Date 1-1-89

MC-9 MAINTENANCE MANUAL

SECTION 8

ENGINE

MC-9 MAINTENANCE MANUAL

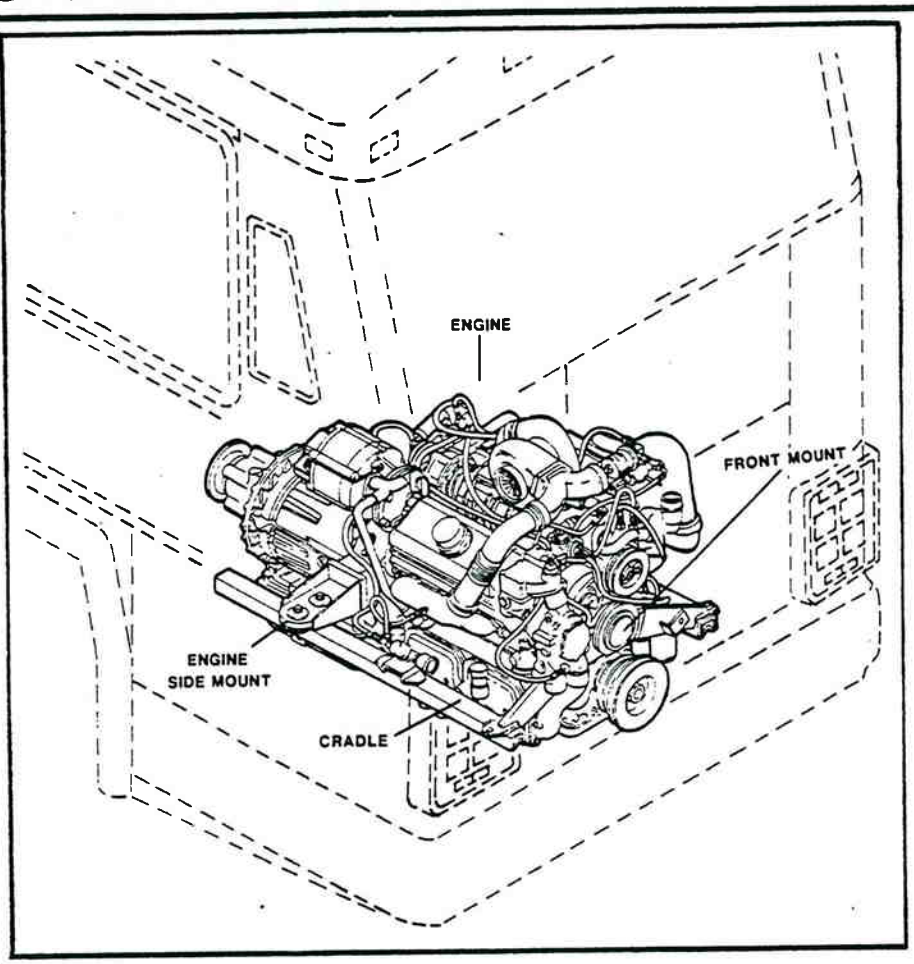

Figure 8-1. Engine Location.

ENGINE

Various Detroit Diesel Engines are used in MC-9 coaches. The 6V-92TA engine is the standard engine; 8V-71 and 8V-92TA engines are optional. Electronically controlled models of the 6V-92TA and the 8V-92TA engines are also used. The general specifications of the engines are shown in the following chart.

Engine Specifications

	6V-92TA	8V-92TA	8V-71
Type	2 Cycle	2 Cycle	2 Cycle
Number of Cylinders	6	8	8
Bore (inches)	4.84	4.84	4.25
Bore (mm)	123	123	108
Stroke (inches)	5	5	5
Stroke (mm)	127	127	127
Comp. Ratio (Nominal) (Turbo. Engines)	17 to 1	17 to 1	—
Comp. Ratio (Nominal) ("N" Engines)	—	—	18.7 to 1
Total Displacement - Cu. In.	552	736	568
Total Displacement - Liters	9.05	12.07	9.32
Number of Main Bearings	4	5	5
Rated Full Load Speed (RPM)	2100	2100	2050

Maintenance and repair information on the engine will be found in the engine manufacturer's service manuals. Engine controls, accessories and related components are covered in the applicable sections of this manual.

Refer to Section 6 (Cooling), 7 (Electrical), 9 (Fuel), and 10 (Lubrication).

To conform with engine manufacturer's practice, TMC/MCI Parts Book, Maintenance Manuals, Service Bulletins and other technical publications identify all engine parts as "L.H.", "R.H.", "Front" or "Rear" when viewing the engine from the flywheel end. This is opposite to the position of these parts with the engine installed in the coach, but the engine manufacturer's designations have been retained to eliminate potential misunderstanding in engine parts identification.

All other parts of the coach are designed "L.H.," "R.H.," "Front" or "Rear" in relation to the normal position of the driver facing forward.

REMOVAL AND REPLACEMENT

The engine unit, including transmission, clutch, air compressor and alternator, may be removed from the coach as a unit for repair to engine or related components. Refer to figure 8-1.

To facilitate removal and replacement of the engine unit and to provide a convenient means of supporting the engine and related components during service work, the use of a dolly is recommended. Such a dolly may be made locally. Refer to tool listings at the end of this section for drawing of dolly.

1. The coach should be driven into a twin-rail hoist and blocks placed between axle bumpers and bumper stops. Dis-

connect height control valve links and pull down to vent air from rear suspension bellows.

2. Drain the engine cooling system as directed in Section 6 of this manual, remove the cooling blower drive belt.

3. Open drain cock and vent air from the brake system. Disconnect the propeller shaft as outlined in Section 14 of this manual. Disconnect transmission and clutch operating linkage. Disconnect clutch cable. Disconnect throttle linkage.

4. Disconnect exhaust muffler slip joint. Disconnect air lines to air compressor governor and fast idle air cylinder.

5. Disconnect electrical connection to speedometer unit (if used), starting motor, starting motor solenoid, alternator, engine controls, tachometer (if used), oil pressure and engine temperature sending units. If the engine is an electronically controlled model (DDEC), disconnect the main DDEC harness from the electronic control module which is on top and to the front of the engine.

6. Disconnect and remove cooling system connections to radiators, surge tank and coach heating system. Disconnect fuel supply and return lines. Remove connections between air cleaner and engine air inlet horn.

7. Remove the air conditioning compressor drive belts. Raise the coach approximately 4-6" (101.6-152.4 mm) above the road height.

8. Remove the clamp bolts securing the engine sub-frame to the coach body. Position the dolly under the engine cradle. Lower the coach body only sufficiently to transfer the weight of the engine onto the dolly.

CAUTION: Due to the minimum clearance between the air compressor and the top of the engine compartment, extreme care should be used to lower the coach body only enough to free the engine cradle. Clearance between engine cradle and coach engine mounting rail should be ⅛-¼" (3.1-6.3 mm).

9. Remove engine assembly as a unit, carefully withdrawing it from the rear of the coach. To reinstall, the procedure is the reverse of the above.

10. Refill cooling system. If engine fuel system has been drained, it will aid restarting if fuel filters are filled with fuel oil. Remove vent plugs and pour fuel oil into filter body until filters are full.

11. Start engine and check operation. Check fuel and cooling system connections for leakage. Test operation of engine controls and accessories.

DIESEL ENGINE LUBRICATING OILS

The oil capacity of coaches equipped with a 6V-92 engine is 30 U.S. quarts (28.28 liters). Coaches equipped with an 8V-71 or 8V-92 engine have an oil capacity of 32 U.S. quarts (30.28 liters). Oil is added through the oil fill tube (figure 8-2).

All diesel engines require heavy-duty lubricating oils. Basic requirements of such oils are lubricating quality, high heat resistance and control of contaminants.

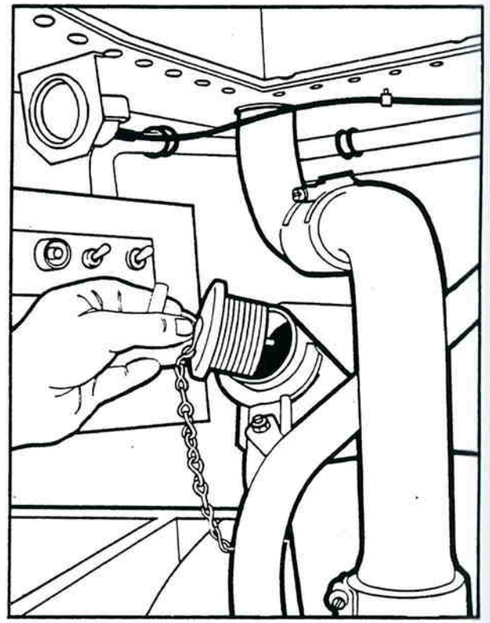

Figure 8-2. Oil Filler Tube.

The reduction of friction and wear by maintaining an oil film between moving parts is the primary requisite of a lubricant. Film thickness and its ability to prevent metal-to-metal contact of moving parts is related to oil viscosity. The optimums for 6V-92, 8V-92 and 8V-71 diesel engines are SAE 40 or 30 weight oil.

Temperature is the most important factor in determining the rate at which deterioration or oxidation of the lubricating oil will occur. The oil should have adequate thermal stability at elevated temperatures, thereby precluding formation of harmful carbonaceous and/or ash deposits.

The piston and compression rings must ride on a film of oil to minimize wear and prevent ring seizure. At normal rates of consumption, oil reaches a temperature zone at the upper part of the piston where rapid oxidation and carbonization can occur. In addition, as oil circulates through the engine, it is continuously contaminated by soot, acids, and water originating from combustion. Until they are exhausted, detergent and dispersant additives aid in keeping sludge and varnish from depositing on engine parts, but such additives in excessive quantities can result in detrimental ash deposits. If abnormal amounts of insolubles form, particularly on the piston in the compression ring area, early engine failure may result.

Oil that is carried up the cylinder liner wall is normally consumed during engine operation. The oil and additives leave carbonaceous and/or ash deposits when subject to the elevated temperatures of the combustion chamber. The amount of deposits is influenced by the oil composition, additive content, engine temperature and oil consumption rate.

LUBRICATING OIL SPECIFICATIONS

Oil quality is the responsibility of the oil supplier. (The term "oil supplier" is applicable to the refiners, blenders and rebranders of petroleum products, and does not include distributors of such products.)

There are many brands of commercial crankcase oil marketed today. Obviously, engine manufacturers or users cannot completely evaluate the numerous commercial oils. The selection of a suitable lubricant in consultation with a reliable oil supplier, observance of his oil drain recommendations (based on used oil sample analysis and experience) and proper filter maintenance, will provide the best assurance of satisfactory oil performance.

Lubricating Oil Recommendation.

API Letter Code Service Classification	Military Specification	SAE Grade
CB	MIL-L-2104A (Supplement 1)	40 or 30
CC	MIL-L-2104B	40 or 30
CD/SC	MIL-L-2104C	40 or 30
CD	MIL-L-45199B (Series 3)	40 or 30
CC/SE	MIL-L-46152	40 or 30
Numerous	Universal	40 or 30

SAE 40 grade oil is recommended in 8V-71 and Series 92 diesel engines. The expected ambient temperatures and engine cranking capability must be considered by the owner-operator when selecting the proper grade of oil. Only when the ambient temperatures and engine cranking capabilities result in difficult starting should SAE 30 grade oil be used.

The 8V-71 and Series 92 engines have given optimum performance and experienced the longest service life with the following oil performance levels having the following ash and zinc limits: The sulfated ash limited (ASTMD-874) shall not exceed 1.000% by weight, except lubricants that contain only barium detergent-dispersant salts where 1.500% by weight is allowed. The zinc content, as zinc diorganodithiophosphate, shall be a minimum of 0.07% by weight.

Lubricants meeting specification MIL-L-46167 are used in Alaska and other extreme sub-zero locations. Generally they may be described as 5W-20 multigrade lubricants made up of synthetic base stock and having low volatility characteristics. Although they have been used successfully in some severe cold regions, they are not considered as desirable as SAE 40, or SAE 30 oils with auxiliary heating aids. For this reason, they should be considered only where engine cranking is a severe problem and auxiliary heating aids are not available on the engine.

POLICY ON LUBRICANT ADDITIVES

TMC/MCI does not recommend or support the use of any supplementary lubricant additives. These include all products marketed as top oils, break-in oils, graphitizers and friction-reducing compounds.

NOTE: TMC/MCI warranty applicable to 8V-71 and Series 92 diesel engines provides in part that the provisions of such warranty shall not apply to any engine unit which has been subject to misuse, negligence or accident. Accordingly, malfunctions attributable to neglect or failure to follow the manufacturer's fuel or lubricating recommendations may not be within the coverage of the warranty.

SERVICE AND INSPECTION INTERVALS

Generally, operating conditions will vary for each engine application, even with comparable mileage or hours and, therefore, maintenance schedules can vary. A good rule of thumb for piston, ring and liner inspection, however, would be at 45,000 miles (54,000 km) or 1,500 hours for the first such inspection and at 30,000 miles (45,000 km) or 1,000 hour intervals thereafter.

A suggested preventive maintenance practice is a regularly scheduled testing of fuel and lubricating oils by either the oil supplier or an independent testing laboratory. Since the oil supplier knows the physical properties of his products and maintains laboratories to determine practical oil drain intervals, take advantage of this service and request him to check drained oil samples frequently and report the results to you.

ENGINE MOUNTS

The engine is mounted to the engine cradle by means of six rubber mounts, two on each side of the flywheel housing and two at the front of the engine (rear of the coach). See figures 8-3 and 8-4.

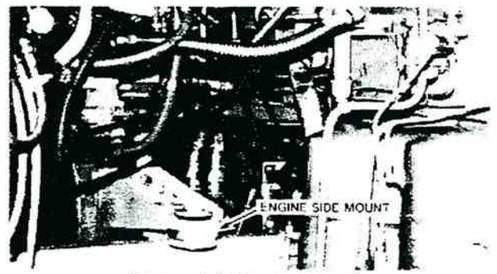

Figure 8-3. Engine Mount.

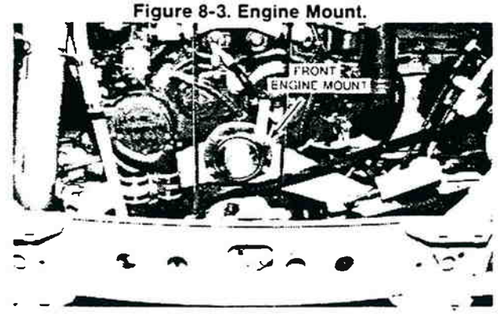

Figure 8-4. Front Engine Mount.