

# Engine Removal / Installation

Yamaha 1100 / 1200 non-pv

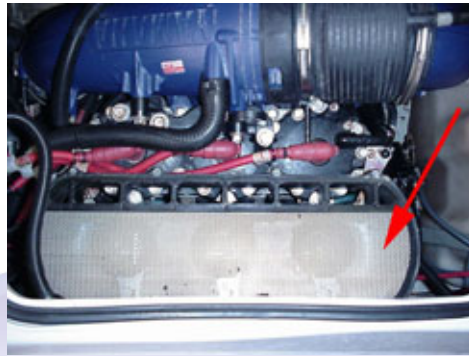
## Step 1

### Battery Removal

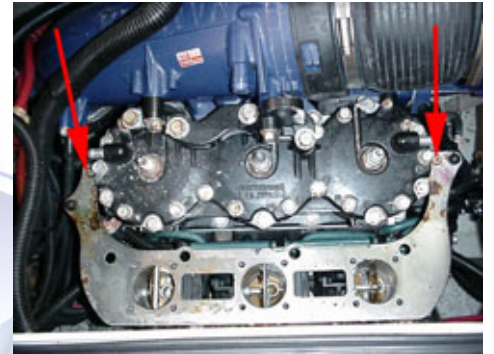


1.1 (Above) Remove the two retaining straps, disconnect the battery and remove it from the hull. Disconnect the negative (black) cable first, then the positive (red).

2.2 (Below) Remove the flame arrestor screen from the base.



2.5 (Below) Remove the two 10mm bolts from the carburetor brace. Tilt it towards the center of the boat and remove the two grease lines from the underside. Remove the brace.



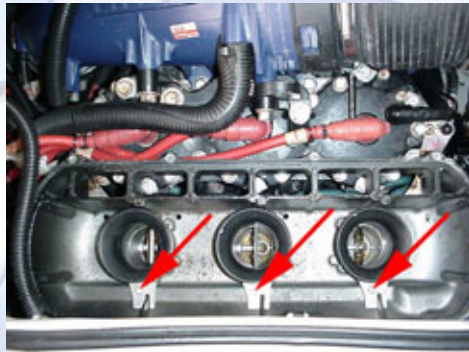
## Step 2

### Intake Removal

2.1 (Below) Remove the eight 8mm bolts from the flame arrestor cover and remove the top.



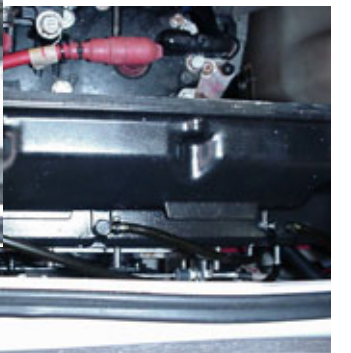
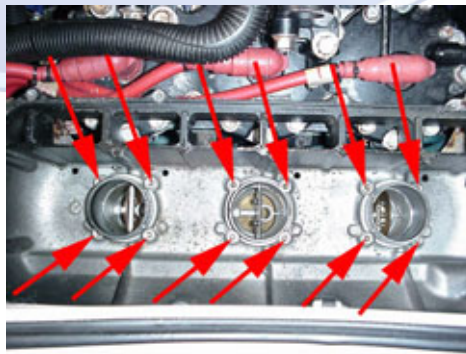
2.3 (Above) Remove the three 8mm bolts securing the velocity stacks and remove the assemblies.



2.4 (Below, right)

Remove the 12 10mm bolts from the flame arrestor base. Move it towards the front of the

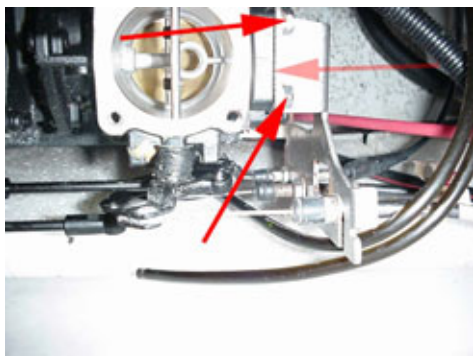
boat and tilt it towards the center exposing the oil line fittings. Remove the three oil lines.



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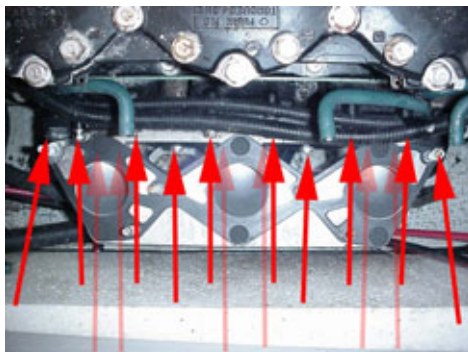
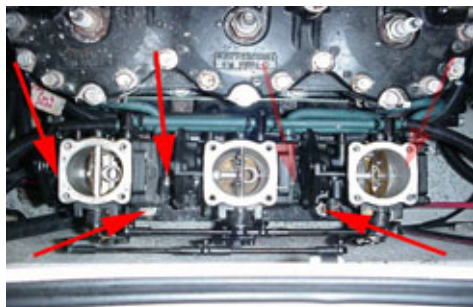
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2.6 (Below) Remove the oil pump cable, throttle cable and choke plate cable from the front carburetor. Remove the three 10mm bolts from the cable mount and remove it from the carb.



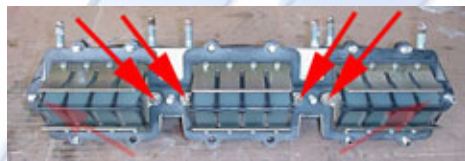
2.7 Loosen the gas tank cap to relieve pressure. Be sure the fuel switch is turned to the "off" position and be aware of any fuel that may spill from the hoses. Make sure the hull is clear of any gasoline fumes before continuing work, especially with power tools.

2.8 (Below) Remove the pulse, fuel in and fuel return lines. Using a wrench, remove the six 12mm bolts securing the carbs to the intake manifold. These bolts can be very tricky to get out due to a lack of clearance in the hull. A good tool for this job is a 12mm wrench cut in half.

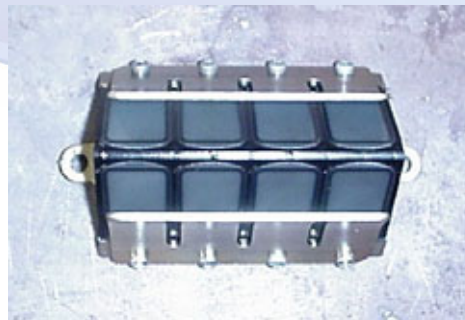


2.9 (Above) Remove the 16 12mm bolts securing the intake manifold to the case. Remove the manifold from the hull.

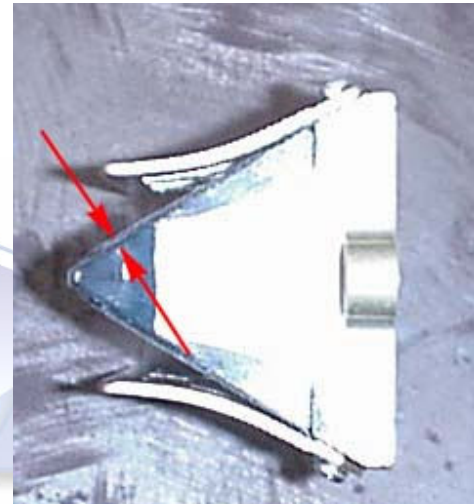
2.10 (Below) Remove the six screws securing the reeds to the intake manifold.



2.11 (Below) Inspect each reed assembly for damage and wear. Look at each reed petal and inspect the edges for signs of cracking, chipping or any missing parts. If any damage is present, replace the petals.



2.12 (Below) Look at each petal-to-cage surface and check for gap. If a gap of more than 0.015" is present, replace the petals.



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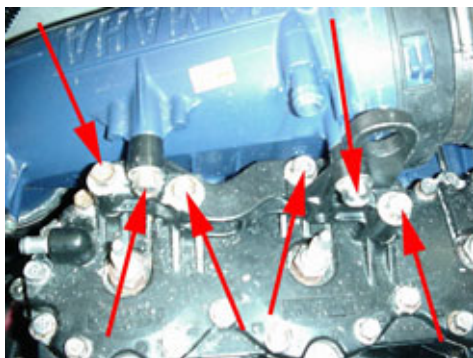
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## Step 3

### Exhaust Removal

3.1 (Below) Remove the six 14mm bolts from the exhaust brace.



3.2 (Below) Remove the two 10mm bolts from the temperature sensor mount and remove the sensor.



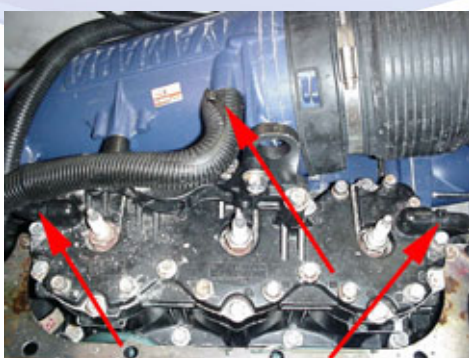
3.3 (Below) Detach the pipe exit line from the fitting.



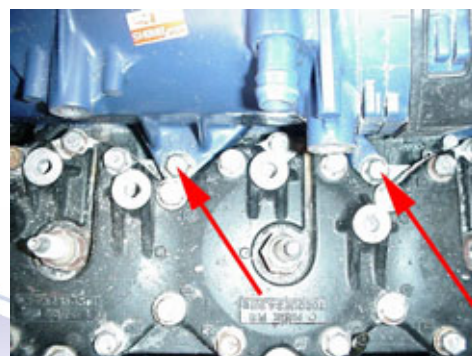
3.4 (Below) Loosen the waterbox coupler with a screwdriver and pry off the rubber fitting from the stinger pipe.



3.5 (Below) Remove the head and pipe water cooling lines.



3.6 (Below) Remove the two 12mm bolts securing the stinger pipe to the head.

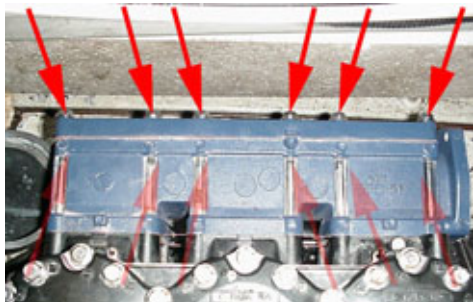


3.7 (Above) Using a 12mm socket, remove the four 12mm bolts securing the exhaust pipe to the exhaust manifold. Wiggle the pipe towards the front of the boat and pull it up and out of the hull.

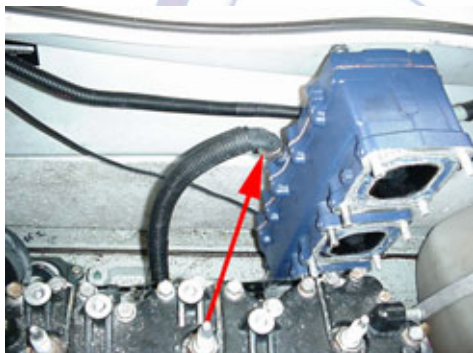
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3.8 (Below) Remove the 12 12mm bolts from the exhaust manifold. NOTE: the bottom row of bolts does not need to come out.



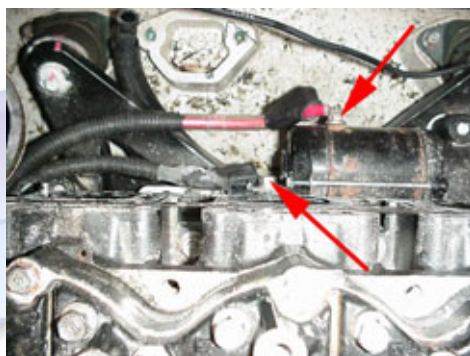
3.9 (Below) Tilt the exhaust manifold on its side and remove the cooling line with a screwdriver.



## Step 4

### Engine Removal

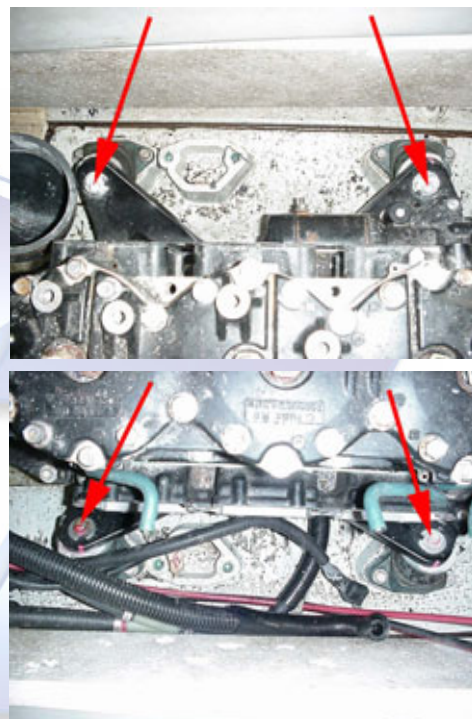
4.1 (Below) Using a 10mm socket and a 8mm socket, remove the block electrical ground and starter wires.



4.2 (Below) Remove the two 10mm bolts securing the PTO coupler cover and remove the cover.



4.3 (Below) Remove the four 12mm motor mount bolts. If you are unable to break any of them free, you can also remove the two respective bolts securing the mount to the hull.



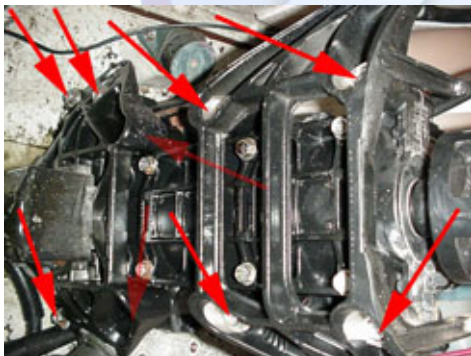
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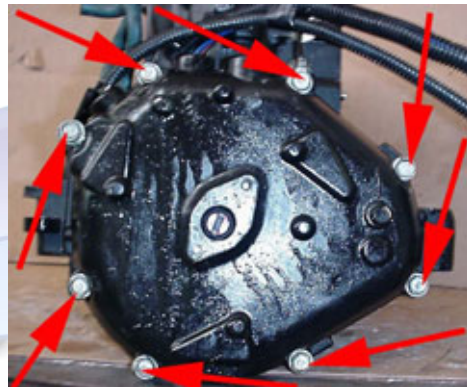
4.4 (Below) If you have a Venture or XL hull, and any of the mounts do not come off the saddles, you must remove the saddles while the engine is still in the hull. Tilt the engine towards the front of the boat, exposing the nine engine support plate bolts.



4.5 (Below) Remove them with a 14mm socket and remove the supports.



4.6 (Below) Tilt the engine over on its other side to gain access to the flywheel cover bolts. Remove the eight 10mm bolts securing the flywheel housing cover and remove it with the stator and wires. Set it aside out of the hull.



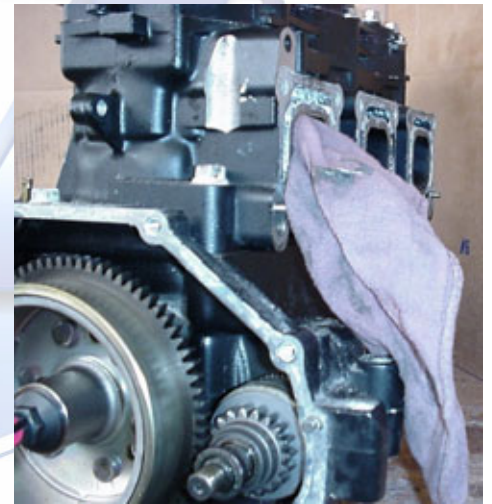
The engine may now be removed from the hull.

## Step 6

### Accessory Removal

With the engine on the ground, workbench or some other solid surface, begin removing the external accessories that will NOT be shipped with the core.

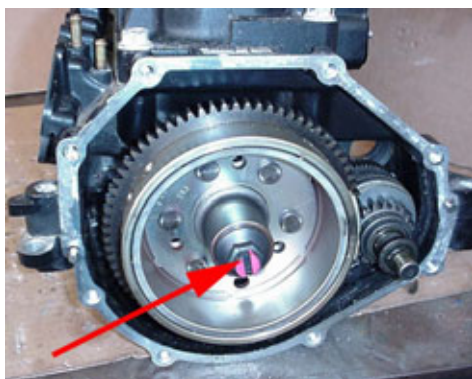
5.1 (Below) Stuff a rag into one of the exhaust ports. Make sure the rag penetrates through the port, into the combustion chamber on top of the piston. This will prevent the engine from turning over while you remove the flywheel nut & PTO coupler.



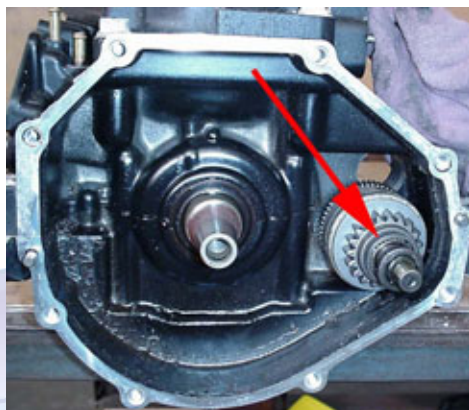
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5.2 (Right) Remove the flywheel nut with a 17mm socket.



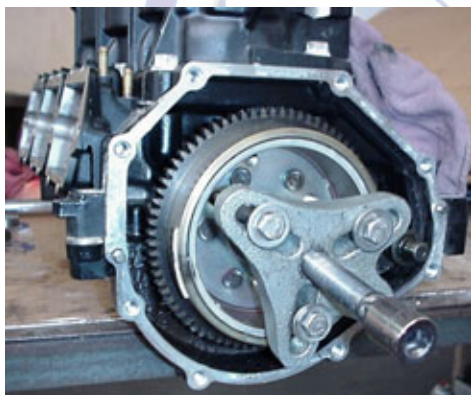
5.4 (Below) Pull the starter bendix out of the housing.



5.7 (Below) Using a breaker bar or chain wrench, remove the PTO flywheel from the crank.



5.3 (Below) Use a universal flywheel puller to remove the flywheel from the shaft. Do not ship the flywheel key to SBT.



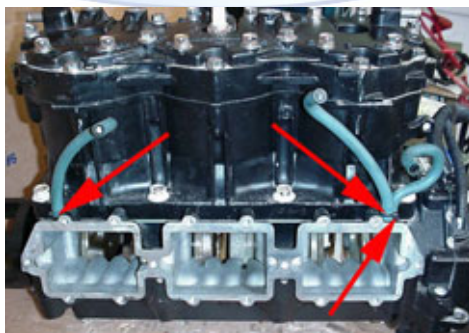
5.5 (Below) Remove the remaining 10mm bolt from the starter and pull it back out of the flywheel housing.



5.8 (Below) Remove the spark plugs, and with all the external accessories removed, the engine is now ready to be shipped to SBT!



5.6 (Below) Remove the pulse lines from the case.



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## **Engine Installation**

### **Oil Injection**

It is SBT's recommendation that the oil injection pump be disabled, and block-off plate(s) be installed prior to use of the new engine in your ski. This is only recommended to insure reliable lubrication and extended engine life for all our customer's PWCs. Re-use of your functioning oil injection pump, if so equipped, does not void your warranty.

### **Paper Gaskets**

It is SBT's recommendation that all paper gaskets be treated with Loctite® High-Tack Gasket Sealer prior to installation. Read and follow all instructions on the product canister to insure good gasket sealing on your new engine.

### **Special Gaskets**

It is SBT's recommendation that all exhaust gaskets be sealed with Loctite® Copper Gasket Adhesive prior to installation. Read and follow all instructions on the product canister to insure good gasket sealing on your new engine.

### **Bolts**

It is SBT's recommendation that all bolts be treated with Loctite® Medium Strength Threadlocker Blue (242) during assembly.

### **Break-In Oil**

It is SBT's requirement that the new engine be broken-in with additional oil in the fuel supply for the first tank. Follow the mixing chart on the back of the bottle to determine quantity needed.

### **Electrical Connections**

It is SBT's recommendation that all electrical connections be sanded, cleaned and secured during the assembly process. It is a common problem to not have solid connections due to corrosion, paint, poor wire condition, etc.

### **Disclaimer**

While every precaution has been taken in the preparation of these guides, SBT assumes no responsibility for errors or omissions. Neither is any Liability assumed for damages resulting from use of the information contained herein. Publication of the procedures in these guides does not imply approval of the manufacturers of the products covered. Persons engaging in the procedures herein do so at their own risk.

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Follow the removal steps in reverse order to install your new SBT short block assembly:

**5.8** Install new spark plugs.

**5.7** Insert a rag into an open exhaust port. Install the PTO coupler.

- Torque to 27 ft. lbs.

**5.6** Install the pulse line hoses on the case.

**5.5** Install the starter and the bottom bolt.

- Torque to 17 ft. lbs.

**5.1 -5.4** Insert the starter bendix into the housing. Place the flywheel key into the shaft slot and install the flywheel.

- Torque to 50 ft. lbs.

If you did not need to remove the engine mounts from the hull, you may now re-install the engine support plates.

- Torque to 12 ft. lbs.

**4.6** Spin the engine mount nuts onto the studs, and rock the mounts back & forth with your hands; try to break them. If any mount(s) fails, replace it before installing the new engine. Place the engine in the hull, PTO side down. It is SBT's recommendation that the oil pump be left off the new engine, and a block-off plate be installed at this time. Using a new gasket, install the flywheel cover.

- Torque to 11 ft. lbs.

**4.5** Install the engine support plates, if not done so already.

- Torque to:17 ft. lbs.

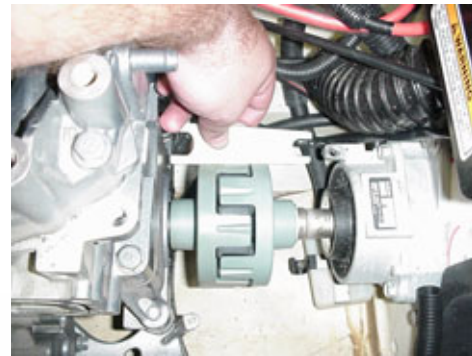
**4.4** Install the engine mounts to the hull if needed.

- Torque to 12 ft. lbs.

**4.3** Install the motor mount bolts if needed.

- Torque to 12 ft. lbs.

Your new engine may require re-shimming. Shims are necessary between the engine mounts and brackets to properly align the engine and pump shafts. If you do not have enough factory shims with your hull, very thin, wide washers may be substituted.



Take a small straight edge and place it on the coupler. You are looking for an even match all the way around the coupler. Place shims where necessary to align the couplers.

**4.2** Install the PTO coupler shield.

- Torque to 4 ft. lbs.

**4.1** Install the starter positive and block ground wires.

- Torque to 3.6 ft. lbs.

**3.9** Place the exhaust manifold in the hull and re-attach the cooling line.

**3.8** Using a new gasket, bolt the exhaust manifold to the case.

- Torque to 29 ft. lbs.

**3.7** Install the exhaust pipe to the manifold.

- Torque to 29 ft. lbs.



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**3.6** Attach the stinger pipe to the head.

- Torque to 22 ft. lbs.

**3.5** Install the pipe and head cooling lines.

**3.4** Re-attach the waterbox coupler.

**3.3** Re-attach the pipe water exit line.

**3.2** Install the temp sensor.

- Torque to 11 ft. lbs.

**3.1** Install the exhaust brace.

- Torque to 29 ft. lbs.

**2.10 – 2.12** Using new gaskets, install the reed cage assemblies to the intake manifold.

- Torque to 6.5 ft. lbs.

**2.9** Attach the intake manifold to the case.

- Torque to 6.5 ft. lbs.

**2.8 – 2.7** Using new gaskets, re-install the carburetors. Re-attach the fuel and pulse lines.

**2.6** Re-attach the oil pump, throttle and choke cables to the carb brace. Secure the brace.

- Torque to 5.8 ft. lbs.

**2.5** Install the carburetor brace and its two grease fittings.

**2.4** Install the flame arrestor base and three oil lines.

- Torque to 5.8 ft. lbs.

**2.3** Install the velocity stacks.

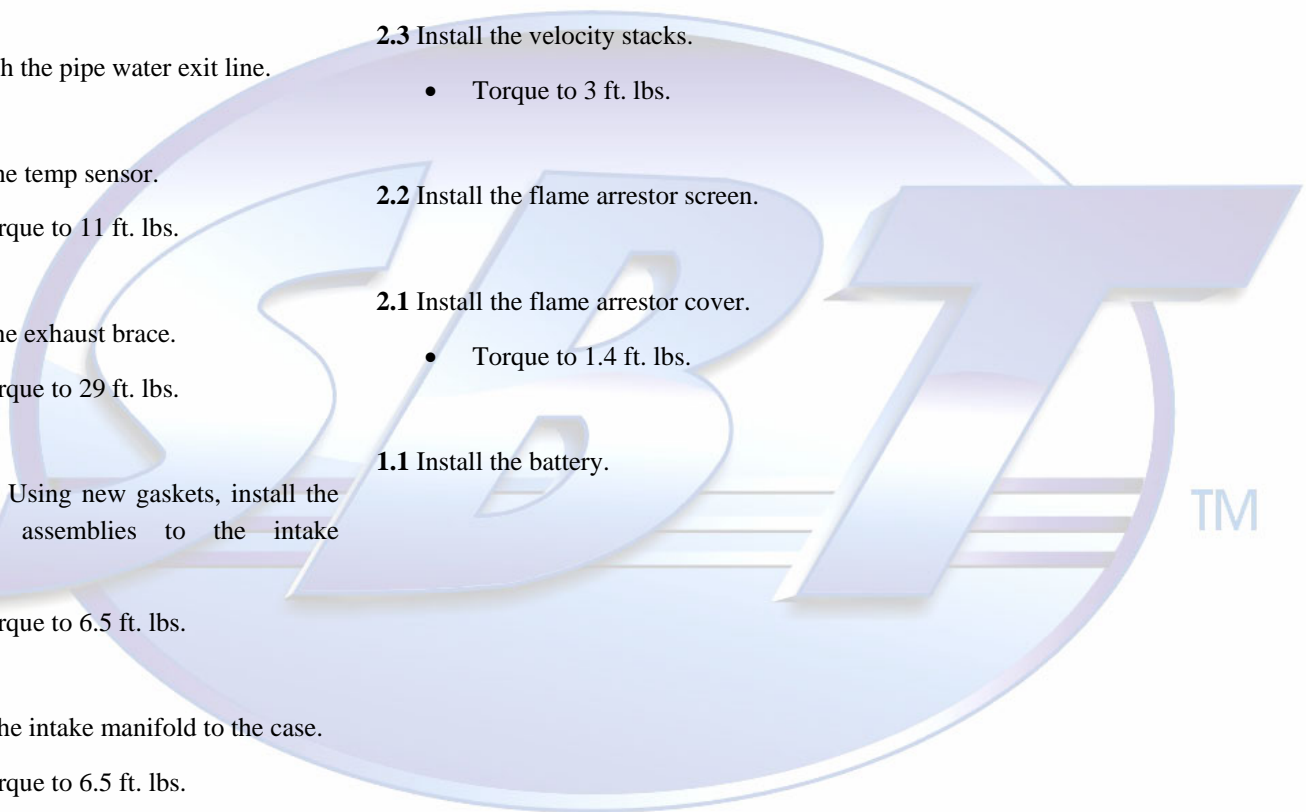
- Torque to 3 ft. lbs.

**2.2** Install the flame arrestor screen.

**2.1** Install the flame arrestor cover.

- Torque to 1.4 ft. lbs.

**1.1** Install the battery.



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## **Tools Needed:**

### **Sockets**

- 8mm
- 10mm
- 12mm
- 14mm
- 17mm

### **Sealers / Lubricants**

- Loctite® Copper Gasket Treatment
- Loctite® Medium Threadlocker (Blue)
- Loctite® High-Tach Gasket Treatment
- SBT Break-In Oil

### **Misc.**

- Ratchet
- Long socket extension
- Short socket extension
- Screwdrivers

### **Parts**

- Installation Gasket Kit

### **Wrenches**

- Torque wrench
- 10mm
- 12mm
- Chain wrench

