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SERVICE BULLETIN

Classification:	Reference:	Date:
EC95-005	NTB95-021	March 8, 1995

POOR ENGINE DRIVEABILITY AND/OR CHECK ENGINE LIGHT ON (CODE 45-INJECTOR LEAK)

APPLIED VEHICLE(S): All Pre-OBD II, CONSULT compatible vehicles

SERVICE INFORMATION

This bulletin outlines procedures and methods to isolate the cause(s) of mixture related driveability incidents. The bulletin also covers incidents where the check engine light is illuminated and code 45 is stored, but there are no driveability symptoms.

SERVICE PROCEDURE

NOTE:

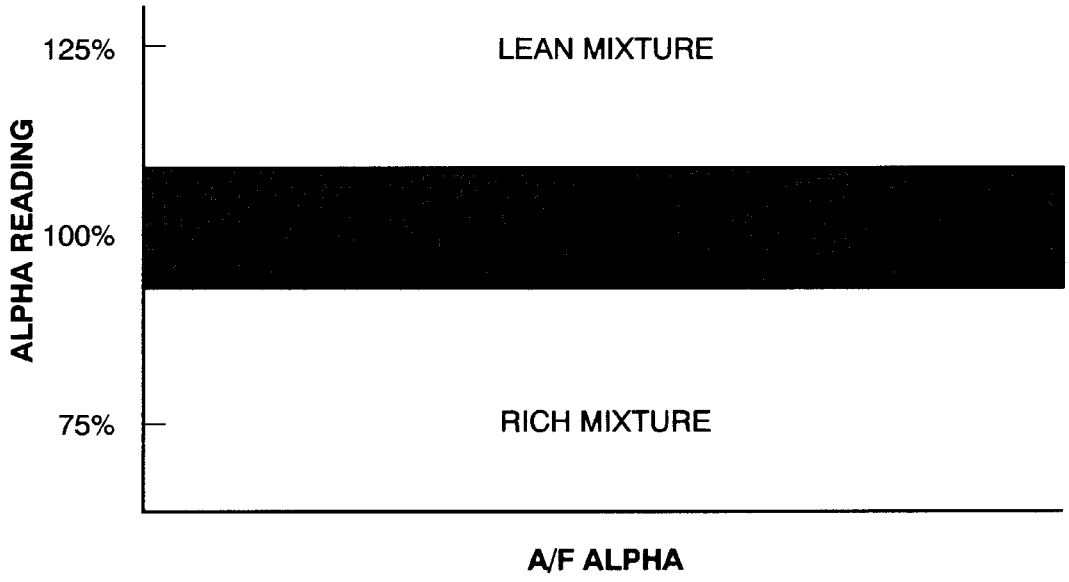
- ANY SENSOR INPUT THAT CAN CAUSE A "RICH" FUEL SIGNAL CAN CAUSE AN INJECTOR LEAK CODE.
- ANY CAUSE FOR EXCESSIVE FUEL PRESSURE CAN CAUSE AN INJECTOR LEAK CODE.

The best way to resolve a Code 45 or driveability incident is to carefully go through **ALL** the following steps:

1. **Consult Alpha Test**
2. **Mass Air Flow Sensor Test**
3. **Fuel Pressure Regulator Test**
4. **Injector Leak Down Test**
5. **Engine Coolant Temperature Sensor Test**
6. **Oxygen (O2) Sensor Test**
7. **Quality Control Check**

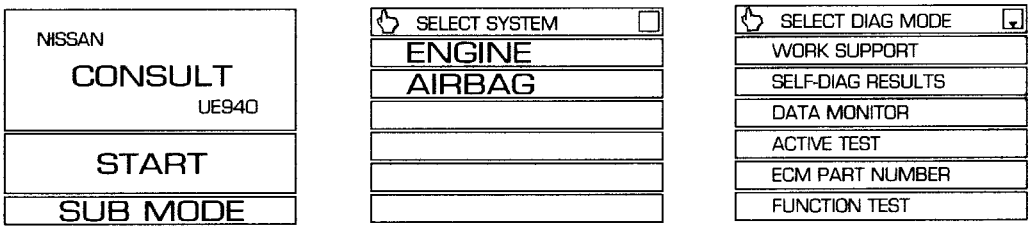
1. Consult Alpha Test

The "ALPHA" reading of CONSULT indicates if the fuel mixture is rich, lean, or correct.

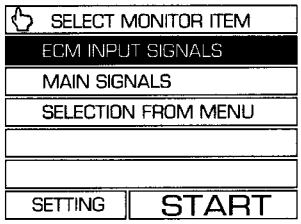


Perform the following check to verify that a "Rich" condition exists.

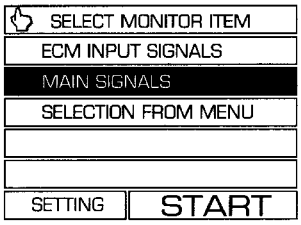
With CONSULT plugged in and turned on with the engine at operating temperature and just above 2000 rpm:



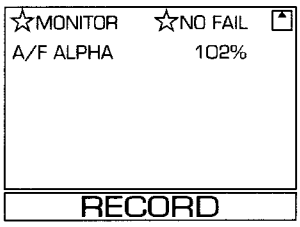
TOUCH START **TOUCH ENGINE** **TOUCH DATA MONITOR**



TOUCH MAIN SIGNALS



PRESS START



PRESS DOWN ARROW UNTIL A/F ALPHA IS SHOWN

The ALPHA reading should be in the range of 90% to 110%, if the fuel mixture is correct. One hundred percent indicates that no correction to the base fuel schedule is necessary. Less than 100% indicates that the O_2 sensor is detecting a rich condition and less fuel will be injected to correct for this. The lower the ALPHA percentage the richer the mixture.

Obtaining a base line ALPHA reading at 2,000 rpm is necessary for verifying any repairs.

2. MAFS (Mass Air Flow Sensor or Air Flow Meter) Test:

A POOR CONNECTION FOR EITHER THE MAFS GROUND OR SIGNAL WIRE CAN CAUSE A FALSE HIGH MAFS VOLTAGE READING, THIS WILL CAUSE A RICH MIXTURE.

NOTE: All tests should be performed with the engine @ 2000 rpm. Engine temperature should be warm.

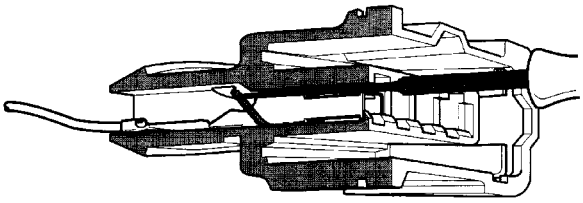
1. Gently move the MAFS harness and connector in all directions while observing the engine speed. If the engine speed or engine smoothness changes when the harness connector is moved, the incident may be caused by a poor connection at the connector pins.

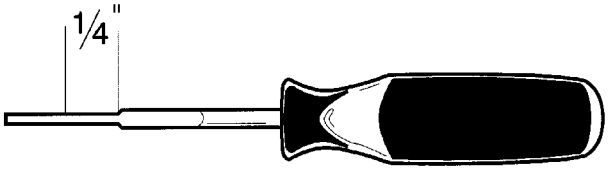
2. Gently move the MAFS harness and connector in all directions while observing the ALPHA reading on CONSULT. This reading should not change while wiggling the MAFS harness or connector.

If moving the MAFS harness causes a change in the ALPHA reading, then the harness/connector must be repaired:

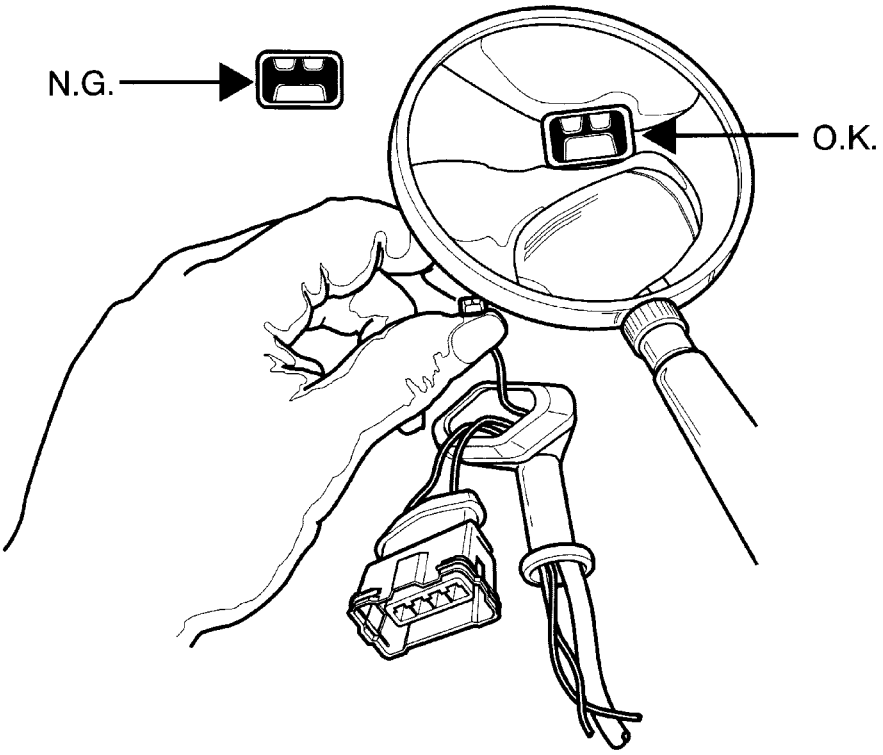
A. Disconnect the MAFS connector at the MAFS.

B. Inspect the male pins on the MAFS for corrosion or damage (clean and repair as necessary).





C. Remove, inspect, and reinstall ONE AT A TIME, the female pins at the MAFS harness connector. Carefully push the connector and wire out through the back side of the connector. Use a modified Kent-Moore tool J38751-305 (modify by increasing the length of the working end of the tool about 1/4"-this can be done with a grinder or file) Extract the individual pin by releasing the locking tab with the special tool through the recess on the component side of the connector. Inspect the contact surfaces of the pin for any corrosion or damage. The female pins contact force should be checked by sliding the female connector over the appropriate male pin on the MAFS and checking for a snug fit. The contact force can be increased by bending the contact springs toward each other slightly with an appropriate tool.



D. If any of the pins appear to be damaged, or if the wire is not properly crimped onto the female pin the terminal pin must be replaced. The terminal pin connector P/N is J38751-50. The wire seal P/N is J38751-48. Both parts are available in the Kent Moore terminal repair kit. Crimp and solder the new terminal pin on to the harness wire.

E. After all the female pins have been inspected/repaired, reattach the MAFS connector and perform tests 1 and 2 above to verify repair.

3. Fuel Pressure Regulator Test:

1. Use an accurate fuel pressure gauge for this test.
2. Release fuel pressure before installing fuel pressure gauge (use CONSULT to disable fuel pump or remove fuel pump fuse, start engine and allow it to run out of gas).
3. Disconnect the fuel hose between the fuel filter and the fuel tube on the engine side and install the fuel pressure gauge.

Fuel pressure specifications:

MODEL	ENGINE	With fuel pressure regulator vacuum hose connected, engine running	With fuel pressure regulator vacuum hose connected or engine off
B13	GA16DE	36	43
	SR20DE	36	43
D21	KA24E	33	43
	VG30E	34	43
J30	VE30DE	36	43
	VG30E	36.3	43.4
S13	KA24DE	34	43
	KA24E	34	43
U12	KA24E	33	43
U13	KA24DE	34	43
V40	VG30E	34	43
Z32	VG30DE	37	44
	VG30DETT	37	44

Table 1

4. Check the fuel pressure at idle and with the regulator vacuum hose pinched off. Compare your reading to the specifications in table 1. If the fuel pressure is excessive replace the fuel pressure regulator and RETEST to verify that fuel pressure is within specification.
5. Stop engine, disconnect the fuel pressure regulator vacuum hose from the intake manifold and plug manifold with a rubber cap.
6. Connect a vacuum pump to the pressure regulator vacuum hose.
7. Start the engine, the fuel pressure should decrease as vacuum increases, if not replace the fuel pressure regulator.
8. When reconnecting the fuel line use new Genuine Nissan hose clamps.

4. Injector Test: (Performed with the fuel pressure gauge still connected)

A. Turn the ignition switch "ON" to cycle the fuel pump on for 5 SECONDS.

B. Turn the ignition switch "OFF" after 5 SECONDS.

C. Use the fuel hose pinching pliers and pinch off the inlet hose between the fuel filter and the gauge, also pinch the outlet hose between the fuel pressure regulator and the hard line returning to the fuel tank.

D. Monitor the fuel pressure gauge every 5 minutes.

E. Compare the time and amount of fuel pressure drop to chart 1.

Note: An initial rise in pressure of 2-5 PSI is normal.

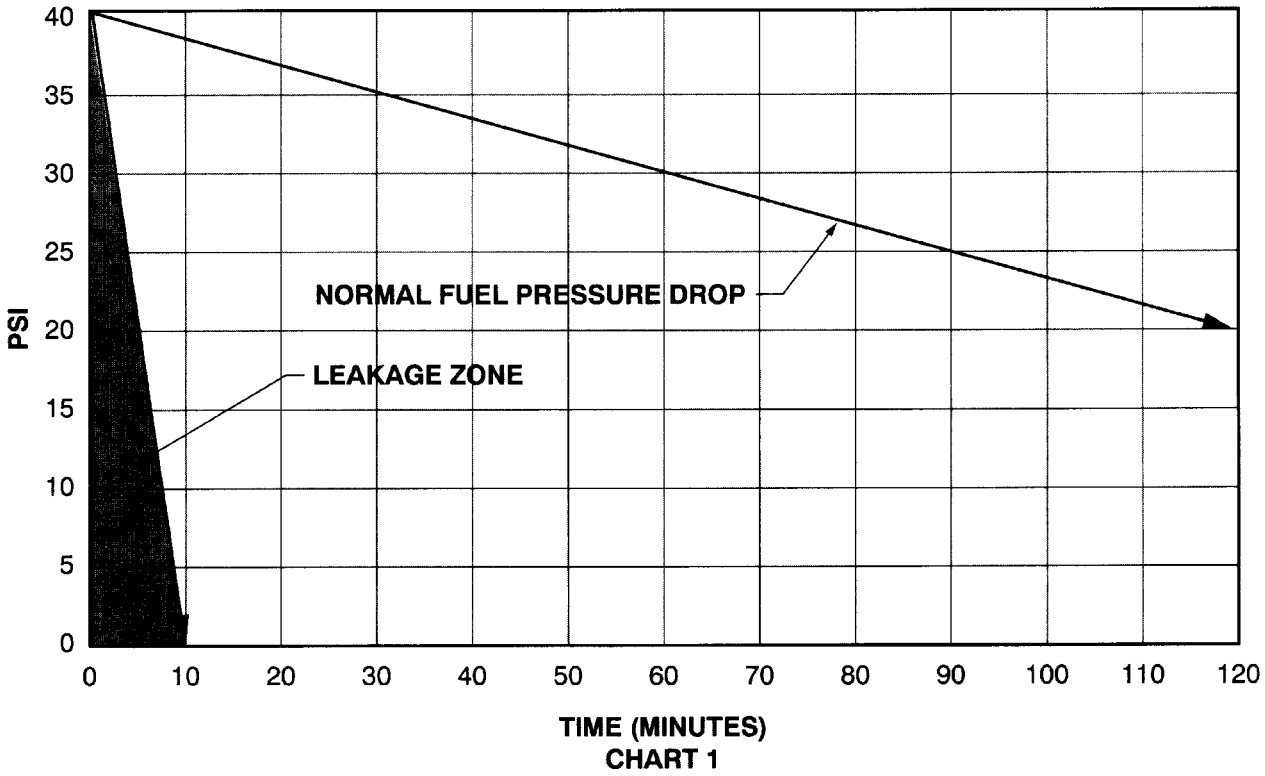


CHART 1

Note: If there is an actual leaking injector(s), the fuel pressure will fall to 0 PSI within about 10 minutes. The time will depend on the severity of the leak or the number of injectors leaking.

NO LEAKING INJECTOR FOUND: CONTINUE TO STEP 5

INJECTOR DETERMINED TO BE LEAKING: AFTER REPLACING THE LEAKING INJECTOR(S) CONTINUE TO CHECK FOR SENSORS THAT CAN CAUSE A RICH CONDITION. REPLACE THE ENGINE OIL AND ENGINE OIL FILTER BECAUSE OF FUEL IN OIL.

5. Engine Coolant Temperature Sensor Test:

A COOLER TEMPERATURE READING (HIGHER RESISTANCE) THAN THE ACTUAL TEMPERATURE WILL CAUSE A RICH MIXTURE

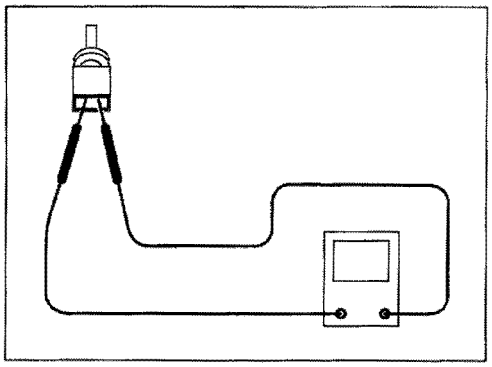
1. Compare the CONSULT readout to the actual engine temperature. Access this the same as for the ALPHA or MAFS reading, (touch start->engine->data monitor->main signals->[or ECM input signals] start-> now watch COOLANT TEMP/S). The coolant temperature should be comparable to like vehicles under the same conditions. NOTE: CONSULT will only indicate an incident coolant temperature sensor or excessive resistance in the coolant temperature sensor circuit.
2. Remove the connector at the coolant temperature sensor and check for any corrosion. This may require a mirror to carefully inspect the connector on the temperature sensor depending on the vehicle type. Clean or replace as necessary.
3. Test the coolant temperature sensor with a OHM meter:

Engine Coolant Temperature Sensor Test

1. Disconnect the engine coolant temperature sensor harness connector.
2. Check the resistance as shown in the figure.

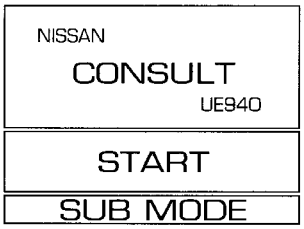
Temperature °C (°F)	Resistance in OHMS
20 (68)	**2300-2700**
90 (194)	**240-260**
110 (130)	**140-150**

In NG, replace the engine coolant temperature sensor.

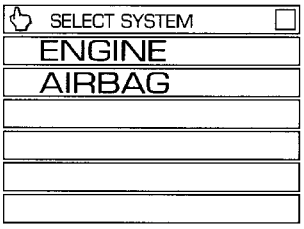


6. O_2 Sensor Test:

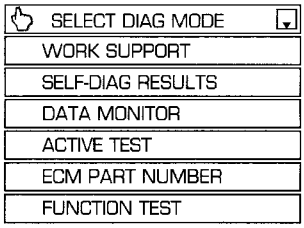
With consult plugged in and turned on check the operation of the O_2 sensor with the engine at operating temperature and just above 2000 rpm.



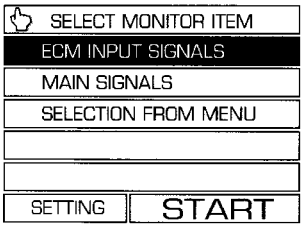
TOUCH START



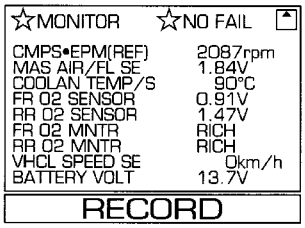
TOUCH ENGINE



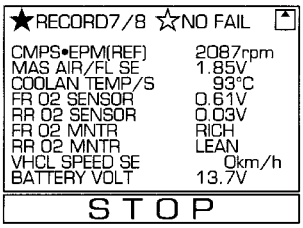
TOUCH DATA MONITOR



ECM INPUT SIGNAL WILL BE SELECTED - TOUCH START



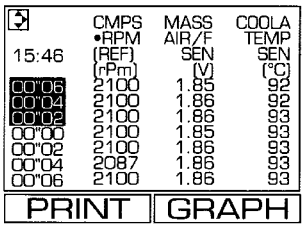
PRESS RECORD



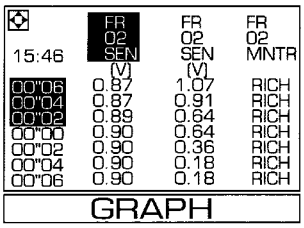
RECORD WILL BECOME STOP AFTER SEVERAL SECONDS



THIS SCREEN WILL APPEAR NEXT, TOUCH DISPLAY



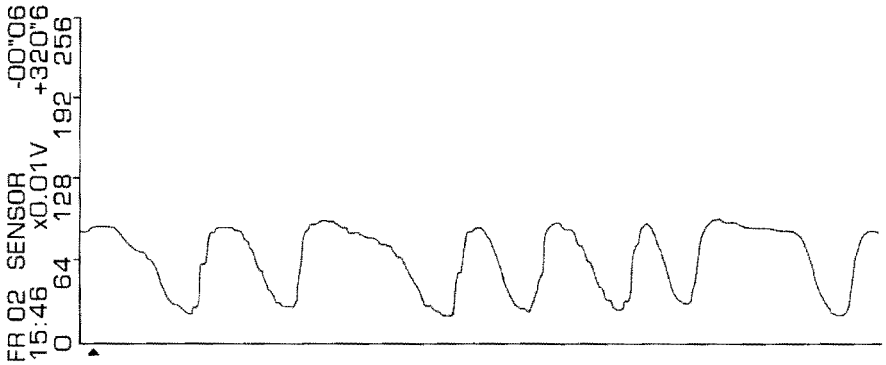
THIS SCREEN WILL APPEAR USE THE RIGHT ARROW TO SELECT FRONT O_2 SENSOR



THIS IS WHAT THE SCREEN SHOULD LOOK LIKE WITH FRONT O_2 SENSOR SELECTED

O_2 Sensor Test Continued:

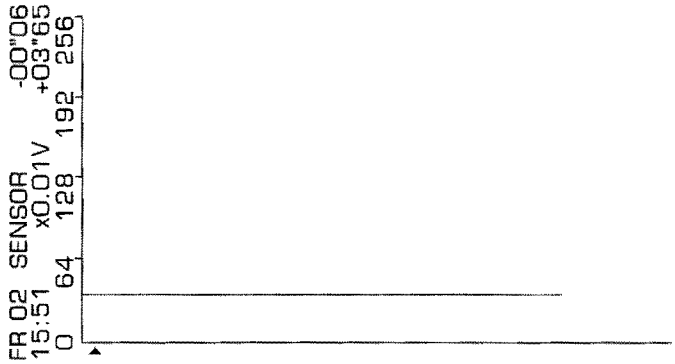
TOUCH GRAPH:



The O_2 sensor voltage should fluctuate between 0.0 and 1.0 Volts when graphed as shown on the previous page. There should be at least 5 peaks upward and 5 peaks downward. The peaks should look similar above 0.5 volts and below 0.5 Volts. A rich mixture will cause the voltage to stay closer to 1.0 Volts, and the graph will have fewer voltage fluctuations.



EXAMPLE: Rich mixture O_2 sensor CONSULT printout



EXAMPLE: NG O_2 sensor CONSULT printout

1. If the O_2 sensor voltage appears NG then check the harness:
2. Turn the ignition switch "OFF".
3. Disconnect the ECM harness connector and O_2 sensor harness connector or heated O_2 sensor harness connector.
4. Check the harness continuity between the ECM O_2 sensor signal terminal and the O_2 sensor signal wire terminal at the harness connector itself. There should be no resistance.
5. If there is resistance in the wire, inspect the harness to determine the cause.
6. Check the O_2 sensor signal wire for any continuity to ground, there should be no continuity (infinite ohms).
7. If there is continuity to ground, inspect the harness to determine the cause.
8. If the harness checks OK, but the consult reading is NG, check the ECM and harness connectors carefully for any damage or corrosion. If all harness checks are OK, then replace the O_2 sensor.

7. Quality Control Test:

Clear any codes and test drive under the following conditions:
Driving Mode:

1. Start engine and let it warm up sufficiently.
2. Idle at least 40 seconds.
3. Drive under the following conditions for at least 5 seconds.
   - Engine speed: 2000 to 2400 rpm
   - Intake manifold vacuum 9 to 14 inHg.
4. Turn OFF the engine and wait for at least 10 seconds.
5. Repeat steps 2 through 4 at least 5 times.

NOTE, IF THE ALPHA READING IS NOT BETWEEN 95-105% REPEAT ALL STEPS--YOU MIGHT HAVE MISSED SOMETHING.

FINAL TEST ALPHA (@2000 RPM):

REMEMBER, IF AN INJECTOR LEAK WAS FOUND, REPLACE THE ENGINE OIL AND OIL FILTER.