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**EMISSION
RETROFIT
KIT**

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for all vehicles without
closed loop control

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Neutronics Enterprises Inc.

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EMISSION RETROFIT KIT MANUAL

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Introduction

The Neutronics Emission Retrofit Kit adds feedback control to cars that did not have it when built. It converts vehicles with open-loop carburetor or fuel injection systems into closed-loop (feedback) systems with three-way catalysts. The system reduces vehicle exhaust emissions levels with minimal change to driving quality.

The Neutronics Retrofit Kit regulates the air/fuel ratio at the catalytic. The retrofit kit can be set up to be used on vehicles with or without an air pump. Vehicles without an air pump need to have a PCV valve or other means to provide dilute air to the intake manifold.

The retrofit kit is protected under US Patents and is accredited as an emission control device by the California Air Resources Board, CARB B-20-1. For a valid CARB accreditation, the kit: (1) needs to be installed on a vehicle that originally came with an oxidation catalytic converter and had an open loop fuel system; (2) needs to be installed with a new three way catalytic converter that has an CARB EO (most after market converters meet this requirement; due to the variety of catalytic converters this is not included in the kit; the control system will function without a catalytic converter; (3) needs to be properly installed.

The smog repair kit cannot be used on vehicles that already have a control system or with lean burn emission systems. Inspect the vehicle to make the determination or contact Neutronics for more information. Known incapable vehicles are:

- ◆ 1976 - 1979 Chrysler with 360 & 400 CID engines with lean burn carburetors
- ◆ 1976-1978 Honda Civic CVCC vehicles with lean burn carburetors

This kit should not be installed on any vehicle that already has an oxygen sensor or a lean burn carburetor

Air Pump Installation

The system controls secondary air injected into the exhaust manifold by the air pump. The air/fuel ratio control computer senses engine speed and oxygen (O₂) concentration in the exhaust. Based on these parameters the computer opens or closes the air control valve.

Non-air Pump Installation

The system controls secondary air drawn into the intake manifold. The air/fuel ratio control computer senses engine speed and oxygen (O₂) concentration in the exhaust. Based on these parameters the computer opens or closes the air control valve.

System Contents

The Emission Retrofit Kit consists of the following components:

Qty	Item	Notes
1	Air fuel ratio control computer	See Figure 1
1	Air control valve	See Figure 2. Engines > 1.5 liters use a larger Outlet on the Air Control Valve
1	Wiring harness with 2 wire tap connectors	
1	Oxygen Sensor	
1	90° Fitting	Used for non-air pump installation
1	'Y' Fitting	Used for non-air pump installation
1	Installation Manual	This Manual
1	Carb B-20-1 Sticker	California vehicles only

Parts and Tools Required for Installation

The system requires some additional common automotive parts. These parts include heater or vacuum hose, hose clamps, cable ties, #10 sheet metal screws and anti-seize compound (for the oxygen sensor threads).

The following specialized test equipment is required in addition to standard service hand tools:

- Digital multi-meter (DVM) for checking wiring and system operation.
- Welding equipment for catalyst and oxygen sensor mounting ring installation.
- Exhaust gas analyzer with at least HC and CO is recommended.
- 7/8" drill bit for installing the 90° fitting (Used for non-air pump installation).

For a valid CARB accreditation, a new three way catalytic converter that has a CARB EO is required.

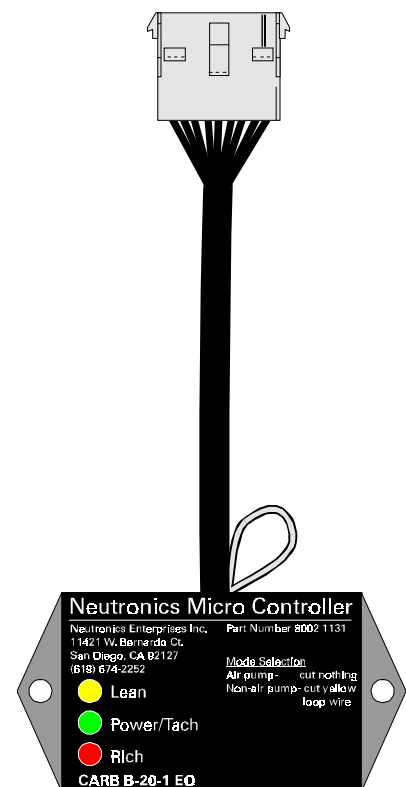


Figure 1. Air Fuel Ratio Control Computer.

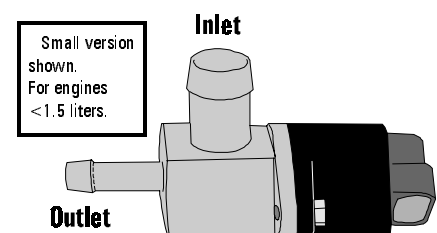


Figure 2. Air Control valve

Inspection/Preparation

Vehicle

The following items need to be completed before installation of the system:

- Check the ignition timing and set according to the manufacturer's specification.
- Replace the plugs, points, condenser, distributor cap, rotor and spark plug wires as necessary. *Most catalytic converter failures are a result of faulty ignition systems. Be sure that the vehicle has recently been tuned up.*
- Be sure that existing emission equipment is working properly. Repair damaged or missing vacuum hoses.
- Be sure that the carburetor is adjusted properly. Check the hydrocarbon (HC) and carbon monoxide (CO) levels. At idle HC should not exceed 300 ppm and CO should not exceed 3.0%. These items can be checked by having a diagnostic inspection performed at a Smog Check Station.
- Check that the idle RPM is set according to the manufacturer's specification.
- Determine if the vehicle has an air pump. If it does not have an air pump then determine if it has a PCV valve.

System

If the vehicle has an air pump then there is nothing to change. Proceed to Emission Repair Kit Installation and follow the instruction for air pump installation.

If the vehicle does not have an air pump then a modification is required to the wiring harness.

- Cut the yellow color loop. See **Figure 3**. This changes the mode of operation from air pump to non air pump.
- Proceed to Smog Repair Kit Installation and follow the instruction for non-air pump installation.

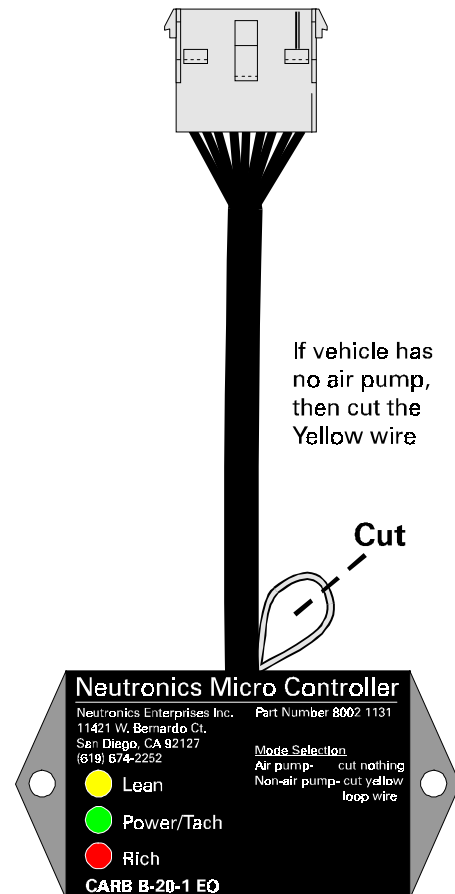


Figure 3. Wire Harness Modifications.

Smog Repair Kit Installation

The only difference between an air pump and non air pump installation is the location of the air control valve.

Air Control Valve

For an air pump installation

The air control valve should be located downstream of the air pump diverter valve and upstream of the air injection check valve. See Figure 4.

- 1. Cut the air pump delivery hose or pipe to accept the air control valve. Be sure to install the valve pointing in the right direction (see Figure 2 for inlet and outlet). The valve should not rub or vibrate against any part of the engine or body.
- 2. Use tie wraps to fasten the valve to a hose, wire harness, or body part. If necessary, use 5/8" or 3/4" heater or emission system hose to connect the valve to the air pump system. Secure the hoses with screw clamps.

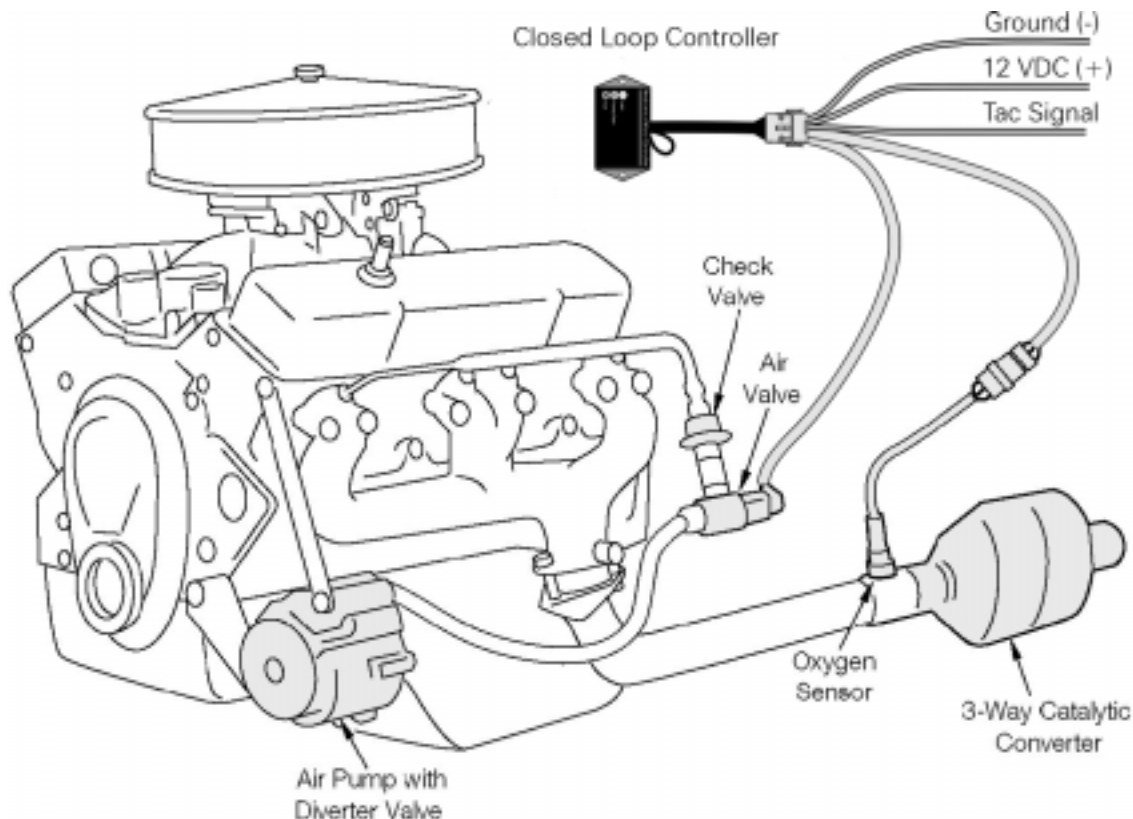


Figure 4. Air Valve Location—*Air Pump*

For a non-air pump installation

In the non-air pump installation, the system controls the amount of secondary air drawn into the intake manifold through the PCV valve or the intake manifold connection.

For Vehicles with a PVC Valve (Figure 5a):

1. Mount the 'Y' fitting in the vacuum line between the carburetor and the PCV valve.
2. Remove the air cleaner. Locate a convenient place on the bottom of the air cleaner housing so that filtered air can be drawn from the air cleaner. Drill a 7/8" hole for the 90° fitting. Install and secure the 90° fitting.
3. Install a new hose from the 90° fitting to the air control valve. Be sure to install the valve pointing in the right direction (see Figure 2 for inlet and outlet). Secure the hose with hose clamps. The valve should not rub or vibrate against any part of the vehicle or engine. It can be tie-wrapped to a hose, wire harness or body part. The air control valve should not touch or be directly exposed to heat from the exhaust manifold or exhaust pipe.
4. Install a new hose from the air control valve to the 'Y' fitting. Secure the hose with hose clamps. Take care not to bend or pinch any hose - secure with tie wraps.
5. Reinstall the air cleaner assembly.

For Vehicles without a PCV Valve (Figure 5b. Non PCV Valve):

1. Connect hose line from Air Valve to Base Plate. Secure with hose clamps.
2. Remove carburetor and install Base Plate between carburetor and engine.
3. Follow remaining instructions 2 , 3 and 5, for Vehicles with PCV Valve (at the top of this page).

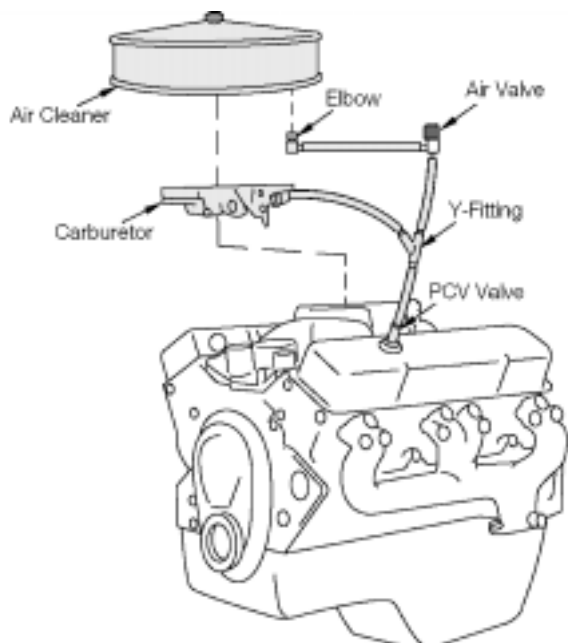


Figure 5a. Air Valve- **PCV Valve**

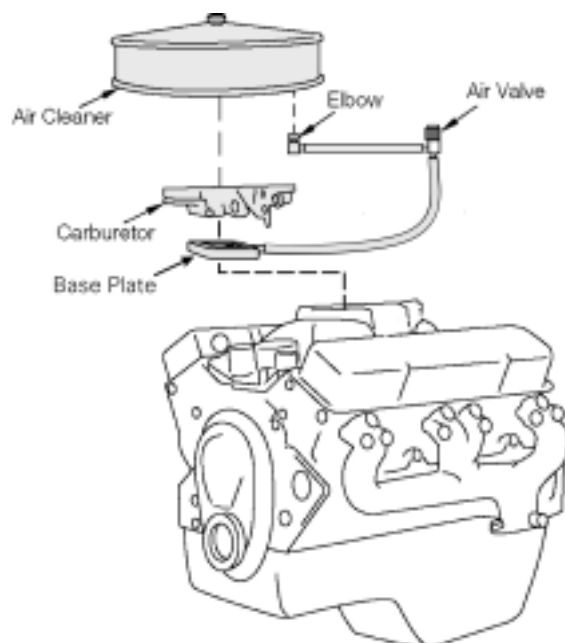


Figure 5b. Air Valve- **Non PCV Valve**

Air/Fuel Ratio Control Computer

- Find a location that minimizes exposure to heat, water, vibration and electrical interference. Check that the wire harness will reach the chosen computer location and all connections. Mount the computer using #10 sheet metal screws.

Wiring Harness

- 1. Disconnect the vehicle's negative battery cable.
- 2. Attach the harness ground wire (black wire with the ring terminal) to the vehicle body using a sheet metal screw. There must be a good electrical contact between the ground wire and the vehicle chassis. See Figure 6.
- 3. Attach the power wire (red wire with the male spade) to ignition switched 12V power at the fuse block or relay box. Use the wire tap provided.
- 4. Attach the engine speed input wire (green wire with male spade) to the negative (-) terminal to the ignition coil. Use the wire tap provided.
- 5. Connect the 4-pin connector to the air control valve.
- 6. Route the 3-pin connector under the vehicle and connect to the oxygen sensor when installed.
- 7. Connect the 15-pin connector to the air/fuel ratio control computer.
- 8. Route the wires as neatly as possible to the existing vehicle wiring. Avoid routing the wires near hot engine parts. Leave sufficient slack for engine movement. Coil up any excess wire and securely bundle it with the existing wire harnesses or hoses. Secure the wire harness with tie-wraps.
- 9. Reconnect the vehicle's negative battery cable.

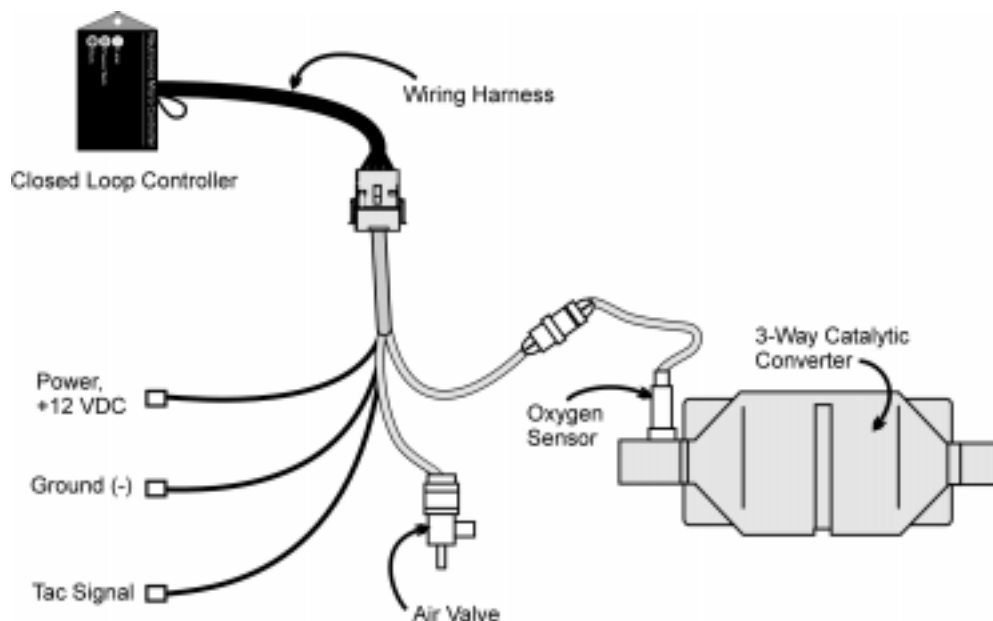


Figure 6. Wiring Harness.

Catalytic Converter/Oxygen Sensor

Due to the variety of catalytic converters, the emission retrofit kit does not include a catalytic converter. The kit will function properly without a new catalytic converter. However, for a valid CARB accreditation the kit needs to be installed with a new three way catalytic converter that has a CARB EO (most after market converters meet this requirement).

- 1. Raise the vehicle on a hoist.
- 2. Install the catalytic converter(s) per the manufacture's instructions.
- 3. Install the fitting for the oxygen sensor between the engine and catalyst. Screw an old spark plug into the fitting before welding to prevent distortion.
- 4. Apply anti-seize to the oxygen sensor threads and install the oxygen sensor into the fitting. Tighten to 15 ft-lb. torque.
- 5. Route the oxygen sensor wires through a safe path in the vehicle frame/body to the catalyst. Take care to avoid close passage by the exhaust pipes, axles, or steering. Be sure the wires can not be caught by objects on the road.
- 6. Connect the oxygen sensor to the wire harness. Ensure that the connector is locked.
- 7. Use tie wraps to securely fasten the harness. Leave sufficient slack at the oxygen sensor to allow for engine and exhaust system movement.
- 8. Lower the vehicle.

Adjusting and Testing

- 1. Turn the ignition key to the "on" position. The yellow, green and red light will light up momentarily as the air control valve is initialized. Then the green light will remain lit (the yellow or red may also stay lit). If the green light is not lit then the controller is not receiving power or does not have a good ground. See *Bad Power and/or Ground*, page 9.

- 2. Start and warm the engine. Check that there are no exhaust leaks. Observe that the green light blinks. It should blink in proportion to engine speed - the faster the engine speed the quicker the blinking. If the green light is not blinking then see *Tac Problem*, page 9.

- 3. After the engine warms up to the operating temperature the red and yellow light should fluctuate on and off (the green light should still be blinking). If the red light remains constantly on then see *Rich Mixture Problem*, page 10. If the yellow light remains constantly on then see *Lean Mixture problem*, page 10.

- 4. The system is now installed and working properly. Idle mixture and speed still need to be adjusted.
 - ◆ a. Disconnect the inlet hose to the air control valve.
 - ◆ b. Plug the inlet of the air control valve.
 - ◆ c. Set idle speed to specification (see vehicle's decal or manual).
 - ◆ d. Adjust the idle mixture to 0.50-1.00% CO before the exhaust enters the catalytic converter.
 - ◆ e. Recheck and reset idle speed if necessary.
 - ◆ f. Remove the plug from the air control valve and reconnect the hose.
 - ◆ g. The red and yellow lights should fluctuate on and off.

- 5. Drive the vehicle for about 10 minutes, reaching speeds to 45-55 mph. This will heat the catalyst to full temperature.

- 6. Check emissions at idle and 2500 RPM. Tailpipe emissions should be below 0.5% CO and 120 ppm HC with a new catalytic converter

- 7. If a new catalytic converter has been installed then clean an area of the engine compartment near the computer and apply the CARB sticker.

Troubleshooting

Bad Power and/or Ground

(No lights are lit when the ignition key is in the "on" position)

Signs:

- Green light is not lit when the ignition key is in the "on" position

Items to be checked:

- Check that the battery was reconnected.
- Check that there is a fuse in the wiring harness.
- Check that the fuse is fully seated.
- Check that the ground lead is connected to a clean metal part of the chassis.
- Check that the power lead is connected to key switched 12 volt power The positive (+) side of the ignition coil is a good location.
- Be sure that the inline splice connector made electrical connect with the existing wire.
- Check that the power lead is not down stream of the ballast resistor of the ignition coil.
- Use an Ohm meter to check that the fuse is good.
- Use a voltmeter to determine the voltage at the location where power is being tapped. The voltage needs to be 12 VDC.
- Check the battery voltage.

Tac Problem

(The green light does not blink)

Signs:

- The green light is lit, but does not blink when the engine is running.

Items to be checked:

- Be sure the green wire is connect to the negative terminal of the ignition coil.
- Be sure that the male tab of the connector was inserted into the center of the wire tap and not pushed off to one side.
- Be sure that the inline splice connector made electrical connect with the existing wire.

Rich Mixture Problem

(Red light stays lit)

Signs:

- Red light stays lit
- Exhaust smoke
- Backfires

Items to be checked:

- Be sure the engine is completely warmed up.
- Be sure that the choke is off.
- Check for and correct any restrictions or blockage in the air supply hoses and fittings.
- Adjust carburetor idle air to the leanest possible setting so that red and yellow lights are fluctuating.
- Check the air valve. See *Checking the Air Valve*, page 11.
- Retest. If system still shows rich condition, check the carburetor float level, accelerator pump, fuel jet size, power enrichment system, choke system and fuel injection system for excess fuel. Follow vehicle manufacturer's diagnostic procedure for over rich condition.

Lean Mixture Problem

(Yellow light stays lit)

Signs:

- The yellow light stays lit
- Stumble or surging
- Rough idle
- Detonation

Items to be checked:

- Be sure the engine is completely warmed up.
- Check electrical connections at the air control valve, oxygen sensor, and controller for tightness.
- Check for and correct any vacuum leaks at the base of carburetor, intake manifold, PCV valve, air control valve, or vacuum hose connections.
- Enrich idle air setting to maximum possible level so the red and yellow lights are fluctuating.
- Retest. If performance is still unsatisfactory, check carburetor float level, accelerator pump, or fuel injectors for plugging.

Checking the Air Valve

Signs:

- Red light stays lit
- Exhaust smoke
- Backfire

Air pump installation

How to check the air valve:

- Disconnect the inlet hose at the air control valve with the engine running. See figure 7. If there is no airflow out of the air pump, check the parts upstream for proper function. Check the other air hoses, air pump, diverter valve and vacuum lines to the diverter valve. Replace or repair defective parts.
- If there is air flow then reconnect the inlet hose to the air control valve. Now check the outlet of the air control valve by disconnecting the outlet hose. If there is no air flow with the engine running, then check that the:
 - ◆ Green light is blinking.
 - ◆ Hoses to the air control valve are not pinched.
 - ◆ 4-pin connector to the air control valve is fully seated.

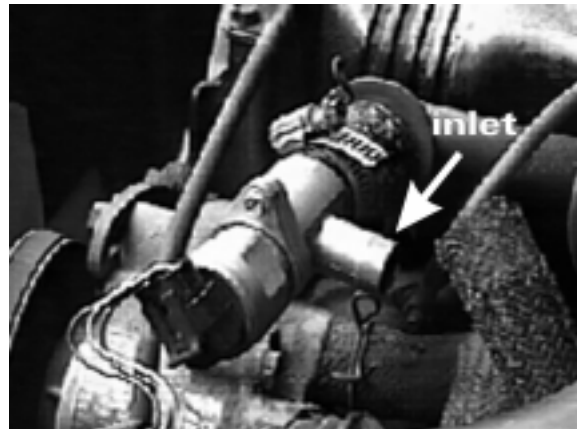


Figure 7. Air Control Valve Inlet Disconnected

Non-air pump installation

How to check

- Check that the system is setup for non-air pump. The yellow loop wire needs to be cut; see *Inspection/Preparation System*, page 3. Correct and retest.
- Disconnect the inlet hose at the air control valve. If the yellow light becomes lit or if the red and yellow light fluctuate, then there is a pinched hose, an obstruction in the air cleaner or the 90° fitting is blocked. Correct and retest.
- If the red light remains lit, reconnect the inlet hose and disconnect the outlet hose at the air valve. If the yellow light becomes lit or if the red and yellow light fluctuate, then the air valve is not working properly. Check the wire connections at the computer and the air valve. Look inside both ends of the valve to ensure the valve is not blocked. Reconnect and retest.
- If there is still no change, disconnect the hose between the carburetor and the 'Y' fitting you installed. The engine should stall or run roughly. If not, then the fitting at the base of the carburetor is blocked. Clean it, reconnect the hose, and retest.