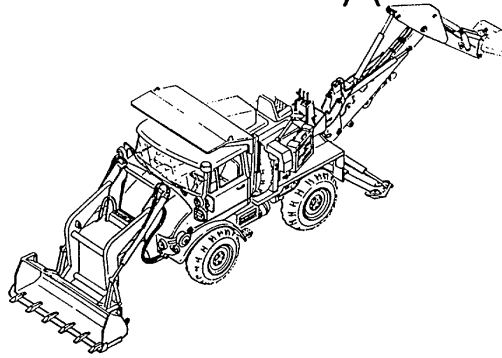


**TECHNICAL MANUAL
OPERATOR'S MANUAL**

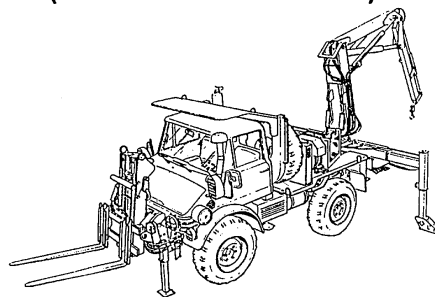
**FOR
TRACTOR, WHEELED, 4 X 4 DED
SMALL EMPLACEMENT EXCAVATOR**

**(SEE)
(NSN 2420-01-160-2754) (EIC:EDL)**



**TRACTOR, WHEELED, 4 X 4 DED
HIGH MOBILITY MATERIAL HANDLER**

**(HMMH)
(NSN 2420-01-205-8636)**



**EQUIPMENT
DESCRIPTION
PAGE 1-4**

**OPERATING
INSTRUCTIONS
PAGE 2-1**

**PREVENTIVE
MAINTENANCE
PAGE 2-24**

**LUBRICATION
INSTRUCTIONS
PAGE 3-1**

**TROUBLESHOOTING
PROCEDURES
PAGE 3-2**

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PROCEDURES
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PAGE Index-1**

**HEADQUARTERS, DEPARTMENT OF THE ARMY 28 JULY 1993
This manual supersedes TM 5-2420-224-10 dated December 1989
Approved for public release; distribution is unlimited.**

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WARNING

Cab seat belts MUST be worn at all times when driving the vehicle.

WARNING

Caution MUST be exercised at all times when traveling or operating in off-road conditions.

WARNING

NEVER approach slopes from an angle while operation in off-road conditions.

WARNING

When operating the backhoe on slopes greater than 10%, NEVER raise the front bucket from the backhoe station or while an operator is in the backhoe operating position.

WARNING

Inspect all hydraulic hoses frequently and replace them if wear/chafing is observed.

WARNING

Caution MUST be exercised regarding physical contact with hydraulic system components when components are at operating temperature.

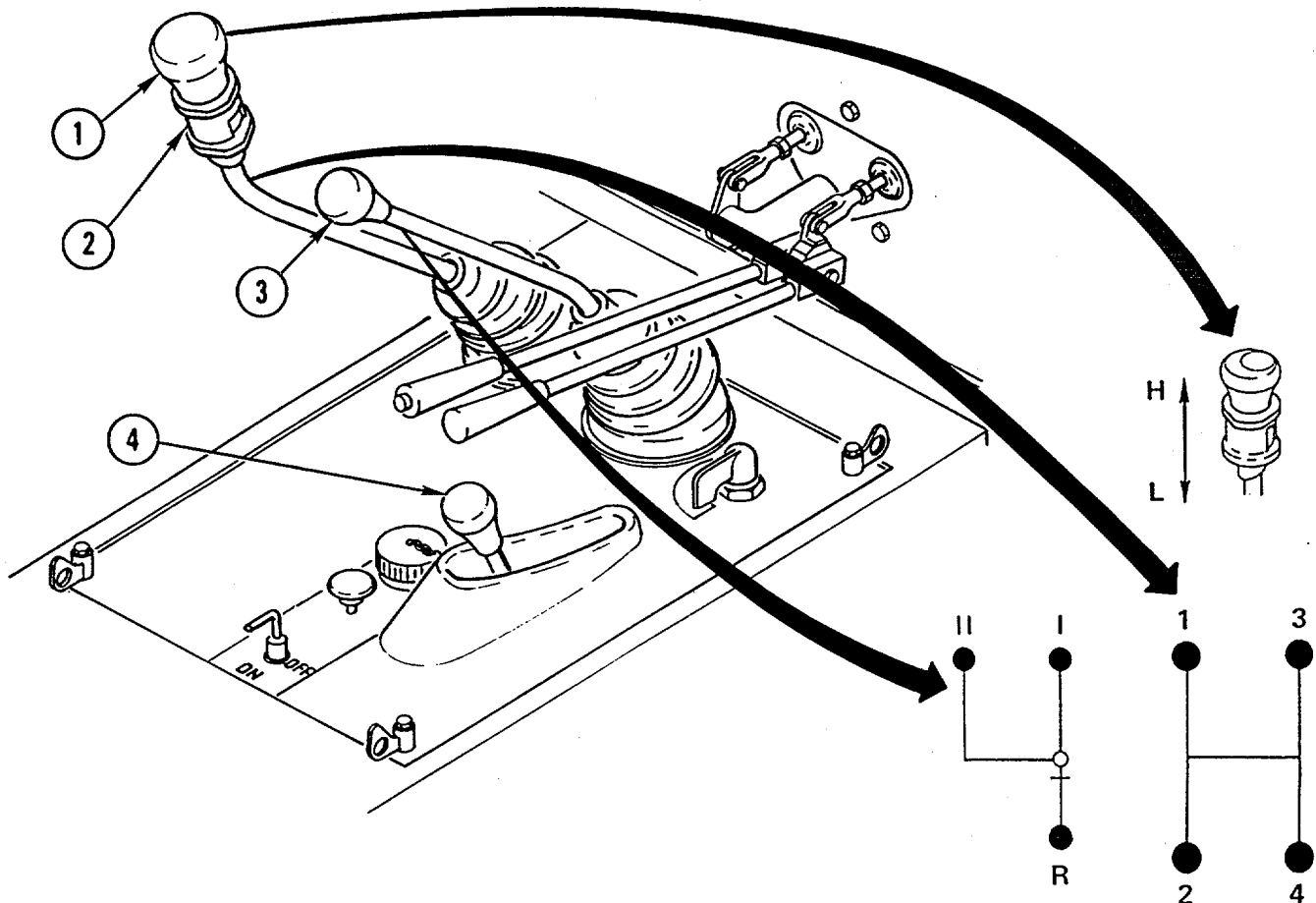
WARNING

Normal (on/off road) backhoe travel position is stowed, however, the positioning of the backhoe in an unstowed center position can improve stability especially in rough and hilly terrain.

WARNING

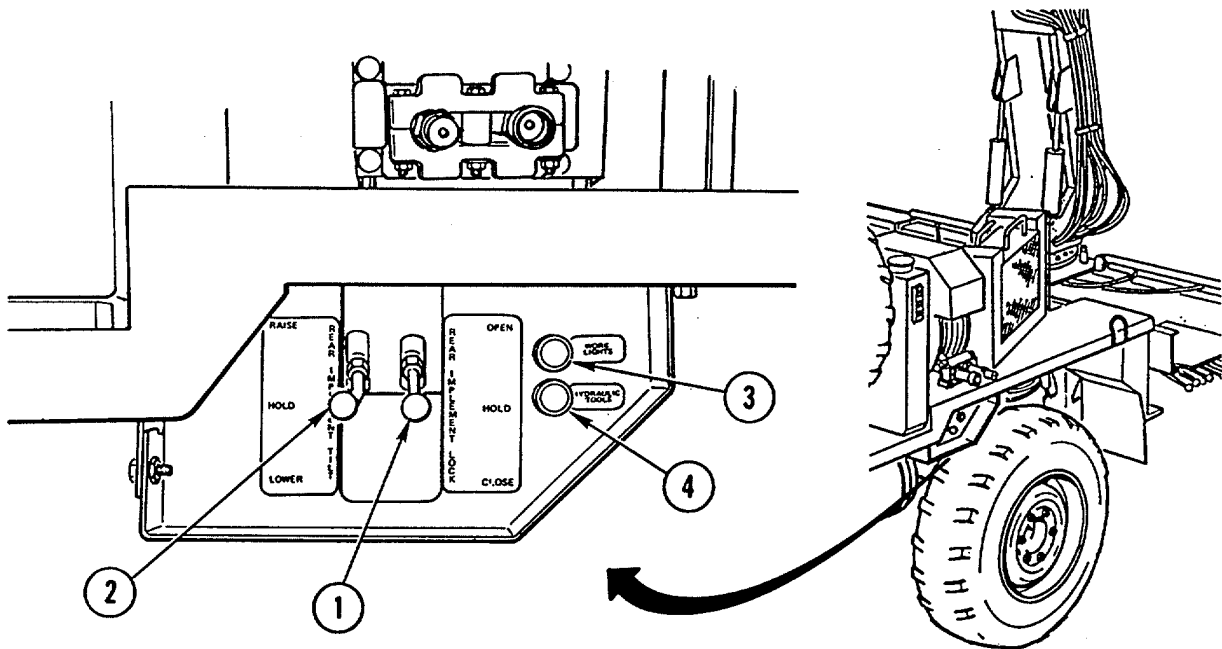
Do not exceed 15 mph (24 kph) when operating the vehicle off road.

c. Transmission Controls.



- (1) Main Shift Lever (1). Shifts all speeds no matter what gear range or intermediate speeds are preselected. Clutch pedal must be fully depressed to engage.
- (2) Intermediate Speed Control (2). Intermediate speeds are main transmission reduction speeds and can be engaged and disengaged while driving either forward or reverse. Versatility of the speed control in these ranges provides varied gear reductions on demand and, therefore, controls the speed of the vehicle. Clutch pedal must be fully depressed to engage.
- (3) Group Shift Lever (3). The group shift selector has three shifting functions: Gear Range I-low group; Gear Range II-high group; and R-reverse. Clutch pedal must be fully depressed to engage.
- (4) Power Take-Off (PTO) Lever (4). Pull back to engage and push forward to disengage. Clutch pedal must be fully depressed to engage PTO. Engine should be at idle for smooth engagement. Indicator light on instrument panel is lit when PTO is engaged.

k. **Left Platform Control Panel.**



- (1) Rear Implement Lock Lever (1). Locks backhoe/crane in place for operation. Lift lever to open locks; press lever down to close locks. Lever returns to center automatically.
- (2) Rear Implement Tilt Lever (2). Tilts backhoe/crane in and out of travel position. Lift lever to raise and fold backhoe/crane into travel position; press lever down to lower and fold out backhoe/crane out of travel position. Lever returns to center automatically.
- (3) Work Lights Switch (3). Activates work lights on rear of vehicle. Pull switch to turn lights on; press switch to turn lights off.
- (4) Hydraulic Tools Switch (4). Activates auxiliary throttle (2000 rpm) and supplies hydraulic fluid for hydraulic hand tool operation. Pull switch to activate; press switch to deactivate.

1. **Backhoe Controls (SEE).**

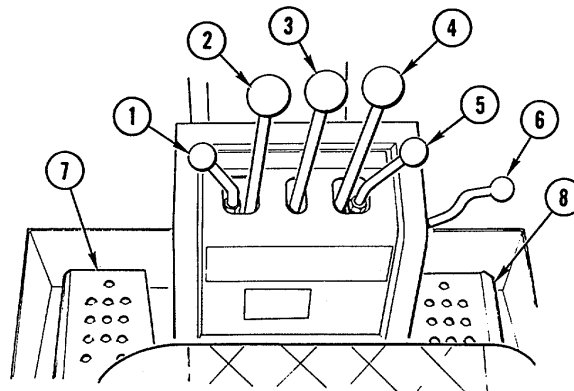


Table 2-1. Preventive Maintenance Checks and Services for SEE/HMMH

Item No.	Interval	Location	<u>Crewmember</u> Procedure	Not Fully Mission Capable If:
		Item to Check/ Service		
6	Before	Backhoe (SEE) Continued	<p style="text-align: center;">NOTE</p> <p>Place backhoe in travel position (refer to page 2-98) to perform the following check.</p> <p>f. Verify all locking devices, safety pins, and latches are present and implements are securely locked in travel position.</p>	f. Locking devices, safety pins are missing or damaged and latches are not locked.
7	Before	Backhoe Bucket (SEE)	Check for loose or missing teeth, and broken or cracked bucket and welds.	Loose or missing teeth or damage that will impair operation.
8	Before	Crane Assembly (HMMH)	<p style="text-align: center;">NOTE</p> <p>Place crane in three-point stance (refer to page 2-136.2) to perform the following checks.</p> <p>a. Inspect crane controls and linkage for damage or binding.</p> <p>b. Visually check for loose or missing bolts, fittings, and hoses, and secure mounting points.</p> <p>c. Verify and inspect operation of engine RPM and control switch, and proper RPM setting for crane assembly.</p> <p>d. Visually inspect hydraulic lines, control valves, fittings, and all cylinders for leaks and damage.</p>	<p style="text-align: center;">NOTE</p> <p>The following NMC criteria (items a through d) only apply if the crane is required to perform your daily mission.</p> <p>b. Parts are missing or mounting points are cracked or damaged.</p> <p>c. Switch is inoperative.</p> <p>d. Class III leak.</p>

Table 2-1. Preventive Maintenance Checks and Services for SEE/HMMH

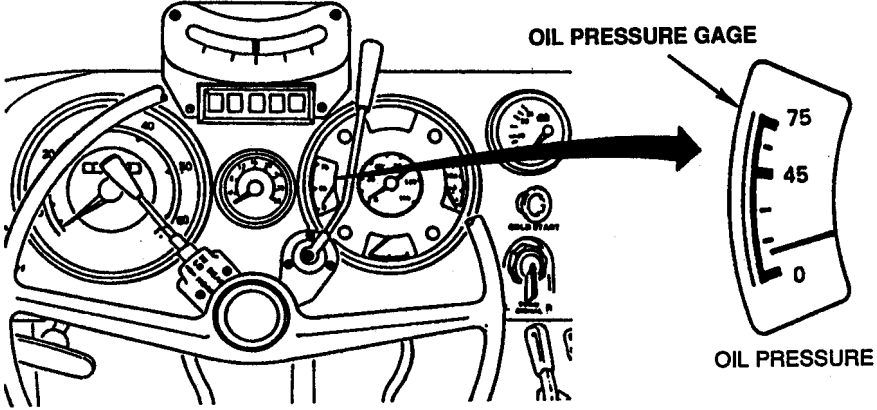
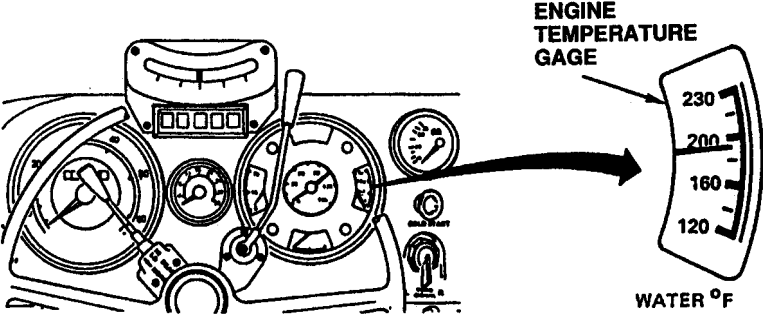
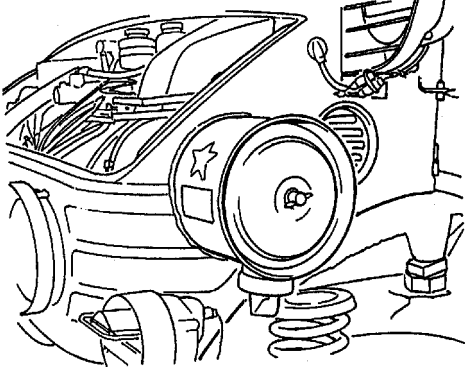
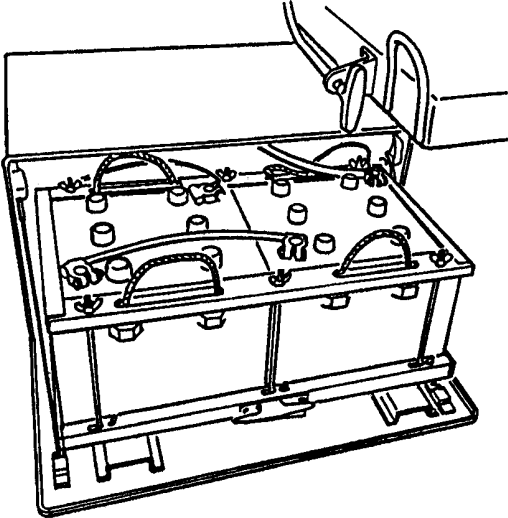
Item No.	Interval	Location	Crewmember Procedure	Not Fully Mission Capable If:
		Item to Check/ Service		
28	During	Warning Lights, Gages, and Instruments	d. Oil pressure gage: idle, 9 psi; working, 29-73 psi.	Minimum oil pressure is not reached.
		Continued		
				
		<p>e. Engine temperature gage: 176° -194° F.</p> 		

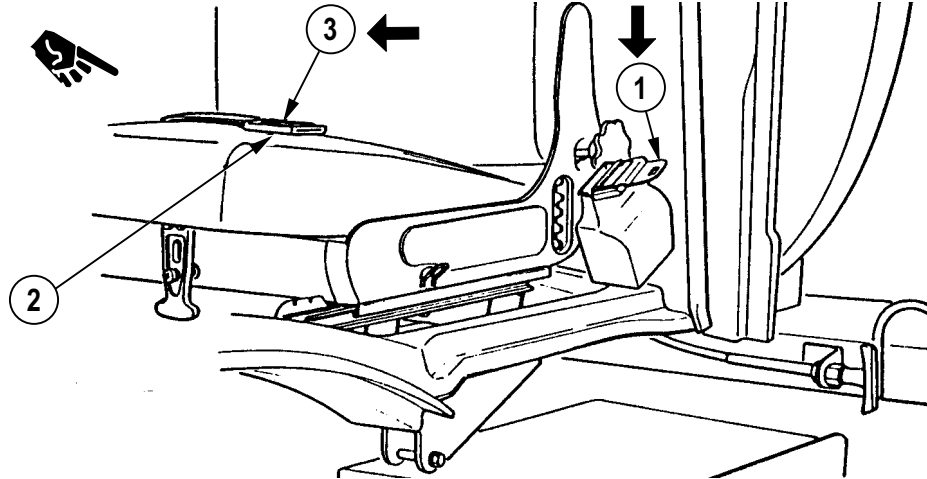
Table 2-1. Preventive Maintenance Checks and Services for SEE/HMMH

Item No.	Interval	Location	Crewmember Procedure	Not Fully Mission Capable If:
		Item to Check/ Service		
50	Weekly	Air Cleaners	<p>Check that dust discharge valve and inlet air line are clear.</p>  <p style="text-align: center;">WARNING</p> <p>Do not smoke or have open flames in vicinity while checking batteries, especially if the caps are off.</p>	Evidence of damage to air cleaner, air line or discharge valve.
51	Weekly	Batteries	<p>Check batteries for tight and corroded connections, frayed or broken cables, and obvious damage to batteries and battery box.</p> 	Batteries have obvious damage, will not hold charge or have damaged terminals.

d. **Fasten/Unfasten Seat Belt.**

WARNING

Seat belt must be fastened at all times during operation of vehicle. Failure to do so could result in personal injury.



(1) Insert latch plate (1) into buckle (2) to fasten seat belt.

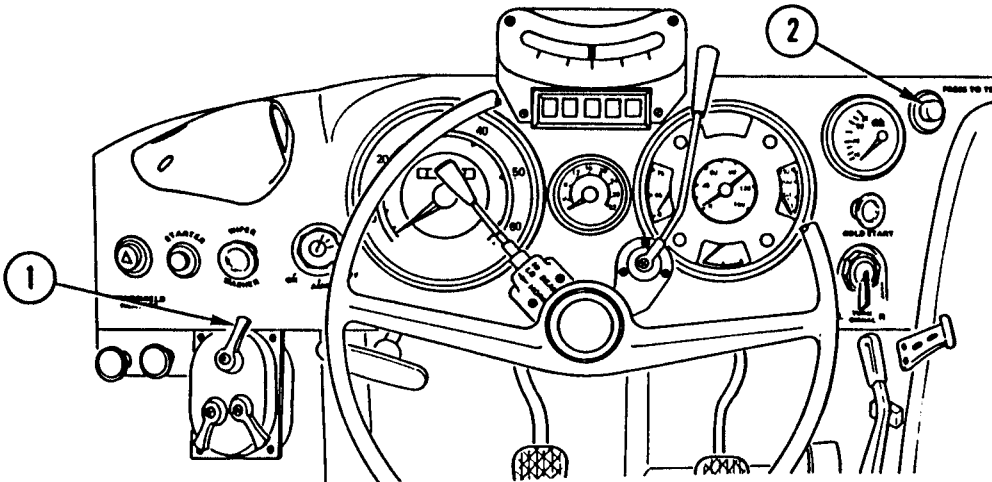
(2) Push button (3) on buckle (2) to unfasten seat belt.

e. **Adjust Rear View and Both Side Mirrors.**

f. **Test Backhoe/Crane Operator Warning Horn.**

CAUTION

If buzzer sounds during operation, stop operation and check engine oil pressure gage for low oil pressure reading, and engine coolant temperature gage for overheating indication. Failure to do so could result in equipment damage.



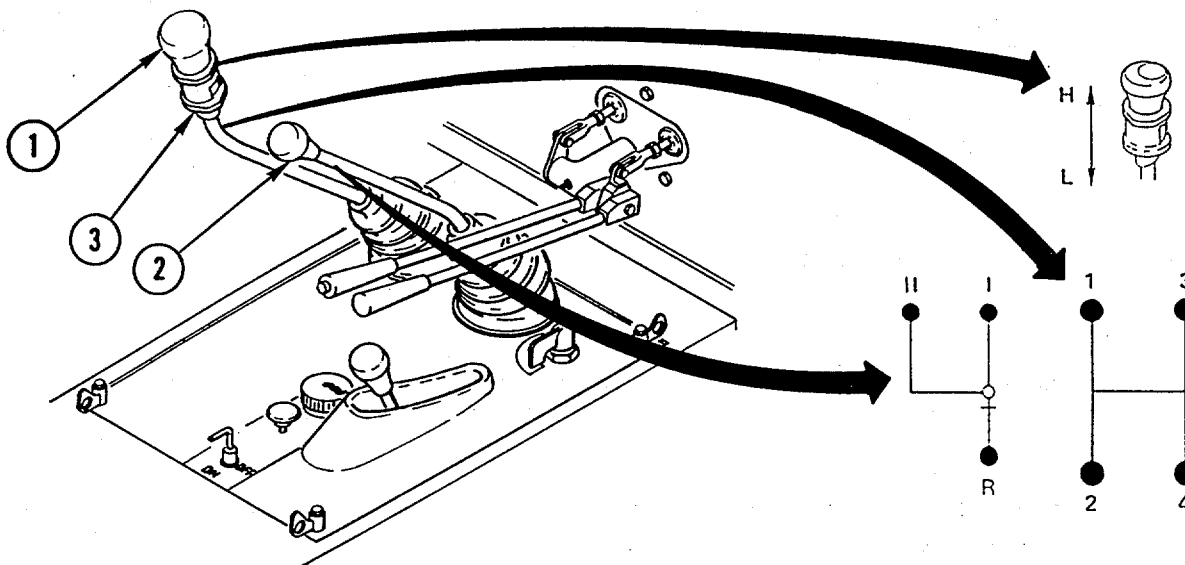
(1) Turn vehicular light switch lever (1) to first position from OFF and hold test button (2) down for time delay with engine running and alternator charging.

(2) Push and hold test button (2) for 6-10 seconds to actuate warning horn.

(3) Intermediate Speed Shifting.

CAUTION

- * When shifting, wait for intermediate shift indicator light to change before letting up on clutch. Failure to do so could result in equipment damage.
- * Do not actuate clutch too fast. Intermediate speed is pneumatically engaged. Failure to do so could result in equipment damage.



Slide intermediate speed control (3) on main shift lever (1) down (position L), disengage clutch, then engage clutch. Pull control up (position H), disengage clutch, then engage clutch.

(4) Changing Direction. The vehicle must come to a complete stop before shifting group shift lever (2) into reverse.

h. **Selecting Four-Wheel Drive and Four-Wheel Drive with Differential Lock.**

CAUTION

- Do not drive on highway with differential locks engaged. Equipment damage may occur.
- While operating vehicle off-road, always engage four-wheel drive or differential lock to activate pressurization of axles and wheel hubs. This will prevent dirt from entering hub drive housing and damaging wheel hub seals.
- Engage and disengage four-wheel drive and four-wheel drive with differential lock only when wheels are rotating in contact with the ground, not spinning or slipping. This will prevent premature failures of the constant velocity joint and axle shaft.
- While operating vehicle off-road, avoid sharp turns with differential locks engaged. Equipment damage may occur.

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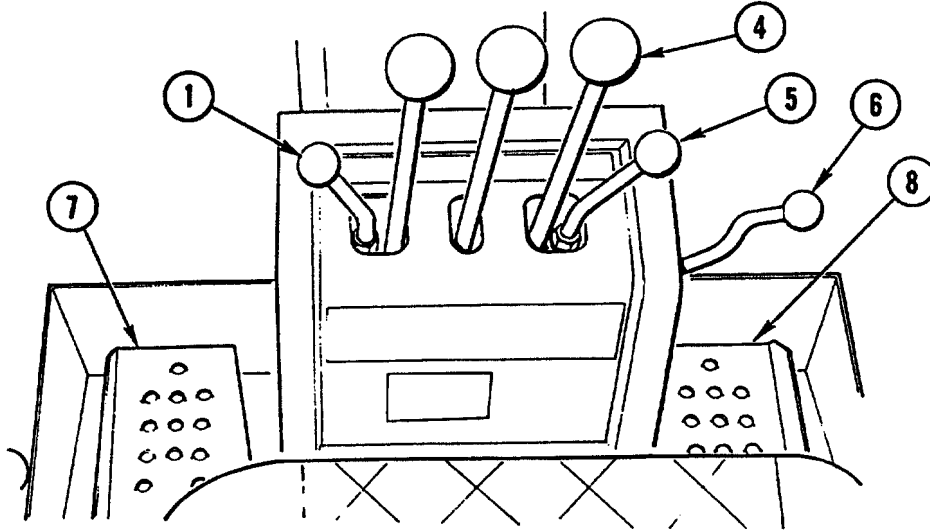


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CAUTION

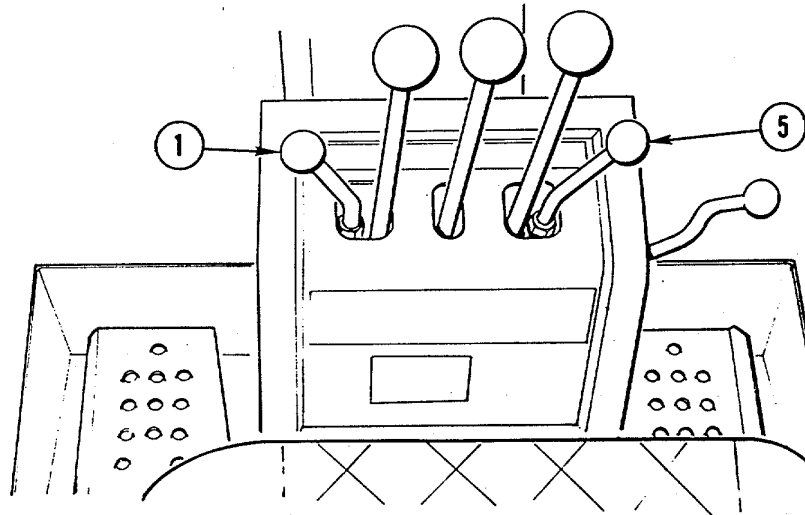
- Always position stabilizer pads for maximum stability when backhoe is not operating next to unmovable object. Failure to do so could result in equipment damage.
- Exercise care when swinging backhoe completely to the side. In some positions, backhoe can contact stabilizers and cause damage.



- (g) Lower stabilizers with control levers (1 and 5) until stabilizers are extended and slightly lift rear of vehicle.
 - (h) Using swing control pedals (7 and 8), swing backhoe to center position.
 - (i) Release tension on boom lock by moving boom control lever (4) out. Lift boom lock by pushing boom lock latch lever (6) to the right.
 - (j) Pull back on boom control lever (4).
 - (k) Backhoe is ready for operation.
- (10) Digging with Backhoe.

WARNING

- Before starting work in new area, walk around and look for holes or obstructions. Failure to find hidden holes or obstructions could result in an accident and injury.
- Before operating backhoe in area where your visibility is reduced (next to a building, etc.), install guard rail and warning signs to keep other personnel away from your machine. Failure to do so could result in personnel injury.

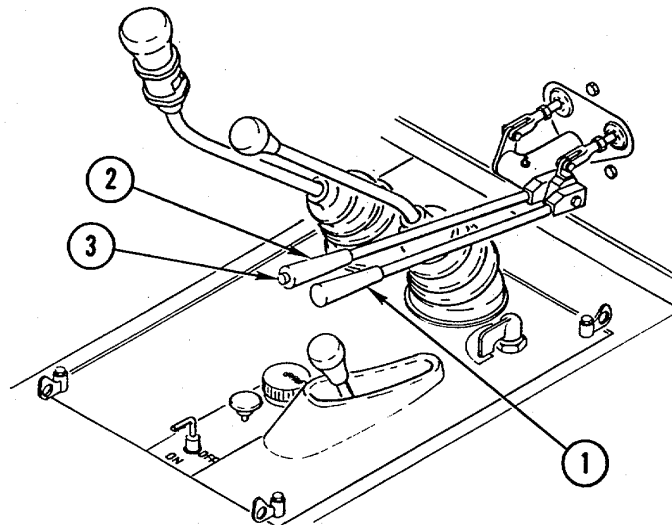


Lower stabilizers with control levers (1 and 5) until stabilizers are extended and slightly lift rear of vehicle.

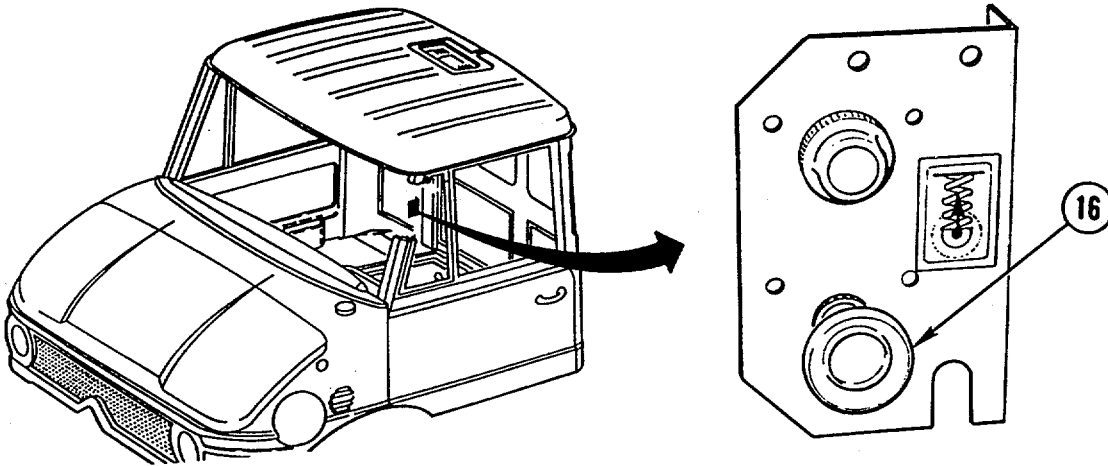
m. Forklift Operation (HMMH).

NOTE

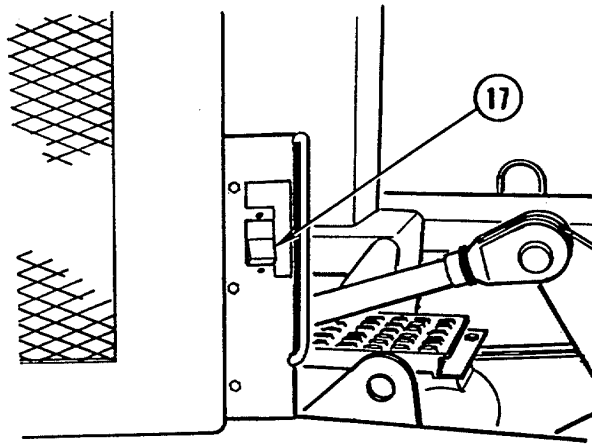
For forklift operation, front suspension lockout system should be engaged (refer to page 2-15).



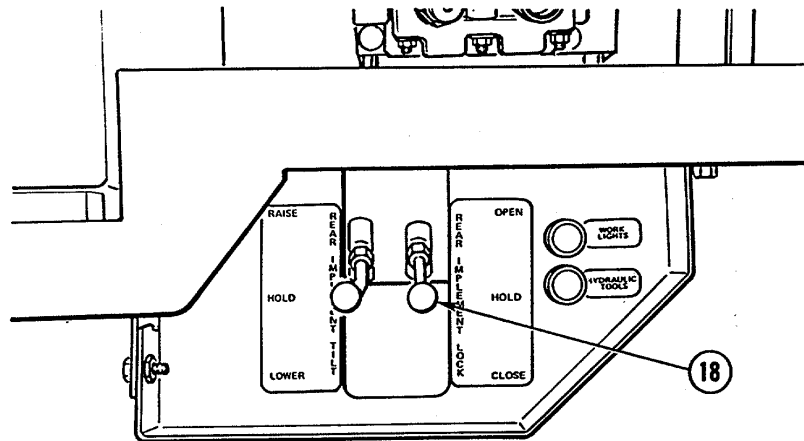
- (1) Mast Control Lever (1). Located to right of driver's seat. Pull lever to raise carriage; push lever to lower carriage.
- (2) Tilt Control Lever (2). Located to right of driver's seat. Pull lever to tilt mast backward; push lever to tilt mast forward.
- (3) Carriage Rotation. Press button (3) and at same time push lever (2) to rotate carriage clockwise or pull lever to rotate carriage counterclockwise.



(e) Activate front suspension lockout system by pulling switch (16) behind passenger seat and pressing clutch pedal at same time.

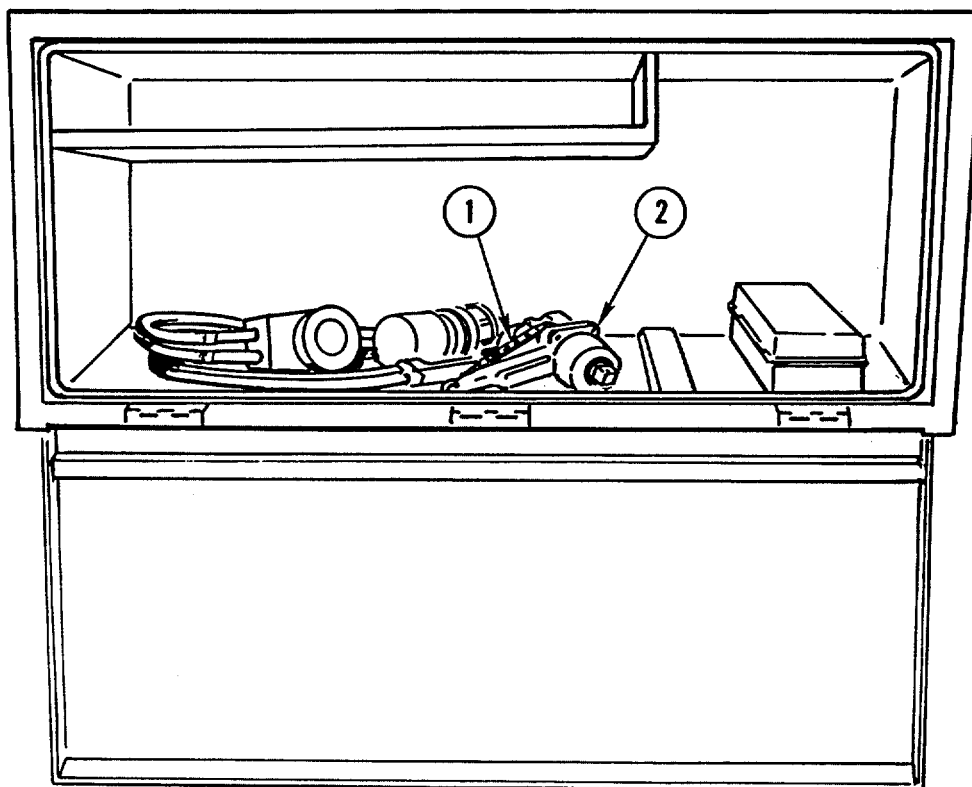


(f) Move engine speed switch (17) from idle position to crane position.



(g) Move rear implement lock lever (18) to OPEN position and make sure locks are fully retracted.

q. **Removing Hydraulic Tools from Hydraulic Accessory Box (HMMH).**



Unlock hydraulic accessory box and remove tiedown strap (1) securing impact wrench (2). Grasp impact wrench with both hands.

r. **Installing Hydraulic Tools in Hydraulic Accessory Box (HMMH).**

Grasp impact wrench (2) with both hands and place in hydraulic accessory box. Secure impact wrench with tiedown strap (1). Close and secure hydraulic accessory box.

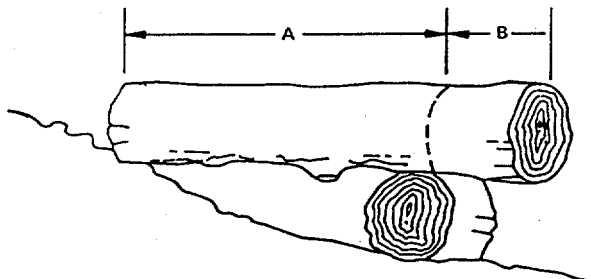
s. **Connecting Hydraulic Tools to Hydraulic Hose Reel.**

WARNING

- Make sure hydraulic power source is off before installing tool hoses to hose reel hoses. Failure to do so could result in personal injury from accidental activation of tool.
- Always wear hearing protection when operating hydraulic tools to prevent personal injury.

WARNING

- Grip chain saw firmly with both hands. Failure to do so could result in personal injury.



- (a) Aline bar and place bucking cleat against work to be cut.
- (b) In area A, cut down from top $\frac{1}{3}$ the way. Finish by cutting up from bottom.
- (c) In area B, cut down from top until cut is complete.

(7) Pruning and Debranching with Chain Saw (SEE).

WARNING

- Make sure footing is firm. Failure to do so could result in personal injury.
- Grip chain saw firmly with both hands. Failure to do so could result in personal injury.
- Do not work overhead with chain saw. Work at chest level or lower. Failure to do so could result in personal injury.

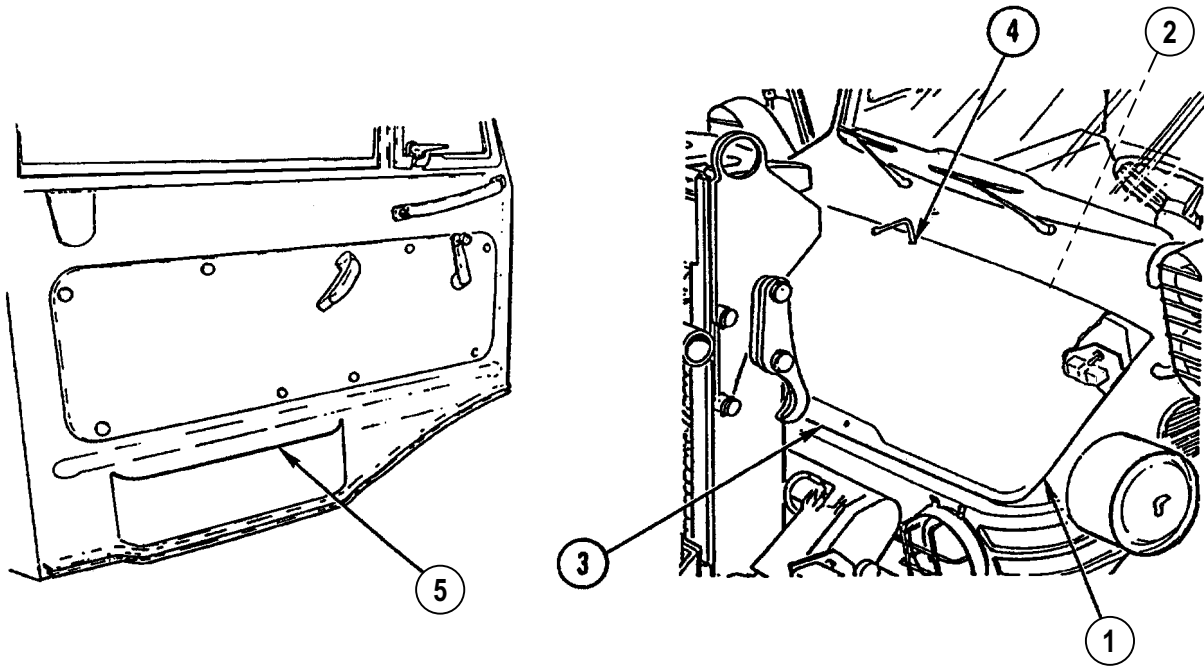
Place bucking cleat as close to work as possible to avoid kickback.

(8) Using Impact Wrench (HMMH).

WARNING

- Before operating impact wrench, make operational check of controls. Failure to do so could result in personal injury.
- Never inspect or clean wrench with power source operating or with operating pressure at tool. Accidental engagement of tool can cause personal injury.
- Always connect hoses from hose reel to tool couplers before energizing power source. Failure to do so could result in personal injury.

z. Installation of the Engine Hood.



CAUTION

Do not catch engine hood on brake fluid reservoir and windshield washer reservoir when installing engine hood with front loader installed. To do so could result in equipment damage.

- (1) Place engine hood (1) on engine compartment (2).
- (2) Lift engine hood (1) slightly from below and lock safety latch on left side by reaching inside bottom-left corner.
- (3) Lock engine hood (1) with key at bottom (3) and at upper bore (4).
- (4) Return key to left-hand door box (5).

2-15. TRACTOR TRAILER OPERATION

General.

- (1) When pulling a trailer, the tractor should be near maximum possible gross weight (16,000 lb).
- (2) When pulling a trailer off-highway, engage four wheel drive.
- (3) The maximum permissible gross towed trailer weight is 17,000 lb (7711 kg) when operating on-highway or off-highway.

Malfunction**Test or Inspection****Corrective Action**

Step 2. Check for wrong grade of fuel.

- Determine grade of fuel with fueling station. If necessary, have unit maintenance drain fuel tank and fill with correct grade of fuel (refer to LO 5-2420-224-12).

Step 3. Check coolant temperature gage for too low operating temperature after warmup period.

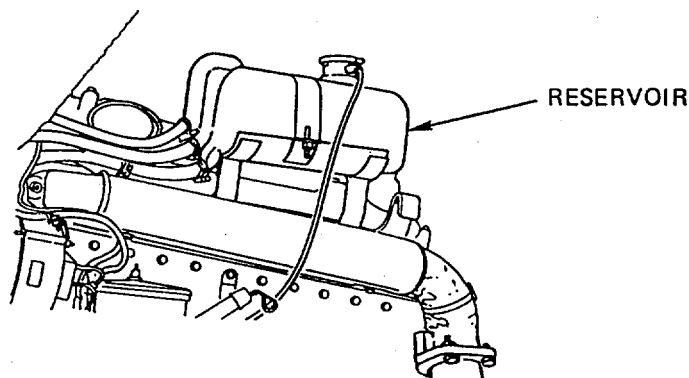
- If temperature is below 1760F (800C), notify unit maintenance.

5. ENGINE OVERHEATS DURING NORMAL OPERATION.

Step 1. Check for low coolant level in reservoir.

WARNING

When engine is hot, remove reservoir cap slowly to relieve pressure. Wear gloves and protective clothing. Failure to do so could result in personal injury.



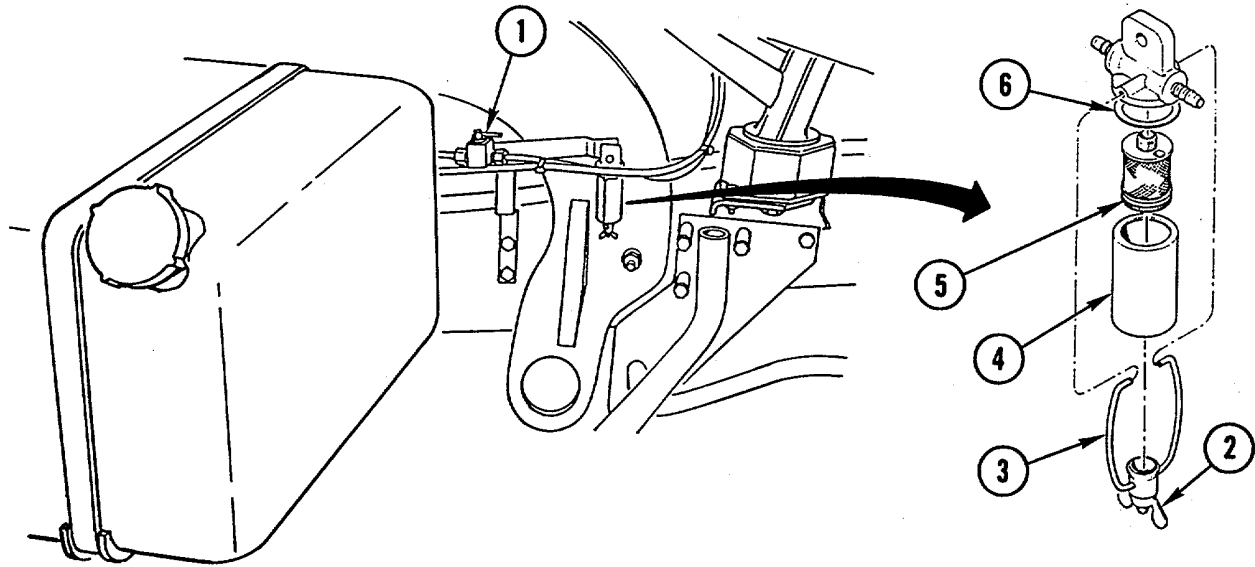
- Add coolant as required. Tighten any connections that may be subject to leaks.

Step 2. Check for debris blocking air flow through radiator.

CAUTION

Do not use screwdriver or any other sharp instrument to remove debris from radiator. To do so could result in equipment damage.

- Remove debris from grille and radiator. If radiator cooling fins are plugged, notify unit maintenance.

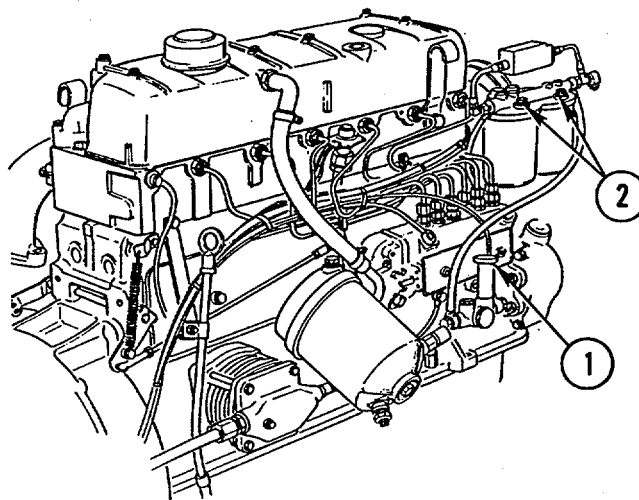


NOTE
Have container available to catch fuel.

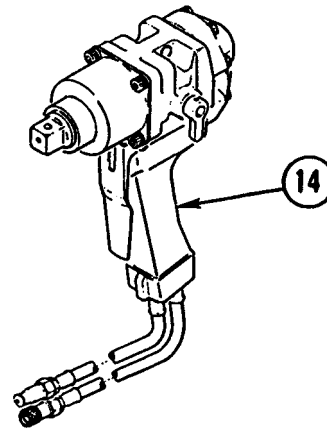
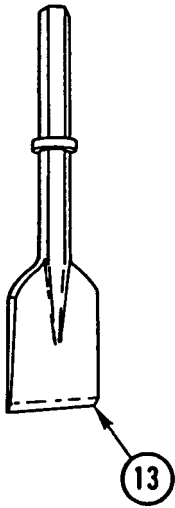
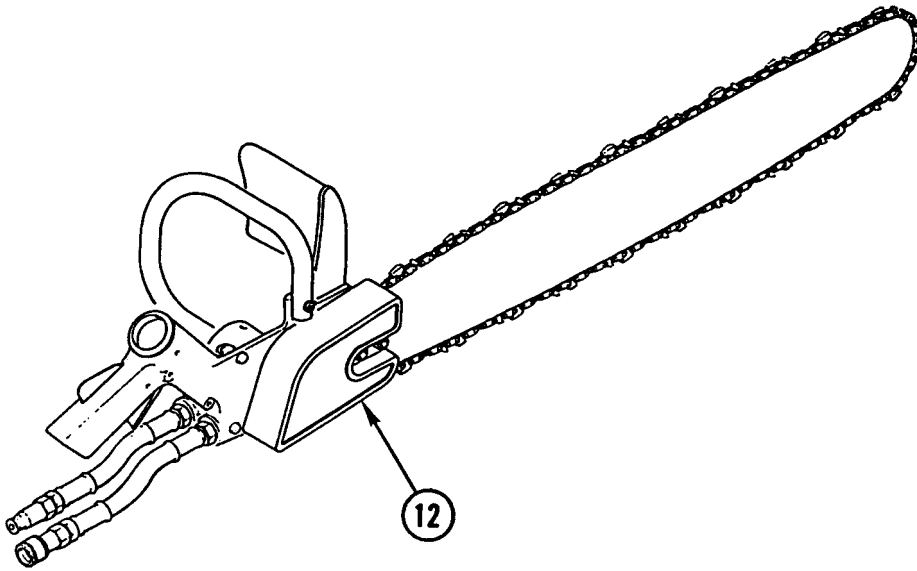
- d. Remove bowl (4), strainer (5), and gasket (6).
- e. Clean strainer (5) with clean diesel fuel.
- f. Install gasket (6) and strainer (5).
- g. Fill bowl (4) with clean diesel fuel and install.
- h. Aline clip (3) and tighten wing nut (2).
- i. Open fuel shutoff valve (1).

3-5. PRIMING AND BLEEDING FUEL SYSTEM

- a. Remove engine hood (refer to page 2-7).



Section II. COMPONENTS OF END ITEM (CONT)



(1) ILLUST NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGE & PART NUMBER	USABLE ON CODE	(4) U/M	(5) QTY RQR
12	3695-01-243-2325	Saw, Chain 15-in. cut bar CSO-6 (54252) CS06120M	A	EA	1
13	3820-01-242-1210	Spade, Clay, 5-1/2 in. (54252) 09262	A	EA	1
14	5130-01-300-6052	Wrench, Impact (64678) 419-559-72-02	B	EA	1

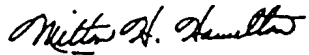
Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
0.1	C	6810-00-543-7415 6810-00-201-0904 6810-00-201-0906	Alcohol, Denatured (81348) OE760 1 gal 55 gal 16 oz	GAL GAL OZ
1	C	6850-00-243-1992	Antifreeze, Permanent, Glycol, Inhibited (81349) MIL-A-46153	GAL
2	O		Fluid, Brake, Silicone MIL-B-46176	QT
3	C	6850-00-926-2275	Fluid, Windshield Washing (81348) 0-C-1901 1 gal bottle	GAL
4	C	9150-00-065-0029 9150-00-936-1017 9150-00-190-0904 9150-00-190-0905 9150-00-190-0907	Grease, Automotive and Artillery (GAA) (81349) MIL-G-10924 2-1/2 oz tube 14 oz cartridge 1 lb can 5 lb can 35 lb can	OZ OZ LB LB LB
5	O		Lubricant, Gear, Universal (81349) MIL-L-2105	
6	O	9150-00-261-7904 9150-00-257-5440 9150-00-257-5443	Oil, Lubricating, Gear, Subzero (GOS) (81349) MIL-L-10324 1 qt can 5 gal drum 55 gal drum	QT GAL GAL
7	C	9150-00-265-9425 9150-00-265-9430 9150-00-265-9430 9150-00-265-9430	Oil, Lubricating, OE/HDO-10 (81349) MIL-L-2104 1 qt can 5 gal drum 55 gal drum, 16 gage 55 gal drum, 18 gage	QT GAL GAL GAL
8	C	9150-00-265-9433 9150-00-265-9435 9150-00-265-9436 9150-00-265-9437	Oil, Lubricating, OE/HDO-30 (81349) MIL-L-2104 1 qt can 5 gal drum 55 gal drum, 16 gage 55 gal drum, 18 gage	QT GAL GAL GAL

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

Official:



MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
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