

Engine Removal / Installation

Tigershark 900/1000

Warning: This is a very difficult engine to swap. If you do not have experience with replacing other PWC engines, have a professional do the engine swap.

Step 1

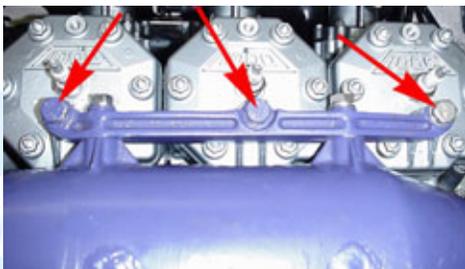
Battery Removal



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).

Step 2

Exhaust Removal

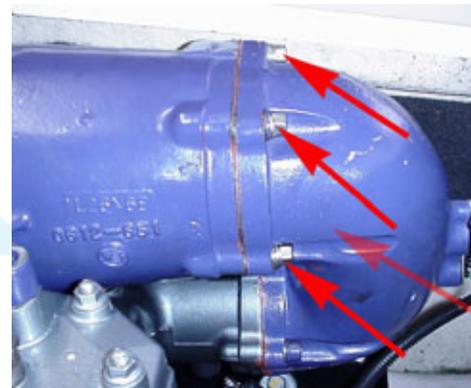


2.1 (Above) Remove the three bolts from the exhaust support brace.

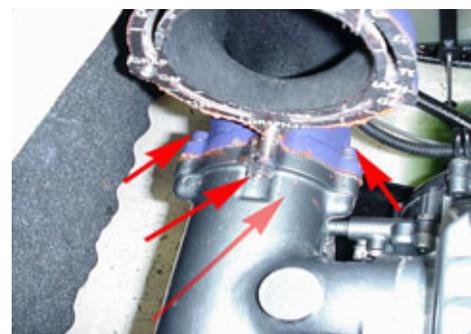
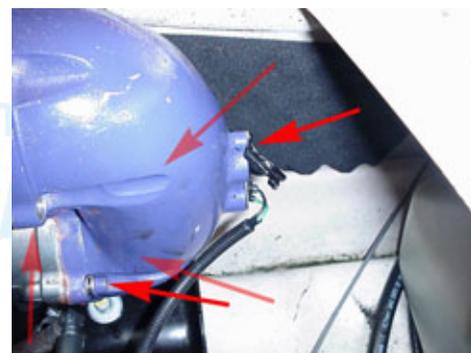
2.2 (Below) Loosen the clamp connecting the stinger pipe to the water box and slide the hose away from the stinger. Loosen the water hose clamp at the end of the stinger pipe and remove the hose.



2.3 (Below) Remove the four allen head bolts securing the stinger pipe to the header pipe. Remove the stinger from the hull.



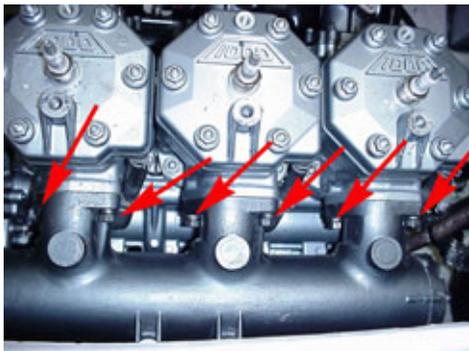
2.4 (Below) Remove the three allen head bolts and one nut securing the header pipe to the exhaust manifold. Remove the bolt securing the temperature sensor to header pipe. While removing from the hull disconnect the water line to the header pipe.



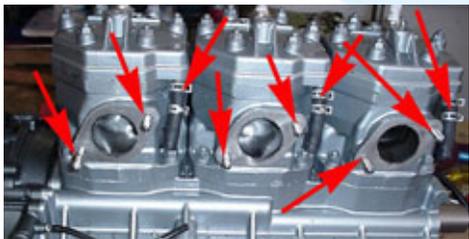
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2.5 (Below) Remove the six nuts securing the exhaust manifold to the engine. Remove the three water lines connecting from the head to the exhaust manifold. Remove the exhaust manifold from the hull.

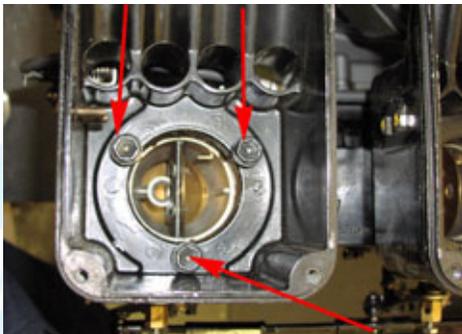


2.6 (Below) Remove the six studs from the engine that hold the exhaust manifold in place.



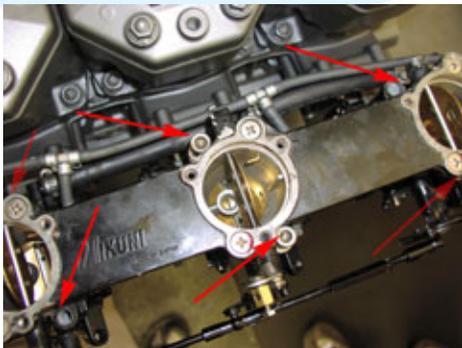
Step 3

Intake Removal

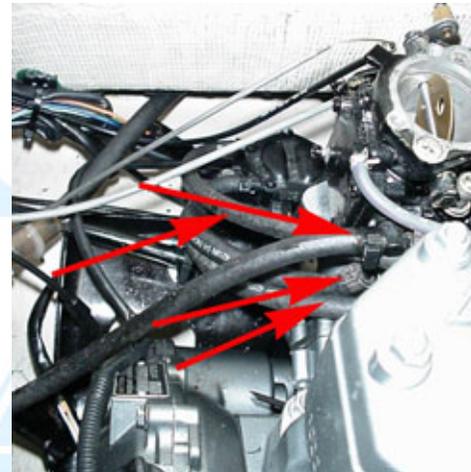


3.1 (Above) Remove the flame arrestor cover. Remove the screens. Remove the three bolts in each base securing the flame arrestor base to the carbs. Remove them from the hull.

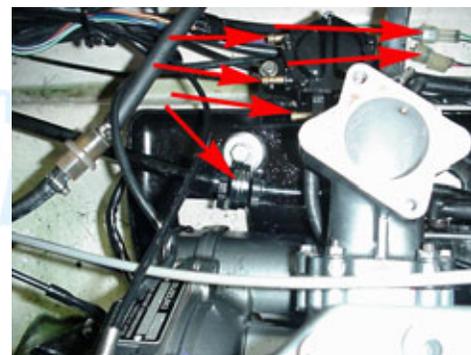
3.2 (Below) Remove six allen head bolts securing the carbs to the intake manifold. Remove the throttle cable and choke cable.



3.3 (Below) Turn the fuel switch to the off position. Remove three fuel inlet lines and one fuel return line. Remove the carbs from the hull.



3.4 (Below) Remove the remaining pulse line and fuel inlet line from the fuel pump. Disconnect the two electrical quick connects. Disconnect the oil line.

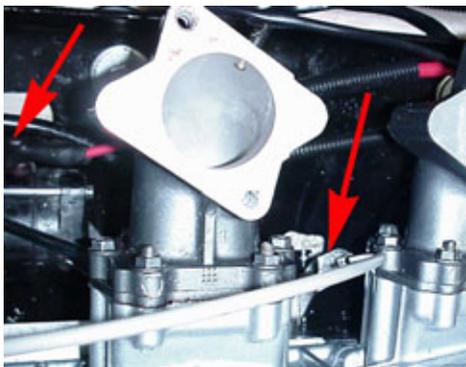


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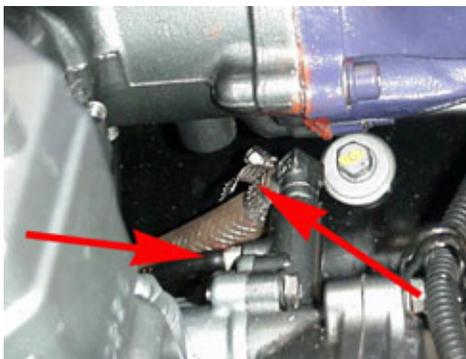
Step 4

Engine Removal



4.1 (Above) Remove the positive cable going to the starter. Remove the throttle cable going to the oil pump. Remove the negative cable attached to the rear cylinder.

4.2 (Below) Remove the cooling lines going to the flywheel housing.



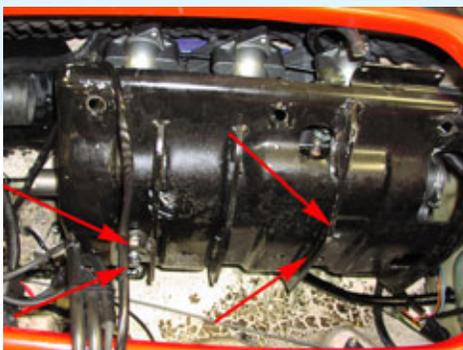
4.3 Disconnect the three electrical quick connects near the front of the engine color coded red, green and white.

4.4 Remove the four bolts securing the jet pump to the hull. Remove the steering cable and reverse gate cable if equipped. Pull the pump off. Pull the driveshaft out.

4.5 (Below) Remove the six engine mounts from the engine bed plate.



4.6 (Below) Flip the engine and bedplate onto its side and remove the four bolts securing the engine to the bed plate. Flip the engine and bed plate back and remove the engine from the hull.



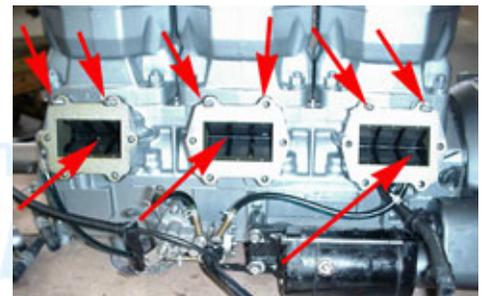
Step 5

Accessory Removal



5.1 (Above) Remove the six nuts and twelve bolts securing the intake manifold to the engine. Remove the oil lines from the manifold.

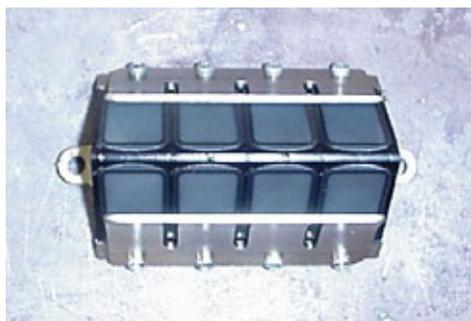
5.2 (Below) Remove the reed cages and six studs from the engine that are used to secure the intake manifold to the engine.



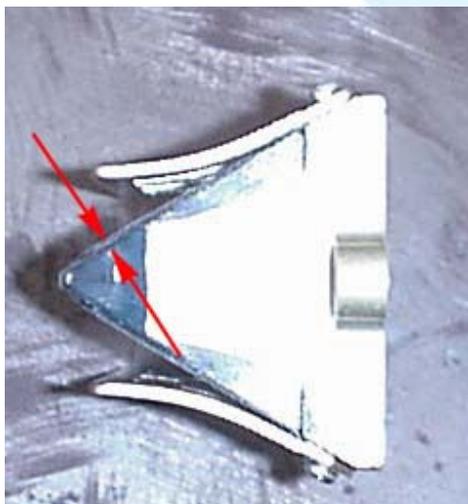
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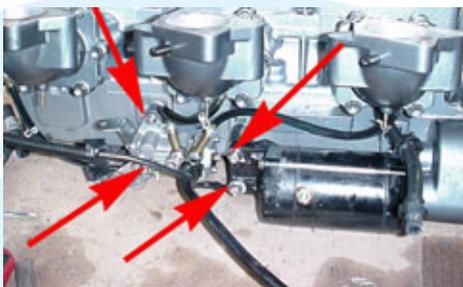
5.3 (Below) Inspect each reed assembly for damage and wear. Look at each reed petal and inspect the edges for signs of cracking, chipping or any missing parts. If any damage is present, replace the petals.



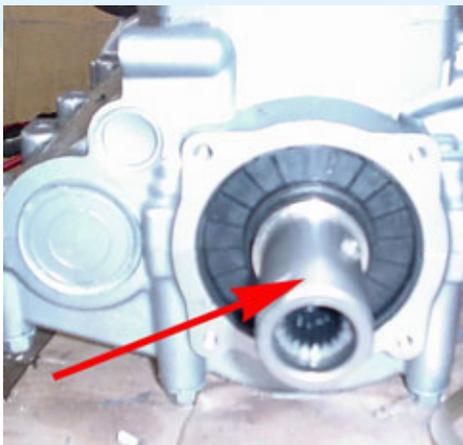
5.4 (Below) Look at each petal-to-cage surface and check for gap. If a gap of more than 0.015" is present, replace the petals.



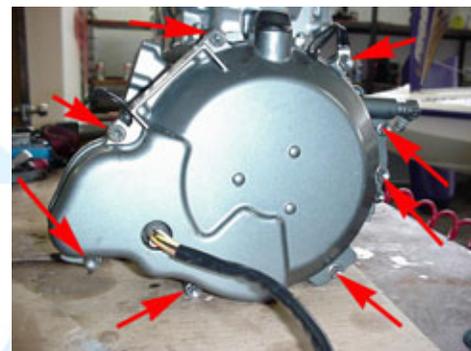
5.5 (Below) Remove the two screws securing the oil pump to the engine. Remove the oil pump and the shaft that drives the oil pump. Remove the two bolts securing the starter to the engine. Remove the starter and spacer that goes between the starter and engine.



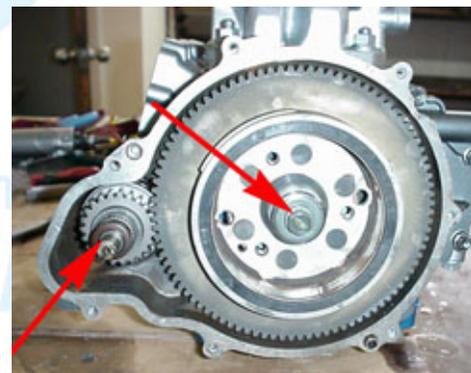
5.6 (Below) Place a rope in the cylinder to block the engine from turning. Using a wrench, turn the PTO counter-clockwise. (It is a regular thread and is very difficult to break free.)



5.7 (Below) Remove the eight bolts securing the flywheel cover to the engine and remove the cover. Remove the expansion accordion and insert from the case.



5.8 (Below) Remove the flywheel nut. Using a universal flywheel puller remove the flywheel from the engine. Remove the bendix from the engine.



5.9 Remove the four bolts securing the seal plates to the engine and remove the plates. There are two of these plates, one on the front of the engine and one on the back of the engine. Remove the flywheel housing from the engine. Your engine is now ready to ship 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:

5.9 Using a new gasket, secure the flywheel housing to the engine. Replace the two seal plate back on the engine using four bolts on each.

- Torque to 6 ft. lbs.

5.8 Replace the bendix. Place the flywheel onto the crankshaft aligning it with the keyway.

- Torque to 35 ft. lbs.

5.7 Using a new o-ring, replace the flywheel cover using eight bolts.

- Torque to 6 ft. lbs.

5.6 Screw the PTO onto the end of the crankshaft.

- Torque to 60 ft. lbs.

5.5 Place the starter into the magnet housing, replace the spacer and securing using two bolts. Using new o-rings, place the oil pump driveshaft into the case and place the oil pump in place. Secure it using two screws.

- Starter – Torque to 6 ft. lbs.
- Oil Pump – Torque to 4 ft. lbs.

5.2 Replace the six studs for the intake manifold. Place the reeds into the intake.

- Torque to 6 ft. lbs.

5.1 Using new gaskets, place the intake manifold in place and secure using six nuts and twelve bolts.

- Torque to 6 ft. lbs.

4.6 Place the engine into the hull. Flip the engine and bedplate onto its side and secure the engine to the bed plate using four bolts.

- Torque to 36 ft. lbs.

4.5 Align the engine with the driveshaft and secure the engine to the hull using six bolts.

- Torque to 36 ft. lbs.

4.4 Replace the jet pump using four bolts. Re-attach the steering cable and reverse cable if equipped.

- Jet Pump – Torque to 35 ft. lbs.
- Steering/reverse – Torque to 6 ft. lbs.

4.3 Re-connect the three electrical quick connects color coded green, red and white.

4.2 Replace the cooling line going to the flywheel housing.

4.1 Re-attach the throttle cable to the oil pump and positive cable to the starter. Re-attach the ground cable to the back cylinder bolt.

- Cylinder - Torque to 35 ft. lbs.

3.4 Re-connect the two electrical quick connects. Re-attach the pulse line and fuel inlet line to the fuel pump.

3.3 Attach the three fuel inlet lines to the carb and the fuel return line to the carbs.

3.2 Using new gaskets, re-attach the carbs to the intake manifold.

- Torque to 8 ft. lbs.

3.1 Re-attach the flame arrestor base's to the carbs using three bolts in each base. Place the screens in place, then re-attach the flame arrestor cover using six bolts.

- Torque to 6 ft. lbs.

2.6 Replace the six studs into the engine for the exhaust manifold.

- Torque to 20 ft. lbs.

2.5 Using new gaskets re-install the exhaust manifold to the engine and secure it using six nuts. Re-attach the three cooling lines to the head.

- Torque to 20ft. lbs.

2.4 Re-attach the temperature sensor to the header pipe and secure using one bolt. Connect the water line from the head pipe to the flywheel housing. Using a new gasket connect the header pipe to the exhaust manifold using three bolts and one nut.

- Temp sensor – Torque to 6 ft. lbs.
- Header pipe – Torque to 20 ft. lbs.

2.3 Using a new gasket secure the stinger pipe to the header pipe.

- Torque to 20 ft. lbs.

2.2 Re-attach the water hose to the stinger pipe. Re-connect the stinger to the waterbox.

2.1 Reattach the stinger support brace to the head of the engine using three bolts.

- Torque to 40 ft. lbs.

1.1 Place the battery into the hull and secure using two straps. Replace the positive cable first and then the negative.

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Tools Needed:

Sockets

- 17mm socket
- 14mm socket
- 13mm socket
- 12mm socket
- 10mm socket
- 8mm socket

Sealers / Lubricants

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

Misc.

- 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

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