
11 OPERATION AND VERIFICATION

Section	Page
11.1 PREPARATION FOR A FIRST TIME START	11-3
11.2 STARTING THE ENGINE	11-9
11.3 RUNNING THE ENGINE	11-12
11.4 STOPPING THE ENGINE	11-14

11.1 PREPARATION FOR A FIRST TIME START

NOTE:

Before starting the engine, do all the recommended pretrip inspections and daily maintenance. Check the engine oil and fuel levels, and drain contaminants from the fuel/water separator (optional).

NOTE:

If you drain the fuel/water separator completely, you may have to prime the fuel system.

Read the appropriate chapters in the driver's manual for detailed information on instruments, gauges, and controls. Be sure you are familiar with all of the instruments, gauges and controls which are needed to operate the engine.

Note especially the location and function of the following:

- Oil pressure gauge
- Low oil pressure warning light
- Coolant temperature gauge
- High coolant temperature warning light
- Water in fuel warning light
- Tachometer
- Air restriction indicator

When you start the engine, and while you are driving, watch for any signs of engine problems. If the engine overheats, uses excessive fuel or lubricating oil, vibrates, misfires, makes unusual noises, or shows an unusual loss of power, turn the engine off as soon as possible and determine the cause of the problem. Frequently, engine damage may be avoided by a quick response to early indications of problems.

11.1.1 Checking the Batteries

Use only batteries that have been correctly filled and serviced. To provide corrosion protection, apply pumpable dielectric grease, part number 48-02349-000, liberally to the terminal pads. Approved suppliers are listed in Table 11-1.

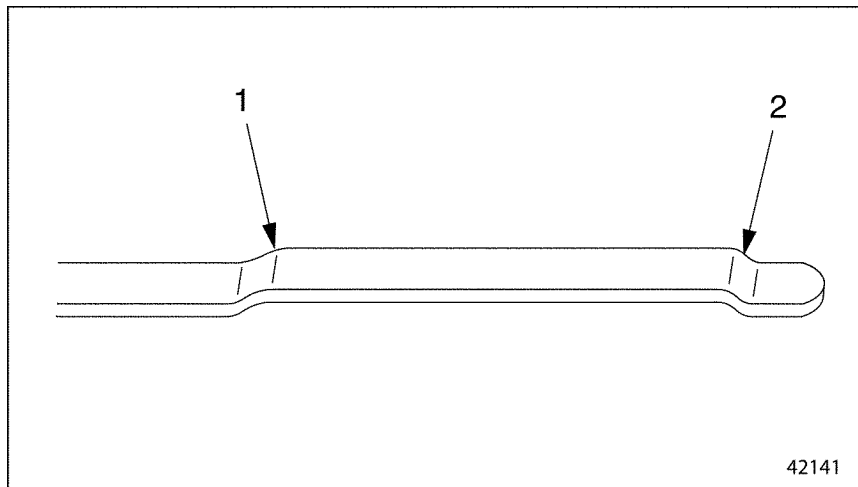
Manufacturer	Lubricant or Part Number
Shell Oil Co.	No. 71032; No. 71306
Texaco, Inc.	No. 955
Quaker State	No. NYK-77

Table 11-1 Approved Electrical Lubricants

11.1.2 Checking the Oil Level

Check the oil level as follows:

1. Check the oil level using the oil dipstick. See Figure 11-1.

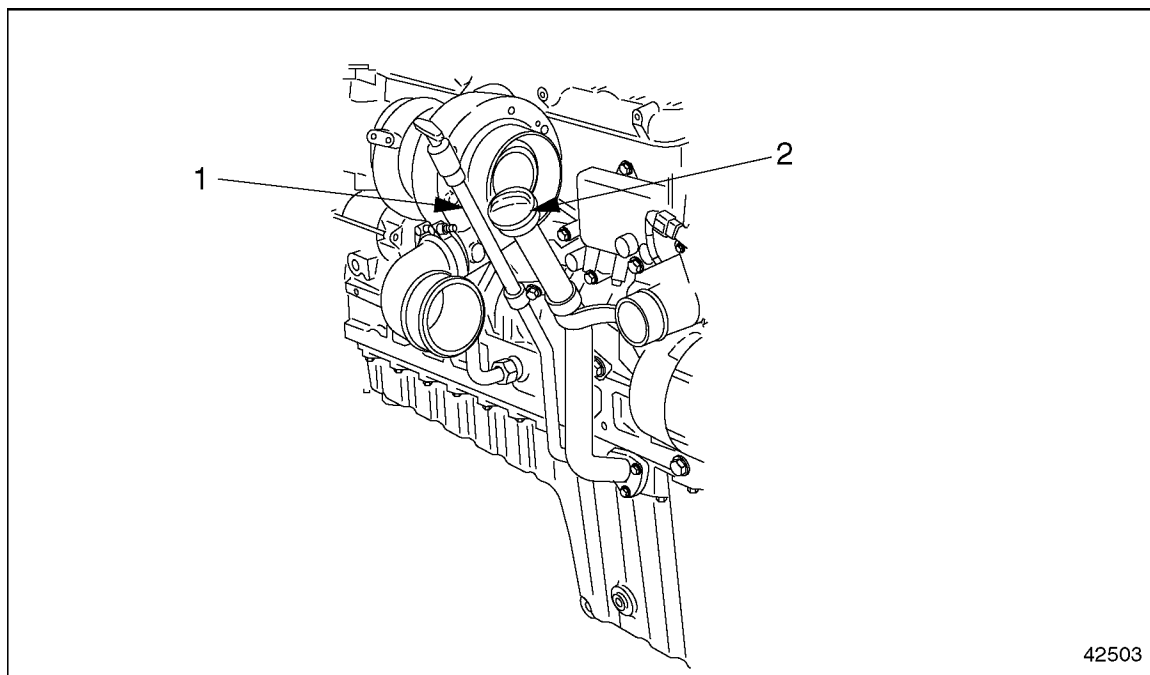


1. Maximum Fill Level

2. Minimum Fill Level

Figure 11-1 Oil Dipstick

2. If necessary, top off by filling engine oil through the oil fill cap until the maximum fill level on the oil dipstick has been reached. See Figure 11-2.



1. Oil Dipstick

2. Oil Fill Cap

Figure 11-2 Oil Fill Cap

11.1.3 Checking the Coolant Level (Cold Check)

Check coolant level as follows:

1. Ensure that all coolant plugs in the bottom of the radiator and on the radiator outlet pipe are secure and tight.
2. Check the coolant level. The cooling system is correctly filled when the coolant is between the maximum and minimum marks on the surge tank.

11.1.4 Adding Fuel

When adding fuel, pay attention to the following:

- Add winter or summer grade fuel according to the season of the year.
- Work in the cleanest conditions possible.
- Prevent water from entering the fuel tank.

11.1.5 Priming the Fuel System

Prime the fuel system as follows:

1. If equipped with a hand pump on the fuel/water separator, work the hand pump until resistance is felt.
2. Crank the engine for 30 seconds at a time, but *no longer*. Before cranking the engine again, wait at least two minutes. The engine should start within two 30-second attempts. If the engine does not start after the two attempts repeat step 2 and step 3.
3. If the engine does not start after three complete attempts go to step 5.
4. Use the diesel fuel system primer (J-47912) to prime the fuel system. See Figure 11-3.

NOTE:

DDC does not recommend opening the high-pressure lines and bleeding the air from the fuel system while cranking.

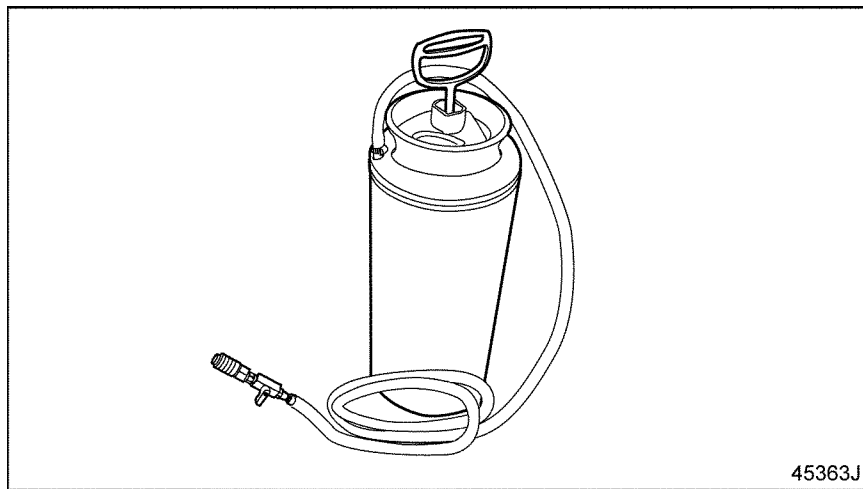
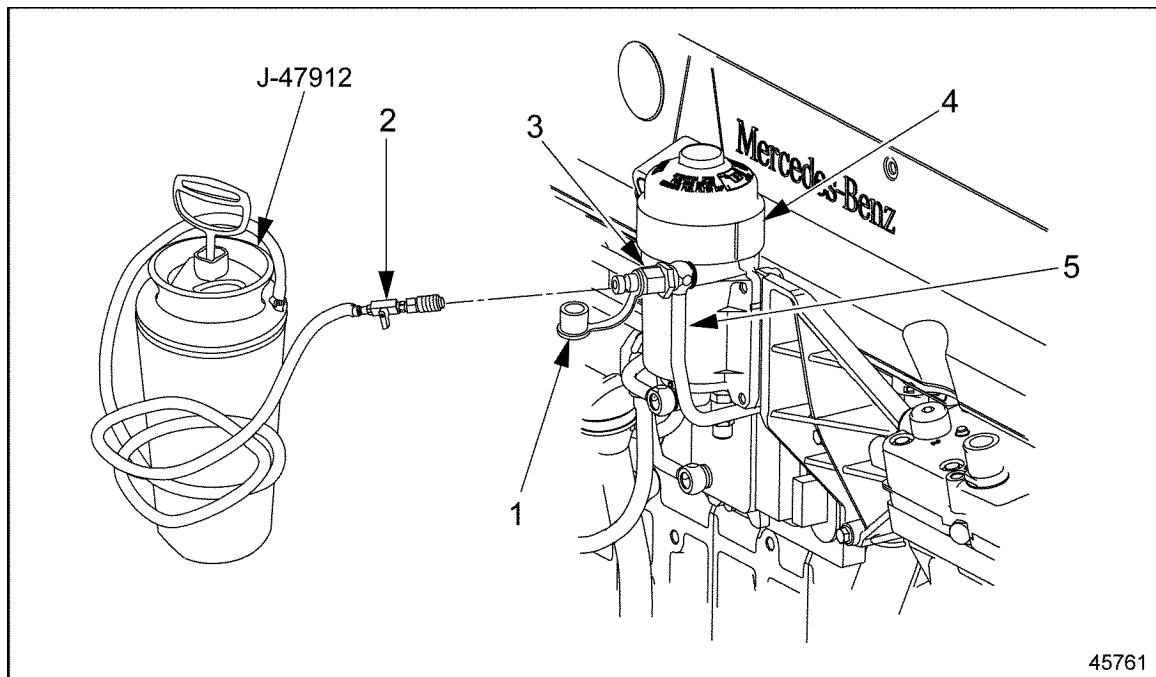


Figure 11-3 Diesel Fuel System Primer Tool J-47912

5. Fill the fuel system primer three-fourths full with fuel oil.

6. Remove the dust cover from the priming valve and connect the line from the primer tank to the priming valve on the secondary fuel filter. Close the valve on the priming line. See Figure 11-4.



- | | |
|-------------------------|--------------------------|
| 1. Dust Cap | 4. Secondary Fuel Filter |
| 2. Valve | 5. Fuel Delivery Line |
| 3. Priming Nipple Valve | |

Figure 11-4 Priming the Fuel Filter

7. Pump the primer tank numerous times to build up pressure.
8. Open the valve on the priming line and wait 60 seconds for system to fill.
9. Crank the engine for 30 seconds at a time, but *no longer*. Before cranking the engine again, wait at least two minutes. The engine should start within four 30-second attempts.

 **WARNING:**

PERSONAL INJURY

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

- Always start and operate an engine in a well ventilated area.**
- If operating an engine in an enclosed area, vent the exhaust to the outside.**
- Do not modify or tamper with the exhaust system or emission control system.**

10. Once the engine starts and runs smoothly, close the valve and disconnect the priming line from the priming nipple valve on the secondary fuel filter. Install the dust cap on the priming nipple valve.
11. Slowly release the pressure on the diesel fuel system primer (J-47912) by slightly turning the pumping handle counter-clockwise.
12. With the engine running, check the fuel filter for leaks. Repair any leaks found.
13. Shut down the engine.

11.2 STARTING THE ENGINE

Before operating the engine, do the work described under "Preparation for a First Time Start." Start the engine as follows:

NOTICE:

Never attempt to start any Mercedes-Benz electronic engine using ether or any other starting fluid. Serious engine damage could result.

NOTE:

As a safety function, the electronic engine control system allows the engine to start only if the transmission is in neutral.

 **WARNING:**

PERSONAL INJURY

To avoid injury when working near or on an operating engine, remove loose items of clothing and jewelry. Tie back or contain long hair that could be caught in any moving part causing injury.

1. Turn on the ignition switch.
2. With the accelerator pedal in the idle position, start the engine.
3. Check the engine for leaks.
 - [a] Check all hoses, hose clamps, and pipe unions on the engine for tightness. Shut down the engine and tighten them if necessary.
 - [b] Check the oil feed and return lines at the turbocharger for tightness. Shut down the engine and tighten them if necessary.
4. Shut down the engine.
5. Approximately five minutes after shutdown, check the engine oil level. If necessary, add oil up to the maximum fill level on the oil dipstick.
6. Check all the mounting fasteners on the engine for tightness.

11.2.1 Checking the Coolant Level (Hot Check)

Check the coolant levels as follows:

1. Allow the engine to run for approximately five minutes at a moderate speed.

 **WARNING:**

HOT COOLANT

To avoid scalding from the expulsion of hot coolant, never remove the cooling system pressure cap while the engine is at operating temperature. Wear adequate protective clothing (face shield, rubber gloves, apron, and boots). Remove the cap slowly to relieve pressure.

2. Then, with the coolant temperature above 50°C (122°F), recheck the coolant level.
3. Add more coolant if necessary. Open the heater valves before adding coolant.
4. Do not close the heater valves until the engine has been run briefly and the coolant level again checked and corrected as necessary.

11.2.2 Starting an Engine That Has Not Been Run for a Long Time

Before starting an engine which has not been run for a long time, certain special work must be carried out.

NOTE:

At outside temperatures below -20°C (-4°F), a coolant preheater is recommended.

 **WARNING:**

PERSONAL INJURY

To avoid injury before starting and running the engine, ensure the vehicle is parked on a level surface, parking brake is set, and the wheels are blocked.

1. Chock the tires, place the transmission in neutral, and set the parking brake.
2. Turn on the ignition switch and start the engine

 **WARNING:****PERSONAL INJURY**

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

- Always start and operate an engine in a well ventilated area.
- If operating an engine in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system or emission control system.

3. If the engine doesn't start after 20 seconds, stop. Try again after waiting about one minute.

NOTICE:

Do not rev the engine if the oil pressure gauge indicates no oil pressure. To avoid engine damage, shut down the engine if no oil pressure appears within approximately ten seconds. Check to determine the cause of the problem.

4. Monitor the oil pressure gauge immediately after starting the engine.

NOTE:

Do not place the engine under full load until it reaches operating temperature.

11.3 RUNNING THE ENGINE


The following sections cover normal operations:

11.3.1 Battery Charge

The battery charge indicator light must go out once the engine starts.

If the indicator light comes on while the engine is running, do the following:

1. Shut down the engine.
2. Check the poly-V belt for tightness.

 WARNING:
FIRE
To avoid injury from fire, keep all potential ignition sources away from diesel fuel, including open flames, sparks, and electrical resistance heating elements. Do not smoke when refueling.

3. Do a load test on the batteries. Charge or replace the batteries as needed.
4. If necessary, visit the nearest authorized dealer to have the alternator voltage and output checked.

11.3.2 Oil Pressure

When the engine has reached its normal operating temperature, the engine oil pressure must not drop below the following values:

- 250 kPa (36 psi) at rated speed
- 50 kPa (7 psi) at idling speed

If oil pressure drops below these values, stop the engine and determine the cause.

11.3.3 Excessive Idling

Never allow the engine to idle for more than 30 minutes. Excessive idling can cause oil to leak from the turbocharger.

11.3.4 Changing the Idle Speed

The rpm range of the MBE 4000 engine is 600 to 850 rpm if the parameters in the VCU are set to the default range.

Change the idling speed as follows:

1. Turn the cruise control switch to the OFF position.
2. To increase the idle speed, push the "Resume" switch until the idle is fast enough.
3. To decrease the idle speed, push the "Decel" switch until the idle is slow enough.

11.3.5 Emergency Running Mode

The engine is equipped with the electronic engine control system, which monitors the engine as it is running.

As soon as a fault is detected, it is evaluated and one of the following measures is initiated.

NOTICE:

To prevent possible serious engine damage, have any faults corrected without delay by an authorized dealer.

- In conjunction with the instrumentation control unit (ICU), the code for the electronic control unit reporting the fault can be read immediately on the display.
- Complete fault codes are transmitted and can be read using minidiag2 at any authorized dealer.
- If the fault is serious enough to impair normal operation, the electronic engine system switches over to emergency running mode. When in emergency running mode, the engine operates at a constant 1300 rpm. This allows you to move the vehicle to a service location.

11.4 STOPPING THE ENGINE

If the engine has been running at full output or the coolant temperature has been high, allow the engine to idle for one to two minutes without load.

Then turn off the ignition keyswitch.

If any the following occur, shut down the engine immediately.

- The oil pressure swings back and forth or falls sharply.
- Engine power and rpm fall, even though the accelerator pedal remains steady.
- The exhaust pipe gives off heavy smoke.
- The coolant and/or oil temperature climb abnormally.
- Abnormal sounds suddenly occur in the engine or turbocharger.

11.4.1 Shutting Down After Hard Operation

After hard operation, do the following:

NOTICE:
After hard operation, allow the engine to idle for one to two minutes without load. Shutting down the engine without idling may cause damage to the turbocharger.

1. If the engine has been running at full output or the coolant temperature has been high, allow the engine to idle for one to two minutes without load.
2. Turn off the ignition switch and shut down the engine.