

Engine Removal / Installation

Sea-Doo 951DI

Step 1

Battery Removal



1.1 (Above) Remove the four 10mm bolts from the seat brace and remove it from the hull.

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



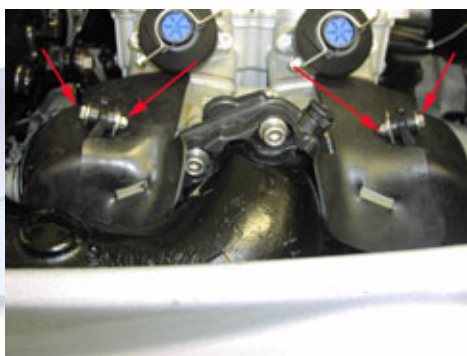
1.3 (Below) Remove the spark plug wires and spark plugs.



Step 2

Intake Removal

2.1 (Below) Loosen the two 10mm bolts and slide the intakes out of the brace on the exhaust manifold. Slide the intakes up and out of the hull.



2.2 (Below) Remove the hitch clip and then pull the clamp holding the air box straight up. Tilt the air box away from the throttle body and then pull it towards the rear of the ski and remove it from the hull.



2.3 (Below) Remove the two quick connects to the air intake sensors.



2.4 (Below) Loosen the two clamps to the throttle body with a flat head screw driver and pull the throttle body straight back away from the reed intake. Set the throttle body in the hull and leave it connected to the throttle cable and air hoses.



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Step 3

Fuel Injector removal

3.1 (Below) Remove the two quick connects to the fuel rail. Remove the two 13mm bolts securing the fuel rail to the head. Lift the fuel rail straight up.



3.2 (Below) Remove the 10mm nut securing the high pressure air hose to the fuel rail. Remove the small air line on the front of the air piston head.



3.3 (Below) Loosen the hose clamp to the air line on the fuel rail and remove the line. Swing the fuel rail over the side of the hull and leave it there for engine installation.



3.4 (Below) Remove the quick connects to the fuel injectors and remove them from the hull along with the o-rings underneath. Remove the connection from the head temperature sensor.



Step 4

Exhaust Removal

4.1 (Below) Remove the exhaust shroud from the pipe by snipping the zip tie and pulling it off.



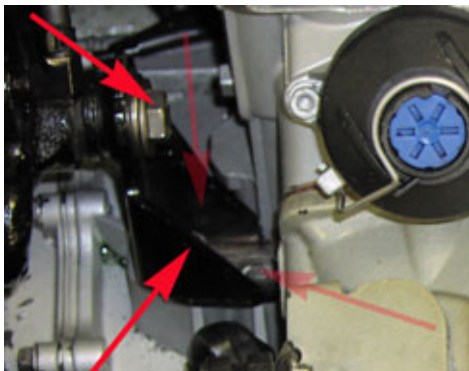
4.2 (Below) Remove the water temperature sensor with a 19mm wrench. Remove the water inlet line to the head by loosening the clamp. Remove the 10mm allen head bolt from the rear exhaust brace.



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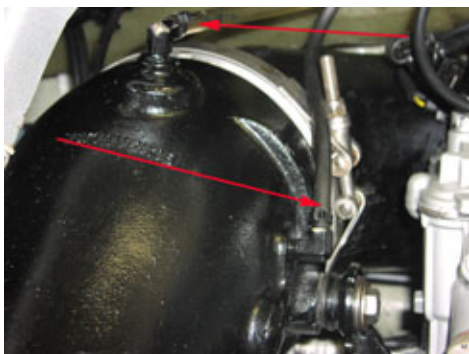
4.3 (Below) Remove the 17mm bolt and three 8mm bolts from the pipe support on the front of the engine.



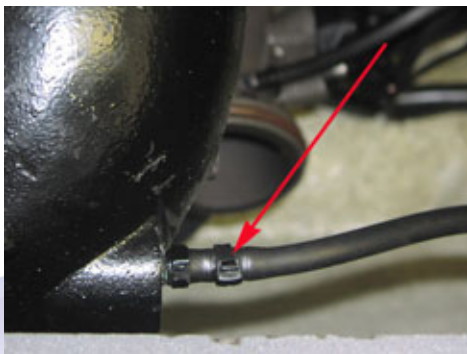
4.4 (Below) Remove the water line to the air piston head and then loosen the exhaust coupler hose to the waterbox.



4.5 (Below) Remove the two water lines to the top of the pipe.



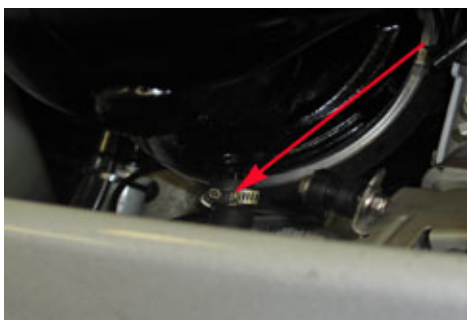
4.6 (Below) Remove the water line to the head pipe.



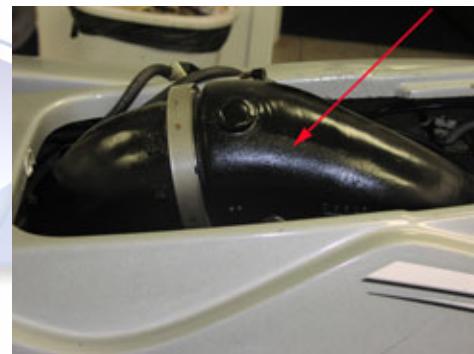
4.7 (Below) Remove the three 10mm allen head bolts and the loosen the 15mm nut. Note: It is not necessary to remove the nut as the exhaust pipe has a groove to slip off of the stud.



4.8 (Below) Wiggle the exhaust straight up away from the exhaust manifold and loosen the hose clamp to the water hose. Remove the hose.



4.9 (Below) Wiggle the exhaust out of the coupler to the waterbox and bring the pipe up and around the top of the engine forming a "U" with the pipe on the top of the engine. Pull the pipe straight up and out of the hull. Note: This is not easy to do and may take a few tries. Once you get the pipe in the right spot it pulls out quite easily once you get the hang of it.



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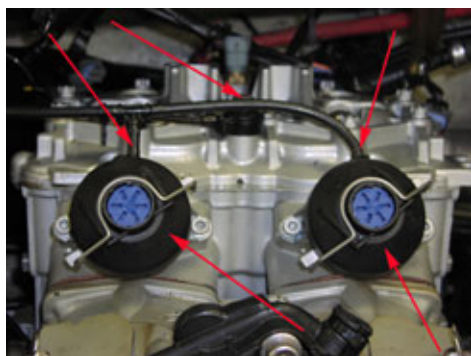
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Step 5

Engine Removal

5.1 (Below) Remove the hoses to the rave valves. Remove the rave valve covers and springs underneath them. Using a 13mm wrench, remove the knock sensor.



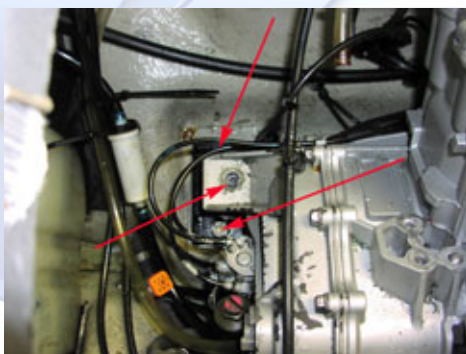
5.2 (Below) Unscrew the two wing nuts and remove the PTO shroud.



5.3 (Below) Disconnect the quick connect line to the flywheel cover. Remove the water inlet line to the flywheel cover. Remove the oil line to the oil pump and plug it as to prevent your hull filling with oil. Using a 10mm wrench, remove the throttle cable to the oil pump.



5.4 (Below) Remove the 13mm bolt securing the engine to the front engine mount. Remove the two 13mm bolts securing the engine mount to the hull and remove it from the hull.

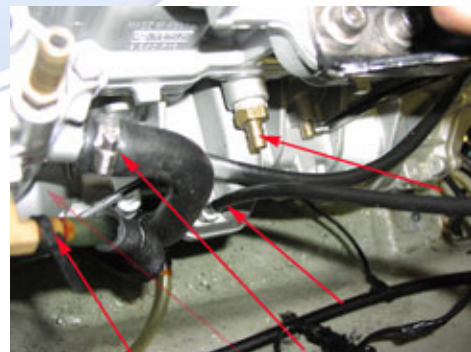


5.5 (Below) Remove the rear water line to the case cooler. Remove the two 13mm bolts securing the engine to the rear engine mounts.



5.6 Lift the front of the engine and slide it backward disengaging the driveshaft from the PTO.

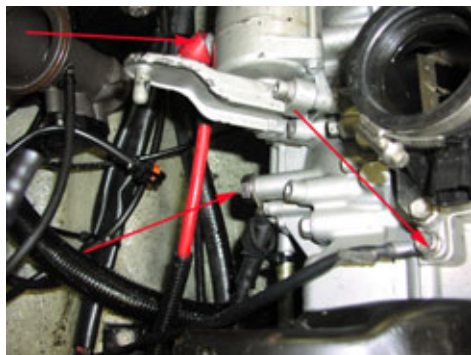
5.7 (Below) To reach the remaining connections on the right side of the engine you must tilt the engine to the left. Remove the air inlet line to the air piston head by loosening the clamp. Remove the water cooling line to the air piston head. Remove the water line to the side of the engine case. Remove the air line to the side of the case. Remove the oil return line from the bottom of the engine case.



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5.8 (Below) Tilt the engine onto its right side to reach the following connections. Remove the positive line to the starter using a 10mm wrench. Remove the small negative cable to the block using a 10mm socket. Remove the large negative cable using a 17mm wrench.

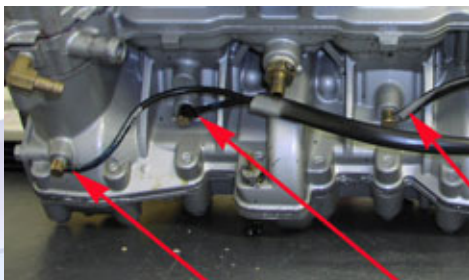


5.9 Holding the engine in an upright position lift it out of the hull.

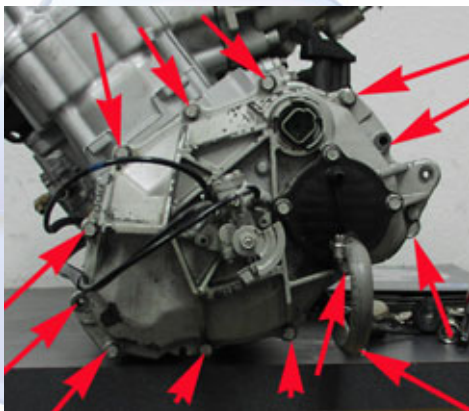
Step 6

External Accessory Removal

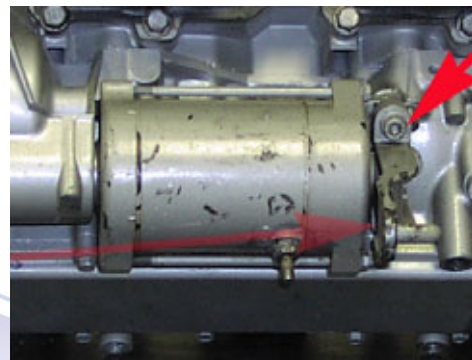
6.1 (Below) Remove the three oil lines from the side of the case



6.2 (Below) Remove the water line to the case cooler. Remove the twelve 10mm flywheel cover bolts, remove the flywheel cover.



6.3 (Below) Remove the two 6mm bolts securing the starter, remove the starter.



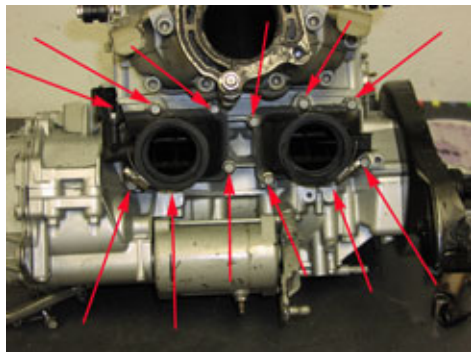
6.4 (Below) Remove the two 6mm allen head bolts from the cover securing the bendix. Remove the bendix. Remove the 18mm flywheel nut and lock washer. Remove three of the 7mm torx head bolts and use a universal flywheel puller to remove the flywheel.



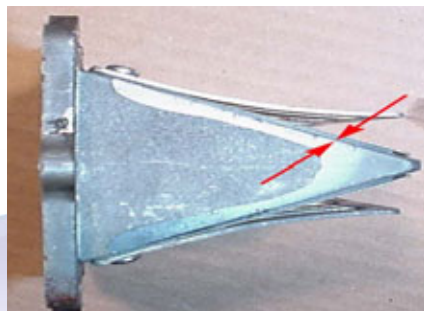
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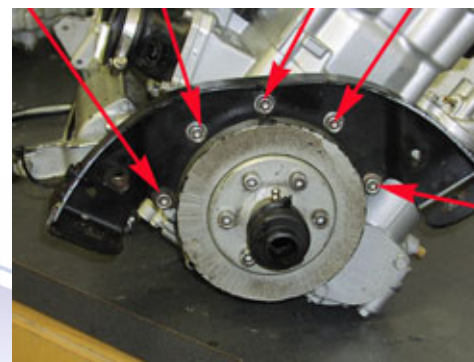
6.5 (Below) Remove the twelve 10mm bolts securing the throttle body adaptor assembly. Pull them straight out with the reeds.



6.7 (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.



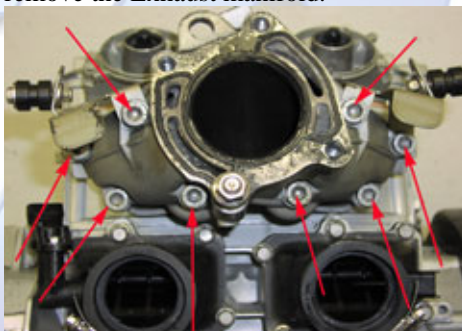
6.10 (Below) Remove the five 8mm allen head bolts from the engine support and remove the engine support.



6.6 (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.

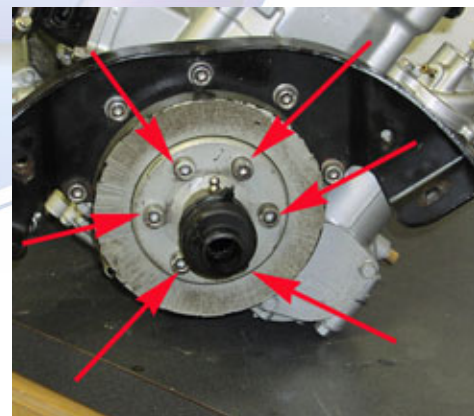
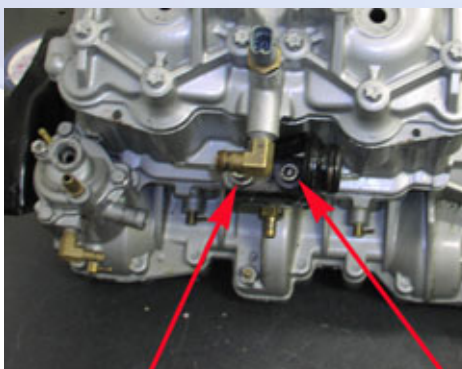


6.8 (Below) Remove the eight 10mm allen head bolts from the exhaust manifold and remove the Exhaust manifold.



6.11 (Below) Remove the six 8mm allen head bolts from the PTO and remove the half of the PTO. Block the cylinder thru the exhaust port using a rag or rope and remove the 17mm center nut holding the PTO on. Using a universal flywheel puller, remove the PTO. With all the external accessories removed your engine is now ready to ship back to SBT.

6.9 (Below) Remove the two 8mm bolts securing the exhaust brace to the engine.



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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.

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

6.11 Place the PTO onto the end of the crankshaft. Torque the 17mm bolt. Place the outer half to the PTO on and replace the six 8mm allen bolts.

- 17mm – Torque to 85 ft. lbs
- 8mm – Torque to 17 ft. lbs

6.10 Replace the engine support using the five 8mm allen bolts.

- Torque to 17 ft. lbs.

6.9 Replace the Exhaust brace onto the engine using the two 8mm allen head bolts.

- Torque to 20 ft. lbs.

6.8 Using new gaskets, replace the exhaust manifold using eight 10mm allen bolts.

- First torque to 17 ft. lbs then torque to 30 ft. lbs.

6.5 Replace the reed valves and throttle body adapter assembly using twelve 10mm bolts.

- Torque to 80 in. lbs.

6.4 Place the bendix into the flywheel housing. Replace the cover to the bendix with two 6mm allen bolts. Replace the three torx head bolts into the flywheel. Place the flywheel onto the crankshaft aligning the keyway up with the slot in the flywheel. Replace the lock washer and 18mm flywheel nut.

- 6mm – torque to 80 in. lbs.
- torx – torque to 115 in. lbs.

6.3 Replace the starter using the bracket and two 6mm bolts.

- Torque to 89 in. lbs.

6.2 Replace the flywheel cover onto the flywheel housing and bolt down using twelve 10mm bolts. Replace the line to the case cooler.

- Torque to 80 in. lbs.

6.1 Replace the oil lines to the side of the case.

5.9 Place the engine into the hull.

5.8 Tilt the engine onto its right side. Connect the large negative line using the 17mm bolt. Replace the small negative line using the 10mm bolt. Replace the positive line to the starter using the 10mm nut.

- 17mm – Torque to 29 ft. lbs
- 10mm bolt – Torque to 80 in. lbs.
- 10mm nut – Torque to 53 in. lbs.

5.7 Tilt the engine onto its left side. Connect the oil line to the bottom of the case. Replace the air line to the side of the case. Replace the water line to the side of the engine case. Replace the water cooling line to the air piston head. Replace the air inlet line to the air piston head and tighten the clamp.

5.6 Lift the front of the engine and slide the PTO onto the driveshaft.

5.5 Replace the rear case cooler water line. Replace the two 13mm bolts to the engine mounts.

- Torque to 18 ft. lbs

5.4 Place the engine mount in the hull along with any shims that may have been under the mount. Replace the two 13mm bolts securing the engine mount to the hull. Replace the 13mm bolt securing the engine to the engine mount.

- Torque to 18 ft. lbs.

5.3 Replace the water inlet line to the flywheel cover. Replace the oil line to the oil pump and bleed the pump using the 8mm bleeder screw. Bleed it until there is no air coming out. Replace the throttle cable to the oil pump and adjust it so the line on the pump and the line on the throttle wheel line up when no throttle is applied. Replace the quick connect to the flywheel cover.

5.2 Replace the PTO shroud using the two wing nuts.

5.1 Replace the covers to the rave valves. Connect the air lines to the rave valves. Replace the knock sensor using the 13mm bolt.

- Torque to 18 ft. lbs.

4.9 Place the Exhaust pipe in the hull over the top of the engine so it makes a “U” over the top of the engine. Slide the engine around the engine so it now rests in the hull.

4.8 Replace the water line to the bottom of the pipe and tighten the clamp.

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- 4.7 Using a new gasket place the exhaust pipe onto the exhaust manifold. Replace the three 10mm allen bolts connecting the pipe to the exhaust manifold. Tighten the nut on the stud as well. Screw them down lightly until all exhaust brace bolts are in. Then go back and tighten the bolts.
 - Torque to 30 ft. lbs.
- 4.6 Replace the water line to the head pipe.
- 4.5 Replace the water lines to the top of the pipe.
- 4.4 Slide the end of the stinger pipe into the coupler to the waterbox and tighten the clamp. Replace the water line to the top of the head on the air piston.
- 4.3 Replace the three 8mm allen bolts securing the front pipe support to the engine. Replace the 17mm bolt securing the pipe support to the pipe. Do not tighten these until all exhaust mounting bolts are in place.
 - 8mm – Torque to 18 ft. lbs
 - 17mm – 18 ft. lbs.
- 4.2 Replace the 10mm bolt to the side exhaust brace. Do not tighten until all exhaust mounting bolts are in place. Replace the water temperature sensor using a 19mm wrench and tighten until snug. Replace the water inlet line to the head and tighten the clamp.
 - Torque to 18 ft. lbs.
- 4.1 Replace the rubber exhaust shroud over the pipe and exhaust manifold using a zip tie.
- 3.4 Replace the connection to the water temperature sensor. Using the o-rings, replace the fuel injectors and connect the quick connects to them.
- 3.3 Connect the air line to the fuel rail and tighten the clamp
- 3.2 Replace the high pressure air line to the head of the air piston using the 10mm nut. Replace the small air line to the front of the air piston head.
 - Torque to 89 in. lbs.
- 3.1 Place the fuel rail onto the fuel injectors and secure it to the head using two 13mm bolts. Reuse o-rings.
 - Torque to 20 ft. lbs.
- 2.4 Slide the throttle body into place and tighten the clamps with a screwdriver.
- 2.3 Replace the quick connects to the two air intake sensors.
- 2.2 Slide the air box into place and snap the clip onto the air box from the throttle body. Place the hitch clip on to secure the clip.
- 2.1 Slide the rubber intake surrounds into place and then replace the intakes and secure them using the 10mm nut and bolt. Tighten until snug.
- 1.3 Replace the spark plugs and place the park plug wires on them.
- 1.2 Place the battery into the hull. Replace the retaining straps and replace the positive wire first and then connect the negative wire.
- 1.1 Replace the seat brace using four 10mm bolts.
 - Torque to 44 in. lbs.

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Tools Needed:

Sockets

- 19mm
- 17mm
- 14mm
- 13mm
- 12mm
- 11mm
- 10mm
- 8mm

Sealers / Lubricants

- Loctite® Copper Gasket Adhesive
- Loctite® 2 Gasket Sealer
- Loctite® Medium Threadlocker (Blue) 242
- Loctite® High-Tach
- 100% Silicone
- SBT Break-In Oil

Misc.

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

Parts

- External Gasket Kit
- Zip-Ties

Wrenches

- 9/16"
- 19mm
- 13mm
- 10mm
- Allen wrenches
- Pipe wrench
- Torque wrench