LUBRICATION ORDER

28 JULY 1993

LO 5-2420-224-12

TRACTOR, WHEELED, 4 X 4 DED SMALL EMPLACEMENT EXCAVATOR (SEE) (NSN 2420-01-160-2754) (EIC:EDL) AND TRACTOR, WHEELED, 4 X 4 DED HIGH MOBILITY MATERIAL HANDLER (HMMH) (NSN 2420-01-205-8636)

Reference: TM 5-2420-224-10 and **TM 5-2420-224-20**

Intervals (on-condition or hard time) and the related man-hour times are based on normal operation. The man-hour time specified is the time you need to do the services prescribed for a particular interval. On-condition (OC) oil sample intervals shall be applied unless changed by the Army Oil Analysis Program (AOAP) laboratory. Change the hard time interval if your lubricants are contaminated or if you are operating the equipment under adverse operating conditions, including longer-than-usual operating hours. The hard time interval may be extended during periods of low activity. If extended, adequate preservation precautions must be taken. Hard time intervals will be applied in the event AOAP laboratory support is not available.

WARNING

Death or serious injury could result from repeated or prolonged breathing or skin contact of drycleaning solvent SD, type II, P-D-680, Use in well-ventilated area. Do not use near open flame or in excessive heat.

Clean fittings before lubricating. Clean parts with drycleaning solvent (SD), type II or equivalent. Dry before lubricating

NOTE

Dotted arrow points indicate lubrication on both sides of the equipment.

Level of maintenance. The lowest level of maintenance authorized to lubricate a point is indicated by one of the following symbols as appropriate: Operator/Crew (C), and Unit Maintenance (0).

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 or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, US Army Tank-Automotive Command, ATTN: AMSTA-MB, Warren, MI 48397-5000. A reply will be furnished to you.

TOTAL MAN-HOURS

INTERVAL	MAN-HOURS
D	0.4
M	3.5
Q	4.0
S	4.5
A	5.0

KEY

LUBRICANTS		CAPACITIES	EXPECTED TEMPERATURES			INTERVALS
			Above +32°F (Above 0°C)	+40° to -10°F (+4° to -26°C)	0° to -65°F (-17° to -53°C)	
OE/HDO (MIL-L-2104)	LUBRICATING OIL, Internal Combustion Engine, Tactical Service	As Required	OE/HDO 15W40	OE/HDO-10	OEA	D – Daily/ 10 hours M – Monthly/ 50 hours Q – Quarterly/ 250 hours S – Semiannually/ 500 hours A – Annually/ 1000 hours OC – On-condition
OEA (MIL-L-46167)	LUBRICATING OIL, Internal Combustion Engine, Arctic	As Required				
	Engine Crankcase	Max 11.6 qt (11.0 l) Min 8.4 qt (8.0 l)				
	Engine Oil Filter	1.05 qt (1.0 l)				
	Hydraulic System	Front 44 qt (41.6 l) Rear 84 qt (79.4 l)	OE/HDO-10	OE/HDO-10	OEA	
	Power Steering Reservoir	3 qt (2.8 l)				
	Front Suspension Lockout System (HMMH)	1 qt (0.94 l)				
GO (MIL-L-2105)	Transmission	7 qt (6.6 l)	GO-80/90	GO-80/90	GO-75	
	Front and Rear Axle Hub Drives	0.25 qt ea (0.23 l)				
	Front and Rear Differentials	2.4 qt (2.25 l)				
(MIL-B-46176)	Hydraulic Brake System	0.8 qt (0.75 l)	ALL TEMPERATURES			
	Hydraulic Clutch System	0.2 qt (0.19 l)				
PL (Medium MIL-L-3150) (Special VV-L-800)	LUBRICATING OIL, General Purpose	As Required	PL-M (Medium)	PL-S (Special)	PL-S (Special)	
GAA (MIL-G-10924)	GREASE, Automotive and Artillery	As Required	ALL TEMPERATURES			
SD-Type II (P-D-680)	SOLVENT, Drycleaning	As Required	ALL TEMPERATURES			
Inhibited Heavy Duty (MIL-A-46153)	Radiator System Coolant Antifreeze	24 qt (23 l)			Above -40°F (Above -40°C)	
Arctic Type (MIL-A-11755)	Radiator System Antifreeze	24 qt (23 l)			-40° to -85°F (-40° to -65°C)	
Alcohol – Ethyl, Methanol, or Denatured	Brake Compressed Air Antifreeze Unit	0.2 qt (0.19 l)	ALL TEMPERATURES			

For Arctic operation refer to TM 9-207

OIL ANALYSIS PROGRAM SAMPLING PROCEDURES

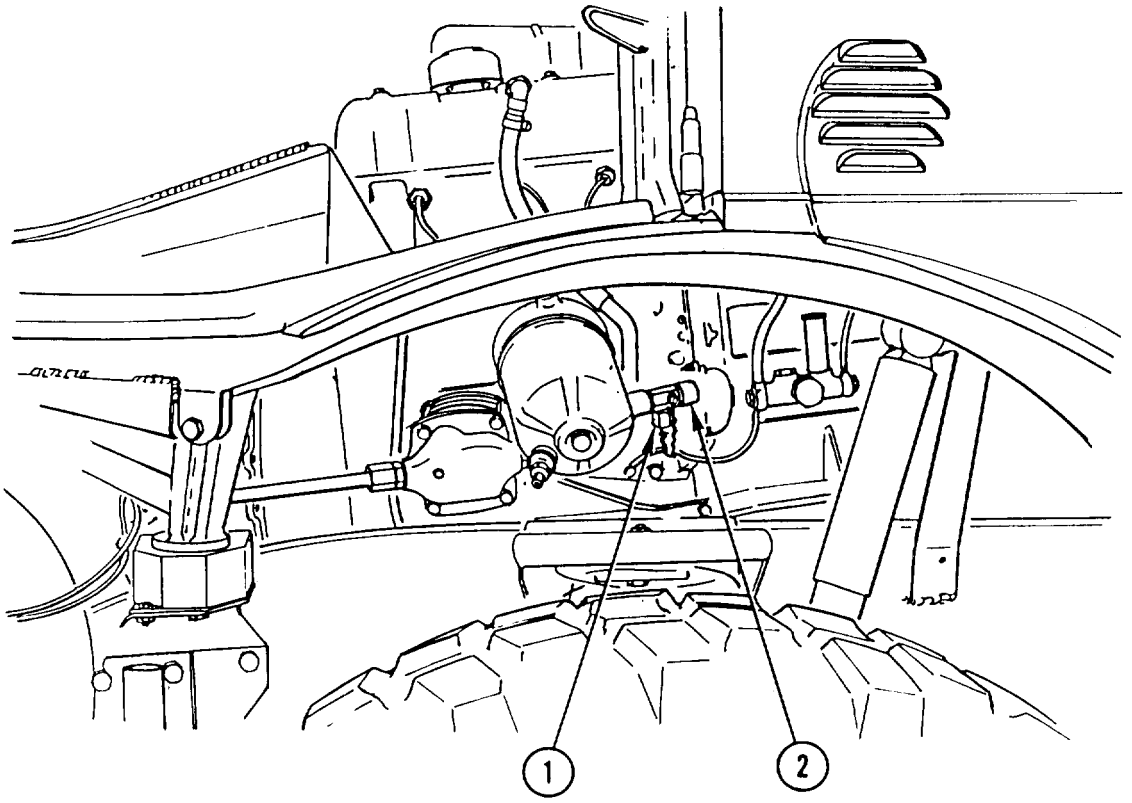
The engine oil sampling valve is located on the end of the oil filter located on the right side of the engine. When a lubrication note specifies that an oil sample must be taken, use the following procedures:

A Ensure that oil to be sampled is at its normal operating temperature (TM 5-2420-224-10).

B Open valve (1) and pump approximately two ounces of oil into suitable container, by pumping plunger (2). Discard this oil. This will remove waste impurities from oil filter.

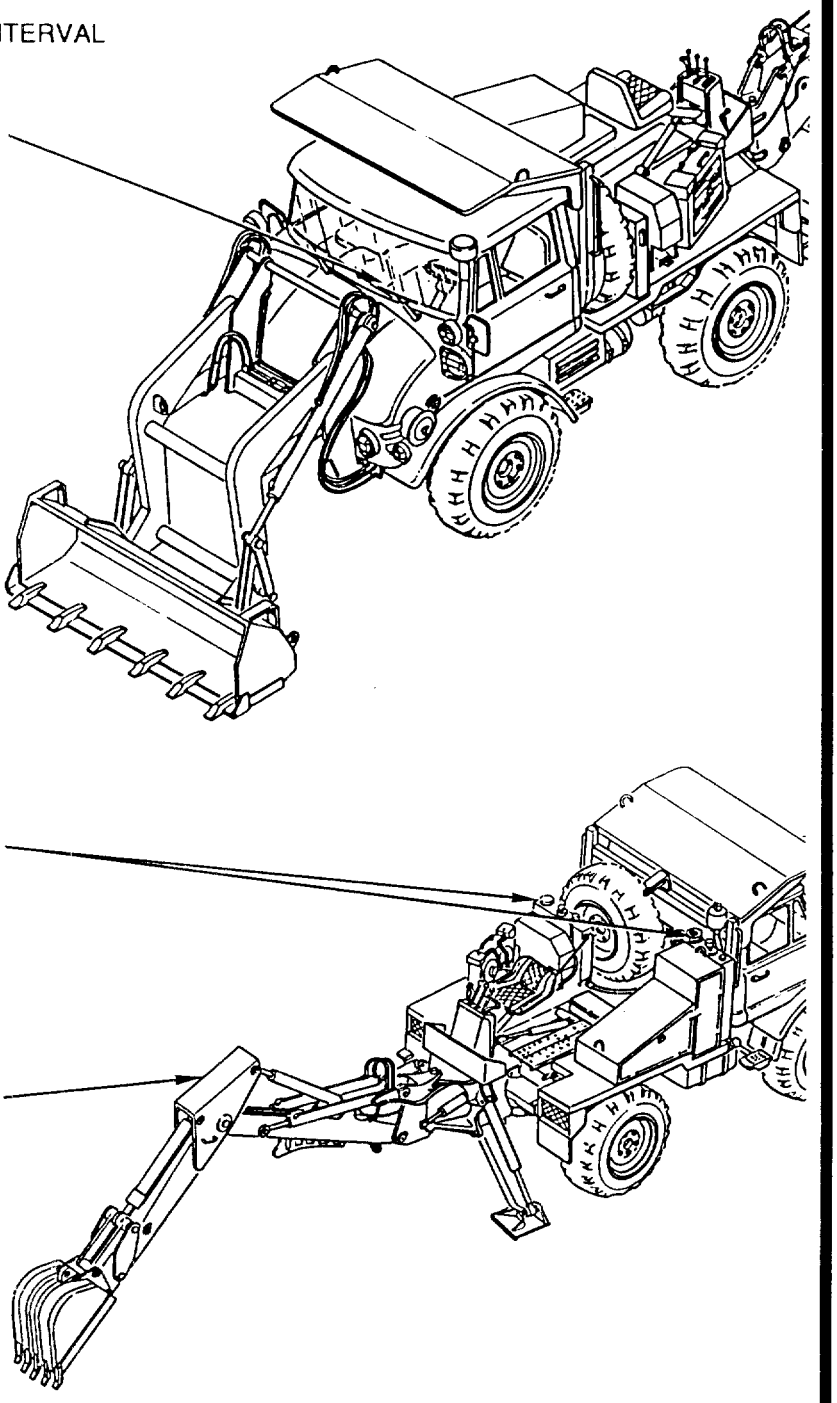
C Place sample bottle (TB 43-0210) under valve (1) and fill sample bottle to approximately 1/2 in. (1.3 cm) below neck of bottle. Close valve (1) and check for leaks.

D Send oil sample to AOAP laboratory.



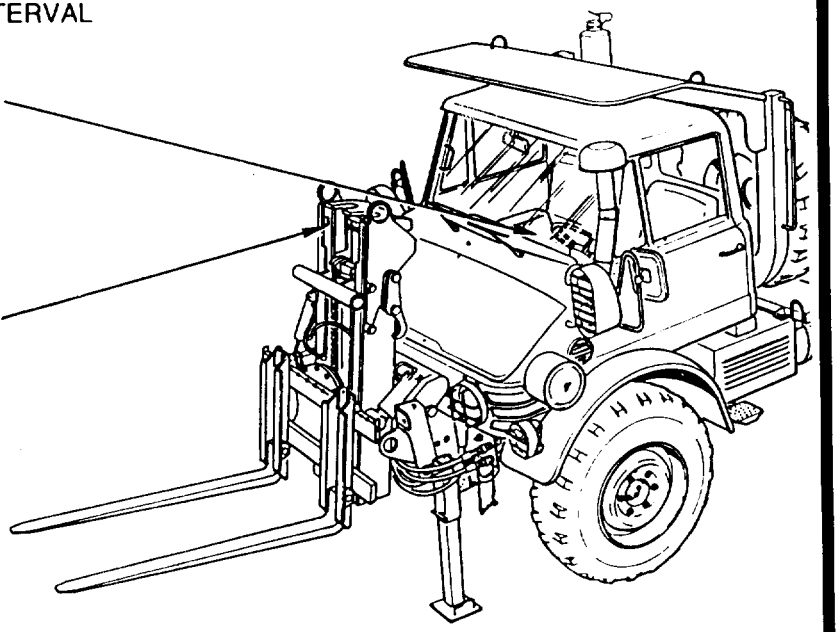
DAILY NOTES:
This page shows what to check or lubricate each day the SEE is operated or driven.

	LUBRICANT	INTERVAL
Engine Crankcase Oil (SEE/HMMH) (See Note 1)(C)	OE/HDO	D
Hydraulic Tanks, Front and Rear (SEE/HMMH) (See Note 2)(C)	OE/HDO	D
Backhoe (SEE) (See Note 3)(C)	GAA	D

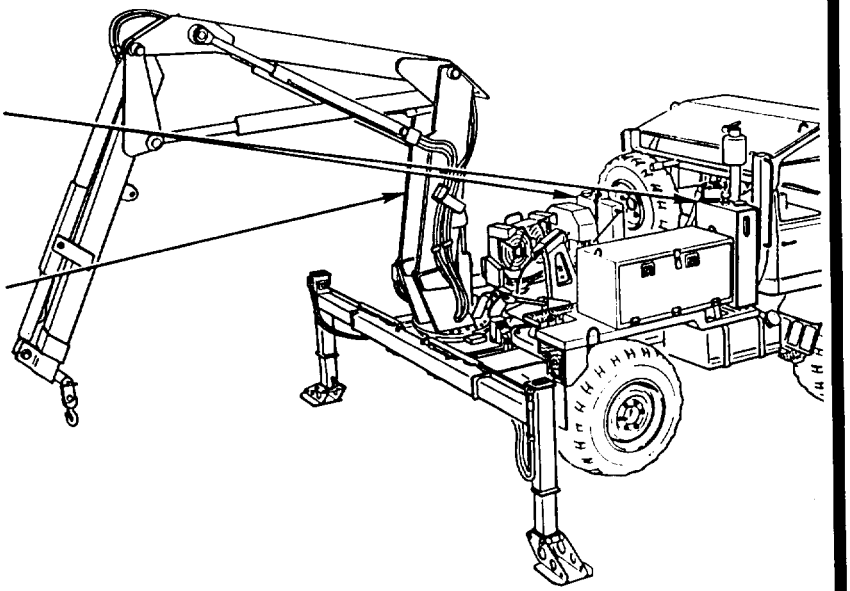


DAILY NOTES (CONTINUED):
This page shows what to check or lubricate each day the HMMH is operated or driven.

	LUBRICANT	INTERVAL
Engine Crankcase Oil (SEE/HMMH) (See Note 1)(C)	OE/HDO	D
Forklift (HMMH) (See Note 4)(C)	GAA, OE/HDO	D



Hydraulic Tanks, Front and Rear (SEE/HMMH) (See Note 2)(C)	OE/HDO	D
Crane (HMMH) (See Note 5)(C)	GAA	D



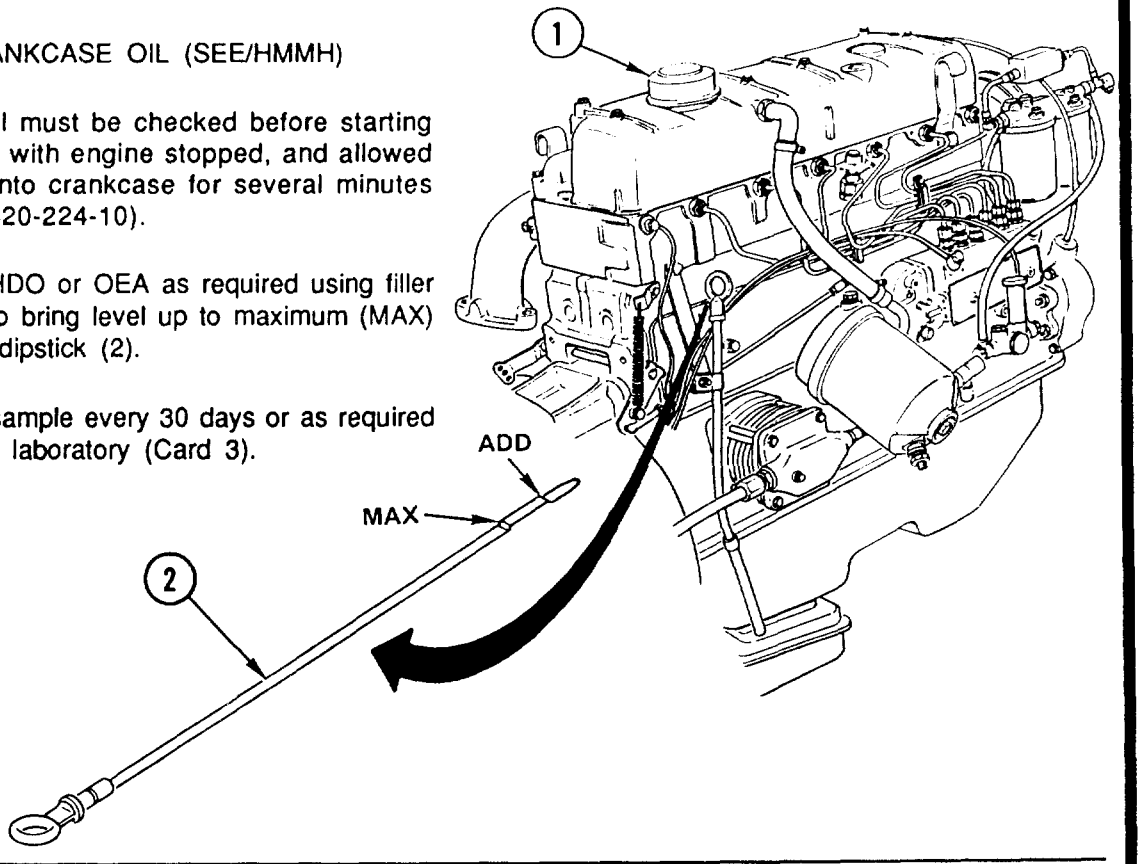
DAILY NOTES (CONTINUED):
Note 1

ENGINE CRANKCASE OIL (SEE/HMMH)

A Engine oil must be checked before starting engine or with engine stopped, and allowed to drain into crankcase for several minutes (TM 5-2420-224-10).

B Add OE/HDO or OEA as required using filler pipe (1) to bring level up to maximum (MAX) mark on dipstick (2).

C Take oil sample every 30 days or as required by AOAP laboratory (Card 3).

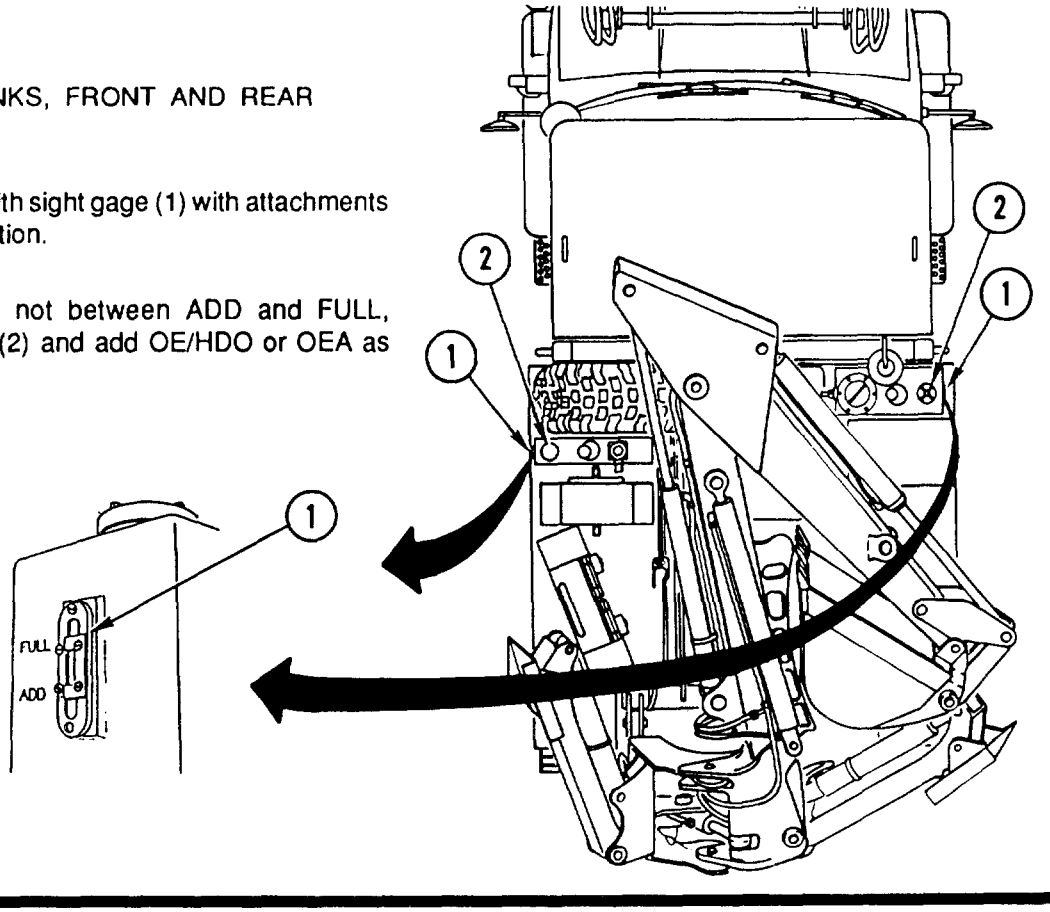


Note 2

HYDRAULIC TANKS, FRONT AND REAR (SEE/HMMH)

A Check level with sight gage (1) with attachments in travel position.

B If oil level is not between ADD and FULL, unscrew cap (2) and add OE/HDO or OEA as required.

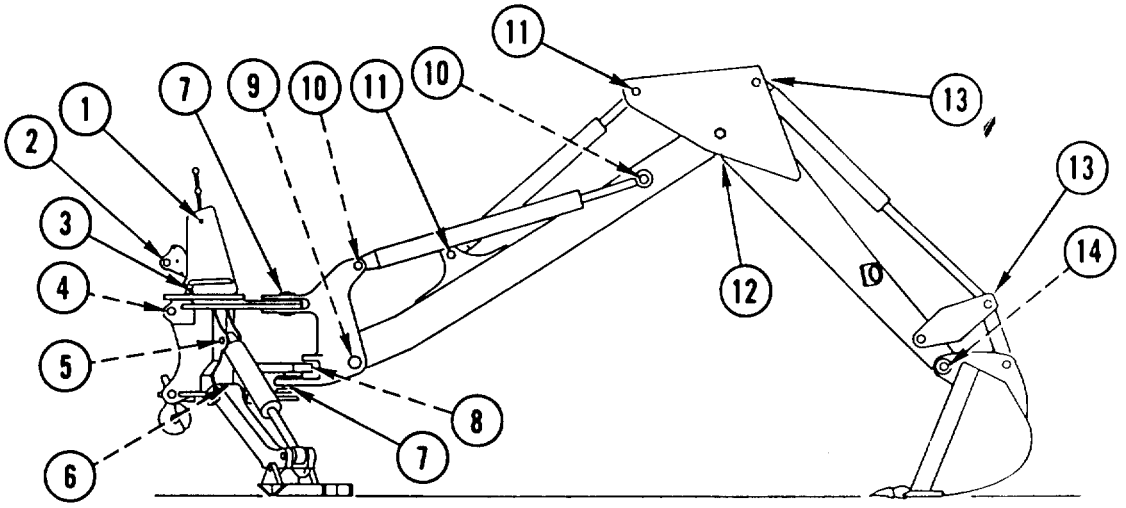


DAILY NOTES (CONTINUED):
Note 3

BACKHOE (SEE)

Lubricate 35 fittings on backhoe with GAA every 10 hours for normal operation. If backhoe is operated in mud or water, reduce lubrication intervals to every 5 hours.

LOCATION	NUMBER OF POINTS
1. CONTROL LEVER	5
2. TILT CYLINDER PIN	1
3. FOOT SWING PEDALS	4
4. BACKHOE MOUNTING PINS	2
5. STABILIZER CYLINDERS	2
6. SWING CYLINDER TRUNNION	4
7. TOWER SWING PINS	2
8. SWING CYLINDER YOKE	2
9. BOOM PIVOT PINS	2
10. BOOM CYLINDER	4
11. CROWD CYLINDER	2
12. DIPPER ARM PIVOT	1
13. BUCKET CYLINDER	2
14. BUCKET PIVOT PIN	2



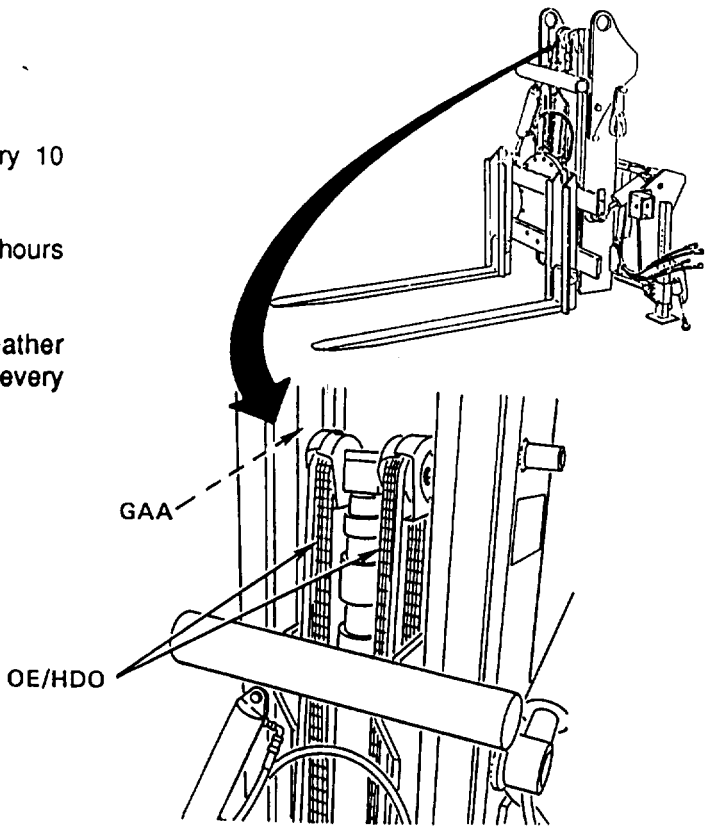
DAILY NOTES (CONTINUED):
Note 4

FORKLIFT (HMMH)

A Lubricate mast channels on forklift every 10 hours with GAA.

B Lubricate mast chains on forklift every 10 hours with OE/HDO.

C If forklift is operated under severe weather conditions, reduce lubrication intervals to every 5 hours.

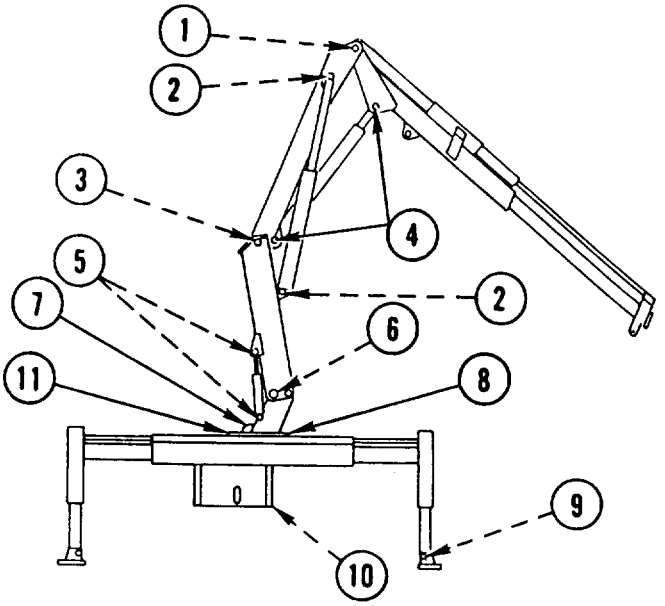


Note 5

CRANE (HMMH)

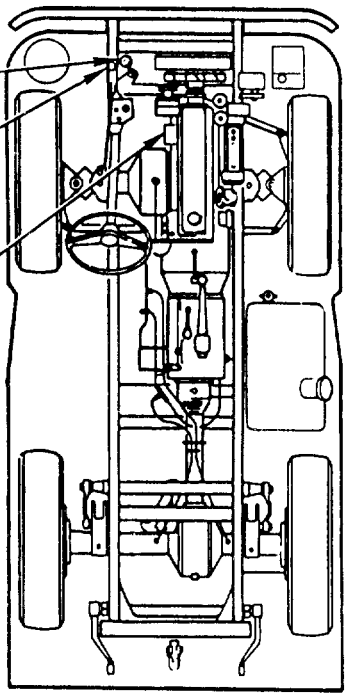
Lubricate 23 fittings on crane with GAA every 10 hours for normal operation. If crane is operated under severe weather conditions, reduce lubrication intervals to every 5 hours.

LOCATION	NUMBER OF POINTS
1. INNER/OUTER BOOM HINGE	2
2. INNER BOOM CYLINDER	4
3. MAST/INNER BOOM HINGE	2
4. OUTER BOOM CYLINDER	2
5. TILT CYLINDER	4
6. TILT PIVOT	2
7. TILT ARM	1
8. GEAR BEARING	1
9. OUTRIGGER PADS	2
10. BASE PIVOT	2
11. ROTATION LOCK	1

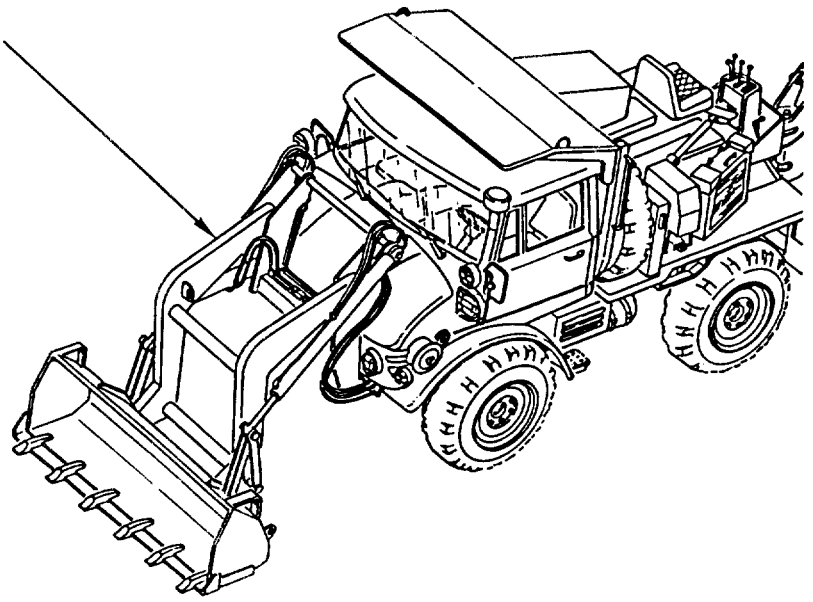


MONTHLY NOTES:
This page shows what to check or lubricate each month the SEE/HMMH is operated or driven.

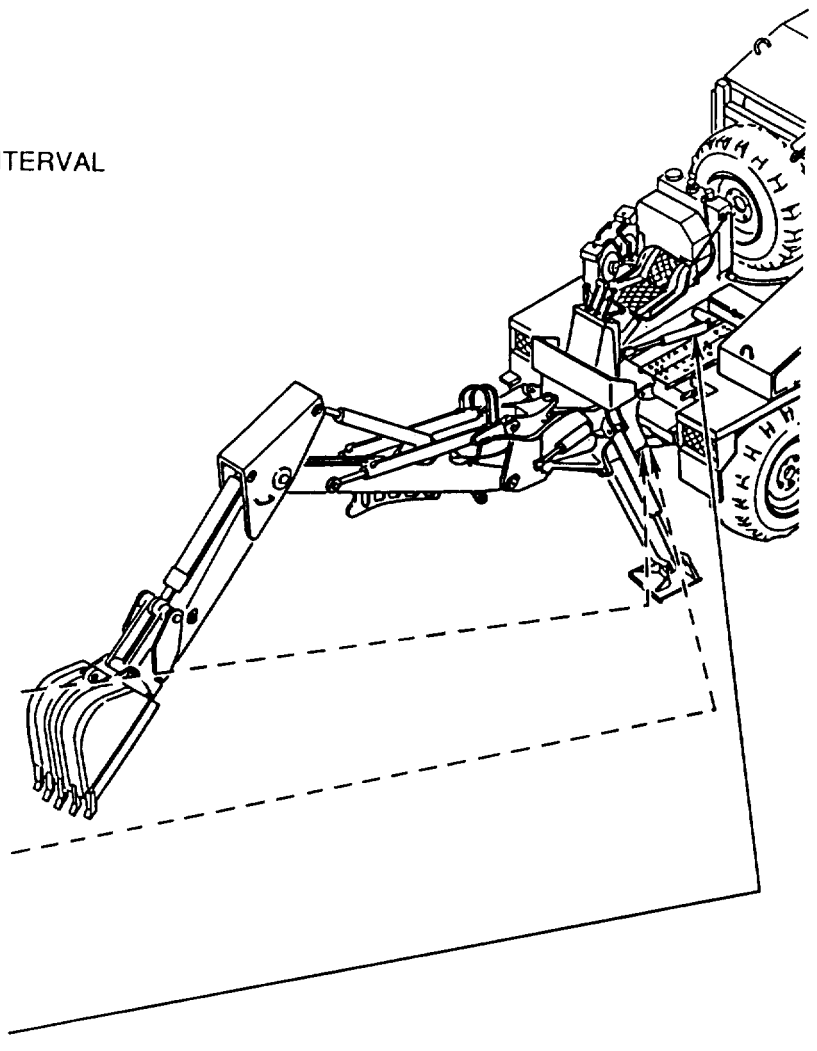
	LUBRICANT	INTERVAL
Brake Reservoir (SEE/HMMH) (See Note 6)(C)	MIL-B-46176	M
Clutch Reservoir (SEE/HMMH) (See Note 7)(C)	MIL-B-46176	M
Steering System Oil (SEE/HMMH) (See Note 8)(C)	OE/HDO	M



Front Loader (SEE) (See Note 9)(C)	GAA	M



MONTHLY NOTES (CONTINUED):

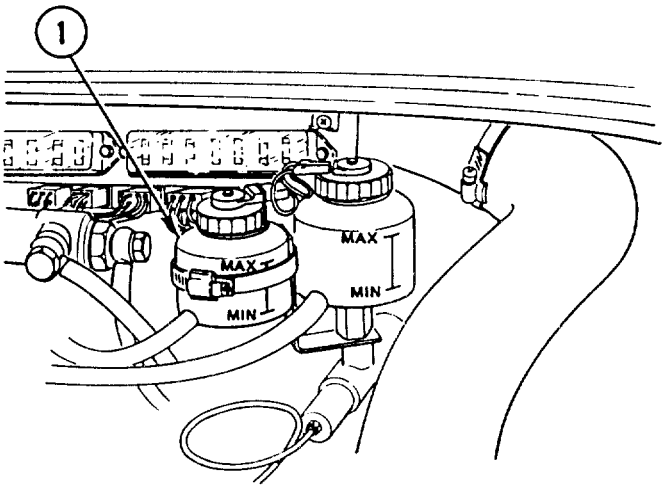


	LUBRICANT	INTERVAL
Rear Implement Lock Cylinders (SEE/HMMH) (See Note 10)(C)	GAA	M
Rear Implement Lock Latches (SEE/HMMH) (See Note 11)(C)	GAA	M
Rear Implement Tilt Cylinder (SEE/HMMH) (See Note 12)(C)	GAA	M

MONTHLY NOTES (CONTINUED):
Note 6

BRAKE RESERVOIR (SEE/HMMH)

A Fluid level must be at maximum (MAX) level mark with vehicle on level ground.



CAUTION

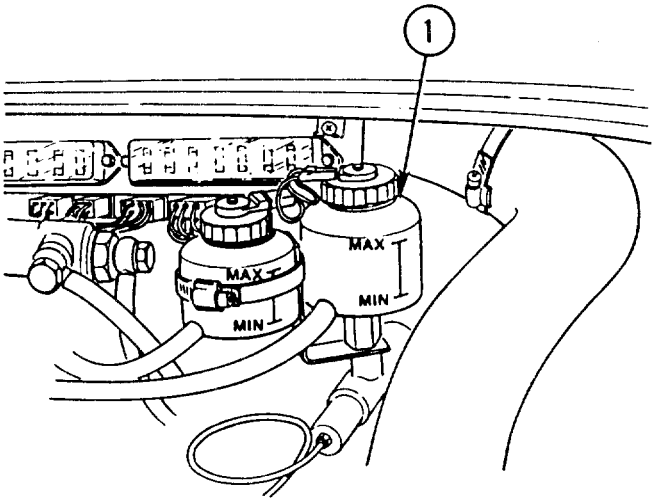
Use only MIL-B-46176 Silicon Base Brake Fluid. Do not mix with other fluids.

B With new brake pads, fluid level must not drop below minimum (MIN) mark while driving. If reservoir (1) is low, add MIL-B-46176 as required.

Note 7

CLUTCH RESERVOIR (SEE/HMMH)

A Fluid level should be at maximum (MAX) with clutch pedal released.



CAUTION

Use only MIL-B-46176 Silicon Base Brake Fluid. Do not mix with other fluids.

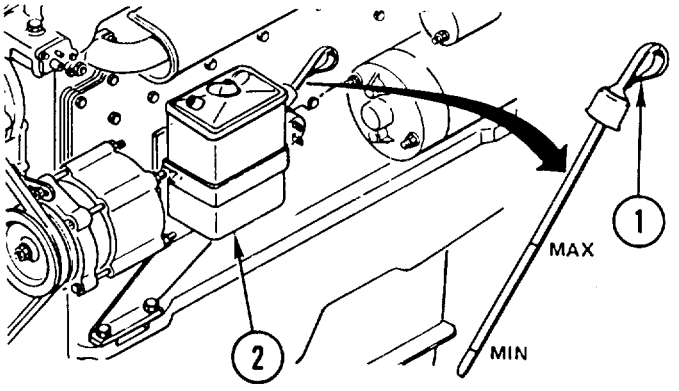
B If reservoir (1) is low, add MIL-B-46176 as required.

Note 8

STEERING SYSTEM OIL (SEE/HMMH)

A Steering oil should be between minimum (MIN) and maximum (MAX) marks on dipstick (1) with engine running.

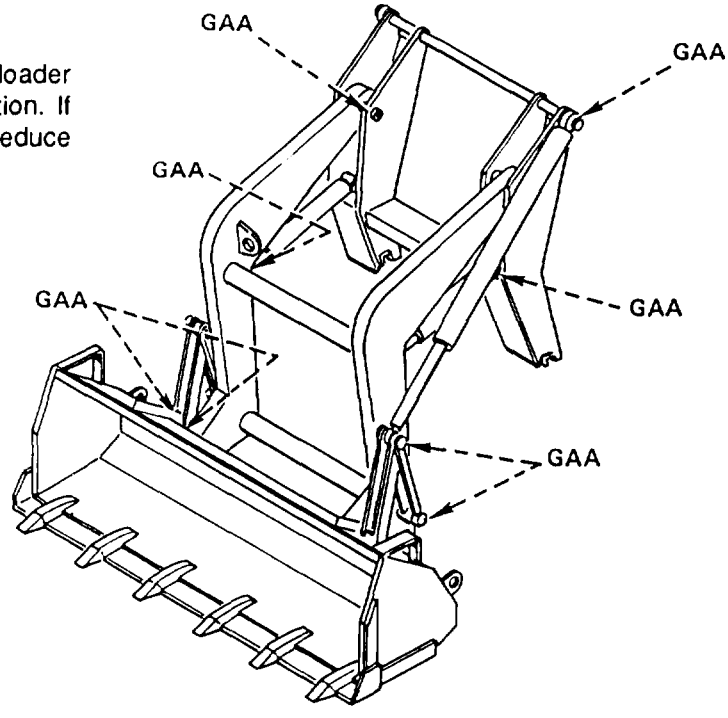
B If reservoir (2) is low, add OE/HDO or OEA as required.



MONTHLY NOTES (CONTINUED):
Note 9

FRONT LOADER (SEE)

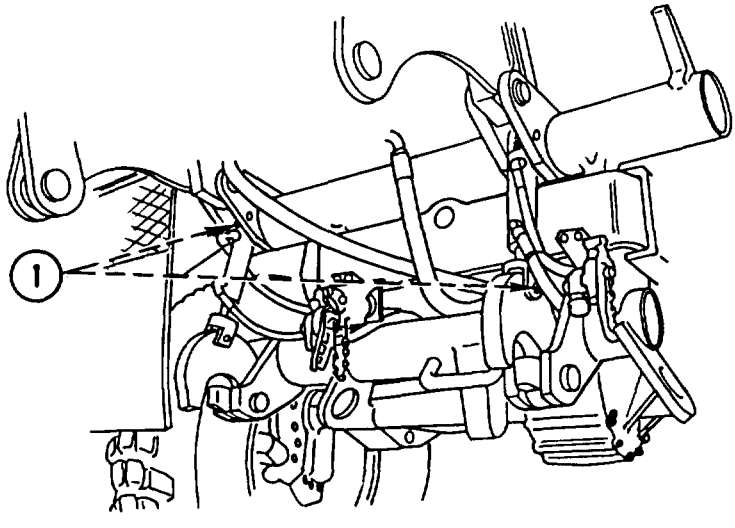
Lubricate eight fittings on each side of front loader with GAA every 10 hours for normal operation. If front loader is operated in mud or water, reduce lubrication intervals to every 5 hours.



Note 10

REAR IMPLEMENT LOCK CYLINDERS (SEE/HMMH)

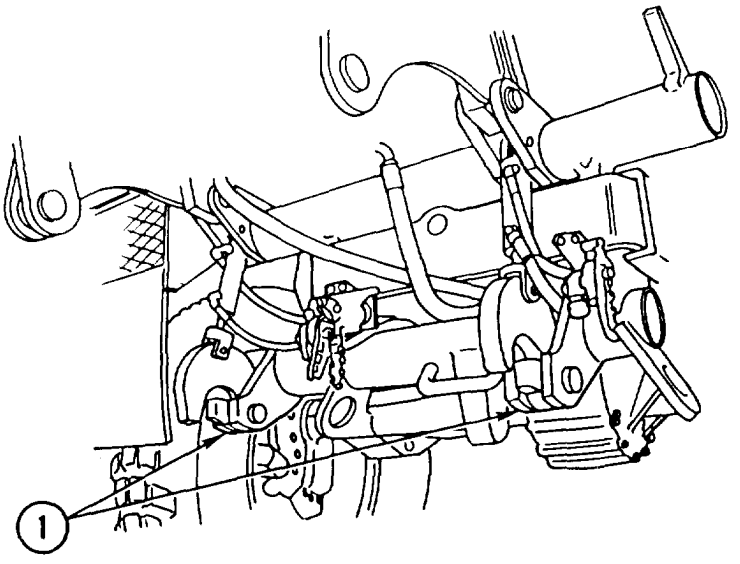
Lubricate four fittings with GAA on left and right rear implement lock cylinders (1).



MONTHLY NOTES (CONTINUED):
Note 11

REAR IMPLEMENT LOCK LATCHES (SEE/HMMH)

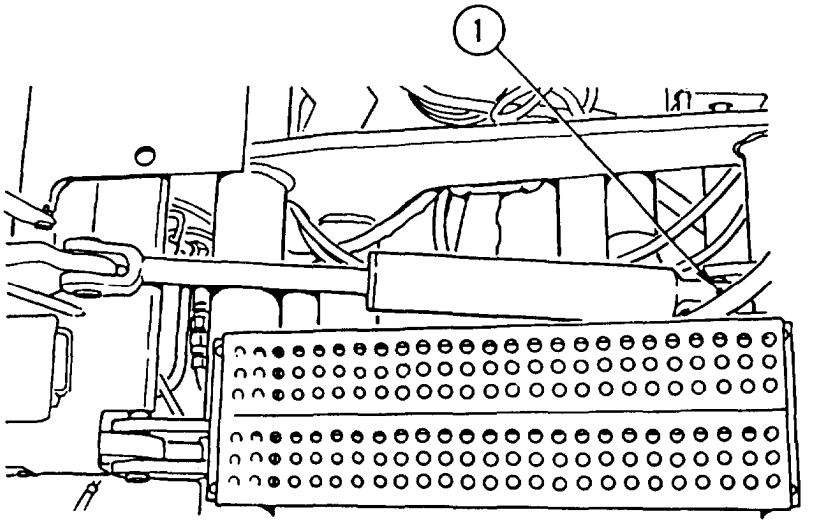
Lubricate two fittings with GAA on left and right rear implement lock latches (1).



Note 12

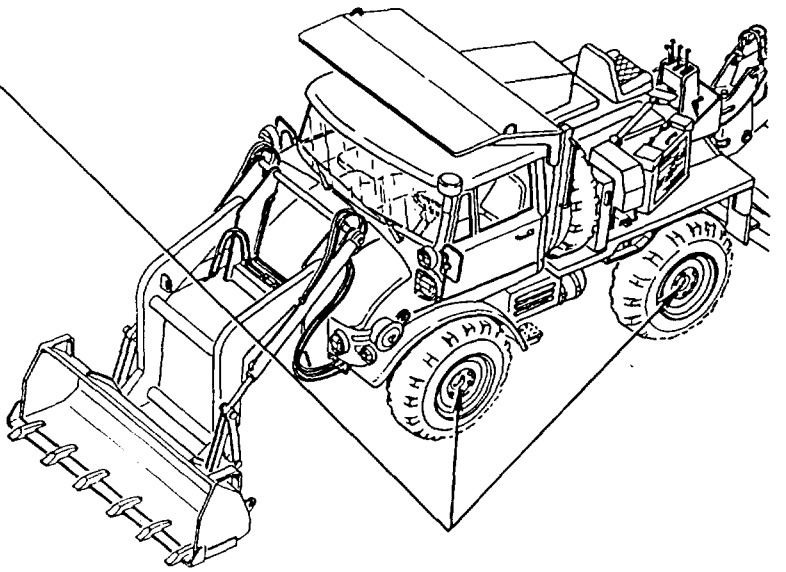
REAR IMPLEMENT TILT CYLINDER (SEE/HMMH)

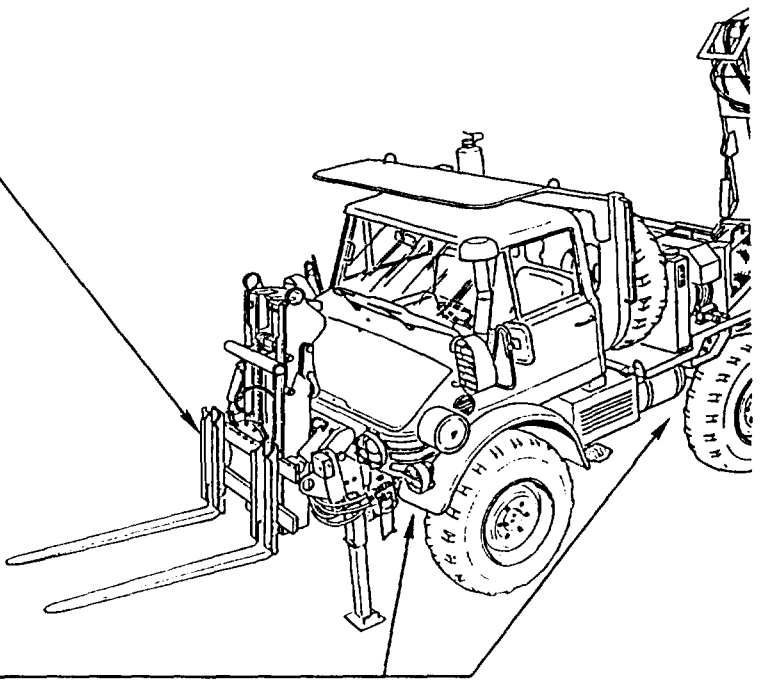
Lubricate one fitting with GAA at forward end of rear implement tilt cylinder (1).



QUARTERLY NOTES:

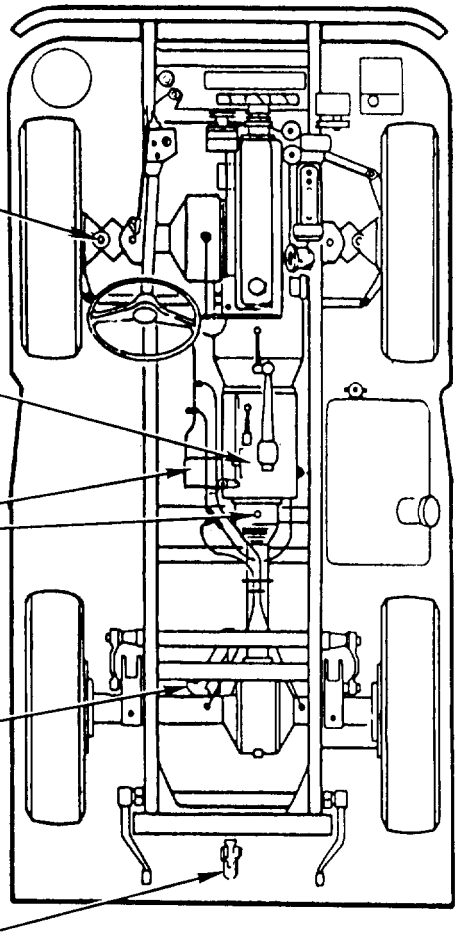
	LUBRICANT	INTERVAL
Axle Drive and Wheel Hub Reduction of Front and Rear Axle (SEE/HMMH) (See Note 13)(O)	GO	Q
Forklift (HMMH) (See Note 14)(O)	GAA	Q
Front and Rear Differentials (SEE/HMMH) (See Note 15)(O)	GO	Q





QUARTERLY NOTES (CONTINUED):

	LUBRICANT	INTERVAL
King Pins (SEE/HMMH) (See Note 16)(O)	GAA	Q
Transmission (SEE/HMMH) (See Note 17)(O)	GO	Q
Front and Rear Thrust Ball Joint (SEE/HMMH) (See Note 18)(O)	GAA	Q
Hand Brake Lever (SEE/HMMH) (See Note 19)(O)	GAA	Q
Pintle Hook (SEE/HMMH) (See Note 20)(O)	GAA	Q



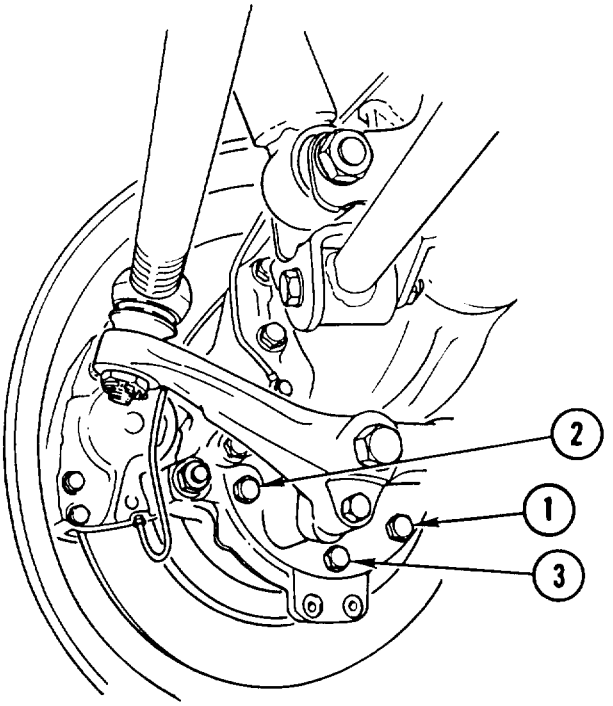
QUARTERLY NOTES (CONTINUED):
Note 13

AXLE DRIVE AND WHEEL HUB REDUCTION OF FRONT AND REAR AXLE (SEE/HMMH)

Remove inspection plug (1) in each axle and check oil level. Oil should be level with the bottom of the oil inspection hole. Add GO-80/90 or GO-75 as required.

WARNING

Place vehicle in two-wheel drive before checking oil level. Oil is under pressure when in four-wheel drive position and could cause serious injury to eyes when removing inspection plug.



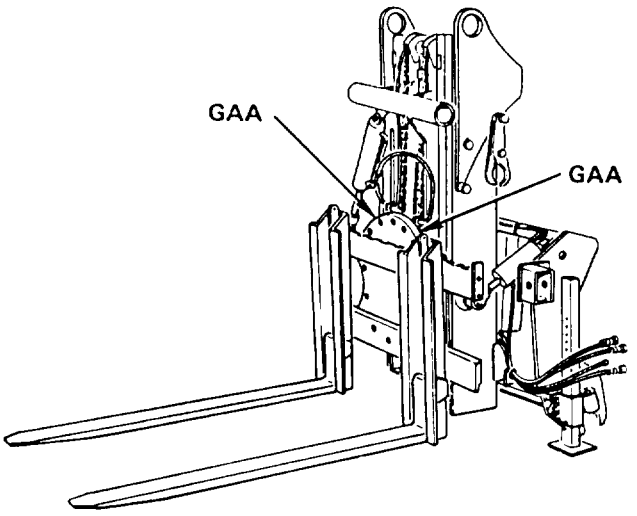
AXLE-WHEEL HUB DRIVE
(DISC BRAKE)

1. CHECK PLUG (REAR)
2. FILL PLUG (FORWARD)
3. DRAIN PLUG (BOTTOM)

Note 14

FORKLIFT (HMMH)

Lubricate two fittings on rotator bearing every 300 hours with GAA.



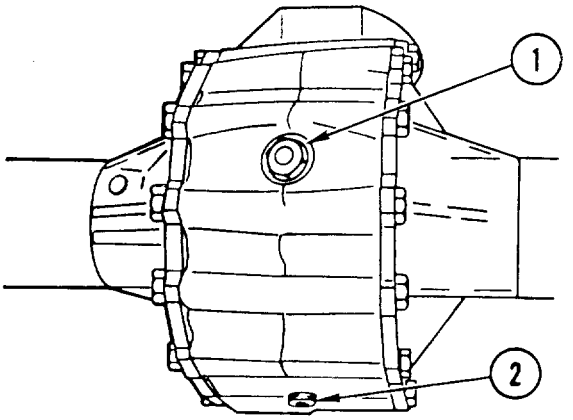
QUARTERLY NOTES (CONTINUED):
Note 15

FRONT AND REAR DIFFERENTIALS
(SEE/HMMH)

Remove inspection plug (1) in each differential and check oil level. Oil should be level with the bottom of the oil inspection hole. Add GO-90 or GO-75 as required.

WARNING

Place vehicle in two-wheel drive before checking oil level. Oil is under pressure when in four-wheel drive position and could cause serious injury to eyes when removing inspection plug.

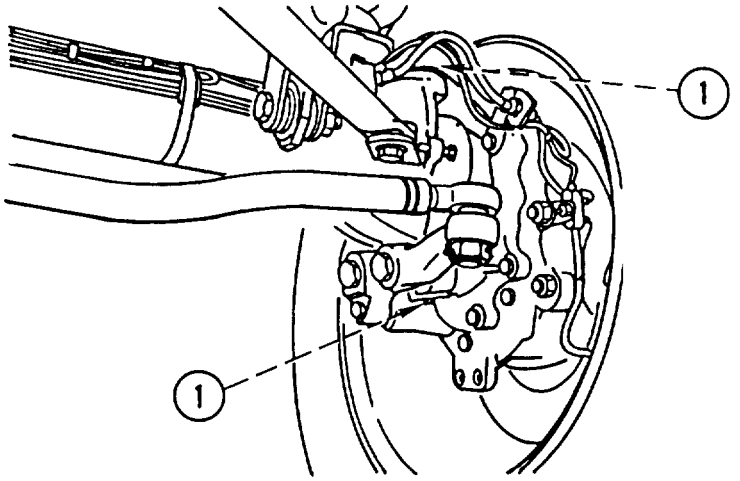


AXLE DRIVE

1. FILL AND CHECK PLUG
2. DRAIN PLUG

Note 16
KING PINS (SEE/HMMH)

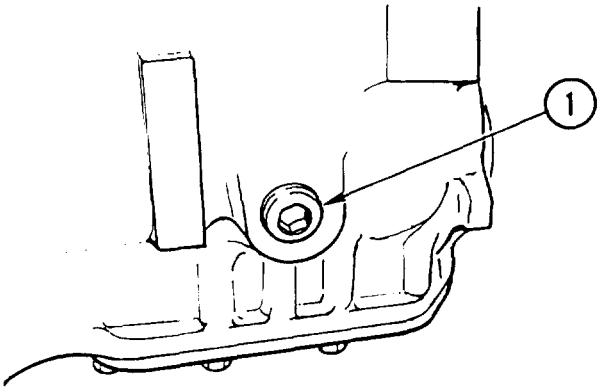
Lubricate four king pins (1) with GAA.



QUARTERLY NOTES (CONTINUED):
Note 17

TRANSMISSION (SEE/HMMH)

Check transmission oil level by removing fill plug (1). Oil should be level with the bottom of the oil inspection hole. Add GO-80/90 or GO-75 as required.



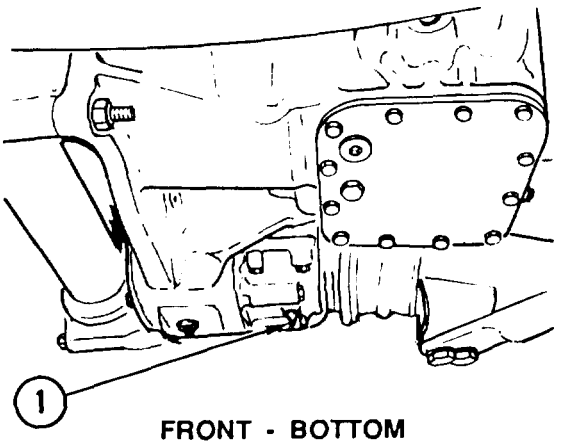
Note 18

CAUTION

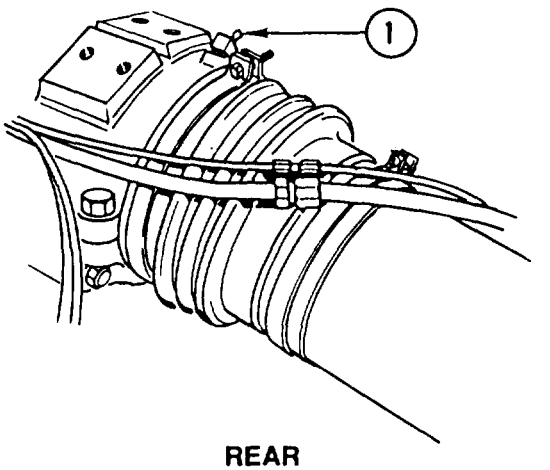
Damage to protective rubber bellows will occur if over-lubricated.

FRONT AND REAR THRUST BALL JOINT (SEE/HMMH)

Lubricate ball joints (1) with five shots of GAA from a standard hand-held grease gun.



FRONT - BOTTOM

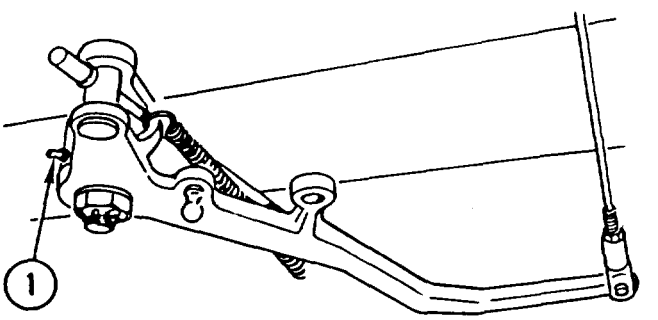


REAR

Note 19

HAND BRAKE LEVER (SEE/HMMH)

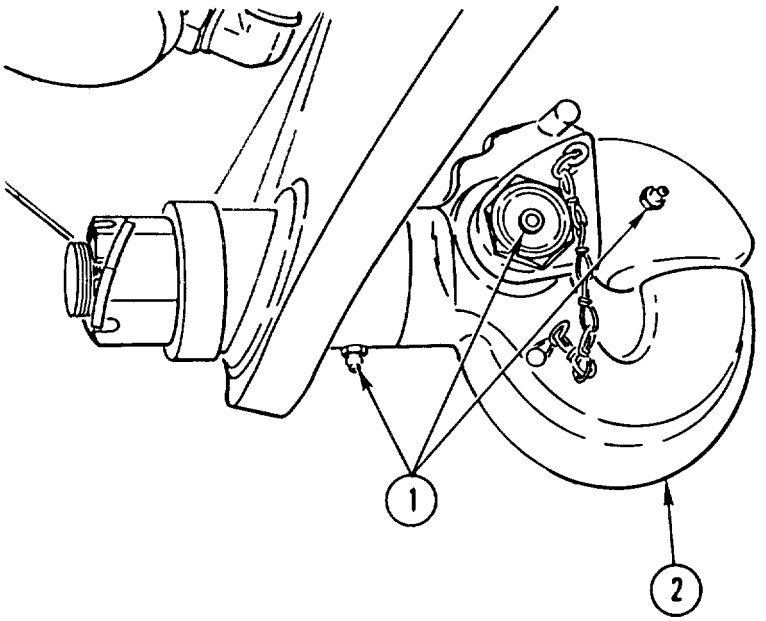
Lubricate hand brake lever fitting (1) above rear axle with GAA.



QUARTERLY NOTES (CONTINUED):
Note 20

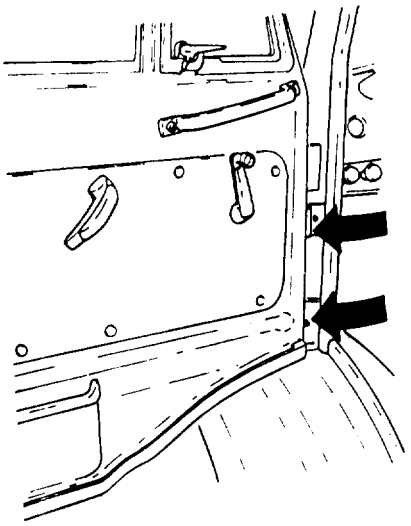
PINTLE HOOK (SEE/HMMH)

Lubricate three fittings (1) on pintle hook (2) with GAA.

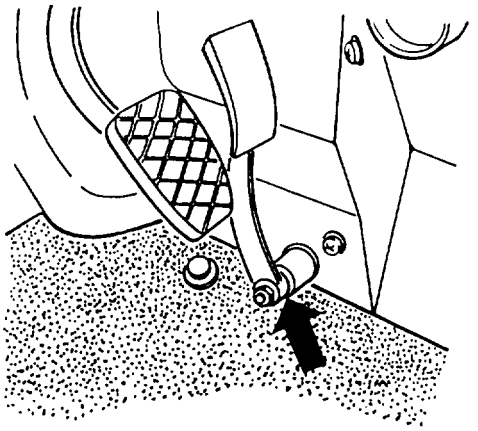


QUARTERLY NOTES (CONTINUED):
OIL CAN POINTS

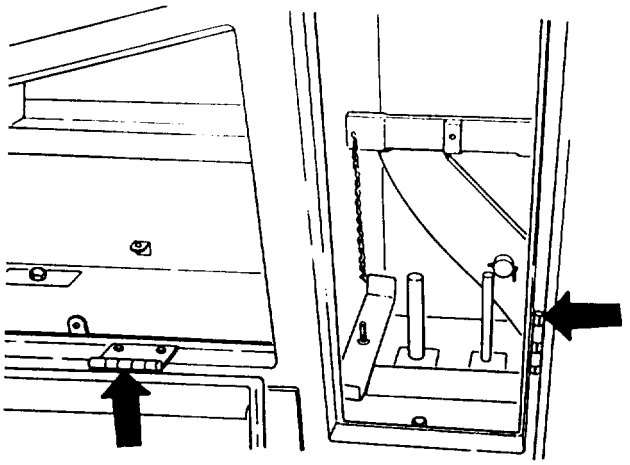
Lubricate with PL-M or PL-S



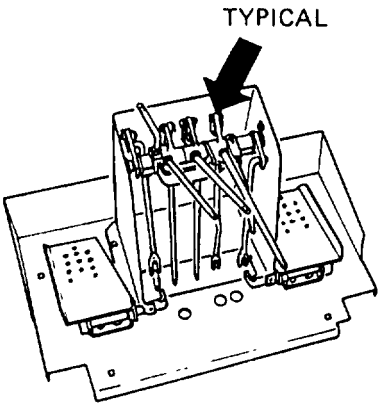
DOOR HINGES



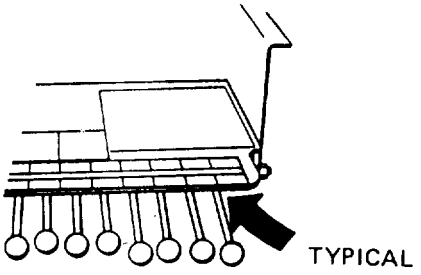
ACCELERATOR PEDAL



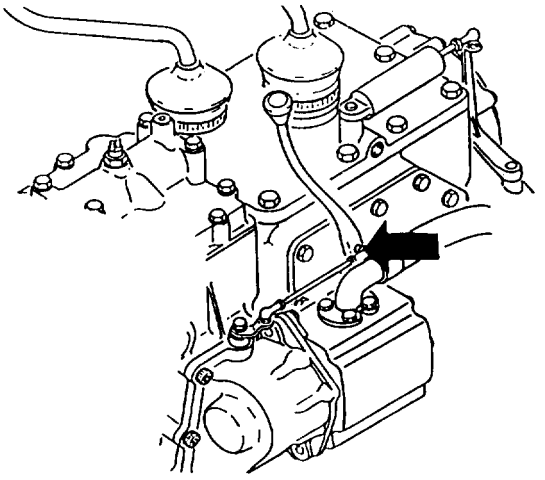
TOOL BOX HINGES



BACKHOE LINKAGES



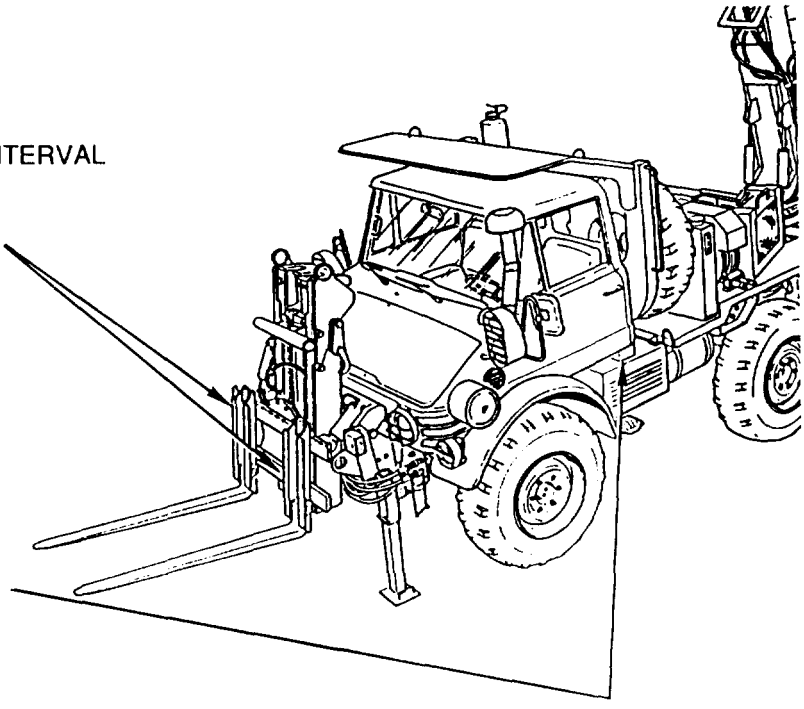
CRANE LINKAGES

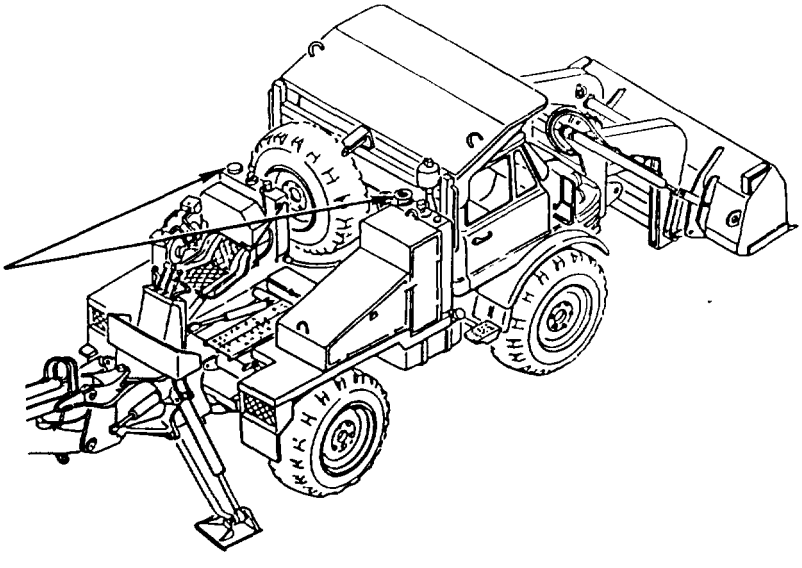


PTO LINKAGES

SEMIANNUAL NOTES:

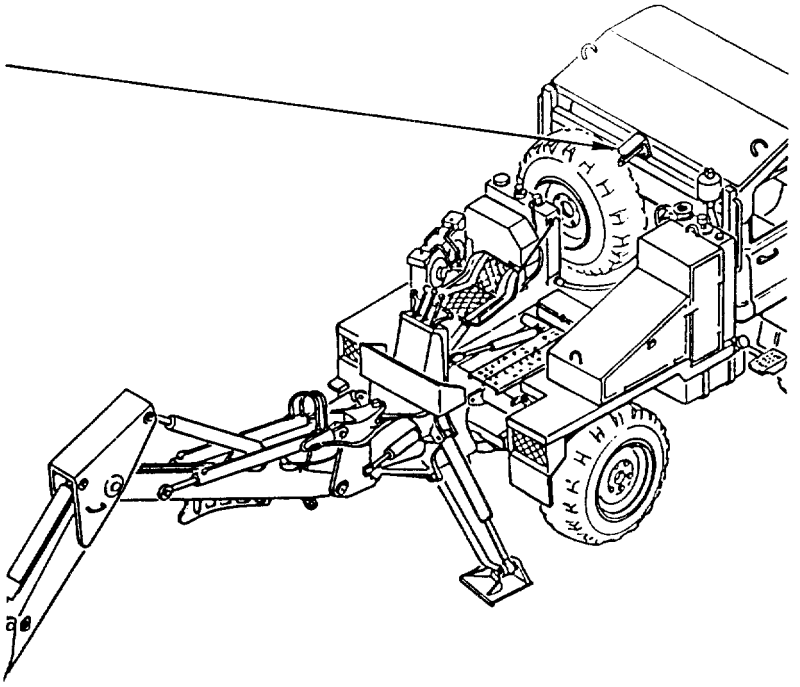
	LUBRICANT	INTERVAL
Forklift Fork Hinges (HMMH) (See Note 21)(O)	GAA	S
Front Suspension Lockout System (HMMH) (See Note 22)(O)	OE/HDO	S
Hydraulic Tanks, Front and Rear (SEE/HMMH) (See Note 23)(O)	OE/HDO	S



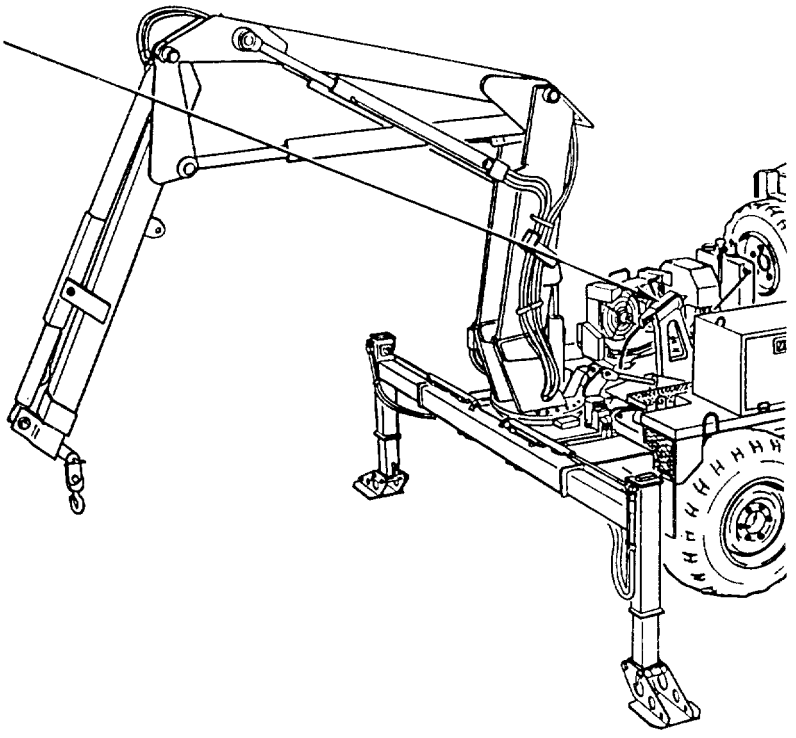


SEMIANNUAL NOTES (CONTINUED):

	LUBRICANT	INTERVAL
Implement Travel Lock Pin (SEE) (See Note 24)(C)	GAA	S



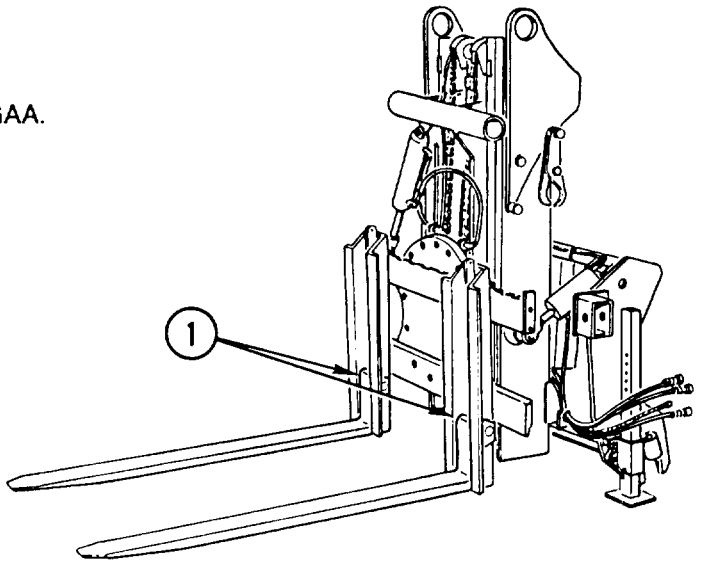
Implement Travel Lock Pin (HMMH) (See Note 25)(C)	GAA	S



SEMIANNUAL NOTES (CONTINUED):
Note 21

FORKLIFT FORK HINGES (HMMH)

Lubricate forklift fork hinge points (1) with GAA.



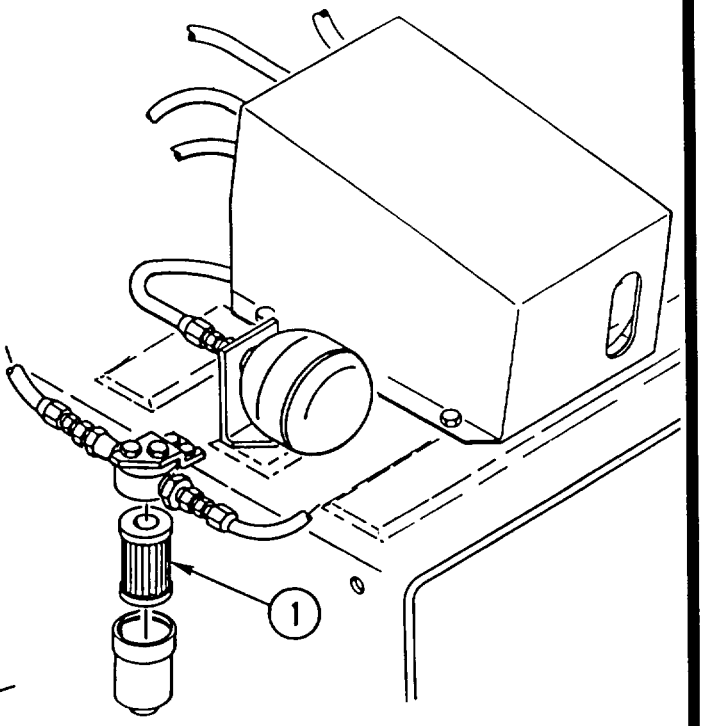
Note 22

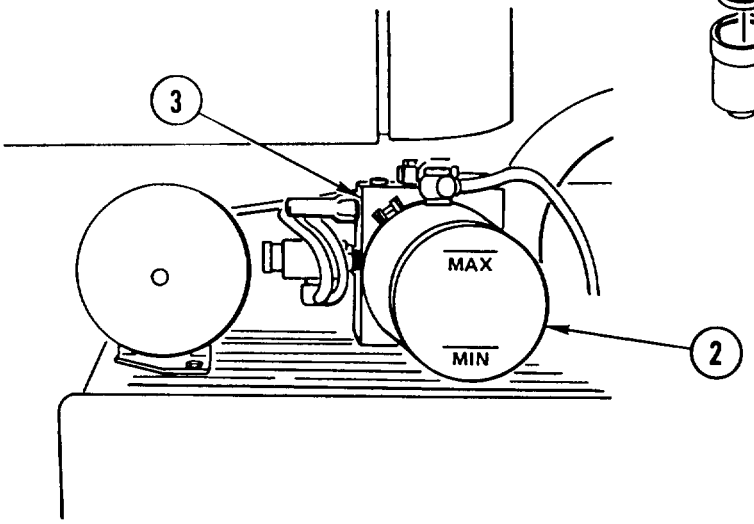
FRONT SUSPENSION LOCKOUT SYSTEM (HMMH)

A Remove and replace oil filter (1) (TM 5-2420-224-20).

B Remove reservoir (2) from manifold (3) and drain oil (TM 5-2420-224-20).

C Install reservoir (2) to manifold (3) and service with OE/HDO or OEA. Oil should be at the MAX mark on reservoir (TM 5-2420-224-20).





SEMIANNUAL NOTES (CONTINUED):
Note 23

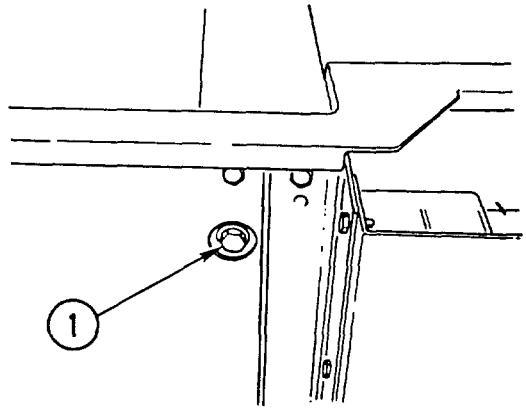
HYDRAULIC TANKS, FRONT AND REAR
(SEE/HMMH)

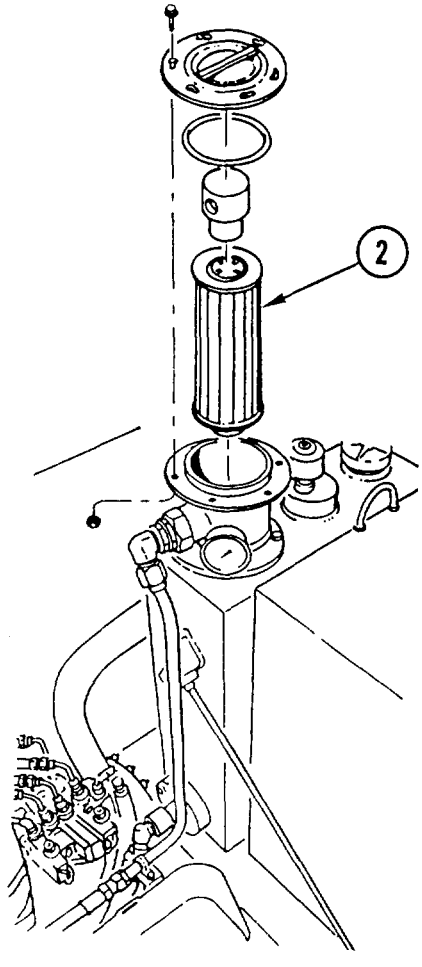
A Place suitable container under drain plug (1) and drain oil. Install drain plug.

B Replace hydraulic filter (2) at top of tank (TM 5-2420-224-20).

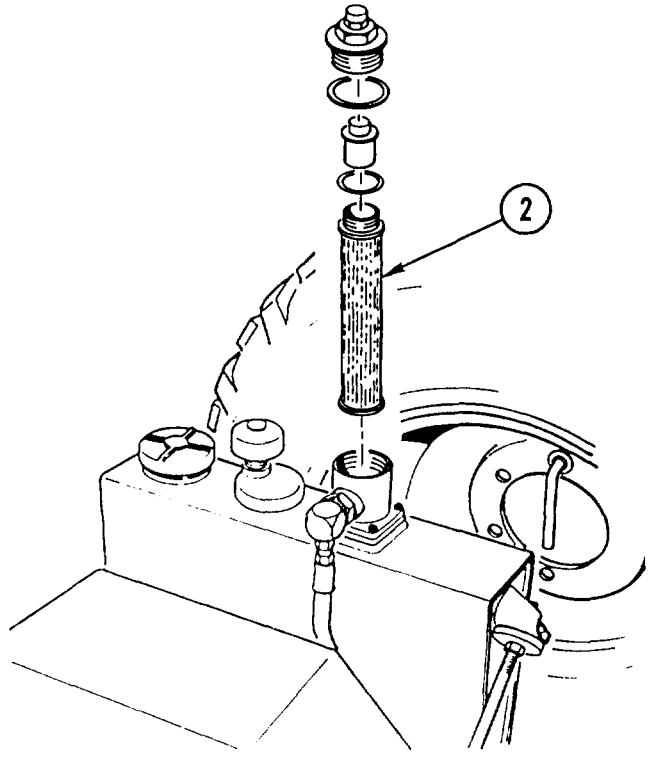
C Fill hydraulic tank with OE/HDO or OEA with implements in travel position.

D Check sight gage to ensure proper oil level is achieved. (See Note 2.)





REAR

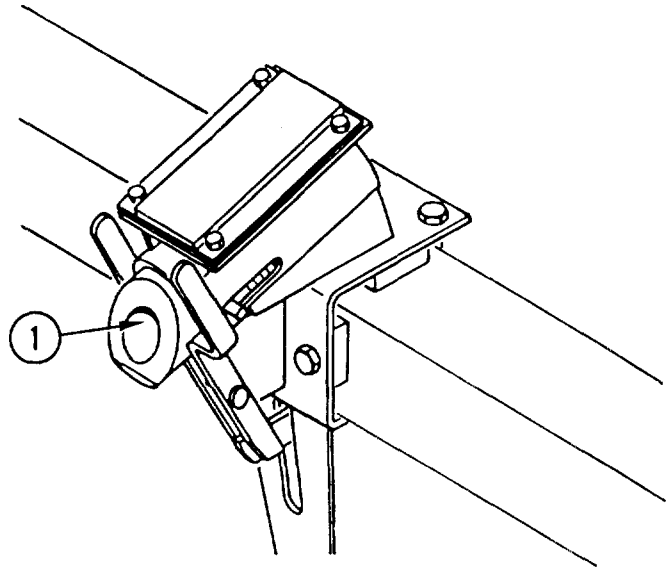


FRONT

SEMIANNUAL NOTES (CONTINUED):
Note 24

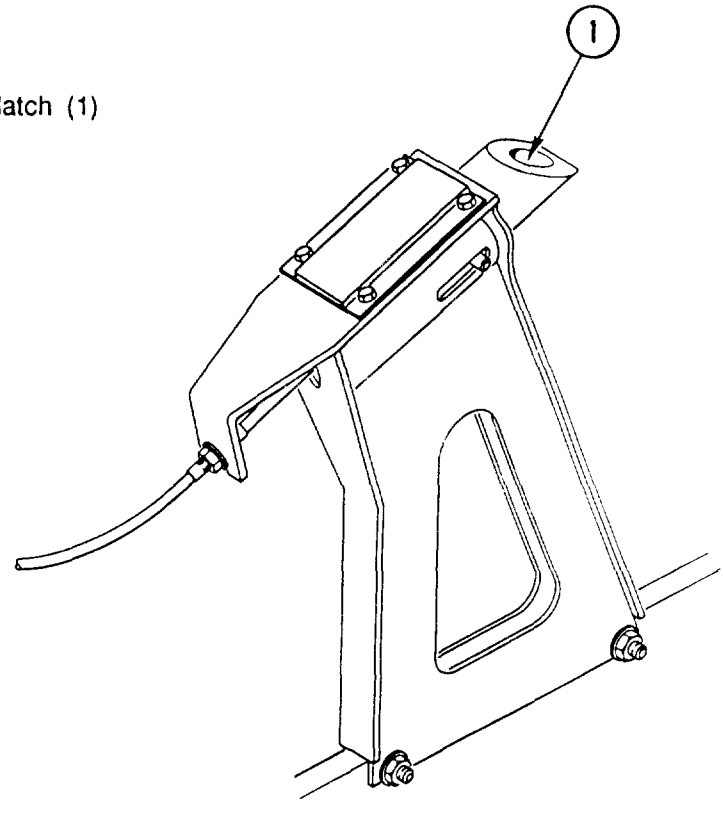
IMPLEMENT TRAVEL LOCK PIN
(SEE)

Lubricate one fitting on implement latch (1) with GAA.



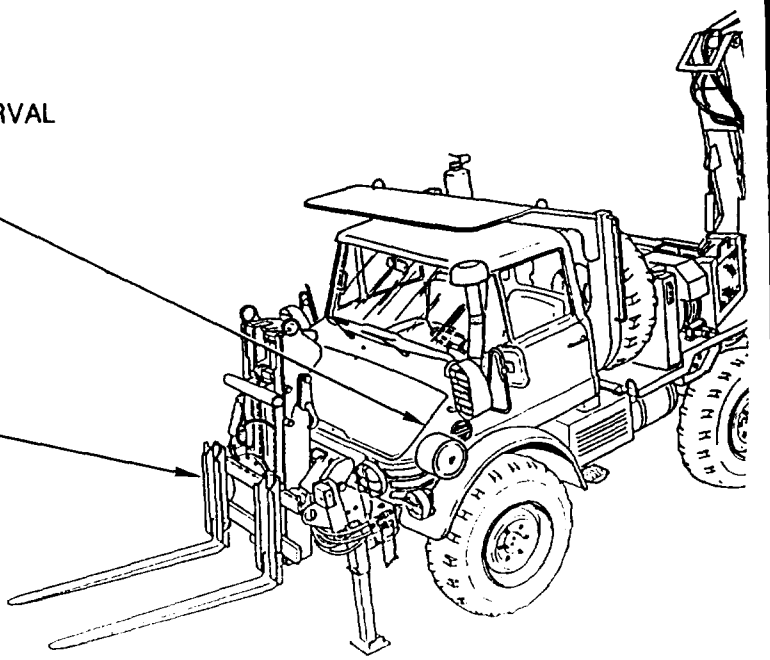
Note 25
IMPLEMENT TRAVEL LOCK PIN
(HMMH)

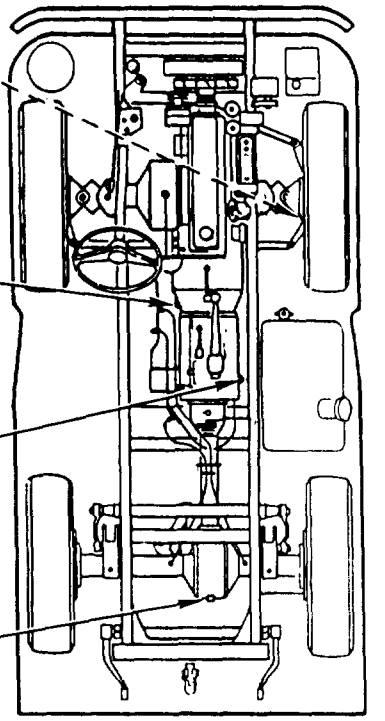
Lubricate one fitting on implement latch (1) with GAA.



ANNUAL NOTES:

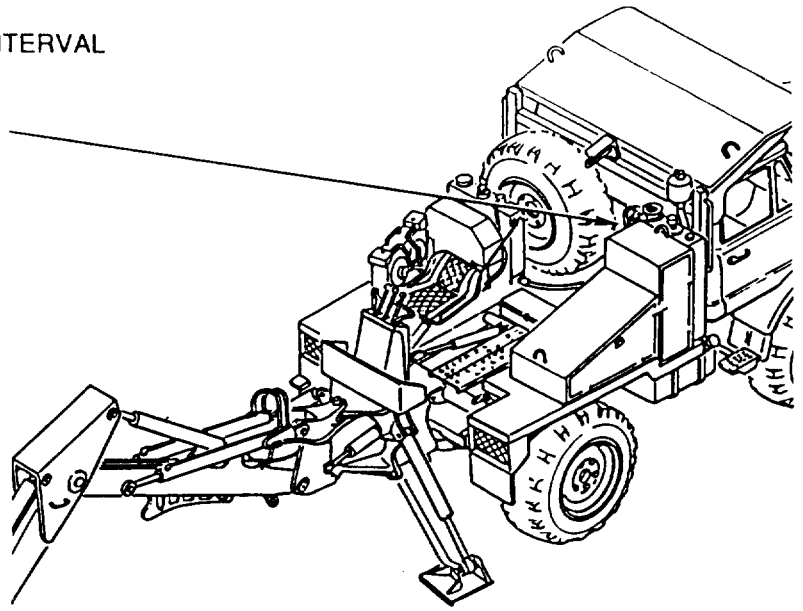
	LUBRICANT	INTERVAL
Steering System Oil (SEE/HMMH) (See Note 26)(O)	OE/HDO	A
Forklift (HMMH) (See Note 27)(O)	GAA	A
Front and Rear Axle Wheel Hub Drives (SEE/HMMH) (See Note 28)(O)	GO	A
Clutch Release Shaft (SEE/HMMH) (See Note 29)(O)	GAA	A
Transmission Oil (SEE/HMMH) (See Note 30)(O)	GO	A
Differential Oil Filler Plug/Oil Drain Plug (SEE/HMMH) (See Note 31)(O)	GO	A

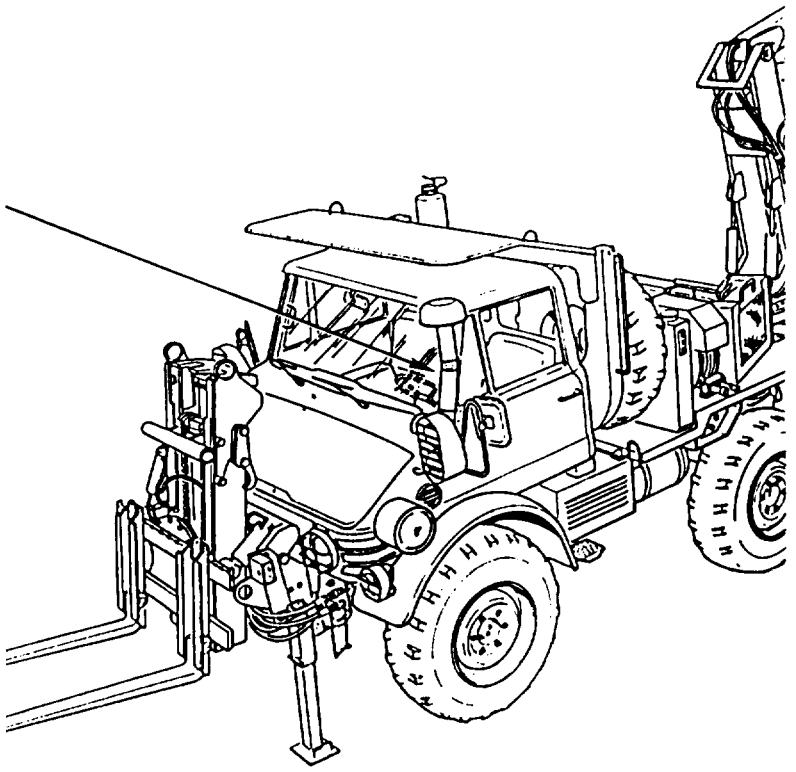




ANNUAL NOTES (CONTINUED):

	LUBRICANT	• INTERVAL
Boom and Bucket Control Lever Linkage (SEE/HMMH) (See Note 32)(O)	GAA	A



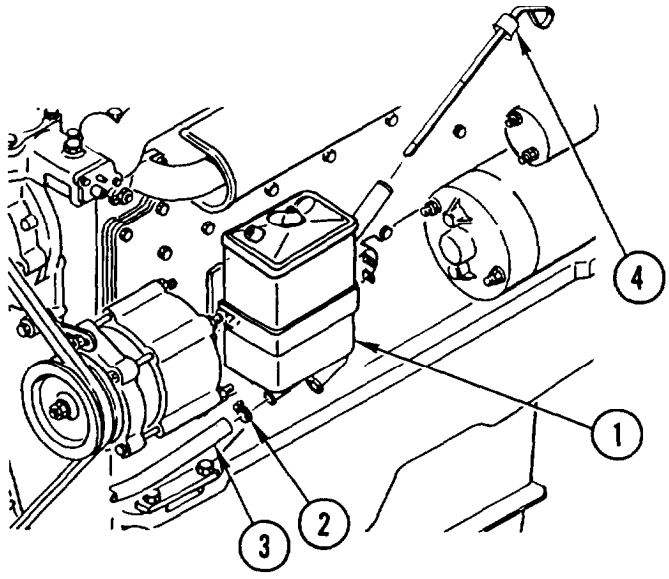


ANNUAL NOTES (CONTINUED):
Note 26

STEERING SYSTEM OIL (SEE/HMMH)

A Tilt cab (TM 5-2420-224-20).

B Place suitable container under steering system reservoir (1). Remove clamp (2) and hose (3) and drain oil. Fill reservoir (1) with OE/HDO or OEA to maximum (MAX) mark on dipstick (4) with engine running.



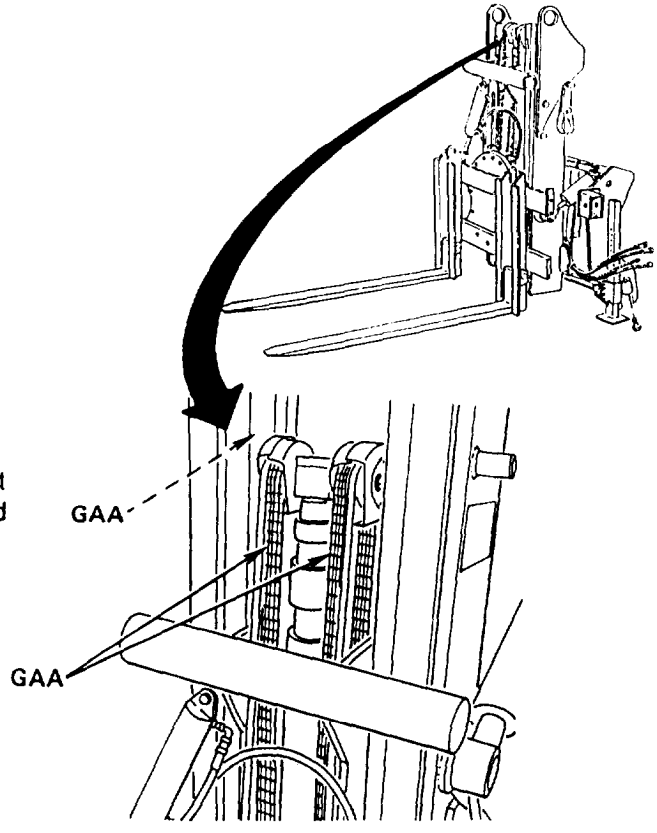
Note 27

FORKLIFT (HMMH)

WARNING

Death or serious injury could result from repeated or prolonged breathing or skin contact of drycleaning solvent SD, type II, P-D-680. Use in well-ventilated area. Do not use near open flame or in excessive heat.

Remove old grease from mast channel and mast chain with drycleaning solvent (SD, type II) and apply thin coating of GAA.



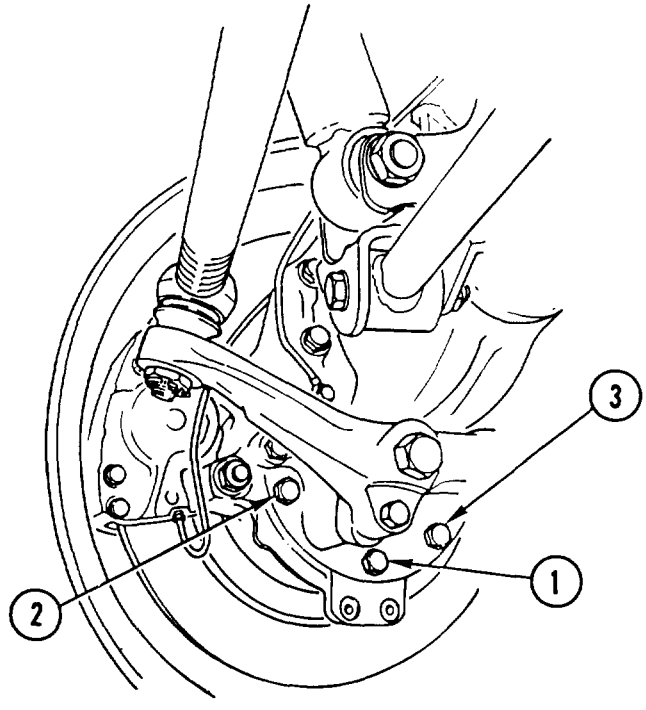
ANNUAL NOTES (CONTINUED):
Note 28

FRONT AND REAR AXLE WHEEL HUB DRIVES
(SEE/HMMH)

Place suitable container under drain plug (1) and drain oil. Install drain plug (1) and remove fill plug (2) and check plug (3). Fill axle with GO-80/90 or GO-75 thru fill plug (2). Oil level should be level with bottom of the inspection hole (3). Install fill plug (2) and check plug (3).

AXLE-WHEEL HUB DRIVE
(DISC BRAKE)

1. DRAIN PLUG (BOTTOM)
2. FILL PLUG (FORWARD)
3. CHECK PLUG (REAR)



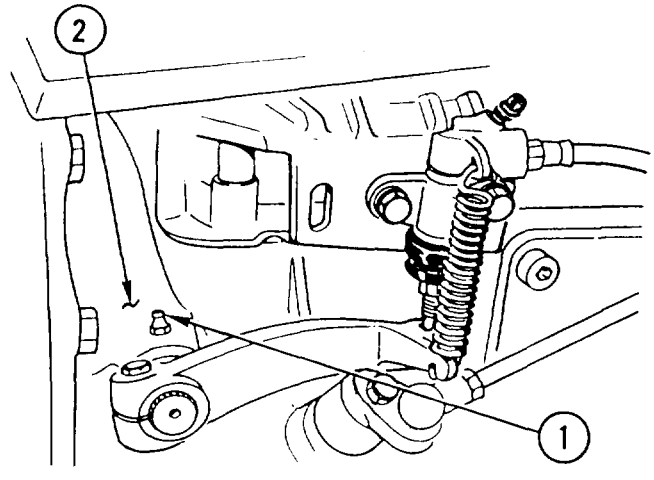
Note 29

CLUTCH RELEASE SHAFT
(SEE/HMMH)

CAUTION

Damage can occur to clutch assembly if over-lubricated.

Apply two shots of GAA from standard hand-held grease gun to fitting (1) on clutch housing (2).



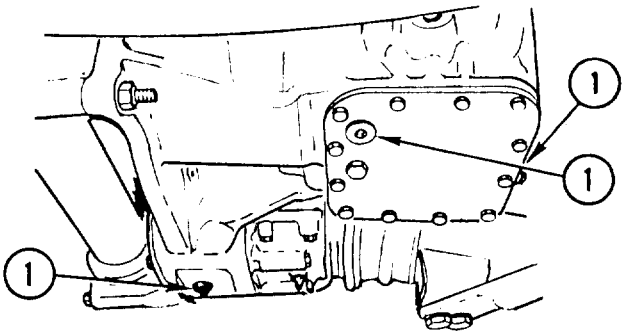
ANNUAL NOTES (CONTINUED):
Note 30

TRANSMISSION OIL (SEE/HMMH)

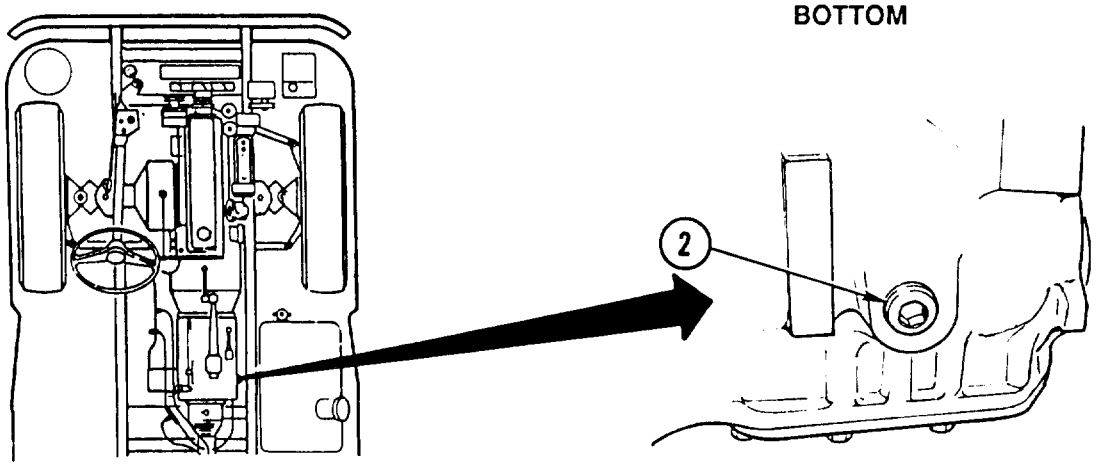
A Vehicle must be parked on level surface.

B All implements must be in transport position.

C Place suitable container under transmission drain plugs (1) and drain oil. Install drain plugs (1) and remove fill plug (2). Fill transmission with GO-80/90 or GO-75 to bottom of fill plug (2) port and install fill plug (2).



BOTTOM

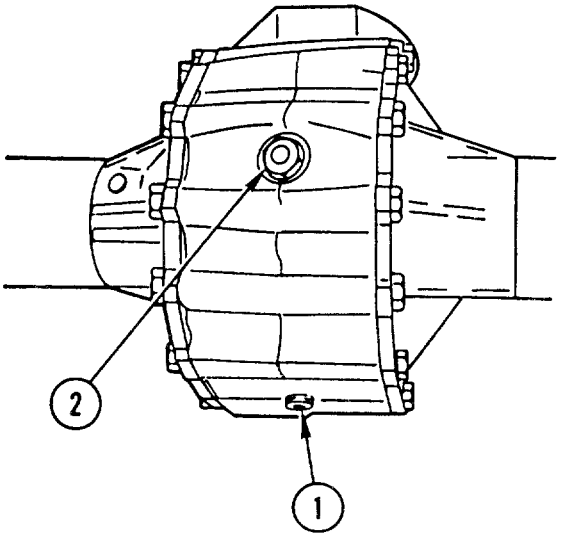


SIDE

Note 31

DIFFERENTIAL OIL FILLER
PLUG/OIL DRAIN PLUG (SEE/HMMH)

Place suitable container under differential. Remove drain plug (1) and drain oil. Install drain plug (1) and remove fill plug (2). Fill differential with GO-80/90 or GO-75 thru fill port (2). Oil level should be level with bottom of fill port (2). Install fill plug (2).

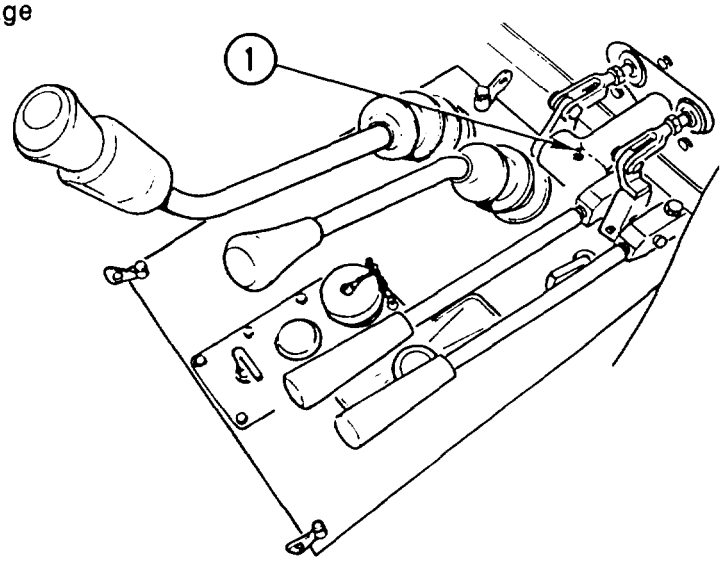


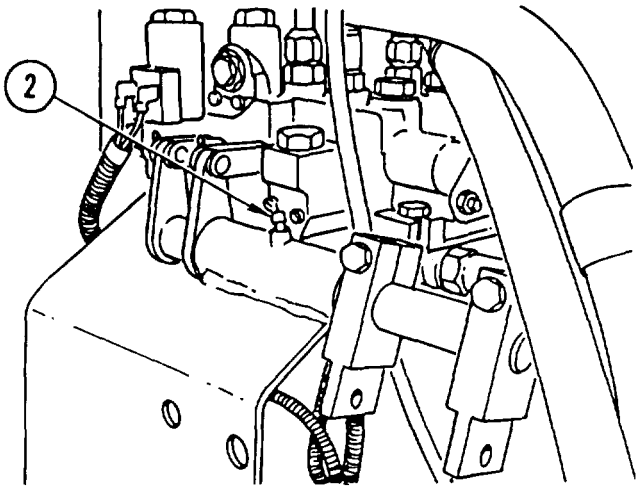
ANNUAL NOTES (CONTINUED):
Note 32

BOOM AND BUCKET CONTROL LEVER LINKAGE (SEE/HMMH)

A Lubricate one fitting with GAA inside cab at boom and bucket control lever linkage (1).

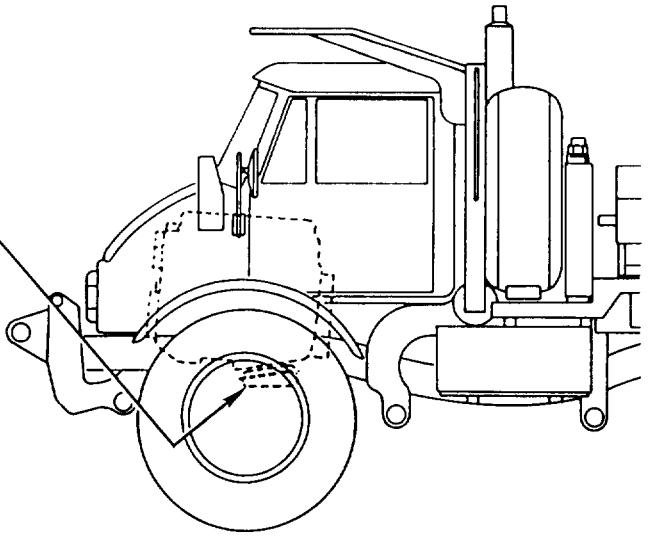
B Lubricate one fitting with GAA outside cab at boom and bucket control lever linkage (2).





ON-CONDITION NOTES:

	LUBRICANT	INTERVAL
Engine Oil Drain (SEE/HMMH) (See Note 33)(O)	OE/HDO	OC



ON-CONDITION NOTES (CONTINUED):
Note 33

ENGINE OIL DRAIN (SEE/HMMH)

WARNING

Hot oil causes burns and serious injury. Use care when checking or draining hot oil.

NOTE

Drain oil when notified by Army Oil Analysis Program (AOAP) laboratory. Unless otherwise notified by AOAP, engine oil must be changed quarterly.

A Remove inside engine hood (TM 5-2420-224-20).

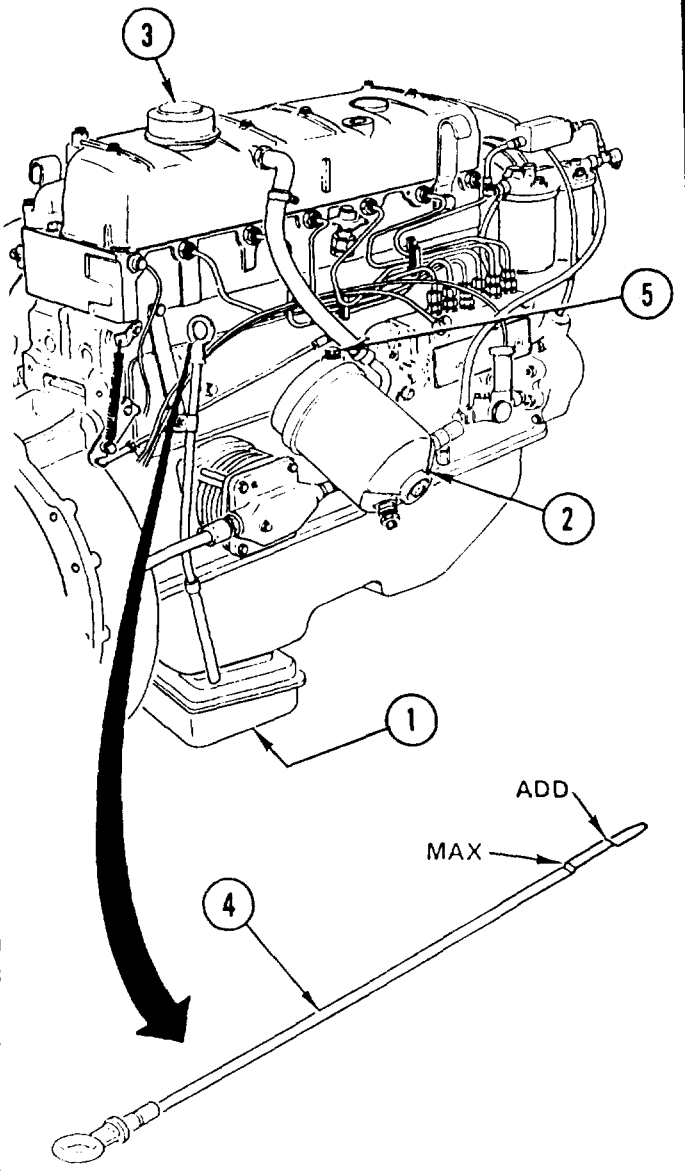
B Run engine until warm; stop engine. Place suitable container under engine. Remove drain plug (1) and drain oil. Install drain plug (1).

C Remove and discard oil filter element (2) (TM 5-2420-224-20). Clean filter base. Apply thin coating of clean oil to gasket on base of new filter element (2) and install on engine (TM 5-2420-224-20).

D Remove filler cap (3) and fill engine with OE/HDO or OEA until dipstick (4) indicates maximum (MAX) level. Remove filler plug (5) and fill filter bowl/canister with OE/HDO or OEA.

E Start engine and check for oil leaks.

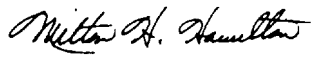
F Check oil level after engine has been shut down.



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
Secretary of the Army
04569

Distribution:
To be distributed in accordance with DA Form 12–38–E (Block 0971) requirements for LO5-2420-224-12.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1993-342-022-80020

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

THEN...JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL.

SOMETHING WRONG WITH PUBLICATION

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

BE EXACT PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT.

PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER	SIGN HERE

TEAR ALONG PERFORATED LINE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

REVERSE OF DA FORM 2028-2 AMSMC OP 103-85

TEAR ALONG PERFORATED LINE

FILL IN YOUR UNIT'S ADDRESS

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

NO POSTAGE NECESSSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 82 ROCK ISLAND IL

POSTAGE WILL BE PAID BY ROCK ISLAND ARSENAL

COMMANDER
U.S. ARMY ARMAMENT, MUNITIONS
AND CHEMICAL COMMAND
ATTN AMSMC-MAS
ROCK ISLAND IL 61201-9948

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN: 071468-000