VERIFYING CUSTOMER COMPLAINT

All troubleshooting must begin by "CHECKING THE BASICS"

Certain basic faults can be undetectable by the self-diagnostic system of the engine control unit and in some cases can actually interfere with the self-checking and fault memory operation.. Low battery voltage, for example, can cause erroneous faults to set in control unit fault memories or can cause a system to go "Fail Safe" without setting a fault in memory. On the other hand, system fault memories are cleared whenever the control unit or the battery is disconnected. Therefore, all fault memories should be read prior to any vehicle power interruption or troubleshooting.

Prior to any teardown, repair or component replacement, the following steps should always be considered.

COMPLAINT VERIFICATION

Whenever possible the repairing technician should personally verify the complaint. Having experienced the malfunction, the technician is less likely to try to repair non-existent faults.

MALFUNCTION VERIFICATION

Today's sophisticated automotive systems are easily misunderstood, which can lead to repairs that attempt to force a particular system to perform in a way that it was never intended to operate. Therefore, the troubleshooting technician should compare the system operation to the nominal system operation. Refer to **DESCRIPTION AND OPERATION** Furthermore, the technician is also encouraged to compare the problem vehicle system operation with a known good vehicle.

PREVIOUS REPAIRS

The vehicle repair history can provide explanations to unusual complaints which seem to elude normal troubleshooting attempts. Incorrect components or unapproved repairs can have subtle influences on seemingly unrelated systems.

BATTERY STATE OF CHARGE

Batteries in a state of partial discharge can have a dramatic effect on CIS-E control units and related components.

POSITIVE BATTERY CABLE INTEGRITY

All B+ connections must be in perfect condition for trouble-free electronic system operation. Refer to **ELECTRICAL AND ELECTRONIC DIAGRAMS** for B+ interconnects.

FUSIBLE LINK INTEGRITY

Fusible links are employed to prevent possible damage to electrical components and wiring harnesses. These links and their connections must be without dynamic resistance. Dynamic resistance can only be checked using the voltage drop method of testing.

NEGATIVE GROUND CONNECTIONS

As all electrical circuits are a circle, all B- connections must also be checked and verified to be in perfect condition. A poor "common" ground point will cause seemingly unrelated systems to influence one another. High current systems which encounter a poor "common" ground can back feed through other electrical systems causing unusual operation and perhaps inexplicable component failure. As with the B+ side of the electrical system, the

ground side should be checked dynamically using the voltage drop technique.

POWERTRAIN CABLE ATTACHMENTS

Metal cables attached to the engine or transmission which appear overheated and/or discolored indicate the need to thoroughly test all ground connections.

POWER SUPPLY RELAYS

Fuel pump and overprotection relays as well as their plug connections can be a source of intermittent operation which will not set a fault in the fault memory.

CRANKSHAFT POSITION SENSOR

Monolithic/optical sensors should be checked statically and dynamically. Physical mounting and condition of the sensor and segment wheel must be assured.

HIGH TENSION COIL AND SECONDARY COMPONENTS WIRING

The secondary ignition system should be checked visibly as well as with a suitable engine analyzer and scope. All components should be examined for tight connections and freedom from carbon tracking, moisture and corrosion.

FUEL DELIVERY AND PRESSURE

Fuel delivery must begin at once when cranking and the pressure in the fuel rails must be within specifications. Fuel pressure retention must be maintained between the fuel pump outlet and the pressure regulator after engine shutdown.

VALVE CLEARANCE AND SPARK PLUGS

These two service items, if out of specification, can significantly impair engine performance. Valve clearance adjustment procedures should be strictly observed. Spark plug type, condition and gap must verified according to specification.

AIR/FUEL RATIO

When troubleshooting idle quality or driveability complaints, it is necessary to consider the following:

Injector spray pattern quality
Presence of unmetered air leaks
Evaporative purge system
Excessive engine oil dilution
Substandard fuel or unapproved additives
Carbon build-up

NEVER USE A BULB TYPE TEST LIGHT TO CHECK COMPUTER CIRCUITS.

A quality digital volt ohm meter, logic probe or a lab-type oscilloscope are the only instruments that can be used to check computer circuits without causing damage.