

Engine Removal / Installation

Sea-Doo 951

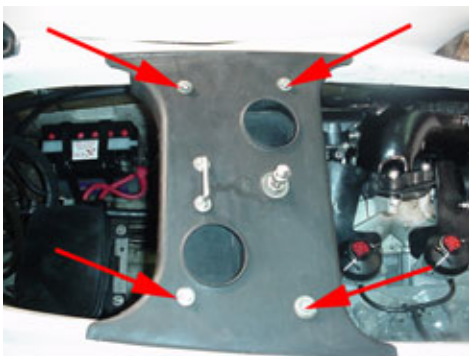
Step 1

Battery Removal



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

1.2 (Below) On GTX series, remove the four 10mm bolts securing the seat support plate and remove it.

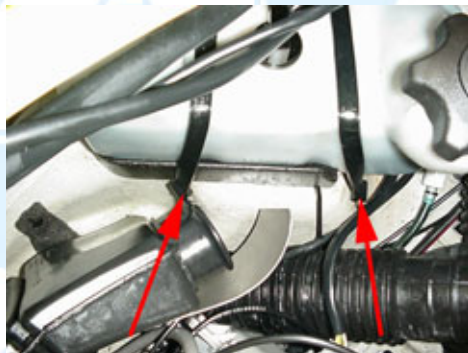


Step 2

Carburetor Removal

Most of the carburetor removal has been shown without the exhaust in place for better clarification. While it is possible to remove the exhaust first, it is more difficult.

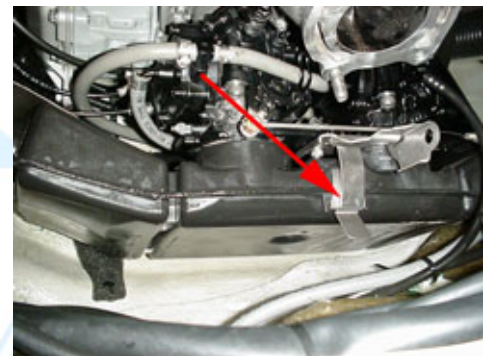
2.1 (Below) On the XP, remove the two retaining straps from the oil tank and move it forward in the hull out of the way. Remove the oil tank mounts with a 10mm socket..



2.2 (Below) Remove the two 10mm bolts securing the intake flaps to the brackets. Remove the flaps. Pull the intake snorkels up and out of the hull.



2.3 (Below) Bend the clip up on the flame arrestor to detach it. Slide it off the carburetors and move it forward in the hull to remove it.



2.4 (Below) 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 cleared of any gasoline fumes before continuing work, especially with power tools.

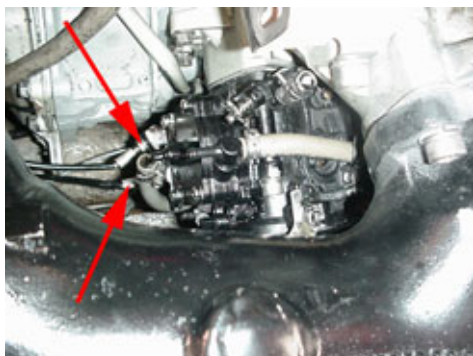
Remove the fuel in and fuel return lines from the carbs. If you have hose clamps, use a screwdriver to loosen them. If you have Sea-Doo non-removable clamps, use a pair of dikes to cut them off.



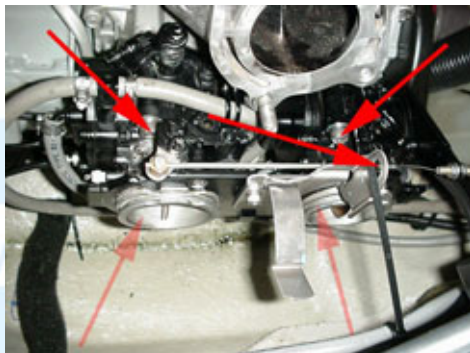
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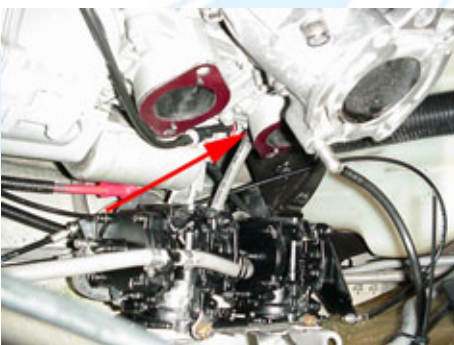
2.5 (Below) Use a 10mm wrench to remove the oil pump, throttle and choke cables from the brackets. Use a small Allen wrench to loosen the choke cable set screws.



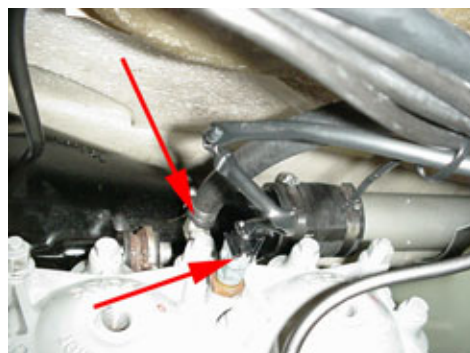
2.6 (Below) Loosen the four 6mm Allen bolts to remove the carbs with a ball Allen socket, if you have one. Remove the Allen bolt securing the carb bracket to the pipe.



2.7 (Below) Remove the pulse line from the engine. Remove the carbs from the hull.



2.8 (Below) Remove the head cooling line, thermo sensor and spark plugs.



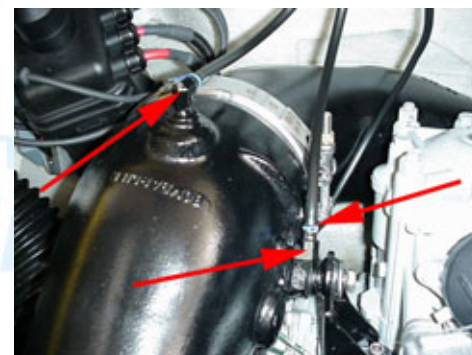
Step 3

Exhaust Removal

3.1 (Below) Using a screwdriver, detach the waterbox coupler from the pipe.



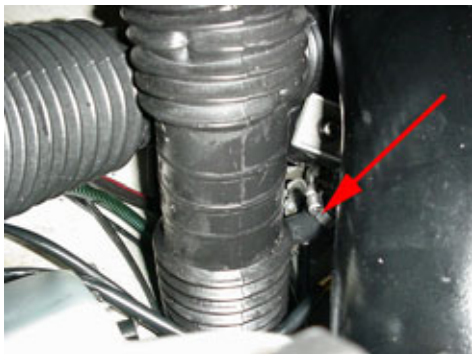
3.2 (Below) Detach all the water outlet lines from the pipe. Mark the two lines so you don't reverse them.



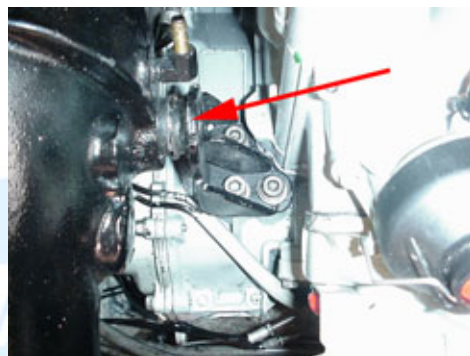
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3.3 (Below) Detach the water inlet and bypass lines from the pipe.



3.4 (Below) Using a 17mm wrench and socket, remove the two pipe retaining bolts.



3.4 (Below) If your pipe has the recovery envelope installed around the manifold-to-pipe joint, remove it.



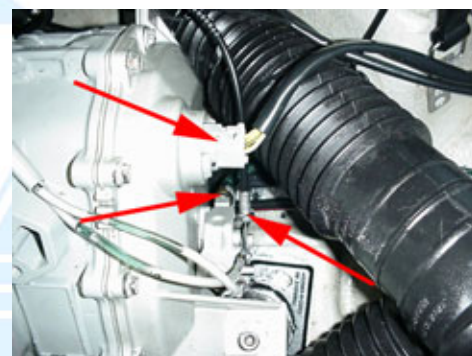
3.5 (Below) Using an 8mm Allen wrench and 15mm wrench or Sea-Doo Special Tool 529 035 505, remove the three bolts and one nut from the pipe at the manifold.



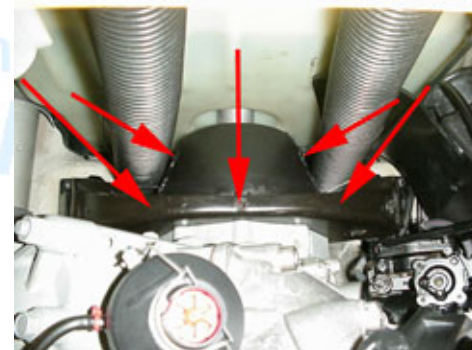
Step 4

Engine Removal

4.1 (Below) Using a screwdriver and 10mm wrench, remove the oil feed line and oil cable from the pump. Inspect both ends of the cable for wear and corrosion. Unplug the flywheel electrical harness.



4.2 (Below) Remove the PTO shield bolts with a 10mm socket.



3.6 Remove the pipe from the hull.

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4.3 (Below) Remove the accessory ground with a 10mm socket.



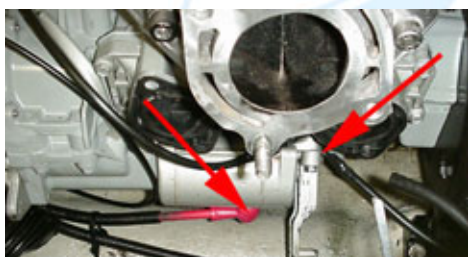
4.6 (Below) Remove the R.A.V.E. valve caps by pushing the retaining clips back. Lift the caps and the springs out. Remove the pulse line at the case that runs to the RAVE valves.



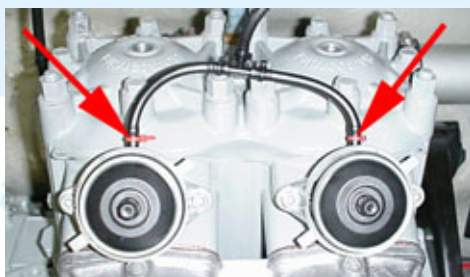
4.8 (Below) Using a 12mm socket, remove the front motor mount bolt. Also remove the two 12mm bolts securing the mount to the hull and slide the mount out of the hull.



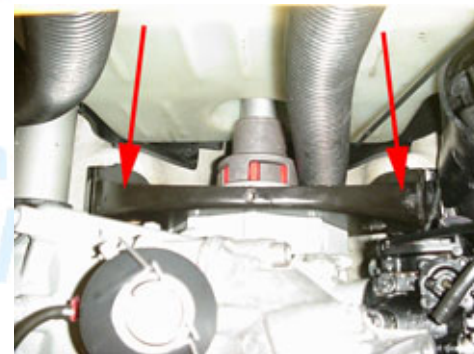
4.4 (Below) Remove the block ground and starter positive wire with a 10mm socket.



4.7 (Below) Detach the vacuum lines from the R.A.V.E. housings.



4.9 (Below) Using a 12mm socket, remove the two rear motor mount bolts. Slide the engine forward to clear the PTO coupler and lift the engine out of the hull.



4.5 (Below) Remove the case cooling line from the engine.



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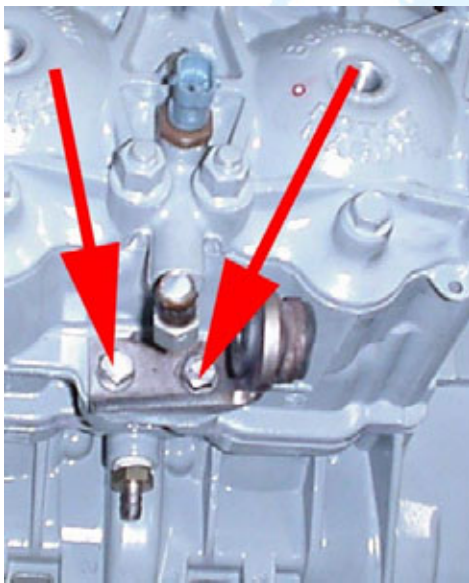
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Step 5

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.

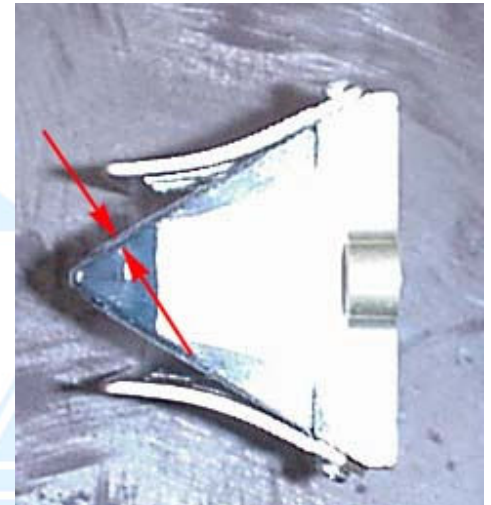
5.1 (Below) Using a 12mm socket, remove the side exhaust brace. Also remove the front brace



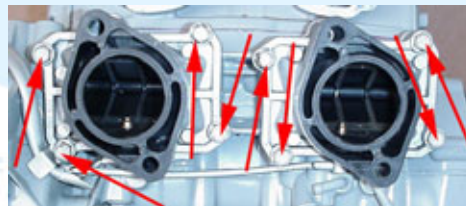
5.2 (Below) Using a 17mm wrench, remove the side cooling fitting.



5.5 (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.

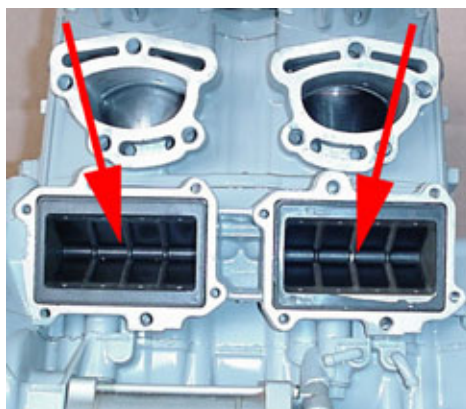


5.3 (Below) Using a 10mm socket, remove the intake manifolds. Remove the eight Allen bolts securing the exhaust manifold and remove it.



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.

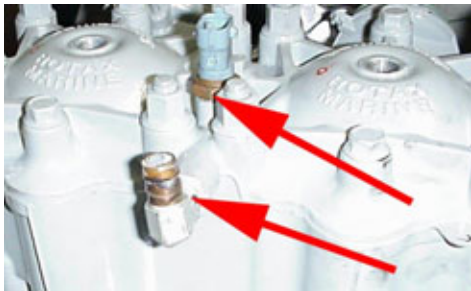
5.4 (Below) Pull out the reed cage assemblies.



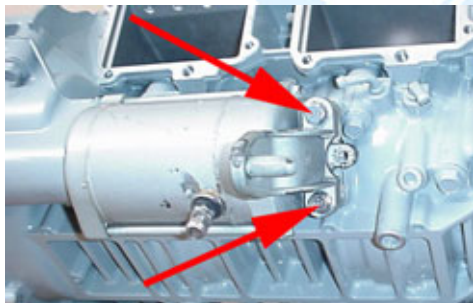
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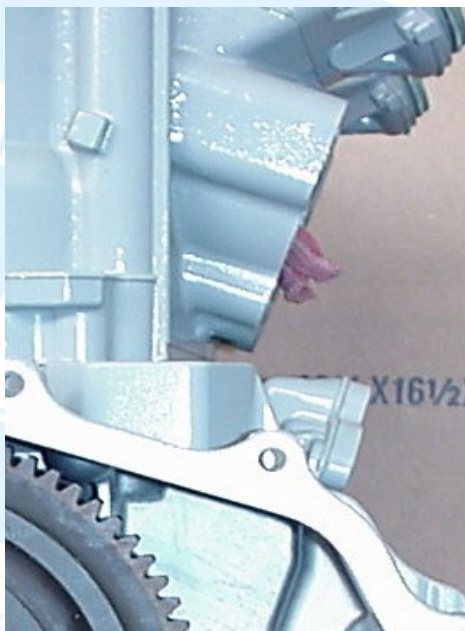
5.6 (Below) Using a pair of pliers, remove the thermo sensor mount and the head cooling line fitting.



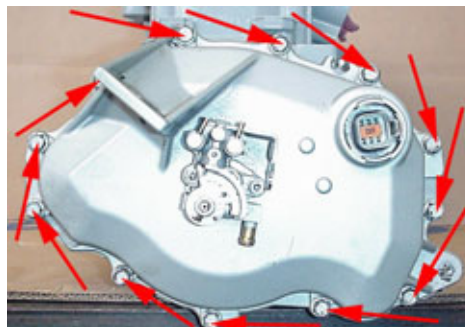
5.7 (Below) Remove the Allen bolts securing the starter and remove it.



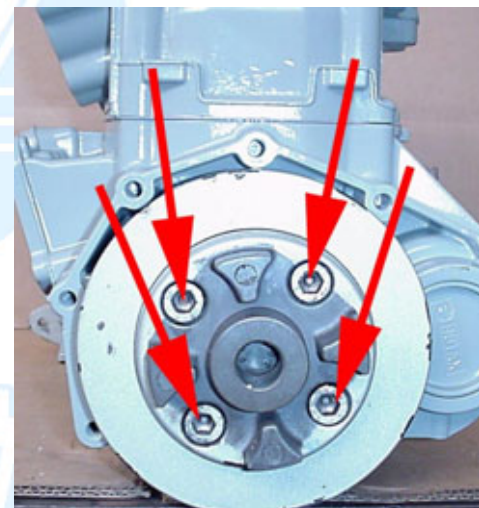
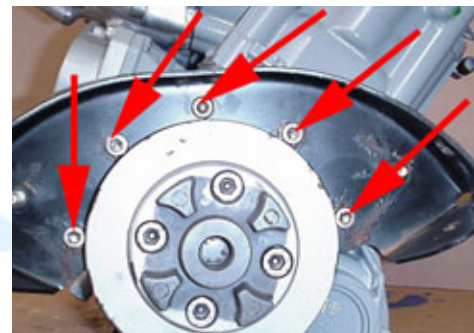
5.8 (Below) Stuff a rag into one of the exhaust ports. Make sure the rag penetrates through the port, into the combustion chamber on top of the piston. This will prevent the engine from turning over while you remove the flywheel nut & PTO coupler.



5.9 (Below) Using a 10mm socket, remove the 12 bolts from the flywheel housing cover and remove it. It is SBT's recommendation that the oil pump be removed from the new engine, and a block-off plate be installed at this time.



5.10 (Below) Remove the five Allen head bolts securing the rear engine mount plate to the block and remove it.

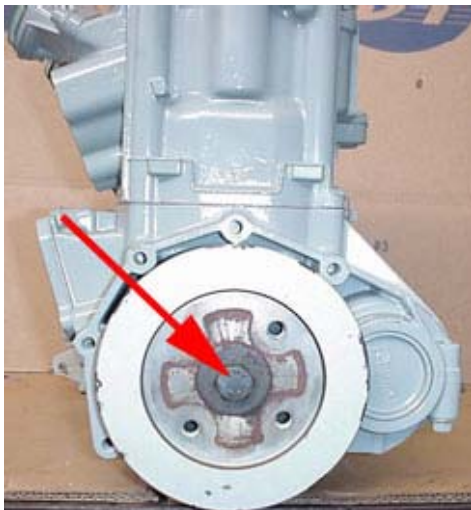


5.11 (Above) Remove the four Allen head bolts securing the PTO coupler to the flywheel.

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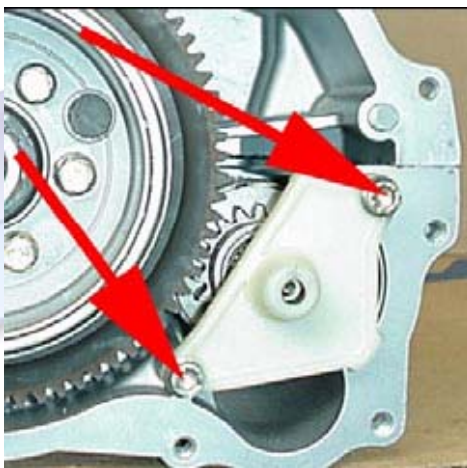
5.12 (Below) Using a 19mm socket, remove the PTO flywheel nut from the shaft.



5.13 (Below) Using a universal flywheel puller, remove the PTO flywheel.

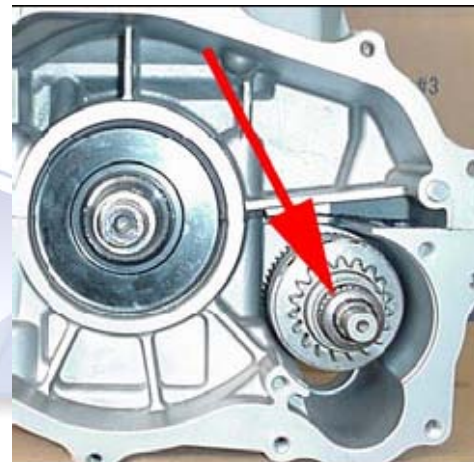


5.14 (Below) Remove the bendix support plate with an Allen wrench.



5.15 Using a 10mm socket, 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.

5.16 (Below) Using a 27mm socket or wrench, remove the flywheel nut. Install the universal flywheel puller into the 3 threaded holes in the magnet cup and remove the flywheel as a complete assembly.



With all of the external accessories removed, the engine is now ready to be packaged and shipped to SBT!

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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:

5.17 Install the bendix.

5.16 Place a rag into an open exhaust port. Place the flywheel on the shaft and install the nut.

- Torque to 85 ft. lbs.

5.15 Bolt on the magneto.

- Torque to 4.3 ft. lbs.

5.14 Install the bendix support plate.

- Torque to 80 in. lbs.

5.13 Place the PTO flywheel on the shaft.

5.12 Install the PTO flywheel bolt.

- Torque to 85 ft. lbs.

5.11 Bolt on the PTO coupler. Remove the rag in the engine.

- Torque to 18 ft. lbs.

5.10 Install the rear motor mount support plate.

- Torque to 18 ft. lbs.

5.9 Using a new gasket, install the flywheel cover.

- Torque to 6 ft. lbs.

5.7 Install the starter.

- Torque to 89 in. lbs.

5.6 Using pipe tape, install the head thermo sensor mount and cooling fitting.

5.4 Install the reed cage assemblies.

5.3 Bolt on the intake manifolds. Using a new gasket, bolt on the exhaust manifold.

- Torque to 5 ft. lbs. (Intake)
- Torque to 30 ft. lbs. (Exhaust)

5.2 Using pipe tape, install the side cooling fitting.

5.1 Install the side and front exhaust braces.

- Torque to 18 ft. lbs.

4.9 Install the motor mount bolts in the mounts and using your hand, wiggle them back and forth as hard as you can. If either break, you need to replace them.

Place the engine in the hull and secure the two rear motor mounts.

- Torque to 30 ft. lbs.

4.8 Install the front motor mount and bolts.

- Torque to 30 ft. lbs.

4.7 Install the R.A.V.E. vacuum lines to the housings.

4.6 Install the R.A.V.E. springs, caps and retaining clips.

4.5 Install the case cooling line.

4.4 Install the block ground and starter positive wires.

4.3 Install the accessory ground wire to the flywheel housing.

4.2 Install the PTO shield. It is much easier to do so by removing the air tubes first.

4.1 Install the oil feed line and injection cable to the oil pump. Open the bleed screw and allow the line to bleed for at least one minute to remove air pockets. Plug in the flywheel harness.

3.6 Place the pipe in the hull and line it up with the engine.

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2.3 Install the flame arrestor assembly.

3.5 Using a new gasket, attach the pipe to the manifold.

- Torque to 30 ft. lbs

2.2 Install the air intake snorkels and flaps.

2.1 (XP only) Install the oil tank and retaining straps.

3.4 Install the pipe retaining bolts to the braces.

1.2 (GTX series only) Install the seat support plate.

3.3 Attach the water inlet and bypass lines to the pipe.

- Torque to 11 ft. lbs.

3.2 Attach the water outlet lines to the pipe.

3.1 Attach the waterbox coupler to the pipe and waterbox.

2.8 Attach the head thermo sensor and cooling line.

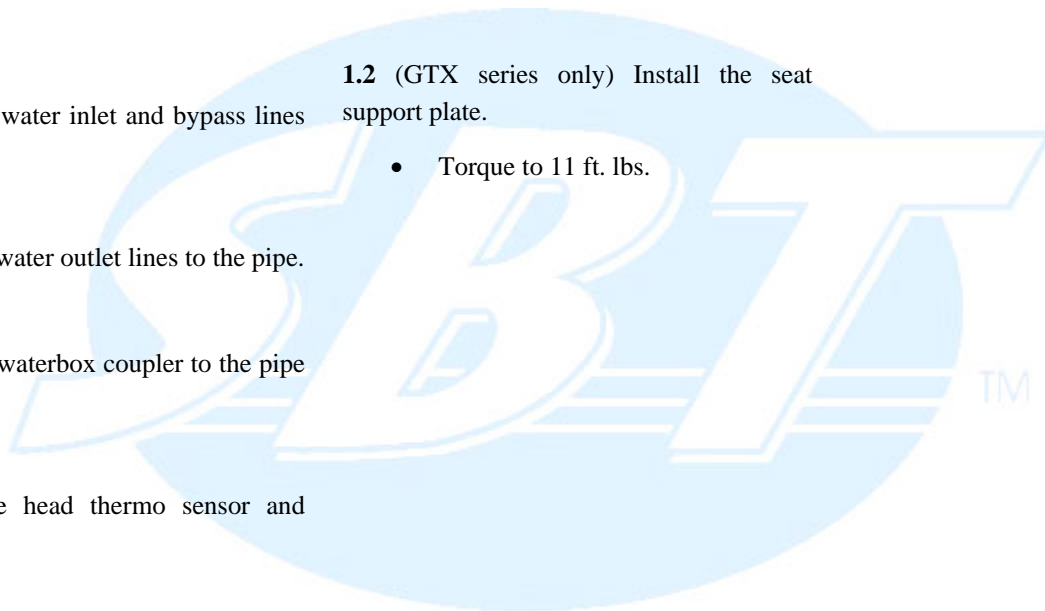
2.7 Place the carbs in the boat and attach the pulse line to the block.

2.6 Using new gaskets, install the carbs to the manifolds.

- Torque to 18 ft. lbs.

2.5 Install the oil pump, throttle and choke cables to the carbs.

2.4 Attach the fuel lines to the carbs.



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Tools Needed:

Sockets

- 27mm socket
- 19mm socket
- 17mm socket
- 15mm socket
- 12mm socket
- 10mm socket

Sealers / Lubricants

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

Misc.

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

Parts

- External Gasket Kit
- Zip-Ties

Wrenches

- Torque wrench
- 15mm wrench
- 10mm wrench
- Allen wrenches - metric