



S&S® In-Tank Fuel Pump Instructions

DISCLAIMER:

S&S parts are designed for high performance, closed course, racing applications and are intended for the very experienced rider only. The installation of S&S parts may void or adversely effect your factory warranty. In addition such installation and use may violate certain federal, state, and local laws, rules and ordinances as well as other laws when used on motor vehicles used on public highways, especially in states where pollution laws may apply. Always check federal, state, and local laws before modifying your motorcycle. It is the sole and exclusive responsibility of the user to determine the suitability of the product for his or her use, and the user shall assume all legal, personal injury risk and liability and all other obligations, duties, and risks associated therewith.

The words Harley®, Harley-Davidson®, H-D®, Sportster®, Evolution®, and all H-D part numbers and model designations are used in reference only. S&S Cycle is not associated with Harley-Davidson, Inc.

SAFE INSTALLATION AND OPERATION RULES:

Before installing your new S&S part it is your responsibility to read and follow the installation and maintenance procedures in these instructions and follow the basic rules below for your personal safety.

- Gasoline is extremely flammable and explosive under certain conditions and toxic when breathed. Do not smoke. Perform installation in a well ventilated area away from open flames or sparks.
- If motorcycle has been running, wait until engine and exhaust pipes have cooled down to avoid getting burned before performing any installation steps.
- Before performing any installation steps disconnect battery to eliminate potential sparks and inadvertent engagement of starter while working on electrical components.
- Read instructions thoroughly and carefully so all procedures are completely understood before performing any installation steps. Contact S&S with any questions you may have if any steps are unclear or any abnormalities occur during installation or operation of motorcycle with a S&S part on it.
- Consult an appropriate service manual for your motorcycle for correct disassembly and reassembly procedures for any parts that need to be removed to facilitate installation.
- Use good judgment when performing installation and operating motorcycle. Good judgment begins with a clear head. Don't let alcohol, drugs or fatigue impair your judgment. Start installation when you are fresh.
- Be sure all federal, state and local laws are obeyed with the installation.
- For optimum performance and safety and to minimize potential damage to carb or other components, use all mounting hardware that is provided and follow all installation instructions.
- Motorcycle exhaust fumes are toxic and poisonous and must not be breathed. Run motorcycle in a well ventilated area where fumes can dissipate.

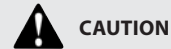
IMPORTANT NOTICE:

Statements in this instruction sheet preceded by the following words are of special significance.



WARNING

Means there is the possibility of injury to yourself or others.



CAUTION

Means there is the possibility of damage to the part or motorcycle.

NOTE

Other information of particular importance has been placed in italic type.

S&S recommends you take special notice of these items.

WARRANTY:

All S&S parts are guaranteed to the original purchaser to be free of manufacturing defects in materials and workmanship for a period of twelve (12) months from the date of purchase. Merchandise that fails to conform to these conditions will be repaired or replaced at S&S's option if the parts are returned to us by the purchaser within the 12 month warranty period or within 10 days thereafter.

In the event warranty service is required, the original purchaser must call or write S&S immediately with the problem. Some problems can be rectified by a telephone call and need no further course of action.

A part that is suspect of being defective must not be replaced by a Dealer without prior authorization from S&S. If it is deemed necessary for S&S to make an evaluation to determine whether the part was defective, a return authorization number must be obtained from S&S. The parts must be packaged properly so as to not cause further damage and be returned prepaid to S&S with a copy of the original invoice of purchase and a detailed letter outlining the nature of the problem, how the part was used and the circumstances at the time of failure. If after an evaluation has been made by S&S and the part was found to be defective, repair, replacement or refund will be granted.

ADDITIONAL WARRANTY PROVISIONS:

- (1) S&S shall have no obligation in the event an S&S part is modified by any other person or organization.
- (2) S&S shall have no obligation if an S&S part becomes defective in whole or in part as a result of improper installation, improper maintenance, improper use, abnormal operation, or any other misuse or mistreatment of the S&S part.
- (3) S&S shall not be liable for any consequential or incidental damages resulting from the failure of an S&S part, the breach of any warranties, the failure to deliver, delay in delivery, delivery in non-conforming condition, or for any other breach of contract or duty between S&S and a customer.
- (4) S&S parts are designed exclusively for use in Harley-Davidson® and other American v-twin motorcycles. S&S shall have no warranty or liability obligation if an S&S part is used in any other application.

CAUTION

S&S® fuel injection is not compatible with E85 fuel. Use of E85 fuel may cause your engine to run poorly and/or damage system components.

Before doing any of the following installation, be sure to disconnect the negative cable of your battery.

Consult appropriate factory technical information for all portions of the fuel handling system (tank, fuel delivery line, fuel rail, injectors) and engine control system (module, calibration, software) to verify compatibility.

WARNING

Gasoline is extremely flammable. Please be sure to work in a well ventilated area and do not have an open flame near the work area.

The following installation should only be done by a qualified technician with the proper tools and training. If you are not comfortable or unsure of your abilities, S&S recommends you contact a local S&S dealer to handle the installation.

NOTE: This pump assembly will provide fuel at a flow rate of 45 liter/hour (11.9 gallon/hour) or more at 4 bar (400 kPa, 58 psi), and use no more than 5A current when the voltage is at 13.8V or greater and the inlet filter is clean and fully immersed in fuel. When the voltage drops to 9V, current will be no more than 5A, and the flow rate of fuel will be 2 liter/hour or greater.

Because of variations in gasoline, engine condition, temperature, elevation, and other factors, S&S recommends that the wide open throttle air-fuel ratio be checked to avoid a potentially harmful lean condition. It is highly recommended that the control system have close-loop exhaust oxygen (O2) feedback

Kit Contents/Replacement Parts:

- 55-5088 Fuel Pump and Fittings (no filter or fuel line)
- 19-0458 Inlet Fuel Filter
- 19-0480 Inlet Fuel Line (SAE 30R10, 5/16" ID, 13.5" long)

Recommended Accessories:

- 10 micron, in-line, high pressure (70 psi minimum) fuel filter (Walbro #: 125-199 recommended. Not available from S&S).
- Mating connector for fuel pump wiring (Packard® # 12047786. Not available from S&S.) or suitable replacement connector assembly
- 106-2250 Pinch Style Hose Clamp (recommended for in-tank and pump outlet to fuel rail hose connections)
- 50-8352 Bolt Style Hose Clamp (recommended for pump outlet to fuel rail hose connection)
- 55-5090 S&S Delphi® style Engine Control Module (ECM)
- 106-2066 S&S Delphi style Closed Loop Oxygen Sensor Kit
- 106-0478 Custom Bike Wiring Harness Kit (Complete EFI and Chassis Wiring)
- 106-0159 12" long, 5/16" ID, SAE 30R12 or equivalent low permeation, high pressure fuel hose to connect the banjo fitting to the fuel rail



Figure 1

Fuel Pump Installation and Tank Preparation:

CAUTION

Important! Be sure to thoroughly clean the fuel tank. If sealants are used, be sure that they are compatible with gasoline and gasoline/alcohol blends. Problems with the fuel system are often caused by inadequate cleaning of the tank and/or the use of sealants not compatible with gasoline or gasoline/alcohol blends.

NOTE: There is a template for mounting the fuel pump at the end of this instruction sheet.

Mounting and Installation Guidelines

1. In new installations, carefully consider the mounting location of the fuel pump and fuel inlet filter. Below are some guidelines for choosing the best location:
2. The fuel inlet filter should be located in the lowest portion of the tank to ensure sufficient fuel flow as the tank empties. For example, consider the orientation of the motorcycle when placed on its side-stand. The lowest portion of the tank will usually be on the same side as the side-stand.
3. As with the inlet filter, the pump itself should be mounted in a low portion of the tank to ensure that it is sufficiently surrounded in fuel as the tank empties. This is to provide cooling for the pump.
4. The pump outlet should be located so that it and the fuel line will have adequate clearance from hot or moving surfaces and electrical hardware. The fuel line should clear all rough or sharp engine surfaces to avoid chafing. The line should have at least one bend to allow for relative motion of the engine with the tank.
5. Occasionally the tank must be raised without complete removal to allow access for service work. Be sure enough slack is used in fuel and electrical connections to make this possible.
6. Ensure proper venting of the tank. The fuel tank must be properly vented to ensure that air can enter the tank to replace the fuel that exits. If the unit is installed on an emissions controlled vehicle, be sure that the tank vent is routed according to applicable laws.
7. The pump should be installed for ease of service. Below are 3 general methods for mounting the fuel pump (**See Figures 2 and 3**):
 - a. Through a hole in the top of the tank (minimum 3½" diameter recommended): With this method, only two holes at the bottom of the tank are required for the fuel outlet and electrical connections (see template at the end of the instruction sheet).
 - b. With a custom flange or mounting plate attached to the bottom of the tank: Generally, an access hole is cut in the bottom of the tank and a ring with tapped holes or studs is made and welded in the access hole. If you are using tapped holes, it is recommended that they are blind to eliminate additional leakage path(s) for the fuel. The pump is then assembled onto an access/mounting plate and the assembly is fastened to the ring with a gasket/sealant. Before installing, be sure that all gasket surfaces are smooth and even. To prevent leakage, additional sealant can be applied to the mounting plate fasteners if blind holes were not created on the mounting ring.
 - c. Through a hole in the side of the tank: As with the "top of the tank" method, only two holes are required at the bottom of the tank for the fuel outlet and electrical connections. An access hole is cut into the side of the tank (i.e. backbone tunnel) and a ring with studs or tapped holes is made and welded into the tank's access hole. A cover plate is then fabricated and fastened to the ring with a gasket/sealant. Before installing, be sure that all gasket surfaces are smooth and even. Again, sealant should be applied to the fasteners if blind holes were not incorporated into the ring.

NOTE: There is a template for mounting the fuel pump at the end of this instruction sheet.



Figure 2: Tank with top access hole

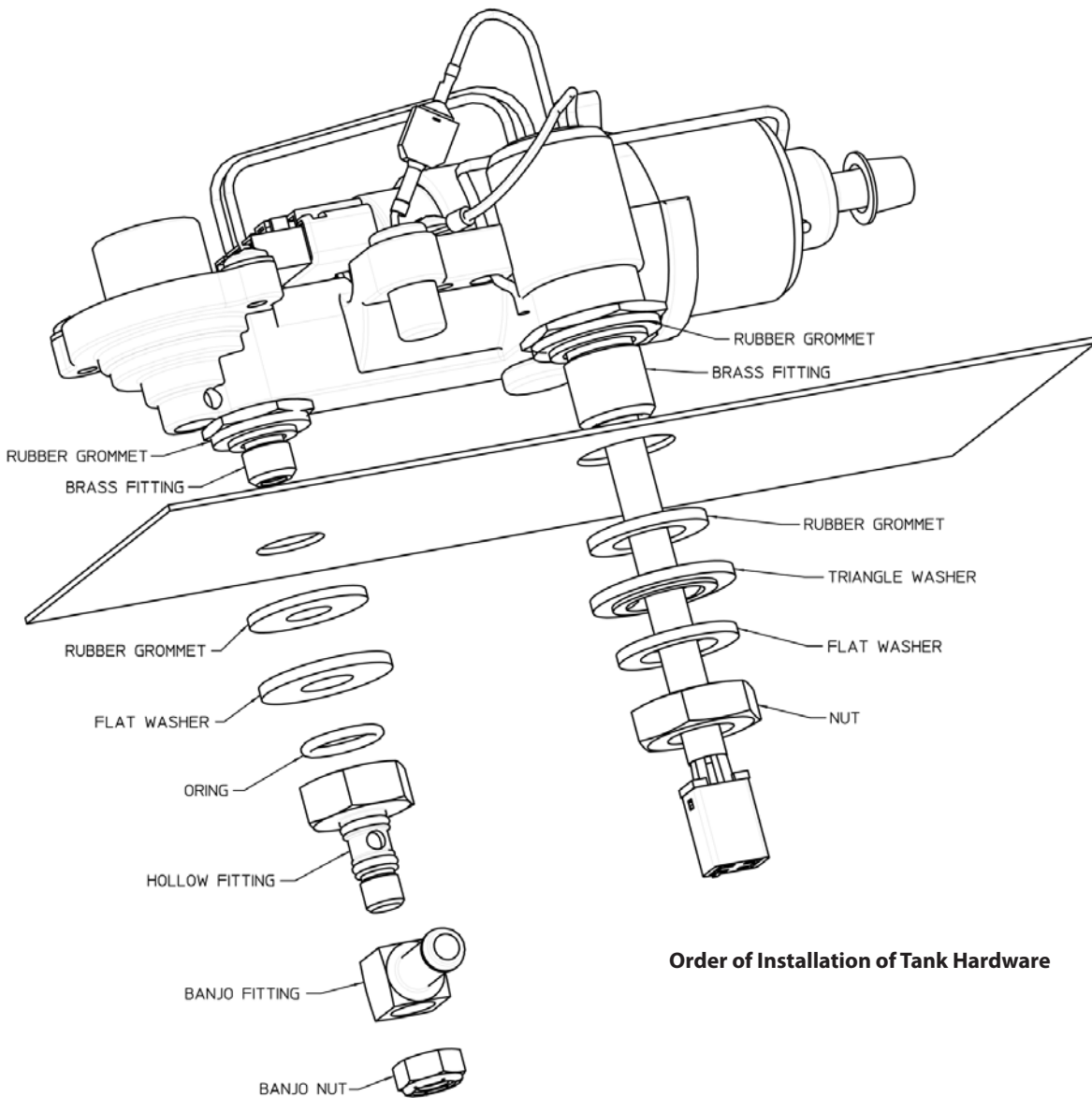


Figure 3: Custom mounting plate at bottom of the tank

8. If the tank was previously used, eliminate trace gasoline.
9. After all fabrication and painting has been completed on the tank, be sure to thoroughly clean the inside of the tank to eliminate welding residue, blasting media, metal shavings, rust, and any other contaminant that could plug the filter or affect the fuel pump. Problems with the fuel system are often caused by inadequate cleaning of the tank or by use of sealants not compatible with gasoline or gasoline/ethanol blends.

Final Pump Installation (See Figure 4)

1. Verify that the brass electrical and fluid fittings in the pump's aluminum frame have 60 to 75 in-lbs of torque applied.
2. If not already in place, install the in-tank grommets on the brass fittings (see Figure 4)
3. Determine the length of hose required to properly locate the inlet filter in the tank, and cut to length.
4. Slide the hose clamps over the hose and insert the white fuel inlet fitting of the pump on one end and the filter fitting in the other.
5. Be sure that the hose is oriented so that the filter will naturally be pushed towards the bottom of the tank when the pump is installed.
6. Crimp the hose clamps over the filter and pump inlet fittings and install the assembly in the tank or mounting plate.
7. **See Figure 4:** Install the external grommets, washers, and hardware on the fuel pump fittings. Using Figure 4 as a guide, pay close attention to the order and orientation of the various parts.
8. Torque both the brass nut for the electrical fitting and the hollow fuel fitting to 60–75 in-lbs.



Order of Installation of Tank Hardware

Figure 4

9. Install the banjo fitting on the hollow fuel fitting. Take care not to abrade o-rings during installation.
10. Orient the outlet of the banjo fitting to the desired location, install the banjo nut, and torque to 35–40 in-lbs.
11. If installing the pump using a mounting plate, install the gasket, and mounting plate/fuel pump assembly. Again, be sure that the fuel filter sits at the bottom of the tank and if blind holes or studs were not used on the mounting ring, be sure to apply a gasoline/alcohol compatible sealing compound to the threads of the fasteners.
12. After sealing compounds have cured, pressurize the tank and check for leaks.

Fuel Pump Electrical Connections (See Figure 5, next page)

The electrical connector supplied with the fuel pump mates with Packard® part number 12047786. You must obtain this connector separately. If you prefer to use another connector, it is recommended that the connector either be sealed or the terminals be greased to avoid corrosion. Do not apply power to the fuel pump at this time.

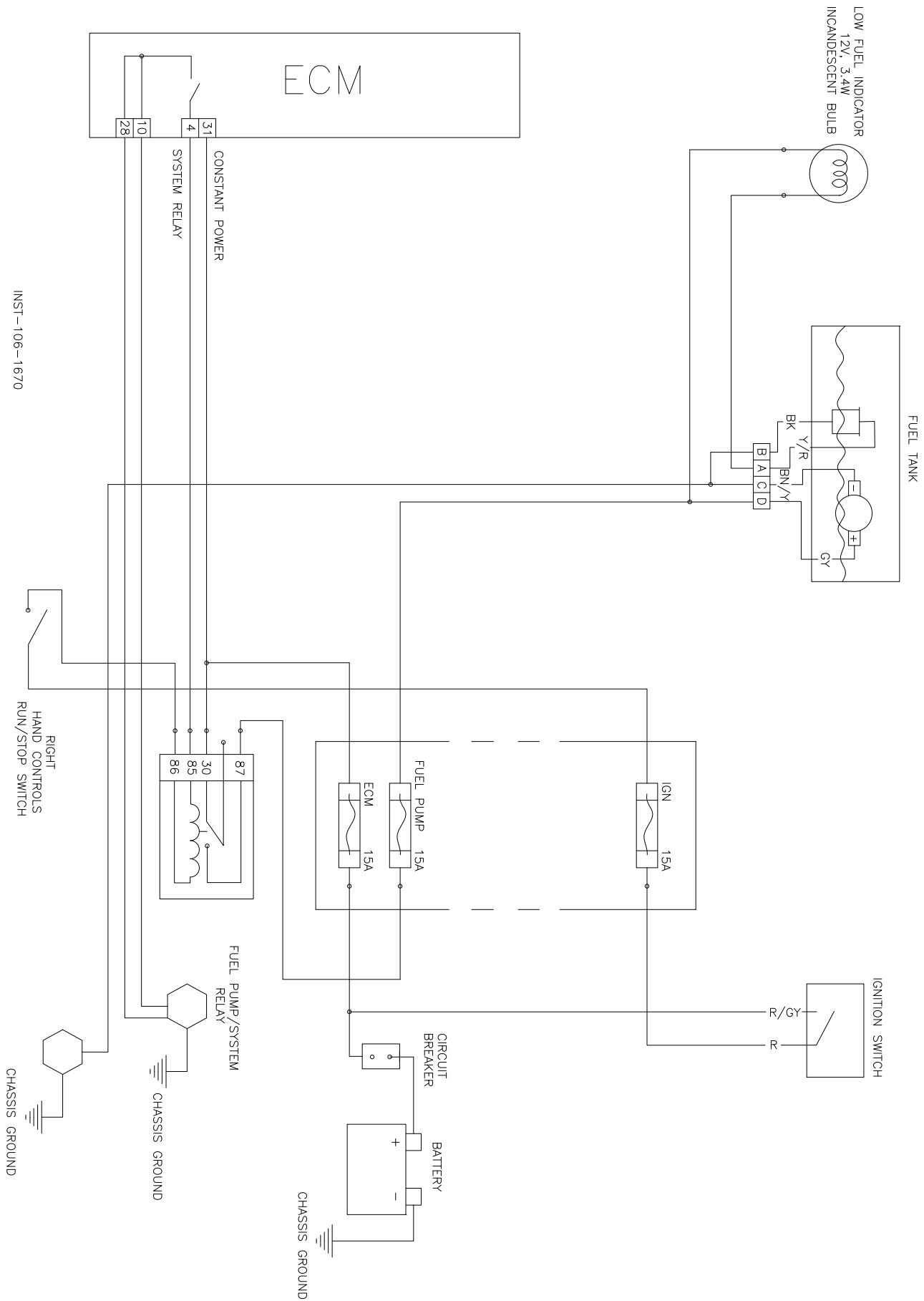
The schematic in Figure 5 shows the recommended wiring for the fuel pump when used with S&S, Delphi® style ECMs:

55-5029 – Serial ECM (55-5034 kit part number)

55-5069 – USB ECM (55-5090 kit part number)

If you are using this fuel pump with another control system, please contact the manufacturer for recommendations. Be sure that the fuel pump is fused appropriately (15 A maximum).

Note in the schematic that the low fuel indicator circuit requires the use of a 12V, 3.4W incandescent bulb. An LED will not work with this circuit.



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Figure 5

Fuel Pump Outlet Connection

1. Use SAE 30R12 or other low permeation, high pressure fuel hose to connect the banjo fitting to the fuel rail. It is recommended to temporarily install fittings for a fuel pressure gauge for initial system testing if the fuel rail does not have a port for system pressure testing. Use either pinch or bolt style hose clamps. Do not use worm-gear clamps with slits in the metal that could potentially cut the hose.
2. Again, be sure that the final routing of the fuel line will have adequate clearance from hot or moving surfaces and electrical hardware. The fuel line should clear all rough or sharp engine surfaces to avoid chafing. The line should have at least one bend to allow for relative motion of the engine with the tank.
3. For best results, S&S suggests the use of a high pressure (at least 70 psi continuous), 10 micron filter on the outlet end of the pump. Often, if the fuel system was not adequately cleaned, small particles will pass through the fuel inlet filter and pump. These particles then plug the inlet screens of the injectors and result in poor running conditions.

Initial Startup

1. Pour a small amount of gasoline in the tank. Be sure to add enough fuel that the inlet filter is submerged.
2. Turn power on and check for leaks. If used with an S&S control system, the pump should operate for 2 seconds and shut off.
3. Add more gasoline. Check the fuel pressure with the pump running. The pressure should be 58 ± 2 psi (400 ± 8 kPa).
4. After the pump turns off, the pressure should hold at least 43.5 psi (300 kPa) for five minutes.
5. Start and run the motorcycle. Again monitor fuel pressure.
6. If available, it is recommended to run the motorcycle on a dynamometer while monitoring air fuel ratio and system pressure, especially at wide open throttle.

Calculating Reserve Fuel

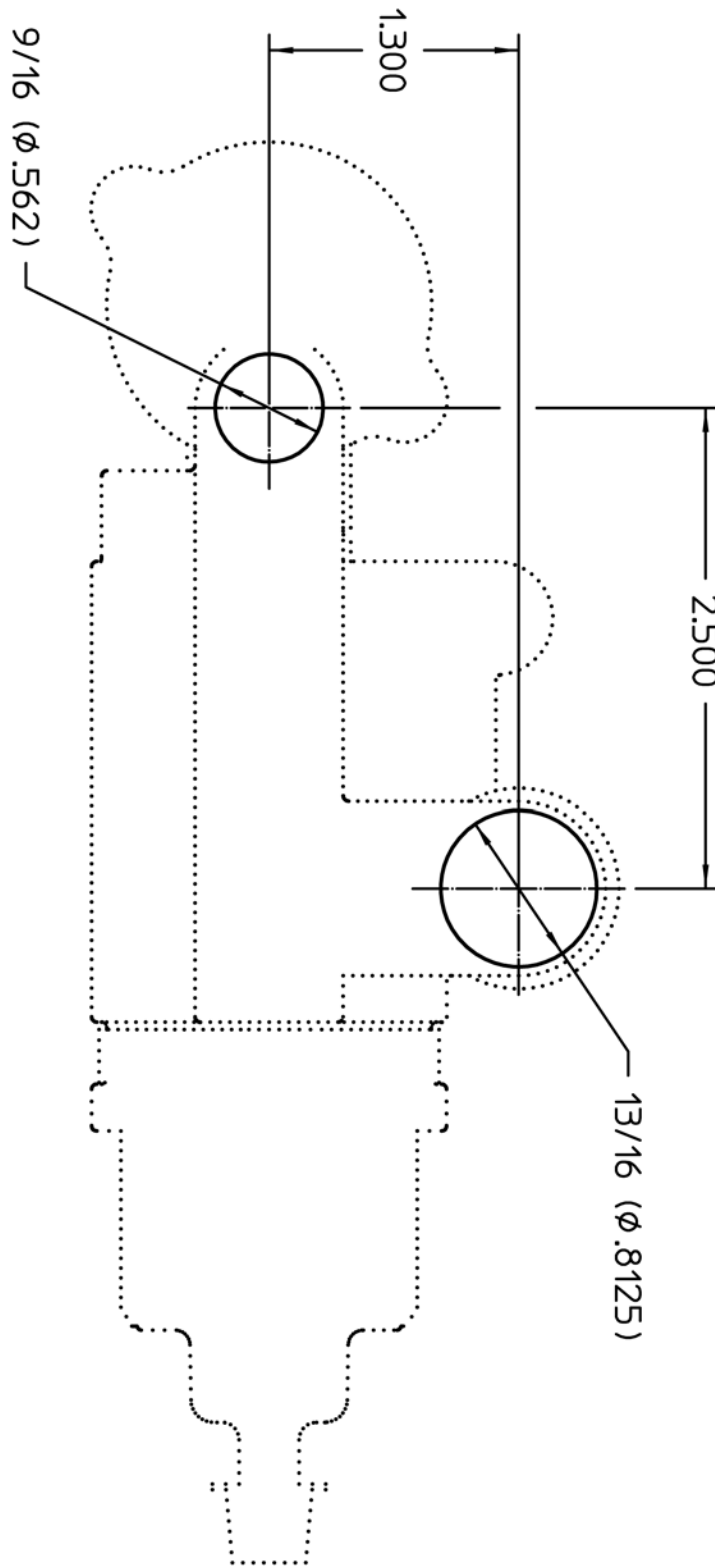
If using the low fuel indicator, you may want to determine the approximate amount of reserve fuel available in your installation. Below is one method for doing this:

1. With the motorcycle upright on a level surface be sure enough fuel is in the tank to completely immerse the inlet filter in fuel. You may need to use a small mirror and flashlight to view this.
2. The low fuel indicator should illuminate with the ignition switch on. Add more gasoline until the low-fuel light turns off. Note the amount of fuel used. This is the reserve.

Troubleshooting

1. The fuel pressure drops off when running Wide Open Throttle on a dyno:
 - a. Be sure that your battery and charging system is in good condition. Be sure that the system voltage is 13.2 volts or greater when running in this condition. It is best to verify system voltage at the fuel pump connector. This will ensure there are no voltage drops in the wiring, switches, or relay causing the problems.
 - b. Be sure inlet filter is not clogged. If in doubt, replace it.
 - c. If an in-line filter is installed on the pump outlet, test pressure on both sides of the filter to determine if it is clogged.
 - d. Review system flow rates and fuel requirements. Be sure the pump is not too small for your system.
2. The motorcycle is running lean or misfiring.
 - a. Be sure the injector inlet screens are not clogged. It is recommended that you remove the injectors, let them dry, and tap the inlet end of the injector to loosen any debris that may have adhered to the injector screens. If it appears that they are clogged or if in doubt, it is recommended that the injectors be cleaned by a shop with professional injector cleaning equipment.
 - b. Verify that the system pressure is correct and the correct calibration is being used.
 - c. Check for intake leaks.
 - d. Ensure that you have adequate spark and troubleshoot other electrical systems.

Figure 6: Fuel Pump Template



CAUTION

When printing instruction sheet, be sure your printer does not re-scale template. Verify dimensions on template prior to using.