



# **INSTALLATION MANUAL**

**FOR**

**PRO-RAM  
(Chevrolet Small Block)**

Cleveland, Ohio  
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[www.mrgasket.com](http://www.mrgasket.com)

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**PRO RAM**  
**Small Block Single Plane Multipoint**  
**750 CFM or 1200 CFM System**

**INSTRUCTION INSTALLATION MANUAL**

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*Some parts are not legal for sale or use in California or on any pollution controlled motor vehicles.*

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**I – INTRODUCTION**

**CONGRATULATIONS!** You have just purchased the finest engine management system available. Digital fuel injection control is an exact science that ACCEL has made simple. This manual is written to assist with the installation of the Small Block system. Please read it carefully.

**CAUTION!**

*Please Read Installation Instructions carefully prior to installing the Small Block System*

**Pro Ram Multi Point System**

**II – PACKAGE CONTENTS**

Item	Part Description	Quantity
1	1200 CFM or 750 CFM Throttle Body Assembly	1
2	Manifold Assembly	1
	- Manifold Base	1
	- Fuel Rail Assembly with regulator	1
	- Injectors	8
	- Water Temp. Sensor	1
	- Air Temp. Sensor	1
	- T. B. Gasket	1
3	Injector Harness	1
4	Main Wire Harness	1
5	Electronic Control Module	1
6	MAP Sensor	1
7	Oxygen Sensor w/ mounting nut	1
8	Fuel Rail Fittings	1
9	Fuel Pump w/ fittings	1
10	Fuel Filter w/ fittings	1
11	Regulator Fitting	1

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### III – INSTALLATION EQUIPMENT LIST

The Following is a partial list of the tools you may need for the installation of your new system.

- Socket set, 3/8" Drive
- Open end wrenches
- Screw driver set
- Needle nose pliers
- 1- 5/8" Green Lee Punch or hole saw
- Drain bucket
- Timing Light
- Torque Wrench
- 1/2" to 3/8" Socket Reducer
- Volt/Ohmmeter (example: Snap on MT406, Matco ET 856)
- Mr. Gasket part number 7809 Silicone Rubber
- Adhesive Sealant
- Gasket Scraper
- Digital Volt Meter

### IV – ADDITIONAL PARTS REQUIRED

Intake Manifold Gasket Set  
Thermostat Housing Gasket  
3/8" Stainless Steel Braided Feed Fuel Line  
180 Degree Fahrenheit Thermostat

### V – MANIFOLD INSTALLATION INSTRUCTIONS

**Warning:** *Read and follow instructions before, during and after installation to preserve warranty. Also disconnect battery leads and drain engine coolant prior to manifold installation.*

In the vast majority of cases, the manifold may be installed without modifications, since the runner openings at the head flanges are already matched to all but the largest possible head flanges are already matched to all the largest possible head port openings. However, if further port matching is required, material removal should be blended up at least two inches into the runner.

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Since the casting lines between the runners and the plenum floor are located entirely outside of the runner entries, an ideal runner approach radius is insured as cast. No modification in this area is necessary.

**Note:** *It may be necessary to purchase some of the parts listed (or the equivalent) in order to properly complete the manifold installation. Also, before moving the distributor, set the rotor to the number one cylinder.*

**Note:** *To reduce chances of engine contamination by dirt or other foreign material, it is advisable to clean the engine exterior before starting the manifolds change.*

After removing the distributor and existing intake manifold, clean the gasket surfaces prior to installing the Small Block Pro Ram system. (It is recommended at this point to use the Green Lee Punches or a hole saw to put two 1 5/8" hole in the fire wall to accommodate the Main Wire Harness. (Refer to Figure A for the hole locations.) Once the gasket surface has been cleaned, apply a fine bead of silicone on both sides of the replacement intake gaskets and place on the heads. Next, place a 1/4" bead of silicone on both ends of the engine block. With all the intake gaskets in place, carefully place the assembled Small Block Single Plane Multi Point System onto the engine. Be sure that the gaskets are still aligned with the bolt holes and start to thread the intake bolts into the engine heads. Torque the intake bolts first to 20 LB/ft. then to 35 LB/ft. Next install the distributor back onto the engine making sure that the rotor is aligned properly with the No.1 cylinder.

The next step is to route the vacuum lines. The following items need to be referenced to manifold vacuum:

1) Map sensor 2) Pressure regulator 3) Power brake booster 4) PCV 5) Transmission kickdown

**Note:** *Never splice the Map Sensor or Pressure Regulator vacuum lines.*

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## VI – MOUNTING THE ECM

The ECM comes with three mounting tabs designed for a #8 sheet metal screw. The ECM should be mounted behind the passengers kick panel on the floor. If your kick panel has an air vent incorporated into it, DO NOT mount the ECM here. This enclosure is not waterproof and therefore needs a mounting place free of moisture. The alternate location is in the dash board area behind the glove box. Never mount the ECM in the engine compartment.

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## VII – MAIN WIRE HARNESS ROUTING AND CONNECTIONS

***BEFORE PROCEEDING DISCONNECT BOTH BATTERY TERMINALS FROM THE BATTERY.***

The System contains two (2) Wire Harnesses. A Main Wire Harness (this will be referenced as the MWH in the following instructions) and an Injector Wire Harness. The injector harness comes installed on the base manifold from ACCEL. An overview schematic of the MWH is shown in *Figure B* (page 18). The harness can be routed and connected as follows: Begin by connecting the MWH's 32 pin connector to the left side of the ECM connector and the MWH's 24 pin connector to the right side of the ECM connector. Make sure the blue tab snaps into place. Then route the longest of the two MWH legs through the driver side firewall hole and the shorter leg through the passenger side firewall hole. Continue pulling the harness legs through the firewall until the rubber grommets seat the firewall, each leg of the harness can be routed between the manifold and rocker arm covers.

The driver side harness leg contains the map - 3 pin green (*refer to Figure A for mounting location*), computer controlled HEI - 4 pin black, ESC - 1 pin black, air - 2 pin grey, water - 2 pin black, and TPS - 3 pin black, sensor connectors. Connect each to the appropriate sensor using *Figure B* as a reference.

***NOTE: IF A NON-COMPUTER CONTROLLED HEI DISTRIBUTOR IS USED, THE COMPUTER CONTROLLED HEI CONNECTOR (4 PIN BLACK) AND THE ESC CONNECTOR (1 PIN BLACK), DO NOT NEED TO BE CONNECTED.***

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Make sure to connect the +12 V switch (female spade terminal) to the switched IGN accessory in the fuse box panel prior to routing the harness through the firewall. The switched ignition accessory must maintain 12 volts during cranking.

The passenger side harness leg contains the Oxygen Sensor connector (3 pin female black), injector (5 pin), tach Pick-up (1 pin brown), fuel pump + (bare red wire), IAC (4 pin black), battery + 12 V (3/8" ring terminal), and battery ground (3/8" ring terminal) connectors. Connect each to the appropriate sensor using Figure B as a reference.

***NOTE: IF A COMPUTER CONTROLLED HEI DISTRIBUTOR IS USED, THE TACH PICK-UP CONNECTOR ( 1 PIN BROWN), DOES NOT NEED TO BE CONNECTED.***

Be sure to use at least a 14-gauge wire to lengthen the fuel pump positive wire. Finally, be sure to connect both the positive and ground terminals of the ECU directly to the battery.

## **IX – DISTRIBUTOR SELECTION**

### **NON COMPUTER CONTROLLED IGNITION**

If you are using a breaker point Ignition, the tach pick up connector (1 pin brown) must be connected to the negative (-) side of the coil. If the existing connector must be changed, be sure not to remove the 39-kilo ohm resistor. It is 3 inches from the end of the connector.

***NOTE: IF YOU ARE USING AN AFTERMARKET IGNITION ENHANCER BOX, (I.E., ACCEL 300+, Mallory HyFire OR MSD), THE MWH'S TACH PICK-UP CONNECTOR MUST BE CONNECTED TO THE ENHANCER BOX'S TACH OUTPUT SIGNAL. IT IS ALSO NECESSARY TO REMOVE THE***

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***RESISTOR FROM THE TACH PICK-UP WIRE. IT IS 3 INCHES FROM THE END OF THE TACH PICK-UP LEAD.***

The total advance will depend on the engine configuration. However, for most applications, 30-34 degrees is a good starting point. The vacuum advance should be controlled with the EGR port on the bottom of the throttle body. ACCEL recommends a distributor with an adjustable vacuum advance canister. Adjust the vacuum advance canister to maintain 18-20 degrees with a hot engine at 800 RPM. Again, this is only a recommendation, depending upon the compression ratio and car profile; the spark timing may have to be decreased to avoid detonation.

### **COMPUTER CONTROLLED IGNITION**

If you are using a GM F-body (small cap, external coil), or Y-body (large cap, internal coil), computer controlled HEI Distributor, the MWH's four-pin mail connector must be connected to the HEI's four pin female connector. If you are using an Y-body HEI, the four-pin connection between the MWH and HEI is compatible. However, if you are using an F-body HEI, the four-pin connection between the WMH and HEI is not compatible. In order to use the F-body HEI; order ACCEL's F-body conversion kit.

In order to set the initial timing, the ignition bypass connector (1 pin black), incorporated into the HEI leg of the MWH must be disconnected. With the engine running at 800 RPM hot, manually adjust the distributor to 6 degrees BTDC. Once adjusted, connect the ignition bypass line. As soon as you connect the bypass line, the ECM will then control the timing. The spark curve programmed into the ECM from ACCEL, has an initial timing of 20 degrees BTDC and a total timing of 34 degrees BTDC in by 3000 RPM. The timing curves can be adjusted using ACCEL's calibration software Calmap.

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ACCEL strongly urges the use of a good quality suppression wire such as ACCEL 8.8 spiral suppression core. We have encountered problems with various ignition wires available on the market, such as helical wound or solids core wires. The use of these wires may interfere with the operation of the ECM. Furthermore, some high energy after market ignition units also produce electric fields which interfere with the ECM's operation. Use of these units is strictly at the risk of the owner. Call ACCEL for recommendations on ignition system compatibility.

## **X – FUEL PUMP MOUNTING AND FUEL LINE INSTALLATION**

The most important component of the high-pressure fuel system is the fuel pump. The location and mounting of the pump is critical. The pump must be located at the rear of the vehicle near the tank at a point below the fuel level in a protected area. It can be mounted using a special fabricated bracket or with an ACCEL fuel pump mounting bracket.

The fuel pump requires a 12-volt source. If your vehicle already has an electronic high pressure fuel pump, you still **MUST** connect the +12 VDC side of the fuel pump to the ACCEL main harness (red/white wire). The +12 VDC comes from the fuel pump relay via the red/white wire in the main harness. The pump draws from 4 to 8 amps of current depending on size and fuel system pressure; therefore, a ground can be connected to any clean, paint-free point on the chassis. Route and secure the wiring from the pump into the engine compartment so that it does not hang below the vehicle, interfere with rotating parts or become exposed to excess heat.

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There seems to be a misunderstanding that a fuel pump “produces pressure”. This is wrong. What actually happens is the pump produces fuel flow at a given system pressure which is maintained by the pressure regulator. The pressure regulator is a dynamic modulating device, which regulates the fuel rail pressure by either restricting or bypassing fuel back to the fuel tank.

### **MECHANICAL PUMP REMOVAL**

Bypass or remove the mechanical engine driven fuel pump. Can the fittings or block off the opening to prevent leakage. Mr. Gasket block off plate part number 1516 can be used to do this.

### **HIGH PRESSURE FUEL FILTER MOUNTING**

The high-pressure fuel filter should be located between the outlet of the high-pressure fuel pump and fuel rail. It is recommended to place a fuel filter between the fuel tank outlet and pump inlet, if the pick-up tube in the tank does not have a filter, it can be mounted on the vehicle's frame. Connect the filter to the fuel line using the ACCEL fittings supplied with the system.

### **HIGH PRESSURE FUEL LINE INSTALLATION**

The system comes with a high-pressure pump and fuel filter. These must be used in conjunction with either 3/8” S.S. braided line or hard tubing to route the fuel line from the tank outlet to the fuel rail inlet.

At this point, the high-pressure circuit of the fuel system can be plumbed (*refer to figure C*)(page 19). If the existing fuel supply line cannot sustain 150-PSI pressure, and then it must be replaced with high-pressure fuel line/tubing. Remember that a carbureted system operates at 6 PSI.

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A fuel injection system operates at pressures up to 50 PSI. Never take any chances. If in doubt, replace the hose. Use only 3/8" diameter double braided stainless steel high-pressure gasoline hose such as Aeroquip 3/8" AQP or equivalent. Use this exclusively to connect the fuel pump and filter to the balance of the fuel system along the entire length of the vehicle. ACCEL recommends supporting the fuel line/tubing every three - (3) feet.

*NOTE: For applications where the high pressure fuel pump can not be located below the level of the tank, it is recommended to use a low pressure electric fuel pump to feed the high-pressure pump. This also should be done if the vehicle continually has "Hot Soak" restart problems.*

## DUAL FUEL TANKS

It is important to note that for vehicles with either two tanks and/or class A RVs, it is highly recommended that a boost pump be installed in each tank and fed through a multi port switching valve when operating in hot climates. Boost pumps used on such vehicles as a Ford 1985 F-250, 5.0L EFI, will work well for this type of application. Also, the switching valve from a Ford 6.9L Diesel, 1984 or Chevrolet 1986 C-10, 305 will work well in dual tank applications. Dual tank equipped must be plumbed to return excess fuel to the tank, which is in use supplying fuel to the EFI System to avoid tank overflow problems. The remotely activated dual three way valves described above will work well in these applications.

## RETURN FUEL LINE INSTALLATION

If your car was originally equipped with a carburetor, a 1/4" diameter fuel line was used to return the bypassed fuel back to the tank. This line is insufficient to return the bypass fuel of the PRO RAM Injection System. Therefore,

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ACCEL recommends using a 5/16" diameter return line from the pressure regulator outlet to the fuel tank. Be sure to route the return line in protected areas with restriction free bends. *Refer to Figure C.*

For the tank connection, ACCEL recommends a 5/16" compression fitting to 6AN Aeroquip hose fitting. *Refer to figure C* on how to route and connect the return fuel line.

## SENDING UNIT MODIFICATION

To install a return line in your tank, remove the sending unit assembly from the fuel tank. Have a gas tank repair shop install the return line in accordance to *Figure D.*

## XI – MOUNTING THE OXYGEN SENSOR

The PRO RAM Kit includes an oxygen sensor and a M18 x 1.5 hex nut. This nut should be welded to the passenger side header collector or exhaust pipe as close to the connecting flange without interfering with the mounting of the exhaust manifold or header. *See Figure E.*

Prior to mounting the nut drill, an 11/16" diameter hole in the exhaust pipe, the hole must be drilled perpendicular to the exhaust pipe.

## XII – STARTING THE ENGINE

Turn the ignition key to the RUN POSITION. DO NOT CRANK YET. The fuel pump should run for two seconds then shut off. Now turn the ignition key OFF. Repeat this procedure of turning the key on and off (4) four times. Again, listening carefully for the fuel pump.

This is needed to prime the fuel delivery system. The best way to check this is with a fuel pressure gauge attached to

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the Shraeder valve on the passenger side fuel rail. Now check for fuel leaks along the entire vehicle length. Crank the engine. Listen or feel for the injectors opening and closing. If the engine does not start after ten seconds of cranking, insure the following:

- 1). ALL electrical connections are made securely. Check that battery connections are tight. Also, check the injector connections.
- 2). There are no fuel leaks.
- 3). The fuel lines are full of fuel. The most common problem is that the pump is wired backwards. On ACCEL fuel pumps, the terminals are labeled plus and minus. Connect the plus to 12 VDC and the minus to ground. If the pump is wired backwards it will run backwards.
- 4). Ignition timing is properly set.

After the vehicle starts, check the fuel leaks along the entire length of the vehicle. The engine should fast idle and then decrease its RPM as the coolant temperature increases. Set the timing once the engine is warm.

### **XIII – THROTTLE PLATE ADJUSTMENT**

The position of the throttle plates relative to the position of the idle air motor is critical. They work together to control both idle and acceleration/deceleration. The position of the throttle plates relative to the idle air motor is preset at DFI (based upon dynamometer and vehicle tests). However, if an erratic idle or acceleration/deceleration problem occurs the following procedure should be used:

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Before starting, a brief explanation will be given on how the idle air motor works in conjunction with the throttle plates. The idle air motor bypasses air around the throttle plate in order to maintain a particular idle speed. In the ACCEL system, the idle speed is determined by the engine coolant temperature. When the engine is cold, the idle air motor bypasses a greater amount of air. As the engine warms up, the idle air motor bypasses less air around the plates which in turn lower the idle RPM. In order for this to happen, the majority of air should be passed around the throttle plates in the throttle bore with a minimal amount being bypassed around the idle air meter passage.

- 1). Let the engine reach operating temperature between 160 - 180 degrees Fahrenheit.
- 2). Set initial timing to achieve a total spark advance between 34 - 36 degrees BTDC. This should be about 18 to 20 degrees initially.
- 3). Consult the following chart for the desired idle speed vs. camshaft duration.

CAM	DESIRED IDLE SPEED (RPM)
268	750 - 800
280	800 - 850
292	850 - 900

*NOTE: These are the values, which are preprogrammed from the factory.*

- 4). The throttle plates need to be adjusted if a high pitched hissing sound is prevalent after the engine has reached 170 - 180 degrees Fahrenheit. This is air that has reached sonic velocity entering the IAC bypass passage. If this occurs when the engine is cold, this is all right. Make sure you are doing this adjustment only after steps 1 & 2 are satisfied.
- 5). If this is the case, the solution is to open the throttle blades until the high pitched hissing has stopped.

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## **XIV – POWER TUNER (OPTIONAL)**

This option allows the driver to change the three-dimensional fuel table while the engine is running. The Power Tuner contains two potentiometers for increasing or decreasing the amount of fuel supplied to the engine during idle and WOT. The idle potentiometer provides the user with the ability to increase or decrease the amount of idle and part throttle fuel by + or - 10%. The WOT potentiometer comes into play only when the throttle is fully opened. The percent increase or decrease is + or - 25%. The Power Tuner does not change the amount of fuel delivered during cranking. The Power Tuner must remain connected to the main harness after adjustments have been made. If it is disconnected, the ECM will automatically default back to the original values. If your engine requires a somewhat different calibration than is noted on the ECM, or you are calibrating a unique engine combination, use ACCEL's Serial Communications Interface option, CALMAP.

## **XV – TROUBLE SHOOTING**

**THE FOLLOWING ARE SOME COMMON PROBLEMS ENCOUNTERED WITH VARIOUS INSTALLATIONS:**

- PROBLEM:** Injectors not opening (clicking), vehicle will not start.
- CAUSE:**
1. Usually due to a low battery. Voltage must be above 9 volts during cranking of the engine to activate the ECM.
  2. Injector harness not connected to main harness.
  3. Short in either pin C7 or C8. Check for continuity to battery (+) or (-) wires with an OHM meter.
  4. Tach wire to (+) side of coil instead of (-).

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- PROBLEM:** Runs rich at idle.
- CAUSE:**
1. Vacuum line to pressure regulator not connected.
  2. MAP Sensor vacuum line pinched.
  3. Power Tuner idle knob turned all one way way.

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- PROBLEM:** Runs rich all the time.
- CAUSE:**
1. Wrong injectors for the engine application.

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- PROBLEM:** Engine cranks a while before starting.
- CAUSE:**
1. +12V and ground terminal not connected directly to battery.

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- PROBLEM:** No spark when using aftermarket enhancer box.
- CAUSE:**
1. If using an ACCEL 300+ or MSD ignition enhancer box, the tach Pick-up of the MWH must be connected to the tach output signal Of the enhancer box. The in line resistor must also be removed if An enhancer box is used. It is 3 inches from the end of the tach lead in the MWH. If an enhancer is used and the tach pick-up lead is connected to the negative (-) side of the coil, the ECM may be permanently damaged.
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## XVI – OPTIONAL KITS

### KNOCK SENSOR HARNESS KIT (PART # 74173)

This kit allows the end user to incorporate a knock sensor to detect denotation and retard the spark timing. It includes a harness, which interfaces between the ESC module, Knock Sensor, and ECM. This kit can only be used in junction with a computer-controlled distributor.

### FAN CONTROL KIT (PART # 74171)

This kit allows the end user to turn a fan on at a given temperature via calmap. This kit includes a harness with integral relay that interfaces between the ECM and fan. It does not include a fan.

### TORQUE CONVERTOR LOCKUP KIT (PART # 74172)

This kit allows the end user to lock and unlock the GM F and Y car 700R4 transmission converter at a prescribed Speed (RPM), Throttle Position (TPS) after being in 4th. Gear using the calmap software. The kit includes a harness with integral relay that interfaces between the ECM and 700R4-transmission connector.

### F-BODY CONVERSION KIT (PART # 74170)

This kit allows the end user to use an F-body computer controlled HEI distributor. It includes a jumper harness which connects between the F-body HEI distributor and MWH. It also includes a two pin connector/harness which connects between the HEI and external coil negative (-) and switched voltage source.

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Figure A

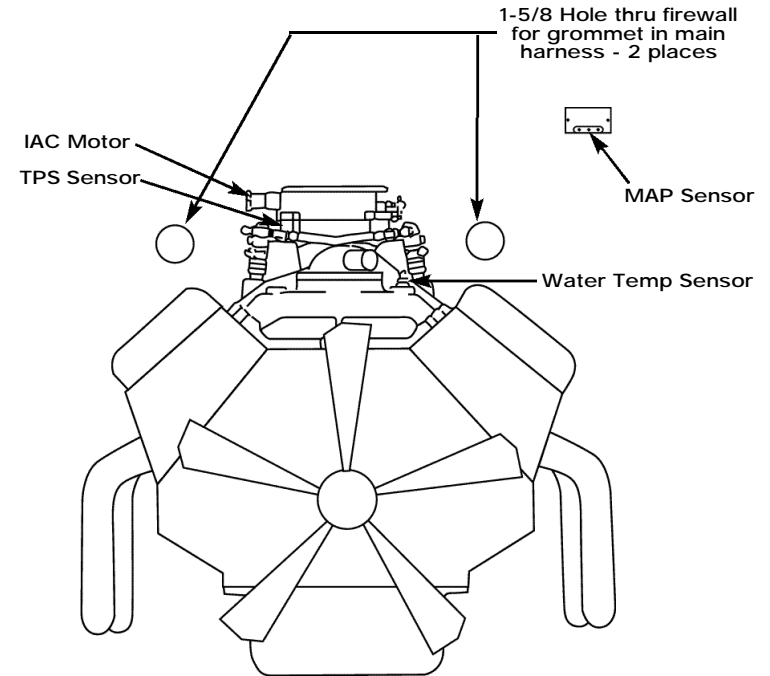


Figure B

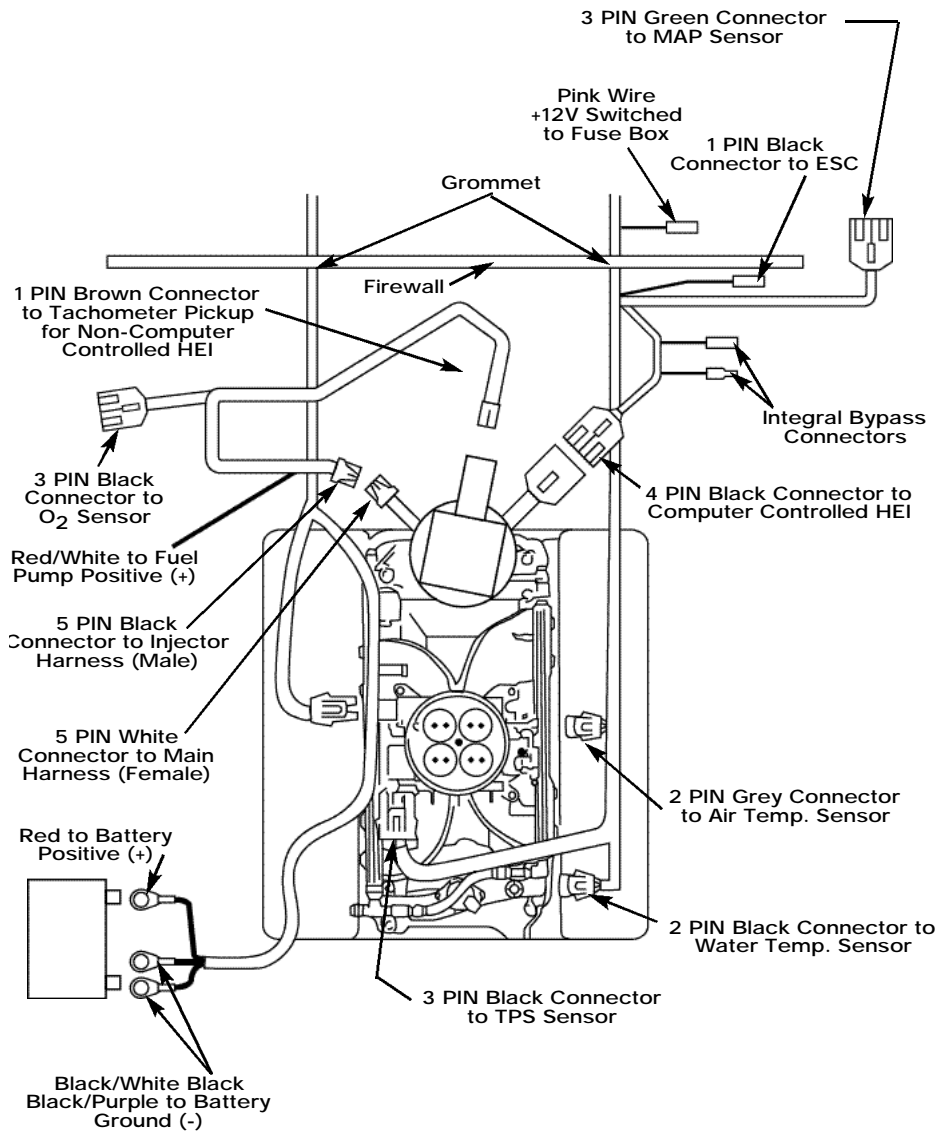
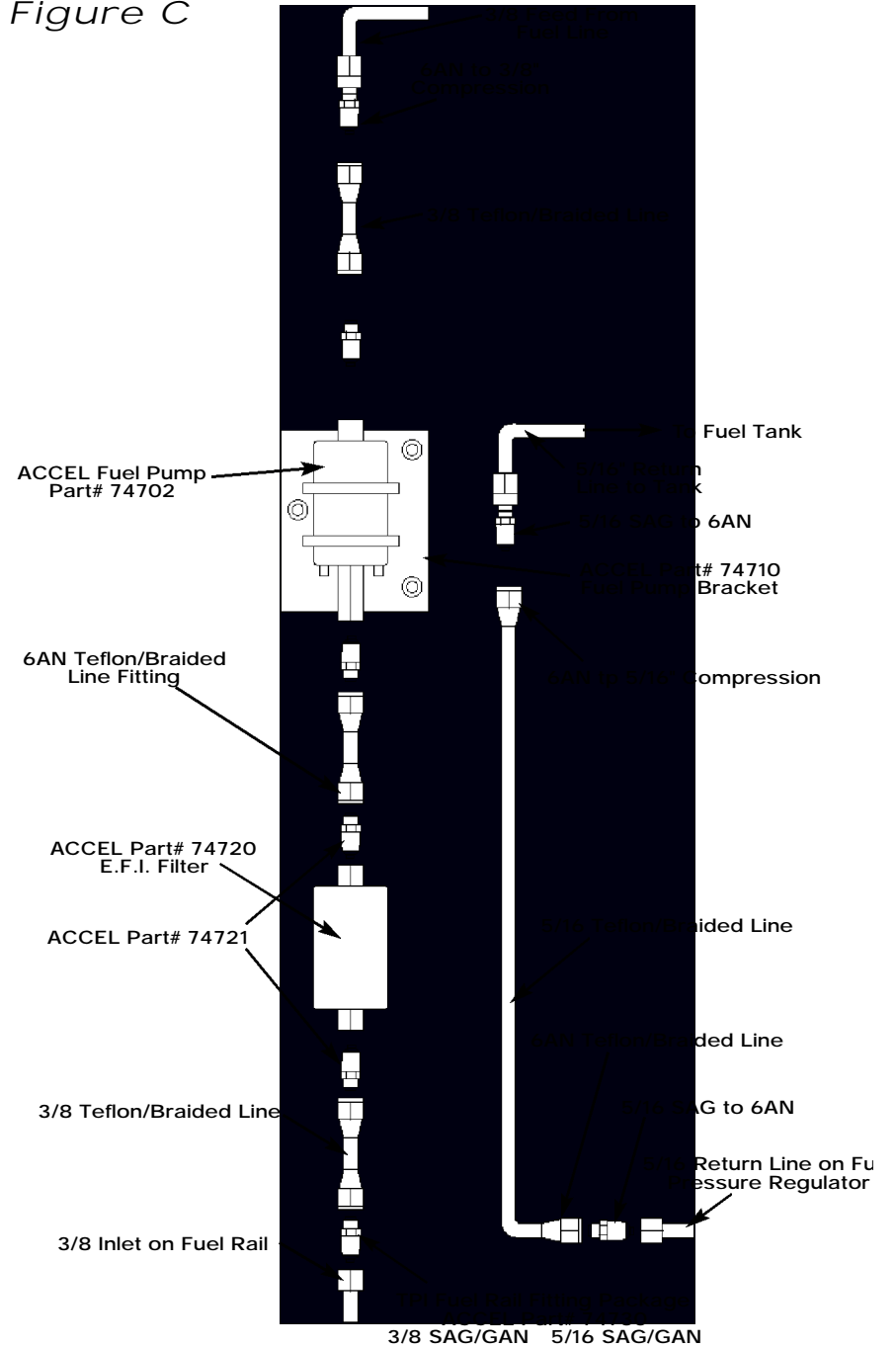


Figure C



NOTE: If using ACCEL Pump Part #74701, please contact ACCEL/DFI Technical Service for proper plumbing instruction.

Figure D

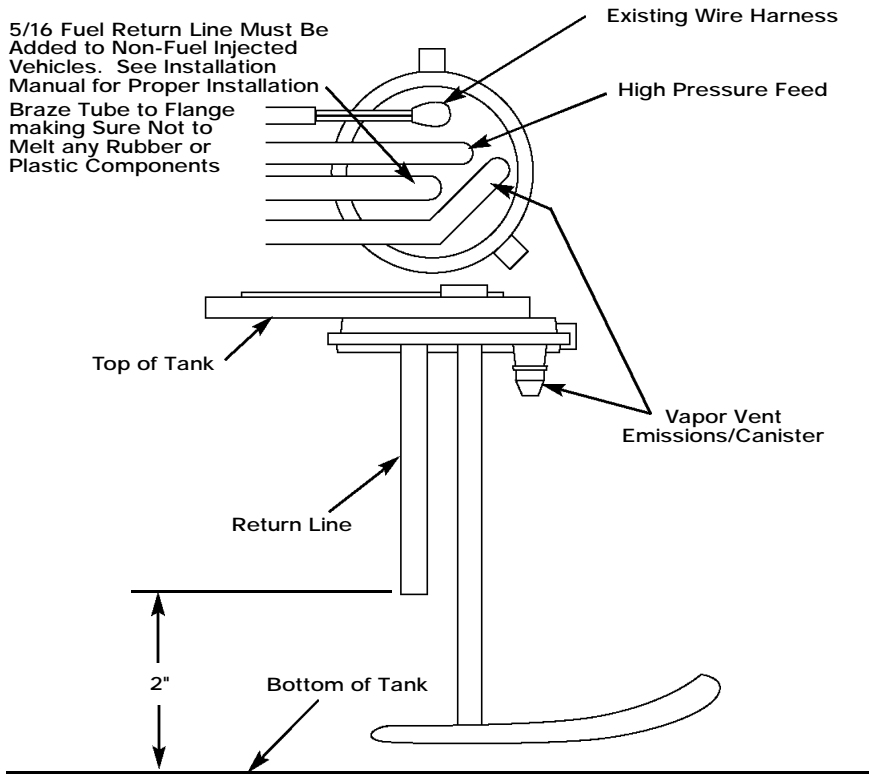
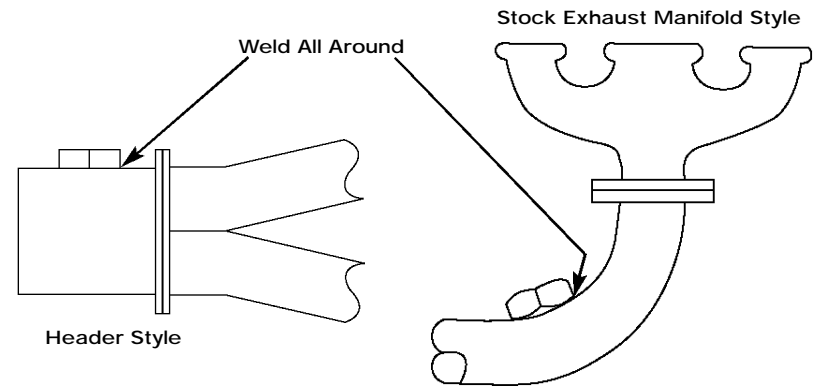


Figure E





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