

AIRSENSORSTM

Single Point
**ELECTRONIC
FUEL INJECTION
SYSTEM**

by AIRSENSORS

**Model N-8A
for
V-8 Automotive Applications**

**Model N-8A-HD
for
V-8 Heavy Duty Applications**

APRIL 1986

TECHNICAL MANUAL

and Owners Guide

AN INTRODUCTION to AIRSENSORS

AirSensors, Inc. (ASI) has been involved in the research and development of sensor technology for about five years. Air mass flow devices designed and developed by ASI have been in limited production for several years. These employ "hot wire" anemometry, coupled with electronics and are used primarily to optimize combustion processes.

The first of a family of products developed to use ASI's air mass sensor is Electronic Fuel Injection (EFI) by AirSensors. There are less than a dozen companies worldwide with the technology to provide EFI. AirSensors is the first company to offer an EFI system designed specifically to replace existing automotive carburetors. EFI by AirSensors has been in limited production for nearly two years. First systems were supplied to B & M Automotive Products (California) as part of "Superjection", featuring B & M Forced Induction systems (superchargers) with EFI.

AirSensors EFI systems increase performance by improving power, low end torque, driveability, cold start and mileage. This is achieved by electronically computing and controlling the appropriate air-to-fuel ratio from monitored engine operating conditions. It brings the benefits of OEM electronic fuel injection to the automotive aftermarket.

A joint venture company, AirSensors International Co., Ltd., (ASICO) is the only manufacturer of carburetors or EFI systems in Taiwan. ASICO is AirSensors' primary manufacturing resource for lower product cost. This association also provides entree to the Asian Pacific Rim where ASI is currently developing multiport system designs for several small auto manufacturers in Taiwan, Korea and India and anticipates becoming a major EFI supplier in that area. Eventually these advanced EFI systems, some with supercharging and turbocharging, will be offered in the U.S. aftermarket.

Current research and development activities are focused upon natural gas combustion control and the use of compressed natural gas in internal combustion engines. Biomass fuel systems, including those using alcohol derivatives from corn, wheat, sugarcane waste and other agricultural sources, are pending near-term research projects with great future potential.

Single Point ELECTRONIC FUEL INJECTION SYSTEMS

Aftermarket EFI Conversion Kits

"N" Model, single point, Electronic Fuel Injection (EFI) Systems by AirSensors are designed specifically for AirSensors normally aspirated V-8 and V-6 engine EFI conversion kits. The kits include virtually all fuel, air and electrical components for conversion of the specified engine application. These are throttlebody type systems designed to replace existing carburetors and provide benefits comparable to those afforded by OEM single point electronic fuel injection. They can also be adapted for forced induction using an appropriate B & M supercharger if sufficient underhood clearance is available.

EFI Systems by AIRSENSORS provide a dramatic improvement in power and driveability in a variety of applications. On a GM equipped 454 motorhome chassis, an average torque increase of 30% is achieved over the entire RPM range, measured at the rear axle. Vans, Towing Vehicles, RVs, and Off-Road Rigs experience similar results. EFI by AIRSENSORS returns the pleasure to driving.

AirSensors EFI systems are recommended for specific applications using the existing emission control devices provided. These systems employ "hot wire" anemometry to measure the mass of intake engine air and are not affected by changes in altitude, temperature or humidity. They electronically determine engine operating conditions and control the injection rate of gasoline to optimize desired performance. Adjustments for engine matching include basic air/fuel ratio selection and enrichment for cold start, acceleration, heavy load and idle conditions.

Each Model EFI system has been designed and engineered for a particular application. For example, the Model N-8A Kit was designed for pre-1981, 305 or 350 V-8 Chevrolet engine, manual transmission applications. It may be applied to, and use the emission devices of, other pre-1981 V-8 engines with approximately the same displacement range, and/or with automatic transmissions, but only with appropriate linkage and modification not supplied with the kit. AirSensors' EFI Kits are designed to be sold on an installed basis by qualified and trained installers, using the technical information supplied with each Kit.

This Technical Manual was prepared especially for installers and maintenance personnel experienced in the engine and drive train systems for which these EFI systems are specified. For forced induction applications, the installer must be familiar with pertinent B & M supercharging systems. The Technical Manual is intended as a guide for installing AirSensors EFI Kits only. After installation it must be left with the vehicle owner as his Owner's Guide.

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SECTION I

OPERATION

FUEL SYSTEM

The recommended fuel system, for which system components are furnished, uses the existing supply line from the gasoline tank to feed pre-filtered fuel to an electric high pressure pump. The output is again filtered and piped to the fuel rail serving the four electronic fuel injectors fitted to the throttlebody. Fuel pressure is maintained at 39 psi by a regulator downstream of the fuel rail, and the gasoline flow surplus to engine (injector) need, is returned to the gasoline tank.

A return line must be installed and safely connected to the tank, if not a part of the existing fuel system. Vaporlock problems are largely avoided by this recommended system because it returns unused fuel exposed to engine compartment heat to the tank and draws cooler replacement fuel from the tank. The use of an existing low pressure "in-tank" pump (which must be free-flowing in the event of pump failure) or a supplemental free-flowing electric "pre-pump" to maintain inlet pressure on the high pressure pump is recommended to reduce excessive pump noise and vaporlock in hotter climates.

Short loop systems which return unused fuel directly to the inlet of the high pressure pump have been installed successfully where heat build-up in the engine compartment has been minimized and positive pressure maintained at the pump inlet. This is a less complex installation which eliminates the need for a return line, if not available, but requires further evaluation before recommendation by AirSensors as a standard system.

THROTTLEBODY

A low profile four-barrel Throttlebody (T/B) fitted with four electronic fuel injectors and a fuel rail system is provided with ASI N Model Kits. It is designed to fit a four-barrel intake manifold and has both Holley and Quadrajet "spreadbore" bolt patterns. It has been installed on a two-barrel manifold with an adapter plate; however, **THIS IS NOT RECOMMENDED** because fuel "puddling" hinders performance and reduces fuel economy.

The four butterfly valves open and close simultaneously; it is not designed for primary and secondary opening operation as provided in many carburetor designs. Air flow is adequate for large block V-8 engine applications. Consequently, full air flow for small block engines applications is available at much less than wide open throttle positions. A low profile two-barrel throttlebody, desirable for many of today's smaller engines, is under design.

Throttlebody injectors are located above the butterfly valves. Two of the provided vacuum ports (angled or marked PV) are timed delay ports. The other vacuum ports (straight or marked MV) are full manifold (hot) vacuum.

The throttle arm, designed specifically for Chevrolet applications, will accommodate the linkages for a small block Chevrolet engine with manual transmission with little or no modification. All other applications will require adapters, many of which are commercially available. AirSensors will eventually have linkage conversion kits for most popular engine configurations in appropriate size ranges.

AIR SYSTEM

Engine intake air is inducted through an air filter to the inlet of AirSensors' proprietary Air Mass Sensor (AMS). This device is a conduit tube in which an electrically heated wire is centered. As air flows by the wire, heat is dissipated from the wire. (The heated wire is susceptible to shock damage and will part at stresses above 50 G's. Although quite rugged, the air mass sensor must be shock isolated from direct engine vibration.)

Electronic circuitry, which is a part of the device, senses the resulting temperature change and causes additional electrical current to flow to the wire, maintaining a constant pre-determined temperature above that of the incoming air. The current required for this purpose is a mathematical function of the mass flow (rather than volume) of the incoming air. For this reason, this device provides the basis for accurate air-fuel ratio control without regard for altitude, temperature or humidity changes.

Response time is very rapid. An electrical signal representing instantaneous air mass flow is generated electronically and transmitted to the EFI system's Electronic Control Unit as one of several inputs for computing and controlling the fuel flow appropriate for engine operating conditions.

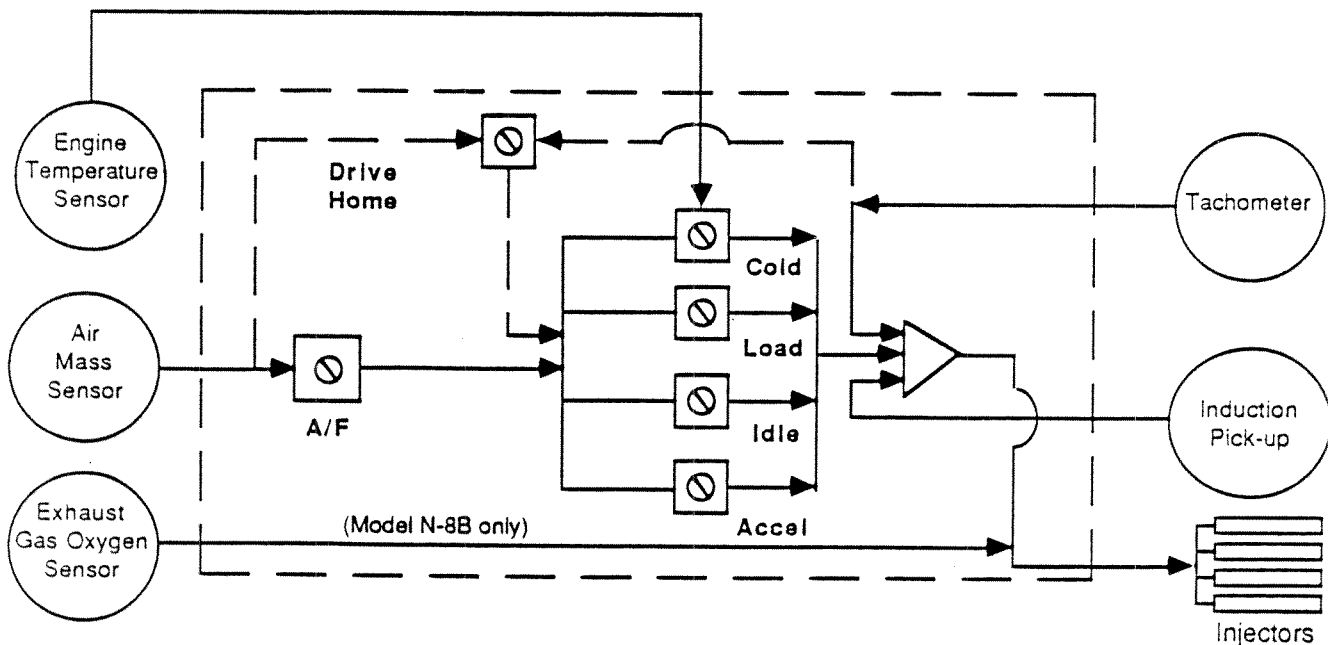
The air plenum, which conducts intake air from the outlet of the air mass sensor to the throttlebody, is subject to friction losses proportional to air flow. Attractive air plenums designed by B & M for restrictive hood clearance problem installations are available on an optional basis. Although these have higher friction losses, they flow sufficient air for most applications and were designed primarily for low hood supercharger applications.

ELECTRONIC SYSTEM

The Electronic Control Unit (ECU) controls the operation of the entire EFI system. It receives electrical input signals from the air mass sensor, tachometer, engine temperature sensor and inductive pick-up (sparkplug impulse), computes the quantity of fuel required for optimum engine operation, and sends electrical impulses to the fuel injectors for the required fuel. A recent design improvement enables the ECU to refine air/fuel ratio control from exhaust gas oxygen (EGO) sensor input signals (MODEL N-8B).

The ECU has a primary air-to-fuel adjustment (A/F ratio selection), four secondary enrichment adjustments (COLD, LOAD, IDLE, ACCEL) and one "break down" adjustment (DRIVE HOME). These are limited adjustments to enable the installer to match the EFI system to the specific vehicle application. Instructions for the adjustments are provided on the side and end of the ECU.

A simple block diagram illustrating how the ECU functions and how its engine matching adjustments relate to EFI system control, is provided below:



ECU ENGINE MATCHING ADJUSTMENTS -- FIGURE 1

This diagram is not intended to illustrate how the ECU functions electronically; this is fairly complex. The interrelationships of inputs, outputs and how the adjustments affect the outputs is accurately illustrated above, however, and provides an understanding for using and properly sequencing the engine matching adjustments. Further detail is provided in Section II.

SECTION II

INSTALLATION

1. PREPARATION

Tools and Procedure

● WARNING ●

Tools must include a dry chemical fire extinguisher (Class A, B & C). **GASOLINE IS HIGHLY FLAMMABLE**; electrical and static **SPARKS MUST BE AVOIDED**. Use sparkproof tools where appropriate.

Aside from normal hand tools and supplies for engine and systems repair and maintenance, some special equipment, listed below, will make the installation and troubleshooting of AirSensors Electronic Fuel Injection Systems easier and more efficient.

ITEM	QUANTITY	TYPICAL (or equivalent)
Volt/Ohmmeter	1	Snap-on p/n MT406 Matco p/n ET586
Test Light	1	Any 12V DC
Fuel Pressure Gage	1	Snap-on p/n MT321B Matco p/n FIT13
Hose Pinch Pliers	2	Snap-on p/n VP07
Steel Tubing Cutter	1	Myte-Mite
Hole Cutter (1 ")	1	Green-Lee
Engine Performance Analyzer (w/EGA)	1	Allen "Computer Test Center" Bear "Ace" Sun "Interrogator"
Exhaust Gas Analyzer (EGA) (Stand alone)	1	(if not included above) Bear p/n 42-907 Sun "The Inspector"

A Check all parts against the EFI KIT parts list (Appendix).

● CAUTION ●

Make sure the vehicle on which the EFI system is to be installed is in good operating condition. Electronic fuel injection will not cure mechanical and electrical faults - low compression, poor cylinder balance, faulty ignition and similar basic problems - any better than will the installation of a new carburetor. It is especially important to have a good ignition system; interference from **BAD PLUGS** or **FRAYED WIRES WILL CAUSE EFI MALFUNCTION.**

2. VEHICLE PREPARATION

Prior to beginning any dissassembly:

- A Idle warm motor (out of gear, with brake set) and test and label each hose for vacuum connection at the carburetor (manifold or ported).
- B Clean both battery terminal connections.
- C Clamp off the fuel supply line, disconnect the hose at the stock pump and drain.
- D Drain the gasoline tank, if a return line is to be installed, to replace the existing fuel tank "sending unit" with one which has a return line fitting.
- E To work on the fuel system, it is recommended that the vehicle be raised and safely supported to a comfortable working height.

● NON-STANDARD APPLICATION ●

AirSensors EFI Systems are engineered for specific applications. For example, Model N-8A is specifically applicable to pre-1981 Chevrolets with 305 or 350 engines and manual transmissions. The EFI Kit provided for this application contains essentially all of the parts for a normal installation. However, the EFI Kit can also be applied to V-8 engines with similar displacement, with manual or automatic transmissions, provided modified throttle, cruise control and transmission linkage requirements are met.

F Procure all adapters and linkage devices needed, if making a non-standard installation.

Some adapters and linkage devices for this purpose are commercially available from suppliers like Holley and Mr. Gasket. AirSensors plans to supply linkage adapter kits for most popular applications as specific needs are identified and parts designed and manufactured. There will always be a need, however, for access to basic metal fabrication equipment to make custom devices for non-standard installations. Once the primary throttle, transmission and cruise control position and geometry has been disrupted by manifold changes or auxiliary equipment, custom modification will be required to restore that geometry.

3. FUEL SYSTEM

Fuel Tank

A If the vehicle has no return line, remove the existing sending unit and replace with a sending unit with a 1/4" OD or larger return line fitting. Always inspect tank and clean, if required.

● WARNING ●

NEVER USE THE VAPOR RETURN LINE from the charcoal vapor canister as the fuel return line.

Alternatively, a return line fitting may be installed in the existing sending unit, making sure that a return tube is fitted inside the unit to a location near the supply line pick up. Remove and replace the supply line filter (sock) if using the existing sending unit.

There are gasoline-tight screw-in devices which can be used to tap gasoline tanks at mid-level for return line connection, if sparkproof tools and proper precautions are exercised. These should only be used by installers experienced in gasoline tank repair.

● DUAL FUEL TANKS ●

Dual fuel tank equipped vehicles must be plumbed to return excess fuel to the tank in use to supply fuel to the EFI system, to avoid tank overflow and other problems. Remotely activated dual three-way valves are highly recommended and are available as optional equipment.

● COMPONENT LOCATION AND CONNECTION ●

Fuel system problems can be largely avoided by locating system components as recommended below. System and components must be protected - shielded if necessary - from exhaust heat and engine compartment heat. Locate all components to protect from road damage and to provide for periodic servicing. Connect all hoses with hose clamps.

B By-pass or remove the mechanical fuel pump, capping the fittings or blocking off the opening to prevent leakage.

C Low Pressure Fuel Filter - Locate at the inlet of fuel pump (except "in-tank") with minimum of 4" separation from pump inlet.

D High Pressure Electric Fuel Pump - Locate below mid-level of the fuel tank (best if located below tank level in a protected position) and fasten to frame close to the tank.

● PRE-PUMP ●

If the vehicle has an "in-tank" electric fuel pump, use it as a "pre-pump" to feed the supplied electric high pressure fuel pump.

A pre-pump is always recommended for vehicles operating in hot climates and for Class "A" RV's and will be supplied as an option, if ordered.

E High Pressure Fuel Filter - Locate at the outlet of the high pressure fuel pump at frame level.

F Steel Fuel Tubing - Use existing steel fuel tubing where practical to provide secure routing and for heat dissipation. Cut with tubing cutter to install components, connecting with high pressure fuel hose and non-cutting metal clamps (see below). Replace any existing low pressure jumper hoses with high pressure hose (see below).

● FITTINGS - HOSE ●

Fuel Hose Clamps/Fittings - Use non-cutting, rolled-edge metal hose clamps designed for the specific hose size, Awab Aluzinc 14, Global Metrics ABZ - NO4 or equivalent. Make sure all hose fittings are identical in size at both ends of hose and the hose I.D. matches.

Low Pressure Fuel Hose - Use high pressure hose (see below) and install with restriction-free bends and in protected locations. Only a small quantity of low pressure hose is required for the entire EFI installation; the use of high pressure hose instead protects against accidental over pressure in the event of regulator failure.

G High Pressure Fuel Hose - Use only double braided high pressure gasoline hose, Aeroquip 1525-(hose size code) or equivalent, and install with restriction-free bends in protected locations. **USE EXCLUSIVELY** from outlet of high pressure fuel pump to fuel rails and from fuel rails to inlet of fuel pressure regulator.

H Throttlebody Fuel Rail - The fuel rail is an integral part of the Throttlebody. Connect the outlet of the high pressure fuel filter to the inlet (either end) of the fuel rail system with high pressure hose.

I Fuel Pressure Regulator - Connect the outlet (other end) of the fuel rail to the inlet (side connection) of the fuel pressure regulator with high pressure fuel hose. Locate the regulator close to the fuel rail. Connect the outlet of the regulator to the return fuel line with high pressure fuel hose. (Connect the dry side of the regulator diaphragm chamber to manifold vacuum, using 5/32" ID vacuum hose between the 3/16" stem on the regulator and one of the two 3/16" straight nipples, marked MV, on the throttlebody.)

J Fast Idle Air Valve (Optional) - If idling is a problem, bolt this optional device to the intake manifold near the throttlebody. Locate to retain engine warmth after engine becomes warm.

4. INTAKE MANIFOLD

● MATCHING MANIFOLD ●

In many instances, a specific manifold matched with an AirSensors EFI system will result in a dramatic improvement in the performance of a normally aspirated engine. For example, an Edelbrock Torker II (p/n 5001) works exceptionally well on a Chevrolet 305/350 V-8, improving low end torque and providing excellent performance. Manifold recommendations are available from AirSensors distributors or from the factory.

The AirSensors normally aspirated EFI system was designed for a dual plane, 180 degree intake manifold using a four barrel, four injector throttlebody, but works best with open plenum manifolds. It fits directly to a four barrel intake manifold with a Holley bolt pattern but requires a commercially available spacer for mounting on Quadra-Jet manifolds, using the alternate bolt pattern on the throttlebody. A manifold change is **HIGHLY RECOMMENDED** if the engine is equipped with a two barrel manifold.

If using a dual plane, 180 degree manifold, proper sequencing of injector firing is indicated in Figure 2 of the Electronic System text below. This sequencing also works well with open plenum manifolds.

● SUPERCHARGER APPLICATIONS ●

ASI N-8 Models are currently designed for a maximum fuel flow of 33 gallons of fuel per hour. This limits their use for supercharged applications. A B & M 144 cubic inch Forced Induction Supercharger, installed in accordance with B & M Installation Instructions, bolts directly to the throttlebody with supplied B & M parts. Contact B & M for supercharger details.

5. THROTTLEBODY

Linkages and Controls

- A Before removal of the carburetor, observe the linkage connections for throttle, transmission kick-down, cruise control and so forth at the carburetor throttle arm.
- B Remove old manifold and install new manifold, if recommended.
- C Install throttlebody, using provided bolts, washers and gaskets.
- D Duplicate the throttle linkage action and geometry on the throttlebody throttle arm, using carburetor clips, clevises, pivot balls as necessary.
- E Reconnect the labeled vacuum hoses to the proper vacuum ports on the throttlebody.
- F Cap all unused ports with provided caps.

6. ELECTRONIC SYSTEM

Wiring Harness

- A Locate a firewall access hole (1 ") through which to pass the "injector connectors end" of the wiring harness, after installing the provided rubber grommet, leaving the "ECU connector end" inside the passenger compartment.
- B Cut a hole, if necessary, first checking **BOTH SIDES** of the firewall for clearance. Harness connection instructions are provided below.

Sensor Locations and Electrical Connections

- C Bolt the Engine Temperature Sensor to the intake manifold at the "exhaust crossover" point for hot climate installations. Bolt to the rear of manifold for cool or cold weather installations.

MAX TEMP 300°F

- D The Induction Pick-up Sensor for V-8 applications is slipped over the spark plug wire for the second cylinder in the engine firing order (#8 cylinder for all Chrysler, General Motors and Ford Engines, except Ford 351 & 400-#3 cylinder and Cadillac 425 & 500-#5 cylinder). The connector side of the sensor is oriented toward the distributor, as indicated on the side of the sensor. It may be necessary to remove the sparkplug boot to pass the wire through the sensor. Check to assure a good electrical connection after replacing boot. (Performance may be improved on some engine/manifold combinations by using a different wire; try this only during troubleshooting.)

Changed to # 6

E Connect all wire leads as follows:

Small White - to IGN at the fuse block, to the large red wire on GM HEI distributors or before ballast resistor on point distributors.

Green - Distributor side of coil, tachometer connection on HEI distributor.

Gray - Engine Temperature Sensor.

Violet and Black (with white connector) - to Induction Pick up Sensor.

Injector Connectors (four) - See Figure 2 below.

Long Red - to the positive (+) terminal on the fuel pump. (Ground the negative terminal to the frame.)

Large Black (twisted with large white) - to the negative (-) battery terminal.

Large White (twisted with large black) - to the positive (+) battery terminal.

Red (with black ground strap) - to the Optional Fast Idle Air Valve. (Ground to Valve bolt.) Tape off wires if not used.

Air Mass Sensor Connector - to matching connector on AMS harness. The connection for the air mass sensor is also made before start-up. It must be disconnected to adjust Drive Home as noted below, however, and then reconnected.

● SHORTENING WIRING HARNESS ●

Shortening the wiring harness is **NOT** recommended. If shortening is required, **DO NOT ELIMINATE** or by-pass resistor in the green lead (system will not function).

Injector Connections

The electronically controlled injectors are fired sequentially to optimize cylinder balance and promote smooth idling and best engine performance. The order of firing varies with engine types as noted in Figure 2 below and is particularly important when using a dual plane, 180 degree manifold. Injector locations on the throttlebody (which may not be marked) are: (1) passenger side, rear; (2) driver side, rear; (3) passenger side, front; and (4) driver side, front.

● INJECTOR CONNECTOR ORDER ●

INJECTOR CONNECTOR

INJECTOR POSITION

All Chevrolets Cadillac 450
All Chryslers Cadillac 500
All Fords except Ford 351 & 400

A (Brown with red)	(1)	RR	(3)
B (Black with red)	(2)	LR	(4)
C (Orange with red)	(3)	RF	(1)
D (Yellow with red)	(4)	LF	(2)

FIGURE 2

7. AIR SYSTEM

Air Plenum, Air Mass Sensor and Air Filter

- A Place provided gasket on throttlebody and place plenum adaptor on gasket. (Plenum adaptor is not required for all air plenums.)
- B Place provided gasket on plenum adaptor and place air plenum on gasket, orienting nozzle to clear space for hose installation (usually the passenger side). Use provided threaded bolt, gasket and wing nut to hold down air plenum.
- C Attach flexible hose to air plenum nozzle with hose clamp.
- D Attach outlet end of air mass sensor (direction of arrowhead on AMS) to other end of flexible hose with hose clamp.

● VIBRATION - CLEARANCE ●

If using an optional B & M air plenum, **MAKE SURE THERE IS NO METAL TO METAL CONTACT** between the throttlebody and the air plenum or between the air plenum and the air mass sensor to transmit vibration and break sensor wires. Wires will break if vibration forces exceed 50 G's. Certain combination of engine and supercharger harmonics will break wires in close-coupled air mass sensors even with the above precautions. If this occurs, **CORRECT BY REMOTE MOUNTING** the air mass sensor with a 4" ID flexible hose extension.

Make sure there is sufficient **FREE CLEARANCE** for AMS and **FILTER** during **HARD ENGINE TORQUE** movements.

E Attach air filter over inlet end of AMS with hose clamp.

F Secure air filter to fender well, radiator support or similar structure (not to engine or engine accessories) with provided bracket, away from pulsating air currents. Air filter should be located to draw cool air into the engine, for best performance.

The air plenum must be installed on the throttlebody with pliable gaskets (including one under the hold down bolt) to minimize engine vibration and reduce dust infiltration. The air mass sensor must be oriented as indicated by flow direction and is connected to the air plenum by the provided 14" length of flexible rubber hose. The air filter is connected directly to the air mass sensor. Use the provided hose clamps on all air hose connections.

• AIR CURRENTS •

SHIELD or RELOCATE THE AIR FILTER away from pulsating **AIR CURRENTS**; fan blades or alternator fins will create false air mass flow values. A thin open cell polyurethane sock may be used to cover the air filter. Secure the AMS and air filter to the fender well or body, not to the engine or engine attachments which will transmit unacceptable vibration. The AMS is designed to withstand body vibrations.

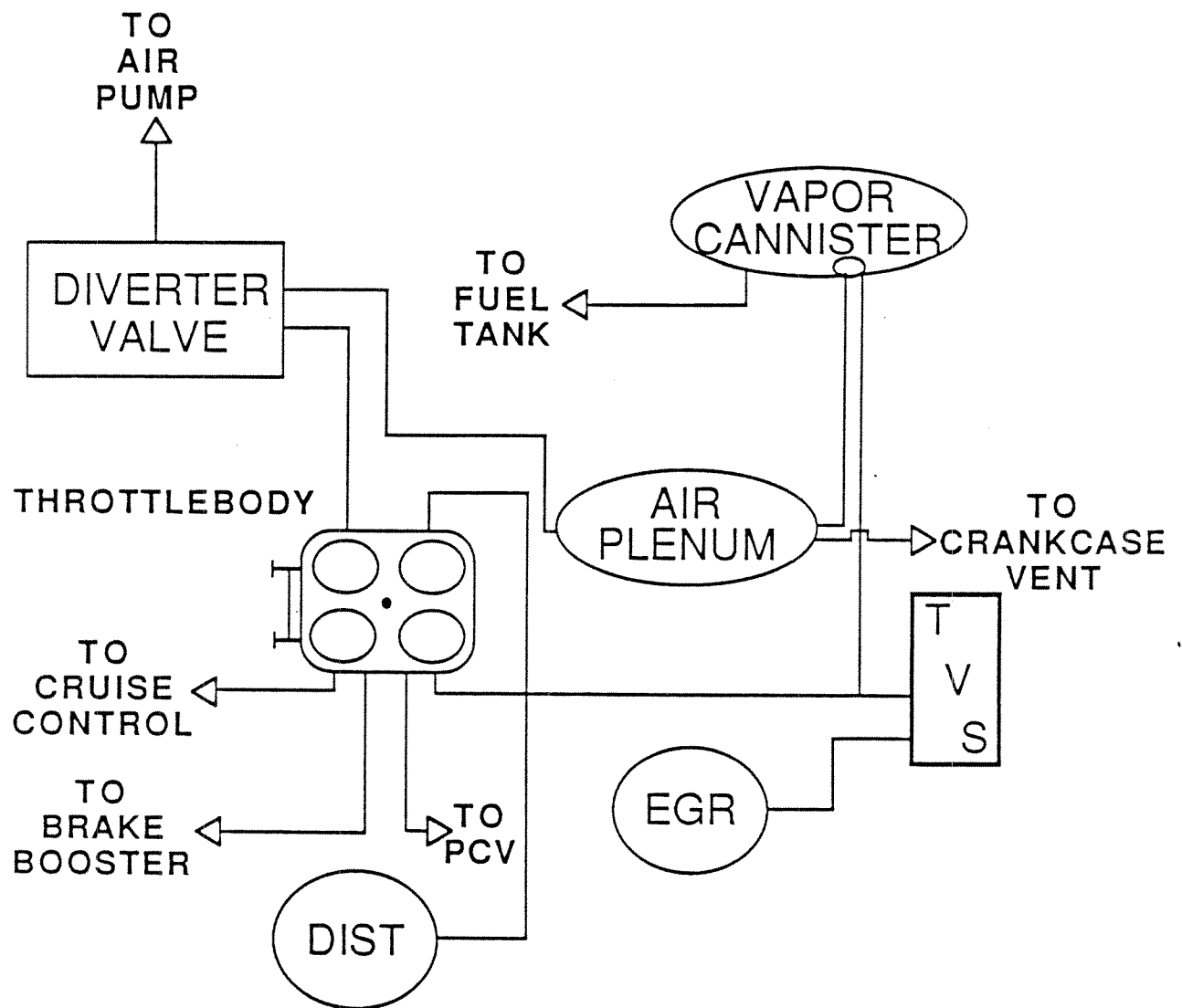
Emission Connections

G Drill and tap air plenum (unless provided) for reconnecting the PCV fresh air supply.

ECUs for Model N-8B EFI systems include EGO circuitry and wiring harness connections for exhaust gas oxygen sensing.

H All of the original emission equipment supplied by the vehicle manufacturer, with the exception of the carburetor, must be retained and operated within its original specifications as designated by the engine manufacturer.

FIGURE 2, TYPICAL EMISSION CONTROL HOSE CONNECTIONS, illustrates the hose connections for a 1986 GM P-series chassis, 454 CID-TURBO 400 Class A motorhome. However, each vehicle has been provided with a specific diagram for its particular emissions connections which must be followed to comply with the emissions standards for that vehicle.



TYPICAL EMISSION CONTROL HOSE CONNECTION
FIGURE 2

8. START-UP

Checks and Tests

- A Check all fuel hose connections and retighten if necessary.
- B Secure hoses and all fuel system components to frame or other solid support and shield from direct heat sources.
- C Refill the fuel tank, if drained, and recheck connections for leaks.
- D Check all electrical connections and tie down all wiring to prevent chafing, snagging or burning.
- E Determine a location for the ECU inside the passenger compartment, fasten for ready removal to make adjustments. A four foot long wiring harness extension is available as a option.
- F Plug in wiring harness and attach the black grounding wire to the ECU case with the provided ground screw.
- G Turn the key to the "ON" (not "start") position and listen for fuel pump operation. It will run for 4 to 8 seconds and then automatically shut off, if no ignition, as a safety feature.
- H Check for fuel leaks, repeat the key "ON" cycle six or more times, checking for fuel leaks after each cycle, to prime the fuel system. A "squawking" noise is normal as fuel regulator "by-pass" pressure is built up and released through the return line.
- I Then turn key to "START"; engine should start within several tries. The ECU adjustments are factory set, at 10 o'clock positions, for normal starting. If engine **DOES NOT START, DO NOT READJUST ECU SETTINGS.** Recheck instructions and entire installation. (See Troubleshooting, Section III.)
- J After starting engine, set timing **NOW** if the distributor was moved or removed during installation (as in a manifold change).
- K Thereafter allow engine to warm up in preparation for making ECU engine matching adjustments.

9. ADJUSTMENTS

Engine Matching Adjustments

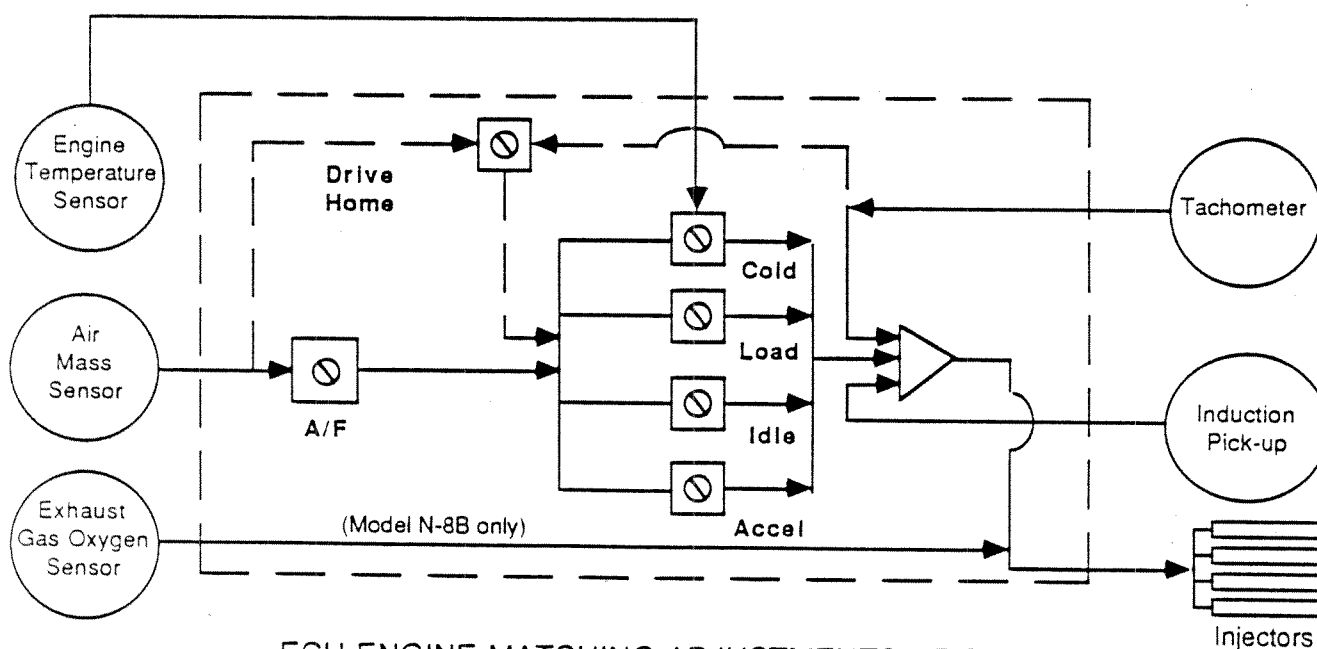
● PRECAUTIONS ●

Make all Engine Matching Adjustments, except **COLD**, with the **ENGINE WARMED**. Assure the vehicle is **SECURED FROM MOVING** while making standing adjustments. Drill and tap the exhaust line (1/8" pipe) to sample the engine exhaust at the **INLET** of the catalytic converter, if so equipped. (Insert 1/8" pipe plug after sampling.)

It is **HAZARDOUS TO DRIVE** and **ALSO MAKE MOVING ADJUSTMENTS** - use a chassis dynamometer or a helper while adjusting **LOAD** and **ACCEL**.

The above precautions and the adjustment instructions below are summarized in labels fixed to the side and end of the ECU.

There are five Engine Matching Adjustments accessed through holes in the cover of the ECU. A Drive Home adjustment in the side functions only when the air mass flow signal is lost. Figure 1 is repeated below for a review of adjustment interrelationships.



ECU ENGINE MATCHING ADJUSTMENTS - FIGURE 1

The functions of the Engine Matching Adjustments are described below. In many respects the EFI system operates much like a carburetor; the adjustments are therefore similar. Note as indicated on the labels, clockwise adjustments (toward R) provide richer mixtures (except for Drive Home).

A/F

A Adjust at 2500 RPM, with no load, to about 2% CO reading for exhaust. Sparkplug or tailpipe color, after some use, should be light gray or tan (white color indicates too lean a mixture; black indicates mixture too rich).

Controls the basic **AIR to FUEL RATIO** of the gasoline/air mixture for warm, steady, level driving. Note in Figure 1 above, all other adjustments provide **ENRICHMENT**, and decreases the A/F ratio, for improved performance and driveability under other driving conditions.

IDLE

B Adjust in gear if vehicle has automatic transmission, with air conditioning on, if so equipped, for smooth operation, using screw adjustment on throttlebody for appropriate RPM.

Controls enrichment during engine idling condition. Cylinder imbalance, poor engine condition or other factors unrelated to EFI, may prevent perfect idling.

LOAD

C Adjust on chassis dynamometer near full throttle to about 4% exhaust CO reading. If no dyno is available, it can be adjusted while driving under load, by a passenger (for safety), by vehicle performance during acceleration (power "sag" or "ping" indicates mixture too lean) and noting exhaust (black smoke indicates mixture too rich).

Controls enrichment during climbing, passing, towing or other operations imposing a heavier **LOAD** on the engine. Will decrease "mileage" if set too rich.

ACCEL

D Adjust to eliminate initial hesitation or "bog" during quick acceleration. Lean out for black exhaust "puffs".

Controls enrichment for "accelerator pump" effect during quick acceleration.

Reas Pick:
IDLE 2-3 % CO @ 700 RPM
LOAD 4-5 %
ACCEL 8000 HIT HARD

DRIVE HOME

E Adjust after first disconnecting the small wiring harness plug from the air mass sensor to simulate loss of air flow signal. May require adjusting to "full rich" position (**COUNTERCLOCKWISE**) to start engine, leaning somewhat thereafter.

This is not a normal operational adjustment. It provides air/fuel ratio control based upon RPM input only if loss of air flow signal occurs (open circuit, broken AMS wire). Expect minimal engine performance only. This is a safety feature to eliminate roadside stranding.

For long "drive home" operations, readjustment of both **DRIVE HOME** and **A/F** settings may be required to improve minimal performance.

COLD

F Adjust only with **COLD ENGINE** to smooth idle after adjusting **IDLE** with warm engine. (Usually this adjustment is made the morning following installation.)

Controls enrichment for "choke" effect. Functions only when Engine Temperature Sensor indicates engine is cold.

The vehicle is now adjusted for optimum performance and driveability. **EFI** by **AIRSENSORS** returns the **PLEASURE** to **DRIVING!**

● NORMAL STARTING ●

Most vehicles equipped with a properly adjusted AirSensors EFI system should start immediately upon turning the key to **START**, without depressing the accelerator pedal, and then drive normally regardless of ambient temperature, altitude or humidity.

If immediate start-up does not occur, it may be helpful to turn key to the **ON** position for several seconds (to rebuild depleted fuel pressure), then return key to **OFF** and start up normally.

Some vehicles require more combustion air during start-up than others, especially during extremely cold weather. This is usually provided by installing a "fast idle" valve but it may be helpful to slightly depress your accelerator pedal during cold weather starting to provide additional intake air.

SECTION III

MAINTENANCE AND TROUBLESHOOTING

MAINTENANCE

The only scheduled maintenance for AirSensors EFI Systems is to clean and re-oil the air filter (K & N oil), replace the secondary fuel filter if clogged, check for fuel leaks and replace cracked or stressed hoses, every 20,000 miles or annually. The primary fuel filter may be removed and backflushed if clogged.

TROUBLESHOOTING

Following this text, you will find a one-page guide entitled **TROUBLESHOOTING - QUICK CHECKS** followed by several **TROUBLESHOOTING MATRICES**. The **QUICK CHECKS** guide will identify and resolve start-up difficulties which are usually minor. Although electronic fuel injection is quite complex, technically, it is relatively easy to install, adjust and maintain.

THE TROUBLESHOOTING MATRICES are provided to systematically track and solve more difficult problems associated with system malfunction or system fine tuning. These were developed from factory experience to efficiently trace and correct virtually any problem likely to be encountered in the field. Their designated use, indicated by MATRIX title, is outlined below:

ENGINE WILL NOT START (three matrices) - identifies basic problems during initial installation and indicates solutions.

ENGINE STARTS: WILL NOT RUN - identifies operating problems mostly during initial installation and indicates solutions.

ENGINE RUNS: DRIVEABILITY IMPROVEMENT - assists in fine tuning system after installation.

ENGINE RUNS: FUEL ECONOMY IMPROVEMENT - assists in fine tuning system after installation and after some operation.

AirSensors, Inc. has several Installation and Performance Technicians available for consultation in the event trouble shooting with the Troubleshooting Matrices provided in this Section proves unproductive. Call (206) 228-6200 and ask for installation assistance. This service is free for this purpose, if not abused.

TROUBLESHOOTING - QUICK CHECKS ..A..

MAKE THE FOLLOWING CHECKS TO ISOLATE PROBLEMS FOR TROUBLESHOOTING AIRSENSORS EFI SYSTEMS: (Make tests in sequence shown.)

1. Observe the light emitting diode (LED), on the middle end of the TOP printed circuit board inside the ECU, THROUGH THE SIDE SLOTS OF the ECU cover. When the ignition key is switched to the "ON" (not "START") position, the LED should glow, the relay click on, and the fuel pump should run. Approximately 7 seconds later, the relay should "click off", the pump stop and the LED go out.

This test, if successful, verifies the battery, switched ignition and fuel pump circuits.

2. Observe the same LED. When the ignition key is now switched to the "START" position, the fuel pump should again start and the LED should again glow and continue to glow during cranking. (The engine may not start.)

This test, if successful, verifies the tachometer circuit.

3. Observe the LED fitted to the end of the LOWER MIDDLE printed circuit board inside the ECU, through the slots nearest to the DRIVE HOME adjustment. When the ignition key is switched "ON", this LED should glow; when the engine is started and run, this LED should go out.

This test, if successful, verifies a valid air mass sensor signal. (If this LED stays on with the engine running, the air mass signal has been lost - improper connection, AMS wire breakage - and the ECU is in the DRIVE HOME mode.)

CAUTION, REMOVE COIL WIRE BEFORE MAKING THIS LAST TEST.
(The engine could backfire.)

4. Remove the air plenum, ground the gray Engine Temperature Sensor lead to the manifold and have another person momentarily crank the engine. Observe the four injectors inside the throttlebody during cranking. Each should pulse fuel sequentially (one at a time).

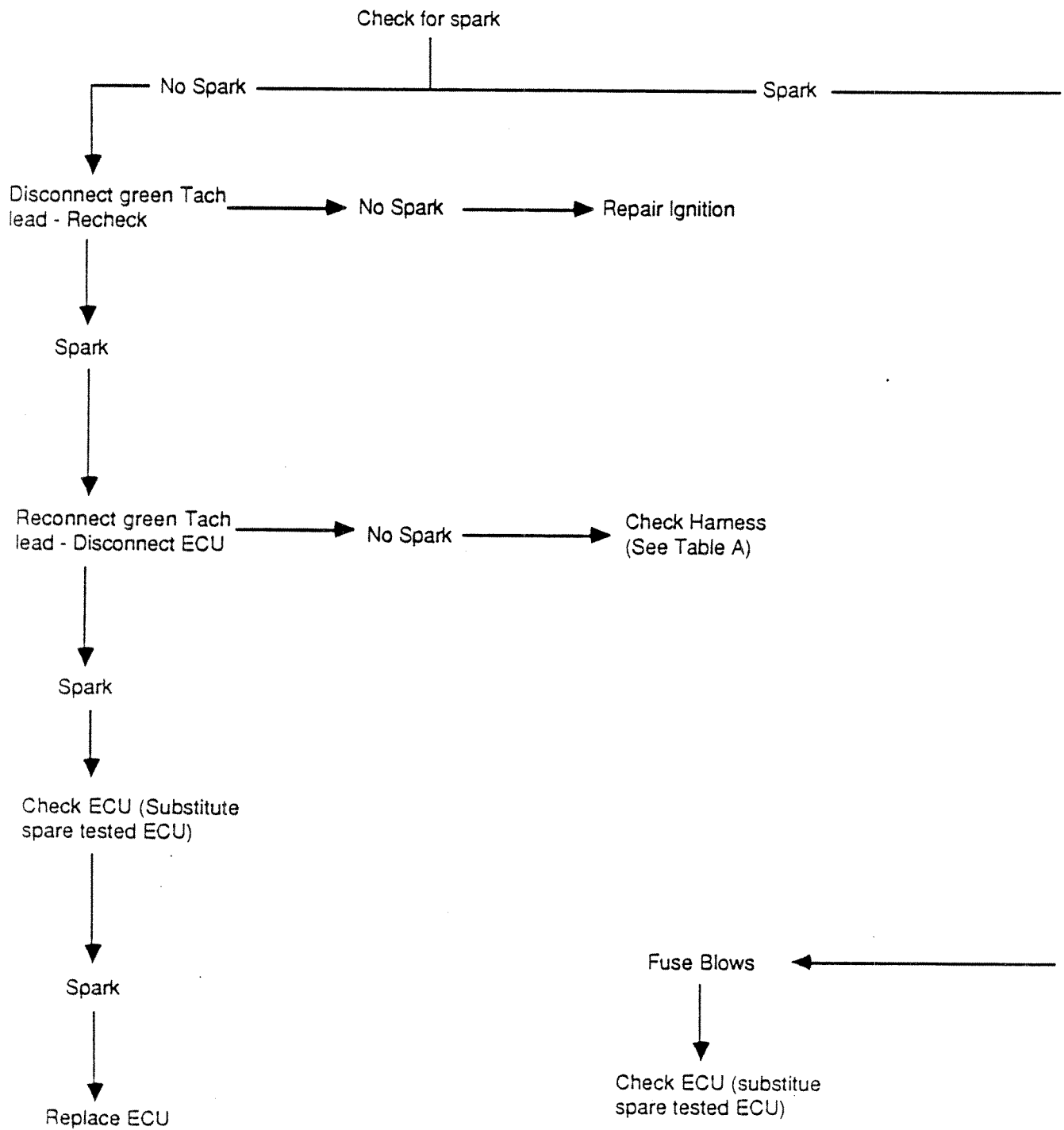
This test, if successful, verifies the operation of the ECU, and injectors, during start-up. (ECU malfunction is rare, check last.)

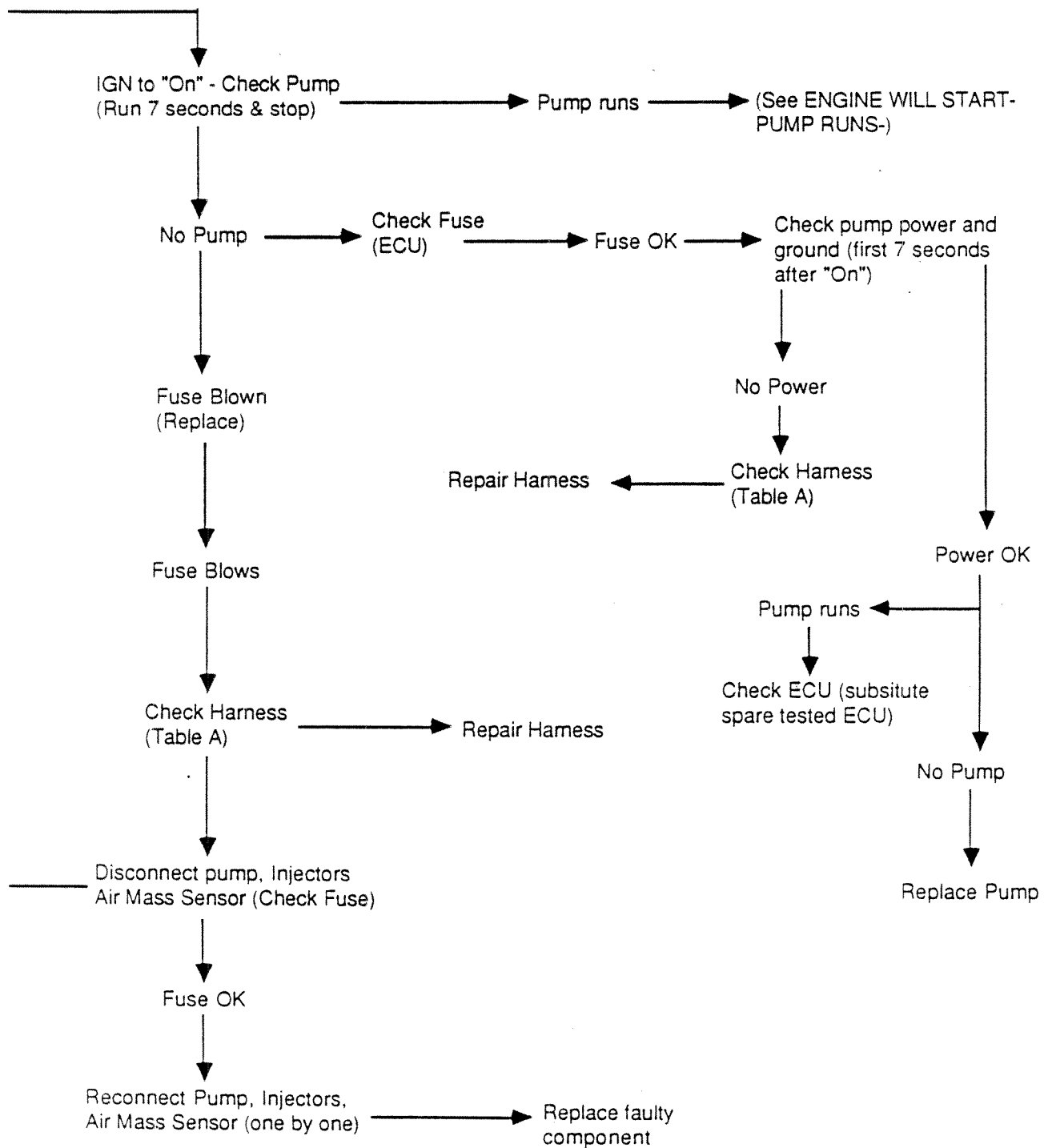
5. In the event the engine becomes "**FLOODED**" while attempting to start, twist and remove fuse from the ECU and crank the engine until clear. Reinsert fuse and start engine.

If the above quick tests are **NOT SUCCESSFULLY COMPLETED**, USE the appropriate **TROUBLESHOOTING MATRIX**. If still **UNSUCCESSFUL**, call the AirSensors Installation and Performance Technician (206) 228-6200.

ENGINE WILL NOT START

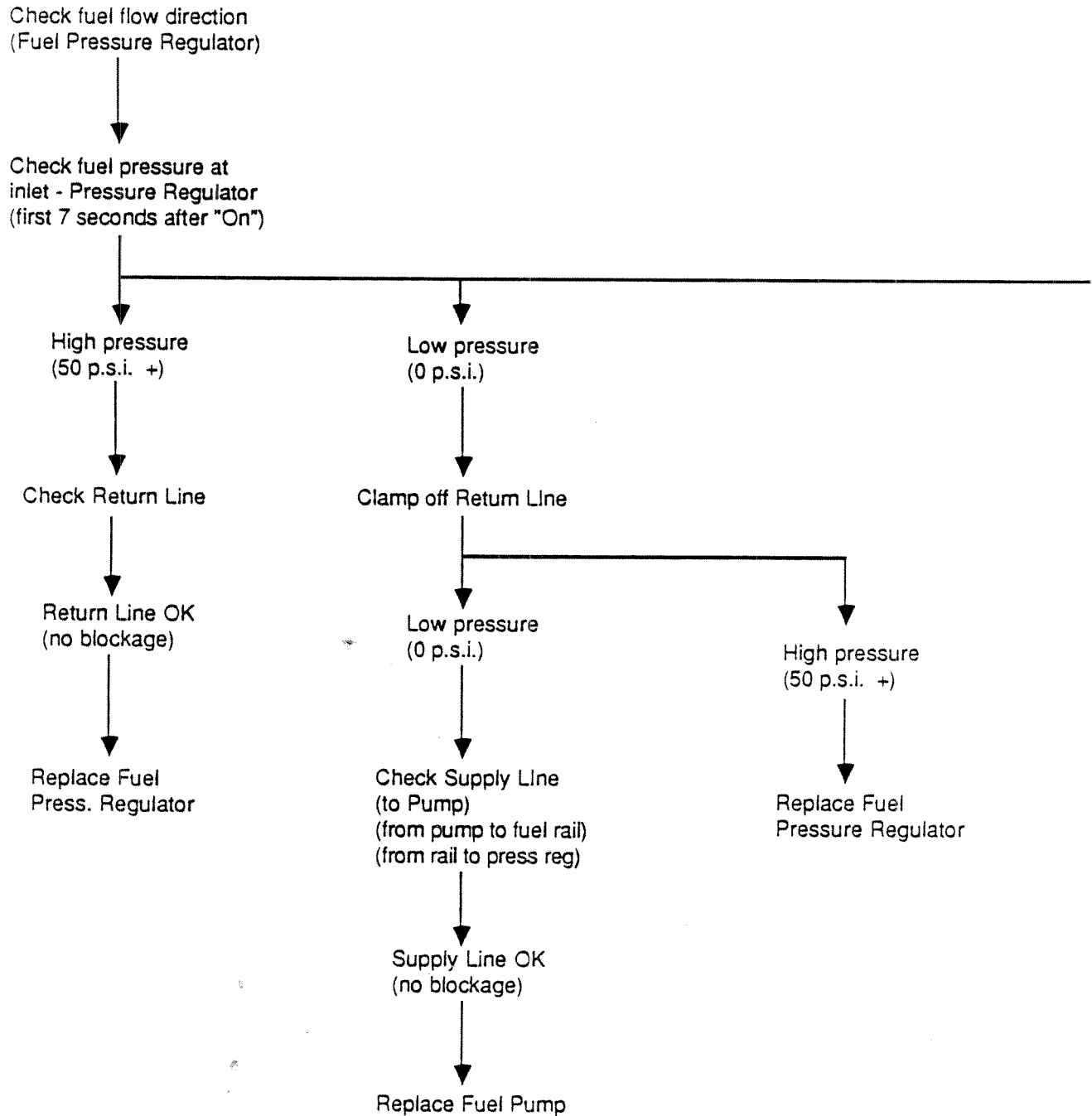
INITIAL CHECKS

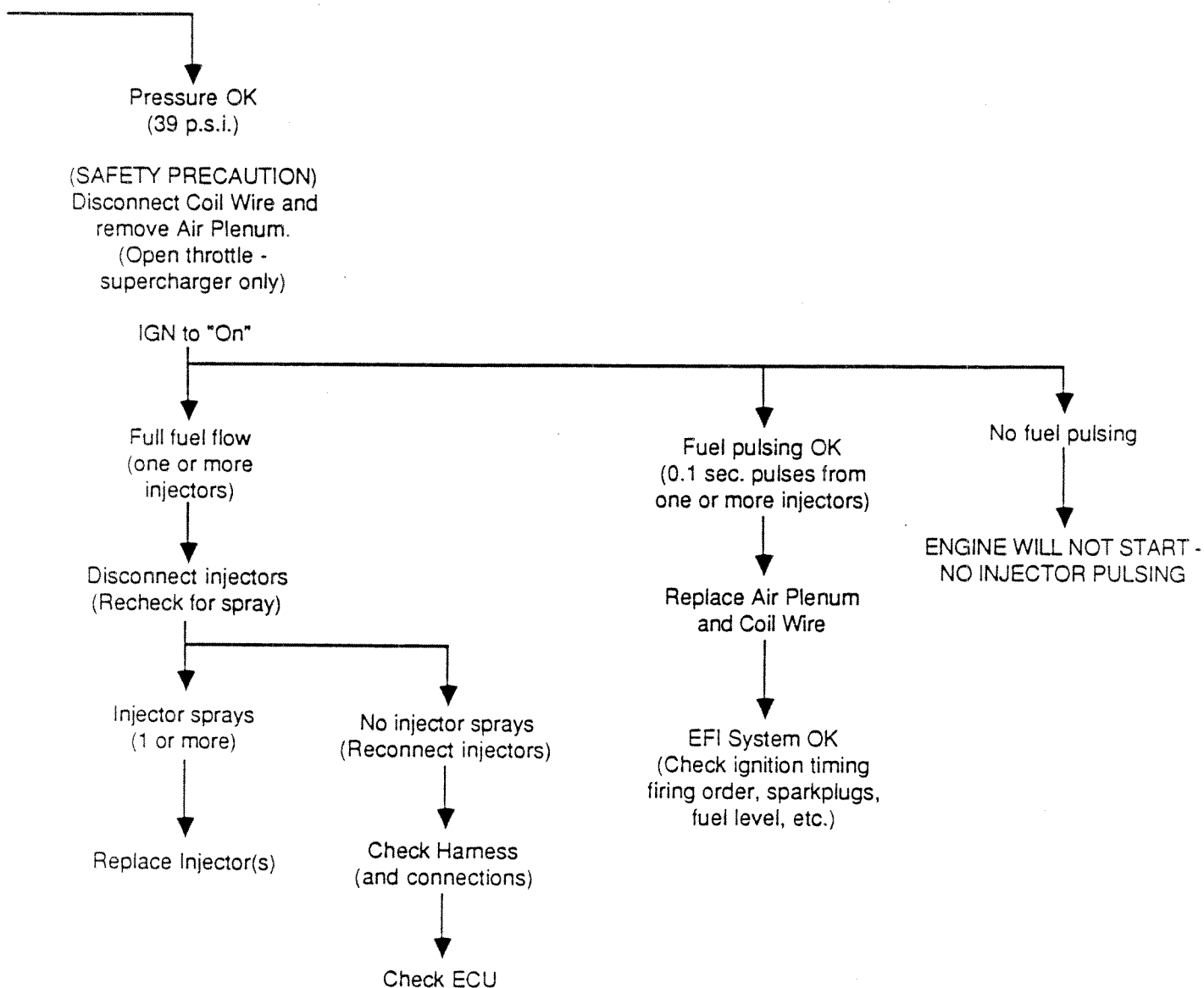




ENGINE WILL NOT START

PUMP RUNS





ENGINE WILL NOT START

NO INJECTOR PULSING

WARNING: Further Testing Requires Extreme Care!
There is a potential for fire and/or explosion.

Reconnect Coil Wire and check
for valid Tach signal. See
TROUBLESHOOTING -QUICK CHECKS
(Technical Manual)

Tach signal OK

Check power to injectors
(Test light from + battery
to colored wire, injector connectors)

No Tach signal

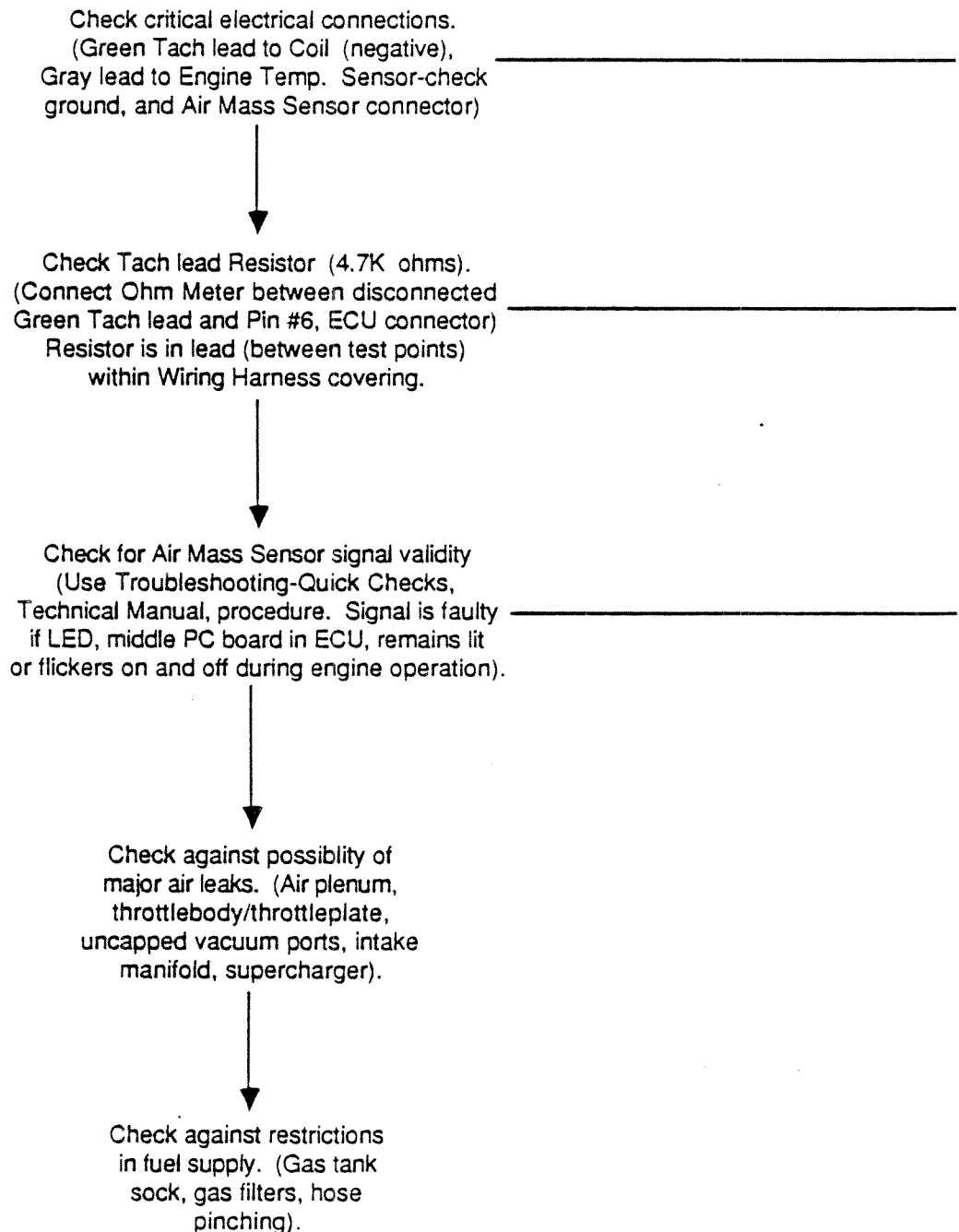
Check Harness
and connectors
pins and connections
to all components

Check ECU

TABLE A
WIRING HARNESS - LEADS AND CONNECTIONS

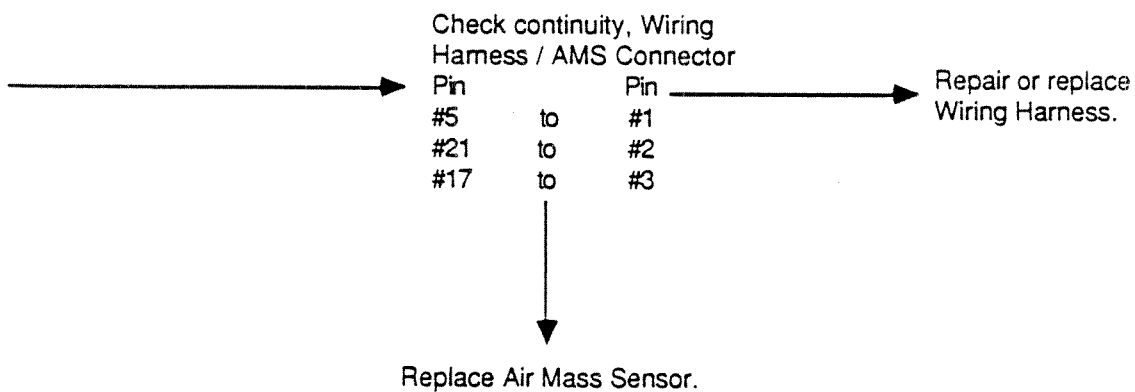
PLUG Pin No.	WIRE		DESTINATION
	Color	Gauge	
1	White	14	Battery (+ 12V)
2	Red	16	Fuel Pump (+ 12V)
3	Red	16	All Injectors (+ 12V, splits inside harness for red leads to injectors)
4	Red	16	Fast Idle Air Valve (+ 12V)
5	White	16	Air Mass Sensor (Pin #1, +12V)
6	White	18	Switched Ignition (+ 12V)
7			(Spare)
8			(Spare)
9	Violet	18	Induction Pick-up
10			(Spare)
11	Brown	18	Injector #1
12	Red	18	Injector #2
13	Orange	18	Injector #3
14	Yellow	18	Injector #4
15	Green	18	Coil (negative) Tach signal (4.7K ohms resistor in series within wiring harness cover)
16	Gray	18	Engine Temperature Sensor
17	Red	16	Air Mass Sensor signal (Pin #3)
18			(Spare)
19			(Spare)
20			(Spare)
21	Black	16	Air Mass Sensor ground (Pin #2)
22	Black	14	Battery (Negative)

NOTE: If injector problems occur during troubleshooting, replace all Ram brand injectors with Bosch equivalent.



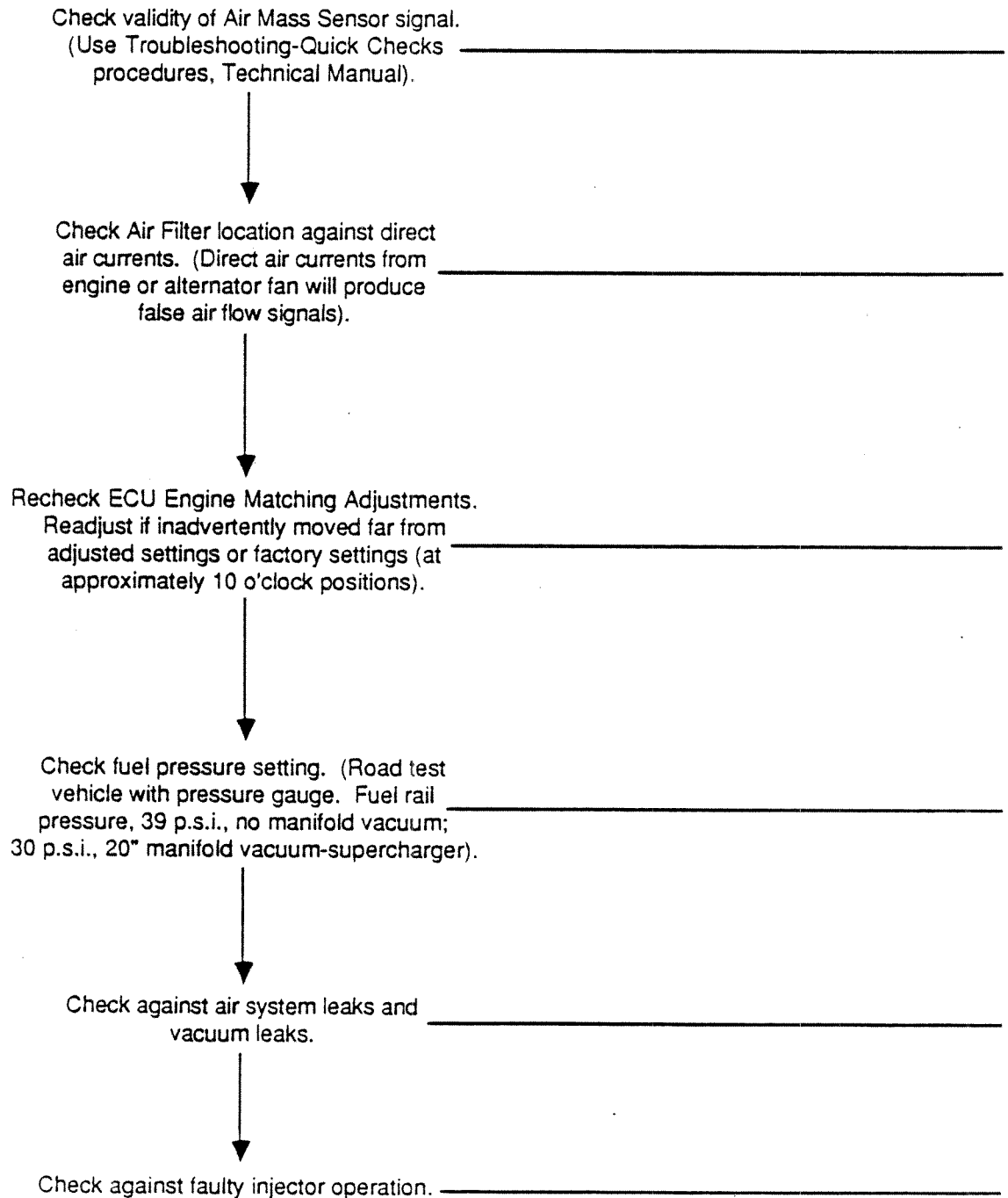
→ Correct circuitry
as required

→ Replace if required.
(Do no bypass Resistor if
shortening Wiring
Harness.)



ENGINE RUNS: DRIVEABILITY IMPROVEMENT

(Fine Tuning)



→ Replace AMS if LED located at end of the lower middle PC board, ECU, remains on / flashes.

→ Shield Air Filter or put thin, open cell foam sock on filter.

→ Readjust using Technical Manual, adjustments.

→ Correct using Trouble shooting Matrix, ENG. WILL NOT START- PUMP RUNS.

→ Repair as required

→ Replace if sticking.
(See Note: Table A)

Note: 1. The use of a four-barrel Throttlebody on a two-barrel intake manifold (with adaptor plate), usually results in lower performance and poorer driveability due to "fuel puddling".

2. If engine runs rough at just above idle speed (butterfly valves barely open), check for correct injector connection order at Throttlebody (very important), then move Induction Pick Up Sensor from the #2 cylinder in the firing order to any other spark plug wire. Because of engine wear and manifold design, cylinder balance may be improved by this change.

Note: The use of a four-barrel Throttlebody on a two-barrel intake manifold (with adaptor plate), usually results in lower performance and reduced fuel economy due to "fuel puddling".

→ If CO reading varies, as COLD adjustment is rotated, relocate Engine Temperature Sensor to a warmer location on intake manifold or replace Sensor if not functioning. (Resistance of Sensor should increase from about 2K ohms at 20 degrees F to more than 100K ohms at 180 F.)

→ If CO reading are not steady, shield or relocate Air Mass Sensor to eliminate strong air currents from fan, alternator, etc. from striking Air Filter. The AMS will erroneously "read" air puffs as mass flow. If unable to attain proper CO reading, check fuel pressure using Troubleshooting Matrix, ENGINE WILL NOT START; PUMP RUNS.

→ Set at 3.0% CO or best lean idle. This reading will vary with engine design and condition.

→ If, under steady, level driving conditions at 2500 RPM, a CO change occurs when adjusting LOAD, contact I & P Technician for directions to rescale load cut-in point.

→ After eliminating "stumble", lean back until "stumble" reoccurs and then enrichen as lightly as possible to eliminate "stumble".

Electronic Fuel Injection
By
AIRSENSORS, INCORPORATED

SECTION IV

GENERAL INFORMATION

FACTORY SERVICE

There are internal adjustments and certain minor modifications which can be made within the ECU to adapt some systems for special applications. These must be made at the factory or by factory-trained technicians authorized by AirSensors to perform this service. A minimum fee of \$25.00 per ECU unit will be charged for this service.

All products to be returned for servicing, within or out of Warranty, must be authorized for return and a return authorization number issued by phone by an Installation and Performance Technician. All service work on AirSensors product will be performed by AirSensors' Seattle facility or its Authorized Agents.

PRODUCT DESCRIPTIONS

Product Descriptions for current and near production AirSensors Electronic Fuel Injection Systems for aftermarket use are provided in Section V, APPENDIX.

STANDARD ELECTRONIC FUEL INJECTION KITS

Parts Lists for STANDARD EFI KITS indicating AirSensors part numbers for current and near production Electronic Fuel Injection Systems and system components are provided in Section V, APPENDIX.

WARRANTY

A copy of the standard product Warranty offered by AirSensors, is provided in Section V, APPENDIX.

SECTION V

APPENDIX

PRODUCT DESCRIPTIONS

CURRENT

Model N-8A; V-8, Chevy 305/350, normally aspirated
Model N-8A-HD; V-8, Chevy 454, normally aspirated

NEAR PRODUCTION

Model N-8B; V-8, Chevy 305/350, NA, EGO sensing
Model N-8C; V-8, Chevy 454, NA, EGO sensing
Model N-6B; V-6, Chevy 2.8L, NA, EGO sensing

EFI KITS: PARTS LISTS

Model N-8A
Model N-8A-HD

WARRANTY

End User

PRODUCT DESCRIPTION (Continued)
Model N-8A

SPECIFICATION

See AirSensors Drawing Number 10569, related drawings, specifications and parts list.

OTHER

Systems are packaged in lots of one and contain all parts for primary application indicated above.

DISTRIBUTOR PRODUCT EFI / N-8A AIRSENSORS, INC.

(N8AHD.PD)

PRODUCT DESCRIPTION

MODEL N-8A-HD

PRODUCT: EFI System, Single Point, 4 Injector, Normally Aspirated, Heavy Duty.
MODEL NUMBER: Model N-8A-HD
PART NUMBER: I0651-005

PURPOSE

To retrofit gasoline-fueled automotive internal combustion engines with electronic fuel injection. Designed expressly for use with normally aspirated engines and existing emission controls. System provides improved performance and driveability.

APPLICATION

Heavy duty vehicles, exceeding 8,500 pound GVW, with automatic transmission and normally aspirated 454 Chevrolet V-8 engines. Is also applicable to other heavy duty vehicles with normally aspirated V-8 engines limited to similar displacements ranging from 400 to 500 cubic inches (6.4 to 8.2 liters) when fitted with appropriate accessory and linkage modifications and brackets, no supplied.

DESCRIPTION

Model N-8A-HD is a custom-engineered EFI system designed to replace a conventional carburetor and to be used with a normally aspirated engine. The system consists of a proprietary air mass sensor, air filter, air plenum, clear-anodized aluminum four-barrel throttlebody with butterfly valves and fitted with a fuel rail system and four fuel injectors, an electric fuel pump, fuel pressure regulator, primary and secondary fuel filters, engine temperature sensor, ignition synchronizer, electronic control unit, wiring harness and various installation parts.

The system is controlled by an analog control unit which processes incoming signals representing engine temperature, rotational velocity (RPM) and intake air mass flow. It computes the fuel-to-air ratio appropriate for engine operating conditions and generates a signal controlling the injectors to supply the computed fuel flow. Adjustments for matching the EFI system to the specific engine application include: Main air-to-fuel mixture; Idle enrichment; Load enrichment; Cold enrichment; Acceleration enrichment and Drive home (loss of air signal) air-fuel ratio control.

PRODUCT DESCRIPTION (Continued)
Model N-8A-HD

SPECIFICATION

See AirSensors Drawing Number 10569, related drawings, specifications and parts list.

OTHER

Systems are packaged in lots of one and contain all parts for primary application indicated above.

(N8B.PD)

PRODUCT DESCRIPTION

MODEL N-8B

PRODUCT: EFI System, Single Point, 4 Injector, Normally Aspirated
MODEL NUMBER: Model N-8B
PART NUMBER: 10569-003

PURPOSE

To retrofit gasoline-fueled automotive internal combustion engines with electronic fuel injection. Designed expressly for use with normally aspirated engines and existing emission controls. System provides improved performance and driveability.

APPLICATION

Pre-1985 autos with manual transmissions and normally aspirated 305 or 350 Chevrolet V-8 engines. Is also applicable to other manual or automatic transmission-equipped pre-1985 autos with normally aspirated V-8 engines limited to cylinder displacements ranging from 262 to 400 cubic inches (4.3 to 6.5 liters) when fitted with appropriate accessory and linkage modifications (not supplied).

DESCRIPTION

Model N-8B is a custom-engineered EFI system designed to replace a conventional carburetor and to be used with a normally aspirated engine. The system consists of a proprietary air mass sensor, air filter, air plenum, clear-anodized aluminum four-barrel throttlebody with butterfly valves and fitted with a fuel rail system and four fuel injectors, and electric fuel pump, fuel pressure regulator, primary and secondary fuel filters, engine temperature sensor, ignition synchronizer, electronic control unit, wiring harness and various installation parts.

The system is controlled by an analog control unit which processes incoming signals representing engine temperature, rotational velocity (RPM), intake air mass flow and the oxygen content of the exhaust gas flow. It computes the fuel-to-air ratio appropriate for engine operating conditions and generates a signal controlling the injectors to supply the computed fuel flow. Adjustments for matching the EFI system to the specific engine application include: Main air-to-fuel mixture; Idle enrichment; Load enrichment; Cold enrichment; Acceleration enrichment and Drive home (loss of air signal) air-fuel ratio control.

(Continued)

PRODUCT DESCRIPTION (Continued)
MODEL N-8B

SPECIFICATION

See AirSensors Drawing Number 10569, related drawings, specifications and parts list.

OTHER

Systems are packaged in lots of five and contain all parts for primary application indicated above.

DISTRIBUTOR PRODUCT EFI / N-8B AIRSENSORS, INC.

(N8C.PD)

PRODUCT DESCRIPTION

MODEL N-8C

PRODUCT: EFI System, Single Point, 4 Injector, Normally Aspirated
MODEL NUMBER: Model N-8C
PART NUMBER: 10651-003

PURPOSE

To retrofit gasoline-fueled automotive internal combustion engines with electronic fuel injection. Designed expressly for use with normally aspirated engines and existing emission controls. System provides improved performance and driveability.

APPLICATION

Pre-1981 autos with manual transmissions and normally aspirated 454 Chevrolet V-8 engines. Is also applicable to other manual or automatic transmission-equipped pre-1981 autos with normally aspirated V-8 engines limited to cylinder displacements ranging from 396 to 454 cubic inches (6.4 to 7.5 liters) when fitted with appropriate accessory and linkage modifications (not supplied).

DESCRIPTION

Model N-8C is a custom-engineered EFI system designed to replace a conventional carburetor and to be used with a normally aspirated engine. The system consists of a proprietary air mass sensor, air filter, air plenum, clear-anodized aluminum four-barrel throttlebody with butterfly valves and fitted with a fuel rail system and four fuel injectors, an electric fuel pump, fuel pressure regulator, primary and secondary fuel filters, engine temperature sensor, ignition synchronizer, electronic control unit, wiring harness and various installation parts.

The system is controlled by an analog control unit which processes incoming signals representing engine temperature, rotational velocity (RPM), intake air mass flow and the oxygen content of the exhaust gas flow. It computes the fuel-to-air ratio appropriate for engine operating conditions and generates a signal controlling the injectors to supply the computed fuel flow. Adjustments for matching the EFI system to the specific engine application include: Main air-to-fuel mixture; Idle enrichment; Load enrichment; Cold enrichment; Acceleration enrichment and Drive home (loss of air signal) air-fuel ratio control.

(Continued)

PRODUCT DESCRIPTION (Continued)
MODEL N-8C

SPECIFICATION

See Airsensors Drawing Number 10651, related drawings, specifications and parts list.

OTHER

Systems are packaged in lots of five and contain all parts for primary application above.

DISTRIBUTOR PRODUCT EFI / N-8C AIRSENSORS, INC.

(N6B.PD)

PRODUCT DESCRIPTION

MODEL N-6B

PRODUCT: EFI System, Single Point, 2 Injector, Normally Aspirated
MODEL NUMBER: Model N-6B
PART NUMBER: 10680-001

PURPOSE

To retrofit gasoline-fueled automotive internal combustion engines with electronic fuel injection. Designed expressly for use with normally aspirated engines and existing emission controls. System provides improved performance and driveability.

APPLICATION

Pre-1985 autos with manual transmissions and normally aspirated 2.8L Chevrolet V-6 engines. Is also applicable to other manual or automatic transmission-equipped pre-1985 autos with normally aspirated V-6 engines limited to cylinder displacements ranging from 140 to 200 cubic inches (2.3 to 3.2 liters) when fitted with appropriate accessory and linkage modifications (not supplied).

DESCRIPTION

Model N-6B is a custom-engineered EFI system designed to replace a conventional carburetor and to be used with a normally aspirated engine. The system consists of a proprietary air mass sensor, air filter, air plenum, clear-anodized aluminum two-barrel throttlebody with butterfly valves and fitted with a fuel rail system and two fuel injectors, an electric fuel pump fuel pressure regulator, primary and secondary fuel filters, engine temperature sensor, ignition synchronizer, electronic control unit, wiring harness and various installation parts.

The system is controlled by an analog control unit which processes incoming signals representing engine temperature, rotational velocity (RPM), intake air mass flow and the oxygen content of the exhaust gas flow. It computes the fuel-to-air ratio appropriate for engine operating conditions and generates a signal controlling the injectors to supply the computed fuel flow. Adjustments for matching the EFI system to the specific engine application include: Main air-to-fuel mixture; Idle enrichment; Load enrichment; Cold enrichment; Acceleration enrichment and Drive home (loss of air signal) air-fuel ratio control.

(Continued)

PRODUCT DESCRIPTION (Continued)
MODEL N-6B

SPECIFICATION

See AirSensors Drawing Number 10680, related drawings, specifications and parts list.

OTHER

Systems are packaged in lots of five and contain all parts for primary application indicated above.

DISTRIBUTOR PRODUCT EFI / N-6B AIRSENSORS, INC.

AirSensors, Inc.

MODEL N-8A EFI KIT - PARTS LIST (Kit Part Number 10569-001)

Item		Part Number	Quantity
	THROTTLEBODY COMPONENTS		
1	Throttlebody Assembly	10753-000	1
2	Cap, Vacuum Port, 1/8"	10265-000	2
3	Cap, Vacuum Port, 1/4"	10760-000	1
4	Hose, Vacuum, 5/32"	10896-000	2 ft.
5	Bolt, T-body, Hex 5/16"-18	10209-040	4
6	Washer, T-body, Flat, 5/16" ID	10205-011	4
	GASKETS		
7	Gasket, T-body/Adapter	10894-000 B	1
8	Gasket, Air Plenum/Wing Nut	10953-000	1
9	Gasket, T-body/Manifold	10952-000	1
	FUEL COMPONENTS		
10	Filter, Fuel, Primary	10570-000 A	1
11	Filter, Fuel, Secondary	10224-000	1
12	Pump, Fuel, Electric	10759-000	1
13	Regulator, Fuel, Vacuum Con	10235-002	1
14	Bracket, Fuel Pump	10965-000	1
15	Hose, Fuel, Supply, 3/8" ID	10237-001	6 ft.
16	Hose, Fuel, Supply, 7/16" ID	10971-001	1 ft.
17	Hose, Fuel, Supply, 5/16" ID	10971-000	2 ft.
18	Hose, Fuel, Return 1/4" ID	10237-000	4 ft.
19	Hose Union, Fuel Hose, 5/16"/3/8"	10972-000	1
20	Hose Union, Fuel Hose, 5/16"-1/4"	10972-001	1
21	Clamp, Fuel Hose	10936-002	12
	AIR COMPONENTS		
22	Filter Assembly, Air, 4"	10221-000 A	1
23	Bracket, Air Filter	10966-000	1
24	Air Mass Sensor, 4"	10743-000 A	1
25	Air Plenum Assembly, 4"	11042-000	1
26	Bail, T-body/Air Plenum	10160-001	1
27	Wing Nut, 1/4"-20	10662-002	1
28	Washer, Wing Nut, Flat, 1/4" ID	10205-010	1
29	Jam Nut, 1/4"-20	10174-101	1
30	Hose, Flex, 4" ID x 14" L	10247-000	1
31	Clamp, Air Hose, 4"	10936-011	2
	ELECTRONIC COMPONENTS		
32	ECU, 4 Inj, Model E-4A	10572-001 A	1
33	Engine Temperature Sensor	10411-000	1
34	Inductive Pickup Sensor	10409-000 A	1
35	Harness, ECU, 4 Inj	10415-000	1
36	Grommet, Rubber, Firewall	10260-000 A	1
37	Ground Lead, Fuel Pump	10408-001	1
38	Tie, Ty-rap, 3.62" L	10151-000	24
39	Tie, Ty-rap, 8" L	10151-002	6
	DOCUMENTS		
40	Technical Manual	50042-000	1
41	Installation Report	50043-000	1
42	Product Literature	50044-000	1
43	Window Decal	50046-000	1

AirSensors, Inc.

MODEL N-8A-HD EFI KIT - PARTS LIST (Kit Part Number 10651-005)

Item		Part Number	Quantity
	THROTTLEBODY COMPONENTS		
1	Throttlebody Assembly	10753-000	1
2	Cap, Vacuum Port, 1/8"	10265-000	2
3	Cap, Vacuum Port, 1/4"	10760-000	1
4	Hose, Vacuum, 5/32"	10896-000	2 ft.
5	Bolt, T-body, Hex 5/16"-18	10209-040	4
6	Washer, T-body, Flat, 5/16" ID	10205-011	4
	GASKETS		
7	Gasket, T-body/Adapter	10894-000 B	1
8	Gasket, Air Plenum/Wing Nut	10953-000	1
9	Gasket, T-body/Manifold	10952-000	1
	FUEL COMPONENTS		
10	Filter, Fuel, Primary	10570-000 A	1
11	Filter, Fuel, Secondary	10224-000	1
12	Pump, Fuel, Electric	10759-000	1
13	Regulator, Fuel, Vacuum Con	10235-002	1
14	Bracket, Fuel Pump	10965-000	1
15	Hose, Fuel, Supply, 3/8" ID	10237-001	6 ft.
16	Hose, Fuel, Supply, 7/16" ID	10971-001	1 ft.
17	Hose, Fuel, Supply, 5/16" ID	10971-000	2 ft.
18	Hose, Fuel, Return 1/4" ID	10237-000	4 ft.
19	Hose Union, Fuel Hose, 5/16"/3/8"	10972-000	1
20	Hose Union, Fuel Hose, 5/16"-1/4"	10972-001	1
21	Clamp, Fuel Hose	10936-002	12
	AIR COMPONENTS		
22	Filter Assembly, Air, 4"	10221-000 A	1
23	Bracket, Air Filter	10966-000	1
24	Air Mass Sensor, 4"	10743-000 A	1
25	Air Plenum Assembly, 4"	11042-000	1
26	Bail, T-body/Air Plenum	10160-001	1
27	Wing Nut, 1/4"-20	10662-002	1
28	Washer, Wing Nut, Flat, 1/4" ID	10205-010	1
29	Jam Nut, 1/4"-20	10174-101	1
30	Hose, Flex, 4" ID x 14" L	10247-000	1
31	Clamp, Air Hose, 4"	10936-011	2
	ELECTRONIC COMPONENTS		
32	ECU, 4 Inj, Model E-4A	10572-005 A	1
33	Engine Temperature Sensor	10411-000	1
34	Inductive Pickup Sensor	10409-000 A	1
35	Harness, ECU, 4 Inj	10415-000	1
36	Grommet, Rubber, Firewall	10260-000 A	1
37	Ground Lead, Fuel Pump	10408-001	1
38	Tie, Ty-rap, 3.62" L	10151-000	24
39	Tie, Ty-rap, 8" L	10151-002	6
	DOCUMENTS		
40	Technical Manual	50042-000	1
41	Installation Report	50043-000	1
42	Product Literature	50044-000	1
43	Window Decal	50046-000	1

(WARRANTY.ASI)

LIMITED WARRANTY

AIRSENSORS WARRANTS:

That each item of mechanical or electrical equipment sold or supplied as part of AirSensors electronic fuel injection systems is warranted for 90 days from the date of sale to the end user, against defects in materials and workmanship.

THESE ARE THE ONLY WARRANTIES MADE AND ALL OTHER WARRANTIES OF FITNESS, MERCHANTABILITY, OR SUITABILITY FOR A PARTICULAR PURPOSE ARE SPECIFICALLY DISCLAIMED. IN NO EVENT SHALL ANY IMPLIED WARRANTIES REMAIN IN EFFECT AFTER THE 90 DAY TERM OF THIS EXPRESS WARRANTY. ANY EXTENSION OF WARRANTY MUST BE APPROVED BY AIRSENSORS IN WRITING.

Some States do not allow limitations on how long an implied warranty lasts.

AIRSENSORS DOES NOT WARRANT:

- * Products which have been modified beyond manufacturer's recommendations.
- * Products which have been subject to misuse, abuse, or accident.
- * Products which have been improperly installed.
- * Products which have been subjected to improper fuel or to fuel containing dirt, gum, water, or other contaminants.
- * Products which have been damaged due to excessive high voltage.
- * Products used for racing.

LIMITATION OF REMEDY TO PARTS AND LABOR:

During the warranty period, AirSensors will provide the parts and labor necessary to repair any warrantable defects.

If warranty work or repair parts are required, they will normally be provided by the facility when the system was installed; or contact AirSensors at the address below for information on obtaining warranty service.

(Continued)

LIMITED WARRANTY (Continued)

AIRSENSORS LIMITS ITS LIABILITY TO THE COSTS OF REPAIR AS DESCRIBED ABOVE AND THESE REMEDIES ARE EXCLUSIVE.

AIRSENSORS DISCLAIMS ALL LIABILITY FOR INCIDENTAL AND CONSEQUENTIAL DAMAGES INCLUDING BUT NOT LIMITED TO LOSS OF TIME, LOSS OF USE, INCONVENIENCE OR EXPENSE ARISING FROM LOSS OF TIME OR USE, LOSS OF PROFITS AND ALL OTHER CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF THIS PRODUCT.

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