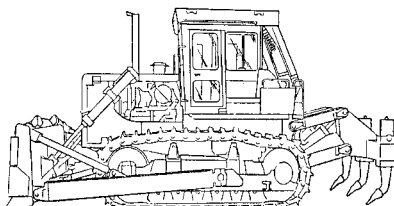
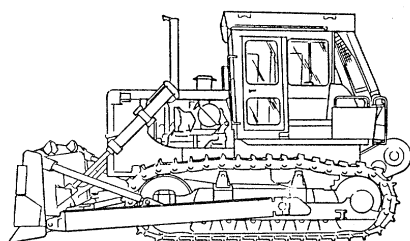
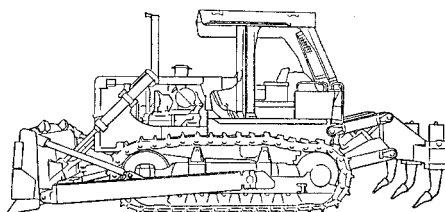
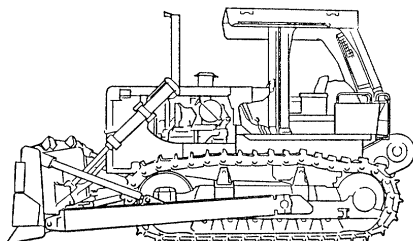


**TECHNICAL MANUAL
UNIT MAINTENANCE MANUAL
FOR**

**TRACTOR, FULL TRACKED, LOW SPEED: DED,
MEDIUM DRAWBAR PULL, SSN M061**



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NSN 2410-01-223-0350
TRACTOR WITH WINCH,
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TRACTOR WITH RIPPER AND WINTERIZED CAB,
NSN 2410-01-253-2118
TRACTOR WITH WINCH AND WINTERIZED CAB,
NSN 2410-01-253-2117**

HEADERQUARTER, DEPARTMENT OF THE ARMY

***This publication along with TM 5-2410-237-34 supersedes TM 5-2410-237-24**

Approved for public release; distribution is limited.

The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this manual. These are recommended precautions that personnel must understand and apply during many phases of maintenance.

WARNING**CARBON MONOXIDE**

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

Carbon monoxide occurs in the exhaust fumes of fuel-burning heaters and internal-combustion engines and becomes DANGEROUSLY CONCENTRATED under conditions of INADEQUATE VENTILATION. The following precautions MUST be observed to insure the safety of personnel whenever the engine is operated for maintenance purposes.

- DO NOT operate the engine in an enclosed area unless it is ADEQUATE LY VENTI LATED.
- DO NOT operate the engine in an enclosed area such as a test cell without properly fitted and functioning exhaust ducts.
- BE ALERT at all times during engine operation for exhaust odors and exposure symptoms. If either are present, IMMEDIATELY VENTI LATE the work area. If symptoms persist, remove affected personnel from the work area and treat as follows: expose to fresh air; keep warm; DO NOT PERMIT PHYSICAL EXERCISE; if necessary, administer artificial respiration as described in FM 21-11.

WARNING**HANDLING WEIGHTS**

This manual considers short-term, non-repetitive lifts of equipment weighting up to 190 pounds to heights of about 3 feet. Under these conditions, this manual assigns one man for each 47-pound increment of weight up to a total of four men to accomplish the required lifts. If local conditions mandate higher lifts, repetitive lifts, or carries greater than 9 feet, refer to MIL-STD-1472 for a guideline on the number of personnel needed.

WARNING

MECHANICAL HAZARDS

Mechanical systems and components used on this equipment are energized, under pressure, or have sharp edges

Use all precautions to de-energize a system, bleed pressure and to protect yourself from sharp edges when working on the equipment. Failure to do so may cause serious PERSONAL INJURY or DEATH.

WARNING

HIGH NOISE DANGER

Your hearing can be PERMANENTLY DAMAGED if you are 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 TB MED 501.

WARNING

USE OF COMPRESSED AIR TO DRY PARTS

Particles blown by compressed air are hazardous. DO NOT exceed 15 psig nozzle pressure when drying parts with compressed air. DO NOT direct compressed air against human skin. Failure to do so may result in SERIOUS INJURY or DEATH. Make certain the air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

WARNING**FLAMMABLE LIQUIDS**

Dry cleaning fluid, mineral spirits paint thinner, alcohol, acetone, methylethyl ketone and trichloroethylene are flammable solvents. Use these materials only in well-ventilated areas away from open flames and other heat sources that could cause ignition. The minimum safety measures described below must be observed in the handling and use of solvents: •

Fire extinguishers should be nearby when these materials are used.

- Cloths or rags saturated with cleaning solvents must be disposed of in accordance with authorized facilities procedures.
- The use of diesel fuel, oil, gasoline or benzine (benzol) is PROHIBITED for cleaning purposes.
- Fuel vapors can ignite and cause an explosion. Do not allow smoking or an open flame within 50 feet (16 meters).

WARNING**PROPER MACHINE OPERATION**

This equipment must be operated only by authorized personnel who have satisfactorily completed a program of training which must include familiarity with safe operating procedures, characteristics, and a knowledge of applicable codes, regulations, and facilities directives. Untrained personnel subject themselves and others to the possibility of DEATH or SERIOUS INJURY from the improper operation of this machine. Understand the equipment, its function, and the controls before operations are begun.

WARNING

To prevent personal injury, hydraulic pressure must be relieved before working on any hydraulic component. Move control levers through all operating positions and return to HOLD position. This will neutralize circuit pressure. Failure to do so may result in severe personal injury or death.

WARNING**HANDLING CLEANING AGENTS (SOLVENTS)**

Toxic solvents are used in cleaning the equipment. Methyl-ethyl ketone TT-M-261 is a highly flammable solvent containing toxic characteristics that may irritate the skin and cause burns or internal disorders fumes are repeatedly inhaled.

Trichloroethylene is a flammable solvent that has a chloroform odor. Inhaling concentrated fumes can cause unconsciousness. Inhaling fumes for a prolonged time can cause headache and drowsiness. Solvent absorbed by the skin can also result in internal disorders.

P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Inhaling fumes for a prolonged time can cause headache and drowsiness. Solvent absorbed through the skin can also result in internal disorders.

The safety measures described below should be observed in the handling and use of solvents.

- Avoid prolonged or repeated breathing of vapors.
- Use only in a well-ventilated area.
- Keep away from heat, sparks, or open flames.
- Avoid contact with skin, eyes and clothing. The use of gloves is advised to prevent irritation or inflammation of the skin. If contact with the skin or eyes does occur, quickly wash the affected area with water for at least 15 minutes. For eyes, seek medical attention immediately after flushing eyes with water.

FIRST AID

Refer to FM21-11 for applicable first aid information.

* TECHNICAL MANUAL
NO. 5-2410-237-20

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., 30 March 1993

Organizational Maintenance Manual

**TRACTOR, FULL TRACKED, LOW SPEED: DED,
MEDIUM DRAWBAR PULL, SSN M061**

**TRACTOR WITH RIPPER,
NSN 2410-01-223-0350
TRACTOR WITH WINCH,
NSN 2410-01-223-7261
TRACTOR WITH RIPPER AND WINTERIZED CAB,
NSN 2410-01-253-2118
TRACTOR WITH WINCH AND WINTERIZED CAB,
NSN 2410-01-253-2117**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Tank Automotive Command, ATTN: AMSTA-MP, Warren, MI 48397-5000. A reply will be furnished to you.

Approved For Public Release; Distribution is Unlimited

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SAFETY SUMMARY

The following warnings appear in the text in the manual and are repeated here for emphasis.

WARNING

Some covers hold springs under compression. Use care when removing them. Failure to do so may cause severe injury.(page 3-16)

WARNING

Never service air cleaners with engine running. A high suction condition exists when the engine is running which could cause severe personal injury. (page 3-42)

WARNING

When using pressurized air, wear safety face shield and protective clothing. Use 30 psi maximum air pressure for cleaning to prevent personal injury or damage to filter.(page 3-43)

WARNING

When using pressurized air, wear safety face shield and protective clothing. Use 30 psi maximum air pressure for cleaning to prevent personal injury. (page 3-6)

WARNING

Ether is poisonous and flammable. Do not store replacement cylinders in living areas, in the operator's compartment, or in direct sunlight. Do not smoke while changing ether cylinders. Avoid breathing of the vapors or repeated contact of ether with skin. Discard cylinders in a safe place in accordance with facilities directives, do not puncture or burn cylinders. Failure to do so may cause severe injury or death. (page 3-91)

WARNING

Let engine cool before removing fill cap from radiator. Hot coolant and steam may cause personal injury. (page 3-102)

WARNING

Loosen the filler cap to the first stop and let any pressure out of the cooling system, then remove the filler cap. Hot coolant and steam can cause personal injury. (page 3-102)

WARNING

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury and equipment damage.(page 4-18)

WARNING

Never disconnect any charging unit circuit or battery circuit cable from battery when the charging unit is operating. A spark can cause an explosion from the flammable vapor mixture of hydrogen and oxygen that is released through the battery outlets. Failure to do so may cause severe personal injury or death. (page 4-64)

WARNING

Do not overfill so that water splashes acid from cell opening. Battery acid can cause skin irritations or burns. Failure to do so may cause severe personal injury. (page 4-65)

WARNING

To prevent electrical shock, make sure battery disconnect switch is in the "OFF" position. Failure to do so may cause personal injury. (page 4-65)

WARNING

Never visually inspect the vent holes or valves to see if grease or oil is coming out of them. Make sure the vent holes are clean before the tension is released on the track. Watch the cylinder to see that it moves. Failure to do so may cause severe personal injury or death. (page 8-8)

WARNING

The adjuster cylinder for the track is under hydraulic pressure. Use the following procedure to relieve this pressure and observe the relaxing of tension on the track. Do not observe the grease coming from the relief valve. Do not, under any circumstances, attempt to relieve the hydraulic pressure by excessive loosening or removal of relieve valve. Failure to follow these precautions could result in serious personal injury. Wear eye protection. (page 8-10)

WARNING

Keep all personnel clear of front and rear of machine during track separation. Track moves fast and uncontrolled at separation. At least 20 feet of clearance required in front. Stand at side of track when removing bolts and master shoe and when making track separation. Failure to follow these precautions could result in serious or even fatal injuries. (page 8-12)

WARNING

If it is necessary to remove damaged glass, use thick gloves to avoid injury. (page 10-41)

WARNING

Handle glass carefully. Failure to do so may cause serious personal injury or death. (page 10-42)

WARNING

Inspect full length of cable for broken strands and kinks and replace cable if these conditions are found. Failure to do so could result in cable breakage which could cause serious injury or death. (page 11-27)

WARNING

Hydraulic oil in the system can be under pressures over 2500 psi with the engine and pump OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF and hydraulic attachments on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank, by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury or death. (page 13-2)

WARNING

Use sling and hoist to install bulldozer cylinder. Failure to do so could result in serious injury or death. (page 13-8)

WARNING

ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF and hydraulic attachments on the ground, move control levers through all operating positions to relieve line pressure. Failure to follow these precautions could result in serious personal injury. (page 13-2)

WARNING

Park tractor on level ground. With blade on ground, move control lever back and forth to relieve pressure in hydraulic circuit. Use sling and hoist to remove cylinders. Failure to follow these precautions could result in serious injury or death. (page 13-30)

WARNING

Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow this precaution could result in serious personal injury. (page 13-33)

HOW TO USE THIS MANUAL

1. ABOUT YOUR MANUAL

Spend some time looking through this manual. You'll find that it has a new look, different than most of the TMs you've been using.

New features added to make this manual easier for you to use are:

- a. **Finding Information** These include entry features such as the thumb indexing indicators on the cover and edge of the manual. Extensive troubleshooting guides for specific systems lead directly to step by step directions for problem solving and maintenance tasks.
- b. **Illustrations** Many methods are used to make finding and fixing parts much easier. Locator illustrations with keyed text, exploded views, and cut-away diagrams make the information in this manual easier to understand and follow.
- c. **Keying Text With Illustrations** Instructions/text are located together with figures that illustrate the specific task you are working on. In most cases, the task steps and figures are located side by side.

This TM is organized so that the information and procedures, needed to perform maintenance tasks, is easily located. Take a few minutes to read through this How To Use part of the manual to learn how it is put together and how to find the information you need.

2. BEFORE YOU START

- a. Read and understand all warning and first aid data in the front of this manual. This data contains general shop safety practices not included in maintenance tasks.
- b. Read Chapter 1 to learn more about the tractor and its purpose, capabilities and features.

3. CONTENTS OF MANUAL

- a. This TM contains unit maintenance instructions at the organizational level for the D7G Tractor. Included are principles of operation, fault isolation troubleshooting, and corrective maintenance tasks as authorized by the Maintenance Allocation Chart (MAC).
- b. This TM is made up of:
 - (1) Chapters. There are 16 chapters.
 - (a) Chapter 1, Introduction. This chapter contains general tractor information of interest to organizational level maintenance technicians.

HOW TO USE THIS MANUAL (Cont'd)

- (b) Chapter 2, Maintenance Instructions. This chapter contains instructions of interest to organizational level maintenance technicians on tools, equipment, preventive maintenance and troubleshooting.
- (c) Chapter 3, Engine Systems Maintenance. This chapter contains engine maintenance divided by major systems.
- (d) Chapter 4, Electrical Systems Maintenance. This chapter contains electrical maintenance divided by major systems.
- (e) Chapter 5, Transmission Maintenance. This chapter contains maintenance of transmission components.
- (f) Chapter 6, Final Drives Maintenance. This chapter contains maintenance of final drive components.
- (g) Chapter 7, Drive Shaft Maintenance. This chapter contains maintenance of drive shaft components.
- (h) Chapter 8, Track Maintenance. This chapter contains maintenance of track components.
- (i) Chapter 9, Steering and Brake Maintenance. This chapter contains maintenance of steering and brake components.
- (j) Chapter 10, Body, Cab, Hood and Hull Maintenance. This chapter contains maintenance of body, cab, hood and hull components.
- (k) Chapter 11, Winch Maintenance. This chapter contains maintenance of winch components.
- (l) Chapter 12, Accessory Items and Winterization Equipment. This chapter contains maintenance of accessory and winterization equipment components.
- (m) Chapter 13, Hydraulic System Maintenance. This chapter contains maintenance of hydraulic components.
- (n) Chapter 14, Gages Maintenance. This chapter contains maintenance of non-electrical gages.
- (o) Chapter 15, Earth Moving Equipment Maintenance. This chapter contains maintenance of blade and ripper components.
- (p) Chapter 16, Preparation for Storage and Shipment. This chapter contains information on storing the tractor for extended periods of time.

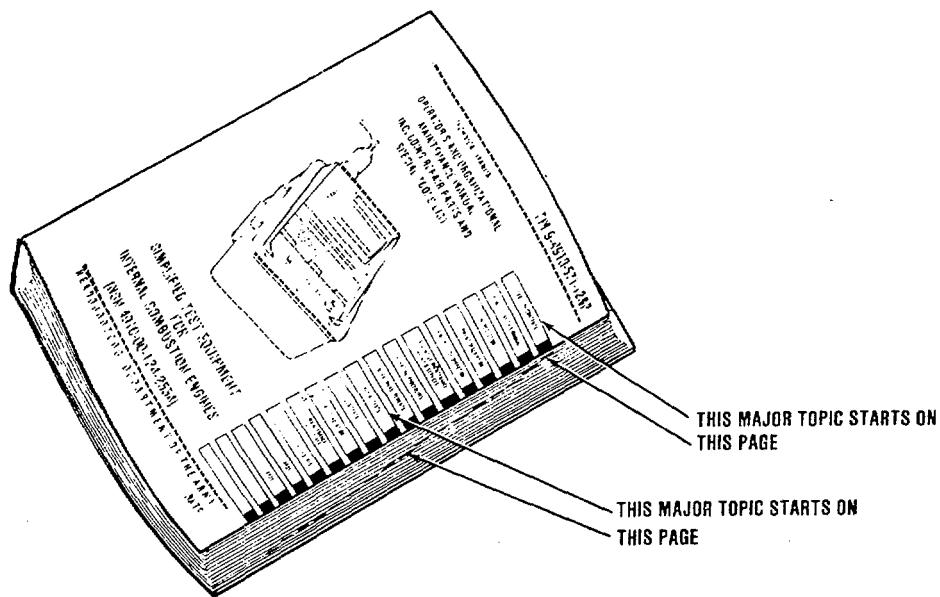
HOW TO USE THIS MANUAL (Cont'd)

- (2) Sections. Some chapters are further subdivided into sections. Sections allow for easier break-up of material. They are:
- (a) Chapter 1 has three sections: General Information, Equipment Description and Data, and Technical Principles of Operation.
 - (b) Chapter 2 has five sections: Repair Parts, Special Tools, TMDE and Support Equipment, Service Upon Receipt of Material, Preventive Maintenance Checks and Services, Troubleshooting Procedures, and General Maintenance Instructions.
 - (c) Chapter 3 has four sections: Oil System, Fuel System, Exhaust System, and Cooling System.
 - (d) Appendix B has four sections: Introduction, Maintenance Allocation Chart, Tool and Test Equipment Requirements, and Remarks.
 - (e) Appendix E has two sections: Introduction and Manufactured Items Illustrations.
- (3) Paragraphs. Paragraphs make up sections. The paragraphs have the information needed to do the job properly. Each paragraph is the start of a major topic within the chapter.
- (4) Pages. Pages are numbered consecutively within each chapter. The first part is the chapter number followed by a dash and the consecutive page number. For example, page 3 of Chapter 2 is numbered 2-3.
- (5) Appendices. Appendices are found in the back of the manual. They provide reference information required for maintenance.
- (a) Appendix A, References. This appendix contains other information you may need to do your job.
 - (b) Appendix B, Maintenance Allocation Chart (MAC). This appendix contains information needed by all maintenance levels. The MAC lists all tasks assigned to each maintenance level and grouped by functional group code. Refer to Section I of Appendix B for more information.
 - (c) Appendix C, Repair Parts and Special Tools List. This appendix (included only in TMs ending with a "P") contains repair parts information for the tractor. Refer to TM5-2410-237-24P.
 - (d) Appendix D, Expendable Supplies and Materials List. This appendix contains information on expendable items you need for maintenance.

HOW TO USE THIS MANUAL (Cont'd)

- (e) Appendix E, Illustrated List of Manufactured Items. This appendix contains information you need to make parts that are not procured.
- (f) Appendix F, Torque Limits. This appendix contains torquing information for hardware without specific torques.
- (6) Glossary. The glossary is located in the back of the manual. It contains a listing of unusual terms and abbreviations used in this manual and their explanation.
- (7) Index. The index is located in the back of the manual. It lists topics in alphabetical order and references the paragraph numbers where information on the topic can be found.

4. HOW TO FIND INFORMATION QUICKLY



- a. Using Front Cover. The front cover of the manual has boxed titles for major topics. At the right side of each box is a blackened area. The blackened area matches black markings on the first page of that major topic in the manual. Fan the outer edge of the manual to find the topic material.

HOW TO USE THIS MANUAL (Cont'd)

CHAPTER NUMBER

PARAGRAPH NUMBER

PARAGRAPH TITLE CONTINUED

<p>TM 9-4910-571-128P</p> <p>2-3-31. DC VOLTAGE TO IN VDC TEST 189 cont</p> <p>Description: This procedure measures voltage in the range of +45 to +46 volts. The VIM is used as a DC voltmeter with the jacking point in the correct position. This test must be done with the consumer being tested turned on.</p> <p>Typical Applications: Battery Coil Primary Fuel Solenoid Starter Motor Starter Solenoid Starter Cable Drop Fuel Pump Output Attention: Weather Cable Drop Any DC voltages within +45 to +46</p> <p>References: Vehicle/Equipment TM</p> <p>Pre-Test Procedures: Procedure Ref Air confidence test 2-2-3</p> <p>Possible Error Messages: EIM: Offset not performed</p> <p>Control Functions: C1, C2, X1, Q1, Q5</p> <p>ROUTINE On vehicles with a master switch in the negative (-) battery cable, sparking may occur if the VIM case touches the vehicle while master switch is off and VIM is on. Sparking in the presence of fuel or fuel vapors presents a potential hazard. Avoid hazard by doing all testing with the vehicle master switch on.</p> <ol style="list-style-type: none"> 1. Connect test probe cable W2. Attach connector P1 of cable W2 to VOLT5/0VMS J4. 2. Do offset test. <ol style="list-style-type: none"> a. Attach red clip E1 to black clip E2. <p>GC TO NEXT PAGE 2-31</p>	<p>TM 9-4910-571-128P</p> <p>2-3-31. DC VOLTAGE TO IN VDC TEST 189 cont</p> <p>2-3-31</p> <ol style="list-style-type: none"> a. Set TEST SELECT switch to 05. b. Press and hold TEST button until CAL appears on display. 1. Release TEST button and wait for offset value to appear on display. If offset is within +0.6 to +6.3, proceed to step 3. If offset is not within +0.6 to +6.3, refer to Offset Fault Isolation, paragraph 3-2-3. <p>ROUTINE Electrical shock hazard. Ensure circuit is off before attaching leads. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.</p> <p>NOTE Always attach red clip E1 to positive (+) side and black clip E2 to negative (-) side of item being measured, or a negative number may be displayed.</p> <ol style="list-style-type: none"> 3. Connect leads. Attach clips E1 and E2 across circuit where voltages to be measured. 4. Measure voltage. <ol style="list-style-type: none"> a. Turn on circuit to be tested. b. Press TEST button. <p>NOTE If +0.9, 1.5 is displayed voltage is not within +45 to +46 volts. The circuit be measured on 0V. If negative (-) number is displayed then a negative voltage is being measured.</p> <ol style="list-style-type: none"> c. Observe displayed value (voltage). <p>GC TO PAGE 2-31</p>
---	--

PAGE NUMBER

- b. Using Paragraph Numbers and Titles. Paragraph numbers include the chapter number. The paragraph number appears before the title of the paragraph title line. Paragraphs that are longer than one page will have the paragraph number and title continued at the top of each following page.

HOW TO USE THIS MANUAL (Cont'd)

DESCRIPTION

TM 9-4910-571-100P

2-3-32. DC CURRENT 0 TO 1500 AMPS DC TEST #90 2-3-32

Description:
This procedure measures DC current in the range of 0 to 1500 amps. The VIM is used as an ammeter with the decimal point in the correct position. This test may be done with the vehicle/equipment operating.

References:
Vehicle/Equipment TM
Pre-Test Procedures:
Procedure 2-2-3
Run confidence test 2-2-3

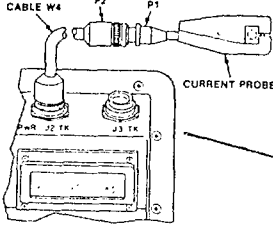
Typical Applications:
Alternator output
Generator output
Average starter current
Field winding current
Accessory current
Battery charging current
Any current from 0 to 1500 Amps DC
Locating shorts

Possible Error Messages:
E002 Transducer not connected
E005 Offset not performed

Control Functions:
01, 02, 03, 04, 05

WARNINGS
On vehicles with a master switch in the negative (-) battery cable, sparking may occur if the VIM case touches the vehicle while master switch is off and VIM is on. Sparking in the presence of fuel or fuel vapors presents a potential hazard. Avoid hazard by doing all testing with the vehicle master switch on.

1. Connect current probe.
a. Attach connector P1 of cable W4 to J2 Tk or J3 Tk.
b. Attach connector P2 of cable W4 to current probe, Tk Item 11.



GO TO NEXT PAGE
2-84

APPLICATIONS

WARNINGS, CAUTIONS AND NOTES

MAJOR STEPS

REFERENCES

PRE-TEST PROCEDURES

ILLUSTRATIONS

5. HOW TO USE A PROCEDURE

Each procedure consists of two parts, an initial setup table and a task section. You must familiarize yourself with the entire maintenance procedures before beginning the maintenance task.

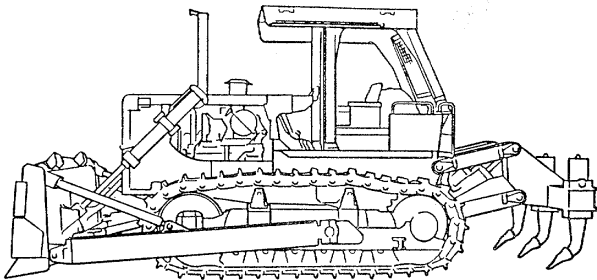
The initial setup table contains the following parts:

Description - Describes the procedure.

Applications - Gives examples of how/where the procedure is used.

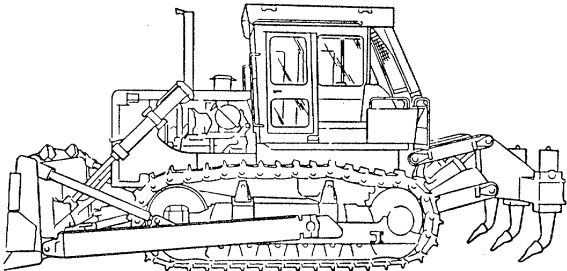
References - Shows where reference material can be found.

Pre-Test Procedures - Refers to procedures that must be done before attempting this procedure.

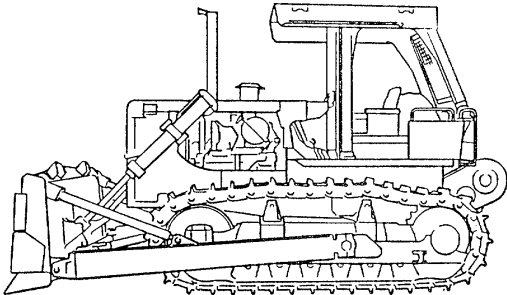


TRACTOR WITH RIPPER
NSN 2410-01-223-0350

TRACTOR WITH RIPPER
AND WINTRIZED CAB
NSN 2410-01-253-2118



TRACTOR WITH WINCH
NSN 2410-01-223-7261



TRACTOR WITH WINCH
AND WINTRIZED CAB
NSN 2410-01-253-2217

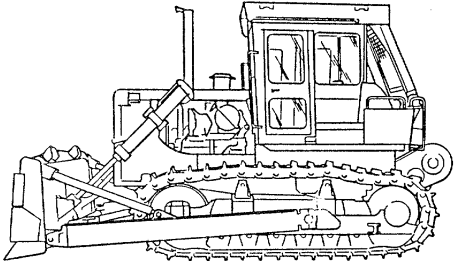


Figure 1-1. Features and components of the D7G CCE Tractor.

CHAPTER 1 INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE

- a. Type of Manual. This manual contains maintenance instructions, at the organizational level, for the D7G Tractor.
- b. Model Numbers and Equipment Names. D7G Tractor, Full Tracked, Low speed: Diesel Engine-Driven, Medium-Drawbar Pull. Equipped with rollover protective structure (ROPS) and Semi-U (straight) tilt type blade. Available in four versions:
 - Tractor with rear-mounted ripper
 - Tractor with rear-mounted winch
 - Tractor with rear-mounted ripper and winterized cab
 - Tractor with rear-mounted winch and winterized cab
- c. Purpose of Equipment. This tractor is designed for dozing soil and rocks, and for clearing land of small trees and brush.
 - (1) Tractors equipped with ripper are designed for dozing and also for ripping soil, rocks, asphalt, and concrete.
 - (2) Tractors equipped with winch are designed for dozing and also for all types of winching operations.

1-2. MAINTENANCE FORMS AND RECORDS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 25-30, The Army Maintenance Management System (TAMMS).

1-3. EQUIPMENT IMPROVEMENT REPORT AND MAINTENANCE DIGEST (EIR MD)

The quarterly Equipment Improvement Report and Maintenance Digest, TB 43-0001-39 series, contains valuable information on the equipment covered in this manual. The information in the TB 43-0001-39 series is compiled from some of the Equipment Improvement Reports that you prepared on the vehicles covered in this manual. Many of these articles result from comments, suggestions, and improvement recommendations that you submitted to the EIR program. The TB 43-0001-39 series contains information on equipment improvements, minor alterations, proposed Modification Work Orders (MWO's), warranties (if applicable), actions taken on some of your DA Forms 2028-2 (Recommended Changes to Publications), and advance information on proposed changes that may affect this manual. The information will help you in doing your job better and will help in keeping you advised of the latest changes to this manual. Also refer to DA PAM 25-30 Consolidated Index of Army Publications and Blank Forms, and Appendix A, References of this manual.

1-4. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Demolition of materiel to prevent enemy use shall be in accordance with the requirement of TM 750-244-3 (Procedures for Destruction of Equipment to Prevent Enemy Use for U.S. Army).

1-5. PREPARATION FOR STORAGE OR SHIPMENT

Refer to Chapter 16 for all storage and shipment instructions.

1-6. OFFICIAL NOMENCLATURE, NAMES, AND DESIGNATIONS.

Refer to the nomenclature cross-reference list below. This listing gives nomenclature cross-references used in this manual. The common name is in the left column and the official name is in the right.

NOMENCLATURE CROSS-REFERENCE LIST

<u>Common Name</u>	<u>Official Nomenclature</u>
D7G Tractor	D7G Tractor, Full Tracked, Low Speed: Diesel Engine-Driven, Medium-Drawbar Pull
Bulldozer	Blade and Pusharm
Brakes	Steering Brakes
Parking Brake	Steering Brake Lock
Start Receptacle	Slave Receptacle

1-7. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S)

If your D7G tractor needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail it to: Commander, US Army Tank-Automotive Command, ATTN: AMSTA QRD, Warren, MI 48397-5000. We'll send you a reply.

1-8. WARRANTY INFORMATION

Refer to warranty TB, Technical Bulletin 5-2410-237-15.

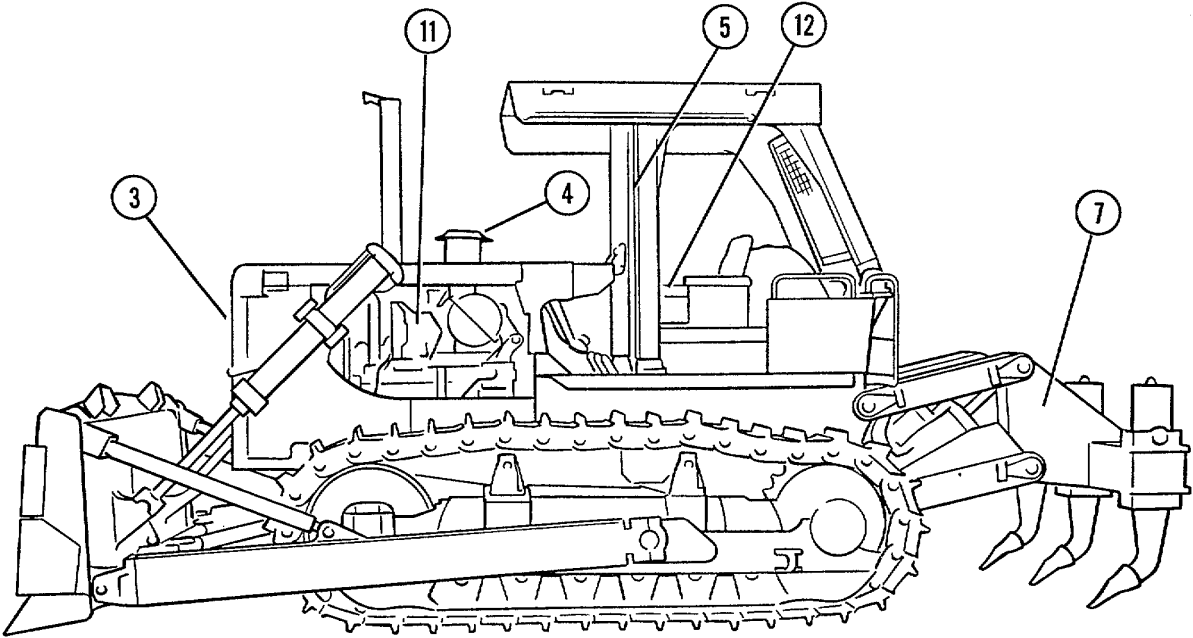
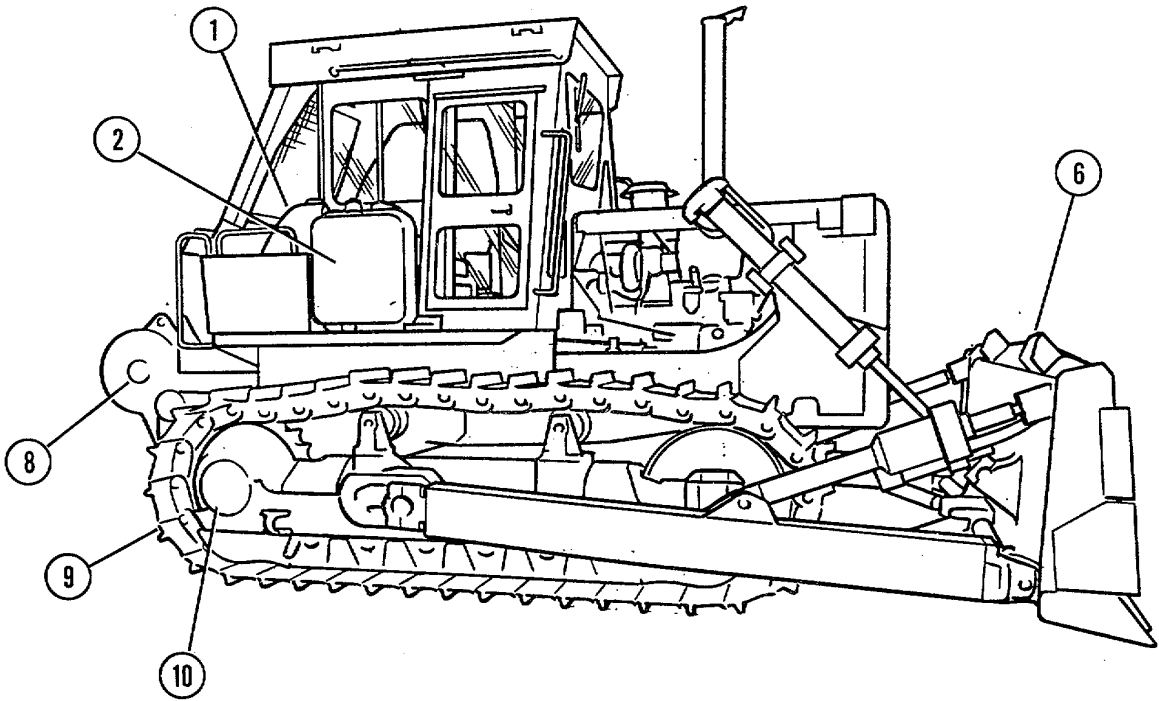
Section II. EQUIPMENT DESCRIPTION AND DATA

1-9. EQUIPMENT PURPOSE, CAPABILITIES AND FEATURES

- a. Purpose. The D7G is designed for earth moving and construction operations.
- b. Capabilities and Features.
 - (1) Can dig and backfill in undisturbed or compacted soil.
 - (2) Tractors with ripper can penetrate and rip compacted soil imbedded with boulders up to a depth of 29" .
 - (3) Tractors with winch can winch loads of 50, 000 lbs at a line speed of 80 ft per minute.
 - (4) Tractors with winch delivers 35, 000 lbs drawbar pull at a speed of 1.4 mph.
 - (5) Operates over rough terrain.
 - (6) All weather operational.
 - (7) Can ford water at depths up to 30 inches.

1-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

- a. Fuel Tank (1). Located at rear of vehicle. Contains diesel fuel for engine operation.
- b. Hydraulic Tank (2). Located on right side of vehicle. Contains hydraulic fluid for hydraulic systems operation.
- c. Radiator (3). Contains water and antifreeze solution which provides engine cooling.
- d. Precleaner (4). Prevents debris from entering the air intake system.
- e. Rollover Protective Structure (5). Protects the operator in the event of an accidental rollover.
- f. Dozer (6). Used for earth moving operations.
- g. Ripper (7). Used for loosening soil and for ripping through hard compacted surfaces.
- h. Winch (8). Used for all types of winching operations.
- i. Tracks (9) and Sprockets (10). Used for steering and propelling the vehicle.
- j. Engine Compartment (11). Houses the engine which provides the power for the D7G.
- k. Operator's Compartment (12). Location of all the controls and indicators which the operator uses during operation.



1-11. DIFFERENCES BETWEEN MODELS

This TM covers organizational maintenance on four models of the D7G. All models are identically equipped except for rear-mounted implement (ripper or winch) and winterized cab.

They are: Dozer with ripper
 Dozer with ripper and winterized cab
 Dozer with winch
 Dozer with winch and winterized cab

1-12. DECALS AND INSTRUCTION PLATES

Refer to TM5-2410-237-24P.

1-13. EQUIPMENT DATA

ENGINE:

Model3306
 Manufacturer Caterpillar
 Fuel system Direct Injection
 Horsepower (@ 2000 rpm)200
 Number of cylinders6
 Bore 4.75 in.
 Stroke 6.00 in.
 Displacement 638 cu. in.
 Firing order
 (injection sequence) 1, 5, 3, 6, 2, 4

DIMENSIONS AND WEIGHT:

Length (tractor) 13'9"
 (with blade) 17'4"
 (with blade
 and winch) 18'4"
 (with blade
 and ripper) 22'9"
 Width 12'0"
 Height 11'0"
 Weight (tractor) 36, 640 lbs
 (w/blade) 44, 000 lbs
 (w/blade and
 winch) 47, 311 lbs
 (w/blade and
 ripper) 50, 100 lbs
 Track
 length (on ground)107"

ELECTRICAL DATA:

Starter

Manufacturer Delco-Remy
 Model 1990228
 Rating 24 volt

Alternator

Manufacturer Bosch
 Model0122469002
 Rating 24 volt, 50 amp

Batteries2, 24 volt
IMPLEMENT DATA:

Blade - Type 7S:

Weight 7, 660 lbs
 Height 4' 2"
 Width 12'0"11

Ripper:

Weight 5, 700 lbs
 Width87"

Winch - Model Cat 57:

Weight3011 lbs

CAPACITIES:

Fuel tank 115 gal.
 Cooling system 12 gal.
 Hydraulic system 21 gal.
 Engine crankcase 7.25 gal.
 Winch oil sump 16 gal.
 Final drives 9 gal. (each)
 Transmission, bevel gear
 and steering clutch
 compartment 18.5 gal.

Section III. TECHNICAL PRINCIPLES OF OPERATION

1-14. GENERAL

This section contains a detailed description of the electrical, hydraulic, and the mechanical systems' theory of operation. It does not contain theory or descriptions except as they apply to the end item.

1-15. ELECTRICAL SYSTEM

GENERAL. The electrical system has three separate circuits: the charging circuit, starting circuit and lighting circuit. Some electrical system components are used in more than one circuit. The batteries, disconnect switch, circuit breaker, cables and wires from the batteries are common in each of the circuits. The lighting circuit and charging circuit are both connected through the ammeter. The starting circuit is not connected through the ammeter.

STARTING CIRCUIT. When the starter switch is turned to the START position, the starter relay is closed and current is delivered to the starter solenoid. The solenoid engages the drive clutch and the starter rotates the flywheel, starting the engine.

CHARGING CIRCUIT. The charging circuit is in operation when the engine is running. An alternator makes electricity for the charging circuit. A voltage regulator in the circuit controls the electrical output to keep the battery at full charge.

BATTERIES. Two 24 volt batteries are used on the tractor. The batteries are contained in a battery box at the rear of the tractor. Batteries are connected in parallel to provide 24 volt starting power for the tractor. A 24 volt, 50 amp alternator provides current when the engine is running and charges the batteries.

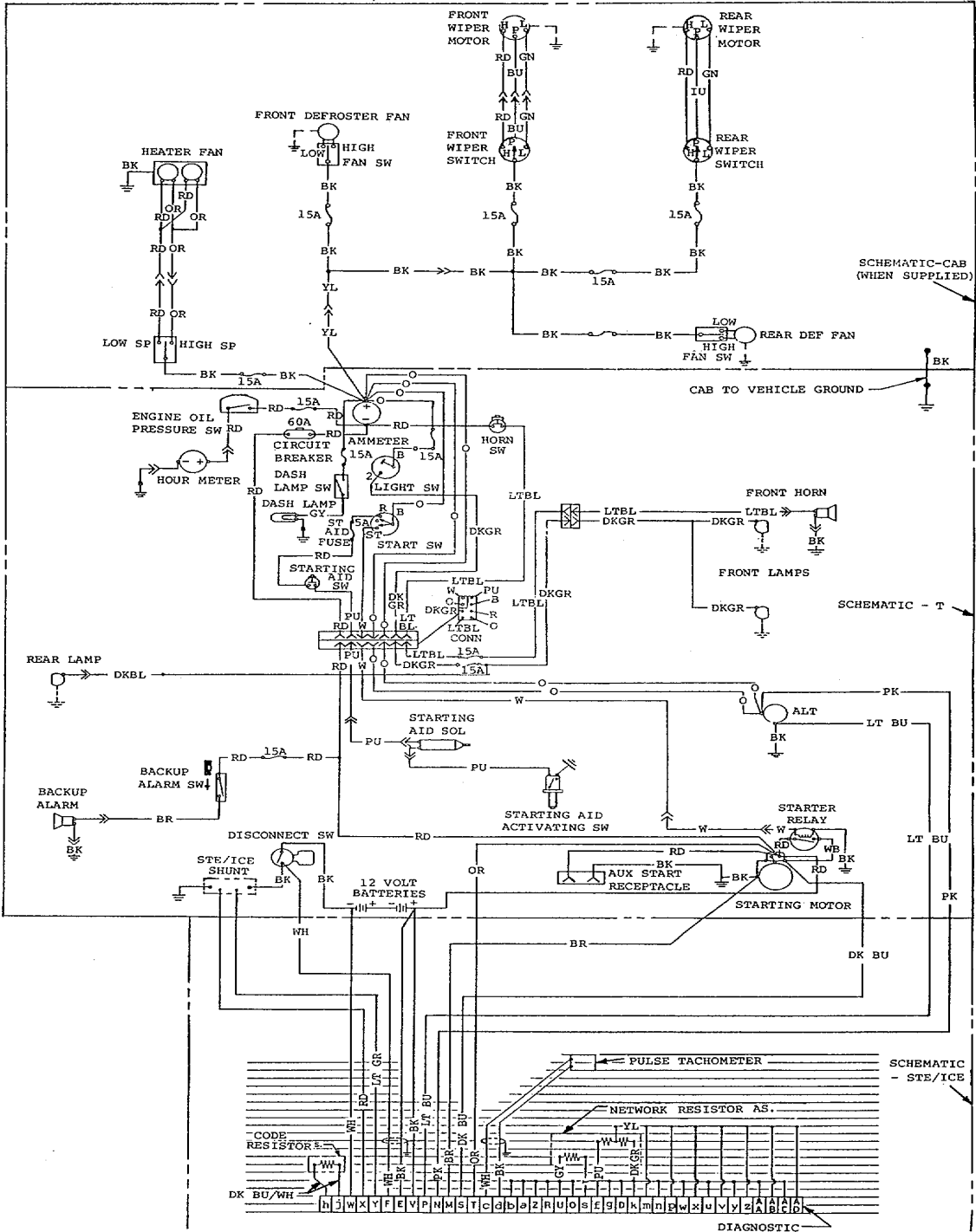
DISCONNECT SWITCH. A disconnect switch connects or disconnects the batteries from the tractor's electrical system. The starting circuit can operate only after the disconnect switch is in the ON position.

LIGHTING. The lighting system consists of two headlights mounted to the hood, one floodlight at the rear of the machine and a dash light. Control of the lights is by the dash light switch and the exterior light switch. The lighting circuits are protected by fuses located on the instrument panel.

HORNS. The electrical horn button provides warning of tractor approach when pressed by the operator. A backup warning alarm sounds whenever the transmission selector lever is in REVERSE.

HEATER CONTROL SWITCH. The winterized cab heater uses a three position toggle switch. The heater's electrical circuits are protected by a fuse on the instrument panel.

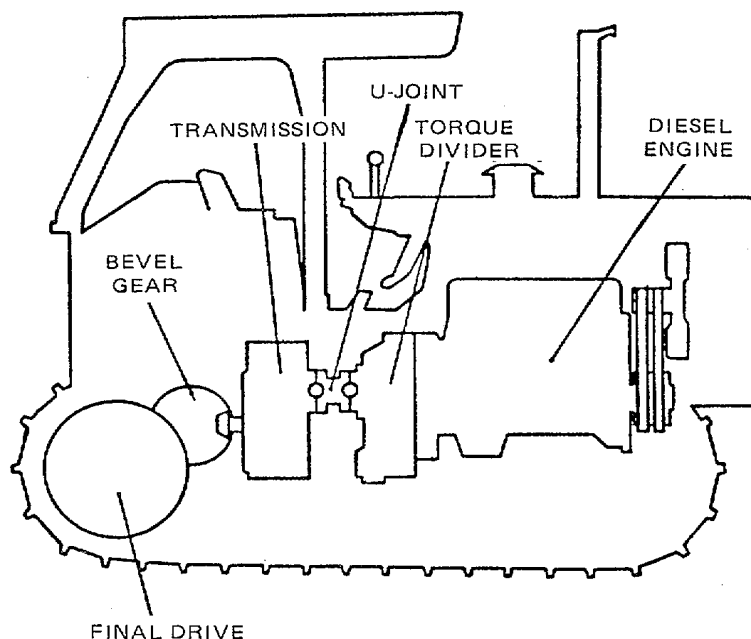
1-15. ELECTRICAL SYSTEM TM 5-2410-237-20



FRONT AND REAR DEFROSTER CONTROL SWITCHES. The winterized cab uses two, three position toggle switches to control the front and rear defroster fans. The defrosters' electrical circuits are protected by a fuse on the instrument panel.

WINDOW WIPER SWITCHES. Electrical window wipers on the winterized cab are controlled by two switches at the rear of the cab. Each window wiper circuit is protected by a fuse.

1-16. POWER TRAIN



ENGINE. The D7G is powered by an in-line six cylinder, direct injection diesel engine with scroll fuel system.

TORQUE DIVIDER. The torque divider connects the engine to the planetary transmission. This connection is both a hydraulic connection and a mechanical connection. The hydraulic connection is through a torque converter. The mechanical connection is through the planetary gear set.

UNIVERSAL JOINT. Connects the torque divider to the transmission and transfers the power at the torque divider to the transmission.

TRANSMISSION. The transmission has three speeds FORWARD and three speeds REVERSE. Valve spools, in the transmission hydraulic controls, control the clutches in the transmission for the speed and direction of the tractor. The valve spools are connected to the transmission control lever. This is a Power Shift transmission.

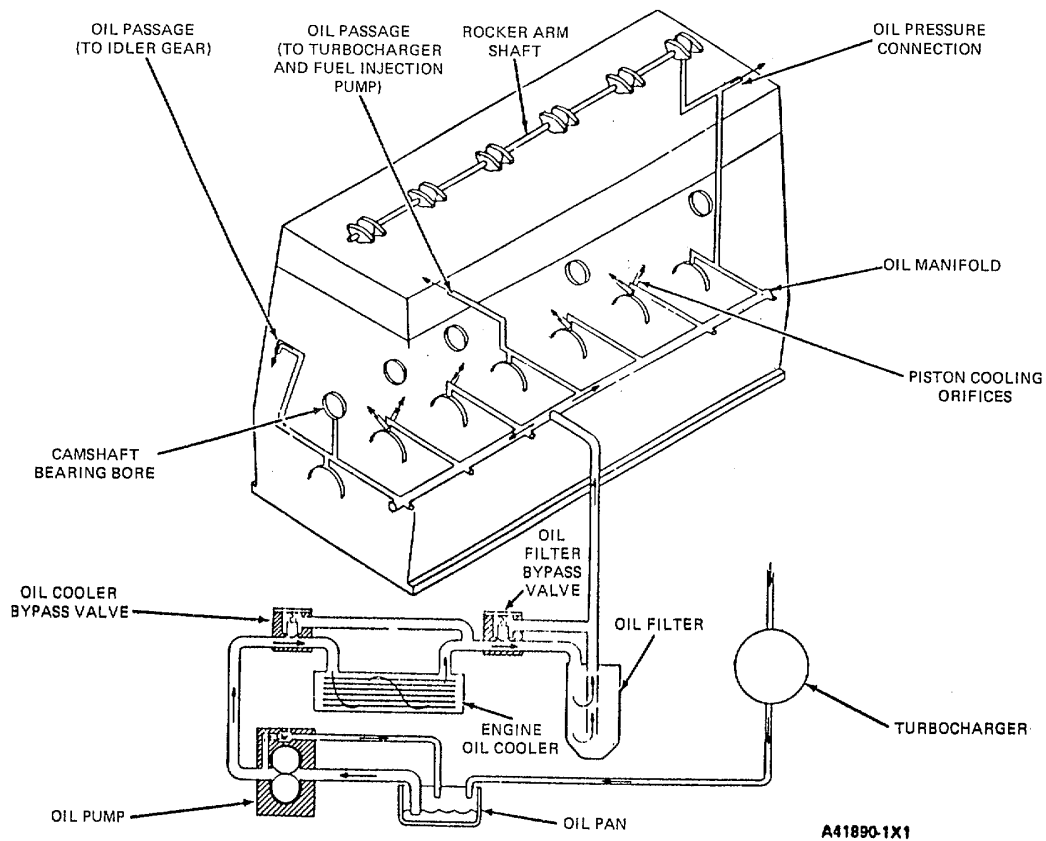
BEVEL GEAR, BRAKES, AND STEERING CLUTCHES. The bevel gear transfers the power from the transmission to the steering clutches and final drives. The steering clutches are controlled from the operator's station by two levers which are connected to the hydraulic clutch valves through a series of linkages.

The brakes are controlled by pedals in the operator's station. The pedals are mechanically linked to the hydraulic control valve. The brakes are also activated when the steering levers are fully extended. This permits the tractor to make a sharper turn.

FINAL DRIVES. Driven by gears which transfer power from the steering clutches to the final drives shaft. Attached to the final drives shaft is the sprocket which turns the track.

TRACK. Driven by the sprocket, the track moves the tractor forward or backward.

1-17. ENGINE LUBRICATION SYSTEM



OIL LINES. Provides passage for oil through the lubrication system.

OIL COOLER BYPASS VALVE. Provides immediate lubrication to the engine when starting the engine cold. When the oil warms the valve will close and the oil will pass through the oil cooler. The valve also allows the engine to be lubricated when the cooler has blockage.

OIL FILTER BYPASS VALVE. When the engine is started cold, the valve opens and allows for immediate lubrication of the engine. The valve will also open if the oil filter has blockage.

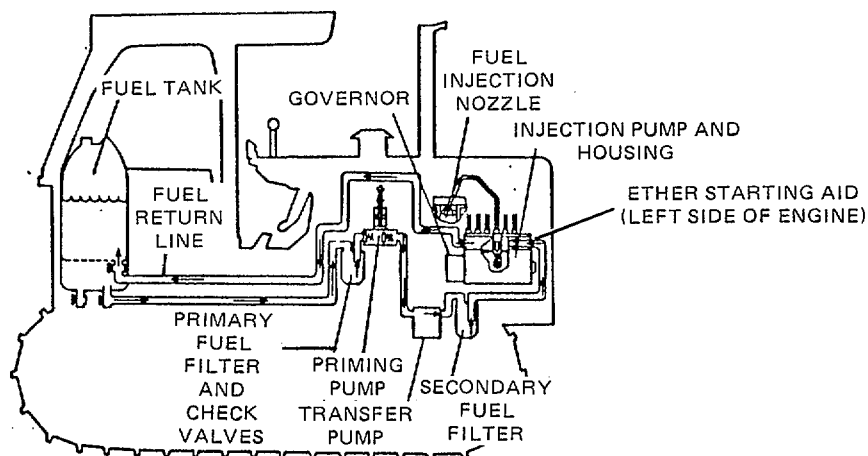
OIL FILTER. Removes harmful particles from the engine lubricating oil.

OIL COOLER. Reduces the temperature of the engine lubricating oil by transferring the heat of the oil to the engine cooling system.

OIL PUMP. Gear driven by the crankshaft, the pump causes oil to circulate through the engine lubricating system.

OIL PAN. Provides containment for the engine lubricating oil. Also seals the bottom of the engine.

1-18. FUEL SYSTEM



FUEL TANK. Provides containment for diesel fuel. It is located at the rear of the tractor.

FUEL RETURN LINE. Provides a return route to the fuel tank for unused fuel. By allowing fuel to make a continual flow through the system, the fuel is kept cool and free of air.

PRIMING PUMP. Used to manually prime the fuel system. The fuel system must be primed whenever there is an interruption in the fuel supply.

FUEL INJECTION NOZZLE. The nozzle goes through the cylinder head into the combustion chamber. Fuel is sent with high pressure to the nozzle where the fuel is made into a fine spray for good combustion.

FUEL INJECTION PUMP. Increases the pressure of the fuel, and sends an exact amount of fuel to the fuel injection nozzle. There is one fuel injection pump for each cylinder of the engine.

PRIMARY FUEL FILTER. Filters all fuel coming from the fuel tank before the fuel enters the transfer pump.

CHECK VALVES. Controls the flow of the fuel at the primary fuel filter. Also works in conjunction with the priming pump to rid the system of air.

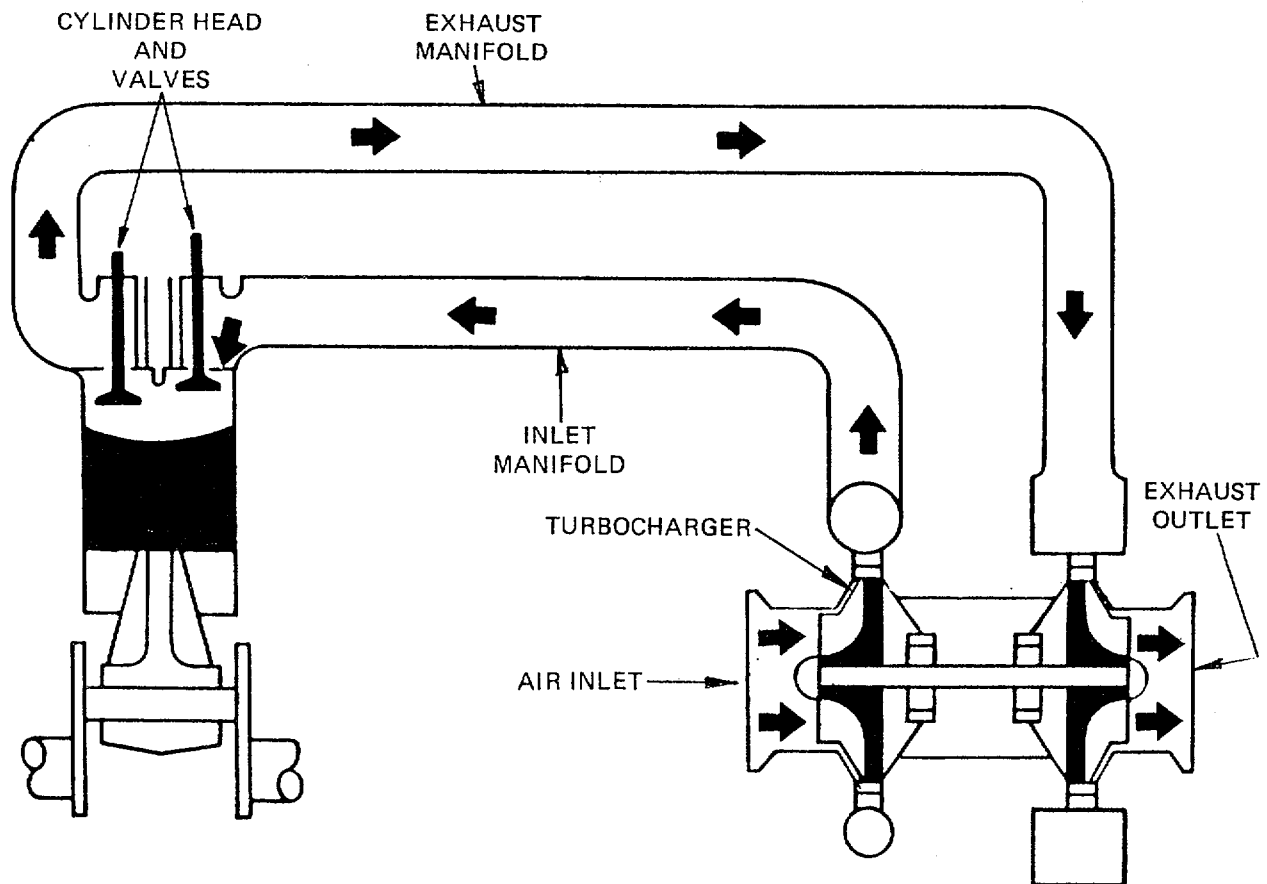
FUEL TRANSFER PUMP. Pulls fuel from the fuel tank and pushes it through the system to the fuel manifold in the injection pump housing.

SECONDARY FUEL FILTER. Filters fuel a second time before it reaches the injection pump manifold.

FUEL INJECTION PUMP HOUSING. Contains the fuel manifold and the injection pumps. The governor attaches to the housing.

GOVERNOR. Controls the amount of fuel needed by the engine to maintain a desired rpm.

ETHER STARTING AID. Delivers a measured amount of ether into the turbocharger inlet to make cold weather starting easier. The ether is stored under pressure in a cylinder. It is electrically activated from a button in the operator's compartment.



EXHAUST MANIFOLD. Carries the exhaust gases from the cylinders to the turbocharger.

INLET MANIFOLD. Diverts compressed air into the engine cylinders where it is mixed with fuel for combustion.

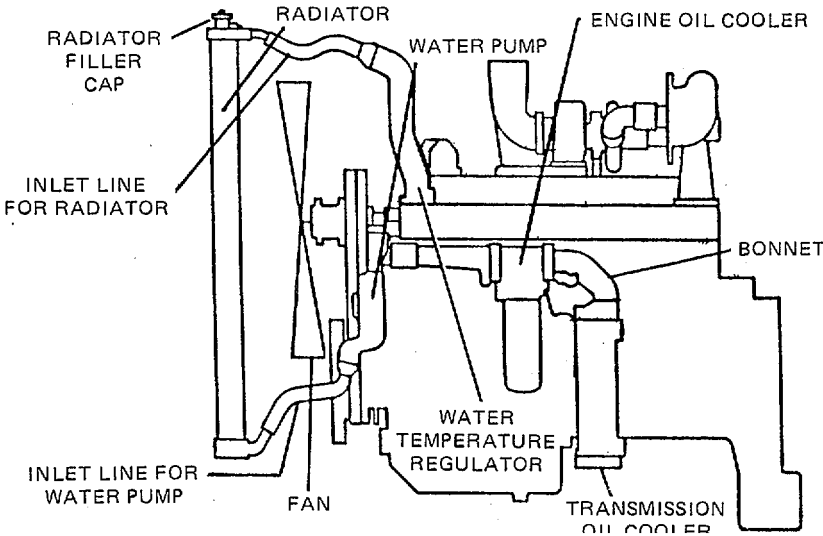
CYLINDER HEAD AND VALVE. The valves which are contained in the cylinder heads control the flow of inlet air into and exhaust gases out of the cylinder during engine operation.

TURBOCHARGER. Pulls in clean air from the air filter and compresses it. The compressed air is pushed to the inlet manifold of the engine. The turbocharger is driven by engine exhaust gases which turn the turbine wheel and the compressor wheel.

AIR INLET. The side of the turbocharger which draws air from the air filter.

EXHAUST OUTLET. Sends exhaust gases through the exhaust pipe and out the muffler.

1-20. COOLING SYSTEM



RADIATOR FILLER CAP. The filler cap is also a pressure relief cap. It keeps the pressure in the cooling system from getting too high when the engine is running. It also lets air into the system when the pressure in the system is less than atmospheric.

RADIATOR. A sealed pressure type in which coolant flows through the inside of the core. The coolant is cooled in the core by the action of air flowing around the radiator fins.

INLET LINE FOR RADIATOR. Provides a passage for the coolant to return to the radiator to be cooled down.

WATER TEMPERATURE REGULATOR. Controls the temperature of the coolant by restricting the amount of coolant flow to the radiator. When the engine is cold, the regulator will stop the flow of coolant to the radiator and allow the coolant to recirculate in the cylinder block until it is warm. When the coolant warms, the regulator will open and allow the coolant to flow through the radiator. This process helps maintain a steady engine temperature.

ENGINE OIL COOLER. Coolant flows through one chamber and lubricating oil through another. The coolant lowers the lubricating oil temperature.

INLET LINE FOR WATER PUMP. Provides passage for the coolant from the radiator to the water pump.

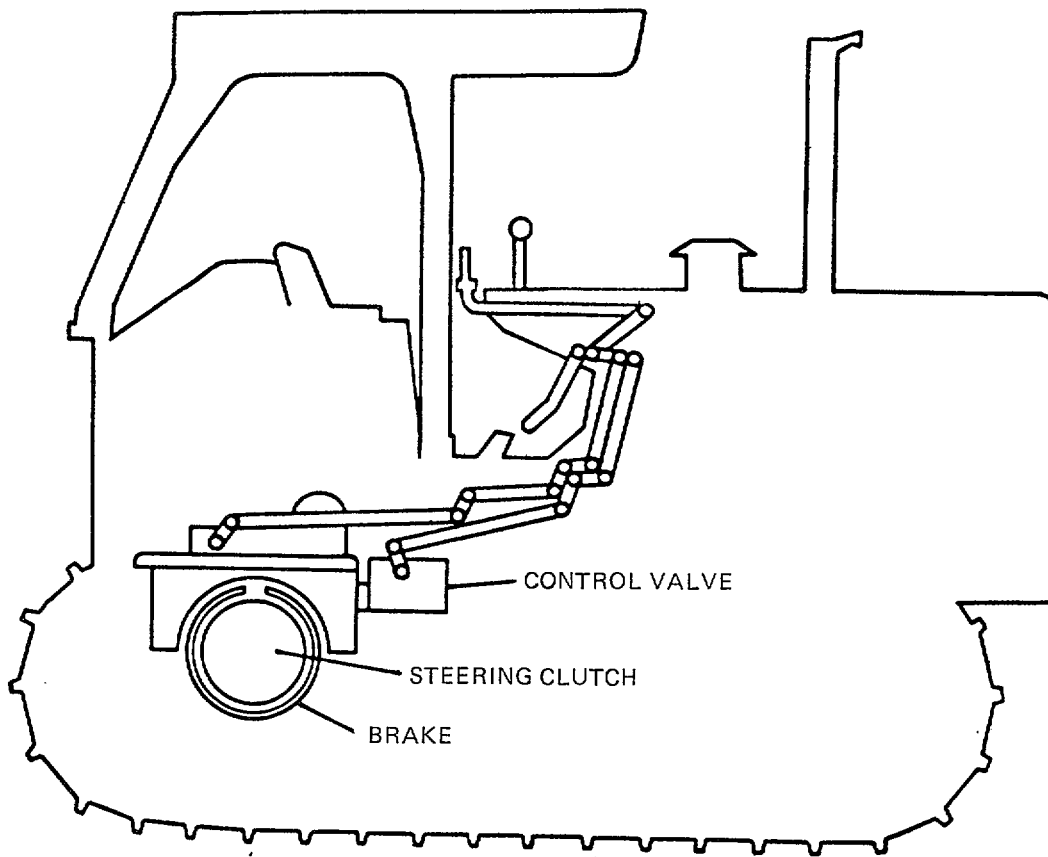
WATER PUMP. Pushes the coolant through the cooling system.

BONNET. Provides a passage for coolant between the engine oil cooler and the transmission oil cooler.

TRANSMISSION OIL COOLER. Reduces the temperature of the transmission oil by transferring the heat of the oil to the engine cooling system.

FAN. Driven by two V-belts from a pulley on the crankshaft. The fan forces air to circulate around the radiator cooling fins and this action helps reduce the temperature of the coolant.

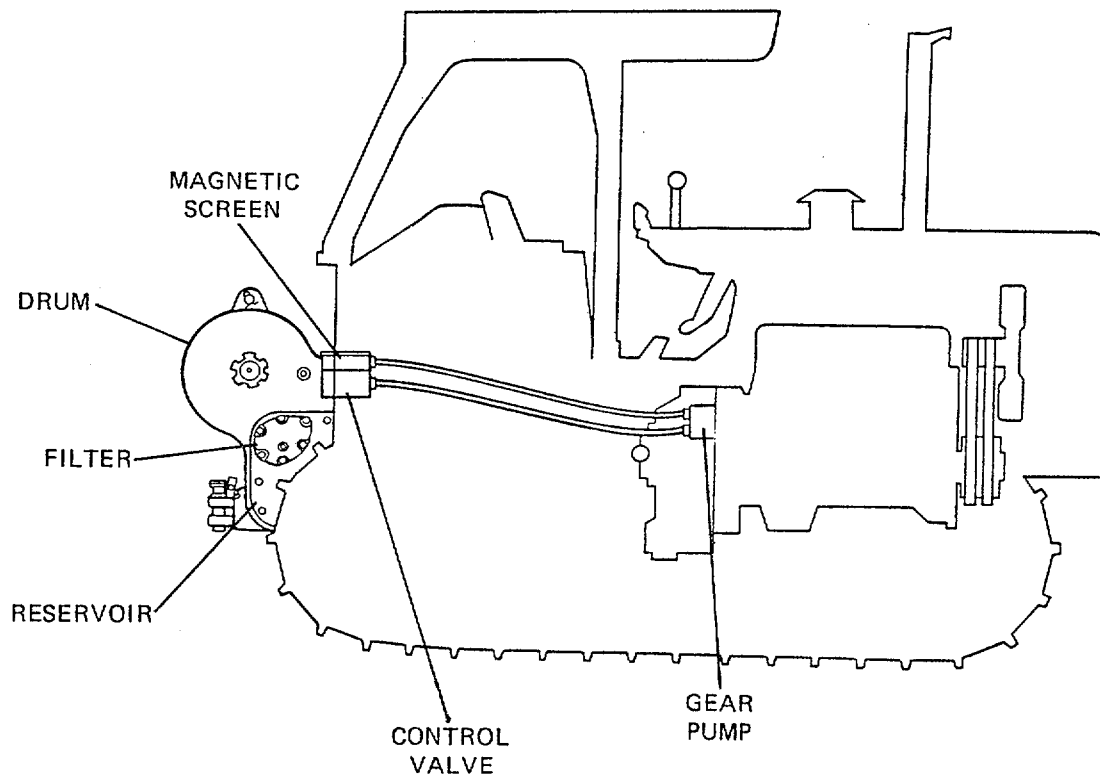
1-21. STEERING AND BRAKE SYSTEM



CONTROL VALVE. The valve is connected mechanically to the steering control levers. The valve directs the flow of pressure oil in response to the movement of the control levers.

STEERING CLUTCH. One for each track, they control the steering of the tractor. Hydraulically operated, it is controlled by the steering lever in the operator's station. When turning left, the left clutch is released which causes the left track to stop moving and act as a pivot for the tractor to turn on. The reverse happens when turning right.

BRAKES. The tractor has two band-type brakes (one on each steering clutch drum) which are used to stop the movement of the tractor, and to assist with the steering of the tractor. When the steering levers are pulled completely out, or the brake pedals are depressed, the bands tighten around the steering clutch drum.



RESERVOIR. Located in the bottom of the winch case, the reservoir provides oil for the hydraulic control and lubrication system.

MAGNETIC SCREEN. Removes metal particles and other harmful debris from the oil before it reaches the pump.

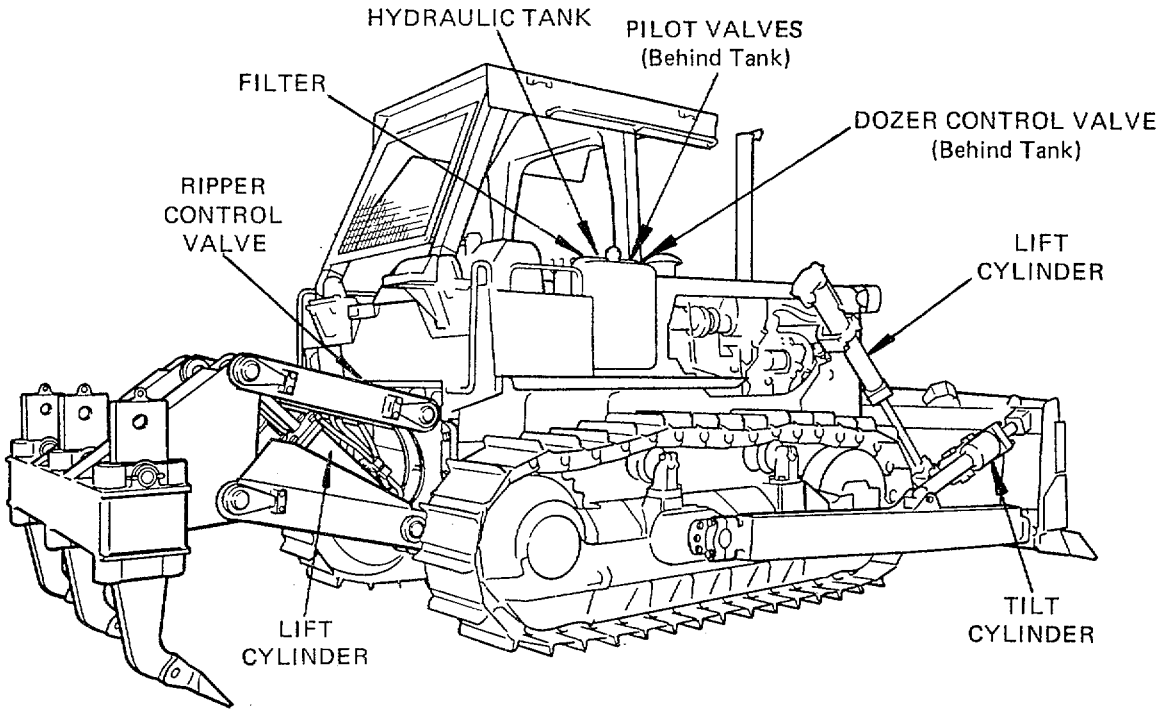
GEAR PUMP. Pulls oil from the reservoir and pushes it through the system.

CONTROL VALVE. Connected mechanically by a series of linkages to the control lever in the operator's station. It controls oil pressure to the input and directional clutches.

FILTER. All oil flow from the pump outlet not used for clutch engagement or disengagement, or for lubrication of the winch components, goes through the filter before returning to the reservoir.

DRUM. A cable attaches to the right side of the drum and is used to perform all types of winching operations.

1-23. DOZER AND RIPPER HYDRAULIC SYSTEM



HYDRAULIC TANK. Provides containment for the oil which flows through the pilot and main oil systems.

FILTER. Removes harmful particles from the hydraulic oil before they can enter the system. It is located in the hydraulic tank.

PILOT VALVE. Actuates the dozer control valve for dozer tilt. The dozer pilot valve is actuated mechanically by the dozer tilt control lever and linkages.

PILOT VALVE. Actuates the ripper control valve for ripper lift. The ripper pilot valve is actuated mechanically by the ripper lift control lever and linkages.

DOZER CONTROL VALVE. Controls oil going to cylinders for dozer tilt and lift. Dozer tilt is hydraulically actuated by the pilot valve, and dozer lift is mechanically activated by the dozer lift control lever and linkages.

RIPPER CONTROL VALVE. Controls oil going to cylinders for ripper lift. Ripper lift is hydraulically actuated by the ripper pilot valve.

TILT CYLINDER. Activated when the dozer tilt control lever actuates the pilot valve and sends pressure oil through control valve to the tilt cylinder.

LIFT CYLINDER. Activated when the dozer lift control lever actuates the control valve and sends pressure oil to the lift cylinders.

LIFT CYLINDER. Activated when the ripper lift control lever actuates the pilot valve and sends pressure oil through control valve to the lift cylinders.

CHAPTER 2

UNIT MAINTENANCE INTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

	Page
Common Tools and Equipment.....	2-1
Repair Parts.....	2-1
Special Tools, TMDE and Support Equipment.....	2-1

2-1. COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTDE) applicable to your unit.

2-2. SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

Refer to TM5-2410-237-24P and Section III of the Maintenance Allocation Chart for special tools and TMDE you will need in maintaining the vehicle. No support equipment is required.

2-3. REPAIR PARTS

Repair parts are listed and illustrated in the repair parts and special tools list (TM5-2410-237-24P) covering organizational maintenance for this equipment.

Section II. SERVICE UPON RECEIPT OF MATERIEL

	Page
Preliminary Servicing and Adjustment of Equipment	2-2
Service Upon Receipt of Materiel.....	2-2

2-4. SERVICE UPON RECEIPT OF MATERIEL

- a. Remove any plastic tape, wrapping paper or any other shipping and protective items.

WARNING

P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks or open flame. Flash point of solvent is 1380°F (580C). Use only in a well ventilated area. Inhaling vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.

- b. Clean any exposed metal parts coated with rust preventive compound. Remove compound with cleaning solvent (P-D-680).
- c. Read and follow all instructions contained in DD Form 1397 attached to the tractor.

- d. Inspect equipment for damage incurred during shipping. If equipment has been damaged, report the damage on DD Form 6, Packing Improvement Report.

- e. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with DA Pam 738-750.

- f. Clean all exterior surfaces.
- g. Touch up any paint scratches.
- h. Install exhaust stack on muffler. See page 3-100.
- i. Place ripper shanks in ripping position. See page 15-14.

2-5. PRELIMINARY SERVICING AND ADJUSTMENT OF EQUIPMENT

- a. Perform the operator preventive maintenance checks and services (PMCS) contained in TM5-2410-237-10.
- b. Perform the organizational preventive maintenance checks and services (PMCS) contained in table 2-1.

- c. Lubricate all points as shown in the lubrication order (L05-2410-237-12) regardless of interval.
- d. Schedule the next preventive maintenance checks and services (PMCS) on DD Form 314, Preventive Maintenance Schedule and Record.
- e. Report all deficiencies on DA Form 2407 if the deficiencies appear to involve unsatisfactory design.
- f. Check that all decals and plates are on vehicle. See page 1-6.
- g. Make sure vehicle is ready for operation; remove all warning tags.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

	Page
General.....	2-4
Leakage Definitions for Organizational PMCS	2-5
Organizational Preventive Maintenance Checks and Services.....	2-4
PMCS Column Description.....	2-6

2-6. GENERAL

To ensure that the tractor is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. Table 2-1 contains a tabulated listing of preventive maintenance checks and services to be performed by Organizational Maintenance personnel. All deficiencies and shortcomings will be recorded as well as the corrective action taken on DA Form 2404 at the earliest possible opportunity.

2-7. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

- a. The item numbers of table 2-1 indicate the sequence of PMCS. Perform at intervals shown below:
 - (1) Do your (S) PREVENTIVE MAINTENANCE once every 6 months.
 - (2) Do your (A) PREVENTIVE MAINTENANCE once every 12 months.
 - (3) Do your (B) PREVENTIVE MAINTENANCE once every 24 months.

- b. If something doesn't work, troubleshoot it with the instructions in this manual or notify your supervisor.

- c. Always do your preventive maintenance in the same order, so it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry.

- d. If anything looks wrong and you can't fix it, write it down on your DA Form 2404. If you find something seriously wrong, report it to Direct Support Maintenance as soon as possible.

WARNING

P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks or open flame. Flash point of solvent is 1380F (590C). Use only in a well ventilated area. Inhaling vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.

WARNING

Particles blown by compressed air are hazardous. Make certain the airstream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

- (1) Keep it clean: Dirt, grease, oil and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent (P-D-680) to clean metal surfaces. Use soap and water when you clean rubber or plastic material.
- (2) Capscrews, nuts and screws: Check that they are not loose, missing, bent or broken. Look for chipped paint, bare metal or rust around capscrew heads. Tighten any that are loose.
- (3) Welds: Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to Direct Support Maintenance.
- (4) Electric wires and connectors: Look for cracked or broken insulation, bare wires and loose or broken connectors. Tighten loose connections and make sure wires are in good condition.
- (5) Hoses and fluid lines: Look for wear, damage and leaks. Make sure clamps and fittings are tight. Wet spots show leaks, of course, but a stain around a fitting or connector can mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, either correct it or report it to Direct Support Maintenance (see Maintenance Allocation Chart, Appendix B).

2-8. LEAKAGE DEFINITIONS FOR UNIT PMCS

It is necessary for you to know how fluid leaks affect the status of your equipment. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your equipment. Learn and be familiar with them.

Class I Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.

Class II Leakage of fluid great enough to form drops, but not enough to cause drops to drip from the item being checked/inspected.

Class III Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

CAUTION

Equipment operation is allowable with minor leakages (Class I or II). Of course, consideration must be given to the fluid capacity in the item/system being checked/inspected. Class II leaks should be reported to your supervisor.

2-9. PMCS COLUMN DESCRIPTION

- a. Item Number - The order that PMCS should be performed, and also used as a source of item numbers for the TM number column on DA Form 2404 Equipment Inspection and Maintenance worksheet when recording results of PMCS.
- b. Interval - Tells when each check is to be performed.
- c. Item To Be Inspected - Lists the checks to be performed.
- d. Procedures - Description of the procedure by which the check is to be performed.

NOTE

Perform Operator PMCS prior to or in conjunction with Organizational PMCS if:

- a. There is a delay between the daily operation and the Organizational PMCS.
- b. Regular operator is not assisting/participating.

Table 2-1. Organizational Preventive Maintenance Checks and Services (PMCS)

ITEM No.	INTERVAL			ITEM TO BE INSPECTED	PROCEDURES
	S	A	B		
	S - Semiannually A - Annually B - Biennially				
1	•			<p style="text-align: center;">Starter</p>	<p style="text-align: center;">ROAD TEST</p> <p>Perform all during operation checks listed in TM5-2410-237-10, in addition to those provided below. Drive the vehicle over varied terrain and at least 15 minutes of operating time. This will provide ample time to check reported malfunctions, and to locate unreported malfunctions.</p> <p>While starting vehicle, listen for unusual noises and difficult cranking.</p> <p style="text-align: center;">2-6</p>

Table 2-1. Organizational Preventive Maintenance Checks and Services (PMCS) (Cont'd)

S - Semiannually A - Annually B - Biennially

ITEM No.	INTERVAL			ITEM TO BE INSPECTED	PROCEDURES
	S	A	B		
2	•			Engine and engine	<ul style="list-style-type: none"> a. Observe response to governor compartment feed. Listen for unusual noises. Observe for hesitation, varying idle speed, and sticking or binding of lever. b. Be alert for excessive vibration and the smell of fuel, oil, coolant and exhaust.
3	•			Brakes	Reach a desired speed and lightly apply brake pedals with steady force. Vehicle should slow down immediately and stop smoothly.
4	•			Engine	Check engine instruments (Refer to TM5-2410-237-10 for proper reading.)
5	•			Transmission	<ul style="list-style-type: none"> a. Check torque converter oil temperature gage. (Refer to TM5-2410-237-10 for proper reading.) b. Check for response to shifting and smoothness of operation in all speed ranges.
ENGINE COMPARTMENT					
6	•			Fuel system	<ul style="list-style-type: none"> a. Inspect fuel filter housings for dents and cracks that could cause leaks. Install new fuel filter and prime fuel system. b. Inspect transfer pump and fittings for leaks. c. Wash cap and filler screen on fuel tank. Check fuel tank for damage that could cause leaks.
7	•			Starter	Inspect starter mounting capscrews and starter wiring for presence, corrosion and loose connections. Tighten mounting capscrews and any loose connections.
2-7					

Table 2-1. Organizational Preventive Maintenance Checks and Services (PMCS) (Cont'd)

S - Semiannually A - Annually B - Biennially

ITEM No.	INTERVAL			ITEM TO BE INSPECTED	PROCEDURES
	S	A	B		
8	•			Alternator	<ul style="list-style-type: none"> a. Inspect alternator for secure mounting. b. Inspect alternator mounting bracket and attaching hardware for cracks, bends, and secure mounting. c. Inspect alternator wiring for frays, bare wires, breaks and loose terminal connections.
9	•			Cooling system	<ul style="list-style-type: none"> a. Inspect all hoses for splits, wear, and cracks that could cause leaks. Inspect hose clamps for tightness. b. Check coolant protection temperature. c. Inspect radiator, water pump, engine oil cooler, and torque converter oil cooler for leaks and secure mounting. d. Inspect radiator core for clogged or bent fins, leaks, and protruding debris. Clean clogged core and remove debris. Straighten bent fins. e. Inspect fan blades for security, breaks, and missing or loose capscrews. f. Inspect temperature sending unit for security. Inspect sending unit wiring for frays, splits, breaks and worn or missing insulation. g. Inspect Vee belts. Replace if damaged.
					2-8

Table 2-1. Organizational Preventive Maintenance Checks and Services (PMCS) (Cont'd)

S - Semiannually A - Annually B - Biennially

ITEM No.	INTERVAL			ITEM TO BE INSPECTED	PROCEDURES
	S	A	B		
10	•		•	Engine lubrication	a. Check oil and dipstick for metal and oil lines particles at end of dipstick. b. Inspect all oil lines and hoses for cracks, frays and wear that could cause leaks. c. Inspect oil filter for security. Make sure filter is securely fastened. d. Inspect rocker housing covers for evidence of leaks. Notify DS maintenance if leaks exist.
11	•			Electrical wiring.	Inspect all engine compartment wiring for frays, splits, missing insulation and poor connections. Replace any damaged wires.
12			•	Engine mounts and lifting bracket	Inspect engine mounts and lifting bracket for security, wear, cracks, splits, broken welds and missing mounting hardware.
TRANSMISSION AND FINAL DRIVES					
13	•			Torque divider	Check torque divider suction screen if lubricant is thick.
14	•			Hydraulic control valves	Inspect hydraulic control valves for leakage, wear or cracks that could cause failure.
15	•			Transmission	a. Inspect transmission body for cracks or loose capscrews that could cause leaks. b. Inspect transmission shift linkage for bends, cracks, and wear that could cause failure.
16	•			Final drives	Inspect final drives for evidence of leakage.
2-9					

Table 2-1. Organizational Preventive Maintenance Checks and Services (PMCS) (Cont'd)

S - Semiannually A - Annually B - Biennially

ITEM No.	INTERVAL			ITEM TO BE INSPECTED	PROCEDURES
	S	A	B		
				PROPELLER AND PROPELLER SHAFTS	
17	•			Drive shaft	Inspect drive shaft for bends, cracks and twisted condition.
18	•			Universal joints	a. Inspect universal joints for play and broken or missing lubrication fittings. There should be no play at universal joints. b. Inspect universal joints for bends or cracks.
				TRACKS	
19	•			Idler yoke	Check if idler yoke is fully extended. Notify DS maintenance to adjust track tension.
20	•			Track roller frame.	Inspect track roller frame for wear, cracks or broken welds. Notify DS maintenance if damage exists.
21	•			Track rollers	Inspect track rollers for damage, wear (para. 8-4) and leaks around shaft. Notify DS maintenance if damage exists.
22	•			Sprocket	Inspect sprockets for excessive wear or signs of damage. Notify DS maintenance if damage exists.
23	•			Track shoe grouser	Check for wear, para. 8-4. Notify GS maintenance if damage exists.
24	•			Link rail	Check for wear, para. 8-4. Notify GS maintenance if damage exists.
25			•	Carrier roller	Check tread for wear, para. 8-4. Notify GS maintenance if damage exists.
26	•			Idler	Check tread for wear, para. 8-4. Notify GS maintenance if damage exists.
					2-10

Table 2-1. Organizational Preventive Maintenance Checks and Services (PMCS) (Cont'd)

S - Semiannually A - Annually B - Biennially

ITEM No.	INTERVAL			ITEM TO BE INSPECTED	PROCEDURES
	S	A	B		
27	•			Bushings	Check for external wear, para. 8-4. Notify GS maintenance if damage exists.
28	•			Track roller guards	Check for wear. Notify GS maintenance if damage exists.
STEERING AND BRAKES					
29	•			Steering and brake linkages	a. Inspect steering and brake linkages for bends, cracks and wear that could cause failure. b. Check brake pedals for signs of wear or looseness.
30	•			Hydraulic controls	Inspect hydraulic controls for cracks, bends and wear. Be sure controls move without any binding.
31			•	Steering valves	Follow routing of all hydraulic steering lines, hoses and tubing and inspect for loose fittings, cracks, bends, breaks and leaks.
FRAME					
32			•	Frame	a. Inspect frame for cracks, breaks, bends, wear and rust. Notify GS maintenance if damage exists. b. Inspect all areas of frame for missing rivets, capscrews and obstructions to other components. Remove obstructions, if possible. Notify GS maintenance for repairs.
33	•			ROPS	a. Check frame of ROPS for cracks, breaks, bends or wear. b. Check screen for damage or wear.

Table 2-1. Organizational Preventive Maintenance Checks and Services (PMCS) (Cont'd)

S - Semiannually A - Annually B - Biennially

ITEM No.	INTERVAL			ITEM TO BE INSPECTED	PROCEDURES
	S	A	B		
				HYDRAULIC CONTROLS	
34	•			Lines and fittings	Follow routing of all hydraulic lines, hoses and tubing and inspect for loose fittings, cracks, bends, breaks and leaks.
35	•			Lift and tilt	a. Inspect cylinder lines for loose fittings, cracks, bends, breaks and leaks. b. Inspect cylinders for leaks and secure mounting.
36		•		Hydraulic tank	a. Inspect hydraulic tank for loose fittings and damaged lines. b. Inspect hydraulic tank for cracks, breaks and leaks.
				WINCH	
37	•			Winch	a. Install new breather on winch. b. Inspect winch cracks, breaks and leaks.
		•			c. Inspect winch for tight mounting and broken or missing parts.
38	•			Lever and linkage	a. Inspect winch lever for proper operation. b. Inspect winch lever and linkage for cracks, bends, and missing mounting hardware.
39	•			Cable	Unwind winch cable completely and inspect for kinks, frays and wear.
				EARTH MOVING COMPONENTS	
40	•			Dozer blade	Inspect cutting edge and end bits for damage and wear.
				2-12	

Table 2-1. Organizational Preventive Maintenance Checks and Services (PMCS) (Cont'd)

S - Semiannually A - Annually B - Biennially

ITEM No.	INTERVAL			ITEM TO BE INSPECTED	PROCEDURES
	S	A	B		
41	•			Trunnion	Inspect for structural damage and missing mounting hardware.
42	•			Ripper	Inspect ripper teeth for damage and wear.
WINTERIZED CAB					
43	•			Defroster	Inspect defrosters for proper operation and evidence of damage.
44	•			Heater	Inspect heater for proper operation and evidence of damage.
45	•			Windshield wipers	Inspect windshield wipers for proper operation and evidence of damage.
INSTRUMENTS, GAGES, AND CONTROL PANEL LIGHT					
46	•			Instruments and gages	a. Inspect all instruments and gages for signs of damage and loose or missing mounting hardware. b. Inspect electrical connections for frays, splits, breaks and missing insulation.
47	•			Control panel light	Inspect lamp socket for damage, and check for loose or damaged wiring
INSTRUCTION PLATES					
48	•			Data, caution and warning plates	Inspect data, caution and warning plates for completeness, security and readability.
2-13					

Section IV. UNIT TROUBLESHOOTING PROCEDURES

	Page
Electrical Test Equipment.....	2-15
Electrical Systems Troubleshooting	2-25
General.....	2-14
Mechanical Troubleshooting	2-68
STE-ICE Diagnosis	2-94
Symptom Index (Electrical)	2-26
Symptom Index (Mechanical)	2-68

2-10. GENERAL

- a. The tables in this section list the common malfunctions which may be found during the operation or maintenance of the D7G tractor or components. You should perform the test/inspections and corrective actions in the order listed.
- b. This manual cannot list all malfunctions that may occur, nor all tests or inspection and corrective actions. If a malfunction is not listed or it is not corrected by the listed corrective actions, notify your supervisor.
- c. Each malfunction symptom, given for an individual component or system, is followed by a step(s) that should be taken to determine the cause and the corrective action that must be taken to remedy the problem.
- d. Before taking any action to correct a possible malfunction, the following rules should be followed:
 - (1) Question the tractor operator to obtain any information that might help determine the cause of the problem.
 - (2) Never overlook the chance that the problem could be of simple origin. The problem could be corrected with minor adjustments.
 - (3) Use all senses to observe and locate troubles.
 - (4) Use test instruments or gages to help you determine the isolate problems.
 - (5) Always isolate the system where the malfunction occurs and then locate the defective component.
- e. Table 2-2 lists electrical malfunctions that may occur in individual units or systems of the tractor. This table covers electrical troubleshooting only. Troubleshooting procedures for the mechanical systems can be found in table 2-3.

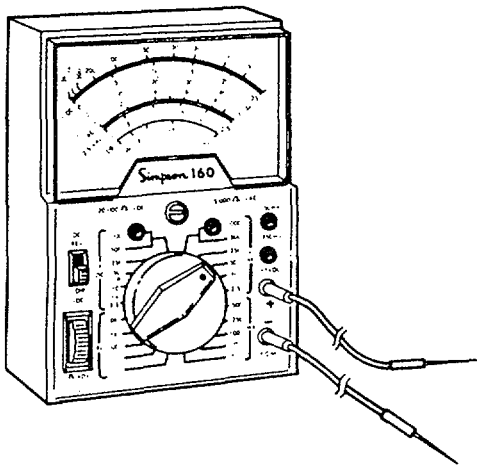
2-11. ELECTRICAL TEST EQUIPMENT

In troubleshooting the electrical system, the lightweight Simpson 160, TS-352 B/U, or AN/URM-105 multimeters will be used to make resistance or continuity tests, and voltage or low ampere current tests. Any one of these meters may be found in the common no. 1 or no. 2 organizational maintenance automotive shop sets.

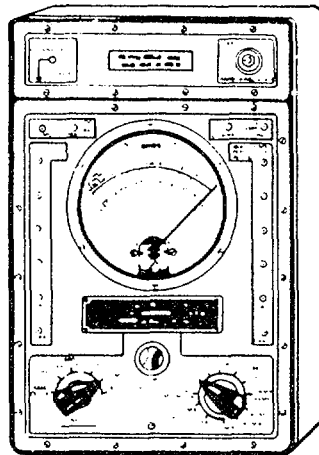
NOTE

The Simpson 160 is only available in new shop sets as a substitute for the TS-352 B/U or the AN/URM-105. The electrical testing instructions which follow show use of all of these instruments, as any of the three can be used.

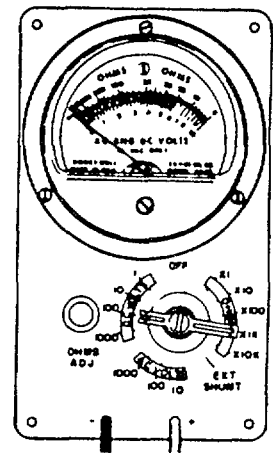
SIMPSON 160



TS-352 B/U



AN/URM-105



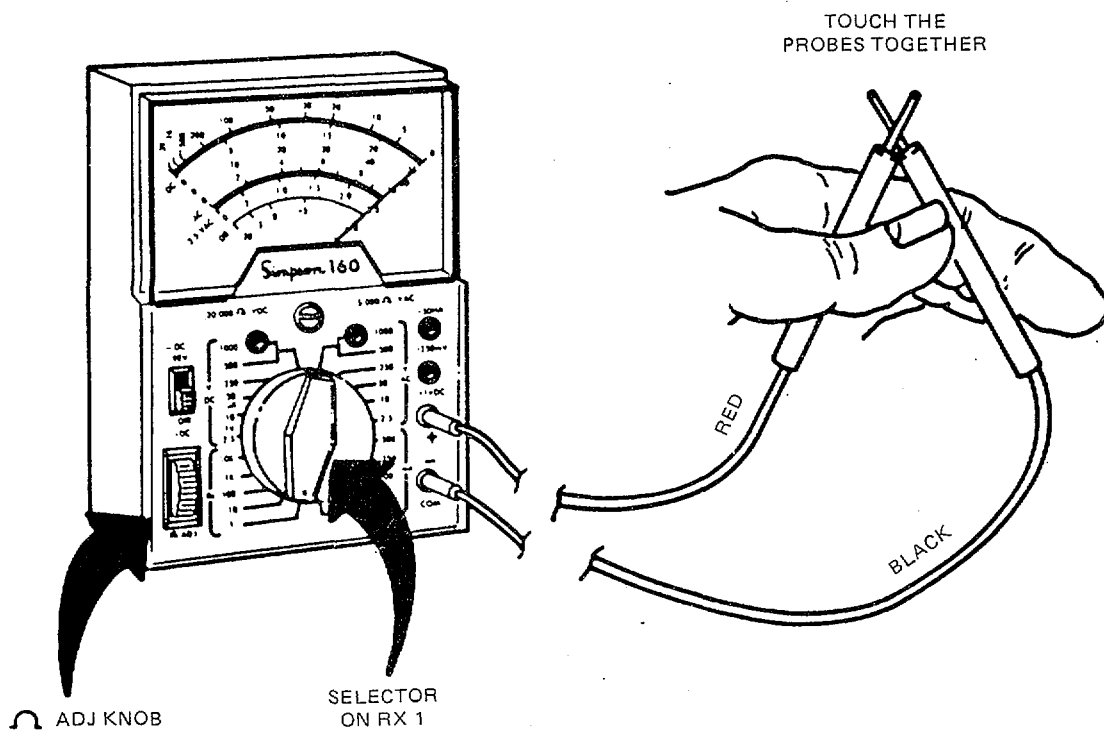
- a. Using the Multimeter. Each of the test instruments discussed here must be set up and "zeroed" before making any tests.

NOTE

If needle will not "zero" on any instrument after following procedures below, replace batteries. If needle still will not "zero" after replacing batteries, turn meter in for repair.

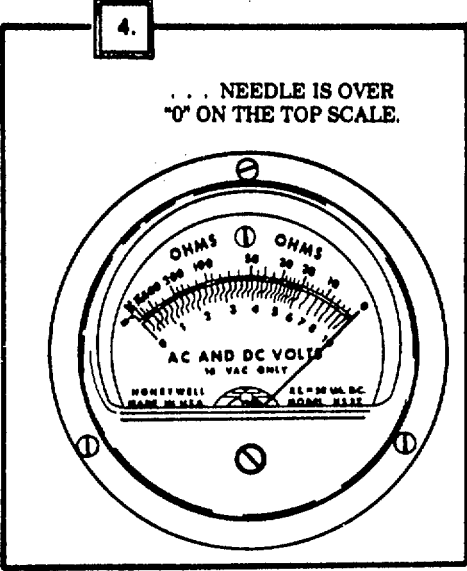
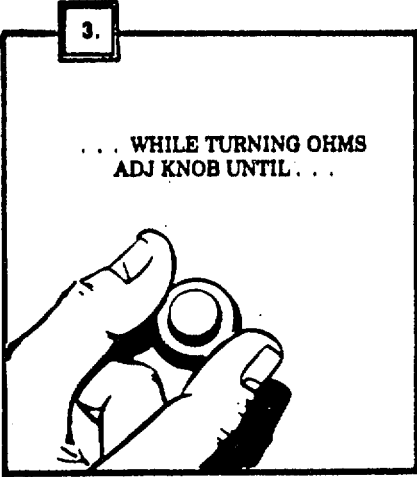
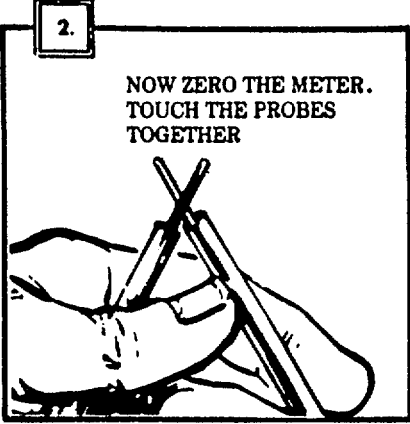
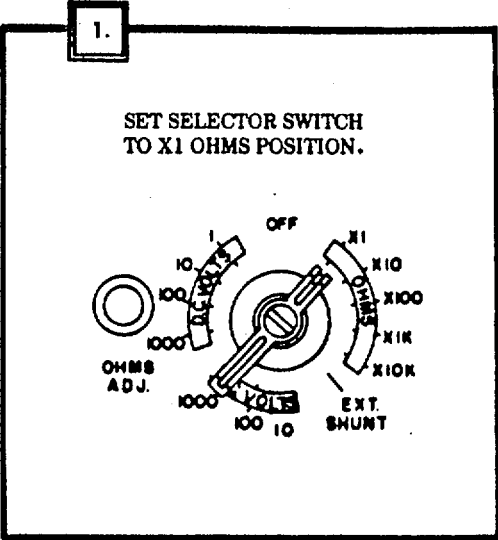
- b. Zeroing the Simpson 160. Perform the following steps:

- Step 1. Set selector switch on "RX1" position.
- Step 2. Put black probe in "COM" jack.
- Step 3. Put red probe in "+" jack.
- Step 4. Touch red and black probed together and turn "ADJ" knob until needle is over the "0" on the top scale.



c. Zeroing the AN/URM-105. Perform the following steps.

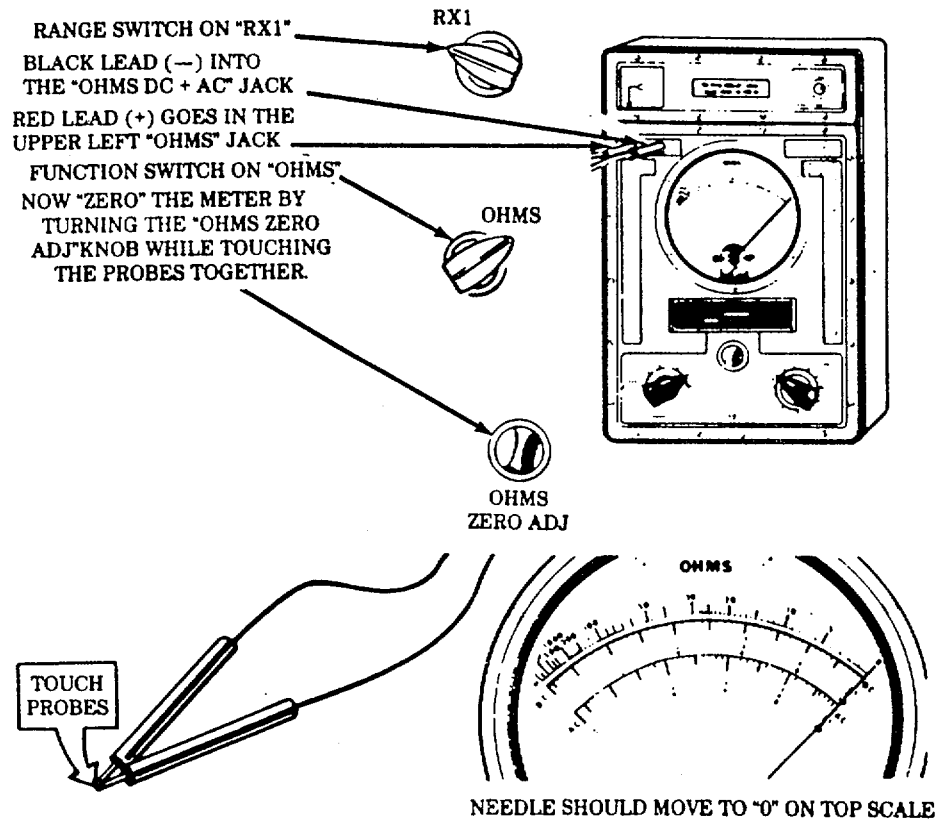
- Step 1. Set selector switch on "X1" ohms position, insert black probe in "-" jack and read probe in "+" jack.
- Step 2. Touch red and black probes together.
- Step 3. Turn "ADJ" knob until needle is over the "0" on the top scale.



ZEROING AN/URM-105

d. Zeroing the TS-352 B/U. Perform the following steps.

- Step 1. Set range switch on "RX1" position.
- Step 2. Put black probe into "OHMS-DC+AC" jack.
- Step 3. Put red probe into "+" jack.
- Step 4. Turn function switch to "OHMS" position.
- Step 5. Touch red and black probes together and turn "OHMS ZERO ADJ" knob until the needle is over the "0" on the top scale.



ZEROING TS 352 B/U

e. Using the Ohms Scale. Once zeroed, the multimeter ohms scale can be used to make tests for continuity, shorts, and resistance.

NOTE

Test for continuity, shorts, and resistance are performed identically using any of the multimeters discussed here.

- f. Testing for Continuity (all three meters). Continuity tests are made to check for breaks in a circuit (such as switch, light bulb, or electrical cable as shown). To make a continuity check, perform the following steps:

Step 1. Zero the multimeter.

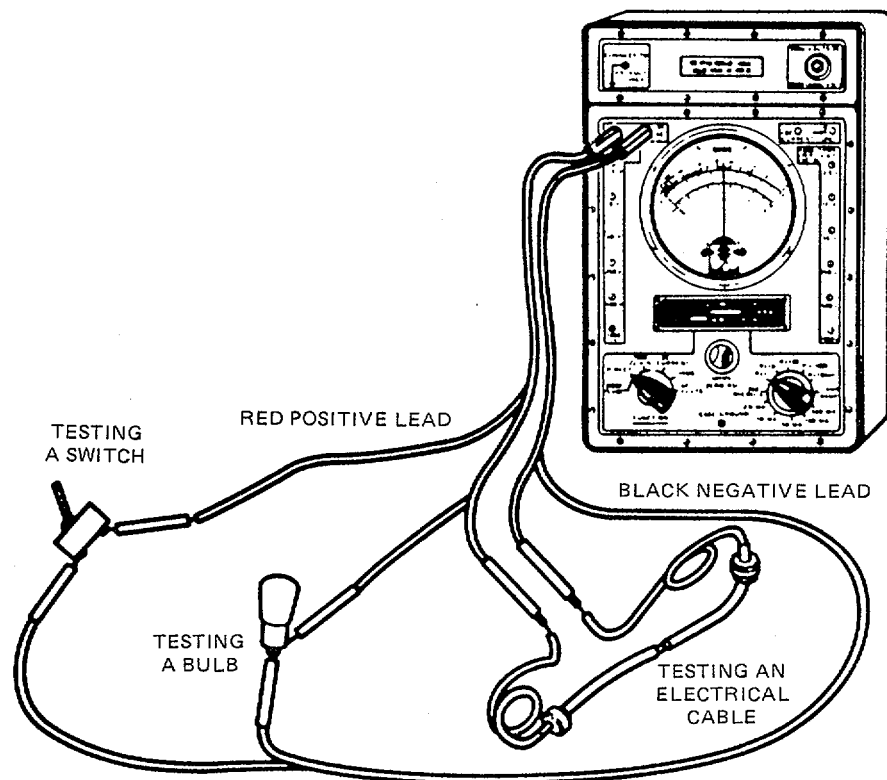
CAUTION

Failure to perform next step can damage multimeter.

Step 2. Disconnect circuit being tested.

Step 3. Connect meter probes to both terminals of circuit being tested. (The TS-352 B/U is illustrated, but all meters are connected the same way).

Step 4. Look at meter needle. If needle swings over "O" on top of scale, circuit has continuity. If needle does not move, circuit is open (broken). If needle jumps or flickers, there is a loose connection in circuit being tested.



- g. Testing for Shorts (all three meters). A short circuit occurs when two circuits that should not be connected have metal-to-metal contact with each other, or when a circuit that should not touch ground, has metal-to-metal contact with ground. To check for shorts, perform the following steps:

Step 1. Zero multimeter.

CAUTION

Failure to perform next step can damage multimeter.

- Step 2. Disconnect circuit being tested.
- Step 3. If checking for a short to ground, connect one probe to one circuit and the other to a ground. If checking for a short between two circuits, connect one probe to each circuit being tested.
- Step 4. Look at meter needle. If needle swings over "O" on top scale, circuit is shorted. If needle doesn't move, there is no short. If needle jumps or flickers, there is an intermittent short in circuit being tested.

h. Testing Resistance (all three meters). To measure resistance in a circuit perform the following steps:

- Step 1. Set up and "zero" test meter.

CAUTION

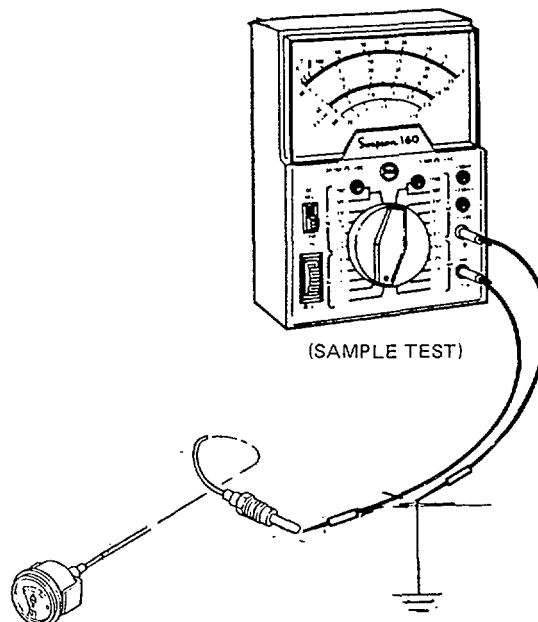
Failure to perform the next step can damage the multimeter.

- Step 2. Disconnect circuit being tested.
- Step 3. If test in this manual calls for an "OHMS RANGE" different than "RX1 or X1", set selector switch to that range (like "RX10 or X10").

NOTE

Zero the meter whenever you change ranges.

- Step 4. Connect probes across the circuit or item or element to be measured. (The illustration shows measuring resistance of a temperature sending unit.)

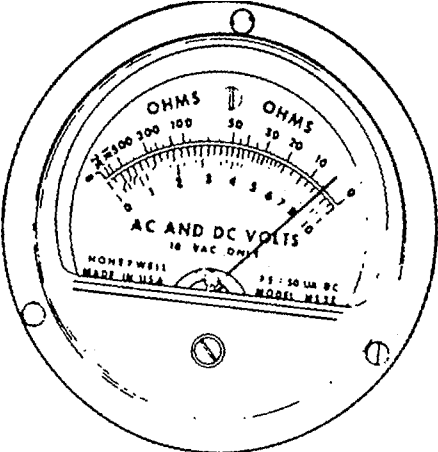


Step 5. Read meter. If meter is on "RX1 or XI" range, reading is taken from top scale. If meter switch is on a different range, multiply reading on scale according to table below:

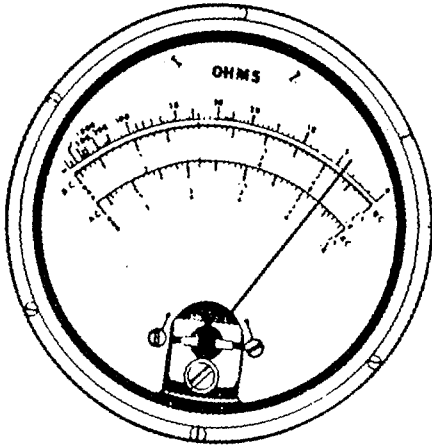
Ohms Switch Setting	You Do
X1 or RX1.....	Read number on scale
X10 or RX10.....	Multiply reading by 10
X100 or RX100.....	Multiply reading by 100
X1K or RX1K.....	Multiply reading by 1000
X10K or RX10K.....	Multiply reading by 10,000
.....	(Remember: K=1000)

For example, the meter ohm switch will show the following readings on the multimeters as shown below:

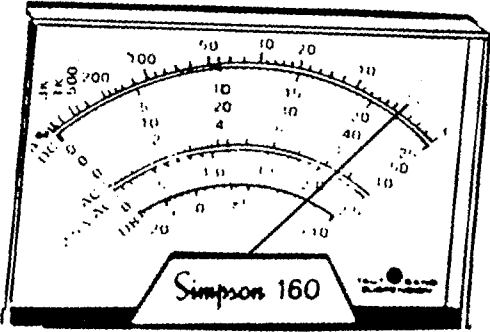
Ohms Switch Setting	Meter Indicates	Actual Resistance
X1 or RX 1	4 ohms	4 ohms
X10 or RX 10	4 ohms	40 ohms
X100 or RX100	4 ohms	400 ohms



AN/URM-105



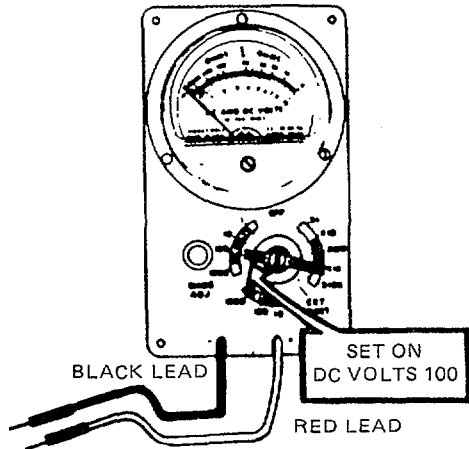
TS-352 B/U



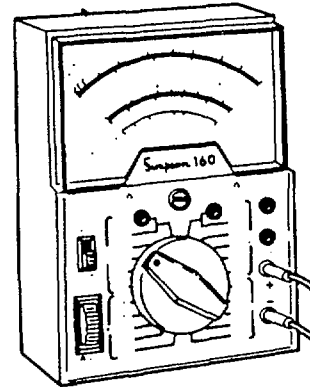
READING OHMS SCALE

- i. Using the DC Volt Scale with the AN/URM-105 and Simpson 160. Before using these multimeters to measure DC voltage, perform the following step:

Step 1. Set meter switch to DC volt range given in test procedure. (To measure 24 volts DC on the AN/URM-105, set switch on "100 DC volts" range, and on the Simpson 160, set switch on "50 V DC" range as shown below.)



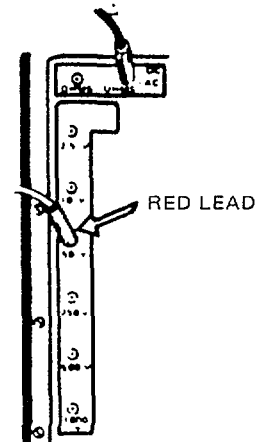
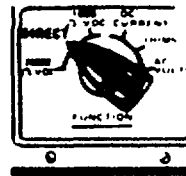
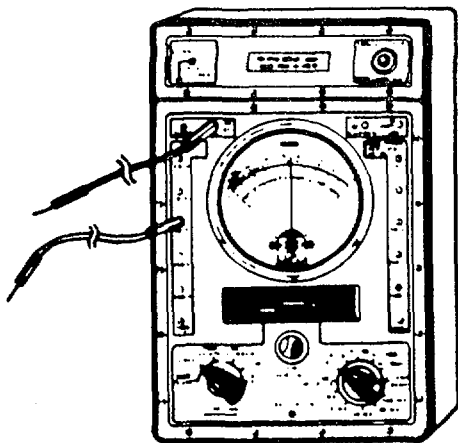
AN/URM-105 DC VOLT SCALE



SIMPSON 160 DC VOLT SCALE

- j. Using DC Volt Scale with the TS-352 B/U. Before using this multimeter to measure DC voltage, perform the following steps:

- Step 1. Set function switch to "direct" (range switch can be at any position). $\frac{3}{4}$,
- Step 2. Put black lead in "DC/+AC/OHMS" jack.
- Step 3. To measure 24 volts DC, plug red lead into "50 V" jack on left side of meter. If measuring less than 10 volts Dc, use "10 V" jack. If measuring less than 2.5 volts Dc, use "2.5 V" jack.



TS 352 B/U DC VOLT SCALE

k. Measuring DC Voltage (all meters). To measure DC voltage, perform following steps:

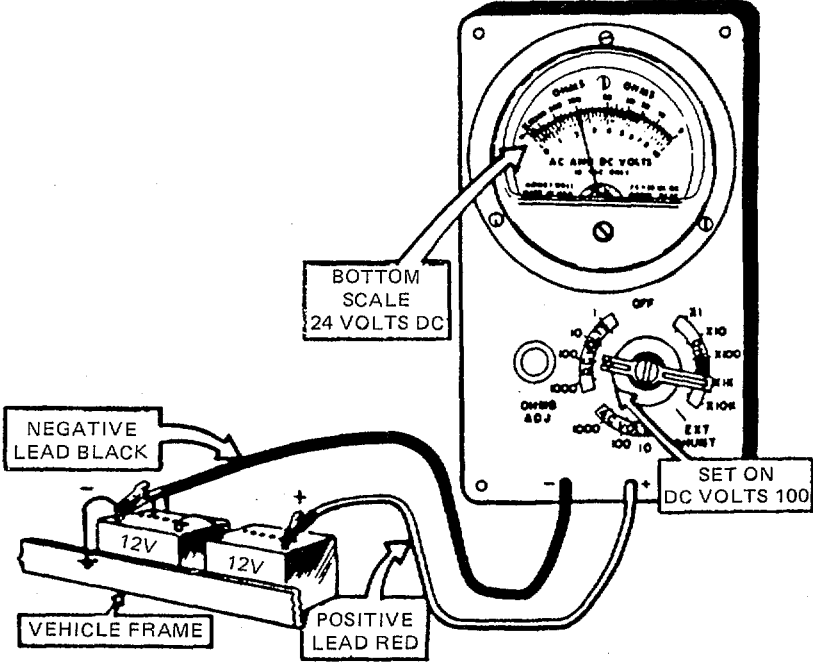
Step 1. Set up multimeter as described in i or j.

CAUTION

If you are not sure of the voltage to be measured on the vehicle, always start on the highest range of the meter you are using.

Step 2. With all three multimeters, connect read probe (+) side of circuit and black probe to negative (-) side. The following example shows 24 volts DC being measured across batteries.

Step 3. Read the meter. (The following examples show how to read all three multimeters.) If needle tries to move off scale to the left, reverse probes on circuit.

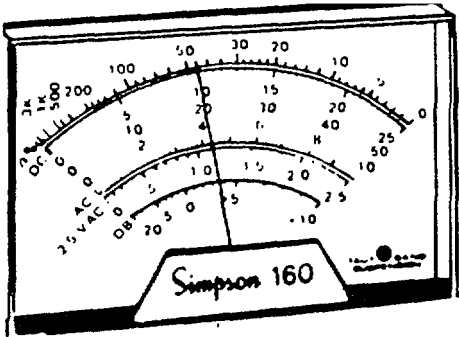


MEASURING DC VOLTAGE

1. Reading the Simpson 160. Perform the following steps:

Step 1. Read the "DC volts" scale for range corresponding to selector switch position. (See illustration below.)

SWITCH SETTING	SCALE
V DC 50	0-50
V DC 10	0-10
V DC 2.5	0.25 (AND DIVIDE BY 10)



Step 2. Observe the following readings on meter as shown below.

SWITCH SETTING	READING
V DC 50	20 VOLTS DC
V DC 10	4 VOLTS DC
V DC 2.5	1 VOLT DC

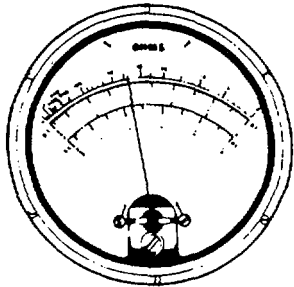
m. Reading the TS-352 B/U. Perform the following steps:

Step 1. Read "DC" volts scale for range corresponding to red lead position.

RANGE	SCALE
50V	0-5 (AND MULTIPLY BY 10)
10V	0-10
2.5V	0-25

Step 2. Observe reading on meter as shown below.

RANGE	READING
50V	20 VOLTS DC
10V	4 VOLTS DC
2.5V	1 VOLT DC



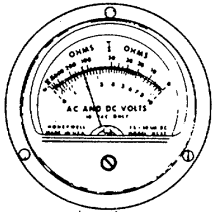
n. Reading the AN/URM-105. Perform the following steps:

Step 1. Read upper, black, straight-lined portion of "AC and DC volts" scale for range corresponding to selector switch position.

SWITCH SETTING	SCALE
1000 DC VOLTS	0-10 (AND MULTIPLY BY 100)
100 DC VOLTS	0-10 (AND MULTIPLY BY 10)
10 DC VOLTS	0-10
1 DC VOLT	0-10 (AND DIVIDE BY 10)

Step 2. Observe reading on meter as shown below.

SWITCH SETTING	READING
100 DC VOLTS	20 VOLTS DC
10 DC VOLTS	2 VOLTS DC
1 DC VOLT	0.2 VOLTS DC



2-12. ELECTRICAL SYSTEMS TROUBLESHOOTING.

Refer to table 2-2 for troubleshooting procedures, and use the symptom index below to quickly locate a particular fault or malfunction.

Because of its complexity, the electrical system is divided into the following functional systems:

- Battery System (page 2-27)
- Starting System (page 2-32)
- Charging System (page 2-43)
- Lighting System (page 2-48)
- Ether Start System (page 2-53)
- Ammeter, Service Meter, and Warning System (page 2-56)
- Winterized Cab Group (page 2-63)

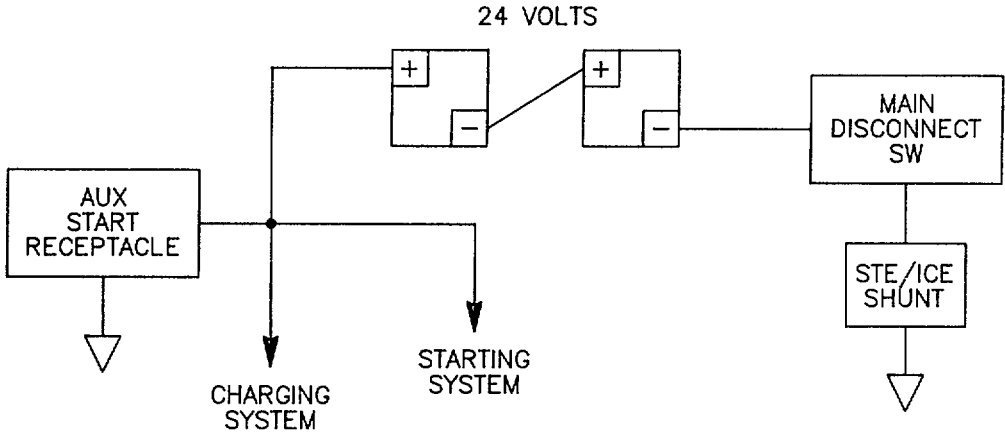
**ELECTRICAL TROUBLESHOOTING
SYMPTOM INDEX**

MALFUNCTION NO.	MALFUNCTION	PAGE
BATTERY SYSTEM		
1.	Batteries are hot, electrolyte is boiling, or excessive use of water	2-27
2.	Specific gravity will not increase to 1.240 under charge	2-28
3.	Engine will not crank	2-28
4.	All tractor electrical systems inoperative.....	2-30
STARTING SYSTEM		
5.	Starting motor inoperative	2-32
6.	Solenoid and starting motor operate; engine cranks slowly.....	2-37
CHARGING SYSTEM		
7.	Batteries hot or boiling, corrected specific gravity of all cells is 1.240	2-43
8.	Batteries use excessive water	2-44
9.	Batteries run down in service	2-44
10.	No alternator output	2-45
11.	Alternator output low	2-46
12.	Alternator charge too high	2-46
LIGHTING SYSTEM		
13.	Lamp(s) will not light	2-49
ETHER START SYSTEM		
14.	Engine cranks but will not start in cold weather (fuel available).....	2-53
AMMETER, SERVICE METER, AND WARNING SYSTEM		
15.	Ammeter inoperative	2-57
16.	Hourmeter inoperative	2-58
17.	Front horn does not sound	2-59
18.	Backup alarm does not sound	2-61
WINTERIZED CAB GROUP		
19.	Heater will not operate, or will not operate in high speed or low speed position	2-63
20.	Defrosters will not operate, or will not operate in high speed or low speed position.....	2-65
21.	Windshield wiper will not operate, or will not operate in high speed or low speed position	2-66

Table 2-2. Electrical Troubleshooting

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

BATTERY SYSTEM



▽ - RGL TRACTOR CHASSIS GROUND

1. BATTERIES ARE HOT, ELECTROLYTE IS BOILING, OR EXCESSIVE USE OF WATER
NOTE

If STE/ICE is available, perform TK Mode, NG50.

Check electrolyte temperature and specific gravity. Refer to TM9-6140-200-14.

NOTE

1.270 is a normal specific gravity for the batteries on the D7G tractor.

- a. If temperature is over 1200F (490C) and specific gravity is 1.300 or greater, batteries are being overcharged. Refer to charging system troubleshooting (malfunction 7).
- b. If temperature is over 1200F (490C), but specific gravity is 1.225 - 1.235, recharge battery. Refer to TM9-6140-200-14.

END OF TESTING!

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
2. SPECIFIC GRAVITY WILL NOT INCREASE TO 1.240 UNDER CHARGE		
NOTE		
If STE/ICE is available, perform TK Mode, NG50.		
Check rate of charging.		
Place battery on charge, assuring that cells are gassing freely. Maintain charge rate slightly below heavy gassing.		
If specific gravity does not recover to 1.240 in 25 hours of charging, replace battery. Refer to TM9-6140-200-14.		
END OF TESTING!		
3. ENGINE WILL NOT CRANK		
Test 1. Inspect batteries.		
Step 1.	Visually inspect batteries for cracks, leaks and corroded or broken terminal posts.	
	a. Replace any cracked, leaking, corroded, or broken batteries, or batteries with loose or broken terminal posts. Refer to TM9-6140-200-14.	
	b. Clean corroded terminal posts. Refer to page 4-67.	
Step 2.	Check for loose, broken, or worn terminals and cables.	
	a. Tighten any loose terminal or cable.	
	b. Replace any terminal or cable that is broken or worn. Refer to page 4-67.	
Step 3.	Check electrolyte level in each battery cell. Refer to TM5-2410-237-10. Fill each cell to fill ring with distilled water.	
Step 4.	Perform specific gravity test. Refer to TM9-6140-200-14. Batteries must test 1.240 or greater, temperature corrected, and each cell in battery must test within 25 points of the others.	

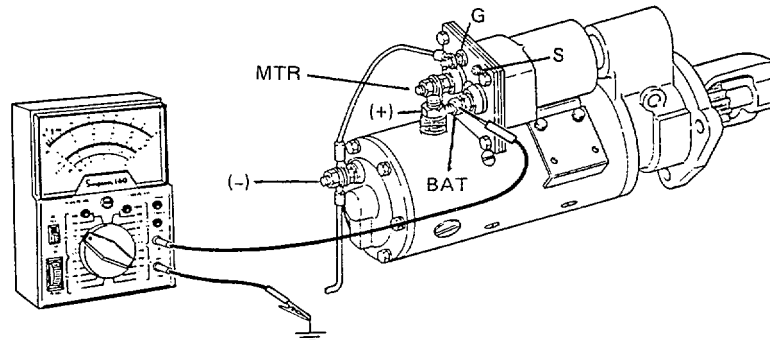
Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
		<ul style="list-style-type: none"> a. Charge all batteries not meeting requirements, and recheck specific gravity. b. If 25 point variation still exists, the battery is defective and must be replaced. Refer to page 4-64.
Step 5	Attempt to crank engine for 15 seconds. Place the battery disconnect switch in the OFF position and feel battery terminal connections.	
<u>WARNING</u>		
<p>Touch terminal connections one at a time; never touch both terminals at once. Be sure not to be grounded to the machine when checking. Failure to do so may cause serious personal injury or death.</p> <p>If battery terminal(s) is hot:</p> <ul style="list-style-type: none"> a. Tighten all loose connections at batteries. b. Tighten battery ground wire at tractor chassis ground. Tighten battery positive wire at starter solenoid. 		
NOTE		
<p>If STE/ICE is available, perform TK Mode, NG20.</p>		
Test 2.	Test batteries under load to determine adequate current capability and voltage drop during a 15 second amperage load.	
Step 1.	Set multimeter to 50 volt range.	
Step 2.	Connect meter positive lead to solenoid terminal BAT, and negative lead to the ground strap.	
Step 3.	Place battery disconnect switch to the ON position Meter should read battery voltage.	
Step 4.	With meter still connected as above, place exterior light switch to the ON position for approximately 15 seconds. Meter reading should not be below 18 volts.	

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Recharge batteries when voltage reading is low. Refer to page 4-65. Each cell of battery must show 1.6 volts.

**END OF TESTING!**

Test 3. Test starting motor.

Go to malfunction 5.

4. ALL TRACTOR ELECTRICAL SYSTEMS INOPERATIVE

Test 1. Test battery disconnect switch for continuity.

- Step 1. Place battery disconnect switch in the OFF position.
- Step 2. Disconnect the negative battery terminal-to-battery disconnect switch cable at the battery.
- Step 3. Set multimeter to RX1 to read continuity.
- Step 4. Connect meter between battery disconnect switch terminals.
- Step 5. Place battery disconnect switch in the ON position. If continuity is not indicated, replace the battery (main) disconnect switch.
 - a. If continuity is not indicated, replace the battery disconnect switch. Refer to page 4-40.
 - b. If continuity is indicated, go to test 2.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 2. Check connection of battery cables and condition of terminals.

Check that battery cables are correctly connected to batteries. Refer to page 4-67.

Reconnect battery cables if necessary.

Test 3. Inspect batteries.

Go to malfunction 3, test 1.

NOTE

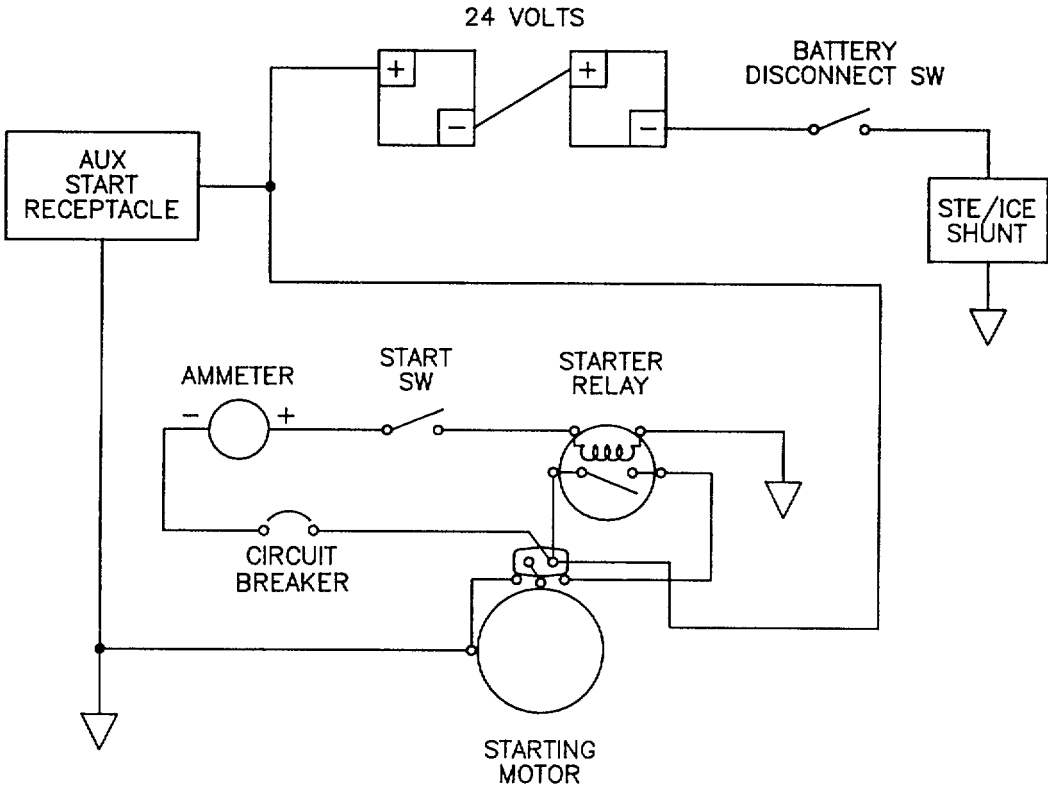
If STE/ICE is available, perform TK Mode, NG81.

END OF TESTING!

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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STARTING SYSTEM



5. STARTING MOTOR INOPERATIVE

NOTE

If STE/ICE is available, perform TK Mode, NG50.

Test 1. Check and, if necessary, reset circuit breaker.

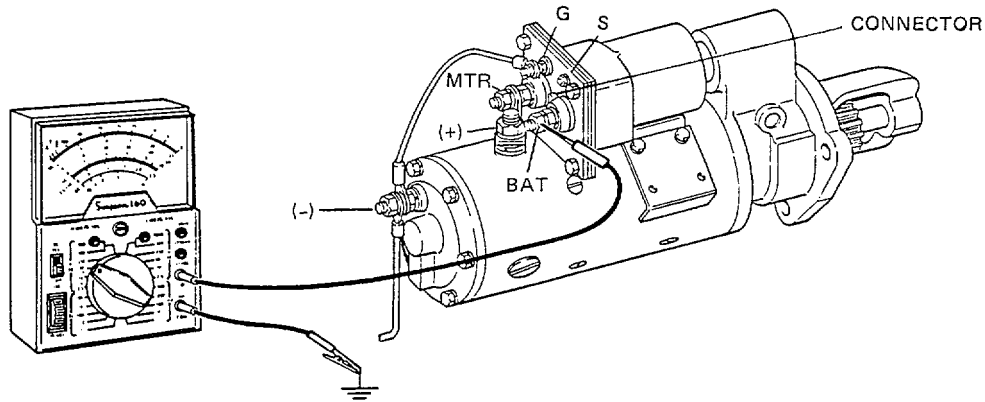
If circuit breaker did not require reset, go to test 2.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Test 2.	Check solenoid operation.	
	Step 1. Place the battery disconnect switch to the ON position. Turn start switch fully clockwise and listen for starter solenoid to energize.	
		a. If thump of starter solenoid energizing is heard, go to step 2.
		b. If thump of solenoid is not heard, go to test 3.
	Step 2. Place the battery disconnect switch to the OFF position.	
	Step 3. Check continuity of connector between starting motor and solenoid. Refer to page 2-19.	
		a. If there is an open circuit, replace the connector. Refer to page 4-17.
		b. If continuity is indicated, replace the starting motor. Refer to page 4-5.
Test 3.	Test starter circuit source voltage.	
	Step 1. Place the battery disconnect switch to the OFF position.	
	Step 2. Place the multimeter to the 50 volt range.	
	Step 3. Connect multimeter positive lead to the BAT terminal on the solenoid and the negative lead to ground.	
	Step 4. Place battery disconnect switch to the ON position.	
		a. If battery voltage is indicated, go to test 4.
		b. If battery voltage is not indicated, go to malfunction 4.
		c. If battery disconnect switch is okay, check wiring continuity. Repair or replace broken wire(s). Refer to pages 2-19 and 4-74.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 4. Check starting motor voltage.

Step 1. Connect meter positive lead to solenoid terminal MTR and negative lead to chassis ground.

Step 2. Place the battery disconnect switch to the ON position. Momentarily turn the start switch fully clockwise and observe meter reading.

a. If voltage is indicated, replace the starting motor. Refer to page 4-5.

b. If voltage is not indicated, go to test 5.

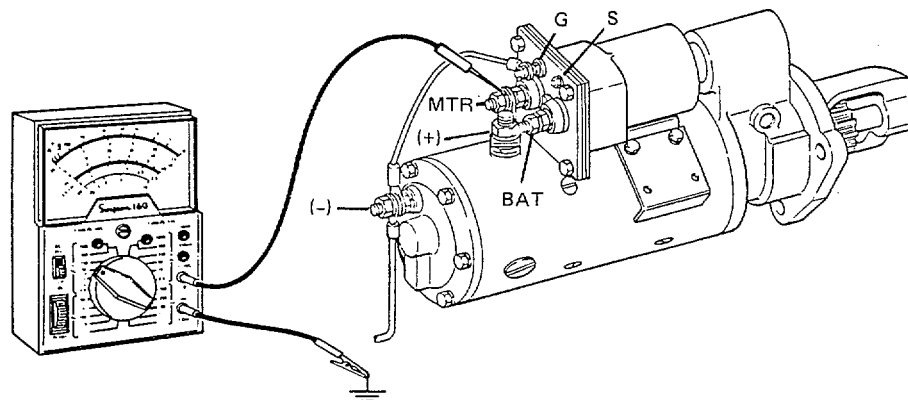
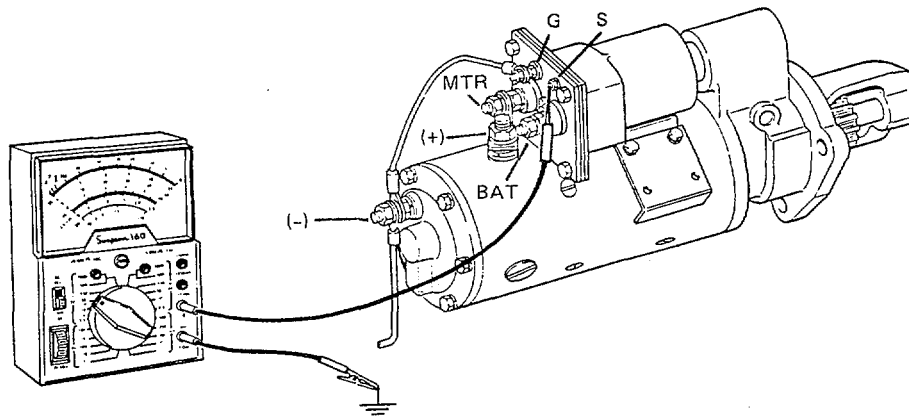


Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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- Test 5. Check starter relay and solenoid.
- Step 1. Place the battery disconnect switch to the OFF position.
- Step 2. Set multimeter to the 50 volt range.
- Step 3. Connect meter positive lead to terminal S on solenoid.
- Step 4. Connect meter negative lead to chassis ground.
- Step 5. Turn battery disconnect switch to the ON position.
- Step 6. Momentarily turn the start switch fully clockwise and observe meter reading.
- If voltage is indicated, replace solenoid. Refer to page 4-14.
 - If voltage is not indicated, go to test 6.

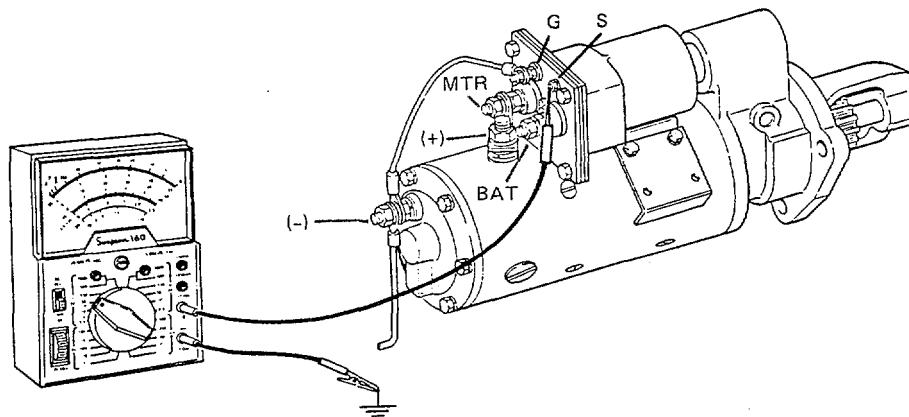


- Test 6. Test starter relay.
- Step 1. Place battery disconnect switch to the OFF position.
- Step 2. Disconnect white wire from starter relay.
- Step 3. Set multimeter to 50 volt range.
- Step 4. Connect meter positive lead to the white wire and negative lead to chassis ground.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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|--|--|--|
| | Step 5. Place battery disconnect switch to ON position. | |
| | Step 6. Momentarily turn start switch fully clockwise and observe meter. | |
| | a. If voltage is indicated, replace starter relay. Refer to page 4-5. | |
| | b. If voltage is not indicated, place battery disconnect switch to the OFF position, reconnect the white wire, and go to test 7. | |

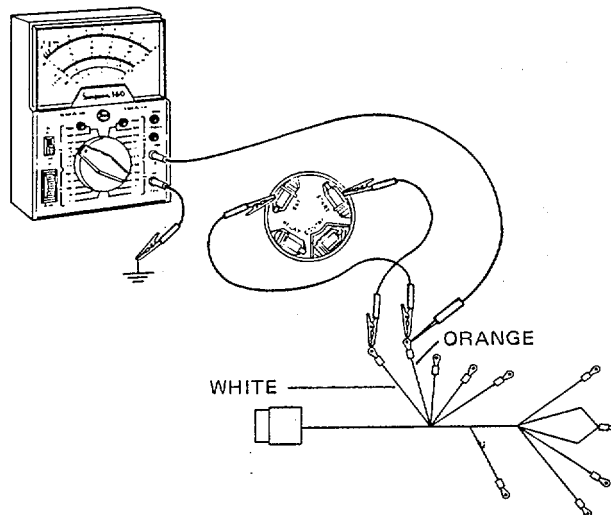


- | | | |
|--|--|--|
| | Test 7. Test start switch. | |
| | Step 1. Place battery disconnect switch to the OFF position. | |
| | Step 2. Disconnect the orange lead from start switch BAT terminal. | |
| | Step 3. Set multimeter to the 50 volt range. | |
| | Step 4. Connect meter positive lead to the orange lead and the negative lead to chassis ground. | |
| | Step 5. Place battery disconnect switch to the ON position. Momentarily turn start switch fully clockwise and observe meter reading. | |

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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|--|--|--|
| | | <p>a. If voltage is indicated, replace the start switch. Refer to page 4-36.</p> <p>b. If voltage is not indicated, place battery disconnect switch in the OFF position and continuity check wiring. Refer to page 2-19. Repair or replace broken wire(s). Refer to page 4-74.</p> <p>c. If wiring is okay, replace the ammeter. Refer to page 4-22.</p> |
|--|--|--|



END OF TESTING!

6. SOLENOID AND STARTING MOTOR OPERATE; ENGINE CRANKS SLOWLY.

NOTE

If STE/ICE is available, perform TK Mode, NG80.

Test 1. Check batteries for overheating.

Step 1. Crank engine for 15 seconds.

WARNING

Touch terminal connections one at a time; never touch both terminals at once. Be sure not to be grounded to the machine when checking. Failure to do so may cause serious personal injury or death.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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- | | | |
|---------|--|--|
| | <p>Step 2. Feel battery terminal connections. If battery terminal(s) is hot:</p> <ul style="list-style-type: none"> a. Clean corroded connection(s). b. Tighten all loose connections at batteries, ground, and starter. | |
| Test 2. | Test specific gravity for each battery. | |

Go to malfunction 1 and perform test.

- | | | |
|---------|------------------------------|--|
| Test 3. | Test starting motor voltage. | |
|---------|------------------------------|--|

Step 1. Set multimeter to the 50 volt range.

Step 2. Connect multimeter positive lead to positive terminal on starting motor and negative lead to negative terminal on starting motor.

Step 3. Crank engine and observe voltage reading on the meter. Voltage should exceed 22 volts.

If voltage is low, place battery disconnect switch to the OFF position, and clean and tighten starting motor terminal connections.

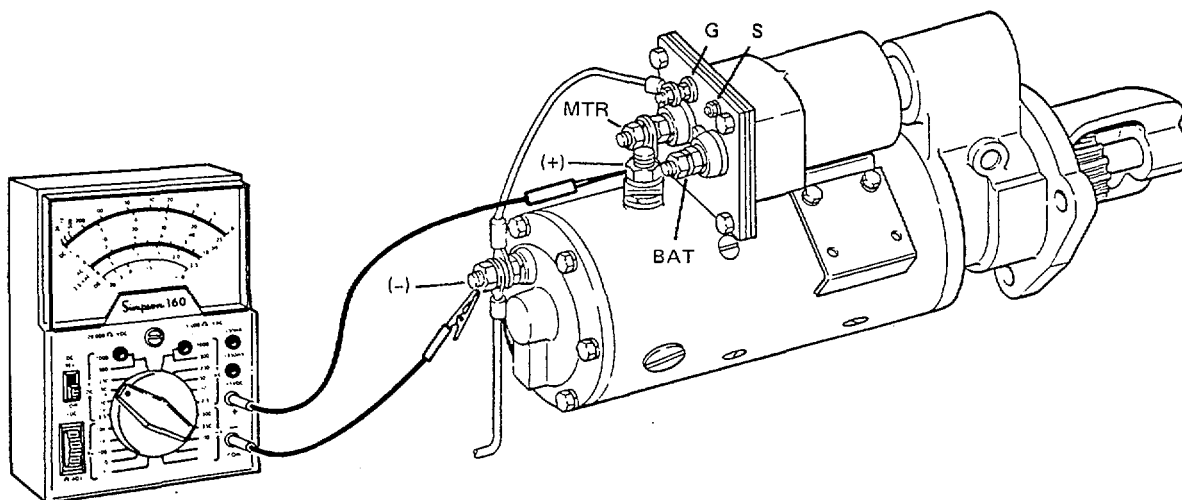


Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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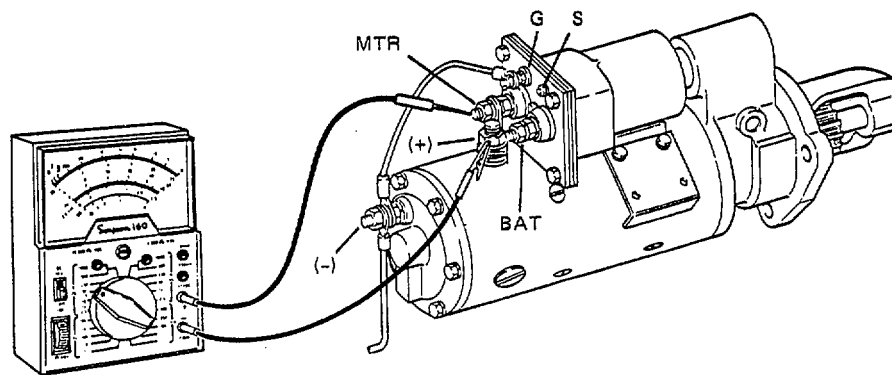
Test 4. Test starting motor-to-solenoid connector.

Step 1. Set multimeter to the 10 volt range.

Step 2. Connect multimeter negative lead to positive terminal on starting motor and positive lead to MTR terminal on solenoid.

Step 3. Crank engine and observe meter.

If voltage reading exceeds 0.1 volt, place battery disconnect switch to the OFF position, and clean and tighten terminal connections.



Test 5. Test solenoid contactors.

Step 1. Set multimeter to the 10 volt range.

Step 2. Connect multimeter positive lead to the solenoid BAT terminal and the negative lead to the solenoid MTR terminal.

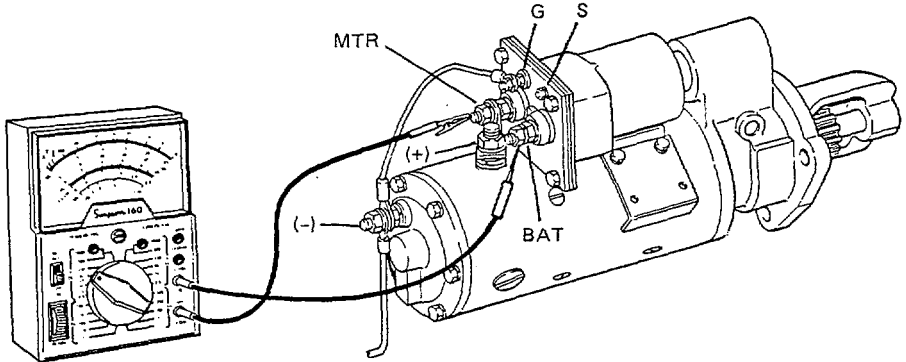
Step 3. Crank engine and observe meter.

a. If voltage reading exceeds 0.4 volts, replace solenoid. Refer to page 4-14.

b. If malfunction still exists, go to tests 6, 7, and 8.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 6. Test negative cable voltage drop from batteries to starting motor.

- Step 1. Set multimeter to the 10 volt range.
- Step 2. Connect meter positive lead to negative terminal on starting motor and negative lead to chassis ground.
- Step 3. Crank engine and observe meter.

If voltage reading exceeds 0.4 volts, clean and tighten cable connections at the batteries, starting motor, and chassis ground points.

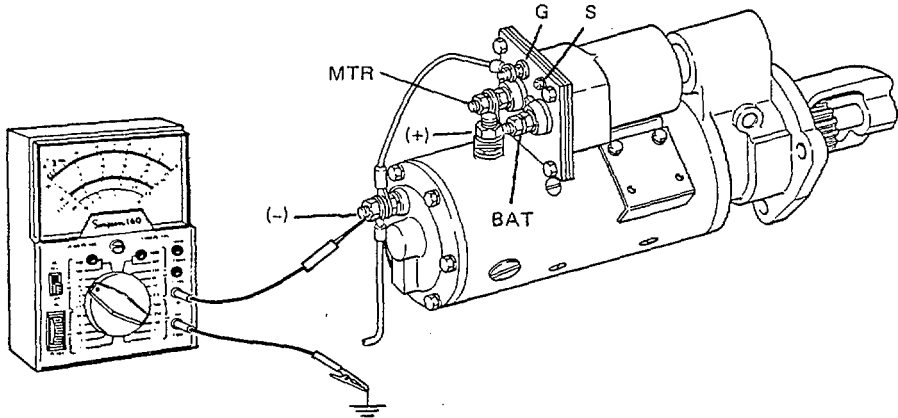


Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 7. Test positive cable voltage from batteries to solenoid.

- Step 1. Set multimeter to the 10 volt range.
- Step 2. Connect multimeter positive lead to battery positive terminal and negative lead to solenoid BAT terminal.
- Step 3. Crank engine and observe meter.

If voltage reading exceeds 0.4 volts, clean and tighten cable connections at the batteries, starting motor, and chassis ground points.

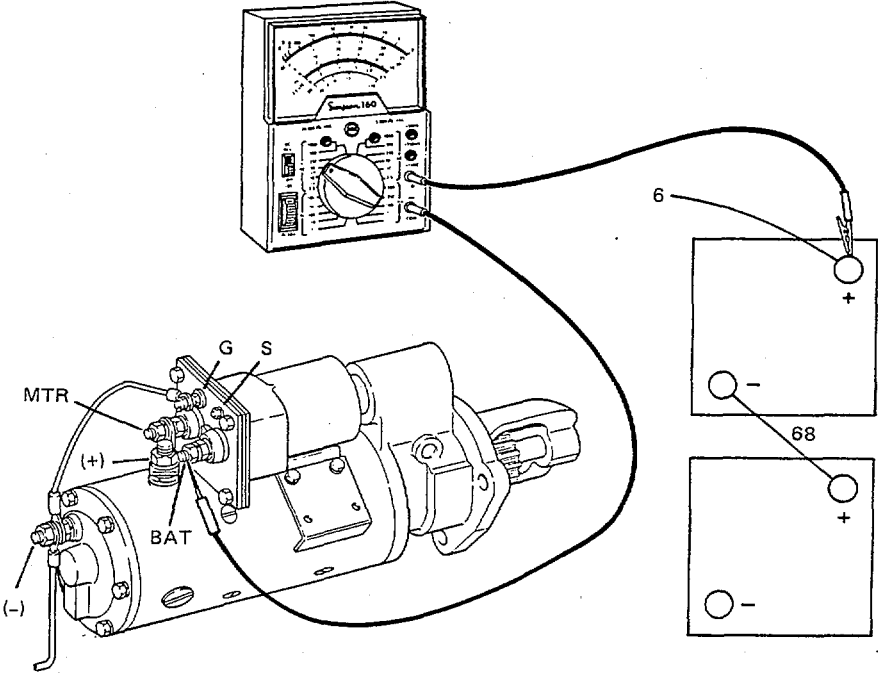
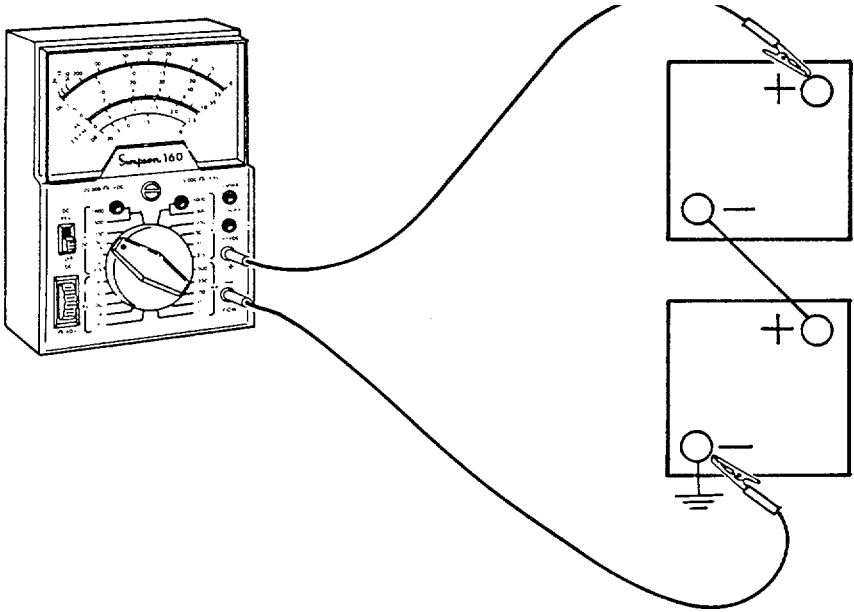


Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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- Test 8. Test battery voltage after cranking load is applied.
- Step 1. Set multimeter to the 50 volt range.
 - Step 2. Connect multimeter lead directly across battery terminals as shown.
 - Step 3. Push governor control lever forward past detent and crank engine for approximately 30 seconds. Observe meter reading after cranking has stopped.
 - a. If voltage is not 20 volts or more, go to malfunction 2.
 - b. If voltage is satisfactory, replace starting motor and solenoid. Refer to page 4-5.
 - Step 4. Place governor control lever to engine idle position and crank engine.

If engine still cranks slowly, notify intermediate maintenance.

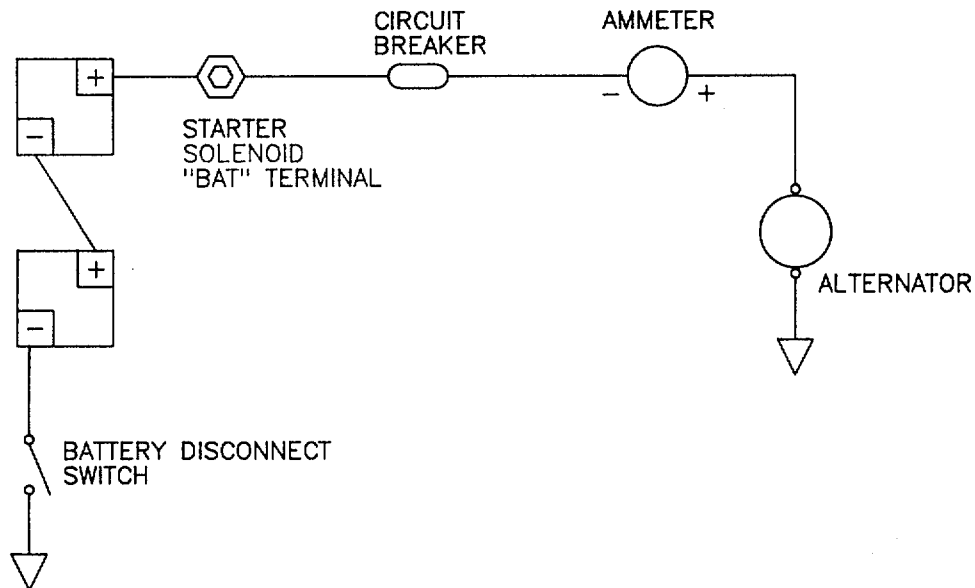


END OF TESTING!

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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CHARGING SYSTEM



CATELC007

▽ - RGL TRACTOR CHASSIS GROUND

7. BATTERIES HOT OR BOILING, CORRECTED SPECIFIC GRAVITY OF ALL CELLS IS 1.240

NOTE

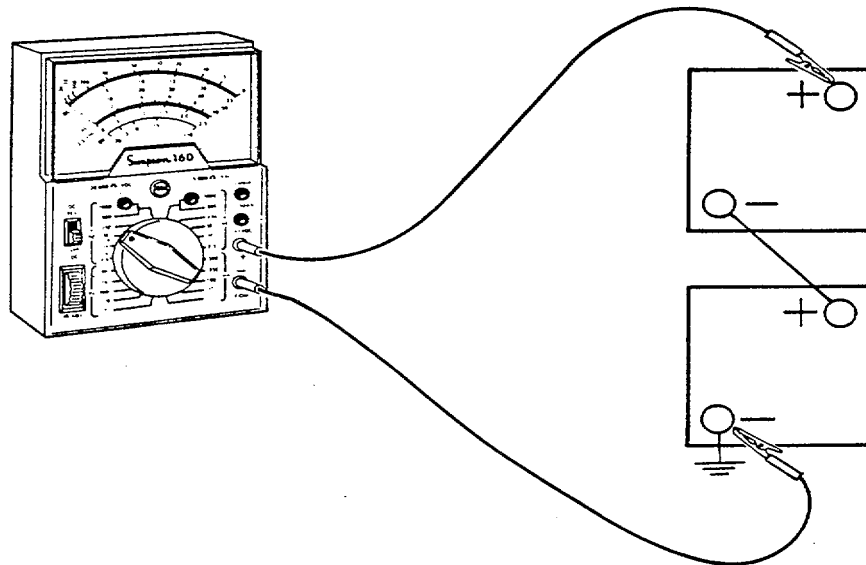
If STE/ICE is available, perform NG50.

Test charging voltage.

- Step 1. Set multimeter to the 50 volt range.
- Step 2. Connect multimeter directly across battery terminals as shown.
- Step 3. Start engine and allow it to stabilize at 2000-2090 rpm. If meter does not indicate 26.6-28.3 volts, replace alternator. Refer to page 4-2.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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END OF TESTING!

8. BATTERIES USE EXCESSIVE WATER

NOTE

If STE/ICE is available, perform TK Mode, NG81.

Test charging voltage. Go to malfunction 7.

END OF TESTING!

9. BATTERIES RUN DOWN IN SERVICE

NOTE

If STE/ICE is available, perform TK Mode, NG50.

- Test 1. Check for loose, broken, or missing alternator belts.
- Adjust loose belts. Refer to page 3-120.
 - Replace broken or missing belts. Refer to page 3-119.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 2. Test charging voltage. Go to malfunction 7.

END OF TESTING!

10. NO ALTERNATOR OUTPUT

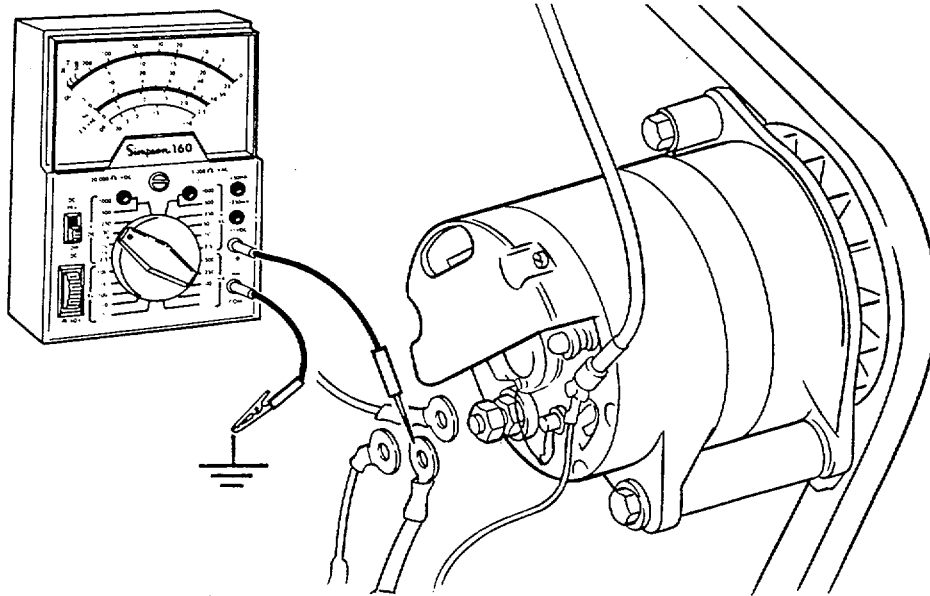
NOTE

If STE/ICE is available, perform TK Mode, NG50.

- Test 1. Check for loose, broken, or missing alternator belts.
- a. Adjust loose belts. Refer to page 3-120.
 - b. Replace broken or missing belts. Refer to page 3-119.
- Test 2. Test alternator circuit voltage.
- Step 1. Place battery disconnect switch to the OFF position.
 - Step 2. Disconnect wiring leads from the alternator + terminal.
 - Step 3. Set multimeter to the 50 volt range.
 - Step 4. Connect multimeter positive lead to one of the orange leads disconnected from the alternator positive terminal and the negative lead to chassis ground.
 - Step 5. Place battery disconnect switch to the ON position.
 - a. If battery voltage is indicated, place battery disconnect switch to the OFF position and check continuity between alternator and ground. Refer to page 2-20. Repair or replace alternator ground cable. Refer to page 4-74.
 - b. If wiring to chassis ground is okay, replace the alternator. Refer to page 4-2.
 - c. If battery voltage is not indicated, repair or replace alternator-to-ammeter wiring. Refer to page 4-74.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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END OF TESTING!

11. ALTERNATOR OUTPUT LOW (AMMETER READING IN RED ZONE)

NOTE

If STE/ICE is available, perform TK Mode, NG50.

- Test 1. Check for loose, broken, or missing alternator belts.
 - a. Adjust loose belts. Refer to page 3-120.
 - b. Replace broken or missing belts. Refer to page 3-119.
- Test 2. Test battery voltage. Go to malfunction 7.

END OF TESTING!

12. ALTERNATOR CHARGE TOO HIGH (AMMETER IN HIGH GREEN ZONE)

NOTE

If STE/ICE is available, refer to TK Mode, NG50.

- Test 1. Test battery voltage. Go to malfunction 7.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	Test 2. Check alternator for overheating.	
	Step 1. Run engine for approximately 10 minutes.	
	Step 2. With engine off, check alternator for high temperature by holding hand near alternator.	
	Step 3. If alternator is hot, place battery disconnect switch to the OFF position, and allow alternator to cool.	
	Step 4. Start engine.	
		If ammeter returns to high green zone and alternator heats up again, replace alternator. Refer to page 4-2.

END OF TESTING!

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

LIGHTING SYSTEM

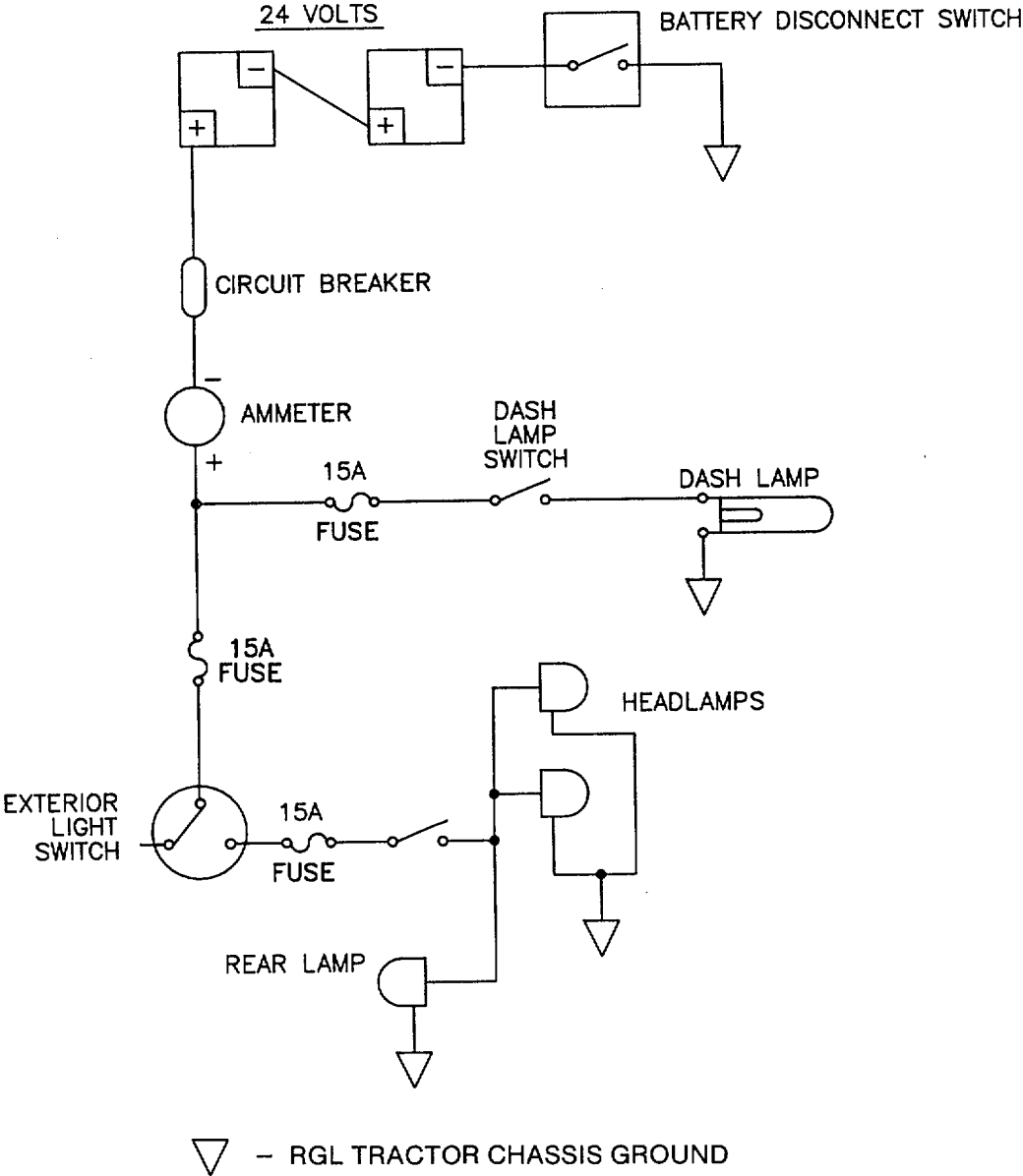


Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

13. LAMP(S) WILL NOT LIGHT

- Test 1. Check for blown fuse(s).
- Step 1. Place battery disconnect switch to the OFF position.
- Step 2. Use multimeter to check for a blown fuse in the circuit with no light.
- a. Replace blown fuse with same rated fuse. Refer to page 4-78.
 - b. If fuse(s) continue to blow, check for a short circuit. Refer to schematic diagram.
 - c. If fuse(s) is not blown, proceed to test 2.

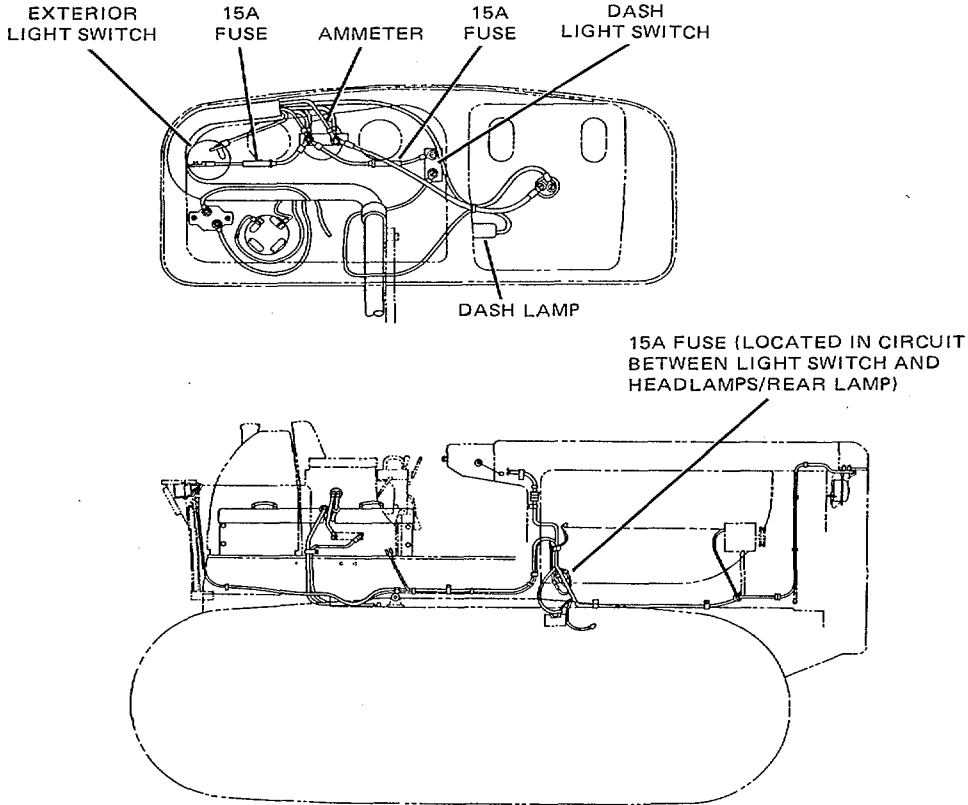


Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Test 2.	Check for defective lamp.	<p>Place battery disconnect switch in the OFF position.</p> <p>a. Replace lamp with one known to be okay. Refer to page 4-18 for dash panel lamps or page 4-44 for headlamps and floodlamps.</p> <p>b. If lamp does not light, go to test 3.</p>
Test 3.	Check for corrosion or dirt in sockets or on terminals.	<p>Place battery disconnect switch in the OFF position.</p> <p>a. Clean corroded connections.</p> <p>b. Clean dirt and rust from sockets and terminals.</p>
Test 4.	Check lamp holders for loose connections and broken wire terminals.	<p>Place battery disconnect switch in the OFF position.</p> <p>a. Tighten all loose connections.</p> <p>b. Repair or replace broken wire terminals. Refer to page 4-74.</p> <p>c. If lamp still does not light, go to test 5 or test 6.</p>
Test 5.	Test headlamp/rear lamp circuit.	<p>Step 1. Place battery disconnect switch in the OFF position.</p>
NOTE		
<p>If any of the following conditions exist, replace broken wire between lamp and harness. Refer to schematic diagram and page 4-74. If none of the exterior lamps light, proceed to step 2.</p>		
<ul style="list-style-type: none"> • one headlamp only will not light. • both headlamps only will not light. • rear lamp only will not light. 		
<p>Step 2. Disconnect orange wire from light switch terminal B.</p>		

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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- | | | |
|---------|--|--|
| Step 3. | Set multimeter to the 50 volt range. | |
| Step 4. | Connect meter positive lead to the disconnected orange wire and the negative lead to chassis ground. | |
| Step 5. | Place the battery disconnect switch to the ON position and observe meter reading. | |
| | a. If voltage is indicated, replace the light switch. Refer to page 4-32. | |
| | b. If voltage is not indicated, replace broken wire(s) to the switch and/or light switch fuse. Refer to the schematic diagram and page 4-74. | |

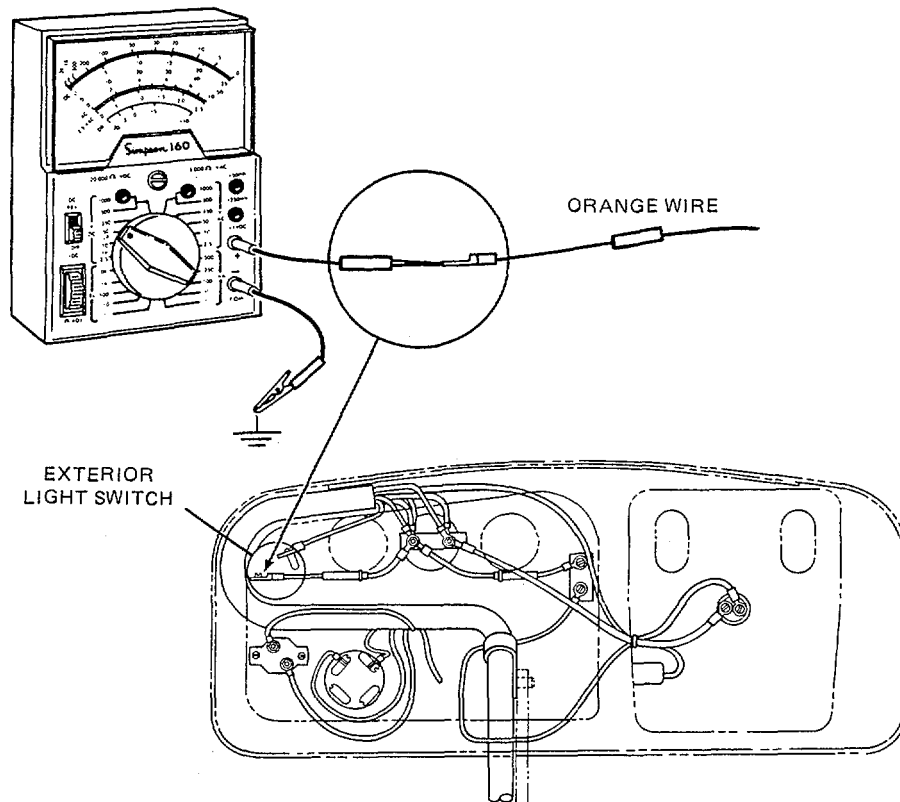
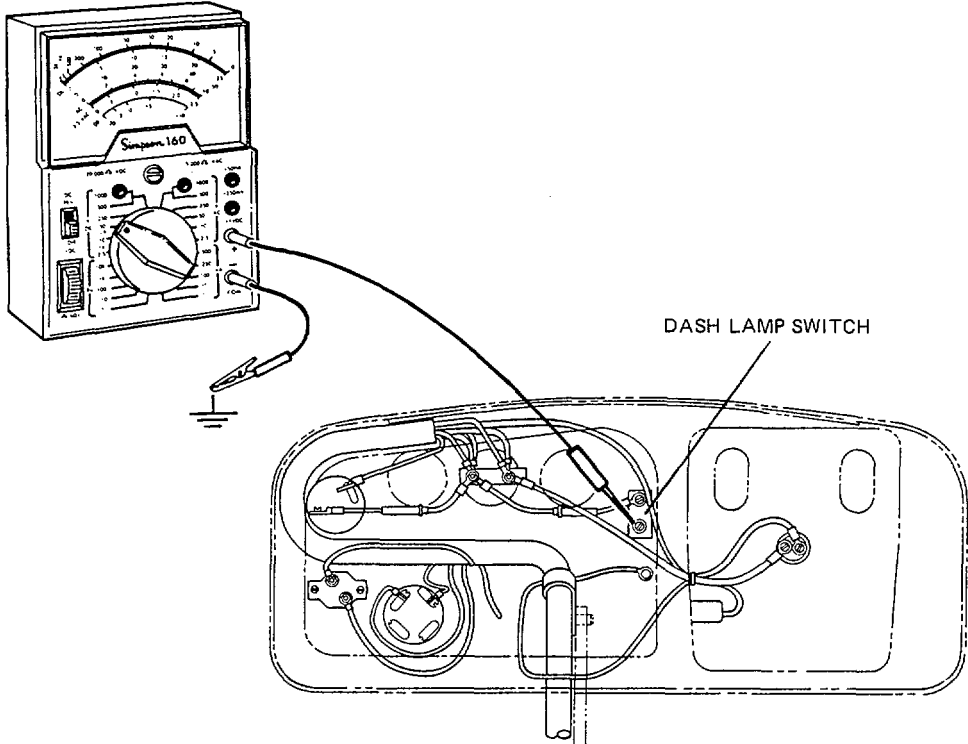


Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 6. Test dash light circuit.

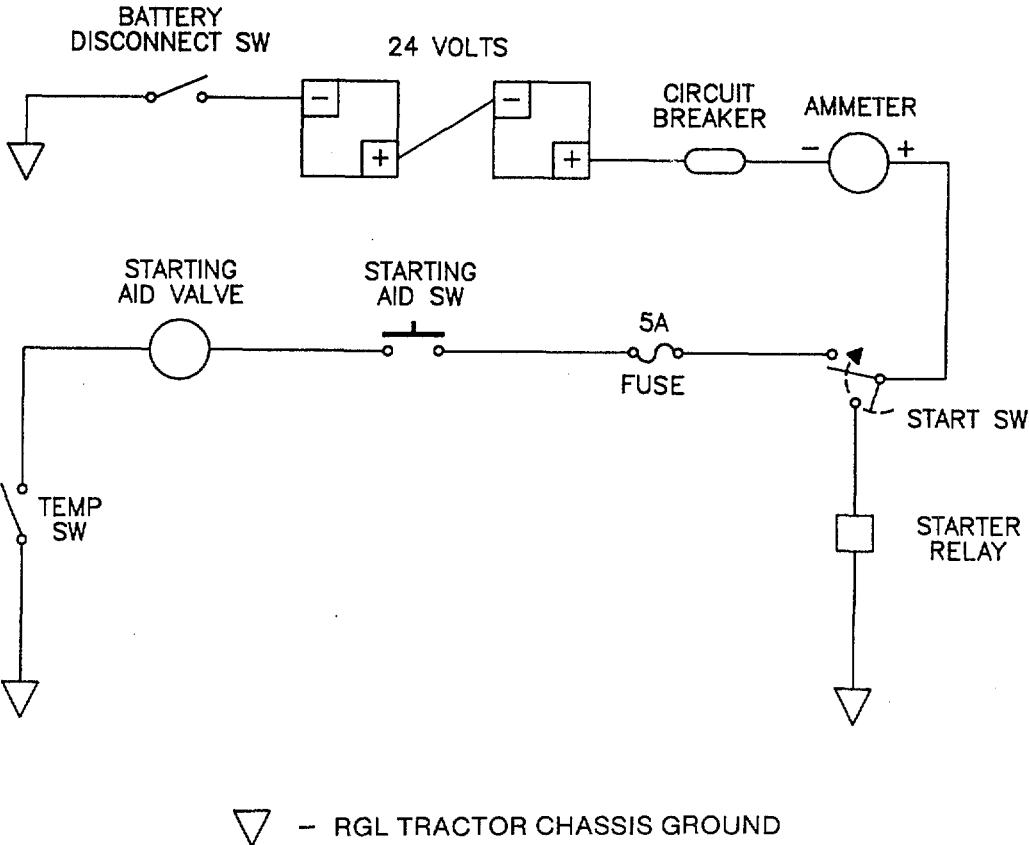
- Step 1. Place the battery disconnect switch to the OFF position.
- Step 2. Disconnect gray wire from dash lamp switch.
- Step 3. Set multimeter to the 50 volt range.
- Step 4. Connect meter positive lead to the switch terminal with disconnected lead and the negative lead to chassis ground.
- Step 5. Place battery disconnect switch to the ON position.
- Step 6. Place the dash light switch to the ON position and observe meter.
 - a. If voltage is indicated, replace the dash lamp body assembly. Refer to page 4-18.
 - b. If voltage is not indicated, replace light switch. Refer to page 4-30.



END OF TESTING!
2-52

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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14. ENGINE CRANKS BUT WILL NOT START IN COLD WEATHER. FUEL AVAILABLE.

Test 1. Check ether canister.

Remove ether canister. Shake and listen for liquid splashing inside canister.

- a. If canister is empty, replace with a full one. Refer to page 3-91.
- b. If canister is full, reinstall and proceed to test 2.

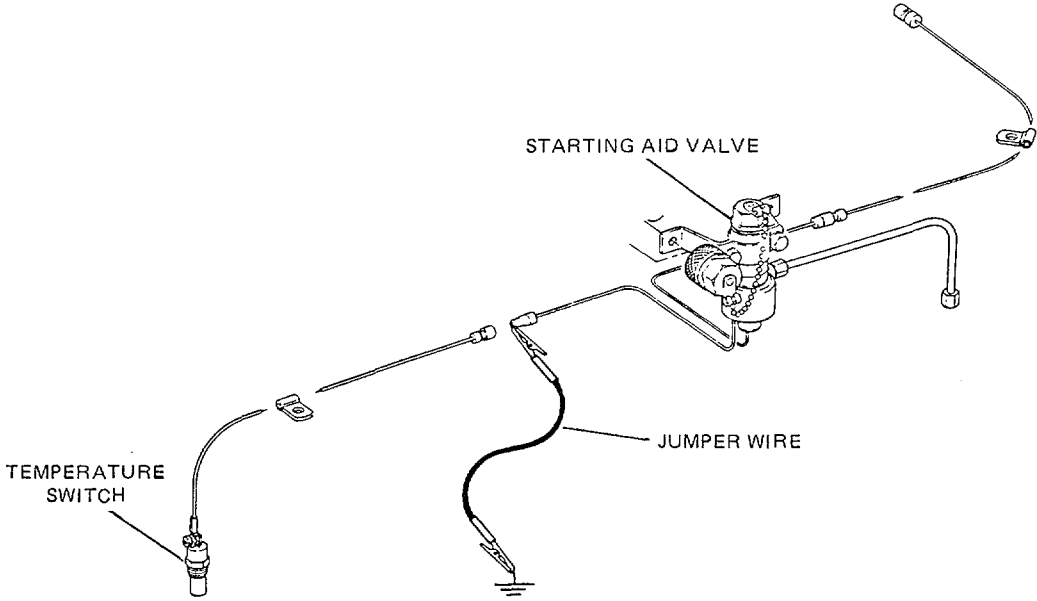
Test 2. Check for a blown starting aid fuse.

Replace blown fuse with same rated fuse. Refer to page 4-78.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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- Test 3. Check starting aid valve operation.
- Step 1. Place battery disconnect switch to the OFF position.
 - Step 2. Disconnect temperature switch lead from starting aid valve.
 - Step 3. Connect a jumper wire between the valve and chassis ground.
 - Step 4. Crank engine, press starting aid button, and listen for starting aid valve operation.
 - a. If valve functions, replace starting aid temperature switch. Refer to page 3-95.
 - b. If valve does not function, place battery disconnect switch in the OFF position and reconnect temperature switch lead to the starting aid valve. Go to test 4.

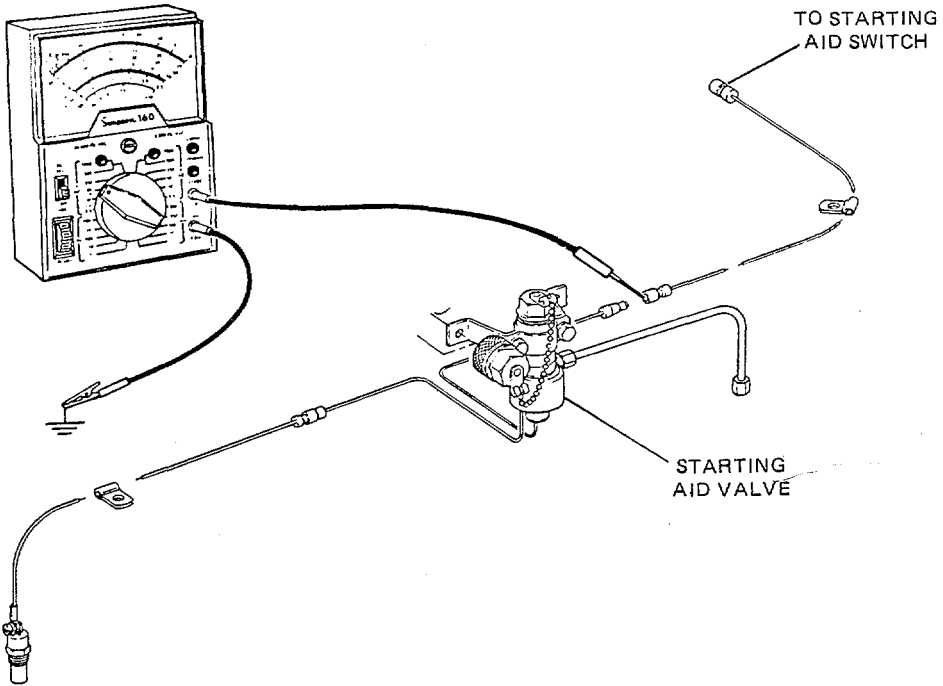


- Test 4. Test starting aid system voltage.
- Step 1. Disconnect starting aid switch-to-valve lead at the starting aid valve.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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- Step 2 Set multimeter to the 50 volt range.
- Step 3 Connect meter positive lead to the purple disconnected wire and the negative lead to chassis ground.
- Step 4 Crank engine, press starting aid button, and observe meter.
 - a If voltage is indicated, replace starting aid valve. Refer to page 3-95.
 - b If voltage is not indicated, replace starting aid switch. Refer to page 4-38.
 - c If valve still does not operate, continuity check starting aid circuit wiring Refer to schematic diagram. See page 2-53 Replace broken wire(s) Refer to page 4-74.

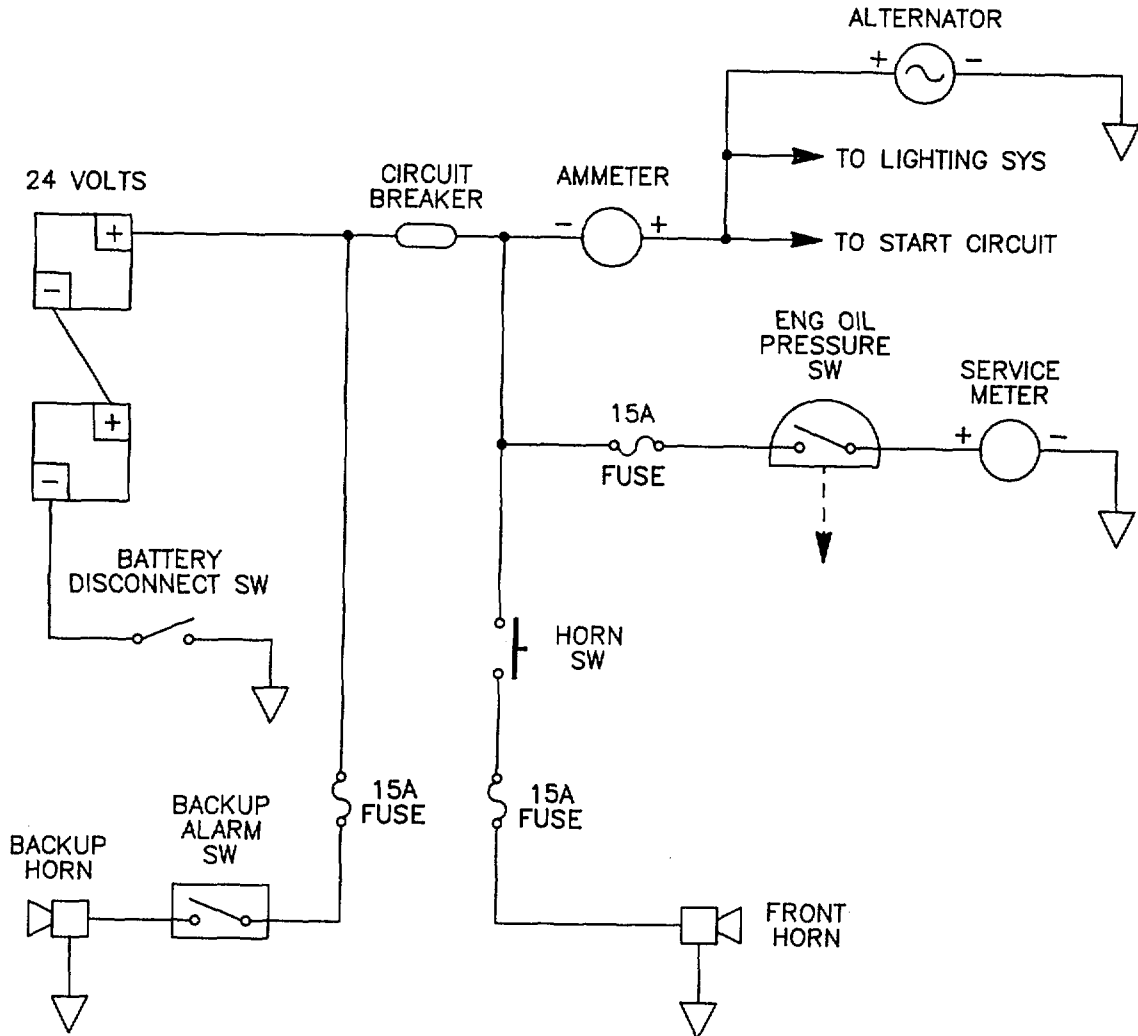


END OF TESTING!

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

AMMETER, SERVICE METER, AND WARNING SYSTEM



▽ - RGL TRACTOR CHASSIS GROUND

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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15. AMMETER INOPERATIVE

Test 1. Test tractor electrical system.

Go to malfunction 4.

Test 2 Check ammeter continuity.

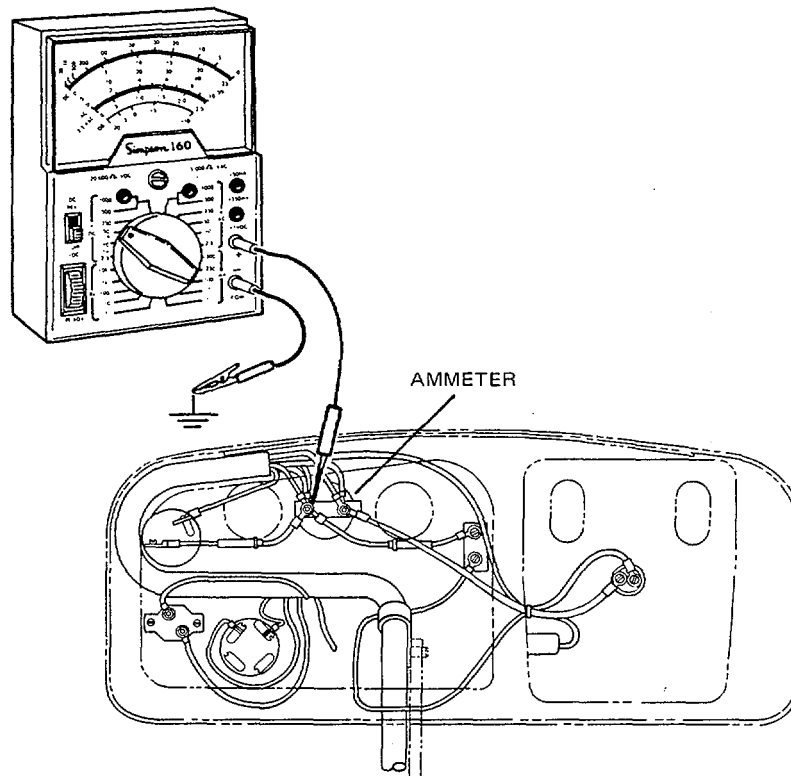
Step 1 Place battery disconnect switch to the OFF position.

Step 2 Set Multimeter to the RX1 to read continuity.

Step 3 Touch meter positive lead to ammeter case and the negative lead to chassis ground.

a If continuity is indicated, replace ammeter. Refer to page 4-22.

b If continuity is not read, clean and tighten ammeter mounting points.



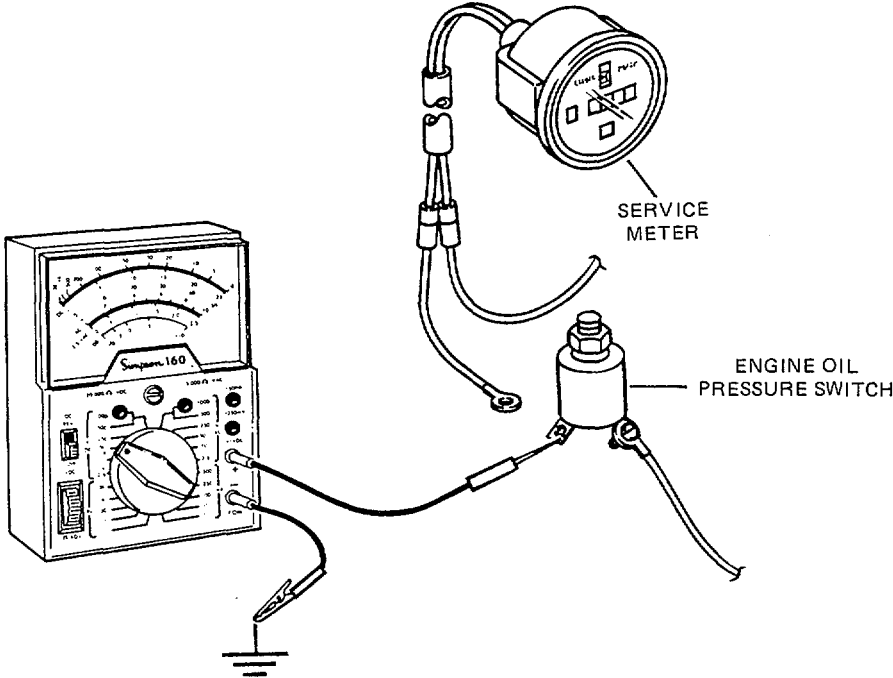
END OF TESTING!

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
16. HOURMETER INOPERATIVE		
Test hourmeter circuit.		
Step 1	Place battery disconnect switch to the OFF position.	
Step 2	Check for a blown fuse.	
	a Replace blown fuse with same rated fuse Refer to page 4-78.	
	b If fuse is not blown, proceed to step 3.	
Step 3	Disconnect engine oil pressure switch to hourmeter wire at the switch.	
Step 4	Set Multimeter to the 50 volt range.	
Step 5	Connect meter positive lead to the switch terminal and the negative lead to chassis ground.	
Step 6	Operate engine and wait until normal operating oil pressure is reached.	
	a If voltage is indicated, stop engine, place battery disconnect switch in the OFF position, and continuity check wiring and ground connections to the hourmeter.	
	Refer to page 219 Refer to schematic diagram See page 2-56 Replace broken wire(s) Refer to page 4-74.	
	b If wiring is okay, replace hourmeter Refer to page 4-20.	
	c If voltage is not indicated, place battery disconnect switch to the OFF position, and continuity check oil pressure switch-to-ammeter wiring. Refer to page 2-19. Refer to schematic diagram See page 2-56 Replace broken wire(s) Refer to page 4-74.	
	d If wiring in step c is okay, replace hourmeter oil pressure switch Refer to page 4-47.	

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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END OF TESTING!

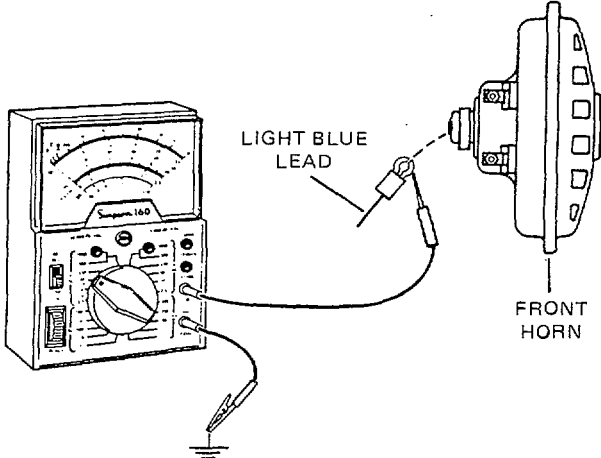
17. FRONT HORN DOES NOT SOUND

Test 1 Test horn circuit voltage.

- Step 1 Place battery disconnect switch in the OFF position.
- Step 2 Disconnect light blue lead from horn.
- Step 3 Set Multimeter to the 50 volt range.
- Step 4 Connect Multimeter positive lead to the light blue lead and the negative lead to chassis ground.
- Step 5 Place battery disconnect switch to the ON position.
- Step 6 Press horn button and observe meter.
 - a If voltage is indicated, replace the horn Refer to page 4-52.
 - b If voltage is not indicated, go to test 2.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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Test 2 Check horn circuit continuity.

- Step 1 Place battery disconnect switch in the OFF position.
- Step 2 Check for a blown fuse.
 - a Replace blown fuse with same rated fuse Refer to page 4-78.
 - b If fuse is not blown, go to step 3.

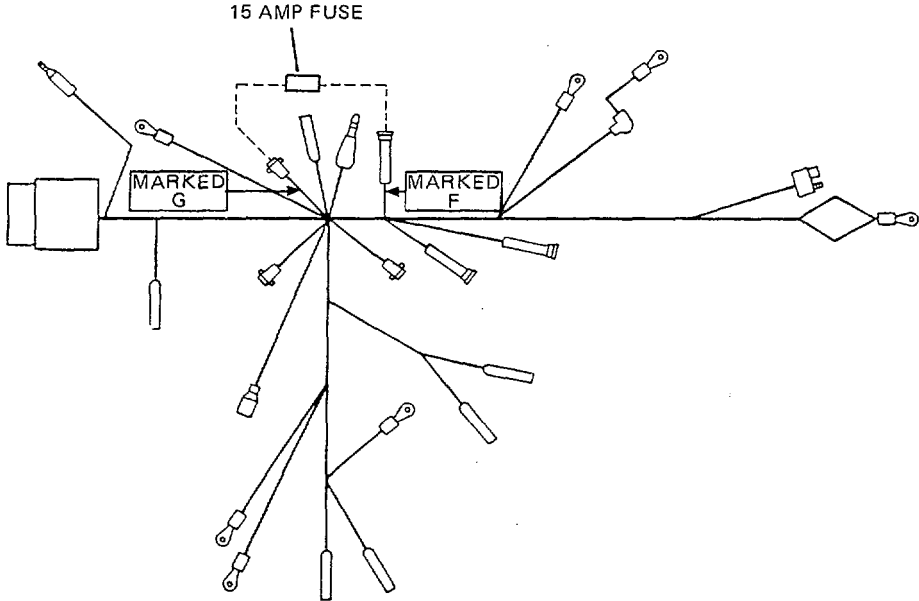


Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Step 3.	Continuity check horn circuit wiring. Refer to page 2-19. Refer to schematic diagram. See page 2-56.	<ul style="list-style-type: none"> a. Replace broken wire(s). Refer to page 4-74. b. If correct continuity is indicated, replace horn. Refer to page 4-52.

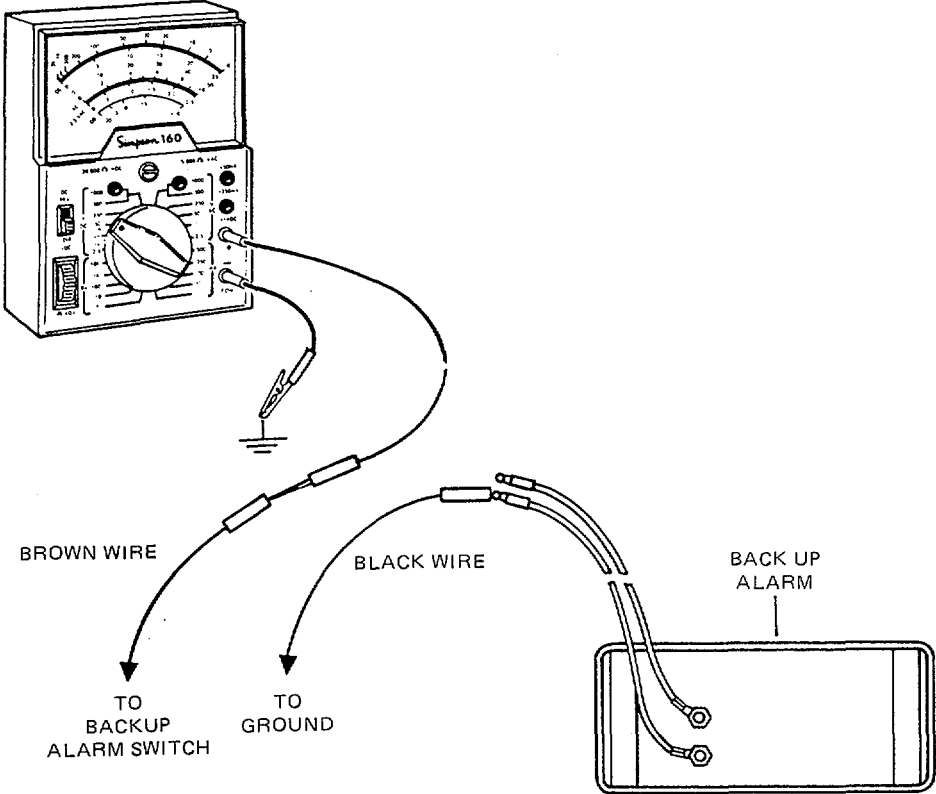
END OF TESTING!**18. BACKUP ALARM DOES NOT SOUND**

Test 1 Test alarm circuit voltage.

- Step 1 Place battery disconnect switch in the OFF position.
- Step 2 Disconnect brown wire from backup alarm.
- Step 3 Set multimeter to the 50 volt range.
- Step 4 Connect meter positive lead to the brown wire and the negative lead to chassis ground.
- Step 5 Place battery disconnect switch in the ON position and transmission selector lever in one of the reverse positions. Observe meter.
 - a If battery voltage is indicated. Replace backup alarm. Refer to page 4-56.
 - b If battery voltage is not indicated, place battery disconnect switch in the OFF position and check for a blown fuse Replace blown fuse with same rated fuse. Refer to page 4-78.
 - c If fuse is not blown, continuity check backup alarm circuit wiring Refer to page 2-19 Refer to schematic diagram See page 2-56 Replace broken wire(s) Refer to page 4-74.
 - d If correct wiring is indicated, replace the backup alarm switch Refer to page 4-58.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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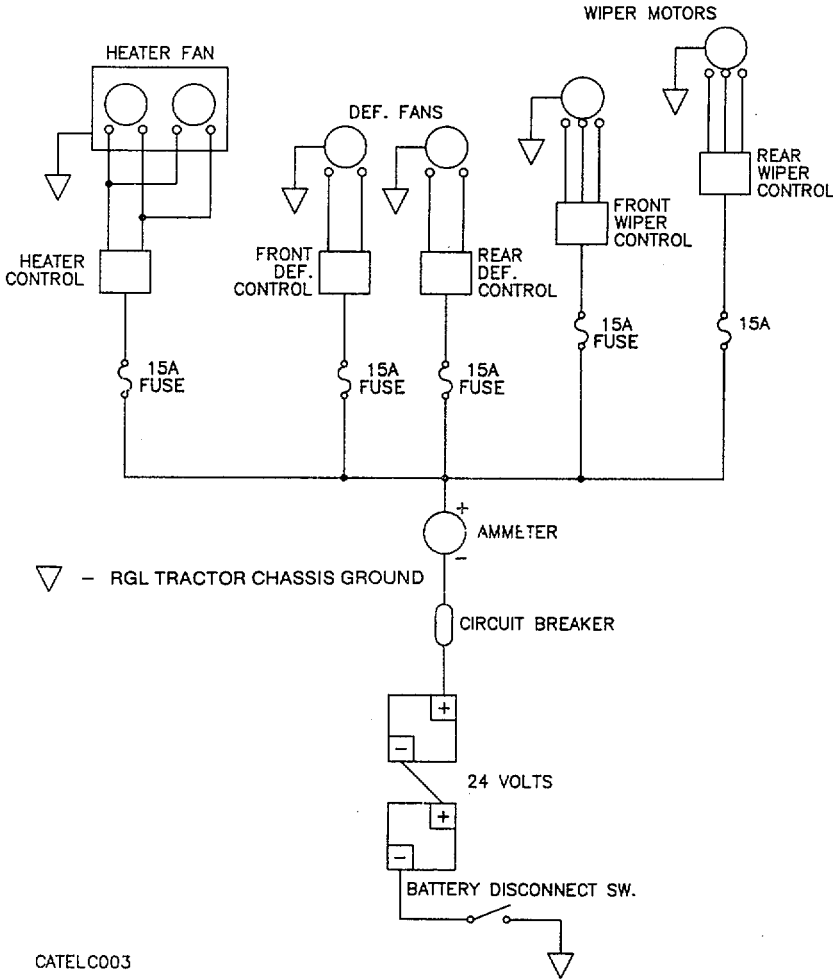


END OF TESTING!

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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WINTERIZED CAB GROUP



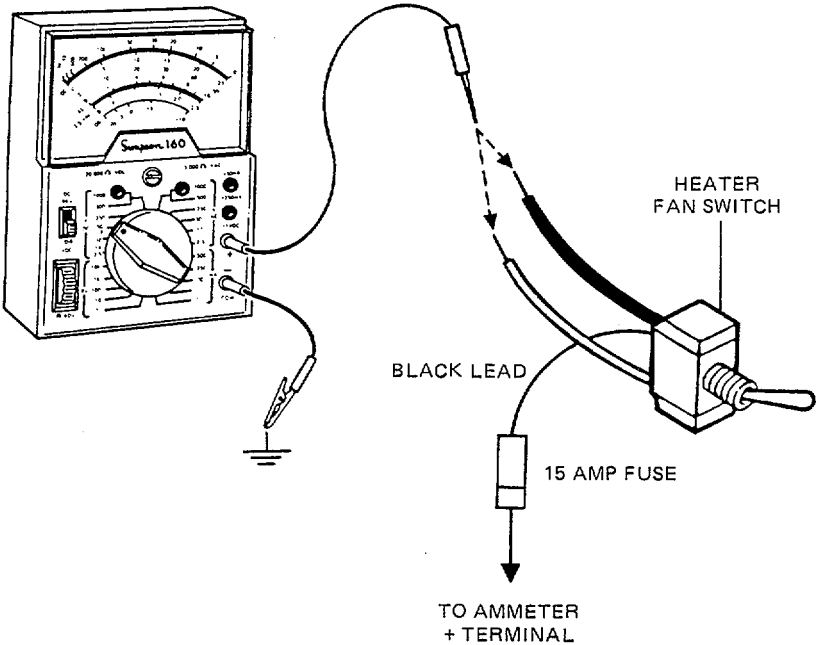
19 HEATER WILL NOT OPERATE, OR WILL NOT OPERATE IN HIGH SPEED OR LOW SPEED POSITION CHARGING SYSTEM VOLTAGE PRESENT.

Test heater circuit voltage.

- Step 1 Place battery disconnect switch to the OFF position.
- Step 2 Check for a blown heater circuit fuse. Replace blown fuse with a fuse of the same rating Refer to page 4-78. If fuse is not blown, reinstall it and go to step 3.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	Step 3	Disconnect red and orange heater switch-to-heater fan motors wire connectors.
	Step 4	Set multimeter to the 50 volt scale.
	Step 5	Connect meter negative lead to chassis ground.
	Step 6	Place battery disconnect switch to the ON position.
	Step 7	Place heater switch in the low speed position and touch meter positive lead to red wire connected to the switch. Observe meter reading.
	Step 8	Place heater switch in the high speed position and touch meter positive lead to the orange wire connected to the switch. Observe meter reading. a If voltage is not indicated in either step 7 or step 8, or in both steps, replace the heater switch. Refer to page 4-61. b If voltage is indicated in steps 7 and 8, replace defective fan motor(s) Refer to page 12-11.

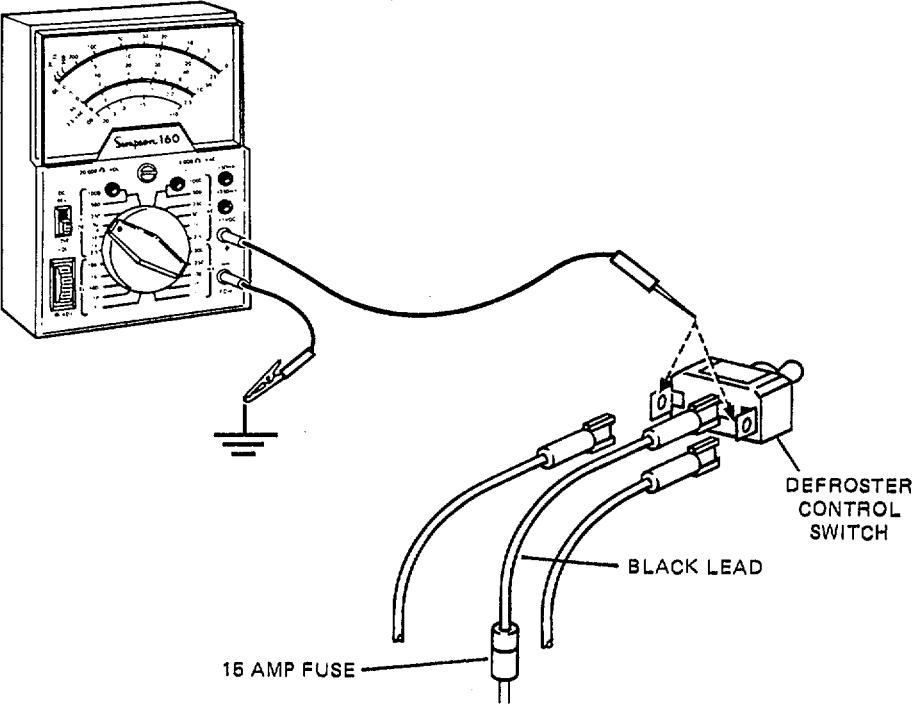


END OF TESTING!

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
20 DEFROSTERS WILL NOT OPERATE, OR WILL NOT OPERATE IN HIGH SPEED OR LOW SPEED POSITIONCHARGING SYSTEM VOLTAGE PRESENT.	NOTE	
	The following procedure is applicable for both the front and rear defroster fans.	
	Test defroster fan circuit voltage.	
	Step 1	Place battery disconnect switch to the OFF position.
	Step 2	Check for a blown defroster fan circuit fuse. Replace blown fuse with a fuse of the same rating Refer to page 4-78. If fuse is not blown, reinstall it and go to step 3.
	Step 3	Identify high speed and low speed control wires at the defroster control switch with tape or similar ID technique.
	Step 4	Disconnect high speed and low speed control wires from the defroster switch.
	Step 5	Set multimeter to the 50 volt scale.
	Step 6	Connect meter negative lead to chassis ground.
	Step 7	Place battery disconnect switch to the ON position.
	Step 8	Place defroster control switch to the low speed position and touch meter positive lead to the switch low speed terminal. Observe meter reading.
	Step 9	Place defroster control switch to the high speed position and touch meter positive lead to the switch high speed terminal. Observe meter reading.
		a If voltage is not indicated in either step 8 or step 9, or in both steps, replace the defroster control switch. Refer to page 12-8.
		b If voltage is indicated in steps 8 and 9, replace defective defroster fan motor. Refer to page 12-7.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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END OF TESTING!

21. WINDSHIELD WIPER WILL NOT OPERATE, OR WILL NOT OPERATE IN HIGH SPEED OR LOW SPEED POSITION. CHARGING SYSTEM VOLTAGE PRESENT.

NOTE

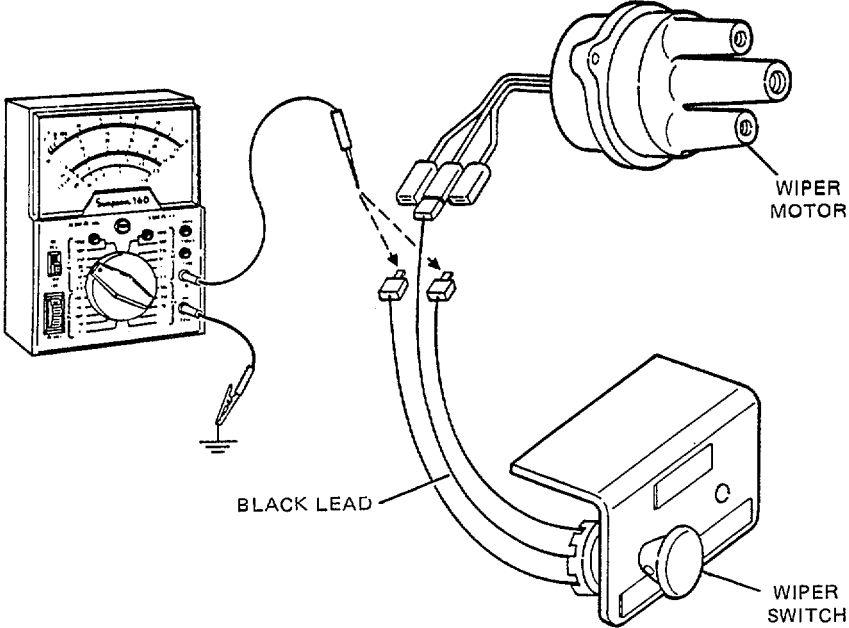
The following procedure is RGL for both the front and rear windshield wiper circuits.

Test wiper motor circuit voltage.

- Step 1 Place battery disconnect switch to the OFF position.
- Step 2 Check for a blown wiper circuit fuse.
Replace blown fuse with a fuse of the same rating. Refer to page 4-78. If fuse is not blown, reinstall it and go to step 3.
- Step 3 Disconnect wiper switch-to-wiper motor wire connectors. Do not disconnect black wire from switch.

Table 2-2. Electrical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	Step 4	Set multimeter to the 50 volt scale
	Step 5	Connect meter negative lead to chassis ground
	Step 6	Place battery disconnect switch to the ON position
	Step 7	Place wiper switch to the low speed position and touch meter positive lead to green wire connected to the switch. Observe meter reading
	Step 8	Place wiper switch to the high speed position and touch meter positive lead to the red wire connected to the switch. Observe meter reading
	a	If voltage is not indicated in either step 7 or step 8, or in both steps, replace the wiper motor switch. Refer to page 4-34
	b	If voltage is indicated in steps 7 and 8, replace wiper motor. Refer to page 12-3



END OF TESTING!

2-13. MECHANICAL TROUBLESHOOTING

Refer to table 2-2 for troubleshooting procedures, and use the symptom index below to quickly locate a particular fault or malfunction.

Because of its complexity, the mechanical system is divided into the following functional systems:

- Engine (page 2-70)
- Ether Start System (page 2-79)
- Exhaust System (page 2-80)
- Cooling System (page 2-81)
- Transmission (page 2-83)
- Steering (page 2-87)
- Hydraulic System (page 2-88)
- Winch (page 2-91)

MECHANICAL TROUBLESHOOTING SYMPTOM INDEX

MALFUNCTION NO.	MALFUNCTION	PAGE
ENGINE		
1	Engine fails to crank.....	2-70
2	Engine cranks but fails to start.....	2-70
3	Engine cranks slowly, hard to start.....	2-71
4	Engine runs, but misfires.....	2-71
5	Engine starts but fails to keep running.....	2-72
6	Poor acceleration and/or lack of power.....	2-73
7	Engine speed unstable or surges at all speeds.....	2-74
8	Too much vibration.....	2-75
9	Loud combustion noise (knock).....	2-75
10	Excessive oil consumption.....	2-75
11	Low oil pressure.....	2-76
12	Black or gray exhaust smoke.....	2-77
13	White or blue exhaust smoke.....	2-77
14	Engine stops abruptly, not seized.....	2-77
15	Excessive fuel consumption.....	2-78
ETHER START SYSTEM		
16	Engine cranks but will not start in cold weather (fuel system operating properly).....	2-79
EXHAUST SYSTEM		
17	Excessive exhaust fumes.....	2-80
18	Exhaust fumes in cab.....	2-80
COOLING SYSTEM		
19	Engine overheats according to engine water temperature gage.....	2-81

MECHANICAL TROUBLESHOOTING SYMPTOM INDEX (Cont'd)

MALFUNCTION NO.	MALFUNCTION	PAGE
20	Engine does not reach normal operating temperature (according to water temperature gage)	2-82
21	No cab heat (water temperature gage reads normal)	2-83
TRANSMISSION		
22	No response to shift lever movement	2-83
23	Incorrect response to transmission selector lever movement	2-83
24	Excessive noise during shifting	2-84
25	Transmission downshifts during operation (no transmission selector lever movement)	2-84
26	Transmission overheats	2-84
27	Low transmission oil pressure	2-85
28	Transmission oil leakage	2-85
29	Transmission noisy	2-85
30	Transmission oil dirty, foamy, and/or milky	2-86
31	Torque divider overheats (according to converter oil temperature gage)	2-86
STEERING		
32	Tractor will not turn in one direction	2-87
33	Tractor will not turn in either direction	2-87
34	Tractor turns in either direction when both steering control levers are pulled at the same time	2-88
35	Slow response to steering control lever movement	2-88
HYDRAULIC SYSTEM (BULLDOZER AND RIPPER)		
36	Irregular cylinder movement	2-88
37	Hydraulic pump noisy	2-89
38	Hydraulic pump overheats	2-89
39	Slow cylinder movement	2-90
40	Tilt and lift cylinders drift	2-90
WINCH		
41	Winch does not operate	2-91
42	Winch operates in one direction only	2-92
43	Winch does not hold load with control lever in "brake on" position	2-92
44	Torque divider stalls	2-93

Table 2-3. Mechanical Troubleshooting

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
ENGINE		
1 ENGINE FAILS TO CRANK		
Step 1	See Electrical Troubleshooting, table 22.	
Step 2	Internal obstruction, notify intermediate maintenance.	
END OF TESTING!		
2 ENGINE CRANKS BUT FAILS TO START		
Step 1	Check with operator to determine if fuel tank was filled with correct fuel. If incorrect fuel was put in, perform the following tasks:	
	a Open draincock (see page 3-58) and drain fuel system.	
	b Replace fuel filters (pages 3-82 and 3-88).	
	c Fill fuel tank with correct fuel (refer to TM5241023710).	
	d Prime fuel system (page 3-33).	
Step 2	Check fuel for water or dirt contamination.	
	a Open draincock (see page 3-58) and drain into clean glass container.	
	b If container is one-fourth full of water, or if dirt is evident, fuel is contaminated Drain fuel tank (refer to page 3-58) completely.	
	c Disconnect ends of fuel lines between tank shutoff valve and primary fuel filter (page 3-58) Clean lines with compressed air or sturdy wire.	
	d Replace fuel filters (pages 3-82 and 3-88).	
	e Reconnect fuel lines (page 3-62).	
	f Fill fuel tank with correct and clean fuel (refer to TM5-2410-237-10).	
	g Prime fuel system (page 3-33).	

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Step 3	If fuel filters were not replaced in step 2, inspect them for dirty and clogged condition.	Replace a dirty or clogged fuel filter (pages 3-82 and 3-88).
Step 4	Inspect fuel lines and connections for leaks, obstructions, and damage.	<p>a Visually check for leaks If a leak is at a connection, tightenIf leak results from cracked, split, or damaged tubing, replace tubing (page 3-58).</p> <p>b Disconnect fuel lines between tank shutoff valve and primary fuel filter (page 3-58) If fuel line is clogged, clear with compressed air or sturdy wire.</p> <p>c Reconnect fuel lines (page 3-62).</p> <p>d Prime fuel system (page 3-33).</p>

END OF TESTING!**3 ENGINE CRANKS SLOWLY, HARD TO START**

- Step 1 In cold weather, make sure proper engine oil is being used.
Replace oil if necessary (page 32).
- Step 2 Check starting circuits Refer to Electrical Troubleshooting, table 22.

END OF TESTING!**4 ENGINE RUNS, BUT MISFIRES**

- Step 1 Check air cleaner for air restriction.
Inspect air cleaner for restrictions Clean air inlet and service air cleaner elements if necessary (page 3-42).
- Step 2 Check fuel for water or dirt contamination.
- See malfunction 2, step 2.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Step 3	Inspect fuel lines and connections for leaks, obstructions, and damage.	<ul style="list-style-type: none"> a Visually check for leaks. If a leak is at a connection, tighten. If leak results from cracked, split, or damaged tubing, replace tubing (page 3-58). b Disconnect fuel lines between shutoff valve and primary fuel filter (page 3-58). If fuel line is clogged, clear with compressed air or sturdy wire. c Reconnect fuel lines (page 3-58). d Prime fuel system (page 3-33).
Step 4	Check fuel injection lines for air. Bleed air from fuel injection lines.	Refer to page 3-33.
Step 5	Check valve clearance.	Adjust valve clearance (page 39).

END OF TESTING!**5 ENGINE STARTS BUT FAILS TO KEEP RUNNING**

- Step 1 Check air cleaner for air restriction.
Check air cleaner for restrictions
- Clean air inlet and service air cleaner elements if necessary (page 3-42).
- Step 2 Check fuel for contamination.
- See malfunction 2, step 2.
- Step 3 Inspect fuel lines and connections for leaks, obstructions, and damage.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	a	Visually check for leaks. If a leak is at a connection, tighten. If leak results from cracked, split, or damaged tubing, replace tubing (page 3-58).
	b	Disconnect fuel lines between tank shutoff valve and primary fuel filter (page 358) If fuel line is clogged, clear with compressed air or sturdy wire.
	c	Reconnect fuel lines (page 3-62).
	d	Prime fuel system (page 3-33).

END OF TESTING!

6 POOR ACCELERATION AND/OR LACK OF POWER

- Step 1 Check with operator to determine if fuel tank was filled with correct fuel If incorrect fuel was put in, perform the following tasks:
- a Open draincock (see page 3-58) and drain fuel system.
 - b Replace fuel filters (pages 3-82 and 3-88).
 - c Fill fuel tank with correct fuel (refer to TM5-2410-237-10).
 - d Prime fuel system (page 3-33).
- Step 2 Check air cleaner for air restriction.
- Inspect air cleaner for restrictions. Clean air inlet and service air cleaner elements if necessary (page 3-42).
- Step 3 Inspect fuel lines and connections for leaks, obstructions, and damage.
- a Visually check for leaks If a leak is at a connection, tightenIf leak results from cracked, split, or damaged tubing, replace tubing (page 3-58).
 - b Disconnect fuel lines between tank shutoff valve and primary fuel filter (page 3-58) If fuel line is clogged, clear with compressed air or sturdy wire.
 - c Reconnect fuel lines (page 3-62).

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	d	Prime fuel system (page 3-33).
Step 4	Check exhaust system for restrictions.	Remove restrictions and/or replace exhaust system part(s) if necessary (page 3-98).
Step 5	Inspect for full governor linkage travel.	Adjust governor linkage travel (page 3-79).
Step 6	Check valve clearance.	Adjust valve clearance (page 39).

END OF TESTING!

7 ENGINE SPEED UNSTABLE OR SURGES AT ALL SPEEDS

- Step 1 Inspect fuel lines and connections for leaks, obstructions, and damage.
- a Visually check for leaks. If a leak is at a connection, tighten. If leak results from cracked, split, or damaged tubing, replace tubing (page 3-58).
 - b Disconnect fuel lines between tank shutoff valve and primary fuel filter (page 3-58). If fuel line is clogged, clear with compressed air or sturdy wire.
 - c Reconnect fuel lines (page 3-62).
 - d Prime fuel system (page 3-33).
- Step 2 Inspect governor linkage for proper operation and adjustment.
- If linkage does not operate properly or is not correctly adjusted, make necessary adjustment (page 3-79).

END OF TESTING!

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
8 TOO MUCH VIBRATION		
Step 1	See malfunction 4.	
END OF TESTING!		
9 LOUD COMBUSTION NOISE (KNOCK)		
Step 1	Check with operator to determine if fuel tank was filled with correct fuel	If incorrect fuel was put in, perform the following tasks:
	<ul style="list-style-type: none"> a Open draincock (see page 3-58) and drain fuel system. b Replace fuel filters (pages 3-82 and 3-88). c Fill fuel tank with correct fuel (refer to TM5-2410-237-10). d Prime fuel system (page 3-33). 	
Step 2	Check fuel injection lines for air. Bleed air from fuel injection lines. Refer to page 3-34.	
END OF TESTING!		
10 EXCESSIVE OIL CONSUMPTION		
Step 1	Check dipstick for overfilling. If dipstick has been read correctly and indicates excessive oil, drain crankcase to safe operating level (page 32).	
Step 2	Check for external oil leaks. <ul style="list-style-type: none"> a Wipe off edges of rocker arm cover, oil pan, oil filter, turbocharger, engine oil cooler, and other external engine surfaces. b Start engine and check for leaks. c Tighten nuts, screws, lines and fittings, and oil filter as necessary. 	

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Step 3	Check engine oil temperature.	Clean core of engine oil cooler, or replace oil cooler if necessary (page 3-26).
Step 4	Check for oil leakage at turbocharger to inlet manifold connection.	If leakage is noted, replace turbocharger (page 3-48).
Step 5	Check with operator for correct machine operation.	Instruct operator not to allow machine to run at low idle for long periods of time.
Step 6	Check for too much oil in valve compartment, notify intermediate maintenance.	
END OF TESTING!		
11 LOW OIL PRESSURE		
Step 1	Check oil lines for cracks, splits, leaks, damage, and obstructions.	<ul style="list-style-type: none"> a Tighten loose fittings and connections. b Replace oil lines that are cracked, split, or damaged (pages 3-14, 3-54 and 14-4). c Clear clogged or obstructed lines with compressed air or sturdy wire.
Step 2	Inspect oil filter for leaks or blockage.	<ul style="list-style-type: none"> a Tighten oil filter. b If leaking continues, service oil filter (page 3-14).
Step 3	Check for fuel in engine oil.	Drain engine lubricating oil, install new oil filter, and refill crankcase (page 32).

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Step 4	Replace engine oil pressure gage with one known to be good (page 14-4).	
END OF TESTING!		
12 BLACK OR GRAY EXHAUST SMOKE		
Step 1	Check air cleaner for air restriction.	
	Inspect air cleaner for restrictions. Clean air inlet and service air cleaner elements if necessary (page 3-39).	
Step 2	Check for bad fuel injection nozzle(s).	
	Locate bad nozzle(s) (page 3-30) Replace bad nozzle(s) (page 3-30).	
13 WHITE OR BLUE EXHAUST SMOKE		
Step 1	Check dipstick for overfilling.	
	If dipstick has been read correctly and indicates excessive oil, drain crankcase to safe operating level (page 32).	
Step 2	Check for fuel in engine oil.	
	Drain engine lubricating oil (page 32), install new oil filter (page 314), and refill crankcase (page 32).	
Step 3	Check for rough running.	
	See malfunction 4.	
END OF TESTING!		
14 ENGINE STOPS ABRUPTLY, NOT SEIZED		
Step 1	Check fuel for water or dirt contamination.	
	See malfunction 2, step 2.	

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Step 2	Inspect fuel lines and connections for leaks, obstructions, and damage.	<ul style="list-style-type: none"> a Visually check for leaks. If a leak is at a connection, tighten. If leak results from cracked, split, or damaged tubing, replace tubing (page 3-58). b Disconnect fuel lines between tank shutoff valve and primary fuel filter (page 3-58). If fuel line is clogged, clear with compressed air or sturdy wire. c Reconnect fuel lines (page 3-62). d Prime fuel system (page 3-33).

END OF TESTING!

15 EXCESSIVE FUEL CONSUMPTION

- Step 1 Check air cleaner for air restriction.
Inspect air cleaner for restrictions. Clean air inlet and service air cleaner elements if necessary (page 3-39).
- Step 2 Inspect fuel lines and connections for leaks.
 - a Tighten any loose connections.
 - b Replace leaking or damaged fuel lines and connections (page 3-58).
 - c Prime fuel system (page 3-33).
- Step 3 Check for fuel in engine lubricating oil.
Drain engine lubricating oil (page 32), install new oil filter (page 3-14) and refill crankcase (page 32).
- Step 4 Check for bad fuel injection nozzle(s).
- Locate bad nozzle(s) (page 330). Replace bad nozzle(s) (page 3-30).

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Step 5	Check for rough running.	See malfunction 4.

END OF TESTING**ETHER START SYSTEM****—WARNING—**

Ether is extremely flammable. Do not perform ether start system testing procedure near fire. Injury to personnel may result.

16 ENGINE CRANKS BUT WILL NOT START IN COLD WEATHER (FUEL SYSTEM OPERATING PROPERLY)

- Step 1 Check ether canister.
- a Remove ether canister from valve. Shake canister and listen for liquid splashing inside it (page 3-91).
 - b If canister is empty, replace with a full one (page 3-91).
- Step 2 Check starting aid valve for proper operation.
- Refer to Electrical Troubleshooting, table 22, malfunction 14, tests 2 through 4.
- Step 3 Check starting aid valve tube assembly for damage.
- a Disconnect both ends of tube assembly (page 3-93).
 - b Inspect tube assembly for kinks, holes, and damaged fittings.
 - c If tube assembly is not damaged in any way, replace starting aid valve (page 3-93).
 - d Replace a damaged tube assembly (page 3-93).

END OF TESTING!

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
EXHAUST SYSTEM		
17 EXCESSIVE EXHAUST FUMES		
Step 1	Inspect muffler for wear and damage.	Replace muffler if necessary (page 3-98).
Step 2	Inspect muffler to turbocharger coupling for wear and damage.	Replace seal, coupling, or performed packing if necessary (page 3-98).
END OF TESTING!		
18 EXHAUST FUMES IN CAB		
Inspect exhaust manifold and connections for leaks, cracks, or damage.		
If corrective action is necessary, notify intermediate maintenance.		
END OF TESTING!		

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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COOLING SYSTEM

WARNING

Care should be taken when removing radiator cap. Steam or hot coolant under pressure may cause injury to personnel.

19. ENGINE OVERHEATS ACCORDING TO ENGINE WATER TEMPERATURE GAGE

Step 1. Check coolant level.

CAUTION

Do not add coolant when engine is hot. Internal engine damage could result.

If coolant is low, fill to proper level (page 3-102).

Step 2. Inspect for looseness, missing, and worn vee belts.

a. Check vee belt tension and adjust if necessary (page 3-120).

b. If a belt is missing or worn out, install new belts (page 3-119).

Step 3. Check fan operation.

If fan does not turn or turn properly after step 2 above, replace fan drive (page 3-116).

Step 4. Inspect radiator, water pump, transmission oil cooler, engine oil cooler, hoses and hose connections, and draincocks for leaks.

a. Tighten hose clamps and fittings.

b. Tighten or close draincocks.

c. Replace damaged hose(s) (page 3-113).

d. Replace defective water pump (page 3-112).

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	e.	Repair or replace defective engine oil cooler (page 3-26).
	f.	Repair or replace defective transmission oil cooler (page 5-22).
	g.	Test radiator (page 3-102). If radiator leaks, notify intermediate maintenance.
Step 5.		Inspect fan for cracked or missing blades. Notify intermediate maintenance if fan blades are damaged or missing.
Step 6.		Check radiator for airflow obstructions. Remove obstructions from radiator.
Step 7.		Check operation of pressure cap and inspect cap sealing surface. a. Clean sealing surface of radiator if necessary. b. Test pressure cap (page 3-107). Replace defective cap.
Step 8.		Test water temperature regulator for proper operation (page 3-110). Replace water temperature regulator if defective (page 3-110).
Step 9.		Test cooling system (page 3-102). If necessary, clean and flush cooling system (page 3-102).
Step 10.		Replace water temperature gage (page 4-27).
END OF TESTING!		
20. ENGINE DOES NOT REACH NORMAL OPERATING TEMPERATURE (ACCORDING TO WATER TEMPERATURE GAGE)		
Step 1.		Test water temperature regulator for proper operation (page 3-110). Replace water temperature regulator if defective (page 3-110).
Step 2.		Replace water temperature gage (page 4-27).
END OF TESTING!		

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
21. NO CAB HEAT (WATER TEMPERATURE GAGE READS NORMAL)		
Step 1.	Check heater operation.	Refer to Electrical Troubleshooting, table 2-2, malfunction 19.
Step 2.	Inspect heater hoses and connections.	<ul style="list-style-type: none"> a. Open water shut-off cocks on heater hoses. b. Replace a damaged hose (page 12-11).
END OF TESTING!		
TRANSMISSION		
22. NO RESPONSE TO SHIFT LEVER MOVEMENT		
Step 1.	Check transmission oil level.	Add oil as necessary (page 5-16).
Step 2.	Check transmission control linkage.	Tighten and/or adjust linkage (page 5-2).
Step 3.	Check for air leaks at inlet side of transmission oil pump.	Tighten connection or replace damaged elbow and seal (page 5-27).
END OF TESTING!		
23 INCORRECT RESPONSE TO TRANSMISSION SELECTOR LEVER MOVEMENT		
Step 1.	Check transmission oil level.	Add oil as necessary (page 5-15).
Step 2.	Check transmission control linkage.	Tighten and/or adjust linkage (page 5-2).
END OF TESTING!		

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
24. EXCESSIVE NOISE DURING SHIFTING		
Step 1.	Check transmission oil level and viscosity.	Add or replace oil as necessary (L05-2410-237-12).
Step 2	Inspect drive shaft and universal joint bearings for looseness, wear, and damage.	
	a. Tighten capscrews that hold drive shaft to the flange to 40 + 5 lb. ft. torque.	
	b. Tighten nuts that hold the universal bearing caps to the drive shaft to 40 + 5 lb. ft.	
END OF TESTING!		
25. TRANSMISSION DOWNSHIFTS DURING OPERATION (NO TRANSMISSION SELECTOR LEVER MOVEMENT)		
	Check for loss of transmission oil pressure caused by low fluid level.	
	Add transmission oil as necessary (L05-2410-237-12).	
]	
END OF TESTING!		
26. TRANSMISSION OVERHEATS		
Step 1.	Check transmission oil level.	
	a. If overfill condition exists, drain oil to proper level (page 5-16).	
	b. If low level is indicated, add oil as necessary (L05-2410-237-12).	
Step 2	Check with operator for correct machine operation.	
	Instruct operator not to operate tractor for long periods of time at or near stall speeds.	

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 3. Check oil cooler and lines for damage.

If necessary, replace oil cooler and/or damaged lines (page 5-22).

END OF TESTING!

27. LOW TRANSMISSION OIL PRESSURE

Step 1. Check transmission oil level.

Add oil if necessary (L05-2410-237-12).

Step 2. Check for damaged oil lines.

Replace damaged line(s) (page 5-27).

END OF TESTING!

28. TRANSMISSION OIL LEAKAGE

Step 1. Inspect drain plug for leaks.

Tighten plug (page 5-16).

Step 2. Inspect oil line connections for leaks.

Tighten connections (page 5-27).

Step 3. Inspect oil lines for damage.

Replace damaged oil line(s) (page 5-27).

END OF TESTING!

29. TRANSMISSION NOISY

Step 1. Submit special sample of oil in accordance with TB 43-0210. There may be metal particles in the oil.

END OF TESTING!

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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30. TRANSMISSION OIL DIRTY, FOAMY, AND/OR MILKY**NOTE**

Dirt/grit in transmission oil indicates oil needs changing (step 1). Foaminess indicates contamination of oil by air (step 2). Milkyness indicates contamination of oil by coolant (step 3).

Step 1. Inspect oil for dirt/grit.

- a. Perform transmission oil service instructions (page 5-16).
- b. Inspect all external transmission fittings for looseness.

Step 2. Inspect for excessive foaming.

- a. Ensure transmission has proper oil level (L05-2410-237-12).
- b. If foaming continues, remove and replace transmission oil filter (page 5-29).

Step 3. Inspect for milkyness in oil.

Replace transmission oil cooler (page 5-22).

END OF TESTING!**31. TORQUE DIVIDER OVERHEATS (ACCORDING TO CONVERTER OIL TEMPERATURE GAGE)**

Step 1. Check transmission oil level.

Add oil as necessary (L05-2410-237-12).

Step 2. Check vee belts.

Adjust vee belt tension or replace vee belts (page 3-119).

Step 3. Check with operator for proper tractor operation.

Instruct operator not to operate tractor for long periods of time at or near stall speed.

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Step 4.	Check oil line connections for leaks.	Tighten connections (page 5-27).
Step 5.	Check for damaged oil lines.	Replace damaged oil line(s) (page 5-27).
Step 6.	Check for obstruction at the system vents.	Clean or replace breathers (page 5-16).
Step 7.	Check for loose oil filter cover.	Tighten cover capscrews and/or replace seal (page 5-29).
Step 8.	Check converter oil temperature gage for proper operation using a gage known to be good.	Replace oil temperature gage if test gage does not indicate overheating (page 4-24).
Step 9.	Check oil cooler.	Clean or replace oil cooler (page 5-22).
Step 10.	Check water pump.	Replace water pump (page 3-112).

END OF TESTING!

STEERING

32. TRACTOR WILL NOT TURN IN ONE DIRECTION

- Step 1. Inspect steering clutches control linkage for damage.
If linkage is damaged, notify intermediate maintenance.
- Step 2. Check steering clutches control linkage travel.
Adjust steering control linkage (page 9-5).

END OF TESTING!

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
33. TRACTOR WILL NOT TURN IN EITHER DIRECTION		
Step 1.	Check steering clutches control linkage travel.	Adjust steering control linkage (page 9-5).
Step 2.	Check steering brakes control linkage travel.	Adjust brakes control linkage (page 9-2).
END OF TESTING!		
34. TRACTOR TURNS IN EITHER DIRECTION WHEN BOTH STEERING CONTROL LEVERS ARE PULLED AT THE SAME TIME		
	Check steering clutches control linkage travel.	Adjust steering control linkage (page 9-5).
END OF TESTING!		
35. SLOW RESPONSE TO STEERING CONTROL LEVER MOVEMENT		
Step 1.	Check fluid level of bevel gear and steering clutch compartment.	Add oil if necessary (page 5-16).
Step 2	Check control linkages travel for steering clutches and brakes.	Adjust steering and brakes control linkages as necessary (pages 9-5 and 9-2).
END OF TESTING!		
HYDRAULIC SYSTEM (BULLDOZER AND RIPPER)		
36. IRREGULAR CYLINDER MOVEMENT (NOT SMOOTH)		
Step 1.	Check all hydraulic lines and connections for leaks, kinks, or other damage.	Replace damaged lines and/or fittings (pages 13-12 through 13-26).

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Step 2.	Check hydraulic system reservoir for correct oil level and viscosity.	Add or replace hydraulic oil as necessary (L05-2410-237-12).
END OF TESTING!		
37. HYDRAULIC PUMP NOISY		
Step 1.	Check oil level in reservoir.	Fill to proper level (L05-2410-237-12).
Step 2.	Check all hydraulic lines and connections for leaks, kinks, or other damage.	Replace damaged lines and/or fittings (pages 13-12 through 13-26).
Step 3	Remove air from pump lines (page 13-2).	
END OF TESTING!		
38. HYDRAULIC PUMP OVERHEATS		
Step 1.	Check oil level in reservoir.	Fill to proper level (L05-2410-237-12).
Step 2	Check all hydraulic lines and connections for leaks or other damage.	Replace damaged lines and/or fittings (pages 13-12 through 13-26).
Step 3.	Check with tractor operator to determine if hydraulic system (blade and/or ripper circuits) was operated with a short, rapid duty cycle prior to pump overheating. This can cause damage to the seals in the system.	
	If seal damage is a possibility, notify intermediate maintenance.	
END OF TESTING!		

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
39. SLOW CYLINDER MOVEMENT		
Step 1.	Check for obstruction that could hinder lift or tilt cylinder movement.	Remove obstruction.
Step 2.	Check all hydraulic lines and connections for leaks, kinks, or other damage.	Replace damaged lines and/or fittings (page 13-12 through 13-26).
Step 3.	Check hydraulic system reservoir for correct oil level and viscosity.	Add or replace hydraulic oil as necessary (L05-2410-237-12).
Step 4.	Replace hydraulic pump (page 13-2).	
END OF TESTING!		
40. TILT AND LIFT CYLINDERS DRIFT		
Step 1.	Check oil level in reservoir.	Fill to proper level (L05-2410-237-12).
Step 2.	Check hydraulic lines and connections to the problem cylinder for leaks, kinks, or other damage.	Replace damaged lines and/or fittings (pages 13-12 through 13-26).
Step 3.	Check relief and/or control valves for leaks.	Notify intermediate maintenance.
Step 4.	If bulldozer tilt cylinder is drifting, replace cylinder (page 13-6).	
Step 5.	If bulldozer or ripper lift cylinder is drifting, notify intermediate maintenance.	

END OF TESTING!

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
WINCH		
41. WINCH DOES NOT OPERATE		
Step 1.	Check for a broken drive shaft.	Replace drive shaft (page 11-2).
Step 2.	Check winch control cables for bends, kinks, breaks, or if they are disconnected from control lever bellcrank or control valve.	<ul style="list-style-type: none"> a. Reconnect a loose control cable (page 11-13). b. If control cable(s) is damaged, notify intermediate maintenance.
Step 3.	Check winch control linkage adjustment.	Adjust if necessary (page 11-13).
Step 4.	Check reservoir for proper oil level.	Fill to proper level (L05-2410-237-12).
Step 5.	Check winch system oil lines and connections for damage and leaks.	<ul style="list-style-type: none"> a. Tighten loose fittings. b. Replace damaged or leaking lines and fittings (page 11-29).
Step 6.	Check magnetic strainer for restriction.	Service magnetic strainer (page 11-16).
Step 7.	Change winch oil filter (page 11-19).	
Step 8.	Check winch oil filter lubrication relief valve operation.	Replace filter housing if necessary (page 11-19).
Step 9.	Inspect winch control valve for damage and leaks.	<ul style="list-style-type: none"> a. Tighten loose fittings. b. Replace control valve (page 11-10).

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Step 10. Check winch gear pump for leaks and overheating.	a. Tighten loose fittings.	b. Replace gear pump if necessary (page 11-30).
END OF TESTING!		
42. WINCH OPERATES IN ONE DIRECTION ONLY		
Step 1. Check for damaged, kinked, broken, or disconnected winch control cables or rod end.	a. Reconnect cable (page 11-13).	b. If control cable is damaged, notify intermediate maintenance.
Step 2. Inspect winch control valve and valve connections for damage and leaks.	a. Tighten loose fittings.	b. Replace winch control valve (page 11-10).
END OF TESTING!		
43. WINCH DOES NOT HOLD LOAD WITH CONTROL LEVER IN "BRAKE ON" POSITION		
Step 1. Check winch control cable adjustment.	Adjust cable linkage if necessary (page 11-13).	
Step 2. Check winch control valve for leaks, damage, and proper operation.	Replace a defective or damaged winch control valve (page 11-10).	
END OF TESTING!		

Table 2-3. Mechanical Troubleshooting (Cont'd)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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44. TORQUE DIVIDER STALLS

Step 1. Check winch control linkage adjustment.

Adjust control linkage if necessary (page 11-13).

Step 2.. Check winch control valve for proper operation.

Replace defective control valve (page 11-10).

END OF TESTING!

2-14. STE/ICE DIAGNOSIS

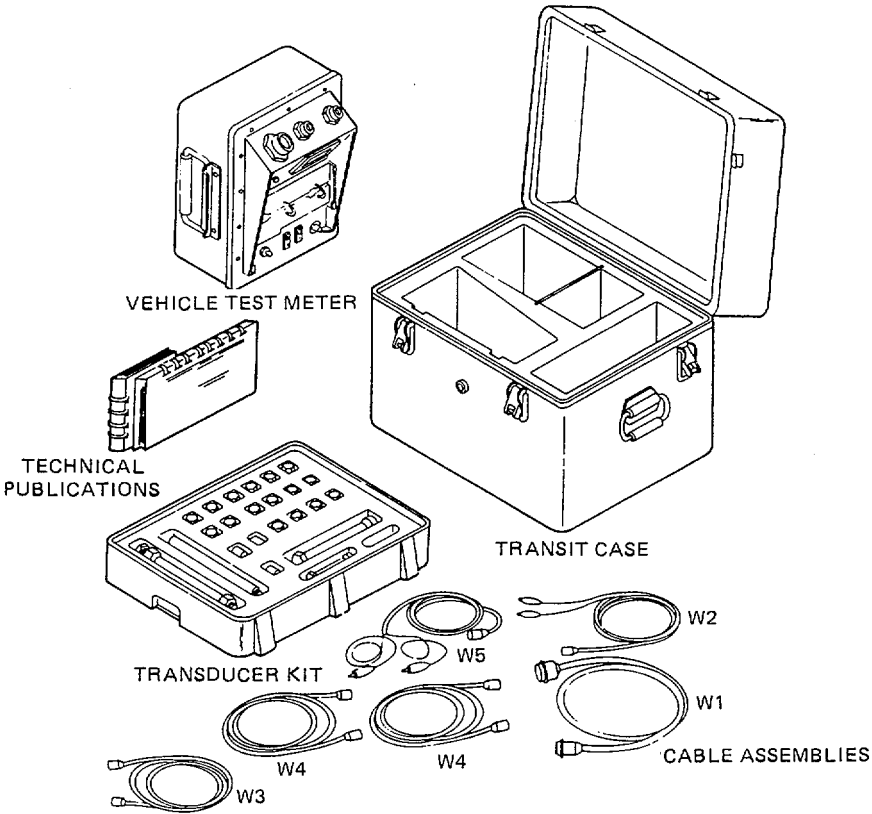
a. General. This section contains information and tests which may be used with STE/ICE (Simplified Test Equipment for Internal Combustion Engines) to locate malfunctions that may develop in the vehicle. The tests can be used during troubleshooting, corrective maintenance, or after parts replacement to isolate malfunctions, anticipate failures, and to check that proper repairs have been made. See subsection d. for STE/ICE testing procedure.

STE/ICE is used primarily with the vehicle electrical system. The tests cannot cover all possible troubles which may occur. If a particular malfunction is not discussed, refer to troubleshooting tables.

When a malfunction occurs, proceed to the start of the GO-Chain test sequence provided in the Vehicle Test Procedure.

Refer to TM9-4910-571-12&P for set-up, operation, and test procedures. Descriptions are given for general tests and maintenance procedures to help you keep STE/ICE working properly. See Appendix G for copies of in-vehicle test cards.

b. Description and Operation. STE/ICE is portable and operates on the tractor's 24-volt system. It consists of a vehicle test meter (VTM), a transducer kit (TK), four electrical cables, a transit case, and technical publications. Refer to the manual provided with the STE/ICE for a description and operation of the VTM and the TK.



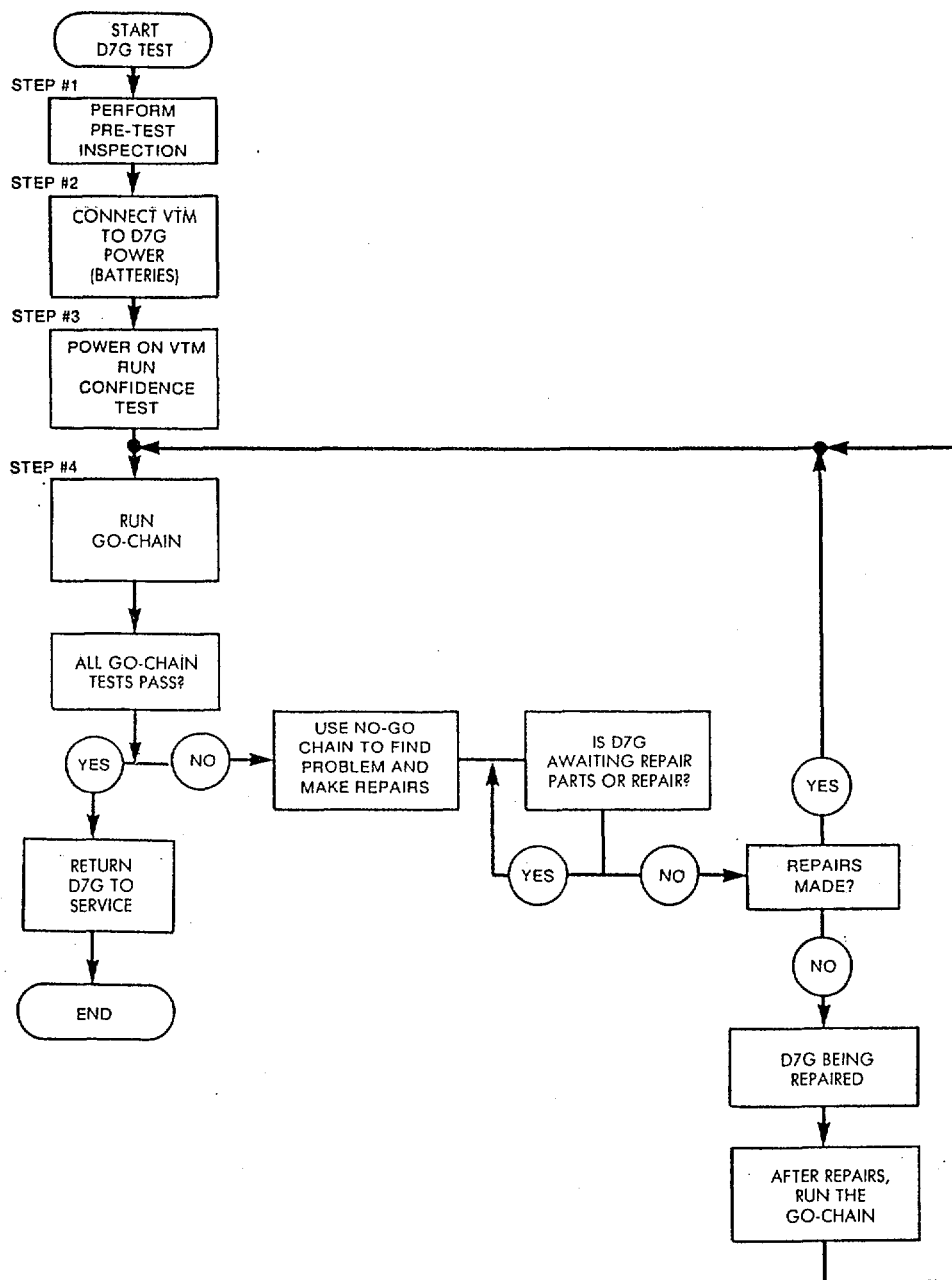
SIMPLIFIED TEST EQUIPMENT INTERNAL COMBUSTION ENGINE (STE/ICE) SYSTEM

c STE/ICE Testing Procedure. The VTM provides a method to test the D7G electrical and mechanical components. Readings are either Go/No Go (pass/fail) indications or digital displays in units (psi, rpm, volts, ohms, amps, etc.).

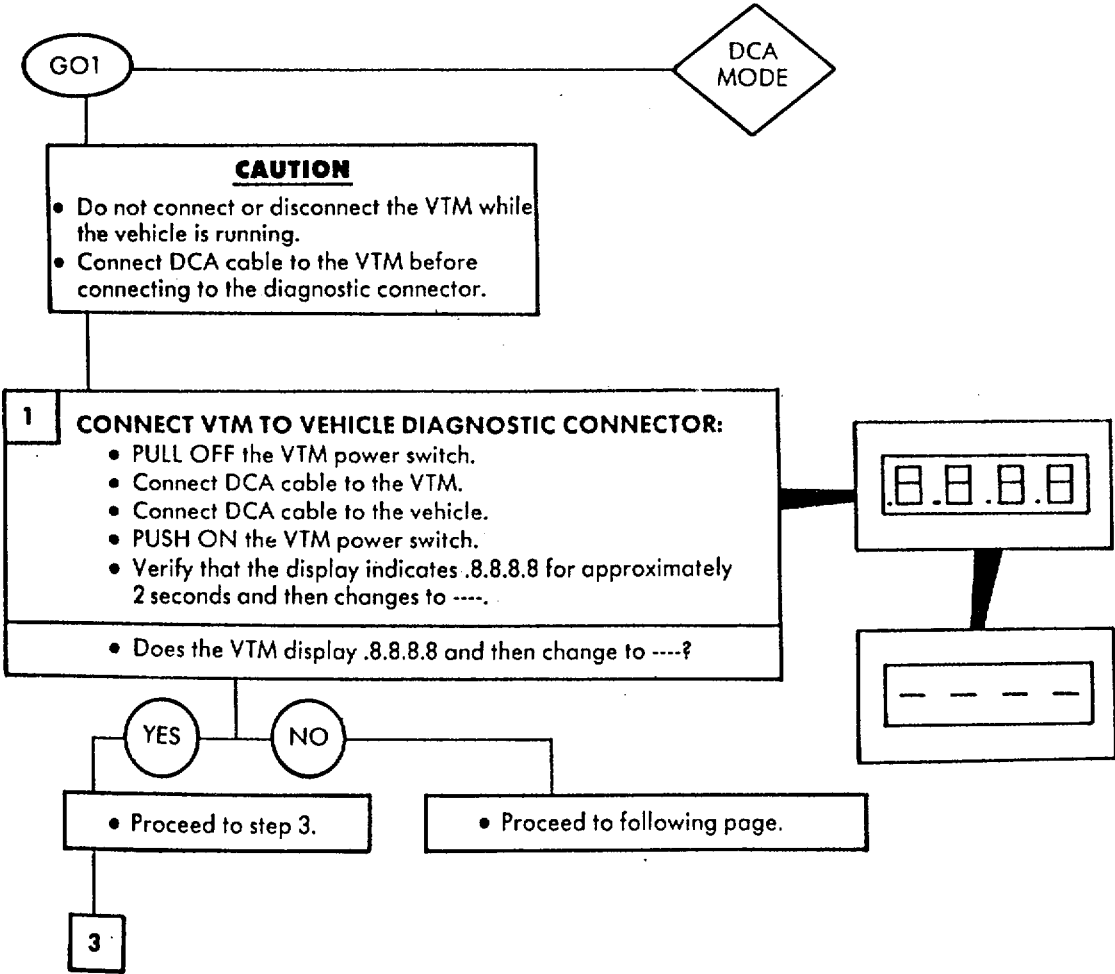
The diagnostic connector assembly (DCA) is mounted beneath the dashboard and provides access to the most frequently needed test points.

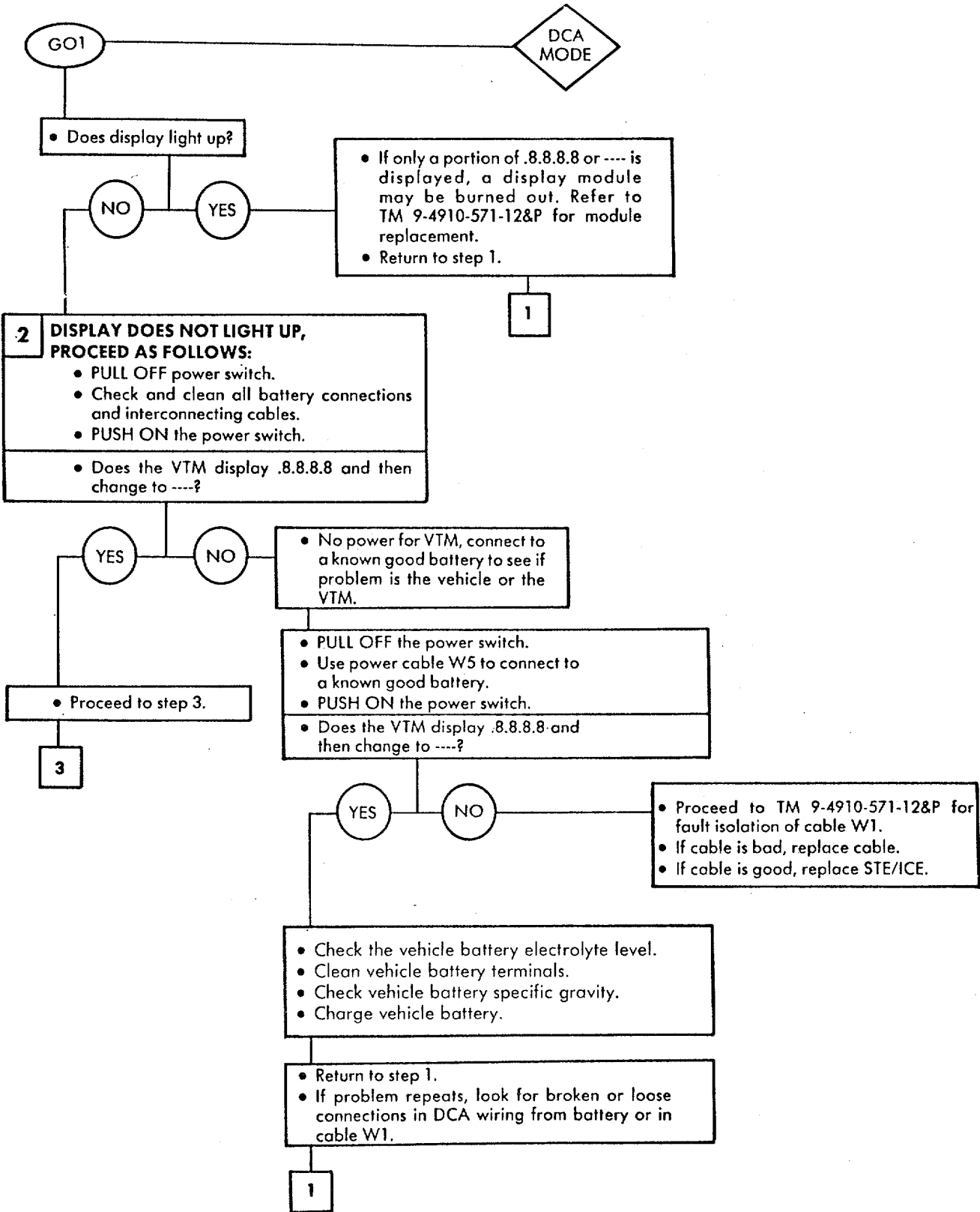
The use of the VTM through the DCA is referred to as the DCA Mode Go-Chain Tests.

When the VTM interfaces with the tractor through the use of the transducer kit, the use of the VTM is referred to as the TK Mode Go-Chain Tests. The DCA and TK Modes can be used at the same time.

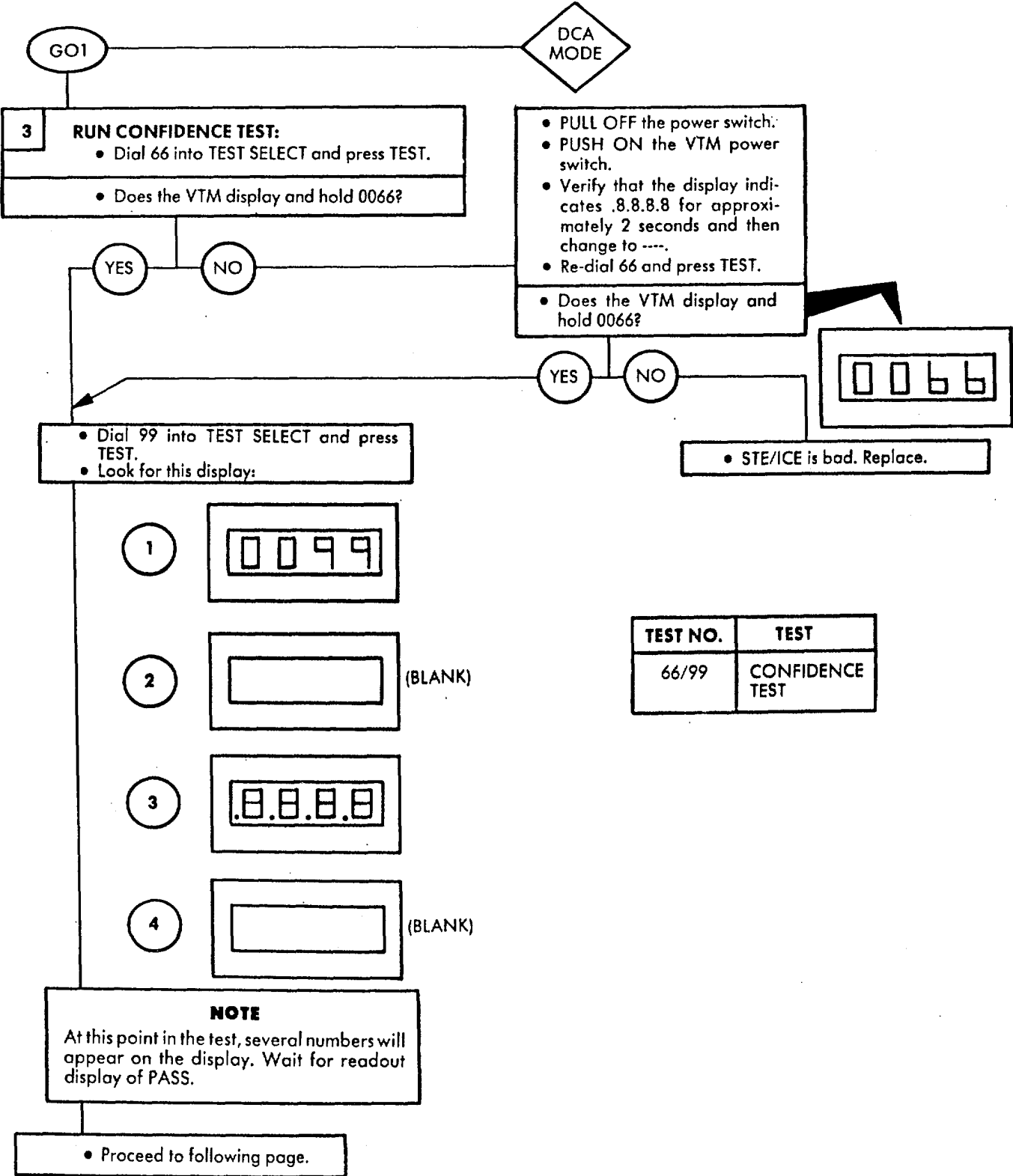


(1) DCA Mode GO-Chain Tests

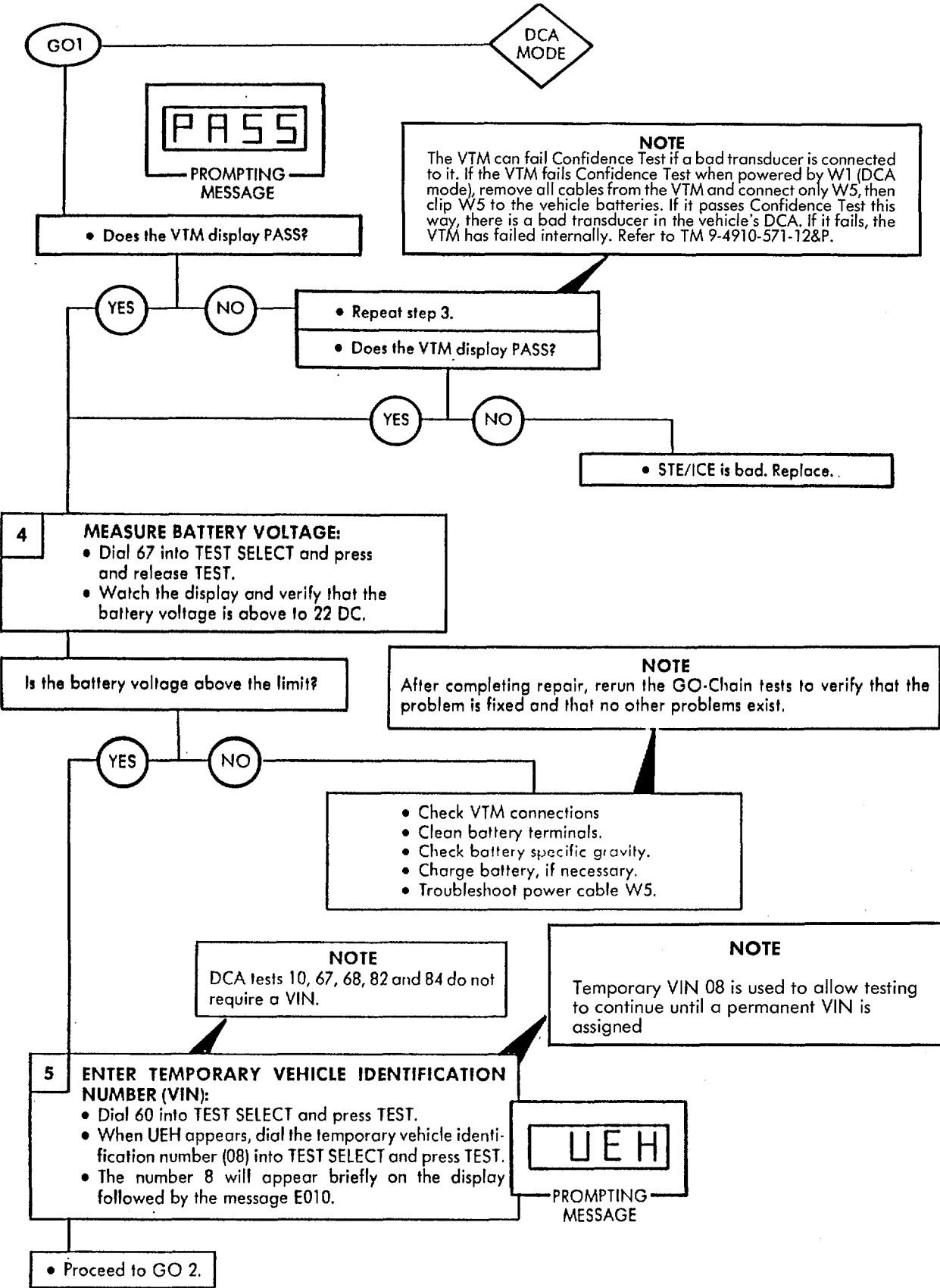


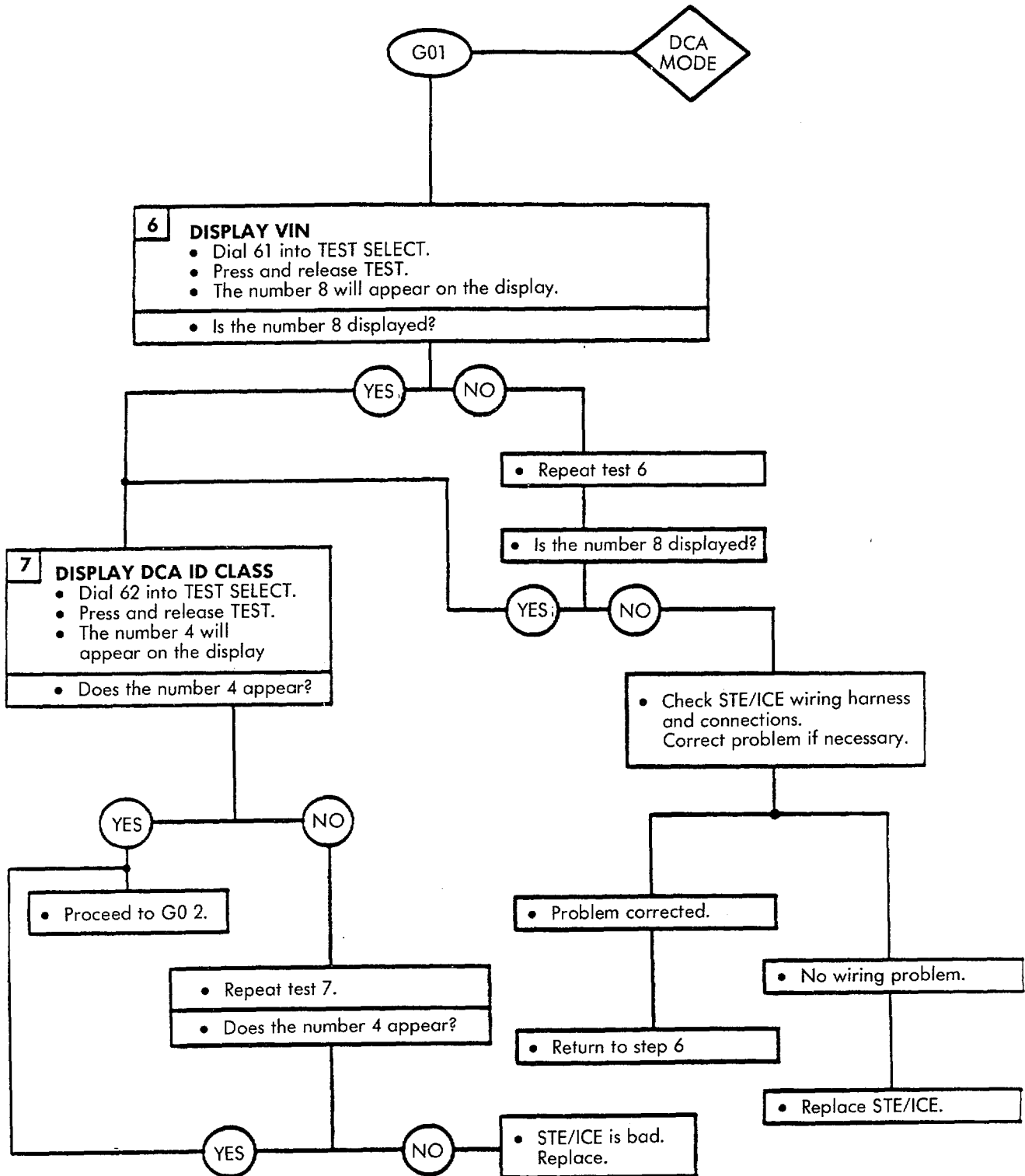


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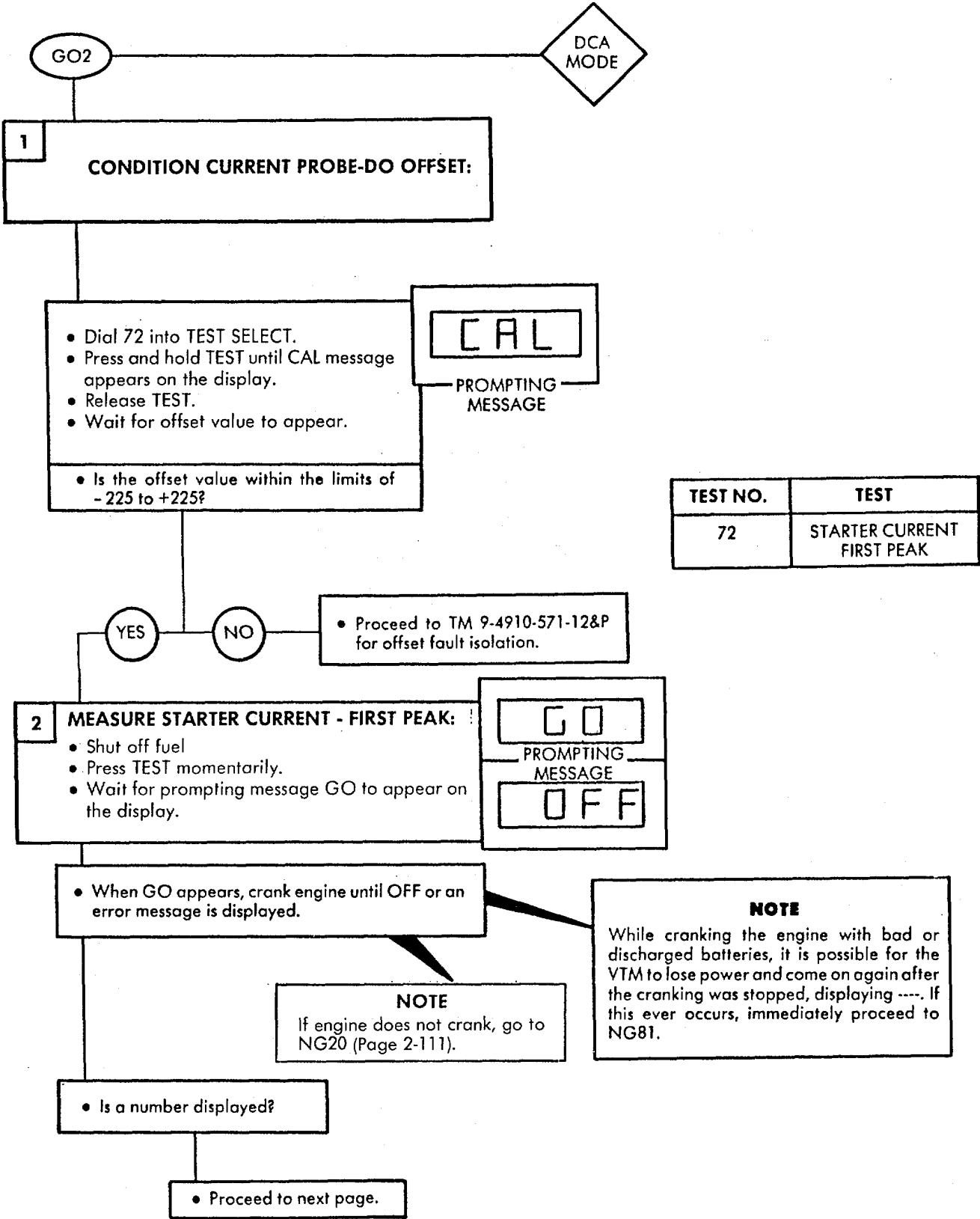


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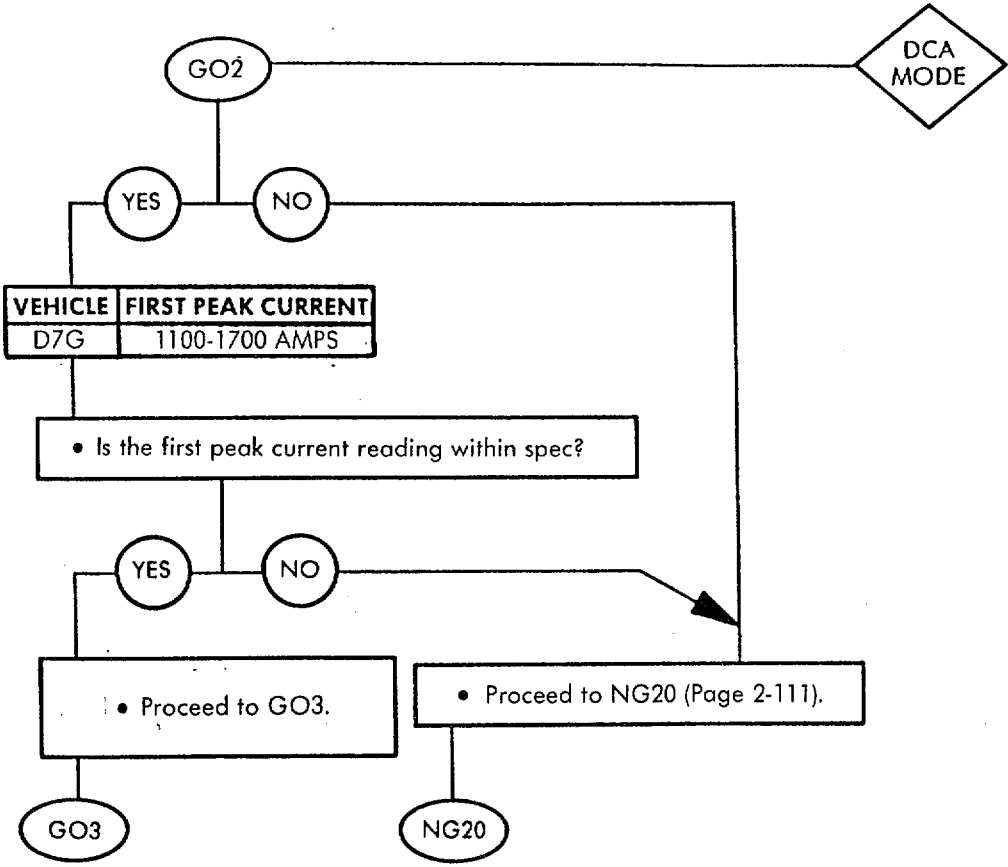




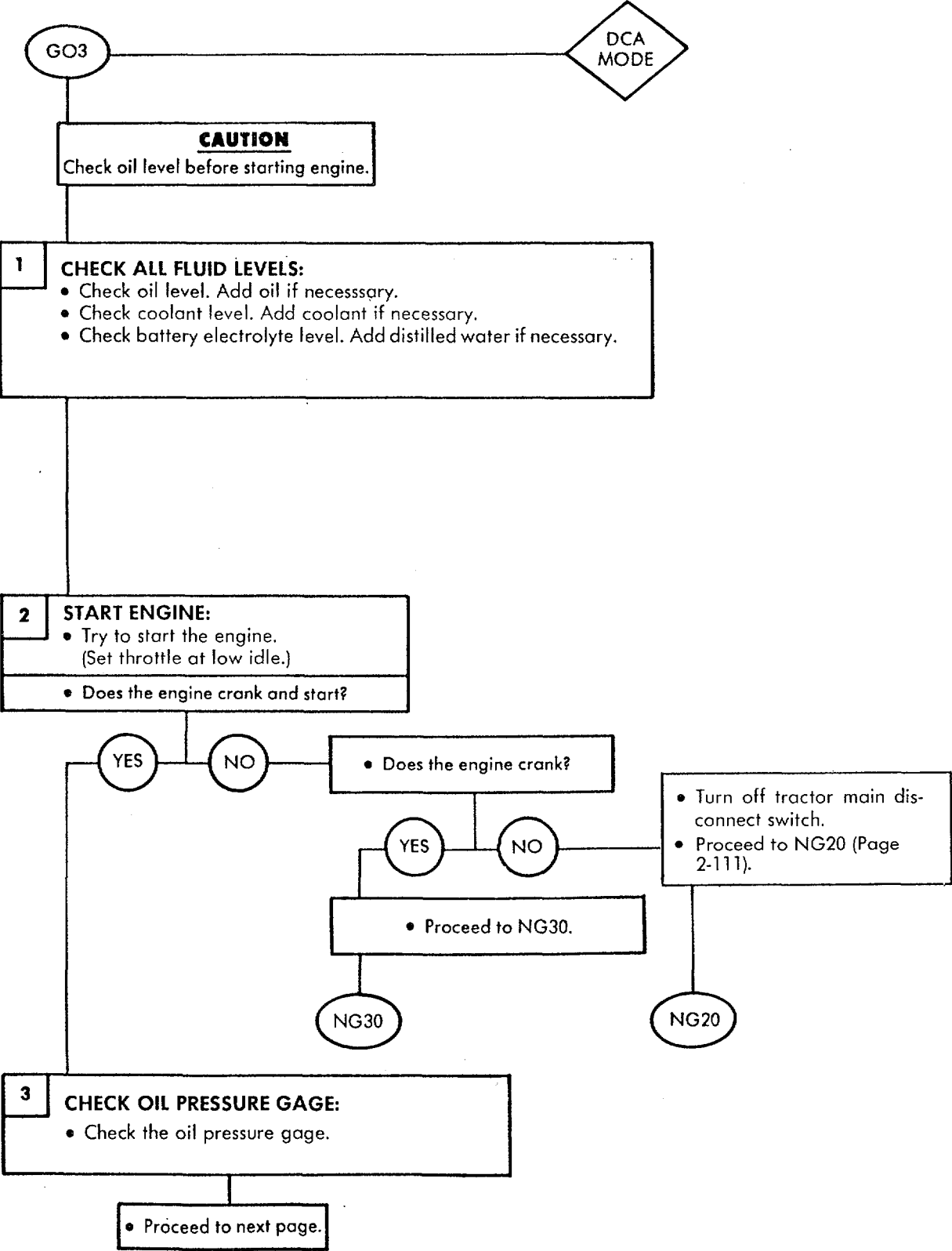
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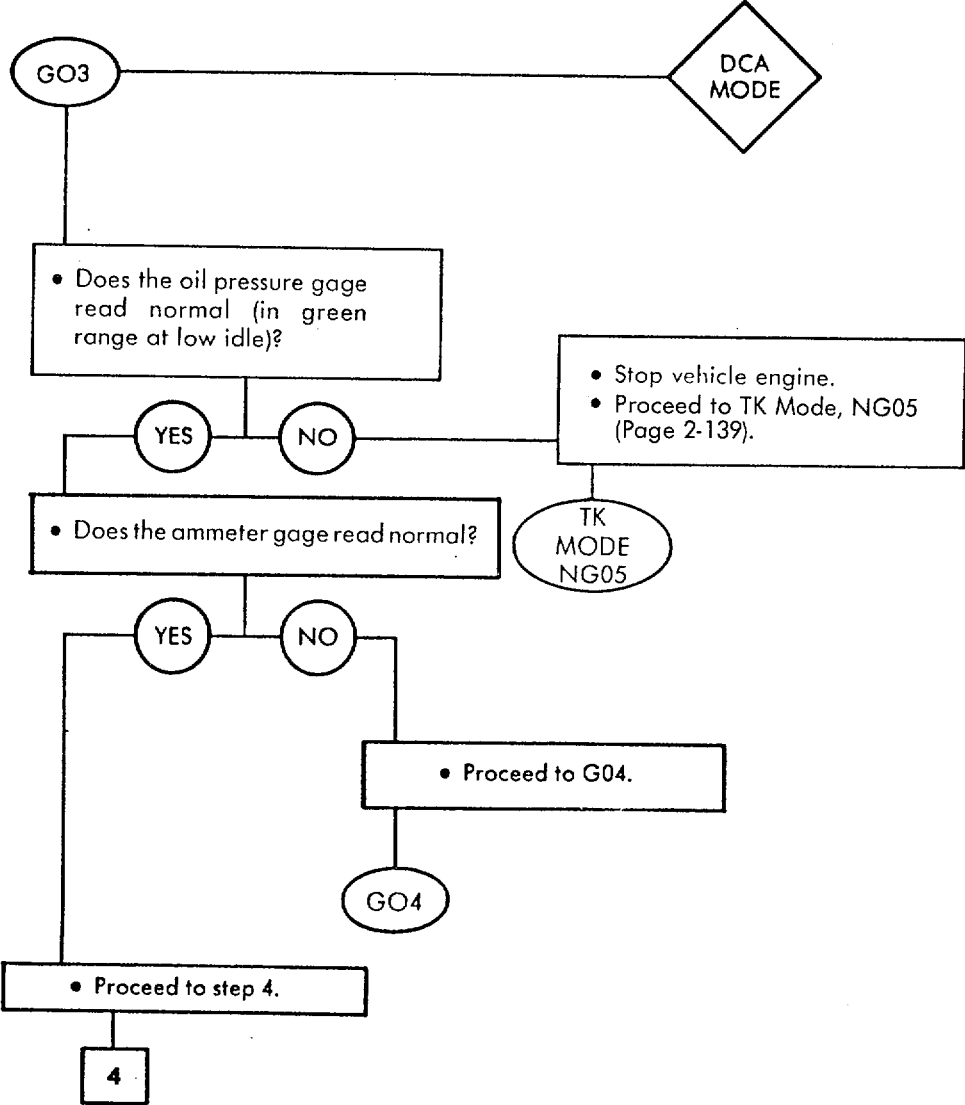
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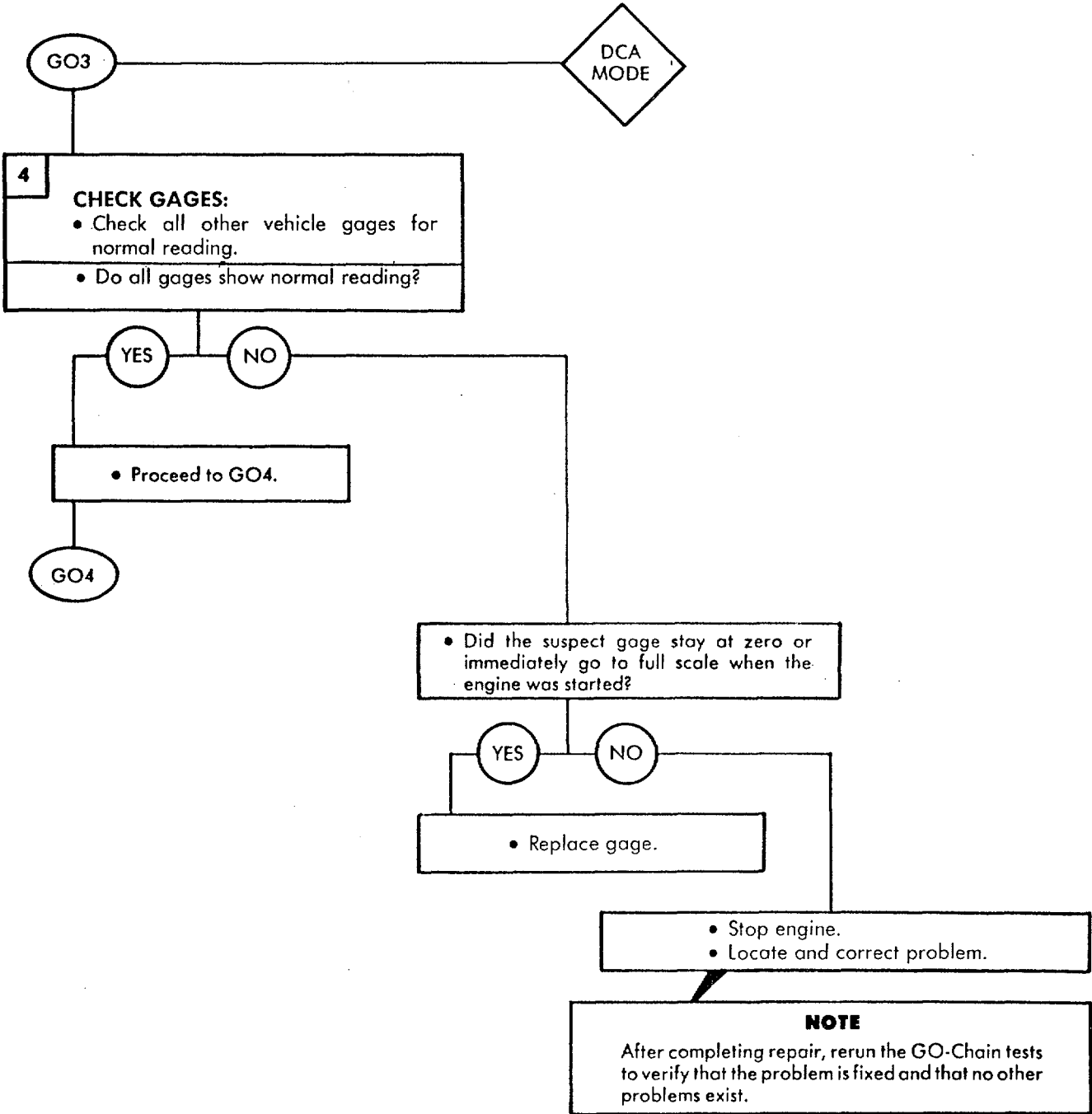
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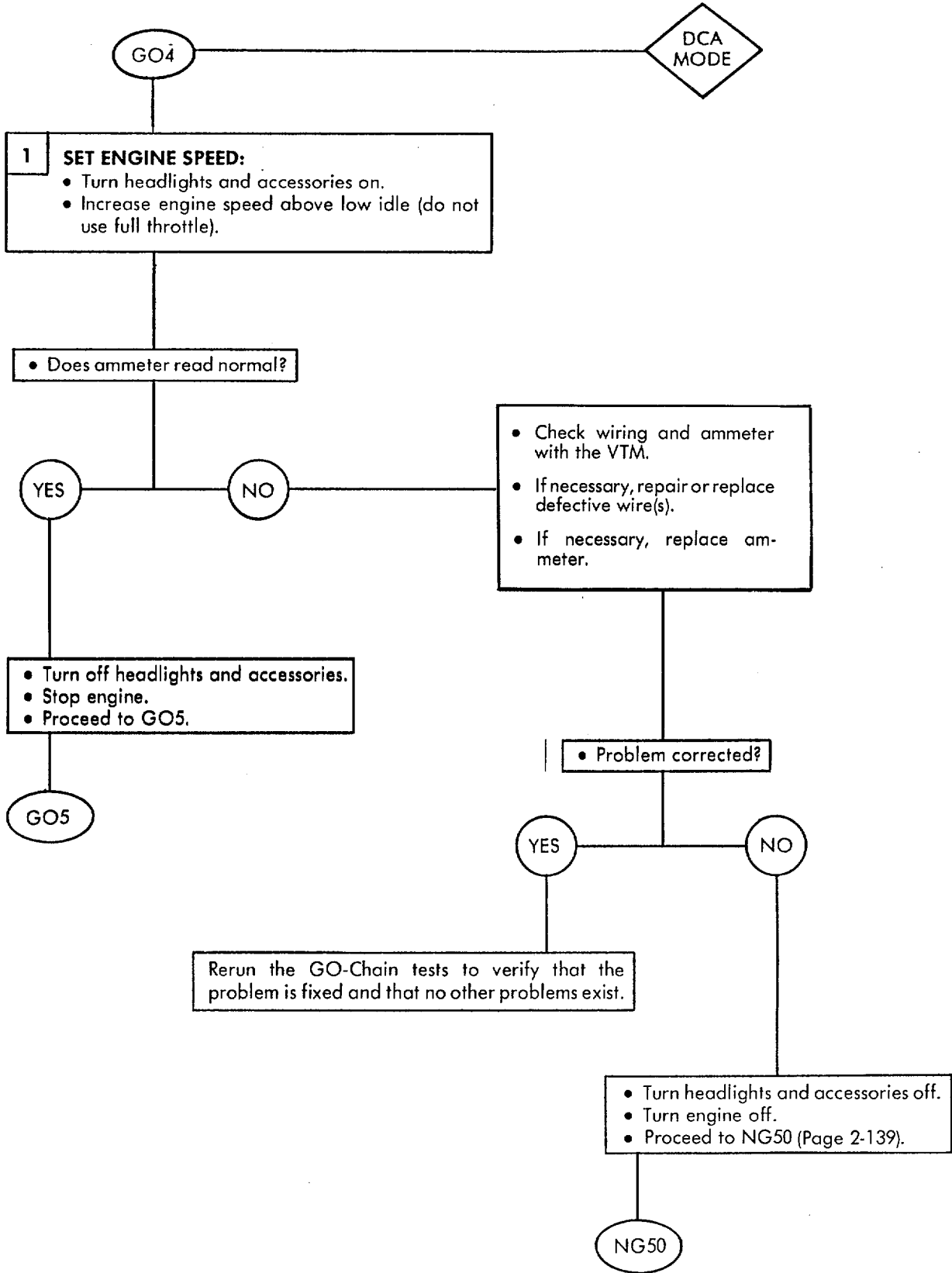
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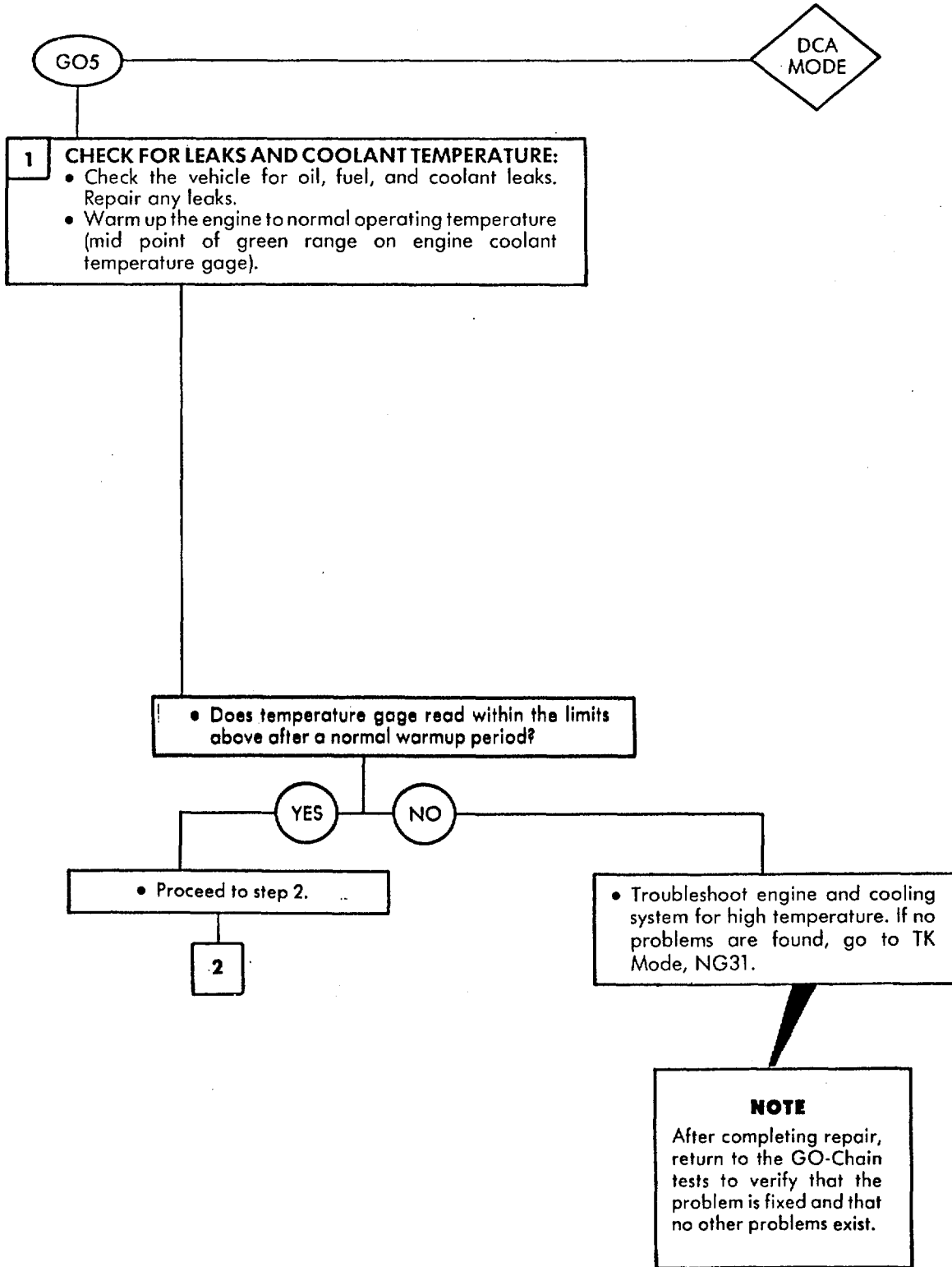


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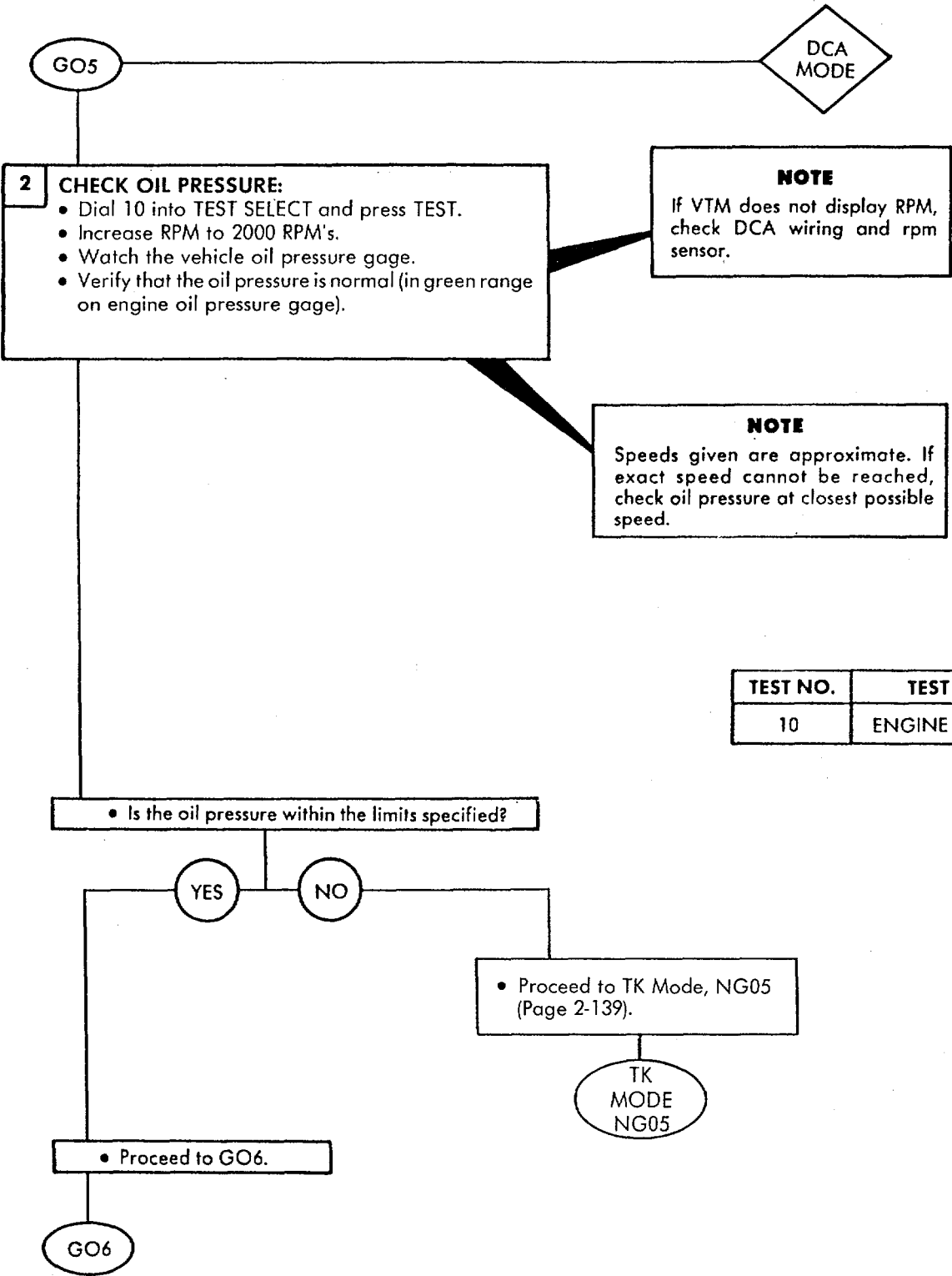


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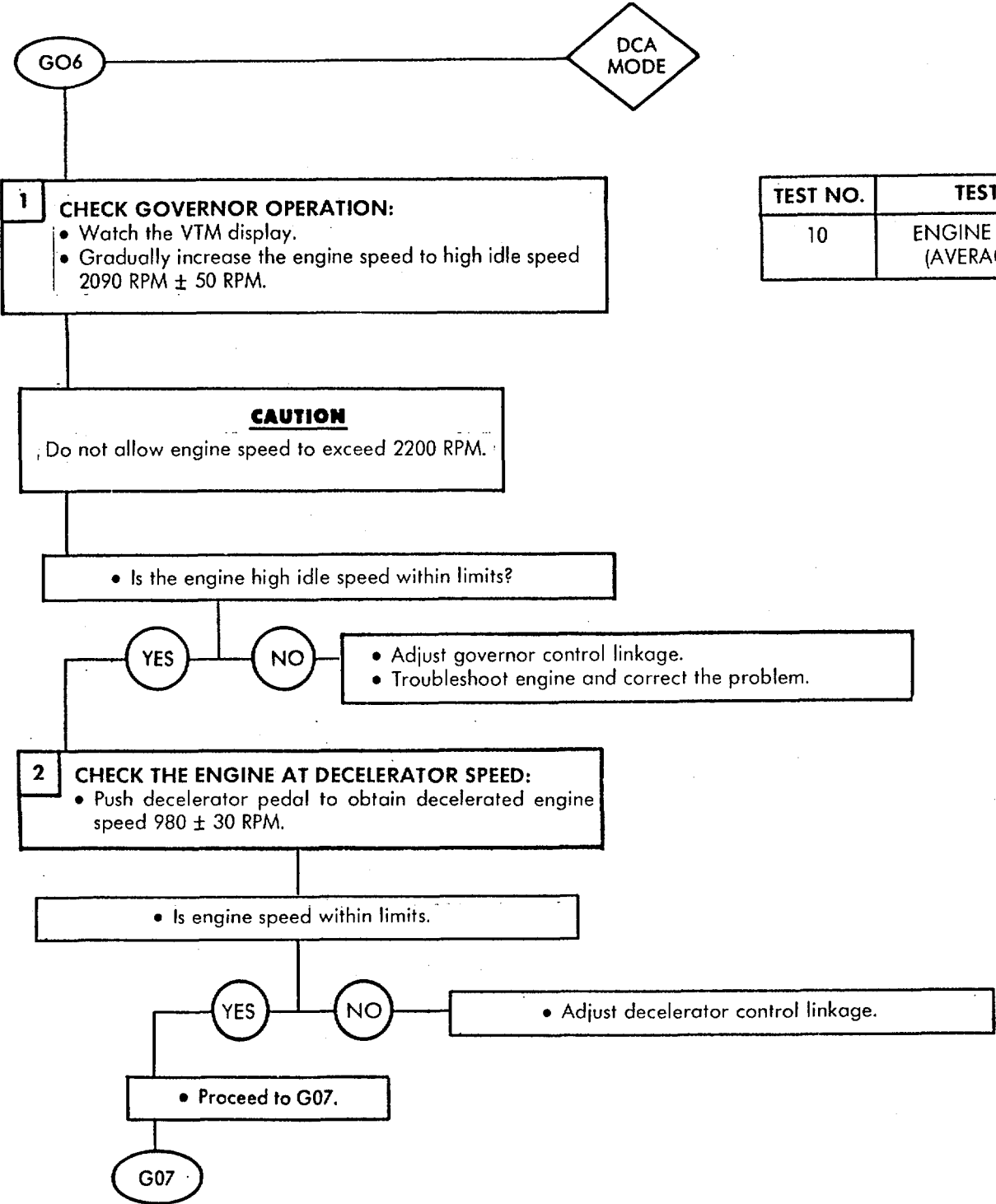


(1) DCA Mode GO-Chain Tests (Cont'd).



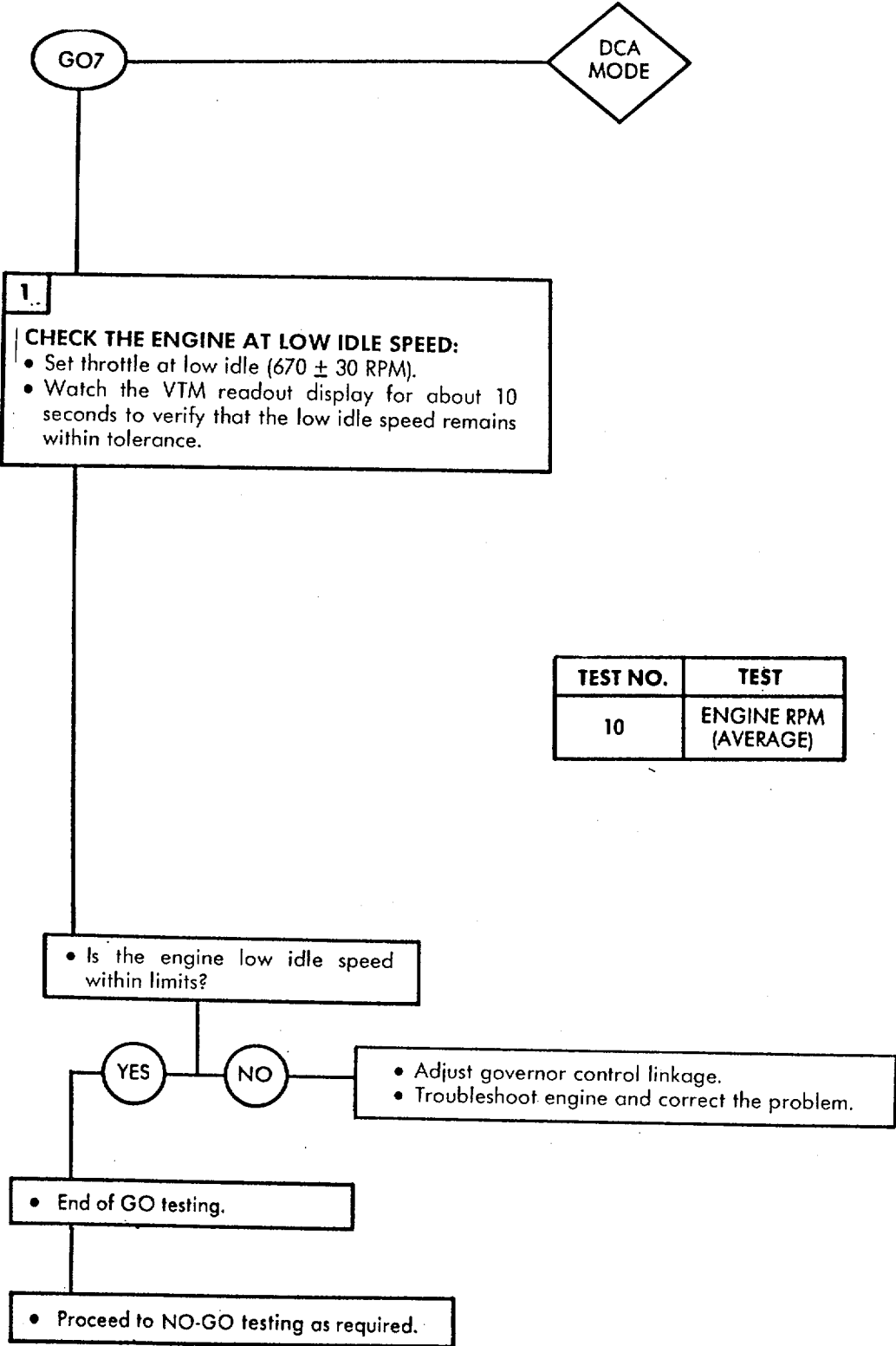
TEST NO.	TEST
10	ENGINE RPM

(1) DCA Mode GO-Chain Tests (Cont'd).



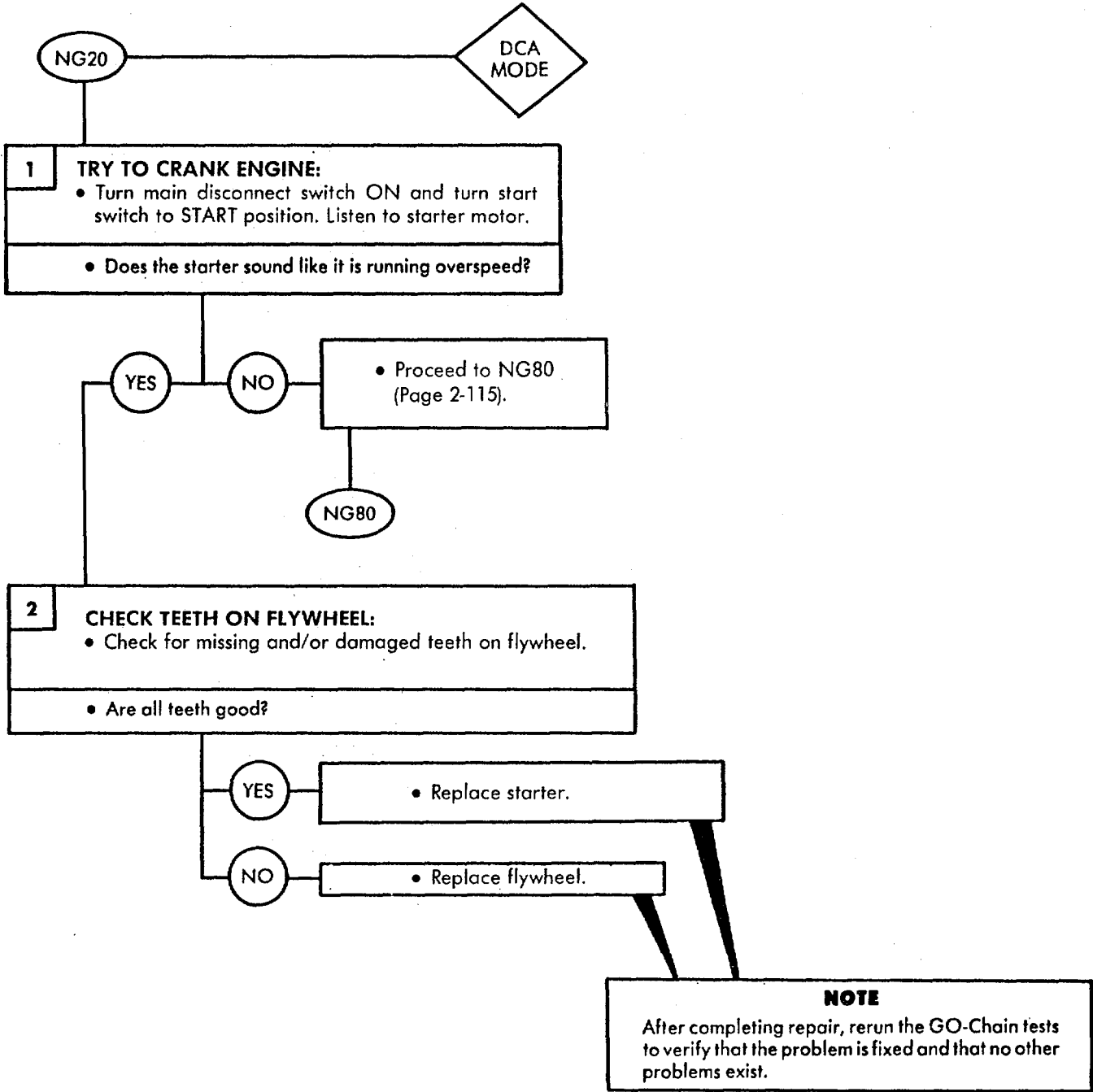
TEST NO.	TEST
10	ENGINE RPM (AVERAGE)

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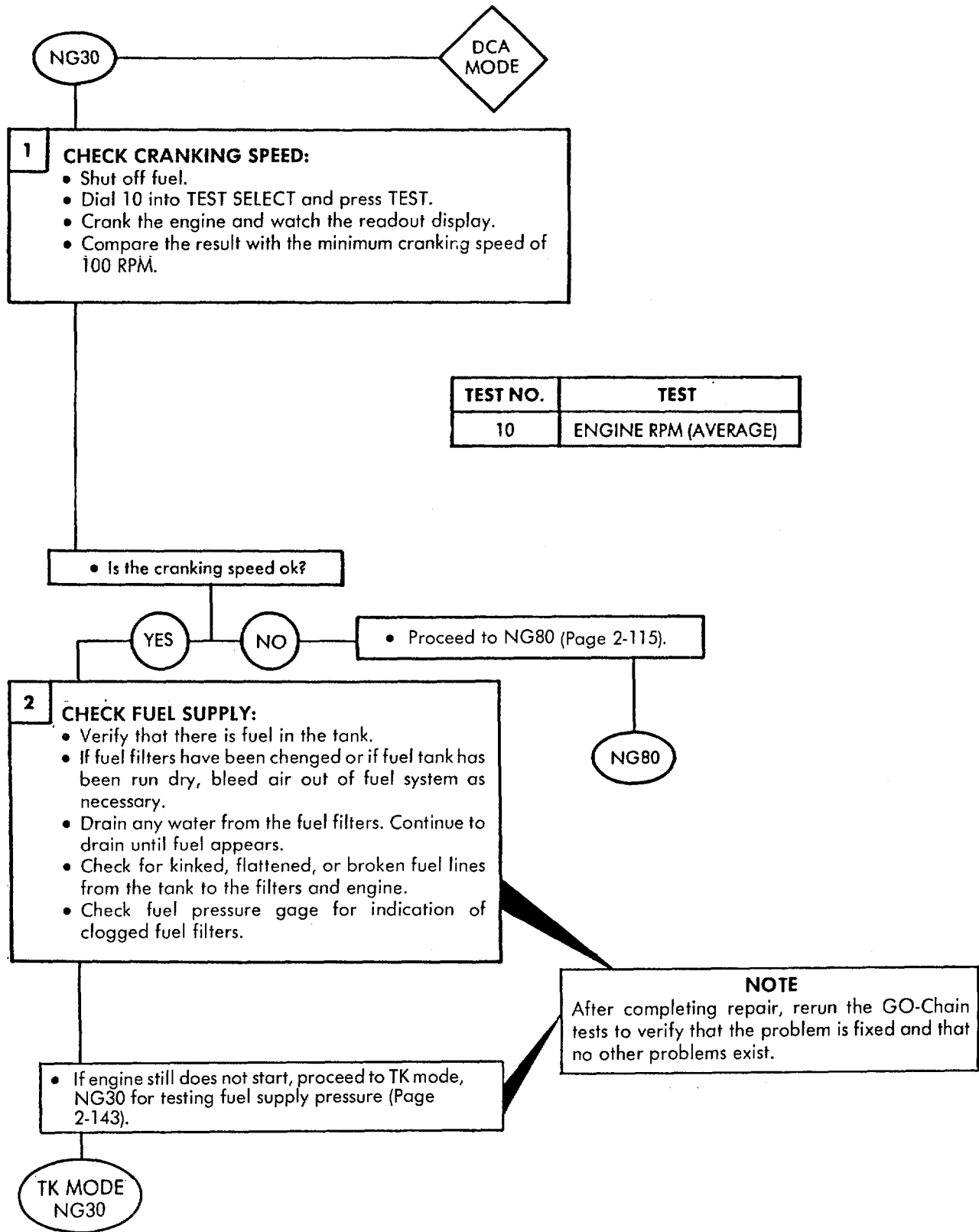


TEST NO.	TEST
10	ENGINE RPM (AVERAGE)

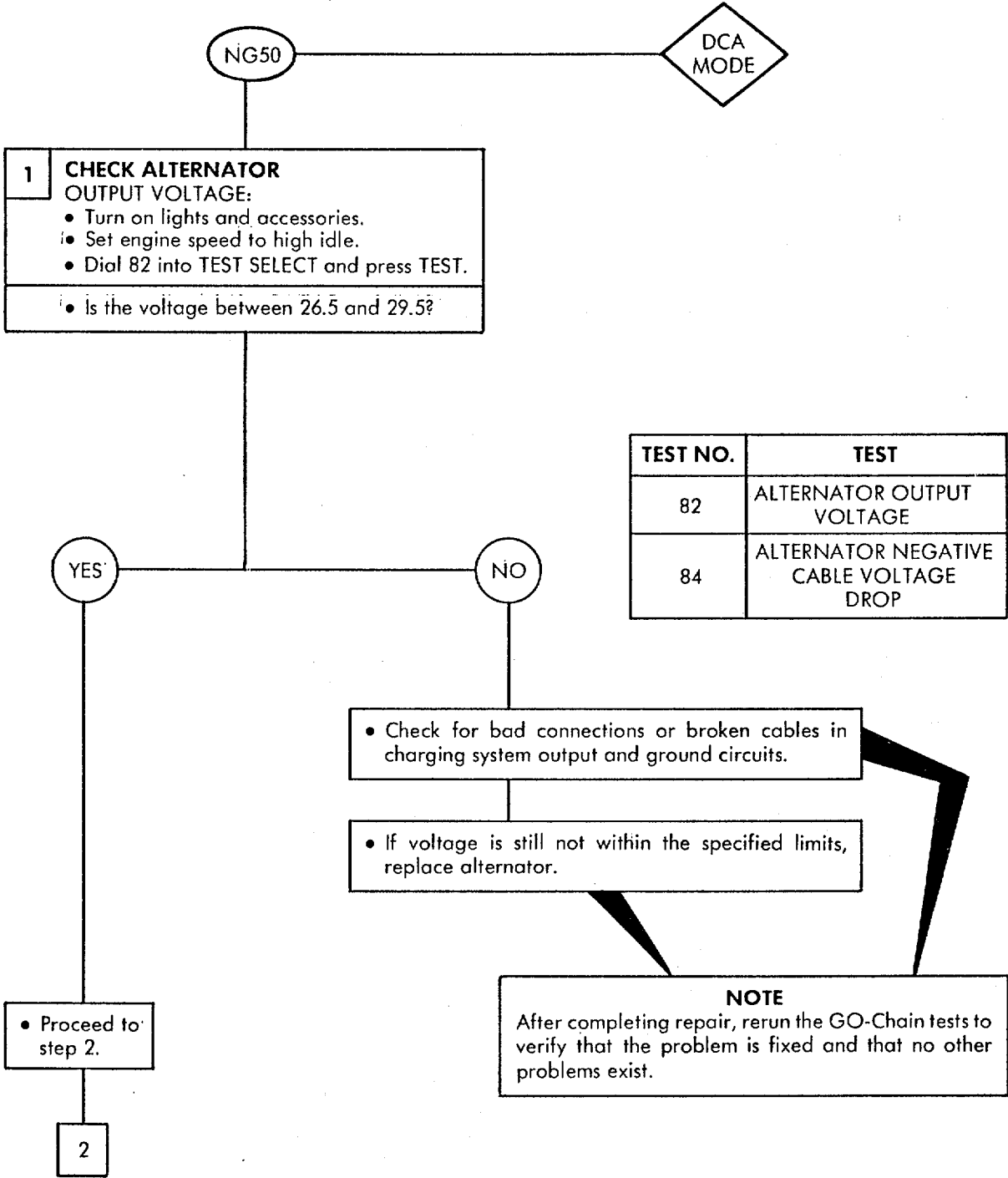
(2) DCA Mode NO-GO Chain Tests.



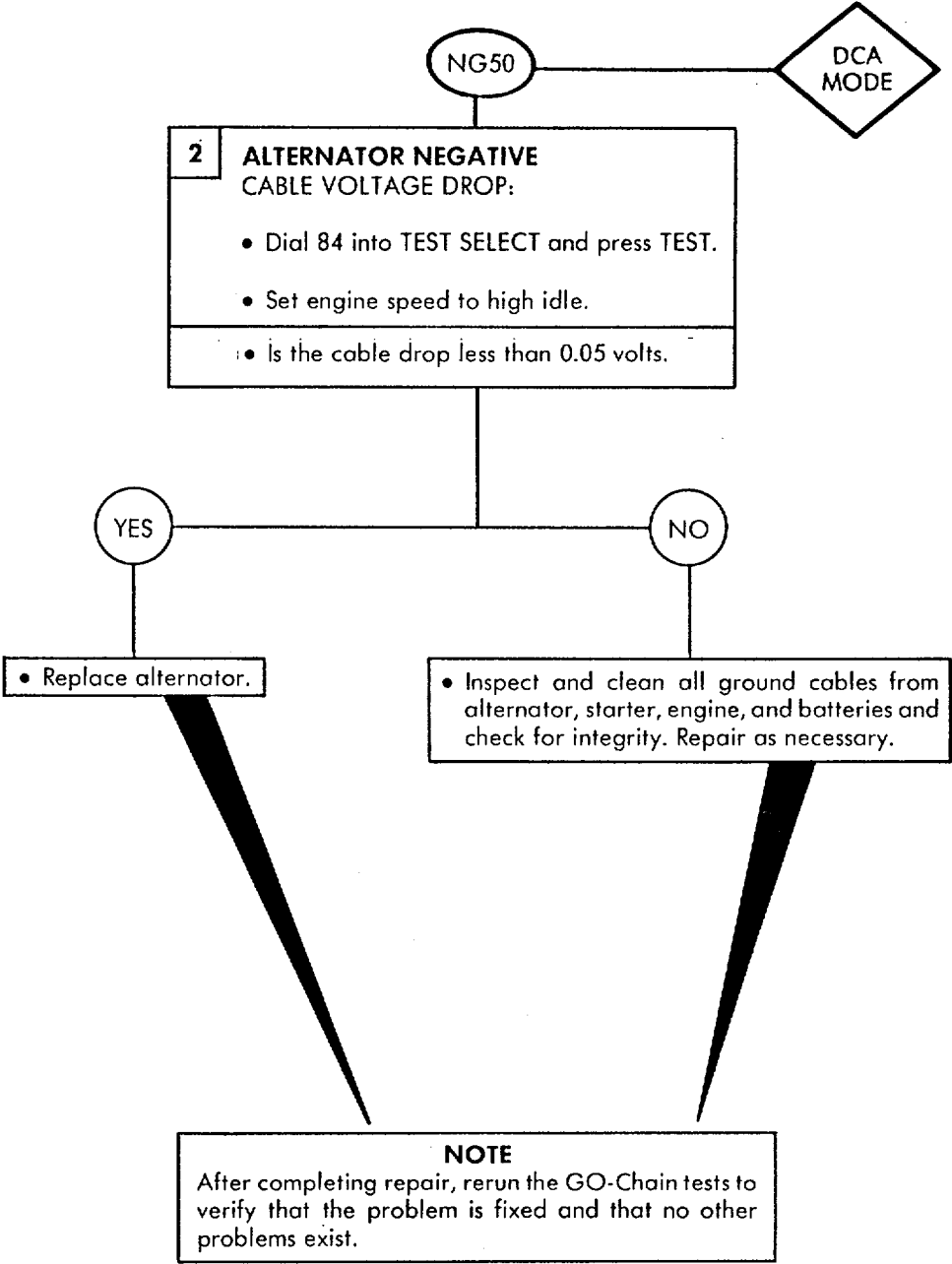
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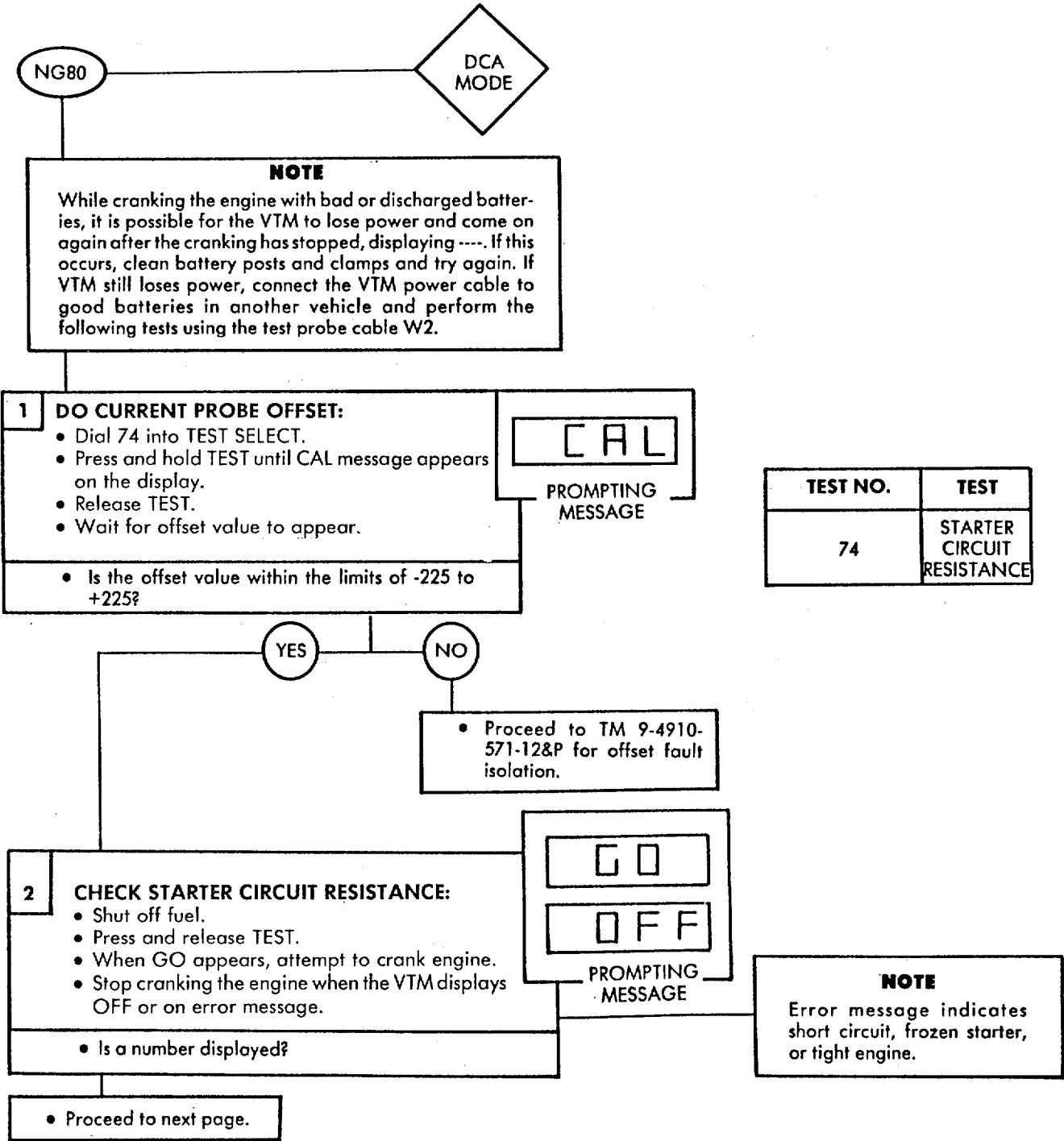
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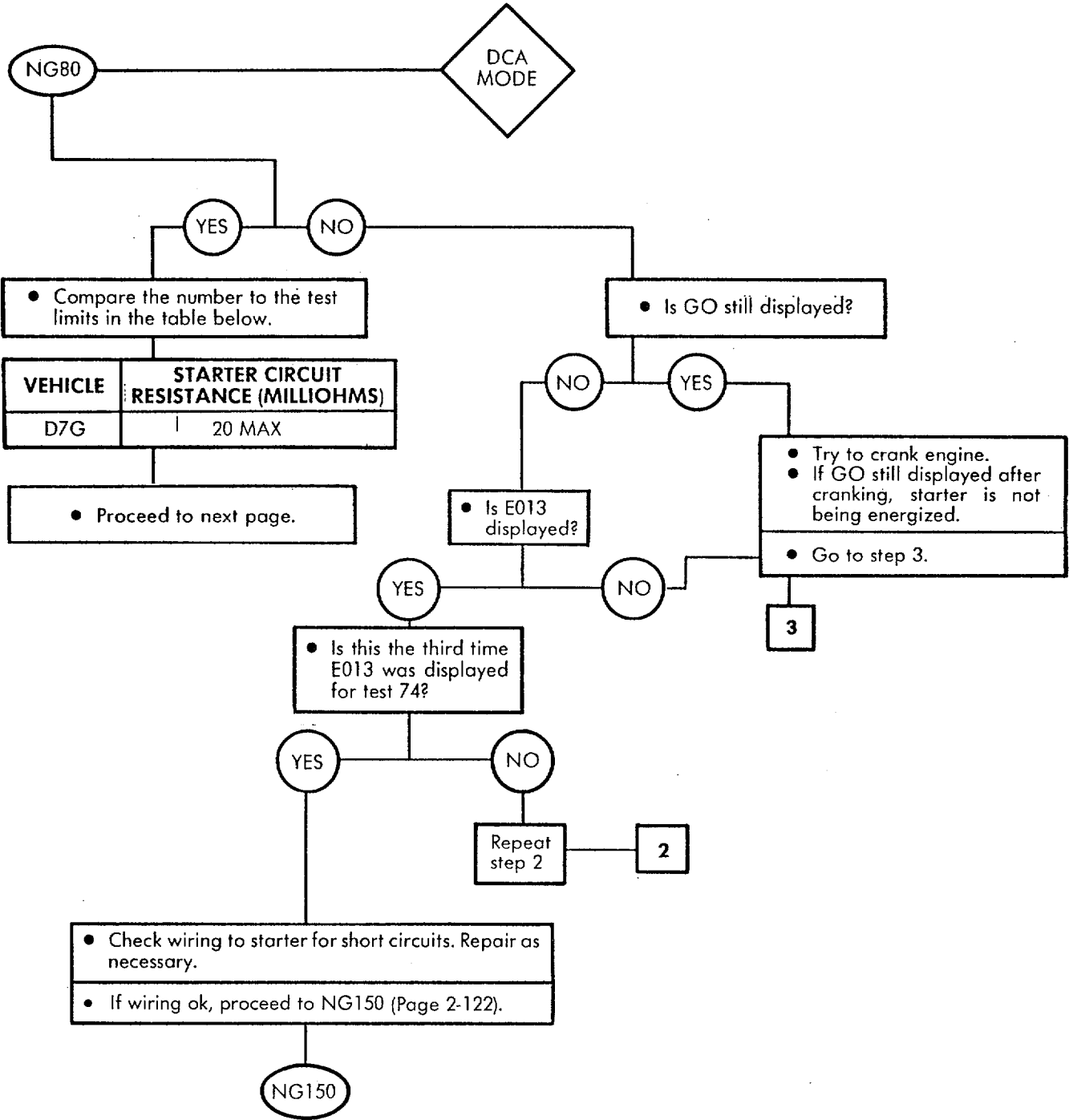
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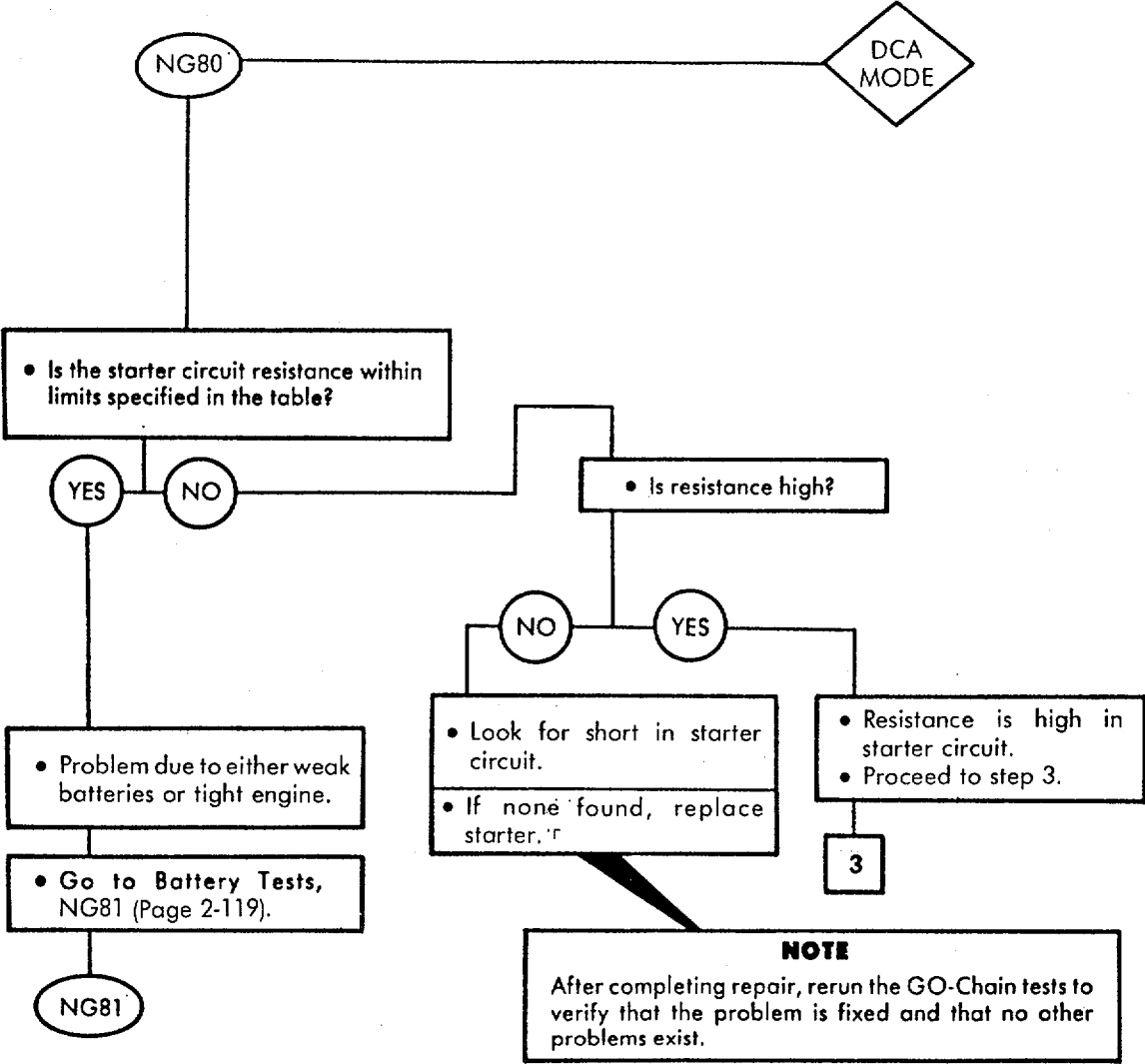
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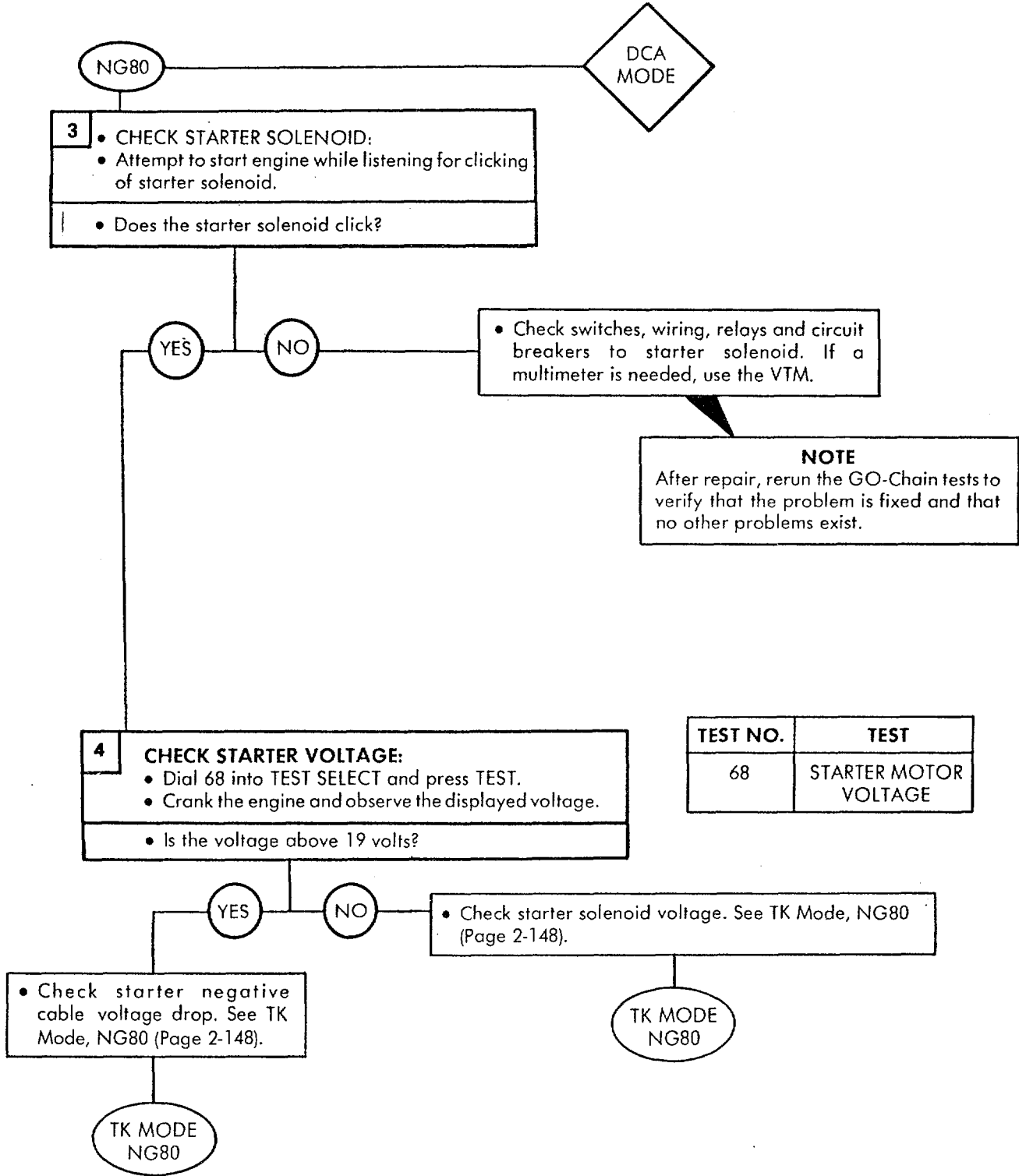
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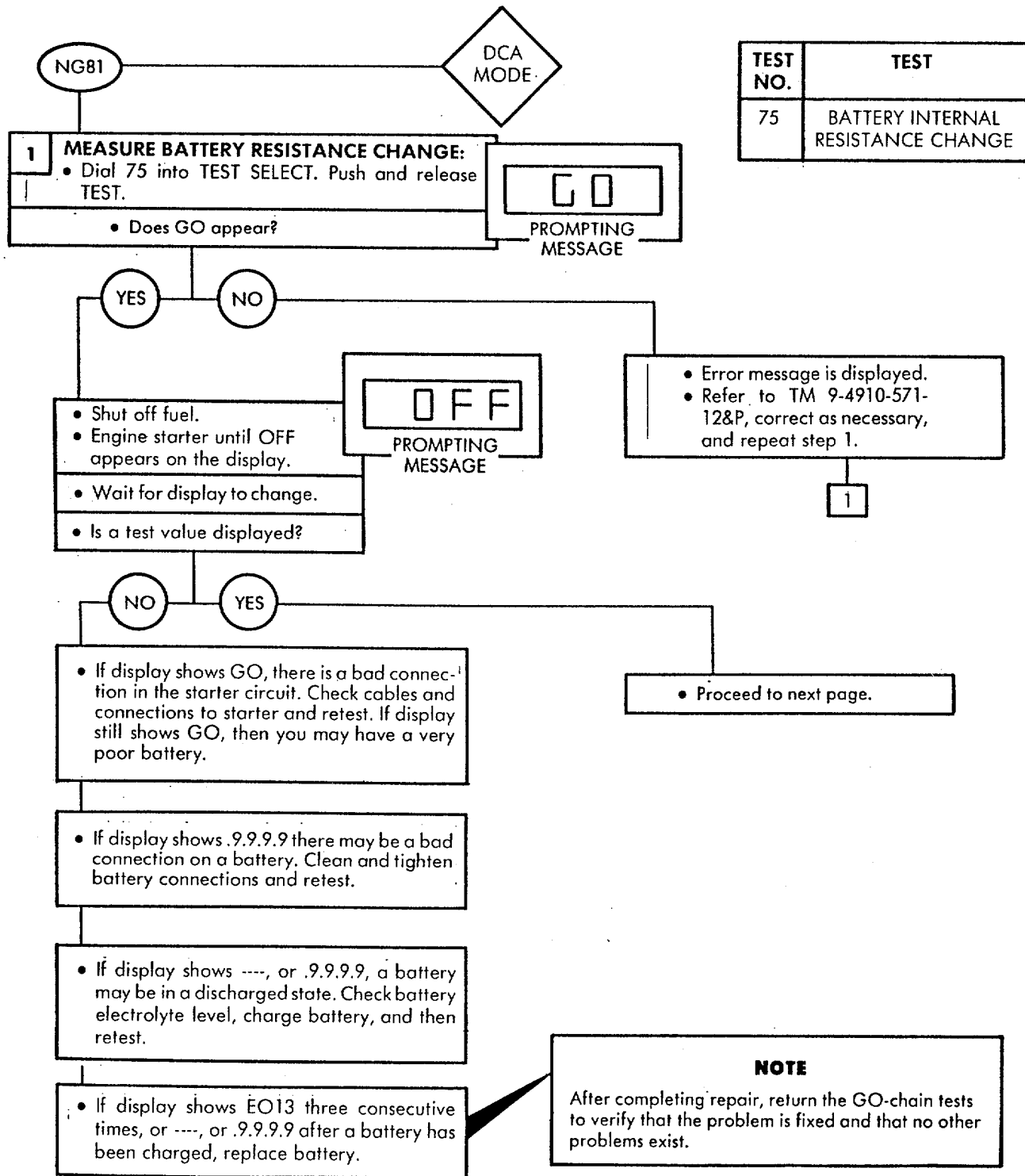
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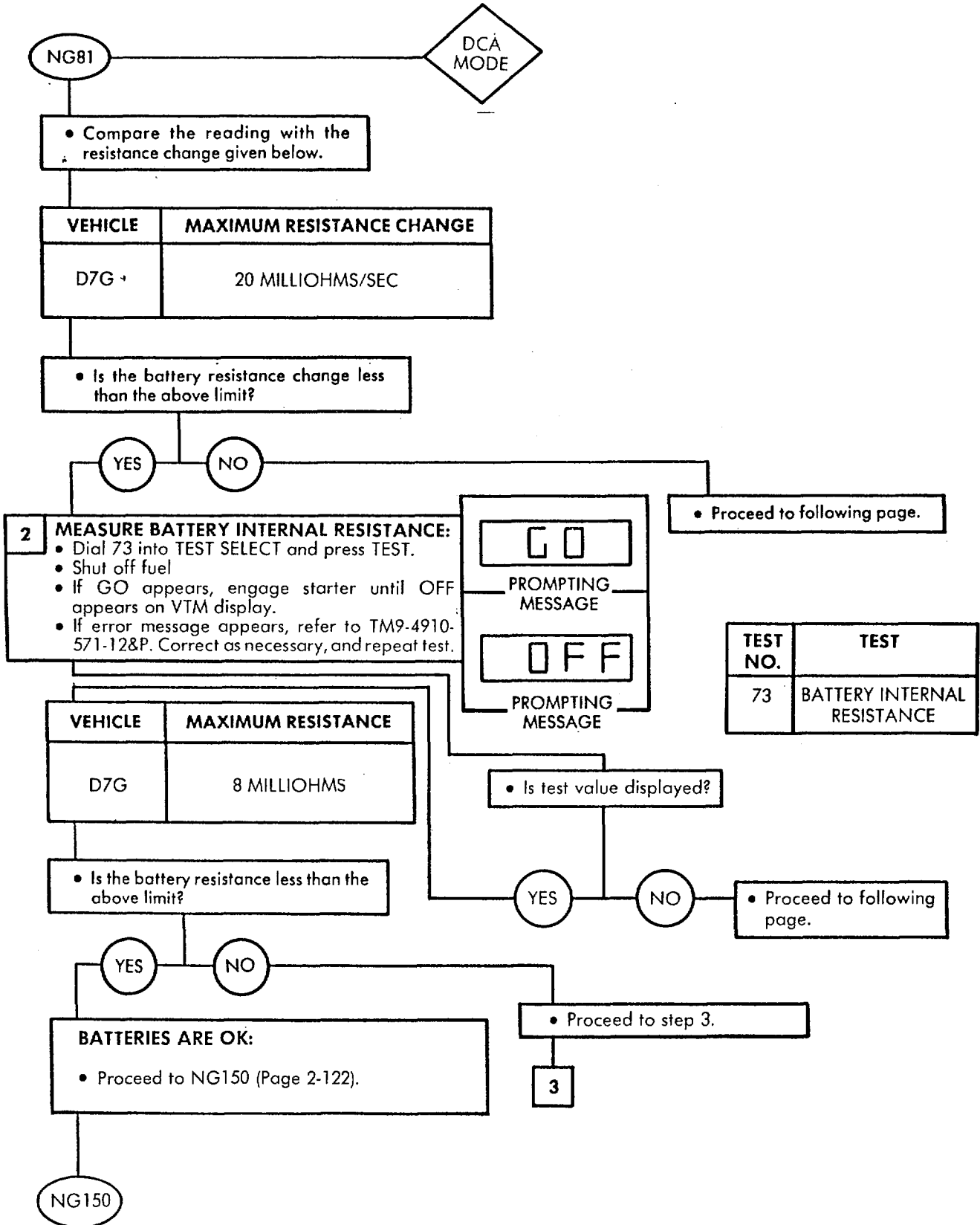
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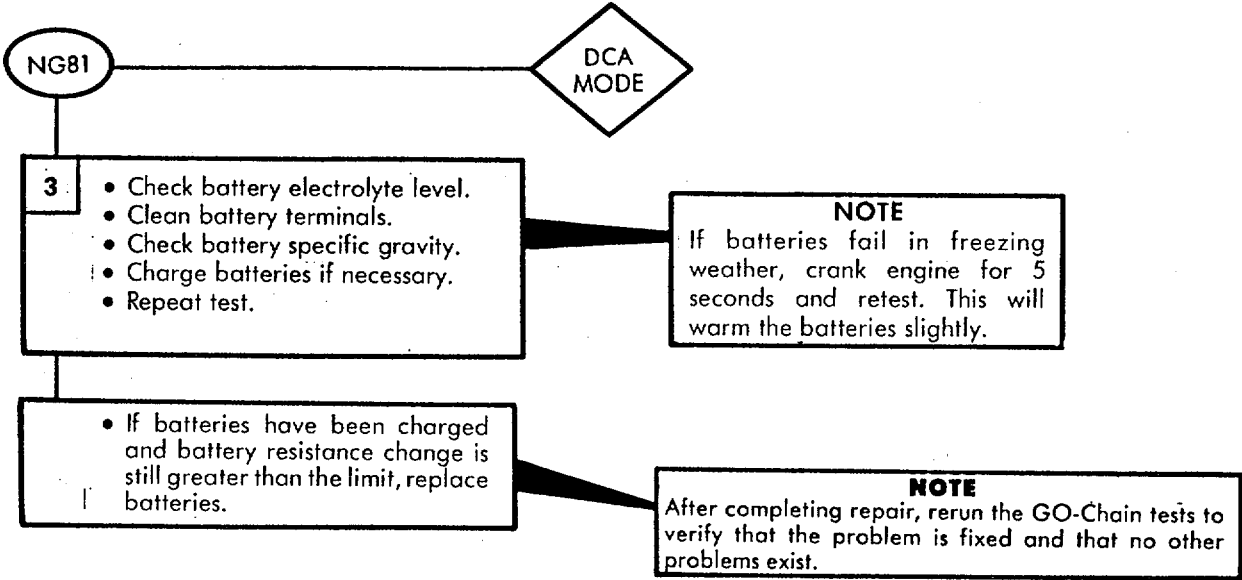
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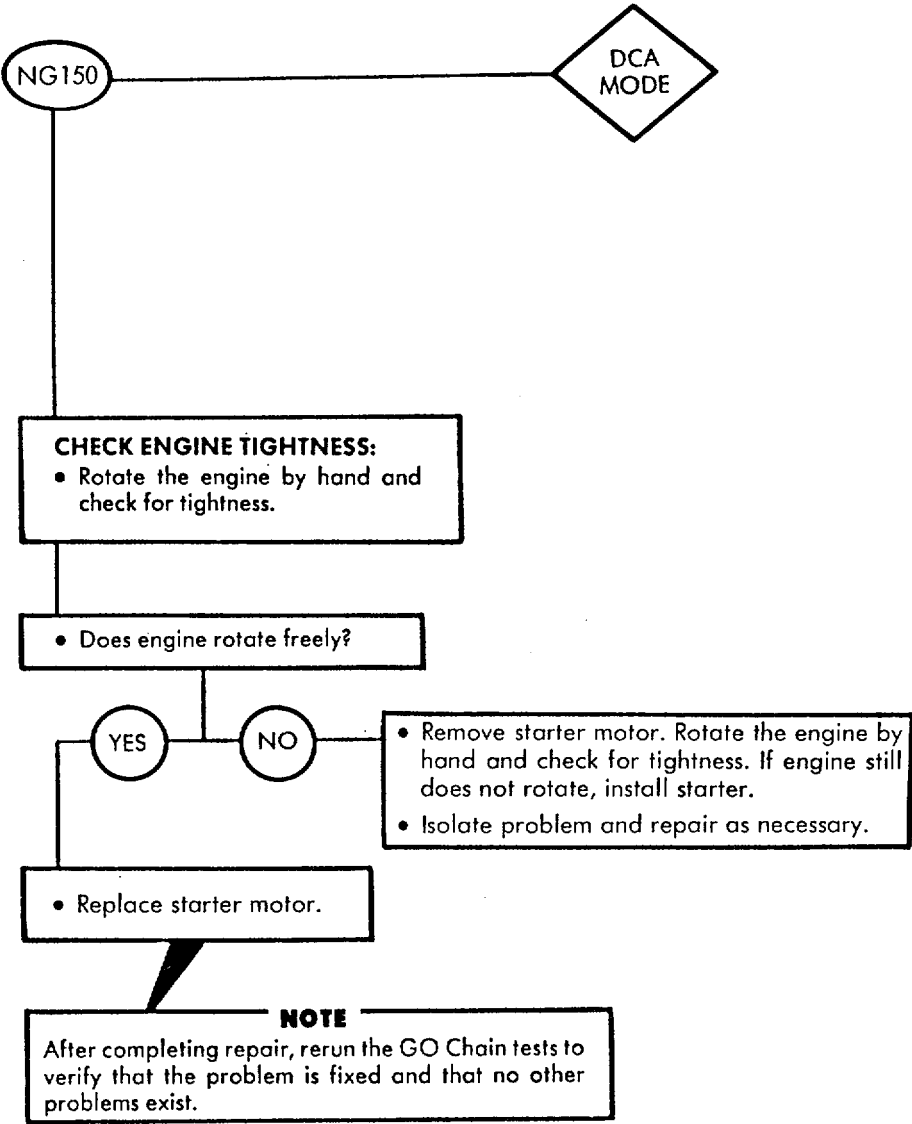
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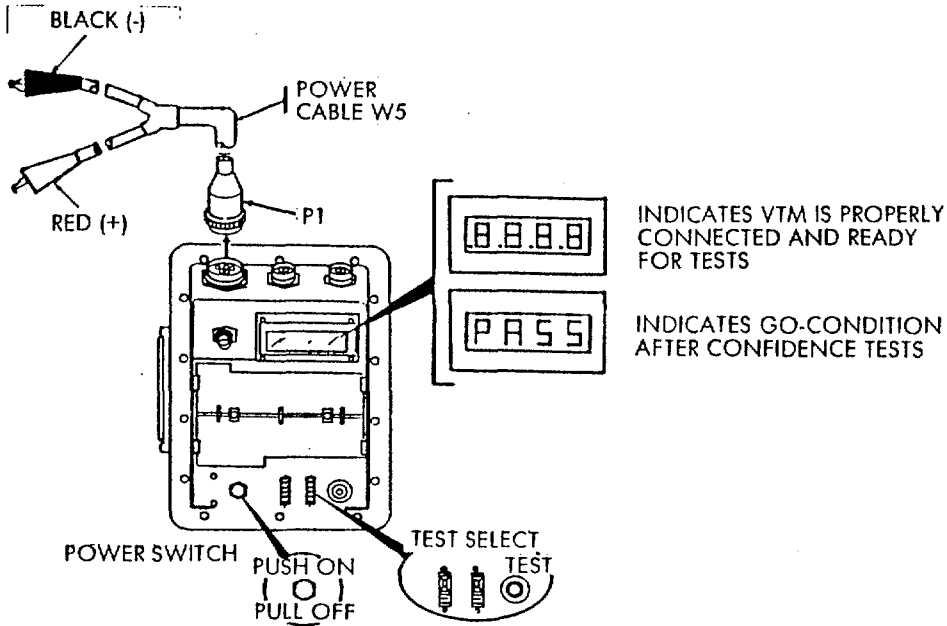
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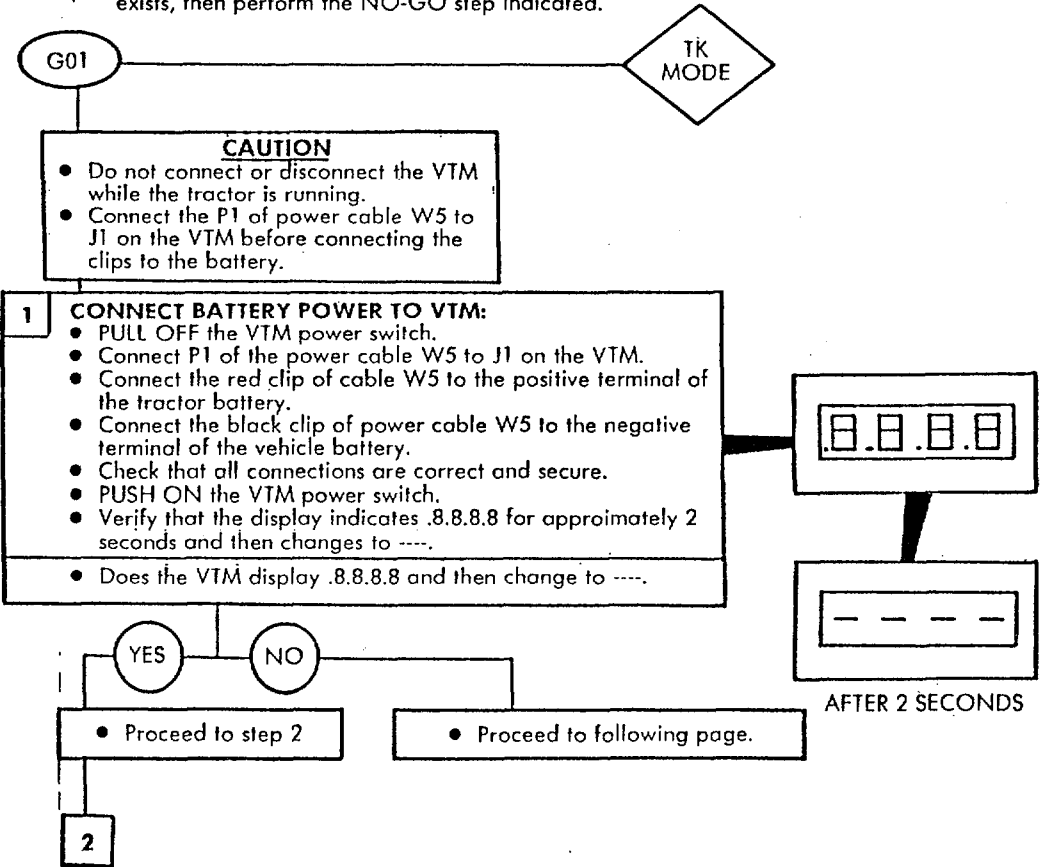
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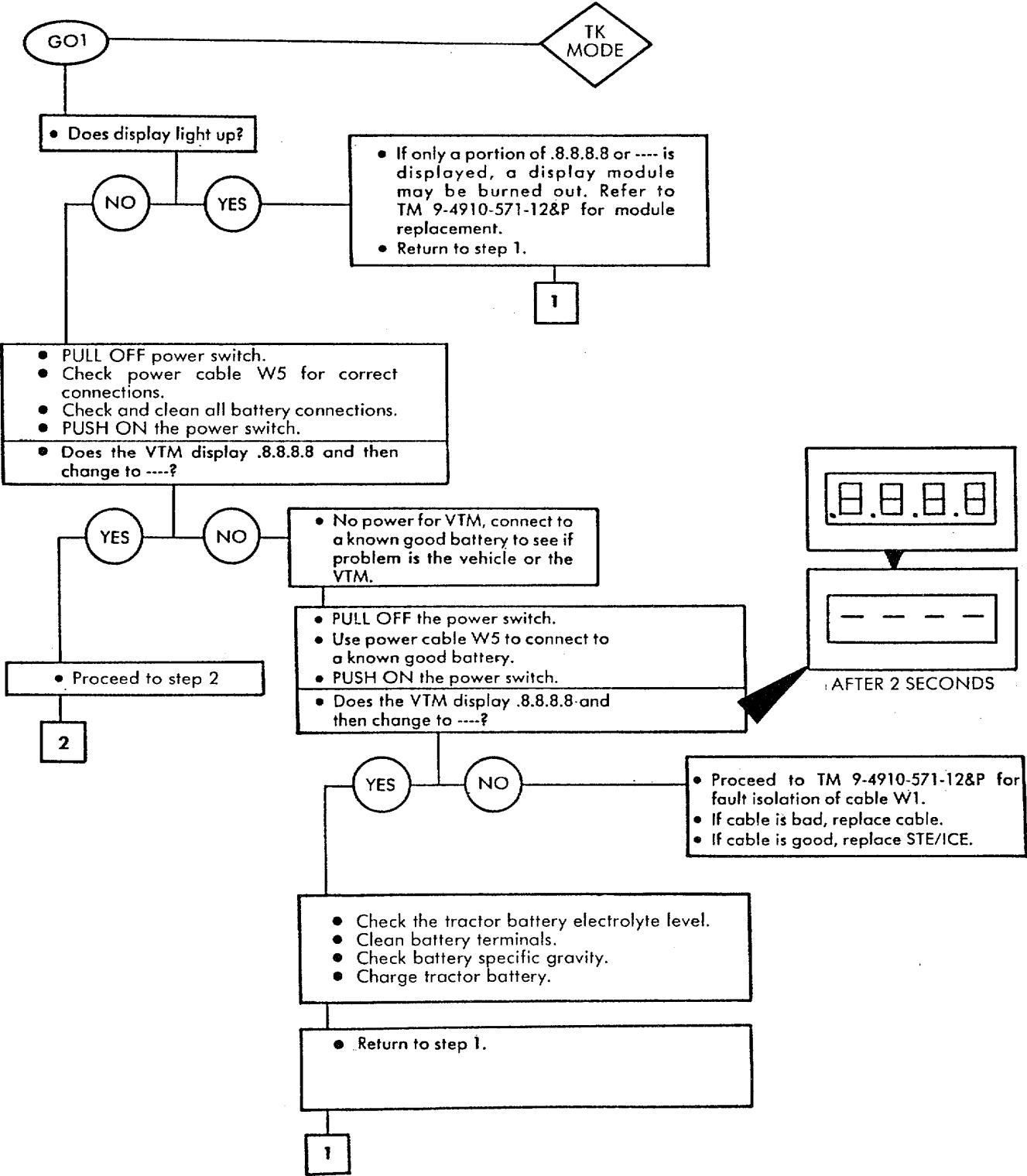
(3) TK Mode GO-Chain Tests.



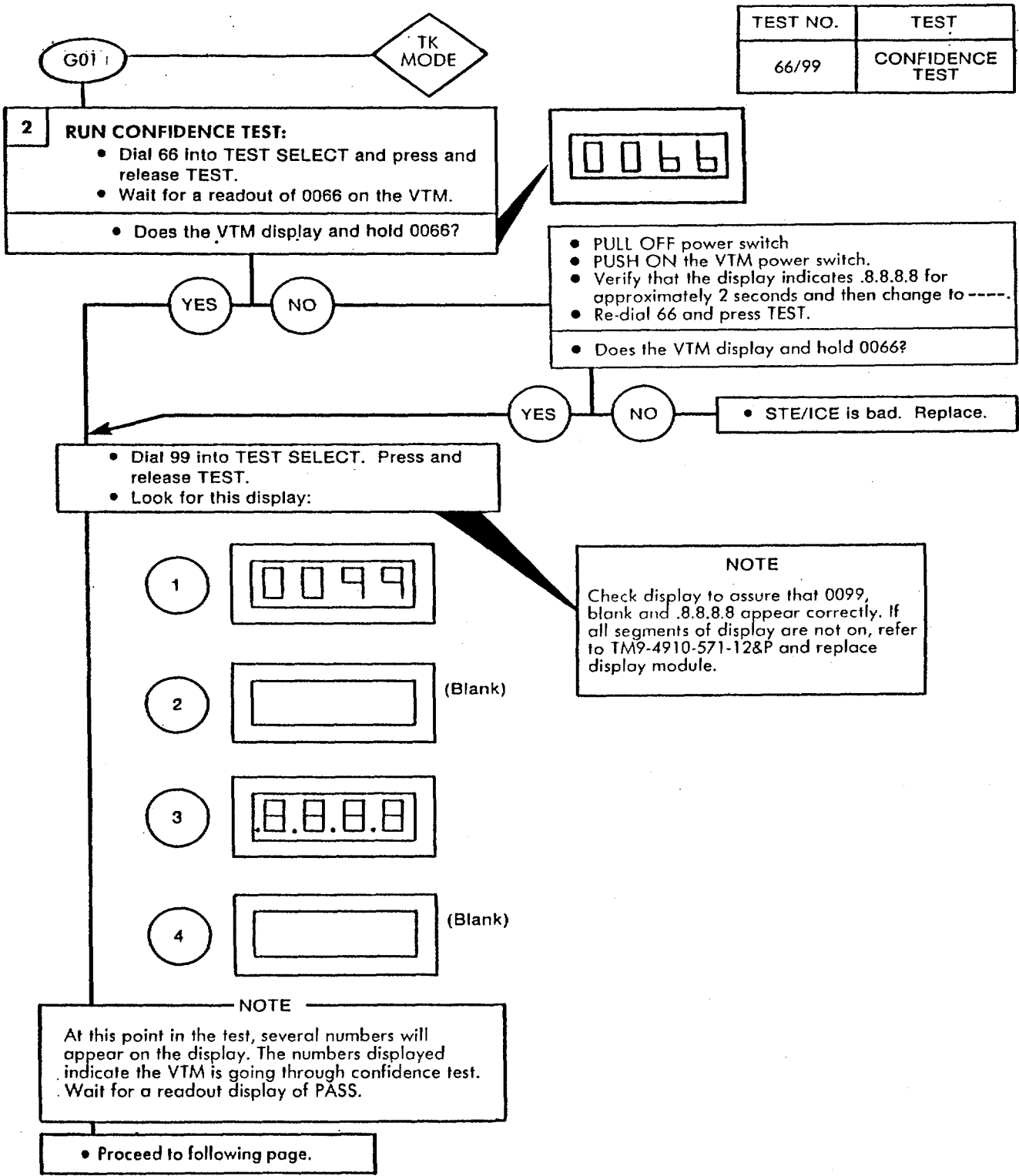
NOTE
Perform all GO steps until a NO-GO condition exists, then perform the NO-GO step indicated.



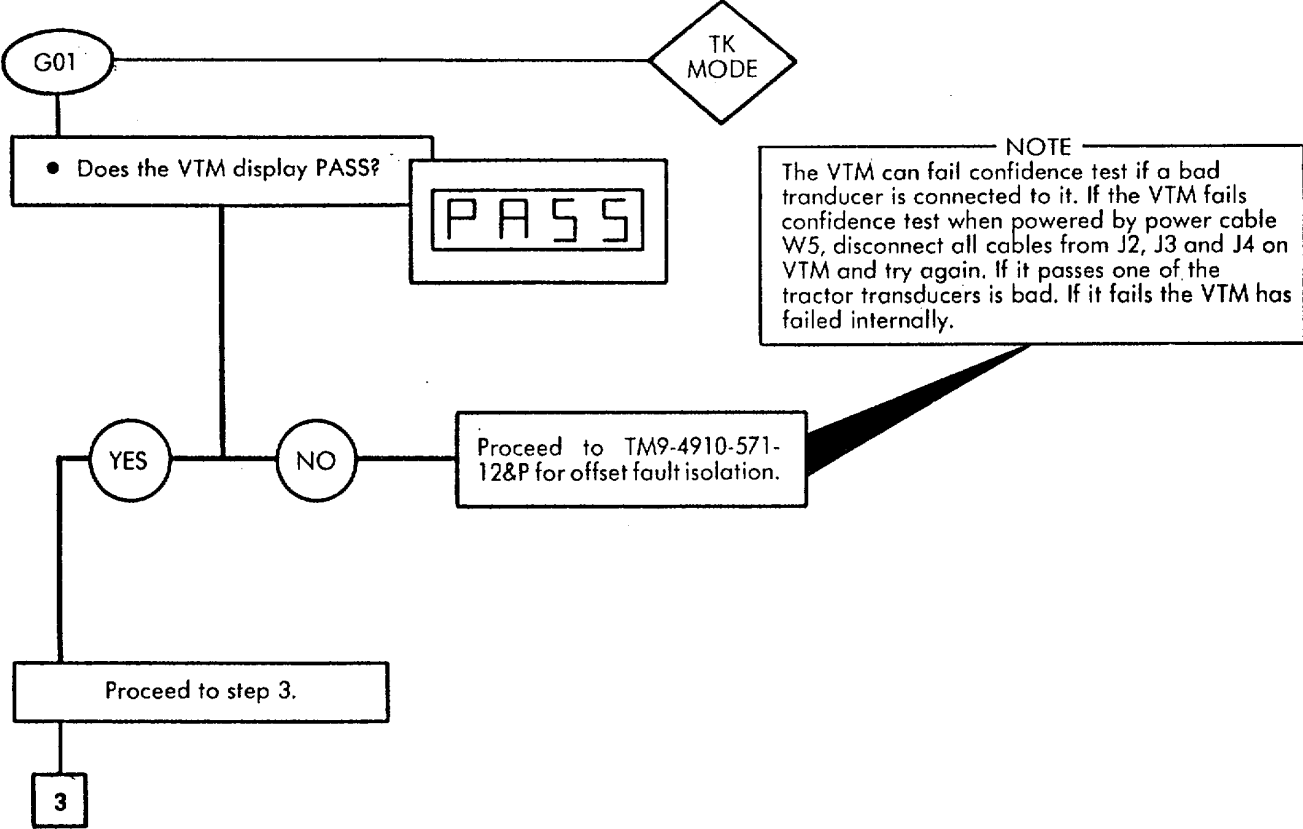
(3) TK Mode GO-Chain Tests (Cont'd).



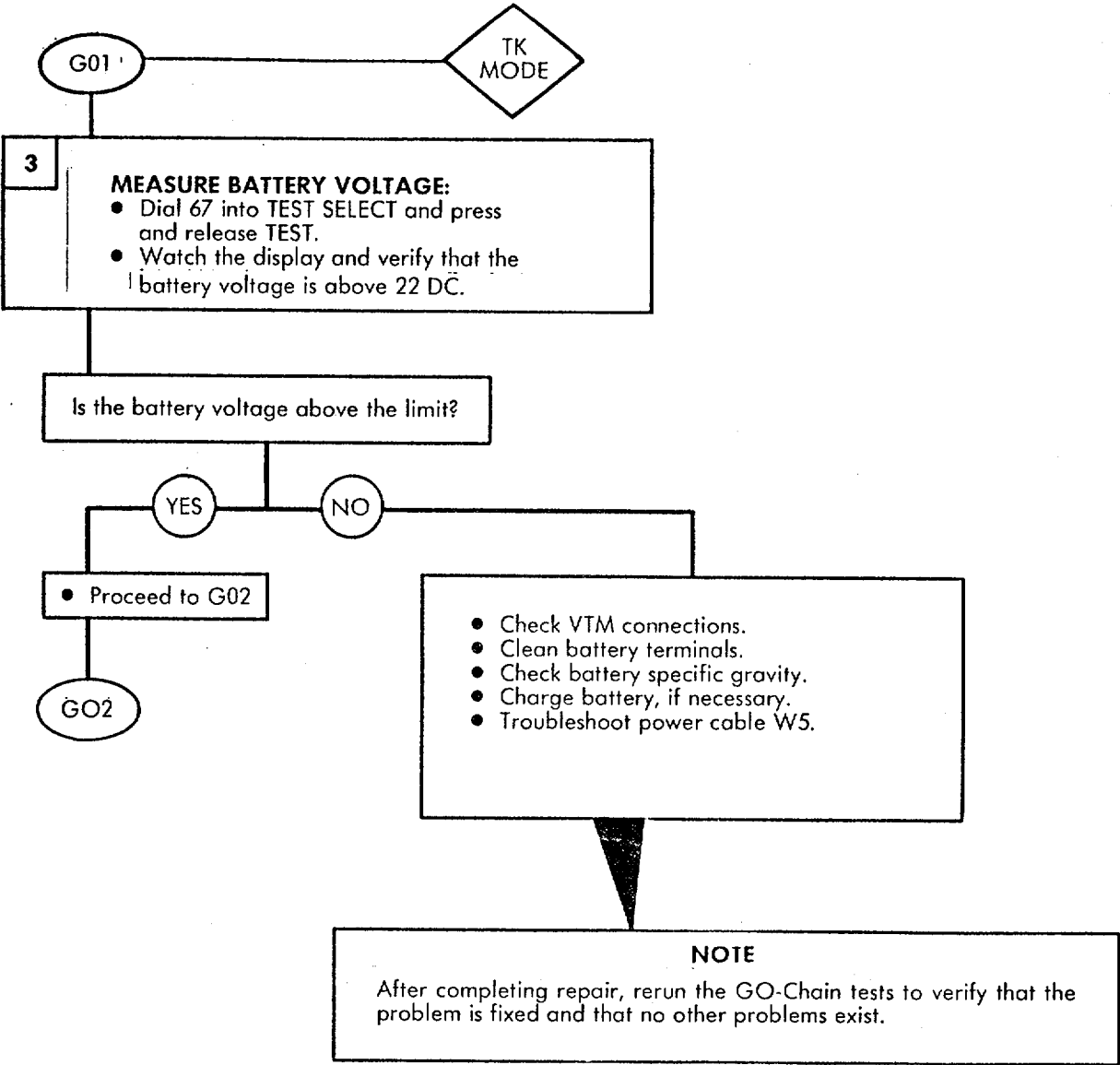
(3) TK Mode GO-Chain Tests (Cont'd).



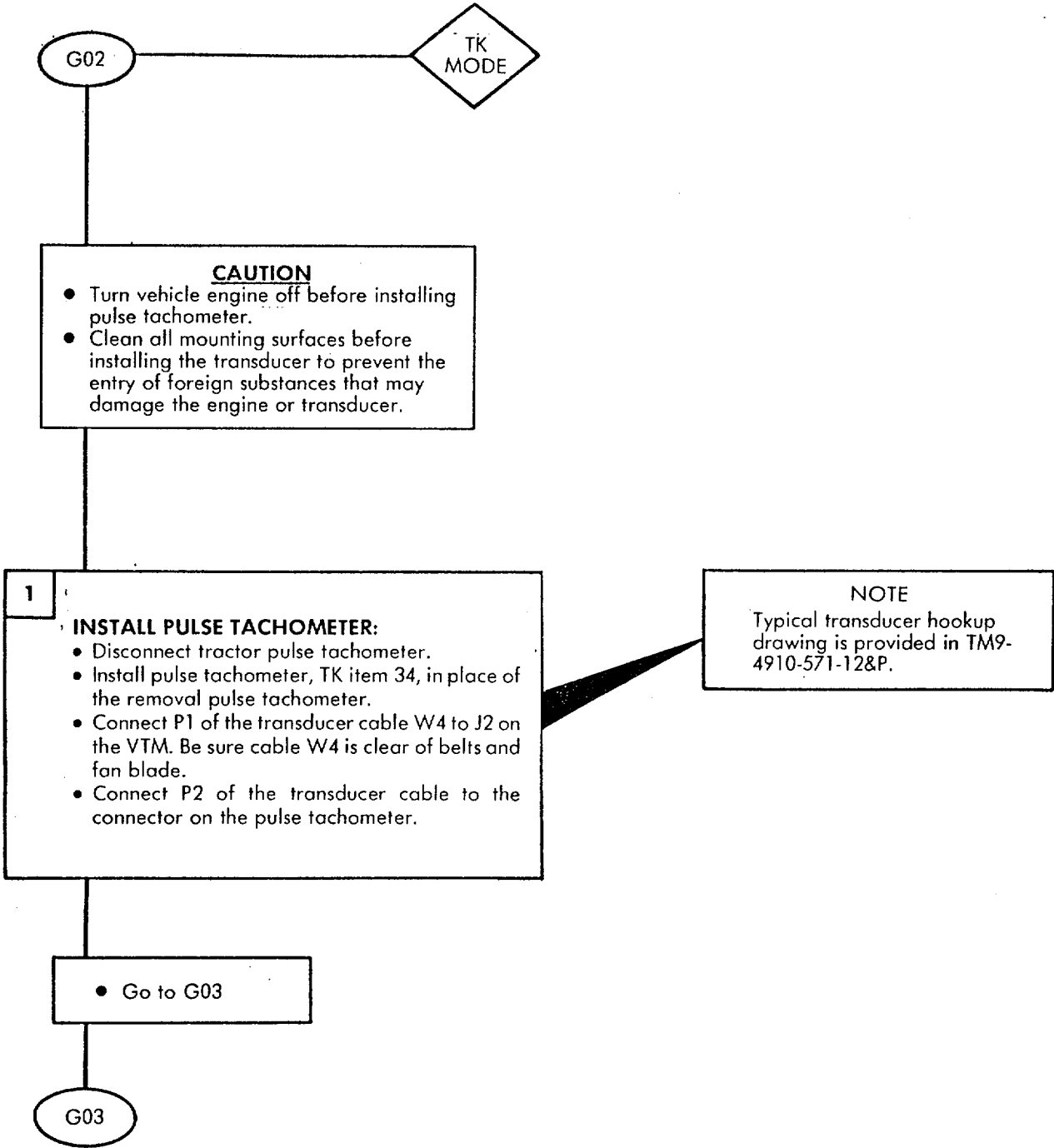
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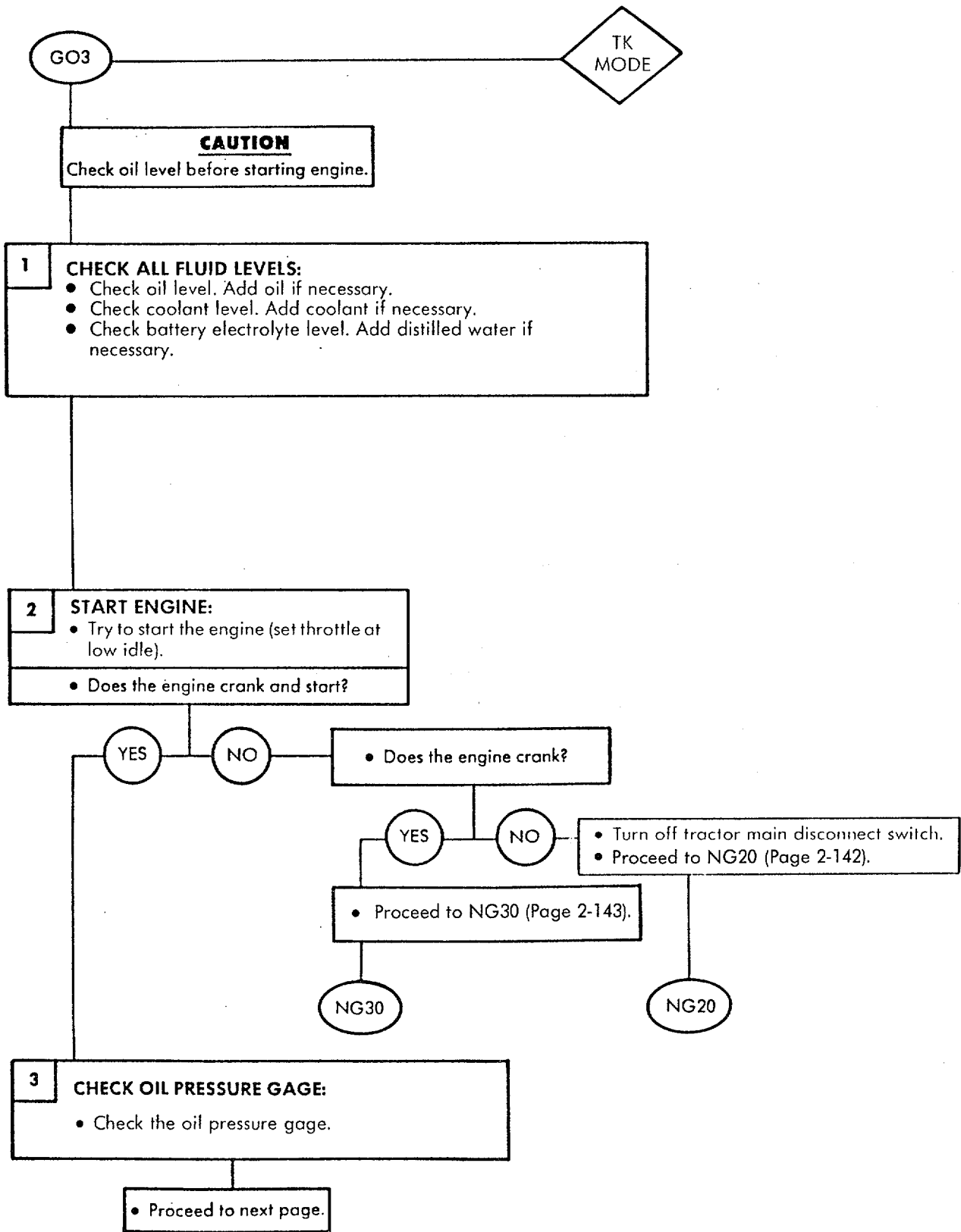
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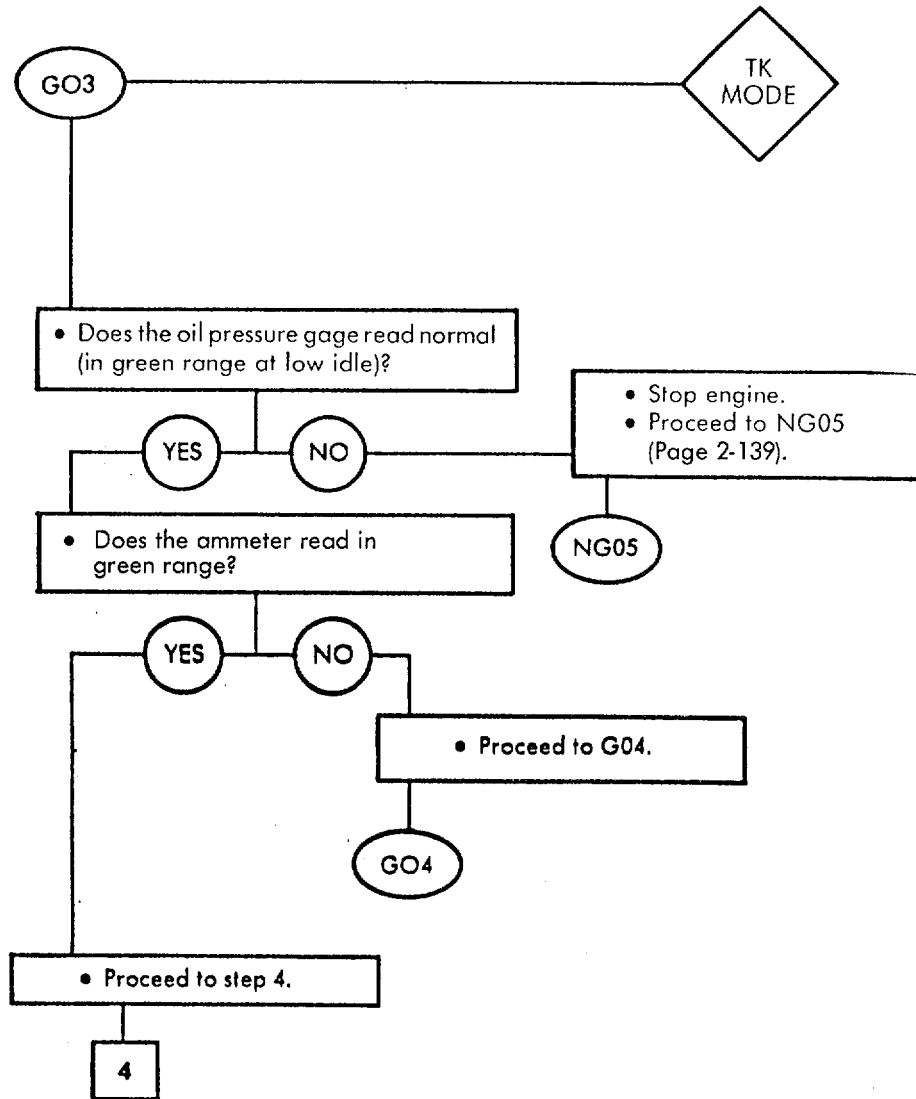
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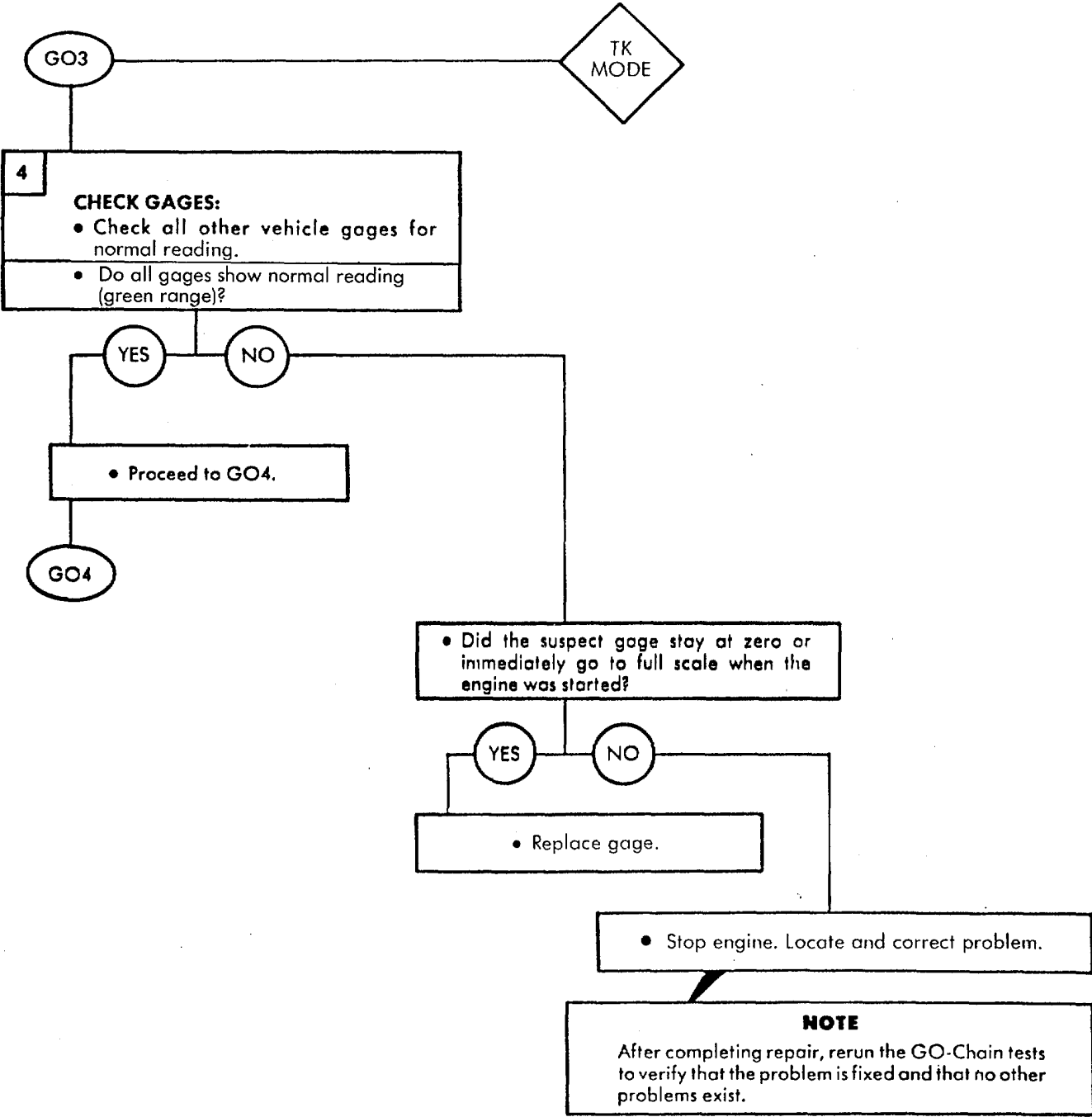
(3) TK Mode GO-Chain Tests (Cont'd).



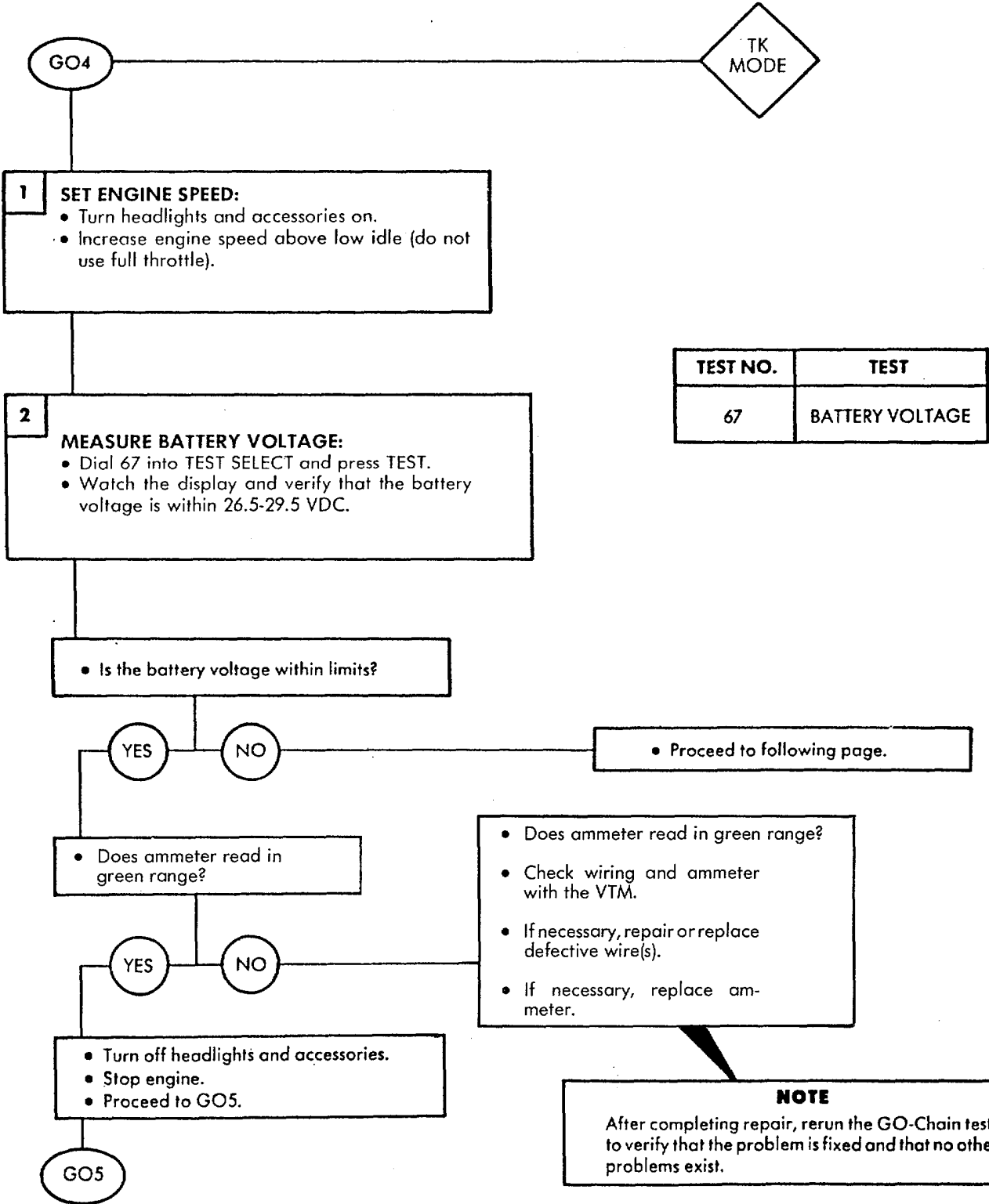
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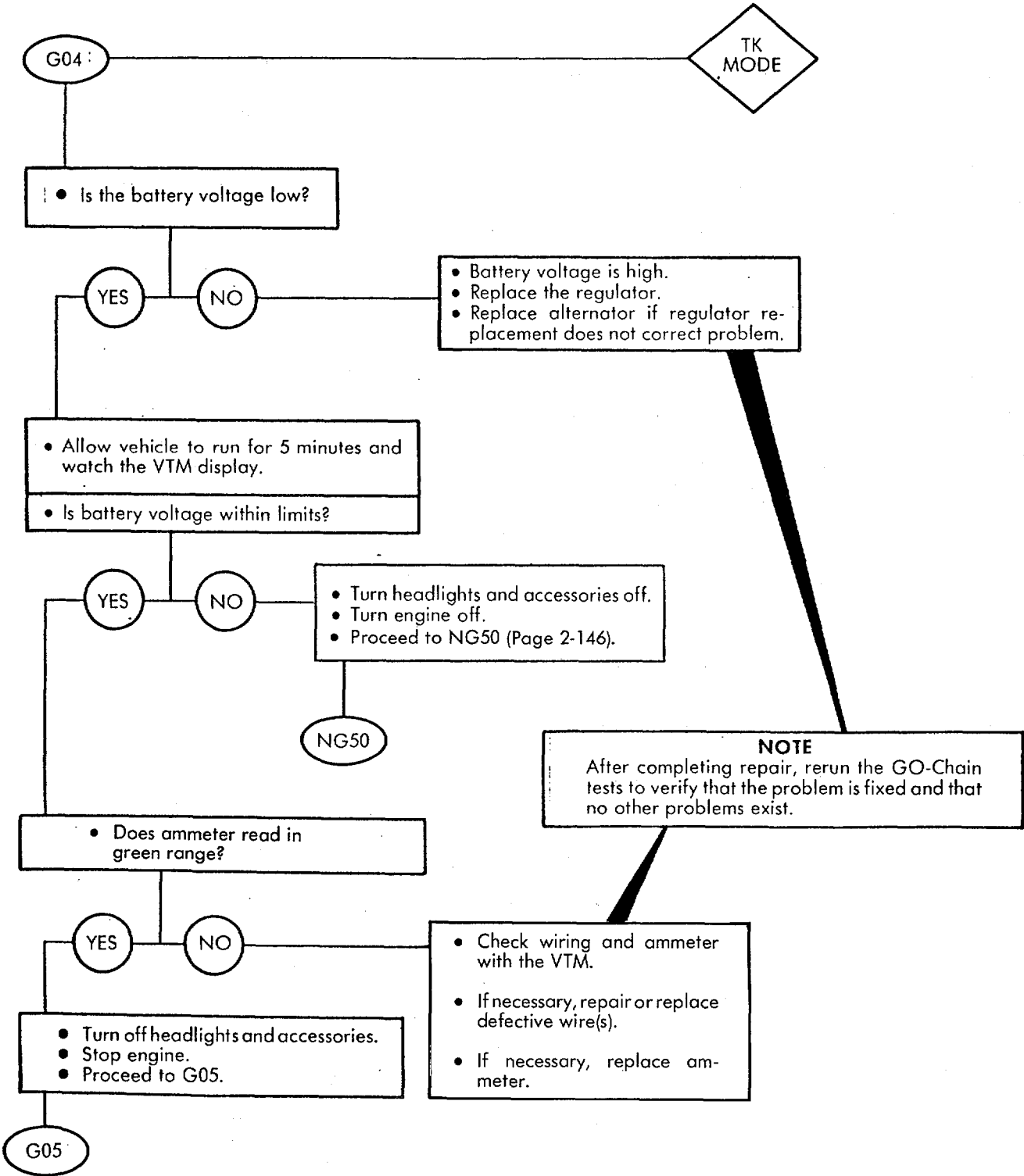
(3) TK Mode GO-Chain Tests (Cont'd).

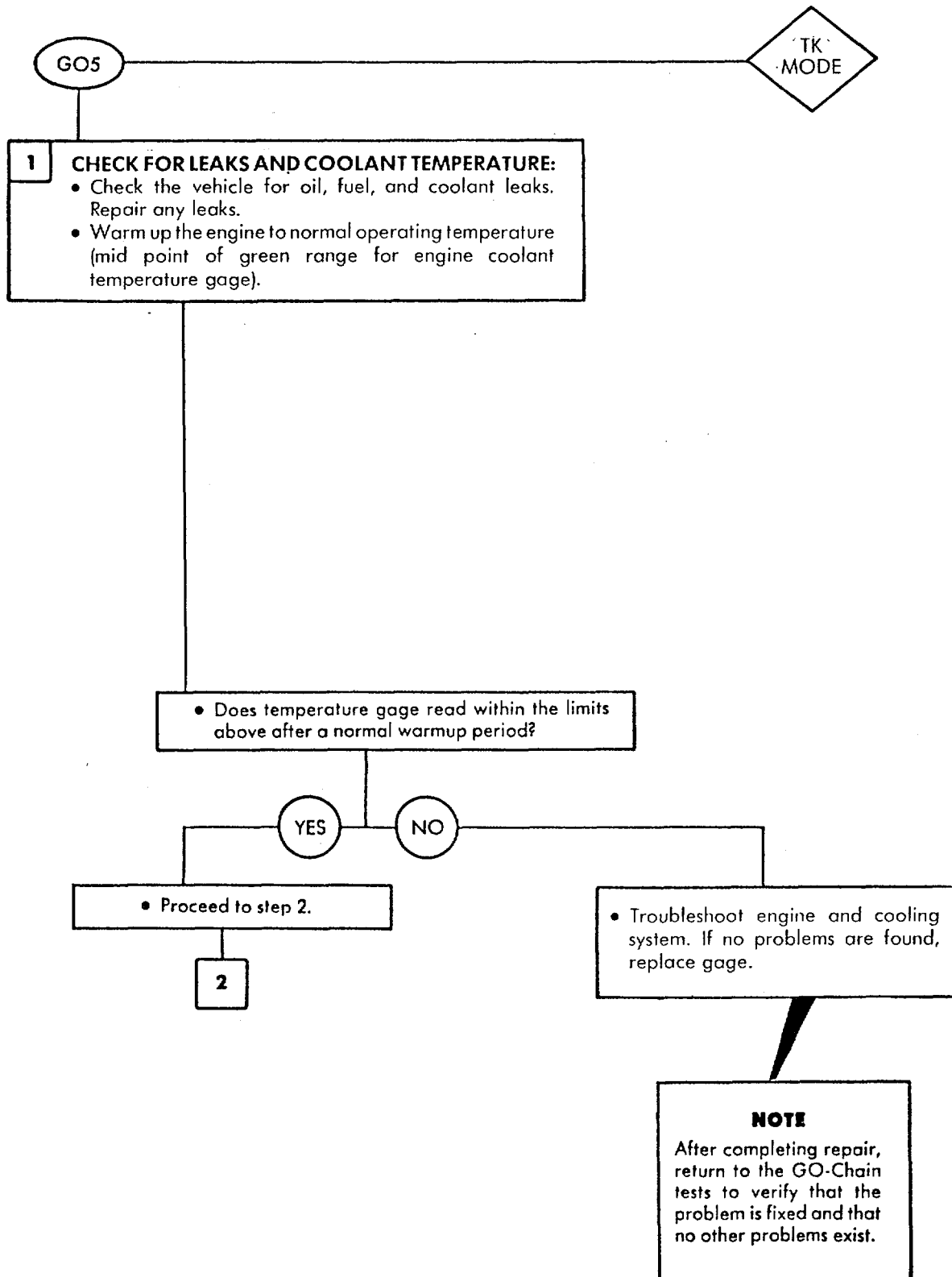


(3) TK Mode GO-Chain Tests (Cont'd).

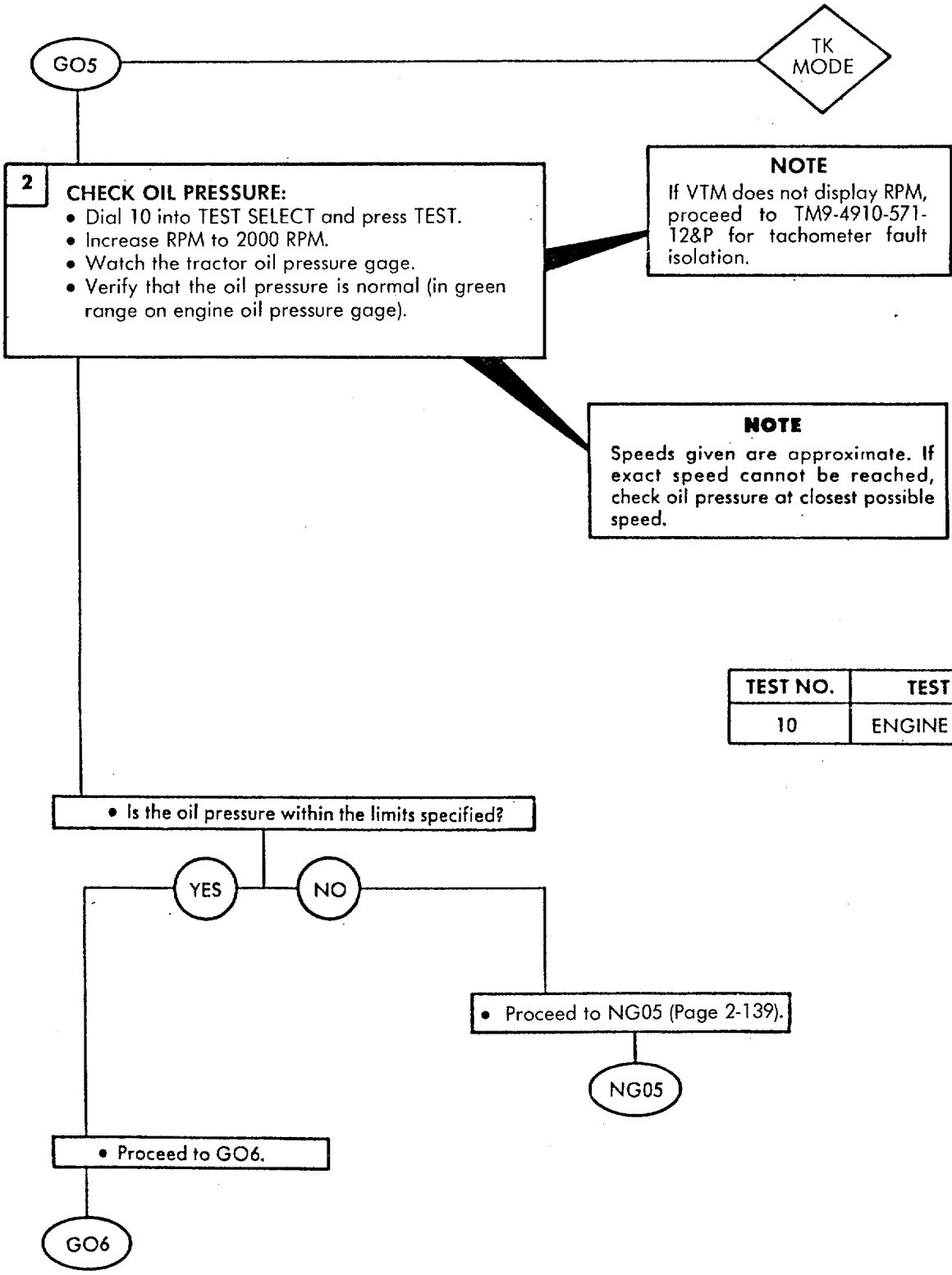


(3) TK Mode GO-Chain Tests (Cont'd).

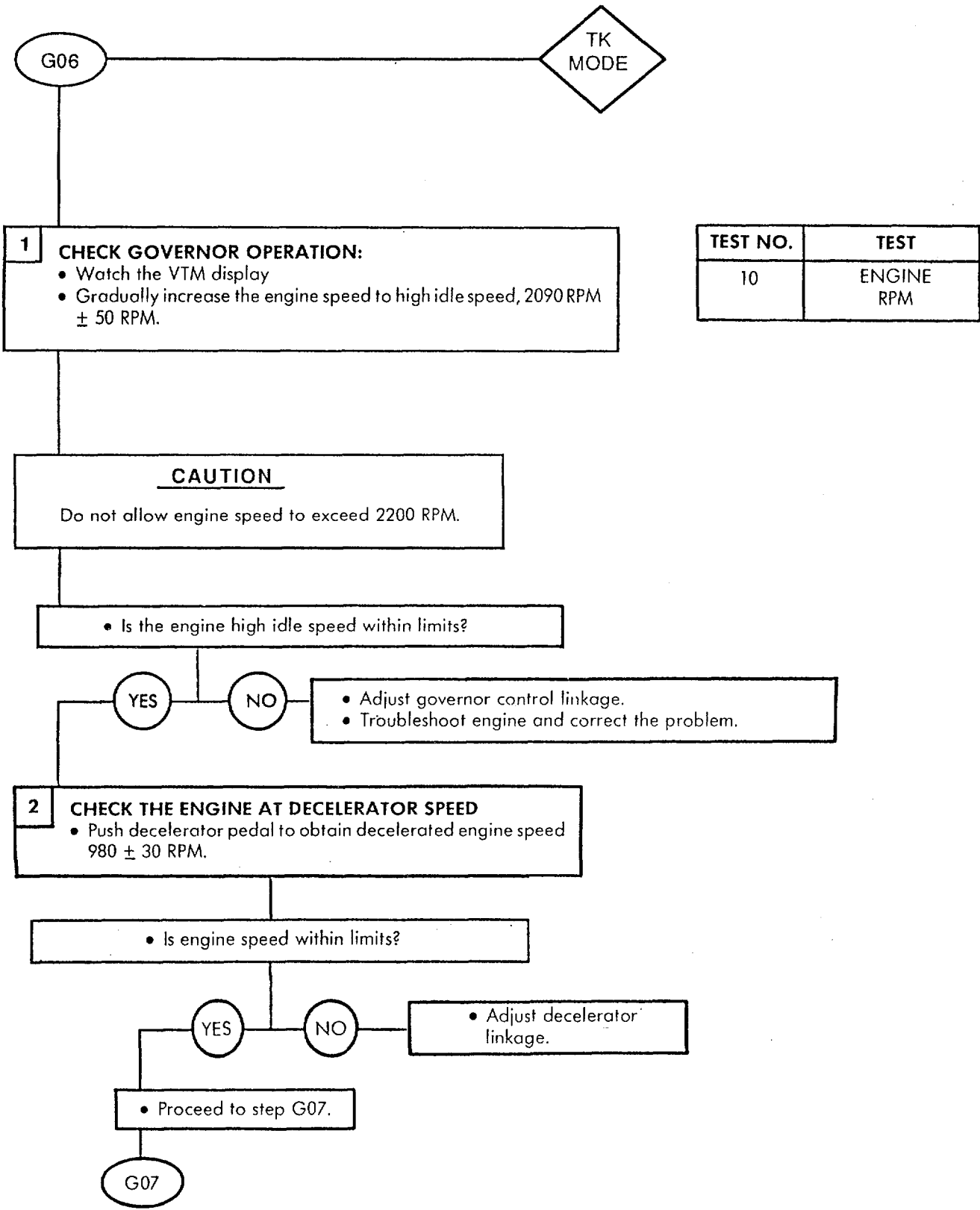




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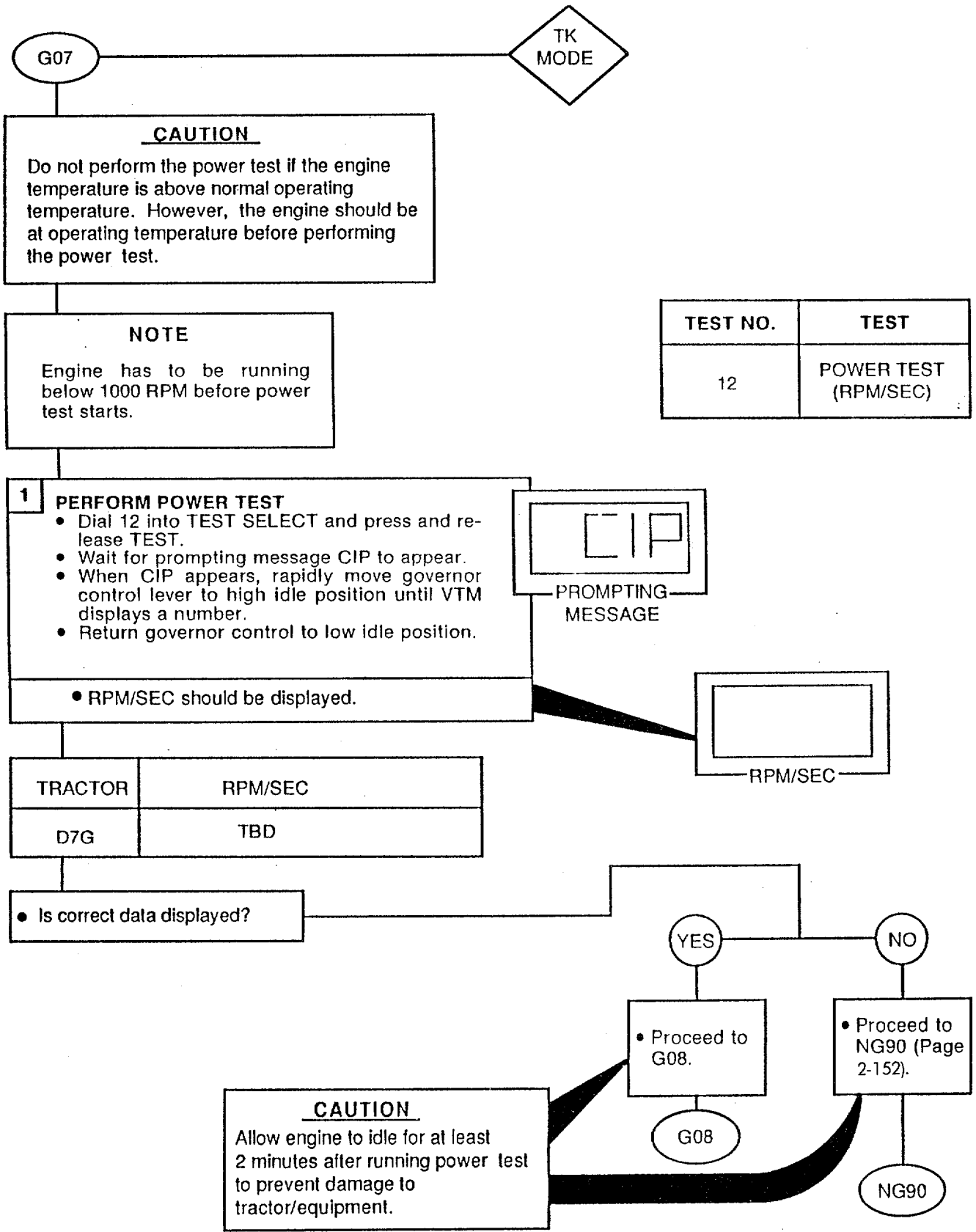


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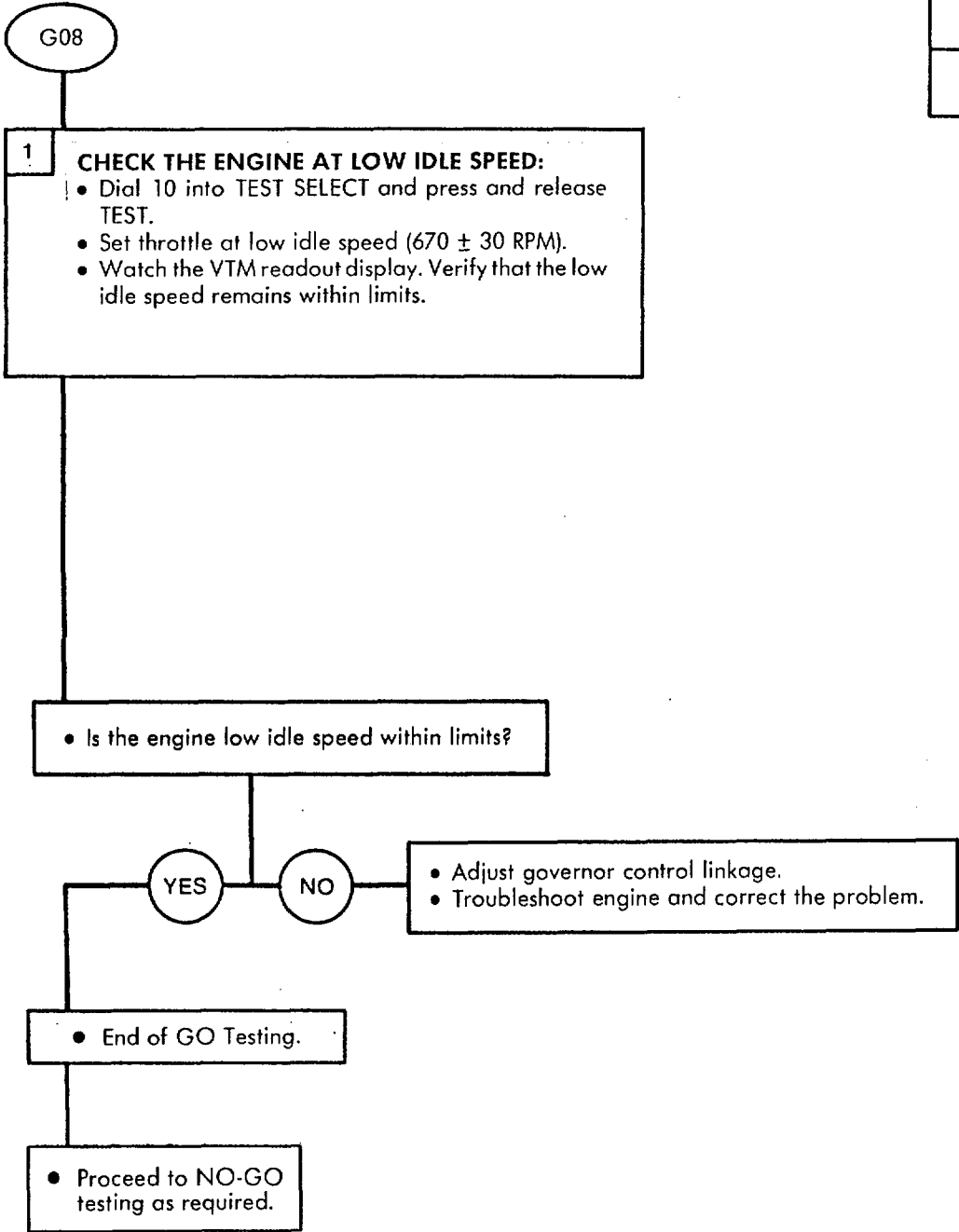
TEST NO.	TEST
10	ENGINE RPM

(3) TK Mode GO-Chain Tests (Cont'd).

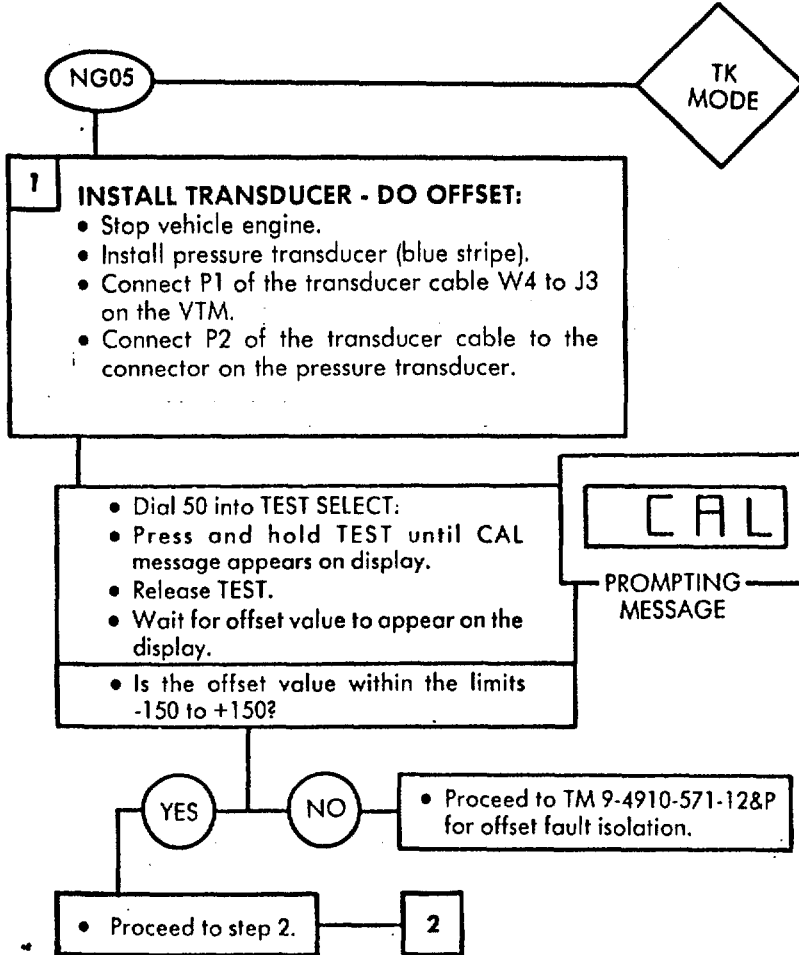
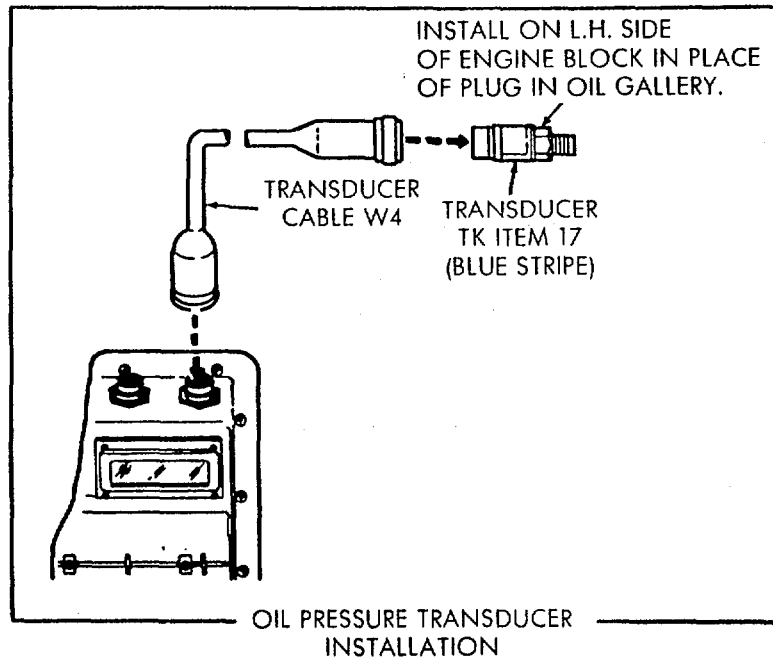


(3) TK Mode GO-Chain Tests (Cont'd).

TEST NO.	TEST
10	ENGINE RPM

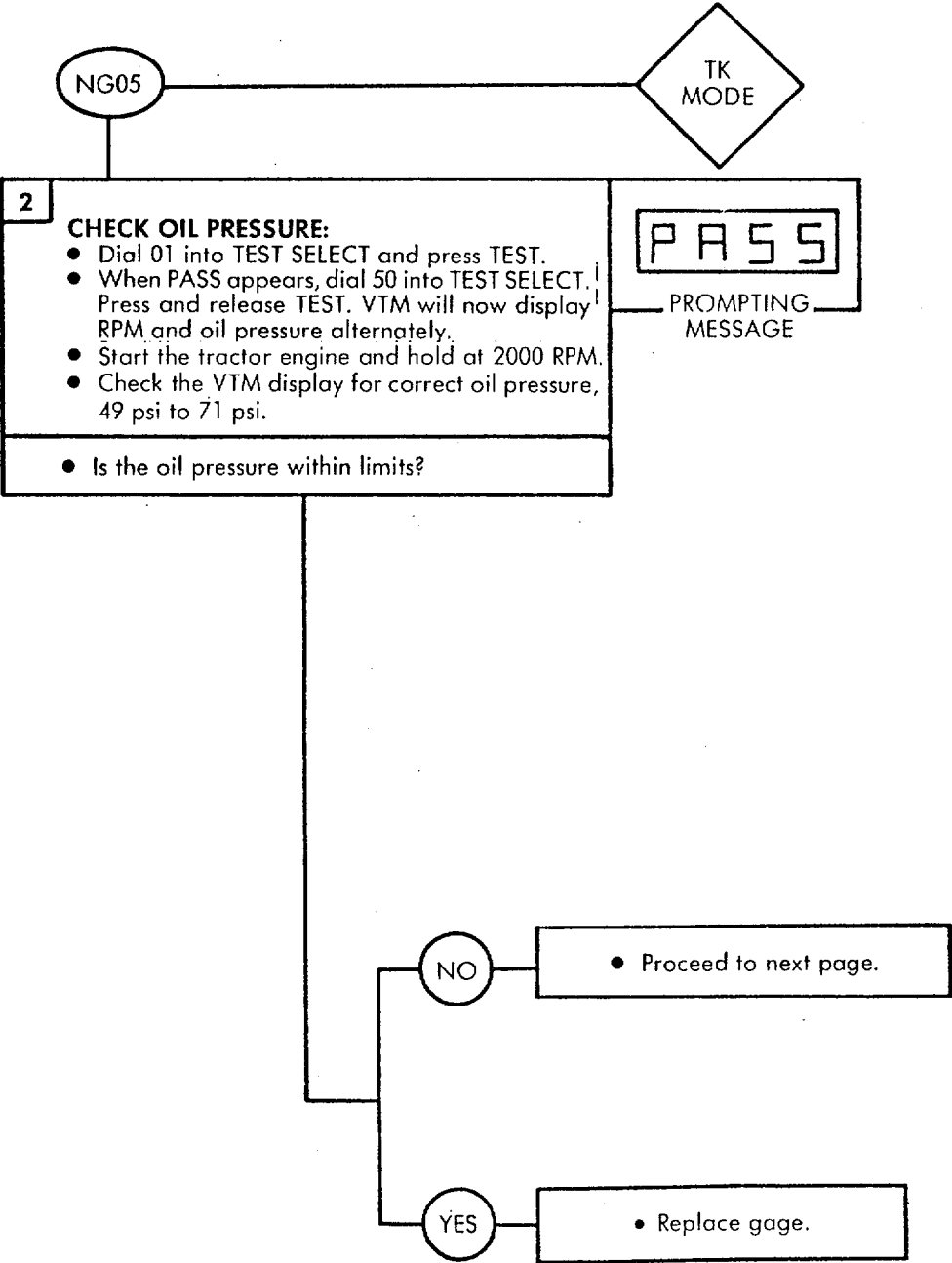


(4) TK Mode NO-GO Chain Tests (Cont'd).

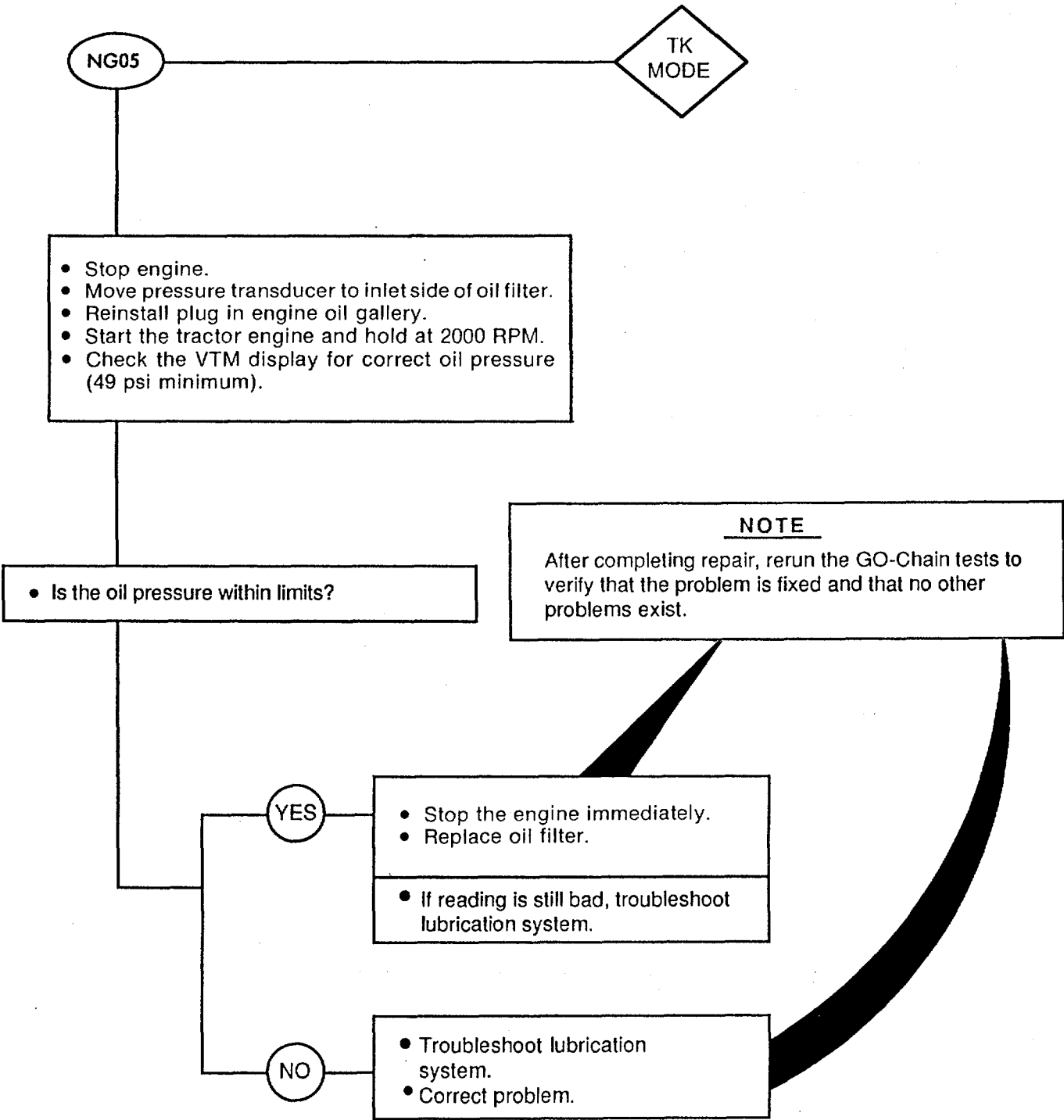


TEST NO.	TEST
01	INTERLEAVE
50	0-1000 PSIG PRESSURE

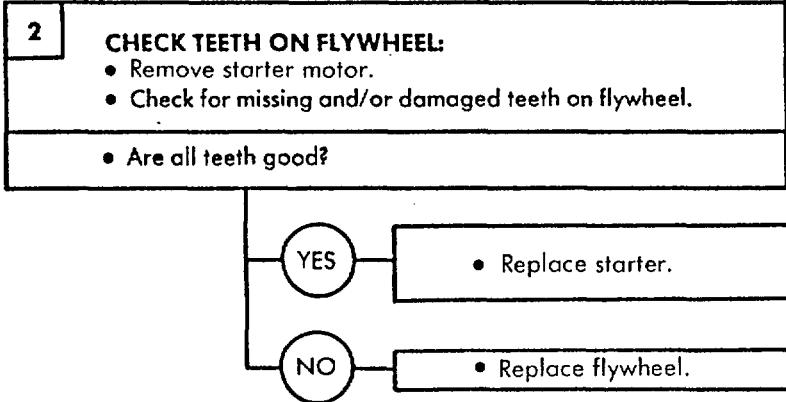
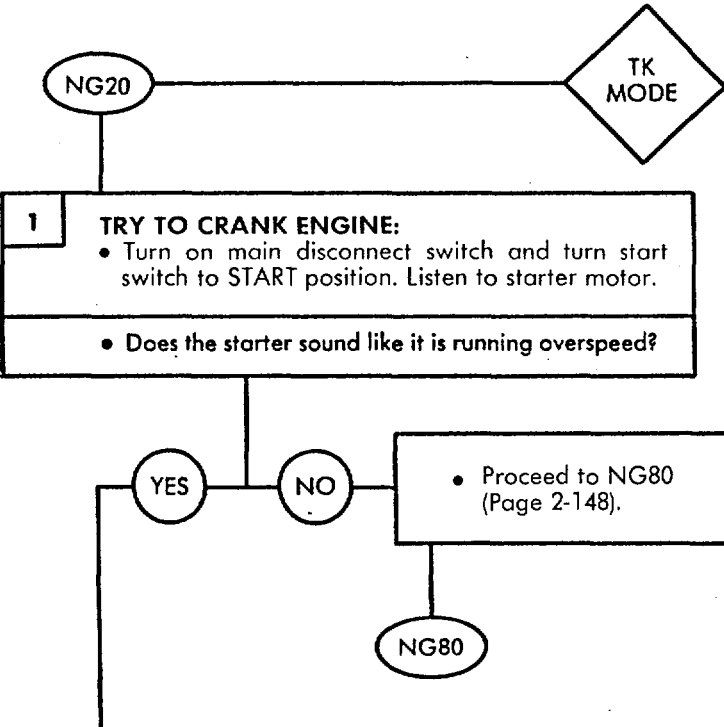
(4) TK Mode NO-GO Chain Tests (Cont'd).



(4) TK Mode NO-GO Chain Tests (Cont'd).

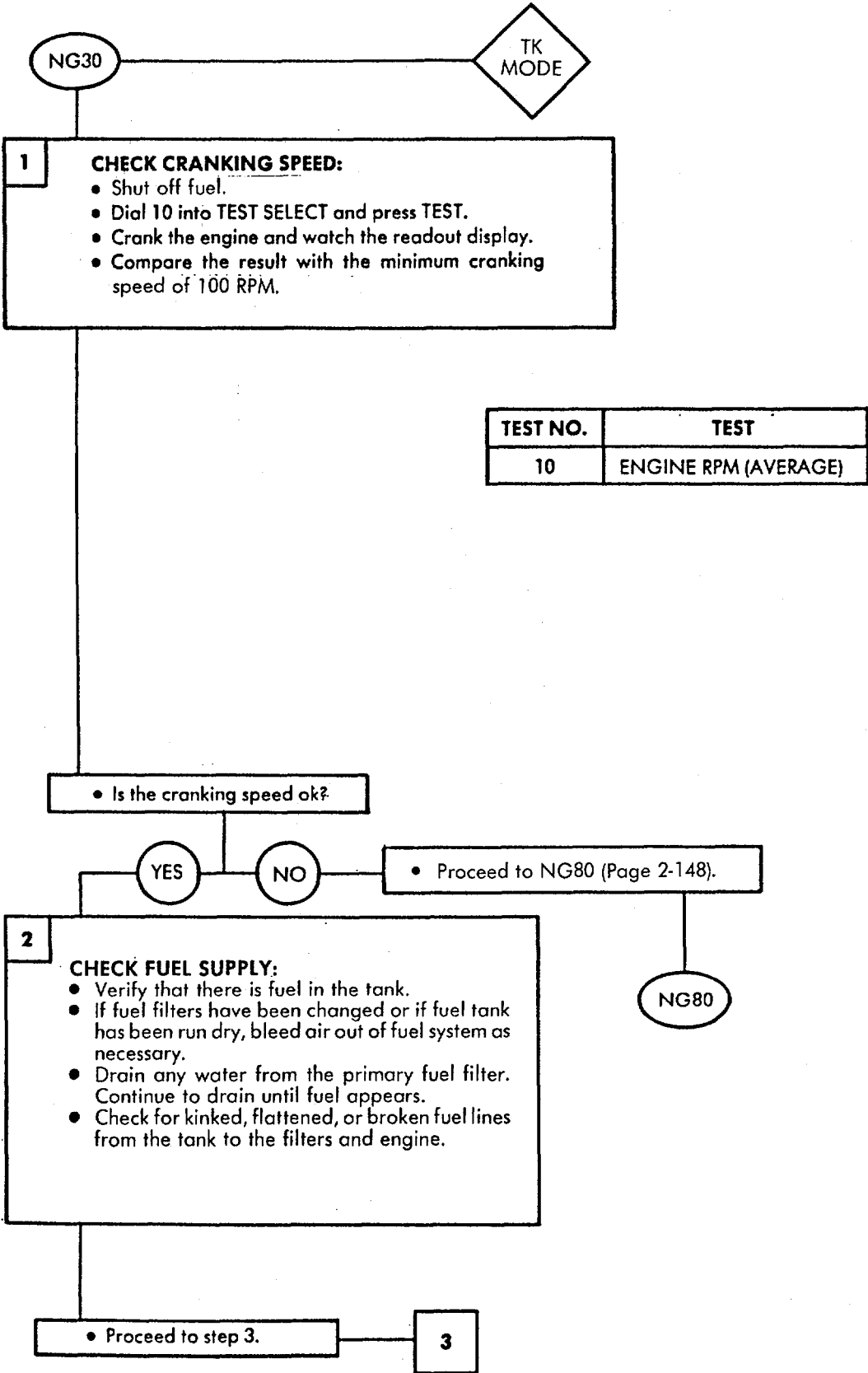


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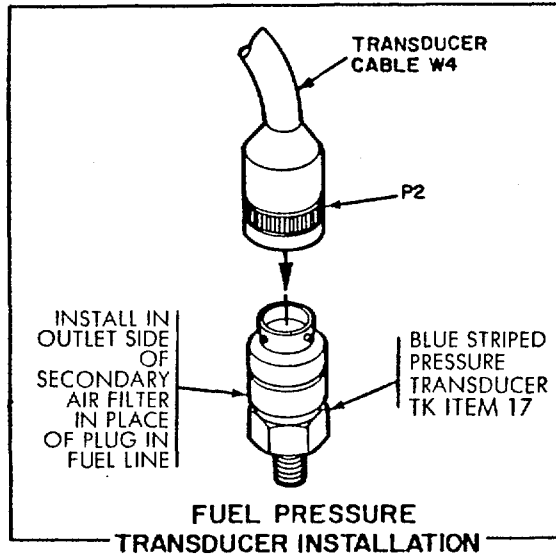


NOTE
After completing repair, rerun the GO-Chain tests to verify that the problem is fixed and that no other problems exist.

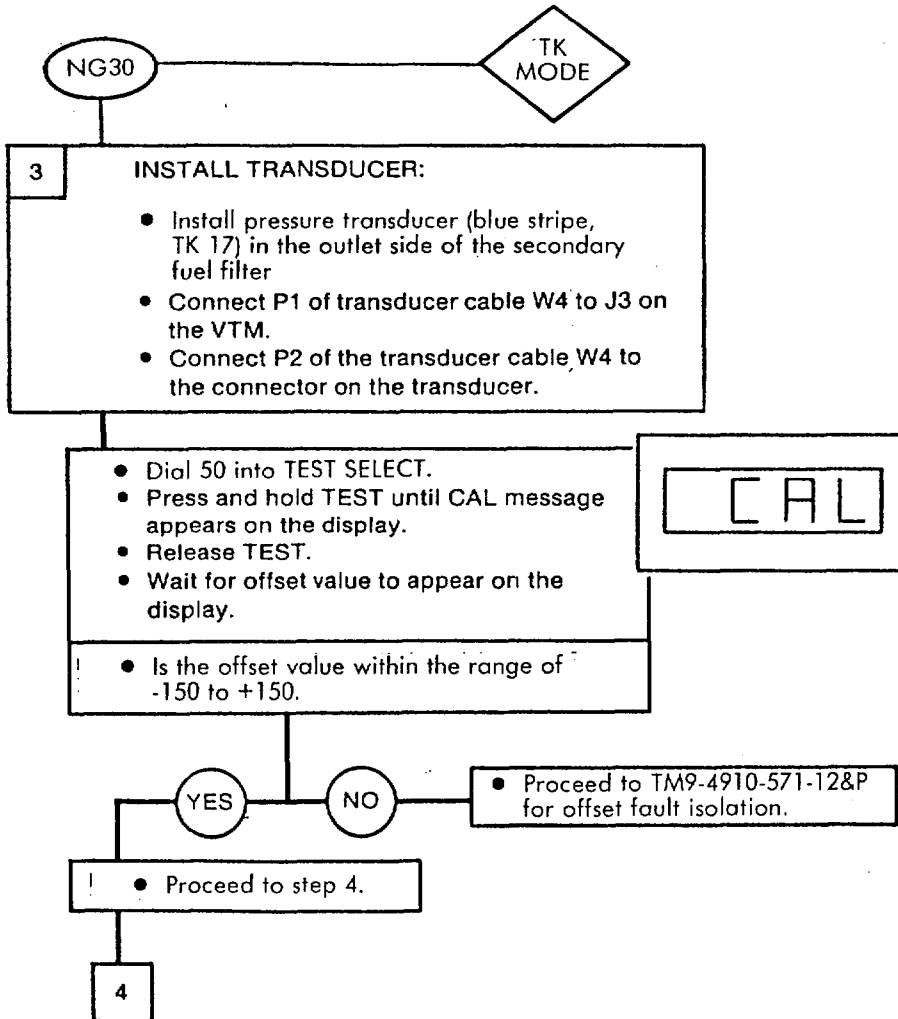
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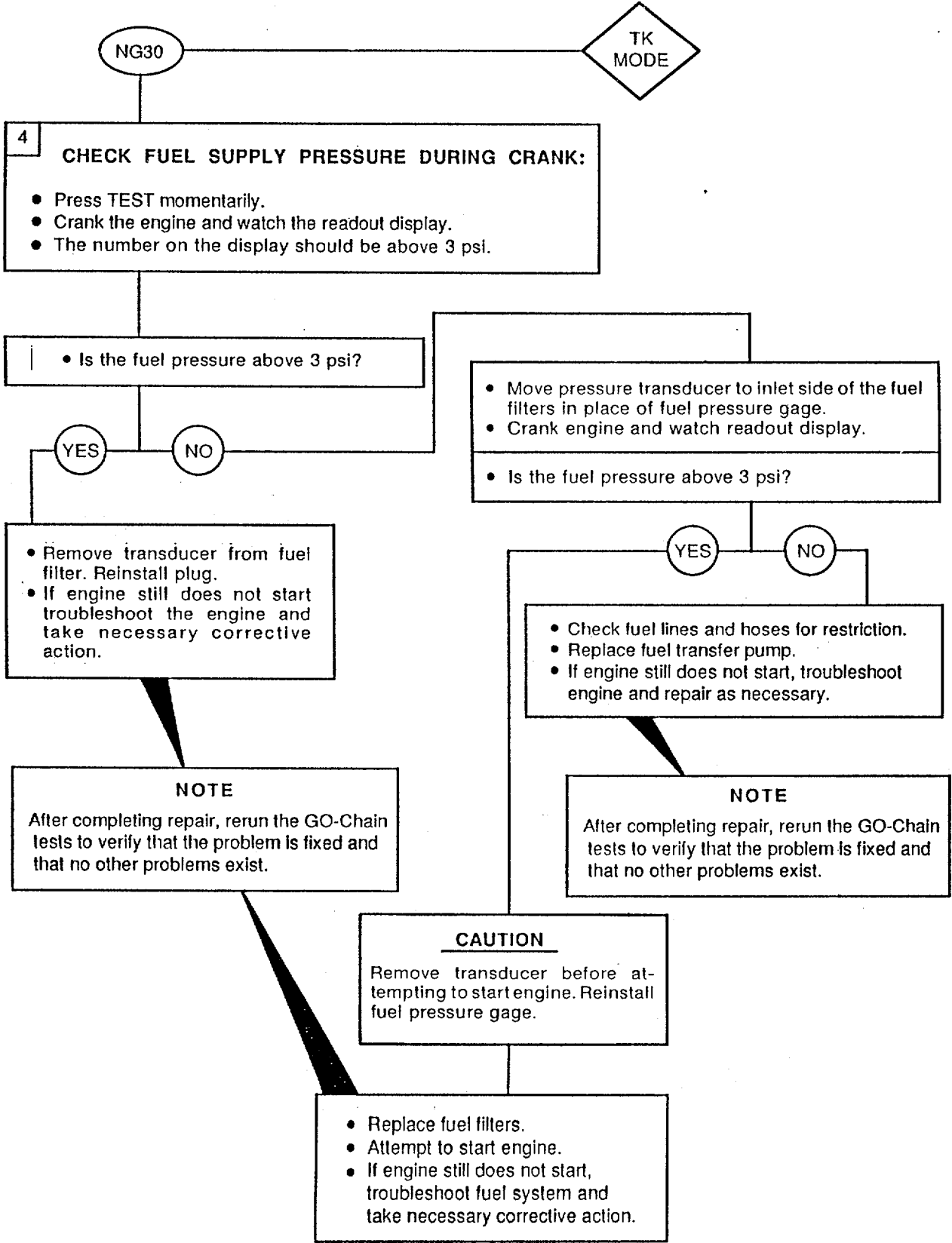
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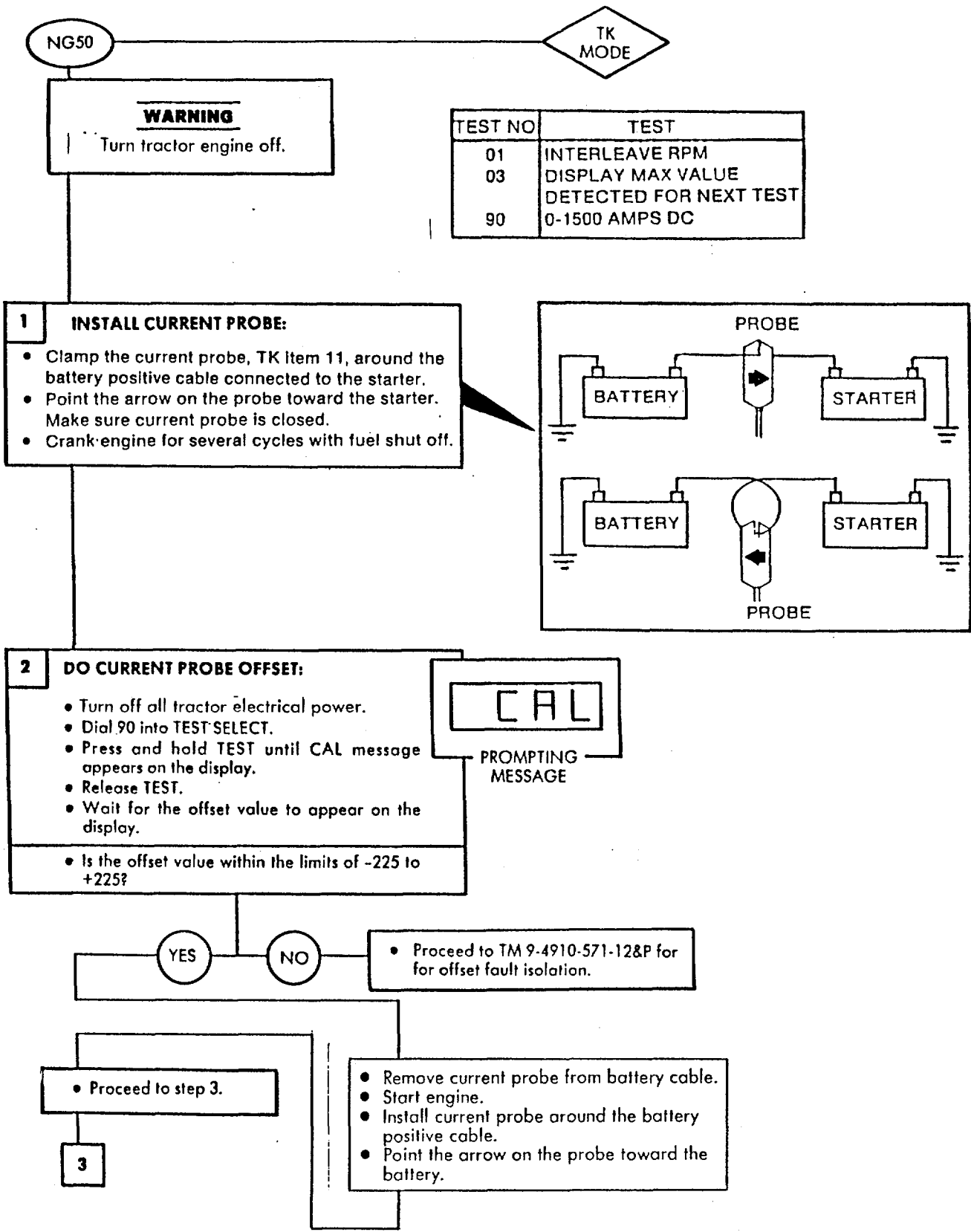
TEST NO.	TEST
50	0-1000 PSIG PRESSURE



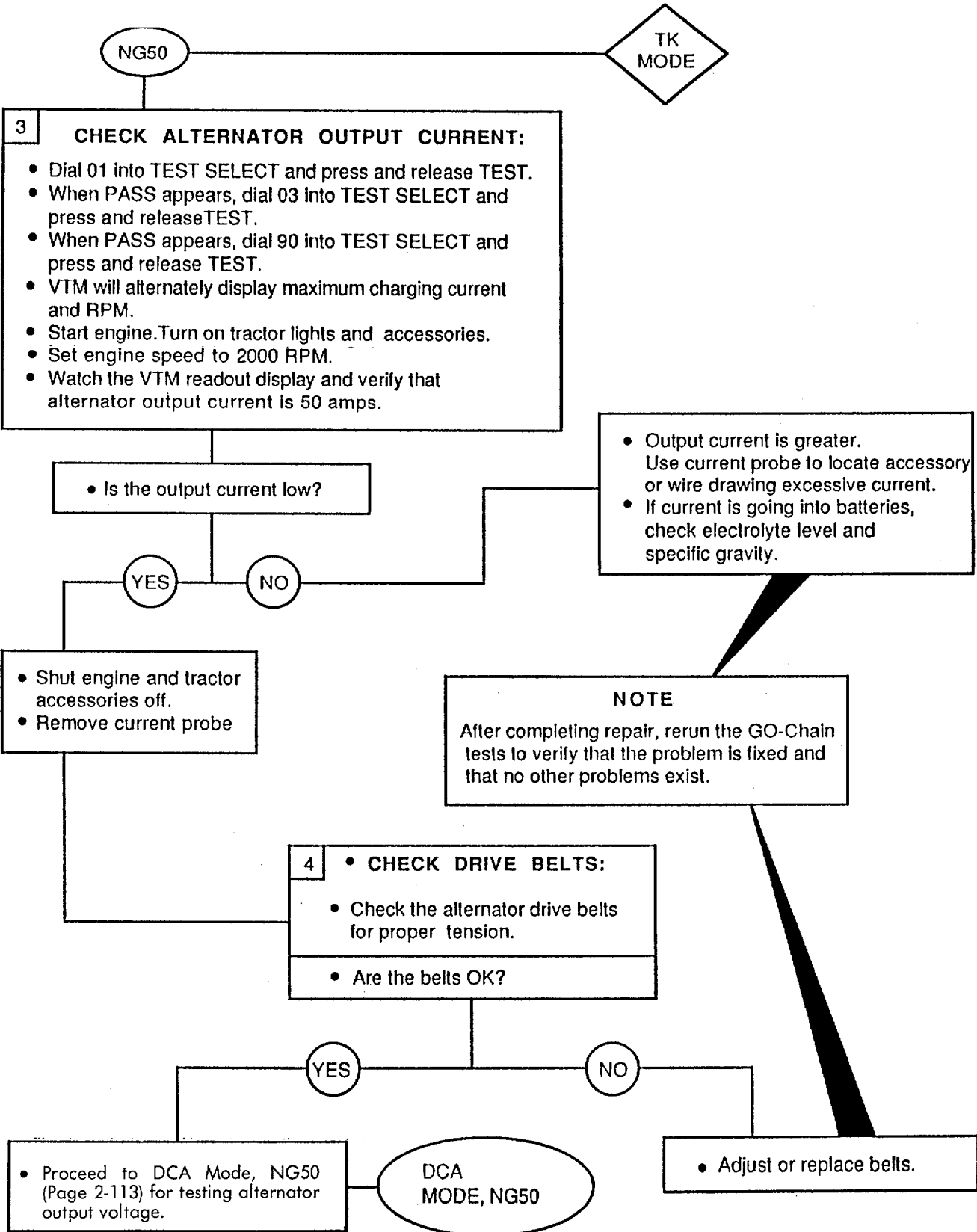
(4) TK Mode NO-GO Chain Tests (Cont'd).



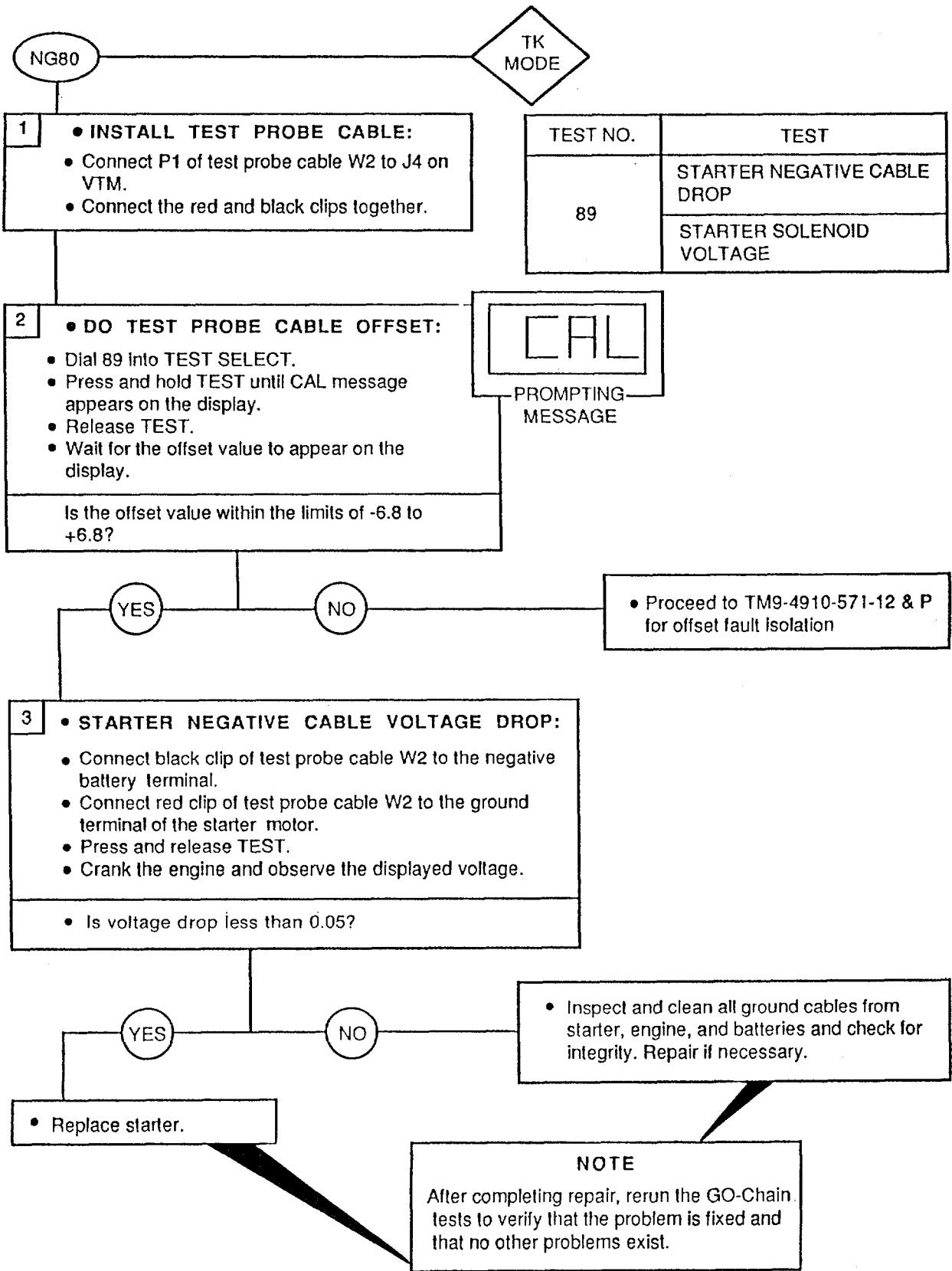
(4) TK Mode NO-GO Chain Tests (Cont'd).



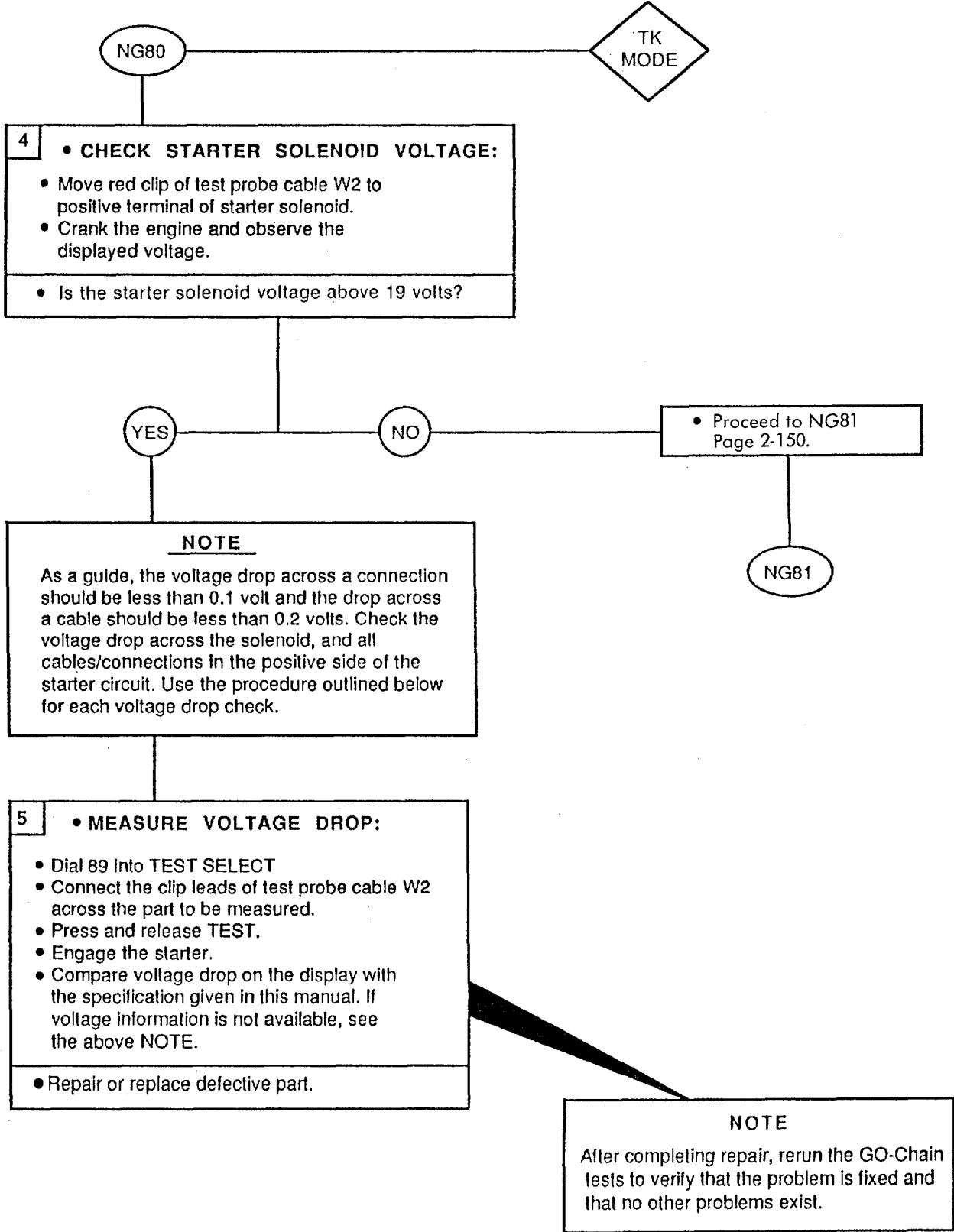
(4) TK Mode NO-GO Chain Tests (Cont'd).



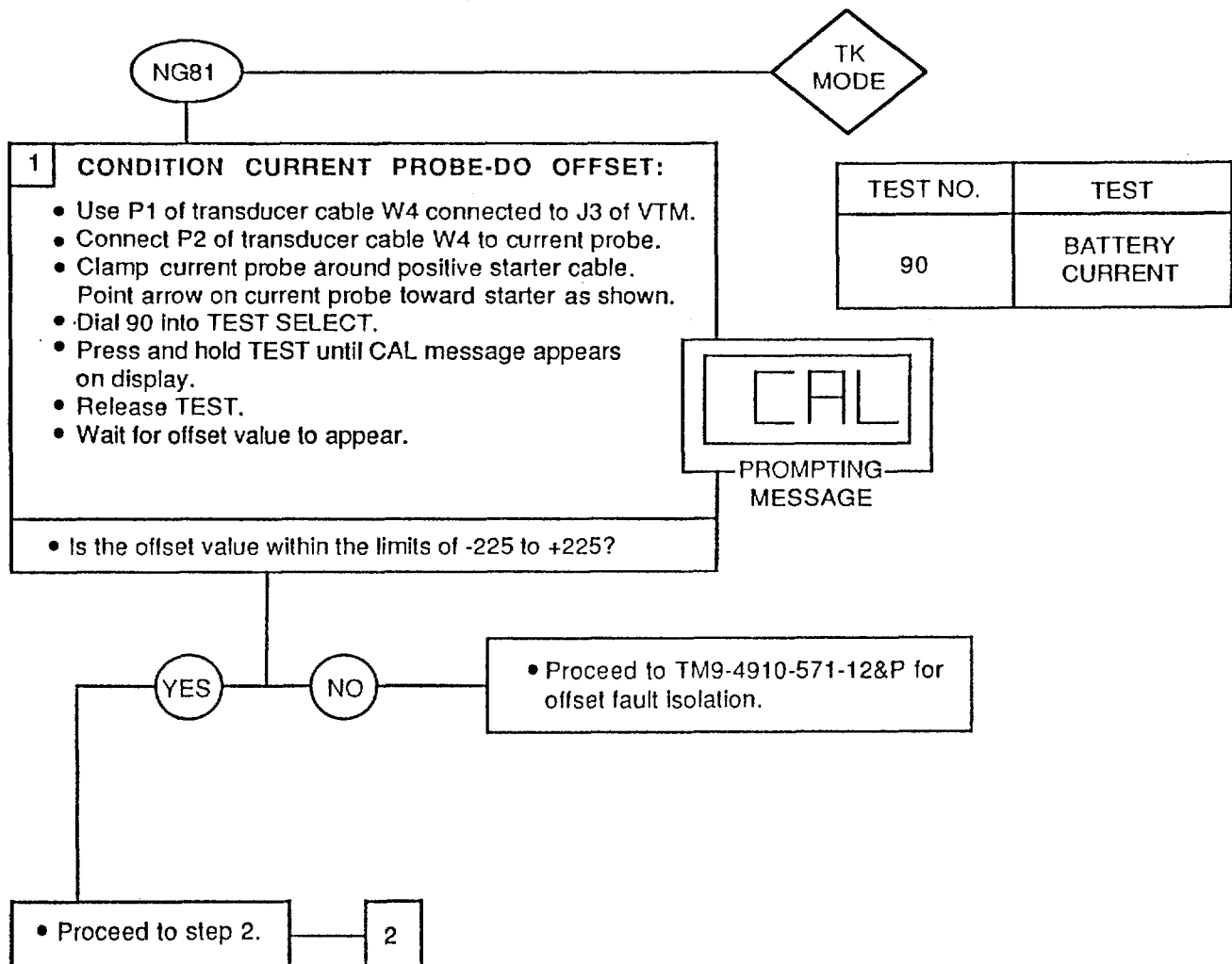
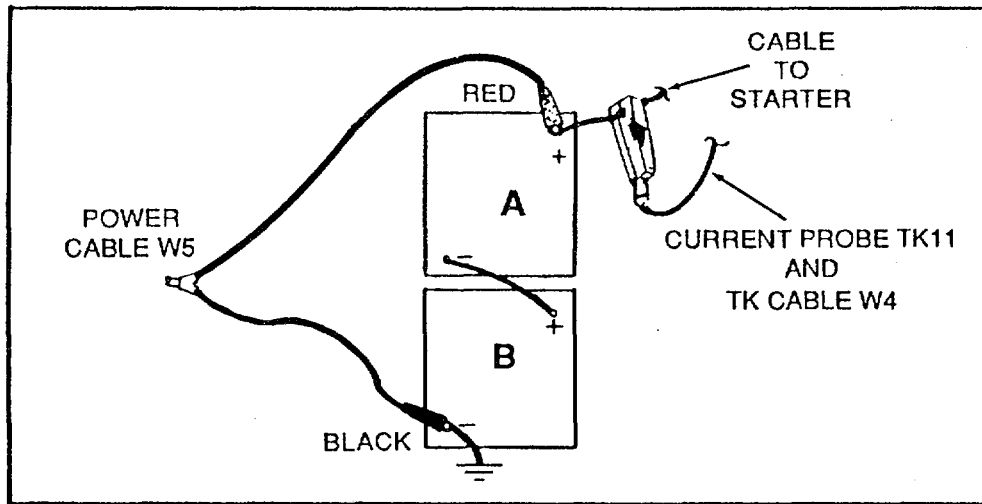
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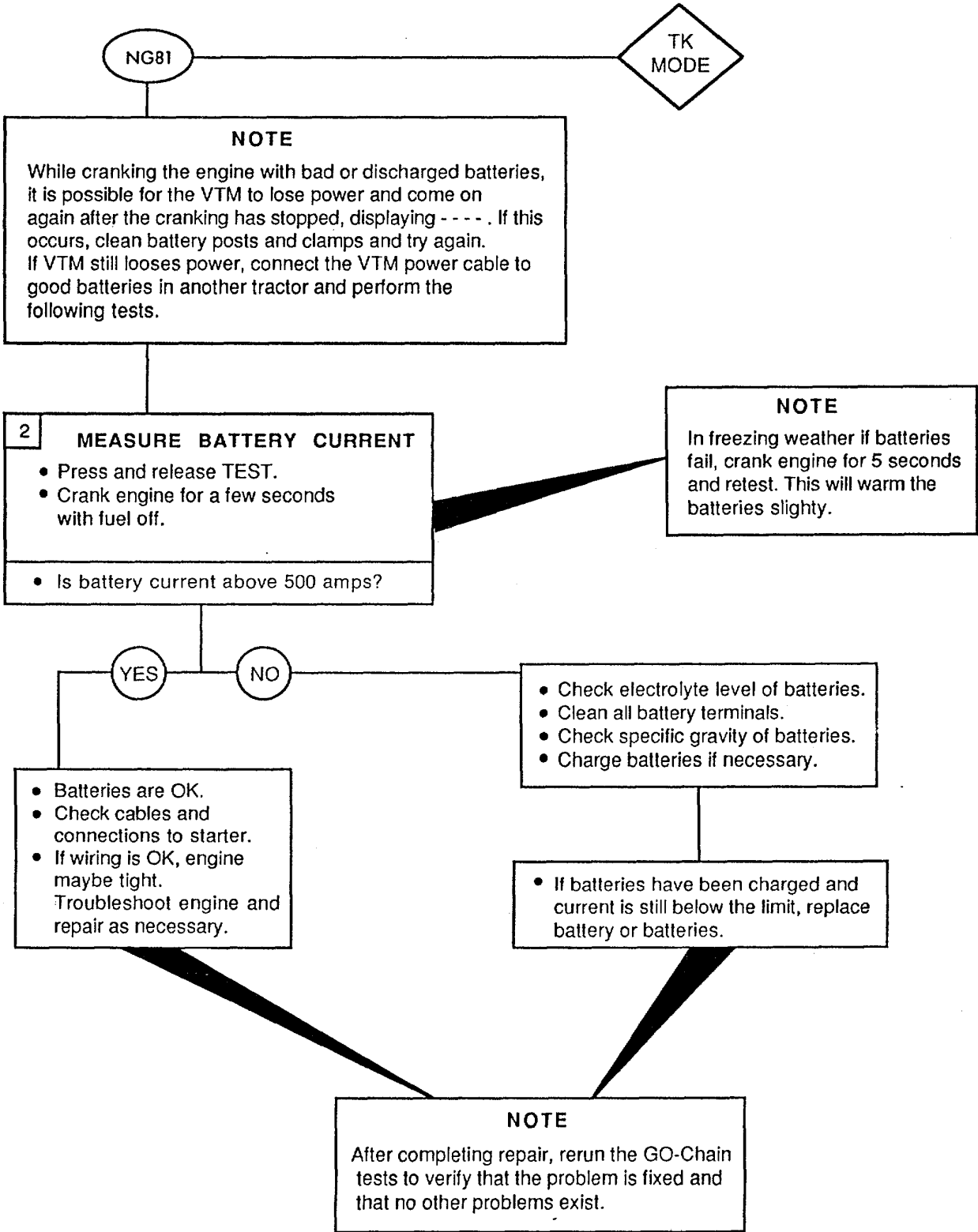
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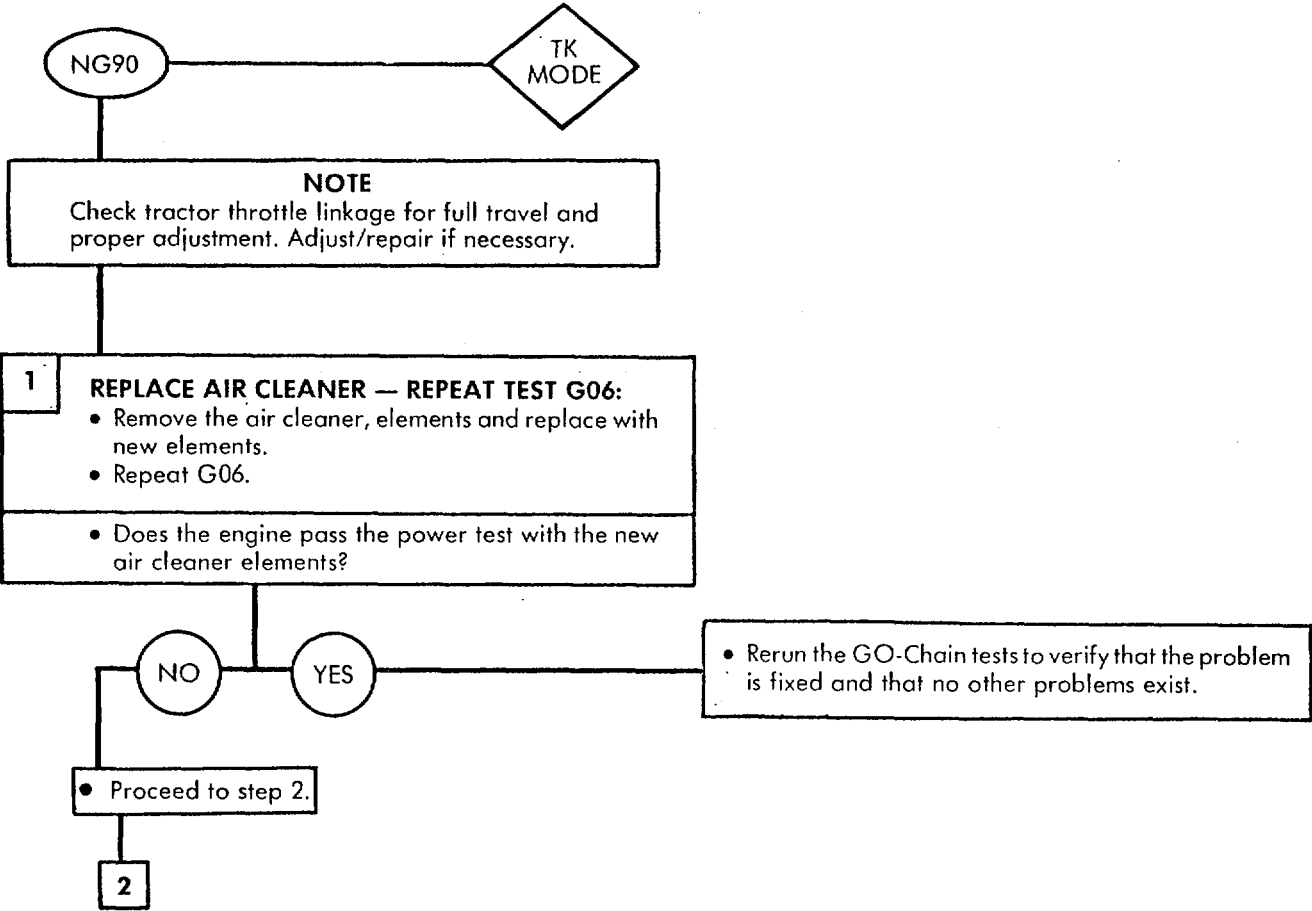
(4) TK Mode NO-GO Chain Tests (Cont'd).



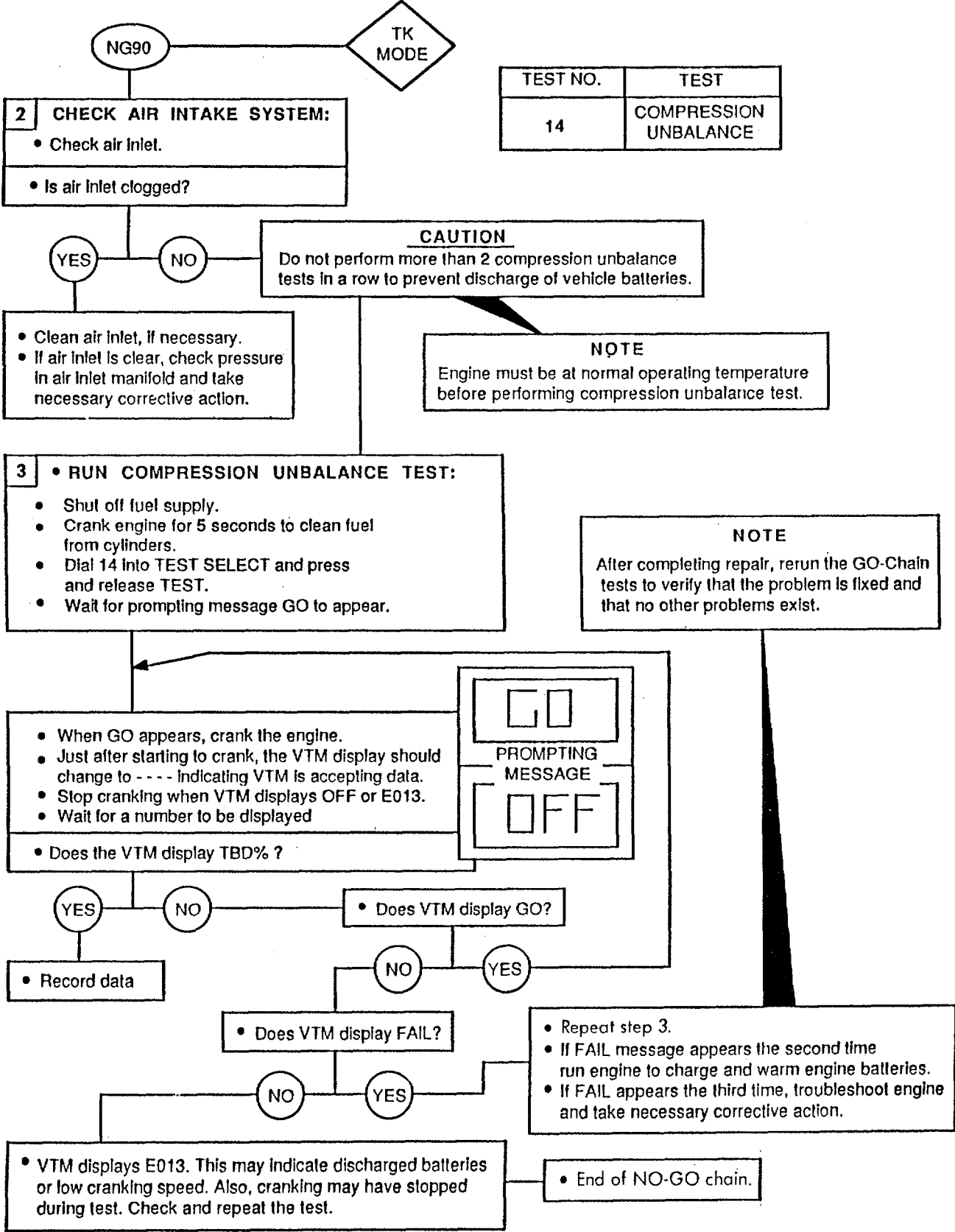
(4) TK Mode NO-GO Chain Tests (Cont'd).



(4) TK Mode NO-GO Chain Tests (Cont'd).



(4) TK Mode NO-GO Chain Tests (Cont'd).



Section V. GENERAL MAINTENANCE INSTRUCTIONS

	Page
Cleaning Instructions.....	2-155
General Information	2-154
Inspection Instructions	2-158
Repair Instructions	2-160
Scope	2-154
Work Safety.....	2-154

2-15. SCOPE.

These general maintenance instructions contain general shop practices and specific methods you must be familiar with to properly maintain the D7G tractor. You should read and understand these practices and methods before starting maintenance tasks on the D7G tractor.

2-16. WORK SAFETY.

- a. Before starting a task, think about the risks and hazards to your safety as well as others. Wear protective gear such as safety goggles or lenses, safety shoes, rubber apron or gloves. Protect yourself against injury.
- b. When lifting heavy parts, have someone help you. Make sure that lifting equipment is working properly, that it is suitable for the task assigned, and is secured against slipping.
- c. Always use power tools carefully.

2-17. GENERAL INFORMATION.

- a. Before beginning a task, find out how much repair, modification, or replacement is needed to fix the equipment as described in this manual. Sometimes the reason for equipment failure can be seen right away and complete teardown is not necessary. Disassemble the equipment only as far as necessary to repair or replace damaged or broken parts.
- b. All tags and forms attached to the equipment must be checked to learn the reason for removal from service. Check all Modification Work Orders (MWO) and Technical Bulletins (TB) for equipment changes and updates.
- c. In some cases a part may be damaged by removal. If the part appears to be good, and other parts behind it are not defective, leave it on and continue the procedure. Here are a few simple rules:
 - (1) Do not take out dowel pins or studs unless loose, bent, broken or otherwise damaged.
 - (2) Do not pull bearings or bushings unless damaged. If you must get at parts behind them, pull out bearings or bushings carefully.

- (3) Replace all gaskets, seals, and preformed packings.

2-18. CLEANING INSTRUCTIONS.

a. General.

- (1) The cleaning instructions will be the same for the majority of parts and components that make up the D7G tractor.
- (2) The importance of cleaning must be thoroughly understood by maintenance personnel. Great care and effort are required in cleaning. Dirt and foreign material are a constant threat to satisfactory maintenance. The following should apply to all cleaning, inspection, repair and assembly operations.
 - (a) Clean all parts before inspection, after repair and before assembly.
 - (b) Hands should be kept free of any accumulation of grease, which can collect dust, dirt or grit.
 - (c) After cleaning, all parts should be covered or wrapped to protect them from dust and dirt. Parts that are subject to rust should be lightly oiled.
- (3) Observe the following precautions during all cleaning operations:

WARNING

P-D-680 (Type II) is a flammable solvent that is potentially dangerous to personnel. Keep away from heat, sparks or open flame. Flashpoint of solvent is 1380F (590C). Use only in a well ventilated area. Inhaling vapors over a period of time can cause headache and drowsiness. Use gloves to prevent irritation or inflammation of the skin. Solvent absorbed through the skin can result in internal disorders. If contact occurs, wash the affected area with water for 15 minutes. For eyes, flush with water and then seek immediate medical attention.

WARNING

Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment. Refer to TM9-247 for correct information.

WARNING

Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury to personnel.

WARNING

Particles blown by compressed air are hazardous. Make certain the airstream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield when using compressed air.

b. External Engine Cleaning.

- (1) Protect all electrical equipment that could be damaged by the steam or moisture before steam cleaning.
- (2) Cover all openings before steam cleaning.
- (3) After cleaning, dry and apply a light coat of oil to all parts subject to rust.
- (4) Blow out all tapped (threaded) holes with compressed air to remove dirt and cleaning fluid.

c. Disassembled Parts Cleaning.

- (1) Place all disassembled parts in wire baskets for cleaning.
- (2) Dry and cover all cleaned parts.
- (3) Place parts on or in "racks" and hold for inspection or repair.
- (4) All parts subject to rusting must be lightly oiled and wrapped.
- (5) Keep all related parts and components together. Do not mix parts.

d. Castings.

- (1) Clean inner and outer surfaces of castings and all areas subject to grease and oil with cleaning solvents. Refer to TM9-247.
- (2) Use a stiff brush to remove sludge and gum deposits.
- (3) Blow out all tapped (threaded) holes with compressed air to remove dirt and cleaning fluid.

- e. Oil Passages. Particular attention must be given to all oil passages in castings and machined parts. Oil passages must be clean and free of any obstructions.
- (1) Clean passages with wire probes to break up any sludge or gum deposits.
 - (2) Wash passages by flushing with solvents. Refer to TM9-247.
 - (3) Dry passages with compressed air.

f. Oil Seals, Electrical Cables, and Flexible Hoses.

CAUTION

Washing oil seals, electrical cables and flexible hoses with dry cleaning solvents or mineral spirits will cause serious damage or destroy the material.

- (1) Wash electrical cables and flexible hose with water and mild soap solution and wipe dry.
- (2) Oil seals are generally damaged during removal, so cleaning will not be necessary since new seals will be used in assembly.

g. Bearings.

- (1) Bearings require special cleaning. After removing surface oil and gum deposits, place bearings in hot oil (1400F (600C)) to loosen congealed oil and grease. Wipe bearings dry. Do not use compressed air. After cleaning, coat bearings with oil, wrap in paper, and hold for inspection.
- (2) Refer to TM9-214 for information and care of bearings.

h. Machine Tooled Parts.

- (1) Clean machine tooled parts with dry cleaning solvent (P-D-680).
- (2) Dry surfaces with compressed air.

i. Machined Surfaces.

- (1) Clean machined surfaces with dry cleaning solvent (P-D-680).
- (2) Dry surfaces with compressed air.

j. Mated Surfaces.

- (1) Remove old gasket and/or sealing compound using wire brush and dry cleaning solvent (P-D-680).
- (2) Lightly oil and wrap all parts subject to rust before storing.

- k. Rusted Surfaces. Clean all rusted surfaces using wire brush and crocus cloth.
- l. Oil Bathed Internal Parts. Wipe oil bathed internal parts clean with lint free cloth.
- m. Air Actuated Internal Parts. Wipe air actuated internal parts clean with lint free cloth.
- n. Externally Exposed Parts. Wash externally exposed parts with soap and water. Rinse thoroughly and air dry.

2-19. INSPECTION INSTRUCTIONS.

- a. General. All components and parts must be carefully checked to determine if they are serviceable for reuse, if they can be repaired, or if they must be scrapped.
- b. Drilled and Tapped (Threaded) Holes.
 - (1) Inspect for wear, distortion (stretching), cracks or any other damage in or around holes.
 - (2) Inspect threaded areas for wear, distortion or evidence of cross-threading.
 - (3) Mark all damaged areas for repair or replacement.
- c. Metal Lines, Flexible Lines (Hoses) and Fittings.
 - (1) Inspect lines for sharp kinks, cracks, bends or dents.
 - (2) Inspect flexible lines for fraying, evidence of leakage or loose fittings or connectors.
 - (3) Check all fittings and connectors for thread damage. Check for hex heads that are worn or rounded by poorly fitting wrenches.
 - (4) Mark all damaged material for repair or replacement.
- d. Castings.
 - (1) Inspect all ferrous and nonferrous castings for cracks using a magnifying glass and strong light.
 - (2) Refer to MIL-I-6866, Inspection, Liquid Penetrant Methods, and MIL-I-6868, Inspection Process, Magnetic Particles.
 - (3) Particularly check areas around studs, pipe plugs, threaded inserts, and sharp corners. Replace all cracked castings.
 - (4) Inspect machined surfaces for nicks, burrs, or raised metal. Mark damaged areas for repair or replacement.

- (5) Inspect all pipe plugs, pipe plug openings, screws, and screw openings for damaged or stripped threads.
 - (6) Check all gasket mating surfaces, flanges on housings, and supports for warpage with a straight edge or surface plate. Inspect mating flanges for discolorations that may indicate persistent oil leakage.
 - (7) Check all castings for conformance to applicable repair standards.
- e. Bearings. Refer to TM9-214 for inspection of bearings. Check all bearings for conformance to applicable repair standards.
- f. Studs, Bolts and Screws. Replace if threads are damaged, bent, loose or stretched.
- g. Gears.

NOTE

When gear teeth wear limits are not established, good judgment is required to determine if gear replacement is necessary.

- (1) Inspect all gears for cracks using a magnifying glass and strong light. No cracks are permissible.
 - (2) Inspect gear teeth for wear, sharp fins, burrs, and galled or pitted surfaces.
 - (3) Check keyway slots for wear or damage.
- h. Bushings and Bushing Type Bearings.
- (1) Check all bushings and bushing type bearings for secure fit, evidence of overheating, wear, burrs, nicks and out-of-round condition. Replace as necessary.
 - (2) Check for dirt in lubrication holes or grooves. Holes and grooves must be clean and free from damage.
- i. Oil Seals. Oil seals are mandatory replacement items.
- j. Core Hole Expansion Plugs. Inspect for leakage. Replace plugs when leakage is present.
- k. Machine Tooled Parts. Inspect for cracks, breaks, elongated holes, wear and chips. Replace any damaged parts.
- l. Machined Surfaces. Inspect for cracks, evidence of wear, galled or pitted surface, burrs, nicks, and scratches.
- m. Mated Surfaces. Inspect for remains of old gasket, seal, secure fit, pitting and evidence of leakage.

- n. Rusted Surfaces. Inspect for pitting, holes and sever damage.
- o. Oil Bathed Internal Parts. Inspect for cracks, nicks, burrs, evidence of overheating and wear.
- p. Air Actuated Internal Parts. Inspect for cracks, nicks, burrs, evidence of overheating and wear.
- q. Externally Exposed Parts. Inspect for breaks, cracks, rust damage and wear.
- r. Springs. Inspect for broken, collapsed and twisted coils.

2-20. REPAIR INSTRUCTIONS.

- a. General. Any repair procedure peculiar to a specific part or component is covered in the section or paragraph relating to that item. After repair, clean all parts thoroughly to prevent dirt, metal chips or other foreign material from entering any working parts.

CAUTION

Repaired items must be thoroughly cleaned to remove metal chips and abrasives to prevent them from entering working parts of the D7G tractor.

- b. Castings.
 - (1) All cracked castings will be replaced.
 - (2) Only minor repairs to machined surfaces, flanges and gasket mating surfaces are permitted. Remove minor nicks, burrs and scratches with:
 - (a) Fine mill file.
 - (b) Crocus cloth dipped in cleaning solvent.
 - (c) Lapping across a surface plate.
 - (3) Remachining of machined surfaces to repair damage, warpage or uneven surfaces is not permitted. Replace castings.
 - (4) Repair damaged threaded pipe plug or screw threads with a tap. Repair oversize holes with threaded inserts.
- c. Bearings. Refer to TM9-214 for repair of bearings.
- d. Studs. Replace all bent and stretched studs. Repair minor thread damage with a thread die. Replace studs having stripped or damaged threads as outlined below:
 - (1) Remove using a stud remover. Back studs out slowly to avoid heat buildup and seizure that can cause stud to break off.

- (2) If studs break off too short to use a stud remover, use a stud extractor to remove or use "welding method".

CAUTION

Refer to TM9-237, Welding Instructions, to avoid damage to castings if welding method is used.

- (3) Broken studs can be removed by welding bar stock or a nut to stud and removing with wrench.

- (4) Install replacement stud slowly to prevent heat buildup and snapping off.

e. Gears.

- (1) Remove gears using pullers.

- (2) Only minor repairs to gears are permitted. Remove minor nicks, burrs or scratches on gear teeth with:

- (a) Fine mill file.

- (b) Crocus cloth dipped in cleaning solvent.

- (3) If keyways are worn or enlarged, replace gear.

- f. Bushings and Bushing Type Bearings. When bushings and bushing type bearings seize to a shaft and spin in the bore, the associated part must also be replaced.

g. Oil Seals.

- (1) Remove oil seals by pressing or prying out, being careful not to damage casting or adapter bore.

- (2) Always install new seal in bore using proper seal replacing tool.

2-21. PAINTING.

Upon installation, restored parts must be painted per TB 43-0209.

CHAPTER 3

ENGINE SYSTEMS MAINTENANCE

Section I. OIL SYSTEM

3-1. GENERAL

This section provides maintenance procedures assigned to the organizational level for the engine lubricating system. To find a specific Maintenance procedure, see the maintenance task summary below.

3-2. ENGINE LUBRICATING SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA	PROCEDURES	PAGE NO.
3-3	Engine Assembly - Test/Service	3-2
3-4	Valve Mechanism Cover - Replace	3-6
3-5	Valve Mechanism - Adjust	3-8
3-6	Engine Oil Sampling Valve - Replace	3-12
3-7	Engine Oil Filter Assembly - Service/Replace/Repair	3-14
3-8	Engine Oil Level Gage - Replace	3-18
3-9	Engine Oil Filler Tube - Replace	3-20
3-10	Crankcase Breather - Service/Replace	3-22
3-11	Engine Fumes Disposal Hose - Replace	3-24
3-12	Engine Oil Cooler - Replace/Repair	3-26

3-3. ENGINE ASSEMBLY - TEST/SERVICE**This task covers:**

- a. Test
- b. Changing Oil

INITIAL SETUP:Applicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

Engine oil filter
Engine oil OE/HDO-30
See L05-2410-237-12
Drain pan (8 US gal.)
(2) Blocks 3' x 8" x 8" (approx.)
1-1/2" dia x 9" long plastic tubing

Equipment Condition

Tractor parked on level ground.
Engine oil warm.

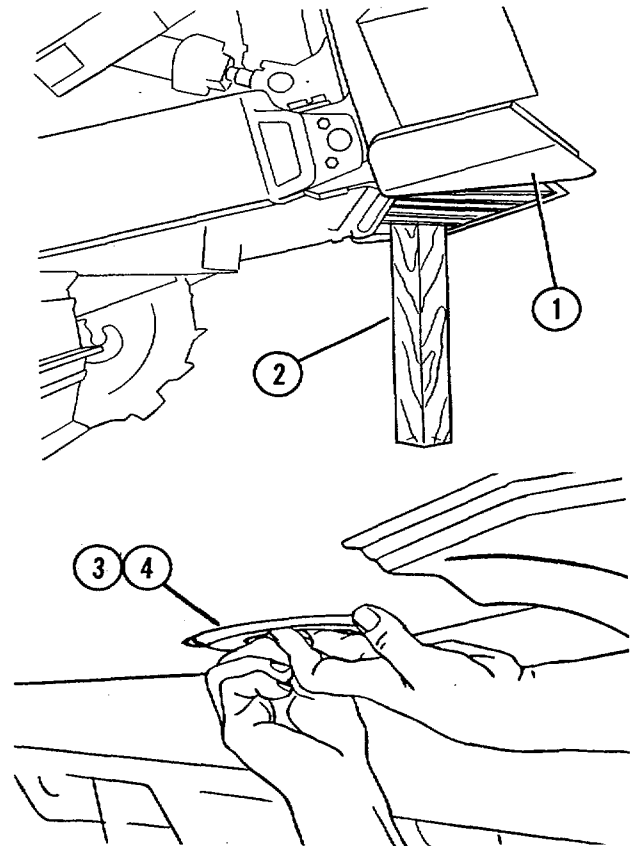
a. Test

Conduct tests using STE/ICE diagnostic equipment. See chapter 2 for specific engine tests.

b. Changing Engine Oil**WARNING**

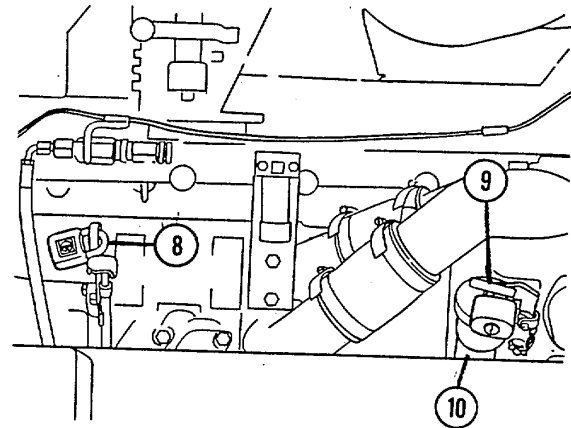
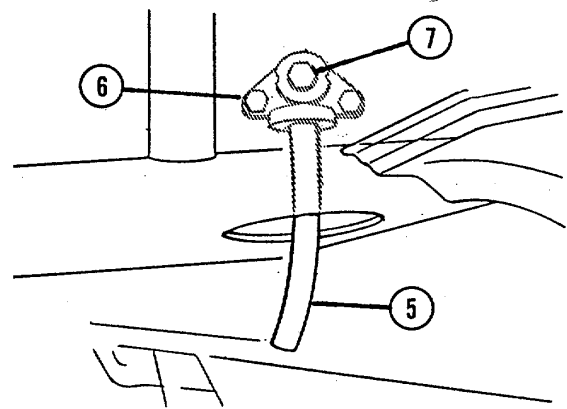
Never crawl under an elevated blade without first blocking the blade.

- (1) Raise the dozer (1) into the fully raised position and place blocking (2) under the dozer for safety. This will provide access to the oil drain plug. Turn engine "OFF."
- (2) Using a socket, loosen capscrew (3) and remove access cover assembly (4) from crankcase guard.



3-3. ENGINE ASSEMBLY - TEST/SERVICE (Cont'd)

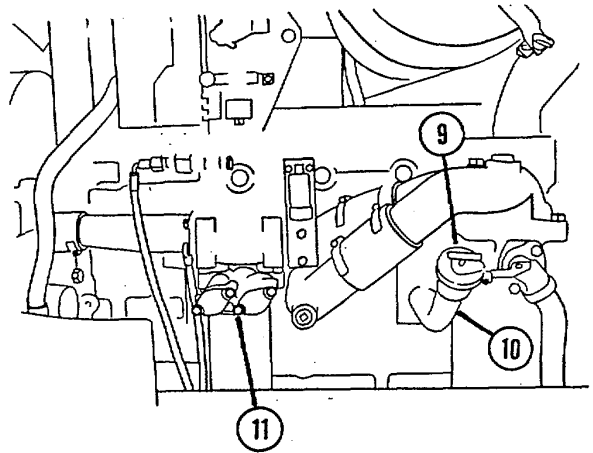
- (3) Slide a piece of 1 1/2" I.D. soft rubber or plastic tubing (5) over the bottom of the oil drain plug adapter (6). Place a bucket under the drain opening and direct the tubing into the bucket to catch the oil.
- (4) Open drain valve (7) using a wrench and allow oil to drain from the engine. After oil has drained from the engine, close the drain valve (7) and remove tubing (5).
- (5) Replace the oil filter. See page 3-14.
- (6) Service crankcase breather. See page 3-22.
- (7) Remove padlocks from oil dipstick (8) and oil filler tube cap (9). Remove cap (9) from fill pipe (10).
- (8) Fill crankcase with new oil. See L05-2410-237-12 for oil grade and refill capacities.
- (9) Install cap (9) onto fill pipe (10).
- (10) Start engine and run for a few minutes at low idle to fill filter housing. Check oil level by pulling dipstick (8) out with the engine running and make sure oil falls between the ADD and FULL marks on the dipstick.

**NOTE**

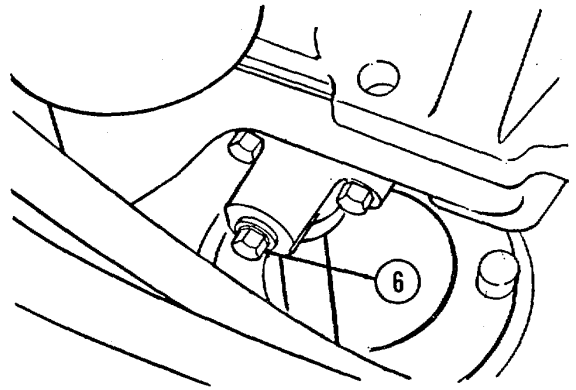
If it is desired to check the oil with the engine stopped, make sure the level falls within the SAFE STARTING RANGE on the ENGINE STOPPED side of the dipstick.

3-3. ENGINE ASSEMBLY - TEST/SERVICE (Cont'd)

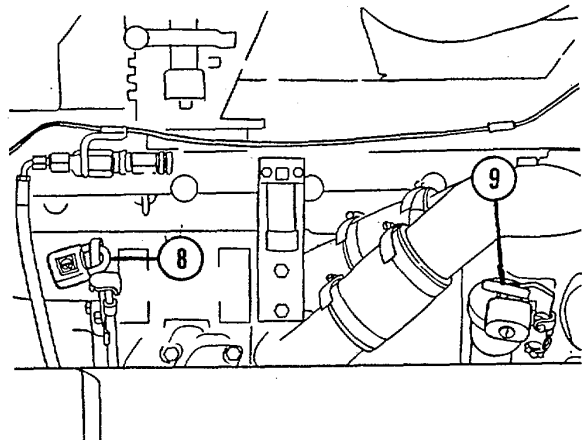
- (11) If necessary, remove the fill cap (9) and add more oil through the crankcase oil fill pipe (10).



- (12) Check filter base (11) and drain plug (6) for leaks.

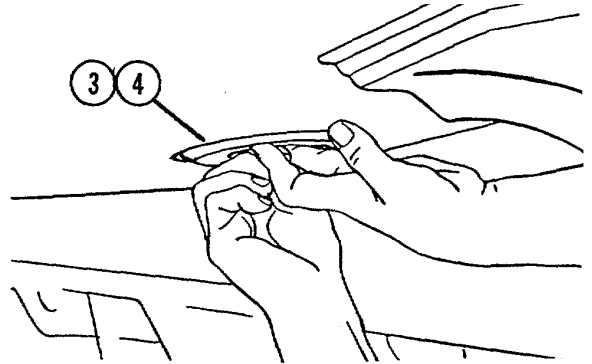


- (13) Install padlocks on crankcase oil fill pipe cap (9) and on oil dipstick (8).

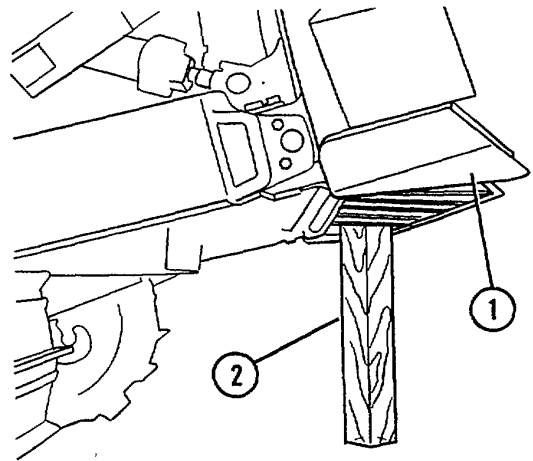


3-3. ENGINE ASSEMBLY - TEST/SERVICE (Cont'd)

- (14) Install access cover assembly (4) and tighten capscrew (3) using a socket.



- (15) Remove blocking (2) from beneath dozer (1) and lower dozer to the ground.



3-4. VALVE MECHANISM COVER - REPLACE**This task covers:**

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP:Applicable Configurations

All

Personnel Required

MOS62B (1)

Common Tools

Shop Equipment, Automotive
Maintenance and Repair, Common #1
Less Power
NSN 4910-00-754-0654

Materials/Parts

Gasket (5)
Gasket cement (App. D, Item 5)
Anti-seize compound (App. D, Item 7)

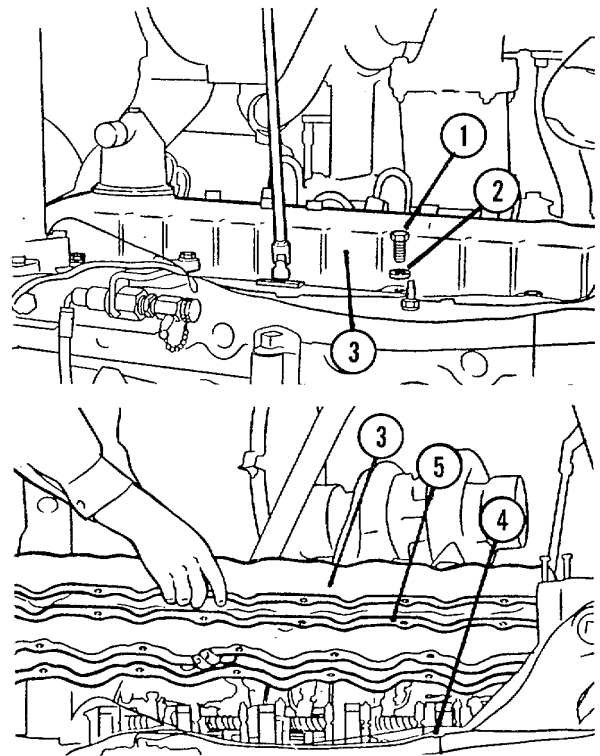
Equipment Condition

Hood removed. (page 10-16)
Ether starting aid removed. (page 3-91)
Air cleaner removed. (page 3-39)
Crankcase breather removed. (page 3-22)

a. Removal**WARNING**

Pressurized air used for cleaning purposes should not exceed 30 psi. Use personal protective equipment.

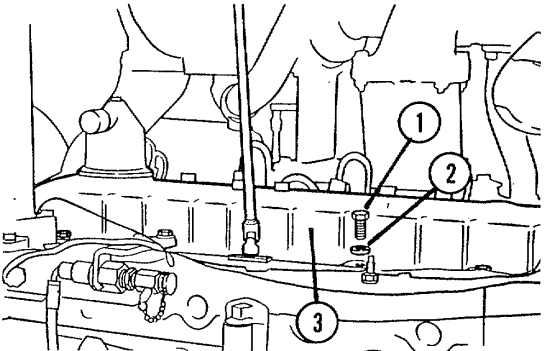
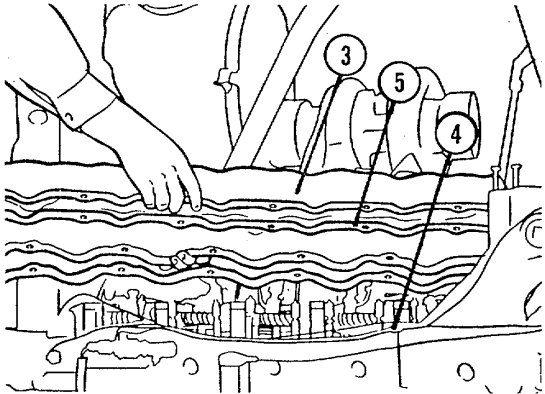
- (1) Use pressurized air to clean any loose particles from the valve cover (3) before removal of cover.
- (2) Use a socket to remove fifteen capscrews (1) and lockwashers (2) that secure valve cover (3).
- (3) Remove valve cover (3) from cylinder head (4). Remove gasket (5) from valve cover and discard gasket.



3-4. VALVE MECHANISM COVER - REPLACE (Cont'd)

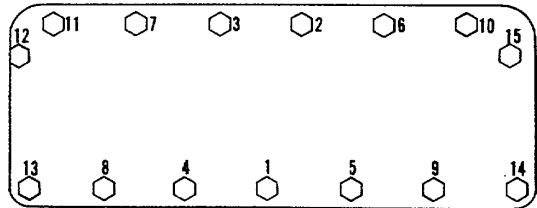
b. Installation

- (1) Make sure that gasket surfaces are clean and position gasket (5) onto cylinder head (4). Put gasket cement on the face of the valve cover and the topside of gasket (5). Install the valve cover (3).
- (2) Apply anti-seize compound to capscrews (1). Use a socket to install fifteen capscrews (1) and lockwashers (2) that secure valve cover (3). Tighten capscrews in the number sequence shown to 72-120 in. lb.
- (3) Install crankcase breather. See page 3-22.
- (4) Install air cleaner. See page 3-39.
- (5) Install ether starting aid. See page 3-91.
- (6) Start engine and inspect mating surface of valve cover for leaks. Turn off engine.
- (7) Install hood. See page 10-16.



c. Place In Service

Run engine and check for proper operation. Inspect gasket surface for oil leakage.



77083X 1

3-5. VALVE MECHANISM - ADJUST

This task covers:

- a. Locating Top Center Compression Position for Number 1 Piston
- b. Adjusting Valve Clearance

INITIAL SETUP:

Applicable Configurations

All

Equipment Condition

Valve cover removed. (page 3-6)

Common Tools

Shop Equipment Automotive
Maintenance & Repair, Common #1
Less Power
NSN 4910-00-754-0654

Materials/Parts

Capscrew (3" x 3/8"-16 NC)

a. Locating Top Center Compression Stroke for Number 1 Piston

NOTE

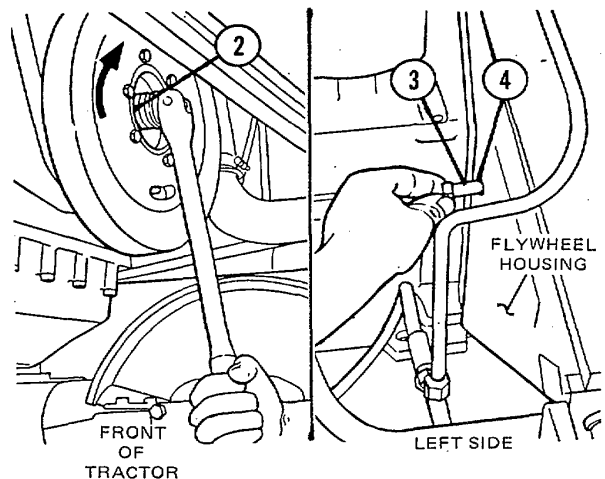
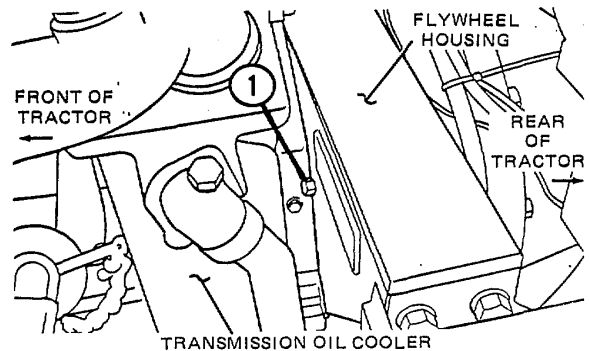
The engine is seen from the vibration damper end when direction of crankshaft rotation is given.

- (1) Remove plug (1) using a socket.

NOTE

STEP 2. is done to remove the play from the timing gears when the engine is set at top center.

- (2) Place a socket and breaker bar on mounting capscrew (2) of the vibration damper. Turn the vibration damper so that the flywheel turns clockwise. Turn the flywheel until a 3/8"-16 NC capscrew (3) can be installed through hole (4) of the flywheel housing.



3-5. VALVE MECHANISM - ADJUST (Cont'd)

NOTE

If the piston is on the compression stroke, the valves will be closed on the number 1 cylinder.

(3) Try moving the rocker arms over cylinder 1 up and down. If the arms do not move, the valves are open and the piston is not on the compression stroke. Proceed to STEP 4.

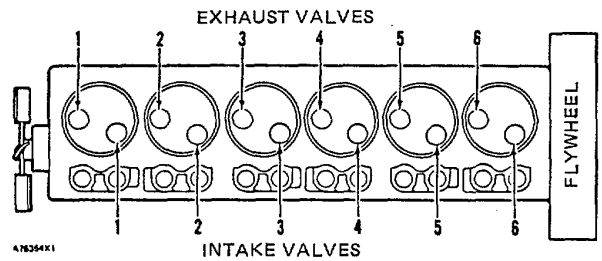
(4) Remove capscrew (3) and turn the flywheel 3600 clockwise. Return capscrew (3) to hole (4). The number 1 piston is now at top center on the compression stroke.

b. Adjusting Valve Clearance

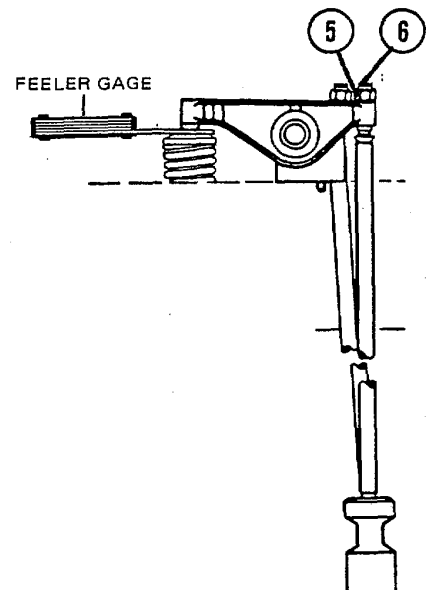
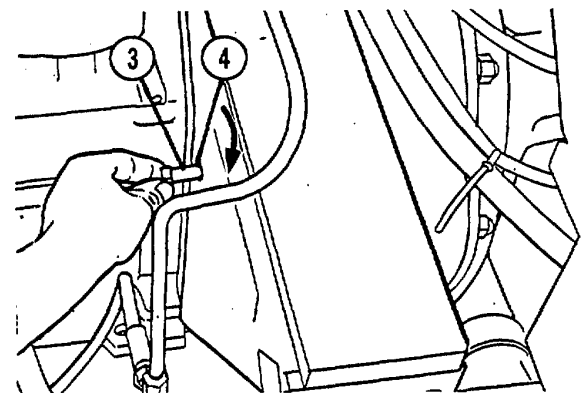
NOTE

When the valve clearance is checked using a feeler gage, it is NOT NECESSARY to adjust the valves if the measurement falls within 0.022 to 0.028 in. (0.56 to 0.71 mm) for the exhaust and within 0.012 to 0.018 in. (0.30 to 0.46 mm) for the intake.

(1) Loosen nuts (5) with a wrench. Make adjustments to all valves by using a flathead screwdriver and turning adjustment screws (6) to obtain the correct reading with the feeler gage.



CYLINDER AND VALVE IDENTIFICATION



3-5. VALVE MECHANISM - ADJUST (Cont'd)

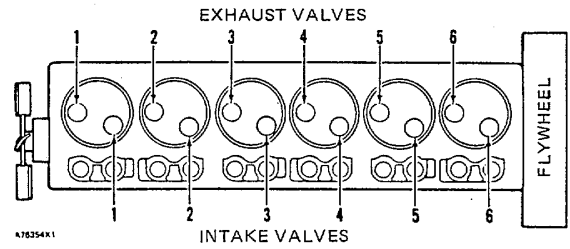
NOTE

Set all valves that need adjustment to 0.025 in. (0.064 mm) for the exhaust and to 0.015 in. (0.38 mm) for the intake in the following manner.

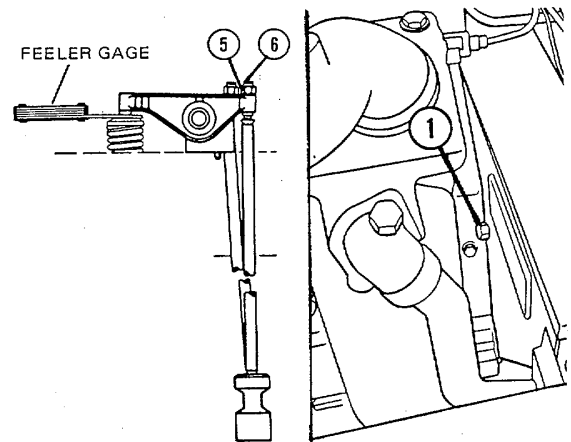
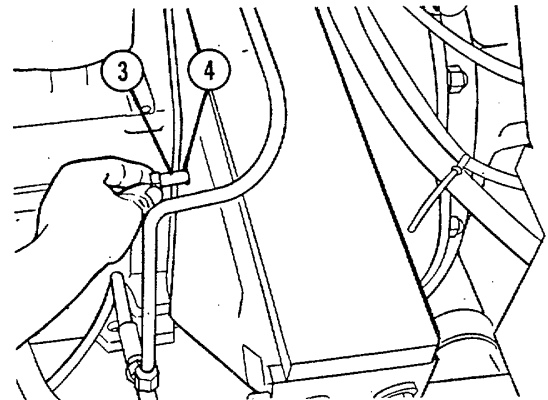
- (2) With the engine set with the No. 1 piston at top center on the compression stroke, make adjustments for valve clearance on the intake valves for cylinders 1, 2 and 4. Make an adjustment to the valve clearance on the exhaust valves for cylinders 1, 3 and 5.
- (3) Remove capscrew (3) from flywheel housing and turn the flywheel 3600 in the direction of engine rotation. This will put the No. 6 piston at top center on the compression stroke. Install capscrew (3) back into flywheel housing.
- (4) Make an adjustment to the valve clearance on the intake valves for cylinders 3, 5 and 6. Make an adjustment to the valve clearance on the exhaust valves for cylinders 2, 4 and 6.
- (5) After all adjustments have been made, use a socket and tighten the nuts (5) for the valve adjustment screws (6) (while holding the screws with a screwdriver) to 22 + 3 ft. lbs. (28 + 4 N.m).

CAUTION

Capscrew (3) will damage flywheel housing and flywheel if not removed and replaced by plug (1).

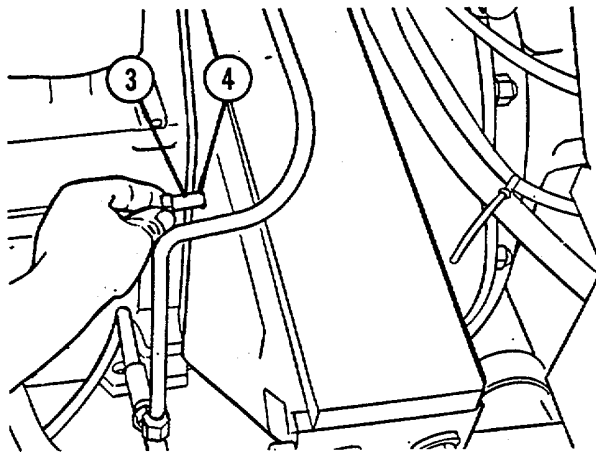


CYLINDER AND VALVE IDENTIFICATION



3-5. VALVE MECHANISM - ADJUST (Cont'd)

- (6) Use a socket to remove capscrew (3) and install plug (1).
- (7) Install valve cover. See page 3-7.



3-6. ENGINE OIL SAMPLING VALVE - REPLACE**This task covers:**

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP:Applicable Configurations

All

Materials/Parts

Preformed packing (3)

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Equipment Condition

Engine cool.

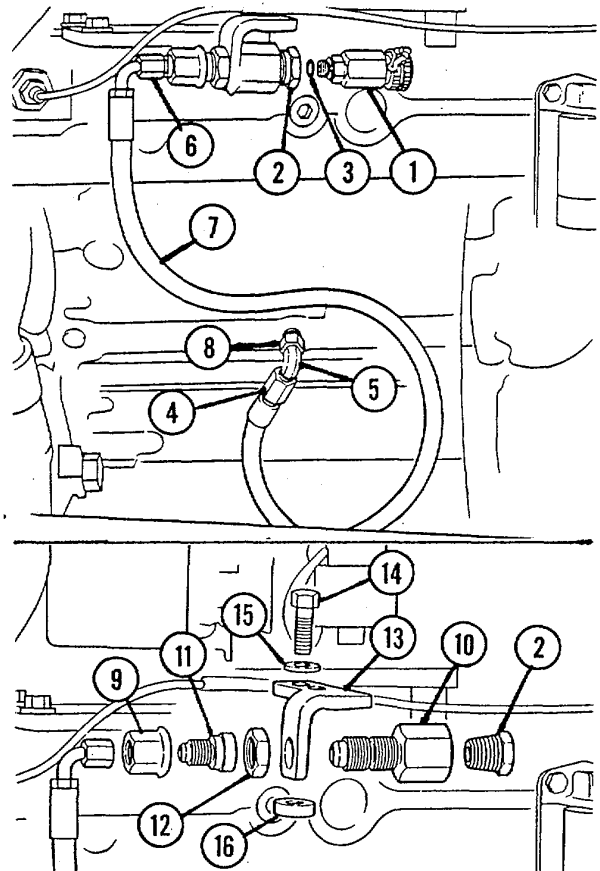
a. Removal

- (1) Use a wrench to unscrew oil sampling valve (1) from adapter (2).
- (2) Remove preformed packing (3) from valve (1) and discard.
- (3) Use a wrench to unscrew hose nut (4) from elbow (5) at engine block. Unscrew hose nut (6) from valve assembly. Remove hose (7).

CAUTION

Do not remove adapter (8) unless inspection shows need for replacement. Adapter may be damaged upon removal.

- (4) Use a wrench to unscrew elbow (5) from adapter (8), and unscrew adapter (8) from engine block.
- (5) Use a wrench to unscrew nut (9) from connector (10), and remove nut (9) with reducer (11).
- (6) Use a wrench to unscrew adapter (2) from connector (10).



3-6. ENGINE OIL SAMPLING VALVE - REPLACE (Cont'd)

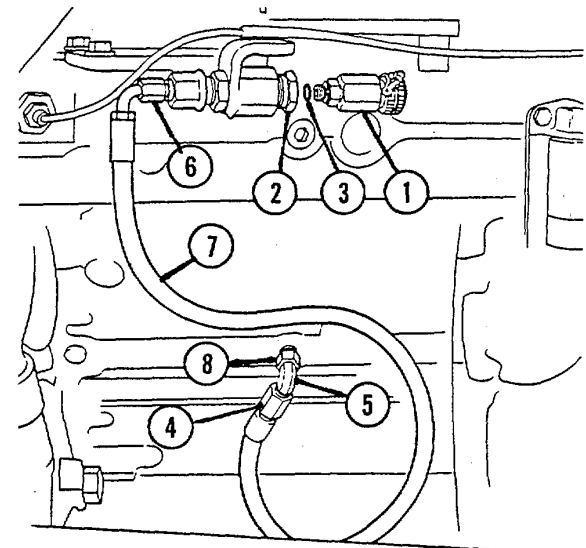
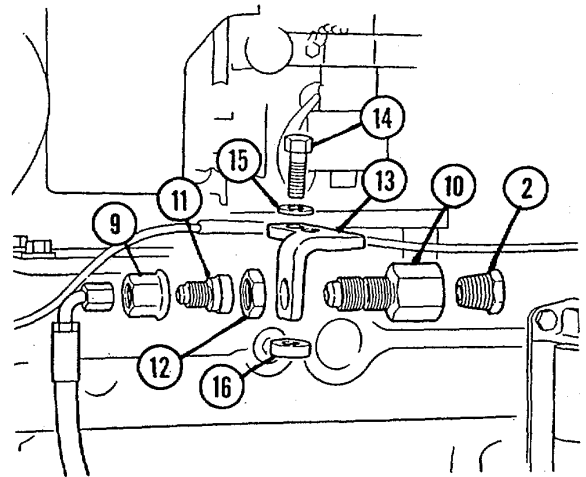
- (7) Use a wrench to remove nut (12) from connector (10). Remove connector (10) from bracket (13).
- (8) Remove two capscrews (14), washers (15) and spacers (16) from bracket (13) and remove bracket from cylinder head.

b. Installation

- (1) Place spacer (16) and bracket (13) in position on cylinder head and install washers (15) and capscrews (14).
- (2) Place connector (10) in position on bracket (13). Use a wrench to install nut (12) and secure connector.
- (3) Use a wrench to install adapter (2) onto connector (10).
- (4) Place reducer (11) through nut (9) and use a wrench to install nut (9) onto connector (10).
- (5) Use a wrench to install elbow (5) onto adapter (2), and screw adapter (2) onto engine block.
- (6) Place hose (7) into position and use a wrench to install hose nut (4) onto elbow (5). Screw hose nut (6) onto end of valve assembly.
- (7) Install new preformed packing (3) onto valve (1).
- (8) Install valve (1) into adapter (2) and hand tighten the valve.

c. Place In Service

Run engine and check for proper operation.



3-7. ENGINE OIL FILTER ASSEMBLY - SERVICE/REPLACE/REPAIR**This task covers:**

- a. Service
- b. Removal
- c. Disassembly
- d. Assembly
- e. Installation
- f. Place In Service

INITIAL SETUP:Applicable Configurations

ALL

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

Materials/Parts

Oil filter (3)
Preformed packings (23) (18) (11)
Gasket (28)
Rag, lint free (App. D, Item 15)
Drain pan (2 quart)

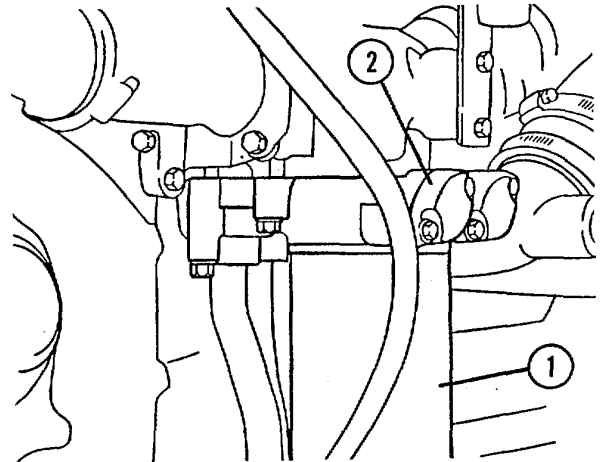
Equipment Condition

Brake lock applied.
Engine OFF.
Drain engine oil (see page 3-2).

a. Service**NOTE**

Place a 2 quart drain pan under filter to catch any oil.

- (1) Use a strap wrench to remove oil filter (1). Discard filter (1).
- (2) Clean bottom of filter base (2) with a lint free rag.
- (3) Apply a thin film of clean motor oil to gasket on base of new oil filter.
- (4) Install new filter (1) and tighten only until gasket on base of filter touches the oil filter base then tighten the filter an additional 3/4 turn. Do not overtighten.



3-7. ENGINE OIL FILTER ASSEMBLY - SERVICE/REPLACE/REPAIR (Cont'd)

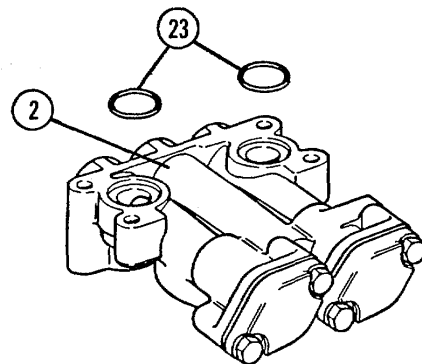
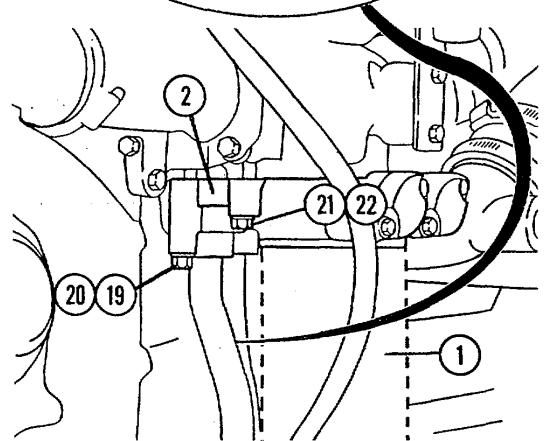
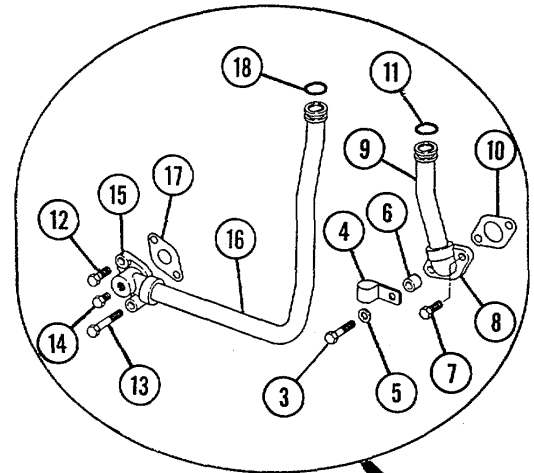
- (5) Check oil level and fill crankcase as required. See page 3-2.

NOTE

Place drain pan under oil filter assembly (1).

b. Removal

- (1) Remove filter (1). See Service in this paragraph.
- (2) Remove capscrew (3) that holds clamp (4), washer (5) and spacer (6) using a socket.
- (3) Remove capscrew (7) that holds flange (8) in place using a socket. Remove oil tube (9) by pulling it out of oil filter base (2). Remove gasket (10) and preformed packing (11). Discard packing (11).
- (4) Remove two capscrews (12 and 13) and capscrew (14) from flange (15) using a socket. Remove oil tube (16) by pulling it out of filter base (2). Remove gasket (17) and preformed packing (18). Discard packing (18).
- (5) Use a wrench to remove capscrew (19), washer (20), three capscrews (21), and three washers (22) that hold the oil filter base (2) onto the engine.
- (6) Remove the oil filter base (2) from the engine and remove preformed packings (23) from the base. Discard preformed packings (23).



3-7. ENGINE OIL FILTER ASSEMBLY - SERVICE/REPLACE/REPAIR (Cont'd)

c. Disassembly

WARNING

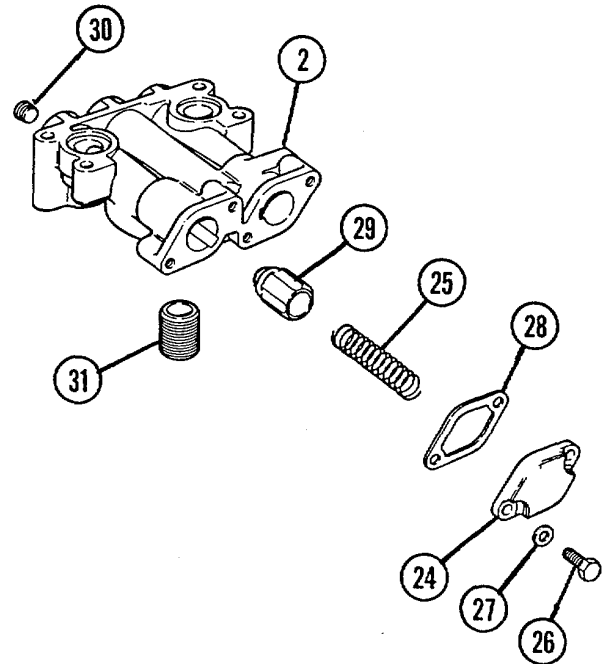
Covers (24) hold springs (25) under compression. Use care when removing them.

- (1) Use a socket to remove four capscrews (26), four washers (27), two covers (24) and two gaskets (28) from the oil filter base (2). Discard gaskets (28).
- (2) Remove springs (25) and plungers (29) from the oil filter base.

NOTE

Do not remove stud (31) unless inspection shows need for replacement.

- (3) Remove plug (30) and if damaged, remove stud (31) from the filter base.

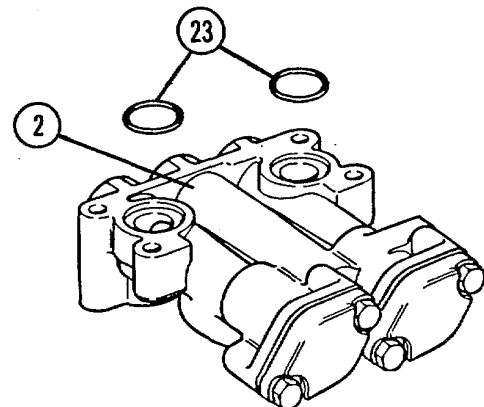


d. Assembly

- (1) Install plug (30) and if removed install stud (31) into the filter base.
- (2) Install plungers (29) and springs (25) into the oil filter base (2).
- (3) Place covers (24) with gaskets (28) into position and using a socket, install four washers (27) and four capscrews (26).

e. Installation

- (1) Install new preformed packings (23) into the oil filter base 2-16

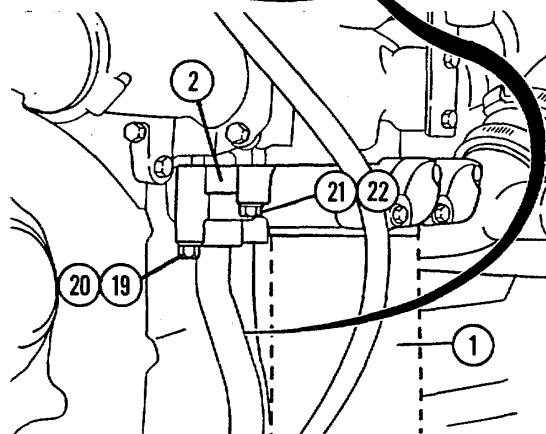
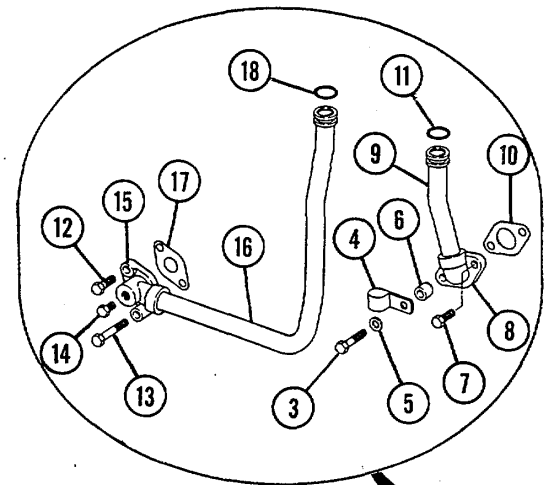
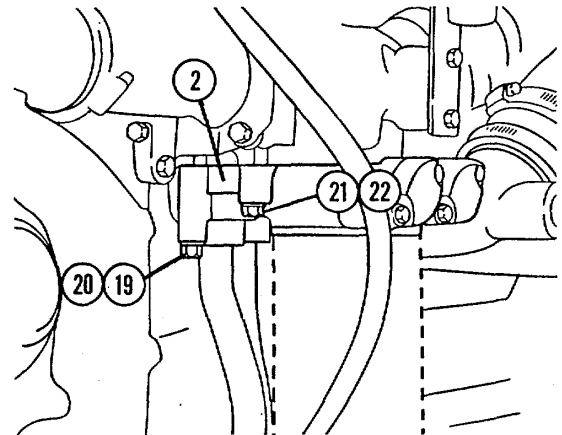


3-7. ENGINE OIL FILTER ASSEMBLY - SERVICE/REPLACE/REPAIR (Cont'd)

- (2) Place oil filter base (2) into position on the engine and using a wrench, install washers (20) and capscrews (19), washers (22) and capscrews (21) that hold the oil filter base (2) onto the engine.
- (3) Install new preformed packing (18) on end of tube (16) and install oil tube (16) by pushing it into filter base (2). Place gasket (17) and flange (15) into position. Use a socket to install capscrews (14) into flange and capscrews (12 and 13) that hold flange (15) in place.
- (4) Install new preformed packing (11) on end of tube (9) and install oil tube (9) by pushing it into the oil filter base. Place gasket (10) and flange (8) into position. Use a socket to install capscrew (7) into flange (8). Place spacer (6), clamp (4) and washer (5) into position.
- (5) Install capscrews (3) that hold clamp (4) using a wrench.
- (6) Install filter. See Service in this paragraph.

f. Place In Service

Run engine and inspect base, filter assembly, and tubing for leaks.



3-8. ENGINE OIL LEVEL GAGE - REPLACE**This task covers:**

- a. Removal
- b. Installation

INITIAL SETUP:

Applicable Configurations
All

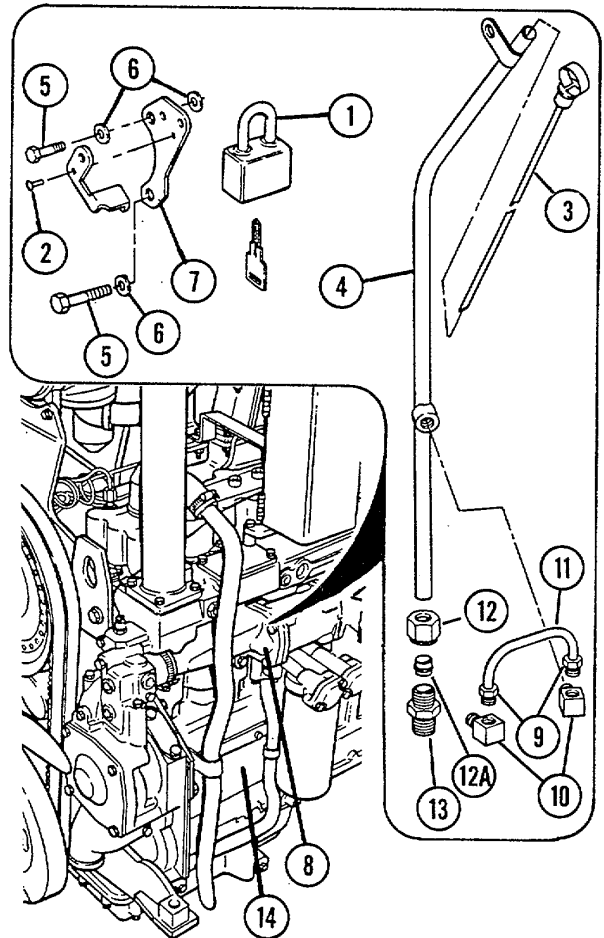
Equipment Condition
Engine cool.

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal

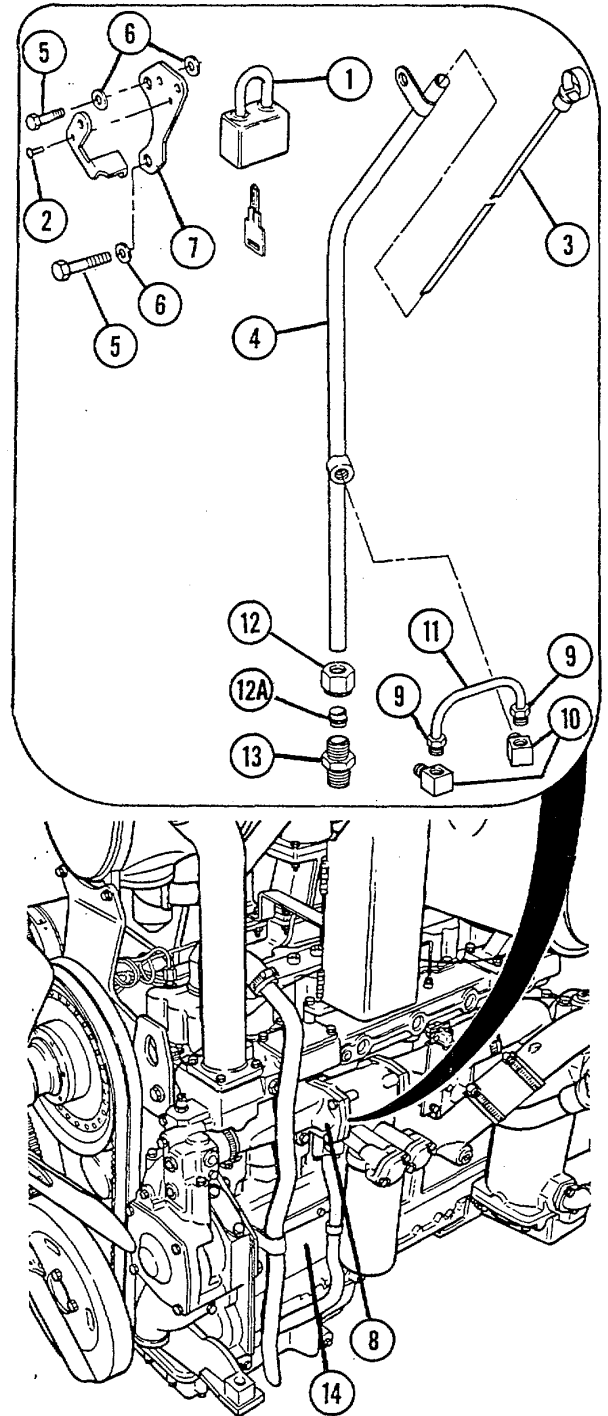
- (1) Remove padlock (1) and slide hasp (2) upward out of way of oil level gage (3).
- (2) Remove oil level gage (3) from gage tube assembly (4).
- (3) Use a socket to remove two capscrews (5), three washers (6) and bracket (7) from water pump outlet pipe (8).
- (4) Use a wrench to remove two oil relief tube compression nuts (9) from two elbows (10) and remove oil relief tube (11).
- (5) Use two wrenches to remove gage tube nut (12) and fitting (12A) from connector (13) and remove gage tube assembly (4).
- (6) Using a wrench remove elbow (10) from gage tube assembly (4).
- (7) Using a wrench remove elbow (10) from engine block (14).



3-8. ENGINE OIL LEVEL GAGE - REPLACE (Cont'd)

b. Installation

- (1) Install elbow (10) in engine block (14).
- (2) Install elbow (10) in gage tube assembly (4).
- (3) Put nut (12) and fitting (12A) on tube (4). Position gage tube assembly (4) on connector (13) and tighten nut (12).
- (4) Position oil relief tube (11) on elbows (10) and tighten two oil relief tube compression nuts (9). If oil relief tube compression nuts do not fit into elbows adjust elbows accordingly.
- (5) Thread capscrew (5) through washer (6), bottom of bracket (7) and gage tube assembly (4), and loosely install to bottom of water pump outlet pipe (8).
- (6) Thread capscrew (5) through washer (6), bottom of bracket (7) and washer (6), and loosely install to top of water pump outlet pipe (8).
- (7) Tighten capscrews (5).
- (8) Install oil level gage (3) in gage tube assembly (4).
- (9) Slide hasp (2) downward over oil level gage (3) and install padlock (1).



3-9. ENGINE OIL FILLER TUBE - REPLACE

This task covers:

- a. Removal
- b. Disassembly

INITIAL SETUP:Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654
Drill
Riveting Tool

Materials/Parts

Gasket (5)
Rivet (6)

Equipment Condition

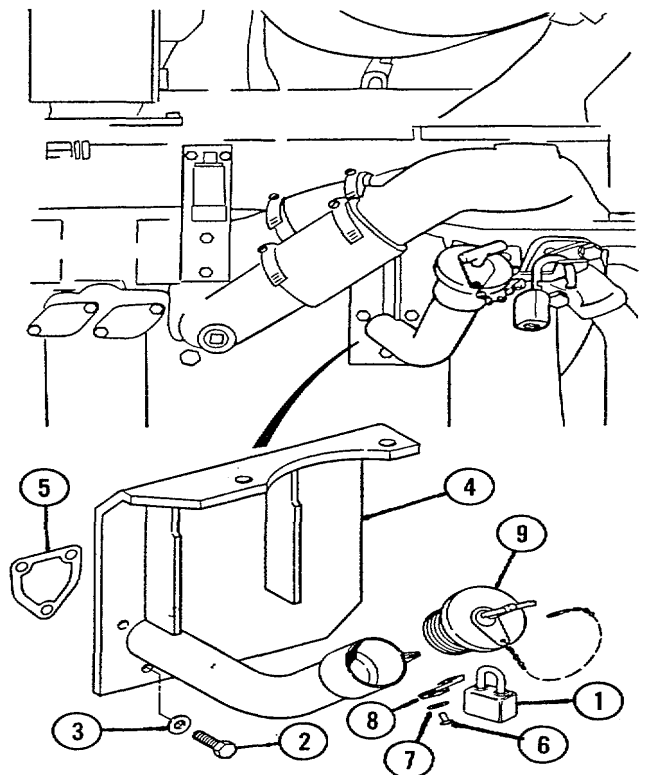
Engine cool.
Transmission oil cooler removed.
(page 5-22)

a. Removal

- (1) Remove lock (1), if present.
- (2) Remove three capscrews (2) and three washers (3) with a wrench.
- (3) Remove tube assembly (4) and gasket (5) from engine. Discard gasket (5).
- (4) If necessary drill out rivet (6) and remove washer (7), hasp (8) and cap assembly (9). Discard rivet (6).

b. Installation

- (1) Put cap assembly (9) on tube assembly (4). Align chain, hasp (8) and washer (7) and insert new rivet (6). Install rivet with rivet tool.
- (2) Clean gasket surface on the tube assembly (4) and engine block using a putty knife.

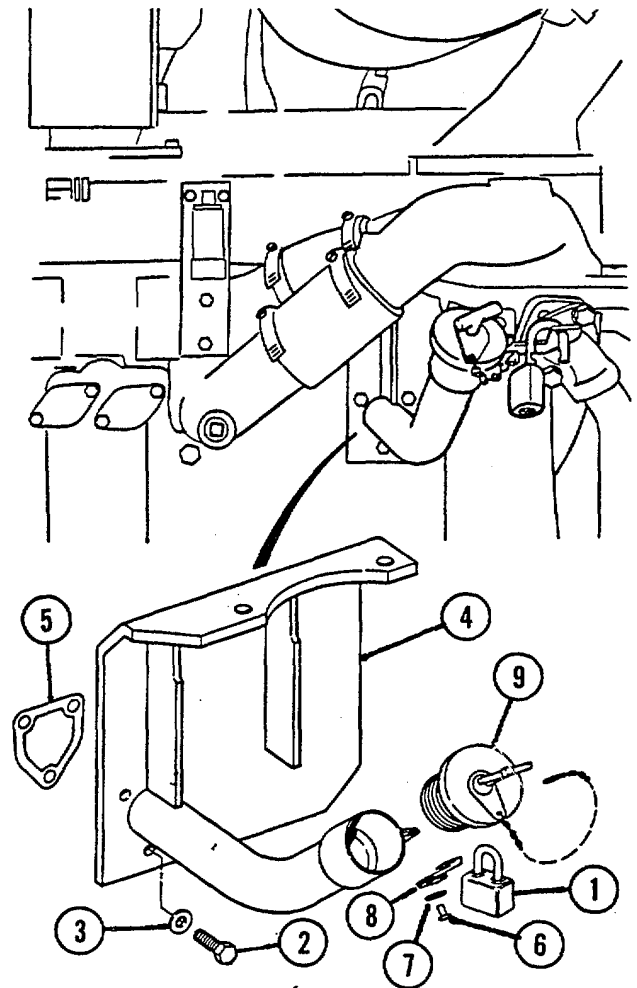


3-9 ENGINE OIL FILLER TUBE - REPLACE (Cont'd)

(3) Install tube assembly (4) with new gasket (5), three washers (3) and three capscrews (2) using a wrench.

(4) Install lock (1) through hasp (8).

(5) Install transmission oil cooler.
See page 5-22.



3-10. CRANKCASE BREATHER - SERVICE/REPLACE

This task covers:

- a. Removal
- b. Disassembly
- c. Inspection

INITIAL SETUP:

Applicable Configurations
 All
 Common Tools
 Shop Equipment, Automotive
 Maintenance and Repair
 Common #1, Less Power
 NSN 4910-00-754-0654

Materials/Parts
 Seal (4)
 Equipment Condition
 Engine cool.
 Fumes disposal hose removed.
 (page 3-24)

- a. Removal
 - (1) Use a socket to remove one capscrew (1) and one washer (2) from breather (3). Remove breather assembly (3).
 - (2) Remove seal (4) from breather assembly (3).

b. Cleaning

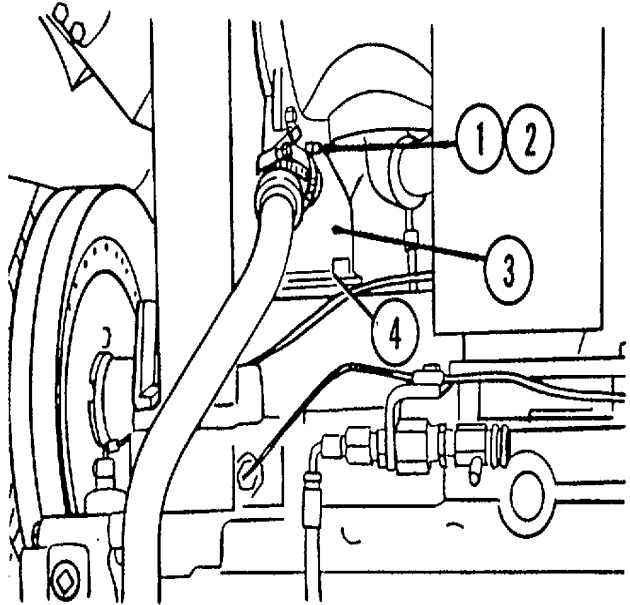
WARNING

Solvent PD-680 is toxic and flammable. Wear proper protective equipment.

CAUTION

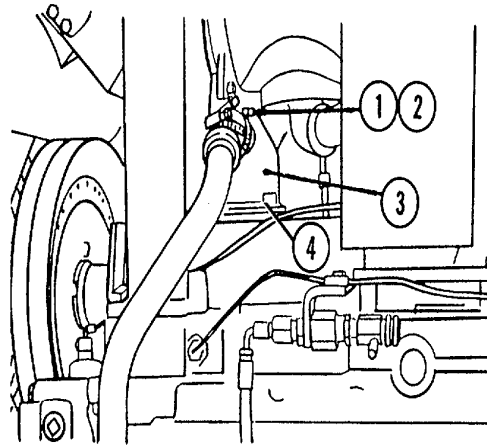
Use a nonflammable cleaning solvent to avoid damaging the breather.

See Cleaning Instructions, page 2-156.



3-10 CRANKCASE BREATHER - SERVICE/REPLACE (Cont'd)**c. Installation**

- (1) Inspect seal (4), install new seal if necessary.
- (2) Position breather assembly (3) onto valve cover.
- (3) Insert capscrew (1) through washer (2) and breather (3). Tighten bolt using a socket. Torque to 10+2 lb. ft.
- (4) Connect fumes disposal hose to breather. See page 3-24.



3-11. ENGINE FUMES DISPOSAL HOSE - REPLACE

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP:Applicable Configurations

All

Equipment Condition

Brake lock applied.
Engine OFF.

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal

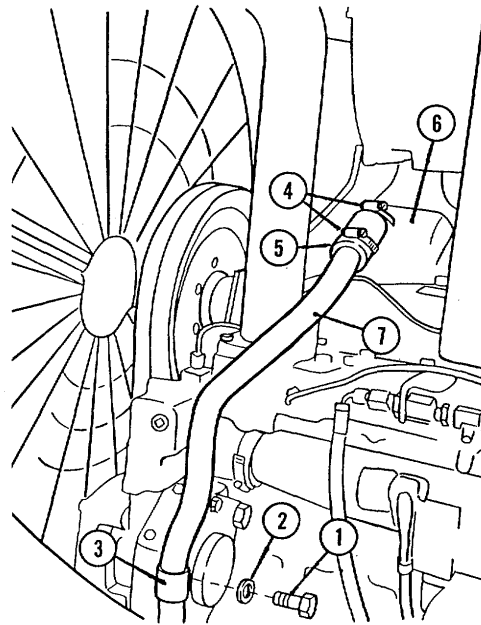
- (1) Use a wrench to remove capscrew (1) and washer (2) holding clip (3) to timing gear housing.
- (2) Use a flat tip screwdriver to loosen two hose clamps (4).
- (3) Remove hose (5) from breather assembly (6) and fumes disposal tube (7).

b. Inspection

See page 2-154 for Inspection instructions.

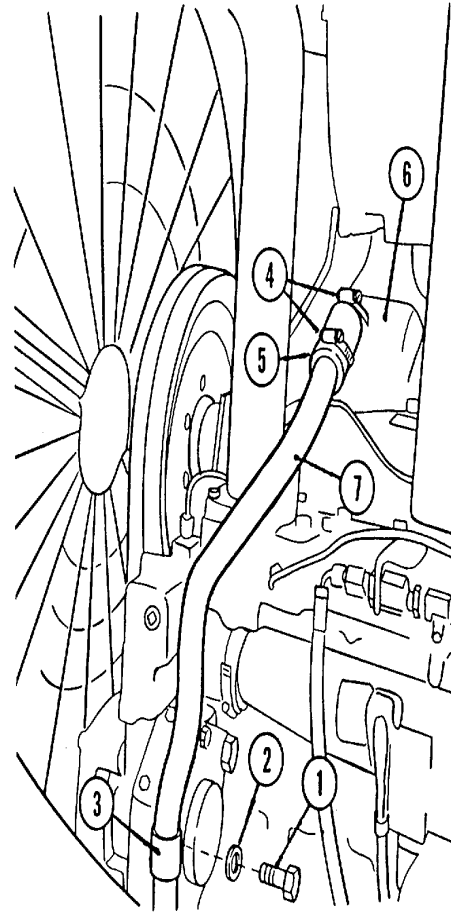
c. Installation

- (1) Install hose (5) on breather assembly (6).
- (2) Slip hose clamps (4) onto hose.
- (3) Connect fumes disposal tube (7) to hose.



3-11. ENGINE FUMES DISPOSAL HOSE - REPLACE (Cont'd)

- (4) Position hose clamps (4) to secure hose to breather and tube. Use screwdriver to tighten hose clamps (4).
- (5) Align clip (3) with appropriate hole on timing gear housing.
- (6) Install capscrew (1) and washer (2) and tighten with wrench.



3-12. ENGINE OIL COOLER - REPLACE/REPAIR

This task covers:

- a. Removal
- b. Disassembly
- c. Pre-Load Check of Bearing
- d. Assembly
- e. Installation

INITIAL SETUP:

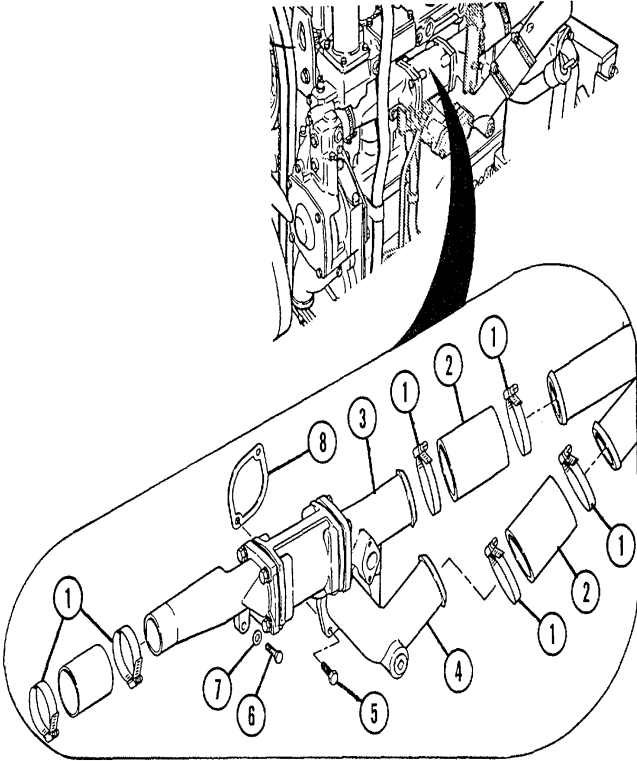
Applicable Configurations
All

Common Tools
Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts
Gaskets (8), (19), (20)

Equipment Condition
Cooling system drained. (page 3-104)
Oil filter base removed. (page 3-14)
Air cleaner removed. (page 3-39)
Oil level gage removed. (page 3-18)

- a. Removal
- (1) Use a flat tip screwdriver to loosen six clamps (1).
 - (2) Slide two hoses '2 off pipe (3) and pipe (4).
 - (3) Use a wrench to remove two capscrews (5).
 - (4) Use a wrench to remove capscrew (6) and washer (7).
 - (5) Remove entire oil cooler assembly from machine and remove gasket (8) from machine.

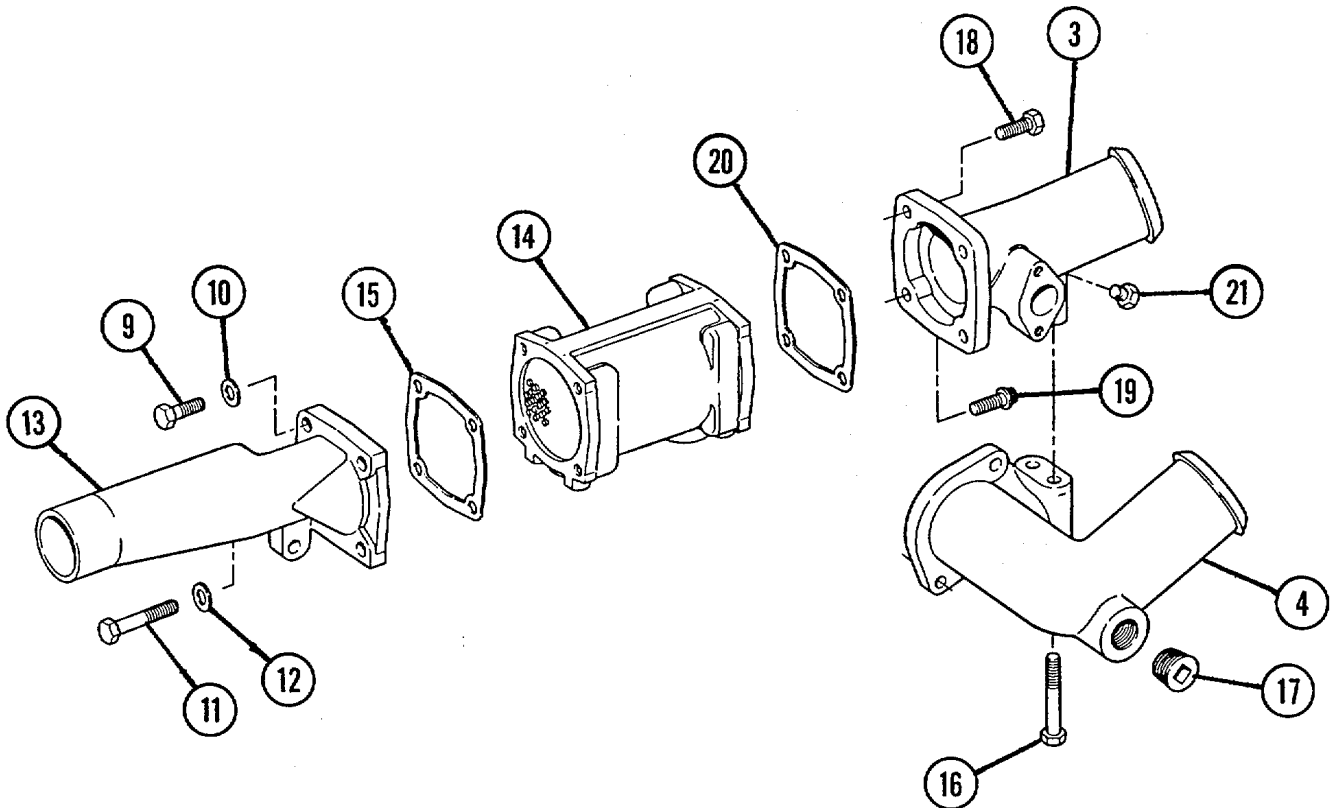


3-12. ENGINE OIL COOLER - REPLACE/REPAIR (Cont'd)**b. Disassembly**

- (1) Use a wrench to remove capscrew (9) and washer (10) and capscrew (11) and washer (12) from pipe (13). Separate pipe (13) from oil cooler (14) and remove gasket (15). Discard gasket (15).
- (2) Use a wrench to remove capscrews (16) from pipe (4) and remove pipe (4) from pipe (3). Use a plug socket to remove plug (17) from pipe (4).
- (3) Use a wrench to remove three capscrews (18) and use a 12-point wrench to remove capscrew (19) from pipe (3). Separate pipe (3) from oil cooler (14) and remove gasket (20). Discard gasket (20).
- (4) Use a wrench to remove plug (21) from pipe (3).

c. Assembly

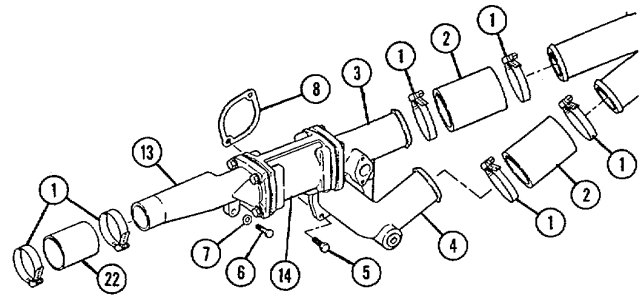
- (1) Use a wrench to install plug (21) into pipe (3).
- (2) Place gasket (20) into position between pipe (3) and oil cooler (14) and using a wrench, install three capscrews (18) and using a 12-point wrench, install capscrew (19) that secures pipe (3) to oil cooler (14).
- (3) Use a plug socket to install plug (17) into pipe (4). Use a socket to install capscrews (16) that hold pipe (4) to pipe (3).
- (4) Position gasket (15) between pipe (13) and oil cooler (14). Use a wrench to install capscrew (9) and washer (10), and capscrew (11) and washer (12) to secure pipe (13) to oil cooler.



3-12. ENGINE OIL COOLER - REPLACE/REPAIR (Cont'd)

d. Installation

- (1) Place gasket (8) in position on oil cooler (14)
- (2) Use a wrench to install capscrew (6) and washer
- (3) Use a wrench to install two capscrews (5).
- (4) Slide two hoses (2) onto pipe (3) and pipe (4).
- (5) Use a flat tip screwdriver to tighten six clamps
- (6) Install oil level gage. See page 3-18.
- (7) Install air filter indicator. See page 3-39.
- (8) Install oil filter base. See page 3-14.
- (9) Fill cooling system. See page 3-104.

e. Place In Service

Run engine and check for proper operation.

Section II. FUEL SYSTEM

3-13. GENERAL

This section provides maintenance procedures assigned to the organizational level for the fuel system. To find a specific maintenance procedure, see the maintenance task summary below.

3-14. FUEL SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA	PROCEDURES	PAGE NO.
3-15	Fuel Injection Nozzles - Replace	3-30
3-16	Fuel Priming Pump - Replace	3-32
3-17	Fuel Injection Lines and Fittings - Replace	3-34
3-18	Air Cleaner - Replace/Repair	3-39
3-19	Air Cleaner Elements - Service/Replace	3-42
3-20	Air Cleaner Prescreen - Service/Replace	3-46
3-21	Air Cleaner Dust Ejector - Replace	3-47
3-22	Turbocharger and Air Lines - Replace	3-48
3-23	Turbocharger Oil Lines - Replace	3-54
3-24	Fuel Lines and Fittings - Replace/Repair	3-58
3-25	Fuel Drain Line and Drain Valve Mechanism - Replace	3-66
3-26	Governor Controls and Linkages - Adjust/Replace	3-69
3-27	Primary Fuel Filter Assembly - Service/Replace/Repair	3-82
3-28	Secondary Fuel Filter Assembly - Service/Replace	3-88
3-29	Ether Starting Aid Assembly - Service/Replace	3-91

3-15. FUEL INJECTION NOZZLE - REPLACE

This task covers:

- a. Removal
- b. Installation
- e. Place in Service

INITIAL SETUP:**Applicable Configurations**

All

Common Tools

Shop Equipment, Automotive
Maintenance and Repair, Common #1
Less Power
NSN 4910-00-754-0654
Reamer

Materials/Parts

Seal (5)
Carbon dam seal (4)

Equipment Condition

Engine cool.
Fuel injection lines and fittings
removed. (page 3-34)

a. Removal**NOTE**

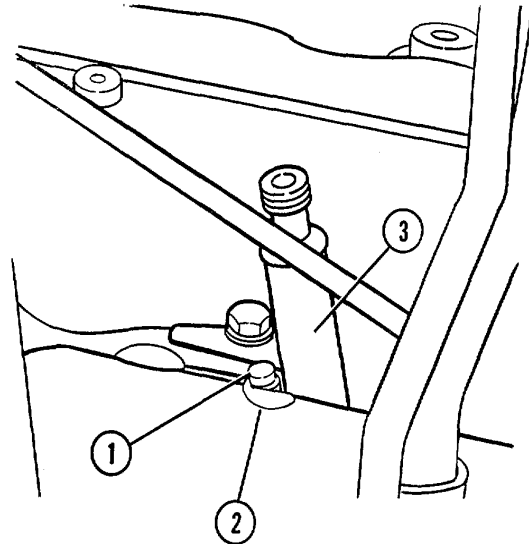
This procedure applies to all six fuel injection nozzles.

- (1) Use a twelve point wrench to remove capscrew (1) and clamp (2) from fuel injection nozzle (3).

CAUTION

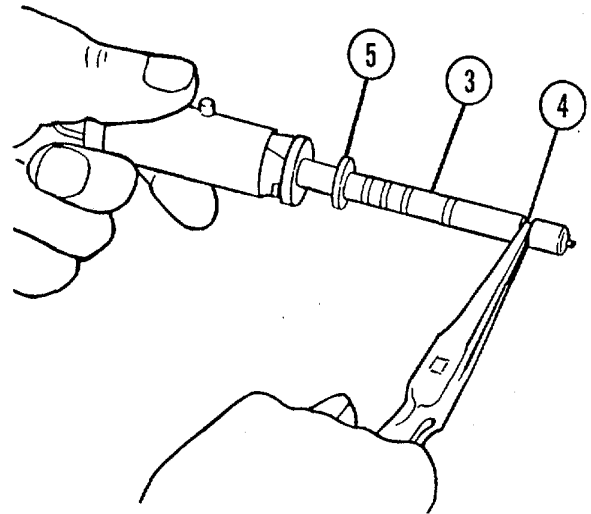
Hold slide hammer puller so the center line of the tool is in alignment with the center line of the fuel injection nozzle. This will prevent distortion of the nozzle which can cause it to bend or break off during removal.

- (2) Remove fuel injection nozzle (3) using slide hammer puller.



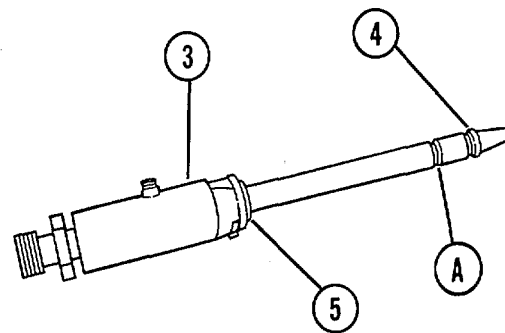
3-15. FUEL INJECTION NOZZLE - REPLACE (Cont'd)

- (3) Remove and discard carbon dam seal (4) from end of injection nozzle (3) using a needle nose pliers.
- (4) Remove seal (5) from injection nozzle (3) and discard seal.



b. Installation

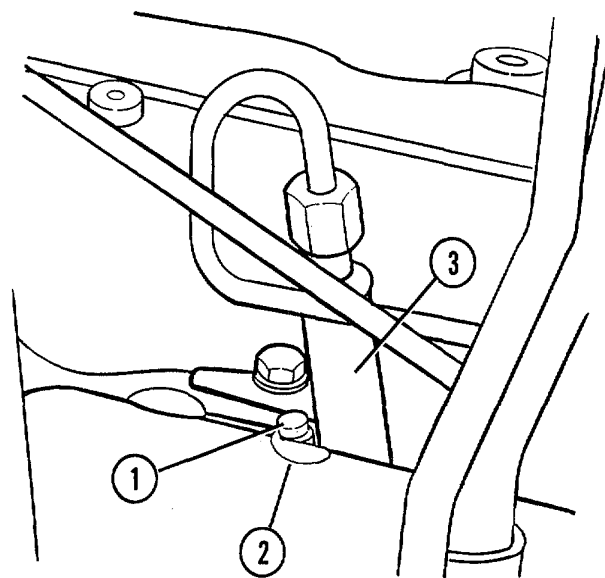
- (1) Install a new seal (5) on fuel injection nozzle (3).
- (2) Place carbon dam seal (4) into groove (A) on narrow end of nozzle (3).



- (3) Insert fuel injection nozzle (3) in position in the cylinder head.
- (4) Install clamp (2) and bolt (1) to hold each nozzle in position.
- (5) Install fuel injection lines See page 3-34.

c. Place In Service

Run engine and check for leaks.



3-16. FUEL PRIMING PUMP - REPLACE

This task covers:

- | | |
|-----------------|----------------------------|
| a. Removal | c. Priming the fuel system |
| b. Installation | d. Place In Service |

INITIAL SETUP:

Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance and Repair, Common #1
Less Power
NSN 4910-00-754-0654

Materials/Parts

Gasket (5)

Equipment Condition

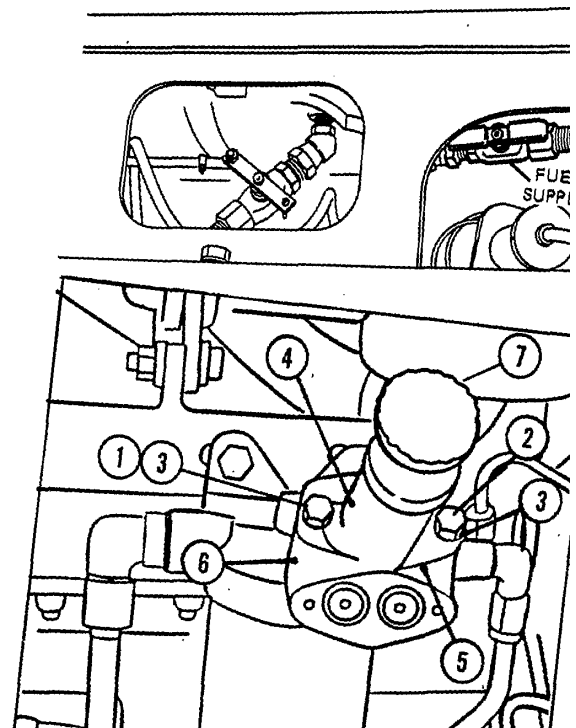
Engine cool.

a. Removal

- (1) Turn fuel supply valve at bottom of fuel tank to the OFF position.
- (2) Use a socket to remove capscrew (1) and capscrew (2) and two washers (3).
- (3) Remove fuel priming pump (4) and gasket (5). Discard gasket (5).

b. Installation

- (1) Position gasket (5) and fuel priming pump (4) on the primary fuel filter base (6).
- (2) Use a socket to install one capscrew (1) and one washer (3). Use a socket to install one capscrew (2) and washer (3).
- (3) Turn the valve for the fuel supply to the ON position.



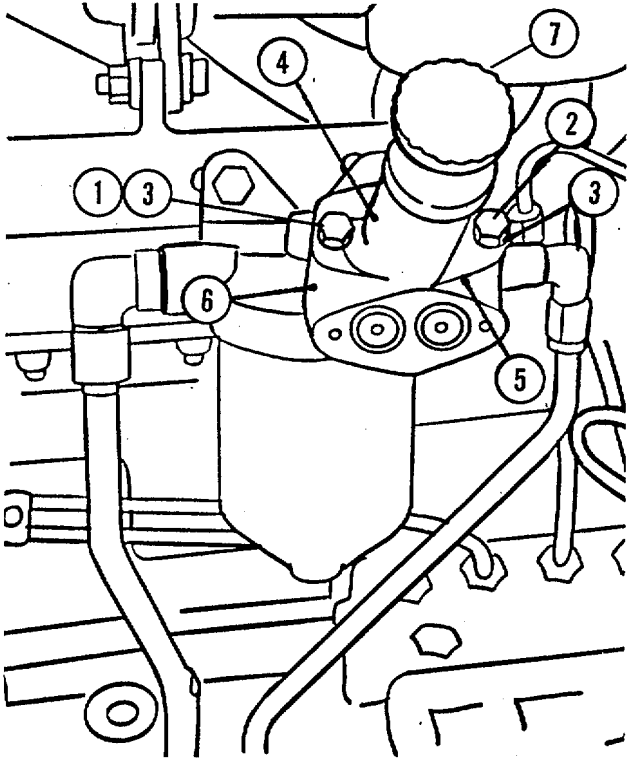
3-16. FUEL PRIMING PUMP - REPLACE (Cont'd)

c. Priming the Fuel System

- (1) Unscrew knob (7) until it is free to pump.
- (2) Pump several times. System is primed when pressure gage returns to "O" immediately after pumping has stopped.

d. Place In Service

Run engine and check for proper operation.



3-17. FUEL INJECTION LINES AND FITTINGS - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place in Service

INITIAL SETUP:

Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance and Repair, Common #1
Less Power
NSN 4910-00-754-0654

Materials/Parts

Caps and Plugs
Wire I.D. Tags

Equipment Condition

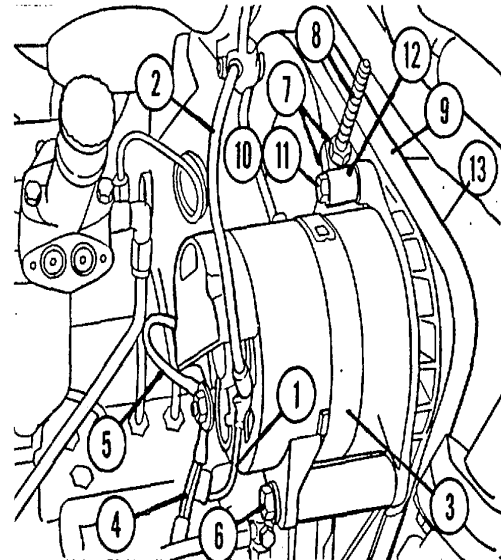
Engine cool.
Disconnect switch in OFF position.

a. Removal

NOTE

Alternator and wiring must be moved out of the way to remove fuel lines on front part of engine.

- (1) Tag and remove wires (1) and (2) from back of alternator (3) and move wires away from fuel lines.
- (2) Tag and remove wires (4) and (5) from back of alternator (3) and move wires away from fuel lines.
- (3) Use a wrench to loosen capscrew (6) in pivot arm of alternator (3).
- (4) Use a wrench to loosen top and bottom nuts (7) on belt tightening rod (8) to take tension off belts (9).



3-17. FUEL INJECTION LINES AND FITTINGS - REPLACE (Cont'd)

- (5) Use a wrench to remove capscrew (10), washer (11) and block (12) with rod (8) and two nuts (7) from alternator (3).
- (6) Remove belts (9) from pulley (13) and swing alternator (3) away from fuel lines.

CAUTION

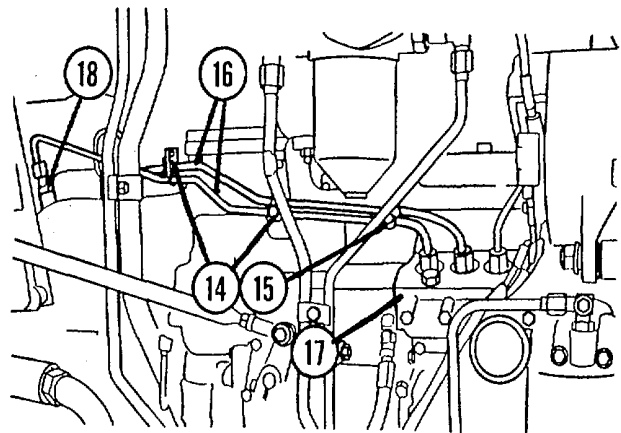
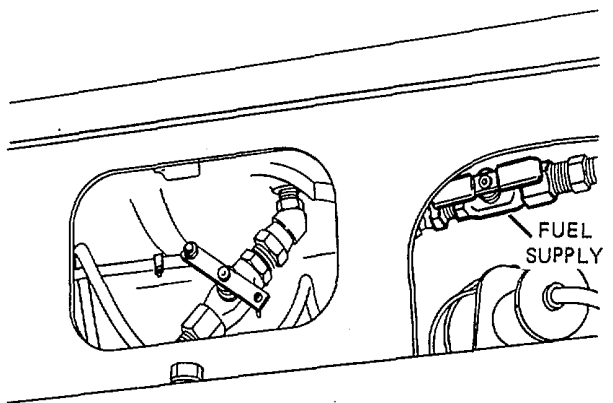
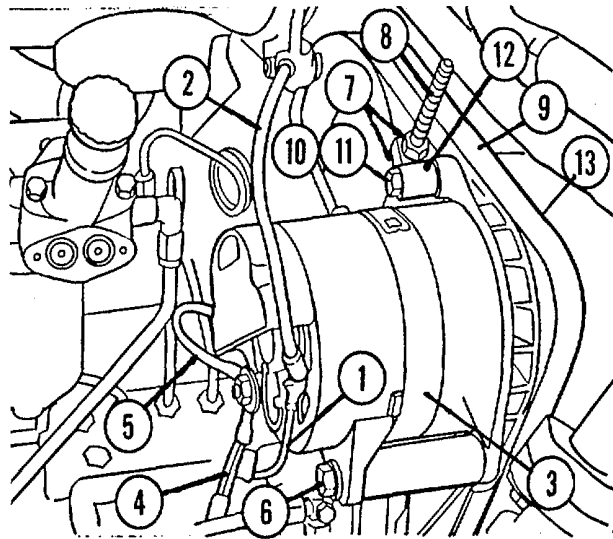
Cap all fuel lines and plug all fuel line holes after removal to prevent dirt from getting into fuel system. Dirt can cause serious damage to the engine. Use care in removal of fuel lines to prevent twisting or bending of the lines which can affect fuel flow to engine or cause fuel leaks and possible fire.

- (7) Turn fuel supply valve at bottom of fuel tank to OFF position.
- (8) Use a socket to remove four bolts (14) and four clamps (15) from two fuel lines (16) toward back of engine.
- (9) Use a wrench to remove two fuel lines (16) from fuel injection pumps (17).

CAUTION

The fuel injection nozzles can be permanently damaged by twisting if only one wrench is used to loosen or tighten the fuel line nuts. Use one wrench to hold the nozzle and another to loosen the nut.

- (10) Use two wrenches to remove two fuel lines (16) from two fuel injectors (18). Tag lines for installation.



3-17. FUEL INJECTION LINES AND FITTINGS - REPLACE (Cont'd)

(11) Use a socket to remove five bolts (14) and five clamps (15) from two fuel lines (19) at center of engine.

(12) Repeat STEPS 9 and 10 for two fuel lines (19).

(13) Use a socket to remove three bolts (14) and three clamps (15) from two fuel lines (20) at front of engine.

(14) Repeat STEPS 9 and 10 for fuel lines (20).

b. Installation

CAUTION

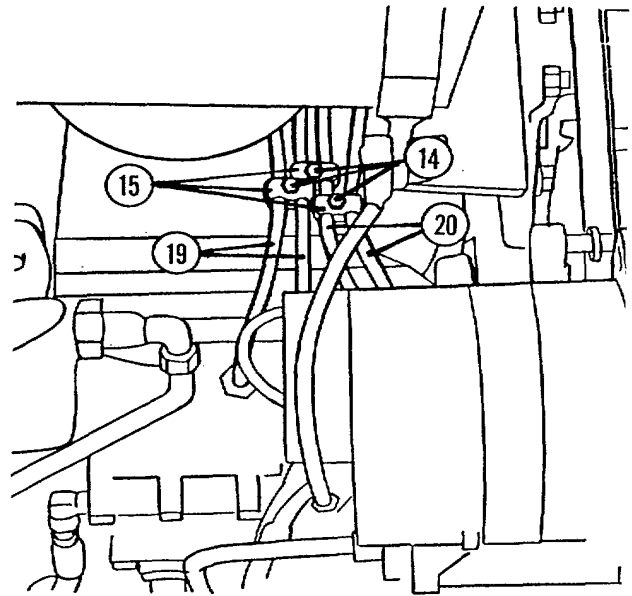
Make sure fuel injection lines are clean and dry. Remove plugs and caps only as lines are installed to prevent dirt from getting into fuel system. Dirt can cause serious damage to engine. The fuel injection nozzles can be permanently damaged if only one wrench is used to tighten fuel line nuts. Use one wrench to hold nozzle and a second wrench to tighten nut.

NOTE

Tighten nuts on both ends of fuel injection lines to a torque of 30+5 lb. ft. (40+7 N.m) using torque wrench.

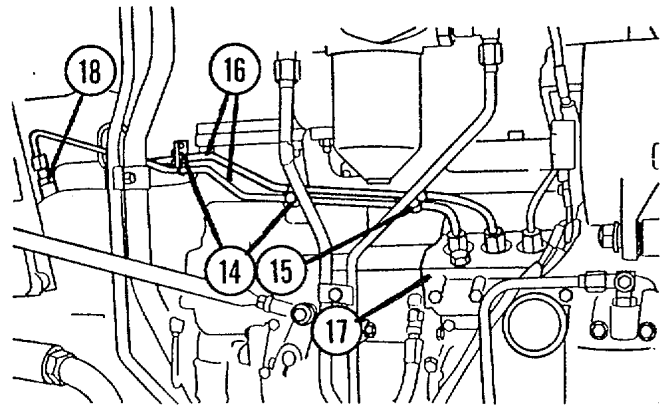
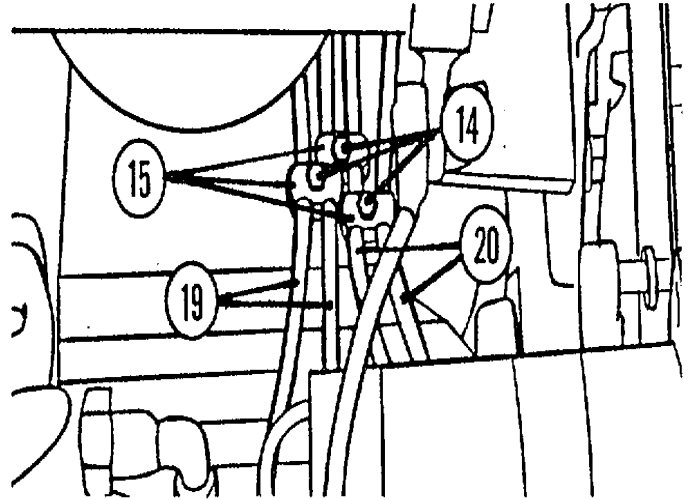
(1) Use two wrenches to install two fuel lines (20) on
(2) two injectors (18) at front of engine.

(2) Install other end of two fuel lines (20) on fuel
(3) injection pumps (17) with wrench.



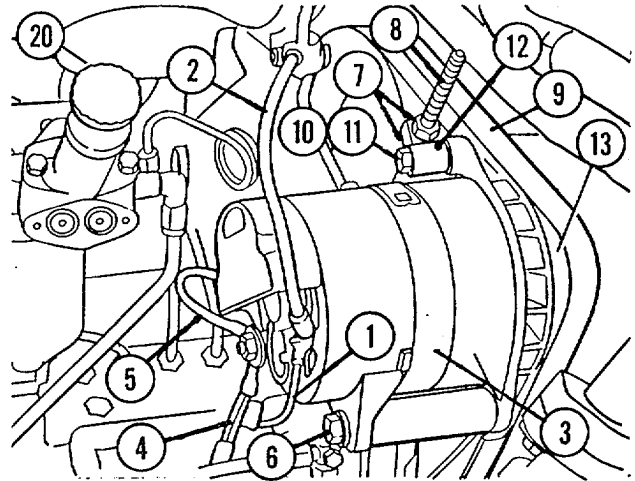
3-17. FUEL INJECTION LINES AND FITTINGS - REPLACE (Cont'd)

- (3) Use a socket to install three clamps (15) and three bolts (14) on two fuel lines (20).
- (4) Repeat STEPS 1 and 2 for two fuel lines (19) at center of engine.
- (5) Use a socket to install five clamps (15) and five bolts (14) on fuel lines (19).
- (6) Repeat STEPS 1 and 2 for two fuel lines (16) at back of engine.
- (7) Use a socket to install four clamps (15) and four bolts (14) on fuel lines (16).
- (8) Turn fuel supply valve at bottom of fuel tank to ON position. See STEP (7).
- (9) Remove (bleed) air from fuel system as follows:
 - (a) Use two wrenches to loosen nut to fuel injector (18) on longest fuel line (16).
 - (b) Operate fuel priming pump until no air bubbles can be seen at injector (18).
 - (c) Use two wrenches to tighten nut to a torque of 30+5 lb. ft.
 - (d) Repeat STEPS a, b and c, working from the longest to the shortest fuel line (16).



3-17. FUEL INJECTION LINES AND FITTINGS - REPLACE (Cont'd)

- (10) Swing alternator (3) into position and install belts (9) on pulley (13).
- (11) Use a wrench to install block 12) with rod (8) and nuts 7) on alternator (3) with capscrew (10) and washer (11).
- (12) Adjust tension on belts. See page 3-119. Tighten two nuts (7) on rod (8).
- (13) Tighten capscrew (6) in pivot arm of alternator (3).
- (14) Install two wires (4) and (5) on back of alternator (3).
- (15) Install two wires (1) and (2) on back of alternator (3).

**c. Place In Service**

Run engine and check for proper operation.

3-18. AIR CLEANER - REPLACE/REPAIR

This task covers:

- | | | |
|----------------|-----------------|---------------------|
| a. Removal | c. Assembly | e. Place in Service |
| b. Disassembly | d. Installation | |

INITIAL SETUP:

Applicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

Gasket (8)

Equipment Condition

Engine cool.

Air cleaner elements removed.
(page 3-42)

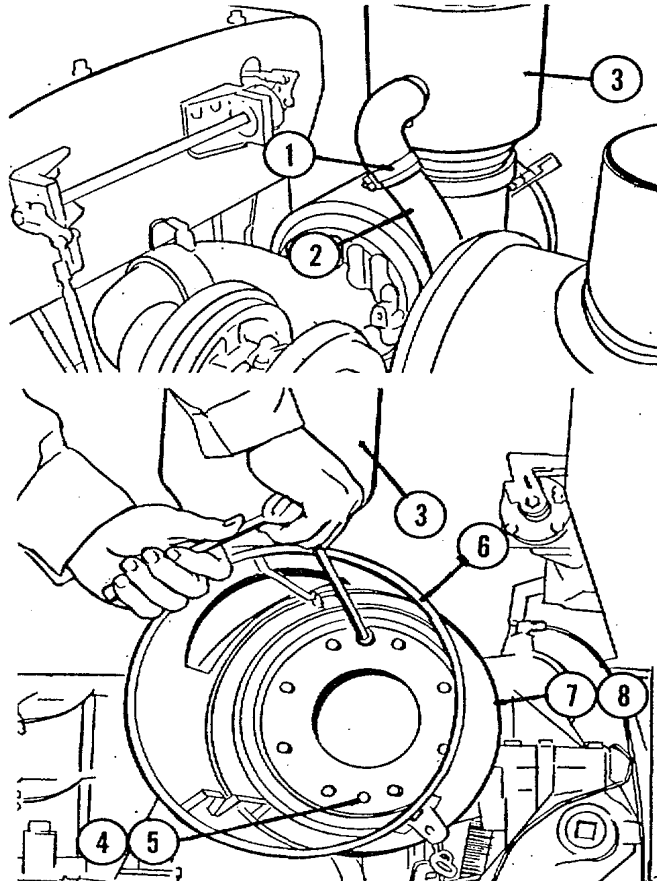
Hood removed. (page 10-16)

a. Removal

(1) Use a flat blade screwdriver to loosen hose clamp (1) securing hose (2) to filter body (3). Remove hose.

(2) Use a twelve point socket to remove two capscrews (4) and two lockwashers (5) and slide filter housing (6) off studs in pipe assembly (7) and remove from engine.

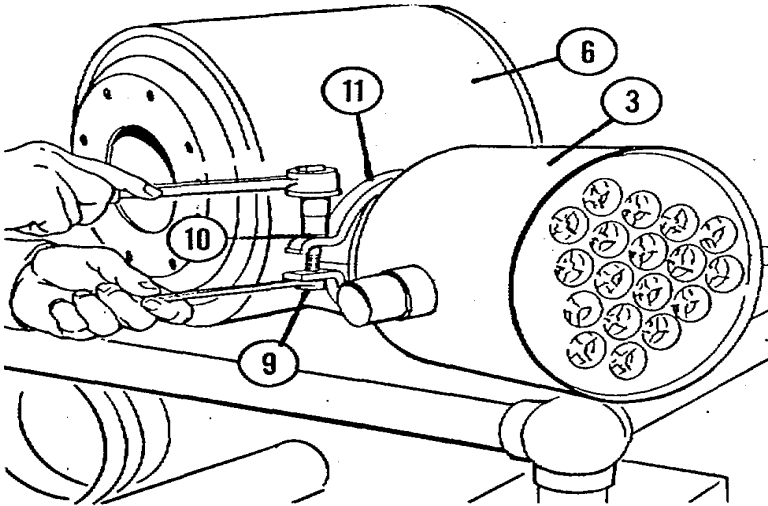
(3) Remove gasket (8) from pipe assembly (7). Discard gasket.



3-18. AIR CLEANER - REPLACE/REPAIR (Cont'd)

b. Disassembly

- (1) Use two wrenches to loosen nut (9), capscrew (10) and securing clamp (11) from filter body (3) and filter housing (6).
- (2) Remove filter body (3) and clamp (11) from filter housing (6).

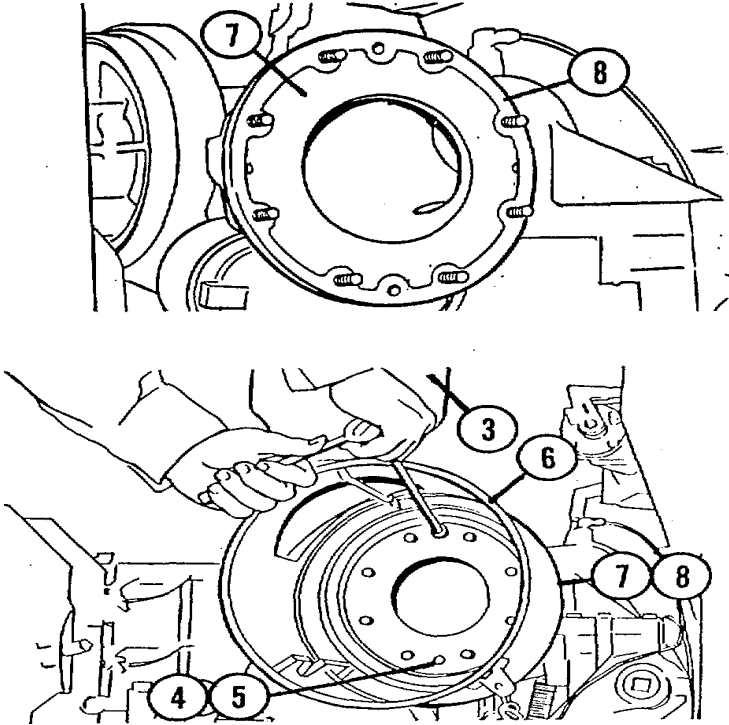


c. Assembly

- (1) Install clamp (11) on filter body (3), and assemble filter body (3) on filter housing (6).
- (2) Use two wrenches to tighten capscrew (10) and nut (9) to secure body (3) and filter housing (6).

d. Installation

- (1) Install new gasket (8) over studs on pipe assembly (7).
- (2) Position filter housing (6) with filter body (3) inserted up through opening in hood. Align eight holes in filter housing (6) with eight studs in pipe (7), and slide housing onto studs.
- (3) Install filter housing (6) on pipe assembly (7) with two capscrews (4) and two lockwashers (5). Use 12-point socket to tighten capscrews (4).

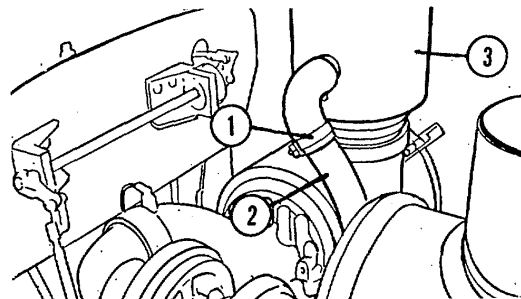


3-18. AIR CLEANER - REPLACE/REPAIR (Cont'd)

- (4) Slide hose (2) onto filter body (3) and tighten hoseclamp (1), using flat tip screwdriver.
- (5) Install air cleaner elements. See page 3-42.
- (6) Install hood. See page 10-16.

e. Place In Service

Run engine and check for proper operation



3-19. AIR CLEANER ELEMENTS - SERVICE/REPLACE

This task covers:

- a. Removal
- b. Cleaning
- c. Installation
- d. Place In Service

INITIAL SETUP:Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance and Repair, Common #1
Less Power
NSN 4910-00-754-0654

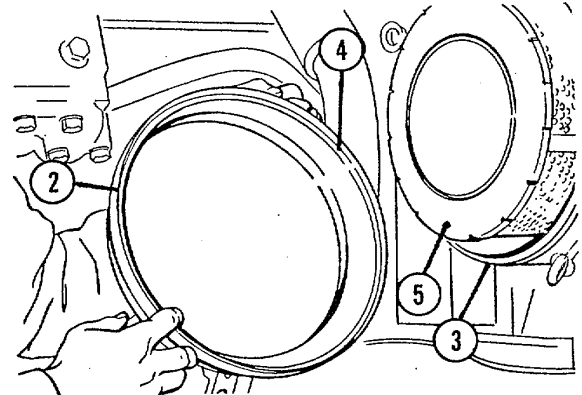
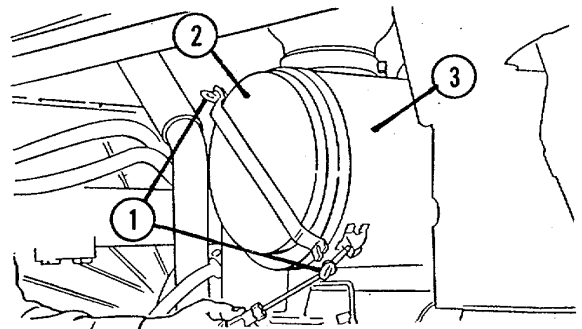
Materials/Parts

Secondary element (7)
Lint-free cloth (App. D, Item 15)
Detergent
Primary element (5)

a. Removal**WARNING**

Never service air cleaners with engine running.

- (1) Loosen two rod assemblies (1) and cover (2) from filter housing (3).
- (2) Remove and discard gasket (4) from cover (2).
- (3) Remove primary element (5).



3-19. AIR CLEANER ELEMENTS - SERVICE/REPLACE (Cont'd)

(4) Use a socket to remove eight locknuts (6) and remove secondary element (7) from studs inside filter housing (3). Discard secondary element.

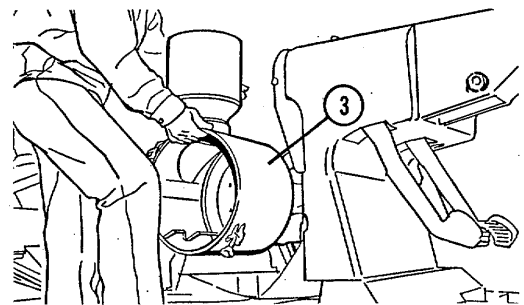
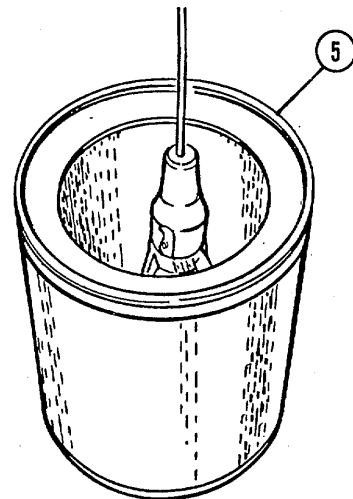
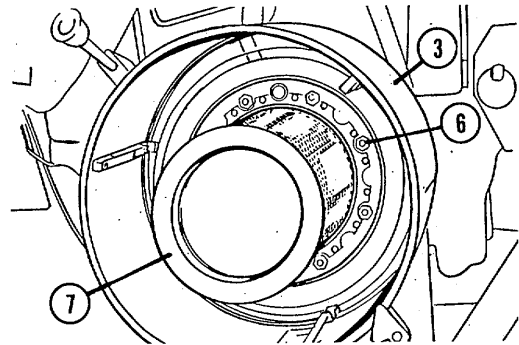
b. Cleaning**WARNING**

When using pressurized air, wear safety face shield and protective clothing. Use 30 psi (2 kg/cm) maximum air pressure for cleaning to prevent personal injury or damage to filter.

CAUTION

To prevent filter damage, do not clean primary elements by bumping or tapping. Use a light inside element to inspect filter for tears, holes or other damage before and after each cleaning process. Discard element if any damage is evident.

- (1) Follow STEPS (2) through (5) for cleaning with pressurized air. Follow STEPS (6) and (7) for cleaning with pressurized water. Follow STEPS (8) and (9) for cleaning in detergent.
- (2) Use a lint-free cloth to clean inside of filter housing (3).



3-19. AIR CLEANER ELEMENTS - SERVICE/REPLACE (Cont'd)

- (3) Direct air inside primary element (5) along length of filter pleats.
- (4) Direct air outside along length of pleats.
- (5) Repeat STEP 3.

CAUTION

To prevent filter damage, use a maximum of 40 psi water pressure.

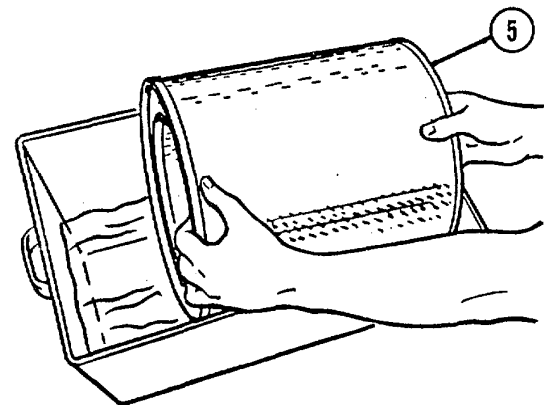
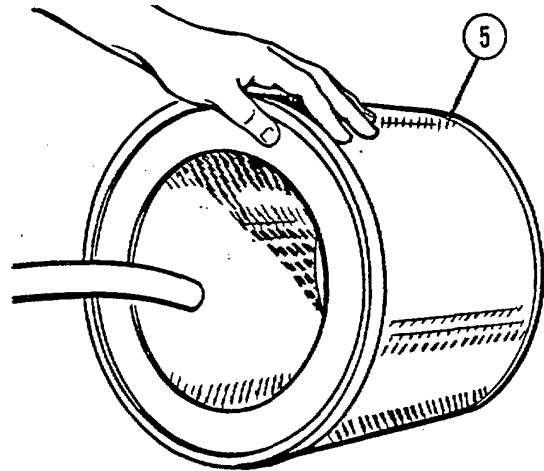
- (6) Direct water inside element (5) along length of filter pleats.
- (7) Direct water outside along length of pleats. Rinse and air dry element (5) thoroughly.
- (8) Wash element in warm water and non-sudsing household detergent.
- (9) Rinse with clean water and air dry thoroughly.

c. Installation**CAUTION**

Always replace the secondary element. Do not attempt to reuse by cleaning.

NOTE

The primary element should be replaced after being cleaned a maximum of 6 times. Replace the element once a year even though it has not been cleaned 6 times.



3-19. AIR CLEANER ELEMENTS - SERVICE/REPLACE (Cont'd)

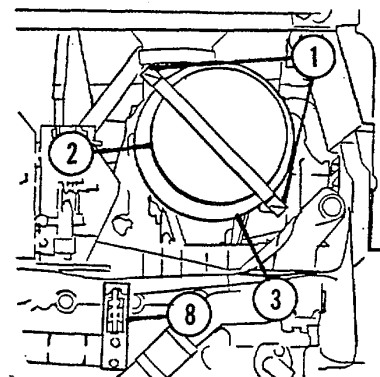
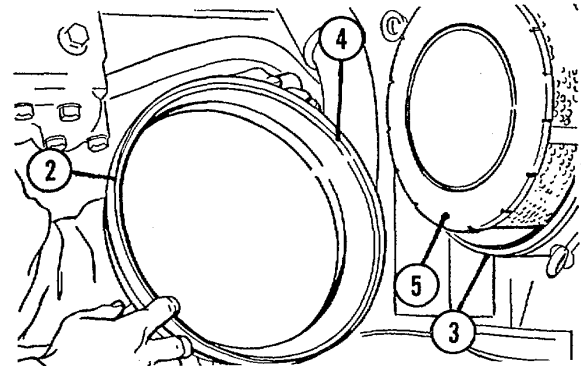
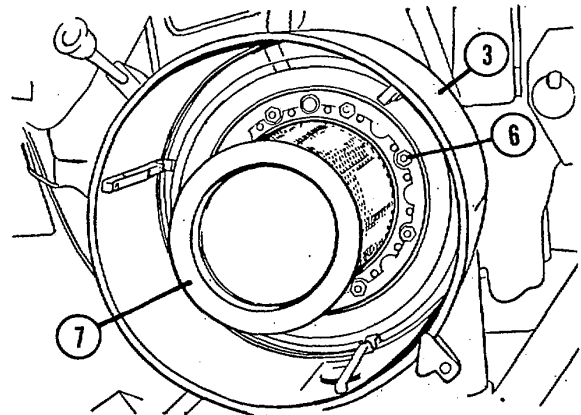
If indicator shows RED shortly after installation of a primary element which has been cleaned approximately 6 times, change to another clean element.

If indicator still shows RED shortly after the installation of the clean primary element, change secondary element.

- (1) Install secondary element (7) in filter housing (3) on eight studs inside housing.
- (2) Use a socket to install eight nuts (6) on studs to secure element (7).
- (3) Install primary element (5) in filter housing (3).
- (4) Install gasket (4) in cover (2) and position cover on filter housing (3).
- (5) Install two rod assemblies (1) to secure cover (2) on filter housing (3).
- (6) Reset filter indicator (8) by pushing button on indicator.

d. Place In Service

Run engine and check for proper operation.



3-20. AIR CLEANER PRESCREEN - SERVICE/REPLACE

This task covers:

- a. Removal
 - b. Service by cleaning
 - c. Installation
-

INITIAL SETUP:Applicable Configurations

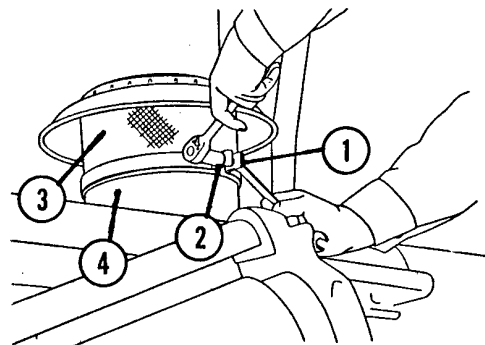
All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal

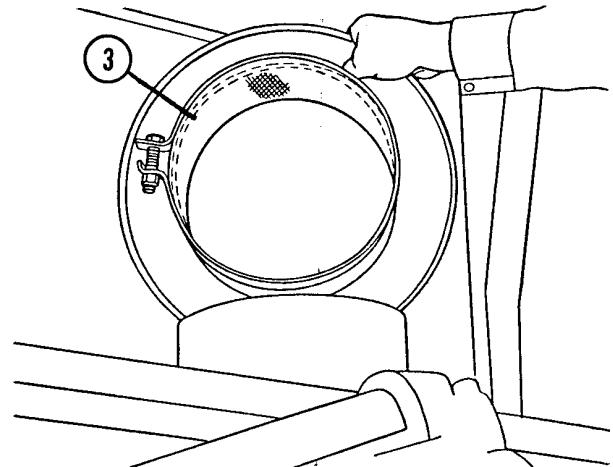
- (1) Use a wrench and a socket to loosen nut (1) and capscrew (2) securing prescreen (3) to filter body (4).
- (2) Remove prescreen (3) from filter body (4).

**b. Service by Cleaning**

See Cleaning Instructions, page 2-156.

c. Installation

- (1) Position prescreen (3) onto body filter (4).
- (2) Tighten capscrew (2) and nut (1) using a socket and a wrench. Tighten to 15-25 lb. ft.



3-21. AIR CLEANER DUST EJECTOR - REPLACE

This task covers:

- a. Removal
 - b. Installation
-

INITIAL SETUP:Applicable Configurations

All

Common Tools

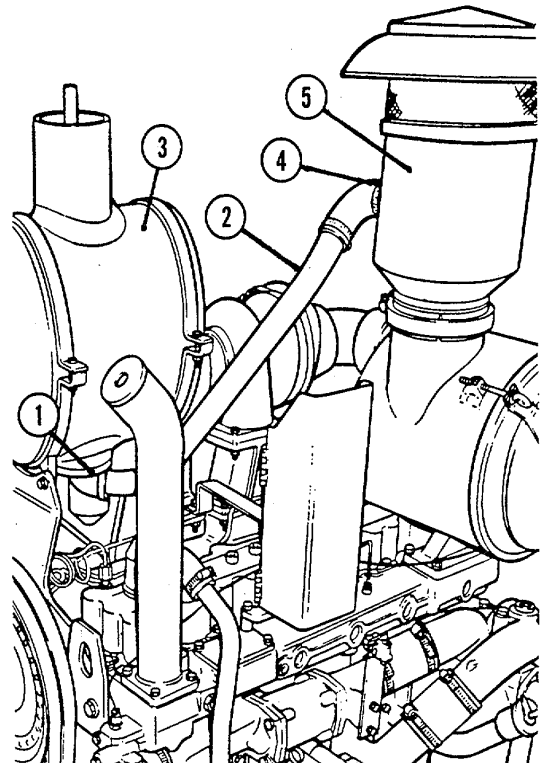
Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal

- (1) Use a wrench to remove two capscrews (1) from dust ejector assembly (2) at bottom of muffler (3).
- (2) Use flat tip screwdriver to loosen hose clamp (4) holding other end of dust ejector assembly (2) on precleaner body (5).
- (3) Remove dust ejector assembly (2) from precleaner body (5).

b. Installation

- (1) Slide hose end of dust ejector assembly (2) onto tube in precleaner body (5) and tighten clamp (4) with screwdriver.
- (2) Use a wrench to install other end of ejector assembly (2) at bottom of muffler (3) with two capscrews (1).



3-22. TURBOCHARGER AND AIR LINES - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP:Applicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

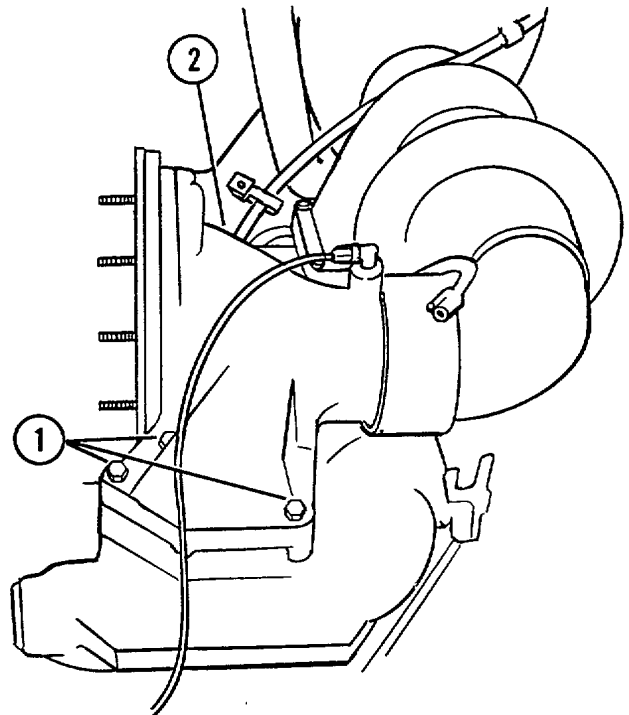
Seal (4), (17) Two each
Gasket (12), (15), (27)
Grease (App. D, Item 9)
Anti-Seize Compound (App. D, Item 7)
Seal (22)
Lint-Free Rag (App. D, Item 15)

Equipment Condition

Engine cool.
Muffler removed. (page 3-98)
Turbocharger oil lines removed. (page 3-54)
Air cleaner removed. (page 3-39)

a. Removal

- (1) Use a socket to remove four capscrews (1) from pipe assembly (2).



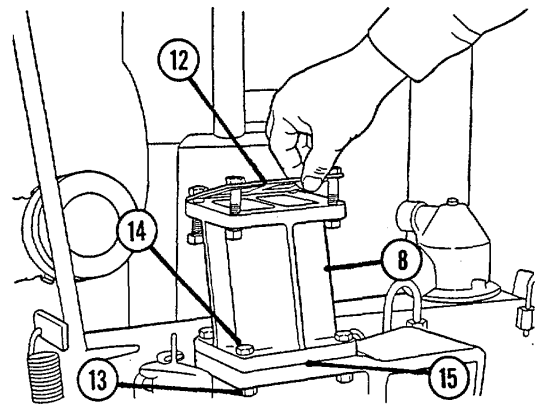
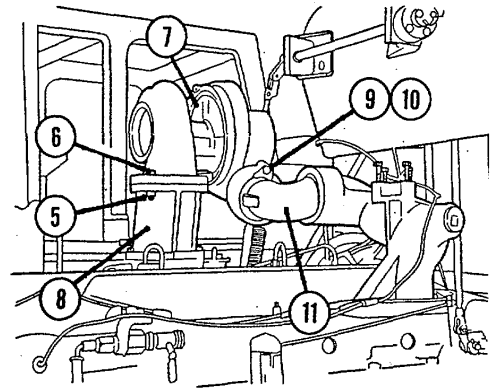
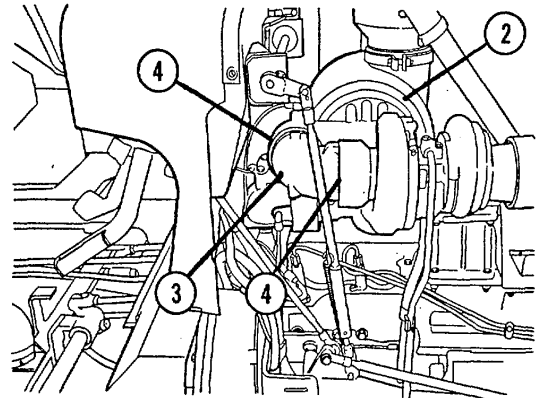
3-22. TURBOCHARGER AND AIR LINES - REPLACE (Cont'd)

- (2) Remove pipe assembly (2) and turbocharger elbow (3).
- (3) Remove two seals (4) from each end of elbow (3) and discard seals (4).
- (4) Use a wrench and a socket to remove four nuts (5) and four capscrews (6) from turbocharger (7) and adapter (8).
- (5) Use a socket to remove capscrew (9) and retainer (10) from elbow (11) and turbocharger (7).
- (6) Carefully lift turbocharger (7) off adapter (8) and remove it from elbow (11) on output side of turbocharger (7).
- (7) Remove gasket (12) from adapter (8) and discard gasket (12).

NOTE

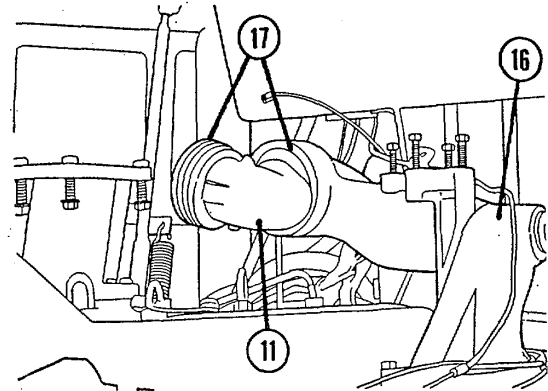
If it is necessary to remove the air lines going to and from the turbocharger, use the following procedure.

- (8) Use a wrench and a socket to remove four nuts (13), four capscrews (14), adapter (8) and gasket (15)



3-22. TURBOCHARGER AND AIR LINES - REPLACE (Cont'd)

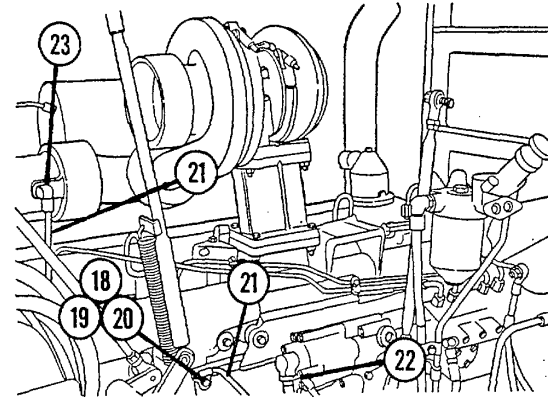
(9) Remove elbow (11) from engine intake pipe (16). Remove two seals (17) from each end of elbow (11) and discard seals (17).



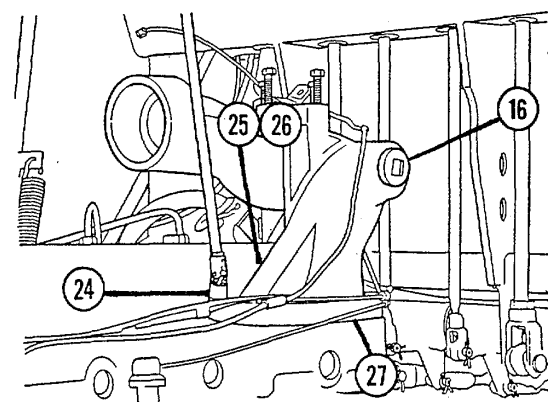
(10) Use a socket to remove two capscrews (18), two washers (19) and two clips (20) from tube assembly (21).

(11) Remove lower end of tube assembly (21) and seal (22). Discard seal (22).

(12) Remove upper end of tube assembly (21) from elbow (23) and remove tube assembly (21).



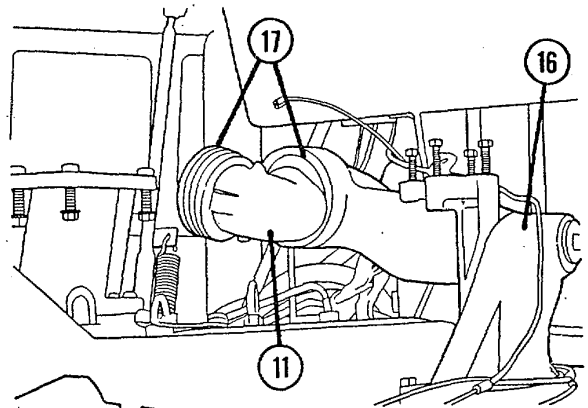
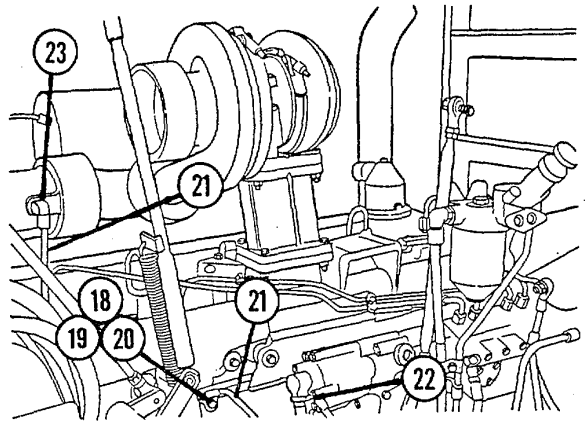
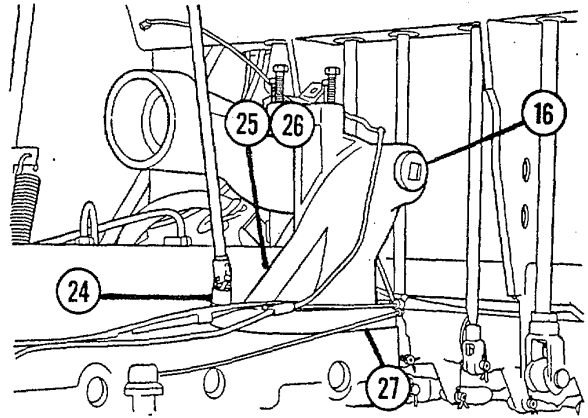
(13) Use a socket to remove five short capscrews (24), one long capscrew (25) washer (26), engine intake pipe (16) and gasket (27) from intake manifold. Discard gasket.



3-22. TURBOCHARGER AND AIR LINES - REPLACE (Cont'd)**b. Installation****NOTE**

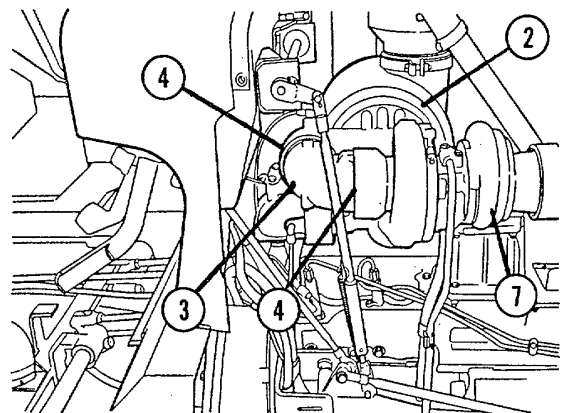
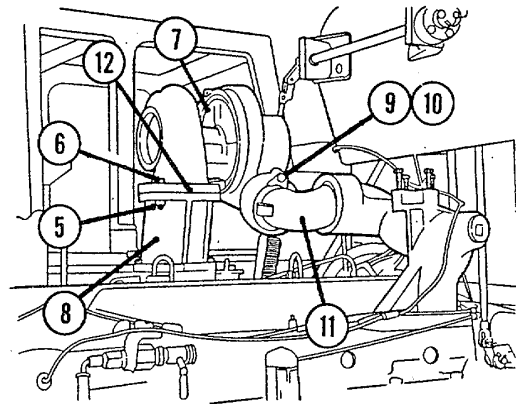
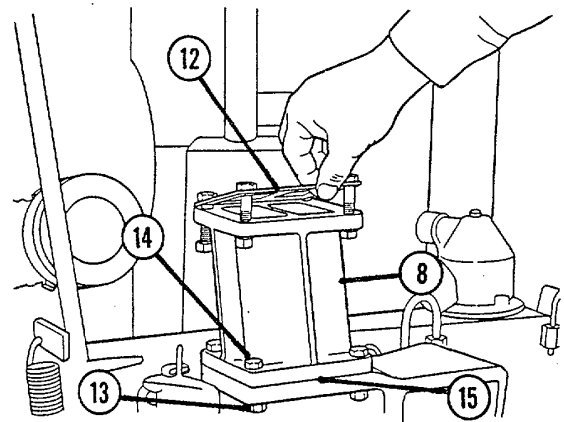
If turbocharger air lines have been removed follow STEPS 1 through 6. If they have not been removed start installation of turbocharger at STEP 7.

- (1) Use a lint-free rag and wipe all sealing surfaces clean and dry before installing new seals and gaskets. Apply light film of clean oil to preformed packing seals only before installation.
- (2) Use a socket to install gasket (27) and engine intake pipe (16) on intake manifold with five short capscrews (24), one washer (26) and one long capscrew (25).
- (3) Install upper end of tube assembly (21) in elbow (23) in engine intake pipe (16).
- (4) Install lower end of tube assembly (21) and seal (22).
- (5) Install two clips (20) on tube assembly (21). Using a socket, install two capscrews (18) and two washers (19) to secure tube.
- (6) Apply grease to seals (17) to be installed on each end of elbow (11).
- (7) Install two seals (17) on each end of elbow (11) and insert one end of elbow in engine intake pipe (16)



3-22. TURBOCHARGER AND AIR LINES - REPLACE (Cont'd)

- (8) Use a wrench and a socket to install gasket (15) and adapter (8) on exhaust manifold with four capscrews (14) and four nuts (13).
- (9) Position gasket (12) on adapter (8).
- (10) Position turbocharger (7) on adapter (8) and insert elbow (11) in output side of turbocharger.
- (11) Apply anti-seize compound to four capscrews (6).
- (12) Align bolt holes in turbocharger (7), gasket (12) and adapter (8) and using a wrench and a socket install four capscrews (6) and four nuts (5) to secure.
- (13) Install two seals (4) on each end of turbocharger elbow (3) and insert one end of elbow in pipe assembly (2).



3-22. TURBOCHARGER AND AIR LINES - REPLACE (Cont'd)

(14) Position pipe assembly with elbow to turbocharger (7). Insert elbow (3) in turbocharger and use socket to install pipe assembly (2) on engine intake pipe (16) with four capscrews (1).

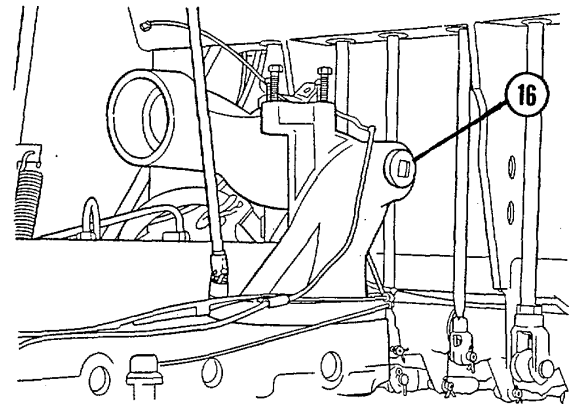
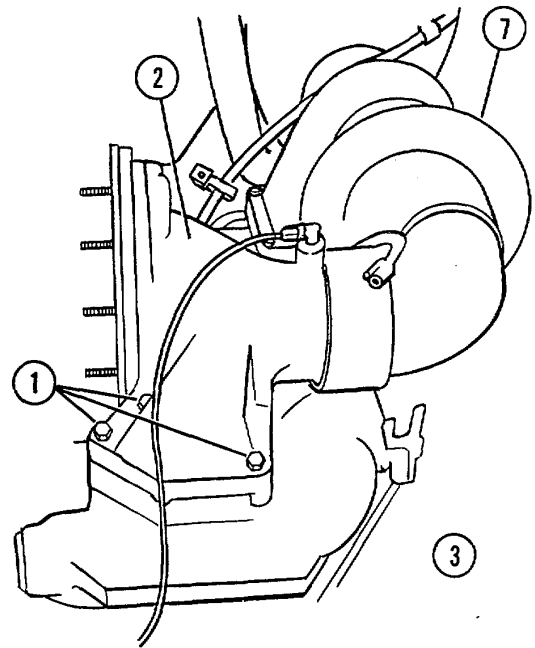
(15) Install air cleaner. See page 3-40.

(16) Install turbocharger oil lines. See page 3-54.

(17) Install muffler. See page 3-98.

c. Place In Service

Run engine and check for proper operation.



3-23. TURBOCHARGER OIL LINES - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP:Applicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

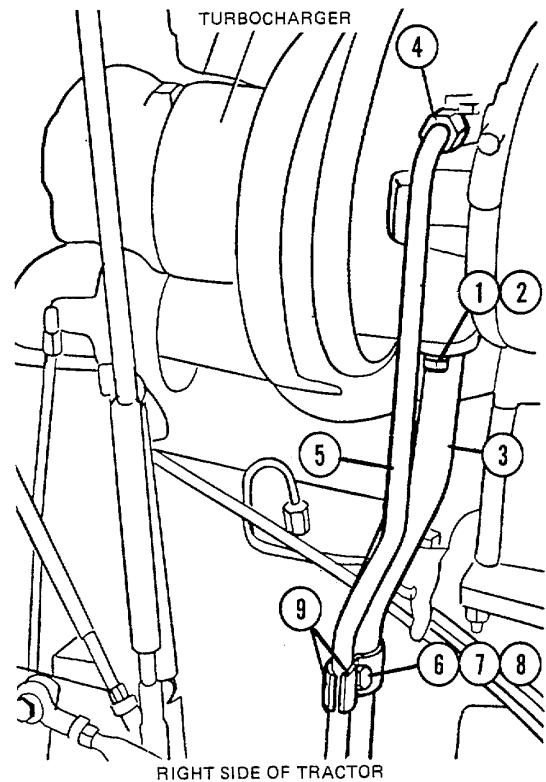
Gaskets (15), (16), (17)
Seal (14)
Preformed packing (22), (23), (24)

Equipment Condition

Engine cool.

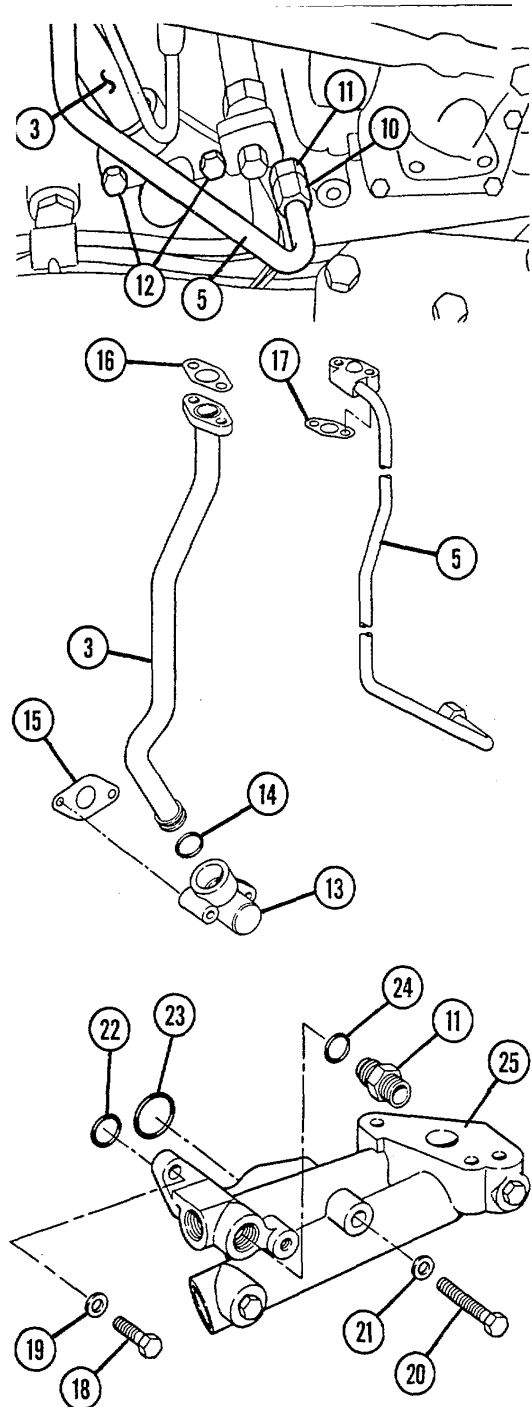
a. Removal

- (1) Use a wrench to remove two capscrews (1) and two washers (2) from oil line (3).
- (2) Use a socket to remove two capscrews (4) from the top of oil line (5).
- (3) Use a wrench and a socket to remove nut (6), capscrew (7) and two washers (8). Remove clips (9) from lines (3 and 5).



3-23. TURBOCHARGER OIL LINES - REPLACE (Cont'd)

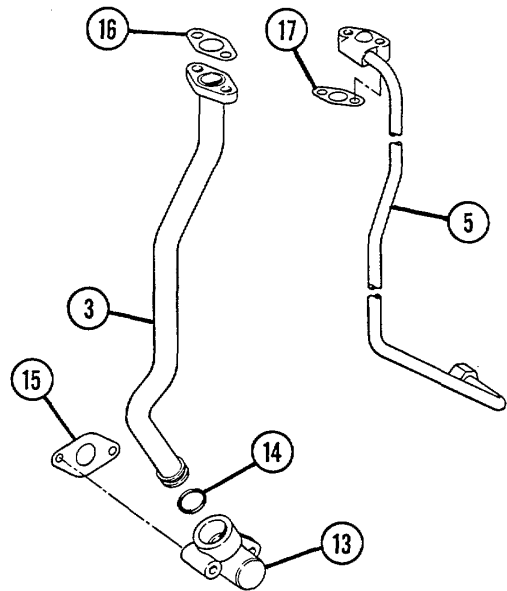
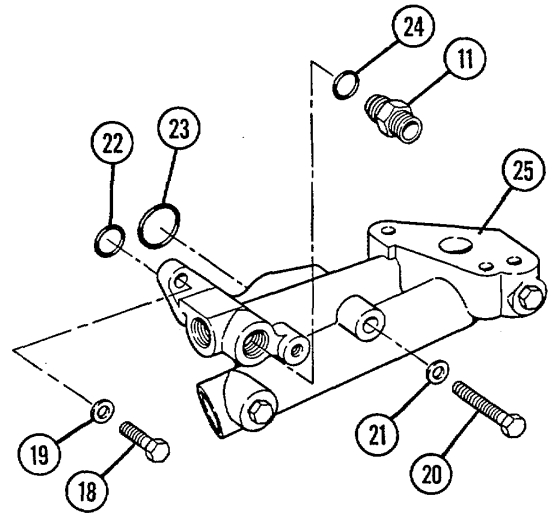
- (4) Use a wrench to unscrew nut (10) from connector (11). Remove line (5)
- (5) Use a socket to remove two capscrews (12) from the bottom of oil line (3). Remove line (3).
- (6) Separate line (3) from adapter (13). Remove seal (14) and gasket (16) from line (3) and gasket (15) from adapter (13). Discard seal (14) and gasket (15) and (16).
- (7) Remove gasket (17) from line (5). Discard gasket (17).
- (8) Use a socket to remove two capscrews (18) and two washers (19).
- (9) Use a socket to remove capscrew (20) and washer (21).
- (10) Remove preformed packings (22 and 23) from support assembly (25). Discard preformed packings (22) and (23).
- (11) Use a wrench to remove connector (11) and preformed packing (24) from support assembly (25). Discard preformed packing (24).



3-23. TURBOCHARGER OIL LINES - REPLACE (Cont'd)

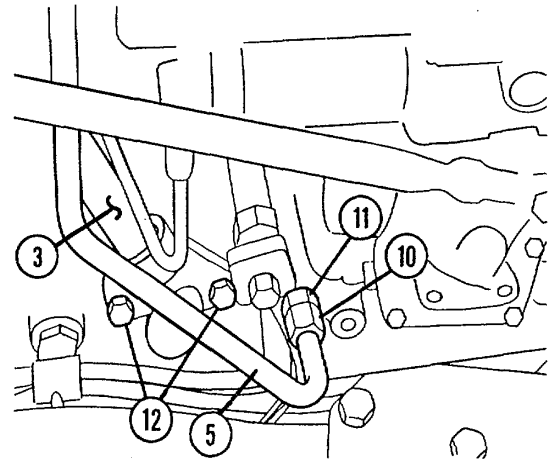
b. Installation

- (1) Place preformed packing (24) on connector (11) and install connector on support assembly (25) with a wrench.
- (2) Place preformed packings (22) and (23) on support assembly.
- (3) Place support assembly in position on engine block and install two capscrews (18) and washers (19) with a socket.
- (4) Use a socket to install capscrew (20) and washer (21).
- (5) Place gasket (17) in position on line (5).
- (6) Place seal (14) on line (3) and slide line (3) into adapter (13).
- (7) Place gasket (15) on adapter (13) and gasket (16) at the top of line (3).

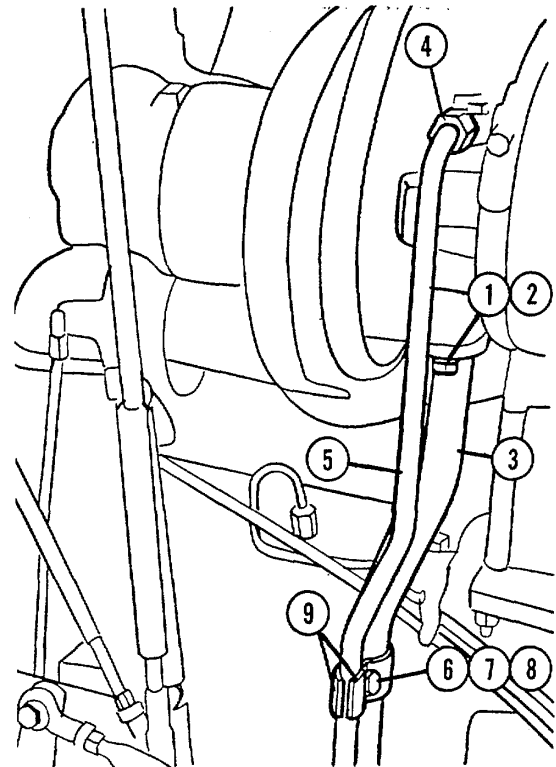


3-23. TURBOCHARGER OIL LINES - REPLACE (Cont'd)

- (8) Place line (3) in position and install two capscrews (12) with a socket.
- (9) Place line (5) in position and tighten nut (10) to connector (11) with a wrench.
- (10) Place clips (9) in position on lines (3 and 5) and tighten capscrew (7), washers (8), and nut (6) with a wrench and a socket.
- (11) Use a socket to install two capscrews (4) to the top of oil line (5).
- (12) Use a wrench to install two capscrews (1) and two washers (2).

**Place In Service**

Run tractor and check for proper operation.



3-24. FUEL LINES AND FITTINGS - REPLACE/REPAIR

This task covers:

- a. Removal
- b. Disassembly
- c. Assembly
- d. Installation
- e. Place In Service

INITIAL SETUPApplicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance and Repair, Common #1
Less Power
NSN 4910-00-754-0654

Materials/Parts

Seal (21) (23) (29), (34), (42),
(47), (49i), (52)
Drain pan, 4 gallons

a. Removal

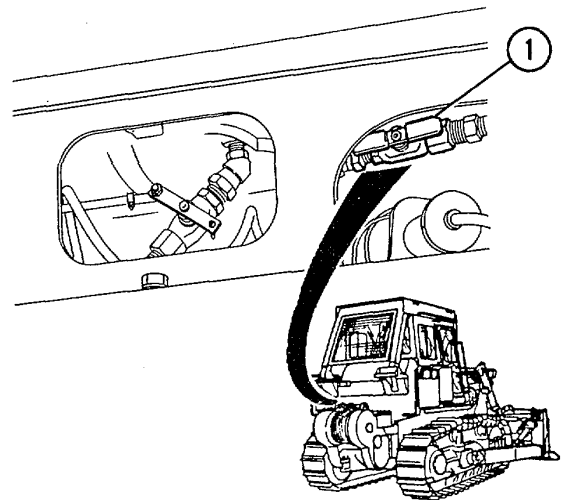
- (1) Turn fuel shut-off valve (1) to the OFF position.

NOTE

When removing fuel shut-off valve, fuel drain valve or fuel return lines, drain the fuel tank completely. Capacity of fuel tank is 114 gallons.

NOTE

Have a suitable container ready to hold any fuel which may leak from the lines.



3-24. FUEL LINES AND FITTINGS - REPLACE/REPAIR (Cont'd)

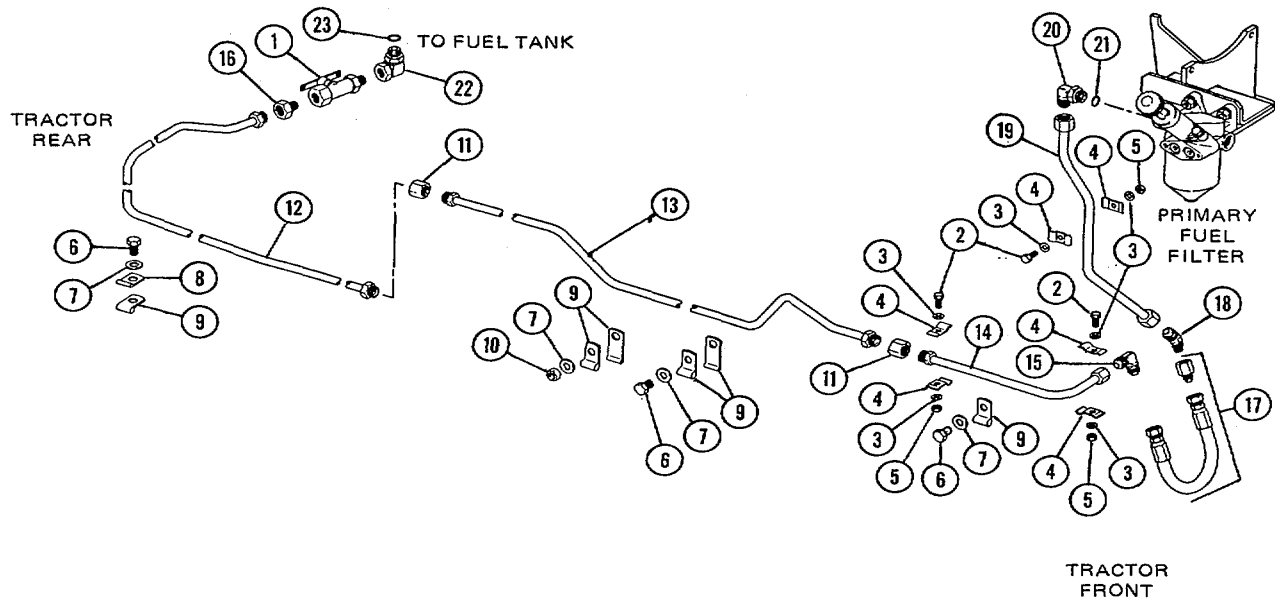
- (2) Use a wrench and a socket to remove three bolts (2), six washers (3), six clamps (4) and three nuts (5).
- (3) Use a socket to remove three bolts (6), three washers (7), one small clip (8) and four large clips (9).
- (4) Use a wrench to remove one nut (10), one washer (7) and two large clips (9).
- (5) Use two wrenches to disconnect unions (11) from tube assemblies (12, 13, 14).
- (6) Use a wrench to disconnect tube assemblies (14, 19) from elbows (15, 18, 20).
- (7) Use two wrenches to disconnect elbows (15) and (18) from hose assembly (17).

- (8) Use a wrench to remove elbow (20) from primary filter base. Remove seal (21). Inspect and replace seal if necessary.

NOTE

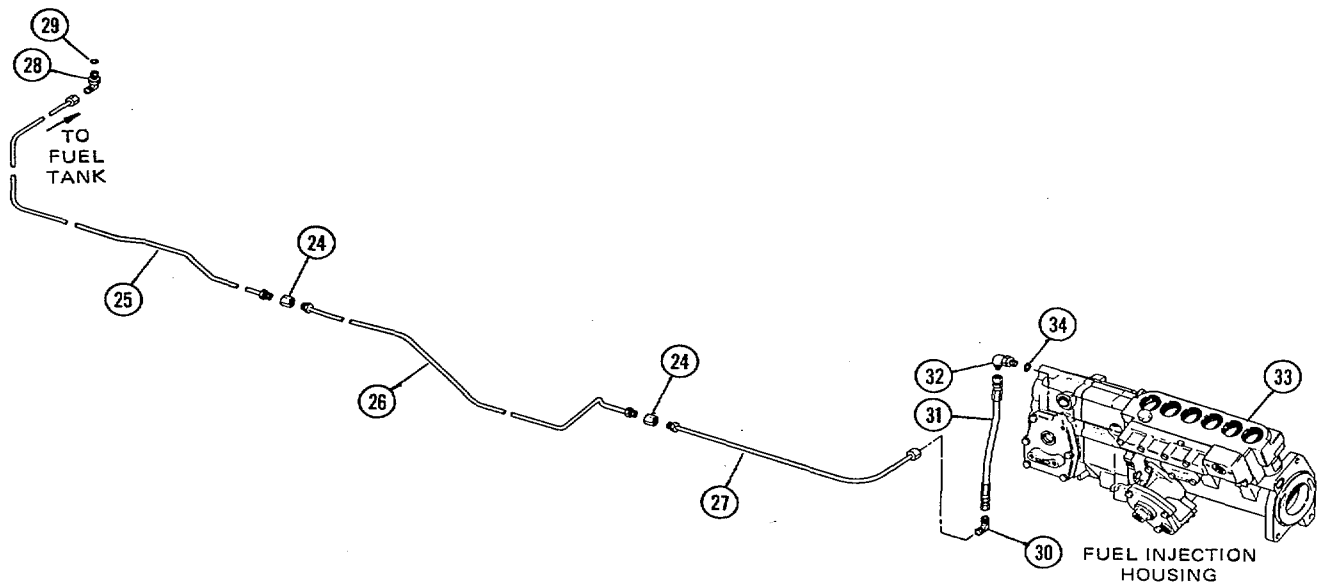
Have a suitable container ready to hold any fuel which may leak from the lines.

- (9) Use two wrenches to disconnect tube assembly (12) from fitting (16).
- (10) Use two wrenches to disconnect valve (1) from fitting (16).
- (11) Use two wrenches to remove valve (1) from elbow (22).
- (12) Use a wrench to remove elbow (22) from fitting in the bottom of the fuel tank. Remove seal (23). Discard seal.



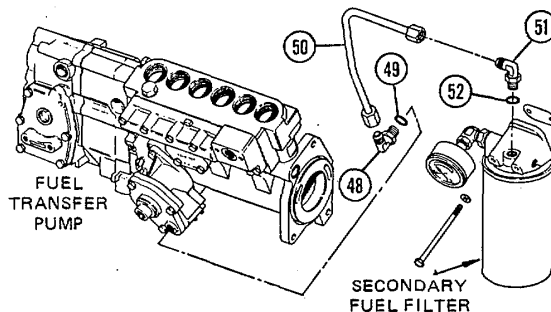
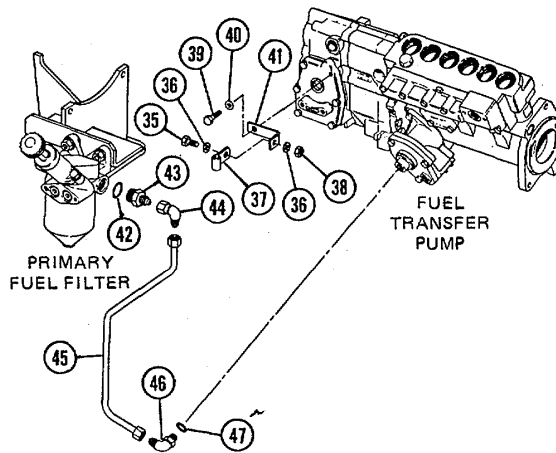
3-24. FUEL LINES AND FITTINGS - REPLACE/REPAIR (Cont'd)

- (13) Use two wrenches to disconnect unions (24) from tube assemblies (25, 26, 27).
- (14) Use a wrench to remove tube assembly (25) from elbow (28). Use two wrenches to remove tube assembly (27) from elbow (30). Use a wrench to remove elbow (28) from the bottom of the fuel tank. Remove seal (29) and discard.
- (15) Use two wrenches to disconnect elbows (30, 32) from hose assembly (31).
- (16) Use two wrenches to remove elbow (32) from fuel injection housing (33). Remove seal (34) and discard.



3-24. FUEL LINES AND FITTINGS - REPLACE/REPAIR (Cont'd)

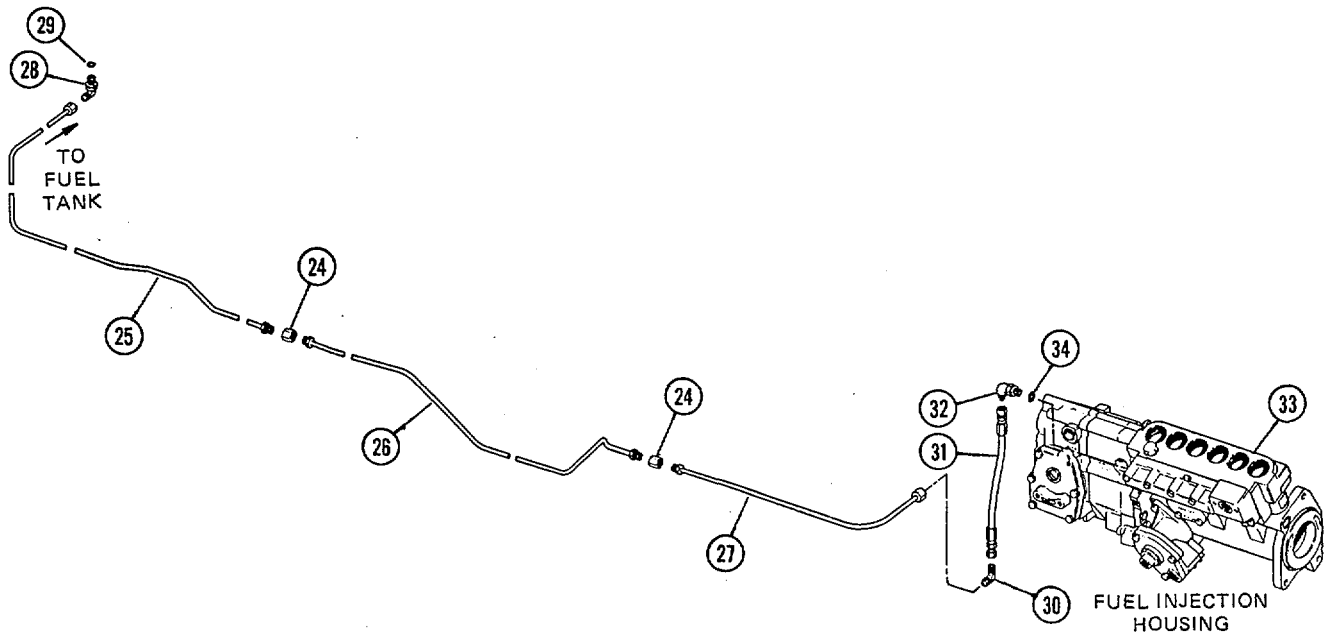
- (17) Use a wrench and a socket to remove one bolt (35), two washers (36), one nut (38) and one clip (37).
- (18) Use a wrench to remove tube assembly (45) from elbows (44, 46). Remove tube assembly.
- (19) Use a wrench to remove elbows (44, 46) from connector (43) and fuel transfer pump. Remove seal (47). Inspect seal and replace if necessary.
- (20) Use a wrench to remove connector (43) from primary fuel filter base. Remove seal (42). Discard seal.
- (21) If required, use a socket to remove one bolt (39), one washer (40) and one bracket (41).
- (22) Use a wrench to disconnect tube assembly (50) from elbows (48, 51).
- (23) Use a wrench to remove elbows (48, 51). Remove and inspect seals (49, 52). Replace if necessary.



3-24. FUEL LINES AND FITTINGS - REPLACE/REPAIR (Cont'd)

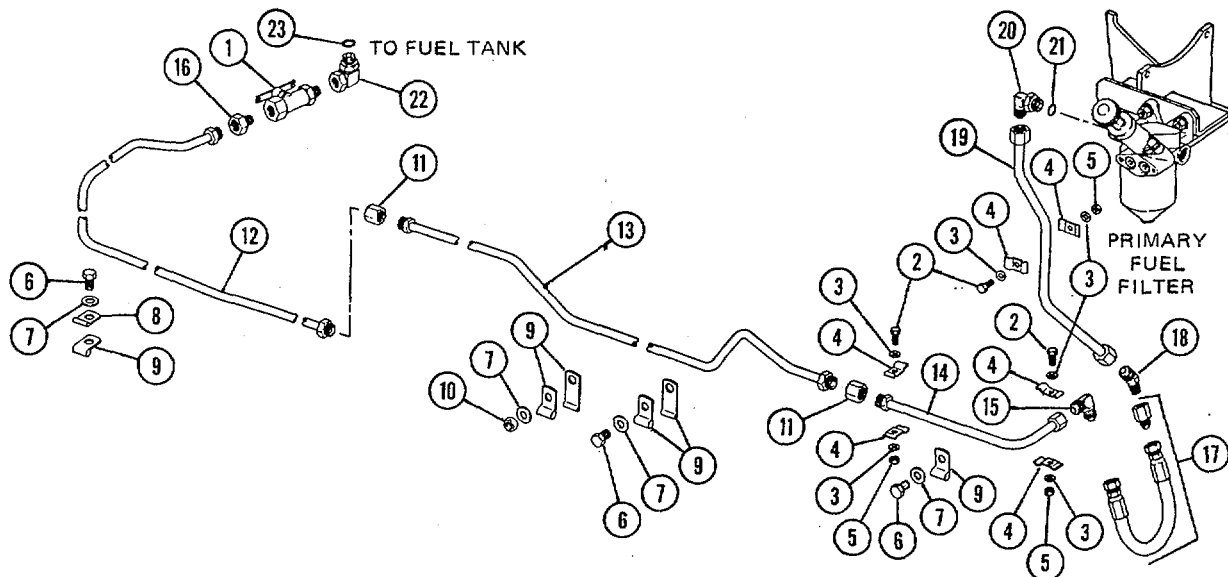
b. Installation

- (1) Place seal (34) in position in fuel injection housing (33).
Install elbow (32) in fuel injection housing.
Tighten with a wrench.
- (2) Connect hose assembly (31) to elbows (32, 30).
Use two wrenches to tighten connections.
- (3) Place seal (29) in position in fuel tank fitting.
Install elbow (28) in fuel tank. Tighten with a
wrench.
- (4) Connect tube assemblies (27, 25) to elbows (30,
28). Use a wrench to tighten connections.
- (5) Assemble unions (24) and tube assemblies (25,
26, 27). Tighten connections with two wrenches.



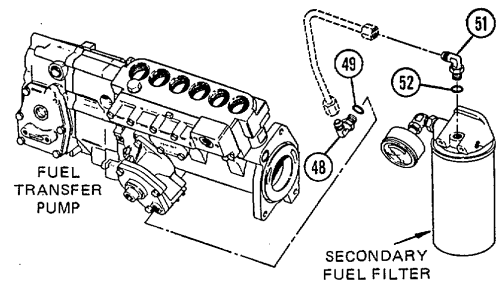
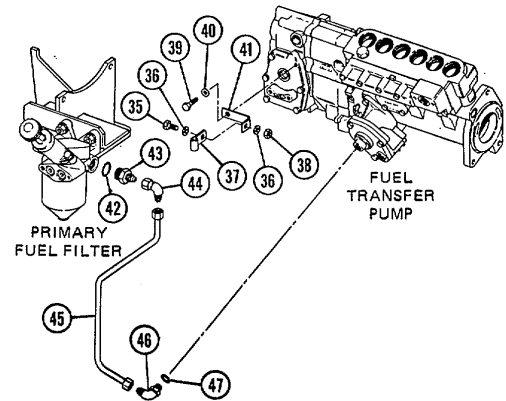
3-24. FUEL LINES AND FITTINGS - REPLACE/REPAIR (Cont'd)

- (6) Place seal (23) in position in fuel tank fitting. Install elbow (22) in fuel tank fitting. Tighten with a wrench.
- (7) Connect valve (1) to elbow (22) and fitting (16). Tighten with two wrenches.
- (8) Connect tube assembly (12) to fitting (16). Tighten with two wrenches.
- (9) Assemble unions (11) and tube assemblies (12, 13, 14). Tighten connections with two wrenches.
- (10) Place seal (21) in position in primary fuel filter. Install elbow (20) in primary fuel filter. Tighten with a wrench.
- (11) Install tube assembly (19) on elbow (20). Install elbow (18) on tube assembly (19). Install elbow (15) on tube assembly (14). Tighten, using two wrenches.
- (12) Install hose assembly (17) on elbows (15, 18). Tighten with two wrenches.
- (13) Use a wrench and a socket to install three bolts (2), six washers (3), six clamps (4) and three nuts (5).
- (14) Use a socket to install three bolts (6), three washers (7), one small clip (8) and four large clips (9).
- (15) Use a wrench to install one nut (10), one washer (7), and two large clips (9).



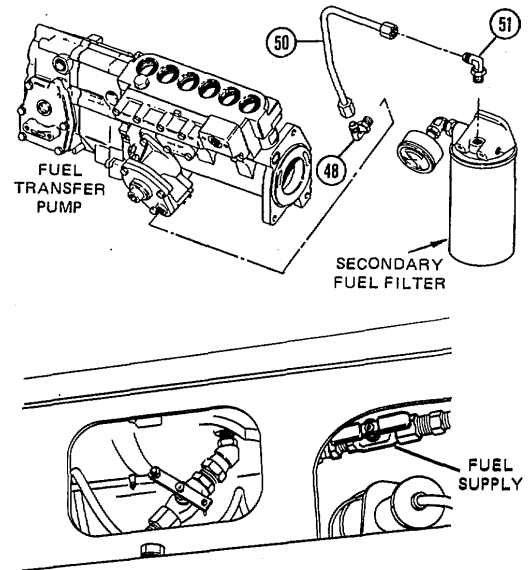
3-24. FUEL LINES AND FITTINGS - REPLACE/REPAIR (Cont'd)

- (16) Pump fuel primer until fuel is present in the fuel filter.
- (17) Place bracket (41) in position and secure with one bolt (39) and one washer (40) using a socket.
- (18) Place seal (42) in position in primary fuel filter. Install connector (43) and tighten using a wrench.
- (19) Place seal (47) in position in fuel transfer pump. Install elbow (46) at fuel transfer pump. Install elbow (44) at primary fuel filter connector (43). Tighten connections using a wrench.
- (20) Connect tube assembly (45) to elbows (44, 46). Tighten connections using a wrench.
- (21) Place clip (37) around tube assembly (45) and align clip with bracket (41). Secure, using a bolt (35), two washers (36) and one nut (38). Tighten using a socket and a wrench.
- (22) Place seal (49) in position on fuel transfer pump. Install elbow (48) on fuel transfer pump. Place seal (52) in position on secondary fuel filter base. Install elbow (51) on secondary fuel filter base. Tighten elbow connections using a wrench.



3-24. FUEL LINES AND FITTINGS - REPLACE/REPAIR (Cont'd)

- (23) Connect tube assembly (50) to elbows (48, 51).
Use a wrench to tighten connections.
- (24) Prime the fuel system. See page 3-33.
- (25) Turn on fuel supply valve.
- c. Place In Service
Run tractor and check for proper operation.



3-25. FUEL DRAIN LINE AND DRAIN VALVE MECHANISM - REPLACE

This task covers:

a. Removal

b. Installation

c. Place in Service

INITIAL SETUP:

Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance and Repair, Common #1
Less Power
NSN 4910-00-754-0654

Materials/Parts

Seal (11)
Drain container, 115 gallons

Equipment Condition

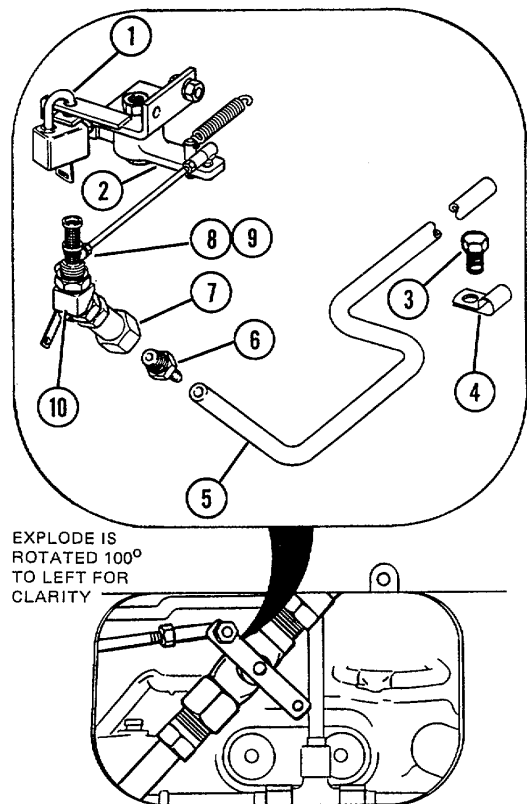
Parking brake engaged.
Engine OFF.

a. Removal

NOTE

When removing fuel drain valve, drain the fuel tank completely. Capacity of fuel tank is 114 gallons.

- (1) Remove lock (1) from drain lever (2). Turn drain lever clockwise to drain fuel. Drain into suitable container.
- (2) Use a socket to remove capscrew (3) holding clip (4) to frame. Pull hose (5) from adapter (6).
- (3) Use two wrenches to remove adapter (6) from valve (7).
- (4) Use two wrenches to remove nut (8) from joint assembly (9).
- (5) Use two wrenches to disconnect valve (7) from elbow (10).

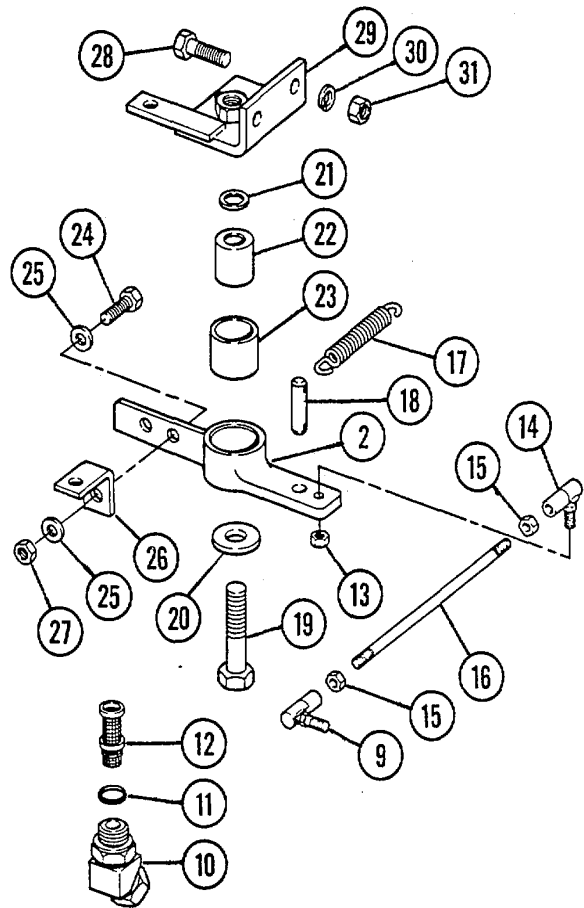


3-25. FUEL DRAIN LINE AND DRAIN VALVE MECHANISM - REPLACE (Cont'd)

- (6) Use a wrench to remove elbow (10) from bottom of fuel tank. Remove seal (11) and strainer 12) from elbow. Discard seal (11).
- (7) Use two wrenches to remove nut 13) from ball joint assembly (14). Remove ball joint assembly (14) from drain lever (2).
- (8) Use a wrench to remove ball joint assemblies (14 and 9) and nuts (15) from rod (16).
- (9) Remove spring (17) from pin (18).
- (10) Use a socket to remove capscrew (19) and washer (20). Remove lever (2). Remove washer (21), spacer (22), and bushing (23) from lever.
- (11) Use a wrench and a socket to remove one capscrew (24), two washers (25), bracket (26), and nut (27) from lever (2).
- (12) Use a wrench and a socket to remove two capscrews (28), bracket (29), two washers (30) and nut (31).

b. Installation

- (1) Place bracket (29) in position and install capscrew (28). Install two washers (30) and nut (31) with a wrench and a socket.
- (2) Place bracket (26) in position on lever (2) and install capscrew (24), washers (25) and nut (27) with a wrench and a socket.

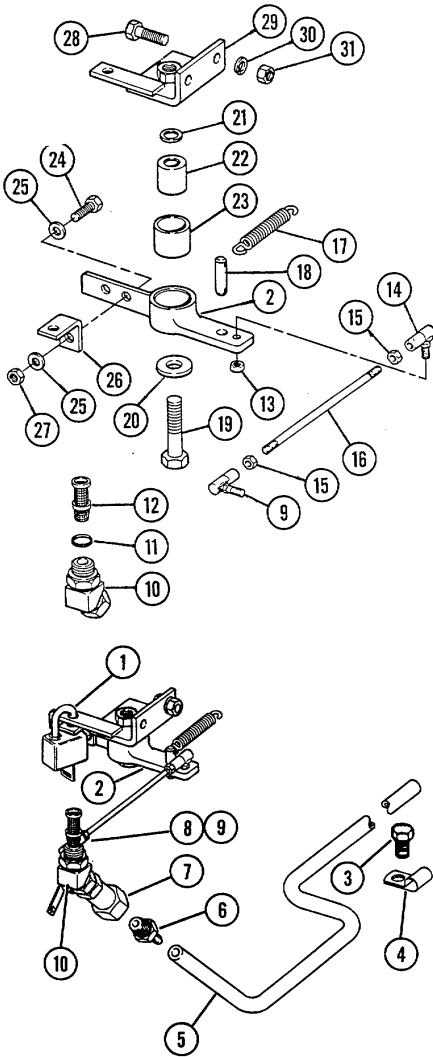


3-25. FUEL DRAIN LINE AND DRAIN VALVE MECHANISM - REPLACE (Cont'd)

- (3) Install bushing (23), spacer (22), and washer (21) on lever (2). Place lever in position on bracket (29) and install capscrew (19) with a socket.
- (4) Connect spring (17) to pin (18).
- (5) Use a wrench to install ball joint assemblies (14 and 9) and nuts (15) to rod (16).
- (6) Place ball joint assembly (14) in position on lever (2). Install nut (13) with a wrench.
- (7) Install seal (11) and strainer (12) on elbow (10). Use a wrench to install elbow to bottom of fuel tank.
- (8) Install valve (7) on elbow (10). Tighten with two wrenches.
- (9) Connect joint (9) and valve (7). Install nut (8) with a wrench.
- (10) Install adapter (6) in valve (7) with two wrenches.
- (11) Install hose (5) in position on adapter (6) and install capscrew (3) in clip (4) with a socket.
- (12) Install lock (1).

c. Place In Service

Run engine and check for leaks.



3-26. GOVERNOR CONTROLS AND LINKAGES - ADJUST/REPLACE

This task covers:

- | | |
|--|---|
| <p>a. Removal</p> <p>c. Adjustment of Government Linkage</p> | <p>b. Installation</p> <p>d. Place in Service</p> |
|--|---|
-

INITIAL SETUP:Applicable Configurations

All

Common Tools

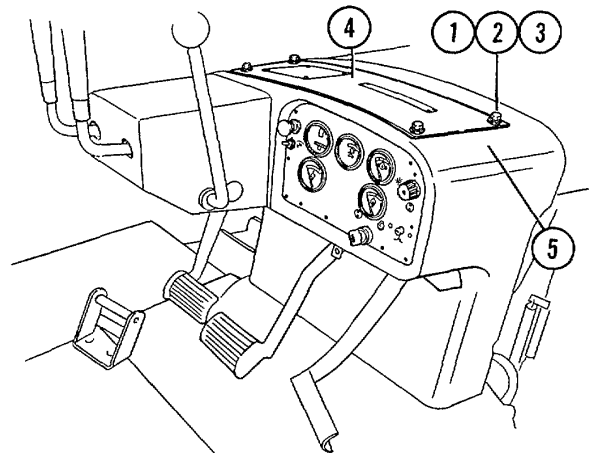
Shop Equipment, Automotive
Maintenance and Repair,
Common #1 Less Power
NSN 4910-00-754-0654

Materials/Parts

Cotter Pin (6, 28)
Gasket (72)
Seal (78) (83)
Lint-Free Rag (App. D, Item 15)
Lubricating Oil OE/HDO-30. See
L05-2410-237-12.

a. Removal

- (1) Use a socket to remove four capscrews (1), four lockwashers (2), four washers (3) and cover 4/ from top of dash assembly (5).



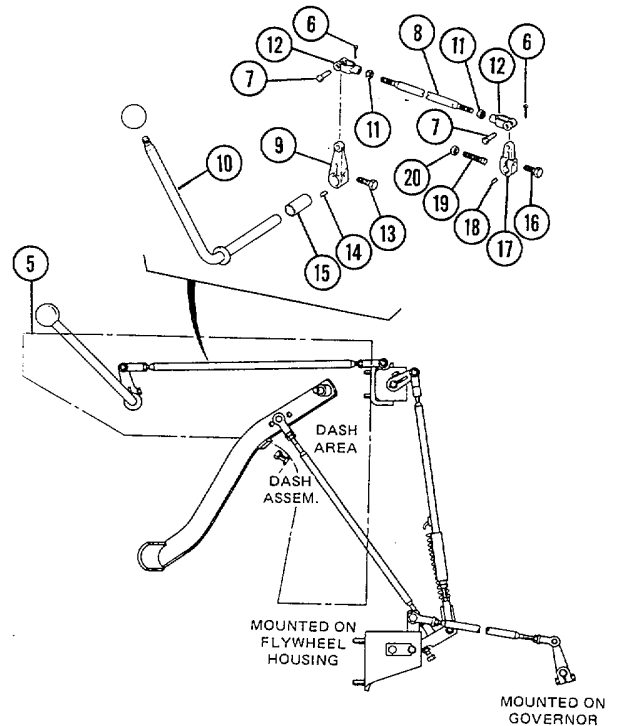
3-26. GOVERNOR CONTROLS AND LINKAGES - ADJUST/REPLACE (Cont'd)

- (2) Use a pair of pliers to remove cotter pin (6), pin (7) and separate end of rod (8) from lever (9) on hand lever (10). Discard cotter pin (6).
- (3) Repeat STEP 2 at other end of rod (8) assembly and remove rod (8) from dash.
- (4) Use two wrenches to loosen jam nut (11) at each end of rod (8) assembly and remove rod end (12) and nut (11) from each end of rod (8).
- (5) Use a wrench to remove capscrew (13) from lever (9) on hand lever (10).

NOTE

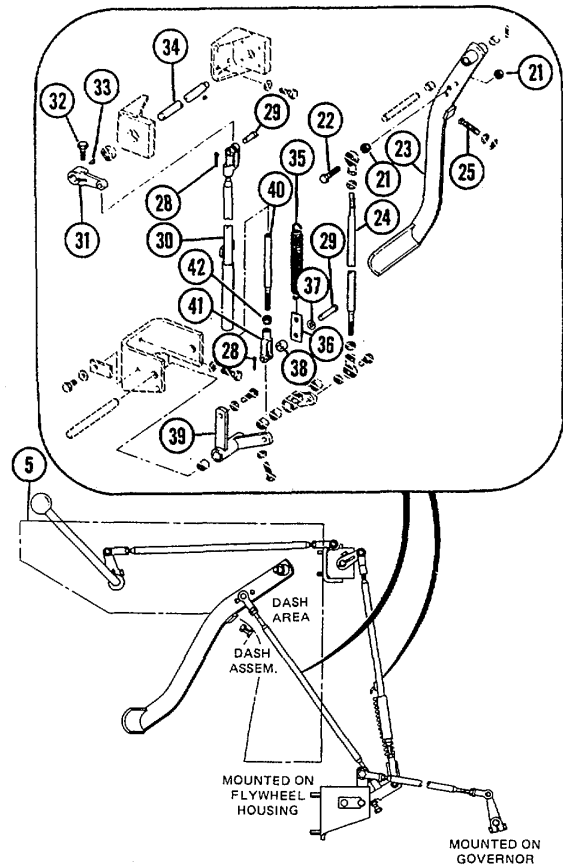
Drive small chisel into slot in levers on shafts to open them up for removal.

- (6) Remove lever (9), key (14) and spacer (15) from hand lever (10) and remove hand lever from side of dash assembly (5).
- (7) Use a wrench to remove capscrew (16) from lever (17) on shaft assembly at back of dash.
- (8) Remove lever (17) and key (18) from shaft assembly.
- (9) Use a wrench to remove capscrew (19) and nut (20) from back of dash assembly (5).



3-26. GOVERNOR CONTROLS AND LINKAGES - ADJUST/REPLACE (Cont'd)

- (10) Use two wrenches to remove two nuts (21), and capscrew (22) from foot lever (23) and rod (24).
- (11) Use two wrenches to remove capscrew (25), washer (26) and nut (27) from lower front of dash assembly (5).
- (12) Use pliers to remove cotter pin (28), pin (29) and upper end of rod (30) from lever (31) at back of dash. Discard cotter pin (28).
- (13) Use a wrench to remove capscrew (32), lever (31) and key (33) from shaft (34).
- (14) Use pliers to remove spring (35) from lower end of rod assembly (30) and strip (36).
- (15) Use pliers to remove cotter pin (28), pin (29), washer (37), strip (36), spacer (38) and rod (30) from bellcrank (39). Discard cotter pin (28)
- (16) Remove rod (40) from rod assembly (30) and using a wrench, remove rod end (41) and nut (42) from rod (40).



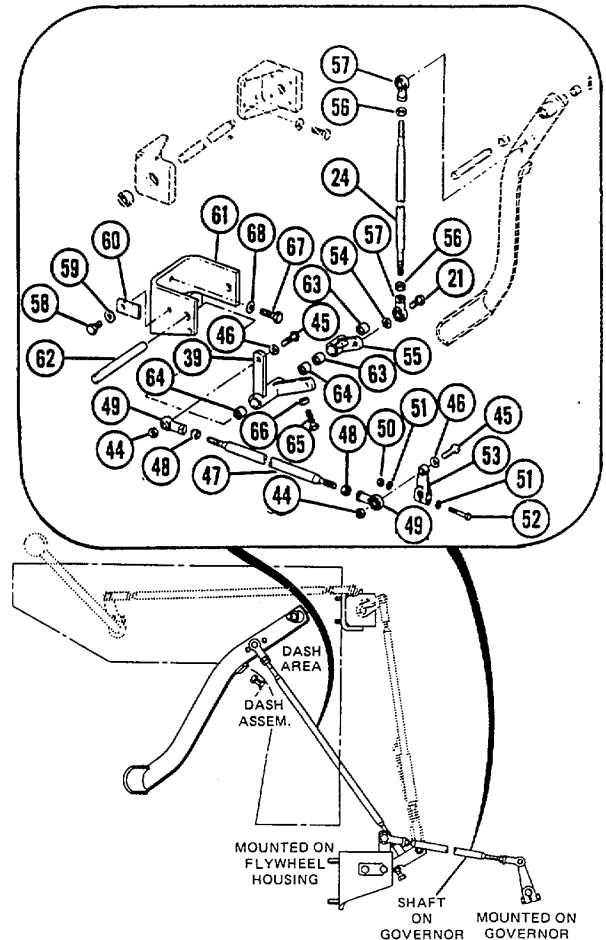
3-26. GOVERNOR CONTROLS AND LINKAGES - ADJUST/REPLACE (Cont'd)

- (17) Use two wrenches to remove nut 44), capscrew (45), two washers 46) and one end of rod (47) from bellcrank (39).

NOTE

Items are removed from lever (53) when repeating STEP 17.

- (18) Repeat STEP 17 at other end of rod assembly and remove rod (47).
- (19) Use two wrenches to loosen jam nut (48) at each end of rod assembly (47). Remove two rod ends (49) and two nuts (48) from rod (47).
- (20) Use two wrenches to remove nut (50), two washers (51) and capscrew (52) from lever (53).
- (21) Remove lever (53) from shaft on governor.
- (22) Use a wrench to remove capscrew (21), lower end of rod (24) and washer (54) from bellcrank (55).
- (23) Use two wrenches to loosen two jam nuts (56) and remove two rod ends (57) and two nuts (56) from rod (24).
- (24) Use a socket to remove capscrew (58), washer (59) and lock (60) from side of bellcrank mounting bracket (61).
- (25) Use pliers to remove shaft (62), bellcrank (39) and bellcrank (55) from bracket (61).
- (26) Remove two bearings (63) from bellcrank (55).
- (27) Remove two bearings (64), capscrew (65) and nut (66) from bellcrank (39).



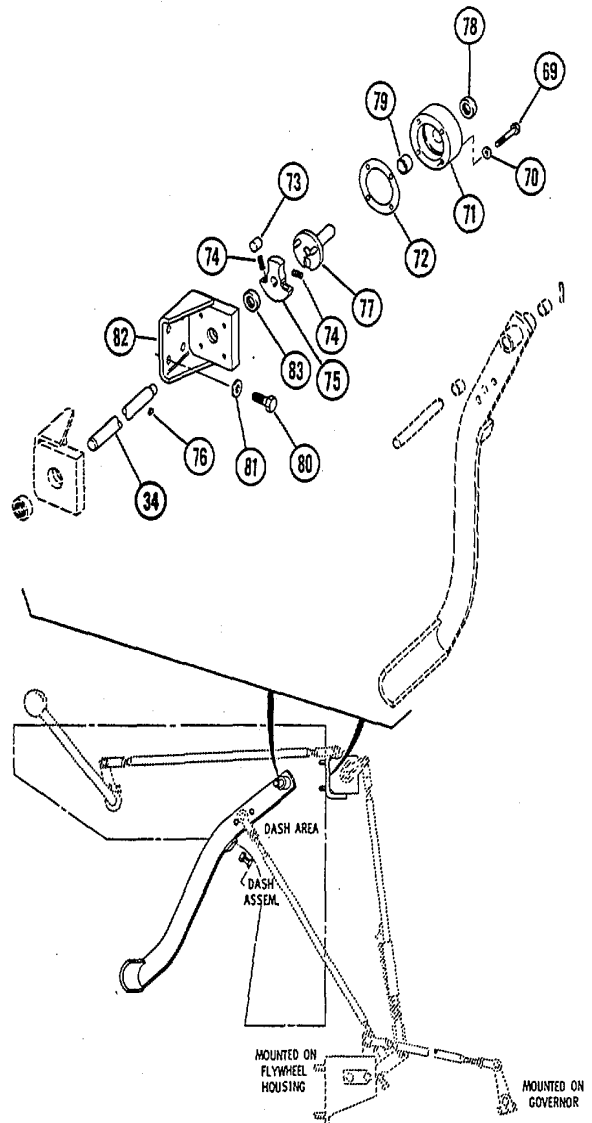
3-26. GOVERNOR CONTROLS AND LINKAGES - ADJUST/REPLACE (Cont'd)

- (28) Use a socket to remove three capscrews (67), three washers (68) and bracket (61) from flywheel housing.

WARNING

Rollers under cover assembly are spring loaded. Use care in removal to prevent injury or lost parts.

- (29) Use a socket to remove four capscrews (69) and four washers (70) from cover assembly (71).
- (30) Push on shaft (34) and pull on cover assembly (71) to remove assembled shaft (34) and cover assembly (71).
- (31) Remove gasket (72) and discard.
- (32) Slowly remove long shaft assembly (34) from cover assembly (71). Keep one hand wrapped around cover assembly to catch two rollers (73) and two springs (74) as shaft assembly (34) is removed.
- (33) Remove plate (75) and key (76) from shaft (34).
- (34) Remove short shaft assembly (77) from cover assembly (71).
- (35) Remove seal (78) and bearing (79) from cover (71) and discard seal.
- (36) Use a wrench to remove four capscrews (80), four washers (81) and support assembly (82) from back of dash assembly.
- (37) Remove seal (83) from support assembly (82) and discard seal.

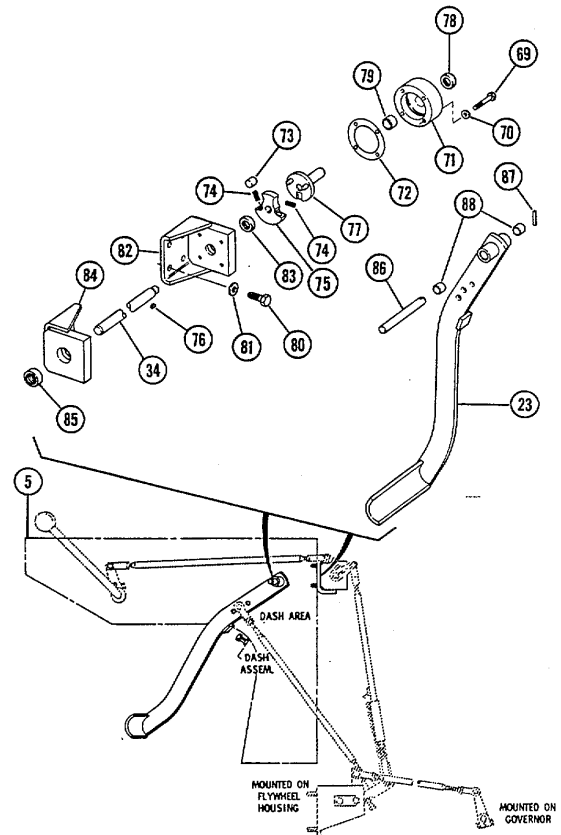


3-26. GOVERNOR CONTROLS AND LINKAGES - ADJUST/REPLACE (Cont'd)

- (38) Use a wrench to remove two capscrews (80), two washers (81) and support assembly (84) from back of dash assembly.
- (39) Remove bearing (85) from support assembly (84).
- (40) Remove dowel (86) from pin (87). Slide decelerator pedal (23) off dowel (86). Remove bearings (88) from pedal (23).

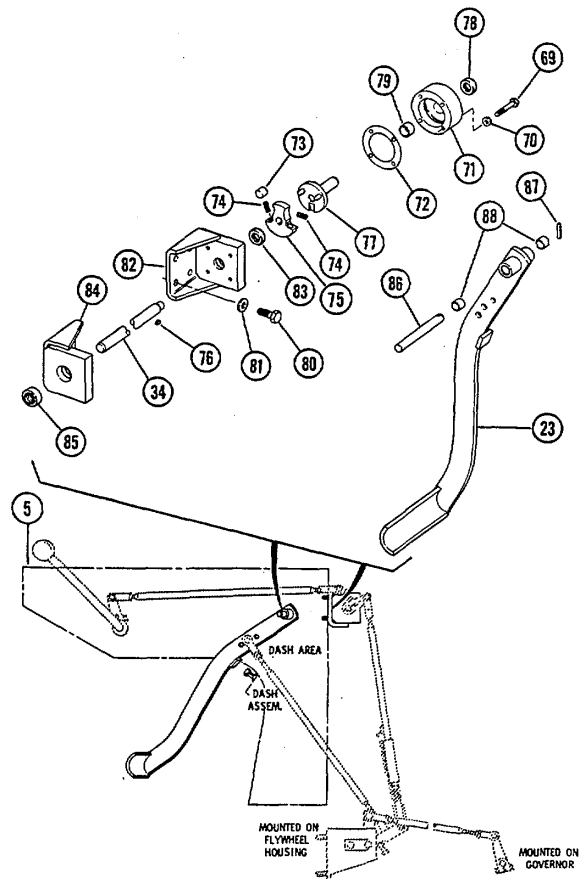
b. Installation

- (1) Use a lint-free rag and wipe contact surfaces of all moving parts clean and lubricate all contact surfaces with clean lubricating oil during installation.
- (2) Drive small chisel into slot in levers to open them up for installation on shafts.
- (3) Install bearings (88) in pedal (23). Slide pedal on dowel (86) and install pin (87) to keep assembly secure.
- (4) Install bearing (85) in support assembly (84).
- (5) Use a wrench to install support assembly (84) on back of dash assembly (5) with two capscrews (80) and two washers (81).
- (6) Lubricate sealing lip and install seal (83) in support assembly (82).



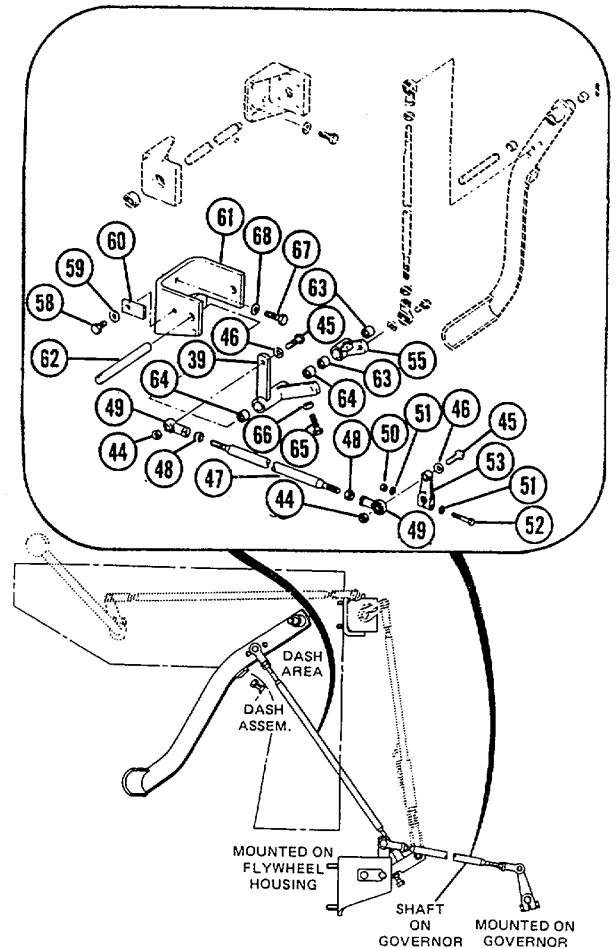
3-26. GOVERNOR CONTROLS AND LINKAGES - ADJUST/REPLACE (Cont'd)

- (7) Use a wrench to install support assembly (82) on back of dash assembly (5) with four capscrews (80) and four washers (81).
- (8) Install bearing (79) in cover (71), lubricate sealing lip and install seal (78) in cover (71).
- (9) Install key (76) and plate (75) on long shaft (34).
- (10) Lubricate cover (71).
- (11) Install short shaft (77) in cover (71).
- (12) Install two springs (74), two rollers (73) and plate end of shaft assembly in cover (71).
- (13) Place gasket (72) over shaft (34) and insert shaft through support assemblies (82 and 84).
- (14) Align screw holes in cover (71), gasket (72) and support (82). Use a socket to install four capscrews (69) and four washers (70) to secure cover (71).



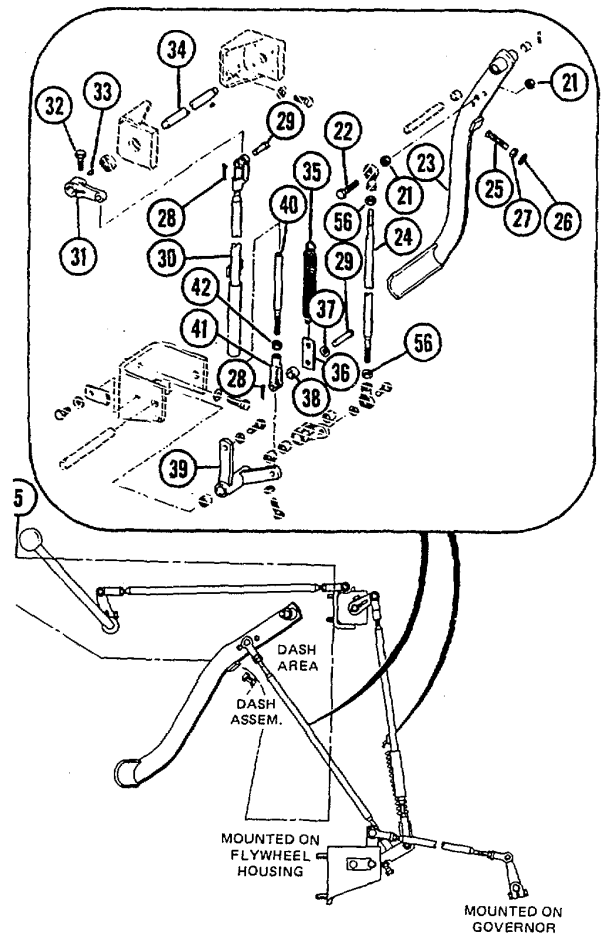
3-26. GOVERNOR CONTROLS AND LINKAGES - ADJUST/REPLACE (Cont'd)

- (15) Use a socket to install bracket (61) on flywheel housing with three capscrews (67) and three washers (68).
- (16) Install two bearings (63) in bellcrank (55).
- (17) Install two bearings (64), nut (66) and capscrew (65) in bellcrank (39). Do not tighten nut.
- (18) Install bellcranks (39 and 55) in bracket (61) with shaft (62).
- (19) Use a socket to install lock (60) on side of bracket (61) with capscrew (58) and washer (59) to secure shaft (62).
- (20) Install lever (53) on shaft of governor and using two wrenches, install capscrew (52), two washers (51) and nut (50) to secure lever.
- (21) Install two jam nuts (48) and two rod ends (49) on rod (47). Adjust rod assembly to length. See Adjustment of Governor Linkage in this paragraph. Use two wrenches to tighten jam nuts (48) against rod ends (49) to secure.
- (22) Use two wrenches to install one end of rod (47) on bellcrank (39) with capscrew (45), two washers (46) and nut (44).
- (23) Repeat STEP 21 for other end of rod (47) assembly on lever (53).



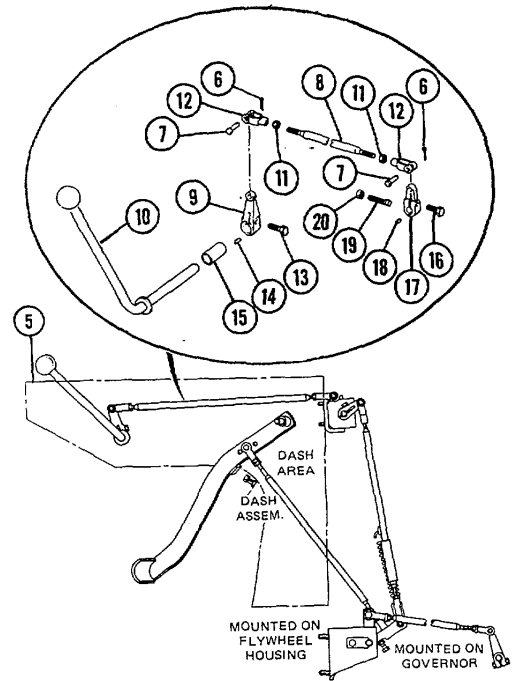
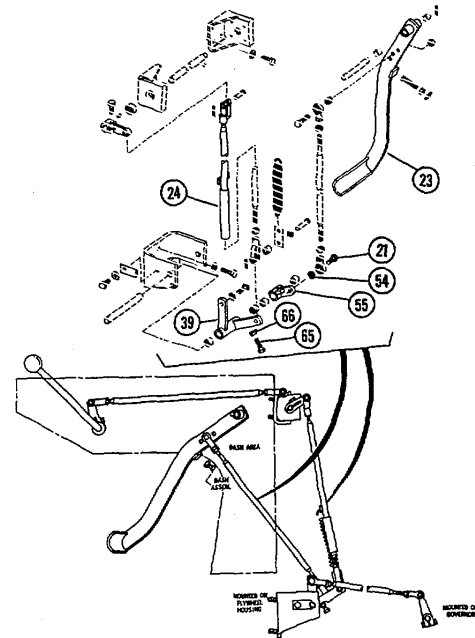
3-26. GOVERNOR CONTROLS AND LINKAGES - ADJUST/REPLACE (Cont'd)

- (24) Install nut (42) and rod end 41 on rod (40) and insert rod (40) in rod assembly (30). Adjust rod length. See Adjustment of Governor Linkage in this paragraph. Use a wrench to tighten jam nut (42) against rod end (41).
- (25) Install pin (29), washer (37), strip (36), spacer (38) and lower end of rod assembly (30) on bellcrank (39) and install new cotter pin (28) in pin (29).
- (26) Install key (33) and lever (31) on shaft (34) and use a wrench to secure lever (31) with capscrew (32).
- (27) Install upper end of rod assembly (30) on lever (31) and secure with pin (29) and new cotter pin (28).
- (28) Use a pliers to install spring (35) on strip (36) and rod assembly (30).
- (29) Install washer (26), nut (27), and capscrew (25) onto lower part of dash assembly (5) finger tight.
- (30) Install two jam nuts (56) and two rod ends (57) on rod (24). Adjust rod assembly to length. See Adjustment of Governor Linkage in this paragraph. Use two wrenches to tighten jam nuts (56) against rod ends (57) to secure.
- (31) Use two wrenches to install upper end of rod (24) assembly on foot lever (23) with capscrew (22) and two nuts (21).



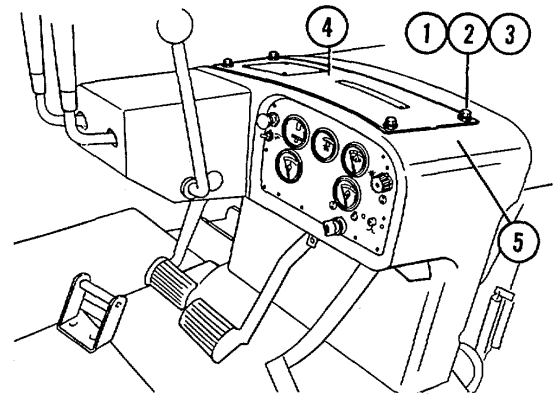
3-26. GOVERNOR CONTROLS AND LINKAGES - ADJUST/REPLACE (Cont'd)

- (32) Use a wrench to install lower end of rod (24) assembly on bellcrank (55) with capscrew (21) and washer (54).
- (33) Use capscrew (65) in bellcrank (39) to adjust foot lever (23) to a dimension of 3.94" from center of foot pedal to front face of instrument panel. Use a wrench to tighten nut (66) to secure capscrew (65) after adjustment.
- (34) Install key (18) and lever (17) on shaft assembly at upper rear of dash assembly (5).
- (35) Install capscrew (19) and nut (20) finger tight at upper rear of dash assembly (5).
- (36) Use a wrench to install capscrew (16) in lever (17) on shaft assembly on back of dash.
- (37) Insert hand lever (10) through side of dash housing and install spacer (15), key (14) and lever (9) on hand lever shaft.
- (38) Use a wrench to install capscrew (13) in lever (9) on hand lever(10).
- (39) Install two jam nuts (11) and two rod ends (12) on rod (8). Adjust rod length. See Adjustment of Governor Linkage in this paragraph. Use two wrenches to tighten jam nuts (11) against rod ends (12) to secure.
- (40) Install one end (12) of rod assembly (8) assembly on lever (9) at hand lever end with pin (7) and new cotter pin (6).
- (41) Repeat STEP 35 at other end of rod assembly at back of dash assembly (5).



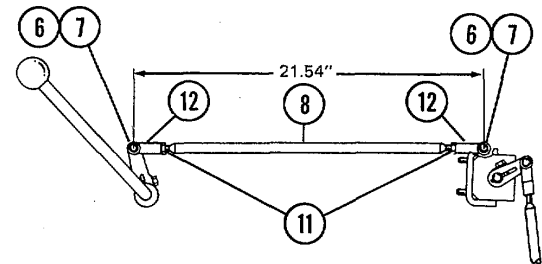
3-26. GOVERNOR CONTROLS AND LINKAGES - ADJUST/REPLACE (Cont'd)

- (42) Make adjustments to linkages. See Adjustment of Governor Linkage.
- (43) Use a wrench to install cover (4) on top of dash assembly (5) with four capscrews (1) and four lockwashers (2) and four washers (3).



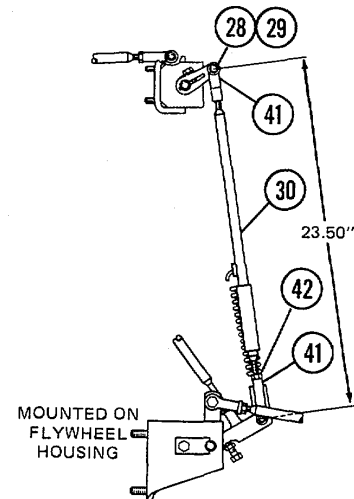
c. Adjustment of Governor Linkage

- (1) Remove cover from top of dash assembly. See page 3-69, STEP (1).
- (2) Use a wrench to loosen locknuts (11) on rod (8) and remove cotter pin (6) and pin (7) at back end of rod assembly. Discard cotter pin (6)
- (3) Adjust rod ends (12) until distance between center line of the holes in rod ends (12) is 21.54 in. (547 mm).



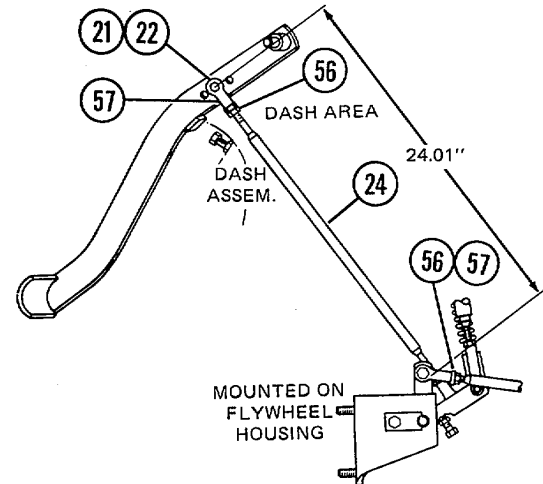
- (4) If this adjustment procedure is done as a result of removal/ installation, install rod (8) assembly with pin (7) and new cotter pin (6) and tighten nuts (11) with a wrench to 6-12 lb. ft.
- (5) Use a wrench to loosen nut (42) on rod (30) and remove cotter pin (28) and pin (29) on top end of rod assembly. Discard cotter pin (28)

- (6) Adjust rod ends (41) until distance between center line of holes in rod ends is 23.50 in. (597 mm).
- (7) Install pin (29) and new cotter pin (28).



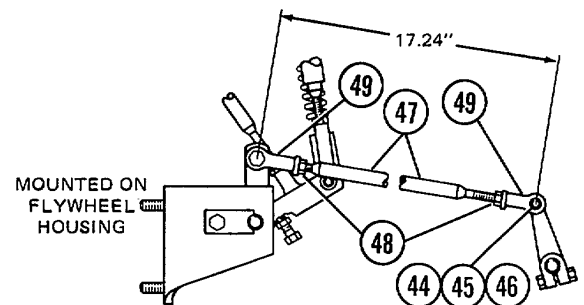
3-26. GOVERNOR CONTROLS AND LINKAGES - ADJUST/REPLACE (Cont'd)

- (8) Use a wrench to loosen nuts (56) on rod (24) and with a wrench remove capscrew (22) and two nuts (21) from rod end (57).
- (9) Adjust rod end (57) until distance between center line of holes in rod ends is 24.01 in. (618 mm).
- (10) a wrench to install capscrew (22) and two nuts (21). Tighten nuts (56) with a wrench to 6-12 lb. ft.
- (11) Use a wrench to loosen nuts (48) on rod (47). Use a socket and a wrench to remove capscrew (45), two washers (46) and nut (44) from rod end (49).
- (12) Adjust rod end (49) until distance between center line of holes in rod ends is 17.24 in.(438 mm)
- (13) Use a wrench and a socket to install rod assembly with capscrew (45), two washers (46) and nut (44). Tighten nuts (48) using a wrench to 6-12 lb. ft.



NOTE

Use STE/ICE to determine high idle RPM. See page 2-95. High idle rpm should be 2130 rpm after adjustment. If it is not, a slight adjustment to the length of rod (47) should be made to obtain the correct high idle rpm.



3-26. GOVERNOR CONTROLS AND LINKAGES - ADJUST/REPLACE (Cont'd)

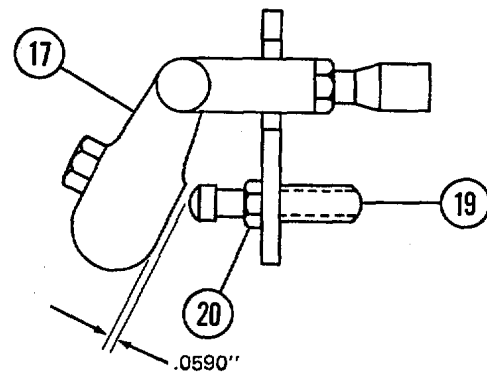
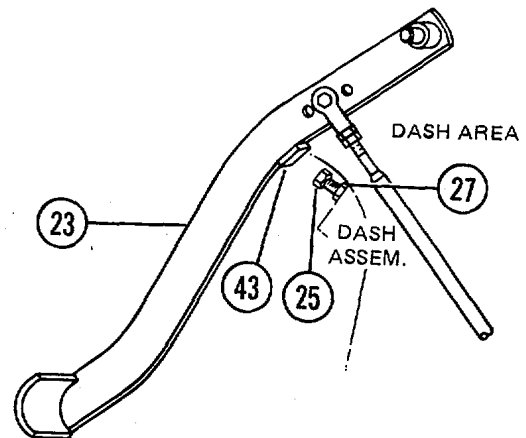
(14) Use a wrench to loosen nut (27). Start engine and depress decelerator lever (23) until pad (43) is resting against stop (25). Use a wrench to turn stop (25) until an engine rpm of $985+50$ rpm is obtained. Use STE/ICE to determine rpm. See page 2-95. Tighten nut (27).

(15) After linkage has been adjusted set engine at high idle and set capscrew (19) at back of dash to 0.0590 " dimension between capscrew (19) and lever (17). Use a wrench to tighten nut (20) to secure capscrew (19).

(16) Shut off engine.

d. Place In Service

Run and test drive tractor and check for proper operation.



3-27. PRIMARY FUEL FILTER ASSEMBLY - SERVICE/REPLACE/REPAIR

This task covers:

- a. Service
- b. Removal
- c. Disassembly
- d. Assembly
- e. Installation
- f. Place In Service

INITIAL SETUPApplicable Configurations

All

Common Tools

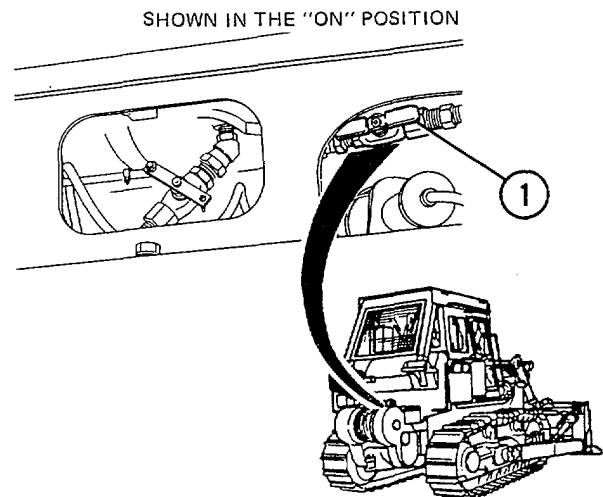
Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

Gasket (5)
Seal (18)
Seal (15)
Lint-free rag (App. D, Item 15)
Diesel fuel

a. Service

- (1) Turn fuel supply valve (1) at bottom of fuel tank to the "OFF" position.



3-27. PRIMARY FUEL FILTER ASSEMBLY - SERVICE/REPLACE/REPAIR (Cont'd)

(2) Hold the filter case (2) with one hand, and use a wrench to loosen nut (3) from the top of base assembly (4).

(3) Remove gasket (5) and filter element (6) from filter case (2) and discard gasket (5).

(4) Use a soft bristle brush to remove foreign particles from the filter element (6).

WARNING

When using pressurized air, wear safety face shield and protective clothing. Use 30 PSI (2 kg/cm²) maximum air pressure for cleaning.

(5) Direct pressurized air through the element (6) to remove any dirt or contamination.

(6) Place filter element (6) onto stud in filter case (2).

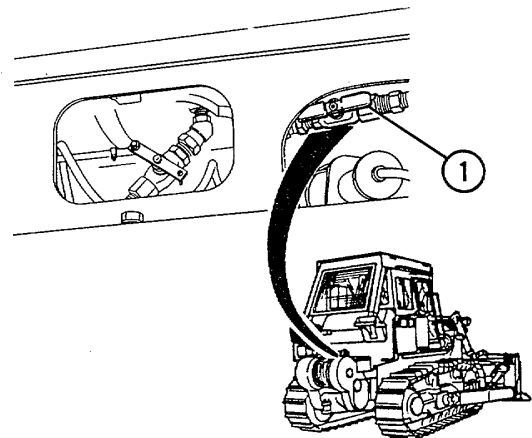
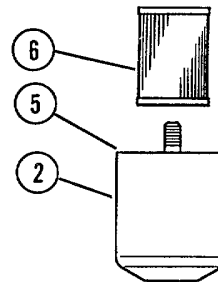
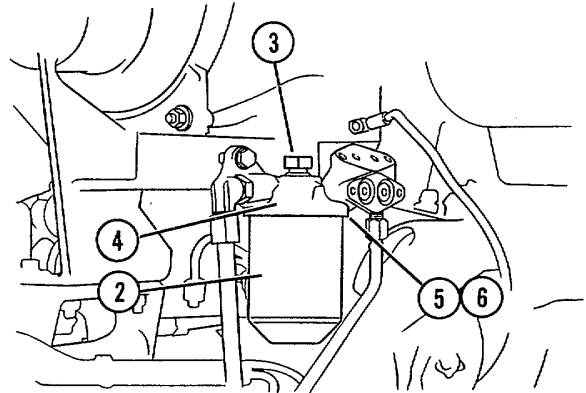
(7) Position gasket (5) on filter case (2).

(8) Position filter case assembly (2) onto filter base (4) and hand tighten nut (3) until filter case assembly (2) is snug against filter base (4).

(9) Hold the filter case assembly (2) with one hand, and use a wrench to tighten nut (3) an additional 3/4 turn.

(10) Open fuel supply valve (1) and prime the fuel system. See page

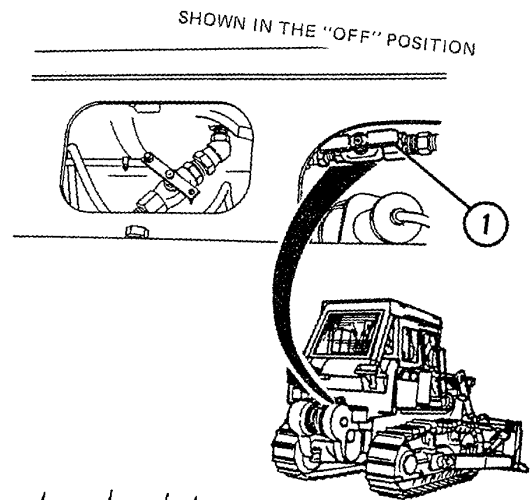
(11) Check for any leaks by visually inspecting the area.



3-27. PRIMARY FUEL FILTER ASSEMBLY - SERVICE/REPLACE/REPAIR (Cont'd)

b. Removal

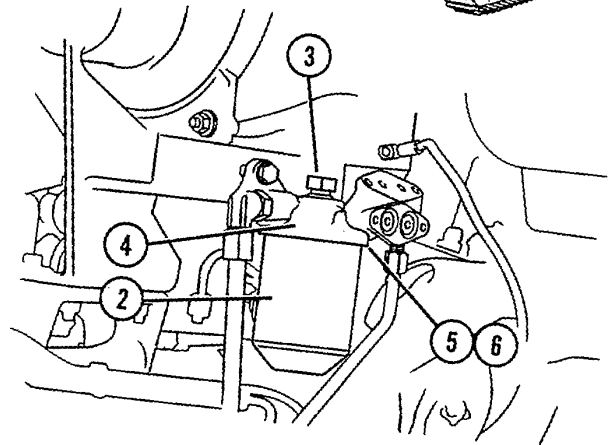
(1) Turn fuel supply valve (1) at bottom of fuel tank to the "OFF" position. See section a. In this paragraph, page 3-82.



(2) Remove the filter case (2), FILTER (6) AND GASKET (5) FROM THE FILTER BASE (4) . Discard gasket (4). See section a. In this paragraph, page 3-82.

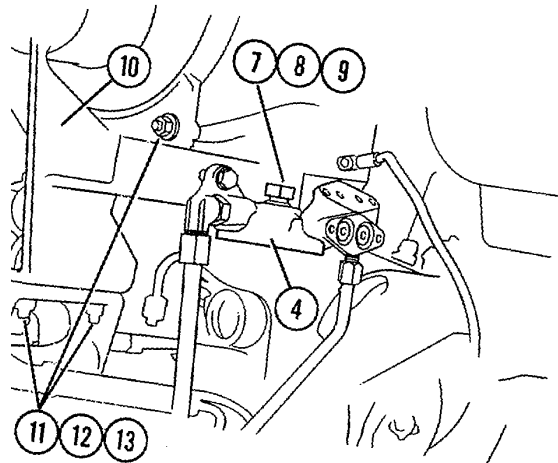
(3) Remove the 333fuel Priming Pump.

(4) Remove fuel lines from filter base. See Page 3-58.



(5) Use two wrenches to remove two capcrews (7) washers (8) and nuts (9). Remove base assembly (4).

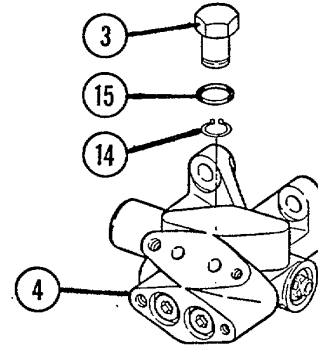
(6) If removal of support assembly (10) is required, use two wrenches to remove six capscrews (11) , Six washers (12) and six washers (13) that secure support assembly to muffle and to the engine.



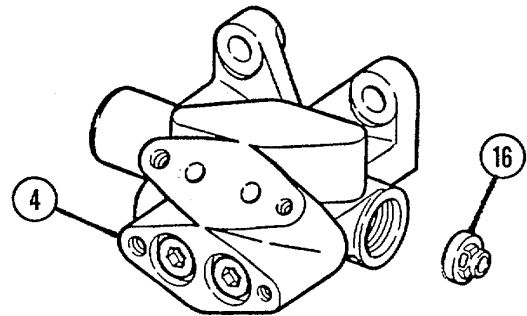
3-27. PRIMARY FUEL FILTER ASSEMBLY - SERVICE/REPLACE/REPAIR (Cont'd)

c. Disassembly

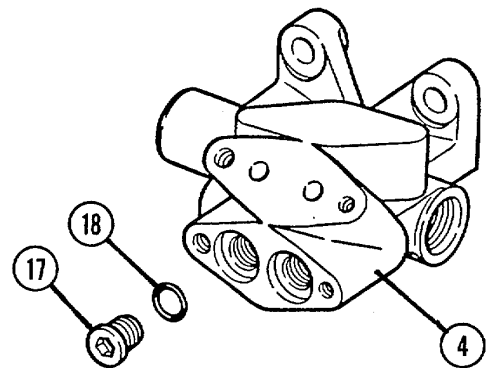
- (1) Remove snap ring (14) from nut (3). Remove nut (3) from base (4) and remove seal (15) from nut (3). Discard seal (15).



- (2) Use a small flat blade screwdriver to remove valve assembly (16) from base (4).



- (3) Use an allen wrench to remove two plugs (17) and two seals (18) from base (4). Discard seals (18).

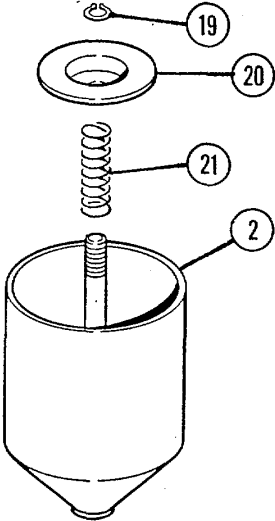


3-27. PRIMARY FUEL FILTER ASSEMBLY - SERVICE/REPLACE/REPAIR (Cont'd)

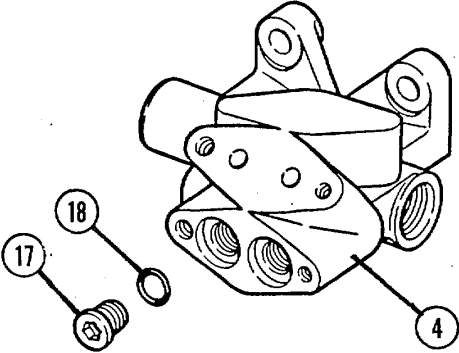
- (4) Remove snap ring (19) from filter case (2) and remove retainer (20) and spring (21).

d. Assembly

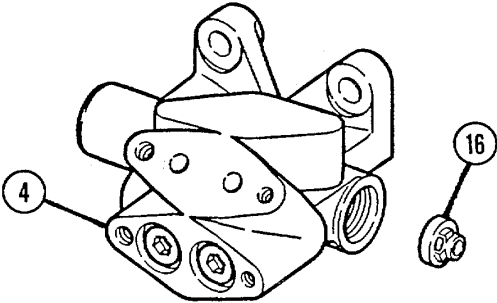
- (1) Use a lint-free rag and wipe sealing surfaces and internal parts clean before assembly. Apply light film of clean diesel fuel oil to O-ring seals before assembly.
- (2) Place spring (21) and retainer 20) onto stud on filter case 2).
- (3) Install snap ring (19) to hold retainer (20) in place.



- (4) Use an allen wrench to install two plugs (17) and two seals (18) in base (4).



- (5) Use a small flat blade screwdriver to install valve assembly (16) into filter base (4).



3-27. PRIMARY FUEL FILTER ASSEMBLY - SERVICE/REPLACE/REPAIR (Cont'd)

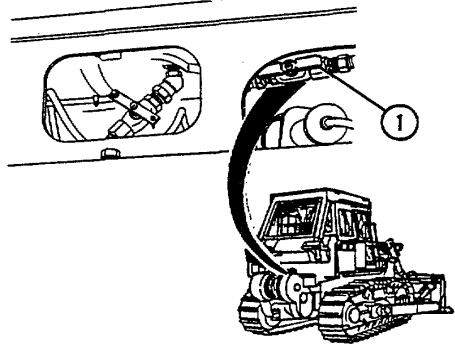
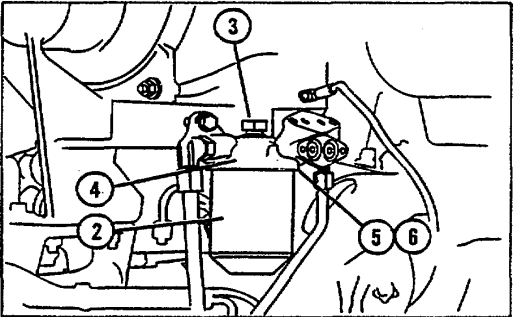
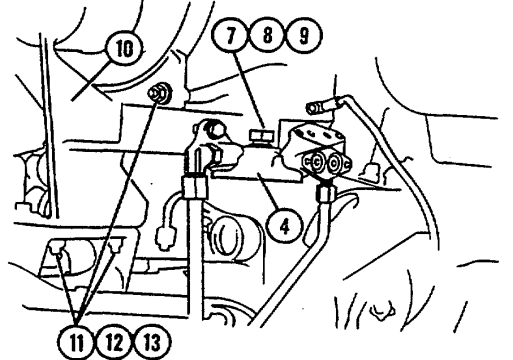
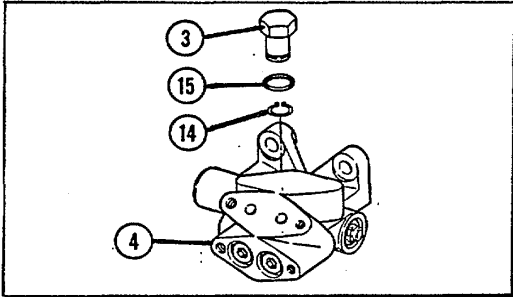
- (6) Install seal (15) onto nut (3). Place nut (3) into position and secure it to base (4) with snap ring (14).

e. Installation

- (1) If support assembly (10) was removed, position support assembly and install six capscrews (11), washers (12) and nuts (13) that secure supports to muffler and to the engine. Tighten with two wrenches.
- (2) Position base assembly (4) on support (10) and install two capscrews (7), four washers (8) and two nuts (9). Tighten with two wrenches.
- (3) Attach fuel lines to the fuel filter base. See page 3-58.
- (4) Install fuel priming pump onto the fuel base. See page 3-33.
- (5) Install fuel filter (6), gasket (5) and filter case (2) onto fuel filter base (4). See section a. in this paragraph, page 3-82.
- (6) Turn fuel supply valve (1) to the "ON" position and prime the fuel system. See page 3-33.
- (7) Check for any leaks by visually inspecting the area.

f. Place In Service

Run engine and check for proper operation.



3-28. SECONDARY FUEL FILTER ASSEMBLY - SERVICE/REPLACE

This task covers:

- a. Service
 - b. Removal
 - c. Installation
 - d. Place In Service
-

INITIAL SETUPApplicable Configurations

All

Common Tools

Shop EQ Auto Maint. & Repair
Common #1 Less Power
NSN 4910-00-754-0654

Materials/Parts

Filter Element (2)
Gasket (10)
Seal (7)
Diesel Fuel
Lint-Free Rags (App. D, Item 15)

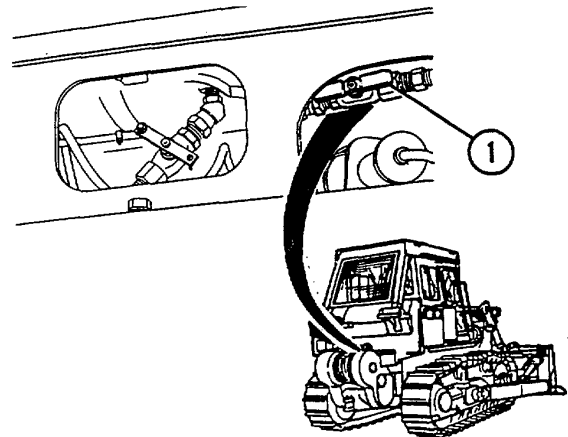
Equipment Condition

Fuel pressure gage removed. (page 14-7)

a. Service

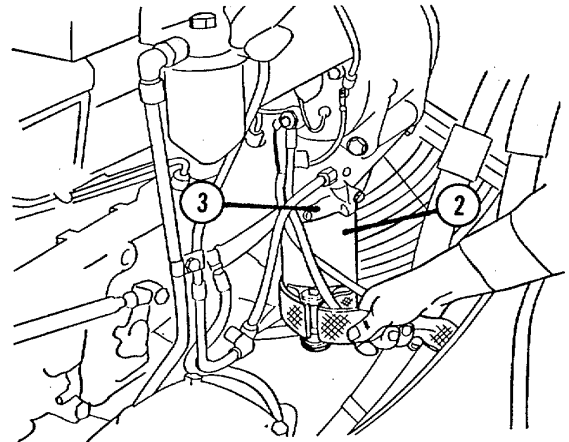
- (1) Turn fuel supply valve (1) at bottom of fuel tank to the "OFF" position.

SHOWN IN THE OFF POSITION

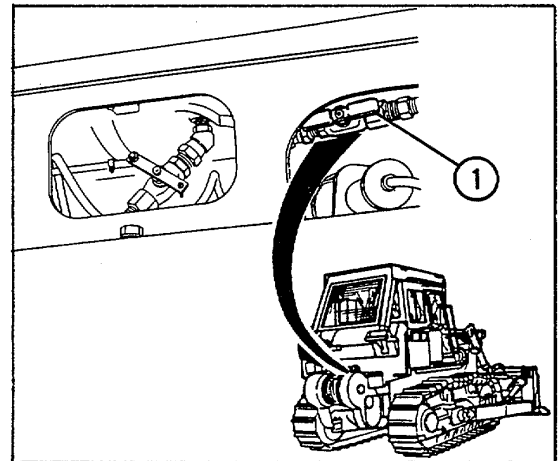


3-28. SECONDARY FUEL FILTER ASSEMBLY - SERVICE/REPLACE (Cont'd)

- (2) Use a strap wrench to remove filter element (2) and discard.
- (3) Use a lint-free rag and wipe sealing surface of filter base (3) clean and dry.
- (4) Coat seal on new element (2) with clean diesel fuel.
- (5) Install new element (2) by hand until seal on element contacts filter base (3). Tighten element additional 3/4 turn.

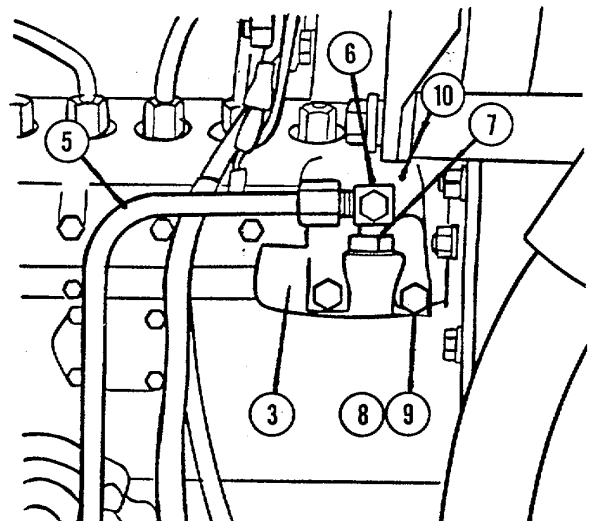


- (6) Open fuel supply valve (1).
- (7) Prime the fuel system. See page 3-33.



b. Removal

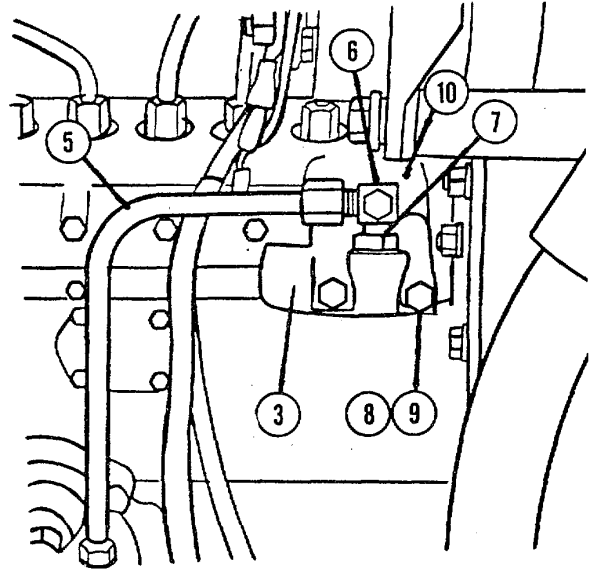
- (1) Remove fuel filter. See Service in this paragraph.
- (2) Use a wrench to disconnect fuel inlet line (5) from elbow (6).
- (3) Use a wrench to remove elbow (6) from fuel filter base (3). Remove and discard seal (7)
- (4) Use a socket to remove two capscrews (8) and flat washers (9).
- (5) Remove filter base (3) and gasket (10). Discard gasket (10).



3-28. SECONDARY FUEL FILTER ASSEMBLY - SERVICE/REPLACE (Cont'd)

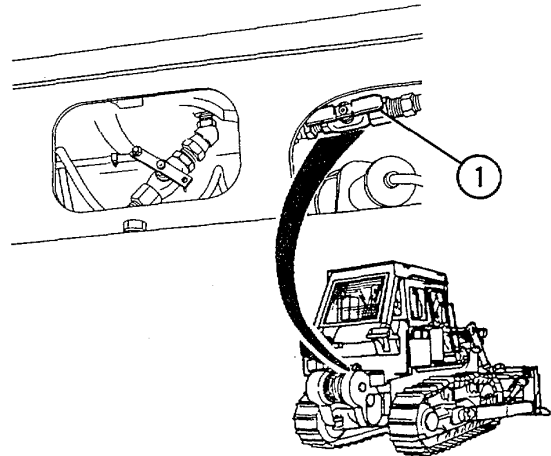
c. Installation

- (1) Use a lint-free rag and wipe all sealing surfaces clean and dry before installation is started.
- (2) Install fuel filter base (3) and new gasket (10) with two capscrews (8) and flat washers (9). Tighten with a socket.
- (3) Install seal (7) and elbow (6) in filter base (3) and tighten with a wrench.
- (4) Install fuel inlet line (5) in elbow (6) and tighten with a wrench.
- (5) Install secondary fuel filter. See Service in this paragraph.
- (6) Install fuel pressure gage. See page 14-7.
- (7) Turn the valve (1) for the fuel supply to the "ON" position.
- (8) Prime the fuel system. See page 3-33.



d. Place In Service

Run engine and check for proper operation.



3-29. ETHER STARTING AID ASSEMBLY - SERVICE/REPLACE

This task covers:

- a. Service
- b. Removal
- c. Installation
- d. Place In Service

INITIAL SETUP

Applicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

Wire ID. Tags
Cotter Pin (43)

Equipment Condition

Engine cool.

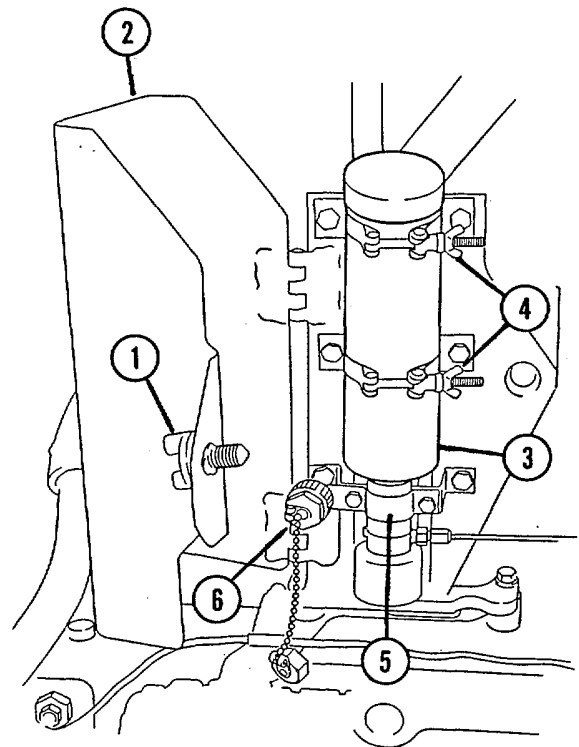
a. Service

WARNING

Ether is poisonous and flammable. Do not store replacement cylinders in living areas, in the operator's compartment, or in direct sunlight. Do not smoke while changing ether cylinders.

Avoid breathing of the vapors or repeated contact of ether with skin. Discard cylinders in a safe place, do not puncture or burn cylinders.

- (1) Loosen wing screw (1) on cover (2).
- (2) Open cover (2) to expose canister (3), and loosen two clamps (4).
- (3) ether canister (3) from valve (5) and dispose of in the proper manner.

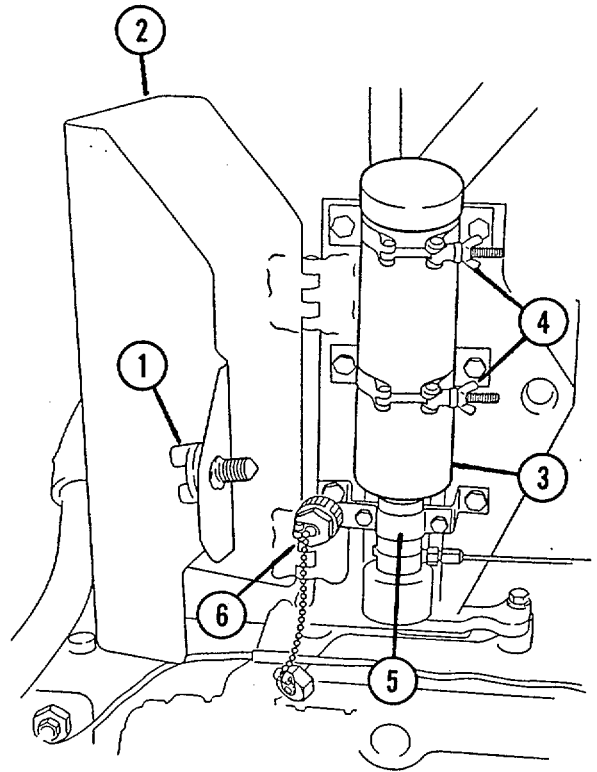


3-29. ETHER STARTING AID ASSEMBLY - SERVICE/REPLACE (Cont'd)

NOTE

Ether canister should be removed and not replaced when the ambient temperature is above 32°F (0C).

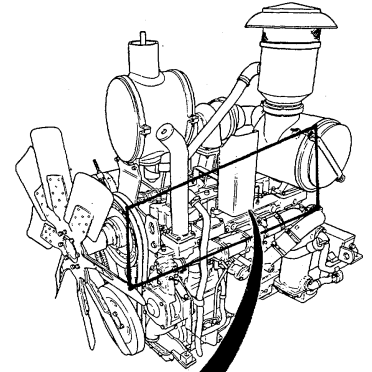
- (4) If ether canister is not being installed, unscrew cap (6) from its storage position and install it in place of ether canister.
- (5) If ether canister is being installed, screw canister (3) into position and tighten clamps (4).
- (6) Close door (2) and secure with wing screw (1).



3-29. ETHER STARTING AID ASSEMBLY - SERVICE/REPLACE (Cont'd)

b. Removal

- (1) Remove ether canister. See Service in this paragraph.
- (2) Use a wrench to remove tube assembly (7) from valve adapter (8) and cylinder head adapter (9).
- (3) Use a wrench to remove adapter (8), and two wrenches to remove adapter (9).
- (4) Remove nozzle (10) from cylinder head with a wrench.

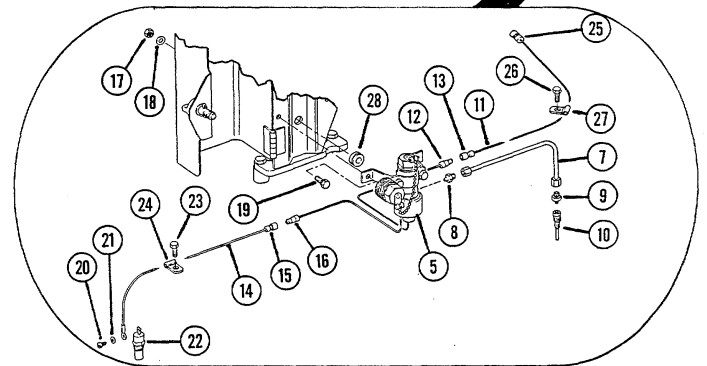


CAUTION

Cover or plug hole in cylinder head so that dirt cannot enter.

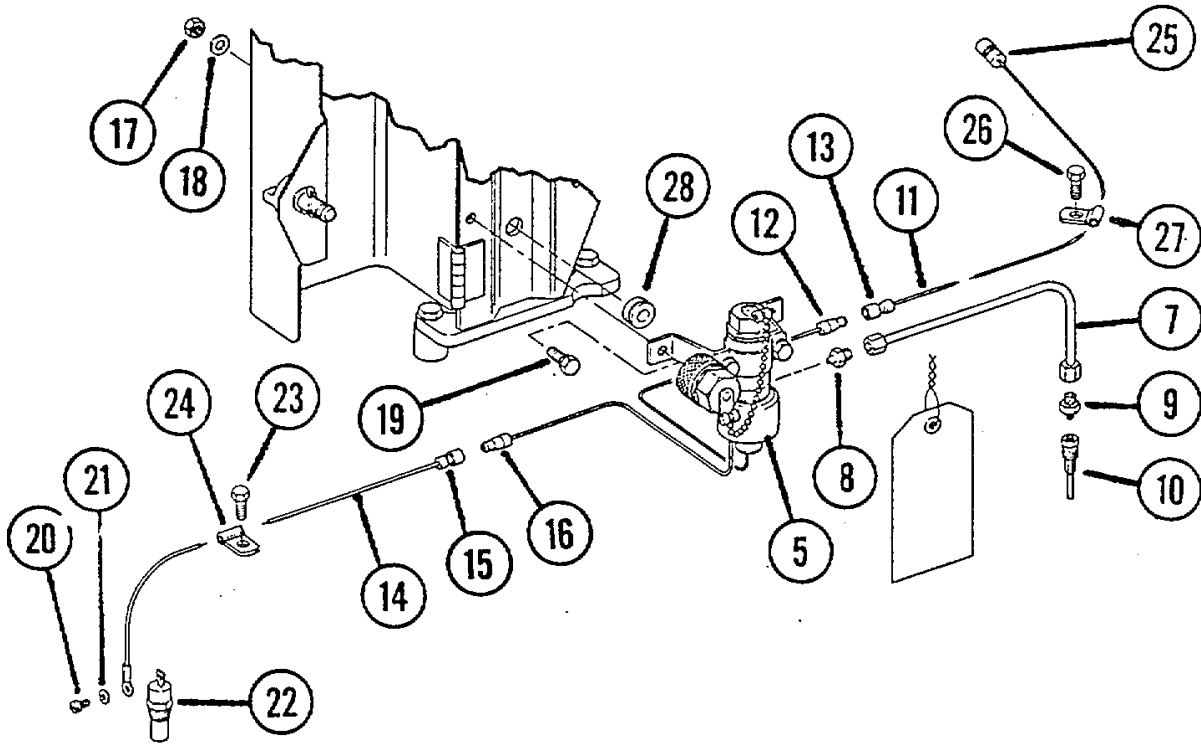
NOTE

Tag wire connections before removal.



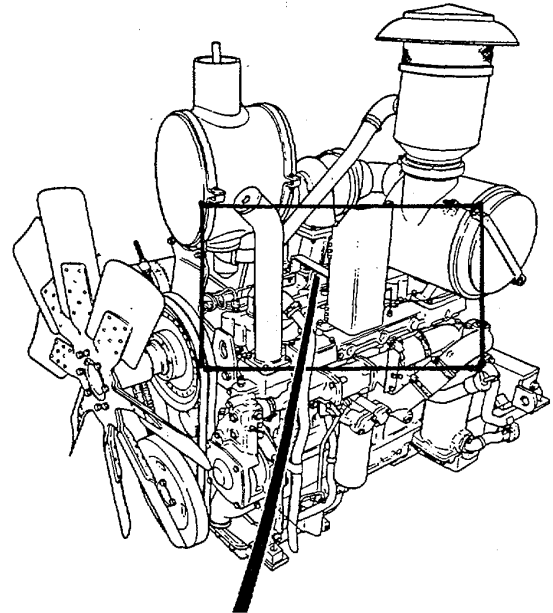
3-29. ETHER STARTING AID ASSEMBLY - SERVICE/REPLACE (Cont'd)

- (5) Disconnect wire assembly (11) at connectors (12 and 13), and wire assembly (14) at connectors (15 and 16). (12)
- (6) Use a wrench to remove two nuts (17), two flat washers (18) and two capscrews (19) and remove valve (5).
- (7) Use a screwdriver to remove slotted screw (20) and washer (21) from temperature switch (22). Use a wrench to remove temperature switch.
- (8) Use a socket to remove capscrew (23) from clamp (24). Remove wire (14).
- (9) Separate connector (25) from wiring harness.
- (10) Use a socket to remove capscrew (26) from clamp (27). Remove wire (11).
- (11) Remove grommet (28)



3-29. ETHER STARTING AID ASSEMBLY - SERVICE/REPLACE (Cont'd)

- (12) Use two wrenches to remove four nuts (29), four washers (30) and four capscrews (31). Remove two clamp assemblies (32).
- (13) Use a wrench and a socket to remove two nuts (33), two washers (34) and two capscrews (35).
- (14) Use a socket to remove capscrew (36), flat washer (37) and bracket (38).
- (15) Use a socket to remove two capscrews (39), two washers (40), box assembly (41) and spacers (42).
- (16) Use pliers to remove cotter pin (43), washer (44), wing bolt (45), and washer (46). Discard cotter pin (43).

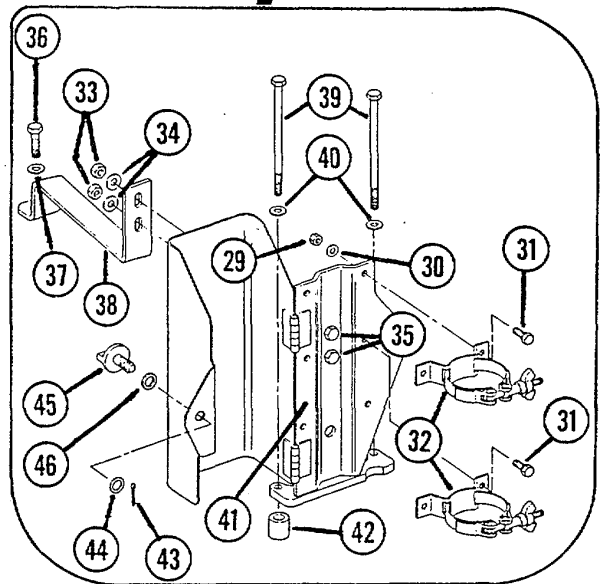


c. Installation

- (1) Install wing bolt (45), washer (46), washer (44) and new cotter pin (43). Bend end of cotter pin over with needle nose pliers.
- (2) Position box assembly (41) and spacers (42) on cylinder head.

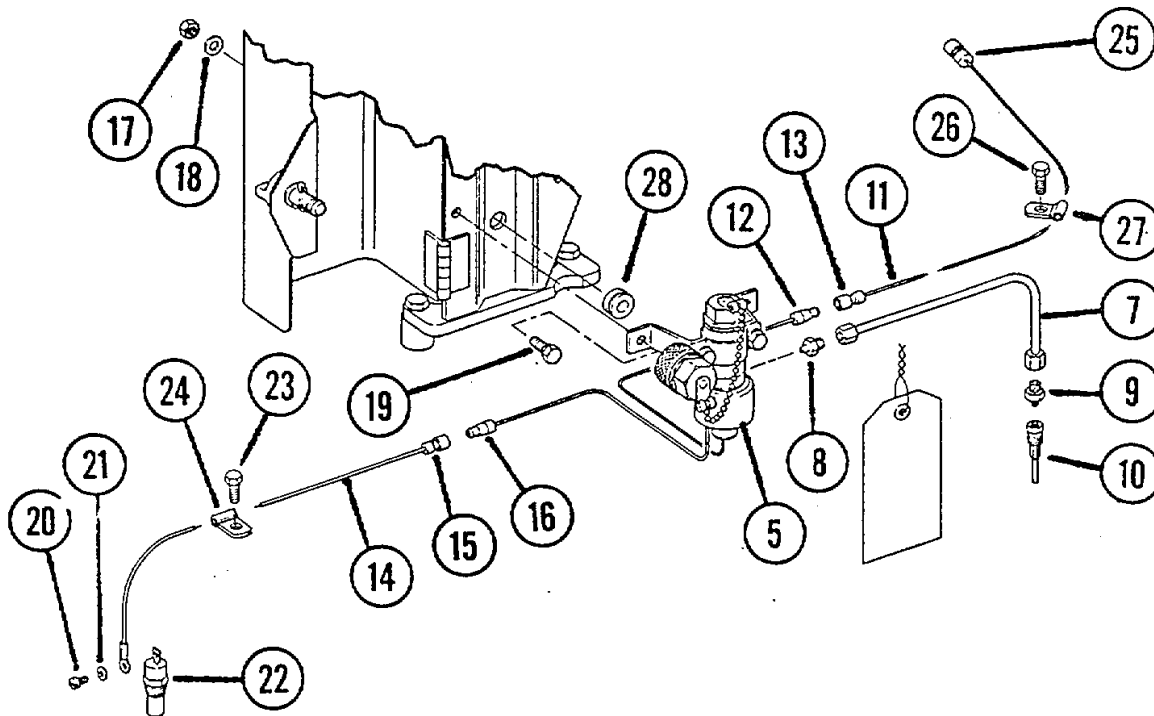
Install two washers (40) and two capscrews (39). Tighten with a socket.

- (3) Use a wrench and a socket to install bracket (38) with capscrew (36), washer (37), two washers (34), two capscrews (35) and two nuts (33).
- (4) Use two wrenches to install two clamp assemblies (32), four capscrews (31), four washers (30) and four nuts (29).



3-29. ETHER STARTING AID ASSEMBLY - SERVICE/REPLACE (Cont'd)

- (5) Install grommet (28).
 - (6) Thread valve wires through grommet and use two wrenches to install valve (5), two capscrews (19), two washers (18) and two nuts (17).
 - (7) Place wire (11) in position and join connectors (12 and 13).
 - (8) Attach connector (25) to wiring harness.
 - (9) Place clamp (27) around wire (11) and use a wrench to install capscrew (26).
 - (10) Place wire (14) in position and join connectors (15 and 16).
 - (11) Use a wrench to install temperature switch (22).
 - (12) Use a screwdriver to attach wire (14), slot screw (20), and washer (21) to temperature switch (22).
 - (13) Place clamp (24) around wire (14) and use a socket to install capscrew (23).
 - (14) Use a wrench to install adapter (8) into valve (5).
 - (15) Position nozzle (10) with orifices pointed to the ends of the engine. Align nozzle with dash marks on the nut. Use a wrench to install nozzle (10) to cylinder head.
 - (16) Use two wrenches to install adapter (9) to nozzle (10).
 - (17) Use a wrench to install tube (7) to adapters (8 and 9).
- d. Place In Service
- Run engine and check for proper operation.



Section III. EXHAUST SYSTEM

3-30. GENERAL

This section provides maintenance procedures assigned to the organizational level for the exhaust system. To find a specific maintenance procedure, see the maintenance task summary below.

3-31. EXHAUST SYSTEM MAINTENANCE SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
3-32	Muffler - Replace	3-98
3-33	Exhaust Extension - Replace	3-100

3-32. MUFFLER - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

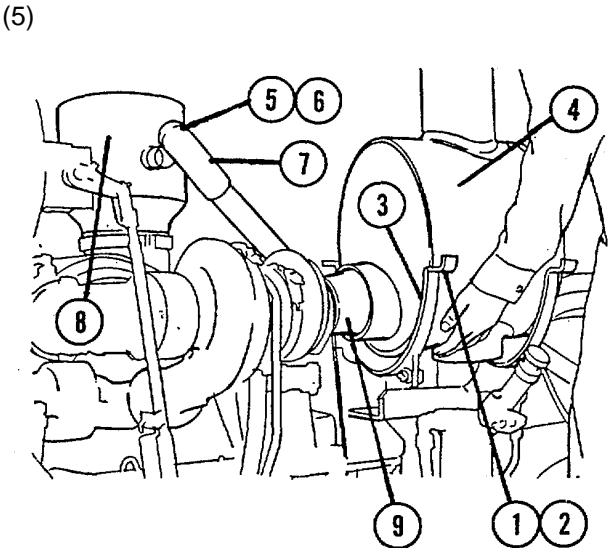
Applicable Configurations
All

Equipment Condition
Engine cool.
Hood removed. (page 10-16)

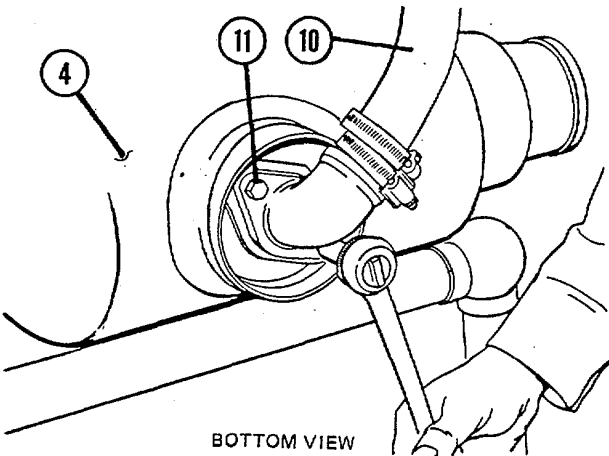
Common Tools
Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal

- (1) Use a wrench and a socket to remove four capscrews (1) and nuts (2) from clamp halves (3). Remove clamp halves from muffler (4).
- (2) Use a flat blade screwdriver to loosen slot screw (5) on hose clamp (6). Separate hose (7) from precleaner body (8).
- (3) Slide muffler (4) away from turbocharger coupling (9). Lift muffler with dust ejector pipe (10) from engine assembly.



- (4) Use a socket to remove two capscrews (11) and separate dust ejector pipe (10) from bottom of muffler (4).



3-32. MUFFLER - REPLACE (Cont'd)

- (5) To remove clamp halves (12), use a socket to remove four capscrews (13), nuts (14), and washers (15).
- (6) To remove bracket (16), use a socket to remove two capscrews (17) and washers (18).

NOTE

To remove bracket (19) you will have to disconnect the fuel priming pump from it. See page 3-32.

- (7) Remove bracket (19). See page 3-32.

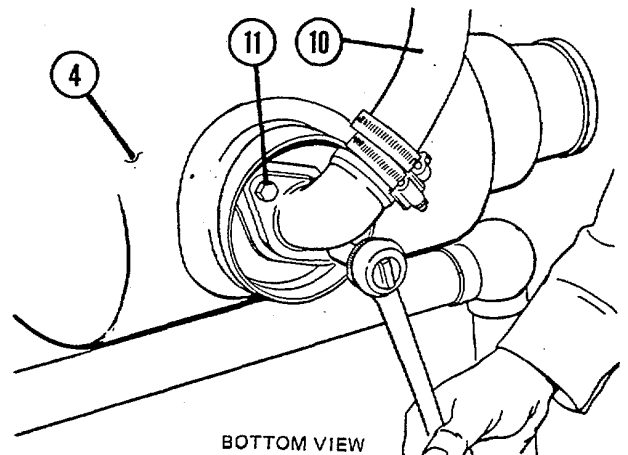
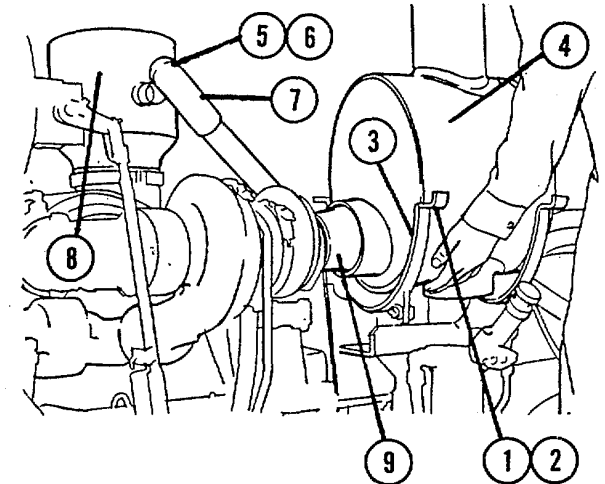
b. Installation

- (1) Install bracket (19). See page 3-32.
- (2) Place bracket (16) in position and use a socket to install two capscrews (17) and washers (18).
- (3) Place clamp halves (12) in position and use a socket to install four capscrews (13), nuts (14) and washers (15).
- (4) Place dust ejector pipe (10) in position on bottom of muffler (4). Use a socket to install two capscrews (11).
- (5) Place muffler (4) in position and slide onto turbocharger coupling (9).
- (6) Line up dust ejector hose (7) with precleaner body (8). Use a screwdriver to tighten slot screw (5) on hose clamp (6).
- (7) Place clamp halves (3) in position on muffler (4) and use a torque socket to install four capscrews (1) and nuts (2). Tighten to 15-25 LB ft.

- (8) Install hood. See page 10-16.

c. Place In Service

Run engine and check muffler for proper operation.



3-33. EXHAUST EXTENSION - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configurations

All

Equipment Condition

Engine OFF and cool.

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

a. Removal

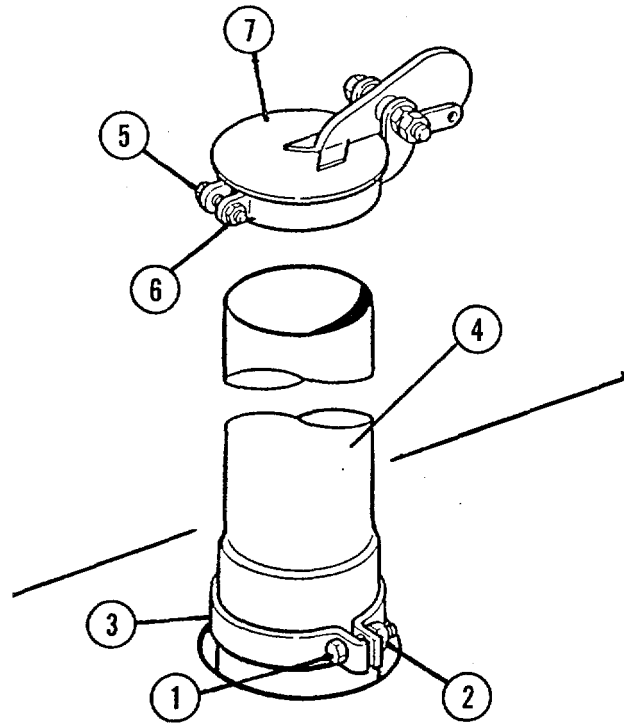
- (1) Use two wrenches to remove capscrew (1) and nut (2) from clamp (3).
- (2) Remove pipe assembly (4).
- (3) Use a wrench and a socket to remove capscrew (5) and nut (6) and remove cap assembly (7).

b. Installation

- (1) Place cap assembly (7) in place on pipe assembly (4). Secure by using a wrench and a socket to install capscrew (5) and nut (6).
- (2) Place pipe assembly (4) in position on muffler.
- (3) Use a wrench to install nut (2) and capscrew (1) which secure clamp (3) around extension and muffler. Tighten to 19-25 LB ft.

c. Place In Service

Run engine and check exhaust system for proper operation.



Section IV. COOLING SYSTEM**3-34. GENERAL**

This section provides maintenance procedures assigned to the organizational level for the cooling system. To find a specific maintenance procedure, see the maintenance task summary below.

3-35. COOLING SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
3-36	Radiator - Test/Service	3-102
3-37	Radiator Cap - Replace/Repair	3-107
3-38	Water Temperature Regulator - Test/Replace	3-110
3-39	Water Pump Assembly - Replace	3-112
3-40	Water Pump Lines - Replace	3-113
3-41	Fan Drive - Replace/Repair	3-116
3-42	Vee Belts - Adjust/Replace	3-119
	3-101	

3-36. RADIATOR - TEST/SERVICE

This task covers:

- a. Pressure Testing Radiator
- b. Changing Coolant

INITIAL SETUP

Applicable Configurations

All

Common Tools

Shop Equipment, Automotive Maintenance & Repair, Common #1 Less Power NSN 4910-00-754-0654 Pressurizing Pump

Materials/Parts

14 Gallon Drain Pan
 12 Gallons of Cooling System Cleaner (App. D, Item 6)
 12 Gallons of Neutralizer (App. D, Item 14)
 12 Gallons of Antifreeze (App. D, Item 3)
 Wood Blocking

Equipment Condition

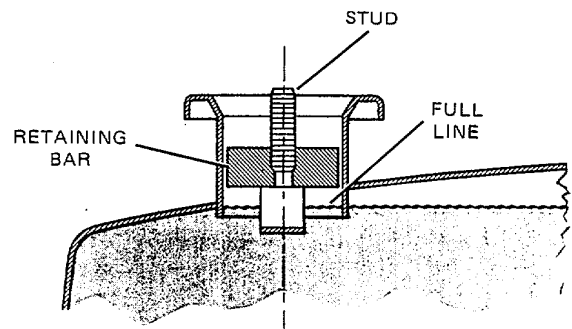
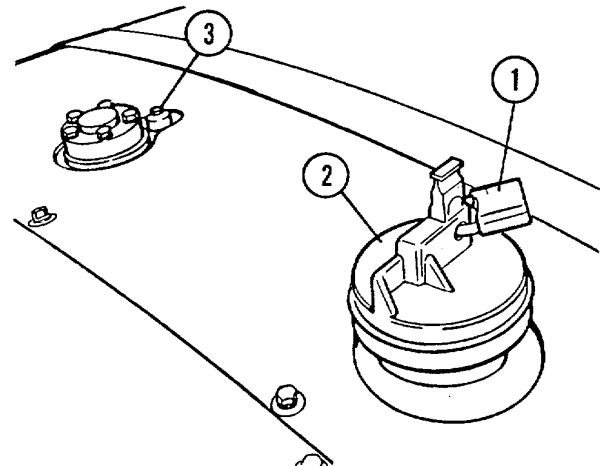
Engine cool.

a. Pressure Testing Radiator

WARNING

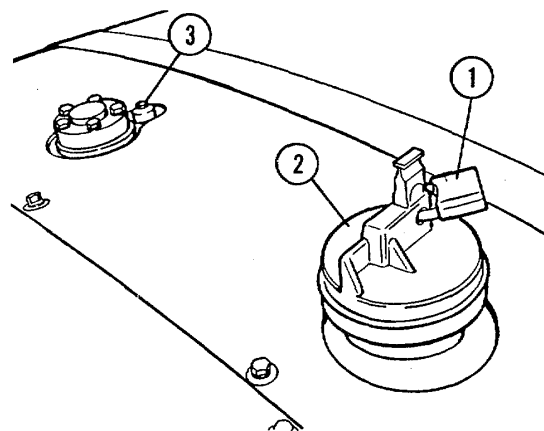
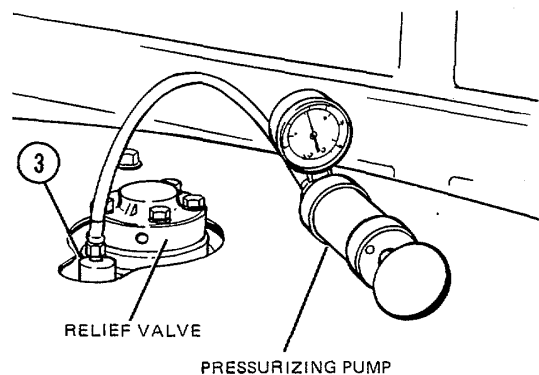
Let engine cool before removing fill cap from radiator. Loosen the filler cap to the first stop and let the pressure out of the cooling system, then remove the filler cap. Hot coolant and steam can cause personal injury.

- (1) Open lock (1) and slowly loosen the fill cap (2) to relieve pressure from the radiator.
- (2) Remove fill cap (2) to inspect coolant level, making sure that the coolant level is just below the bottom of the stud retaining bar.
- (3) Replace the fill cap (2) and tighten.
- (4) Use a socket to remove plug (3) from the top of the radiator.



3-36. RADIATOR - TEST/SERVICE (Cont'd)

- (5) Mount a pressurizing pump at the location where plug (3) was removed.
- (6) Pump air into the radiator until the pressure reading on the gage reads 14 psi (97.8 kPa).
- (7) Inspect the radiator for outside leakage.
- (8) Check all cooling system connections and hoses to make sure that there is no external leakage.
- (9) If no external leakage is evident and the pressure reading on the gage remains constant for 5 minutes, there is no internal leakage in the system.
- (10) If no external leakage is evident and the pressure reading on the gage falls, there is internal leakage. Contact Direct Support.
- (11) If no internal or external leakage is found, pump more air into the radiator. The relief valve must open between 15 and 18 psi (105 and 125 kPa). If not, valve must be replaced See page 3100b.
- (12) When test is completed, open bleed valve on pump to release pressure in radiator.
- (13) Remove pressurizing pump from radiator and install plug (3). Tighten plug (3) with a socket.

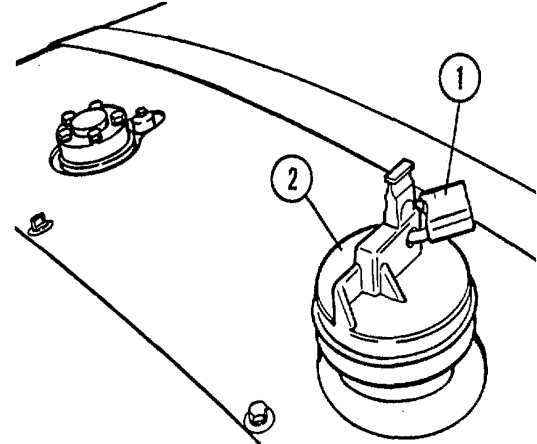


3-36. RADIATOR - TEST/SERVICE (Cont'd)

b. Changing Coolant**WARNING**

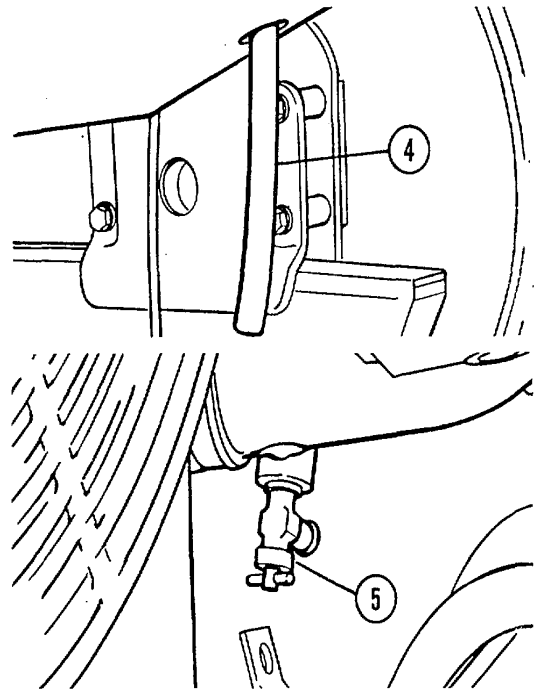
Let engine cool before removing fill cap from radiator. Loosen the filler cap to the first stop and let the pressure out of the cooling system, then remove the filler cap. Hot coolant and steam can cause personal injury.

- (1) Open lock (1) and slowly loosen the filler cap (2) to relieve pressure from the radiator. Remove filler cap (2).



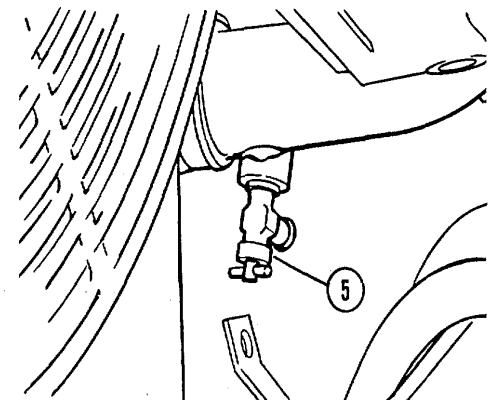
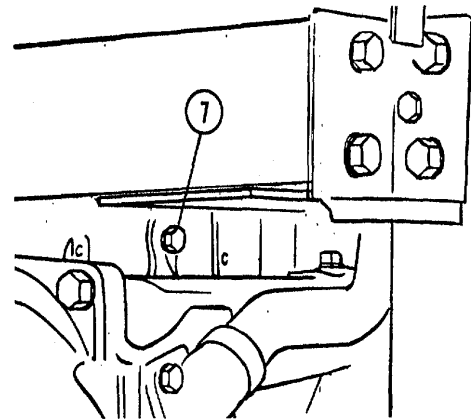
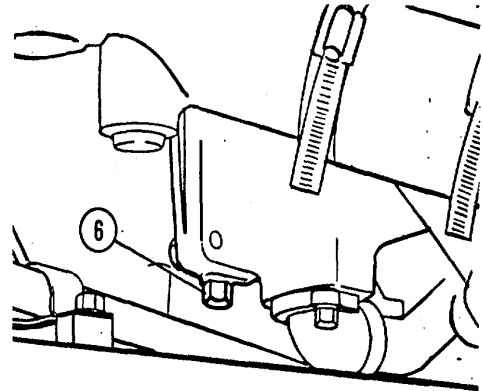
- (2) Install radiator drain tube (4) on drain valve (5).

- (3) Place a drain pan beneath drain tube and open radiator drain valve (5).



3-36. RADIATOR - TEST/SERVICE (Cont'd)

- (4) Remove transmission cooler drain plug (6).
- (5) Remove engine block drain plug (7). Allow all coolant solution to drain.
- (6) Close radiator drain valve (5).
- (7) Install transmission cooler drain plug (6).
- (8) Install engine block drain plug (7).
- (9) Flush cooling system. To flush:
 - (a) Add 12 gallons of cooling system cleaner and install radiator cap.
 - (b) Start engine and allow to idle for 1/2 hour. Stop engine and allow to cool.
 - (c) Open drain valve (5) and remove drain plugs (6) and (7). Allow all cleaning solution to drain.
 - (d) Close drain valve (5) and install drain plugs (6) and (7).
 - (e) Add 12 gallons of cooling system cleaner neutralizing solution and install radiator cap.
 - (f) Start and run engine for 10 minutes. Stop engine and allow to cool.
 - (g) Open drain valve (5) and remove drain plugs (6) and (7). Allow all neutralizing solution to drain.



3-36. RADIATOR - TEST/SERVICE (Cont'd)

- (h) Flush system with clean water until draining water is clear. Do not run engine while flushing.
- (i) Close drain valve (5) and install drain plugs (6) and (7).

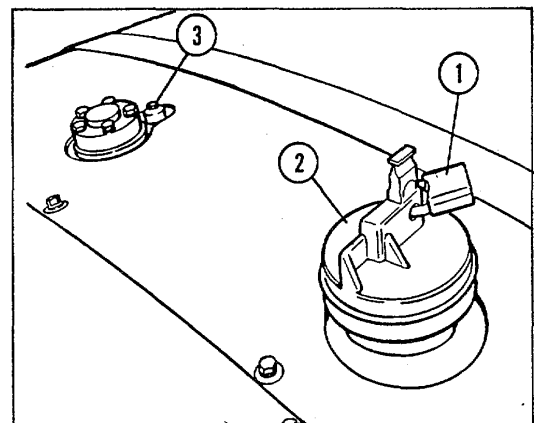
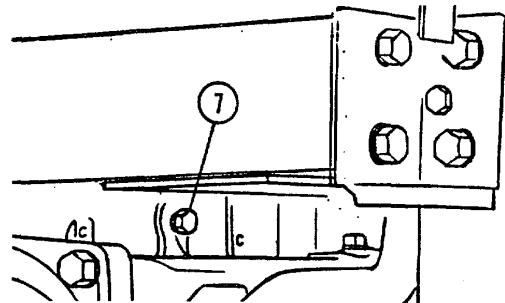
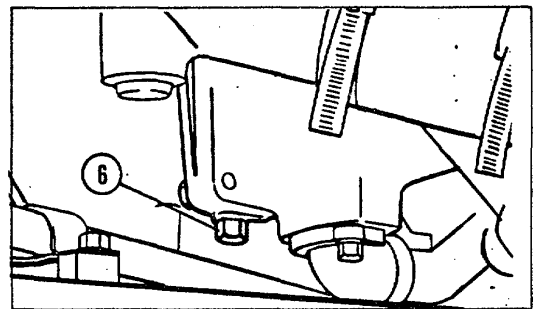
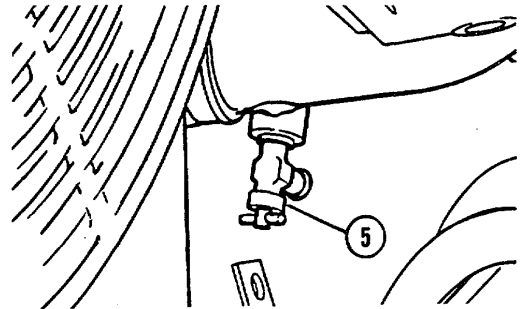
CAUTION

Antifreeze should never exceed 60% by volume. Failure of cooling system can occur.

- (10) Mix 12 gallons of antifreeze solution to provide protection to the lowest expected ambient temperature.
- (11) Add coolant slowly (5 U.S. gallons per minute or less) to proper level.
- (12) Install radiator fill cap (2) and close lock (1).
- (13) Start engine and run for 15 minutes. Stop engine and recheck coolant level.

NOTE

If machine is to be stored in or shipped to an area with below freezing temperatures, cooling system must be drained completely or protected to lowest expected ambient temperature.



3-37. RADIATOR CAP/RELIEF VALVE - REPLACE/REPAIR

This task covers:

- a. Removal
- b. Disassembly
- c. Assembly
- d. Installation
- e. Place In Service

INITIAL SETUP**Applicable Configurations**

All

Materials/Parts

Gasket (5), (13)

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654
Vise

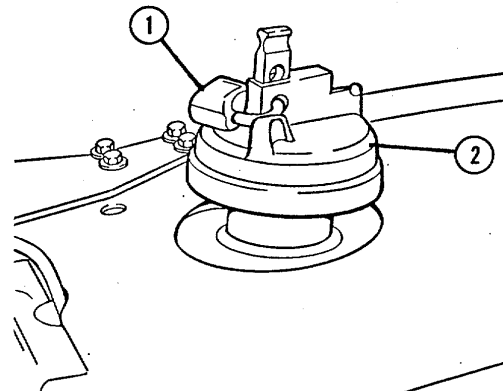
Equipment Condition

Engine cool.

a. Removal**WARNING**

Let engine cool before removing fill cap from radiator. Loosen the filler cap to the first stop and let the pressure out of the cooling system, then remove the filler cap. Hot coolant and steam can cause personal injury.

- (1) Open and remove lock (1) securing radiator filler cap (2).
- (2) Remove filler cap slowly to relieve pressure and remove filler cap.



3-37. RADIATOR CAP/RELIEF VALVE - REPLACE/REPAIR (Cont'd)

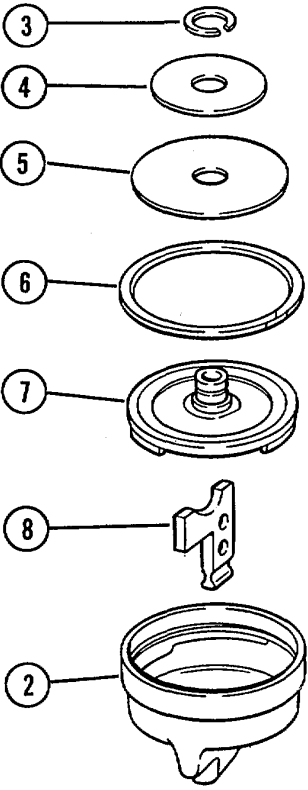
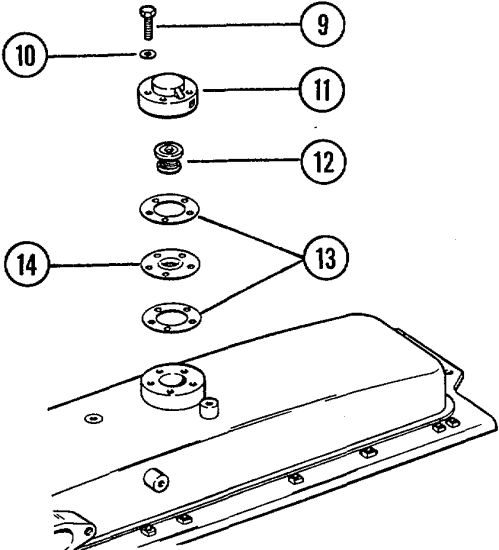
- (3) Use a socket wrench to remove five capscrews (9) and washers (10).
- (4) Remove cover (11).
- (5) Remove valve (12).
- (6) Remove gaskets (13) with plate (14). Discard gaskets (13).

b. Disassembly

- (1) Put filler cap (2) in vise. Use two small screwdrivers to remove ring (3) and retainer (4) from filler cap.
- (2) Remove and discard gasket (5) from filler cap.
- (3) If necessary, use two screwdrivers to remove ring (6), cap (7) and tang (8).

c. Assembly

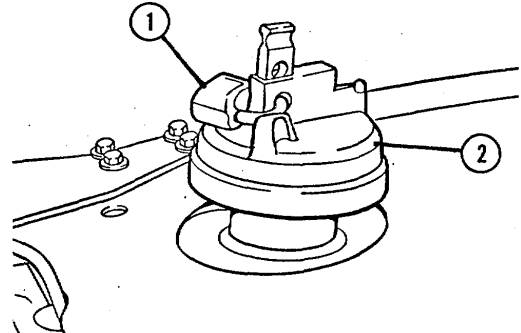
- (1) If removed, install tang (8), cap (7) and ring (6) into filler cap
- (2) Install new gasket (5) into filler cap.
- (3) Install retainer (4) and ring (3) into filler cap.



3-37. RADIATOR CAP/RELIEF VALVE - REPLACE/REPAIR

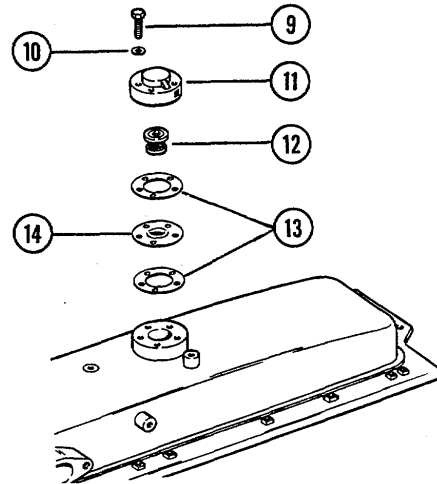
d. Installation

- (1) Install filler cap (2) on radiator and tighten securely.
- (2) Install lock (1) through filler cap and close lock tightly.
- (3) Install gaskets (13) with plate (14).
- (4) Install valve (12).
- (5) Use a socket wrench to install cover (11), washers (10), and capscrews (9).



e. Place In Service

Start engine and check cap for leaks.



3-38. WATER TEMPERATURE REGULATOR - TEST/REPLACE

This task covers:

- a. Removal
- b. Testing Regulator Operation
- c. Installation

INITIAL SETUP

Applicable Configurations

All

Materials/Parts

Gasket (6)
Antifreeze (App. D, Item 2)

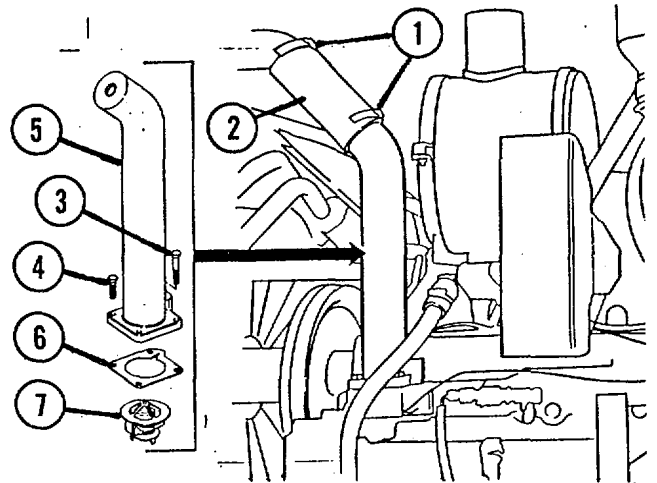
Common Tools

Tool Kit, Auto Maintenance and Repair, Common #1 Less Power
NSN 4910-00-754-0654

Equipment Condition

Engine cool.
Coolant drained. (page 3-104)

- a. Removal
 - (1) Use a flat blade screwdriver to loosen two clamps (1) and slide hose (2) toward the radiator.
 - (2) Use a wrench to remove three capscrews (3) and one capscrew (4) that secured elbow (5) to the cylinder head. Remove and discard gasket (6).
 - (3) Remove the water temperature regulator (7) from the elbow.
- b. Testing Regulator Operation
 - (1) Place a thermometer in a container with water. Heat water to 175°F.
 - (2) Submerge water temperature regulator in heated water. Read temperature on thermometer when water temperature regulator starts to open.



3-38. WATER TEMPERATURE REGULATOR - TEST/REPLACE (Cont'd)**NOTE**

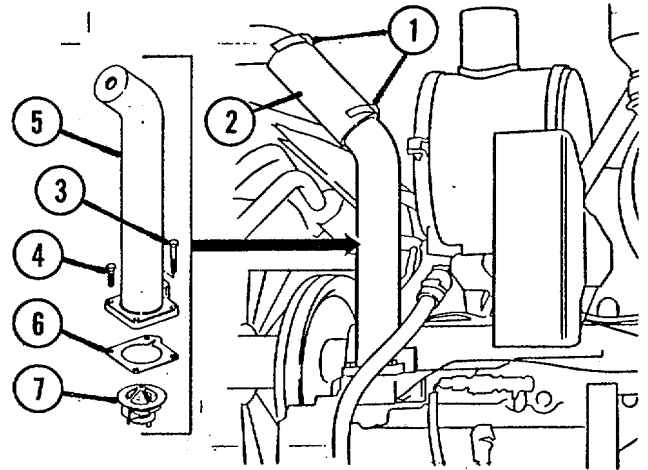
The water temperature regulator should start to open at 1750F and will fully open at 1950F maximum.

- (3) Discard water temperature regulator if it is not fully opened at 1950F.
- c. Installation (1) Install the water temperature regulator (7) in the cylinder head with the spring toward the inside of the engine.

CAUTION

If the water temperature regulator is installed wrong, it will cause the engine to overheat.

- (2) Install elbow (5) and a new gasket (6) over the water temperature regulator. Use a wrench to install three capscrews (3) and one capscrew (4) that secure it.
- (3) Slide hose (2) in position and tighten the two clamps (1) that secure it.
- (4) Fill the cooling system with coolant to the correct level. See page 3106.



3-39. WATER PUMP ASSEMBLY - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

Preformed Packing (4)
Antifreeze (App. D, Item 2)
Oil OE/HDO-30 See L05-2410-237-12

Equipment Condition

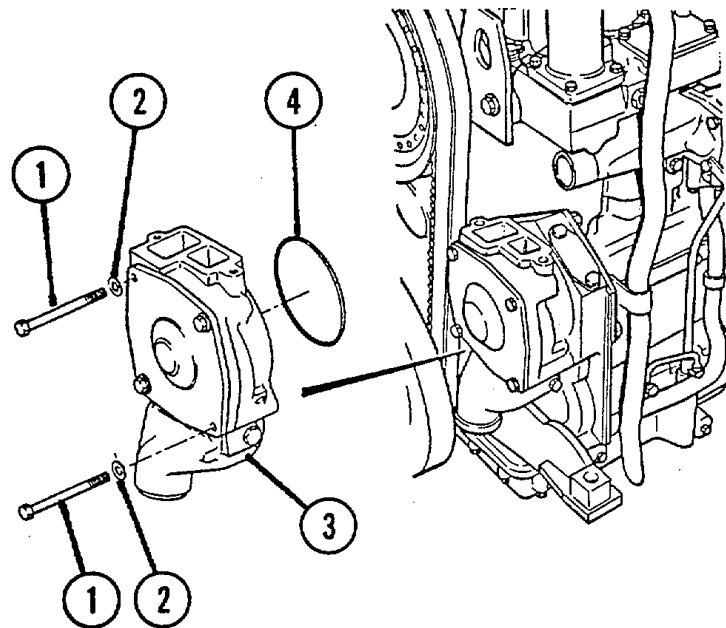
Engine cool.
Coolant drained. (page 3-104)
Water pump lines removed.(page 3-113)

a. Removal

- (1) Use a socket to remove two capscrews (1), two washers (2) and water pump (3) from timing gear cover.
- (2) Remove and discard preformed packing (4) from water pump.

b. Installation

- (1) Lightly lubricate a new preformed packing (4) with clean oil and install on water pump (3).
 - (2) Position water pump on timing gear cover and install two capscrews (1) and two washers (2) with a socket.
 - (3) Install water pump lines. See page 3114.
 - (4) Fill the cooling system with coolant to the correct level. See page 3106.
- c. Place In Service Run engine and check for proper operation.



3-40. WATER PUMP LINES - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configurations

All

Materials/Parts

Gasket (11), (12)
Antifreeze (App. D, Item 2)

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Equipment Condition

Engine cool.
Coolant drained. (page 3-104)

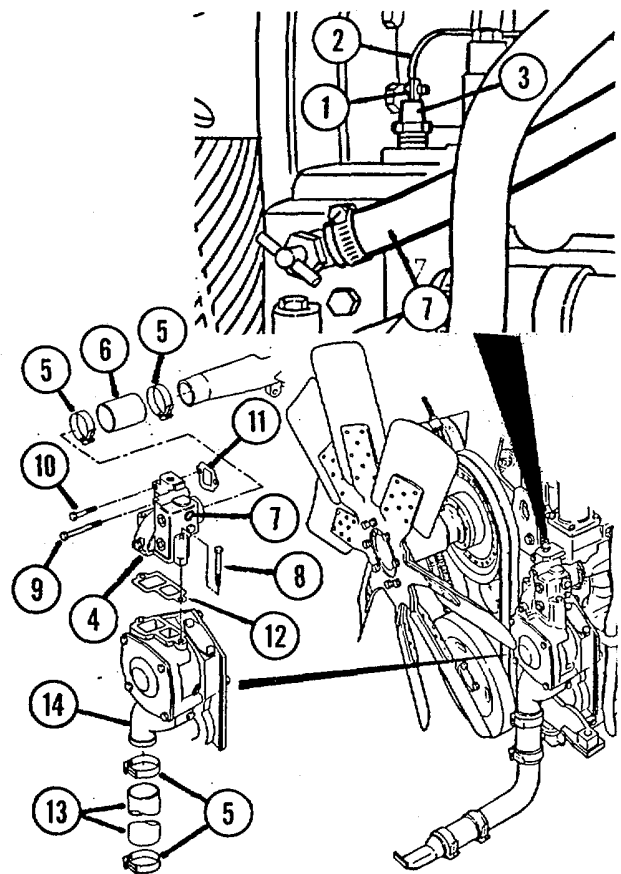
a. Removal

- (1) Use a flat blade screwdriver to remove screw (1) and wire (2) from top of sending unit (3). Use a wrench to remove sending unit from elbow (4)
- (2) Use a flat blade screwdriver to loosen two clamps (5) from around hose (6) and slide hose toward rear of engine.

NOTE

Follow step (3) only if tractor is equipped with a winterized cab

- (3) A tractor with a winterized cab has a heater hose (7) which must be disconnected from elbow (4).
- (4) Use a socket to remove two capscrews (8) and two capscrews (9 and 10).
- (5) Carefully separate elbow (4) from engine.

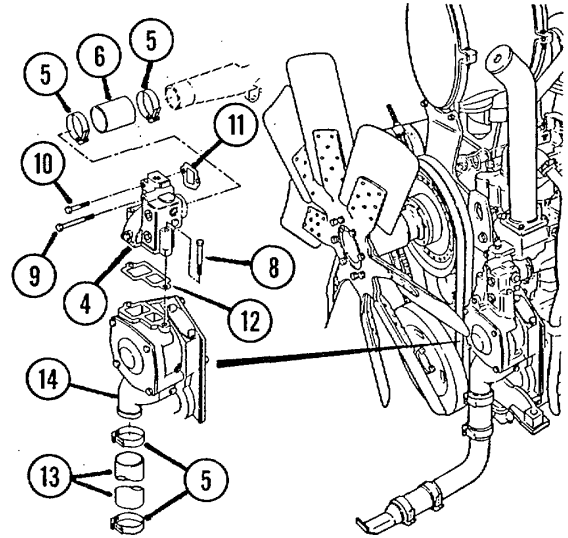


3-40. WATER PUMP LINES - REPLACE (Cont'd)

- (6) Use a putty knife to remove all gasket (11 and 12) material from mating surfaces.
- (7) Use a flat blade screwdriver to loosen two clamps (5) and slide hose (13) off bottom of water pump (14).

b. Installation

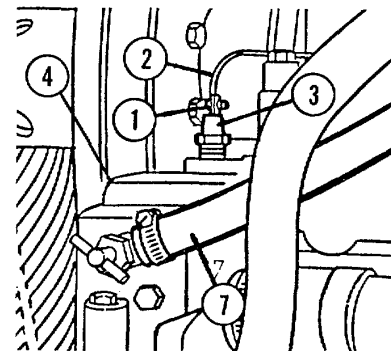
- (1) Place hose (13) onto bottom of water pump (14). Use flat blade screwdriver to tighten two clamps (5).
- (2) Put new gaskets (11 and 12) into position on elbow (4).
- (3) Place elbow (4) into position on engine.
- (4) Secure elbow to engine with two capscrews (8) and two capscrews (9 and 10). Use a socket to tighten the capscrews.



NOTE

Follow step (5) only if tractor is equipped with a winterized cab.

- (5) A tractor with a winterized cab has a heater hose (7) which was disconnected and must be connected to the elbow (4).
- (6) Slide hose (6) over elbow (4). Move two clamps (5) into position and tighten with a flat blade screwdriver.
- (7) Place sending unit (3) onto elbow (4) and tighten with a wrench.
- (8) Attach wire (2) with screw (1) and tighten with a flat blade screwdriver.



3-40. WATER PUMP LINES - REPLACE (Cont'd)

- (9) Fill the cooling system with coolant to the correct level. See page 3106.
- c. Place In Service Run engine and check for proper operation.

3-41. FAN DRIVE - REPLACE/REPAIR

This task covers:

- Removal
- Disassembly
- Assembly
- Installation
- Place In Service

INITIAL SETUP

Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

Materials/Parts

Preformed Packing (12)
Seal (19)
Grease (App. D, Item 10)

Equipment Condition

Tractor parked.
Hood removed. (page 10-16)

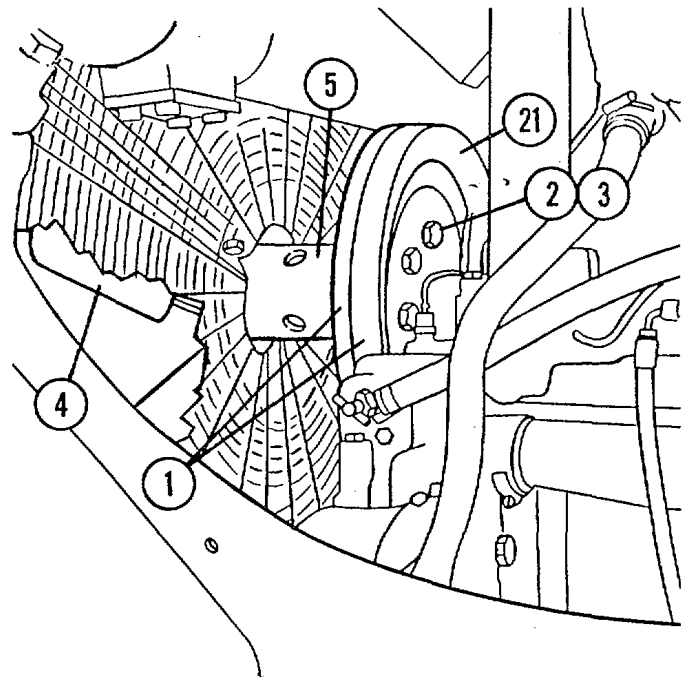
a. Removal

- Loosen the tension on the vee belts (1). Refer to page 3119.

CAUTION

Be extra careful not to cause damage to the radiator core when the fan is put against it.

- Use a wrench to remove six capscrews (2) and six washers (3) that hold the fan (4) and adapter (5) as a unit to the fan drive. Put the fan/adapter unit against the radiator.



3-41. FAN DRIVE - REPLACE/REPAIR (Cont'd)

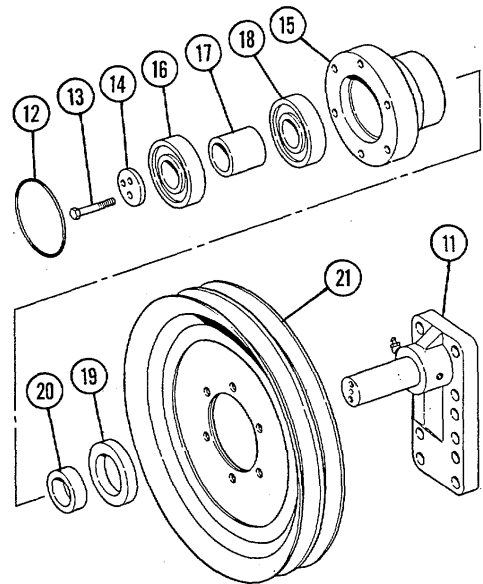
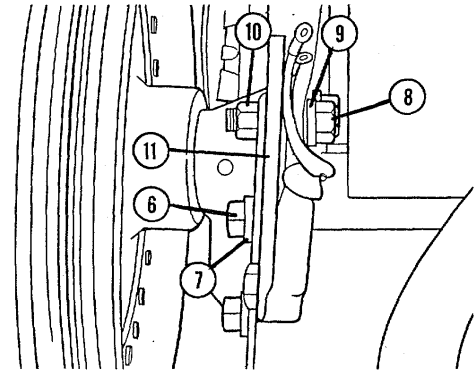
- (3) Use a wrench to remove four capscrews (6) and four washers (7) that hold fan drive assembly to engine block.
- (4) Use two wrenches to remove two capscrews (8), two washers (9) and two nuts (10) that secured bracket assembly (11) to bracket on top of engine. Remove fan drive assembly.

b. Disassembly

- (1) Remove and discard preformed packing (12).
- (2) Use a socket to remove two capscrews (13) and a washer (14) and remove hub (15).
- (3) Remove bearing (16), sleeve (17) and bearing (18) from hub (15).
- (4) Remove and discard seal (19) from hub (15).
- (5) Remove spacer (20) and pulley (21) from bracket assembly (11).

c. Assembly

- (1) Put pulley (21) in position on bracket assembly (11).
- (2) Install spacer (20) on bracket assembly (11).
- (3) Use a driver tool and a hammer to install seal (19) in hub (15). Ensure the lip of the seal is as illustrated.
- (4) Install hub (15) on bracket assembly (11).



3-41. FAN DRIVE - REPLACE/REPAIR (Cont'd)

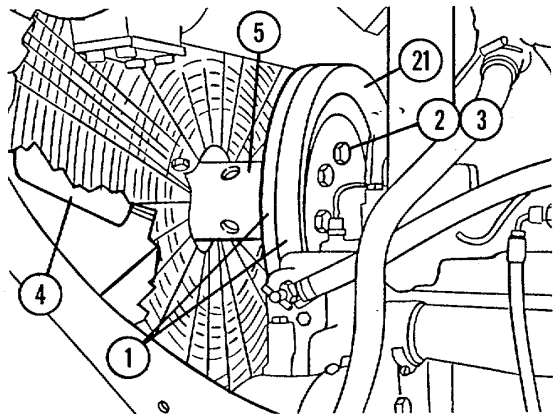
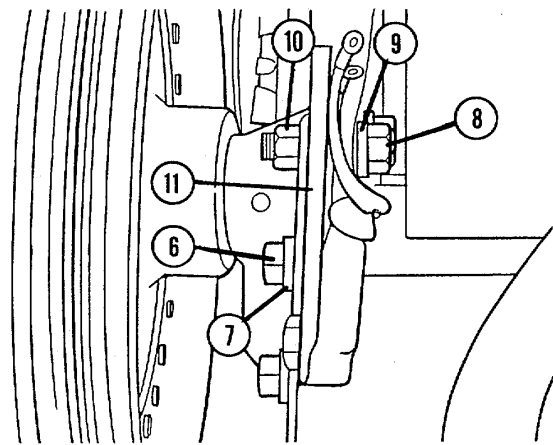
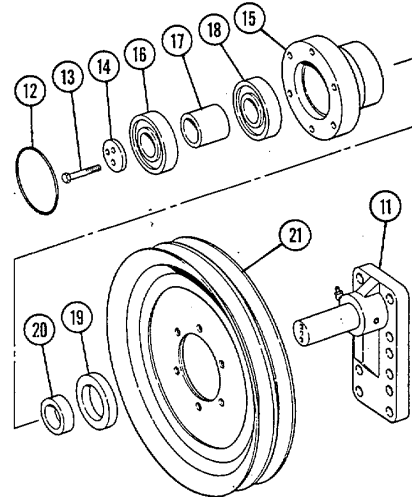
- (5) Install bearing (18), sleeve (17) and bearing (16). Ensure that bearing (16) is in the counterbore of the hub (15) all the way.
- (6) Use a socket to install washer (14) and two capscrews (13) onto shaft of bracket assembly (11).
- (7) Install new preformed packing (12).
- (8) Fill the fan drive with multipurpose type grease.

d. Installation

- (1) Put fan drive assembly in position against cylinder block. Use two wrenches to install two capscrews (8), two washers (9) and two nuts (10) which secure bracket assembly (11) to bracket on top of engine.
- (2) Use a wrench to install four washers (7) and six capscrews (6) which secure bracket assembly (11) to engine block.
- (3) Position the adapter (5) and fan (4) unit against the fan pulley (21). Use a wrench to install six washers (3) and six capscrews (2).
- (4) Put the vee belts (1) in position on the fan pulley and make adjustments. Refer to page 3119.
- (5) Install hood. See page 1016.

e. Place In Service

Run engine and check fan for proper operation.



3-42. VEE DRIVE - ADJUST/REPLACE

This task covers:

- a. Removal
 - b. Installation
 - c. Adjustment of Vee Belts
 - d. Place In Service
-

INITIAL SETUP**Applicable Configurations**

All

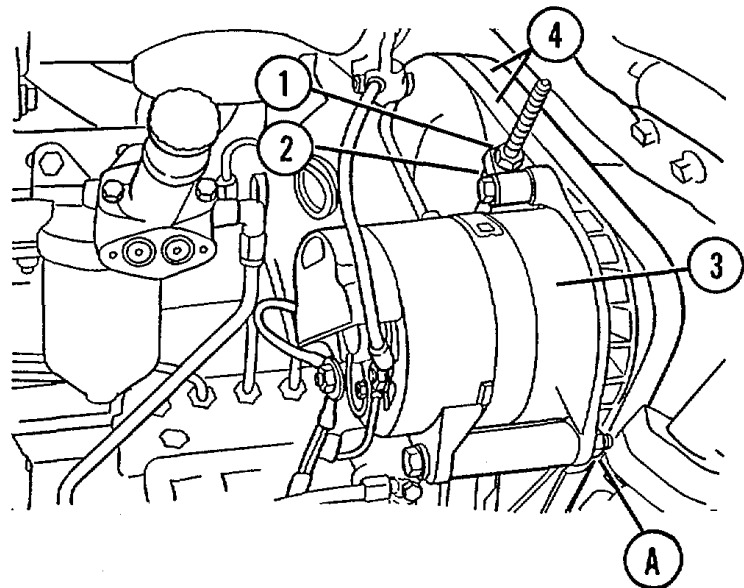
Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654
Lifting Equipment 100 lb.

- a. Removal
 - (1) Remove hood. See page 1016.
 - (2) Loosen nut (A) using a wrench.
 - (3) Use a wrench to loosen nut (1) and nut (2) on alternator (3). Loosen nut until all tension is off vee belts (4)

CAUTION

Be extra careful not to cause damage to the radiator core when the fan is put against it.



3-42. VEE DRIVE - ADJUST/REPLACE (Cont'd)

- (4) Attach lifting equipment to the fan adapter (5) and take out slack.
- (5) Use a wrench to remove six capscrews (6) and six washers (7) that hold the fan and adapter as a unit to the fan drive. Put the fan/adapter unit against the radiator core.
- (6) Remove vee belts (4).

b. Installation

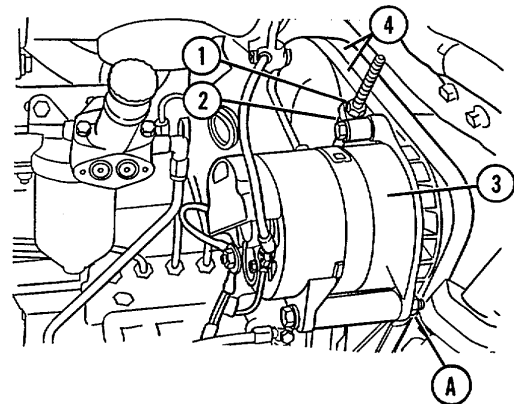
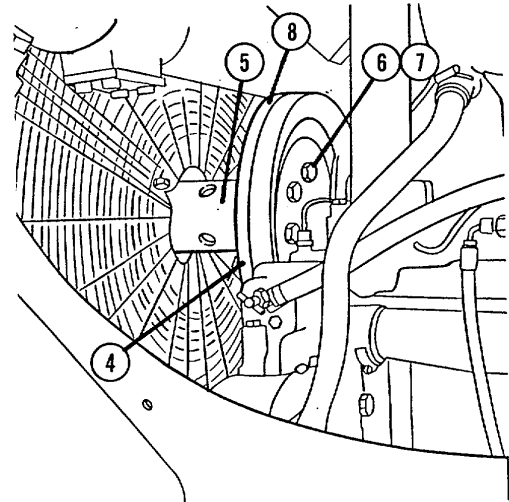
- (1) Put two vee belts (4) in place on pulleys.
- (2) Position the adapter (5) and fan unit against the fan pulley (8). Use a wrench to install six washers (7) and six capscrews (6).
- (3) Install hood. See page 1016.

c. Adjustment of Vee Belts

- (1) Check adjustment of the vee belts with a belt tension gage. Tighten new belts until gage indication is 120+5 lbs. The correct gage indication for used belts is 90+10 lbs.
- (2) Loosen nut (A) to permit tension adjustment.

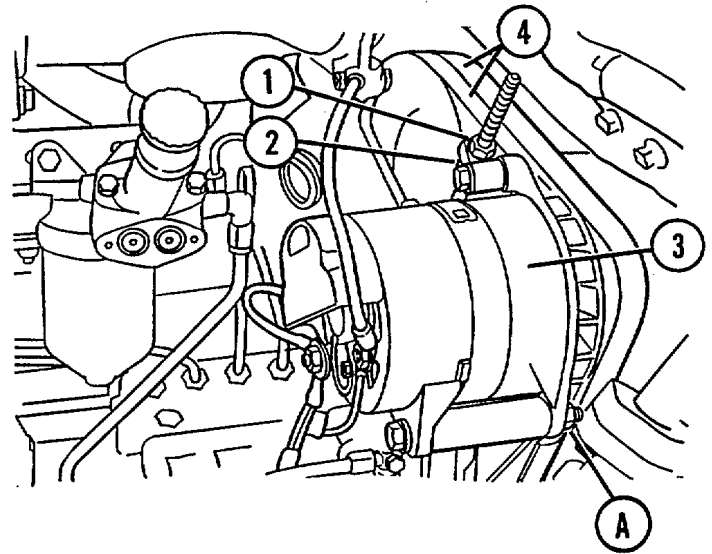
NOTE

Belts are considered used if they have more than 30 minutes of operation at rated engine speed.



3-42. VEE DRIVE - ADJUST/REPLACE (Cont'd)

- (3) Adjust nuts (1) and (2) to increase or decrease tension with a wrench. When correct belt tension is obtained tighten nut (1) against nut (2) using a second wrench.
- (4) Tighten nut (A).
- d. Place In Service
Run engine at high speed for 30 minutes and recheck belt tension. Correct gage indication for used belts is 90+10 lbs.



3-121/(3-122 Blank)

CHAPTER 4

ELECTRICAL SYSTEMS MAINTENANCE

Section I. STARTING AND GENERATING CONTROL SYSTEM

4-1. GENERAL

This section provides maintenance procedures assigned to the organizational level for the starting and generating control system. To find a specific maintenance procedure, see the maintenance task summary below.

4-2. STARTING AND GENERATING CONTROL SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA	PROCEDURES	PAGE NO.
4-3	Alternator - Replace	4-2
4-4	Alternator Mounting Brackets - Replace	4-4
4-5	Starting Motor - Test/Replace	4-5
4-6	Starting Motor Solenoid - Replace	4-14

4-3. ALTERNATOR - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configurations

All

Materials/Parts

Wire I.D Tags

Common Tools

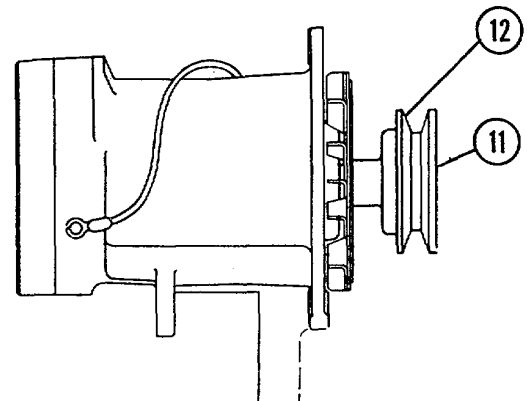
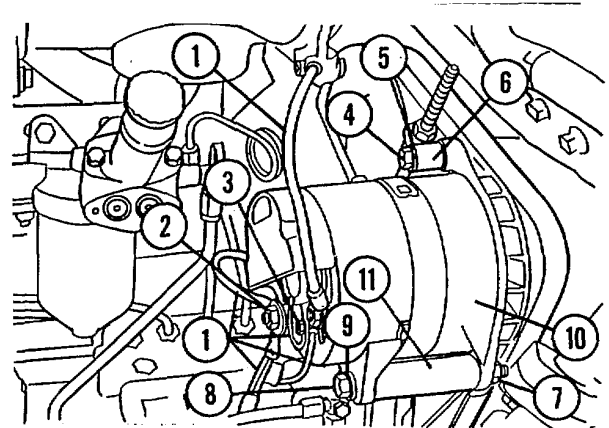
Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

Equipment Condition

Remove V belts. (page 3-119)

a. Removal

- (1) Tag wires to ensure proper installation. Disconnect wires (1) from alternator using two wrenches by removing two nuts (2 and 3).
- (2) Use a wrench to remove capscrew (4) and washer (5) that secured the alternator block (6) to the alternator (10).
- (3) Use a wrench to remove nut (7), capscrew (8) and spacer (9). Remove alternator (10) from the bracket (11)
- (4) If the alternator is to be replaced, use a wrench to remove nut (11) from alternator shaft. Remove pulley (12),



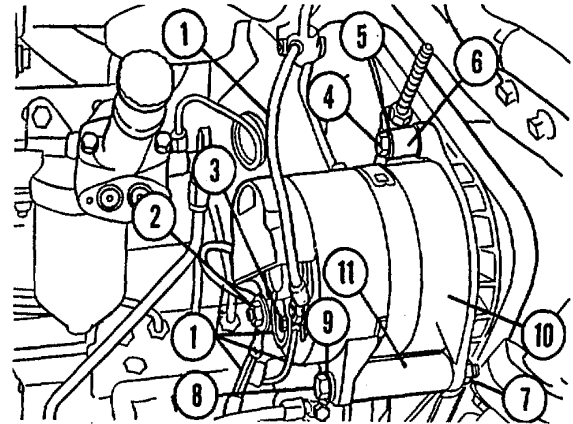
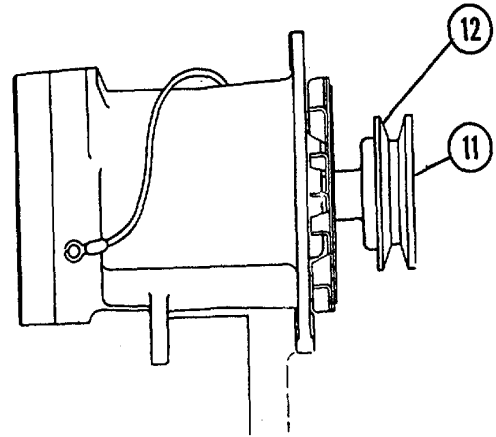
4-3. ALTERNATOR - REPLACE (Cont'd)

b. Installation

- (1) Slide pulley (12) onto alternator shaft. Secure with nut (7). Use a torque wrench to tighten nut to 7080 lb. ft.
- (2) Place alternator (10) into position on the bracket (11). Install spacer (9) capscrew (8) and nut (7). Do not tighten.
- (3) Install alternator block (6) to the alternator with capscrew (4) and washer (5). Use a wrench to tighten capscrew (4).
- (4) Attach wires (1) to their respective terminals and secure with two nuts (2 and 3). Use two wrenches to tighten nuts.
- (5) Install Vee belts. See page 3120.
- (6) Adjust Vee belts. See page 3120.

c. Place In Service

Run engine and check for proper operation.



4-4. ALTERNATOR MOUNTING BRACKETS - REPLACE

This task covers:

- a. Removal
 - b. Installation
 - c. Place In Service
-

INITIAL SETUP

Applicable Configurations

All

Equipment Condition

Engine cool.

Alternator removed. (page 4-2)

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

a. Removal

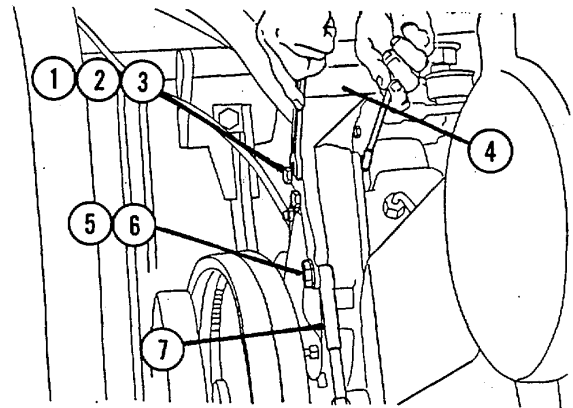
- (1) Use two wrenches to remove four capscrews (1), nuts (2) and washers (3) from front timing gear cover. Remove bracket (4) with attached rod (7).
- (2) Use a wrench to remove capscrew (5) and washer (6) from rod (7). Remove rod.

b. Installation

- (1) Install rod (7) with washer (6) and capscrew (5). Use a wrench to tighten screw.
- (2) Install bracket (4) and attached rod (7) with four washers (3), four capscrews (1) and four nuts (2). Use two wrenches to tighten nuts and capscrews.
- (3) Install alternator. See page 43.

c. Place In Service

Run engine and check for proper operation.



4-5. STARTING MOTOR - TEST/REPLACE

This task covers:

- a. Testing Starting Motor and Solenoid
- b. Removal
- c. Installation
- d. Place In Service

INITIAL SETUP

Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
 Maintenance and Repair, Common #1
 Less Power
 NSN 4910-00-754-0654
 Lifting Equipment 100 lb.

Test Equipment

Voltmeter
 RPM Indicator

Materials Parts

Gasket (50)
 Seals (13) (22)
 Wire I.D. Tags
 Caps and Plugs

Equipment Condition

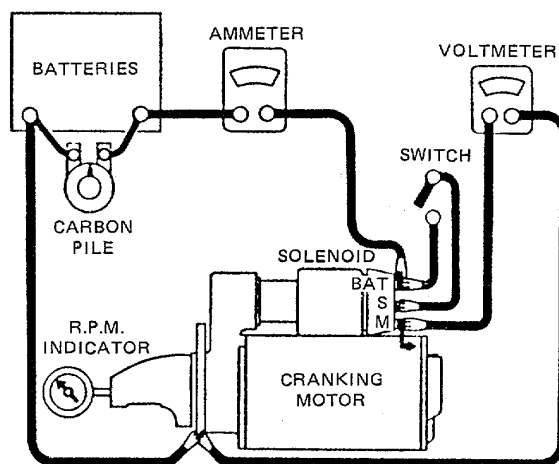
Battery disconnected. (page 4-67)
 Start receptacle removed. (page 4-67)
 Transmission oil magnetic screen
 assembly removed. (page 5-35)

a. Testing Starting Motor and Solenoid

NOTE

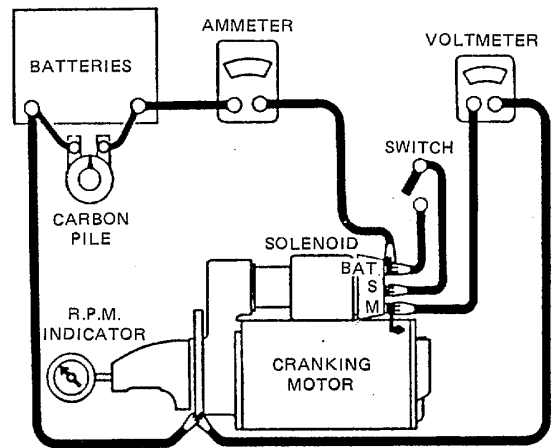
With the starting motor and solenoid removed from the engine, check the armature for freedom of rotation by prying the pinion with a screwdriver. If the armature does not turn do not perform the following no load test. Check with your supervisor for proper disposition of faulty starting motor.

- (1) Connect a voltmeter between the motor terminal and motor frame.



4-5. STARTING MOTOR - TEST/REPLACE (Cont'd)

- (2) Use an RPM indicator to measure armature speed.
- (3) Connect motor and ammeter in series with two fully charged 12V batteries.
- (4) Connect a switch in open position between solenoid battery terminal and solenoid switch terminal.
- (5) Close the switch and compare RPM, current and voltage reading with specifications in Table 4-1. See Table 4-2 which interprets test results.



NOTE

It is not necessary to obtain the exact voltage specified in Table 4-1, as an accurate interpretation can be made by recognizing that if the voltage is slightly higher then the RPM will be proportionately higher, with current remaining essentially unchanged. However, if the exact voltage from the no-load test (Table 4-1) is desired, a carbon pile connected across both batteries can be used to reduce voltage to specified value. If specified current draw does not include the solenoid, deduct from the ammeter reading the specified current draw of the solenoid hold-in winding. Make disconnections only with switch in open position.

Table 4-1. Starting Motor Specifications

Solenoid:		No Load Test:	
Rated voltage	24 V	Volts	20
Pull-In Winding		Minimum amps	70
Amps	9-11.5	Maximum amps	110
Volts	5	Minimum RPM	5500
Hold-in Winding		Maximum RPM	9000
Amps	6.8 Maximum		
Volts	20		

4-5. STARTING MOTOR - TEST/REPLACE (Cont'd)**NOTE**

If results 2 through 6 are obtained, replace starter and forward test results to intermediate maintenance.

Table 4-2. No Load Test Results

Test Results	Interpretation
1. Rated current draw and no-load speed.	Indicates normal condition of starting motor and solenoid.
2. Low free speed and high current draw.	<p>Indicates too much friction. Tight, dirty, or worn bearings, bent armature shaft or loose pole shoes allowing armature to drag.</p> <p>Indicates shorted armature. This can be checked further on a growler after disassembly.</p> <p>Indicates grounded armature or fields. Check further after disassembly.</p>
3. Failure to operate with high current draw.	<p>Indicates a direct ground in the terminal or fields.</p> <p>Indicates "frozen" bearings (this should have been determined by turning armature by hand).</p>
4. Failure to operate with no current draw.	<p>Indicates an open field circuit. This can be checked after disassembly by inspecting internal connections and tracing circuit with a test lamp.</p> <p>Indicates open armature coils. Inspect the commutator for badly burned bars after disassembly.</p> <p>Indicates broken brush springs, worn brushes, high insulation between the commutator bars or other causes which would prevent good contact between brushes and commutator.</p>
5. Low no-load speed	Indicates high internal resistance due to poor connections, and low current defective leads, dirty commutator and causes "failure to draw. Operate with no current draw".

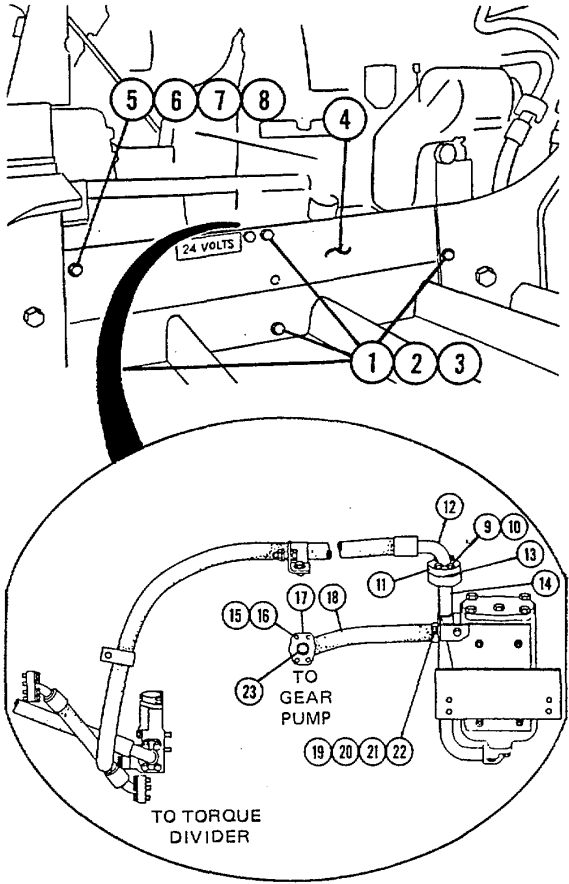
4-5. STARTING MOTOR - TEST/REPLACE (Cont'd)

Table 4-2. No Load Test Results (Cont'd)

Test Results	Interpretation
6. High free speed and high current draw.	Indicates shorted fields. If shorted fields are suspected, replace field coil assembly and check for improved performance.

b. Removal

- (1) Use a socket to remove four capscrews (1), four lockwashers (2) and four washers (3) from guard panel (4).
- (2) Use a wrench and a socket to remove one capscrew (5), one lockwasher (6), one washer (7), one nut (8) and guard panel (4).
- (3) Use a wrench to remove four capscrews (9) and four washers (10) from flange (11) of hose assembly (12) at transmission oil filter.
- (4) Remove seal (13) and plug opening in hose assembly (12) and in tube (14). Discard seal (13).
- (5) Use a wrench to remove four capscrews (15) and four washers (16) from flange (17) of hose assembly (18) at transmission oil pump.
- (6) Use a wrench to remove four capscrews (19) and four washers (20) from flange (21) of hose assembly (18) at transmission oil filter.
- (7) Remove seals (22) from ends of hose assembly (18). Plug openings at transmission oil pump and transmission oil filter. Plug openings in hose assembly (18). Discard seals(22).



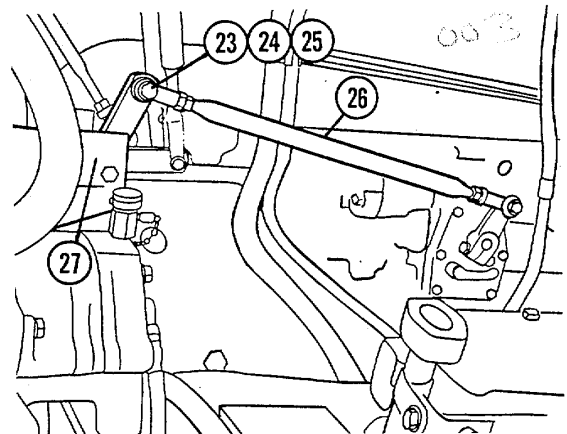
4-5. STARTING MOTOR - TEST/REPLACE (Cont'd)

- (8) Use a wrench and socket to remove one capscrew (23), two washers (24) and one nut (25) which hold rod (26) to bracket (27) on the flywheel housing. Move rod towards radiator.

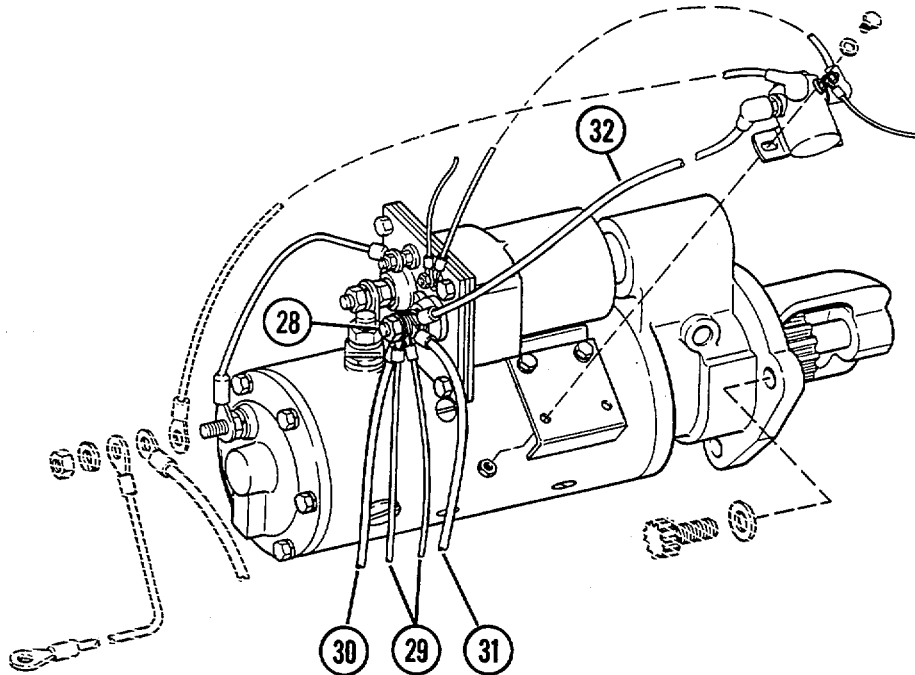
NOTE

Always tag wires and cables before disconnecting them.

- (9) Use a wrench to remove nut (28). Remove the following cables and wires from positive terminal on solenoid:
 - (a) circuit breaker cable (29) and STE-ICE cable (29),
 - (b) slave receptacle wire (30),
 - (c) battery wire (31),
 - (d) magnetic switch wire (32).

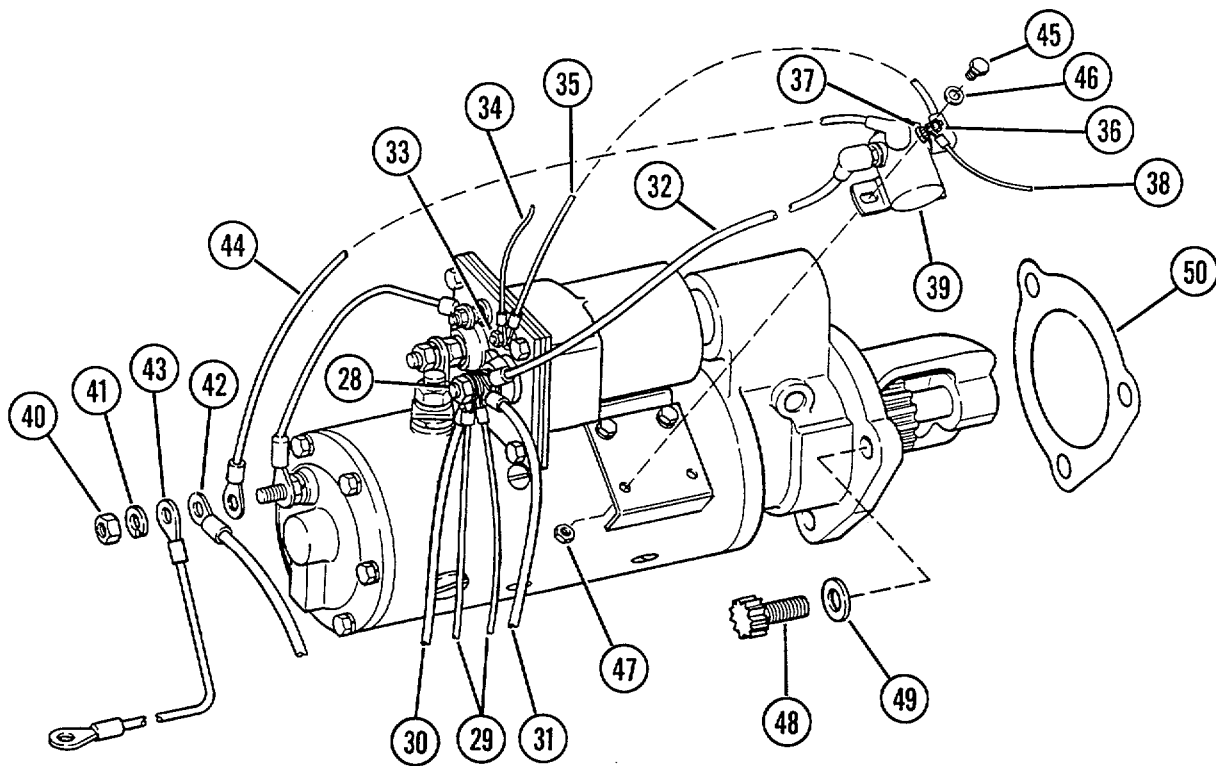


- (10) Use a wrench to remove nut (33). Remove the following two wires from signal terminal on solenoid:
 - (a) STE-ICE wire (34),
 - (b) solenoid switch wire (35)



4-5. STARTING MOTOR- TEST/REPLACE (Cont'd)

- (11) Use a wrench to remove nut (40) and the lockwasher (41). Remove the following cable and wires from ground terminal on starting motor:
 - (a) solenoid receptacle cable (42),
 - (b) engine frame wire (43),
 - (c) magnetic switch wire (44).
- (12) Lift rubber boots on all four posts of magnetic switch. (39). Use a wrench to remove four nuts (36) and washers (37). Disengage the following wires from posts on magnetic switch:
 - (a) solenoid positive (+) terminal wire (32),
 - (b) solenoid switch wire (35),
 - (c) start switch wire (38),
 - (d) starter ground (-) terminal wire (44).
- (13) Use a wrench to remove two capscrews (45), washers (46) and nuts (47). Remove magnetic switch (39).
- (14) Attach lifting equipment to starting motor and take out slack.
- (15) Use a twelve point socket to remove three capscrews (48) and three washers (49) which hold starting motor flywheel housing. Use lifting equipment to remove the starting motor. The weight of the starting motor is 80 lbs.
- (16) Remove and disregard gasket (50)



4-5. STARTING MOTOR - TEST/REPLACE (Cont'd)

c. Installation

- (1) Place gasket (50) in position on starting motor. Use lifting equipment to lower starting motor into position. The weight of the starting motor is 80 lbs.
- (2) Use a twelve point socket to install three capscrews (48) and three washers (49) which hold the starting motor to the flywheel housing.
- (3) Place the following wires and cable on ground terminal of starting motor:
 - (a) starter relay terminal wire (44),
 - (b) engine frame wire (43),
 - (c) slave receptacle cable (42).
- (4) Install lockwasher (41) on ground terminal of starting motor. Use a wrench to install nut (40).
- (5) Place magnetic switch (39) in place and use a wrench to install two capscrews (45), washers (46) and nuts (47).
- (6) Connect the following wires onto magnetic switch (39):
 - (a) starter ground (-) terminal wire (44),
 - (b) start switch wire (38),
 - (c) solenoid switch wire (35),
 - (d) solenoid positive (+) terminal wire (32).
- (7) Use a wrench to install four washers (37) and nuts (36) on magnetic switch (39). Slide rubber boots over four posts of magnetic switch (39).

4-5. STARTING MOTOR - TEST/REPLACE (Cont'd)

(8) Place the following two wires on signal terminal of solenoid: (a) solenoid switch wire (35), (b) STE-ICE wire (34).

(9) Use a wrench to install nut (33) on signal terminal of solenoid.

(10) Place the following wires and cables on positive terminal of solenoid:

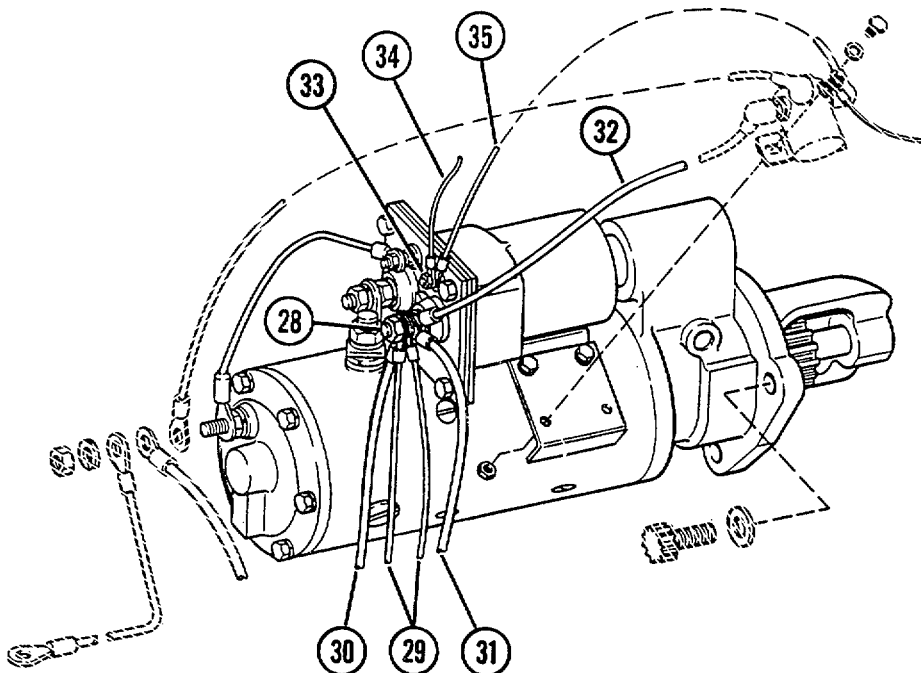
(a) magnetic switch wire (32),

(b) battery wire (31),

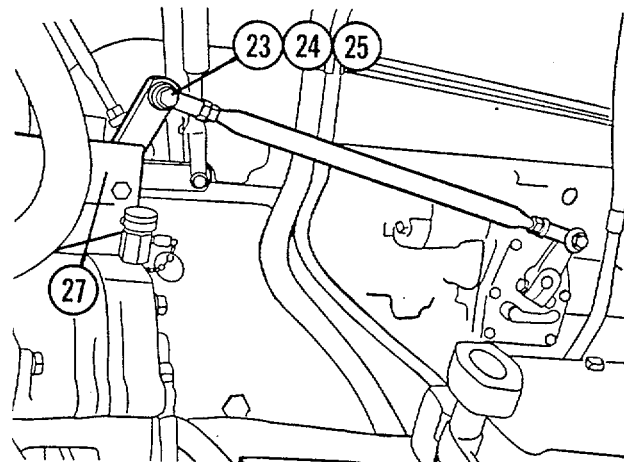
(c) slave receptacle wire (30),

(d) STE-ICE cable (29) and circuit breaker cable (29).

(11) Use a wrench to install nut (28) on positive terminal of solenoid.

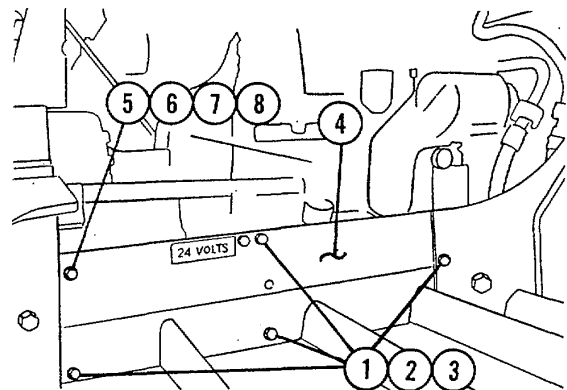
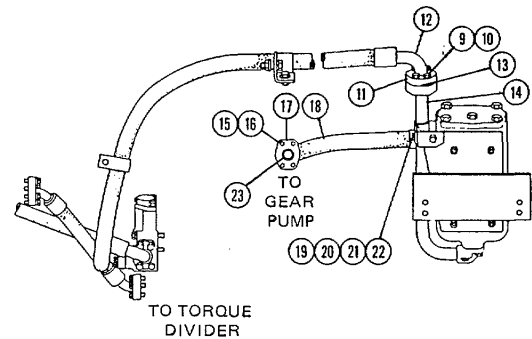


(12) Move rod (26) in position and use a wrench and a socket to install nut (25), washers (24) and capscrew (23) which hold rod (26) to bracket (27).



4-5. STARTING MOTOR - TEST/REPLACE (Cont'd)

- (13) Remove plugs at transmission oil pump, transmission oil filter, and hose assembly (18). Install new seals (22) at ends of hose assembly (18).
- (14) Place hose assembly (18) in position at transmission oil filter. Use a wrench to install four capscrews (19) and four washers (20) on flange (21).
- (15) Line up hose assembly (18) at transmission oil pump. Use a wrench to install four capscrews (15) and four washers (16) on flange (17).
- (16) Remove plugs from hose assembly 12) and tube (14). Install seal (13) in hose assembly (12).
- (17) Place hose assembly (12) in position at transmission oil filter. Use a wrench to install four capscrews (9) and four washers (10) on flange (11).
- (18) Place guard panel (4) in position and use a wrench and a socket to install nut (8), washer (7), lockwasher (6) and capscrew (5).
- (19) Use a socket to install four washers (3), four lockwashers (2) and four capscrews (1) on guard panel (4).
- (20) Install transmission oil magnetic screen. See page 5-35.
- (21) Install start receptacle. See page 4-12.
- (22) Reconnect battery. See page 4-67.



d. Place In Service

Run engine and check for proper operation.

4-6. STARTING MOTOR SOLENOID - REPLACE/REPAIR

This task covers:

- a. Removal
- b. Disassembly
- c. Assembly
- d. Installation
- e. Place In Service

INITIAL SETUPApplicable Configurations

All

Materials/Parts

Gasket (21)

Common Tools

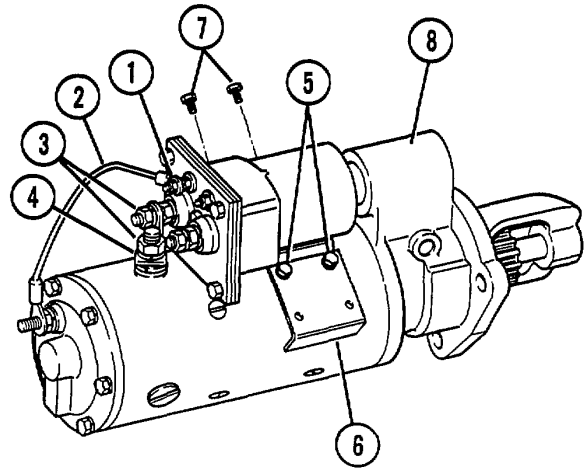
Tool Kit, General Mechanics
NSN 5180-00-699-5273

Equipment Condition

Starting motor removed. (page 4-8)

a. Removal

- (1) Use a wrench to remove nut (1) and wire (2) from ground terminal on solenoid.
- (2) Use a wrench to remove two nuts (3) and connector (4) from solenoid and starting motor.
- (3) Use a socket to remove two capscrews (5) and bracket (6).
- (4) Use a socket to remove two capscrews (7) and separate solenoid (8) from starting motor.



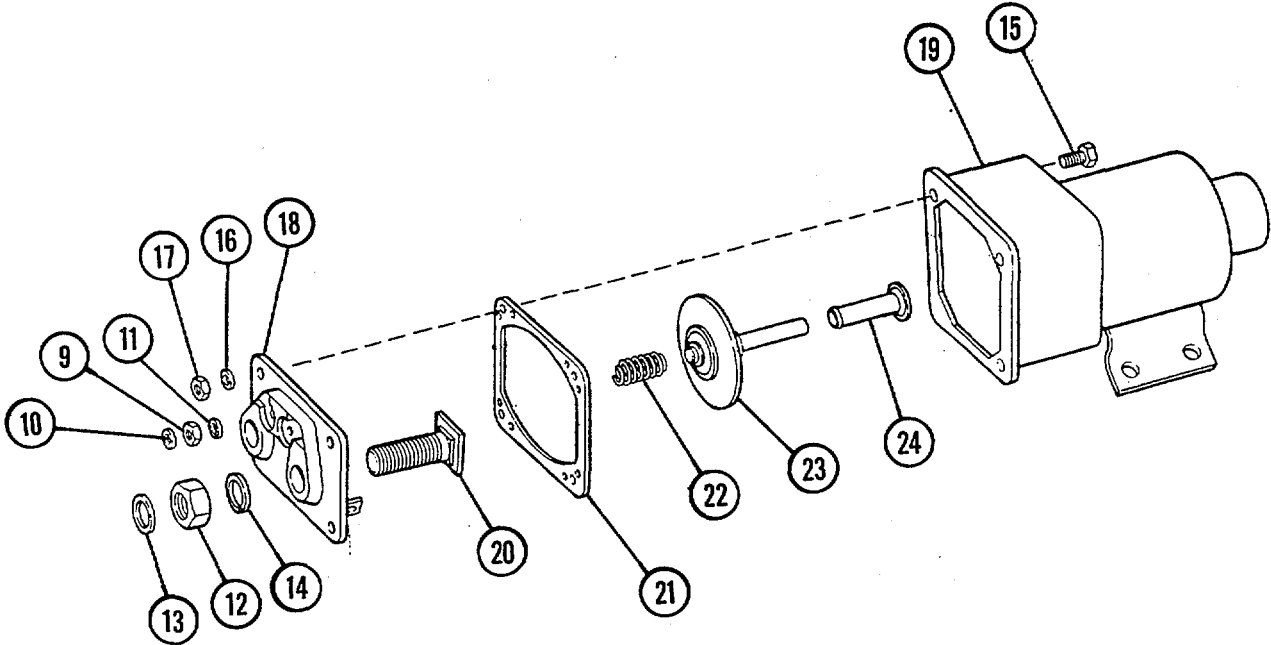
4-6. STARTING MOTOR SOLENOID - REPLACE/REPAIR (Cont'd)

b. Disassembly

- (1) Use a wrench to remove two nuts (9), two washers (10) and two lockwashers (11).
- (2) Use a wrench to remove two nuts (12), two washers (13) and two lockwashers (14).
- (3) Use two wrenches to remove four capscrews (15), four washers (16), four nuts (17) and terminal assembly (18) from solenoid housing (19). Remove two studs 20: Remove and discard gasket
- (4) Remove spring (22), contact assembly (23) and bushing (24) from solenoid housing.

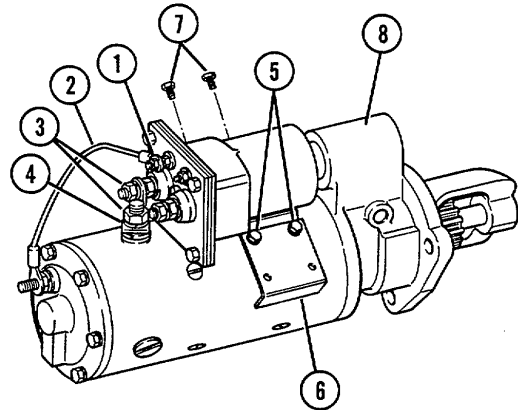
c. Assembly

- (1) Install bushing (24) onto contact assembly (23) and put in solenoid housing (19). Install spring (22).
- (2) Install new gasket (21) onto solenoid housing. Install two studs (20) into terminal assembly (18) and secure with two lockwashers (14), two washers (13) and two nuts (12). Tighten nuts with a wrench.
- (3) Install terminal assembly to solenoid housing. Install four capscrews (15), four washers (16) and four nuts (17) and tighten with two wrenches.
- (4) Use a wrench to install two lockwashers (11), two washers (10) and two nuts (9).



4-6. STARTING MOTOR SOLENOID - REPLACE/REPAIR (Cont'd)**d. Installation**

- (1) Place solenoid (8) in position on starting motor and use a socket to install two capscrews (7).
- (2) Place bracket (6), in position and use a socket to install two capscrews (5).
- (3) Place connector (4) on terminals of the starting motor and solenoid. Use a wrench to install two nuts (3).
- (4) Place wire (2) on solenoid ground terminal and use a wrench to install nut (1).
- (5) Install starting motor. See page 4-11.

**e. Place In Service**

Run engine and check for proper operation.

Section II. INSTRUMENTS, SWITCHES, LAMPS, AND HORN**4-7. GENERAL**

This section provides maintenance procedures assigned to the organizational level for the instruments, switches, lamps, and horn. To find a specific maintenance procedure, see the maintenance task summary below.

4-8. INSTRUMENTS, SWITCHES, LAMPS, AND HORN TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
4-9	Dash Panel Lamps - Replace	4-18
4-10	Hourmeter - Replace	4-20
4-11	Ammeter - Replace	4-22
4-12	Torque Converter Oil Temperature Gage with Sending Unit - Replace	4-24
4-13	Engine Water Temperature Gage with Sending Unit - Replace	4-27
4-14	Dash Light Switch - Replace	4-30
4-15	Exterior Lights Switch - Replace	4-32
4-16	Windshield Wiper Switches - Replace	4-34
4-17	Engine Start Switch - Replace	4-36
4-18	Ether Aid Start Switch - Replace	4-38
4-19	Battery Disconnect Switch - Replace	4-40
4-20	Circuit Breaker Reset - Replace	4-42
4-21	Headlamps and Rear Floodlamps - Replace	4-44
4-22	Hourmeter Oil Pressure Switch - Replace	4-47
4-23	Diagnostic (STE/ICE) Wiring - Replace/Repair	4-49
4-24	Horn - Replace	4-52
4-25	Horn Button - Replace	4-54
4-26	Backup Alarm - Replace	4-56
4-27	Backup Alarm Switch - Replace	4-58
4-28	Heater Switch - Replace	4-61

4-9. DASH PANEL LAMP - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUPApplicable Configurations

All

Materials/Parts

Bulb (11)

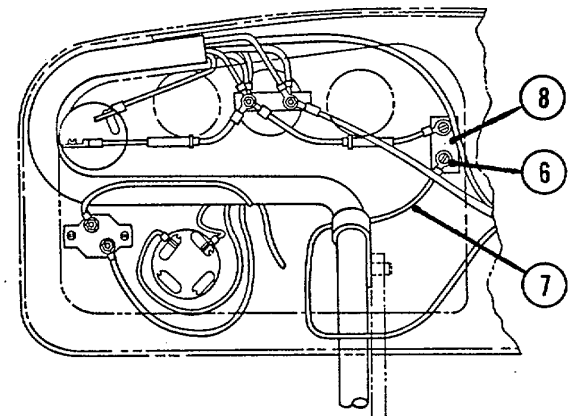
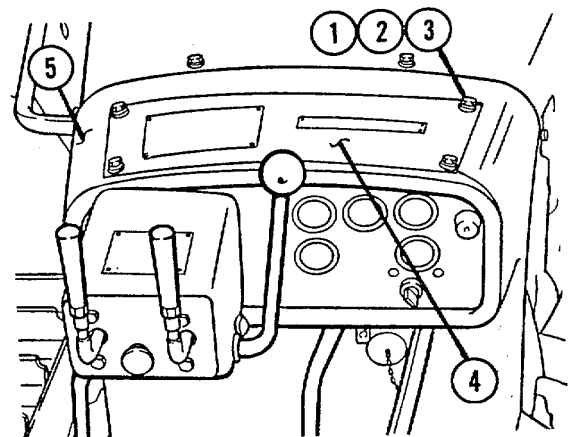
Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal**WARNING**

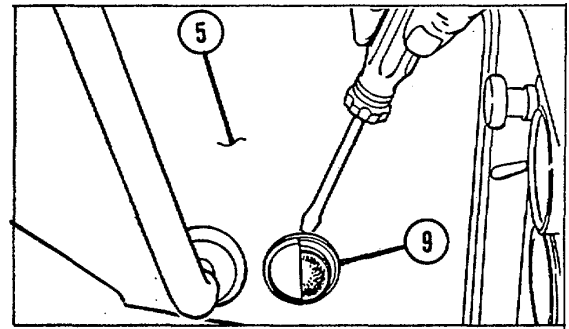
Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Use a socket to remove four capscrews (1), four washers (2), four lockwashers (3) and cover (4) from top of dash assembly (5).
- (2) Remove one screw (6) holding dash lamp assembly wire (7) to bottom of dash lamp switch (8).



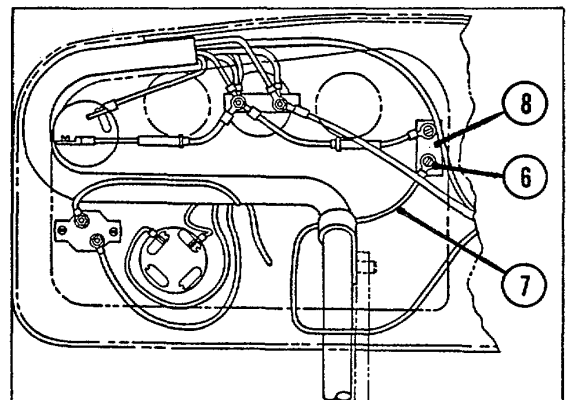
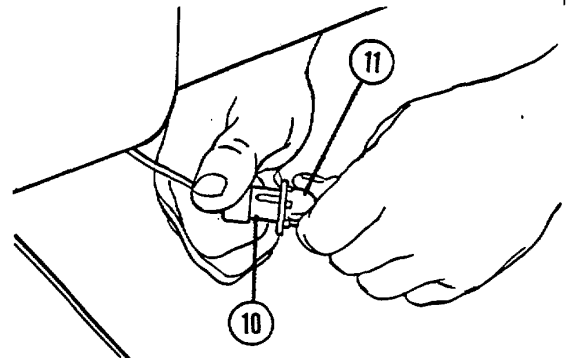
4-9. DASH PANEL LAMP - REPLACE (Cont'd)

- (3) Remove dash lamp cover (9) from side panel of dash assembly (5).
- (4) Remove dash lamp assembly (10) out through back side of panel to opening in bottom of dash assembly (5).
- (5) Remove bulb (11) from dash lamp assembly if necessary.



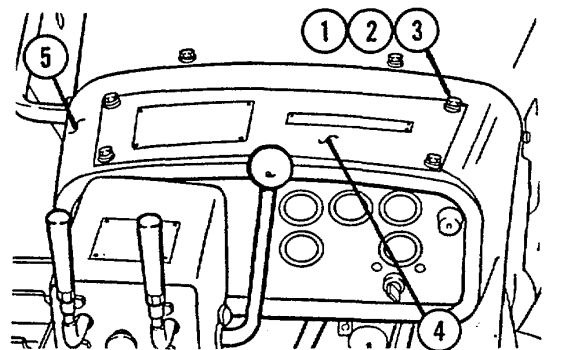
b. Installation

- (1) Install bulb (11) in dash lamp assembly (10) if necessary.
- (2) Place dash lamp assembly (10) in position in back of side panel of dash assembly (5).
- (3) Install dash lamp cover (9) in side panel of dash assembly (5).
- (4) Route dash lamp assembly wire (7) to bottom of dash lamp switch (8) and install screw (6).
- (5) Install cover (4) on top of dash assembly (5) with four capscrews (1), four washers (2) and four lockwashers (3). Use a socket to tighten capscrews.



c. Place In Service

Turn battery disconnect switch "ON" and ensure dash panel lamp operates.



4-10. HOURMETER - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUPApplicable Configurations

All

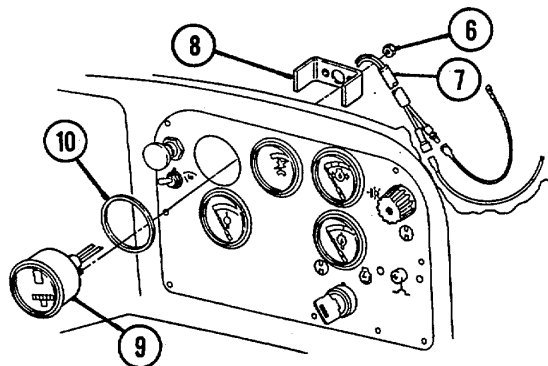
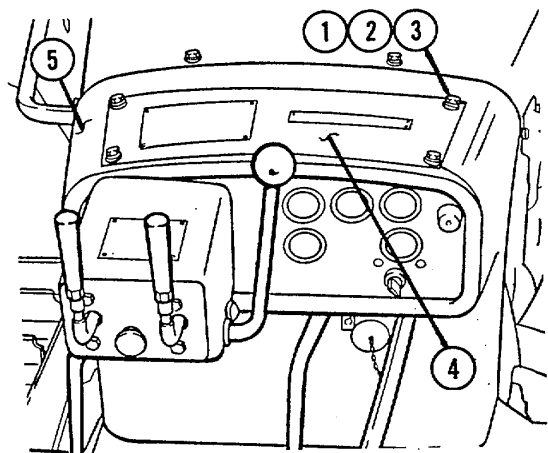
Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal**WARNING**

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Use a socket to remove four capscrews (1), four washers (2), four lockwashers (3) and cover (4) from top of dash assembly (5).
- (2) Remove two nuts (6), plug (7) and bracket (8) from back of hourmeter (9).
- (3) Slide hourmeter (9) with seal (10) out through front of dash panel (11).
- (4) Remove seal (10) from hourmeter (9).



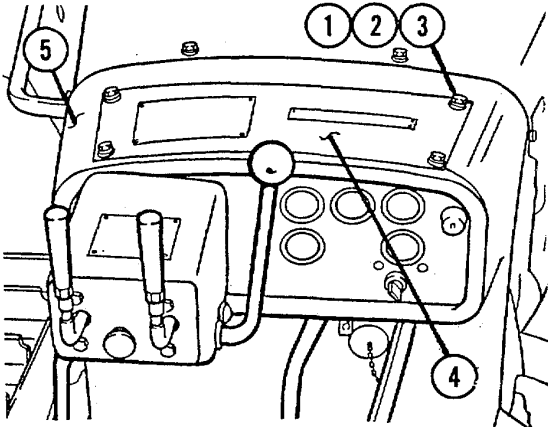
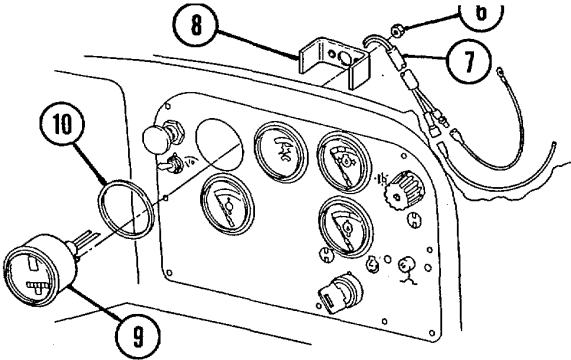
4-10. HOURMETER - REPLACE (Cont'd)

b. Installation

WARNING

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Install seal (10) on hourmeter (9).
- (2) Insert hourmeter (9) into position through front of dash panel (11).
- (3) Install bracket (8), plug (7) and two nuts (6) on back of hourmeter (9).
- (4) Install cover (4) on top of dash assembly (5) with four capscrews (1), four lockwashers (3) and four washers (2). Use a socket to tighten capscrews.



c. Place In Service

Start machine and check hourmeter for proper operation.

4-11. AMMETER - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configurations
All

Materials/Parts
Wire I.D. Tags

Common Tools

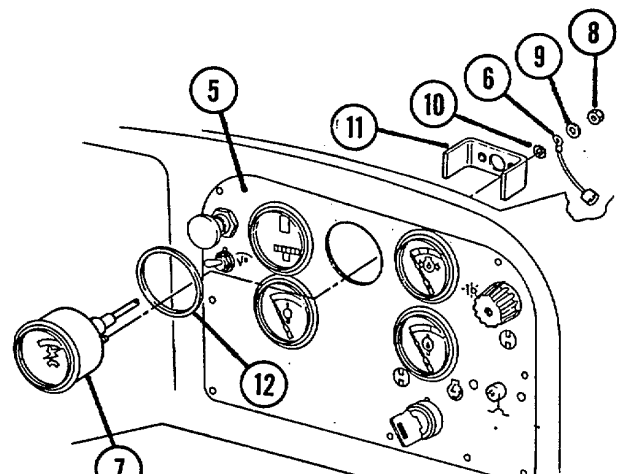
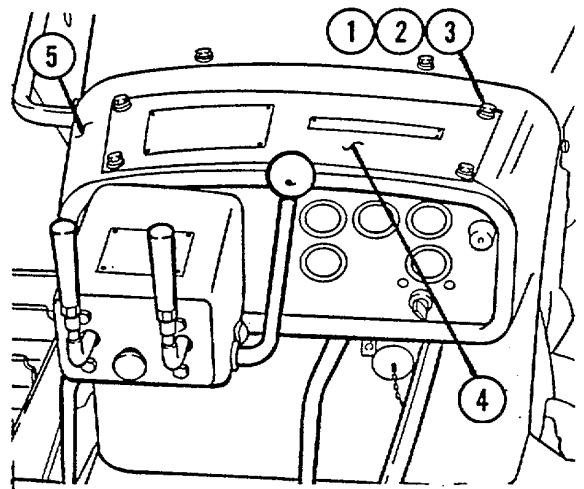
Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal

WARNING

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Use a socket to remove four capscrews (1), four washers (2), four lockwashers (3) and cover (4) from top of dash assembly (5).
- (2) Tag eight wires (6) at back of ammeter (7) for identification during installation.
- (3) Use a wrench to remove two nuts (8), two flat washers (9), eight wires (6), two star lockwashers (10) and bracket (11) from back of ammeter.



4-11. AMMETER - REPLACE (Cont'd)

- (4) Slide ammeter with seal (12) out through front of dash assembly (5).
- (5) Remove seal (12) from ammeter.

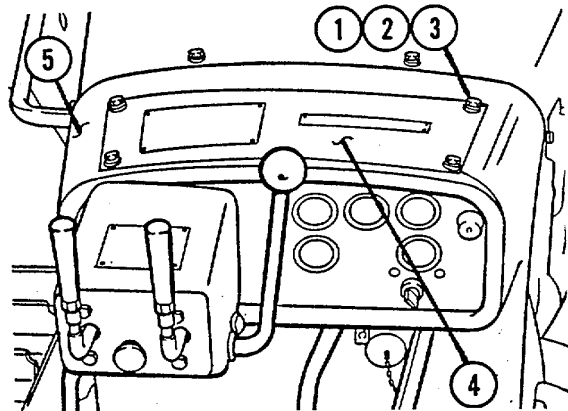
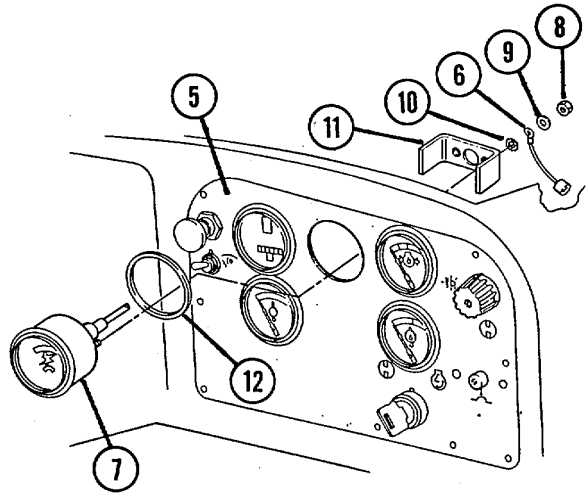
b. Installation**WARNING**

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Install seal (12) on ammeter (7).
- (2) Insert ammeter into position on dash assembly (5).
- (3) Install bracket (11), two star lockwashers (10), eight wires (6), two flat washers (9) and two nuts (8) on back of ammeter (7). Use a wrench to tighten nuts.
- (4) Install cover (4) on top of dash assembly (5) with four capscrews (1), four washers (2) and four lockwashers (3). Use a socket to tighten capscrews.

c. Place In Service

Start machine and check for proper ammeter operation.



4-12. TORQUE CONVERTER OIL TEMPERATURE GAGE WITH SENDING UNIT - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUPApplicable Configurations

All

Materials/Parts

Seal (13)

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Equipment Condition

Engine cool.
Floor plates removed. (page 10-44)

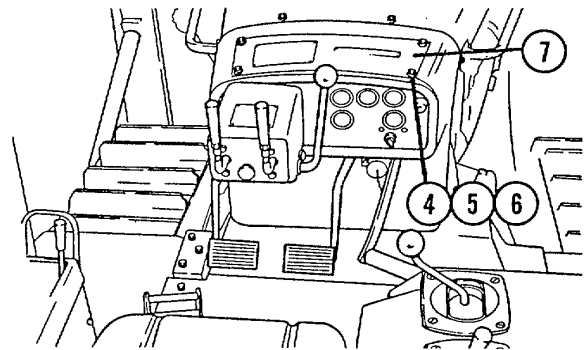
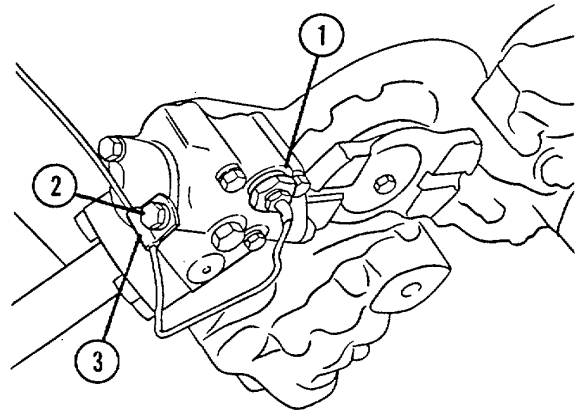
a. Removal

- (1) Use a wrench to remove sending unit (1) from torque converter.
- (2) Use a socket to remove capscrew (2) and clip (3) that secure line to tractor.

WARNING

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (3) Use a socket to remove four bolts (4), four washers (5), four lockwashers (6) and cover (7) from top of dash assembly.

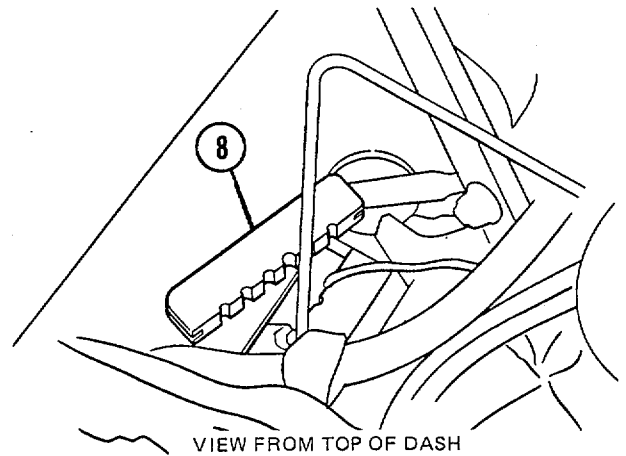


4-12. TORQUE CONVERTER OIL TEMPERATURE GAGE WITH SENDING UNIT - REPLACE (Cont'd)

- (4) Remove rubber grommet (8) from dash assembly and carefully pull sending unit (1) up through the bottom of the dash assembly.
- (5) Use a wrench to remove two nuts (9), two washers (10) and bracket (11) that secure gage to panel.
- (6) Slide gage (12) with seal (13) and sending unit (1) out through the front of the dash panel.
- (7) Remove seal (13) from gage (12).

CAUTION

Torque converter oil temperature gage (12) and sending unit (1) are an assembly and cannot be separated.

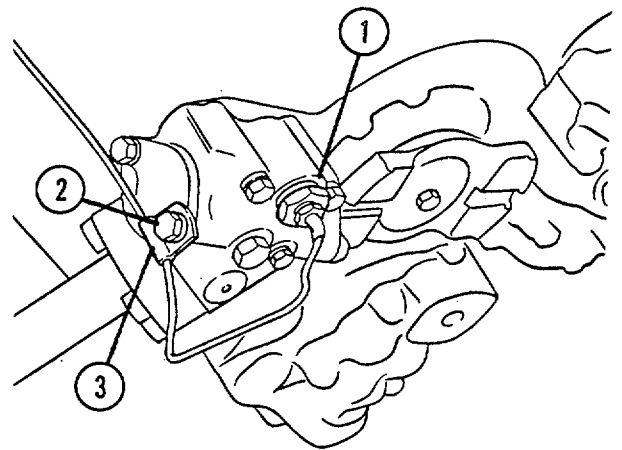
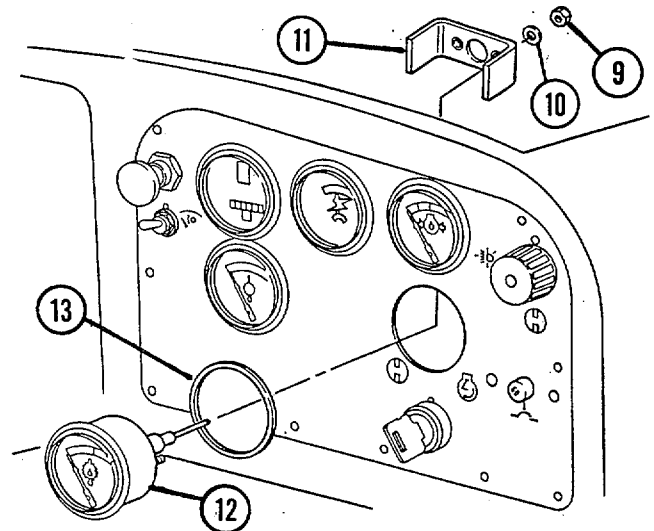


b. Installation

WARNING

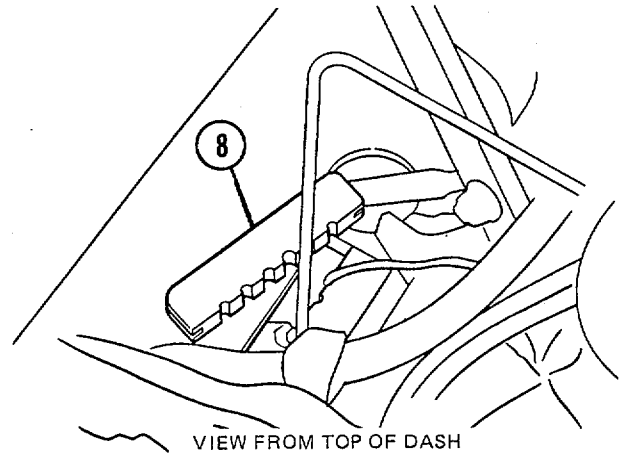
Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Install seal (13) onto gage (12).
- (2) Slide gage (12) with seal (13) and sending unit (1) into the front of the dash panel.
- (3) Use a wrench to install bracket (11) and two nuts (9) that secure gage (12) to panel.



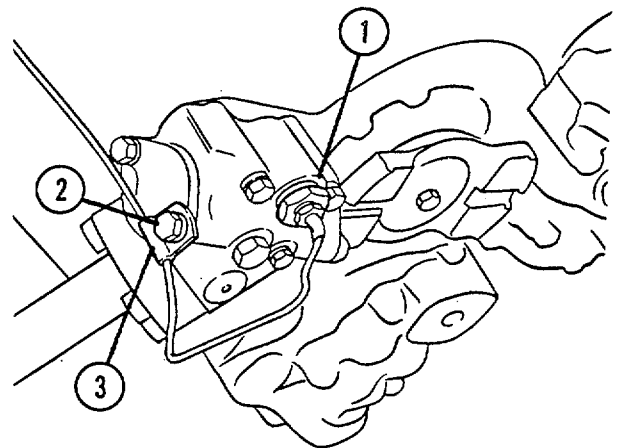
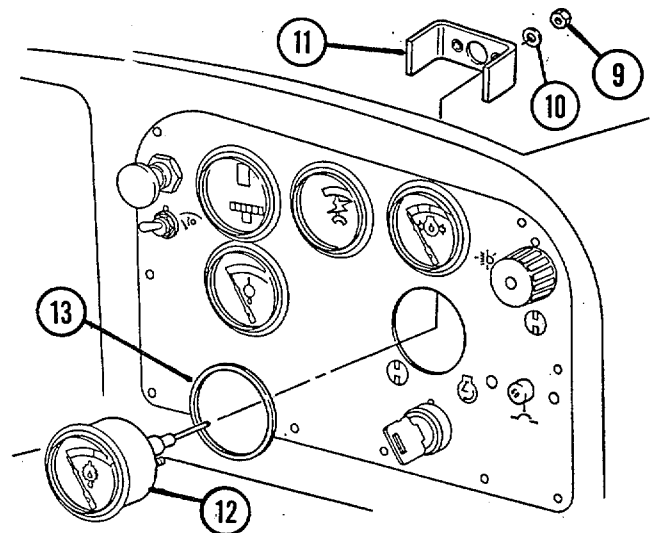
4-12. TORQUE CONVERTER OIL TEMPERATURE GAGE WITH SENDING UNIT - REPLACE (Cont'd)

- (4) Carefully route sending unit (1) through the bottom of the dash assembly and into position. Install rubber grommet (8) into dash assembly.
- (5) Place cover (7) into position on top of dash assembly. Use a socket to install four bolts (4), four washers (5) and four lockwashers (6) that secure cover (7) to top of dash assembly.
- (6) Use a socket to install capscrew (2) and clip (3) that secure line to tractor.
- (7) Use a wrench to install sending unit (1) into torque converter.
- (8) Install floor plates. See page 10-44.



c. Place In Service

Run engine and check gage for proper operation.



4-13. ENGINE WATER TEMPERATURE GAGE WITH SENDING UNIT - REPLACE

This task covers:

- a. Removal
 - b. Installation
 - c. Place In Service
-

INITIAL SETUP
Applicable Configurations

11A

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

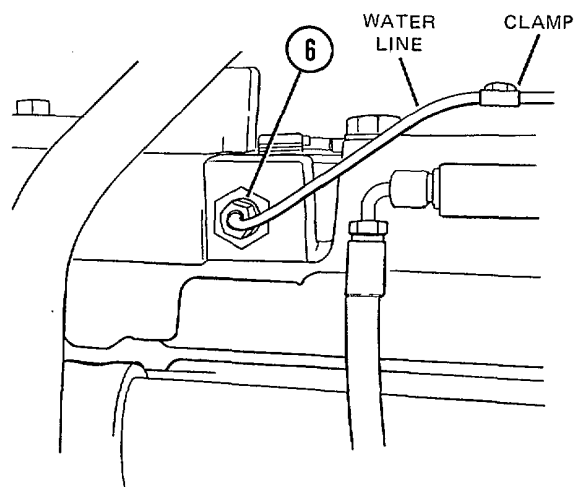
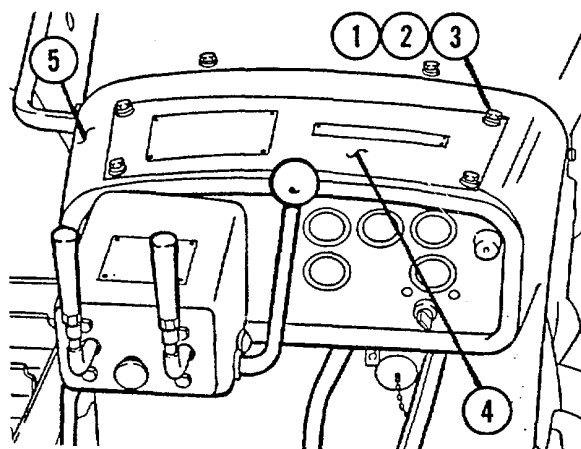
Equipment Condition

Engine cool.

a. Removal
WARNING

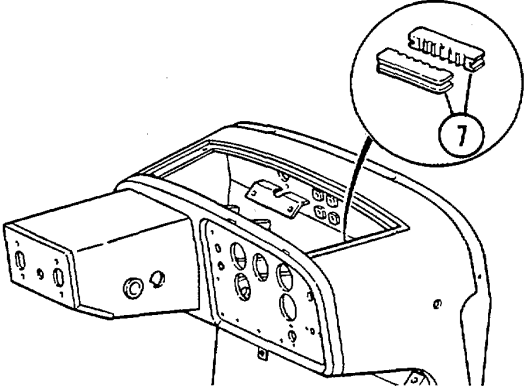
Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Use a socket to remove four capscrews (1), four washers (2), four lockwashers (3) and cover (4) from top of dash assembly (5)
- (2) Use a socket to remove three clamps on water line to sending unit (6).
- (3) Remove water temperature sending unit (6) from intake manifold using a wrench.



4-13. ENGINE WATER TEMPERATURE GAGE WITH SENDING UNIT - REPLACE (Cont'd)

- (4) Remove grommet (7) from dash assembly.
- (5) Use a wrench to remove two nuts (8), washers (9) and one bracket (10) from back of water temperature gage.



NOTE

Do not attempt to separate water temperature sending unit from gage. They must be replaced as a unit.

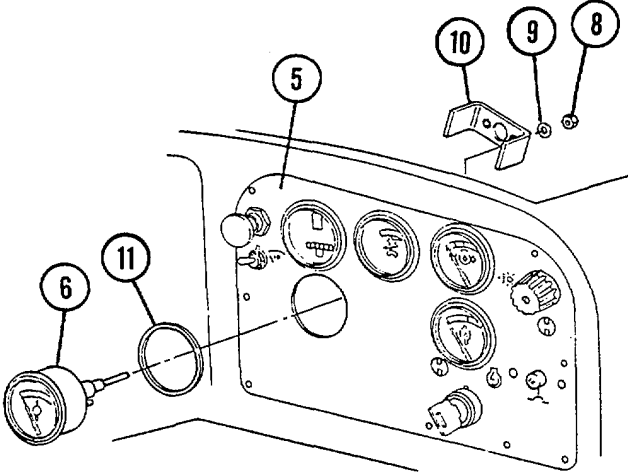
- (6) Slide water temperature gage and sending unit (6) with seal (11) out through front of dash assembly (5).
- (7) Remove seal (11) from water temperature gage (6).

b. Installation

WARNING

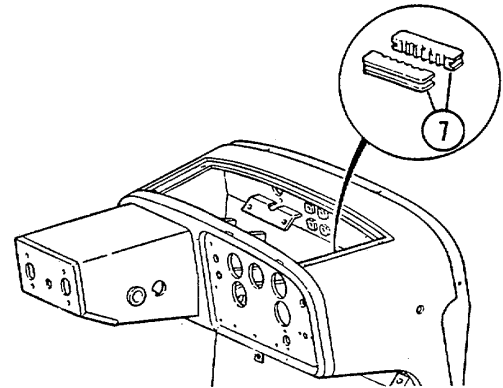
Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Install seal (11) on water temperature gage (6).
- (2) Insert water temperature gage into position through front of dash assembly (5).
- (3) Install bracket (10), washers (9) and two nuts (8) on back of gage. Use a wrench to tighten nuts.



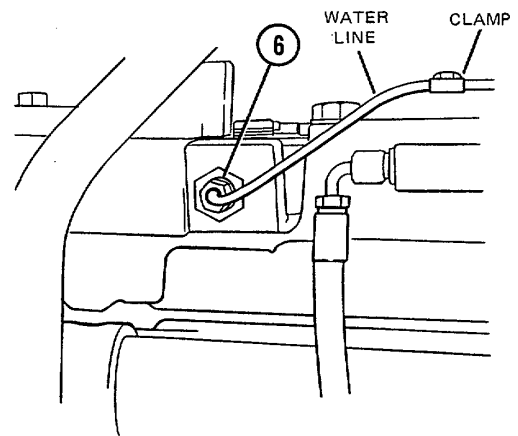
4-13. ENGINE WATER TEMPERATURE GAGE WITH SENDING UNIT - REPLACE (Cont'd)

- (4) Slide line down through dash and install grommet (7) into dash assembly.

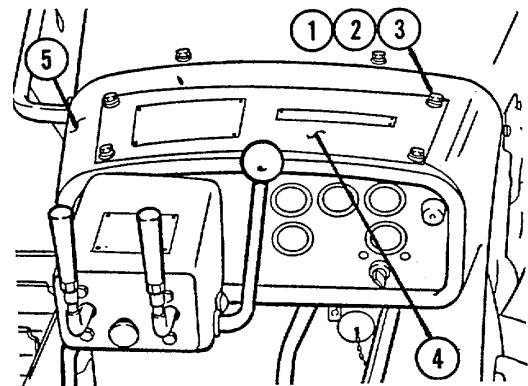


- (5) Install three clamps along water temperature line with socket.

- (6) Install water temperature sending unit (6) into intake manifold with a wrench.



- (7) Install cover (4) on top of dash assembly (5) with four capscrews (1), four lockwashers (3) and four washers (2). Use a socket to tighten capscrews.



c. Place In Service

Run engine and check for proper operation of gage.

4-14. DASH LIGHT SWITCH - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUPApplicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

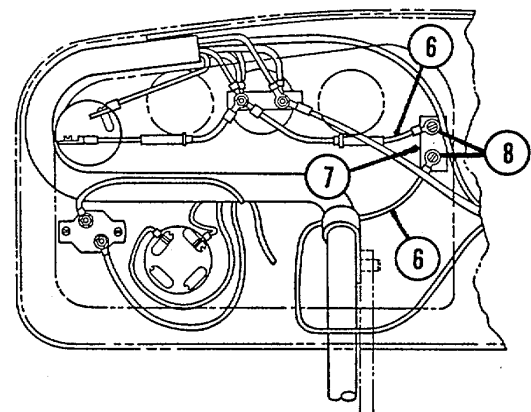
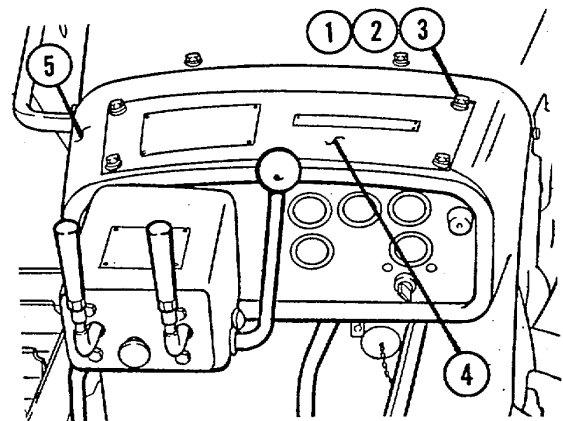
Materials/Parts

Wire I.D. Tags

a. Removal**WARNING**

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Use a socket to remove four capscrews (1), four washers (2), four lockwashers (3) and cover (4) from top of dash assembly (5).
- (2) Tag two wires (6) on back of dash light toggle switch (7) for identification during installation.
- (3) Use a screwdriver to remove two screws (8) and two wires (6) from back of toggle switch.



4-14. DASH LIGHT SWITCH - REPLACE (Cont'd)

- (4) Use a wrench to remove nut (9) and retaining ring (10) from front of toggle switch (7) and remove toggle switch through back of dash assembly (5).

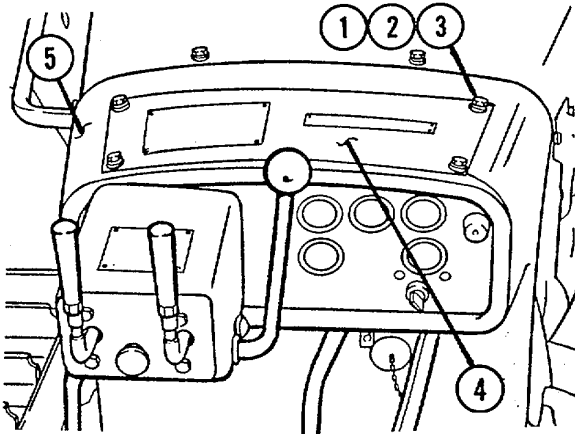
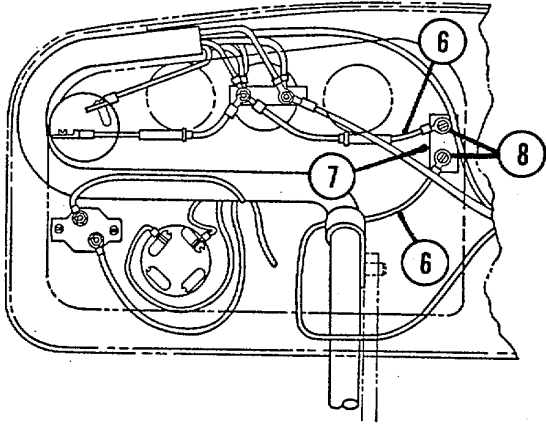
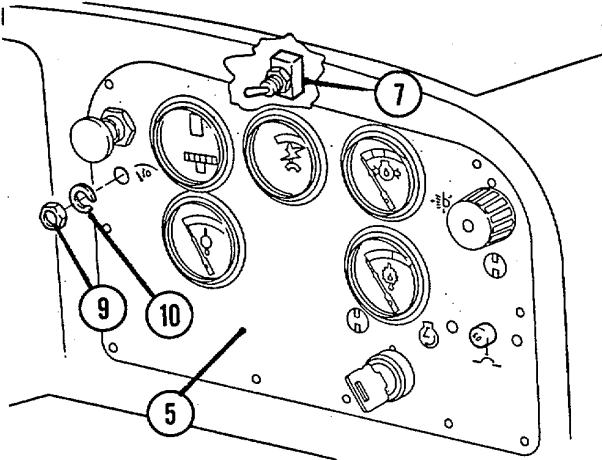
b. Installation

WARNING

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Insert dash light toggle switch (7) through back of dash assembly (5) and install retaining ring (10) and nut (9) using a wrench.
- (2) Install two wires (6) on back of toggle switch (7) with two screws (8).
- (3) Install cover (4) on top of dash assembly (5) with four capscrews (1), four lockwashers (3) and four washers (2). Use a socket to tighten capscrews.

- c. Place In Service Turn battery disconnect switch "ON" and check dash light switch operation.



4-15. EXTERIOR LIGHTS SWITCH - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUPApplicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

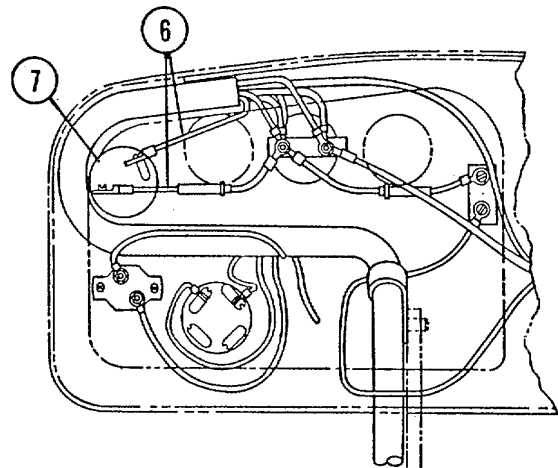
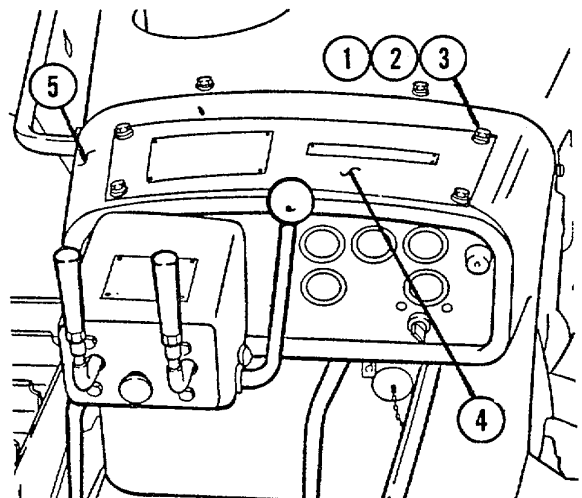
Materials/Parts

Wire I.D. Tags

a. Removal**WARNING**

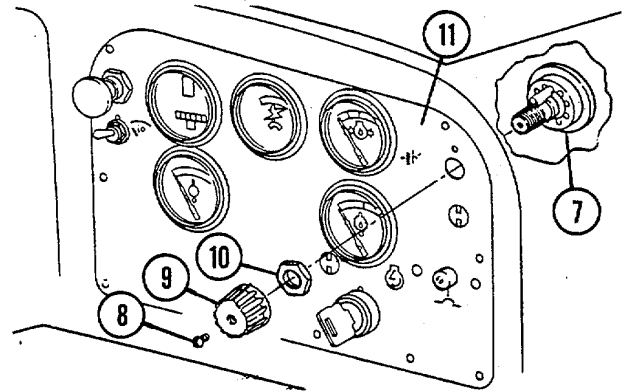
Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Use a socket to remove four capscrews (1), four washers (2), four lockwashers (3) and cover (4) from top of dash assembly (5).
- (2) Tag two wires (6) on back of light switch (7) for identification during installation.



4-15. EXTERIOR LIGHTS SWITCH - REPLACE (Cont'd)

- (3) Remove screw (8) and knob (9) from front of light switch assembly.
- (4) Remove locknut (10) with a wrench from front of switch (7) and remove switch through back of dash panel (11).
- (5) Use a flat blade screwdriver to remove two screws (12) and two wires (6) from back of light switch (7).

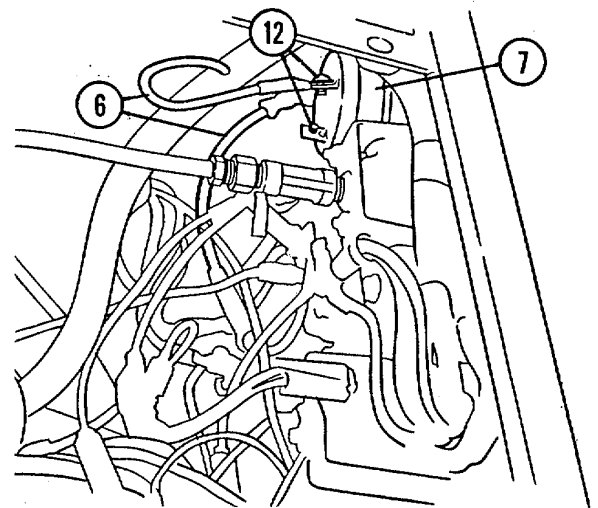


b. Installation

WARNING

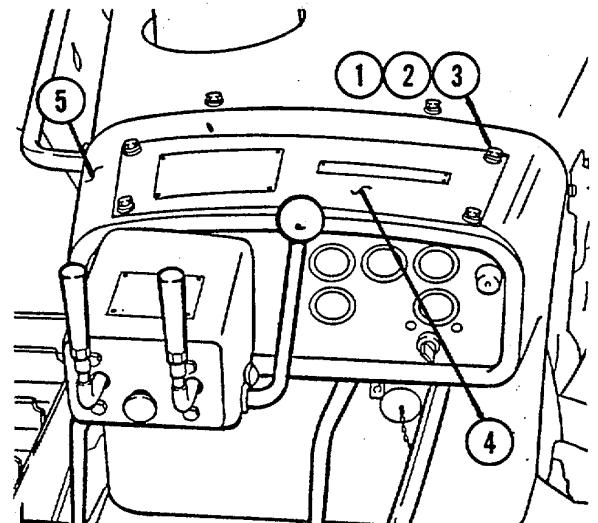
Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Install two wires (6) on back of switch (7) with two screws (12). Tighten screws with a flat blade screwdriver.
- (2) Insert light switch (7) through back of dash panel (11) and install locknut (10) on switch on front side of panel. Use a wrench to tighten locknut.
- (3) Install knob (9) on front of switch (7) with screw (8).
- (4) Install cover (4) on top of dash assembly (5) with four capscrews (1), four lockwashers (3) and four washers (2). Use a socket to tighten capscrews.



c. Place In Service

Turn battery disconnect switch "ON" and check exterior light switch for proper operation.



4-16. WINDSHIELD WIPER SWITCHES - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUPApplicable Configurations

With Winterized Cab

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

Wire I.D. Tags

Equipment Condition

Engine OFF.

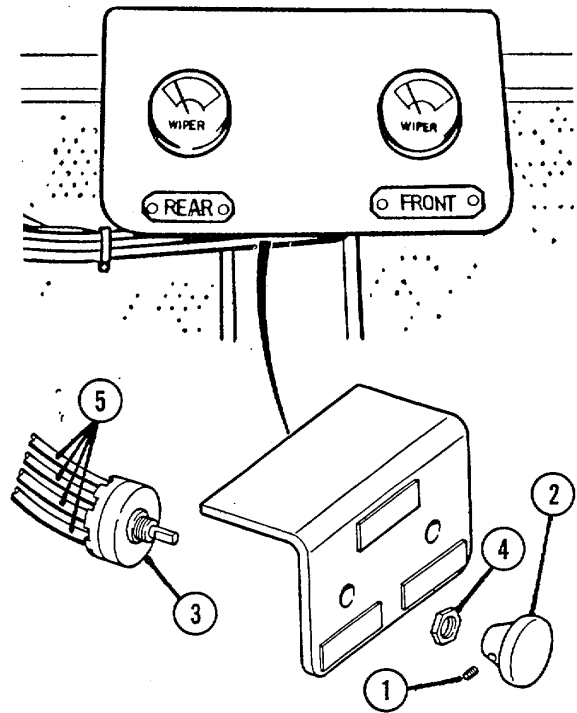
a. Removal**WARNING**

Make sure battery disconnect switch is OFF before attempting to remove wiper switches. Failure to follow this precaution could result in personal injury.

NOTE

This procedure to be used for either front or rear windshield wiper switch.

- (1) Remove set screw (1) from switch knob (2) and remove knob from switch (3) shaft.
- (2) Remove locknut (4) from switch (3) and remove switch (3) from mounting bracket.
- (3) Tag and remove four wires (5) from back of switch (3).



4-16. WINDSHIELD WIPER SWITCHES - REPLACE (Cont'd)

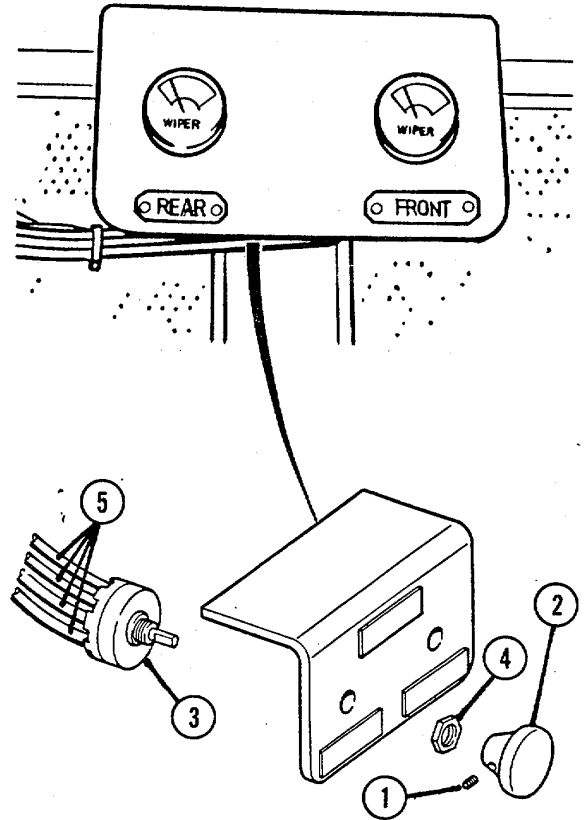
b. Installation**WARNING**

Turn battery disconnect switch to OFF before attempting to install switch to prevent personal injury or damage to parts.

- (1) Install four wires (5) on back of switch (3).
- (2) Install switch (3) in mounting bracket with locknut (4).
- (3) Install knob (2) on switch (3) with set screw (1).
- (4) Turn battery disconnect switch to ON.

c. Place In Service

Start engine and check wiper switch operation.



4-17. ENGINE START SWITCH - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUPApplicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

Wire I.D. Tags

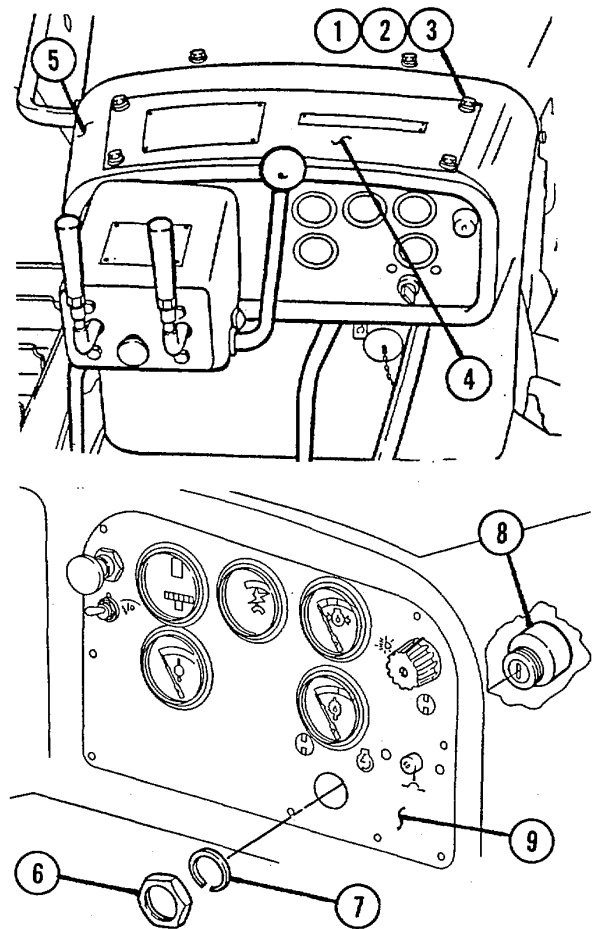
Equipment Condition

Key removed from switch.

a. Removal**WARNING**

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Use a socket to remove four capscrews (1), four washers (2), four lockwashers (3) and cover (4) from top of dash assembly (5).
- (2) Remove nut (6) and retaining ring (7) from front of engine start switch (8).
- (3) Remove switch (8) through back of dash panel (9).



4-17. ENGINE START SWITCH - REPLACE (Cont'd)

- (4) Tag three wires (10) at back of engine start switch (8) for identification during installation.
- (5) Use a flat blade screwdriver to remove two screws (11) and two wires (10) from back of engine start switch (8).

b. Installation

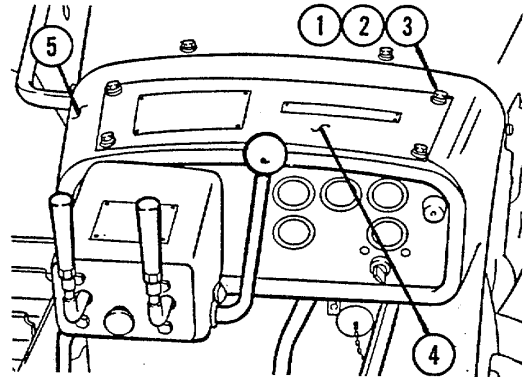
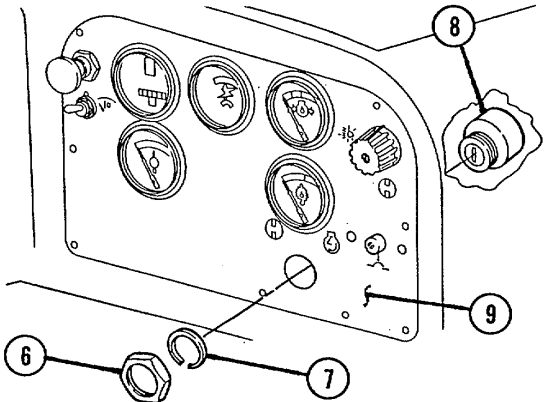
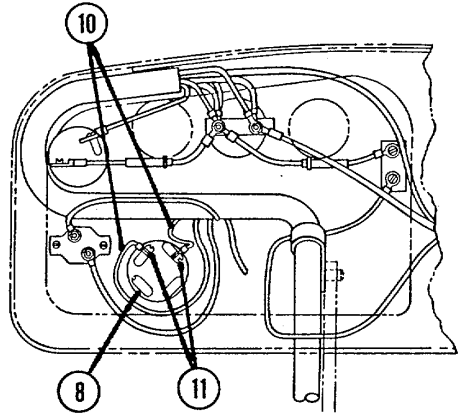
WARNING

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Install three wires (10) on back of switch (8) with two screws (11). Use a flat blade screwdriver to tighten screws.
- (2) Insert engine start switch (8) through back of dash panel (9) and install retaining ring (7) and nut (6) on front of switch.
- (3) Install cover (4) on top of dash assembly (5) with four capscrews (1), four lockwashers (3) and four washers (2). Use a socket to tighten capscrews.

c. Place In Service

Start engine to check switch operation.



4-18. ETHER AID START SWITCH - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

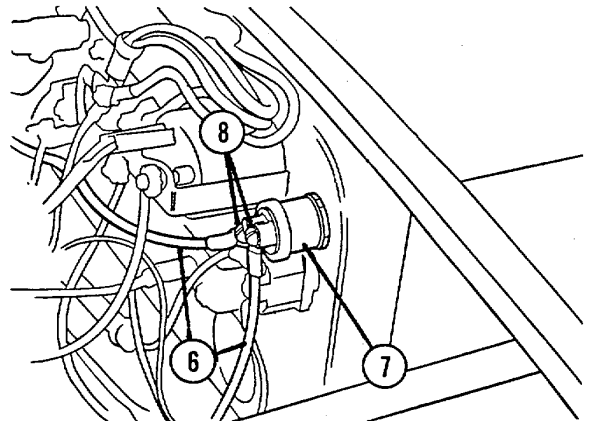
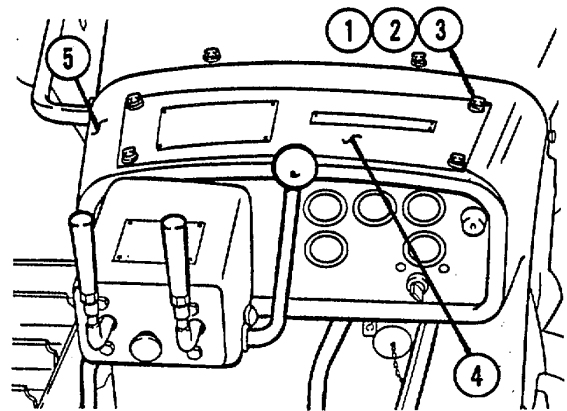
Wire I.D. Tags

a. Removal

WARNING

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Use a socket to remove four capscrews (1), four washers (2), four lockwashers (3) and cover (4) from top of dash assembly
- (2) Tag two wires (6) at back of ether aid start switch (7) for identification during installation.
- (3) Use a flat blade screwdriver to remove two screws (8) and two wires (6) from back of switch (7).



4-18. ETHER AID START SWITCH - REPLACE (Cont'd)

- (4) Use a flat blade screwdriver to remove screw (9) and knob (10) from front of switch.
- (5) Use a wrench to remove nut (11) from front of switch and slide switch out through back of dash panel (12).

b. Installation**WARNING**

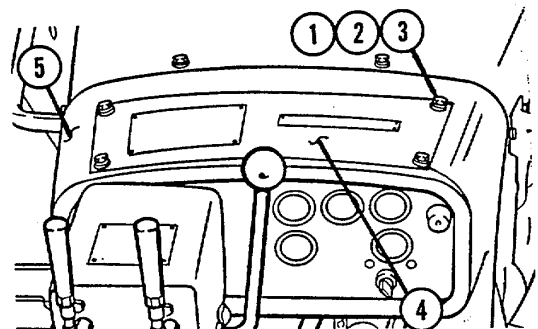
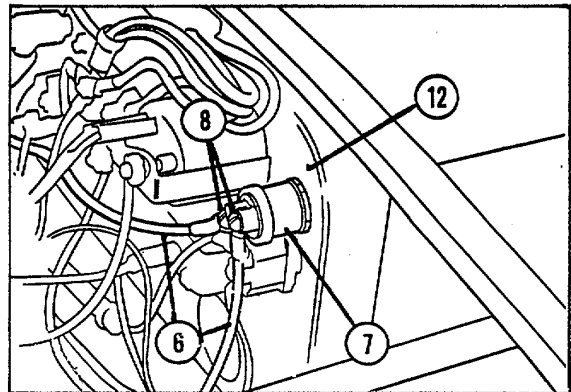
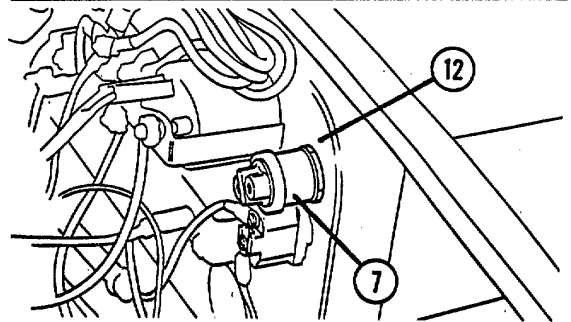
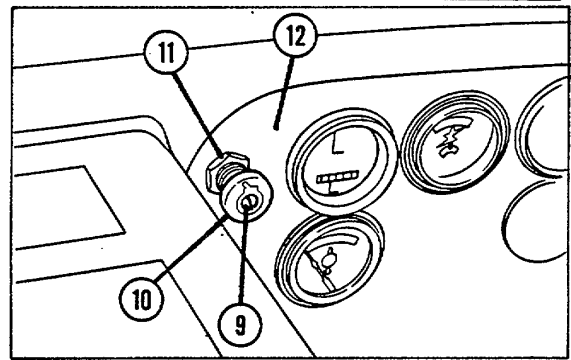
Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Insert ether aid start switch (7) through back of dash panel (12).
- (2) Install nut (11) with a wrench on front of switch.
- (3) Install knob (10) on front of switch with screw (9) using a flat blade screwdriver.
- (4) Install two wires (6) to back of switch (7) with two screws (8) using a flat blade screwdriver.

- (5) Install cover (4) on top of dash assembly (5) with four capscrews (1), four lockwashers (3) and four washers (2). Use a socket to tighten capscrews.

c. Place In Service

Check ether aid switch for proper operation.



4-19. BATTERY DISCONNECT SWITCH - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUPApplicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-699-5273

Materials/Parts

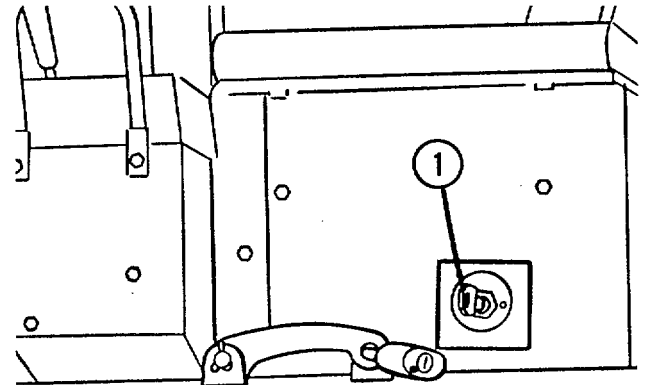
Wire I.D. Tags

Equipment Condition

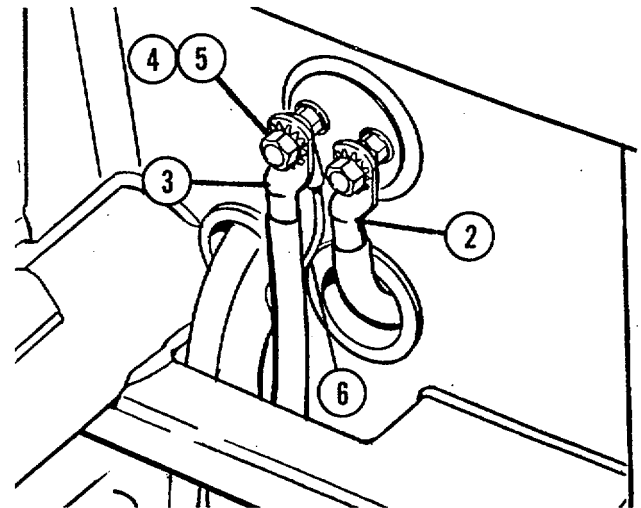
Negative battery cable disconnected.
(page 4-67)

a. Removal

- (1) Turn switch to OFF and remove lever (1).
- (2) Tilt seat forward.



- (3) Tag cables (2 and 3).
- (4) Use a wrench to remove two nuts (4) and two star washers (5).
- (5) Remove cables (2 and 3) and wire (6).

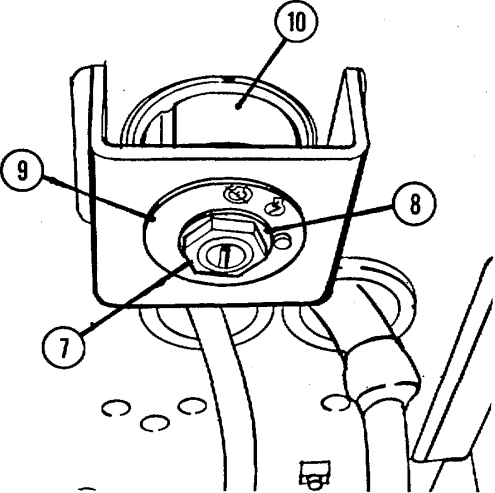


4-19. BATTERY DISCONNECT SWITCH - REPLACE (Cont'd)

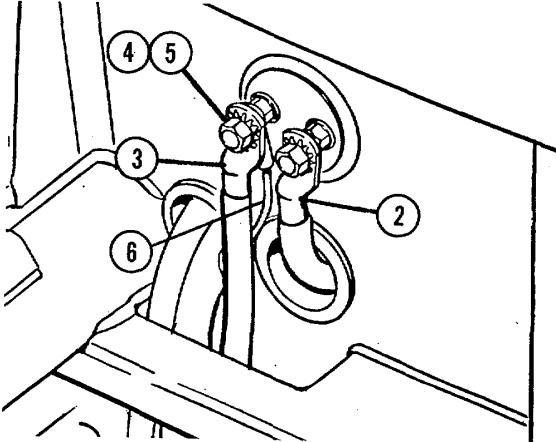
- (6) Use a wrench to remove nut (7), lockwasher (8) and face plate (9) from mounting stud.
- (7) Push switch (10) out of mounting bracket.

b. Installation

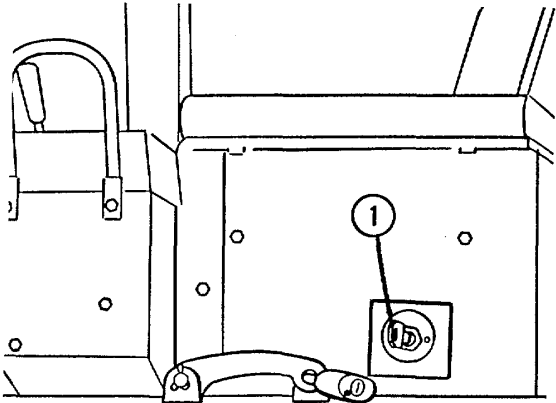
- (1) Push switch (10) into mounting bracket.
- (2) Use a wrench to install face late (9), lockwasher (8) and nut (7) to mounting stud.



- (3) Install wire (6) and cables (2 and 3).
- (4) Use a wrench to install two star washers (5) and two nuts (4).
- (5) Tilt seat to normal position.



- (6) Install lever (1).
- (7) Install negative battery cable. See page 4-67.



c. Place In Service

Start engine and check disconnect switch operation.

4-20. CIRCUIT BREAKER RESET - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configurations

All

Common Tools

Tool Kit, General Mechanics

NSN 5180-00-699-5273

Materials/Parts

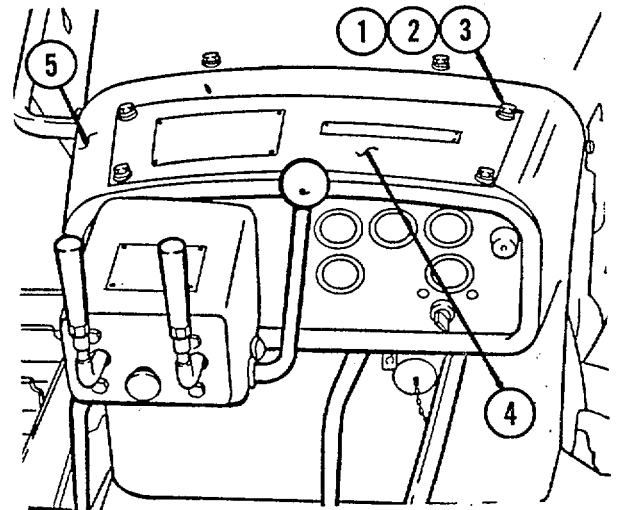
Wire I.D. Tags

a. Removal

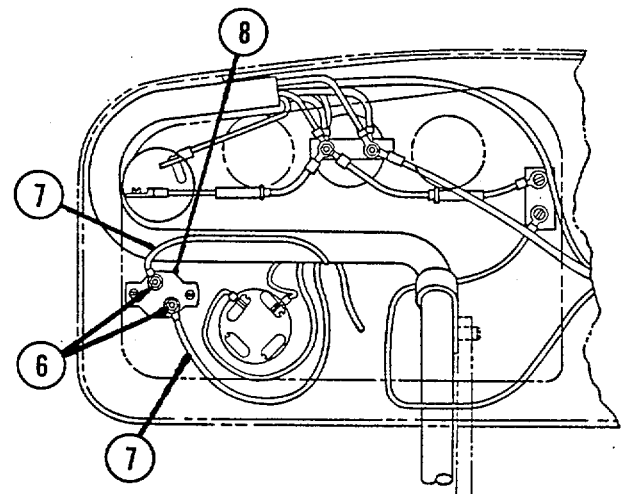
WARNING

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Use a socket to remove four capscrews (1), four washers (2), four lockwashers (3) and cover (4) from top of dash assembly (5).



- (2) Remove two nuts (6) with a wrench and remove two wires (7) from back of circuit breaker (8).



4-20. CIRCUIT BREAKER RESET - REPLACE (Cont'd)

- (3) Use a flat blade screwdriver to remove two screws (9) and circuit breaker (8) from back of dash panel (10).
- (4) Tag two wires disconnected from back of circuit breaker for identification during installation.

b. Installation

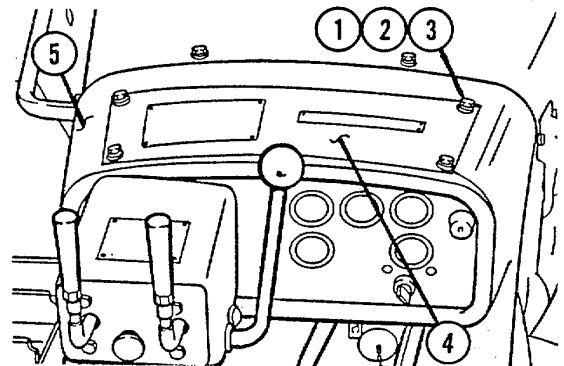
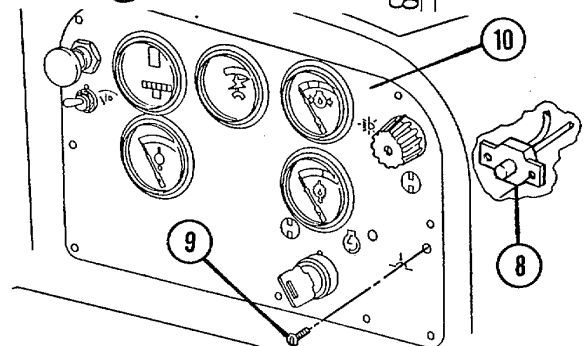
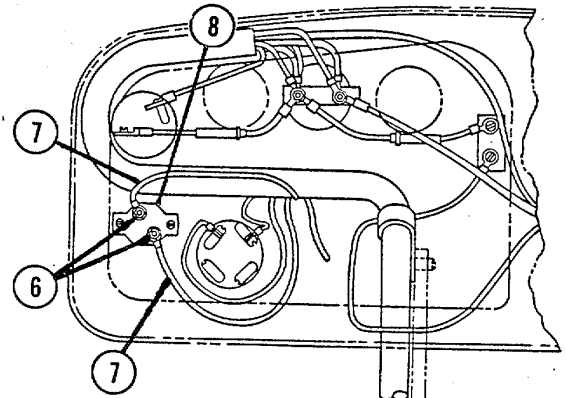
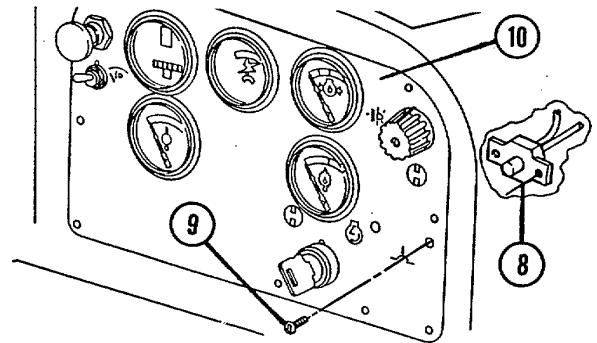
WARNING

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Install two wires (7) on back of circuit breaker (8) with two nuts (6).
- (2) Install circuit breaker (8) in back of dash panel (10) with two screws (9). Use a flat blade screwdriver to tighten screws.
- (3) Install cover (4) on top of dash assembly (5) with four capscrews (1), four lockwashers (3) and four washers (2). Use a socket to tighten capscrews.

c. Place In Service

Start engine. Engine and electrical components operate when circuit breaker is functional.



4-21. HEADLAMPS AND REAR FLOODLAMPS - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUPApplicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

WARNING

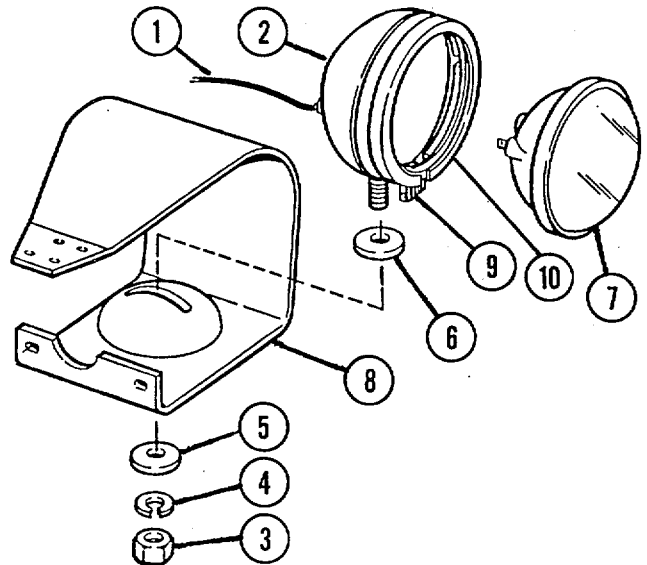
Turn battery disconnect switch to "OFF" before working on electrical parts of tractor. Failure to do this could result in personal injury.

NOTE

Lamp Removal is similar for the headlamps, and the rear floodlamp. For rear floodlamp Removal, loosen nut (3) and turn lamp to disconnect wire (1). Follow STEPS 2-6.

a. Removal

- (1) Remove screw securing wire (1) from back of body (2) with a screwdriver.
- (2) Use a wrench to remove nut (3), lockwasher (4), and washer (5) from body (2). Lift body with washer (6) and headlamp (7) from guard (8).
- (3) Use a screwdriver to loosen screw (9) on outside clamp (10). Remove screw and clamp.



4-21. HEADLAMPS AND REAR FLOODLAMPS - REPLACE (Cont'd)

- (4) Remove headlamp (7) from rubber ring (11).
Unplug headlamp (7).
- (5) Remove screw to remove inside clamp (12) from rubber ring (11).
- (6) If necessary, remove rubber ring (11) from body (2).

b. Installation

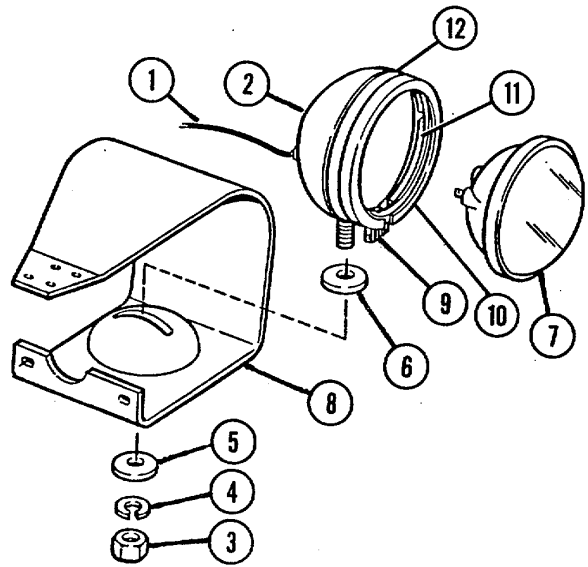
WARNING

Turn battery disconnect switch to "OFF" before working on electrical parts of tractor. Failure to do this, could result in personal injury.

NOTE

On rear floodlamp, loosen nut (3), turn lamp to disconnect wire (1). Follow STEPS 2 through 5.

- (1) If removed, place rubber ring (11) in position on body (2). Place inside clamp (12) in position over rubber ring. Secure rubber ring by installing and tightening clamp screw.
- (2) Plug receptacle into headlamp (7) and place headlamp in body (2).
- (3) Place outside clamp (10) in position on rubber ring (11) and tighten screw (9) until assembly is secure.



4-21. HEADLAMPS AND REAR FLOODLAMPS - REPLACE (Cont'd)

- (4) Place body and headlamp assembly in position on guard (8).

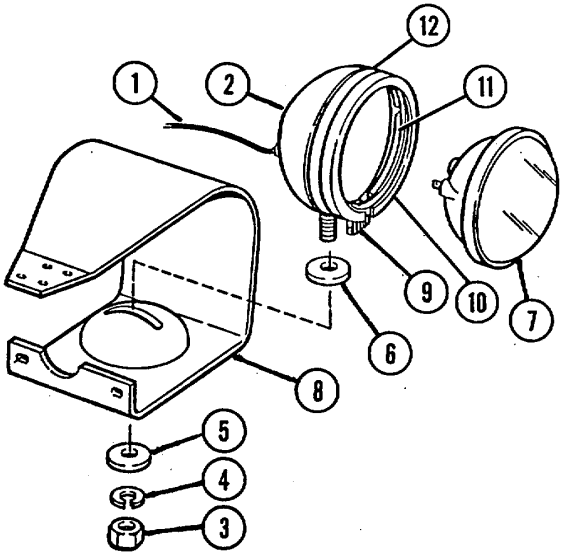
NOTE

On rear floodlamp, perform STEP 6 first, then STEP 5.

- (5) Use a wrench to attach washer (5), lockwasher (4) and nut (3) to headlamp assembly.
- (6) Attach wire (1) to body (2) with screw.

c. Place In Service

Turn disconnect switch to "ON" position. Turn on headlamps and floodlamp, and check for proper operation.



4-22. HOURMETER OIL PRESSURE SWITCH - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

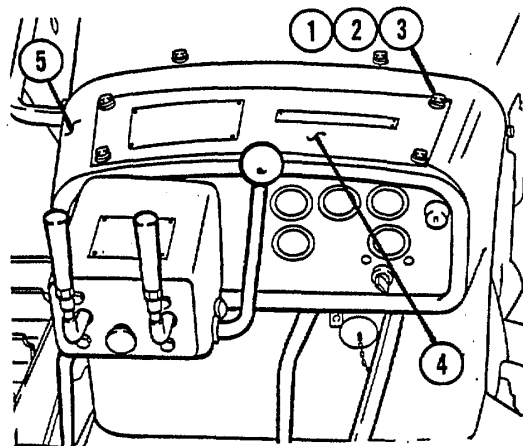
Wire I.D. Tags

a. Removal

WARNING

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

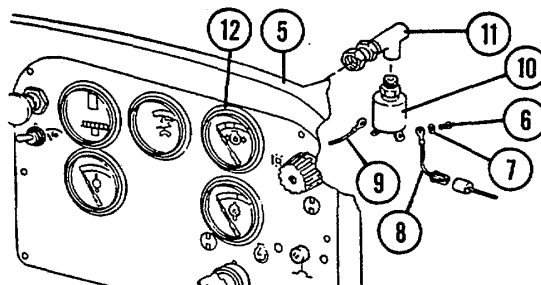
- (1) Use a wrench to remove four capscrews (1), four lockwashers (2), four washers (3) and cover (4) from top of dash assembly (5).



NOTE

Tag wires for installation.

- (2) Use a small screwdriver to remove screws (6) and washers (7) and disconnect wires (8 and 9) from switch (10).



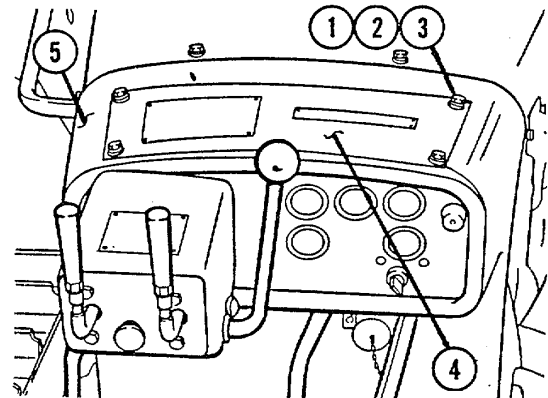
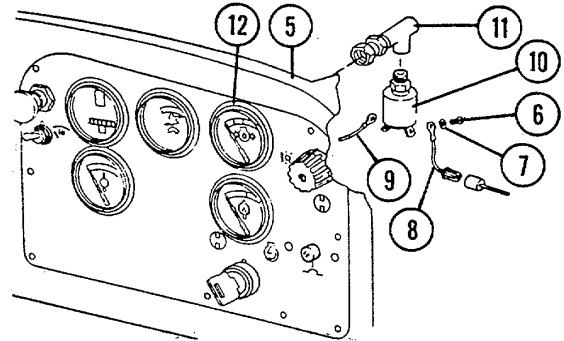
4-22. HOURMETER OIL PRESSURE SWITCH - REPLACE (Cont.)

- (3) Remove hourmeter oil pressure switch (10) with a wrench from tee (11) behind oil pressure gage (12).
- (4) Bring hourmeter oil pressure switch (10) out of opening in top of dash assembly (5).

b. Installation**WARNING**

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Use a wrench to install hourmeter oil pressure switch (10) in tee (11) on back of oil pressure gage (12).
 - (2) Connect wires (8 and 9) to switch (10) with washers (7) and screws (6).
 - (3) Install cover (4) on top of dash assembly (5) with four capscrews (1), four lockwashers (2) and four washers (3). Use a socket to tighten capscrews.
- c. Place In Service Run engine and check pressure switch operation.



4-23. DIAGNOSTIC (STE-ICE) WIRING - REPLACE/REPAIR

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

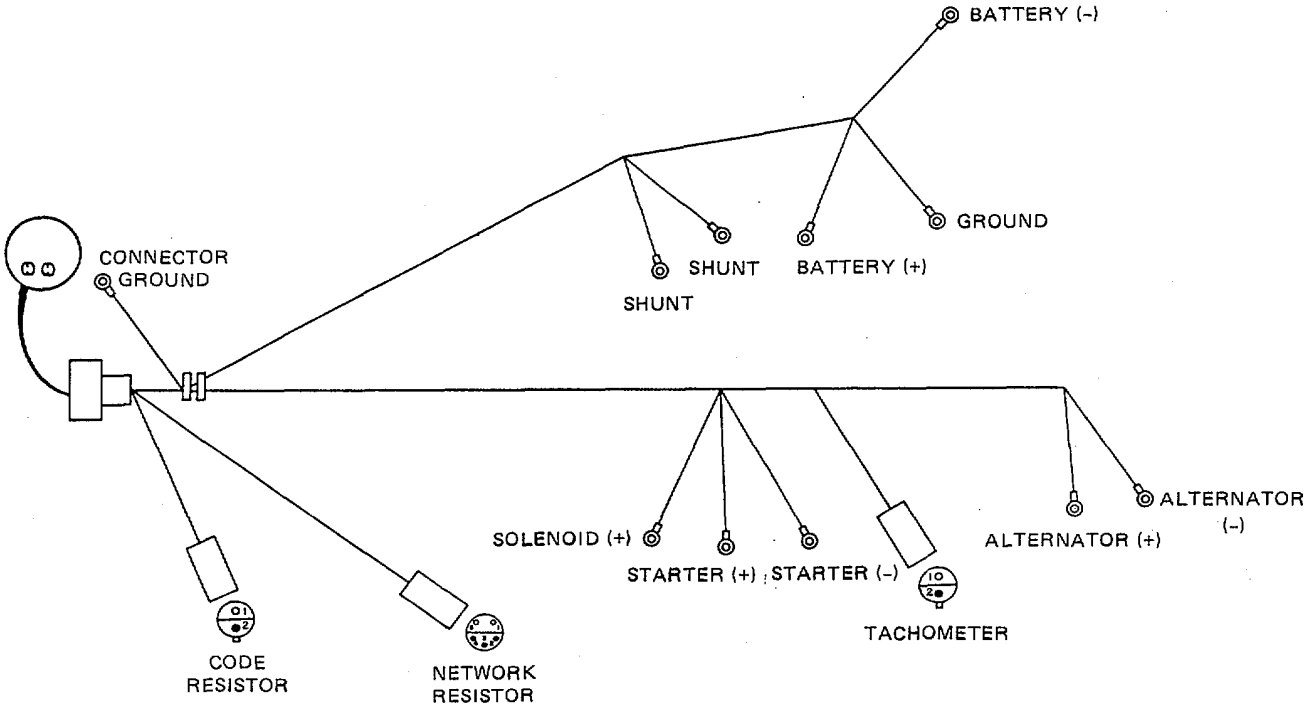
INITIAL SETUP

Applicable Configurations
All

Materials/Parts
Wire I.D. Tags

Common Tools
Shop Equipment, Automotive Maintenance and Repair, Common #1 Less Power NSN 4910-00-754-0654

Equipment Condition
Battery disconnect switch turned to OFF.



4-23. DIAGNOSTIC (STE-ICE) WIRING - REPLACE/REPAIR (Cont'd)

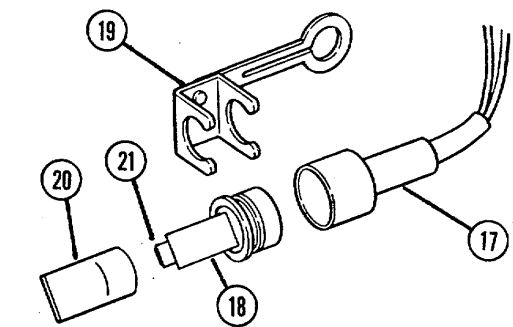
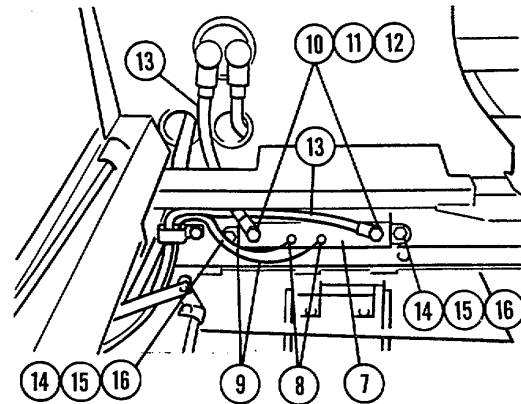
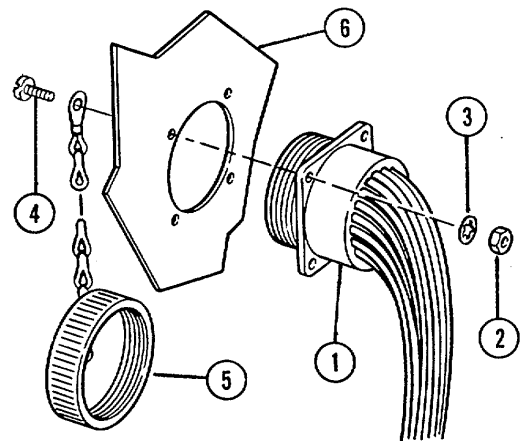
a. Removal

- (1) Disconnect ground cable from battery. See page 4-67.

NOTE

Mark all wires for installation.

- (2) Locate faulty wire and trace it back to connector (1). Remove solder holding wire to connector and remove wire.
- (3) Use a screwdriver and a wrench to remove four nuts (2), lockwashers (3), capscrews (4) and cap (5) from dash panel (6). Remove connector (1)
- (4) To remove shunt (7), start by using a Phillips screwdriver to remove two screws (8) holding wires (9).
- (5) Use a socket to remove two capscrews (10), lockwashers (11) and star washers (12). Remove cables (13) from shunt (7).
- (6) Use a wrench and a socket to remove two capscrews (14), two washers (15) and two self-locking nuts (16). Remove shunt (7).
- (7) To remove network or code resistor, remove wires (17) and housing (18) from bracket (19).
- (8) Pull resistor assembly (18) from wires (17).

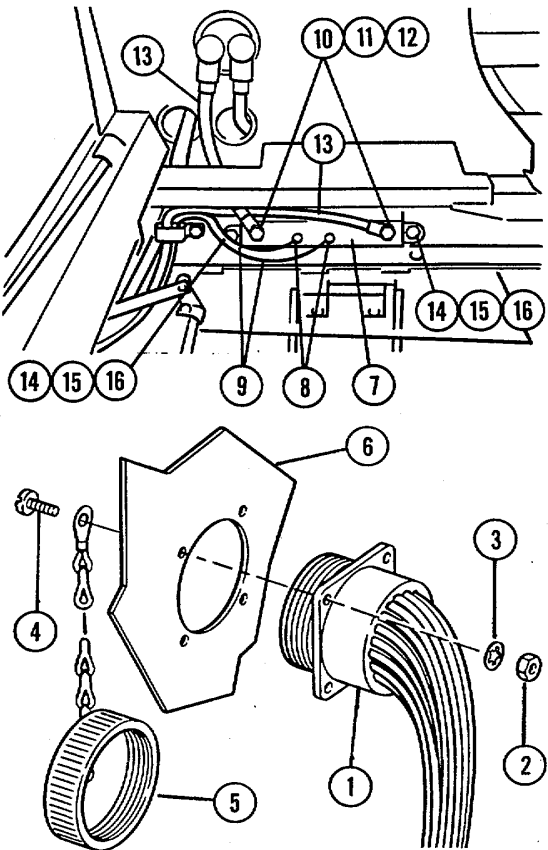


b. Installation

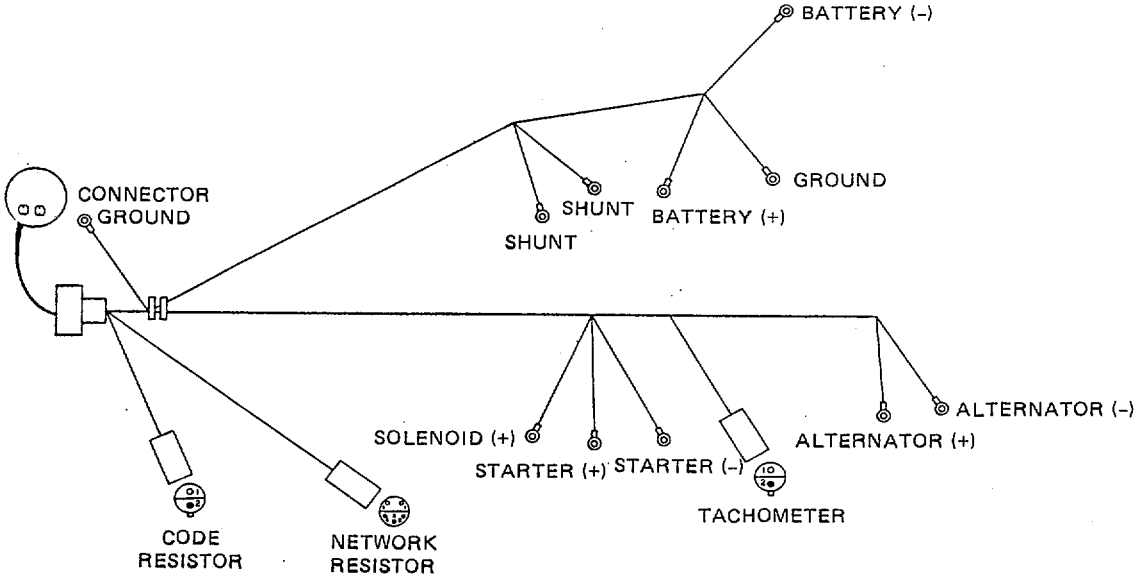
- (1) Connect resistor assembly (18) to wires (17) and install in bracket (19).

4-23. DIAGNOSTIC (STE-ICE) WIRING - REPLACE/REPAIR (Cont'd)

- (2) Place shunt (7) in position and use a wrench to install two capscrews (14), two washers (15), and two self-locking nuts (16).
- (3) Place cables (13) on shunt (7) and use a wrench to install two capscrews (10), lockwashers (11), and star washers (12).
- (4) Place wires (9) on shunt (7) and use a phillips screwdriver to install two screws (8).
- (5) Place connector (1) in position on dash panel (6) and use a screwdriver and a wrench to install four nuts (2), lockwashers (3), cap (5) and capscrews (4).
- (6) Fabricate replacement wire(s) of the same gage, length, and terminal type as the wire(s) removed. See Appendix E. Install new wire.
- (7) Connect ground cable to battery. See page 4-67.



c. Place In Service Check diagnostic wiring for proper operation.



4-24. HORN - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configurations

All

Personnel Required

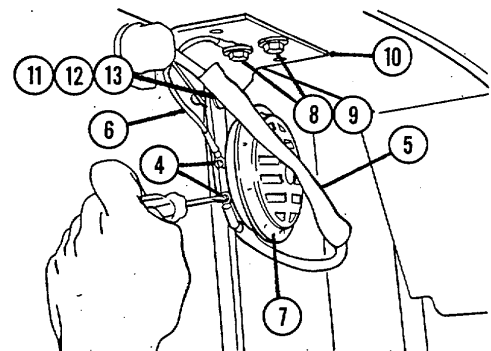
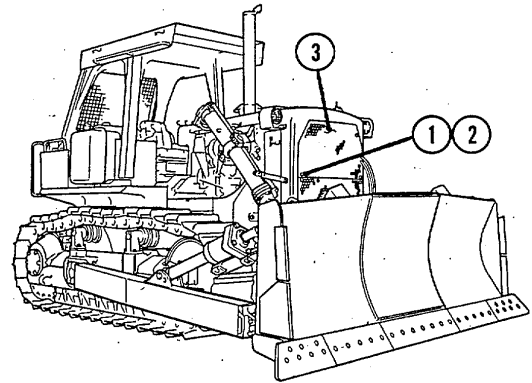
MOS62B (2)

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

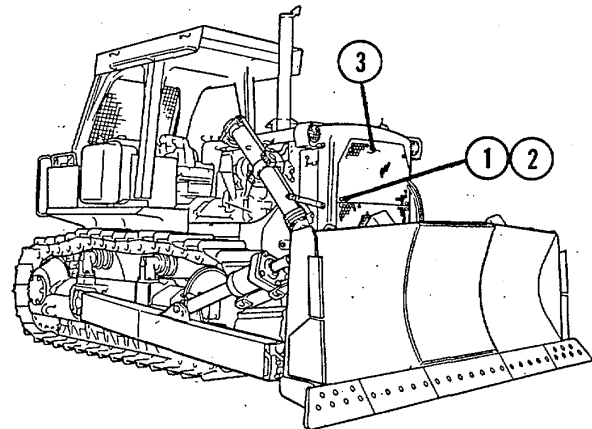
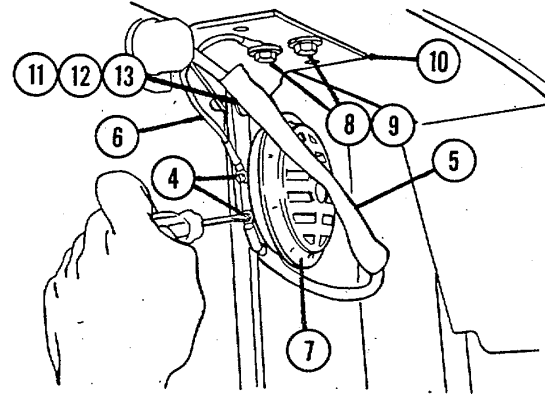
a. Removal

- (1) Remove four capscrews (1) and four washers (2) using a wrench.
- (2) Remove upper radiator grill plate assembly (3). Use two persons; the weight of the plate assembly is 60 lbs.
- (3) Remove two capscrews (4) to disconnect wire harness (5) and wire (6) from the horn (7).
- (4) Use a socket to remove capscrew (8) and washer (9). Remove horn bracket (10) from guard assembly.
- (5) Use a socket to remove nut (11), washer (12) and capscrew (13). Remove horn assembly (7) from bracket.



4-24. HORN - REPLACE (Cont'd)**b. Installation**

- (1) Put horn assembly (7) in position on bracket and install capscrew (13), washer (12) and nut (11) which connect them. Use a socket to tighten nut and capscrew.
- (2) Position horn and bracket (10) on guard assembly. Install washer (9) and capscrew (8). Use a socket to tighten capscrew.
- (3) Connect wire harness (5) and wire (6) to the horn (7) and secure with two capscrews (4). Check operation of horn.
- (4) Place upper radiator grill plate assembly (3) in position and install four washers (2) and four capscrews (1) using a wrench. The weight of the plate assembly is 60 lbs.

**c. Place In Service**

Check horn for proper operation.

4-25. HORN BUTTON - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configurations

All

Materials/Parts

Wire I.D. Tags

Common Tools

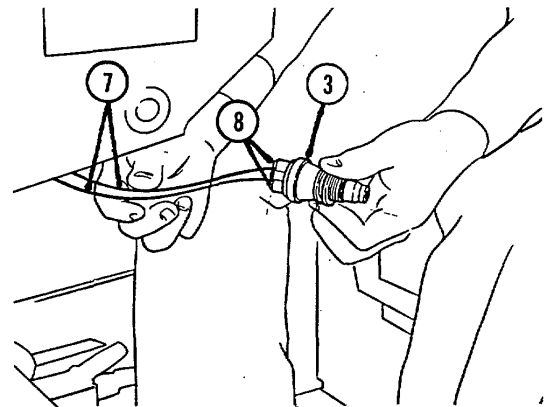
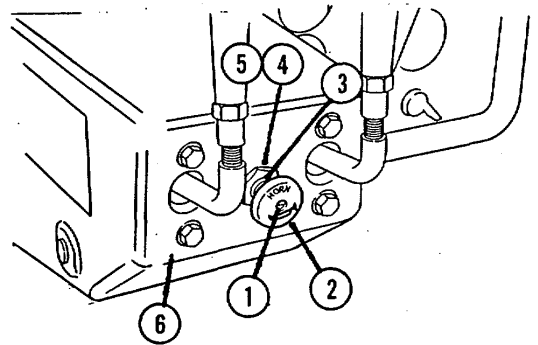
Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal

WARNING

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Remove screw (1) and button (2) from front of horn switch (3).
- (2) Remove nut (4) and star washer (5) from front of horn switch (3) with a wrench.
- (3) Reach under control panel (6) and pull horn switch (3) out of the control panel.
- (4) Tag two wires (7) on horn switch (3) for identification during installation.
- (5) Remove two screws (8) and two wires (7) from horn switch.



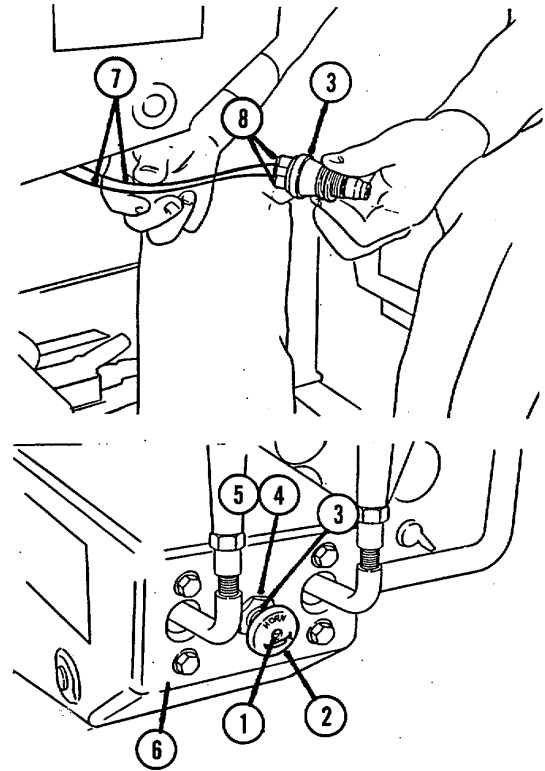
4-25. HORN BUTTON - REPLACE (Cont'd)**b. Installation****WARNING**

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Locate wires (7) and connect to horn switch (3) with screws (8).
- (2) Insert horn switch (3) into position through bottom of control panel (6).
- (3) Use a wrench to install star washer (5) and nut (4) on front of horn switch (3).
- (4) Install button (2) on horn switch (3) with screw (1).

c. Place In Service

Check horn for proper operation.



4-26. BACKUP ALARM - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP**Applicable Configurations**

All

Equipment Condition

Battery disconnect switch OFF.

Common Tools

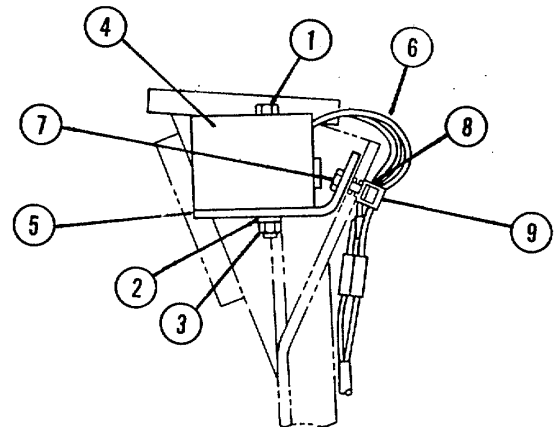
Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal

- (1) Use two wrenches to remove two capscrews (1), two washers (2) and two nuts (3) that hold alarm (4) to bracket (5).
- (2) Disconnect wires (6) from alarm (4).
- (3) To remove bracket (5) from ROPS rear panel, use two wrenches to remove two capscrews (7), two washers (8) and two nuts (9).

b. Installation

- (1) Position alarm bracket (5) on ROPS rear panel and install two capscrews (7), two washers (8) and two nuts (9) that secure it. Tighten with a wrench.
- (2) Connect wires (6) to alarm (4).



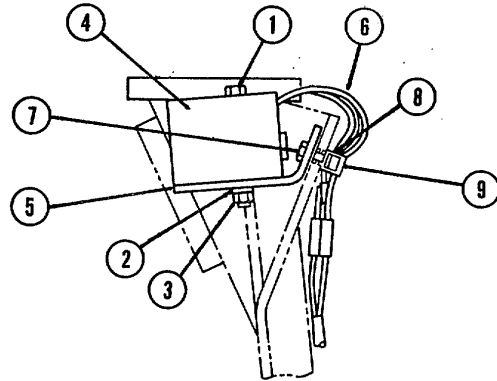
4-26. BACKUP ALARM - REPLACE (Cont'd)

(3) Put alarm (4) in position on bracket (5) and install capscrews (1), washers (2) and nuts (3). Use two wrenches to tighten.

(4) Turn battery disconnect switch "ON".

c. Place In Service

Check backup alarm for proper operation.



4-27. BACKUP ALARM SWITCH - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configurations

All

Materials/Parts

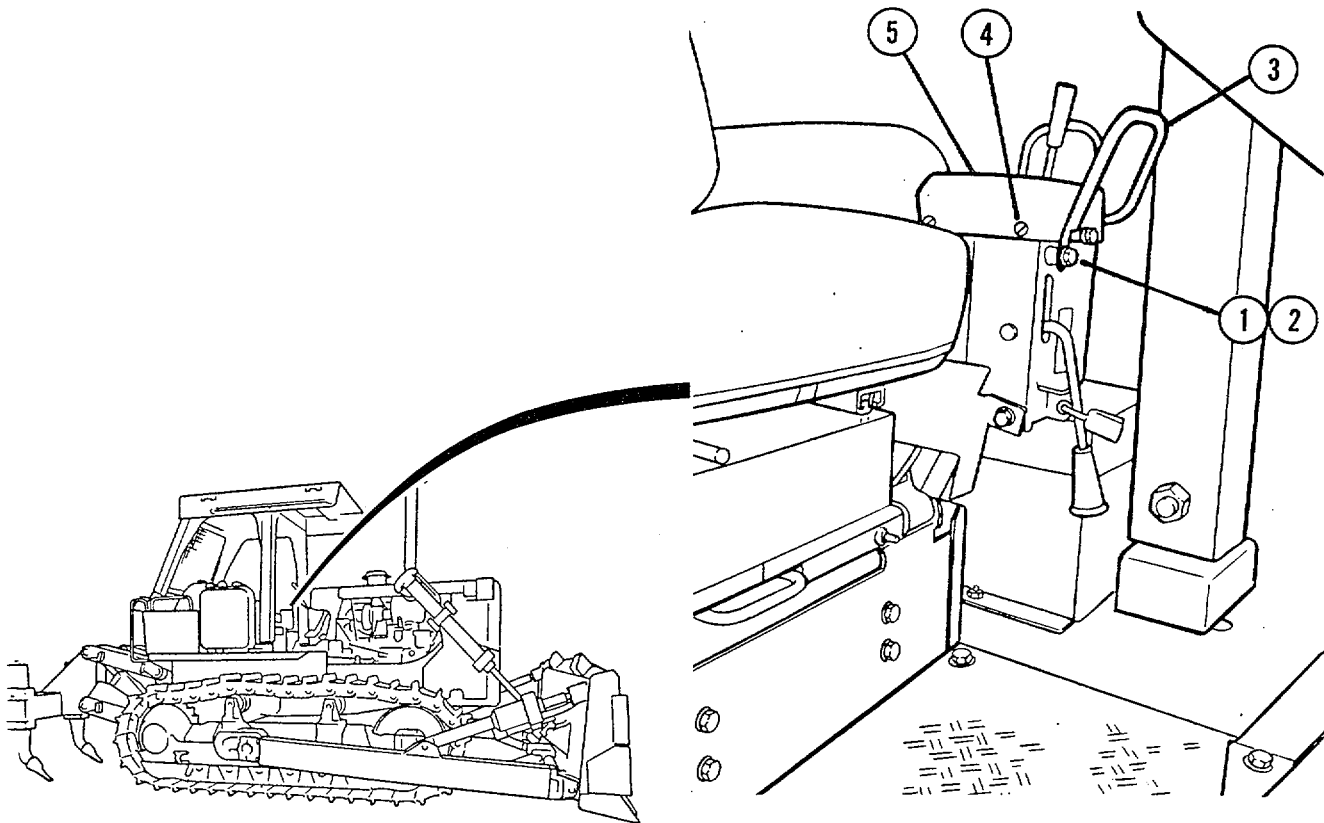
2 ea. Pop Rivets (8) (18)

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654
Pop Rivet Gun

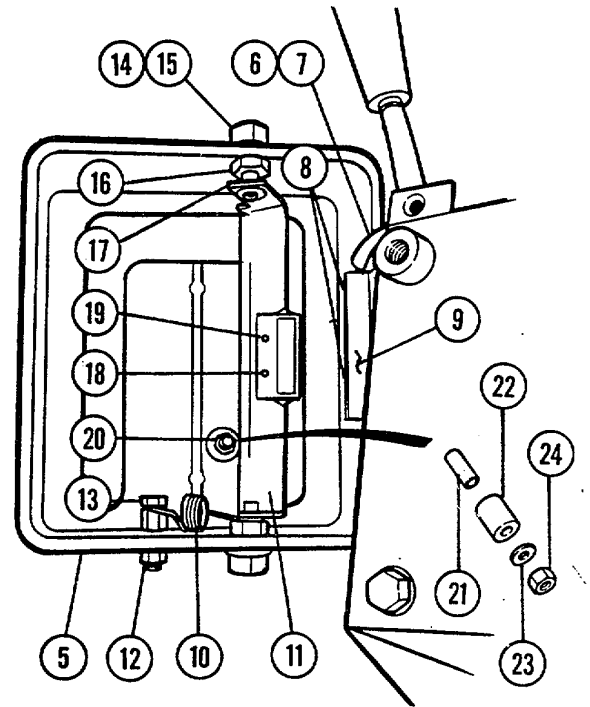
a. Removal

- (1) Use a socket to remove three capscrews (1) and lockwashers (2) that hold guard (3) and remove guard (3).
- (2) Use a flat blade screwdriver to remove four screws (4) and lift guide (5) from console.



4-27. BACKUP ALARM SWITCH - REPLACE (Cont'd)

- (3) Disconnect male ends of connectors (6) from female ends of connectors (7).
- (4) Use a drill and drill through center of rivets (8) to remove rivets and switch (9).
- (5) Remove spring (10) from lever (11) and retainer (13).
- (6) Use a wrench to remove nut (12) and retainer (13).
- (7) Use two wrenches to remove capscrews (14) and washers (15), from both sides of guide while holding nuts (16). Remove bearings (17) and lever (11).
- (8) Use a drill and drill through center of rivets (18) and remove actuator (19) from lever (11).
- (9) Use a flat blade screwdriver and wrench to remove screw (20), spacer (21), bumper (22), washer (23) and nut (24) from guide (5).



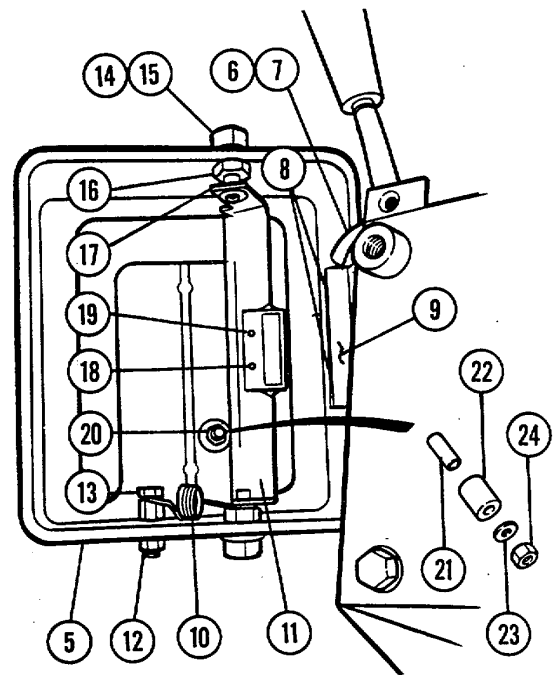
b. Installation

- (1) Use a flat blade screwdriver and a wrench to place screw (20) into position on guide (5) and attach spacer (21), bumper (22), washer (23) and nut (24).
- (2) Use a pop rivet gun and install two rivets (8) to secure switch (9) to guide (5).
- (3) Use two rivets (18) and attach actuator (19) to lever (11).
- (4) Place retainer (13) into position and secure to guide with nut (12). Tighten nut with a wrench. Install spring (10) on lever (11) and retainer (13).

4-27. BACKUP ALARM SWITCH - REPLACE (Cont'd)

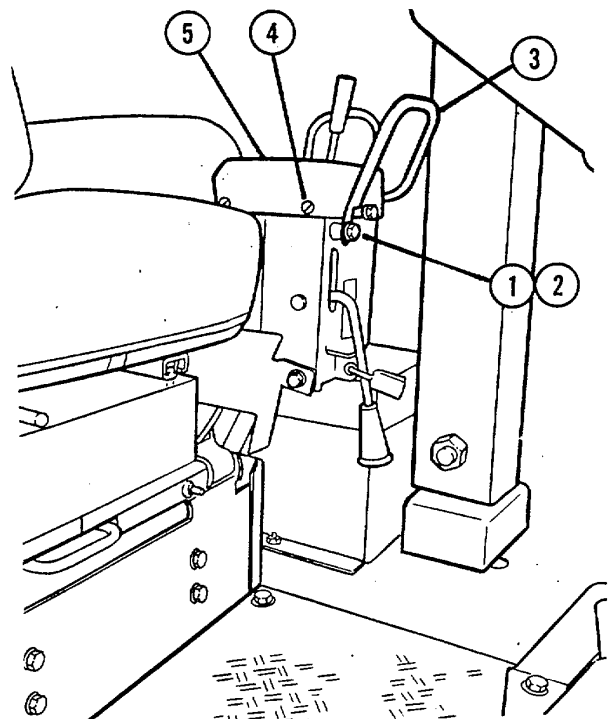
(5) Place lever into position and insert capscrews (14), washers (15), nuts (16) and bearings (17). Tighten nuts and capscrews with two wrenches.

(6) Attach male ends of connectors (6) to female ends of connectors (7).



(7) Place guide (5) into position and secure with four screws (4). Tighten screws with a flat blade screwdriver.

(8) Attach guard (3) to console with three capscrews (1) and lockwashers (2). Use a socket to tighten capscrews.



c. Place In Service

Check backup alarm switch for proper operation.

4-28. HEATER SWITCH - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configuration

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

Wire I.D. Tags

Equipment Condition

Brake lock applied.

a. Removal

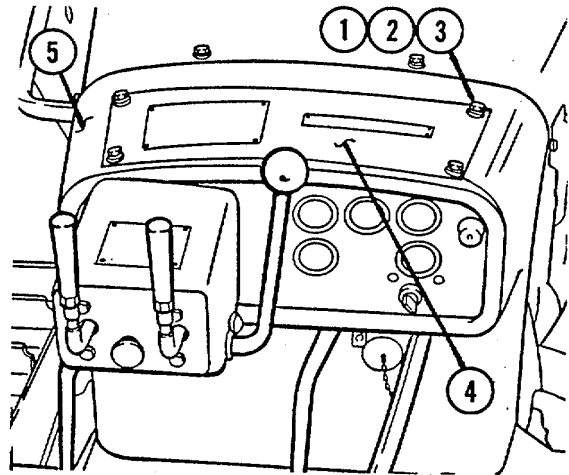
WARNING

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Use a socket to remove four capscrews (1), four lockwashers (2), four washers (3) and cover (4) from top of dash assembly (5).

NOTE

Tag wires for installation.



4-28. HEATER SWITCH - REPLACE (Cont'd)

- (2) Remove nut (8) from front of heater switch (7) and remove switch (7) through back of dash assembly (5).
- (3) Use a screwdriver to remove screws (6) and wires from heater switch (7).

b. Installation

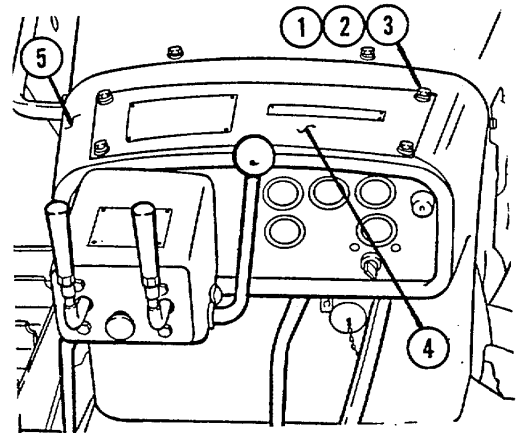
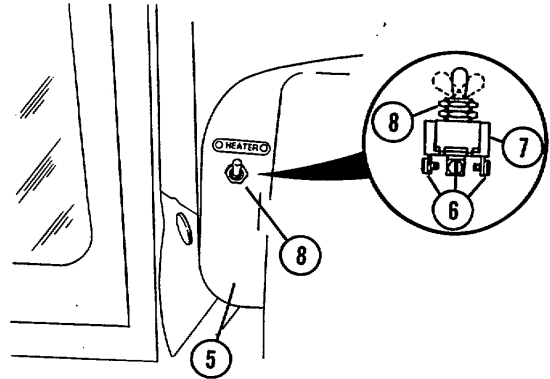
WARNING

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (1) Install wires on back of heater switch (7) and secure with screws (6).
- (2) Insert heater switch (7) through back of dash assembly (5) and install nut (8) on front of switch.
- (3) Install cover (4) on top of dash assembly (5) with four capscrews (1), four lockwashers (2) and four washers (3). Use a socket to tighten capscrews.

c. Place In Service

Start engine and check heater switch for proper operation.



Section III. BATTERY SYSTEM**4-29. GENERAL**

This section provides maintenance procedures assigned to the organizational level for the battery system. To find a specific maintenance procedure, see the maintenance task summary below.

4-30. BATTERY SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
4-31	Storage Batteries - Test/Service/Replace	4-64
4-32	Battery Cables and Terminals - Service/Replace	4-67

4-31. STORAGE BATTERIES - TEST/SERVICE/REPLACE

This task covers:

- a. Removal
 - b. Installation
 - c. Place In Service
 - d. Installation
-

INITIAL SETUP

Applicable Configurations

All
TM5-2410-237-10)

Equipment Condition

Battery box cover removed. (See

Common Tools

Shop Equipment, Automotive
Maintenance and Repair,
Common #1 Less Power
NSN 4910-00-754-0654
Lifting Equipment (250 lbs.
capacity)

- a. Testing Battery Voltage

WARNING

Never disconnect any charging unit circuit or battery circuit cable from battery when the charging unit is operating. A spark can cause an explosion from the flammable vapor mixture of hydrogen and oxygen that is released through the battery outlets. Injury to personnel can be the result.

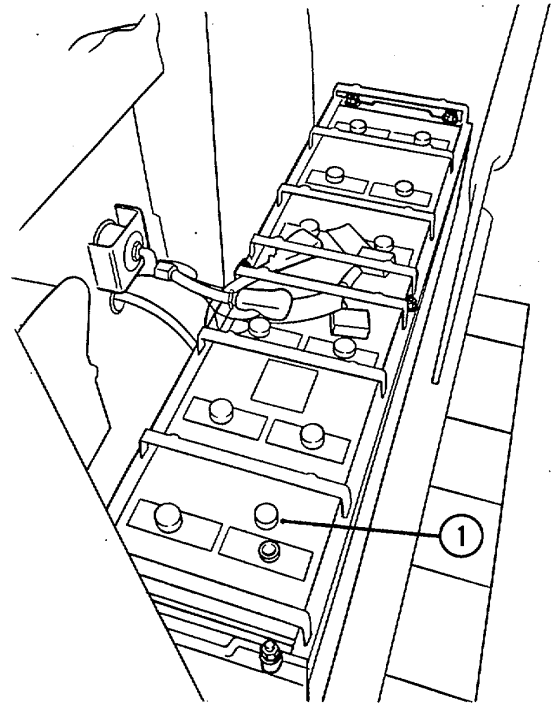
- (1) Using a duo battery tester, test state of charge of battery.

4-31. STORAGE BATTERIES - TEST/SERVICE/REPLACE (Cont'd)

b. Service By Adding Electrolyte**WARNING**

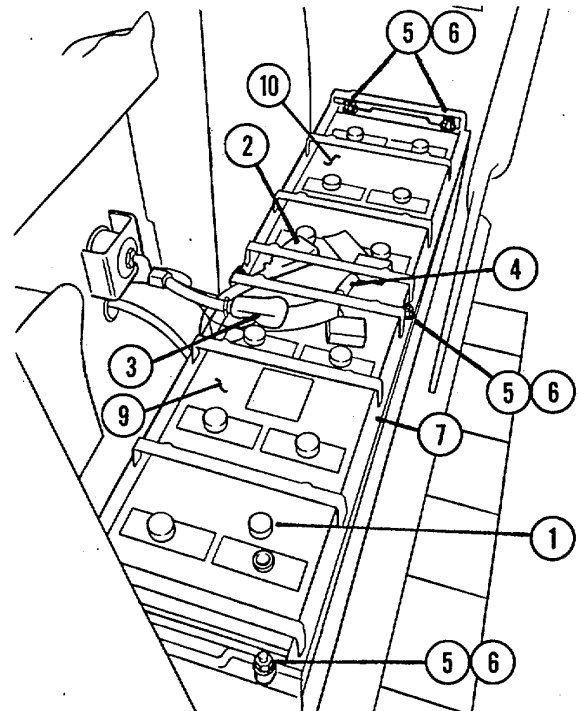
Do not overfill so that water splashes acid from cell opening. Battery acid can cause skin irritations or burns.

- (1) Remove fill plugs (1).
- (2) Add electrolyte to each cell per instructions on container.
- (3) Install fill plugs (1).
- (4) Install battery box cover. See TM5-2410-237-10.

c. Place In Service**WARNING**

Turn battery disconnect switch to OFF. Disconnect negative battery cable from battery before disconnecting positive battery cables. This precaution is to avoid damage to wiring and the battery by accidental "grounds" with tools.

- (1) Lift up rubber boot and use a wrench to disconnect negative battery cable (2).
- (2) Lift up rubber boot and use a wrench to disconnect positive battery cable (3).
- (3) Lift up rubber boots on cable (4) and use a wrench to remove cable from battery terminals.
- (4) Use a wrench to remove six locknuts (5) and washers (6) from battery hold-down bracket (7). Remove bracket (7). Remove bracket (7).

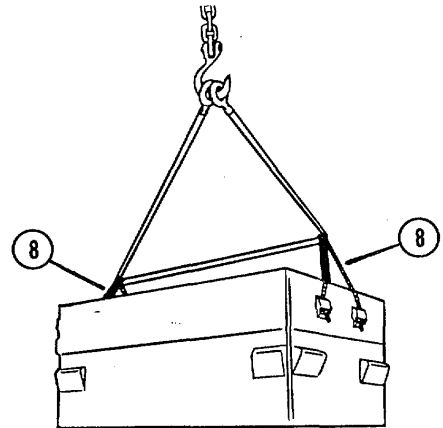


4-31. STORAGE BATTERIES - TEST/SERVICE/REPLACE (Cont'd)

- (5) Attach lifting equipment to battery handles (8). Weight of battery is 115 lbs. Remove battery.
- (6) Repeat STEP 5 to remove second battery.

d. Installation

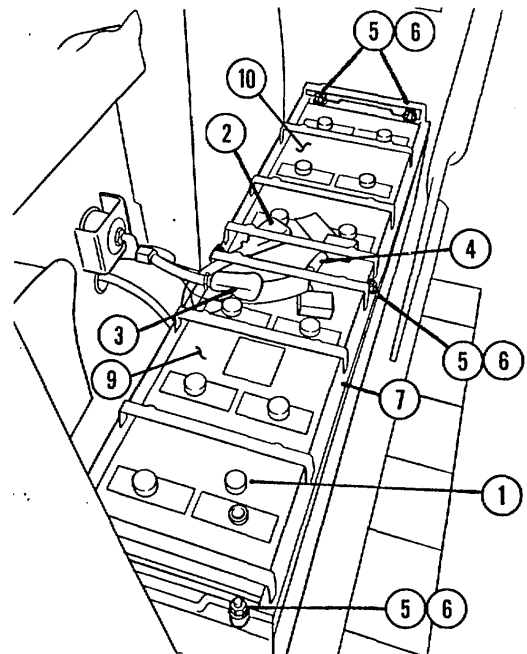
- (1) Attach lifting equipment to battery handles (8). Use lifting equipment to lower battery into battery box. Weight of battery is 115 lbs.
- (2) Repeat STEP 1 for second battery.
- (3) Place battery hold-down bracket (7) through studs on battery box. Use a wrench to install locknuts (5) and washers (6).



CAUTION

To prevent accidental "grounds" with tools, install positive cables first. Always attach negative cables last.

- (4) Attach cable (4) to positive terminal of battery (9) and negative terminal of battery (10). Use a wrench to secure cable to terminals. Slide boots over terminals.
- (5) Attach positive battery cable (3) to positive terminal of battery (9). Use a wrench to secure cable to terminal. Slide boot over terminal.
- (6) Attach negative battery cable (2) to negative terminal on battery (10). Use a wrench to secure cable to terminal. Slide boot over terminal.
- (7) Install battery box cover. See TM5-2410-237-10.



4-32. BATTERY CABLES AND TERMINALS - SERVICE/REPLACE

This task covers:

- a. Removal
 - b. Installation
 - c. Place In Service
 - d. Installation
-

INITIAL SETUP**Applicable Configurations**

All

Materials/Parts

Lint-free rag (App. D, Item 15)

Common Tools

Shop Equipment, Automotive
Maintenance and Repair, Common
#1 Less Power
NSN 4910-00-754-0654

Equipment Condition

Engine cool.
Battery disconnect in OFF position.
Battery cover assembly removed.
(See TM5-2410-237-10)

a. Service

- (1) Disconnect cables from battery posts. See b. STEPS (1) and (2).
- (2) Use a wire brush to clean terminals and battery posts. Wipe clean with dry rag.
- (3) Connect cables to battery posts. See c. STEPS (13) and (14).

b. Removal**WARNING**

Batteries give off flammable fumes. Do not smoke or create sparks when working around battery. Doing so can cause an explosion which can result in personal injury. To avoid sparks when removing cables, always begin by removing the negative (-) battery cable first.

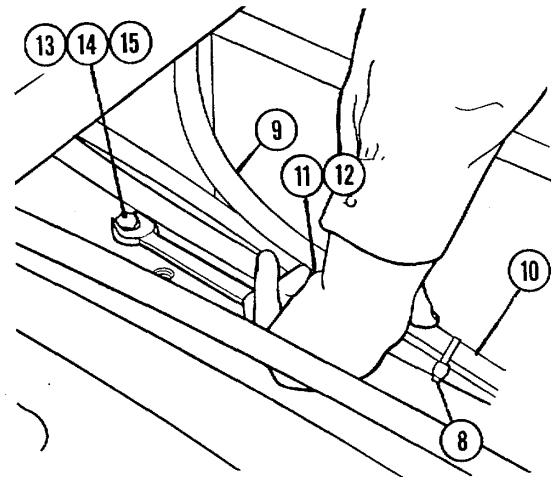
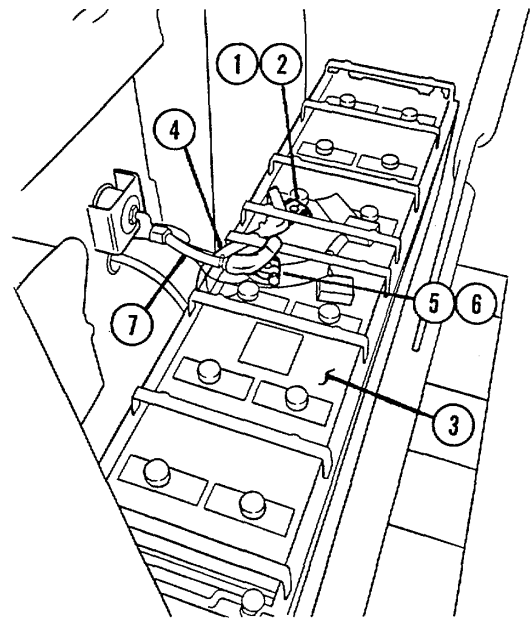
4-32. BATTERY CABLES AND TERMINALS - SERVICE/REPLACE (Cont'd)

- (1) Remove floor plates. See page 10-44.
- (2) Use a wrench to loosen nut (1) on cable terminal (2) at negative (-) post of battery (3). Disconnect negative (-) cable (4) from battery.
- (3) Use a wrench to loosen nut (5) on cable terminal (6) at positive (+) post of battery. Disconnect positive (+) cable (7) from battery.
- (4) Use a side cutter to remove any tie straps (8) that may secure cables (9 and 10) to frame.

NOTE

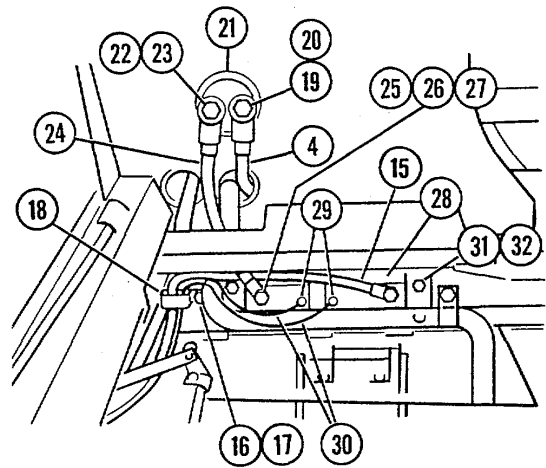
The capscrews (11) and clamps (12) are located inside the bell housing and on frame under seat.

- (5) Use a wrench to remove two clamps (12).
- (6) Use a wrench to remove capscrew (13), washer (14) and disconnect cable (15) from tractor frame.

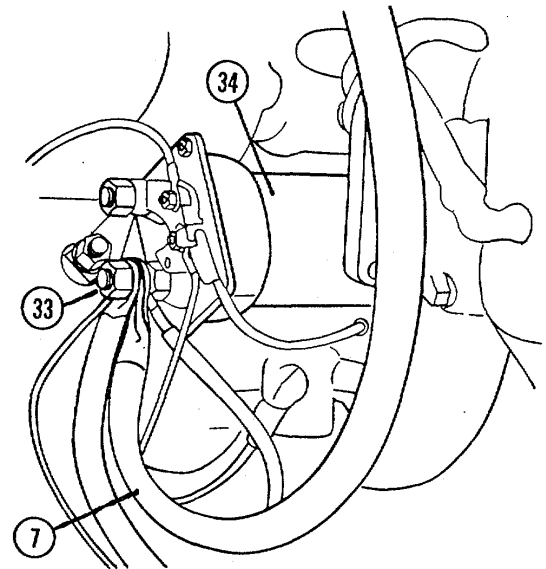


4-32. BATTERY CABLES AND TERMINALS - SERVICE/REPLACE (Cont'd)

- (7) Use a socket to remove three capscrews (16), three flat washers (17) and three clamps (18).
- (8) Use a wrench to remove nut (19) and star washer (20) that secured the negative (-) cable (4) to battery disconnect switch (21). Pull cable from battery side.
- (9) Use a wrench to remove nut (22), star washer (23) and disconnect cable (24) from the negative (-) post of the battery disconnect switch.
- (10) Use a wrench to remove two nuts (25), two flat washers (26) and two star washers (27) that secured cables (15 and 24) to shunt (28). Remove cable (24) from the battery disconnect to shunt. Remove cable (15) from shunt.



- (11) Use a phillips screwdriver to remove two screws (29) and disconnect two wires (30) from shunt (28).
- (12) Use two wrenches and a socket to remove two self-locking nuts (31), two capscrews (32) and shunt from seat frame.
- (13) Use a wrench to remove nut (33) and remove positive (+) cable (7) from starting motor solenoid (34) to battery. Work positive (+) cable out toward starting motor solenoid.

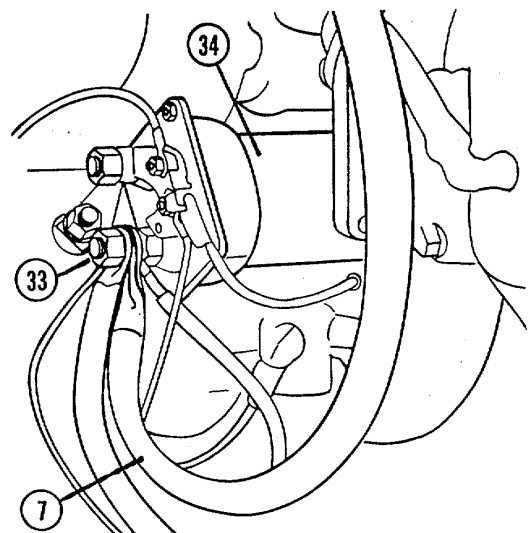
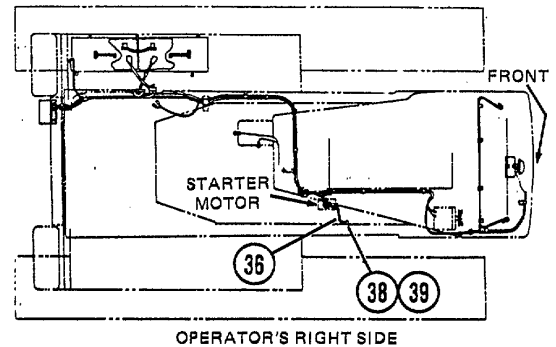
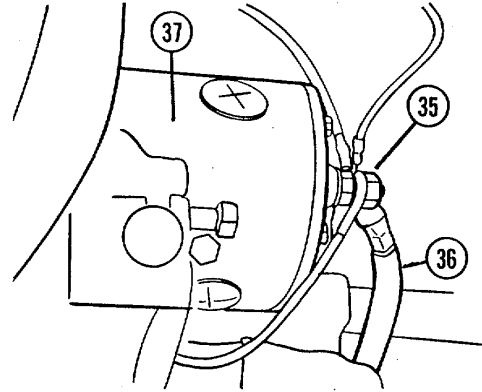


4-32. BATTERY CABLES AND TERMINALS - SERVICE/REPLACE (Cont'd)

- (14) Use a wrench to remove nut (35) and disconnect negative (-) cable (36) from starting motor (37).
- (15) Use a wrench to remove capscrew (38), star washer (39) and remove negative (-) cable (36) from frame.

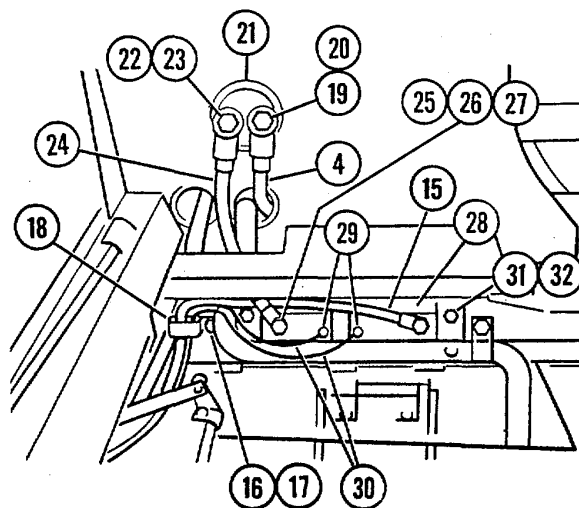
c. Installation

- (1) Install negative (-) cable (36) to frame and secure with a capscrew (38) and star washer (39). Use a wrench to tighten capscrew.
- (2) Connect negative (-) cable (36) to starting motor (37) and secure with a nut (35) by using a wrench.
- (3) Connect positive (+) cable (7) to starting motor solenoid (34) and secure with a nut (33) by using a wrench. Work positive (+) cable toward battery.



4-32. BATTERY CABLES AND TERMINALS - SERVICE/REPLACE (Cont'd)

- (4) Install shunt (28) onto seat frame. Secure shunt with two self-locking nuts (31) and two capscrews (32) by using a wrench and a socket.
- (5) Connect two wires (30) to shunt and secure with two screws (29) by using a phillips screwdriver
- (6) Connect cables (15 and 24) to shunt and secure with two star washers (27), two flat washers (26) and two nuts (25) by using wrench.
- (7) Connect cable (24) from the shui to the negative (-) post on the battery disconnect switch (21). Use a wrench to install star washer (23) and nut (22) that secure cable.
- (8) Install the negative (-) cable (4) through battery side and connect it to the battery disconnect switch. Secure cable with nut (19) and star washer (20) by using a wrench.
- (9) Use a socket to install three capscrews (16), three flat washers (17) and three clamps (18).



4-32. BATTERY CABLES AND TERMINALS - SERVICE/REPLACE (Cont'd)

- (10) Connect cable (15) from shunt to tractor frame. Use a wrench to install capscrew (13) and flat washer (14) that secure cable.
- (11) Use a wrench to install two capscrews (11) and two clamps (12).

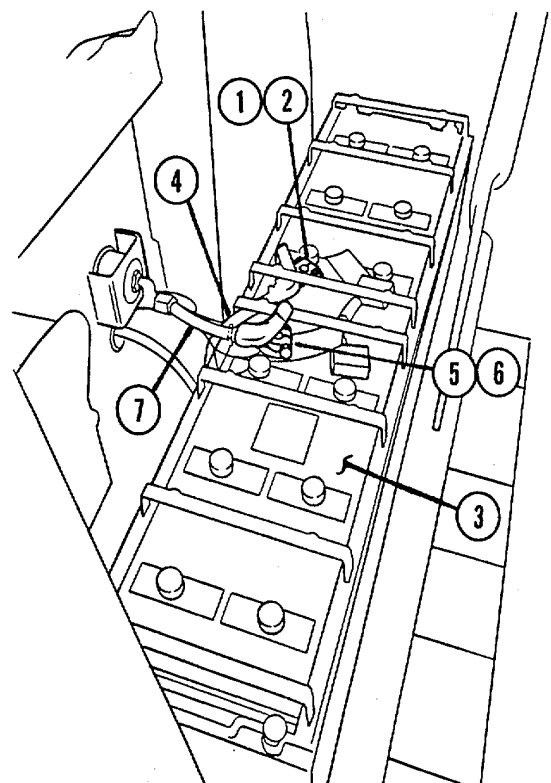
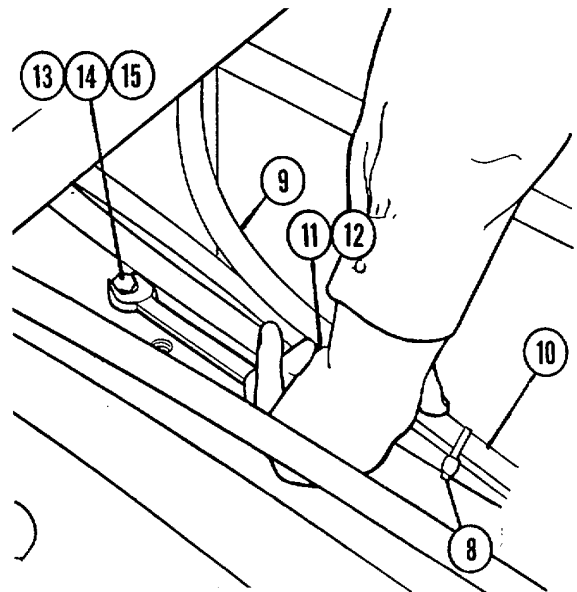
NOTE

The capscrews (11) and clamps (12) are located inside the bell housing and on frame under seat.

- (12) Install tie straps (8) to secure cables (9 and 10) on frame.
- (13) Connect positive (+) cable (7) from starting motor solenoid to positive post (+) on battery (3). Use a wrench to tighten nut (5) on cable terminal (6).
- (14) Connect negative (-) cable (4) from battery disconnect switch to negative post (-) on battery. Use a wrench to tighten nut (1) on cable terminal (2).
- (15) Install battery cover assembly. See TM5-2410-237-10.
- (16) Install floor plates. See page 10-44.

d. Place In Service

Check batteries for proper operation.



Section IV. WIRING HARNESSSES

4-33. GENERAL

This section provides maintenance procedures assigned to the organizational level for the wiring harnesses. To find a specific maintenance procedure, see the maintenance task summary below.

4-34. WIRING HARNESSSES MAINTENANCE TASK SUMMARY

TASK PARA	PROCEDURES	PAGE NO.
4-35	Chassis Wiring Harnesses - Replace/Repair	4-74
4-36	Starting Receptacle - Replace	4-76
4-37	Fuses - Replace	4-78

4-35. CHASSIS WIRING HARNESSSES - REPLACE/REPAIR

This task covers:

- a. Removal
- b. Repair
- c. Installation
- d. Place In Service

INITIAL SETUP

Applicable Configurations
All

Materials/Parts
Wire (As required in Appendix E)
I.D. Tags

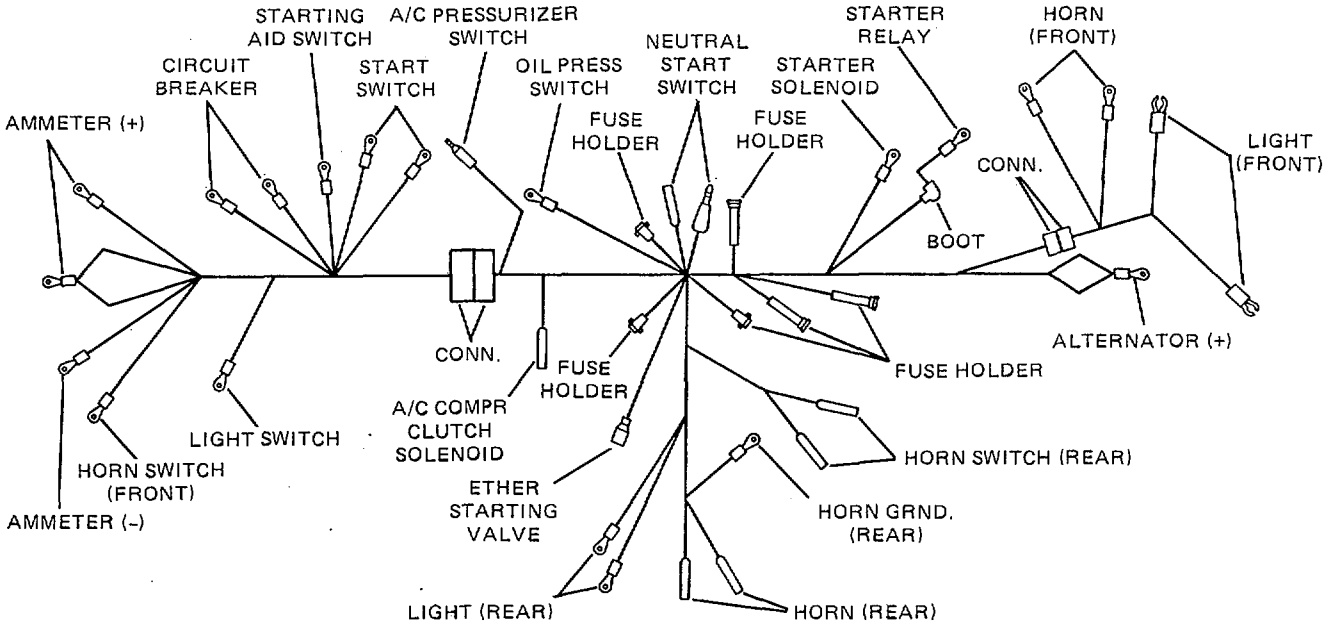
Common Tools

Shop Equipment, Automotive	<u>Equipment Condition</u>
Maintenance & Repair,	Engine cool.
Common #1 Less Power	
NSN 4910-00-754-0654	

a. Removal

(3) Tag and disconnect faulty wire(s) from terminals.

- (1) Disconnect ground cable from battery See page 4-67.
- (2) Remove all clamps, clips, tie straps and tape necessary to free faulty wire(s).
- (3) Tag and disconnect faulty wire(s) from terminals.



4-35. CHASSIS WIRING HARNESSSES - REPLACE/REPAIR (Cont'd)

b. Repair

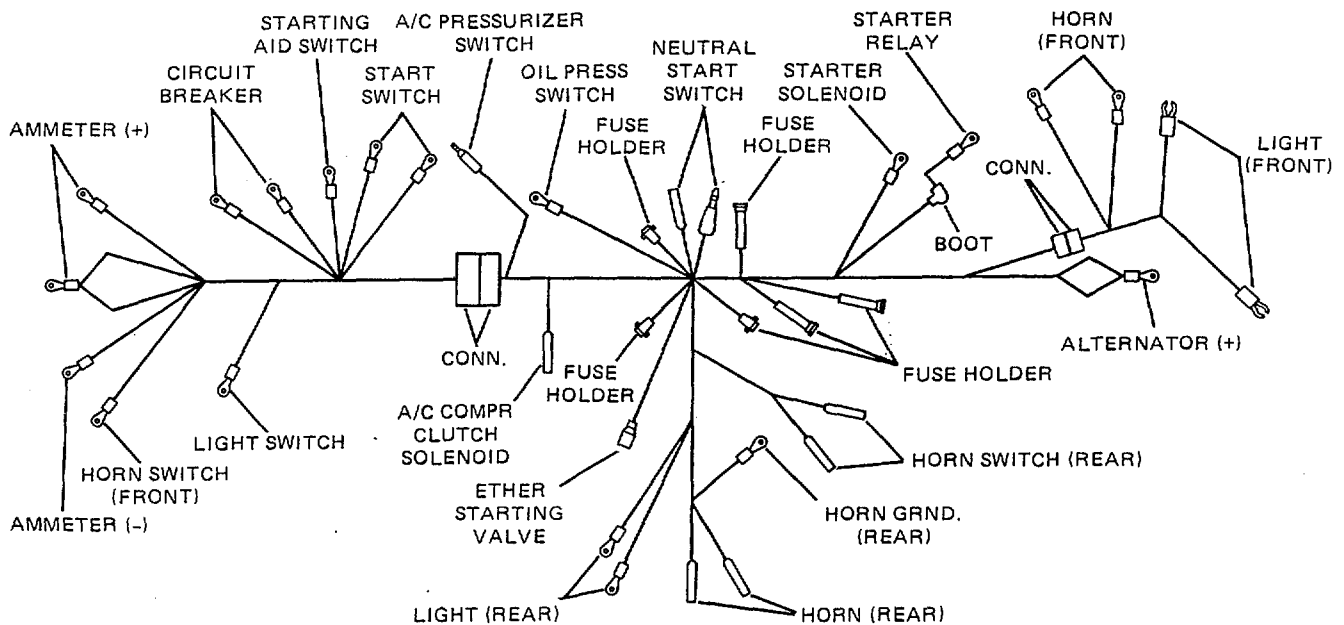
Fabricate replacement wire(s) of the same gage, length and terminal type as the wire(s) removed. See Appendix E for manufacturing instructions.

c. Installation

- (1) Connect wire(s) to proper terminals. Be sure to make good contact.
- (2) Connect ground cable to battery. See page 4-67.
- (3) Install clamps, clips, tie straps and tape as needed to secure wire(s).

d. Place In Service

Perform operational check for proper function.



4-36. STARTING RECEPTACLE - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUPApplicable Configurations

All

Common Tools

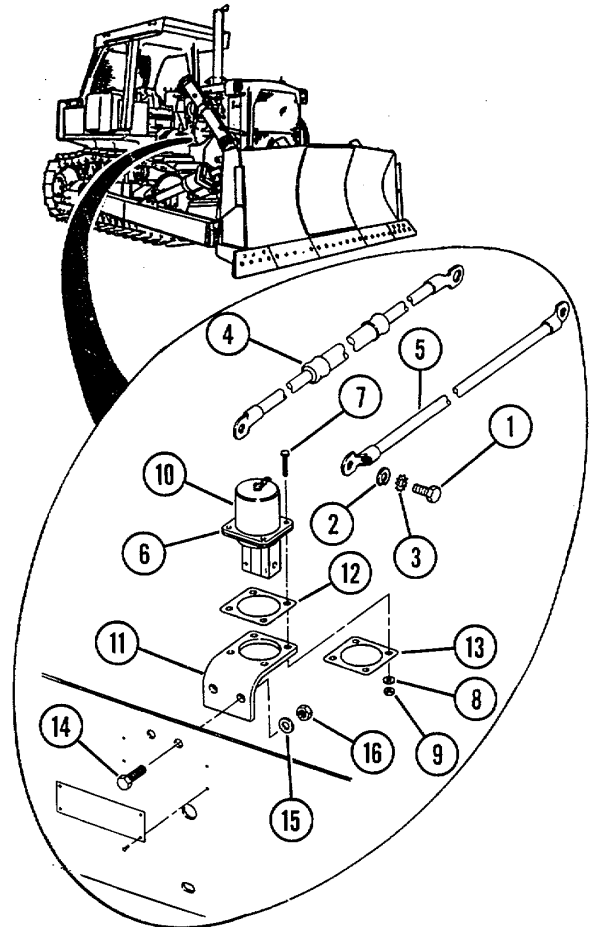
Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal

WARNING

To prevent electrical shock, make sure battery disconnect switch is in the "OFF" position. Disconnect negative battery cable.

- (1) Use a wrench to remove two capscrews (1), two lockwashers (2) and two star washers (3). Remove cables (4 and 5) from electrical adapter (6).
- (2) Use two wrenches to remove four capscrews (7), four washers (8) and four nuts (9).
- (3) Remove cap (10) and electrical adapter (6) from bracket (11) and insulators (12 and 13).
- (4) To remove bracket, use a socket and a wrench to remove two capscrews (14), two washers (15), two nuts (16), and two insulators (12 and 13).



4-36. STARTING RECEPTACLE - REPLACE (Cont'd)

b. Installation

- (1) Align bracket (11) and insert two capscrews (12). Attach two washers (13) and two nuts (14). Tighten with a wrench and a socket.
- (2) Install electrical adapter (6), insulators (12 and 13) and cap (10) into bracket (11) and use two wrenches to install four capscrews (7), four washers (8), and four nuts (9).
- (3) Connect cables (4 and 5) to electrical adapter (6) and use a wrench to install two capscrews (1), two star washers (3), and two lockwashers (2).

c. Place In Service

Start engine and check for proper operation.

4-37. FUSES - REPLACE

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Applicable Configurations
All

Materials/Parts

D. Tags

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

Equipment Condition

Tractor parked on level ground.
Engine cool.

a. Removal

- (1) Refer to table A for location of in-line fuse holder for each circuit and type of fuse required.

TABLE A

Location	Circuit	Fuse Type
CAB WIRING HARNESS	Front Defrost Fan Rear Defrost Fan Front Wiper Motor Rear Wiper Motor	AGC-15EX (15A 32V) SFE-15 1/4 - X1 - 1/4 SFE-15 1/4 - X1 - 1/4 SFE-15 1/4 - X1 - 1/4
INSIDE DASH	Heater Fan Ether Starting Aid Dash Lights Oil Pressure Gage	FO2A (32V 15A) AGC-5TX (5A 32V) AGC-15EX (15A 32V) AGC-15EX (15A 32V)
REAR, RIGHT OF ENGINE	Front Horn Exterior Lights Backup Alarm	AGC-15EX (15A 32V) AGC-15EX (15A 32V) AGC-15EX (15A 32V)

4-37. FUSES - REPLACE (Cont'd)

NOTE

Removal of dash cover is only required for fuses inside dash.

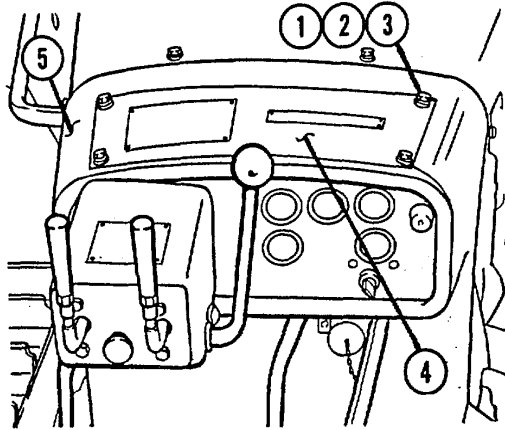
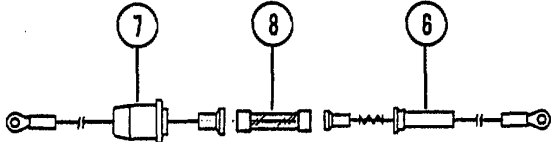
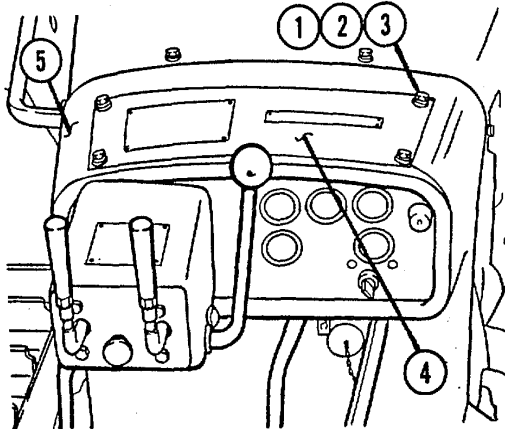
CAUTION

Turn battery disconnect switch to OFF before working inside dash assembly. Failure to follow this precaution could result in personal injury.

- (2) Use a wrench to remove four capscrews (1), four lockwashers (2), four washers (3) and cover (4) from top of dash assembly (5).
- (3) Hold body (6) of fuse holder assembly with one hand and cap (7) with the other. Push cap against body and twist cap counterclockwise.
- (4) Remove fuse (8) from body. Discard fuse.

b. Installation

- (1) Place new fuse (8) of same type and rating in body (6) of fuse holder assembly.
- (2) Holding body (6) with one hand, place cap (7) on body aligning prongs of cap with slots in body.
- (3) Push fuse (8) down with cap (7) and turn cap clockwise.
- (4) If required, install cover (4) on top of dash assembly (5) with four capscrews (1), four lockwashers (2) and four washers (3). Use a socket to tighten capscrews.



**CHAPTER 5
TRANSMISSION MAINTENANCE**

5-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the transmission. To find a specific maintenance procedure, see the maintenance task summary below.

5-2. TRANSMISSION MAINTENANCE TASK SUMMARY

TASK PARA	PROCEDURES	PAGE NO.
5-3	Transmission Selector Lever and Linkage - Adjust/ Service/Replace	5-2
5-4	Transmission Safety Lock Lever - Replace	5-11
5-5	Torque Divider - Service	5-14
5-6	Transmission Assembly - Service	5-16
5-7	Transmission Oil Cooler Lines - Replace	5-18
5-8	Transmission Oil Cooler - Replace/Repair	5-22
5-9	Transmission Oil Lines - Replace	5-27
5-10	Transmission and Steering Clutch Oil Filter Assembly - Service/Replace/Repair	5-29
5-11	Transmission Oil Magnetic Screen Assembly - Service/Replace	5-33
5-12	Transmission Oil Sampling Valve - Replace	5-36

5-3. TRANSMISSION SELECTOR LEVER AND LINKAGE - ADJUST/SERVICE/REPLACE

This task covers:

- a. Removal of lever and linkage
- b. Installation of lever and linkage
- c. Adjustment of linkage
- d. Place In Service

INITIAL SETUP
Applicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

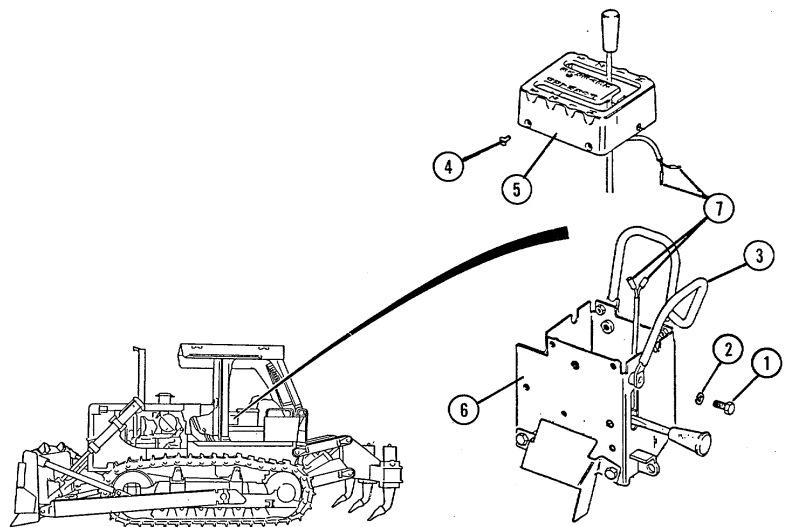
Wire I.D. tags

Equipment Condition

Floor plates removed. (page 10-44)
Seat removed. (page 10-46) Do not
remove seat base.

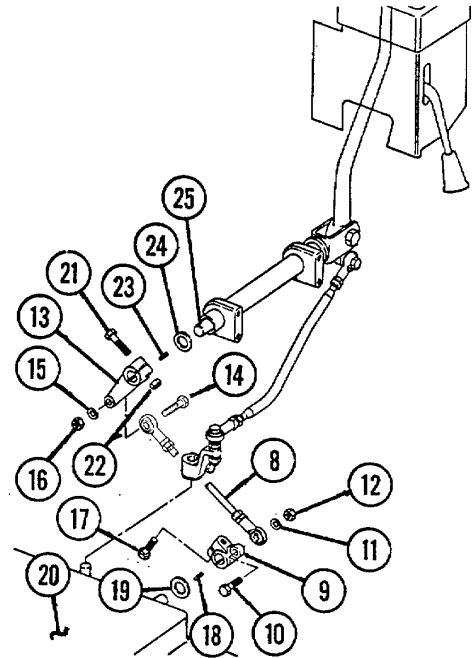
a. Removal of Levers and Linkage

- (1) Use a wrench to remove three capscrews (1), lockwashers (2) and guard (3). Using a flat blade screwdriver remove four screws (4) that hold guide cover (5) to transmission control box (6).
- (2) Partially remove guide cover (5) and tag two wires (7) for identification during installation.
- (3) Disconnect two wires (7) and remove guide cover (5) completely.

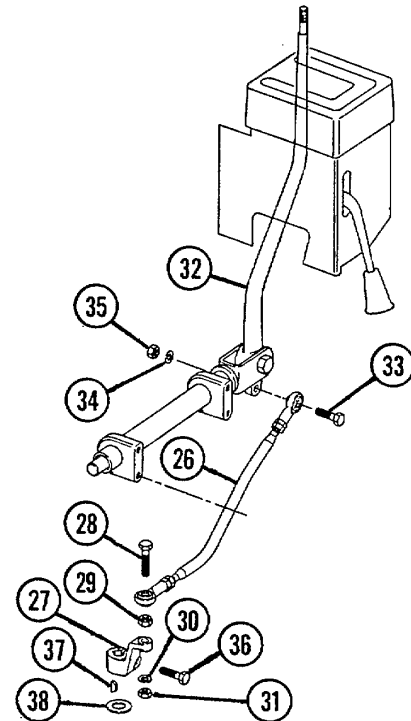


5-3. TRANSMISSION SELECTOR LEVER AND LINKAGE - ADJUST/SERVICE/REPLACE (Cont'd)

- (4) Disconnect one end of rod assembly (8) from lever (9) by using two wrenches to remove capscrew (10), lockwasher (11) and nut (12).
- (5) Disconnect other end of rod assembly (8) from lever (13) by using two wrenches to remove capscrew (14), lockwasher (15) and nut (16). Remove rod assembly (8).
- (6) Use a wrench to loosen capscrew (17) and remove lever (9), key (18) and washer (19) from transmission (20).
- (7) Use two wrenches to remove capscrew (21) and nut (22) from lever (13) and slide lever (13), key (23) and spacer (24) from shaft (25).

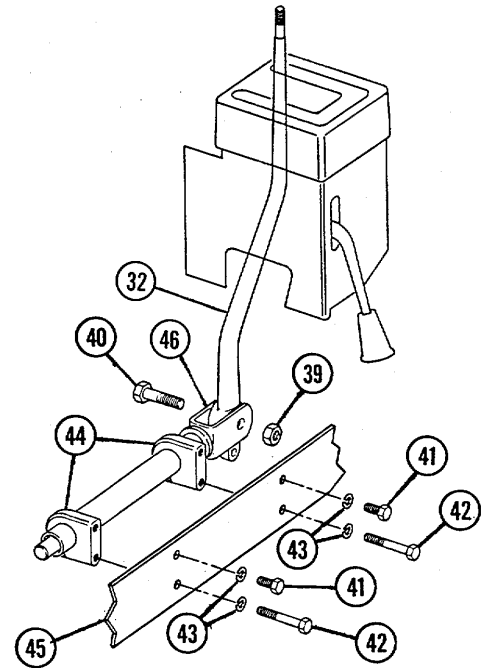


- (8) Disconnect one end of rod assembly (26) from lever (27) by using two wrenches to remove capscrew (28), nut (29), lockwasher (30) and nut (31).
- (9) Disconnect other end of rod assembly (26) from lever (32) by using two wrenches to remove capscrew (33), lockwasher (34) and nut (35). Remove rod assembly (26).
- (10) Use a wrench to loosen capscrew (36) and remove lever (27), key (37) and flat washer (38) from transmission (20).



5-3. TRANSMISSION SELECTOR LEVER AND LINKAGE - ADJUST/SERVICE/REPLACE (Cont'd)

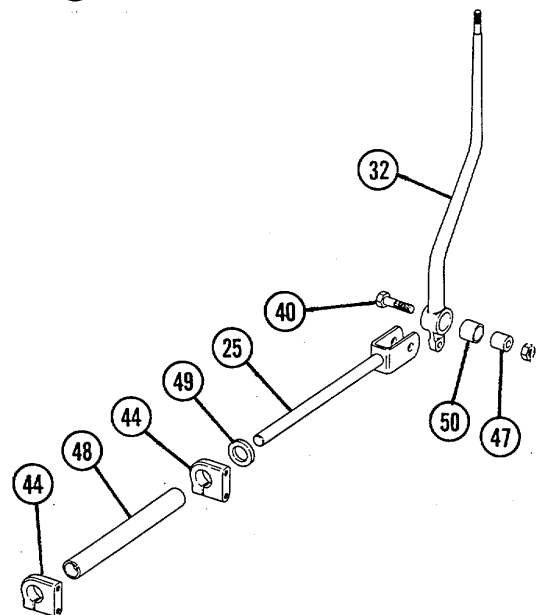
- (11) Use two wrenches to remove locknut (39) from capscrew (40).
- (12) Use a wrench to remove two short capscrews (41), two long capscrews (42) and four lockwashers (43) holding two clamps (44) to plate (45).



- (13) Move shaft assembly (46) and remove capscrew (40) and spacer (47).
- (14) Slide support (48) and spacer (49) from shaft (25).
- (15) Press bushing (50) from lever (32) if necessary.
- (16) Remove clamps (44) from support (48).

b. Installation of Lever and Linkage

- (1) Install two clamps (44) into position on support (48).
- (2) If removed, press bushing (50) into lever (32).
- (3) Install spacer (49) and support (48) on shaft (25).

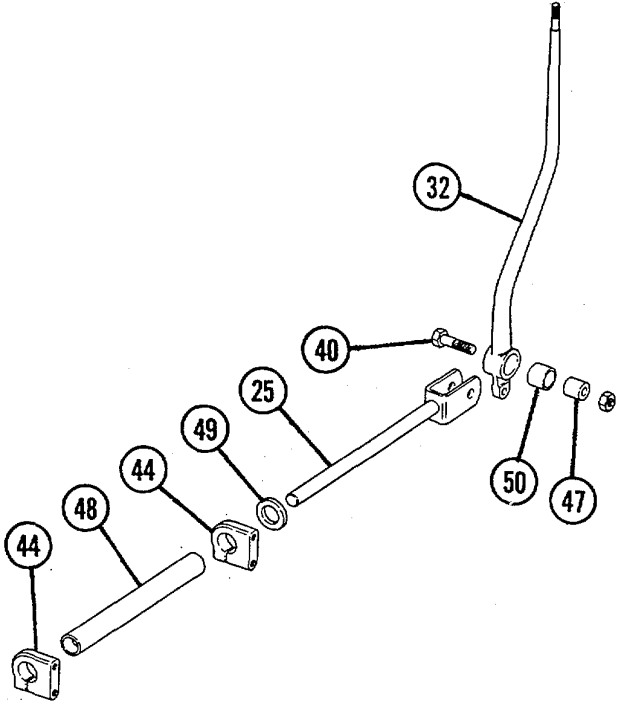


5-3. TRANSMISSION SELECTOR LEVER AND LINKAGE - ADJUST/SERVICE/REPLACE (Cont'd)

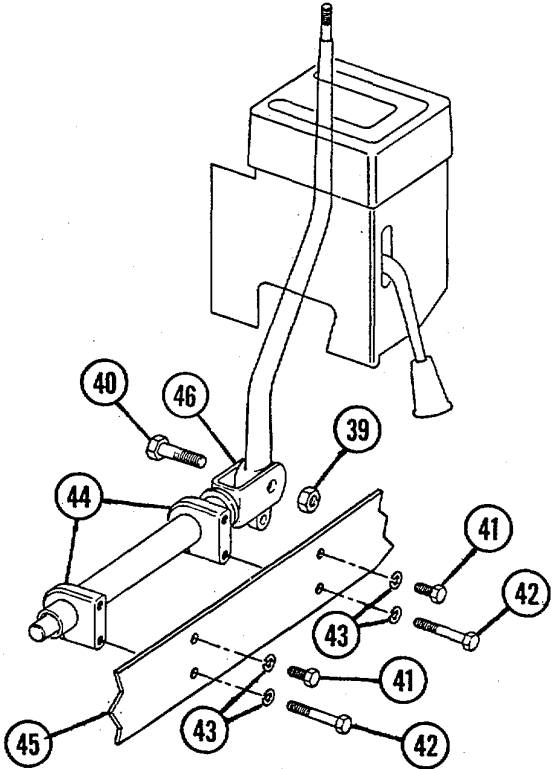
- (4) Hold shaft assembly (46) and lever (32) in place and install capscrew (40) and spacer (47).
- (5) Hold shaft assembly (46) in position and align holes in clamps (44) with holes in plate (45).

NOTE

To install clamps properly in STEP six, short capscrews must be installed in top holes of clamp and long capscrews must be installed in bottom holes of clamp.

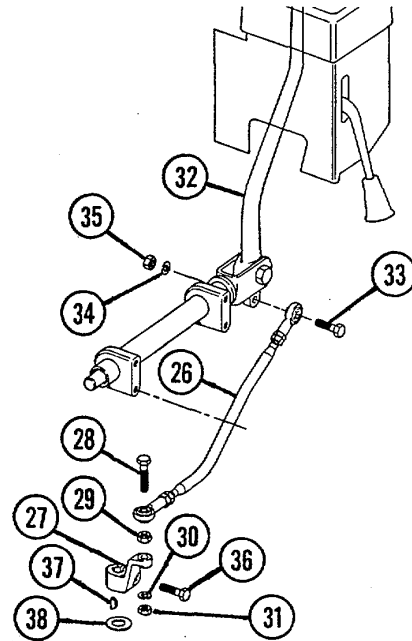


- (6) Install clamps (44) to plate (45) with two short capscrews (41), two long capscrews (42) and four lockwashers (43). Tighten capscrews using a wrench.
- (7) Use two wrenches and install locknut (39) onto capscrew (40).

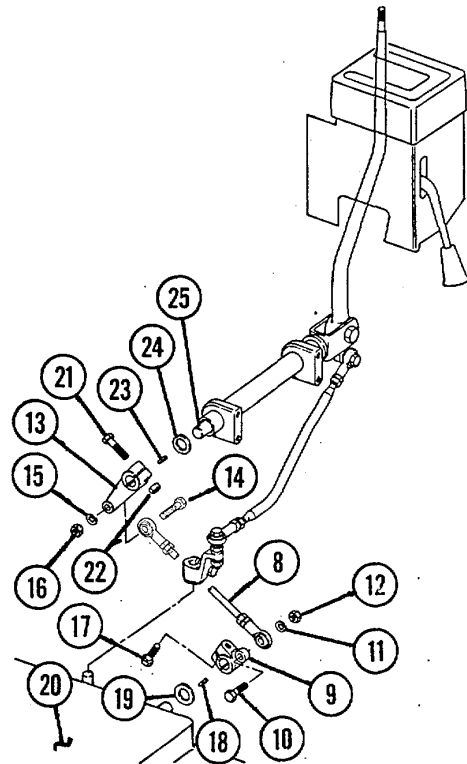


5-3. TRANSMISSION SELECTOR LEVER AND LINKAGE - ADJUST/SERVICE/REPLACE (Cont'd)

- (8) Place washer (38), lever (27) and key (37) in position on transmission (20) and tighten capscrow (36) with a wrench.
- (9) Install one end of rod assembly (26) to lever (32) with capscrow (33), lockwasher (34) and nut (35). Tighten capscrow (33) using two wrenches.
- (10) Install other end of rod assembly (26) to lever (27) with capscrow (28), nut (29), lockwasher (30) and nut (31). Tighten capscrow with two wrenches.

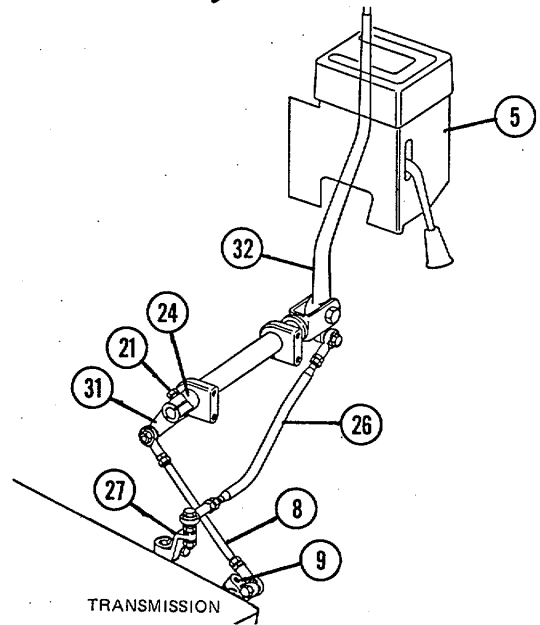
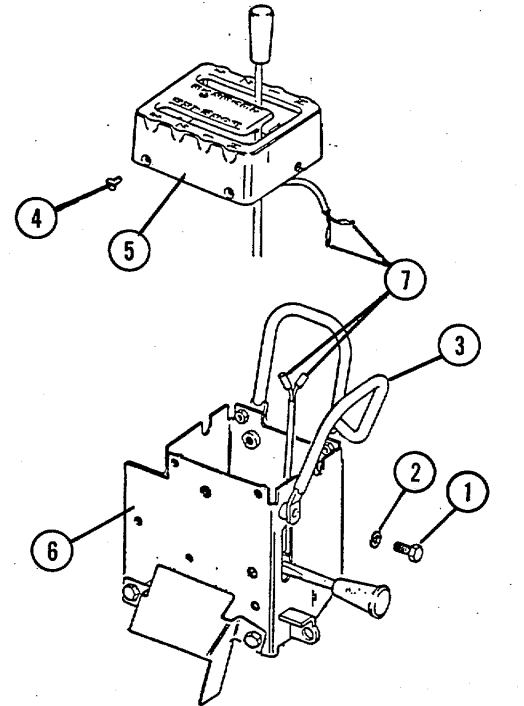


- (11) Install spacer (24), lever (13) and key (23) on shaft (25) and install capscrow (21) and nut (22). Tighten capscrow (21) using two wrenches.
- (12) Place washer (19), lever (9) and key (18) in position on transmission (20) and tighten capscrow (17) using a wrench.
- (13) Install one end of rod assembly (8) to lever (13) with capscrow (14), lockwasher (15) and nut (16). Tighten capscrow (14) using two wrenches.
- (14) Install other end of rod assembly (8) to lever (9) with capscrow (10), lockwasher (11) and nut (12). Tighten capscrows (10) using two wrenches.



5-3. TRANSMISSION SELECTOR LEVER AND LINKAGE - ADJUST/SERVICE/REPLACE (Cont'd)

- (15) Connect two wires (7) and place guide cover (5) in position on transmission control box (6).
- (16) Install four screws (4).
- (17) Hold guard (3) in position and install three lockwashers (2) and capscrews (1). Tighten capscrews using a wrench.

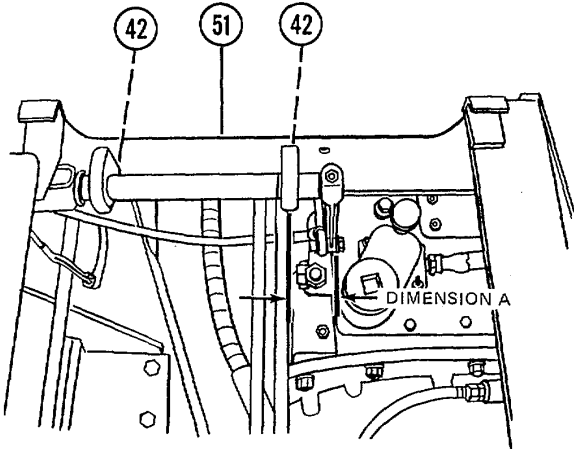


c. Adjustment of Linkage

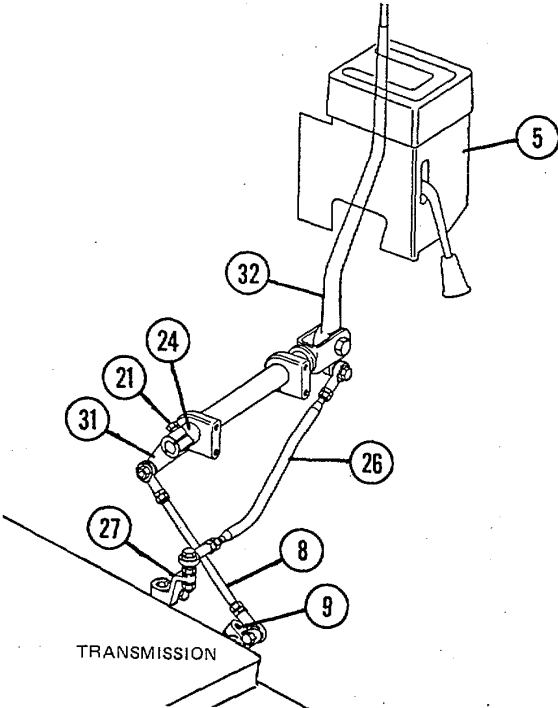
- (1) Use a wrench to loosen two capscrews (21) on lever (13) and put a 0.030 in. (0.76 mm) thickness gage between spacer (24) and lever (13).

5-3. TRANSMISSION SELECTOR LEVER AND LINKAGE - ADJUST/SERVICE/REPLACE (Cont'd)

- (2) Loosen two capscrews (42) to adjust shaft support (51) so that dimension A is 1.67 in. (42.4 mm) and tighten capscrews (42).

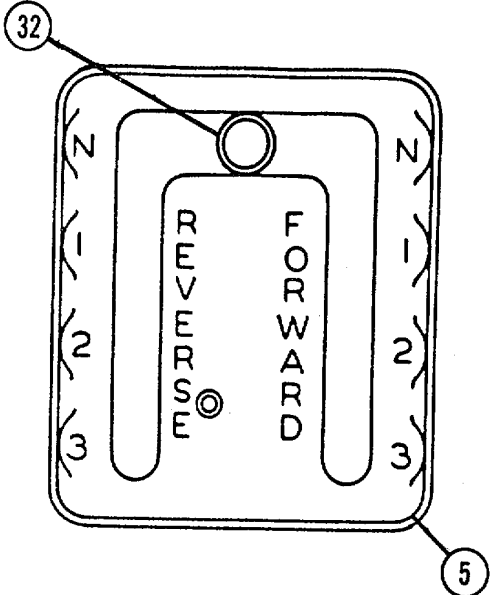


- (3) Disconnect rod (26) from levers (27) and (32). See Removal of Levers and Linkage steps eight and nine above, in this paragraph.
- (4) Put lever (27) in FORWARD "F" position.
- (5) Disconnect rod (8) from levers (9) and (13). See Removal of Levers and Linkage steps four and five above, in this paragraph.
- (6) Put lever (9) in NEUTRAL "N" position.

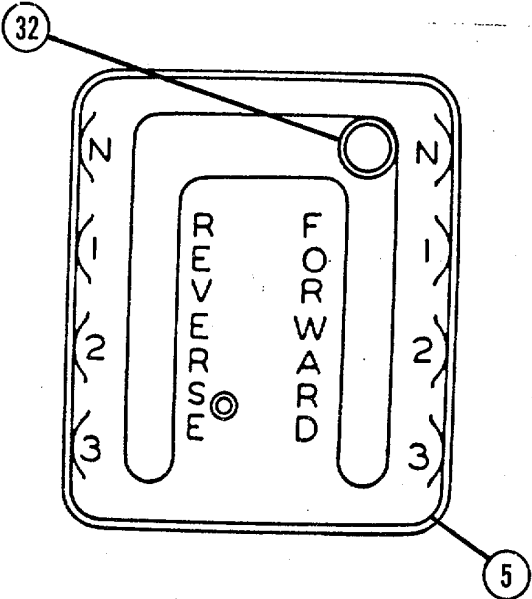


5-3. TRANSMISSION SELECTOR LEVER AND LINKAGE - ADJUST/SERVICE/REPLACE (Cont'd)

- (7) Put lever (32) in the center of the NEUTRAL opening of guide cover (5).
- (8) Adjust bolts on ends of rod (8) until rod (8) can be installed between levers (9) and (13).
- (9) Connect rod (8) to levers (9) and (13). See Installation of Levers and Linkage, STEPS eleven and twelve in this paragraph.



- (10) Put lever (32) in front of the FORWARD slot of NEUTRAL opening of guide cover (5).

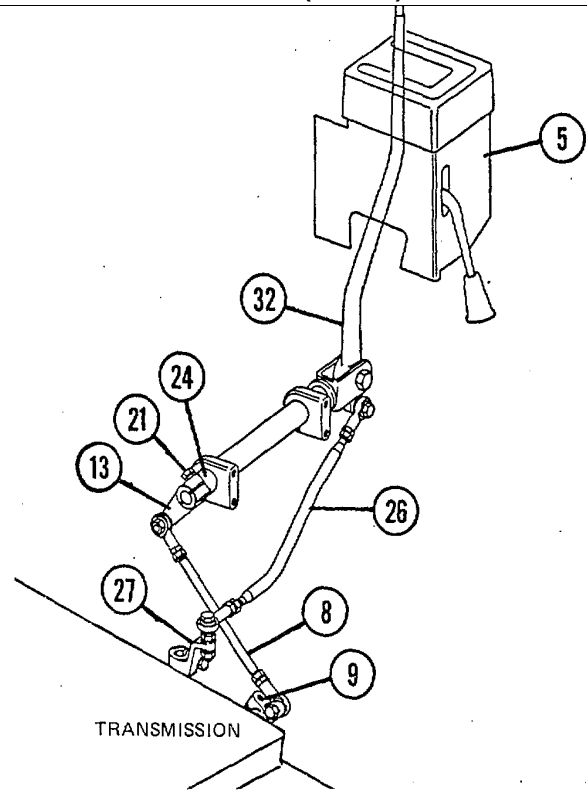


5-3. TRANSMISSION SELECTOR LEVER AND LINKAGE - ADJUST/SERVICE/REPLACE (Cont'd)

- (11) Adjust bolts on ends of rod (26) until rod (26) can be installed between levers (27) and (32).
- (12) Connect rod (26) to levers (27) and (32). See Installation of Levers and Linkage, STEPS seven and eight above, in this paragraph.
- (13) Install seat. See page 10-49.
- (14) Install floor plates. See page 10-44.

d. Place In Service

Test drive tractor in all speeds.



5-4. TRANSMISSION SAFETY LOCK LEVER - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUPApplicable Configurations

All

Common Tools

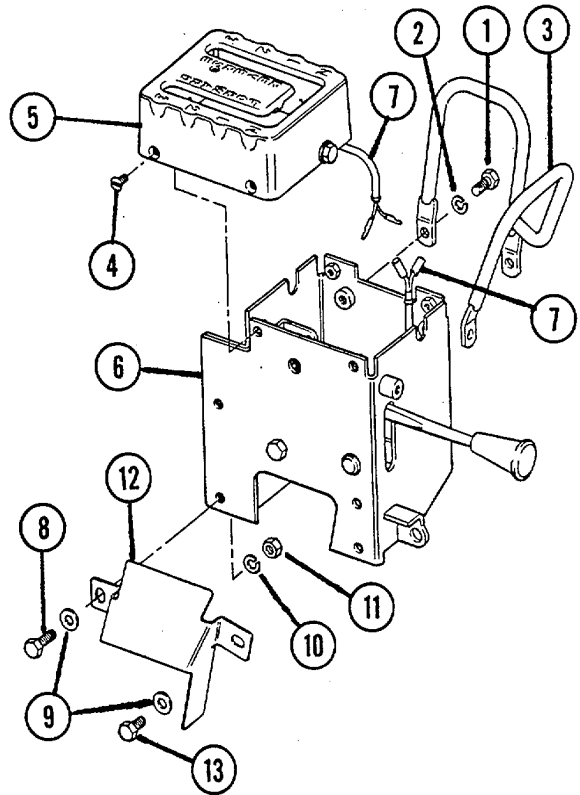
Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

Cotter pins (15) (23)
Wire I.D tags

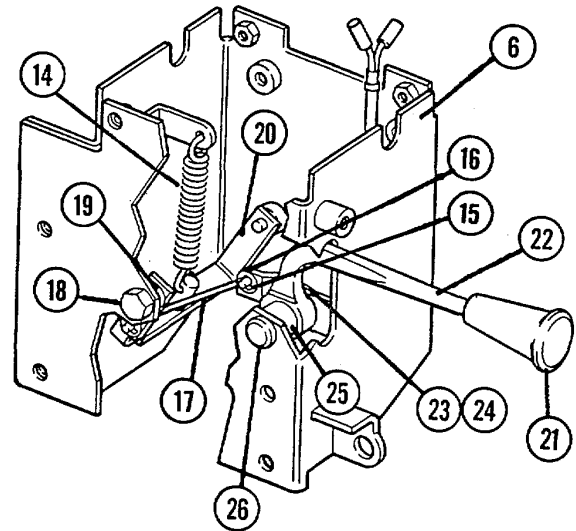
a. Removal

- (1) Use a wrench and remove three capscrews (1), lockwashers (2) and guard (3).
- (2) Remove four screws (4) that hold guide cover (5) in position on transmission control box (6).
- (3) Partially remove guide cover (5) and tag two wires (7) for identification during installation.
- (4) Disconnect two wires (7) and remove guide cover (5) completely.
- (5) Use two wrenches to remove capscrew (8), washer (9), lockwasher (10), and nut (11) from one side of shield (12).
- (6) Use two wrenches to remove capscrew (13), washer (9), lockwasher (10) and nut (11) from other side of shield (12) and remove shield (12).



5-4. TRANSMISSION SAFETY LOCK LEVER - REPLACE (Cont'd)

- (7) Remove spring (14).
- (8) Remove two cotter pins (15), two washers (16) and rod (17). Discard cotter pins (15).
- (9) Use a wrench to remove two capscrews (18), two lockwashers (19) and lever (20) from transmission control box (6).
- (10) Unscrew knob (21) and remove from lever (22).
- (11) Remove cotter pin (23), washer (24), lever (22), spacer (25), and pin (26) from transmission control box (6). Discard cotter pin (23).

**b. Installation**

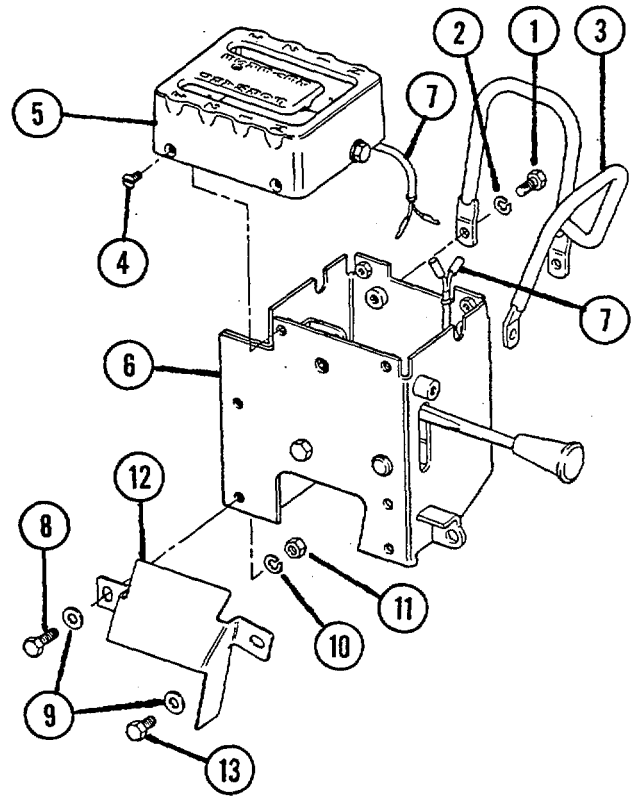
- (1) Position pin (26) in transmission control box (6) and install spacer (25), lever (22), washer (24) and new cotter pin (23).
- (2) Screw knob (21) onto lever (22).
- (3) Install lever (20) in transmission control box (6) with two screws (18) and two lockwashers (19).
- (4) Install rod (17) with two washers (16) and two new cotter pins (15).
- (5) Install spring (14).

5-4. TRANSMISSION SAFETY LOCK LEVER - REPLACE (Cont'd)

- (6) Position shield (12) on transmission control box (6) and use two wrenches to install capscrew (13), washer (9), lockwasher (10) and nut (11).
- (7) Use two wrenches to install capscrew (8), washer (9), lockwasher (10) and nut (11).
- (8) Connect two wires (7) and position guide cover (5) on transmission control box (6).
- (9) Install four screws (4).
- (10) Use a wrench to install guard (3) with three capscrews (1) and lockwashers (2).

c. Place In Service

Check transmission safety lock lever for proper operation.



5-5. TORQUE DIVIDER - SERVICE

This task covers:

- a. Removal of Suction Screen
- b. Cleaning and Inspection of Suction Screen
- c. Installation of Suction Screen
- d. Place in Service

INITIAL SETUP

Applicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

Gasket (6)
Transmission Oil OE/HDO-30 (Refer to
L05-2410-237-12)
Thread Sealant (App D, Item 17)

Equipment Condition

Engine cool.
Transmission oil drained (page 5-16)
Front crankcase guard removed (page
10-11)

a. Removal of Suction Screen

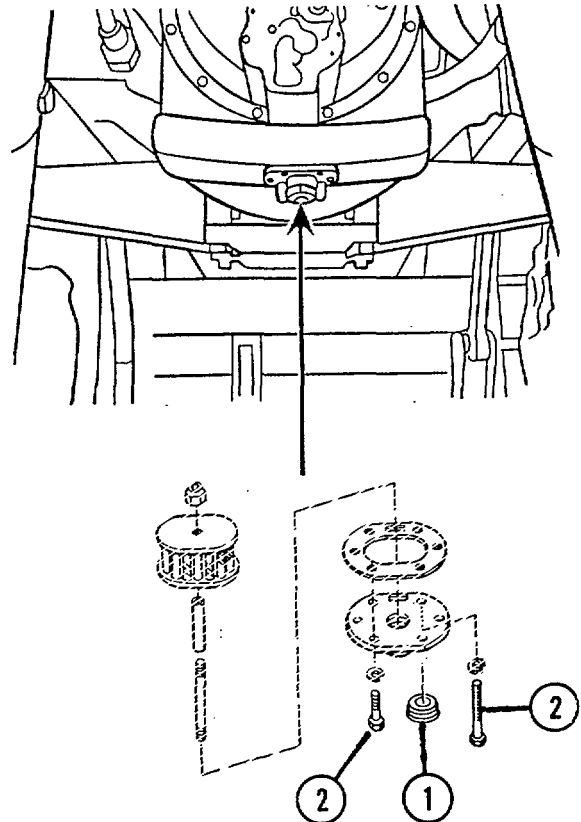
NOTE

Wash suction screen whenever common oil compartment is drained for repairs on brakes, transmission or torque divider.

- (1) Use a square allen wrench to remove drain plug (1) and drain oil.

NOTE

Capscrews (2) must be installed in the same locations that they were removed from. Mark each individual bolt and its corresponding hole to assure proper reassembly.



5-5. TORQUE DIVIDER - SERVICE (Cont'd)

- (2) Use a socket to remove six capscrews (2), lockwashers (3) and plate (7) with assembled parts.
- (3) Use a wrench to remove locknut (4) and remove screen assembly (5).
- (4) Remove and discard gasket (6).

b. Cleaning and Inspection of Suction Screen

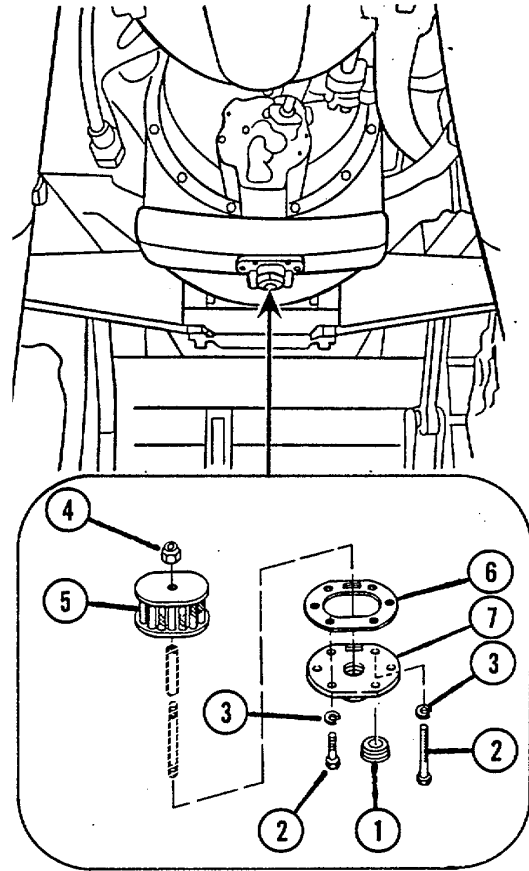
- (1) See page 2-156 for Cleaning Instructions.
- (2) See page 2-154 for Inspection Instructions.

c. Installation of Suction Screen

- (1) Install new gasket (6) and screen assembly (5) on plate (7) with locknut (4).
- (2) Tighten locknut (4).
- (3) Install lockwashers (3) and capscrews (2) in the same order they were removed.
- (4) Put thread sealant on drain plug (1) threads. Install plug (1) and tighten.
- (5) Fill the transmission oil to the correct level. See page 5-17.
- (6) Install front crankcase guard. See page 10-12.

d. Place In Service

Start engine and check for leaks.



5-6. TRANSMISSION ASSEMBLY - SERVICE

This task covers:

Change Lubricant and Breather

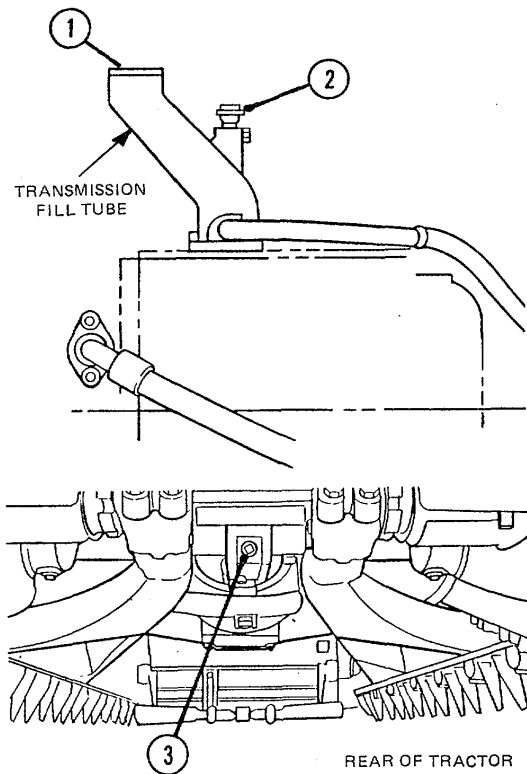
INITIAL SETUP ,Applicable Configurations

All

Common ToolsTool Kit, General Mechanics
NSN 5180-00-699-5273Materials/PartsTransmission Oil OE/HDO-30
Refer to L05-2410-237-12
Transmission breather (2)Equipment ConditionFront crankcase guard removed (page
10-11)Change Lubricant and Breather**NOTE**

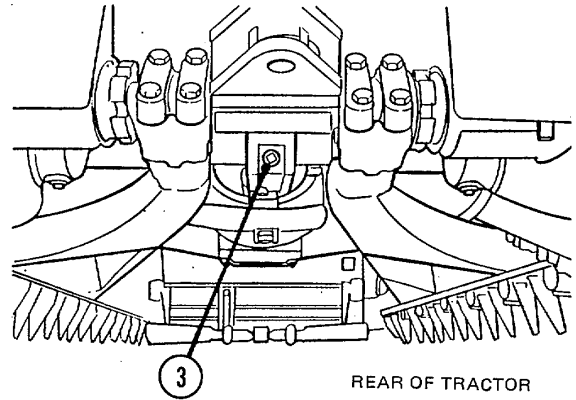
Lift seat forward to access transmission breather and fill pipe.

- (1) Remove fill pipe cap (1).
- (2) Use a wrench to remove transmission breather (2) and discard.
- (3) Install a new transmission breather (2) and tighten with a wrench.
- (4) Remove drain plug (3) and allow transmission to drain.
- (5) Change transmission oil filter. See page 5-29.
- (6) Clean transmission oil magnetic screen assembly. See page 5-33.

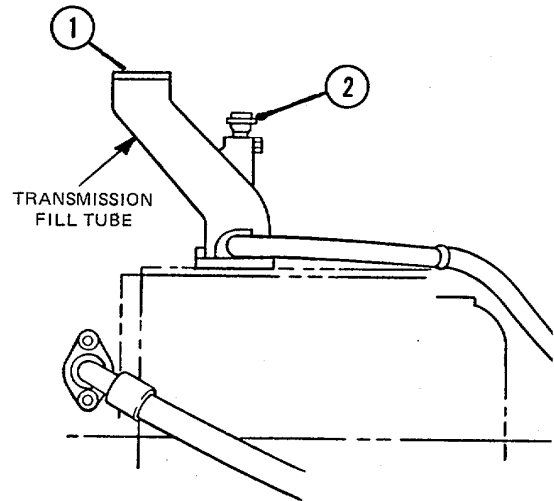


5-6. TRANSMISSION ASSEMBLY SERVICE (Cont'd)

- (7) Clean torque divider suction screen. See page 515.
- (8) Install drain plug (3) and tighten.
- (9) Fill transmission with oil to top of reservoir.



- (10) Install fill pipe cap (1).
- (11) Install crankcase guard. See page 1011.



5-7. TRANSMISSION OIL COOLER LINES REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

Seals (8) (9) (15) (16) (20) (21) (24) (28)
Caps and Plugs

Equipment Condition

Engine cool.
Transmission fluid drained. (page 5-16)
Floor plates removed. (page 10-44)

a. Removal

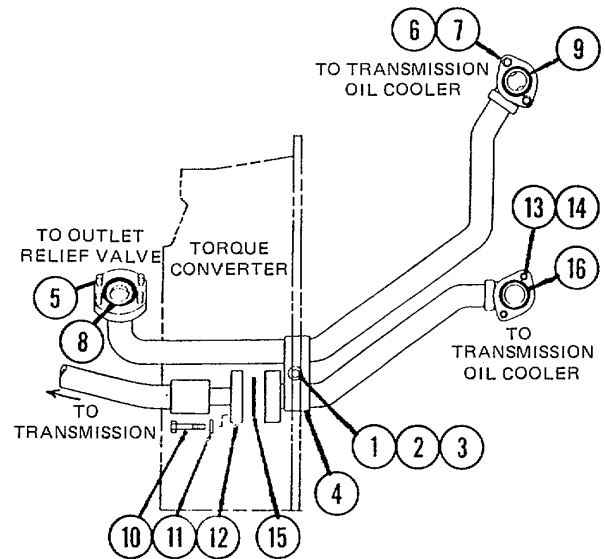
- (1) Tilt seat forward. Slide seat back until hinge pins are free of hooks on seat base. Remove seat assembly by lifting from tractor.
- (2) Use two wrenches, loosen one capscrew (1), one lockwasher (2), one nut (3) and a clamp set (4).

NOTE

Provide pans to collect excess fluid when disconnecting cooler lines.

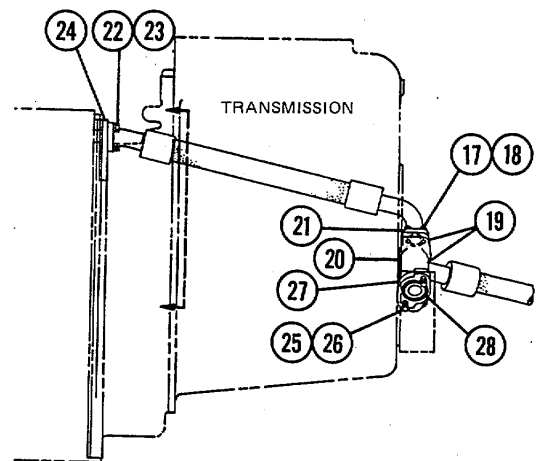
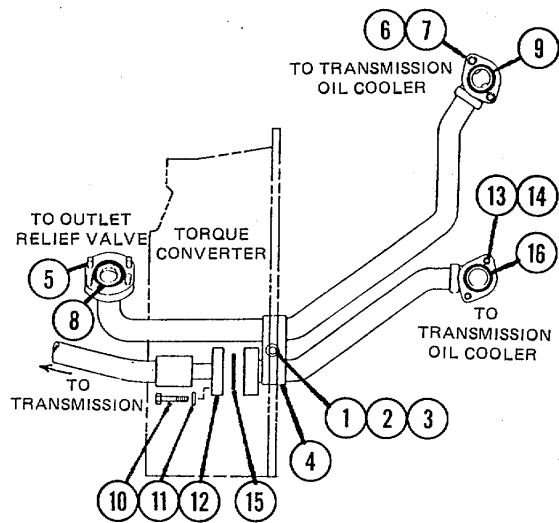
CAUTION

Place protective caps on all transmission system openings to prevent foreign material from contaminating the system.



5-7. TRANSMISSION OIL COOLER LINES REPLACE (Cont'd)

- (3) Use a wrench to remove four capscrews (5) holding the cooler line tube assembly to the torque converter relief valve.
- (4) Use a wrench to remove two capscrews (6) and two lockwashers (7) holding the cooler line tube assembly to the cooler oil inlet. Separate tube assembly from relief valve and oil inlet. Lift out cooler line tube assembly. Remove and discard seals (8, 9) from connections.
- (5) Use a wrench to remove four capscrews (10), four washers (11) and two flange halves (12) holding hose assembly to tube assembly.
- (6) Use a wrench to remove two capscrews (13) and two lockwashers (14) that hold cooler line tube assembly to the cooler oil outlet. Separate connections and lift out oil cooler line tube assembly. Remove clamp (4) from tube assembly. Remove seal (15) and seal (16) from cooler tube assembly ends and discard.
- (7) Use a wrench to remove eight capscrews (17), eight washers (18) and four flange halves (19). Disconnect fittings from diverter manifold. Remove seals (20, 21) Discard seals.
- (8) Remove seat (see page 1046) to expose relief valve for brake cooling and lubrication. Use a socket to remove two capscrews (22) and two lockwashers (23). Remove hose assembly. Remove seal (24) and discard.

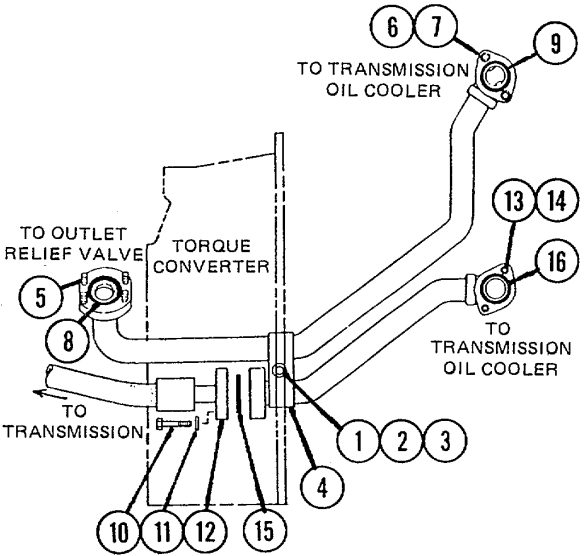
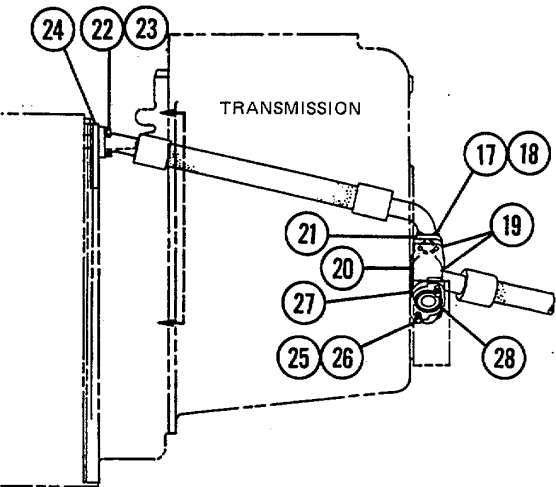


5-7. TRANSMISSION OIL COOLER LINES REPLACE (Cont'd)

- (9) If required, use a wrench to remove two bolts (25), two lockwashers (26) and one diverter manifold (27). Remove seal (28) and discard.

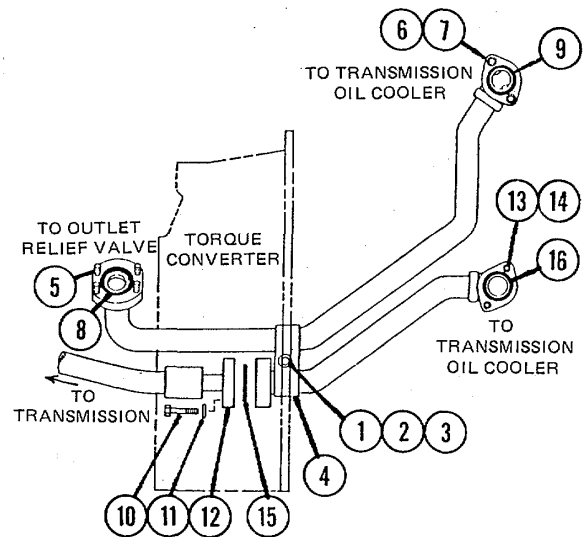
b. Installation

- (1) If diverter manifold was removed, place seal (28) in position on transmission manifold. Place diverter manifold (27) in position and secure with two capscrews (25) and two lockwashers (26). Tighten with a wrench.
- (2) Place seal (24) and hose assembly in position. Use a wrench to insert two capscrews (22) and two lockwashers (23). Start both capscrews.
- (3) Place seal (21), hose assembly and two flange halves (19) in position on diverter manifold 27). Secure with four capscrews (17) and four lockwashers (18). Tighten using a wrench. Tighten two capscrews (22) using a socket.
- (4) Place seal (20) and hose assembly in position on diverter manifold 27). Secure with four capscrews (17) and four lockwashers (18). Tighten four capscrews using a wrench.
- (5) Place seal (16) and tube assembly in position on oil cooler outlet. Secure with two capscrews (13) and two lockwashers (14). Tighten using a wrench.
- (6) Place seal (15), hose assembly and two flange halves (12) in position with tube assembly. Secure with four capscrews (10) and four washers (11). Tighten using a wrench.



5-7. TRANSMISSION OIL COOLER LINES REPLACE (Cont'd)

- (7) Place seal (9) and tube assembly in position at oil cooler inlet. Secure with two capscrews (6) and two lockwashers (7). Tighten using a wrench.
- (8) Position clamp (4) around tube assemblies and secure with one capscrew (1), one lockwasher (2) and one nut (3).
- (9) Place seal (8) and tube assembly in position at torque converter relief valve. Secure with four capscrews (5). Tighten with a wrench.
- (10) Tighten capscrews (1) and nut (3) using two wrenches.
- (11) Replace floor plates. See page 1044.
- (12) Replenish transmission fluid. See page 516.
- (13) Lower seat assembly on seat base. Slide seat forward until hinge pins fit into hooks. Lower seat until seat locks in position.



c. Place In Service

Run engine and check for proper operation.

5-8. TRANSMISSION OIL COOLER REPLACE/REPAIR

This task covers:

- a. Removal
- b. Installation
- c. Place In Service
- d. Installation
- e. Place In Service

INITIAL SETUPApplicable Configurations

All

Personnel Required

MOS62B (2)

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910007540654
Lifting Equipment 100 lb.

Materials/Parts

Preformed Packing (17)
Gasket (25) (30)
Drain Dan

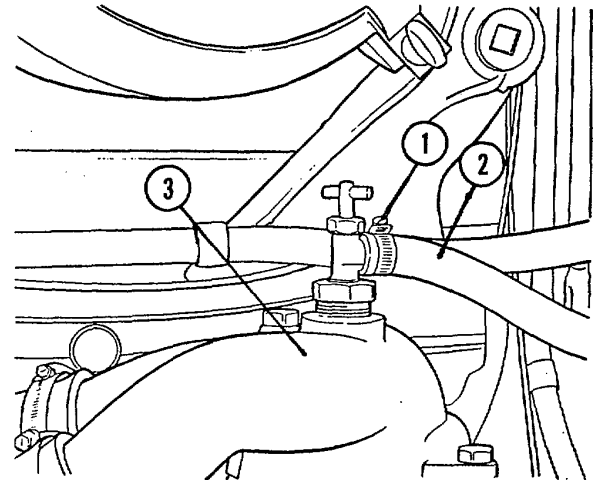
Equipment Condition

Tractor parked on level ground.
Engine cool.
Front crankcase guard removed. (page
10-11)
Engine coolant drained. (page 3-104)
Transmission oil drained. (page 516)

a. Removal**NOTE**

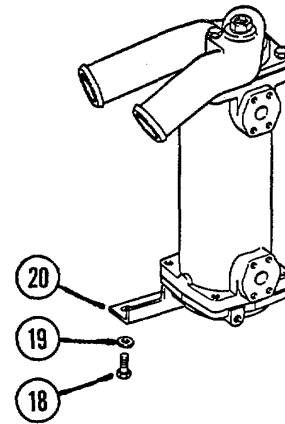
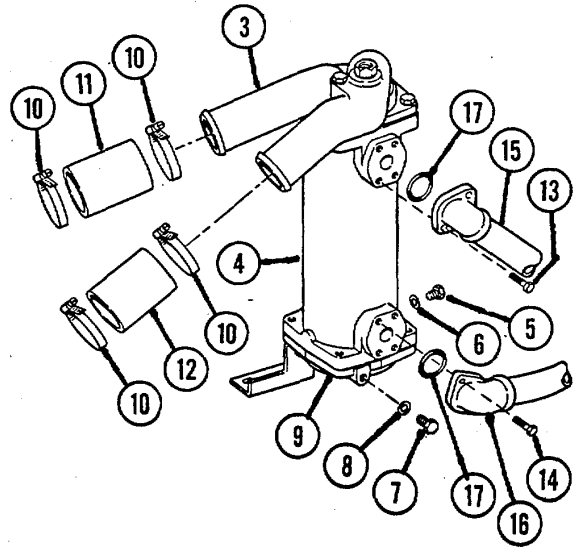
Step (1) is for winterized cab model only.

- (1) Loosen clamp (1) and disconnect heater hose (2) from bonnet (3).



5-8. TRANSMISSION OIL COOLER REPLACE/REPAIR (Cont'd)

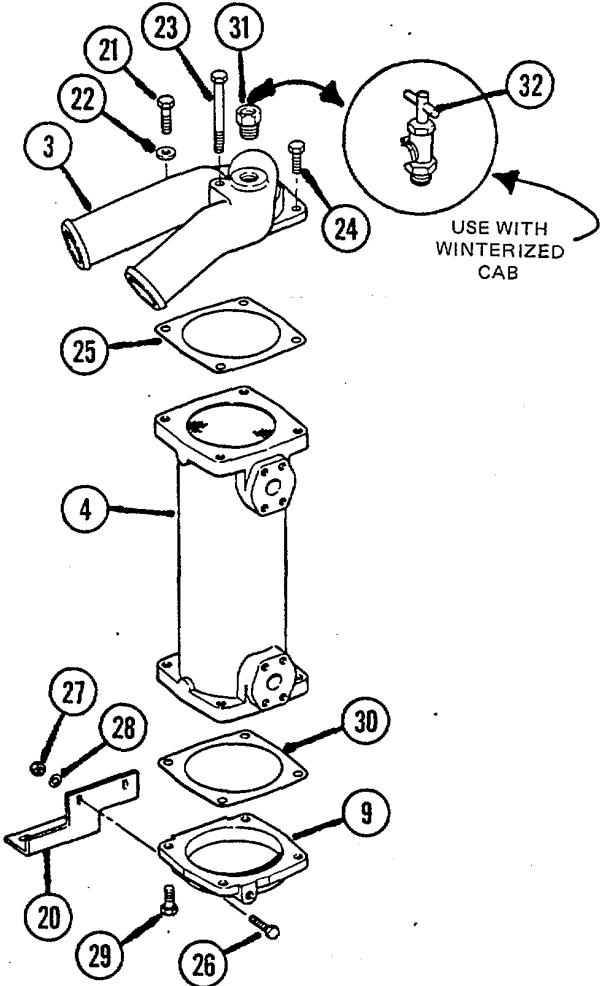
- (2) Place a drain pan under cooler (4) to catch transmission oil.
- (3) Use a wrench to remove drain plug (5) and washer (6) from cooler (4).
- (4) Place a drain pan under cooler (4) to catch coolant.
- (5) Use a wrench to remove drain plug (7) and washer (8) from bonnet (9).
- (6) Loosen four clamps (10).
- (9) Slide tubes (15 and 16) away from oil cooler (4) and discard preformed packing (17).
- (10) Use lifting equipment to support the cooler assembly.
- (11) Use a socket and remove two capscrews (18) and washers (19) that secure holding bracket (20) to the cylinder block.
- (12) Remove transmission cooler assembly from machine.



5-8. TRANSMISSION OIL COOLER REPLACE/REPAIR (Cont'd)

b. Disassembly

- (1) Use a socket to remove two capscrews (21), washers (22), capscrew (23) and capscrew (24).
- (2) Separate bonnet (3) from cooler (4) and remove gasket (25). Discard gasket (25).
- (3) Use a wrench and a socket and remove two capscrews (26), nuts (27) and washers (28) that secure bracket (20) to bonnet (9).
- (4) Use a wrench to remove four capscrews (29) and separate bonnet (9) from cooler (4). Remove and discard gasket (30).
- (5) Use a square allen wrench to remove plug (31) (without winterized cab) or valve (32) (with winterized cab) from bonnet (3).



c. Assembly

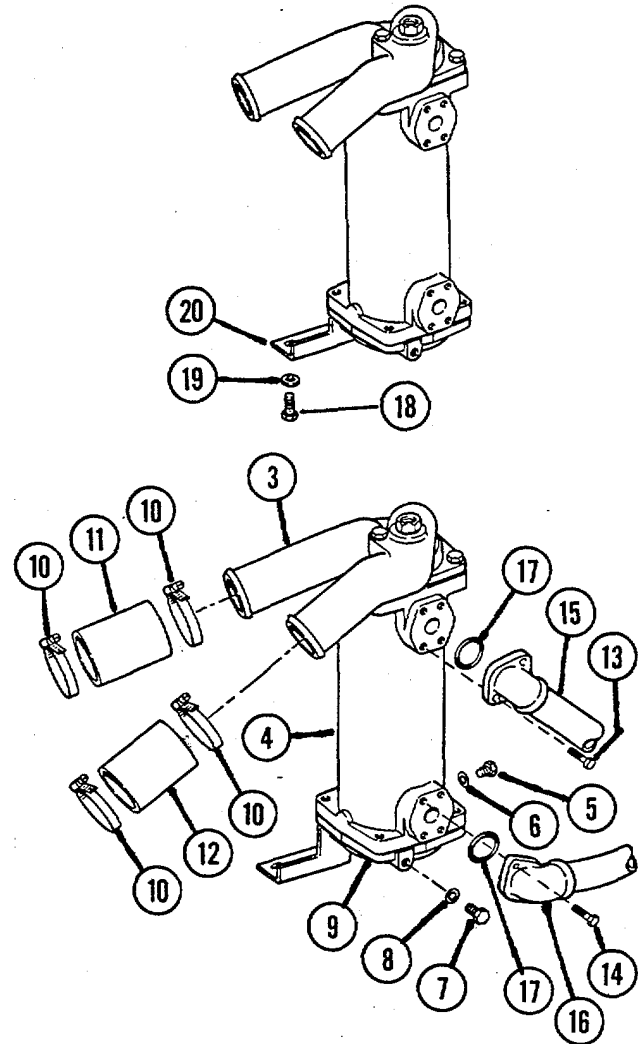
- (1) Use a square allen wrench to install plug (31) (without winterized cab) or valve (32) (with winterized cab) into bonnet (3).
- (2) Place gasket (30) and bonnet (9) into position on cooler (4) and use a wrench to install four capscrews (29).
- (3) Place bracket (20) onto bonnet (9) and use a socket and a wrench to install two capscrews (26), nuts (27) and washers (28).
- (4) Place gasket (25) and bonnet (3) onto cooler (4) and use a socket to install two capscrews (21), washers (22), capscrew (23) and capscrew (24).

5-8. TRANSMISSION OIL COOLER REPLACE/REPAIR (Cont'd)**d. Installation**

- (1) Lower transmission oil cooler assembly into position on the machine.
- (2) Use a socket and install two capscrews (18) and washers (19) that secure holding bracket (20) to the cylinder block.
- (3) Remove lifting equipment from the oil cooler.
- (4) Install preformed packing (17) and tubes (15 and 16) by using a socket and installing two capscrews (13) and two capscrews (14).
- (5) Slide hoses (11 and 12) into position on bonnet (3).
- (6) Tighten four clamps (10).
- (7) Use a wrench to install drain plug (7) and washer (8) onto bonnet (9).
- (8) Use a wrench to install drain plug (5) and washer (6) into cooler (4).

NOTE

STEP (9) is for winterized cab model only.

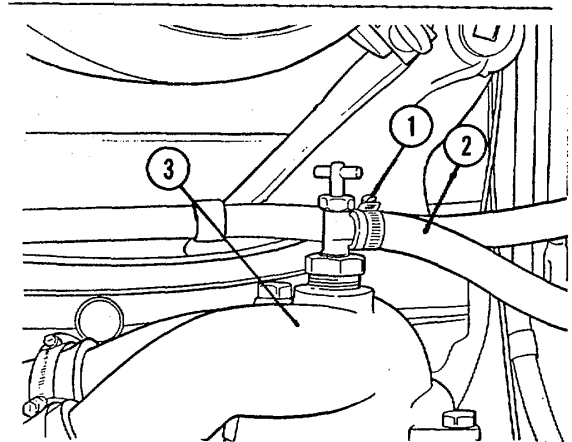


5-8. TRANSMISSION OIL COOLER REPLACE/REPAIR (Cont'd)

- (9) Slide heater hose (2) onto bonnet (3) and tighten clamp (1).
- (10) Fill transmission oil to correct level. See page 516.
- (11) Fill engine coolant to correct level. See page 3104.
- (12) Replace front crankcase guard. See page 1011.

e. Place In Service

Run engine and check for proper operation.



5-9. TRANSMISSION OIL LINES REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP**Applicable Configurations**

All

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910007540654

Materials/Parts

Preformed Packing (as required)
Caps and Plugs

Equipment Condition

Floor plates removed. (page 1044)
Transmission oil drained. (page 516)

-
- a. Removal

CAUTION

Always cap lines and hoses and/or plug holes when removing hydraulic lines. Contaminants may enter the system and cause premature failure.

NOTE

This procedure will cover removal and installation of one hydraulic line. This is a typical example only. Procedures for removal and installation of other lines should vary only slightly.

- (1) Mark hoses before removal to ensure proper reassembly.
- (2) Remove bolts from hose clamps along entire length of hose.

5-9. TRANSMISSION OIL LINES REPLACE (Cont'd)

- (3) Remove capscrews from flanges on both ends of line.
- (4) Remove and discard preformed packing.
- (5) Remove hydraulic lines. Cap end of hose and plug opening where flange was removed.

- (1) Remove caps and/or plug from hoses and lines.
- (2) Route hose along its proper path.
- (3) Install preformed packing onto ends of hose.
- (4) Place flanges into position and install bolts
- (5) Install clamps and bolts into their previous location.
- (6) Fill transmission oil to correct level. See page 516.
- (7) Replace floor plates. See page 1044.

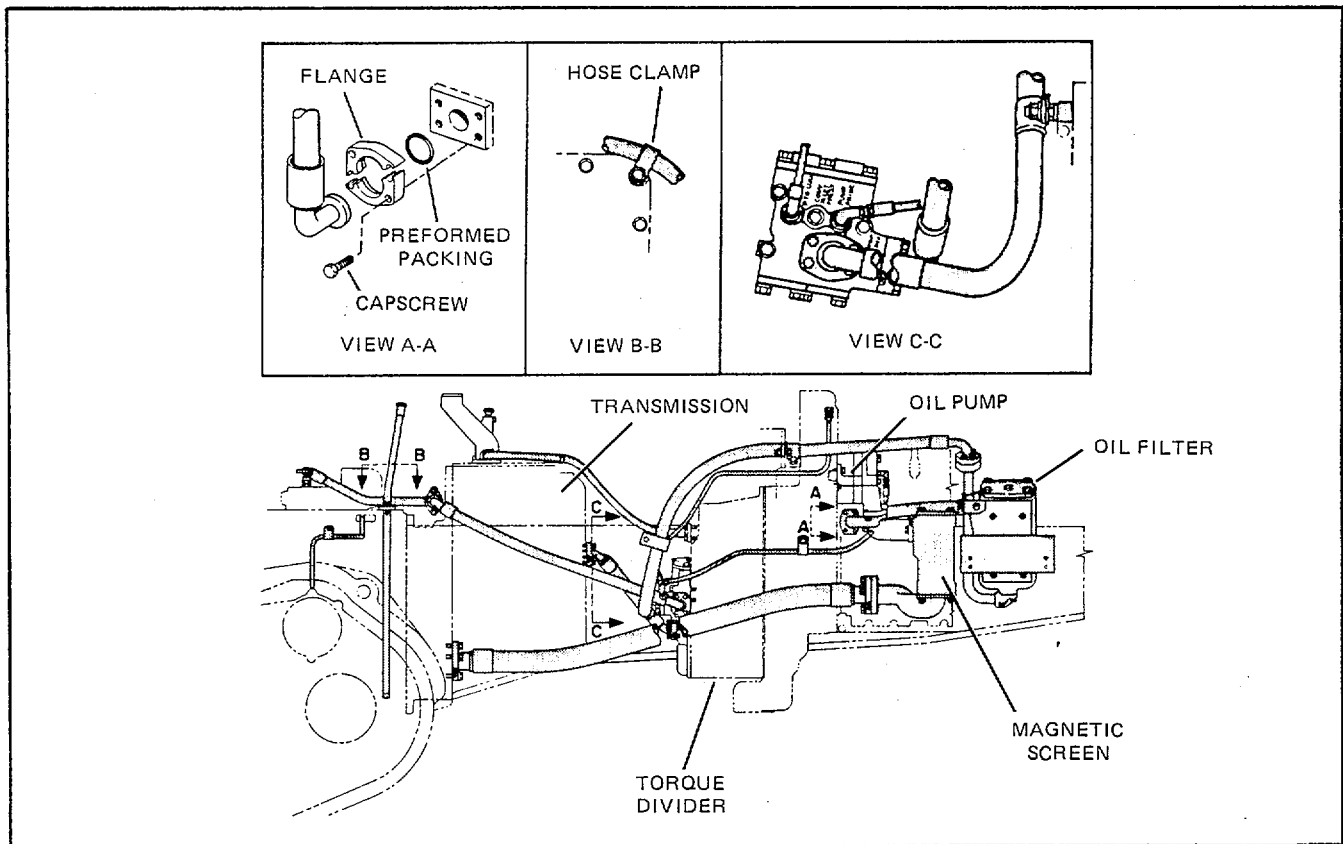
b. Installation

CAUTION

Care should be taken not to contaminate hydraulic system during installation of hydraulic lines. Dirt and foreign substances should be removed from surrounding area before lines are installed.

c. Place In Service

Test drive and check for leaks.



5-10. TRANSMISSION AND STEERING CLUTCH OIL FILTER ASSEMBLY SERVICE/REPLACE/REPAIR

This task covers:

- a. Removal
- b. Installation
- c. Place In Service
- d. Assembly
- e. Installation
- f. Place In Service

INITIAL SETUPApplicable Configurations

All

Common Tools

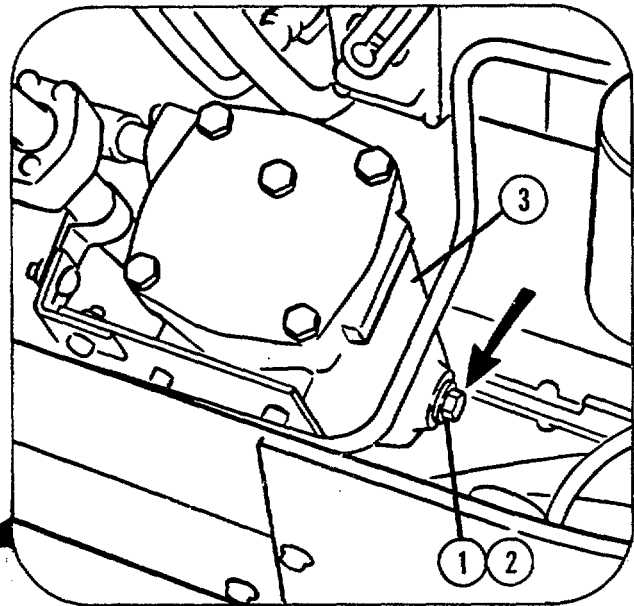
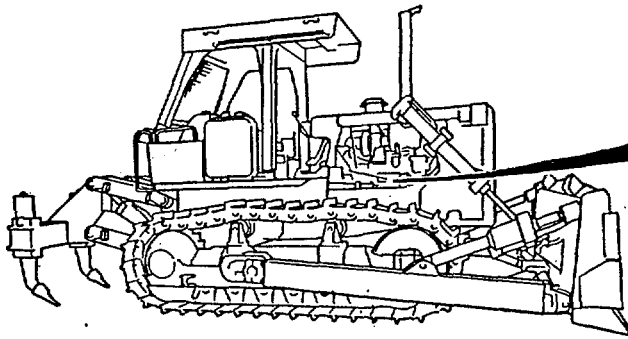
Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910007540654

Materials/Parts

Preformed packing (2) (7) (21)
Oil filter (6)
Oil pan
Lint-free rag (App. D, Item 15)
Seal (18)

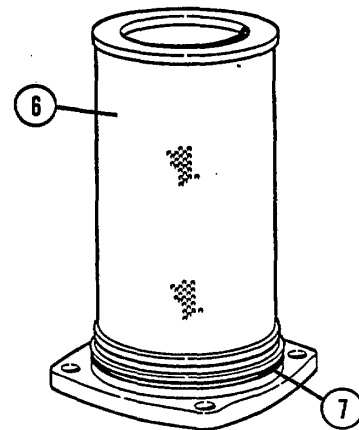
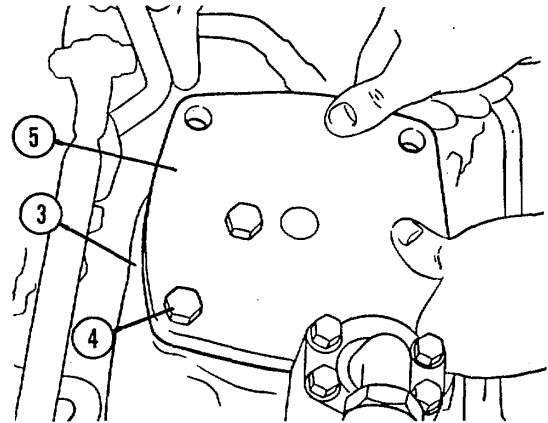
a. Service

- (1) Place an oil pan beneath the transmission oil filter.
- (2) Use a wrench to remove drain plug (1) and preformed packing (2) from housing (3) and allow oil to drain. Discard preformed packing (2).

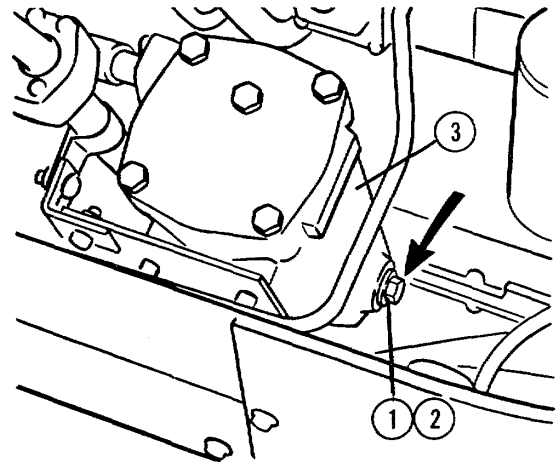


5-10. TRANSMISSION AND STEERING CLUTCH OIL FILTER ASSEMBLY SERVICE/REPLACE/REPAIR (Cont'd)

- (3) Use a socket to remove four capscrews (4).
- (4) Remove cover (5) and filter (6) from housing (3) and discard filter (6).
- (5) Remove preformed packing (7) from cover (5) and discard packing. Clean cover with cloth.
- (6) Install new preformed packing (7) onto cover (5).
- (7) Install new filter (6) into filter housing (3) and install cover (5).
- (8) Install four capscrews (4) that hold cover (5) to housing (3) using a socket.



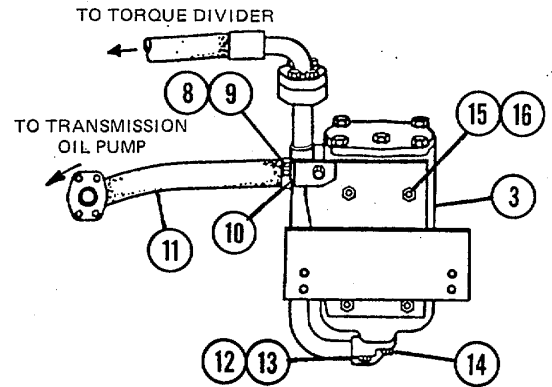
- (9) Install filter plug (1) and new preformed packing (2) into housing (3) using wrench.
- (10) Fill transmission with transmission oil. See L05241023712.



5-10. TRANSMISSION AND STEERING CLUTCH OIL FILTER ASSEMBLY SERVICE/REPLACE/REPAIR (Cont'd)

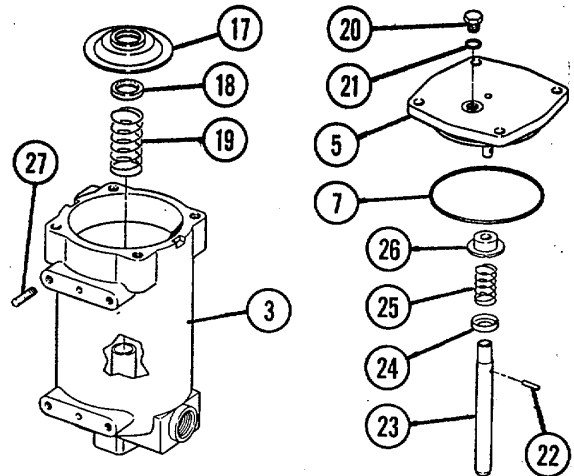
b. Removal

- (1) Perform Service STEPS 1 through 5.
- (2) Use a wrench to remove eight capscrews (8), washers (9) and two split clamps (10) and remove hose assembly (11).
- (3) Use a socket to remove four capscrews (12), washers (13) and split clamp (14).
- (4) Use a wrench to remove four nuts (15) and washers (16) that secure housing (3) to the machine. Remove housing (3).



c. Disassembly

- (1) Remove retainer (17), seal (18) and spring (19) from inside of housing (3). Discard seal (18).
- (2) Use a socket to remove plug (20) and preformed packing (21) from cover (5). Discard preformed packing (21).
- (3) Use a hammer and punch to remove pin (22) from tube (23) and remove tube (23), retainer (24), spring (25) and retainer (26) from cover (5).
- (4) If necessary, remove four studs (27) from housing (3).

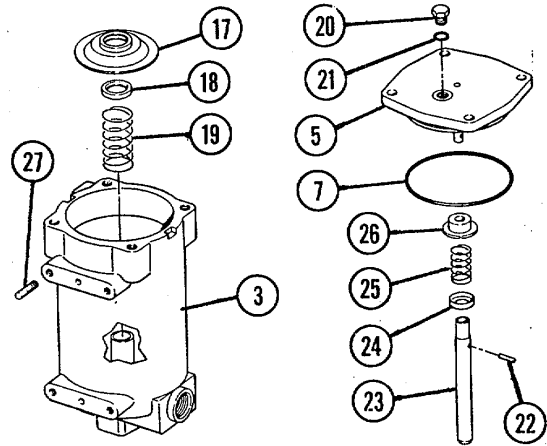


d. Assembly

- (1) If removed, install four studs (27) into housing (3).
- (2) Install retainer (26), spring (25), retainer (24) and tube (23) onto cover (5) and insert pin (22) into tube (23).

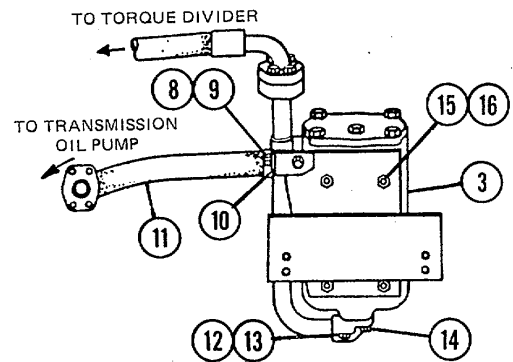
5-10. TRANSMISSION AND STEERING CLUTCH OIL FILTER ASSEMBLY SERVICE/REPLACE/REPAIR (Cont'd)

- (3) Use a socket to install plug (20) and preformed packing (21) into cover (5).
- (4) Install spring (19), seal (18) and retainer (17) into housing (3).



e. Installation

- (1) Place housing (3) into position on the machine and use a wrench to install four nuts (15) and washers (16) that secure housing (3) to the machine.
- (2) Use a wrench to install four cap screws (12), washers (13) and split clamps (14) that hold oil line to base of oil filter housing (3).
- (3) Use a wrench to install cap screws (8), washers (9) and two split clamps (10) that secure hose assembly (11) to housing (3).
- (4) Perform Service STEPS 6 through 10.



f. Place In Service

Test drive and check for proper operation.

5-11. TRANSMISSION OIL MAGNETIC SCREEN ASSEMBLY SERVICE/REPLACE

This task covers:

- a. Service by Cleaning Magnetic Screen
- b. Removal
- c. Installation
- d. Place In Service

INITIAL SETUPApplicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910007540654

Materials/Parts

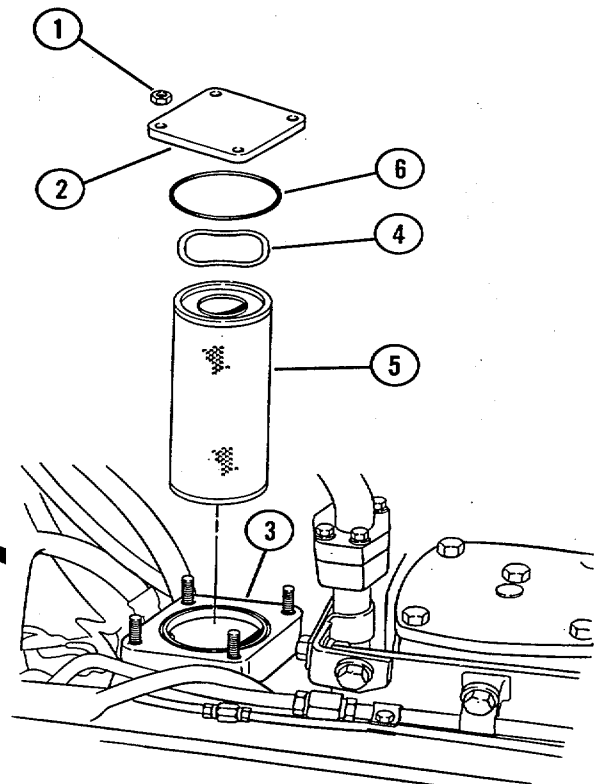
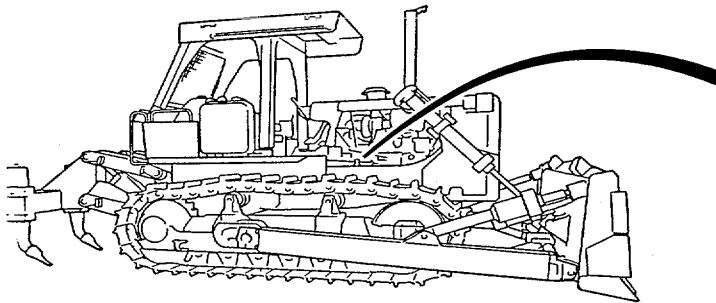
Preformed packing (6) (12) (15)
Transmission Oil OE/HDO30 (See
L05241023712)

Equipment Condition

Transmission oil drained. (page 516)

a. Service by Cleaning Magnetic Screen

- (1) Use a wrench to remove four nuts (1) and cover (2) from housing (3).
- (2) Remove spring washer (4) from top of magnetic screen assembly (5).
- (3) Remove preformed packing (6) from housing (3) and discard.
- (4) Remove magnetic screen assembly (5) from housing (3).



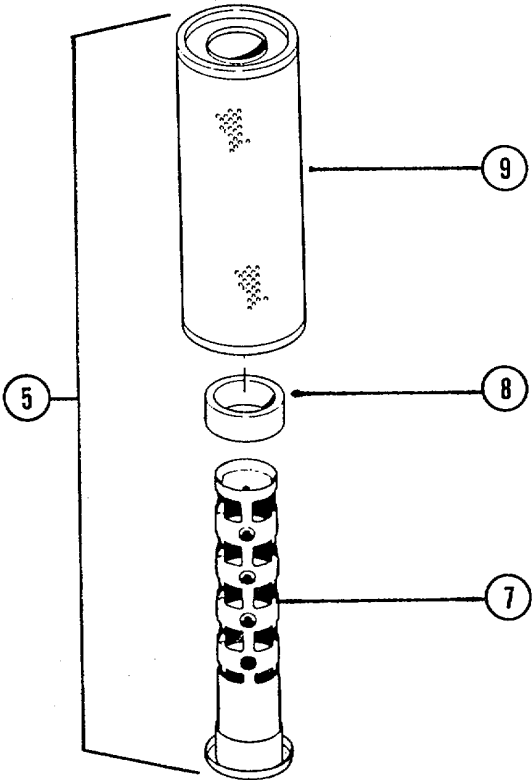
5-11. TRANSMISSION OIL MAGNETIC SCREEN ASSEMBLY SERVICE/REPLACE (Cont'd)

- (5) Disassemble screen assembly (5) by removing tube (7) and magnets (8) from screen (9).

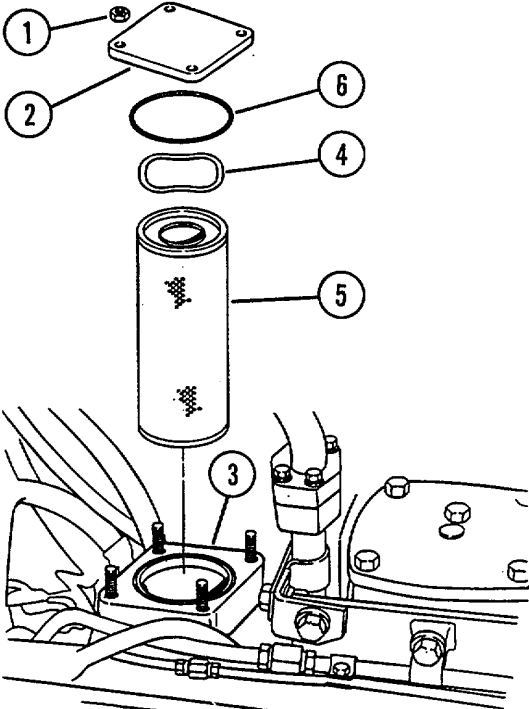
WARNING

The following step calls for optional use of pressure air. Pressure air and debris blown by pressure air can cause personal injury. Wear safety face shield and protective clothing when using pressure air. Use 30 psi (2 kg/cm) maximum pressure air for cleaning pressure.

- (6) Steam clean and dry using pressurized air.
- (7) Steam clean and dry with pressure air. Do not drop or rap magnets.
- (8) Place screen (9) over magnets (8) and tube (7) with "THIS SIDE OUT" notice on screen toward the top.



- (9) Install screen assembly (5) into housing (3).
- (10) Install preformed packing (6) in housing.
- (11) Install spring washer (4) on top of screen assembly (5).
- (12) Place cover (2) on housing (3) and install four nuts (1) with a wrench

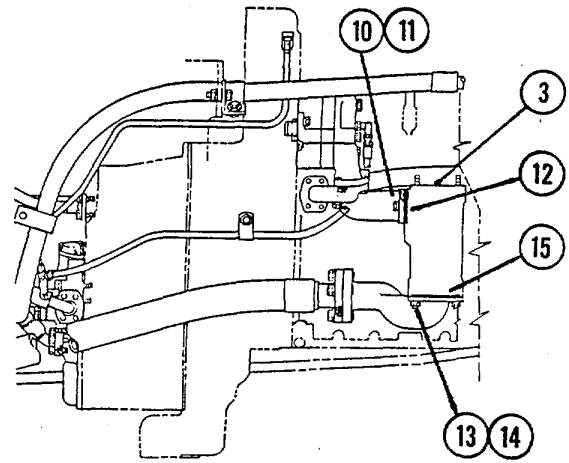


5-11. TRANSMISSION OIL MAGNETIC SCREEN ASSEMBLY SERVICE/REPLACE (Cont'd)**b. Removal**

- (1) Perform service STEPS a. (1) through (5).
- (2) Use a wrench to remove two capscrews (10) and lockwashers (11). Discard preformed packing (12).
- (3) Use a wrench to remove four nuts (13) and lockwashers (14). Discard preformed packing (15).
- (4) Remove housing (3) from tractor.

c. Installation

- (1) Install housing (3) into position on tractor.
- (2) Insert preformed packing (15) into position. Use a wrench to install four nuts (13) and lockwashers (14).
- (3) Insert preformed packing (12) into position. Use a wrench to install two capscrews (10) and lockwashers (11).
- (4) Perform STEPS a. (8) through (12).
- (5) Fill transmission oil to correct level. See page 516.

**d. Place In Service**

Run engine and check for proper operation.

5-12. TRANSMISSION OIL SAMPLING VALVE REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP**Applicable Configurations**

All

Materials/Parts

Preformed packing (2)

Common Tools

Tool Kit, General Mechanics

NSN 5180006995273

a. Removal

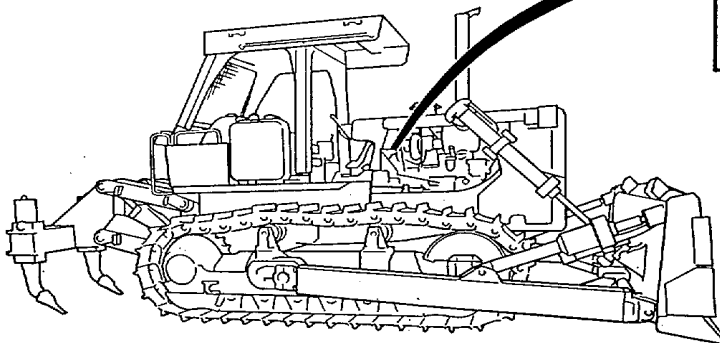
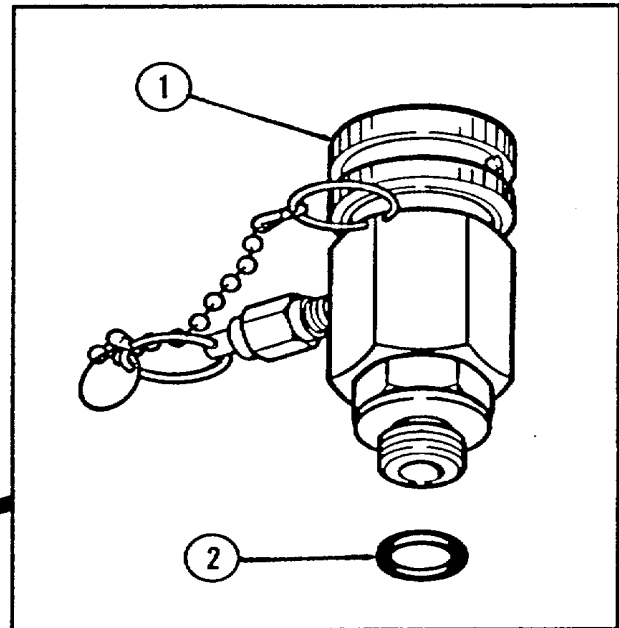
- (1) Use a wrench to remove valve (1) from top of winch pump.
- (2) Discard preformed packing (2).

b. Installation

- (1) Install new preformed packing (2) on valve (1).
- (2) Use a wrench to install valve (1) onto winch pump.

c. Place In Service

Check valve for proper operation.



CHAPTER 6

FINAL DRIVES MAINTENANCE

6-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the final drives. To find a specific maintenance procedure, see the maintenance task summary below.

6-2. FINAL DRIVES MAINTENANCE TASK SUMMARY

TASK PARA	PROCEDURES	PAGE NO.
6-3	Final Drive Service	6-2

6-3. FINAL DRIVE SERVICE

This task covers:
Changing Oil

INITIAL SETUP

Applicable Configurations
All

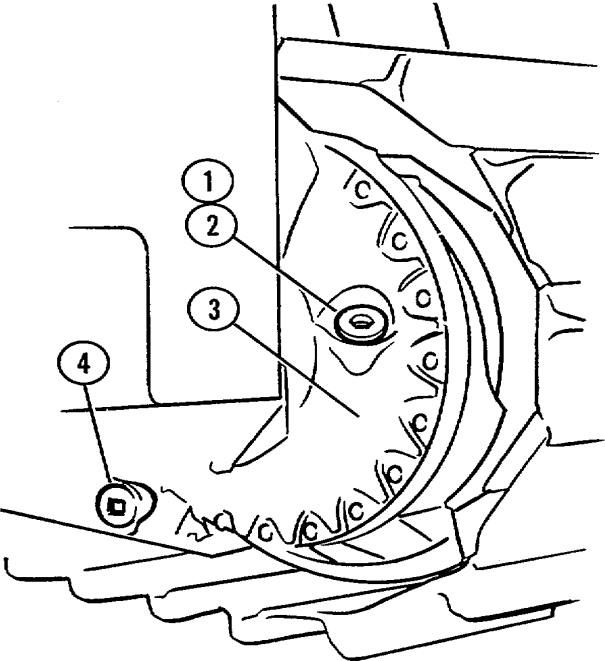
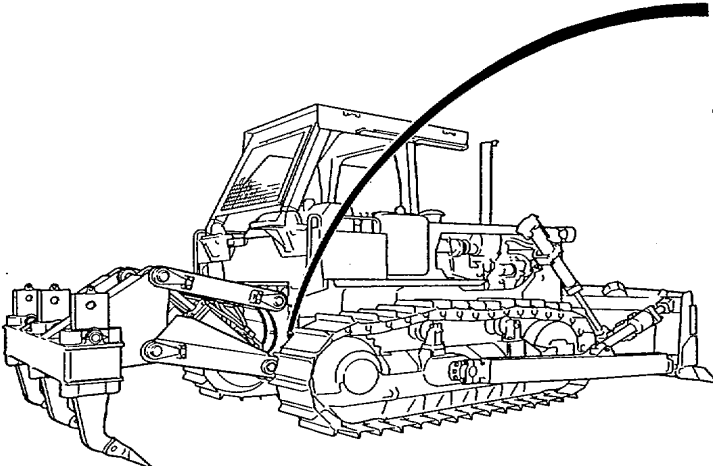
Common Tools
Shop Equipment, Automotive
Maintenance & Repair, Common #1
Less Power
NSN 4910007540654

Materials/Parts
Gasket (2)
Oil 6080/90 Refer to L05241023712
Drain pan (No greater than 6 inches
in height)

Equipment Condition
Tractor parked on level ground.

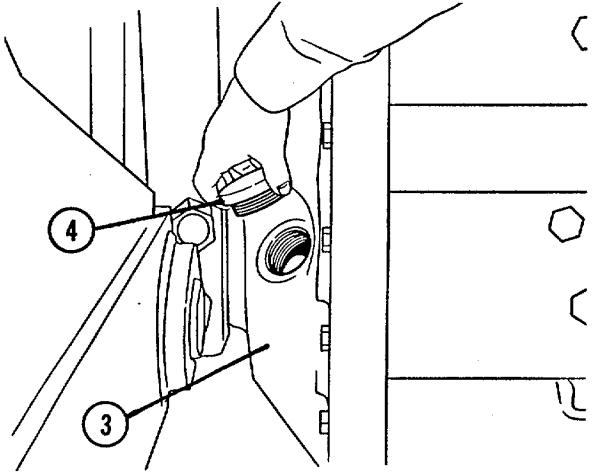
Changing Oil

- (1) Use a square allen wrench to remove fill plug (1) and gasket (2) from final drive housing (3). Discard gasket.



6-3. FINAL DRIVE SERVICE (Cont'd)

- (2) Place a drain pan underneath final drive housing
- (3) Use a square allen wrench to remove drain plug (4) from final drive housing (3) and allow oil to drain.
- (3) Install drain plug (4) in final drive housing (3).

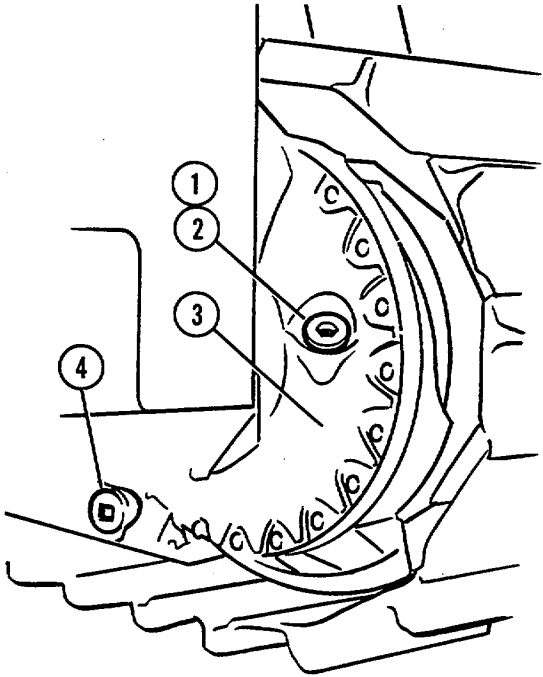


- (4) Fill final drive housing (3) through fill plug (1) opening. For oil grade and fill capacity refer to lube order LO 5241023712.
- (5) Install gasket (2) and fill plug (1) in final drive housing (3).
- (6) Repeat STEPS 1 through 5 on other side of tractor.

NOTE

Final drives and transmission share a common breather.

- (7) If necessary, replace breather.



CHAPTER 7

DRIVE SHAFT MAINTENANCE

7-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the drive shaft. To find a specific maintenance procedure, see the maintenance task summary below.

7-2. DRIVE SHAFT MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
7-3	Drive Shaft and Universal Joint - Replace	7-2

7-3. DRIVE SHAFT AND UNIVERSAL JOINT - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP:Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance and Repair, Common #1
Less Power
NSN 4910-00-754-0654

Equipment Condition

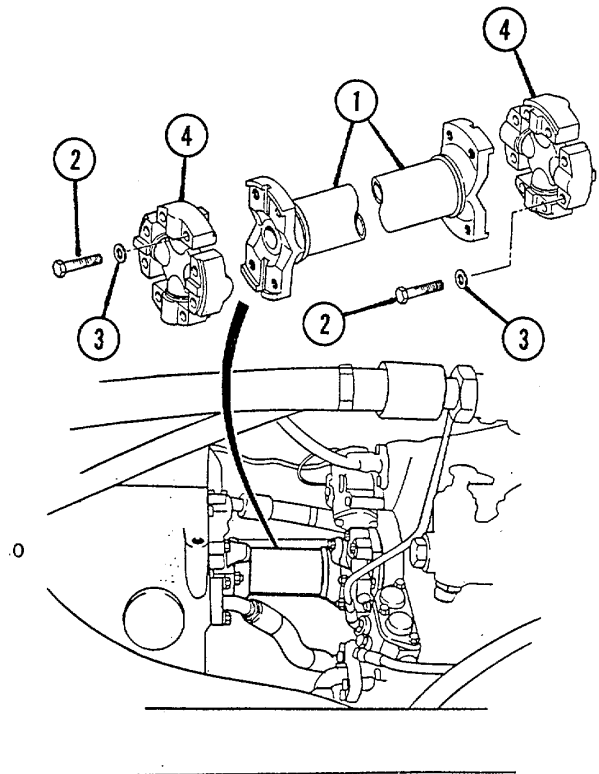
Tractor parked.
Engine cool.
Rear crankcase guard removed. (page
10-11)

a. Removal

- (1) Hold drive shaft assembly (1) in place to remove capscrews. Use a socket to remove eight capscrews (2) and washers (3) that secured the drive shaft assembly to transmission and torque divider.
- (2) Use a socket to remove eight capscrews (2) and washers (3) that hold the U-joints assemblies (4) to the drive shaft (1).

b. Installation

- (1) Install U-joints (4) with eight capscrews (2) and washers (3) onto drive shaft (1). Use a torque wrench with a socket to tighten capscrews to a torque of 40 ± 5 ft. lb.



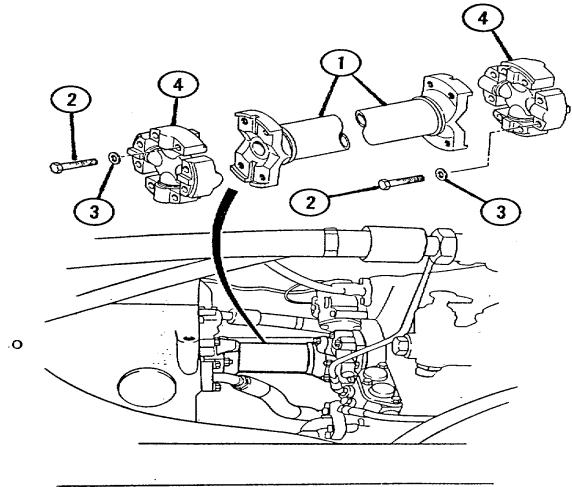
7-3. DRIVE SHAFT AND UNIVERSAL JOINT - REPLACE (Cont'd)

(2) Install drive shaft assembly (1) into position.
Secure to transmission and torque divider with
eight capscrews (2) and washers (3).

(3) Install rear crankcase guard. See page 10-11.

c. Place In Service

Test drive and check for proper operation.



7-3/(7-4 Blank)

CHAPTER 8
TRACK MAINTENANCE

8-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the tracks. To find a specific maintenance procedure, see the maintenance task summary below.

8-2. TRACK MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
8-3	Track Drive Sprocket Segments - Replace	8-2
8-4	Track Assembly - Inspect/Adjust/Replace	8-4

8-3. TRACK DRIVE SPROCKET SEGMENTS - REPLACE

This task covers:

- a. Disassembly
- b. Assembly
- c. Place In Service

INITIAL SETUP:Applicable Configurations

All
Tractor parked on level ground.

Equipment Condition

Engine OFF.

Common Tools

Shop Equipment, Automotive
Maintenance & Repair
Common #1 Less Power
NSN 4910-00-754-0654

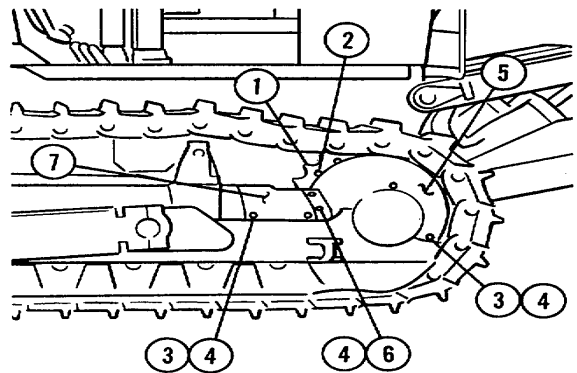
NOTE

Use this procedure for right or left side of tractor.

a. Disassembly**NOTE**

Move tractor at intervals and inspect five sprocket segments (1) per track for cracked or broken teeth and loose or missing capscrews (2). Replace capscrews (2) or sprocket segments (1) as necessary.

- (1) Use a socket and breaker bar to remove three capscrews (3) and washers (4) from guard (5).
- (2) Use a socket to remove two capscrews (6), two washers (4) and guard (5).
- (3) Use a socket to remove four capscrews (3), four washers (4) and guard (7).

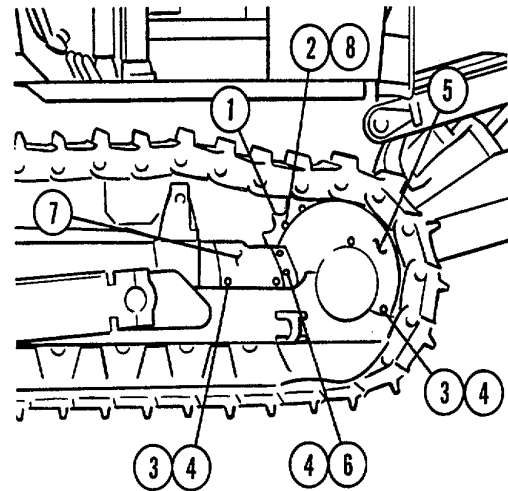


8-3. TRACK DRIVE SPROCKET SEGMENTS - REPLACE (Cont'd)

- (4) Move tractor as needed to gain access to four nuts (8) and capscrews (2) to be removed from sprocket segment (1).
- (5) Use a wrench and a socket to remove four nuts (8) and four capscrews (2) from one sprocket segment (1).

b. Assembly

- (1) Use a wrench and a socket to install four nuts (8) and four capscrews (2) to secure sprocket segment (1) to hub. Use a torque wrench and tighten to a wet torque of 220+40 lb. ft. Using a socket, tighten 120 degrees more.
- (2) Use a socket to install four capscrews (3), four washers (4), and guard (7).
- (3) Use a socket to install two capscrews (6), two washers (4), and guard (5).
- (4) Use a socket to install three capscrews (3) and washers (4) which secures guard (5).

**c. Place In Service**

Test drive and check for proper operation.

8-4. TRACK ASSEMBLY - INSPECT/ADJUST/REPLACE

This task covers:

- a. Inspection
 - b. Adjustment
 - c. Removal
 - d. Installation
 - e. Place in Service
-

INITIAL SETUP:
Applicable Configurations

All MOS62B (2)

Personnel Required
Common Tools

Shop Equipment, Automotive
Maintenance, Common #1 Less Power
NSN 4910-00-754-0654

Materials/Parts

Anti-Seize Compound (App. D, Item 7)
3 in. dia. x 3.5 in. long slug (10)

Equipment Condition

All implements in fully raised
position.

a. Inspection
NOTE

- Inspection includes all moving parts and guides of the undercarriage because of their functional relationship. Wear of one item directly affects the other items. Inspection should include all the listed items.
- Undercarriage components are considered rebuildable in the range of 80 - 100% worn condition. Components at 120% worn condition are considered beyond repair or destroyed.

8-4. TRACK ASSEMBLY - INSPECT/ADJUST/REPLACE (Cont'd)

- (1) Track shoes:
 Measure track shoe grouser height and refer to table 8-1. Rebuild or replace shoes as necessary.

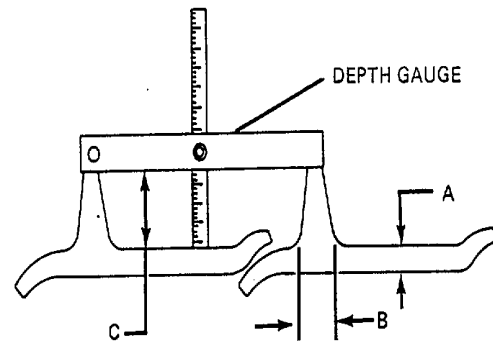


Table 8-1. Shoe Dimensions

Shoe Type	Grouser Thickness A	Grouser Width B	C	Grouser Height Wear		
				New	80%	100%
Standard Single Grouser	0.56 in.	1.04 in.	2.81 in.	1.36 in.	1.00 in.	0.64 in.
Extreme Service Single Grouser	0.66 in.	1.32 in.	2.81 in.	1.77 in.	1.50 in.	1.26 in.

- (2) Track chain:

NOTE

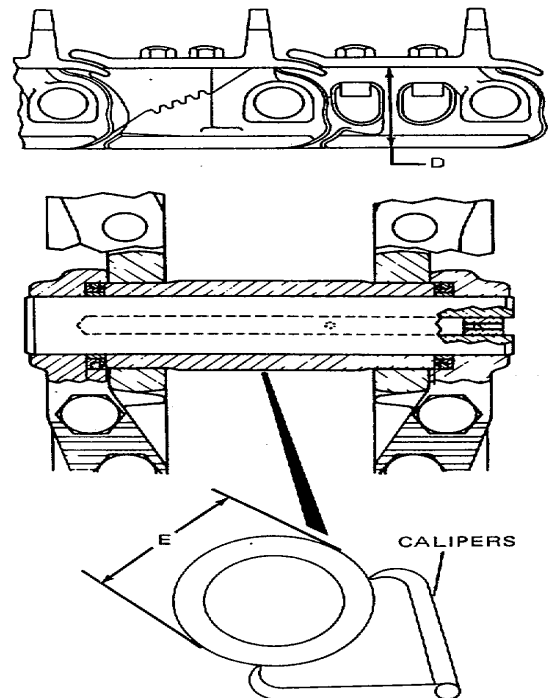
Tractor uses a lubricated track chain which means there is virtually no wear on chain pins as long as seals retain lubricating oil in bushing.

- (a) Measure link rail height and refer to table 8-2. Rebuild or replace track chain as necessary.

NOTE

Check for "dry" pin and bushing joints by feeling bushings or link pin bosses for higher temperatures compared to other joints of chain.

- (b) Measure bushing external wear and refer to table 8-2. Bushings should be turned between the 80 and 100% worn dimension. Rebuild or replace track chain as necessary.

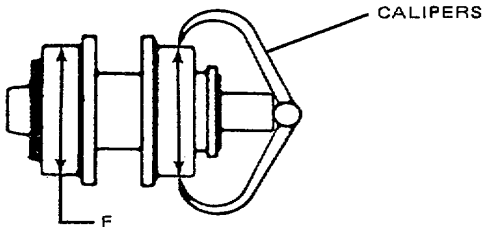


8-4. TRACK ASSEMBLY - INSPECT/ADJUST/REPLACE (Cont'd)

Table 8-2. Chain Dimensions

Measurement	New	80%	100%	120%
Chain Link Rail Height D	4.94 in.	4.62 in.	4.50 in.	4.30 in.
Chain Bushing External Diameter E	2.94 in.	2.80 in.	2.74 in.	2.67 in.

(3) Carrier Roller:
 Measure carrier roller tread diameter and refer to table 8-3. Rebuild or replace carrier roller as necessary.



NOTE

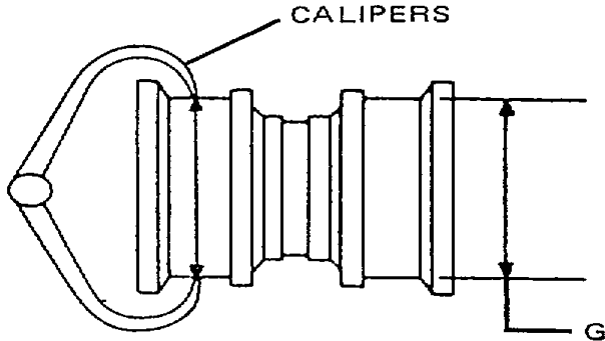
Front and rear carrier rollers can be switched to balance tread wear between the front and rear rollers.

Table 8-3. Carrier Roller Dimensions

Measurement	New	80%	100%	120%
Carrier Roller Tread Diameter F	7.50 in.	6.91 in.	6.75 in.	6.46 in.

(4) Track Roller:

Measure track roller tread diameter and refer to table 8-4. Rebuild or replace track roller as necessary.



NOTE

Front and rear track rollers wear faster. Switch front and rear rollers with intermediate rollers to balance tread wear and prolong roller wear.

8-4. TRACK ASSEMBLY - INSPECT/ADJUST/REPLACE (Cont'd)

Table 8-4. Track Roller Dimensions

Measurement	New	80%	100%	120%
Track Roller Tread Diameter G	8.75 in.	8.11 in.	7.87 in.	7.48 in.

(5) Track Idler:

Measure track idler tread wear and refer to table 8-5. Rebuild or replace track idler as necessary.

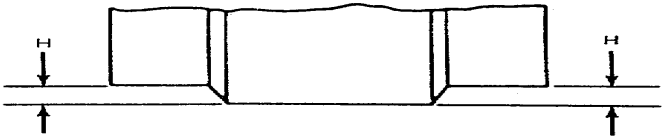


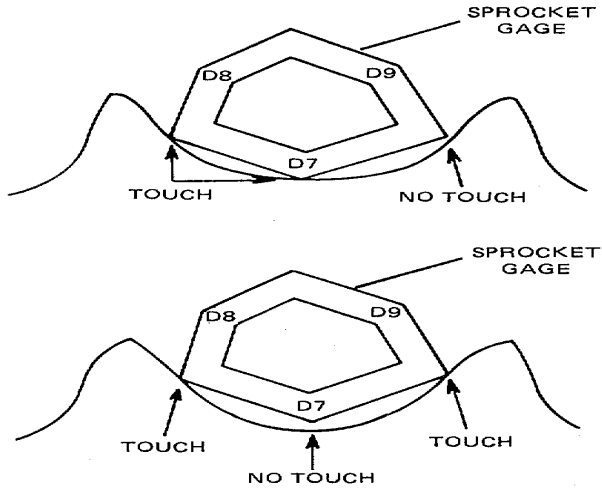
Table 8-5. Track Idler Dimensions

Measurement	New	80%	100%	120%
Track Idler Tread Wear H	0.88 in.	1.09 in.	1.26 in.	1.46 in.

(6) Track drive sprocket:
Measure drive sprocket wear using sprocket gage.

If sprocket does not touch on one of the two outer points of gage, sprocket must be replaced before chain is replaced or bushings of existing chain are turned.

If sprocket touches outer two points and not the center point of gage, sprocket can be used with a new chain or existing chain that has bushings turned.



8-4. TRACK ASSEMBLY - INSPECT/ADJUST/REPLACE (Cont'd)

(7) Track guiding guard:

NOTE

Guiding guards have no service limits or wear charts.

Guiding guard has wear strips (I) that can be replaced as an undercarriage rebuilding procedure. The wear strips should be replaced before any wear or damage is done to the main structure of the guard.

The most convenient time to check and maintain guard wear strips is at pin and bushing maintenance or track replacement.

(8) Roller guards:

NOTE

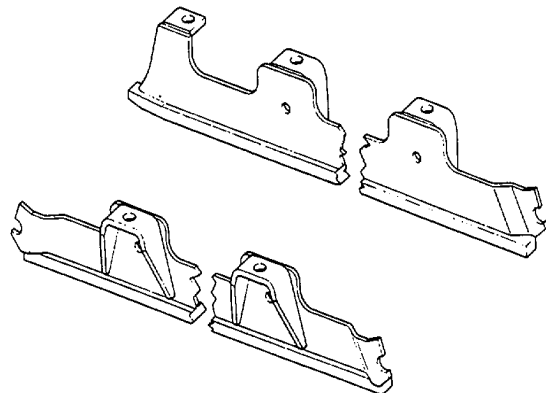
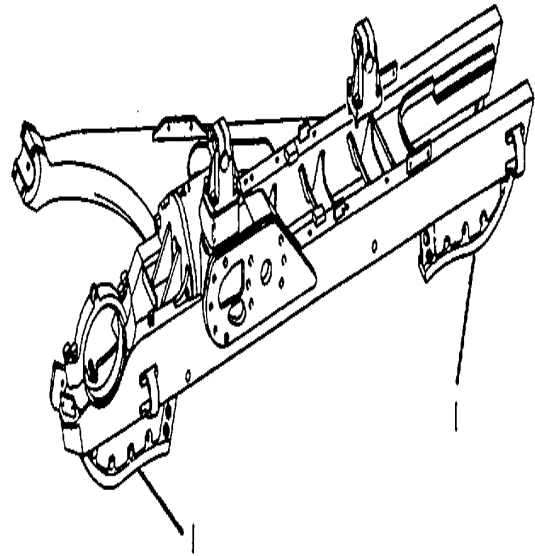
Roller guards provide some guiding effect, but their use should be based on the need to keep foreign debris from entering the roller areas. In some instances, guards can increase wear on chain and pin ends.

Replace roller guards if cracked, bent, or worn.

b. Adjustment

WARNING

Never visually inspect the vent holes or valves to see if grease or oil is coming out of them. Make sure the vent holes are clean before the tension is released on the track. Watch the cylinder to see that it moves.



8-4. TRACK ASSEMBLY - INSPECT/ADJUST/REPLACE (Cont'd)**NOTE**

The track adjustment procedure should be performed on the same surface conditions in which the machine is used. Packing must NOT be removed from the track, if packing conditions exist on the job.

- (1) Move the machine forward a distance of twice its length. Allow the machine to come to a stop without the use of the brakes.
- (2) Remove cover (1) from track roller frame covering adjuster. See page 10-19.

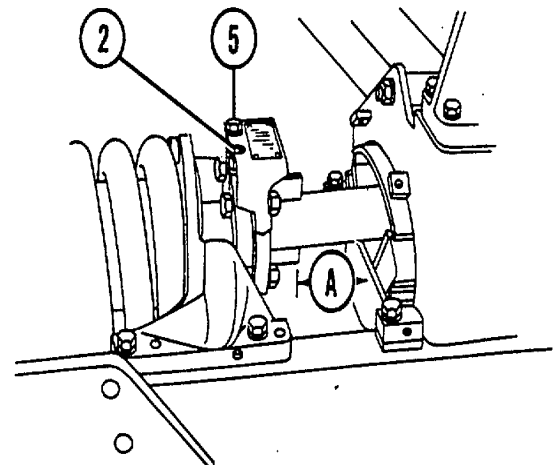
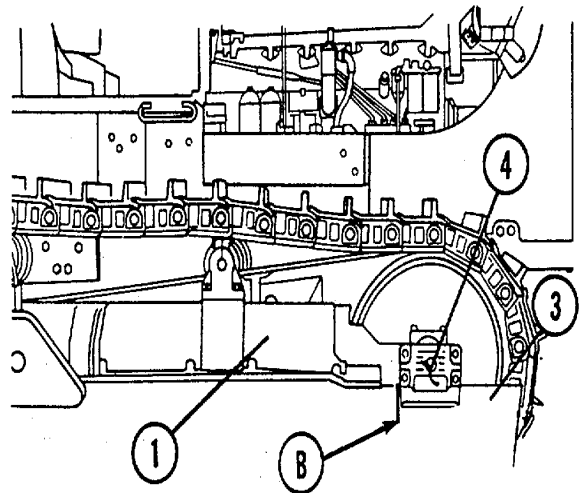
CAUTION

Do not tighten the track if clearance (A) between the front of the stop on the recoil rod and the rear face of the equalizer bar support is less than 0.125 in.(3.18 mm).

CAUTION

Do not use a compressed air grease gun to adjust track chain. Power grease gun can blow seals in adjuster.

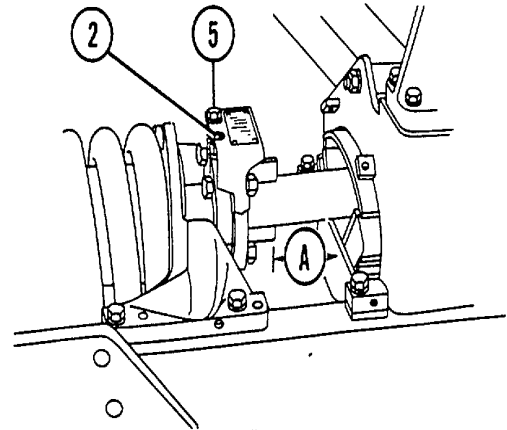
- (3) Use grease gun attached to hydraulic track adjuster (2) to move the idler forward (toward the front of the machine) until the track is in the full tight position.
- (4) Make a mark (B) on the track roller frame (3) 1/2" behind the rear face of the idler bearing assembly (4).



8-4. TRACK ASSEMBLY - INSPECT/ADJUST/REPLACE (Cont'd)**NOTE**

It may be necessary to use breaker bar to move idler bearing assembly.

- (5) Open the relief valve (5), and allow the idler to move back, until the front face of the idler bearing assembly (4) is even with mark (B).
- (6) Close the relief valve (5). Tighten to a torque of 25 ± 5 lb. ft. (35 ± 7 N•m).
- (7) Install track roller frame cover (1). See page 10-20.

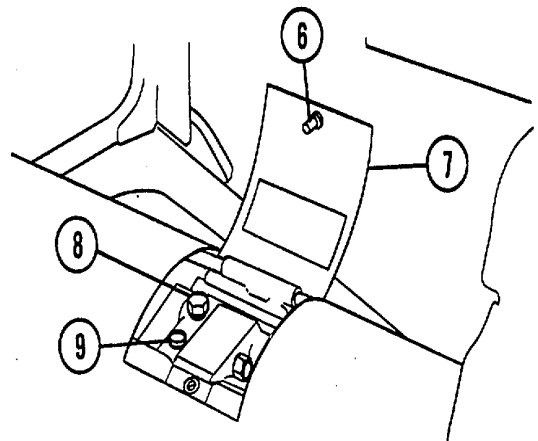
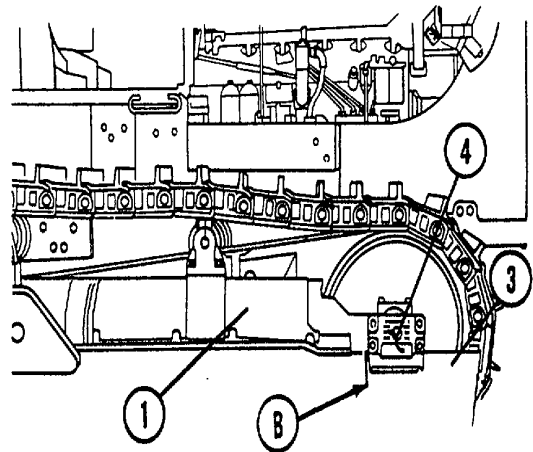
**c. Removal**

- (1) Use a wrench to loosen bolt (6) and open track adjuster panel (7).

WARNING

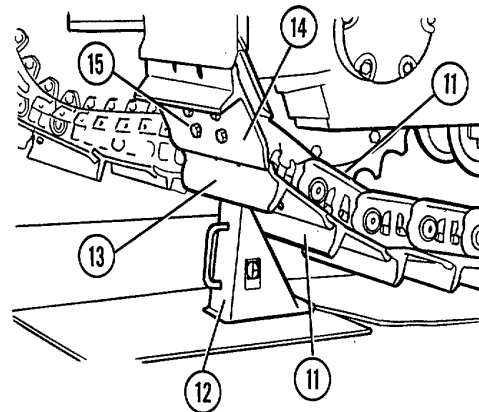
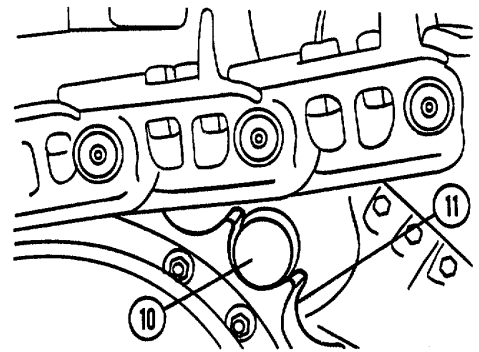
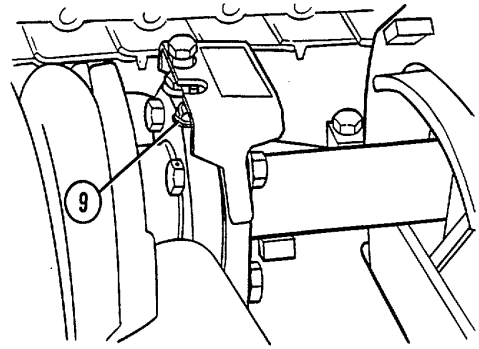
The adjuster cylinder for the track is under high hydraulic pressure. Use the following procedure to relieve this pressure and observe the relaxing of tension on the track. Do not observe the grease coming from the relief valve. Do not, under any circumstances, attempt to relieve the hydraulic pressure by excessive loosening or removal of relieve valve. Failure to follow these precautions could result in serious personal injury. Wear eye protection.

- (2) Use a wrench to turn relief valve (8) one turn counter-clockwise to release grease from vent hole below relief valve. If track does not loosen, proceed to STEP (7). If track loosened, proceed to STEP (6).



8-4. TRACK ASSEMBLY - INSPECT/ADJUST/REPLACE (Cont'd)

- (3) If track did not loosen, turn fill valve (9) one turn counterclockwise to release grease. If track does not loosen, proceed to STEP four. If track loosens, proceed to STEP (7).
- (4) If track did not loosen, start machine and move forward and backward to loosen track. If track does not loosen, proceed to STEP five. If track loosens, proceed to STEP (7).
- (5) If track did not loosen, position a 3" diameter by 3.5" long steel slug (10) on sprocket (11) teeth. Slug must have contact with track bushing when sprocket is turned in reverse. Move the machine to the rear. This puts tension to the rear against the force of the recoil spring and pushes grease out of vent holes.
- (6) Move machine forward to release tension on track. Remove slug (10) from sprocket (11).
- (7) Move track until master link is in the eight o'clock position on sprocket (11).
- (8) Position track block (12) under track shoe (13) next to master shoe (14). Move track until track shoe (13) makes contact with track block (12).



8-4. TRACK ASSEMBLY - INSPECT/ADJUST/REPLACE (Cont'd)**WARNING**

Keep all personnel clear of front and rear of machine during track separation. Track moves fast and uncontrolled at separation. At least 20 feet of clearance required in front. Stand at side of track when removing bolts and master shoe and when making track separation. Failure to follow these precautions could result in serious or even fatal injuries.

CAUTION

Do not drive completely off track. Damage to idler and sprocket will occur.

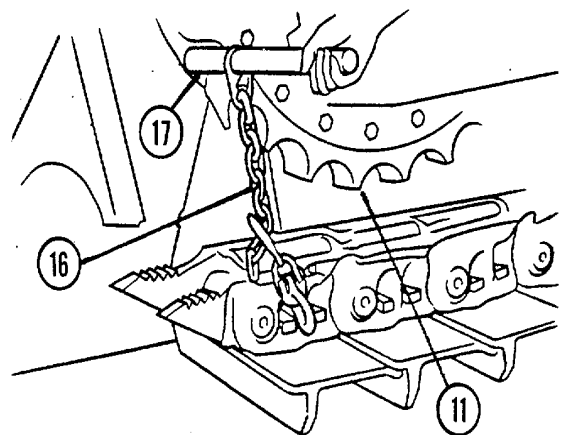
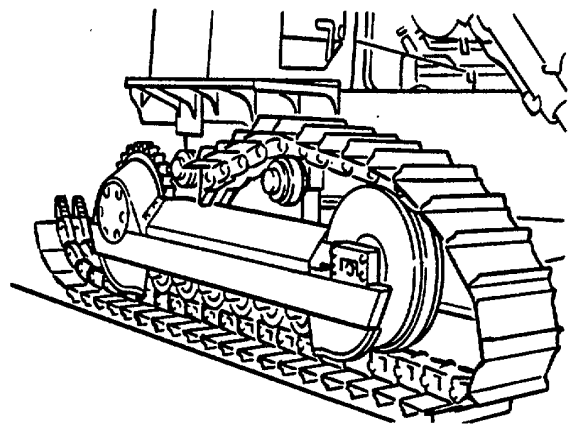
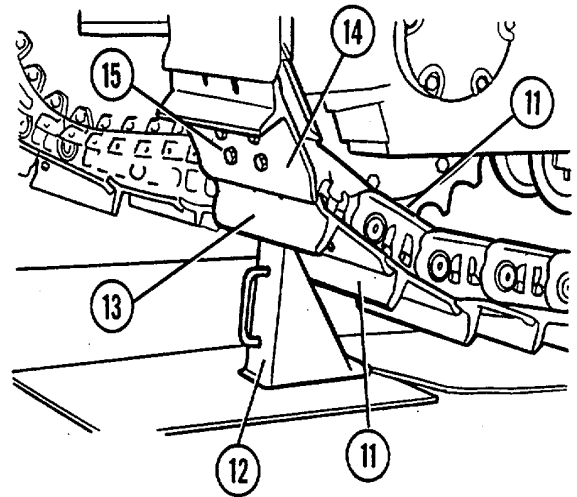
- (9) Use a wrench to remove four capscrews (15) and master shoe (14) from track.
- (10) Start the machine and drive slowly forward to remove the track from the sprocket, carrier rollers, and front idler.

d. Installation

- (1) Lay new track in front of machine, and drive off old track onto new track. Stop after the sprocket clears the master link.
- (2) Position track with master link one link past bottom center line of sprocket (11).

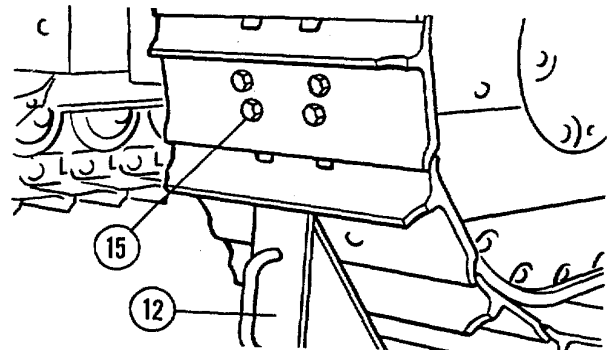
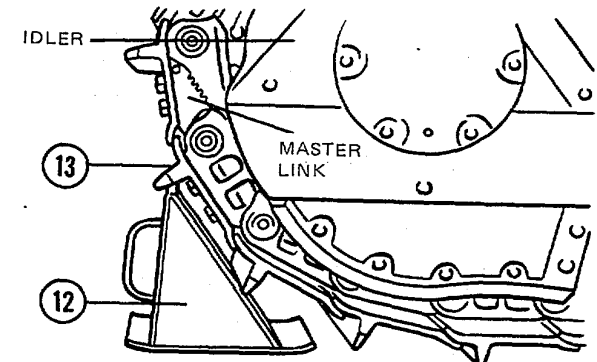
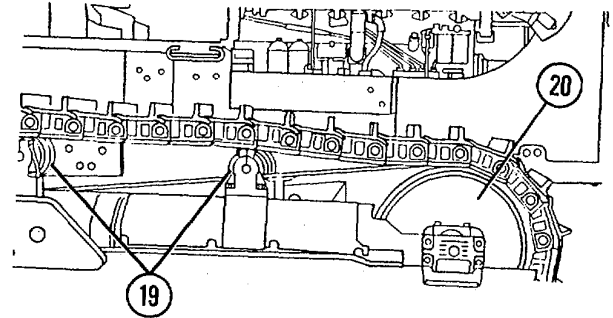
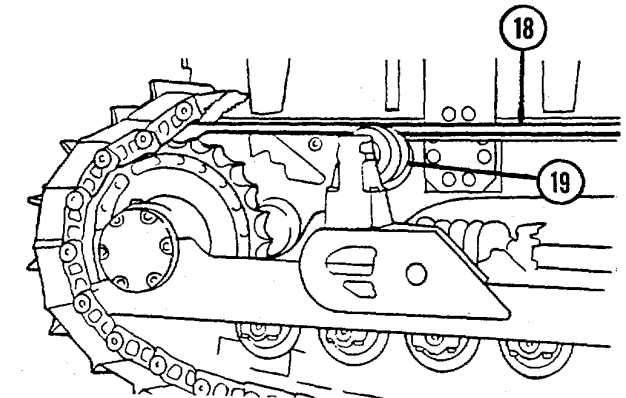
NOTE

Use tanker bar to keep track taut during installation.



8-4. TRACK ASSEMBLY - INSPECT/ADJUST/REPLACE (Cont'd)

- (3) Start machine and slowly rotate sprocket until track is pulled at least one link past top center line of sprocket.
- (4) Position long bar (18) across track carrier roller (19) and between track and sprocket.
- (5) Rotate sprocket slowly to feed track over two carrier rollers (19) and front idler (20). Use bar (18) to guide track. Remove bar (18).
- (6) Place block (10) under grouser of track shoe (13), and drive machine forward to tighten track against block (12).
- (7) Apply anti-seize compound to capscrews (15) for master link.
- (8) Install four capscrews (15) on master link. Tighten capscrews to a torque of 220 ± 40 lb. ft. (300 ± 50 N•m). Turn capscrews (15) an additional 180 degrees 1/2 turn).
- (9) Remove track block (12).
- (10) Adjust track. See page 8-8.



e. Place in Service

Test drive and check track for proper operation.

CHAPTER 9**STEERING AND BRAKE MAINTENANCE****9-1. GENERAL**

This chapter provides maintenance procedures assigned to the organizational level for the steering and brakes. To find a specific maintenance procedure, see the maintenance task summary below.

9-2. STEERING AND BRAKES MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
9-3	Steering Brake Pedals and Linkage - Adjust	9-2
9-4	Steering Clutch Levers and Linkage - Adjust	9-5
9-5	Steering Brake Lock Lever and Linkage - Replace	9-8

9-3. STEERING BRAKE PEDALS AND LINKAGE - ADJUST

This task covers:

- a. Adjustment
- b. Place In Service

INITIAL SETUP:

Applicable Configurations

All

Materials/Parts

- Gasket (5)
- Cotter Pin (7)

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4190-00-754-0654

Equipment Condition

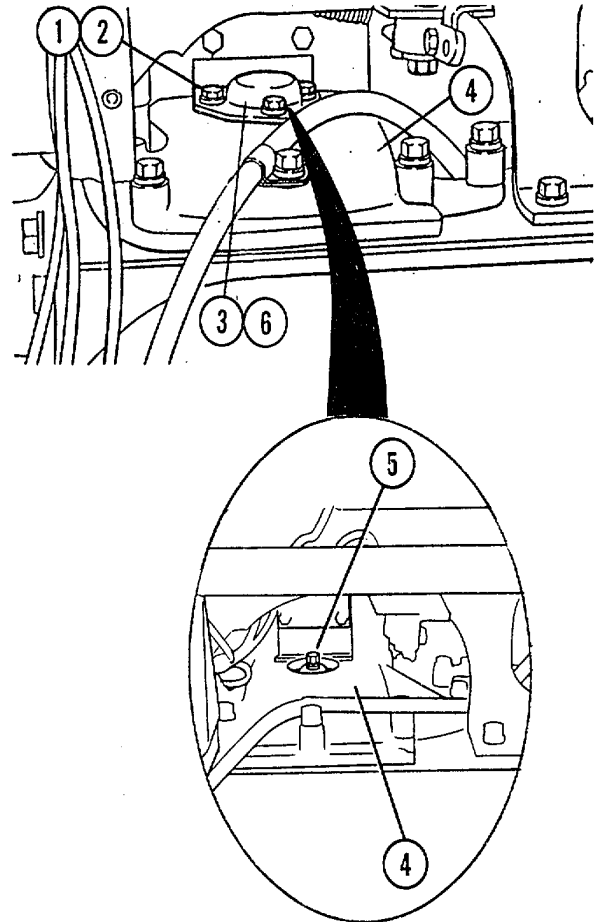
- Floor plates removed. (page 10-44)
- Winch (See 11-2)
- Ripper (See TM5-2410-237-34)

a. Adjustment

NOTE

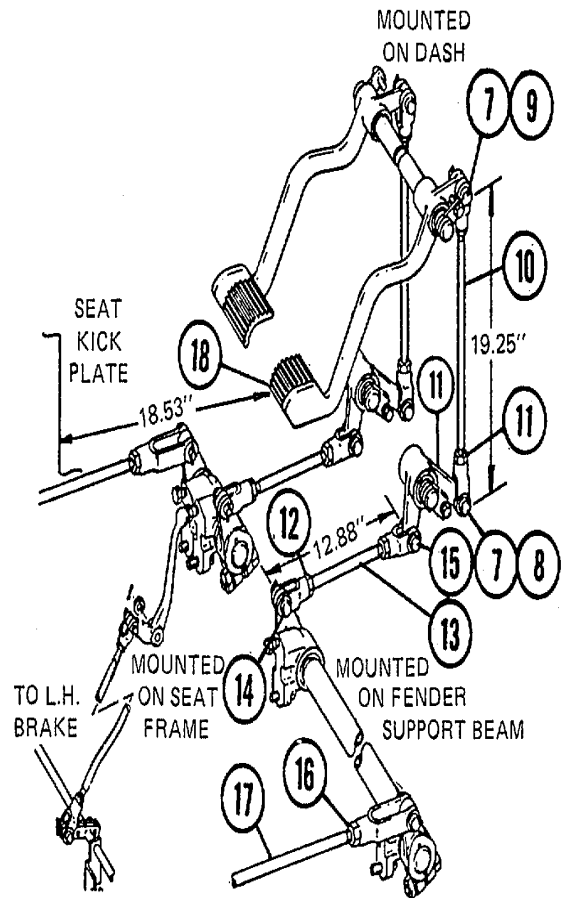
The following procedure is for right side linkage. Repeat procedure for left side linkage.

- (1) Use a wrench to remove three capscrews (1) and washers (2) from cover (3).
- (2) Remove cover (3) with gasket from top of final drive case (4) to gain access to brake band adjusting nut (5). Discard gasket (6).



9-3. STEERING BRAKE PEDALS AND LINKAGE - ADJUST (Cont'd)

- (3) Use a wrench to turn brake band adjusting nut (5) clockwise until band is tight, and then loosen 1-1/2 turns (9 clicks) counter-clockwise.
- (4) Remove rod (10) by removing cotter pins (7) and pins (8 and 9). Discard cotter pins (7).
- (5) Use two wrenches to loosen nut (11) at both ends of rod (10).
- (6) Turn rod (10) until distance between center line of pins (8 and 9) is 19.25 ± 0.02 ".
- (7) Use a wrench and a torque wrench to tighten nut (11) to a torque of 75 ± 10 lb. ft.
- (8) Install rod (10) and secure with pins (8 and 9) and new cotter pins (7).
- (9) Use two wrenches to loosen nut (12) on rod (13).
- (10) Turn rod (13) until distance between center lines of pins (14 and 15) is 12.88".
- (11) Use a wrench and a torque wrench to tighten nut (12) to a torque of 75 ± 10 lb. ft.
- (12) Use two wrenches to loosen nut (16) on rod (17).
- (13) Turn rod end to adjust length of rod (17) so distance between the front of the right brake pedal (18) and the seat kick plate is 18.53 ± 0.12 ".
- (14) Use a wrench and a torque wrench to tighten nut (16) to a torque of 75 ± 10 lb. ft.

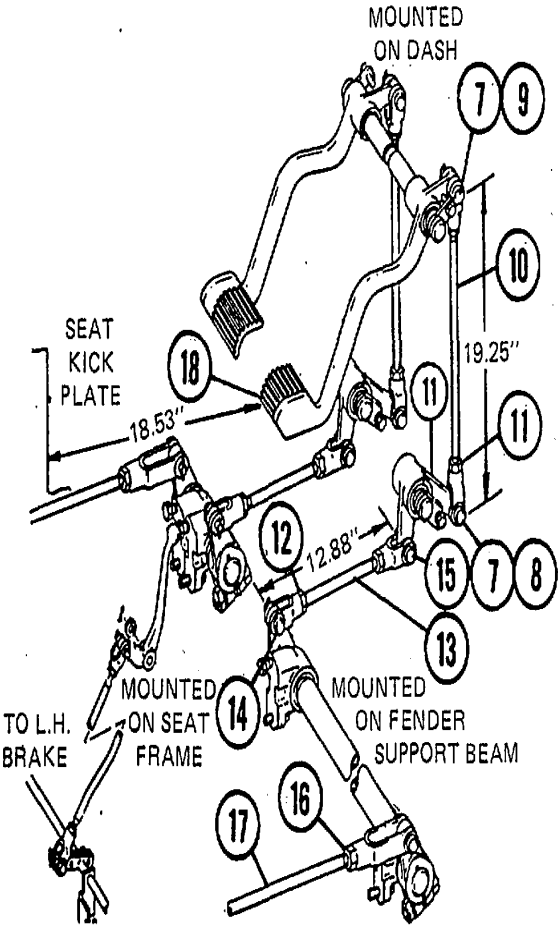


9-3. STEERING BRAKE PEDALS AND LINKAGE - ADJUST (Cont'd)

- (15) Install gasket (6) and cover (3). Use a wrench to install three washers (2) and capscrews (1).
- (16) Repeat STEPS 1 through 13 for the left side.
- (17) Install floor plates. See page 10-44.

b. Place In Service

Test drive and check for proper operation.



9-4. STEERING CLUTCH LEVERS AND LINKAGE - ADJUST

This task covers:

- a. Adjustment
- b. Place In Service

INITIAL SETUP:**Applicable Configurations**

All

Materials/Parts

Cotter Pin (6, 14)

Common Tools

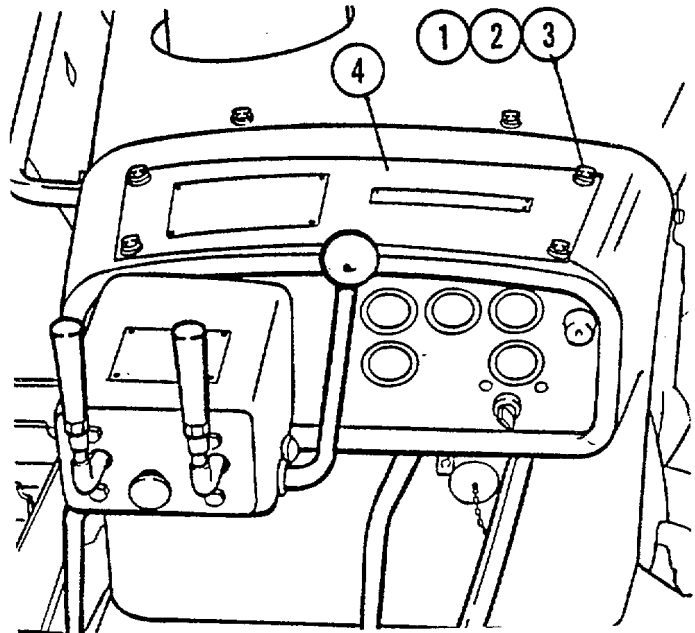
Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

Equipment Condition

Floor plates removed. (page 10-44)

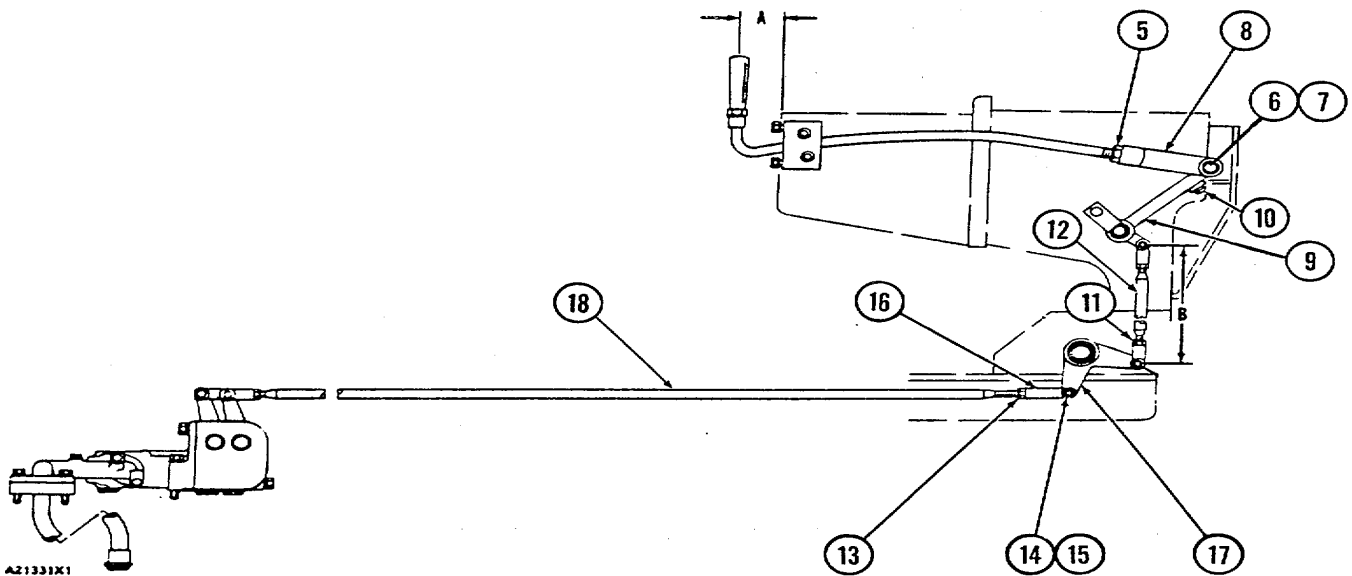
a. Adjustment

- (1) Use a socket to remove four capscrews (1), four lockwashers (2), four washers (3), and cover (4) from top of dash.



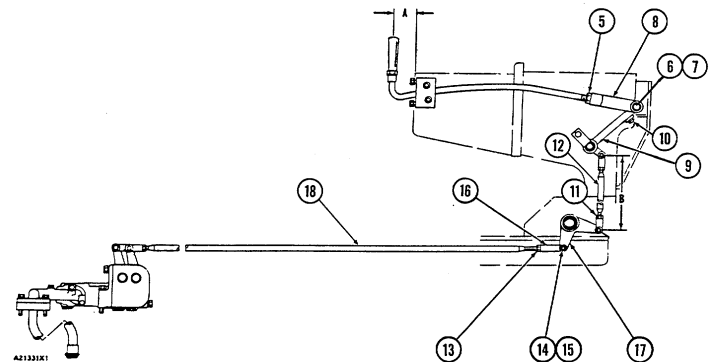
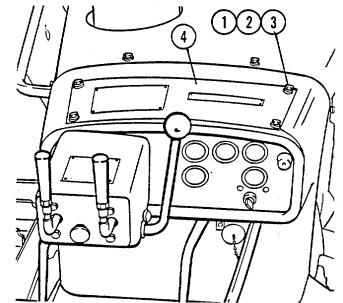
9-4. STEERING CLUTCH LEVERS AND LINKAGE - ADJUST (Cont'd)

- (2) Use a wrench to loosen nuts (5).
- (3) Use a pliers to remove cotter pins (6) and pins (7) that connect rod ends (8) to levers (9). Discard cotter pins (6).
- (4) Push levers (9) all the way toward the front of the machine against bumpers (10).
- (5) Turn rod ends (8) so distance (A) between the center line of handles (1) and the face of the dash is 2.50 ± 0.12 ".
- (6) Install the pins (7) and new cotter pins (6) that connect rod ends (8) to levers (9).
- (7) Tighten nuts (5) to a torque of 75 ± 10 lb. ft.
- (8) Use two wrenches to loosen nuts (11).
- (9) Turn rods (12) so distance (B) between the center line of the pins is 18.50 ± 0.02 ".
- (10) Tighten nuts (11) to a torque of 9 ± 3 lb. ft.
- (11) Use two wrenches to loosen nuts (13).
- (12) Remove cotter pins (14) and pins (15) that connect rod ends (16) to levers (17). Discard cotter pins (14).



9-4. STEERING CLUTCH LEVERS AND LINKAGE - ADJUST (Cont'd)

- (13) Pull rods (18), one at a time, toward the front of the machine until a resistance is felt.
- (14) Make an adjustment to rod ends (16), one at a time, so pins (15) can be installed through the rod ends into levers (17).
- (15) Turn rod ends (16), one at a time, 1/2 turn so the length of rods (18) is made shorter.
- (16) Put rod ends (16) in position on levers (17) and install pins (15) and new cotter pins (14).
- (17) Tighten nuts (13) to a torque of 9+3 lb. ft.
- (18) Place cover (4) in position and use a socket to install four washers (3), lockwashers (2) and four capscrews (1).
- (19) Install floor plates. See page 10-44.



b. Place In Service

Test drive and check for proper operation.

9-5. STEERING BRAKE LOCK LEVER AND LINKAGE - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configurations

All

Materials/Parts

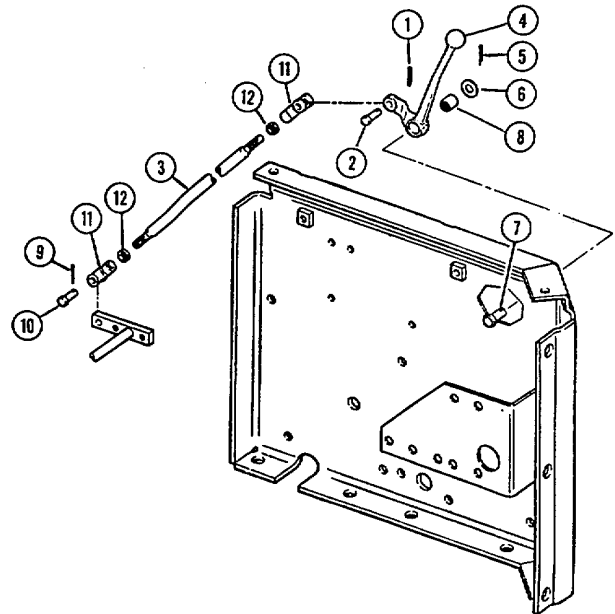
Cotter Pin (1, 5, 9)

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal

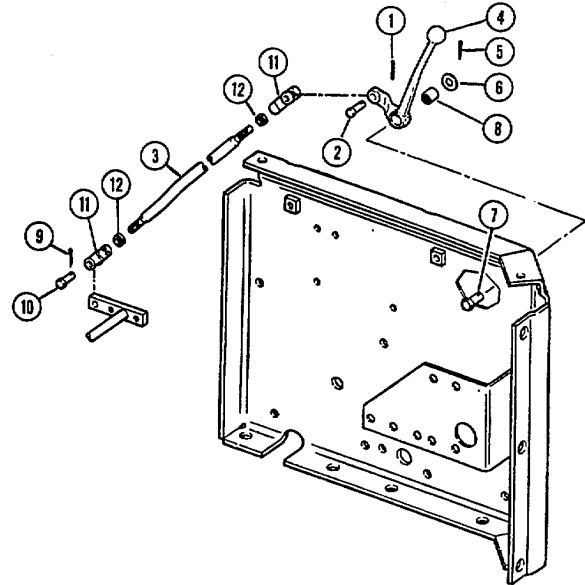
- (1) Remove cotter pin (1) and pin (2) that connects rod (3) to lever (4). Discard cotter pin (1).
- (2) Remove cotter pin (5) and washer (6) and slide lever (4) from pin (7). Pin (7) is welded inside plate. Discard cotter pin (5).
- (3) Remove bearing (8) from lever (4).
- (4) Tilt seat forward to gain access to parking brake linkage.
- (5) Remove cotter pin (9) and pin (10) and remove rod (3) from tractor. Discard cotter pin (9).
- (6) If necessary, use a wrench and remove rod end (11) and nut (12) from rod (3).



9-5. STEERING BRAKE LOCK LEVER AND LINKAGE - REPLACE (Cont'd)

b. Installation

- (1) If removed, use a wrench and install rod ends (11) and nuts (12) onto rod (3).
- (2) Place rod (3) into position and install new cotter pin (9) and pin (10).
- (3) Lower seat into operating position.
- (4) Install bearing (8) into lever (4).
- (5) Slide lever (4) onto pin (7) and install new cotter pin (5) and washer (6).
- (6) Install new cotter pin (1) and pin (2) that connects rod (3) to lever (4).

**c. Place In Service**

Check steering brake lock for proper operation.

9-9/(9-10 Blank)

CHAPTER 10
BODY, CAB, HOOD AND HULL MAINTENANCE

10-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the body, cab hood and hull. To find a specific maintenance procedure, see the maintenance task summary below.

10-2. BODY, CAB, HOOD AND HULL MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
10-3	Hydraulic Tank Mounting Brackets and Plates - Replace	10-2
10-4	Crankcase Guard - Replace	10-11
10-5	Headlamp Protective Cover - Replace	10-13
10-6	Rear Floodlamp Protective Cover - Replace	10-15
10-7	Hood - Replace/Repair	10-16
10-8	Track Roller Guard - Replace	10-19
10-9	Battery Box - Replace	10-22
10-10	ROPS - Replace	10-24
10-11	ROPS Mounting Brackets and Plates - Replace	10-26
10-12	Protective Screen - Replace	10-30
10-13	Winterized Cab - Replace/Repair	10-31
10-14	Windshield Glass - Replace	10-41
10-15	Floor Plates - Replace	10-44
10-16	Seat Assembly - Replace	10-46
10-17	Tool Box - Replace	10-52
10-18	Recoil Mechanism Guards - Replace	10-54

10-3. HYDRAULIC TANK MOUNTING BRACKETS AND PLATES - REPLACE

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Applicable Configurations
All

Material/Parts
Cotter Pin (26, 31)

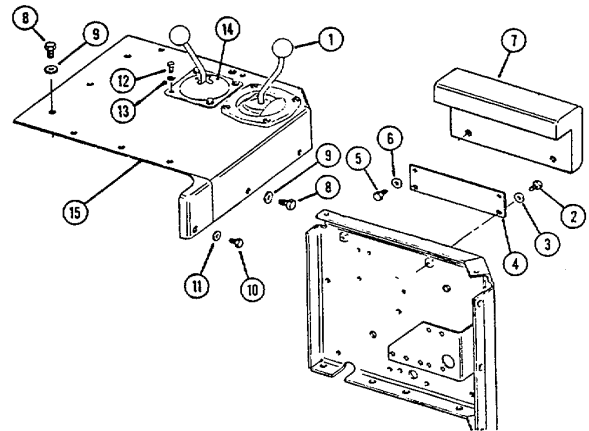
Common Tools
Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal

NOTE

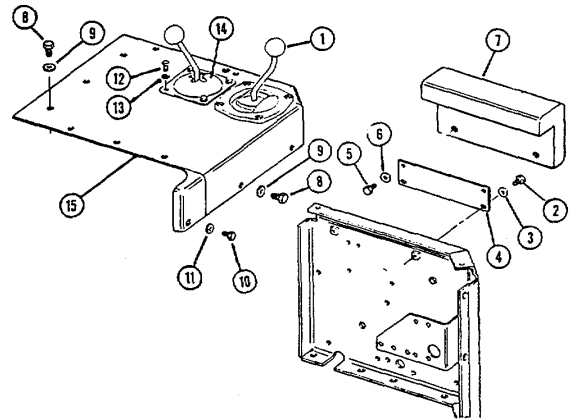
If equipped, remove sound suppression panels from hydraulic control console. See page 12-16.

- (1) Remove knobs (1) from tops of ripper or winch control lever and bulldozer control lever.
- (2) Use a wrench to remove two capscrews (2) and washers (3) that hold armrest bracket 4 to the console and remove armrest (7) from tractor.
- (3) Use a wrench to remove two capscrews (5) and washers (6) that secure armrest bracket (4) to armrest (7).
- (4) Use a socket to remove eight capscrews (8) and washers (9) and a socket to remove capscrew (10) and washer (11).

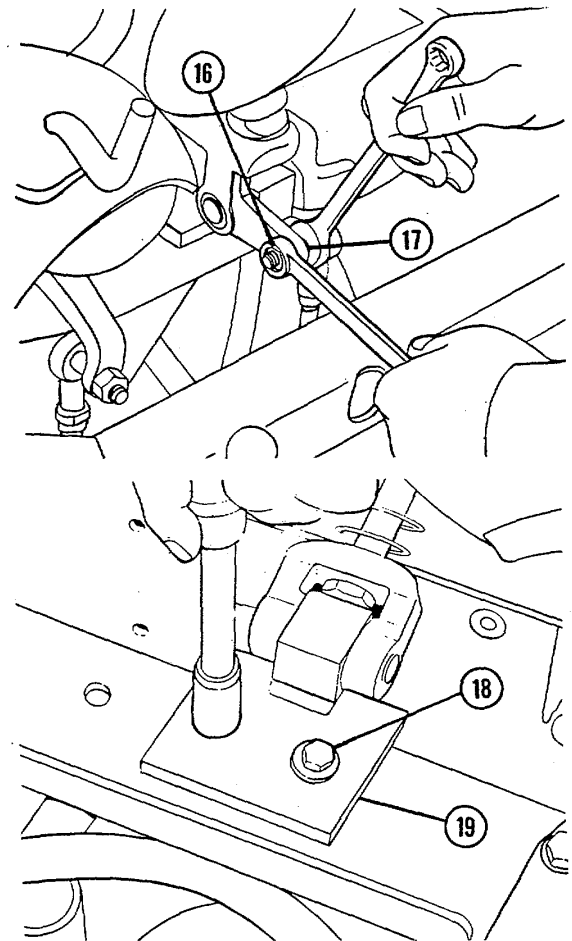


10-3. HYDRAULIC TANK MOUNTING BRACKETS AND PLATES - REPLACE (Cont'd)

- (5) On ripper models only, use a socket to remove four capscrews (12) and lockwashers (13) that secure guide (14) to the cover (15). Remove guide (14).
- (6) Slide cover (15) from tractor.



- (7) On ripper models only, use two wrenches to remove nut (16) from rod end (17).



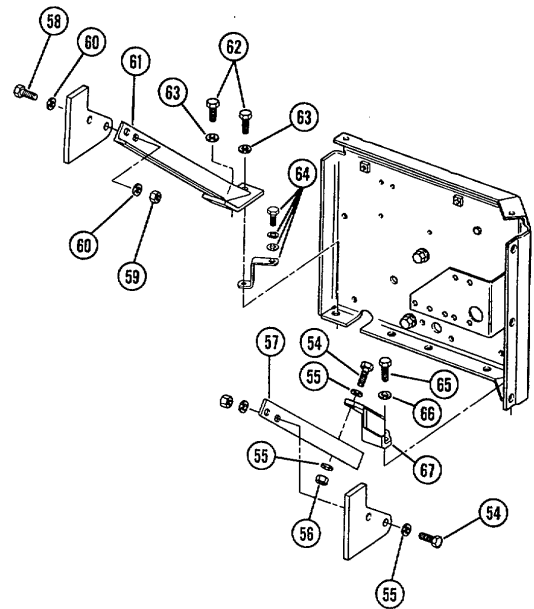
- (8) On ripper models only, use a socket to remove two capscrews (18) that secure the ripper linkage bracket (19) to the mounting group. Remove ripper control lever assembly from tractor.

10-3. HYDRAULIC TANK MOUNTING BRACKETS AND PLATES - REPLACE (Cont'd)

- (9) Use two wrenches to remove nut (20) from rod end (21) and slide rod end (21) from bulldozer control linkage.
- (10) Use two wrenches to remove nut (22) from rod end (23) and remove rod end from bulldozer control linkage.
- (11) Use a wrench to remove four capscrews (24) and lockwashers (25) from bulldozer control linkage and remove bulldozer control linkage.
- (12) Remove cotter pin (26), washer (27) and pin (28) that connect rod (29) to lever (30). Remove cotter pin (31) and washer (32) and remove brake lock lever (30). Discard cotter pins (26 and 31).
- (13) Use a wrench to remove four capscrews (33) and washers (34) that secure bracket (35) to tractor. Remove bracket (35).

NOTE

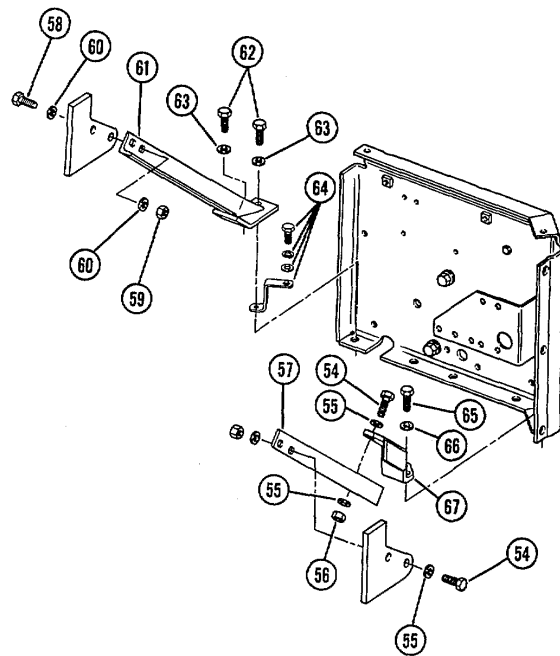
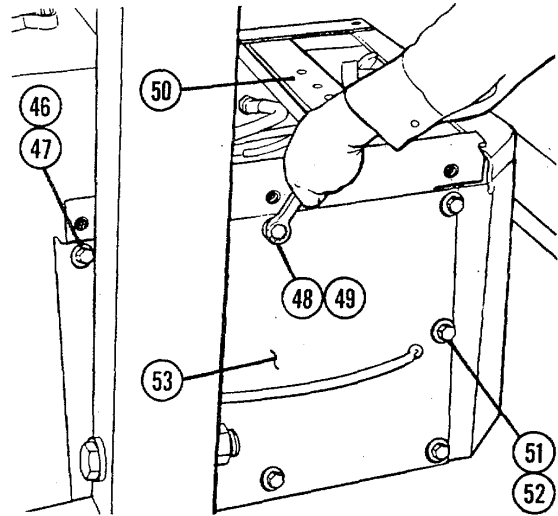
To make installation easier, mark all hoses before removal.



- (14) Use a wrench to remove lines (36 and 37). Use a wrench to remove line (38).
- (15) Use a wrench to remove two capscrews (39) and washers (40) that secure bracket (41) to the hydraulic tank. Remove bracket (41).
- (16) Use a wrench to remove four nuts (42), capscrews (43), spacers (44) and eight washers (45) from tractor.

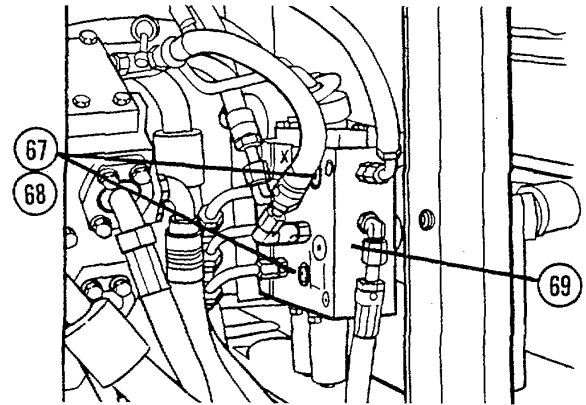
10-3. HYDRAULIC TANK MOUNTING BRACKETS AND PLATES - REPLACE (Cont'd)

- (17) Use a wrench to remove one capscrew (46) and washer (47).
- (18) Use a wrench to remove two capscrews (48) and washers (49). Lift bracket assembly (50) from tractor.
- (19) Use a wrench to remove three capscrews (51) and washers (52) that secure panel (53) to the tractor. Remove panel (53) from tractor.
- (20) Use a wrench to remove four capscrews (54), eight washers (55) and four nuts (56) that secure brace (57) to tractor. Remove brace (57) from tractor.
- (21) Use a wrench to remove two capscrews (58), nuts (59) and four washers (60) that secure the upper end of brace (61) to the hydraulic tank.
- (22) Use a wrench to remove two capscrews (62), washers (63) that secure lower end of brace (61) to tractor. Remove brace (61) and bracket (64).
- (23) Use a wrench to remove two capscrews (65) and washers (66) that secure bracket (67) to tractor. Remove bracket (67).



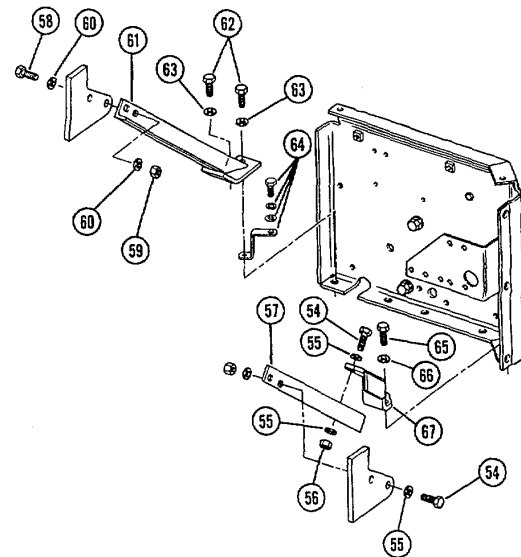
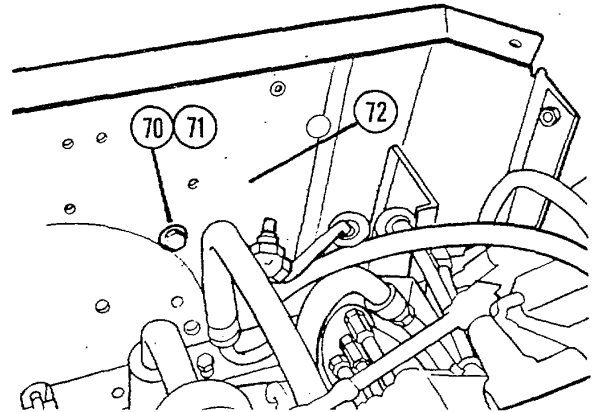
10-3. HYDRAULIC TANK MOUNTING BRACKETS AND PLATES - REPLACE (Cont'd)

- (24) Use a wrench to remove three capscrews (68) and washers (69) that secure pilot valve (70) to side panel.
- (25) Use a wrench to remove eight capscrews (71) and washers (72) that secure the side panel (73) to the tractor. Remove side panel (73).



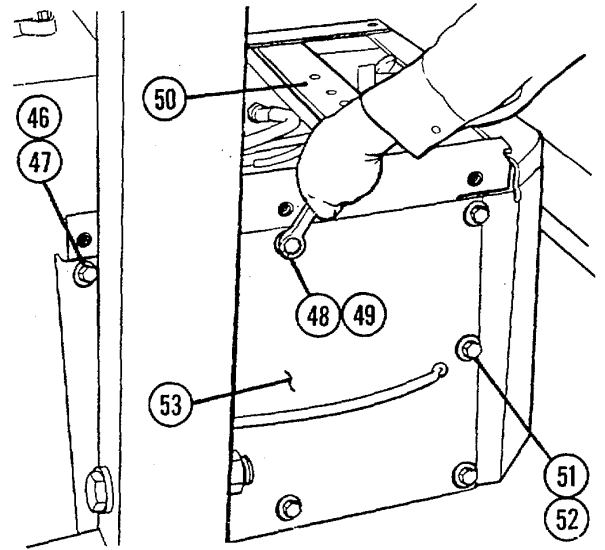
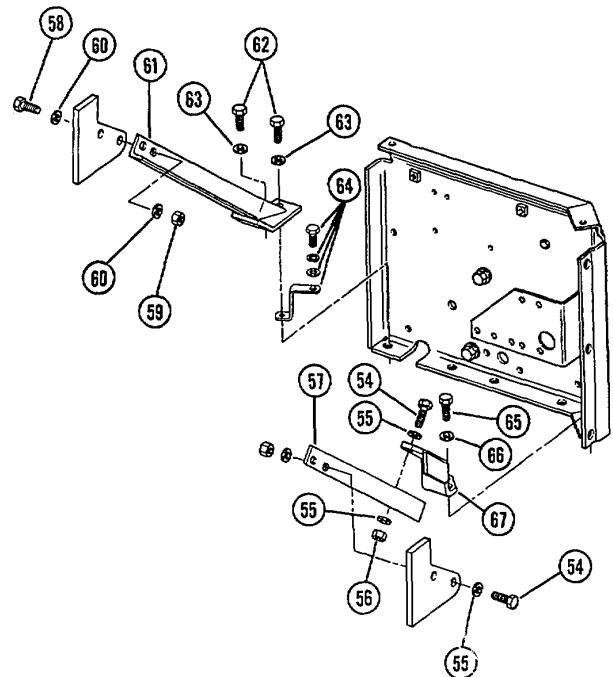
b. Installation

- (1) Place side panel (73) in position against seat. Use a wrench to install eight capscrews (71) and washers (72).
- (2) Use a wrench to install three capscrews (68) and washers (69) that secure pilot valve (70) to side panel.
- (3) Place bracket (67) into position on tractor. Use a wrench to install two capscrews (65) and washers (66) that secure bracket (67) to tractor.
- (4) Place bracket (64) and brace (61) into position. Use a wrench to install two capscrews (62) and washers (63) that secure lower end of brace (61) to tractor.



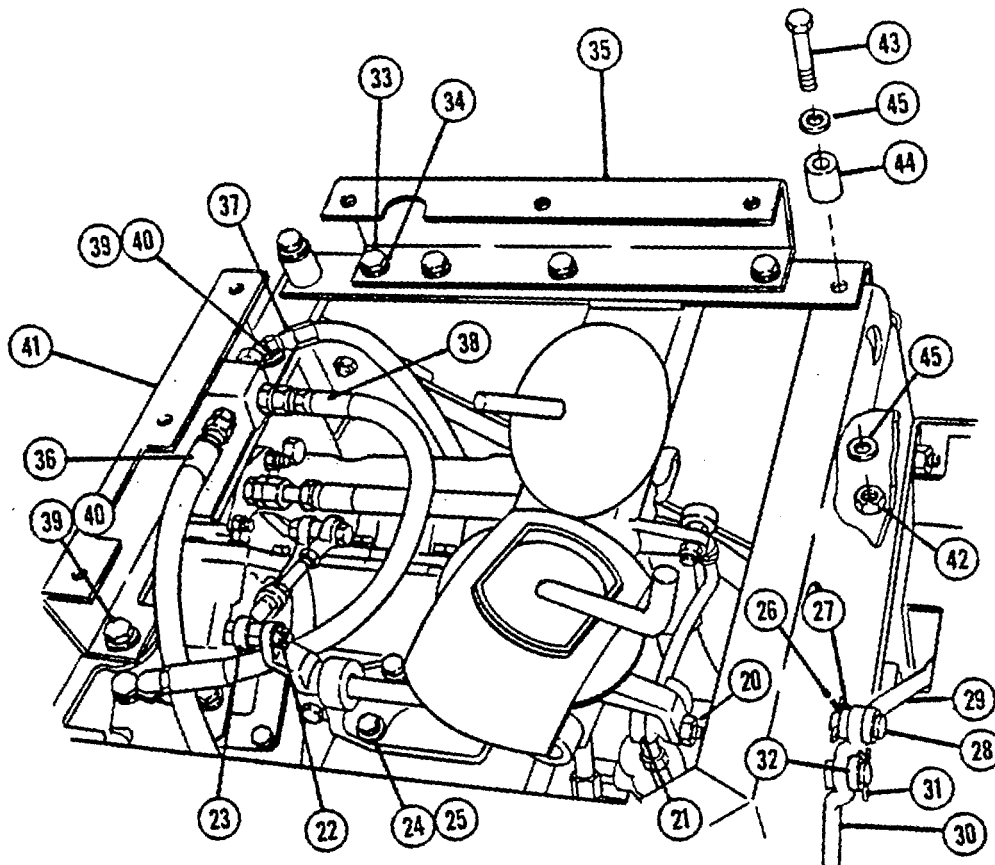
10-3. HYDRAULIC TANK MOUNTING BRACKETS AND PLATES - REPLACE (Cont'd)

- (5) Use a wrench to install two capscrews (58), nuts (59) and four washers (60) that secure the upper end of brace (61) to the hydraulic tank.
- (6) Place brace (57) into position on tractor. Use a wrench to install four capscrews (54), eight washers (55) and four nuts (56) that secure brace (57) to tractor.
- (7) Place panel (53) into position on tractor. Use a wrench to install three capscrews (51) and washers (52) that secure panel (53) to the tractor.
- (8) Place bracket assembly (50) into position on tractor. Use a wrench to install two capscrews (48) and washers (49).
- (9) Use a wrench to install one capscrew (46) and washer (47).



10-3. HYDRAULIC TANK MOUNTING BRACKETS AND PLATES - REPLACE (Cont'd)

- (10) Use a wrench to install four nuts (42), capscrews (43), spacers (44) and eight washers (45) spacers (44) and eight washers
- (11) Place bracket (41) into position on hydraulic tank. Use a wrench to install two capscrews (39) and washers (40) that secure bracket (41) to the hydraulic tank.
- (12) Use a wrench to install lines (36 and 37). Use a wrench to install line (38).
- (13) Place bracket (35) into position on tractor.. Use a wrench to install four capscrews (33) and washers (34) that secure bracket (35) to tractor.
- (14) Place brake lock lever into position and install new cotter pin (31) and washer (32). Install new cotter pin (26), washer (27) and pin (28) that connect rod (29) to lever (30).
- (15) Place bulldozer control linkage into position and use a wrench to install four capscrews (24) and lockwashers (25).
- (16) Install rod end (23) into bulldozer control linkage. Use two wrenches to install nut (22) onto rod end (23).
- (17) Place rod end (21) into bulldozer control linkage. Use two wrenches to install nut (20) onto nut rod end (21).



10-3. HYDRAULIC TANK MOUNTING BRACKETS AND PLATES - REPLACE (Cont'd)

(18) On ripper models only, place the ripper control linkage bracket (19) into position on the tractor. Use a socket to install two capscrews (18) that secure the ripper linkage bracket (19) to the mounting group.

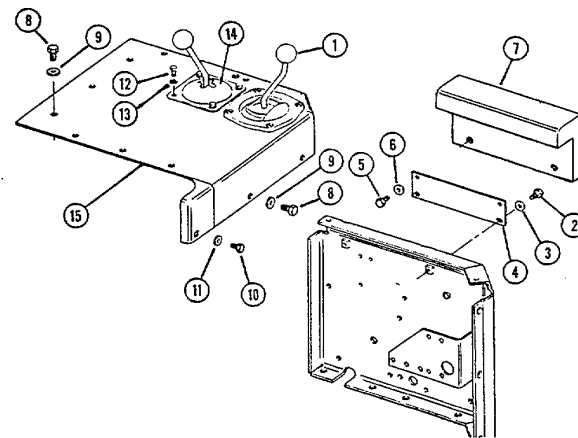
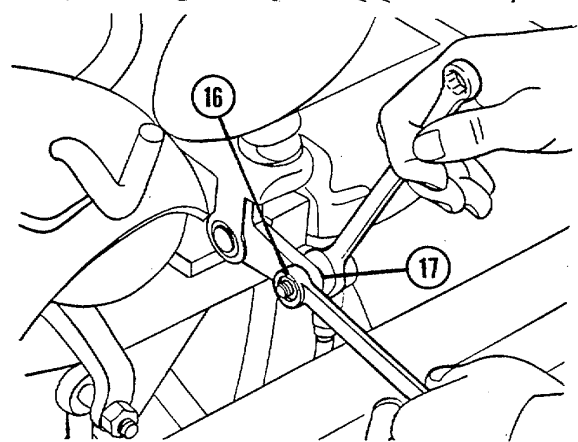
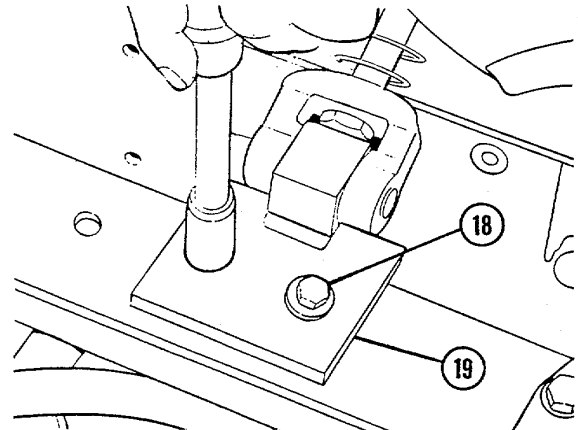
(19) Slide rod end (17) onto the ripper control lever. Use two wrenches to install nut (16) onto rod end (17).

(20) Slide cover (15) into position.

(21) On ripper models only, place guide (14) into position and use a socket to install four capscrews (12) and lockwashers (13) that secure guide (14) to the cover (15).

(22) Use a socket to install eight capscrews (8) and washers (9) and use a wrench to install capscrew (10) and washer (11).

(23) Place armrest bracket (4) in position on armrest (7). Use a wrench to install two capscrews (5) and washers (6) that secure armrest bracket (4) to armrest (7).

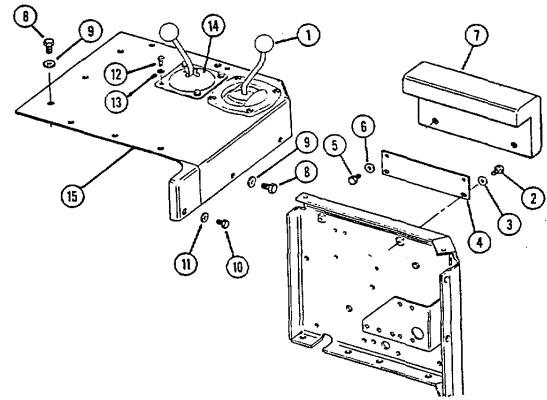


10-3. HYDRAULIC TANK MOUNTING BRACKETS AND PLATES - REPLACE (Cont'd)

- (24) Place armrest in position on the tractor. Use a wrench to install two capscrews (2) and washers (3) that hold armrest bracket (4) to the console.
- (25) Install knobs (1) onto tops of ripper or winch control lever and bulldozer control lever.

NOTE

If equipped, install sound suppression panels onto hydraulic control console. See page 12-16.



10-4. CRANKCASE GUARD - REPLACE

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654
Dolly Type Hydraulic Jack, 10 ton
NSN 4910-00-289-7233

Materials/Parts

18" Piece of 2" x 4" Wood

Equipment Condition

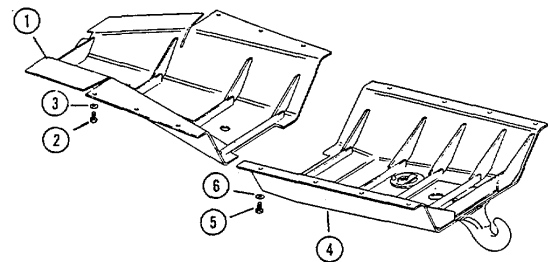
Tractor parked on level ground.
Engine cool.

a. Removal

NOTE

An 18" piece of 2 x 4 wood block on jack may be useful in crankcase guard removal.

- (1) Raise dozer blade completely and support with jack stand under blade.
- (2) Apply light pressure to rear section of crankcase guard (1) with hydraulic floor jack.
- (3) Use a socket to remove six capscrews (2) and six washers (3).
- (4) Lower hydraulic floor jack and remove rear section of crankcase guard (1) from front of tractor.



10-4. CRANKCASE GUARD - REPLACE (Cont'd)

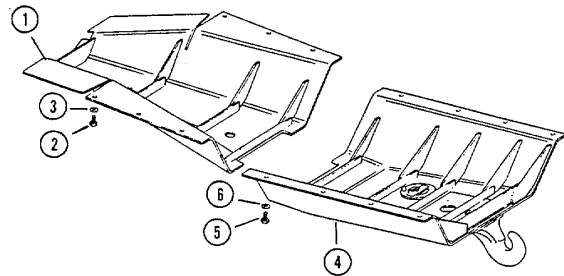
- (5) Repeat STEP 2 for front section of crankcase guard (4).
- (6) Use a socket to remove eight capscrews (5) and eight washers (6) .
- (7) Lower jack and remove front section of crankcase guard (4).

b. Installation

NOTE

An 18" piece of 2 x 4 wood block on jack may be useful in crankcase guard installation.

- (1) Place front section of crankcase guard (4) on jack and raise into position. Apply light pressure to hold in position.
- (2) Use a socket to install eight capscrews (5) and eight washers (6).
- (3) Repeat STEP 1 for rear section of crankcase guard (1).
- (4) Use a socket to install six capscrews (2) and six washers (3).
- (5) Raise dozer completely and remove jack stand from blade.



10-5. HEADLAMP PROTECTIVE COVER - REPLACE

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Applicable Configurations

All

Equipment Condition

Headlamp removed. (page 4-44)

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal

NOTE

This procedure can be used for either R.H. or L.H. headlamp guard.

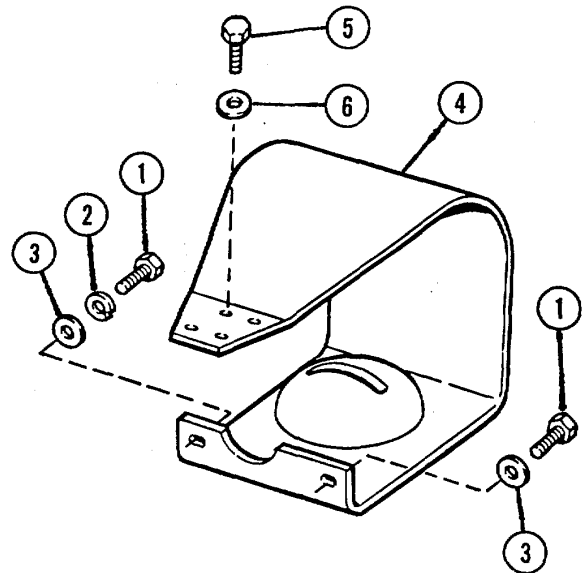
- (1) Use a wrench to remove two bolts (1), one lockwasher (2) and two washers (3) from lower lip of lamp guard (4).
- (2) Using same wrench, remove four bolts (5), four washers (6) and guard (4) from top of radiator cover.

b. Installation

NOTE

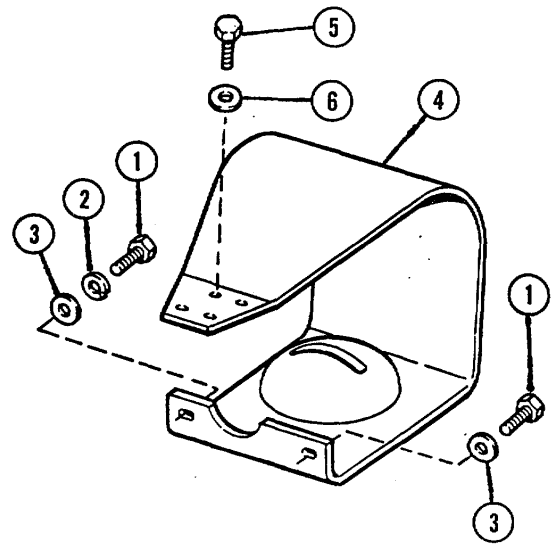
This procedure can be used for either R.H. or L.H. headlamp guard.

- (1) Use a wrench to install top leg of guard (4) on radiator cover with four bolts (5) and four washers (6).



10-5. HEADLAMP PROTECTIVE COVER - REPLACE (Cont'd)

- (2) Using same wrench install two bolts (1) and one lockwasher (2) and two washers (3) to radiator guard.
- (3) Install headlamp. See page 4-44.



10-6. REAR FLOODLAMP PROTECTIVE COVER - REPLACE

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Applicable Configurations

All

Equipment Condition

Rear floodlamp removed. (page 4-44)

Common Tools

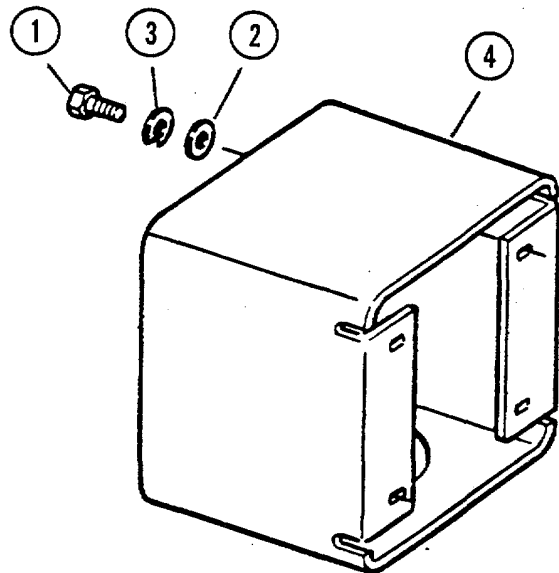
Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal

- (1) Use a socket to remove four capscrews (1), washers (2) and one lockwasher (3) from rear floodlamp protective cover (4).
- (2) Remove rear floodlamp protective cover (4).

b. Installation

- (1) Place rear floodlamp protective cover (4) into position on tractor.
- (2) Use a socket to install four capscrews (1), washers (2) and one lockwasher (3) that secure rear floodlamp protective cover (4) to tractor.
- (3) Install rear floodlamp. See page 4-44.



10-7. HOOD - REPLACE/REPAIR

This task covers:

- a. Removal
- b. Disassembly
- c. Assembly
- d. Installation

INITIAL SETUP

Applicable Configurations

All

Common Tools

Tool Kit, General Mechanics
 NSN 5180-00-699-5273
 Lifting Equipment 200 lb.
 Side Cutters

Materials/Parts

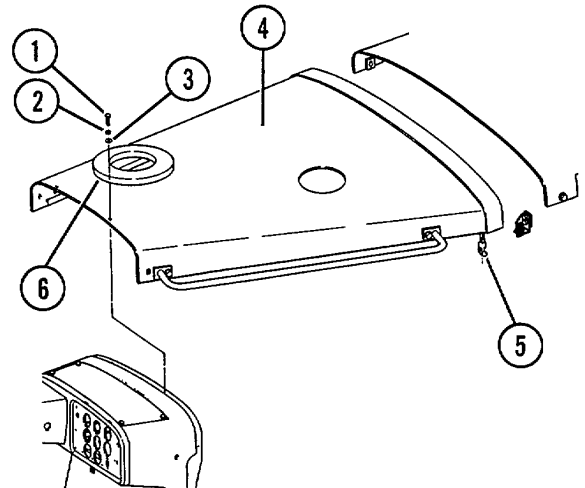
Cotter pin (12)

Equipment Condition

Exhaust extension removed. (page 3-100)
 Prescreen filter removed. (page 3-42)

a. Removal

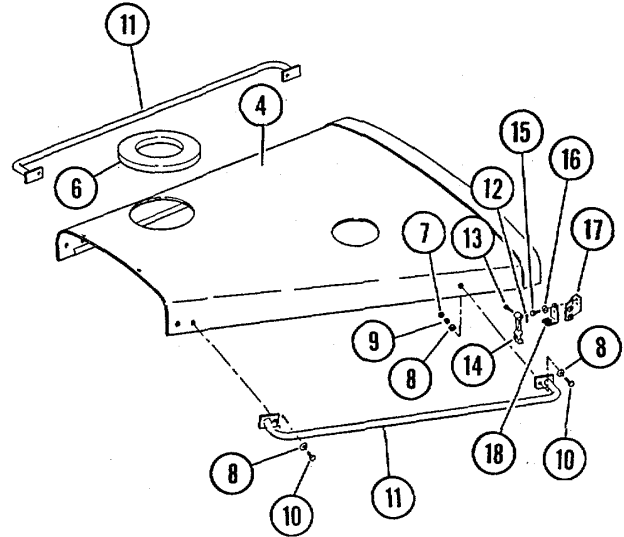
- (1) Use a socket to remove four capscrews (1), four lockwashers (2) and four washers (3) at cab end of hood (4).
- (2) Release two latches (5) at radiator end of hood (4).
- (3) Attach lifting equipment and remove hood (4).
- (4) Remove grommet (6).



10-7. HOOD - REPLACE/REPAIR (Cont'd)

b. Disassembly

- (1) Attach lifting equipment and turn hood (4) upside down.
- (2) Use two wrenches to remove two nuts (7), four washers (8), two lockwashers (9), two capscrews (10) and iron grab assembly (11) on one side of hood (4).
- (3) Use side cutters to remove cotter pin (12), pin (13) and latch assembly (14) on same side of hood (4). Discard cotter pin (12).
- (4) Repeat STEPS 3 and 4 on other side of hood.
- (5) Use a wrench to remove two capscrews (15) and lockwashers (16) from brackets (17 and 18).
- (6) Repeat STEP 6 on other side of hood.



c. Assembly

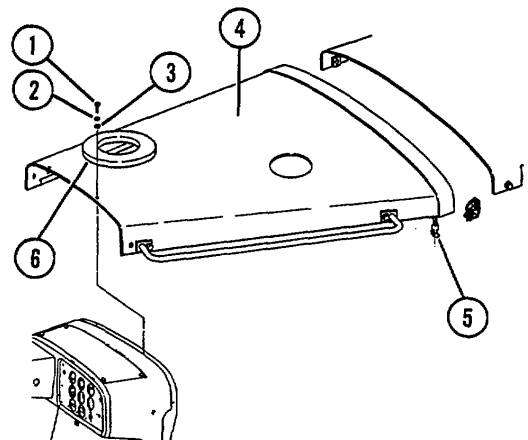
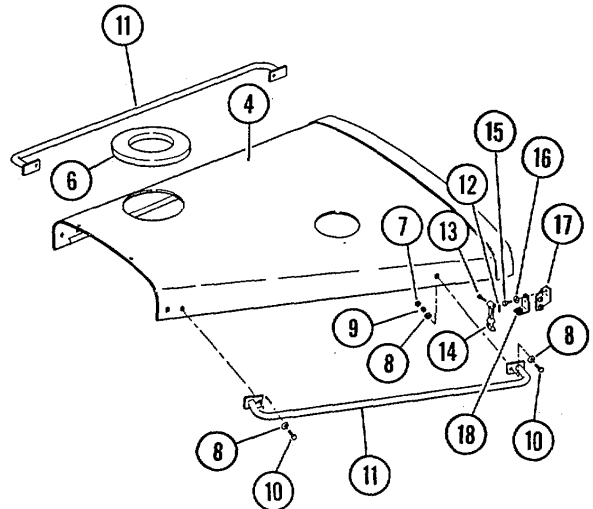
- (1) Install brackets (18 and 17) and secure with two capscrews (15) and lockwashers (16). Use a wrench to tighten.
- (2) Repeat STEP 1 on other side of hood.
- (3) Install latch assembly (14) on one side of hood (4) with pin (13) and new cotter pin (12). Use side cutters to bend cotter pin (12).

10-7. HOOD - REPLACE/REPAIR (Cont'd)

- (4) Install grab iron (11) on same side of hood (4) with two capscrews (10), two lockwashers (9), four washers (8) and two nuts (7). Use two wrenches to tighten nuts (7).
- (5) Repeat STEPS 3 and 4 on other side of hood.
- (6) Attach lifting equipment and turn hood (4) top side up.

d. Installation

- (1) Attach lifting equipment and lift hood (4) into position on tractor.
- (2) Install four capscrews (1), four lockwashers (2) and four washers (3) at cab end of hood (4). Use a socket to tighten capscrews (1).
- (3) Latch two latches (5) at radiator end of hood (4).
- (4) Install grommet (6).
- (5) Install prescreen filter. See page 3-42.
- (6) Install exhaust extension. See page 3-100.



10-8. TRACK ROLLER GUARD - REPLACE

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

MOS62B (2)

Common Tools

Shop Equipment, Automotive
Maintenance, Common #1 Less Power
NSN 4910-00-754-0654

Materials/Parts

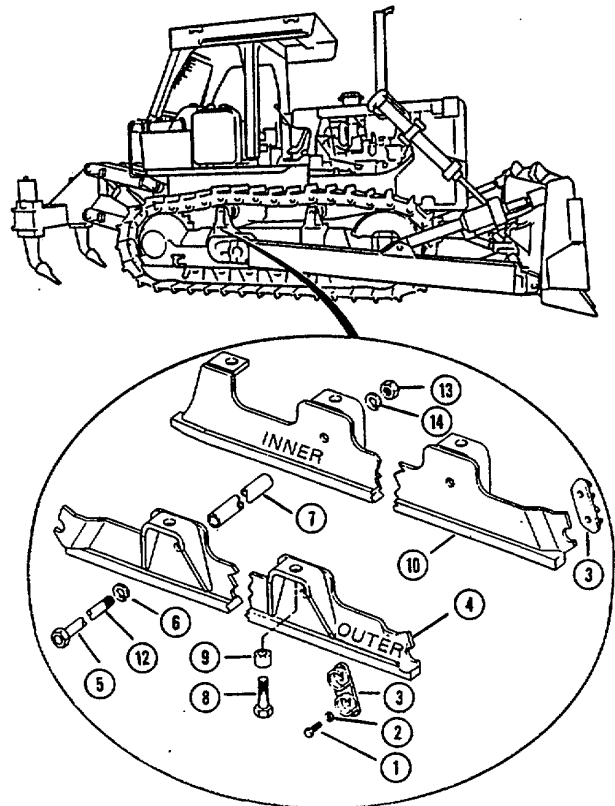
2 Wood Blocks 20" x 4" x 4"

Equipment Condition

Tractor parked on level ground.

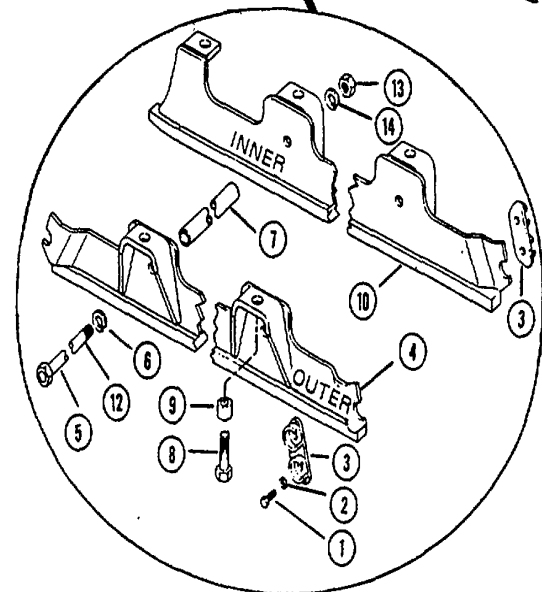
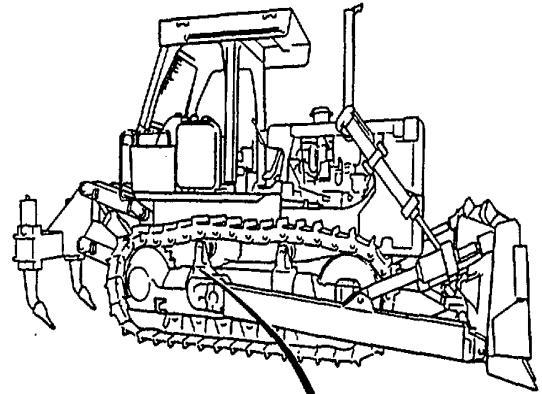
Removal

- (1) Use a socket to remove two capscrews (1), two washers (2) and one retainer (3) from each end of the outer guard assembly (4).
- (2) Use a wrench to remove five nuts (5) and five washers (6). Push five rods (12) through the guard assembly (4).
- (3) Place wooden blocks between the track assembly and the outer guard assembly (4).
- (4) Use a wrench to remove five capscrews (8) and five spacers (9) that hold outer guard assembly. Use capscrews to lower guard assembly onto the wooden blocks. Use two persons to remove outer guard assembly (4). The weight of the assembly is 80 lbs.



10-8. TRACK ROLLER GUARD - REPLACE (Cont'd)

- (5) Remove five rods (12) from the inner guard assembly. If required, remove one nut (13) and one washer (14) from each of the five rods. Remove five spacers (7) from the inner guard assembly (10).
- (6) Put wooden blocks between track assembly and inner guard assembly (10) at each end.
- (7) Use a socket to remove two capscrews (1), two washers (2) and one retainer (3) at the forward end of the inner guard assembly (10).
- (8) Use a wrench to remove six capscrews (8) and six spacers (9) that hold the inner guard assembly. Use capscrews to lower guard assembly onto the wooden blocks. Use two persons to remove inner guard assembly (10). The weight of the assembly is 80 lbs.



b. Installation

- (1) Use two persons to place inner guard assembly (10) in position and loosely install the six capscrews (8) and six spacers (9) that hold the inner guard assembly to the track roller frame.
- (2) Insert rods (12) through inner guard with nut (5) and washer (6) attached.
- (3) Place tubes (7) over rods (12).
- (4) Use two persons to place outer guard assembly (4) in position and loosely install the five capscrews (8) and five spacers (9) that hold the outer guard assembly to the track roller frame.

10-8. TRACK ROLLER GUARD - REPLACE (Cont'd)

- (5) Feed rods (12) through outer guard (4).
- (6) Loosely install washers (6) and nuts (5). Tighten only the rods at each end.
- (7) Tighten capscrews (8) on both inner and outer guard to 500+10 lb. ft.
- (8) Tighten nuts (5) on rods (12) to 265+35 lb. ft.
- (9) Install the retainer (3) at the forward end of the inner guard assembly. Secure the retainer with two capscrews (1) and two washers (2). Tighten capscrew using a socket.
- (10) Install a retainer (3) at each end of the outer guard assembly. Secure each retainer with two capscrews (1) and two washers (2). Tighten capscrew using a socket.

10-9. BATTERY BOX - REPLACE**This task covers:****a. Removal****b. Installation****INITIAL SETUP:**Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
 Maintenance and Repair, Common #1
 Less Power NSN 4910-00-754-0654

Equipment Condition

Batteries removed. (page 4-65)

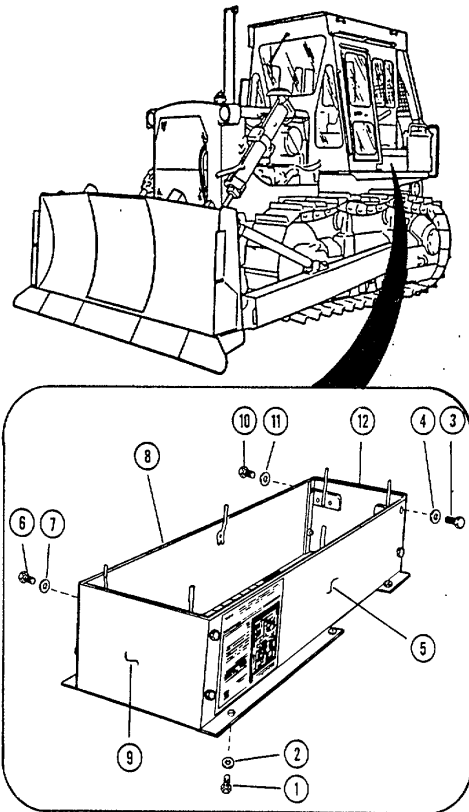
a. Removal

- (1) Use a socket to remove six capscrews (1) and washers (2) located underneath fender.

NOTE

Save instruction plates when removing front panel (5)

- (2) Use a socket to remove four capscrews (3) and washers (4) from panel (5). Lift panel (5) from tractor.
- (3) Use a wrench to remove two capscrews (6) and washers (7) from panel (8). Lift panel (9) from tractor.
- (4) Use a wrench to remove two capscrews (10) and washers (11) from panel (8). Lift panel (12) from tractor and then remove panel (8).



10-9. BATTERY BOX - REPLACE (Cont'd)

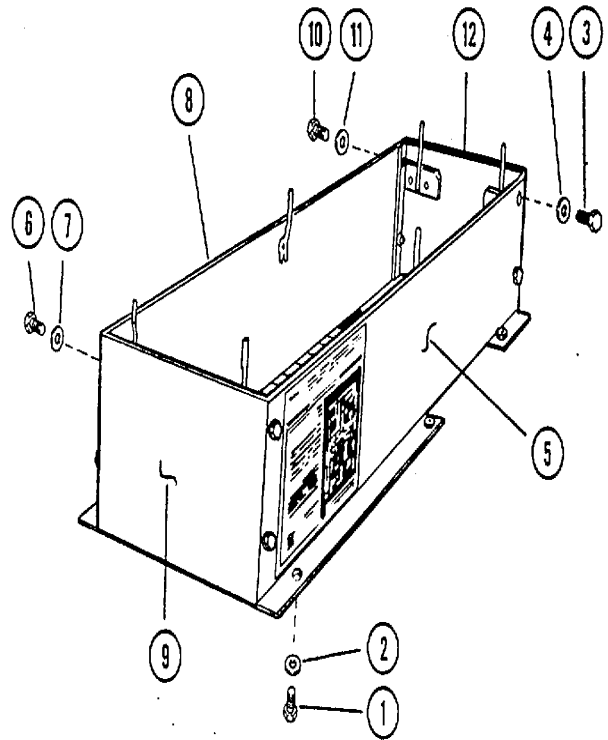
b. Installation

- (1) Place panel (8) in position on tractor. Place panel (12) in position and use a wrench to install two capscrews (10) and washers (11).
- (2) Place panel (9) in position and use a wrench to install two capscrews (6) and washers (7).

NOTE

When installing panel (5) replace instruction plates.

- (3) Place panel (5) in position and install four capscrews (3) and washers (4).
- (4) Use a socket to install six capscrews (1) and washers (2).
- (5) Install batteries. See page 4-67.



10-10. ROPS - REPLACE

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Applicable Configurations

Tractor with ROPS

Personnel Required

MOS62B (2)

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654
Lifting Equipment (2 Ton minimum)

Equipment Condition

Tractor parked on level ground.
Protective screen removed. (page 10-30)

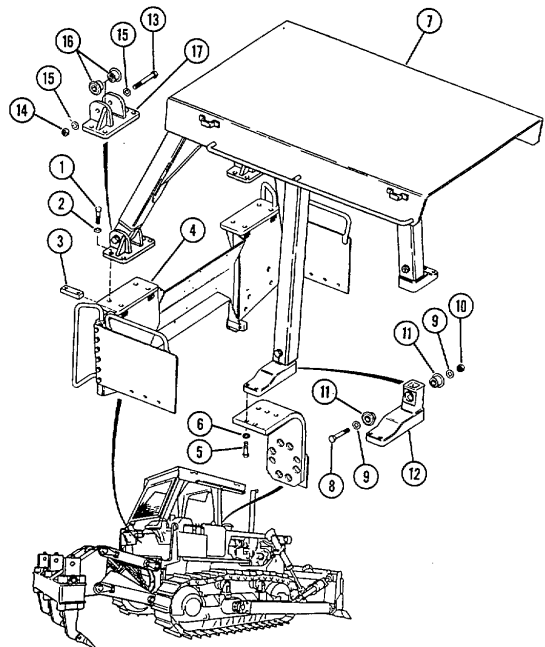
a. Removal

- (1) Use a wrench to remove four bolts (1), washers (2) and two nut strips (3) from each side of rear mounting pads (4).
- (2) Use a wrench to remove three capscrews (5) and washers (6) from each side of the front mounting pads of the ROPS. The capscrew heads (5) are located underneath the fenders.
- (3) Attach lifting equipment to the ROPS assembly (7) and lift the assembly from the tractor.

NOTE

STEPS (4) and (5) apply to both right and left pads.

- (4) Use a wrench and a socket to remove bolt (8), two washers (9), nut (10), two bushings (11) and pad (12) from front leg of ROPS assembly (7).



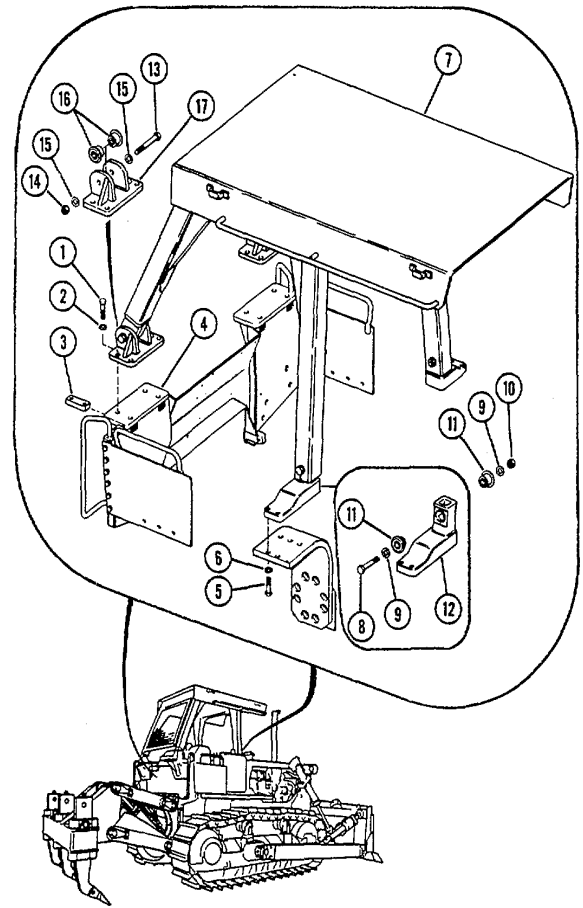
10-10. ROPS - REPLACE (Cont'd)

- (5) Use a wrench and a socket to remove bolt (13), nut (14), two washers (15), bushings (16), and pad (17) from rear leg of ROPS assembly (7).

b. Installation**NOTE**

STEPS (1) and (2) apply to both right and left hand pads.

- (1) Use a wrench and a socket to install rear pad (17) and two bushings (16) with bolt (13), two washers (15) and nut (14).
- (2) Use a wrench and a socket to install front pad (12) and two bushings (11) with bolt (8), two washers (9) and nut (10).
- (3) Attach lifting equipment to the ROPS assembly (7) and lift the assembly into position on the tractor.
- (4) Use a socket to install four capscrews (1), washers (2) and two nut strips (3) to each side of rear mounting pads on ROPS. Torque capscrews (1) to 900+100 ft. lbs.
- (5) Use a socket to install three capscrews (5), and washers (6) on each side of the ROPS that secure the front mounting pads of the ROPS to the tractor. Torque capscrews (5) to 900+100 ft. lbs.
- (6) Install protective screen. See page 10-30.



10-11. ROPS MOUNTING BRACKETS AND PLATES - REPLACE

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

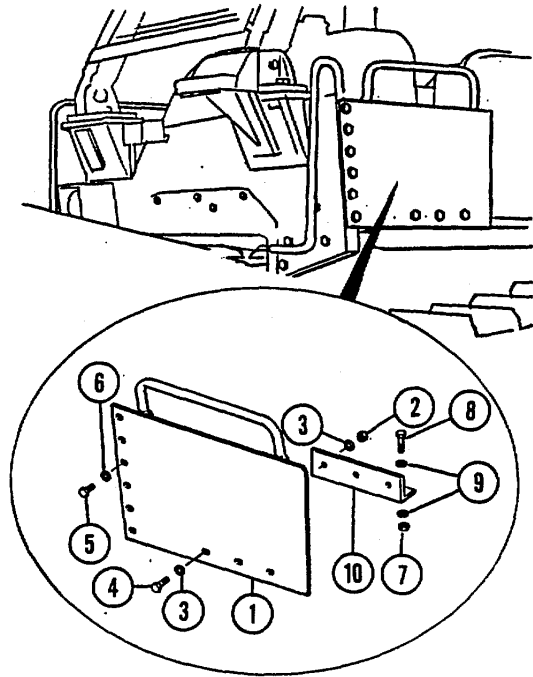
Applicable Configurations
All

Common Tools
Tool Kit, General Mechanics
NSN 5180-00-699-5273
Lifting Equipment 100 lb.

Equipment Condition
Engine OFF.
ROPS removed. (page 10-24)
Rear lights removed. (page 4-44)
Backup alarm removed. (page 4-56)

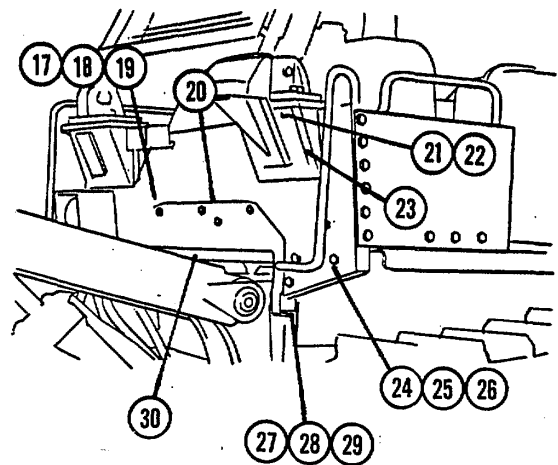
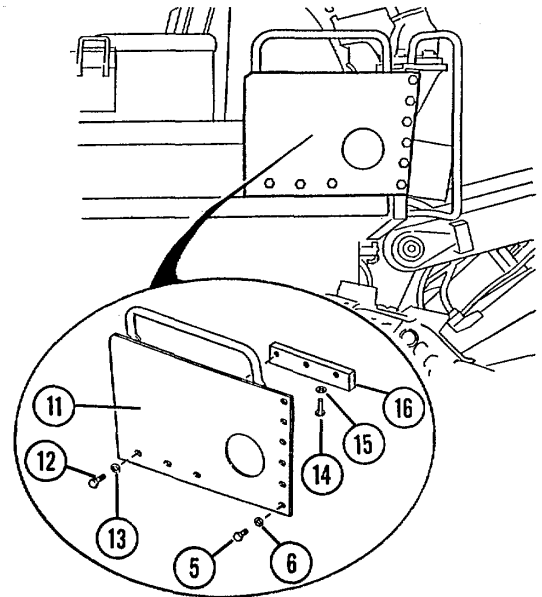
a. Removal

- (1) Attach lifting equipment to R.H. side plate assembly (1).
- (2) Use two wrenches to remove three nuts (2) six flat washers (3) and three cap screws (4) from bottom edge of R.H. plate assembly (1).
- (3) Use a wrench to remove six cap screws (5), six flat washers (6) and R.H. plate assembly (1).
- (4) Use two wrenches to remove two nuts (7), two cap screws (8) four washers (9) and angle (10) from R.H. side of machine.



10-11. ROPS MOUNTING BRACKETS AND PLATES - REPLACE (Cont'd)

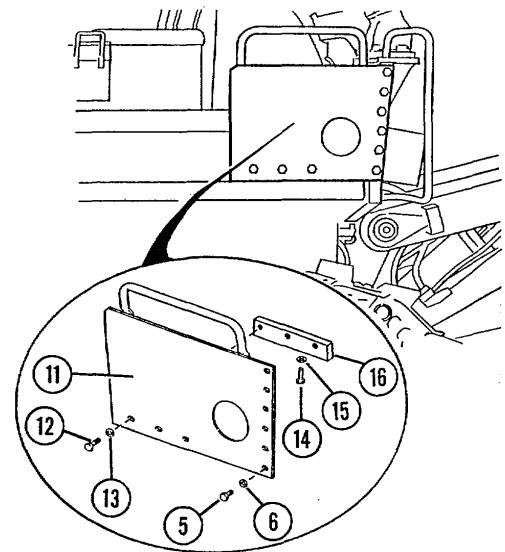
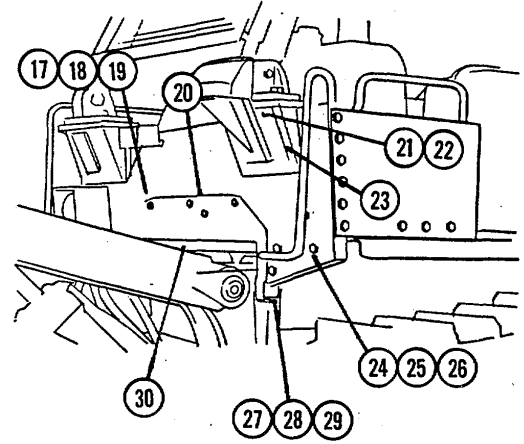
- (5) Attach lifting equipment to L.H. side plate assembly (11).
- (6) Use a wrench to remove three capscrews (12) and three flat washers (13) from bottom edge of side plate (11).
- (7) Use a wrench to remove six capscrews (5), six flat washers (6) and side plate (11).
- (8) Use a wrench to remove three capscrews (14), three flat washers (15) and block (16) from L.H. side.
- (9) Use a wrench to remove five capscrews (17), five flat washers (18), five lockwashers (19) and cover (20) from back of machine.
- (10) Remove four capscrews (21) four flat washers (22) and gas can support bracket (23).
- (11) Attach lifting equipment to support assembly (30).
- (12) Use two wrenches to remove three capscrews (24), six flat washers (25) and three nuts (26) from one side of support assembly (30).
- (13) Use a wrench to remove capscrew (27), flat washer (28) and shims (29) on same side of support (30).
- (14) Repeat STEPS 12 and 13 and remove support assembly (30) from machine.



10-11. ROPS MOUNTING BRACKETS AND PLATES - REPLACE (Cont'd)

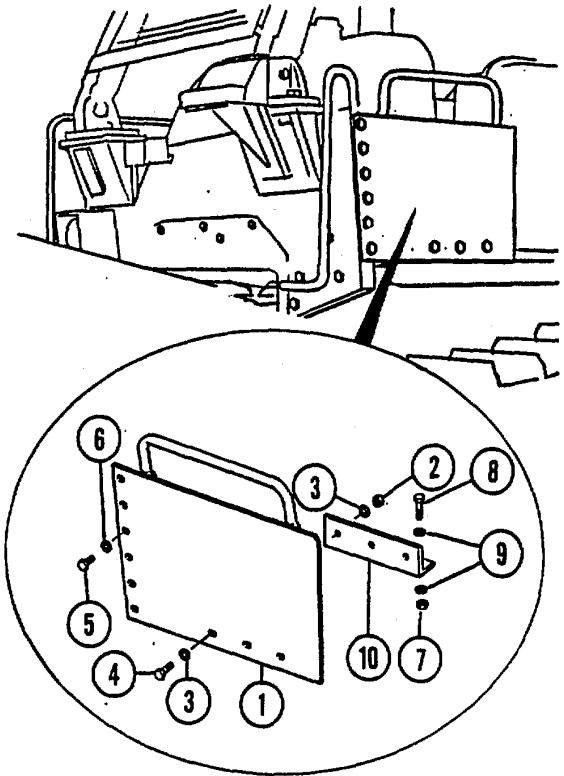
b. Installation

- (1) Use lifting equipment to position support assembly (30) at rear of machine.
- (2) Use a wrench to install capscrew (27), flat washer (28) and shims (29) on one side of support (30). Do not tighten capscrew.
- (3) Use two wrenches to install three capscrews (24), six flat washers (25) and three nuts (26) on same side of support assembly (30). Do not tighten capscrews.
- (4) Repeat steps 2 and 3 on other side of support (30); tighten all capscrews and remove lifting equipment.
- (5) Install gas can support bracket (23) on support assembly (30) with four capscrews (21) and four washers (22).
- (6) Use a wrench to install cover (20) on support assembly (30) with five capscrews (17), five flat washers (18) and five lockwashers (19).
- (7) Use a wrench to install block (16) at left rear of machine with three capscrews (14) and three flat washers (15).
- (8) Use lifting equipment to position L.H. side plate (11) to left side rear of machine.
- (9) Use a wrench to install plate (11) on block (16) with three capscrews (14) and three flat washers (15). Do not tighten capscrews.



10-11. ROPS MOUNTING BRACKETS AND PLATES - REPLACE (Cont'd)

- (10) Use a wrench to install side plate (11) on rear support (30) with six capscrews (5) and six flat washers (6). Tighten nine capscrews.
- (11) Use two wrenches to install angle (10) at right rear of machine with two capscrews (8), four washers (9), and two nuts (7).
- (12) Use lifting equipment to position R.H. side plate (1) to right side rear of machine.
- (13) Use two wrenches to install plate (1) on angle (10) with three capscrews (4), six flat washers (3) and three nuts (2). Do not tighten capscrews.
- (14) Use a wrench to install plate (1) on rear support (30) with six capscrews (5) and six flat washers (6). Tighten nine capscrews.
- (15) Install backup alarm. See page 4-56.
- (16) Install rear lights. See page 4-44.
- (17) Install ROPS. See page 10-25.



10-12. PROTECTIVE SCREEN - REPLACE

This task covers:**a. Removal****b. Installation**

INITIAL SETUP:Applicable Configurations

All

Equipment Condition

Tractor parked on level ground.

Common Tools

Tool Kit, General Mechanics

NSN 5180-00-699-5273

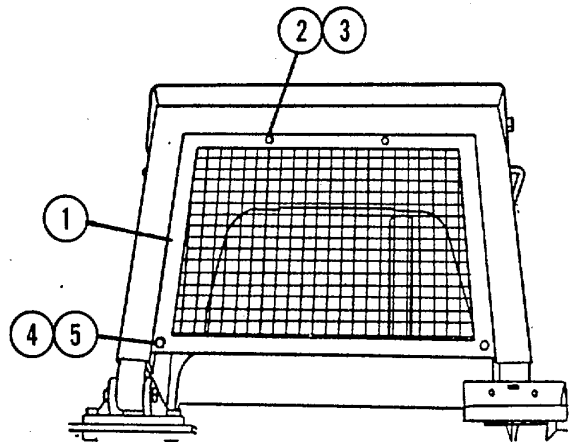
Lifting Equipment 100 lb.

a. Removal

- (1) Attach lifting equipment to screen (1).
- (2) Use a socket to remove two capscrews (2) and two washers (3) at top of screen (1).
- (3) Use a socket to remove two capscrews (4) and two washers (5) at bottom of screen and remove screen (1).

b. Installation

- (1) Position screen (1) and use a socket to install two capscrews (4) and two washers (5) at bottom of screen.
- (2) Use a socket to install two capscrews (2) and two washers (3) into top of screen (1).



10-13. WINTERIZED CAB - REPLACE/REPAIR**This task covers:****a. Removal****b. Installation****INITIAL SETUP:**Applicable Configurations

Tractor with winterized cab

Common Tools

Shop Equipment, Automotive
 Maintenance and Repair, Common #1
 Less Power
 NSN 4910-00-754-0654
 Lifting Equipment 200 lb.

NOTE

Perform equipment conditions
 only if winterized cab is
 being repaired.
 (page 12-16)

Personnel Required

MOS62B (3)

Materials/Parts

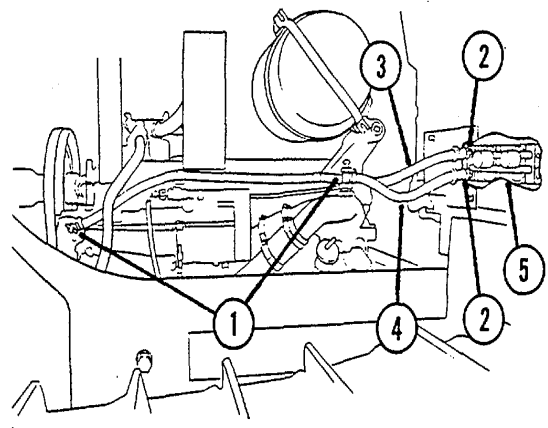
Cement (App. D, Item 4)
 Elastomeric Sealant (App. D, Item 16)
 Blocks
 Gasket (48), (60)

Equipment Condition

Defroster fans removed. (page 12-7)
 Heater removed. (page 12-11)
 Windshield wipers removed. (page 12-3)
 Windshield wiper switches removed.
 (page 4-34)
 Sound suppression panels removed.

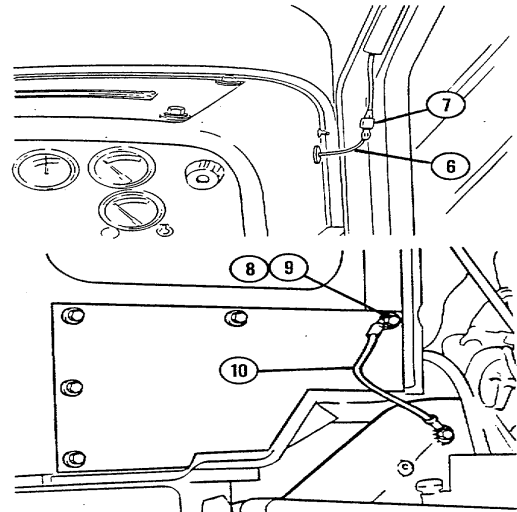
a. Removal

- (1) Close two petcocks (1) on heater hoses in engine compartment.
- (2) Mark hoses, loosen two hose clamps (2), and separate hoses (3 and 4) from heater (5). Pull hoses out of cab.



10-13. WINTERIZED CAB - REPLACE/REPAIR (Cont'd)

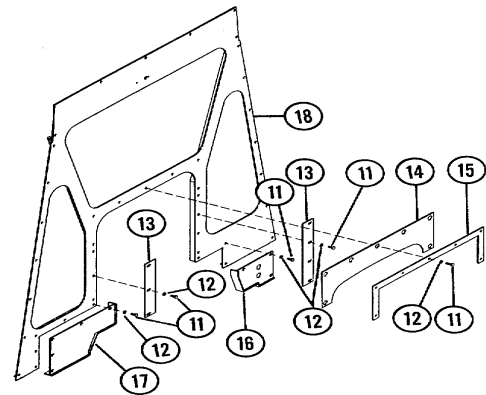
- (3) Disconnect power wire (6) at connector (7) to the right of the dash panel.



- (4) Use a socket to remove cap screw (8), washer (9), and ground wire (10) from right front cab panel. Move wire away from cab and reinstall cap screw and washer.

- (5) Slide a flat knife between foam and tractor mating surface to break seal.

- (6) Using a wrench, loosen twenty-two cap screws (11) and twenty-two washers (12) from panels (13, 14, 15, 16 and 17) attached to front panel (18).



- (7) Follow instructions for removing ROPS. See page 10-24. Weight of cab is 1500 lbs greater than ROPS.

- (8) Support rear feet with blocks to level canopy when resting on ground.

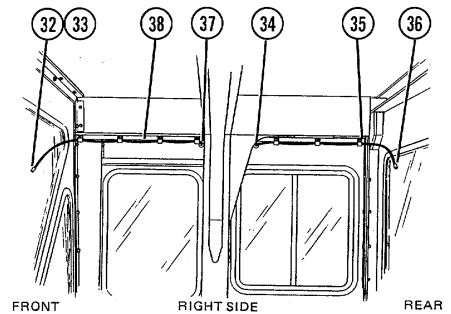
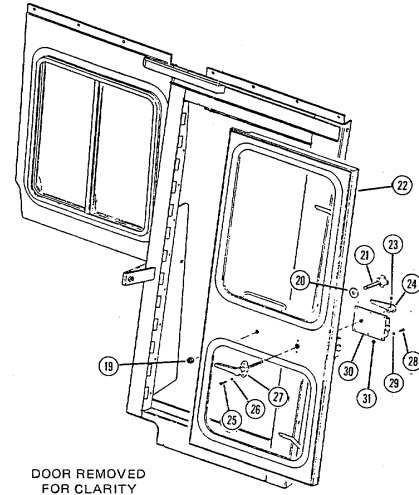
- (9) Remove all from gaskets from mating surfaces.

b. Disassembly

- (1) Remove glass from all panels. See page 10-41.

10-13. WINTERIZED CAB - REPLACE/REPAIR (Cont'd)

- (2) Remove nut (19), washer (20) and knob (21) from door (22).
- (3) Use an allen wrench to loosen set screw (23) on inside handle (24) and remove handle.
- (4) Use a flat blade screwdriver to remove two screws (25), two washers (26) and outside handle (27).
- (5) Use an allen wrench to remove six screws (28) and washers (29) securing latch assembly (30) and shims (31) to door (22). Remove latch assembly and shims.
- (6) Remove all capscrews (32) and clamps (33) holding wire harness to cab.
- (7) Pry out grommet (34).
- (8) Disconnect four wire bullet connectors (35) and remove rear wire harness half (36).
- (9) Pry out grommet (37).
- (10) Take front harness half (38) out towards front of cab.



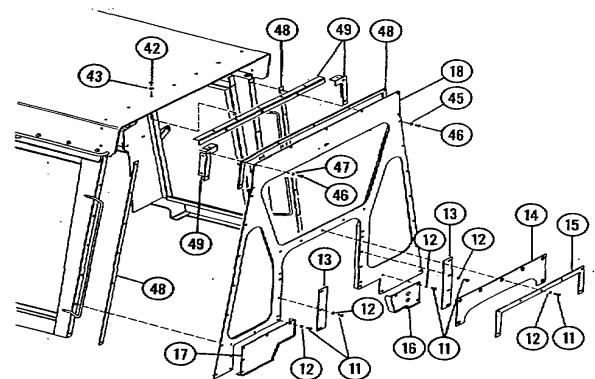
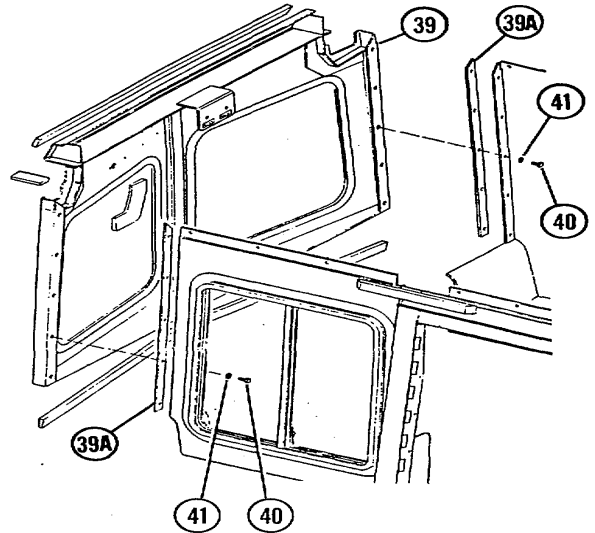
10-13. WINTERIZED CAB - REPLACE/REPAIR (Cont'd)

- (11) Have two assistants hold panel (39) for removal.
- (12) Use a wrench to remove five capscrews (40) and washers (41) that hold rear panel to side panel. Repeat this procedure on other side.
- (13) Two assistants should lower rear panel (39) onto a pallet. Remove gaskets (39A).

NOTE

Panels (16 and 17) and braces (13 and 15) were loosened during removal.

- (14) Use a wrench to remove five capscrews (11), washers (12), and panel (17) from front panel (18).
- (15) Use a wrench to remove three capscrews (11), washers (12), and panel (16) from front panel (18).
- (16) Use a wrench to remove seven capscrews (11), washers (12), and braces (13) from front panel (18).
- (17) Use a wrench to remove seven capscrews (11), washers (12), brace (15), and plate (14) from front plate (18).
- (18) Attach lifting equipment to front panel (18).



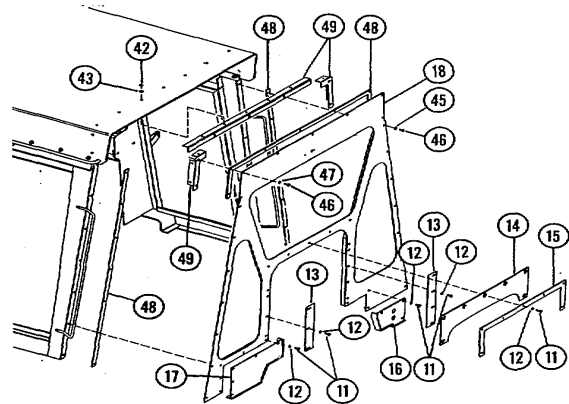
10-13. WINTERIZED CAB - REPLACE/REPAIR (Cont'd)

- (19) Use a socket to remove eleven capscrews (42) and washers (43) from ROPS canopy.
- (20) Use a socket to remove fourteen capscrews (44) and washers (45) from side of panel (18).

WARNING

The front panel will be unsteady.
Use extreme caution when removing from ROPS.

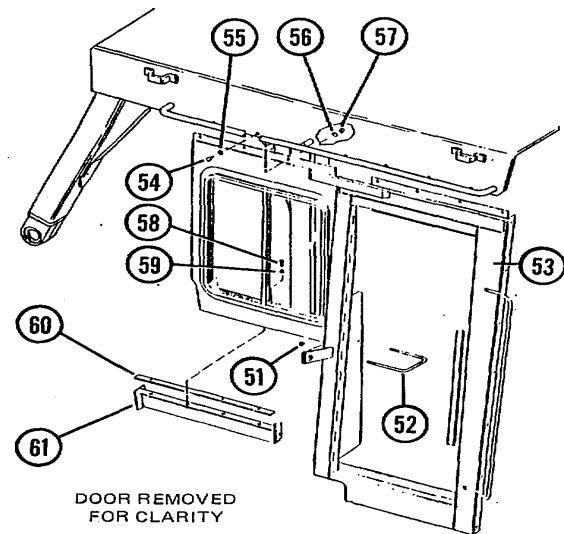
- (21) Use lifting equipment to separate panel (18) from side panels and ROPS. Use two assistants to steady front panel. Lay panel on pallet.
- (22) Use a socket to remove seven capscrews (46), washers (47), gasket (48), brackets (49) and nuts (50).



NOTE

STEPS 23 through 25 are for the removal of either the right or left side panel.

- (23) Attach lifting equipment to the side panel. Use a socket to remove nuts (51) and U-bolts (52) from side panel (53) and ROPS support leg.
- (24) Use a socket to remove seven capscrews (54), washers (55), washers (56) and nuts (57).
- (25) Use lifting equipment to move panel (53) away from ROPS.
- (26) On right side panel use a wrench to remove four capscrews (58) and washers (59). Remove gasket (60) and plate (61).



10-13. WINTERIZED CAB - REPLACE/REPAIR (Cont'd)

- (27) On left side panel loosen hand screws (62).
- (28) Use a wrench to remove four capscrews (63) and panel (64) from left side panel.
- (29) Loosen hand screws (65) and remove panel (66) from side panel (67).

c. Assembly

NOTE

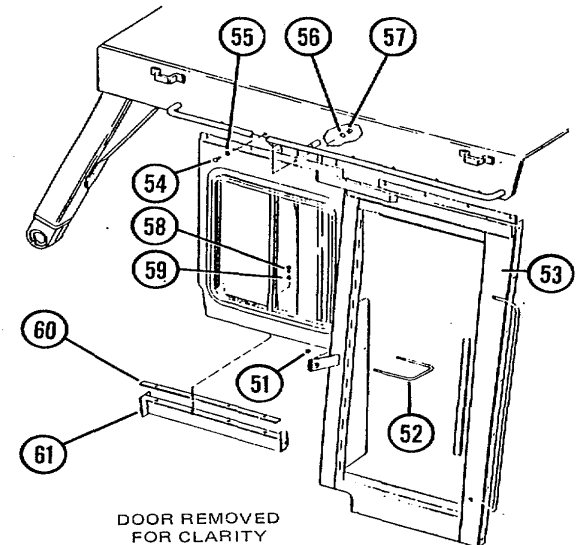
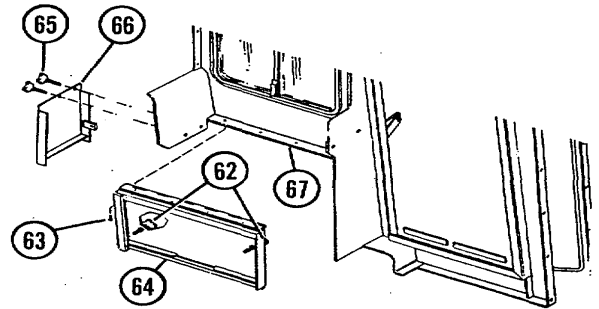
Use elastomeric sealant on all mating surfaces.

- (1) Place panel (66) in position on side panel (67). Tighten hand screws (65).
- (2) Use a wrench to install panel (64) with four capscrews (63) to side panel (67). Tighten hand screws (62).
- (3) On right side panel (53) use a wrench to install plate (61) and gasket (60) with four capscrews (54) and washers (58) and nuts (57).

NOTE

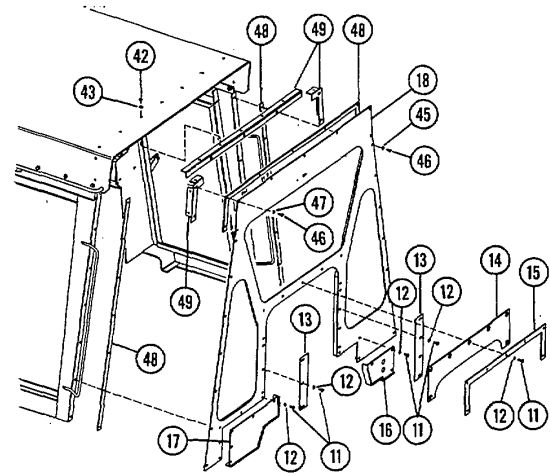
Follow STEPS 4 and 5 for the installation of either the left or the right side panel.

- (4) Attach lifting equipment to side panel (53) to position panel on ROPS.
- (5) Use a socket to install seven capscrews (54), washers (55), washers (56), and nuts (57).



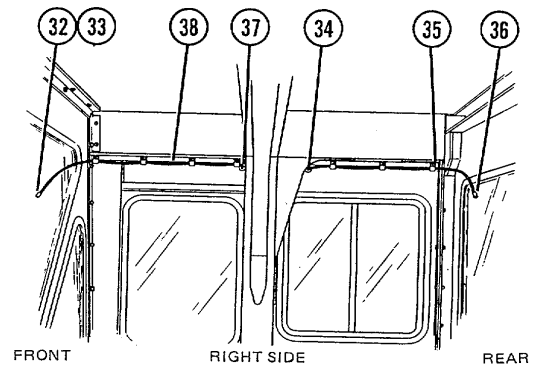
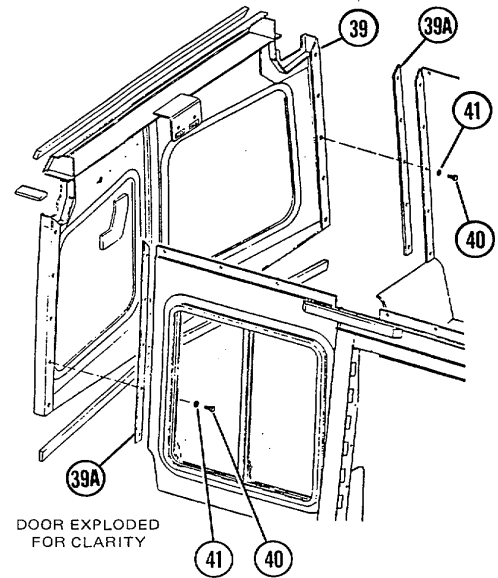
10-13. WINTERIZED CAB - REPLACE/REPAIR (Cont'd)

- (6) Use a socket to install seven capscrews (46), washers (47), gasket (48), brackets (49) and nuts (50).
- (7) Attach lifting equipment to front panel (18) to position panel on side panels.
- (8) Place straight gaskets (48) in position and use a socket to install fourteen capscrews (44) and washers (45) from side of panel (18).
- (9) Use a socket to install eleven capscrews (42) and washers (43) on ROPS canopy.
- (10) Use a wrench to install seven capscrews (11), washers (12), brace (15), and plate (14) to front plate (18).
- (11) Use a wrench to install seven capscrews (11), washers (12), and braces (13) to front panel (18).
- (12) Use a wrench to install three capscrews (11), washers (12), and panel (16) to front panel (18).
- (13) Use a wrench to install five capscrews (11), washers (12), and panel (17) to front panel (18).



10-13. WINTERIZED CAB - REPLACE/REPAIR (Cont'd)

- (14) Place gaskets (39A) in position on side panels. Use two assistants to position panel (39) on side panels.
- (15) Use a wrench to install five capscrews (40) and washers (41) on each side panel.
- (16) Install grommets (37) and (34).
- (17) Pull front harness half (38) in through front of cab and feed through grommets (37 and 34).
- (18) Pull rear harness half (36) in through back of cab.
- (19) Connect four wire bullets (35).
- (20) Install clamps (33) and capscrews (32) that hold wire harness to cab.

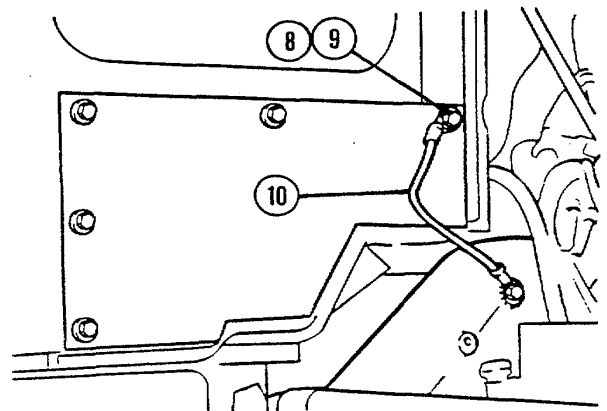
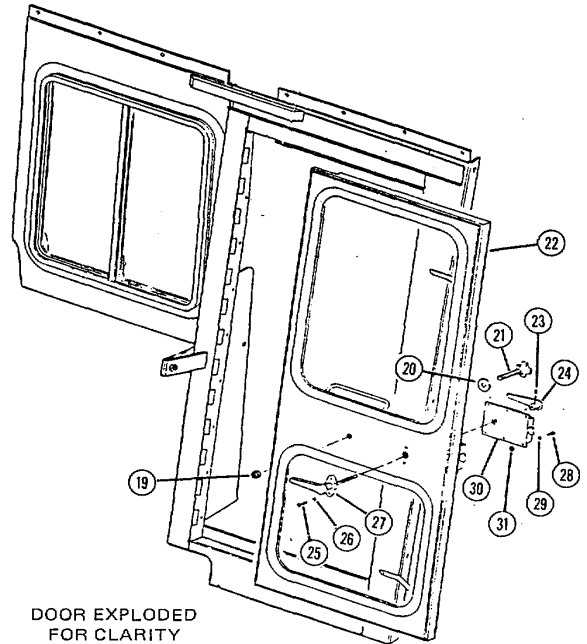


10-13. WINTERIZED CAB - REPLACE/REPAIR (Cont'd)

- (21) Use an allen wrench to install six screws (28), washers (29), latch assembly (30) and shims (31) to door (22).
- (22) Use a flat blade screwdriver to install two screws (25), two washers (26) and handle (27) to door (22).
- (23) Place handle (24) in position and use an allen wrench to install set screw.
- (24) Place knob (21) and washer (20) in door (22) and install nut (19).
- (25) Install glass in all panels.
See page 10-41.

d. Installation

- (1) Cement all foam gaskets on mating surface of cab.
- (2) Follow instructions for installing ROPS. See page 10-24. Weight of cab is 1500 lbs greater than ROPS.
- (3) Use a socket to install ground wire (10), washer (9), and capscrew (8).



10-13. WINTERIZED CAB - REPLACE/REPAIR (Cont'd)

(4) Connect power wire (6) at connector (7) located to the right of dash panel.

(5) Install heater. See page 12-14.

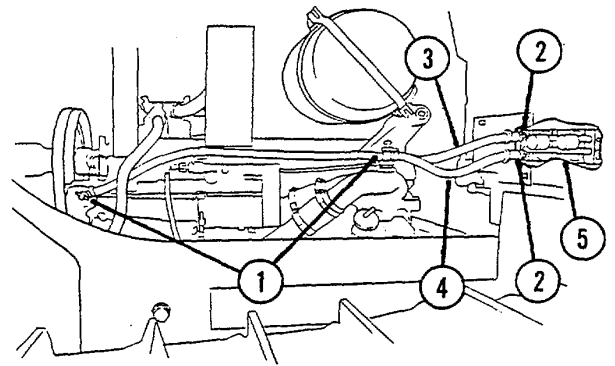
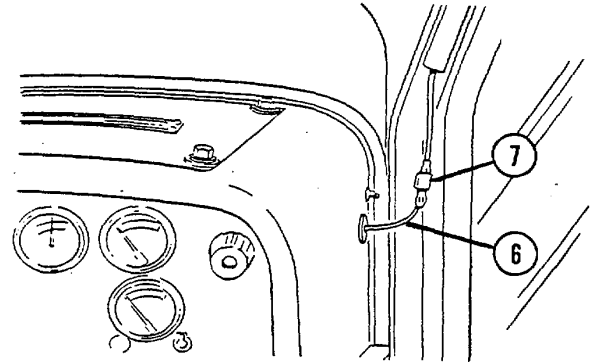
(6) Feed hoses (3 and 4) into cab. Connect hoses to heater (5) and tighten clamps (2).

(7) Open petcocks (1).

(8) Install windshield wiper switches. See page 4-34.

(9) Install windshield wiper blades. See page 12-3.

(10) Install defroster fans. See page 12-7.



10-14. WINDSHIELD GLASS - REPLACE

This task covers:

- a. Removal
 - b. Installation
-

INITIAL SETUPApplicable Configurations

Tractor with winterized cab

Materials/Parts

Seal (2)

Common Tools

Shop Equipment, Automotive
Maintenance and Repair, Common #1
Less Power
NSN 4910-00-754-0654

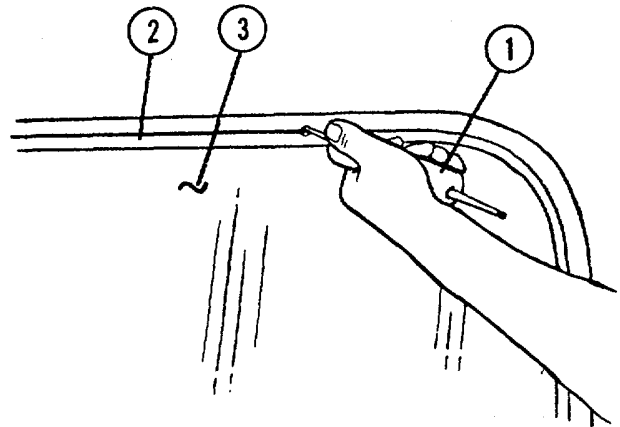
a. Removal**WARNING**

If it is necessary to remove damaged glass, use thick gloves to avoid injury.

NOTE

This procedure is written as a typical example of windshield glass removal. All cab window glass is removed in the same manner.

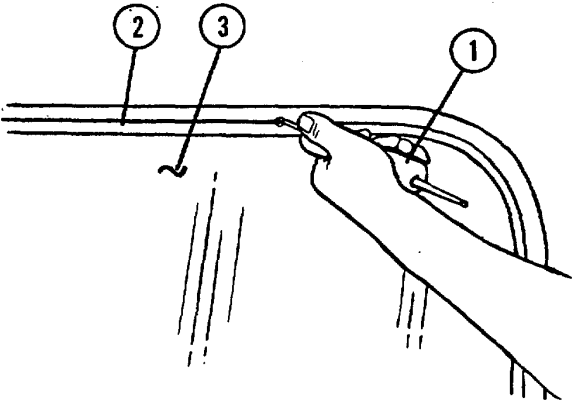
- (1) Put seal installer (1) between two lips of seal (2).

**WARNING**

Use care when removing seal (2) to prevent glass from causing personal injury.

10-14. WINDSHIELD GLASS - REPLACE (Cont'd)

- (2) Move seal installer (1) along seal (2) to pull locking lip out away from cab. Move seal installer (1) completely around circumference of glass (3).
- (3) Remove windshield glass (3).



b. Installation

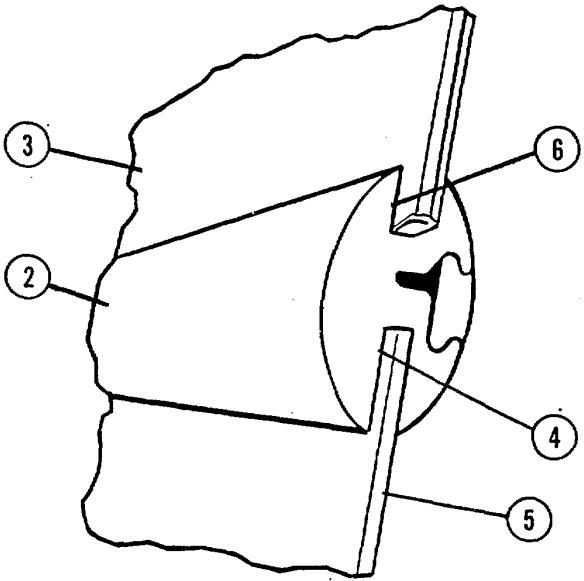
WARNING

Handle glass carefully to avoid personal injury.

NOTE

This procedure is written as a typical example of windshield glass installation. All cab window glass is installed in the same manner.

- (1) Install seal (2) around circumference of window opening. Start along the side of the window panel. Install edge (4) of seal (2) over panel (5) with locking lip toward the outside of cab.
- (2) Cut seal (2) to extend past the starting point by 0.125 in. (3.18mm) per foot of window opening circumference.
- (3) Push ends of seal (2) together and push them over panel (5) to make a tight, smooth joint.



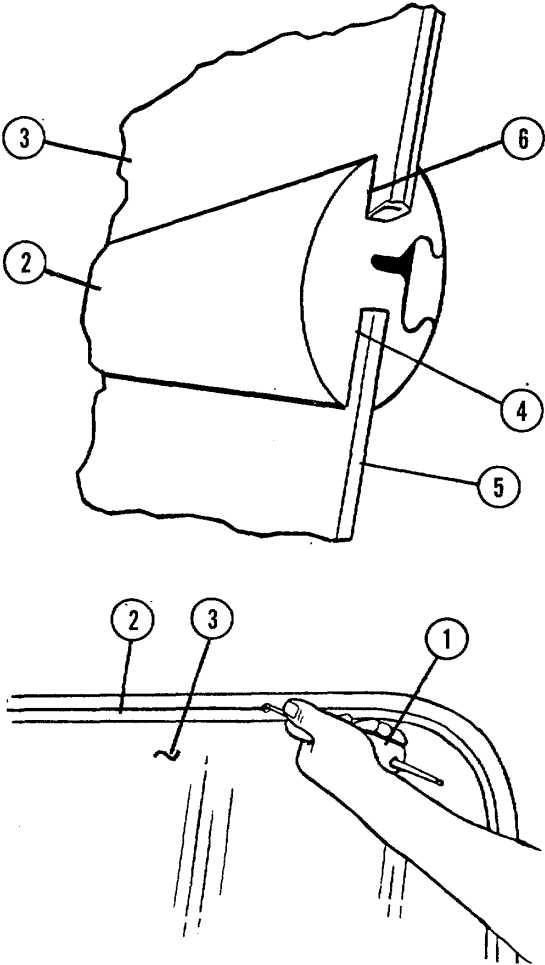
NOTE

When glass (3) is installed, edge (6) must be over glass (3).

- (4) Put lower corner of glass (3) in channel of seal (2) as far as possible. Do not use too much force.

10-14. WINDSHIELD GLASS - REPLACE (Cont'd)

- (5) Moving in both directions from the starting point, lift glass channel lip and glass will slip into place.
- (6) Put a solution of soap and water on locking lip of seal (2).
- (7) Install curved end of seal installer (1) between locking lip and its groove at any point away from seal (2) joint.
- (8) Move seal installer (1) along groove completely around circumference of seal (2). Rubber lip will lock into position around circumference of glass (3).



10-15. FLOOR PLATES - REPLACE

This task covers:

- a. Removal
- b. Installation

INITIAL SETUPApplicable Configurations

All

Equipment Condition

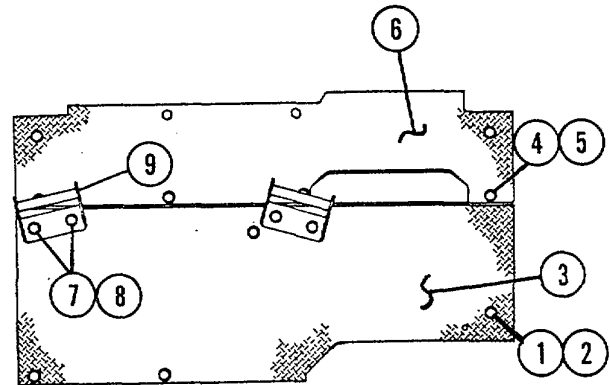
Tractor parked on level ground.
Heater removed (tractor with cab).
See page 12-11.

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal

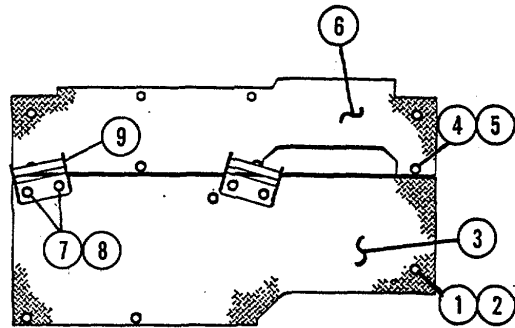
- (1) Remove floor mat from winterized cab.
- (2) Use a wrench to remove five capscrews (1) and five washers (2) from rear section of floor plate (3).
- (3) Remove four capscrews (7) and four washers (8) to remove footrests (9) from floor plate (3).
- (4) Use a wrench to remove eight capscrews (4) and eight washers (5) from front section of floor plate (6).
- (5) Remove floor plates (3 and 6) from tractor.

**b. Installation**

- (1) Position front section of floor plate (6) in tractor.
- (2) Position rear section of floor plate (3) in tractor.

10-15. FLOOR PLATES - REPLACE (Cont'd)

- (3) Install footrests (9) to floor plate (3) with four capscrews (7) and washers (8).
- (4) Use a wrench to install eight capscrews (4) and eight washers (5) in front floor plate (6). Do not tighten.
- (5) Use a wrench to install five capscrews (1) and five washers (2) in rear floor plate (3). Tighten all bolts in floor plates (3 and 6).
- (6) Replace floor mat in winterized cab.
- (7) Install heater in winterized cab. See page 12-14.



10-16. SEAT ASSEMBLY - REPLACE

This task covers:

- a. Removal
- b. Installation

INITIAL SETUPApplicable Configurations

All

Materials/Parts

Wire I.D. tags

Common Tools

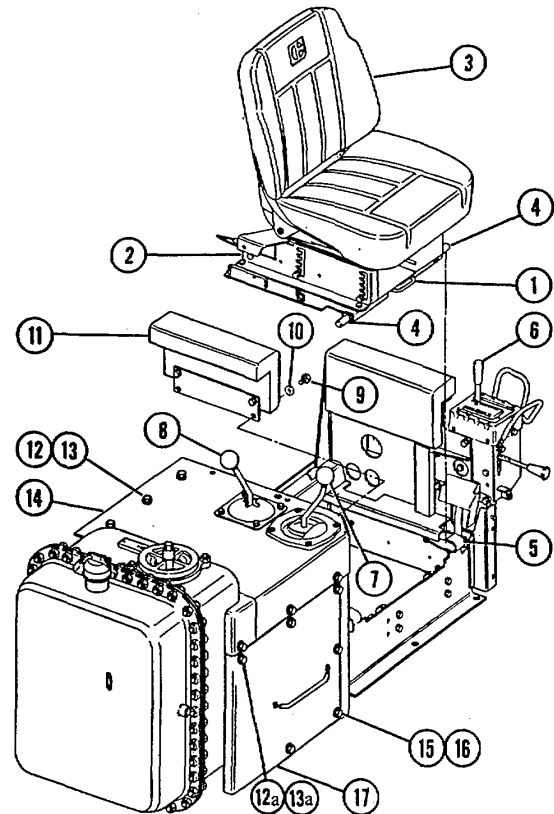
Shop Equipment, Automotive
Maintenance and Repair,
Common #1 Less Power
NSN 4910-00-754-0654
Lifting Equipment 200 lb.
Battery cables removed. (page 4-67)
Brake lock lever removed. (page 9-8)

Equipment Condition

ROPS or winterized cab removed (if
equipped). (page 10-24 or 10-31)
Battery disconnect switch removed.
(page 4-40)
Floor plates removed. (page 10-44)

a. Removal

- (1) Pull rod assembly (1) at front of seat adjuster (2) forward to release seat lock.
- (2) Attach lifting equipment to back of seat (3).
- (3) Tilt seat (3) forward. Slide seat back and straight up so hinge pins (4) slide out of seat base assembly (5).
- (4) Remove transmission selection lever handle (6), blade control lever handle (7) and winch/ripper control lever handle (8).
- (5) Use a wrench to remove two capscrews (9), two washers (10) and armrest assembly (11).
- (6) Use a wrench to remove two capscrews (12a) and two washers (13a).



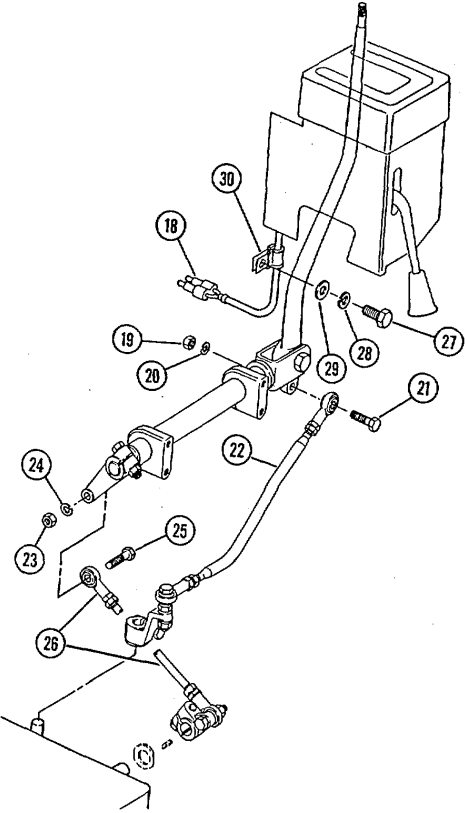
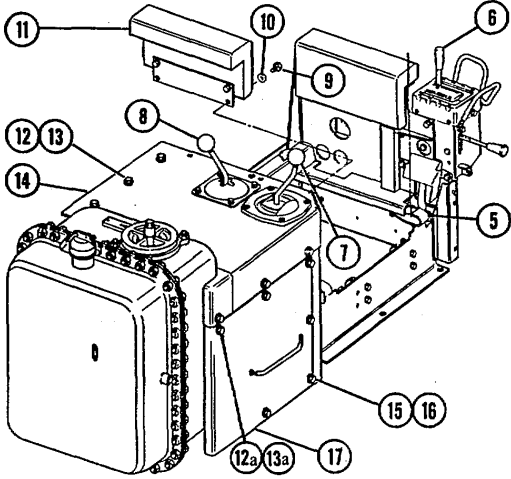
10-16. SEAT ASSEMBLY - REPLACE (Cont'd)

- (7) Use a wrench to remove eight capscrews (12), eight washers (13) and cover (14).
- (8) Use a wrench to remove five capscrews (15), five washers (16) and plate (17).

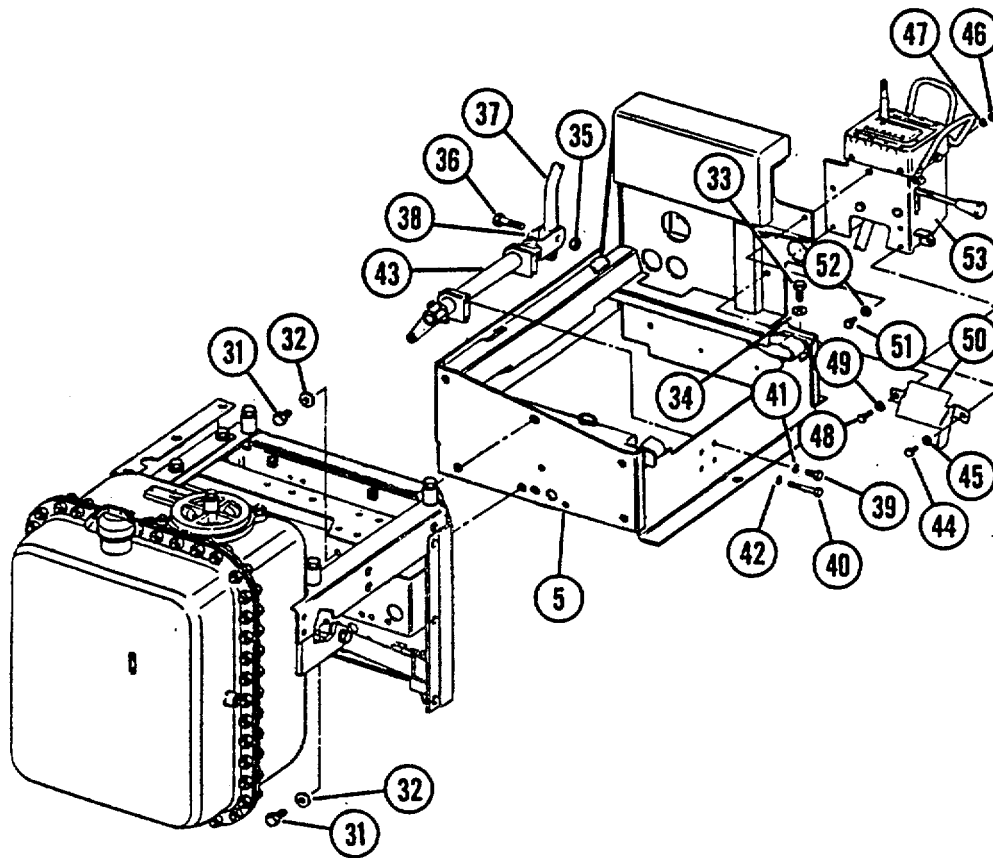
NOTE

Tag all wires from wiring harness with identification before removal.

- (9) Disconnect two backup alarm wires (18) from the wiring harness.
- (10) Use two wrenches to remove nut (19), lockwasher (20) and capscrew (21) that secure transmission direction linkage rod (22).
- (11) Use two wrenches to remove nut (23), lockwasher (24) and capscrew (25) that secure transmission gear selection linkage rod (26).
- (12) Use a wrench to remove capscrew (27), lockwasher (28), washer (29) and clamp (30).



10-16. SEAT ASSEMBLY - REPLACE (Cont'd)



- (13) Use a wrench to remove six capscrews (31) and washers (32) from right side of seat base assembly (5).
- (14) Attach lifting equipment to seat base assembly (5).
- (15) Use a wrench to remove three capscrews (33) and three washers (34) from fender side of seat base assembly (5).
- (16) Lift seat base assembly (5) from tractor with lifting equipment.
- (17) Use a wrench to remove nut (35) and capscrew (36). Disconnect lever (37) from fork (38).
- (18) Use a wrench to remove two capscrews (39), two capscrews (40) and four lockwashers (41 and 42). Remove linkage assembly (43) from seat base (5).
- (19) Use a wrench to remove capscrew (44) and washer (45). Remove nut (46), lockwasher (47), capscrew (48), washer (49) and shield (50).
- (20) Use a wrench to remove capscrew (51), washer (52) and transmission control box assembly (53) from seat base (5).

10-16. SEAT ASSEMBLY - REPLACE (Cont'd)

b. Installation

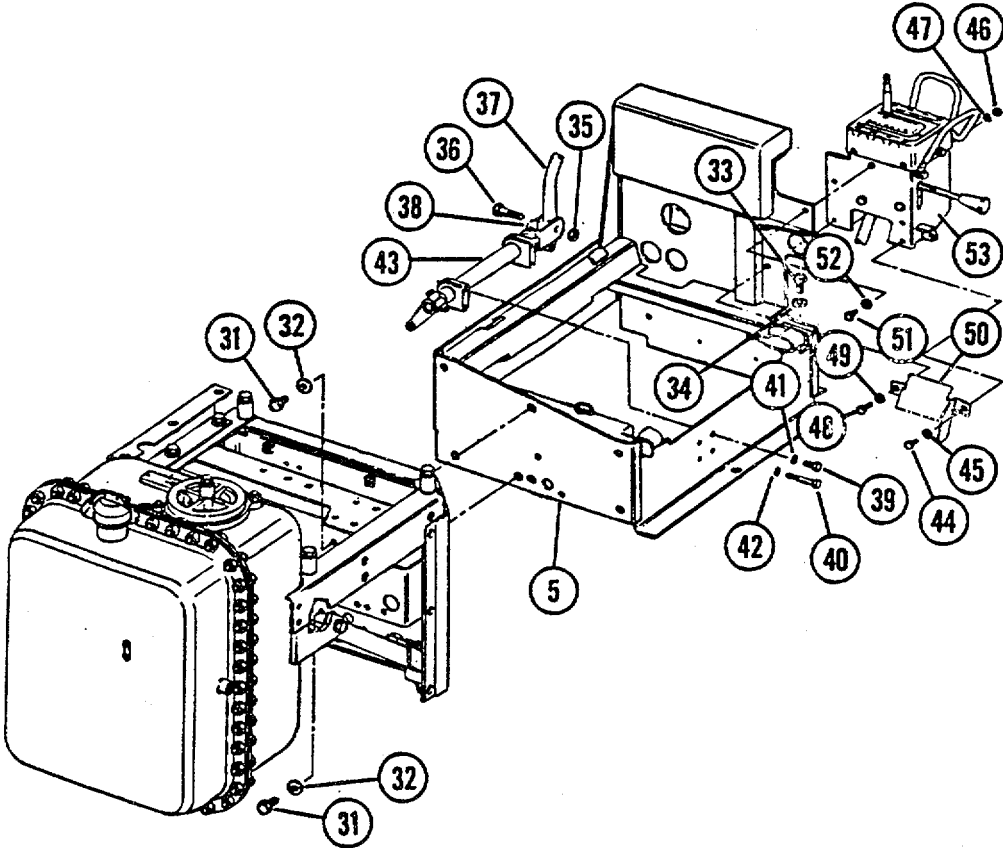
- (1) Position transmission control box assembly (53) on left side of seat base (5). Use a wrench to install capscrew (51) and washer (52) to secure control box.
- (2) Place shield (50) in position and use a wrench to install capscrew (44) and washer (45). Install capscrew (48), washer (49), lockwasher (47) and nut (46).
- (3) Place linkage assembly (43) in position on seat base (5). Use a wrench to install four capscrews (39 and 40) and four lockwashers (41 and 42).
- (4) Loosely install bushing in lever. Align holes in lever (37) and fork (38). Use a wrench to install capscrew (36) and nut (35).

- (5) Attach lifting equipment and lift seat base assembly (5) into position on tractor. Leave lifting equipment attached.

NOTE

Do not tighten any seat base mounting capscrews until they have all been installed.

- (6) Install seat assembly (5) on fender side with three capscrews (33) and three washers (34).
- (7) Install six capscrews (31) and six washers (32) through right side of seat base assembly (5).
- (8) Tighten nine mounting capscrews (31 and 33) with a wrench.



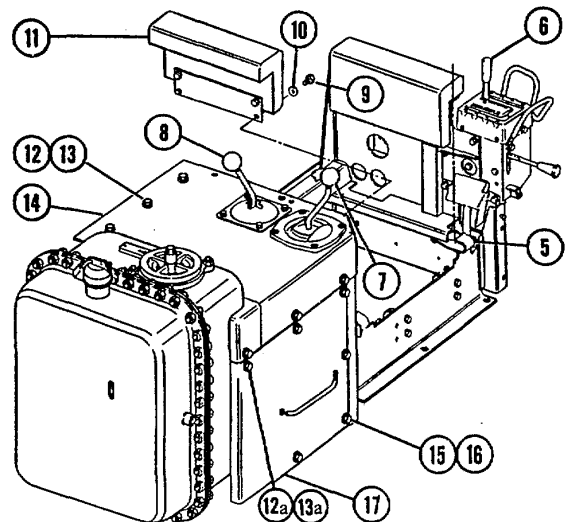
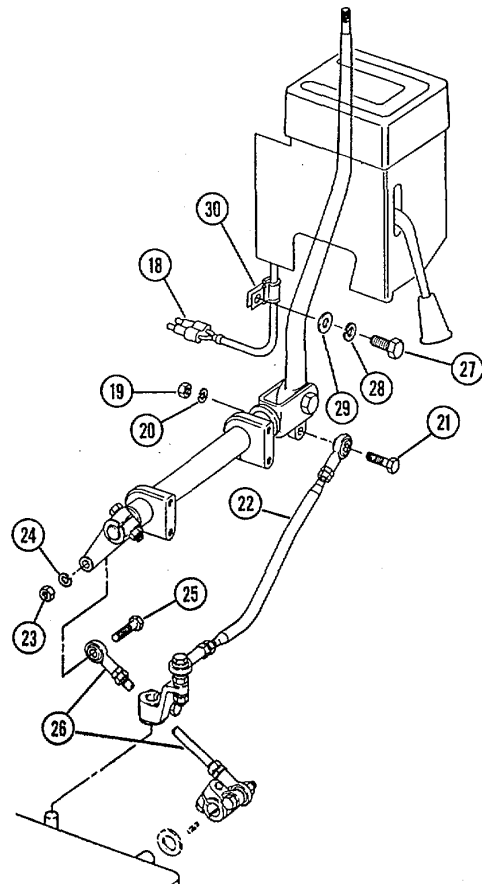
10-16. SEAT ASSEMBLY - REPLACE (Cont'd)

- (9) Use two wrenches to install nut (23), lockwasher (24) and capscrew (25) which secure transmission gear selection linkage rod (26).
- (10) Use two wrenches to install nut (19), lockwasher (20) and capscrew (21) which secure transmission direction linkage rod (22).
- (11) Connect two backup alarm wires (18) to wiring harness.
- (12) Install clamp (30) on wiring. Use a wrench to secure with capscrew (27), lockwasher (28) and washer (29).
- (13) Place plate (17) in position and use a wrench to install five capscrews (15) and five washers (16).

NOTE

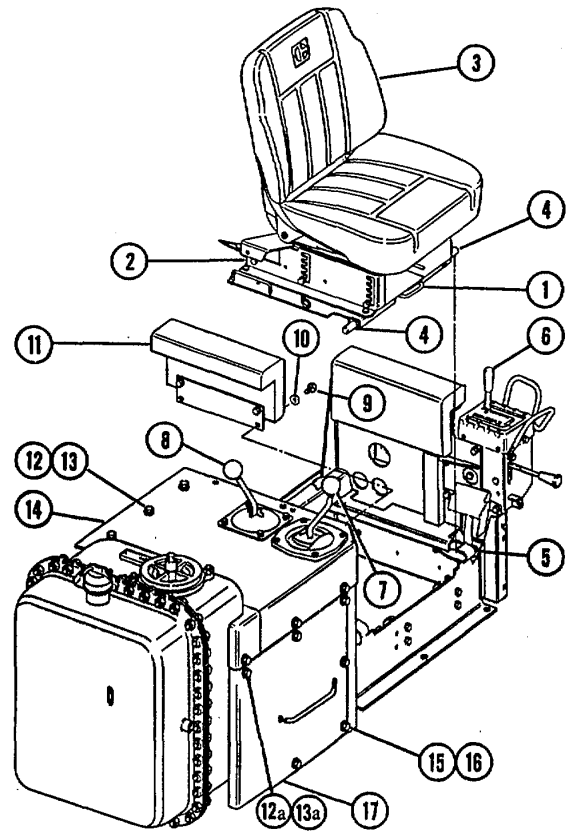
Carefully guide blade control and winch/ripper handle(s) through dust covers in cover.

- (14) Place cover (14) in position and use a wrench to install eight capscrews (12) and eight washers (13). Use a wrench to install two capscrews (12a) and two washers (13a).



10-16. SEAT ASSEMBLY - REPLACE (Cont'd)

- (15) Place armrest assembly (11) in position. Use a wrench to install two capscrews (9) and two washers (10).
- (16) Install transmission selection lever handle (6), blade control lever handle (7) and winch/ripper control lever handle (8).
- (17) Attach lifting equipment to the back of seat (3). Position seat in seat base (5).
- (18) Tilt seat (3) forward. Slide seat forward and place hinge pins (4) into hooks in seat base assembly (5).
- (19) Push back of seat (3) down until the locks snap into position.
- (20) Install brake lock lever. See page 9-8.
- (21) Install battery cables. See page 4-67.
- (22) Install floor plates. See page 10-24.
- (23) Install battery disconnect switch. See page 4-40.
- (24) Install ROPS or winterized cab (if so equipped). See page 10-24 or 10-31.



10-17. TOOL BOX - REPLACE

This task covers:

- a. Removal
- b. Installation

INITIAL SETUPApplicable Configurations

All

Personnel Required

MOS62B (2)

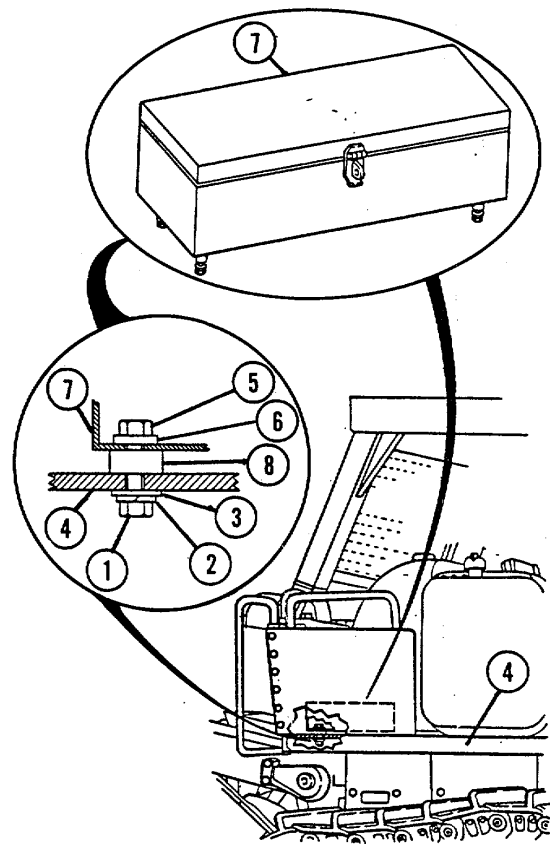
Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal**NOTE**

One person is required to hold wrench on bolt heads in tool box while other person removes nuts and washers under fender.

- (1) Use a wrench to remove four nuts (1) four lockwashers (2) and four washers (3) from tool box mounting on underside of fender (4).
- (2) Remove four capscrews (5) and four washers (6) from inside tool box (7) on top side of fender (4).
- (3) Remove tool box (7) from mounting on fender.
- (4) Remove four spacers (8) from fender (4).



10-17. TOOL BOX - REPLACE (Cont'd)

b. Installation

- (1) Position four spacers (8) over tool box mounting holes in fender (4).
- (2) Position tool box (7) on spacers (8).
- (3) Line up hole in corner of tool box (7) with holes in spacer (8) and fender (4).
- (4) Install washer (6) on capscrew (5) and insert capscrew through hole in tool box (7), spacer (8) and fender (4).
- (5) Repeat STEPS 3 and 4 for other three holes.

NOTE

One person is required to hold wrench on capscrews inside tool box while a second person installs nuts and washers under fender.

- (4) Use a wrench to install four washers (3), four lockwashers (2) and four nuts (1) on underside of fender (4).

10-18. RECOIL MECHANISM GUARDS - REPLACE

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Applicable Configurations

All

Common Tools

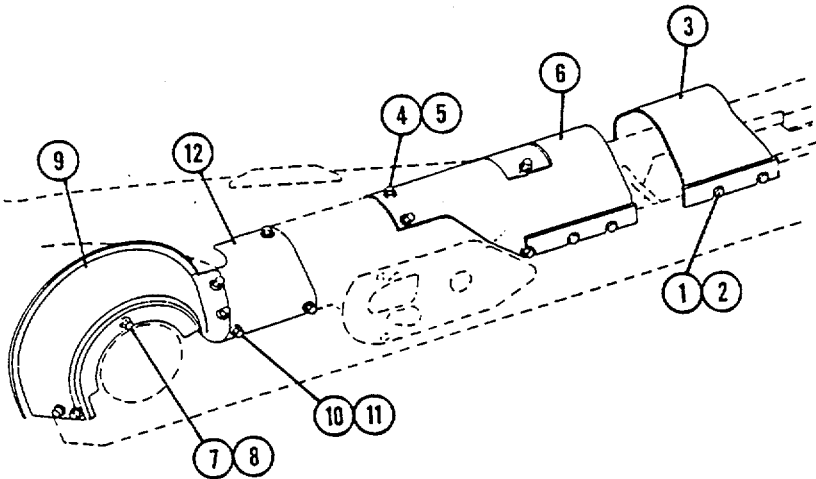
Tool Kit, General Mechanics
NS 5180-00-699-5273

a. Removal

- (1) Use a socket to remove four capscrews (1) four washers (2) and cover (3) from front end of track roller frame.
- (2) Use a socket to remove nine capscrews (4), nine washers (5) and cover (6) from center of roller frame.
- (3) Use a socket to remove five capscrews (7), five washers (8), and cover (9).
- (4) Use a socket to remove four capscrews (10), four washers (11), and cover (12) from rear end of roller frame.

b. Installation

- (1) Use a socket to install cover (12), four washers (11) and four capscrews (10).
- (2) Use a socket to install cover (9), five washers (8), and five capscrews (7).
- (3) Use a socket to install cover (6), nine washers (5), and nine capscrews (4).
- (4) Use a socket to install cover (3), four washers (2), and four capscrews (1).



CHAPTER 11

WINCH MAINTENANCE

11-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the winch. To find a specific maintenance procedure, see the maintenance task summary below.

11-2. WINCH MAINTENANCE TASK SUMMARY

TASK PARA	PROCEDURES	PAGE NO.
11-3	Winch Assembly - Service/Replace	11-2
11-4	Winch Control Valve - Replace	11-10
11-5	Winch Control Lever and Linkage - Adjust	11-13
11-6	Winch Magnetic Strainer Assembly - Service/Replace	11-16
11-7	Winch Oil Filter - Replace/Service	11-19
11-8	Winch Breather - Replace	11-23
11-9	Drawbar Pin - Replace	11-25
11-10	Winch Cable Assembly - Replace/Repair	11-26
11-11	Winch Gear Pump - Replace	11-29
11-12	Winch Hydraulic Lines and Fittings - Replace	11-31

11-3. WINCH ASSEMBLY - SERVICE/REPLACE

This task covers:

- a. Changing Oil
- b. Removal
- c. Installation
- d. Place In Service

INITIAL SETUPApplicable Configurations

Tractor with winch

Personnel Required

MOS62B (3)

Common Tools

Shop Equipment, Automotive
Maintenance Common #2 Less Power
NSN 4910-00-754-0650
Lifting Equipment (2 Ton capacity)
2 Blocks 4' x 4" x 4"

Materials/Parts

Oil OE/HDO-30 (See L05-2410-237-12)
Gasket (2, 4, 14, 26)
Performed Packing (15, 29, 37, 39)
16 Gallon Container

Special Tools

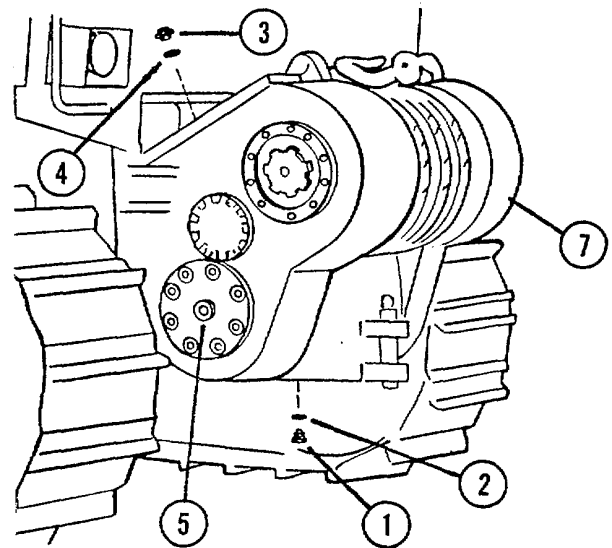
(2) Link brackets 5P9736

Equipment Condition

Winch operated for about 5 min (oil warm).
Tractor parked on level ground.

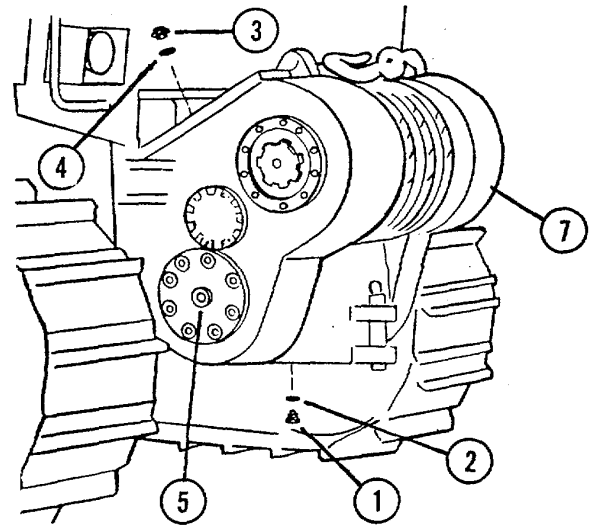
a. Changing Oil

- (1) Place suitable container under winch drain plug (1) to collect drained oil. Capacity is approximately 16 gallons.
- (2) Use a wrench to remove drain plug (1) and gasket (2). Allow oil to drain completely. Discard oil in an appropriate manner.
- (3) Use a wrench to remove fill plug (3) and gasket (4).
- (4) Clean and inspect drain plug (1). Replace plug gasket (2) if necessary. Install drain plug with gasket.



11-3. WINCH ASSEMBLY - SERVICE/REPLACE (Cont'd)

- (5) Fill winch with oil at fill plug opening until oil can be seen through sight gage (5) (approximately 16 gals.). See L05-2410-237-12.
- (6) Clean and inspect fill plug (3). Replace plug gasket (4) if necessary. Install fill plug with gasket.
- (7) Run engine at low idle. Oil must be visible in sight gage (5). Add oil if necessary.
- (8) Perform related winch maintenance. See page 2-2 PMCS.

**b. Removal****NOTE**

Remove cable assembly if necessary. See page 11-26.

NOTE

Tractor will be immobilized when winch is removed. If tractor must be moved, perform STEPS 2, 3 and 4 of winch gear pump removal, page 11-25 or use items of COEI List (TM5-2410-237-10) to plug winch gear lines isolating winch gear pump.

- (1) Remove winch control valve. See page 11-10.
- (2) Remove winch magnetic strainer assembly. See page 11-16. Wire magnetic strainer up and out of the way.

NOTE

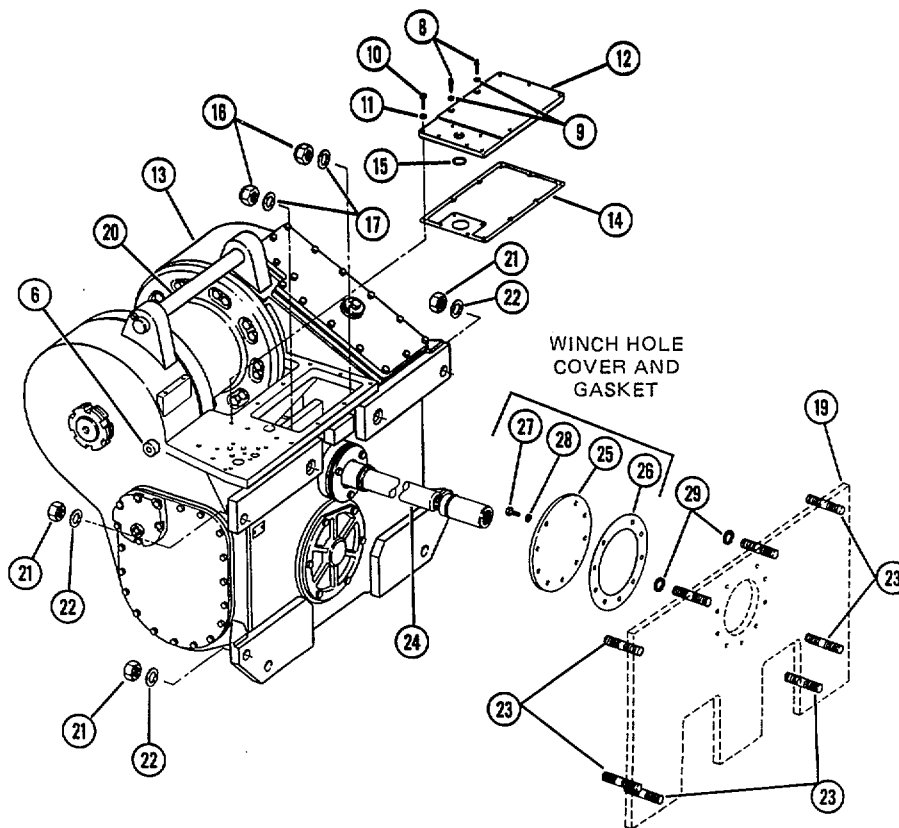
Use a tap to chase and clean threaded holes of bosses to which lifting brackets are attached.

11-3. WINCH ASSEMBLY - SERVICE/REPLACE (Cont'd)

- (3) Install a suitable lifting bracket capable of lifting two tons in threaded boss (6) on each side of winch (7).
- (4) Use a 12 point wrench to remove two capscrews (8) and two lockwashers (9).
- (5) Use a wrench to remove seven capscrews (10), seven lockwashers (11) and cover (12) from top of winch (13).
- (6) Remove and discard gasket (14) and performed packing (15) from cover (12).
- (7) Use a slugging wrench to remove two nuts (16) and two washers (17) from two inner studs (18) that secure winch to rear of tractor (19).
- (8) Attach lifting equipment to both lifting brackets and to bar (20) for added support.
- (9) Use a socket with torque multiplier to remove six self-locking nuts (21) and six washers (22) from six studs (23).

CAUTION

Remove the winch slowly and carefully to prevent damage to mounting studs, transmission and drive shaft. Three persons are required to remove the winch. Adjust the lifting equipment as necessary to remove load from studs.



11-3. WINCH ASSEMBLY - SERVICE/REPLACE (Cont'd)

- (10) Use lifting equipment to move winch straight back until drive shaft (24) is completely out of tractor body.
- (11) Set winch (13) on adequate blocking to prevent tipping.

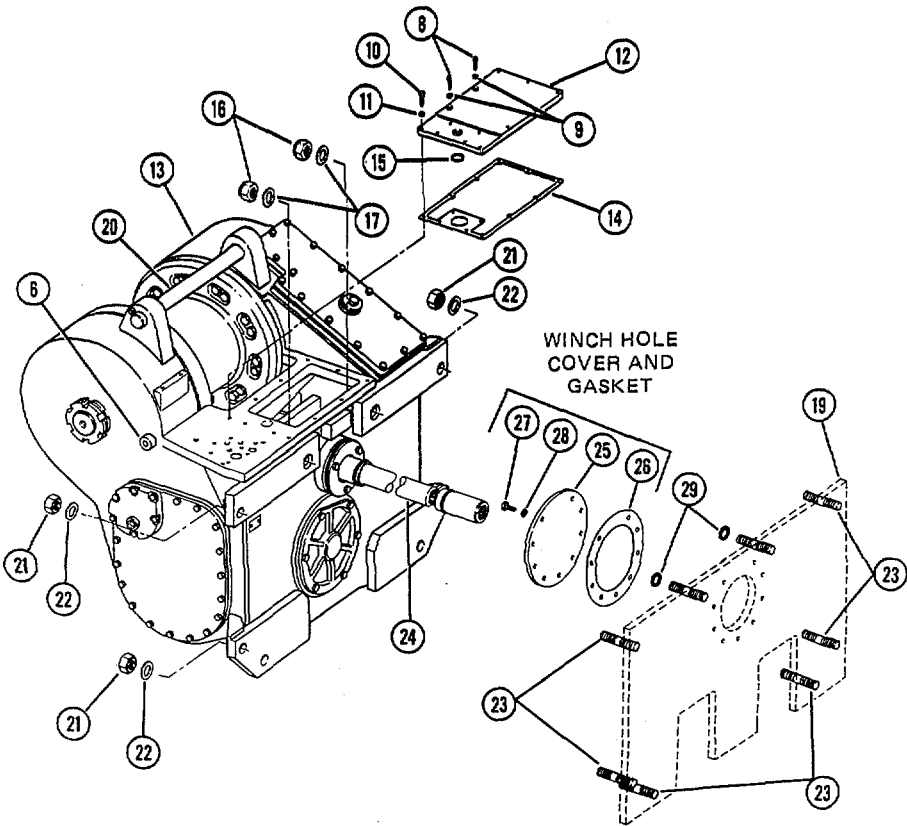
CAUTION

Cover and gasket must be installed to prevent dirt and other damaging contaminants from entering the final drive case.

NOTE

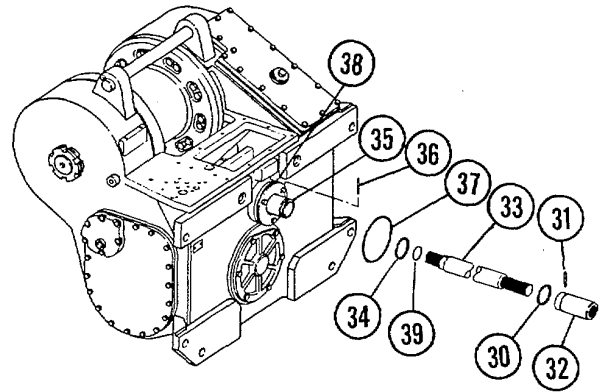
Round cover is stored on side of fuel tank; gasket and capscrews are stored in tool box.

- (12) Install a round cover (25) and gasket (26) over hole for winch drive shaft. Secure cover to tractor (19) with nine capscrews (27) and nine lockwashers (28) using a wrench.
- (13) Remove and discard two performed packings (29) from two studs (18) on back of tractor (19).



11-3. WINCH ASSEMBLY - SERVICE/REPLACE (Cont'd)

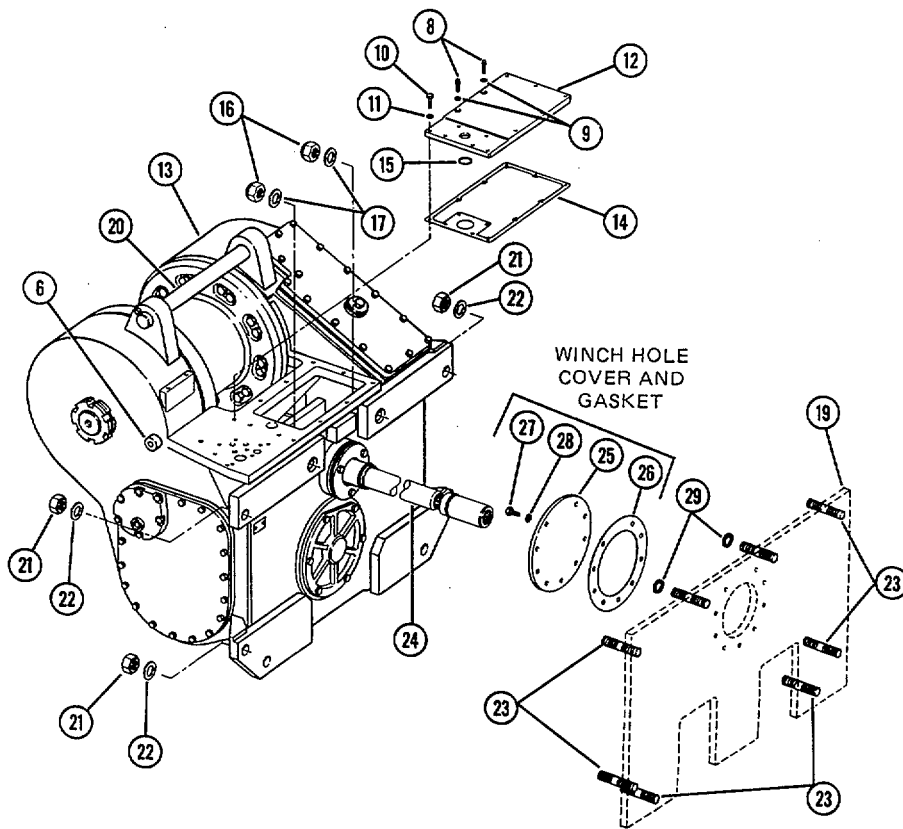
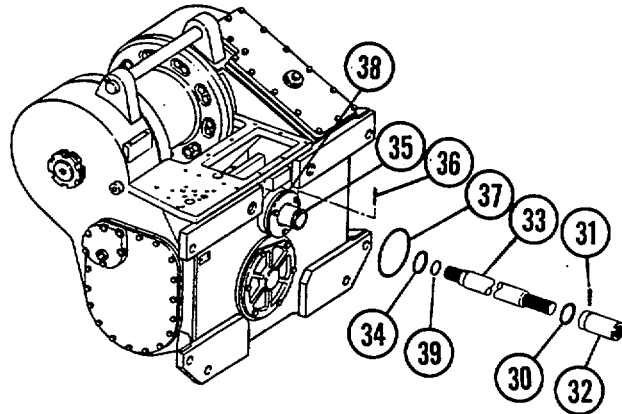
- (14) Remove ring (30), pin (31) and coupling (32) from transmission end of winch drive shaft (33).
- (15) Remove retaining ring (34) from winch coupling (35).
- (16) Remove pin (36) and drive shaft (33) from winch coupling (35).
- (17) Remove and discard seal (37) from coupling flange (38).
- (18) Remove and discard seal (39) from drive shaft (33).

**c. Installation**

- (1) Remove all traces of paint, rust, etc. from winch and tractor mounting surfaces that make contact.
- (2) Clean ring groove in winch coupling (35), seal groove in coupling flange (38) and seal groove in drive shaft (33).
- (3) Lightly lubricate and install a new seal (39) on drive shaft (33).
- (4) Lightly lubricate and install a new seal (37) on coupling flange (38).
- (5) Temporarily install ring (34) onto end of winch coupling (35). Rotate coupling with hole straight up. Keep bottom of ring to hold pin (36) in position.
- (6) Insert drive shaft (33) into winch coupling (35), align holes and install pin (36).
- (7) Retain pin (36) with ring (34) by sliding into groove in winch coupling (35).

11-3. WINCH ASSEMBLY - SERVICE/REPLACE (Cont'd)

- (8) Clean ring groove in coupling (32). Lightly lubricate and temporarily install ring (30) on groove end of coupling. Do not install in groove at this time.
- (9) Install coupling (32) on drive shaft, align holes and install pin (31).
- (10) Retain pin (31) with ring (30) by sliding into groove in coupling (32).



- (11) Install a suitable lifting bracket in threaded boss (6) on each side of winch (13).
- (12) Use a wrench to remove nine capscrews (27), nine lockwashers (28), gasket (26) and round cover (25) covering drive shaft hole in back of tractor.
- (13) Clean the base of two top inner studs (18). Lightly lubricate and install two new performed packings (29) on studs.
- (14) Attach lifting equipment to lifting brackets on winch and to bar (20).

11-3. WINCH ASSEMBLY - SERVICE/REPLACE (Cont'd)

CAUTION

Install the winch slowly and carefully to prevent damage to mounting studs, transmission and drive shaft. Two persons are required to install the winch. Adjust the winch as needed with lifting equipment until proper alignment is achieved.

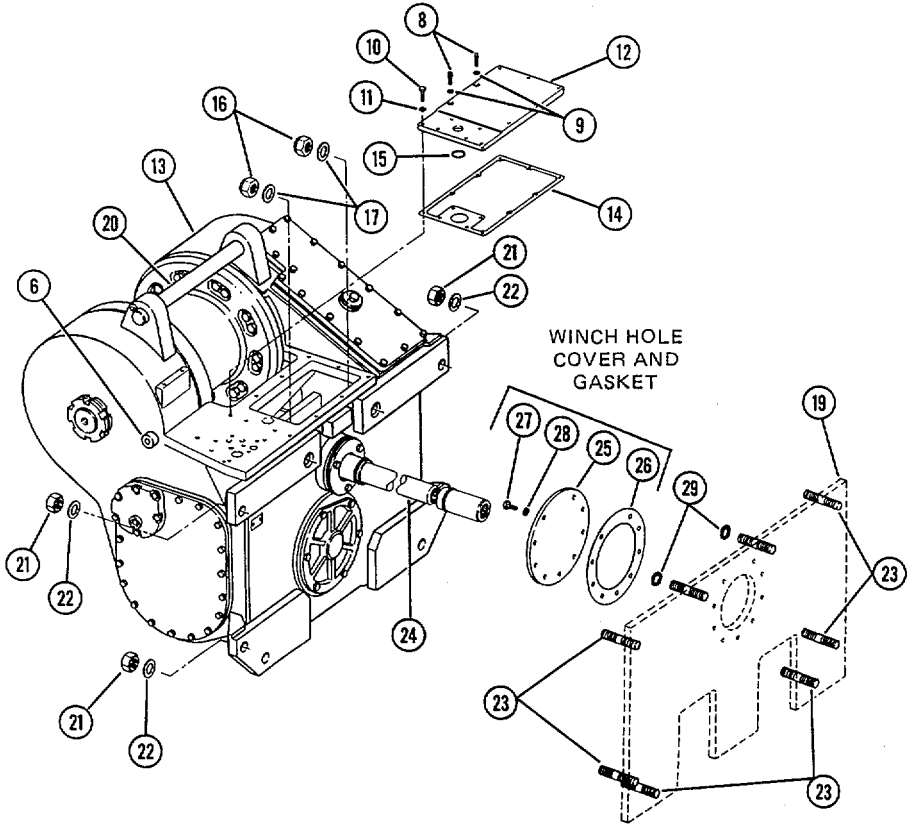
WARNING

Use caution when lining up shaft to avoid bodily injury. Weight of winch assembly is 1.5 tons.

WARNING

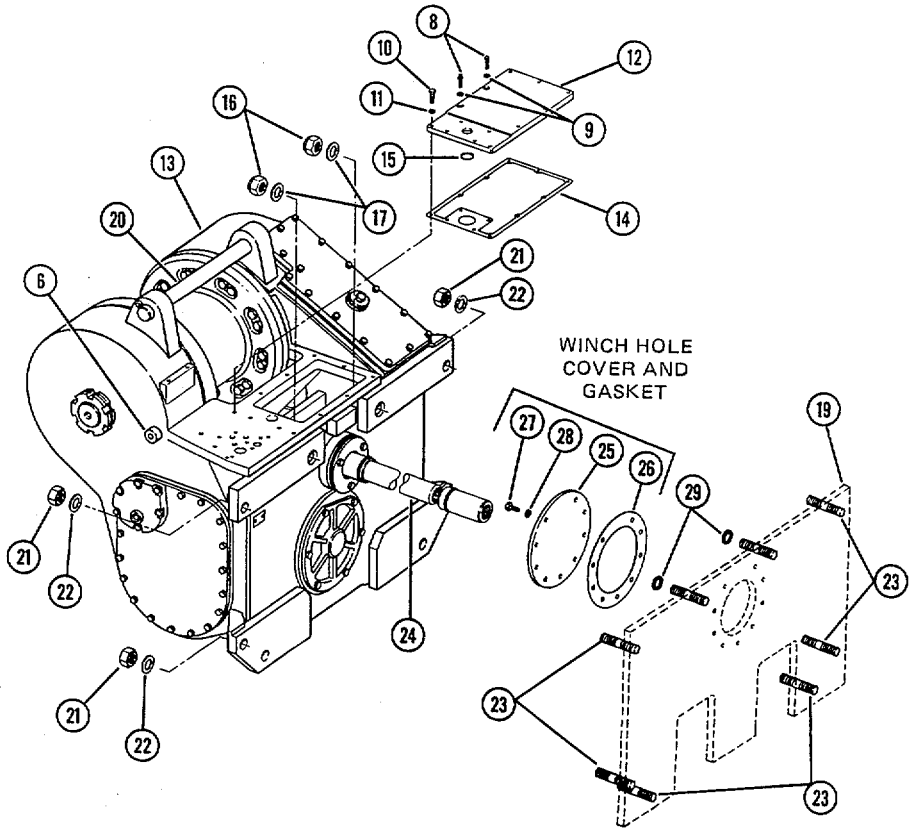
Make sure winch is steady when aligning drive shaft to hole in back of tractor to avoid personal injury.

- (15) Align winch drive shaft (24) with hole in back of tractor. One person is needed to rotate winch drive shaft to ensure that splines of transmission coupling and transmission output shaft align properly. Slowly move winch toward tractor until coupling on drive shaft is seated in transmission and winch housing and on mounting studs. When aligned properly, winch case will be flush with the back of the tractor.



11-3. WINCH ASSEMBLY - SERVICE/REPLACE (Cont'd)

- (16) Use a socket with a torque multiplier to install washers (22) and self-locking nuts (21) onto studs (23).
 - (17) Use a special tool torque wrench adapter to install two washers (17) and two nuts (16) onto two top inner studs (18).
 - (18) Torque nuts (16) to 1200+120 ft. lbs.
 - (19) Torque nuts (21) to 1200+120 ft. lbs.
 - (20) Install a new preformed packing 15), a new gasket (14) and cover 12) on winch (13). Use a wrench to install seven capscrews (10) and seven lockwashers (11). Use a twelve point wrench to install two capscrews (8) and two washers (9).
 - (21) Remove lifting equipment and brackets from winch (13).
 - (22) Install magnetic strainer. See. page 11-17 (23) Install winch control valve. See page 11-11.
 - (24) Install cable assembly, if removed. See page 11-27.
- d. Place In Service
- Check for proper winch operation.



11-4. WINCH CONTROL VALVE - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP**Applicable Configurations**

Tractor with winch
Gasket (24)

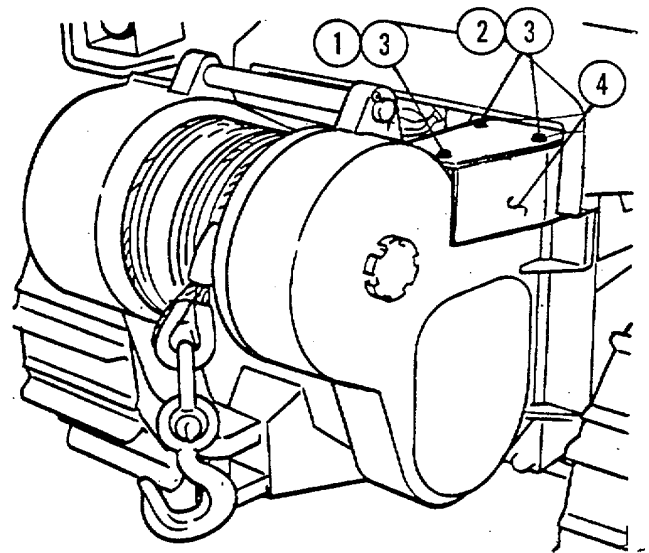
Materials/Parts

Preformed packing (23)

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

-
- a. Removal
(1) Use a socket to remove two capscrews (1), two capscrews (2) and four lockwashers (3) from cover (4). Remove cover.



11-4. WINCH CONTROL VALVE - REPLACE (Cont'd)

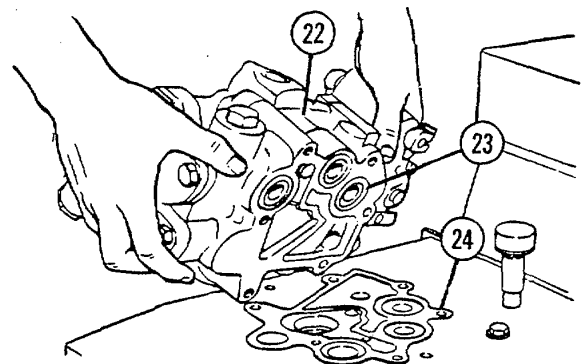
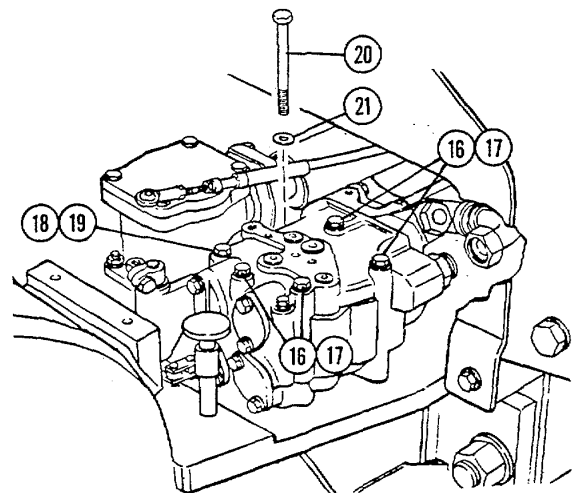
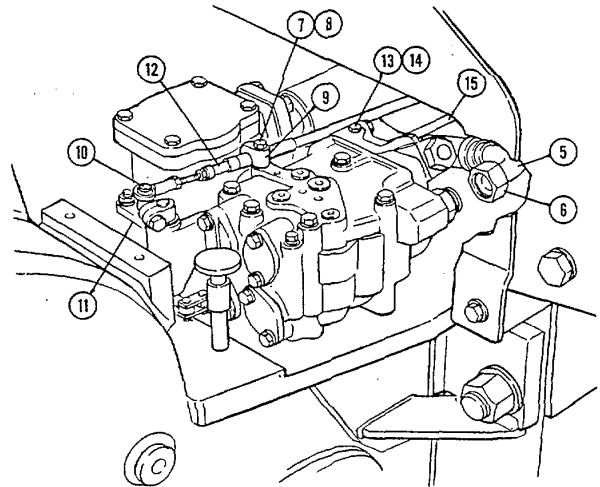
CAUTION

Plug hose (5) and valve port to prevent dirt from entering system.

- (2) Disconnect hose (5) by unscrewing fitting (6) with a wrench.
- (3) Remove capscrew (7) and washer (8) using a socket. Remove clamp (9).
- (4) Remove capscrew (10) and nut (11) using a wrench. Lay cable (12) to the side.
- (5) Remove capscrew (13) and washer (14) using a wrench. Pull cable (15) from control valve.
- (6) Use a wrench to remove four 5-3/4" capscrews (16) and washers (17).
- (7) Use a wrench to remove one 5-1/4" capscrew (18) and washer (19). Remove one 4" capscrew (20) and washer (21).
- (8) Remove control valve (22). Remove and discard three preformed packings (23) and gasket (24).
- (9) Plug ports on the mating surface.

b. Installation

- (1) Remove any plugs on mating surface of winch.
- (2) Place three preformed packings (23) on control valve (22). Place new gasket (24) on mating surface of winch. Place control valve in position on winch.

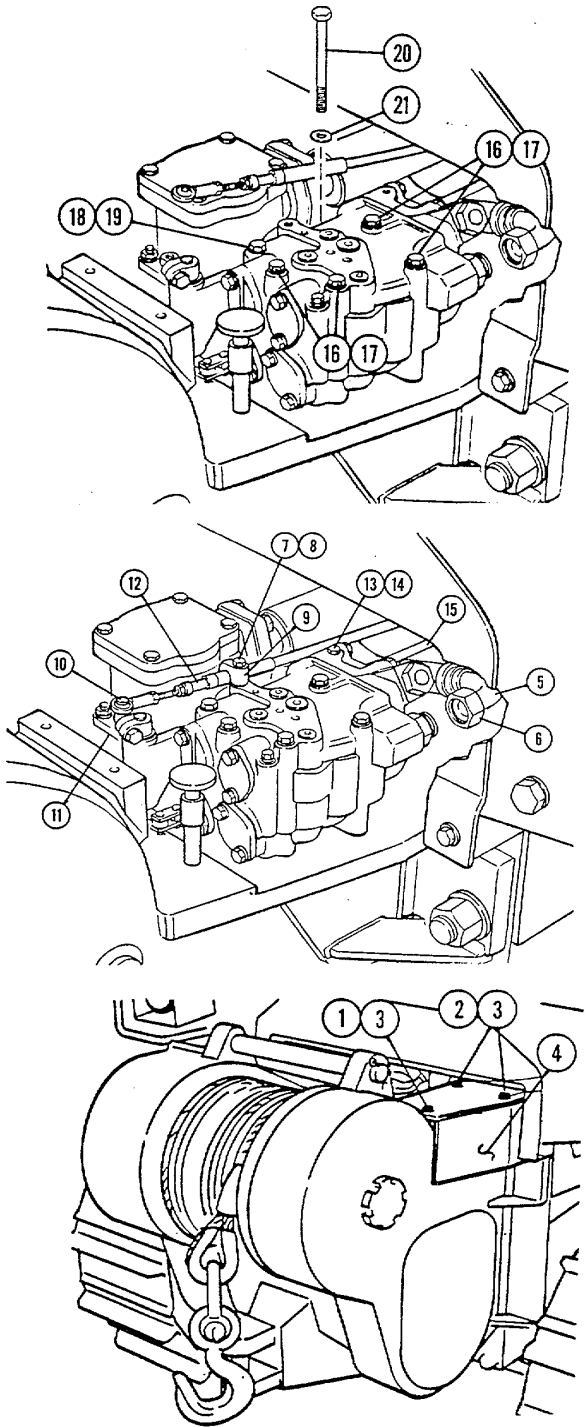


11-4. WINCH CONTROL VALVE - REPLACE (Cont'd)

- (3) Use a wrench to install four 5-3/4" capscrews (16) and four washers (17).
- (4) Use a wrench to install one 5-1/4" capscrew (18) and washer (19).
- (5) Use a wrench to install one 4" capscrew (20) and washer (21).
- (6) Push cable (15) in control valve, and secure by installing capscrew (13) and washer (14) with a wrench.
- (7) Place cable (12) in position on the control valve. Install capscrew (10) and nut (11) using a wrench.
- (8) Align cable (12) for installation of clamp (9). Use a socket to install capscrew (7) and washer (8). See page 11-12 for cable adjustment.
- (9) Connect hose (5) to control valve by tightening fitting (6) with a wrench.
- (10) Place cover (4) in position and secure with capscrews (1 and 2) and lockwashers (3). Use a socket to tighten capscrews.

c. Place In Service

Check winch for proper operation.



11-5. WINCH CONTROL LEVER AND LINKAGE - ADJUST

This task covers:

- a. Adjustment of the Linkage
 - b. Place In Service
-

INITIAL SETUP

Applicable Configurations

Tractor with winch

Common Tools

Tool Kit, General Mechanics

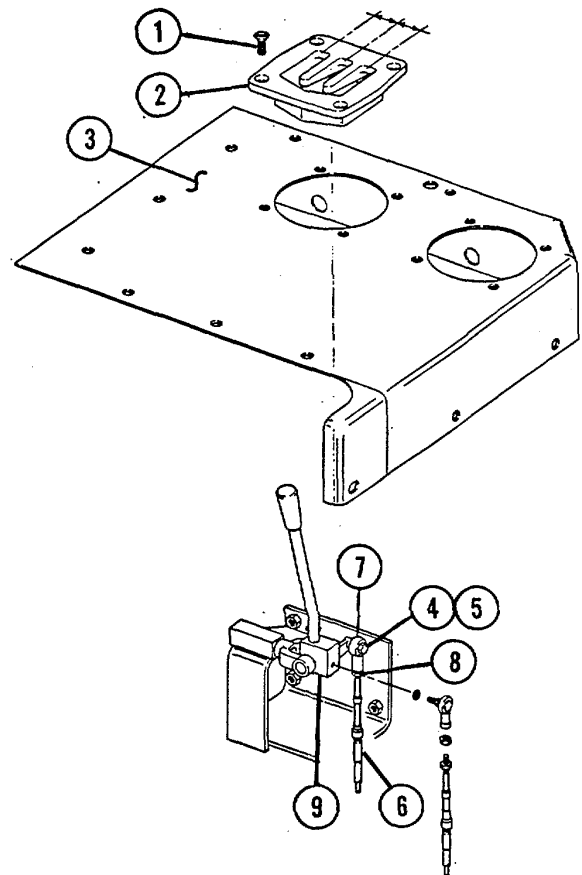
NSN 5180-00-699-5273

- a. Adjustment of the Linkage

CAUTION

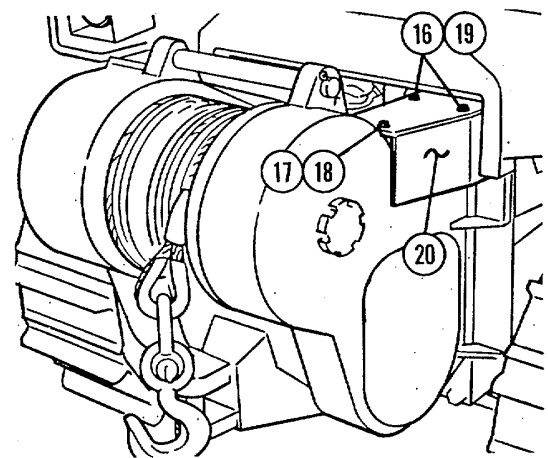
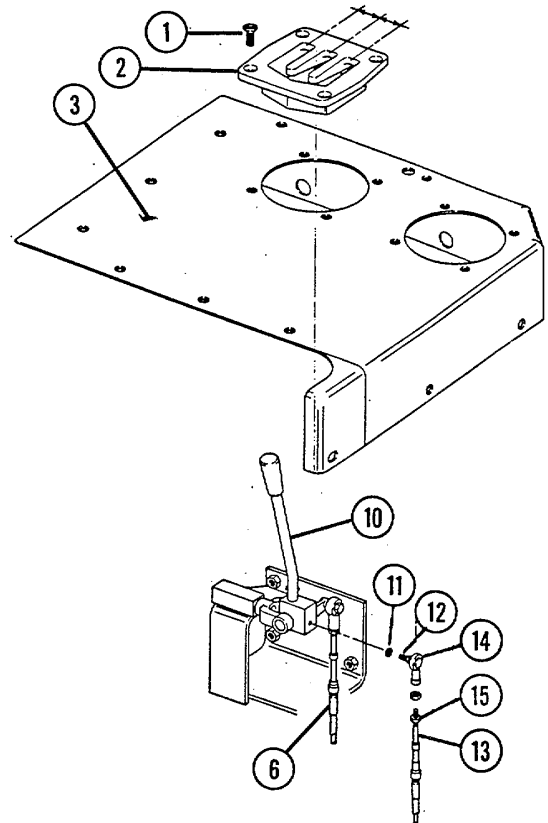
Do not make an adjustment to the linkage with the engine running. Damage to linkage will result.

- (1) Use a flat blade screwdriver to remove four capscrews (1) which secured guide (2) to cover (3). Remove guide.
- (2) Use a wrench and remove capscrew (4) and nut (5) from control cable (6)
- (3) Loosen rod end (7) until distance between rod end and the end of the threads on cable is 0.50 in.
- (4) Use a wrench to tighten nut (8) against rod end (7) to a torque of 30+5 lb in.
- (5) Put rod (7) end in position on bellcrank (9). Use a wrench to install capscrew (4) and nut (5).



11-5. WINCH CONTROL LEVER AND LINKAGE - ADJUST (Cont'd)

- (6) Put control lever (10) in BRAKE ON position.
- (7) Remove lockwasher (11) and capscrew (12) on cable (13) using a wrench. Remove rod end (14) from control lever.
- (8) Loosen rod end until dimensions (A and B) are the same when the control lever is in BRAKE ON position.
- (9) Use a wrench to tighten nut (15) against rod end to a torque of 30+5 lb in.
- (10) Install rod end (14) on control lever (10). Use a wrench to install lockwasher (11) and capscrew (12).
- (11) Move the control lever (10) to all positions. Ensure that threads on the cables (6 and 13) do not come in contact with the rubber seals. If the threads come in contact with the rubber seals, adjust cables again.
- (12) Install guide (2) onto cover (3). Use a flat blade screwdriver to install four capscrews (1).
- (13) Use a wrench to remove two capscrews (16), two capscrews (17) and four lockwashers (18 and 19) from cover (20). Remove cover.

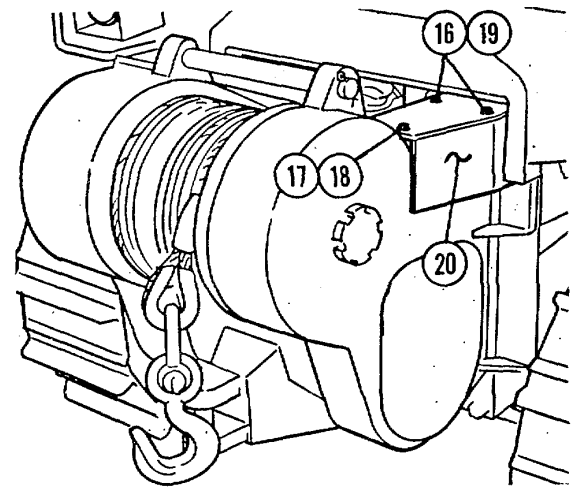
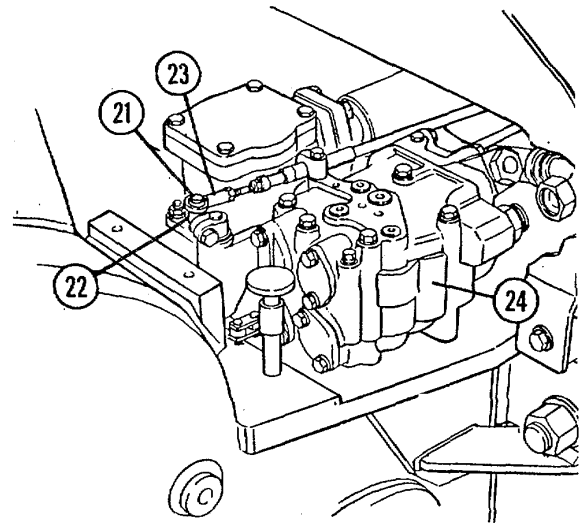


11-5. WINCH CONTROL LEVER AND LINKAGE - ADJUST (Cont'd)

- (14) Use a wrench to remove capscrew (21) and nut (22) which secured cable (23) to winch control valve (24).
- (15) Adjust cable so that distance between the rod end (23) and the end of threads on cable is 0.50 in.
- (16) Install rod end in position on the lever and secure with capscrew (21) and nut (22). Use a wrench to tighten the nut against rod end to a torque of 30+ 5 lbs. in.
- (17) Install cover over winch control valve. Use a wrench to install two capscrews (16), two capscrews (17) and four lockwashers (18 and 19) which secure cover (20).

b. Place In Service

Check winch for proper operation.



11-6. WINCH MAGNETIC STRAINER ASSEMBLY - SERVICE/REPLACE

This task covers:

- a. Service by Cleaning Strainer
- b. Removal
- c. Installation
- d. Place In Service

INITIAL SETUP**Applicable Configurations**

Tractor with Winch

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

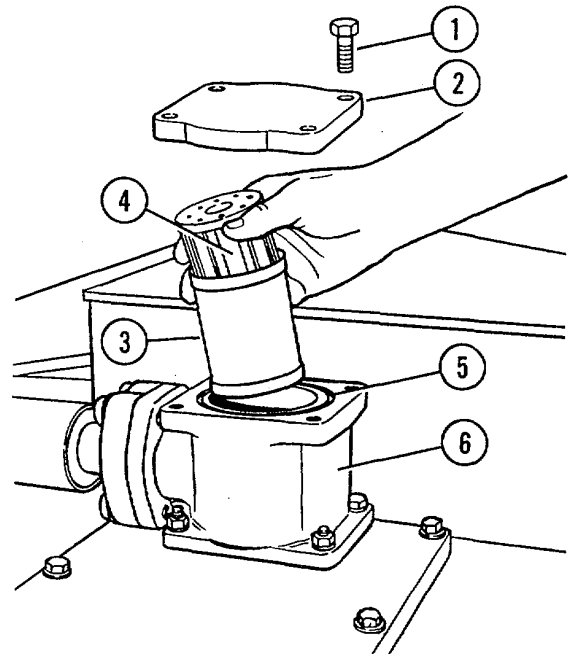
Cleaning solvent (App. D, Item 19)

Preformed packing (5, 15)

Oil OE/HDO-10 (See L05-2410-237-12)

a.. Service By Cleaning Strainer

- (1) Use a socket to remove four capscrews (1) from cover (2). Remove cover.
- (2) Remove screen (3) and filter (4) and wash in clean solvent.
- (3) Remove and discard preformed packing (5) from housing (6).
- (4) Put screen (3) and filter (4) in housing (6).
- (5) Put clean oil on preformed packing (5) and install on housing (6).
- (6) Place cover (2) in position on housing (6) and secure with four capscrews (1). Tighten capscrews with a socket.

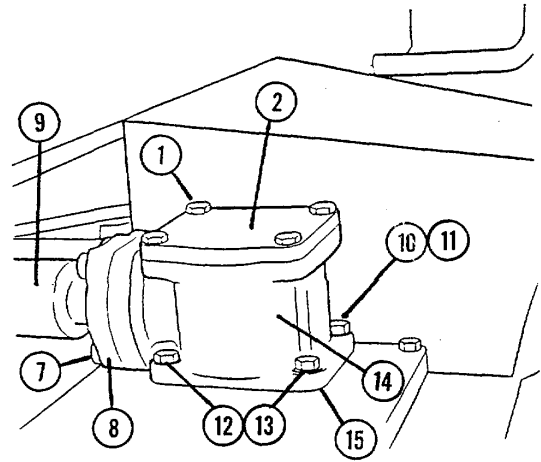


11-6. WINCH MAGNETIC STRAINER ASSEMBLY - SERVICE/REPLACE (Cont'd)

b. Removal**CAUTION**

Plug hose (9) to prevent dirt from entering system.

- (1) Use a socket to remove four capscrews (7) from split flanges (8) Remove flanges and disconnect hose (9)
- (2) Use a socket to remove two capscrews (10) and two lock washers (11)
- (3) Use a socket to remove two nuts (12) and two lockwashers (13)
- (4) Lift magnetic strainer assembly (14) off winch and remove preformed packing (15) from base of strainer assembly . Discard preformed packing.

**c. Installation**

- (1) Place new preformed packing (15) on base of magnetic strainer assembly (14)

NOTE

Be sure that mating surfaces are clean.

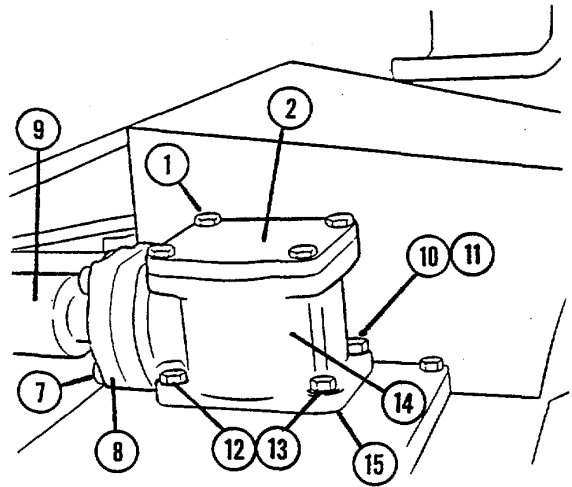
- (2) Place magnetic strainer assembly (14) in position on the winch. Install nuts (12) and lockwashers (13) Install capscrews (10) and lock washers (11). Tighten nuts and capscrews to a torque of 40 ± 2 lb ft.

11-6. WINCH MAGNETIC STRAINER ASSEMBLY - SERVICE/REPLACE (Cont'd)

- (3) Place hose (9) and split flanges (8) in position on magnetic strainer assembly (14). Install four capscrews (7) using a wrench.

d. Place In Service

Check winch for proper operation.



11-7. WINCH OIL FILTER - REPLACE/SERVICE

This task covers:

- a. Service by Changing Oil Filter
- b. Removal
- c. Installation
- d. Place In Service

INITIAL SETUP

Applicable Configurations
Tractor with winch

Common Tools

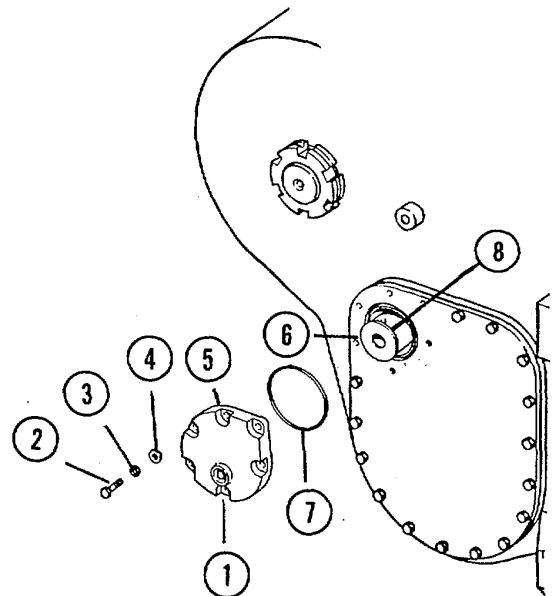
Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

Materials/Parts

Filter Element (6)
Preformed packing (7), (19), (8)
Gasket (12)
Oil OE/HDO-30 (See L05-2410-237-12)

a. **Service by Changing Oil Filter**

- (1) Remove plug (1) using a socket and let oil drain. Install plug after oil has drained.
- (2) Use a socket to remove six capscrews (2), six lockwashers (3) and six washers (4) from filter cover (5).
- (3) Remove filter cover (5), and filter element (6) with preformed packing (8). Discard filter element (6) and preformed packing (8).
- (4) Remove preformed packing (7) from cover (5). Discard preformed packing.
- (5) Install new oil filter element (6).
- (6) Put clean oil on preformed packing (7) and install preformed packing in groove on filter cover (5).

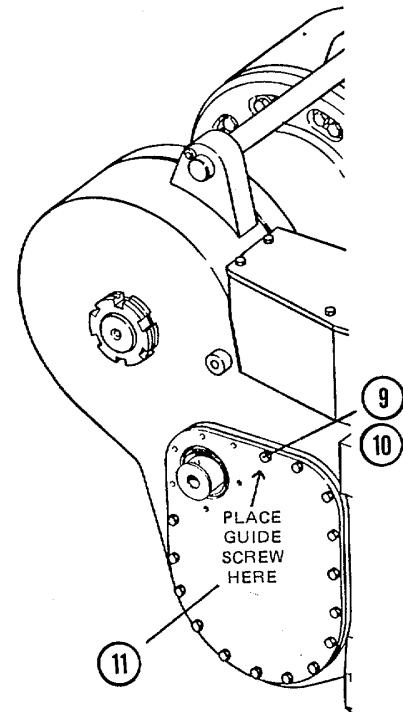
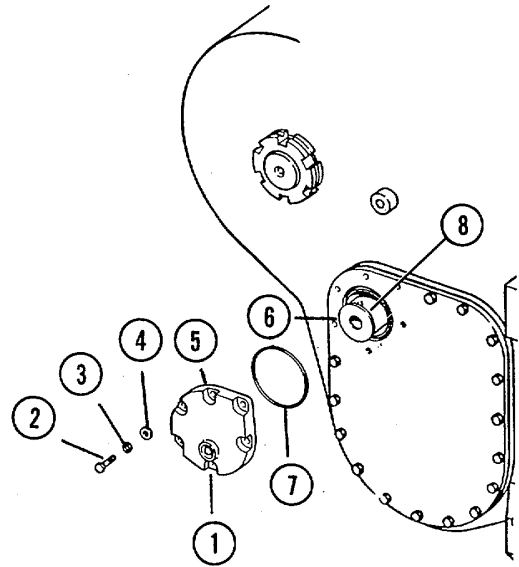


11-7. WINCH OIL FILTER - REPLACE/SERVICE (Cont'd)

- (7) Put clean oil on preformed packing (8)
- (8) Insert filter cover (5) into filter base and align capscrew holes.
- (9) Use a socket to install six capscrews (2) six lockwashers (3) and six washers (4) to filter cover (5).

b. Removal

- (1) Remove oil filter element. See Service in this paragraph.
- (2) Use a wrench to remove one capscrew (9) and washer (10) near the top of cover plate (11). Insert a guide screw in its place.
- (3) Remove the remaining fourteen capscrews (9) and washers (10) from the cover plate.

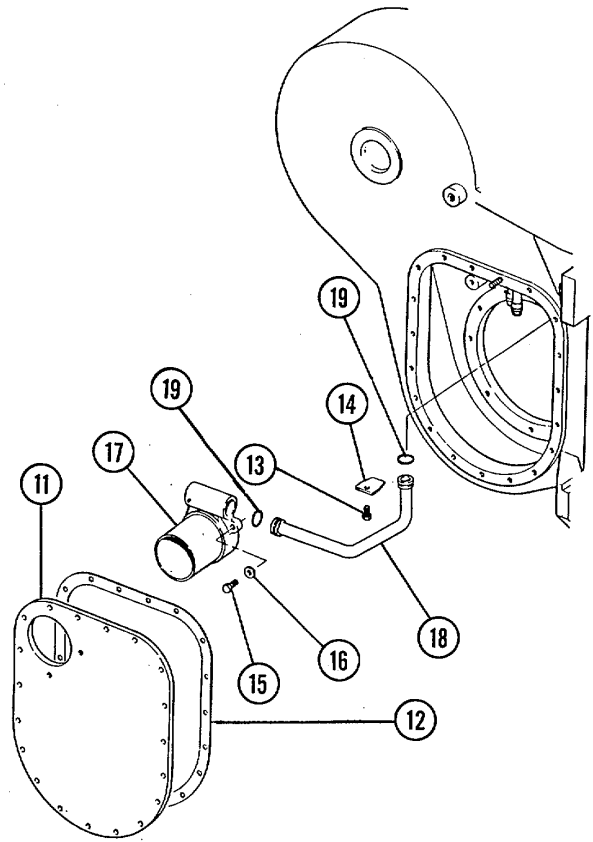


11-7. WINCH OIL FILTER - REPLACE/SERVICE (Cont'd)

- (4) Lift cover plate (11) and gasket (12) from guide screw. Discard gasket.
- (5) Use a wrench to remove capscrew (13) and lock (14).
- (6) Use a wrench to remove two capscrews (15) and washers (16) from oil filter housing (17).
- (7) Lower filter housing and pipe (18) to remove from winch case.
- (8) Separate pipe (18) from filter housing (17).
- (9) Remove and discard preformed packings (19).

c. Installation

- (1) Install preformed packings (19) on pipe (18).
- (2) Push pipe (18) into filter housing (17).
- (3) Place filter housing and pipe in position inside winch case. Use a wrench to install capscrews (15) and washers (16) which secure housing to winch case.
- (4) Use a wrench to secure top of pipe (18) with lock (14) and capscrew (13).
- (5) Place gasket (12) in position on cover plate (11).

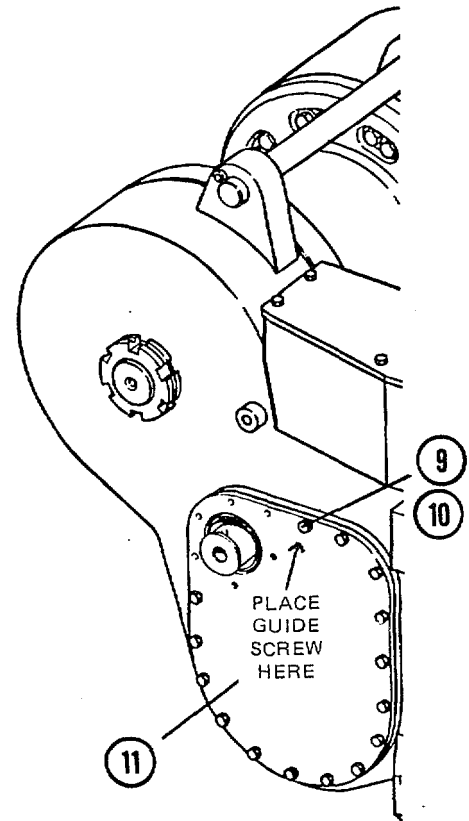


11-7. WINCH OIL FILTER - REPLACE/SERVICE (Cont'd)

- (6) Place a guide screw in winch case to help with installation of cover plate (11).
- (7) Place cover plate in position and install fourteen washers (10) and fourteen capscrews (9).
- (8) Remove guide screw and install one washer (10) and capscrew (9).
- (9) Install oil filter element. See Service by changing oil filter in this paragraph.

c Place In Service

Check winch for proper operation.



11-8. WINCH BREATHER - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configurations
Tractor with winch

Materials/Parts
Caps and Plugs

Common Tools
Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

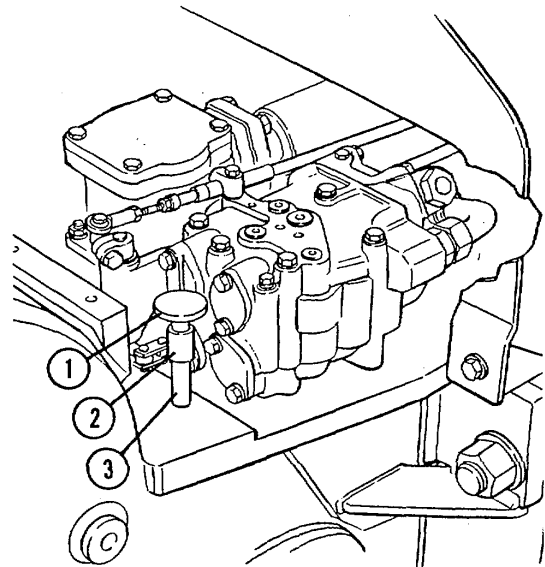
Equipment Condition
Winch valve cover removed.
(page 11-10)

a. Removal

- (1) Use a wrench to unscrew breather (1) from coupling (2).
- (2) Use a small pipe wrench to remove coupling (2) from nipple (3)
- (3) Use a small pipe wrench to remove nipple (3) from winch.
- (4) Plug breather hole on winch.

b. Installation

- (1) Remove plug, if present, from breather hole.
- (2) Wipe breather hole clean.
- (3) Install nipple (3) using a small pipe wrench.
- (4) Use a small pipe wrench to install coupling (2) on nipple.
- (5) Install breather (1) and hand tighten.



11-8. WINCH BREATHER - REPLACE (Cont'd)

(6) Install winch valve cover. See page 11-10.

c. Place In Service

Check winch for proper operation.

11-9. DRAWBAR PIN - REPLACE

This task covers:

- a. Removal
 - b. Installation
-

INITIAL SETUP**Applicable Configurations**

Tractor with winch

Common Tools

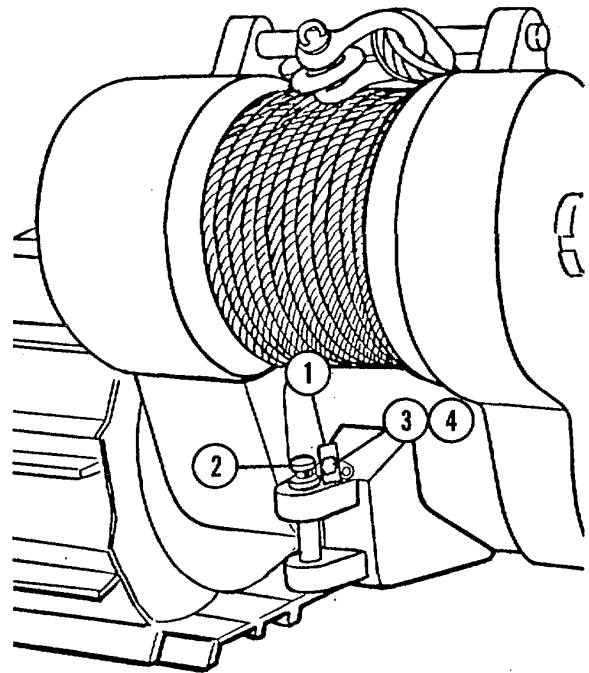
Shop Equipment, Automotive Maintenance
and Repair, Common #1 Less Power
NSN 4910-00-754-0654

a. Removal

- (1) Lift latch (1) and remove drawbar pin (2).
- (2) Remove capscrew (3) and locknut (4) using a wrench. Remove latch (1).

b. Installation

- (1) Place latch (1) in position and secure with capscrew (3) and locknut (4). Tighten capscrew with a wrench.
- (2) Install drawbar pin (2) in bracket. Move latch as required to permit pin to enter completely.



11-10. WINCH CABLE ASSEMBLY - REPLACE/REPAIR

This task covers:

- a. Removal
- b. Disassembly
- c. Assembly
- d. Installation
- e. Place In Service

INITIAL SETUP**Applicable Configurations**

Tractor with winch

Equipment Condition

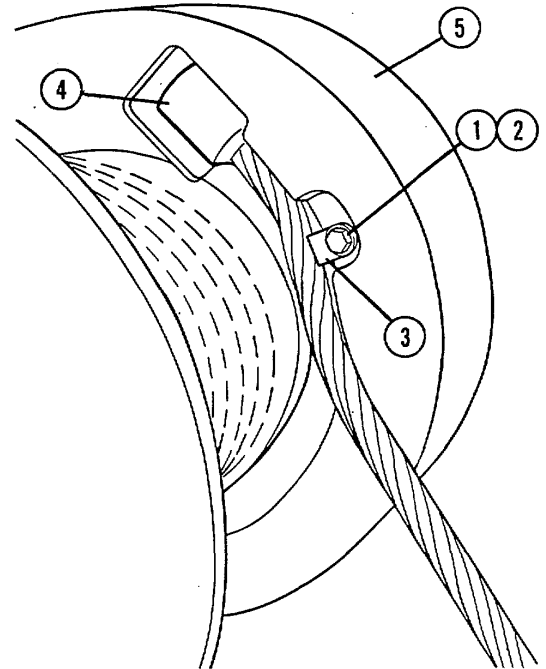
Winch cable reeled out.

Common Tools

Shop Equipment, Automotive Maintenance
and Repair, Common #1 Less Power
NSN 4910-00-754-0654

a. Removal

- (1) Use a wrench to remove capscrew (1), lockwasher (2) and cable clamp (3).
- (2) Pull cable ferrule (4) from winch drum (5).



11-10. WINCH CABLE ASSEMBLY - REPLACE/REPAIR (Cont'd)b. Disassembly**WARNING**

When handling the winch cable, wear thick gloves. Failure to do so may cause severe injury to the hands and fingers.

WARNING

Inspect full length of cable for broken strands and kinks and replace cable if these conditions are found. Failure to do so could result in cable breakage which could cause serious injury or death.

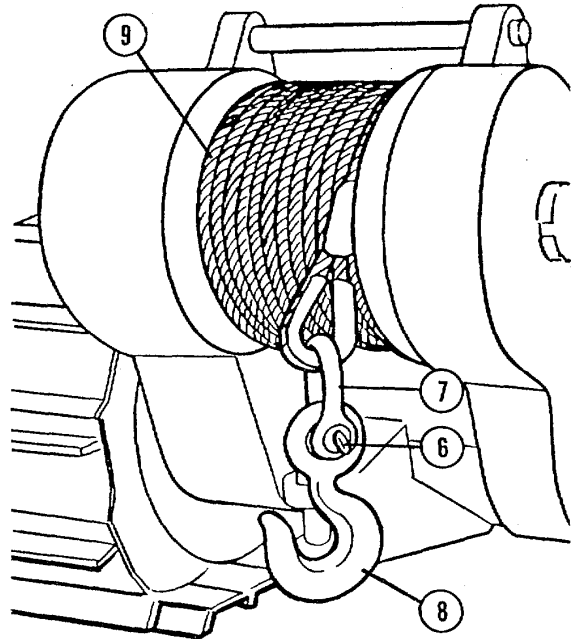
- (1) Remove pin (6) from clevis (7) and remove hook (8).
- (2) Remove clevis from cable (9).

c. Assembly

- (1) Assemble clevis (7) in loop at end of cable (9).
- (2) Position eye of winch hook (8) in clevis and assemble clevis pin (6) through clevis and winch hook.

d. Installation**WARNING**

When handling the winch cable, wear thick gloves. Failure to do so may cause severe injury to the hands and fingers.

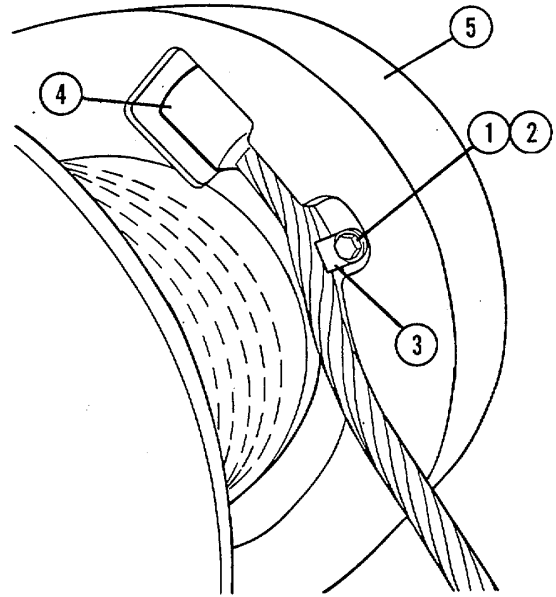


11-10. WINCH CABLE ASSEMBLY - REPLACE/REPAIR (Cont'd)

NOTE

Lay cable out in straight line behind tractor before starting installation.

- (1) Install cable ferrule (4) in groove on cable drum (5).
- (2) Place clamp (3), capscrew (1), and lockwasher (2) in position. Tighten capscrew with a wrench.
- (3) Start engine and wind cable on drum.



11-11. WINCH GEAR PUMP - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP**Applicable Configurations**

Tractor with winch

Common Tools

Shop equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

Materials/Parts

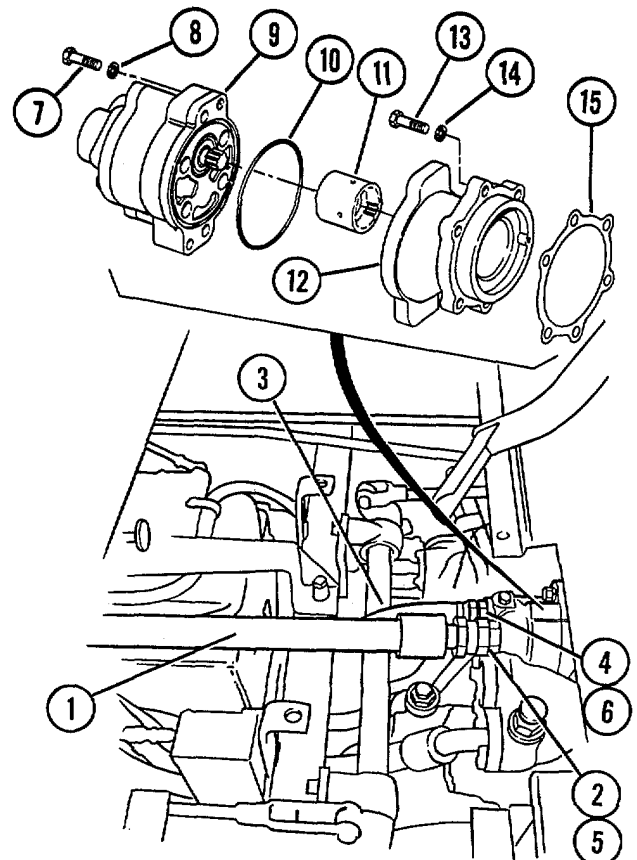
Seals (5 and 6)
Preformed packing (10)
Gasket (15)
Hydraulic Oil OE/HDO-10 (See
L05-2410-237-12)
Lint-free rag (App. D, Item 15)

Equipment Condition

Tractor parked on level ground.
Engine cool.
Floor plates removed. (page 10-44)

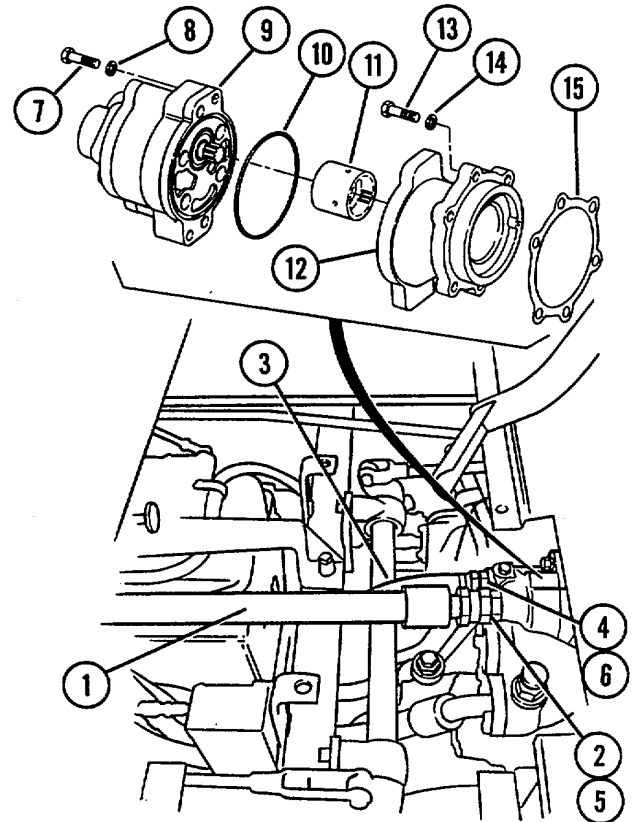
a. Removal

- (1) Use a wrench to disconnect hose (1) from connector (2) and use a wrench to disconnect hose (3) from connector (4). Remove and discard two seals (5 and 6) from hoses.
- (2) Use a wrench to remove two capscrews (7) and two lockwashers (8).
- (3) Remove pump (9) and preformed packing (10). Discard preformed packing.
- (4) Remove coupling (11) from adapter assembly (12).
- (5) Use a wrench to remove six capscrews (13) and six lockwashers (14) from the adapter assembly. Remove adapter assembly and gasket (15). Discard gasket.



11-11. WINCH GEAR PUMP - REPLACE (Cont'd)**b. Installation**

- (1) Wipe pump adapter assembly mounting surface clean and install new gasket (15).
- (2) Install adapter assembly (12) over gasket with six capscrews (13) and six lockwashers (14). Use a wrench to tighten capscrews.
- (3) Install coupling (11) in adapter assembly.
- (4) Use a lint-free rag and wipe sealing surface of gear pump (9) clean.
- (5) Apply film of clean hydraulic oil to new preformed packing (10) and install preformed packing on pump.
- (6) Install pump on adapter assembly with two capscrews (7) and two lockwashers (8).
- (7) Install a new preformed packing (6) on hose (3). Install hose to connector (4) on pump.
- (8) Install a new preformed packing (5) on hose (1). Install hose to connector (2) on pump.

**c. Place In Service**

Check winch for proper operation.

11-12. WINCH HYDRAULIC LINES AND FITTING

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configurations

Tractor with winch

Common Tools

Shop Equipment, Automotive Maintenance & Repair, Common #1 Less Power NSN 4910-00-754-0654

Materials/Parts

Preformed packing (3, 6, 12)
Thread Sealant (App. D, Item 17)
Lint-free rag (App. D, Item 15)
Oil pan
Plugs and caps

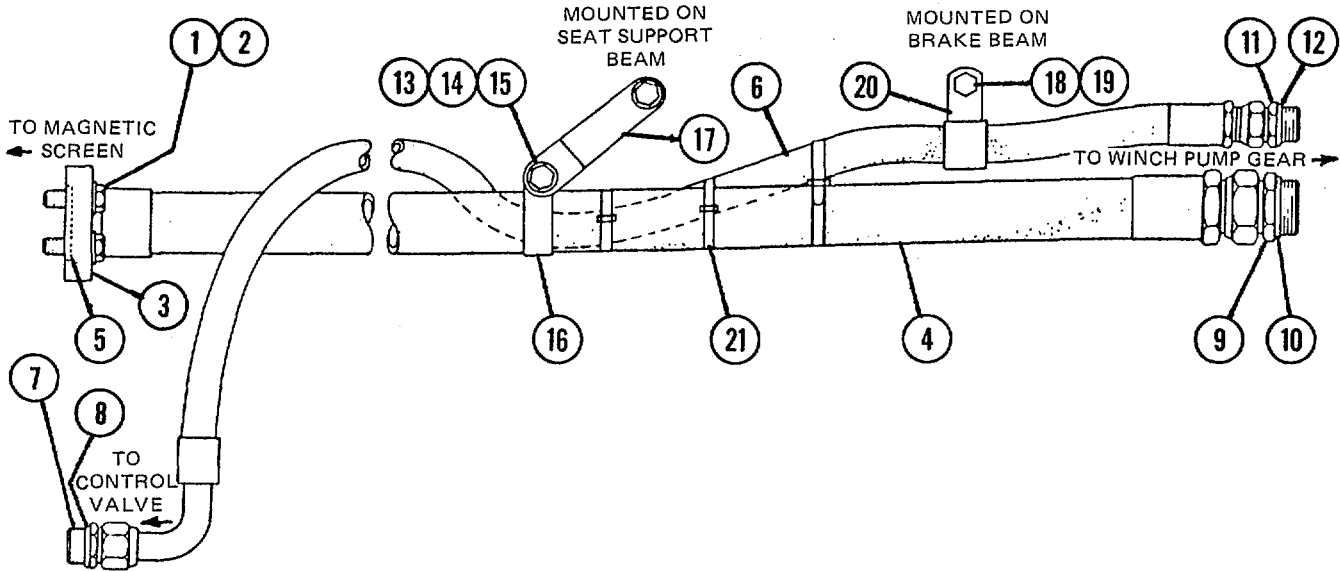
Equipment Condition

Cab floor plates removed. (page 10-44)

a. Removal

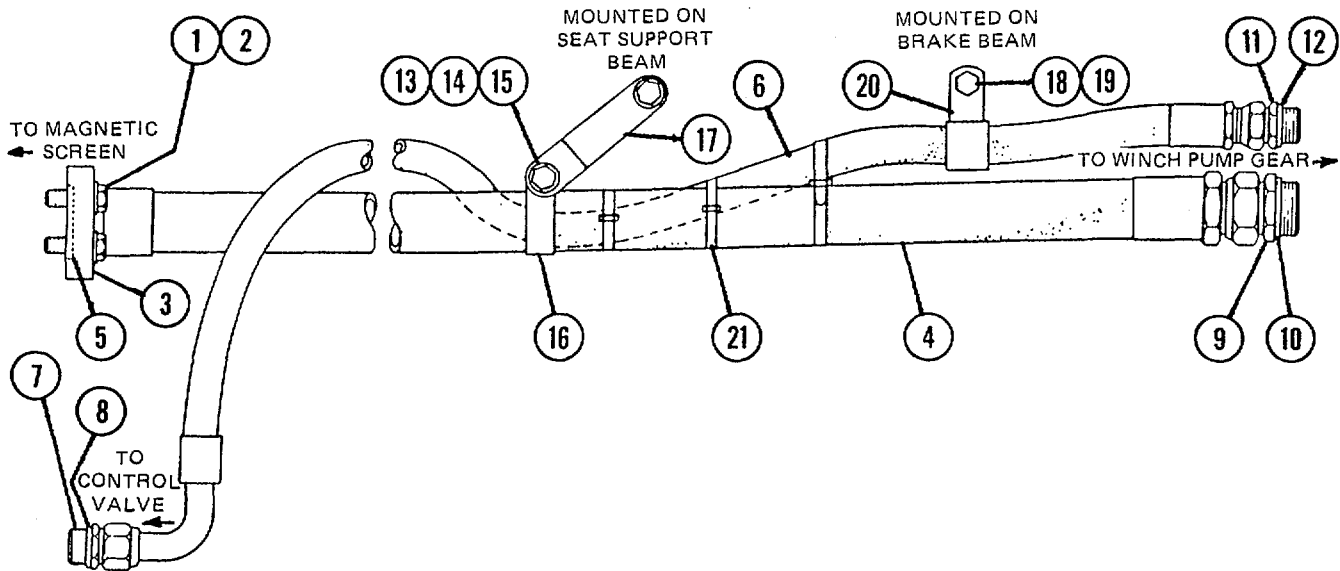
- (1) Use a lint-free rag and wipe all hoses, tubes, and surrounding areas clean before opening any hydraulic connections.
- (2) Label all lines before removal

- (3) Provide a suitable container to catch any oil that may leak from the hydraulic system.
- (4) Use two wrenches to disconnect hose (1) from connector (2) located at winch gear pump a wrench to remove connector. Remove and discard preformed packing (3) from connector.



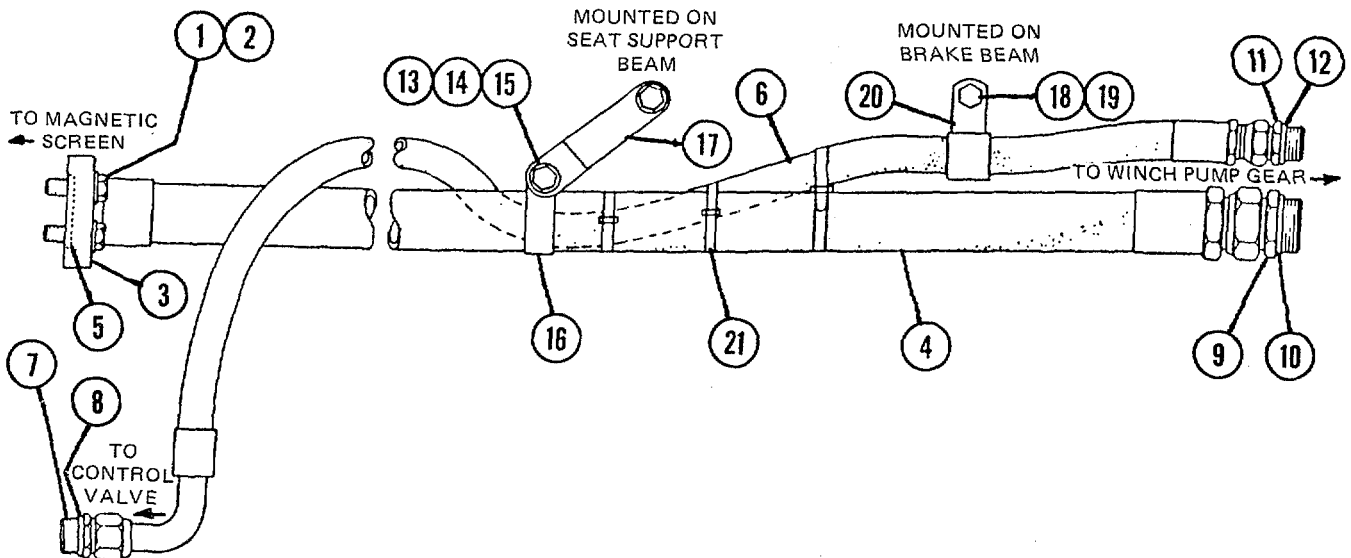
11-12. WINCH HYDRAULIC LINES AND FITTING - REPLACE (Cont'd)

- (5) Use two wrenches to disconnect hose (4) from connector (5) located on winch gear pump. Use a wrench to remove connector (5). Remove and discard preformed packing (6) from connector.
- (6) Use a wrench to disconnect hose (1) from connector (7) located at winch control valve. Use a wrench to remove connector (7). Remove and discard preformed packing (8) from connector (7).
- (7) Use wrench to remove four capscrews (9), four washers (10) and two flanges (11) to disconnect hose (4) from winch control valve. Remove and discard preformed packing (12) from hose end.
- (8) Use two wrenches to remove one capscrew (13), one lockwasher (14), one nut (15) and one clip (16) which secured hose (4) to bracket (17).
- (9) Use a wrench to remove one capscrew (18), spacer (19) and clip (20) which secured hose (1) in position.
- (10) Remove hoses (4 and 1) from machine. If necessary, cut three straps (21) securing hoses.
- (11) Plug all hose ends and openings to prevent dirt entering the hydraulic system.
 - b. Installation
 - (1) Use a wrench to install connector (2) with a new preformed packing (3) into winch gear pump.
 - (2) Use two wrenches to connect hose (1) to connector (2) on winch gear pump.
 - (3) Use a wrench to install connector (5) with a new preformed packing (6) into winch gear pump.



11-12. WINCH HYDRAULIC LINES AND FITTING - REPLACE (Cont'd)

- (4) Use two wrenches to connect hose (4) to connector (5) on winch gear pump position.
 - (5) Use a wrench to install connector (7) with a new preformed packing (8) into winch control valve.
 - (6) Use a wrench to connect hose (1) to connector (7) on winch control valve.
 - (7) Install a new preformed packing (12) in hose end (4). Position hose onto magnetic screen and secure with two flanges (11), four washers (10) and four capscrews (9) Use a wrench to tighten capscrews (9)
 - (8) Install one clip (16), one capscrew (13), one lockwasher (14) and one nut (15) to secure hose (4) to bracket (17). Use two wrenches to tighten capscrew (13) and nut (15).
 - (9) Install one clip (20), one capscrew (18) and one spacer (19) to secure hose (1) in
 - (10) Tie hoses together with three straps (21).
 - (11) Install floor plates See page 10-44.
- c. Place In Service
- (1) Start engine and run winch.
 - (2) Ensure that oil stays in sight gage on winch hydraulic reservoir. Add oil, if necessary. See page 11-2.
 - (3) Check winch for proper operation.



CHAPTER 12

ACCESSORY ITEMS AND WINTERIZATION EQUIPMENT

12-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the accessory items and winterization equipment. To find a specific maintenance procedure, see the maintenance task summary below.

12-2. ACCESSORY ITEMS AND WINTERIZATION EQUIPMENT MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
12-3	Mirrors - Replace	12-2
12-4	Windshield Wipers - Replace/Repair	12-3
12-5	Defroster Fan - Replace/Repair	12-7
12-6	Personnel Heater - Replace/Repair	12-11
12-7	Data Plates and Instructions Holders - Replace	12-15
12-8	Sound Suppression Panels - Replace	12-16

12-3. MIRRORS - REPLACE

This task covers:

- a. Removal
 - b. Installation
-

INITIAL SETUP

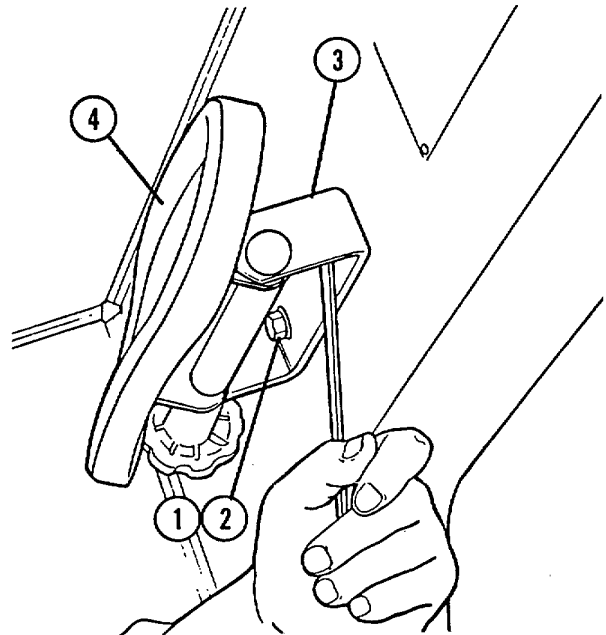
Applicable Configurations

All

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

- a. Removal
 - (1) Use a wrench to remove two capscrews (1) and two lockwashers (2) from bracket (3) on mirror assembly (4).
 - (2) Remove mirror assembly (4).
- b. Installation
 - (1) Place mirror assembly (4) in position.
 - (2) Install two lockwashers (2) and two capscrews (1) to secure mirror assembly (4).



12-4. WINDSHIELD WIPERS - REPLACE/REPAIR

This task covers:

- a. Removal
- b. Disassembly
- c. Assembly
- d. Installation
- e. Place In Service

INITIAL SETUP

Applicable Configurations

Personnel Required

Tractor with winterized cab
MOS62B (2)

Common Tools

Materials/Parts

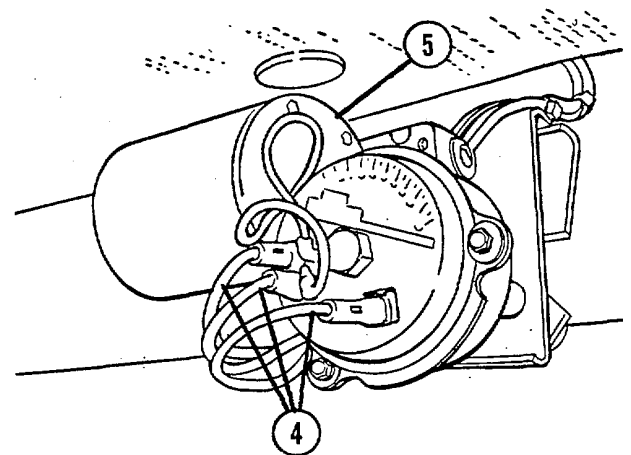
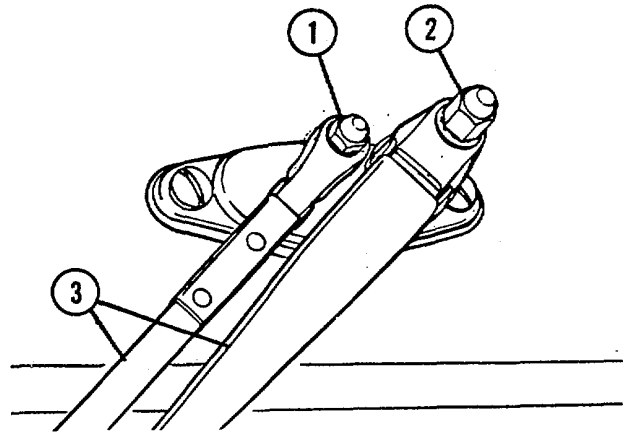
Tool Kit, General Mechanics
Wire I.D. tags
NSN 5180-00-699-5273
Gasket (10), (15)

NOTE

This paragraph is for the replacement and repair of the front or rear wipers.

a. Removal

- (1) Use a wrench to remove nuts (1) and (2). Pull arms (3) off shafts.
- (2) Disconnect and tag three wires (4) from wiper motor and bracket assembly (5).



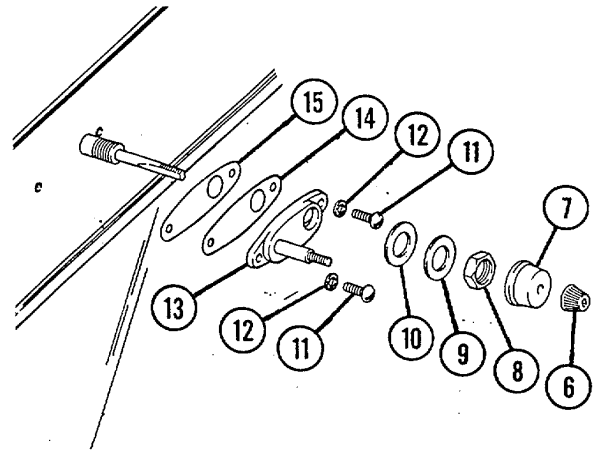
12-4. WINDSHIELD WIPERS - REPLACE/REPAIR (Cont'd)

- (3) Remove spacer (6) and rubber boot (7) by pulling straight off.
- (4) Use a wrench to remove shaft nut (8), washer (9) and gasket (10). Discard gasket (10).

NOTE

Before removing slotted screws (11) have an assistant hold the motor and bracket assembly to keep it from falling.

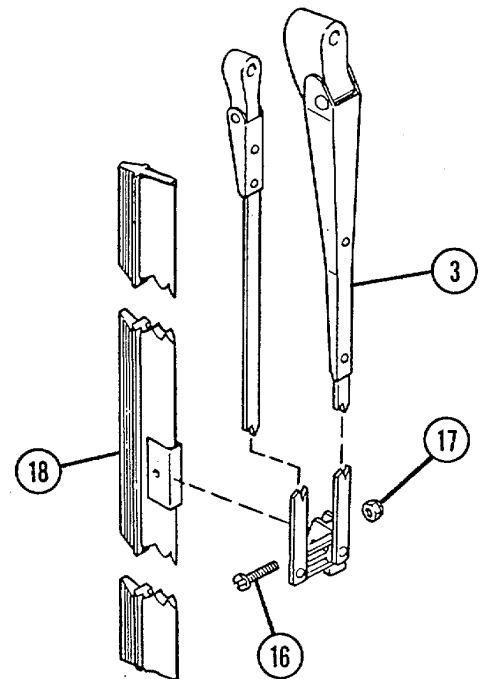
- (5) Use a flat blade screwdriver to remove two slotted screws (11) and star washers (12) securing wiper motor and bracket assembly to cab.
- (6) Remove adapter (13), spacer (14) and gasket (15) from outside of cab. Discard gasket (15).



Remove wiper motor and bracket assembly.

b. Disassembly

- (1) Remove slotted screw (16) and nut (17) from wiper blade bracket and remove wiper blade (18) from arm (3).

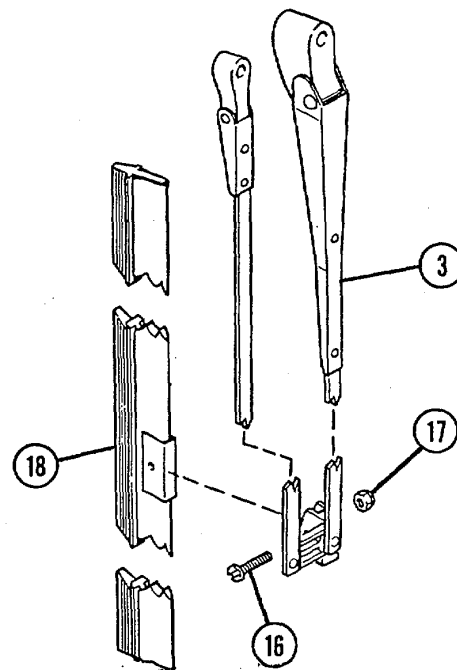
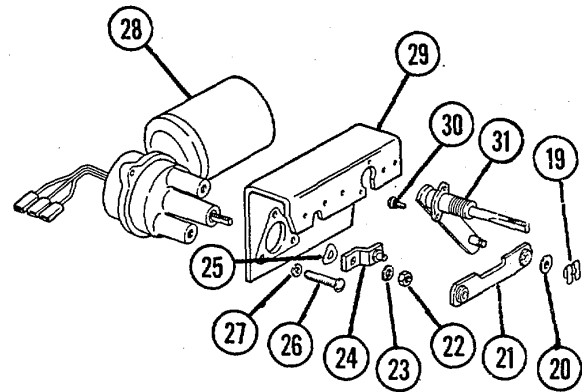


12-4. WINDSHIELD WIPERS - REPLACE/REPAIR (Cont'd)

- (2) Remove two clips (19), two washers (20) and arm (21).
- (3) Remove nut (22), washer (23), arm (24) and wave washer (25).
- (4) Remove three slotted screws (26) and three split washers (27) securing wiper motor (28) to bracket (29).
- (5) Remove two screws (30) and remove arm (31). Save shims on stud of arm (31) for assembly.

c. Assembly

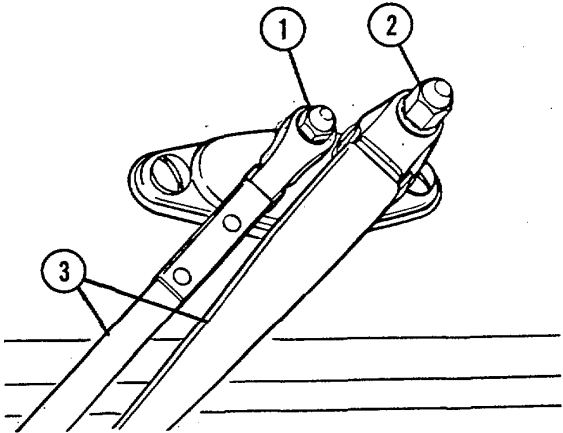
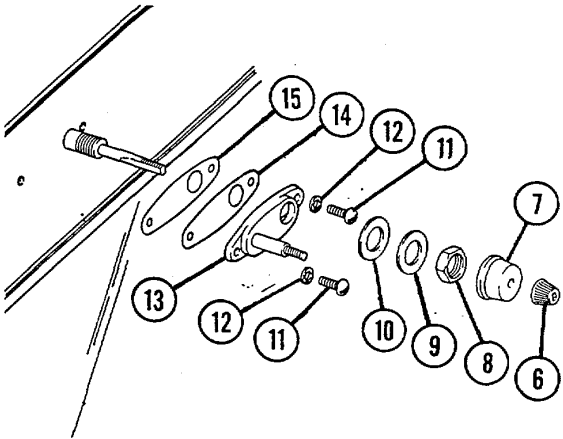
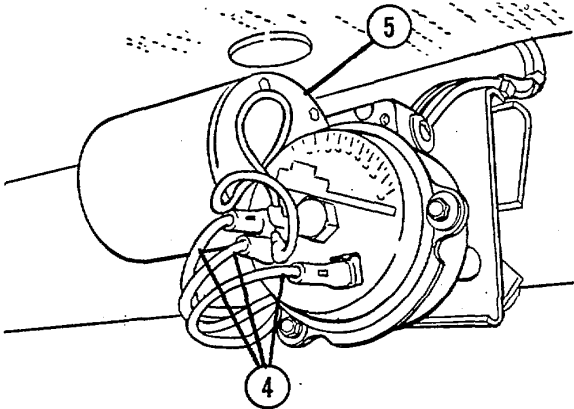
- (1) Install two screws (30) into arm (31), secure to bracket (29). Place shims on stud of arm (31)
- (2) Position wiper motor (28) onto back of bracket (29) and secure with three screws (26) and three washers (27).
- (3) Assemble wave washer (25), arm (24) and washer (23) onto motor shaft and secure with nut (22).
- (4) Assemble arm (21) onto pins on arm (31) and arm (24). Secure with two washers (20) and two clips (19).
- (5) Install wiper blade (18) into bracket in two piece arm (3). Install slotted screw (16) and nut (17) and tighten securely.



12-4. WINDSHIELD WIPERS - REPLACE/REPAIR (Cont'd)

d. Installation

- (1) From inside cab, have assistant hold wiper motor and bracket assembly (5) in position.
 - (2) From outside of cab, place gasket (15), spacer (14) and adapter (13) over shaft protruding through cab.
 - (3) Install two slotted screws (11) and star washers (12) to secure adapter (13) and wiper motor and bracket assembly (5) to cab.
 - (4) Place gasket (10) and washer (9) in position on stud. Use a wrench to secure with nut (8).
 - (5) Slide boot (7) and spacer (6) on stud.
 - (6) Place two piece wiper arm (3) in position.
 - (7) Use a wrench to install nuts (1) and (2).
 - (8) Connect three wires (4) to motor.
- e. Place In Service Check windshield wipers for proper operation.



12-5. DEFROSTER FAN - REPLACE/REPAIR

This task covers:

- a. Removal
 - b. Disassembly
 - c. Assembly
 - d. Installation
 - e. Place In Service
-

INITIAL SETUP

Applicable Configurations

Tractor with winterized cab

Materials/Parts

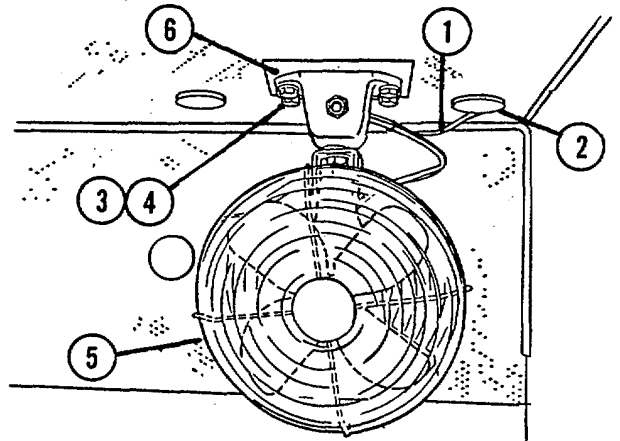
Wire I.D. Tags

Common Tools

Shop Equipment, Automotive
Maintenance and Repair, Common #1
Less Power
NSN 4910-00-754-0654

a. Removal

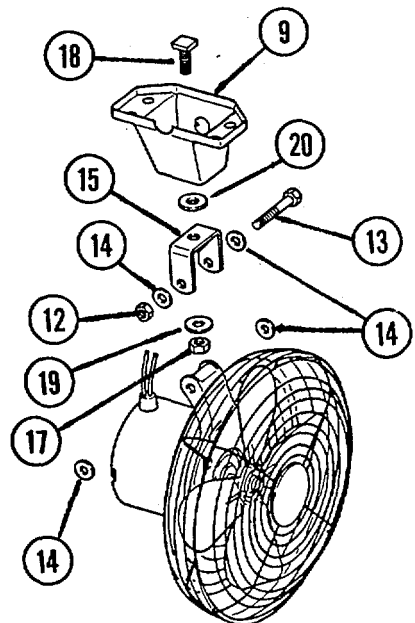
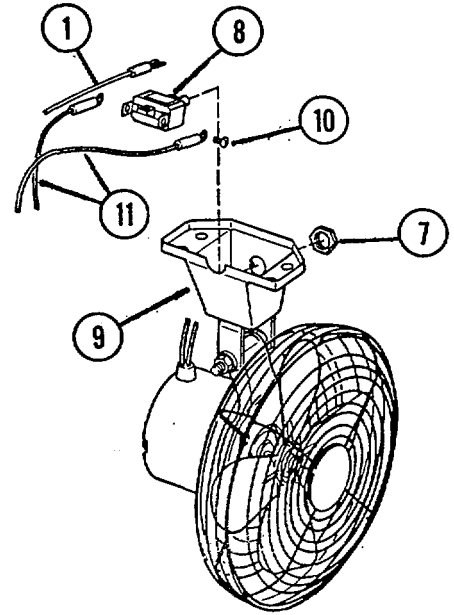
- (1) Disconnect wire (1) at fuse holder (2).
- (2) Use a socket to remove four capscrews (3), four washers (4) and defroster fan (5) from bracket (6) in cab roof.



12-5. DEFROSTER FAN - REPLACE/REPAIR (Cont'd)

b. Disassembly

- (1) Remove 1/2" locknut (7) and switch (8) from switch housing (9).
- (2) Remove three screws (10), wire (1) and two wires (11) from switch (8). Tag wires for reassembly.
- (3) Use a wrench to remove nut (12), capscrew (13) and four washers (14) securing bracket (15) to plate (16).
- (4) Use a wrench to remove nut (17), bolt (18), washer (19) bushing (20) and bracket (15) from switch housing (9).

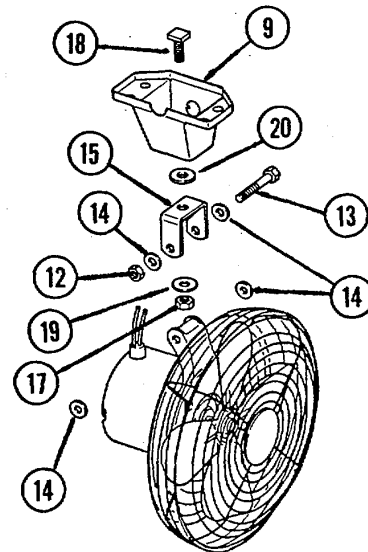
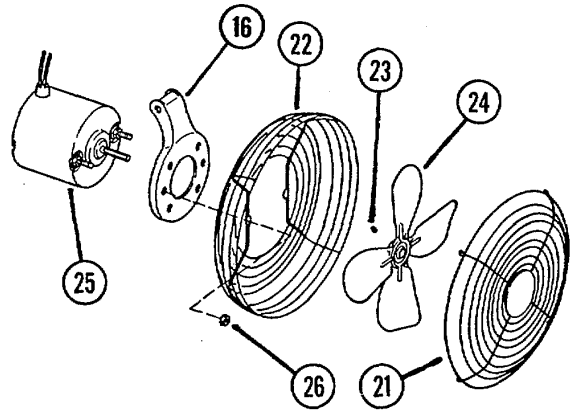


12-5. DEFROSTER FAN - REPLACE/REPAIR (Cont'd)

- (5) Remove front fan guard (21) from rear fan guard (22).
- (6) Use an allen wrench to remove set screw (23) and fan blade (24) from motor (25) shaft.
- (7) Use a socket to remove two nuts (26), rear fan guard (22) and plate (16) from motor (25).

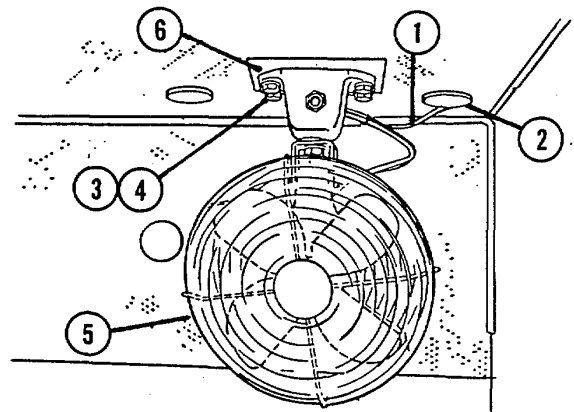
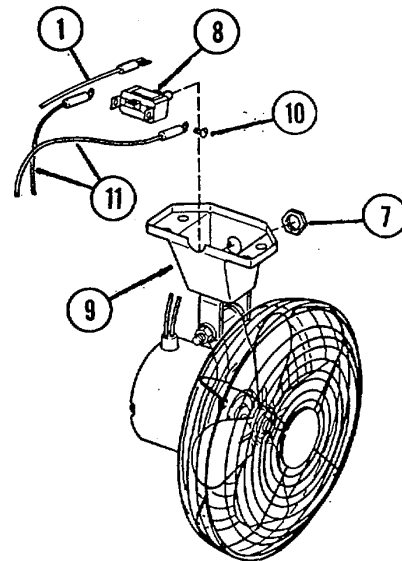
c. Assembly

- (1) Install plate (16) and rear fan guard (22) on motor (25) with two nuts (26).
- (2) Use an allen wrench to install set screw (23) part way into fan blade (24) hub. Install fan blade (24) on motor (25) shaft and tighten set screw (23).
- (3) Install front fan guard (21) on rear fan guard (22).
- (4) Use a wrench to install bolt (18) through bottom of switch housing (9). Install bushing (20), bracket (15), washer (19) and nut (17) on bolt (18) and tighten securely.
- (5) Position plate (16) with two washers (14) into bracket (15). Use a wrench to install capscrew (13) two washers (14) and nut (12) securing plate (16) to bracket (15). Tighten securely.



12-5. DEFROSTER FAN - REPLACE/REPAIR (Cont'd)

- (6) Connect wire (1) and two wires (11) to switch (8) with three screws (10).
- (7) Place switch (8) in housing (9) and install locknut (7) on switch.
- d. Installation
- (1) Install defroster fan (5) on bracket (6) with four capscrews (3) and four washers (4). Tighten capscrews (3) securely.
- (2) Connect wire (1) at fuse holder (2).
- e. Place In Service Check defroster fans for proper operation.



12-6. PERSONNEL HEATER - REPLACE/REPAIR

This task covers:

- a. Removal
 - b. Disassembly
 - c. Assembly
 - d. Installation
 - e. Place In Service
-

INITIAL SETUPApplicable Configurations

Tractor with winterized cab

Materials/Parts

Wire I.D. Tags

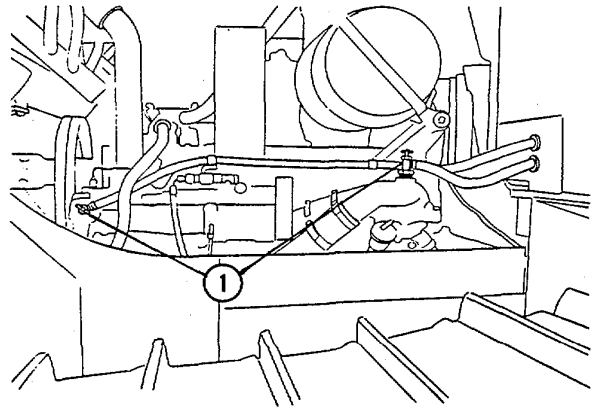
Common Tools

Shop Equipment, Automotive
Maintenance and Repair, Common #1
Less Power
NSN 4910-00-754-0654

Equipment Condition

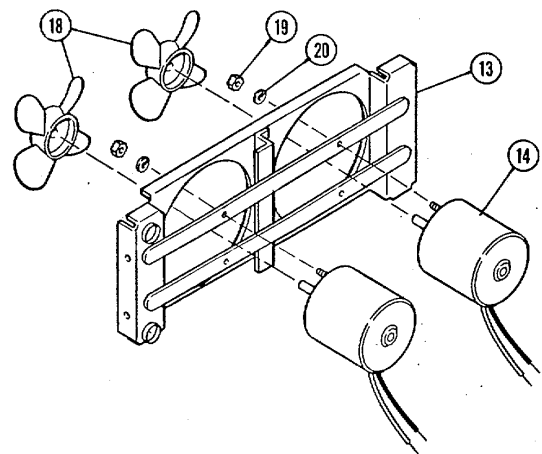
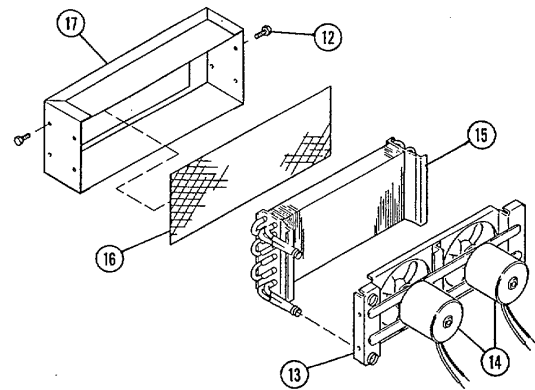
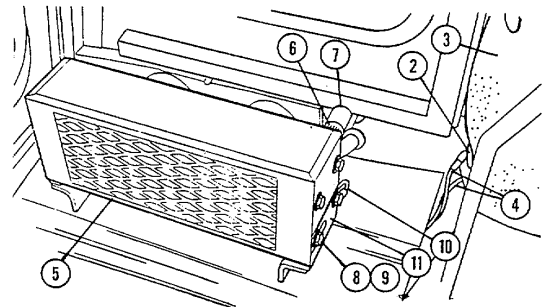
Personnel heater cool.

- a. Removal
 - (1) Close two water shut-off cocks (1) on heater hoses in engine compartment.



12-6. PERSONNEL HEATER - REPLACE/REPAIR (Cont'd)

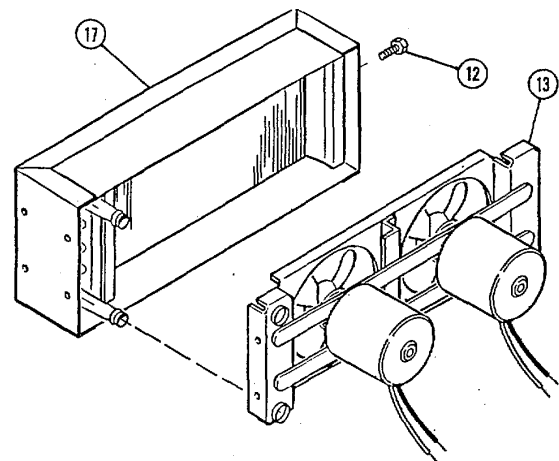
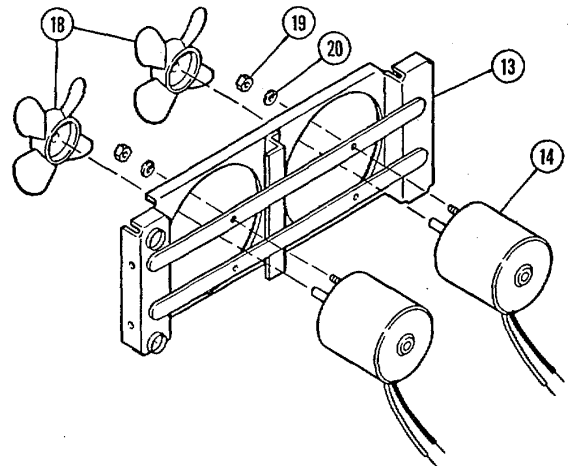
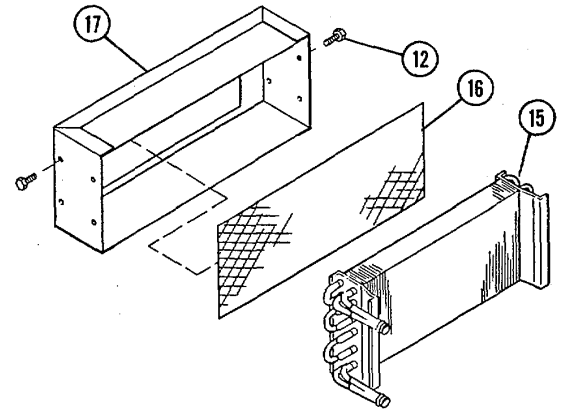
- (2) Unscrew button (2) at lower left corner of front insulation panel (3) and pull back.
 - (3) Mark two wires (4) from heater (5) and then disconnect.
 - (4) Remove two hose clamps (6) and remove hoses (7) from back of heater (5).
 - (5) Use a wrench to remove capscrew (8), washer (9) and ground wire (10) from lower rear corner of heater (5).
 - (6) Use a wrench to remove three capscrews (8), three washers (9) and heater (5) from mounting brackets (11).
- b. Disassembly
- (1) Use a wrench to remove one capscrew (12) from each side of heater. Remove back panel (13) with fan motors (14).
 - (2) Lift heater core (15) and screen (16) out of heater cover (17).
 - (3) Remove fan blades (18) from fan motors (14) by sliding off motor shafts. Cut tie strap on motor wires.
 - (4) Use a wrench to remove nuts (19) and lockwashers (20). Remove fan motors (14) from back panel (13).



12-6. PERSONNEL HEATER - REPLACE/REPAIR (Cont'd)

c. Assembly

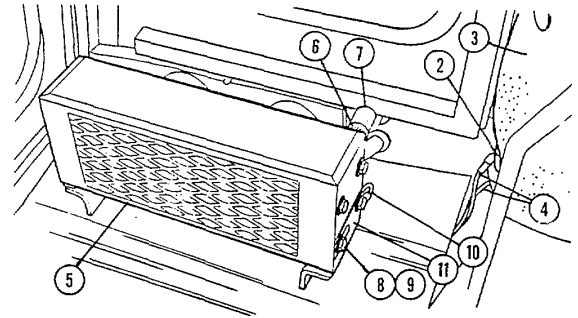
- (1) Install screen (16) into heater cover (17).
- (2) Place heater core (15) into heater cover (17).
- (3) Place fan motors (14) on back panel (13) and secure with lockwashers (20) and nuts (19). Install tie strap on motor wires.
- (4) Slide fan blades (18) onto fan motor (14) shafts.
- (5) Place back panel (13) in position in heater cover (17). Install two capscrews (12) at top rear of cover to hold panel (13) in position.



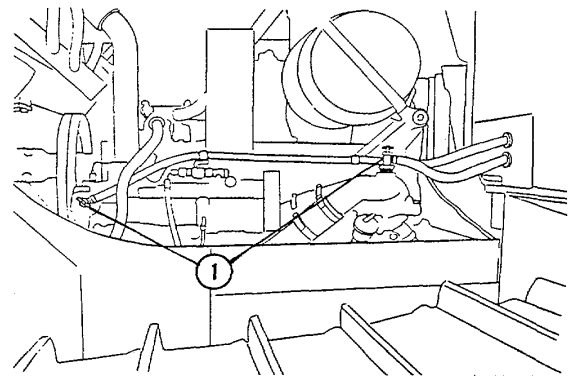
12-6. PERSONNEL HEATER - REPLACE/REPAIR (Cont'd)

d. Installation

- (1) Position heater (5) on mounting brackets (11) on floor and install ground wire (10) in lower rear corner of heater with capscrew (8) and washer (9).
- (2) Install three capscrews (8) and washers (6) to secure heater to mounting brackets (11).
- (3) Install two hoses (7) and tighten two hose clamps (6).
- (4) Connect two fan motor wires (4). Push insulation panel (3) back into position and fasten with button (2).
- (5) Open two water shutoff cocks (1) on heater hoses in engine compartment.

**e. Place In Service**

Check personnel heater for proper operation.



12-7. DATA PLATES AND INSTRUCTION HOLDERS - REPLACE

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Applicable Configurations

All

Materials/Parts

Drive Screws (1)

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

a. Removal

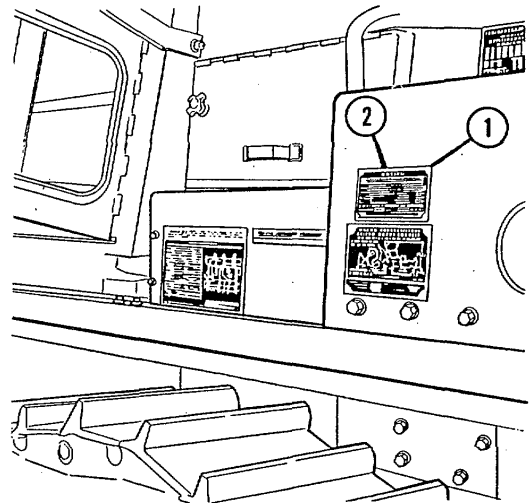
NOTE

This is a general procedure that applies to all data plates on tractor.

- (1) Use a drill bit to remove drive screws (1).
- (2) Remove data plate (2) from tractor.

b. Installation

- (1) Position data plate (2) on tractor.
- (2) Install new drive screws (1).



12-8. SOUND SUPPRESSION PANELS - REPLACE

This task covers:

- a. Removal
 - b. Installation
-

INITIAL SETUP

Applicable Configurations

Tractor with winterized cab

Common Tools

Tool Kit, General Mechanics
NSN 5180-00-699-5273

a. Removal

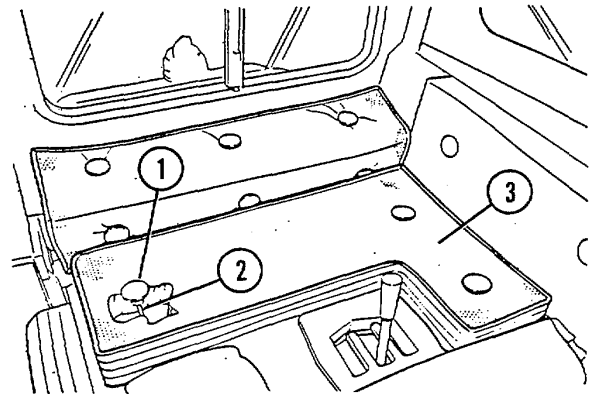
NOTE

This procedure is typical for all panels which are secured to the walls and roof of the operator's station.

- (1) Turn button (1) counterclockwise to unscrew it from mounting stud (2). Repeat for all buttons.
- (2) Lift panel (3) over mounting stud to remove.

b. Installation

- (1) Place panel (3) in position over mounting stud (2).
- (2) Install button (1) on mounting stud (2) to secure panel.



CHAPTER 13

HYDRAULIC SYSTEM MAINTENANCE

13-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the hydraulic system. To find a specific maintenance procedure, see the maintenance task summary below.

13-2. HYDRAULIC SYSTEM MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURES	PAGE NO.
13-3	Hydraulic Pump - Replace	13-2
13-4	Blade Tilt Cylinder - Replace/Adjust	13-6
13-5	Blade Adjustable Brace - Replace/Adjust	13-10
13-6	Ripper Hydraulic Lines and Fittings - Replace	13-12
13-7	Blade Hydraulic Lines and Fittings - Replace	13-16
13-8	Blade Tilt Cylinder Hydraulic Lines and Fittings - Replace	13-19
13-9	Hydraulic Pump Lines and Fittings - Replace	13-23
13-10	Hydraulic Filter Element - Replace	13-27
13-11	Blade Lift Cylinder - Replace/Adjust	13-29
13-12	Hydraulic Tank - Service	13-33

13-3. HYDRAULIC PUMP - REPLACE

This task covers:

- a. Removal
 - b. Installation
 - c. Place In Service
-

INITIAL SETUP

Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654
Lifting Equipment 100 lb.
Chain

Materials/Parts

Seal (6) (12) (18)
Oil OE/HDO-10 (See L05-2410-237-12)
Caps and Plugs
Lint-free Rag (App. D, Item 15)

Equipment Condition

Hydraulic oil tank drained. (page
13-33)
Floor plates removed. (page 10-44)

- a. Removal

WARNING

Hydraulic oil in the system can be under pressures over 2500 psi with the engine and pump OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic systems. With engine OFF and hydraulic attachments on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

13-3. HYDRAULIC PUMP - REPLACE (Cont'd)

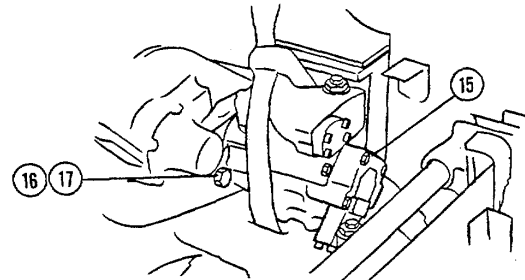
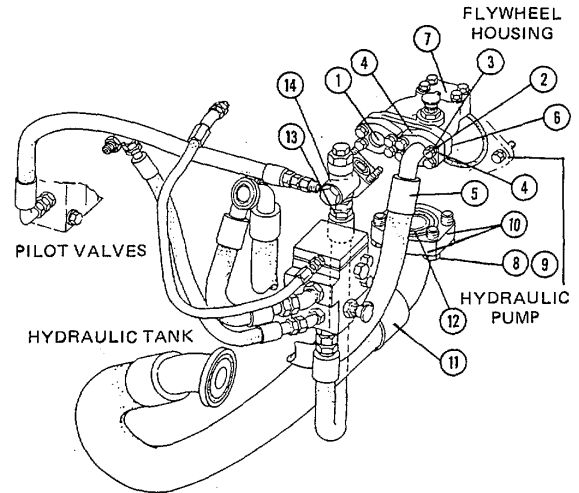
CAUTION

Wipe the area clean around all hydraulic connections to be opened during removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

On tractors with ripper attachments, a second hose is connected into the hydraulic pump manifold in place of cover (1). Follow STEP 1 to remove ripper hose if tractor is so equipped.

- (1) Use a wrench to remove four capscrews (2), four flat washers (3), and split flanges (4).
- Separate hose (5) and seal (6) from manifold (7). Discard seal.
- (2) Use a wrench to remove four capscrews (8), four flat washers (9) and split flanges (10).
- Separate large hose (11) and seal (12) from bottom of hydraulic pump. Discard seal.
- (3) Use a wrench to disconnect hose (13) from underside of elbow (14) on pump.
 - (4) Attach chain and lifting equipment to hydraulic pump assembly (15).
 - (5) Use a wrench to remove two capscrews (16) and two flat washers (17) from pump (15) mounting.
 - (6) Use lifting equipment to remove pump (15) from tractor.



13-3. HYDRAULIC PUMP - REPLACE (Cont'd)

- (7) Remove and discard seal (18) from pump (15).
- b. Installation

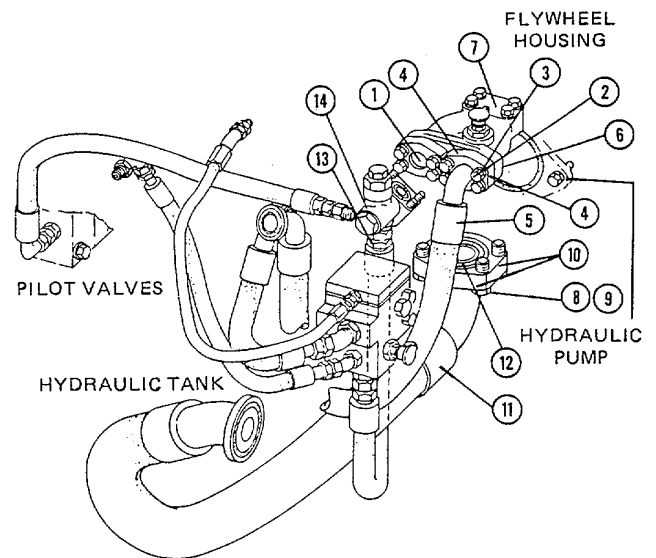
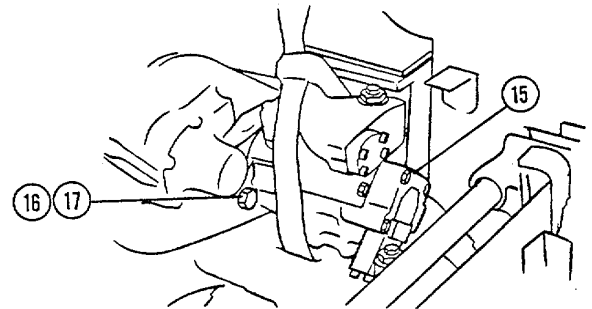
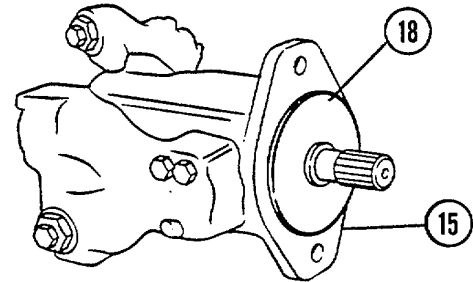
NOTE

Wipe all sealing surfaces and hose connections clean and dry just before assembly. Apply light film of clean hydraulic oil to all seals just before assembly.

- (1) Place seal (18) on pump (15).
- (2) Attach lifting equipment to pump assembly (15) and lift assembly into position in tractor.
- (3) Use a wrench to install pump (15) on flywheel housing with two capscrews (16) and two flat washers (17).
- (4) Remove lifting equipment.
- (5) Use a wrench to install hose (13) on underside of elbow (14).
- (6) Use a wrench to install large hose (11) on bottom of pump (15) with seal (12), two split flanges (10), four capscrews (8) and four flat washers (9).

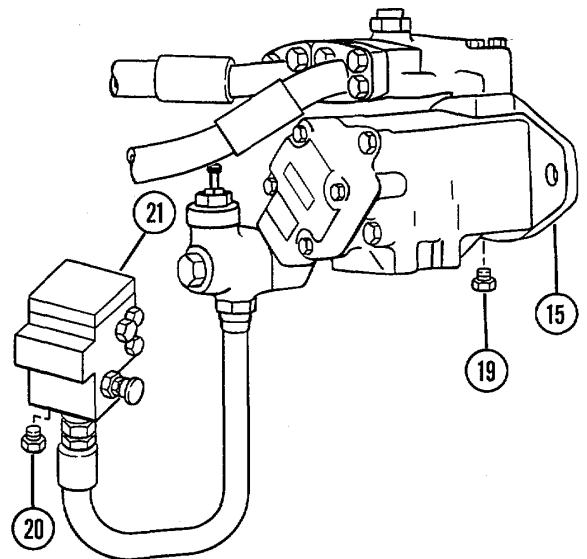
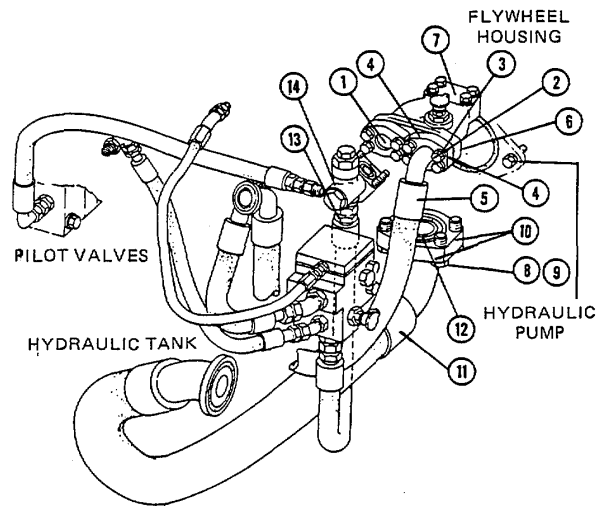
NOTE

On tractors with ripper attachments, a second hose is connected into the hydraulic pump manifold in place of cover (1). Follow procedure in STEP 7 to attach hose.



13-3. HYDRAULIC PUMP - REPLACE (Cont'd)

- (7) Use a wrench to install hose 5) on manifold (7) with seal 6), two split flanges (4), four capscrews (2) and four flat washers (3).
- (8) Install floor plates. See page 1044.
- (9) Fill hydraulic tank to specified capacity. See page 1333.
- (10) Remove plugs (19 and 20) from the tee test taps on pump (15) and valve (21).
- (11) Let the air escape from the suction line and pump.
- (12) Install plugs (19 and 20) as soon as oil starts to run out of holes.
- (13) Check and fill hydraulic tank, if necessary.
 - c. Place In Service Check hydraulic pump for proper operation.



13-4. BLADE TILT CYLINDER - REPLACE/ADJUST

This task covers:

- a. Removal
 - b. Installation
 - c. Adjustment
 - d. Place In Service
-

INITIAL SETUP
Applicable Configurations

All

Personnel Required

MOS62B (2)

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654
Lifting Equipment 200 lb.
(1/2 Ton minimum)
Special Tools
Sling (1/2 Ton minimum) 1U8236

Materials/Parts

Cotter Pin (12)
Seals (9)
Wire I.D. Tags
Suitable drain pan (2 gallon)
Caps and Plugs
Lint-free Rag (App. D, Item 15)
Equipment Condition
Tractor parked on level ground.

- a. Removal

WARNING

Hydraulic oil in the system can be under pressures over 2500 psi (17000kPa) with the engine and pump OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF and hydraulic attachments on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank, by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

13-4. BLADE TILT CYLINDER - REPLACE/ADJUST (Cont'd)

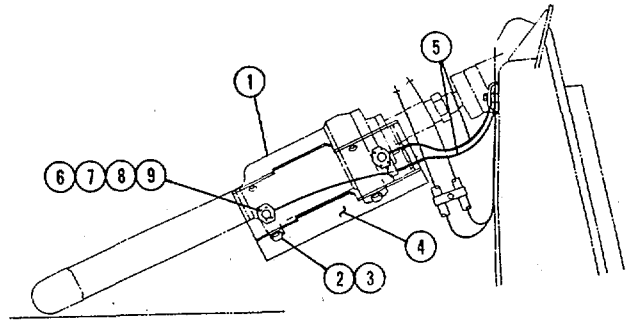
- (1) Use a socket to remove four capscrews (2), four lockwashers (3) and hose guard (4) from tilt cylinder (1).
- (2) Tag two hoses (5).

CAUTION

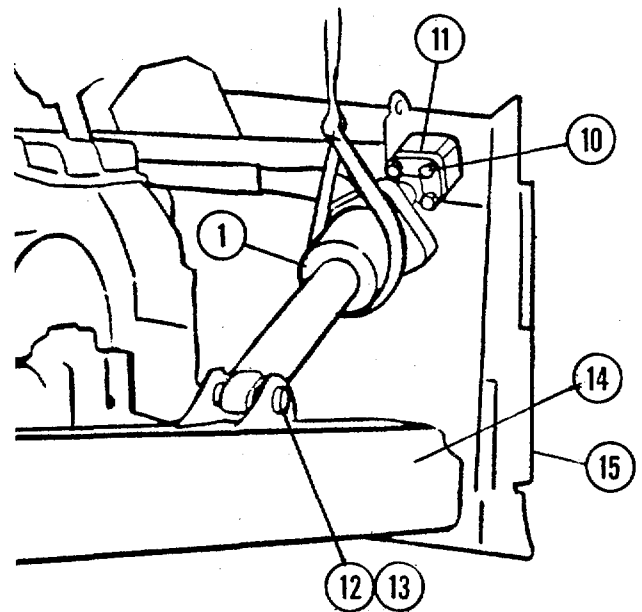
Wipe the area clean around all hydraulic connections to be opened during Removal. Always cap hoses and plug holes after removing hydraulic oil lines. Contamination of hydraulic system could result in premature failure.

NOTE

Use suitable container to catch any hydraulic oil that may drain from system.



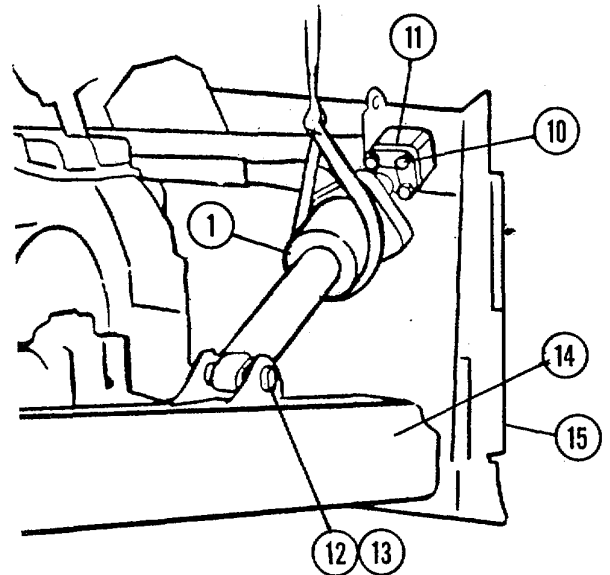
- (3) Use a wrench to remove four capscrews (6), four washers (7), two split clamps (8), seal (9) and one hose (5). Discard seal.
- (4) Using a wrench, repeat STEP 4 for other hose (5).
- (5) Attach lifting equipment to center of tilt cylinder (1).
- (6) Use a socket to remove four capscrews (10) and shims (11) at blade end of cylinder (1).
- (7) Remove cotter pin (12) and use hammer to clear pin (13) at push arm (14) end of cylinder and remove cylinder (1) with lifting equipment. Discard cotter pin (12).



13-4. BLADE TILT CYLINDER - REPLACE/ADJUST (Cont'd)b. Installation**WARNING**

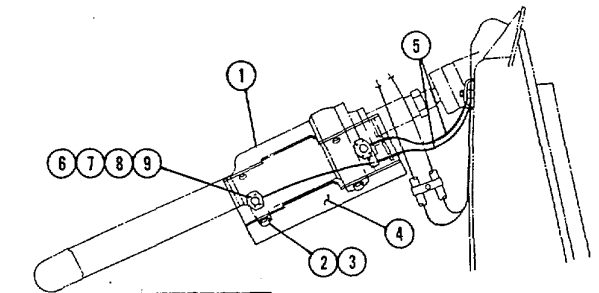
Use lifting equipment to install cylinder. Failure to follow this precaution could result in serious injury.

- (1) Attach lifting equipment to center of tilt cylinder (1) and position cylinder to blade (15) and push arm (14).
- (2) Use a socket to install cylinder (1) on blade (15) with four capscrews (10). Do not install shims (11).

**NOTE**

Push or pull as needed to line up cylinder with push arm.

- (3) Install cylinder (1) on push arm (14) with pin (13) and new cotter pin (12). Adjust cylinder with shims (11). See c. Adjustment.
- (4) Use a wrench to remove cap and install hose (5) with new seal (9), two split clamps (8), four capscrews (6) and four washers (7).
- (5) Using a wrench, repeat STEP 4 for other hose (5). Remove tags.
- (6) Use a socket to install hose guard (4) on cylinder (1) with four capscrews (2) and four lockwasher (3).
- (7) Make sure enough slack exists in hoses to permit rod extension.



13-4. BLADE TILT CYLINDER - REPLACE/ADJUST (Cont'd)

- (8) Start engine and check for leaks.
- (9) Check oil level in hydraulic oil tank and if necessary, add oil. See page 13-33.

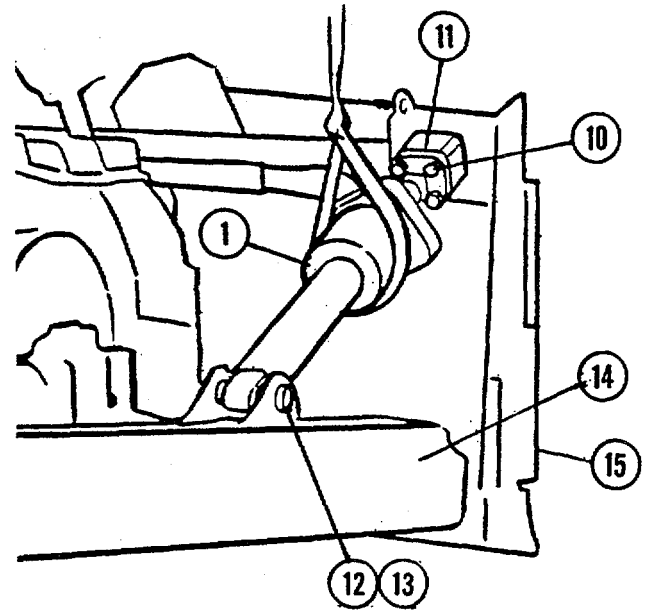
c. Adjustment**WARNING**

Use lifting equipment to hold cylinder during Adjustment. Failure to follow this precaution could result in personal injury.

NOTE

All shims (11) must be removed before Adjustment is made.

- (1) Measure the clearance between the cylinder (1) and the blade (15) with shims (11).
- (2) Remove capscrews (10) and install shims (11) equal in thickness to the measured clearance plus one. Reinstall capscrews (10).

d. Place In Service

Check blade tilt for proper operation.

13-5. BULLDOZER ADJUSTABLE BRACE - REPLACE/ADJUST

This task covers:

- a. Removal
 - b. Cleaning
 - c. Installation
 - d. Adjustment
 - e. Place In Service
-

INITIAL SETUPApplicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance and Repair,
Common #1 Less Power
NSN 4910-00-754-0654
Lifting Equipment 500 lb.

Materials/Parts

Shims (5)
Cleaning Solvent (App D, Item 19)
Cotter Pin (6)

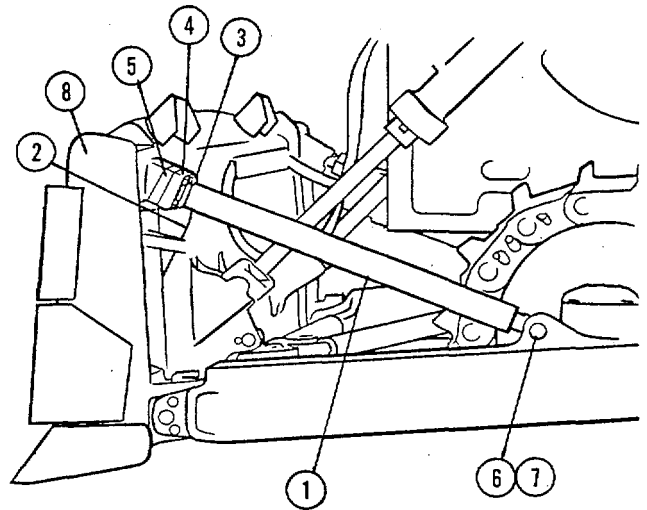
Equipment Condition

Tractor parked on level ground.

a. Removal**NOTE**

Turn brace handle as needed so that it easily slides through handle stop loop on back of blade.

- (1) Attach lifting equipment to rear of brace (1) near push arm pin (7).
- (2) Remove cotter pin (6) and tap pin (7) out with a drift pin and hammer. Discard cotter pin (6).
- (3) Move lifting equipment to front of brace (1) just behind handle (2).
- (4) Loosen four capscrews (3) and separate cap (4) and shims (5) from blade (8). Turn brace (1) as needed to remove capscrews (3).



13-5. BULLDOZER ADJUSTABLE BRACE - REPLACE/ADJUST (Cont'd)

(5) Remove brace (1).

b. Cleaning

Use solvent to clean grease from ball and cap (4) at blade end of brace (1) and socket in blade (8). Clean shims (5). See page 2-156.

c. Installation

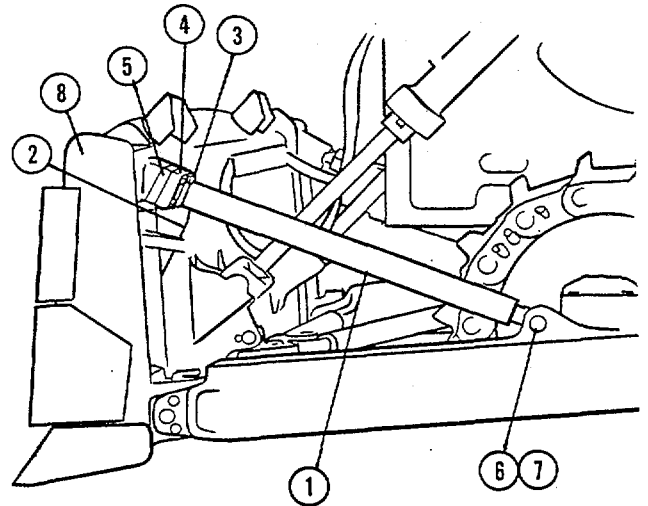
Use lifting equipment to put brace (1) in position, and install pin (7). Secure pin (7) with new cotter pin (6).

d. Adjustment

- (1) Lengthen brace. Install cap (4) on blade with four capscrews (3), but without shims (5) and tighten capscrews (3) evenly.
- (2) Measure distance between cap (4) and socket on blade (8) with as many shims (5) as necessary to fill gap.
- (3) Remove four capscrews (3) and shorten brace (1). Install the shims (5) required in STEP 4 plus add one shim.
- (4) Lengthen brace (1) and install four capscrews (3).
- (5) Lubricate ball and socket. Refer to L05-2410-237-12.

e. Place In Service

Check blade for proper operation.



13-6. RIPPER HYDRAULIC LINES AND FITTINGS - REPLACE

This task covers:

- a. Removal
 - b. Installation
 - c. Place In Service
-

INITIAL SETUPApplicable Configurations

Tractor with ripper

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

Materials/Parts

Seal (5)___(8)
Caps and Plugs
Lint-free Rag (App._D, Item 15)
Oil Pan
Hydraulic Oil OE/HDO-10 (See
L05-2410-237-12)

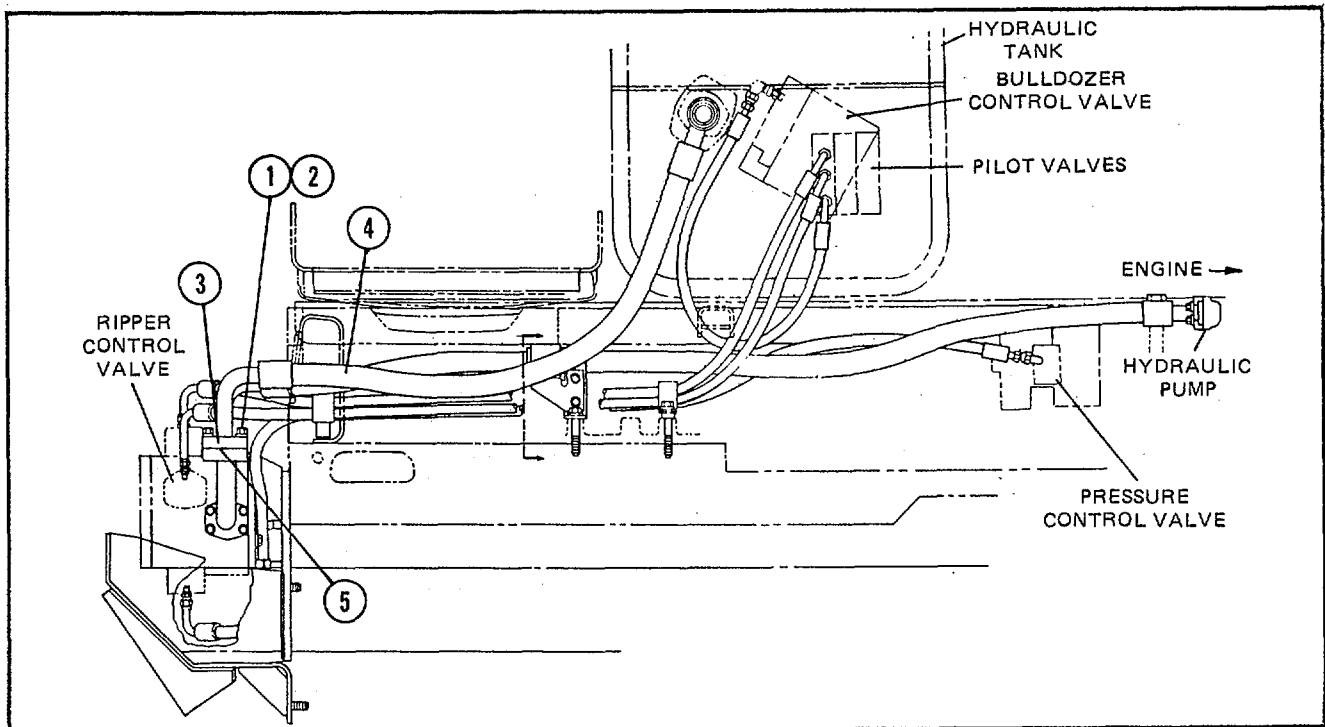
Equipment Condition

Hydraulic system cool.

a. Removal**WARNING**

Hydraulic oil in the system can be under pressure over 2500 psi (17000OkPa) with the engine and pump OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF and hydraulic attachments on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

13-6. RIPPER HYDRAULIC LINES AND FITTINGS - REPLACE (Cont'd)

**CAUTION**

Wipe the area clean around all hydraulic connections to be opened during Removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper Installation. Use suitable container to catch any hydraulic oil that may drain from the system.

- (1) For hydraulic lines with split or regular flange fittings: Use a proper size wrench to remove four capscrews (1), four washers (2), two split flanges or regular flange (3), line (4) and seal (5). Discard seal.

13-6. RIPPER HYDRAULIC LINES AND FITTINGS - REPLACE (Cont'd)

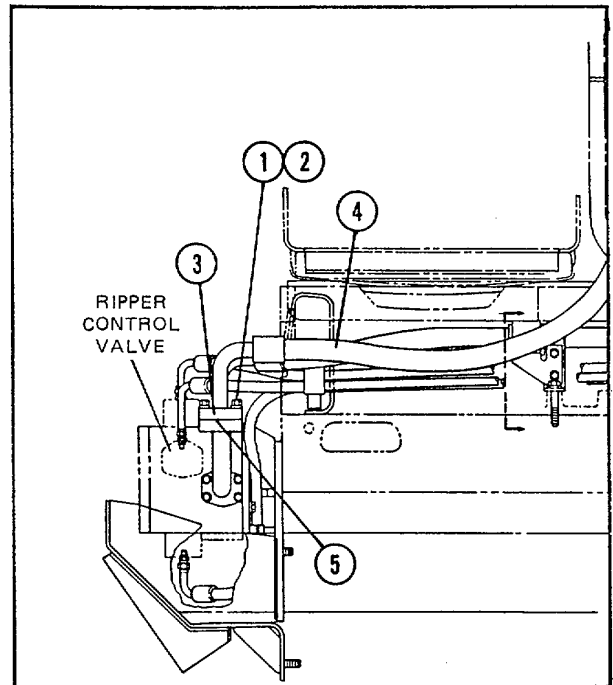
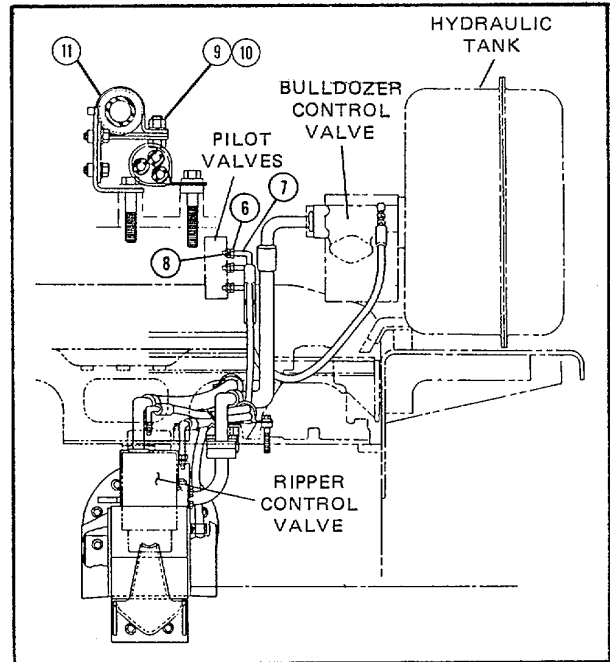
- (2) For hydraulic lines with connector fittings, use a wrench to loosen connector (6) and remove line (7) from connection. Remove seal (8) from connector (6) and discard seal.
- (3) For lines held in position with clamps, use a proper size wrench to remove capscrew (9), washer (10) and clamp (11) from lines.

b. Installation

CAUTION

Remove caps from lines and remove plugs from holes as Installations are made. Wipe all line ends, line fittings and mounting surfaces clean. Apply light film of clean hydraulic oil to all seals as they are installed. Contamination of hydraulic system could result in premature failure.

- (1) For hydraulic lines with flange fittings, use a proper size wrench to install end of line (4) with seal (5), two split flanges (3), four capscrews (1) and four washers (2). Remove identification tag if necessary.
- (2) For hydraulic line with connector fittings, install seal (8) on connector (6). Use a proper size wrench to install connector (6) end of line (7) at proper location. Remove identification tags if necessary.
- (3) For lines held in position with clamp, use proper size wrench to install clamp (11) on line or lines with capscrew (9) and washer (10). Remove identification tags if necessary.



13-6. RIPPER HYDRAULIC LINES AND FITTINGS - REPLACE (Cont'd)

(4) Check oil level in hydraulic tank and if necessary, add oil. See page 13-33.

c. Place In Service

- (1) Start engine and cycle cylinders. Stop engine and reposition fittings if lines pull tight.
- (2) Start engine and cycle cylinders. Check that oil stays in sight gage on hydraulic tank.
- (3) Check ripper for proper operation.

13-7. BLADE HYDRAULIC LINES AND FITTINGS - REPLACE

This task covers:

- a. Removal
 - b. Installation
 - c. Place In Service
-

INITIAL SETUP

Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

Materials/Parts

Seal (5)
Drain Pan (2 gallon)
Caps and Plugs
Lint-free Rag (App. D, Item 15)
Hydraulic Oil OE/HDO-10 (See
L05-2410-237-12)

Equipment Condition

Hydraulic system cool.

a. Removal

WARNING

Hydraulic oil in the system can be under pressure over 2500 psi (17000kPa) with the engine and pump OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF and hydraulic attachments on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

13-7. BLADE HYDRAULIC LINES AND FITTINGS - REPLACE (Cont'd)

CAUTION

Wipe the area clean around all hydraulic connections to be opened during Removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper Installation. Use suitable container to catch any hydraulic oil that may drain from the system.

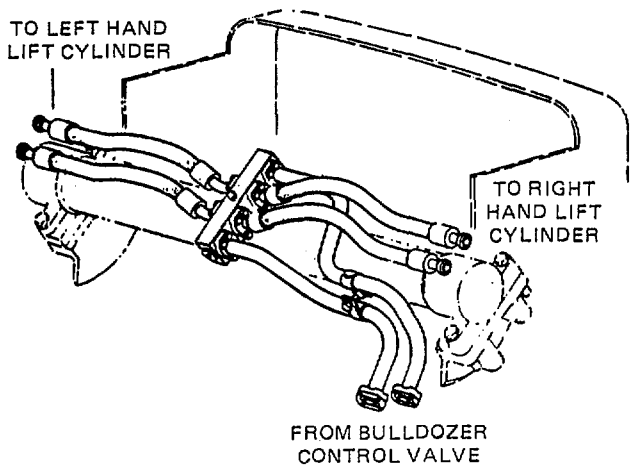
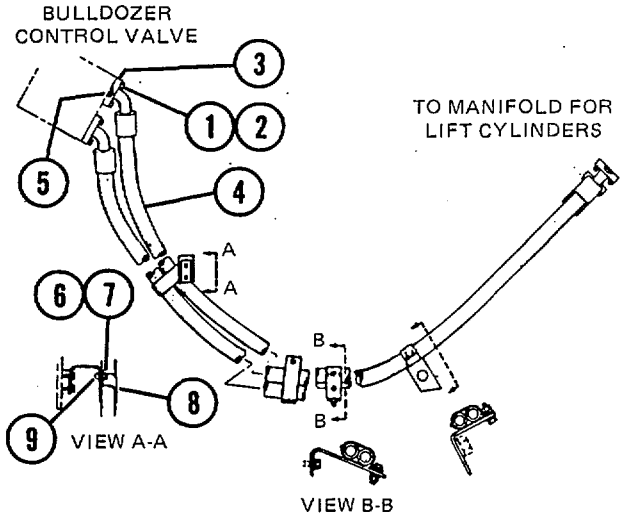
(1) For hydraulic lines with split or regular flange fittings: Use a proper size wrench to remove four capscrews (1), four washers (2), two split flanges or regular flange (3), line (4) and seal (5). Discard seal.

(2) For lines held in position with clamps, use a proper size wrench to remove capscrew (6), washer (7), clamp (8) and nut (9), if present.

b. Installation

CAUTION

Remove caps from lines and remove plugs from holes as Installations are made. Wipe all line ends, line fittings and mounting surfaces clean. Apply light film of clean hydraulic oil to all seals as they are installed. Contamination of hydraulic system could result in premature failure.

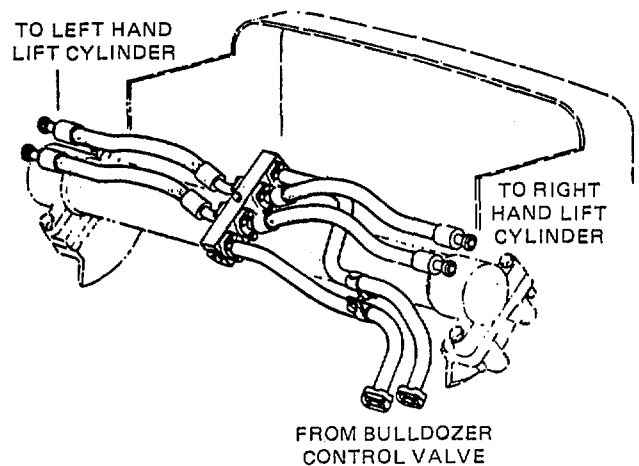
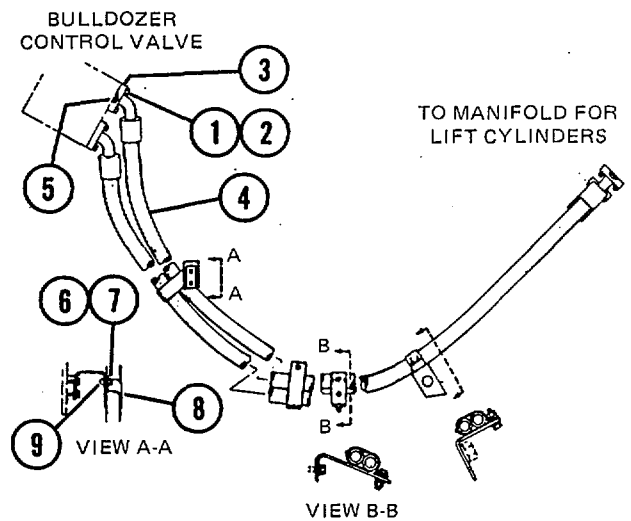


13-7. BLADE HYDRAULIC LINES AND FITTINGS - REPLACE (Cont'd)

- (1) For hydraulic lines with flange fittings, use a proper size wrench to install end of line (4) with seal (5), two split flanges (3), four capscrews (1) and four washers (2). Remove identification tag if necessary.
- (2) For lines held in position with clamp, use proper size wrench to install clamp (8) on line or lines with capscrew (6), washer (7) and nut (8). Remove identification tags if necessary.
- (3) Check oil level in hydraulic tank and if necessary, add oil. See page 13-33.

c. Place In Service

- (1) Start engine and cycle cylinders. Reposition fittings if lines pull tight.
- (2) Ensure that oil stays in sight glass on hydraulic tank.
- (3) Check blade for proper operation.



13-8. BLADE TILT CYLINDER HYDRAULIC LINES AND FITTINGS - REPLACE

This task covers:

- a. Removal
 - b. Installation
 - c. Place In Service
-

INITIAL SETUP
Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

Equipment Condition

Hydraulic system cool.

Materials/Parts

Seal (5) (8)
Drain Pan (2 gallon)
Caps and Plugs
Lint-free Rag (App. D, Item 15)
Hydraulic Oil OE/HDO-10 (See
L05-2410-237-12)

a. Removal
WARNING

Hydraulic oil in the system can be under pressure over 2500 psi (17000kPa) with the engine and pump OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF and hydraulic attachments on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

13-8. BLADE TILT CYLINDER HYDRAULIC LINES AND FITTINGS - REPLACE (Cont'd)

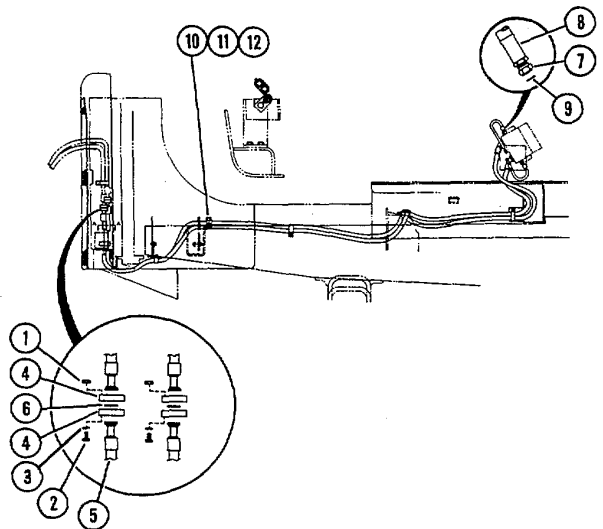
CAUTION

Wipe the area clean around all hydraulic connections to be opened during Removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper Installation. Use suitable container to catch any hydraulic oil that may drain from the system.

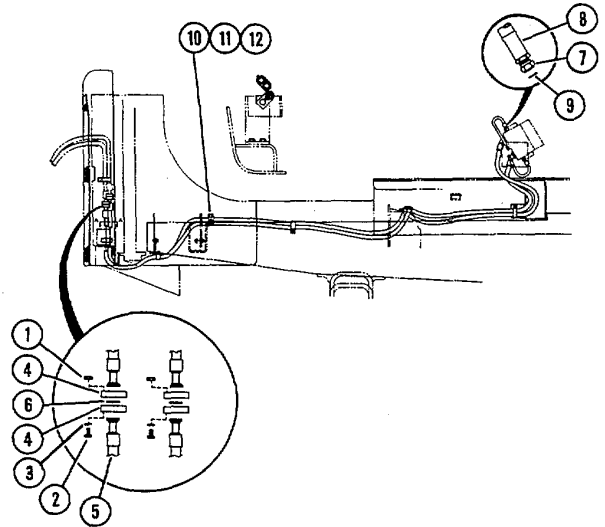
- c. (1) For hydraulic lines with split or regular flange fittings: Use a proper size wrench to remove four nuts (1), four capscrews (2), four washers (3), two split flanges or regular flange (4), line (5) and seal (6). Discard seal.
- (2) For hydraulic lines with connector fittings, use a wrench to loosen connector (7) and remove line (8) from connection. Remove seal (9) from connector (7) and discard seal.
- (3) For lines held in position with clamps, use a proper size wrench to remove capscrew (10), washer (11) and clamp (12) from lines.



13-8. BLADE TILT CYLINDER HYDRAULIC LINES AND FITTINGS - REPLACE (Cont'd)**b. Installation****CAUTION**

Remove caps from lines and remove plugs from holes as Installations are made. Wipe all line ends, line fittings and mounting surfaces clean. Apply light film of clean hydraulic oil to all seals as they are installed. Contamination of hydraulic system could result in premature failure.

- (1) For hydraulic lines with flange fittings, use a proper size wrench to install end of line (5) with seal (6), two split flanges (4), four capscrews (2), four washers (3) and four nuts (1). Remove identification tag if necessary.
- (2) For hydraulic line with connector fittings, install seal (9) on connector (7). Use a proper size wrench to install connector (7) end of line (8) at proper location. Remove identification tags if necessary.
- (3) For lines held in position with clamp, use proper size wrench to install clamp (12) on line or lines with capscrew (10) and washer (11). Remove identification tags if necessary.
- (4) Check oil level in hydraulic tank and if necessary, add oil. See page 13-33.

**c. Place In Service**

- (1) Start engine and cycle cylinders. Stop engine and reposition fittings if lines pull tight.

13-8. BLADE TILT CYLINDER HYDRAULIC LINES AND FITTINGS - REPLACE (Cont'd)

- (2) Start engine and cycle cylinders. Ensure that oil stays in sight glass on hydraulic tank.
- (3) Check blade for proper operation.

13-9. HYDRAULIC PUMP LINES AND FITTINGS - REPLACE

This task covers:

- a. Removal
 - b. Installation
 - c. Place In Service
-

INITIAL SETUPApplicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

Materials/Parts

Seal (5) (8)
Drain Pan (2 gallon)
Caps and Plugs
Lint-free Rag (App_D, Item 15)
Hydraulic Oil OE/HDO-10 (See
L05-2410-237-12)

Equipment Condition

Hydraulic tank drained. (page 13-33)

a. Removal**WARNING**

Hydraulic oil in the system can be under pressure over 2500 psi (17000kPA) with the engine and pump OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF and hydraulic attachments on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

13-9. HYDRAULIC PUMP LINES AND FITTINGS - REPLACE (Cont'd)

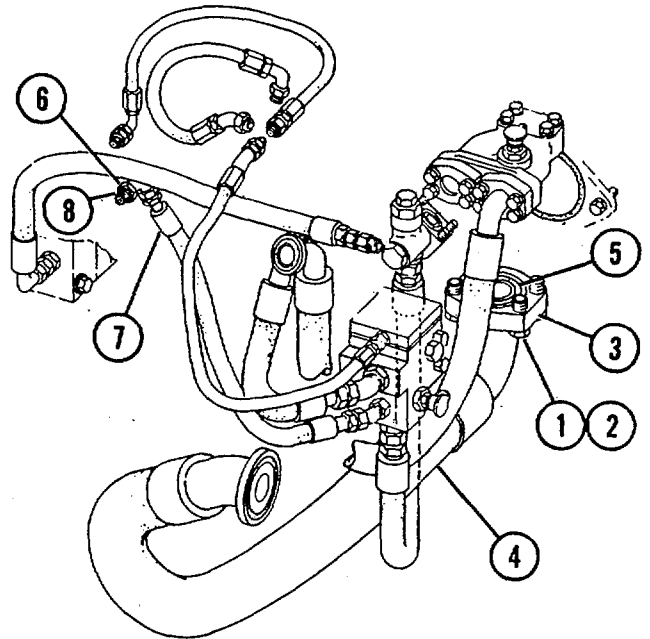
CAUTION

Wipe the area clean around all hydraulic connections to be opened during Removal and disassembly. Cap oil lines and plug holes after removing lines. Contamination of the hydraulic system could result in premature failure.

NOTE

If more than one hydraulic line is to be removed, identify lines to assure proper Installation. Use suitable container to catch any hydraulic oil that may drain from the system.

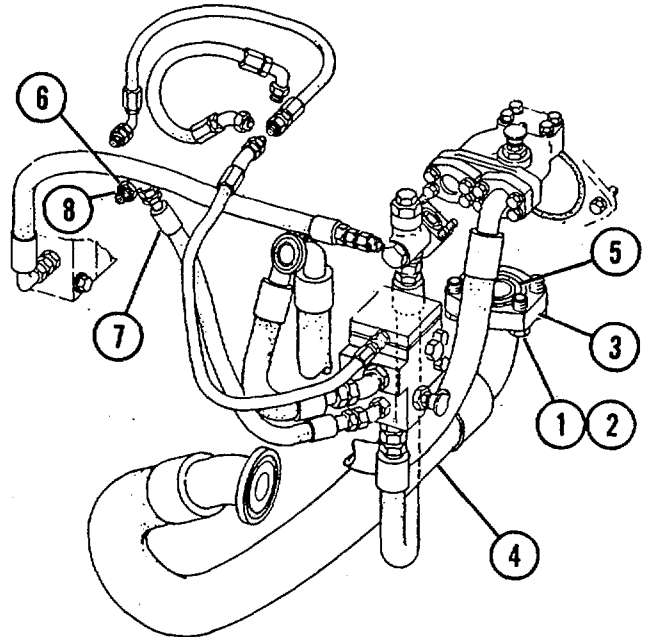
- (1) For hydraulic lines with split or regular flange fittings: Use a proper size wrench to remove four capscrews (1), four washers (2), two split flanges or regular flange (3), line (4) and seal (5). Discard seal.
- (2) For hydraulic lines with connector fittings, use a wrench to loosen connector (6) and remove line (7) from connection. Remove seal (8) from connector (6) and discard seal.



13-9. HYDRAULIC PUMP LINES AND FITTINGS - REPLACE (Cont'd)**b. Installation****CAUTION**

Remove caps from lines and remove plugs from holes as Installations are made. Wipe all line ends, line fittings and mounting surfaces clean. Apply light film of clean hydraulic oil to all seals as they are installed. Contamination of hydraulic system could result in premature failure.

- (1) For hydraulic lines with flange fittings, use a proper size wrench to install end of line (4) with seal (5), two split flanges (3), four capscrews (1) and four washers (2). Remove identification tag if necessary.
- (2) For hydraulic line with connector fittings, install seal (8) on connector (6). Use a proper size wrench to install connector (6) end of line (7) at proper location. Remove identification tags if necessary.
- (3) Fill hydraulic tank with oil. See page 13-33.

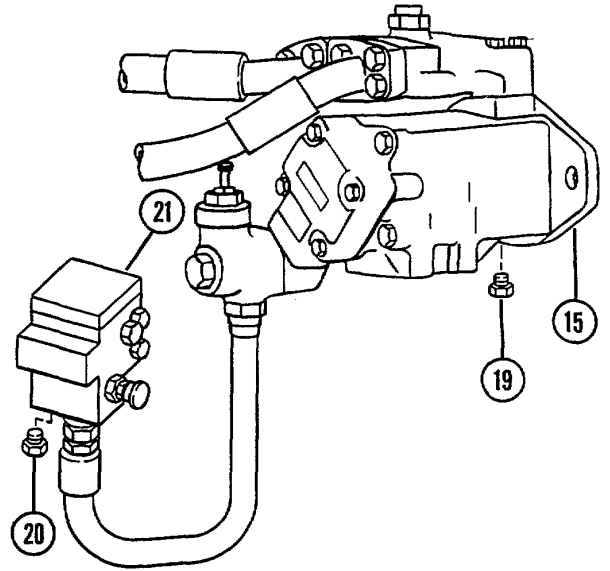


13-9. HYDRAULIC PUMP LINES AND FITTINGS - REPLACE (Cont'd)

- (4) Remove plugs (9 and 10) from the tee test taps on pump (11) and pressure control valve (12).
- (5) Let the air escape from the suction line and pump.
- (6) Replace plugs (9 and 10) as soon as the oil starts to run out of the holes.
- (7) Check and fill hydraulic tank, if necessary.

c. Place In Service

Check hydraulic system for proper operation.



13-10. HYDRAULIC FILTER ELEMENT - REPLACE

This task covers:

- a. Removal of Element and Screen Assembly
- b. Installation of Element and Screen Assembly

INITIAL SETUPApplicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-745-0654

Materials/Parts

Preformed packing (9) (10)
Element (7)

Equipment Condition

Hydraulic oil cool.

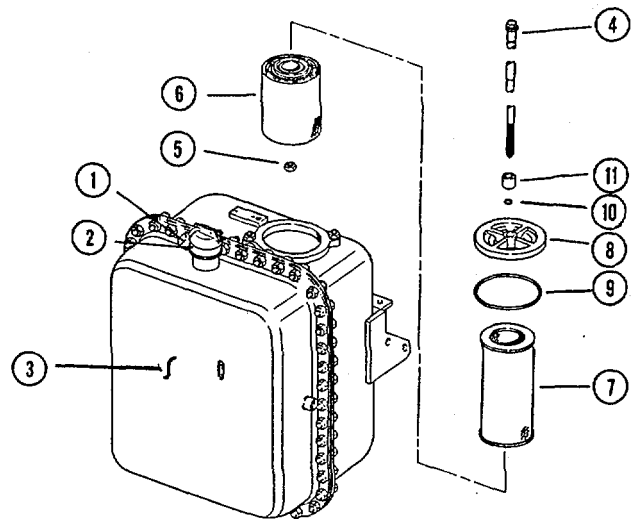
a. Removal of Element and Screen Assembly

- (1) Unlock and remove padlock (1) and loosen fill cap (2) to relieve pressure in hydraulic tank (3).
- (2) Use wrench to loosen capscrews (4) and remove filter assembly from hydraulic tank (3).
- (3) Use a wrench to remove retaining nut (5) from capscrew (4).

WARNING

Do not attempt to disassemble the screen assembly. The screen assembly is assembled under high spring tension and disassembly without the proper tools may cause severe injury.

- (4) Remove screen assembly (6) from capscrew (4).

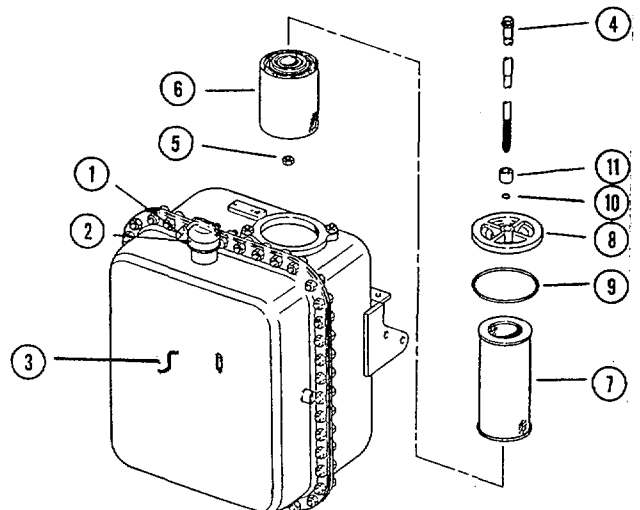


13-10. HYDRAULIC FILTER ELEMENT - REPLACE (Cont'c)

- (5) Separate filter element (7) from cover (8). Discard filter element.
- (6) Slide cover (8) off capscrew (4).
- (7) Remove preformed packing (9) from cover (8). Discard preformed packing.
- (8) Remove preformed packing (10) and spacer (11) from capscrew (4). Discard preformed packing (10).

b. Installation of Element and Screen Assembly

- (1) Install spacer (11) and preformed packing (10) on capscrew (4).
- (2) Install preformed packing (9) on cover (8).
- (3) Install cover (8) on capscrew (4).
- (4) Slide filter element (7) over capscrew (4) to mate with cover (8).
- (5) Install screen assembly (6) on capscrew (4).
- (6) Install retaining nut (5) on capscrew (4).
- (7) Install filter assembly in hydraulic tank (3) and use a wrench to tighten capscrew (4).
- (8) Check oil level in sight gage on hydraulic tank (3) and add oil as required. For oil grade and fill specifications see lube order LO 5-2410-237-12.
- (9) Tighten fill cap (2) on hydraulic tank (3) and install and lock (1).



13-11. BLADE LIFT CYLINDER - REPLACE/ADJUST

This task covers:

- a. Removal
- b. Installation
- c. Adjustment

INITIAL SETUP
Applicable Configurations

Tractor with blade assembly

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654
Lifting Equipment 300 lb.

Materials/Parts

Seals (6)
Caps and Plugs
Drip Pan
Cable Puller

Equipment Condition

Hydraulic system cool.

a. Removal

WARNING

Hydraulic oil in the system can be under pressure over 2500 psi (17000kPa) with the engine and pump OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF and hydraulic attachments on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

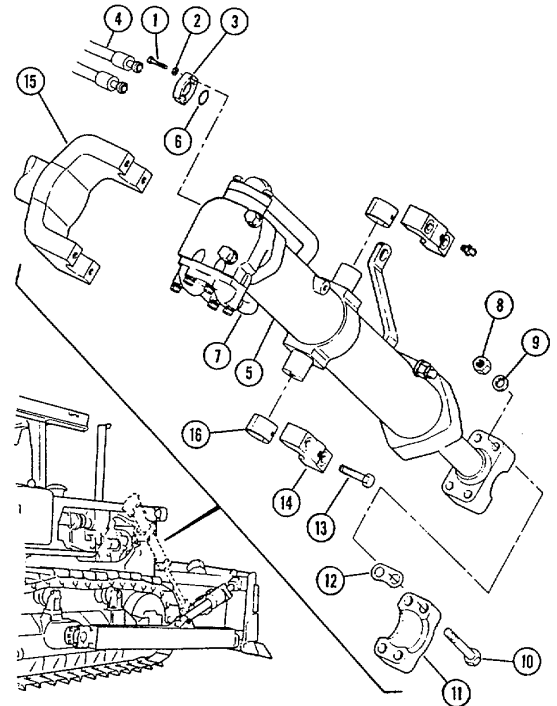
13-11. BLADE LIFT CYLINDER - REPLACE/ADJUST (Cont'd)**WARNING**

Park tractor on level ground. With blade on ground, move control lever back and forth to relieve pressure in hydraulic lines. Use sling and hoist to remove cylinders. Failure to follow these precautions could result in serious injury.

NOTE

Mark all hoses to make installation easier. Put a container under hoses to handle leakage.

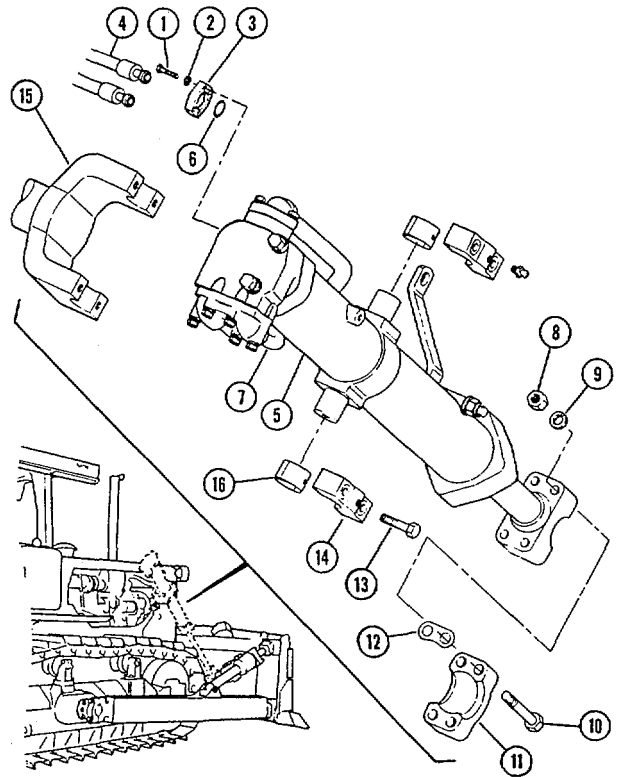
- (1) Use a wrench to remove four capscrews (1), four washers (2), split flange (3), seal (6), and hose (4) from lift cylinder (5). Discard seal (6).
- (2) Cap hose (4), and plug pipe (7).
- (3) Repeat STEPS 1 and 2 for other hose.
- (4) Use a wrench to remove four nuts (8), four lockwashers (9), four capscrews (10), cap (11), and shims (12). Retract cylinder.
- (5) Attach lifting equipment to upper part of cylinder.
- (6) Use a wrench to remove four capscrews (13), two caps (14) and with lifting equipment, lift cylinder from cylinder mount (15).
- (7) Remove two bearings (16) from cylinder pivot.



13-11. BLADE LIFT CYLINDER - REPLACE/ADJUST (Cont'd)b. Installation**WARNING**

Use lifting equipment to install cylinder. Failure to follow this precaution could result in serious injury.

- (1) Install two bearings (16) on cylinder pivot.
- (2) Attach lifting equipment to upper part of lift cylinder (5) and position cylinder pivot to cylinder mount (15).
- (3) Place two caps (14) in position and install four capscrews (13) to secure cylinder in mount (15).
- (4) Extend cylinder until contact is made with blade mounting bracket. Use a wrench to install four capscrews (10), cap (11), four lockwashers (9) and four nuts (8). Do not install shims (12).
- (5) Remove cap from hose (4) and plug from pipe (7).
- (6) Install hose (4) on pipe (7) with new seal (6), split flange (3), four capscrews (1) and four washers (2). Do the Adjustment in c. Adjustment.
- (7) Repeat STEPS 5 and 6 for other hose.
- (8) Start engine and check for proper operation.
- (9) Check oil level in hydraulic oil tank and if necessary, add oil. See page 13-33.



13-11. BLADE LIFT CYLINDER - REPLACE/ADJUST (Cont'd)

c. Adjustment

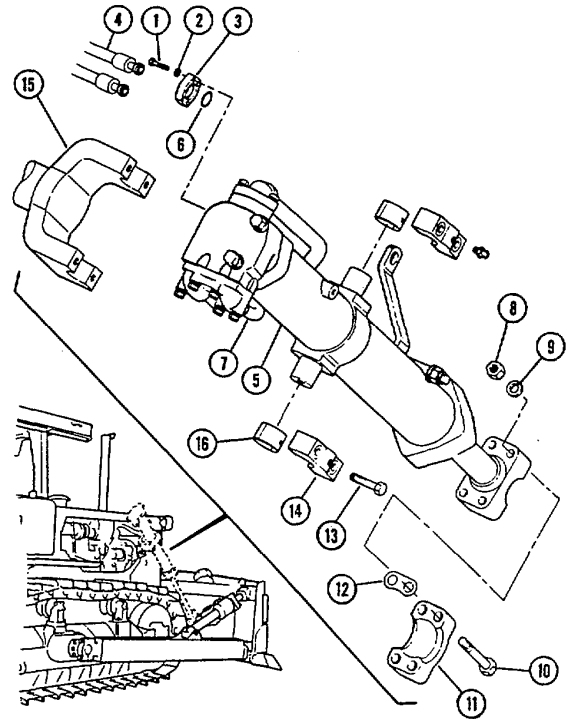
NOTE

All shims must be removed before Adjustment.

- (1) Measure clearance between two halves (11 and 17) with shims (12).
- (2) Remove cap (11) and install shims (12) equal to the measured clearance plus one. Reinstall cap (11).

d. Place In Service

Check blade for proper operation.



13-12. HYDRAULIC TANK - SERVICE**This task covers:**

Changing Oil

INITIAL SETUP:Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654

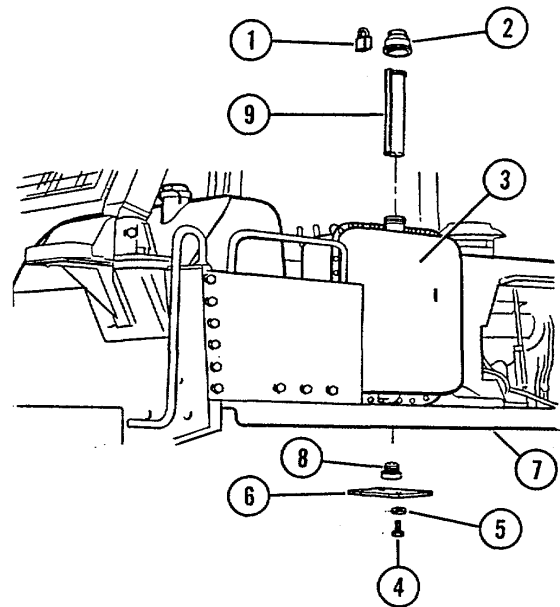
Materials/Parts

Drain Pan (21 to 25 gallon capacity)
Hydraulic Oil OE/HDO-10 (See
L05-24410-237-12)
Cleaning Solvent (App. D, Item 19)

Changing Oil**WARNING**

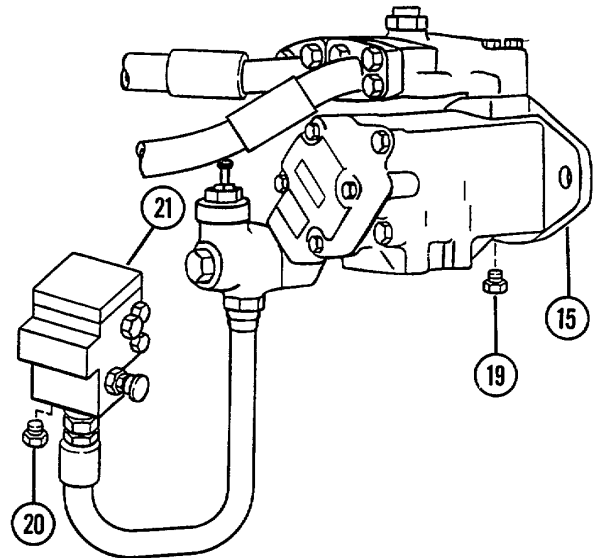
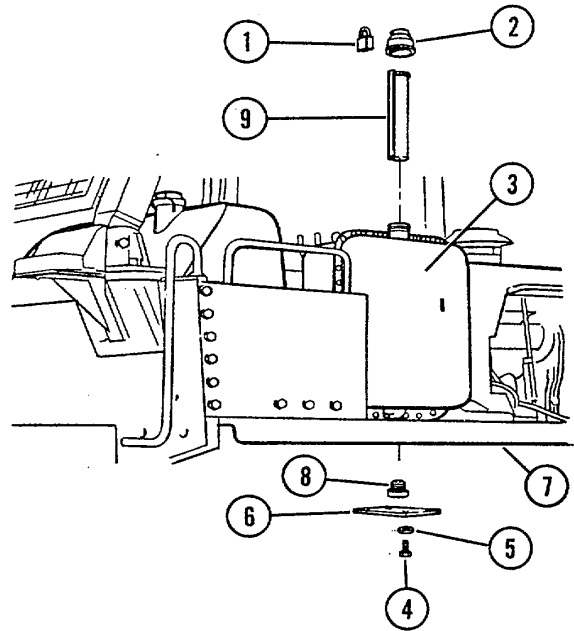
Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow this precaution could result in serious personal injury.

- (1) Remove padlock (1) from filler cap (2). Remove filler cap (2) from hydraulic tank (3).
- (2) Use a wrench to remove four capscrews (4), four flat washers (5), and plate (6) located under fender (7).
- (3) Use a square wrench to remove drain plug (8) at bottom of tank (3).



13-12. HYDRAULIC TANK - SERVICE (Cont'd)

- (4) Insert a 1" pipe nipple that is located in tractor tool box, into drain to relieve check valve. Position drain tray under fender at drain hole. Allow oil to drain into a suitable container.
- (5) Remove filler strainer (9). Wash strainer in solvent and reinstall in filler neck of tank (3).
- (6) Remove pipe nipple and install drain plug (8) using a wrench.
- (7) Change filter element. See page 13-27.
- (8) Move plate (6) into position and secure with four washers (5) and four capscrews (4). Tighten capscrews with a wrench.
- (9) Add oil to tank until it is visible in the sight gage. Capacity is approximately 21 gallons. See L05-2410-237-10 for type of oil.
- (10) Remove plugs (10 and 11) from the tee test taps on pump (12) and pressure control valve (13).
- (11) Let air escape and replace plugs as soon as oil starts to run out.
- (12) Check and fill tank, if necessary.
- (13) Install cap (2) on hydraulic tank (3). Lock in place with padlock (1).



CHAPTER 14

GAGES (NON-ELECTRICAL) MAINTENANCE

14-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the gages (non-electrical). To find a specific maintenance procedure, see the maintenance task summary below.

14-2. GAGES (NON-ELECTRICAL) MAINTENANCE TASK SUMMARY

TASK PARA	PROCEDURES	PAGE NO.
14-3	Tachometer Drive - Replace	14-2
14-4	Engine Oil Pressure Gage - Replace	14-4
14-5	Fuel Pressure Gage - Replace	14-7
14-6	Air Filter Indicator - Replace	14-9

14-3. TACHOMETER DRIVE - REPLACE**This task covers:**

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP:Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance and Repair, Common #1
Less Power NSN 4910-00-754-0654

Materials/Parts

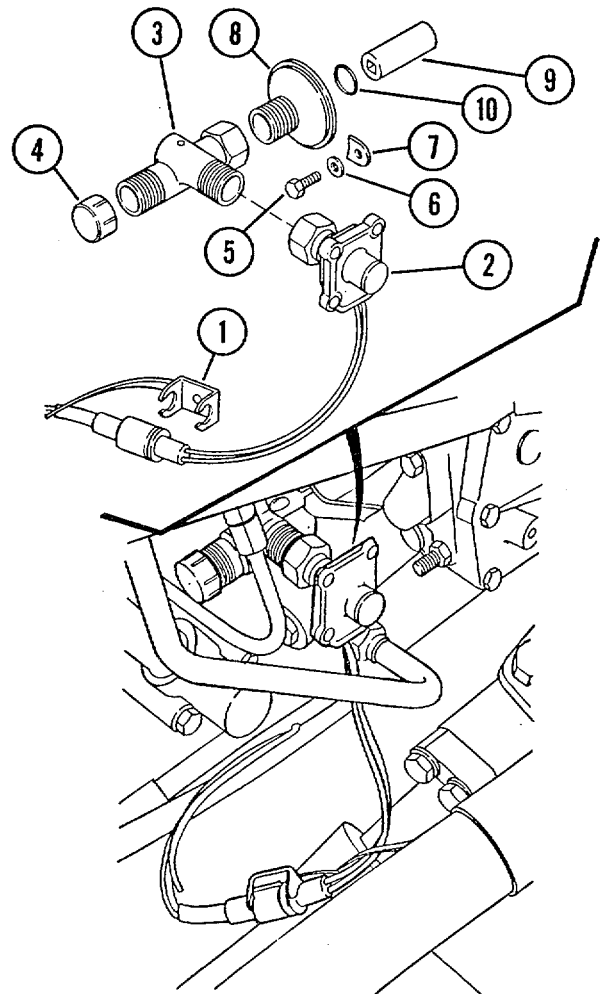
Seal (10)

Equipment Condition

Engine cool.
Battery disconnect switch OFF.

a. Removal

- (1) Remove clip (1) from wire connection. Disconnect wires. Use a wrench to remove pulse tachometer (2).
- (2) Use a wrench to remove dual drive tachometer adapter (3). If required, remove protective cap (4) from dual drive tachometer adapter.
- (3) Use a wrench to remove two capscrews (5), two flat washers (6) and two clamps (7) that hold adapter assembly (8) to governor. Slide adapter off coupling (9) and remove seal (10) from adapter (8). Discard seal (10).
- (4) Slide coupling (9) off cable from governor.

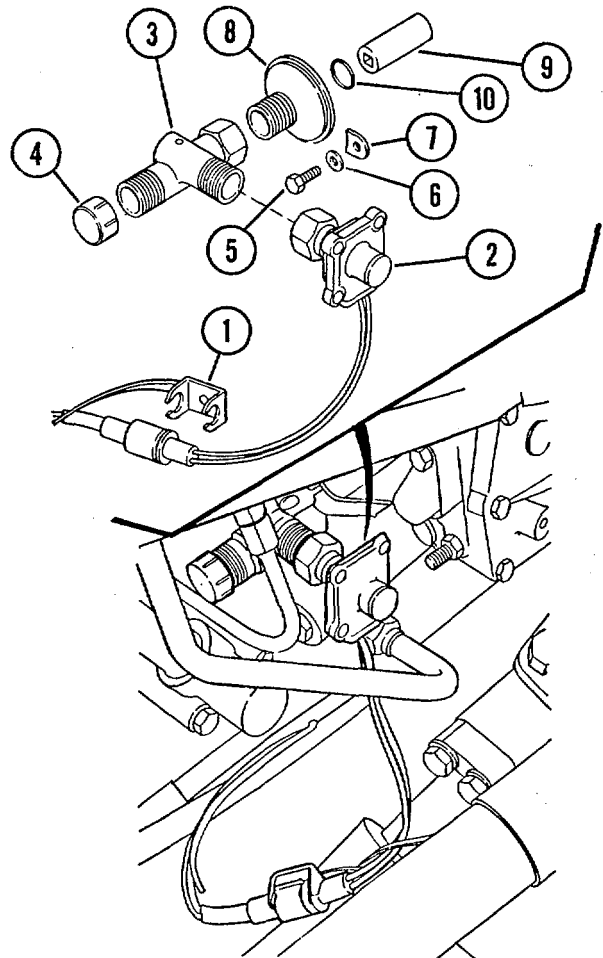


14-3. TACHOMETER DRIVE - REPLACE (Cont'd)**b. Installation**

- (1) Slide coupling (9) on cable at governor.
- (2) Install seal (10) on adapter (8). Slide adapter (8) over coupling (9) and use a wrench to install two clamps (7), flat washers (6), and capscrews (5).
- (3) If removed, install protective cap (4) on dual drive tachometer adapter (3). Use a wrench to install dual drive tachometer adapter (3).
- (4) Install pulse tachometer (2) to angle drive end of dual drive tachometer adapter. Tighten with a wrench.
- (5) Connect pulse tachometer wire to STE-ICE connection. Secure connection with clip (1).

c. Place In Service

Check tachometer for proper operation.



14-4. ENGINE OIL PRESSURE GAGE - REPLACE

This task covers:

- a. Removal
 - b. Installation
 - c. Place In Service
-

INITIAL SETUP:Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance and Repair,
Common #1 Less Power
NSN 4910-00-754-0654

Materials/Parts

Teflon tape
Caps and plugs
Seal (15)

Equipment Condition

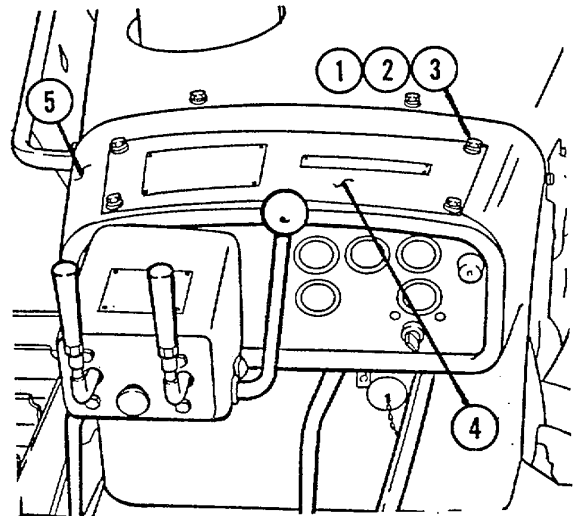
Engine cool.
Disconnect switch OFF.

WARNING

Turn battery disconnect switch OFF before working in dash assembly to avoid personal injury.

a. Removal

- (1) Use a wrench to remove four capscrews (1), four washers (2), four lockwashers (3) and cover (4) from top of dash assembly (5).



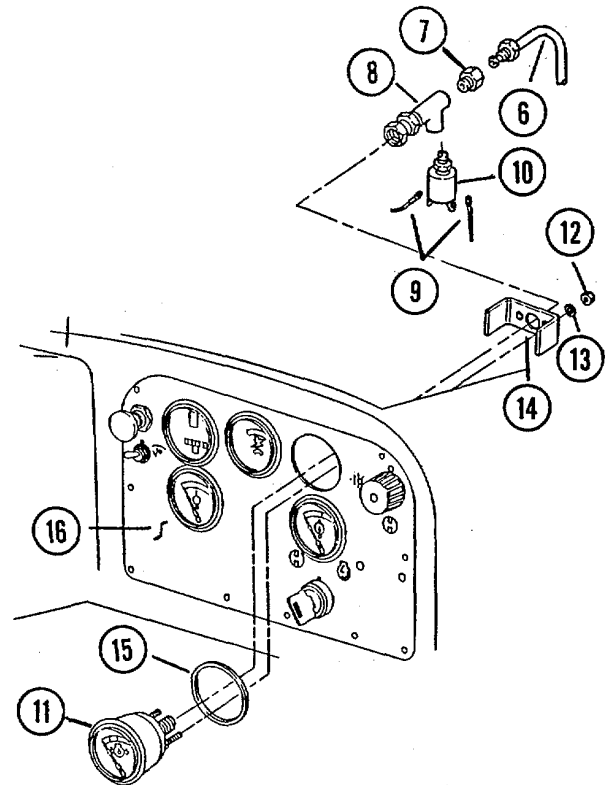
14-4. ENGINE OIL PRESSURE GAGE - REPLACE (Cont'd)

- (2) Use two wrenches to remove oil line (6) from connector (7) on back of tee (8).
- (3) Use a wrench to remove connector (7) from back of tee (8).
- (4) Disconnect wires (9) and remove hourmeter switch (10) with a wrench.
- (5) Use two wrenches to remove tee (8) from back of oil pressure gage (11). Cap tee and oil line (6) to keep them clean.
- (6) Use a wrench to remove two nuts (12), two star washers (13) and bracket (14).
- (7) Slide oil pressure gage (11) with seal (15) out through front of dash panel (16).
- (8) Remove seal (15) from oil pressure gage (11). Discard seal (15).

b. Installation**WARNING**

Turn battery disconnect switch OFF before working inside dash assembly to avoid personal injury.

- (1) Install seal (15) on oil pressure gage (11).
- (2) Insert oil pressure gage (11) into position on dash panel (16).
- (3) Install two star washers (13), two nuts (12) and bracket (14) on back of gage (11). Tighten nuts with a wrench.

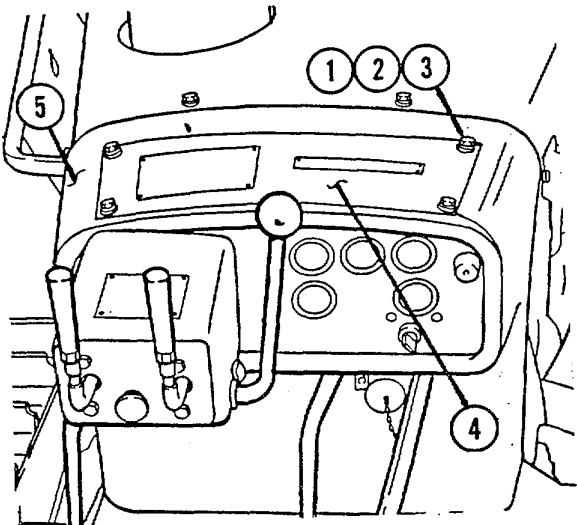
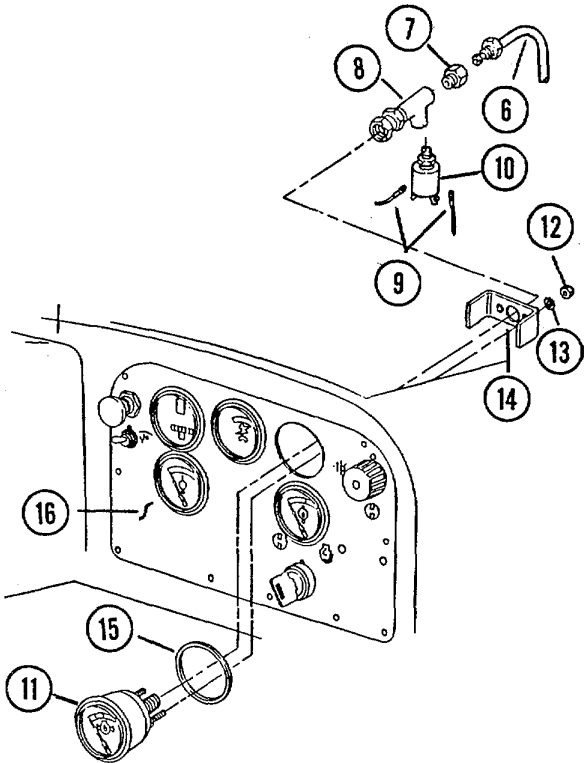


14-4. ENGINE OIL PRESSURE GAGE - REPLACE (Cont'd)

- (4) Wrap nipple on back of oil pressure gage (11) with teflon tape.
- (5) Install tee (8) on oil pressure gage (11). Use a wrench to tighten tee.
- (6) Wrap nipple on hourmeter switch (10) with teflon tape.
- (7) Install hourmeter switch (10) onto side of tee (8) with a wrench.
- (8) Use a wrench to install connector (7) on tee (8).
- (9) Use two wrenches to connect oil line (6) to connector (7).
- (10) Install cover (4) on top of dash assembly (5) with four capscrews (1), four washers (2) and four lockwashers (3).

c. Place In Service

Check engine oil pressure gage for proper operation.



14-5. FUEL PRESSURE GAGE - REPLACE**This task covers:**

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP:Applicable Configurations

All
Drain pan

Common Tools

Shop Equipment, Automotive
Maintenance and Repair,
Common #1 Less Power
NSN 4910-00-754-0654

Materials/Parts

Preformed packing (4)

Equipment Condition

Engine OFF and cool.
Fuel shut-off valve closed.

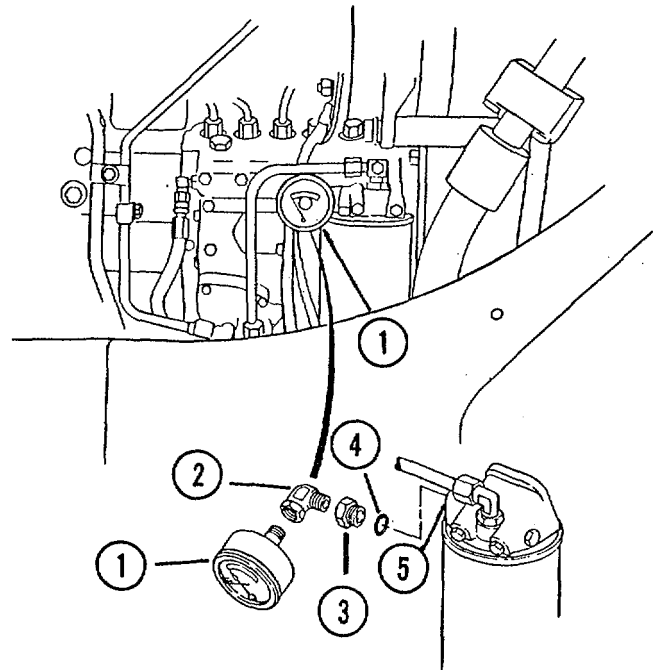
a. Removal**NOTE**

Some fuel may drain when removing pressure gage. Position drain pan accordingly.

- (1) Use a wrench to remove fuel pressure gage (1) from elbow (2).
- (2) If necessary, use a wrench to remove elbow (2) from nut (3).
- (3) If necessary, use a wrench to remove nut (3) and preformed packing (4) from secondary fuel filter base (5). Discard preformed packing.

b. Installation

- (1) Install a new preformed packing (4) and nut (3) to secondary fuel filter base (5). Use a wrench to tighten nut (3).

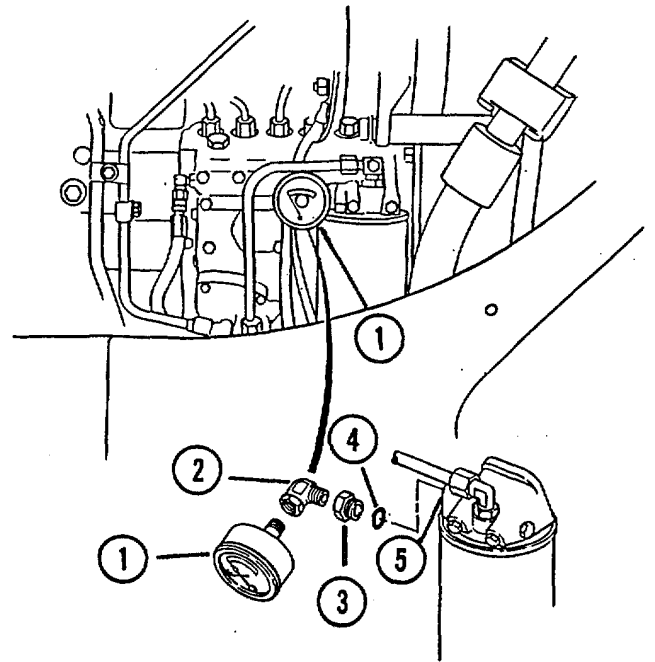


14-5. FUEL PRESSURE GAGE - REPLACE (Cont'd)

- (2) Use a wrench to install elbow (2) to nut (3).
- (3) Use a wrench to install fuel pressure gage (1) onto elbow (2).

c. Place In Service

Check fuel pressure gage for proper operation.



14-6. AIR FILTER INDICATOR - REPLACE**This task covers:**

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP:Applicable Configurations

All

Common Tools

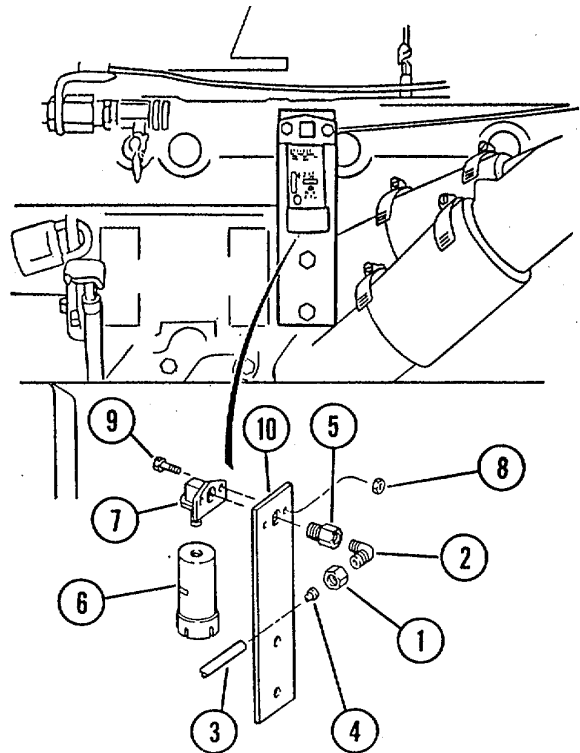
Shop Equipment, Automotive
Maintenance and Repair,
Common #1 Less Power
NSN 4910-00-754-0654

Equipment Condition

Engine OFF and cool.

a. Removal

- (1) Remove nut (1) from elbow (2) with wrench.
- (2) Separate tubing (3) from elbow (2). Take care not to lose insert (4).
- (3) Remove fitting (5) and elbow (2) with a wrench.
- (4) Unscrew air filter indicator (6) from bonnet (7).
- (5) Remove two nuts (8), two capscrews (9) and bonnet (7) from bracket (10).

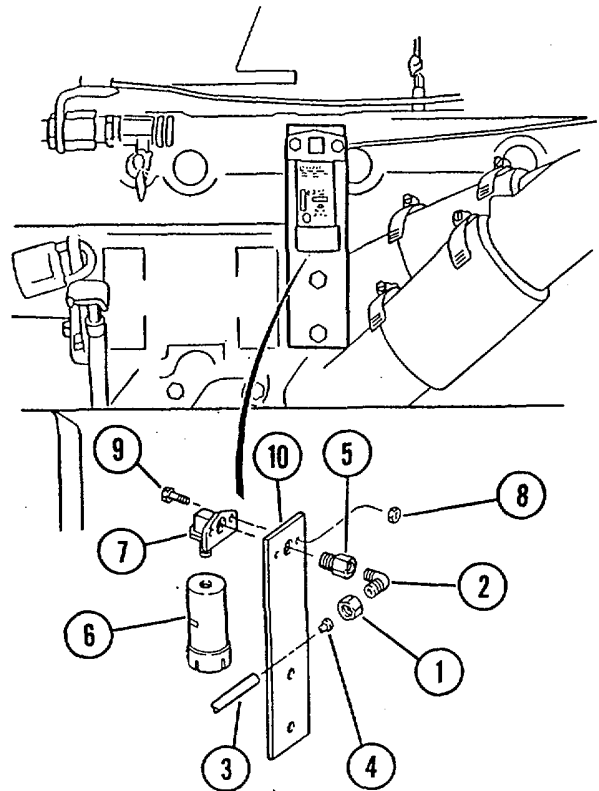


14-6. AIR FILTER INDICATOR - REPLACE (Cont'd)**b. Installation**

- (1) Attach bonnet (7) to bracket (10) with two capscrews (9) and nuts (8).
- (2) Screw air filter indicator (6) into bonnet (7).
- (3) Use a wrench to install fitting (5) and elbow (2).
- (4) Connect tubing (3) to elbow (2). Make sure insert (4) is placed in tubing (3).
- (5) Use a wrench to install nut (1) on elbow (2).

c. Place In Service

Check air filter indicator for proper operation.



CHAPTER 15

EARTH MOVING EQUIPMENT MAINTENANCE

15-1. GENERAL

This chapter provides maintenance procedures assigned to the organizational level for the earth moving equipment. To find a specific maintenance procedure, see the maintenance task summary below.

15-2. EARTH MOVING EQUIPMENT MAINTENANCE TASK SUMMARY

TASK PARA.	PROCEDURE	PAGE NO.
15-3	Blade Cutting Edge and End Bit - Replace	15-2
15-4	Blade and Pusharm Assembly - Replace	15-4
15-5	Blade Pusharm Trunnion - Replace	15-10
15-6	Ripper Tooth - Replace	15-12
15-7	Ripper Shank - Replace	15-14

15-3. BLADE CUTTING EDGE AND END BIT - REPLACE

This task covers:

- a. Removal
 - b. Disassembly
 - c. Place In Service
-

INITIAL SETUP:Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance, Common #2
Less Power
NSN 4910-00-754-0650

Materials/Parts

Cutting edge section (8, 9 and 10)
End bit (4 or 5)
2 Blocks 12" x 4" x 4"

a. Removal

- (1) Raise blade (1) approximately 12", block securely and shut off engine.
- (2) Remove nuts (2), capscrews (3) and end bit (4 and 5) as needed.
- (3) Remove nuts (6), capscrews (7) and cutting edge (8, 9 and 10) as needed.

b. Installation**CAUTION**

If the opposite edge of the cutting edge section is not worn, rotate this section. If both edges of the cutting edge sections are worn, replace worn section(s) to prevent wear on blade support.

- (1) Thoroughly clean mounting surface of blade (1), cutting edges (8, 9 and 10), and end bit (4 and 5).

15-3. BLADE CUTTING EDGE AND END BIT - REPLACE (Cont'd)

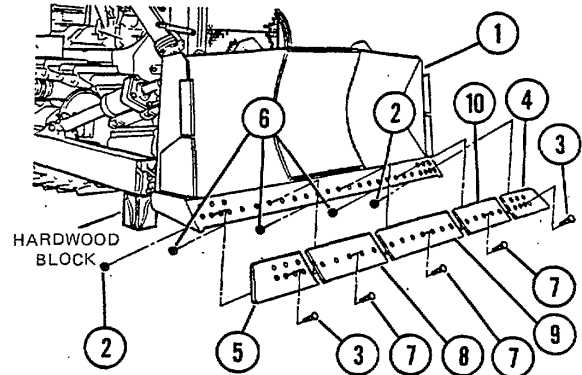
- (2) Install cutting edges (8, 9 and 10) with capscrews (7) and nuts (6).
- (3) Torque nuts (6) to 350+50 ft. lbs.
- (4) Install two end bits (4 and 5) with capscrews (3) and nuts (2).
- (5) Torque nuts (2) to 350+50 ft. lbs.

WARNING

Wear safety glasses whenever striking metal objects with a hammer.

- (6) Seat all capscrew heads firmly in countersink with heavy hammer.
- (7) Tighten capscrews again to proper torque requirements.
- (8) Raise blade (1) and remove blocking.

Place In Service Check blade for proper operation.



15-4. BLADE AND PUSHARM ASSEMBLY - REPLACE

This task covers:

- a. Removal
 - b. Disassembly
 - c. Place In Service
-

INITIAL SETUP:Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
 Maintenance, Common #2
 Less Power
 NSN 4910-00-754-0650

Personnel Required

MOS62B (2)

Materials/Parts

2 Blocks each side 12" x 4" x 4"
 6' Wire 1/16" Dia x 24" Long

- a. Removal

WARNING

Hydraulic oil in the system can be under pressure over 2500 psi (17000kPA) with the engine and pump OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF and hydraulic attachments on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

CAUTION

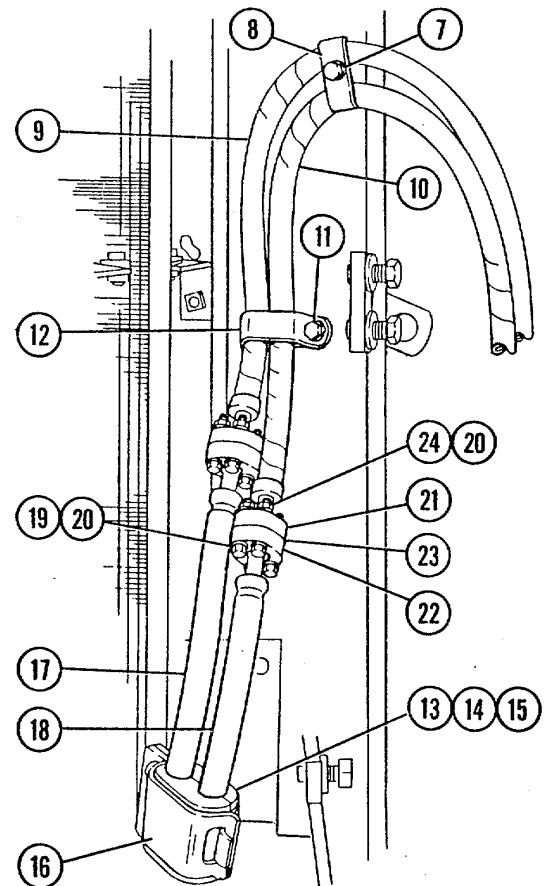
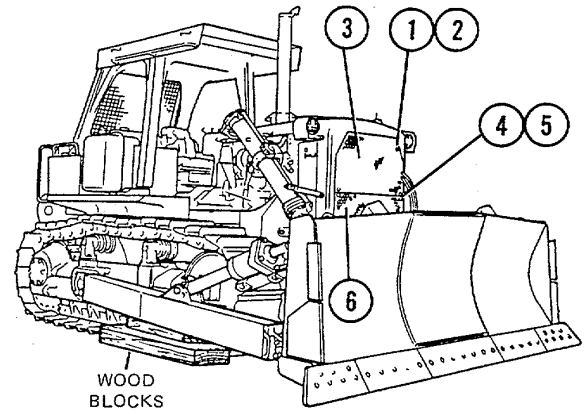
Before disconnecting hydraulic lines and fittings, clean area to prevent contamination of the system. Contaminate can result in premature failure of the system.

15-4. BLADE AND PUSHARM ASSEMBLY - REPLACE (Cont'd)

NOTE

It is recommended to perform this procedure outside your facility to avoid tying up bay space.

- (1) Place wooden blocks under pusharms of dozer.
- (2) Use a wrench to remove four capscrews (1), washers (2), and upper radiator guard (3).
- (3) Use a wrench to remove four capscrews (4), washers (5), and lower radiator guard (6).
- (4) Use a wrench to remove capscrew (7) and clamp (8) from tilt cylinder hoses (9 and 10) and radiator guard.
- (5) Use a wrench to remove capscrew (11) and clamp (12) from tilt cylinder hoses (9 and 10) and radiator guard.
- (6) Use a wrench to remove two capscrews (13), washers (14), nuts (15), and clamp (16) from radiator guard. Open clamp and separate hoses (17 and 18).
- (7) Mark hoses and use two wrenches to remove four capscrews (19), eight washers (20), split flanges (21 and 22), plate (23) and nut (24). Separate hoses (10 and 18).
- (8) To separate hoses (9 and 17) repeat STEP 7.



15-4. BLADE AND PUSHARM ASSEMBLY - REPLACE (Cont'd)

NOTE

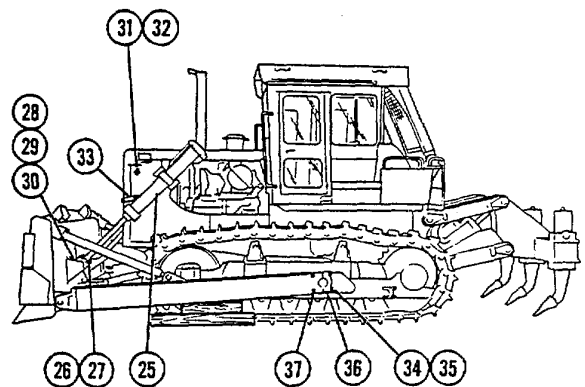
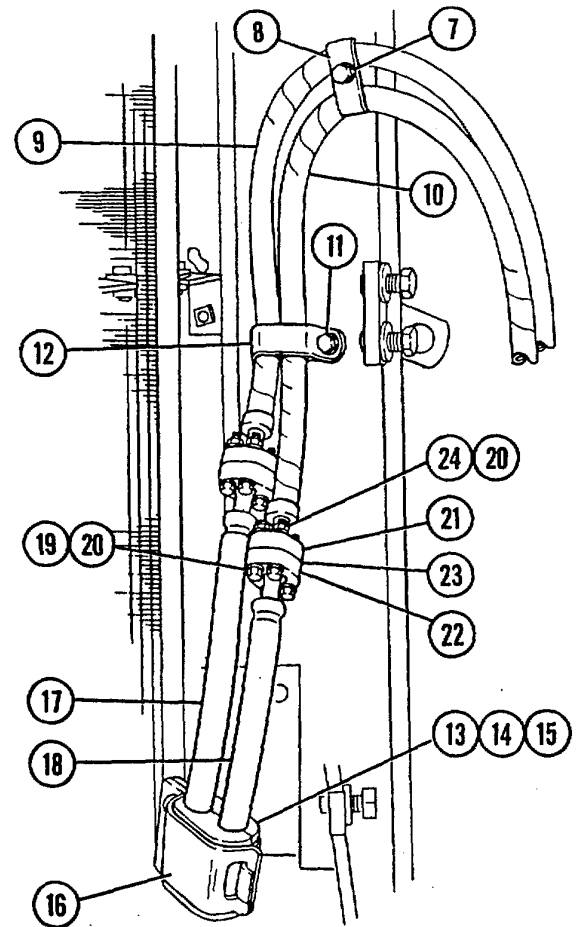
After disconnecting, connect hose (9) to (10) and connect hose (17) to (18) to form a loop. This will close the system and prevent dirt and moisture contamination.

- (9) Connect hose (9) to hose (10) with split flanges (21 and 22) and plate (23). Use two wrenches to install eight washers (20), four capscrews (19) and nuts (24).
- (10) Connect hoses (17 and 18) by following procedure in STEP 9.
- (11) Disconnect lift cylinder (25) at blade. Use a wrench to remove four nuts (26), lockwashers (27), and capscrews (28). Remove cap (29) and (30).

CAUTION

When retracting the cylinders, have a person guide the rod to prevent damage to the rod from contact with the track or other parts of the machine.

- (12) Repeat STEP 11 on other lift cylinder. Retract both cylinders.
- (13) Remove pin (31) from post (32). Line up bracket (33) on cylinder with post (32). Install bracket (33) on post (32) and secure with pin (31).
- (14) Repeat STEP 13 for other cylinder, and secure cylinder rods in position with wire.

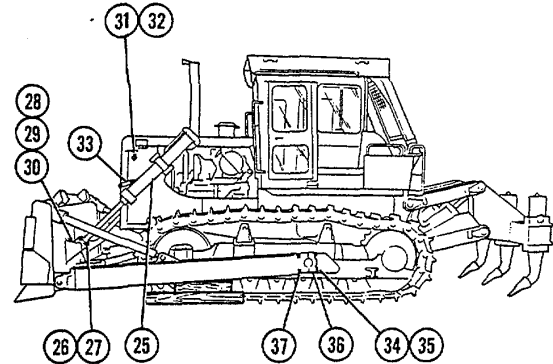


15-4. BLADE AND PUSHARM ASSEMBLY - REPLACE (Cont'd)

- (15) Use a torque multiplier with a socket to remove two capscrews (34), washers (35), cap (36) and nuts (37).
- (16) Repeat STEP 15 on other pusharm.
- (17) Carefully back the tractor away from the pusharm and blade assembly.

b. Installation

- (1) Drive tractor up to blade and pusharm assembly. Have another mechanic guide you into position.
- (2) Place cap (36) in position on trunnion and use two wrenches to install nuts (37), washers (35) and capscrews (34). Repeat STEP for other pusharm.
- (3) Remove wires securing rods to cylinders. Remove pins (31) from posts (32). Remove cylinders and brackets (33) from posts (32). Reinstall pins (31) in posts (32).
- (4) Remove any paint from the contact surfaces of the ball and both halves of the sockets of the lift cylinders. Extend cylinder rods until they contact ball. Use a wrench to install caps (29), capscrews (28), lockwashers (27) and nuts (26). Do not install shims (30).
- (5) Adjust lift cylinders. See page 13-29.

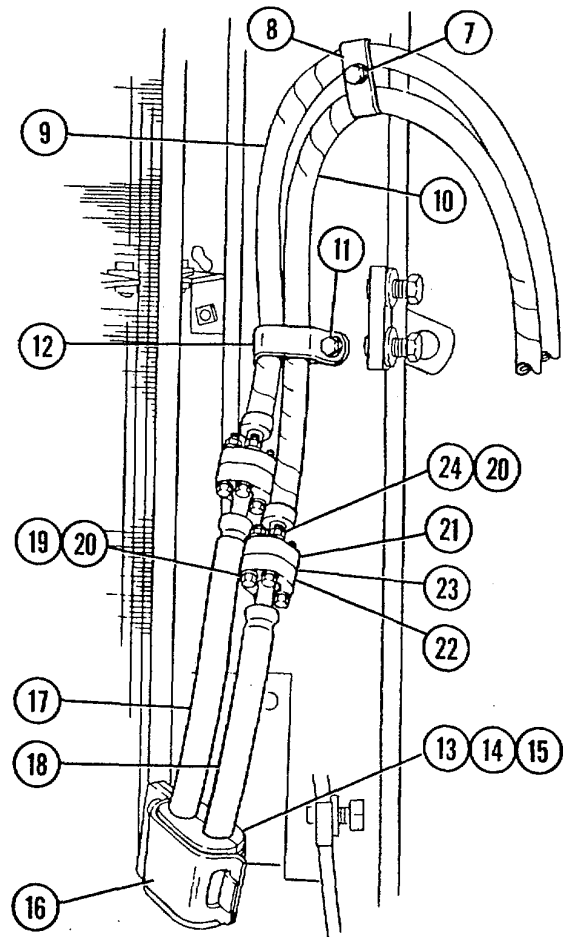


15-4. BLADE AND PUSHARM ASSEMBLY - REPLACE (Cont'd)

WARNING

Hydraulic oil in the system can be under pressure over 2500 psi (17000kPA) with the engine and pump OFF. ALWAYS relieve pressure in hydraulic lines before attempting to remove any component in the hydraulic system. With engine OFF and hydraulic attachments on the ground, move control levers through all operating positions several times to relieve line pressure. Relieve pressure in hydraulic oil tank by loosening filler cap very slowly. Failure to follow these precautions could result in serious personal injury.

- (6) Disconnect hose (9) from (10) and hose (17) from (18). Use two wrenches to remove capscrews (19), washers (20), nuts (24), split flanges (21 and 22), and plate (23).
- (7) Connect hose (9) to (17) and hose (10) to (18). Use two wrenches to install plates (23), hoses, split flanges (21 and 22), washers (20), capscrews (19), and nuts (24).
- (8) Place clamp (16) around hoses (17 and 18). Place hoses and clamp in position on radiator guard, and use a wrench to install two washers (14), two capscrews (13) and two nuts (15).
- (9) Place clamp (12) around tilt cylinder hoses, and use a wrench to install capscrew (11) and clamp (12) to radiator guard.
- (10) Place clamp (8) around cylinder hoses, and use a wrench to install capscrew (7) and clamp (8) to radiator guard.

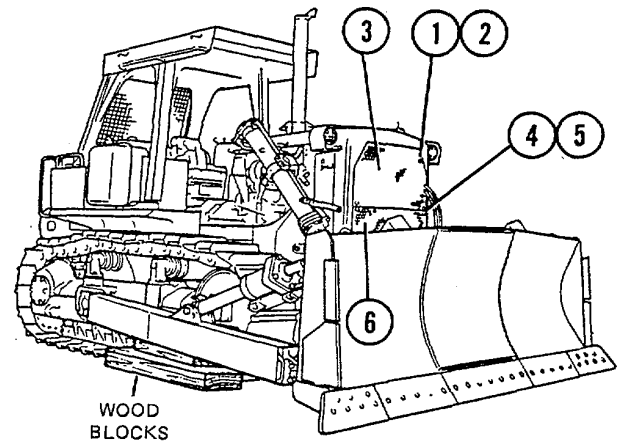


15-4. BLADE AND PUSHARM ASSEMBLY - REPLACE (Cont'd)

- (11) Place lower radiator guard door (6) in position and use a wrench to install four washers (5) and capscrews (4).
- (12) Place upper radiator guard door (3) in position, and use a wrench to install four washers (2), and capscrews (1).
- (13) Raise the blade and remove all blocking from under the pusharms.

c. Place In Service

Check blade and pusharm for proper operation.



15-5. BLADE PUSHARM TRUNNION - REPLACE**This task covers:**

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP:Applicable Configurations

All

Common Tools

Shop Equipment, Automotive
Maintenance, Common #2
Less Power
NSN 4910-00-754-0650

Materials/Parts

Lint-free Rag (App. D, Item 15)

Equipment Condition

Blade and pusharm assembly removed.
(page 15-4)

a. Removal**NOTE**

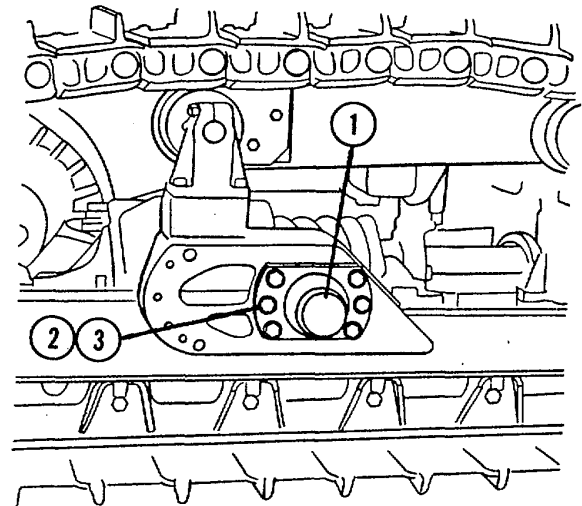
This procedure can be used for R.H. or L.H. trunnion assembly.

- (1) Position small jack under trunnion (1) and raise jack to contact trunnion.
- (2) Use a wrench to remove two bolts (2) and two lockwashers (3) from each side of trunnion (1).

NOTE

Use jack to take weight of trunnion off last two bolts during removal.

- (3) Use a wrench to remove one bolt (2) and one lockwasher (3) from each side of trunnion and remove trunnion (1).

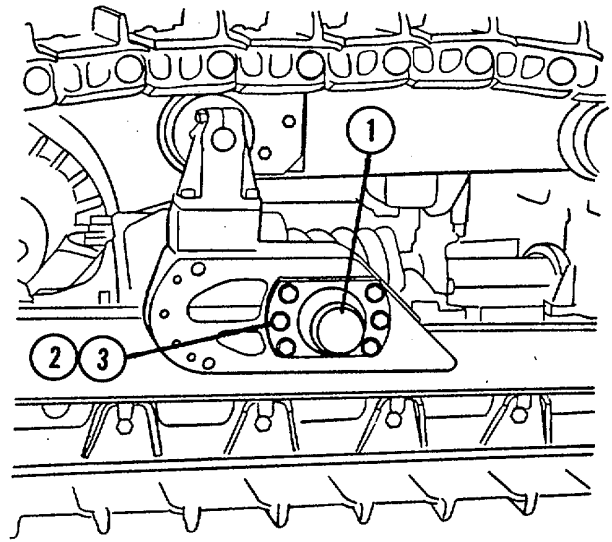


15-5. BLADE PUSHARM TRUNNION - REPLACE (Cont'd)**b. Installation**

- (1) Wipe trunnion mounting surface on machine and mounting surface on trunnion (1) clean before installation.
- (2) Position trunnion (1) on small jack and use jack to line up bolt holes.
- (3) Install trunnion (1) with six bolts (2) and six lockwashers (3).
- (4) Install blade and pusharm assembly. See page 15-4.

c. Place In Service

Check blade and pusharm for proper operation.



15-6. RIPPER TOOTH - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP:

Applicable Configurations

Tractor with Ripper

Common Tools

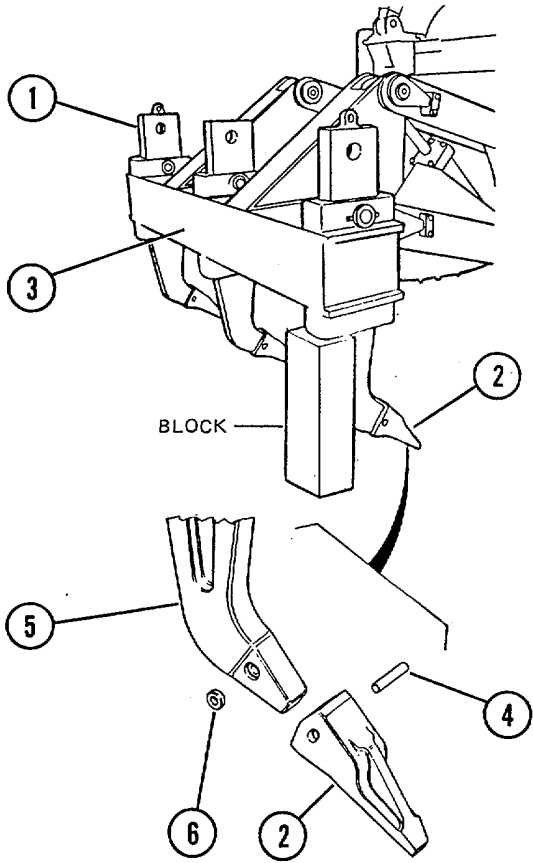
Tool Kit, General Mechanics
NSN 5180-00-699-5273

Materials/Parts

Blocks 3' x 4" x 4"

a. Removal

- (1) Raise ripper (1) until teeth tips (2) are approximately 6" off ground.
- (2) Place blocks under ripper beam (3).
- (3) While facing rear of tractor, using drift pin and hammer, drive pin (4) from the right side of tooth (2).
- (4) Remove tooth (2) and retainer (6) from the shank (5).

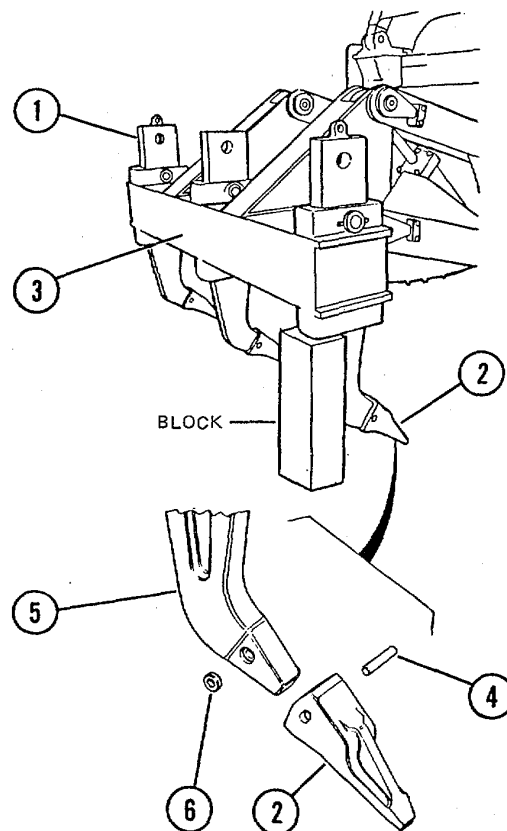


15-6. RIPPER TOOTH - REPLACE (Cont'd)**b. Installation**

- (1) Install retainer (6) in recess on R.H. side of ripper shank (5).
- (2) Slide tooth (2) over end of ripper shank (5) and retainer (6) and insert pin (4) in tooth and shank, grooved end first.
- (3) From L.H. side of tooth (2) using hammer, drive pin (4) through retainer (6) and flush on both sides of tooth (2).
- (4) Repeat STEPS 1, 2 and 3 for other two teeth.
- (5) Start engine, raise ripper, remove blocks, lower ripper and turn off engine.

c. Place In Service

Check ripper for proper operation.



15-7. RIPPER SHANK - REPLACE

This task covers:

- a. Removal
- b. Installation
- c. Place In Service

INITIAL SETUP

Applicable Configurations

Tractor with Ripper
Blocks 5' x 8" x 8"

Materials/Parts

Cotter Pin (4)

Common Tools

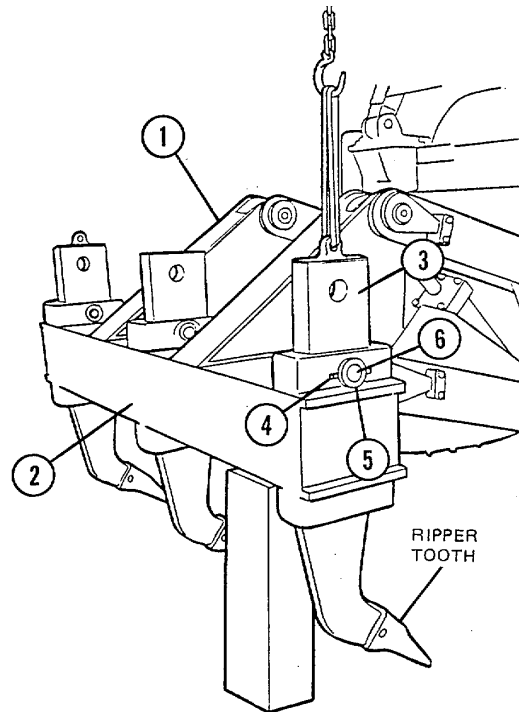
Shop Equipment, Automotive
Maintenance & Repair,
Common #1 Less Power
NSN 4910-00-754-0654
Lifting Equipment 1000 lb.
Special Tools
Sling 1U8236

a. Removal

NOTE

Follow **STEPS (1) through (3) to remove from ripping position; STEPS (4) and (5) from road position.**

- (1) Raise ripper (1) to its maximum raised position.
- (2) Place suitable block(s) under ripper beam (2) and shut off engine.
- (3) Attach lifting equipment to to ripper shank (3). Remove slack. Go to STEP (7).
- (4) Lower ripper.
- (5) Fasten lifting equipment to top of shank (3).



15-7. RIPPER SHANK - REPLACE (Cont'd)

- (6) Use lifting equipment to take pressure off pin (6).

NOTE

When removing center shank, remove cotter pins and retainers from both ends of pin. Push pin to the right so that end of pin enters hole in ripper beam brace.

- (7) Remove cotter pin (4) and retainer (5) from one end of pin (6). Discard cotter pin (4).
- (8) Using a drift pin and hammer, remove pin (6) from beam and shank.
- (9) Lower lifting equipment until shank is resting on the ground.

b. Installation**NOTE**

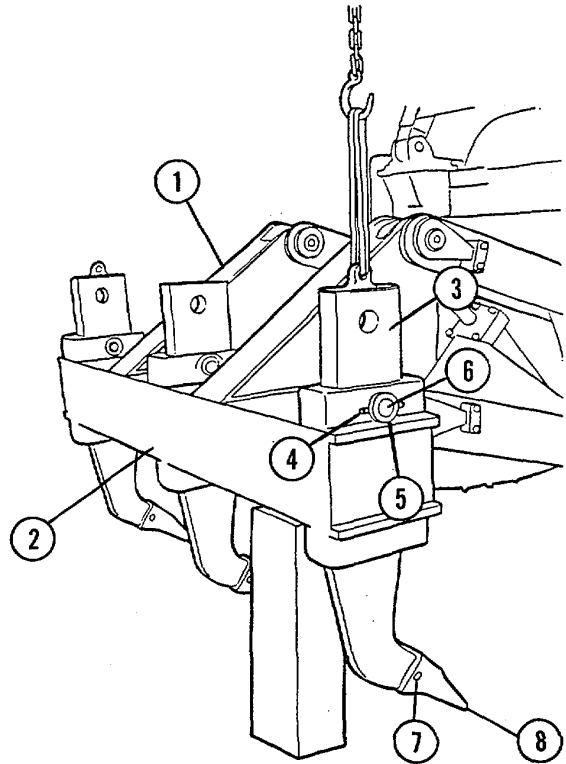
STEPS (1 and 2) are for installing in ripping position. STEP (3) is for road position.

- (1) Position ripper shank (3) beneath shank hole in beam (2).

NOTE

If installing on a hard surface, remove tooth retaining pin (7) and tooth (8) for clearance. If installing on a soft surface, a small hole about 10" deep will provide enough clearance.

- (2) Attach lifting equipment to lifting eye in shank (3). Feed sling through hole in bottom of beam (2). Go to STEP (3).
- (3) Attach lifting equipment to top of shank directly beneath ripper tooth (8).



15-7. RIPPER SHANK - REPLACE (Cont'd)

- (4) Lift shank into position and insert pin (6). Use a hammer to drive pin (6) through beam (2) and shank (3).
- (5) Install retainers (5) on both ends of pin (6). Align holes in retainers and pin (6), and install new cotter pins (4) at both ends of pin (6).

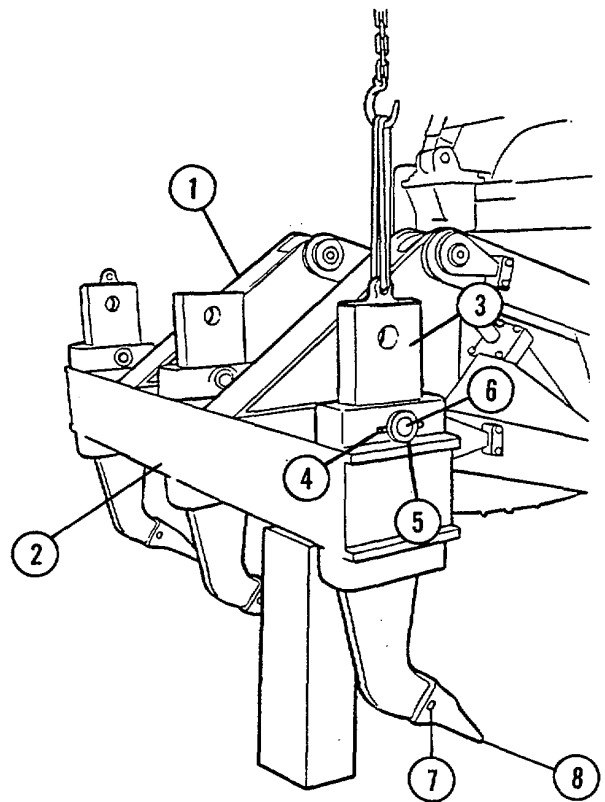
NOTE

When installing in road position, raise ripper instead of lower, as stated in STEP (6)

- (6) Remove lifting equipment from shank (3). Start engine, remove block(s), lower ripper, and turn off engine.

c. Place In Service

Check ripper for proper operation, when installing ripping position.



CHAPTER 16
PREPARATION FOR STORAGE AND SHIPMENT

	Page
Preparation for Storage.....	16-1
Preparation for Shipment	16-1

16-1. PREPARATION FOR STORAGE

- a. Perform the operator preventive maintenance checks and services (PMCS) contained in TM5-2410-237-10.
- b. Perform the organizational preventive maintenance checks and services (PMCS) contained in table 2-1.
- c. Perform the lubrication contained in lubrication order L05-2410-237-12.
- d. Schedule the next preventive maintenance checks and services (PMCS) on DD Form 814, Preventive Maintenance Schedule and Record.
- e. Store tractor with blade (and ripper if equipped) lowered. Cycle controls after engine shutdown to relieve any pressure in circuits.
- f. Seal exhaust stack opening and air intake precleaner opening with tape.
- g. Coat exposed metal portions of blade (and ripper if equipped) cylinder rods with rust preventive compound.
- h. Cover seat, armrests and dash with protective plastic wrap.
- i. Fill fuel tank completely.
- j. Ensure that fuel drain valve handle, battery box, engine oil filler spout, fuel tank cap, engine oil level gage, hydraulic tank cover, dash cover, seat assembly and radiator cover are securely locked with padlocks.
- k. On cab models, ensure all windows are closed and lock cab door.
- l. Ensure that tractor is fully equipped. Refer to TM5-2410-237-10HR.
- m. Fill-in DD Form 1397 completely and attach to a conspicuous part of the tractor.

16-2. PREPARATION FOR SHIPMENT

- a. Perform the operator preventive maintenance checks and services (PMCS) contained in TM5-2410-237-10.
- b. Perform the organizational preventive maintenance checks and services (PMCS) contained in table 2-1.

- c. Perform the lubrication contained in lubrication order L05-2410-237-12.
- d. Schedule the next preventive maintenance checks and services (PMCS) on DD Form 814, Preventive Maintenance Schedule and Record.
- e. Seal exhaust stack opening and air intake precleaner opening with tape.
- f. Consult TM5-2410-237-10 for shipping and transportation data.

**APPENDIX A
REFERENCES**

A-1. SCOPE

This appendix lists forms, field manuals, technical manuals, and other publications referenced in this manual and which apply to unit maintenance of the D7G tractor.

A-2. DEPARTMENT OF THE ARMY PAMPHLETS

Consolidated Index of Army Publications and Blank Forms.....DA Pam 25-30
 The Army Maintenance Management System (TAMMS).....DA Pam 738-750

A-3. FORMS

Recommended Changes to Equipment Technical PublicationsDA Form 2028-2
 Organizational Control Record for Equipment..... DA Form 2401
 Equipment Inspection and Maintenance Worksheet..... DA Form 2404
 Maintenance Request.....DA Form 2407
 Preventive Maintenance Schedule and RecordDD Form 314
 Processing and Deprocessing Record for Shipment, Storage, and
 Issue of Vehicles and Spare Engines.....DD Form 1397
 Product Quality Deficiency Report (NSN 7540-00-105-0078)SF 368

A-4. FIELD MANUALS

Camouflage FM 5-20
 First Aid for Soldiers FM 21-11
 Basic Cold Weather Manual..... FM 31-70
 Northern Operations FM 31-71
 Mountain Operations (How to Fight)..... FM 90-6

A-5. LUBRICATION ORDER

Tractor, Full Tracked, Low Speed: DED,
 Medium Drawbar Pull, D7G.....L05-2410-237-12

A-6. TECHNICAL BULLETINS

Warranty Program for Tractor, Full Tracked,
 Low Speed: DED, Medium Drawbar Pull, D7G TB 5-2410-237-15

Occupational and Environmental Health: Hearing ConservationTB MED 501

Equipment Improvement Report and Maintenance
Digest (US Army Tank-Automotive Command)
Tank-Automotive EquipmentTB 43-0001-39 series

Nonaeronautical Equipment Army Oil Analysis Program (AOAP)..... TB 43-0210

A-7 TECHNICAL MANUALS

Operator’s Manual for Tractor, Full Tracked,
Low Speed: DED, Medium Drawbar Pull, D7G TM5-2410-237-10

Hand Receipt for Components of End Item (COEI),
Basic Issue Items (BII), and Additional
Authorized List (AAL) for Tractor, Full
Tracked, Low Speed: DED, Medium Drawbar
Pull, D7G TM5-2410-237-10HR

Unit Maintenance Manual for Tractor, Full Tracked,
Low Speed: DED, Medium Drawbar Pull, D7G TM 5-2410-237-20

Unit Maintenance, Intermediate Direct Support, and
Intermediate General Support Maintenance Repair Parts
and Special Tools List (Including Depot Maintenance
Repair Parts and Special Tools List) for Tractor,
Full Tracked, Low Speed: DED, Medium Drawbar Pull, D7G TM5-2410-237-24P

Operator and Organizational Maintenance Manual Including
Repair Parts and Special Tools List Simplified Test
Equipment for Internal Combustion Engines (STE-ICE)
(4910-00-124-2554).....TM9-4910-571-12&P

Operator’s, Organizational, Direct Support,
and General Support Maintenance Manual for
Lead-Acid Storage Batteries; 4HN, 24V,
(NSN 6140-00-069-3528) MS75047-1; 2HN,
12 V (6140-00-057-2553) MS 35000-1; 6TN,
12 V (6140-00-057-2554) MS35000-3..... TM9-6140-200-14

Painting Instructions for Field Use..... TM43-0139

Procedures for Destruction of Equipment to Prevent
Enemy Use (Mobility Equipment Command)..... TM750-244-3

A-8 OTHER PUBLICATIONS

Expendable/Durable Items (Except Medical,
Class V, Repair Parts, and Heraldic Items) CTA 50-970

Army Medical Department Expendable/Durable Items CTA 8-100

**APPENDIX B
MAINTENANCE ALLOCATION CHART**

Section I. INTRODUCTION

B-1. GENERAL

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place "Replace" is authorized by the MAC and is shown as the 3d position code of the SMR code.

i. Repair. The application of maintenance services, including fault location/troubleshooting, removal/installation, and disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational conditions as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II

a. Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "00." b. Column 2, Component/Assembly. Column 2 contains the names of components assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph B-2).

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the

specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

- C.....Operator or Crew
- O.....Organizational Maintenance
- F.....Direct Support Maintenance
- H.....General Support Maintenance
- D.....Depot Maintenance

NOTE

Tool sets not listed for a specific task but which contain the necessary tools to accomplish the task may be used in lieu of listed set. Example, Contact Truck.

e. Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. Column 6, Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III

a. Column 1, Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. Column 2, Level Maintenance. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The National Stock Number (NSN) of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number.

B-5. EXPLANATION OF COLUMNS IN REMARKS, SECTION IV

a. Column 1, Reference Code. The code recorded in column 6, Section II.

b. Column 2, Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
01	ENGINE								
0100	Engine Assembly:	Inspect	0.2						A
		Test		1.5				2	B
		Service		0.5				2	C
		Replace			16.4			6	
		Repair			46			6	D
		Overhaul					80	7	
	Front Engine Support	Replace			3			6	
	Engine Mounts and	Replace			4.3			6	
	Lifting Eyes								
	Trunnion	Replace			4.6			6	
0101	Crankcase, Block, Cylinder Head:								
	Liners, Cylinder	Replace				11		6,7	
	Block Assembly	Replace				40		7	
		Repair				16		7	
	Cylinder Head Assembly and Spacer Plate	Replace			5			6,7,13	
		Repair			16			6,7,13	
0102	Crankshaft: Crankshaft Assembly	Replace						6,7	
		Repair				24		6,7	
	Bearings	Replace				8		6,7	
	Front Seal and Wear Sleeve	Replace				3.7		6,7	E
	Rear Seal and Wear Sleeve	Replace				4		6	
	Crankshaft Pulley	Replace				4		6	
	Vibration Damper	Replace			3.5			6	
		Replace			3			6	
0103	Flywheel Assembly: Flywheel	Replace						6	
		Repair				4.3		6	
	Flywheel Housing	Replace				3		6	
		Repair				10		6	
		Repair				2		6	

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
0104	Pistons, Connecting Rods, Piston Pins, Rings: Bearings	Replace Repair Replace				10 8 3.2	6,7 6,7 6,7	E	
0105	Valves, Camshaft, and Timing Systems: Covers, Front Housing Cover, Valve Mechanism Valve Mechanism Lifters, Valve Camshaft and Camshaft Bearings Timing Gears, Bearings and Timing Gear Plate	Replace Repair Replace Adjust Replace Replace Replace				11.5 1.5 1.9 5.4 19 16	6,7 6,7 3 3 6,7 6,7 6,7	F	
0106	Engine Lubrication System: Pump, Oil Pan, Oil Plate, Oil Pan Valve, Oil Sampling Filter Assembly, Oil Gage, Oil Level Filler Tube, Oil Breather, Crankcase Hose, Fumes Disposal	Replace Repair Replace Replace Repair Replace Service Replace Repair Replace Replace Service Replace Replace				2.6 2 2.3 2.6 0.5 0.2 0.4 0.8 2 1 0.5 0.2 0.6 0.5	6,7 6,7 6,7 6,7 6,7 2 3 3 3 2 3 3 3 3 2	G H I	

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
0106	Engine Lubrication System: (Cont) Cooler, Engine Oil	Replace Repair		0.7 0.4				2 2	
0108	Manifolds: Manifold, Exhaust	Replace			3.8			6,7	
0109	Accessory Drive: Rear Drive Gears Cover Assembly	Replace Replace			6 2			6,7 6,7	
03	FUELSYSTEM								
0301	Fuel Injection Nozzles	Test Replace Repair		1	0.5 1			6 3 6	J
0302	Fuel Pumps: Pump, Transfer	Replace Repair			0.5 1			6 6	
	Pump, Priming Housing, Fuel Injection Pump	Replace Test Repair		0.3			3 7.5	3 7 6,12	K L
	Pumps, Injection	Replace			2			6,10,11, 12	
	Lines and Fittings, Fuel Injection	Repair Replace		0.5	3		1.5		
0304	Air Cleaner:	Replace Repair		1 0.5	2 2				
	Elements	Service Replace		0.2 0.5	3 3				
	Pre Screen	Service Replace		0.2 0.5	2 2				
	Dust Ejector	Replace		0.2	2				

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
0305	Turbocharger: Turbocharger and Air Lines	Replace		3				2	M
		Repair			2			6	
0306	Oil Lines	Replace		1				2	
		Tanks, Lines Fittings: Tank, Fuel	Service	0.1				6	
			Replace			1.2		6	
		Lines and Fittings, Fuel	Replace		1.5				
Repair			1				3		
0308	Drain Lines and Drain Valve Mechanism	Replace		1.5				3	
		Governor, Speed Control: Housing, Governor and Fuel Injection Pump	Adjust			1		6,12	
			Replace			3		6	
		Governor	Adjust			1		6	
Replace				2		7			
0309	Filter Assembly, Primary Fuel:	Repair	3				7	0	
		Governor Controls and Linkage	Adjust		0.5			3	
			Replace		2.2			3	
		Filter Assembly, Secondary Fuel:	Service		0.4				2
Replace			0.5				2		
Repair			1				2		
0311	Ether Starting Aid:	Service		0.2				2	
		Replace		2				2	
0312	Fuel Ratio Control	Adjust					0.2	4	
		Replace					0.8	7	
		Repair					1.5	7	

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
04	EXHAUST SYSTEM								
0401	Muffler and Pipes:								
	Muffler	Replace		0.7				2	
	Exhaust Extension	Replace		0.2				3	
05	COOLING SYSTEM								
0501	Radiator:								
	Radiator	Inspect	0.5						
		Test		1				3	
		Service		0.5				3	
		Replace			3.2			5,6	
		Repair			4.4			5,6	
	Cap	Replace		0.1				3	
		Repair		0.1				3	
0503	Manifold, Thermostat and Housing Gaskets: Regulator	Test		1				3	
		Replace		0.5				3	
0504	Water Pump: Pump Assembly	Replace		2.5				2	
		Repair			2			6,7	
	Water Lines	Replace		1				2	
0505	Fan Assembly: Fan Drive	Replace		1.5				3,13	
		Repair		0.5				3	
	Fan Guard	Replace			0.5			6	
	Belts, Vee	Adjust		0.2				3	
		Replace		0.5				3	
06	ELECTRICAL SYSTEM								
0601	Alternator:	Test			0.5			6	
		Replace		1.3				3	
		Repair			3			6	

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
			0601	Alternator: (Cont) Brackets, Alternator Mounting	Replace		1		
0603	Starting Motor:	Test		0.5				3	
		Replace		2				3	
		Repair			3			6	
	Starting Motor Solenoid	Replace		0.3				2	
0607	Instruments and Control Panel:								
	Lamps	Inspect	0.1					5	
		Replace		0.5				2	
	Hourmeter	Inspect	0.1					5	
		Replace		0.5				2	
	Ammeter	Inspect	0.1					5	
		Replace		0.5				2	
	Water Temperature, Engine	Inspect	0.1					5	
		Replace		0.5				2	
	Oil Temperature, Torque Converter	Inspect	0.1					5	
		Replace		0.5				2	
0608	Switches:								
	Dash Light	Replace		0.5				2	
	Exterior Lights	Replace		0.5				2	
	Windshield Wiper, Front and Rear	Replace		0.5				2	
	Start, Engine	Replace		0.5				2	
	Start, Ether Aid	Replace		0.5				2	
	Battery Disconnect	Replace		0.5				2	
	Reset, Circuit Breaker	Replace		0.5				2	
	Heater	Replace		0.5				2	
	Fuses	Replace		0.3				3	

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
0609	Lights: Head lamps and Rear Floodlamp	Replace		0.5				2	
0610	Sending Units: Oil Pressure Switch, Hourmeter	Replace		0.5				2	
	Diagnostic (STE/ICE) Wiring	Replace		1				3	
		Repair		0.5				3	
0611	Horn:	Replace		1				2	
	Horn Button	Replace		0.5				2	
	Backup Alarm	Replace		0.5				2	
	Switch, Backup Alarm	Replace		1				3	
0612	Batteries, Storage:	Test		0.5				3	
		Service		0.4				3	Q
		Replace		1				3	
	Cables and Terminals:	Service		0.2				3	
		Replace		0.4				3	
0613	Chassis Wiring Harnesses:	Replace		2.5				3	
	Starting Receptacle:	Replace		0.5				2	
07	TRANSMISSION								
0705	Lever and Linkage, Transmission:	Adjust		1				2	
		Service		0.1				2	
		Replace		3				2	
	Safety Lock Lever, Transmission	Replace		1				2	
0708	Torque Divider:	Service		0.2	6			2	CC
		Replace				10.5		6	
		Repair						6	

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
0710	Transmission Assembly:	Inspect	0.2	R					
		Test				1		6,8	S
		Service		0.2	2			6	
		Replace			3.6			6	
Repair				18		6			
	Hydraulic Control Valves	Overhaul					40	7,4	
		Replace			2.5			6	
		Repair			2			6	
0721	Coolers, Pumps, Motors: Transmission Oil	Replace		1				2	
		Repair			1			15,16, 17,18	
	Cooler Lines	Replace			1.5			6	
		Test			0.2			6	
		Repair			4			6	
	Pump, Oil	Replace		1				3	
		Repair			1			15,16, 17,18	
	Oil Lines, Transmission	Replace		0.2				3	
		Repair		0.7				3	
	Oil Filter Assembly	Service		0.4				3	
		Replace						3	
		Repair						3	
	Relief Valve, Transmission	Replace			0.8			6	
		Repair			1			6	
	Oil Cooler, Transmission	Replace		0.7				3	
Repair			0.7				3		
Outlet Relief Valve, Torque Converter	Replace						2	6	
	Repair						2	6	
Scavenge Pump, Torque Divider	Replace						1	6	
	Repair						1	6	
Magnetic Screen Assembly	Service		0.5				3	T	
	Replace		0.5				3		
	Repair		0.5				2		
08	TRANSFER AND FINAL DRIVE ASSEMBLIES								
0801	Final Drive:	Service		0.5				3	
		Adjust			3			6,14	U

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
0801	Final Drive: (Cont) Final Drive Cases, Gears, Idler Pinions and Bearings Bevel Gear and Shaft Final Drive Pinions and Flanges	Replace Replace Replace Repair			6 1 1	20		6 6 6 6	DD DD
09	PROPELLER AND PROPELLER SHAFTS								
0900	Drive Shafts and Universal Joint:	Replace		1.5				3	
13	WHEELS AND TRACKS								
1301	Suspension Assembly: Equalizer Bar Assembly Track Rollers Frame Assembly, Track Roller Recoil Spring	Replace Replace Repair Replace Repair Replace			1 2	1.8	4 2	6,26-34 6 6 6,24,25 1 6	DD DD DD DD
1302	Track Carrier Rollers:	Replace Repair			0.5 1.5			6 6	
1303	Track Idlers: Track Idler Yokes Track Adjuster	Replace Repair Replace Repair Replace			1.7 4 0.5 3.2 2 4			6 6 6 6 6 6	
1304	Track Drive Sprockets: Sprocket Segments Shaft, Drive Sprocket	Replace Replace Replace		1		4		3 6	DD

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS	
			C	O	F	H	D			
1305	Track Assembly:	Inspect Adjust Replace Repair Overhaul		0.2 0.5 4			4		3 3,6 6 6	EE
14	STEERING									
1403	Steering Brakes:									
	Actuating Mechanisms, Steering Brakes	Replace Repair			6 6				6 6	
	Hydraulic Controls, Steering Brakes	Replace Repair			1 1.5				6 6	
	Pedals and Linkage, Steering Brakes	Adjust Replace Repair		0.5					3 6 6	
	Brake Lock Lever, Steering	Replace		1					2	
	Steering Brake Lining	Replace			0.5				6	
	Steering Clutch	Replace Repair			4 10				6 6	
	Steering Clutch Hubs	Replace			1				6	
	Steering Clutch Levers and Linkage	Adjust Replace Repair		0.5					3 6 6	
1414	Steering System Valves:									
	Relief Valve, Steering Brake	Replace			0.5				6	
	Steering Clutch Control Valve	Replace Repair			4.2 3				6 6	
15	FRAME, TOWING ATTACHMENTS AND DRAWBARS									
1501	Frame Assembly: Frame and Case Assembly	Repair					12		6	

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
18	BODY, CAB, HOOD AND HULL								
1801	Body, Cab, Hood and Hull Assemblies:								
	Hydraulic Tank Mounting Brackets and Plates	Replace		1				2	
	Crankcase Guard	Inspect Replace	0.1	1				3	
	Radiator Guard	Inspect Replace	0.1		0.5			6	
	Headlamp Protective Covers	Replace		0.3				2	
	Rear Floodlamp Protective Cover	Replace		0.3				2	
	Hood	Replace Repair		0.2 0.5	1,5			2	
	Dash	Replace Repair			1 0.5			6 6	
	Battery Box	Replace		1				3	
	Track Roller Guard	Inspect Replace	0.1	1				5 3	
	Recoil Mechanism Guard	Replace		1				2	
	ROPS	Replace		0.7				3	
	ROPS Brackets and Plates	Replace		0.5				2	
	Protective Screen	Replace		0.2				2	
	Winterized Cab	Replace Repair		3 6				3 3	
1802	Fenders, Windshield Glass and Related Items:								V
	Windshield Glass	Replace		2				3	

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
1802	Fenders, Windshield Glass and Related Items: (Cont) Fenders	Replace			1			6	
1805	Floor, Subfloor and Related Components: Floorplates	Replace		0.4				2	
1806	Upholstery, Seats and Carpet: Seat Assembly	Replace Repair		1	4			3 6	
1808	Storage Racks, Boxes, Straps, Carrying Case: Tool Box	Replace		1				2	
20	HOIST, WINCH CAPSTAN, WINDLASS, POWER CONTROL UNIT AND POWER TAKEOFF								
2001	Winch Assembly:	Inspect	0.2						W
		Service		0.3				4	TX
		Replace		8				4,25	
		Repair			36			6,19-22	
		Overhaul					32	7	
	Winch Control Valve	Replace		0.7				3	
		Repair			2			6,8	
	Winch Control Lever and Linkage	Adjust		0.2				2	
		Replace			0.8			6	
	Winch Magnetic Strainer Assembly	Service		0.5				2	Y
		Replace		0.5				2	
	Winch Oil Filter Assembly	Service		0.5				3	Z
		Replace		0.5				3	
	Drawbar Pin	Replace		0.5				3	
	Cable Assembly	Replace		1.5				3	
		Repair		2				3	

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
2001	Winch Assembly: (Cont) Gear Pump	Replace Repair		2	3			3 6	
	Winch Lines	Replace Repair		0.5	0.2			3 2	
22	BODY, CHASSIS, OR HULL AND ACCESSORY ITEMS								
2202	Accessory Items: Mirrors	Replace		0.5				2	
2207	Winterization Equipment: Personnel Heater	Replace Repair		1.5 2				3 3	
	Windshield Wipers	Replace Repair		1 1				2 2	
	Defroster Fans	Replace Repair		1 1				3 3	
	Sound Suppression Panels	Replace		1				2	
2210	Data Plates and Instruction Holders	Replace		1				3	
24	HYDRAULIC AND FLUID SYSTEMS	Test			4			6,8	
2401	Pump and Motors: Pump	Test Replace Repair		1	1.3 0.5			6,8 3 6,8	
2402	Manifold and/or Control Valves:								
	Blade Control Valve	Replace Repair			3 2			6 6	
	Blade Quick Drop Valve	Replace Repair			1 1			6 6	

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
2402	Manifold and/or Control Valves: (Cont)								
	Pressure Control Valve	Replace Repair		1 1				6 6	
	Pilot Valves	Replace Repair		1 1.5				6 6	
	Ripper Control Valve	Replace Repair		1 2				6 6	
2403	Hydraulic Controls and/or Manual Controls:								
	Blade Control Lever and Linkage	Replace		1.5				6	
	Ripper Control Lever and Linkage	Replace		1.1				6	
2404	Tilt Cylinders and Tilt Crank:								
	Tilt Cylinder, Blade	Adjust Replace Repair			0.6 0.6 4			3 3 6	
	Adjustable Brace, Blade	Adjust Replace Repair			0.6 1 1			3 3 6	
2406	Hydraulic Lines and Fittings:								
	Ripper Lines	Replace Repair			1 0.5			3 6,8,15, 16,17,18	AA
	Blade Lines	Replace Repair			1 0.5			3 6,8,15, 16,17,18	AA
	Tilt Cylinder Lines, Blade	Replace Repair			1 0.5			3 6,8,15, 16,17,18	AA

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
2406	Hydraulic Lines and Fittings: (Cont) Pump Lines, Hydraulic	Replace Repair		1	0.5			3 6,8,15, 16,17,18	AA
	Hydraulic Filter Element Hydraulic Filter Screen Assy	Service Repair		0.2	0.5			3,23 3,23	
2407	Hydraulic Cylinders: Blade Lift Cylinder	Adjust Replace Repair		0.6 0.6				3 3 6	
	Ripper Lift Cylinder	Repair			4			6	
	Blade Lift Cylinder Mounting Tube	Replace			1			6	
2408	Liquid Tanks or Reservoirs: Hydraulic Tank	Service Replace Repair		0.5	1.2 4			3 6 6	BB
47	GAGES (NON-ELECTRICAL)								
4701	Instruments: Tachometer Drive	Replace		0.8				3	
4702	Indicators: Fuel Pressure	Inspect Replace	0.1		0.5			3	
	Oil Pressure, Engine	Inspect Replace	0.1		0.5			3	
	Air Filter Indicator	Inspect Replace	0.1		0.5			3	
74	EARTH MOVING EQUIPMENT COMPONENTS								

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
7435	Blade Assembly: Cutting Edge End Bit	Replace		1.5				4	
		Replace		1				4	
7436	Lift Arms and Pivot Assemblies: Blade and Push Arm Assembly Trunnion	Replace		2.5				4	
		Repair		6				6	
		Replace		0.5				4	
7465	Ripper: Ripper Assembly Ripper Tooth Ripper Shank	Replace		1				6	
		Repair		6					
		Replace		0.2				2	
		Replace		0.2				3	
94	KITS								
95	GENERAL USE STANDARDIZATION PARTS								
9501	Hardware Supplies and Bulk Materiel, Common								

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/ NATO STOCK NUMBER	TOOL NUMBER	FSCM
1	O,F	Shop Equipment, Contact Maintenance, Truck Mounted SC4040-95-CL-B04	4940-00-294-9518	#T10138	97403
2	O,F	Tool Kit, General Mechanics SC5180-90-CL-N05	5180-00-699-5273	#W45060	50980
3	0	Shop Equipment, Automotive Maintenance and Repair, Common #1 Less Power SC4910-95-CL-A74	4910-00-754-0654	#W32593	19204
4	0	Shop Equipment, Automotive Maintenance, Common #2 Less Power SC4910-95-CL-A72	4910-00-754-0650	#W32730	19204
5	F	Welding, Field Maintenance SC3470-95-CL-A08	4940-00-357-7268	#T16714	19204
6	F,H	Shop Equipment, General Purpose Repair, Semi-Trailer Mounted SC4940-95-CL-B02	4940-00-287-4894	#T10549	19204
7	F,H	Shop Equipment, Machine Shop Field Maintenance Basic SC3470-95-CL-A02	3470-00-754-0708	#T15644	19207
8	F,H	Tool Outfit, Hydraulic System, Test and Repair (HSTRU) SC3470-95-CL-B07	4940-01-036-5784	#T30377	97403
9	F,H	Test Set, Diesel Injector; SC4910-1L	4910-00-317-8265	#V73742	19207
10	F	Wrench, Injector Pump Removal	5120-01-123-5884	8S4613	11083
11	F	Extractor, Injector	5120-00-178-1267	8S2244	11083
12	F	Pin, Timing	2815-01-268-2194	8V4186	11083
13	F	Fan Drive Support Bracket	5340-01-270-1290	5P1762	11083
14	F	Tool Arrangement, Final Drive Bearings	5120-01-272-4055	6V82	11083
15	F	Press, Hydraulic	4940-01-272-2839	5P4180	11083

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/ NATO STOCK NUMBER	TOOL NUMBER	FSCM
16	F	Pump, Hydraulic	4320-01-271-9831	4002	
17	F	Coupling Assembly	4730-01-275-0057	1P2376	11083
18	F	Hose Assembly	3442-00-876-6552	8F24	11083
19	F	Gage, Pressure, 10-60 psi		8T0846	11083
20	F	Gage, Pressure, 0-600 psi		8T0856	11083
21	F	Wrench, Spanner		2P2345	11083
22	F	Plate, Puller		1P2393	11083
23	H	Bracket, Link		6V2157	11083
24	H	Bracket, Link		5P9736	11083
25	H	Stand		8S7640	11083
26	H	Tube		8S7611	11083
27	H	Pin		8S7615	11083
28	H	Stand		4C6486	11083
29	H	Tube		8S7621	11083
30	H	Collar		8S7625	11083
31	H	Cylinder		8S7650	11083
32	H	Pin		8S7615	11083
33	H	Electric Pump		3S6224	11083

Section IV. REMARKS

REFERENCE CODE	REMARKS
A	Inspect by checking lubricating oil level, and checking for leaks.
B	Engine tests conducted using STE/ICE diagnostic equipment.
C	Service by changing engine oil.
D	Complete engine gasket kit is available.
E	Undersize bearings are available.
F	Valve mechanism adjustment consists of measuring clearance between rocker arm and valve turning adjustment screw. This procedure also indicates how to locate top dead center for no. 1 piston.
G	Includes the removal of the suction bell.
H	Consists of the removal of the oil pick-up tube.
I	Service by cleaning.
J	Test nozzle prior to disassembly to determine if nozzle can be reused.
K	Includes priming the fuel system.
L	Fuel injection pump timing checks can be performed on or off engine.
M	Replacement includes removal of air cleaner air lines.
N	Checking timing by timing pin method.
O	Setting high and low idle.
P	Inspect by checking coolant level and by checking for leaks.
Q	Battery maintenance instructions are provided in TM9-6140-200-14.
R	Inspect by checking transmission fluid level, and checking for leaks.
S	Test consists of pressure check and performance tests.
T	Service by cleaning screen.
U	Adjust final drives bearing.
V	Includes the removal of insulation panels.
W	Inspect by checking oil level and cable condition. Check for leaks.
X	Service by changing winch hydraulic/lubricating oil.
Y	Service by cleaning magnetic strainer.

Section IV. REMARKS

REFERENCE CODE	REMARKS
Z	Service by replacing filter element.
AA	Hose assemblies are replaced by manufactured hoses with reusable couplings. Special assembly fixture is required.
BB	Service by changing hydraulic system oil.
CC	Service consists of removing and cleaning suction screen.
DD	Ground handling task is required.
EE	Track removal required at general support on immobile machine only.

APPENDIX C

REPAIR PARTS AND SPECIAL TOOLS LIST

This appendix not applicable; refer to TM5-2410-237-24P for repair parts information.

C-1/(C-2 Blank)

APPENDIX D
EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. Introduction

D-1. SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the D7G tractor. These items are authorized to you by CTA 50-970, Expendable Items (except Medical, Class V, Repair Parts, and Heraldic Items).

D-2. EXPLANATION OF COLUMNS

- a. Item Number, Column 1. This number is assigned to the entry in the listing.
- b. Level, Column 2. This column identifies the lowest level of maintenance that requires the listed item. The symbol designations for the various maintenance categories are as follows:

- C..... Operator/Crew
- O..... Organizational Maintenance
- H..... General Support Maintenance
- F..... Direct Support Maintenance
- D..... Depot Maintenance

- c. National Stock Number Column 3. This is the National Stock Number (NSN) assigned to the item; use it to request or requisition the item.
- d. Description, Column 4. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if applicable.
- e. Unit of Measure (U/M), Column 5. Indicates the measure used in performing the actual maintenance function. 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, requisition the lowest unit of issue that will satisfy your requirements.

Section II. Expendable Supplies and Materials List

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
			Anti-Freeze, Permanent Ethylene Glycol (-600F (-51°C)) Inhibited (MIL-A-46153)	
1	0	6850-00-181-7929	1 gal Container	gal.
2	0	6850-00-181-7933	5 gal Container	gal.
3	0	6850-00-181-7940	55 gal Drum	gal.
4	0		Cement,	
5	0	8040-00-0664-4134	Cement, Gasket,	
6			Cleaner, Cooling System,	
7	0	8030-00-0251-3980	Compound, Anti-Seize, Grease, Automotive and Artillery GAA, (MIL-G-10924)	
8	0	9150-00-065-0029	2-1/4 oz Tube	oz.
9	0	9150-00-935-1017	14 oz Cartridge	oz.
10	0	9150-00-190-0904	1-3/4 lb Can	lb.
11	0	9150-00-190-0905	6-1/2 lb Can	lb.
12	0	9150-00-190-0907	35 lb Can	lb.
13	0	9150-00-530-7369	120 lb Drum	lb.
14			Neutralizer,	
15	0	7920-00-205-3570	Rags, Wiping, A-A-531, (58536)	be.
16	0		Sealant, Elastomeric,	

Section II. Expendable Supplies and Materials List (cont'd)

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
17	0	8030-00-0246-0931	Sealant, Thread Solvent, Dry Cleaning, P-D-680, (81348)	
18	0	6850-00-664-5685	1 qt Container	qt.
19	0	6850-00-281-1985	1 gal Container	gal.
20	0	6850-00-285-8011	Drum	

D-3/(D-4 Blank)

APPENDIX E

ILLUSTRATED LIST OF MANUFACTURED ITEMS

Section I. INTRODUCTION

E-1. SCOPE This appendix includes complete instructions for making items authorized to be manufactured or fabricated at Organizational maintenance level.

Section II. MANUFACTURED ITEMS ILLUSTRATIONS

E-2. PART NUMBER INDEX A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the figure which covers fabrication criteria. See table E-1.

E-3. MANUFACTURED ITEMS All bulk materials needed for manufacture of an item are listed by part number or specification number in a tabular list on the illustration.

Table E-1. Part Number to Figure Cross Reference.

PART NUMBER	FIGURE	PART NUMBER	FIGURE
IS9593	E-10	2L8069	E-14
2D8783	E-6	2L8071	E-13
2L8049	E-2	2L8071	E-13
2L8050	E-13	2L8071	E-14
2L8052	E-13	2L8071	E-3
2L8052	E-13	2L8074	E-1
2L8052	E-13	2L8074	E-17
2L8054	E-13	2L8075	E-12
2L8054	E-13	2L8075	E-13
2L8054	E-3	2L8075	E-15
2L8065	E-13	2L8075	E-2
2L8066	E-13	2L8075	E-3
2L8066	E-14	2L8075	E-5
2L8066	E-14	2L8076	E-1
2L8066	E-14	2L8076	E-13
2L8066	E-2	2L8076	E-15
2L8066	E-3	2L8076	E-2
2L8066	E-6	2L8076	E-7
2L8066	E-7	2L8076	E-7
2L8066	E-8	2L8076	E-8

Table E-1. Part Number to Figure Cross Reference (Cont)

PART NUMBER	FIGURE	PART NUMBER	FIGURE
2L8077	E-1	595546-13	E-20
2L8078	E-1	595546-16	E-20
2L8079	E-3	595546-30	E-20
2L8079	E-6	595546-50	E-20
2L8081	E-1	595546-9	E-20
2P9081	E-14	595697-16	E-23
2P9082	E-14	595697-50	E-23
2P9093	E-14	595697-8	E-23
2R1033	E-3	595834-2	E-22
2R1033	E-4	595834-3	E-22
2R1034	E-3	595834-5	E-22
2S5011	E-3	595834-50	E-22
2S5011	E-8	595869-13	E-19
2S5012	E-3	595869-192	E-19
2S5012	E-7	595869-30	E-19
2S5012	E-7	595869-50	E-19
2S5012	E-7	595869-9	E-19
2S5013	E-3	5P0640	E-1
2S5013	E-8	5P0642	E-1
2S5013	E-8	5P0644	E-1
2S5014	E-3	5P0648	E-1
2S5014	E-7	5P0651	E-1
2S5014	E-7	5P0653	E-1
2S5014	E-7	5P0653	E-11
2S5014	E-8	5P0658	E-1
2S5014	E-8	5P0659	E-1
315637	E-15	5P0664	E-1
3D7814	E-14	5P0664	E-1
3M6015	E-4	5P1204	E-2
3M6018	E-3	5P1204	E-3
3N539	E-13	5P1442	E-18
3S2093	E-1	5P1475	E-12
3T2288	E-4	5P1475	E-9
3T2289	E-5	5P2223	E-2
3T2927	E-7	5P2762	E-13
3T3422	E-13	5P2762	E-14
3T4697	E-9	5P2762	E-2
3T5961	E-3	5P2762	E-3
4D6565	E-13	5P2764	E-10
4S6825	E-18	5P2764	E-13
595042-15	E-21	5P2764	E-13
595042-4	E-21	5P2764	E-3
595042-50	E-21	5P2764	E-7
595042-92	E-21	5P2764	E-7
595385-46	E-27	5P2764	E-8
595502-12	E-24	5P2765	E-10
595502-2	E-24	5P2765	E-3
595502-30	E-24	5P3160	E-3
595502-50	E-24	5P3385	E-2

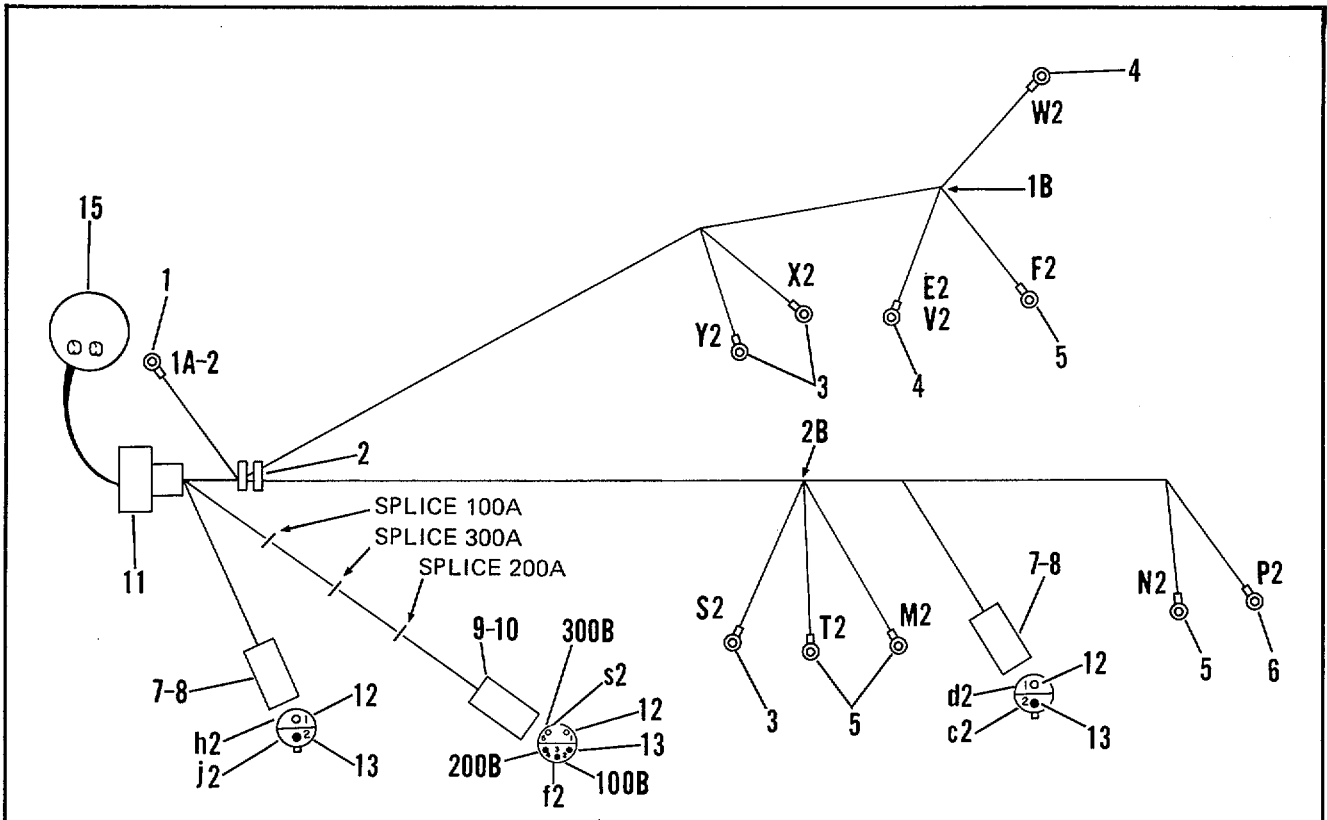
Table E-1. Part Number to Figure Cross Reference (Cont)

PART NUMBER	FIGURE	PART NUMBER	FIGURE
5P3385	E-3	6A3353	E-14
5P4505	E-14	6A3354	E-7
5P4507	E-16	6A3354	E-8
5P4507	E-17	6A3359	E-1
5P4510	E-12	6A3361	E-1
5P4510	E-2	6A3363	E-6
5P4510	E-3	6A3369	E-2
5P4511	E-3	6A3369	E-3
5P4515	E-1	6A3626	E-15
5P4516	E-1	6A3770	E-1
5P4517	E-1	6K1828	E-3
5P4571	E-13	6K613	E-4
5P4703	E-4	6K7361	E-12
5P4703	E-5	6K7361	E-3
5P5017	E-3	6N9587	E-10
5P5018	E-12	6N9587	E-4
5P5018	E-2	6N9587	E-5
5P5018	E-3	6P5759	E-7
5P5610	E-10	6T6505	E-11
5P5610	E-3	6T6506	E-11
5P5610	E-6	7G8660	E-2
5P5623	E-11	7K4474	E-11
5P5624	E-6	7K4474	E-16
5P5624	E-6	7K4474	E-6
5P5624	E-9	7K4475	E-17
5P5630	E-18	7K9689	E-3
5P5633	E-18	7N7779	E-1
5P5675	E-13	7N7780	E-1
5P5675	E-13	7N9738	E-1
5P5675	E-13	7T6985	E-12
5P5694	E-6	7T6988	E-9
5P5968-13	E-25	8C6919	E-1
5P5995	E-10	8C6919	E-1
5P7211-13	E-26	8C6919	E-1
5P7211-4	E-26	8C6919	E-1
5P7211-50	E-26	8C6919	E-1
5P7760	E-18	8C6919	E-1
5P7760 (231-12)	E-18	8D6372-30	E-28
5P9798	E-1	8P9363	E-13
5R4686	E-13	8P9364	E-6
5R7046	E-17	8P9365	E-8
5R7840	E-1	8S4626	E-16
5R7842	E-1	8T2225	E-1
5R7945	E-15	98708	E-14
5R7947	E-16	98708	E-14
5R7948	E-6	98708	E-14
5R7975	E-1	98708	E-3
5R7976	E-1	9F4337	E-13
6A3348	E-13	9G3678	E-1

Table E-1. Part Number to Figure Cross Reference (Cont)

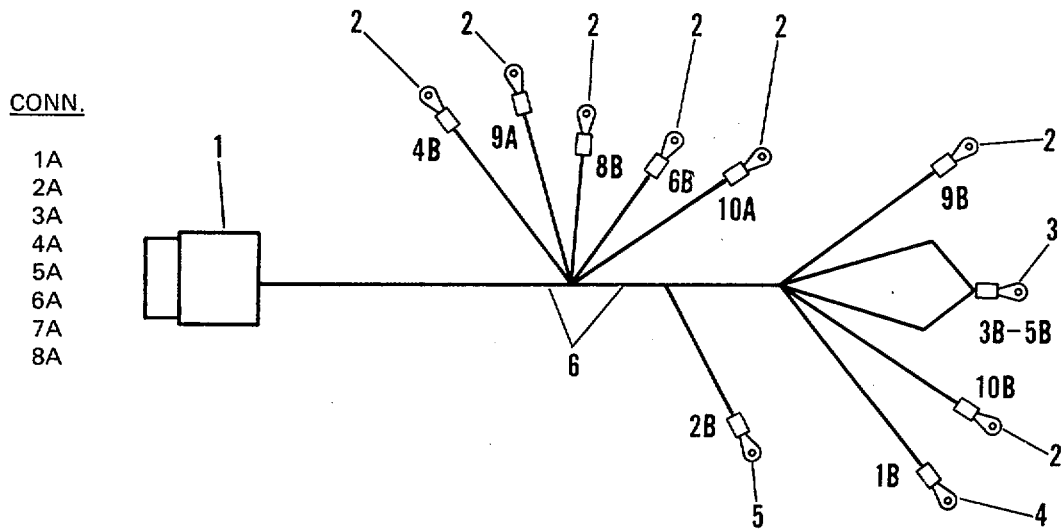
PART NUMBER	FIGURE	PART NUMBER	FIGURE
9G7209	E-8		
9G7308	E-7		
9G9019	E-6		
9L1794	E-18		
9P2189	E-13		
9P5253	E-10		
9W1413	E-11		
MS521301A221R	E-18		
MS521301A223R	E-18		

Figure E-1



5R7842 - HARNESS ASSEMBLY (STE/ICE)			14. BULK WIRE - SECTION			
	DIAGNOSTIC CONNECTOR			LENGTH	GA.	
1.	2L8074	TERMINAL	1			
2.	3S2093	STRAP	2			
3.	2L8076	TERMINAL	3			
4.	2L8078	TERMINAL	2			
5.	2L8081	TERMINAL	4			
6.	2L8077	TERMINAL	1			
7.	7N9738	HOUSING	2			
8.	5P9798	TUBE	10 cm			
9.	9G3678	HOUSING	1			
10.	8T2225	TUBE	5 cm			
11.	5R7840	CONNECTOR	1			
12.	7N7779	SOCKET	4			
13.	7N7780	PIN	5			
			14.	8C6919	- GND-1A to GND-1B - BARE 252 cm	16
				8C6919	GND-2A to GND-2B - 119 cm	16
				8C6919	CONN. E1 to E2	277 cm
				8C6919	CONN. F1 to F2	277 cm
				8C6919	CONN. c1 to c2	126 cm
				8C6919	CONN. d1 to d2	126 cm
				5P0664	CONN. h1 to h2	22 cm
				5P0664	CONN. j1 to j2	22 cm
				5P0658	CONN. W1 to W2	280 cm
				6A3361	CONN. V1 to V2	280 cm
				5P0653	CONN. X1 to X2	220 cm
				5P4516	CONN. Y1 to Y2	220 cm
				5P0648	CONN. P1 to P2	240 cm
				5P4515	CONN. N1 to N2	230 cm
				5P0642	CONN. M1 to M2	130 cm
				5P0651	CONN. T1 to T2	130 cm
				5P4517	CONN. S1 to S2	130 cm
				6A3770	CONN. s1 to s2	30 cm
				5P0640	CONN. f1 to f2	30 cm
					SPLICE	
				6A3359	CONN. - 300A - 300B	110 cm
					SPLICE	
				5P0659	CONN. - 100A - 100B	110 cm
					SPLICE	
				5P0644	CONN. - 200A - 200B	170 m
			15.	5R7975	PLUG 15	
				5R7976	PLUG 15	

Figure E-2



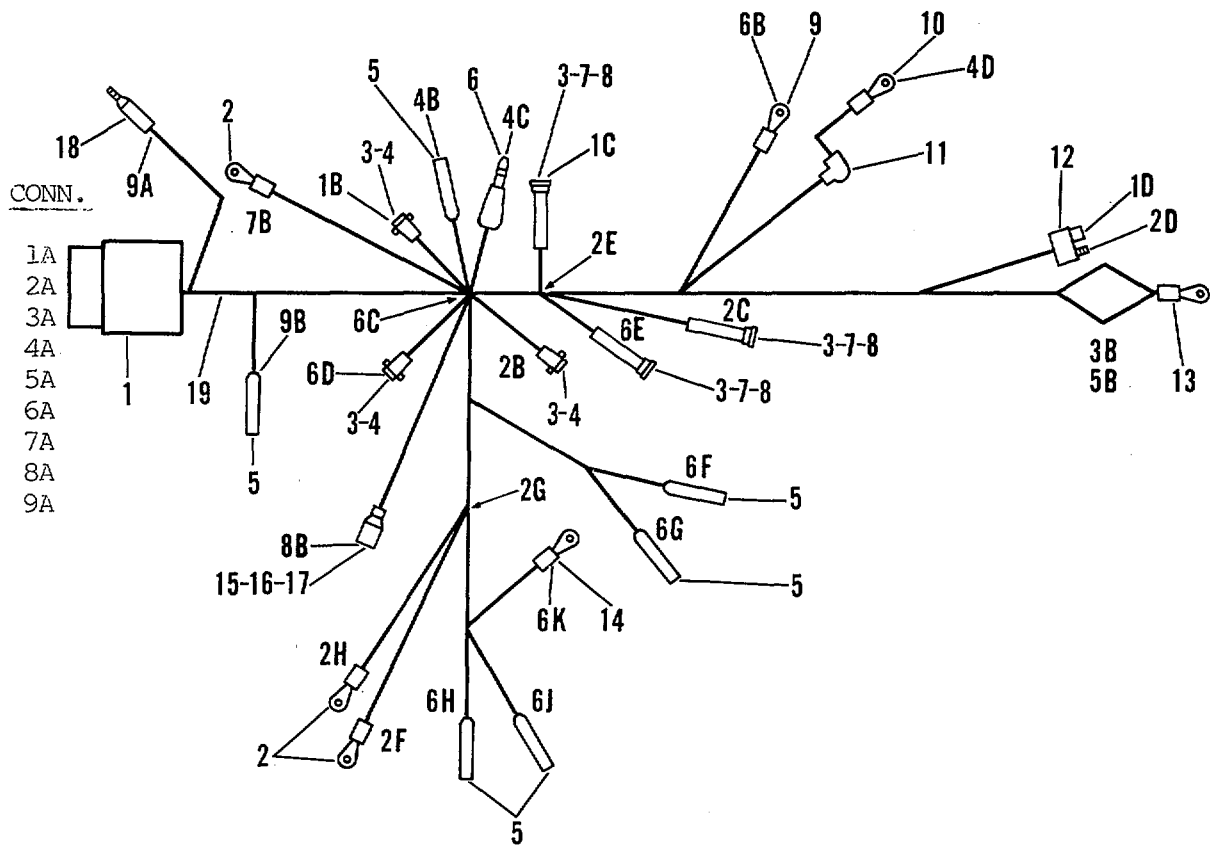
CONN.

- 1A
- 2A
- 3A
- 4A
- 5A
- 6A
- 7A
- 8A

7G8660 – HARNESS ASSEMBLY

- 1. 5P2223 – Connector (1)
- 2. 2L8066 – Terminal (7)
- 3. 2L8049 – Terminal (1)
- 4. 2L8076 – Terminal (1)
- 5. 2L8075 – Terminal (1)
- 6. BULK WIRE – SECTION – LENGTH – GA.
 - 5P5018 – 1A to 1B – 140 cm – 14
 - 5P4510 – 2A to 2B – 70 cm – 14
 - 5P3385 { – 3A to 3B – 100 cm – 10
 - 5A to 5B – 100 cm – 10
 - 9A to 9B – 70 cm – 10
 - 6A3369 – 4A to 4B – 60 cm – 10
 - 5P2762 { – 6A to 6B – 65 cm – 10
 - 10A to 10B – 75 cm – 10
 - 5P1204 – 8A to 8B – 80 cm – 12

Figure E-3



3T5961 - HARNESS ASSEMBLY

- 1. 5P3160 - Connector
- 2. 2L8075 - Terminal (3)
- 3. 2S5014 - Contact (6)
- 4. 2S5012 - Cap (3)
- 5. 6K1828 - Connector (6)
- 6. 7K9689 - Connector (1)
- 7. 2S5013 - Spring (3)
- 8. 2S5011 - Body (3)
- 9. 2L8071 - Terminal (1)
- 10. 2L8066 - Terminal (1)
- 11. 98708 - Boot (1)
- 12. 6K7361 - Connector (1)
- 13. 2L8054 - Terminal (1)
- 14. 2L8079 - Terminal (1)
- 15. 3M6018 - Terminal (1)
- 16. 2R1033 - Washer (1)
- 17. 2R1034 - Shell (1)
- 18. 5P5610 - Connector (1)

19. BULK WIRE	- SECTION -	LENGTH -	GA.
5P5018 (Conn)	- 1A to 1B	104 cm	14
	1C to 1D	146 cm	14
5P4510 (Conn)	- 2A to 2B	104 cm	14
	2C to 2D	146 cm	14
5P4511 Splice	- 2E to 2F	473 cm	14
	Splice - 2G to 2H	87 cm	14
5P3385 (Conn)	- 3A to 3B	305 cm	10
	(Conn) - 5A to 5B	305 cm	10
6A3369 (Conn)	- 4A to 4B	102 cm	10
	- 4C to 4D	98 cm	10
5P2762 (Conn)	- 6A to 6B	180 cm	10
5P2764 Splice	- 6C to 6D	12 cm	14
	- 6E to 6F	248 cm	14
5P5017	- 6G to 6H	250 cm	14
	- 6J to 6K	36 cm	14
	(Conn) - 7A to 7B	134 cm	14
5P1204 (Conn)	- 8A to 8B	130 cm	12
5P2765	- 9A to 9B	90 cm	14

Figure E-4

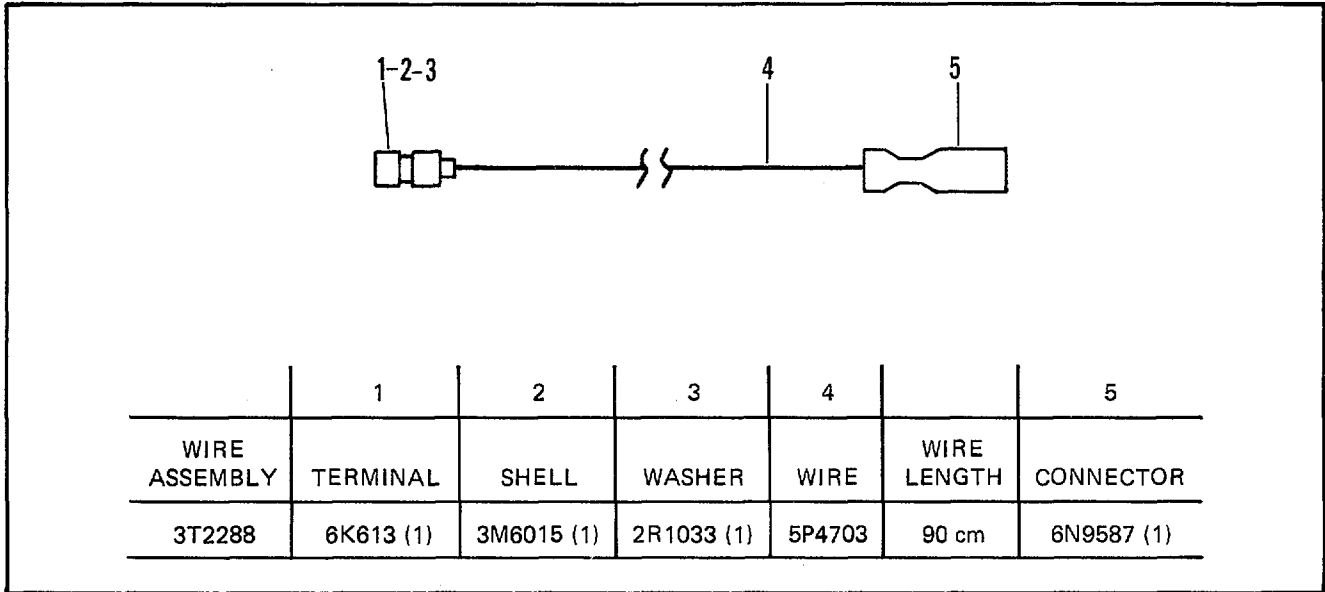


Figure E-5

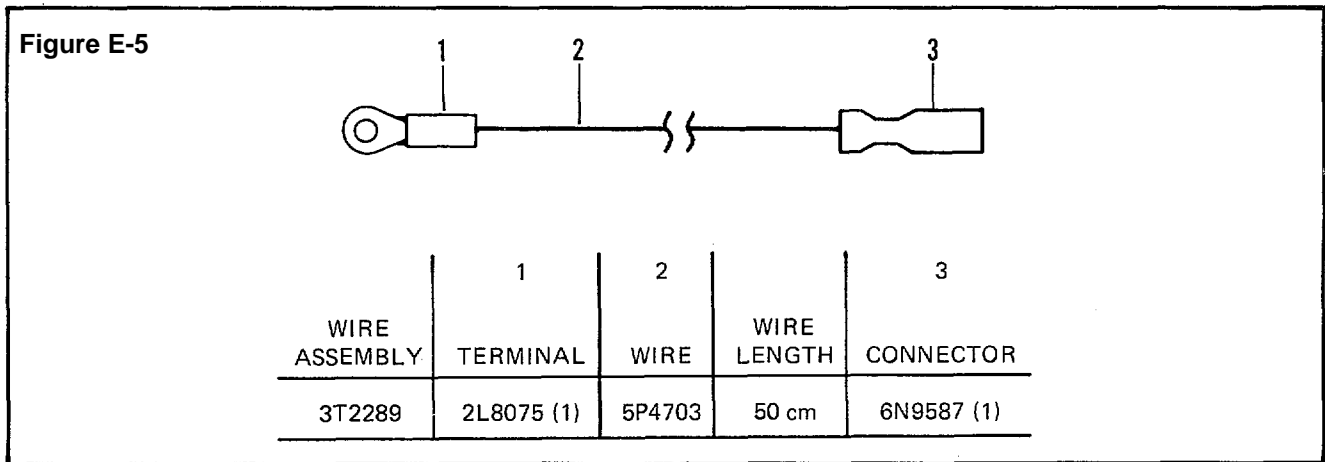


Figure E-6

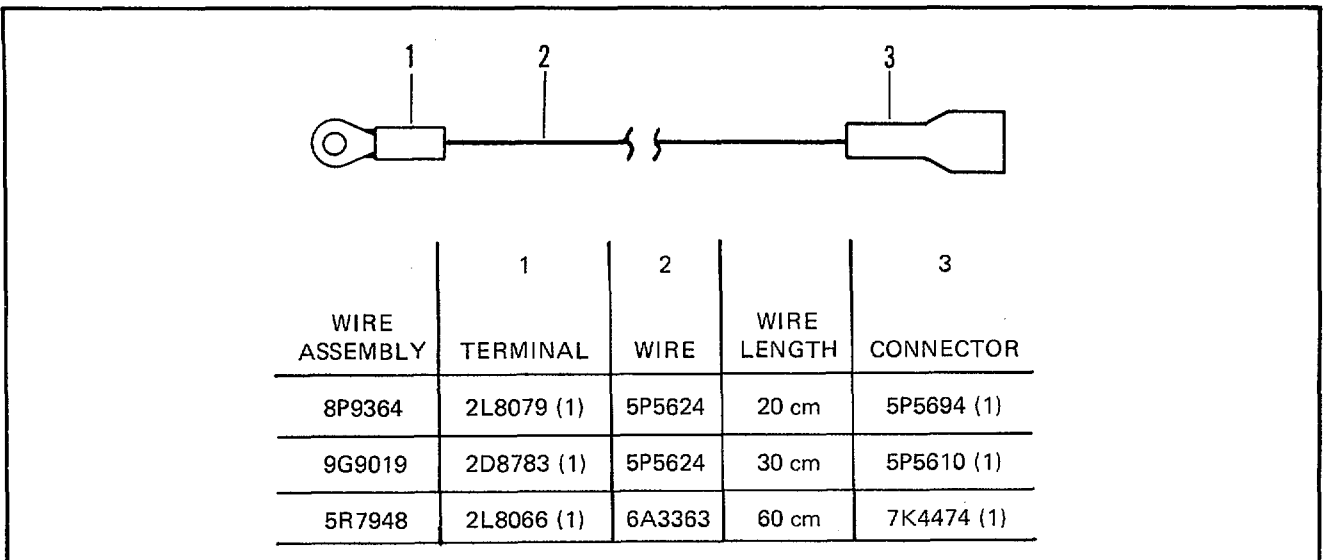
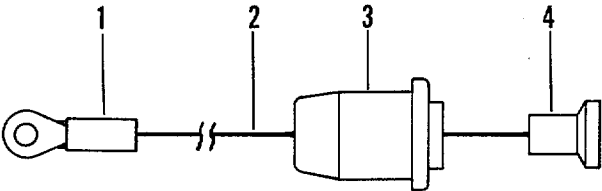
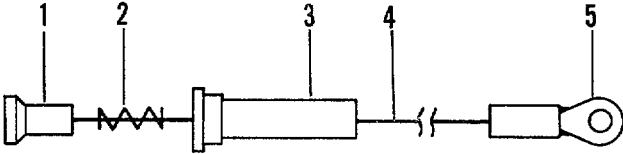


Figure E-7

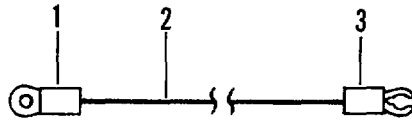


	1	2	3	4	
WIRE ASSEMBLY	TERMINAL	WIRE	WIRE LENGTH	CAP	CONTACT
6P5759	2L8076 (1)	5P2764	20 cm	2S5012 (1)	2S5014 (1)
9G7309	2L8066 (1)	6A3354	10 cm	2S5012 (1)	2S5014 (1)
3T2927	2L8076 (1)	5P2764	40 cm	2S5012 (1)	2S5014 (1)

Figure E-8

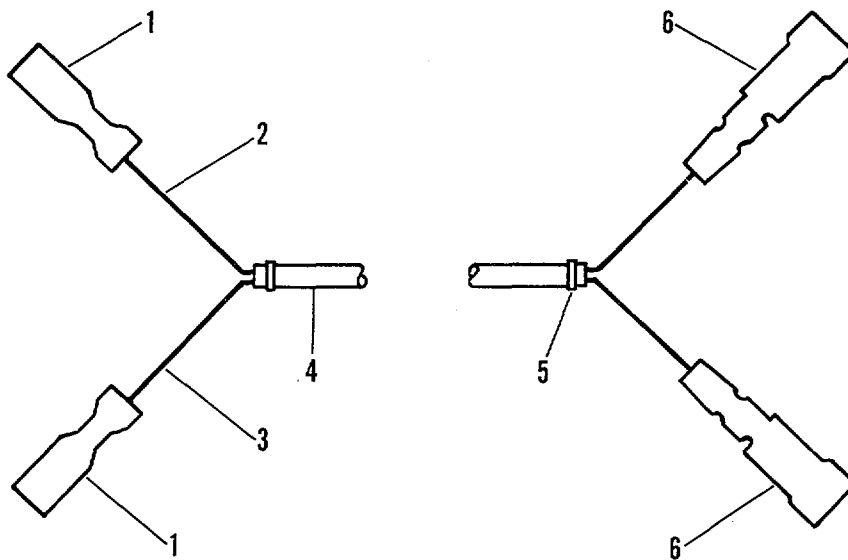


	1	2	3	4	5	
WIRE ASSEMBLY	CONTACT	SPRING	BODY	WIRE	WIRE LENGTH	TERMINAL
9G7308	2S5014 (1)	2S5013 (1)	2S5011 (1)	6A3354	10 cm	2L8066 (1)
8P9365	2S5014 (1)	2S5013 (1)	2S5011 (1)	5P2764	20 cm	2L8076 (1)



	1	2		3
WIRE ASSEMBLY	TERMINAL	WIRE	WIRE LENGTH	TERMINAL
7T6988	3T4697 (1)	5P5624	20 cm	5P1475 (1)

Figure E-10



- 9P5253 – WIRE ASSEMBLY
1. 6N9587 – Connector (2)
 2. 5P2764 – Wire (70 cm)
 3. 5P2765 – Wire (70 cm)
 4. 5P5995 – Tube (60 cm)
 5. 1S9593 – Strap (2)
 6. 5P5610 – Connector (2)

Figure E-11

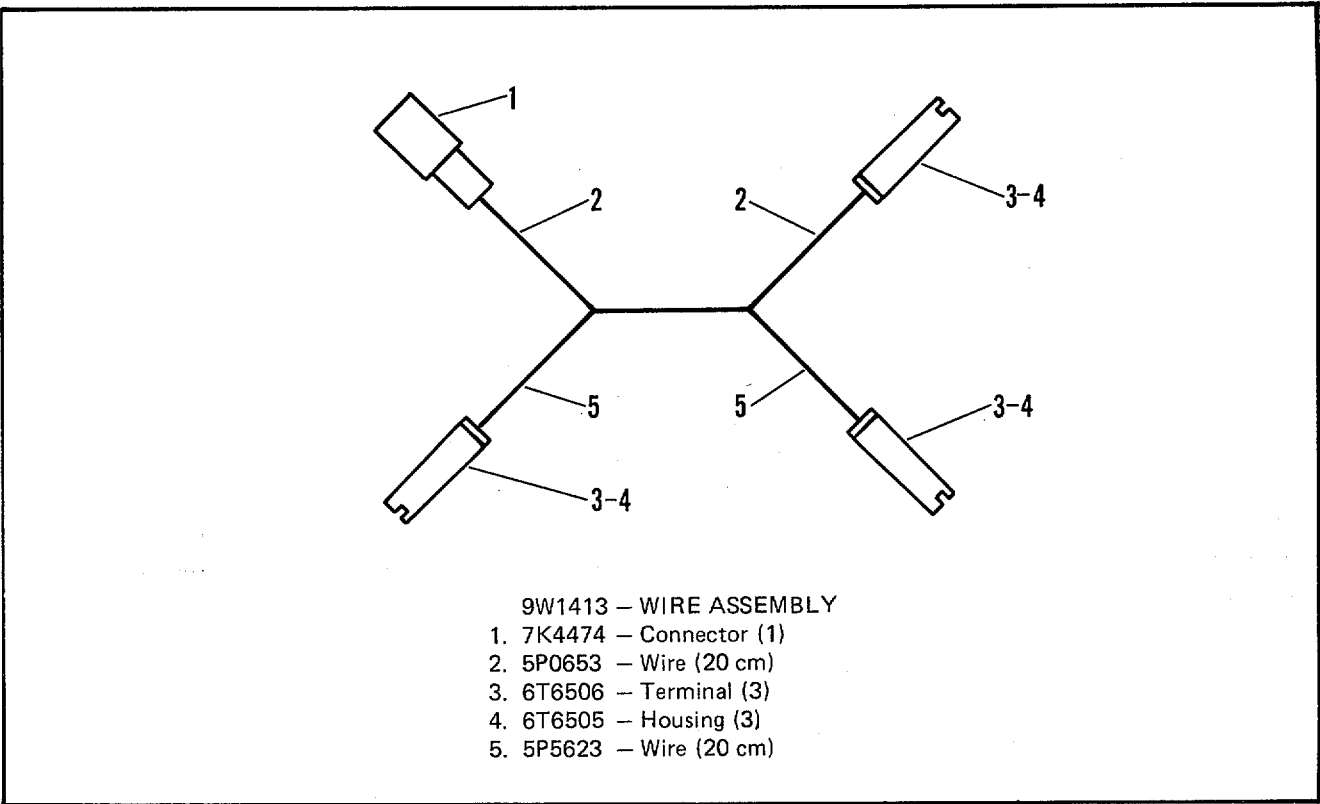
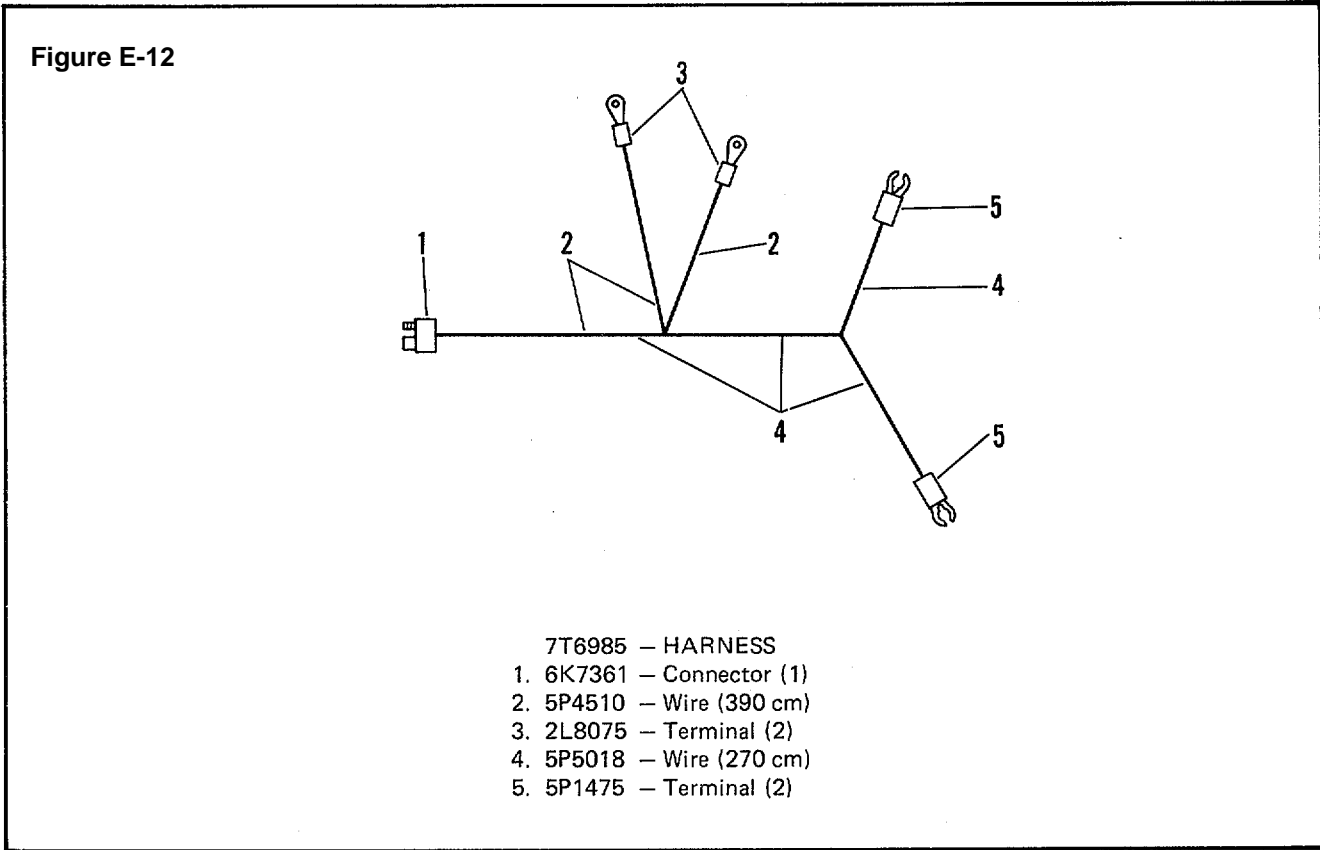
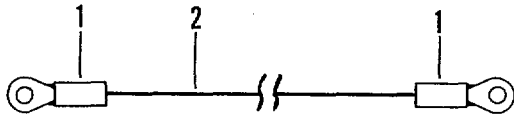


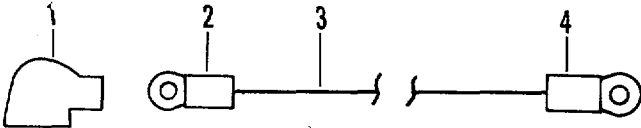
Figure E-12





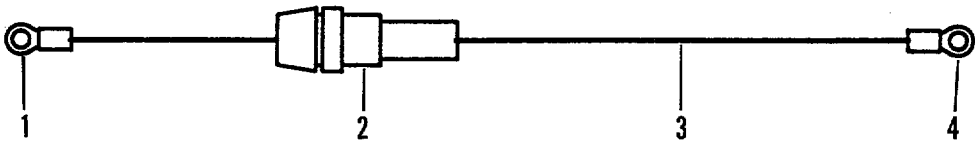
	1	2	
WIRE ASSEMBLY	TERMINAL	WIRE	WIRE LENGTH
9P2189	2L8076 (2)	5P2764	70 cm
4D6565	2L8050 (1) 2L8052 (1)	5P5675	40 cm
9F4337	2L8052 (1) 2L8054 (1)	5P5675	30 cm
5R4686	2L8065 (1) 2L8071 (1)	5P2762	20 cm
3T3422	2L8066 (1) 2L8071 (1)	6A3348	30 cm
8P9363	5P4571 (1) 2L8075 (1)	5P2764	20 cm
3N539	2L8052 (1) 2L8054 (1)	5P5675	30 cm

Figure E-14



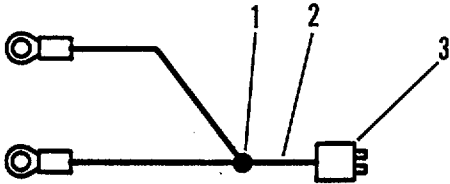
	1	2	3		4
WIRE ASSEMBLY	BOOT	TERMINAL	WIRE	WIRE LENGTH	TERMINAL
2P9081	98708 (1)	2L8066 (1)	5P4504	30 cm	2L8069 (1)
2P9093	98708 (1)	2L8066 (1)	6A3353	40 cm	2L8071 (1)
2P9082	98708 (1)	2L8066 (1)	5P2762	30 cm	3D7814 (1)

Figure E-15



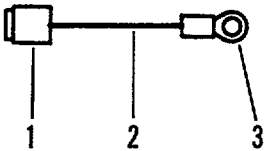
	1	2	3		4
WIRE ASSEMBLY	TERMINAL	HOLDER	WIRE	WIRE LENGTH	TERMINAL
5R7945	2L8075	315637	6A3626	50 cm	2L8076

Figure E-16



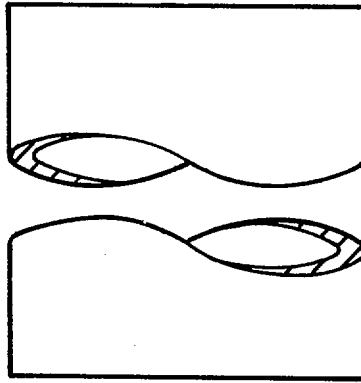
	1	2		3
WIRE ASSEMBLY	SPLICE	WIRE	WIRE LENGTH	CONNECTOR
5R7947	8S4626	5P4507	50 cm	7K4474

Figure E-17



	1	2		3
WIRE ASSEMBLY	CONNECTOR	WIRE	WIRE LENGTH	TERMINAL
5R7946	7K4475	5P4507	69 cm	2L8074

Figure E-18



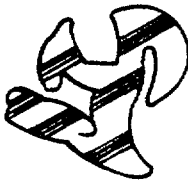
BULK HOSE

HOSE PART NO.	HOSE LENGTH
MS521301A223R	9 in. (23 cm)
MS521301A221R	5 in. (13 cm)
9L1794	3 in. (7.62 cm)
5P7760 (231-12)	59 in. (150 cm)
5P7760	20 in. (51 cm)
4S6825	4.5 in. (11.5 cm)
5P1442	27.6 in. (70.1 cm)

BULK TUBE

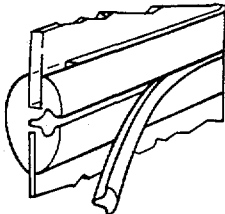
TUBE PART NO.	TUBE LENGTH
5P5630	44 in. (112 cm)
5P5633	12 in. (31 cm)

Figure E-19



PART NUMBER	LENGTH
595869-9	9 ft
595869-13	13 ft
595869-30	30 ft
595869-50	50 ft
595869-192	192 in.

Figure E-20



PART NUMBER	LENGTH
595546-9	9 ft
595546-13	13 ft
595546-16	16 ft
595546-30	30 ft
595546-50	50 ft

Figure E-21



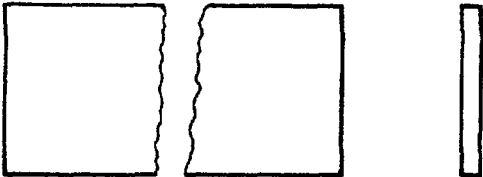
PART NUMBER	LENGTH
595042-4	4 ft
595042-15	15 ft
595042-92	92 in.
595042-50	50 ft

Figure E-19



PART NUMBER	LENGTH
595834-2	2 ft
595834-3	3 ft
595834-5	5 ft
595834-50	50 ft

Figure E-23



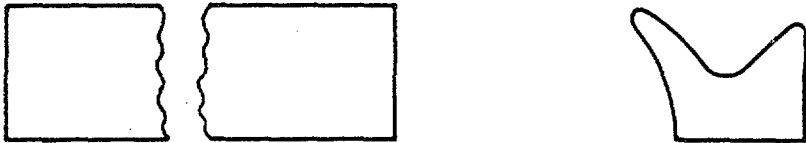
PART NUMBER	LENGTH
595697-8	8 ft
595697-16	16 ft
595697-50	50 ft

Figure E-24



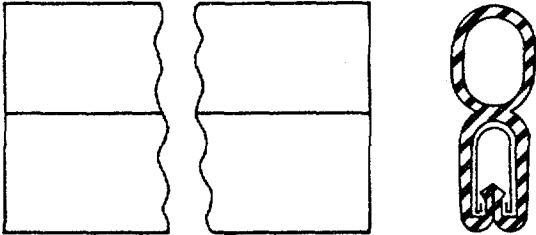
PART NUMBER	LENGTH
595502-2	2 ft
595502-12	12 ft
595502-30	30 ft
595502-50	50 ft

Figure E-25



PART NUMBER	LENGTH
5P5968-13	13 ft

Figure E-26



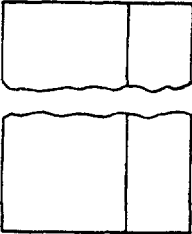
PART NUMBER	LENGTH
5P7211-4	4 ft
5P7211-13	13 ft
5P7211-50	50 ft

Figure E-27



PART NUMBER	LENGTH
595385-46	46 in.

Figure E-28












PART NUMBER	LENGTH
8D6372-30	30 ft

**APPENDIX F
TORQUE LIMITS**

F-1. SCOPE

Table F-1 gives the standard torque values for capscrews, nuts and taperlock studs of SAE Grade 1 and better. Exceptions to the following values are given in the maintenance task where appropriate.

F-2. CAPSCREW MARKING

Current Usage	Much Used	Much Used	Used at Times	Used at Times
Quality of Material	Minimum	Medium	Best	Commercial
SAE Grade Number	1 or 2	5	6 or 7	8
Capscrew Head Markings			6  7 	 
Manufacturer's marks may vary				
These are all SAE Grade 5 (3 line)	 			

F-3. STANDARD TORQUE VALUES

CAUTION

If replacement capscrews are of a higher grade than originally supplied, use torque specifications for that placement. This will prevent equipment damage due to overtorquing.

Table F-1. Standard Torque Limits

Capscrew Body Size (Inches) - (Thread)		Grade 1/2 Torque Lb Ft (Nm)		Grade 5 Torque Lb Ft (Nm)		Grade 6/7 Torque Lb Ft (Nm)		Grade 8 Torque Lb Ft (Nm)	
NOTE									
Use these torques for standard capscrews with clean, dry threads.									
1/4	20	5	(7)	8	(11)	10	(14)	12	(16)
28	6	(8)	10	(14)				14	(19)
5/16	18	11	(15)	17	(23)	19	(26)	24	(33)
24	13	(18)	19	(26)				27	(37)
3/8	16	18	(24)	31	(42)	34	(46)	44	(60)
24	20	(27)	35	(47)				49	(66)
7/16	14	28	(38)	49	(66)	55	(75)	70	(95)
20	30	(41)	55	(75)				78	(106)
1/2	13	39	(53)	75	(102)	85	(115)	105	(142)
20	41	(56)	85	(115)				120	(163)
9/16	12	51	(69)	110	(149)	120	(163)	155	(210)
18	55	75	120	163				170	(231)
5/8	11	83	(113)	150	(203)	167	(226)	210	(285)
18	95	(129)	170	(231)				240	(325)
3/4	10	105	(142)	270	366	280	(380)	375	(508)
16	115	(156)	295	(400)				420	(569)
7/8	9	160	(217)	395	(536)	440	(597)	605	(820)
14	175	(237)	435	(590)				675	(915)
1	8	235	(319)	590	(800)	660	(895)	910	(1234)
	14	250	(339)	660	(895)			990	(1342)

NOTE

Use these torques for capscrews and nuts on hydraulic valve bodies with clean, dry threads.

5/16	18	14	(19)	14	(19)	-	-	-	-
3/8	16	25	(34)	25	(34)	-	-	-	-
7/16	14	40	(54)	40	(54)	-	-	-	-
1/2	13	61	(82)	61	(82)	-	-	-	-
5/8	11	120	(162)	120	(162)	-	-	-	-

Table F-1. Standard Torque Limits (Cont'd)

Capscrew Body Size (Inches) (Thread)	Grade 1/2 Torque Lb Ft (Nm)	Grade 5 Torque Lb Ft (Nm)	Grade 6/7 Torque Lb Ft (Nm)	Grade 8 Torque Lb Ft (Nm)

NOTE
Use these torques for studs with clean, dry taperlock threads.

1/4	20	-	-	6	(8)	-	-	-	-
5/16	18	-	-	11	(16)	-	-	-	-
3/8	16	-	-	21	(29)	-	-	-	-
7/16	14	-	-	32	(43)	-	-	-	-
1/2	13	-	-	42	(58)	-	-	-	-
9/16	12	-	-	65	(87)	-	-	-	-
5/8	11	-	-	80	(107)	-	-	-	-
3/4	10	-	-	117	(160)	-	-	-	-
7/8	9	-	-	180	(242)	-	-	-	-
1	8	-	-	275	(375)	-	-	-	-
1-1/8	8	-	-	335	(455)	-	-	-	-
1-1/4	8	-	-	420	(565)	-	-	-	-
1-3/8	8	-	-	500	(675)	-	-	-	-
1-1/2	6	-	-	575	(780)	-	-	-	-

NOTE

Always use the torque values listed above when specific torque values are not available.

Do not use above values in place of those specified in other sections of this manual; special attention should be observed when using SAE Grade 6, 7 and 8 capscrews.

Reduce torque by 10 percent when engine oil is used as a lubricant.

Reduce torque by 20 percent if new plated capscrews are used.

Capscrews threaded into aluminum may require reductions in torque of 30 percent or more of Grade 5 capscrews torque and must attain two capscrew diameters of thread engagement.

GLOSSARY
Section I. ABBREVIATIONS

ROPS	Rollover protective structure
DC	Direct current
V	Volts
STE/ICE.....	Simplified test equipment for internal combustion engines
VTM.....	Vehicle test meter
TK.....	Transducer kit
DCA.....	Diagnostic connector assembly
psi.....	pounds per square inch
RPM.....	Revolutions per minute
kPa	Kilo pascals

Section II. DEFINITIONS OF UNUSUAL TERMS

Electrolyte - A substance when introduced to liquid is capable of conducting electric current.

Transducer - A device that transmits power from one system to another.

Pusharm - One on each side of dozer; attaches blade to roller frame.

Glossary-1/(Glossary-2 Blank)

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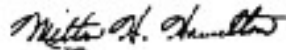
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By Order of the Secretary of the Army:

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THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

- 1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
- 1 Meter = 100 Centimeters = 1.000 Millimeters = 39.37 Inches
- 1 Kilometer = 1.000 Meters = 0.621 Miles

SQUARE MEASURE

- 1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
- 1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
- 1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

- 1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches
- 1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

LIQUID MEASURE

- 1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
- 1 Liter = 1,000 Milliliters = 33.82 Fluid Ounces

TEMPERATURE

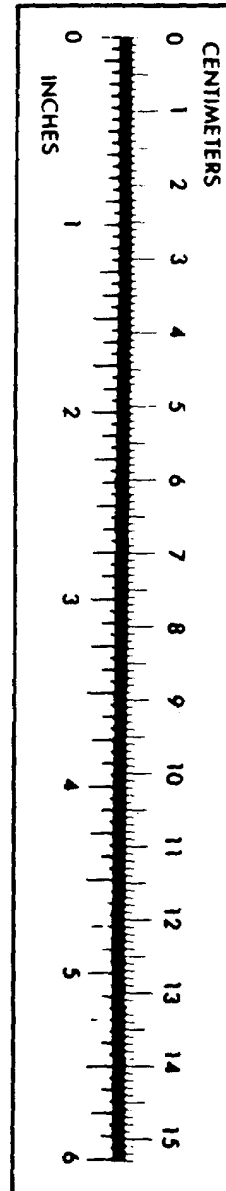
- $5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}$
- 212° Fahrenheit is equivalent to 100° Celsius
- 90° Fahrenheit is equivalent to 32.2° Celsius
- 32° Fahrenheit is equivalent to 0° Celsius
- $9/5 \text{ C}^{\circ} + 32 = \text{F}^{\circ}$

WEIGHTS

- 1 Gram = 0.001 Kilograms = 1,000 Milligrams = 0.035 Ounces
- 1 Kilogram = 1,000 Grams = 2.2 lb.
- 1 Metric Ton = 1,000 Kilograms = 1 Megagram = 1.1 Short Tons

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



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