Date 1-1-89

MC-9 MAINTENANCE MANUAL

SECTION 10
LUBRICATION

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LUBRICATION

Engine crankcase oil should be checked daily or before the start of each run and oil added to bring the level to the "Full" mark on the dipstick. A new oil filter element should be installed each time the crankcase oil is changed.

OIL CHANGES

The oil service period is dependent on the operating conditions (e.g. load factors, etc.) of an engine that will vary with the numerous service applications. The oil change interval should be based on 300 operating hours times the average vehicle operating speed. See the example in the chart, below.

AVG. OPERATING SPEED	OIL CHANGE INTERVAL	
	Miles	**Km**
50 mph (x 300 hrs =)	15,000	24,000
40 mph	12,000	19,000
30 mph	9,000	14,500

The oil change interval may be gradually increased or decreased with experience on a specific lubricant while also considering the recommendations of the oil supplier (analysis of drained oil can be helpful) until the most practical oil change period for the particular service has been established.

Solvents should not be used as flushing oils in running engines. Dilution of the fresh refill oil supply can occur, which may be detrimental.

Full flow oil filtration systems have been used in 6V-92 and 8V-92 diesel engines since they were first introduced. For the best results, the oil filter element should be replaced each time the oil is changed.

Engine flow oil temperature should be checked every 25,000 miles (40,000 km) to determine oil cooler efficiency. This check should be made by inserting a steel jacketed thermometer in the dipstick opening immediately after stopping a hot, loaded engine. If the oil temperature exceeds the coolant temperature by more than 60°F (33°C), the oil cooler may be clogged.

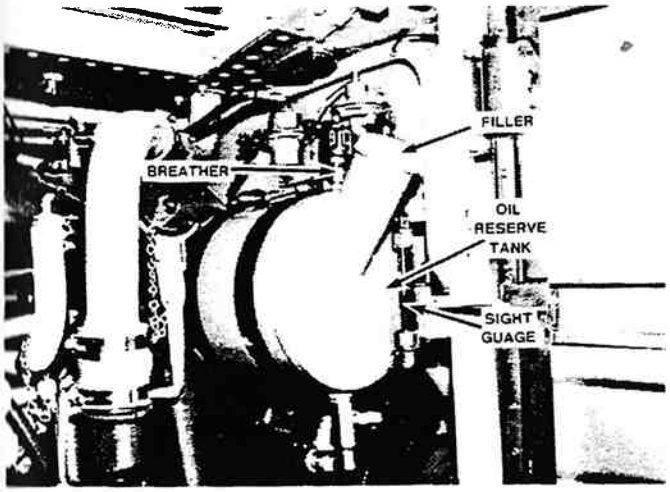

Figure 10-1. Engine Lubrication Tank (Optional) and Related Components.

Satisfactory prolonged heavy-duty engine operation requires heavy-duty lubricating oils with additives. These oils provide better lubrication, have more heat resistance and counteract sludge formation more effectively than the straight mineral type oils. Refer to Section 8, Engine, for detailed oil specifications.

OIL RESERVE TANK

A two-gallon (7.6 L) oil reserve tank is available as optional equipment (see figure 10-1). It is connected to the crankcase by a hose with a shut-off valve, allowing oil to be added to crankcase by opening the valve. Comparison of oil levels in the sight gauge, before and after adding oil to the crankcase, shows how much oil was added.

COLD WEATHER OPERATION

Cold weather starting will be easier when immersion type electrical coolant heaters are used. Other practical consideration, such as the use of batteries, cables and connectors of adequate size, proper setting of voltage regulators, ether starting aids, and proper fuel selection will enhance starting with the use of SAE30 or SAE40 oils.

BREAK IN PERIOD

Lubricant in the transmission and differential supplied as "factory fill" in new coaches should be drained and refilled after 1,000 miles (1,600 km) and in no case over 3,000 miles (4,800 km) of initial operation.

A lubrication chart is included in this section to give approximate location of key service points on the 96A2/102A2 and 96A3/102A3 model coaches. Where cleaning, removal or disassembly are required for lubrication purposes, these procedures are covered in the applicable sections of this manual.

Lubricant compartments of the engine and transmission are provided with dipsticks for checking lubricant level. Power steering fluid reservoir and blower drive gear box are equipped with sight gauges to facilitate checking of oil level.

A preventive maintenance schedule is also included at the end of this section. It includes lubrication, cleaning and inspection intervals.

FLEXIBLE HOSES

MAINTENANCE

The performance of the engine and auxiliary equipment is greatly dependent on the ability of flexible hoses to transfer lubricating oil, air, coolant, and fuel oil. Maintenance of hoses is an important step to ensure efficient, economical and safe operation of the engine and related equipment.

Check hoses daily as part of the pre-start up inspection. Examine hoses for leaks, and check all fittings, clamps, and ties carefully. Ensure that hoses are not resting on or touching shafts, couplings, heated surfaces including exhaust manifolds, any sharp edges, or other obviously hazardous areas. Since all machinery vibrates and moves to a certain extent, clamps and ties can loosen and wear with age. To ensure continued proper support, inspect fasteners frequently and tighten or replace them as necessary.

Investigate leaks immediately to determine if fittings have loosened or cracked and also if hoses have ruptured or worn through. Take corrective action immediately. Leaks are not only potentially detrimental to machine operation, but can also result in added expense caused by the need to replace lost fluids.

WARNING: Personal injury and/or property damage may result from fire due to the leakage of flammable fluids such as fuel or lube oil.

SERVICE LIFE

A hose has a limited service life, determined by the temperature and pressure of the gas or fluid within it, time in service, mounting, ambient temperatures, amount of flexing, and the vibration it is subject to. With this in mind, TMC/MCI recommends that all hoses be thoroughly inspected at least every 500 operating hours and/or annually. Look for cover damage or indications of damaged, twisted, worn, crimped, brittle, cracked, or leaking lines. Hoses having the outer cover worn through or damaged metal reinforcement should be considered unfit for service.

TMC/MCI further recommends that all hoses be replaced during major overhaul and/or after a maximum of five years service. Replacement hose assemblies should always be equal or superior to the original equipment supplied with the engine.

Review the plumbing and fasten hoses only after the engine or related machinery are installed. Make sure that hoses are routed and clipped properly to prevent damage from vibration, abrasion, heat, and mechanical loads. Extra fasteners or readjustment of an existing support may be required during the operating life of a unit.

Hoses routed close to heated surfaces may have a shortened service life. Additional shields or protective sleeves may extend hose life in special applications where shortened life is anticipated or has been experienced. Consult with the hose manufacturer relative to alternate hose compositions where shields and sleeves are impractical.

The service life of a hose may also be reduced by exposure to road salt. Some types of hoses with wire braid reinforcement are subject to oxidation damage and a subsequent reduction in hose strength.

The proper installation, routing and fitting torque criteria for hoses can be obtained from major hose suppliers and manufacturers.

GREASE FITTING PLATE

A grease fitting mounting plate is attached to a master bracket in the left front service compartment to the rear of the pitman arm. These zerk fittings are connected to lubricating lines which lead to points listed on the nameplate. See figure 10-2.

The nameplate explains the function of each fitting.

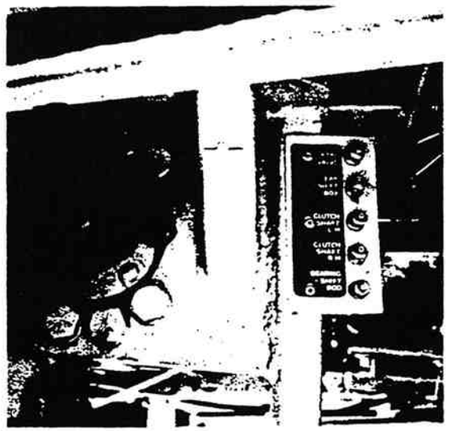

Figure 10-2. Grease Fitting Mounting Plate.

OIL Type

LUBRICATION SCHEDULE (Refer to figure 10-3 for locations.)

SERVICE INTERVAL A — Check Daily - Service as Required.

ITEM NUMBER*	DESCRIPTION	LUBE METHOD	LUBRICANT**
1	Engine Crankcase	Fill	0-1 (SAE 30 or 40)
2	Blower Gearbox	Fill	0-1 (SAE 30)
3	Power Steering Reservoir	Fill	0-1 (SAE 10-W-40)
4	Front and Trailing Axle Wheel Bearings	Fill	0-1 (SAE 30)
5	Transmission (automatic)	Fill	0-5
	Transmission (standard)	Fill	0-1 (SAE 30 below 10°F/-18°C) (SAE 40 or 50 above 10°F/-18°C)

SERVICE INTERVAL B — Every 150 hrs or 5,000 miles (8,000 km).

6 & 7	Tie rod ends and lower drag link ends	Zerks (all points)	L-5
8	Brake Camshaft - front wheels	Zerks (each side)	L-5
9	Front Slack Adjusters	Zerks (each side)	L-5
10	King Pin Bushings, upper and lower	2 Zerks (each side)	L-5
11	Propeller Shaft	3 Zerks	L-5
12	Brake Camshafts - rear	Zerk (each side)	L-5
13	Rear Slack Adjusters	Zerk (each side)	L-5
14	Rear Brake Chambers	Apply	L-6
15	Differential	Fill/Change	G-1 (Below 0°F/-18°C) G-2 (Above 0°F/-18°C)
16	Air Cleaner (Dry Type)	Check and Replace Element As Required	
38	Clutch Linkage	Zerk	L-5
39	Trailing Axle Pivot	Zerk	L-5

Steering Gear Compartment

19	Steering Drag Link End	Zerk	L-5
20	Steering Shaft U-joint	2 Zerks	L-5
21	Steering Shaft Slip Joint	Zerk	L-5
40	Fitting on Front Central Lube Plate	3 Zerks	L-5
41	Clutch Lever Bearing	Zerk	L-5

Engine Compartment

22A	A/C Compressor Mounting Pivot	Zerk	L-5
22B	Shutter Rods & Cranks	Apply	O-2
43	Clutch Release Bearing	Zerk	A-2

*** See Location Diagram, figure 10-3.**
**** See Lubricant Requirements Chart.**

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SERVICE INTERVAL C — Every 300 hrs or 10,000 miles (16,000 km).

ITEM NUMBER*	DESCRIPTION	LUBE METHOD	LUBRICANT**
23	Engine Crankcase	Drain, Fill	0-1 (SAE 30 or 40)
24	Engine Oil Filter	Change	
25	Shutterstat Air Filter	Add	F-2
	Service Door Hinges	Apply	L-3
44	Fuel Filters	Change	
26	Entrance Door Linkage (remove panel for access behind target panel) & Door Air Lock Mechanism	Apply	0-2
45	Entrance Door Hinges	Apply	L-3

SERVICE INTERVAL D — Every 750 hrs or 25,000 miles (40,000 km).

27	Brake Anchor Pins (Caution: Do not overlubricate.)	4 Zerks (2 ea. side)	L-5
15	Differential	Drain,Fill	G-1 (Below 0°F/-18°C) G-S (Above 0°F/-18°C)

SERVICE INTERVAL E — Every 1,500 hrs or 50,000 miles (80,000 km).

	Air Cylinders - various locations	Remove air lines and apply	0-1 (SAE 30)
29	A/C Compressor Air Cylinder	Apply	0-1 (SAE 30)
30	Blower Air Cylinder	Apply	0-1 (SAE 30)
31	Steering Column	2 Zerks	L-5
32	Baggage Door and Side Service Door Locks	Apply	0-2
33	Transmission Oil Filter	Replace Element	
34	Condenser Door and Check Strap	Apply	0-2
35	Fuel Tank Door	Apply	0-2
36	Battery Door and Catch	Apply	0-2
42	Transmission (standard)	Drain, Flush, Refill	0-1 (SAE 30 Below 10°F/-12°C) 0-1 (SAE 40 or 50 Above 10°F/-12°C)

SERVICE INTERVAL F — Every 2250 hrs or 75,000 miles (121,000 km).

3	Power Steering Reservoir Filter	Replace Element	0-1 (SAE 10-W-40)
37	Power Steering Line Filter	Replace Element	0-1 (SAE 10-W-40)
	Air Suspension Filter	Replace Element	

SERVICE INTERVAL G — Every 3,000 hrs or 100,000 miles (161,000 km); at each brake rebuild.

4	Wheel Bearings and Seals	Inspect, Apply	0-1 (SAE 30)

*** See Location Diagram, figure 10-3.**
**** See Lubricant Requirements Chart.**

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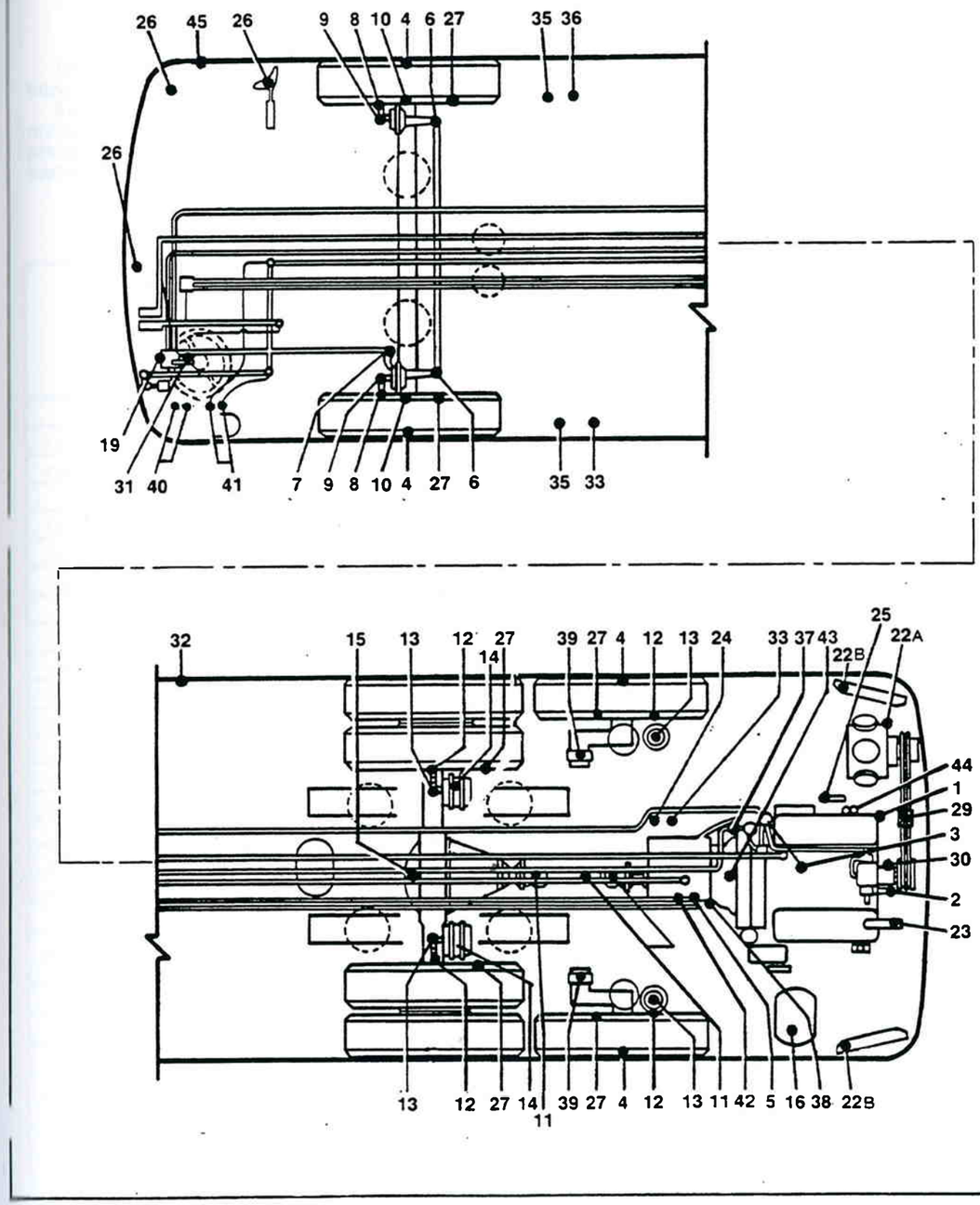

Figure 10-3. Lubrication Item Numbers and Locations.