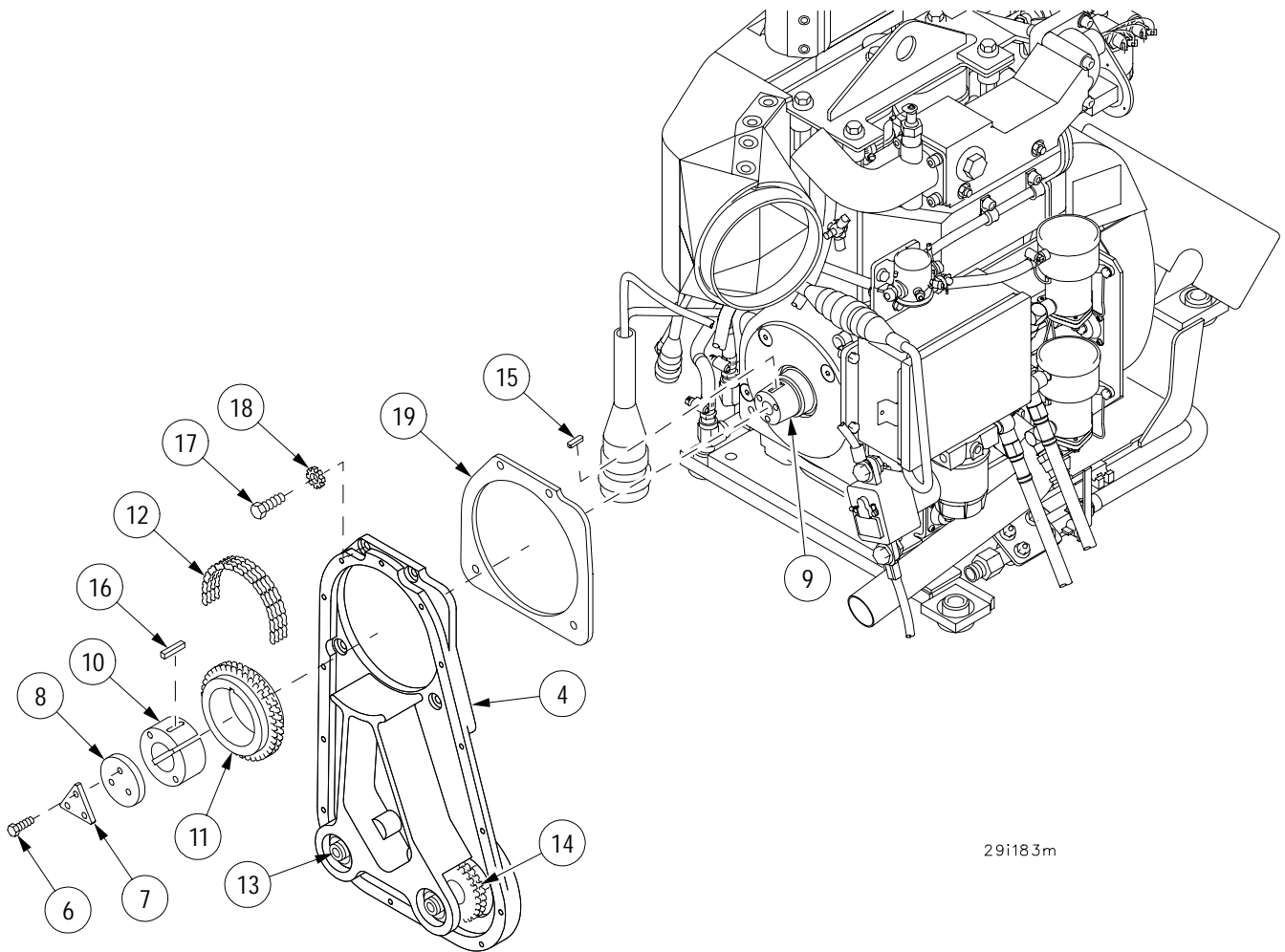
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AUXILIARY POWER UNIT CHAIN CASE, CHAIN, AND SPROCKETS REPAIR (HATZ) - CONTINUED

0082 00

Removal-Continued

3. Remove three screws (6), locking plate (7) and spacer (8) from shaft (9).
4. Attach screws of mechanical puller to bushing (10) and pull bushing (10) and sprocket (11) from shaft (9) and separate chain (12) from sprocket (11).
5. Remove chain (12) from sprockets (13 and 14).
6. Remove key (15) from shaft (9).
7. Using suitable driver and hand arbor press, separate bushing (10) from sprocket (11) and remove key (16).
8. Remove four screws (17), four lockwashers (18) and chain case (4) from APU assembly. Discard lockwashers.
9. Remove gasket (19) from APU assembly. Discard gasket.



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AUXILIARY POWER UNIT CHAIN CASE, CHAIN, AND SPROCKETS REPAIR (HATZ) - CONTINUED

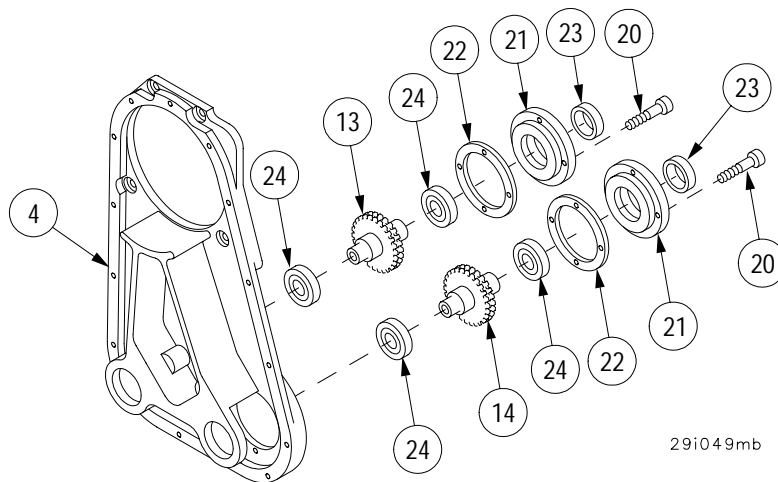
0082 00

Disassembly

NOTE

Perform the following steps to remove either or both sprockets.

1. Remove four screws (20) from retainer (21).
2. Install two 1/4 -20UNC-2B screws in two small threaded holes in retainer (21) and pull retainer from chain case (4).
3. Remove sprocket (13 or 14) from chain case (4).
4. Remove gasket (22) from chain case (4). Discard gasket.
5. Remove seal (23) from retainer (21). Discard seal.
6. Using suitable driver and hand arbor press, remove bearings (24) from retainer (21) and chain case (4).



Cleaning



1. Clean all parts with dry-cleaning solvent.
2. Remove all gasket material from mounting surfaces.

AUXILIARY POWER UNIT CHAIN CASE, CHAIN, AND SPROCKETS REPAIR (HATZ) - CONTINUED

0082 00

Inspection

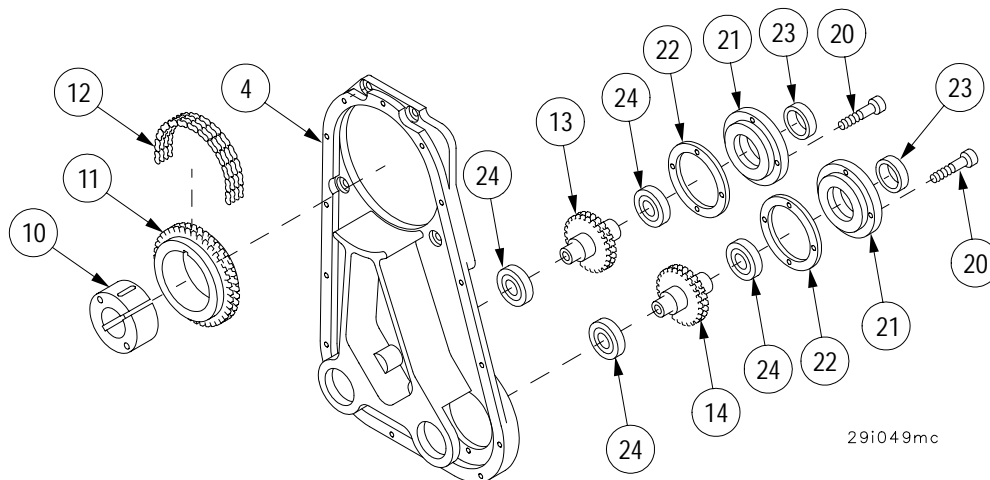
1. Inspect bushing (10), replace if worn or grooved.
2. Inspect sprockets (11, 13 and 14), replace if worn, cracked, missing teeth or distorted.
3. Inspect chain (12), replace if worn or stretched.
4. Inspect each bearing (24), replace if worn, scored, pitted or broken.
5. Inspect remaining parts, replace any that are unserviceable.

Assembly

NOTE

Perform steps 1 and 2 to install each bearing.

1. Reduce bearing (24) by freezing.
2. Immediately position bearing (24) squarely on bore of chain chase (4) or retainer (21), press in place.
3. Install new seal (23) in each retainer (21) with wide inner diameter side of seal (23) facing out from bearing (21). Lubricate seal inner diameter with lubricant.
4. Apply adhesive to surfaces of two new gaskets (22), position gaskets on retainers (21).
5. Install sprockets (13 and 14) into bearings (24) in chain case (4) with internal splined-end of sprocket facing outward.
6. Apply adhesive to threads of four screws (20).
7. Install each of two retainers (21) in chain case (4) with four screws (20).

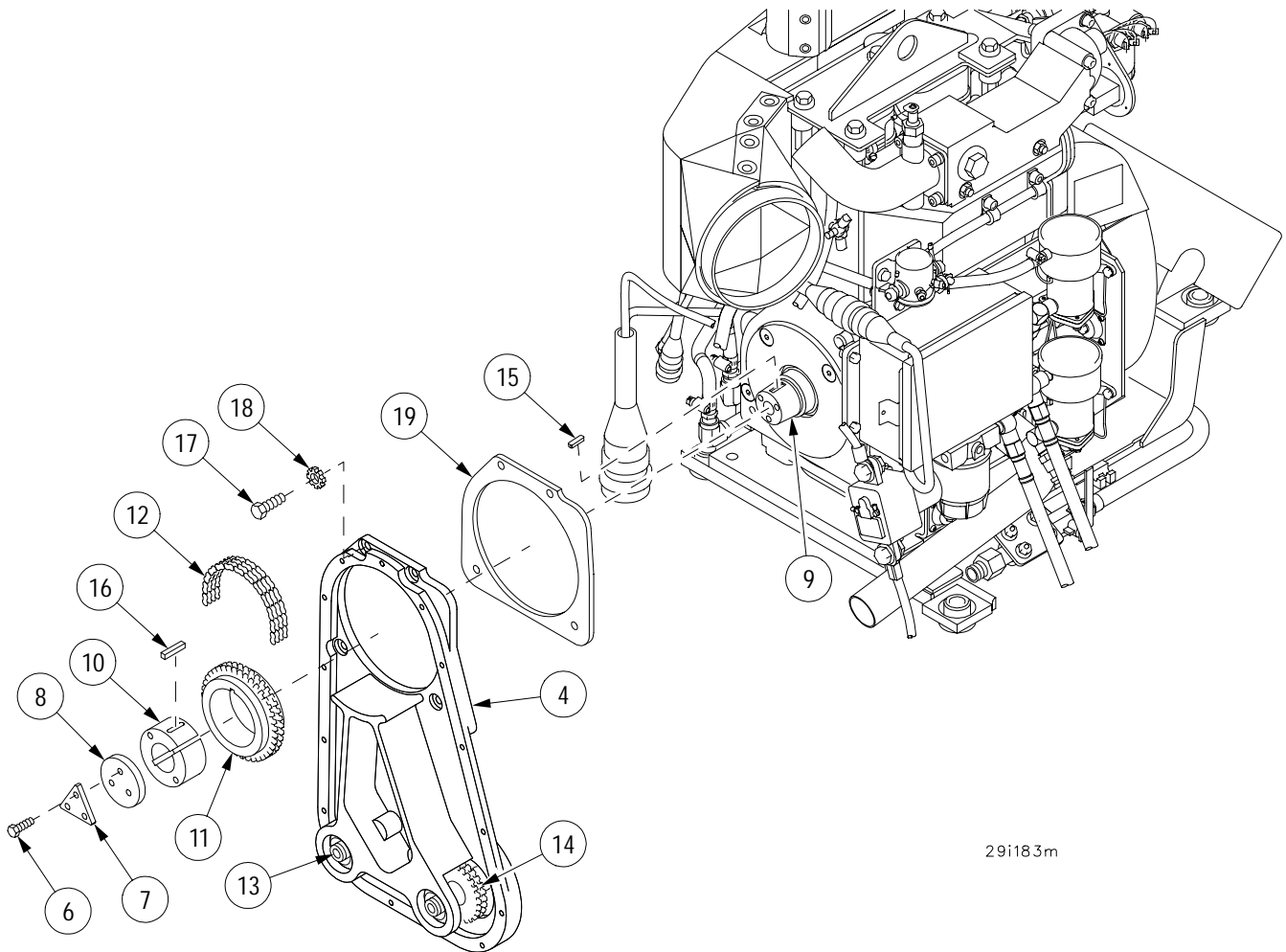


AUXILIARY POWER UNIT CHAIN CASE, CHAIN, AND SPROCKETS REPAIR (HATZ) - CONTINUED

0082 00

Assembly-Continued

8. Apply adhesive to surfaces of new gasket (19).
9. Insert four screws (17) and four new lockwashers (18) in chain case (4), position gasket (19) over four screws (17) on chain case (4) surface.
10. Install chain case (4) on APU assembly, tighten four screws (17).
11. Position key (16) in slot in bushing (10), press bushing into sprocket (11) until flush with sprocket (11).
12. Install key (15) into slot of shaft (9).
13. Install chain (12) on sprockets (13 and 14). Fit chain on sprocket (11) with holes in bushing (10) facing outward. Align sprocket keyway with key (15).
14. Install sprocket (11) on shaft (9).
15. Install spacer (8) to shaft (9) with three screws (6) and locking plate (7). Do not tighten three screws (6).



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AUXILIARY POWER UNIT CHAIN CASE, CHAIN, AND SPROCKETS REPAIR (HATZ) - CONTINUED

0082 00

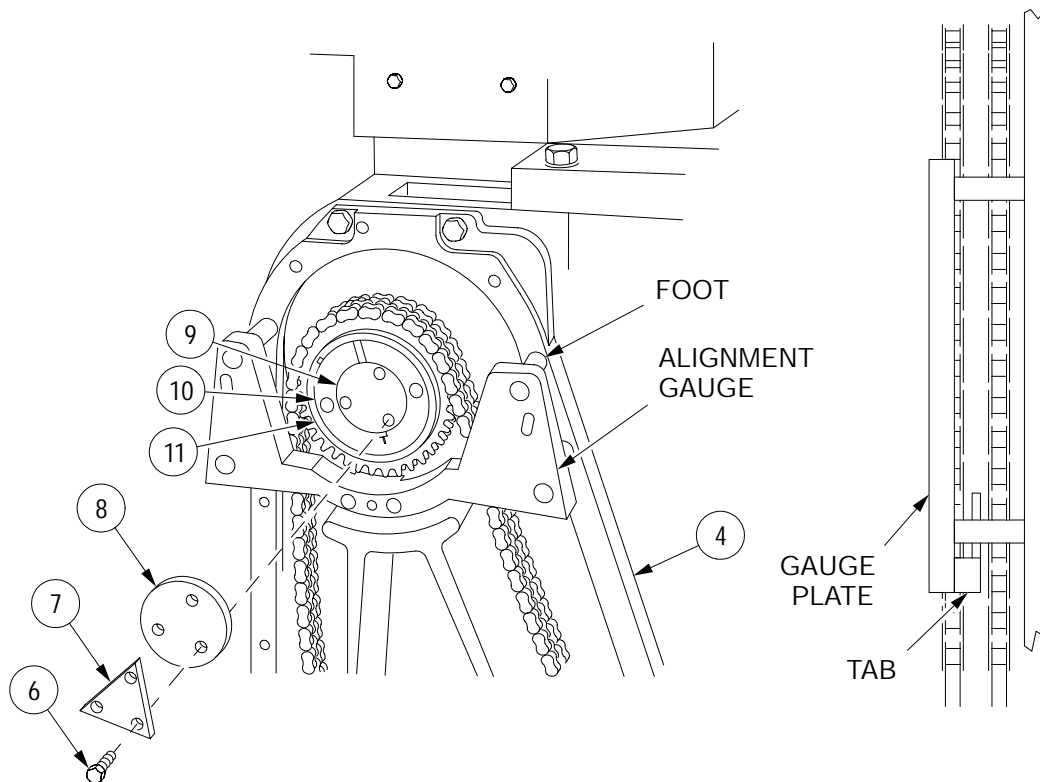
Alignment

1. Install alignment gauge so that feet of gauge seat flat against machined surface of chain case (4) and gauge tab seats between drive teeth of sprocket (11).
2. While holding alignment gauge in place, torque three screws (6) to 50-55 lb-ft (68-75 NSm). Alignment gauge tab should not touch either row of teeth and feet must be flat on chain case surface.

NOTE

Improper alignment of sprocket may result from worn bushing. In this case, replace bushing.

3. If alignment gauge tab touches either row of teeth on sprocket (11), remove three screws (6), locking plate (7) and spacer (8). Loosen sprocket (11) and bushing (10) from shaft (9) using mechanical puller.
4. Reinstall three screws (6), locking plate (7) and spacer (8) on shaft (9) but do not tighten three screws (6). Repeat alignment procedures.



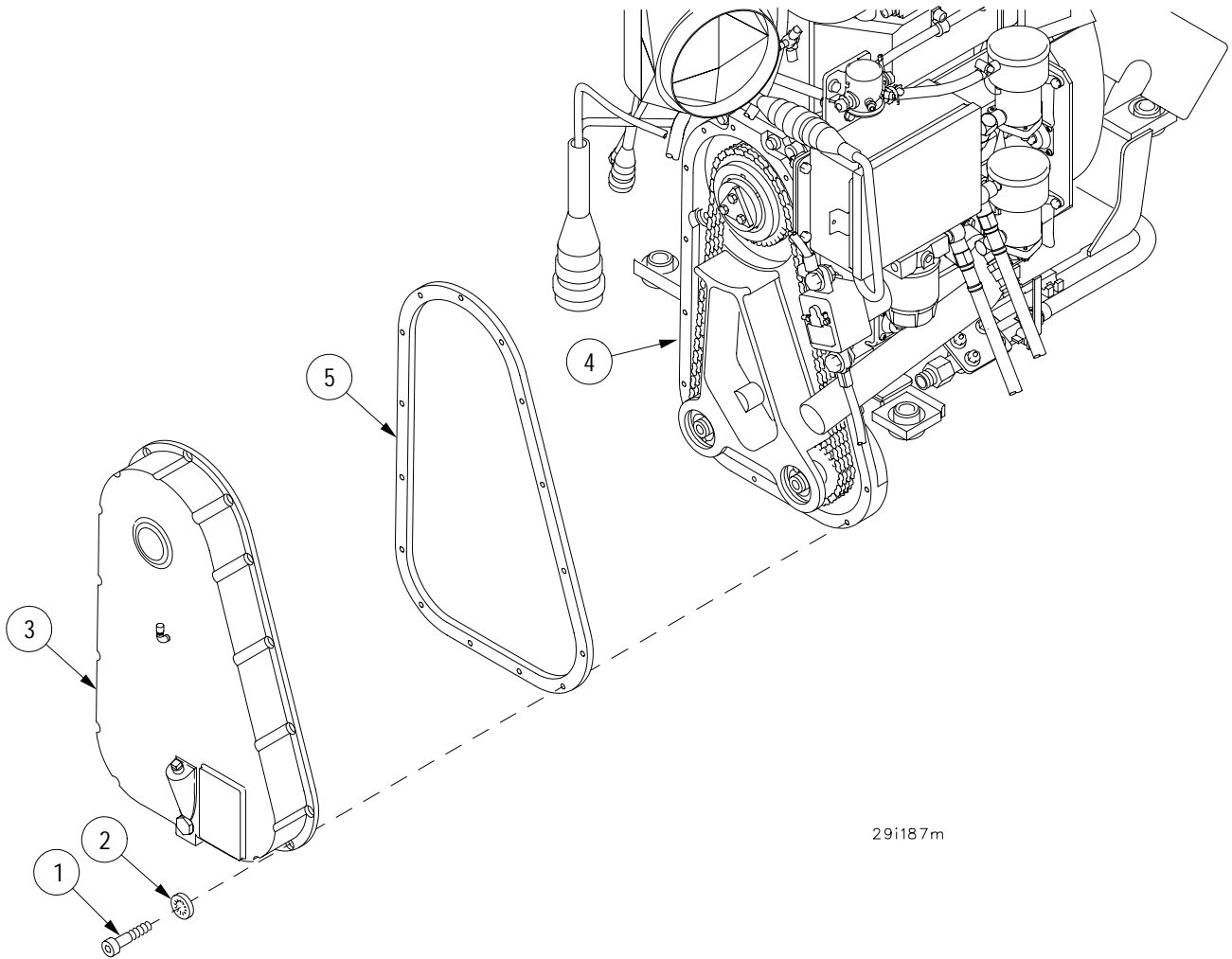
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**AUXILIARY POWER UNIT CHAIN CASE, CHAIN, AND SPROCKETS REPAIR
(HATZ) - CONTINUED**

0082 00

Installation

1. Apply adhesive to surfaces of new gasket (5), position gasket on chain case cover (3).
2. Install cover (3) on chain case (4) with 15 screws (1) and 15 new lockwashers (2). Torque screws to 35-40 lb-in. (3.96-4.52 NSm).

**NOTE****FOLLOW-ON MAINTENANCE:**

Install APU generator, if removed
(TM 9-2350-292-20)

Fill APU chain case with oil (TM 9-2350-292-20)

END OF TASK

CHAPTER 12

CHEMICAL, BIOLOGICAL AND RADIOLOGICAL (CBR) EQUIPMENT

M2A2 AIR PURIFIER REPAIR**0083 00****THIS WORK PACKAGE COVERS:**

Disassembly, Assembly

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)

Materials/Parts

Lockwashers (4) (item 16, WP 0091 00)

M12A1 gas filter (item 17, WP 0091 00)

Particulate filter (item 18, WP 0091 00)

Tapping screws (4) (item 65, WP 0091 00)

Equipment Conditions

M2A2 air purifier removed

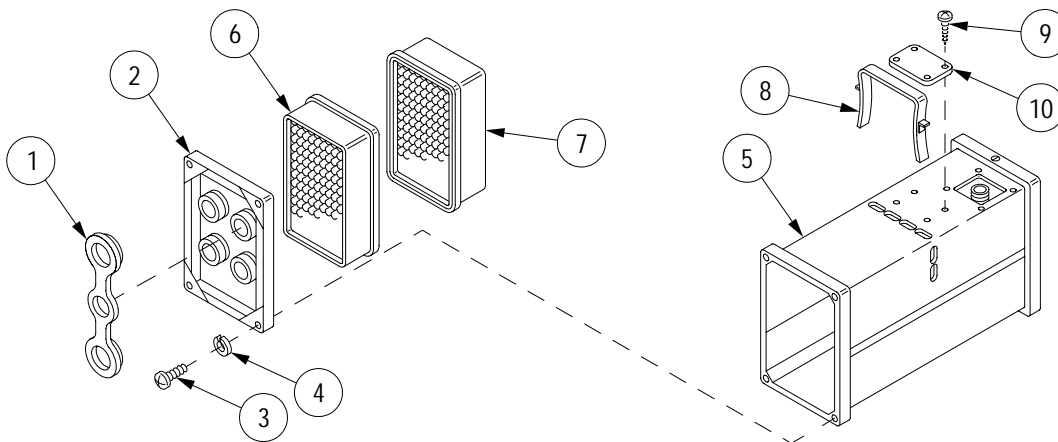
(TM 9-2350-292-20)

References

TM 9-2350-292-20

**Disassembly**

1. Remove cap (1) from the top of the M2A2 manifold assembly (2).
2. Remove four screws (3), four lockwashers (4) and manifold assembly (2) from top of precleaner housing (5). Discard lockwashers.
3. Remove M12A1 gas filter (6) from precleaner housing (5). Discard M12A1 gas filter.
4. Remove particulate filter (7) from precleaner housing (5). Discard particulate filter.
5. Remove clip spring (8) from precleaner housing (5).
6. Remove four tapping screws (9) and data plate (10) from precleaner housing (5). Discard tapping screws.
7. Inspect parts for damage and replace as required.

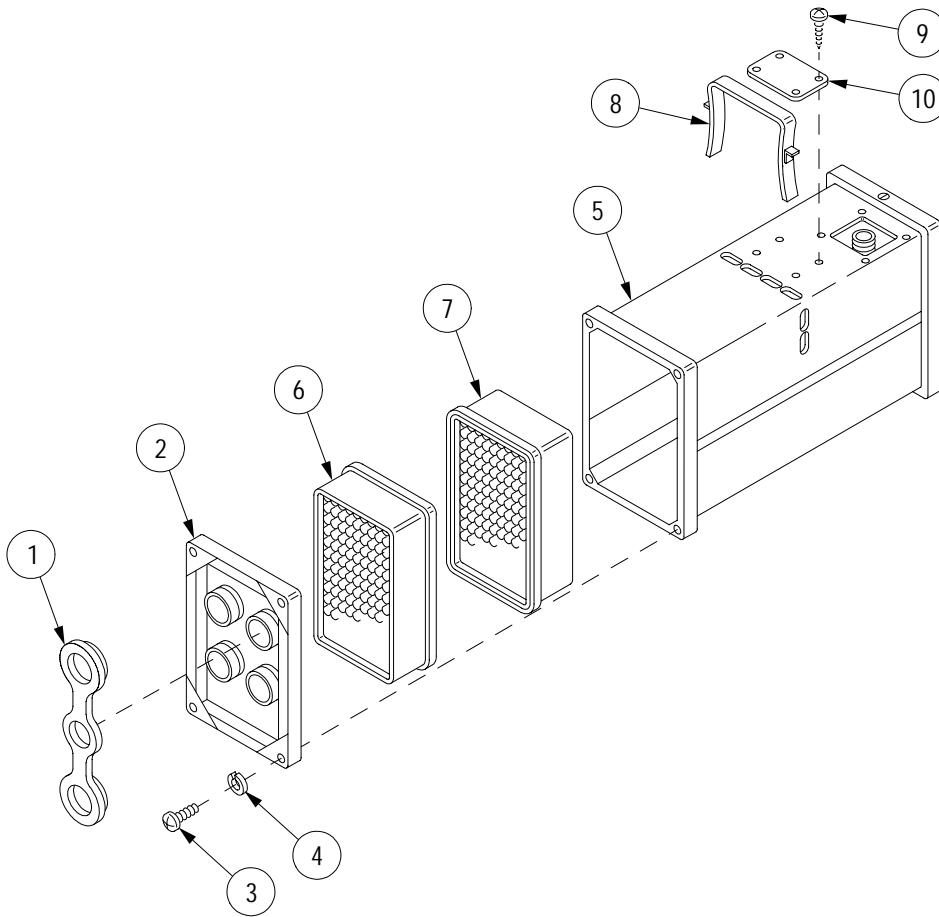


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M2A2 AIR PURIFIER REPAIR - CONTINUED

Assembly

1. Install data plate (10) on precleaner housing (5) with four new tapping screws (9).
2. Install clip spring (8) on precleaner housing (5).
3. Install new particulate filter (7) in precleaner housing (5).
4. Install new M12A1 gas filter (6) in precleaner housing (5).
5. Install manifold assembly (2) on top of precleaner housing (5) with four screws (3) and four new lockwashers (4).
6. Install cap (1) on top of manifold assembly (2).



911004ma

NOTE

FOLLOW-ON MAINTENANCE:
 Install M2A2 air purifier (TM 9-2350-292-20)

END OF TASK

AIR PURIFIER CONTROL UNIT ENCLOSURE ASSEMBLY REPAIR**0084 00****THIS WORK PACKAGE COVERS:**

Disassembly, Assembly

INITIAL SETUP:**Tools and Special Tools**

- General mechanic's tool kit (item 1, WP 0090 00)
- Soldering gun (item 10, WP 0090 00)

Materials/Parts

- Lockwashers (4) (item 33, WP 0091 00)
- Lockwashers (4) (item 31, WP 0091 00)
- Lockwashers (6) (item 32, WP 0091 00)
- Lockwashers (4) (item 92, WP 0091 00)
- Electrical tiedown strap (item 24, WP 0087 00)
- Marker tags (AR) (item 26, WP 0087 00)

Materials/Parts - Continued

- Tin alloy solder (item 7, WP 0087 00)
- Soldering flux (item 8, WP 0087 00)
- Gasket (item 93, WP 0091 00)
- Gasket (item 94, WP 0091 00)

Equipment Conditions

- Air purifier control unit enclosure assembly removed (TM 9-2350-292-20)

References

- TB SIG 222
- TM 9-2350-292-20

NOTE

Tag all electrical connections and electrical leads prior to removal to aid in installation.

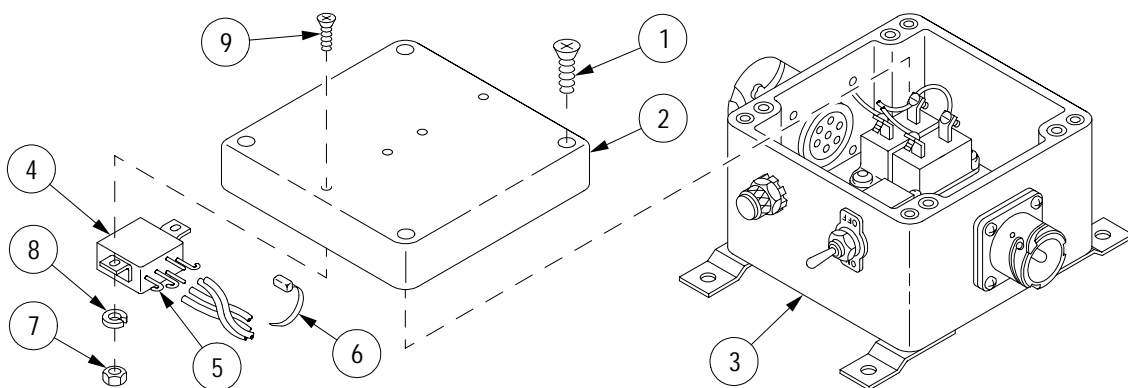
Disassembly

1. Loosen four captive screws (1) and remove enclosure lid (2) from enclosure (3) exercising extreme care to avoid damage to wires of lid-mounted relay K1 (4).

NOTE

Before proceeding, see detailed instructions on soldering and solder (TB SIG 222).

2. Unsolder four wires from terminals (5) on relay K1 (4).
3. Remove electrical tiedown strap (6) from wires of relay K1 (4). Discard tiedown strap.
4. Remove two nuts (7), two lockwashers (8), two screws (9) and relay K1 (4) from enclosure lid (2). Discard lockwashers.



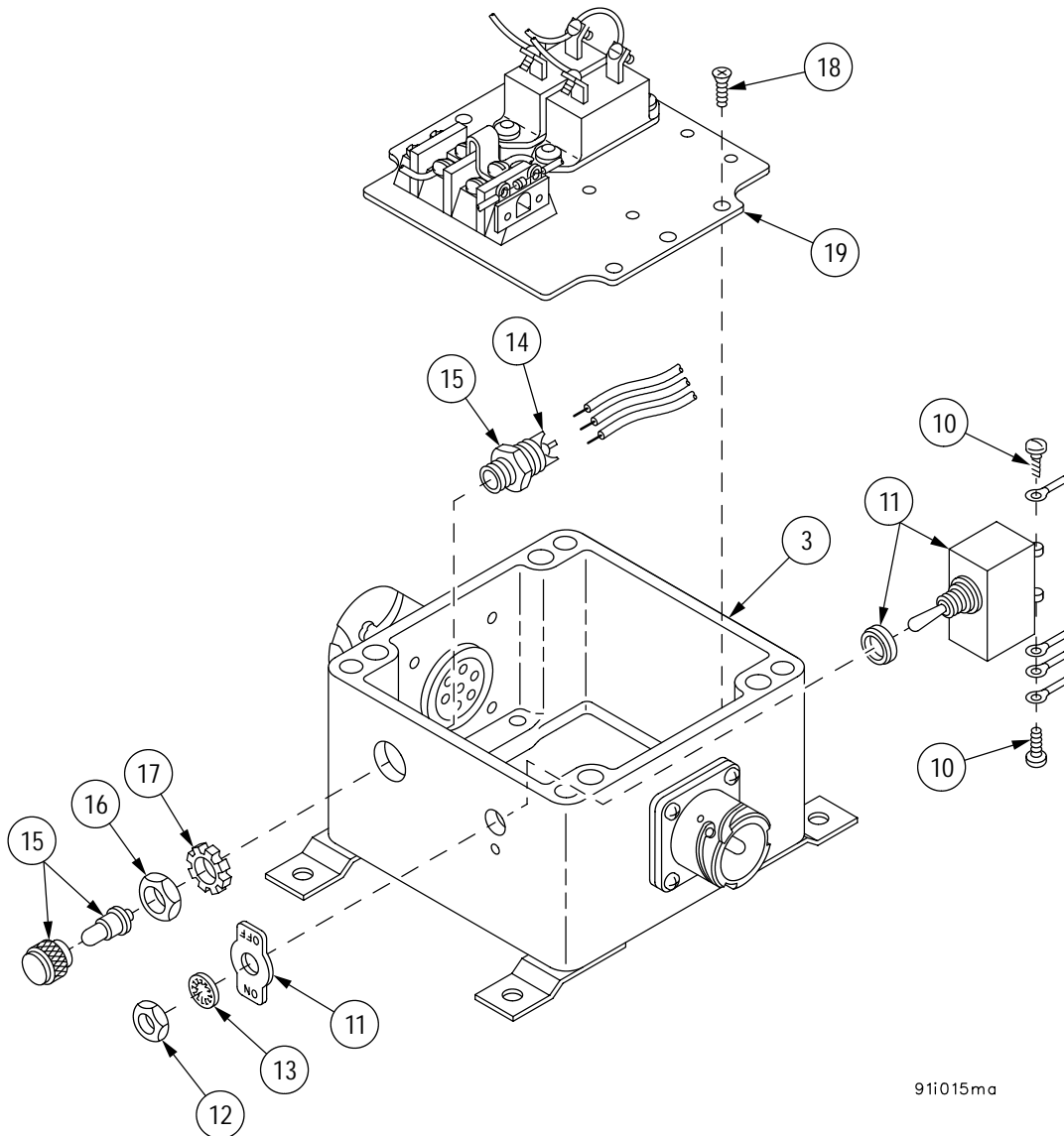
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**AIR PURIFIER CONTROL UNIT ENCLOSURE ASSEMBLY REPAIR -
CONTINUED**

0084 00

Disassembly-Continued

5. Remove two screws (10) and four wires from switch S1 (11).
6. Remove nut (12), lockwasher (13) and switch S1 (11) from enclosure (3). Retain attaching hardware for installation.
7. Unsolder three wires from terminals (14) on light DS1 (15).
8. Remove nut (16), lockwasher (17) and light DS1 (15) from enclosure (3). Retain attaching hardware for installation.
9. Remove four screws (18) and carefully separate subplate (19) from enclosure (3).



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**AIR PURIFIER CONTROL UNIT ENCLOSURE ASSEMBLY REPAIR -
CONTINUED**

0084 00

Disassembly-Continued

10. Remove four screws (20), jumper (21) and four wires from terminal board TB1 (22).

NOTE

Perform step 11 only if diode CR1 is faulty.

11. Unsolder diode (23) from terminal board (24).

12. Remove four nuts (25), four lockwashers (26), four screws (27) and terminal board TB1 (22) and terminal board (24) from subplate (19). Discard lockwashers.

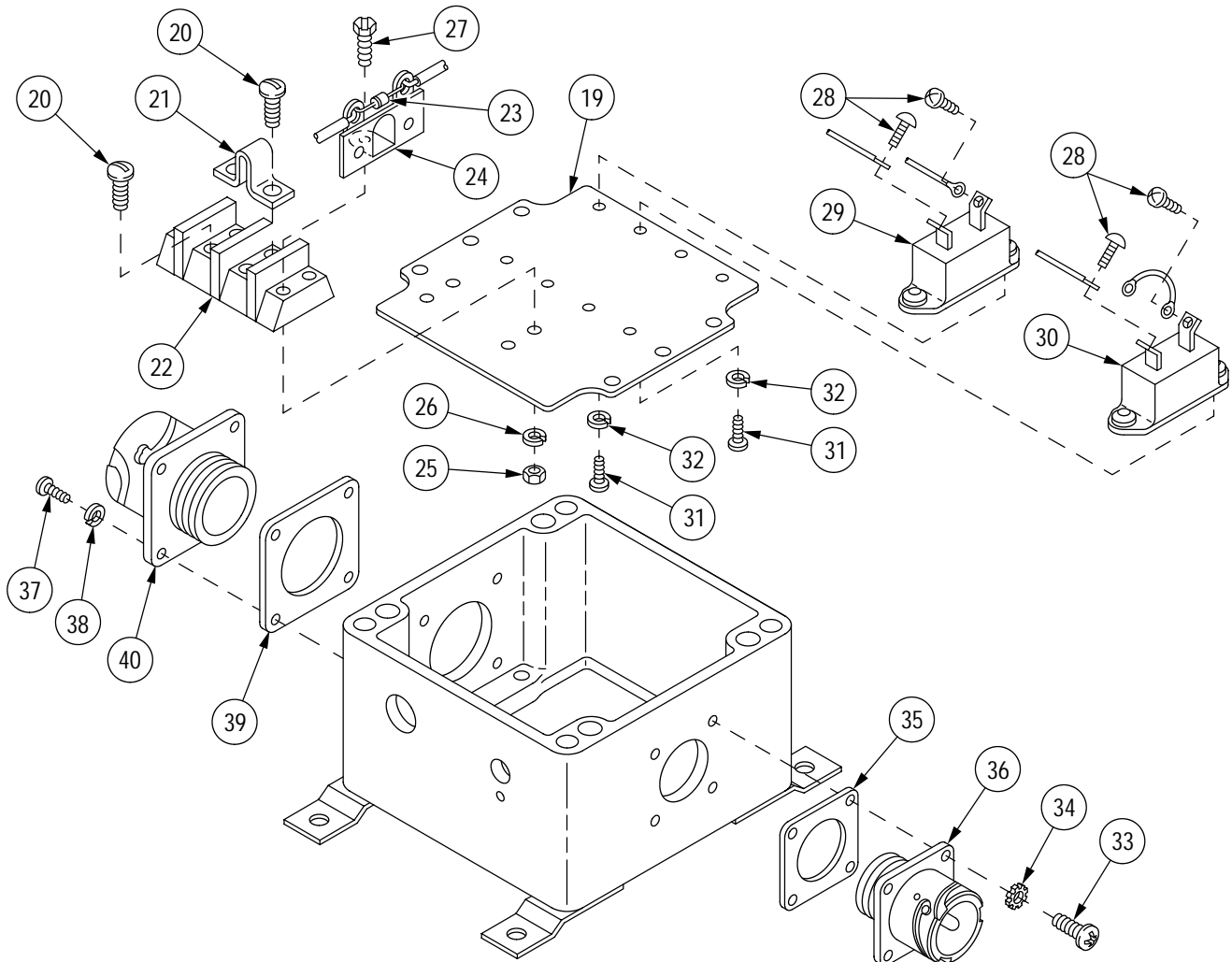
13. Remove four screws (28) and four wires from circuit breakers CB1 (29) and CB2 (30).

14. Remove four screws (31), four lockwashers (32) and circuit breakers CB1 (29) and CB2 (30) from subplate (19). Discard lockwashers.

15. Remove four screws (33), four lockwashers (34), gasket (35) and connector J1 (36). Discard lockwashers and gasket. Refer to Chapter 6 for connector repair procedures.

16. Remove four screws (37), four lockwashers (38), gasket (39) and connector J2 (40). Discard lockwashers and gasket. Refer to Chapter 6 for connector repair procedures.

17. Inspect parts for damage and replace as required.



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**AIR PURIFIER CONTROL UNIT ENCLOSURE ASSEMBLY REPAIR -
CONTINUED**

0084 00

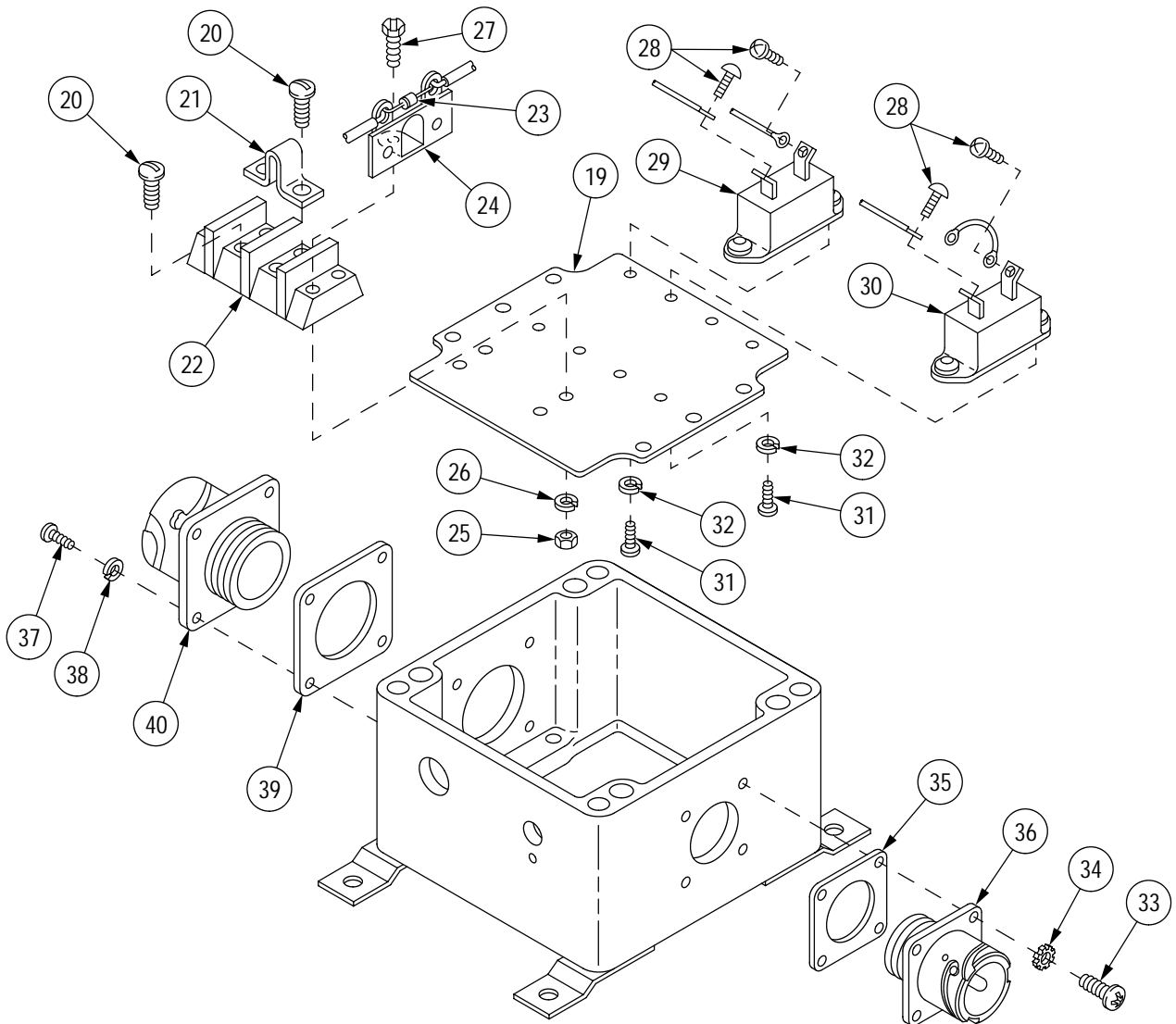
Assembly

1. Install connector J2 (40) and new gasket (39) with four screws (37) and four new lockwashers (38).
2. Install connector J1 (36) and new gasket (35) with four screws (33) and four new lockwashers (34).
3. Install circuit breakers CB1 (29) and CB2 (30) on subplate (19) with four screws (31) and four new lockwashers (32).
4. Install four wires on circuit breakers CB1 (29) and CB2 (30) with four screws (28).
5. Install terminal boards TB1 (22) and (24) with four screws (27), four new lockwashers (26) and four nuts (25).

NOTE

Before proceeding, see detailed instructions on soldering and solder (TB SIG 222).

6. If diode CR1 was removed, solder diode (23) to terminal board (24).
7. Install four wires and jumper (21) on terminal board TB1 (22) with four screws (20).



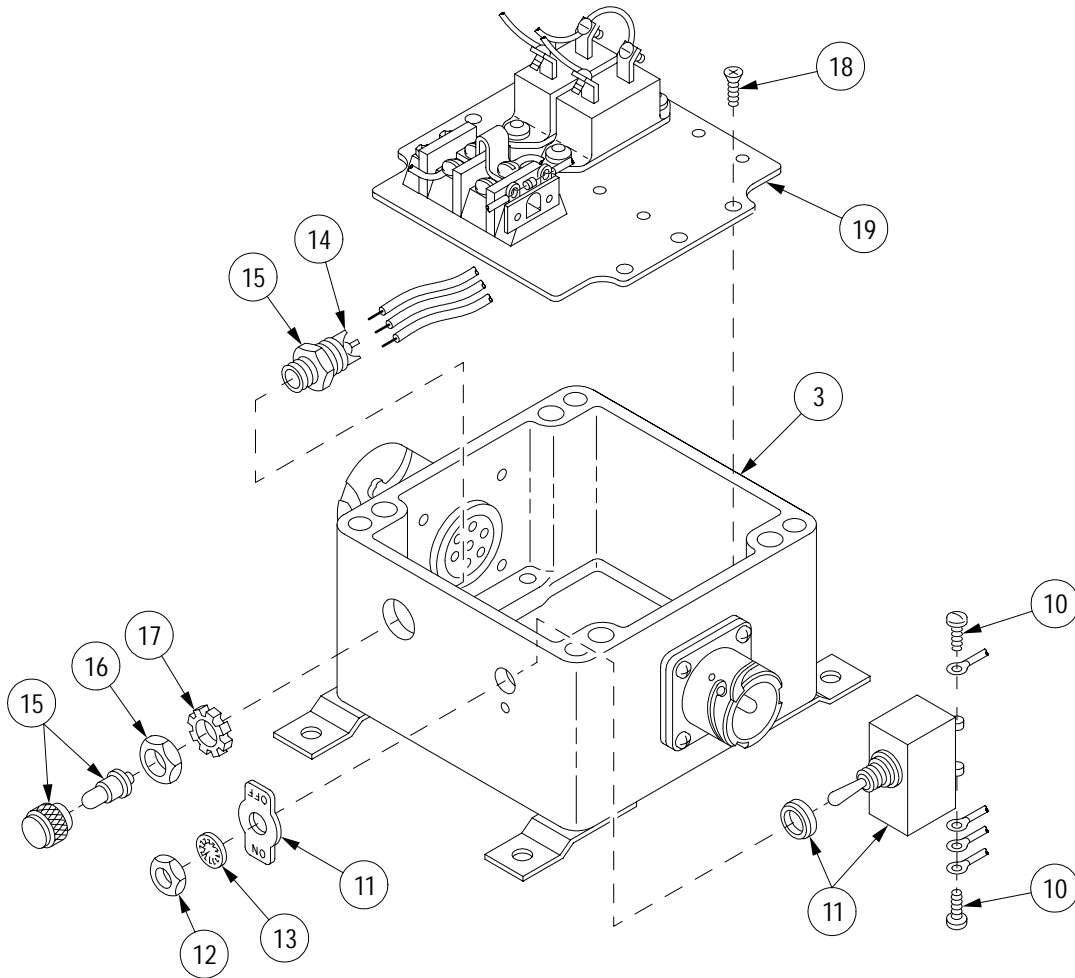
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**AIR PURIFIER CONTROL UNIT ENCLOSURE ASSEMBLY REPAIR -
CONTINUED**

0084 00

Assembly-Continued

8. Install subplate (19) in enclosure (3) with four screws (18).
9. Install light DS1 (15) in enclosure (3) with lockwasher (17) and nut (16).
10. Solder three wires to terminals (14) on light DS1 (15).
11. Install switch S1 (11) in enclosure (3) with lockwasher (13) and nut (12).
12. Install four wires on switch S1 (11) with two screws (10).



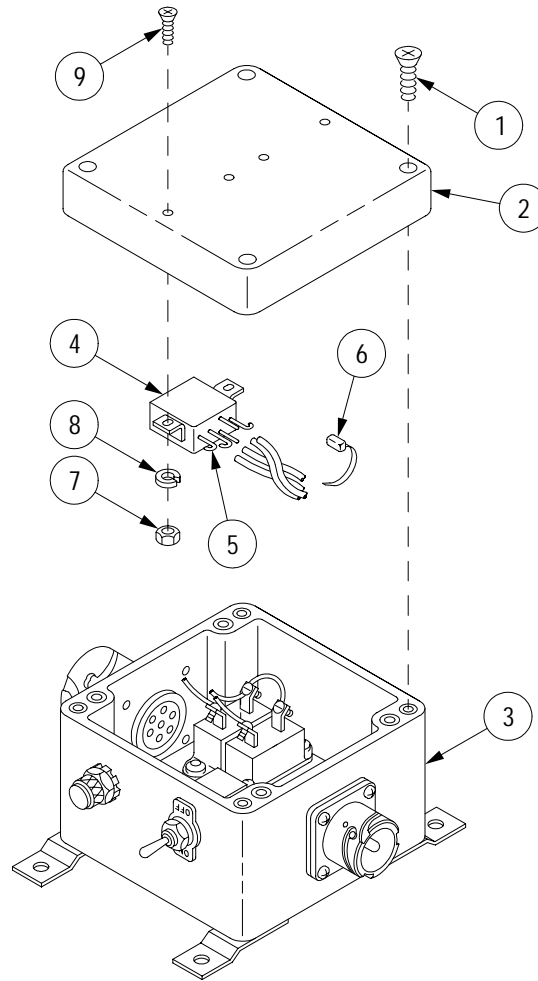
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**AIR PURIFIER CONTROL UNIT ENCLOSURE ASSEMBLY REPAIR -
CONTINUED**

0084 00

Assembly-Continued

13. Install relay K1 (4) on enclosure lid (2) with two screws (9), two new lockwashers (8) and two nuts (7).
14. Solder four wires to terminals (5) on relay K1 (4).
15. Place new electrical tiedown strap (6) around wires from relay K1 (4).
16. Install enclosure lid (2) on enclosure (3) with four captive screws (1).



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NOTE

FOLLOW-ON MAINTENANCE:
Install air purifier control unit enclosure
assembly (TM 9-2350-292-20)

END OF TASK

CHAPTER 13

WHEELS AND TRACKS

ADJUSTING LINK AND COMPONENTS (NEW CONFIGURATION) REPAIR**0085 00****THIS WORK PACKAGE COVERS:**

Disassembly, Assembly, Test

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit (item 1, WP 0090 00)
 Adjustable spanner wrench (item 74, WP 0090 00)
 Torque wrench (item 25, WP 0090 00)
 Track adjuster test fixture (item 75, WP 0090 00)
 Adjusting link test fixture assembly kit (item 76, WP 0090 00)
 Hand lubricating gun (item 79, WP 0090 00)
 Machinist's vise (item 62, WP 0090 00)
 Vise jaw caps (item 78, WP 0090 00)
 Safety goggles (item 23, WP 0090 00)
 Electrical heat gun (item 13, WP 0090 00)
 Dead blow hammer (item 77, WP 0090 00)

Materials/Parts

Track adjusting link parts kit (item 105, WP 0091 00)

Materials/Parts-Continued

Lubricant (item 2, WP 0087 00)
 Sealing compound (item 53, WP 0087 00)
 Wiping rags (item 6, WP 0087 00)
 Dry-cleaning solvent (item 1, WP 0087 00)
 Sleeving insulation (item 106, WP 0091 00)
 Lumber (item 45, WP 0087 00)

Equipment Conditions

Track adjusting link (New Configuration) removed
 (TM 9-2350-292-20)

Personnel Required

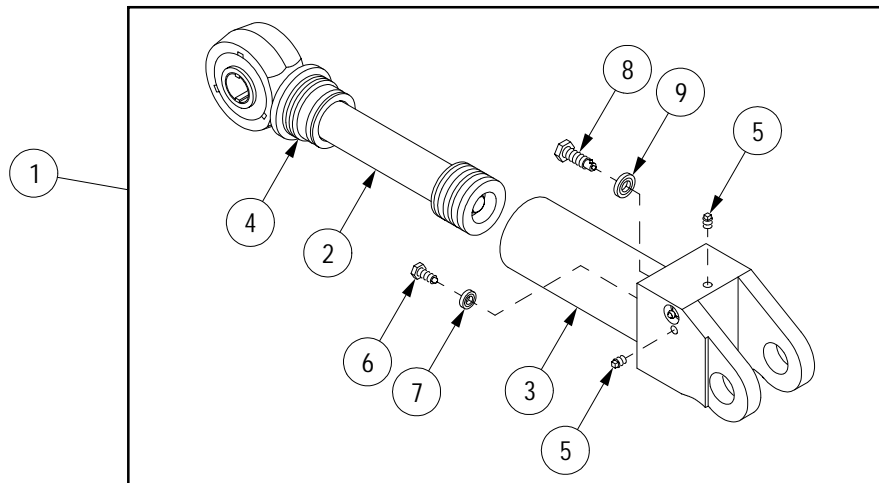
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References

TM 9-2350-292-20

Disassembly

1. Pump lubricant into adjusting link (1) to extend shaft (2) 4 to 6 inches (101.6 to 152.4 mm) out of cylinder (3).
2. Remove shaft (2) with retainer assembly (4) from cylinder (3).
3. Remove two pipe plugs (5) from cylinder (3).
4. Remove grease bleed valve assembly (6) from cylinder (3). Discard preformed packing (7).
5. Remove pressure relief valve assembly (8) from cylinder (3). Discard preformed packing (9).



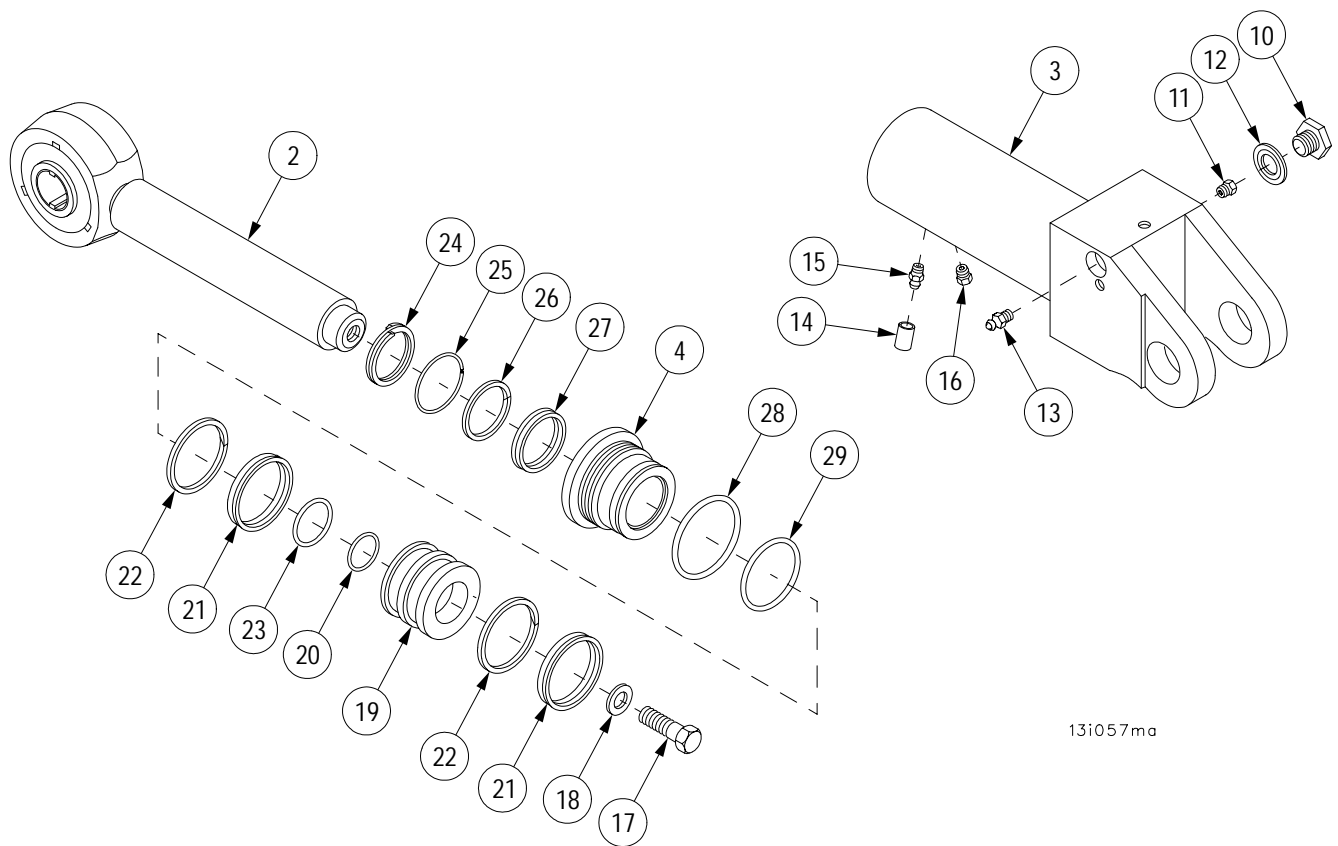
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ADJUSTING LINK AND COMPONENTS (NEW CONFIGURATION) REPAIR - CONTINUED

0085 00

Disassembly-Continued

6. Remove plug (10) and safety relief valve (11) from cylinder (3). Discard preformed packing (12).
7. Remove and discard lubrication fitting (13).
8. Remove and discard sleeving insulation (14) and lubrication fitting (15) from cylinder (3).
9. Remove safety relief valve (16) from cylinder (3).
10. Place shaft (2) with retainer assembly (4) in vise.
11. Remove screw (17), flat washer (18) and piston (19) from shaft (2). Discard preformed packing (20).
12. Remove and discard two seals (21), two back-up rings (22) and preformed packing (23) from piston (19).
13. Remove retainer assembly (4) from shaft (2).
14. Remove and discard retaining ring (24), retainer (25), scraper (26) and seal (27) from large end of retainer assembly (4).
15. Remove and discard two preformed packings (28 and 29) from small end of retainer assembly (4).



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**ADJUSTING LINK AND COMPONENTS (NEW CONFIGURATION) REPAIR -
CONTINUED**

0085 00

Disassembly-Continued**CAUTION**

All signs of previous stake positions on adjusting link must be completely removed. Failure to comply could result in improper bearing fit causing damage to bearing and adjusting link.

NOTE

Perform Disassembly steps 16 and 17 only if bearing is found to be defective.

16. Remove staked portion of shaft (2) that retains bearing (30).
17. Remove bearing (30) from shaft (2).

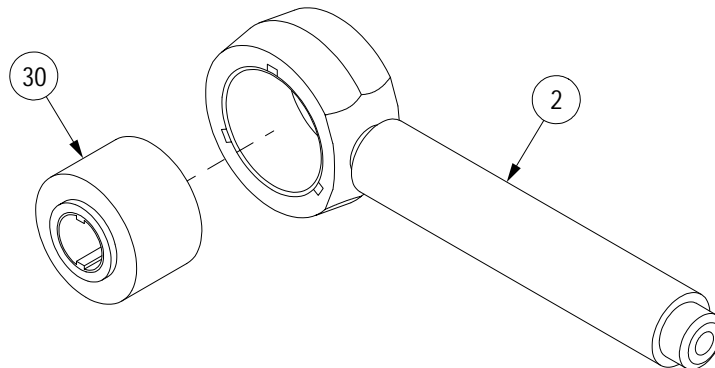


18. Clean all parts with dry-cleaning solvent.
19. Inspect parts for damage and replace as required.

Assembly**NOTE**

Perform Assembly steps 1 and 2 only if bearing is being replaced.

1. Install bearing (30) in shaft (2).
2. Stake bearing (30) on both sides of shaft (2) at three equally spaced distances around bearing (30).



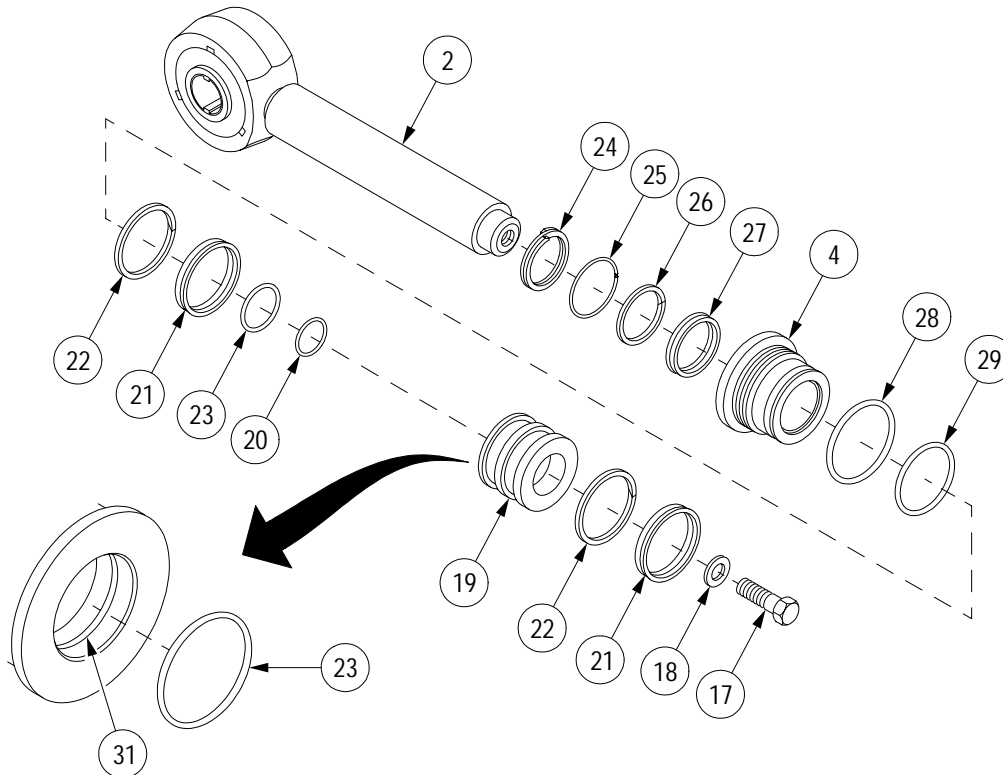
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ADJUSTING LINK AND COMPONENTS (NEW CONFIGURATION) REPAIR - CONTINUED

0085 00

Assembly-Continued

3. Apply lubricant to all seals and packings prior to installation.
4. Install two new preformed packings (29 and 28) at small end of retainer assembly (4).
5. Install new seal (27), new scraper (26), new retainer (25) and new retaining ring (24) at large end of retainer assembly (4).
6. Apply lubricant to shaft (2).
7. Install retainer assembly (4) on shaft (2) (large end towards bearing).
8. Install new preformed packing (23) in groove (31) in piston (19).
9. Install two new back-up rings (22) and two new seals (21) on piston (19).
10. Install new preformed packing (20) in bottom of piston (19).
11. Apply sealing compound to threads of screw (17).
12. Install piston (19) on shaft (2) with flat washer (18) and screw (17). Torque screw to 96-120 lb-ft (130.1- 162.7 N•m).



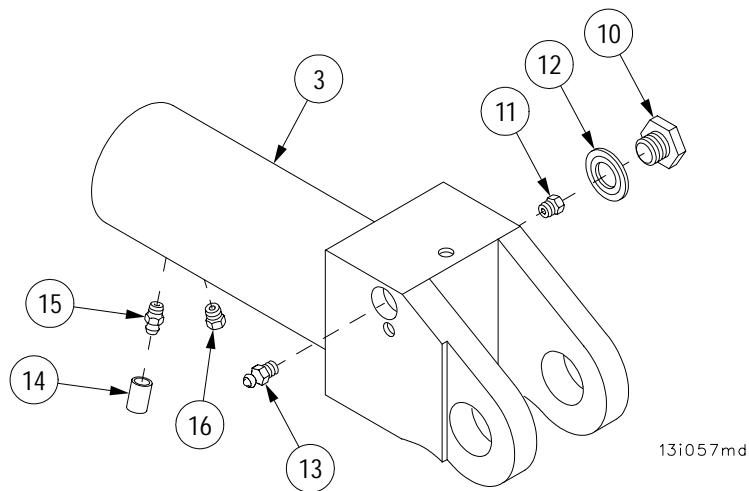
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**ADJUSTING LINK AND COMPONENTS (NEW CONFIGURATION) REPAIR -
CONTINUED**

0085 00

Assembly-Continued

13. Apply lubricant to threads of safety relief valve (16).
14. Install safety relief valve (16) in cylinder (3). Torque safety relief valve to 3-7 lb-ft (4.0-9.5 N•m).
15. Apply lubricant to threads of lubrication fitting (15).
16. Install lubrication fitting (15) in cylinder (3). Torque lubrication fitting to 6-8 lb-ft (8.1-10.8 N•m).
17. Cut new sleeving insulation (14) to 0.50 in. (12.7 mm) long.
18. Install sleeving insulation (14) over lubrication fitting (15). Heat shrink sleeving insulation (14) over lubrication fitting (15). Do not cover hex portion of lubrication fitting (15).
19. Apply lubricant to threads of lubrication fitting (13).
20. Install lubrication fitting (13) in cylinder (3). Torque lubrication fitting to 3-7 lb-ft (4.0-9.5 N•m).
21. Apply lubricant to threads of safety relief valve (11).
22. Install safety relief valve (11) in cylinder (3). Torque safety relief valve to 3-7 lb-ft (4.0-9.5 N•m).
23. Install new preformed packing (12) on plug (10). Apply sealing compound to threads of plug (10) and install plug (10) in cylinder (3).



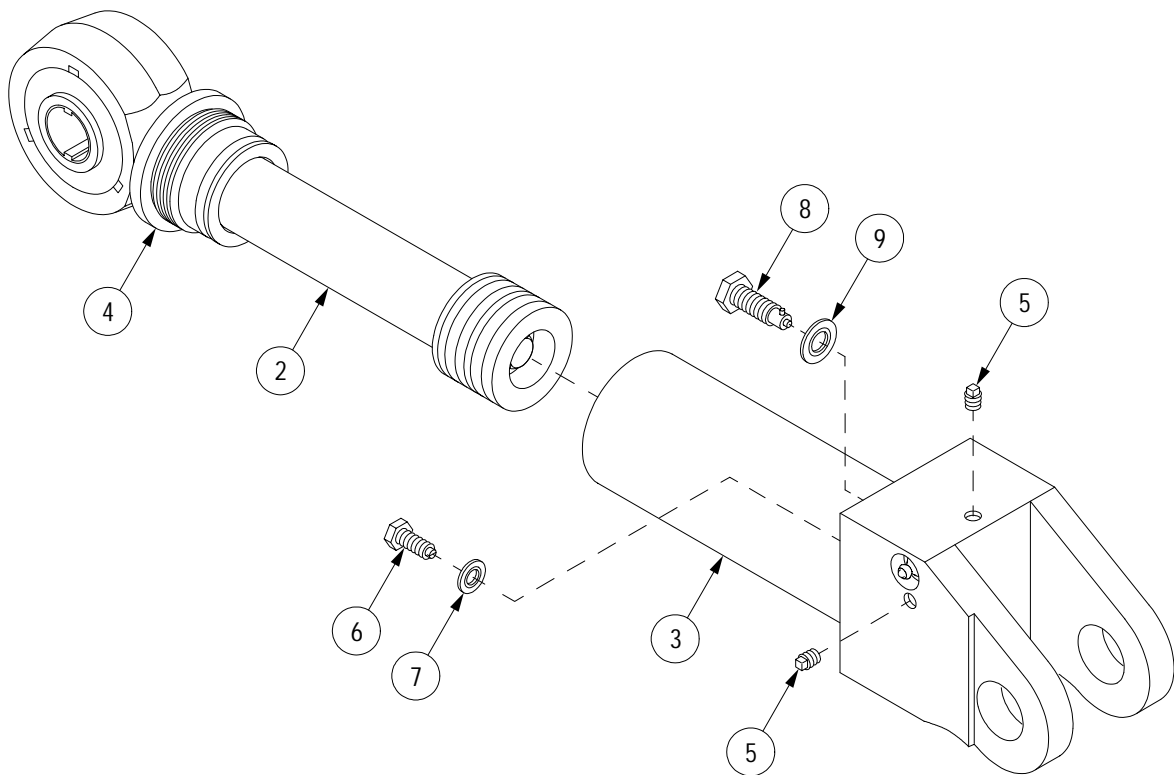
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**ADJUSTING LINK AND COMPONENTS (NEW CONFIGURATION) REPAIR -
CONTINUED**

0085 00

Assembly-Continued

24. Apply lubricant to threads of pressure relief valve assembly (8).
25. Install pressure relief valve assembly (8) with new preformed packing (9) in cylinder (3). Torque safety relief valve to 40-60 lb-ft (54.20-81.4 N•m).
26. Apply lubricant to threads of grease bleed valve assembly (6).
27. Install grease bleed valve assembly (6) with new preformed packing (7) in cylinder (3).
28. Apply sealing compound to threads of two pipe plugs (5).
29. Install two pipe plugs (5) in cylinder (3).
30. Apply lubricant to shaft (2) and cylinder (3).
31. Install shaft (2) in cylinder (3) and secure with retainer assembly (4).



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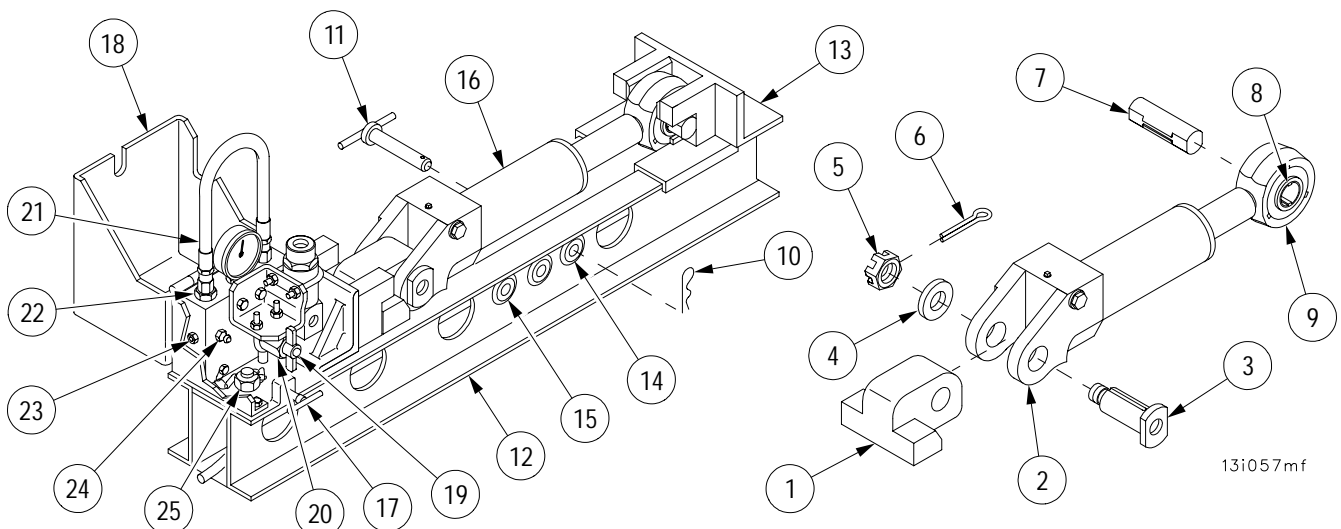
**ADJUSTING LINK AND COMPONENTS (NEW CONFIGURATION) REPAIR -
CONTINUED****0085 00****Test**

1. Install adapter link (1) on cylinder (2) with headed pin (3), flat washer (4), nut (5) and cotter pin (6).
2. Install fixture pin (7) through bearing (8) in shaft (9).
3. Remove lock pin (10) from straight pin (11) and remove straight pin (11) from frame (12).

NOTE

Pin goes through hole in frame farthest from gauge when testing right track adjusting link. When testing left track adjusting link, pin goes through hole in frame closest to gauge.

4. Move slide (13) until hole in slide (13) lines up with hole (14 or 15) in frame (12). Install straight pin (11) and secure with lock pin (10).
5. Place track adjusting link (16) on frame (12) with adapter link (1) under hooks in frame (12) and fixture pin (7) under hooks in slide (13).
6. Loosen T-handle (17) and open fixture cover (18).
7. Turn handle (19) to close fixture valve (20).
8. Install swivel end of hose (21) on manifold adapter (22).
9. Loosen bleed plug (23) and pump lubricant into fixture lubrication fitting (24) until lubricant flows out from around bleed plug (23). Tighten bleed plug (23).
10. Disconnect swivel end of hose (21) from manifold adapter (22).
11. Remove manifold adapter (22) and install plug (25) at manifold adapter (22) location. Store manifold adapter (22) at plug (25) storage location.



ADJUSTING LINK AND COMPONENTS (NEW CONFIGURATION) REPAIR - CONTINUED

0085 00

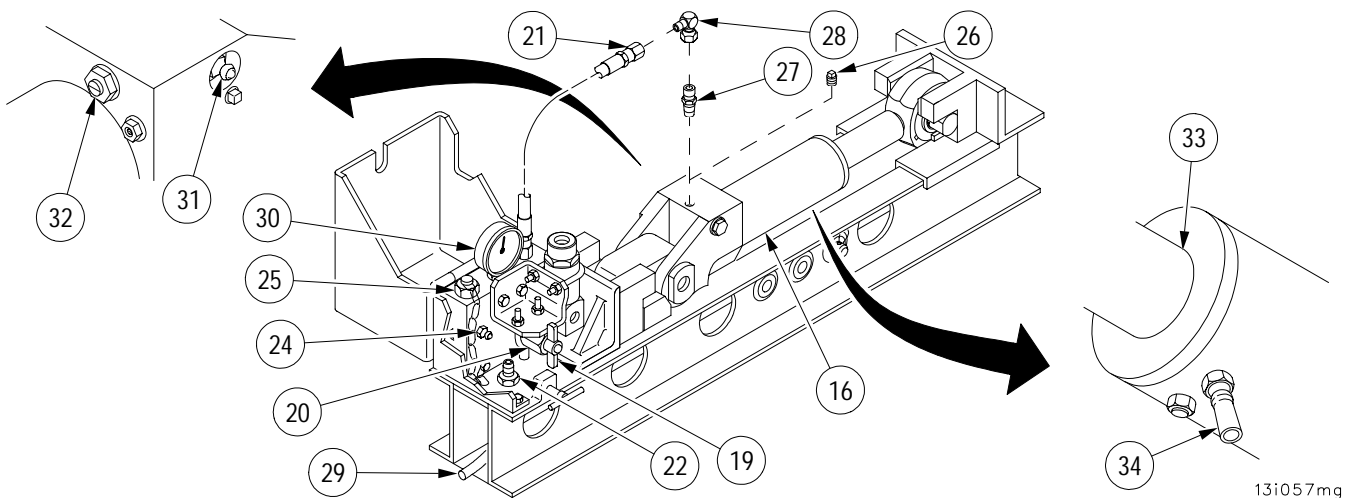
Test-Continued

12. Remove track adjusting link plug (26) and install straight adapter (27) and elbow adapter (28).
13. Install swivel end of hose (21) on elbow adapter (28).
14. Turn handle (19) to open fixture valve (20).
15. Pump lubricant into fixture lubrication fitting (24) until lubricant comes out of fixture valve drain tube (29). Turn handle (19) to close fixture valve (20).

WARNING

Pressure relief valve opens above 2250 psi and releases pressurized lubricant. Safety goggles must be worn and pressure relief valve covered with rag to prevent lubricant from entering eyes. Failure to comply could cause severe eye injury.

16. Watch gauge (30) and pump lubricant in lubrication fitting (31) until pressure relief valve assembly (32) opens. Catch lubricant with rag. Pressure relief valve assembly (32) should open when pressure is above 2250 psi. If pressure relief valve assembly (32) does not open when pressure goes above 2250 psi, replace pressure relief valve assembly (32) and retest.
17. Check track adjusting link (16) for leaks. If lubricant leaks around track adjusting link shaft (33), remove shaft and repair retainer assembly. If track adjusting link (16) leaks at insulation sleeving (34), remove shaft and repair piston assembly. After repair, perform track adjusting link test.
18. Turn handle (19) to open fixture valve (20) and bleed off pressure until gauge (30) reads 0 psi.
19. Turn handle (19) to close fixture valve (20). Wipe lubricant from fixture valve drain tube (29).
20. Remove plug (25) from manifold adapter location and install in storage location after removing manifold adapter (22).



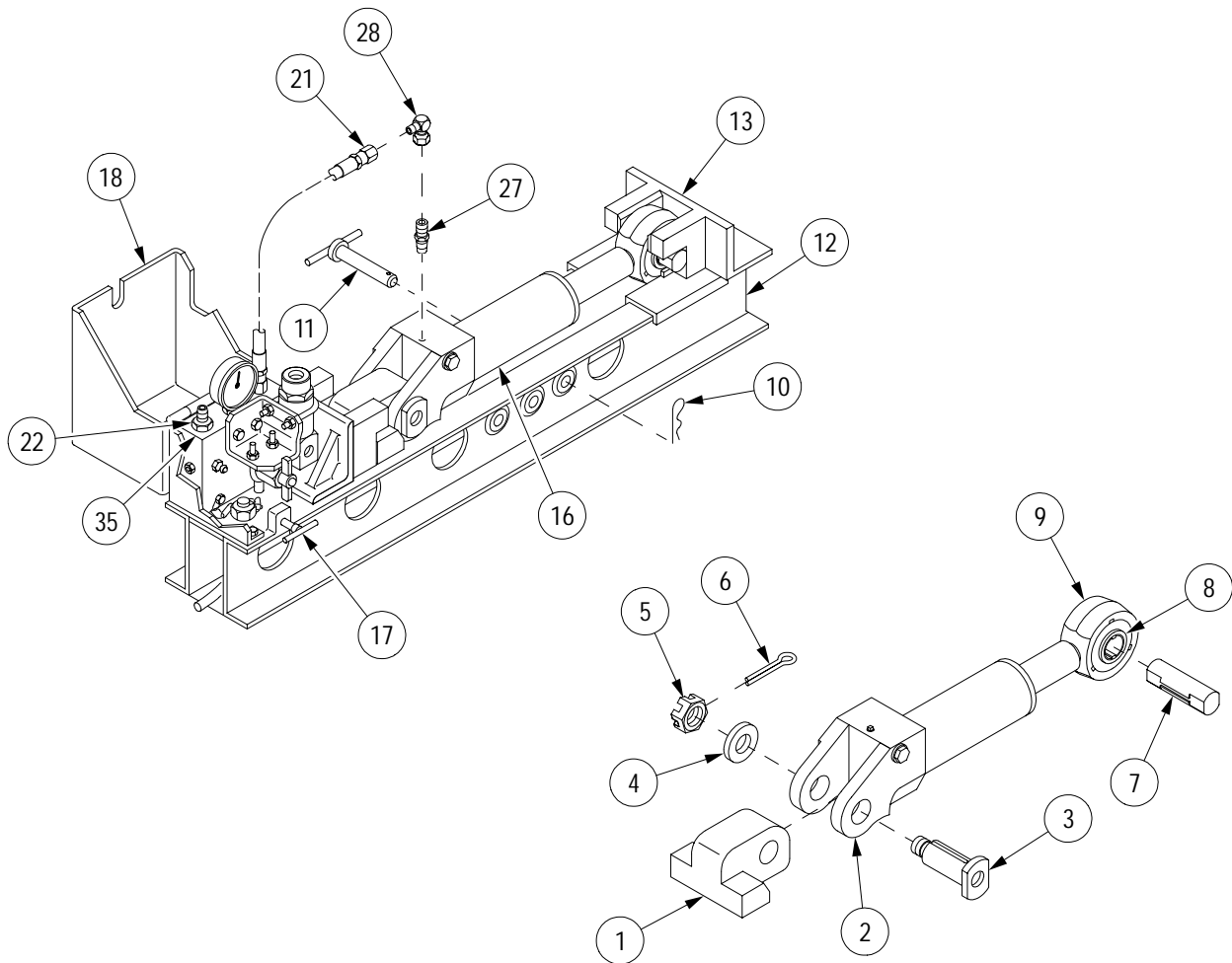
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**ADJUSTING LINK AND COMPONENTS (NEW CONFIGURATION) REPAIR -
CONTINUED**

0085 00

Test-Continued

21. Disconnect swivel end of hose (21) from elbow adapter (28). Remove elbow adapter (28) and straight adapter (27) from track adjusting link (16). Install manifold adapter (22) in block (35).
22. Reconnect swivel end of hose (21) to manifold adapter (22). Close and secure fixture cover (18) with T-handle (17).
23. Remove lock pin (10) from straight pin (11), move slide (13) away from track adjusting link (16). Remove track adjusting link (16) from frame (12).
24. Remove fixture pin (7) from bearing (8) in shaft (9).
25. Remove cotter pin (6), nut (5), flat washer (4), headed pin (3) and adapter link (1) from cylinder (2).
26. Move slide (13) toward fixture cover (18) until hole in slide (13) aligns with hole in frame (12). Install straight pin (11) and secure with lock pin (10).



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ADJUSTING LINK AND COMPONENTS (NEW CONFIGURATION) REPAIR - CONTINUED

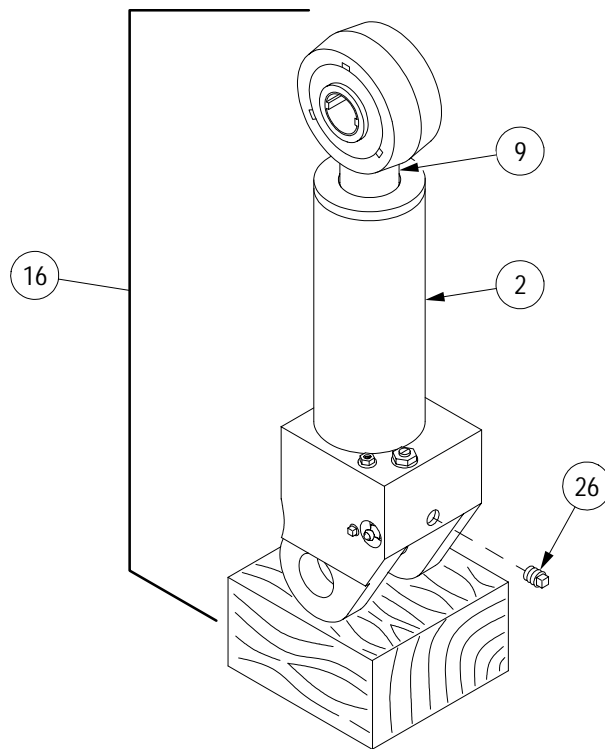
0085 00

Test-Continued

27. Place track adjusting link (16) on wooden block. Position rag under drain hole in track adjusting link (16).
28. Compress shaft (9) into cylinder (2) until shaft (9) bottoms.
29. Position track adjusting link (16) on flat surface.



30. Clean track adjusting link plug (26) with dry-cleaning solvent.
31. Apply sealing compound to threads of track adjusting link plug (26).
32. Install track adjusting link plug (26) in cylinder (2).



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NOTE

FOLLOW-ON MAINTENANCE:
Install track adjusting link (New Configuration)
(TM 9-2350-292-20)

END OF TASK

CHAPTER 14

SUPPORTING INFORMATION

REFERENCES**0086 00****THIS WORK PACKAGE COVERS:**

Scope, and lists all Field Manuals, Forms, Technical Bulletins, Technical Manuals, Regulations, Military Specifications, and Miscellaneous Publications listed in this manual.

SCOPE

The following publications are applicable at Direct Support and General Support Maintenance levels to material covered in this technical manual. Appropriate indexes should be consulted frequently for latest applicable changes, revisions and additions.

FORMS

Processing and Deprocessing Record for Shipment, Storage, and Issue of Vehicles and Spare Engines	DD Form 1397
Quality Deficiency Reports	SF Form 368
Recommended Change to Publications	DA Form 2028
U.S. Army Accident Investigation Report	DA Form 285

FIELD MANUALS

First Aid for Soldiers	FM 21-11
NBC Protection	FM 3-4
NBC Decontamination	FM 3-5
Explosives and Demolitions	FM 5-250

TECHNICAL BULLETINS

Warranty: Recovery Vehicle, Heavy, Full-Tracked: M88A2	TB 9-2350-292-15
Solder and Soldering	TB SIG 222
Color, Markings and Camouflage Patterns used on Military Equipment managed by USATSARCOM (Reprinted w/basic including C1 and C2)	TB 43-0147
Elimination of Combustibles from Interiors of Metal or Plastic Gasoline and Diesel Fuel Tanks	TB 750-1047

TECHNICAL MANUALS

Inspection, Care And Maintenance Of Antifriction Bearings.	TM 9-214
Materials Used For Cleaning, Preserving, Abrading And Cementing Ordnance Material And Related Materials Including Chemicals.	TM 9-247
Operator's Manual: Recovery Vehicle, Heavy, Full-Tracked: M88A2	TM 9-2350-292-10
Unit Maintenance Manual: Recovery Vehicle, Heavy, Full-Tracked: M88A2	TM 9-2350-292-20
Unit, Direct Support and General Support Maintenance Repair Parts and Special Tools List for Recovery Vehicle, Heavy, Full-tracked: M88A2	TM 9-2350-292-24P
Organizational, Direct Support and General Support Maintenance Manual (Including Repair Parts and Special Tools) for Heaters, Vehicular Compartment. Stewart-Warner 10560M (NSN 2540-01-071-0651), 10560M24B1 (2540-01-169-5159), 10560C24 (2540-01-083-0691), and 10560G (75400-01-262-6013); Hupp MF60A-24V (2540-00-930-8938), MF510B (2540-01-071-0652), MF510C, MF60B-24V (2540-01-172-3834); Espar V7s (2540-01-114-7688)	TM 9-2540-205-24&P

REFERENCES - CONTINUED

0086 00

TECHNICAL MANUALS - CONTINUED

- Direct Support and General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Engine, Diesel, Industrial Type Model DJEAM and DJBMA (NSN 2815-01-175-7342) and (NSN 2815-00-615-8740) TM 9-2815-221-34&P
- Unit, Direct Support and General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Engine Assembly, Diesel, HATZ 2 G 40 (NSN 2815-01-446-3500) TM 9-2815-250-24&P
- Direct Support and General Support Maintenance Manual for Engine with Container: Turbosupercharger Diesel, Fuel Injection, 90-Degree "V" Type, Air-Cooled, 12-Cylinder, Assembly; Model AVDS-1790-8CR TM 9-2815-247-34
- Direct Support and General Support Maintenance Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools) for Engine With Container: Turbosupercharged, Oil-Cooled Generator; Diesel Fuel Injection, 90-Degree "V" Type, Air Cooled, 12-Cylinder, Assembly: Model ADVS-1790-8CR TM 9-2815-247-34P
- Direct Support and General Support Maintenance Manual Including Repair Parts and Special Tools List for Starter, Electrical, Assembly (Delco-Remy-GMC Model 1109972) (NSN 2920-00-937-1557) and (Model No. 1990272) (2920-01-13-3722) {TO 38X14-2-32} TM 9-2920-252-34&P
- Direct Support and General Support Maintenance Manual Including Repair Parts and Special Tools List for 650 AMP Generator Assembly (Bendix Corp., Model 30B95-3-B) (NSN 2920-00-441-8137); Voltage Regulator Assembly (Bendix Corp., Model 24B30-3-B) and (Electro-Tech Model 1300) (6110-00-467-4000) TM 9-2920-252-34&P
- Painting Instructions For Army Material (reprinted w/basic Incl. c1 and c2) TM 9-43-0139
- Operator's and Organizational Maintenance Manual Including Repair Parts and Special Tools List for Simplified Test Equipment for Internal Combustion Engines (NSN 4910-01-124-2554) (Reprinted w/basic incl. c1 and c2) TM 9-4910-571-12&P
- Operator's, Organizational, Direct Support and General Support Maintenance Manual for Lead-Acid Storage Batteries TM 9-6140-200-14
- Unit Maintenance Manual for Ground ICOM Radio Sets AN/PRC-119A (NSN 5820-01-267-9482) (EIC: L2Q), AN/VRC-87A (5820-01-267-9480) (EIC: L22), AN/VRC-88A (5820-01-267-9481) (EIC: L23), AN/VRC-89A (5820-01-267-9479) (EIC: L24), AN/VRC-90A (5820-01-267-5105) (EIC: L25), AN/VRC-92A (5820-01-267-9477) (EIC: L27) TM 11-5820-890-20-1
- Procedures for Destruction of Equipment to Prevent Enemy Use TM 750-244-6
- Operator and Organizational Maintenance for Test Set, Electronic System, AN/PSM-95 TM 9-6625-2301-12
- Direct Support and General Support Maintenance Manual Including Repair Parts and Special Tools List for Turbosupercharger, (Schwitzer Model 5HDR) (NSN 2950-00-397-3384) (11668377-1) and (2950-01-167-1700) (187727) TM 9-2990-205-34&P

REGULATIONS

- Accident Reporting and Records AR 385-40
- Reporting of Product Quality Deficiencies Across Component Lines AR 702-7

REFERENCES - CONTINUED

0086 00

MILITARY SPECIFICATIONS

Fusion Welding for Aerospace Applications MIL-STD-2219
 Cleaning Methods and Pretreatment of Ferrous Surfaces for Organic Coating TT-C-490
 Safety in Welding and Cutting ANSI/ASC Z49.1
 Rods and Wire, Welding, Corrosion and Heat Resistant Alloys MIL-R-5031B
 Primer Coating, Epoxy, Water Reducible, Lead and Chromate Free MIL-P-53030A
 Primer, Epoxy Coating, Corrosion Inhibiting, Lead and Chromate Free MIL-P-53022B

MISCELLANEOUS PUBLICATIONS

Army Medical Department Expendable/Durable Items CTA 8-100

Expendable Items (except Medical, Class V, Repair Parts, and
 Heraldic Items) CTA 50-970

The Army Maintenance Management System (TAMMS), as contained
 in the Maintenance Management Update DA PAM 738-750

Hearing Conservation DA PAM 40-501

Sets, Kits, and Outfits Shop Equipment, Automotive Maintenance
 and Repair for Field Maintenance, Basic, Less Power (NSN 4910-00-754-0705) SC 4910-95-A31

Tool Kit, Automotive Fuel and Electrical System Repair (NSN 5180-00-754-0655) .. SC 5180-95-CL-B08

Sets, Kits, Outfits, and Tools Shop Equipment, Automotive Maintenance,
 and Repair; Field Maintenance, Supplemental No. 1, Less Power
 (NSN 4910-00-754-0706) and Shop Equipment Automotive Maintenance
 and Repair: Field Maintenance, Supplemental No. 1 MAP Only
 (NSN 4910-00-919-0078) SC 4910-95-A62

Sets, Kits, and Outfits Components List, Shop Equipment, Automotive
 Maintenance and Repair: Organizational Maintenance, Common No. 2,
 Less Power (NSN 4910-00-754-0650) SC 4910-95-A72

Sets, Kits, and Outfits, Components List Shop Equipment, Fuel and Electrical
 System Engine: Field Maintenance, Basic, Less Power (NSN 4910-00-754-0714)
 (T30414) and Shop Equipment, Fuel and Electrical System Engine: Field
 Maintenance, Basic, Map Only (NSN 4910-00-919-0083) SC 4910-95-B20

Sets, Kits, and Outfits Tool Kit, General Mechanic's Automotive (GMTK)
 (NSN 5180-00-177-7033) SC 5180-90-N26

Sets, Kits and Outfits Components List, Shop Equipment, Artillery Maintenance:
 Field Maintenance, Set N, Less Power (NSN 4933-00-754-0704) (T24523) SC 4933-95-A12

Operator's Circular Welding Theory And Application TC-9-237

END OF TASK

EXPENDABLE AND DURABLE ITEMS LIST

0087 00**THIS WORK PACKAGE COVERS:**

Scope, Explanation of Columns, and a list of all Expendable and Durable items needed to maintain the M88A2 HRV at DS/GS Level Maintenance.

SCOPE

This work package lists expendables and durable items you will need to maintain the M88A2 HRV systems. This listing is for informational purposes only and is not the authority to requisition the listed items. These items are authorized to you by CTA 50-970, expendable items (except Medical, Class V, Repair Parts and Heraldic Items).

EXPLANATION OF COLUMNS

- a. **Column (1) - Item number.** This number is assigned to the entry in the listing for referencing when required.
- b. **Column (2) - Level.** This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew

O - Unit Maintenance

F - Direct Support Maintenance

H - General Support Maintenance

- c. **Column (3) - National Stock Number.** This is the national stock number assigned to the item; use it to request or requisition the item.
- d. **Column (4) - Description.** Indicates the federal item name and, if required, a description to identify the item. The last line for each item indicates the Commercial and Government Entity Code (CAGEC) parentheses followed by the part number.
- e. **Column (5) - Unit Of Measure (U/M)/Unit Of Issue (U/I).** This measure is expressed by a two-character alphabetical abbreviation (e.g., EA, IN, PR). If the unit of measure differs from the unit of issue as shown in the Army Master Data File (AMDF) requisition the lowest unit of issue that will satisfy your requirements.

EXPENDABLE AND DURABLE ITEMS LIST

0087 00

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) (U/M) (U/I)
1	O	6850-01-331-3350 6850-01-331-3349	Dry-cleaning solvent, type II, 55-gal drum (81348) P-D-680 55 GL Drum 5 GL can	GL GL
2	O	9150-00-190-0904	Grease, automotive and artillery, (98308) MIL-G-10924	LB
3	F	9150-00-250-0926	Petrolatum, technical	PT
4	O	5510-00-274-5377	Lumber, hardwood, (81348), MML736, 2x4x8	BF
5	O	9150-00-111-6254	Fluid, hydraulic, rust-inhibited, fire-resistant (FRH), (81349) MIL-H-46170	GL
6	O	7920-00-205-1711	Rag, wiping, 50-lb bale (58536) A-A-2522GRB	LB
7	F	3439-00-133-1108	Solder, Tin Alloy, 1 LB spool: (81348) SN60WRAP3	LB
8	F	3439-00-400-1972	Flux, Soldering: MIL-F-14256 (81349)	PT
9	O	5970-00-419-4291	Tape, insulation, electrical, 108 ft roll: (81349) MIL-I-24391	FT
10	F	5510-00-267-2134	Lumber, hardwood, (81348), MML736, 4x4x10	BF
11	O	4110-00-262-1551	Chain, Weldless 42C16505 (01976)	FT
12	F	9150-00-261-7891	Lubricating oil, exposed gear, (81348) VV-L-751	QT
13	O	8040-00-833-9563	Adhesive, MIL-A-46106 TYPE 1	KT
14	F	3439-01-343-3855	Electrode, welding ER308I-035IN (21053)	LB
15	F	8010-01-309-0329	Epoxy primer coating (81349) MIL-P-53022	KT
16	F	8010-00-082-2434	Epoxy coating kit, MIL-C-22750 Type I (81349)	KT
17	O	8030-01-181-5549	Sealing compound, MIL-A-46106 TYPE 3	KT
18	O	5350-00-025-7935	Cloth, abrasive, 11678467-3 (19206)	LB
19	O	7930-00-530-8067	Detergent, general purpose, P-D-220TY2 (81348)	GL
20	O	8030-00-981-7006	Sealing compound, Loctite 545 (Optional: apply sealant HV per MIL-S-22473)	BT
21	F	7920-00-044-9281	Cloth, cleaning (51200) MIRACLEWIPE001	BX
22	O	5340-00-882-5070	Plug, dust protective 3/4 inch	EA
23	F	9505-00-221-2650	Wire, non-electrical (96906) MS20995C20	LB
24	F	5975-00-111-3208	Strap, tiedown, electrical (96906) MS3367-5	HD
25	F	5975-00-156-3253	Strap, tiedown, electrical (96906) MS3367-2-9	HD
26	O	9905-00-537-8954	Tag, marker MIL-T-12755CLRW (81349)	EA
27	O	9150-01-433-7974 9150-01-433-7986 9150-01-433-7974 9150-01-422-9346 9150-01-438-6082 9150-01-438-6079	Lubricating oil, engine (OE), MIL-L-2104, (81349) 1 QT can, OE30 5 GL can, OE30 55 GL Drum, OE30 1 QT can, 15W40 5 GL can, 15W40 55 GL Drum, 15W40	QT CN DR QT CN DR
28	O	4730-00-203-3638	Cap, 37 degree, 1/4 in, ORS (30780) 4FNTXB	EA
29	O	4730-00-995-1229	Cap, 37 degree, 3/8 in, ORS (30780) 6FNTX	EA
30	O	4730-00-278-5708	Cap, 37 degree, 3/4 in, ORS (30780) 12FNTX-B	EA
31	O	4730-00-400-6420	Adapter, 1/2 in, (30780) 85FOX-B	EA
32	O	4730-00-936-5046	Adapter, 3/4 in, (96906) MS39324-12-12	EA

EXPENDABLE AND DURABLE ITEMS LIST – CONTINUED

0087 00

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) (U/M) (U/I)
33	O	4730-00-138-8454	Cap, 37 degree, 1 in, ORS (30780) 16FNTXB	EA
34	O	4730-00-912-9416	Plug, 37 degree, 1/4 in, ORS (30780) 4PNTXB	EA
35	O	4730-00-833-0211	Plug, 37 degree, 3/8 in, ORS (30780) 6PNTXB	EA
36	O	4730-00-833-0215	Plug, 37 degree, 1/2 in, ORS (30780) 8PNTXB	EA
37	O	4730-00-030-7129	Plug, 37 degree, 3/4 in, ORS (30780) 12PNTX-B	EA
38	O	4730-00-132-1183	Plug, 37 degree, 1 in, ORS (96906) MS51518B16Z	EA
39	O	4730-00-787-9402	Tee, 37 degree, 1/4 in, ORS (30780) 4R50XSS	EA
40	O	4730-00-936-2158	Tee, 37 degree, 3/4 in, ORS (30780) 12R50XS	EA
41	O	4730-01-310-2849	Tee, 37 degree, 1 in, ORS (30780) 16R50X-S	EA
42	O	5340-01-063-1192	Cap, dust protective 1/2 inch MIL-C-5501/7F8 (81349)	EA
43	O	5340-01-085-4239	Plug, dust protective 1/2 inch MIL-C-5501/7-F10 (81349)	EA
44	O	5340-01-109-7061	Plug, dust protective 1/4 inch MIL-C-5501/7-F3 (81349)	EA
45	F	5510-00-267-2139	Lumber, hardwood, MML-736, 12x12x10 (81348)	BF
46	O	4020-01-204-7039	Rope, fibrous (19207)	FT
47	O	8040-01-147-9957	Adhesive (19207), 12347278	KT
48	O	6520-01-140-5364	Goggles, safety, 652000C093171 (89875)	EA
49	O		Epoxy, 12934621 (100 grams)	PK
50	O	8030-00-155-6444	Compound, antiseize, NSA16 (15145)	CN
51	O		Tape, pressure sensitive; 12367083 (19207)	EA
52	O	8030-00-275-8111	Compound, sealing, A-A-52495-1	GL
53	O	8030-01-014-5869	Compound, sealing, MIL-S-46163, TY2, GRN	BT
54	O	8040-01-250-3969	Adhesive 242 (05972)	EA
55	O	8030-00-148-9833	Compound, sealing	BT
56	O		Adhesive, P/N 12414580	TU
57	O	8030-00-163-5792	Sealing compound, P/N 11663357	CN
58	O		Insulation sleeving, 3", P/N 12352468-13	FT
59	F	4720-00-608-2588	Hose, non-metallic ORT RC3 (73842)	FT
60	F	4730-00-908-3194	Clamp, 1.5 inch ID MS35338-11 (45681)	EA

END OF TASK

MANUFACTURED ITEMS LIST

0088 00

THIS WORK PACKAGE COVERS:

Scope, Part Number List and complete instructions, illustrations and all materials necessary for support items to be manufactured or fabricated at DS/GS Maintenance Level.

SCOPE

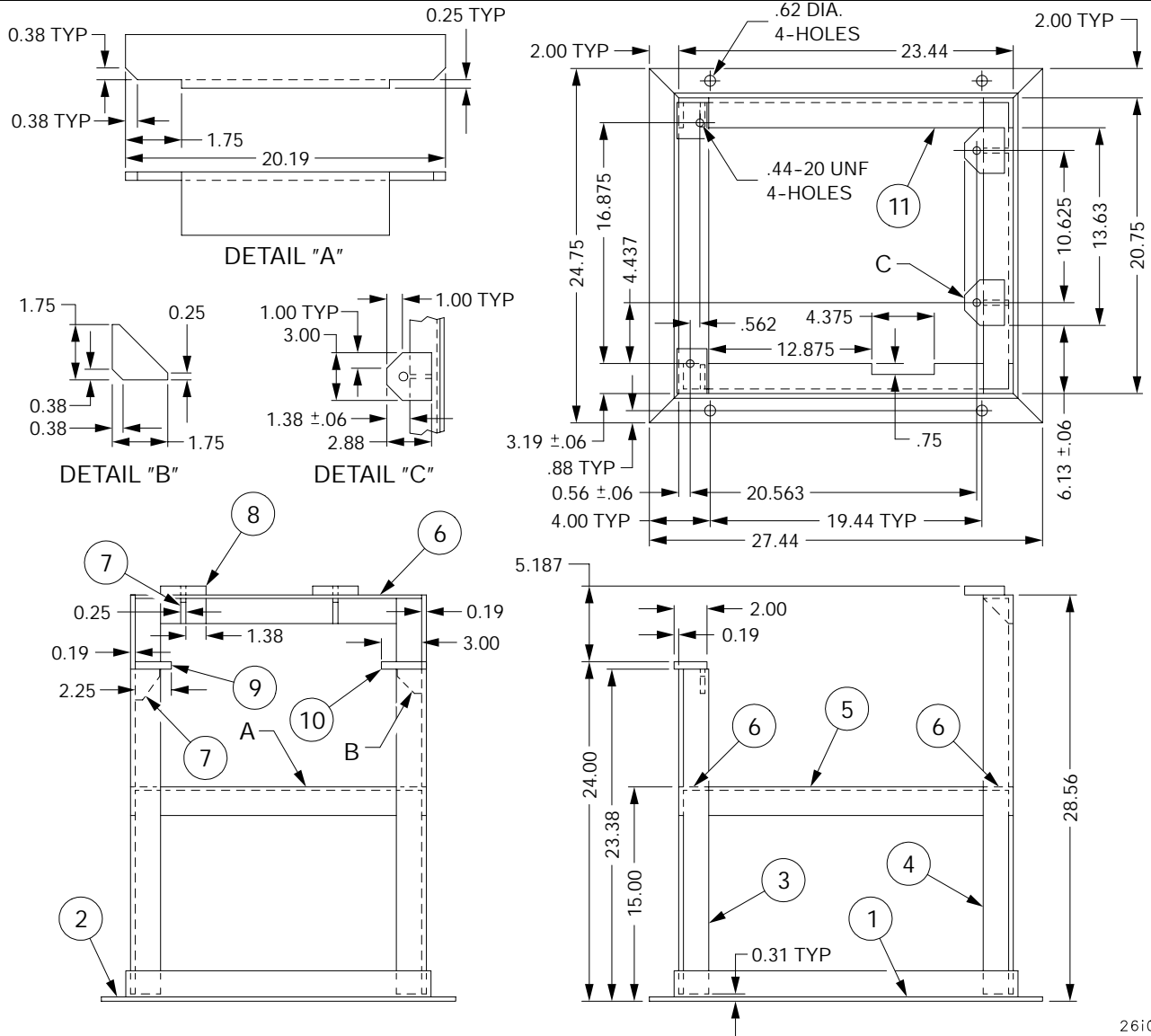
This work package includes complete instructions for making items authorized to be manufactured or fabricated at DS/GS maintenance level. A part number list is provided for cross-referencing the item to be manufactured to the figure which covers fabrication criteria. All bulk materials needed for manufacture of an item are listed in a tabular list on the illustration.

PART NUMBER LIST

<u>ITEM</u>	<u>PART NUMBER</u>	<u>REFERENCE</u>
Test Stand, APU	-----	Figure 1
Stand, Nose Piece	-----	Figure 3

MANUFACTURED ITEMS LIST - CONTINUED

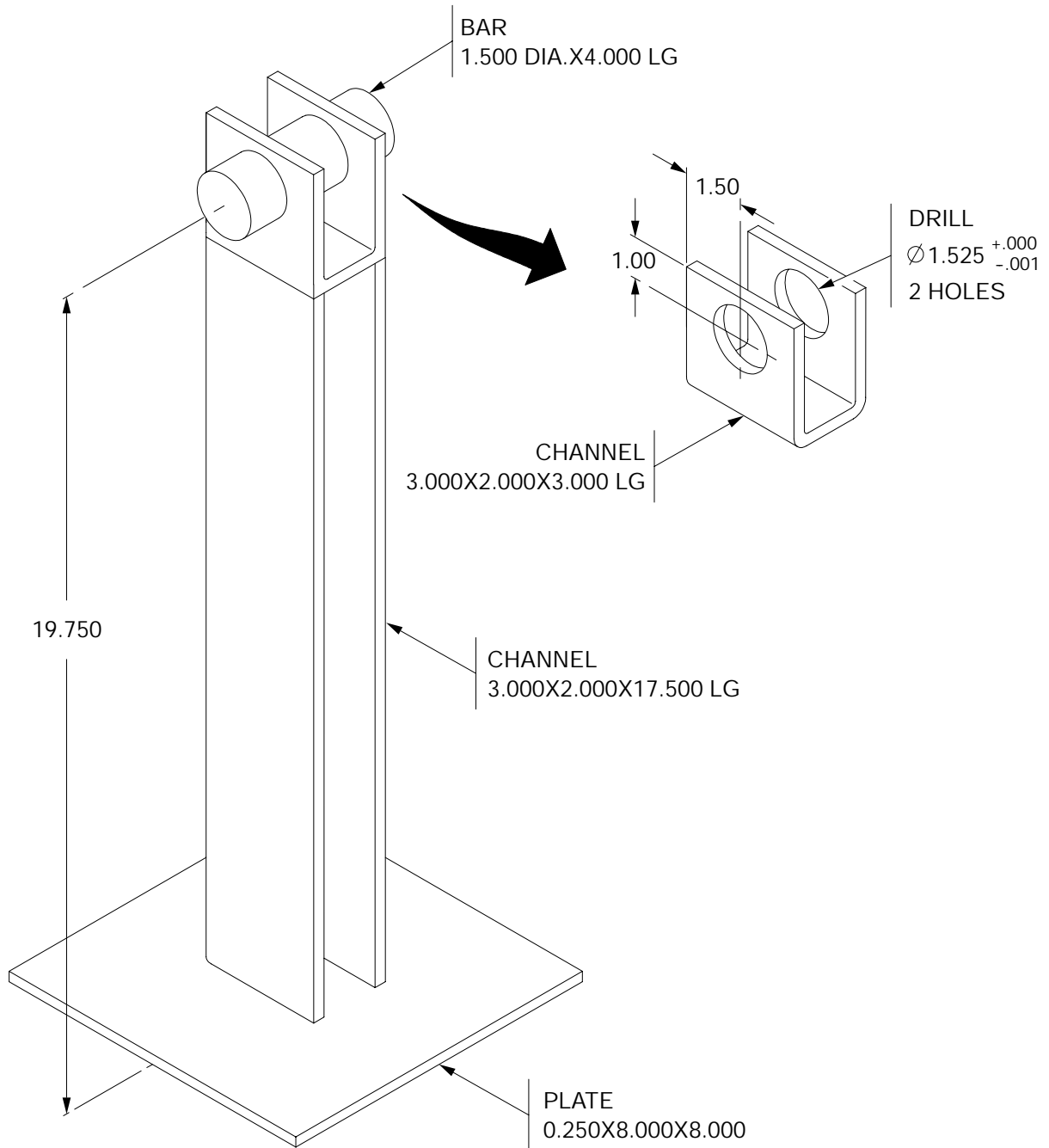
0088 00



26i020m

ITEM NO	ITEM NAME	QUANTITY	SIZE (inches)	MATERIAL
1	Base angle	2	2.00 X 2.00 X 0.25 X 27.44 Lg	Steel
2	Base angle	2	2.00 X 2.00 X 0.25 X 24.75 Lg	Steel
3	Support angle	2	2.00 X 2.00 X 0.25 X 23.06 Lg	Steel
4	Support angle	2	2.00 X 2.00 X 0.25 X 28.25 Lg	Steel
5	Support angle	1	2.00 X 2.00 X 0.25 X 19.38 Lg	Steel
6	Support angle	3	2.00 X 2.00 X 0.25 X 20.10 Lg	Steel
7	Gusset	4	0.25 X 3.00 X 2.88 Lg	Hr steel
8	Pad	2	0.75 X 1.75 X 1.75 Lg	Hr steel
9	Pad	1	0.75 X 2.25 X 2.00 Lg	Hr steel
10	Pad	1	0.75 X 2.25 X 3.00 Lg	Hr steel
11	Support angle	1	2.00 X 2.00 X 0.25 X 19.38 Lg	Steel

Figure 1. APU Test Stand.



26i021m

ITEM NO	ITEM NAME	QUANTITY	SIZE (inches)	MATERIAL
1	Plate	2	8.00 X 8.00 X 0.250	Steel
2	Channel	2	3.00 X 2.00 X 0.250 X 17.5 Lg	Steel
3	Channel	2	3.00 X 2.00 X 0.250 X 3 Lg	Steel
4	Bar	2	1.500 X 4.00' Lg	Steel

Figure 2. Stand, Nose Piece.

END OF TASK

TORQUE LIMITS**0089 00****THIS WORK PACKAGE COVERS:**

Scope, Torque Limits, How to use Torque Table, Tightening Metal Fasteners, Fastener Size and Thread Pattern, and Fastener Grade

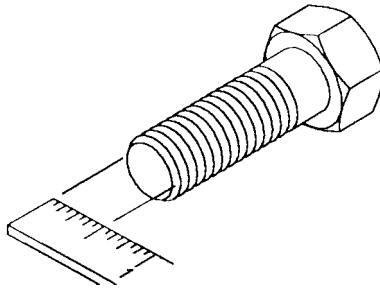
SCOPE

This work package provides general torque limits for screws used on the M88A2 HRV vehicles. Special torque limits are indicated in the maintenance procedures for applicable components. The general torque limits given in this work package shall be used when specific torque limits are not indicated in the maintenance procedure.

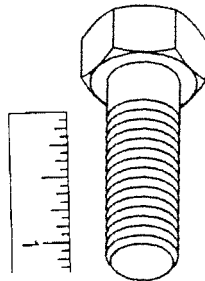
These general torque limits shall not be applied to screws that retain rubber components. The rubber components may be damaged before the correct torque limit is reached. If a special torque limit is not given in the maintenance instructions for rubber components, tighten the screw or nut until it touches the metal, then tighten it one more turn.

TORQUE LIMITS

Table 1 lists dry torque limits. Dry torque limits are used on screws that do not have lubricants applied to the threads. Table 2 lists wet torque limits. Wet torque limits are used on screws that have high-pressure lubricants applied to the threads.

HOW TO USE TORQUE TABLE

- a. Measure the diameter of the screw you are installing.



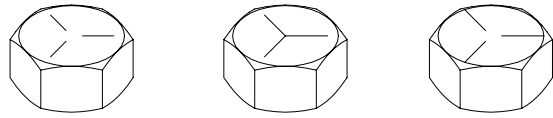
- b. Count the number of threads per inch or use a pitch gage.
- c. Under the heading SIZE, look down the left hand column until you find the diameter of the screw you are installing (there will usually be two lines beginning with the same size).
- d. In the second column under SIZE, find the number of threads per inch that matches the number of threads you counted in step b.

TORQUE LIMITS - CONTINUED

0089 00

HOW TO USE TORQUE TABLE - CONTINUED

CAPSCREW HEAD MARKINGS
 Manufacturer's marks
 may vary. These are all SAE
 Grade 5 (3 line)

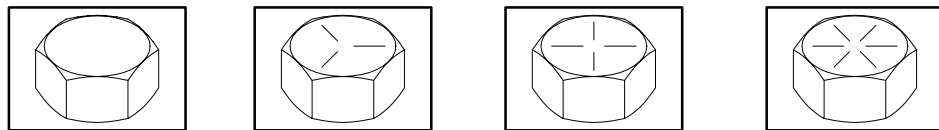


26PH007m

- e. To find the grade screw you are installing, match the markings on the head to the correct picture of CAPSCREW HEAD MARKINGS on the torque table.
- f. Look down the column under the picture you found in step e. until you find the torque limit in (lb-ft or N·m) for the diameter and threads per inch of the screw you are installing.

Table 1 Torque Limits for Dry Fasteners

SAE CAPSCREW HEAD MARKINGS



26PH006m

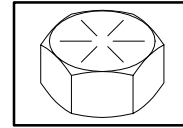
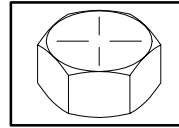
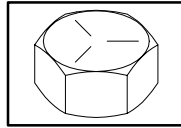
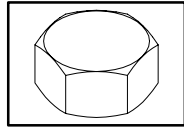
SIZE			TORQUE							
			SAE GRADE No. 1 or 2		SAE GRADE No. 5		SAE GRADE No. 6 or 7		SAE GRADE No. 8	
DIA. INS.	THREADS PER INCH	MMs	POUND- FEET	N·m	POUND- FEET	N·m	POUND- FEET	N·m	POUND- FEET	N·m
1/4	20	6.35	5	6.78	8.0	10.85	10	13.56	12.0	16.27
1/4	28	6.35	6	8.14	10.0	13.56	—	—	14.0	18.98
5/16	18	7.94	11	14.92	17.0	23.05	19	25.76	24.0	32.52
5/16	24	7.94	13	17.63	19.0	25.76	—	—	27.0	36.61
3/8	16	9.53	18	24.41	31.0	42.04	34	46.10	44.0	59.66
3/8	24	9.53	20	27.12	35.0	47.46	—	—	49.0	66.44
7/16	14	11.11	28	37.97	49.0	66.44	55	74.58	70.0	94.92
7/16	20	—	30	40.68	55.0	74.58	—	—	78.0	105.77
1/2	13	12.70	39	52.88	75.0	101.70	85	115.26	105.0	142.38
1/2	20	—	41	55.60	85.0	115.26	—	—	120.0	162.78
9/16	12	14.29	51	69.16	110.0	149.16	120	162.72	155.0	210.18
9/16	18	—	55	74.58	120.0	162.72	—	—	170.0	230.52
5/8	11	15.88	63	85.43	150.0	203.40	167	226.45	210.0	284.76
5/8	18	—	95	128.82	170.0	230.52	—	—	240.0	325.44
3/4	10	19.05	105	142.38	270.0	366.12	280	379.68	375.0	508.50
3/4	16	—	115	155.94	295.0	400.02	—	—	420.0	596.52
7/8	9	22.23	160	216.96	395.0	535.62	440	596.64	605.0	820.38
7/8	14	—	175	237.30	435.0	589.86	—	—	675.0	915.30
1	8	25.40	235	318.66	590.0	800.04	660	894.96	910.0	1233.96
1	14	—	250	339.00	660.0	894.96	—	—	990.0	1342.44
1-1/8	—	25.58	—	—	800.0	1064.8	—	—	1280.0	1735.7
					880.0	1193.3			1440.0	1952.8
1-1/4	—	31.75	—	—	—	—	—	—	1820.0	2467.9
									2000.0	2712.0
1-3/8	—	34.93	—	—	1460.0	1979.8	—	—	2380.0	3227.3
					1680.0	2278.1			2720.0	3688.3
1-1/2	—	38.10	—	—	1940.0	2630.6	—	—	3160.0	4285.0
					2200.0	2983.2			3560.0	4827.4

TORQUE LIMITS - CONTINUED

HOW TO USE TORQUE TABLE - CONTINUED

Table 2 Torque Limits for Wet Fasteners

SAE CAPSCREW HEAD MARKINGS



26PH006m

SIZE			TORQUE							
			SAE GRADE No. 1 or 2		SAE GRADE No. 5		SAE GRADE No. 6 or 7		SAE GRADE No. 8	
DIA. INS.	THREADS PER INCH	MMs	POUND- FEET	N·m	POUND- FEET	N·m	POUND- FEET	N·m	POUND- FEET	N·m
1/4	20	6.35	4.9	6.10	7.2	9.76	9.0	12.20	10.8	14.64
1/4	28	6.35	5.4	7.33	9.0	12.20	—	—	12.6	17.08
5/16	18	7.94	9.9	13.34	15.3	22.54	17.1	23.18	21.6	29.27
5/16	24	7.94	11.7	15.87	17.1	23.18	—	—	24.3	32.95
3/8	16	9.53	16.2	21.97	27.9	37.84	30.6	41.49	39.6	53.69
3/8	24	9.53	18.0	24.41	31.5	42.71	—	—	44.1	59.80
7/16	14	11.11	25.2	34.17	44.1	59.80	49.5	67.12	63.0	85.42
7/16	20	—	27.0	36.61	49.5	67.12	—	—	70.2	95.19
1/2	13	12.70	35.1	47.59	67.5	91.53	76.5	103.73	94.5	128.14
1/2	20	—	36.9	50.04	76.5	103.73	—	—	108.0	146.50
9/16	12	14.29	45.9	62.24	99.0	134.24	108.0	146.45	139.5	189.16
9/16	18	—	49.5	67.12	108.0	146.45	—	—	153.0	207.47
5/8	11	15.88	56.7	76.89	135.0	183.06	150.3	203.80	189.0	256.28
5/8	18	—	85.5	115.94	153.0	207.47	—	—	216.0	296.90
3/4	10	19.05	94.5	128.14	243.0	329.51	252.0	341.71	337.5	457.65
3/4	16	—	103.5	140.35	265.5	360.2	—	—	378.0	536.87
7/8	9	22.23	144.0	195.26	355.5	482.06	396.0	536.98	544.5	738.34
7/8	14	—	157.5	213.57	391.5	530.87	—	—	607.5	823.77
1	8	25.40	211.5	286.79	531.0	720.04	594.0	805.46	819.0	1110.56
1	14	—	225.0	305.10	594.0	805.46	—	—	891.0	1208.20
1-1/8	—	25.58	—	—	720.0	976.32	—	—	1152.0	1562.13
					792.0	1073.97			1296.0	1757.52
1-1/4	—	31.75	—	—	—	—	—	—	—	2221.11
										2440.80
1-3/8	—	34.93	—	—	1314.0	1781.82	—	—	2142.0	2904.57
					1512.0	2050.29			2448.0	3319.47
1-1/2	—	38.10	—	—	1746.0	2367.54	—	—	2844.0	3856.5
					1980.0	2684.88			3204.0	4344.66

TIGHTENING METAL FASTENERS

When torquing a fastener, select a torque wrench whose range (Table 3) fits the required torque value. A torque wrench is most accurate from 25% to 75% of its stated range. A torque wrench with a stated range of 0 to 100 will be most accurate from 25 to 75 Pound-Feet. The accuracy of readings will decrease as you approach 0 Pound-Feet or 100 Pound-Feet. The following ranges (Table 3) are based on this principle.

TORQUE LIMITS - CONTINUED

0089 00

TIGHTENING METAL FASTENERS - CONTINUED

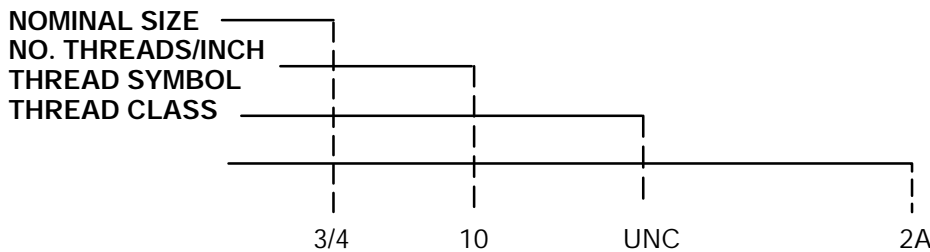
Table 3 TORQUE RANGES	
STATED RANGE	MOST EFFECTIVE RANGE
0-2000 lb-in	4-13 lb-ft
0-600 lb-ft	50-450 lb-ft
0-170 lb-ft	44-131 lb-ft
15-75 lb-ft	30-60 lb-ft

FASTENER SIZE AND THREAD PATTERN

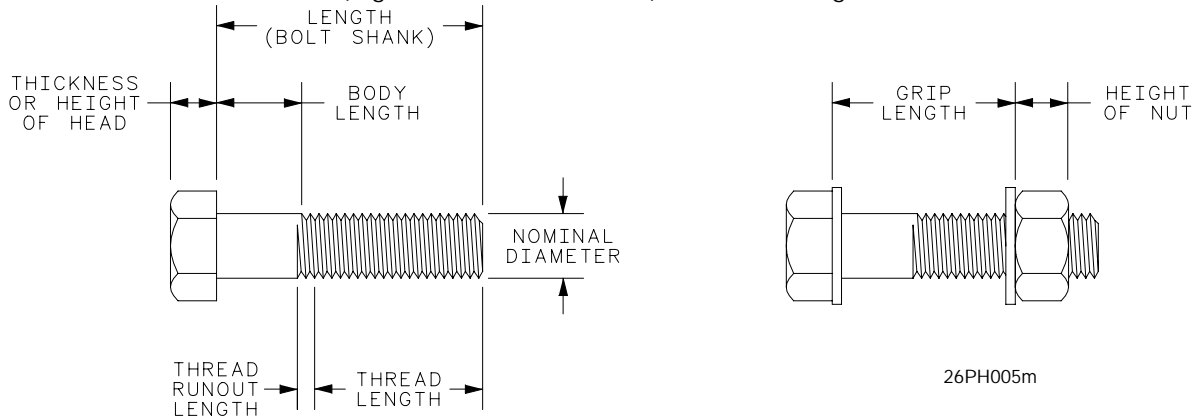
Threaded fasteners are categorized according to diameter of the fastener shank. Thread styles are divided into broad groups, the two most common being coarse (Unified Coarse-UNC) and fine (Unified Fine-UNF). These groups are defined by the number of threads per inch on the bolt shanks. In addition, threads are categorized by thread class (Table 4), which is a measure of the degree of fit between the threads of the bolt or screw (external threads) and the threads of the attaching nut or tapped hole (internal threads). The most common thread class for bolts and screws is Class 2.

Table 4 THREAD CLASSES AND DESCRIPTION		
EXTERNAL	INTERNAL	FIT
1A	1B	LOOSE FIT
2A	2B	MEDIUM FIT
3A	3B	CLOSE FIT

Thread patterns are designed as follows:



NOTE: Unless followed with -LH (e.g. 3/4-1 OUNC-2A-LH), threads are right hand.



FASTENER GRADE

In addition to being classified by thread type, threaded fasteners are also classified by material. The most familiar fastener classification system is the SAE grading system (Table 5).

Table 5 SAE Screw and Bolt Markings	
SCREWS	BOLTS
SAE GRADE 2 NO MARKING	SAE GRADE 6 4 RADIAL DASHES 90° APART
SAE GRADE 3 2 RADIAL DASHES 180° APART	SAE GRADE 7 5 RADIAL DASHES 72° APART
SAE GRADE 5 3 RADIAL DASHES 120° APART	SAE GRADE 8 6 RADIAL DASHES 60° APART

Markings On Hex Locknuts

GRADE A - No Marks

GRADE B - 3 Marks

GRADE C - 6 Marks

GRADE A - No Mark

GRADE B - Letter B

GRADE C - Letter C

GRADE A - No Notches

GRADE B - One Notch

GRADE C - Two Notches

END OF TASK

TOOL IDENTIFICATION LIST

0090 00

THIS WORK PACKAGE COVERS:

Lists all Common Tools and Special Tools/Fixtures needed to maintain the M88A2 HRV at Direct Support and General Support Maintenance Levels

(1) ITEM NO.	(2) ITEM NAME	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) REFERENCE
1	Tool kit, General Mechanic's: Automotive (GMTK)	5180-00-177-7033	SC 5180-90-N26	SC 5180-90-N26
2	Press, Arbor Hand	3444-00-449-7295	26A49 (79805)	SC 4910-95-A31
3	Pliers Set, Retaining	5120-00-789-0492	4440R	SC 4910-95-A31
4	Handle, Socket Wrench (Ratchet), 3/4 in dr	5120-00-249-1076	9649	SC 4910-95-A31
5	Handle, Socket Wrench (Sliding Tee), 3/4 in dr	5120-00-709-4072	L52BH	SC 4910-95-A31
6	Extension, Socket Wrench, 3/4 in dr, 3 in	5120-00-273-9208	A-A-2170	SC 4910-95-A31
7	Socket, Socket Wrench, 3/4 in dr, 1 in	5120-00-237-0989	A-A-1394	SC 4910-95-A31
8	Socket, Socket Wrench, 3/4 in dr, 1-1/4 in	5120-00-235-5871	A-A-1394	SC 4910-95-A31
9	Sling, Lifting	4910-00-473-7556	7081593	TM 9-2350-292-24P
10	Soldering Gun	3439-00-542-0396	8200G3	SC 4910-95-A31
11	Tool Kit, Automotive Fuel and Electrical	5180-00-754-0655	SC 5180-95-CL-B08	SC 5180-95-CL-B08
12	Multimeter	6625-01-139-2512	T00377	SC 4910-95-A31
13	Heater, Gun-type, Electrical	4940-00-561-1002	500A	SC 4910-95-A31
14	Puller Assy, Slide Hammer	5120-00-310-4668	8708712	TM 9-2350-292-24P
15	Adapter, Mechanical	5120-00-767-9102	10867497	CTA 50-970
16	Shop Equipment, Welding (Trailer-Mounted)	3431-01-090-1231	11022000	SC 3431-95-A04
17	Respirator, Air Filter	4240-00-022-2524	GGG-M-125/6	SC 4910-95-A31
18	Hose Assembly, Nonmetallic	4720-00-356-8557	ZZ-H-461	SC 4910-95-A31
19	Separator, Oil and Water	4940-00-242-4101	N20MIL2	SC 4910-95-A31
20	Compressor, Air	4310-00-542-4566	MIL-C-52980	SC 4910-95-A31
21	Spray Gun, Paint	4940-00-261-8415	JGK-501	SC 4910-95-A31
22	Cup, Spray Paint	4940-00-190-5164	81-500	SC 4910-95-A31
23	Goggles, Industrial	4240-00-269-7912	A-A-1814	SC 4910-95-A31
24	Cleaner, Steam, Pressure	4940-00-186-0027	200-AO	SC 4910-95-A31
25	Wrench, Torque, 0-175 lb-ft, 1/2 in dr	5120-00-640-6364	A-A-2411	SC 4910-95-A31
26	Test Set Armature, (Growler)	6625-00-828-5810	TS965U	SC 4940-95-B20
27	Pliers, Wire Twisting	5120-00-542-4171	8491162	SC 4910-95-A31
28	Puller, Mechanical	5120-00-595-9304	5630732	SC 4940-95-B20
29	Socket, Wrench, Face Spanner, 1/2 in dr	5120-00-034-8443	8390124	CTA 50-970

TOOL IDENTIFICATION LIST - CONTINUED

0090 00

(1) ITEM NO.	(2) ITEM NAME	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) REFERENCE
30	Sling, Endless, 8 ft	3940-00-675-5002	PD101-96	TM 9-2350-292-24P
31	Wrench, Torque, 3/8 in dr 0 to 120 in-lb	5120-00-585-7706	A-A-1274	SC 4940-95-B20
32	Hoisting Beam	3940-01-440-0283	12366100	TM 9-2350-292-24P
33	Wrench Set, Socket, 3/4 in dr	5120-00-204-1999	GGG-W-641	SC 4910-95-A31
34	Puller, Mechanical	5120-00-613-6775	11671732	TM 9-2350-292-24P
35	Alignment Gauge	5210-00-613-6779	11671961	TM 9-2350-292-24P
36	Guide, Shaft	4910-00-767-0419	10884600	TM 9-2350-292-24P
37	Bolt, Eye	5306-01-297-2749	8764542	CTA 50-970
38	Wrench, Torque, 0-600 lb-ft 3/4-in dr	5120-00-221-7983	SW130-301	SC 4910-95-A31
39	Multiplier, Torque Wrench	5120-00-169-2986	PD 1201	SC 4910-95-A31
40	Handle, Manual Control	5340-00-766-1964	10867499	TM 9-2350-292-24P
41	Kit, APU Ground Hop		12366015	TM 9-2350-292-24P
42	Gauge, Pressure, Dial 0-300 psi	6620-00-795-0330	7950330	TM 9-2350-292-24P
43	Gauge Assembly, Testing 0-4000 psi	4910-00-766-3355	10884612	TM 9-2350-292-24P
44	Gauge, Pressure, Dial 0-5000 psi	6685-01-130-3471	12310644	TM 9-2350-292-24P
45	Wrench, Spanner	5120-00-767-9099	10884603	CTA 50-970
46	Wrench, Open-end, 1-1/8 & 1-5/16	5120-00-184-8438	1037A	SC 4920-95-B20
47	Test Stand, APU			Figure 1, WP 0088 00
48	Wrench, Open-End, 1-1/2 in	5120-00-184-8439	3070	SC 4910-95-A31
49	Wrench, Combination, 1-1/4 in	5120-00-228-9517	1173	SC 4910-95-A72
50	Wrench, Adjustable, Auto, 0-2-1/2 jaw opng, 18 in L	5120-00-449-8084	D724	CTA 50-970
51	Crowbar	5120-00-224-1390	11677049-1	TM 9-2350-292-10
52	Socket, Socket Wrench, 1-1/8, 3/4 in. dr	5120-00-239-0021	A-A-1394	SC 4910-95-A31
53	Socket, Socket Wrench, 1-1/2, 3/4 in. dr	5120-00-293-0094	47148	SC 4910-95-A31
54	Stand, Nose Piece			Figure 2, WP 0088 00
55	Socket, Socket Wrench, 1-7/8, 3/4 in. dr	5120-00-199-7769	GGG-W-641	SC 4910-95-A31
56	Puller Kit, Universal	5180-00-357-6917	705	SC 4910-95-A31
57	Socket, Socket Wrench, 3/8 Hex, 1/2 in. dr	5130-00-221-8004	B107.2	SC 4940-95-B20
58	Socket, Socket Wrench, 3-5/8 in, 3/4 in. dr		LDH 1162	CTA 50-970
59	Socket, Socket Wrench, 1-3/8 in, 3/4 in. dr	5130-00-227-6685	GGG-W-660	TM 9-2350-292-10

TOOL IDENTIFICATION LIST - CONTINUED

0090 00

(1) ITEM NO.	(2) ITEM NAME	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) REFERENCE
60	Extension, Socket Wrench, 16 in, 3/4 in. dr	5120-00-227-8079	A-A-2170	SC 4910-95-A62
61	Extension, Socket Wrench, 8 in, 3/4 in. dr	5120-00-243-7328	A-A-2170	SC 4910-95-A62
62	Vise, Machinist's	5120-00-223-1945	GGG-V-410	SC 4910-95-A62
63	Handle, Socket Wrench (Hinged), 3/4 in. dr	5120-00-221-7959	H337	SC 4910-95-A31
64	Sling, Lifting		Ee2-802-10 FT	CTA 50-970
65	Maintenance Kit, Electrical	5935-01-344-1073	5705498	
66	Plug, Flanged, 1 inch		16-FOPX	TM 9-2350-292-24P
67	Drill, Electric, Portable	5130-00-293-1849	W-D-661	SC 4910-95-A31
68	Drill Set, Twist	5133-00-293-0983	800434	SC 4910-95-A31
69	Kit, Engine Ground Hop		12365729	TM 9-2350-292-24P
70	Shackle, 12-1/2 ton		12364386	TM 9-2350-292-10
71	Socket Wrench Attachment, 1/4 in hex, 3/8 in dr	5120-00-596-8508	V8508	SC 4910-95-A31
72	Socket Set, Socket Wrench	5130-01-307-2052	427IMY	CTA 50-970
73	Wrench, Torque 0-300 lb-in	5120-00-247-2536	A-A-1274	SC 4910-95-A31
74	Wrench, Spanner, Adj	5120-00-293-0798	TKFX3B	SC 4933-95-CL-A12
75	Test Fixture, Adjusting Link	4910-01-218-5896	12326061	TM 9-2350-292-24P
76	Kit, Adjusting Link Test Fixture Assembly		12477506	TM 9-2350-292-24P
77	Hammer, Hand	5120-01-065-2211	57-534	SC 4910-95-A31
78	Caps, Vise Jaw	5120-00-221-1506	A-A-2938	SC 4910-95-A31
79	Lubricating Gun, Hand	4930-00-766-3545	610101-LVR	TM 9-2350-292-10
80	Sling, Endless, 4 ft	3940-00-675-5002	PD101-48	TM 9-2350-292-10
81	Multiplier, Torque Wrench	5120-01-122-9393	TD-1500	SC 4910-95-A31

END OF TASK

MANDATORY REPLACEMENT PARTS LIST

0091 00**THIS WORK PACKAGE COVERS:**

Scope, Explanation of Columns, and Mandatory Replacement Parts referenced in the task Initial Setups and procedures.

SCOPE

This work package is a cross-reference of item numbers to part numbers and is included for that purpose only.

EXPLANATION OF COLUMNS

a. **Column (1) - Item Number.** This number is assigned to the entry in the listing for cross-referencing to the part number.

b. **Column (2) - Part Number.** 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, specification, standards and inspection requirements to identify an item or range of items.

c. **Column (3) - Description.** This column contains the nomenclature which appears on the first page of the task under the subheading "Materials/Parts".

MANDATORY REPLACEMENT PARTS LIST - CONTINUED

0091 00

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE
1	MS35338-46	5310-00-637-9541	Washer, lock
2	MS35338-45	5310-00-407-9566	Washer, lock
3	MS24665-283	5315-00-842-3044	Pin, cotter
4	7388836		Seal
5	24113		Pin, Spring
6	22818	5330-01-321-6583	Seal
7	24109	5330-01-151-7169	Seal
8	70575	5325-01-372-3841	Ring, retaining
9	11890	3120-01-373-0333	Washer, thrust
10	25728	3120-01-373-1485	Washer, thrust
11	11026	5310-01-049-1647	Washer, lock
12	10330	5331-01-416-2984	Packing, preformed
13	24981	5331-01-268-5809	Packing, preformed
14	25643	5331-01-267-2936	Packing, preformed
15	24306	3120-01-314-0047	Washer, thrust
16	MS35338-42	5310-00-045-3299	Washer, lock
17	C5-19-2267	4240-00-289-7978	Filter, gas, M12A1
18	C5-19-853	4240-00-368-6291	Filter, particulate
19	MS35335-36	5310-00-550-3503	Washer, lock
20	MS35338-44	5310-00-582-5965	Washer, lock
21	2-126574	5310-01-166-0602	Washer, lock
22	10947432	5330-00-238-5599	Gasket
23	MS29513-115	5331-00-248-3847	Packing, preformed
24	MS35335-31	5310-00-596-7693	Washer, lock
25	12364559	5330-01-418-9123	Gasket
26	MS35338-51	5310-00-584-7888	Washer, lock
27	MS35338-53	5310-00-584-7889	Washer, lock
28	MS35338-47	5310-00-209-0965	Washer, lock
29	7064833		Washer, lock
30	MS35335-37	5310-00-209-5116	Washer, lock
31	MS35338-43	5310-00-045-3296	Washer, lock
32	MS35338-41	5310-00-045-4007	Washer, lock
33	MS35338-40	5310-00-543-2410	Washer, lock
34	MS24665-285	5315-01-359-1451	Pin, cotter
35	MS35338-50		Washer, lock
36	MS35333-40	5310-00-550-1130	Washer, lock
37	MS35335-35	5310-00-627-6128	Washer, lock
38	11671375	5330-00-613-6855	Gasket
39	11671392	5330-00-614-9128	Gasket
40	11671660	5330-00-613-6854	Seal
41	MS35338-48	5310-00-584-5272	Washer, lock
42	MS28778-8	5331-00-808-0794	Packing, preformed

MANDATORY REPLACEMENT PARTS LIST - CONTINUED

0091 00

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE
43	12364819	5330-01-420-5024	Gasket
44	12364558	5330-01-420-3008	Gasket
45	12364557	5330-01-420-5126	Gasket
46	12365800	5330-01-420-8869	Gasket
47	MS28778-12	5331-00-251-8839	Packing, preformed
48	MS35338-27		Washer, lock
49	21-2-5	5310-00-140-2135	Washer, lock
50	MS20995C20	9505-00-221-2650	Wire, non-electrical
51	N012-01522	4320-00-967-6271	Parts kit (Bilge pump)
52	5703512	2590-00-967-6272	Parts kit (Bilge pump)
53	MS28778-4	5331-00-805-2966	Packing, preformed
54	MS28778-6	5331-00-804-5695	Packing, preformed
55	12364519	3120-01-429-5820	Bushing
56	12364520	3120-01-429-5819	Bushing
57	MS35338-52	5310-00-754-2005	Washer, lock
58	MS35335-32	5310-00-596-7691	Washer, lock
59	7359808	5330-00-291-1720	Seal, nonmetallic round
60	MS28775-113	5331-00-582-2855	Packing, preformed
61	MS16562-50	5315-00-814-3531	Pin, spring
62	RR 309177		Kit, parts
63	13435	5310-01-422-6671	Washer, lock
64	10052	5330-01-022-8879	Packing, preformed
65	MS51861-12	5305-00-140-8001	Screw, tapping
66	2015N-9	5331-01-439-6471	Packing, preformed
67	2008N-9	5331-01-439-6473	Packing, preformed
68	2012N-9	5331-01-115-8226	Packing, preformed
69	A82777	5331-00-579-6495	Packing, preformed
70	2016N-7	5330-00-153-8812	Packing, preformed
71	MS171530	5315-01-049-1773	Pin, spring
72	5-483X	3130-01-423-7723	Journal, cross kit
73	D4J	2520-01-150-4940	Kit, dust
74	MS16555-48	5315-00-845-5110	Pin, straight, headless
75	MS51000-157-2	5330-01-437-9507	Seal, plain
76	MS51000-166-2	5330-01-437-9519	Seal, plain
77	MS35338-55	5310-00-060-9435	Washer, lock
78	MS28778-20	5331-00-816-3546	Packing, preformed
79	FF9446-25	5331-01-269-6152	Packing, preformed
80	22617-20	5330-01-168-1802	Packing, preformed
81	2222N-7	5331-00-984-3808	Packing, preformed
82	MS35340-51	5310-00-052-6454	Washer, lock
83	2203V047	5315-01-415-6706	Pin, cotter
84	12367101		Kit, upper roller

MANDATORY REPLACEMENT PARTS LIST - CONTINUED**0091 00**

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE
85	20Z2376D2	5315-01-365-1368	Pin, headed
86	2203V019	5315-01-417-3968	Pin, cotter
87	18Z2D113		Ring, retaining
88	2222N552-9		Packing, preformed
89	853297	5340-01-465-5528	Seal, antipilferage (with safety wire)
90	69D8		Key, woodruff
91	25Z1363D1	3120-01-418-6296	Bushing
92	MS35335-57	5310-00-058-3599	Washer, lock
93	16953	5999-01-433-4617	Gasket
94	16956	9160-01-440-9897	Gasket
95	BH00787655	5331-01-429-9514	Seal
96	10867171		Packing, preformed
97	MS16555-77	5315-00-816-1329	Pin, straight, headless
98	MS20066-203	5315-01-132-0268	Key, machine
99	MS28775-327	5330-00-579-8157	Packing, preformed
100	3616V011	5310-01-385-5797	Washer, lock
101	MS2018N-7		Packing, preformed
102	MS45904-86	5310-01-088-8837	Washer, lock
103	M83485/1-920	5331-01-460-0483	Packing, preformed
104	12367102		Kit, lower roller
105	12367087	2530-01-477-3966	Parts kit, track adjusting link
106	NTFR-1/4-0	1015-01-205-0371	Insulation, sleeving
107	DIN7980-10		Washer, lock
108	50146000	5310-01-400-2138	Washer, lock
109	99400641		Seal-HAD
110	MS51848-9	5310-01-038-6432	Washer, lock
111	J515CH221X0183H		Packing, preformed
112	J515CH183X0089H		Packing, preformed

ALPHABETICAL INDEX

A

Actuating Cylinder And Boom Foot Boot Replacement, Hoist Boom, WP 0065 00
 Actuating Cylinder Replacement, Stayline, WP 0066 00
 Adjusting Link and Components (New Configuration) Repair, WP 0085 00
 Air Purifier Control Unit Enclosure Assembly Repair, WP 0084 00
 Air Purifier Repair, M2A2, WP 0083 00
 Assembly Procedures, Disassembly And, WP 0035 00
 Auxiliary Power Unit Chain Case, Chain And Sprockets Repair, WP 0081 00, WP 0082 00
 Auxiliary Power Unit Engine Replacement, WP 0079 00
 Auxiliary Power Unit Engine Replacement (HATZ), WP 0080 00
 Auxiliary Winch Assembly Repair, WP 0060 00

B

Ball And Roller Bearings, WP 0035 00
 Bearings, Ball And Roller, WP 0035 00
 Bearings, Shafts, Gears And, WP 0035 00
 Bilge Pump Assembly Repair, WP 0068 00
 Boom Actuating Cylinder And Boom Foot Boot Replacement, Hoist, WP 0065 00
 Boom Assembly Replacement, Hoist, WP 0064 00
 Boom Foot Boot Replacement, Hoist Boom Actuating Cylinder And, WP 0065 00
 Boom Lever Replacement, WP 0067 00
 Boom Limit Valve Repair, WP 0077 00
 Bracket Replacement, Roller Mounting, WP 0058 00
 Burrs, Scratching and Raised Metal, Removing, WP 0035 00

C

Cable Repair, Wiring Harness And, WP 0043 00
 Chain And Sprockets Repair, Auxiliary Power Unit Chain Case, WP 0081 00, WP 0082 00
 Chain Case, Chain And Sprockets Repair, Auxiliary Power Unit, WP 0081 00, WP 0082 00
 Check Valve Replacement, Level Winder, WP 0057 00
 Common Tools And Equipment, WP 0035 00

Control Assembly Repair, Transmission, WP 0044 00
 Control Unit Enclosure Assembly Repair, Air Purifier, WP 0084 00
 Control Valve Manifold Assembly Repair, Hydraulic, WP 0074 00
 Control Valve Replacement, Level Winder, WP 0056 00
 Corrosion Prevention And Control, WP 0001 00
 Cylinder And Boom Foot Boot Replacement, Hoist Boom Actuating, WP 0065 00
 Cylinder And Link Replacement, Spade, WP 0062 00
 Cylinder Replacement, Level Winder Hydraulic, WP 0055 00
 Cylinder Replacement, Stayline Actuating, WP 0066 00

D

Destruction Of Materiel To Prevent Enemy Use, WP 0001 00
 Differences Between Models, WP 0002 00
 Directional Control Valve Assembly Repair, Main/Hoist Winch, WP 0072 00
 Disassembly And Assembly Procedures, WP 0035 00

E

Electric Fuel Pump Repair, WP 0038 00
 Electrical Test Equipment And Electrical Testing, WP 0035 00
 Electrical Testing, Electrical Test Equipment And, WP 0035 00
 Enclosure Assembly Repair, Air Purifier Control Unit, WP 0084 00
 Engine And Transmission Assemblies, Separation Of, WP 0037 00
 Engine and Transmission Related Components, Removal and Installation, WP 0036 00
 Engine Replacement, Auxiliary Power Unit, WP 0079 00
 Engine Replacement, Auxiliary Power Unit (HATZ), WP 0080 00
 Equipment Characteristics, Capabilities And Features, WP 0002 00
 Equipment Data, WP 0002 00
 Equipment Operation And Description, WP 0003 00
 Equipment, Common Tools And, WP 0001 00

ALPHABETICAL INDEX - CONTINUED

F

Fittings And Flange Replacement, Main Winch Manifold, Tubes, WP 0054 00
 Fittings, Adapters And Valve Assemblies Replacement, Main Winch And Spade Hydraulic Hoses, WP 0063 00
 Flange Replacement, Main Winch Manifold, Tubes, Fittings And, WP 0054 00
 Front Fuel Tank Replacement, WP 0041 00
 Fuel Pump Repair, Electric, WP 0038 00
 Fuel Tank Repair, WP 0042 00
 Fuel Tank Replacement, Front, WP 0041 00
 Fuel Tank Replacement, Left, WP 0040 00
 Fuel Tank Replacement, Right, WP 0039 00

G

Gears And Bearings, Shafts, WP 0035 00
 General Troubleshooting Instructions, WP 0004 00

H

Harness And Cable Repair, Wiring, WP 0043 00
 Hoist Boom Actuating Cylinder And Boom Foot Boot Replacement, WP 0065 00
 Hoist Boom Assembly Replacement, WP 0064 00
 Hoist Winch Assembly And Supports Replacement, WP 0045 00
 Hoist Winch Hydraulic Motor Replacement, WP 0046 00
 Hydraulic Control Valve Manifold Assembly Repair, WP 0074 00
 Hydraulic Cylinder Replacement, Level Winder, WP 0055 00
 Hydraulic Hoses, Fittings, Adapters And Valve Assemblies Replacement, Main Winch And Spade, WP 0063 00
 Hydraulic Motor Assembly Replacement, Hoist Winch, WP 0046 00
 Hydraulic Pump Assembly Repair, Main, WP 0071 00
 Hydraulic Pump Support Replacement, Main, WP 0069 00
 Hydraulic Reservoir Assembly Repair, WP 0078 00

I

Inserts (One Piece Type), Screw Thread, WP 0035 00

Installation Of Self-Locking Studs, Removal And, WP 0035 00
 Instructions, General Troubleshooting, WP 0004 00

L

Left Fuel Tank Replacement, WP 0040 00
 Level Winder Check Valve Replacement, WP 0057 00
 Level Winder Control Valve Replacement, WP 0056 00
 Level Winder Hydraulic Cylinder Replacement, WP 0055 00
 Level Winder Plate Assembly Replacement, WP 0059 00
 Lever Replacement, Boom, WP 0067 00
 Limit Valve Repair, Boom, WP 0077 00
 Link Replacement, Spade, Cylinder And, WP 0062 00
 Location And Description Of Major Components, WP 0002 00
 Lock Assembly Repair, Spade, WP 0061 00
 Lower Roller Replacement, Main Winch, WP 0053 00
 Lubrication, WP 0035 00

M

M2A2 Air Purifier Repair, WP 0083 00
 Main Hydraulic Pump Assembly Repair, WP 0071 00
 Main Hydraulic Pump Support Replacement, WP 0069 00
 Main Winch And Spade Hydraulic Hoses, Fittings, Adapters And Valve Assemblies Replacement, WP 0063 00
 Main Winch Lower Roller Replacement, WP 0053 00
 Main Winch Manifold, Tubes, Fittings And Flange Replacement, WP 0054 00
 Main Winch Repair, WP 0048 00
 Main Winch Replacement, WP 0047 00
 Main Winch Power Reduction Manifold Assembly Repair, WP 0073 00
 Main Winch Roller Spring Assembly Replacement, WP 0051 00
 Main Winch Side Mounting Brackets Replacement, WP 0050 00
 Main Winch Upper Roller Replacement, WP 0052 00

ALPHABETICAL INDEX - CONTINUED

Main/Hoist Winch Directional Control Valve Assembly
Repair, WP 0072 00

Maintenance Forms, Records And Reports,
WP 0001 00

Maintenance, General, WP 0035 00

Manifold Assembly Repair, Hydraulic Control Valve,
WP 0074 00

Metal, Removing Burrs, Scratches And Raised,
WP 0035 00

Motor Replacement, Hoist Winch Hydraulic,
WP 0046 00

Mounting Bracket Replacement, Roller, WP 0058 00

Mounting Brackets Replacement, Main Winch Side,
WP 0050 00

N

Nomenclature Cross-Reference List, WP 0001 00

P

Painting, WP 0035 00

Parts, Repair, WP 0001 00

Parts, Replacement Of, WP 0035 00

Plate Assembly Replacement, Level Winder,
WP 0059 00

Power Reduction Manifold Assembly Repair, Main
Winch, WP 0073 00

Power Take-Off (PTO) Shaft Repair, WP 0070 00

Power Unit Chain Case, Chain And Sprockets Repair,
Auxiliary, WP 0081 00, WP 0082 00

Power Unit Engine Replacement, Auxiliary, WP 0079 00

Preparation For Storage Or Shipment, WP 0001 00

Pump Assembly Repair, Bilge, WP 0068 00

Pump Assembly Repair, Main Hydraulic, WP 0071 00

Pump Repair, Electric Fuel, WP 0038 00

Pump Support Replacement, Main Hydraulic,
WP 0069 00

Q

Quality Assurance, WP 0001 00

Quick Guide to Troubleshooting, WP 0004 00

R

Raised Metal, Removing Burrs, Scratches And,
WP 0035 00

Relief Valve Adjustment, RV2, WP 0075 00

Repair Parts, WP 0001 00

Reporting Equipment Improvement Recommendations,
WP 0001 00

Reservoir Assembly Repair, Hydraulic, WP 0078 00

Right Fuel Tank Replacement, WP 0039 00

Roller Bearings, Ball And, WP 0035 00

Roller Mounting Bracket Replacement, WP 0058 00

Roller Replacement, Main Winch Lower, WP 0053 00

Roller Spring Assembly Replacement, Main Winch,
WP 0051 00

RV2 Relief Valve Adjustment, WP 0075 00

S

Scratches And Raised Metal, Removing Burrs,
WP 0035 00

Screw Thread Inserts (One Piece Type), WP 0035 00

Self-Locking Studs, Removal And Installation Of,
WP 0035 00

Separation of Engine and Transmission Assemblies,
WP 0037 00

Shaft Repair, Power Take-Off (PTO), WP 0070 00

Shafts, Gears And Bearings, WP 0035 00

Side Mounting Brackets Replacement, Main Winch,
WP 0050 00

Spade Hydraulic Hoses, Fittings, Adapters And Valve
Assemblies Replacement, Main Winch And,
WP 0063 00

Spade Lock Assembly Repair, WP 0061 00

Spade, Cylinder And Link Replacement, WP 0062 00

Special Tools, TMDE And Support Equipment,
WP 0001 00

Spring Assembly Replacement, Main Winch Roller,
WP 0051 00

Sprockets Repair, Auxiliary Power Unit Chain Case,
Chain And, WP 0081 00, WP 0082 00

Stayline Actuating Cylinder Replacement, WP 0066 00

Studs, Removal And Installation Of Self-Locking,
WP 0035 00

Support Equipment, Special Tools, TMDE And,
WP 0060 00

ALPHABETICAL INDEX - CONTINUED

Support Replacement, Main Hydraulic Pump,
WP 0069 00

Supports Replacement, Hoist Winch Assembly And,
WP 0045 00

T

Tank Repair, Fuel, WP 0042 00

Tank Replacement, Front Fuel, WP 0041 00

Tank Replacement, Left Fuel, WP 0040 00

Tank Replacement, Right Fuel, WP 0039 00

TMDE And Support Equipment, Special Tools,
WP 0001 00

Tools And Equipment, Common, WP 0001 00

Transmission Assemblies, Separation Of Engine And,
WP 0037 00

Transmission Control Assembly Repair, WP 0044 00

Transmission Related Components, Removal and
Installation of Engine and, WP 0036 00

Troubleshooting Instructions, General, WP 0004 00

Troubleshooting, Quick Guide, WP 0004 00

Tubes, Fittings And Flange Replacement, Main Winch
Manifold, WP 0054 00

U

Upper Roller Replacement, Main Winch, WP 0052 00

V

Valve Adjustment, R2V Relief, WP 0075 00

Valve Assemblies Replacement, Main Winch And Spade
Hydraulic Hoses, Fittings, Adapters And,
WP 0063 00

Valve Assembly Repair, Main/Hoist Winch Directional
Control, WP 0072 00

Valve Manifold Assembly Repair, Hydraulic Control,
WP 0074 00

Valve Repair, Boom Limit, WP 0077 00

Valve Replacement, Level Winder Check, WP 0057 00

Valve Replacement, Level Winder Control, WP 0056 00

W

Warranty Information, WP 0001 00

Welding, WP 0035 00

Winch Assembly And Supports Replacement, Hoist,
WP 0045 00

Winch Assembly Repair. Auxiliary, WP 0060 00

Winch Directional Control Valve Assembly Repair, Main/
Hoist, WP 0072 00

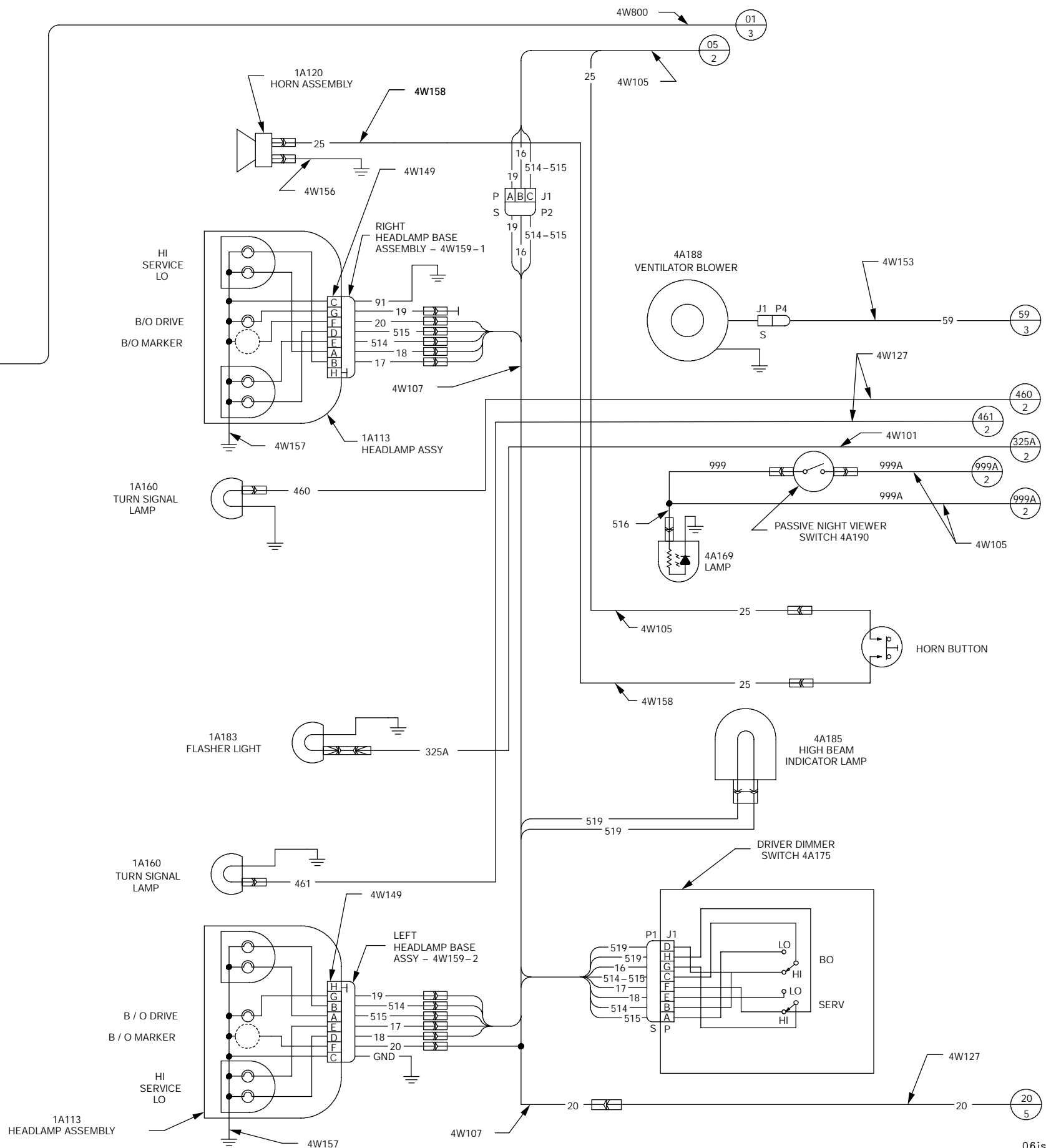
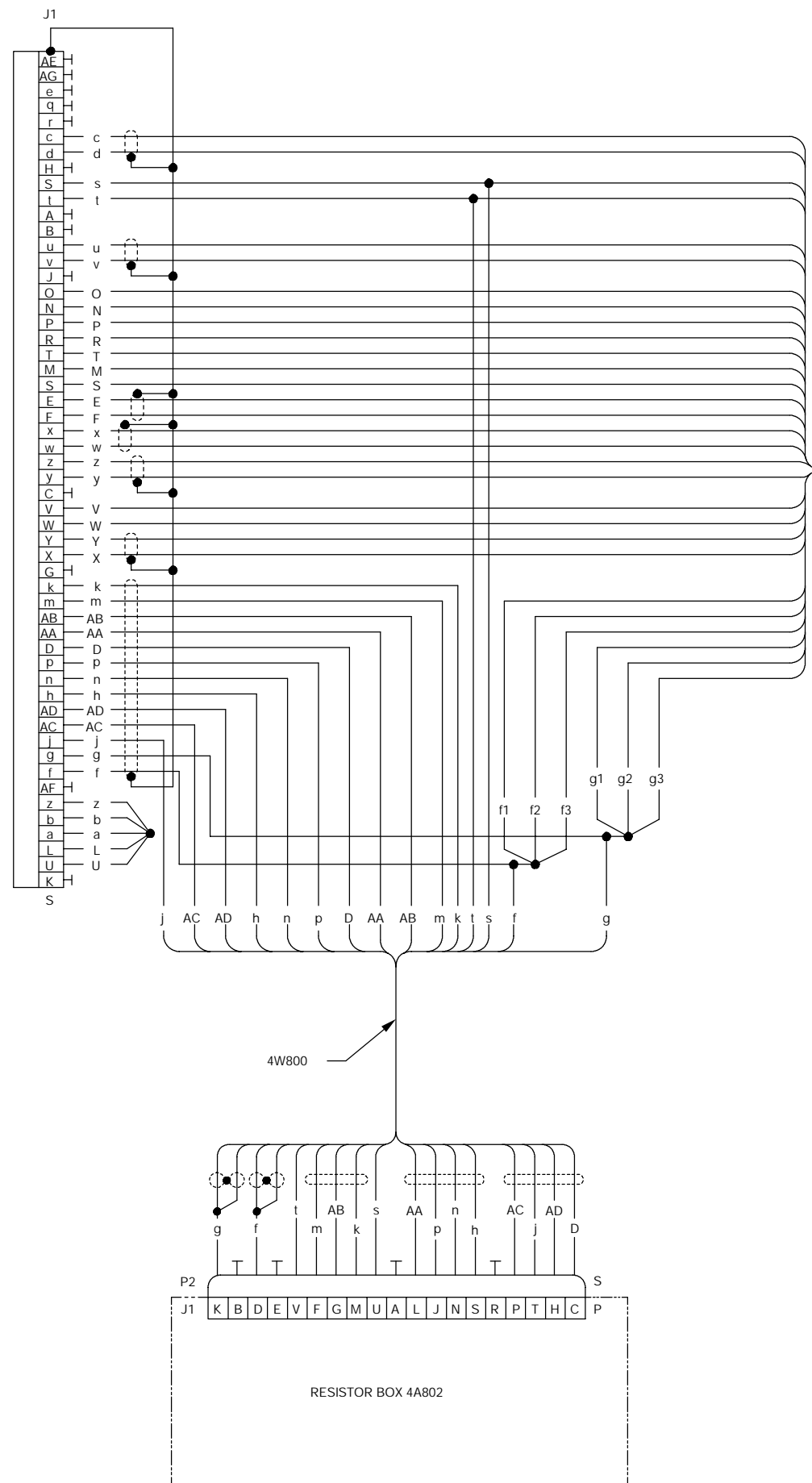
Winch Hydraulic Motor Assembly Replacement, Hoist,
WP 0046 00

Winch Repair, Main, WP 0048 00

Winch Replacement, Main, WP 0047 00

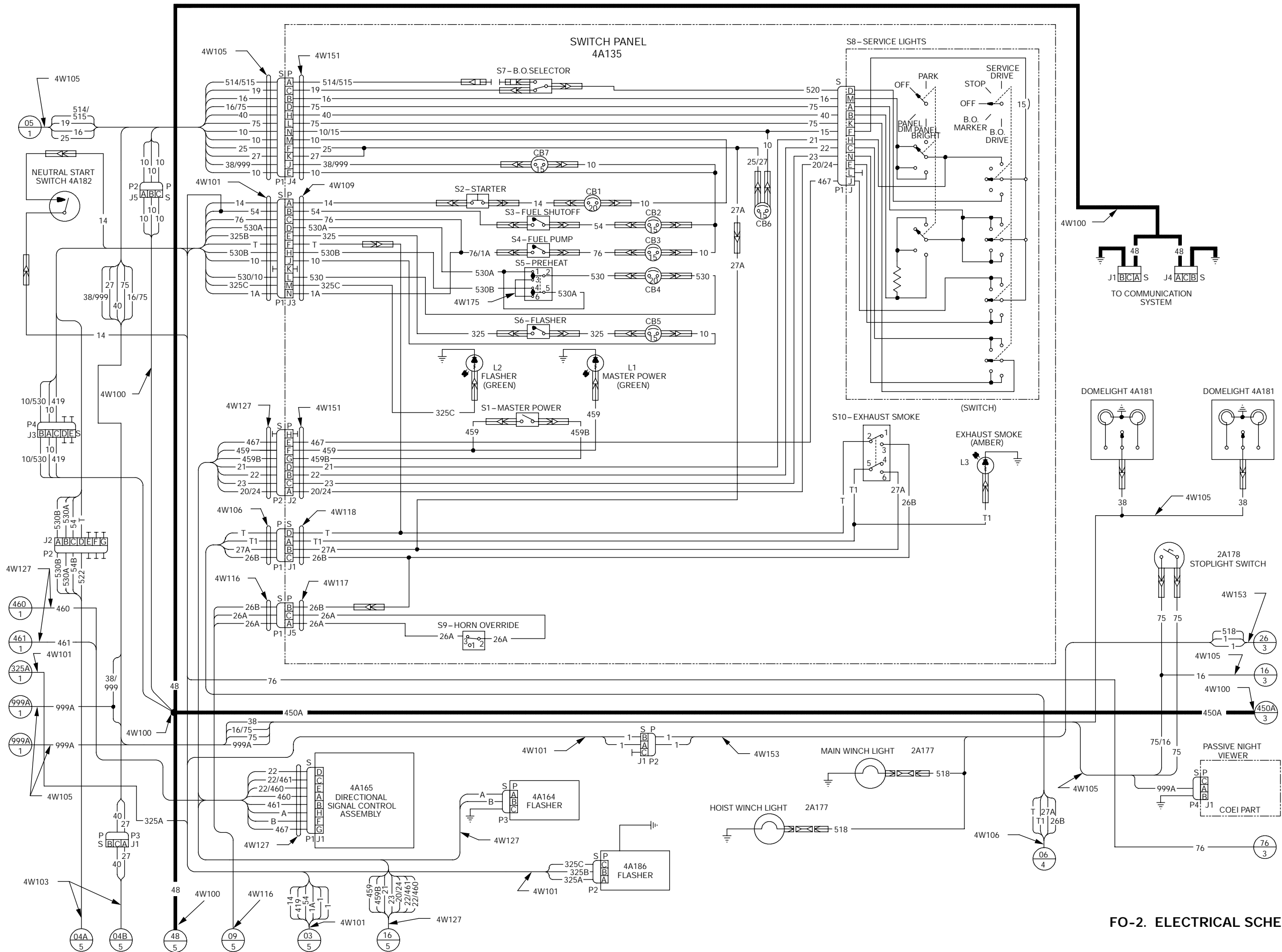
Winch Side Mounting Brackets Replacement, Main,
WP 0050 00

Wiring Harness And Cable Repair, WP 0043 00



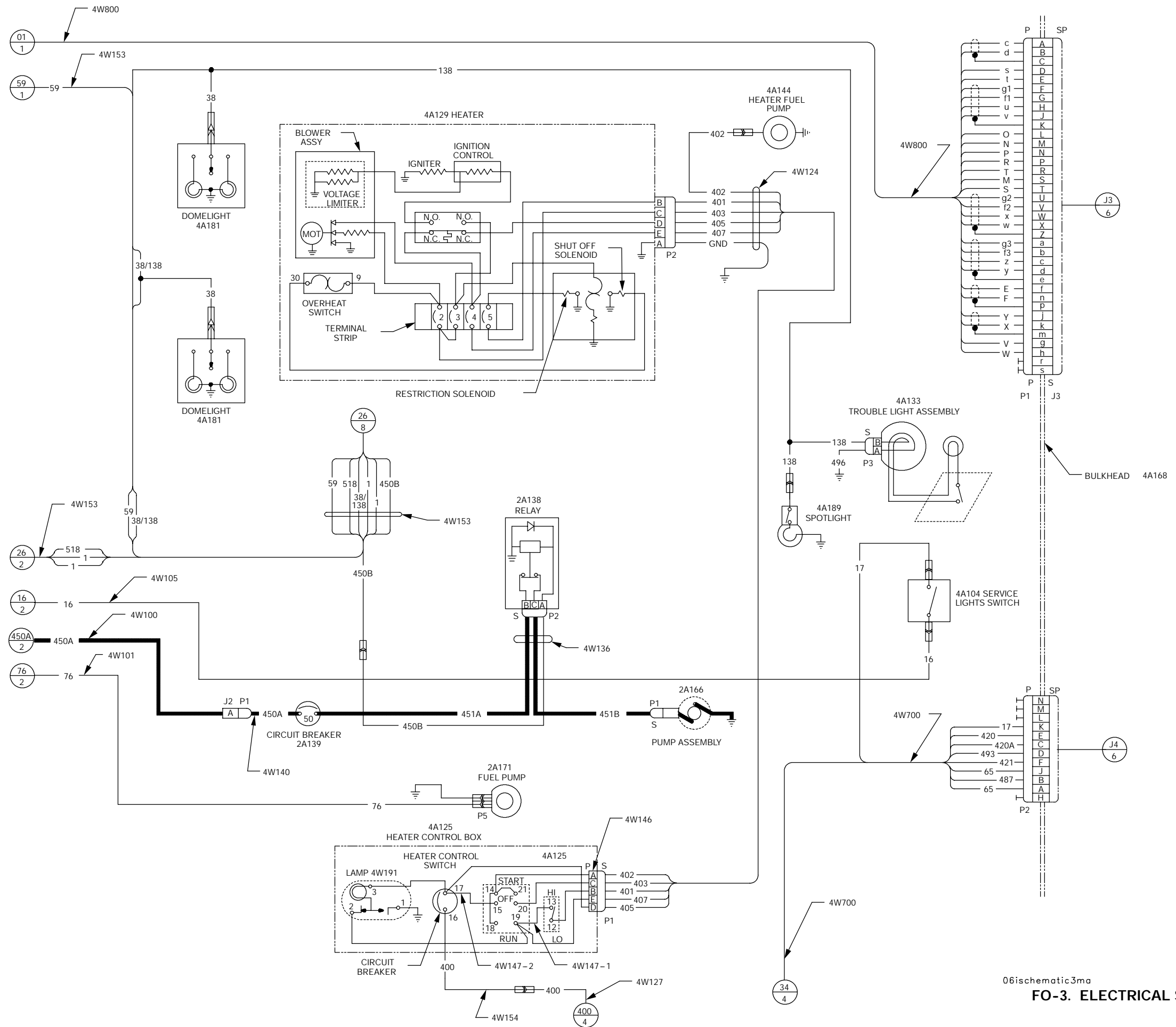
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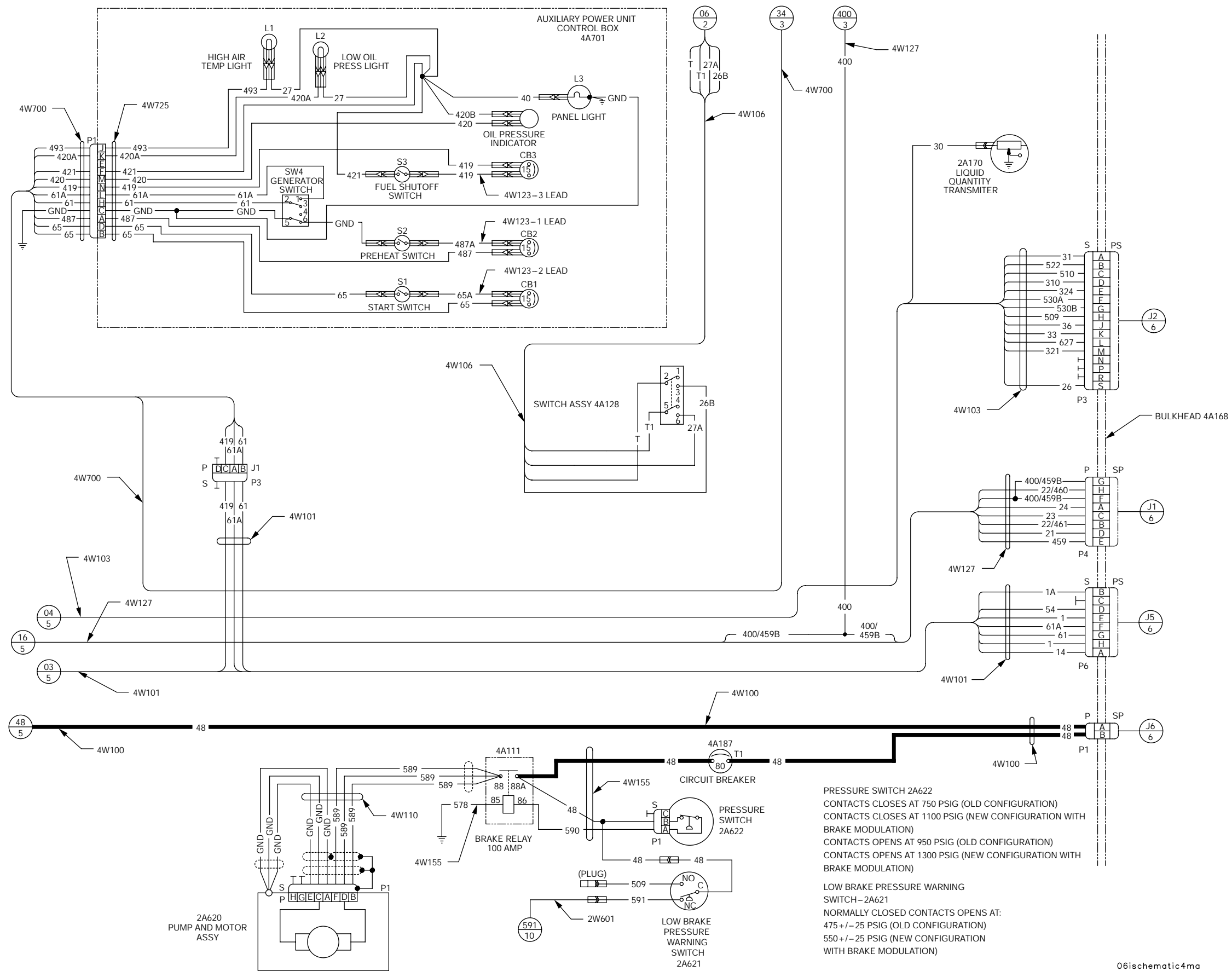


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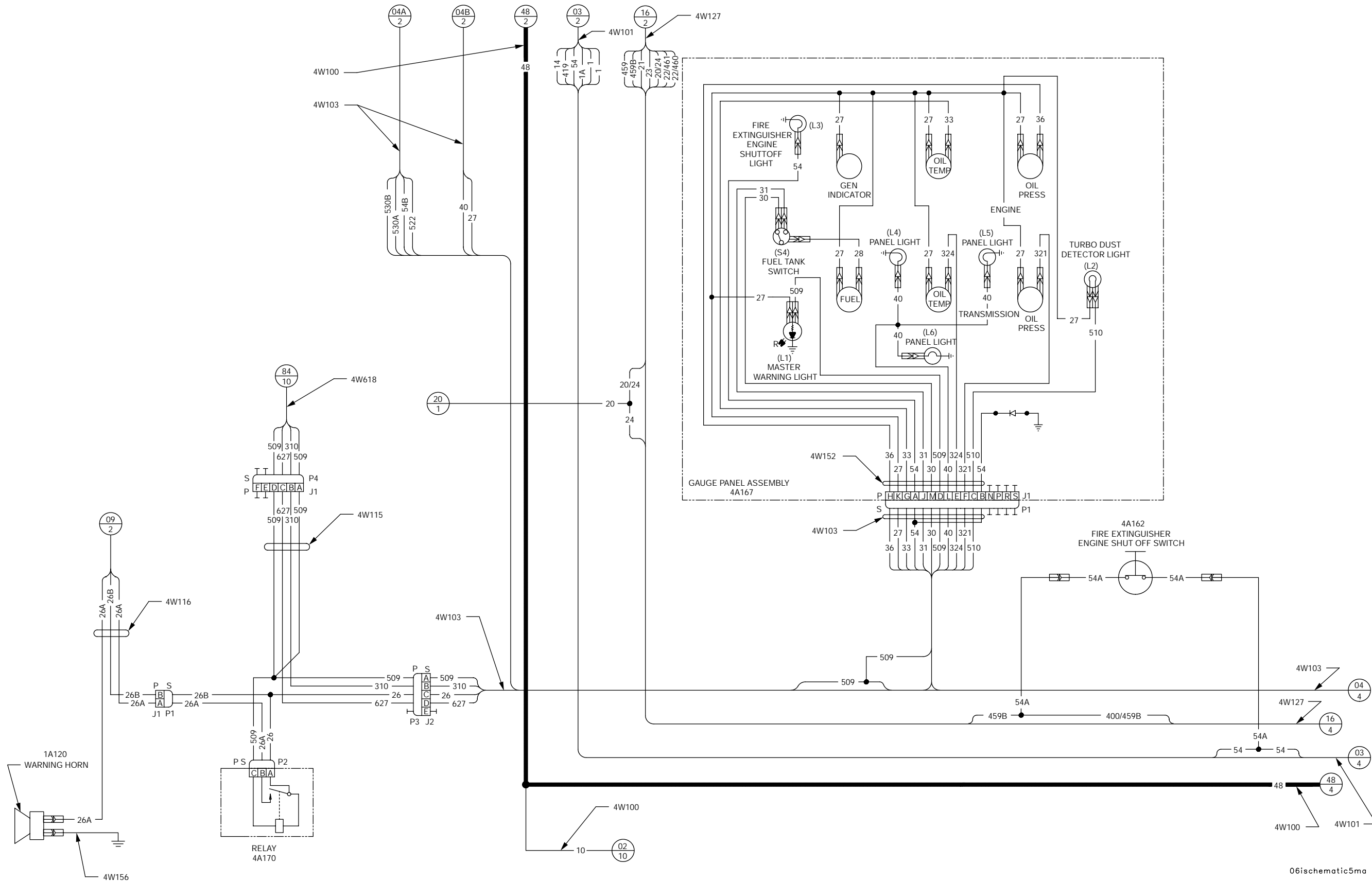
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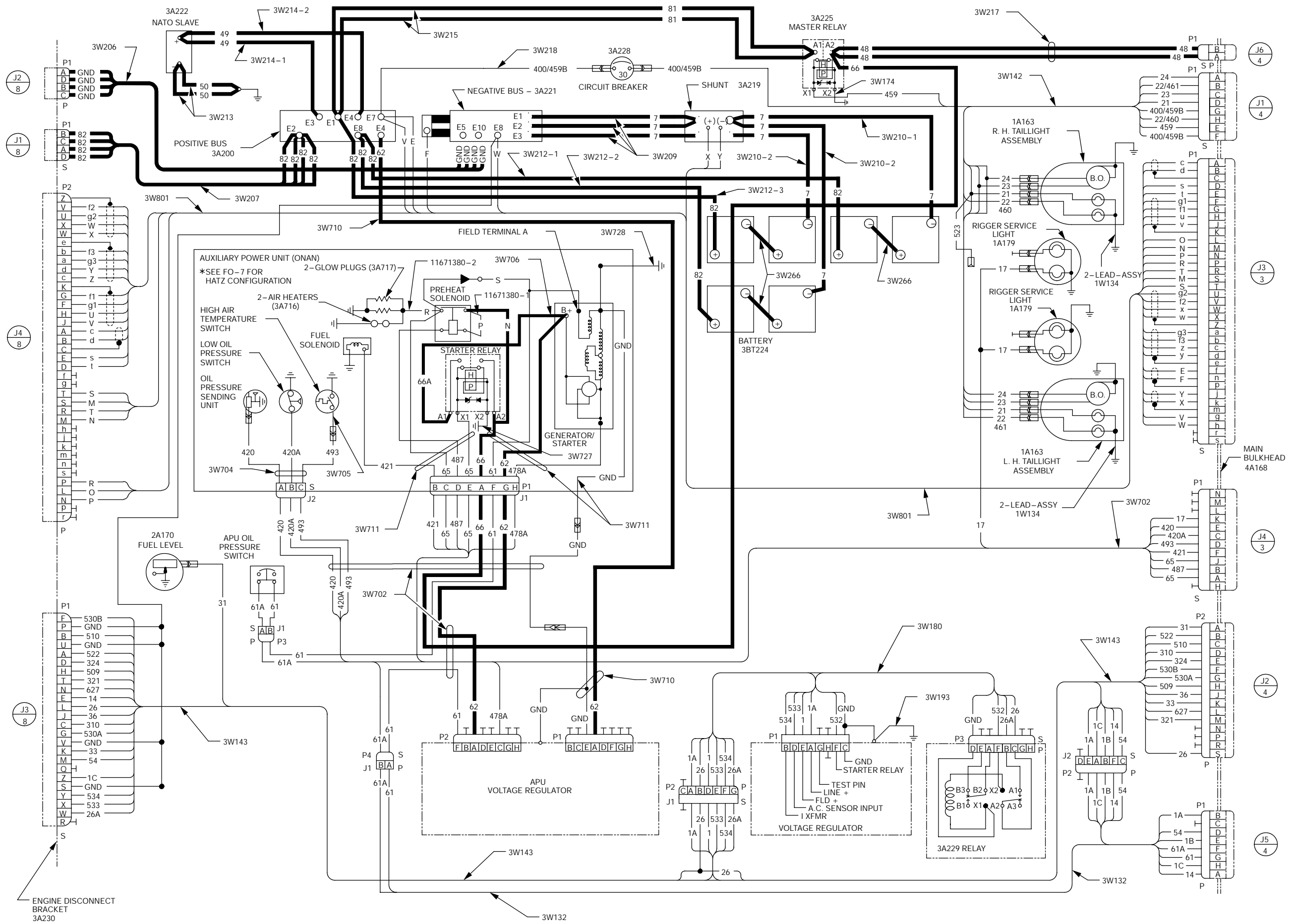
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 FP-5/(FP-6 blank)



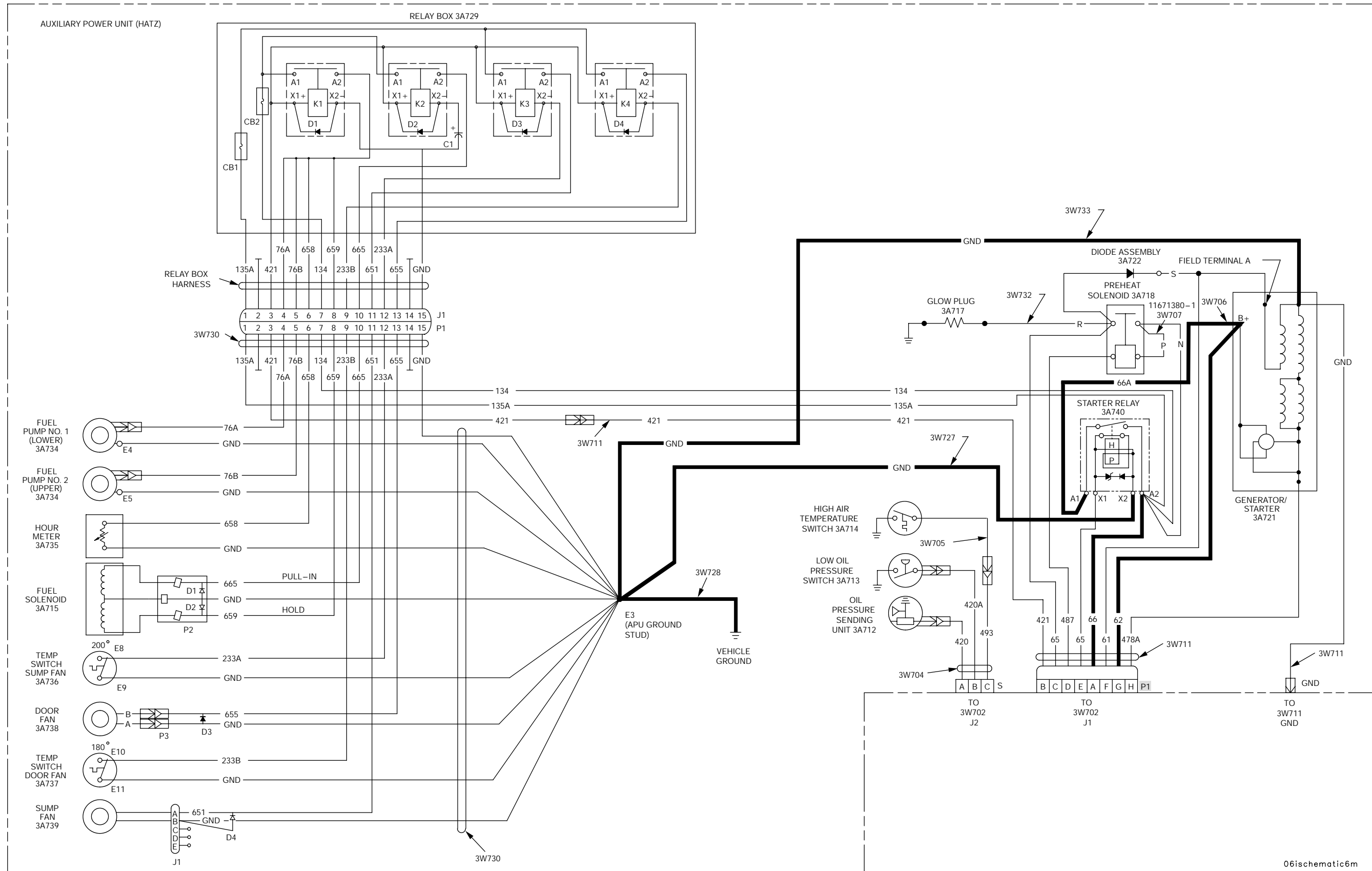
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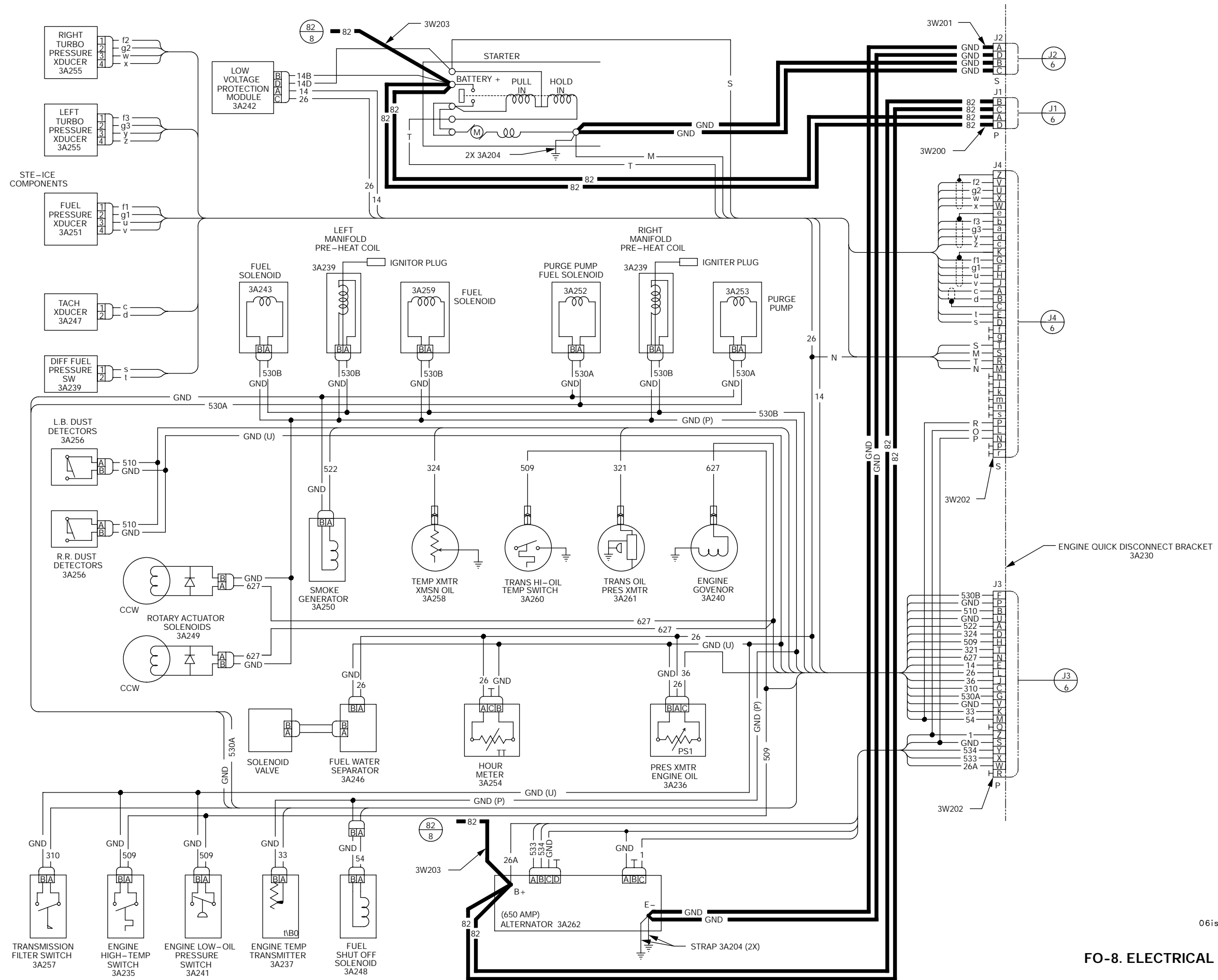


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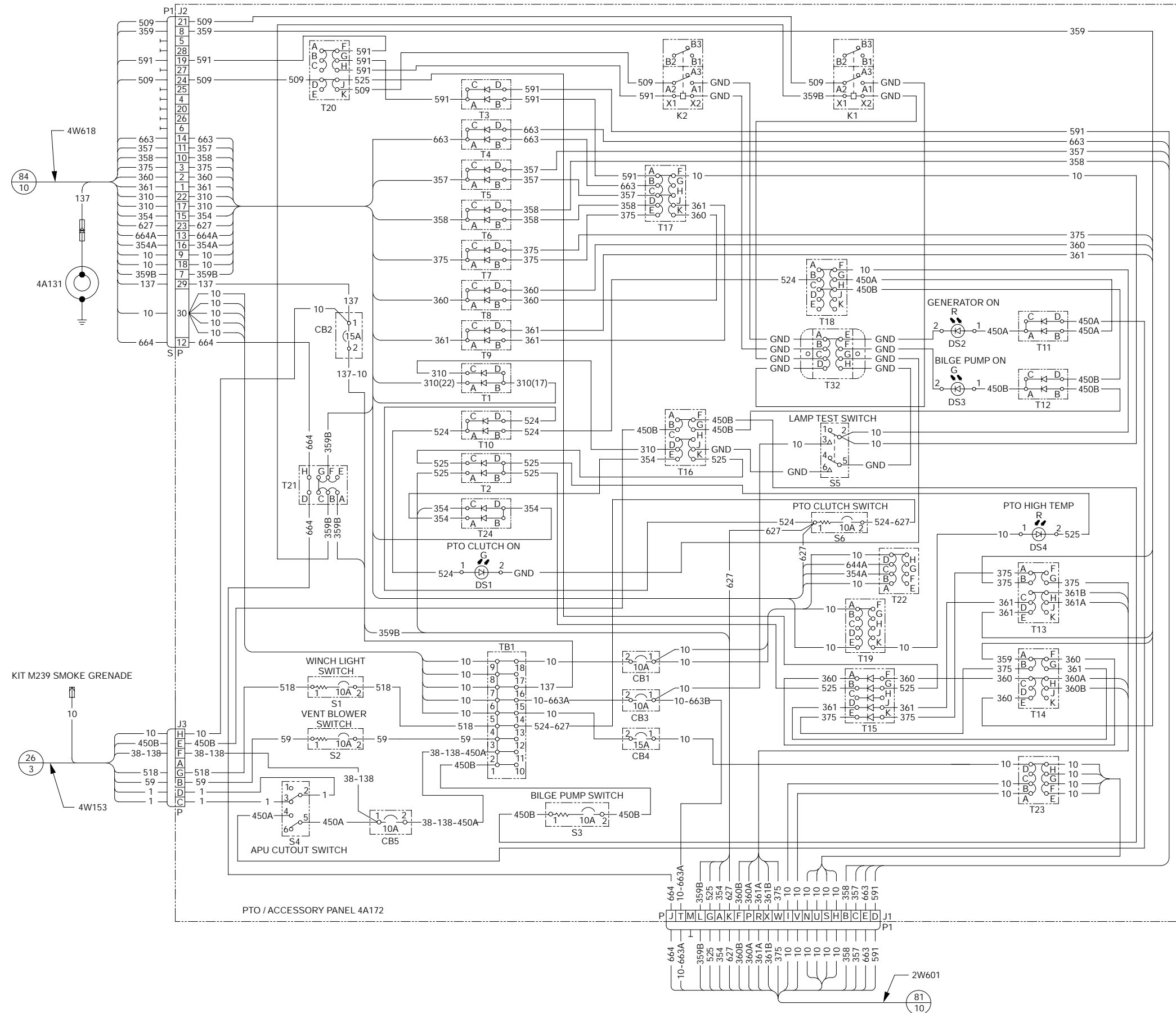


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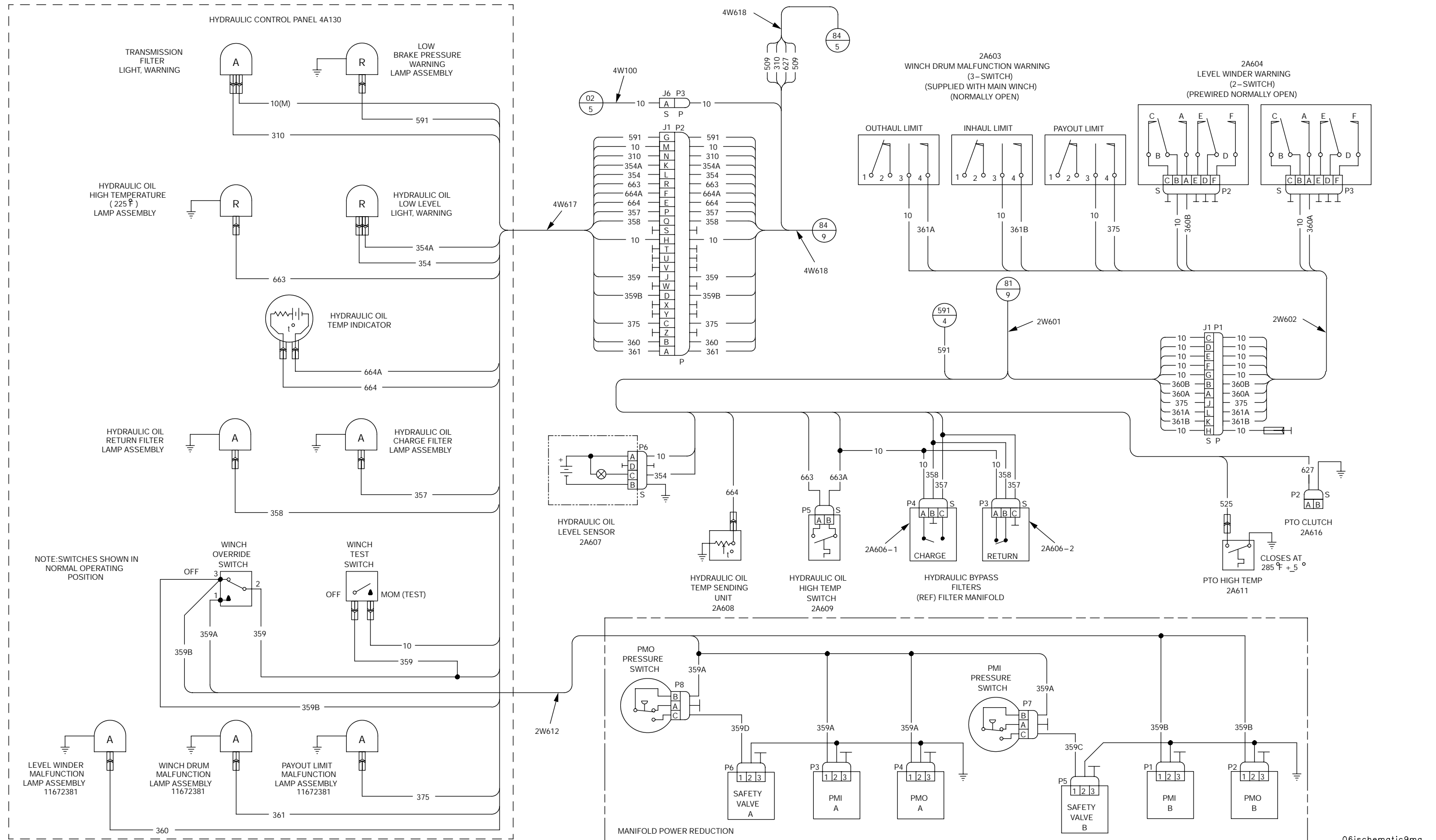




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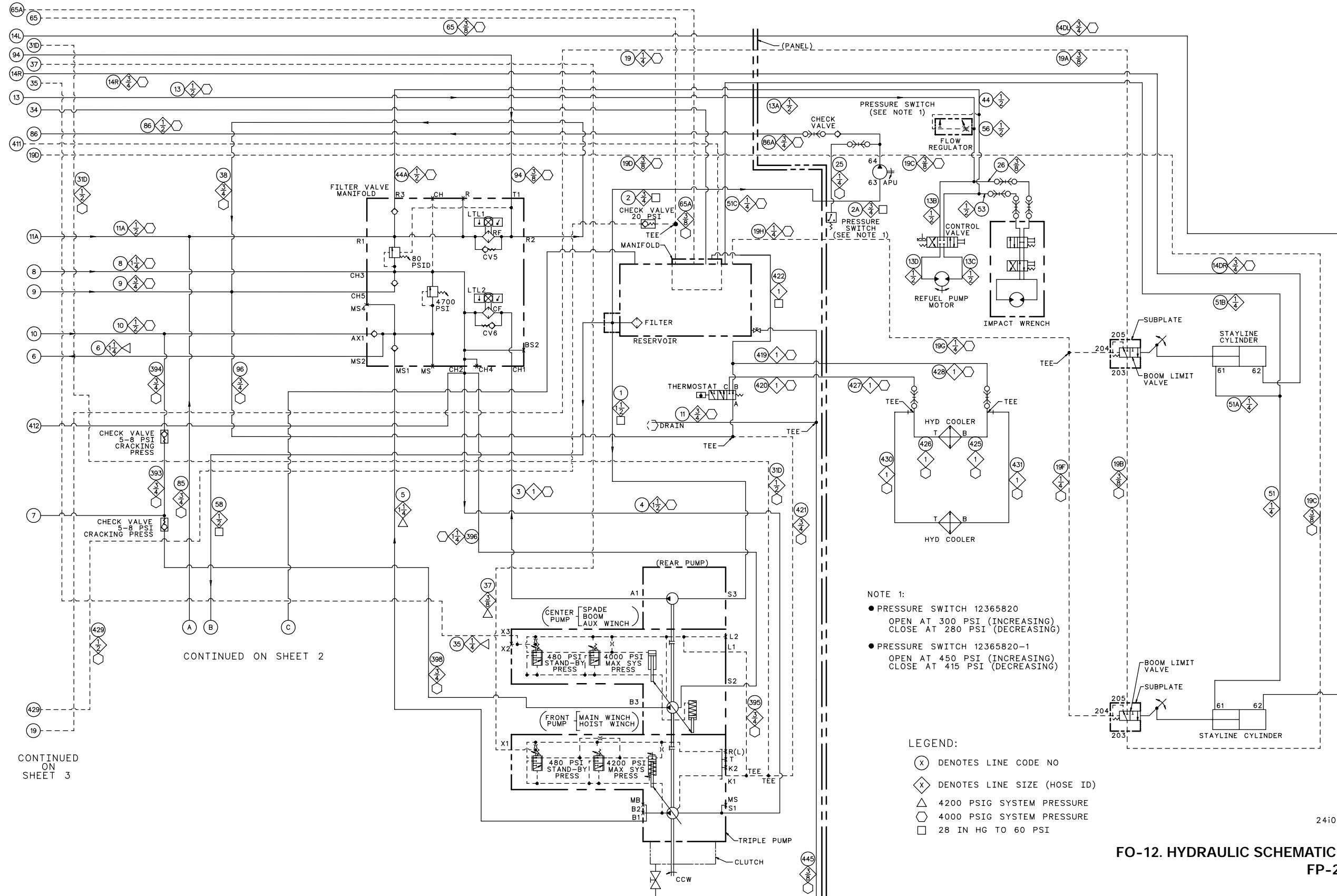


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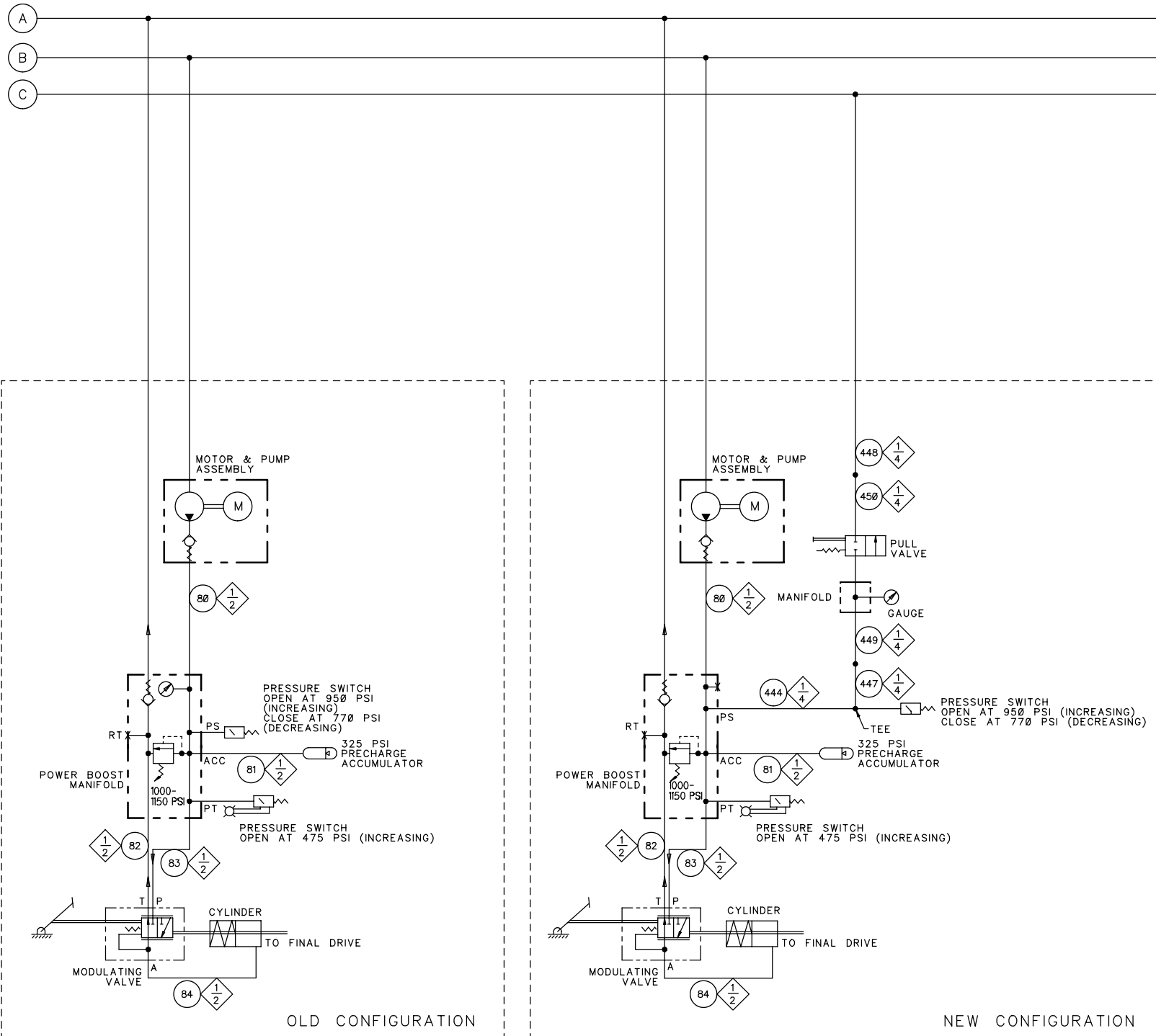
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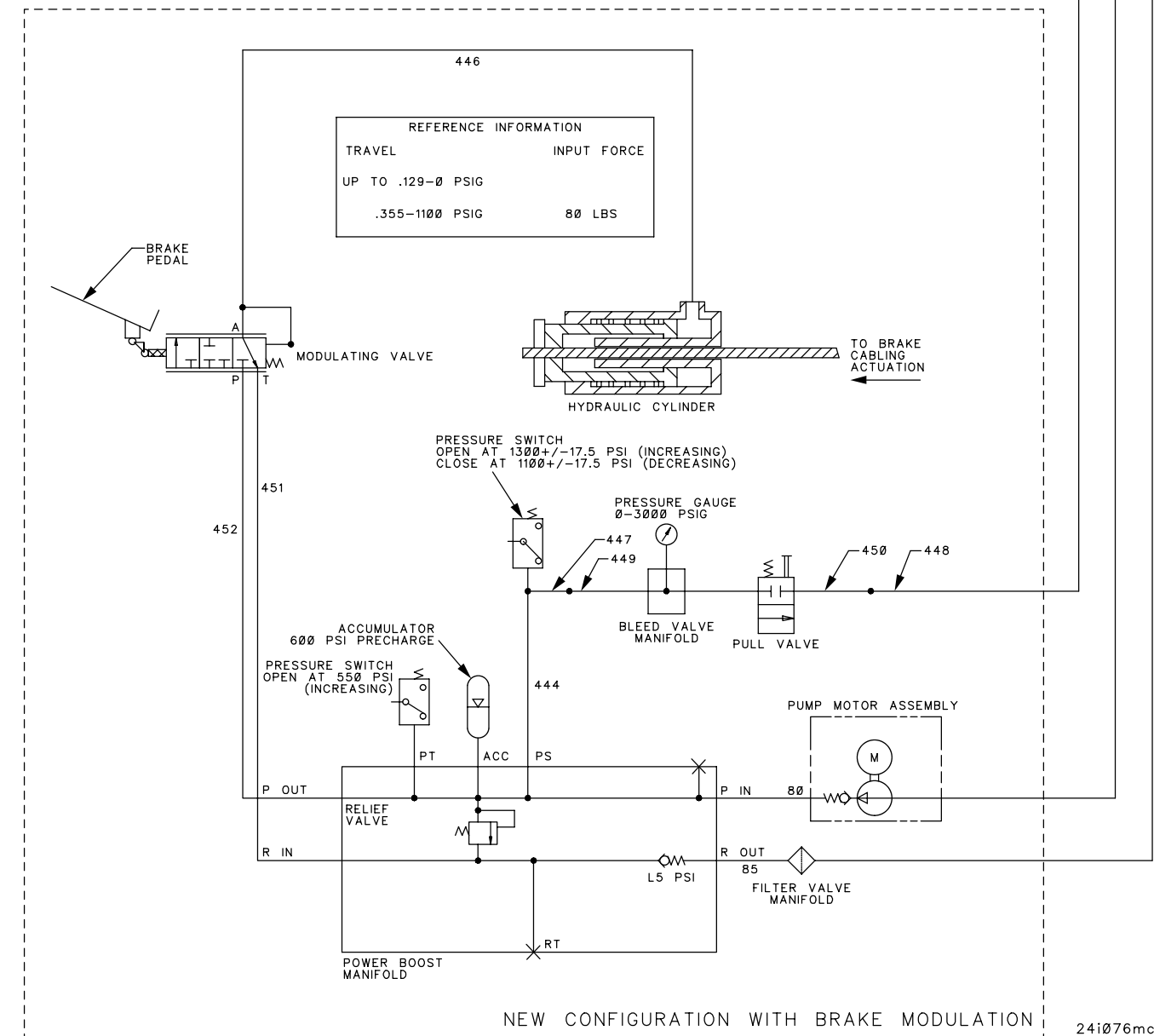


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FO-12. HYDRAULIC SCHEMATIC (SHEET 1 OF 3)
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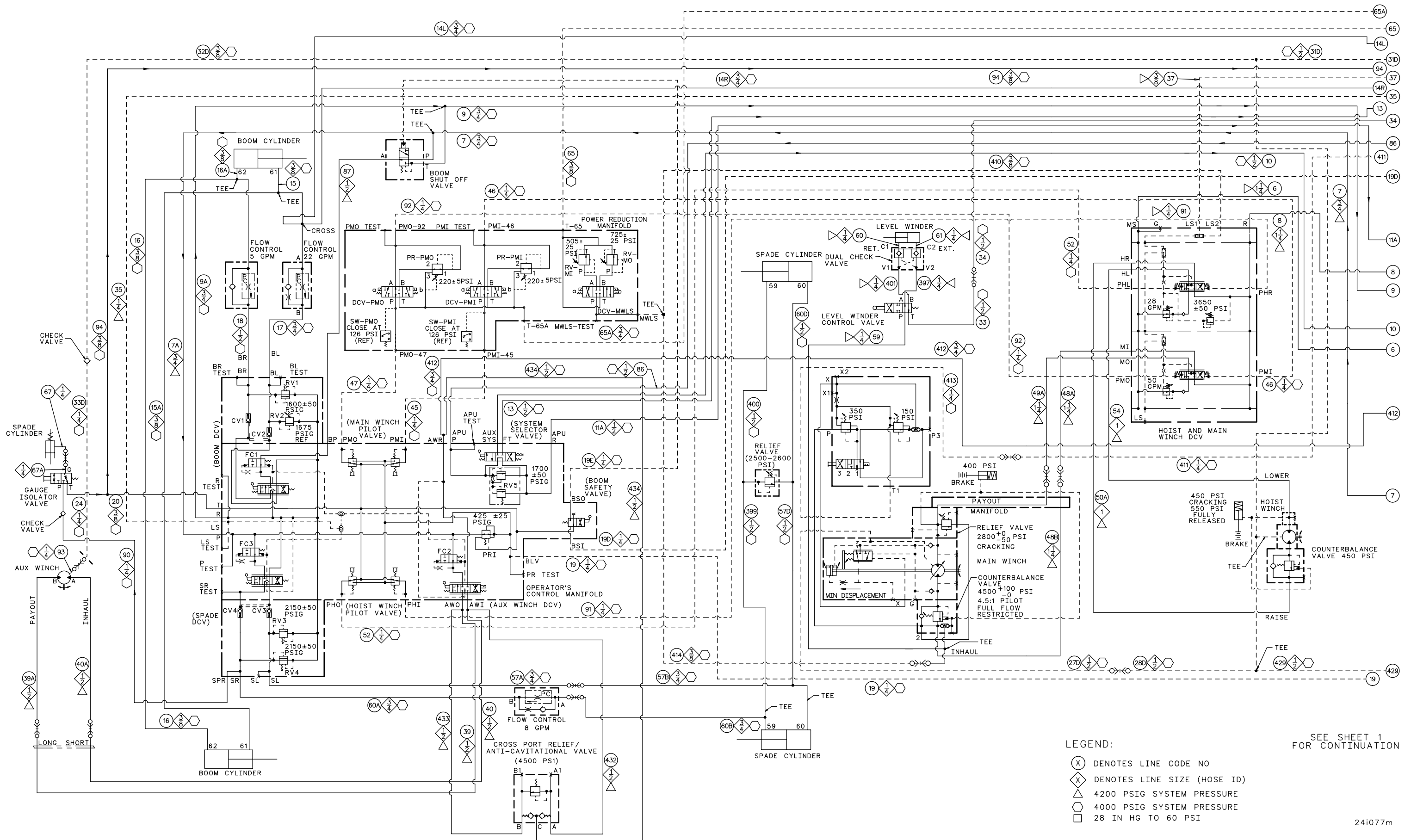


NOTE:
 THE M88A2 VEHICLES CONTAIN THREE DIFFERENT BRAKING SYSTEMS. THE ORIGINAL BRAKING SYSTEM REFERRED TO AS THE OLD CONFIGURATION, A MODIFIED BRAKING SYSTEM WITH THE ADDITION OF A BLEED VALVE AND GAUGE REFERRED TO AS THE NEW CONFIGURATION AND THE MODIFIED NEW CONFIGURATION BRAKING SYSTEM WITH A NEW BRAKE PEDAL CONNECTED DIRECTLY TO THE MODULATING VALVE, NEW PRESSURE SWITCHES AND OPERATING AT HIGHER HYDRAULIC PRESSURE REFERRED TO AS THE NEW CONFIGURATION WITH BRAKE MODULATION.



REFERENCE INFORMATION

TRAVEL	INPUT FORCE
UP TO .129-0 PSIG	80 LBS
.355-1100 PSIG	



LEGEND:

- (X) DENOTES LINE CODE NO
- (X) DENOTES LINE SIZE (HOSE ID)
- △ 4200 PSIG SYSTEM PRESSURE
- 4000 PSIG SYSTEM PRESSURE
- 28 IN HG TO 60 PSI

SEE SHEET 1 FOR CONTINUATION

By Order of the Secretary of the Army:

Official:



JOEL B. HUDSON

*Administrative Assistant to the
Secretary of the Army*

0120613

ERIC K. SHINSEKI
*General, United States Army
Chief of Staff*

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PUBLICATION/FORM NUMBER						DATE	TITLE
ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
<i>* Reference to line numbers within the paragraph or subparagraph.</i>							
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CONVERSION TABLE

inch	decimal	mm	inch	decimal	mm	inch	decimal	mm
1/64	0.015625	0.3969	23/64	0.359375	9.1281			
1/32	0.031250	0.7938	3/8	0.375000	9.5250	45/64	0.703125	17.8594
3/64	0.046875	1.1906				23/32	0.718750	18.2562
1/16	0.062500	1.5875	25/64	0.390625	9.9219	47/64	0.734375	18.6531
			13/32	0.406250	10.3188	3/4	0.750000	19.050
5/64	0.078125	1.9844	27/64	0.421875	10.7156			
3/32	0.093750	2.3812	7/16	0.437500	11.1125	49/64	0.765625	19.4469
7/64	0.109375	2.7781				25/32	0.781250	19.8437
1/8	0.125000	3.1750	29/64	0.453125	11.5094	51/64	0.796875	20.2406
			15/32	0.468750	11.9062	13/16	0.812500	20.6375
9/64	0.140625	3.5719	31/64	0.484375	12.3031			
5/32	0.156250	3.9688	1/2	0.500000	12.7000	53/64	0.828125	21.0344
11/64	0.171875	4.3656				27/32	0.843750	21.4312
3/16	0.187500	4.7625	33/64	0.515625	13.0969	55/64	0.859375	21.8281
			17/32	0.531250	13.4938	7/8	0.875000	22.2250
13/64	0.203125	5.1594	35/64	0.546875	13.8906			
7/32	0.218750	5.5562	9/16	0.562500	14.2875	57/64	0.890625	22.6219
15/64	0.234375	5.9531				29/32	0.906250	23.0188
1/4	0.250000	6.3500	37/64	0.578125	14.6844	59/64	0.921875	23.4156
			19/32	0.593750	15.0812	15/16	0.937500	23.8125
17/64	0.265625	6.7469	39/64	0.609375	15.4781			
9/32	0.281250	7.1438	5/8	0.625000	15.8750	61/64	0.953125	24.2094
19/64	0.296875	7.5406				31/32	0.967500	24.6062
5/16	0.312500	7.9375	41/64	0.640625	16.2719	63/64	0.984375	25.0031
			21/32	0.656250	16.6688			
21/64	0.328125	8.3344	43/64	0.671875	17.0656	1	1.000000	25.4000
11/32	0.343750	8.7312	11/16	0.687500	17.4625			

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
 1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
 1 Kilogram = 1000 Grams = 2.2 Lb.
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
 1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
 1 Sq. Kilometer = 1,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
 1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

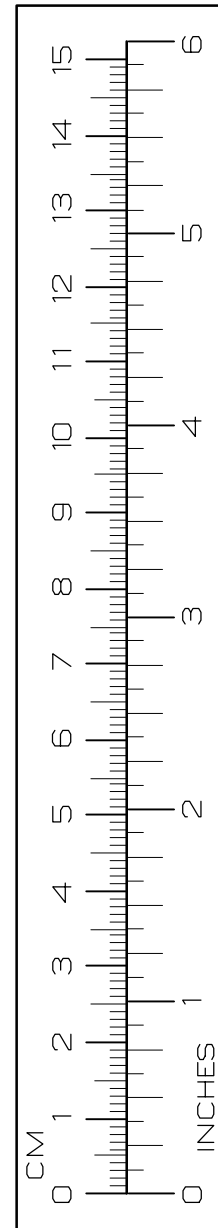
TEMPERATURE

$212_{\text{ Fahrenheit}} \text{ is equivalent to } 100_{\text{ Celcius}}$
 $90_{\text{ Fahrenheit}} \text{ is equivalent to } 32.2_{\text{ Celcius}}$
 $32_{\text{ Fahrenheit}} \text{ is equivalent to } 0_{\text{ Celcius}}$
 $(9/5 \times _C) + 32 = _F$

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square 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 Square 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
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square 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 Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



PIN: 078534-000