LUBRICATION ORDER

LO 10-4320-226-12

(This Lubrication Order with LO 10-4320-343-12, Supersedes LO 54320-226-12, 17 May 1991)

31 August 1993

WATER PUMPING ASSEMBLY, DIESEL ENGINE DRIVEN, WHEEL MOUNTED, 350 GALLONS PER MINUTE (GPM), 275 FOOT HEAD MODELS: 350 PAW (NSN 4320-01-158-2954)

AND

W-87012 (NSN 4320-01-158-2954)

References: TM 10-4320-226-14 and C9100-1L

REPORTING OF ERRORS

You can improve this publication by calling attention to errors and by recommending improvements and by stating your reasons for the recommendations. Your letter or DA Form 2028, Recommended Changes to Publications and Blank Forms, should be mailed directly to Commander, U.S. Army Aviation and Troop Command, ATTN: AMSAT-I-MTS, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. A reply will be furnished directly to you.

NOTES

This LO is for operator/crew (C) or unit (O) maintenance. Lube intervals (on-condition or hard time) are based on normal operation. Lube more during constant use, and less during inactive periods. Use correct grade of lubricant for seasonal temperature expected.

Intervals (on-condition or hard time) and related task-hour times are based on normal operation. The task-hour specified is the time you need 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 your lubricants are contaminated or if you are operating the equipment under adverse 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 or required.

Ensure pumping unit assembly is level before checking oil levels.

Lubricate immediately after fording, or as soon after as unit movement permits.

On the pictures a dash line (--) means lube points on both sides.

Maintenance levels are indicated on the pictures as (C) for operator/crew or (O) for unit level.

Lube intervals are indicated on the pictures as Q for quarterly, S for semiannually, or a number followed by H for hours of operation.

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

Oil fitters shall be Serviced cleaned changed as applicable, when:
a. They are known to be contaminated, or clogged;
b. Service is recommended by AOAP laboratory analysis, or
c. At prescribed hardtime intervals.

Engine oil must be sampled quarterly as prescribed by DA Pam 738-750.

Before you start your lube service

ALWAYS	NEVER
a. Clean grease fittings before lubrication.	a. Use wrong type/grade grease.
b. Use the lubrication order as your guide.	b. Use too much lubricant.

TOTAL TASK-HOUR		TOTAL TASK-HOUR	
INTERVAL	TASK-HOUR	INTERVAL	TASK HOUR
10	0.1	200	1.0
100	0.5	3000	1.5

KEY

LUBRICANTS	CAPACITY	EXPECTED TEMPERATURES	INTERVALS
OE/HDO Lubricating Oil, ICE, Tactical (MIL-L-2104)		SEE TABLE 1	
OEA Lubricating Oil, ICE, Arctic (MIL-L-46167)			
Engine Crankcase	8.5 qts (8.04 L)		Check every 10 Hrs. Change every 200 Hrs.
Oil can points	As required		Every 50 Hrs
Pump bearing Housing	8 ounces		Check every 10 hrs.
GAA Grease, Automotive and Artillery (MIL-G-10924)			
Wheel bearings	As required		Every 3000 hrs.

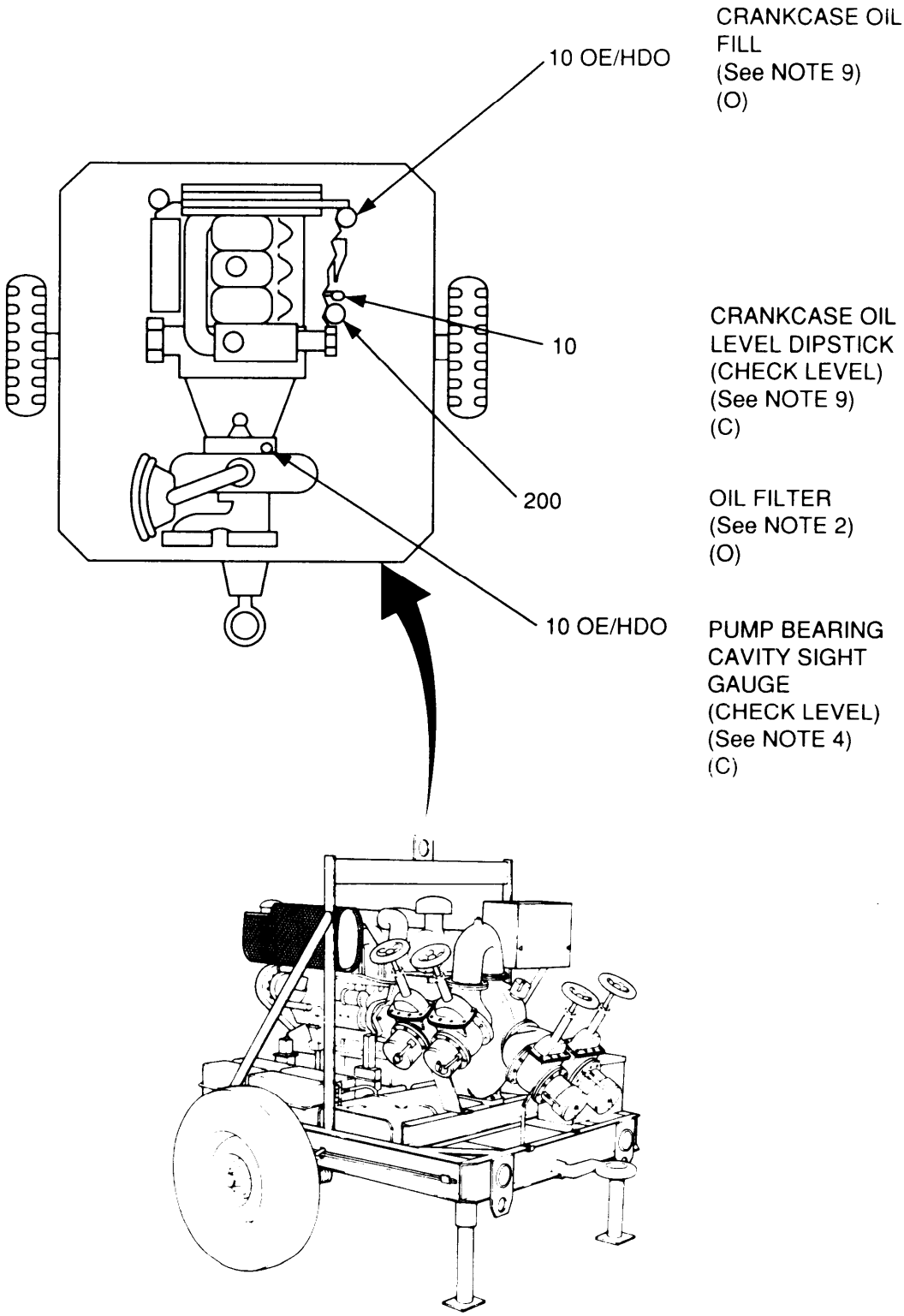

Figure 1. Lubrication Points (sheet 1 of 2).
Card 3 of 7

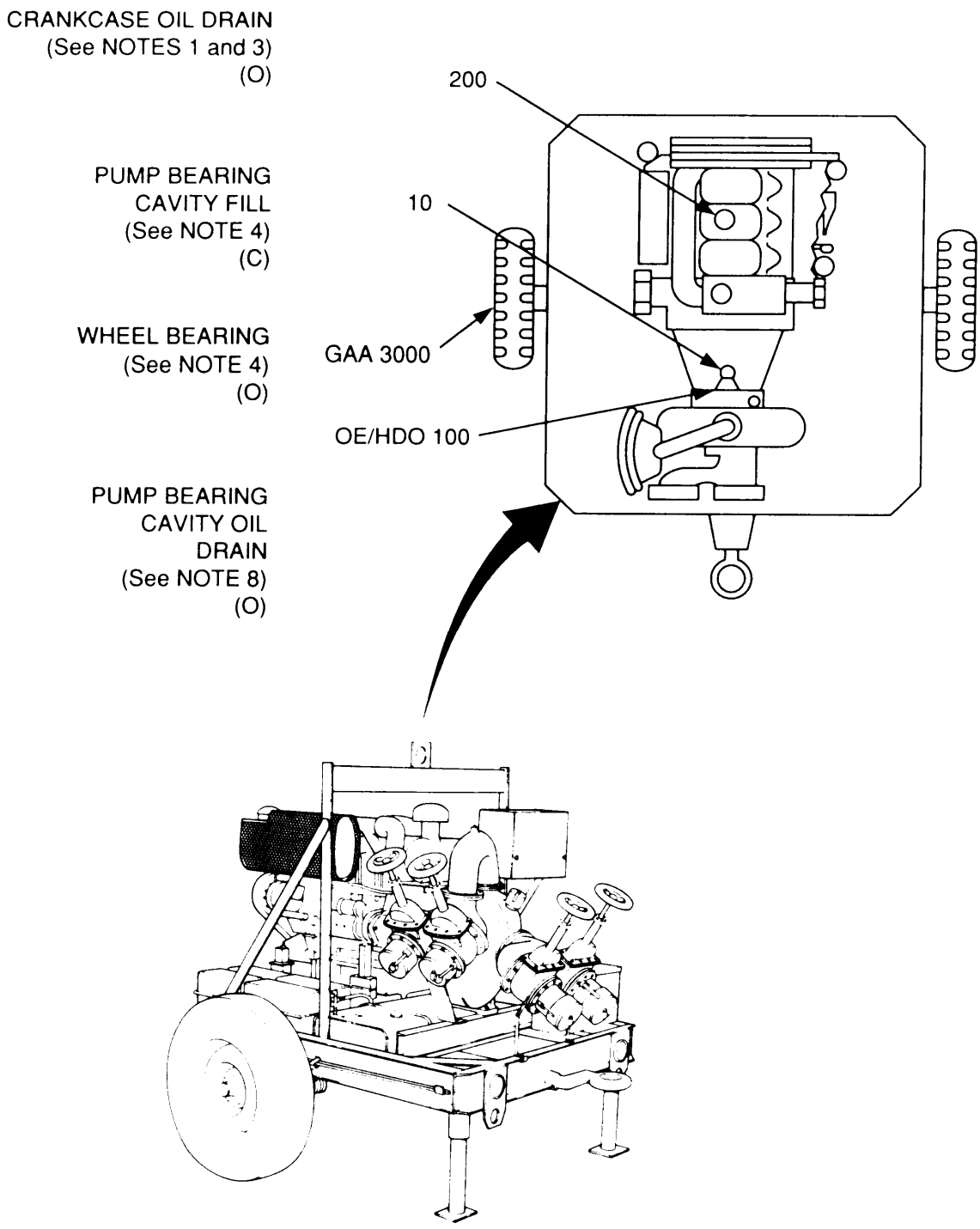

Figure 1. Lubrication Points (sheet 2).
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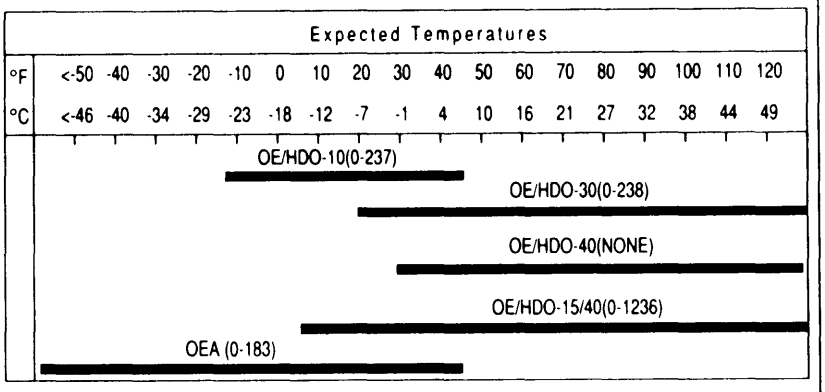
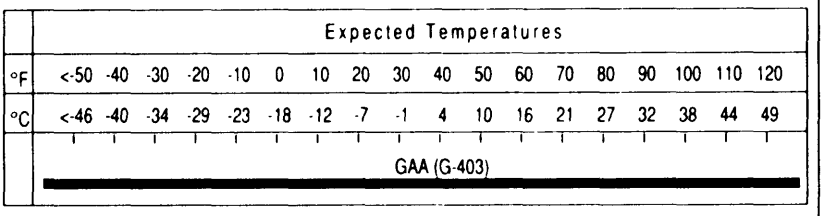
Table 1. Lubricant Table for 350 GPM Pump Assembly Engine Crankcase.

Lubricants	Components	Capacity	Ambient Temperature Range Usage*	Interval
OE/HDO (MIL-L-2104) Lubricating Oil, Internal Combustion Engine, Combat/Tactical **OEA** (MIL-L-46167) Lubricating Oil, Internal Combustion Engine, Arctic	Engine	8.5 Qts (8.04 L)		200 hrs
	Oil Can Points	As Required		
	Pump Bearing Housing	8 oz.		
GAA (MIL-G-10924) Grease Automotive and Artillery	Wheel Bearings	As Required		3000 hrs

*If OEA lubricant is required to meet low expected temperature range, OEA lubricant is to be used in lieu of OE/HDO-10 lubricant for all expected temperatures where OE-HDO-10 is specified

NOTES:

1. EXTENDED COLD TEMPERATURES. Proceed as follows for operation of equipment in extended cold temperature areas below -10°F (-23°C). Remove lubricant prescribed in table 1 for temperatures above -lO°F (-23°C). Clean parts with dry cleaning solvent (SD, type II) or equivalent. Lubricate with lubricant specified in Table 1 for the specific component to operate temperatures of -10°F and below (eg. OEA for engine, GM for wheel bearings).

2. OIL FILTER. Replace oil filter with every crankcase oil change. Remove element, clean seat, and install new element. After servicing crankcase, operate engine for 5 minutes and check oil filter for leakage. Check oil level and bring to top mark on dipstick.

3. ENGINE CRANKCASE. Drain after operation when hot. To drain, remove plug at bottom of crankcase sump. Clean and inspect plug. Remove filler cap, fill sump with 8.5 qts (8.04L) of oil OE/HDO to bring level to top mark on dipstick. ON new or overhauled engines, drain oil after 50 hours of operation and service crankcase.

4. PUMP/BEARING CAVITY, Check oil level at sight gauge. To add oil, remove vent fitting. Use OE/HDO and fill until oil is in view in sight gauge. Install vent fitting.

5. WHEEL BEARING. Pack wheel bearings as follows:

a. Position assembly on jack stands.

b. Remove grease cap.

c. Remove cotter pin.

d. Remove axle nut and washer.

e. Remove outer bearing and hub.

f. Remove grease seal and inner bearing.

g. Degrease all parts.

h. Pack bearings with grease prescribed in key.

i. Install inner bearing and seal.

j Install outer bearing and hub.

k. Install axle nut and washer.

l. Install cotter pin.

m. Install grease cap.

6. OIL CAN POINTS. Every 50 hours clean and lightly oil the following:

(1) Control Panel Hinge.

(2) Control Panel lock.

(3) Tool Box Hinge.

(4) Tool Box Latch.

(5) Battery Cover Latch.

7. PUMP BEARING CAVITY. Remove drain plug at bottom of intermediate bracket to drain oil. Clean and install drain plug. Remove vent fitting and fill with 8 ounces (236.56cc) of OE/HDO oil. Install vent fitting.

8. ENGINE CRANKCASE OIL LEVEL. Check oil level dipstick for FULL indication. To add oil, remove filler cap and add OE/HDO to bring level to FULL mark on dipstick, remove plug in bottom of crankcase sump and drain required amount. Check oil level.

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
owaf3

DISTRIBUTION :
To be distributed in accordance with DA Form 12-25-E, block no. 6148, requirements for LO 10-4320-226-12.

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

* U.S. GOVERNMENT PRINTING OFFICE: 1993-342-022-80024

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

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: 071635