



Part Number
501-12 *Pro-Jection 1D*, 300 CFM

INSTALLATION TUNING AND TROUBLESHOOTING MANUAL

NOTE: These instructions must be read and fully understood before beginning installation. If this manual is not fully understood, installation should not be attempted. Failure to follow these instructions, including the pictures may result in subsequent system failure.

TABLE OF CONTENTS:

1.0 Introduction	3
2.0 Application	3
3.0 Warnings, Notes and Notices	3
4.0 Parts Identification	4
5.0 Additional Items Required for Installation	8
6.0 Tools Required for Installation	8
7.0 Removal of Existing Fuel System	8
8.0 Pro-Jection Throttle Body Installation	9
9.0 Fast Idle Solenoid Bracket Installation	10
10.0 Throttle Cable and Throttle Ball Installation	10
11.0 Vacuum Line Connections	11
12.0 Fuel Delivery and Fuel Return Systems	11
12.1 Fuel Pump Mounting Tips	11
12.1.1 Installation of Fuel Pump and Fuel Filters	11
12.2 Fuel Delivery and Return Line Installation Tips	12
12.2.1 Fuel Delivery Line Installation	12
12.2.2 Fuel Return Line Installation	12
13.0 Installation of the Temperature Sensor	13
14.0 Mounting the Electronic Control Unit (ECU)	14
15.0 Electrical Connections	14
15.1 Installing the Wiring Harness	14
15.2 Throttle Position Sensor (TPS)	15
15.3 Engine Coolant Temperature Sensor	15
15.4 Fast Idle Solenoid	16
15.5 Fuel Injectors	16
15.6 Fuel Pump Electrical Connections	16
15.7 Primary Power	17
15.8 Tachometer Signal Input	17
16.0 Closed Loop Installation and Connections (Optional)	18
17.0 Preparing to Start the Engine	19
18.0 Tuning the PRO-JECTION Fuel Injection System	19
18.1 Operational Overview of the Digital ECU	19
18.1.1 Main	20
18.1.2 Idle	20
18.1.3 High RPM	20
18.1.4 Accel Pump	21
18.1.5 Choke	21
19.0 Before Starting the Engine	21
19.1 Setting the Mechanical Idle	21
19.2 Setting the Throttle Position Sensor (TPS)	22
20.0 Tuning the System for Performance	23
20.1 Tuning the Main	23
20.2 Tuning the IDLE	23
20.3 Tuning the ACCEL	24
20.4 Tuning the HIGH RPM	24
20.5 Tuning the CHOKE	25
21.0 System Maintenance	25
22.0 Troubleshooting and Component Testing	25
22.1 Adjusting the Fuel Pressure	27
22.2 Testing the Engine Coolant Temperature Sensor	27
22.3 Testing the Throttle Position Sensor	28
22.4 Testing the Power Relay	28
22.5 Testing the Fast Idle Solenoid	29

1.0 INTRODUCTION:

Holley Performance Products has written this manual for the installation of the **PRO-JECTION 1D** fuel injection system. This manual contains all the information needed to install this system. Please read all the **WARNINGS, NOTICES, NOTES, and TIPS**, they contain valuable information that can save you time and money. It is our intent to provide the best possible products for our customer; products that perform properly and satisfy your expectations. Should you need information or parts assistance, please contact our technical service department at 1-270-781-9741, Monday through Friday, 7 a.m. to 5 p.m. Central Time. By using this number, you may obtain any information and/or parts assistance that you may require. Please have the part number of the product you purchased when you call.

WARNING! The **PRO-JECTION 1D** system consists of a number of sophisticated components. Failure of any one component does not constitute, nor does it justify, warranty of the complete system. Individual service items are available for replacement of components. If assistance is required or if you need further warranty clarification, you can call Holley Technical Service at the number shown above.

WARNING! To preserve warranty, these instructions must be read and followed thoroughly and completely before and during installation. It is important that you become familiar with the parts and the installation of the **PRO-JECTION** system before you begin. Failure to read and understand these instructions could result in damage to **PRO-JECTION** components that are not covered by the warranty and could result in serious personal injury and property damage.

WARNING! For closed loop systems using an oxygen sensor, use only unleaded fuels with this product. Use of leaded fuels will destroy the oxygen sensor and will result in incorrect exhaust gas oxygen reading and improper fuel delivery. Failure to follow these directions does not constitute the right to a warranty claim.

WARNING! Failure to follow all of the above will result in an improper installation, which may lead to personal injury, including death, and/or property damage. Improper installation and/or use of this or any Holley product will void all warranties.

2.0 APPLICATION

The Holley **PRO-JECTION** fuel injection system is designed to replace the two barrel carburetor on the 258 c.i.d. six cylinder Jeep. This universal 300 CFM system can provide you with the benefits of modern fuel injection such as improved low end torque, improved driveability and increased economy.

3.0 WARNINGS, NOTES AND NOTICES

DANGER! ENSURE THAT THE ENGINE IS COOL BEFORE BEGINNING THE INSTALLATION OF THIS SYSTEM. NEVER SMOKE, USE AN OPEN FLAME OR PRODUCE ANY SPARKS IN AN AREA WHERE GASOLINE OR GASOLINE VAPORS ARE PRESENT. DOING SO MAY CAUSE A FIRE AND/OR EXPLOSION, RESULTING IN PROPERTY DAMAGE, SERIOUS INJURY, AND/OR DEATH.

DANGER! NEVER DRILL INTO OR INSTALL ANY FITTINGS INTO A TANK THAT CONTAINS FUEL. DOING SO MAY CAUSE A FIRE AND/OR EXPLOSION, RESULTING IN PROPERTY DAMAGE, SERIOUS INJURY AND/OR DEATH.

WARNING! For a safe and reliable installation of the Holley **PRO-JECTION** fuel injection system, a thorough knowledge of the vehicle's mechanical and electrical systems is required. Otherwise, the installation should be completed only by a professional mechanic. An improperly installed system will cause poor vehicle performance and/or lead to property damage, personal injury, and / or death.

WARNING! This type of work **MUST** be performed in a well-ventilated area. Do not smoke or have an open flame present near gasoline vapors and explosion may result.

WARNING! DO NOT use the vapor canister lines as fuel return lines. Fuel leaks and fire will occur. Use only rubber And stainless steel fuel lines approved for automotive applications.

WARNING! The **PRO-JECTION 1D** system is NOT recommended for high-speed, high-performance engine applications.

WARNING! This system is NOT to be used for MARINE or AIRCRAFT applications.

NOTE: Before beginning the installation of this system, ensure that all mechanical and electrical systems are in good working order. These include all engine components such as the valve train, intake manifold, and gaskets, all electrical components, including the distributor, spark plug wires, battery, battery cables, starter, and starter solenoid, and the vehicle's fuel system including the fuel tank and fuel lines. Any damage or improperly operating

components must be replaced before installing the system.

NOTE: It will be required to install a fuel return line from the engine compartment to the fuel tank, if your vehicle is not so equipped

NOTE: Although every possible precaution was taken in the design of the digital electronic control unit to prevent interference from radio sources, the use of solid core spark plug wires may interfere with the operation of the electronic control unit. Holley recommends the use of either suppression or spiral wound spark plug wires, such as Holley P/N 830-100, 830-110, or 830-120.

4.0 PARTS IDENTIFICATION:

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>QTY</u>	<u>SERVICE PART</u>
1	TBI Assembly	1	500-14
2	Electronic Control Unit	1	534-35
3	Fuel Pump	1	512-103
4	Fuel Pump Bracket	1	
5	Fuel Filter, Metal	1	562-1
6	Fuel Filter Bracket	1	
7	Wiring Harness Assembly	1	534-25-1
8	Fuel Pump Cable	1	*
9	Manifold Adapter	1	17-44
10	Manifold Gasket	1	1008-1168
11	TBI Flange Gasket	2	508-2
12	Air Cleaner Bail	1	
13	Air Cleaner Adapter	1	
14	Air Cleaner Gasket	1	
15	Air Cleaner Adapter Gasket	1	508-1
16	Throttle Cable Bracket	1	
17	Solenoid Bracket	1	
18	Solenoid Nut	1	
19	Fast Idle Solenoid	1	46-74
20	Temperature Sensor	1	534-2
21	Fuel Pump Block-off Plate & Gasket	1	12-813
22	Relay	1	534-26
23	Fuse Holder Cable Assembly	1	*
24	Fuel Pump Filter, Plastic	1	562-3
25	Dielectric Grease	1	
26	Hose Clamp	8	
27	Vacuum Plug	1	
28	Throttle Cable Ball Stud	1	
29	Manifold Adapter Mounting Bolt	2	
30	TBI Mounting Stud	2	
31	TBI Mounting Stud	1	
32	TBI Mounting Nut	3	
33	Air Cleaner Locknut	1	
34	1/4-20 Bolt	2	
35	1/4-20 Bolt	1	
36	#10 Lockwasher	1	
37	10-32 Nut	1	
38	Cable Ties	12	

Contents of Assorted Terminal Package P/N 534-4

39	Connector, 2 Way, Female	1
40	Connector, 3 Way, Male	1
41	Wire Tap Connector	2
42	Quick Disconnect, Male, 1/4"	2
43	Quick Disconnect, Female, 1/4"	6
44	Ring Terminal, 3/8"	1
45	Ring Terminal, 1/4"	1
46	Ring Terminal, 3/16"	1
47	Butt Splice	2

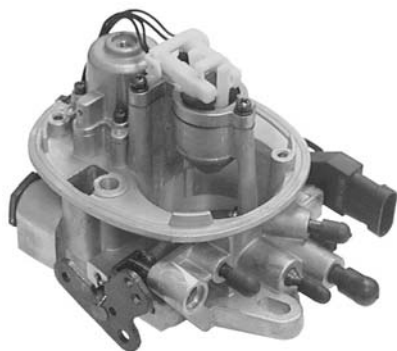
TBI Service Parts:

Fuel Injector, 80 PPH	522-26
Throttle Position Sensor	543-3

Optional Parts:

Rich / Lean Indicator w/ Oxygen Sensor
Rich / Lean Indicator w/o Oxygen Sensor
Closed Loop Kit for 1D and 2D PRO-JECTION

534-51
534-50
534-55



Item 1



Item 2



Item 3



Item 4



Item 5



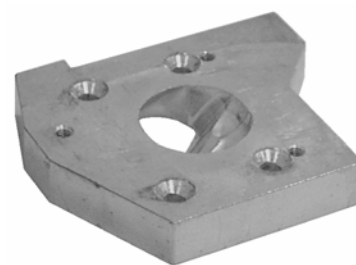
Item 6



Item 7



Item 8



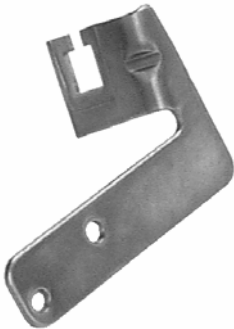
Item 9



Item 10

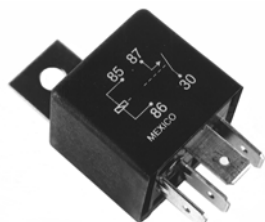


Item 13



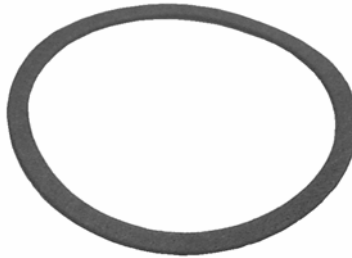
Item 16

Item 19



Item 22

Item 11



Item 14



Item 17

Item 20



Item 23

Item 12

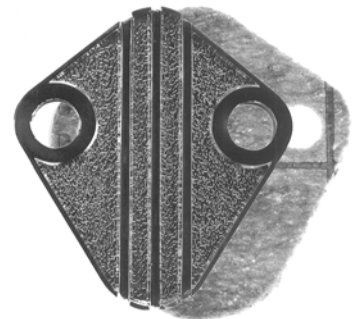


Item 15



Item 18

Item 21



Item 24



Item 25



Item 26



Item 27



Item 28



Item 29



Item 30



Item 31



Item 32



Item 33



Item 34



Item 35



Item 36



Item 37

Contents of Assorted Terminal Package P/N 534-4



Item 38



Item 39



Item 40



Item 41



Item 42



Item 43



Item 44



Item 45



Item 46



Item 47

5.0 ADDITIONAL ITEMS REQUIRED FOR INSTALLATION

- 0 - 30 P.S.I. Fuel Pressure Gauge
- 3/8" SAE J526 Steel Tubing*
- 5/16" SAE J526 Steel Tubing*
- Tachometer
- RTV Silicone (Oxygen Sensor Safe)
- 3/8" SAE J30d Rubber Fuel Hose*
- 5/16" SAE J30d Rubber Fuel Hose*
- Masking Tape
- Miscellaneous Hardware

*The length of these items is dependent upon your specific vehicle application and installation

6.0 TOOLS REQUIRED FOR INSTALLATION

- Small Size Standard Screwdriver
- Medium Size Standard Screwdriver
- 3/8" Nut Driver
- Digital Volt/Ohm Meter (10 Megohm)
- Tubing Cutter
- Standard Socket Set with Driver
- Electric Drill
- Assorted Drill Bits
- 3/8" & 5/16" Tubing Bender
- 2" Hole Saw
- Terminal Crimping Tool
- Standard Combination Wrench Set
- Adjustable Wrench
- Utility knife
- Torque Wrench

An assistant is necessary for some installation and adjustment procedures and should be present for safety reasons.

7.0 REMOVAL OF EXISTING FUEL SYSTEM

Begin the installation of the **PRO-JECTION 1D** system by removing the stock fuel delivery system. This includes the removal of the carburetor and the mechanical fuel pump (or electric fuel pump, if used) and the modification of the fuel lines.

DANGER! ENSURE THAT THE ENGINE IS COOL BEFORE BEGINNING THE INSTALLATION OF THIS SYSTEM. NEVER SMOKE, USE AN OPEN FLAME OR OTHER SOURCES OF EXTREME HEAT, OR PRODUCE ANY SPARKS NEAR ANY OPEN GASOLINE OR GASOLINE VAPORS. DOING SO MAY CAUSE A FIRE AND/OR AN EXPLOSION, RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY, AND / OR DEATH.

DANGER! ALWAYS DISCONNECT YOUR VEHICLE'S BATTERY BEFORE PERFORMING ANY WORK ON THE VEHICLE'S ELECTRICAL OR FUEL SYSTEM. FAILURE TO DO SO MAY PRODUCE SPARKS, CAUSING A FIRE OR EXPLOSION, RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY, AND / OR DEATH.

DANGER! ALWAYS PERFORM ANY WORK ON THE FUEL SYSTEM IN A WELL VENTILATED AREA. FAILURE TO DO SO MAY RESULT IN THE BUILDUP OF DANGEROUS GASOLINE VAPORS, CAUSING A FIRE OR EXPLOSION, RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY AND / OR DEATH.

WARNING! Always dispose of any unused fuel in an approved container. Do not pour gasoline onto the ground or allow it to evaporate in an enclosed area. Failure to do so may cause a fire or explosion, resulting in property damage, personal injury, and/or death.

- 1 - Disconnect the vehicle's battery and remove the air cleaner assembly. Inspect the air filter and replace if necessary.
- 2 - Identify each vacuum hose connected to the carburetor. With a pen and a piece of masking tape, label each hose as it is disconnected. (i.e. distributor vacuum, manifold vacuum, EGR vacuum, etc.)

NOTE: It may be helpful to take several photographs during the disassembly process to use as visual aids when installing the throttle body. These photographs will aid in the installation of the vacuum lines and the throttle linkages.

- 3 - Disconnect each of the vacuum lines from the carburetor.
- 4 - Disconnect the throttle and transmission linkage(s) from the carburetor ensuring that these are not damaged in the process.
- 5 - Disconnect the fuel supply line from the carburetor and from the outlet side of the fuel pump and discard it. This will usually result in some gasoline being spilled. Clean up any spilled gasoline before continuing.
- 6 - Remove the hold down studs or bolts that connect the carburetor to the manifold and remove the carburetor. Drain the fuel in the fuel bowls into an approved container. **Never store a carburetor that has not been drained.**
- 7 - Remove the carburetor flange gasket and discard it. **Ensure that you do not drop any parts into the manifold. Doing so may result in damage to your engine.**
- 8 - Disconnect the fuel supply-line from the mechanical fuel pump, if so equipped and plug it. This line will be utilized during the fuel injection system installation.
- 9 - Remove the mechanical fuel pump (if so equipped) and thoroughly clean the fuel pump mounting surface. Remove all of the old gasket material and any oil or dirt.
- 10 - Install the fuel pump block-off plate and the block-off plate gasket on the mechanical fuel pump mounting pad cover. The use of an automotive RTV silicone between the gasket and the engine block is highly recommended.

8.0 PROJECTION THROTTLE BODY INSTALLATION

- 1 - Place manifold gasket on intake manifold.
- 2 - Install the throttle cable bracket on the intake manifold adapter plate using two 1/4-20 bolts. See Figure 2.
- 3 - Install adapter plate on manifold. Secure with four (4) tapered head bolts with the bracket toward the inside of the engine facing the rocker cover. Torque to 8 ft. lbs. And then 15 ft. lbs in a criss cross pattern.

NOTE: With this installation, the throttle lever will be on the opposite side of the original carburetor.

- 4 - Insert the coarse threaded end of the three TBI mounting studs into the adapter plate and secure by screwing the studs into the adapter plate.
- 5 - Place the TBI flange gasket over the three 5/16" studs.
- 6 - Place the throttle body on top of the TBI flange gasket by placing the throttle body over the 5/16" studs.
- 7 - Place the air cleaner bail over the two TBI mounting studs with the air cleaner stud over the pressure regulator on the TBI. Secure with the TBI mounting nuts. Do not place a nut on the third TBI mounting stud until after the fast idle solenoid bracket is installed. One the fast idle solenoid bracket is installed, torque each nut to 5 to 7 ft. lbs in a criss cross pattern. See Figure 3.

9.0 FAST IDLE SOLENOID BRACKET

WARNING! The Holley *PROJECTION* system does not employ a method to increase engine idle speed when the A/C is used. Holley does not recommend using the fast idle solenoid to increase this speed. Use the throttle stop screw to adjust the idle speed 50 RPM higher for the A/C compressor load. Over advanced ignition timing will accent A/C stalling, as will too lean of an idle mixture.

- 1 - Install the fast idle solenoid bracket over throttle body stud. Attach other end of bracket to the adapter plate using 1/4-20 bolt. Screw the locknut onto the throttle body stud securing both bracket and TBI to adapter plate.
- 2 - Insert fast idle solenoid into large hole on bracket and secure with its nut.

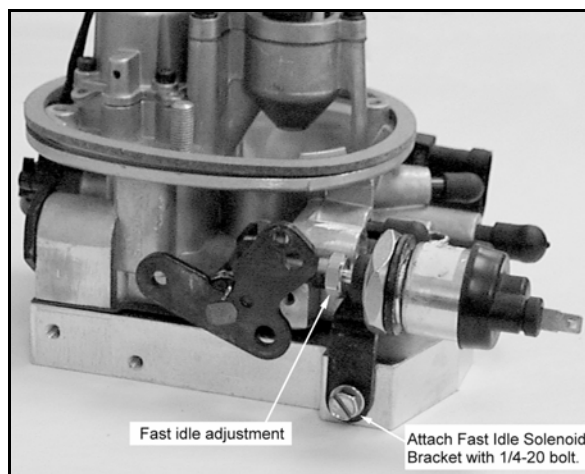


Figure 1

- 3 - Turn the brass hex head adjustment screw in clockwise about one turn to prevent the engine from racing upon initial start. See figure 1.

10.0 THROTTLE CABLE AND THROTTLE BALL INSTALLATION

- 1 - Install throttle cable bracket to the throttle body adapter. Cutout in square hole should face the front of vehicle.
- 2 - Secure the throttle cable bracket with 1/4-20 bolts. See Figure 2.
- 3 - Snap throttle cable into square cut out in bracket.
- 4 - Insert throttle ball in top hole of throttle lever and secure with #10 lockwasher and 10-32 nut. See Figure 3.
- 5 - Snap end of throttle cable onto throttle ball and secure with retaining clip.

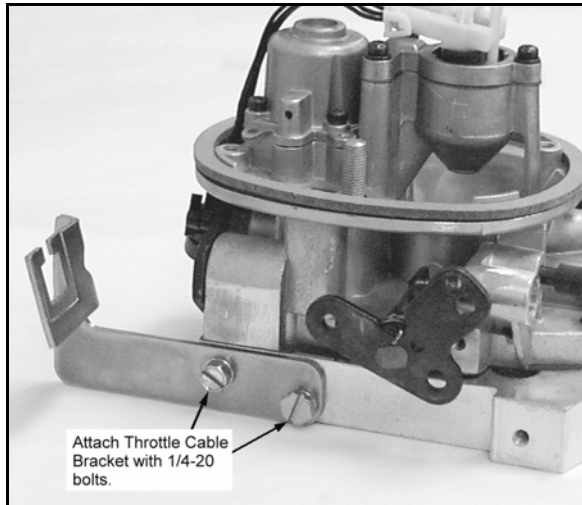


Figure 2

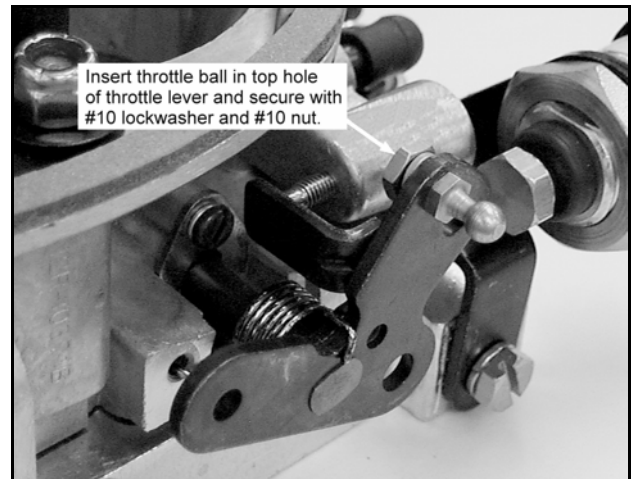


Figure 3

11.0 VACUUM LINE CONNECTIONS

- 1 - Inspect all of the vacuum lines that were disconnected during the removal of the stock fuel system for any signs of wear or damage and replace those that are in need of repair.
- 2 - Connect all of the vacuum lines that were labeled during the disassembly of the stock fuel system to the throttle body as shown in Figure 4.
- 3 - Plug all of the vacuum ports on the throttle body that are not used with vacuum plugs. **Failure to plug off the unused vacuum ports will cause vacuum leaks, resulting in sub-standard system and vehicle performance.**
- 4 - Although the fuel pressure regulator on the throttle body is factory set at 15 PSI, it may be necessary to adjust the fuel pressure for your specific application. See **Adjusting the Fuel Pressure** section at the end of this manual.

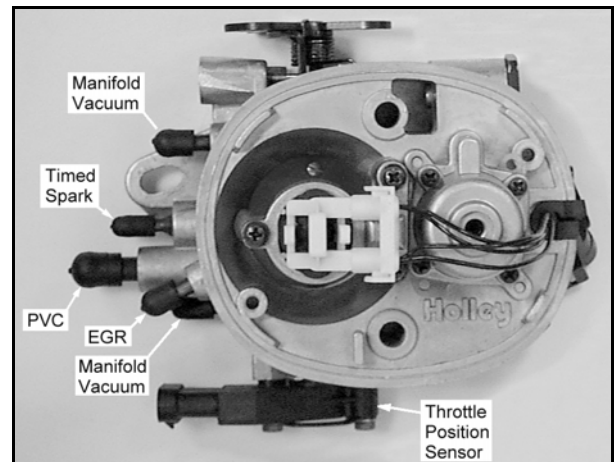


Figure 4

12.0 FUEL DELIVERY AND FUEL RETURN SYSTEMS

DANGER! NEVER WORK UNDER A VEHICLE SUPPORTED ONLY BY A JACK. ALWAYS SUPPORT THE VEHICLE WITH JACK STANDS THAT ARE IN GOOD OPERATING CONDITION. FAILURE TO DO SO MAY RESULT IN PROPERTY DAMAGE, SERIOUS INJURY AND / OR DEATH.

DANGER! MOUNT THE FUEL PUMP AND ALL FUEL LINES AWAY FROM ANY DIRECT SOURCES OF HEAT, SUCH AS THE EXHAUST SYSTEM, AND AWAY FROM ANY MOVING PARTS THAT COULD DAMAGE THE PUMP OR FUEL LINES. FAILURE TO DO SO MAY RESULT IN THESE COMPONENTS BEING DAMAGED, CAUSING A POSSIBLE FIRE OR EXPLOSION AND RESULTING IN PROPERTY DAMAGE, SERIOUS INJURY, AND/OR DEATH.

DANGER! FAILURE TO USE RUBBER FUEL HOSE THAT MEETS SAE J30 STANDARDS AND STEEL FUEL LINE THAT MEETS SAE J526 STANDARDS COULD RESULT IN FUEL LEAKS. A FUEL LEAK MAY CAUSE A FIRE OR EXPLOSION, RESULTING IN PROPERTY DAMAGE, SERIOUS INJURY AND / OR DEATH.

12.1 FUEL PUMP MOUNTING TIPS

- 1 - **DO NOT** mount the pump higher than the lowest point of the fuel tank.
- 2 - Form a “U” shaped loop in the fuel line with the pump at the lowest point to trap fuel at the pump inlet.
- 3 - Make sure the fuel tank is properly vented.

12.1.1 INSTALLATION OF FUEL PUMP AND FUEL FILTERS

- 1 - Insert the fuel pump into the fuel pump bracket and mount the fuel pump as close to the fuel tank as possible on either the frame rail or another rigid structural member. **The fuel pump must be mounted below the lowest point in the fuel tank.** This is necessary to allow for an adequate fuel supply to the fuel pump since the pump is gravity fed. The pump is designed to push fuel and is not designed to suck fuel out of the tank.
- 2 - Connect a short length of 3/8" I.D. J30d fuel hose to the inlet side of the fuel pump. Secure the fuel hose to the fuel pump with a hose clamp.
- 3 - Attach the outlet side of the small fuel filter (use the arrow printed on the filter for reference) to the other end of the fuel hose and secure the filter to the hose with a hose clamp. **This filter MUST be installed between the fuel tank and the fuel pump.**
- 4 - Connect another length of 3/8" J30d fuel line between the inlet side of the small plastic fuel filter and the fuel tank. Secure each end of the hose with a hose clamp.
- 5 - Attach a short length of 3/8" I.D. J30d fuel line to the outlet side of the fuel pump and secure the hose to the fuel pump with a hose clamp.
- 6 - Connect the inlet side of the metal fuel filter to the other end of the 3/8" I.D. J30d fuel hose attached to the fuel pump and secure it with a hose clamp.
- 7 - Check to see both filters are installed in the proper direction. A flow direction arrow (←) is stamped on the side to indicate the direction of the flow.

12.2 FUEL DELIVERY AND RETURN LINE INSTALLATION TIPS

WARNING! Fuel pressure can be maintained in the *PRO-JECTION* fuel system for up to one (1) hour after engine shutdown. The existence of this pressure can cause fuel to spray out, causing possible fire or personal injury. Allow at least one (1) hour to after engine shutdown for fuel pressure to return to zero.

- 1 - Some vehicles may use a 3/8" I.D. fuel hose and fuel lines. If the existing fuel hose and fuel lines are being retained, inspect and replace any hoses, clamps or fuel line showing signs of age.
- 2 - Rigid fuel line SAE J526 steel tubing should be used for under vehicle runs, such as along vehicle frame rails or under the floor pan.

- 3 - Anchor all fuel lines to solid chassis members at 1-1/2 foot intervals using rubber coated steel clamps.
- 4 - Install the small plastic filter at the fuel pump inlet. This filter is designed to protect the fuel pump for particles of dirt or other foreign material.
- 5 - Always use a Holley filter P/N 562-3 at the pump inlet. These filters have a 70 micron screen designed to protect the fuel pump by catching the smaller particles of dirt and foreign material that normal fuel filter would miss.

12.2.1 FUEL DELIVERY LINE INSTALLATION

WARNING! The *PRO-JECTION* fuel system requires a 3/8" I.D. fuel line delivery system. It may be required to replace the existing steel fuel line which runs from the fuel tank to the engine compartment; if the current fuel delivery system on your vehicle is not equipped with 3/8" I.D. fuel line. Replace using the proper rubber fuel hose that meets SAE J30 standards and steel fuel lines that meets SAE J526 standards. Failure to use the proper rubber fuel hose and steel fuel lines may cause a fire or explosion, resulting in property damage, serious injury and/or death.

NOTE: Before connecting the fuel supply and return lines to the throttle body, Holley recommends that a fuel pressure gauge be temporarily installed in both lines. Install a fuel pressure gauge (0 - 30 P.S.I.) into a "T" fitting and install the fitting into the fuel line. **This gauge must be removed once**

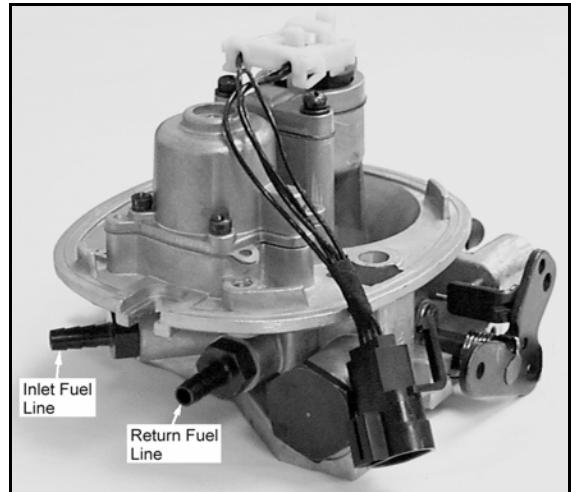


Figure 5
the system installation is complete.

- 1 - Locate the fuel inlet fitting on the throttle body. The fitting on an angle closest to the throttle position sensor is the supply line fitting. See Figure 5.
- 2 - Using 3/8" I.D. SAE J30 fuel hose and SAE J526 steel fuel line, connect the outlet side of the large metal fuel filter to the inlet fitting on the throttle body. Secure the fuel supply line to the fitting with hose clamps.

12.2.2 FUEL RETURN LINE INSTALLATION

The fuel return line is necessary to allow unused portion of fuel to be returned to the fuel tank. Some late model vehicles may already have a return line to the fuel tank that can be utilized. If a fuel return line must be installed, **a minimum size of 5/16" I.D. is required.**

DANGER! FAILURE TO USE RUBBER FUEL HOSE THAT MEETS SAE J30 STANDARDS AND STEEL FUEL LINE THAT MEETS SAE J526 STANDARDS COULD RESULT IN FUEL LEAKS. A FUEL LEAK MAY CAUSE A FIRE OR EXPLOSION, RESULTING IN PROPERTY DAMAGE, SERIOUS INJURY AND/OR DEATH.

DANGER! NEVER DRILL INTO OR INSTALL ANY FITTINGS INTO A TANK THAT CONTAINS FUEL. DOING SO MAY CAUSE A FIRE AND / OR AN EXPLOSION, RESULTING IN PROPERTY DAMAGE, SERIOUS INJURY, AND/OR DEATH.

DANGER! DO NOT USE THE VAPOR CANISTER LINES AS FUEL RETURN LINES. FUEL LEAKS AND FIRE WILL OCCUR RESULTING IN PROPERTY DAMAGE, SERIOUS INJURY AND/OR DEATH.

WARNING! Proper installation of the fuel return line may necessitate complete fuel tank removal. For your safety Holley **STRONGLY RECOMMENDS** that a fuel tank specialist install the fuel return line fitting, who regularly performs this type of work and who is familiar with safety regulations and precautions necessary to perform this type of work.

WARNING! The fuel return line should enter the fuel tank at the "fuel level sending unit flange" or at the filler neck. The filler neck or the sending unit must be removed from the tank to complete the installation.

WARNING! The fuel pressure in the fuel return line must be less than 4 PSI for the *PRO-JECTION* system to operate properly. Fuel return line pressure of 4 PSI or more can result from the fuel return line being too small or from too many bends in the fuel line. Fuel pressure in excess of 4 PSI may result in flooding, which

may cause stalling or hard starting.

NOTE: Before connecting the fuel supply and return lines to the throttle body, Holley recommends that a fuel pressure gauge be temporarily installed in both lines. Install a fuel pressure gauge (0 - 30 P.S.I.) into a "T" fitting and install the fitting into the fuel line. **This gauge must be removed once the system installation is complete.**

- 1 - Locate the fuel outlet fitting on the throttle body. The fitting next to the large nut connects to the return line. See Figure 5.
- 2 - Using 5/16" I.D. SAE J30 fuel hose and SAE J526 steel fuel line, attach the fuel return line to the fuel return outlet fitting on the throttle body to the return line fitting on the fuel tank. Secure the fuel return line to the fittings with hose clamps.

13.0 INSTALLATION OF THE TEMPERATURE SENSOR

The engine coolant temperature sensor is used by the electronic control unit to monitor engine temperature. The ECU uses this data to either lean out or enrich the fuel delivery.

DANGER! NEVER REMOVE THE RADIATOR CAP WHEN THE ENGINE IS HOT. THE COOLING SYSTEM WILL BE UNDER PRESSURE AND REMOVING THE RADIATOR CAP MAY RESULT IN SEVERE BURNS AND/OR OTHER INJURIES. ALWAYS ALLOW THE ENGINE TO COOL DOWN BEFORE REMOVING THE RADIATOR CAP.

WARNING! DO NOT use Teflon tape or another thread sealant when installing the engine coolant temperature sensor. The outer body is made of brass and the threads will seal against the surface into which the sensor is installed. The use of a thread sealant will produce incorrect temperature readings.

- 1 - Drain the radiator until the coolant level is below the coolant temperature sensor port in the intake manifold. Save the coolant.
- 2 - Install the engine coolant temperature sensor into the water passage on the intake manifold. Most intake manifolds have a plug that can be removed for the installation of a temperature sensor. **DO NOT INSTALL THE ENGINE COOLANT TEMPERATURE SENSOR IN THE THERMOSTAT HOUSING OR IN THE CYLINDER HEAD.**
- 3 - Tighten the temperature sensor and torque the sensor to 15 lb. ft.. **DO NOT OVER-TORQUE THE SENSOR. OVER-TORQUING MAY CAUSE THE INTAKE MANIFOLD TO CRACK.**
- 4 - Refill the cooling system to capacity.

14.0 MOUNTING THE ELECTRONIC CONTROL UNIT (ECU)

WARNING! DO NOT open the ECU. The digital electronics contained within this unit are sensitive to static electricity. Opening this unit WILL VOID THE WARRANTY.

WARNING! When mounting the ECU, care must be taken that none of your vehicle's other systems, such as the electrical system, air conditioning, or heating components, are damaged by either drilling holes or using mounting screws. Always check on the other side of the location that is to be drilled to ensure that no damage will occur.

WARNING! DO NOT mount the ECU in an enclosed area such as the glove compartment. Mount the unit in an area that will allow air to flow freely across the unit to dissipate heat generated by the ECU.

WARNING! DO NOT mount the ECU in the engine compartment. The ECU is not designed for the environment (heat, moisture) present in the engine compartment. Premature failure of the ECU will result.

- 1 - Pick a suitable location on the interior of the vehicle in which the ECU can be mounted. Ensure that the mounting location allows for sufficient length of the wiring harness, an exit for the wiring harness to the engine compartment and clearance for connectors and the adjustment knobs on the front of the unit are accessible before mounting the ECU.
- 2 - Using the ECU baseplate as a template, drill 4 pilot holes, ensuring that no damage will result to any of your vehicle's other systems.
- 3 - Mount the ECU with the 4 self-starting sheet metal screws (not included).

15.0 ELECTRICAL CONNECTIONS

The cable assembly plugs into the ECU and also connects to the throttle body, fuel pump, sensors, electrical power and ground. Apply a small amount of dielectric grease to all electrical terminals and connections.

DANGER! ALWAYS DISCONNECT YOUR VEHICLE'S BATTERY BEFORE PERFORMING ANY WORK ON THE VEHICLE'S ELECTRICAL OR FUEL SYSTEM. FAILURE TO DO SO MAY PRODUCE SPARKS, CAUSING A FIRE OR EXPLOSION, RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY, AND/OR DEATH.

WARNING! When routing the wiring harness, keep the harness away from any direct sources of heat, such as the exhaust system, and any moving parts. The wiring harness must be installed to keep it away from any road hazards. An unsecured or dangling wiring harness under the vehicle will eventually result in a loose connection and subsequent fuel pump and/or system failure.

WARNING! Route all wires away from any moving parts or direct sources of heat, such as the exhaust system. Use the wire ties included with this kit to hold the wires clear. Bare or frayed wires may cause damage to the electronic control unit, resulting in subsequent system failure.

WARNING! Proper electrical connections are absolutely critical to ensure reliable system performance. Securely crimp and/or solder all terminal connections, where required. Use Dielectric grease in all terminal connections.

WARNING! The PRO-JECTION system must be appropriately grounded to ensure proper system performance and to prevent any damage to the system. To ensure a good grounding plane, connect a ground strap between the engine and the chassis.

NOTE: All connections listed **MUST** be made in order for the Pro-Jection system to operate properly.

NOTE: The single PINK wire in the wiring harness must go to ground.

15.1 INSTALLING THE WIRING HARNESS

WARNING! Before drilling into your vehicle's firewall, check both sides of the firewall for possible interference with electrical systems, heating or air conditioning parts, etc. Failure to do so may result in damage to your vehicle.

NOTE: When routing the wiring harness through the firewall, care must be taken not to damage the wiring harness. Protect the wiring harness by installing a grommet around the wiring harness and then inserting the grommet into the hole in the firewall.

- 1 - Determine a location in the firewall, close to where the ECU was mounted, through which the wiring harness can be routed into the engine compartment. Try to use an existing hole in the firewall but if this is not possible, it will be necessary to either drill or punch a 2 inch hole into the firewall.
- 2 - Feed the wiring harness from the interior of the vehicle into the engine compartment, allowing for enough length in the wiring harness to connect the harness to the ECU and to mount the harness so that it does not interfere with the operation of the vehicle. **DO NOT CONNECT THE WIRING HARNESS TO THE ECU AT THIS TIME.**
- 3 - Use a utility knife to slit the grommet on one edge so that the grommet can be pulled apart and placed over the wiring harness.
- 4 - Install the grommet over the wiring harness and insert the grommet into the hole cut into the firewall through which the harness has been previously routed.

15.2 THROTTLE POSITION SENSOR (TPS)

- 1 - Locate the bundle of wires that contains the short **Black**, **Blue**, and **Gray** wires that are terminated with male terminal pins and the **Black** wire terminated with a ring terminal. Locate the 3-position tower connector.
- 2 - Insert the wires terminated with the male terminal pins into the connector until each pin snaps into place inside the connector. **DO NOT force the pins. If you feel any resistance, gently rotate the pins until they slide into the connector.** Follow the insertion code shown below.

Connector Position	Wire Color
A	Gray
B	Blue
C	Black

- 3 - Fold the cover located on the top of the connector over the wires and secure the cover in place by snapping the cover over the two hold downs located on the side of the connector.
- 4 - Insert the connector into the throttle position sensor located on the passenger side of the throttle body until it securely snaps into place. **DO NOT force the connector into the TPS. If you feel any resistance, ensure that each of the pins is centered in the 3 position connector and gently press the connector into the TPS.**
- 5 - Connect the other black wire in this wire bundle that is terminated with a ring terminal to a good grounding location such as the engine block or the intake manifold. Ensure that the surface to which the ring terminal will be connected is free of any dirt or oil. **Improper grounding WILL result in sub-standard system performance.** Holley recommends connecting the ring terminal to one of the intake manifold bolts and the use of a star washer (not included) to ensure that a good ground connection is maintained.

NOTE: **DO NOT** secure the black ground wire near the exhaust crossover in the manifold. The heat may deteriorate the wire and/or connection. It is important to have a good engine to chassis ground. If necessary, install a ground strap between vehicle engine and chassis.

15.3 ENGINE COOLANT TEMPERATURE SENSOR

- 1 - Locate the single brown wire in the wiring harness and one of the female quick disconnect terminals.
- 2 - Route the brown wire away from any direct sources of heat towards the engine coolant temperature sensor and determine the appropriate length of wire needed to connect the brown wire to the sensor.
- 3 - Cut the brown wire to the appropriate length and strip 1/4" of insulation off the wire. Twist the exposed wire strands and insert the bare wire into the female quick disconnect terminal. Securely crimp the female quick disconnect terminal to the wire with a crimping tool. Test the crimp by pulling on the wire and the crimp terminal.
- 4 - Connect the brown wire to the engine coolant temperature sensor by inserting the tab located on the top of the coolant temperature sensor into the female quick disconnect terminal

15.4 FAST IDLE SOLENOID

- 1 - Locate the yellow wire in the harness and one of the female quick disconnect terminals.
- 2 - Route the yellow wire away from any direct sources of heat towards the fast idle solenoid and determine the appropriate length of wire needed to connect the yellow wire to the solenoid.
- 3 - Cut the yellow wire to the appropriate length and strip 1/4" of insulation off the wire. Twist the exposed wire strands and insert the bare wire into the female quick disconnect terminal. Securely crimp the female quick disconnect terminal to the wire with a crimping tool. Test the crimp by pulling on the wire and the crimp terminal.
- 4 - Connect the yellow wire to the fast idle solenoid by inserting the tab located at the base of the fast idle solenoid into the female quick disconnect terminal.

15.5 FUEL INJECTORS

- 1 - Locate the harness pigtail that contains the 4-position male connector to which one orange, one violet and two red wires are attached.
- 2 - Route this harness pigtail towards the front of the throttle body away from any direct sources of heat.
- 3 - Plug the connector at the end of the pigtail into the oval connector at the front of the throttle body. Press the two connectors together until the safety latch snaps into place.

15.6 FUEL PUMP ELECTRICAL CONNECTIONS

- 1 - Locate the harness pigtail containing the red and green wires terminated with male terminal pins and the 2-position shroud connector.
- 2 - Insert the wires terminated with the male terminal pins into the connector until each pin snaps into place inside the connector. **DO NOT force the pins. If you feel any resistance, gently rotate the pins until they slide into the**

connector. Follow the insertion code shown below.

Connector Position	Wire Color
A	Green
B	Red

- 3 - Fold the connector cover located on the top of the connector over the wires and secure it in place by snapping the cover over the two hold downs located on the side of the connector.
- 4 - Plug the fuel pump wiring harness connector into the connector assembled in Step 3 until the safety latch snaps into place. **DO NOT force the connectors. If you feel any resistance, ensure that each of the pins is centered in both of the connectors and gently press the connectors together.**

NOTE: On some applications, fuel inlet pressure may drop when under high load conditions due to the large amount of fuel volume required. To increase the amount of fuel that the pump can deliver, a relay may be added to boost the voltage at the pump terminals. The ECU uses a power transistor to drive the fuel pump and during high current demands may cause a voltage drop, which limits the amount of voltage at the pump. This will not cause a problem for most applications. If you feel this is affecting your vehicle performance then add a relay to the system as shown in figure 6. Use Holley P/N 534-26 or equivalent. All wire must be 18 gauge or larger. When using a relay, an unrestricted fuel return line of 5/16" or larger must be used.

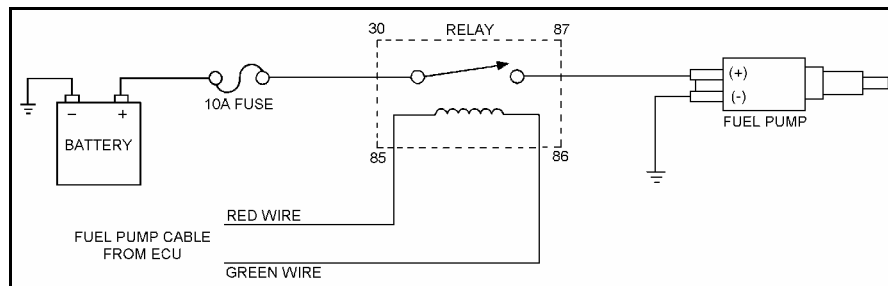


Figure 6

15.7 PRIMARY POWER

WARNING! DO NOT connect the primary power wire directly to the battery. Doing so will cause the PRO-JECTION system to be in continuous operation causing possible damage to your vehicle's battery and the PRO-JECTION system.

WARNING! When connecting the system's primary power, a relay must be used to prevent low voltage situations during the system's operation. DO NOT connect the primary power wire directly to a switched +12 volt source.

- 1 - Locate the single red wire in the wiring harness, the power relay, the fuse holder cable assembly, and four (4) female quick disconnect terminals from the assorted terminal package.
- 2 - Mount the relay on the firewall with a self tapping sheet metal screw. (Screw is not included) Connect a 16 gauge stranded wire from the positive terminal of the battery to terminal position 30 on the relay. Terminate the wire with a female quick disconnect terminal and then plug the terminal into the relay. See Figure 8.
- 3 - Cut the two wires that split off the fuse holder cable assembly as close to the heat shrink wrap as possible and strip 1/4" of insulation off the resulting single wire. See Figure 7.

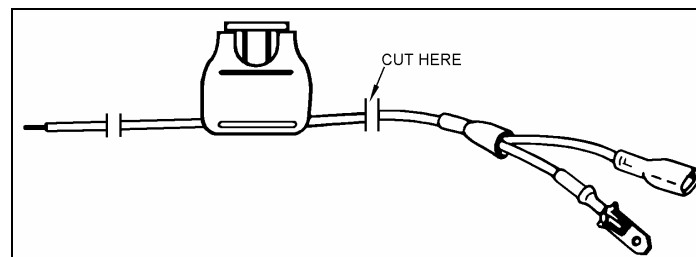


Figure 7

- 4 - Connect one wire of the fuse holder cable assembly to terminal position 87 on the relay with a female quick disconnect terminal.

- 5 - Connect the other end of the fuse holder cable assembly to the single red wire in the **PRO-JECTION** harness with either a butt connector or by soldering the two wires together and then covering the connection with heat shrink.
- 6 - Connect terminal position **85** on the relay to a good chassis or engine ground.
- 7 - Connect terminal position **86** on the relay to your vehicle's switched +12 volt power. The switched power source must be energized both in the "**RUN**" and "**CRANK**" positions of the ignition switch. To find a good switched +12 volt power source, temporarily reconnect the battery and use a volt meter to locate this source. Some vehicle's are equipped with spare terminals on the primary fuse block labeled "**IGN**". Disconnect your battery after locating the switched power source.

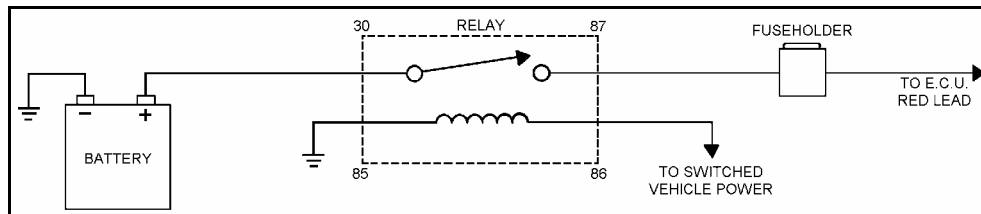


Figure 8

15.8 TACHOMETER SIGNAL INPUT

WARNING! If your vehicle is equipped with a Capacitive Discharge (CD) ignition system, **DO NOT** connect the PRO-JECTION System's tach signal input wire to the negative side of the ignition coil as you would with an inductive ignition system. Refer to the CD ignition manufacturer's installation instructions to determine where the tach signal input wire can be connected.

NOTE: To determine if the ignition system is an inductive style ignition system, use a volt meter to measure the voltage on the positive coil wire. Connect the positive volt meter lead to the (+) side of the coil and the negative volt meter lead to ground. Set the appropriate voltage range on the volt meter. If 14 Volts, or less, are present with the engine running, the ignition is an inductive style system. This determination needs to be made before beginning the installation of the **PRO-JECTION** fuel injection system.

NOTE: Although all possible precautions were taken to prevent spark noise from interfering with the operation of the digital electronic control unit, interference is possible in some cases. To prevent any possible interference, ensure that the tach signal wire is not routed in close proximity to the spark plug wires.

- 1 - The digital ECU used with this system has been designed to automatically detect either a 12 volt square wave tach signal or a 150 volt peak-to-peak signal. No additional components are required to modify the tach signal.
- 2 - Locate the single white wire in the **PRO-JECTION** harness.
- 3 - Route the white wire towards the location where the tach signal is generated, avoiding all direct sources of heat.
- 4 - If you are operating an inductive type of ignition system, connect the white wire to the negative side of the ignition coil with a ring terminal.
- 5 - If you are operating a MSD Ignition, connect the white wire to the output labeled "TACH" with an appropriate crimp terminal.
- 6 - If you are operating either a Holley HP or Strip Annihilator Ignition System (Holley Part #'s 800-100 or 800-200), the white wire should be connected to the brown wire in the ignition's primary harness.

16.0 CLOSED LOOP INSTALLATION AND CONNECTION (OPTIONAL)

The digital electronic control unit is designed to utilize a heated, three wire oxygen sensor to operate the system in a closed loop mode. When operating in a closed loop mode, the electronic control unit utilizes a reference signal from the oxygen sensor to determine whether the engine is running too rich or too lean. The electronic control unit then adjusts the fuel delivery to maintain a stoichiometric fuel delivery (14.7:1 Air / Fuel Ratio).

DANGER! NEVER WORK UNDER A VEHICLE SUPPORTED ONLY BY A JACK. ALWAYS SUPPORT THE VEHICLE WITH JACK STANDS THAT ARE IN GOOD OPERATING CONDITION. FAILURE TO DO SO MAY RESULT IN PROPERTY DAMAGE AND / OR SERIOUS INJURY OR DEATH.

WARNING! The oxygen sensor must be mounted in a location that will prevent the sensor from being damaged by

road hazards or moving parts on your vehicle. Failure to do so will cause damage to the oxygen sensor, resulting in substandard system performance.

WARNING! Use only Unleaded fuels when operating an oxygen sensor. Use of Leaded fuels will DESTROY the oxygen sensor and will result in incorrect exhaust gas oxygen readings.

WARNING! The use of some RTV Silicone sealant will destroy the oxygen sensor. Ensure that the RTV silicone sealant that you use is compatible with oxygen sensor vehicles. To determine compatibility, check the packaging of your RTV silicone or contact the sealant manufacturer.

WARNING! Disconnect the digital electronic control unit from the wiring harness when welding on the vehicle. Failure to do so will result in damage to the digital electronic control unit.

NOTE: The oxygen sensor boss should be installed by someone with experience in welding exhaust systems. Any competent exhaust shop will be able to accomplish this task at minimum cost.

NOTE: Federal Law prohibits the disconnection of AIR pumps. The use of an oxygen sensor in conjunction with an AIR pump may result in an extremely rich fuel mixture, resulting in possible damage to your engine.

NOTE: The installation of an oxygen sensor that will operate with the digital electronic control unit requires the use of Holley Part #534-54, Digital **PRO-JECTION** Closed Loop Kit for 1 and 2-Barrel Applications.

NOTE: The oxygen sensor should only be used **AFTER** the **PRO-JECTION** system has been properly tuned in an open loop mode (oxygen sensor is disconnected). Utilizing the oxygen sensor without first tuning the Pro-Jection system in an open loop mode may result in engine fuel requirements that are outside the range of adjustment of the closed loop system.

1 - Determine a location in the exhaust system in which to mount the oxygen sensor. This location must be as close to the engine as possible. Good mounting locations are in a header collector, the drop pipe, or the "Y" pipe on a single exhaust system.

NOTE: If your vehicle is equipped with catalytic converters, the oxygen sensor MUST be located between the engine and the catalytic converters.

2 - Drill a 7/8" hole into the exhaust pipe where the oxygen sensor will be mounted.

3 - Insert the weld ring into the hole and weld all the way around the ring to ensure a leak proof connection. Ensure that you do not damage the threads inside the weld ring.

4 - Install the oxygen sensor into the weld ring and tighten it securely. It is a good idea to coat the threads with a small amount of anti-seize to aid in the removal of the sensor.

5 - Connect the oxygen sensor wiring harness included with the closed loop kit to the oxygen sensor by pressing the two connectors together until the safety latch snaps into place.

6 - Route the oxygen sensor wiring harness away from any direct sources of heat and moving parts from the oxygen sensor to the rear of the electronic control unit. Secure the harness with wire ties.

7 - Plug the small black connector on the wiring harness into the 6 position connector on the rear of the digital electronic control unit only **AFTER** the system has been properly tuned in open loop mode.

NOTE: The digital electronic control unit utilizes only three of the six positions in the small connector on the rear of the unit. The other three positions are for **FACTORY USE ONLY** and no connections should be made to these 3 connector positions.

17.0 PREPARING TO START THE ENGINE

1 - After all electrical connections have been made, double-check all connections to ensure that they are tight and secure.

2 - Inspect the fuel system to ensure that all connections are tight and secure.

3 - Reconnect the battery.

18.0 TUNING THE **PRO-JECTION** FUEL INJECTION SYSTEM

Now that the installation of all components has been accomplished, you are ready to start your engine and begin the tuning process. Before doing so, review the following operational outline to gain a better understanding of the five adjustment knobs on the front of the ECU unit will accomplish.

18.1 OPERATIONAL OVERVIEW OF THE DIGITAL ECU:

This digital ECU is programmed at the factory with a fuel map applicable to operation of the Jeeps engine.. The ECU utilizes inputs from various sensors and from the adjustment knobs located on the front of the ECU to calculate the appropriate fuel delivery to the engine. When the ignition is initially turned on, power is applied to the digital ECU. At this time, the ECU provides power to the fuel pump for several seconds to prime the fuel lines and to build pressure in the fuel injection system.

During cranking, the ECU begins receiving tach signals from the engine through the white wire in the wiring harness. At this time, power is applied to the fuel pump for continuous operation and the fuel injectors are fired to deliver fuel to the engine. The appropriate amount of fuel is calculated by taking into account the throttle position, engine coolant temperature, and an optional oxygen sensor feedback voltage. The throttle position sensor provides information relative to how far and how fast the throttle is being opened or closed. The oxygen sensor provides information on whether the engine is running rich or lean. Even though the oxygen sensor is heated, the ECU will continue to operate in an open loop mode for a short period of time after initial start-up. This combined information is then used by the ECU to adjust the fuel delivery to the engine.

The ECU also powers the fast idle solenoid, which works in direct conjunction with the engine coolant temperature sensor. During cold starts, the fast idle solenoid will remain extended until the engine reaches an operating temperature of 75° F. If the engine temperature is already above 70° F when starting the engine, the fast idle solenoid will remain in the extended position for a factory-set period of time. The amount of time that the fast idle solenoid remains extended is factory set and **CAN NOT BE CHANGED** by the user. In addition to operating the fast idle solenoid, the signal received from the engine coolant temperature sensor also provides information to the ECU relative to enriching or leaning out the fuel delivery. When the engine is cold, more fuel will be delivered and the fuel delivery is adjusted as the engine warms up.

During vehicle operation, the fast idle solenoid is also utilized to allow for a smoother deceleration. During deceleration, the fast idle solenoid is activated for a pre-determined period of time and prevents stalling, as would an idle air control motor. In addition to all of the aforementioned features, a "CLEAR FLOOD" mode has also been programmed into the ECU to aid in vehicle startup should excessive fuel have entered the intake manifold. Should the engine flood during start up, the CLEAR FLOOD mode can be initialized by turning the ignition off, pressing the accelerator all the way to the floor, and cranking the engine until it starts.

In addition to the information provided to the ECU by the various sensors, the user is also able to adjust the fuel delivery through the use of the five adjustment knobs on the front of the ECU. The user is able to adjust fuel delivery for Choke, Accelerator Pump, Idle, Main, and High RPM settings. A detailed description of each adjustment is given below. Refer to Figure X during the discussion of each of the adjustments.

The fuel map that is programmed into the digital ECU is comprised of 256 individual points. Each point has a throttle position and rpm value assigned to it. These values are used by the digital ECU to determine the appropriate fuel delivery when the system is in operation.

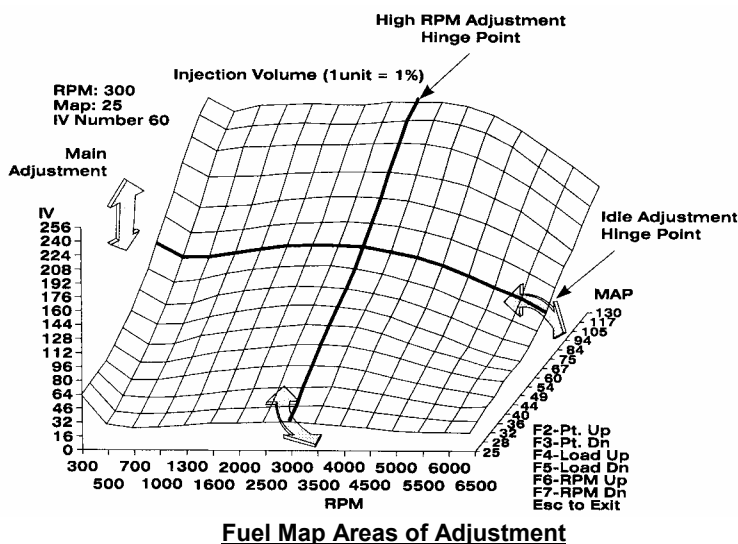


Figure 9

18.1.1 MAIN

The MAIN adjustment knob allows the user to adjust the fuel delivery of the entire fuel map 50% above or below the values set at the factory. Rotating the knob clockwise will raise the entire fuel map vertically, therefore increasing the fuel delivery for all points in the map. Rotating the knob counter-clockwise will lower the entire map vertically, therefore decreasing the fuel delivery for all points in the map.

NOTE: In tuning the system, the MAIN is the first value to be adjusted. All other adjustments are made AFTER the MAIN has been properly set.

18.1.2 IDLE

The Idle adjustment knob allows the user to adjust the fuel delivery in the idle region of the fuel map 30% above or below the values that are set at the factory. This is accomplished by moving the lower part of the fuel map either up or down along a hinged horizontal line as indicated in Figure 9. Adjustments to the idle region of the fuel map are made AFTER the MAIN Adjustment knob has been properly adjusted. Turning the knob clockwise increases the fuel delivery, while a counter-clockwise rotation decreases the amount of fuel delivered to the engine during idle.

18.1.3 HIGH RPM

The HIGH RPM adjustment knob allows the user to adjust the fuel delivery for engine speeds over 3000 rpm 50% above or below the values that are set at the factory. This is accomplished by moving the fuel map either up or down along a diagonal hinged line as indicated in Figure 9. Turning the adjustment knob clockwise increases the fuel delivery, while a counter-clockwise rotation decreases the amount of fuel delivered to the engine at high engine speeds.

18.1.4 ACCEL PUMP

The ACCEL PUMP adjustment knob allows the user to adjust the addition of fuel for acceleration 50% above or below the value set at the factory. Rotating the adjustment knob clockwise results in additional fuel being added to the fuel enrichment set at the factory, while rotating the adjustment knob counter-clockwise will result in less fuel being added during acceleration. The proper adjustment is made while performing acceleration tests, which are described later on in this section.

18.1.5 CHOKE

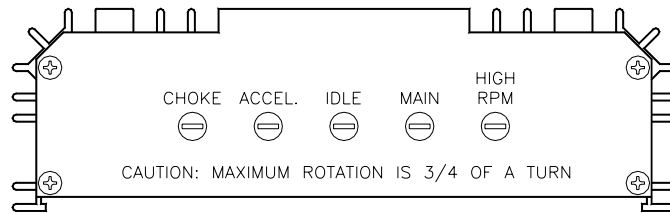
The CHOKE adjustment knob allows the user to adjust the amount of fuel enrichment while the engine is warming up 20% above or below the value set at the factory. Rotating the adjustment knob clockwise will increase the amount of fuel added while the engine is warming up. Rotating the adjustment knob counter-clockwise will decrease the amount of fuel added while the engine is warming up. The CHOKE adjustment knob **DOES NOT** control the length of time that the fast idle solenoid is on.

19.0 BEFORE STARTING THE ENGINE:

DANGER! NEVER MAKE ANY ADJUSTMENTS TO THE POTENTIOMETERS ON THE FRONT OF THE DIGITAL ECU WHILE THE VEHICLE IS IN MOTION. BE SURE THAT THE VEHICLE IS IN PARK OR NEUTRAL WITH THE PARKING BRAKE SET. FAILURE TO DO SO MAY RESULT IN PROPERTY DAMAGE, PERSONAL INJURY, AND/OR DEATH.

WARNING! The adjustment knobs on the front of the ECU are precision manufactured parts and do not require a great deal of force to turn. DO NOT apply excessive force to the adjustment knobs. Full adjustment range for the knobs is 3/4 of a turn.

- 1 - After all electrical connections have been made, double-check all connections to ensure that they are tight and secure.
- 2 - Reconnect the battery.
- 3 - If installed, remove the oxygen sensor harness from the digital ECU by unplugging the harness from the rear of the ECU.
- 4 - Although the adjustment potentiometers on the front of the digital ECU were set at the factory in the null position, check to ensure that they were not moved. If necessary, rotate the potentiometers so that they are positioned as shown in Figure 10.
- 5 - Turn the ignition key to the "RUN" position. **DO NOT START THE ENGINE.** Listen for the fuel pump. The fuel pump should run for several seconds before shutting off.
- 6 - Turn the ignition key to the "OFF" position.



Adjustment Potentiometer Settings for Initial Startup

Figure 10

19.1 SETTING THE MECHANICAL IDLE:

The setting of the mechanical idle speed is critical in the operation of the Digital ECU and is best accomplished by using a tachometer. If your vehicle is not equipped with a tachometer, Holley highly recommends one be used. To adjust, follow the instructions carefully.

- 1 - Disconnect the yellow wire from the fast idle solenoid by unplugging the female quick disconnect terminal from the tab at the base of the solenoid.
- 2 - Start the engine. With the engine warm and running at idle, insert a flat blade screwdriver into the head of the idle adjustment screw located on the front of the throttle body on the driver's side of the vehicle.
- 3 - Turn the idle adjustment screw clockwise to increase the engine idle speed, or counterclockwise to decrease the engine idle speed, until the engine speed is approximately 750 to 800 rpm.
- 4 - Have another person depress the brake pedal and set the parking brake. Put the car in gear (automatic transmissions only) and allow the engine speed to stabilize while continuing to apply both the brakes and the parking brake. Turn the air conditioning on high, if so equipped, and turn on your high beam lights.
- 5 - Adjust the idle adjustment screw until the engine speed is set at approximately 700 rpm.
- 6 - With the parking brake set and while continuing to apply the brakes, shift the transmission back into "Park" and allow the engine speed to stabilize.
- 7 - Once again, shift the transmission into gear while applying the brakes and having the parking brake set. Check the engine speed to verify that the engine idles at approximately 700 rpm.
- 8 - Do not reconnect the yellow wire to the fast idle solenoid at this time.

NOTE: The idle speed required for your vehicle may differ. Set the engine idle for a speed that best suits your application.

- 9 - Shift the engine back into "Park" and shut off the engine.

19.2 SETTING THE THROTTLE POSITION SENSOR (TPS)

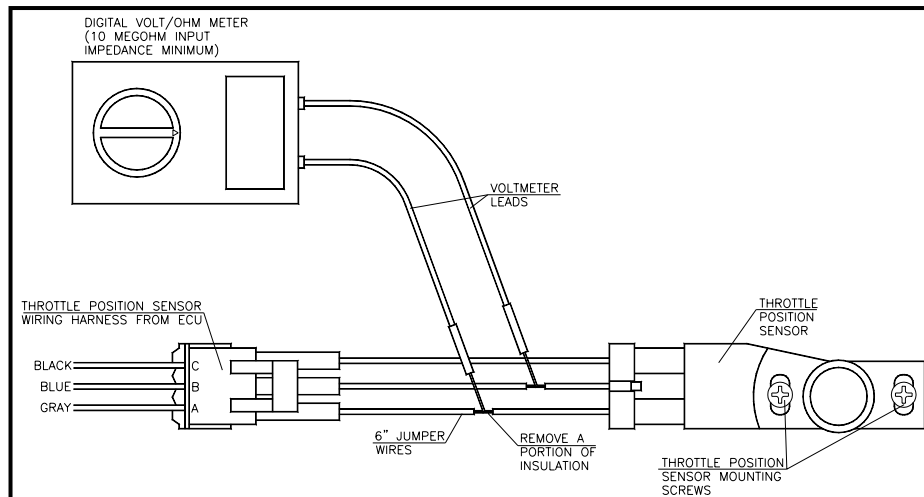


Figure 11

The setting of the throttle position sensor is critical in the operation of the Digital ECU and is best accomplished by using a digital voltmeter. To adjust, follow the instructions carefully.

NOTE: Fuel delivery can **NOT BE ADJUSTED** by changing the positions of the TPS. The TPS must be set in the position outlined below.

- 1 - Unplug the three position connector from the TPS and attach jumper wires between the TPS and the connector.
- 2 - Remove a portion of the insulation on the jumper wires connecting to both the black and the blue wires leading to the TPS as shown in Figure 11.
- 3 - Attach the positive (+) lead of a digital volt meter to the jumper wire connected to the blue wire.
- 4 - Attach the negative (-) lead of a digital volt meter to the jumper wire connected to the black wire.
- 5 - Turn the ignition key to the "RUN" position. Do not start the engine.
- 6 - Slightly loosen the two screws that hold the TPS in place with a Phillips screwdriver.
- 7 - Adjust the TPS until the voltage between the blue and black wire measures 0.63 to 0.65 volts.
- 8 - Tighten the two screws that hold the TPS in place and verify that the voltage between the blue and black wires on the TPS continues to read between 0.63 to 0.65 volts. Readjust the TPS if necessary to obtain this voltage reading.
- 9 - Turn the ignition key to the "OFF" position.
- 10 - Remove the jumper wires and plug the three position connector back into the TPS, ensuring that the safety latch snaps into place.

NOTE: Once the TPS and mechanical idle have been set, you are ready to tune the system.

20.0 TUNING THE DIGITAL ECU FOR PERFORMANCE:

DANGER! NEVER MAKE ANY ADJUSTMENTS TO THE POTENTIOMETERS ON THE FRONT OF THE DIGITAL ECU, WHILE THE VEHICLE IS IN MOTION. BE SURE THAT THE VEHICLE IS IN PARK OR NEUTRAL WITH THE EMERGENCY BRAKE SET. FAILURE TO DO SO MAY RESULT IN PROPERTY DAMAGE, PERSONAL INJURY, AND/OR DEATH.

WARNING! The adjustment knobs on the front of the ECU are precision manufactured parts and do not require a great deal of force to turn. Do not apply excessive force to the adjustment knobs. Full adjustment range for the knobs is 3/4 of a turn.

WARNING! Initial tuning of the system should be completed in an area free of traffic, such as in a large parking lot. DO NOT attempt to tune this system on a busy road where a possible stall may result in an accident.

NOTE: A small change in the adjustment knob settings will have a large effect on the amount of fuel delivered to the engine under various operating conditions. Make small adjustments to the adjustment knob setting when tuning the system.

NOTE: Holley recommends the use of a Rich / Lean indicator that will provide information relative to the air and fuel delivery to the engine when tuning the system. A Rich / Lean indicator with an Oxygen Sensor is available from Holley as P/N 534-51 and without an Oxygen Sensor as P/N 534-50. Use P/N 534-50 if you have already installed a closed loop kit.

NOTE: When tuning the system for future closed loop operation, all potentiometer settings must be set slightly richer than stoichiometric in case an oxygen sensor failure should occur. This will prevent damage to your engine due to lean operating conditions.

NOTE: The tuning of the digital ECU is critical in the operation of the fuel injection system and is best accomplished by using a tachometer. If your vehicle is not equipped with a tachometer, Holley highly recommends one be used. To adjust, follow the instructions carefully.

20.1 TUNING THE MAIN

As described earlier, the MAIN adjustment knob controls the fuel delivery across the entire operating range by raising or lowering the fuel delivery 50% above or below the values programmed at the factory. Therefore, adjustments made with the MAIN adjustment knob will affect the fuel delivery in all modes of engine operation.

- 1 - Disconnect the closed loop harness, if installed, from the rear of the digital ECU. Initial tuning should be completed with the system operating in open loop mode.
- 2 - Start the engine and allow the engine to reach operating temperature.
- 3 - Once the engine has reached operating temperature, place the vehicle in second gear or the automatic transmission equivalent, make wide open throttle runs from 1000 RPM TO 3000 RPM. Adjust the main jet knob for the fastest wide open acceleration in this RPM Range.
- 4 - Let off the throttle and allow the engine to return to idle. The idle will have to be readjusted

20.2 TUNING THE IDLE

Adjustments made to the IDLE adjustment knob will affect the area of the fuel map that relates to the idle operation of the vehicle.

- 1 - Turn the IDLE adjustment knob either clockwise or counter-clockwise until maximum engine rpm is achieved and the engine idles smoothly. If you are using a rich / lean indicator to tune the system, turn the IDLE adjustment knob until the green center LED is lit.

NOTE: Many engines require a richer fuel mixture at idle. Therefore it may not be possible to maintain the fuel mixture at a stoichiometric level while maintaining the engine at a smooth idle. Adjust the idle fuel delivery that best meets your engine's requirements.

- 2 - Turn on the air conditioner and your high beam lights. Set the parking brake and depress the brake pedal. Shift the transmission into gear.
- 3 - Adjust the IDLE adjustment knob as described in Step 1.
- 4 - Shift the transmission into neutral or back into park. To stabilize the idle quickly press the accelerator to the floor and release. Shift the transmission back into gear. Allow the idle to stabilize and adjust if necessary.
- 5 - Once the idle has been properly set, turn off the air conditioner and the high beam lights. Shift the transmission back into Park.

NOTE: If you are unable to adjust the IDLE adjustment knob to achieve a proper idle, it may be necessary to once again adjust the mechanical idle adjustment screw located on the driver's side front of the throttle body to a higher setting as described on Page 21 of this manual. If you change the setting of the idle adjustment screw, it will be necessary to once again adjust the TPS to the proper idle setting as described on Page 22 of this manual. Once the TPS and idle have been adjusted, it will also be necessary to adjust the MAIN adjustment knob as described on page 23.

- 6 - Now return to **SETTING THE THROTTLE POSITION SENSOR (TPS)** and follow the steps outlined to adjust the TPS again. Once the TPS has been reset return to **TUNING THE MAIN** and adjust again. Then return to step one of this section and tune the idle again.

20.3 TUNING THE ACCEL

The ACCEL adjustment knob controls the amount of fuel that is added to the engine when accelerating. Adjustments made here allow for a quick, crisp response during acceleration.

WARNING! **DO NOT attempt to perform acceleration tests on a busy road or highway. Complete this stage of the tuning process in an area free of traffic, such as a large parking lot. Failure to do so may result in property damage, personal injury, and/or death.**

- 1 - Shift the transmission into gear and slowly accelerate the vehicle to approximately 20 mph.
- 2 - Quickly depress the accelerator pedal and note the performance of the engine. If the engine bogs (falls flat) and black smoke comes out of the exhaust, the ACCEL adjustment is set too high. If the engine bogs and no black smoke comes out of the exhaust, the ACCEL adjustment is set too low.
- 3 - Adjust the ACCEL adjustment knob accordingly and continue performing acceleration tests you achieve a quick, crisp response during acceleration and no black smoke comes from the exhaust.

20.4 TUNING THE HIGH RPM

The HIGH RPM adjustment knob changes the fuel delivery to the engine at engine speeds over 3000 rpm.

DANGER! NEVER MAKE ANY ADJUSTMENTS TO THE POTENTIOMETERS ON THE FRONT OF THE DIGITAL ECU WHILE THE VEHICLE IS IN MOTION. BE SURE THAT THE VEHICLE IS IN PARK OR NEUTRAL WITH THE EMERGENCY BRAKE APPLIED. FAILURE TO DO SO MAY RESULT IN PROPERTY DAMAGE, PERSONAL INJURY, AND/OR DEATH.

WARNING! DO NOT attempt to perform acceleration tests on a busy road or highway. Complete this stage of the tuning process in an area free of traffic, such as a large parking lot. Failure to do so may result in property damage, personal injury, and/or death.

NOTE: To properly set the HIGH RPM setting, it will be necessary to operate your engine at a steady speed while determining the proper fuel delivery.

- 1 - Shift the transmission into second gear or the automatic transmission equivalent.
- 2 - Begin to smoothly accelerate the vehicle until the engine speed is above 3000 RPM. Now quickly press the accelerator and perform a hard acceleration. Note the performance of the engine.
- 3 - Bring the vehicle to a complete stop and set the parking break. Increase or decrease the amount of fuel delivered during high engine speeds by turning the HIGH RPM adjustment knob either clockwise or counter-clockwise. If your vehicle is equipped with a Rich / Lean indicator, adjust the HIGH RPM adjustment knob until the meter indicates a stoichiometric fuel mixture at high engine speeds.
- 4 - Adjust the HIGH RPM adjustment knob accordingly and continue performing acceleration tests until you achieve a quick, crisp response during acceleration.

20.5 TUNING THE CHOKE

The CHOKE adjustment knob controls the fuel delivery to the engine during a cold start. The CHOKE adjustment knob **DOES NOT** control the "ON" time for the fast idle solenoid. Adjustment to the CHOKE should be made after the engine has cooled down completely.

- 1 - After the engine has cooled down completely (Holley recommends allowing the engine to sit overnight), start the engine.
- 2 - Immediately after starting the engine, shift the transmission into gear and accelerate slowly.
- 3 - Turn the CHOKE adjustment knob to achieve a clean drive-away from a cold start. Several cold starts will be necessary to zero in on the proper CHOKE setting.

21.0 SYSTEM MAINTENANCE

The **PRO-JECTION 1D** system is virtually maintenance free. To ensure performance and reliability, periodically check all fuel lines for leaks and replace them as needed. Also ensure that all electrical connections remain secure and that all wires are routed away from and direct sources of heat, such as the exhaust system, and any moving parts.

If a decrease in system performance is noticed, a dirty or clogged fuel filter may be the cause. Holley recommends that both fuel filters installed with the **PRO-JECTION 1D** system be changed every 20,000 miles of normal operation. These filters are non-serviceable and must be replaced. Contact your local parts dealer for Holley replacement fuel filters.

22.0 TROUBLESHOOTING AND COMPONENT TESTING

Double check all wiring connections and installed components for their proper operation before replacing any parts. If you suspect an unlikely ECU failure, check all other system components before replacing this ECU. Also ensure that all other systems on your vehicle are in proper working condition. Experience has shown that most problems can be traced to something other than an ECU failure.

If you experience any problems with your **PRO-JECTION 1D** fuel injection system, complete the following checklist before contacting Holley's Technical Services Department.

	PROBLEM	POSSIBLE CAUSE	SOLUTION
--	---------	----------------	----------

A	Fuel Pump Does Not Operate	<ul style="list-style-type: none"> - Open or blown fuse - Poor ground connection - Loose connector - Broken or burned wire - No power to pump from ECU - No power to the ECU - Faulty fuel pump 	<ul style="list-style-type: none"> - Replace fuse - Clean ground location and tighten connection - Check Connection - Replace or repair wire - Check for voltage and ground at the pump. If proper voltage is present, replace the ECU. - Check power out from relay. Test relay and replace if faulty. See Testing the Power Relay section. - Replace the fuel pump
B	No Fuel From the Injectors	<ul style="list-style-type: none"> - Open or blown fuse - Poor ground connection - No power to the ECU - Loose injector harness connection - No fuel in tank - Low fuel pressure - Kinked or restricted fuel line - Fuel pump does not operate - No TACH signal - Faulty ECU 	<ul style="list-style-type: none"> - Replace fuse - Clean ground location and tighten connection - Check power out from relay. Test relay and replace if faulty. See Testing the Power Relay section. - Inspect and clean connection, reconnect - Add fuel to tank - Install pressure gauges and adjust fuel pressure. See Adjusting Fuel Pressure section. - Repair kinks and remove obstructions from fuel line. - See Item A - Check for proper wire connection. See TACH Signal connections on Page 17 - Replace ECU
C	Engine starts but stalls after starter motor disengages	<ul style="list-style-type: none"> - No voltage to relay switched power input with ignition in "RUN" position - No TACH signal 	<ul style="list-style-type: none"> - Check switched power connection to relay with ignition in "RUN" position - Check for proper ignition system operation - Check for proper wire connection. See TACH Signal connections on Page 17
D	Injector flows fuel with ignition switch in the "RUN" position and engine not running	<ul style="list-style-type: none"> - Poor Engine ground wire connection - Leaky fuel injector 	<ul style="list-style-type: none"> - Clean ground location and tighten connection - Replace fuel injector
E	"CLEAR FLOOD" mode does not operate while cranking the engine	<ul style="list-style-type: none"> - Throttle does not open fully - Faulty TPS - Low voltage to ECU during cranking - ECU does not supply 5 volt signal to TPS 	<ul style="list-style-type: none"> - Check for interference between the throttle linkage and surrounding components. Adjust throttle linkage. - Test TPS. See Testing the TPS section. Replace TPS - Ensure that voltage to ECU is above 8 volts during cranking. Replace battery. or starter - Check all wire connections. Replace ECU
F	Engine Runs Rich	<ul style="list-style-type: none"> - ECU adjustment knobs are set too high - High supply fuel pressure - High return fuel pressure - Incorrect TPS adjustment - Faulty TPS - Oxygen sensor is mounted incorrectly - Faulty oxygen sensor - Leaking fuel injector 	<ul style="list-style-type: none"> - Adjust knob settings. See Tuning section on Page 19 - Install pressure gauges and adjust fuel pressure. See Adjusting fuel pressure section. - Kinked or restricted fuel return line. Repair kinks and remove obstructions from fuel line. - Adjust TPS position. See Adjusting the TPS section on Page 22 - Test TPS. See Testing the TPS section. Replace TPS - See Optional Closed Loop System installation section on Page 18 - Replace the oxygen sensor - Replace fuel injector
G	Engine Runs Lean	<ul style="list-style-type: none"> - ECU adjustment knobs are set too low 	<ul style="list-style-type: none"> - Adjust knob settings. See Tuning

		<ul style="list-style-type: none"> - Low supply fuel pressure - Incorrect TPS adjustment - Faulty TPS - Restricted Fuel Injector - Vacuum Leak - Water in fuel - Faulty oxygen sensor 	<ul style="list-style-type: none"> section on Page 19 - Install pressure gauges and adjust fuel pressure. See Adjusting Fuel Pressure section. - Adjust TPS position. See Adjusting the TPS section on Page 22 - Test TPS. See Testing the TPS section. Replace TPS - Remove fuel injector and clean injector screen and throttle body. Replace injector - Locate vacuum leak and repair - Remove water from fuel with proper fuel additive. - Replace the oxygen sensor
H	Hard Starting (Cold Engine)	<ul style="list-style-type: none"> - "CHOKE" knob adjustment set too low - Non-functional coolant temperature sensor - Non-functional fast idle solenoid - Fuel pump not flowing fuel 	<ul style="list-style-type: none"> - Increase "CHOKE" setting - Test temperature sensor. See Testing the Temperature Sensor section. Replace sensor if necessary. - Check wire connection to solenoid - Test solenoid. See Testing the Fast Idle Solenoid section. Replace solenoid if necessary. - See Item A
I	Hard Starting (Warm Engine)	<ul style="list-style-type: none"> - Engine is flooding - Non-functional coolant temperature sensor - Fuel pump not flowing fuel 	<ul style="list-style-type: none"> - Use "CLEAR FLOOD" mode. Inspect injectors after shutting off engine for injector leakage. Replace leaking injectors - Test temp sensor. See Testing the Temp Sensor section. Replace sensor if needed. - See Item A
J	Fuse blows repeatedly	<ul style="list-style-type: none"> - Improper fuse installed - Fuel pump motor is locked - Wire insulation is broken resulting in a short to ground - Faulty ECU 	<ul style="list-style-type: none"> - Install 10 Amp Fuse - Test Fuel Pump. See Item A - Inspect wiring harness and repair wire - Replace ECU
K	Low Fuel Pressure	<ul style="list-style-type: none"> - Low Voltage at fuel pump - Kinked or restricted fuel line - Faulty fuel pump - Throttle body pressure regulator improperly adjusted - Low fuel level in tank - Restrictive screen in tank 	<ul style="list-style-type: none"> - Check voltage to pump from ECU. Inspect wiring harness. Check Battery voltage. - Repair kinks and remove obstructions from fuel line. - See Item A - See Adjusting Fuel Pressure section - Add fuel to tank - Clean fuel tank and increase screen size
L	High Fuel Pressure	<ul style="list-style-type: none"> - Kinked or restricted fuel return line - Return line diameter too small - Throttle body pressure regulator improperly adjusted 	<ul style="list-style-type: none"> - Repair kinks and remove obstructions from fuel line - Replace fuel return line with larger diameter fuel line. - See Adjusting Fuel Pressure section

22.1 ADJUSTING THE FUEL PRESSURE:

The pressure regulator located at the rear of the throttle body is factory set at 15 PSI. A slight adjustment may be necessary to allow for proper system operation.

- 1 - Install a pressure gauge into the fuel supply line. This gauge must be removed after the fuel pressure has been properly adjusted.
- 2 - Start the engine and verify that the fuel lines do not leak. If any leaks are found, turn off the engine and repair the leaks before continuing.
- 3 - Insert a 5/32" Allen wrench into the pressure regulator screw on the top of the throttle body.
- 4 - Turn the screw into the throttle body to increase the fuel supply pressure or out of the throttle body to decrease the fuel supply pressure.

22.2 TESTING THE COOLANT TEMPERATURE SENSOR:

The coolant temperature sensor used with the **PRO-JECTION 1D** system is a single wire sensor. The ECU supplies a fixed voltage to the sensor. The resistance within the sensor varies with temperature and this variation in resistance is used by the ECU to determine the engine's coolant temperature.

- 1 - Drain enough coolant out of the radiator to drop the coolant level below the point in which the engine coolant temperature sensor is installed in the manifold.
- 2 - Remove the sensor from the manifold and allow the sensor to reach room temperature, approximately 70° F.
- 3 - Connect the positive (+) lead of a digital voltmeter set to measure resistance to the metal tab located at the top of the sensor and the negative (-) voltmeter lead to the sensor's body.
- 4 - Measure the resistance. The resistance value of the temperature sensor at room temperature should be approximately 3.8 kΩ.
- 5 - Submerge the body of the coolant temperature sensor in boiling water (212° F) and measure the resistance as described in Step 3. The resistance value of the temperature sensor in boiling water should be approximately 182 kΩ.

NOTE: If the resistance values of your engine coolant temperature sensor do not match these values, the temperature sensor must be replaced.

22.3 TESTING THE THROTTLE POSITION SENSOR:

A properly adjusted and functioning throttle position sensor is essential to the proper operation of the **PRO-JECTION 1D** system. The TPS is a precision electrical component that acts as a variable resistor. The ECU provides a reference voltage to the TPS. As the resistance varies with the throttle angle, the TPS provides a return signal to the ECU.

- 1 - Disconnect the three position connector from the TPS and install three jumper wires as shown in Figure 12.
- 2 - Connect the positive (+) lead of a digital voltmeter set to measure DC voltage to the blue wire leading to the TPS and the negative (-) lead of the voltmeter to the black wire leading to the TPS.
- 3 - Turn the ignition key to the "RUN" position. Do not start the engine.
- 4 - Observe the voltmeter and verify that the voltmeter indicates between 0.63 to 0.65 volts with the TPS set at idle.
- 5 - Slowly open the throttle and observe the voltmeter's readout. The voltage should increase smoothly from 0.63 volts at idle to 4.5 to 5.0 volts at wide open throttle. If the voltmeter readings fluctuate or seem jumpy, the TPS is intermittent and will need to be replaced.
- 6 - Remove the jumper wires and reinstall the 3 position connector.

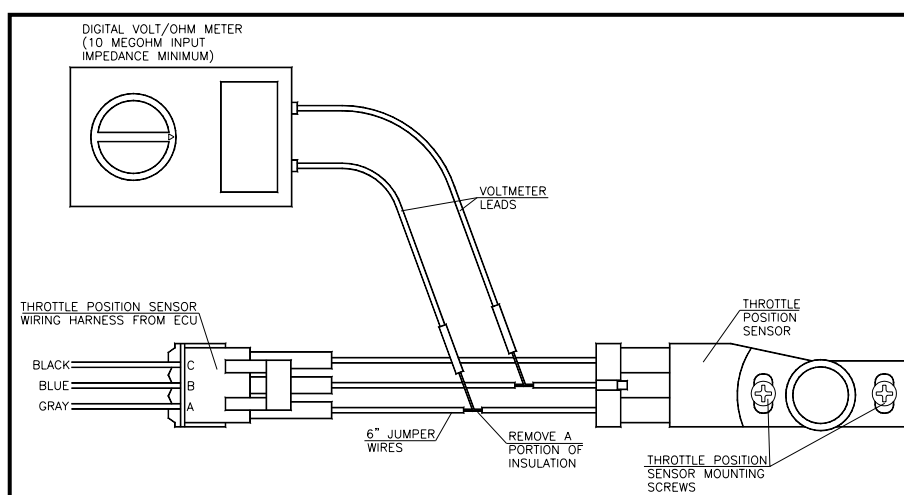


Figure 12

22.4 TESTING THE POWER RELAY:

The power relay used with the **PRO-JECTION 1D** Fuel Injection System is a normally open type of relay. When Power is applied across the relay's coil (terminals 85 and 86) the magnetic field generated closes the contacts between terminals 30 and 87.

- 1 - Unplug all wires from the relay and remove the relay from your vehicle.
- 2 - With a digital volt/ohm meter, check the continuity between terminals 85 and 86 on the relay. If there is no continuity between these two terminals, the relay must be replaced.
- 3 - With a digital volt/ohm meter, ensure that there is no continuity between terminals 30 and 87 on the relay. If continuity exists between these two terminals with no power applied to the relay's coil, the relay must be replaced.
- 4 - Connect terminal 86 to ground.
- 5 - Connect terminal 85 to a positive (+) 12 Volt power source.
- 6 - With a digital volt/ohm meter, check for continuity between terminals 30 and 87 when power is applied. If there is no continuity between terminals 30 and 87 with power applied to the relay's coil, the relay must be replaced.

22.5 TESTING THE FAST IDLE SOLENOID:

- 1 - Remove the yellow wire from the tab located at the base of the fast idle solenoid.
- 2 - Attach a temporary jumper wire to the positive (+) terminal on your battery.
- 3 - Attach the other end of the temporary jumper wire to the tab located at the base of the fast idle solenoid.
- 4 - If the plunger at the top of the fast idle solenoid does not extend with power applied to the fast idle solenoid, the solenoid must be replaced.

Copyright © 2000

Printed in USA

Date: 3-14-00

199R-9895-3

Holley
Performance Products Inc