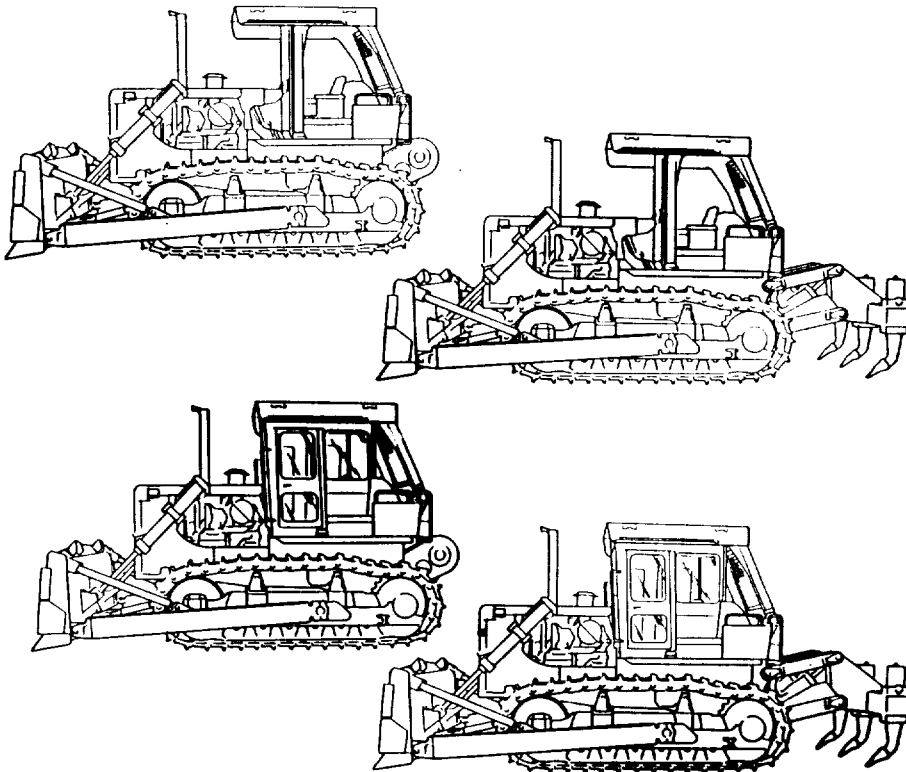


TECHNICAL MANUAL

OPERATOR'S MANUAL  
FOR

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



INTRODUCTION	1-1
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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

---

\*This publication supersedes TM 5-2410-237-10- dated 20 Jan. 1989.

Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY

JANUARY 1993



## WARNING

To avoid injury, eye protection and acid-resistant gloves must be worn when working around batteries. Do not smoke, use open flame, make sparks or create other ignition sources around batteries. If a battery is giving off gases, it can explode and cause injury to personnel. Remove all jewelry such as rings, ID tags, watches, and bracelets. If jewelry or a tool contacts a battery terminal, a direct short will result in instant heating or electric shock damage to equipment, and injury to personnel.

Sulfuric acid contained in batteries can cause serious burns. If battery corrosion or electrolyte makes contact with skin, eyes or clothing, take immediate action to stop the corrosive burning effects. Failure to follow these procedures may result in injury or death.

- a. **Eyes.** Flush with cold water for no less than 15 minutes and seek medical attention immediately.
- b. **Skin.** Flush with large amounts of cold water until all acid is removed. Seek medical attention as required.
- c. **Internal.** If corrosion or electrolyte is ingested, drink large amounts of water or milk. Follow with milk of magnesia, beaten egg or vegetable oil. Seek medical attention immediately.
- d. **Clothing/Equipment.** Wash area with large amounts of cold water. Neutralize acid with baking soda or household ammonia.

## WARNING

- **DO NOT** smoke or permit any open flame in area of tractor while you are servicing fuel system. Be sure hose nozzle is grounded against filler tube during refueling to prevent static electricity. Failure to follow this warning may result in injury to personnel or equipment damage.
- **DO NOT** perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to vehicle and injury or death.

## WARNING

- **DO NOT** service cooling system unless engine has cooled. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.
- **DO NOT** remove cooling system radiator cap when engine is hot. Allow engine to cool down. Loosen cap to first stop and let any pressure out of cooling system, then remove cap. Failure to follow this warning may cause serious burns.
- Wear effective eye, glove, and skin protection when handling coolants. Failure to do so may cause injury.

## WARNING

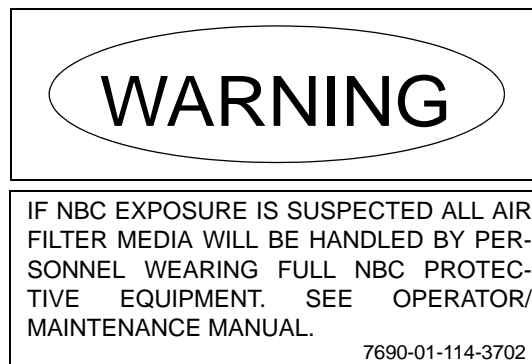
Do NOT remove hydraulic tank filler cap or disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Hydraulic system pressure can be over 2500 psi (17,237 kPa), even with engine and pump OFF. To relieve pressure, lower all hydraulic attachments to the ground and shut down engine. Move control levers through all operating positions, then **SLOWLY** loosen hydraulic tank filler cap. After maintenance, tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury or death.

## WARNING

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

## WARNING

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



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

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

Part Number (PN) - 12296626

Commercial and Government Entity Code (CAGEC) - 19207

## WARNING

Follow winch operating precautions and procedures carefully. Failure to follow safe operating precautions and procedures could result in injury or death, or damage to equipment:

- Wear heavy gloves when handling wire rope to protect hands against injury.
- Stand clear of a reeled-out wire rope that is loaded. Stand clear a distance equal to 1-1/2 times the length of reeled-out wire rope.

TECHNICAL MANUAL  
TM5-2410-237-10  
Change No. 1

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
Washington, D.C., 15 March 2005

**OPERATOR'S MANUAL**

**FOR**

**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**

TM 5-2410-237-10, dated 26 January 1993, is changed as follows:

1. A Service Life Extension Program (SLEP) has been implemented on selected D7G Tractors. SLEP information is included in this change package.
2. File this change sheet in front of the publication for reference purposes.
3. New or changed material is indicated by a vertical bar adjacent to the material and/or change designations at the bottom of the affected page.
4. Remove old pages and insert new pages.

**Remove Pages**

*i through 1-0  
1-1 and 1-2  
1-5 and 1-6  
1-9 and 1-10  
2-3 and 2-4  
2-9 through 2-18  
2-19 through 2-22  
2-45 through 2-52  
3-1 through 3-14  
A-1 and A-2  
B-3 through B-6  
D-1 through D-4*

*Index-1 through Index-4  
Sample 2028  
Blank 2028s*

**Insert Pages**


*a and b  
A and B  
i through 1-0  
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1-5 and 1-6  
1-9 and 1-10  
2-3 and 2-4  
2-9 through 2-18.18  
2-19 through 2-22  
2-45 and 2-50  
3-1- through 3-20  
A-1 and A-2  
B-3 through B-6  
D-1 through D-3/(D-4 Blank)  
E-1 through E-15/(E-16 Blank)  
F-1 thru F-6  
Index-1 through Index-4  
Sample 2028  
Blank 2028s*

TM5-2410-237-10  
C1

By Order of the Secretary of the Army:

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

Official:

  
SANDRA R. RILEY  
*Administrative Assistant to the*  
*Secretary of the Army*  
0500601

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## LIST OF EFFECTIVE PAGES/WORK PACKAGES

Date of issue for original manual and change pages is:

Original            26 January 1993  
 Change 1           15 March 2005

**TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 42 AND TOTAL NUMBER OF CHAPTERS IS 3 CONSISTING OF THE FOLLOWING:**

<b>Page No.</b>	<b>*Change No.</b>
Cover (Back Blank)	0
a to b	1
A (B Blank)	1
i thru 1-0	1
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1-5 and 1-6	1
1-7 and 1-8	0
1-9 and 1-10	1
1-11 thru 1-16	0
2-1 and 2-2	0
2-3 and 2-4	1
2-5 thru 2-8	0
2-9 thru 2-18.18	1
2-19 thru 2-22	1
2-23 thru 2-44	0
2-45 thru 2-50	1
3-1 thru 3-22	1
A-1 and A-2	1
B-1 and B-2	0
B-3 thru B-6	1
C-1 thru C-4	0
D-1 thru D-4	1
E-1 thru E-16	1
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TECHNICAL MANUAL

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
Washington, D.C., 26 January 1993

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**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

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

How to Use This Manual . . . . . ii

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    Section II Equipment Description . . . . . 1-3

    Section III Technical Principles of Operation . . . . . 1-7

**CHAPTER 2 OPERATING INSTRUCTIONS . . . . . 2-1**

    Section I Description and Use of Operator's Controls and Indicators . . . . . 2-1

    Section II Operator Preventive Maintenance Checks and Services (PMCS) . . . . . 2-10

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**CHAPTER 3 OPERATOR/CREW MAINTENANCE INSTRUCTIONS . . . . . 3-1**

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**APPENDIX C. ADDITIONAL AUTHORIZATION LIST . . . . . C-1**

\*This publication changes TM 5-2410-237-10, dated 26 January 1993, and supersedes portions of LO 5-2410-237-12, dated 20 January 1989, TM 5-2410-237-10-HR, dated 23 November 1992, and TB 5-2410-237-14, dated 9 June 1989.

APPENDIX D. EXPENDABLE SUPPLIES AND MATERIALS LIST .....D-1

APPENDIX E. OPERATION AND OPERATOR MAINTENANCE OF MINE CLEARING/ARMOR  
PROTECTION (MCAP) KIT ..... E-1

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## HOW TO USE THIS MANUAL

### NOTE

**A Service Life Extension Program (SLEP) has been implemented on selected D7G Tractors.**

**The major differences between a non-SLEP and SLEP tractor are as follows:**

**A non-SLEP tractor is equipped with a folded core radiator and a fixed engine cooling fan.**

**A SLEP tractor is equipped with a modular radiator and a reversible engine cooling fan.**

**Information in this change to TM5-2410-237-10 covers both non-SLEP and SLEP tractors.**

This manual (TM5-2410-237-10) is divided into 3 chapters and 6 appendixes with an alphabetical index located after the last appendix. Chapters are divided into sections and sections are further divided into paragraphs.

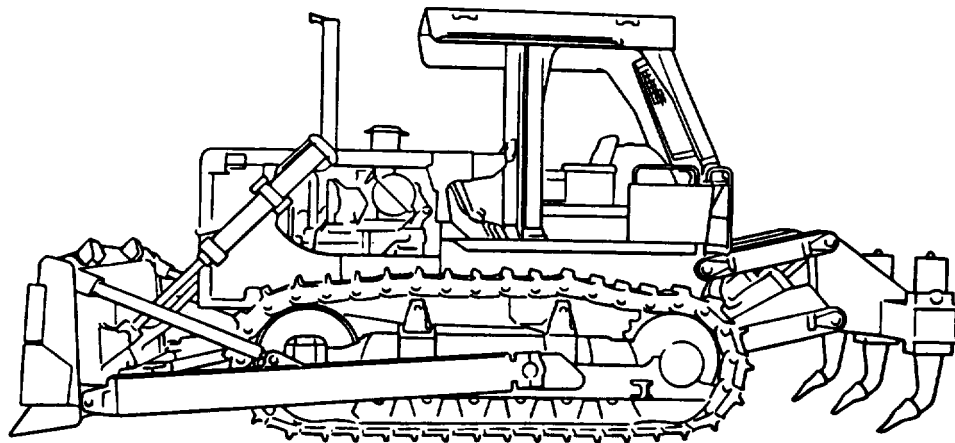
Look in Chapter 1 for standard data found in all TM's. Chapter 1 will also help you to become familiar with the tractor through physical and functional descriptions of the equipment.

Look in Chapter 2 for information regarding the safe operation of the tractor under a variety of conditions. Also find details on the operator's controls and indicators, as well as your PMCS responsibilities, to include lubrication.

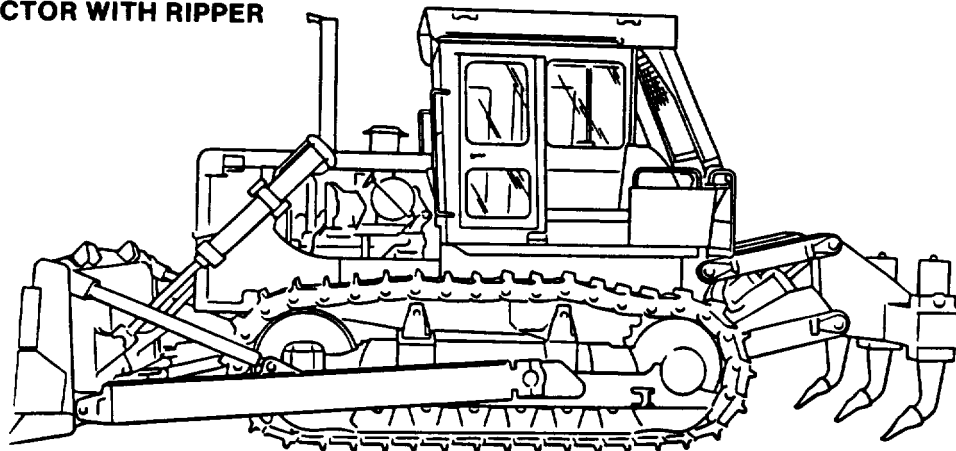
Chapter 3 begins with a troubleshooting table which will help you isolate and deal with problems which may occur. Operator's maintenance tasks are also contained in this chapter. At the beginning of each maintenance task is a block of information called "Initial Setup." Read this block of information before you begin the task; it contains important information about the task to be done.

The table of contents will direct you to chapters and sections. But if you need to find a specific subject, go to the alphabetical subject index for its location in the manual.

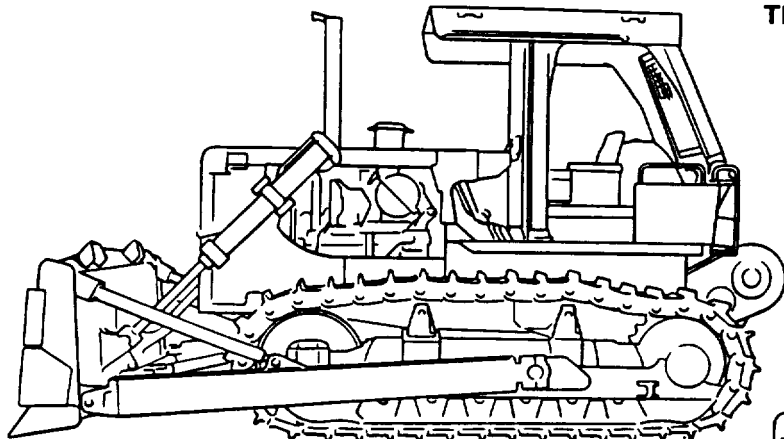
Dashed leader lines used in the Lubrication Chart (Page 2-11.3) indicate lubrication points that are located on both sides of the equipment.



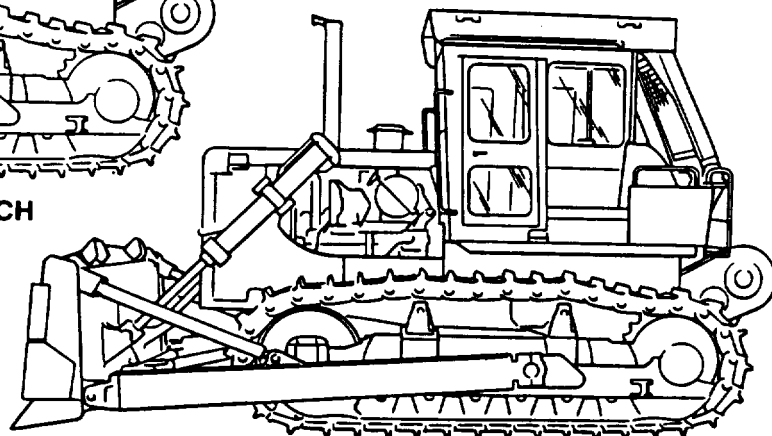
**TRACTOR WITH RIPPER**



**TRACTOR WITH RIPPER AND WINTERIZED CAB**



**TRACTOR WITH WINCH**



**TRACTOR WITH WINCH AND WINTERIZED CAB**

**Figure 1-0. T-9 Tractor – Features and Components**

## CHAPTER 1 INTRODUCTION

### Section I. General Information

#### NOTE

A Service Life Extension Program (SLEP) has been implemented on selected D7G Tractors.

The major differences between a non-SLEP and SLEP tractor are as follows:

A non-SLEP tractor is equipped with a folded core radiator and a fixed engine cooling fan.

A SLEP tractor is equipped with a modular radiator and a reversible engine cooling fan.

Information in this change to TM5-2410-237-10 covers both non-SLEP and SLEP tractors.

#### 1-1. SCOPE.

- a. **Type of Manual.** This manual contains operation and maintenance instructions for the operator/crew of the T-9 Tractor, Caterpillar Model D7G.
- b. **Model Numbers and Equipment Names.** T-9 Tractor, Full Tracked, Low Speed: Diesel Engine-Driven, Medium-Drawbar Pull, Caterpillar Model D7G, is 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.
 

Tractors equipped with ripper are designed for dozing and also for ripping soil, rocks, asphalt, and concrete.

Tractors equipped with winch are designed for dozing and also for all types of winching operations.
- d. **Special Limitation on Equipment.** The tractor has no special limitations. Normal limitations such as speed, drawbar pull, etc. are outlined in paragraph 1-7.
- e. **Mine Clearing/Armor Protection (MCAP) Kit.** When equipped with an MCAP kit, the tractor is capable of clearing both surface-laid and buried anti-tank (AT) and anti-personnel (AP) land mines, to a depth of 12 inches each pass. Refer to Appendix E.

#### 1-2. MAINTENANCE FORMS AND RECORDS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS).

#### 1-3. DELETED

**1-4. DELETED**

**1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S).**

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

**1-6. WARRANTY INFORMATION.**

Tractors that have gone through the Service Life Extension Program (SLEP) can be identified by the letter "R" added to the tractor's serial number. These tractors have a new warranty. Refer to Appendix F for this warranty information.

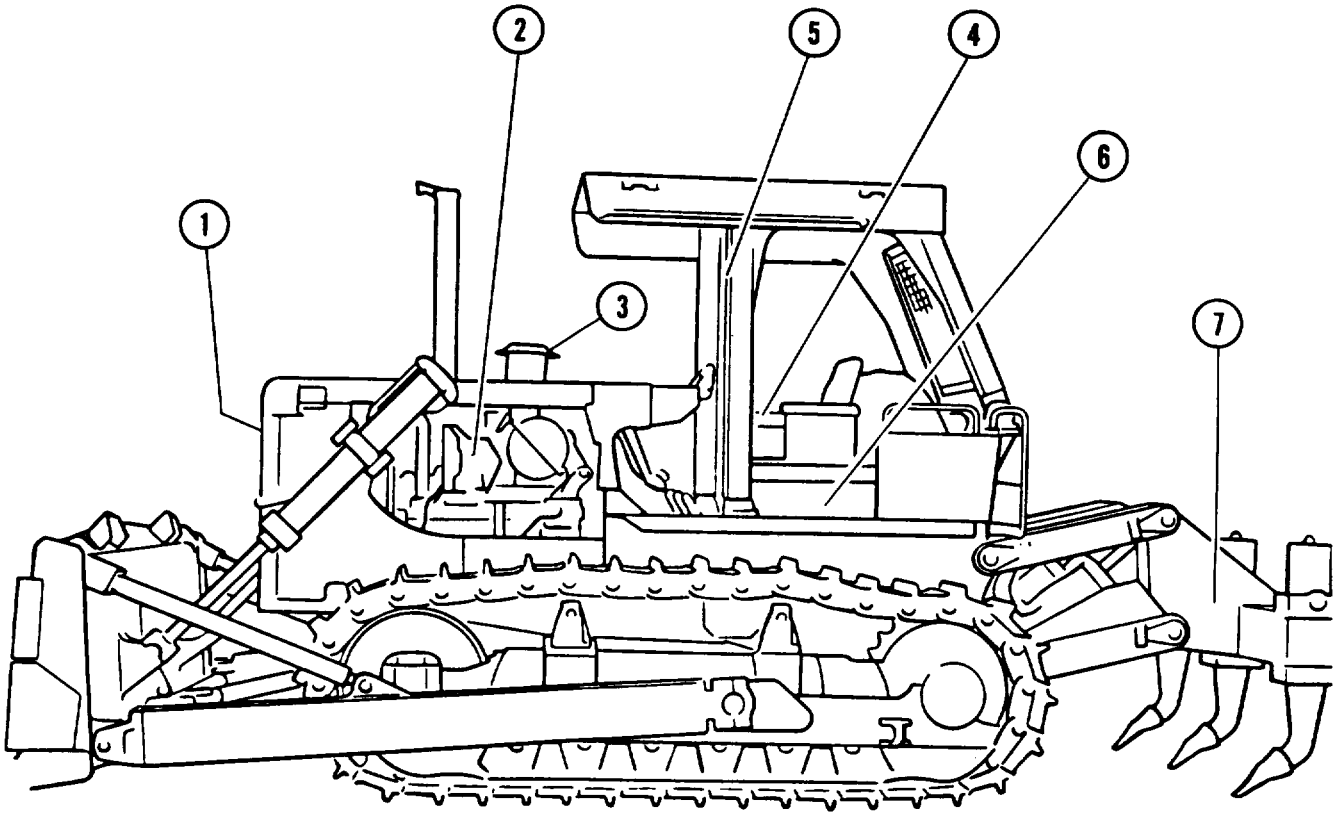
## Section II. Equipment Description

### 1-7. EQUIPMENT PURPOSE, CAPABILITIES AND FEATURES.

- a. Purpose. The T-9 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 inches.
  - (3) Tractors with winch can winch loads of 50,000 lbs at a line speed of 80 ft per minute.
  - (4) Tractors with winch deliver 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.
  - (8) Travel speeds are given in paragraph 1-10 on page 1-6.

1-8. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

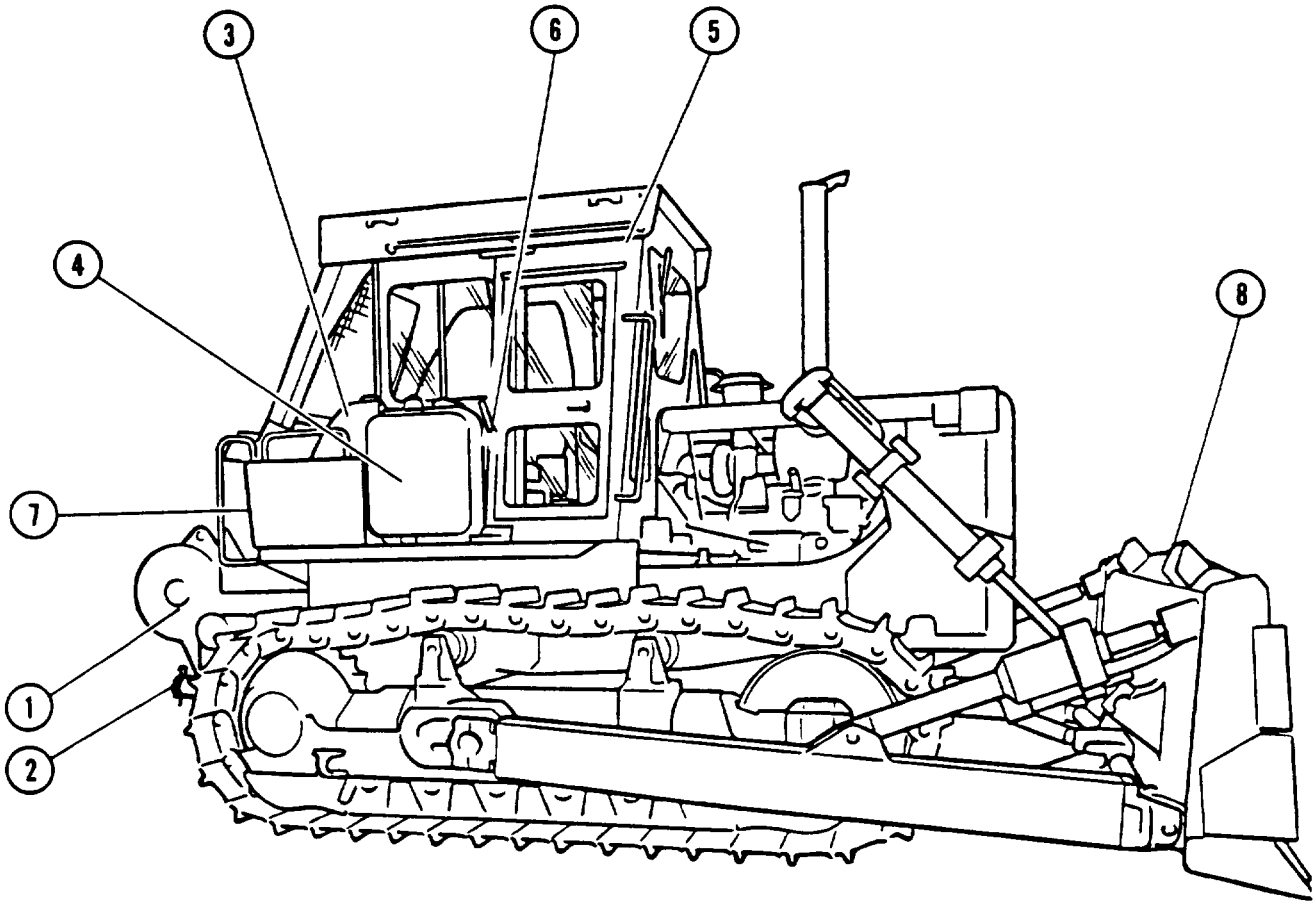
a. Left Side View of Tractor with Ripper.



- (1) Radiator. Contains coolant which provides engine cooling.
- (2) Ether Starting Aid Compartment. Location of the ether canister for cold weather starting.
- (3) Precleaner. Prevents debris from entering the air intake system.
- (4) Operator's Station. Location of all the controls and indicators which the operator uses during operation.
- (5) Rollover Protective Structure. Protects the operator in the event of an accidental rollover.
- (6) Battery Box. Holds the batteries which provide current for the electric system.
- (7) Ripper. Used for loosening soil and for ripping through hard compacted surfaces.



b. Right Side View of Tractor with Winch and Winterized Cab.



- (1) Winch. Used for all types of winching operations.
- (2) Drawbar. Used for towing compaction equipment, scrapers, etc.
- (3) Fuel Tank. Contains fuel for engine operation.
- (4) Hydraulic Tank. Contains hydraulic oil for hydraulic systems operation.
- (5) Winterized Cab. Protects the operator from severe weather.
- (6) Door Stop. The door can be secured to this arm to keep it in the open position.
- (7) Tool Box. Contains the drawbar pin assembly for tractor with winch.
- (8) Bulldozer Blade Assembly. Used for earth moving operations.

**1-9. DIFFERENCES BETWEEN MODELS.**

This operator’s TM covers the operation of four models of the T-9, Caterpillar Model D7G Tractor. All models are identically equipped except for the rear-mounted implement and winterized cab. The controls for each application are explained beginning on page 2-1.

**1-10. EQUIPMENT DATA.**

**ENGINE:**

Model . . . . . 3306  
 Manufacturer . . . . . Caterpillar  
 Fuel system . . . . . Direct Injection  
 Horsepower (@2000 rpm) . . . . . 200  
 Number of cylinders . . . . . 6  
 Bore . . . . . 4.75 in. (12.0 cm)  
 Stroke . . . . . 6.00 in.(15.2 cm)  
 Displacement . . . . . 638 cu. in.(10.4 L)  
 Firing order (injection sequence) . . . . . 1,5,3,6,2,4

**DIMENSIONS AND WEIGHT:**

Length (tractor) . . . . . 13’9” (4.2 m)  
 (with blade) . . . . . 17’4” (5.3 m)  
 (with blade and winch) . . . . . 18’4” (5.6 m)  
 (with blade and ripper) . . . . . 22’9” (6.9 m)  
 Width . . . . . 12’ (3.6 m)  
 Height . . . . . 11’ (3.3 m)  
 Weight (tractor) . . . . . 37,256 lbs (16,899 kg)  
  
 (w/blade) . . . . . 46,112 lbs (20,916 kg)  
 (w/blade and ripper) . . . . . 51,720 lbs (23,460 kg)  
 (w/blade and winch) . . . . . 48,910 lbs (22,185 kg)  
 (winterized cab with ROPS) . 2,489 lbs (1,129 kg)  
 Track:  
 Length (on ground) . . . . . 107” (272 cm)

**ELECTRICAL DATA:**

Starter:  
 Manufacturer . . . . . Delco-Remy  
  
 Rating . . . . . 24 volt  
  
 Alternator:  
 Manufacturer . . . . . Bosch  
  
 Rating . . . . . 24 volt, 50 amp  
  
 Batteries . . . . . 24 volt system, 2 12-volt batteries

**IMPLEMENT DATA:**

Blade:  
 Weight . . . . . 7,660 lbs (3,474 kg)  
 Height . . . . . 4’2” (1.2 m)  
 Width . . . . . 12’ (3.65 m)  
  
 Ripper:  
 Weight . . . . . 5,700 lbs (2,585 kg)  
 Width . . . . . 87’ (221 cm)  
  
 Winch:  
 Weight . . . . . 3,600 lbs (1,633 kg)  
 Cable length . . . . . 177’ (53.9 m)  
 (200’ (60.9 m) installed @ SLEP rebuild if cable is bad or less than 175’ (53.3 m))

**OPERATION DATA:**

Speed (forward):  
 1st . . . . . 0-2.3 mph (0-3.7 kph)  
 2nd . . . . . 0-4.0 mph (0-6.4 kph)  
 3rd . . . . . 0-6.2 mph (0-10 kph)  
  
 Speed (reverse):  
 1st . . . . . 0-2.8 mph (0-4.5 kph)  
 2nd . . . . . 0-4.9 mph (0-7.8 kph)  
 3rd . . . . . 0-7.4 mph (0-10 kph)

**CAPACITIES:**

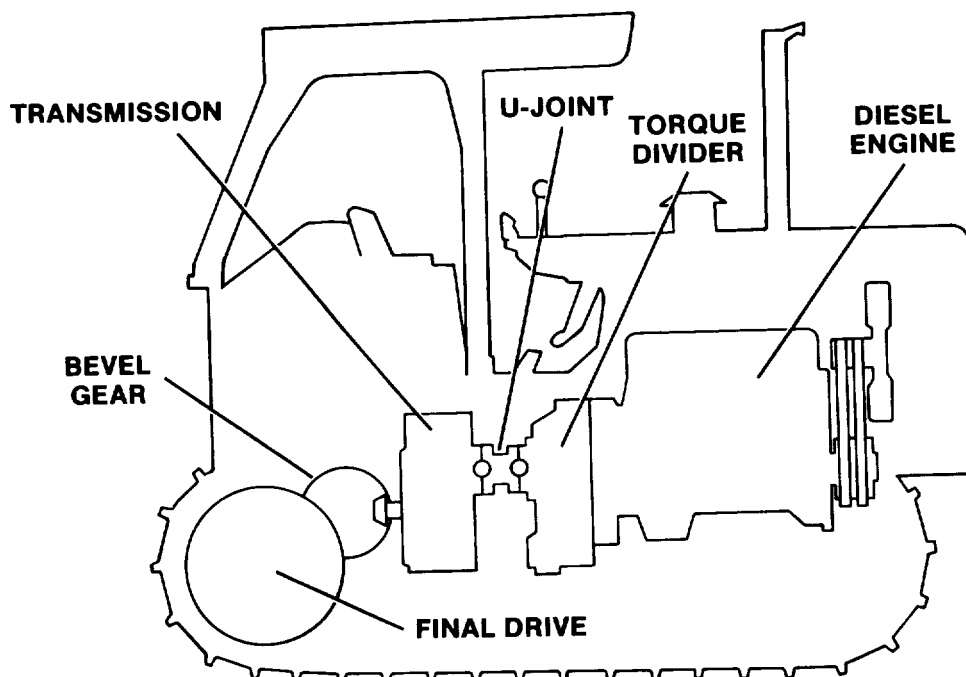
Fuel tank . . . . . 115 gallons (435 L)  
 Cooling system . . . . . 12 gallons (45 L)  
 Hydraulic system . . . . . 21 gallons (80 L)  
 Engine crankcase . . . . . 7.25 gallons (27 L)  
 Winch oil sump . . . . . 16 gallons (60 L)  
 Final drives . . . . . 9 gallons (each) (34 L)  
 Transmission, bevel gear and steering clutch compartments . 18.5 gallons (70 L)

## Section III. Technical Principles of Operation

## 1-11. GENERAL.

This section explains how components of the T-9 tractor work together. A functional description of equipment operation is given for the power train, engine lubrication system, fuel system, engine cooling system, steering and brake system, electrical system, dozer hydraulic system, ripper hydraulic system, and the winch hydraulic system.

## 1-12. POWER TRAIN.



**DIESEL ENGINE.** The tractor is powered by an in-line six cylinder diesel engine with a direct injection fuel system.

**TORQUE DIVIDER.** Connects the engine to the transmission. The torque divider will increase or decrease the torque from the engine depending on the load at which the tractor is working.

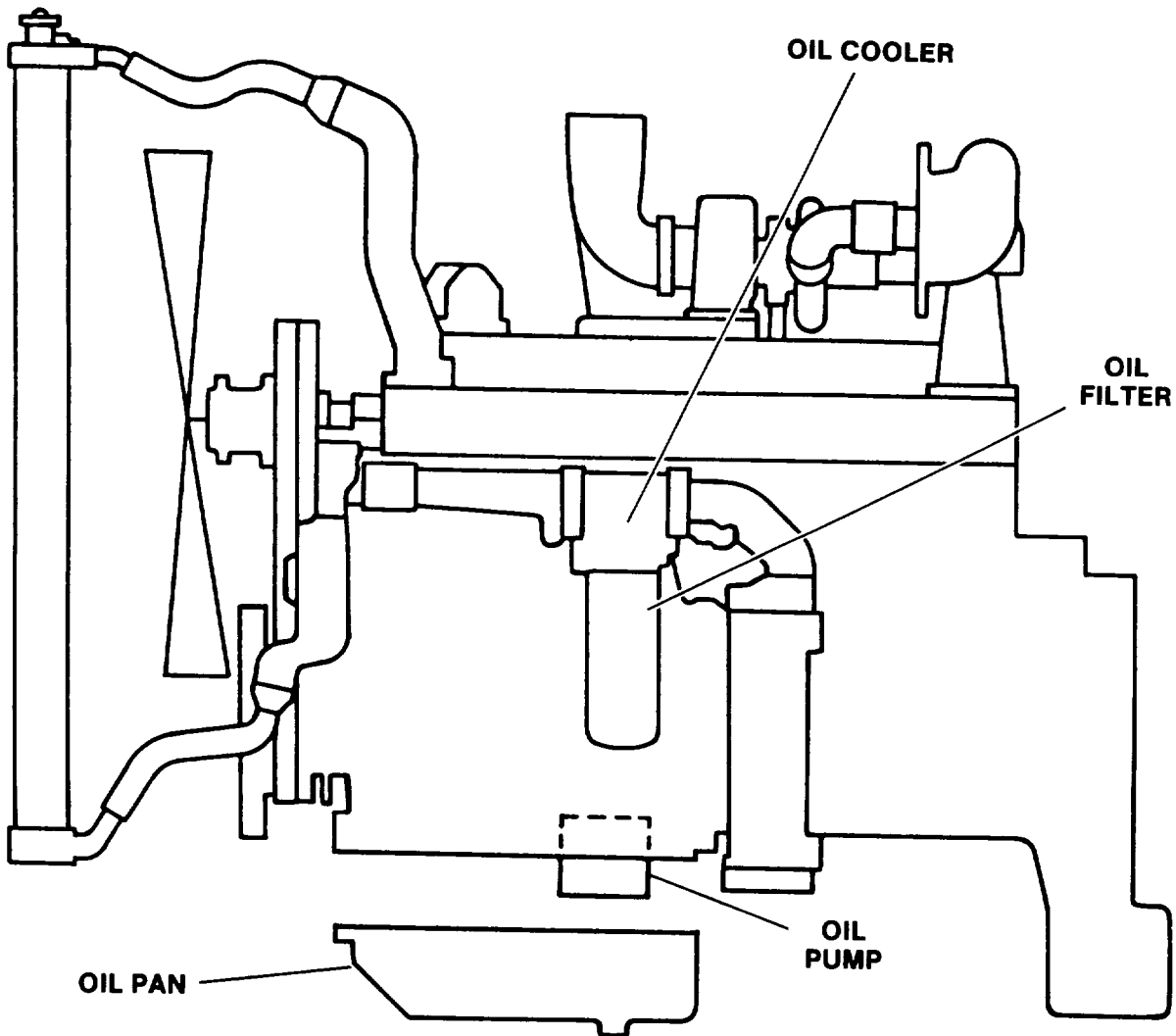
**U-JOINT.** Transfers the power from the torque divider to the transmission.

**TRANSMISSION.** Controls the speed and direction of the tractor. At this point in the power train the operator can control the power by moving the transmission selector lever to neutral or one of three speeds in forward or reverse.

**BEVEL GEAR.** Connects transmission to the final drives.

**FINAL DRIVE.** Delivers the power of the power train to the sprocket which turns the track.

1-13. ENGINE LUBRICATION SYSTEM.



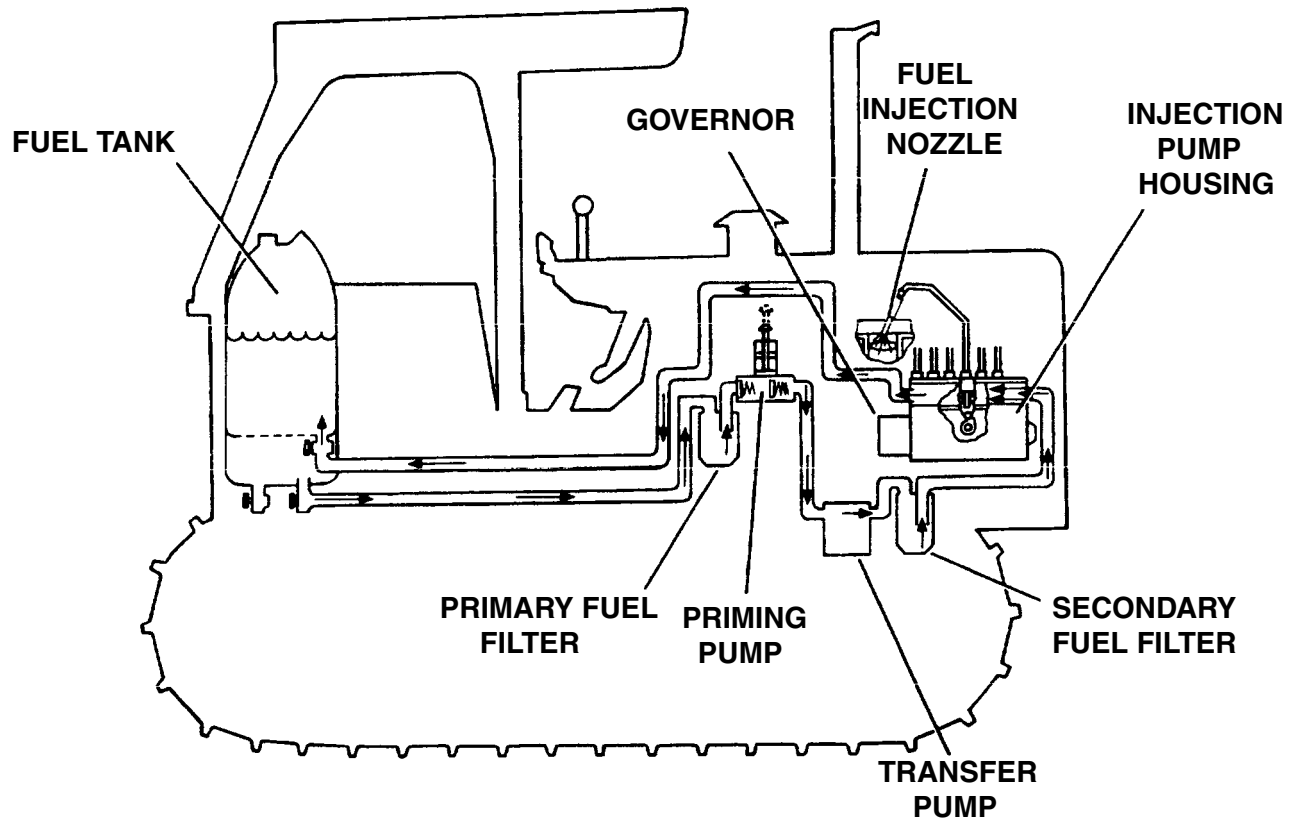
**OIL PAN.** Contains the oil that lubricates moving parts in the engine. It is attached to the bottom of the engine block.

**OIL PUMP.** The pump is located just above the oil pan in the crankcase. The pump draws oil from the oil pan and sends it through the oil cooler, and then through the oil filter. From the filter the oil enters the cylinder block to lubricate the engine and is then returned to the oil pan. From the filter, oil is also sent through the turbocharger and then returned to the oil pan.

**OIL COOLER.** When the engine is warm, the oil is sent through the oil cooler to lower its temperature.

**OIL FILTER.** Removes particles from the oil which could cause damage to the internal parts of the engine.

## 1-14. FUEL SYSTEM.



**FUEL TANK.** Provides containment for the fuel. A fuel strainer and the fuel level gage are contained in the filler neck of the tank.

**PRIMING PUMP.** Used by Unit Maintenance to prime the fuel system.

**PRIMARY FUEL FILTER.** Removes larger particles from the fuel before it reaches the transfer pump.

**TRANSFER PUMP.** Pulls fuel from the fuel tank through the primary fuel filter, and pushes it on to the secondary filter and the injection pump.

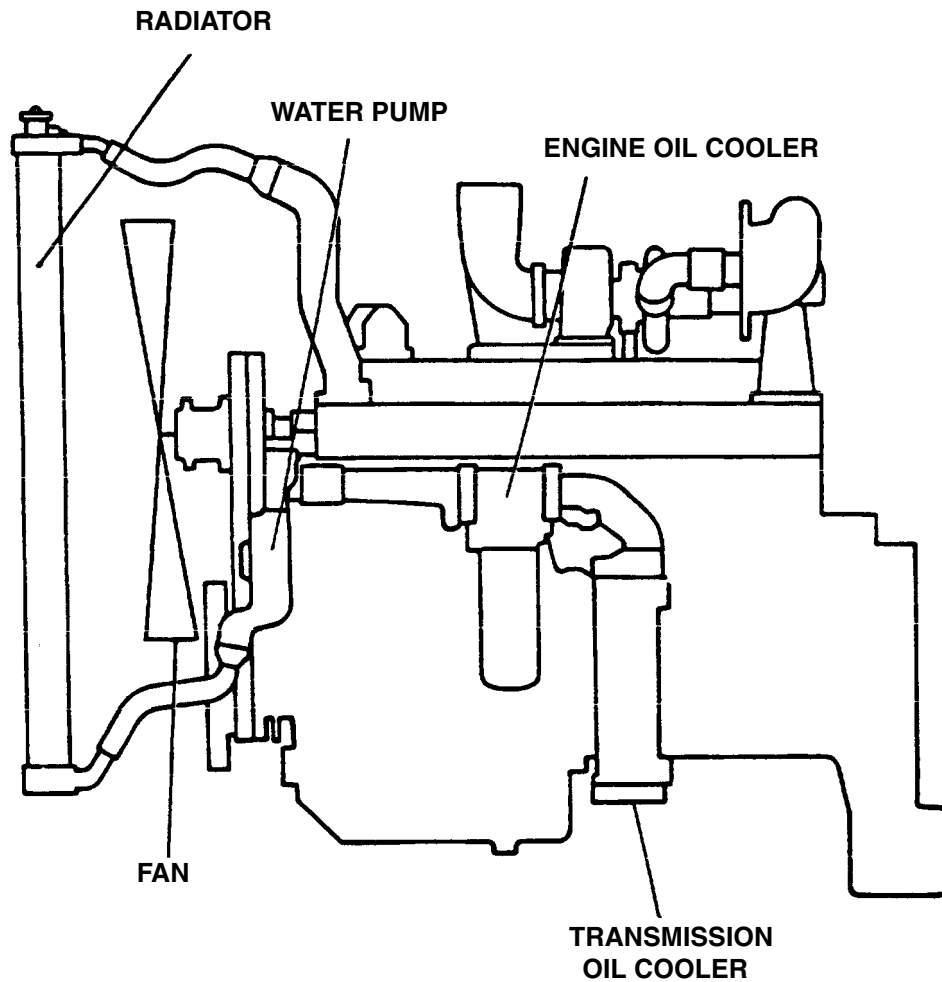
**SECONDARY FUEL FILTER.** Removes smaller particles from the fuel before it reaches the injection pump.

**INJECTION PUMP HOUSING.** Contains six fuel injection pumps which send an exact amount of fuel to the injection nozzles.

**FUEL INJECTION NOZZLE.** Turns the stream of fuel into a fine spray which permits good combustion in the cylinder. There is one nozzle for each cylinder.

**GOVERNOR.** Attached to the fuel injection pump housing, it controls the amount of fuel needed by the engine to maintain a desired engine speed. The governor is controlled by the governor control lever in the operator's station.

1-15. ENGINE COOLING SYSTEM.



**RADIATOR.** Has a filler cap which permits adding coolant to the system. Coolant circulates through the radiator to be cooled after leaving the cylinder block.

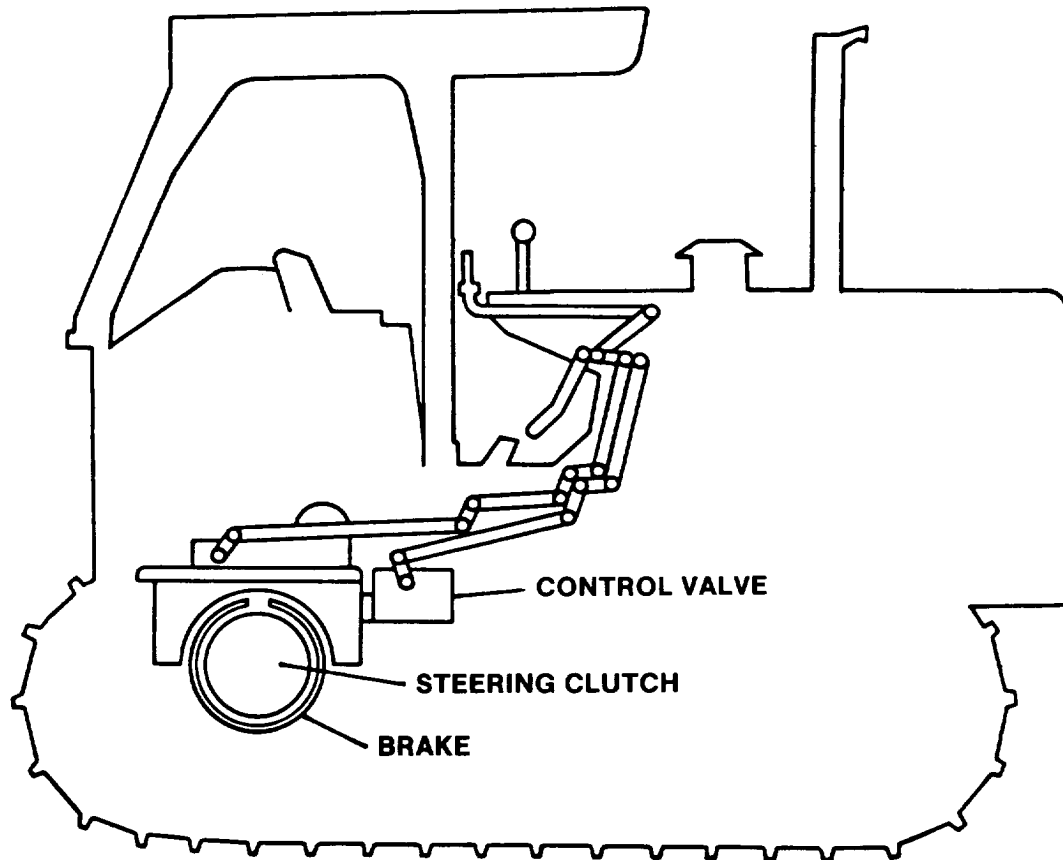
**WATER PUMP.** Draws coolant from the radiator and sends it through the engine oil cooler, and then through the transmission oil cooler. From the transmission oil cooler the coolant enters the cylinder block to cool the engine, and then returns to the radiator.

**ENGINE OIL COOLER.** Coolant passes through water passages and cools the oil going through the oil passages of the cooler.

**TRANSMISSION OIL COOLER.** Coolant passes through the water passages and cools the oil going through the oil passages of the cooler.

**FAN.** The fan is powered by the engine. It helps lower the temperature of the coolant as it passes through the radiator.

## 1-16. STEERING AND BRAKE SYSTEM.

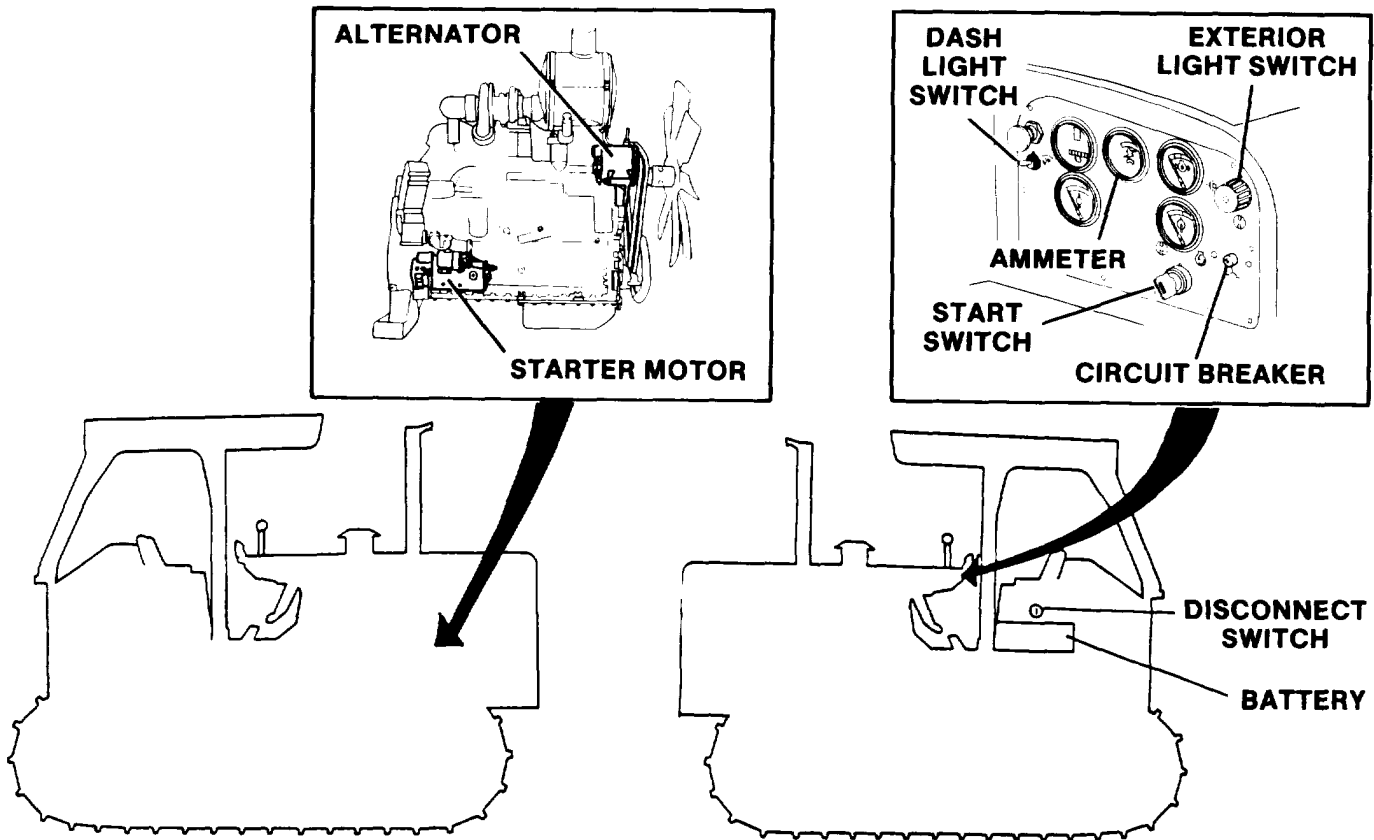


**CONTROL VALVE.** The valve is connected mechanically to the steering control levers. The valve directs the flow of pressure oil in response to the movement of the control levers.

**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 same thing 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.

1-17. ELECTRICAL SYSTEM.



**BATTERIES.** Provide power for three circuits; the charging circuit, the starting circuit, and the lighting (low amperage) circuit. Two 12 volt batteries are connected in parallel to provide 24 volt, 50 amp starting power.

**ALTERNATOR.** The 24 volt, 50 amp alternator, an integral part of the charging circuit, provides current when the engine is running.

**STARTER MOTOR.** Part of the starting circuit, the starter motor is used to turn the engine flywheel fast enough to get the engine to start running.

**CIRCUIT BREAKER.** A switch that opens the battery circuit if the current in the electrical system goes higher than the switch is rated for. When the circuit is open, no current will flow through the electrical system.

**DISCONNECT SWITCH.** A switch that is controlled by the operator. When it is in the off position, the battery circuit will be open so that no current is flowing through the electrical system.

**START SWITCH.** When the disconnect switch is on, you can engage the starting circuit by turning the ignition switch.

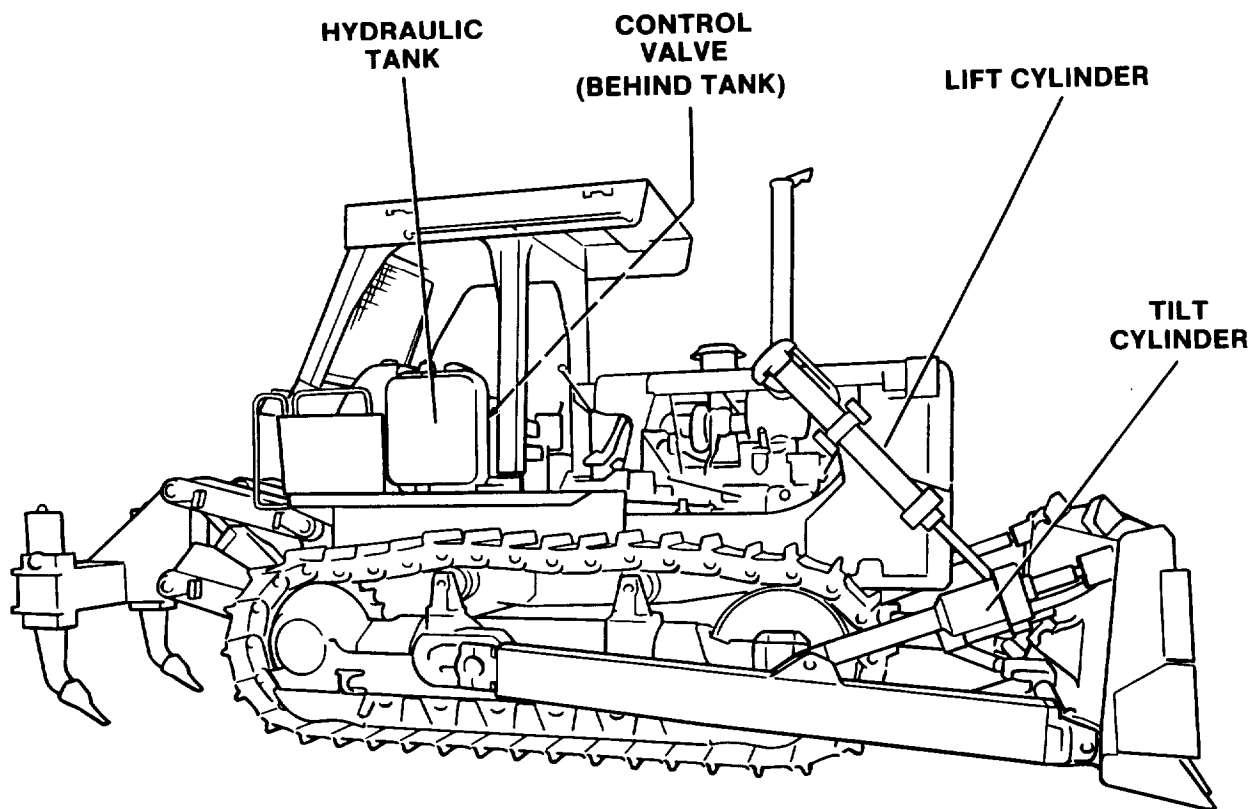
**AMMETER.** This gage monitors the charging circuit.

**DASH LIGHT SWITCH.** Closes the circuit to the dash lamp.

**EXTERIOR LIGHT SWITCH.** Closes the circuit to the lamps on the exterior of the tractor.



## 1-18. BULLDOZER HYDRAULIC SYSTEM.



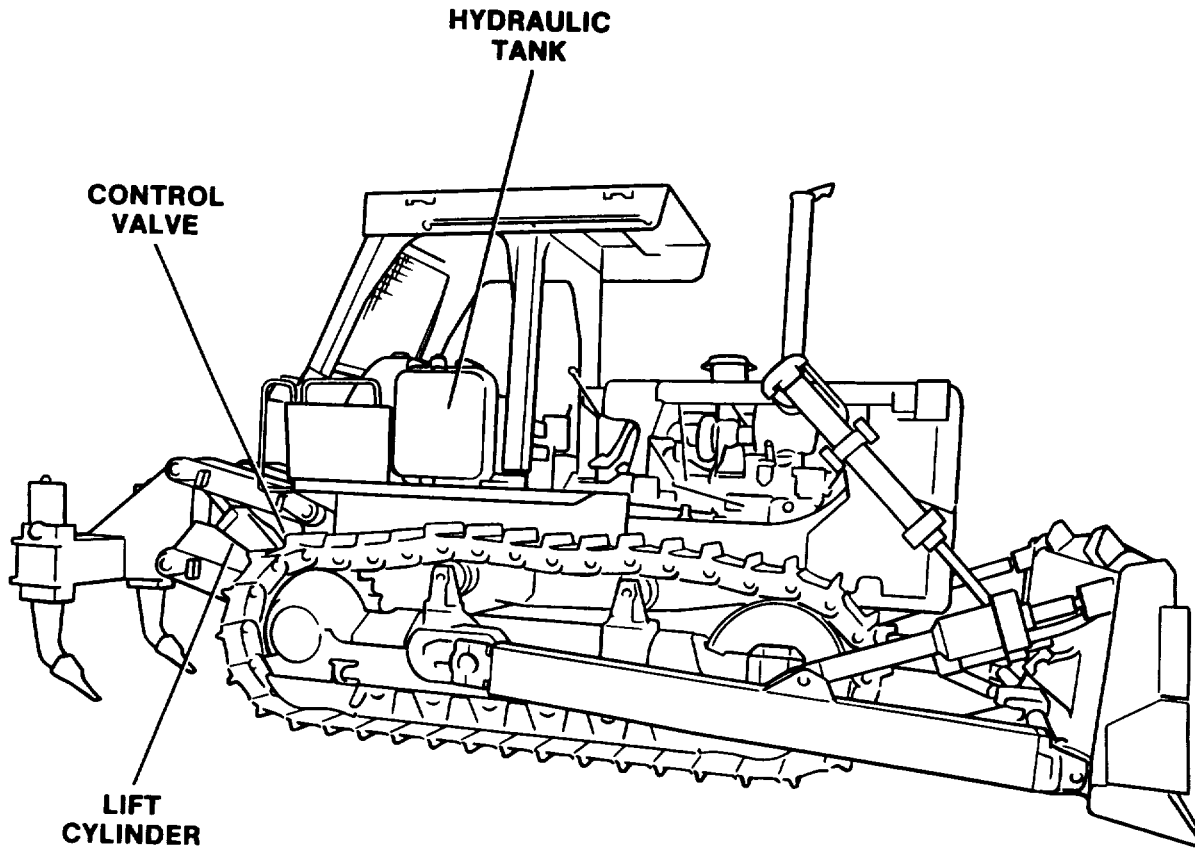
**BULLDOZER CONTROL VALVE.** This valve is connected mechanically to the bulldozer control lever. The valve directs the flow of pressure oil in response to the movement of the control lever.

**TILT CYLINDER.** This cylinder is controlled by the bulldozer control lever. When, the lever is moved to the right, pressure oil from the hydraulic tank causes the cylinder to extend. Moving the lever to the left causes the cylinder to retract.

**LIFT CYLINDERS.** These are two cylinders which are controlled by the bulldozer control lever. When the lever is pushed forward, pressure oil causes the cylinders to extend and lower the blade. When the lever is pulled back, the cylinders retract and raise the blade.

**HYDRAULIC TANK.** This is the reservoir for the oil which controls the movement of the cylinders.

1-19. RIPPER HYDRAULIC SYSTEM.

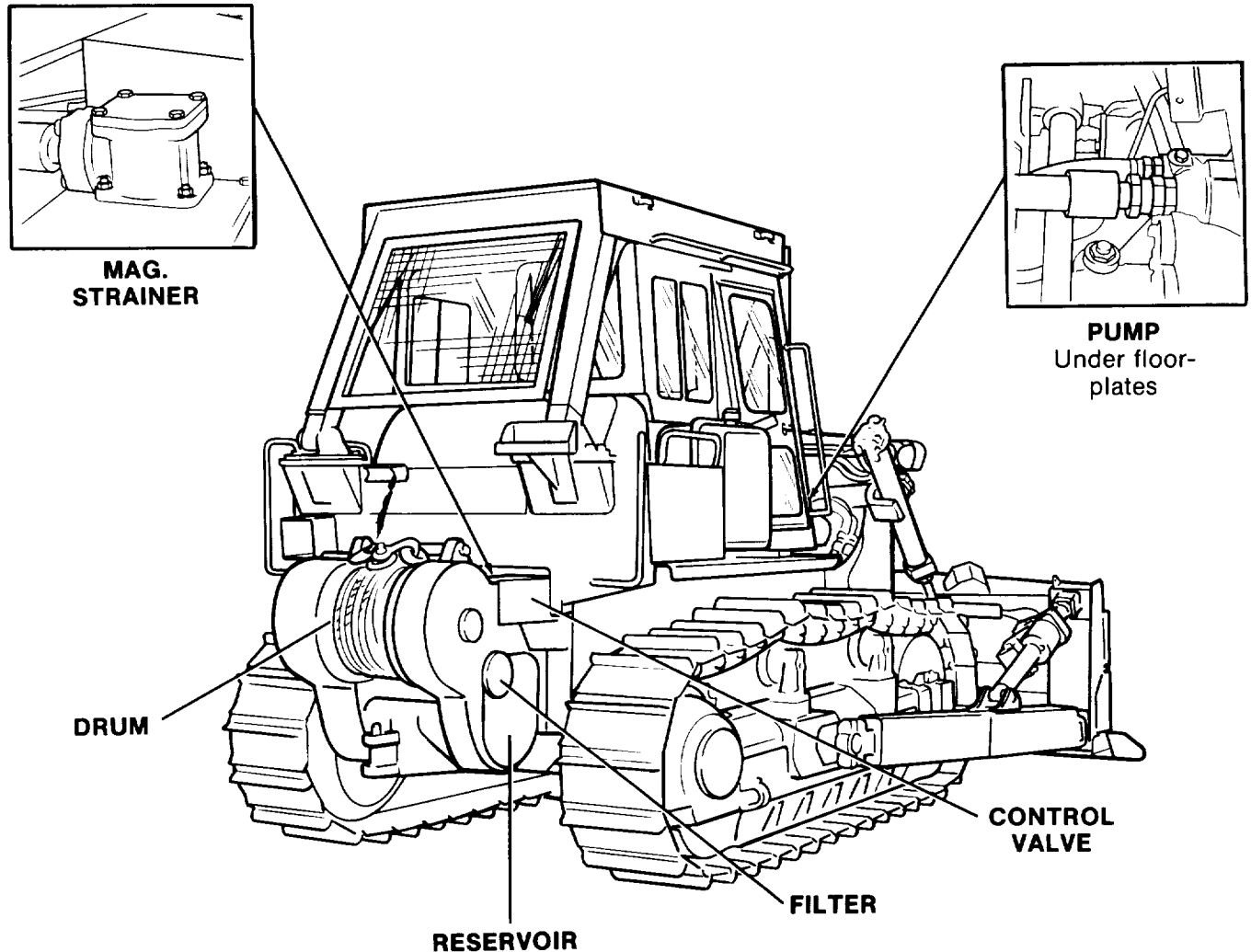


**RIPPER CONTROL VALVE.** This valve is connected mechanically to the ripper control lever. This valve directs the flow of pressure oil to the cylinders in response to the movement of the ripper control lever.

**LIFT CYLINDERS.** These are two cylinders which are controlled by the ripper control lever. When the lever is moved to the left, pressure oil causes the cylinders to extend and lift the ripper. When the lever is moved to the right, the cylinders retract and lower the ripper.

**HYDRAULIC TANK.** This is the reservoir for the oil which controls the movement of the ripper and bulldozer hydraulic cylinders.

1-20. WINCH HYDRAULIC SYSTEM.



**RESERVOIR.** Contains oil which is used for winch lubrication and hydraulic control systems.

**PUMP.** Driven directly off the engine, the pump is responsible for the circulation of the oil.

**MAGNETIC STRAINER.** Oil is pulled from the reservoir and goes through the strainer before it enters the lubrication system and the hydraulic control system. The strainer removes harmful large metallic particles from the oil which could cause damage to the systems.

**FILTER.** Removes smaller harmful particles from the oil before the oil returns to the reservoir.

**CONTROL VALVE.** This valve responds to the winch control lever. When you move the lever, the valve sends pressure oil to engage or disengage directional clutches which permit the drum to turn.

**DRUM.** The gears which turn the drum are powered by the transmission. The direction the drum turns is controlled by moving the winch control lever.



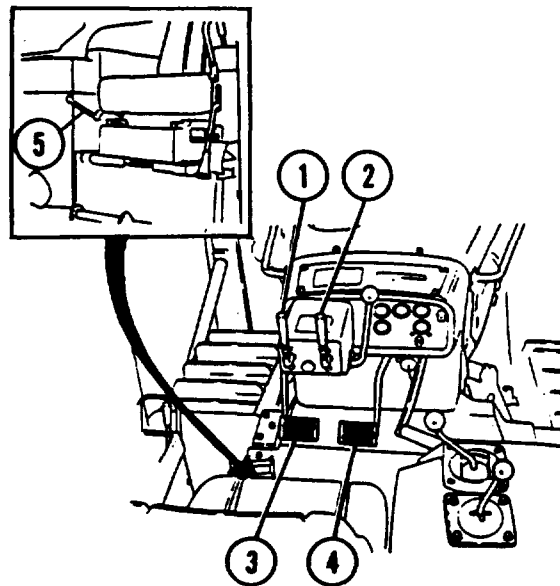
CHAPTER 2  
OPERATING INSTRUCTIONS

Section I. Description and Use of Operator's Controls and Indicators

2-1. OPERATOR'S CONTROLS AND INDICATORS.

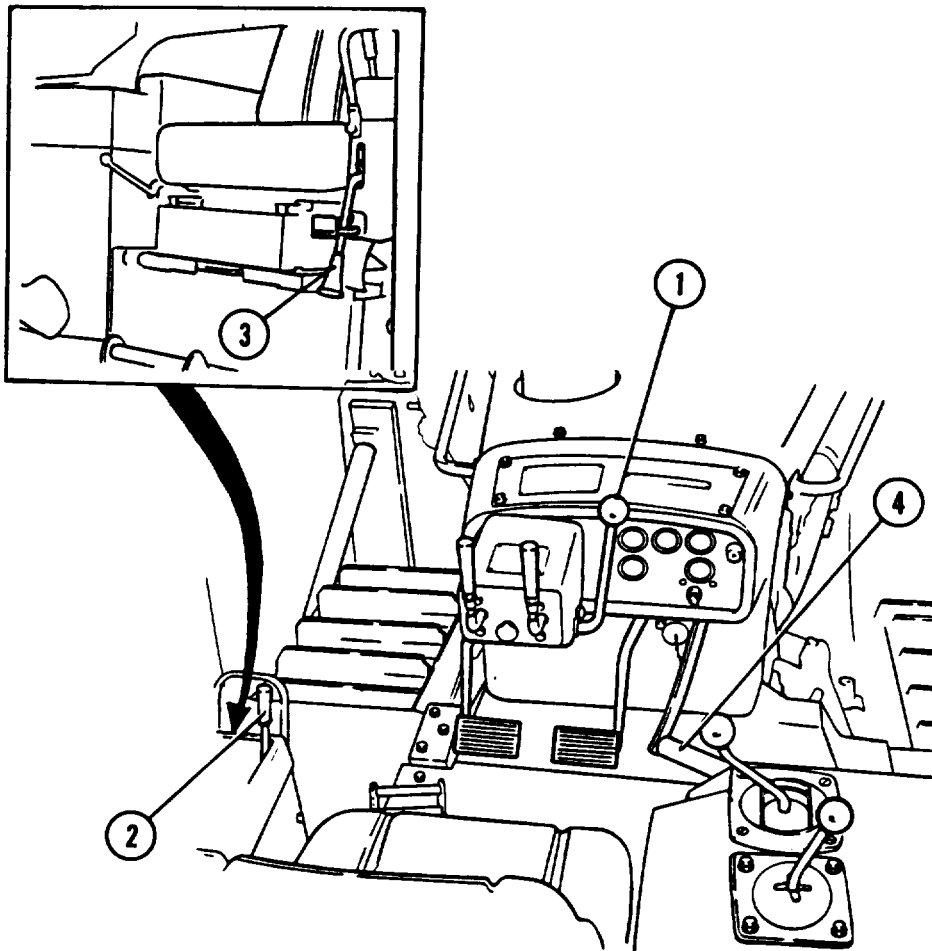
This section describes, locates, and illustrates the controls and indicators used on the tractors.

a. Steering and Brake Controls.



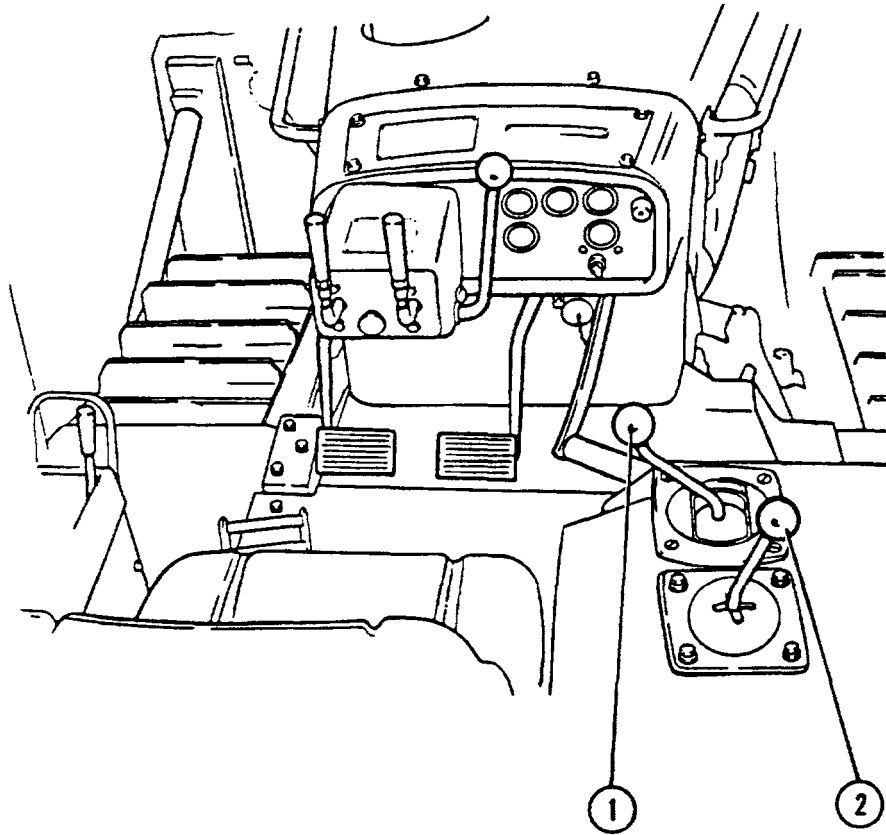
Key	Control or Indicator	Function
1	Left steering control lever	Pulling the steering lever to the first detent causes the tractor to make a gradual turn in the direction relative to the lever being pulled. When the lever is pulled all the way back, the brake engages and causes the tractor to make a sharp turn.
2	Right steering control lever	See Function column for item 1.
3	Left brake pedal	Depress the pedal to slow or stop the movement of the track relative to the pedal.
4	Right brake pedal	See Function column for item 3.
5	Brake lock lever	To engage, depress left brake pedal firmly. Push brake lock lever down, and then depress right pedal firmly. To release, depress both brake pedals and pull lock lever up.

b. Transmission and Engine Speed Controls.



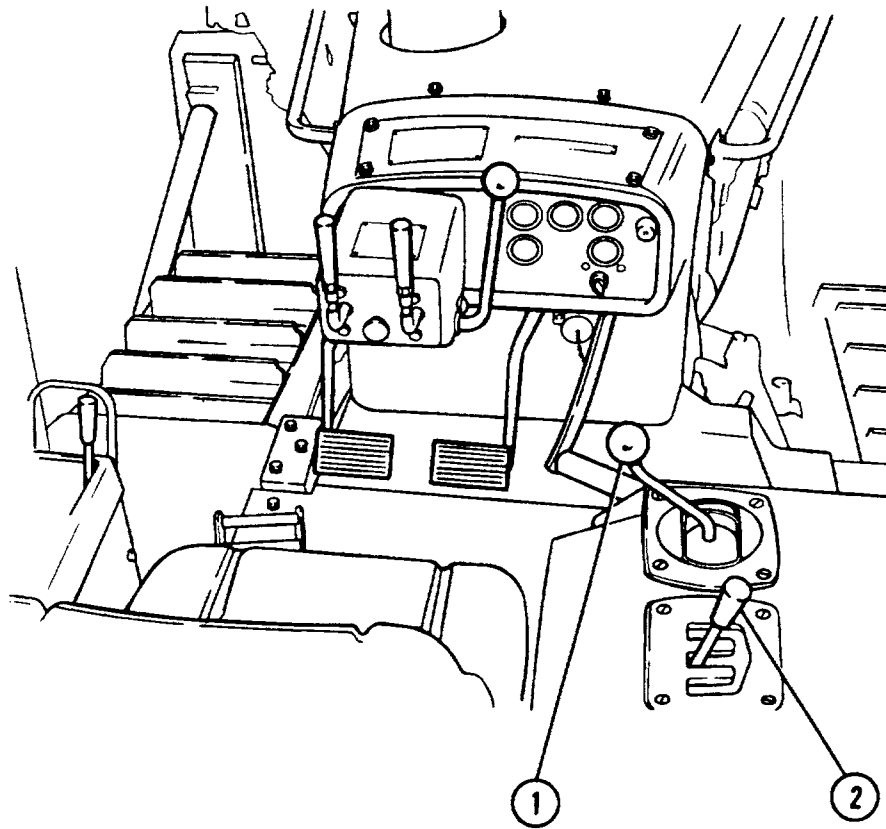
Key	Control or Indicator	Function
1	Governor control lever	This lever controls the speed of the engine. Pull the lever toward you to increase engine speed, and push away to decrease engine speed. To shut off engine, push forward past detent.
2	Transmission selector lever	This lever controls direction and speed of the tractor. The transmission has three forward speeds and three reverse speeds.
3	Transmission lock lever	The transmission can be locked in NEUTRAL by pushing the lock lever down. Pull the lever up to unlock the transmission selector lever.
4	Decelerator	Depress the pedal to override the governor control lever and reduce engine speed. Release the pedal to return engine speed to the governor control lever setting.

c. Implement Controls (Tractors with Ripper).



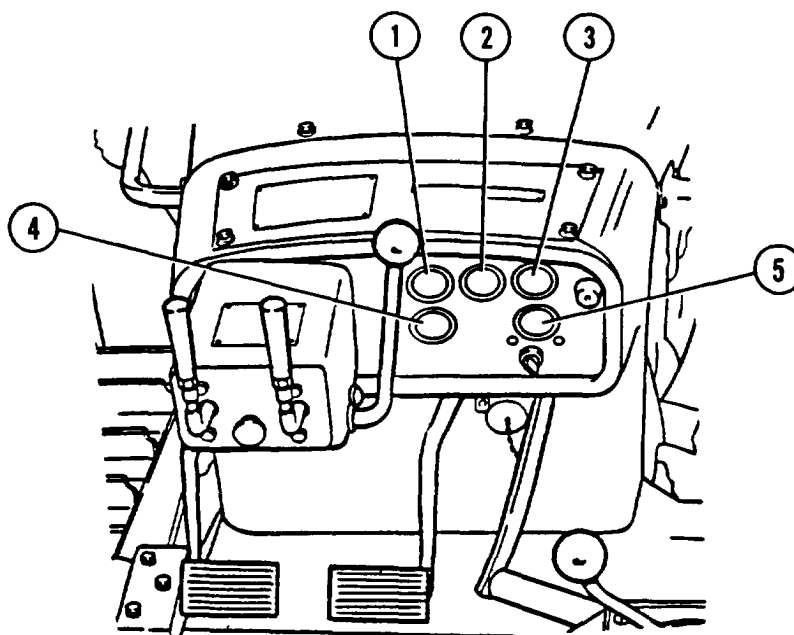
Key	Control or Indicator	Function
1	Blade control lever	<p>This lever controls blade lift and tilt. The lever is normally in the HOLD position. When the lever is moved to the right, the blade tilts so the right side is lower than the left side. When the lever is moved to the left, the blade tilts so the left side is lower than the right side. Move the lever backward to raise the blade, and forward to lower it. If the lever is pushed forward, past the lower position, it will go into the FLOAT position. The float position is the only position with a detent. In this position, the blade is free to move up or down according to outside forces.</p>
2	Ripper control lever	<p>This lever controls ripper lift and lower. When the lever is moved to the right, the ripper will lower. Move the lever to the left and the ripper will rise. The ripper can be lowered when the engine is not running.</p>

d. Implement Controls (Tractors with Winch).



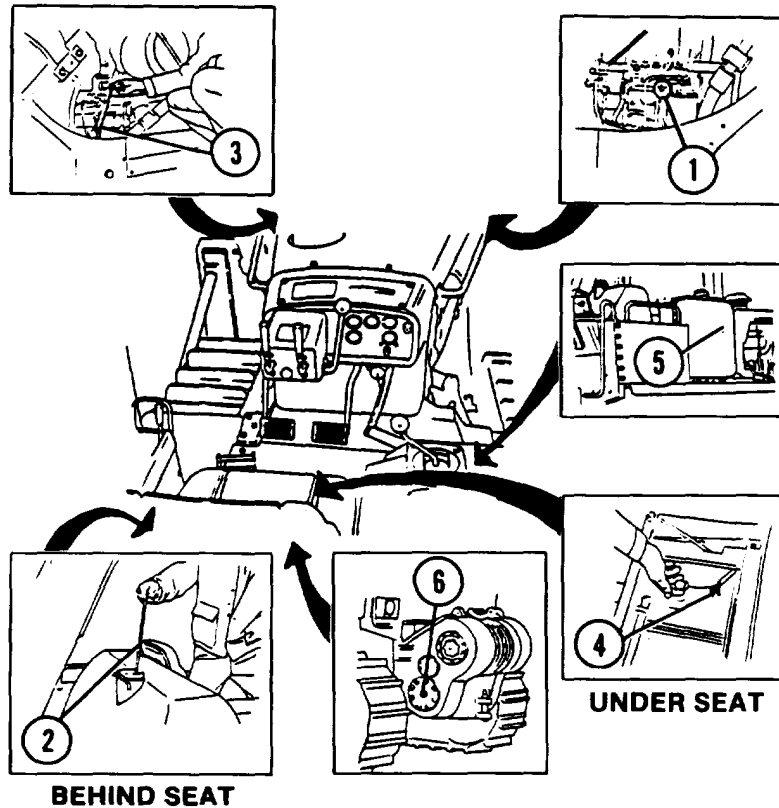
Key	Control or Indicator	Function
1	Blade control lever	<p>This lever controls blade lift and tilt. The lever is normally in the HOLD position. When the lever is moved to the right, the blade tilts so the right side is lower than the left side. When the lever is moved to the left, the blade tilts so the left side is lower than the right side. Move the lever backward to raise the blade, and forward to lower it. If the lever is pushed forward, past the lower position, it will go into the FLOAT position. The float position is the only position with a detent. In this position, the blade is free to move up or down according to outside forces.</p>
2	Winch control lever	<p>This lever controls movement in and the movement out of the winch cable. The lever is normally in the BRAKE ON (neutral) position, and returns automatically from all positions but the BRAKE OFF detent position.</p>



e. Gages on Dash Panel.

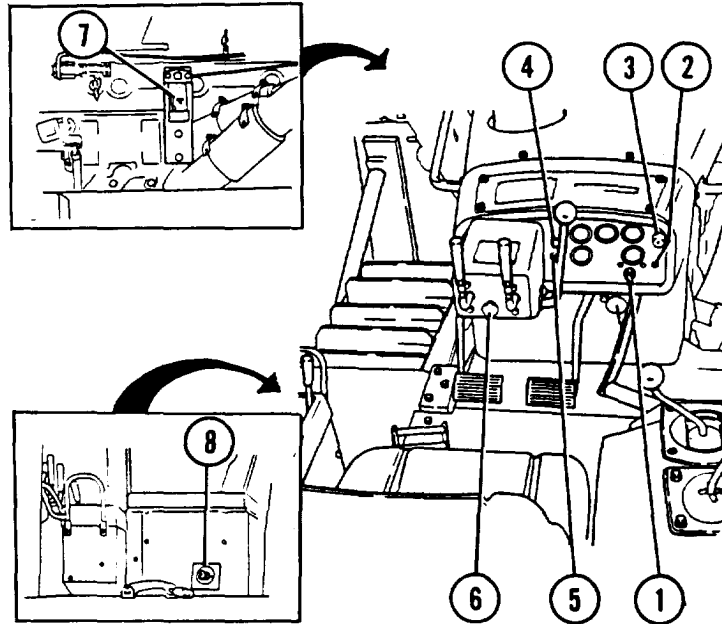
	Control or Indicator	Function
1	Service meter	This meter operates whenever the engine is operating. It indicates the total operating hours of the tractor.
2	Ammeter	This meter measures the discharge current from the battery when the engine is off and key is on. When the engine is running, it measures the charging current from the alternator to the battery.
3	Oil pressure gage	This gage indicates oil pressure when the engine is running. The normal operating pressure at high idle is indicated by the green portion of the gage. The white portion is normal for low idle, and the red portion of the gage indicates low oil pressure.
4	Water temperature gage	This gage indicates the temperature of the engine coolant. The green portion of the gage indicates normal operating temperature. The red portion indicates engine overheat.
5	Torque converter temperature gage	This gage indicates the temperature of the torque converter oil. The green portion of the gage indicates normal operating temperature. The red band indicates overheating.

f. Fuel Pressure and Fluid Level Gages.



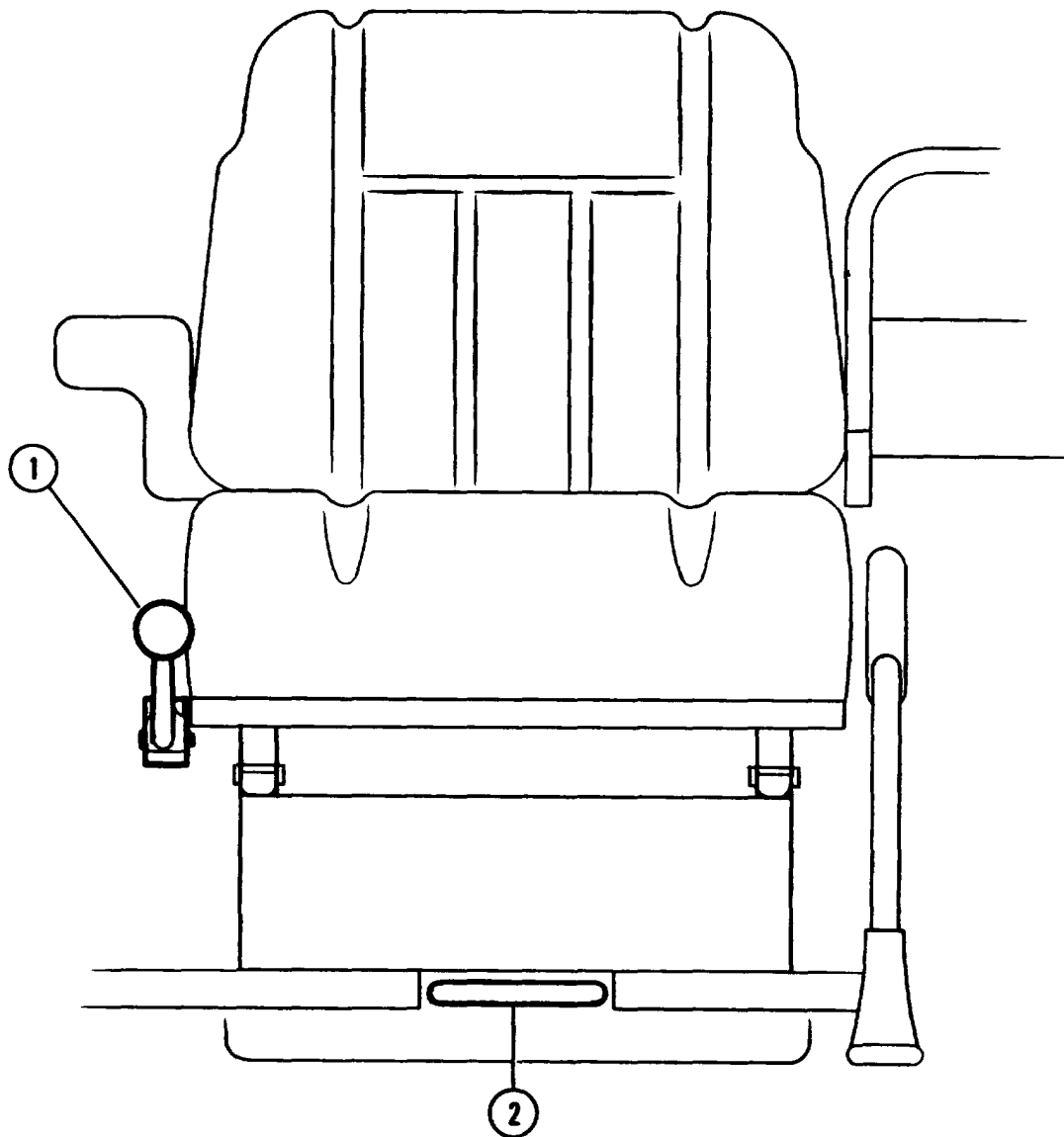
Key	Control or Indicator	Function
1	Fuel pressure gage	This gage indicates fuel transfer pump delivery pressure. The green portion of the gage indicates normal pressure, and the red portion indicates that pressure is low.
2	Fuel level gage	This gage indicates the amount of fuel present in the fuel tank.
3	Oil level gage	This gage indicates the amount of engine lubricating oil that is present in the crankcase.
4	Transmission oil level gage	This gage indicates the amount of transmission oil that is present in the reservoir.
5	Hydraulic oil level gage	This gage is a sight gage on the oil tank which indicates oil level for the hydraulic implements.
6	Winch hydraulic oil level gage	This gage is a sight gage on the winch. It indicates oil level for the hydraulic system of the winch.

g. Switches and Indicators.



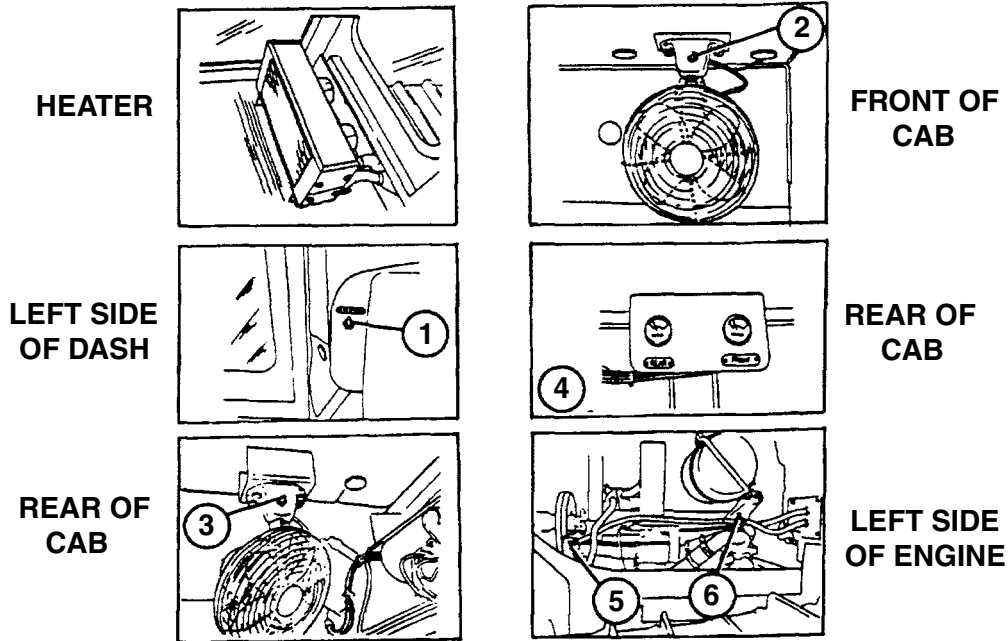
Key	Control or Indicator	Function
1	Starting switch	This switch is key operated. Turn the key fully clockwise to start the engine. Release the key when the engine starts, and the switch will move to the ON position.
2	Circuit breaker	A 60-amp circuit breaker protects the starting and charging circuits should a malfunction occur. Press to reset.
3	Exterior light switch	Turn the switch fully clockwise to turn on the exterior lights. Turn the switch fully counterclockwise to turn off.
4	Starting aid button	Pressing this button causes ether to be injected into the air intake. It is used to help start the tractor in cold weather.
5	Dash light switch	Flip up to turn dash light on, down for off.
6	Horn button	Push this button to sound the horn.
7	Air filter indicator	When the red band is visible it indicates that the air filter needs servicing. Reset by pushing the button on the bottom.
8	Battery disconnect switch	This switch is key operated. In the OFF position, electrical power to all systems is interrupted. In the ON position, power is available for all systems.

h. Seat Adjustment Controls.



Key	Control or Indicator	Function
1	Travel adjust lever	Push lever to right and move seat to desired position. When lever is released, seat will be locked in position.
2	Seat latch release handle	Pull handle out to release seat latch. Tilt seat forward when latch is released. The seat must be tilted forward to access transmission fill pipe and oil level gage.

i. Winterized Cab Controls.



Key	Control or Indicator	Function
1	Heater control switch	This switch is a three position toggle switch which controls heater. Flip the switch up for low heat, to the middle to turn off, and down for high.
2	Front defroster control switch	This switch is a three position toggle switch which controls the speed of the fan. The left position is low speed, the middle position is off and the right position is high speed.
3	Rear defroster control switch	This switch is a three position toggle switch which controls the speed of the fan. The left position is high, the middle position is off and the right position is low.
4	Window wiper control switches	The controls are located at the rear of the cab. Turn the switches to the left for off, to the middle for slow, and to the right for fast.
5	Feed valve	Supplies hot water to heater. Turn to the right to open and to the left to close. Keep valve closed when heater is not required.
6	Return valve	Allows water from heater to return to the coolant system. Turn to the right to open and to the left to close. Keep valve closed when heater is not required.

## Section II. Operator Preventive Maintenance Checks and Services (PMCS)

### 2-2. GENERAL.

- a. To ensure that the D7G Tractor is ready for operation at all times, it must be inspected on a regular basis so that defects may be found and corrected before they result in serious damage, equipment failure or injury to personnel.
- b. The PMCS Table in this section contains systematic instructions on inspections, lubrications, adjustments and corrections to be performed by the operator to keep your equipment in good operating condition and ready for its primary mission.

#### 2-2.1. EXPLANATION OF TABLE ENTRIES.

- a. **Item Number (Item No.) Column.** Numbers in this column are for reference. When completing DA Form 2404 or DA Form 5988-E (*Equipment Inspection and Maintenance Worksheet*), include the item number for the check/service indicating a fault. Item numbers also appear in the order that you must perform checks and services for the interval listed.
- b. **Interval Column.** This column tells you when you must perform the procedure in the procedure column.
  - (1) *Before* procedures must be done immediately before you operate the tractor.
  - (2) *During* procedures must be done while you are operating the tractor.
  - (3) *After* procedures must be done immediately after you have operated the tractor.
  - (4) *Weekly* procedures must be done once each week.
  - (5) *Monthly* procedures must be done once each month.
- c. **Man-Hours Column.** This column indicates man-hours required to complete prescribed lubrication service.
- d. **Location, Item to Check/Service Column.** This column provides the location and item to be checked or serviced.

#### NOTE

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

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

#### 2-2.2. GENERAL PMCS PROCEDURES.

- a. Always perform PMCS in the same order so it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry. If the machine does not perform as required, refer to the appropriate troubleshooting procedure in Chapter 3, Section II.
- b. If anything looks wrong and you can't fix it, write it on your DA Form 2404 or DA Form 5988-E. If you find something seriously wrong, IMMEDIATELY report it to your supervisor.
- c. Before performing preventive maintenance, read all the checks required for the applicable interval and prepare all that is needed to make all the checks. You'll always need a rag (Item 13, Appendix D) or two.

## WARNING

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

- (1) **Keep It Clean.** Dirt, grease, oil and debris get in the way and may cover up a serious problem. Clean as you work and as needed. Use solvent cleaning compound (Item 2, Appendix D) on all metal surfaces. Use detergent (Item 4, Appendix D) and water when you clean rubber, plastic and painted surfaces.

## WARNING

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

- (2) **Hazardous Waste Disposal.** Ensure all spills are cleaned up and disposed of in accordance with local policy and ordinances.
- (3) **Rust and Corrosion.** Check metal parts for rust and corrosion. If any bare metal or corrosion exists, clean and apply a light coat of lubricating oil (Item 10, Appendix D). Report it to your supervisor.
- (4) **Bolts, Nuts, and Screws.** Check bolts, nuts and screws for obvious looseness, missing, bent or broken condition. You can't try them all with a tool, but look for chipped paint, bare metal or rust around bolt heads. If you find one you think is loose, report it to your supervisor.
- (5) **Welds.** Look for loose or chipped paint, rust or gaps where parts are welded together. If you find a bad weld, report it to your supervisor.
- (6) **Electric Wires and Connectors.** Look for cracked or broken insulation, bare wires and loose or broken connectors. Report loose connectors to your supervisor. Ensure that the wires are in good condition.
- (7) **Hoses and Fluid Lines.** Look for wear, damage and signs of leaks. Ensure that clamps and fittings are tight. Wet spots indicate leaks, but a stain around a fitting or connector can also mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, report it to your supervisor.
- (8) **Fluid Leakage.** It is necessary for you to know how fluid leakage affects the status of your machine. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your machine. Learn and be familiar with them, and remember - when in doubt, notify your supervisor.

## CAUTION

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

## NOTE

**Notify your supervisor of any leaks you cannot fix.**

### Leakage Definitions for PMCS

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





**2-3. GENERAL LUBRICATION PROCEDURES.**

**NOTE**

- **Lubrication instructions contained in this PMCS are MANDATORY.**
  - **Overall view of lubrications points is located at the end of this paragraph. Localized views are located, together with specific lubrication instructions, in the PMCS Table.**
  - **The D7G is no longer enrolled in the Army Oil Analysis Program (AOAP).**
  - **Refer to FM 9-207 for lubrication in arctic operation.**
1. Included in this PMCS are lubrication services to be performed by the operator.
  2. Lubrication intervals are based on normal operation. Lubricate more during constant use and less during inactive periods. Use correct grade of lubricant for seasonal temperature expected (Refer to *KEY* on page 2-11.2).
  3. For equipment under manufacturer’s warranty, hardtime intervals shall be followed. Shorten intervals if lubricants are known to be contaminated or if operation is under adverse conditions (e.g., longer than usual operating hours, extended idling periods, extreme dust, etc.).
  4. Keep all lubricants in a closed container and store in a clean, dry place away from extreme heat. Keep container covers clean and do not allow dust, dirt or other foreign material to mix with lubricants. Keep lubrication equipment clean and ready for use.

**WARNING**

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

5. Clean area around lubrication points with solvent cleaning compound (Item 2, Appendix D) or equivalent before lubricating equipment. Keep all external parts of equipment not requiring lubrication free of lubricants. After lubrication, wipe off excess lubricant to prevent accumulation of foreign matter.
6. Maintain a record of lubrication performed and report any problems noted during lubrication. Refer to DA Pam 738-750 for forms and procedures to record and report any findings.

**2-3.1. PMCS INITIAL SETUP.**

**Tools and Test Equipment**

Basic Issue Items (Appendix B)

**Materials/Parts**

- Antifreeze (Item 1, Appendix D)
- Detergent (Item 4, Appendix D)
- Grease, GAA (Item 8, Appendix D)
- Oil, lubricating, OEA-30 (Item 9, Appendix D)
- Oil, lubricating, OE/HDO-10 (Item 10, Appendix D)

**Materials/Parts - Continued**

- Oil, lubricating, OE/HDO-15/40 (Item 11, Appendix D)
- Oil, lubricating, OE/HDO-30 (Item 12, Appendix D)
- Rags (Item 13, Appendix D)

**Personnel Required**

Driver/operator

**Equipment Condition**

- Engine OFF and cool
- Tractor parked on level ground

- KEY -

NOTE

Only lubricants authorized for use by the operator are listed in this KEY.

LUBRICANT/ COMPONENT	REFILL CAPACITY	EXPECTED TEMPERATURES*			INTERVALS
		Above +15°F (Above -9°C)	+40°F to -15°F (+4°C to -26°C)	+40°F to -65°F (+4°C to -54°C)	
<b>OE/HDO Lubricating Oil, ICE, Tactical Service (MIL-PRF-2104)</b>					D - Daily W - Weekly M - Monthly
<b>OEA-30 Lubricating Oil, ICE, Arctic (MIL-PRF-46167)</b>					
Engine Crankcase	7.25 gal. (27.4 l)	OE/HDO - 15/40 or OE/HDO-30 See Note	OE/HDO - 15/40 or OE/HDO-10 See Note	OEA-30	
Transmission, Bevel Gear and Steering Clutch Compartments	18.5 gal. (70.0 l)				
Towing Winch	16 gal. (60.6 l)				
Hydraulic Tank	21 gal. (79.5 l)	OE/HDO-15/40 or OE/HDO-10 See Note		OEA-30	
<b>GAA Grease, Automotive and Artillery</b>					
Track Roller Frame Outer and Inner Bearings	As Req'd	All Temperatures			
Blade Lift Cylinder Sup- port and Upper Trunnion Bearings	As Req'd	All Temperatures			
Ripper Linkage and Cyl- inder Bearings	As Req'd	All Temperatures			
Blade Tilt Brace	As Req'd	All Temperatures			
Blade Tilt Brace/Tilt Cyl- inder Ball and Socket	As Req'd	All Temperatures			
Fan Drive Pulley Bearing	As Req'd	All Temperatures			
<b>ANTIFREEZE Permanent, Ethylene Glycol, Inhibited (MILA46153)</b>					
Cooling System	12 gal. (45.4 l)	Refer to PMCS Table			

\* For arctic operation, refer to FM 9-207.

Key Note: Grade 15W-40 (OE/HDO-15/40) is the preferred lubricant but should only be used when temperatures are above 0°F (-18°C).

LUBRICANT • INTERVAL

INTERVAL • LUBRICANT

Blade Tilt Brace and Tilt Cylinder Ball and Socket (1 Fitting Each Side) GAA

Blade Tilt Brace Screw Threads (1 Fitting) GAA

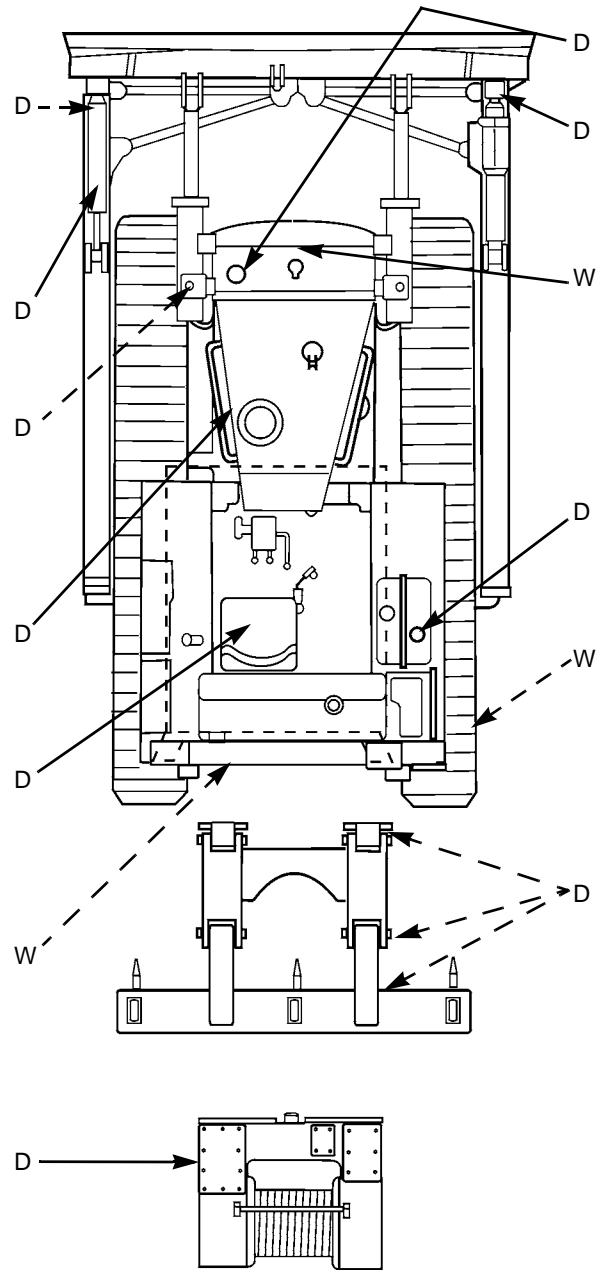
Blade Lift Cylinder Support and Upper Trunnion Bearings (3 Fittings Each Side) GAA

Engine Crankcase Check Level/Add OE/ HDO or OEA-30

Transmission Assembly Check Level/Add OE/ HDO or OEA-30

Track Roller Frame Inner Bearings (1 Fitting Each Side) GAA

Winch Check Level/Add OE/ HDO or OEA-30



Radiator Check Level/Add

GAA Blade Tilt Cylinder Ball and Socket (1 Fitting)

GAA Fan Drive Pulley Bearing (1 Fitting)

OE/ HDO or OEA-30 Hydraulic Tank Check Level/Add

GAA Track Roller Frame Outer Bearings (1 Fitting Each Side)

GAA Ripper Linkage and Cylinder Bearings (10 Fittings Each Side)

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
1	Before			<p><b>CAUTION</b></p> <p>If equipped with the Mine Clearing/Armor Protection (MCAP) kit, access to tractor components for servicing (e.g. engine, transmission and hydraulic oil level checks) is achieved by opening armored hinged access doors. Service locations are the same as a tractor without the kit. Do NOT neglect PMCS to an MCAP-equipped machine or damage to equipment will result.</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• Review all WARNINGS, CAUTIONs and NOTEs before performing Operator PMCS on the D7G Tractor.</li> <li>• Perform all weekly and before operation PMCS checks if:                             <ul style="list-style-type: none"> <li>a. You are the assigned operator but have not operated the tractor since the last weekly checks.</li> <li>b. You are operating the tractor for the first time.</li> </ul> </li> <li>• Unless otherwise indicated, perform all lubrication and preventive maintenance with tractor parked on level ground, transmission in N (Neutral) with transmission lock lever in locked position, brake lock lever engaged, implements lowered to the ground and engine shut down.</li> <li>• Refer to Appendix E for PMCS of MCAP-specific components.</li> <li>• After one week of <u>initial</u> operation of a SLEP D7G Tractor, notify Unit Maintenance to replace transmission, bevel gear and steering clutch oil filter element and clean magnetic strainer.</li> <li>• After one month of <u>initial</u> operation of a SLEP D7G Tractor, notify Unit Maintenance to check level of oil in final drives.</li> </ul>	
			FRONT AND LEFT SIDE		
			Overall View	<p>a. Check on ground under tractor for evidence of fluid leakage such as oil, coolant or fuel.</p> <p>b. Check tractor for obvious damage that would impair operation.</p>	<p>Class III leaks are evident.</p> <p>Damage that would impair operation is evident.</p>

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
1 (Con't)				c. Check for evidence of fluid leakage at tractor belly pans.	Class III leaks are evident.
2	Before		Lift Cylinders, Tilt Cylinder and Lines and Fittings	a. Check lift cylinders on both sides at front of machine for leakage. Also check tilt cylinder at right-front of machine.  b. Check exposed lift cylinder and tilt cylinder lines for leaks.	Class III leaks are evident.  Class III leaks are evident.
3	Before		Ether Starting Aid System	<p style="text-align: center;"><b>WARNING</b></p> <p><b>Ether fuel is extremely flammable and toxic. DO NOT smoke and make sure you are in a well-ventilated area away from heat, open flames or sparks. Wear eye protection. Avoid contact with skin and eyes and avoid breathing ether fumes. If fluid enters or fumes irritate the eyes, wash immediately with large quantities of clean water for 15 minutes. Seek medical attention immediately if ether is inhaled or causes eye irritation. Failure to follow this warning may cause injury or death.</b></p> <p>a. If required for cold weather starting, check to ensure ether canister is present and securely installed.</p> <p>b. If canister is not installed, loosen thumbscrew, open cover and ensure cap is installed on solenoid valve.</p>	Ether canister is missing or loose, if required for cold weather starting.
4	Before		Radiator	<p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• <b>DO NOT service cooling system unless engine has been allowed to cool down. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.</b></li> <li>• <b>DO NOT remove cooling system radiator cap when engine is hot. Allow engine to cool down. Loosen cap to first stop and let any pressure out of cooling system, then remove cap. Failure to follow this warning may cause serious burns.</b></li> <li>• <b>Wear effective eye, glove, and skin protection when handling coolants. Failure to do so may cause injury.</b></li> </ul>	

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
4 (Con't)				<p>a. Check for coolant leaks, worn or damaged hoses and debris buildup. Remove buildup of debris.</p> <p>b. With engine off and cool, remove radiator cap and check coolant level. Coolant level should be within 1/2 in. (13 mm) of bottom of fill pipe.</p> <p>c. Note color of coolant. Coolant should not appear rusty or brownish. Notify your supervisor if coolant is rusty or brownish.</p> <p style="text-align: center;"><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• If unsure of coolant type in your tractor, notify your supervisor.</li> <li>• Use clean water that is low in scale-forming minerals. Do NOT use softened water.</li> </ul> <p>d. If level of coolant is low, add a 50/50 mixture of antifreeze (Item 1, Appendix D) and clean water to bring level up to correct level.</p> <p>e. Wipe pressure cap clean with a clean rag (Item 13, Appendix D).</p> <p>f. Inspect radiator cap for damage to cap or cap gasket, foreign material and deposits.</p> <p>g. Install radiator cap.</p>	Class III leaks are evident.
5	Before	0.2 Hours	Engine Oil Level	<p style="text-align: center;"><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• To ensure an accurate COLD CHECK reading, engine must be shut down and cold.</li> <li>• If equipped with winterization kit, open access door to gain access to dipstick and oil filler tube.</li> <li>• Check engine oil level as follows. See paragraph 3-4.</li> </ul> <p>a. Wipe area clean around dipstick and oil filler tube.</p> <p>b. Remove dipstick, wipe clean, then reinsert fully into dipstick tube. Remove dipstick and take reading.</p>	Gasket is missing or damaged.

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
5 (Con't)				<p>c. Level must be within cross-hatched area labeled SAFE STARTING RANGE ON ENGINE STOPPED side of dipstick.</p> <p>d. If required, add lubricating oil (Item 9, 10, 11 or 12, Appendix D). Refer to <i>KEY</i> on page 2-11.2 for correct grade of oil for expected temperature range.</p> <p>(1) Turn filler cap to the left and remove from oil filler tube.</p> <p>(2) Add oil through filler tube opening until level is within cross-hatched labeled area on SAFE STARTING RANGE ON ENGINE STOPPED side of dipstick.</p> <p>(3) Reinstall filler cap and turn to the right until tight.</p>	
6	Before		ROPS	Inspect for loose mounting bolts and cracks, bends or broken welds in ROPS and ROPS mounting brackets.	ROPS and ROPS mounting brackets have loose or missing bolts or cracks, bends or broken welds.

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

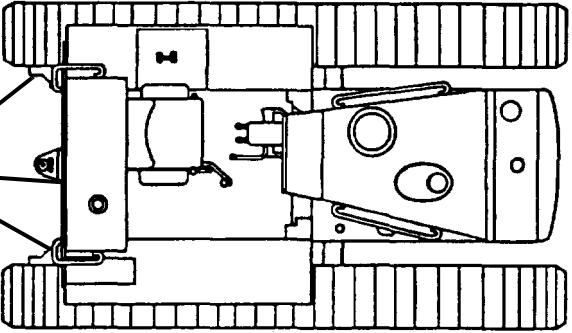
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
7	Before		REAR AND RIGHT SIDE	<p align="center"><b>NOTE</b></p> <p align="center"><b>Notify Unit Maintenance to check final drive oil level if Class III leaks are noted from final drive.</b></p> <p>a. Check on ground under tractor for evidence of transmission and final drive oil leakage. Be alert for leaks from final drive check level/fill and drain plugs.</p>	Class III leaks are evident.
			Overall View		
					
8	Before		Ripper (If Equipped)	<p>b. Check tractor for obvious damage that would impair operation.</p> <p>Inspect ripper lift cylinder and lines for leakage.</p>	Damage that would impair operation is evident. Class III leaks are evident.
9	Before	0.2 Hours	Winch (If Equipped)	<p>a. Inspect for structural damage or leakage.</p> <p>b. Ensure hook and clevis are present and securely installed on end of wire rope.</p> <p>c. Ensure hook's safety latch is present on hook, if winch is to be used for overhead lifting.</p> <p>d. Check winch sight gage for proper oil level. If required, add lubricating oil (Item 9, 10, 11 or 12, Appendix D) until visible in sight gage. Refer to KEY on page 2-11.2 for correct grade of oil for expected temperature range.</p>	Class III leaks are evident. Hook and clevis are missing, if required for mission. Safety latch is missing. No oil is visible in sight gage.



Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
10	Before		Drawbar	Ensure pin and safety latch are present.	Pin and safety latch are missing, if required for mission.
11	Before		V-belts	Check fan and alternator V-belts. Check for loose, torn, frayed, missing, excessively worn or unevenly worn belts. Check belt deflection at midpoint between pulleys. Belt deflection should be 1/2 in. (13 mm).	V-belts are loose, torn, frayed, missing or excessively/unevenly worn.
12	Before		Belly Pans	Check for evidence of fluid leaks at tractor belly pans.	Class III leaks are evident.
13	Before	0.2 Hours	Hydraulic System Oil Level	<p style="text-align: center;"><b>NOTE</b></p> <p style="text-align: center;"><b>If equipped with winterization kit, open access door to gain access to hydraulic tank.</b></p> <p>Check sight gage on hydraulic tank. Oil should be visible in sight gage. Add oil if needed:</p> <ol style="list-style-type: none"> <li>a. Wipe area clean around filler cap.</li> <li>b. Remove padlock. Turn filler cap to the left and remove.</li> <li>c. Ensure that strainer is clean and free of debris.</li> </ol>	

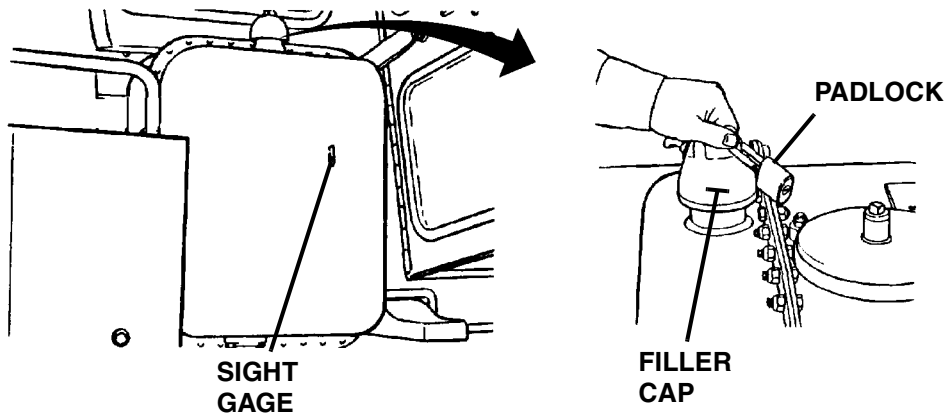


Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

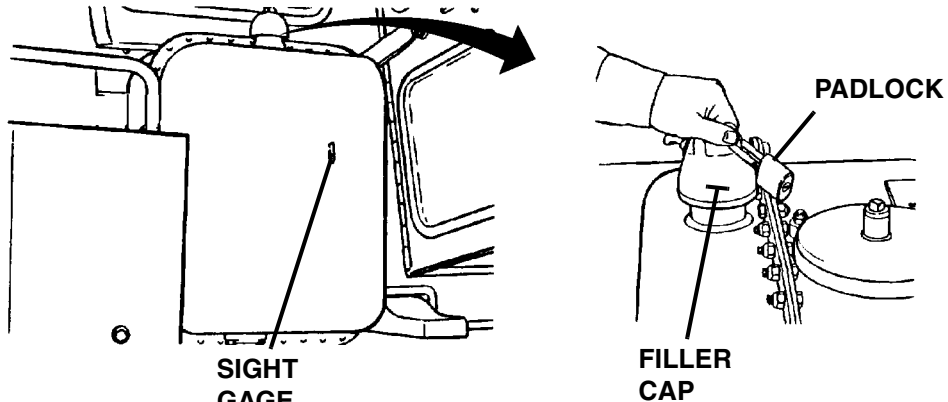
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
13 (Con't)				<p style="text-align: center;"><b>WARNING</b></p> <p style="text-align: center;">Wear eye protection to avoid injury.</p> <p>d.If necessary, remove retaining ring and strainer from tank. Clean strainer, then reinstall and secure with retaining ring.</p> <p>e.Add oil (Item 9, 10 or 11, Appendix D) through filler opening until level is visible in sight gage. Refer to <i>KEY</i> on page 2-11.2 for correct grade of oil for expected temperature range.</p> <p>f. Reinstall filler cap and turn to the right until tight. Reinstall padlock.</p>	
					
14	Before		Seat, Seat Belt, Gages and Indicators	<p>a.Occupy and adjust seat. See page 2-8.</p> <p>b.Check all gages and indicators for damage.</p> <p>c.Check for damage to governor and steering clutch levers, brake pedals and decelerator pedal. There should be free movement.</p> <p>d.If equipped with winterized cab, check for broken or damaged windows. Ensure windows are clean, to ensure an unobstructed view.</p>	<p>Damage is evident that would impair operation.</p> <p>Damage is evident that would impair operation.</p>

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
14 (Con't)				<p>e. Start engine and allow to warm up. See paragraph 2-5.</p> <p>f. Ensure all indicators and gages are functioning properly. See pages 2-5 and 2-6. Be sure to check fuel pressure gage on right side of engine compartment.</p> <p style="text-align: center;"><b>WARNING</b></p> <p><b>Use of seat belt while operating machine is mandatory. Fasten seat belt BEFORE operating machine. Trying to fasten seat belt during operation creates a hazardous condition. Failure to follow this warning may result in injury or death.</b></p>	Needle is in RED zone on gage.
15	Before		Winterized Cab (If Equipped)	<p>g. Fasten seat belt. Adjust as needed so that belt is snug across lap with buckle in the middle.</p> <p>h. Check operation of flood lights and dash lights.</p> <p>a. Check defroster fans for proper operation.</p> <p>b. Check windshield wipers for proper operation.</p> <p>c. Check heater for proper operation.</p>	Seat belt is missing or will not buckle or adjust.
16	Before		Steering Brake and Steering Clutch Controls	<p>a. Move tractor ahead slowly. Depress both brake pedals and ensure tractor stops.</p> <p>b. Test right and left steering clutch levers while moving ahead slowly.</p>	Brakes do not function. Either lever fails to turn tractor.
17	Before		Implement Controls	Check controls of bulldozer blade and winch (if equipped) or ripper (if equipped) for proper operation.	Controls do not function properly.
18	Before		Backup Alarm	<p>a. Place transmission in reverse and listen for backup alarm to sound.</p> <p>b. Return transmission to neutral (N) and lock.</p>	

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
19	During		Indicators, Gages and Dash Panel Lights	a. Check oil pressure gage for proper operating pressure. b. Check engine water temperature gage for proper operating temperature. c. Check transmission oil pressure gage and torque converter temperature gage for proper pressure and operating temperature. d. Check air cleaner indicator for proper operation. If red band is visible, service air cleaner. See paragraph 3-11. e. Check ammeter for proper operation. f. Check operation of dash lights.	Needle is in RED zone on gage.  Needle is in RED zone on gage.  Needle is in RED zone on gages.  Needle is in RED zone on gage.
20	During		Overall Machine	a. Be alert for evidence of fluid leaks such as oil, coolant or fuel. b. Be alert for proper operation of steering brakes and power train components. c. Be alert for proper operation of implement controls.	Class III leaks are evident.

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
21	After	0.2 Hours	FRONT AND LEFT SIDE	<p style="text-align: center;"><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• Ensure tractor is parked on level ground with transmission in neutral (N), transmission safety lock lever in locked position, brake lock lever engaged and implements lowered to ground.</li> <li>• Leave engine running for transmission and engine HOT oil level checks, and until track inspection has been performed.</li> </ul> <p>Check level of oil in transmission with engine running at low idle speed and transmission warm.</p> <p>a. Tilt operator seat forward to access transmission dipstick and filler tube under seat.</p> <p>b. Wipe area clean around dipstick and oil filler tube and cap.</p> <p>c. Remove dipstick, wipe clean, then reinstall. Remove dipstick and check level on dipstick. Maintain level at FULL line on dipstick.</p> <p>d. If level is low, use Key, socket head (Item 15, Section II, Appendix B) and adjustable wrench (Item 3, Section III, Appendix B) to remove filler cap and add lubricating oil (Item 9, 10, 11 or 12, Appendix D) until level indicated on dipstick is at FULL line. Refer to <i>KEY</i> on page 2-11.2 for correct grade of oil for expected temperature range.</p>	
			Transmission Oil Level		

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
22	After	0.2 Hours	Engine Crankcase	<p style="text-align: center;"><b>NOTE</b></p> <p><b>If equipped with winterization kit, open access door to gain access to dipstick and oil filler tube.</b></p> <p>With engine running, warm and operating at low idle, check level of oil in engine crankcase. See paragraph 3-4.</p> <p>a. Wipe area clean around dipstick and oil filler tube and cap.</p> <p>b. Remove dipstick, wipe clean, then reinsert fully into dipstick tube. Remove dipstick and take reading.</p> <p>c. Level must be at FULL mark on side of dipstick labeled ENGINE RUNNING.</p> <p>d. If required, add lubricating oil (Item 9, 10, 11 or 12, Appendix D). Refer to <i>KEY</i> on page 2-11.2 for correct grade of oil for expected temperature range.</p> <p>(1) Turn filler cap to the left and remove.</p> <p>(2) Add oil through filler tube opening until level is at FULL mark on ENGINE RUNNING side of dipstick.</p> <p>(3) Reinstall filler cap and turn to the right until filler cap is tight.</p>	
23	After		Overall View	<p>a. Check on ground under tractor for evidence of fluid leakage such as oil, coolant or fuel.</p> <p>b. Check tractor for obvious damage that would impair operation.</p> <p>c. Check for evidence of fluid leakage at tractor belly pans.</p>	<p>Class III leaks are evident.</p> <p>Damage that would impair operation is evident.</p> <p>Class III leaks are evident.</p>

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
24	After		<b>Bulldozer Blade Assembly</b>	Check blade cutting edges and end bits for cracks, wear or damage and missing or loose mounting bolts.	Edge is cracked, damaged or worn to less than 3/4 in. (19 mm) from edge of moldboard or end bits are worn/damaged in the same manner. Mounting bolts are missing or loose.
25	After		<b>Lift Cylinders, Tilt Cylinder and Lines and Fittings</b>	<p>a. Check lift cylinders on both sides at front of machine for damage or leakage. Also check tilt cylinder at right-front of machine.</p> <p>b. Check exposed lift cylinder and tilt cylinder lines for leaks or for damage or wear that could cause leaks.</p> <p>c. Check for pitting or rust on exposed cylinder rods.</p>	<p>Class III leaks are evident or damage that would impair operation.</p> <p>Class III leaks are evident. Lines show wear or damage that could cause leaks.</p> <p>Pitting or rust are evident.</p>
26	After		<b>Radiator Guards</b>	Check upper and lower guards for damage and loose or missing bolts.	Guard is touching radiator. Guard dents or damage prevent air circulation to radiator. Loose or missing bolts are evident.

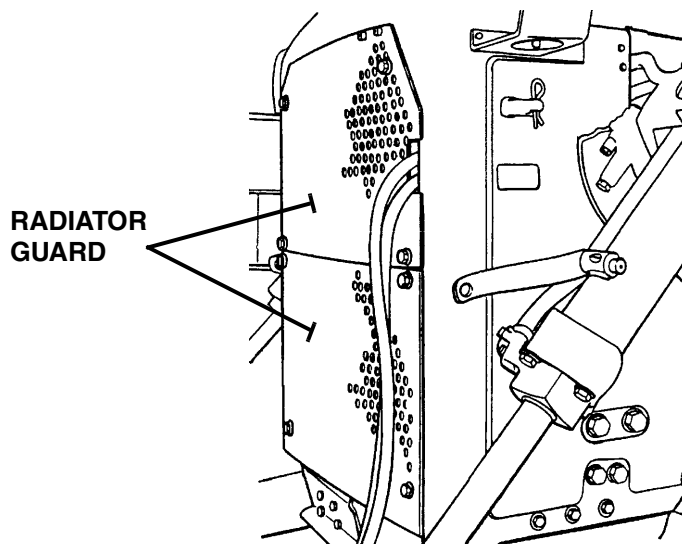


Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
27	After	0.3 Hours	Tracks	<p>a. Inspect tracks on left side of machine for damaged shoes and missing or loose bolts. Check master link for missing or loose bolts.</p> <p>b. Check recoil mechanism access cover for damage and loose or missing bolt.</p> <p>c. Check all rock guards for damage and loose or missing bolts.</p> <p>d. Check idler and rollers for wear, leaks, damage and loose or missing hardware. Notify your supervisor if any leaks are evident.</p> <p>e. Inspect track pins for evidence of leaking oil. Any wetness in area of track pin bushings indicates a problem. Notify your supervisor.</p> <p style="text-align: center;"><b>WARNING</b></p> <p><b>BE ALERT for personnel in the area while moving tractor to perform inspection. While operator moves tractor, an assistant must look for damage to sprocket segments. Ensure assistant is clear, to the side of tracks, and all other personnel are clear of the area. Failure to follow this warning may cause injury or death.</b></p> <p>f. Check sprocket segments for missing or broken segments.</p>	<p>Any bolts are missing or loose.</p> <p>Access cover is damaged and cannot be securely closed.</p> <p>Guard is missing or loose.</p> <p>Damaged or worn idlers or rollers are evident. Loose or missing hardware is noted.</p> <p>Any sprocket segment is missing or damaged.</p>





Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
27 (Con't)					
				g. Check track tension as follows: <ol style="list-style-type: none"> <li>(1) Place a straight edge on top of grousers, between idler and front carrier roller.</li> <li>(2) Measure track sag between bottom edge of straight edge and top of grouser, at midpoint between idler and front carrier roller.</li> <li>(3) If sag, distance A, is 1 1/2 - 2 in. (3.8-5.1 cm), track tension is OK.</li> <li>(4) Adjust track if too tight or too loose. See paragraph 3-12.</li> </ol>	
28	After		Belly Pans	Look under tractor and check for damage to belly pans. Check for loose or missing mounting bolts.	Belly pan is missing, severely bent or loose.

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

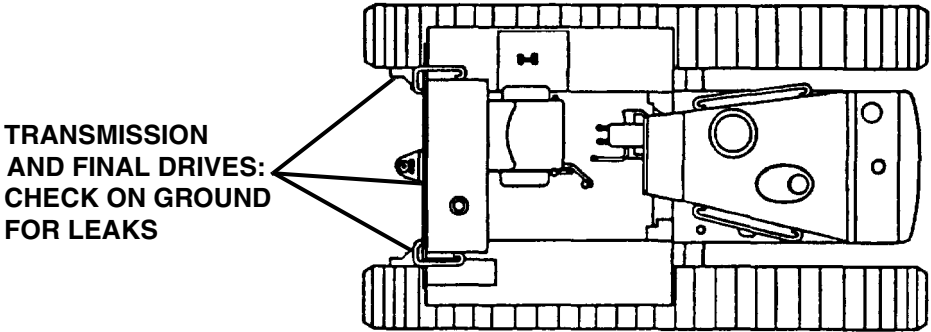
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
29	After		Grab-handles	Check for presence and security of grabhandle mounting at left rear of cab.	
			REAR AND RIGHT SIDE		
30	After		Overall View	a. Check on ground under tractor for evidence of transmission and final drive oil leakage.	Class III leaks are evident.
					
31	After		Ripper (If Equipped)	b. Check tractor for obvious damage that would impair operation. a. Inspect ripper teeth and shanks for cracks, breaks, looseness or wear. Teeth are worn if a hole has developed in tip. b. Inspect ripper lift cylinder and lines for damage or leakage. c. Check for pitting or rust on exposed cylinder rods.	Damage that would impair operation is evident. Cracks, breaks, looseness or holes in teeth are evident. Damage that would impair operation or Class III leaks are evident. Pitting or rust are evident.
32	After		Grab-handles	Check for presence and security of grabhandle mounting at right rear of cab.	
33	After		Belly Pans	Look under tractor and check for damage to belly pans. Check for loose or missing mounting bolts.	Belly pan is missing, severely bent or loose.

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
34	After	0.3 Hours	Tracks	<p>a. Inspect tracks on right side of machine for damaged shoes and missing or loose bolts. Check master link for missing or loose bolts.</p> <p>b. Check recoil mechanism access cover for damage and loose or missing bolt.</p> <p>c. Check all rock guards for damage and loose or missing bolts.</p> <p>d. Check idler and rollers for wear, leaks, damage and loose or missing hardware. Notify your supervisor if any leaks are evident.</p> <p>e. Inspect track pins for evidence of leaking oil. Any wetness in area of track pin bushings indicates a problem. Notify your supervisor.</p> <p style="text-align: center;"><b>WARNING</b></p> <p><b>BE ALERT for personnel in the area while moving tractor to perform inspection. While operator moves tractor, an assistant must look for damage to sprocket segments. Ensure assistant is clear, to the side of tracks, and all other personnel are clear of the area. Failure to follow this warning may cause injury or death.</b></p> <p>f. Check sprocket segments for missing or broken segments.</p> <p>g. Check track tension as follows:</p> <p>(1) Place a straight edge on top of grousers, between idler and front carrier roller.</p> <p>(2) Measure track sag between bottom edge of straight edge and top of grouser, at midpoint between idler and front carrier roller.</p>	<p>Any bolts are missing or loose.</p> <p>Access cover is damaged and cannot be securely closed.</p> <p>Guard is missing or loose.</p> <p>Damaged or worn idlers or rollers are evident. Loose or missing hardware is noted.</p> <p>Any sprocket segment is missing or damaged.</p>

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
34 (Con't)					
<p><b>NOTE</b></p> <p>Ensure tractor is parked on level ground with transmission in neutral (N), transmission safety lock lever in locked position, brake lock lever engaged and implements lowered to the ground.</p>					
35	After		<b>Turbo-charger</b>	h. Shut down engine. See paragraph 2-11. Visually check for oil leaks at turbocharger. Check for black soot between turbocharger and muffler.	Any leaks or soot are evident.
36	After		<b>Exhaust System</b>	Check for evidence of leaks. Ensure mounting is secure.	Any exhaust leaks are evident.
37	After		<b>Engine Air Precleaner</b>	Check precleaner for damage. Ensure precleaner is securely installed and housing is free of debris. If clogged, remove, wipe clean and reinstall.	Precleaner is damaged.

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
38	After	0.2 Hours	Fuel Tank	<p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to machine and injury or death.</li> <li>• DO NOT smoke or permit any open flame in area of machine while you are servicing fuel system. Be sure hose nozzle is grounded against filler tube during refueling to prevent static electricity. Failure to follow this warning may result in injury to personnel or equipment damage.</li> <li>• Ensure fire extinguisher is in fuel servicing area.</li> </ul> <p style="text-align: center;"><b>NOTE</b></p> <p>Use a suitable container to capture draining water or sediment. Dispose of drained fluid IAW local policy and ordinances. Ensure all spills are cleaned up.</p> <p>a. Drain water or sediment from fuel tank. See page 3-7.</p> <p>b. Refuel as needed. See page 3-6.</p>	
39	After	0.4 Hours	Blade Tilt Brace and Blade Tilt Cylinder Ball and Socket	<p>a. Apply GAA grease (Item 8, Appendix D) to grease fitting on blade tilt brace ball and socket, on left side of machine.</p> <p>b. Repeat step a to lubricate blade tilt cylinder ball and socket on right side of machine.</p>	

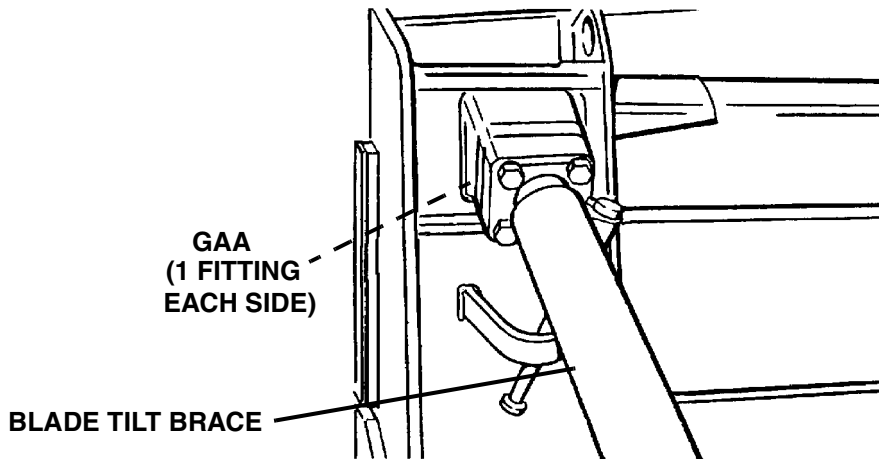


Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

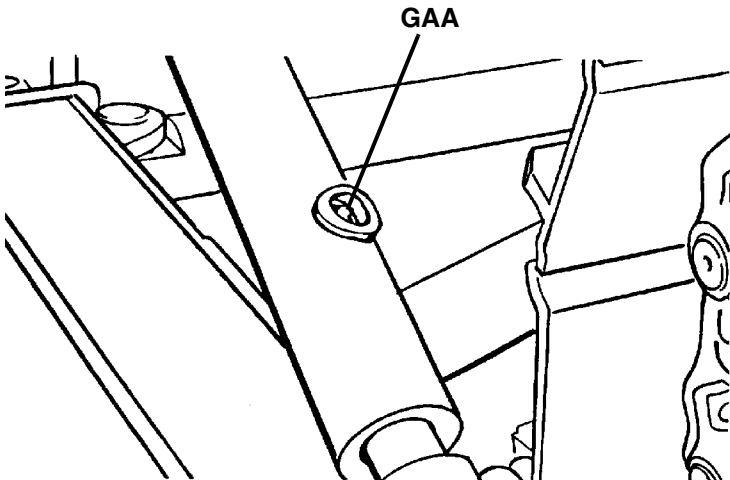
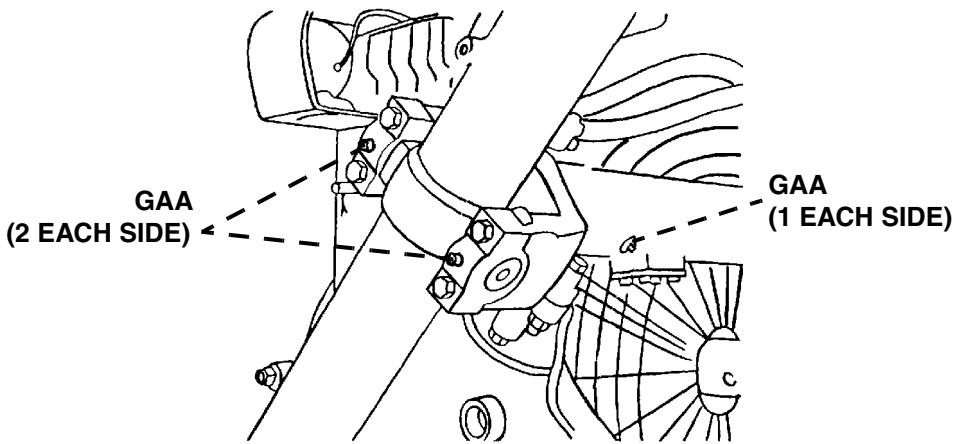
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
40	After	0.2 Hours	Blade Tilt Brace - Screw Threads	Apply GAA grease (Item 8, Appendix D) to blade tilt brace screw threads grease fitting.	
					
41	After	0.5 Hours	Blade Lift Cylinder Upper Trunnion Bearings and Lift Cylinder Support	Apply GAA grease (Item 8, Appendix D) to six grease fittings (three each side) on lift cylinder upper trunnion bearings and on lift cylinder support.	
					

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

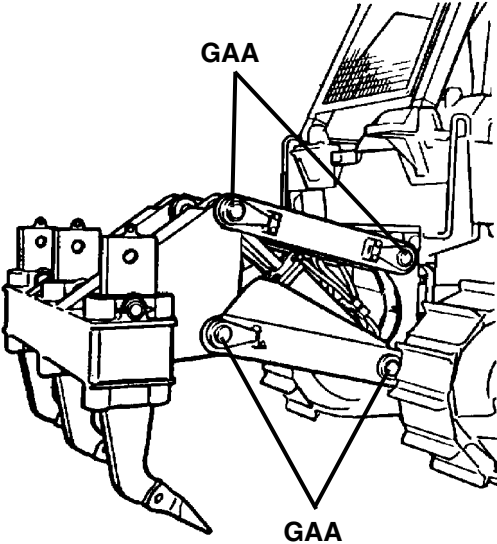
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
42	After	0.5 Hours	Ripper (If Equipped)	Apply GAA grease (Item 8, Appendix D) to 20 ripper linkage and cylinder bearing grease fittings, 10 on each side.	
					
43	Weekly	0.2 Hours	Batteries	<p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>To avoid injury, eye protection and acid-resistant gloves must be worn when working around batteries. Do not smoke, use open flame, make sparks or create other ignition sources around batteries. If a battery is giving off gases, it can explode and cause injury to personnel. Remove all jewelry such as rings, ID tags, watches, and bracelets. If jewelry or a tool contacts a battery terminal, a direct short will result in instant heating, damage to equipment, and injury to personnel.</li> <li>Sulfuric acid contained in batteries can cause serious burns. If battery corrosion or electrolyte makes contact with skin, eyes or clothing, take immediate action to stop the corrosive burning effects. Failure to follow these procedures may result in injury or death.</li> </ul> <p style="text-align: center;"><b>NOTE</b></p> <p>For complete information on servicing batteries, refer to TM 9-6140-200-14.</p>	



Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
43 (Con't)				<p>a. Remove battery box access cover from battery box on left side of tractor. See paragraph 3-7.</p> <p>b. Inspect batteries for obvious damage such as a cracked case and electrolyte leakage.</p> <p>c. Check battery hold-down for looseness and damage. If loose, tighten wingnuts.</p> <p>d. Check batteries for broken and corroded connections or frayed/burned/melted cables and clamps.</p> <p>e. Remove fill plugs and check electrolyte level in cells of both batteries. Level should be 1/8 in. (3 mm) above tops of plates. Add distilled water as needed to maintain correct level.</p> <p>f. Ensure batteries are clean and battery cables are secure.</p> <p>g. Close access cover and secure with two latches.</p>	<p>One or both batteries are missing.</p> <p>Any electrolyte leakage is evident.</p> <p>Hold-down is damaged or loose.</p> <p>Broken and corroded connections or frayed/burned/melted cables and clamps are evident.</p> <p>Battery cables are not secure.</p>

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

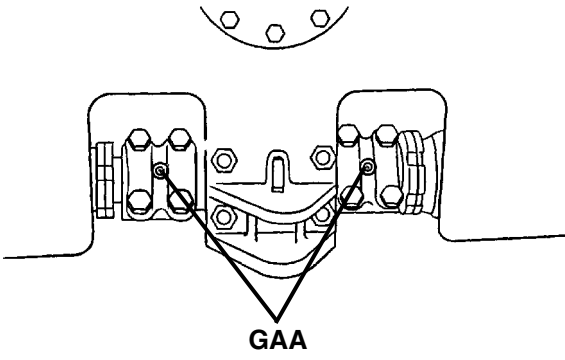
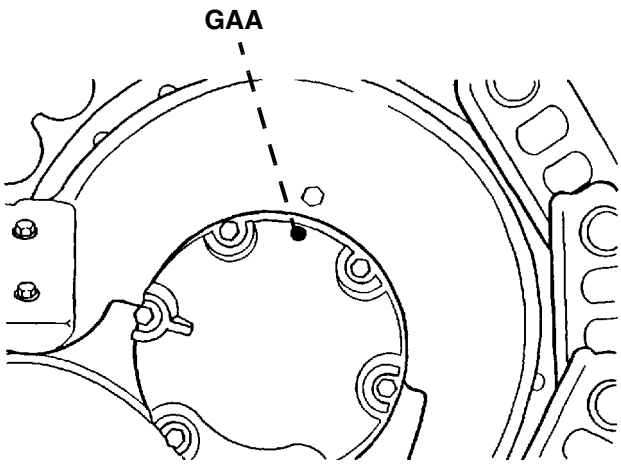
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
44	Weekly	0.3 Hours	Track Roller Frame Inner Bearings	Apply GAA grease (Item 8, Appendix D) to two track roller frame inner bearings under rear of machine.	
					
45	Weekly	0.3 Hours	Track Roller Frame Outer Bearings	On each side, apply GAA grease (Item 8, Appendix D) to grease fitting to lubricate track roller frame outer bearings. Pump grease gun until you can hear grease being expelled.	
					

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

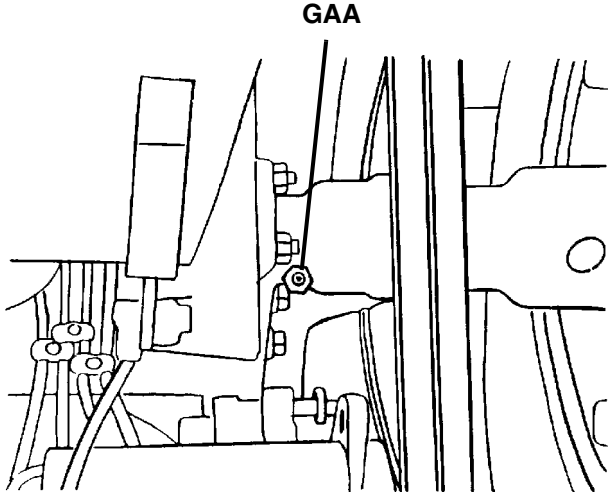
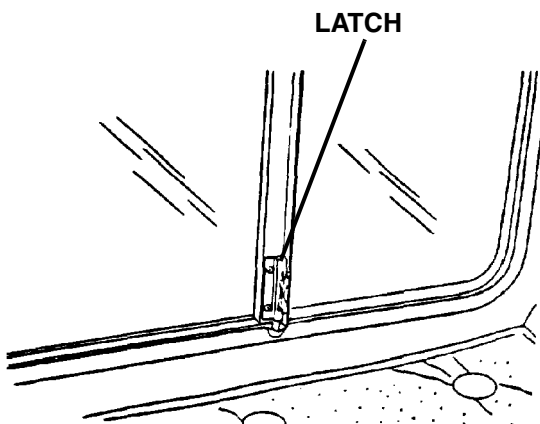
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
46	Weekly	0.2 Hours	Fan Drive	Apply GAA grease (Item 8, Appendix D) to fan drive grease fitting.	
					
47	Monthly		Winch Wire Rope (If Equipped)	<p style="text-align: center;"><b>WARNING</b></p> <p>When handling winch wire rope, wear a pair of heavy gloves. Damaged or frayed wires can injure fingers and hands.</p> <p>a. Unreel full length of wire rope. See paragraph 2-16.</p> <p style="text-align: center;"><b>WARNING</b></p> <p>Wear eye protection when using wire brush to protect against injury.</p> <p>b. Clean entire length of wire rope with a wire brush.</p> <p>c. Inspect entire length of wire rope for flat spots, fraying, kinks and signs of rusting.</p> <p>d. Reel in wire rope. See paragraph 2-16.</p>	<p>Wire rope has any flat spot more than 1/2 the diameter of the wire rope. Any frays or kinks are evident.</p>

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) for D7G Tractor (Continued).

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
48	Monthly		Winterized Cab (If Equipped)	a. Check window latch on working window for proper operation.	
					
49	Monthly		Decals and Data Plates	b. Check door stop and securing bolt for proper operation. c. Check door handles and locks for proper operation. Ensure all decals and data plates are present and legible.	

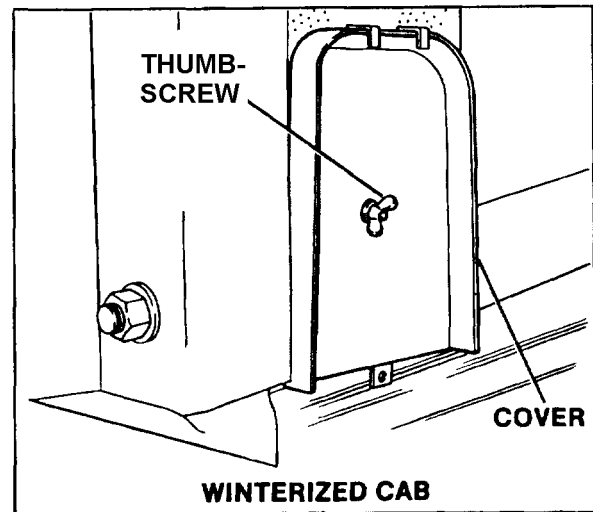
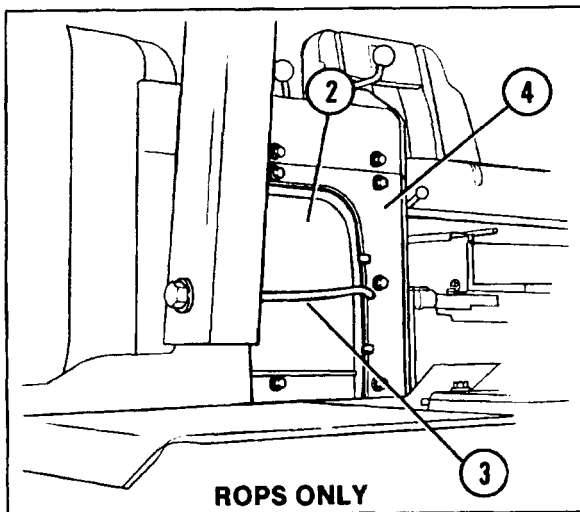
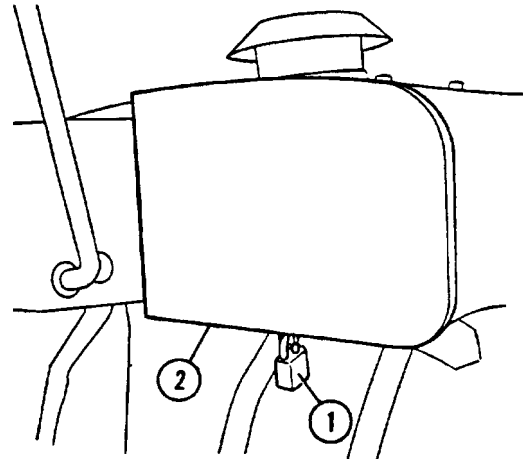
### Section III. Operation Under Usual Conditions

#### 2-4. OPERATING PROCEDURES, TRACTOR.

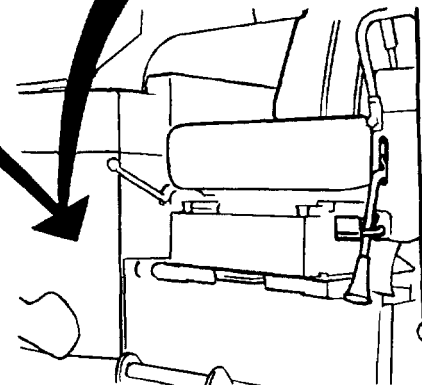
It is essential that the operator know how to perform every operation of which the tractor is capable. This section gives instructions on starting and stopping the tractor, on the basic motions of the tractor, and how to use these instructions to perform the specific tasks for which the equipment was designed.

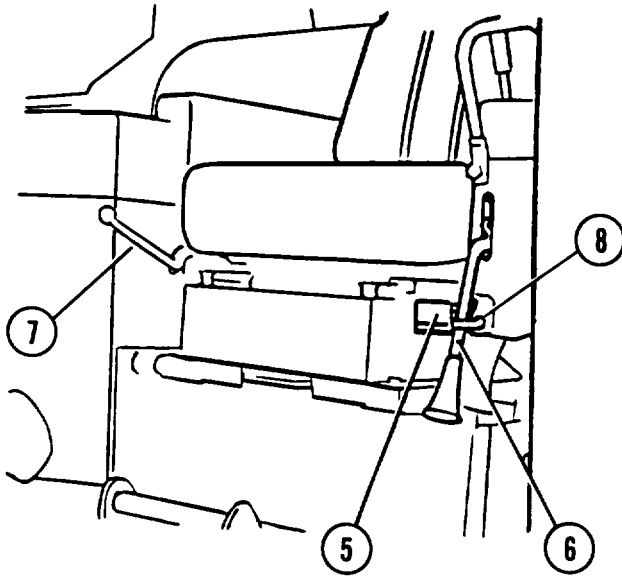
#### 2-5. STARTING THE ENGINE.

- a. Remove padlock (1) and gage panel protective cover (2). Secure padlock (1) to protective cover (2).



- b. For tractors with ROPS only, slide protective cover (2) between spring (3) and panel (4) during operation.
- c. For tractors with winterized cab, attach cover to panel with thumbscrew.





- d. Remove padlock (5) from transmission safety lock lever (6). Return padlock to locking bracket (8).
- e. Adjust operator's seat so that when your seat belt is buckled you can still depress the brake pedals.

**NOTE**

Before starting the tractor, make sure that the parking brake is engaged.

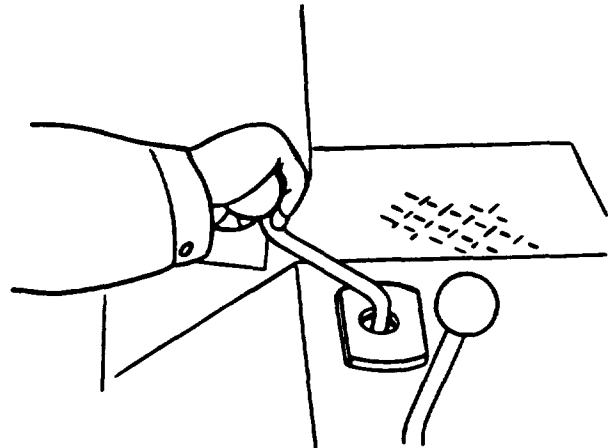
- f. If parking brake is not engaged, depress left brake pedal, push brake lock lever (7) down, and then depress right brake pedal firmly.

**NOTE**

Before starting the tractor, make sure that the transmission selector is locked in NEUTRAL.

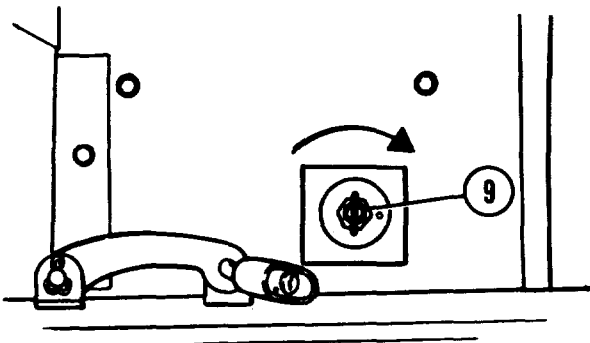
- g. If transmission selector is not in neutral position, move selector lever to neutral and push safety lock lever (6) down to lock it in position.

- h. Move all equipment controls to the hold position.

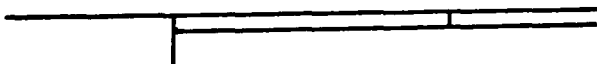


**CAUTION**

Never turn disconnect switch OFF when the engine is running, or serious damage to the electrical system will result.



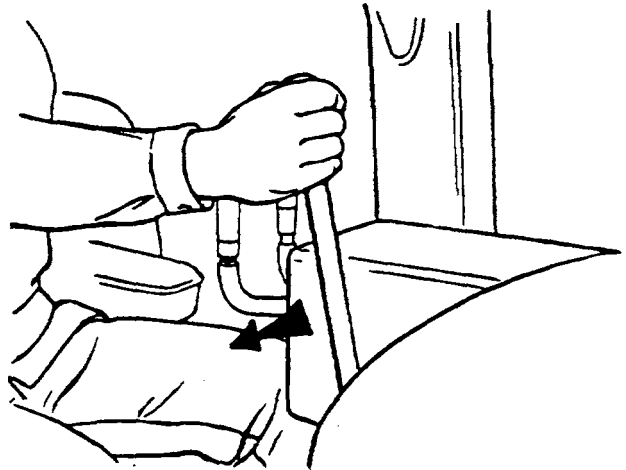
- i. Turn disconnect switch (9) ON.



- j. Pull governor control just past detent position.

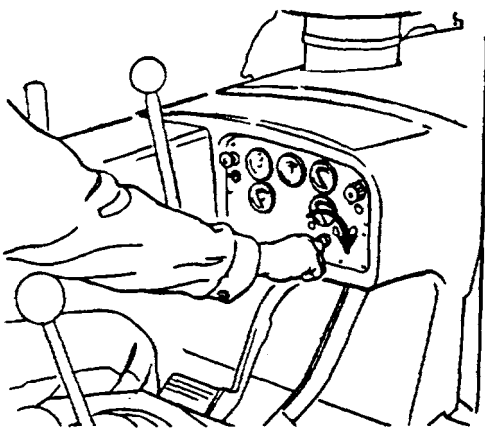
**WARNING**

Make sure area is well ventilated when starting and running engine. Failure to do this could result in carbon monoxide poisoning.



**CAUTION**

Crank engine for no more than 30 seconds, at 2 minute intervals, or damage to starter motor may occur.



- k. Turn the start key clockwise to start position. Release the key as soon as the engine starts.
- k.1. If engine fails to start, wait for two minutes. Repeat cycle up to six times for a total of seven 30-second cranking cycles. If engine still fails to start, wait for 30 minutes. Repeat starting cycle up to a total of four additional 30-second cranking cycles. If needed, wait 30 minutes, then repeat cycle up to four 30-second cranking cycles.

**CAUTION**

If oil pressure does not register within 15 seconds after the engine starts, stop the engine or serious damage may occur. Stop engine by pushing control lever forward past the detent.

- l. Observe gages to make sure all systems are operating in the NORMAL range.

**CAUTION**

Limit idling time. Excessive idling can cause carbon buildup and engine damage.

- m. Before applying load, warm up engine for at least five (5) minutes with governor control lever at 1/4 to 1/2 speed position.



**2-6. MOVING THE TRACTOR.****WARNING**

Hearing protection is required to be worn at all times while the vehicle is being operated.

**WARNING**

Never operate the tractor or any equipment in areas where power lines, overhead or underground cables or power sources exist without first notifying the appropriate power company to de-energize the lines or take suitable precautions.

Never operate the tractor, any part thereof, or load closer to any electrical power line or power source than the distance specified or required by Federal, State/Provincial, Local or other applicable safety codes or regulations. In addition, United States OSHA regulations require a flagman when operating in close proximity of energized power lines.

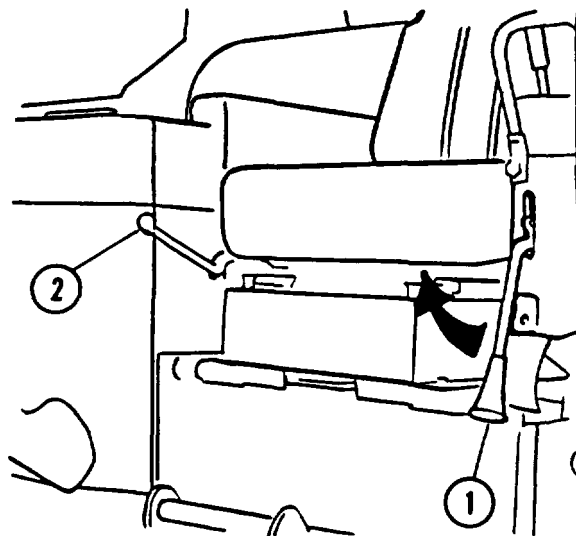
**NOTE**

Observe gages frequently during operation. All gages must indicate within the **NORMAL** operating range.

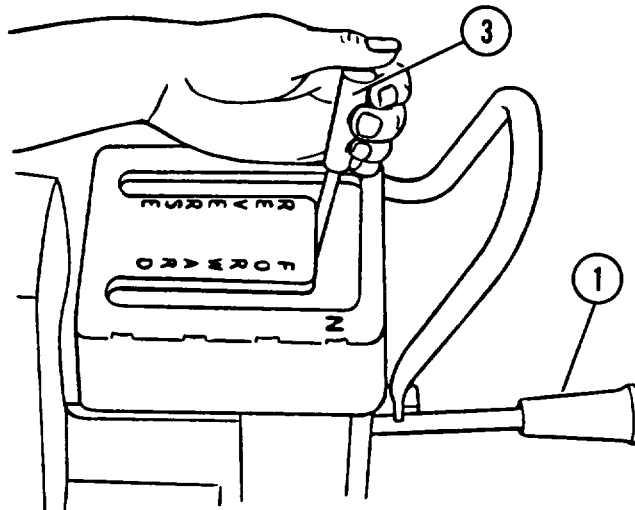
- a. Raise lowered equipment high enough to clear obstructions.

- b. Release transmission safety lock by lifting lever (1) up.

- c. Depress both brake pedals and release brake lock (2).



- d. Move transmission selector lever (3) to desired direction and gear position.



## WARNING

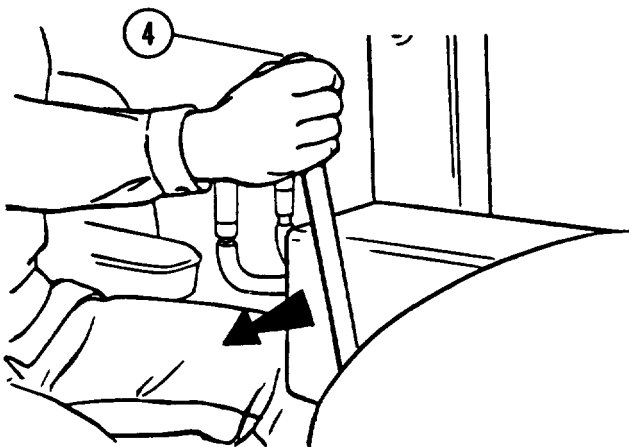
Keep tractor under control at all times. **DO NOT NEUTRALIZE TRANSMISSION** to allow tractor to coast. Select gear range before starting on downgrade. **DO NOT** change gears while going downhill.

**DO NOT ALLOW TRACTOR TO COAST DOWNHILL.**

When load is pushing tractor, put gear selector in first speed before starting downhill. If engine starts to overspeed, depress both brake pedals.

**DO NOT SHIFT TRANSMISSION WHILE MOVING.**

Failure to follow these instructions can result in loss of control and endanger the operator.



- e. Pull governor control lever (4) toward you until desired speed is obtained.

## 2-7. CHANGING GEAR AND DIRECTION.

### NOTE

Gear and directional shifts at full engine speed are permissible. However, for maximum service life of power train components, decelerating and/or braking is recommended.

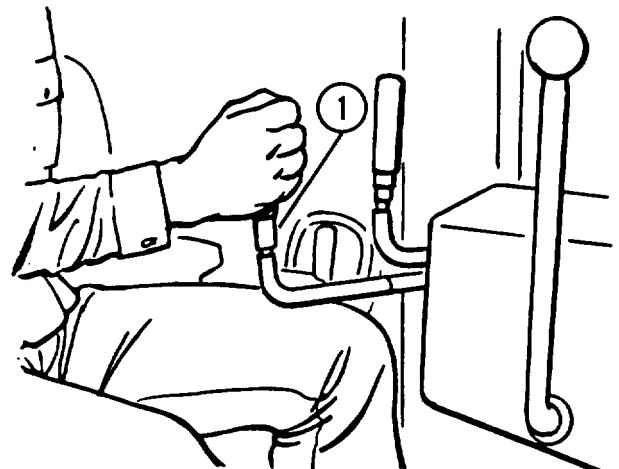
- a. To change gear, decrease engine speed by pushing governor control lever, or by depressing decelerator.
- b. Move transmission selector to desired gear, and return to desired engine speed.
- c. To change direction, decrease engine speed by pushing governor control lever.
- d. Depress both brake pedals to slow tractor.
- e. Move transmission selector lever to desired direction and speed.
- f. Release brake pedals and increase engine speed as required.

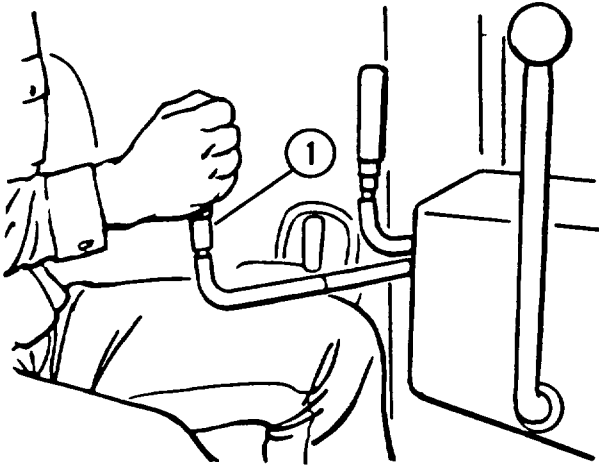
## 2-8. STEERING THE TRACTOR.

### WARNING

When turning on a downgrade, if engine starts to overspeed, depress both brake pedals to keep control of the tractor.

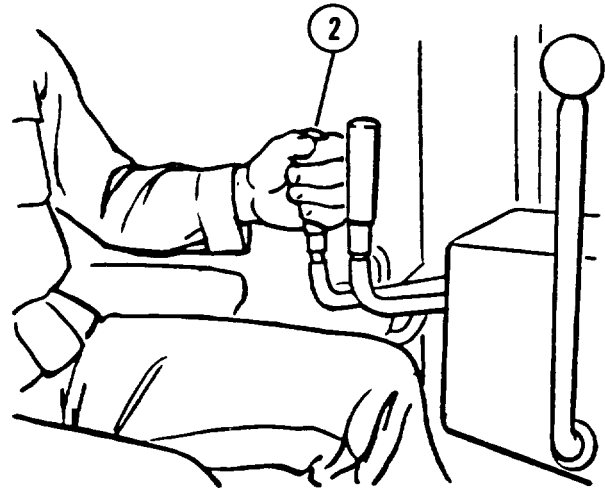
- a. To make a gradual right turn, pull the right steering clutch lever (1) to the first position. Release lever to end turn.



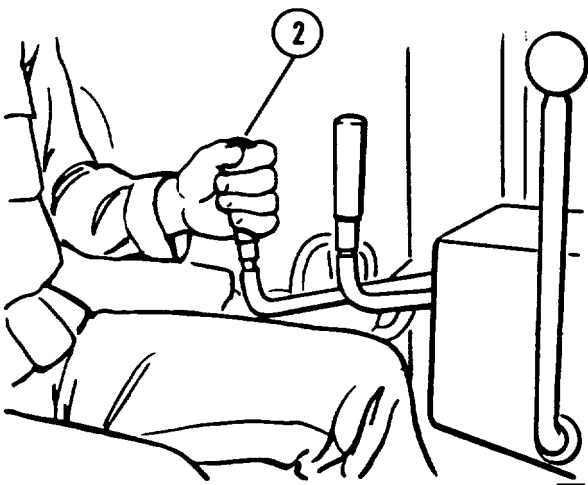


b. To make a sharp right turn, pull the right steering clutch lever (1) all the way out. Release lever to end turn.

c. To make a gradual left turn, pull the left steering clutch lever (2) to the first position. Release lever to end turn.



d. To make a sharp left turn, pull the left steering clutch lever (2) all the way out. Release lever to end turn.



## 2-9. STEERING ON A STEEP DOWNGRADE.

**WARNING**

When steering on a steep downgrade the tractor will respond differently to the steering controls.

- a. Make a **GRADUAL RIGHT** turn by pulling the **LEFT** steering clutch lever to the first detent.
- b. Make a **GRADUAL LEFT** turn by pulling the **RIGHT** steering clutch lever to the first detent.
- c. Make **SHARP** turns following the normal steering procedures in para 2-8, beginning on page 2-25.

## 2-10. STOPPING THE TRACTOR.

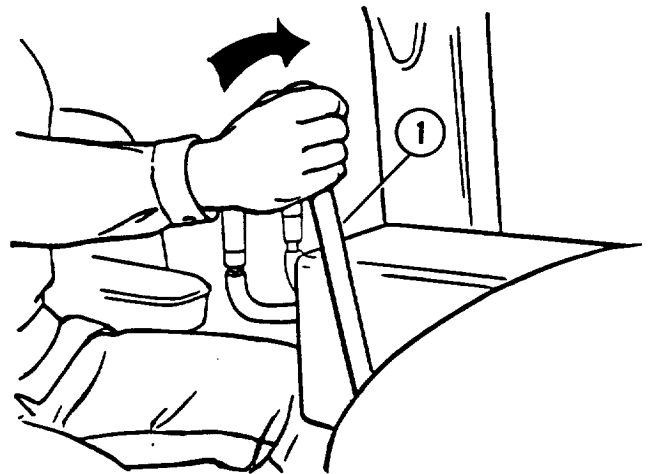
**NOTE**

Always park the tractor on level ground.

**WARNING**

Before leaving the tractor, always stop the engine.

- a. Reduce engine speed by pushing governor control lever (1).
- b. Move transmission selector lever to **NEUTRAL**. Push transmission safety lock down to the lock position.
- c. Depress left brake, engage brake lock, and depress right brake firmly.
- d. Lower all equipment.



2-11. STOPPING THE ENGINE.



After the machine has been working, operate at low idle for 5 minutes before stopping the engine. This will allow hot areas to cool gradually, and the turbocharger to slow down. This will extend the life of the engine and turbocharger.

- a. Push governor control lever past detent to stop engine. When engine stops, turn start switch to off.



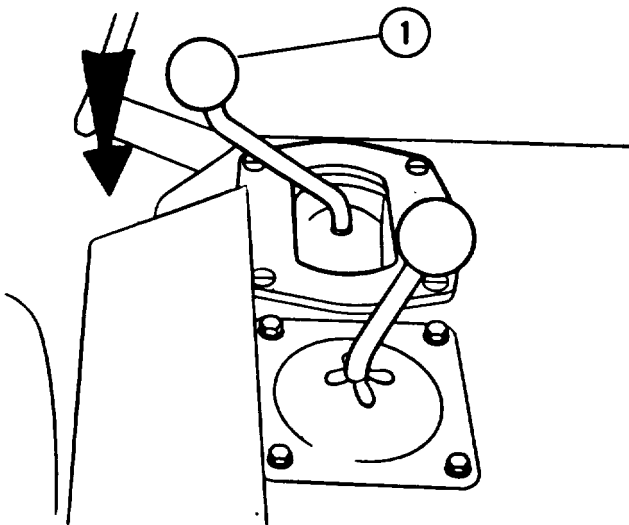
Never turn disconnect switch OFF when the engine is running. Serious damage to the electrical system will result.

- b. Turn disconnect switch off.

2-12. BULLDOZER BLADE LIFT, TILT, AND TIP.

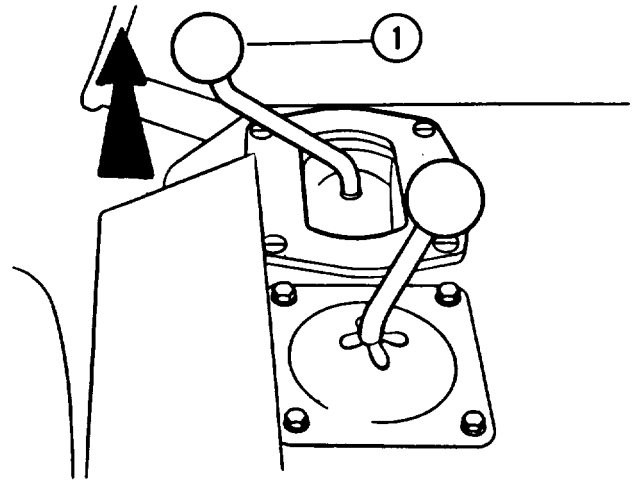
NOTE

The engine must be running to operate the hydraulic implements on the tractor.



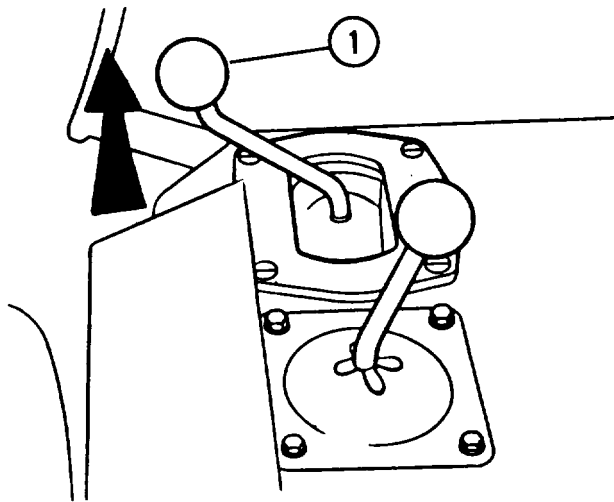
- a. Move blade control lever (1) backward to raise the blade.

- b. Move blade control lever (1) forward to lower the blade.



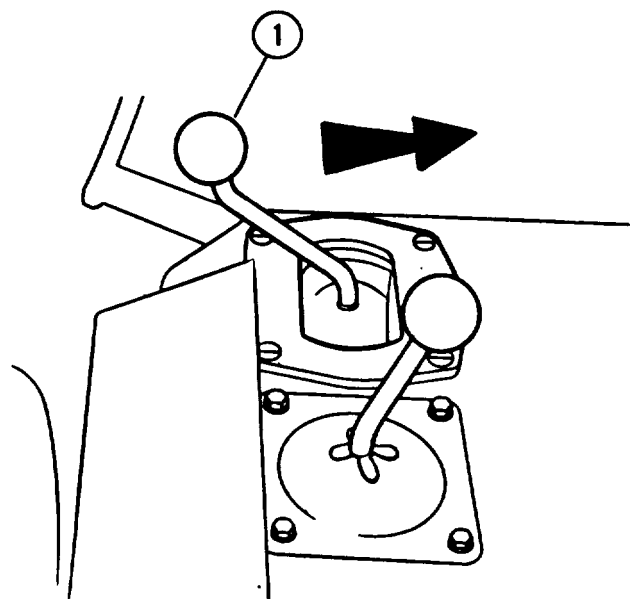
**NOTE**

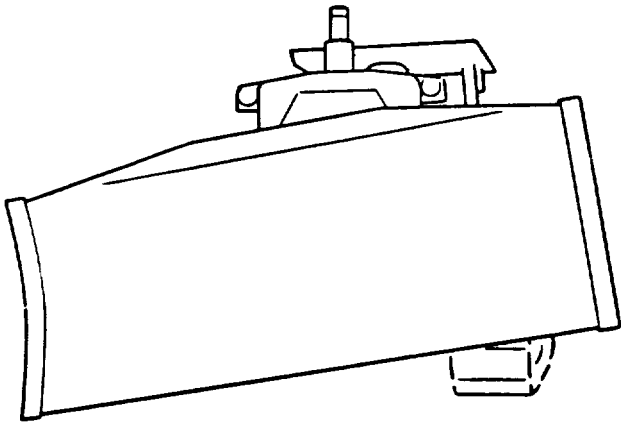
The float position is the only position with a detent. In this position, the blade is free to move up or down according to the terrain.



- c. Push the blade control lever (1) forward, past the lower position, to put the blade in the FLOAT position.

- d. Move blade control lever (1) to the right to tilt the blade so that the blade is high on the left side.



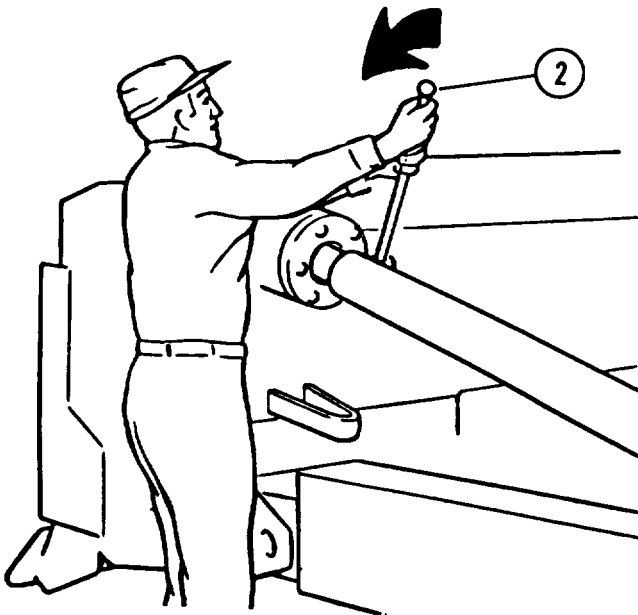
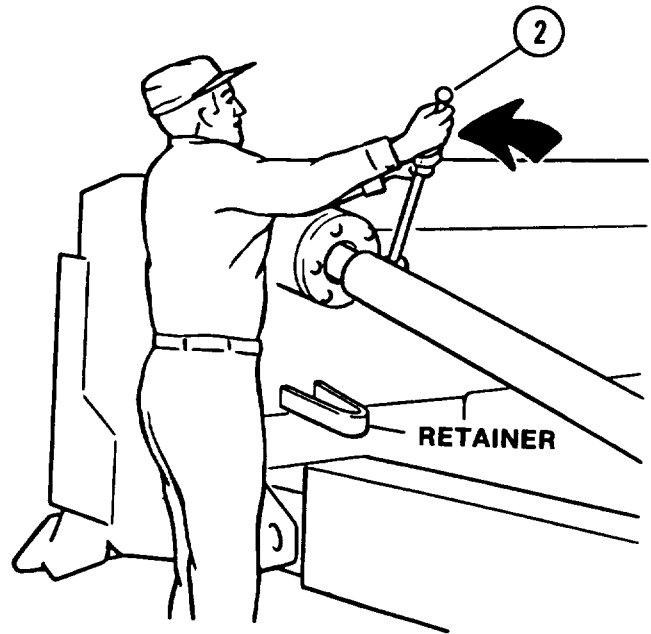


- e. Move blade control lever to the left to tilt the blade so that the blade is high on the right side.

**NOTE**

If additional tilt is required, the brace may be adjusted.

- f. To adjust the brace, turn the handle (2) on the tube to lengthen or shorten the brace. Always secure the handle (2) in the retainer after an adjustment has been made.

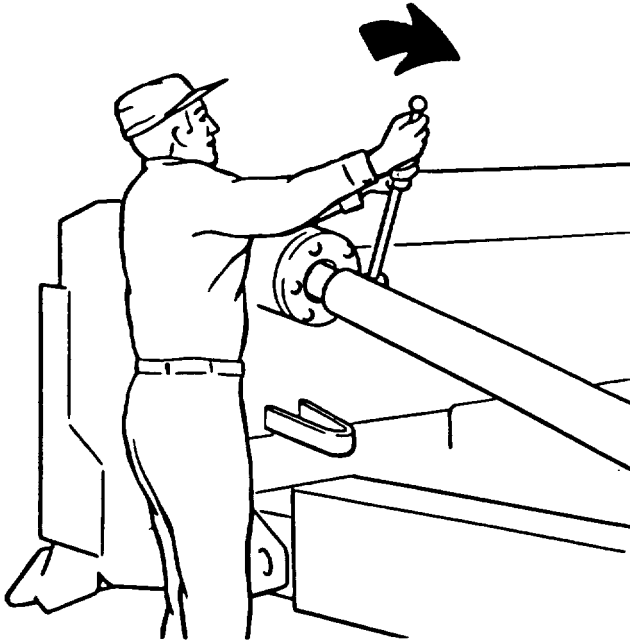


- g. Shorten brace to make left side of blade lower and right side higher.



**CAUTION**

Do not extend tube farther than 4.25 in. or you will disengage tube.



h. Lengthen brace to make right side of blade lower and left side of blade higher.

i. To tip the blade forward, lengthen brace and move blade control lever to the left.

j. To tip the blade back, shorten brace and move blade control lever to the right.

**2-13. OPERATING TECHNIQUES FOR DOZING.**

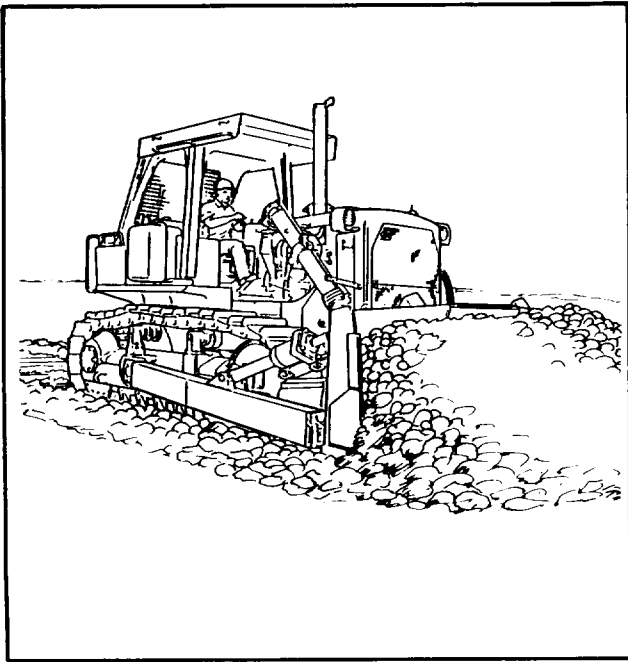
Following are suggested techniques for safe dozing operations.

**WARNING**

Use extra caution when crossing side hills, ridges, logs and ditches. Tractor can tip and cause serious personal injury.

**CAUTION**

Do not operate with the blade below the maximum digging depth (18 inches below ground level). Operating below this depth may cause damage to the blade lift cylinder.

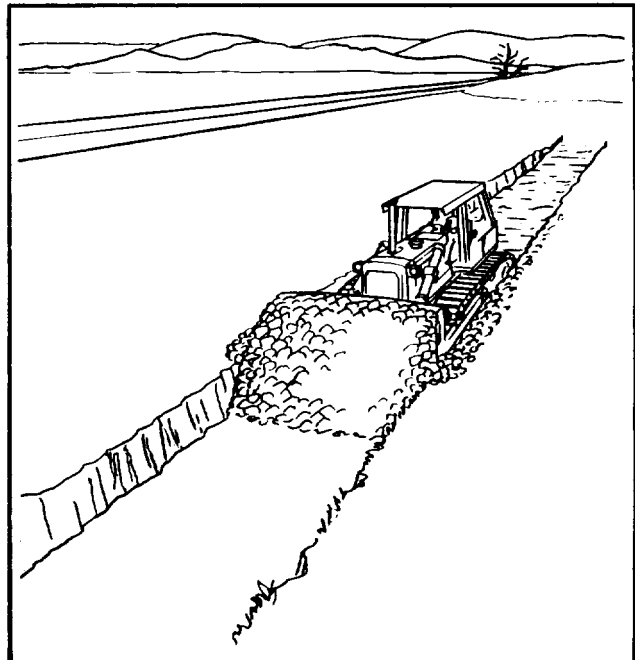


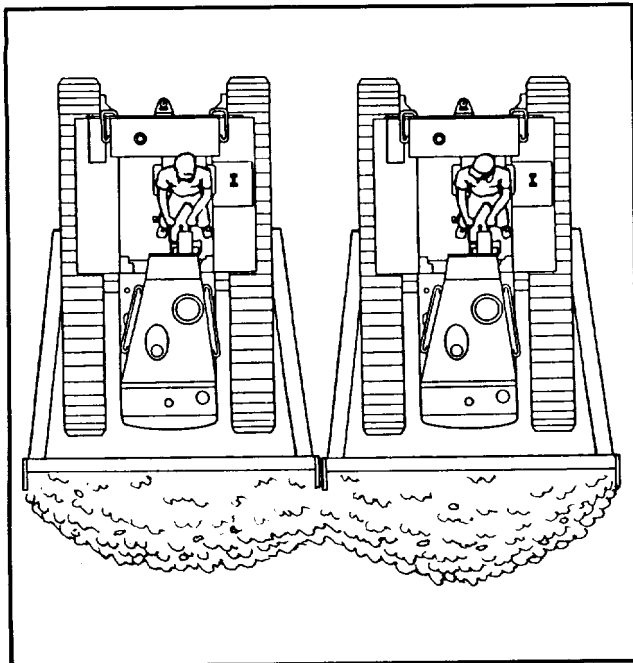
- a. Straight Dozing. If the blade digs in and the rear of the tractor rises, raise blade to continue even cut. Moving a heavy load causes travel speed to drop; shift to a lower gear and/or raise the blade slightly.

**NOTE**

When doing finishing or leveling work, a full blade handles more easily than a partially-loaded blade.

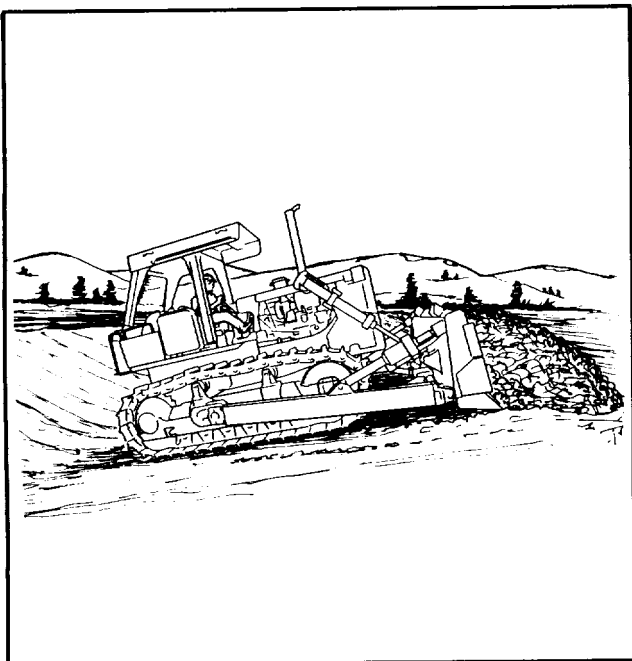
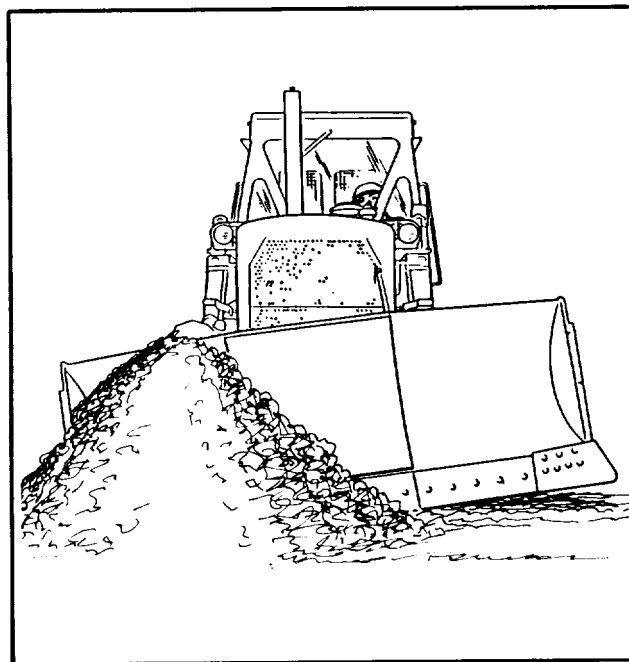
- b. Slot Dozing. This allows larger loads to be pushed in front of the blade. It is used in stockpiling and high-production bulldozing.



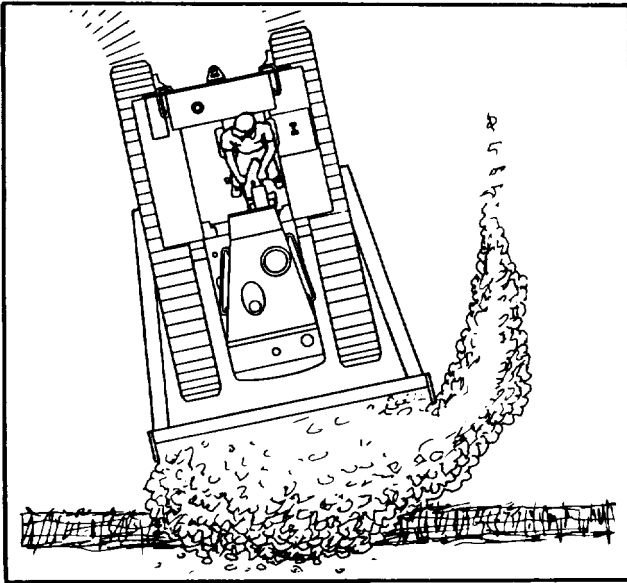


c. Side-by-Side Dozing. Use when moving large quantities of loose material. Keep blades close together and tractors parallel.

d. Tilt Dozer Ditching. Tilt blade and work with low side in ditch center. Level blade when required depth and slope are reached.



e. Straight Dozer Ditching. Tilt blade to cut shallow "V" ditches. For larger ditches, doze at right angles to center line of ditch. When desired depth is reached, doze length of ditch to smooth sides and bottom.



f. Straight Dozer Backfilling. Push at a 90° angle to ditch.

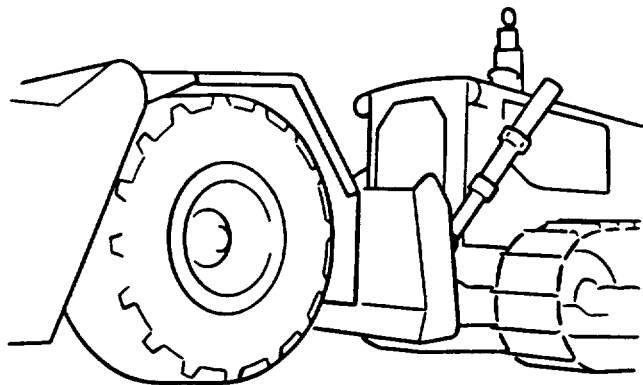
g. Push Loading.

- (1) Position bulldozer cutting edge slightly above ground level.

**WARNING**

Make contact with scraper gradually. Injury to scraper operator can occur if contact is too forceful.

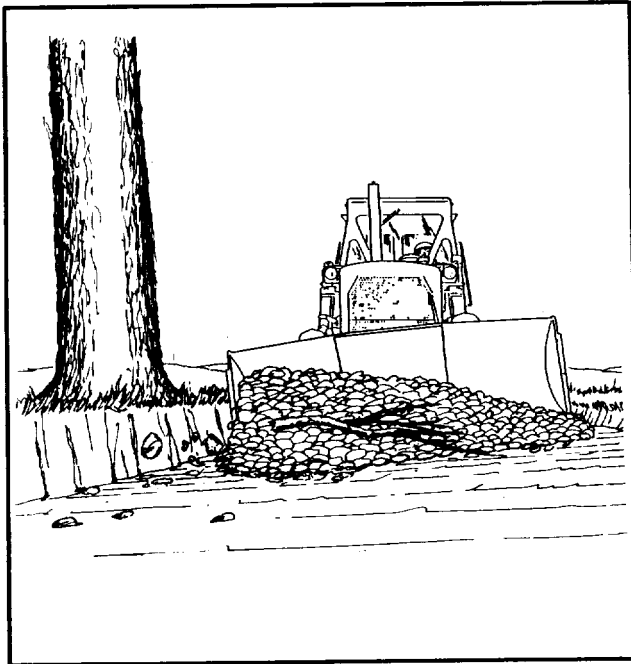
- (2) Tractor should make contact with moving scraper. Contact must be gradual and at the push block of the scraper.
- (3) Contact push block squarely. Don't allow blade or push cup to contact scraper tires.
- (4) Do not lift rear of scraper off the ground.
- (5) Upshift tractor when cut is complete to help scraper get moving.



h. Large Tree Removal.

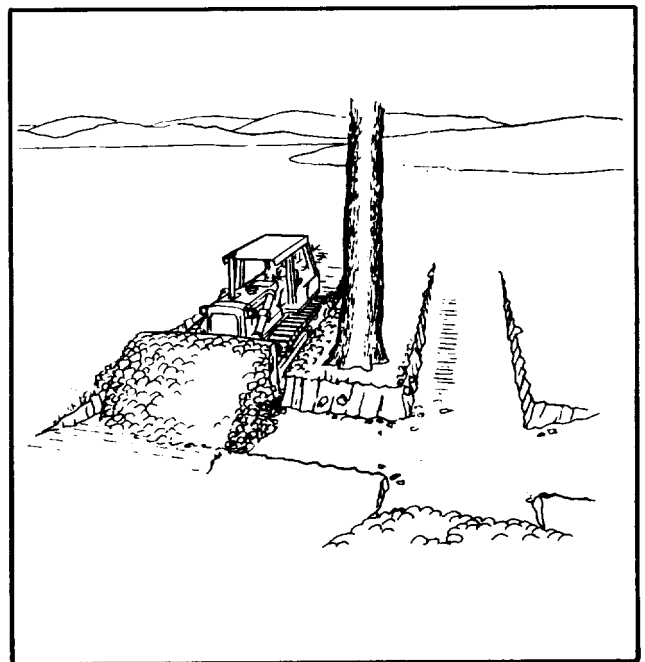
**WARNING**

Be aware of any dead limbs which may fall during removal.



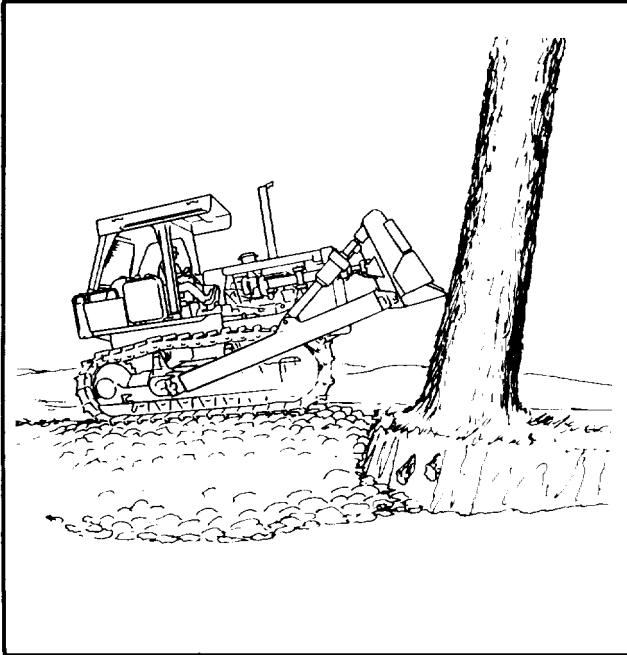
(1) Cut roots on side opposite direction of fall.

(2) Cut roots on sides parallel to direction of fall.



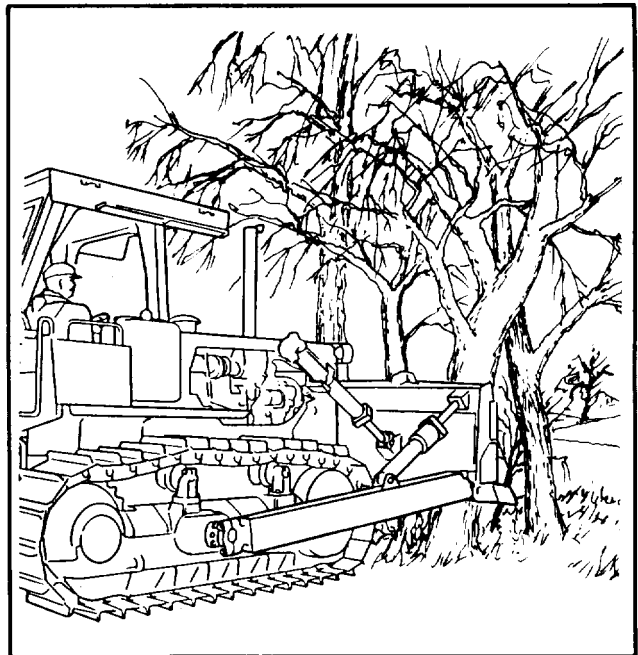
**WARNING**

Do not drive onto stump while tree is falling. Back away immediately when tree starts to fall to avoid personal injury or damage to tractor.

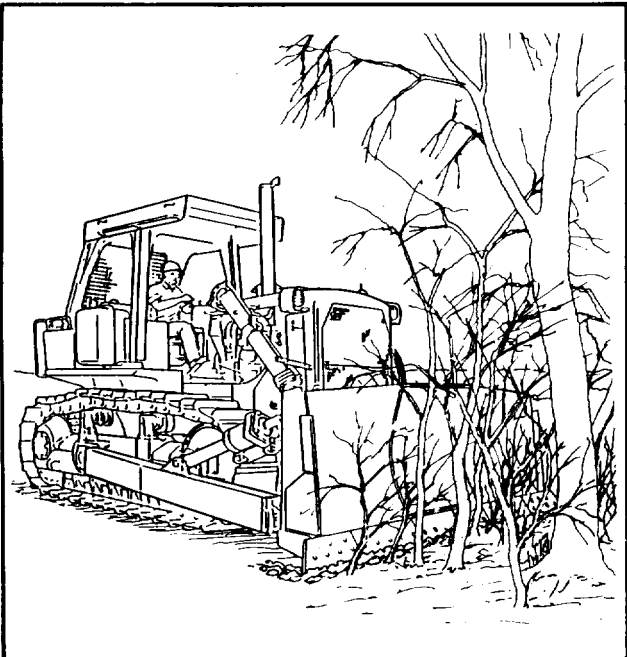


- (3) Ease into tree. Push in direction of fall with blade high. Build earth ramp if higher contact is needed.

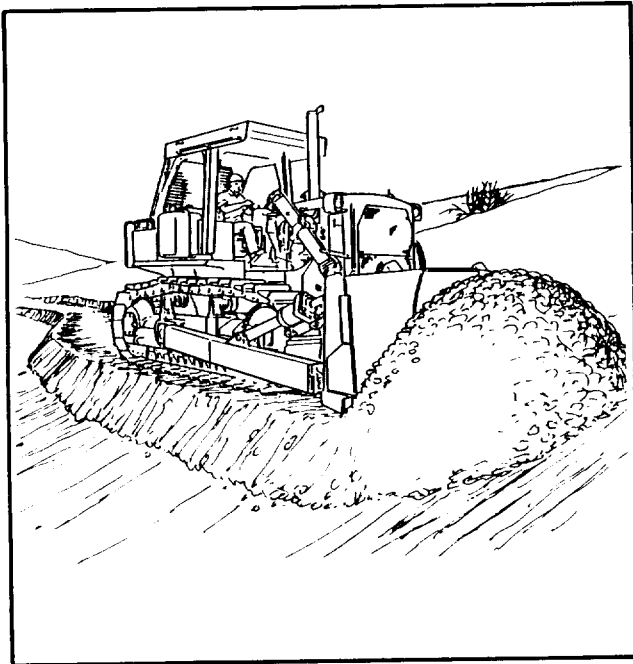
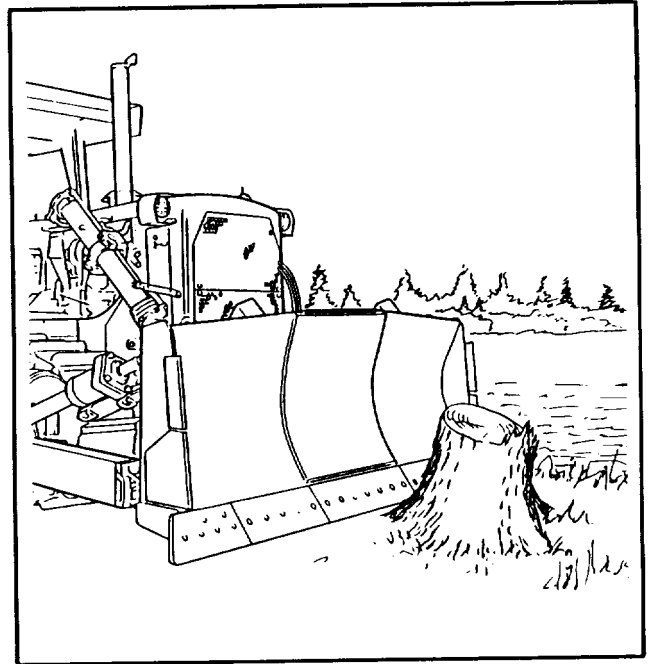
- i. Large Brush and Medium Size Tree Removal. Contact tree 12 to 16 inches above ground. Move forward while lifting blade.



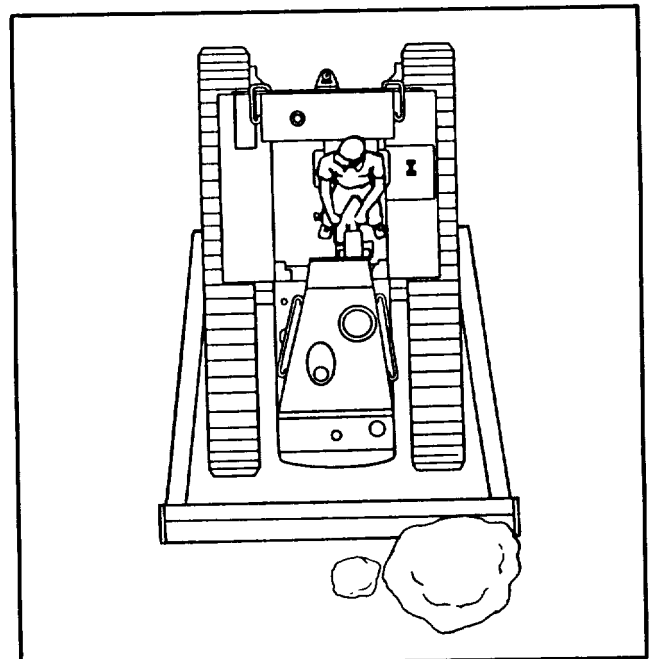
- j. Brush Clearing. Lower blade a few inches into the ground and move forward. Lift blade when brush is out to loosen earth from roots.



k. Stump Removal. Cut roots if necessary and contact stump near ground and lift blade while pushing.



l. Side Hill Cut. Start cut downgrade if possible. Slope to inside of cut. Doze bench wide enough for machines that will follow.



m. Rock Pushing. Contact rock at one side of blade.

2-14. RIPPER RAISE AND LOWER.

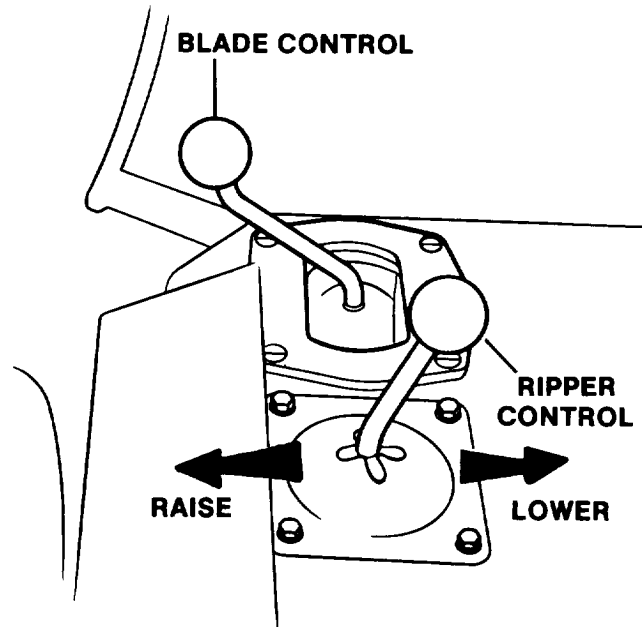
NOTE

Normally, the engine must be running to operate the hydraulic implements, but the ripper can be LOWERED with engine off.

**WARNING**

Keep all personnel clear of vehicle while operating ripper to avoid personal injury.

- a. To lower the ripper, move ripper control lever to the right.
- b. To raise the ripper, move lever to the left.



2-15. OPERATING TECHNIQUES FOR RIPPING.

**CAUTION**

Do not turn or back tractor while shanks are in the ground. Twisting puts strain on the shanks and tips that may cause failure. Inspect ripper tips frequently.

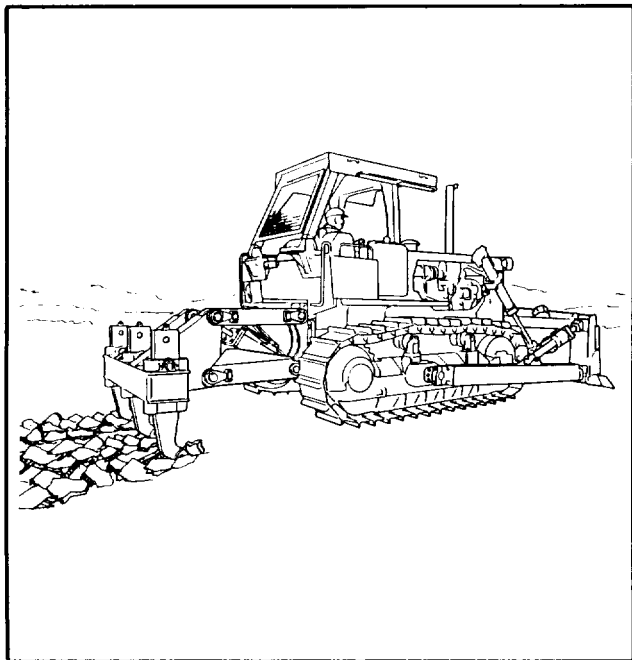
NOTE

Rip downhill whenever possible.

a. General Use.

- (1) Use FIRST speed for most ripping operations. It is better to use additional shanks where practical, rather than to increase speed.
- (2) Always use center shank when ripping with one shank. If material breaks up easily, more shanks may be used.





- (3) Cross rip only when necessary.
  - (4) When ripping for scraper loading, rip in same direction that scrapers will load.
  - (5) In most cases it is desirable to rip as deeply as possible. Sometimes it is better to rip at partial depth and remove the material in its natural layers.
  - (6) Keep several inches of material on top of the unripped formation to cushion the machine and provide traction.
  - (7) When final material size must be relatively small, close spacing of passes is recommended.
- b. Hard to Rip Material.
    - (1) Use one shank in tough-to-rip material (solid rock) or material that tends to break out in large slabs or pieces (granite).
    - (2) Always use center shank when one-shank ripping.
  - c. Asphalt Road Surfaces. Raise ripper shanks to lift out and break material,
  - d. Concrete Road Surfaces. Use a single ripper shank. Ripper is especially effective in severing reinforcement rods or mesh.
  - e. Packed Soil, Hard Pan, Clay, Shale or Cemented Gravel. Three shanks work well in these materials. Use as many shanks as possible to break material to desired size, without stalling or hanging up the tractor.
  - f. Rock with Fractures, Faults, and Planes of Weakness. Use two shanks where rock breaks out in small pieces, and the tractor can handle the job easily. When tractor begins to stall or tracks spin, use only the center shank.

2-16. WINCH OPERATION.

**WARNING**

When handling the winch cable, wear a pair of heavy gloves. Damaged or fraying wires can seriously injure the fingers and hands.

**WARNING**

Exercise care with suspended loads. If engine speed is too low the weight of the load may cause it to drop, even when the winch is in REEL IN position.

Make certain personnel are clear of cable when there is a load on the cable. Cable can break and cause personal injury.

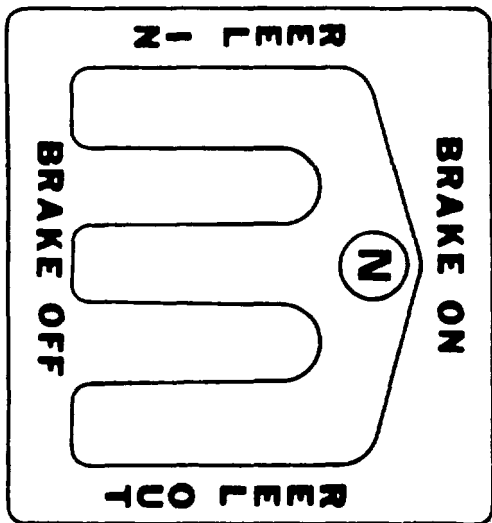
**NOTE**

The engine must be running to operate hydraulic implements of the T-9 tractor. Winch line speed is controlled by engine speed.

**WARNING**

Do not use the winch to pull when there is fewer than three wraps of the cable on the winch drum. A bare drum pull can cause the cable to break away from the winch drum and cause severe injury to personnel.

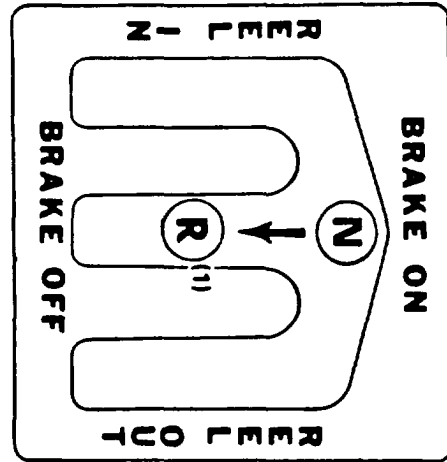
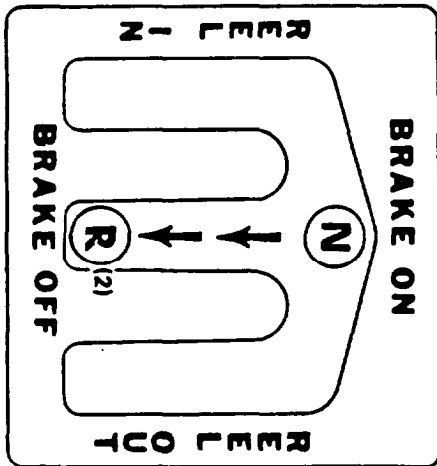
- a. To lock cable so it will not move, put winch control lever in the BRAKE ON (Neutral) position.



**CAUTION**

Do not leave in BRAKE OFF mode for extended periods. When moving away from a load, operate tractor in low gear to prevent overspeeding of winch components.

- b. To allow a load to move out cable, move winch control lever to the BRAKE OFF (Release) position. When released, the lever will return to the BRAKE ON (Neutral) position.



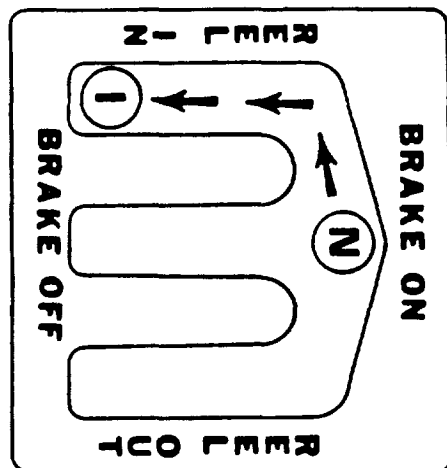
- c. There is a BREAK OFF position with a detent which also allows a load to move out the cable load. The lever will not automatically return to the BRAKE ON (Neutral) position from the detent; it must be moved.

**NOTE**

For maximum service life of winch, engage winch at lowest practical engine speed. Heavy line loads will require winch engagements at higher engine speeds than with lighter loads.

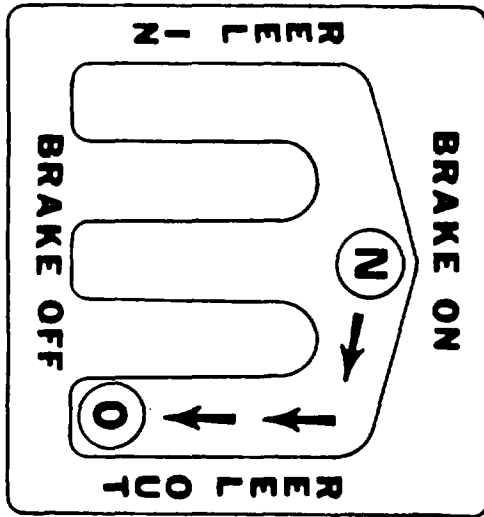
Always winch with cable in as straight a line as possible behind tractor.

- d. To reel the cable in under power, move winch control lever to the REEL IN position. When released, the lever will return to the BRAKE ON (Neutral) position.



**NOTE**

To reel in or out slowly, decelerate and accelerate as necessary.



- e. To unspool cable under power, move the winch control lever to the REEL OUT position. When released, the lever will return to the BRAKE ON (Neutral) position.

**2-17. OPERATING TECHNIQUES FOR WINCHING.**

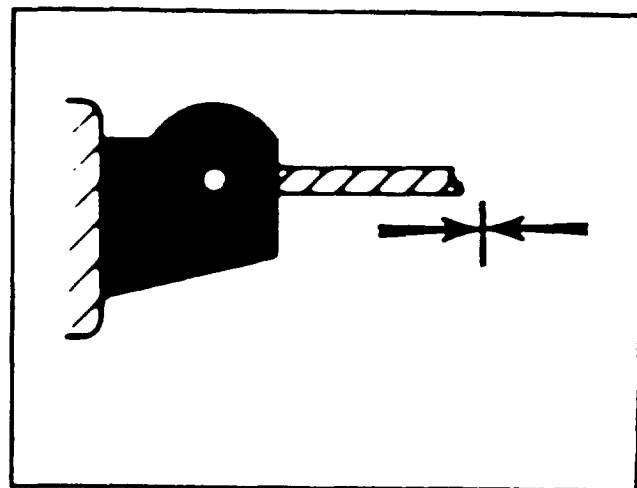
**WARNING**

Exercise care with suspended loads. If engine speed is too low the weight of the load may cause it to drop, even when the winch is in REEL IN position.

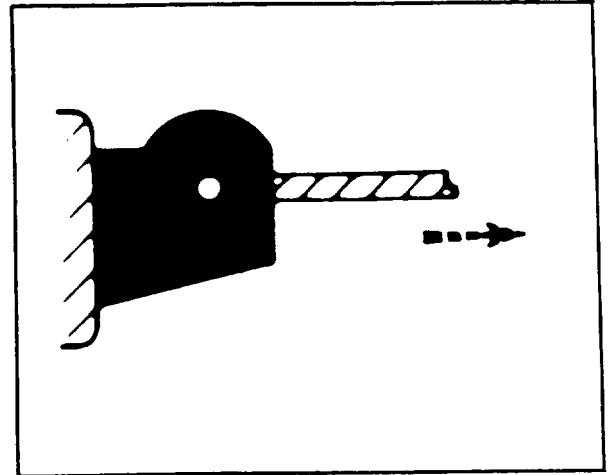
Make certain personnel are clear of cable when there is a load on the cable. Cable can break and cause personal injury.

a. General Use.

- (1) For towing, holding a load, or when winch is not in use, put winch control lever in the BRAKE ON (Neutral) position. The cable will not move.

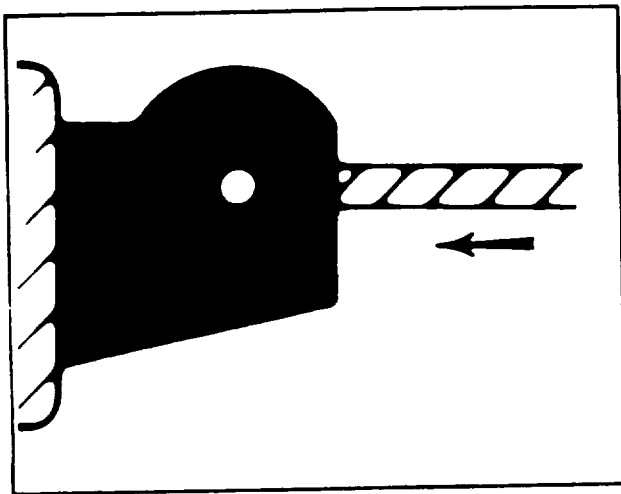


- (2) To reel out cable by moving tractor away from heavy load, or to lower a load by its own weight, move winch control lever to the BRAKE OFF (Release) position.



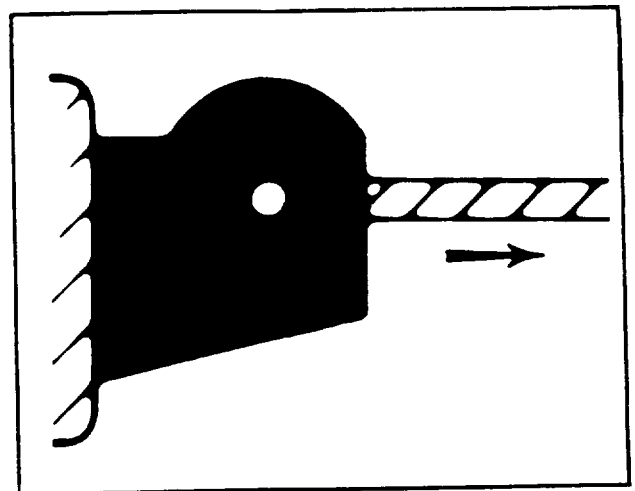
**CAUTION**

Do not leave in BRAKE OFF mode for extended periods. When moving away from a load, operate tractor in low gear to prevent overspeeding of winch components.



- (3) To pull a load toward the tractor, move the winch control lever to the REEL IN position.

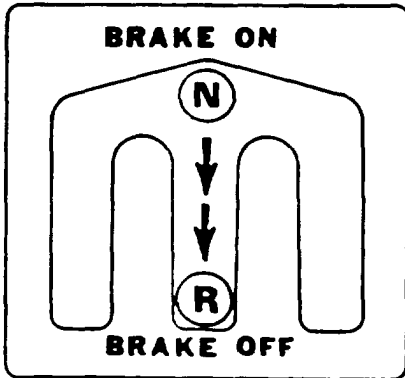
- (4) To lower a light load with power, or moving away from load in first gear, put winch control lever in REEL OUT position.



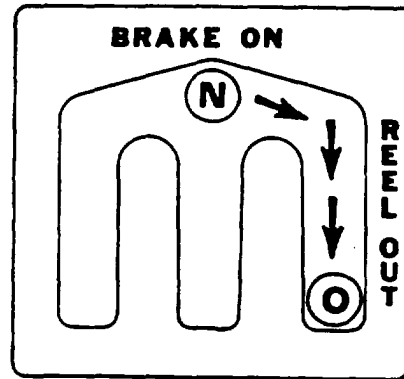
b. Inching (Fine Control Operation).



Inch loads with engine speeds low and tractor stationary. Do not operate for extended periods of time while INCHING to prevent damage to vehicle.



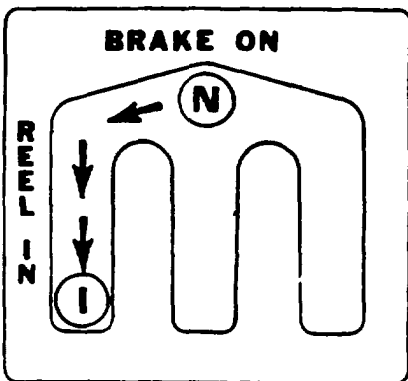
- (1) To inch out, move lever slowly towards the BRAKE OFF position until load starts to move. For precise lowering, move lever slightly to engaged or disengaged position as required.



- (2) To inch out when the load is not heavy enough to lower itself in the BRAKE OFF position, move the lever slowly towards the fully engaged REEL OUT position until load starts to move.

**NOTE**

Engine or torque converter may stall if line load and/or engine load is too high when engaged.



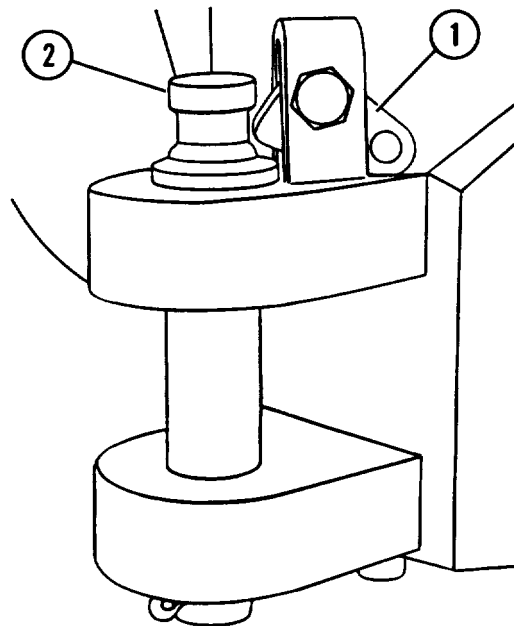
- (3) To inch in, move lever slowly towards the fully engaged REEL IN position until load starts to move. Increase engine speed if necessary to raise load.

2-18. USING THE DRAWBAR.

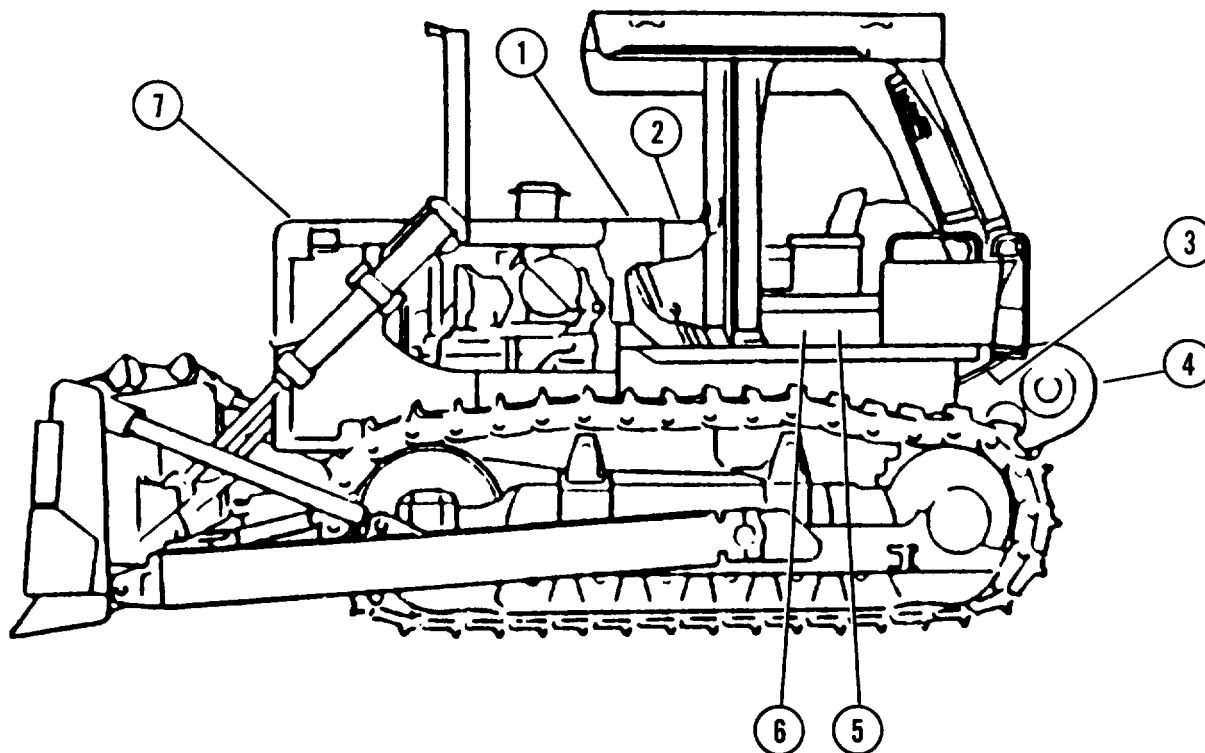
**WARNING**

Clear personnel from vehicle when backing machine.

- a. Lift retainer (1) and remove pin (2) from drawbar.
- b. Back the tractor to the vehicle being towed. When the towed vehicle is in the drawbar of the tractor, secure it with pin (2).



2-19. DECALS AND WARNING PLATES.



- (1). Identification Plate, Operation
- (2). Warning Plate, Operation
- (3). Tag, Winch Lubrication Notice
- (4). Plate, Winch Lubrication
- (5). Plate, Winch Lubrication Guide
- (6). Plate, Winch Lubrication Guide
- (7). Tag, Cooling System Notice

## Section IV. Operation Under Unusual Conditions

### 2-20. OPERATION IN EXTREME COLD.

- a. Preparations. Extensive preparation of mechanical equipment is required when extreme cold weather is anticipated. The following steps will help protect the tractor against sub-freezing temperatures.
  - (1) Contact Unit Maintenance to prepare the cooling system by draining and then refilling with antifreeze. Run the engine until operating temperature is reached to mix the solution.
  - (2) Contact Unit Maintenance to change the engine lubricating oil to the proper grade for cold weather operation.

### 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.**

- (3) Contact Unit Maintenance to install ether canister.
- b. Starting the Engine.
  - (1) Try starting the engine using the procedure found in Section III, Operation Under Usual Conditions, page 2-19.

### CAUTION

**Do not use excessive starting fluid during starting or after the engine is running. Engine damage can result.**



- (2) If engine does not start, push the starting aid button while cranking the engine, and hold for three seconds (time required to fill the chamber). Ether is injected when aid switch is released. Use additional starting fluid once every two seconds until engine runs smoothly.
- (3) If oil pressure does not register within first 15 seconds, stop engine immediately and investigate. If oil pressure is normal, proceed to step (4).

## CAUTION

**Low idling speeds during extremely cold temperatures can result in incomplete combustion and heavy deposit formation on the valves. These deposits can cause burned valves, bent pushrods, or other damage to valve components.**

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> <li>(4) Run engine at reduced speed only long enough to circulate the oil through the engine, then increase speed and warm up the engine.</li> <li>(5) Cover the radiator if necessary to bring engine up to operating temperature.</li> </ol> <p>c. <u>At Halt or Parking.</u></p> <ol style="list-style-type: none"> <li>(1) To avoid water condensation in the fuel tank, completely fill the fuel tank after each operating period.</li> <li>(2) Park the tractor in sheltered place if possible. Cover to protect engine, accessories, and controls from ice and snow.</li> <li>(3) Wet mud or snow should be cleaned from engine compartment, hydraulic cylinders, and all track components before it freezes.</li> </ol> | <ol style="list-style-type: none"> <li>(4) In extremely cold weather remove the batteries and store them in a moderately warm place. Reinstall batteries just prior to starting.</li> </ol> <p><b>2-21. OPERATION IN EXTREME HEAT.</b></p> <ol style="list-style-type: none"> <li>a. <u>Preparation.</u> Precautions must be taken to avoid overheating.             <ol style="list-style-type: none"> <li>(1) Contact Unit Maintenance to drain, flush, and refill cooling system.</li> <li>(2) Contact Unit Maintenance to lubricate the tractor with correct grade of lubricants in accordance with the expected temperature range of operation.</li> </ol> </li> <li>b. <u>Starting the Engine.</u> See Section III, Operation Under Usual Conditions, page 2-19.</li> </ol> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

- c. Operation.

### WARNING

**Do not open radiator when engine is hot. Damage to the radiator or serious injury will result. Allow engine to cool at least 8 hours if air temperature is 75°F.**

- (1) Check coolant temperature gage at frequent intervals.
- (2) Check air cleaner indicators frequently. Service air cleaner as required. See paragraph 3-11.
- d. At Halt or Parking. Park tractor in shaded area if possible.

#### **2-22. OPERATION UNDER RAINY OR HUMID CONDITONS.**

- a. Starting the Engine. See Section III, Operation Under Usual Conditions, page 2-19.
- b. At Halt or Parking.
  - (1) If possible, park tractor under shelter.
  - (2) Dry off seat and wiring to prevent formation of mildew.
  - (3) Keep fuel tank full at all times to avoid condensation from forming in the tank.
  - (4) Contact Unit Maintenance to check all points of lubrication.

#### **2-23. OPERATION IN DUSTY OR SANDY AREAS.**

- a. Starting the Engine. See Section III, Operation Under Usual Conditions, page 2-19.

- b. Operation.

- (1) Check the radiator frequently and keep clear of dust and sand.
- (2) Check air cleaner indicator frequently. Service air cleaner as often as required. See paragraph 3-11.
- (3) Check pre-cleaner frequently and clear screen of dust and sand.

- c. At Halt or Parking.

- (1) Contact Unit Maintenance to lubricate the tractor at more frequent intervals. Clean all fittings and lubrication openings thoroughly before lubrication to prevent entrance of dust or sand with the lubricant.
- (2) When not in use, cover the operator's compartment, and utilize whatever means are available to protect the engine compartment from the entry of windblown dust or sand.

#### **2-24. OPERATION IN SALT WATER AREAS.**

- a. Starting the Engine. See Section III, Operation Under Usual Conditions, page 2-19.

- b. At Halt or Parking.
- (1) In salt water area, keep the tractor as clean as possible. Saltwater causes corrosion of exposed parts. After operation is complete, wash with fresh water, if available.
- (2) Keep all lubricating points wiped clean and contact Unit Maintenance to lubricate as needed.
- (3) Keep all wiring and connections clean and free from corrosion.

**2-25. WATER FORDING OPERATION.**

- a. Test the depth of the water, allowing for the consistency of the bottom. Do not attempt to ford even the narrowest stream that is more than 30 inches (76.2 cm) deep.

**2-26. OPERATION UNDER EMERGENCY CONDITIONS.**

- b. Make certain all gages are indicating normal operating pressure and temperatures.
- c. Shift the transmission into the low-speed range, and speed up the engine to minimize the danger of stalling. Enter the water slowly to minimize surges of backwash into the engine compartment. Forging speed should not exceed 3 to 4 miles per hour.
- d. In the event of complete submersion, contact Unit Maintenance for appropriate disposition.
- e. Contact Unit Maintenance to lubricate the tractor completely, as soon as possible after fording.

- b. Emergency Starting Using NATO Slave Receptacle.

### WARNING

- To avoid possible electric shock when slave starting tractor, use NATO slave cable that **DOES NOT** have loose or missing insulation.
- **DO NOT** proceed with slave starting if suitable slave cable is not available.

### CAUTION

- **DO NOT** allow “live” and “dead” machines to come in contact with each other during slave starting. Failure to follow this caution may cause electrical system damage.
- Under no circumstances can the tractor be started by being towed or pushed. Failure to follow this caution will damage transmission.

### NOTE

If machine other than another D7G is used to slave start tractor, refer to Operator’s Manual for that machine for any special slave starting procedures.

- (1) Ensure battery disconnect switch is in OFF position on “dead” and “live” machines.

### NOTE

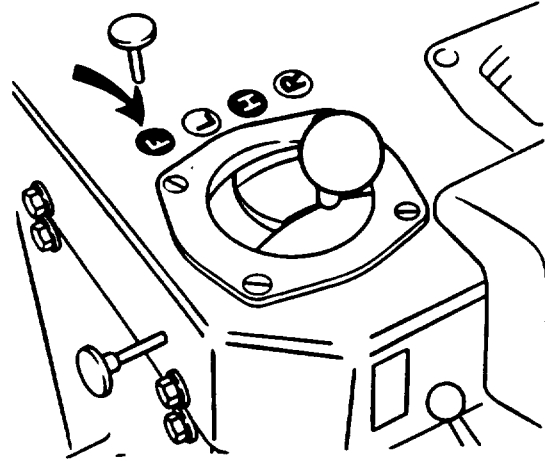
**NATO slave receptacle is located on right-side engine compartment guard.**

- (2) Connect NATO slave cable to receptacle on “dead” machine.
- (3) Connect other end of NATO slave cable to receptacle on “live” machine.
- (4) Start engine of “live” machine and run at high idle.
- (5) Place battery disconnect switch and engine start switch on “dead” machine to ON position.
- (6) Allow “live” machine to run for 2-3 minutes to charge batteries on “dead” machine.
- (7) Start engine of “dead” machine. See paragraph 2-5.
- (8) Disconnect NATO slave cable from both machines.

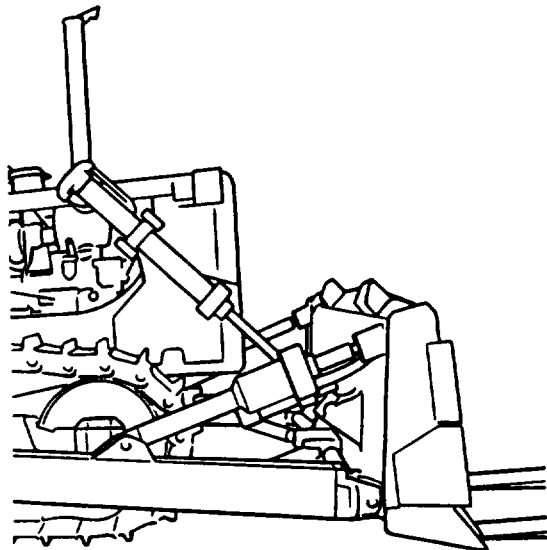
c. Vehicle Evacuation and Recovery.

If the tractor becomes inoperative during a work cycle, the following procedures will allow the bulldozer blade and/or the ripper to be raised to a transport position for vehicle evacuation and recovery.

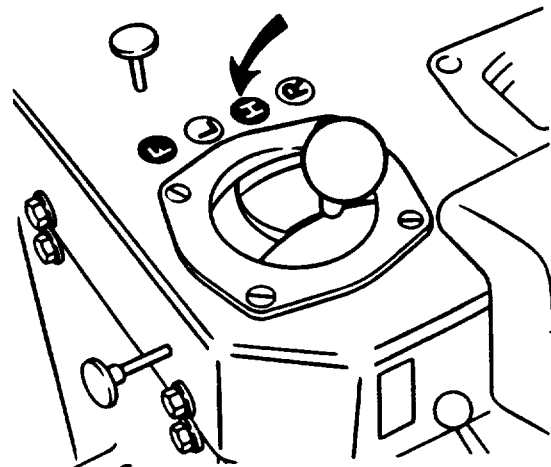
- (1) Move dozer control lever to FLOAT position.



- (2) Raise dozer blade to desired height using any convenient lifting device (ie: lift truck, crane, winch, etc.).



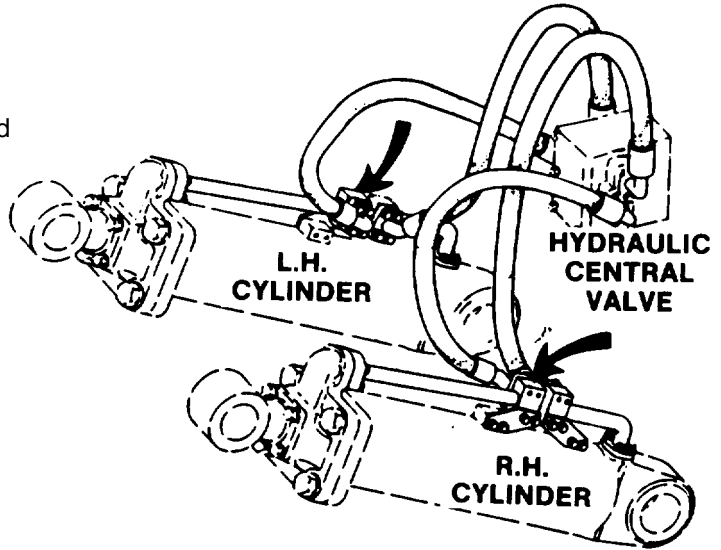
- (3) When dozer blade has been raised to desired height, move dozer control lever to HOLD position.



**NOTE**

Control lever may need to be cycled several times to relieve pressure in hydraulic system.

- (4) Disconnect hydraulic hoses at rod end of ripper hydraulic cylinders.

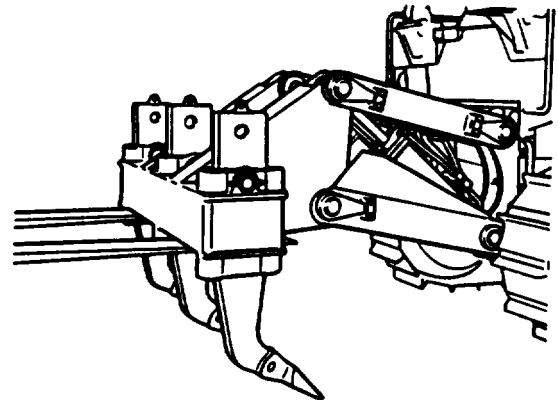


- (5) Remove ripper shank retaining pins.

- (6) Raise ripper beam to height that will clear ripper shanks using any convenient lifting device (ie: lift truck, crane, winch, etc.).

**NOTE**

Hydraulic oil will be displaced from hydraulic cylinder.

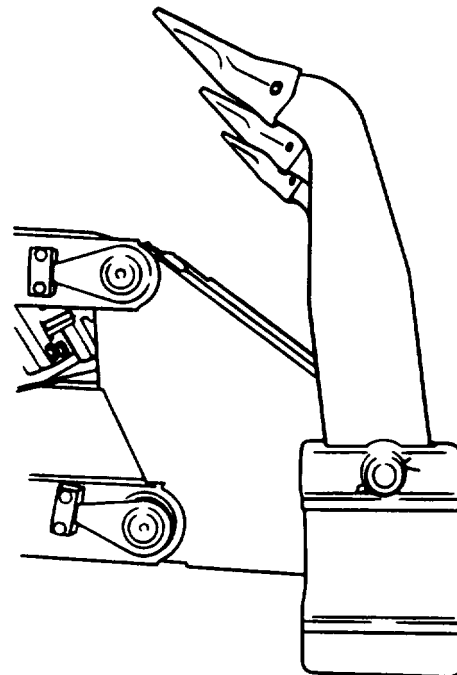


- (7) Move ripper shanks clear of ripper beam.

- (8) Lower ripper beam.

- (9) Reconnect hydraulic hoses to ripper cylinders.

- (10) Reassemble ripper shanks into ripper beam in inverted position.



## CHAPTER 3 OPERATOR/CREW MAINTENANCE INSTRUCTIONS

### Section I. Lubrication Instructions

**3-1. LUBRICATION.** Refer to Chapter 2, Section II of this manual.

### Section II. Troubleshooting

**3-2. GENERAL.**

- a. The table lists the common malfunctions which you may find during the operation or maintenance of the tractor or its components. You should perform the tests/inspections and corrective actions in the order listed.
- b. This manual cannot list all the malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**3-3. TROUBLESHOOTING.** Refer to table 3-1 for troubleshooting procedures.

**Table 3-1. Troubleshooting**

---

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

---

**1. ENGINE WILL NOT CRANK**

- Step 1. Check to see if battery disconnect switch is OFF.  
Turn disconnect switch ON.
- Step 2. Check circuit breaker reset button on dash instrument panel.  
Push circuit breaker reset button.
- Step 3. Check for loose or disconnected battery cables.  
Notify Unit Maintenance.

**2. ENGINE CRANKS BUT WILL NOT START**

- Step 1. Check governor control lever for correct starting position. See page 2-22.  
Move lever to correct starting position.
- Step 2. Check to see if fuel tank is empty.  
If low or empty, refill.
- Step 3. Check to see if any fuel lines are damaged.  
Notify Unit Maintenance.
- Step 4. Check for loose battery cables.  
Notify Unit Maintenance.

---

<b>MALFUNCTION</b>
<b>TEST OR INSPECTION</b>
<b>CORRECTIVE ACTION</b>

---

**3. ENGINE MISFIRES OR RUNS ROUGH**

- Step 1. Check to see if fuel tank is low or empty.  
If low or empty, refill.
- Step 2. Check to see if any fuel lines are damaged.  
Notify Unit Maintenance.
- Step 3. Check for black or gray exhaust smoke.  
Notify Unit Maintenance.
- Step 4. Check for white or blue smoke.  
Notify Unit Maintenance.

**4. ENGINE OVERHEATS**

**WARNING**

**DO NOT service cooling system unless engine has cooled. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.**

- Step 1. Check for trash buildup along radiator surface.  
Clear radiator surfaces.
- Step 2. Check for leaks and/or worn hoses.  
Notify Unit Maintenance.

**WARNING**

**DO NOT remove cooling system radiator cap when engine is hot. Allow engine to cool down. Loosen cap to first stop and let any pressure out of cooling system, then remove cap. Failure to follow this warning may cause serious burns.**

- Step 3. Check for low coolant level.  
Add coolant as needed.



---

<b>MALFUNCTION</b>
<b>TEST OR INSPECTION</b>
<b>CORRECTIVE ACTION</b>

---

**5. TRACTOR STARTS BUT WILL NOT MOVE**

Check to see if tractor was started with transmission in 1st, 2nd or 3rd in forward or reverse.

Move transmission selector to NEUTRAL and then re-select the appropriate gear.

---

### Section III. Maintenance Procedures

Alphabetical Index of Section III.

<u>Procedure</u>	<u>Para No.</u>	<u>Page No.</u>
Adjust track . . . . .	3-12	3-18
Inspect batteries . . . . .	3-7	3-10
Inspect radiator . . . . .	3-6	3-8
Inspect winch assembly . . . . .	3-10	3-14
Service air cleaner . . . . .	3-11	3-15
Service batteries . . . . .	3-7	3-10
Service engine assembly . . . . .	3-4	3-5
Service fuel tank . . . . .	3-5	3-6

---

**3-4. ENGINE ASSEMBLY - SERVICE.**


---

*This Task Covers:*

Adjustment

---

**INITIAL SETUP**
**Applicable Configurations**

All

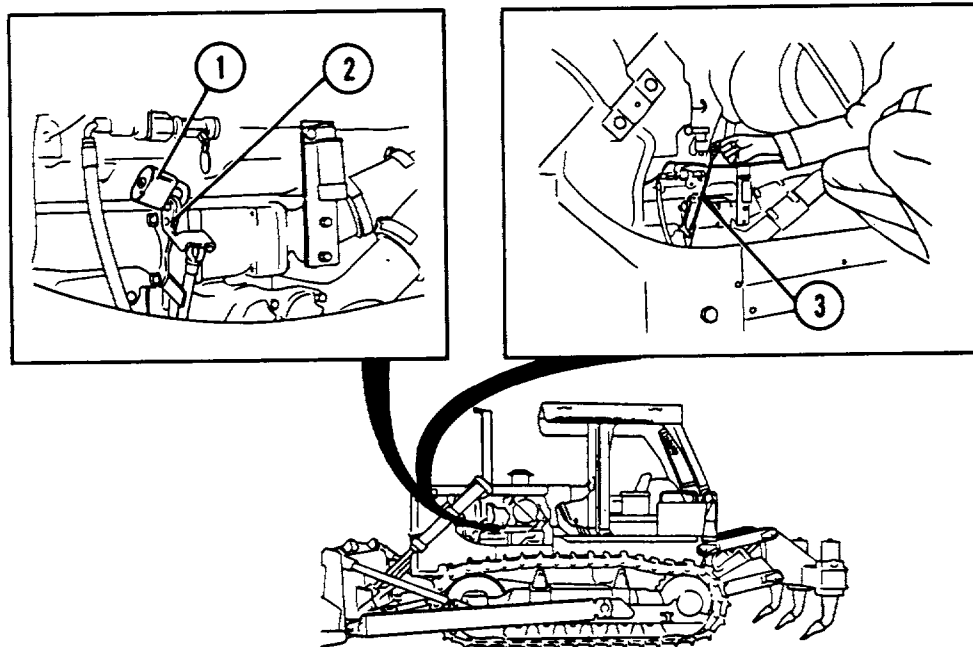
**Personnel Required**

MOS 21E (2)

**Equipment Condition**

Engine can be ON or OFF.  
Tractor must be on level ground.  
Transmission locked in neutral.  
Brake lock applied.

---



- a. Remove padlock (1) from anti-theft device (2).
- b. Check dipstick (3) with engine off. Oil level must be in SAFE STARTING RANGE on ENGINE STOPPED side of dipstick.
- c. Oil level can also be checked when engine is warm and running. Oil level must be between ADD and FUEL marks on ENGINE RUNNING side of dipstick.
- d. Return dipstick (3) and secure anti-theft device (2) with padlock (1).

**3-5. FUEL TANK - SERVICE.**

*This Task Covers:*

- a. Checking and filling fuel tank
- b. Draining sediment and water from fuel tank

**INITIAL SETUP**

**Applicable Configurations**

All

**Materials/Parts**

Fuel (Item 5, 6 or 7, Appendix D)

**Personnel Required**

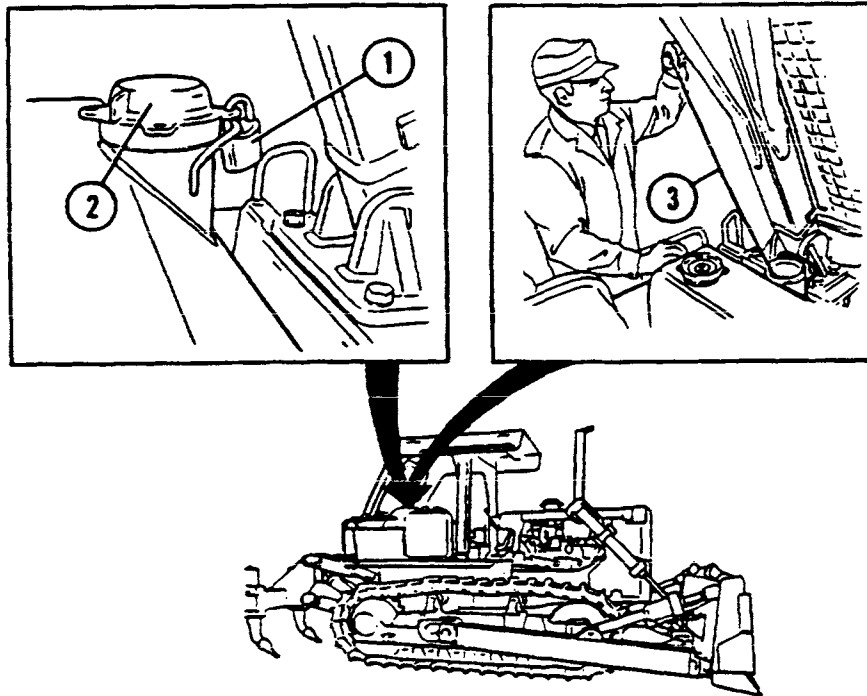
MOS 21E (2)

**Equipment Condition**

Engine can be ON or OFF.  
 Tractor must be on level ground.  
 Transmission locked in neutral.  
 Brake lock applied.

**WARNING**

**DO NOT smoke or permit any open flame in area of tractor while you are servicing fuel system. Be sure hose nozzle is grounded against filler tube during refueling to prevent static electricity. Failure to follow this warning may result in injury to personnel or equipment damage.**



a. Checking and Filling Fuel Tank.

- (1) Remove padlock (1) from fuel tank cap.
- (2) Remove fuel tank cap (2).
- (3) Check fuel level gage (3).

- (4) Add fuel as required. Fuel tank has a 115 gallon capacity. Install fuel level gage (3).
- (5) Tighten fuel tank cap (2) and secure with padlock (1).

---

**3-5. FUEL TANK - SERVICE.**

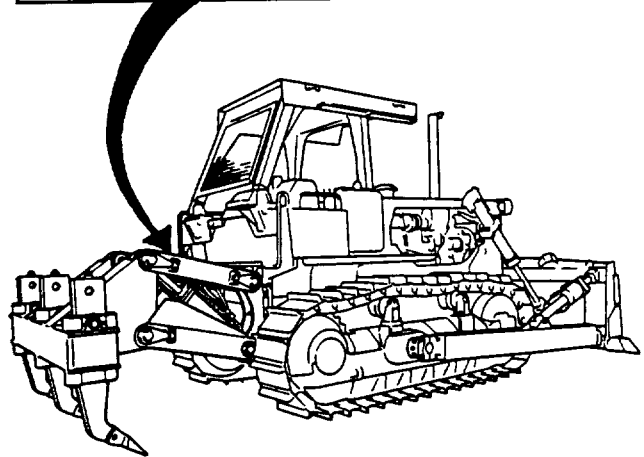
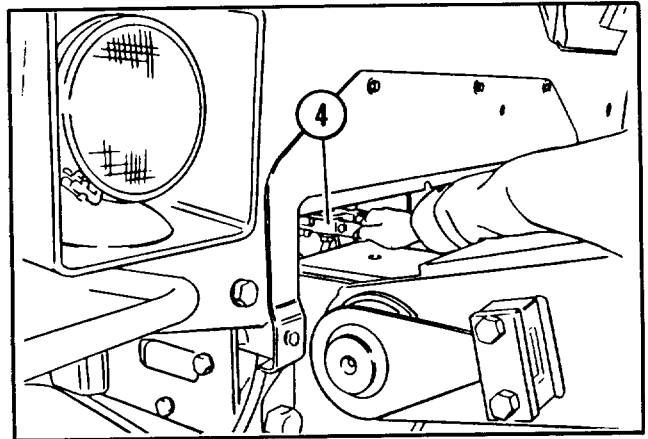
---

- b. Draining Sediment and Water From Fuel Tank.

**NOTE**

**Allow a reasonable cool down period after operation before attempting to drain water from fuel tank. It is during the cool down that condensation forms.**

- (1) Remove padlock from drain valve lever (4).
- (2) Pull lever (4) toward you, away from locking bracket. Leave valve open until all water or sediment has been drained.
- (3) Close valve and secure to locking bracket with padlock.



---

**3-6. RADIATOR - INSPECT.**

---

*This Task Covers:*

Checking coolant level

---

**INITIAL SETUP**

**Applicable Configurations**

All

**Personnel Required**

MOS 21E (1)

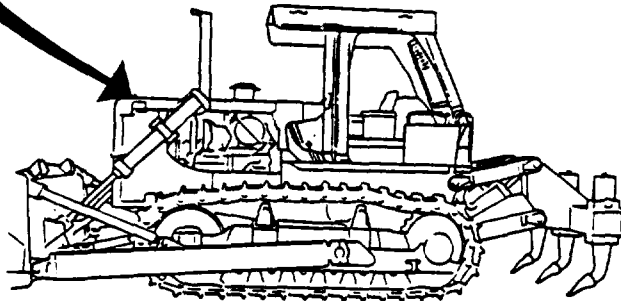
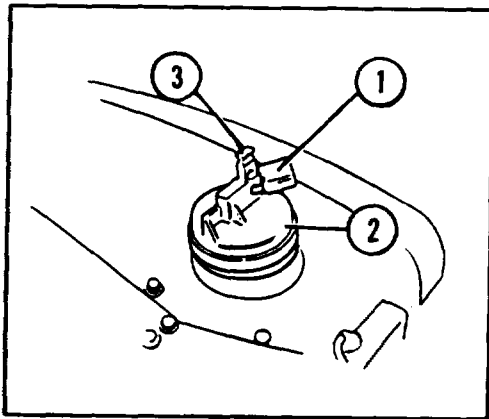
**Equipment Condition**

Tractor must be on level ground.  
Transmission locked in neutral.  
Brake lock applied.  
Engine must be OFF and cool.

---

**WARNING**

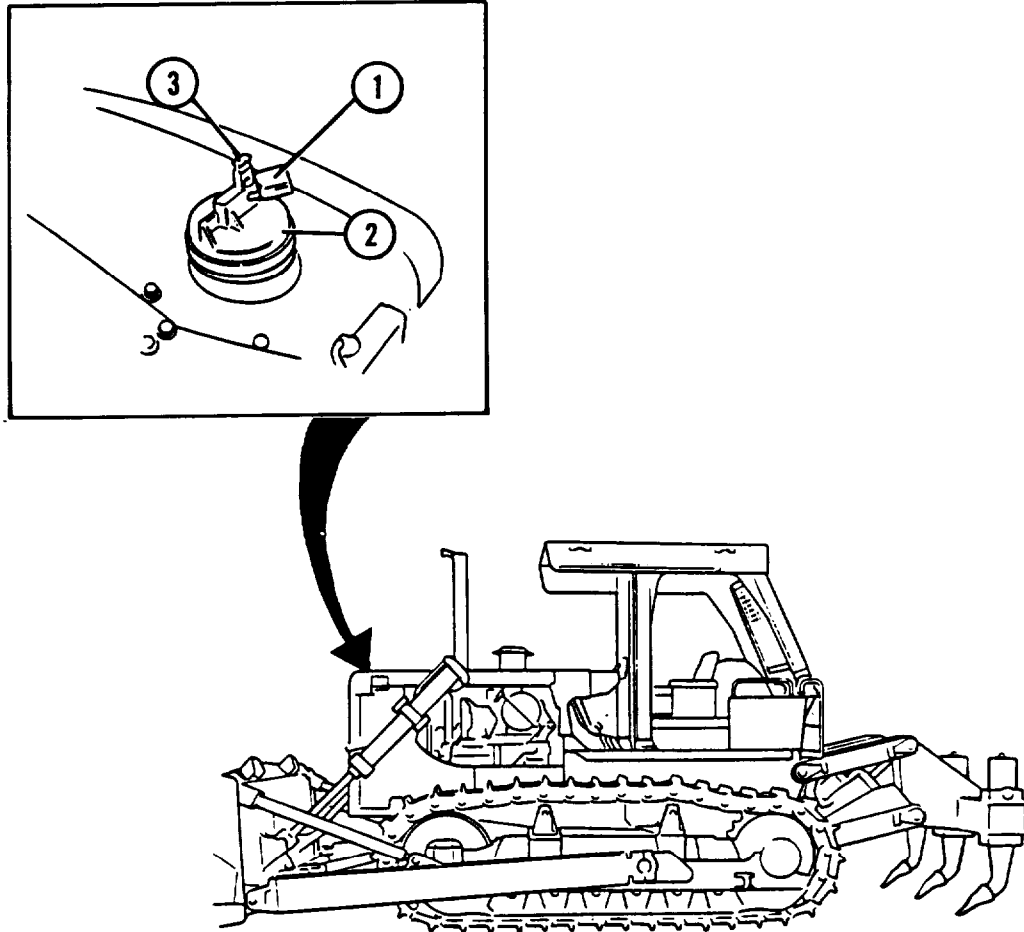
**DO NOT** remove cooling system radiator cap when engine is hot. Allow engine to cool down. Loosen cap to first stop and let any pressure out of cooling system, then remove cap. Failure to follow this warning may cause serious burns.



a. Remove lock (1) from radiator cap (2).

b. Turn cap until tab (3) drops and cap offers resistance.

3-6. RADIATOR - INSPECT.



- c. Remove radiator cap (2) slowly to relieve pressure.
- d. Coolant level should be within 1/2 inch of bottom of fill pipe.
- e. When operating above 32°F use clean water that is low in minerals to fill radiator.
- f. When operating below 32°F (0°C), add appropriate antifreeze solution to provide protection to the lowest expected ambient temperature. Refer to Appendix D.
- g. Install cap (2), lift tab (3) and install padlock (1) through the hole in cap (2).

---

### 3-7. BATTERIES - SERVICE.

---

*This Task Covers:*

Checking electrolyte level and cleaning battery posts

---

#### **INITIAL SETUP**

##### **Applicable Configurations**

All

##### **Materials/Parts**

Scrub brush with non-metallic bristles.

##### **Personnel Required**

MOS 21E (2)

##### **Equipment Condition**

Tractor must be on level ground.  
Transmission locked in neutral.  
Brake lock applied.  
Engine must be OFF and cool.

---

### WARNING

To avoid injury, eye protection and acid-resistant gloves must be worn when working around batteries. Do not smoke, use open flame, make sparks or create other ignition sources around batteries. If a battery is giving off gases, it can explode and cause injury to personnel. Remove all jewelry such as rings, ID tags, watches, and bracelets. If jewelry or a tool contacts a battery terminal, a direct short will result in instant heating or electric shock, damage to equipment, and injury to personnel.

Sulfuric acid contained in batteries can cause serious burns. If battery corrosion or electrolyte makes contact with skin, eyes or clothing, take immediate action to stop the corrosive burning effects. Failure to follow these procedures may result in injury or death.

- **Eyes.** Flush with cold water for no less than 15 minutes and seek medical attention immediately.
- **Skin.** Flush with large amounts of cold water until all acid is removed. Seek medical attention as required.
- **Internal.** If corrosion or electrolyte is ingested, drink large amounts of water or milk. Follow with milk of magnesia, beaten egg or vegetable oil. Seek medical attention immediately.
- **Clothing/Equipment.** Wash area with large amounts of cold water. Neutralize acid with baking soda or household ammonia.

### NOTE

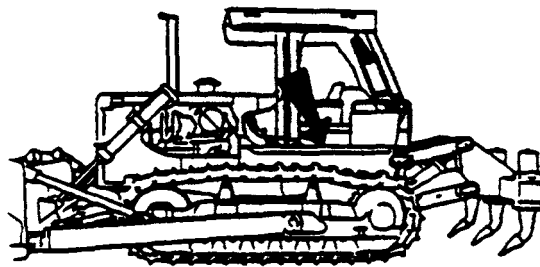
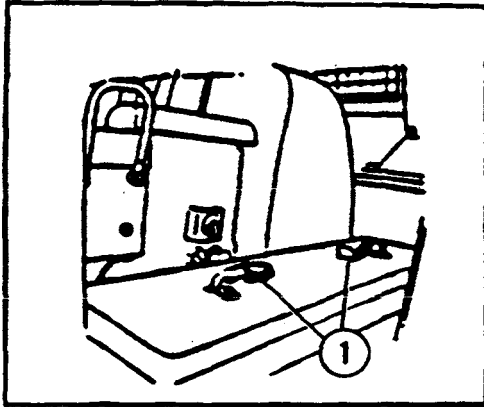
For tractors equipped with ROPS, begin at step a. For tractors with winterized cab, begin at step b.



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**3-7. BATTERIES - SERVICE.**

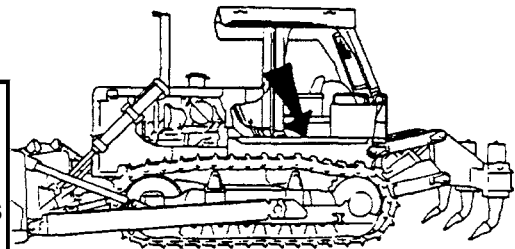
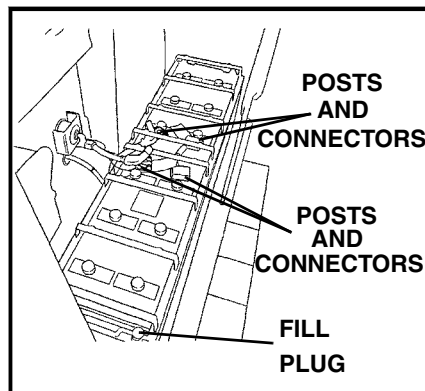
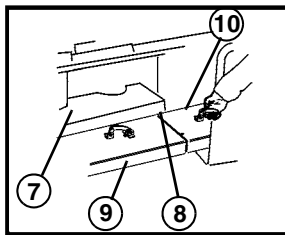
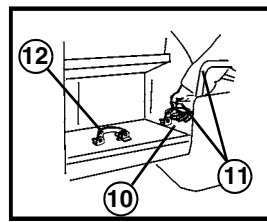
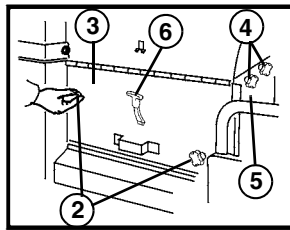
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- a. Remove padlock and then grab handles (1) and lift up until cover is released from battery box. Proceed to step h.



**3-7. BATTERIES - SERVICE.**



- b. Unscrew two knobs (2) on side panel (3).
- c. Unscrew two knobs (4) on rear panel (5) and secure in open position using rubber hook (6).
- d. Remove insulation (7) from top of battery box. Remove padlocks from battery cover halves (9 and 10).
- e. Unscrew two wing bolts (8) that hold battery cover halves (9 and 10) together.
- f. Grab handle (11) on cover half (10) and pull handle until cover releases. Lift cover out.
- g. With helper holding side panel (3), pull handle (12) on cover half (9) until cover releases. Lift and then slide cover out towards you.

**NOTE**

**At proper charging rate, batteries will not require more than 1 ounce (30 cc) of distilled water per cell per week.**

- h. Check each cell by removing the fill plugs.
- i. Electrolyte level should be 1/8 in. (3.175 mm) above tops of plates.
- j. Clean battery posts and cable connectors with a non-metallic bristle brush.
- k. Check for corrosion on battery terminals, battery box, or wiring. Clean or notify Unit Maintenance to replace necessary components. Clean components with a solution of baking soda (Item 13, Appendix D) and water (1-1/2 cups of backing soda per gallon of water). Also check for corrosion in battery tray that would indicate a cracked battery.
- l. Ensure there is no debris under battery and that hold-downs are tight.
- m. Ensure all vent caps are present and in place.

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**3-8. DELETED.**

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**3-9. DELETED.**

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### 3-10. WINCH ASSEMBLY - INSPECT.

---

*This Task Covers:*

- a. Checking hydraulic fluid level.
- b. Inspecting cable.

---

#### **INITIAL SETUP**

##### **Applicable Configurations**

Tractor with winch

##### **Personnel Required**

MOS 21E (2)

##### **Equipment Condition**

Tractor must be on level ground.  
Transmission locked in neutral.  
Brake lock applied.  
Engine OFF.

---

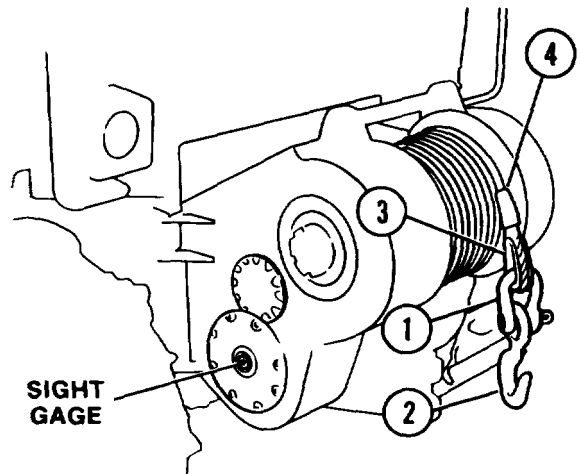
- a. Checking Hydraulic Fluid Level.
  - (1) Check sight gage on left side of winch.  
Oil should be visible.
  - (2) If oil is not visible in sight gage, add oil.

- b. Inspecting Cable.

#### **WARNING**

**Wear heavy gloves when handling cable to protect hands against injury.**

- (1) Check entire length cable for signs of rust, fraying, or kinking. Contact Unit Maintenance for replacement.
- (2) Check clevis (1), hook (2), form (3), and clamp (4) for signs of weakness such as cracking or bending. Contact Unit Maintenance for replacement.



**3-11. AIR CLEANER - SERVICE.**

*This Task Covers:*

Service

**INITIAL SETUP**

**Applicable Configurations**

All

**Materials/Parts**

Detergent (Item 4, Appendix D)

Rag, wiping (Item 13, Appendix D)

**Personnel Required**

MOS 21E

**Equipment Condition**

Tractor must be on level ground.

Transmission locked in neutral.

Equipment lowered.

Engine OFF and cool.

**WARNING**

If NBC exposure is suspected, personnel wearing protective equipment should handle all air cleaner media. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.

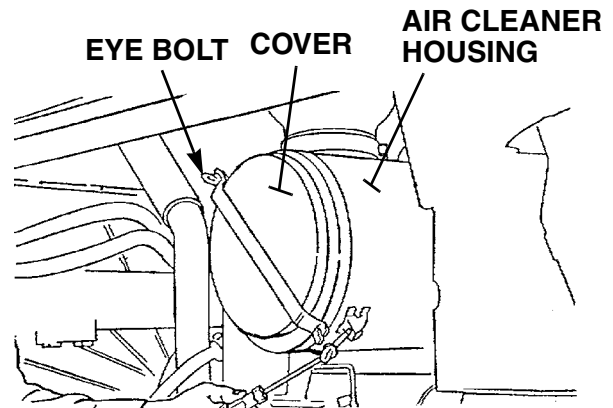
NBC contaminated filters must be handled using adequate precautions (FM 21-40) and must be disposed of by trained personnel.

Failure to follow this warning may cause injury or death.

**CAUTION**

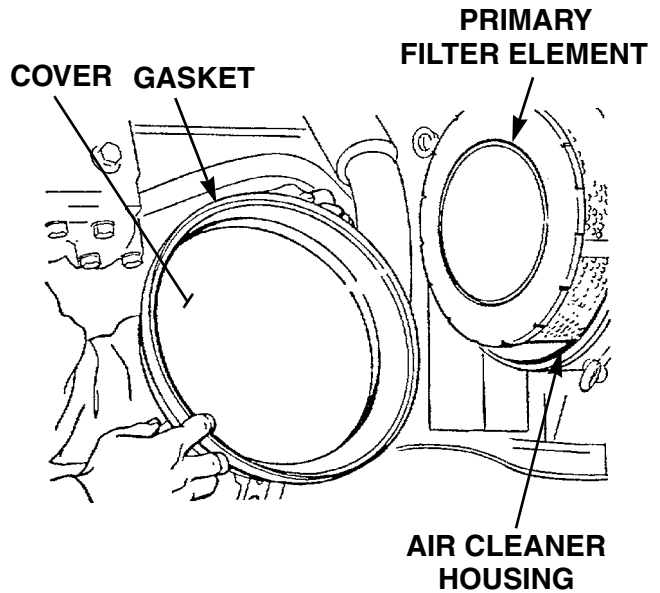
Never service air cleaner with engine running. Engine damage could result if service is performed with engine running.

1. Loosen two eye bolts and remove cover from air cleaner housing.



**3-11. AIR CLEANER - SERVICE.**

2. Inspect gasket on inside of cover. Obtain replacement if gasket is damaged.
3. Remove primary filter element from air cleaner housing.
4. Thoroughly wipe inside of air cleaner housing clean with a rag.



5. Check sealing surfaces on primary filter element for dirt on the “clean” side. If this is evident, problem may be a damaged filter element, incorrect element fit or the need for cleaning sealing surfaces.

**WARNING**

Particles blown by compressed air are hazardous. **DO NOT** exceed 15 psi (103 kPa) nozzle pressure when drying parts with compressed air. Use a maximum of 30 psi (207 kPa) when cleaning components. **DO NOT** direct compressed air against human skin. Failure to follow this warning may cause injury or death. Make sure air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield.

**CAUTION**

To prevent damage, do **NOT** clean primary filter element by bumping or tapping.

**NOTE**

Use a light inside primary filter element to inspect filter for tears, holes or other damage before and after each cleaning process.

Discard primary filter element if any damage is evident.

6. Direct compressed air inside primary filter element, along length of filter pleats.
7. Direct compressed air outside, along length of filter pleats.
8. Repeat step 6.

**CAUTION**

To prevent primary filter element damage, use a maximum of 40 psi (276 kPa) water pressure.

9. Direct water inside primary filter element, along length of filter pleats.
10. Direct water outside, along length of filter pleats. Rinse and air dry primary filter element thoroughly.



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**3-11. AIR CLEANER - SERVICE.**

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11. Wash primary filter element in warm water and detergent.
12. Rinse with clean water and air dry thoroughly.

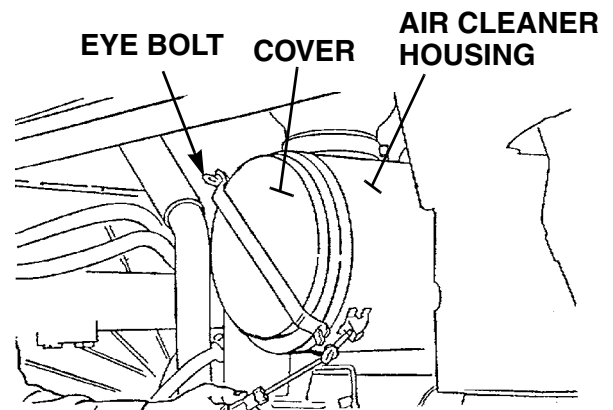
**NOTE**

**Primary filter element should be replaced once each year or after being cleaned a maximum of 6 times.**

**If air filter indicator shows RED shortly after installation of primary filter element, which has been cleaned approximately 6 times, replace primary filter element.**

**If air filter indicator still shows RED shortly after installation of clean primary filter element, notify Unit Maintenance to replace secondary filter element.**

13. Install primary filter element in air cleaner housing.
14. Position cover on air cleaner housing and secure with two eye bolts.
15. Reset air filter indicator by pushing button on bottom of indicator. See page 2-7.
16. Run engine and check for proper operation.



---

### 3-12. TRACKS - ADJUSTMENT.

---

*This Task Covers:*

Adjustment

---

#### **INITIAL SETUP**

##### **Applicable Configurations**

All

##### **Tools**

Lubricating gun, hand (Item 1, Section III, Appendix B)

Wrench, adjustable (Item 3, Section III, Appendix B)

##### **Materials/Parts**

Grease, GAA (Item 8, Appendix D)

Rag, wiping (Item 13, Appendix D)

Drawbar pin

##### **Personnel Required**

MOS 21E (2)

##### **Equipment Condition**

Tractor must be on level ground.

---

#### NOTE

- **Track adjustment should be performed on level ground and on same surface conditions on which machine is operated.**
  - **Packed dirt should not be removed from track, if packing conditions exist on the job.**
1. Move machine forward a distance of at least twice its length. Allow machine to coast to a stop. Do NOT apply brakes. Shut down engine.
  2. Loosen bolt and open recoil mechanism access cover.
  3. Wipe clean relief valve.

### 3-12. TRACKS - ADJUSTMENT.

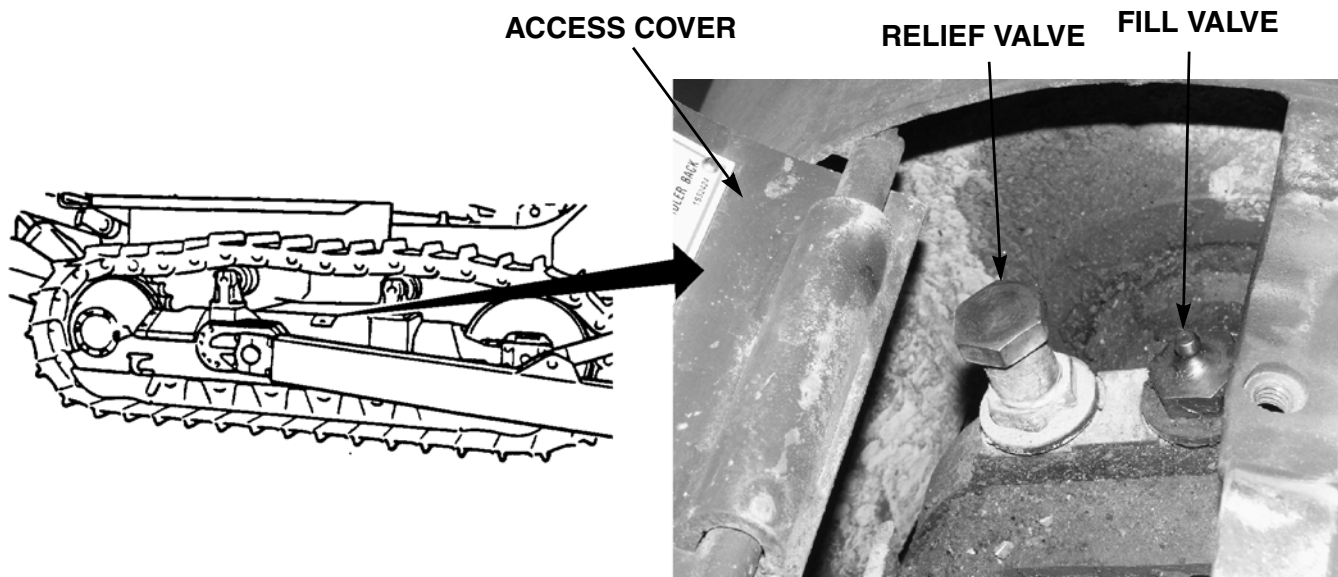
#### WARNING

Wear eye protection and keep face clear when venting grease from relief valve during track adjustment. **NEVER** visually inspect relief valve to see if grease is escaping. Always observe track to verify it has loosened. Failure to follow this warning could cause eye injury or blindness.

#### NOTE

If track tension does not release, notify Unit Maintenance.

4. Open relief valve and allow grease to escape and track tension to release.
5. Close relief valve. Clean area around fill and relief valves.



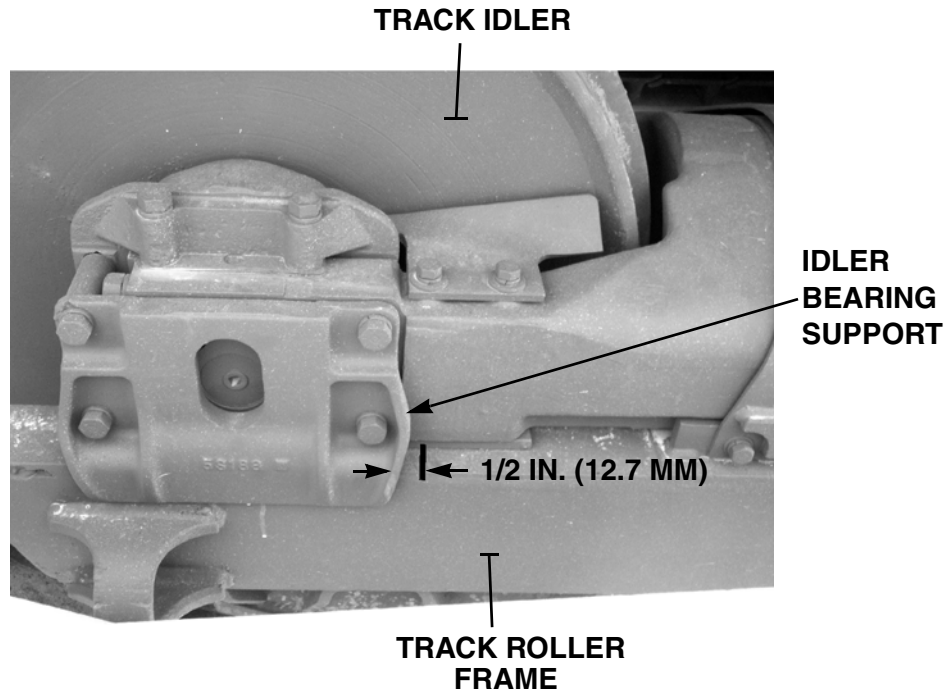
6. Fill grease gun and connect to fill valve.
7. Pump grease into fill valve until track idler moves forward toward front of tractor. STOP pumping when track idler stops moving.
8. Mark a line on track roller frame 1/2 in. (13 mm) from rear face of idler bearing support.

#### WARNING

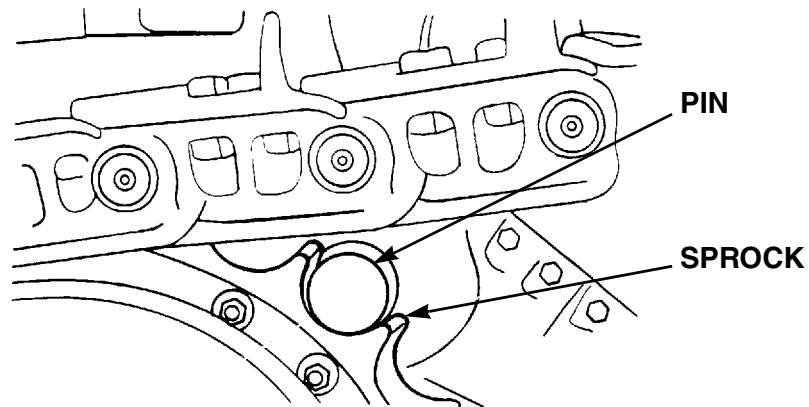
Wear eye protection and keep face clear when venting grease from relief valve during track adjustment. **NEVER** visually inspect relief valve to see if grease is escaping. Always observe track to verify it has loosened. Failure to follow this warning could cause eye injury or blindness.

9. Open relief valve no more than one turn and allow grease to escape and idler to move back.

**3-12. TRACKS - ADJUSTMENT.**



10. Put a drawbar pin (or a length of steel pipe) between top of track sprocket teeth near track link.



11. Start engine and move machine in reverse until rear face of idler bearing support moves past mark made on track roller frame.
12. Move machine forward until pin is free of sprocket. Shut down engine and remove pin.
13. Connect grease gun to fill valve. Close relief valve.
14. Pump grease into fill valve until rear face of idler bearing support lines up with mark made on track roller frame.
15. Close recoil mechanism access cover and tighten bolt.
16. Operate machine and check track for proper operation.

## APPENDIX A REFERENCES

### A-1. SCOPE.

This appendix lists all forms, field manuals, technical manuals, and other publications referenced in this manual and which apply to operation and operator maintenance of the D7G Tractor.

### A-2. PUBLICATION INDEXES.

The following indexes should be consulted frequently for latest changes or revisions and for new publications relating to material covered in this technical manual.

Consolidated Army Publications and Forms Index . . . . . DA Pam 25-30  
 Functional User's Manual for the Army Maintenance Management System . . . . . DA Pam 738-750

### A-3. FORMS.

#### NOTE

**Refer to DA Pam 738-750, *The Army Maintenance Management System (TAMMS)*, for instructions on the use of maintenance forms.**

Equipment Inspection and Maintenance Worksheet . . . . . DA Form 2404, DA Form 5988-E  
 Organizational Control Record for Equipment . . . . . DA Form 2401  
 Product Quality Deficiency Report . . . . . SF Form 368  
 Recommended Changes to Publications and Blank Forms . . . . . DA Form 2028

### A-4. FIELD MANUALS.

Basic Cold Weather Manual . . . . . FM 31-70  
 Chemical and Biological Contamination Avoidance . . . . . FM 3-3  
 Desert Operations . . . . . FM 90-3  
 First Aid . . . . . FM 4-25.11  
 NBC Decontamination . . . . . FM 21-40  
 Northern Operations . . . . . FM 31-71  
 Nuclear Contamination Avoidance . . . . . FM 3-3-1  
 Operations and Maintenance of Ordnance Materiel in Cold Weather . . . . . FM 9-207  
 Recovery and Battlefield Damage Assessment and Repair . . . . . FM 9-43-2  
 Rigging Techniques, Procedures, and Applications . . . . . FM 5-125

### A-5. TECHNICAL MANUALS.

Materials Used for Cleaning, Preserving, Abrading and Cementing Ordnance Materiel and  
 Related Materiels Including Chemicals . . . . . TM 9-247  
 Operator's, Unit, Direct Support, and General Support Maintenance Manual  
 for Lead-Acid Storage Batteries . . . . . TM 9-6140-200-14  
 Painting Instructions for Army Materiel . . . . . TM 43-0139  
 Procedures for Destruction of Equipment to Prevent Enemy Use (Mobility Equipment Command) . . TM 750-244-3  
 Transportability Guidance, Tractor, Full-Track, Low-Speed DED, Medium Drawbar Pull . . . . TM 55-2410-237-14

**A-6. OTHER PUBLICATIONS.**

Army Medical Department Expendable/Durable Items . . . . . CTA 8-100  
Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items) . . . . . CTA 50-970

APPENDIX B

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

Section I. Introduction

**B-1. GENERAL.**

This appendix lists Components of End Item (COEI) and Basic Issue Items (BII) for the T-9 Tractor to help you inventory items required for safe and efficient operation. The lists are divided into the following sections:

a. Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the tractor whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. Section III. Basic Issue Items. These are the minimum essential items required to place the M061 Tractor in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the tractor during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request requisition replacement BII, based on TOE/MTOE authorization of the end item.

**B-2. EXPLANATION OF COLUMNS.**

a. Column (1) - Illustration Number (Illus Number). This column indicates the number of the illustration in which the item is shown.

b. Column (2) - National Stock Number. Indicates the National stock number assigned to the item; use it to request or requisition the item.

c. Column (3) - Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. Indicates the five digit Commercial and Government Entity (CAGE) code, part number and Usable On code if applicable. Usable On codes identify which items are used on different models. Codes used are as follows:

**USED ON CODE**

**MODEL**

(Blank)  
A  
AC  
B  
BC

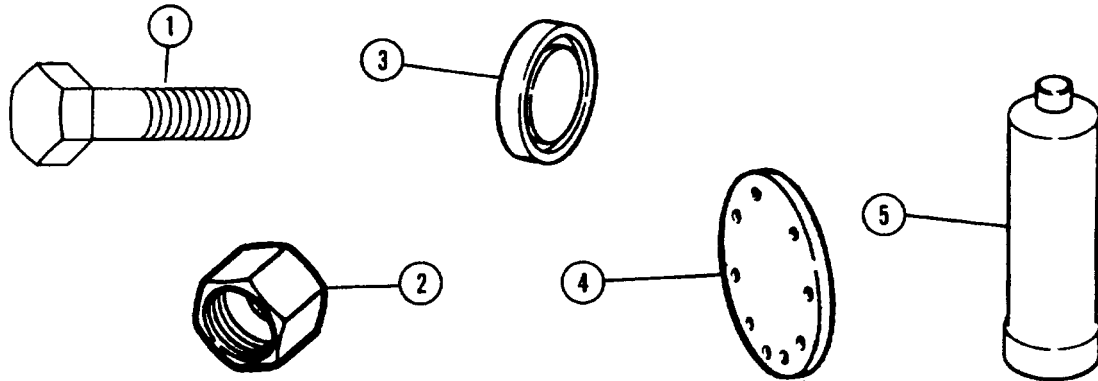
All Models  
Tractor with Ripper  
Tractor with Ripper and Winterized Cab  
Tractor with Winch  
Tractor with Winch and Winterized Cab

d. Column (4) - Unit of Measure (U/M). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in. pr).

e. Column (5) - Quantity Required (Qty Rqr). Indicates the quantity of the item authorized to be used with/on the equipment.

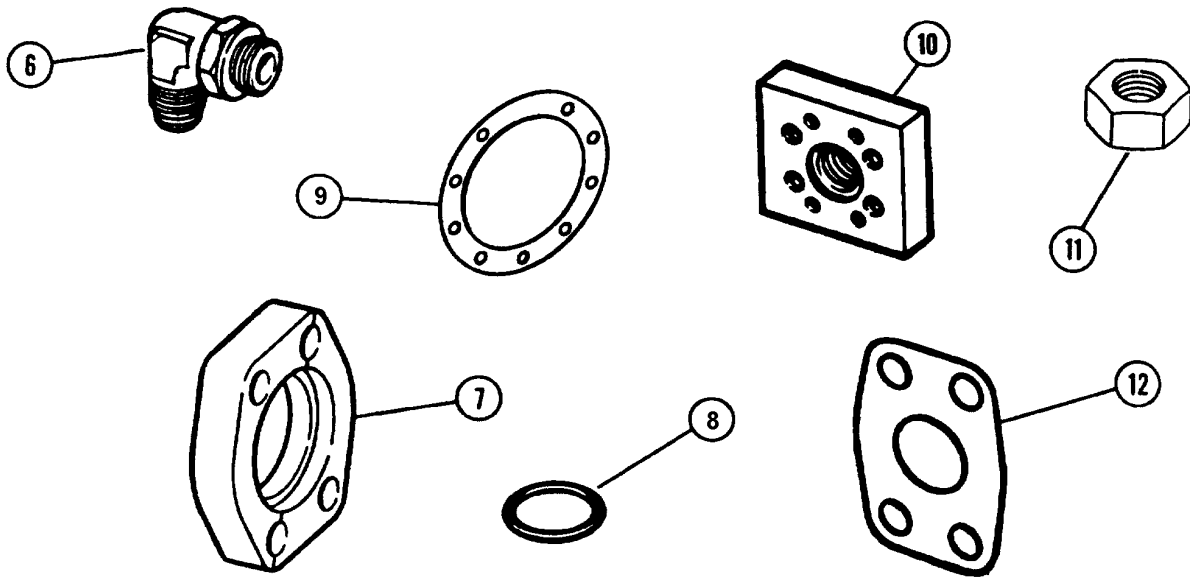


Section II. Components of End Item List



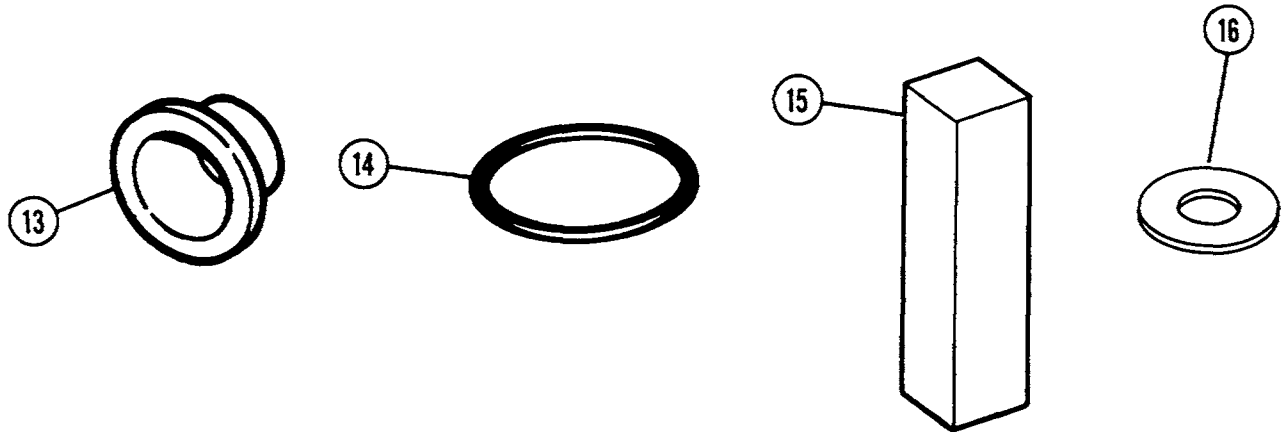
(1) Illus Number	(2) National Stock Number	(3) Description (CAGEC) and Part Number	Usable On Code	(4) U/M	(5) Qty/ Rqd
1	5305-00-724-7218	SCREW, CAP HEXAGON HEAD spline cover 5/8-11 X 1 in. (80204) B1821BH063C100N	B BC	EA	9
1	5305-00-782-9489	SCREW, CAP HEXAGON HEAD 3/8-16 X 2 in. (80204) B1821BH038C200N	A AC	EA	8
1	5305-00-071-2069	SCREW, CAP HEXAGON HEAD 1/2-13 X 1-1/2 in (80204) B1821BH050C150N	B BC	EA	4
1	5306-00-226-4833	BOLT, MACHINE 5/16-18 X 2 in. (80204) B1821BH031C200N		EA	8
1	5305-00-071-2066	SCREW, CAP HEXAGON HEAD (80204) B1821BH050C100N	B BC	EA	1
2	4730-00-647-3311	CAP: tube (11083) 9S8896	B BC	EA	1
3	2815-01-165-5737	COVER: for cylinder (11083) 5H4019	A AC	EA	4
3	3859-01-053-7358	COVER: for cylinder (11083) 2J2668	B BC	EA	1
4	2520-00-569-3839	COVER: for transmission (11083) 2A1465	B BC	EA	1
5	2910-00-646-9727	CYLINDER, ENGINE STARTING (11083) 7N0296		EA	1

Section II. Components of End Item List (cont'd)



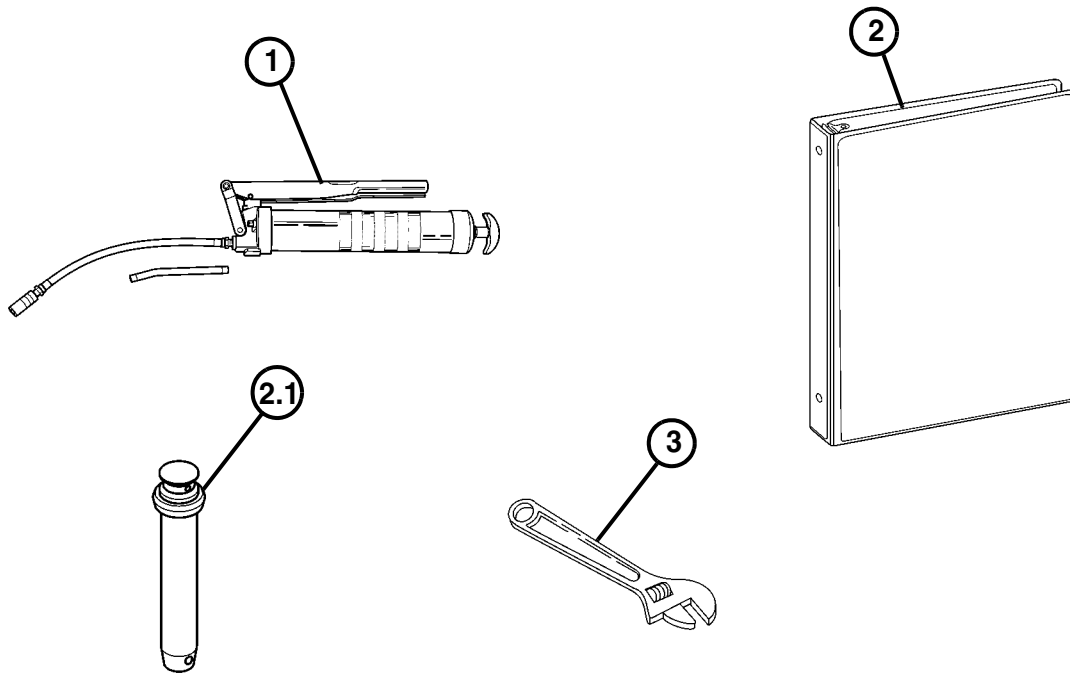
(1) Illus Number	(2) National Stock Number	(3) Description (CAGEC) and Part Number	Usable On Code	(4) U/M	(5) Qty/ Rqd
6	4730-01-063-4224	ELBOW: for adapter tool (11083) 0307950	B BC	EA	1
7	4730-01-051-5256	FLANGE, 1/2: for hydraulic hose clamp (11083) 1P4577	A AC	EA	8
7	5340-01-060-0309	FLANGE, 1/2: for hydraulic hose clamp (11083) 1P4579	B BC	EA	2
7	5340-00-007-9934	FLANGE, 1/2: for hydraulic hose clamp (11083) 1P4574		EA	8
8	5330-01-302-9890	GASKET: for either cylinder (11083) 7N9801		EA	1
9	5330-00-149-7248	GASKET: for winch spline opening (11083) 2A1466	B BC	EA	1
10	2530-01-269-4804	BODY VALVE: for winch assembly (11083) 5R7848	B BC	EA	1
11	5340-00-732-0558	NUT, HEX: for hydraulic hose cover flange (96906) MS51967-8		EA	8
11	5310-00-880-7744	NUT, HEX: for hydraulic hose cover flange (96906) MS51967-5	A AC	EA	8
12	5365-01-032-2194	PLATE, SPACER (19207) 11632862	A AC	EA	2
12	5340-01-270-1800	PLATE: (11083) 3H6274		EA	2

Section III. Basic Issue Items List (Con't).



(1) Illus Number	(2) National Stock Number	(3) Description (CAGEC) and Part Number	Usable On Code	(4) U/M	(5) Qty Rqd	
13	5340-01-272-8426	PLUG: (11083) 5P1004	B BC	EA	2	
14	5330-00-944-8281	O-RING: for winch spline hub (11083) 3D2824	B BC	EA	1	
14	5330-00-914-5846	O-RING: for hydraulic hose cover (11083) 4J0524	B BC	EA	1	
14	5330-00-913-6145	O-RING: for hydraulic hose cover (11083) 4J05140		EA	4	
15	5120-01-275-2128	KEY, SOCKET HEAD SCREW (11083) 5R6278 (for transmission filler spout and final drive filler plug)		EA	1	
16	5310-00-809-5997	WASHER: for cylinder cover flange (96906) MS27183-17	B BC	EA	4	
16	5310-00-081-4219	WASHER: for cylinder cover flange (96906) MS27183-12		EA	8	
16	5310-01-098-0624	WASHER: for winch cover storage on fuel tank (11083) 5P8245	B BC	EA	1	
16	5310-00-003-9174	WASHER: for transmission cover (96906) MS27183-21	B	EA	9	

Section III. Basic Issue Items List (Con't).



(1) Illus Number	(2) National Stock Number	(3) Description (CAGEC) and Part Number	Usable On Code	(4) U/M	(5) Qty Rqd
1	4930-00-223-3391	LUBRICATING GUN, HAND (19207) 5644803		EA	1
2		MANUAL, OPERATORS TM5-2410-237-10		EA	1
2.1	5315-00-426-5074	PIN, DRAWBAR (11083) 7F9541		EA	1
3	5120-01-473-9274	WRENCH, ADJUSTABLE 12 INCHES LONG (96508) AT112BK		EA	1

**APPENDIX C**

**ADDITIONAL AUTHORIZATION LIST**

**Section I. Introduction**

**C-1. GENERAL.**

This appendix lists additional items you are authorized to request for the support of the T-9 Tractor. This list identifies items that do not have to accompany the T-9 Tractor and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA documents.

**C-2. EXPLANATION OF COLUMNS.**

a. Column (1) - National Stock Number. Indicates the National stock number assigned to the item; use it to request or requestion the item.

b. Column (2) - Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. Indicates the five digit Commercial and Government Entity (CAGE) code, part number and Usable On code if applicable. Usable On codes identify which items are used on different models. Codes used are as follows:

<u>USED ON CODE</u>	<u>MODEL</u>
(Blank)	All Models
A	Tractor with Ripper
AC	Tractor with Ripper and Winterized Cab
B	Tractor with Winch
BC	Tractor with Winch and Winterized Cab

c. Column (3) - Unit of Measure (U/M). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr).

d. Column (4) - Quantity Required (Qty Rqr). Indicates the quantity of the item authorized to be used with/on the equipment.

## Section II Additional Authorization List

(1) National Stock Number	(2) Description (CAGE) and Part Number	Usable On Code	(3) U/M	(4) Qty Rqr
	ADAPTER, GREASE GUN COUPLING: grease gun, rigid, thin-stem, 6 in. long, type IV, class 2, (19207) 5349744		EA	1
	AX: single bit, 4 lb head weight, 4-3/4 in. cutting edge, 35-1/2 in. to 36-1/2 in. long, type I, class 1, design A, olive drab finish (19207) 6150925		EA	1
	BAG: pamphlet, cotton duck 3 in. X 9-1/4 X 11-1/4 in. in compartment behind operator's seat (19207) 7961712		EA	1
	BAG: tool, cotton duck 10 in. X 20 in. w/flap (81337) 5-7-1		EA	1
	BRACKET ASSEMBLY, LIQUID CONTAINER: Strap Assy included (19207) 6566675		EA	1
	CAN: water, MIL type, 5 gallon (19207) 11655980		EA	1
	CAN: gasoline, MIL type, 5 gallon, (81902) 14196P1		EA	1
	CHAIN ASSEMBLY: tow, single leg, 5/8 in. link, 16 ft long, w/grab hook, w/2 pear-shaped coupling links, olive drab finish (19207) 7077063		EA	1
	EXTENSION: grease gun, flex hose, 12 in. long to 14 in. long (19207) 6300333		EA	1
	EXTINGUISHER, FIRE, DRY CHEMICAL: stored pressure discharge, hand operated, 5 lb nominal capacity (19207) 7015266		EA	1
	FIRST-AID KIT: general purpose, 12 unit (19207) 11677011		EA	1
	FLASHLIGHT: electric, hand, 2-cell, w/lamp and lens filter, w/o batteries, type I, class A (21108) MX991-U		EA	1
	GREASE GUN: hand. lever operated, 14 oz. cartridge or bulk load (19207) (5644803)		EA	1
	HAMMER: hand, machinist's, ball-peen, 2 lb., 15 in. to 17 in. lg. type II, class 1, style A (in toolbox-vehicle right side) (81348) GGG-H-86		EA	1
	HANDLE: mattock, pick, railroad or clay pick, 36 in. long, olive drab finish grade AA (19207) 11677021		EA	1
	MATTOCK: pick type, 5 lb w/o handle, olive drab finish, type II class F (19207) 11677022		EA	1

## Section II. Additional Authorization List (cont'd)

(1) National Stock Number	(2) Description (CAGE) and Part Number	Usable On Code	(3) U/M	(4) Qty Rqr
	OILER: hand, push bottom, 8 oz. capacity, 4 in. long spout (96906) M515164-1 SHOVEL: hand, round point, D handle, short size (19207) 11655784		EA  EA	1  1





## APPENDIX D EXPENDABLE SUPPLIES AND MATERIALS LIST

### SECTION I. INTRODUCTION

#### D-1. SCOPE.

This Appendix lists expendable supplies and materials you will need to maintain the D7G Tractor. This listing is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, *Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items)*, or CTA 8-100, *Army Medical Department Expendable/Durable Items*.

#### D-2. EXPLANATION OF COLUMNS.

- a. **Column (1) - Item Number.** This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item [e.g., Use antifreeze (Item 1, Appendix D)].
- b. **Column (2) - Level.** This column identifies the lowest level of maintenance that requires the listed item.  
C - Operator/Crew
- c. **Column (3) - National Stock Number (NSN).** This is the NSN assigned to the item which you can use to requisition it.
- d. **Column (4) - Description, Item Name, Commercial and Government Entity Code (CAGEC), and Part Number (P/N).** This provides the other information you need to identify the item.
- e. **Column (5) - Unit of Measure (U/M).** This code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

**SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST**

**Table 1. Expendable Durables List.**

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
1	C	6850-01-441-3218	ANTIFREEZE: Permanent, Ethylene Glycol, Inhibited (58536) AA52624-1-A 1 Gallon Bottle	GAL
		6850-01-441-3223	55 Gallon Drum	GAL
2	C		CLEANING COMPOUND: Solvent, Type III (81349) MIL-PRF-680	
		6850-01-474-2318	1 Gallon Can	GAL
		6850-01-474-2320	5 Gallon Can	GAL
		6850-01-474-2321	55 Gallon Drum	GAL
3	C	8030-01-509-1597	COMPOUND: Sealing (11083) 9S3263	OZ
4	C		DETERGENT: General Purpose, Liquid (83421) 7930-00-282-9699	
			7930-00-282-9699	1 Gallon Can
5	C		FUEL: Diesel, DF-1 Grade, Winter (81346) ASTM D 975	
		9140-00-286-5286	Bulk	GAL
		9140-00-286-5287	5 Gallon Can	GAL
		9140-00-286-5288	55 Gallon Drum	GAL
6	C		FUEL: Diesel, DF-2 Grade (81346) ASTM D 975	
		9140-00-286-5294	Bulk	GAL
		9140-00-286-5295	5 Gallon Can	GAL
		9140-00-286-5296	55 Gallon Drum	GAL
7	C	9130-01-031-5816	FUEL, TURBINE: Aviation (81349) MILT83133 GR JP8	GAL
8	C		GREASE: Automotive and Artillery, GAA	
		9150-01-197-7688	(81349) M-10924-A 2-1/4 Ounce Tube	OZ
		9150-01-197-7690	(81349) M-10924-C 1-3/4 Pound Can	LB
		9150-01-197-7692	(81349) M-10924-E 35 Pound Can	LB
		9150-01-197-7693	(81349) M-10924-B 14 Ounce Cartridge	OZ

Table 1. Expendable Durables List (con't).

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
9	C	9150-00-402-4478	OIL: Lubricating, OEA-30, Arctic (81349) MIL-L-46167 1 Quart Can	QT
		9150-00-402-2372	(81349) MIL-PRF-46167 5 Gallon Can	GAL
		9150-00-491-7197	(81349) MIL-PRF-46167 55 Gallon Drum	GAL
10	C	9150-00-189-6727 9150-00-186-6668 9150-00-191-2772	OIL: Lubricating, OE/HDO-10 (81349) M2104-1-10W 1 Quart Can 5 Gallon Can 55 Gallon Drum	QT GAL GAL
11	C	9150-01-152-4117 9150-01-152-4118 9150-01-152-4119	OIL: Lubricating, OE/HDO-15/40 (81349) M2104-3-15W40 1 Quart Can 5 Gallon Can 55 Gallon Drum	QT GAL GAL
12	C	9150-00-186-6681 9150-00-188-9858	OIL: Lubricating, OE/HDO-30 (81349) M2104-1-30W 1 Quart Can 5 Gallon Can	QT GAL
13	C	7290-00-205-1711	RAG: Wiping (64067) 7920-00-205-1711 50 Pound Bale	LB
14	C	6810-00-264-6618	SODIUM, BICARBONATE: Technical (58536) AA374-2 1 Pound Box	LB



## APPENDIX E OPERATION AND OPERATOR MAINTENANCE OF MINE CLEARING/ARMOR PROTECTION (MCAP) KIT

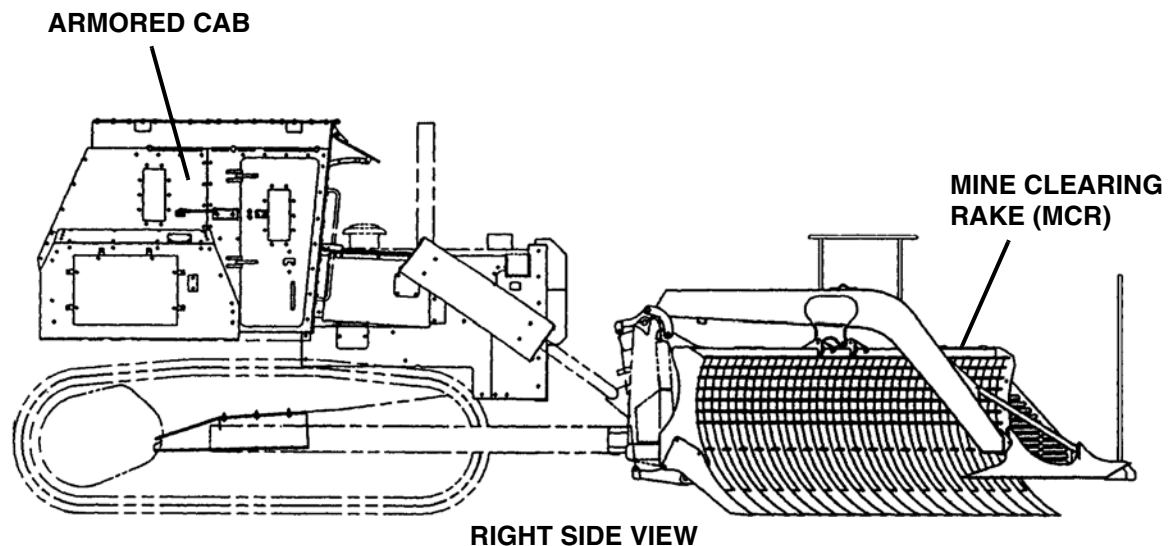
### Section I. Equipment Description and Data

#### E-1. INTRODUCTION.

- a. The D7G Tractor can be equipped with a Mine Clearing/Armor Protection (MCAP) kit. This appendix is provided to assist the operator in operating and performing operator maintenance on the MCAP kit.
- b. The original MCAP kit was issued in 1991. It has since been updated, in 1996 and again in 2004. The 1991 and 1996 versions are similar.
- c. The 2004 MCAP kit has larger window openings to improve operator visibility. Instead of a dual-unit fan assembly, it has a single fan with six louvered, adjustable openings into the cab. The 2004 single-unit fan assembly also has two air intake filter elements which can be removed to clean or to replace.
- d. Read and become thoroughly familiar with the contents of this appendix before attempting to operate or perform operator maintenance on the MCAP kit.

#### E-2. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

- a. The MCAP kit consists of two major assemblies that are initially installed by Unit Maintenance: a mine clearing rake (MCR) that is mounted to welded ears on the bulldozer blade moldboard, and armor protection that protects the tractor and operator from explosive blasts.
- b. The MCR is designed to clear both surface-laid and buried anti-tank (AT) and anti-personnel (AP) land mines and windrow them to the right side of the tractor. The MCR will clear 12 feet (366 cm) wide transit lanes to a maximum depth of 12 inches (30.5 cm) each pass. Cleared lanes may be widened by repetitively picking up the previous windrow and casting it to the right.
- c. The armor protection includes belly armor and panels around the operator's compartment, engine, fuel tank, hydraulic tank, and lift cylinders. There are two armored doors to the operator's station and hinged access panels for ease of service and maintenance to machine.



**E-3. EQUIPMENT DATA.**

**Mine Clearing Rake (MCR):**

Weight ..... 3900 lbs (1,769 kg)  
Angle ..... Side cast to right  
Raking Depth ..... 12 inches max. (30 cm)  
Tines ..... Replaceable  
Mode of Operation ..... Float or manual

**Armor:**

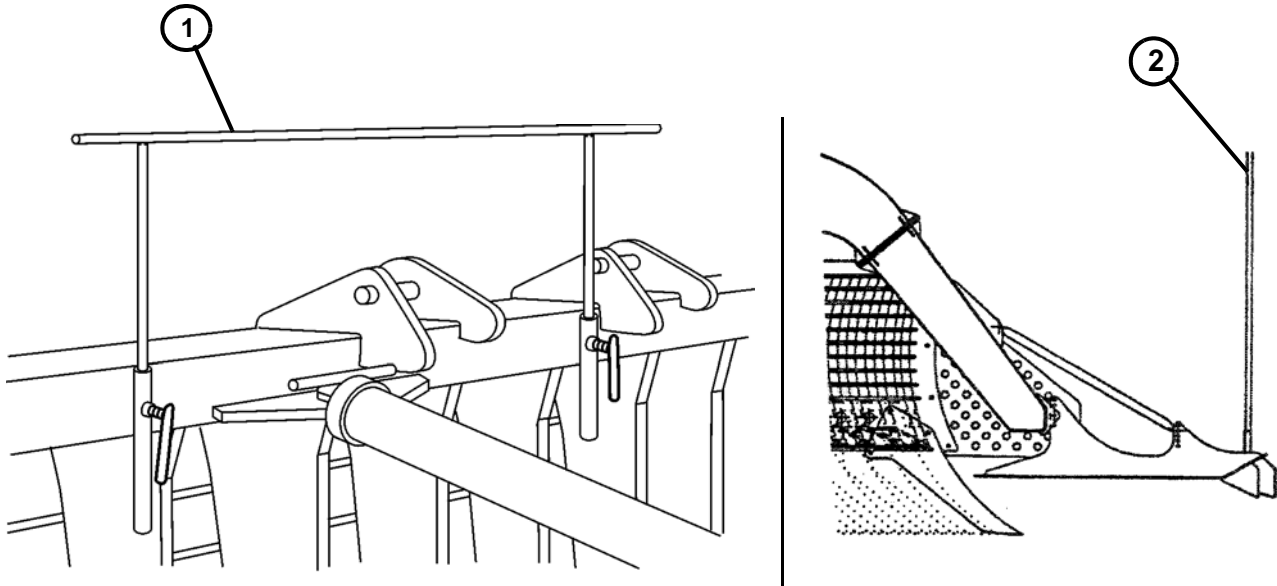
Weight ..... 6800 lbs (3,084 kg)  
Material ..... MIL-A-12560 RHA  
Transparent Armor ..... 8 view ports  
Protection Level ..... Artillery and landmine fragmentation;  
7.62 mm armor-piercing small arms fire

## Section II. Description and Use of Operator's Controls and Indicators

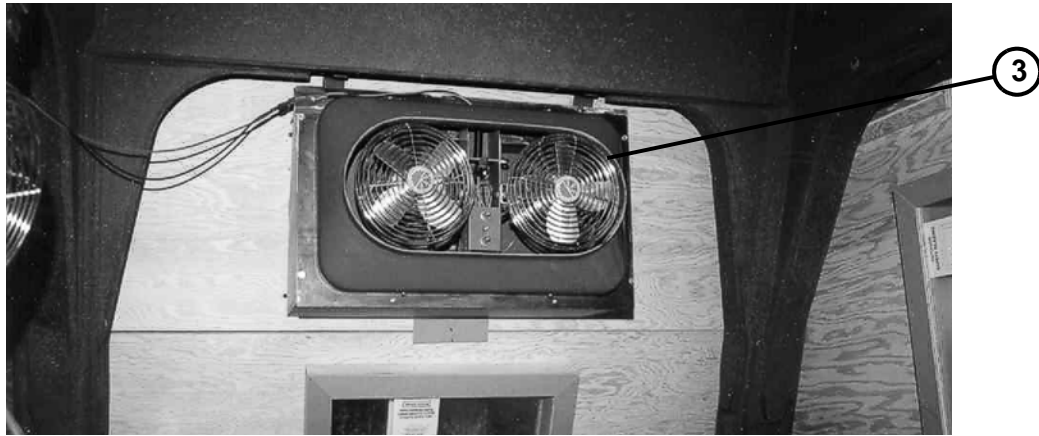
### E-4. OPERATOR'S CONTROLS AND INDICATORS.

#### NOTE

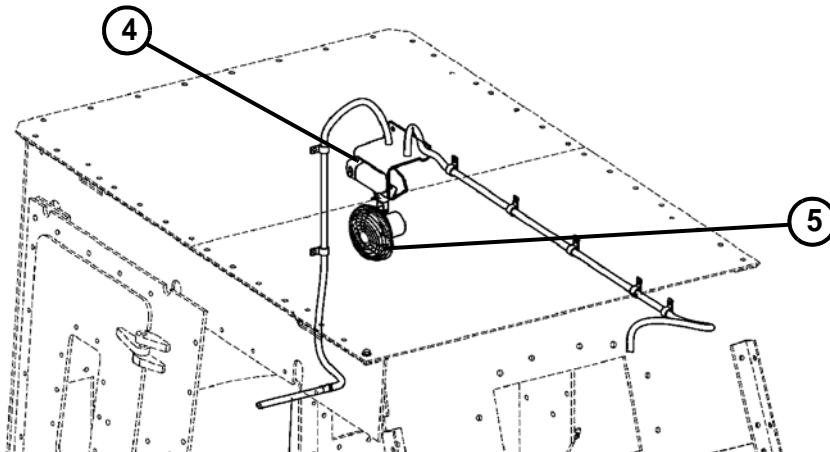
- The following controls and indicators are unique to an MCAP-equipped tractor.
- Refer to Chapter 2, Section I of this manual for all other controls and indicators.



KEY	CONTROL OR INDICATOR	FUNCTION
1	Rake Depth Indicator	Assists operator to keep rake level and operating at the correct depth. Horizontal bar of indicator, viewed in relation to radiator guard, shows if rake is level relative to tractor. When clearing mines, clearance between horizontal bar and radiator guard, as viewed by operator inside cab, should be no greater than 2 inches (51 mm). If clearance is more than 2 inches (51 mm), rake engagement is too shallow. Indicator may be adjusted by the operator.
2	Skid Shoe Locator Rod	Indicates location and depth of skid shoe, as viewed by the operator inside the cab. Assists in running machine adjacent to existing windrow without hitting it. If cable turnbuckles are loosened slightly, skid shoe can rotate down if terrain drops off; rod will dip out of sight and provide operator advance warning of change in terrain. Rod also serves to indicate if skid shoe has become damaged.



KEY	CONTROL OR INDICATOR	FUNCTION
3	Dual-Unit Fan Assembly (1991 and 1996 MCAP)	Brings fresh air into cab, to vent fumes from batteries and to cool cab interior. Located behind operator's seat. Two-speed fans are operated by toggle switch, independently of each other. Open spring-loaded door in unit and run <u>both</u> fans at high speed when operating under full armor protection.
	Single-Unit Fan Assembly (2004 MCAP) (Not Illustrated)	Latest 2004 MCAP kits are equipped with a single-unit fan assembly located behind the operator's seat. It has six louvered, adjustable openings into the cab. It also has two air inlet filter elements that can be removed for cleaning or replacement.



KEY	CONTROL OR INDICATOR	FUNCTION
4	Lamp Assembly	Mounted together with single-unit fan on right side of cab interior. Depress switch to turn ON/OFF.
5	Single-Unit Fan	Two-speed fan is operated by toggle switch. Provides ventilation inside cab for operator comfort.
	Fuel Tank Access Door (Not Illustrated)	Open door from inside cab to access fuel filler cap for refueling.



## Section III. Preventive Maintenance Checks and Services for MCAP Kit

### E-5. PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

#### CAUTION

Operator Preventive Maintenance Checks and Services for the T-9 tractor (Caterpillar Model D7G) is described in Chapter 2, Section II of this manual. Do NOT neglect to perform PMCS as described in Chapter 2, Section II. Failure to do so will cause damage to machine.

#### NOTE

- When equipped with the MCAP kit, access to machine components for servicing (e.g. engine, transmission and hydraulic oil level checks) is achieved by opening armored hinged access doors.
- The following procedures apply ONLY to PMCS of components of the MCAP kit.
  - a. Before Operation.
    - (1) Check all pins and retainer bolts on mine clearing rake (MCR) to ensure secure mounting to bulldozer.
    - (2) Check that MCR retainer hook bolts at bottom of rake are secure.
    - (3) Check that rake teeth are undamaged and teeth retainer bolts are tight. NOTE: Any missing, damaged or bent teeth that cause a gap or lack of rake depth MUST be replaced immediately.
    - (4) Ensure rake depth indicator is installed, in good condition, and correctly adjusted. Refer to *Rake Depth Indicator Adjustment* in Section V of this appendix.

#### NOTE

**If MCR is to be operated in manual mode, skid shoe and beam may not be installed.**

- (5) Adjust skid shoe to proper running height depending on expected soil conditions. Refer to *Skid Shoe Installation and Adjustment* in Section V of this appendix.
- (6) Check that cable turnbuckles are tight.
- (7) Inside armored cab, ensure that doors are securely closed and latched.
- (8) Check operation of lamp assembly.

#### WARNING

**If dual-unit or single-unit fan assembly does not function at high speed, toxic battery fumes could accumulate inside cab, causing injury to operator. Temperature in cab could also become elevated to an unsafe level.**

- (9) Check operation of fans. Operation with full armor is NOT authorized if dual-unit fan assembly or single-unit fan assembly at rear of cab does not function at high speed.
- b. After Operation.
    - (1) Thoroughly inspect armor plates, brackets, and access doors for damage or loose or missing bolts. If any bolts are loose, remove bolts, apply sealing compound (Item 3, Appendix D), and reinstall. Notify Unit Maintenance to apply proper torque.
    - (2) Ensure that armor protection glass in view ports is clean. If dirty, clean glass in accordance with instructions in *Cleaning Armor Protection Glass*. Refer to Section V of this appendix.
    - (3) Check all pins and retainer bolts on rake to ensure secure mounting to bulldozer blade.
    - (4) Check that rake retainer hook bolts at bottom of rake are secure.
    - (5) Check that cable turnbuckles are tight.

- (6) Check that rake teeth are undamaged and teeth retainer bolts are tight. WARNING: Any missing, damaged or bent teeth that cause a gap or lack of rake depth MUST be replaced immediately to prevent missing mines and causing death or injury to personnel.
  - (7) On 2004 MCAP-equipped machines, remove, clean and reinstall two air intake filter elements in single-unit fan assembly.
- c. Weekly. Notify Unit Maintenance to check torque on tine and spill plate bolts.

## Section IV. Operating Instructions

### E-6. INTRODUCTION.

#### a. Introduction.

### NOTE

**Before operating machine, ensure *Before operation* PMCS has been performed.**

- (1) This machine can be operated in two modes to clear mines: float mode or manual mode.
  - (2) Prior to operation, the mode of operation must be determined.
  - (3) In all cases, it is crucial to run the mine clearing rake (MCR) as deep as possible, without bogging down the machine or clogging the rake and skid shoe.
  - (4) If operating in float mode, beam and skid shoe must be installed. In manual mode, beam and skid shoe are also installed, unless soil and terrain conditions make it necessary to remove them. Refer to Section V of this appendix to install or remove beam and skid shoe.
- b. Operate in Float Mode.
- (1) On level, dry, firm soil, the MCR can be operated in float mode. With bulldozer blade control lever in float, this mode allows the rake to automatically follow the contour of the ground. With beam properly mounted and with skid shoe depth adjusted, the MCR will penetrate the ground to the proper depth without operator assistance.
  - (2) The force of the soil rolling to the right side may cause the tractor to turn left in a large arc. Frequent small steering corrections may be needed to maintain a straight path.
- c. Operate in Manual Mode.
- (1) Manual mode allows better tractor balance and more uniform track contact with the ground. Rake teeth depth and side tilt are controlled with bulldozer's blade control lever.
  - (2) Manual mode is suitable in wet, looser, disturbed soil with uneven terrain.
  - (3) Beam and skid shoe are installed in manual mode, unless wet or clay soil and dense vegetation cause skid shoe to become clogged. In this case, manual mode is performed with beam and skid shoe removed.

### E-7. OPERATE IN FLOAT MODE.

- a. Ensure beam and skid shoe are installed and correctly adjusted. Refer to Section V of this appendix.
- b. Close and secure all doors on armored cab to protect from mine fragments.

### WARNING

**When operating under full armor protection, operate machine only with dual-unit or single-unit fans at high speed. Failure to do so could cause injury or death.**

- c. Turn fan(s) behind operator's seat inside cab to on, HIGH speed. Open vent door in fan assembly.
- d. Put on hearing protection.
- e. Position tractor to desired starting point and lower rake to ground.
- f. Tilt rake to a level operating position using bulldozer blade control lever.
- g. Place bulldozer blade control lever in float position.
- h. Move slowly forward, making steering corrections as needed to maintain desired direction of travel.
- i. Observe rake depth indicator to ensure adequate depth of teeth engagement of MCR. More than 2 inches (51 mm) of clearance between radiator guard and horizontal bar, as viewed by operator inside

cab, indicates that rake is running shallow. Make adjustments as needed. Refer to *Skid Shoe Installation and Adjustment* in Section V of this appendix.

- j. To position tractor for successive passes, use skid shoe locator rod as a visual reference. Line up on adjacent windrow, without hitting windrow, and use vertical rod to judge lateral position relative to windrow.

#### **E-8. OPERATE IN MANUAL MODE.**

- a. Ensure beam and skid shoe are installed and correctly adjusted. Refer to Section V of this appendix.
- b. Close and secure all doors on armored cab to protect from mine fragments.

### **WARNING**

**When operating under full armor protection, operate machine only with dual-unit or single-unit fans at high speed. Failure to do so could cause personal injury or death.**

- c. Turn fan(s) behind operator's seat inside cab to on, HIGH speed. Open vent door in fan assembly.
- d. Put on hearing protection.
- e. Position tractor to desired starting point and lower rake to ground.
- f. Tilt rake to a level operating position using bulldozer blade control lever.
- g. While slowly moving forward, lower rake down into ground until front of tractor starts to lift up off ground. Return lever to hold position and begin clearing operations.

### **WARNING**

**Care must be taken so that full rake penetration is maintained. If full rake penetration is not maintained, effectiveness of mine clearing operation will be compromised.**

- h. Adjust teeth engagement and blade tilt as necessary to follow ground terrain.
  - (1) Watch rake depth indicator to gage MCR teeth engagement depth and ensure rake position is level. Use position of horizontal bar relative to radiator guard. If bar is parallel to radiator guard, rake is level relative to tractor.
  - (2) More than 2 inches (51 mm) of clearance between radiator guard and horizontal bar indicates that rake is running shallow.
- i. To position tractor for successive passes, use skid shoe locator rod as a visual reference. Line up on windrow ahead and use vertical rod to judge lateral position relative to windrow.
- j. If desired, loosen beam cable turnbuckles to allow skid shoe to rotate down if the terrain suddenly drops off. This will cause vertical rod to dip down out of sight, giving operator advance warning of terrain change.
- k. Use vertical rod to determine if skid shoe is damaged. Any damage to skid shoe will cause top of vertical rod to be either out of sight or skewed out of its normal operating position.

### **WARNING**

**DO NOT dismount machine during mine clearing unless machine has been moved to a clear area. Failure to follow this warning may cause injury or death.**

- l. If rake and skid shoe are becoming clogged, remove machine from uncleared area to a cleared area, then dismount and remove beam and skid shoe. Continue mine clearing in manual mode with beam and skid shoe removed.

## Section V. Maintenance Instructions

### E-9. MCAP KIT AND TOOL REQUIREMENTS.

- a. Tools and expendables needed to install/maintain the MCAP will be provided with each kit. These can be used by the operator to make adjustments to the mine clearing rake (MCR) and to perform PMCS on the armor.
- b. Tools and expendables should be stowed in the tractor's toolbox and turned in if MCAP kit is removed from machine.
- c. The following table lists MCAP kit and tools.

DESCRIPTION	PART NUMBER (CAGEC)	NSN	QTY
Clamp, Material Lifting	4R9712 (11083)	3940-01-515-7742	1
Compound, Sealing: Thread Lock	9S3263 (11083)	8030-01-509-1597	1
Link, Bearing (Lifting)	1387575 (11083)	5120-01-451-1401	1
Tool Kit	2362235 (11083)		1
• Tool Bag	2110136 (11083)	5140-01-524-7563	1
• Wrench, Adjustable: 10 in.	D710 (96508)	5120-00-449-8083	1
• Wrench, Combination: 7/16 in.	1161 (05506)	5120-00-228-9505	1
• Wrench, Combination: 1/2 in.	1162 (05506)	5120-00-228-9506	1
• Wrench, Combination: 9/16 in.	1163 (05506)	5120-00-228-9507	1
• Wrench, Combination: 3/4 in.	1166 (05506)	5120-00-228-9510	1
• Wrench, Combination: 15/16 in.	1168 (05506)	5120-00-228-9513	1
• Wrench, Combination: 1-1/8 in.	1172 (05506)	5120-00-228-9516	1

### E-10. CLEANING ARMOR PROTECTION GLASS.

#### CAUTION

**DO NOT allow any metal or hard parts of cleaning equipment to contact glass surfaces. Never use a cleaning solution or cloth that contains abrasives of any kind. Failure to follow this caution may result in damage to glass surfaces.**

- a. Glass-clad polycarbonate and laminated glass allows the operator to see the path in front of the MCR while being protected from explosive blasts.
- b. To protect this surface from damage, clean using the following procedures:
  - (1) Cleaning Heavily Soiled Glass.
    - (a) Flush glass surfaces with clean water to remove as many abrasives as possible.
    - (b) With glass surfaces still heavily wetted, carefully work a rubber squeegee from top to bottom, removing excess water. Ensure that any remaining abrasive materials do not become trapped between glass and squeegee; otherwise glass surfaces may be become scratched.

- (c) Clean glass with a clean, soft, grit-free cloth and a mild, non-abrasive, non-alkaline cleaning solution. Never use ammonia to clean glass.
- (d) Rinse immediately with clean water and remove any excess water from glass with a squeegee.
- (2) Routine Cleaning of Glass.
  - (a) Use a mild soap or detergent and lukewarm water.
  - (b) Uniformly spray cleaning solution or apply it with a clean, soft, grit-free applicator. Rinse thoroughly.
  - (c) Dry glass with a clean, grit-free cloth or a squeegee.

**E-11. MINE CLEARING RAKE (MCR) INSTALLATION.**

**NOTE**

**MCR cannot be installed unless Unit Maintenance has already welded rake-mounting ears to bulldozer blade moldboard.**

- a. Remove self-locking nuts, bolts, and rake-mounting pins from top of MCR frame.
- b. At bottom of frame, remove bolts, rotate hooks to open position, and thread bolts back in holes, to ensure hooks remain in unlock position.

**WARNING**

**Do NOT stand between MCR and tractor during installation of MCR. Forward movement of tractor could trap personnel standing between MCR and tractor. Injury or death could result.**

**NOTE**

**Ground guide assistance is required.**

- c. Drive slowly up to MCR that is resting on blocks. Approach MCR as squarely as possible, with right bulldozer end plate aligned with slotted plate on rake, and rake mounting ears aligned with welded mounting ears on moldboard.

**NOTE**

**Because tractor and MCR may not be in perfect alignment, only one push pad may be tight against bulldozer cutting edge. This is OK.**

- d. Continue slowly moving forward until blade cutting edge contacts one or both rake push pads.
- e. Aline mounting pin holes on MCR with mounting ears on moldboard. Install pin, bolt, and self-locking nut at one mounting ear. As required, slowly move tractor forward and/or right or left to aline remaining mounting pin hole on rake with mounting ear on moldboard. Install pin, bolt, and self-locking nut.

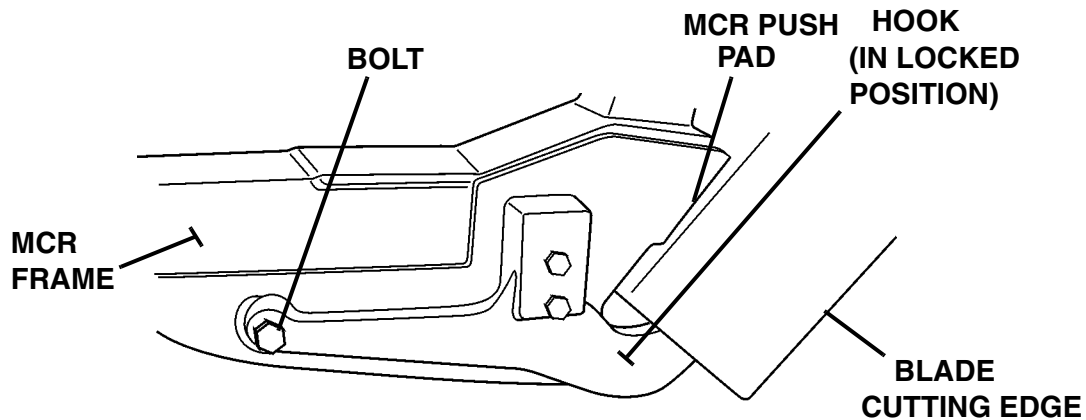
**WARNING**

Teeth of MCR are sharp. Keep feet and hands away from rake when it is being lifted. Failure to follow this warning may cause injury.

**NOTE**

Both pads may not contact cutting edge at this point.

- f. Lift MCR with bulldozer blade so that rake push pads rest against blade cutting edge.
- g. Remove bolts, rotate hooks to lock position, and reinstall retaining bolts and tighten.



- h. Lower MCR to ground. Rock blade control lever back and forth several times, to ensure rake is resting safely on ground.
- i. Place blade control lever in float position and shut down engine.

**E-12. BEAM INSTALLATION.****NOTE**

- Beam which supports skid shoe can be mounted on mine clearing rake (MCR) in either a centered or offset-right position.
  - Centered beam position allows operator to run windrow to right of skid shoe and clear a wider swath with less risk of a mine hitting skid shoe. Offset-right position provides a corrective steering effect in those soils which tend to make tractor steer to the left.
  - Beam should be installed in offset-right position for most operating conditions.
- a. Begin with MCR installed on tractor, with rake resting on ground. Blade control lever is in float position and engine is off.

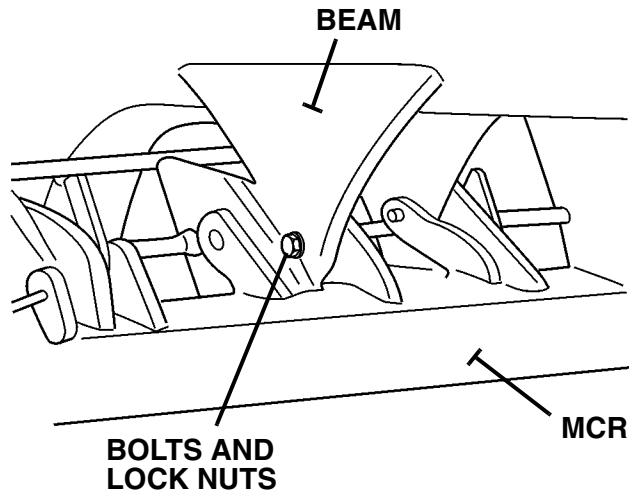
### WARNING

Beam is heavy. Use a suitable lifting device and assistance when positioning beam over MCR.

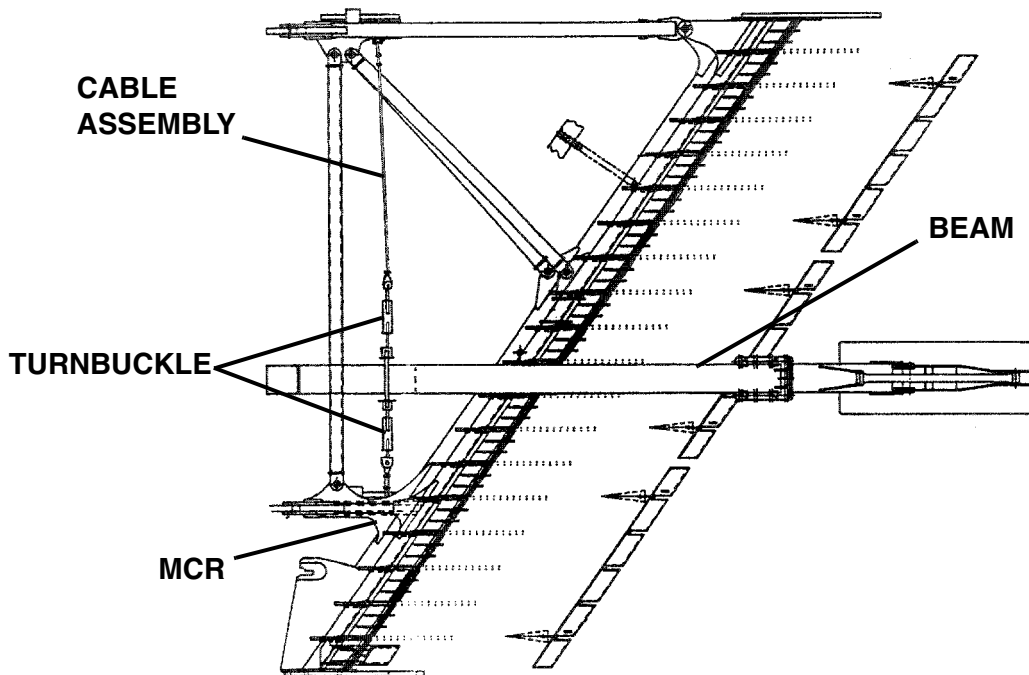
### NOTE

1991 model MCAP beam weighs 309 lb (140.1 kg). 1996 and 2004 model MCAP beams weigh 611 lb (277.3 kg).

- b. Place beam in desired position above MCR and install to MCR with two bolts and lock nuts.



- c. Install cable assemblies to beam. Pin three-clamp end to bracket.

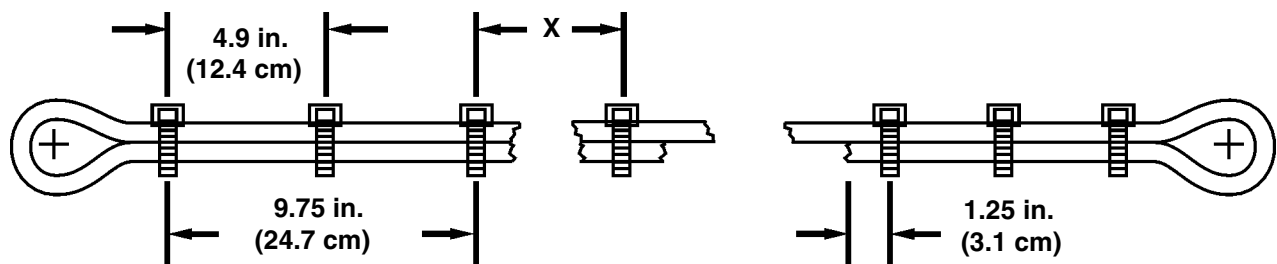




## NOTE

Because length of cable assemblies is supplied for a beam mounted in center position, cable adjustment is required to mount beam in offset-right position.

- d. Adjust cable assemblies to fit as follows:
- (1) Remove clamps from four-clamp end.
  - (2) To lengthen cable assemblies, pull on live (long) end of cable. To shorten, pull on dead (short) end of cable:
    - (a) L.H. cable length must be changed from 54.55 inches (138.6 cm) to 66.1 inches (167.9 cm).
    - (b) R.H. cable length must be changed from 42.2 inches (107.2 cm) to 34.8 inches (88.4 cm).
    - (c) Install four clamps with saddle (nut side) applied to live end of cable. First clamp should be as close to thimble as possible with center to center dimensions as shown.
    - (d) Tighten clamp nuts to 65 lb-ft (88 Nm).



X DIMENSION DETERMINED BY CABLE LENGTH

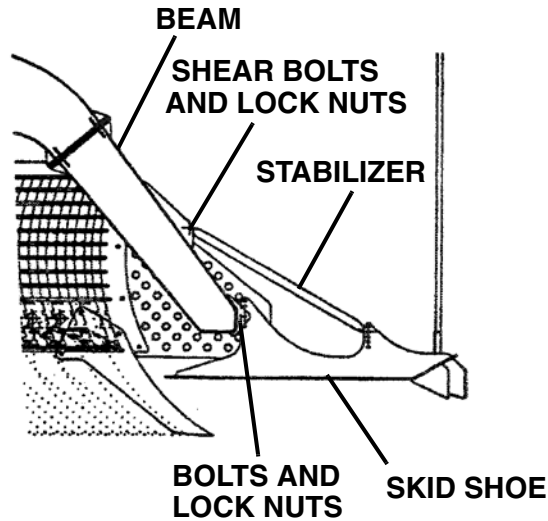
- e. Alternating between two turnbuckles, tighten cables until beam is pulled down firmly against top of bulldozer blade. Ensure beam is aligned straight and parallel with machine's path, not angled to the side.

### E-13. SKID SHOE INSTALLATION AND ADJUSTMENT.

- a. General Information.
- (1) Skid shoe mounting arrangement allows two independent adjustments: skid shoe depth and skid shoe attack angle.
  - (2) Position of skid shoe in relation to beam controls depth that rake teeth engage soil. To start, set skid shoe-to-tine tip depth at approximately 66% of desired digging depth.
  - (3) Lowering skid shoe relative to beam reduces depth of teeth engagement. Skid shoe is also lowered for loose soil conditions in which skid shoe tends to sink.
  - (4) Raising skid shoe relative to beam allows teeth to operate deeper. Skid shoe is also raised for firmer terrain surfaces.
  - (5) Attack angle of skid shoe is controlled by adjusting attachment location of stabilizer bar.

b. Installation and Adjustment.

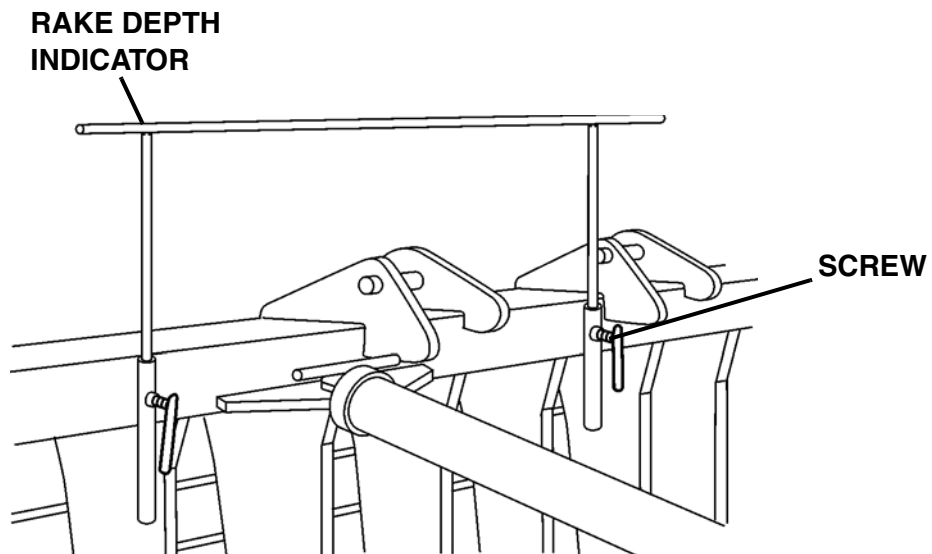
- (1) Select the desired shoe depth. Position skid shoe at desired location at end of beam. Secure rear ears of shoe to beam with bolts and lock nuts.
- (2) Adjust stabilizer so that leading nose of skid shoe is raised at about a 3-degree angle. Install shear bolts and lock nuts to secure stabilizer to beam.



- (3) Operate MCR.
- (4) Make adjustments to skid shoe depth and attack angle as required.

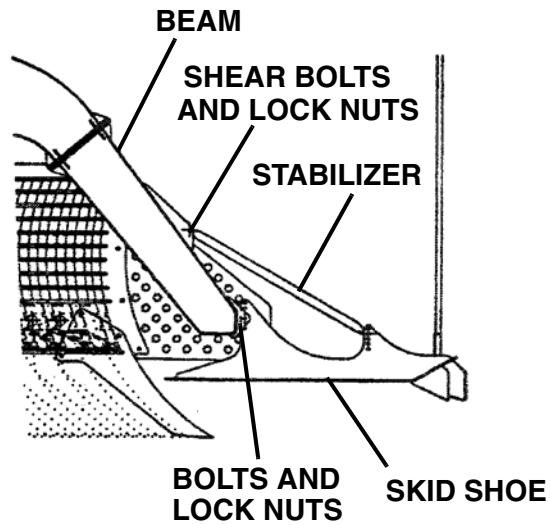
**E-14. RAKE DEPTH INDICATOR ADJUSTMENT.**

- a. Remove screw from each vertical bar and raise/lower rake depth indicator.
- b. Install screw in proper hole to secure each vertical bar.



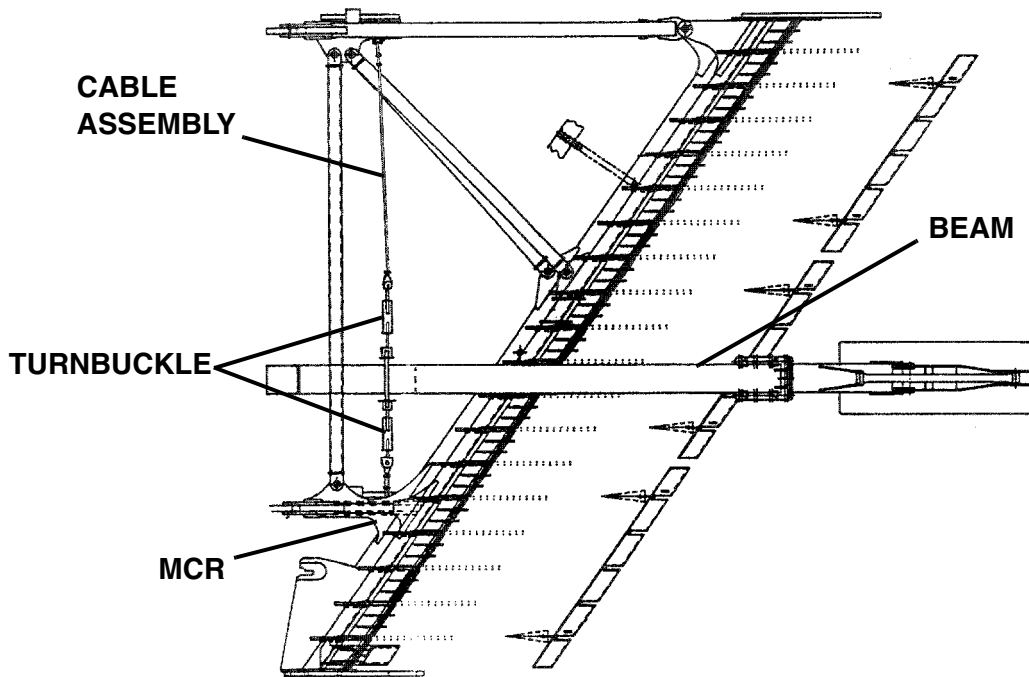
**E-15. SKID SHOE REMOVAL.**

- a. Remove lock nuts and shear bolts to remove stabilizer from attachment to beam.
- b. Remove lock nuts, bolts, and rear ears of skid shoe from beam.



**E-16. BEAM REMOVAL.**

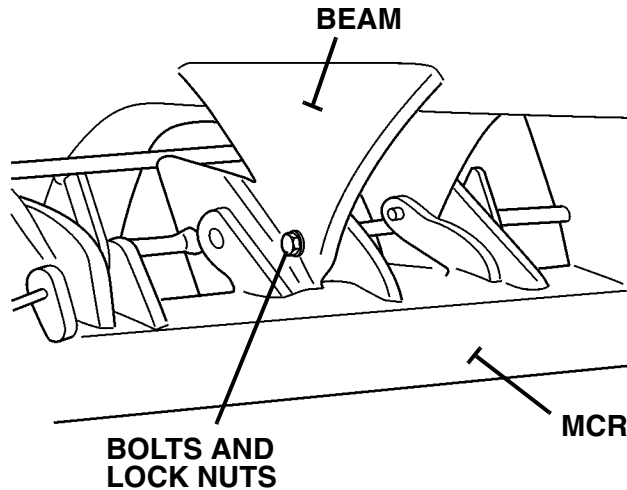
- a. Loosen two turnbuckles to free beam from top of bulldozer blade. Remove cable assemblies from beam and MCR.



## WARNING

**Beam is heavy. Use a suitable lifting device and assistance when lifting beam from MCR.**

- b. Remove two lock nuts, bolts, and beam from MCR.



### E-17. REMOVAL OF MINE CLEARING RAKE (MCR).

- a. Remove skid shoe and beam. Refer to *Skid Shoe Removal in paragraph 3-15* and *Beam Removal in paragraph 3-16*.
- b. Set MCR teeth on ground, then place blade control lever in float position.
- c. Move blade control lever to hold position. Engage parking brake.

## WARNING

**Teeth of MCR are sharp. Keep feet and hands away from rake when it is being lifted. Failure to follow this warning may cause injury to personnel.**

## CAUTION

**Ensure MCR is lifted off ground before attempting to remove bolts. Bolts should come out with very little effort after they are initially broken loose. Removing bolts while they are in a bind could damage threaded hole and/or bolt.**

- d. Lift MCR slightly off ground. Remove bolts from both sides and rotate hooks to unlock position. Reinstall bolts in threaded holes to guard against loss.
- e. Place 7-10 inch (180-254 mm) blocks under retaining hook mounting brackets. Slowly lower MCR onto blocks and onto the ground.

## NOTE

**If pins are hard to drive out, slightly raise or lower bulldozer blade until very little resistance is felt when driving out pins.**

- f. On each side of bulldozer blade moldboard, remove self-locking nut and bolt and drive out pin.
- g. Slowly back tractor away from MCR.
- h. Reinstall pins, bolts, and self-locking nuts to pin bores of MCR.

Effective with sales to the first user on or after July 1, 2000

# CATERPILLAR BATTERY LIMITED WARRANTY

## USA and Canada

Caterpillar Inc. or any of its subsidiaries ("Caterpillar") warrants new batteries sold by it and used within the geographic area serviced by authorized USA and Canadian Caterpillar dealers, to be free from defects in material and workmanship.

In other areas, different warranties may apply. Copies of applicable warranties may be obtained by writing to Caterpillar, Inc., 100 N.E. Adams St., Peoria, IL USA 61629.

This warranty is subject to the following:

1. The warranty period is as follows, starting from the date of battery sale or product delivery to the first user.

Application	Battery Type & Warranty Period	
	Premium, High Output	General Service Line
On-Highway vehicles up to 680 kilograms (3/4 ton) capacity with charging systems in a personal, family or household use application.	72 Months	72 Months
On-Highway vehicles up to 680 kilograms (3/4 ton) capacity with charging systems in other than a personal, family or household use application.	36 Months	36 Months
All on-highway vehicles over 680 kilograms (3/4 ton) capacity with charging systems.	36 Months	30 Months
Earthmoving, construction, materials handling, paving and off-highway equipment, agricultural, industrial engine, electric power generation and marine products with charging systems.	36 Months	24 Months
For deep cycle applications or applications without constant battery charging systems (i.e. auxiliary batteries for marine pleasure craft or recreational vehicles; electric trolling motor or golf cart applications which use batteries as their motive power; lawn garden applications, etc.).	3 Months	(See Note)

Note: For "General Service Line" batteries in deep cycle applications or applications without constant battery charging systems, the warranty period is as follows:

BCI group sizes U-1R, U-1, 8V, and GC-2: 18 Months  
 BCI group sizes 24 M and 27M: 30 Months  
 The warranty period for all other batteries is 3 Months.

2. Within the periods stated in Item 1, Caterpillar will replace a battery which it finds to be defective in material or workmanship with a new battery at the following cost to the user:

For the first 18 months from date of sale or delivery for PHO group 31 batteries used in on-highway applications, 12 months for Cat PHO batteries not used in the aforementioned on-highway applications and 3 months for "General Service Line" category batteries, or batteries in deep cycle applications or applications without constant battery charging systems, there is no charge to the user. After this time period, user cost is determined by the following formula:

$$\frac{\text{Current Consumer's Battery Price}}{\text{Months in Warranty Period}} \times \frac{\text{Months of Service}}{\text{Service}} = \text{User Cost}$$

3. This warranty will be honored upon return of the battery, during normal working hours, to a Caterpillar dealer or other source approved by Caterpillar.
4. Taxes, installation, or transportation costs, which may result from replacement, are not included in this warranty.

(continued on reverse side...)

APPENDIX F  
WARRANTY INFORMATION

NEITHER THE FOREGOING EXPRESS WARRANTY NOR ANY OTHER WARRANTY BY CATERPILLAR, EXPRESS OR IMPLIED, IS APPLICABLE TO ANY ITEM CATERPILLAR SELLS WHICH IS WARRANTED DIRECTLY TO THE USER BY ITS MANUFACTURER.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. REMEDIES UNDER THIS WARRANTY ARE LIMITED TO THE PROVISION OF MATERIAL AND SERVICES, AS SPECIFIED HEREIN. CATERPILLAR IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

CATERPILLAR EXCLUDES ALL LIABILITY FOR OR ARISING FROM ANY NEGLIGENCE ON ITS PART OR ON THE PART OF ANY OF ITS EMPLOYEES, AGENTS OR REPRESENTATIVES IN RESPECT OF THE MANUFACTURE OR SUPPLY OF GOODS OR THE PROVISION OF SERVICES RELATING TO THE GOODS.

IF OTHERWISE APPLICABLE, THE VIENNA CONVENTION (CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS) IS EXCLUDED IN ITS ENTIRETY.

For personal or family use batteries used in the USA, its territories and possessions, some states do not allow limitations on how long an implied warranty may last nor allow the exclusion or limitation of incidental or consequential damages. Therefore, the previously expressed exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary by jurisdiction. To find the location of the nearest Caterpillar dealer or authorized repair facility, call (877) 228-9900. If you have questions concerning this warranty or its application, call or write: NACD Business Operations, Caterpillar Inc., 100 N. E.-Adams St., Peoria, IL 61629-1250 Telephone:(309)675-4037.

Effective with sales to the first user on or after September 1, 1999

# CATERPILLAR WARRANTY

## Ground Engaging Tools Worldwide

(excluding the commonwealth of Independent States)

Caterpillar Inc. or any of its subsidiaries ("Caterpillar") warrants the following Ground Engaging Tools (and every major component thereof) sold by it, and used outside the Commonwealth of Independent States (formerly USSR), against breakage. This warranty is applicable after the expiration of any standard machine or parts warranty to:

- Tips and adapters used on buckets, rippers and scrapers
- End bits and router bits
- Side cutters and sidebar protectors
- Uni-tooth components
- Modulok and HD Mining System components
- MEGS (Mining Edge Guard System) components
- Mechanically-attached adapter systems and wear plates
- Lip Protection System components
- Base edge assemblies, bolt-on flat plate or half arrow segments and cutting edges (except high carbon motor grader cutting edges)
- Ripper shank protectors and multi-piece ripper protectors
- Scarifier tips
- Compactor feet
- Landfill compactor tips and chopper blades (an additional warranty applies to Long Life Plus Tips)
- Bolt-on wear plates and sole plates
- Loader bucket cutting edge corner components
- Grader Bit and Mining Bit adapters

- Grader Bit, Mining Bit assemblies and tungsten carbide motor grader cutting edges (except for carbide element)
- Percussive drill products

This warranty also covers the parent material of the Ground Engaging Tools covered if Caterpillar-sourced Abrasion-Resistant Material (ARM) has been applied by a Caterpillar dealer.

This warranty is subject to the following:

### Warranty Period

The warranty period is not limited by time and is applicable throughout the *useful life* of the Ground Engaging Tools covered.

### Caterpillar Responsibilities

If a breakage occurs during normal operation, Caterpillar will, during normal working hours and at a place of business of a Caterpillar dealer or other source approved by Caterpillar:

- Provide (at Caterpillar's choice) new or Caterpillar-approved repaired parts or assembled components needed to correct the defect.

Note: Items replaced under this warranty become the property of Caterpillar.

### User Responsibilities

The user is responsible for:

- Labor (including welding) and hardware costs associated with removal and installation.
- Parts shipping charges in excess of those which are usual and customary.
- Local taxes, if applicable.
- Giving timely notice of a warrantable failure and promptly making the product available for repair.

### Limitations

Caterpillar is not responsible for failures resulting from:

- Any use or installation which Caterpillar judges improper.
- Breakage of Ground Engaging Tools due to worn mating components or those that have been hardfaced or improperly welded.
- Attachments of competitive parts to Caterpillar components.
- Cracks in the ARM weld and chipping of hard particles out of the weld. This is not considered "breakage" under the terms of this warranty.
- Abuse, neglect and/or improper repair.

A different warranty statement applies to Ground Engaging Tools used in the Commonwealth of Independent States. Copies of this warranty may be obtained by writing Caterpillar Inc., 100 N.E. Adams St., Peoria, IL USA 61629.

*For products operating outside of Australia, Fiji, Nauru, New Caledonia, New Zealand, Papua New Guinea, the Solomon Islands and Tahiti, the following is applicable:*

NEITHER THE FOREGOING EXPRESS WARRANTY NOR ANY OTHER WARRANTY BY CATERPILLAR, EXPRESS OR IMPLIED, IS APPLICABLE TO ANY ITEM CATERPILLAR SELLS WHICH IS WARRANTED DIRECTLY TO THE USER BY ITS MANUFACTURER.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. REMEDIES UNDER THIS WARRANTY ARE LIMITED TO THE PROVISION OF MATERIAL AND SERVICES, AS SPECIFIED HEREIN. CATERPILLAR IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

CATERPILLAR EXCLUDES ALL LIABILITY FOR OR ARISING FROM ANY NEGLIGENCE ON ITS PART OR ON THE PART OF ANY OF ITS EMPLOYEES, AGENTS OR REPRESENTATIVES IN RESPECT OF THE MANUFACTURE OR SUPPLY OF GOODS OR THE PROVISION OF SERVICES RELATING TO THE GOODS.

IF OTHERWISE APPLICABLE, THE VIENNA CONVENTION (CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS) IS EXCLUDED IN ITS ENTIRETY.

*For products operating in Australia, Fiji, Nauru, New Caledonia, New Zealand, Papua New Guinea, the Solomon Islands and Tahiti, the following is applicable:*

THIS WARRANTY IS IN ADDITION TO WARRANTIES AND CONDITIONS IMPLIED BY STATUTE AND OTHER STATUTORY RIGHTS AND OBLIGATIONS THAT BY ANY APPLICABLE LAW CANNOT BE EXCLUDED, RESTRICTED OR MODIFIED ("MANDATORY RIGHTS"). ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED (BY STATUTE OR OTHERWISE), ARE EXCLUDED.

NEITHER THIS WARRANTY NOR ANY OTHER CONDITION OR WARRANTY BY CATERPILLAR, EXPRESS OR IMPLIED (SUBJECT ONLY TO THE MANDATORY RIGHTS), IS APPLICABLE TO ANY ITEM CATERPILLAR SELLS WHICH IS WARRANTED DIRECTLY TO THE USER BY ITS MANUFACTURER.

TO THE EXTENT PERMITTED UNDER THE MANDATORY RIGHTS, IF CATERPILLAR IS THE SUPPLIER TO THE USER, CATERPILLAR'S LIABILITY SHALL BE LIMITED AT ITS OPTION TO (a) IN THE CASE OF SERVICES, THE SUPPLY OF THE SERVICES AGAIN OR THE PAYMENT OF THE COST OF HAVING THE SERVICES SUPPLIED AGAIN, AND (b) IN THE CASE OF GOODS, THE REPAIR OR REPLACEMENT OF THE GOODS, THE SUPPLY OF EQUIVALENT GOODS, THE PAYMENT OF THE COST OF SUCH REPAIR OR REPLACEMENT OR THE ACQUISITION OF EQUIVALENT GOODS.

CATERPILLAR EXCLUDES ALL LIABILITY FOR OR ARISING FROM ANY NEGLIGENCE ON ITS PART OR ON THE PART OF ANY OF ITS EMPLOYEES, AGENTS OR REPRESENTATIVES IN RESPECT OF THE MANUFACTURE OR SUPPLY OF GOODS OR THE PROVISION OF SERVICES RELATING TO THE GOODS.

CATERPILLAR IS NOT LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES UNLESS IMPOSED UNDER MANDATORY RIGHTS.

IF OTHERWISE APPLICABLE, THE VIENNA CONVENTION (CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS) IS EXCLUDED IN ITS ENTIRETY.

Claims under this warranty should be submitted to a place of business of a Caterpillar dealer or other source approved by Caterpillar. For further information concerning either the location to submit claims or Caterpillar as the issuer of this warranty, write Caterpillar Inc., 100 N. E. Adams St., Peoria, IL USA 61629.



Effective with sales to the first user on or after June 1, 2001

# CATERPILLAR WARRANTY

## Earthmoving, Construction, and Material Handling Machines Rebuilt As Part Of The Service Life Extension Program

Caterpillar warrants products rebuilt to be free from defects in material and workmanship.

This warranty is subject to the following:

### Warranty Period

For rebuilt machines and attachments, the warranty period is 18 months or 500 operating hours, whichever occurs first, starting from date of delivery to the user.

An additional warranty against breakage is applicable to certain Caterpillar brand Ground Engaging Tools. Refer to the applicable warranty statement for coverage detail.

An additional prorated warranty applies to Caterpillar brand batteries after the 18-month or 500 hours. Refer to applicable warranty statement for coverage detail.

### Caterpillar Responsibilities

If a defect in material or workmanship is found during the warranty period, Caterpillar will, during normal working hours and at a place of business of a Caterpillar dealer or other source approved by Caterpillar:

- Provide (at Caterpillar's choice) new, remanufactured, or Caterpillar-approved repaired parts or assembled components needed to correct the defect.
- Provide reasonable and customary labor needed to correct the defect.
- The costs associated with transporting the product, or reasonable travel by dealer mechanic.

### User Responsibilities

The user is responsible for:

- Providing proof of the delivery date to the user.
- Labor costs, except as stated under "Caterpillar Responsibilities".
- Local taxes, if applicable.

- Parts shipping charges in excess of those which are usual and customary.
- Costs to investigate complaints, unless the problem is caused by a defect in Caterpillar material or workmanship.
- Giving timely notice of a warrantable failure and promptly making the product available for repair.
- Performance of the required maintenance (including use of proper fuel, oil, lubricants and coolant) and replacement of items due to normal wear and tear.
- Allowing Caterpillar access to all electronically stored data.

### Limitations

Caterpillar is not responsible for failures resulting from:

- Any use or installation which Caterpillar judges improper.
- Attachments, accessory items and parts not sold or approved by Caterpillar.
- Abuse, neglect and/or improper repair.
- User's delay in making the product available after being notified of a potential product problem.
- Unauthorized repair or adjustments, and unauthorized fuel setting changes.

**NEITHER THE FOREGOING EXPRESS WARRANTY BY CATERPILLAR, EXPRESS OR IMPLIED, IS APPLICABLE TO ANY ITEM CATERPILLAR SELLS WHICH IS WARRANTED DIRECTLY TO THE USER BY ITS MANUFACTURER.**

**THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, EXCEPT CATERPILLAR EMISSION-RELATED COMPONENTS WARRANTIES FOR NEW ENGINES, WHERE APPLICABLE. REMEDIES UNDER THIS WARRANTY ARE LIMITED TO THE PROVISION OF MATERIAL AND SERVICES, AS SPECIFIED HEREIN. CATERPILLAR IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.**

As used in this warranty, the term "Caterpillar" means Caterpillar, Inc., or one of its subsidiaries, except Caterpillar Overseas S.A., Caterpillar France S.A., Caterpillar (U.K.) Limited, or Caterpillar Belgium S.A., whichever last sold the product involved.



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<p><b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b></p> <p>For use of this form, see AR 25-30; the proponent agency is OAASA</p>	<p>Use Part II (<i>reverse</i>) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).</p>	<p>DATE</p> <p>1 July 2006</p>
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<p><b>TO:</b> (<i>Forward to proponent of publication or form</i>) (<i>Include ZIP Code</i>)</p>	<p><b>FROM:</b> (<i>Activity and location</i>) (<i>Include ZIP Code</i>)</p>
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**PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS**

<p>PUBLICATION/FORM NUMBER</p> <p>TM5-2410-237-10</p>	<p>DATE</p> <p>15 March 2005</p>	<p>TITLE</p> <p>Operator's Manual for Tractor, Full Tracked Low Speed: DED Medium Drawbar Pull, D7G</p>
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ITEM	PAGE	PARA-	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON
	3			2		Item 10, change illustration. Reason: Tube end shown assembled on wrong side of lever cam.

SAMPLE

<p>TYPED NAME, GRADE OR TITLE</p>	<p>TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION</p>	<p>SIGNATURE</p>
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<b>TO:</b> <i>(Forward direct to addressee listed in publication)</i>	<b>FROM:</b> <i>(Activity and location) (Include ZIP Code)</i>	<b>DATE</b>
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**PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS**

<b>PUBLICATION NUMBER</b>	<b>DATE</b>	<b>TITLE</b>
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PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
<h1>SAMPLE</h1>								

**PART III - REMARKS** *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

<b>TYPED NAME, GRADE OR TITLE</b>	<b>TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION</b>	<b>SIGNATURE</b>
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<b>TO:</b> <i>(Forward direct to addressee listed in publication)</i>	<b>FROM:</b> <i>(Activity and location) (Include ZIP Code)</i>	<b>DATE</b>
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TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
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## THE METRIC SYSTEM AND EQUIVALENTS

<p><b>Linear Measure</b></p> <p>1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches          1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches          1 Kilometer = 1000 Meters = 0.621 Miles</p> <p><b>Weights</b></p> <p>1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces          1 Kilogram = 1000 Grams = 2.2 Pounds          1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons</p> <p><b>Liquid Measure</b></p> <p>1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces          1 Liter = 1000 Milliliters = 33.82 Fluid Ounces</p>	<p><b>Square Measure</b></p> <p>1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches          1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet          1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles</p> <p><b>Cubic Measure</b></p> <p>1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches          1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet</p> <p><b>Temperature</b></p> <p><math>5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}</math>          212° Fahrenheit is equivalent to 100° Celsius          90° Fahrenheit is equivalent to 32.2° Celsius          32° Fahrenheit is equivalent to 0° Celsius  <math>9/5 \text{ C}^{\circ} + 32 = \text{F}^{\circ}</math></p>
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## APPROXIMATE CONVERSION FACTORS

To Change	To	Multiply By
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Sq Inches	Sq Centimeters	6.451
Sq Feet	Sq Meters	0.093
Sq Yards	Sq Meters	0.836
Sq Miles	Sq Kilometers	2.590
Acres	Sq Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Sq Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

To Change	To	Multiply By
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Sq Centimeters	Sq Inches	0.155
Sq Meters	Sq Feet	10.764
Sq Meters	Sq Yards	1.196
Sq Kilometers	Sq Miles	0.386
Sq Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Sq Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621

