Symptom Charts

Chart 1

- Starting Concerns: No Crank/Slow Crank

Note: Perform the following preliminary checks:

- Automatic transmission in PARK or NEUTRAL.
- Clutch fully depressed.
- Battery connections.
- Starter relay connections.
- Battery load test.
- Fuse links.
- Ignition switch.

SYSTEM/COMPONENT	REFERENCE (Section 5 Pinpoint Test unless noted)
Check Starter Relay	REFER to the Workshop Manual, Section 303-06.
Check Electrical Accessories	REFER to the Workshop Manual, Section 414-00.
Check Starting System Secondary Circuits	REFER to the Workshop Manual, Section 303-06.
Check Starting System Components	REFER to the Workshop Manual, Section 303-06 and 303-14.

Chart 2

- Stalls/Quits: Idle, Acceleration, Cruise, Deceleration

Note: Perform the following preliminary checks:

- Engine oil level/quality.
- Electrical connections.
- Automatic transmission TCC.
- ATF level.
- Engine overheating.

SYSTEM/COMPONENT	REFERENCE (Section 5 Pinpoint Test unless noted)
Check For Cold Weather Stall	If engine restarts after stall, oil return to oil pan may be too slow. CONFIRM correct grade of oil for frigid conditions. CHANGE oil, if necessary.
Check Performance Diagnostics	GO to Section 4A or Section 4B , Diagnostic Subroutines. PERFORM Performance Diagnostic Procedures.

Chart 3

- Starting Concerns: Hard Start/Long Crank/Erratic Start/Erratic Crank, Stall After Start, No Start/Normal Crank
- Stalls/Quits: Idle

Note: Perform the following preliminary checks:

- Check engine oil level.
- Confirm correct dipstick part number.
- Check for sufficient clean fuel.
- Check for an intake restriction.

SYSTEM/COMPONENT	REFERENCE (Section 5 Pinpoint Test unless noted)
Check High-Pressure Oil Pump Reservoir Level	Make sure oil level is within 25.4 mm (1 inch) of inspection plug.
Attempt To Start Engine	REFILL high-pressure oil pump reservoir. ATTEMPT to start engine. If engine starts and then stalls after about 15 seconds, the lubrication system is not supplying enough oil to the high-pressure oil pump. GO to Chart 14. If not, PERFORM KOEO Self Test.
Perform KOEO On-Demand Self Test	GO to the appropriate pinpoint test if fault is indicated.
Check Fuel Pump Pressure	GO to Section 4A or Section 4B , Diagnostic Subroutines, Hard Start, No Start Procedures. PERFORM Fuel Pump Pressure Test.
Perform KOEO Injector Electrical Self Test	• If the test does not run, GO to the next step. • If the test runs, GO to Check Parameter Identification (PIDs).
Repeat KOEO Injector Electrical Self Test.	REPEAT KOEO Injector Self Test. DISCONNECT and RECONNECT injector wiring at valve cover gaskets, one at a time. If the KOEO Injector Electrical Self Test runs, REMOVE valve cover and INSPECT the disconnected valve cover wiring harness for a pinched or grounded injector wire. If not, GO to Pinpoint Test NC and CHECK IDM power and ground. GO to NA29 to locate short to ground at IDM or in injector circuits.
Check Parameter Identification (PIDs)	GO to Section 4A or Section 4B , Diagnostic Subroutines, Hard Start/No Start Diagnostics. PERFORM Steps 9A, 9B, 9C or 9D. If a fault is indicated, GO to the appropriate pinpoint test.
Check Glow Plug Relay Circuit	**CAUTION:Confirm resistance to ground is above 10,000 ohms before attaching to starter relay.** CHECK voltage between glow plug relay circuit 38 (BK/OG) and chassis ground. If battery voltage is not present, INSTALL a new relay feeder wire fusible link 299 (DB).
Check Glow Plug Relay	GO to Pinpoint Test KC .
Check Glow Plugs	GO to Pinpoint Test KC .
Check Glow Plug Connectors	GO to Pinpoint Test KC .

Chart 4

- Additional Driveability Concern: Engine Will Only Idle

Note: Perform the following preliminary checks:

- IVS, AP and ETC sensor connector attachment.
- Interference from floor mats.
- Accelerator pedal damage.

SYSTEM/COMPONENT	REFERENCE (Section 5 Pinpoint Test unless noted)
Check Pedal Sensors	GO to the appropriate pinpoint test and CONFIRM that sensors and wiring are working.

Chart 5

- Unique Idle Concern: Slow Return to Idle
- Unique Idle Concern: Fast Idle

Note: Perform the following preliminary checks:

- PCM system check.
- Accelerator pedal for binding, broken return spring, stuck condition (floor mats).
- External fuel source.
- Engine not reaching normal operating temperature.
- PTO and charge protect devices disengaged.

SYSTEM/COMPONENT	REFERENCE (Section 5 Pinpoint Test unless noted)
Perform Quick Test Operation	GO to Section 2 , Diagnostic Methods. PERFORM Quick Test Operation. If a fault is indicated, GO to the appropriate pinpoint test.
Check Accelerator Pedal	REPAIR if needed.
Check Crankcase	If overfilled, DRAIN crankcase to correct level. DETERMINE cause of overfill.
Check Engine Oil	If there is coolant in engine oil, REPAIR as required.
Check For Fuel Contamination	GO to Section 4A or Section 4B , Diagnostic Subroutines. PERFORM Performance Diagnostic Procedures.
Check Parameter Identification (PIDS)	GO to Section 2 , Diagnostic Methods, Parameter Identification (PID). SELECT Parameter Identification (PID). WARM engine to normal operating temperature. SELECT PID EOT. If EOT value is below 38°C (100°F), INSTALL a new EOT sensor according to Workshop Manual, Section 303-14.
Check Turbocharger	REMOVE turbocharger inlet air duct. INSPECT turbocharger compressor wheel for damage to blade and for signs that the blade has been rubbing against the housing. If turbocharger is OK, RETURN to Symptom Chart index. If not, INSTALL a new turbocharger.

Chart 6

- Unique Idle Concerns: Rolling Idle, Stalls When Engaging Clutch
- Runs Rough: Idle

Note: Perform the following preliminary checks:

- Check engine oil level.

- Confirm oil change within 8,046.5 km (5,000 miles).
- Check air intake system: Air Filter Minder
- Confirm acceptable SAE oil viscosity and API rating of oil.
- Check fuel quality. Refer to Section 4A or Section 4B .
- Confirm correct dipstick part number.

SYSTEM/COMPONENT	REFERENCE (Section 5 Pinpoint Test unless noted)
Perform KOEO On-Demand Self Test	GO to the appropriate pinpoint test if fault is indicated.
Perform KOEO Injector Electrical Self Test	GO to the appropriate pinpoint test if fault is indicated.
Check For Aerated Oil	GO to Section 4A or Section 4B , Diagnostic Subroutines, Performance Diagnostic Procedures. PERFORM Injection Control Pressure Test.
Check Source Of Aerated Oil	OVERFILL the engine with 1.9 L (2 quarts) of the specified oil. RAISE the rear of the vehicle approximately 25 cm (10 inches). RUN engine at WOT for 180 seconds. If ICP is greater than 12.4 mPa (1,800 psi) or 2.30 V oil is aerating due to lack of defoaming agents, CHANGE engine oil and RETEST. If it is less, REPAIR O-ring or pickup tube leak. REFER to the Workshop Manual, Section 303-01.
Injection Control Pressure Test	GO to Section 4A or Section 4B , Diagnostic Subroutines, Performance Diagnostic Procedures. PERFORM Injection Control Pressure Test.
Low Idle Stability Test	GO to Section 4A or Section 4B , Diagnostic Subroutines, Performance Diagnostic Procedures. PERFORM Low Idle Stability Test.
Check For Biased ICP Sensor	GO to Pinpoint Test DC .
Check Fuel Pump Pressure	GO to Section 4A or Section 4B , Diagnostic Subroutines, Performance Diagnostic Procedures. PERFORM Fuel Pump Pressure Test.
Check Lubrication Pressure	REFER to the Workshop Manual, Section 303-00.
KOER On-Demand Self Test	GO to Section 4A or Section 4B , Diagnostic Subroutines, Performance Diagnostic Procedures. PERFORM KOER On-Demand Self Test. If DTC 1211 is present, GO to Section 4A or Section 4B . MONITOR ICP while cranking (9C). If no DTCs are present, GO to Section 4A or Section 4B , KOER Cylinder Contribution Test.
Check Pressure Balance	PLUG high-pressure hose for right cylinder head using Adapter for 303-S626. RECORD IPR at specified rpm (F650/750 2,500 rpm, all others 3,000 rpm). PLUG high-pressure hose for left cylinder head using Adapter for 303-S626 and REATTACH high-pressure hose on right cylinder head. RECORD IPR at specified rpm. If IPR duty cycle difference is greater than 2%, GO to Check For Leak Source. If it is not, INSTALL a new IPR.
Check For Leak Source	REMOVE valve cover on cylinder head with higher IPR reading. With engine idling, LOOK for bubbling around injector bores or oil gallery drain plugs. Or, with engine off, ATTACH approximately 689 kPa (100 psi) air pressure to high-pressure oil gallery. REMOVE injector spill spouts for visibility. LOOK/LISTEN for leaks. If a leak is present, INSTALL new seals on injectors or RESEAL oil galleries as required. If not, GO to Section 4A or Section 4B , Diagnostic Subroutines, Performance Diagnostic Procedures. PERFORM KOER Cylinder Contribution Test.
Check Rough Idle	If rough idle was present when vehicle was new or after installing a new high-pressure pump, CHECK high-pressure oil pump. If not, PERFORM KOER Cylinder Contribution Test.
Check High-Pressure Oil Pump	ATTACH right hose to left head and plug left hose. CHECK IPR at idle. COMPARE this reading to the reading for left head in Step AF12. If difference in readings is greater than 0.2 V or 2%, imbalance is caused by high-pressure oil pump. CONFIRM high-pressure hoses are clear and INSTALL a new high-pressure oil pump. If not, GO to Section 4A or Section 4B , Diagnostic Subroutines, Performance Diagnostic Procedures. PERFORM KOER Cylinder Contribution Test.
Check For Engine Wear	GO to Section 4A or Section 4B , Diagnostic Subroutines, Performance Diagnostic

	Procedures. PERFORM Crankcase Pressure Test. If crankcase pressure is higher than 5.6 mm Hg (3 in H_2 O), REPAIR engine as required. If not, TEST the fuel injectors. REFER to the Injector Performance Test.
Check For Incorrect Injector Application	REMOVE engine valve covers. CHECK part number stamped on top of each injector. If the correct injectors are installed, TEST the fuel injectors. REFER to the Injector Performance Test. If the injectors are not correct, INSTALL new injectors.

Chart 7

- Lack/Loss Of Power
- Runs Rough
- Misses
- Buck/Jerk
- Hesitation/Stumble
- Surge
- Additional Driveability Concerns: Poor Fuel Economy

Note: Perform the following preliminary checks:

- Confirm brakes are not dragging.
- Confirm transmission and axle fluid levels.
- Confirm transmission and axle tube are not "cooked".
- Check for oil in coolant.
- Check engine oil level.
- Confirm oil change within 8,046.5 km (5,000 miles).
- Check air intake system: Air Filter Minder.
- Check MAP sensor hose for holes, blockage, or disconnection.
- Check intake manifold system for leaks.
- Confirm acceptable SAE oil viscosity and API rating of oil.
- Check for sufficient clean fuel.
- Check for intake restriction.
- Compare loaded weight of vehicle with performance expectations.

SYSTEM/COMPONENT	REFERENCE (Section 5 Pinpoint Test unless noted)
Boost Pressure Test	GO to Pinpoint Test KH .
Perform KOEO On-Demand Self Test	GO to the appropriate pinpoint test if fault is indicated.
Perform KOEO Injector Electrical Self Test	GO to the appropriate pinpoint test if fault is indicated.
Retrieve/Clear Continuous DTCs	GO to Section 4A or Section 4B , Diagnostic Subroutines, Performance Diagnostic Procedures. RETRIEVE/CLEAR Continuous DTCs. RECORD any codes retrieved. CLEAR Continuous DTCs. RUN vehicle. If CMP fault codes are retrieved, GO to next step. If CMP codes are not present, GO to Check Continuous Fault Codes.
Check Cold CMP Clearance (CMP Code Present)	REFER to the Workshop Manual, Section 303-01. If OK, TEST the CMP sensor. REFER to the Camshaft Position (CMP) Sensor Test.
Check CMP Clearance To Timing Disk	REFER to the Workshop Manual, Section 303-01. If OK, TEST the CMP sensor. REFER to the Camshaft Position (CMP) Sensor Test.
Check Continuous Fault	GO to the appropriate pinpoint test if fault is indicated.

Codes	
Check For Biased ICP Sensor	GO to Pinpoint Test DC .
Check Fuel Pump Pressure	GO to Section 4A or Section 4B , Diagnostic Subroutines, Performance Diagnostic Procedures. PERFORM Fuel Pump Pressure Test.
Check Fuel Regulator	INSTALL a new regulator valve if there is evidence of sticking or foreign material.
Check Pump Inlet Restriction	GO to Section 4A or Section 4B , Diagnostic Subroutines, Performance Diagnostic Procedures. PERFORM Inlet Restriction Test.
Check For Aerated Oil	GO to Section 4A or Section 4B , Diagnostic Subroutines, Performance Diagnostic Procedures. PERFORM Injection Control Pressure Test.
Check Source Of Aerated Oil	OVERFILL the engine with 1.9 L (2 quarts) of the specified oil. RAISE the rear of the vehicle approximately 25 cm (10 inches). RUN engine at WOT for 180 seconds. If ICP is greater than 12.4 mPa (1,800 psi) or 1.75 V oil is aerating due to lack of defoaming agents, CHANGE engine oil and RETEST. If it is less, REPAIR O-ring or pickup tube leak. REFER to the Workshop Manual, Section 303-01.
Injection Control Pressure Test	GO to Section 4A or Section 4B , Diagnostic Subroutines, Performance Diagnostic Procedures. PERFORM Injection Control Pressure Test.
Check For Low IDM Power	GO to NA29 .
Check Lubrication Pressure	REFER to the Workshop Manual, Section 303-00.
KOER On-Demand Self Test	GO to Section 4A or Section 4B , Diagnostic Subroutines, Performance Diagnostic Procedures. PERFORM KOER On-Demand Self Test. If DTC 1211 is present, GO to Section 4A or Section 4B . MONITOR ICP while cranking (9C). If DTC 0476 is present, GO to Pinpoint Test DE . If no DTCs are present, GO to Section 4A or Section 4B , Crankcase Pressure Test.
Check Balance Pressure	PLUG high-pressure hose for right cylinder head using Adapter for 303-S626. RECORD IPR at specified rpm (F650/750 2,500 rpm, all others 3,000 rpm). PLUG high-pressure hose for left cylinder head using Adapter for 303-S626 and REATTACH high-pressure hose on right cylinder head. RECORD IPR at specified rpm. If IPR duty cycle difference is greater than 2%, GO to Check For Leak Source. If it is not, refer to the Injection Pressure Regulator (IPR) Valve Test.
Check For Leak Source	REMOVE valve cover on cylinder head with higher IPR reading. With engine idling, LOOK for bubbling around injector bores or oil gallery drain plugs. Or, with engine off, ATTACH approximately 689 kPa (100 psi) air pressure to high-pressure oil gallery. REMOVE injector spill spouts for visibility. LOOK/LISTEN for leaks. If a leak is present, INSTALL new seals on injectors or RESEAL oil galleries as required. If not, GO to Section 4A or Section 4B , Diagnostic Subroutines, Performance Diagnostic Procedures. PERFORM KOER Cylinder Contribution Test.
Check For Biased EBP Sensor	GO to Pinpoint Test DE .
Check For Exhaust Restriction (KOER, DTC 0476)	GO to Pinpoint Test KB .
Exhaust Back Pressure Operation Test	GO to Pinpoint Test KB .
Check EPR Electrical System	GO to Pinpoint Test KB .
Check For Engine Wear	GO to Section 4A or Section 4B , Diagnostic Subroutines, Performance Diagnostic Procedures. PERFORM Crankcase Pressure Test.
Check For Piston Or Valve Leaks	REFER to the Workshop Manual, Section 303-00.
Check For Exhaust Restriction (N) DTC)	Note: F650/750 vehicles are not equipped with an EBP sensor. Procedure for measuring exhaust back pressure (EBP) can be found in Section 4B . MEASURE exhaust back pressure (EBP). If EBP is greater than 234 kPa (34 psi) or 2 V, LOCATE and REPAIR restriction in exhaust system. VERIFY repair.

Check Fuel Injector Oil Discharge	REMOVE valve covers. OBSERVE oil flow out of fuel injector spill spouts with engine at idle. If there is high oil flow, TEST the fuel injectors. REFER to the Injector Performance Test.
Atmospheric Pressure Rationality Check	GO to Section 2 , Diagnostic Methods Parameter Identification (PID). With KOEO, SELECT Parameter Identification (PID). SELECT PIDs: EBP, MAP and BARO (EBP is not used on F650/750). If any PID values/readings deviated from atmospheric pressure in your locale by more than 10 kPa (1.5 psi), GO to the appropriate pinpoint test for the sensor with the largest difference.
Check For Biased EOT Sensor	GO to DB13 .
EOT Rationality Check	GO to Pinpoint Test DB .

Chart 8

- Additional Driveability Concerns: CHECK ENGINE Light Concern
- Warning Indicators: CHECK ENGINE Light

SYSTEM/COMPONENT	REFERENCE (Section 5 Pinpoint Test unless noted)
Perform KOEO On-Demand Self Test and Retrieve/Clear Continuous DTCs	GO to appropriate pinpoint test.
Run Bulb Check	CYCLE ignition switch. If CHECK ENGINE light flashes, CHECK to see if light is OK. If not, GO to Pinpoint Test NB .

Chart 9

- Exhaust System Concerns: Visible Smoke (No Oil Consumption)

SYSTEM/COMPONENT	REFERENCE (Section 5 Pinpoint Test unless noted)
Preliminary Checks	PERFORM preliminary checks. REFER to Diagnostic Performance Procedures 1-4 in Section 4A or Section 4B . VERIFY any concerns.
Atmospheric Pressure Rationality Check	GO to Section 2 , Diagnostic Methods Parameter Identification (PID). With KOEO, SELECT Parameter Identification (PID). SELECT PIDs: EBP, MAP and BARO (EBP is not used on F650/750). If any PID values/readings deviate from atmospheric pressure in your locale by more than 10 kPa (1.5 psi), GO to the appropriate pinpoint test for the sensor with the largest difference.
Check Color Of Exhaust Smoke	Note: Some white tailpipe exhaust smoke is a normal condition at start-up with temperatures below 10°C (50°F) or with an extended idle in a cool climate. START engine. If exhaust smoke is white, GO to next step. If exhaust smoke is black, CHECK for charge air cooler restrictions.
Check White Tailpipe Exhaust Smoke	GO to Section 4A or Section 4B , Diagnostic Subroutines, Hard Start/No Start Diagnostic Procedure. PERFORM Glow Plug System Operation Check.
Check Charge Air Cooler for Restrictions	CHECK for any conditions that may restrict air flow through the charge air cooler. DISCONNECT ducts at CAC and CHECK for restrictions. CHECK inside of CAC for restrictions. If there are any restrictions, CLEAN as required. VERIFY repair.
Confirm Fuel Quality	DRAIN fuel tank. ADD known high quality diesel fuel to tank. If the amount of smoke is decreased, ADVISE operator of need for higher quality fuel.

Check For Out-of-Range Sensor	CHECK operation of: intake air temperature (IAT) sensor, manifold air temperature (MAT) sensor, engine oil temperature (EOT) sensor. If the sensor temperature readings are not within 6 degrees, REFER to the applicable pinpoint test in Section 5 .
Check For Coolant Leak	REFER to the Workshop Manual, Section 303-03.
Check Intake Air Heater Operation	GO to Pinpoint Test KL .
Check Thermostat Operation	REFER to the Workshop Manual, Section 303-03.
Isolate Engine Cylinders Generating Smoke	Note: When the vehicle is assembled, gaskets are not installed between the cylinder head and the exhaust manifold. If the exhaust manifold is separated from the cylinder head, gaskets must be installed. REMOVE the exhaust manifold attaching bolts. PRY the manifolds away from the cylinder head. START engine. If a cylinder is generating excessive smoke, CHECK compression. If not, TEST glow plug(s).
Check Crankcase Pressure	REFER to Section 4A or Section 4B .
Test Glow Plug	REMOVE glow plug from smoking cylinder. GROUND body of glow plug and INSTALL jumper wire from B+ source to glow plug terminal. If glow plug tip does NOT become hot, INSTALL a new glow plug. VERIFY repair.
Test Fuel Injectors	REFER to the Injector Performance Test. If the injectors test OK, REFER to the Workshop Manual Section 303-01.

Chart 10

- Additional Driveability Concerns: Speed Control

SYSTEM/COMPONENT	REFERENCE (Section 5 Pinpoint Test unless noted)
Check ABS Light	REPAIR if necessary.
Check Brake Warning Light	GO to Pinpoint Test FF if light is on.
Perform KOEO On-Demand Self Test and Retrieve/Clear Continuous DTCs	GO to the appropriate pinpoint test.
Perform KOER Switch Self Test	GO to the appropriate pinpoint test.
Road Test	GO to Section 2 , Diagnostic Methods, Parameter Identification (PID), SELECT Parameter Identification (PID). SELECT PIDs: PBA, BPA, CPP, BOO, SCCS_M, VSS and VS SET. DRIVE vehicle and FUNCTION speed control system. COMPARE VSS to speedometer. If the WDS does not display the correct values for each PID selected, GO to the appropriate pinpoint test.
Check Speed Control	If speed control drops out when climbing hills, engine power is not adequate to hold hill. If it does not drop, GO to Chart 7.
Check Vehicle Load	If vehicle load is too heavy to hold hills, CONFIRM condition with WDS PIDS VSS and VS SET. If it holds hills, GO to Chart 7.

Chart 11

- Warning Indicators: TCIL

SYSTEM/COMPONENT	REFERENCE (Section 5 Pinpoint Test unless noted)
Check TCIL	REFER to the Workshop Manual, Section 307-01.

Chart 12

- Automatic Transmission Shift Concerns:
  - A/T Upshift Concern
  - A/T Downshift Concern
  - Engagement Concern

SYSTEM/COMPONENT	REFERENCE (Section 5 Pinpoint Test unless noted)
Check Automatic Transmission Fluid	REPAIR as necessary. VERIFY a symptom no longer exists.
Check Parameter Identification (PIDs)	GO to Section 2 , Diagnostic Methods, Parameter Identification (PID), SELECT Parameter Identification (PID). DISPLAY PIDs: TR, SCC_M, 4x4L and VSS. If the scan tool displays correct values for each PID, GO to Chart 7. If not, GO to the appropriate pinpoint test.

Chart 13

- Oil System Concerns: High Oil Consumption, Leaks

Note: Perform the following preliminary checks:

- External leaks (rocker cover gasket, crankshaft seals, etc.).
- Correct dipstick.
- Correct oil viscosity and API rating. Refer to operator's guide.
- Check air intake system: Air Filter Minder.
- Loads do not exceed maximum GCVW.

SYSTEM/COMPONENT	REFERENCE (Section 5 Pinpoint Test unless noted)
Verify High Oil Consumption	CONFIRM oil consumption through maintenance records or other documentation. If records are not available, have operator log oil consumption 1,450 km (900 miles). If oil consumption rate is NOT higher than 0.95 liter (1 quart) per 900 miles, no problem exists. RETURN vehicle to consumer.
Check For Oil In Fuel	REMOVE fuel filter housing cover and CHECK color of fuel. If fuel is black, indicating there is oil in the fuel, CHECK O-rings. If not, CHECK base engine.
Check Fuel Injector O-Rings	REMOVE injector and INSPECT middle O-rings. If middle O-rings are missing or damaged, INSTALL new injector O-rings. VERIFY repair. If O-rings are OK, TEST the fuel injectors. REFER to the Injector Performance Test. If engine did not consume oil when new, CHECK base engine.
Check Base Engine	PERFORM Crankcase Pressure Test. REFER to Section 4A or Section 4B , Diagnostic Routines
Isolate Turbocharger	REMOVE air duct at turbocharger compressor housing outlet. REPEAT crankcase pressure test. If crankcase pressure decreases, INSTALL a new turbocharger. VERIFY repair. If not,

	CHECK turbocharger for oil leak. REFER to the Workshop Manual, Section 303-04.

Chart 14

- Starting Concerns: Hard Start/No Start — Dry Reservoir

SYSTEM/COMPONENT	REFERENCE (Section 5 Pinpoint Test unless noted)
Check Oil Reservoir	CONFIRM SAE viscosity and API rating of oil. REMOVE oil reservoir fill plug and REFILL reservoir. START engine and TEST DRIVE vehicle for 16 km (10 miles). REMOVE oil reservoir fill plug and CHECK reservoir oil level. VERIFY reservoir is full. NOTE level. CHECK reservoir leak down.
Reservoir Leak Down	Note: Perform the following step before starting engine. ALLOW vehicle to sit overnight. REMOVE oil reservoir fill plug and CHECK reservoir oil level. If oil level changed, CHECK for leaks. If not, GO to Chart 3.
Check For Oil Leaks	REFER to the Workshop Manual, Section 303-01.
Check Oil Pressure At Reservoir	REMOVE fill plug or oil pressure unit. INSTALL gauge and MEASURE oil pressure at idle, engine warm. If oil pressure is 83 kPa (12 psi) or less, REFER to the Workshop Manual, Section 303-04.
Check Engine Oil Pressure	Note: Low oil pressure from the engine oil pump can also cause low oil levels in reservoir. MEASURE engine lube oil pressure. Plug located on the left side of block just above the oil pan rail can be used as a test port. If oil pressure is 55 kPa (8 psi) greater than pressure reservoir, REPAIR the cause of pressure drop between main oil gallery and reservoir. If not, REPAIR pump regulator valve. REFER to the Workshop Manual, Section 303-04.