

# Engine Removal / Installation

Kawasaki 900 / 1100

## Step 1

### Battery Removal

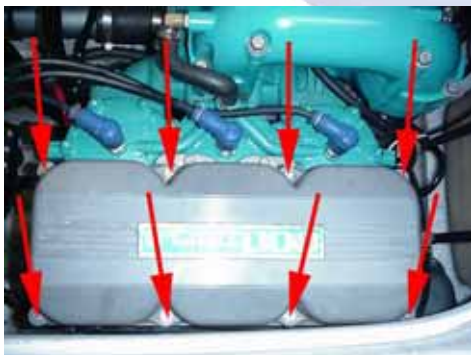


1.1 (Above) Remove the two retaining straps, disconnect the battery and remove it from the hull. Disconnect the negative (black) cable first, then the positive (red).

## Step 2

### Intake Removal

2.1 (Below) Remove the eight 10mm bolts securing the flame arrester cover to the base and remove it.



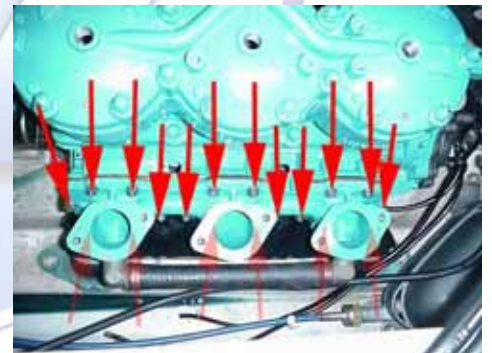
2.2 (Below) Pull out the flame arrester screens.



2.3 (Below) Remove the six 10mm bolts securing the flame arrester base and carbs to the manifold and remove the base.



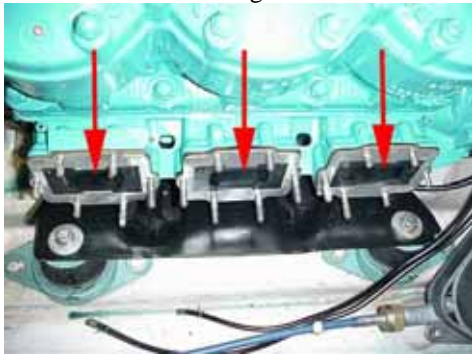
2.4 (Below) Loosen the gas tank cap to relieve pressure. Be sure the fuel switch is turned to the "OFF" position, and be aware of any fuel that may spill from the hoses. Make sure the hull is clear of any gasoline fumes before continuing work, especially with power tools. Remove the pulse lines from the block, and the three oil lines from the carbs. Move the carbs aside in the hull.  
2.5 (Below) Remove the 18 10mm nuts from the studs securing the intake manifold to the engine and remove the manifold.



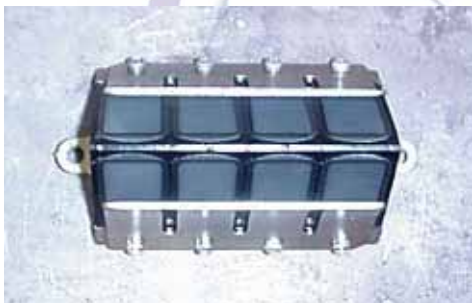
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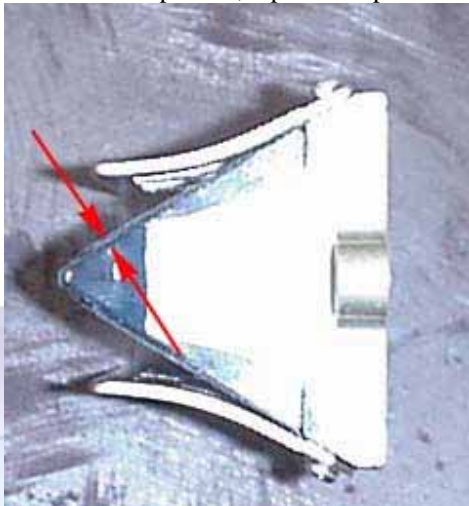
2.6 (Below) Pull out the reed cage assemblies from the engine.



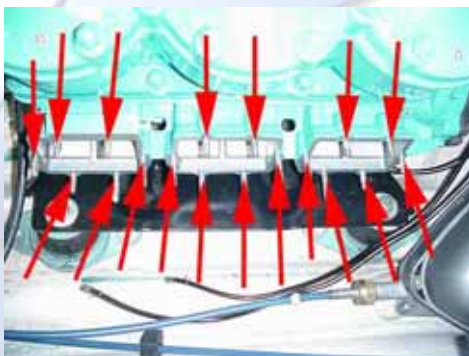
2.7 (Below) Inspect each reed assembly for damage and wear. Look at each reed petal and inspect the edges for signs of cracking, chipping or any missing parts. If any damage is present, replace the petals.



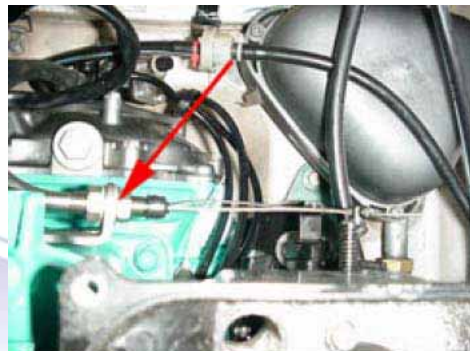
2.8 (Below) Look at each petal-to-cage surface and check for gap. If a gap of more than 0.015" is present, replace the petals.



2.9 (Below) Remove the 18 6mm studs from the engine with a stud socket.



2.10 (Below) Remove the throttle and choke cables from the bracket, then remove the two 10mm bolts securing the bracket to the cylinder and remove it.



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## Step 3

### Exhaust Removal

3.1 (Below) Remove the pipe cooling entry and exit lines. ZXI models require splitting the exhaust pipe sections.

3.2 (Below) Remove the 12mm pipe to manifold bolts. Loosen the pipe to waterbox coupler and slide the pipe up and forward to remove it from the hull.



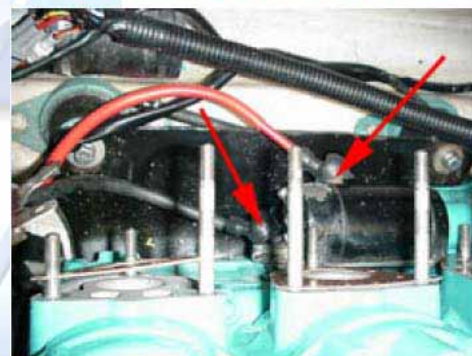
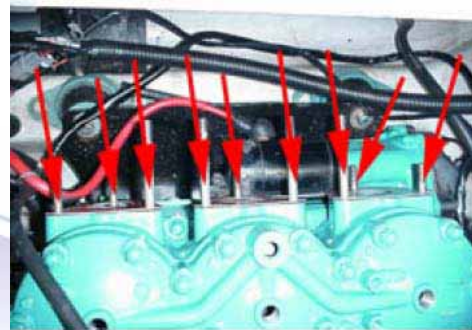
3.3 (Below) Remove the nine 12mm nuts securing the exhaust manifold to the engine and pull the manifold back off the studs.



3.4 (Below) Disconnect the water lines from the manifold. Remove it from the hull.



3.5 (Below) Remove the nine exhaust studs with an 8mm stud socket. Remove the starter ground and positive wires with a 10mm socket.



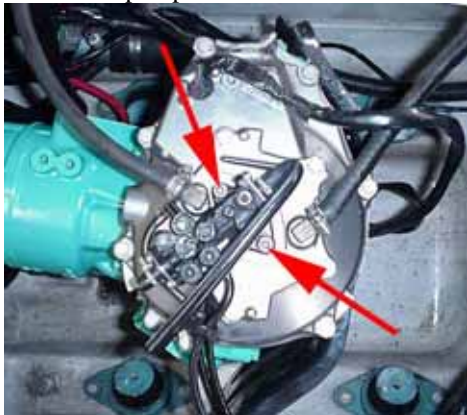
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## Step 4

### Engine Removal

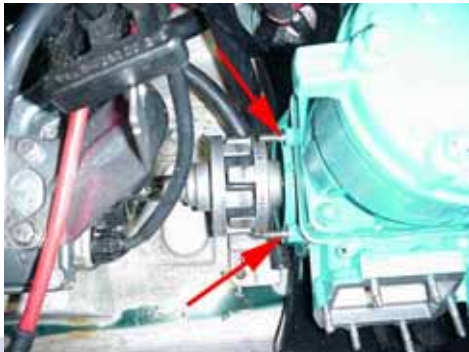
4.1 (Below) Remove the two Allen bolts securing the oil pump to the flywheel cover and set the pump aside in the hull.



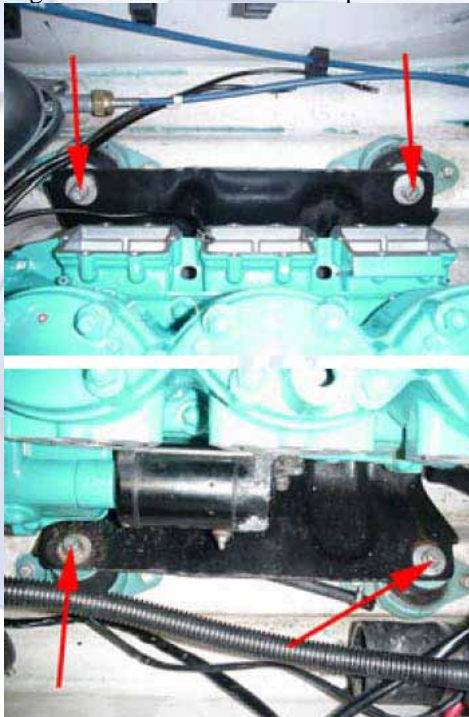
4.2 (Below) Remove the two 10mm nuts securing the PTO cover to the engine and remove the cover.



4.3 (Below) Remove the two PTO cover studs with a 6mm stud socket.



4.4 (Below) Remove the four 12mm nuts from the motor mounts, and slide the engine forward off the PTO coupler.



4.5 (Below) Remove the two 10mm bolts from the electrical box to expose the wiring harnesses beneath. Detach the wiring harnesses. **NOTE: DO NOT CUT THE WIRES!** Remove the engine from the hull.



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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) Remove the six 12mm bolts from the bottom bed plate and remove it.



5.2 (Below) Remove the two 10mm bolts securing the starter to the engine. Pull the starter firmly back to remove it from the flywheel housing.



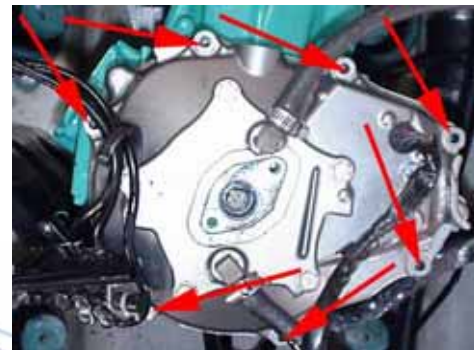
5.3 (Below) Stuff a rag into an open exhaust port. This will prevent the engine from turning over while removing the flywheel and PTO coupler.



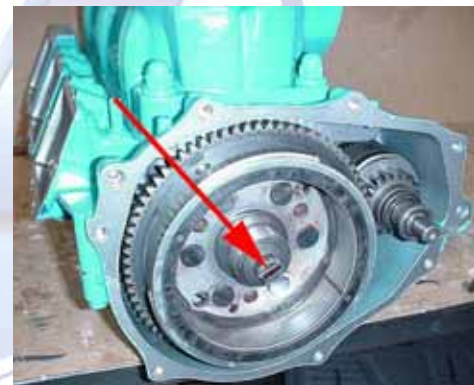
5.4 (Below) Using a chain wrench, remove the PTO flywheel from the crankshaft.



5.5 (Below) Remove the seven 10mm bolts securing the flywheel cover to the engine and remove the cover.



5.6 (Below) Remove the flywheel nut with a 14mm socket. Unless you have a special Kawasaki Flywheel puller tool, you will now need to take your engine to your local dealer to have them remove your flywheel. This service should cost between \$10 and \$20. After removing the flywheel, remove the bendix gear.



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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:

**5.6 - 5.7** Stuff a rag into an open exhaust port. Install the starter bendix gear and flywheel.

- Torque to 94 ft. lbs.

**5.5** Using a new gasket, install the flywheel cover.

- Torque to 69 in. lbs.

**5.3 - 5.4** Install the PTO flywheel.

- Torque to 72 ft. lbs.

**5.2** Install the starter.

- Torque to 78 in. lbs. (1100)
- Torque to 69 in. lbs. (900)

**5.1** Install the engine bed plate.

- Torque to 27 ft. lbs.

**4.5** Spin the engine mount bolts into the mounts, and rock them back & forth with your hands; try to break them. If any mount(s) fails, replace it before installing the new engine. Place the engine in the hull and slide it back onto the driveshaft coupler.

Your new engine may require re-shimming. Shims are necessary between the engine mounts and brackets to properly align the engine and pump shafts. If you

do not have enough factory shims with your hull, very thin, wide washers may be substituted.



Take a small straight edge and place it on the coupler. You are looking for an even match all the way around the coupler. Place shims where necessary to align the couplers.

**4.4** Tighten the motor mounts.

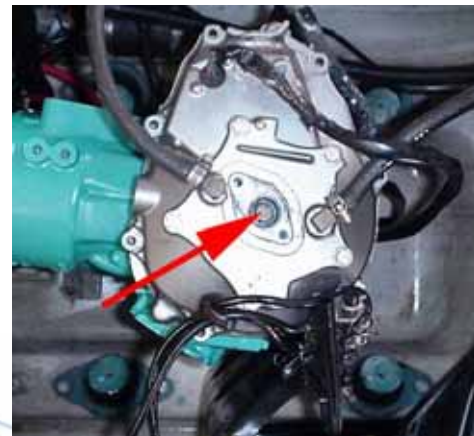
- Torque to 33 ft. lbs.

**4.3** Install the PTO cover studs to snug.

**4.2** Install the PTO cover.

**4.1** Align the oil pump key and, using a new gasket, install the oil pump. Open the bleed screw and allow the line to bleed for at least one minute to remove air pockets. 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.

- Torque to 69 in. lbs.



**3.5** Attach the starter positive and ground wires. Install the exhaust studs to snug.

**3.4** Place the exhaust manifold in the hull and attach the cooling lines.

**3.3** Install the exhaust manifold nuts.

- Torque to 14.5 ft. lbs.

**3.2** Place the pipe in the hull and install the pipe to manifold bolts.

- Torque to 36 ft. lbs.

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**3.1** Attach the pipe cooling lines.

**2.10** Install the cable bracket and cables into it.

- Torque to 69 in. lbs.

**2.9** Install the intake studs to snug.

**2.6 – 2.8** Install the reed cage assemblies in the engine.

**2.5** Install the intake manifold.

- Torque to 87 in. lbs.

**2.4** Install the carb lines and cables. Using new gaskets, place the carbs on the manifold.

**2.3** Install the flame arrestor base and carb/base bolts.

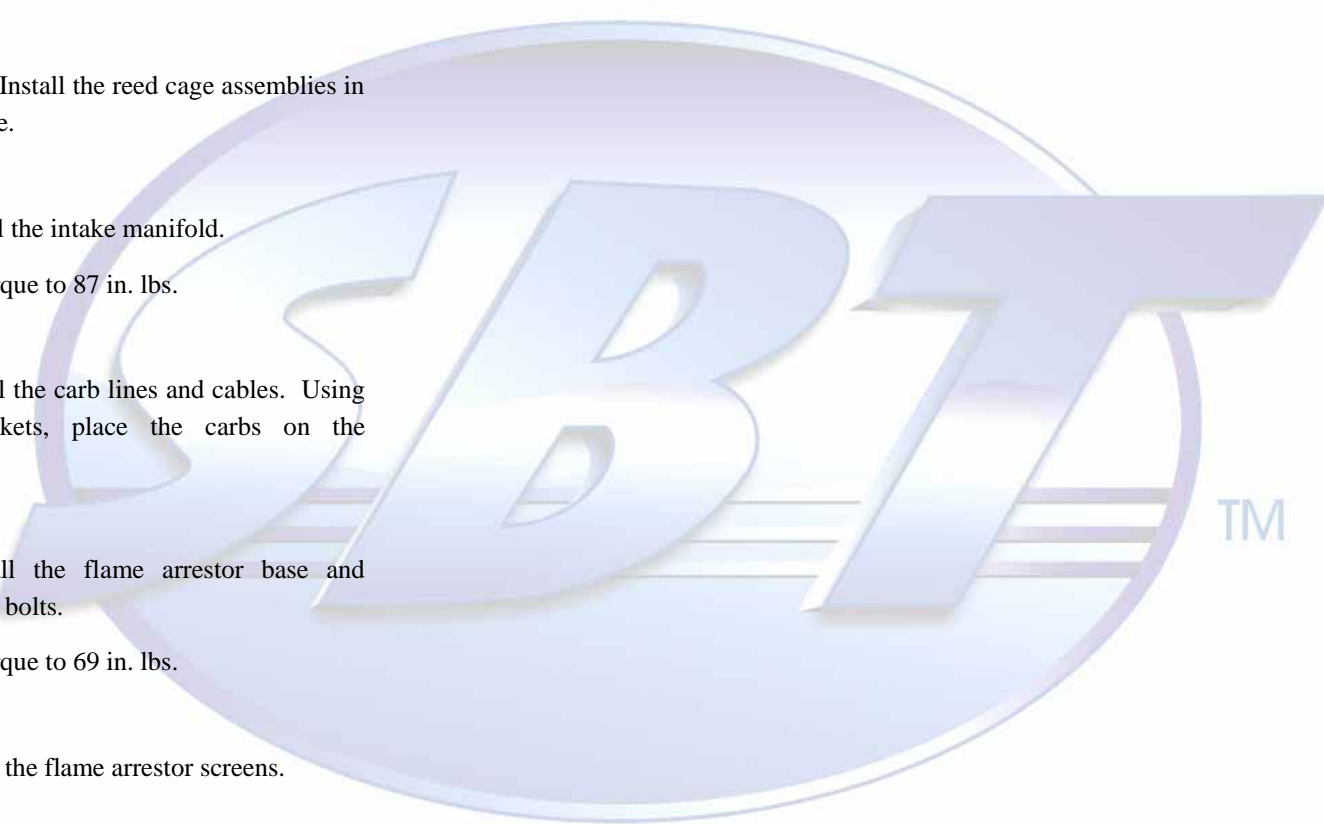
- Torque to 69 in. lbs.

**2.2** Insert the flame arrestor screens.

**2.1** Install the flame arrestor cover.

- Torque to 69 in. lbs.

**1.1** Install the battery, making sure it is fully charged.





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## **Tools Needed:**

### **Sockets**

- 12mm socket
- 10mm socket

### **Misc.**

- Ratchet
- Long socket extension
- Short socket extension
- Screwdrivers
- 6mm stud socket\*
- 8mm stud socket\*

### **Wrenches**

- 10mm wrench
- Torque wrench
- Chain wrench

### **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

\* If no stud sockets are available, you may double-nut the studs to remove/install them. Place two nuts on the stud and tighten them together. Wrench against the bottom one to remove the stud, wrench against the top nut to install the stud.