

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 25 June 1975

CHANGE }

No. 1 }

Lubrication Order

GUN, AIR DEFENSE ARTILLERY, SELF-PROPELLED: 20-MM
M163 (2350-00-999-4392)

LO 9-2350-300-10, 27 September 1973, is changed as follows:

The title is changed as shown above.

1. Remove old cards and insert new cards as indicated below. Changes are indicated by a hand adjacent to the change.

Remove cards

9 and 10

11 and 12

Insert cards

9 and 10

11 and 12

2. File this change sheet in the front of the publication for reference purposes.

By Order of the Secretary of the Army:

FRED C. WEYAND
General, United States Army
Chief of Staff

Official:

VERNE L. BOWERS
Major General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-37 (qty rqr block No. 400), Requirements for LO for Gun Self-Propelled, Antiaircraft, Arty 20MM XM163 Chassis XM 741.

LUBRICATION ORDER

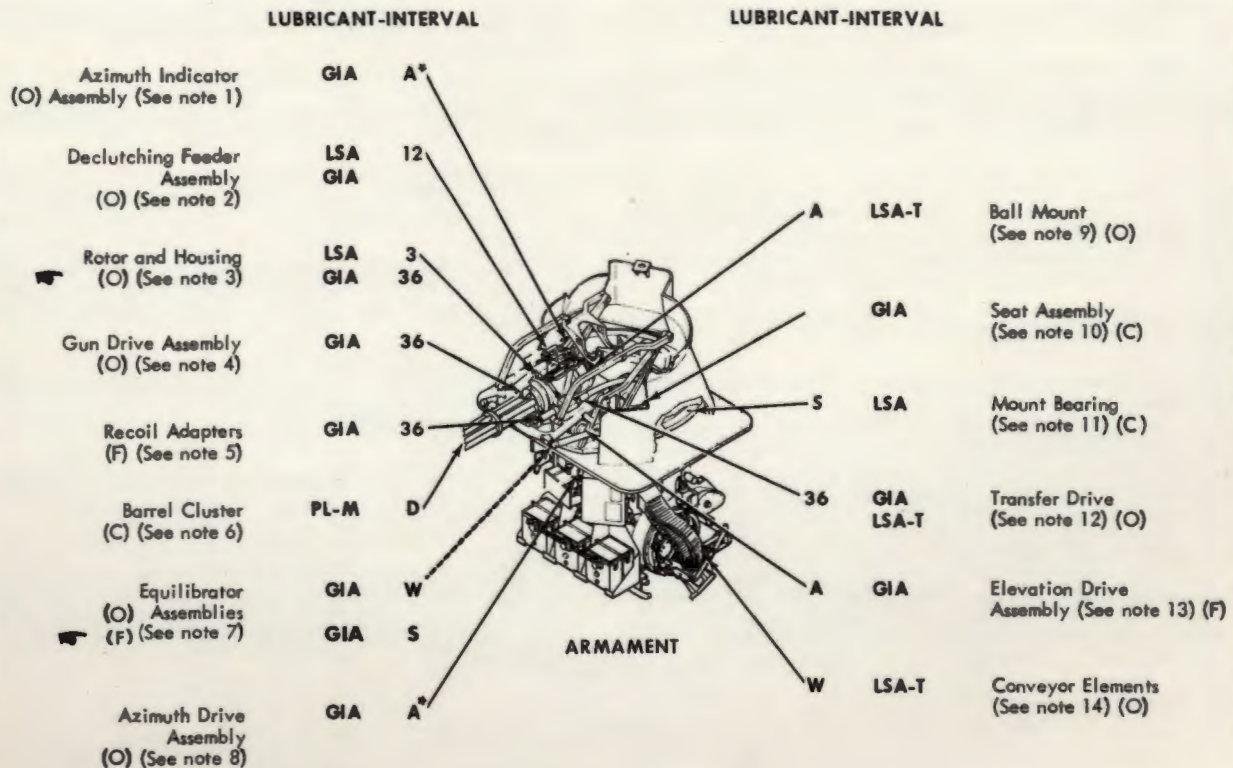
GUN, AIR DEFENSE ARTILLERY, SELF-PROPELLED: 20-MM M163 (2350-999-4392)

Reference: TM 9-2350-300-10, TM 9-2350-300-20/1, CL 9100SL

Intervals and related man-hours are based on normal operation. The time specified is the time required to perform all the services for that particular interval. Reduce to compensate for abnormal operation and severe conditions or contaminated lubricants. During inactive periods, intervals may be extended commensurate with adequate preservation. Time in MAN-HR column applies only to listed interval; add listed times if lubrication for two or more intervals is performed at same time. Level of maintenance for lubri-

cation requirements is indicated at note reference by (C) for Crew/Operator, (O) for Organizational, (F) for Direct Support and (H) for General Support. Lubricate all exterior chassis points after water operation. Clean fittings before lubricating. Clean parts with THINNER, PAINT, MINERAL SPIRITS (TPM) or DRY CLEANING SOLVENT (SD-2). Dry before lubricating. Dotted lines indicate lubrication points on both sides of the equipment. Do not overlubricate; wipe off excess lubricant.

TOTAL MAN-HR		TOTAL MAN-HR	
INTERVAL	MAN-HR	INTERVAL	MAN-HR
A*	N/A	S	2.50
D	1.00	3	1.00
W	1.00	12	1.00
Q	.50	36	3.00



A* - During assembly or installation

AR 904161

LUBRICANT	REFILL CAPACITY (APP)	EXPECTED TEMPERATURE			INTERVAL
		Above +32°F	+40°F to 10°F	0°F to -65°F	
PL-M (Mil-L-3150) - Lubricating oil, preservative, medium	As req	PL-M	PL-S	PL-S	For arctic operation refer to TM 9-207 A* - During reassembly or installation D - Daily when equipment is operated W - Weekly Q - Quarterly S - Semi-annually 3 - 3,000 rounds cycled 12 - 12,000 rounds cycled 36 - 36,000 rounds cycled
PL-S (VV-L-800) - Lubricating oil, general purpose, preservative	As req				
GIA (Mil-G-23827) - Grease, instrument, aircraft	As req				
LSA (Mil-L-46000) - Lubricating oil, semi-fluid (automatic weapons)	As req	All temperatures			
LSA-T (Mil-L-46150) - Lubricant weapons, semi-fluid (high load carrying capacity)	As req				
SFD (Mil-L-46147) - Lubricant, solid film	As req				

NOTES

1. AZIMUTH INDICATOR ASSEMBLY. - During installation, coat all gear teeth with grease (GIA).

2. DECLUTCHING FEEDER ASSEMBLY. - Every 12,000 rounds cycled, lubricate traveling ring cam, stop plate, actuating shaft, collar assembly, and inside of feeder spur gear with lubricant (LSA) and coat all gear teeth, clutch and spur gear with grease (GIA).

3. ROTOR AND HOUSING. - Clean rotor tracks and breech bolt assemblies and lubricate with lubricating oil (LSA) every 3,000 rounds. Clean and lubricate housing cam path, rear surface of front locking cam path, gear teeth, and ball bearings with grease (GIA) every 36,000 rounds cycled and/or at assembly.

4. GUN DRIVE ASSEMBLY. - Every 36,000 rounds cycled, coat all gear teeth with grease (GIA).

5. RECOIL ADAPTERS. - Every 36,000 rounds cycled, coat springs and spindle bodies with grease (GIA).

6. BARREL CLUSTER. - Daily after firing, and weekly during inactive periods, coat inside and outside surfaces of gun barrels and exposed surfaces of center and muzzle clamps with lubricating oil (PL-M). After application, wipe off excess oil.

7. EQUILIBRATOR ASSEMBLIES. - (C) Elevate cannon to upper limit, clean outside of inner cylinder weekly, and apply coat of grease (GIA), wipe off excess, leaving a thin film. (F) At assembly and/or semiannual maintenance, apply a thin coat of grease (GIA) to the inside of the body assembly and the threads on the cap, bar, and body assembly.

8. AZIMUTH DRIVE ASSEMBLY. - During assembly only, coat all gear teeth and contact surfaces between gearshaft and clutch with grease (GIA).

9. BALL MOUNT. - Each time cannon is removed/installed, lubricate gun mount ball with lubricant (LSA-T).

10. SEAT ASSEMBLY. - Quarterly, lubricate vertical post and latch mechanism with grease (GIA).

11. MOUNT BEARING. - Semiannually, lubricate bearing with lubricating oil (LSA). During lubrication, rotate mount through complete circle to assure that entire mount bearing receives lubrication.

12. TRANSFER DRIVE. - Every 36,000 rounds cycled, coat all gear teeth with grease (GIA) and remove core of flexible shafts and lubricate with lubricant (LSA-T).

13. ELEVATION DRIVE ASSEMBLY. - During reassembly only, coat all gear teeth and contact surfaces between gearshafts and clutch with grease (GIA).

14. CONVEYOR ELEMENTS. - When elements show signs of corrosion, clean, inspect, and apply a thin coat of lubricant (LSA-T). (In the event any element is found to have cracked or chipped portions, all elements (123) in the conveyor should be replaced.)

LUBRICATION ORDER

**GUN, AIR DEFENSE ARTILLERY, SELF-PROPELLED: 20-MM
M163 (2350-999-4392)**

Reference: TM 9-2350-300-10, TM 9-2350-300-20/1, CL 9100SL

Intervals and related man-hours are based on normal operation. The time specified is the time required to perform all the services for that particular interval. Reduce to compensate for abnormal operation and severe conditions or contaminated lubricants. During inactive periods, intervals may be extended commensurate with adequate preservation. Time in MAN-HR column applies only to listed interval; add listed times if lubrication for two or more intervals is performed at same time. Level of maintenance for lubri-

cation requirements is indicated at note reference by (C) for Crew/Operator, (O) for Organizational, (F) for Direct Support and (H) for General Support. Lubricate all exterior chassis points after water operation. Clean fittings before lubricating. Clean parts with THINNER, PAINT, MINERAL SPIRITS (TPM) or DRY CLEANING SOLVENT (SD-2). Dry before lubricating. Do not overlubricate; wipe off excess lubricant.

LUBRICANT-INTERVAL

INTERVAL-LUBRICANT

Aft Cover Assembly
(F) Bearing (See note 1)

GIA

S

Drum Assembly
(F) (See note 2)

GIA

S

Scoop Disc
Assembly
(F) (See note 3)

GIA

S

Exit Cover Assembly
(F) (See note 4)
(C) (See note 4)

GIA

S

LSA

W

AMMUNITION DRUM

S

GIA

W

LSA

S

GIA

W

LSA

S

GIA

W

LSA

Drum Drive Assembly
(See note 5) (F)

(See note 5) (C)

Exit Unit Assembly
(See note 6) (F)

(See note 6) (C)

Conveyor Assembly
(See note 7) (F)

(See note 7) (C)

Antenna
(F) (See note 8)

GIA

A*

ANTENNA

A* During assembly only

TOTAL MAN-HR		TOTAL MAN-HR	
INTERVAL	MAN-HR	INTERVAL	MAN-HR
A*	0.1	36	0.6

AR 904159

KEY

LUBRICANT	REFILL CAPACITY (APP)	EXPECTED TEMPERATURE			INTERVAL
		Above +32°F	+40°F to -10°F	0°F to -65°F	
GIA (Mil-G-23827) - Grease, instrument, aircraft	As req	All temperatures			For arctic operation refer to TM9-207 A* - During assembly only S - Semiannually 36 - 36,000 rounds cycled
GAA (Mil-G-10924) - Grease, automotive and artillery	As req				
OE/HDO (Mil-L-2104) or OES (Mil-L-10295) - Lubricating oil, internal combustion engine	As req				

NOTES

1. **AFT COVER ASSEMBLY BEARING.** - Apply a thin coat of grease (GIA) to the sleeve bearing surface every 36,000 rounds cycled or semiannually, whichever occurs first.
2. **DRUM ASSEMBLY.** - Clean inside of drum assembly with dry cleaning solvent (SD-2). Dry before lubricating. Coat all gear teeth with grease (GIA) every 36,000 rounds cycled or semiannually, whichever occurs first.
3. **SCOOP DISC ASSEMBLY.** - Apply a thin coat of grease (GIA) to scoop disc shaft, bearing sleeve, gear sprocket assembly, sprocket wheel, spring, and scoop extension surface every 36,000 rounds cycled or semiannually, whichever occurs first.
4. **EXIT COVER ASSEMBLY.** - (F) Clean ball bearings, ball bearing grooves in gear retainer, and exit cover housing with dry cleaning solvent (SD-2). Dry before lubricating. Apply a thin coat of grease (GIA) to the ball bearing grooves, gear retainer, ball bearings, spur gear, and shaft every 36,000 rounds cycled or semiannually, whichever occurs first. (C) Apply lubricating oil (LSA) to takeoff gear teeth, timing pin, and spring weekly during active periods and quarterly during inactive periods.
5. **DRUM DRIVE ASSEMBLY.** - (F) Apply a thin coat of grease (GIA) to all gear teeth, spur gear bearing, and all moving parts every 36,000 rounds cycled or semiannually, whichever occurs first. (C) Lubricate shift pin with lubricating oil (LSA) weekly during active periods and quarterly during inactive periods.
6. **EXIT UNIT ASSEMBLY.** - Lubricate front scoop guide, front guide assembly, rear scoop guide, link stripper, and wear plate cam path with lubricating oil (LSA), and coat all ball bearings, sleeve bearings, and gear teeth with grease (GIA) every 36,000 rounds cycled or semiannually, whichever occurs first. (C) Lubricate double link stripping guide assembly, lock pin, drum assembly rail, and round positioning pin with lubricating oil (LSA) weekly during active periods and quarterly during inactive periods.
7. **CONVEYOR ASSEMBLY.** - (F) Lubricate link guide assembly, feed link guide assembly, and element guide with lubricating oil (LSA), and coat all ball bearings, sleeve bearings, and gear teeth with grease (GIA) every 36,000 rounds cycled or semiannually, whichever occurs first. (C) Lubricate handle lever assembly, handle lockbutton, and timing lock with lubricating oil (LSA) weekly during active periods and quarterly during inactive periods.
8. **ANTENNA.** - During reassembly only, lubricate gears on traverse and elevation drive motor pinion assemblies with grease (GIA).
9. **OIL CAN POINTS.** - Every 75 hours, 750 miles, or as required, lubricate door, ramp, and cover hinges and latches; control leakage pins and shafts; seat controls; trim vane controls, and ramp cable pulleys. Use oil (OE/HDO or OES) seasonal grade.
10. **LUBRICATE AT TIME OF ASSEMBLY.** - Coat end of suspension torsion bar; idler wheel support arm spindle and bearings; power plant door and hatch cover torsion spring laminations; steering control linkage bearing surfaces and pins; and towing pintle shaft. Use grease (GAA or GIA) as specified during assembly procedure.

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:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

OFFICIAL:

VERNE L. BOWERS
Major General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-37
(qty rqr block No. 400) Operator Maintenance for Gun,
Self-Propelled, Antiaircraft Artillery, 20-MM, XM163.

AR 904162

27 SEPTEMBER 1973 (Supersedes LO 9-2350-300-10, 15 December 1970 with Changes)

**GUN, AIR DEFENSE ARTILLERY, SELF-PROPELLED: 20-MM
M163 (2350-999-4392)**

Reference: TM 9-2350-300-10, TM 9-2350-300-20/1, CL 9100SL

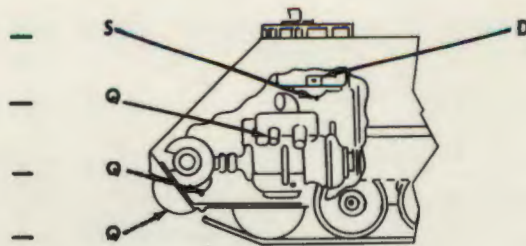
Intervals and related man-hours are based on normal operation. The time specified is the time required to perform all the services for that particular interval. Reduce to compensate for abnormal operation and severe conditions or contaminated lubricants. During inactive periods, intervals may be extended commensurate with adequate preservation. Time in MAN-HR column applies only to listed interval; add listed times if lubrication for two or more intervals is performed at same time. Level of maintenance for lubri-

cation requirements is indicated at note reference by (C) for Crew/Operator, (O) for Organizational, (F) for Direct Support and (H) for General Support. Lubricate all exterior chassis points after water operation. Clean fittings before lubricating. Clean parts with THINNER, PAINT, MINERAL SPIRITS (TPM) or DRY CLEANING SOLVENT (SD-2). Dry before lubricating. Dotted lines indicate lubrication points on both sides of the equipment. Do not over lubricate; wipe off excess lubricant.

LUBRICANT-INTERVAL

INTERVAL-LUBRICANT

- Fan gear box drain (O) (See note 1)
- Differential oil (O) filter (See note 2)
- Differential drain (O) (See note 5)
- Final drive drain (O) (See note 4)

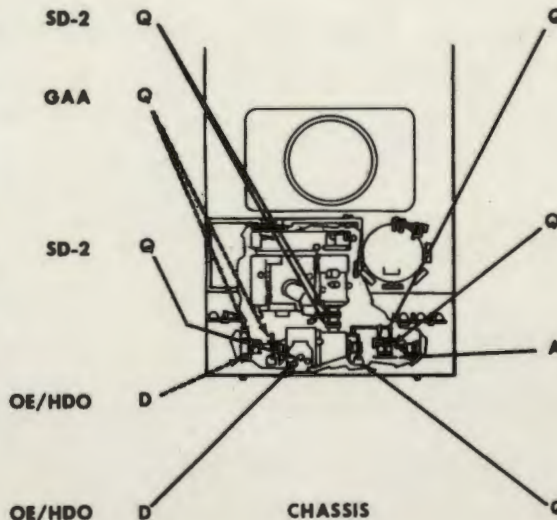


- OE/HDO Fan Gear Box Sight Level And Fill (Check level-level must be between Full and Add marks on slight indicator) (See note 1) (C)

FOLD

FOLD

- Air box drain (O) (See note 3)
- Universal joint (Every 75 hours, 750 miles or quarterly, lubricate all universal joints and propeller shaft bearings) (O) (12 places)
- Differential breather (Every 75 hours, 750 miles or quarterly, remove, clean, dry, (O) and install breather)
- Final drive fill and level (Check level) (C) (See note 4)
- Differential fill and level (Check level) (C) (See note 5)



- GAA Steering Control Lever (Every 75 hours, 750 miles or quarterly, lubricate steering control lever shaft bearings in 3 places) (O)
- OHA Pivot Steer Master Cylinder (See note 6) (O)
- GIA Tachometer And Speedometer Shafts (See note 7) (O)
- Pivot Steer Bleeder Valves (See note 6) (O)

TOTAL MAN-HR		TOTAL MAN-HR	
INTERVAL	MAN-HR	INTERVAL	MAN-HR
A	3.2	Q	2.6
D	0.1	S	0.5

WE 74639

KEY

LUBRICANT	REFILL CAPACITY (APP)	EXPECTED TEMPERATURE			INTERVAL
		Above +32°F	+40°F to -10°F	0°F to -65°F	
OE/HDO (Mil-L-2104) or OES (Mil-L-10295) - Lubricating oil internal combustion engine - Differential final drives	20 qts 1-1/2 qts ea	OE/HDO-30	OE/HDO-10	OES	For arctic operation refer to TMR-207 A - 300 hours, 3,000 miles or annually D - Daily Q - 75 hours, 750 miles or quarterly S - 150 hours, 1,500 miles or semi-annually
OHA (Mil-H-5606) - Hydraulic fluid, petroleum base Pivot steer system	1 pt	All temperatures			
GAA (Mil-G-10924) - Grease, automotive and artillery	As req				
SD-2 (P-D-680) - Solvent, dry cleaning	As req				
GIA (Mil-G-23827) - Grease, instrument, aircraft	As req				

NOTES

1. FAN GEAR BOX. - Every 150 hours, 1,500 miles, or semi-annually, drain fan gear box. Drain only when hot after operation. To drain, remove plug in bottom of gear box housing. Clean and install plug, and secure with safety wire. To refill, remove filler plug and fill gear box with 10 ounces of oil (OE/HDO) to bring level between FULL and ADD marks on sight indicator.

5. DIFFERENTIAL. - Before operation, check differential oil level to make certain there is sufficient oil for operation. Start and idle engine for 2 to 3 minutes to charge differential. Check differential oil level with engine idling; oil should be between FULL and ADD marks on gage rod. Add oil (OE/HDO) as required. Every 75 hours, 750 miles, or quarterly, drain differential. Drain

FOLD

FOLD

2. DIFFERENTIAL OIL FILTER. - Every 75 hours, 750 miles, or quarterly, service filter element. Remove four nuts, flat washers, and screws securing filter body on head, and remove body. Remove element; clean housing and element with solvent (SD-2), and install element and housing. If element or preformed packings are unserviceable, install new packings and element, using differential oil filter kit. Install element and body on head, and secure with four screws, flat washers, and nuts. Tighten nuts to 4 to 6 pound-feet torque. After filling differential, check for oil leaks at filter with engine running.

only when hot after operation. To drain, remove front hull drain plug and differential drain plug. Inspect differential drain plug for metallic particles. If metal chips are found, notify direct support maintenance personnel. Clean and install drain plugs. Service oil filter (See note 2). Remove gage rod from housing, add oil (OE/HDO) (refill with 20 quarts) and check level. During oil change, remove differential breather, clean with solvent (SD-2), and install breather.

3. AIR BOX DRAIN AND CRANKCASE BREATHER COLLECTOR CAN. - Every 75 hours, 750 miles, or quarterly, empty can and remove element. Clean element and inside of can with solvent (SD-2), and reinstall.

6. PIVOT STEER SYSTEM. - Every 75 hours, 750 miles, or quarterly, remove plugs and check fluid level in both master cylinders. Add fluid (OHA) as required to bring fluid within 1/2 to 3/4 inch from top of cylinder.

CAUTION: Use only OHA petroleum base hydraulic fluid. DO NOT use brake fluid. DO NOT overfill.

4. FINAL DRIVES. - Daily, check oil in both final drives for level between FULL and ADD marks on gage rod. Add oil (OE/HDO) as required. Drain final drives every 75 hours, 750 miles, or quarterly. Drain only when hot after operation. To drain, remove plug in bottom of each final drive housing. Inspect drain plugs and oil for metallic particles. If metal chips or filings are found, notify direct support maintenance personnel. Clean and install plugs. Fill each final drive with approximately 1-1/2 quarts of oil (OE/HDO) to bring level to between FULL and ADD marks on gage rod.

CAUTION: Do not attempt to grease pivot steer bleeder valves.

7. TACHOMETER AND SPEEDOMETER SHAFTS. - Annually, disconnect shafts at both ends, remove slotted washers from drive ends of cores, and remove cores from instrument panel end of shafts. Lubricate cores with grease (GIA), insert cores in shafts, install slotted washers, and connect both ends of shafts.

WE 74640

LUBRICATION ORDER

**GUN, AIR DEFENSE ARTILLERY, SELF-PROPELLED: 20-MM
M163 (2350-999-4392)**

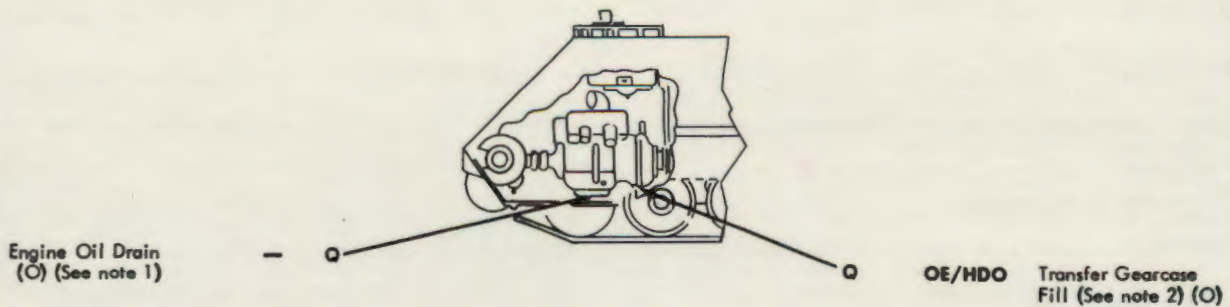
Reference: TM 9-2350-300-10, TM 9-2350-300-20/1, CL 9100SL

Intervals and related man-hours are based on normal operation. The time specified is the time required to perform all the services for that particular interval. Reduce to compensate for abnormal operation and severe conditions or contaminated lubricants. During inactive periods, intervals may be extended commensurate with adequate preservation. Time in MAN-HR column applies only to listed interval; add listed times if lubrication for two or more intervals is performed at same time. Level of maintenance for lubri-

cation requirements is indicated at note reference by (C) for Crew/Operator, (O) for Organizational, (F) for Direct Support and (H) for General Support. Lubricate all exterior chassis points after water operation. Clean fittings before lubricating. Clean parts with THINNER, PAINT, MINERAL SPIRITS (TPM) or DRY CLEANING SOLVENT (SD-2). Dry before lubricating. Do not over lubricate; wipe off excess lubricant.

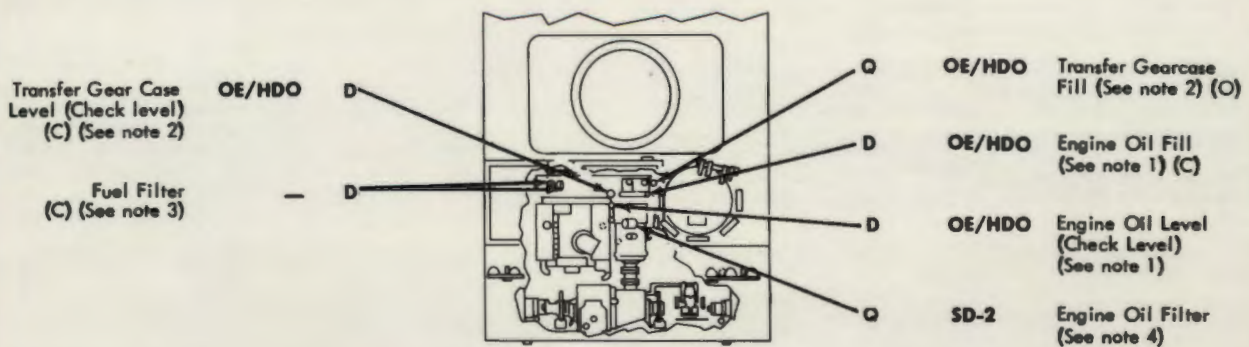
LUBRICANT-INTERVAL

INTERVAL-LUBRICANT



FOLD

FOLD



CHASSIS

TOTAL MAN-HR		TOTAL MAN-HR	
INTERVAL	MAN-HR	INTERVAL	MAN-HR
D	0.2	Q	2.6

WE 74641

KEY

LUBRICANT	REFILL CAPACITY (APP)	EXPECTED TEMPERATURE			INTERVAL
		Above +32°F	+40°F to -10°F	0°F to -65°F	
OE/HDO (Mil-L-2104) - Lubricating oil, internal combustion engine or OES Engine (Mil-L-10295) Transfer gearcase	18 qts 2-1/2 qts	OE/HDO-30	OE/HDO-10	OES	For arctic operation refer to TAP-207 D - Daily Q - 75 hours, 750 miles or quarterly
SD-2 (P-D-680) - Solvent, dry cleaning	As req	All temperatures			

NOTES

1. **ENGINE.** - Daily, before starting engine, check oil for level between FULL and ADD marks on gage rod. Start and idle engine 5 to 8 minutes. Stop engine, allow oil to drain down into the sump (1 to 3 minutes), check oil for level and add oil (OE/HDO) as required.

CAUTION: DO NOT overfill.

Every 75 hours, 750 miles, or quarterly, drain engine oil. Drain only when hot after operation. To drain, remove hull bottom access cover and engine drain plug. Inspect plug and oil for

2. **TRANSFER GEARCASE.** - Daily, check transfer gearcase oil level for between FULL and ADD marks on gage rod. Add oil (OE/HDO) as necessary. Every 75 hours, 750 miles, or quarterly, drain gearcase oil. Drain only when hot after operation. To drain, remove hull drain plug and gearcase drain plug. Inspect gearcase drain plug for metallic particles. If metal chips are found in oil on plug, notify direct support maintenance personnel. Drain at least 15 minutes, clean and install gearcase drain plug. Fill transfer gearcase with approximately 2-1/2 quarts of oil (OE/HDO). Start engine; operate for 1 minute; stop engine, and check oil level. Level should be between FULL and ADD marks on gage rod.

FOLD

FOLD

metallic particles. If metal chips are found, notify direct support maintenance personnel. Clean and install drain plug, and install hull bottom access cover. Fill engine with approximately 18 quarts of oil (OE/HDO) to bring level between FULL and ADD mark on gage rod. Service oil filter (See note 4). Run engine and check for oil leaks at filter with engine operating.

NOTE: If engine has been filled with (PE) oil (preservative engine oil) by the manufacturer or at time of overhaul, retain this oil in the engine until the first scheduled oil change. Maintain operating oil level by adding the applicable grade of oil (OE/HDO) to the (PE) oil. When the first scheduled oil change is made, refill engine with applicable grade of oil (OE/HDO). OE/HDO oil is equivalent to FE-10-1 and OE/HDO-30 is equivalent to PE-30-1.

3. **FUEL FILTERS.** - Daily, open drain cocks, and drain 1/4 pint of fuel from each filter into container. Close drain cock. Every 75 hours, 750 miles, or quarterly with engine stopped and fuel cut off at fuel compartment, remove elements. Clean inside of shells. Install new elements in shells and install shells. Remove filler plugs from top of filter. Fill shells with clean fuel; install filler plug when fuel level reaches plug hole.

4. **ENGINE OIL FILTER.** - Every 75 hours, 750 miles, or quarterly, or during oil change, replace oil filter element. Remove drain plug, filter cover, gasket, and element. Clean inside of cover with solvent (SD-2), and install new filter element and gasket. Install filter cover, making sure gasket is not crimped and forms a tight seal. Install drain plug. After filling engine, check for oil leaks at filter and drain plug with engine operating.

LUBRICATION ORDER

**GUN, AIR DEFENSE ARTILLERY, SELF-PROPELLED: 20-MM
M163 (2350-999-4392)**

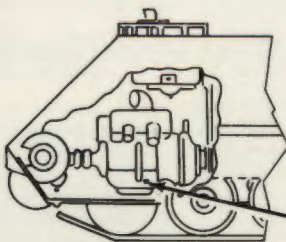
Reference: TM 9-2350-300-10, TM 9-2350-300-20/1, CL 9100SL

Intervals and related man-hours are based on normal operation. The time specified is the time required to perform all the services for that particular interval. Reduce to compensate for abnormal operation and severe conditions or contaminated lubricants. During inactive periods, intervals may be extended commensurate with adequate preservation. Time in MAN-HR column applies only to listed interval; add listed times if lubrication for two or more intervals is performed at same time. Level of maintenance for lubri-

cation requirements is indicated at note reference by (C) for Crew/Operator, (O) for Organizational, (F) for Direct Support and (H) for General Support. Lubricate all exterior chassis points after water operation. Clean fittings before lubricating. Clean parts with THINNER, PAINT, MINERAL SPIRITS (TPM) or DRY CLEANING SOLVENT (SD-2). Dry before lubricating. Do not over lubricate; wipe off excess lubricant.

LUBRICANT-INTERVAL

INTERVAL-LUBRICANT



Q

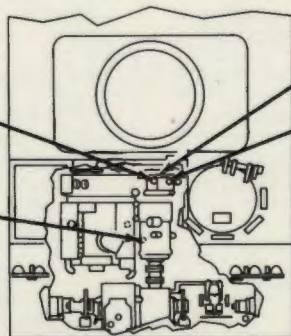
Transmission Drain
(See note 3) (O)

FOLD

Hydraulic Tank
(O) Filter (See note 1)

SD-2

S



D

OHA

Hydraulic Tank Level
(See note 1) (C)

D

OHA

Hydraulic Tank Fill
And Breather (See
Note 1) (C)

Transmission Oil Filter
(O) (See note 2)

SD-2

Q

CHASSIS

TOTAL MAN-HR		TOTAL MAN-HR	
INTERVAL	MAN-HR	INTERVAL	MAN-HR
D	0.1	S	1.8
Q	1.5		

WE 74643

KEY

LUBRICANT	REFILL CAPACITY (APP)	EXPECTED TEMPERATURE			INTERVAL
		Above +32°F	+40°F to -10°F	0°F to -65°F	
OE/HDO (Mil-L-2104) or OES (Mil-L-10295) - Lubricating oil, internal combustion engine Transmission	16 qts	OE/HDO-10	OE/HDO-10	OE/HDO-10	D - Daily Q - 75 hours, 750 miles or quarterly S - 150 hours, 1,500 miles or semi-annually
OHA (Mil-H-5056) - Hydraulic fluid, petroleum base - Hydraulic tank pivot steer system	2 gals 1 pt	All temperatures			
SD-2 (P-D-680) - Solvent, dry cleaning	As req				

For arctic operation refer to TAP-207

NOTES

1. RAMP AND SUSPENSION LOCKOUT HYDRAULIC SYSTEM TANK. - Daily, with ramp down and suspension lockout cylinders retracted, check fluid level in hydraulic tank. Fluid level must show MAX. and MIN. marks in window of sight indicator. To add fluid (OHA), remove adapter with breather from top of tank. Every 75 hours, 750 miles, or quarterly, remove breather from adapter, wash breather in solvent (SD-2), and install breather in adapter. Inspect gasket for serviceability, and install adapter with breather in top of tank.

CAUTION: DO NOT use compressed air to dry strainer; damage will result.

cavity with solvent (SD-2) and install new element. After filling transmission, check for oil leaks at filter with engine operating.

3. TRANSMISSION. - Daily, check transmission oil level for between FULL and ADD marks on gage rod. With engine disconnect engaged, start and operate engine at 800 rpm for 3 to 5 minutes with shift lever in 2-3 and brakes locked to allow transmission oil to reach normal operating temperature. Move shift lever through all ranges to assure complete circulation. Return shift lever to N, and check transmission oil level with engine operating at 1,500 rpm. Add oil (OE/HDO) as required. Every 75 hours, 750 miles,

FOLD

Every 150 hours, 1,500 miles, or semi-annually, drain hydraulic tank, clean strainer, and replace filter. Lower ramp and retract suspension lockout cylinder. Place a suitable container of at least 2 gallons capacity under drain elbow in bottom of tank, and remove plug. Disconnect hose at strainer adapter elbow. Remove four caps screws and key washers securing strainer to tank. Discard key washers. Remove adapter with strainer. Remove strainer from adapter, wash thoroughly in solvent (SD-2). Clean interior of tank through strainer opening, using solvent (SD-2) and clean cloth. Inspect preformed packing for serviceability, and install packing and strainer on adapter. Secure adapter to tank with four new key washers and four cap screws. Connect hose to adapter elbow. Unscrew filter (counterclockwise) from housing. Remove and discard gasket and filter. Install new gasket in housing. Screw new filter into housing, making sure filter is seated in place. Fill tank with fluid (OHA) (2 gallons) to bring level between MAX. and MIN. marks. Operate ramp and suspension lockout system, and check for leaks.

2. TRANSMISSION OIL FILTER. - Every 75 hours, 750 miles, or quarterly, replace oil filter element. Remove element, clean

or quarterly, drain transmission oil. Drain only when hot after operation. To drain, remove hull bottom access cover plate and transmission drain plug. Catch oil in suitable container. Allow oil to drain thoroughly - 1 hour if time permits. Examine oil for evidence of overheating, foreign matter, and metallic particles. If metal chips or filings are found on plug or in oil, notify direct support maintenance personnel. Clean and install drain plug, and install access cover plate. Service filter (See note 2). Add oil (OE/HDO) as required to bring oil level between FULL and ADD marks on gage rod (refill capacity 16 quarts). After filling transmission, check for oil leaks with engine operating. Recheck oil level.

NOTE: If transmission has been filled with (PE) oil (preservative engine oil) by the manufacturer or at time of overhaul, retain this oil in the transmission until the first scheduled oil change. Maintain operating oil level by adding the applicable grade of oil (OE/HDO). When the first scheduled oil change is made, refill transmission with applicable grade of oil (OE/HDO). OE/HDO-10 is equivalent to PE-10-1.

FOLD

LUBRICATION ORDER

**GUN, AIR DEFENSE ARTILLERY, SELF-PROPELLED: 20-MM
M163 (2350-999-4392)**

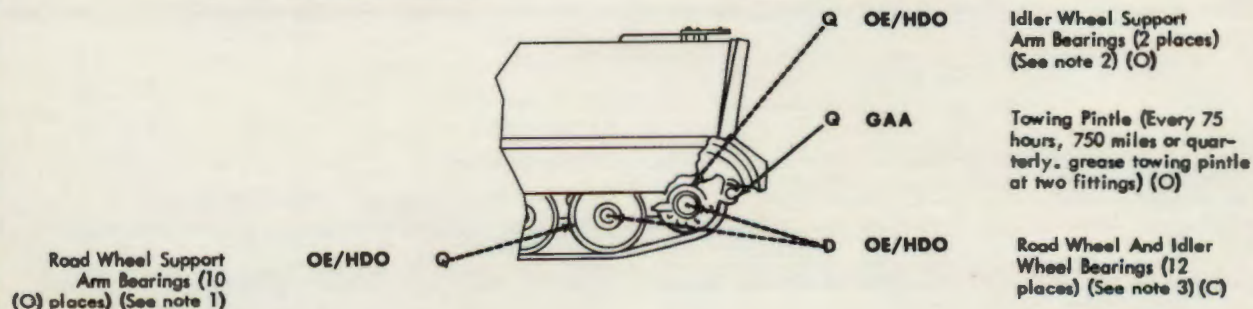
Reference: TM 9-2350-300-10, TM 9-2350-300-20/1, CL 9100SL

Intervals and related man-hours are based on normal operation. The time specified is the time required to perform all the services for that particular interval. Reduce to compensate for abnormal operation and severe conditions or contaminated lubricants. During inactive periods, intervals may be extended commensurate with adequate preservation. Time in MAN-HR column applies only to listed interval; add listed times if lubrication for two or more intervals is performed at same time. Level of maintenance for lubri-

cation requirements is indicated at note reference by (C) for Crew/Operator, (O) for Organizational, (F) for Direct Support and (H) for General Support. Lubricate all exterior chassis points after water operation. Clean fittings before lubricating. Clean parts with THINNER, PAINT, MINERAL SPIRITS (TPM) or DRY CLEANING SOLVENT (SD-2). Dry before lubricating. Dotted lines indicate lubrication points on both sides of the equipment. Do not over lubricate; wipe off excess lubricant.

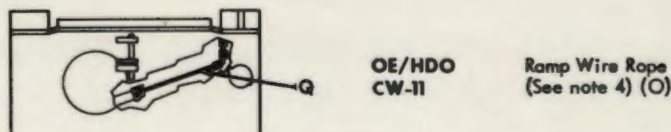
LUBRICANT-INTERVAL

INTERVAL-LUBRICANT



FOLD

FOLD



CHASSIS

TOTAL MAN-HR		TOTAL MAN-HR	
INTERVAL	MAN-HR	INTERVAL	MAN-HR
D	0.1	G	1.4

KEY

LUBRICANT	REFILL CAPACITY (APP)	EXPECTED TEMPERATURE			INTERVAL
		Above +32°F	+40°F to -10°F	0°F to -65°F	
OE/HDO (Mil-L-10324) - Lubricating oil, internal combustion engine OES (Mil-L-10295) Road wheel and idler wheel bearings Road wheel Support arm Bearings	As req As req	OE/HDO-10	OE/HDO-30	OES	D - Daily Q - 75 hours, 750 miles or quarterly
CW-II (VV-L-751) - Lubricating oil, chainwire rope, exposed gear GOS (Mil-L-10324) - Lubricating oil, sub-zero	As req As req	CW-II-B (medium)	CW-II-A (light)	GOS	
GAA (Mil-G-10924) - Grease, automotive and artillery	As req	All temperatures			

For arctic operation refer to TM 9-207

NOTES

1. ROAD WHEEL SUPPORT ARM BEARINGS. - Every 75 hours, 750 miles, or quarterly, check oil level of road wheel support arm housings. To check, remove lower plug from housing. Oil should be level with bottom of hole. To fill, remove top plug, and add oil (OE/HDO) until oil reaches bottom of lower plug hole. Fill slowly to allow time for oil to reach all cavities. Clean and install both plugs. After fording, check for water in oil. Replace oil if contaminated. If lubrication fittings have been installed,

through relief valve.

3. ROAD WHEEL AND IDLER WHEEL BEARINGS. - Daily, check oil level of road and idler wheel hubs. Oil must show in lower half of sight indicator. To add oil, rotate wheel until either filler plug is on upper side of hub cap. Remove plug, and add oil (OE/HDO) until level shows in lower half of sight indicator. Allow time for oil to reach cavities. Clean and install filler plug. After fording,

FOLD

FOLD

use grease gun with flexible adapter to lubricate with GAA lubricant until lubricant escapes through relief valve.

check for water in oil. Replace oil if contaminated. If lubrication fittings have been installed, lubricate every 75 hours, 750 miles, or quarterly using grease gun with flexible adapter. Fill hubs with GAA lubricant until lubricant escapes through relief valve.

2. IDLER WHEEL SUPPORT ARM BEARINGS. - Every 75 hours, 750 miles, or quarterly, check oil level of idler wheel support arm housings. To check, remove either filler plug. Oil should be level with bottom of hole. Clean and install both plugs. After fording, check for water in oil. Replace oil if contaminated. If lubrication fittings have been installed, use grease gun with flexible adapter, lubricate with GAA lubricant until lubricant escapes

4. RAMP WIRE ROPE. - Every 75 hours, 750 miles, or quarterly, lower ramp, clean exposed portion of wire rope with oil (OE/HDO). Wipe off excess oil and coat with oil (CW-II). Remove rear floor plate, raise ramp, and clean concealed portion of wire rope with oil (OE/HDO). Wipe off excess oil and coat with oil (CW-II).

LUBRICATION ORDER

GUN, AIR DEFENSE ARTILLERY, SELF-PROPELLED: 20-MM M163 (2350-999-4392)

Reference: TM 9-2350-300-10, TM 9-2350-300-20/1, CL 91005L

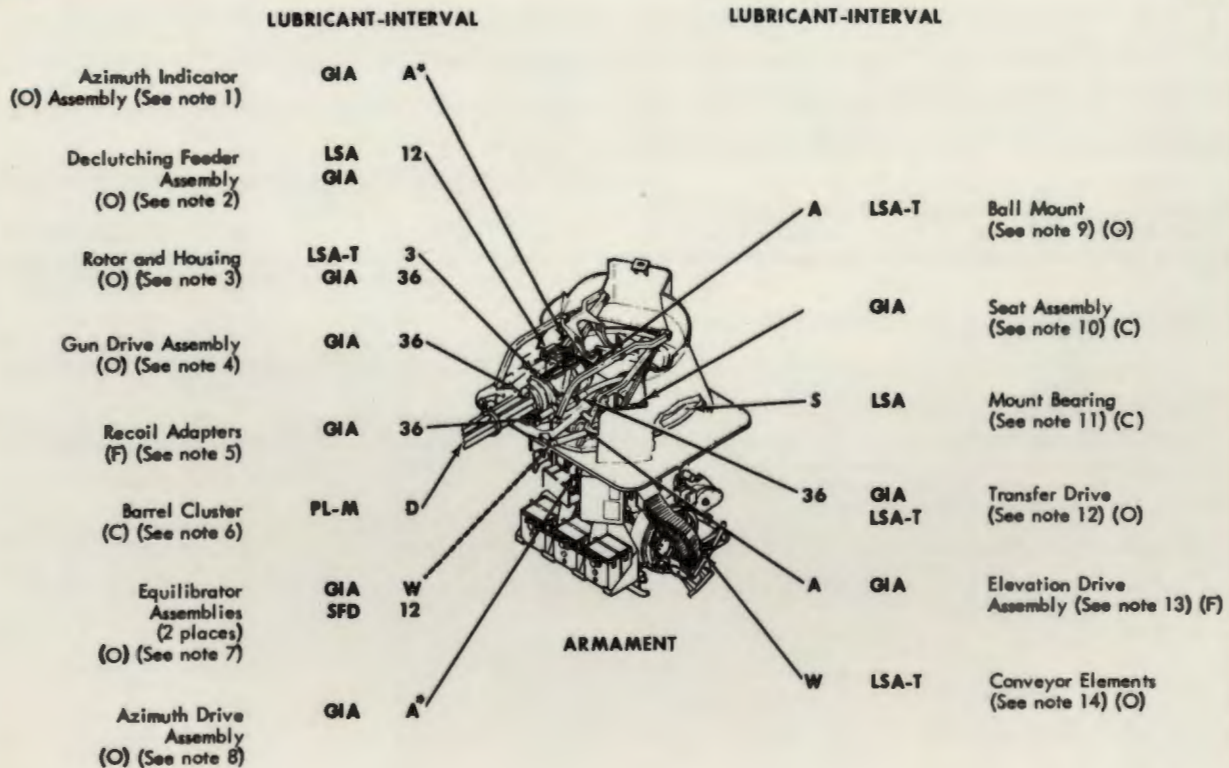
Intervals and related man-hours are based on normal operation. The time specified is the time required to perform all the services for that particular interval. Reduce to compensate for abnormal operation and severe conditions or contaminated lubricants. During inactive periods, intervals may be extended commensurate with adequate preservation. Time in MAN-HR column applies only to listed interval; add listed times if lubrication for two or more intervals is performed at same time. Level of maintenance for lubri-

cation requirements is indicated at note reference by (C) for Crew/Operator, (O) for Organizational, (F) for Direct Support and (H) for General Support. Lubricate all exterior chassis points after water operation. Clean fittings before lubricating. Clean parts with THINNER, PAINT, MINERAL SPIRITS (TPM) or DRY CLEANING SOLVENT (SD-2). Dry before lubricating. Dotted lines indicate lubrication points on both sides of the equipment. Do not over lubricate; wipe off excess lubricant.

TOTAL MAN-HR		TOTAL MAN-HR	
INTERVAL	MAN-HR	INTERVAL	MAN-HR
A°	N/A	S	2.50
D	1.00	3	1.00
W	1.00	12	1.00
Q	.50	36	3.00

FOLD

FOLD



A° - During assembly or installation

WE 74647

LUBRICANT	REFILL CAPACITY (APP)	EXPECTED TEMPERATURE			INTERVAL
		Above +32°F	+40°F to 10°F	0°F to -65°F	
PL-M (Mil-L-3150) - Lubricating oil, preservative, medium	As req	PL-M	PL-S	PL-S	For arctic operation refer to TM 9-207 A* - During reassembly or installation D - Daily when equipment is operated W - Weekly Q - Quarterly S - Semi-annually 3 - 3,000 rounds cycled 12 - 12,000 rounds cycled 36 - 36,000 rounds cycled
PL-S (VV-L-800) - Lubricating oil, general purpose, preservative	As req				
GIA (Mil-G-23827) - Grease, instrument, aircraft	As req				
LSA (Mil-L-46000) - Lubricating oil, semi-fluid (automatic weapons)	As req	All temperatures			
LSA-T (Mil-L-46150) - Lubricant weapons, semi-fluid (high load carrying capacity)	As req				
SFD (Mil-L-46147) - Lubricant, solid film	As req				

NOTES

FOLD

FOLD

1. AZIMUTH INDICATOR ASSEMBLY. - During installation, coat all gear teeth with grease (GIA).
2. DECLUTCHING FEEDER ASSEMBLY. - Every 12,000 rounds cycled, lubricate traveling ring cam, stop plate, actuating shaft, collar assembly, and inside of feeder spur gear with lubricant (LSA) and coat all gear teeth, clutch and spur gear with grease (GIA).
3. ROTOR AND HOUSING. - Every 3,000 rounds cycled, clean rotor tracks and breech bolt assemblies and lubricate with lubricant (LSA-T). Every 36,000 rounds cycled, lubricate housing cam path, rear surface of front locking wells, gear teeth and ball bearings with grease (GIA).
4. GUN DRIVE ASSEMBLY. - Every 36,000 rounds cycled, coat all gear teeth with grease (GIA).
5. RECOIL ADAPTERS. - Every 36,000 rounds cycled, coat springs and spindle bodies with grease (GIA).
6. BARREL CLUSTER. - Daily after firing, and weekly during inactive periods, coat inside and outside surfaces of gun barrels and exposed surfaces of center and muzzle clamps with lubricating oil (PL-M). After application, wipe off excess oil.
7. EQUILABRATOR ASSEMBLIES. - Elevate cannon to upper limit, clean outside of inner cylinder weekly, and apply coat of grease (GIA). Apply solid film lubricant (SFD) to springs and inside of inner cylinder at assembly.

8. AZIMUTH DRIVE ASSEMBLY. - During assembly only, coat all gear teeth and contact surfaces between gearshaft and clutch with grease (GIA).
9. BALL MOUNT. - Each time cannon is removed/installed, lubricate gun mount ball with lubricant (LSA-T).
10. SEAT ASSEMBLY. - Quarterly, lubricate vertical post and latch mechanism with grease (GIA).
11. MOUNT BEARING. - Semi-annually, lubricate bearing with lubricating oil (LSA). During lubrication, rotate mount through complete circle to assure that entire mount bearing receives lubrication.
12. TRANSFER DRIVE. - Every 36,000 rounds cycled, coat all gear teeth with grease (GIA) and remove core of flexible shafts and lubricate with lubricant (LSA-T).
13. ELEVATION DRIVE ASSEMBLY. - During reassembly only, coat all gear teeth and contact surfaces between gearshafts and clutch with grease (GIA).
14. CONVEYOR ELEMENTS. - When elements show signs of corrosion, clean, inspect, and apply a thin coat of lubricant (LSA-T). (In the event any element is found to have cracked or chipped portions, all elements (123) in the conveyor should be replaced.)

LUBRICATION ORDER

GUN, AIR DEFENSE ARTILLERY, SELF-PROPELLED: 20-MM M163 (2350-999-4392)

Reference: TM 9-2350-300-10, TM 9-2350-300-20/1, CL 9100SL

Intervals and related man-hours are based on normal operation. The time specified is the time required to perform all the services for that particular interval. Reduce to compensate for abnormal operation and severe conditions or contaminated lubricants. During inactive periods, intervals may be extended commensurate with adequate preservation. Time in MAN-HR column applies only to listed interval; add listed times if lubrication for two or more intervals is performed at same time. Level of maintenance for lubri-

cation requirements is indicated at note reference by (C) for Crew/Operator, (O) for Organizational, (F) for Direct Support and (H) for General Support. Lubricate all exterior chassis points after water operation. Clean fittings before lubricating. Clean parts with THINNER, PAINT, MINERAL SPIRITS (TPM) or DRY CLEANING SOLVENT (SD-2). Dry before lubricating. Do not over lubricate; wipe off excess lubricant.

LUBRICANT-INTERVAL

INTERVAL-LUBRICANT

Aft Cover Assembly
(F) Bearing (See note 1)

GIA 36

Drum Assembly
(F) (See note 2)

GIA 36

Scoop Disc
Assembly
(F) (See note 3)

GIA 36

Exit Cover Assembly
(F) (See note 4)

GIA 36

AMMUNITION DRUM

A** GIA

Drum Drive Assembly
(See note 5) (F)

GIA

Exit Unit Assembly
(See note 6) (F)

FOLD

FOLD

Antenna
(F) (See note 7)

GIA A*

ANTENNA

A* During assembly only
A** During assembly only

TOTAL MAN-HR		TOTAL MAN-HR	
INTERVAL	MAN-HR	INTERVAL	MAN-HR
A*	0.1	36	0.6
A**	0.7		

WE 74649

KEY

LUBRICANT	REFILL CAPACITY (APP)	EXPECTED TEMPERATURE			INTERVAL
		Above +32°F	+40°F to -10°F	0°F to -65°F	
GIA (Mil-G-23827) - Grease, instrument, aircraft	As req	All temperatures			For arctic operation refer to TM9-207 A* - During assembly only A** - During assembly only 36 - 36,000 rounds cycled
GAA (Mil-G-10924) - Grease, automotive and artillery	As req				
OE/HDO (Mil-L-2104) or OES (Mil-L-10295) - Lubricating oil, internal combustion engine	As req				

NOTES

- 1. AFT COVER ASSEMBLY BEARING. - Every 36,000 rounds cycled, apply a thin coating of grease (GIA) to the sleeve bearing surface.
- 2. DRUM ASSEMBLY. - Every 36,000 rounds cycled, coat all gear teeth with grease (GIA).
- 3. SCOOP DISC ASSEMBLY. - Every 36,000 rounds cycled, coat scoop extension shaft with grease (GIA).
- 4. EXIT COVER ASSEMBLY. - Every 36,000 rounds cycled, apply a thin coating of grease (GIA) to the ball bearing groove.

- 7. ANTENNA. - During reassembly only, lubricate gears on traverse and elevation drive motor pinion assemblies with grease (GIA).
- 8. OIL CAN POINTS. - Every 75 hours, 750 miles, or quarterly, or as required, lubricate door, ramp, and cover hinges and latches; control leakage pins and shafts; seat controls; trim vane controls, and ramp cable pulleys. Use oil (OE/HDO or OES) seasonal grade.

FOLD

FOLD

- 5. DRUM DRIVE ASSEMBLY. - During reassembly only, coat all gear teeth, spur gear bearing, and all moving parts with grease (GIA).
- 6. EXIT UNIT ASSEMBLY. - Every 36,000 rounds cycled, coat gear teeth, rails, and stripper with grease (GIA).

- 9. LUBRICATE AT TIME OF ASSEMBLY. - Coat ends of suspension torsion bar; idler wheel support arm spindle and bearings; power plant door and hatch cover torsion spring laminations; steering control linkage bearing surfaces and pins; and towing pintle shaft. Use grease (GAA or GIA) as specified during assembly procedure.

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:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

OFFICIAL:

VERNE L. BOWERS
Major General, United States Army
The Adjutant General

DISTRIBUTION: To be distributed in accordance with DA Form 12-37 (copy req block No. 400) Operator Maintenance requirements for Gun, Self-Propelled, Antiaircraft Artillery, 20-MM, XM143.

WE 74650