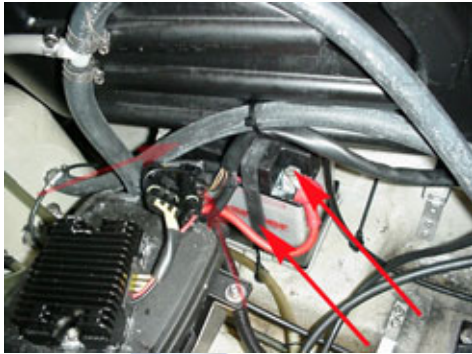


# Engine Removal / Installation

Sea-Doo 800 RFI

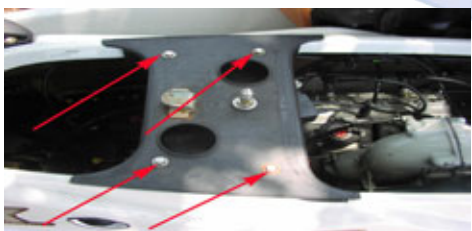
## Step 1

### Battery and Seat Brace 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).

1.2 (Below) (GTX HULL) Remove the 4 bolts securing the seat brace with a 10mm socket. Disconnect the spark plug wires. Disconnect the two quick connects to the coil. Remove the seat brace.



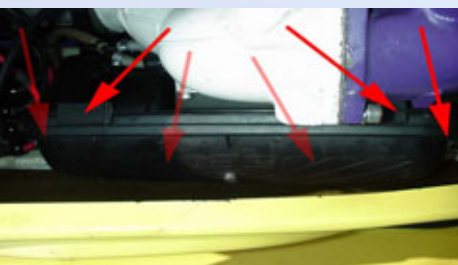
## Step 2

### Intake Removal

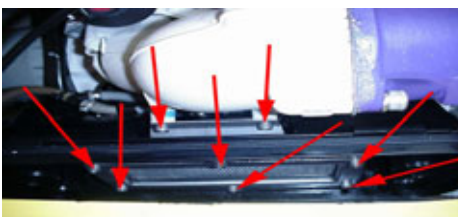
2.1 (Below) Disconnect the head temp sensor wire, head cooling lines, and the lines to the rave valves.



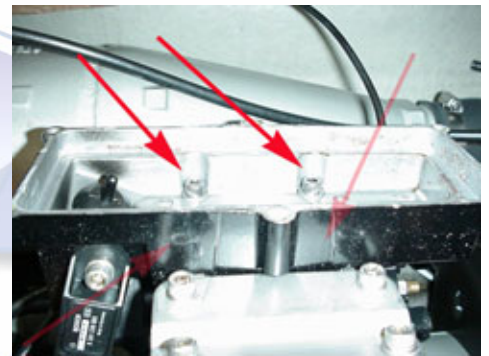
2.2 (Below) Remove the air silencer cover by sliding the 6 tabs off and pulling the cover up and out.



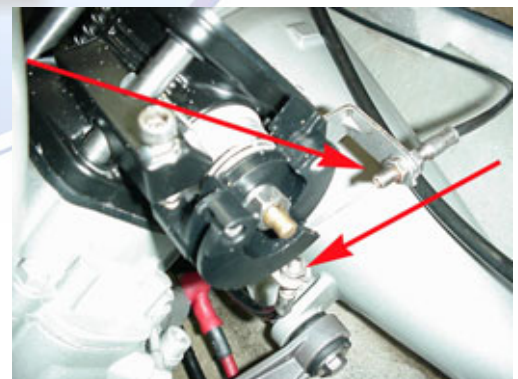
2.3 (Below) Remove the six allen head bolts from the flame arrestor bracket. Remove the bracket, air silencer base and flame arrestor. Remove the two allen head bolts from the head pipe brace.



2.4 (Below) Remove the four bolts securing the flame arrestor base to the throttle body. Remove the base.



2.5 (Below) Remove the throttle and oil pump cables from the throttle body with a 10mm wrench. Remove the three quick connects from the sensors on the throttle body.

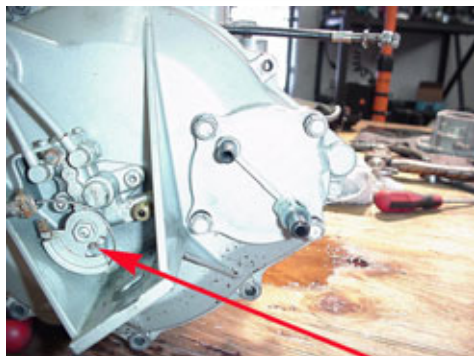
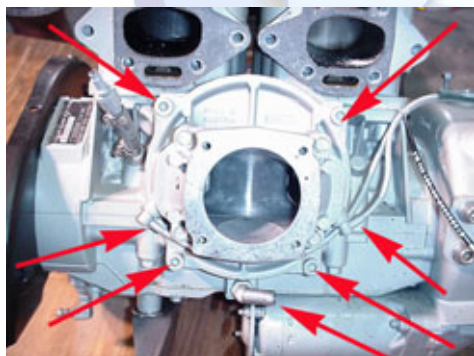


# Engine Removal / Installation

## Sea-Doo 800 RFI

2.6 Remove the four 6mm allen head bolts securing the throttle body.

2.7 (Below) There are two oil lines running from the oil tank to the case and oil pump. These provide oil to the oil bath inside the case. Loosen the clamps and pull the 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. 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.



2.8 (Below) Loosen the gas tank cap to relieve pressure. Disconnect the fuel supply line. Be aware of any fuel that may spill from the hose. Make sure the hull is clear of any gasoline fumes before continuing work, especially with power tools.



## Step 3

### Exhaust Removal

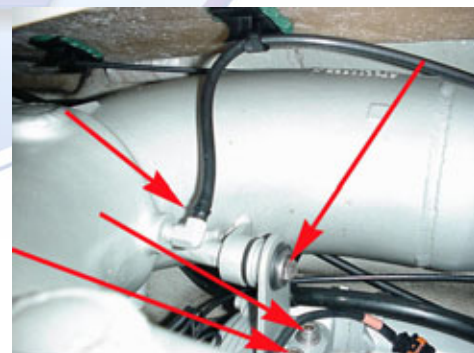
3.1 (Below) Loosen the clamp and disengage the waterbox from the stinger pipe.



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



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. Disconnect the water line from the header pipe.





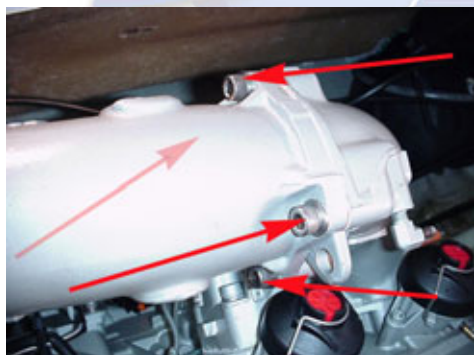
# Engine Removal / Installation

Sea-Doo 800 RFI

3.4 (Below) Remove the 13mm bolt from the header pipe securing the pipe to the case of the engine.



3.5 (Below) Remove the four 8mm Allen bolts from the exhaust header pipe. Loosen and remove the head pipe. Remove the two water lines on the T-fitting, found under the stinger pipe mounting point.



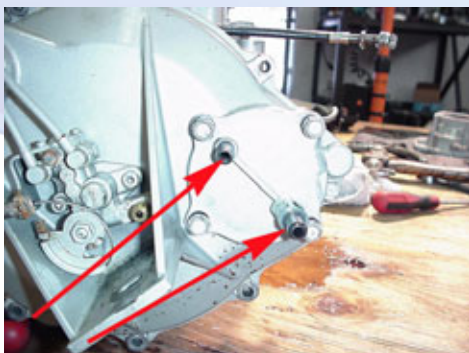
## Step 4

### Engine Removal

4.1 Disconnect the flywheel electrical harness using the quick connect. Disconnect the crank position sensor using a 10mm socket. **NOTE: DO NOT CUT THE WIRES.**



4.2 (Below) Remove the two cooling lines on the flywheel cover



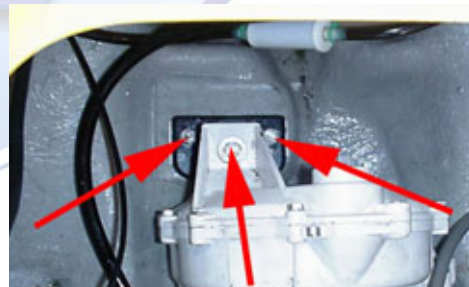
4.3 (Below) Remove the ground cable from the case using a 12mm socket.



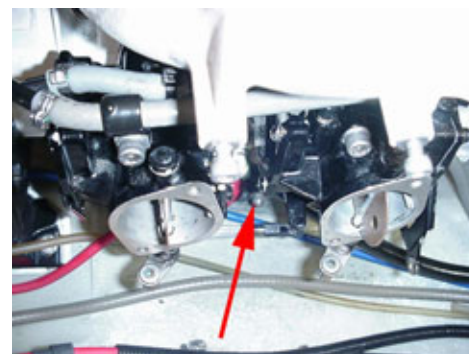
4.4 (Below) Remove the two wing nuts and remove the PTO flywheel shield.



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



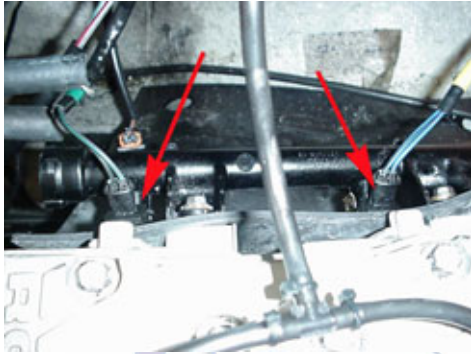
4.6 (Below) Remove the starter wire with a 10mm socket.



# Engine Removal / Installation

Sea-Doo 800 RFI

4.7 (Below) Disconnect the two electrical connections from the fuel rail.



4.8 (Below) Remove the cooling line and air intake line.



4.9 (Below) 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.

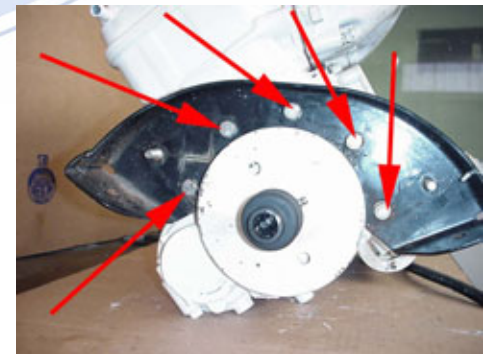


## Step 5

### 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.

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



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



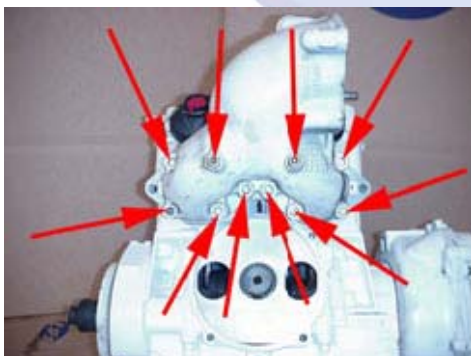
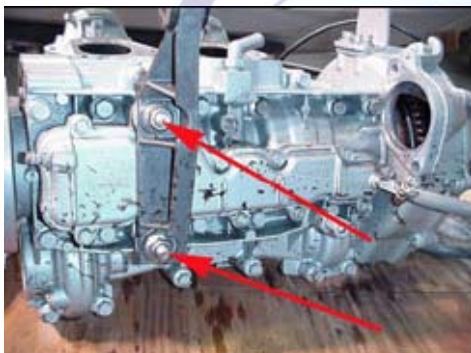
# Engine Removal / Installation

## Sea-Doo 800 RFI

5.4 (Below) Remove the two 10mm bolts securing the fuel rail to the cylinders. Remove the rail and carefully remove the fuel injectors.

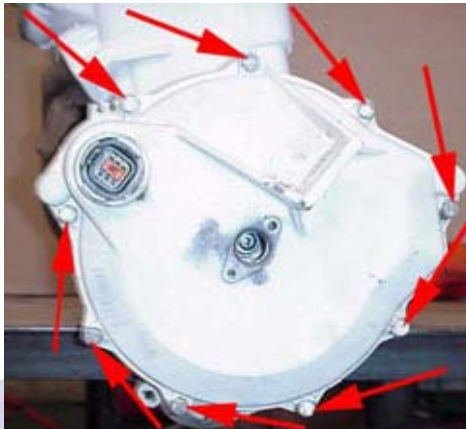


5.5 (Below) Remove the two 14mm bolts securing the head pipe support to the case. Remove the support.



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

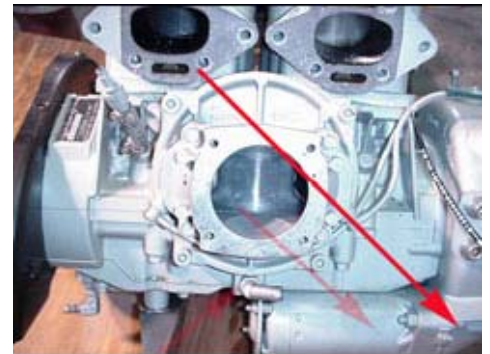
5.6 (Below) Remove the nine 10mm bolts from the Flywheel cover and remove it.



5.7 (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.



5.8 (Below) Remove the three allen head bolts securing the starter. Remove the Starter.



5.9 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.

# Engine Removal / Installation

## Sea-Doo 800 RFI

5.10 (Below) Use a universal flywheel puller to remove the flywheel.



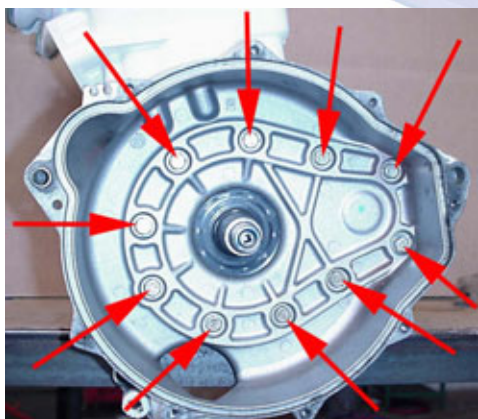
5.12 (Below) Remove the rubber boot from the PTO flywheel and use a pipe wrench to remove it. NOTE: take care not to damage the grease fitting. It can be removed if necessary with a 7mm socket. Remove the rag.



5.11 (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.



5.13 (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 RFI

## 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 groves, 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

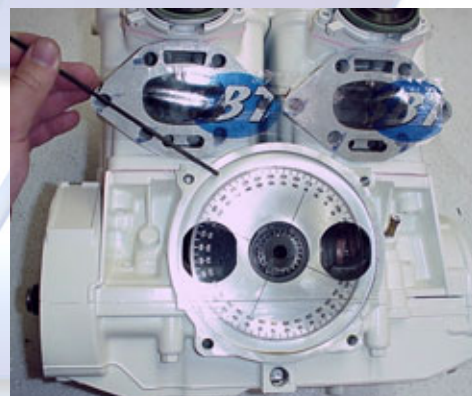
Before re-assembly, your valve must be re-timed. To do so requires a degree wheel, and the specifications for your particular engine.

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, 99+GTX RFI, 99+ GSX RFI	147

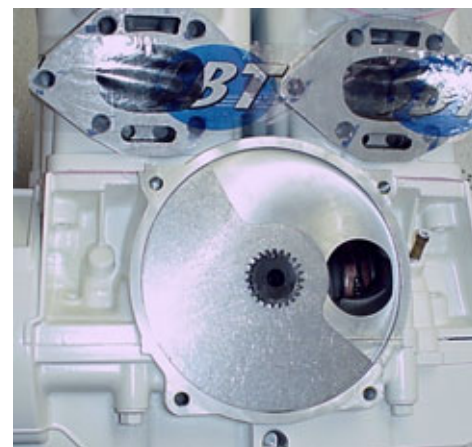
(Below) Place a screwdriver, or use a TDC gauge in the front (MAG) cylinder through the spark plug hole. Turn the crankshaft to find Top Dead Center of this piston.



(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 RFI*

## **Engine Installation**

**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.

## **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.

TM



# Engine Removal / Installation

## Sea-Doo 800 RFI

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

**5.11** Using a new gasket, install the flywheel housing.

- Torque to 4 ft. lbs.

**5.10** Install the flywheel.

**5.8** Install the starter.

- Torque to 26 ft. lbs.

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

- Torque to 77 ft. lbs.

**5.7** Stuff a rag into an exhaust port to stop the engine from turning. Install the PTO Flywheel.

- Torque to 81 ft. lbs.

**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** Install the fuel injectors. Install the fuel rail.

- Torque to 60 in. 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.

**4.8** Connect the cooling line to the bottom case cooler. Connect the air intake line.

**4.7** Connect the electrical connectors to the fuel rail.

**4.6** Install the starter wire and nut.

- Torque to 62 in. lbs.

**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 it's mounting position. Slide it back onto the driveshaft. Tighten the boot and clamp. Install the front engine mount and shims.

- Torque to 18 ft. lbs.

**4.4** Install the PTO shield.

**4.3** Install the ground cable to the case

- Torque to 80in. lbs.

**4.2** Install the cooling lines to the flywheel cover

**4.1** Connect the flywheel electrical harness to the flywheel housing.

**3.5** Using a new gasket, install the exhaust header pipe. Connect the two water lines with the T-fitting to the block. Connect the two oil bath lines to the block.

- Torque to 30 ft. lbs.

**3.3** Install the exhaust brace.

- Torque to 18 ft. lbs.

**3.2** Connect the cooling line from the head

to the header pipe.

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

**2.8** Reconnect the fuel supply line

**2.7** Reconnect the two oil lines to the case and oil line to the oil pump. Using the bleeder screw, bleed the oil pump.

**2.6** Using new gaskets, install the throttle body onto the rotary valve cover

- Torque to 16 ft. lbs.

**2.5** Re-attach the throttle and oil pump line to the throttle body. Reconnect the three quick connect connections to the throttle body.

**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.

**1.2** Install the seat brace and two quick connects to the coil.

- Torque to 44 in. lbs.

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

# *Engine Removal / Installation*

*Sea-Doo 800 RFI*

## **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