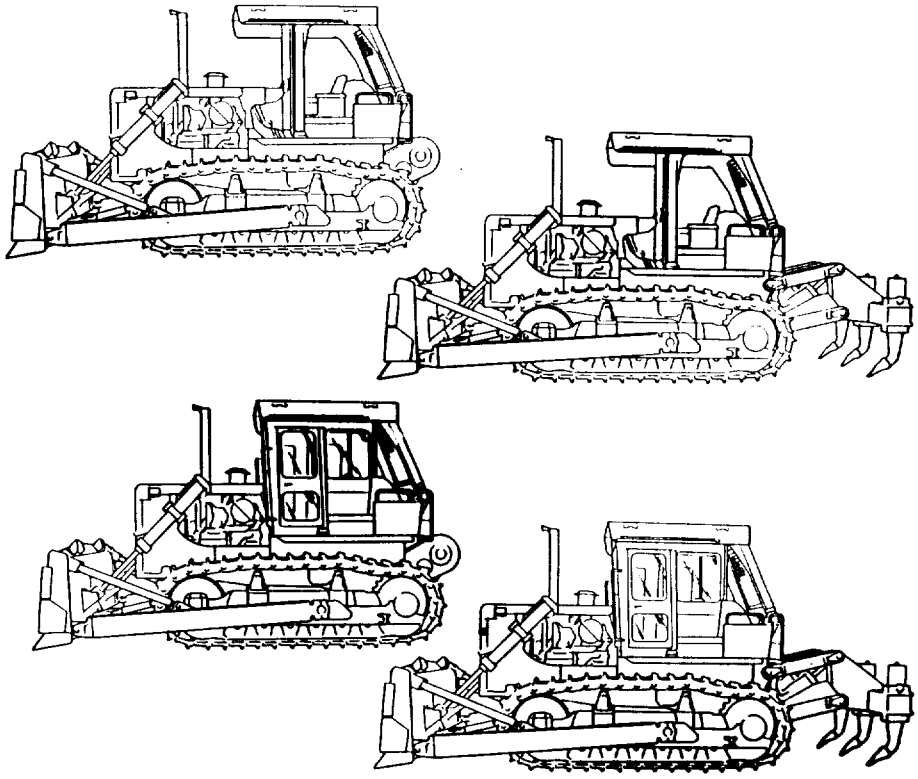
*TM5-2410-237-10

TECHNICAL MANUAL

OPERATOR'S MANUAL FOR

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



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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

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

Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY

26 JANUARY 1993

WARNING

Wear a hard hat, safety glasses, and respirator as required by job conditions. Adjust seat and fasten seat belt before operating.

WARNING

Start engine in well ventilated areas. Do not smoke while fueling tractor, or when near batteries.

WARNING

Match speed with job conditions — do not coast. Clear obstacles from path of machine. Be aware of hazards such as wires and ditches.

WARNING

Clear all personnel from machine and surrounding area when preparing to operate.

WARNING

The operator must satisfy himself that no one will be endangered while backing the tractor.

WARNING

Stop engine before leaving the tractor. Do not jump off the machine; use steps and grab irons.

WARNING

Stop tractor frequently at night, walk around and inspect machine — stay alert.

WARNING

Noise level of the vehicle exceeds the acceptable limit set. Hearing protection is required to be worn at all times while the vehicle is being operated.

WARNING

Do not use the winch to pull when there are 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.

TECHNICAL MANUAL

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

Operator's Manual
FULL TRACKED, LOW SPEED:
DIESEL ENGINE DRIVEN, MEDIUM-DRAWBAR-PULL, T-9

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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

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

HOW TO USE THIS MANUAL

This manual (TM5-2410-237-10) is divided into 3 chapters and 4 appendixes with a subject 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.

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.

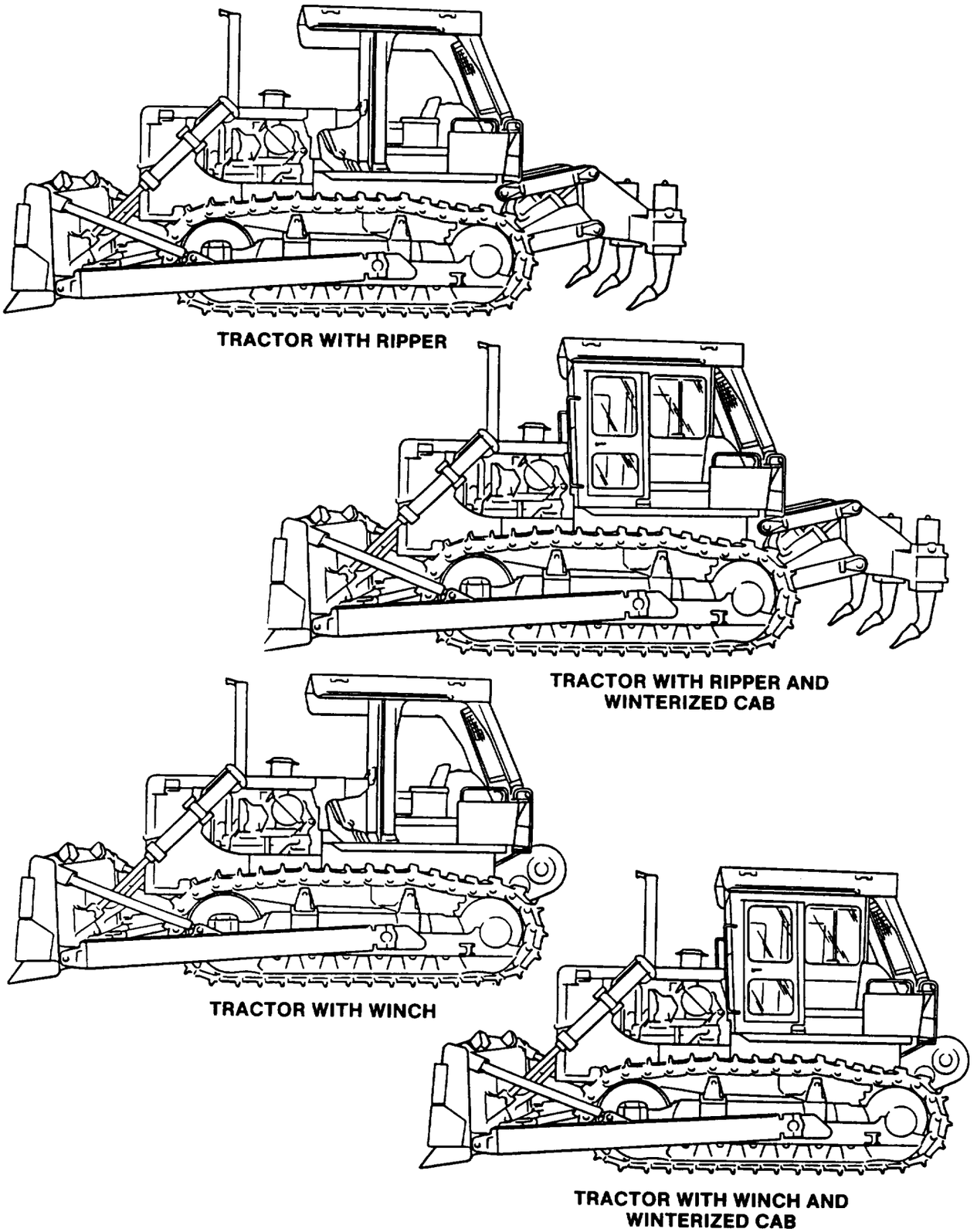


Figure 1-0. T-9 Tractor – Features and Components

CHAPTER 1

INTRODUCTION

Section I. General Information

1-1. SCOPE.

a. Type of Manual. This manual contains operation and maintenance instructions for the operator/crew of the T-9 Tractor.

b. Model Numbers and Equipment Names. T-9 Tractor, Full Tracked, Low Speed: Diesel Engine-Driven, Medium-Drawbar Pull, equipped with rollover protective structure (ROPS) and Semi-U (straight) tilt type blade. Available in four versions:

- Tractor with rear-mounted ripper
- Tractor with rear-mounted winch
- Tractor with rear-mounted ripper and winterized cab
- Tractor with rear-mounted winch and winterized cab

c. Purpose of Equipment. This tractor is designed for dozing soil and rocks, and for clearing land of small trees and brush.

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 have no special limitations. Normal limitations such as speed, drawbar pull, etc. are outlined in paragraph 1-7.

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. EQUIPMENT IMPROVEMENT REPORT AND MAINTENANCE DIGEST (EIR MD).

The quarterly Equipment Improvement Report and Maintenance Digest, TB43-0001-39 series, contains valuable information on the equipment covered in this manual. The information in the TB43-0001-39 series is compiled from some of the Equipment Improvement Reports that you prepared on the vehicles covered in this manual. Many of these articles result from comments, suggestions, and improvement recommendations that you submitted to the EIR program. The TB43-0001-39 series contains information on equipment improvements, minor alterations, proposed Modification Work Orders (MWO's), warranties (if applicable), actions taken on some of your DA Forms 2028-2 (Recommended Changes to Publications), and advance information on proposed changes that may affect this manual. The information will help you in doing your job better and will help in keeping you advised of the latest changes to this manual. Also refer to DA PAM 25-30, Consolidated Index of Army Publications and Blank Forms, and Appendix A, References, of this manual.

1-4. HAND RECEIPT (-HR) MANUALS.

This manual has a companion document with a TM number followed by "-HR" (which stands for Hand Receipt). The TM5-2410-237-10-HR consists of preprinted hand receipts (DA Form 2026) that list end item related equipment (i.e., COEI, BII, and ML) you must account for. As an aid to property accountability, additional -HR manuals maybe requisitioned from the following source in accordance with procedures in AR 25-30:

The US Army Adjutant General Publications Center
ATTN: AGLD-OD
1655 Woodson Road
St. Louis, MO 63114

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

If your T-9 tractor needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail it to: Commander, US Army Tank-Automotive Command, ATTN: AMSTA-QRD, Warren, MI 48397-5000. We'll send you a reply.

1-6. WARRANTY INFORMATION.

Refer to warranty TB, TB5-2410-237-15.

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.

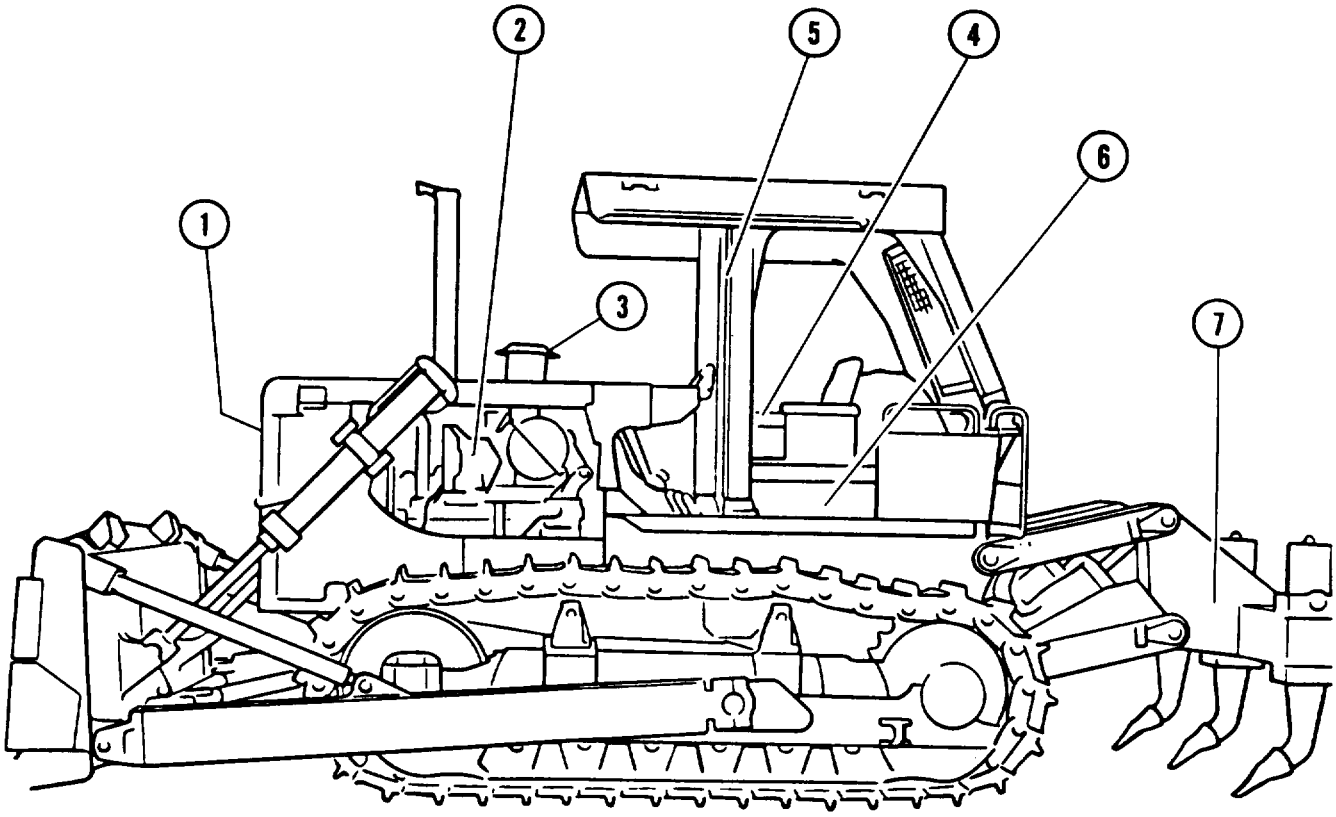
(6) All weather operational.

(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) Precleaned. Prevents debris from entering the air intake system.

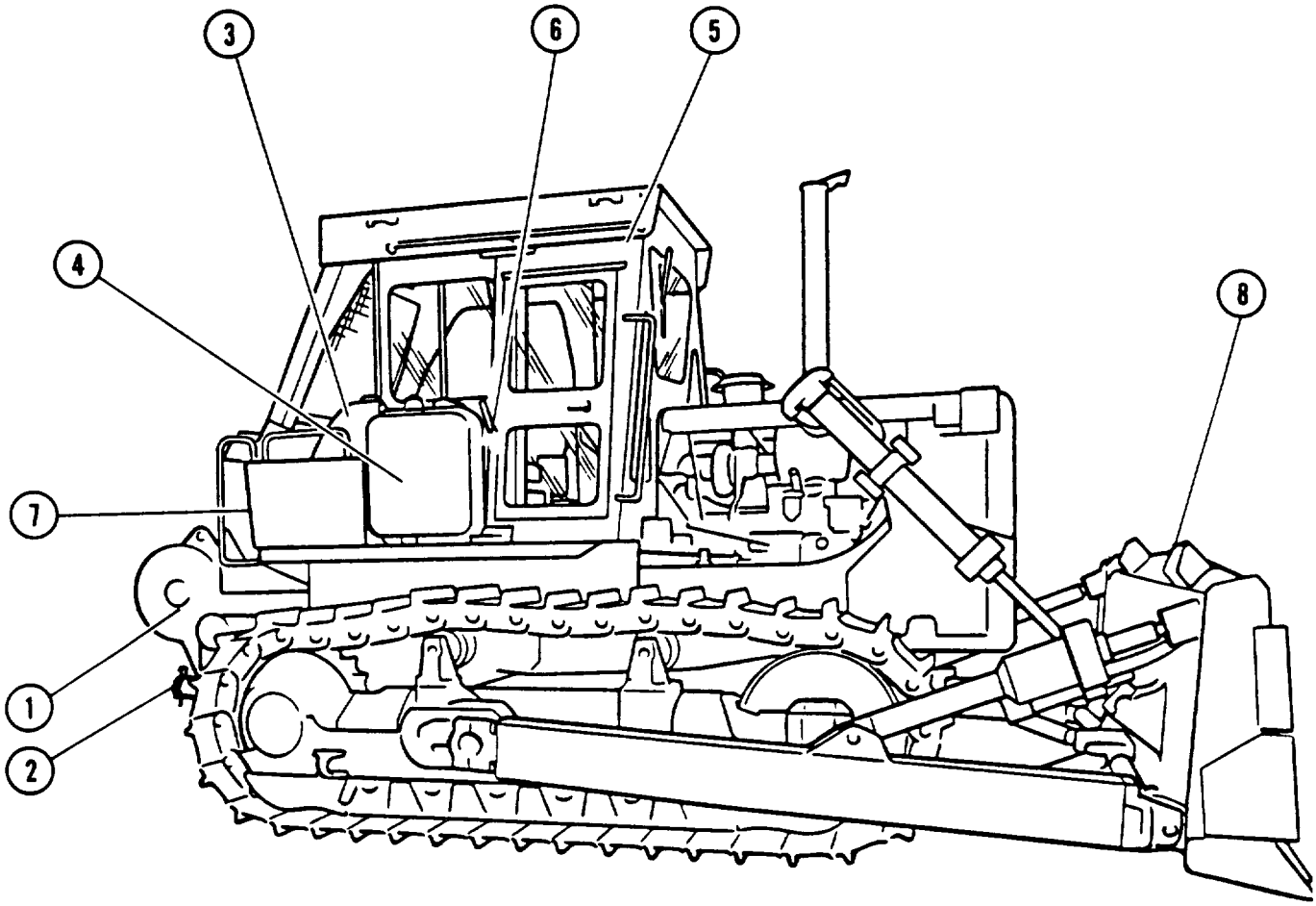
(4) Operator's Station. Location of all the controls and indicators which the operator uses during operation.

(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 other vehicles.

(3) Fuel Tank. Contains diesel fuel for engine operation.

(4) Hydraulic Oil Tank. Contains hydraulic fluid 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. Used for earth moving operations.

1-9. DIFFERENCES BETWEEN MODELS.

This operator's TM covers the operation of four models of the T-9. All models are identically equipped except for rear-mounted implement and winterized cab. The controls for each application are explained 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.
Stroke	6.00 in.
Displacement	638 cu. in.
Firing order (injection sequence)	1,5,3,6,2,4

DIMENSIONS AND WEIGHT:

Length (tractor)	13'9"
(with blade)	17'4"
(with blade and winch)	18'4"
(with blade and ripper)	22'9"
Width	12'0"
Height	11'0"
Weight (tractor)	33,600 lbs
(w/ROPS)	35,200 lbs
(w/blade)	44,300 lbs
(w/blade and ripper)	50,100 lbs
(w/blade and winch)	47,311 lbs
(winterized cab with ROPS)	3,000 lbs
Track	
Length (on ground)	107"

ELECTRICAL DATA:

Starter	
Manufacturer	Delco-Remy
Model	1990228
Rating	24 volt
Alternator	
Manufacturer	Bosch
Model	0122469002
Rating	24 volt, 50 amp
Batteries	24 volt

IMPLEMENT DATA:

Blade:	
Weight	7,660 lbs
Height	4'2"
Width	12'0"
Ripper:	
Weight	5,700 lbs
Width	87"
Winch:	
Weight	3,011 lbs

OPERATION DATA:

Speed (forward):	
1st	0-2.3 mph
2nd	0-4.0 mph
3rd	0-6.2 mph
Speed (reverse):	
1st	0-2.8 mph
2nd	0-4.9 mph
3rd	0-7.4 mph

CAPACITIES:

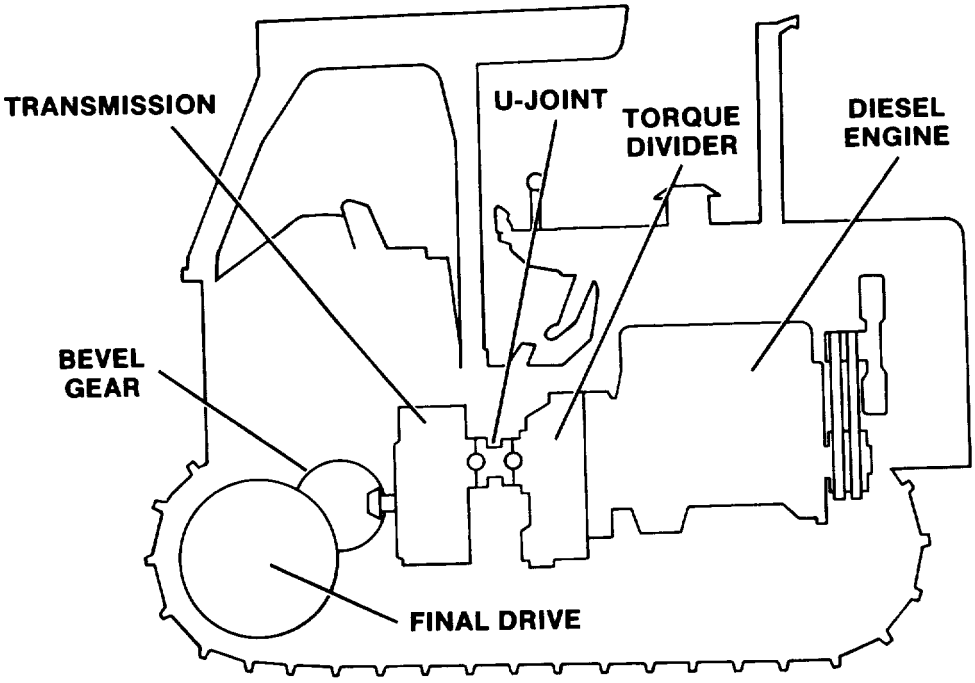
Fuel tank	115 gallons
Cooling system	12 gallons
Hydraulic system	21 gallons
Engine crankcase	7.25 gal.
Winch oil sump	16 gallons
Final drives	9 gal. (each)
Transmission, bevel gear and steering clutch compartment	18.5 gallons

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.

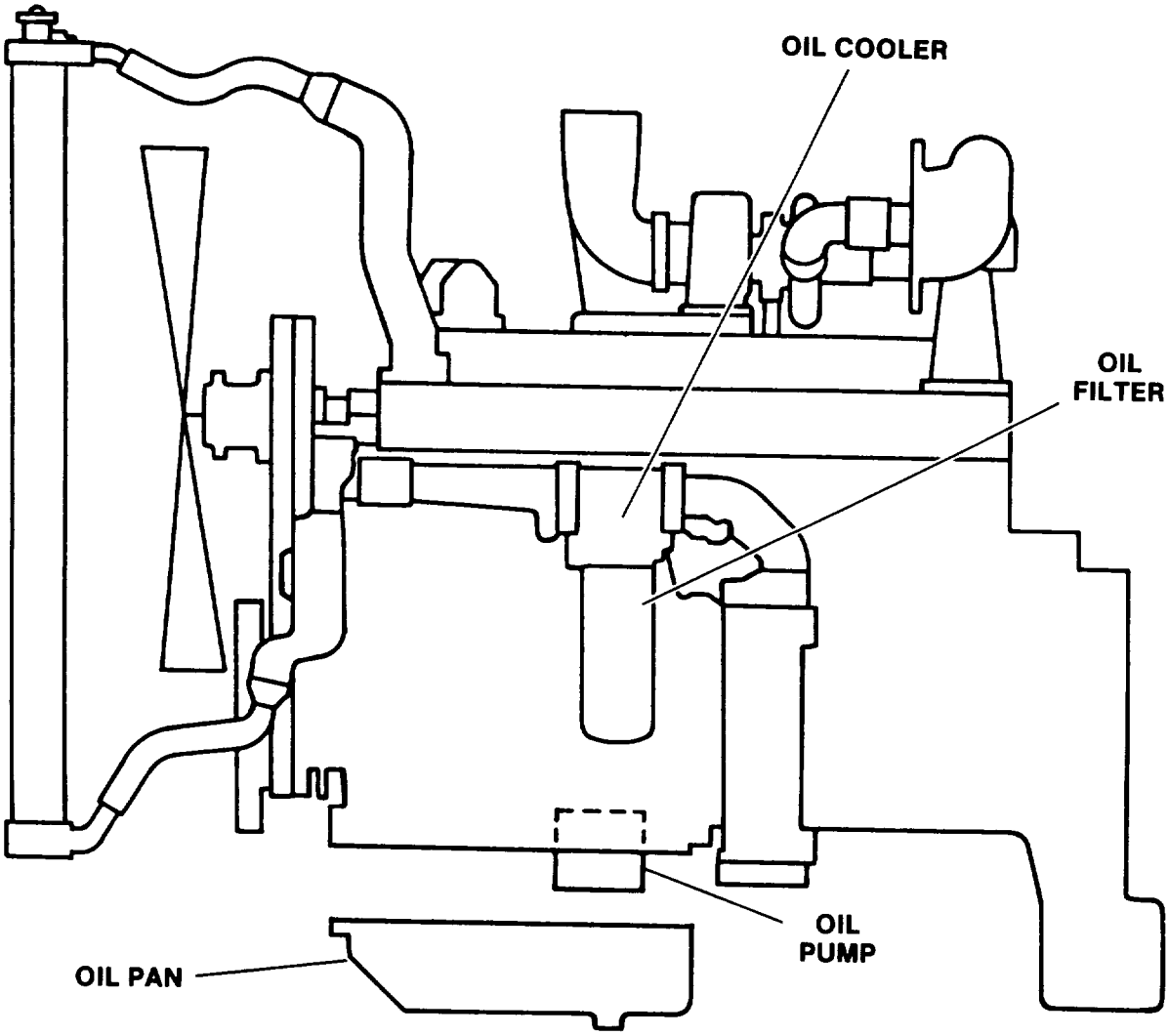
U-JOINT. Transfers the power from the torque divider to the transmission.

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.



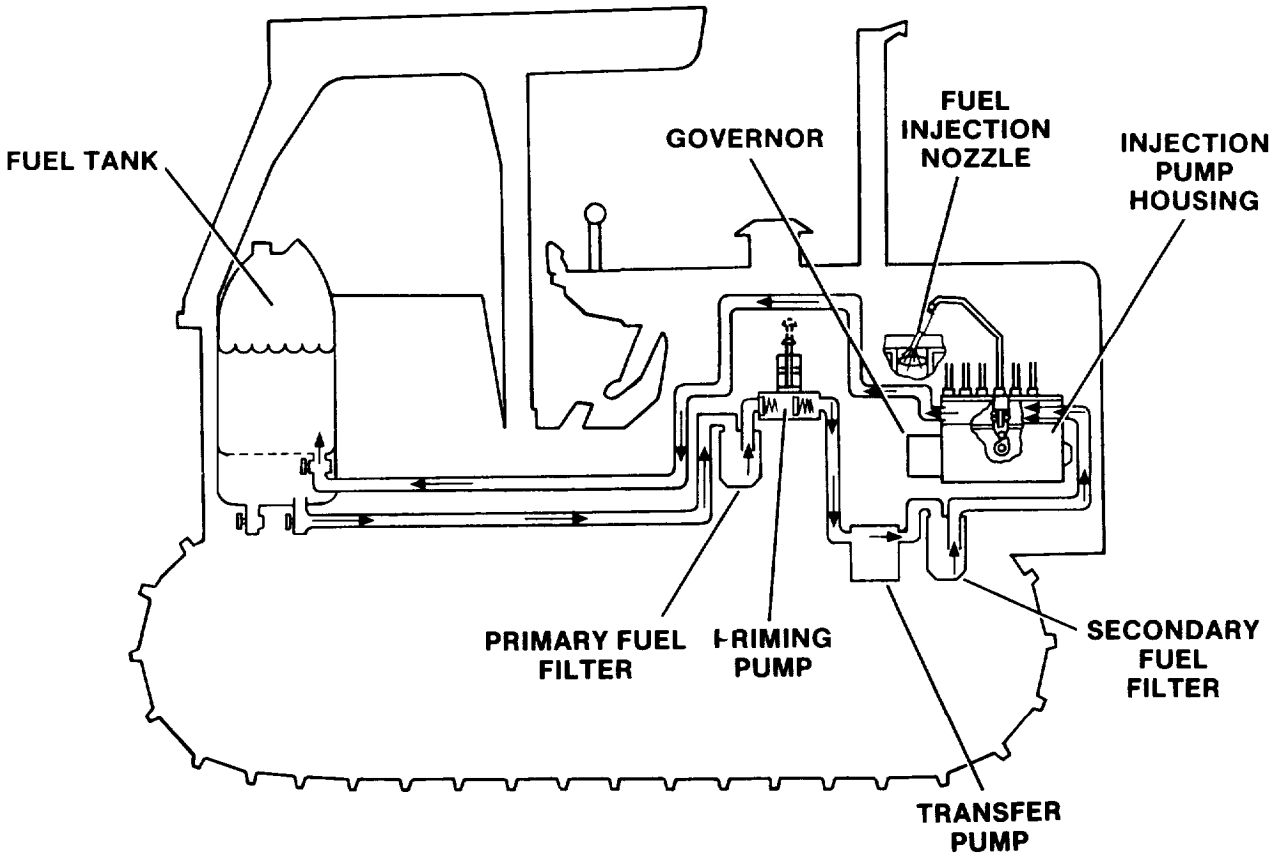
OIL PAN. Contains the oil that lubricates moving parts in the engine. It is attached to the bottom of the engine block.

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 diesel 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.

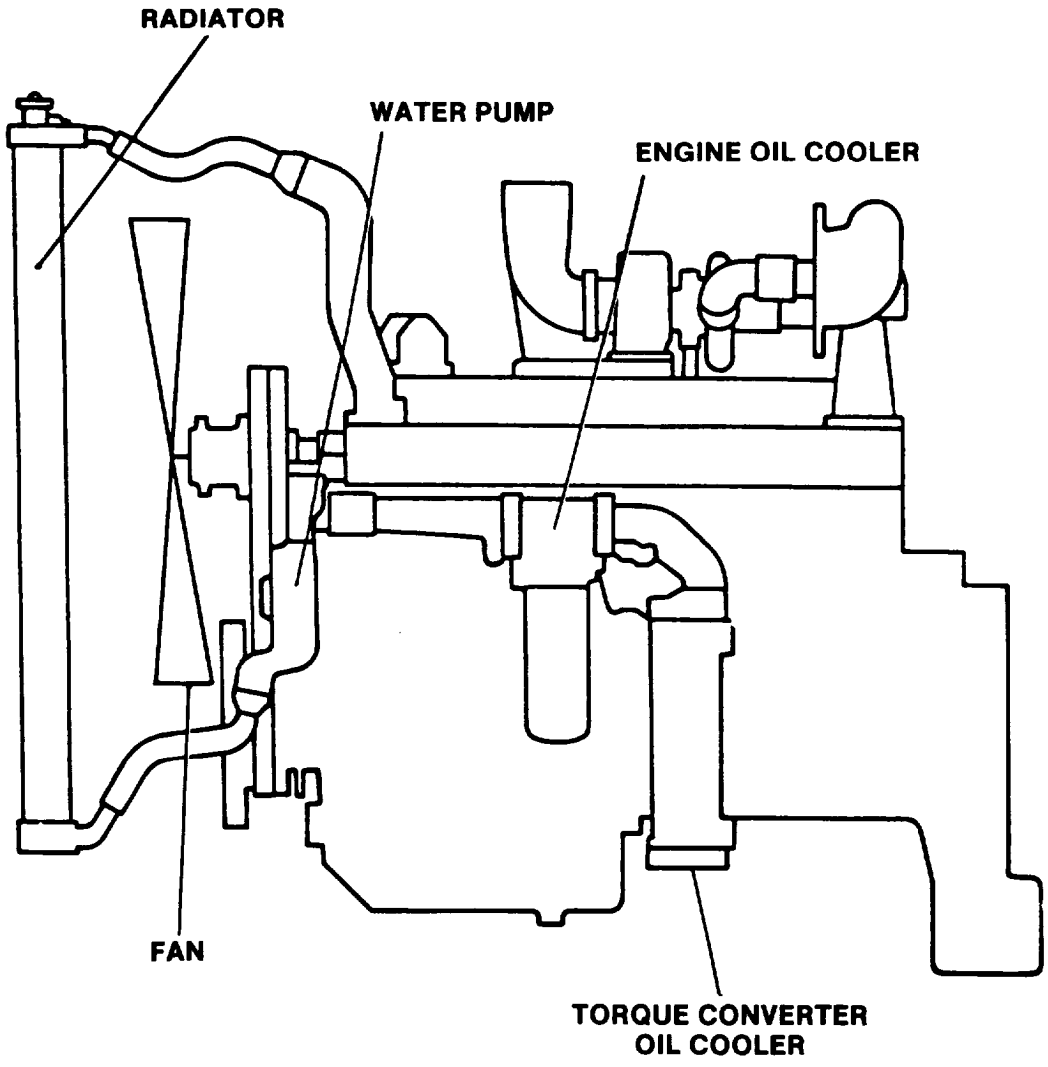
SECONDARY FUEL FILTER. Removes smaller particles from the fuel before it reaches the injection pump.

INJECTION PUMP HOUSING. Contains the 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, and each nozzle has its own fuel injection pump.

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.

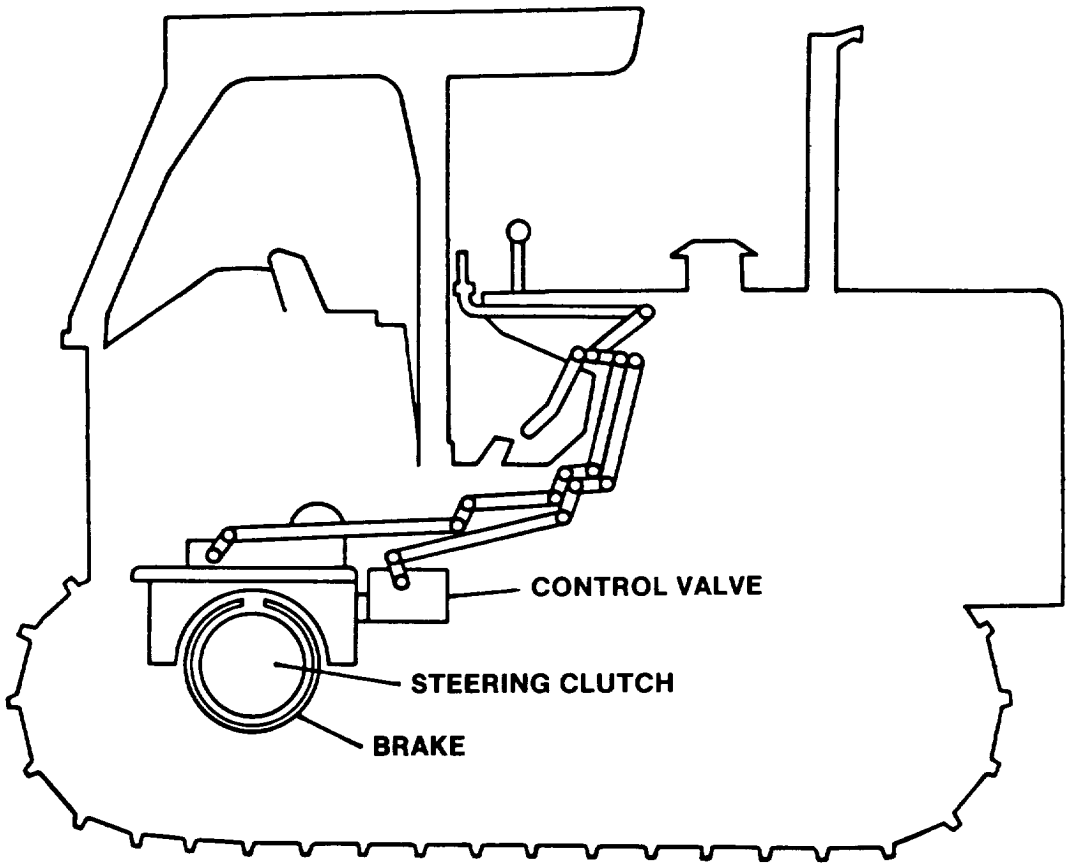
WATER PUMP. Draws water from the radiator and sends it through the engine oil cooler, and then through the torque converter oil cooler. From the torque converter oil cooler the coolant enters the cylinder block to cool the engine, and then returns to the radiator.

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

TORQUE CONVERTER 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.

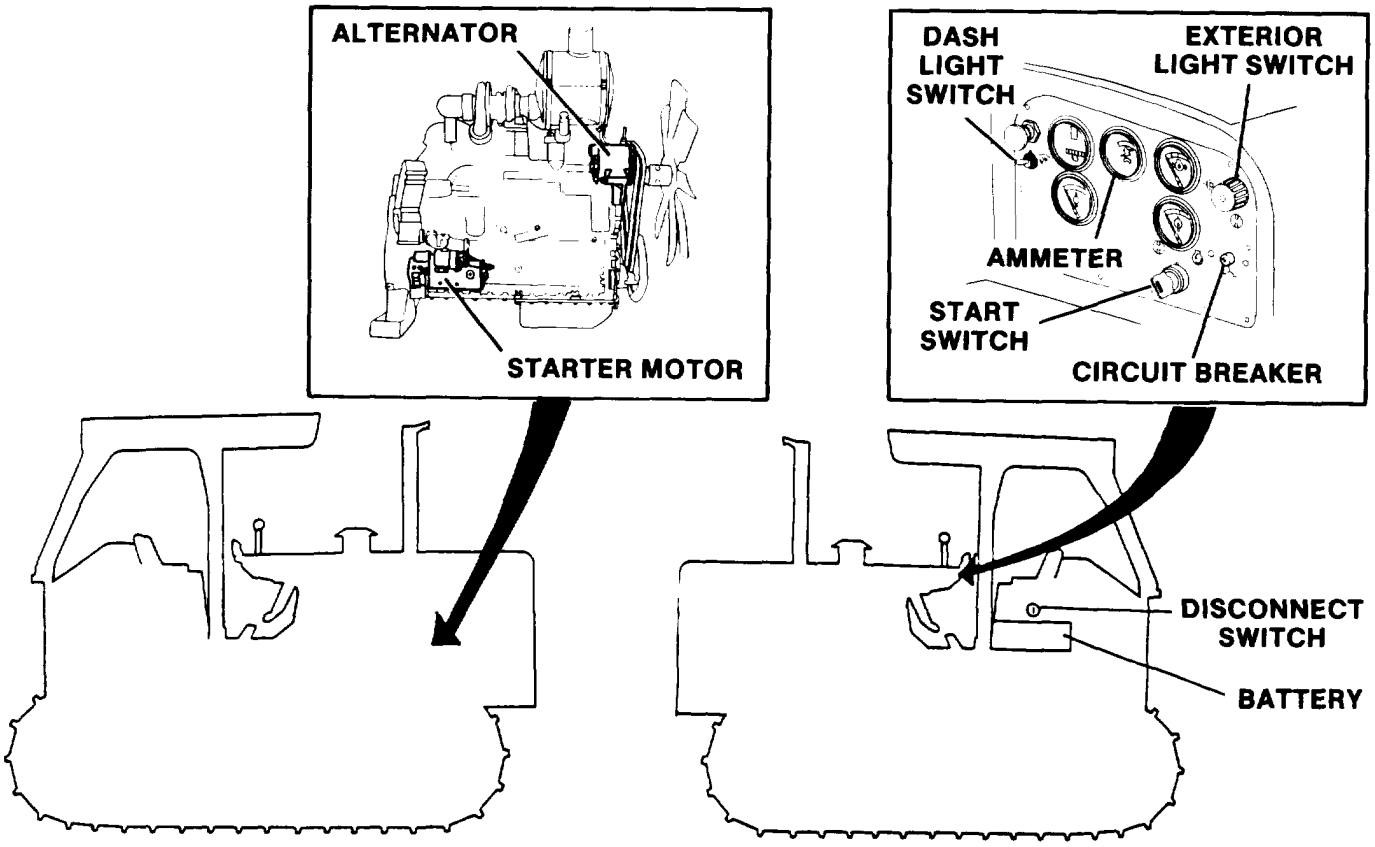


CONTROL VALVE. The valve is connected mechanically to the steering control levers. The valve directs the flow of pressure oil in response to the movement of the control levers.

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.

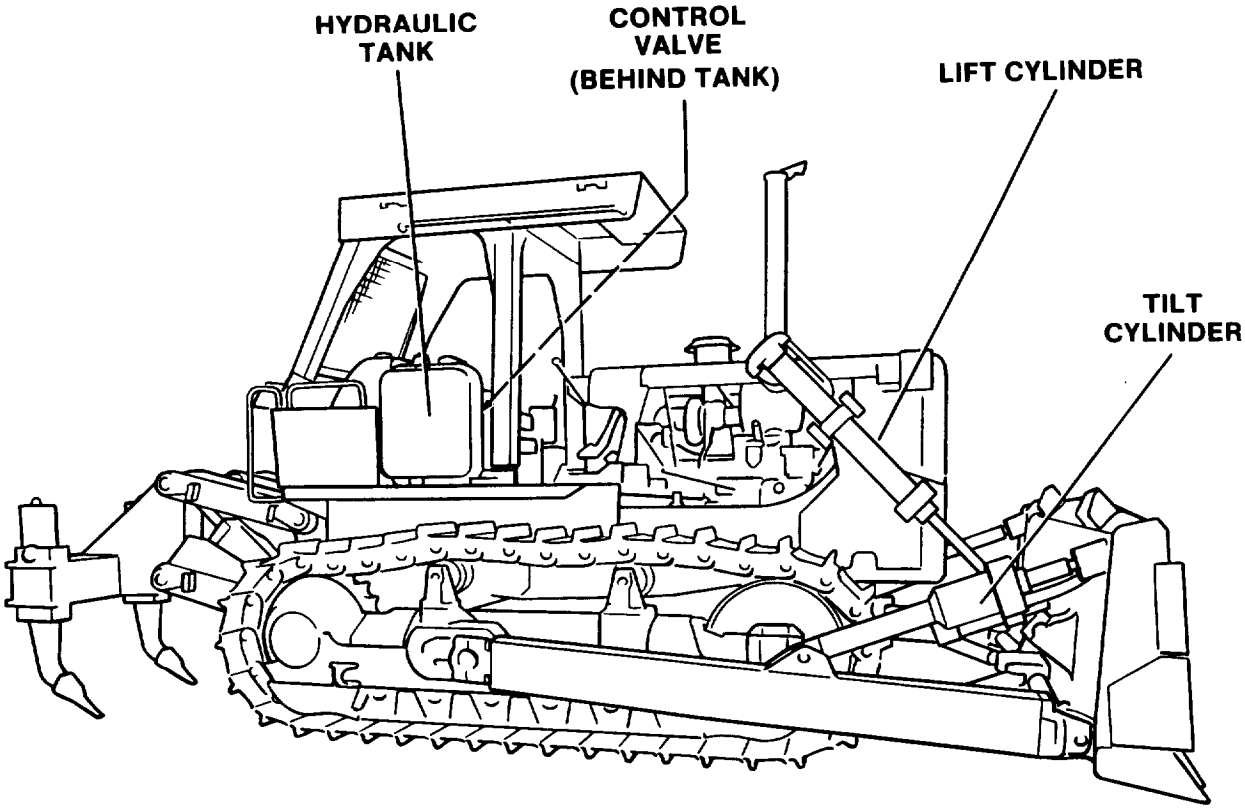
START SWITCH. When the disconnect switch is on, you can engage the starting circuit by turning the ignition switch.

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.



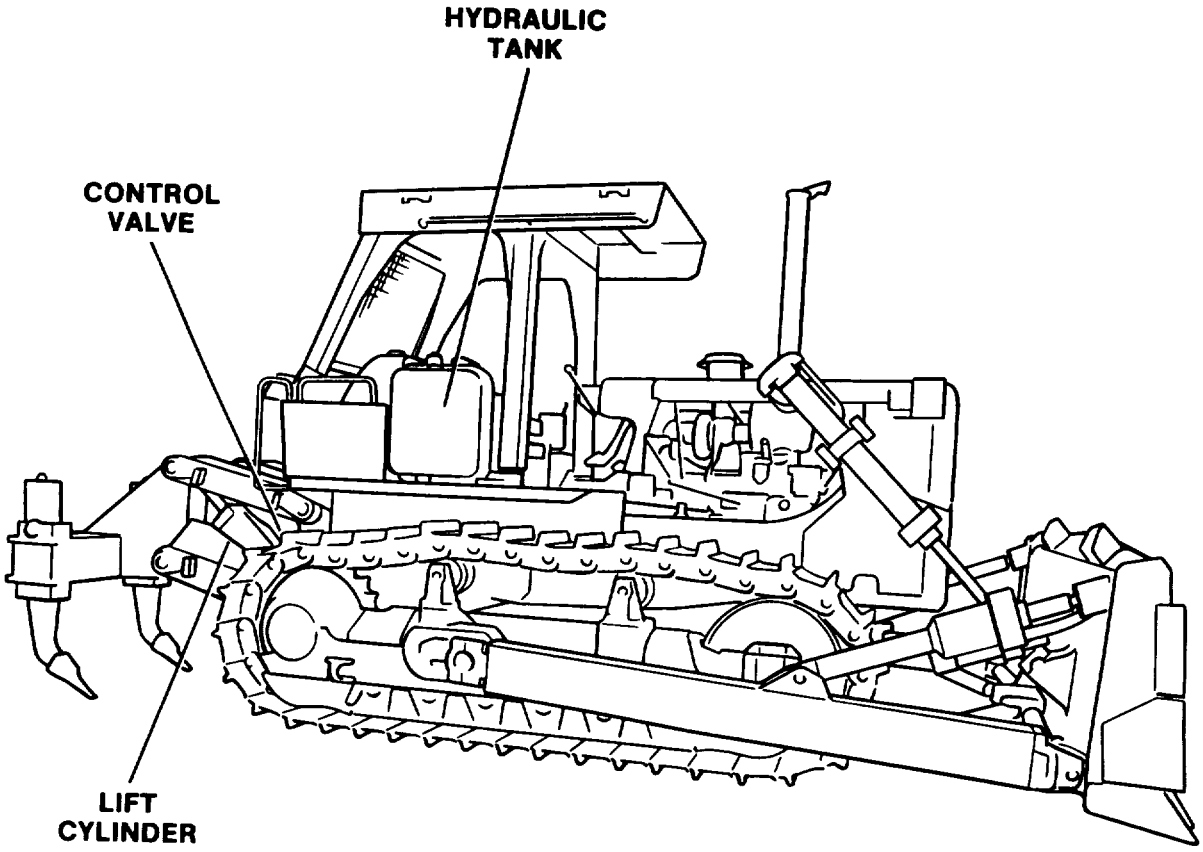
BULLDOZER CONTROL VALVE. This valve is connected mechanically to the bulldozer control lever. The valve directs the flow of pressure oil in response to the movement of the control lever.

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.

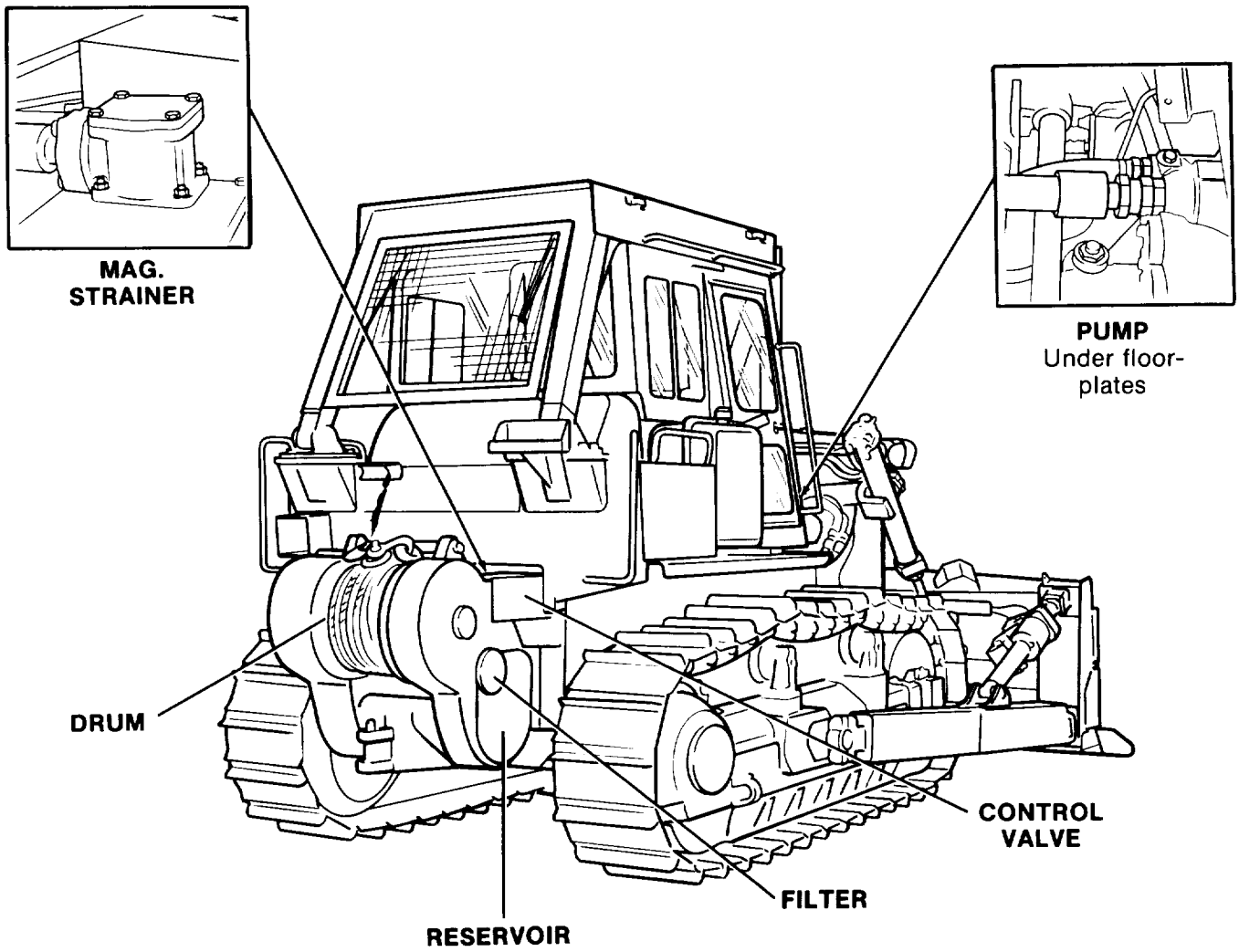


RIPPER CONTROL VALVE. This valve is connected mechanically to the ripper control lever. This valve directs the flow of pressure oil to the cylinders in response to the movement of the ripper control lever.

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

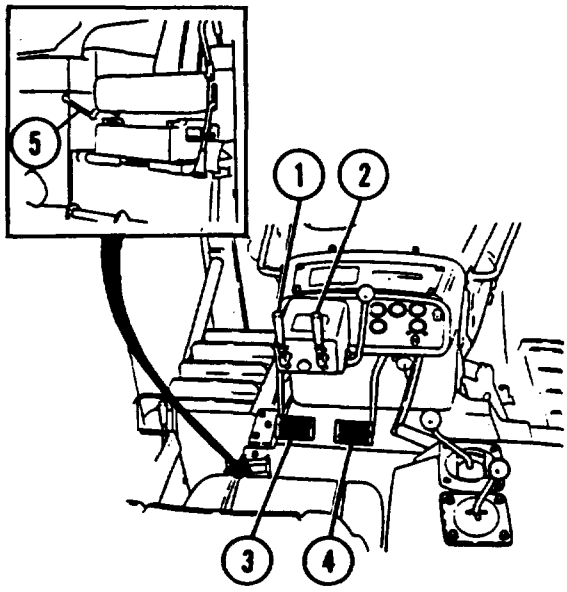
OPERATING INSTRUCTIONS

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

2-1. OPERATOR'S CONTROLS AND INDICATORS.

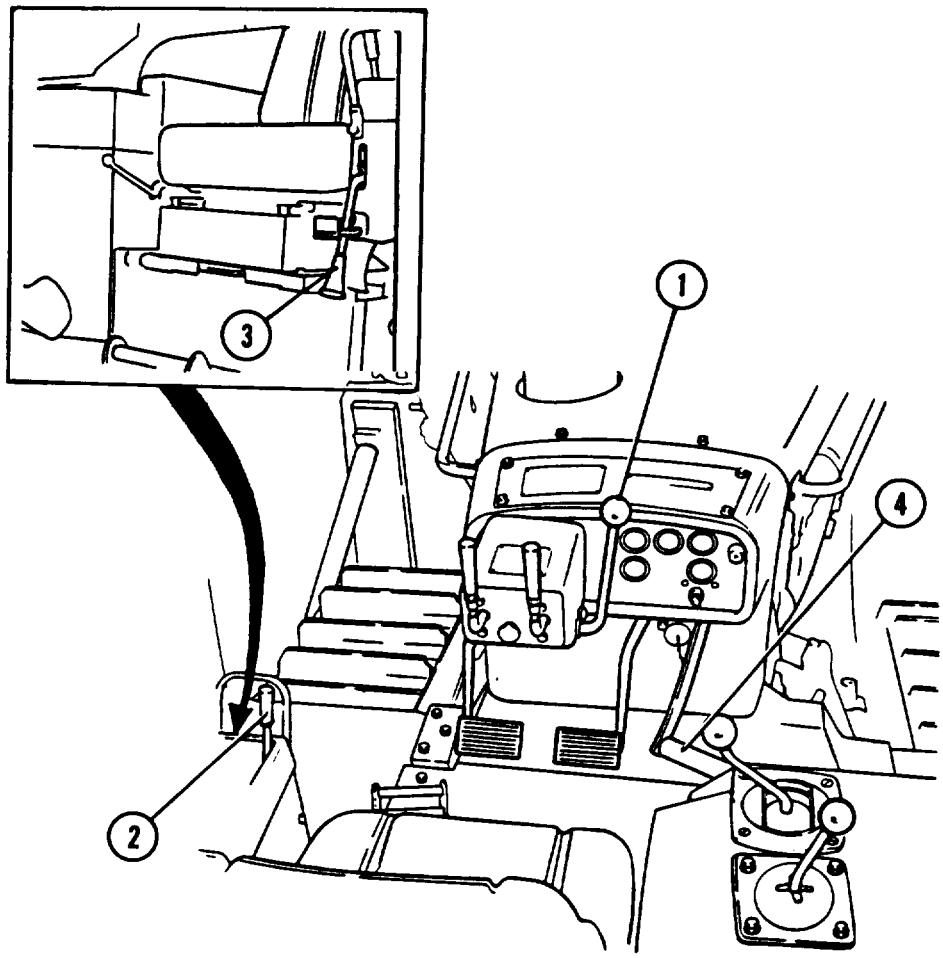
This section describes, locates, and illustrates the controls and indicators used on the tractors.

a. Steering and Brake Controls.



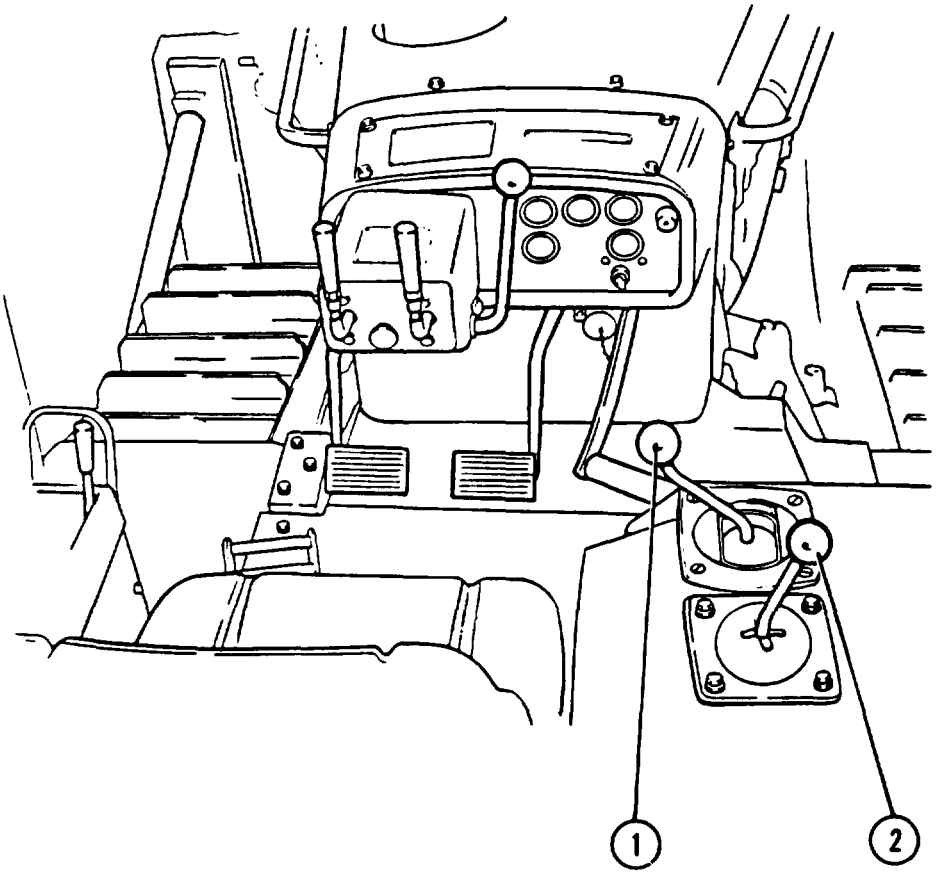
Key	Control or Indicator	Function
1	Left steering control lever	Pulling the steering lever to the first detent causes the tractor to make a gradual turn in the direction relative to the lever being pulled. When the lever is pulled all the way back, the brake engages and causes the tractor to make a sharp 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.



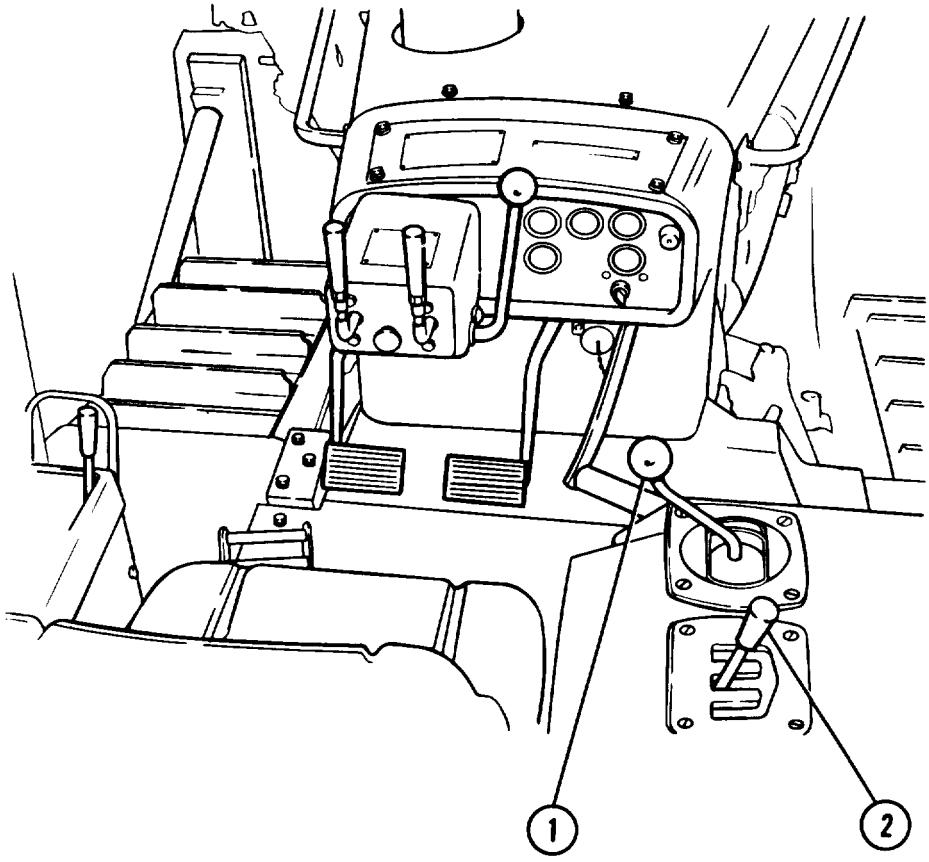
Key	Control or Indicator	Function
1	Governor control lever	This lever controls the speed of the engine. Pull the lever toward you to increase engine speed, and push away to decrease engine speed. To shut off engine, push forward past detent.
2	Transmission selector lever	This lever controls direction 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).



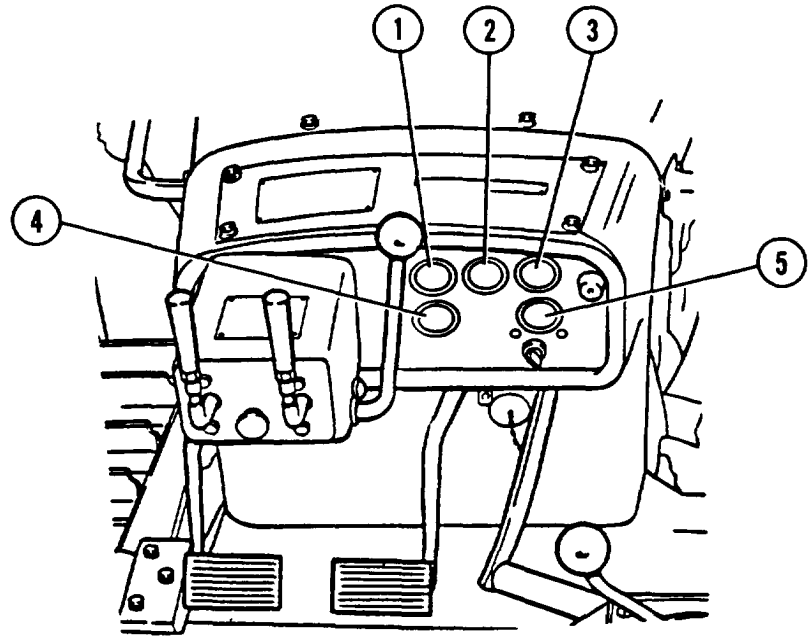
Key	Control or Indicator	Function
1	Blade control lever	This lever controls blade lift and tilt. The lever is normally in the HOLD position. When the lever is moved to the right, the blade tilts so the right side is higher than the left side, and when it is moved to the left the blade will be higher on the left. 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.
2	Ripper control lever	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.

d. Implement Controls (Tractors with Winch).



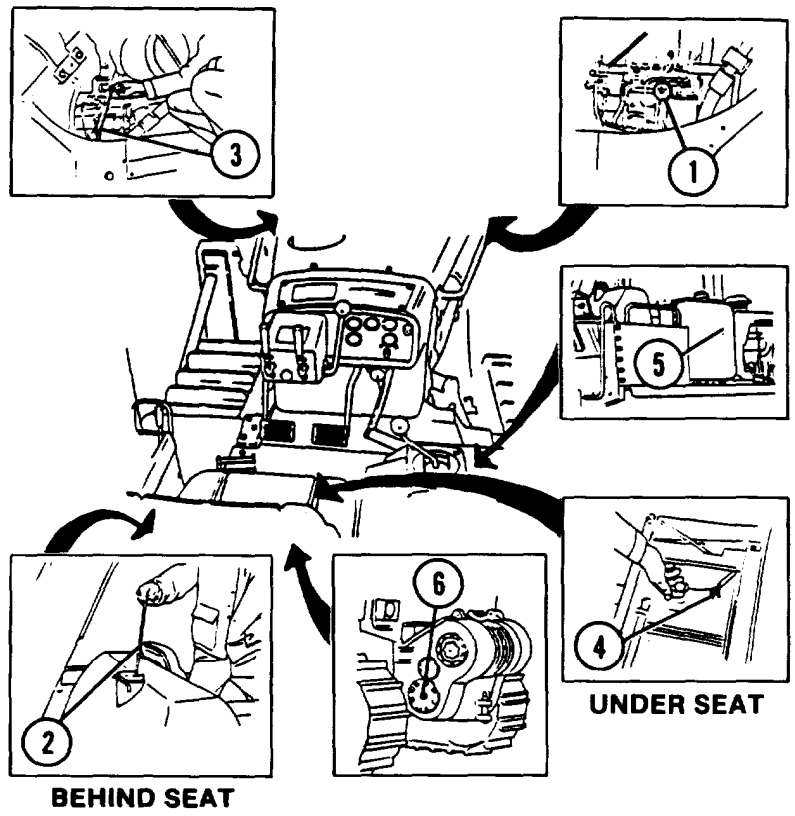
Key	Control or Indicator	Function
1	Blade control lever	This lever controls blade lift and tilt. The lever is normally in the HOLD position. When the lever is moved to the right, the blade tilts so the right side is higher than the left side, and when it is moved to the left the blade will be higher on the left. 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.
2	Winch control lever	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.

e. Gages on Dash Panel.



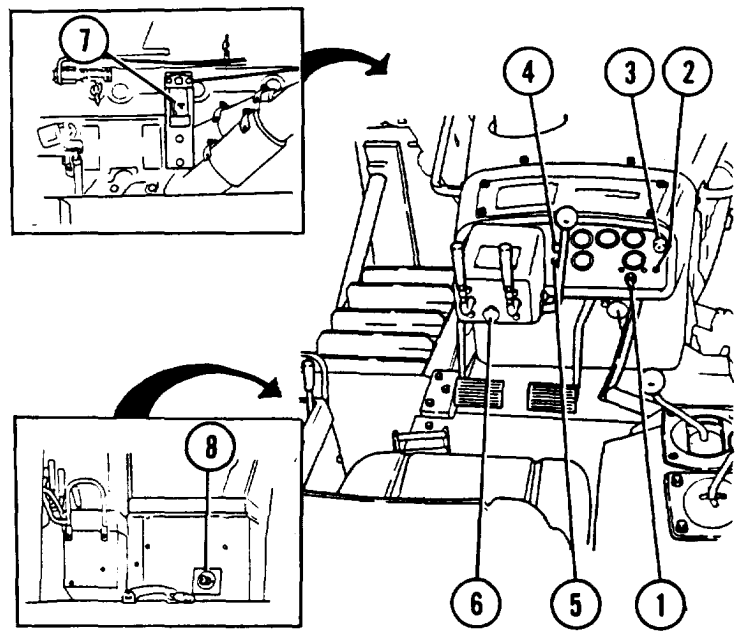
	Control or Indicator	Function
1	Service meter	This meter operates whenever the engine is operating. It indicates the total operating hours of the tractor.
2	Ammeter	This meter measures the discharge current from the battery when the engine is off and key is on. When the engine is running, it measures 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.



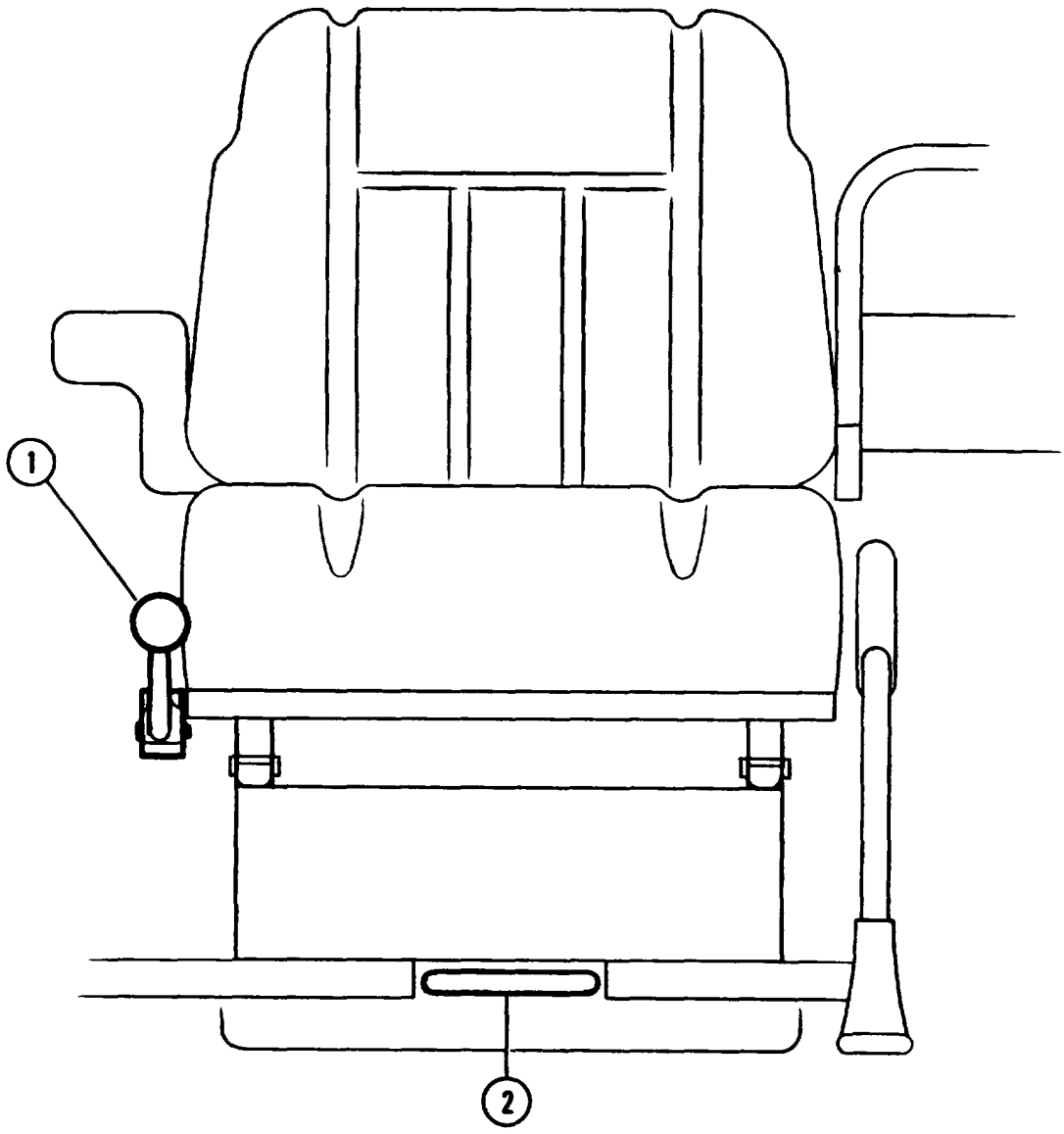
Key	Control or Indicator	Function
1	Fuel pressure gage	This gage indicates fuel transfer pump delivery pressure. The green portion of the gage indicates normal pressure, and the red portion indicates that pressure is low.
2	Fuel level gage	This gage indicates the amount of fuel present in the fuel tank.
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.



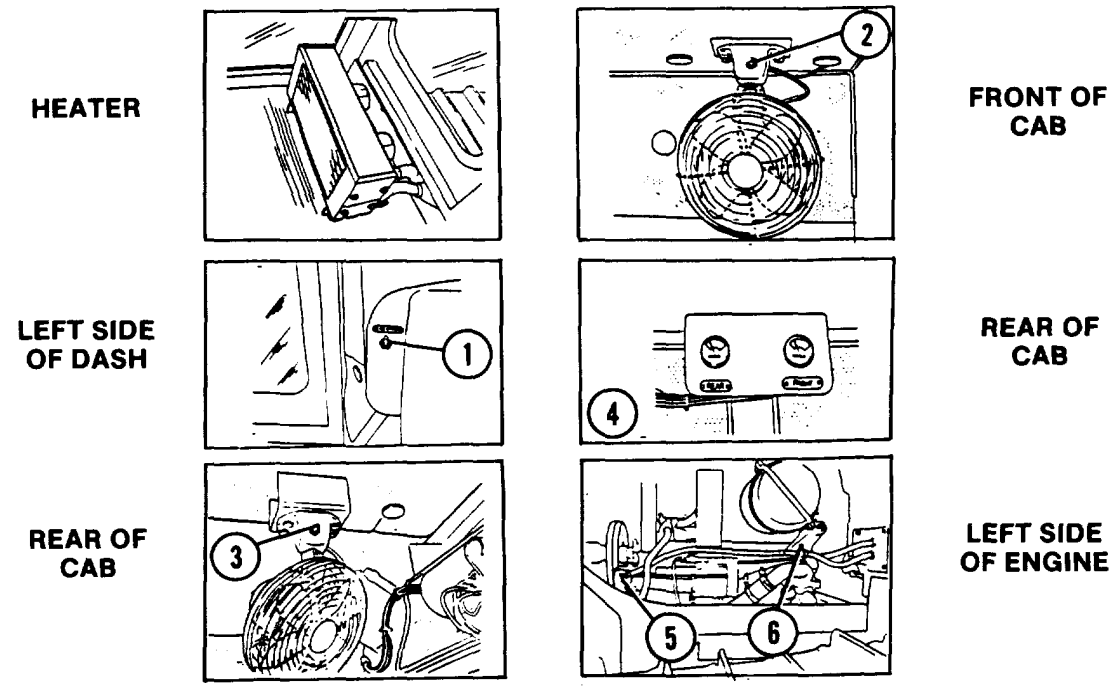
Key	Control or Indicator	Function
1	Starting switch	This switch is key operated. Turn the key fully clockwise to start the engine. Release the key when the engine starts, and the switch will move to the ON position.
2	Circuit breaker	A 60-amp circuit breaker protects the starting and charging circuits 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 positon 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 clockwise to open and counterclockwise to close. Keep valve closed when heater is not required.
6	Return valve	Allows water from heater to return to the coolant system. Turn clockwise to open and counterclockwise to close. Keep valve closed when heater is not required.

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

2-2. GENERAL.

a. Do your before (B) PMCS just before you operate the tractor. Pay attention to CAUTIONS and WARNINGS.

b. Do your during (D) PMCS while you are actually operating the tractor. Pay attention to CAUTIONS and WARNINGS.

c. Do your after (A) PMCS right after operating the tractor. Pay attention to CAUTIONS and WARNINGS.

d. Do your weekly (W) PMCS once every 7 days.

e. Do your monthly (M) PMCS once every 30 days.

f. If something does not work, troubleshoot it with the instructions in this manual. Report any deficiencies using the proper forms. See DA PAM 738-750.

g. Always do your PMCS in the same order so it gets to be a habit. Once you have had some practice, you'll spot anything wrong in a hurry.

h. If anything looks wrong and you can't fix it, write it on your DA Form 2404. if something is seriously wrong, report it to Unit Maintenance RIGHT NOW.

i. When you do your PMCS, take the proper tools needed to make all checks. Always take clean rags with you.

2-3. PMCS PROCEDURES.

a. Doing PMCS will help avoid unnecessary breakdowns of the equipment.

b. The following items area description of the columns in the PMCS table.

(1) Item Number. These numbers indicate the order in which the PMCS should be performed. They are also to be used when recording the results of PMCS for the TM number column on DA Form 2404, Equipment inspection and Maintenance Worksheet.

(2) Interval. The interval tells when the PMCS should be done. See the key at the top of the table to determine what each column represents.

(3) Item To Be Inspected/Procedure. This column tells you the specific item to be checked or serviced and how to do the check or service.

(4) Equipment Is Not Ready/Available If. This column lists equipment conditions that mean the tractor or its implements cannot be safely used. DO NOT use the tractor until the condition has been remedied.

c. Leakage definitions for Operator/Crew PMCS are as follows:

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

(2) Class II - Leakage of fluid great enough to form drops, but not enough to cause drops to drip from the item being inspected.

(3) Class Ill - Leakage of fluid great enough to form drops that fall from the item being inspected.

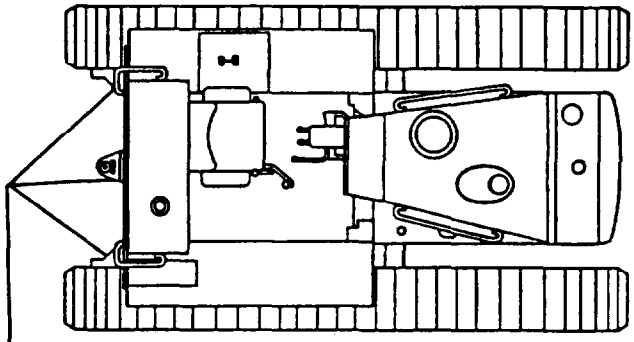
PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B-Before Operation D-During Operation A-After Operation W-Weekly M-Monthly

Item No.	Interval B	D	A	W	M	Item To Be Inspected Procedure: Do The PMCS and Have Items Repaired, Filled or Adjusted as Needed	Equipment is Not Ready/Available If:
						NOTE Perform all weekly and before operations PMCS if: (1) You are the assigned operator and have not operated since the last weekly. (2) You are operating for the first time.	
1						WALK-AROUND CHECKS a. Radiator	
	•					(1) Check for leaks, worn hoses, and trash buildup.	Coolant is leaking.
	•					(2) Check coolant level. Coolant level should be within 1/2 inch (1cm) of bottom of fill pipe. Never check coolant on a hot engine.	No coolant is present, or low level.
						b. Engine. Check oil level. Level must be within safe starting range on dipstick. See page 3-5. See LO 5-2410-237-12 for type of oil.	Oil is below safe starting range on dipstick.
						c. Hydraulic Oil Level. (1) Check sight gage on hydraulic oil tank for dozer and ripper.	Oil is not visible in sight tube.
	•					(2) Check sight gage on winch. See page 3-14.	Oil is not visible in sight tube.
						d. Transmission and Final Drives. (1) Check transmission fluid level. Level must be between ADD and FULL marks, when engine is at normal operating temperature.	Level is below ADD.
						(2) Check for fuel leakage.	Class I leaks are present.
						(3) Check for oil leakage.	Class III leaks are present.

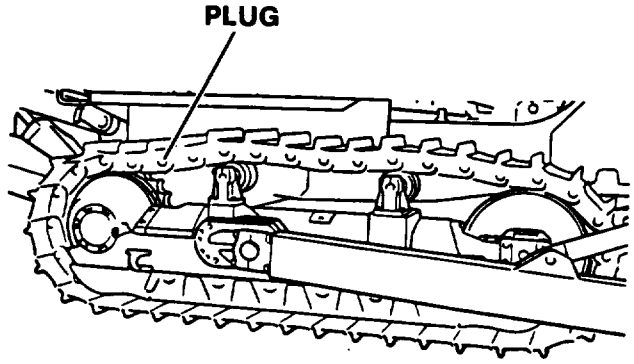
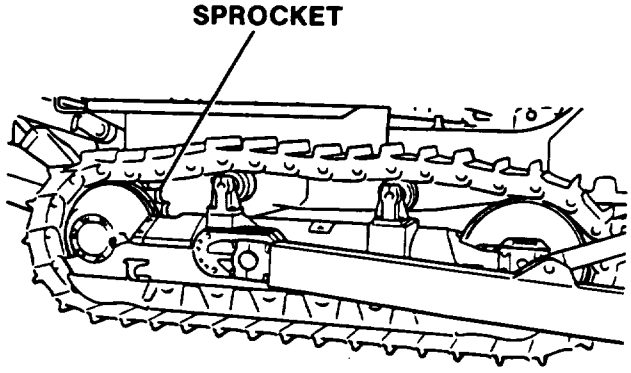
PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B-Before Operation D-During Operation A-After Operation W-Weekly M-Monthly

Item No.	Interval B	D	A	W	M	Item To Be Inspected Procedure: Do The PMCS and Have Items Repaired, Filled or Adjusted as Needed	Equipment is Not Ready/Available If:
	•					(4) Check on ground, in areas indicated, for signs of leakage.	Class III leaks are present.
						 **TRANSMISSION AND FINAL DRIVES** Check on ground for leaks	
						e. Ripper.	
	•					(1) Check ripper teeth and shanks.	Teeth or shanks missing or damaged and mission requires use of the ripper.
	•					(2) Check lift cylinder for leakage.	Class III leaks are present.
						f. Dozer.	
	•					(1) Check blade cutting edge and end bits.	Edge or bits are badly worn or damaged.
	•					(2) Check lift and tilt cylinders for leakage.	Class III leaks are present.
	•					(3) Check tilt cylinder lines which are exposed at radiator grill.	Lines show excessive wear or damage.
						g. Tracks.	
	•					(1) Inspect for damaged shoes and missing or loose bolts. Check master link for missing or loose bolts.	Any bolts are missing or loose.

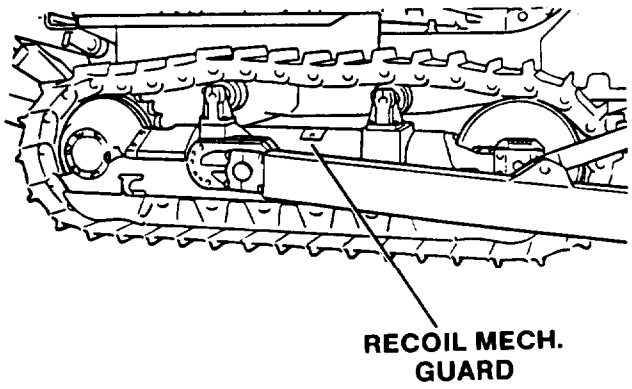
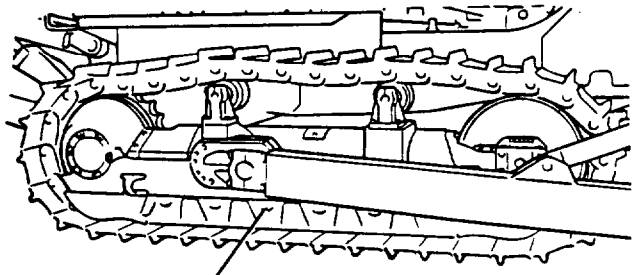
PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B-Before Operation **D-During Operation** **A-After Operation** **W-Weekly** **M-Monthly**

Item No.	Interval B	D	A	W	M	Item To Be Inspected Procedure: Do The PMCS and Have Items Repaired, Filled or Adjusted as Needed	Equipment is Not Ready/Available If:
	•					(2) Inspect links for missing or leaking oil plugs. 	Any leak is detected or plug is missing.
	•					h. Sprockets. Check for excessive wear and missing or broken segments. 	Any of the sprocket segments are damaged.
	•					i. Winch. Check for structural damages or leakage.	Class II leaks are present.

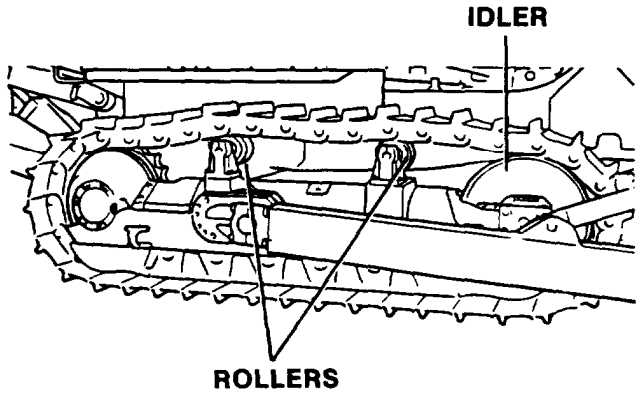
PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B-Before Operation **D-During Operation** **A-After Operation** **W-Weekly** **M-Monthly**

Item No.	Interval B	D	A	W	M	Item To Be Inspected Procedure: Do The PMCS and Have Items Repaired, Filled or Adjusted as Needed	Equipment is Not Ready/Available If:
2			•			RECOIL MECHANISM GUARD Check for damage and loose or missing bolts.  **RECOIL MECH. GUARD**	Guard is damaged and/or bolts are missing or loose.
3			•			TRACK ROLLER GUARD Check for damage and loose or missing bolts.  **ROLLER GUARD**	Guard is damaged and/or bolts are missing or loose.
4			•			CRANKCASE GUARD Check for damage and loose or missing bolts.	Guard is broken or bent severely, or bolts are missing.
5			•			RADIATOR GUARD Check for damage and loose or missing bolts.	Guard is bent or damaged or bolts are missing.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B-Before Operation D-During Operation A-After Operation W-Weekly M-Monthly

Item No.	Interval B	D	A	W	M	Item To Be Inspected Procedure: Do The PMCS and Have Items Repaired, Filled or Adjusted as Needed	Equipment is Not Ready/Available If:
6						IDLERS AND ROLLERS	
			•			Check for wear and leaks around the shaft.	Class III leaks are present.
							
7						BATTERIES	
						WARNING Batteries generate explosive and toxic gases. Keep sparks, flames, and other ignition sources away at all times. Battery gases can explode. Always shield eyes when working near batteries. Do not lean over the battery; and avoid breathing the gases.	
				•		Check electrolyte level. Fluid should be at triangle in fill plug opening. Add distilled water to bring level up.	
8				•		INDICATORS, GAGES AND CONTROL PANEL LIGHT	
	•					a. Check all gages and indicators for damage.	Damage prevents proper operation.
		•				b. Check oil pressure gage for proper operating pressure.	Needle is in the red zone.
		•				c. Check water temperature gage for proper operating temperature.	Needle is in the red zone.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES

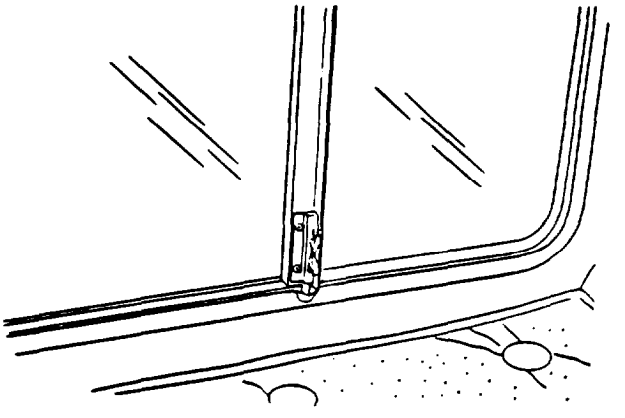
B-Before Operation D-During Operation A-After Operation W-Weekly M-Monthly

Item No.	Interval B	D	A	W	M	Item To Be Inspected Procedure: Do The PMCS and Have Items Repaired, Filled or Adjusted as Needed	Equipment is Not Ready/Available If:
		•				d. Check torque converter temperature gage for proper operating temperature.	Needle is in the red zone.
		•				e. Check fuel pressure gage for proper operating pressure.	Needle is in the red zone.
		•				f. Check service meter for proper operation.	
		•				g. Check air cleaner indicator for proper operation.	Red band is visible.
		•				h. Check ammeter for proper operation.	Needle is in the red zone.
		•				i. Check control panel light.	Light doesn't illuminate.
9						SERVICE BRAKES	
	•					Start engine and move ahead slowly. Depress both brake pedals and the tractor will stop.	Brakes do not function.
10						STEERING CONTROLS	
	•					Start engine and move ahead slowly. Test right and left steering while moving.	Either control fails to turn the tractor.
11						IMPLEMENT CONTROLS	
	•					Start engine. Test dozer and ripper controls for proper operation. Test dozer and winch controls on the TYPE II for proper operation.	Controls do not perform properly.
12						WINCH CABLE	
						WARNING	
						When handling the winch cable, wear a pair of heavy gloves. Damaged or frayed wires can seriously injure fingers and hands.	
					•	Check for fraying, kinking, and signs of rusting.	Cable is frayed or damaged.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B-Before Operation D-During Operation A-After Operation W-Weekly M-Monthly

Item No.	Interval B	D	A	W	M	Item To Be Inspected Procedure: Do The PMCS and Have Items Repaired, Filled or Adjusted as Needed	Equipment is Not Ready/Available If:
13						WINTERIZED CAB	
	•					a. Check for broken or damaged windows.	
					•	b. Check window latch on working window for proper operation.	
					•	c. Check door stop and securing bolt for proper operation.	
					•	d. Check door handles and locks for proper operation.	
		•				e. Check wipers for proper operation.	
		•				f. Check heater for proper operation.	
	•					g. Check defroster fans for proper operation.	
14						BACKING ALARM	
		•				Put transmission in reverse and listen for alarm to sound.	Alarm fails to sound.



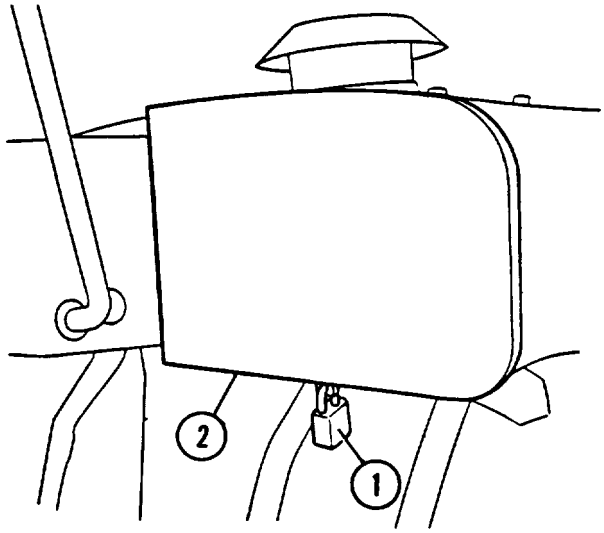
Section III. Operation Under Usual Conditions

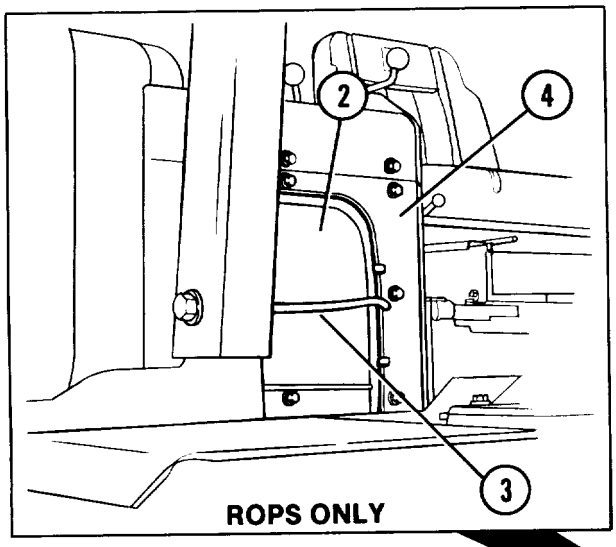
2-4. OPERATING PROCEDURES, TRACTOR.

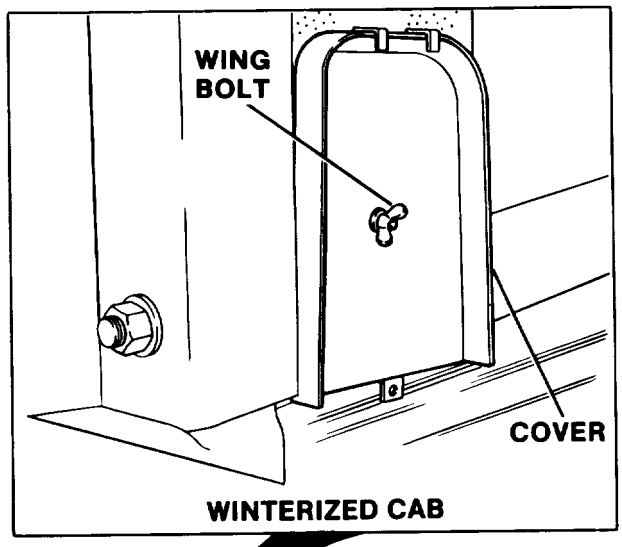
It is essential that the operator know how to perform every operation of which the tractor is capable. This section gives instructions on starting and stopping the tractor, on the basic motions of the tractor, and how to use these instructions to perform the specific tasks for which the equipment was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

2-5. STARTING THE ENGINE.

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

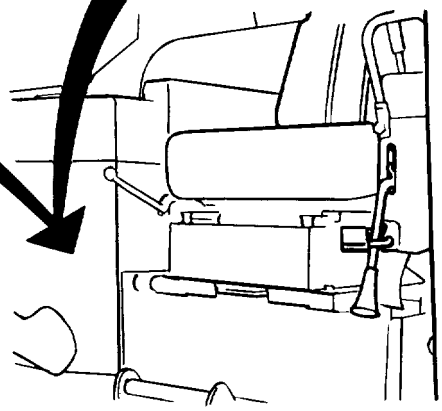


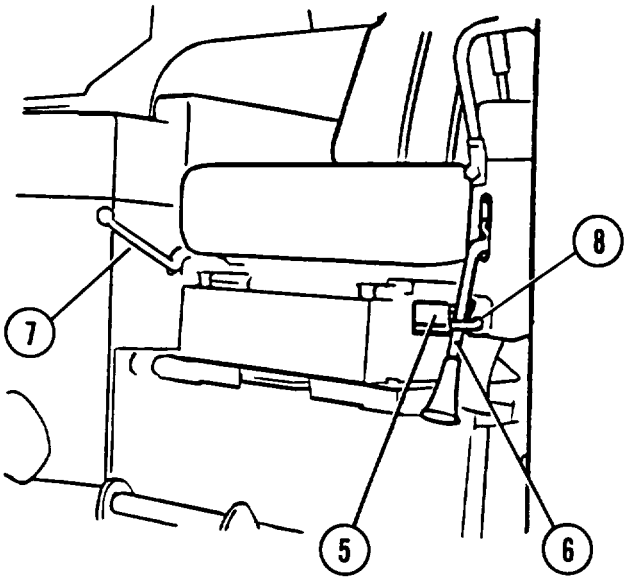




b. For tractors with ROPS only, slide protective cover (2) between spring (3) and panel (4) during operation:

c. For tractors with winterized cab, attach cover to panel with captive wing bolt.





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.

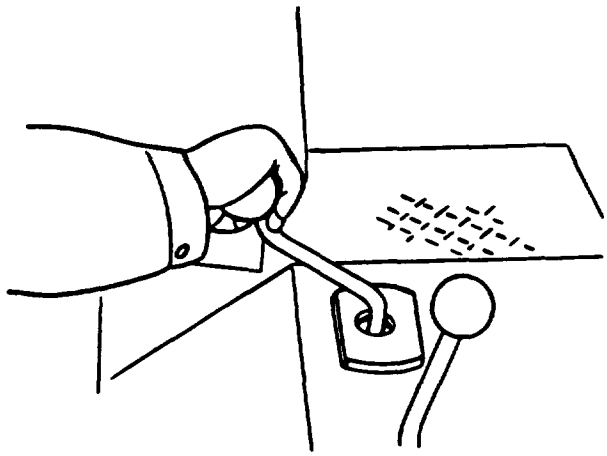
f. If parking brake is not engaged, depress left brake pedal, push brake lock lever (7) down, and then depress right brake pedal firmly.

NOTE

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

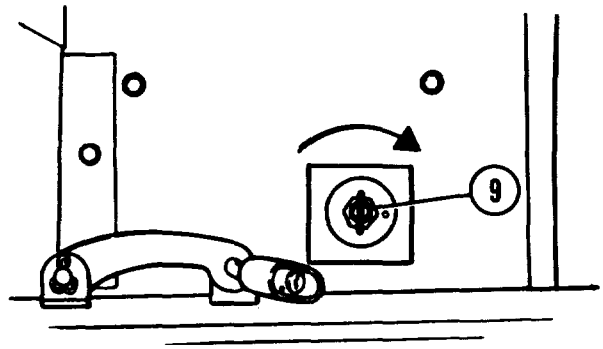
g. If transmission selector is not in neutral position, move selector lever to neutral and push safety lock lever (6) down to lock it in position.

h. Move all equipment controls to the hold position.



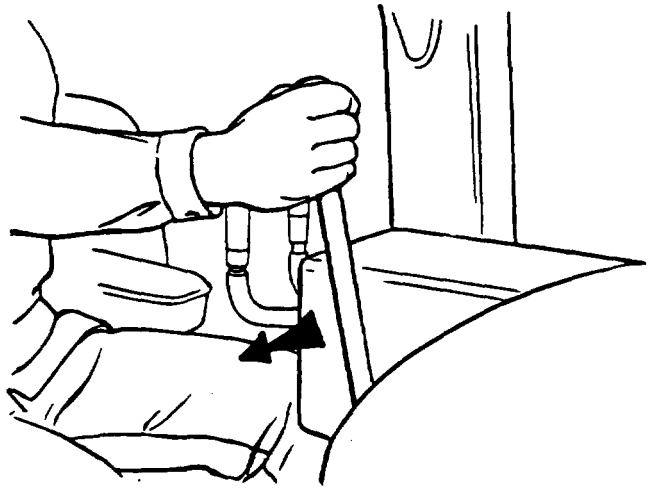
CAUTION

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.

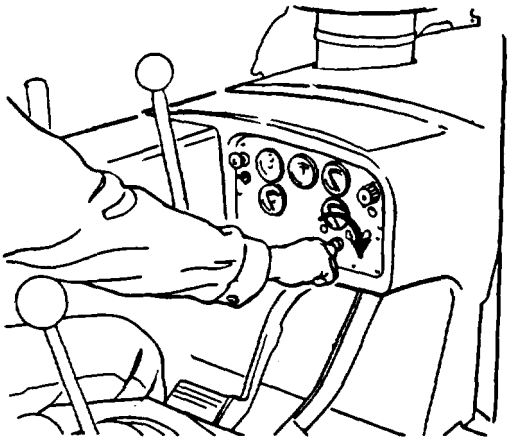


WARNING

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

CAUTION

Do not crank the engine longer than 30 seconds, or damage to the starter motor may occur.



k. Turn the start key clockwise to the start position. Release the key as soon as the engine starts.

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.

m. Operate engine under light load for 5 minutes to allow for proper lubrication of the turbocharger.

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.

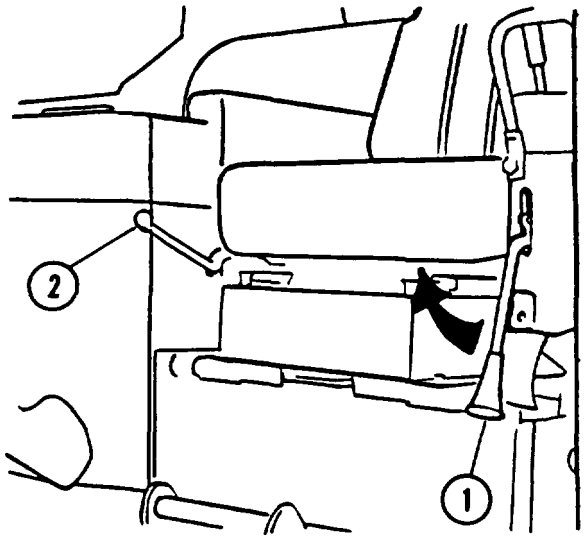
Never operate the tractor, any part thereof, or load closer to any electrical power line or power source than the distance specified or required by Federal, State/Provincial, Local or other applicable safety codes or regulations. In addition, United States OSHA regulations require a flagman when operating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

NOTE

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

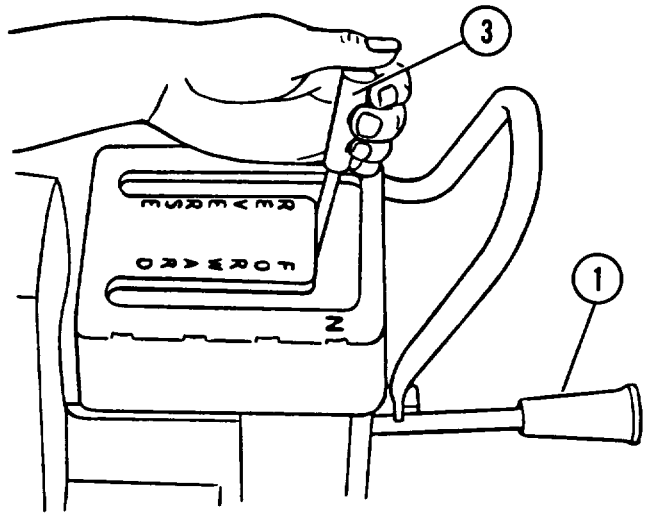
a. Raise lowered equipment high enough to clear obstructions.

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

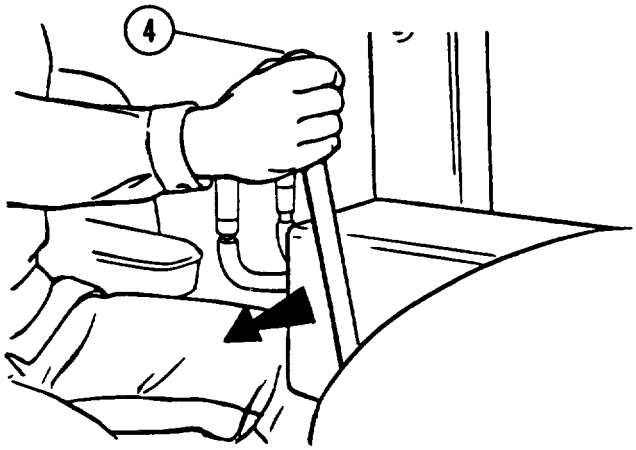
Keep tractor under control at all times. DO NOT NEUTRALIZE TRANSMISSION to allow tractor to coast. Select gear range before starting on downgrade. DO NOT change gears while going downhill.

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.

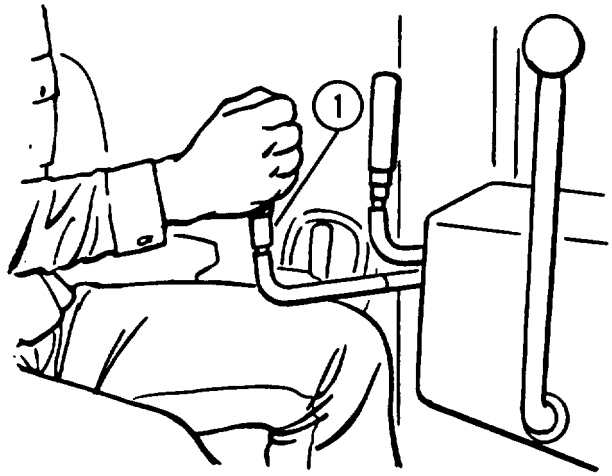
e. Move transmission selector lever to desired direction and speed.

f. Release brake pedals and increase engine speed as required.

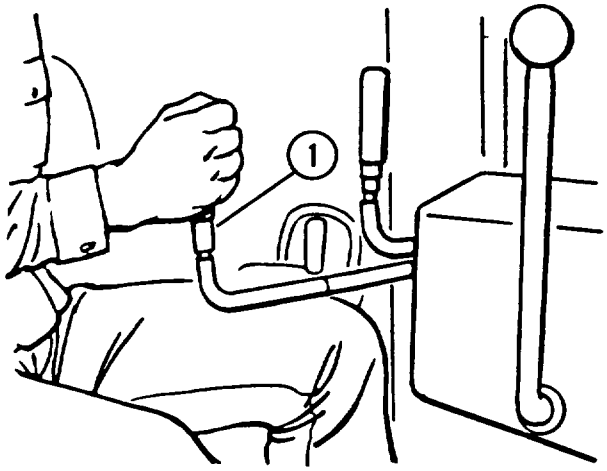
2-8. STEERING THE TRACTOR.

WARNING

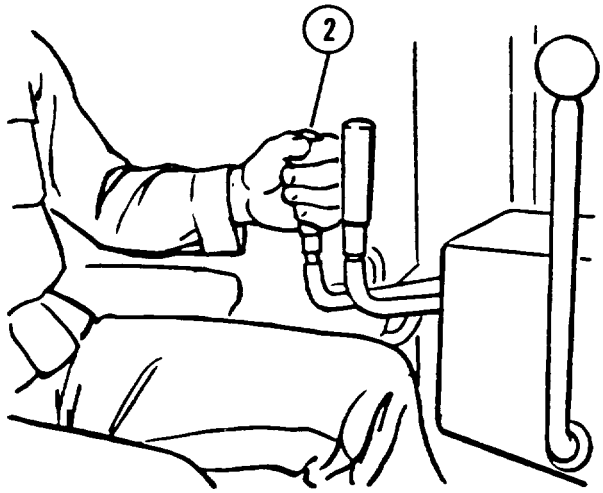
When turning on a downgrade, if engine starts to overspeed, depress both brake pedals to keep control of the tractor.



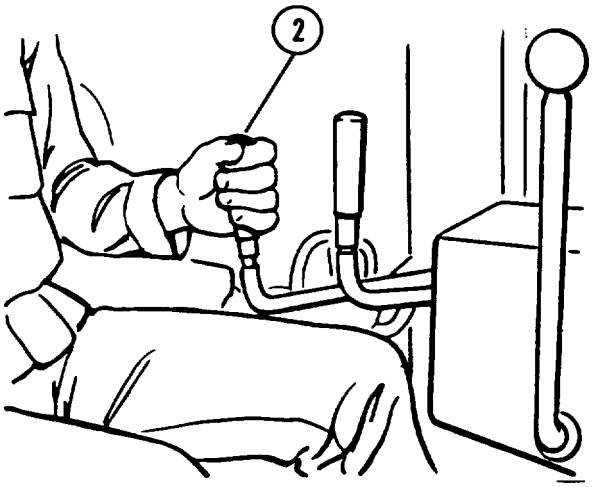
a. To make a gradual right turn, pull the right steering clutch lever (1) to the first position. Release lever to end turn.



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.

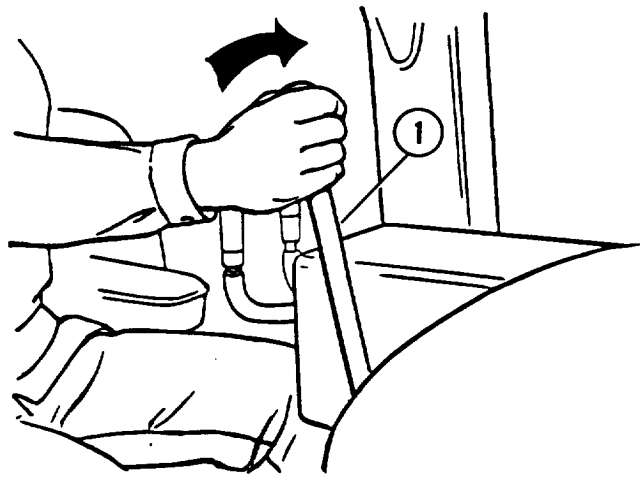
NOTE

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.

CAUTION

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.**

CAUTION

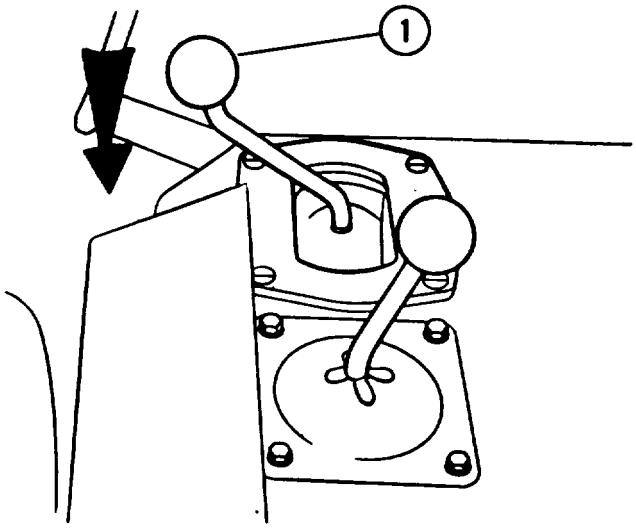
Never turn disconnect switch OFF when the engine is running. Serious damage to the electrical system will result.

b. **Turn disconnect switch off.**

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

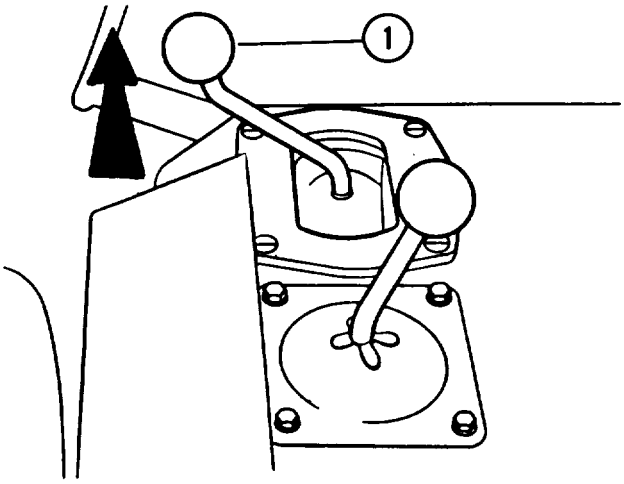
NOTE

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



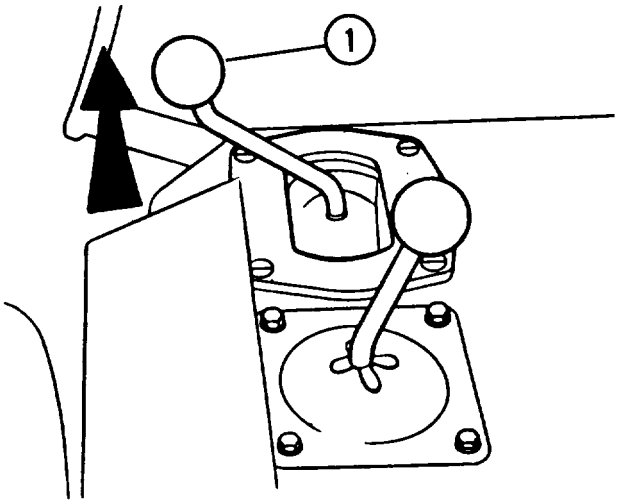
a. **Move blade control lever (1) backward to raise the blade.**

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

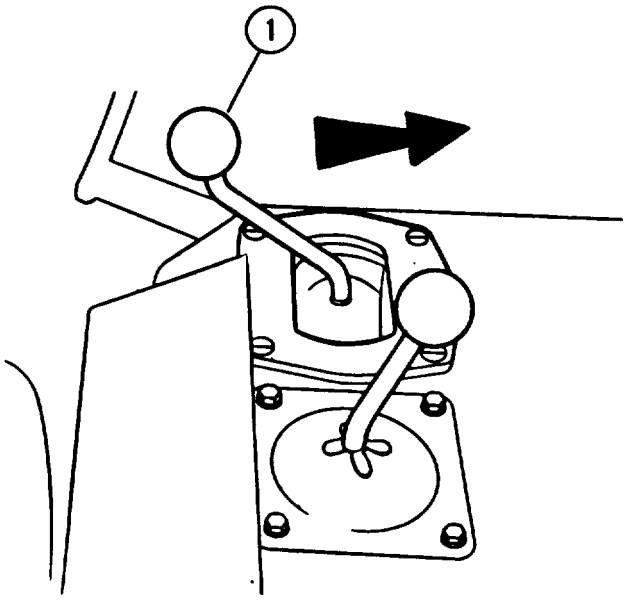


NOTE

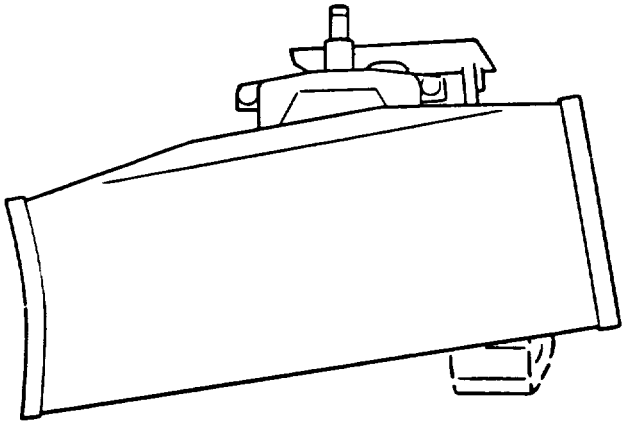
The float position is the only position with a detent. In this position, the blade is free to move up or down according to the terrain.



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.

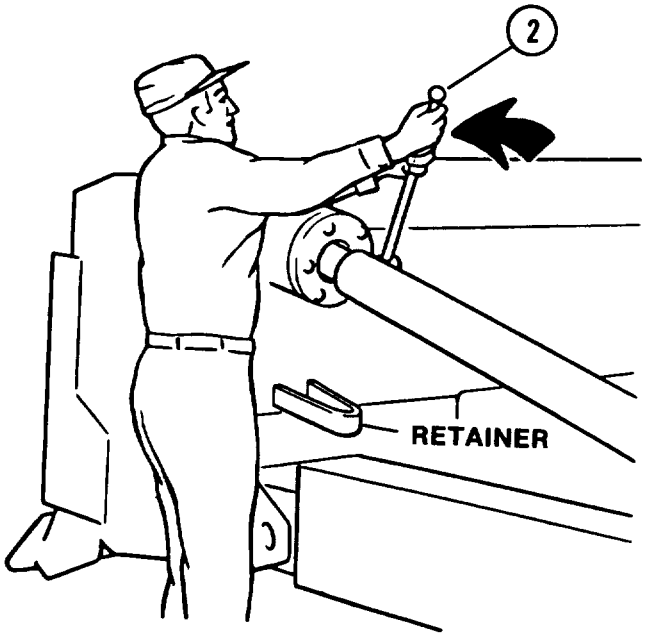


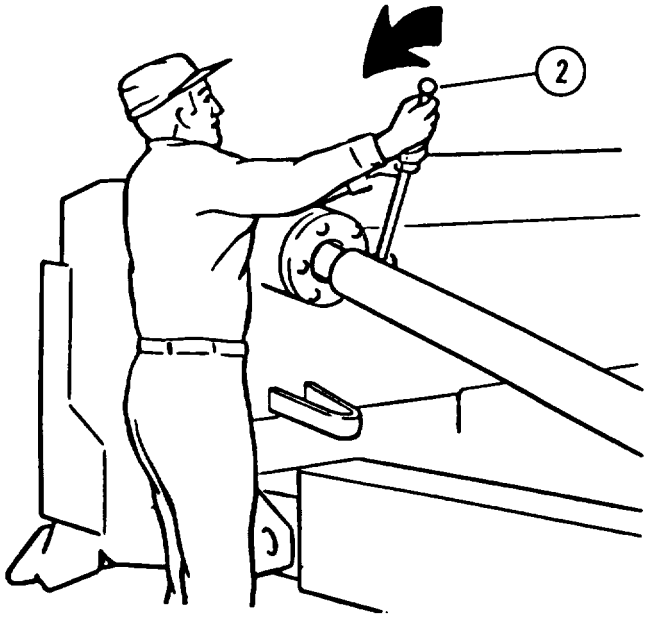
e. Move blade control lever to the left to tilt the blade so that the blade is high on the right side.

NOTE

If additional tilt is required, the brace maybe 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.

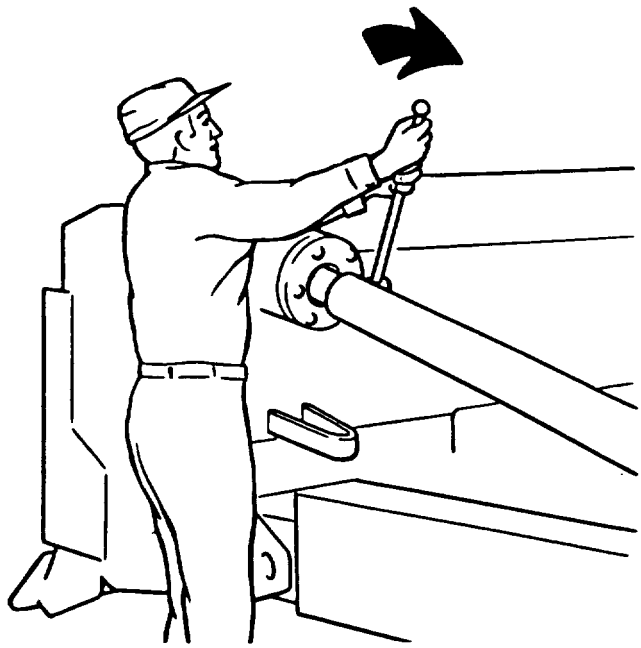




g. Shorten brace to make left side of blade lower and right side higher.

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.

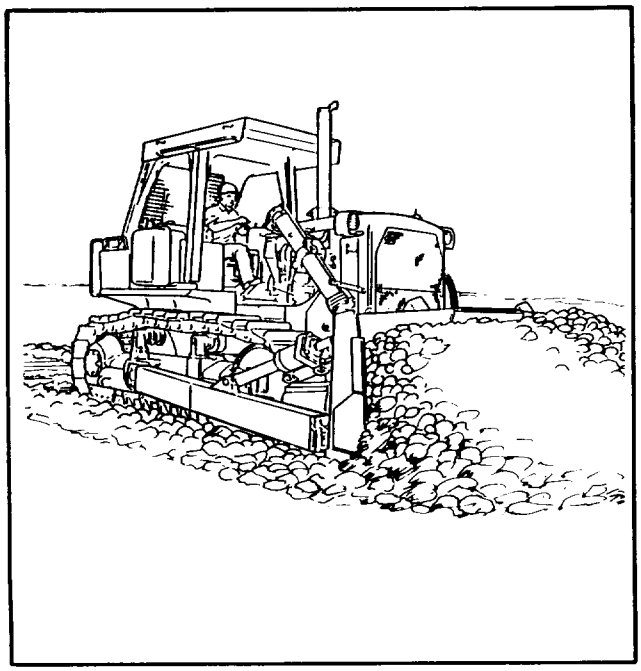
Following are suggested techniques for safe dozing operations.

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.

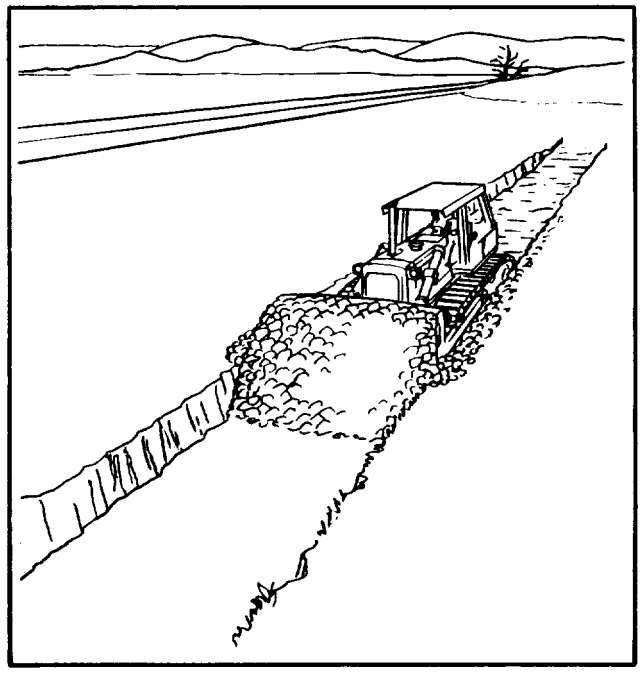


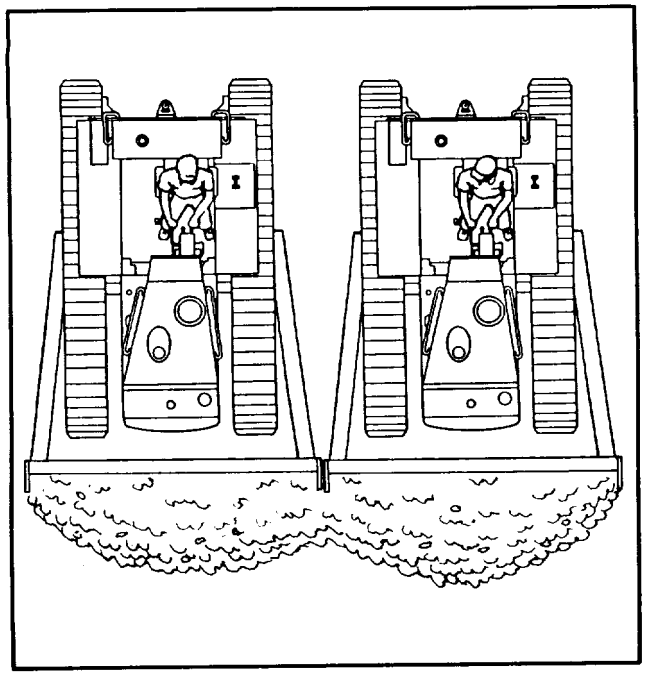
a. Straight Dozing. If the blade digs in and the rear of the tractor rises, raise blade to continue even cut. Moving a heavy load causes travel speed to drop; shift to a lower gear and/or raise the blade slightly.

NOTE

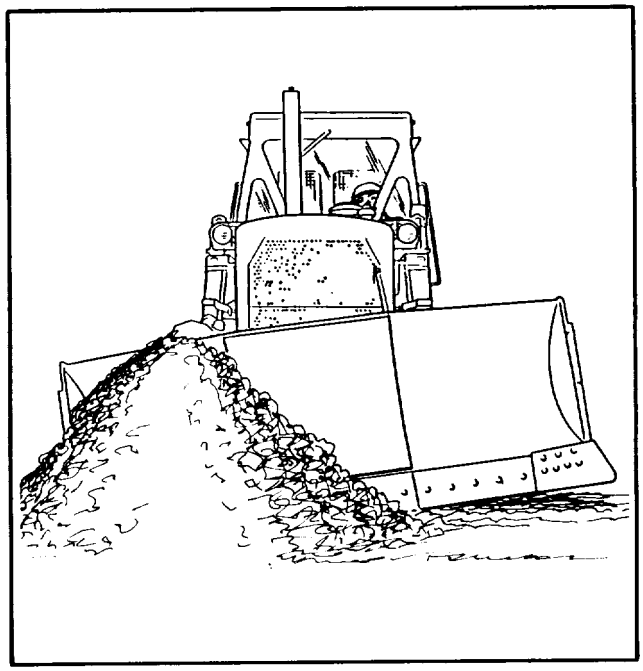
When doing finishing or leveling work, a full blade handles more easily than a partially-loaded blade.

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

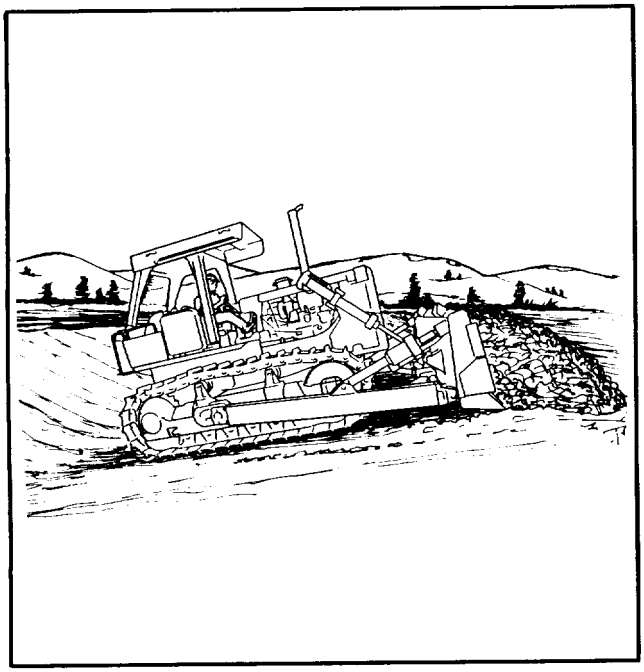




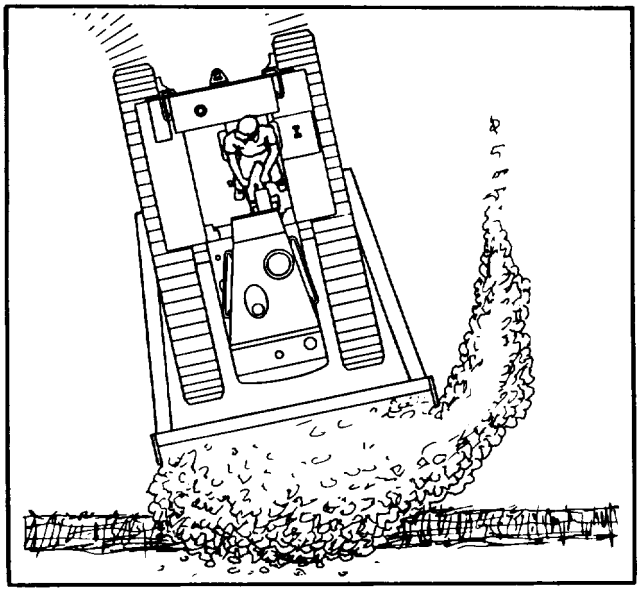
c. Side-by-Side Dozing. Use when moving large quantities of loose material. Keep blades close together and tractors parallel.



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

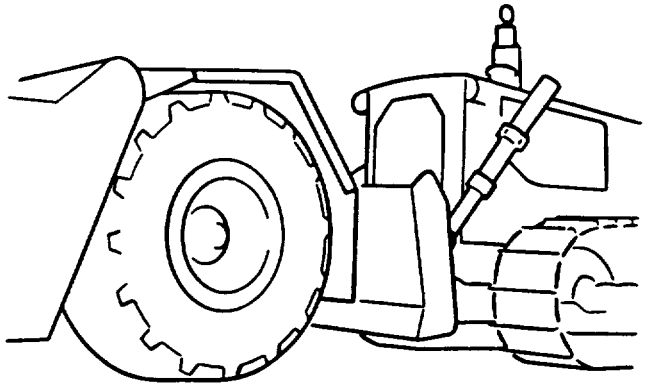
Make contact with scraper gradually. Injury to scraper operator can occur if contact is too forceful.

(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.

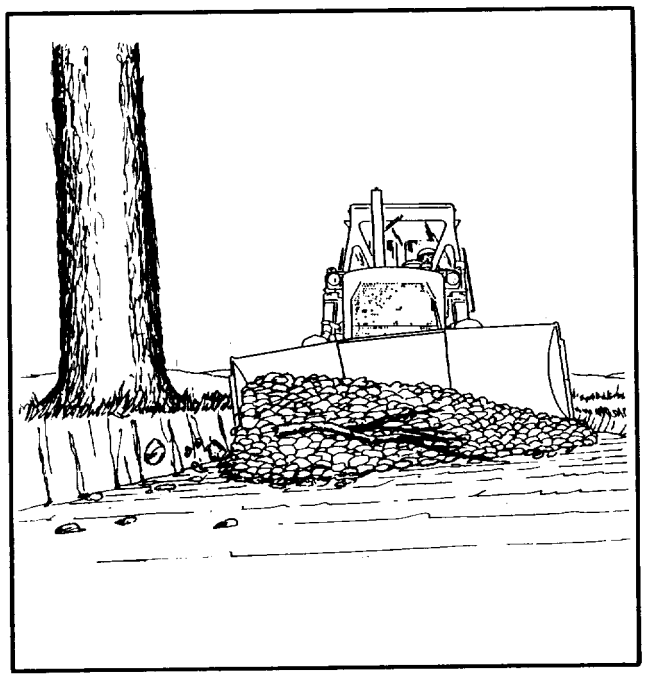
(5) Upshift tractor when cut is complete to help scraper get moving.



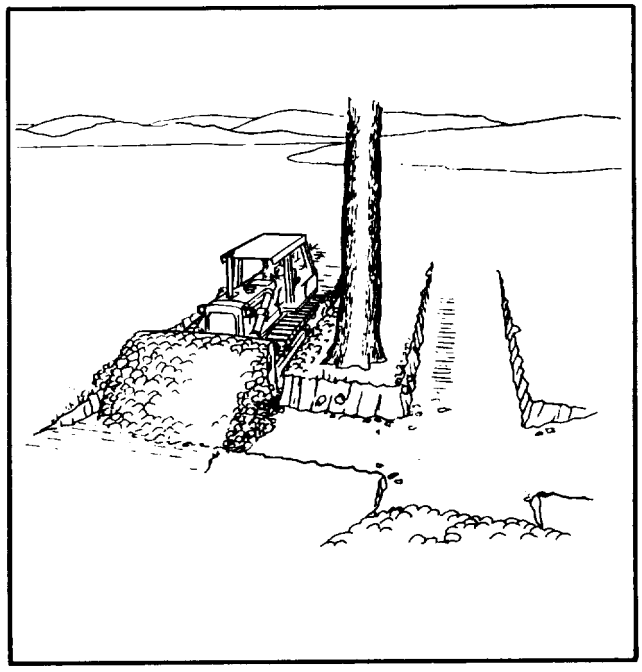
h. Large Tree Removal.

WARNING

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



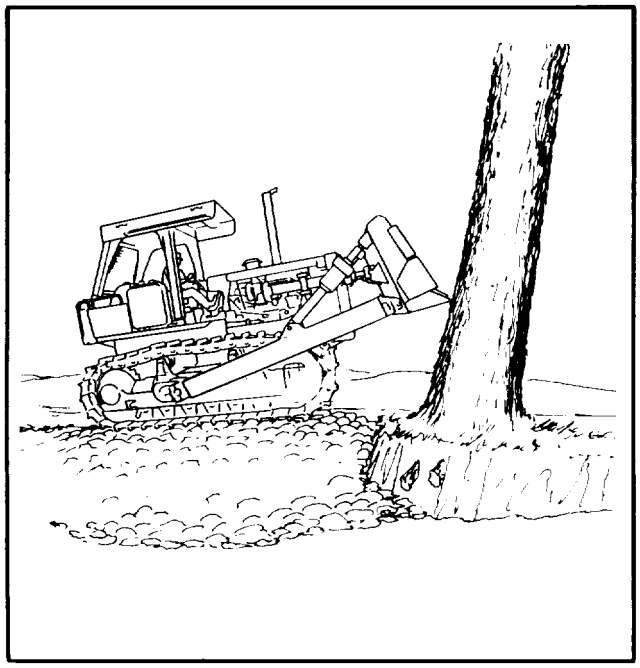
(1) Cut roots on side opposite direction of fall.



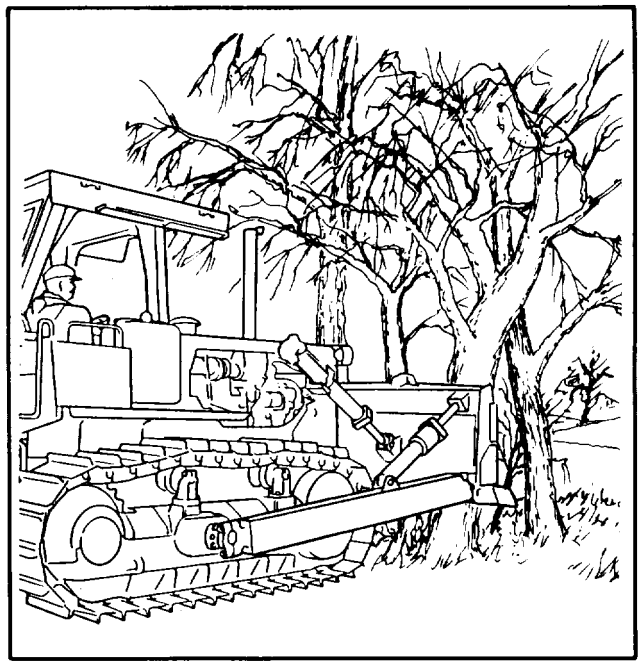
(2) Cut roots on sides parallel to direction of fall.

WARNING

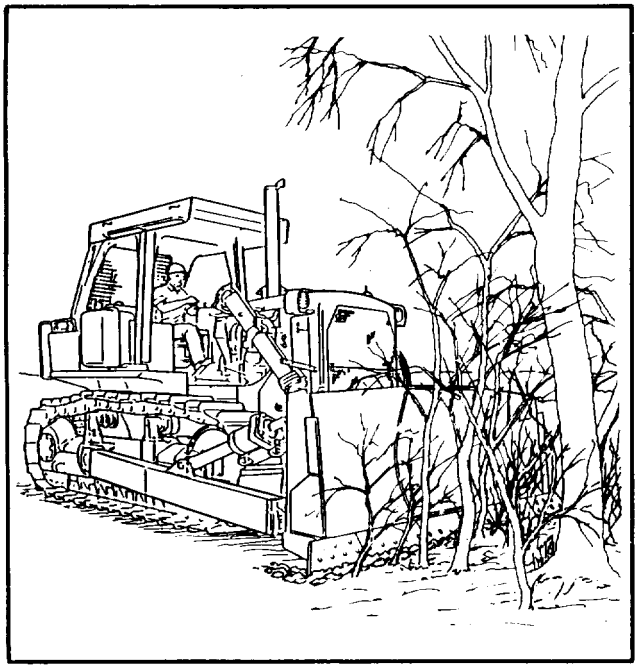
Do not drive onto stump while tree is falling. Back away immediately when tree starts to fall to avoid personal injury or damage to tractor.



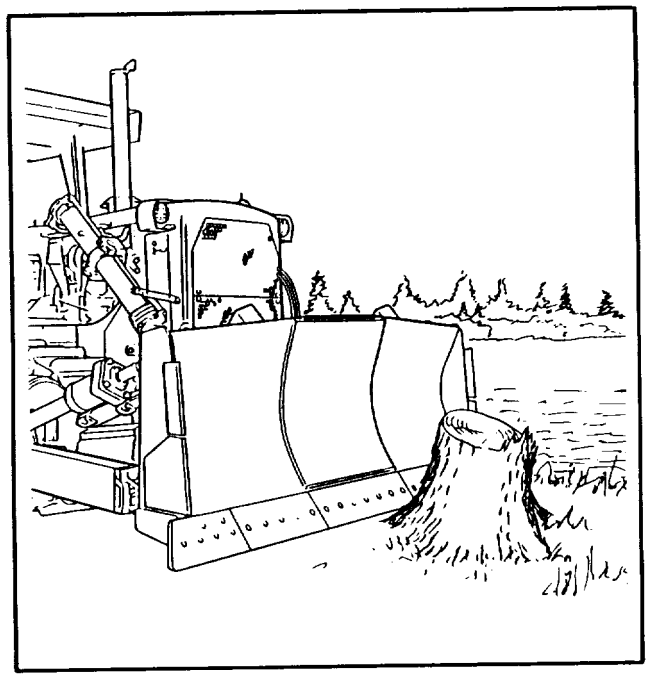
(3) Ease into tree. Push in direction of fall with blade high. Build earth ramp if higher contact is needed.



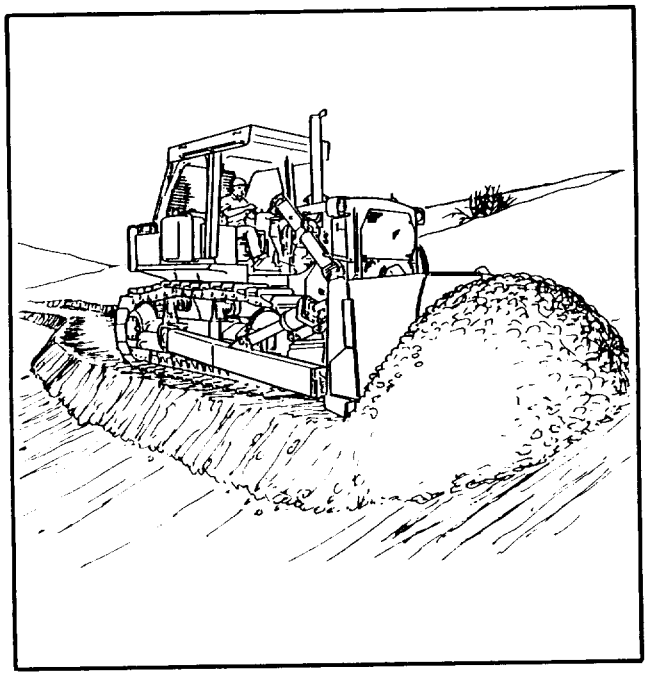
i. Large Brush and Medium Size Tree Removal. Contact tree 12 to 16 inches above ground. Move forward while lifting blade.



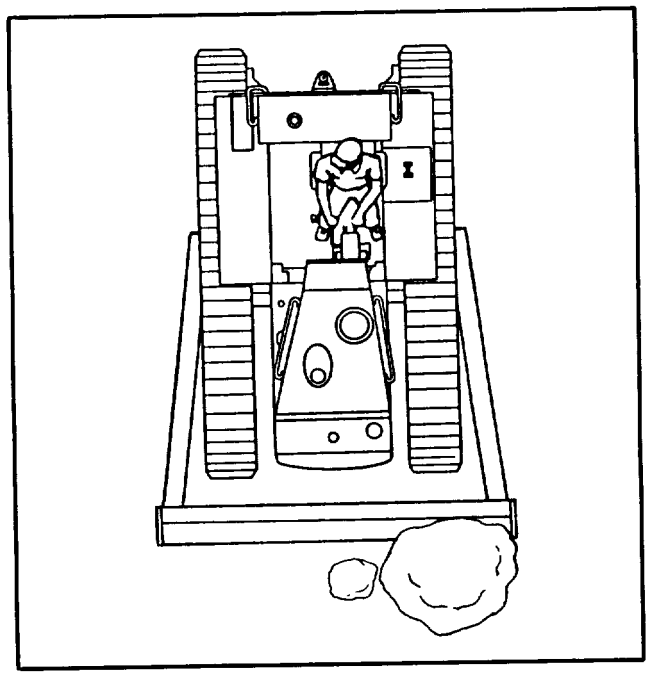
j. Brush Clearing. Lower blade a few inches into the ground and move forward. Lift blade when brush is out to loosen earth from roots.



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

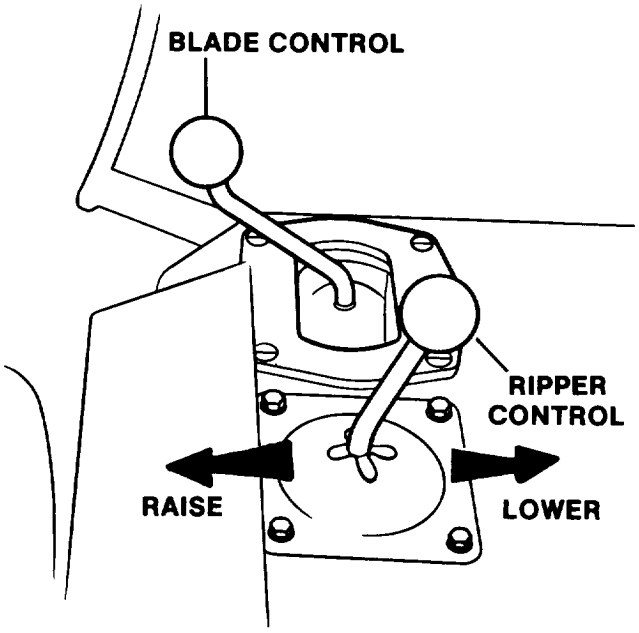
Normally, the engine must be running to operate the hydraulic implements, but the ripper can be LOWERED with engine off.

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.

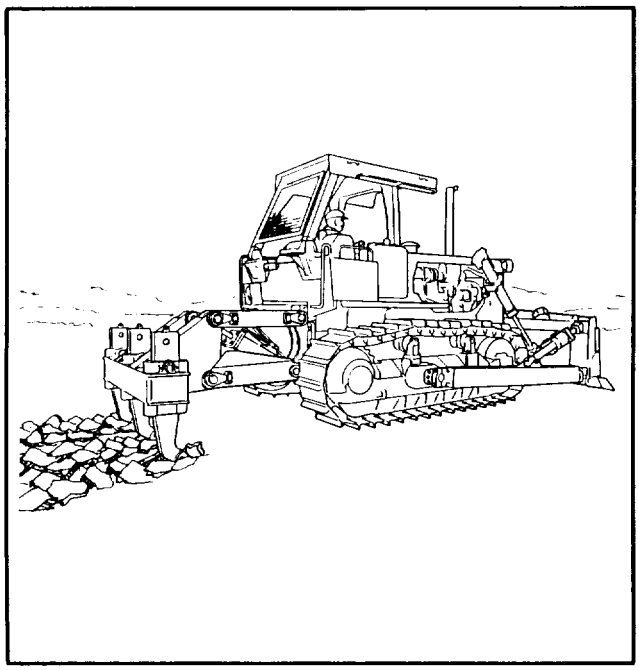
NOTE

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) Inmost 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. Adphalt 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.

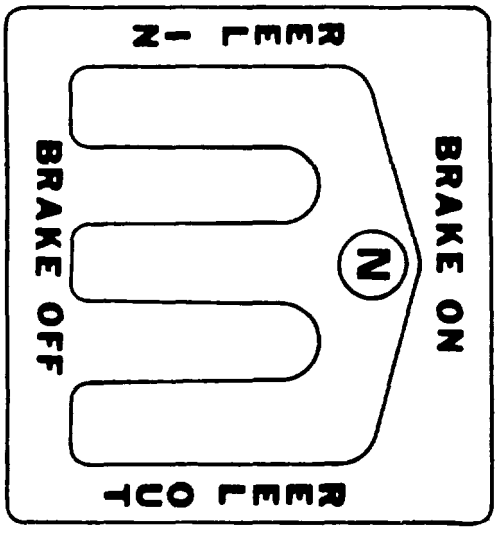
WARNING

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

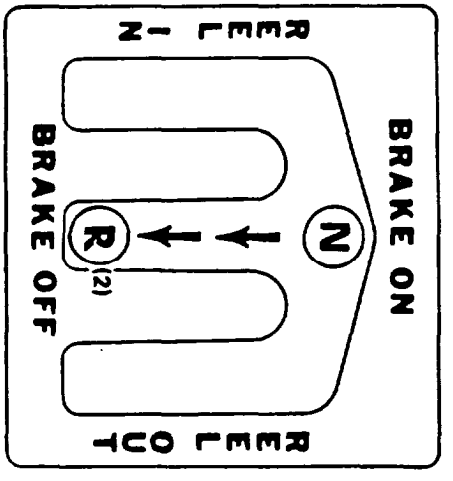
Do not use the winch to pull when there is fewer than three wraps of the cable on the winch drum. A bare drum pull can cause the cable to break away from the winch drum and cause severe injury to personnel.

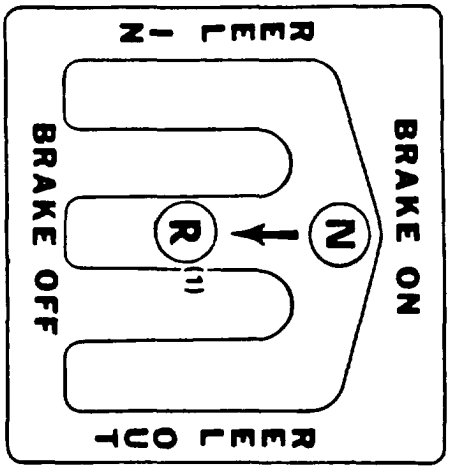
a. To lock cable so it will not move, put winch control lever in the BRAKE ON (Neutral) position.

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.





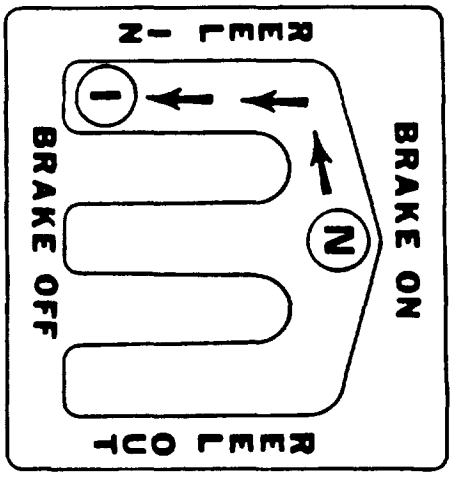
c. There is a BREAK OFF position with a detent which also allows a load to move out the cable load. The lever will not automatically return to the BRAKE ON (Neutral) position from the detent; it must be moved.

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.

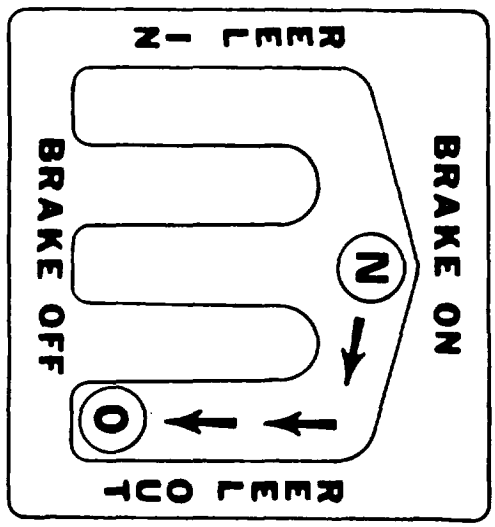
Always winch with cable in as straight a line as possible behind tractor.

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.

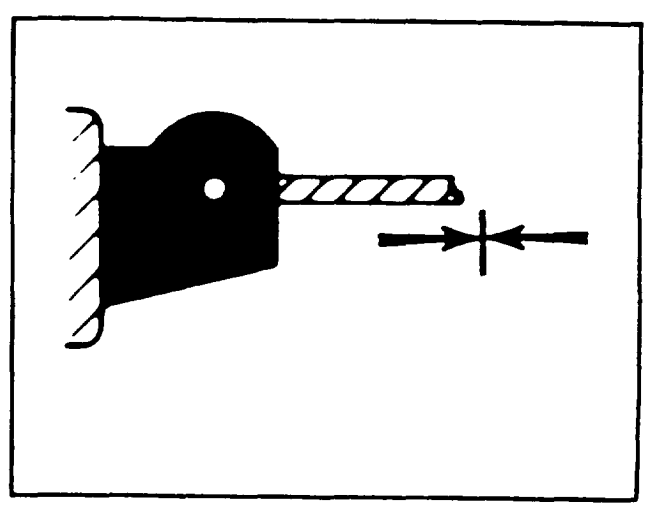
WARNING

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.

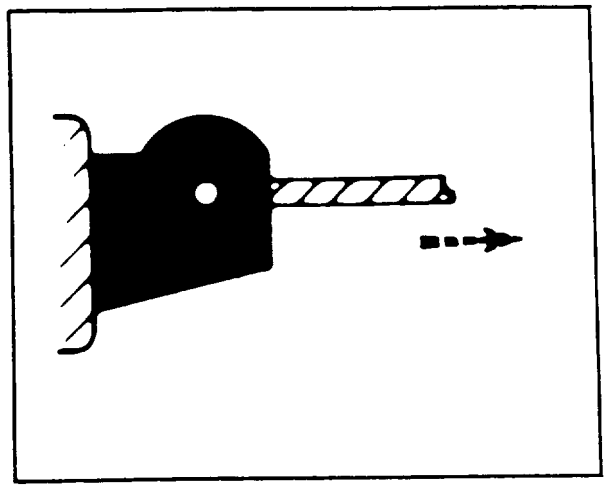
Make certain personnel are clear of cable when there is a load on the cable. Cable can break and cause personal injury.

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.

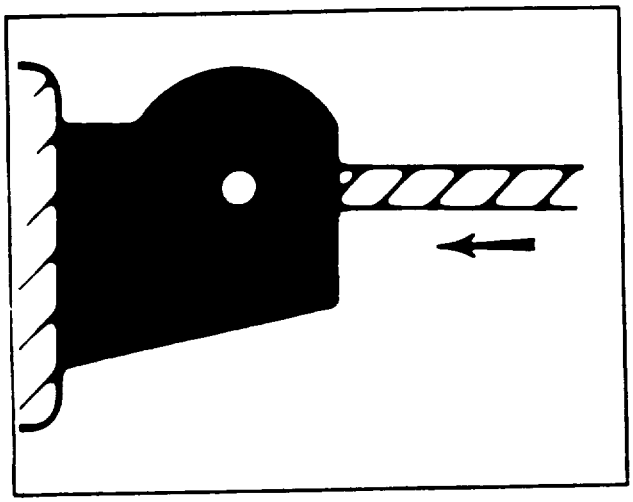


(2) To reel out cable by moving tractor away from heavy load, or to lower a load by its own weight, move winch control lever to the BRAKE OFF (Release) position.

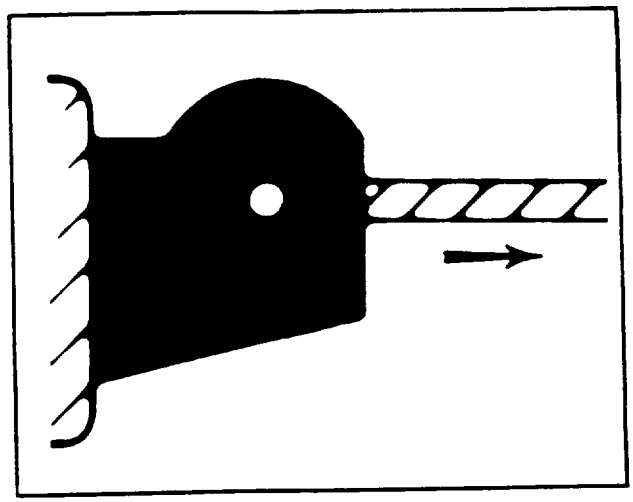


CAUTION

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.

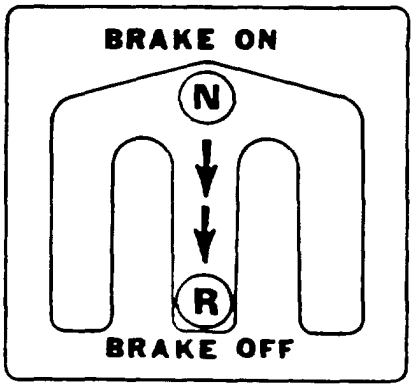


(4) To lower a light load with power, or moving away from load in first gear, put winch control lever in REEL OUT position.

b. Inching (Fine Control Operation).

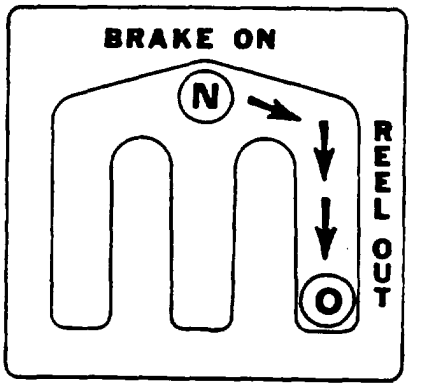
CAUTION

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



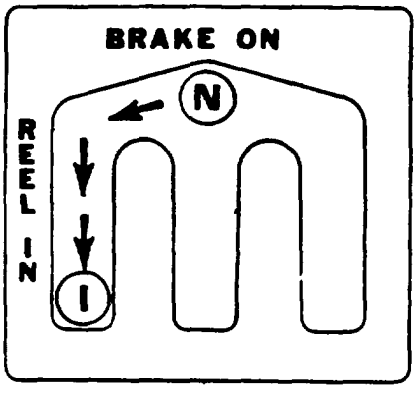
(1) To inch out, move lever slowly towards the BRAKE OFF position until load starts to move. For precise lowering, move lever slightly to engaged or disengaged position as required.

(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.



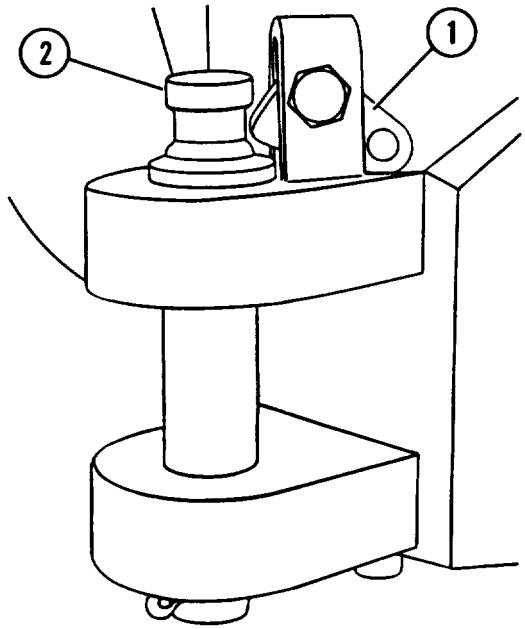
NOTE

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.



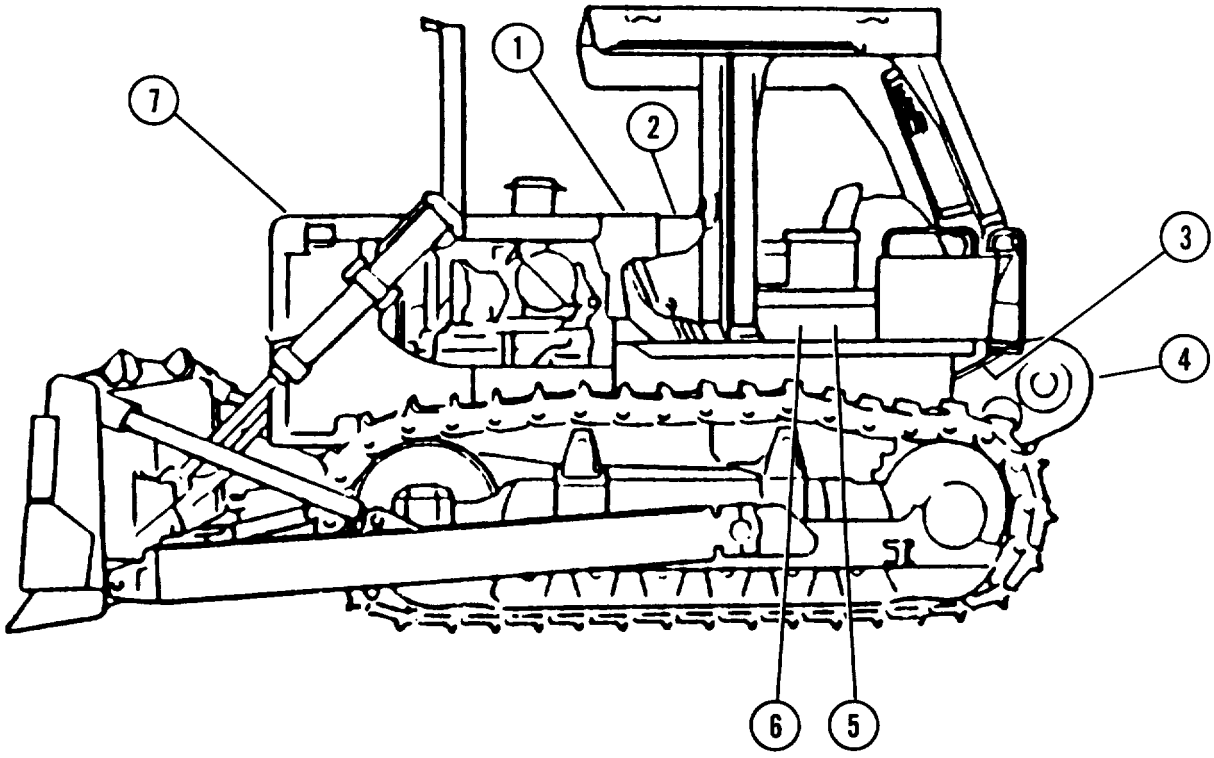
WARNING

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 grade called for in LOS-2410-237-12 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 bum 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 formations on the valves. These deposits can cause burned valves, bent pushrods, or other damage to valve components.

(4) Run engine at reduced speed only long enough to circulate the oil through the engine, then increase speed and warm up the engine.

(5) Cover the radiator if necessary to bring engine up to operating temperature.

c. At Halt or parking.

(1) To avoid water condensation in the fuel tank, completely fill the fuel tank after each operating period.

(2) Park the tractor in sheltered place if possible. Cover to protect engine, accessories, and controls from ice and snow.

(3) Wet mud or snow should be cleaned from engine compartment, hydraulic cylinders, and all track components before it freezes.

(4) In extremely cold weather remove the batteries and store them in a moderately warm place. Reinstall batteries just prior to starting.

2-21. OPERATION IN EXTREME HEAT.

a. Preparation. Precautions must be taken to avoid overheating.

(1) Contact Unit Maintenance to drain, flush and refill cooling system.

(2) Contact Unit Maintenance to lubricate the tractor with correct grade of lubricants in accordance with the Lubrication Order, LO5-2410-237-12.

b. Starting the Engine. See Section Ill, Operation Under Usual Conditions, page 2-19.

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 indicator frequently. Have filter serviced as often as required.

d. At Halt or Parking. Park tractor in shaded area if possible.

2-22. OPERATION UNDER RAINY OR HUMID CONDITIONS.

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

b.

(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 according to LO5-2410-237-12.

2-23. OPERATION IN DUSTY OR SANDY AREAS.

a. Starting the Engine. See Section Ill, 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. Have filter serviced as often as required.

(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 Ill, 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 instructed in LO5-2410-237-12.

(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 deep.

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. Fording speed should not exceed 3 to 4 miles per hour.

d. In the event of complete submersion, contact Unit Maintenance for appropriate disposition.

e. Conact Unit Maintenance to lubricate the tractor completely, as soon as possible, after fording.

2-26. OPERATION UNDER EMERGENCY CONDITIONS.

NOTE

The engine cannot be started by towing or pushing the vehicle.

a. Emergency Starting with Booster Cables.

NOTE

The T-9 tractor has a 24-volt starting system. To start, use a 24-volt battery or two 12-volt batteries connected in series.

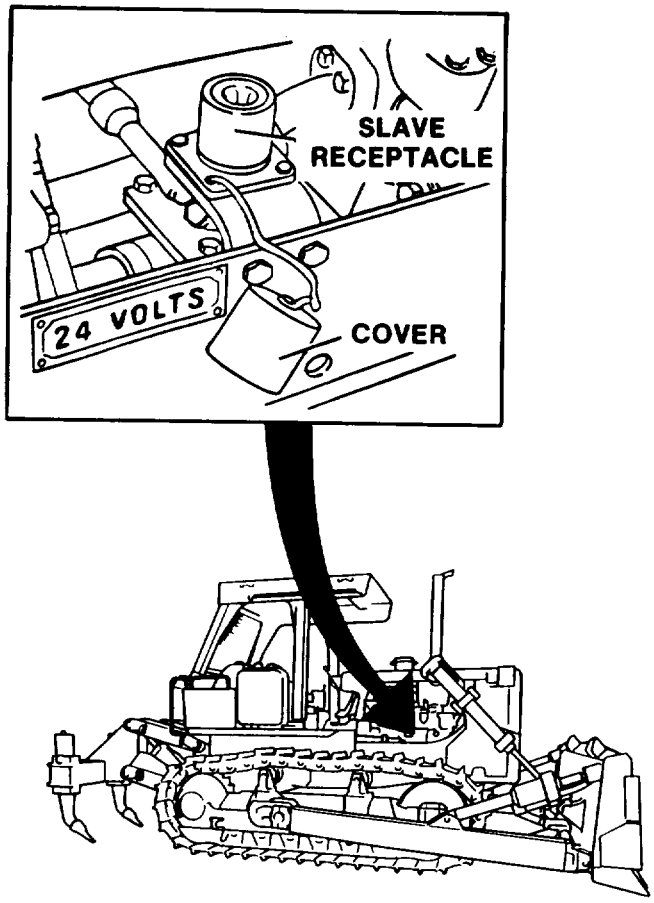
(1) Engage the brake lock and place all controls in neutral or hold position.

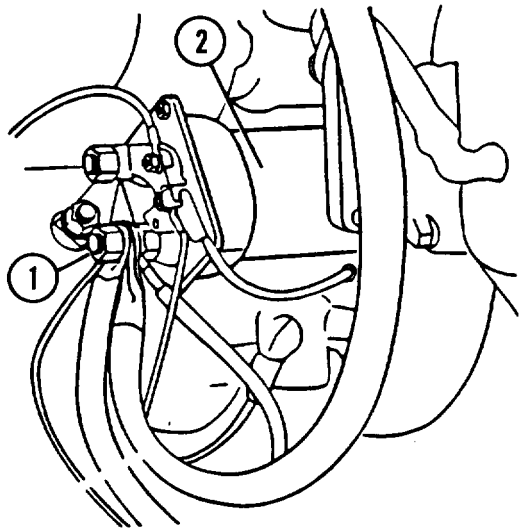
(2) Attach a positive lead battery cable from the positive terminal of booster battery to the BAT terminal (1) of the starter solenoid (2).

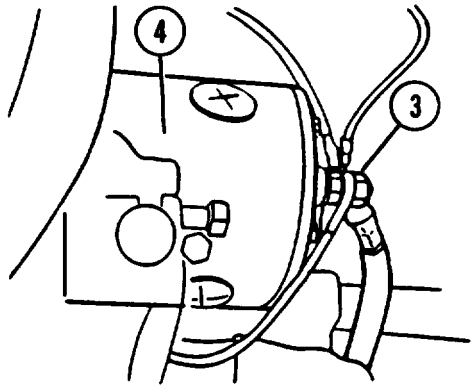
(3) Attach the negative lead from the negative terminal of the booster battery and to the ground connection or ground terminal (3) on the starter (4).

(4) Start the engine using the procedure in Section III, Operation Under Usual Conditions. See Paragraph 2-5, page 2-19.

(5) After engine is started, remove the negative lead from the ground terminal of the battery first. Disconnect other cable from starter and battery.







b. Emergency Starting Using Slave Receptacle.

(1) Remove protective cover from slave receptacle.

(2) If a slave cable is available, connect the slave cable to the slave receptacle on the charging vehicle and to the slave receptacle on the vehicle to be started.

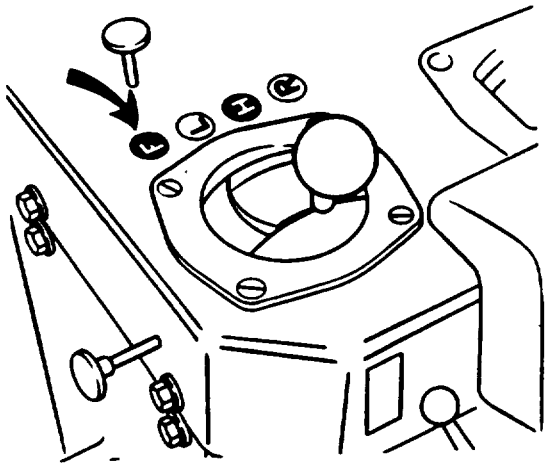
(3) Start the engine using the procedure in Section III, Operation Under Usual Conditions. See Paragraph 2-5, page 2-19.

(4) After engine starts, disconnect slave cable and install cover on slave receptacle.

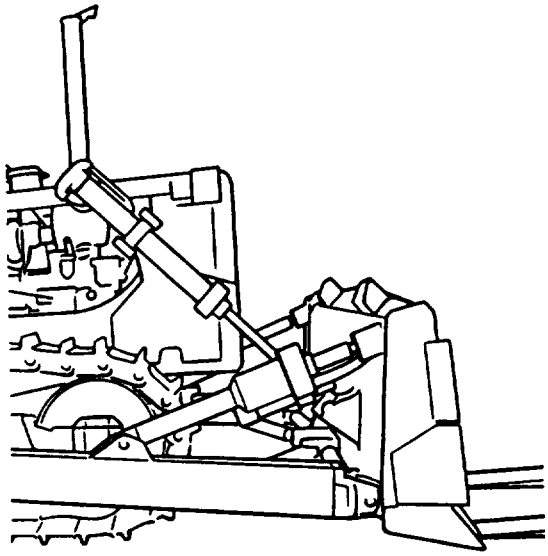
c. Vehicle Evacuation and Recovery.

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.

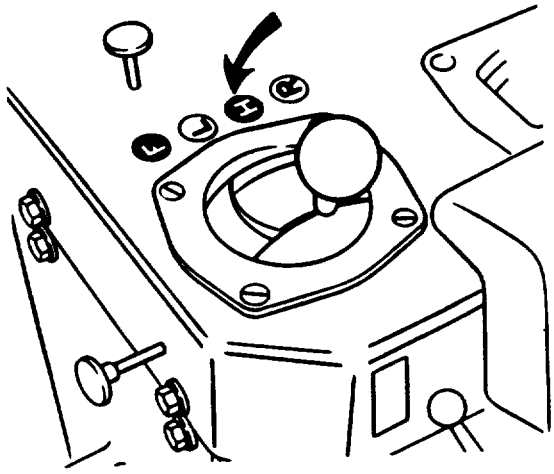
(1) Move dozer control lever to FLOAT position.



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



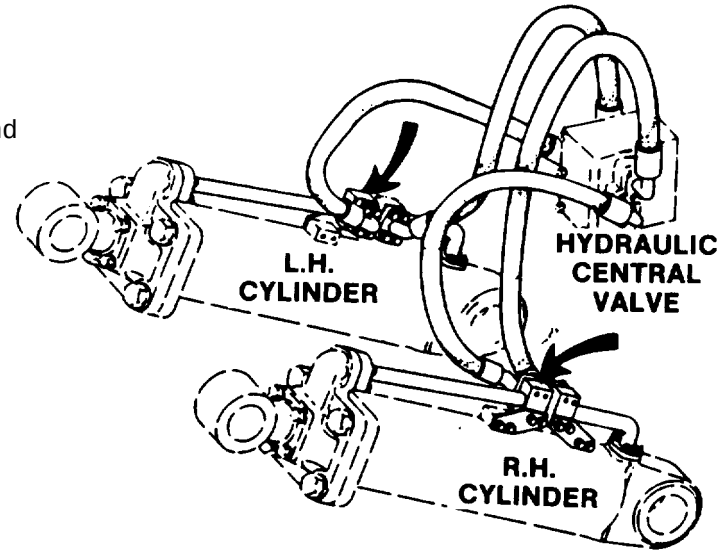
(3) When dozer blade has been raised to desired height, move dozer control lever to HOLD position.



NOTE

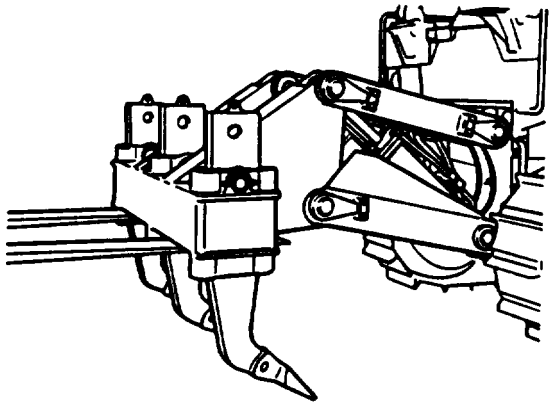
Control lever may need to be cycled several times to relieve pressure in hydraulic system.

(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

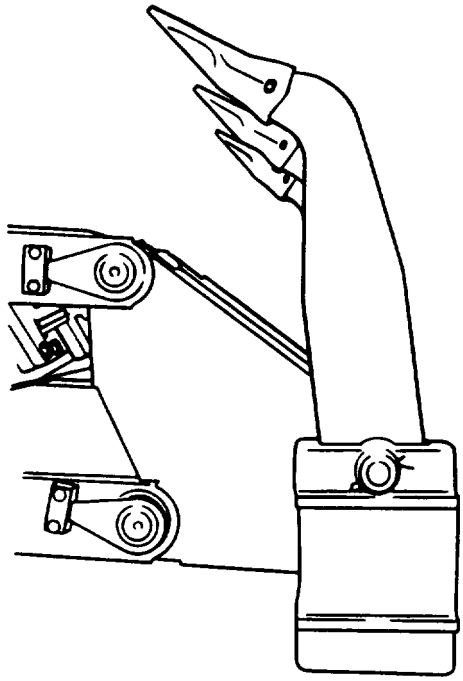
Hydraulic oil will be displaced from hydraulic cylinder.

(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 MAINTENANCE INSTRUCTIONS

Section I. Lubrication Instructions

3-1. LUBRICATION. See LO5-2410-237-12.

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
Check for loose or disconnected battery cables.
Notify Unit Maintenance.
2. ENGINE CRANKS BUT WILL NOT START
Step 1. Check to see if fuel tank is empty.
If low or empty, refill.
Step 2. Check to see if any fuel lines are damaged.
Notify Unit Maintenance.
Step 3. Check for loose battery cables.
Notify Unit Maintenance.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

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

Damage to radiator can occur if pressure cap is removed on a hot engine. Personal injury can also occur from the hot coolant. Allow appropriate cool down time before checking coolant level.

Step 1. Check for low coolant level.

Add coolant as needed.

Step 2. Check for leaks and/or worn hoses.

Notify Unit Maintenance.

WARNING

Engine and radiator area will be extremely hot. Contacting exposed skin to these areas could result in severe burns.

Step 3. Check for trash buildup along radiator surface.

Clear radiator surfaces.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
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.

Procedure	Para No.	Page No.
Inspect batteries	3-7	3-10
Inspect hydraulic tank	3-9	3-13
Inspect radiator	3-6	3-8
Inspect transmission assembly	3-8	3-12
Inspect winch assembly	3-10	3-14
Service engine assembly	3-4	3-5
Service fuel tank	3-5	3-6

3-4. ENGINE ASSEMBLY - SERVICE.

This task covers:

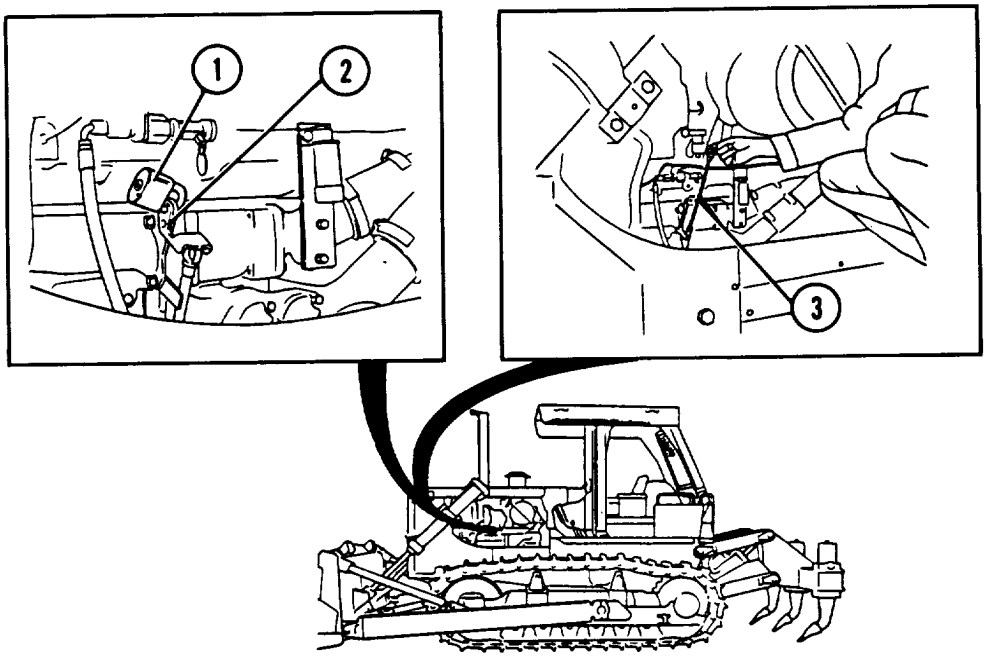
Checking engine oil level.

INITIAL SETUP

Applicable Configurations
All

Personnel Required
MOS 62E (1)

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 FULL 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:

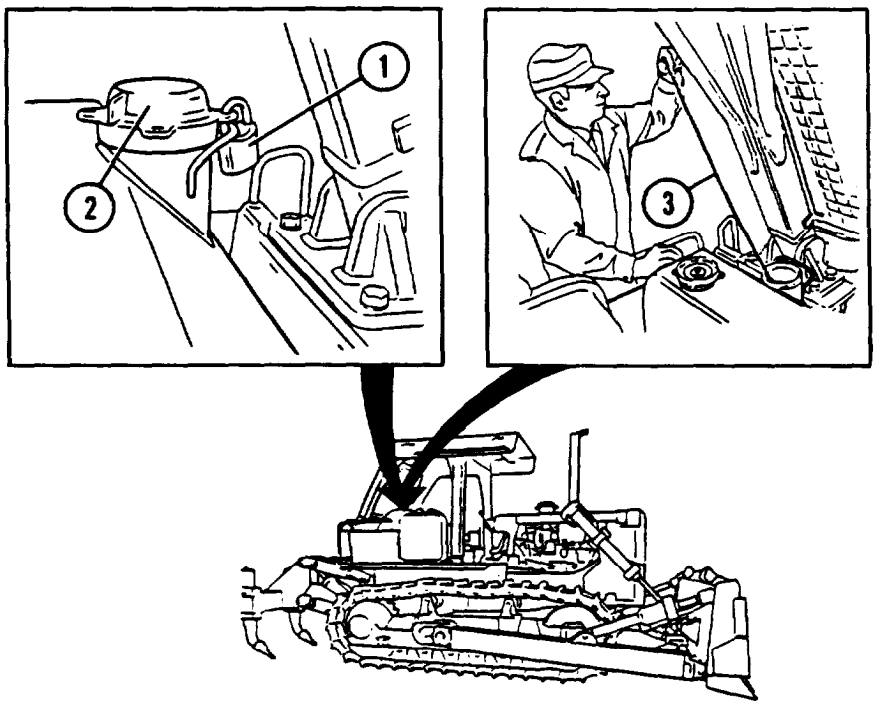
a. Checking and filling the fuel tank.
b. Draining sediment and water from the fuel tank.

INITIAL SETUP

Applicable Configurations
All

Personnel Required
MOS 62E (1)

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



a. 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 diesel 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 Water From Fuel Tank.

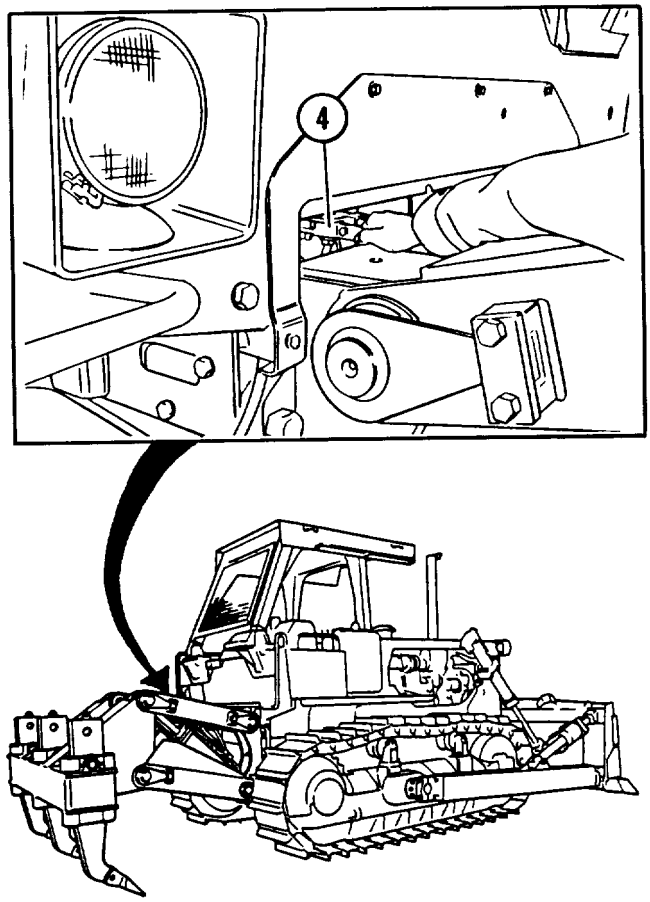
NOTE

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

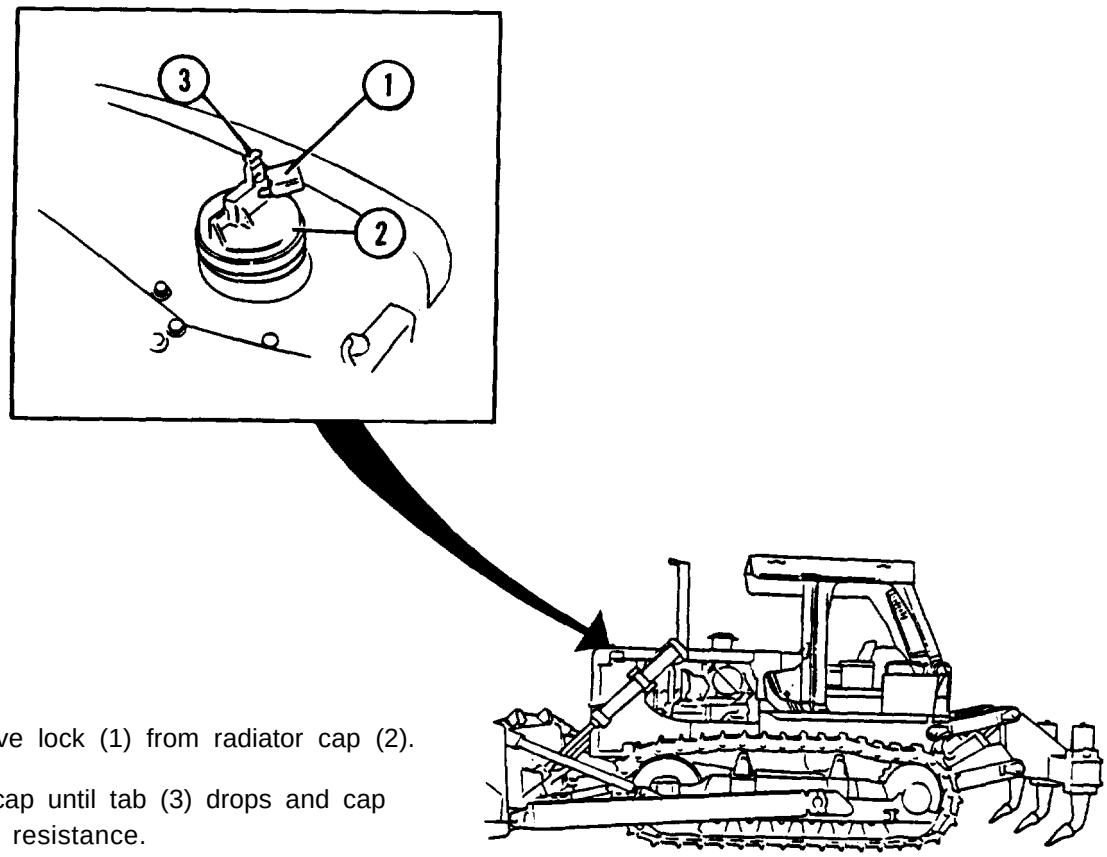
Applicable Configurations
All

Personnel Required
MOS 62E (1)

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

WARNING

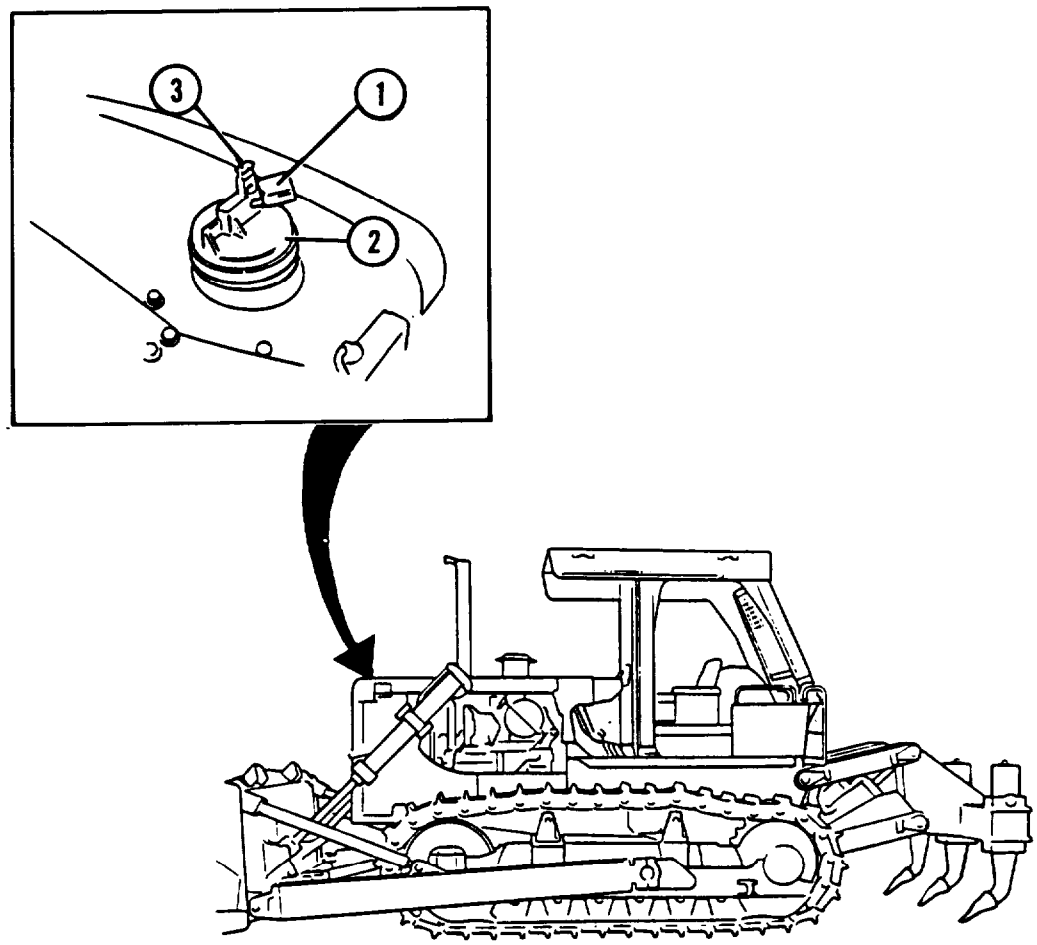
Damage to radiator or serious personal injury can occur if pressure cap is removed from a hot engine. Allow cool down time before this procedure.



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

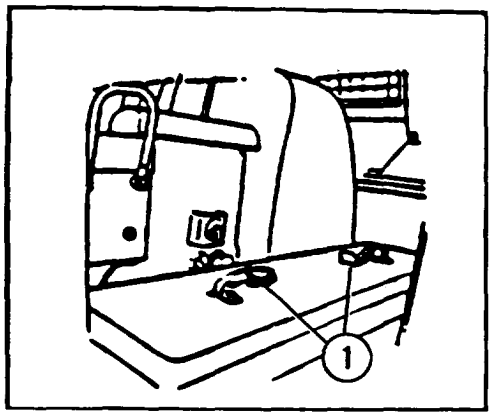
Materials/Parts
Scrub brush with non-metallic bristles.

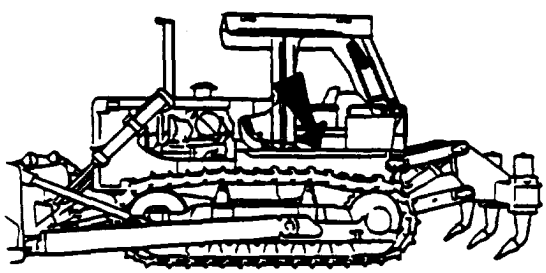
Personnel Required
MOS 62E (2)

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

NOTE

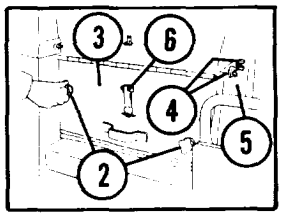
For tractors equipped with Reps, begin at step a. For tractors with winterized cab, begin with step b.

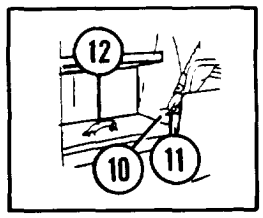


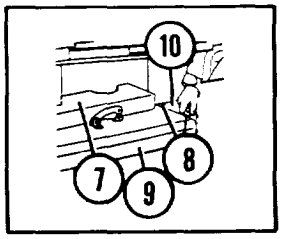


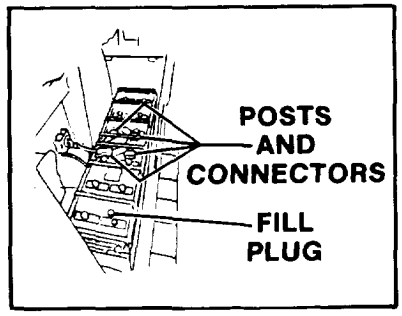
a. Remove padlock and then grab handles (1) and lift up until cover is released from battery box. Proceed to step h.

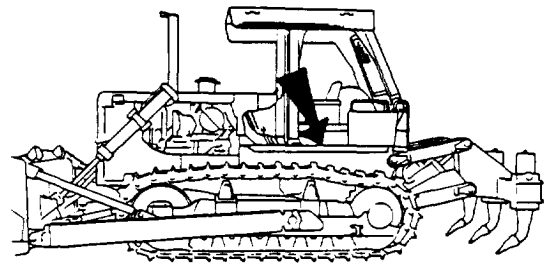
3-7. BATTERIES - SERVICE.











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 water per cell per week.

h. Check each cell by removing the fill plugs.

i. Electrolyte level should be up to the triangle in the fill plug opening.

j. Clean battery posts and cable connectors with a non-metallic bristle brush.

3-8. TRANSMISSION ASSEMBLY - INSPECT.

This task covers:

Checking transmission fluid level.

INITIAL SETUP

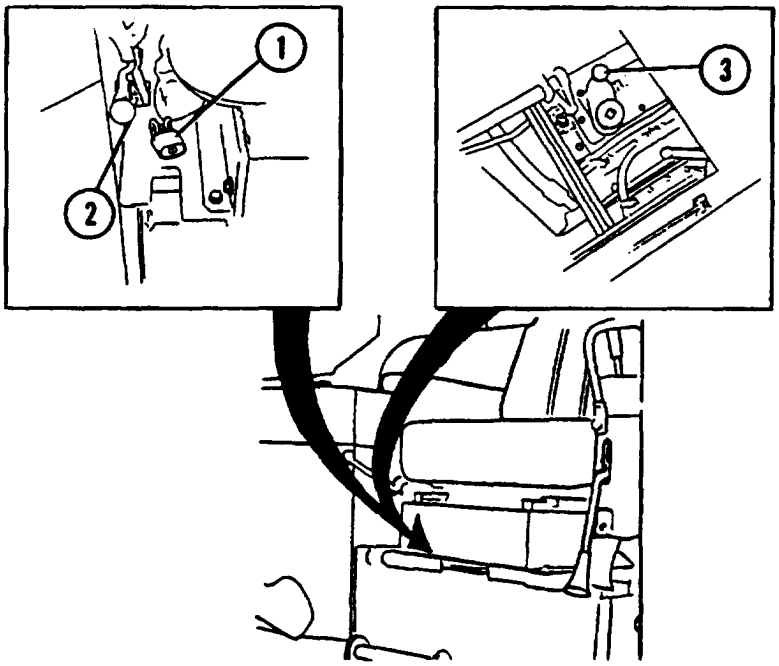
Applicable Configurations
All

Personnel Required
MOS 62E

Equipment Conditions
Tractor must be on level ground.
Transmission locked in neutral.
Brake lock applied.
Engine running at low idle.

NOTE

Allow oil to warm up before level is checked.



a. Remove padlock (1) which locks seat floorplate.

b. Pull handle (2) to release seat latch, grab the metal portion of the seat back and tilt the seat forward.

c. Check dipstick (3); oil level should be between ADD and FULL marks.

d. If transmission fluid is low, add fluid.

3-9. HYDRAULIC TANK - INSPECT.

This task covers:

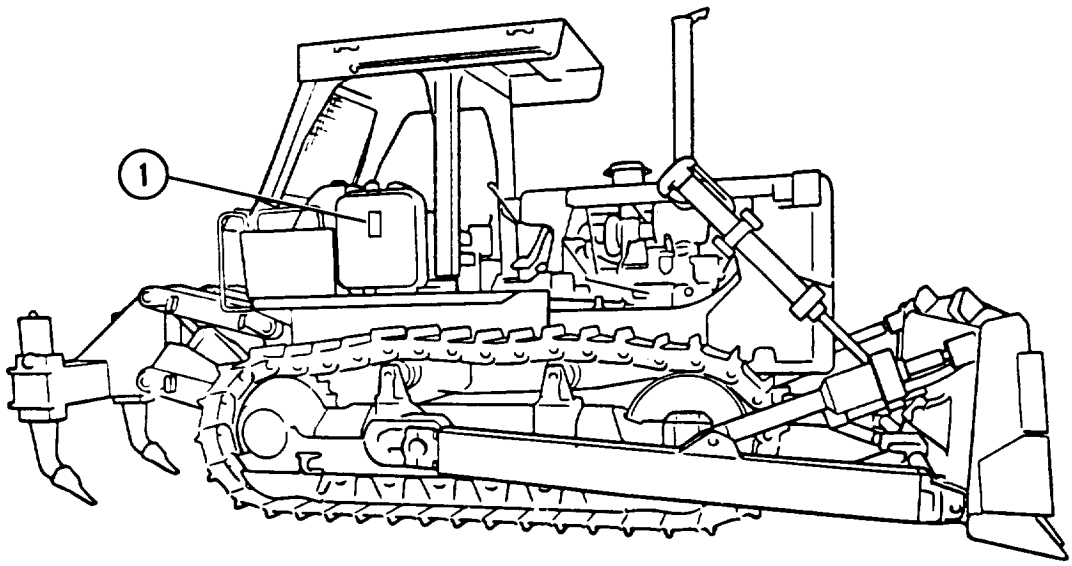
Checking hydraulic fluid level.

INITIAL SETUP

Applicable Configurations
All

Personnel Required
MOS 62E (1)

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



a. Oil should be visible in sight gage (1).

b. Contact Unit Maintenance if oil level is low or does not appear in the sight gage.

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 62E (1)

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

a. Checking Hydraulic Fluid Level.

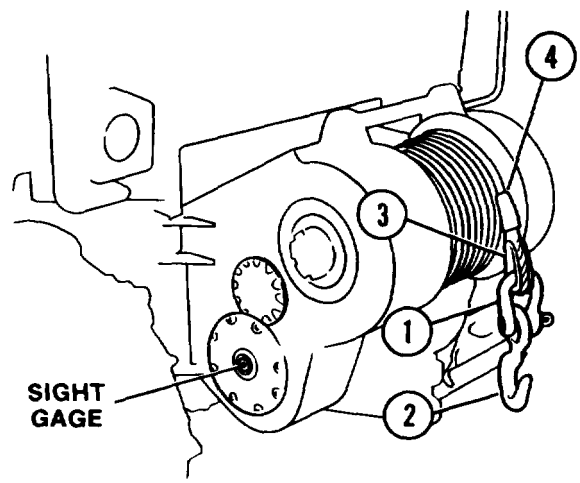
(1) Check sight gage on left side of winch. Oil should be visible.

(2) If oil is not visible in sight gage, add oil.

b. Inspection Cable.

(1) Check 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.



APPENDIX A

REFERENCES

A-1. SCOPE.

This appendix lists forms, field manuals, technical manuals, and other publications referenced in this manual and which apply to operating the T-9 tractor.

A-2. ARMY REGULATIONS.

The Army Integrated Publishing and Printing Program ..... AR 25-30

A-3. DEPARTMENT OF THE ARMY PAMPHLETS.

Consolidated Index of Army Publications and Blank Forms ..... DA Pam 25-30

The Army Maintenance Management System (TAMMS) ..... DA Pam 738-750

A-4. FORMS.

Equipment Inspection and Maintenance Worksheet ..... DA Form 2404

Organizational Control Record for Equipment ..... DA Form 2401

Quality Deficiency Report, Category 2 ..... SF 368

Recommended Changes to Equipment Technical Publications ..... DA Form 2028-2

A-5. FIELD MANUALS.

Camouflage ..... FM 5-20

Basic Cold Weather Manual ..... FM 31-70

Northern Operations ..... FM 31-71

Mountain Operations (How To Fight) ..... FM 90-6

A-6. LUBRICATION ORDER.

Tractor, Full Tracked, Low Speed: DED, Medium Drawbar Pull, T-9 ..... LO5-2410-237-12

A-7. TECHNICAL BULLETINS.

Warranty Program for Tractor, Full Tracked,
Low Speed: DED, Medium Drawbar Pull, T-9 ..... TB5-2410-237-15

Equipment Improvement Report and Maintenance
Digest (US Army Tank-Automotive Command)
Tank-Automotive Equipment ..... TB43-0001-39 series

A-8. TECHNICAL MANUALS.

Utilization of Engineer Construction Equipment:
Volume A; Earthmoving, Compaction,
Grading, and Ditching Equipment TM5-331A

Operator's Manual for Tractor, Full Tracked,
Low Speed: DED, Medium Drawbar Pull, T-9 ..... TM5-2410-237-10

Hand Receipt for Components of End Item (COEI),
Basic Issue Items (BII), and Additional
Authorized List (AAL) for Tractor,
Full Tracked, Low Speed: DED, Medium Drawbar
Pull, T-9 ..... TM5-2410-237-10HR

Operator's, Organizational, Direct Support,
and General Support Maintenance Manual for
Lead-Acid Storage Batteries; 4HN, 24V,
(NSN 6140-00-069-3528) MS75047-1;2HN,
12 V (6140-00-057-2553) MS35000-1;6TN,
12 V (6140-00-057-2554) MS35000-3 ..... TM9-6140-200-14

Painting Instructions for Field Use TM43-0139

A-9. OTHER PUBLICATIONS.

Expendable 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 (Bll) 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, Bll 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 Bll, 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.

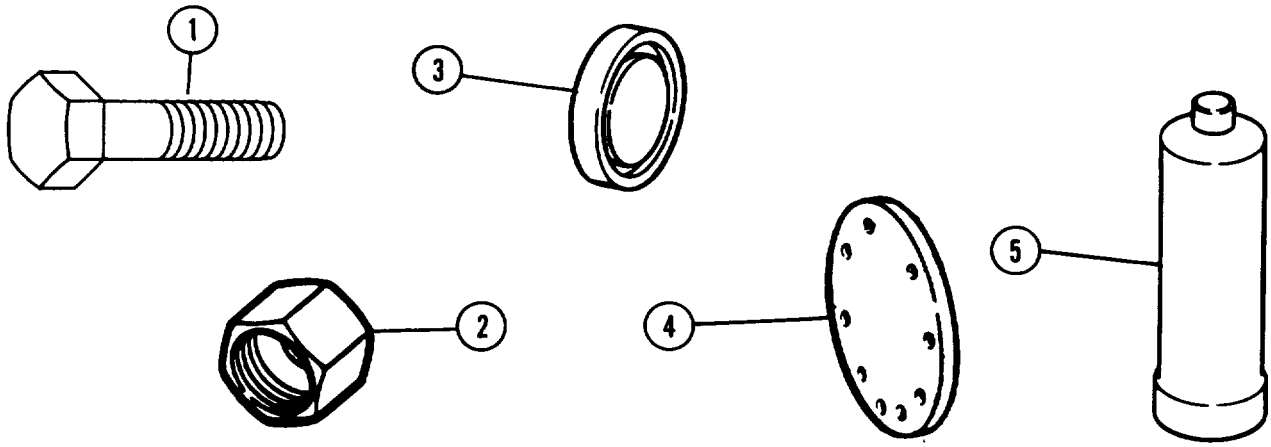
c. Column (3) - Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. Indicates the five digit Commercial and Government Entity (CAGE) code, part number and Usable On code if applicable. Usable On codes identify which items are used on different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

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

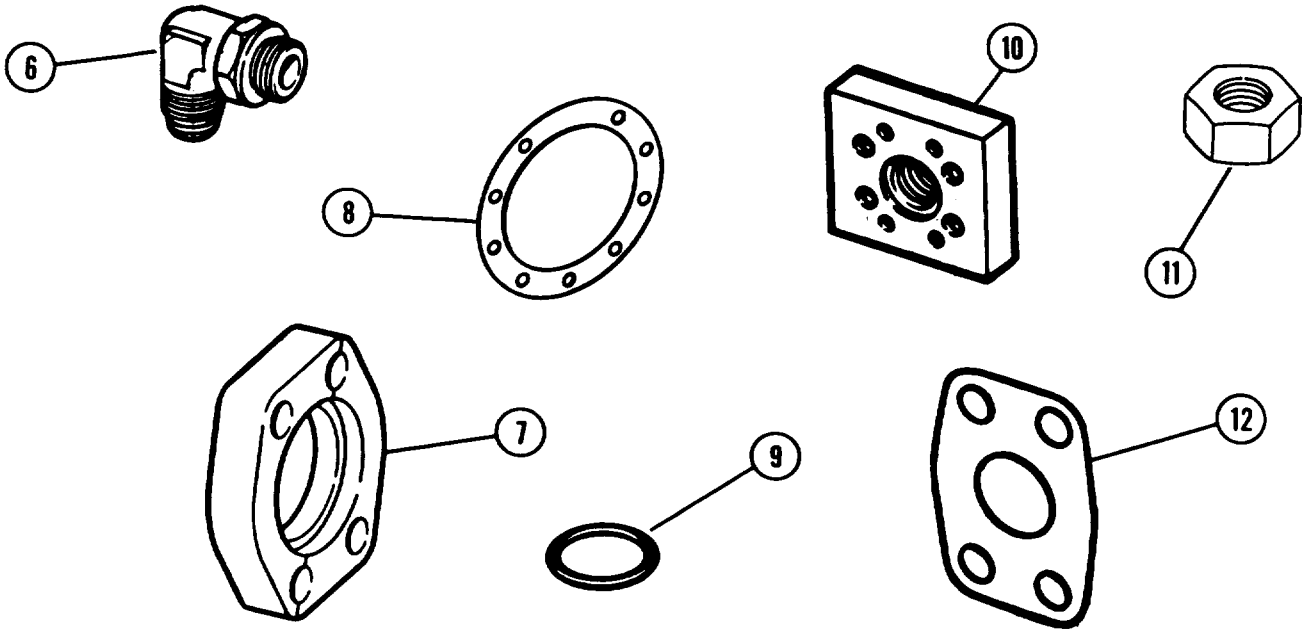
e. Column (5) - Quantity Required (Qty Rqr). Indicates the quantity of the item authorized to be used with/on the equipment.

Section II. Components of End Item List



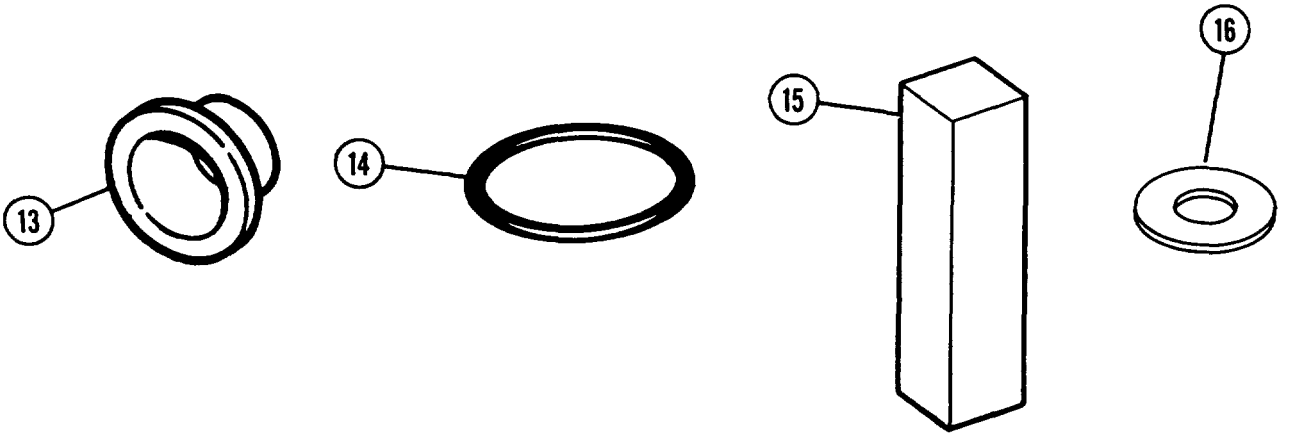
(1) Illus Number	(2) National Stock Number	(3) Description (CAGE) and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
1	5305-00-724-7218	BOLT: hex head capscrew for winch spline cover 5/8-11 X 1 in. (96906) MS90728-158	B BC	EA	9
1	5305-00-782-9489	BOLT: hex head capscrew 3/8-16 X 2 in. (96906) MS90728-66	A AC	EA	8
1	5305-00-071-2069	BOLT: hex head capscrew 1/2-13 X 1-1/2 in. (96906) MS90728-113	B BC	EA	4
1	5306-00-226-4833	BOLT: hex head capscrew 5/16-18 X 2 in. (96906) MS90728-40		EA	8
1	5305-00-071-2066	BOLT: for winch cover storage on fuel tank (96906) MS90728-109	B BC	EA	1
2	4730-00-027-0755	CAP: (11083) 9S8896	B BC	EA	1
3	2815-01-165-5737	COVER: for hydraulic hoses (11083) 5H4019	A AC	EA	4
3	5340-01-215-1481	COVER: for hydraulic hoses (11083) 2J2668	B BC	EA	1
3	3895-01-053-7358	COVER: for hydraulic hoses (11083) 5H4017		EA	4
4	2520-00-569-3839	COVER: for winch spline opening (11083) 2A1465	B BC	EA	1
5	2910-00-646-9727	CYLINDER ASSEMBLY Ether (61112) LP-535-1		EA	1

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



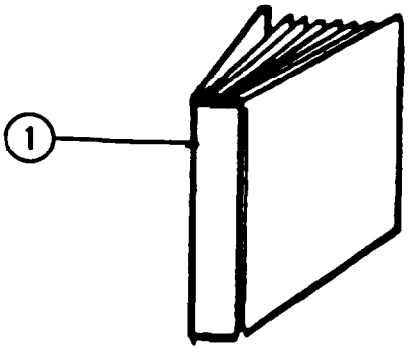
(1) Illus Number	(2) National Stock Number	(3) Description (CAGE) and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
6	2915-00-962-9008	ELBOW: for adapter tool (11083) 307950	B BC	EA	1
7	4730-01-051-5256	FLANGE, 1/2: for hydraulic hose clamp (11083) 1P4577	A AC	EA	8
7	5340-01-060-0309	FLANGE, 1/2: for 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 ether 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	JUNCTION BLOCK: for winch assembly (11083) 5R7848	B BC	EA	1
11	5310-00-732-0558	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: (11083) 2K5644	A AC	EA	2
12	5340-01-270-1800	PLATE: (11083) 3H6274		EA	2

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



(1) Illus Number	(2) National Stock Number	(3) Description (CAGE) and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
13	5340-01-272-8426	PLUG: (11083) 5P1004	B BC	EA	2
14	5330-00-944-8281	SEAL: for winch spline hub (11083) 3D2824	B BC	EA	1
14	5330-00-914-5846	SEAL: for hydraulic hose cover (11083) 4J524	B BC	EA	1
14	5330-00-913-6145	SEAL: for hydraulic hose cover (11083) 4J5140		EA	4
15	5120-01-275-2128	TOOL, DRAIN: (11083) 5R6278 (for transmission filler spout and final drive filler plug)		EA	1
16	5310-00-809-5997	WASHER: for hydraulic hose flange (96906) MS27183-17	B BC	EA	4
16	5310-00-081-4219	WASHER: for hydraulic hose 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 winch spline cover	B	EA	9

Section III. Basic Issue Items List



(1) Illus Number	(2) National Stock Number	(3) Description (CAGE) and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
1		LUBRICATION CHART: LO5-2410-237-12		EA	1
1		MANUAL, HAND RECEIPT: TM5-2410-237-10-HR		EA	1
1		MANUAL, OPERATORS: TM5-2410-237-10		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:

USED ON CODE	MODEL
(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 IL Additional Authorization List

(1) National Stock Number	(2) Description (CAGE) and Part Number	Usable On Code	(3) U/M	(4) Qty Rqr
4930-00-204-2550	ADAPTER, GREASE GUN COUPLING: grease gun, rigid, thin-stem, 6 in. long, type IV, class 2, (19207) 5349744		EA	1
5110-00-293-2336	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
2540-00-670-2459	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
2590-00-473-6331	BRACKET ASSEMBLY, LIQUID CONTAINER: Strap Assy included (19207) 6566675		EA	1
7240-00-242-6153	CAN: water, MIL type, 5 gallon (19207) 11655980		EA	1
7240-00-222-3088	CAN: gasoline, MIL type, 5 gallon, (81902) 14196P1		EA	1
4010-00-473-6166	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
4930-00-288-1511	EXTENSION: grease gun, flex hose, 12 in. long to 14 in. long (19207) 6300333		EA	1
4210-00-775-0127	EXTINGUISHER, FIRE, DRY CHEMICAL: stored pressure discharge, hand operated, 5 lb nominal capacity (19207) 7015266		EA	1
6545-00-922-1200	FIRST-AID KIT: general purpose, 12 unit (19207) 11677011		EA	1
6230-00-264-8261	FLASHLIGHT: electric, hand, 2-cell, w/lamp and lens filter, w/o batteries, type I, class A (21108) MX991-U		EA	1
4930-00-223-3391	GREASE GUN: hand, lever operated, 14 oz. cartridge or bulk load (19207) (5644803)		EA	1
5120-00-061-8546	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
5120-00-288-6574	HANDLE: mattock, pick, railroad or clay pick, 36 in. long, olive drab finish grade AA (19207) 11677021		EA	1
5120-00-243-2395	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
4930-00-266-9182	OILER: hand, push bottom, 8 oz. capacity, 4 in. long spout (96906) M515164-1		EA	1
5120-00-293-3336	SHOVEL: hand, round point, D handle, short size (19207) 11655784		EA	1

APPENDIX D

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. Introduction

D-1. GENERAL.

This appendix lists expendable supplies and materials you will need to operate and maintain the T-9 Tractor. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Clas V, Repair Parts, and Heraldic Items).

D-2. EXPLANATION OF COLUMNS.

a. Column (1) - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use grease (item 5, Appdx. D) on shaft.").

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. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4) - Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the five digit Commercial and Government Entity (CAGE) code in parentheses followed by the part number.

e. Column (5) - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. Expendable/Durable Supplies and Material List

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
			ANTIFREEZE: Permanent Ethylene Glycol (-60°F (-51°C)) inhibited (81349) (MIL-A-46153)	
1	C	6850-00-181-7929	1 gal. Container	gal.
2	C	6850-00-181-7933	5 gal. Container	gal.
3	C	6850-00-181-7940	55 gal. Drum	gal.
			ANTIFREEZE: Permanent Type; Arctic Grade (-90°F (-68°C)) (81349) (MIL-A-11755)	
4	C	6850-00-174-1806	55 gal. Drum	gal.
			GREASE, AUTOMOTIVE AND ARTILLERY GAA (81349) (MIL-G-10924)	
5	C	9150-00-065-0029	2-1/4 oz Tube	oz
6	C	9150-00-935-1017	14 ozCartridge	oz
7	C	9150-00-190-0904	1-3/4 lb Can	lb
8	C	9150-00-190-0905	6-1/2 lb Can	lb
9	C	9150-00-190-0907	35 lb Can	lb
10	C	9150-00-530-7369	120 lb Drum	lb
			INHIBITOR: Corrosion, Liquid Cooling System; Powder Form (81348) (0-I-490)	
11	C	6850-00-753-4967	6 oz can	oz
			OIL, FUEL, DIESEL DF-2: Regular (81348) (VV-F-800)	
12	C	9140-00-286-5295	5 gal. Can	gal.
13	C	9140-00-286-5296	55 gal. Drum, 16 gage	gal.
14	C	9140-00-286-5297	55 gal. Drum, 18 gage	gal.
15	C	9140-00-286-5294	Bulk	gal.
			OIL, FUEL, DIESEL, DF-1: Winter (81348) (VV-F-800)	
16	C	9140-00-286-5287	5 gal. Drum	gal.
17	C	9140-00-286-5288	55 gal. Drum, 16 gage	gal.
18	C	9140-00-286-5289	55 gal. Drum, 18 gage	gal.
19	C	9140-00-286-5286	Bulk	gal.

Section II. Expendable/Durable Supplies and Material List (cont'd)

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
			OIL, FUEL, DIESEL DF-A: Arctic (81348) (VV-F-800)	
20	C	9140-00-286-5282	5 gal. Drum	gal.
21	C	9140-00-286-5284	55 gal. Drum, 16 gage	gal.
22	C	9140-00-286-5285	55 gal. Drum, 18 gage	gal.
23	C	9140-00-286-5283	Bulk	gal.
			OIL, LUBRICATING, ENGINE, ARCTIC (ICE, SUB-ZERO) (81349) OEA (MIL-L-46167)	
24	C	9150-00-402-4478	1 qt Can	qt
25	C	9150-00-402-2372	5 gal. Can	gal.
26	C	9150-00-491-7197	55 gal. Drum, 16 gage	gal.
			OIL, LUBRICATING, GEAR, MULTI-PURPOSE, GO 80/90 (81349) (MIL-L-2105)	
27	C	9150-01-035-5392	1 qt Can	qt
28	C	9150-01-035-5393	5 gal. Drum	gal.
29	C	9150-01-035-5394	55 gal. Drum, 16 gage	gal.
			OIL, LUBRICATING GEAR MULTI-PURPOSE, GO 75 (81349) (MIL-L-2105)	
30	C	9150-01-035-5390	1 qt Can	qt
31	C	9150-01-035-5391	5 gal. Drum	gal.
32	C	9150-00-189-6727	1 qt Can	qt
33	C	9150-00-186-6668	5 gal. Drum	gal.
34	C	9150-00-188-9867	55 gal. Drum, 16 gage	gal.
35	C	9150-00-191-2772	55 gal. Drum, 18 gage	gal.
36	C	9150-00-183-7807	Bulk	gal.
			OIL, LUBRICATING, GEAR MULTI-PURPOSE, GO 85W/140 (81349) (MIL-L-2105)	
37	C	9150-01-048-4591	1 qt Can	qt
38	C	9150-01-035-5395	5 gal. Can	gal.
39	C	9150-01-035-5396	55 gal. Drum	gal.

Section II. Expendable/Durable Supplies and Material List (cont'd)

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
			OIL, LUBRICATING, OE/HDO 10 (81349) (MIL-L-2104)	
40	C	9150-00-189-6727	1qt Can	qt
41	C	9150-00-191-2772	55 gal. Drum, 18 gage	gal.
			OIL, LUBRICATING, OE/HDO 30 (81349) (MIL-L-2104)	
42	C	9150-00-186-6681	1 qt Can	qt
43	C	9150-00-188-9858	5 gal. Drum	gal.
44	C	9150-00-189-6729	55 gal. Drum, 18 gage	gal.
45	C	9150-00-183-7808	Bulk	gal
			OIL, LUBRICATING, OE/HDO 15/40 (81349) (MIL-L-2104D)	
46	C	9150-01-152-4117	1 qt Can	qt
47	C	9150-01-152-4118	5 gal. Drum	gal.
48	C	9150-01-152-4119	55 ga. Drum	gal.

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By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

MILTON H. HAMILTON
Administrative Assistant to the
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03365

Distribution:

To be distributed in accordance with DA Form 12-25-E, Block 3606, requirements for TM 5-2410–237–10.

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BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
3		2		Item 10. Change illustration. Reason: Tube end shown assembled on wrong side of lever cam.
109		51		Item 3. The NSN and P/N are not listed on the AMDF nor the MCRL. Request correct NSN and P/N be furnished.
2-8			2-1	Preventive Maintenance Checks and Services. Item 7 under "Items to be inspected" should be changed to read as follows: Firing linkage and firing mechanism pawl.
12	1-6a			Since there are both 20- and 30- round magazines for this rifle, data on both should be listed.

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THE METRIC SYSTEM AND EQUIVALENTS

'NEAR MEASURE

. 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

'VEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

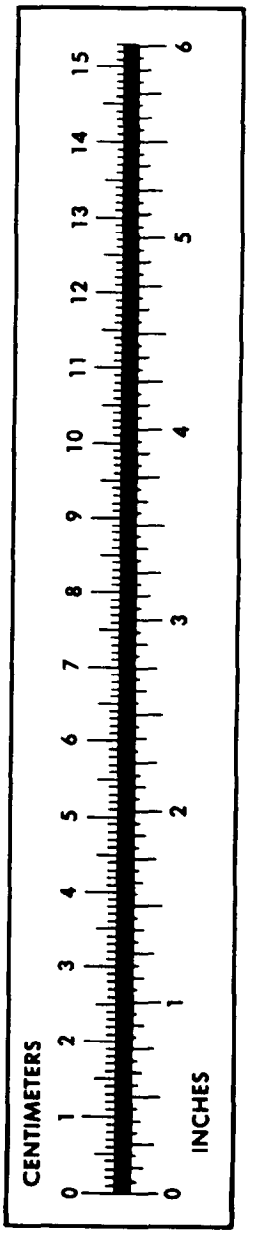
TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
ıts	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
lometers per Liter	Miles per Gallon	2.354
meters per Hour	Miles per Hour	0.621



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