

Engine Removal / Installation

Sea-Doo 800

Step 1

Battery Removal

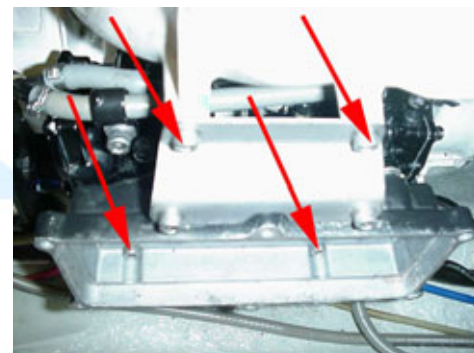


2.1 (Above) Remove the two retaining straps, disconnect the battery and remove it from the hull. Disconnect the negative (black) cable first, then the positive (red).

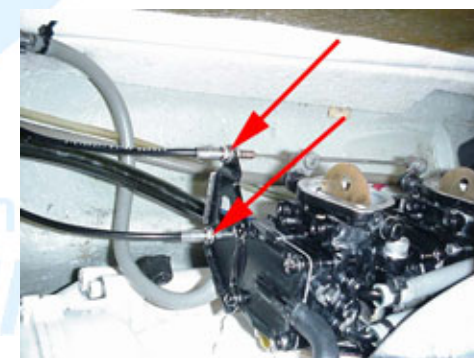
2.2 (Below) Remove the air silencer cover by sliding the 6 tabs off and pulling the cover up and out.



2.4 (Below) Remove the four bolts securing the flame arrestor base to the carbs, and the two bolts securing the carb brace to the block. Remove the base.



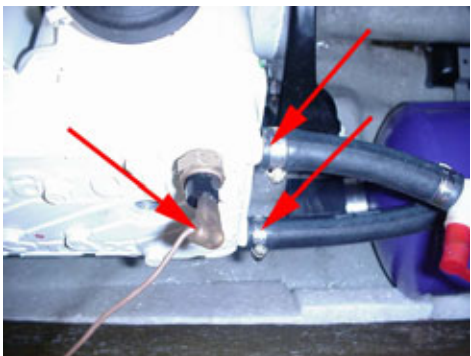
2.5 (Below) Remove the throttle, choke and oil pump cables from the carbs with a 10mm wrench.



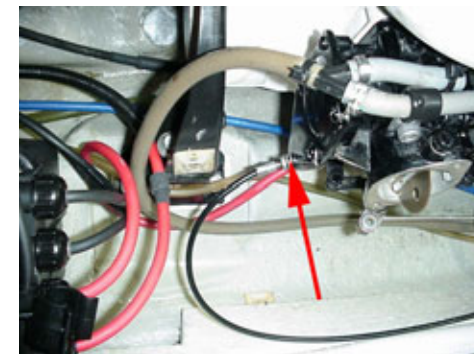
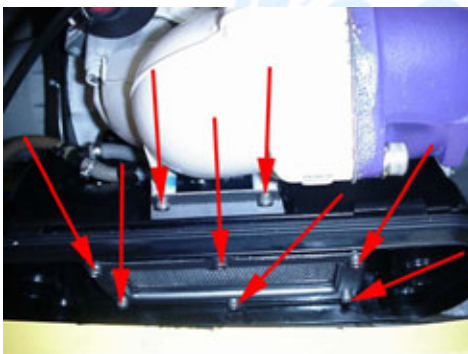
Step 2

Intake Removal

2.1 (Below) Disconnect the head temp sensor wire, and head cooling lines. Disconnect the spark plug wires from the plugs.



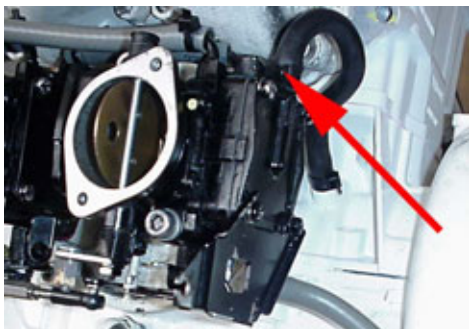
2.3 (Below) Remove the six allen head bolts from the flame arrestor bracket. Remove the bracket, air silencer base and flame arrestor.



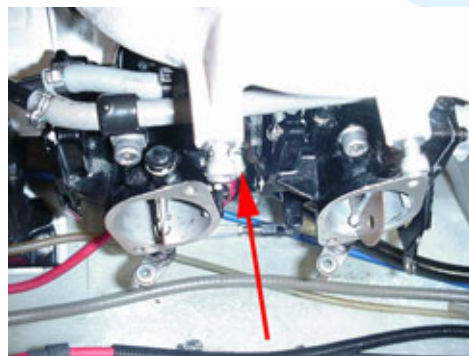
Engine Removal / Installation

Sea-Doo 800

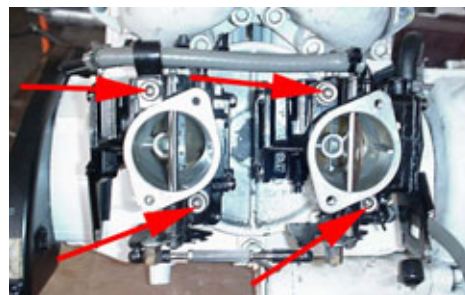
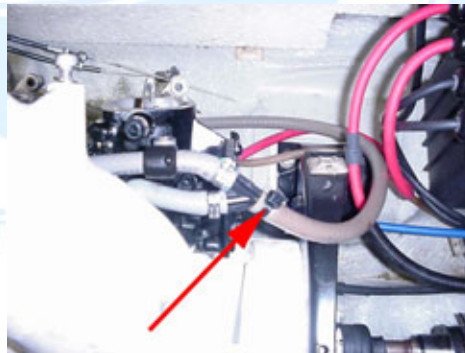
2.6 (Below) Remove the pulse line from the block.



2.7 (Below) There are two oil lines running from the oil tank to the case. These provide oil to the oil bath inside the case. Loosen the clamps and pull both lines from the case. Don't worry about spilled oil, you will inevitably lose the oil in the case. Zip-tie the two lines anywhere above the tank level so the oil will not drain out.

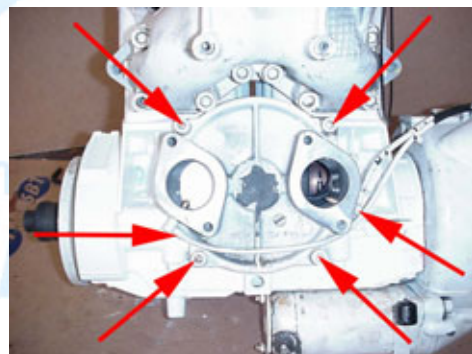
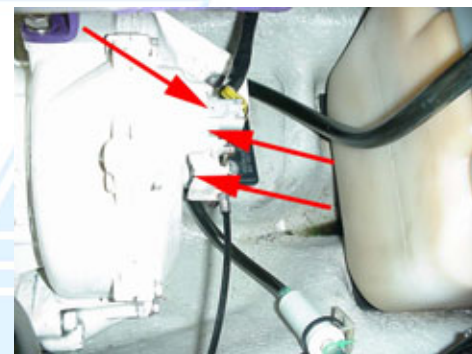


2.8 (Below) Loosen the gas tank cap to relieve pressure. Disconnect the fuel supply and return lines. Be sure the fuel switch is turned to the "OFF" position, and be aware of any fuel that may spill from the hoses. Make sure the hull is clear of any gasoline fumes before continuing work, especially with power tools.



2.9 (Above) Remove the four bolts securing the carbs to the rotary valve cover and remove the carbs.

2.10 (Right) Remove the oil injector lines going to the rotary valve cover. Remove the four bolts securing the cover. Remove it and the rotary valve below. Remove the two 10mm bolts from the oil pump. Remove the pump and plastic driveshaft. 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. Block off plugs are shown.



Engine Removal / Installation

Sea-Doo 800

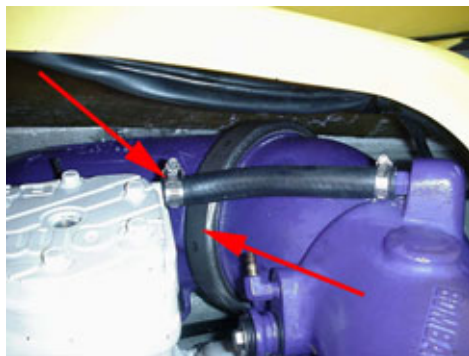
Step 3

Exhaust Removal

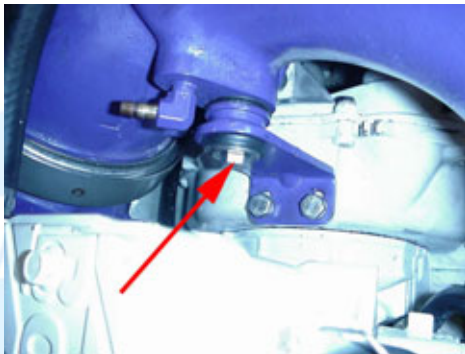
3.1 (Below) Loosen the clamp and disengage the waterbox from the stinger pipe.



3.2 (Below) Disconnect the waterlines coming from the pipe and from the head. Remove the clamp by loosening it with a 13mm socket.



3.3 (Below) Remove the 13mm bolt from the header pipe, and the two 13mm bolts securing the brace to the flywheel housing. Remove the brace.



3.4 (Below) Remove the three 8mm Allen bolts and one 17mm nut from the exhaust header pipe. Loosen and remove the head pipe.



3.5 (Below) Remove the two 8mm Allen bolts securing the stinger pipe to the block. Remove the stinger pipe by moving the front electrical box out of the way, and sliding the pipe forward through and out the front hood cavity. Remove the two water lines on the T-fitting, found under the stinger pipe mounting point.



Engine Removal / Installation

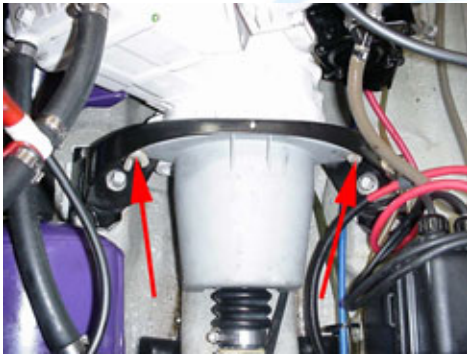
Sea-Doo 800

Step 4

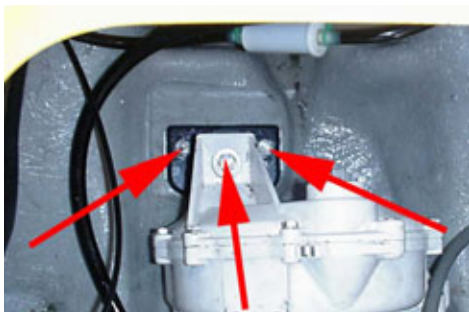
Engine Removal

4.1 Disconnect the flywheel electrical harness. **NOTE: DO NOT CUT THE WIRES.**

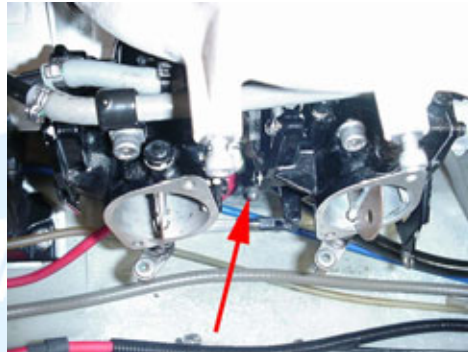
4.2 (Below) Remove the two wing nuts and remove the PTO flywheel shield.



4.3 (Below) Remove the front engine mount bolt and two bolts securing the mount to the hull with a 13mm socket.



4.4 (Below) Remove the starter wire with a 10mm socket.

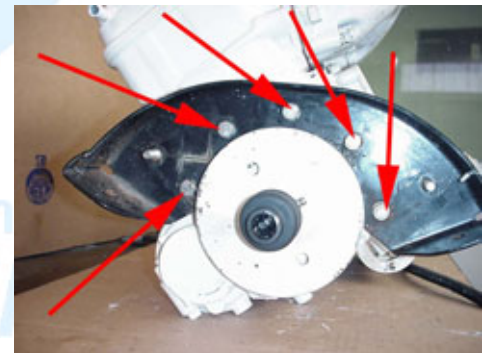


4.5 Remove the two rear engine mount bolts with a 13mm socket. Loosen the clamp around the driveshaft at the PTO and slide the engine approximately 4" forward to clear the driveshaft. **NOTE:** There are two rubber bumpers on either end of the driveshaft. Make sure you don't lose them, and make sure to replace them, if removed. If possible, have someone hold the driveshaft while you slide the engine to prevent the impeller side bumper from disengaging. Lift the engine out of the hull.

5.2 (Below) Remove the two water fittings and two oil fittings on either side of the hull.



5.3 (Below) Remove the five 13mm bolts from the engine support and remove it.



Step 5

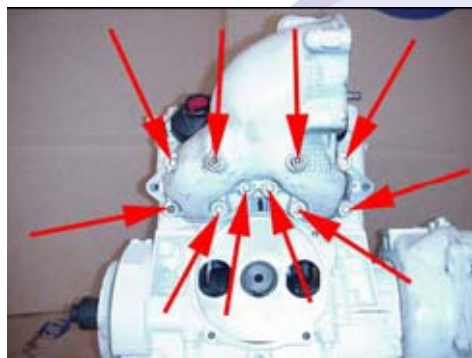
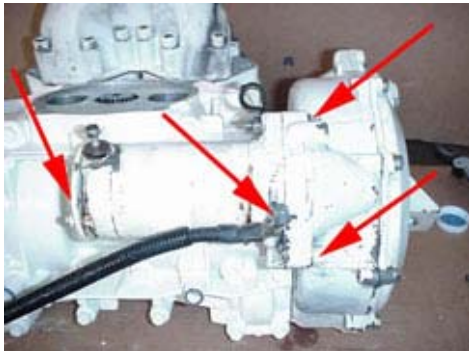
Accessory Removal

5.1 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.

Engine Removal / Installation

Sea-Doo 800

5.4 (Below) Remove the 13mm bolt and remove the ground wire. Remove the three Allen bolts from the starter and remove it.



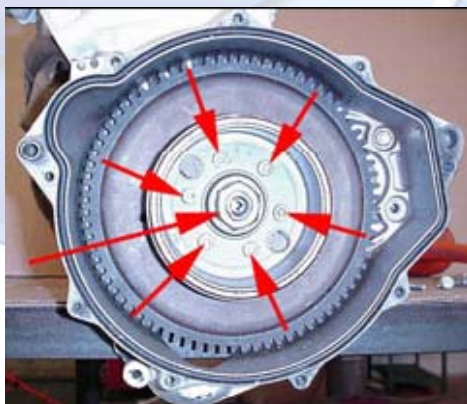
5.5 (Above) Remove the 10 8mm Allen Bolts and the exhaust manifold.

5.6 (Below) Remove the nine 10mm bolts from the Flywheel cover and remove it.



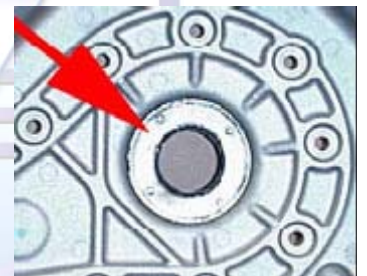
5.7 (Above) Stuff a rag into one of the exhaust ports. Make sure the rag penetrates through the port, into the combustion chamber on top of the piston. This will prevent the engine from turning over while you remove the flywheel nut & PTO coupler.

5.8 Remove 3 of the 6 bolts holding the magnet cup to the flywheel (every other bolt, not 3 in a row). **DO NOT REMOVE THE MAGNET CUP FROM THE FLYWHEEL; IT IS TIMED TO ITS LOCATION.** Use a 27mm socket and remove the nut holding the flywheel to the crankshaft.



5.9 Install a universal flywheel puller into the exposed threaded holes in the magneto cup and remove assembly.

5.10 (Below) Remove the ten 13mm bolts securing the flywheel housing to the block, and remove it. Tap out the front oil seal and replace with a new one.



Engine Removal / Installation

Sea-Doo 800

5.11 (Below) Remove the rubber boot from the PTO flywheel and use a pipe wrench to remove it. NOTE: take care not to damage the grease fitting. It can be removed if necessary with a 7mm socket. Remove the rag.



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



Engine Removal / Installation

Sea-Doo 800

Insert

Rotary Assembly

Before re-assembly of your new SBT engine, your rotary valve and cover must be inspected and re-timed.

(Below) Examine the surface of the valve cover. It is imperative that there not be any grooves, holes, cuts, etc. in the cover, especially any that connect between the two ports. If there is anything but minor surface scratching, the surface must be machined, or the cover replaced. For minor scratches, 400 grit wet sand paper can be used to flatten the surface.



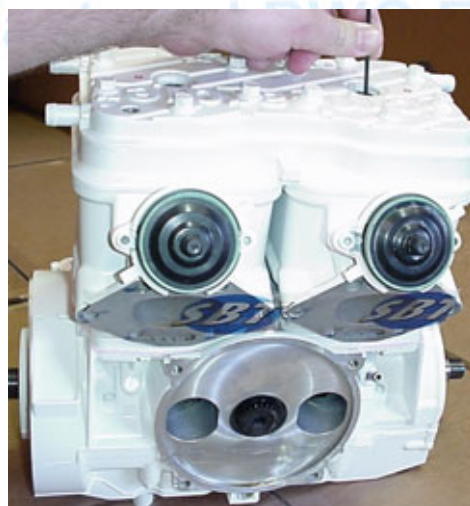
Examine the rotary valve itself. It must also be free of any imperfections. It must not have any pitting, holes, scratches, dings, dents, bends, etc. If any of these are present you **MUST** replace the valve. We recommend the use of **ONLY** OEM valves.

Timing

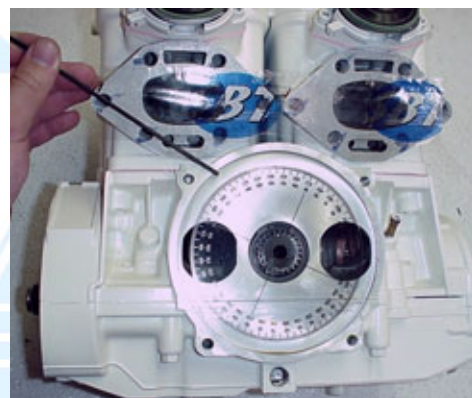
Before re-assembly, your valve must be re-timed. To do so requires a degree wheel, and the specifications for your particular engine.

Year, Model	Opening BTDC \pm 5°
'90-'93 SP, '91 GT, '91 XP, '92-'93 GTS, '93 SPi	115
'92 GTX, '92 XP	129
'88, '89, '94+ SP, '90 GT, '93 SPX, '93GTX, '93 XP	130
'94+ SPX, '94+ XP, '94+ GTX	147

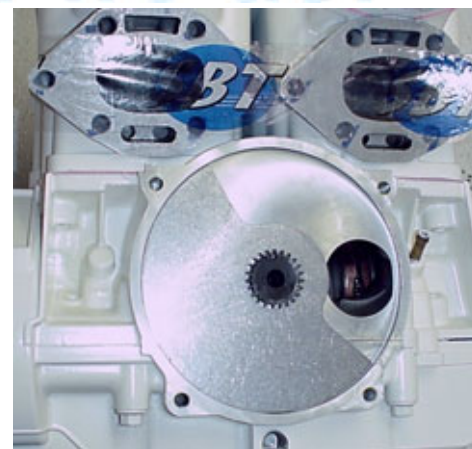
(Below) Place a screwdriver, or use a TDC gauge in the front (MAG) cylinder through the spark plug hole. Turn the crankshaft to find Top Dead Center of this piston.



(Below) Place a degree wheel over the rotary valve gear, aligning the 0°/360° mark at the bottom of the front (MAG) port. Using the timing spec guide, mark the opening degree on the case according to the timing wheel. **NOTE:** do not automatically use the notch on the case to time by.



(Below) Align the rotary valve as shown, so that the port is open, and the edge of the valve matches as precisely as possible with the mark. **NOTE:** the valve is asymmetrical. Flip it around to find the closest match.



Engine Removal / Installation

Sea-Doo 800

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.

Engine Removal / Installation

Sea-Doo 800

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

5.11-5.12 Stuff a rag into an exhaust port to stop the engine from turning. Install the PTO Flywheel.

- Torque to 81 ft. lbs.

5.10 Using a new gasket, install the flywheel housing.

- Torque to 4 ft. lbs.

5.9 Install the flywheel.

5.8 Install the magneto rotor and flywheel nut, making sure to properly align the flywheel key.

- Torque to 77 ft. lbs.

5.7-5.6 Using a new o-ring, install the flywheel outer cover.

- Torque to 80 in. lbs.

5.5 Using a new gasket, install the exhaust manifold.

- Torque to 17 ft. lbs.

5.4 Using a new o-ring, install the starter.

- Torque to 16 ft. lbs.

5.3 Install the engine support.

- Torque to 26 ft. lbs.

5.2 Install the water and oil fittings to the block. The smaller, water fittings need to point towards each other, and the oil fittings need to point towards the front of the engine.

4.5 Spin the engine mount bolts into the mounts, 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. Lift the engine into the hull, forward of its mounting position. Slide it back onto the driveshaft. Tighten the boot and clamp.

4.4 Install the starter wire and nut.

- Torque to 62 in. lbs.

4.3 Install the front engine mount and shims.

- Torque to 18 ft. lbs.

4.2 Install the PTO shield.

4.1 Connect the flywheel electrical harness to the flywheel housing.

3.5 Connect the two water lines with the T-fitting to the block. Connect the two oil bath lines to the block. Slide the stinger pipe into place and secure the bolts.

3.4 Using a new gasket, install the exhaust header pipe.

- Torque to 30 ft. lbs.

3.3 Install the exhaust brace.

- Torque to 18 ft. lbs.

3.2 Install the copper o-ring, coated with fresh Loctite Copper Gasket Sealer, and install the clamp. Re-attach the water lines.

3.1 Re-attach the waterbox to the coupler and tighten the clamps.

2.10 Install the oil pump driveshaft. Using a new o-ring, install the oil pump. Open the bleed screw and allow the line to bleed for at least one minute to remove air pockets. Re-attach the oil lines. Using a new o-ring, install the rotary valve cover.

- Torque to 18 ft. lbs.

2.9 Using new gaskets, install the carbs onto the rotary valve cover.

- Torque to 16 ft. lbs.

2.7-2.8 Re-attach the carb fuel and pulse lines.

2.5 Re-attach the throttle, choke and oil pump lines to the carbs.

Engine Removal / Installation

Sea-Doo 800

2.4 Install the flame arrestor base and brace.

- Torque to 88 in. lbs.

2.3 Install the flame arrestor, top bracket and air silencer base.

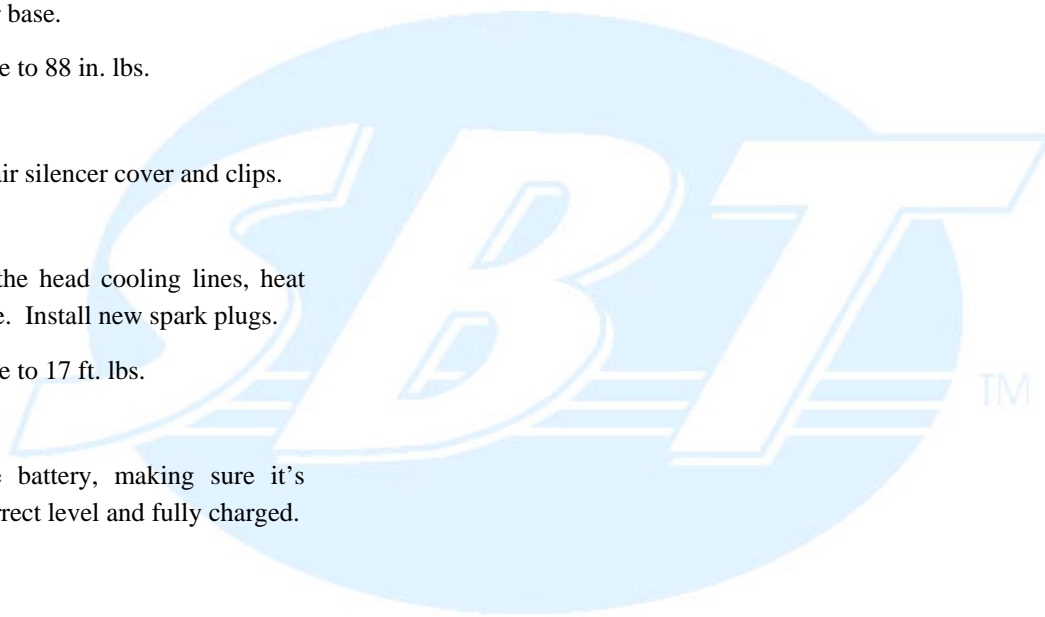
- Torque to 88 in. lbs.

2.2 Install the air silencer cover and clips.

2.1 Re-attach the head cooling lines, heat sensor and wire. Install new spark plugs.

- Torque to 17 ft. lbs.

1.1 Install the battery, making sure it's filled to the correct level and fully charged.



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Tools Needed:

Sockets

- 27 mm
- 13mm
- 10mm

Misc.

- Ratchet
- Long socket extension
- Short socket extension
- Screwdrivers
- Universal flywheel puller
(Available at most major auto parts stores for rent/lend/purchase)

Sealers / Lubricants

- Loctite® Copper Gasket Adhesive
- Loctite® 2 Gasket Sealer
- Loctite® Medium Threadlocker (Blue) 242
- Loctite® High-Tach
- SBT Break-In Oil

Parts

- External Gasket Kit
- Zip-ties

Wrenches

- 17mm
- 13mm
- 10mm
- Torque wrench
- Pipe wrench
- Allen wrenches

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