

# REMOVAL AND INSTALLATION

## GENERAL

On some models, it is not necessary to remove engine from watercraft to service TOP END, PTO FLYWHEEL or MAGNETO. However, engine removal is necessary to repair BOTTOM END.

## ENGINE REMOVAL

### **DI Models**

Use the VCK (Vehicle Communication Kit) (P/N 529 035 981) and release the fuel pressure in the fuel system. Refer to ENGINE MANAGEMENT section.

### **All Models**

In order to remove engine from watercraft proceed as follows.

First, disconnect battery cables from battery.

### **⚠ WARNING**

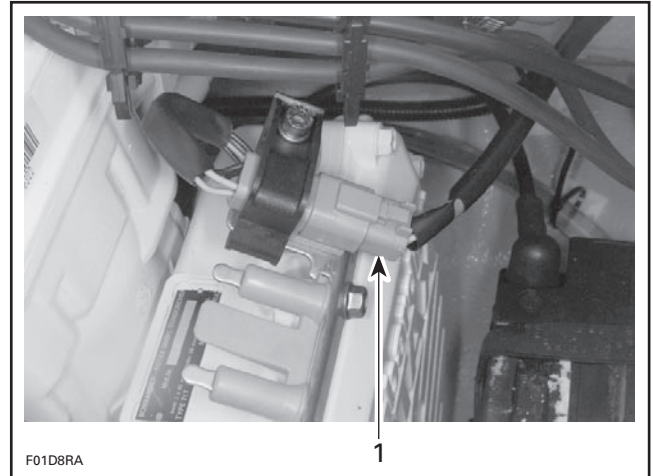
Always disconnect battery cables exactly in the specified order, **BLACK** negative cable first then the **RED** positive battery cable last.

## Electrical Connections

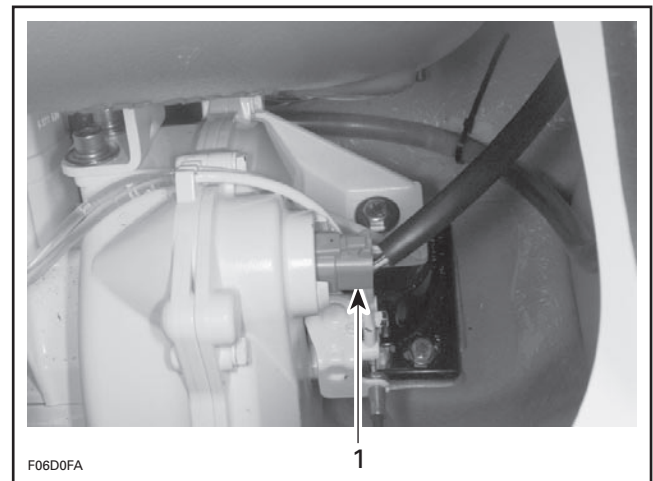
It is recommended to disconnect electrical connections prior to disconnecting fuel lines.

Disconnect temperature sensor wire and spark plug cables.

Disconnect magneto wiring harness.



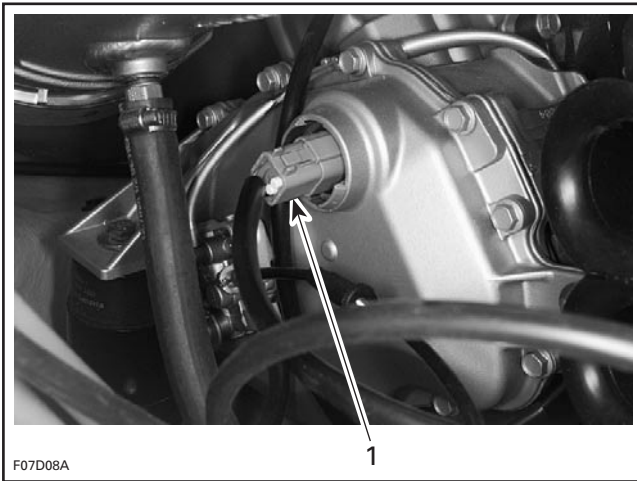
**717 ENGINES**  
1. Unplug connector



**787 RFI ENGINES**  
1. Unplug connector

## Section 04 ENGINE (2-STROKE)

### Subsection 02 (REMOVAL AND INSTALLATION)



#### 947 DI ENGINES

1. Unplug connector

#### GTI RFI Series

Disconnect throttle position sensor (TPS), air pressure sensor (APS) and air temperature sensor (ATS).

Disconnect crankshaft position sensor (CPS).

Disconnect connectors from fuel injectors.

Refer to FUEL INJECTION for location of sensors and connectors.

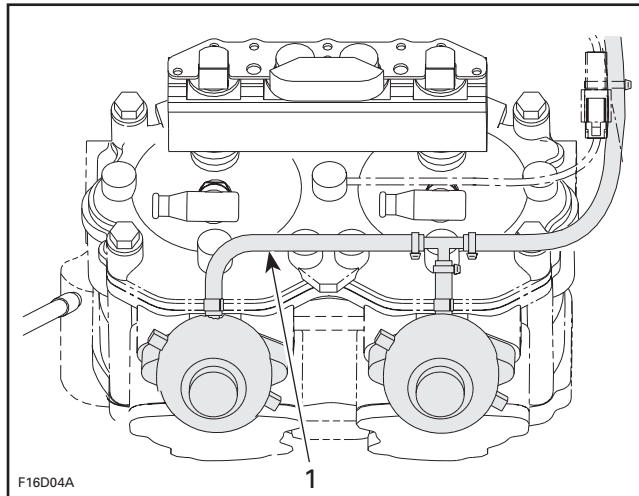
#### DI Models

Disconnect both throttle position sensors (TPS), manifold air pressure sensor (MAPS) and manifold air temperature sensor (MATS).

Disconnect connectors from fuel injectors and direct injectors.

Disconnect connector from knock sensor.

Disconnect RAVE valve hose where shown. Inspect hose. If it has hardened or is slit, replace hose.



1. Disconnect hose here

Refer to ENGINE MANAGEMENT for location of sensors and connectors.

Unplug air compressor lines (inlets and outlets): cooling, oil (outlet only) and air (inlet only on throttle body side).

Disconnect vent hose from balancing shaft gear housing.

#### Jet Pump Removal

##### All Models

To withdraw jet pump, refer to JET PUMP.

**CAUTION:** Whenever removing engine from watercraft, engine/jet pump alignment must be performed at reinstallation.

#### Drive System

To withdraw driveshaft(s), refer to DRIVE SYSTEM.

#### Cooling System

Disconnect the engine water supply hose.

Disconnect the engine water return hose.

**NOTE:** Engine will have to be raised inside bilge to disconnect drain hose before removing from bilge.

Refer to COOLING SYSTEM for proper water hose location.

#### Tuned Pipe

To remove tuned pipe, refer to EXHAUST SYSTEM.

### Air Intake Silencer

To remove air intake silencer, refer to AIR INTAKE.

### Carburetor/Throttle Body

#### **Carburetor-Equipped Models**

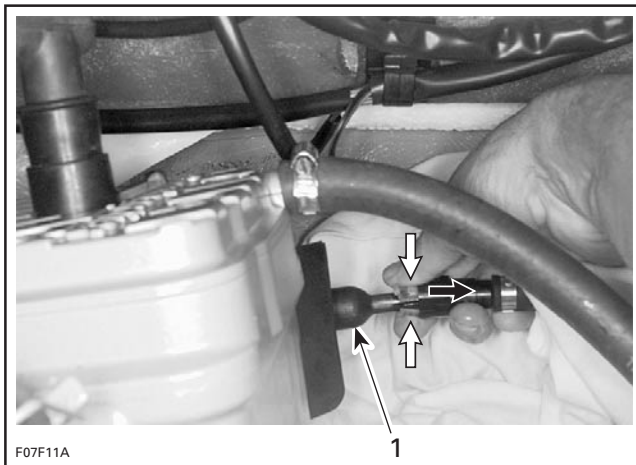
Turn fuel valve to OFF.

Disconnect fuel supply and fuel return hoses.

To remove carburetor(s), refer to CARBURETOR for proper procedure.

#### **GTI RFI Series**

Disconnect fuel supply hose from fuel rail.



**PRESS TABS AND PULL CONNECTOR**  
1. Fuel rail

**⚠ WARNING**

The fuel hose may be under pressure. Cover the fuel line connection with an absorbent shop rag. Slowly disconnect the fuel hose to release the pressure. Wipe off any fuel spillage inside bilge.

#### **DI Models**

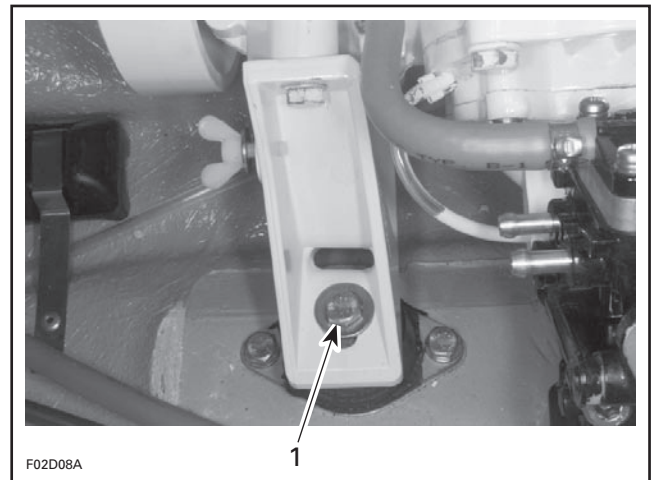
Remove air/fuel rail. Refer to ENGINE MANAGEMENT.

#### **All Models**

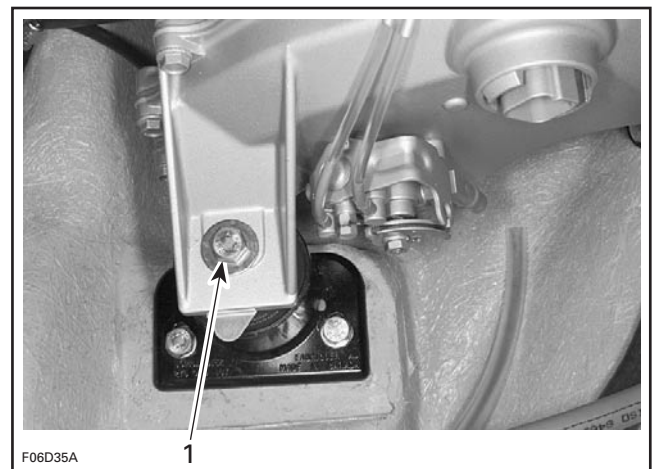
### Engine Support

**NOTE:** Be careful when removing engine support(s) or rubber mount adapters, shims could have been installed underneath. Shims control engine/jet pump alignment. Always note position of shims for reinstallation, to avoid altering engine alignment.

Remove engine support mount screws.



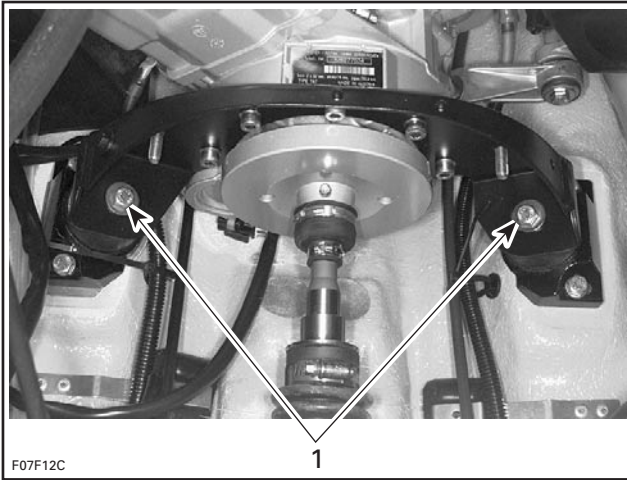
**717 ENGINES**  
1. Remove screw of each engine support



**TYPICAL — 787 RFI AND 947 DI ENGINES — FRONT SUPPORT**  
1. Remove screw

## Section 04 ENGINE (2-STROKE)

### Subsection 02 (REMOVAL AND INSTALLATION)

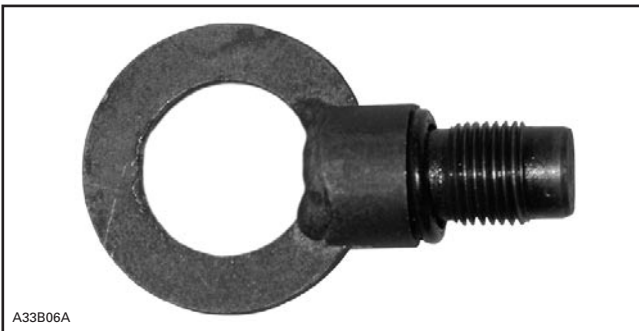


TYPICAL — 787 RFI AND 947 DI ENGINES — REAR SUPPORT  
1. Remove screws

## Lifting Engine

### 717 Engines

Engine can be easily lifted using lifting rings (P/N 529 035 830) and the engine lift tool (P/N 529 035 940).



LIFTING RING

Remove spark plugs and replace by lifting ring (P/N 529 035 830).

Hook engine lift tool (P/N 529 035 940) into lifting ring holes.



ENGINE LIFT TOOL

Using a chain block, a hoist or other suitable equipment, slightly lift engine to ease the remaining component removal.

**CAUTION:** Take care not to damage cable or oil injection hoses.

### 787 RFI and 947 DI Engines

Engine can be easily lifted by inserting a hook into exhaust manifold eyelet.



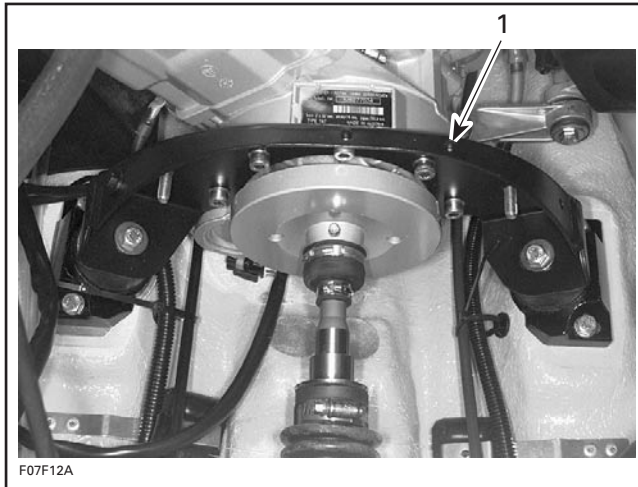
TYPICAL

Using a chain block, a hoist or other suitable equipment, slightly lift engine to ease the remaining component removal.

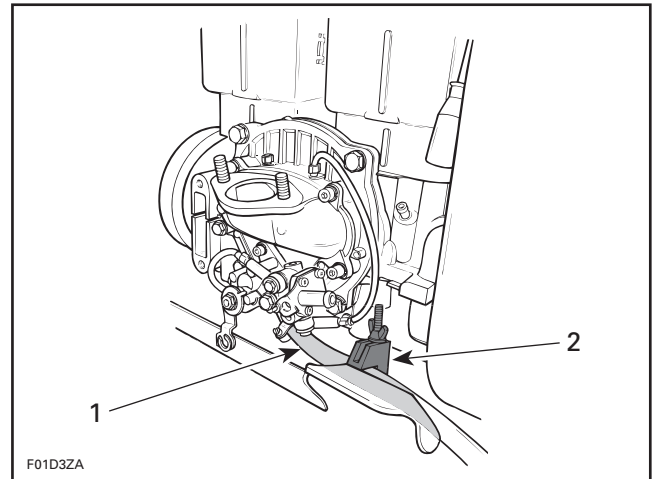
**CAUTION:** Take care not to damage cable or oil injection hoses.

**Section 04 ENGINE (2-STROKE)**  
**Subsection 02 (REMOVAL AND INSTALLATION)**

Remove rear engine support.



**TYPICAL**  
 1. Rear support



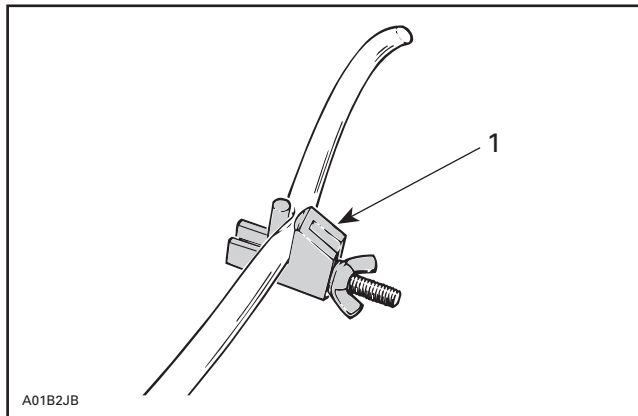
**TYPICAL — 717 ENGINES**  
 1. Rotary valve oil supply line  
 2. Hose pincher installed

**Removal of Remaining Components**

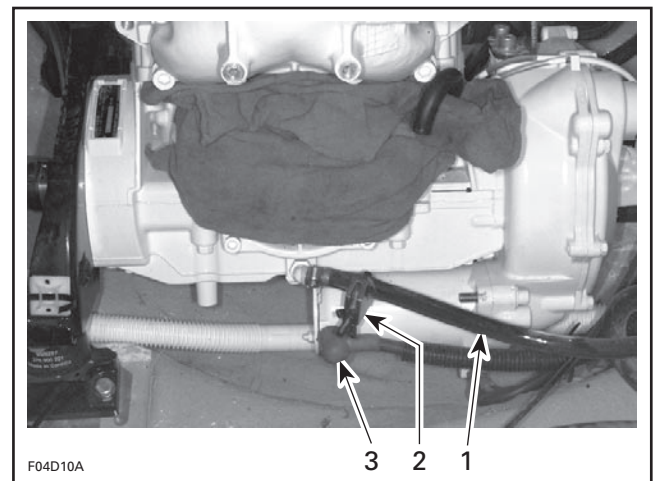
Lift up engine slowly until oil injection hoses can be reached.

**All Engines**

Install a hose pincher to oil supply hoses of oil injection pump and rotary valve shaft (except the 947 DI engines); then, disconnect hoses.



**TYPICAL**  
 1. Hose pincher (P/N 295 000 076)



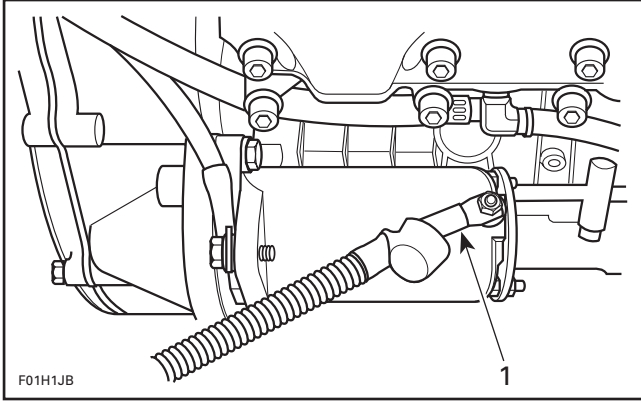
**TYPICAL — 787 RFI ENGINES**  
 1. Rotary valve oil supply line  
 2. Hose pincher installed  
 3. Disconnect RED positive cable

Install a hose pincher to oil return hose of rotary valve shaft (except the 947 DI engines); then, disconnect hose.

## Section 04 ENGINE (2-STROKE)

### Subsection 02 (REMOVAL AND INSTALLATION)

Disconnect RED positive cable from starter post.

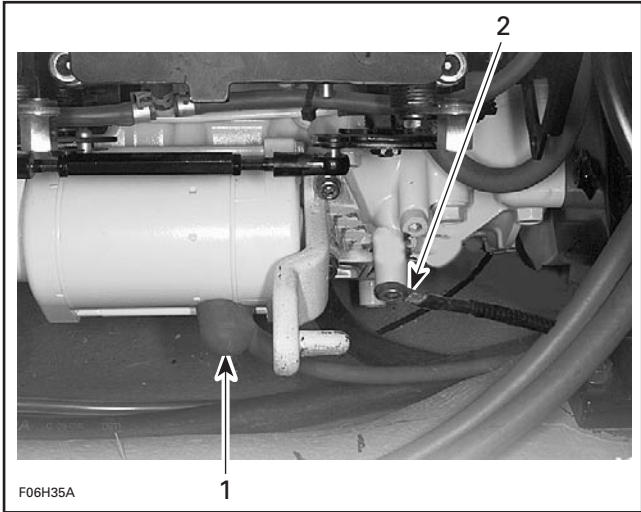


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TYPICAL

1. Disconnect RED positive cable

Disconnect BLACK negative cable from engine crankcase.

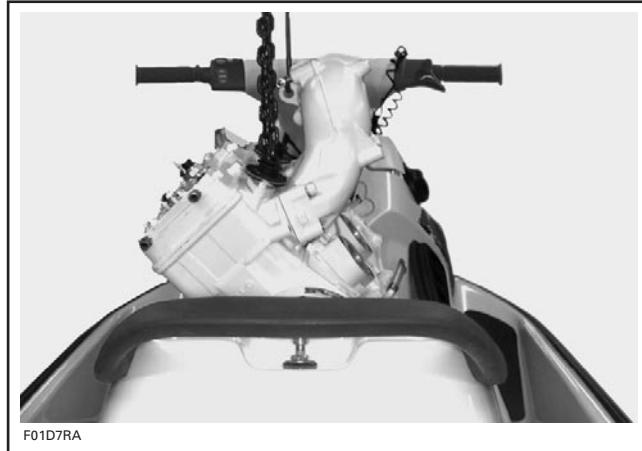


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1. Positive starter cable  
2. Ground cable

Carry on engine lifting then tilt engine so that it can be removed from the body opening.

**CAUTION:** Be careful not to scratch body or to hit any component.



F01D7RA

TYPICAL

## CLEANING

Wipe off any spillage in bilge. Clean with a bilge cleaner.

Clean external parts of engine.

## INSTALLATION

Installation of engine in watercraft is essentially the reverse of removal procedures. However pay particular attention to the following.

### Rubber Mount, Shim and Screw

Check tightness and condition of rubber mounts. If they have been removed, apply Loctite 243 (blue) on screw threads. Torque screws to 25 N•m (18 lbf•ft).

**CAUTION:** Strict adherence to this torque is important to avoid damaging threads of aluminum insert in bilge.

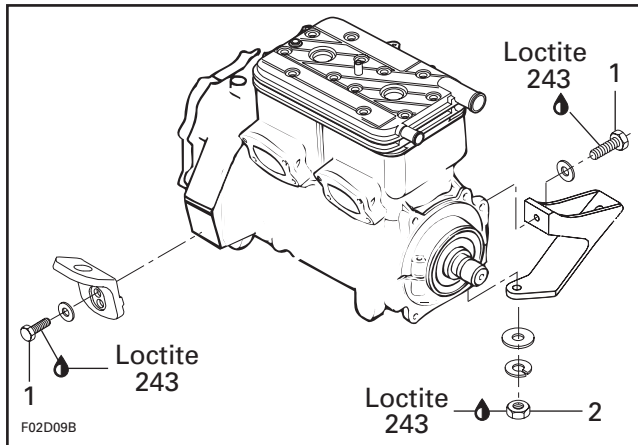
### Engine Support

#### 717 Engines

Torque front and rear engine supports as shown in the following illustration.

## Section 04 ENGINE (2-STROKE)

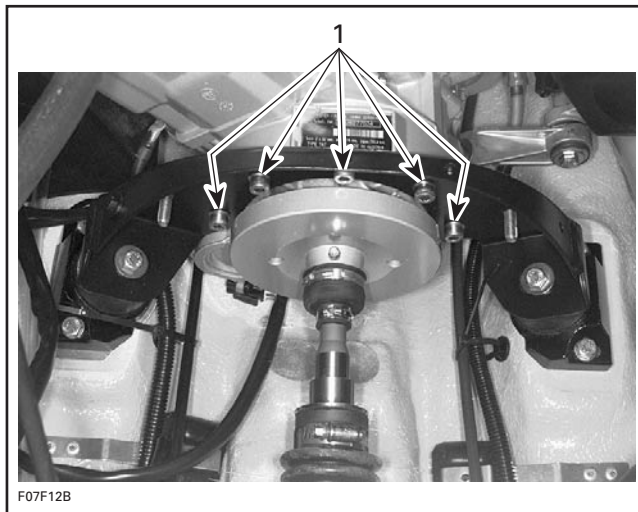
### Subsection 02 (REMOVAL AND INSTALLATION)



1. Torque screws to 22 N•m (16 lbf•ft)
2. Torque nuts to 39 N•m (29 lbf•ft)

#### 787 RFI Engines

Apply Loctite 243 (blue) to rear engine support screws and install them with flat washers and torque to 24 N•m (17 lbf•ft).

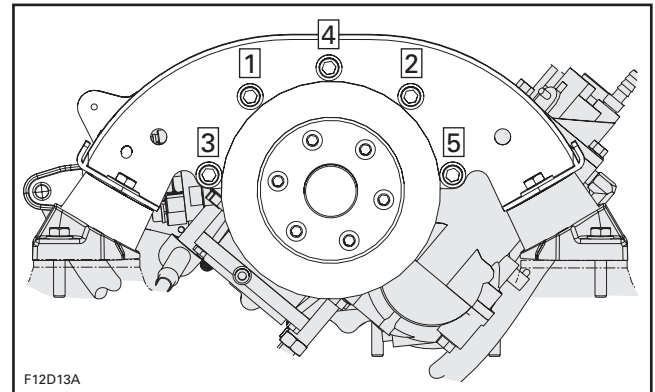


TYPICAL

1. Torque engine support screws to 24 N•m (17 lbf•ft)

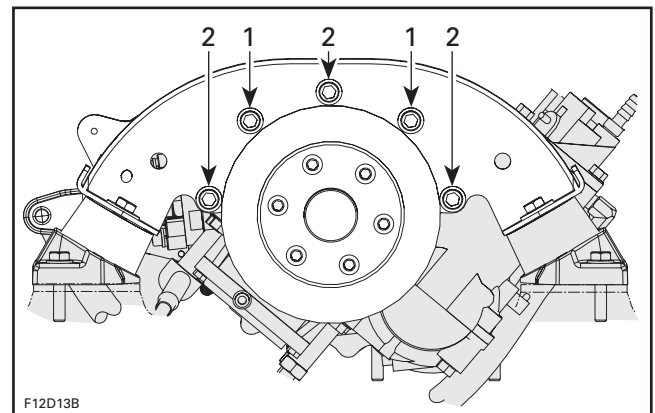
#### 947 DI Engines

Install and torque the engine support screws to 24 N•m (17 lbf•ft) in the indicated order. Refer to the following illustration.



TORQUE TO 24 N•M (17 LBF•FT) AS PER SEQUENCE

**NOTE:** Remember to install sleeves and flat washers.



1. Sleeves
2. Flats washers

#### Oil Injection Hoses

##### 717 and 787 RFI Engines

Make sure to reinstall hoses before completely lowering engine in bilge.

#### Positive Starter Cable

Torque nut of positive starter cable to 6 N•m (53 lbf•in). Apply dielectric grease on nut.

#### Engine/Jet Pump Alignment

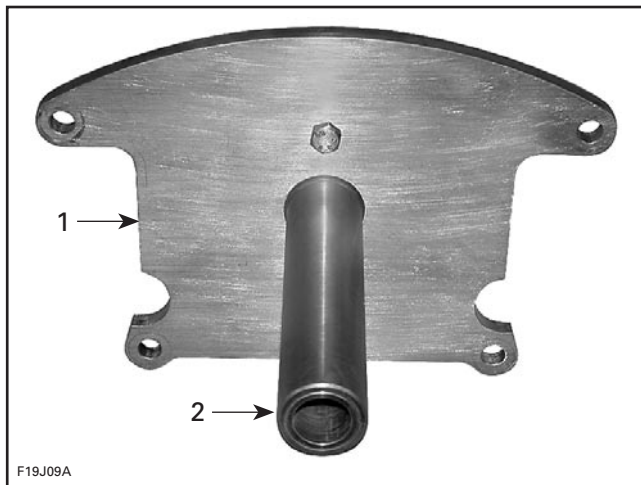
Alignment is necessary to eliminate possible vibration and/or damage to components. Check alignment of engine using the following alignment tools.

Support plate kit (P/N 529 035 506).

Use plate (P/N 529 035 507).

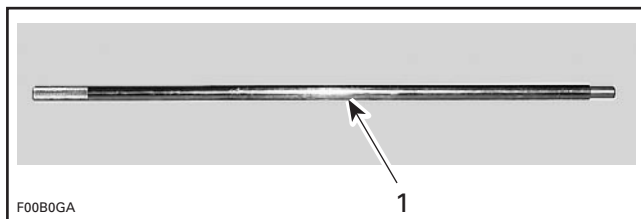
## Section 04 ENGINE (2-STROKE)

### Subsection 02 (REMOVAL AND INSTALLATION)



1. Plate
2. Support

Alignment shaft (P/N 295 000 141).

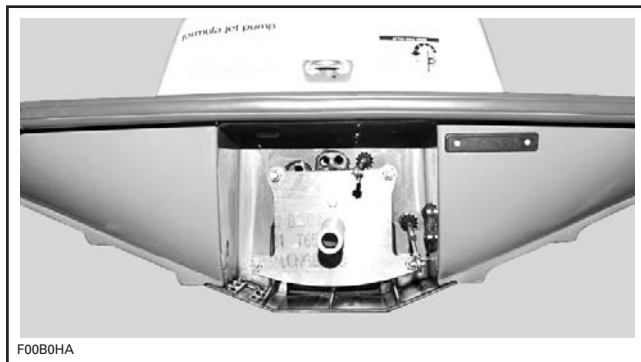


1. Alignment shaft

#### All Models except XP DI

To verify alignment proceed as follows:

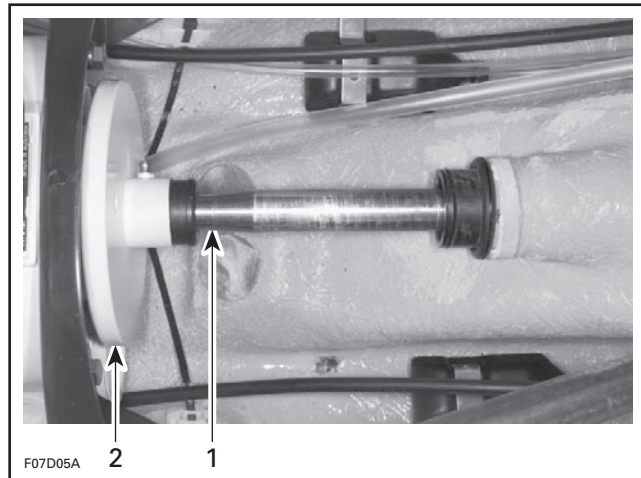
- Install the appropriate plate with the support to hull with four nuts.



- Carefully slide shaft through support.
- Insert shaft end into PTO flywheel.

**NOTE:** Ensure the protective hose and carbon ring (or seal carrier) is removed to check engine alignment.

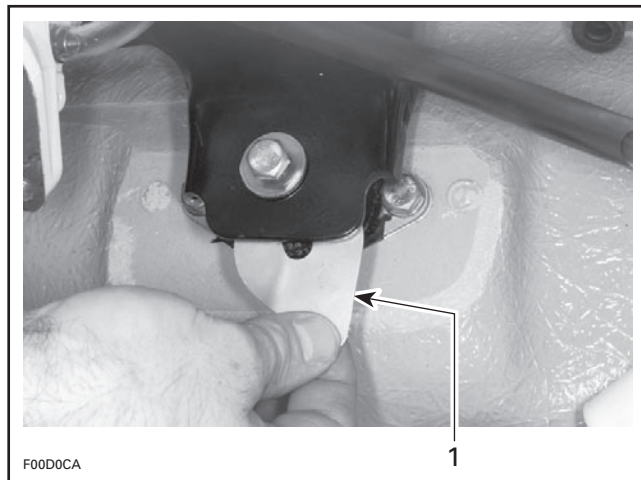
**NOTE:** If the alignment is correct, the shaft will slide easily without any deflection in PTO flywheel.



- TYPICAL**
1. Alignment shaft
  2. PTO flywheel

If the alignment is incorrect loosen engine support screws to enable to align PTO flywheel with shaft end.

**NOTE:** Use shim(s) (P/N 270 000 024) or (P/N 270 000 025) as necessary between engine supports and rubber mounts to correct alignment.



- TYPICAL**
1. Shim

**CAUTION:** Whenever shims are used to correct alignment, never install more than 1.3 mm (0.051 in) shim thickness on the 947 DI engines and 3 mm (0.12 in) on the 717 and 787 engines.

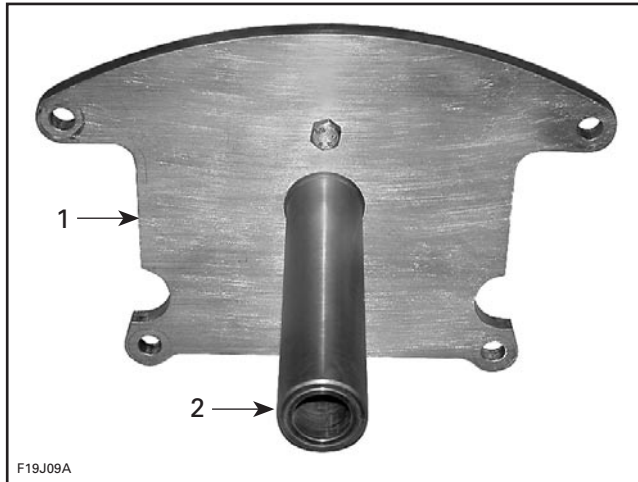


**Section 04 ENGINE (2-STROKE)**  
**Subsection 02 (REMOVAL AND INSTALLATION)**

**XP DI Models**

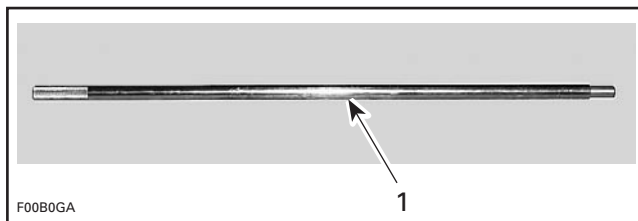
Use:

- plate (P/N 529 035 507)



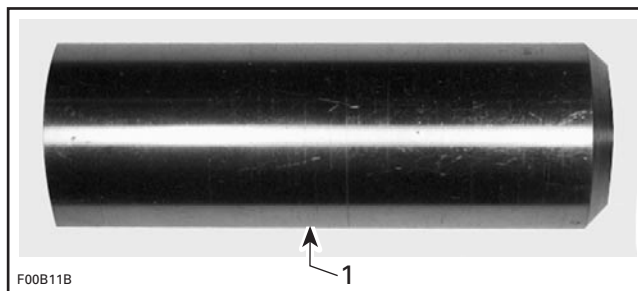
1. Plate
2. Support

- alignment shaft (P/N 295 000 141)



ALIGNMENT SHAFT

- PTO flywheel adapter (P/N 529 035 590).



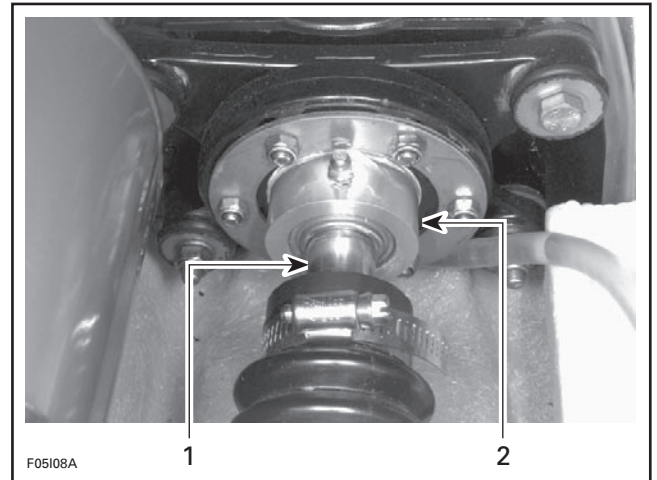
1. Adapter

Install support plate at rear of watercraft.

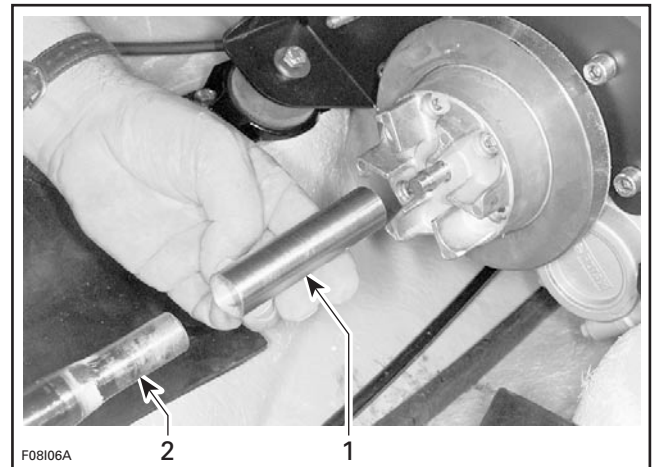
Install adapter on shaft.

**NOTE:** First ensure the mid bearing shaft support has been properly aligned prior to performing engine alignment. Refer to DRIVE SYSTEM. Then, ensure the mid bearing is loosened to check engine alignment.

Carefully slide alignment shaft (P/N 295 000 141) through shaft support and seal carrier.



- TYPICAL
1. Alignment tool
  2. Seal carrier



1. Alignment shaft
2. Adapter

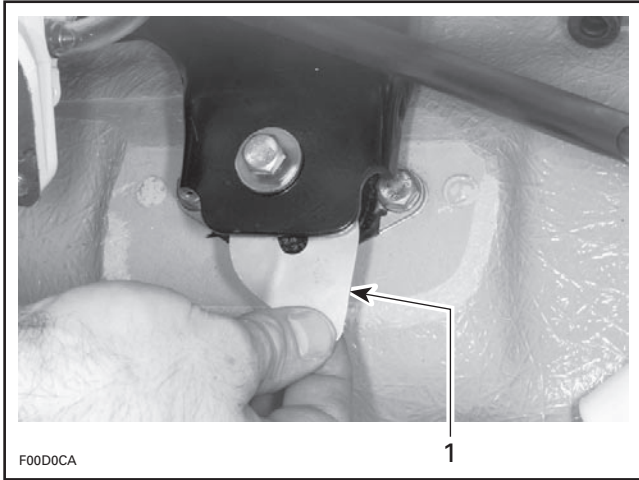
Continue to slide the alignment shaft forward and install PTO adapter (P/N 529 035 590) on shaft end.

If the alignment is incorrect loosen engine support screws to enable to align PTO flywheel with shaft end.

**NOTE:** Use shim(s) (P/N 270 000 024) or (P/N 270 000 025) as necessary between engine supports and rubber mounts to correct alignment.

## Section 04 ENGINE (2-STROKE)

### Subsection 02 (REMOVAL AND INSTALLATION)



TYPICAL  
1. Shim

**CAUTION:** Whenever shims are used to correct alignment, never install more than 1.3 mm (0.051 in) shim thickness.

Remove alignment shaft. Ensure the alignment washers of mid bearing are still loose.

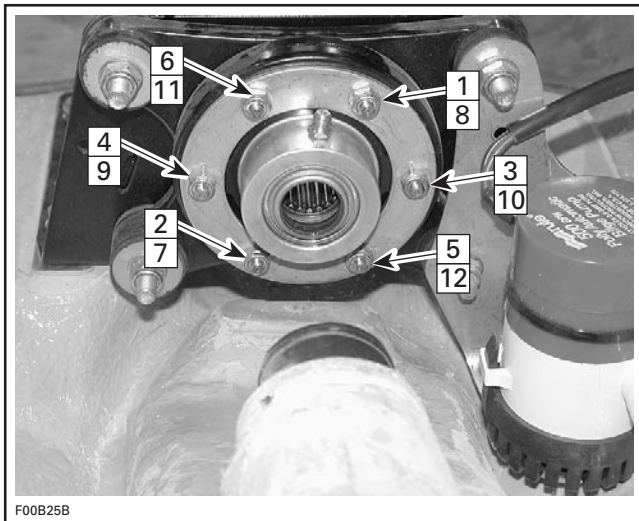
Reinstall drive shaft. Refer to DRIVE SYSTEM.

Ensure grease fitting of seal carrier is located on the top.

Apply Loctite 243 (blue) on studs and install nuts no. 21.

Refer to following illustration for tightening sequence. Torque 1 to 6 at 3 N•m (27 lbf•in) and then 7 to 12 at 10 N•m (89 lbf•in).

**NOTE:** It is very important to tighten nuts of seal carrier in this sequence to maintain its alignment.



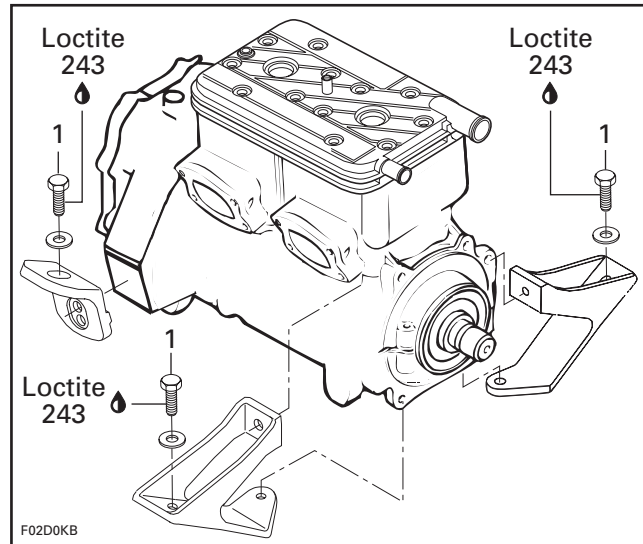
TIGHTENING SEQUENCE

## Engine Support Screws

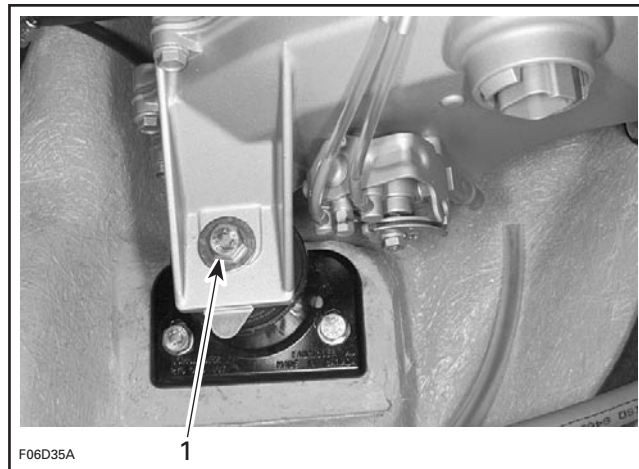
### All Models

Apply Loctite 243 (blue) on screw threads.

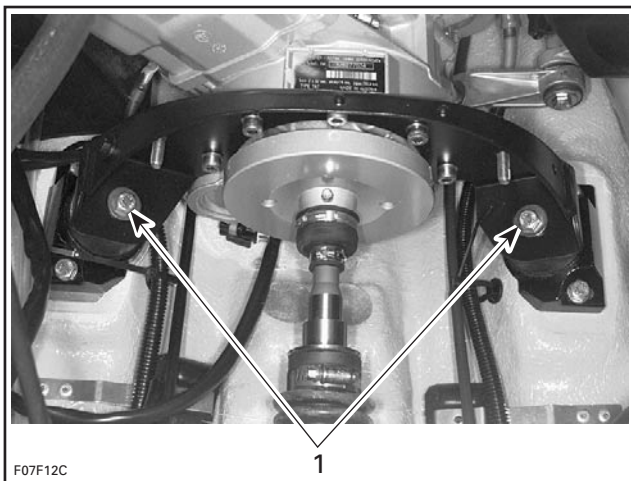
Torque engine support screws to 25 N•m (18 lbf•ft) when procedure is completed.



717 ENGINES  
1. Torque to 25 N•m (18 lbf•ft)



FRONT ENGINE SUPPORT — 787 RFI AND 947 DI ENGINES  
1. Torque to 25 N•m (18 lbf•ft)



**REAR ENGINE SUPPORT — 787 RFI AND 947 DI ENGINES**  
1. Torque to 25 N•m (18 lbf•ft)

### Final Inspection

Check throttle cable condition and lubricate cable with BOMBARDIER LUBE lubricant.

After its installation, properly adjust and bleed oil injection pump as specified in OIL INJECTION PUMP and adjust throttle cable as specified in ENGINE MANAGEMENT (DI models).

Check hose condition and pressure test fuel system, refer to FUEL CIRCUIT.

### **WARNING**

Whenever doing any type of repair on watercraft or if any components of the fuel system are disconnected, a pressure test must be done before starting engine.

Verify all electrical connections.

Run engine and ensure there is no leakage.

**CAUTION:** If watercraft is out of water, engine must be cooled using the flush kit.