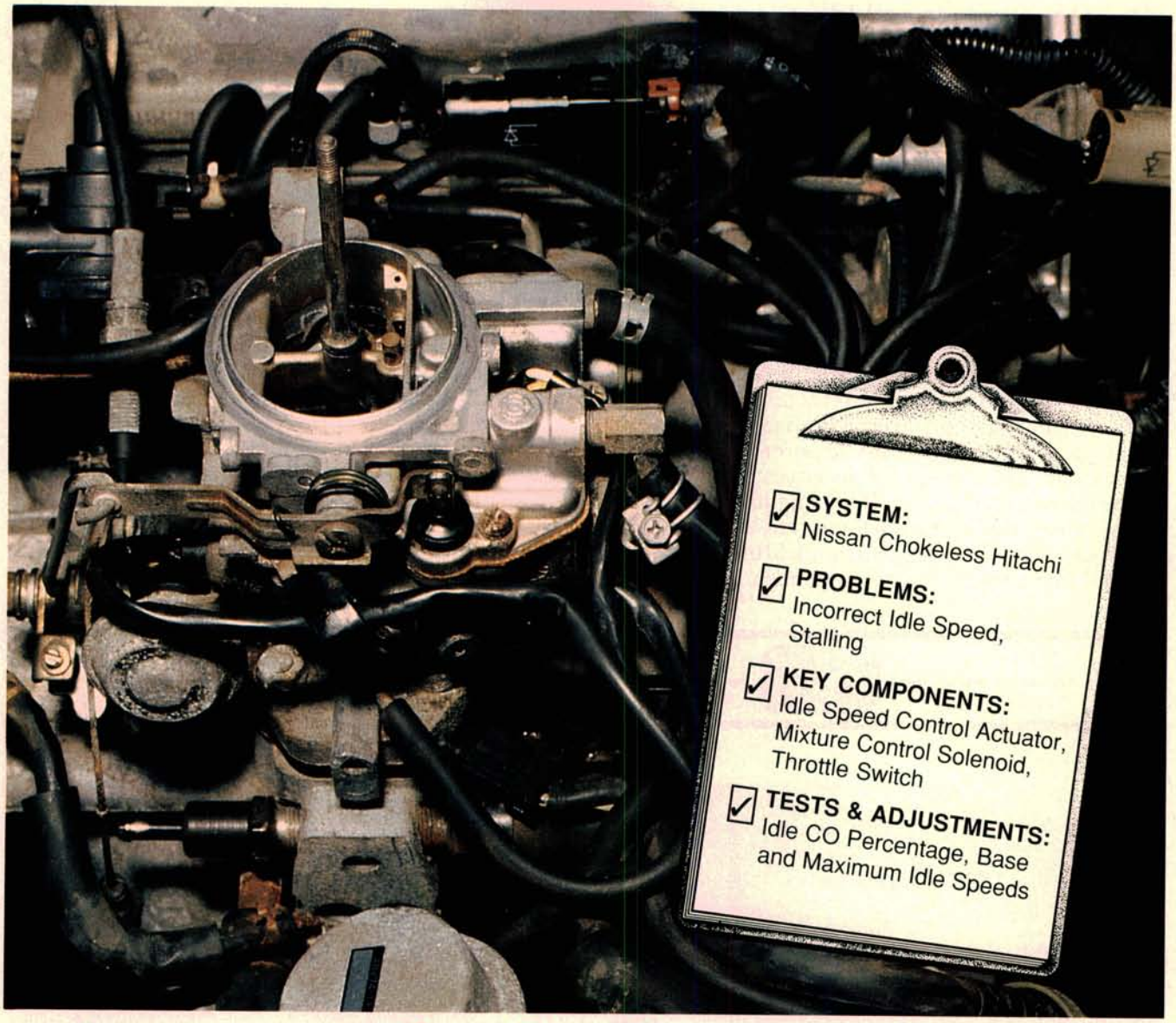


Nissan Chokeless Hitachi

PART TWO

Last month's **Driveability Clinic** began our look at Nissan's chokeless Hitachi carburetor by detailing the operation of the idle speed control and cold enrichment systems. These are the systems that help this carburetor survive without a choke plate. This month we'll detail several basic adjustments that can determine the effectiveness of the chokeless Hitachi fuel system after the engine reaches operating temperature.

We'll begin with base CO percentage adjustment. Proper CO adjustment is the first building block of the system. If the base CO adjustment is too rich or lean, warm driveability, emissions, and fuel economy can all suffer.

Then we'll explain the adjustment of the idle speed control system. An incorrectly adjusted idle speed control system can also have a big effect on both cold and warm engine driveability.

We'll also look at the ECU's only adjustable input sensor, the throttle switch. The throttle switch is the ECU's watchdog at the throttle linkage. Signals from the throttle switch help the ECU decide when to allow fuel flow to the carburetor idle circuit. An incorrectly adjusted, sticking, or inoperative throttle switch can cause a variety of driveability problems.

Our final page includes several high percentage chokeless Hitachi diagnostic tips. Good luck.

Idle CO Percentage and Idle Speeds

During closed loop operation, the ECU sends a varying duty cycle signal to the air fuel ratio solenoid. At idle, the solenoid adjusts the amount of fuel that passes through the idle circuit to control the idle CO percentage. This system helps the engine deliver an acceptable combination of performance, economy, and low emissions.

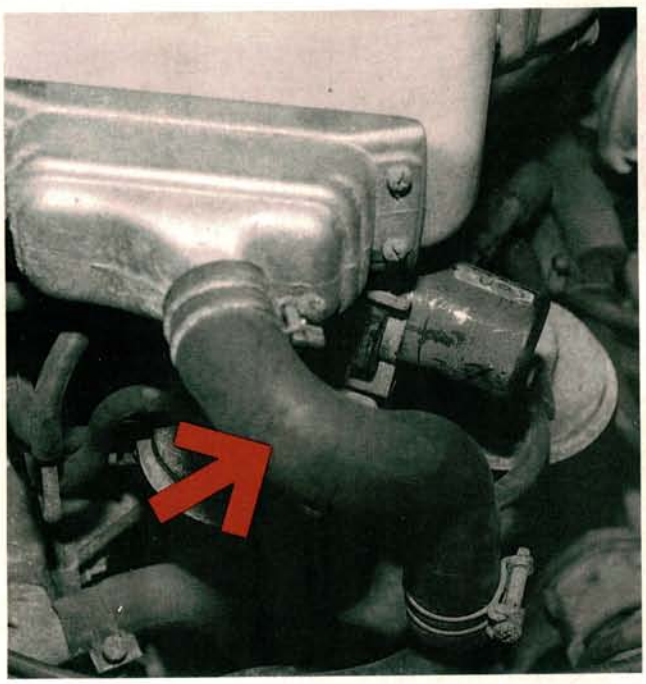
But remember the chokeless Hitachi is still a carburetor, so it still has an idle mixture screw. The air fuel ratio solenoid adjusts the idle mixture, but the idle mixture screw provides the idle mixture control system's base setting. The air fuel ratio solenoid can't properly control the idle mixture and idle emissions if the idle mixture screw is incorrectly adjusted.

Each time the carburetor is disassembled for cleaning or repair, the idle CO percentage should be checked, and adjusted if necessary. You'll need to use the same procedure if the engine has flunked an emissions test or the customer has a driveability complaint. The chokeless Hitachi's idle speed control and idle mixture control systems make this procedure a bit more involved than on other carburetors.

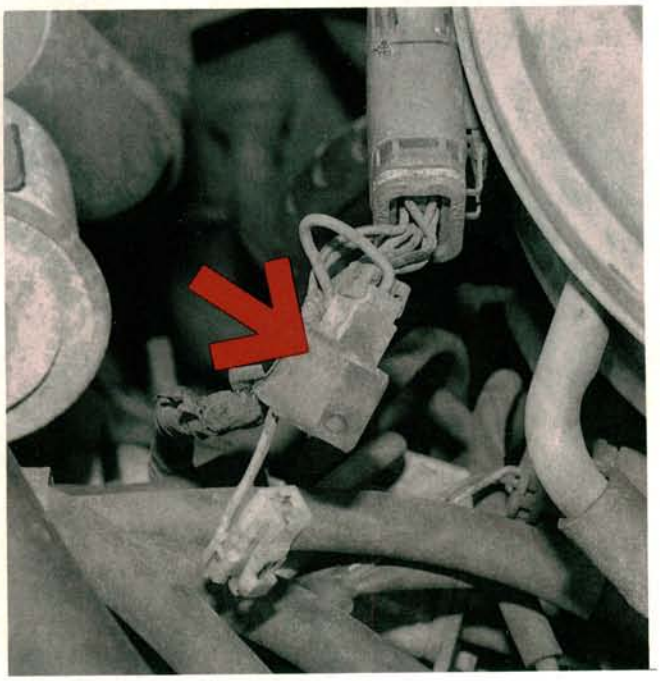
Start by removing the anti-tamper seal plug at the base of the carburetor. It's easy to remove the seal plug when the carburetor is off the engine, and a little harder when it's not. Carefully drill a hole in the center of the plug with an $^1/_8$-inch drill, then remove the plug using a self-tapping screw and slide hammer.

The seal plug can also be removed when the carburetor is mounted on the engine. Clearance is limited, so you'll need to improvise. Remove the hex bit from a small Allen socket. Insert a very short $^1/_8$-inch drill bit in the Allen socket base and secure the drill bit with the socket set screw. Aim carefully, then use your air ratchet as a slow speed drill. Thread a self-tapping screw into the seal plug hole to push the plug out of the carburetor.

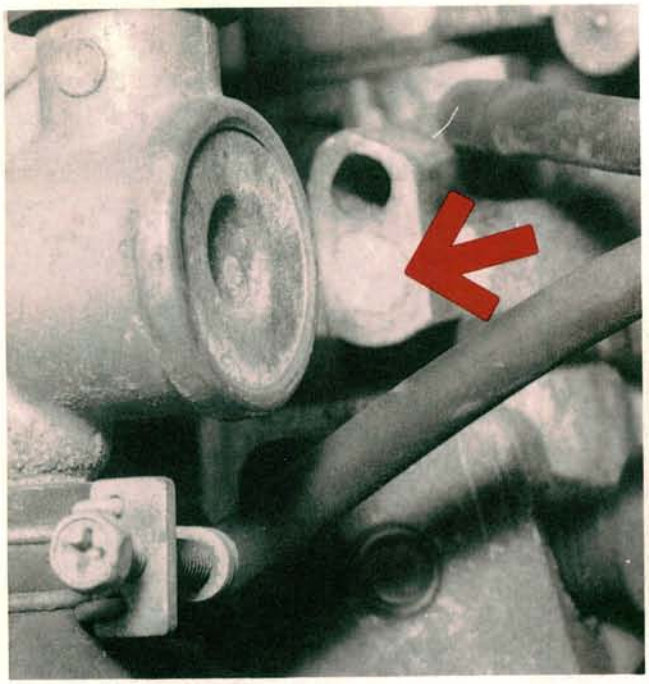
Before we adjust the CO, make sure the headlights are off, the blower motor and A/C are off, and the front wheels are pointed straight ahead. The air cleaner, all hoses, and wiring should be connected to the carburetor. If the cooling fan cycles on during your adjustments, wait until it switches off before continuing.



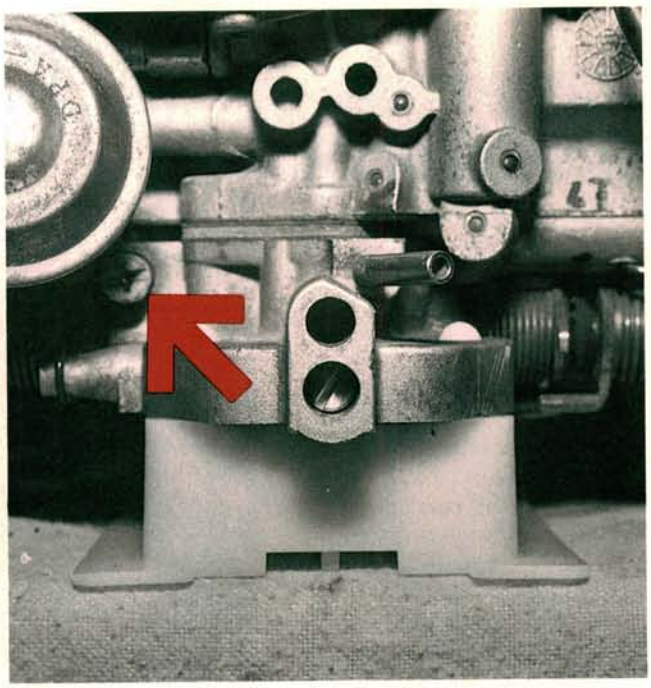
1 To adjust the CO, run the engine until it reaches operating temperature, then let it idle for two minutes. Disconnect and plug the air induction hose at the air cleaner. Rev the engine to 2-3000 RPM two or three times, then return to idle speed. The warm idle speed must be below 1000 RPM.



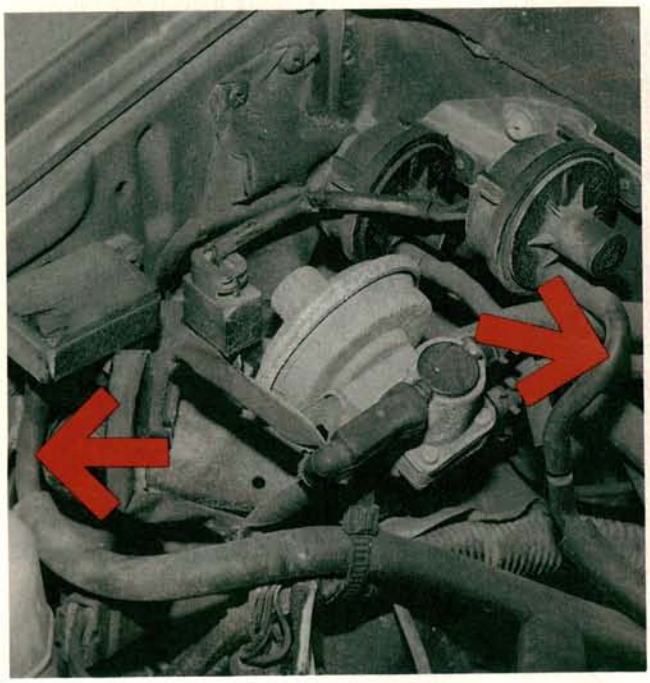
2 Check and adjust the ignition timing if necessary. Rev the engine again, then recheck the warm idle speed (800 ± 100 RPM for M/T, 650 ± 100 in Drive for A/T). Stop the engine, then unplug the blue taped air fuel ratio solenoid harness connector at the left side of the air cleaner.



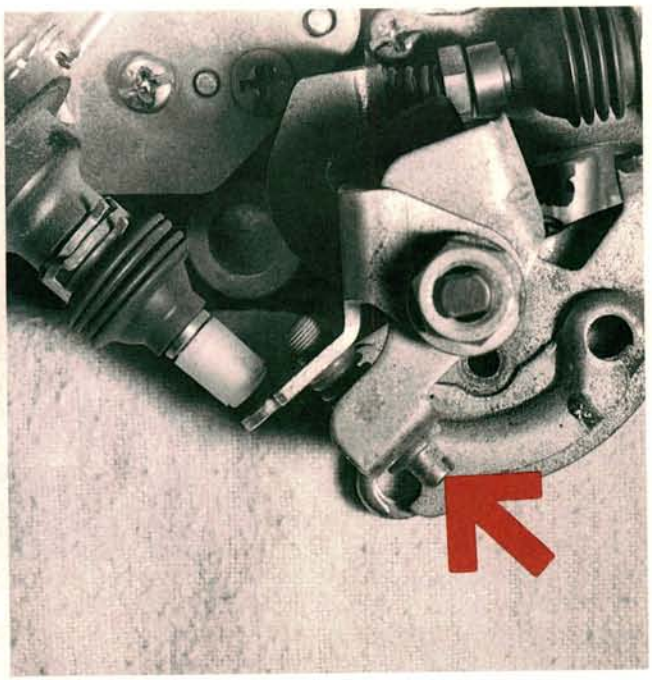
3 Restart the engine and rev to 2-3000 RPM several more times before returning to idle speed. Check the idle CO percentage and adjust if necessary by turning the idle mixture screw. Stop the engine, reconnect the air fuel ratio solenoid harness connector, then disconnect the VCM harness connector.



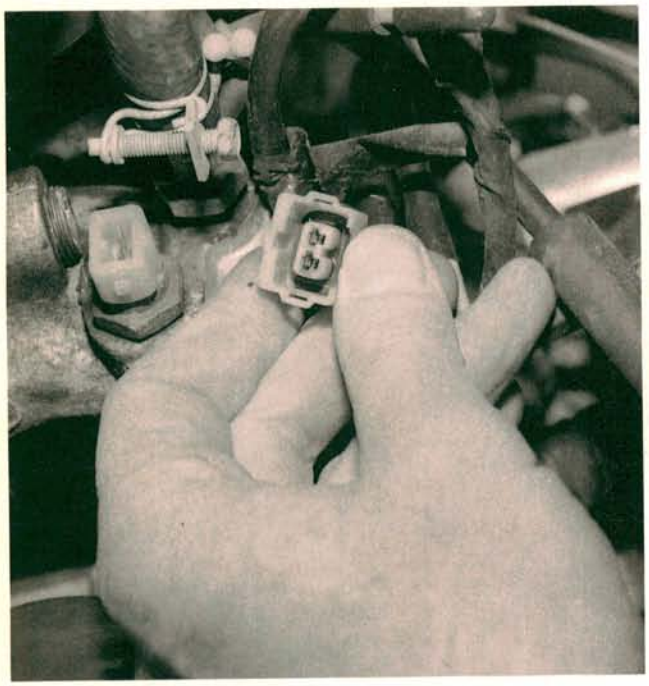
4 Restart the engine and rev to 2-3000 RPM several more times before returning to idle. Check the base idle speed and adjust if necessary, using the small screw at the base of the carburetor (700 ± 50 RPM for M/T, 550 ± 50 RPM in Drive for A/T). Stop the engine and reconnect the VCM harness connector.



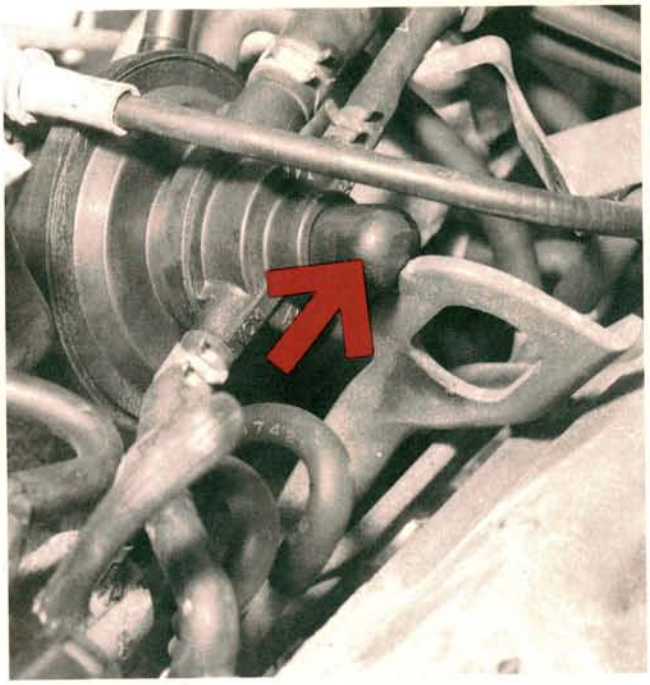
5 The ISCA adjustment is our next stop. Disconnect and plug the boost sensor vacuum hose. Disconnect the vacuum hose from either of the vacuum switches. Leave this hose unplugged. Disconnect and plug the vacuum hose leading from either of the vacuum cut solenoids to the air filter.



6 Start the engine and be ready to work quickly. Adjust the small screw at the bottom of the car buretor throttle shaft bell crank for an idle speed of 2800-3200 RPM for M/T and 3200-3600 RPM in neutral for A/T. Adjusting toward the low end of the spec is easier on the engine's bottom end during cold starts.

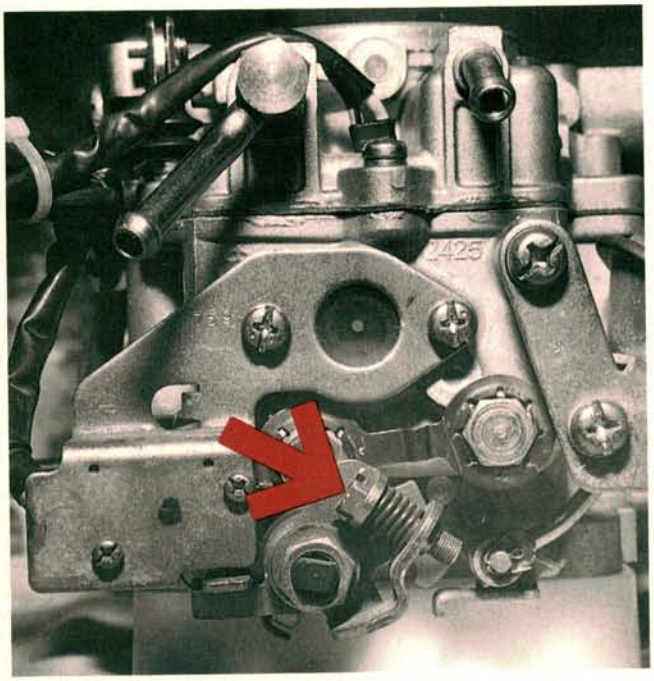


7 Shut off the engine, reinstall the vacuum hoses, then move the ECU diagnostic switch to the "ON" position. Locate the water temperature sensor at the rear of the intake manifold and carefully remove the sensor's harness connector. Bridge the connector terminals with a jumper wire.



8 Restart the engine, then remove the rubber plug from the top of the ISCA. Adjust the ISCA screw to obtain an idle speed of 1500-1900 RPM in neutral for both manual and automatic transmission models. Shut the engine off, then reconnect the water temperature sensor and turn the ECU diagnostic switch off.

9 An incorrectly adjusted or sticking throttle switch may cause a hesitation while driving. To adjust the throttle switch, connect the positive lead of your voltmeter to the green wire with white tracer on the carburetor side of this connector. Ground the voltmeter's other lead.



10 Raise the engine speed to 2000 RPM. The DVOM should read 0 volts. Slowly lower the engine RPM. At 1200 RPM, the DVOM should read 12 volts. Bend the linkage tab to adjust the throttle switch on earlier carburetors. Later carburetors have an easier to use threaded adjuster. Recheck your adjustment.

Warm Engine Quick Checks

The following quick checks will help you sort things out if you're having problems after the engine has reached operating temperature.

• **VCM ticking, warm idle speed too slow or hunts.** Start looking for vacuum leaks. The vacuum sensors monitor the VCM control vacuum signal to the ISCA and provide a fail safe system. If the control vacuum signal is too weak, the vacuum cut solenoids are activated to prevent the ISCA push rod from extending too far.

• **Warm idle speed slow - no vacuum leaks found.** Check the manifold vacuum supply at the VCM. Weak supply vacuum will also put the system in fail safe mode. Vacuum at the VCM should be as strong as manifold vacuum. If it's not, check the vacuum port at the back of the intake manifold or look for collapsed vacuum hoses. The vacuum port may become clogged with carbon from the nearby EGR valve. A weak vacuum supply may also cause the idle speed to hunt up and down. Unscrew the vacuum tee and clean as necessary to restore the vacuum supply.

• **Idle speed too high after engine warmup.** If the idle speed is too high, the ISCA air filter may be clogged. The filter is mounted on the intake manifold, near the ISCA. Remove the filter hose and retest the idle speed. If the idle returns to normal, the filter is clogged and should be replaced.

• **ISCA doesn't raise idle speed when accessory loads are added.** Check the VCM air filter for clogging. Pull the hose off the filter to see if the idle speed can now be raised. Replace the filter if it's clogged. The VCM needs outside air from the filter to mix with the intake manifold vacuum supply. This creates the control vacuum signal that operates the ISCA.

• **ISCA plunger retracted - base idle speed adjusted too high.** The ECU monitors engine RPM. If the base idle speed is adjusted too high, the ECU thinks the engine is above idle and doesn't need idle speed control. The ECU changes its duty cycle signal to the VCM and the ISCA plunger retracts.

• **Engine stalls at warm idle speeds - idle circuit clogged.** The idle circuit has many small passages that are very susceptible to dirt contamination. Revving the engine, then placing your hand over the carburetor air intake may dislodge small deposits. If this doesn't work, try removing the idle mixture screw and fuel shutoff valve. Now blow compressed air through both passages to dislodge the dirt. If neither of these methods does the trick, a complete carburetor overhaul is recommended.

• **Air fuel ratio solenoid failure.** If the air fuel ratio quits, don't try to remove it from the carburetor top. New solenoids are not available separately and must be purchased with the carburetor top.

• **Carburetor parts cleaning.** Use care when cleaning carburetor parts during a carburetor overhaul. The diaphragms, o-rings, and electrical parts in this carburetor don't hold up very well in dip tank carburetor cleaners. Complete carburetor disassembly, followed by a thorough cleaning with an aerosol carburetor cleaner and compressed air should remove all but the most stubborn dirt.

• **Clogged venturi slit - uneven acceleration.** Be sure to check the slit in the primary venturi directly above the idle mixture screw during carburetor overhauls. The slit helps smooth the transition from idle to cruising speeds. If it's clogged, the engine won't accelerate smoothly and will buck and hesitate.

• **Hesitation or jerking during accceleration-incorrectly adjusted or sticking throttle switch.** The throttle switch signals the ECU when the throttle opening is slightly above idle speed. The ECU uses the signal from the throttle switch to decide when to cut the fuel to the idle circuit for better emissions. An incorrectly adjusted throttle switch can trick the ECU into cutting the fuel at the wrong time.

• **No start or stalling when warm.** A defective fuel pump may cause a no start or stalling when warm. The engine may not restart after it stalls. Early pump designs were prone to weak fuel pressure and vapor lock problems. A modified fuel pump and hose design was introduced on later models and can be installed on early models. The updated fuel system prevents the fuel pump vapor lock problem. You can easily determine whether the revised pump and hoses have been installed by checking the carburetor fuel return fitting. Updated systems will have a rubber plug over the return fitting with no fuel return line attached.

• **Intermittent driveability problems - poor connection at coolant temperature sensor.** Just because it's plugged in, don't assume the coolant temperature sensor harness connector is making good contact. Remove the connector and visibly inspect for signs of corrosion.