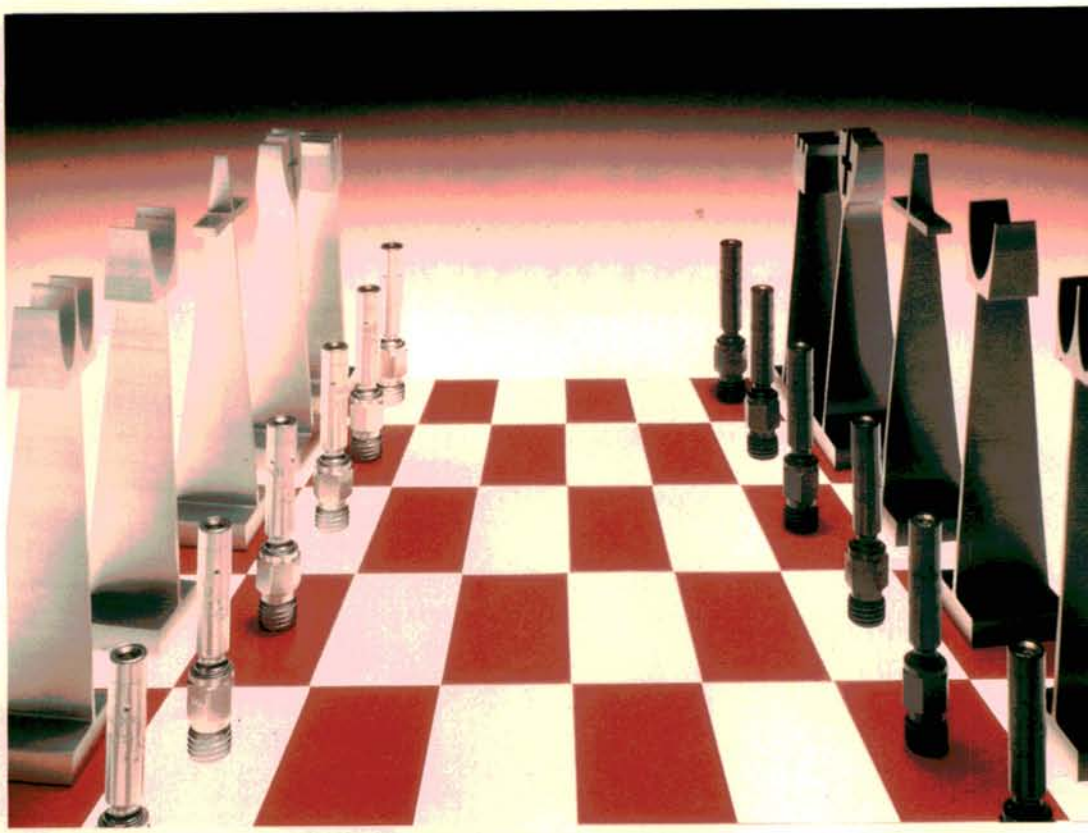
IMPORT SERVICE

Two For One



KE-Jetronic

Perhaps you're wondering why we've combined this pair of "Two For One" follow up articles. It wouldn't seem that Bosch KE-Jetronic and Nissan ECCS engine management systems have a great deal in common. You might even say they are more dissimilar than they are alike.

We've already spent a lot of time with both of these systems in previous articles. Our coverage of KE-Jetronic systems began in the December 1988 *Import Service* and continued in March and July of 1989.

Even after three in-depth articles on KE and two on ECCS, we found there was still more material to cover. Both articles include vehicle specific troubleshooting tips and repair procedures. And that's what makes them similar.

A special thanks goes out to **Dre' Brungardt** for his technical assistance.

1 The ignition signal is a very important KE sensor input. Detonation or poor low speed performance on models with knock sensor control units may be caused by a detonation sensor that is installed either too loose or too tight. The proper sensor installation torque is 10-12 Nm (7-9 ft-lb) for Type I sensors (wiring enters sensor off center) and 20-25 Nm (15-18 ft-lb) for Type II sensors (wiring connection enters from the side).

2 Backed out wiring connector terminals can cause intermittent component operation. This idle air stabilization valve worked intermittently. After removing the harness connector's rubber boot, we found that the center wiring terminal had never been properly seated in the harness connector. Peel back the protective wiring boots and give the wires a light tug. Bend back loose terminal locking tabs, then make sure they are locked in place.

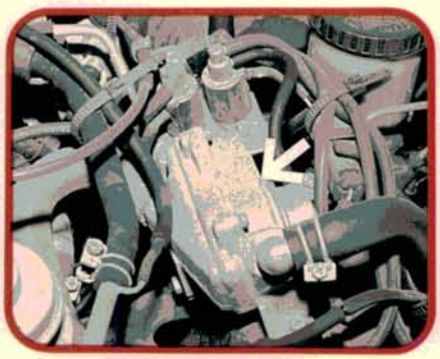
ECCS

We covered the operating theory of the Nissan ECCS engine management system in the April and May 1990 issues of *Import Service*. Like the KE articles, there was more information than we were able to include in the first two parts. We thought this would be a good time to bring you up to date on both systems.

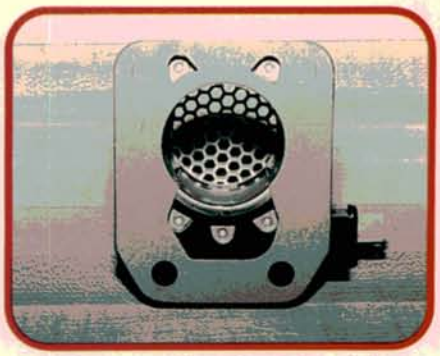
Unlike the KE system, all ECCS systems have self-diagnostic ability. We covered the use of self-diagnosis as a troubleshooting aid in the second part of this series.

But there are many components in the system that aren't recognized by ECU self-diagnostics and won't set a trouble code. We've concentrated on vehicle-specific symptoms and problems that will affect ECCS operation, but probably won't be picked up by the ECU's self-diagnostic section.

—By Karl Seyfert



1 On most ECCS systems, extra air is drawn into the exhaust system through a passage in the air flow meter. The air injection valve (AIV) uses reed valves and the engine's negative exhaust pulses to make sure the air flows only toward the exhaust. The reed valves can fail, allowing exhaust and moisture to attack the inside of the air flow meter. Corrosion inside the aluminum air flow meter housing or other air flow meter problems are usually caused by a damaged AIV.



2 The mixture heater used on ECCS equipped 1988 Sentras and Pulsars is not interchangeable with the mixture heater used on 1987 models. Interchanging these parts will cause a no idle-up condition from the idle speed control valve (ISCV). The 1988 mixture heater can be identified by an extra ISCV air passage at the rear of the heater. 1987 models do not have this passage and will block the idle-up passage.

KE-Jetronic

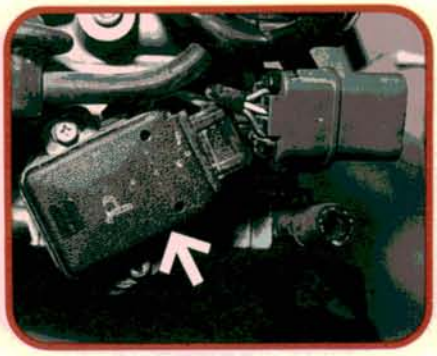
3 Some KE systems are equipped with an altitude sensor (arrow). The altitude sensor helps the ECU decide the correct milliamp current to send to the differential pressure regulator (DPR), based on barometric pressure. The ECU should decrease the DPR's milliamp signal approximately 1 milliamp for every additional 1000 feet of altitude above sea level. At sea level, the altitude sensor has no effect on the DPR reading or fuel mixture.

4 Disconnect the altitude sensor connector. With the ignition on, check for an 8 volt reference signal from the ECU at terminal 2 (middle terminal) of the harness sensor connector. Terminal 3 goes to ground, and terminal 1 sends the sensor's return signal to the ECU. Disconnect the coolant temperature sensor. Use a shunt harness to connect a DVOM to the DPR, then jumper terminals 1 and 2 (zero sensor resistance) to simulate high barometric pressure. DPR current should increase about 3 milliamps.

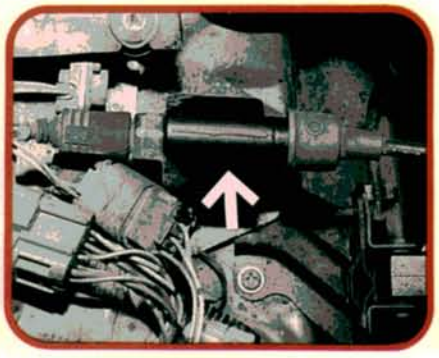
5 Now jumper terminals 1 and 3 to simulate low barometric pressure (high sensor resistance). The DPR current should decrease to approximately 0-4 milliamps. The low DPR milliamp current leans out the fuel mixture to match the thin air at high altitude. If your readings in the previous tests are correct, the altitude sensor may be at fault. Reconnect the sensor's harness connector, then apply vacuum to its vent hole. DPR current should drop.

ECCS

3 A burned distributor cap rotor button may damage the LEDs and photo diodes inside E16 Sentra and Pulsar distributors. The stray secondary spark works its way down the distributor shaft and "blinds" the distributor's photo diodes. Then the diodes may fail intermittently, and cause driveability problems by sending incorrect engine speed and crank angle position signals to the ECU. Always check cap and rotor condition during maintenance work.

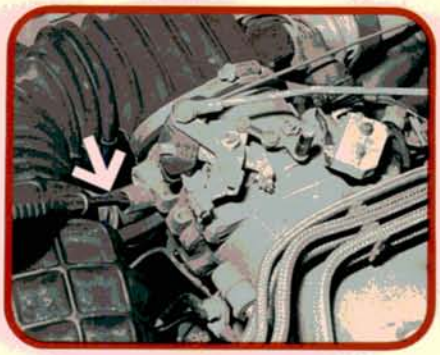


4 A defective throttle sensor on 1986.5 Trucks, 1987 Pathfinders, Vans, Sentra Coupes and 4WD Wagons, and 1987 Pulsar NXs can cause an intermittent engine hesitation or surge under load (it feels like the ignition is being shut off for less than a second at a time). The sensor tells the ECU the exact throttle position. Measure the sensor's resistance while slowly opening the throttle. Watch for opens or dead spots.

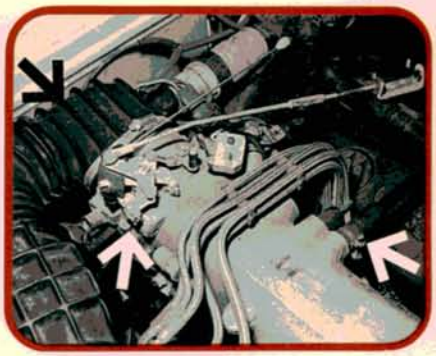


5 The molded ignition coils used on many ECCS vehicles can crack in hard to see places. Cracks allow secondary voltage to leak to ground, especially under load. Misting the coil with water while the engine is running won't always reveal the cracked area. Take the coil off the car and give it a careful inspection. Cracks may be hidden behind the metal coil mounting brackets. A chalky white deposit outlining the cracked area is a dead giveaway.

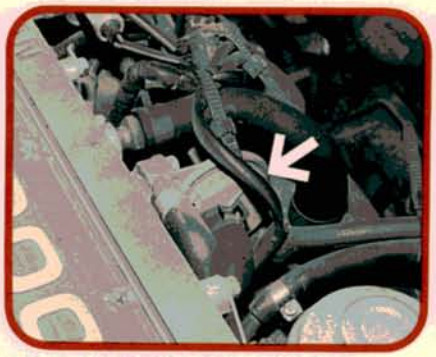
6 If the engine has an unstable or incorrect idle speed, use the following procedure to test the idle air stabilization system. The engine oil temperature must be above 80 degrees C, ignition timing must be set to specs, and the A/C switch should be off. With the oxygen sensor connected, duty cycle measured at the idle air stabilization valve's test connector should be 28 percent (±2 percent).



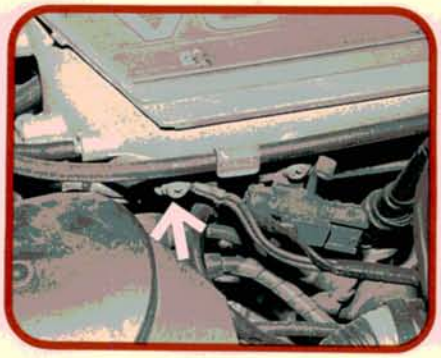
7 If the duty cycle is incorrect, adjust it by slowly turning the idle screw (not the idle stop adjustment). If duty cycle still reads 33 to 40 percent, make sure the A/C is off. Also make sure the ECU is getting a closed throttle switch signal at ECU terminal 13. If the duty cycle still can't be adjusted to specs and varies between 20 and 25 percent, check for an RPM signal from the ignition control unit at ECU terminal 25.



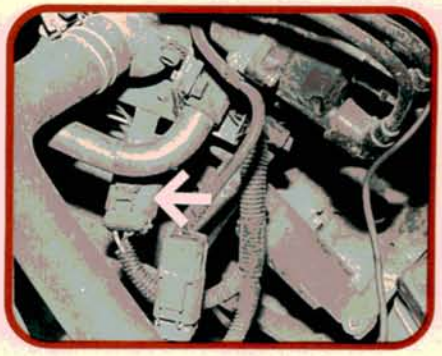
8 If the duty cycle is a steady 25 percent, the idle speed is incorrect. Check for vacuum leaks at the throttle body gaskets, seals, and all hoses in the intake system. Idle fluctuation or hunting can also be caused by a vacuum leak in the air shrouded injection system. Revised air shrouded injection parts are available to replace a distorted o-ring and a distorted or cracked plastic connecting flange which may cause vacuum leaks and an unstable idle.



6 Cold engine fast idle speed on 1985-88 Maximas is not directly controlled by the ECCS control unit. Maximas (and several other ECCS systems) have separate electrically heated bi-metal auxiliary air regulators like those found on earlier L-Jetronic systems. The air regulator's shutter wheel can stick in the closed position, causing a hesitation and no fast idle when the engine is cold. Since the regulator is outside the ECCS system, no trouble codes will be stored.



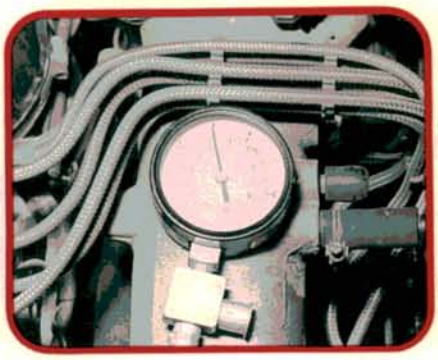
7 A loose engine ground bolt at the front corner of the intake manifold on 1985-88 Maximas can keep the engine from idling, cause it to run rough, and make the exhaust smell bad. Even though the ECCS control unit is located under the passenger seat, wire 19F at the engine grounding bolt supplies the ECU's main ground circuits. The ECU can't accurately control the system without a good ground. Clean and tighten the ground connection as necessary.



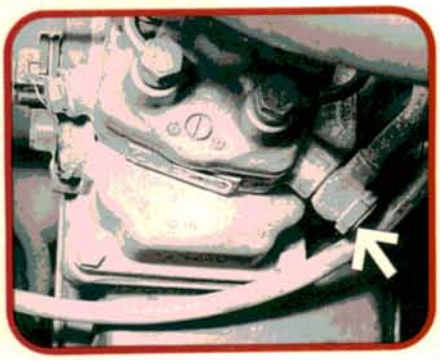
8 A damaged oxygen sensor connector can cause an intermittent surge or hesitation at 1500-2000 RPM on 1987-88 Sentras after the engine is warmed up. Check the routing of the oxygen sensor harness. The connector may be distorted if the harness is pulled too tight. This can cause an intermittent connection, especially at the connector's middle pin. Also make sure the tight harness hasn't chafed any of the oxygen sensor wiring.

KE-Jetronic

9 Check the idle air stabilizer valve's windings for continuity. Resistance should be 24-30 ohms between the outside terminals and 12-15 ohms between either of the outside terminals and the center terminal. Resistance between any of the terminals and ground should be infinite. A carbon-clogged valve may be slow to respond to changes in engine load. Updated valves (identified by a green or yellow dot) are available for 1986 models.



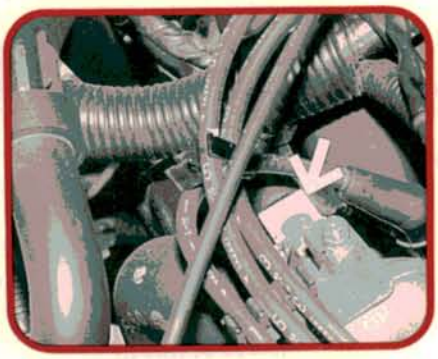
10 A loss of residual fuel pressure will cause hard starting problems. KE systems should maintain a minimum of 2.6 bar (38 PSI) residual fuel pressure for at least 10 minutes after the engine is shut off. If lost residual pressure is caused by a failed fuel pump check valve, the check valve can be replaced separately. The fuel reservoir check valve on Jetta/Golf models is also available separately. Ensure that only one spring is installed under the reservoir plunger.



11 Here's a KE tip that's worth repeating. Some KE systems have a mini-filter built into the banjo bolt at the inlet side of the fuel distributor. The filter was designed to trap any debris left over from production. The filter can become clogged over time, reducing fuel pressure and volume, and affect system operation. The filter bolt can be identified by a flat crown on its head. Remove the bolt and replace it with a hollow, non-filter type bolt.

ECCS

9 A blown engine control fuse and a no-start condition on a 1984-86 Sentra may be caused by the engine wiring harness shorting against the alternator adjusting bracket. This can be hard to find because the bare wires are on the underside of the harness and may only touch the bracket when the engine moves in its mounts under load. You can replace the fuse and it probably won't blow immediately. Repair shorted wires as necessary, then insulate the harness from the bracket.

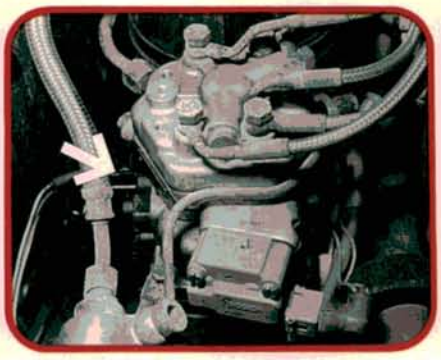


10 On 1989 Maximas, the branch of the ECCS harness that connects to the coolant temperature sensor may be misrouted. The misrouted harness can stretch the wiring, damaging it at the temperature sensor connector. Broken or loose wiring to the coolant temperature sensor may make the engine run rich and very hard to start when cold. The Check Engine light may also light on California models. Re-route or repair the harness to prevent future stretching.

11 Port injected ECCS systems use injectors manufactured by either DKC or JECS. When replacing injectors, always check the original injector's metal ring color and replace it with one of the same color. Ring color indicates the injector's flow rate characteristics. DKC or JECS injectors can be mixed on the same engine, but must all have the same color ring as the original injectors.

KE-Jetronic

12 Some replacement fuel filters may restrict fuel flow and cause a loss of power on Volkswagen Quantums. The recessed inlet boss on these filters may have insufficient clearance for the original fuel filter banjo bolt. Threading the original bolt into these replacement filters can cause the bolt to bottom out inside the filter. A shorter (25 mm) replacement banjo bolt is available from Volkswagen parts departments for use with these filters.



13 Worn air flow position sensor (APS) wiper contacts may cause fuel enrichment problems. The APS potentiometer reports the sensor plate's position to the ECU. Resistance across APS terminals 1 and 2 should be 2.8-4.0 ohms when the sensor plate is at rest. Resistance between terminals 2 and 3 should be less than 1.2 K ohms at rest and increase smoothly to a maximum of 4 K ohms as the sensor plate is lifted.

14 Grease inside the ECU connector can cause stray voltage and a lean running condition on some Jetta and Quantum engines. To test the oxygen sensor circuit for voltage leakage, disconnect the sensor. Install a DVOM between the oxygen sensor's harness side connector and the ground terminal at the cold start injector. With the ignition on, the DVOM should read 0.55 volts or less. Clean the ECU connector if your reading is too high, then repeat the test.

ECCS

12 The VG30i and Z24i engines used in 1986.5 through 1989 Trucks, Pathfinders, and Vans have a throttle body injection ECCS system with two separate injectors. The engine should run on one injector if the other fails mechanically, but the engine will lack power during acceleration and may have a rough idle that forces you to keep your foot on the gas to keep the engine running. Use the following procedure to check the operation of both injectors.

13 The ECCS self-diagnostic system can't identify mechanical injector failure, and won't register a trouble code. Run through Mode Three self-diagnostics first to check for trouble codes. If any other codes are present, repair these problems first. Test both injectors by a process of elimination. Locate the injector harness connector (arrow), then disconnect the red wire on the injector side of the connector. This disables the "B" injector.

14 The engine should run at idle on injector "A" because the ECU senses an electrical failure and switches to Fail-Safe Mode. If the engine won't idle, or idles poorly, replace injector "A". Stop the engine, reconnect the injector "B" red wire, then disconnect the green wire on the injector side of the connector to disable the "A" injector. Restart the engine. Replace the "B" injector if the engine won't idle or idles poorly.