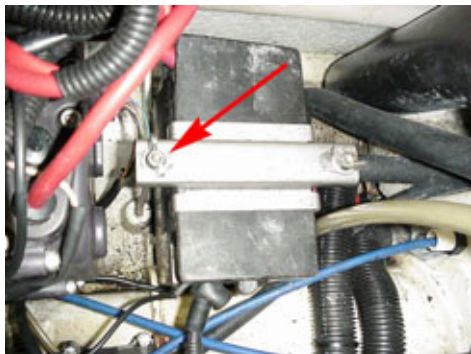


Engine Removal / Installation

Polaris 900 / 1050

Step 1

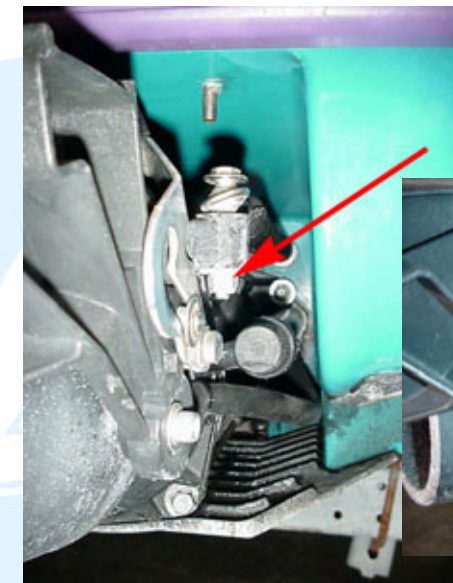
Battery Removal



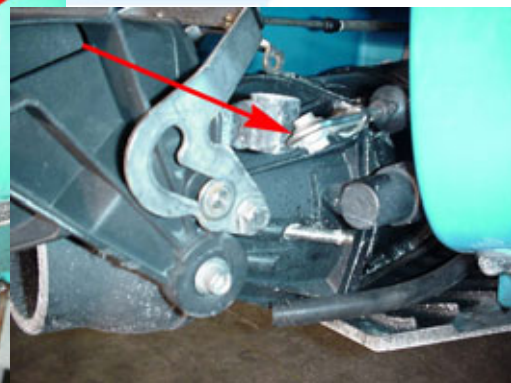
1.1 (Above) Loosen the front retaining wing nut, swing the retainer plate back and remove the plastic protective cover.



1.2 (Left) Next, disconnect the battery and remove it from the hull. Disconnect the negative (black) cable first, then the positive (red).



2.2 (Below, Right) On the back of the pump assembly, the reverse gate rod and steering rod need to be removed. The steering rod nut can be removed using a 9/16" wrench.

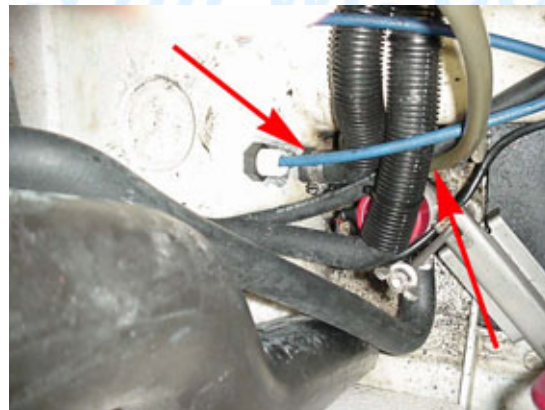


2.3 (Below) On the inside of the hull, at the rear, the cooling water intake and bilge hoses need to be removed. Loosen the hose clamps with a screwdriver, then work the hoses off the nipples.

Step 2

Pump Removal

2.1 (Right) The pump assembly needs to be removed from the hull to facilitate driveshaft clearance for engine removal.



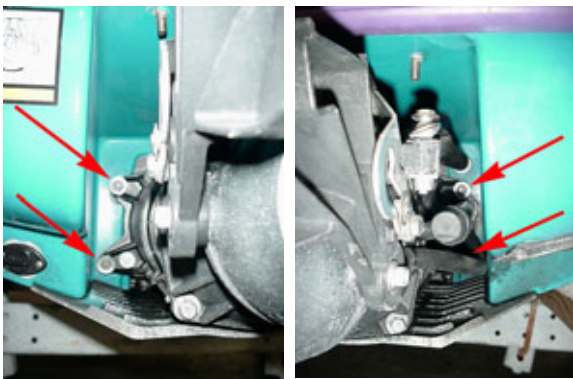
Engine Removal / Installation

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2.4 (Above) Remove the reverse clip by bending the top tab and pushing the clip towards the bend to clear the pivot rod. It's easiest to use needle nose pliers to gently pry the top of the clip up while pushing to release it. After releasing the clip, slide the pivot rod out of the bushing from the bottom.

2.5 (Below) Now that all hoses and cables are detached, the pump assembly can be removed from the hull. There are 4 mounting bolts, 2 on either side of the pump assembly, that need to be removed. This is most easily done with a long socket extension, combined with a 15mm socket.



2.6 (Left) A good deal of force will be needed to remove the pump assembly from the hull at this point. Grasp the end of the pump and pull it up & down, left & right, to break the seal and free the assembly. Once it begins to break-free, pull the assembly straight back and remove the pump from the hull. Note that the driveshaft may not always come out with the pump assembly. If it stays in the hull, simply grab it and pull back to remove.

Step 3

Intake Removal

3.1 (Below) This step will facilitate removal of the flame arrestor, carburetors, intake manifold and reed cages.



3.2 (Above) Remove the flame arrestor cover bolts with a 13mm socket.

3.3 (Below) After removing the arrestor cover, remove the flame arrestor, exposing the arrestor base. Loosen the 6 bolts with a



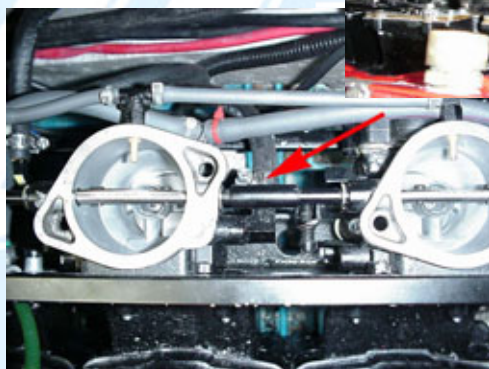
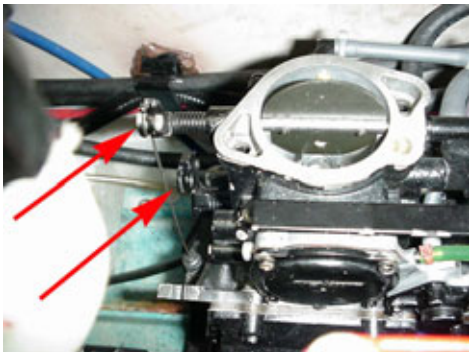
10mm socket and remove the base.



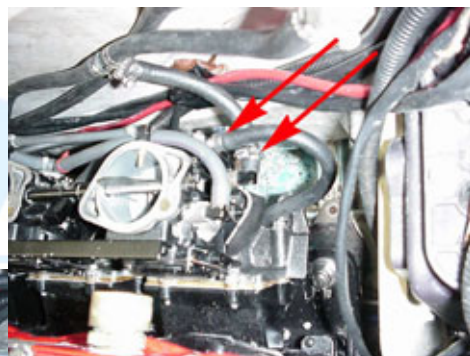
Engine Removal / Installation

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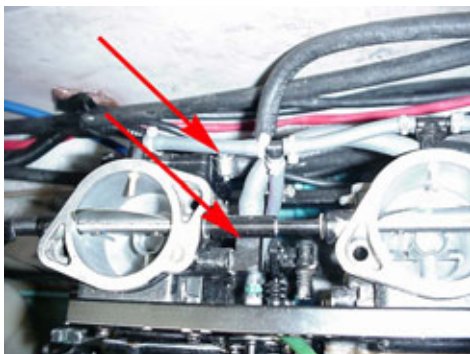
3.4 (Below, Right) Remove the throttle, oil pump and choke cables from the carburetor assembly. Pivot the shafts for easy removal of the cable end-barrels.



3.6 (Below) Remove the rear carb fuel-in and pulse lines from the assembly. Remove the fuel return line, found in the center of the assembly.



3.5 (Below) Loosen the gas tank cap to relieve pressure. Remove the front carb fuel-in and pulse lines from the assembly. Loosen the hose clamps with a screwdriver and gently twist off the hoses. 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.



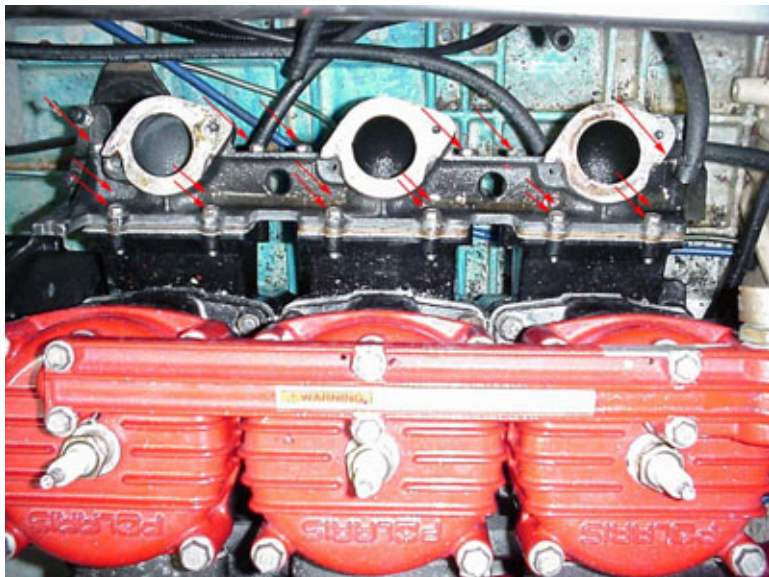
3.7 (Below) It is easiest to tilt the carburetor assembly to facilitate removal of the hoses.

Next, remove the 3 oil lines, one attached to each carb.



Engine Removal / Installation

Polaris 900 / 1050

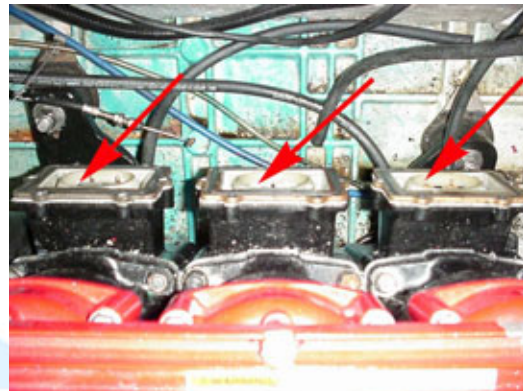


3.8 (Above) The intake manifold is fastened with 18 bolts; 6 per intake tract. The bottom 6 bolts are hidden in the picture but are inline with the top bolts. Remove them all with a 10mm socket.

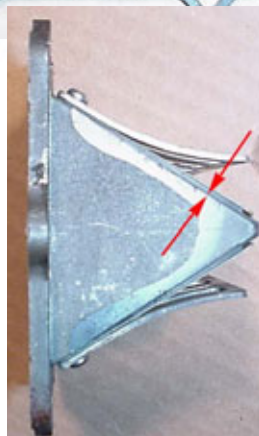
3.9 (below) Tilt the intake manifold on its side and remove the throttle, oil and choke cables with a 10mm wrench. It is easiest to only loosen one end of each cable, then you can re-assemble them to the same length later.



3.10 (Right) Next, simply remove the three reed cages and reed stuffers from the case.



3.11 (Left) 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.



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

Engine Removal / Installation

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Step 4

Exhaust Removal

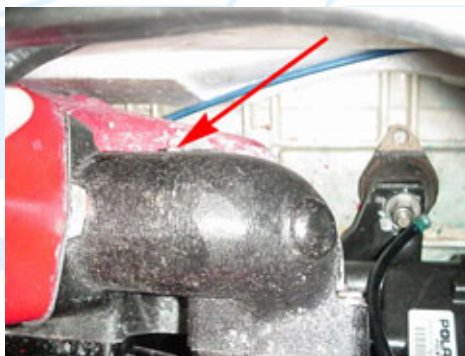


4.1 (Above) Start by removing the waterbox. This will ease removal of the exhaust pipe later. Remove the restraining strap and the two hoses connected at either ends. Loosen the clamps with a screwdriver. Twist the waterbox side-to-side, and pull up from the rear to remove it from the hull.

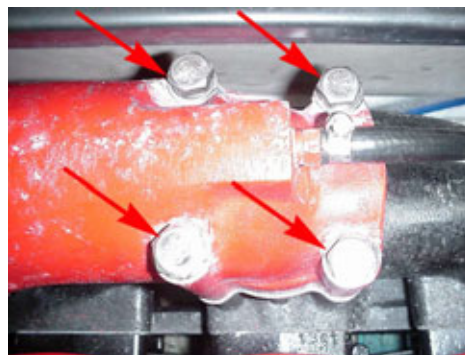
4.2 (Below) Remove the rear water line from the pipe by loosening the clamp with a screwdriver.



4.3 (Left) There are 2 lower bolts securing the exhaust pipe to the exhaust manifold. Remove the rear bolt using a 17mm socket.



4.4 (Left) Remove the front bolt also with a 17mm socket.

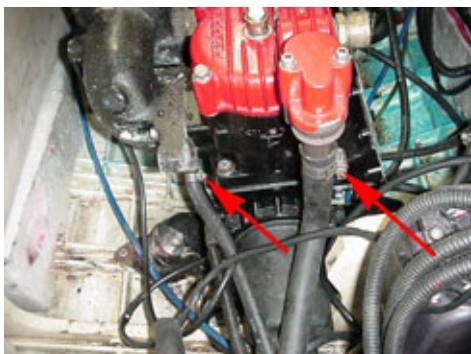


4.5 (Left) Remove the top 4 bolts with a 19mm socket and a 19mm wrench. The pipe is now ready to be removed. Simply lift it up and back to remove it from the hull.

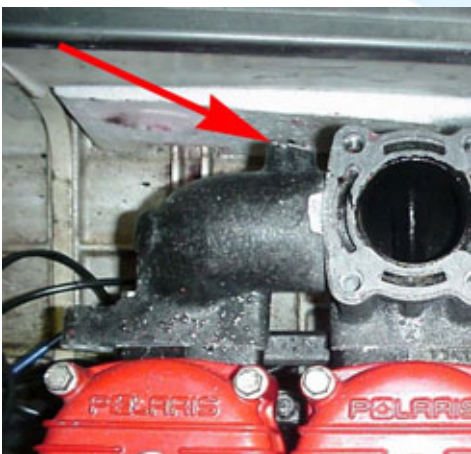
Engine Removal / Installation

Polaris 900 / 1050

4.6 (Below) Remove the waterlines from the head and exhaust manifold by loosening the clamps with a screwdriver.



4.7 (Below) Remove the temperature sensor by removing the retaining nut with a 8mm socket. This will allow the mount plate to be removed, exposing the wiring harness. Wiggle and pull the harness out of the manifold.



4.8 (Above) Each cylinder has 3 bolts; two at the top and one at the bottom. Remove the bottom and outermost two bolts (short) with a 12mm socket, and loosen the four innermost bolts (long) using a 13mm socket.



4.9 (Left) After removing the exhaust manifold from the hull, remove the block ground bolt and the starter wire nut & washer using a 10mm socket.

Engine Removal / Installation

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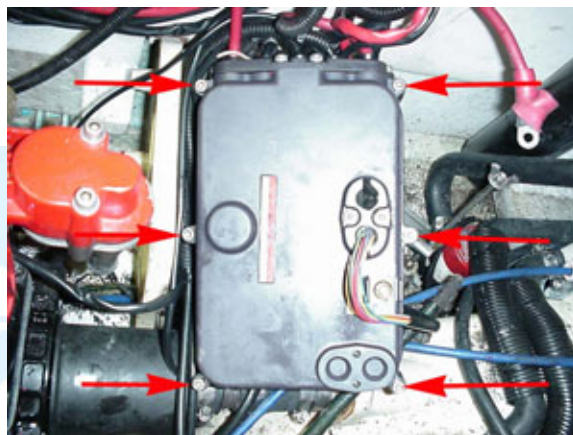
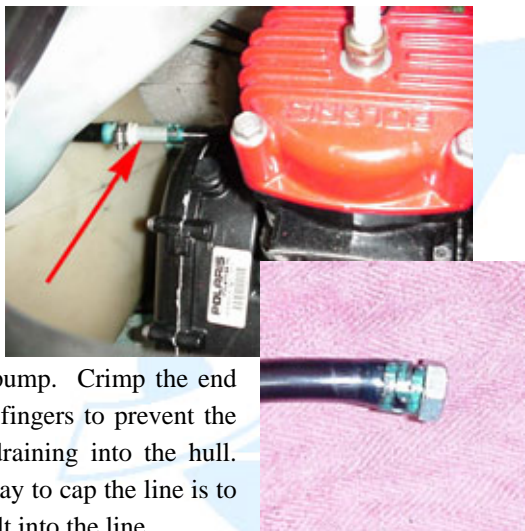
Step 5

Engine Removal

5.1 (Below) Feel to the end of the oil line

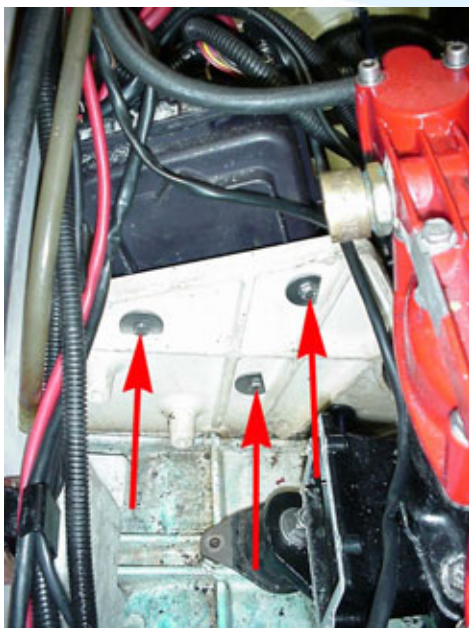
where it meets the pump. Pinch the end clamp and remove the line

from the pump. Crimp the end with your fingers to prevent the oil from draining into the hull. An easy way to cap the line is to insert a bolt into the line.



5.3 (Above) Open the electrical box by removing the six bolts with an Allen wrench.

5.2 (Right) Remove the three bolts mounting the electrical box to the hull with an 11mm socket.



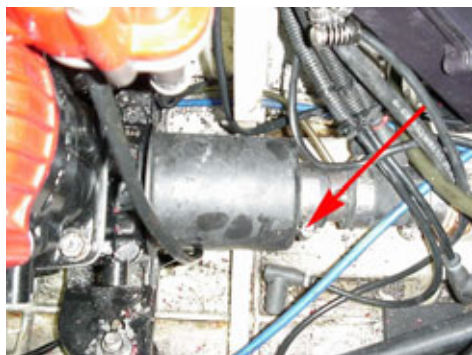
5.4 (Right) **NOTE: DO NOT CUT THE WIRES!** Disconnect all the wires coming through the grommet into the box. Note the location of the wires connected directly to the circuit board for later installation. All other wires are color coded. Remove the two Allen head bolts & grommet from the box then pull the wires through and out.



Engine Removal / Installation

Polaris 900 / 1050

5.5 (Below) Loosen the clamp around the coupler cover and remove the cover.



Remove the 4 motor mount nuts & washers using a 19mm socket, and get a buddy to help you lift the engine out of the hull.

Step 6

Accessory Removal

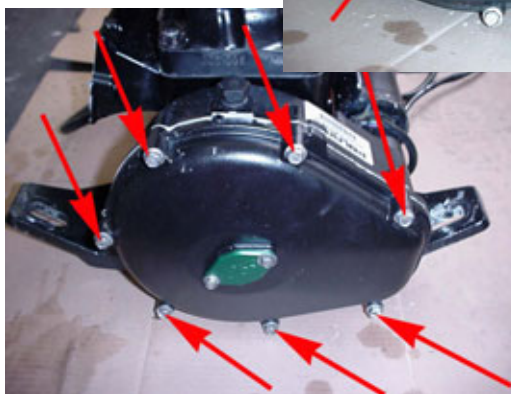
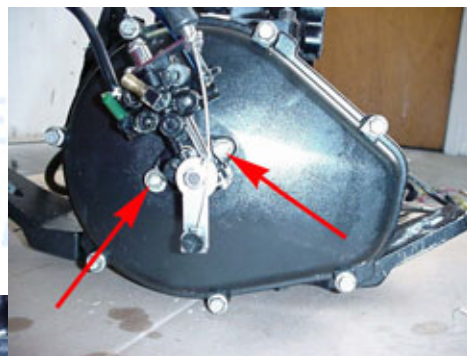
6.1 (Below) With the engine on the ground, workbench or some other solid surface, begin removing the external accessories that will NOT be shipped with the core. Start with the head cooling lines by removing the six 10mm bolts with a socket.



6.2 (Left, 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 PTO coupler. Use a large wrench on the flat sides of the coupler to remove it. A 14" pipe wrench works very well.



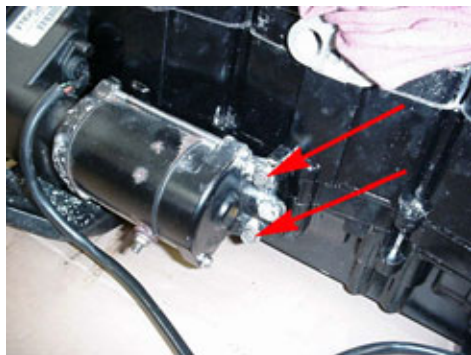
6.3 (Right, Below) Remove the two bolts securing the oil pump to the flywheel cover with a 8mm socket. It is SBT's recommendation that the oil pump be left off the new engine, and a block-off plate be installed at this time. Remove the seven flywheel cover bolts with a 10mm socket.



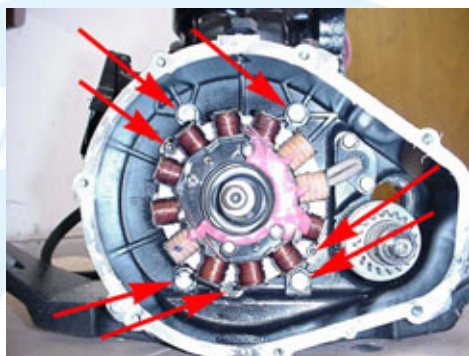
Engine Removal / Installation

Polaris 900 / 1050

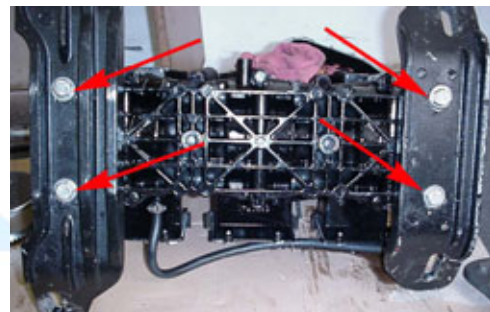
6.4 (Below) Remove the starter by first removing the two 10mm bolts with a socket. Then pull the starter motor straight back out of the flywheel case. It may be somewhat difficult to remove, but it will come out.



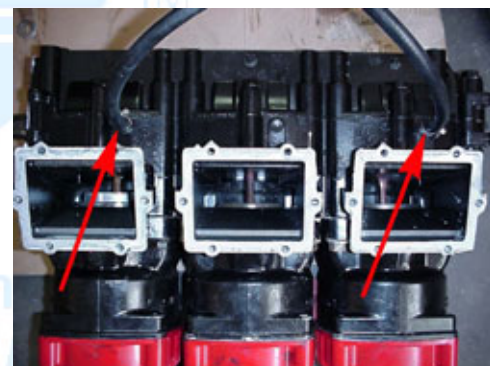
6.6 (Below) Next remove the 4 bolts holding the flywheel case to the crankcase, using a 13mm socket. Then, loosen the 3 Allen head bolts to free the flywheel case from the engine. Remove the starter bendix, and punch out the crank seal, replacing it with a new one.



6.7 (Below) Remove the engine cradle by removing the four 16mm bolts with a socket.



6.8 (Below) Loosen the hose clamps and remove the two impulse hoses from the case.



6.5 (Above) Remove the end nut on the shaft with a 19mm socket. The rag in the exhaust port for PTO coupler removal will again prevent the engine from turning over, allowing the nut to be removed. Next use a universal flywheel puller to remove the flywheel from the shaft. **CAUTION:** Do not screw the puller screws into the flywheel more than 5 complete turns or damage to the stator may occur.



6.9 (Right) 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

Polaris 900 / 1050

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

Polaris 900 / 1050

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

6.9 Install new spark plugs.

- Torque to 18 ft. lbs.

6.8 Install the impulse lines.

6.7 Install the engine cradles.

- Torque to 40 ft. lbs.

6.6 Install the flywheel housing, sealing with Loctite® 2 Gasket Sealer.

- Torque to 22 ft. lbs.

6.5 Stuff a rag into an open exhaust port. Slide the flywheel on the shaft and tighten the flywheel nut.

- Torque to 65 ft. lbs.

6.4 Slide the starter motor in place and fasten it to the block.

- Torque to 108 in. lbs.

6.3 Using a new gasket, install the flywheel case cover and oil pump (or block-off plate).

- Torque to 60 in. lbs.

6.2 Install the PTO coupler.

- Torque to 160 ft. lbs.

6.1 Install the cooling rails, with new gaskets.

- Torque to 108 in. lbs.

Spin the engine mount nuts onto the studs, 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 new engine into the hull and place it on the engine mount studs. Re-install engine mount bolts.

- Torque to 45 ft. lbs.

5.5 Install the coupler shroud.

5.4 Feed the flywheel wires back into the electrical box and reconnect all wires.

5.3 Replace the wire grommet and close the electrical box.

5.2 Fasten the electrical box to the hull.

5.1 Attach the oil pump line if your oil injection pump is to be used. If not, make sure the line is capped securely. Open the bleed screw and allow the line to bleed for at least one minute to remove air pockets.

4.9 Attach the starter and block ground wires.

4.8 Using new gaskets, attach the exhaust manifold to the block, noting that the upper 4 (long) bolts need to be in the manifold while placing it into the hull.

- Torque to 22ft. lbs.

4.7 Attach the temperature sensor.

4.6 Attach the head and manifold waterlines.

4.5 Insert the 4 top bolts into the stinger pipe, and place it with a new gasket, into the hull and atop the manifold.

- Torque to 22 ft. lbs.

4.4 – 4.3 Torque the front and rear exhaust bolts to 14 ft. lbs.

4.2 Attach the rear waterline to the stinger.

4.1 Install the waterbox and attach the exhaust hose.

3.10 Install the reed cage assemblies and the stuffers.

3.9 Attach the choke, throttle and oil cables (if using the oil pump) to the manifold.

Engine Removal / Installation

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3.8 Install the intake manifold.

- Torque to 108 in. lbs.

3.7 Install the oil lines to the carbs, if so equipped.

3.5 – 3.6 Install the carb impulse and fuel lines.

3.4 Attach the choke, throttle and oil (if so equipped) cables to the carbs.

3.3 Install new gaskets under the carbs. Install the flame arrestor base and place the flame arrestor.

- Torque to 108 in. lbs.

3.2 Install the flame arrestor cover.

- Torque to 9.5 ft. lbs.

2.6 Install the drive shaft into the hull. You will feel it slide into the coupler by its splines. Apply 100% silicone to the pump housing on the o-ring to provide a seal to the hull. Slide the pump assembly over the shaft, meeting with the mounting bolts on the hull.

2.5 Re-attach the pump mounting bolts to support the pump.

- Torque to 28 ft. lbs.

2.4 Re-attach the reverse rod to the gate and install the clip.

2.3 Re-attach the water intake and bilge hoses on the inside rear of the hull to the pump.

2.2 Re-attach the steering rod to the steering nozzle.

- Torque to 8 ft. lbs.

1.2 Install the battery, making sure it has a full charge. Attach the positive wire first.

1.1 Install the plastic battery cover and install the securing rod & wing nut.

Remanufactured PWC Engines...
It's all we do.

Engine Removal / Installation

Polaris 900 / 1050

Tools Needed:

Sockets

- 19mm
- 17mm
- 16mm
- 15mm
- 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
- 10mm
- Allen wrenches
- Pipe wrench
- Torque wrench