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Emission-Related Installation Instructions for S&S[®] Replacement Engines

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.

INSTALLATION OVERVIEW

S&S Replacement Engines are legal for use in all 50-States as replacement engines in 1970-1998 Harley-Davidson® motorcycles originally equipped with a carbureted, non-catalyst, big twin engine.

In order to meet California Smog Check Program requirements, a manufacturer's identification/tuning label must be permanently affixed to the vehicle in a clearly visible location. This label is included with each S&S Replacement Engine and must be applied to a non-removable part of the chassis such as a frame tube.

WARNING

This label is required to aid in passing the California Smog Check program.

Use the following guidelines to install label:

- 1- Remove any oil or grease from the application site.
- 2- Clean area with an all-purpose liquid cleanser and dry with a clean cloth.
- 3- Remove the adhesive backing and carefully apply the label.
- 4- Working from the center, force any trapped air out past the edges.

INSTALLATION REQUIREMENTS

- S&S Replacement Engines are supplied with a special carbon impregnated air filter element to prevent fuel vapor from entering the atmosphere while the engine is shut off and must be used. Filter service requirements are described in the S&S Replacement Engine Owner's Manual.
- The motorcycle must be equipped with the original Harley-Davidson® evaporative canister and the evaporative system hose routing must conform to the "Evaporative Hose Routing Diagram" provided in this manual.
- The stock OEM Harley-Davidson® exhaust system or equivalent must be used.

Installation Notes

S&S® Engines may include instruction sheets for individual components. Most instructions apply to all S&S Engines. In the following instances, however, components or procedures supplied with and described for S&S Replacement Engines are different from those for other S&S Engines.

- *Some S&S Engines may be configured to allow crankcase pressure to exit via the crankcase and/or cylinder head vents. S&S Replacement Engines must only utilize cylinder head venting.*
- *The camshaft supplied in S&S Replacement Engines is of proprietary S&S design. This camshaft has been designed to allow the engine to meet exhaust emission standards. Substitution of a camshaft with different specifications is not permitted and would be in violation of the Clean Air Act and California State Law.*
- *S&S 3 $\frac{3}{8}$ " bore engines come equipped with an S&S Super Stock® ignition system that is preset at the factory. Breaking the tamper proof seal will void the warranty on the engine.*
- *The Super Stock ignition system requires the use of a 3 OHM single-fire coil like the S&S coil PN 55-1571.*
- *The carburetor supplied with S&S Replacement Engines is not to be adjusted. For service requirements, contact S&S Cycle Technical Services, 608-627-1497. The tuning instructions described in S&S Carburetor Instruction PN 51-1012 do not apply to carburetors supplied with S&S Replacement Engines. More specific information can be found in your S&S Replacement Engine Owners manual.*
- *The carburetors included with S&S Replacement Engines are butterfly type carburetors with a preset idle mixture screw and preset midrange and high speed jets. The carburetors also feature an accelerator pump and variable fast idle device for improved throttle response, engine starting, and warm ups. The Super E carburetor has a 1 $\frac{7}{8}$ " (47.6mm) bore at the butterfly and a 1 $\frac{1}{16}$ " (39.6mm) venturi.*

Installation Instructions

This S&S Replacement Engine has been manufactured, assembled, and calibrated by S&S Cycle, Inc. Before proceeding, verify that this engine fulfills the requirements for your motorcycle. Installing an S&S engine into a motorcycle requires specialized knowledge, skills, and tools. For this reason installation should be performed by a professional mechanic.

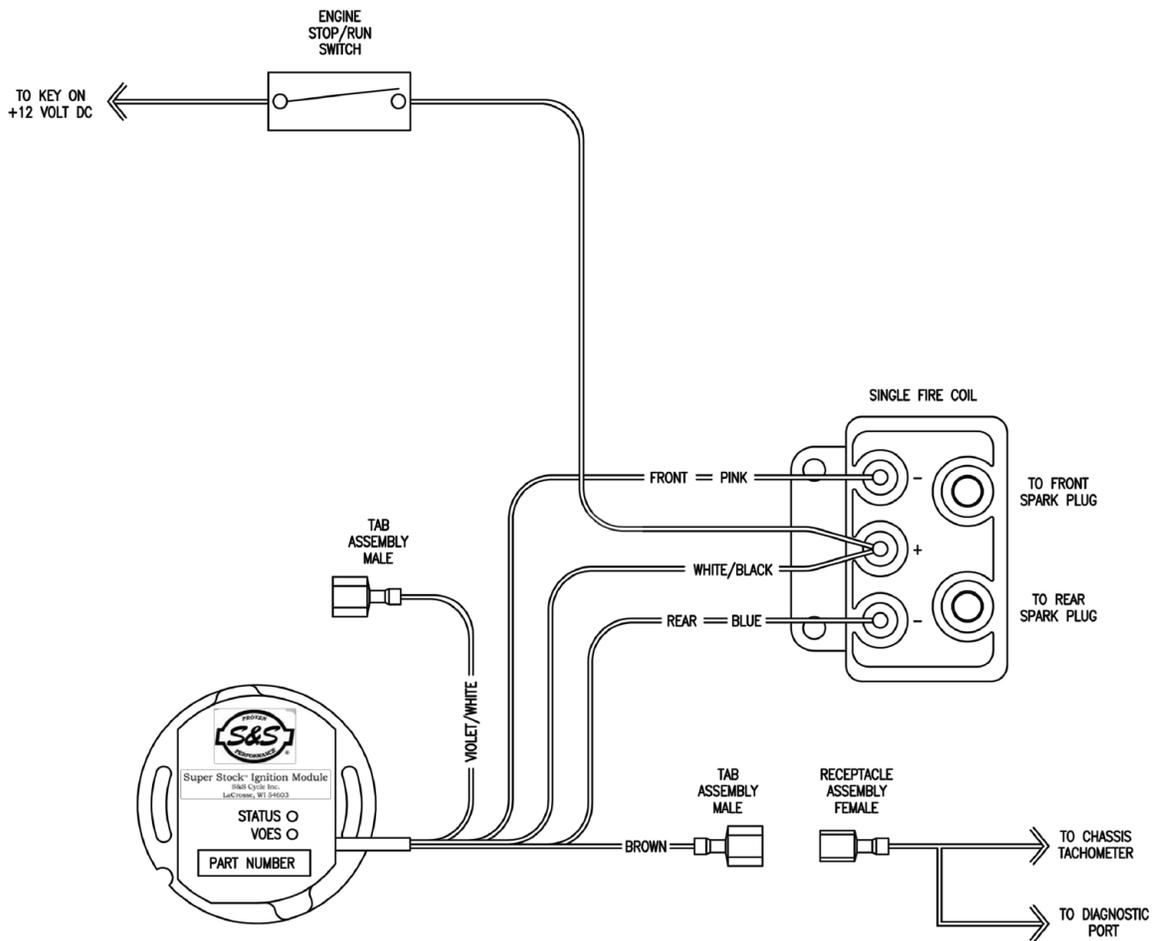
WARNING

Improper installation of engine or related components could result in injury or death to the operator and/or passenger and damage to the motorcycle.

Installation

- 1- Remove the original engine according to the applicable Harley-Davidson® Service Manual.
- 2- Install the S&S engine into the motorcycle chassis according to the chassis service manual.
- 3- Hook up the ignition module.
 - A- Make electrical connections according to following chart and wiring diagram.

| Ignition Module | | |
|-----------------|----------------------------|---------------------|
| White/Black | Switched 12-volt power | Small ring terminal |
| Pink | Front cylinder on coil | Small ring terminal |
| Blue | Rear cylinder on coil | Small ring terminal |
| Violet/White | VOES | Tab assembly (male) |
| Brown | Tachometer/Diagnostic Port | Tab assembly (male) |



4- Install Oil Lines

A- First, flush the oil tank and lines and install a new oil filter that has been filled with oil.

CAUTION

New oil tanks and lines must be flushed to remove any debris that could damage the engines oiling system.

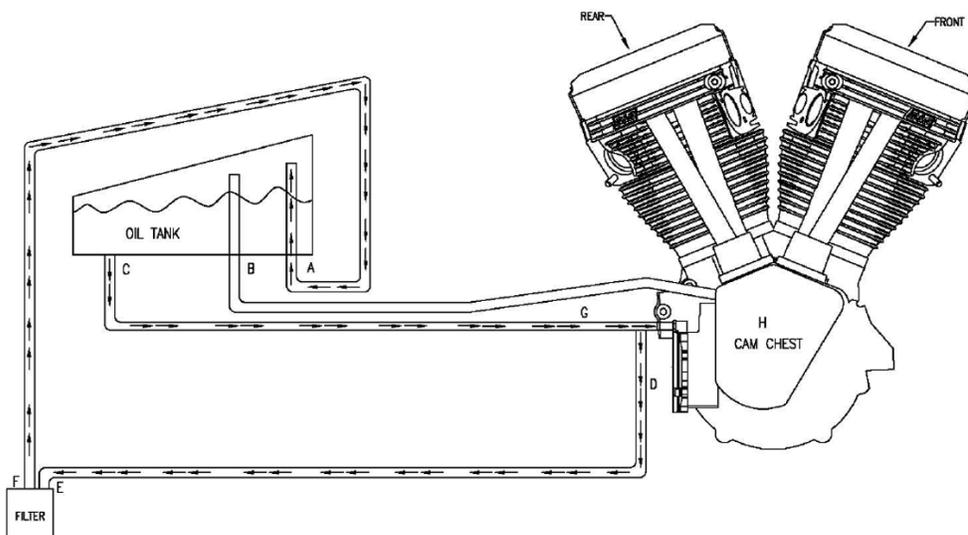
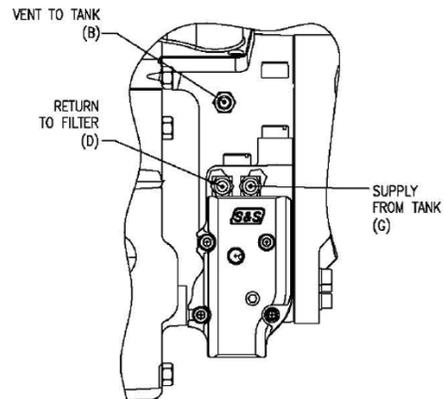
- B- Connect oil lines following the diagram below. Do not connect the oil feed line to the engine at this time.
- C- Clamp off the open end of the oil feed line and fill the oil tank with oil of the appropriate type and grade recommended in the S&S® Replacement Engine Owner's Manual.
- D- Unclamp the feed line to allow the line to fill with oil; then quickly attach it to the fitting on the oil pump. The oil pump was primed at the factory so no further priming should be necessary. It is necessary to confirm that oil is circulating properly prior to operating the motorcycle.
- E- To confirm proper circulation of oil:
 - 1- Remove both spark plugs.
 - 2- Remove the oil return line from the oil tank and place the end in a suitable container.
 - 3- Using the starter, turn the engine several rotations. Oil should come out the return line. If not, repeat the procedure as needed.
 - 4- Reconnect the return line to the oil tank and install the spark plugs.

CAUTION

Lack of oil circulation through the engine will cause damage to the internal engine components.

V-SERIES OILING SYSTEM DIAGRAM

- A. FILTER TO TANK
- B. VENT TO TANK
- C. TANK TO PUMP IN
- D. PUMP OUT TO FILTER
- E. FILTER IN
- F. FILTER OUT
- G. SUPPLY FROM TANK
- H. CAM CHEST



Throttle Requirements

NOTE: S&S Super E & G carburetors require the use of a two cable, pull open - pull closed throttle assembly. All models equipped with a single cable throttle mechanism must be converted to the two cable, pull open - pull closed type. S&S offers a variety of these throttle assemblies.

WARNING

Single, braided wire cable throttle mechanisms cannot mechanically close the throttle. If the throttle inadvertently sticks in the open position, loss of control of motorcycle and personal injury to you or others may result.

Any motorcycle equipped with single cable throttle system must be converted to a two cable system. Kits with 36" (91cm), 39" (99cm), 42" (107cm), 48" (122cm), or 52" (132cm) length cables are available. Throttle assembly kits may be ordered separately. See descriptions below.

Two cable throttle systems designed for a butterfly type carburetor have cable fittings that can simply be "plugged in" to the S&S Super E or G carburetor throttle linkage.

Optional S&S Two Cable Throttle Kits

Kits fit 1" (25.4mm) O.D. handlebars and can be used on most chassis. An adapter sleeve is available for use with handlebars having 7/8" (22.2mm) ends. Fittings on provided cables readily "plug in" to S&S® Super E, G, or stock H-D 1981 and later butterfly type carburetors. Kits include one opening side cable, one closing side cable, left and right handlebar grips, and handlebar clamps.

- Throttle kit with 36" (91cm) cables PN 19-0450
- Throttle kit with 39" (99cm) cables PN 19-0448
- Throttle kit with 42" (107cm) cables PN 19-0482
- Throttle kit with 48" (122cm) cables PN 19-0449
- 7/8" to 1" (22.2 to 25.4mm) Adapter sleeve PN 19-0235

NOTE: 1981 to 1990 OEM style cables may be used as replacement cables for throttle kits above.

5- Throttle/Cables

A- Install new throttle assembly.

- I- Install new throttle assembly and cables. Position grip and cables so cables can be angled towards carb for easy adjustment and free operation.
- II- Apply light coat of clean cable lubricant to cables and fittings. Loosen cable adjustment locknuts and turn adjusting screw so half of the threads are exposed.

6- Throttle/Cable Assembly

A- Install throttle cables on carburetor.

- I- Remove throttle cable housing bracket, PN 11-2339.
- II- Install opening side throttle cable barrel fitting and throttle cable in throttle linkage on appropriate side of throttle cable housing bracket. Opening side cable housing outside diameter is smaller and measures .190" (4.826mm).
- III- Repeat step II for closing side throttle cable. Closing side cable has a spring around inner cable wire.
- IV- Reinstall throttle cable housing bracket on carburetor.

B- Turn throttle cable adjusters to remove excessive free play. Test the throttle to ensure it opens and closes freely. The throttle should snap shut when released. Turn handlebars to extreme left and open and close throttle, then turn bars to extreme right and repeat. If throttle binds, loosen cable adjusters to put more free play in cables. Tighten the adjusting screw locknuts after final adjustments are made.

NOTE: Throttle grip assembly must be assembled correctly and work freely to prevent possible sticking during operation. Cable routing must be free of tight bends to minimize cable to cable housing friction. Throttle must not bind and must snap shut to fully closed position when released.

WARNING

Incorrect cable adjustment may cause throttle to stick open, causing loss of control of motorcycle, serious injury or death.

7- Install Fuel Tank

A- Install fuel tank making sure it does not come in contact with engine or sensors.

8- Hook up Evaporative System

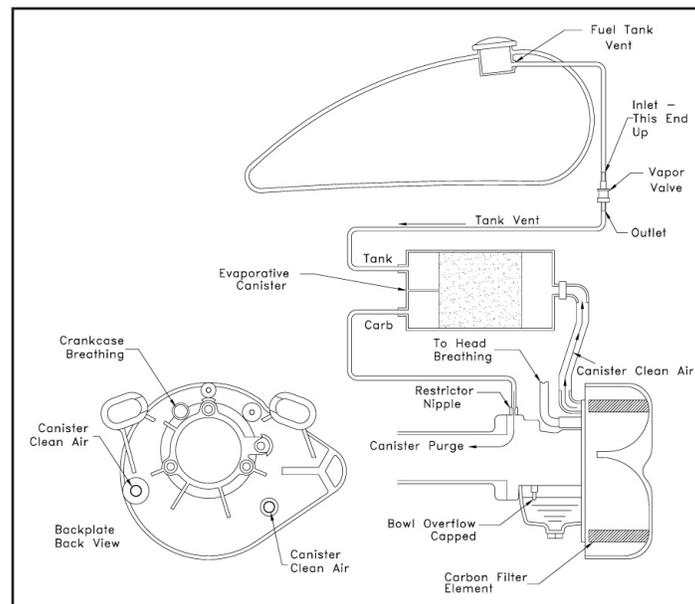
The stock Harley-Davidson® evaporative system must be used when installing an S&S Replacement Engine.

A- Using the “Evaporative Hose Routing Diagram” provided below, establish a routing for the evaporative system hoses. Ensure that all hoses are free of contact with any hot or moving parts.

B- After the evaporative hose routing has been determined, cut the hose to length if need be and make the proper connections.

NOTE: The “Canister Clean Air” hose must be routed to the backplate. The backplate used on S&S Replacement Engines has two different locations that the canister clean air hose may be connected. One location is towards the rear of the motorcycle and one towards the front. From the factory S&S has installed a socket head plug in each location. Follow the steps below to complete the installation.

1. Determine which backplate location will work best with your application.
2. Remove air cleaner cover and filter element from backplate
3. Remove backplate by removing the three slotted head screws and two head breather screws.
4. Remove socket head plug from backplate and replace with 90° fitting.
5. Install 3/8" ID hose fitting onto 90° fitting.
6. Install backplate, filter element and air cleaner cover using blue thread lock on slotted head and Phillips head screws.
7. Determine a location to install 1/2" ID to 3/8" ID hose reducer fitting. This fitting steps the factory H-D® 1/2" ID canister clean air hose down to 3/8" ID.
8. Cut the factory 1/2" ID hose and the provided 3/8" ID hose to proper lengths.
9. Make all connections using provided spring clamps to secure hose.



Evaporative Hose Routing Diagram

C- Cap off the carburetor bowl overflow using the provided 3/16" x 1/2" rubber cap and nylon tie strap. If desired, the overflow may be routed to the unused canister clean air location on the backplate. To do this you will need to source your own hose and fitting(s).

9- Fuel Hose

A- Slip hose clamp over end of fuel hose that is included with the engine. Lubricate the steel fuel inlet tube attached to the carburetor by applying a thin coating of oil. Slip end of fuel hose over tube.

B- Position fuel hose to avoid contact with hot cylinders or other engine parts. The steel tube on the carburetor can be rotated as needed. Tighten hose clamp securing the fuel hose to the carburetor fitting. Slip protective fuel hose covering over fuel hose and position it to prevent direct contact between fuel hose and cylinders or other engine parts.

C- Connect fuel hose to gas tank petcock using hose clamp provided.

⚠ WARNING

Gasoline is extremely flammable and explosive under certain conditions. Do not smoke or expose gasoline to sparks or open flame. Gasoline fumes are toxic when inhaled. Perform installation in a well ventilated area away from open flames or sparks. Unwarranted sparks and inadvertent engagement of starter while working on electrical components can cause serious injury or death.

10- Final assembly and checks.

- A- Connect vacuum petcock hose (if equipped).
- B- Check fuel line routing and connections.
- C- Test throttle to ensure it opens and closes freely. Turn handlebars to extreme left and open and close throttle, and then turn bars to extreme right and repeat. Throttle must snap closed in all positions.
- D- Reassemble any remaining components.
- E- Verify manufacturing identification/timing label is properly affixed.
- F- Verify all emission related instructions and requirements have been met.
- G- Fill gas tank.
- H- Check carburetor fuel inlet fitting and fuel line connections for leaks.
- I- See S&S® Replacement Engine Owner's Manual for engine starting instructions and break-in procedure.

NOTE: Fuel needle and seat assembly must completely shut off fuel supply entering bowl. Fuel inlet fitting and fuel line connections must not leak.

CAUTION

Gasoline leaking past inlet needle may flood engine causing fire hazard or damage to components.

WARNING

Gasoline leaks at inlet o-rings, fuel line connections, or inlet needle may flood engine and overflow into surrounding area creating fire hazard.

CAUTION

Failure to break-in engine according to correct procedure may result in serious damage to engine that is not repairable under warranty.

11- Troubleshooting Tips

- A- Engine will not start:
 - I- Fuel tank may be empty or petcock may be in closed position.
 - II- Weak or no-spark condition may be caused by a discharged battery, damaged ignition module, or damaged coil. Verify the condition of components.
 - III- Spark plug gap may be too wide.
- B- Engine will not run at steady speed or rpm:
 - I- There may be a restriction in fuel supply system (gas tank vent plugged, needle and seat not working properly, etc.)
 - II- Faulty ignition system. Check for fouled plugs, defective coil, defective electronic module, or improper ignition timing.

GENERAL INFORMATION NOTE: When the motorcycle is not running, the petcock should always be turned off to prevent possible fuel leakage past the needle and seat.

CONCLUSION

Complete remainder of installation according to the applicable service manuals. Refer to the S&S® Replacement Engine Owner's Manual for important information on breaking in the engine.

