

12.1 SCHEDULED INTERVALS

When performed on a regular basis, changing the engine oil and filters is the least costly way of obtaining safe and reliable vehicle operation. Added benefits and savings occur when you check that the valves, fuel injectors, and oil and cooling circuits are in good working order during oil changes.

The maintenance section of this manual explains when you should change your oil and what to look for when checking for wear or damage.

All service intervals and maintenance operations are based on the parts and accessories expressly approved for your engine.

The scope and frequency of maintenance work are determined by the engine's operating conditions: severe duty, short haul, or long haul.

Evidence of regular maintenance is essential if a warranty claim has to be submitted.

If optional equipment is installed, be sure to comply with the maintenance requirements for these extra items.

NOTE:

If the engine is stored for more than 18 months, the oil must be changed before the engine can be brought into service.

12.1.1 Maintenance Schedule Types

There are three types of maintenance schedule. To determine which schedule to use, find the distance traveled by the vehicle in a year, regardless of vehicle type.

- Schedule I (Severe Service)** Severe Service applies to vehicles that annually travel up to 6000 miles (10,000 kilometers) or that operate under severe conditions. Examples of Severe Service usage include: operation on extremely poor roads or where there is heavy dust accumulation; constant exposure to extreme hot, cold, salt-air, or other extreme climates; frequent short-distance travel; construction-site operation; city operation (fire truck, garbage truck); or farm operation.
- Schedule II (Short Haul)** Short Haul applies to vehicles that annually travel up to 60,000 miles (100,000 kilometers) and operate under normal conditions. Examples of Short-Haul usage are: operation primarily in cities and densely populated areas; local transport with infrequent freeway travel; or high percentage of stop-and-go travel.
- Schedule III (Long Haul)** Long Haul (over-the-road transport) is for vehicles that annually travel more than 60,000 miles (100,000 kilometers), with minimal city or stop-and-go operation. Examples of Long-Haul usage are: regional delivery that is mostly freeway miles; interstate transport; or any road operation with high annual mileage.

12.1.1.1 Maintenance Schedule and Interval Operations

The three different schedules of vehicle usage (severe, short haul, and long haul) are listed in Table 12-1. For each schedule, the appropriate distance interval (in miles and kilometers) is given for performing and repeating each maintenance operation.

Maintenance Schedule	Maintenance Interval Operation	Maintenance Intervals		
		Frequency	Miles	Km
Schedule I (Severe Service) vehicles that annually travel up to 6000 miles (10 000 km)	Maintenance 1 (M1)	every	10,000	17,000
	Optional oil centrifuge (change rotor)	every	20,000	32,000
	Maintenance 2 (M2)	every	20,000	32,000
	Maintenance 3 (M3)	first	20,000	32,000
then every		40,000	68,000	
Schedule II (Short Haul) vehicles that annually travel up to 60,000 miles (100 000 km)	Maintenance 1 (M1)	every	15,000	25 000
	Optional oil centrifuge (change rotor)	every	20,000	32,000
	Maintenance 2 (M2)	every	30,000	50,000
	Maintenance 3 (M3)	first	30,000	50 000
		then every	60,000	100,000
Maintenance 4 (M4)	every	120,000	20,000	
Schedule III (Long Haul) vehicles that annually travel more than 60,000 miles (100 000 km)	Optional oil centrifuge (change rotor)	every	20,000	32,000
	Maintenance 1 (M1)	every	25,000	42,000
	Maintenance 2 (M2)	every	50,000	84,000
	Maintenance 3 (M3)	first	50,000	84,000
		then every	100,000	167,000
Maintenance 4 (M4)	every	200,000	334,000	

Table 12-1 Maintenance Schedule Table

The descriptions of all maintenance operations, indicating all maintenance operation sets at which each operation must be performed are listed in Table 12-2, listed in Table 12-3, listed in Table 12-4.

These three maintenance interval tables show which maintenance operation must be performed at the actual distances (in miles or kilometers) for each maintenance operation. The schedule of actual distances is based on the intervals given in the Maintenance Schedule Table.

Maint. No	Maintenance Interval	Miles	Km
1	M1	10,000	17,000
2	M1, M2 and M3	20,000	32,000
3	M1	30,000	50,000
4	M1 and M2	40,000	67,000
5	M1	50,000	84, 000
6	M1, M2 and M3	60,000	100, 000
7	M1	70,000	117,000
8	M1 and M2	80,000	134,000
9	M1	90,000	150,000
10	M1, M2 and M3	100,000	167,000
11	M1	110,000	184,000
12	M1 and M2	120,000	200,000
13	M1	130,000	217,000
14	M1, M2 and M3	140,000	234,000
15	M1	150,000	250,000
16	M1 and M2	160,000	267,000

Table 12-2 Maintenance Intervals for Schedule I, Severe Service

Maint. No.	Maintenance Interval	Miles	Km
1	M1	15,000	25 000
2	M1 and M3	30,000	50,000
3	M1	45,000	75,000
4	M1 and M2	60,000	100,000
5	M1	75,000	125,000
6	M1and M3	90,000	150,000
7	M1	105,000	120,000
8	M1, M2 and M4	120,000	200,000
9	M1	135,000	225,000
10	M1, M2 and M3	150,000	250,000
11	M1	165,000	275,000
12	M1 and M2	180,000	300,000
13	M1	195,000	325,000
14	M1, M2 and M3	210,000	350,000
15	M1	225,000	375,000
16	M1, M2 and M4	240,000	400,000

Table 12-3 Maintenance Intervals for Schedule II, Short Haul

Maint. No	Maintenance Interval	Miles	Km
1	M1	25,000	42,000
2	M1, M2 and M3	50,000	84,000
3	M1	75,000	125,000
4	M1 and M2	100,000	167,000
5	M1	125,000	209,000
6	M1, M2 and M3	150,000	250 000
7	M1	175,000	292,000
8	M1, M2, and M4	200,000	334,000
9	M1	225,000	375,000
10	M1, M2 and M3	250,000	417,000
11	M1	275,000	459,000
12	M1 and M2	300,000	500,000
13	M1	325,000	542,000
14	M1, M2 and M3	350,000	584,000
15	M1	375,000	625,000
16	M1, M2, and M4	400,000	667,000

Table 12-4 Maintenance Intervals for Schedule III, Long Haul

12.1.1.2 Maintenance Operation Sets

Each Maintenance Operations Sets Table (M1 through M3) lists the descriptions of only those maintenance operations that must be performed at that maintenance operation set. Each maintenance operation set is listed in a separate Maintenance Operations Table.

The descriptions of all maintenance operations, and the maintenance operation sets at which each operation must be performed are listed in Table 12-5 and listed in Table 12-6.

Operation Description	M1	M2	M3
Engine Inspecting	✓	✓	✓
Valve Lash Checking and Adjusting			✓
Fuel /Water Separator Pre-Filter Element Cleaning	✓	✓	✓
Main Fuel Filter Element Changing		✓	✓
Engine Oil and Filter Changing	✓	✓	✓
Coolant Concentration and Inhibitor Level Checking	✓	✓	✓
Coolant Flushing and Changing*		✓	✓
Cooling System Inspecting	✓	✓	✓

* Coolant flushing and changing must be done at least every two years.

Table 12-5 Required Maintenance Operations Sets, Schedule I

Maintenance Operation Description	M1	M2	M3	M4
Engine Inspecting		✓	✓	✓
Valve Lash Checking and Adjusting†				✓
Fuel /Water Separator Pre-Filter Element Cleaning		✓	✓	✓
Main Fuel Filter Element Changing		✓	✓	✓
Engine Oil and Filter Changing	✓	✓	✓	✓
Coolant Concentration and Inhibitor Level Checking	✓	✓	✓	✓
Coolant Flushing and Changing*				✓
Cooling System Inspecting		✓	✓	✓

* Coolant flushing and changing must be done at least every two years.

† For Schedule II and III, the valve lash checking and adjusting must be done first at 60,000 and then every M4.

Table 12-6 Required Maintenance Operations Sets, Schedule II and III

12.1.2 Fuel/Water Separator Pre-Filter Element Cleaning

Clean the pre-filter element as follows: