LO 5-5420-202-13

LUBRICATION ORDER

31 JANUARY 2011

THIS MANUAL SUPERSEDES LO 5-5420-202-12 DATED 13 MARCH 1992 AND LO 5-5420-226-12 DATED 31 AUGUST 1992.

LUBRICATION ORDER FOR LAUNCHER: M48A5 TANK CHASSIS, TRANSPORTING FOR BRIDGE, ARMORED-VEHICLE-LAUNCHED: SCISSORING-TYPE, CLASS 60 OR CLASS 70 M48A5 NSN 5420-01-076-6096 PART NUMBER 13222E0980 CAGE CODE 97403 (EIC: ARE) AND M60A1 TANK CHASSIS NSN 5420-00-889-2020 PART NUMBER 13211E3100 CAGE CODE 97403 (EIC: ARC)

References: TM 5-5420-202-10, TM 5-5420-202-23, TM 5-5420-228-24, DA PAM 738-750, FM 9-207, FM 90-3

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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

NOTES:

Hard (fixed) time intervals and the related man-hour times are based on normal operation. The man-hours time specified is the time you need to do all the services prescribed for a particular interval. Adjust the interval if your lubricants are contaminated or if you are operating the equipment under adverse conditions, including longer-than-usual operating hours. The interval may be extended during periods of low activity. If extended, adequate preservation precautions must be taken.

When checking fluid levels, vehicle must be on level surface.

Oil filters shall be serviced/cleaned/changed when they are known to be contaminated or clogged, service is recommended by Army Oil Analysis Program (AOAP), or hard time service is required.

Dispose of used lubricants in accordance with local directives.

Lubricate oil can points that become accessible while performing other lubrication tasks.

Whenever powerplant is removed, remove, clean, and inspect transmission side oil screen (See note 11).

If operating in 0°F to -65°F (-18°C to -54°C) temperatures without AOAP, quarterly/750 mile transmission and engine oil changes are required (See note 7).

For arctic operation, see FM 9-207.

For desert operation, see FM 90-3.

Clean all grease fittings before attaching grease gun.

When using grease gun, operate until grease appears around seals or out of relief valve and check escaping grease for contamination. If contamination is found, notify field maintenance.

If no other treatment is directed, clean and coat unprotected metal surfaces with Cleaner/Lubricant/Preservative (CLP) (MIL-PRF-63460).

Clean around filler necks/drain plugs/openings before servicing to keep dirt from entering system.

NOTES:

WARNING

Cleaning Compound (MIL-PRF-680) is flammable and may cause irritation to the eyes or skin. Use in well ventilated areas and keep away from heat and open flames. Wear protective goggles, gloves, and clothing. If compound comes in contact with eyes, flush immediately with water. If compound comes in contact with skin, wash with soap and water. Failure to comply may result in injury, illness or death to personnel.

Use clean rag (NSN 7920-00-205-1711) and cleaning compound (MIL-PRF-680) to clean grease or oil from all metal surfaces except those exposed to powder fouling. For powder-fouled surfaces use CLP (MIL-PRF-63460).

MAINTENANCE LEVEL. The lowest maintenance level authorized to perform the task shown on each lubrication order card are referenced by a symbol (i.e. (C)). Refer to Table 1 for symbol and maintenance level identification outlined in this lubrication order.

Table 1. Maintenance Levels.

Symbol	Maintenance Level
C	Crew
F	Field

LUBRICATION INTERVAL. The lubrication interval is located in column four of each lubricant table. Intervals are referenced by a symbol (i.e. (D)). Refer to Table 2 for symbol identification and definitions, as outlined in this lubrication order.

Table 2. Lubrication Intervals.

Symbol	Definition
D	Daily
Q	Quarterly
S	Semiannually
B	Biennial
OC	On Condition
AR	As Required

LAUNCHER, ENGINE AND TRANSMISSION CHECKS
LUBRICANT - INTERVAL

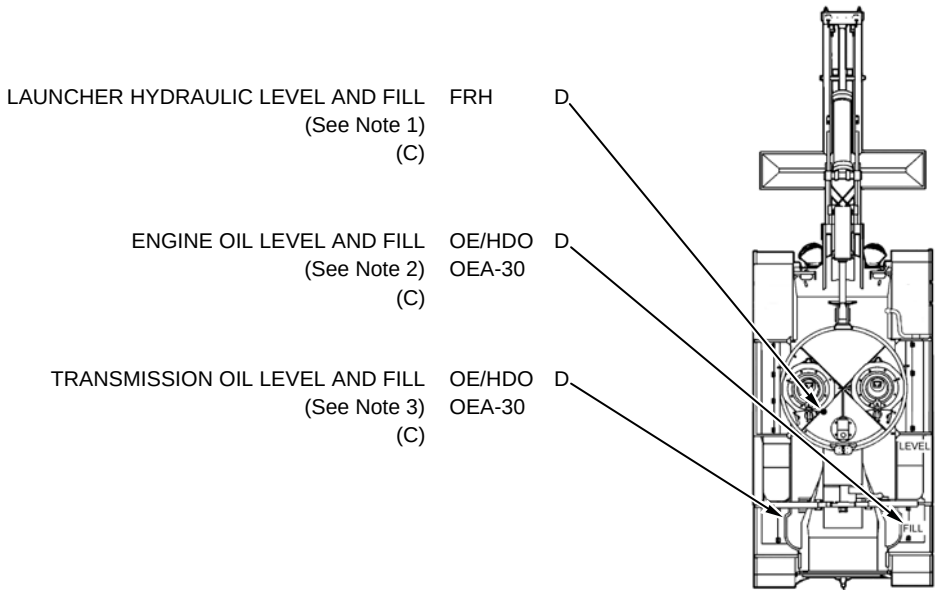


Table 3. Launcher, Engine and Transmission Checks Lubricant.

Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Launcher All Temperatures	FRH (H-544) MIL-PRF-46170	AR	D	0.2
Engine Transmission 5°F to 125°F (-15°C to 52°C)	OE/HDO-15/40 (O-1236) MIL-PRF-2104	AR AR	D D	0.1 0.1
5°F to -70°F (-15°C to -57°C)	OEA-30 (O-183) MIL-PRF-46167			

For arctic operation, see FM 9-207- however, the current arctic oil can be used year around in arctic regions up to 90°F (32°C).

NOTES:

WARNING

Fire Resistant Hydraulic (FRH) fluid may cause irritation to the eyes and skin. Avoid contact with eyes, skin, and clothing. Wear protective goggles, gloves, and clothing. If FRH fluid comes in contact with eyes or skin, flush the area with water. Failure to comply may result in injury or illness to personnel.

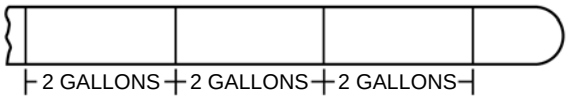
1. LAUNCHER HYDRAULIC LEVEL AND FILL. Remove cap to check level on dipstick. Fill as required.
2. ENGINE OIL LEVEL AND FILL. Check engine oil levels daily after operating the engine. The vehicle must be parked on level ground to obtain an accurate oil level reading.

   Checking procedure for:

   Engine Running, Cold Oil.

   1. When the oil level is checked after the engine has been started, but operated at 700 to 1200 rpm for only 5 to 10 minutes, the oil temperature will be below normal operating temperature.
   2. Check the oil level (with engine idling at 700 to 750 rpm). If the level is in the “IDLING RANGE” (between the “ADD” and “HOT FULL” marks), the engine is safe to operate. If the oil level is below the “ADD” mark, add oil as necessary to bring the level to the “COLD FULL” mark.

On the backside of dipstick are four hashmarks. The distance between each mark is 2 gallons (7.6L). When oil level shows low on dipstick, turn to these marks to determine the correct amount of oil to add. Any added oil will not show on the dipstick until after the engine has been running for several minutes.



NOTES:

Engine Running, Hot Oil.

1. Check oil level with engine idling at 700 to 750 rpm. After a hot run, oil level will be 2 to 3 inches (5.08 to 7.62 cm) above “HOT FULL" mark. This would be normal under these conditions due to oil expansion and aeration.
2. If the tactical situation permits, allow the engine to idle at 700 to 750 rpm for 5 to 10 minutes and check the level again.
    a) If the oil level is above the “ADD” mark, the engine is safe to operate. However, oil may be added pending expected mission duration.
    b) If the oil level is above the “ADD” mark, add oil as necessary to bring the level to the “HOT FULL" mark.

3. TRANSMISSION OIL LEVEL AND FILL. Set the parking brakes with shift lever in PARK. Start engine and run at 1000 to 1200 rpm until transmission oil temperature gage reads in green band. With engine idling at 700 to 750 rpm, check oil level. Add oil as required to transmission to bring level to FULL mark on transmission dipstick.

   Oil level on the transmission dipstick must be at or above the ADD mark. Approximately 3 gallons (11.4 L) of oil will raise the transmission oil level from ADD to FULL.

GRENADE LAUNCHERS, BREATHER FILTER, AND CYLINDER PLUG LUBRICANT - INTERVAL

SMOKE GRENADE LAUNCHERS (Do not lube contacts at bottom of tubes) (See Note 4) (C) — CLP — AR

HYDRAULIC BREATHER FILTER (Remove, clean, install) (See Note 5) (C) — FRH — AR

HOLDDOWN CYLINDER PLUG (Extend and coat with grease) (C) — GAA (M60 & M48) — AR

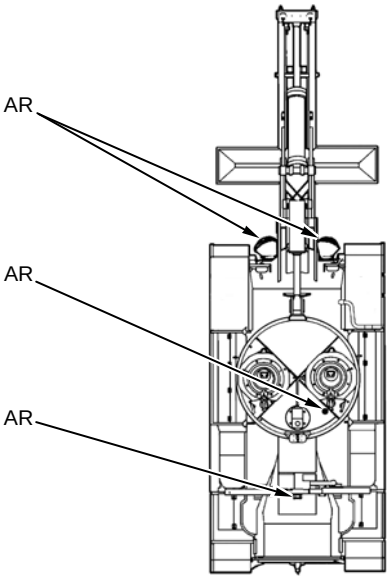


Table 4. Grenade Launchers, Breather Filter, and Cylinder Plug Lubricant.

Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Smoke Grenade Launcher				
All Temperatures	CLP (S-758) MIL-PRF-63460	AR	AR	0.2
Hydraulic Breather Filter				
All Temperatures	FRH (H-544) MIL-PRF-46170	AR	AR	0.1
Holddown Cylinder Plug				
All Temperatures	GAA (M60 & M48) (G-403) MIL-PRF-10924	AR	AR	0.1

For arctic operation, see FM 9-207- however, the current arctic oil can be used year around in arctic regions up to 90°F (32°C).

NOTES:

4. SMOKE GRENADE LAUNCHERS.
    a) Before Firing: Wipe all surfaces dry.
    b) After Firing: Immediately clean with CLP (MIL-PRF-63460) and wipe dry. Apply a light coat of CLP to all surfaces. Make sure all surfaces are coated. Do not wipe dry. After firing, repeat process for 2 days.
    c) Inactivity: If not to be fired for an extended period, quarterly, clean with CLP, wipe dry and apply CLP (MIL-PRF-63460) to all surfaces.
    d) Do not lubricate contacts at bottom of tubes.

WARNING

FRH fluid may cause irritation to the eyes and skin. Avoid contact with eyes, skin, and clothing. Wear protective goggles, gloves, and clothing. If FRH fluid comes in contact with eyes or skin, flush the area with water. Failure to comply may result in injury or illness to personnel.

Cleaning Compound (MIL-PRF-680) is flammable and may cause irritation to the eyes or skin. Use in well ventilated areas and keep away from heat and open flames. Wear protective goggles, gloves, and clothing. If compound comes in contact with eyes, flush immediately with water. If compound comes in contact with skin, wash with soap and water. Failure to comply may result in injury, illness or death to personnel.

5. HYDRAULIC BREATHER FILTER. Remove cap. Clean filter with cleaning compound (MIL-PRF-680) and dry by shaking. Oil the filter using FRH fluid (MIL-PRF-46170). Do not use OE/HDO oil. In extremely dusty conditions, service more frequently. Every month, remove breather tube, clean with cleaning compound, and dip in FRH fluid. Do not use OE/HDO oil.

RESERVOIR, ENGINE, AND TRANSMISSION DRAIN LUBRICANT – INTERVAL

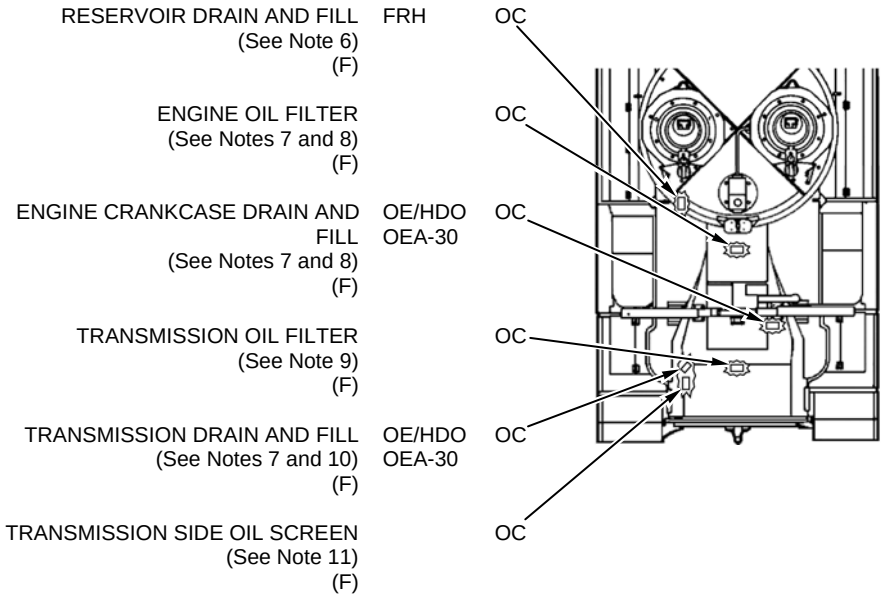


Table 5. Reservoir, Engine, and Transmission Drain Lubricant.

Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Reservoir				
All Temperatures	FRH (H-544) MIL-PRF-46170	115 gal (w/o bridge)	OC	1.2
Engine				
Transmission				
5°F to 125°F (-15°C to 52°C)	OE/HDO-15/40 (O-1236) MIL-PRF-2104	17 gal 17 gal	OC OC	0.5 0.5
5°F to -70°F (-15°C to -57°C)	OEA-30 (O-183) MIL-PRF-46167			

For arctic operation, see FM 9-207- however, the current arctic oil can be used year around in arctic regions up to 90°F (32°C).

NOTES:

WARNING

FRH fluid may cause irritation to the eyes and skin. Avoid contact with eyes, skin, and clothing. Wear protective goggles, gloves, and clothing. If FRH fluid comes in contact with eyes or skin, flush the area with water. Failure to comply may result in injury or illness to personnel.

6. RESERVOIR DRAIN AND FILL.
   a) Routine samples of FRH fluid must be submitted to an assigned AOAP laboratory every 25 hours of operation or 30 days, whichever occurs first, in accordance with DA PAM 738-750. FRH fluid will be analyzed for condition and will be changed only when directed by the AOAP laboratory. After refilling reservoir, operate hydraulic system for 5 minutes. Bleed, if necessary.
   b) In the event AOAP laboratory support is not available, drain FRH fluid annually or every 3,000 miles, whichever occurs first.
7. AOAP. Oil samples from both engine and transmission must be submitted to an assigned AOAP laboratory every 25 hours of operation or 60 days, whichever occurs first, in accordance with DA PAM 738-750. Oil will be analyzed for condition and will be changed only when directed by the AOAP laboratory. In the event AOAP laboratory support is not available, drain oil every 1500 miles or semiannually, whichever occurs first. Semiannual oil changes are to be coordinated with seasonal changes. When using OEA oil, drain every 750 miles or quarterly, whichever occurs first.
8. Drain oil only after operation while oil is warm. To drain engine, remove engine drain plug access cover from bottom of hull and remove drain plug and gasket. Remove vent bolt and sealing washer (on oil filter cover) and loosen filter housing drain valve 3/4-inch hex nut (below filter cover) six turns. After draining, clean and install drain plug, new gasket and access cover. Remove cover and filter elements from filter housing, clean housing, install new filter elements, and reinstall housing cover with new gasket. Torque 3/4-inch hex nut to 150 lb-in (17 N•m) (do not overtighten). Install vent bolt and new sealing washer. Refill crankcase with 17 gallons (64.4 L) of seasonal grade oil, start engine, and follow checking procedures in Note 2.

NOTES:

WARNING

Cleaning Compound (MIL-PRF-680) is flammable and may cause irritation to the eyes or skin. Use in well ventilated areas and keep away from heat and open flames. Wear protective goggles, gloves, and clothing. If compound comes in contact with eyes, flush immediately with water. If compound comes in contact with skin, wash with soap and water. Failure to comply may result in injury, illness or death to personnel.

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip-guarding and personal protective equipment (goggles/faceshield, gloves, etc.). Failure to comply may result in injury to personnel.

9. TRANSMISSION OIL FILTER. Remove element. Clean with cleaning compound (MIL-PRF-680). Dry with compressed air. Inspect for damage and replace, if defective. Install element.
10. To drain transmission, remove two drain plug access plates from bottom of hull and remove drain plugs. After draining, clean and install drain plugs and access plates. Refill transmission to ADD mark on dipstick. Follow transmission oil check procedure in Note 3.
11. TRANSMISSION SIDE OIL SCREEN. Whenever powerplant is removed and transmission is drained, remove, clean, inspect, and install the side oil screen.

SUSPENSION AND TOW CABLES
LUBRICANT – INTERVAL

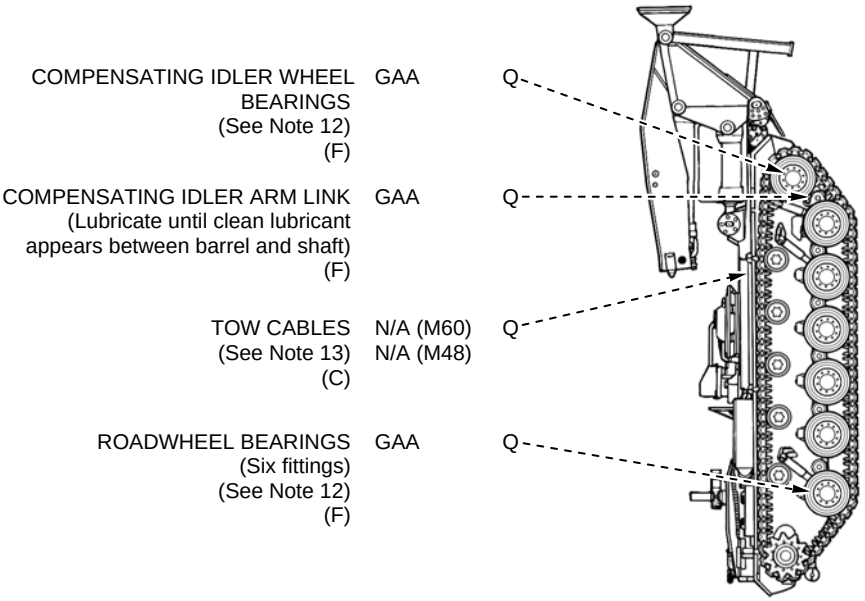


Table 6. Suspension and Tow Cables Lubricant.

Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Compensating Idler Wheel Bearings Compensating Idler Arm Link Roadwheel Bearings				
All Temperatures	GAA (G-403) MIL-PRF-10924	AR	Q	0.3
Tow Cables All Temperatures	N/A (N/A) MIL-PRF-16173	AR	Q	0.1

For arctic operation, see FM 9-207- however, the current arctic oil can be used year around in arctic regions up to 90°F (32°C).

NOTES:

WARNING

Cleaning Compound (MIL-PRF-680) is flammable and may cause irritation to the eyes or skin. Use in well ventilated areas and keep away from heat and open flames. Wear protective goggles, gloves, and clothing. If compound comes in contact with eyes, flush immediately with water. If compound comes in contact with skin, wash with soap and water. Failure to comply may result in injury, illness or death to personnel.

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip-guarding and personal protective equipment (goggles/faceshield, gloves, etc.). Failure to comply may result in injury to personnel.

12. COMPENSATING IDLER WHEEL BEARINGS AND ROADWHEEL BEARINGS. Clean grease from seal assembly. Clean lubricant pressure relief fitting using a clean, lint-free, dry cloth (MIL-C-40129). Check lubricating pressure relief fittings for proper operation. The plunger-type fittings are checked by pulling up on the plunger. The plunger should move freely. The ball-type fittings should be checked to ensure that the two relief ports are open. If plunger does not move freely, or relief ports are not open (ball-type), remove and thoroughly clean in cleaning compound (MIL-PRF-680). Dry with compressed air or lint-free cloth. Verify that plunger or ball moves freely before installing fitting. Apply lubricant until it appears at lubricant pressure relief fitting, No lubricant should appear at seal assembly. Wipe off excess lubricant from relief fitting.
13. TOW CABLES. Clean cables with cleaning compound (MIL-PRF-680), and coat with corrosion preventive compound (MIL-PRF-16173, Grade 1).

SUSPENSION, HATCH SWING, LATCH AND TOWING PINTLE
LUBRICANT – INTERVAL

COMPENSATING IDLER ARM HOUSING GAA Q
(Lubricate until clean lubricant appears at relief vent. Wipe off excessive lubricant)
(F)

TRACK SUPPORT ROLLER BEARINGS GAA Q
(Three fittings M60) (Five fittings M48)
(Lubricate until lubricant can be felt at seal behind roller. Wipe off excessive lubricant from behind roller, seal, and along inner rim)
(F)

HATCH COVER SWING AND SAFETY LATCH GAA Q
(C)

ROADWHEEL ARM BEARINGS GAA Q
(Six fittings)
(Lubricate until clean lubricant appears between arm retainer and arm. Wipe off excessive lubricant)
(F)

TOWING PINTLE GAA Q
(Three fittings)
(F)

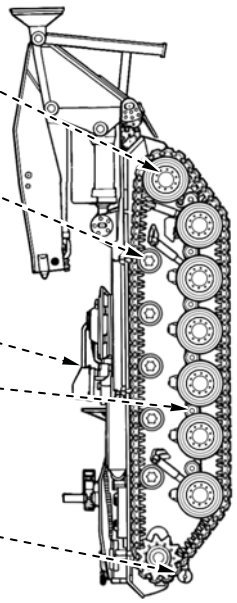


Table 7. Suspension, Hatch Swing, Latch and Towing Pintle Lubricant.

Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Compensating Idler Arm Housing Track Support Roller Bearings Hatch Cover Swing and Safety Latch Roadwheel Arm Bearings Towing Pintle				
All Temperatures	GAA (G-403) MIL-PRF-10924	AR	Q	0.4

For arctic operation, see FM 9-207- however, the current Arctic Oil can be used year around in Arctic regions up to 90°F (32°C).

LAUNCHER
LUBRICANT – INTERVAL

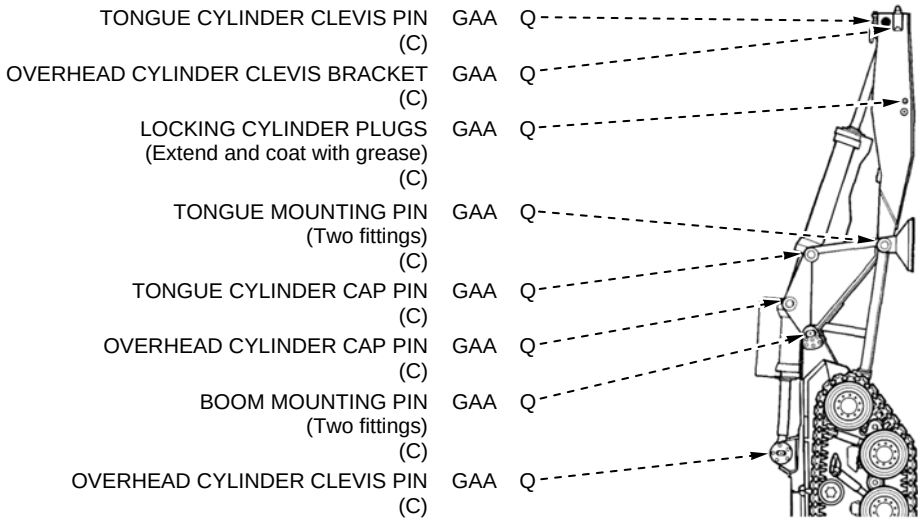


Table 8. Launcher Lubricant.

Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Tongue Cylinder Clevis Pin Overhead Cylinder Clevis Bracket Locking Cylinder Plugs Tongue Mounting Pin Tongue Cylinder Cap Pin Overhead Cylinder Cap Pin Boom Mounting Pin Overhead Cylinder Clevis Pin				
All Temperatures	GAA (G-403) MIL-PRF-10924	AR	Q	1.5

For arctic operation, see FM 9-207- however, the current arctic oil can be used year around in arctic regions up to 90°F (32°C).

LAUNCHER
LUBRICANT – INTERVAL

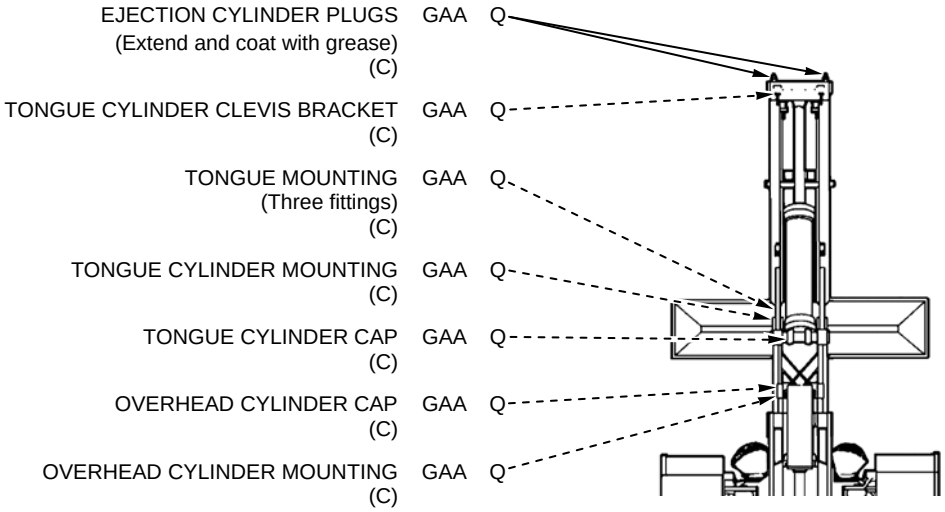


Table 9. Launcher Lubricant.

Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Ejection Cylinder Plugs Tongue Cylinder Clevis Bracket Tongue Mounting Tongue Cylinder Mounting Tongue Cylinder Cap Overhead Cylinder Cap Overhead Cylinder Mounting				
All Temperatures	GAA (G-403) MIL-PRF-10924	AR	Q	1.5

For arctic operation, see FM 9-207- however, the current arctic oil can be used year around in arctic regions up to 90°F (32°C).

CONTROL LINKAGES AND ESCAPE HATCH
LUBRICANT – INTERVAL

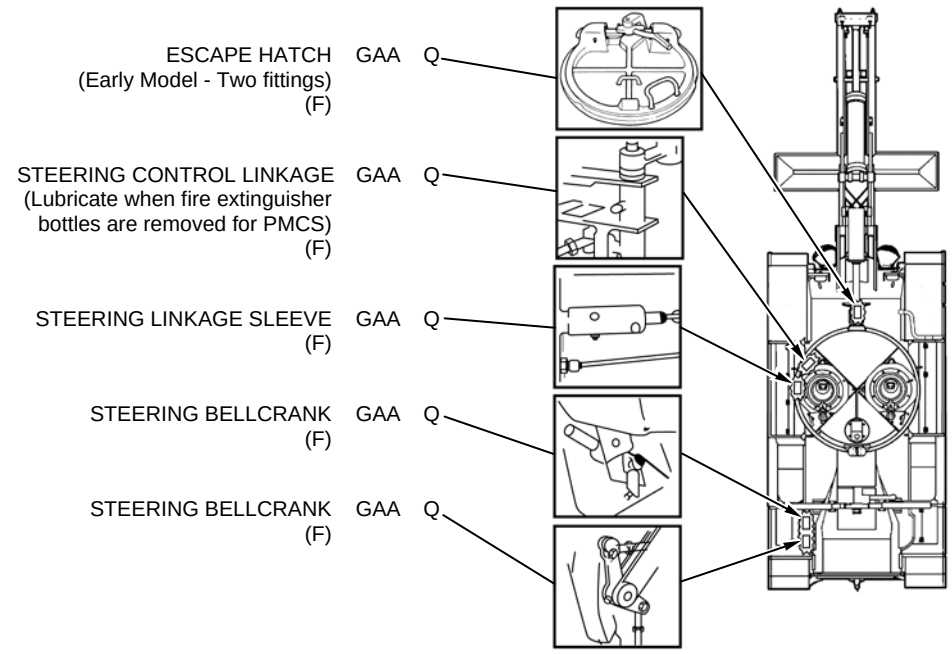


Table 10. Control Linkages and Escape Hatch Lubricant.

Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Escape Hatch Steering Control Linkage Steering Linkage Sleeve Steering Bellcrank				
All Temperatures	GAA (G-403) MIL-PRF-10924	AR	Q	1.0

For arctic operation, see FM 9-207- however, the current arctic oil can be used year around in arctic regions up to 90°F (32°C).

OIL CAN POINTS, CLUTCH, UNIVERSAL JOINTS AND MASTER CYLINDER LUBRICANT - INTERVAL

OIL CAN POINTS (See Notes 14 and 15) (C)	OE/HDO OEA-30	Q
HYDRAULIC BRAKE MASTER CYLINDER (Check level: must be 1/4-inch (0.635 cm) from top of opening) (F)	BFS	Q
CLUTCH (F)	GAA	Q
PUMP DRIVE SHAFT UNIVERSAL JOINTS (See Note 16) (F)	GAA	Q

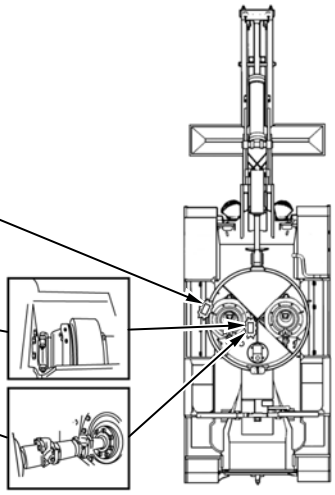


Table 11. Oil Can Points, Clutch, Universal Joints and Master Cylinder Lubricant.

Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Oil Can Points				
5°F to 125°F (-15°C to 52°C)	OE/HDO-15/40 (O-1236) MIL-PRF-2104	AR	Q	0.4
5°F to -70°F (-15°C to -57°C)	OEA-30 (O-183) MIL-PRF-46167			
Hydraulic Brake Master Cylinder				
All Temperatures	BFS (H-547) MIL-PRF-46176	AR	Q	0.2
Clutch				
Pump Drive Shaft Universal Joints				
All Temperatures	GAA (G-403) MIL-PRF-10924	AR	Q	0.2

For arctic operation, see FM 9-207- however, the current arctic oil can be used year around in arctic regions up to 90°F (32°C).

NOTES:

CAUTION

Optic components of periscope and night viewer may be damaged by lubricating oil. Use care when lubricating periscope or night viewer covers to prevent oil from being applied to optical surfaces. Failure to comply may result in equipment damage.

14. OIL CAN POINTS. Quarterly, lubricate the following items:
    - Headlight removal nuts
    - Fender stowage box hatches and hinges
    - Towing hooks (hinge pin)
    - Brake linkage
    - Transmission support guide rails and rollers
    - Driver’s escape hatch late model (clean and coat pins, plungers, and all unpainted surfaces)
    - Grille door hinges
    - Control rod clevises
    - Driver's and commander’s seat moving parts
    - Hatch locks and hinges
    - Universal joints
15. Do not lubricate the following items:
    - Starter solenoid
    - Air cleaner blower motor
    - Hydraulic powerpack electric motor
    - Heater motor
    - Ventilator blower motor
    - Gas particulate fan motor
    - Tracks
    - Tachometer drive adapter
    - Any item not pointed out in this lubrication order
16. PUMP DRIVE SHAFT UNIVERSAL JOINTS. Remove access cover. If any lubrication fitting hole is plugged, remove plug and install lubrication fitting. Do not remove fittings after lubricating.

CONTROL LINKAGES AND UNIVERSAL JOINTS
LUBRICANT – INTERVAL

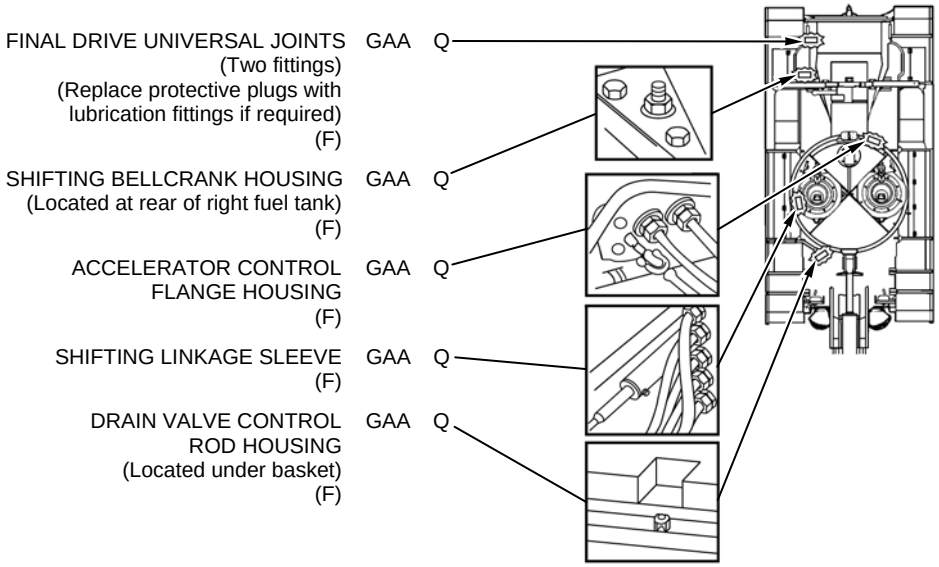


Table 12. Control Linkages and Universal Joints Lubricant.

Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Final Drive Universal Joints Shifting Bellcrank Housing Accelerator Control Flange Housing Shifting Linkage Sleeve Drain Valve Control Rod Housing				
All Temperatures	GAA (G-403) MIL-PRF-10924	AR	Q	1.0

For arctic operation, see FM 9-207- however, the current arctic oil can be used year around in arctic regions up to 90°F (32°C)

HYDRAULIC FILTER, BRAKE LEVERS AND FINAL DRIVE LUBRICANT – INTERVAL

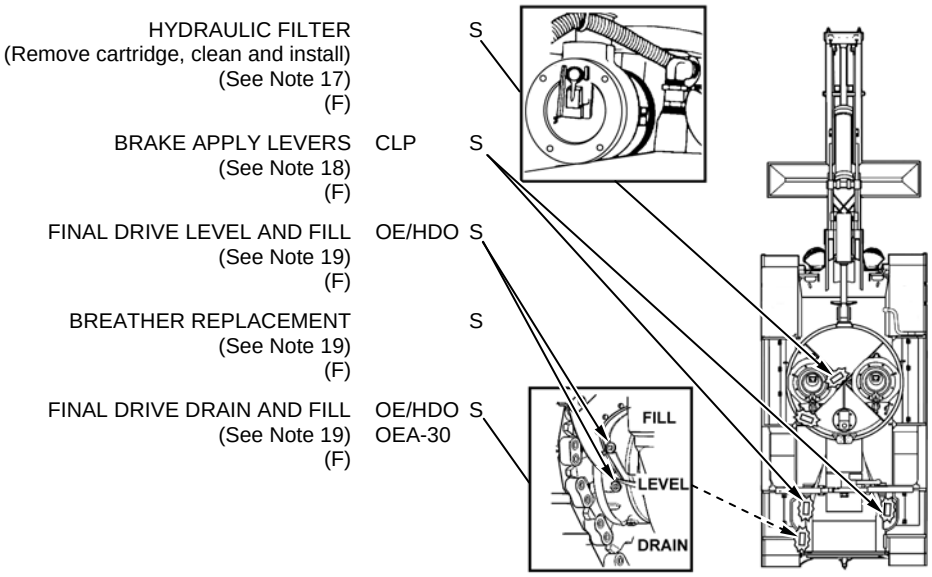


Table 13. Hydraulic Filter, Brake Levers and Final Drive Lubricant.

Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Brake Apply Levers All Temperatures	CLP (S-748) MIL-PRF-63460	AR	S	0.2
Final Drive 5°F to 125°F (-15°C to 52°C)	OE/HDO-15/40 (O-1236) MIL-PRF-2104	AR 8 qt.	S B	0.2 0.4
5°F to -70°F (-15°C to -57°C)	OEA-30 (O-183) MIL-PRF-46167			

For arctic operation, see FM 9-207- however, the current arctic oil can be used year around in arctic regions up to 90°F (32°C).

NOTES:

WARNING

FRH fluid may cause irritation to the eyes and skin. Avoid contact with eyes, skin, and clothing. Wear protective goggles, gloves, and clothing. If FRH fluid comes in contact with eyes or skin, flush the area with water. Failure to comply may result in injury or illness to personnel.

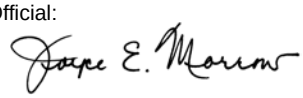
Cleaning Compound (MIL-PRF-680) is flammable and may cause irritation to the eyes or skin. Use in well ventilated areas and keep away from heat and open flames. Wear protective goggles, gloves, and clothing. If compound comes in contact with eyes, flush immediately with water. If compound comes in contact with skin, wash with soap and water. Failure to comply may result in injury, illness or death to personnel.

17. HYDRAULIC FILTER. Remove cartridge. Filter cartridge can be removed without draining hydraulic system. Clean with cleaning compound, (MIL-PRF-680), and dry by shaking. Replace cartridge with engine running, operate hydraulic controls for five minutes. Check for leaks. Check FRH fluid level and fill as required.
18. BRAKE APPLY LEVERS. Semiannually, when powerplant is removed, for scheduled maintenance, remove brake lever covers; clean and coat all moving parts with CLP. Install cover and gasket. (MIL-PRF-63460).
19. FINAL DRIVE.
    a) Check oil level semiannually. Check more frequently if there is evidence of leakage. Check before operating vehicle when oil is cold. To check oil level, remove oil level plug. If final drive has been overfilled, allow excess oil to drain into a suitable container. It is normal for a small quantity of oil (approximately two or three tablespoons) trapped behind plug to run out as the plug is removed. Make sure oil level is up to lower edge of plug hole. Carefully insert finger into level plug hole and feel for oil. Check oil for metal content. If oil level is low, install level plug, remove fill plug, add oil. Allow oil to settle. Recheck oil level. Repeat procedure, as necessary, until proper level is reached. DO NOT OVERFILL. Clean and install fill and level plugs. Drain every two years, biennial. To drain, remove drain plug from bottom of housing. Drain only after operation while oil is warm. After draining, clean and install drain plug. Refill to proper level as outlined above. Whenever oil is checked or changed, check magnetic plug for metal shavings.
    b) When temperatures are constantly below 10°F (-12°C) for 7 or more days, change oil to OEA-30, MIL-PRF-46167.
    c) Remove and install breather (if equipped) at time of semiannual power plant removal.

By Order of the Secretary of the Army:

GEORGE W. CASEY, JR.
General, United States Army
Chief of Staff

Official:



JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army
1100303

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 257851, requirements for LO 5-5420-202-13.

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

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

LIQUID MEASURE

1 Millimeter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Millimeters = 33.82 Fluid Ounces

SQUARE MEASURE

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

CUBIC MEASURE

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

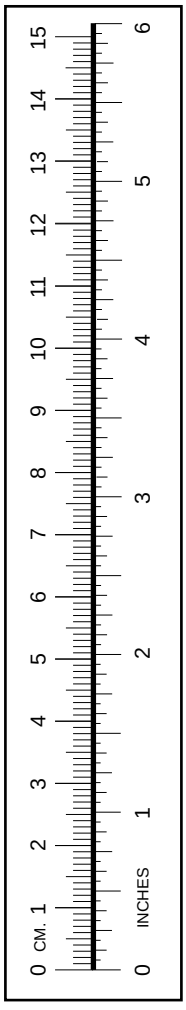
TEMPERATURE

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

APPROXIMATE CONVERSION FACTORS

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

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



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