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**TRUCK, LIFT, FORK, CLEAN BURN DIESEL, FRONT/SIDE LOADING  
6,000 LB CAPACITY MODEL R60SL-DC  
NSN 3930-01-378-7497**

**References:** TM 10-3930-669-10, TM 10-3930-669-20, TM 10-3930-669-34, TM 9-4910-709-14&D, FSC C9100-IL

**Approved for public release; distribution is unlimited.**

**REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS**

this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms) to: Commander, US Army Tank-automotive and Armaments Command, ATTN: AMSTA-IM-OPIT, Warren, MI 48397-5000. A reply will be furnished to you. You may also provide DA Form 2028-2 information to TACOM via datafax or e-mail. TACOM's datafax number for AMSTA-IM-OPIT is (810) 574-6323 and the e-mail address is: amsta-im-opit@cc.tacom-tech-pubs@cc.tacom.army.mil.

**Maintenance Levels.** This Lubrication Order(L0) is for Operator/Crew and Unit Maintenance. The lowest level of maintenance authorized to lubricate a point is indicated by either Operator/Crew (C) or Unit Maintenance (0). Operator/Crew may lubricate points authorized for Unit Maintenance when authorized by Unit Maintenance.

**Locators.** Points indicated with dotted lines are lubricated on both sides of the forklift. Reference to the appropriate localized view is given after most lubrication entries. Localized views begin on Card 9.

**Lube Intervals.** Intervals (on-condition or hard-time) and the related man-hour times are based on normal operation. The man-hour times

specified is the time needed to do all 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 lubricants are contaminated or if operating the equipment under adverse operating conditions, including longer-than-usual operating hours. The calendar 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. Hard-time intervals must be applied during the warranty period. Intervals shown in this lubrication section are hourly. Notes are located on Cards 19 to 21.

**WARNING**

- Drycleaning solvent (P-D-680) is TOXIC and flammable. Wear protective goggles and gloves; use only in a well-ventilated area; avoid contact with skin, eyes, and clothes; and do not breathe vapors. Keep away from heat or flame. Never smoke when using solvent; the flashpoint for type I drycleaning solvent is 100°F (38°C) and for type II is 138°F (50°C). Failure to do so may result in injury or death to personnel.
- If personnel become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts skin or clothes, flush with cold water. If solvent contacts eyes, immediately flush eyes with water and get immediate medical attention.

**Cleaning.** Clean grease fitting and grease gun tip before lubricating. Clean parts with drycleaning solvent (P-D-680, Type II or equivalent). Dry before lubricating. After high-pressure washing, lubricate all fittings and oil can points outside and underneath the forklift. Drain if water is found. For corrosion control, refer to TM 10-3930-669-10.

**AOAP Sampling.** Engine oil must be sampled at 50 hours of operation or 90 days, whichever occurs first, for Active Army Units. Transmission oil must be sampled at 100 hours of operation or 90 **days**, whichever occurs first,

for Active Army Units. Reserve and National Guard activities will use 50 hours or 180 days, whichever occurs first, as prescribed interval. Hydraulic fluid will be sampled once a year. Sampling will be performed as prescribed by DA Pam 738-750.

**Warranty Statement.** For Equipment under manufacturer’s warranty, hard-time oil service intervals shall be followed. Intervals shall be shortened if lubricants are to be contaminated or if operation is under adverse conditions such as longer than usual operating hours, extended idling periods, or extreme dust.

## -KEY-

LUBRICATION POINT	CAPACITIES	EXPECTED TEMPERATURES	LUBRICANT	INTERVAL
Engine Crankcase	10 qt. (9.5 l)	See Chart A		AR- As Required  OC- On Condition  10HRS  100HRS  250HRS  500HRS  1000HRS  2000HRS
Shift Carriage	As Required	GAA Grease, Automotive and Artillery, (MIL-G-10924) All Temperatures		
Pivot Cylinder	As Required			
Steer Axle	As Required			
Tilt Cylinder	As Required			
Shift Cam Rollers	As Required			
Shift Cylinder	As Required			
Pivot Shaft Bearing	As Required			
Mast Tilt	As Required			
Steering Wheel Bearings	As Required			
Fork Latches	As Required			
Hood Latches	As Required			
Throttle Linkage	As Required			
Transmission	8 qt. (7.57)	See Chart B		
Shift and Mast Chains	As Required	CPC Corrosion Preventive Compound (MIL-C-46176) All Temperatures		
Drive Axle	(5.67 l)	See Chart C		
Hydraulic Oil Tank	10.8 gal. (40.1 l)	See Chart B		
Master Cylinder	0.75 qt. (0.7 l)	BFS Silicone Brake Fluid, Automotive (MIL-L-46176) All Temperatures		

### CHART A. ENGINE

EXPECTED TEMPERATURE		-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°F	°C	-50	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	43	49
LUBRICANTS:		OE/HDO LUBRICATING OIL, ICE, TACTICAL (MIL-L-2104) OEA LUBRICATING OIL, ICE, ARCTIC (MIL-L-46167)																	
		*See Note 2a																	

### CHART B. TRANSMISSION/HYDRAULIC

EXPECTED TEMPERATURE		-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
° F	° C	-50	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	43	49
LUBRICANTS:		OE/HDO LUBRICATING OIL, ICE, TACTICAL (MIL-L-46152)																	
		See Notes 3a, 3b, and 3c																	

### CHART C. DRIVE AXLE

EXPECTED TEMPERATURE		-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°F	°C	-50	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	43	49
LUBRICANTS:		LUBRICATING OIL, GEAR, MULTIPURPOSE (MIL-L-2105)																	
		*See Notes 5a through 5d																	

LUBRICANT • INTERVAL

**ENGINE COVER HINGES**

Lubricate. (0) SAE 1000HRS  
(See Note 7 and View 1.)

**SHIFT CAM ROLLERS**

Lubricate. (0) (2 Fittings) GAA 250HRS  
(See Note 1c and View 4.)

**SHIFT AND MAST CHAINS**

Lubricate. (0) (6 Chains) CPC 250HRS  
(See Note 1b and Views 2 and 3.)

**PIVOT CYLINDER**

Lubricate Clevis. (0) GAA 50HRS  
(See Note 1d and View 5.)

**SHIFT CYLINDER**

Lubricate. (0) (3 Fittings) GAA 50HRS  
(See View 6.)

**SHIFT CARRIAGE**

Lubricate. (0) GAA 8HRS  
(See View 7.)

**DOOR LATCH AND HINGES**

Lubricate. (0) (4 Oil Points) (See SAE Note 7a and Views 12 and 39.)

**FUEL TANK**

Drain Sediment. (0)  
(See Notes 4a, 4b, 4d, and 4e and View 14.)

**FORK LATCHES**

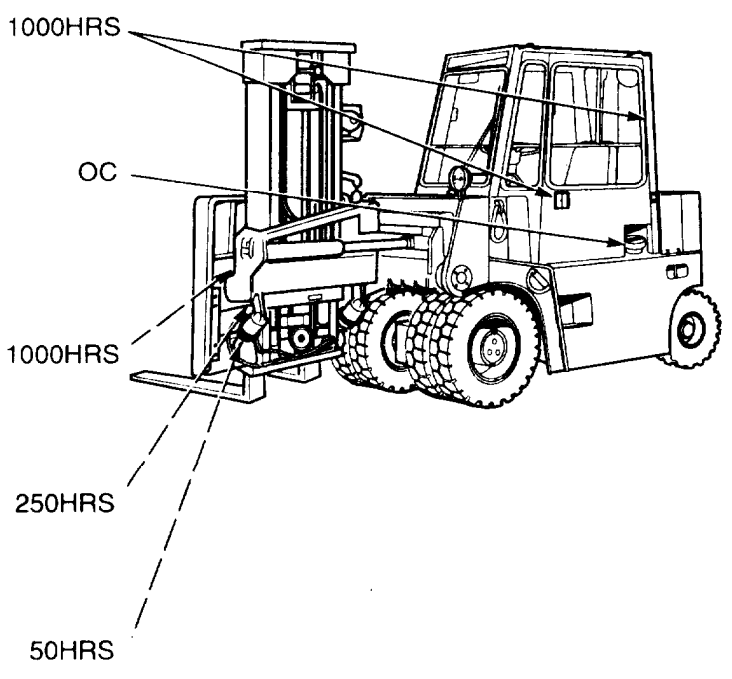
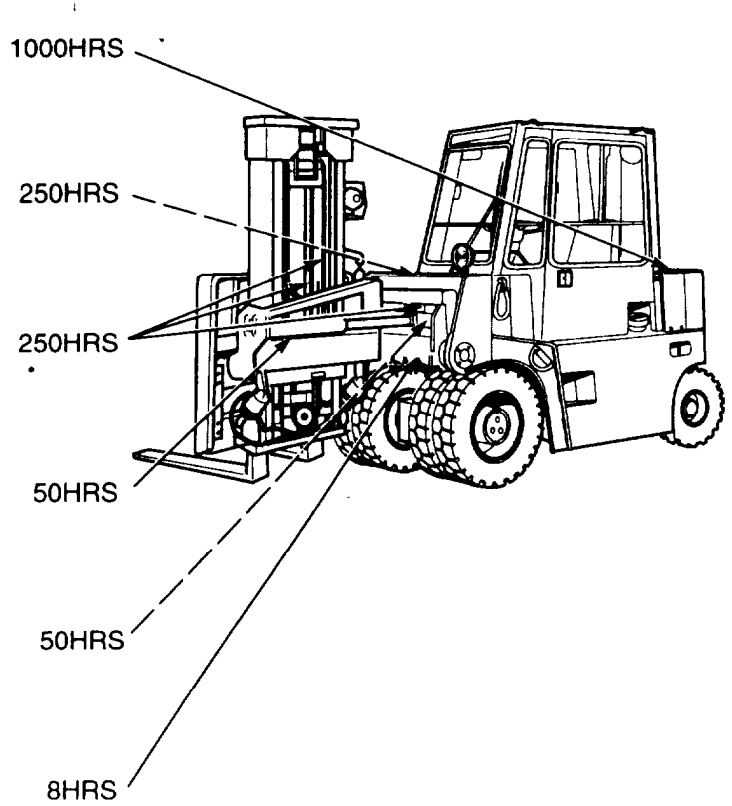
Lubricate. (0) SAE 1000HRS  
(See Note 7a and View 8.)

**MAST TILT**

Lubricate. (0) GAA 250HRS  
(See Note 1a and View 9.)

**TILT CYLINDER**

Lubricate Clevis. (0) GAA 50HRS  
(See Note 1d and View 10.)



**LUBRICANT      INTERVAL**

**ENGINE PANEL HINGES**

Lubricate. (0)  
(See Note 7a and View 24.)

SAE

1000HRS

**MAST**

Lubricate. (0)  
(See Note 1b and View 29.)

CPC

250HRS

**DRIVE AXLE**

Check Oil. (0)  
(See Note 5a and 5b and View 11.)

250HRS

Drain and Fill. (0)  
(See Note 5 and Views 11  
and 13.)

GO

500HRS

**PIVOT SHAFT BEARING**

Lubricate. (0) (2 Fittings)  
(See Note 1e and View 20.)

GAA

250HRS

**ENGINE COVER HINGE  
AND STRUT**

Lubricate. (0) (3 Oil Points)(See SAE  
Note 7a and Views 18 and 37.)

1000HRS

**FUEL/ WATER SEPARATOR**

Drain. (C)  
(See View 34.)

50HRS

Clean. (0)  
(See View 34.)

500HRS

**STEERING WHEEL BEARINGS**

Lubricate. (0) (2 Bearings)  
(See Note 6b and View 16.)

GMD

2000HRS

**HYDRAULIC OIL TANK**

Check Oil at Screen and Fill. (0)  
(See Note 9 and View 19.)

8HRS

Drain. (0)  
(See Note 9c and View 36.)

OE/HDO/OEA

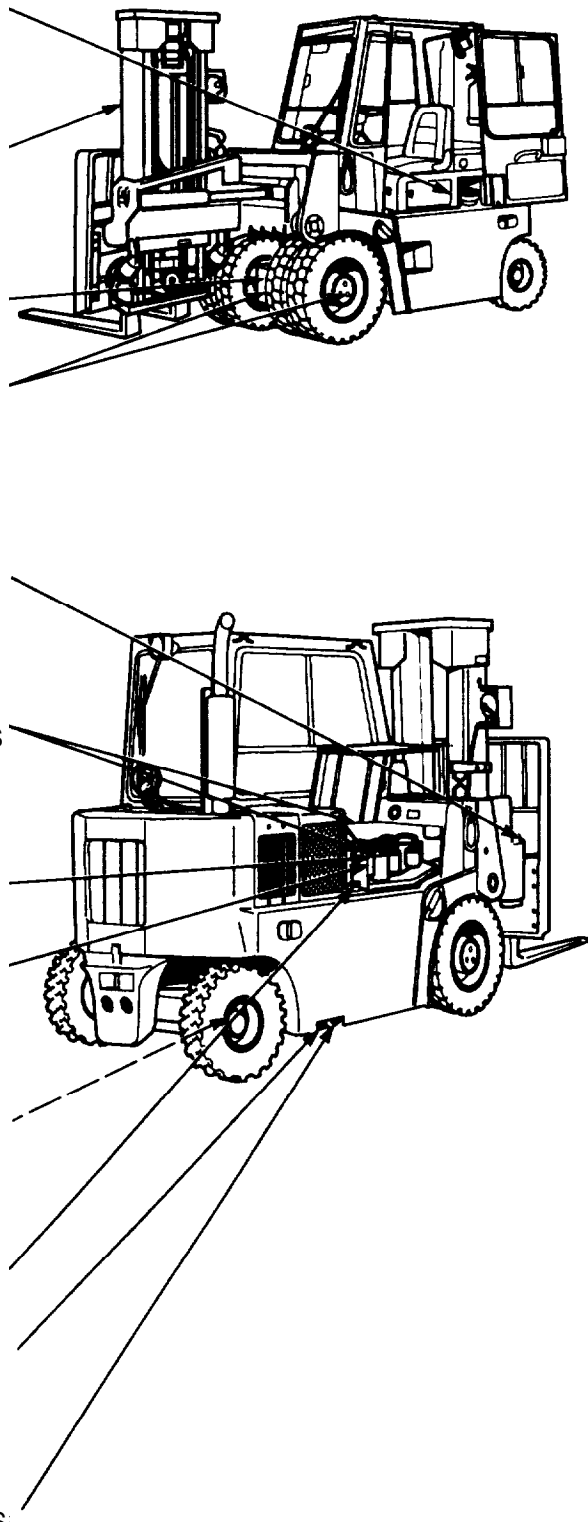
1000HRS

**ENGINE CRANKCASE**

Drain. (0)  
(See Note 2a and View 31.)

OE/HDO/OEA

250HRS



**LUBRICANT      INTERVAL**

**HYDRAULIC OIL FILTER**

Replace Filter. (0)  
(See Note 9b and View 21.)

**HYDRAULIC OIL SAMPLING VALVE**

Sample Oil. (0)  
(See Note 8 and View 27.)

**TRANSMISSION OIL FILTER**

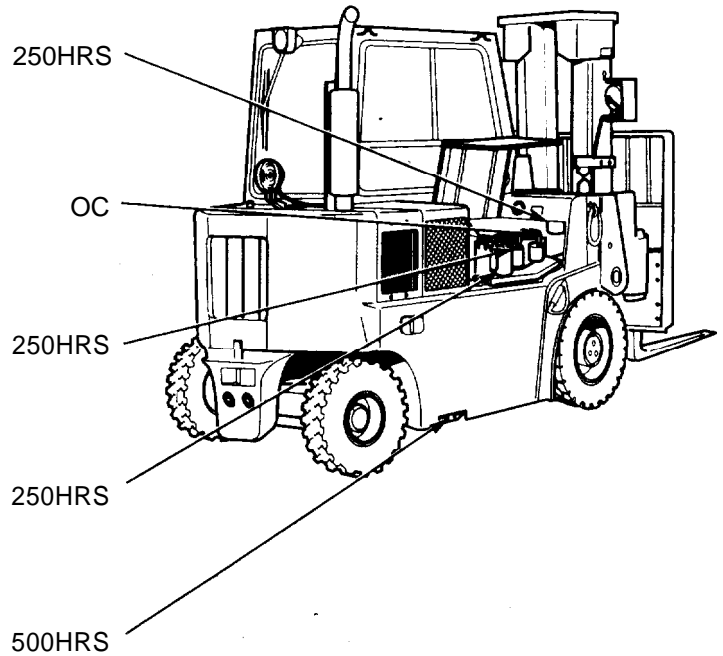
Replace Filter. (0)  
(See Note 3b and View 38.)

**ENGINE OIL FILTER**

Replace Filter. (0)  
(See Note 2b and View 32.)

**TRANSMISSION**

Drain. (0)  
(See Note 3a and View 40.)



**ENGINE CRANKCASE**

Check Oil at Dipstick. (C)  
(See Note 2a and View 25.)

Fill at Filler Tube. (0)  
(See Note 2b and View 30.)

**TRANSMISSION**

Check Oil at Dipstick. (C)  
(See Note 3a and View 33.)

Fill at Dipstick Tube. (O)(See  
Notes 3a and 3c and View 33.)

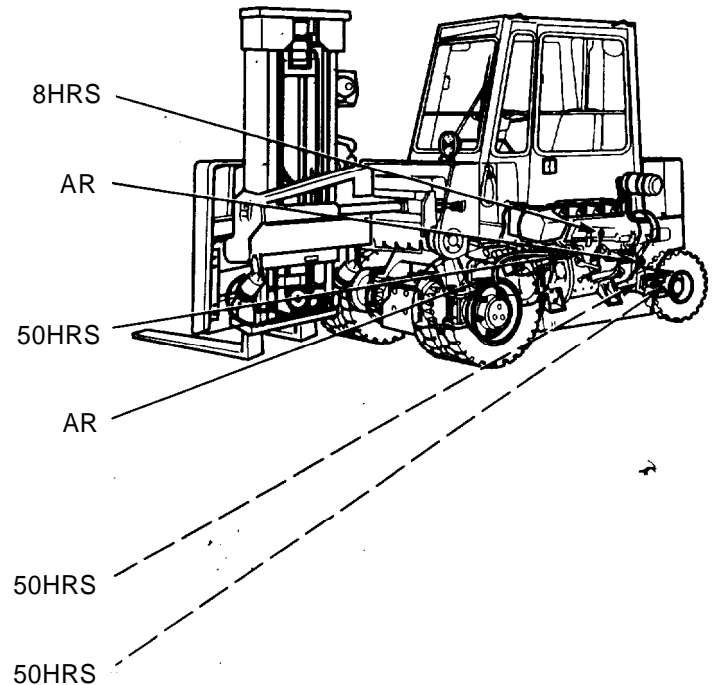
**STEER AXLE**

Lubricate Tie Rod: (0) (4 Fittings) GAA  
(See Note 6a and View 15.)

Lubricate King Pin. (0) (4 Fittings) GAA  
(See Note 6a and View 15.)

OE/HDO/OEA

OE/HDO



**LUBRICANT      INTERVAL**

**THROTTLE**

Lubricate. (0)  
(See Note 7b and View 26.)

SAE

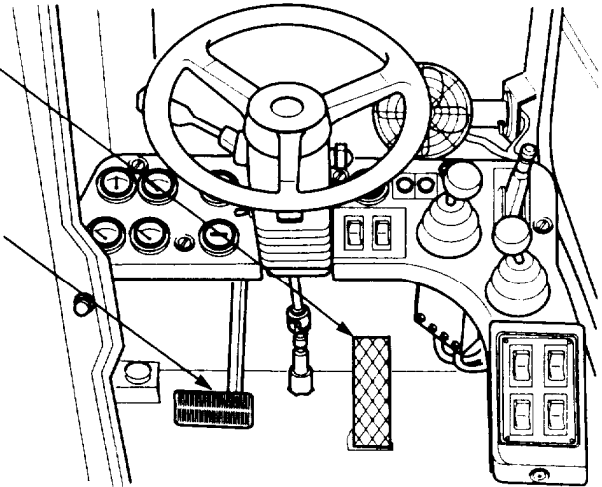
1000HRS

**BRAKE PEDAL AND LINKAGE**

Lubricate. (0)  
(See Note 7b and View 17.)

SAE

1000HRS



**TRANSMISSION OIL  
SAMPLING VALVE**

Sample Oil. (0)  
(See Note 8 and View 28.)

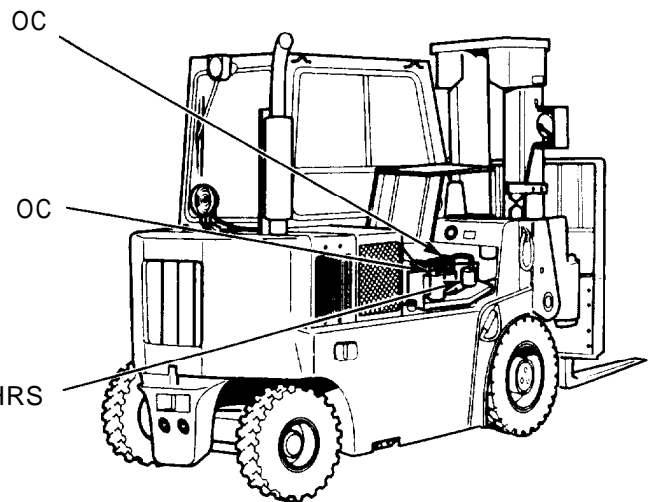
OC

**ENGINE OIL  
SAMPLING VALVE**

Sample Oil. (0)  
(See Note 8 and View 23.)

OC

500HRS



**FUEL FILTER**

Replace Filter. (0)  
(See Note 4c and View 35.)

**MASTER CYLINDER**

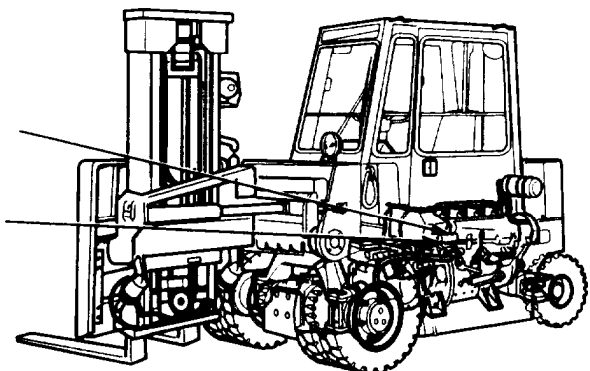
Check Brake Fluid. (0)  
(See Note 10a and View 22.)

Drain and Fill. (0)  
(See Note 10 and View 22.)

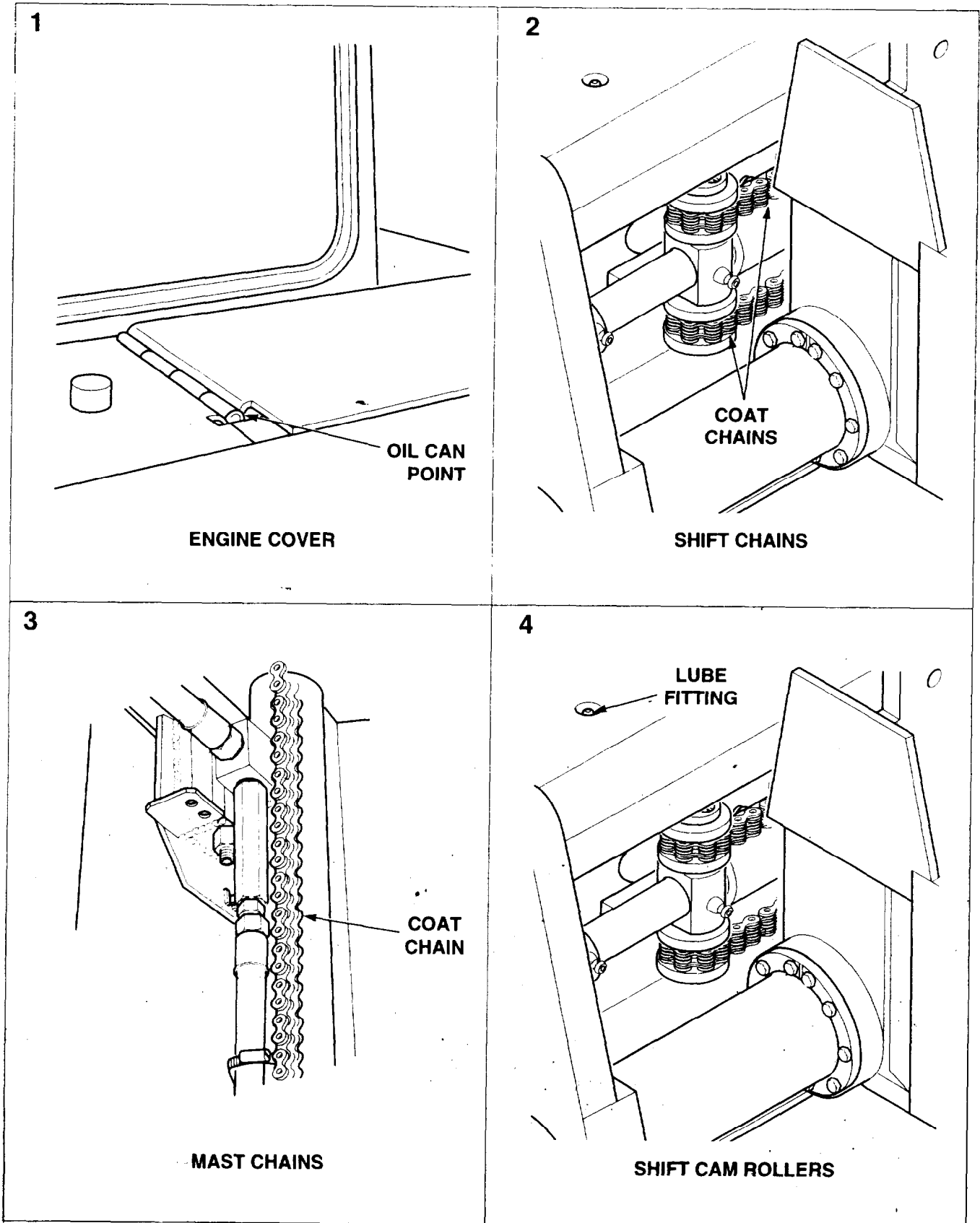
BFS

250HRS

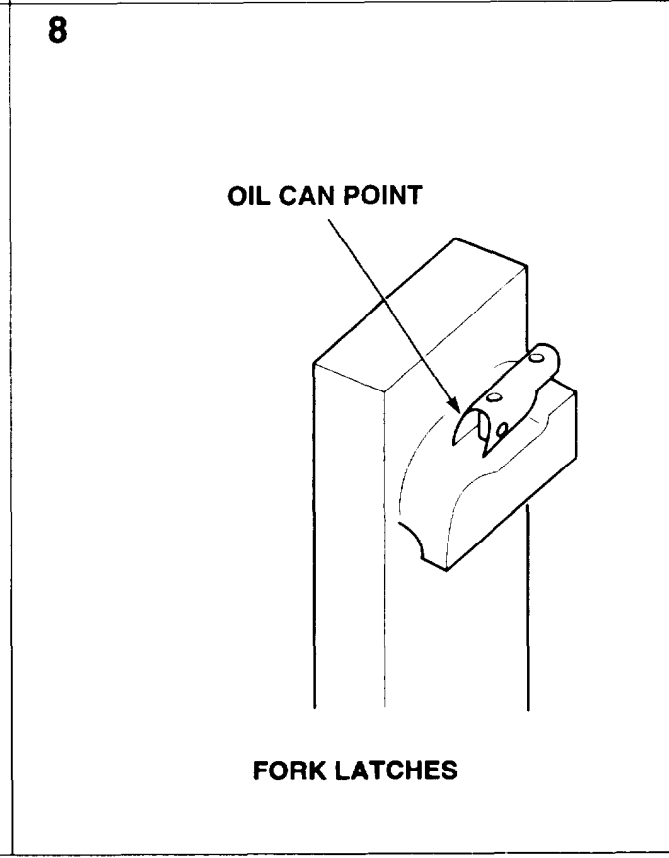
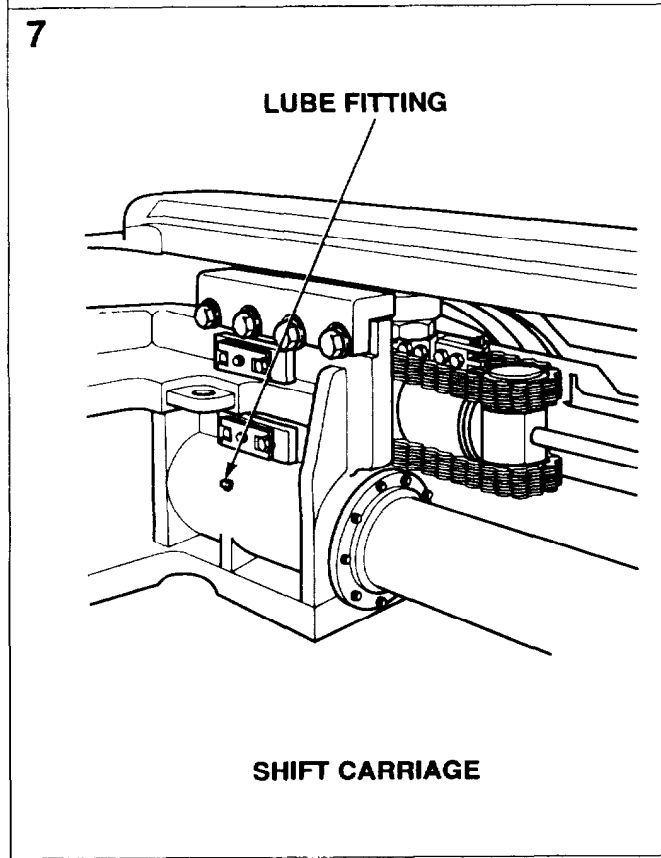
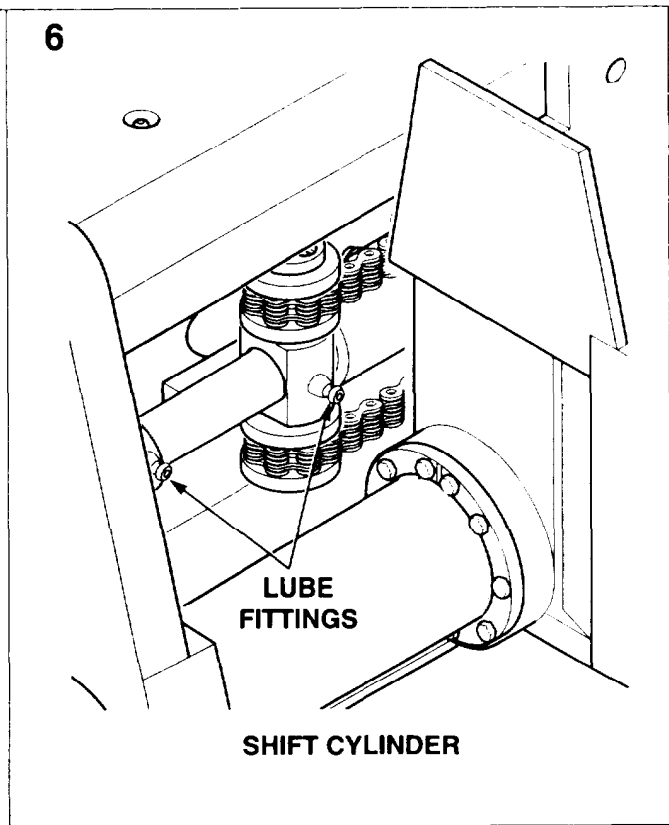
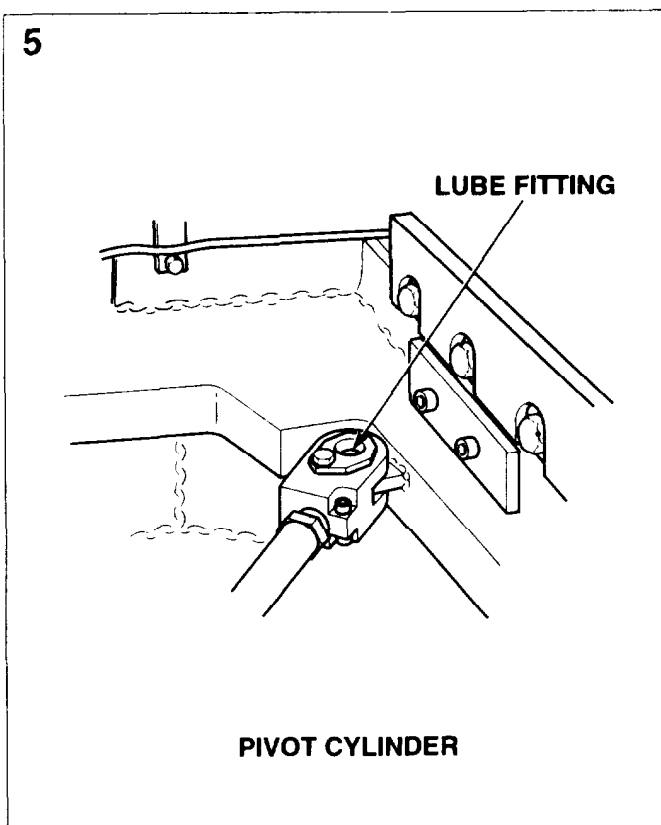
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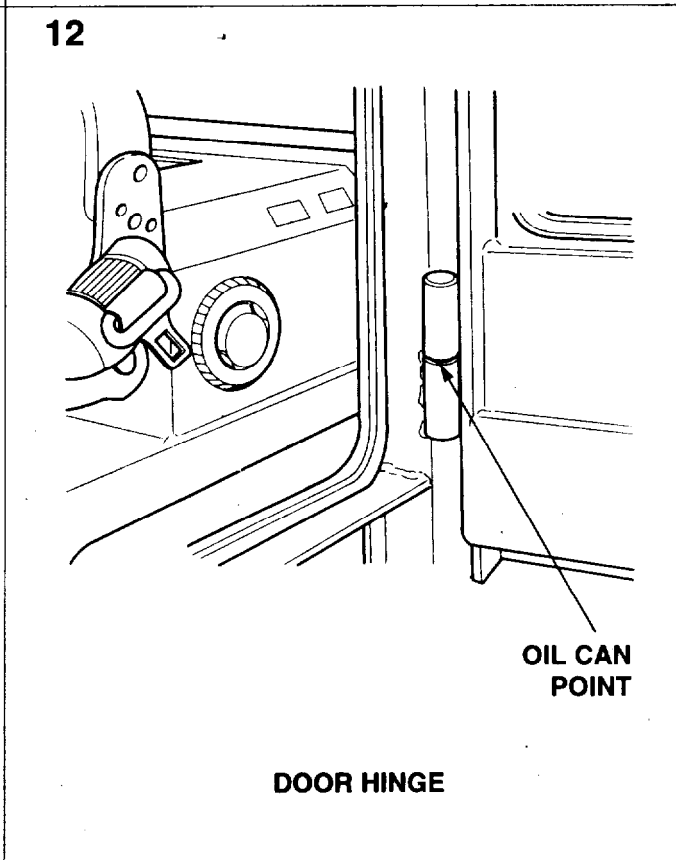
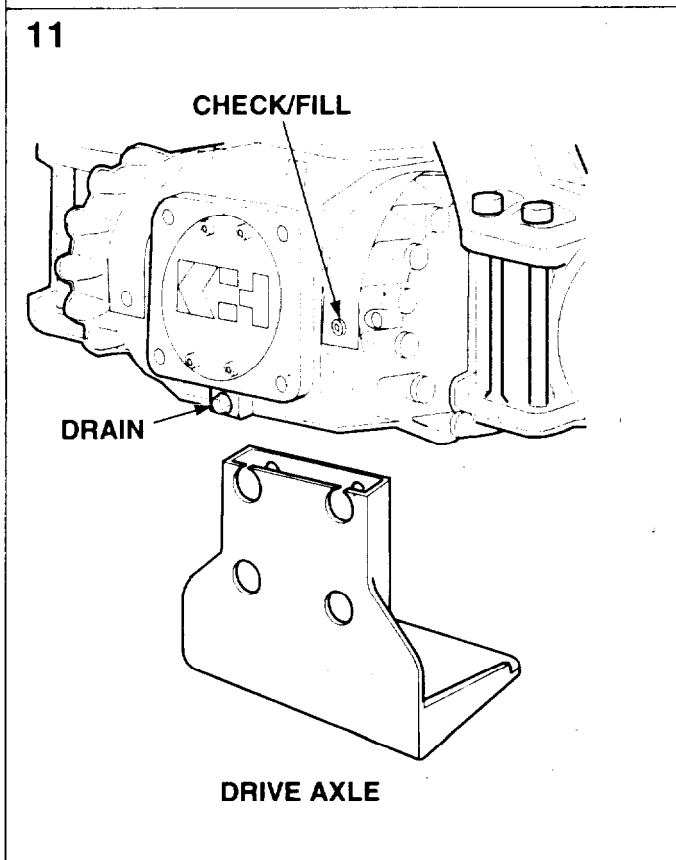
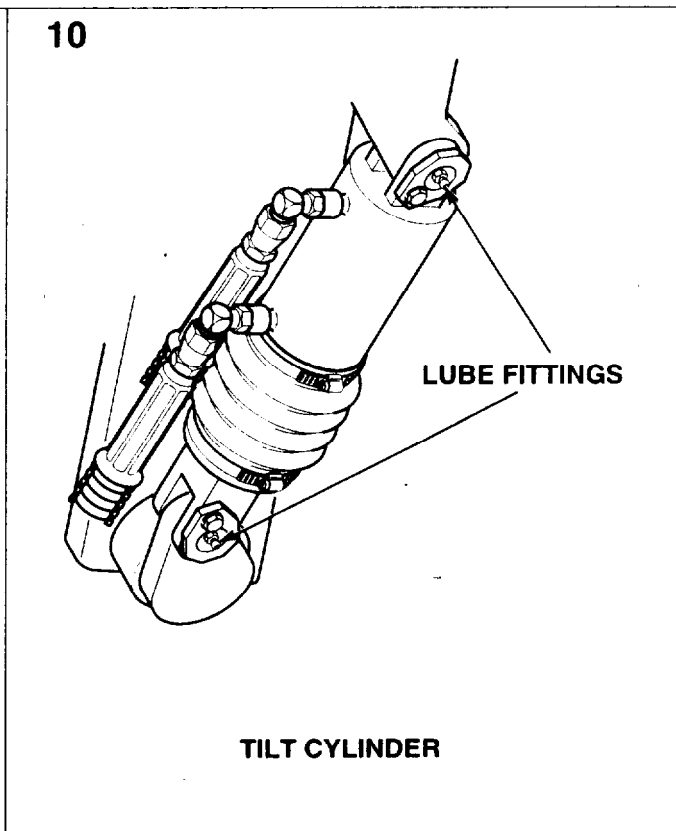
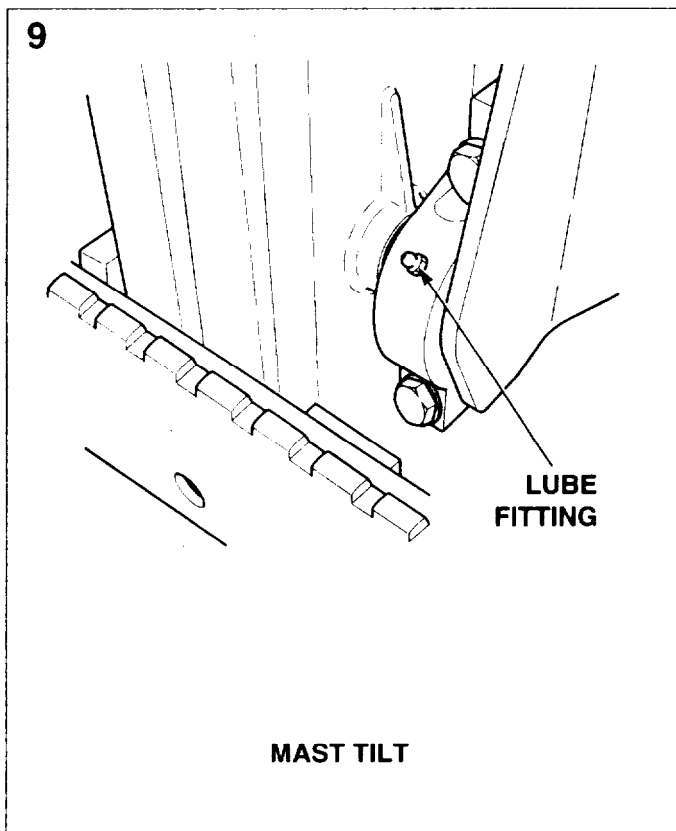




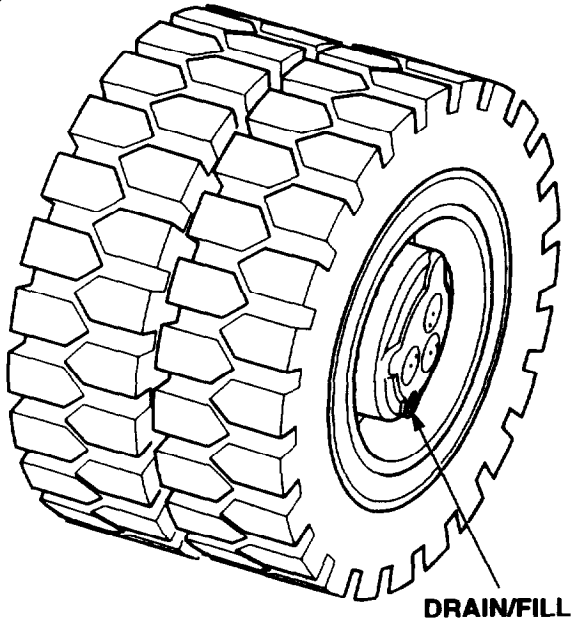


# LO 10-3930-669-12



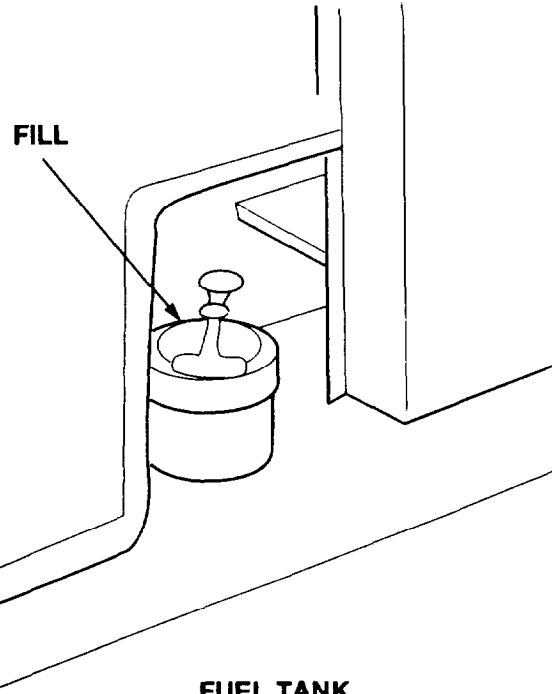


13



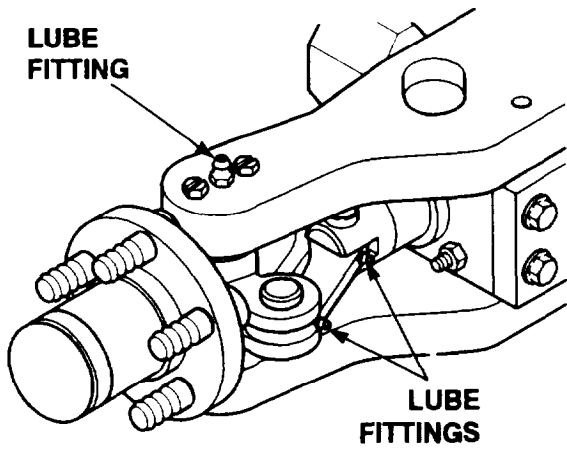
DRIVE AXLE

14



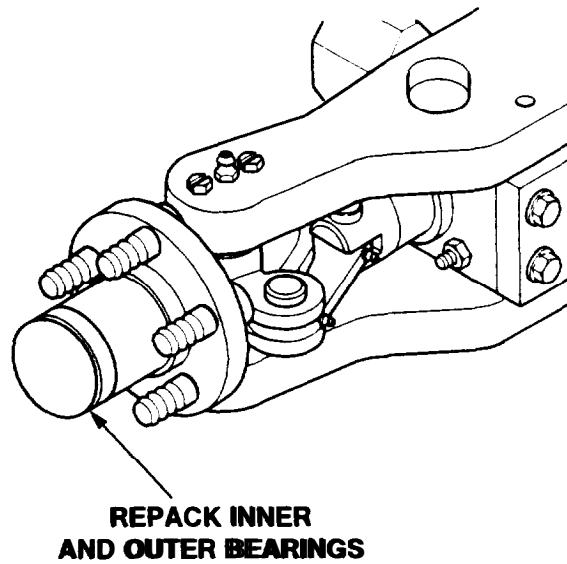
FUEL TANK

15

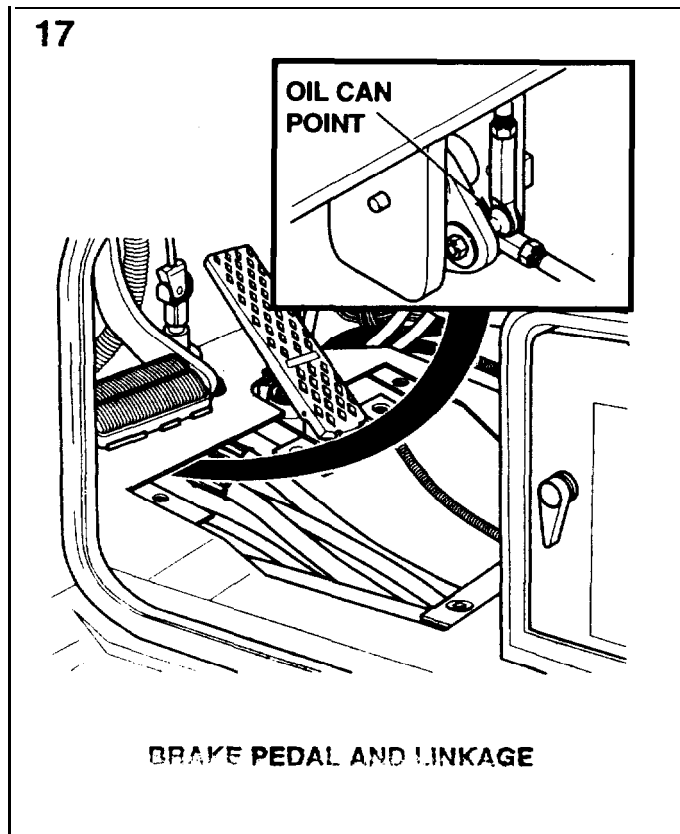


STEER AXLE

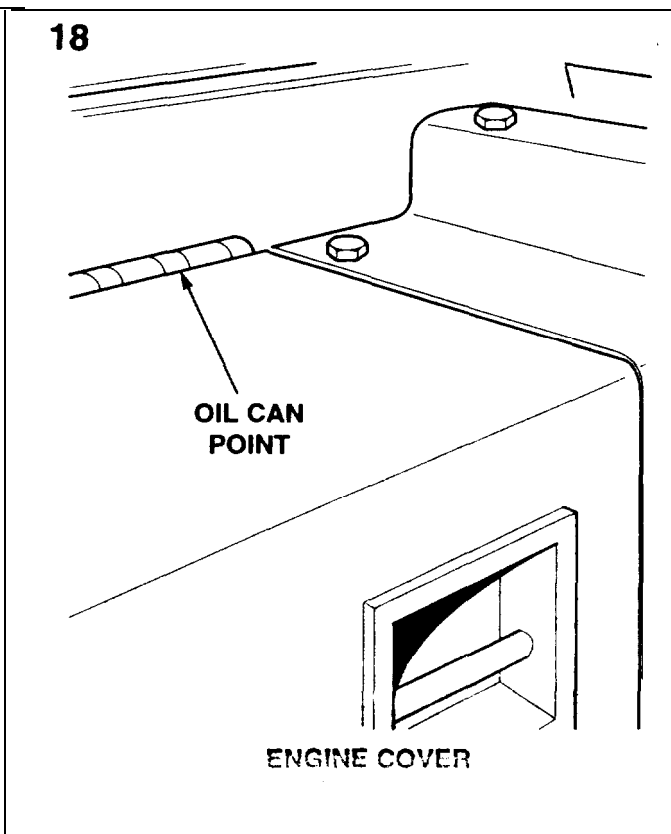
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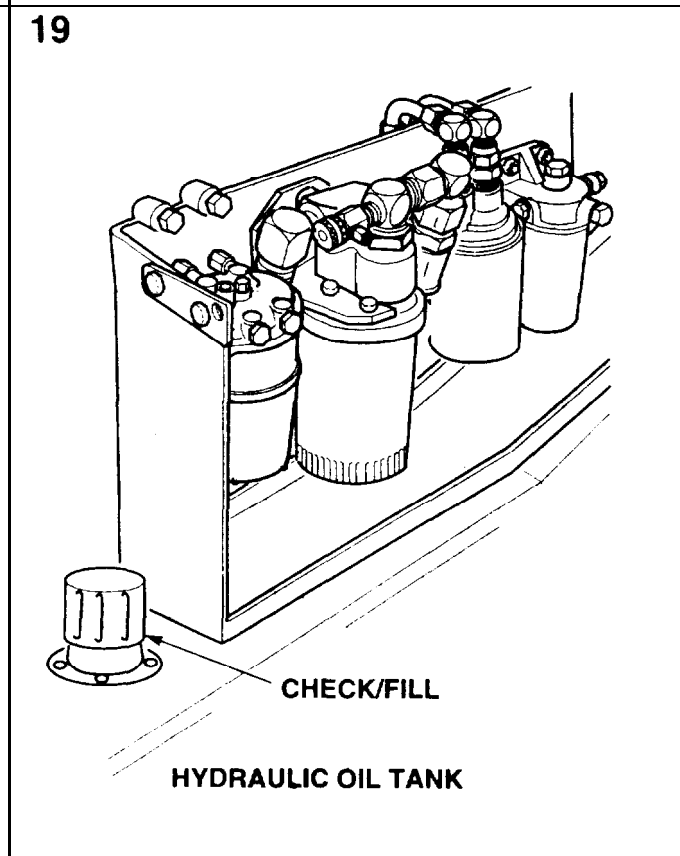
STEERING WHEEL BEARINGS



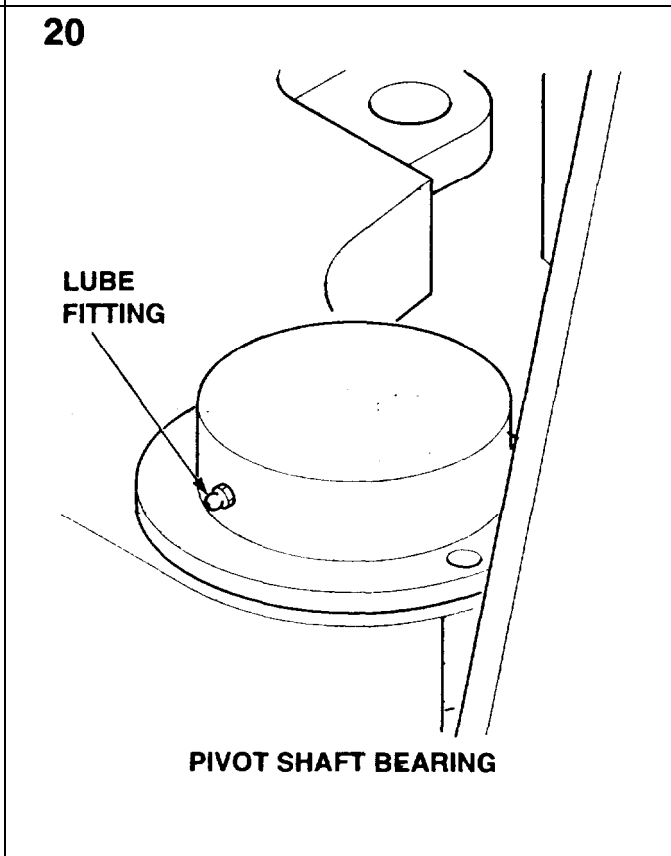
BRAKE PEDAL AND LINKAGE



ENGINE COVER

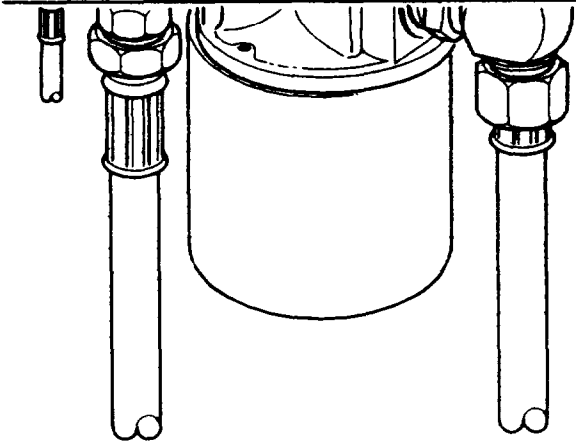


HYDRAULIC OIL TANK

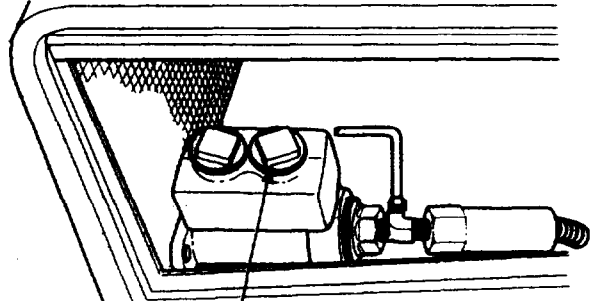


PIVOT SHAFT BEARING

21

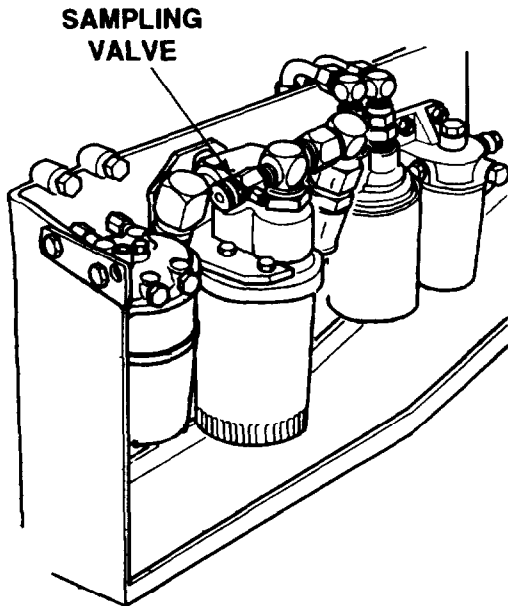


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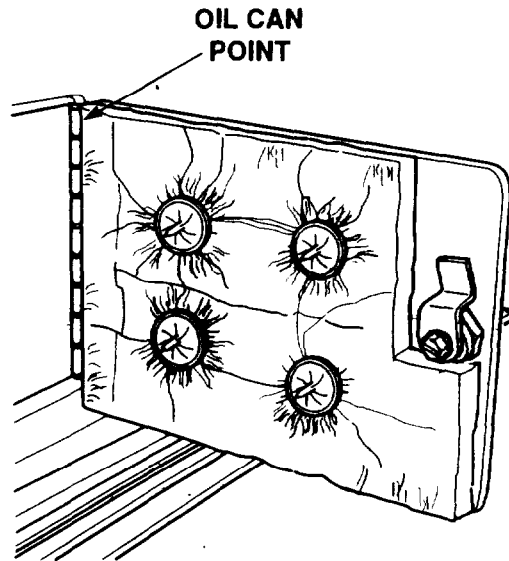
CHECK/DRAIN/FILL

23



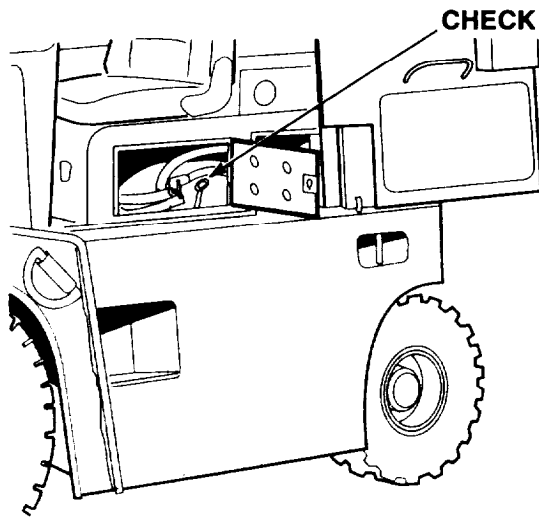
ENGINE OIL SAMPLING VALVE

24



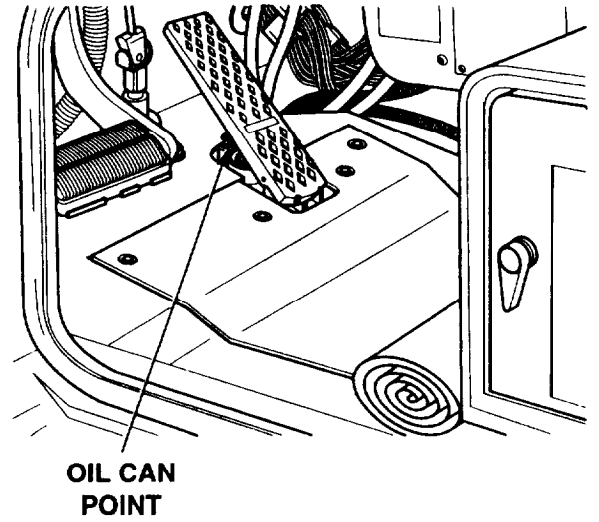
OIL CAN POINT

25



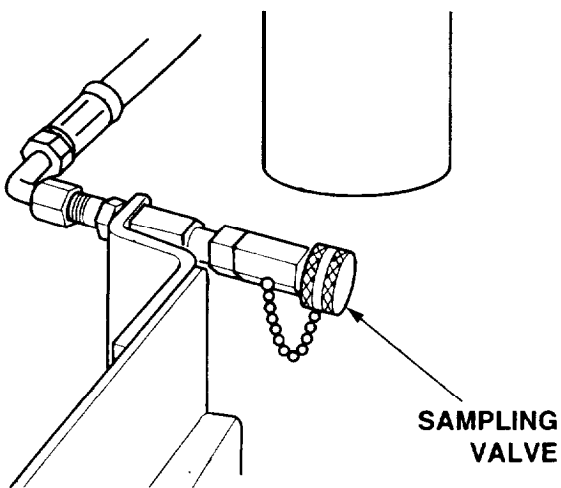
ENGINE OIL DIPSTICK

26



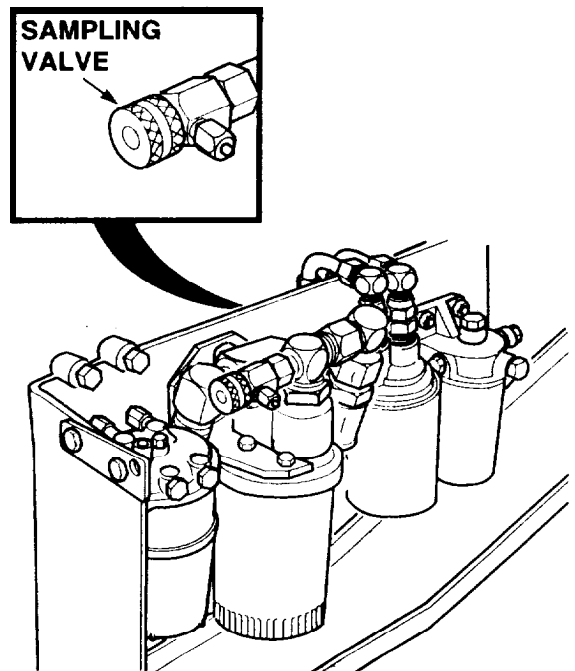
THROTTLE PEDAL

27

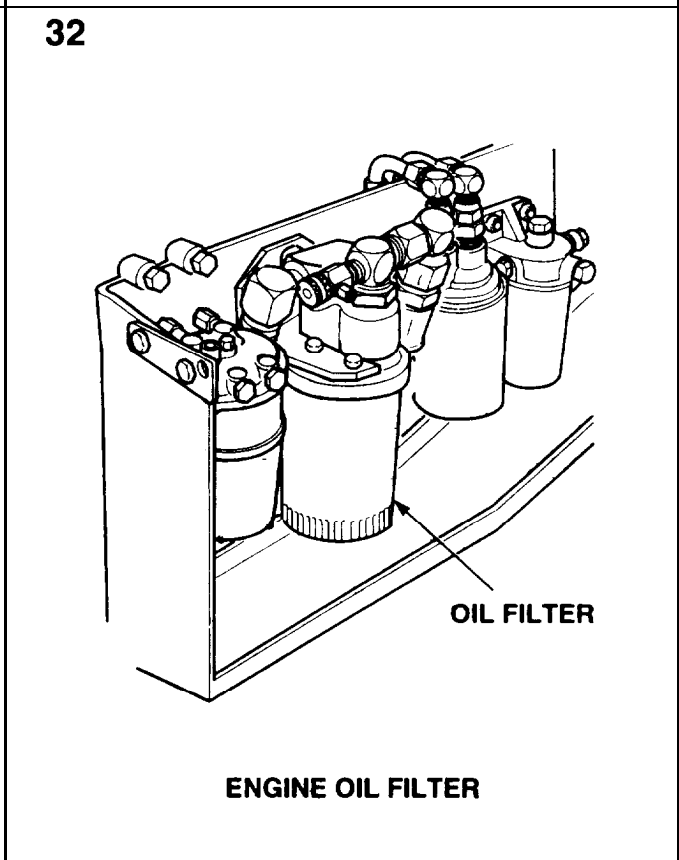
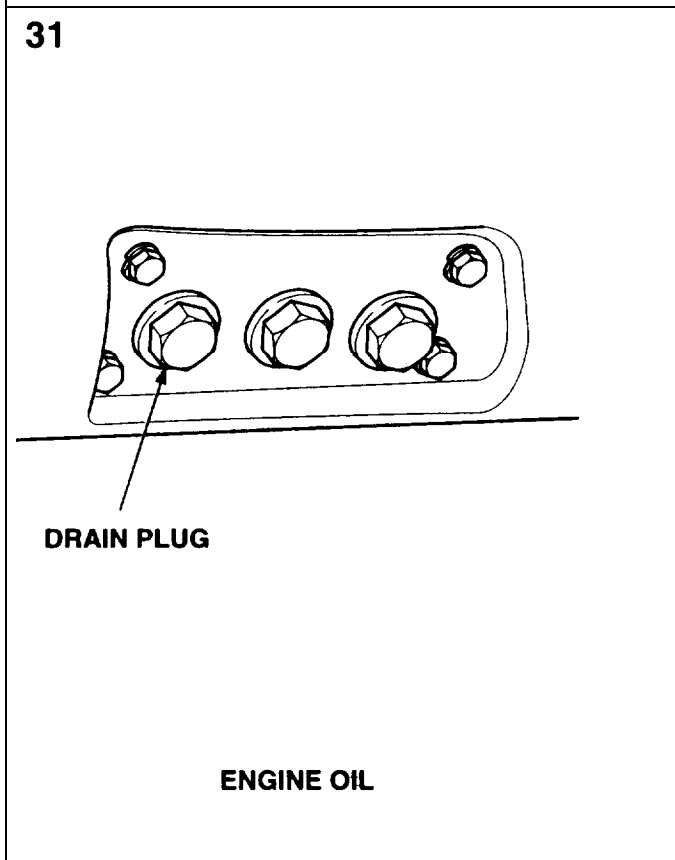
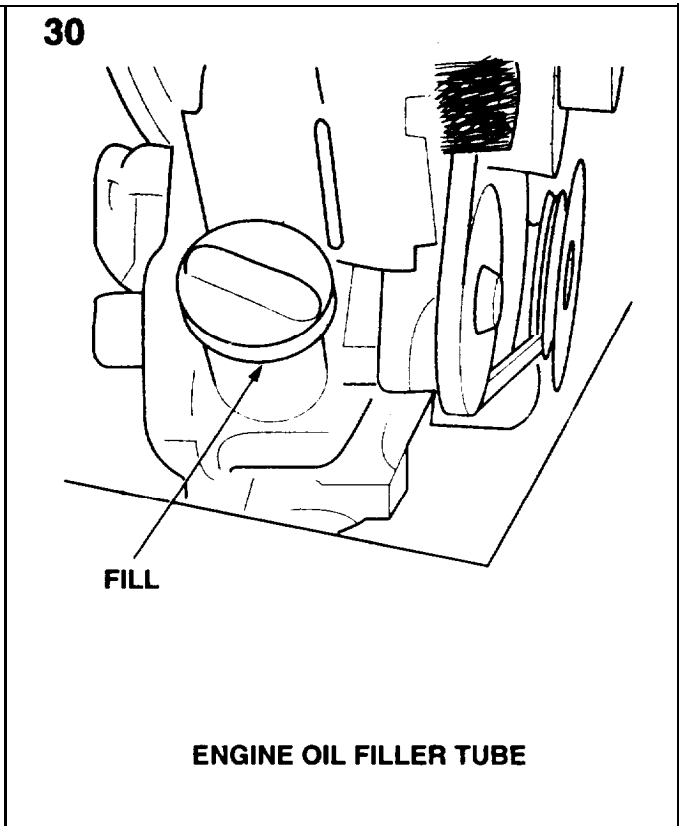
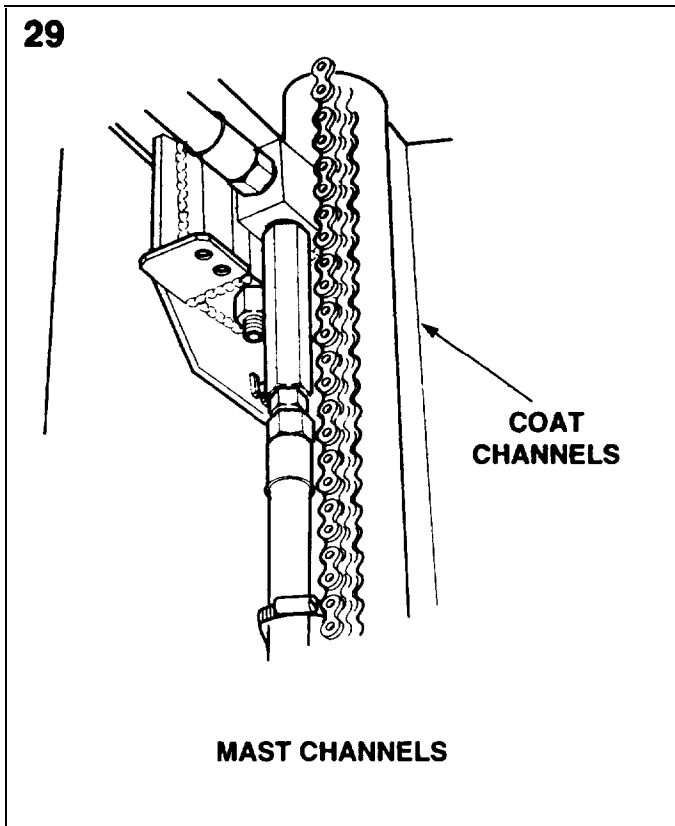


HYDRAULIC OIL SAMPLING VALVE

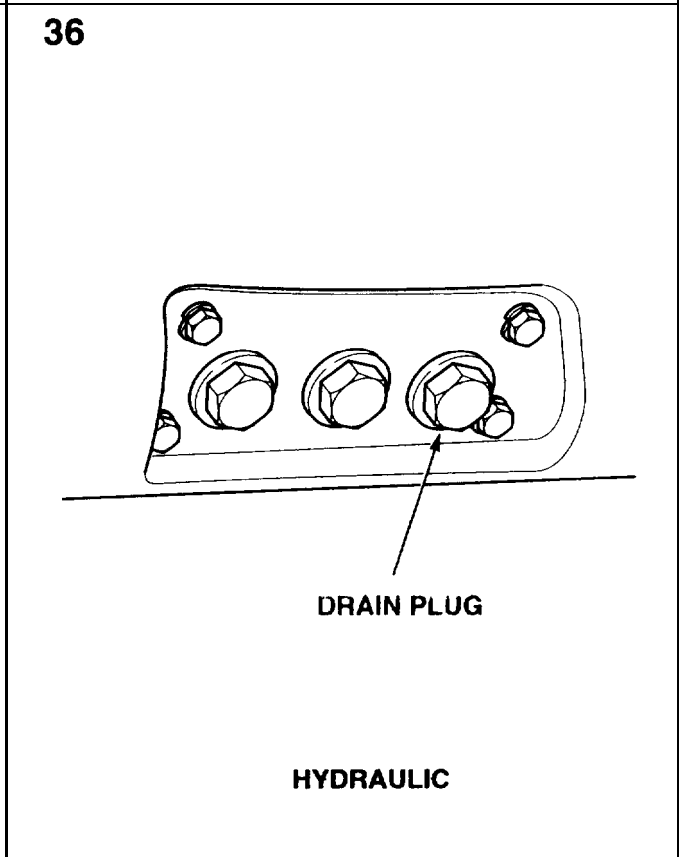
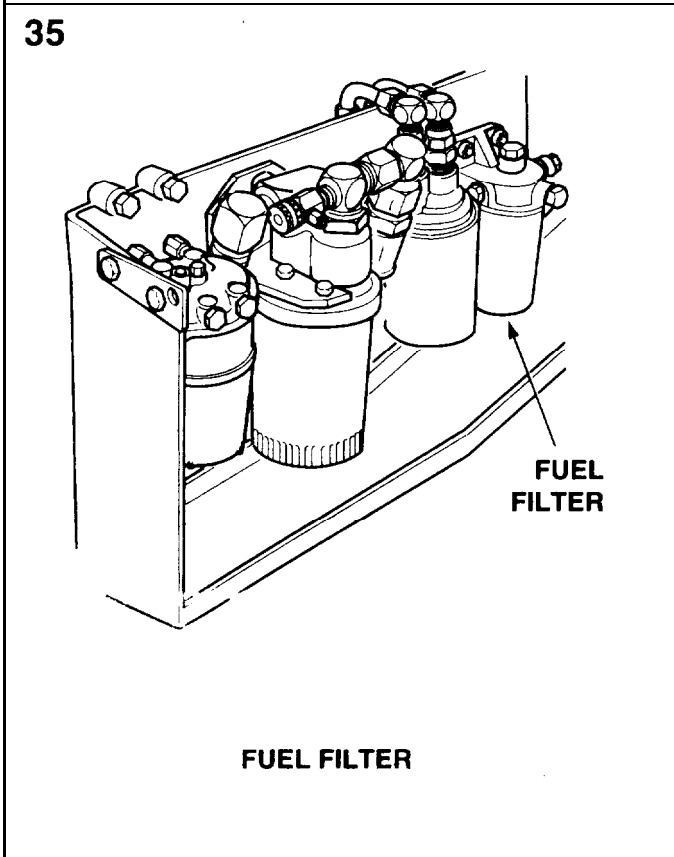
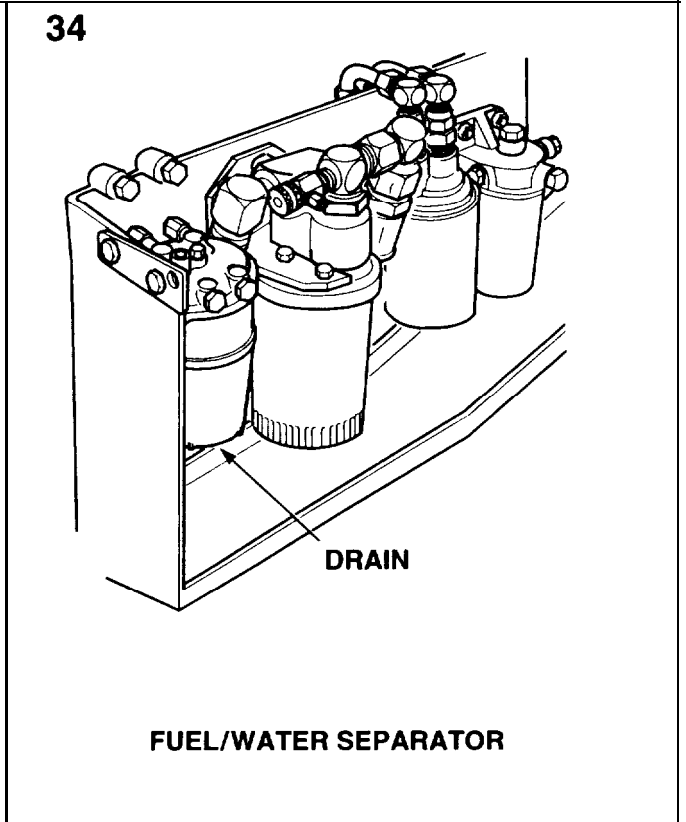
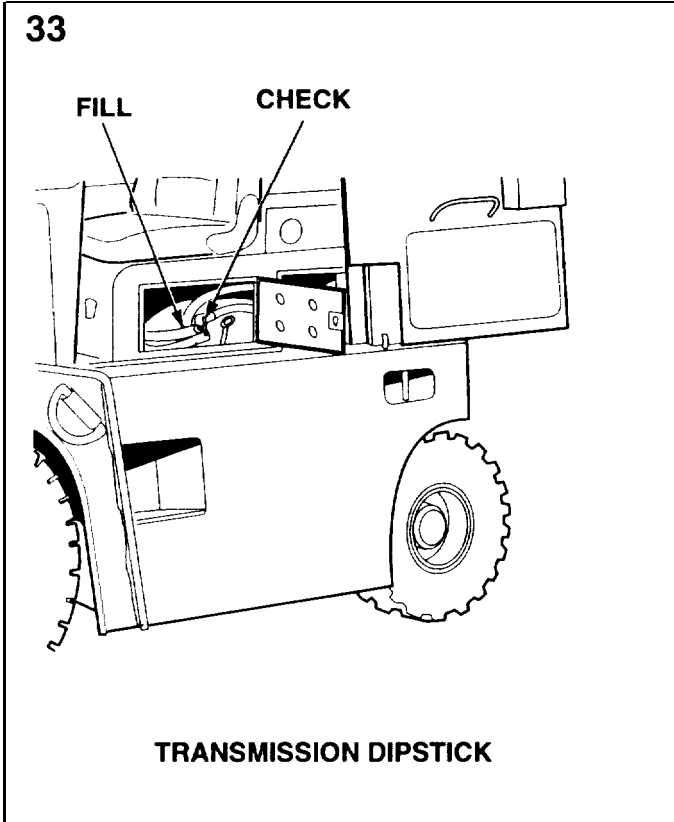
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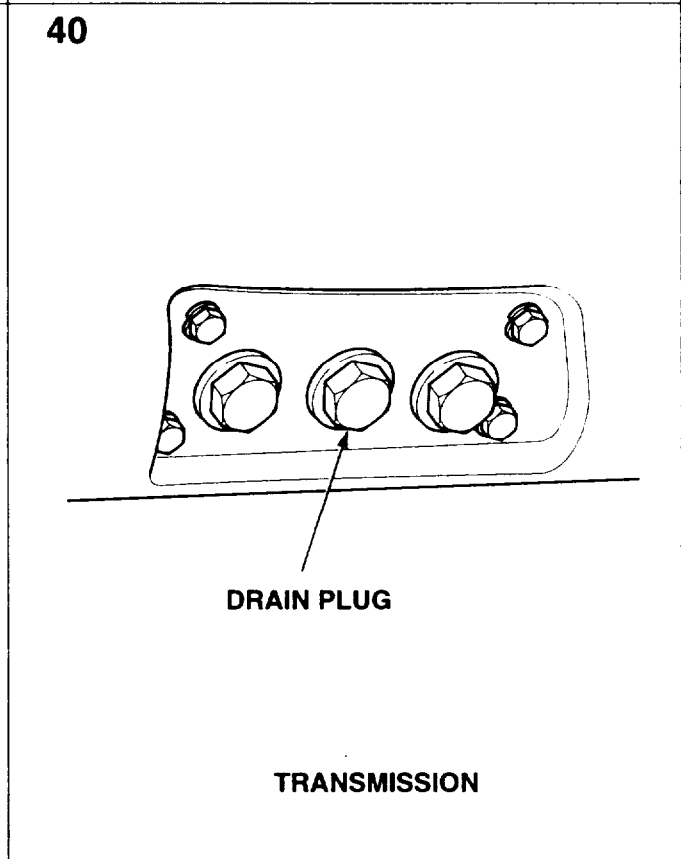
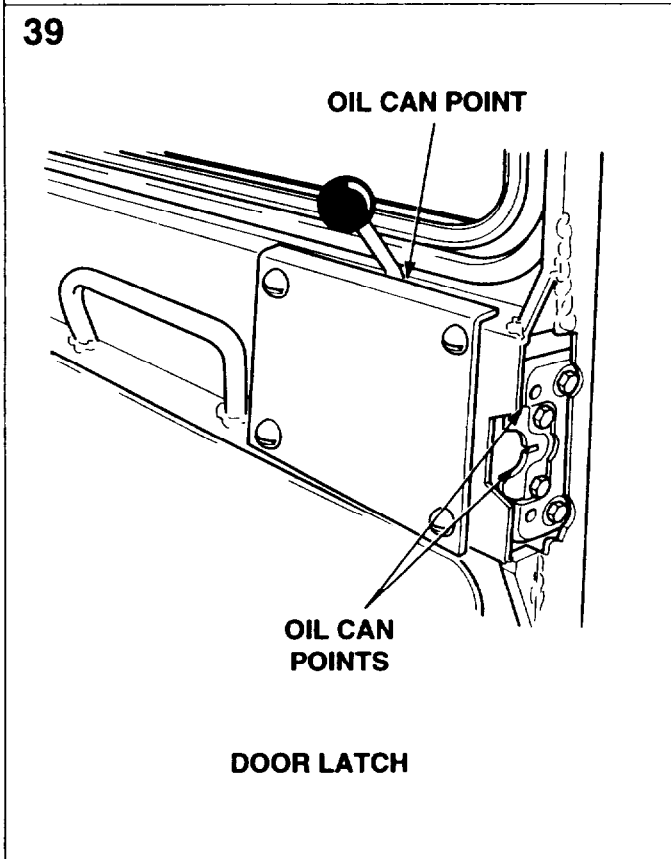
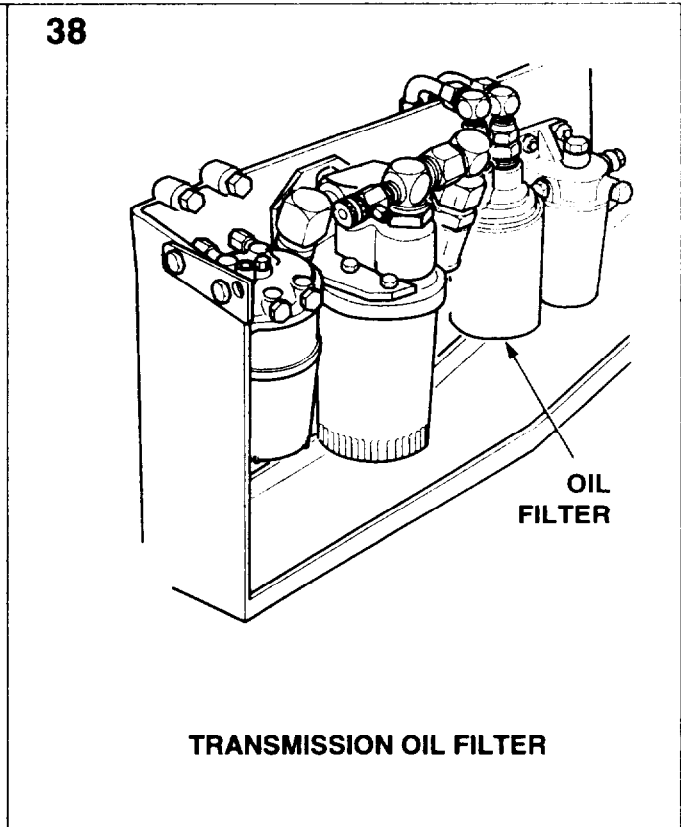
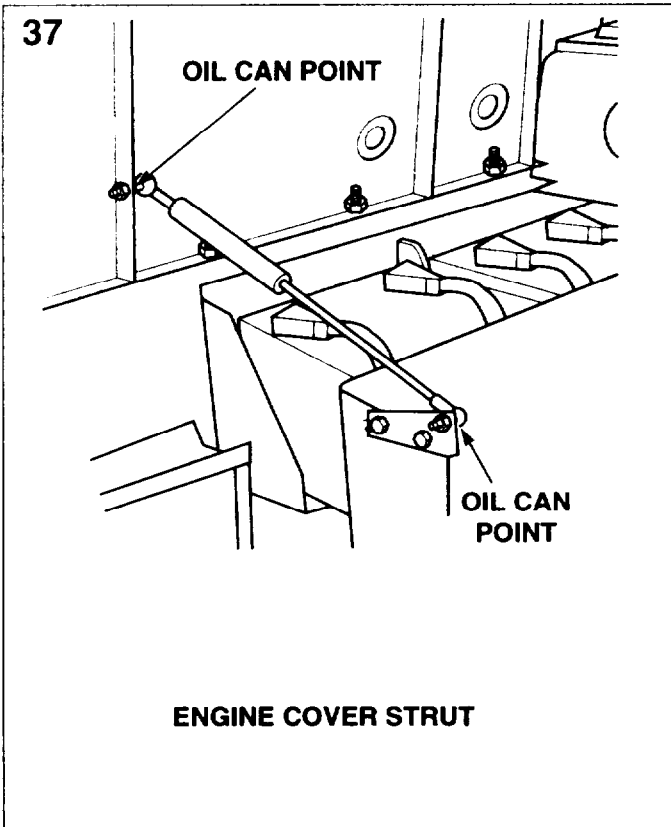


TRANSMISSION OIL SAMPLING VALVE









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## NOTES

### 1. CHASSIS AND MAST.

**WARNING**

Do not start engine or move forklift when anyone is working on vehicle. Severe injury or death to personnel could result.

#### NOTE

If an air-operated grease gun does not purge the fitting, use a hand-operated grease gun. If the part does not purge, remove and clean fitting, install fitting, and grease again. If part still does not purge, refer to maintenance task for that component.

- a. **Purging of Lubricant.** When using a grease gun, apply lubricant to the fitting until clean lubricant squeezes out of the part being lubricated.
- b. **Shift and Mast Chains.** Clean off dirt and debris before lubricating chains. Coat chains and connections liberally.
- c. **Shift Cam Rollers.** Carriage must be shifted fully to the right to lubricate both rollers.
- d. **Pivot Cylinder and Tilt Cylinder Clevis.** Apply grease with pneumatic grease gun only.
- e. **Pivot Shaft.** Apply grease with pneumatic grease gun only.

### 2. ENGINE.

- a. **Crankcase.** Check oil level with forklift parked on level ground and the engine off and cool (TM 10-3930-669-10). Do not overfill crankcase. Refer to TM 10-3930-669-20, remove plug and drain crankcase.
- b. **Engine Oil Filter.** After installing new filter, fill crankcase, operate engine five minutes, and check filter for leaks. Shut off engine, check crankcase level, and fill to FULL mark.

### 3. TRANSMISSION.

- a. **Transmission Housing.** Check oil level with forklift parked on level ground (TM 10-3930-669-10). After running engine for 5 minutes, check transmission oil level with engine running. Drain housing after running transmission in neutral for 5 minutes. Refer to TM 10-3930-669-20, remove plug and drain transmission.
- b. **Transmission Oil Filter.** After installing new filter, fill housing, operate engine five minutes, and check filter for leaks. Shut off engine, check housing level, and fill to FULL mark.
- c. **Transmission Drain Screen.** Refer to TM 10-3930-669-20, remove and clean the drain screen after each oil change.

## 4. FUEL SYSTEM.

- a. **Fuel Tank Strainer.** Refer to TM 10-3930-669-20, remove fuel cap and strainer and clean with drycleaning solvent.
- b. **Fuel Filter.** Fill replacement filter with fuel, and refer to TM 10-3930-669-20 to bleed fuel system.
- c. **Fuel/Water Separator.** Clean canister during each filter change.
- d. **Fuel Tank.** Drain fuel tank only when fuel is contaminated.
- e. **Fuel Tank.** To drain the fuel tank, remove drain plug from drain located on bottom of tank.

## 5. DRIVE AXLE.

- a. Initial oil change for new drive axles must be done after the first 100 hours of operation. Following oil changes will be made at the normal interval of 2000 hours. Remove front plate prior to drain and fill, refer to TM 10-3930-669-20.
- b. Initial level checks for the axle will be made from the housing side plug. Drive axle oil cannot be checked until oil has cooled. Oil level should be at the bottom of the hole. Each planetary wheel end oil level check is performed with the plugs at the three or nine o'clock position.
- c. Planetary wheels must be drained first. Align each wheel drain plug at the six o'clock position. Remove plug and drain one wheel at a time. After draining the wheels, remove drain plugs from under axle and drain housing. During all lubricant changes, remove metal particles from magnetic drain plugs.
- d. Align each planetary wheel drain plug at the three or nine o'clock position. Fill planetary wheel slowly through the hole until oil runs out. Install plug. Remove two check/fill plugs from axle housing. Fill left and right sides of axle housing through each check/fill hole until oil begins to run out and install check plug.

## 6. STEER AXLE.

- a. **King Pin and Tie Rod.** To prevent seals from being pushed out of bore when greasing fittings on steering gears, use only two pumps from a manual grease gun or two clicks from a pneumatic grease gun.
- b. **Wheel Bearings.** Be sure to clean bearings with drycleaning solvent and inspect for pitting, recesses, and visible damage. Pack bearings with clean grease only.

## 7. OIL CAN POINTS.

- a. Lubricate doors, side panels, engine cover hinges, locks, and pivot points every 1000 hours. Lubricate door rotary locks and latches with lubricant cleaner.
- b. Lubricate linkage at connections and friction points liberally.

**8. ARMY OIL ANALYSIS PROGRAM (AOAP).**

- a. Refer to DA Pam 738-750 for sampling requirements.
- b. After expiration of warranty, active Army units will send an oil sample to an AOAP laboratory for analysis every 50 hours of operation or 90 days, which ever occurs first. Reserve and National Guard activities will send an oil sample to an AOAP Laboratory for analysis every 50 hours or 180 days, which ever occurs first. Hydraulic oil will be sampled once a year.
- c. Intervals for sampling as well as draining and refilling lubricants may be changed by an AOAP laboratory.
- d. If AOAP laboratory support is not available, drain and refill crankcase oil and change oil filter every 250 hours of operation. Drain and refill transmission oil every 500 hours and oil filter every 250 hours of operation. Drain and refill hydraulic oil tank every 1000 hours of operation. Change hydraulic oil filter every 250 hours of operation. Drain and refill drive axle every 500 hours of operation.

**9. HYDRAULIC SYSTEM.**

- a. **Hydraulic Oil Check.** Check oil level with forklift parked on level ground. Mast must be fully lowered with forks on the floor and sideshift assembly fully shifted to the left. Also, mast pivot must be fully retracted. Oil level is low when touching the bottom of tank strainer.
- b. **Hydraulic System Oil.** If hydraulic system oil becomes contaminated, immediately change oil and filter.
- c. **Hydraulic Tank.** Refer to TM 10-3930-669-20, remove plug and drain hydraulic tank.
- d. **Hydraulic Tank Strainer.** Refer to TM 10-3930-669-20, remove hydraulic cap and strainer.

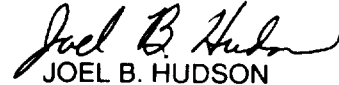
**10. BRAKE SYSTEM.**

- a. Remove plug from master cylinder and check fluid level. Level is at the end of the threaded port. Add brake fluid to level and install plug.
- b. Remove both plugs when changing brake fluid. Fluid must be drained with a pump. Refer to TM 10-3930-669-20 to bleed brake system.
- c. Silicone brake fluid (BFS) must be used at all times.
- d. Change brake fluid only if contaminated.

A copy of this lubrication order will remain with the equipment at all times; instructions contained herein are mandatory.

By Order of the Secretary of the Army:

Official:



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*Administrative Assistant to the  
Secretary of the Army*

03478

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*General, United States Army  
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