

# Engine Removal / Installation

Yamaha 500

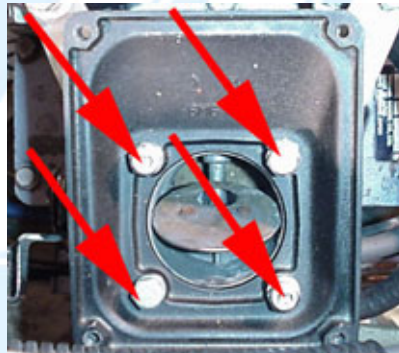
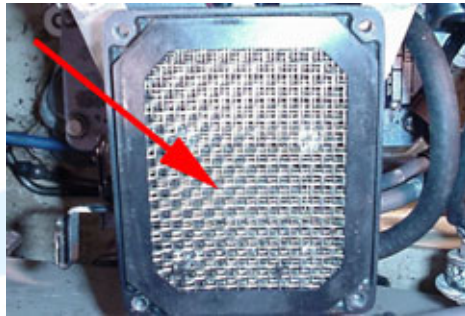
## Step 1

### Battery Removal



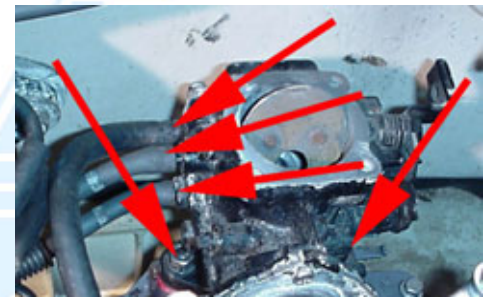
1.1 (Above) Remove the two retaining straps, disconnect the battery and remove it from the hull. Disconnect the negative (black) cable first, then the positive (red).

2.2 (Below) Remove the flame arrestor screen from the base.



2.3 (Above) Remove the four 10mm bolts securing the flame arrestor base to the carb 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 cleared of any gasoline fumes before continuing work, especially with power tools. Remove the fuel in, fuel out and pulse lines from the carbs. Detach the throttle and choke cables. Remove the two nuts securing the carb to the intake manifold and remove the carb.



2.5 (Below) Detach the cables from the bracket and remove the bracket.



## Step 2

### Engine Removal

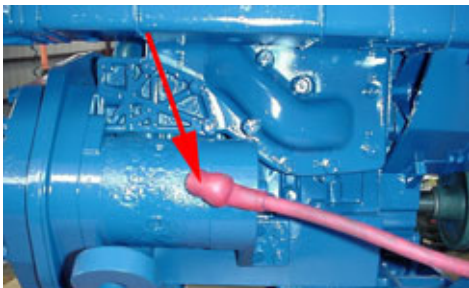
2.1 (Below) Remove the four screws securing the flame arrestor cover to the base.



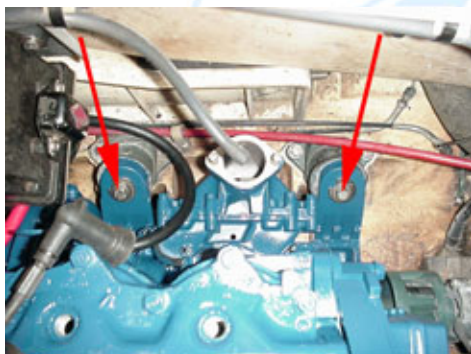
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2.6 (Below) Remove the negative battery cable from the flywheel cover with a 12mm socket. Remove the starter positive cable with an 8mm socket.



2.7 (Below) Remove the four motor mount bolts with a 12mm socket (carb side shown).



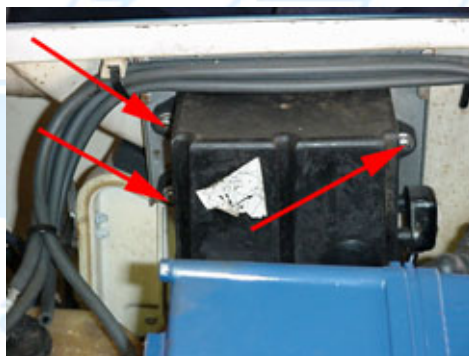
2.8 (Below) Remove the PTO coupler shield with a 10mm socket.



2.9 (Below) Detach the starter switch electrical harnesses.



2.10 (Below) Remove the three 10mm bolts and remove the electrical box from the hull.



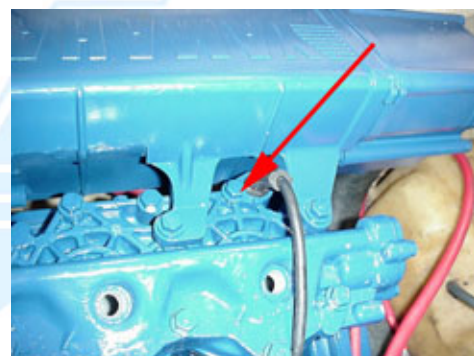
2.11 Detach the exhaust coupler hose and water inlet hose from the exhaust plate. You may now remove the engine from the hull.

## Step 3

### 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.

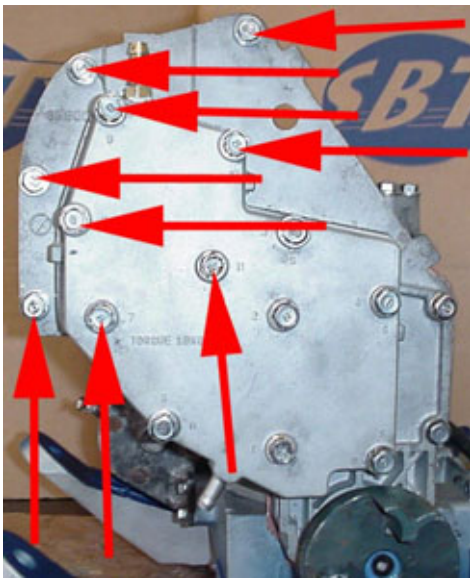
3.1 (Below) Remove the thermo sensor with a 10mm socket.



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3.2 (Below) Remove the nine 10mm bolts securing the muffler to the bracket.



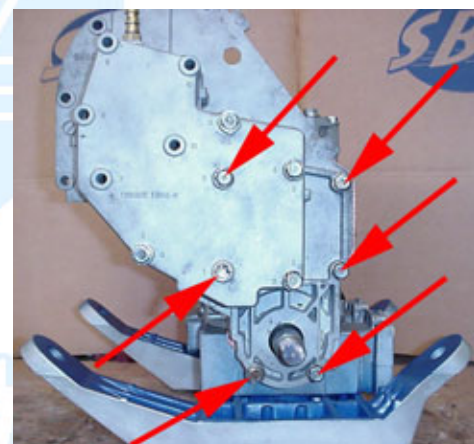
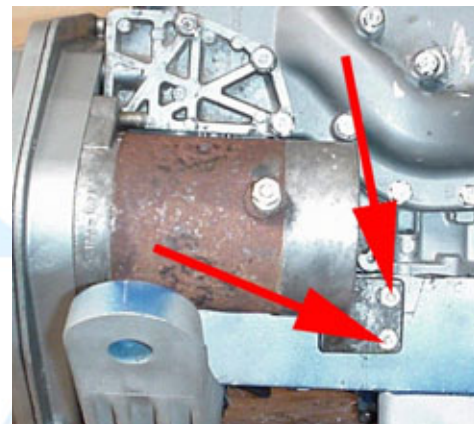
3.3 (Above) Remove the two 12mm bolts securing the muffler to the head and remove the muffler.

3.4 (Below) Feed a line of rope into one of the cylinders through a spark plug hole and rotate the engine to compress it. This will prevent the engine from turning over as you remove the PTO coupler and flywheel.



3.5 (Above) Using a chain wrench, remove the PTO coupler.

3.6 (Below) Remove the two 8mm bolts securing the starter to the engine and pull the starter out of the housing.

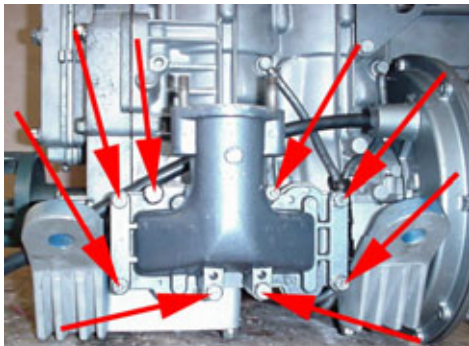


3.7 (Above) Remove the six 10mm bolts securing the exhaust bracket to the engine and remove the bracket.

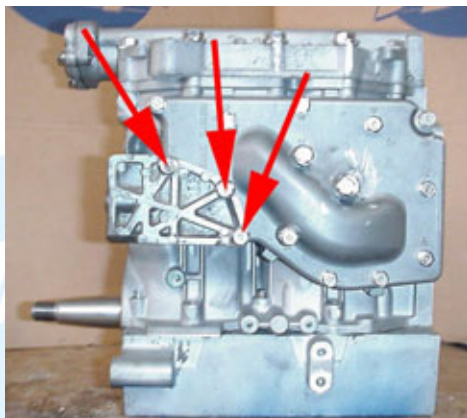
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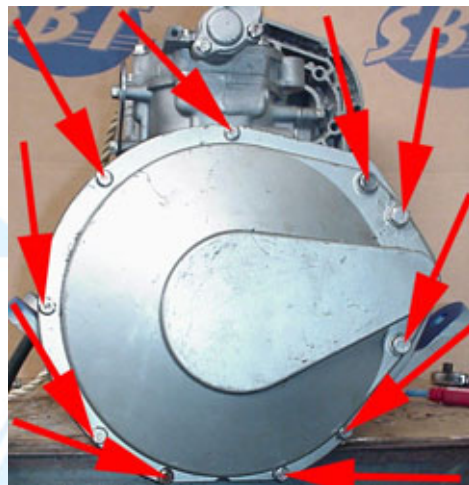
3.8 (Below) Remove the eight 10mm bolts securing the intake manifold to the block and remove it.



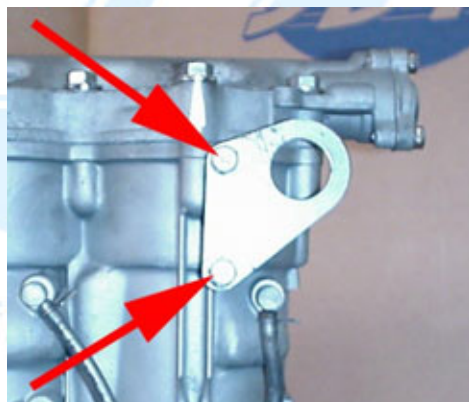
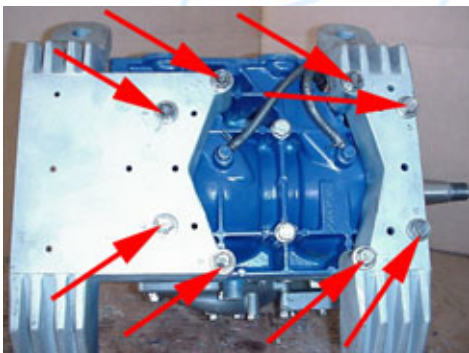
3.10 (Below) Remove the three 10mm bolts from the exhaust bracket and remove it.



3.12 (Below) Remove the 10 10mm & 12mm bolts from the flywheel housing and remove it.

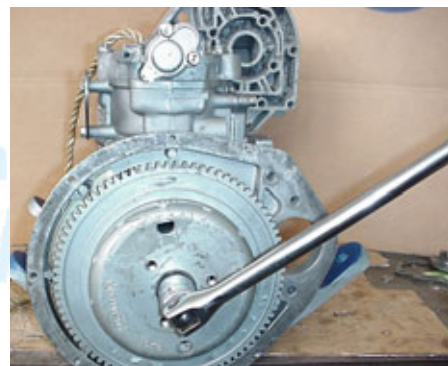


3.9 (Below) Remove the eight 12mm bolts from the engine support plates and remove them.



3.11 (Above) Remove the two 10mm bolts from the lifting brace and remove it.

3.13 (Below) Using a 19mm socket and breaker bar, remove the flywheel nut.



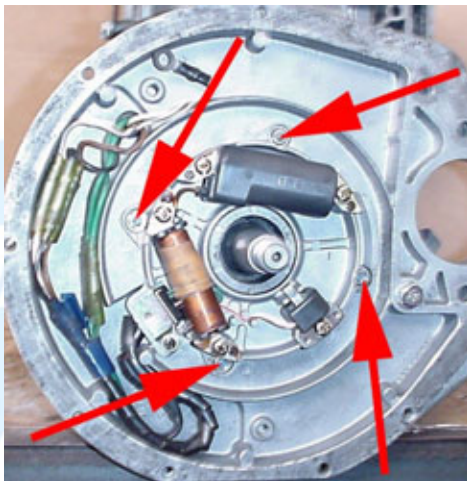
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3.14 (Below) Using a universal flywheel puller, remove the flywheel from the crank. **CAUTION:** Do not screw the puller screws into the flywheel more than 5 complete turns or damage to the stator may occur.



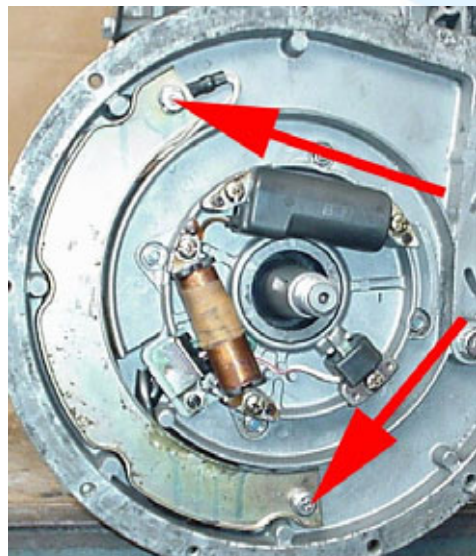
3.16 (Below) Unplug the electrical wires. **NOTE: DO NOT CUT THE WIRES!** Using an 8mm socket, remove the stator.



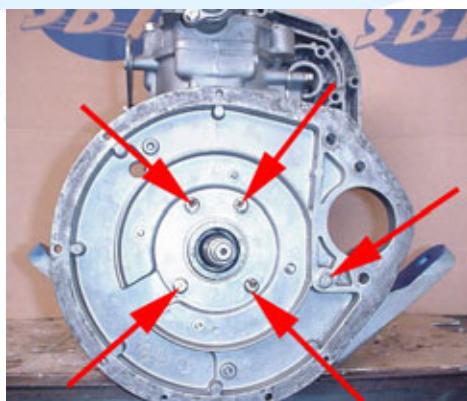
3.18 (Below) Remove the equalization lines from the block.



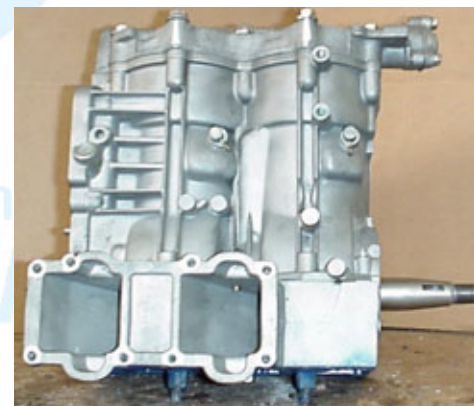
3.15 (Below) Remove the two 10mm bolts from the wiring protector and remove it.



3.17 (Below) Remove the four 10mm bolts securing the flywheel housing to the block and remove it.



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



# *Engine Removal / Installation*

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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:

**3.18** Install the equalization lines.

**3.17** Using a new gasket, install the flywheel housing.

- Torque to 14 ft. lbs.

**3.16** Install the stator, carefully lining it up exactly as it was removed. Re-attach the electrical wires.

- Torque to 2.9 ft. lbs.

**3.15** Install the wiring protector plate.

- Torque to 2.9 ft. lbs.

**3.13-3.14** Install the flywheel and nut.

- Torque to 100 ft. lbs.

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

- Torque to 5.8 & 12 ft. lbs.

**3.11** Install the lifting brace.

- Torque to 14 ft. lbs.

**3.10** Install the exhaust bracket.

- Torque to 22 ft. lbs.

**3.9** Install the engine support plates.

- Torque to 22 ft. lbs.

**3.8** Using a new gasket, install the intake manifold.

- Torque to 14 ft. lbs.

**3.7** Using a new gasket, install the exhaust bracket.

- Torque to 22 ft. lbs.

**3.6** Using a thin bead of Permatex 2 Gasket Sealer, install the starter motor.

- Torque to 14 ft. lbs.

**3.5** Install the PTO coupler.

- Torque to 27 ft. lbs.

**3.3** Install the muffler and head bolts.

- Torque to 22 ft. lbs.

**3.2** Using a new gasket, install the muffler to the bracket.

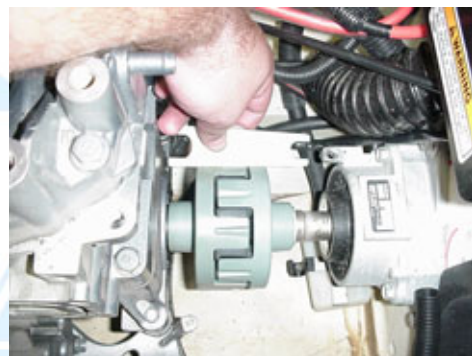
- Torque to 14 ft. lbs.

**3.1** Install the thermo sensor to the head.

- Torque to 4.3 ft. lbs.

**2.11** Place the hull. Install the water inlet line to the exhaust plate. Install the exhaust coupler hose.

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.

**2.10** Install the electrical box.

- Torque to 11 ft. lbs.

**2.9** Re-connect the starter switch wires.

**2.8** Install the PTO coupler shield.

- Torque to 4.3 ft. lbs.

**2.7** Install the motor mount bolts.

- Torque to 12 ft. lbs.

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**2.6** Attach the starter positive wire and block ground.

- Torque to 2.9 ft. lbs

**2.5** Install the carb bracket and control cables.

**2.4** Using a new gasket, install the carb and attach the cables and fuel lines.

- Torque to 4.3 ft. lbs.

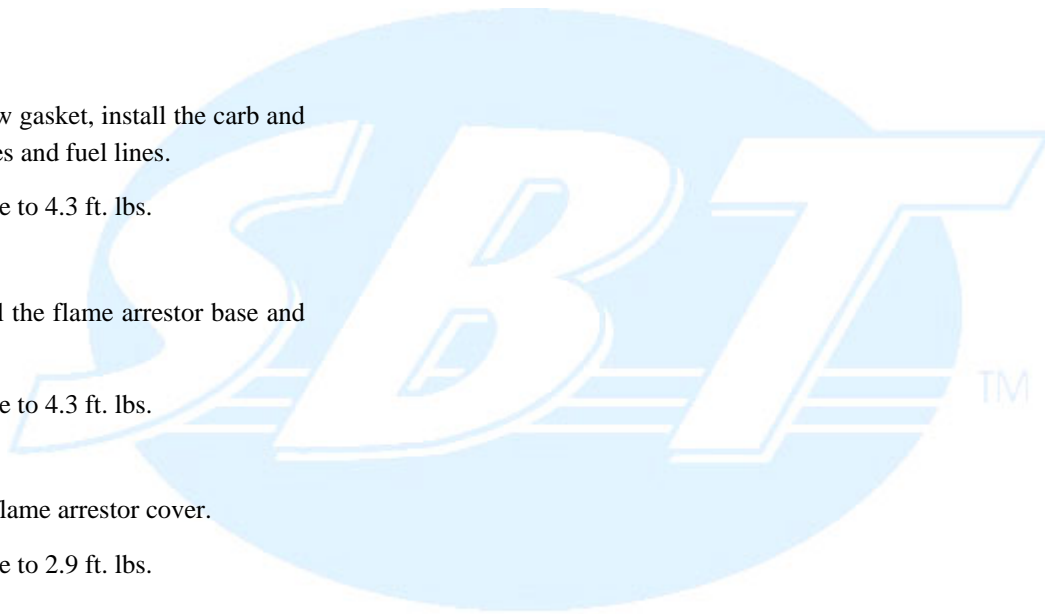
**2.2 - 2.3** Install the flame arrester base and screen.

- Torque to 4.3 ft. lbs.

**2.1** Install the flame arrester cover.

- Torque to 2.9 ft. lbs.

**1.1** Install the battery.



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## **Tools Needed:**

### **Sockets**

- 19mm socket
- 12mm socket
- 10mm socket
- 8mm socket

### **Misc.**

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

### **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

### **Wrenches**

- Torque wrench
- 10mm wrench
- Chain wrench

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