



**EVINRUDE<sup>®</sup>**  
**Johnson<sup>®</sup>**






## INSTALLATION INSTRUCTIONS

### 1999 (EE) 150/175 *FFI*<sup>™</sup> Enhancement Package P/N 5001213

#### SAFETY

These installation instructions contain information that can help prevent personal injury and damage to equipment. Understand the following symbols before proceeding:

 Safety Warning	Alerts you to the possibility of danger and identifies information that will help prevent injuries.
 Note	Identifies information that will help prevent damage to machinery.
 Important	Appears next to information that controls correct assembly and operation of the product.

#### TO THE OWNER

The assembly procedures outlined in this sheet should be performed by a skilled technician. If you have questions, see your DEALER. Save these instructions in your owners kit. This sheet contains information important to the future use and maintenance of your engine.

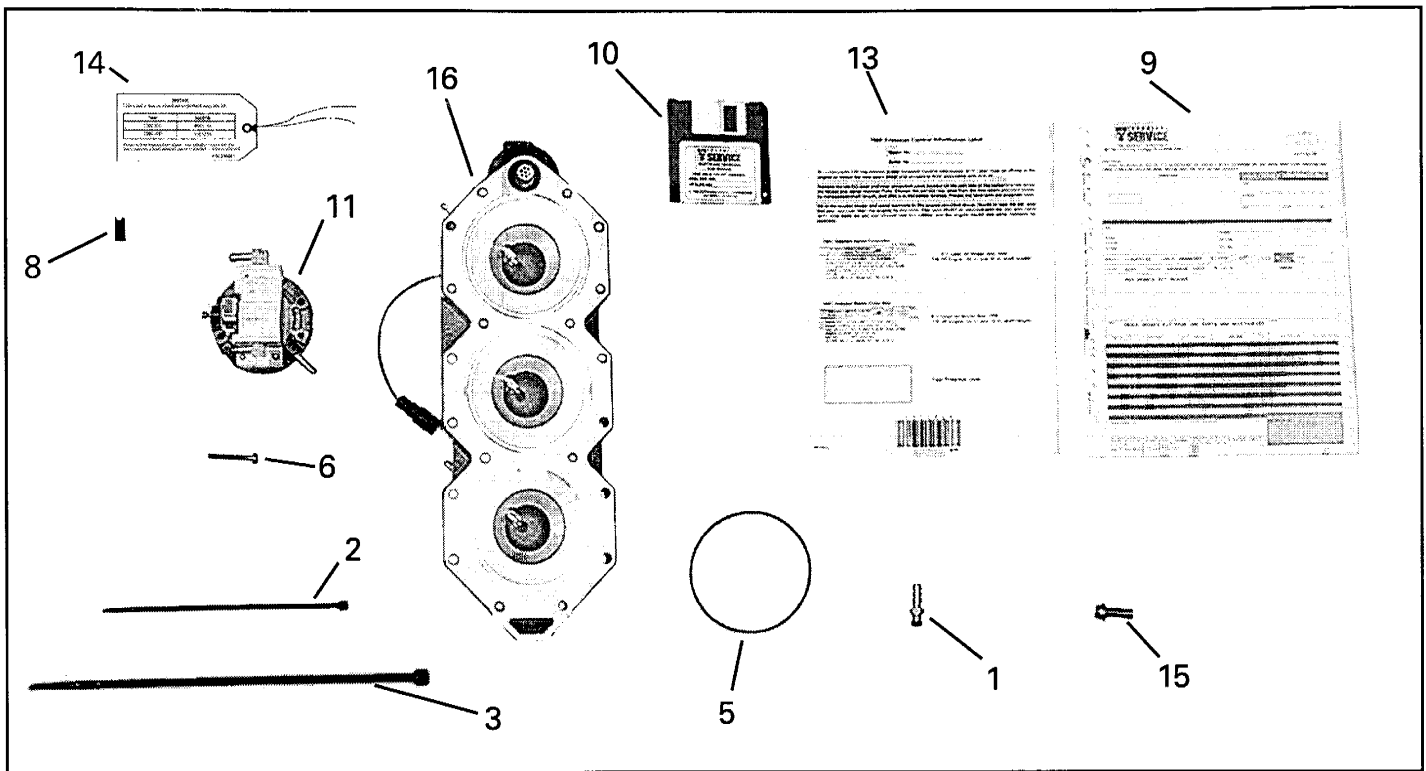
#### TO THE INSTALLER

Give this sheet to the owner. Advise the owner of any special operation or maintenance information contained in the instructions.

#### PREFACE

This kit includes important new parts and upgrades for 1999 (EE) 60° V6 *FFI* outboards. **Diagnostic Software**, Version 1.3 or newer, is required to perform some of the procedures in this instruction sheet.

Spark plugs **MUST** be replaced at least every 100 Hrs. Failure to follow this schedule could result in poor performance or engine damage.

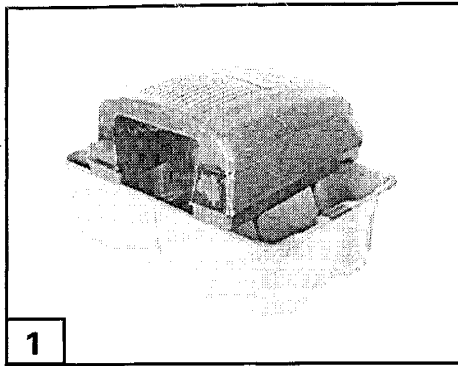


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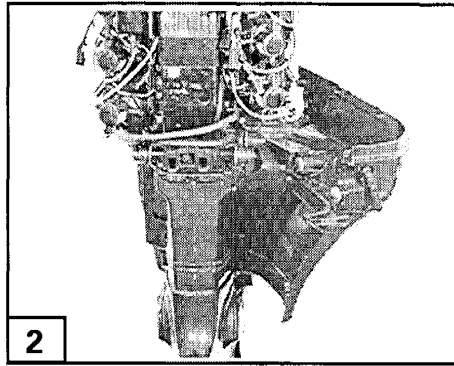
## CONTENTS OF KIT

Ref.	P/N	Name of Part	Qty.
1	303492	PULSE FITTING .....	2
2	320107	TIESTRAP, 7.3 in. (185 mm) .....	10
3	907833	TIE STRAP, 11 IN. (279 mm) .....	6
5	335523	O-RING .....	6
6	333724	SCREW, Oil pump to crankcase .....	4
7	343765	CLAMP, Screw, Oil inlet hose .....	1
8	346431	SPACER .....	4
9	.	WARRANTY CLAIM FORM .....	1
10	.	ECU PROGRAM DISK .....	1
11	5001047	OIL PUMP ASSEMBLY .....	1
13	.	ECI LABEL AND INSTRUCTIONS .....	1
14	.	OWNER INFORMATION TAG .....	1
15	345778	SCREW, Injector mounting .....	12
16	.	CYLINDER HEAD, Port .....	1
16	.	CYLINDER HEAD, Starboard .....	1

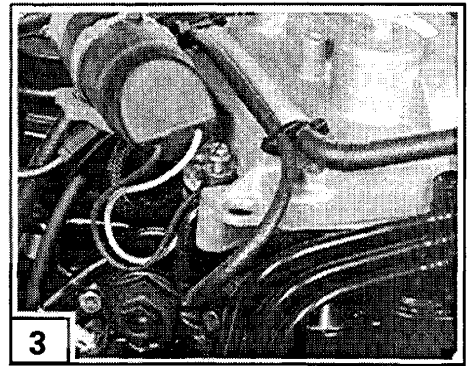
Ref.	P/N	Name of Part	Qty.
CYLINDER HEAD SERVICE PARTS			
.	5001266	. CYLINDER HEAD, Port .....	1
.	5001267	. CYLINDER HEAD, Starboard .....	1
.	5001211	. SPARK PLUG .....	3
.	586140	. TEMPERATURE SENSOR, Port .....	1
.	585184	. TEMPERATURE SWITCH, Starboard .....	1
.	435491	. THERMOSTAT .....	1
.	345911	. SPRING, Thermostat .....	1
.	338632	. COVER, Thermostat .....	1
.	335981	. SEAL, Thermostat to cyl. head .....	1
.	331188	. O-RING, Thermostat cover .....	1



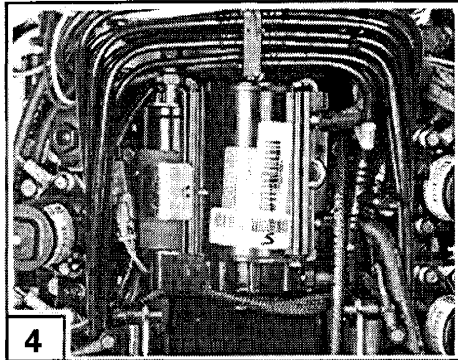
DP0195



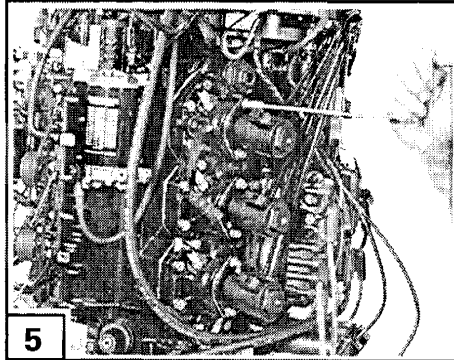
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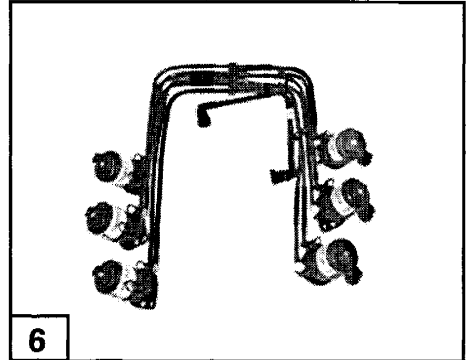
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## ⚠ DISCONNECT BATTERY CABLES AT BATTERY

- 1 Remove air silencer. Set air silencer on drain pan with inlet tubes facing down.

## REMOVE LOWER COVERS

- 2 Disconnect trim switch and remove the port lower engine cover. Remove the cable entry cover and swing the starboard lower cover out of the way. It is not necessary to remove the cables or wiring.

## REMOVE INJECTORS

Disconnect all spark plug wires and fuel injector harnesses from all injectors.

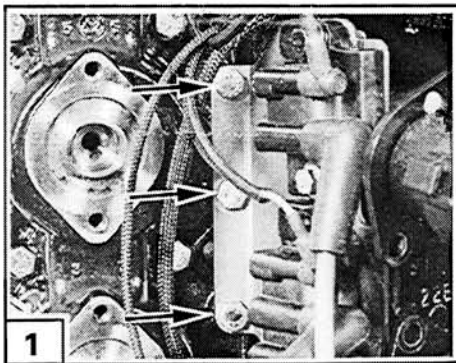
Disconnect temperature switch and temperature sensor.

- 3 Remove PORT ECU mounting screw. This will allow the ECU to be lifted slightly and provide room to remove the fuel line from the electric fuel pump.

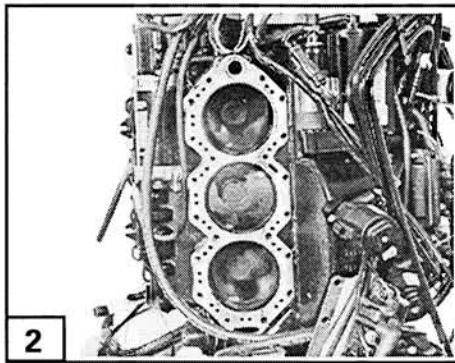
⚠ Relieve fuel pressure from fuel distribution lines prior to disassembly.

- 4 Disconnect the fuel distribution lines from the electric fuel pump and the vapor separator.
- 5 Remove injector flange screws from each injector. Retain washers for reuse. Discard screws.
- 6 Leave injectors connected to fuel lines and remove injectors and fuel distribution lines as an assembly.

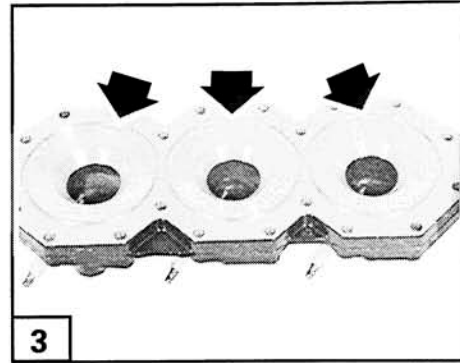
**Note** Be careful that the injector nozzles do not fall out.



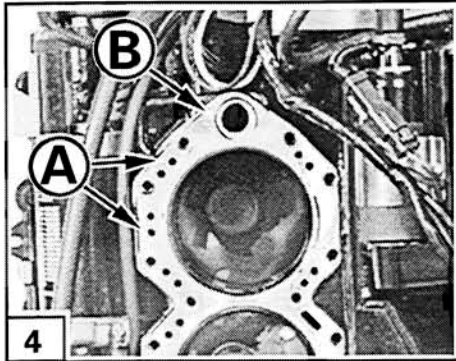
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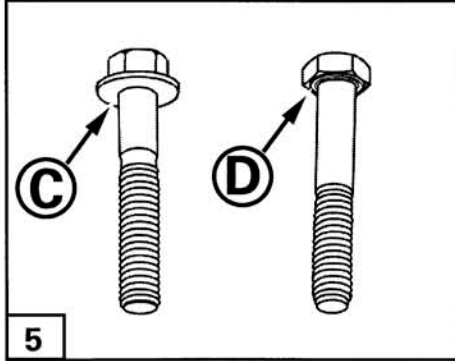
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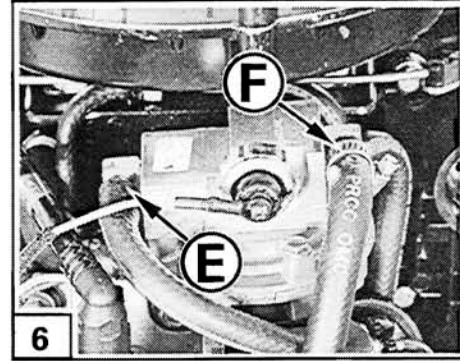
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## REMOVE CYLINDER HEAD

**1** Remove screws that mount the coil mounting bracket to the head. Move coils out of the way. Remove remaining cylinder head screws and remove cylinder head. Repeat on other head.

**2** Clean both cylinder head surfaces on cylinder block. Inspect cylinders and pistons for scoring or other damage.

**Note** The presence of some light scratches (called scuffing) is normal. Do not confuse these scratches with actual scoring damage. **The rule-of-thumb is: If you can not easily hook a finger nail in the scratch, the cylinder is usable for service.**

If cylinder damage is present, contact the Technical Service Department for replacement parts. **Do not continue installing this kit.**

## INSTALL CYLINDER HEAD

**3** Apply a small amount of *Triple-Guard*® grease to cylinder head O-rings and place O-rings in grooves. Stretch O-rings if they seem too small.

**4** **LIGHTLY** apply *RTV* sealant around water passages (A) of cylinder block. Be careful not to apply *RTV* sealant to thermostat area (B) or where it can get into the O-ring grooves.

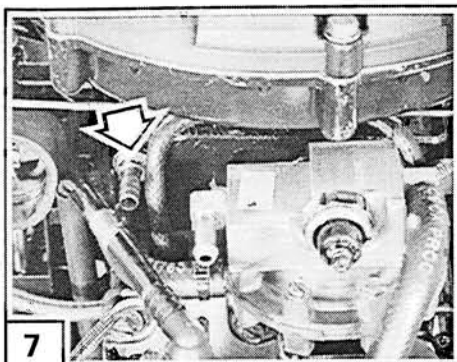
**5** Install head and tighten screws in stages to the following torque:

Style	Torque	Lubricant
(C)	14-16 ft. lbs. (19-21,5 N•m)	<i>Gasket Sealing Compound</i>
(D)	20-22 ft. lbs. (27-30 N•m)	None

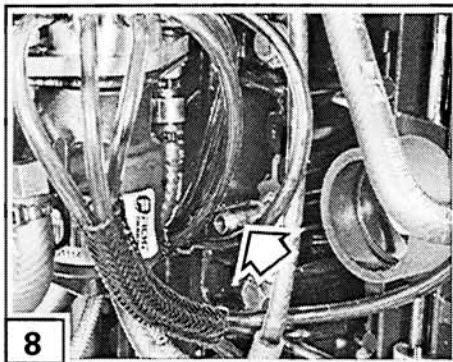
## INSTALL FUEL INJECTORS

Using **original washers and NEW SCREWS**, provided, install injectors. Tighten screws alternately until seated, then tighten to a final torque of 144-168 in. lbs. (16-19 N•m).

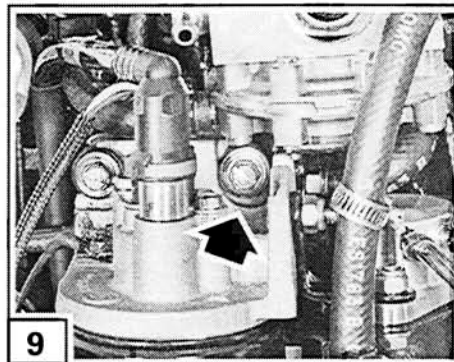




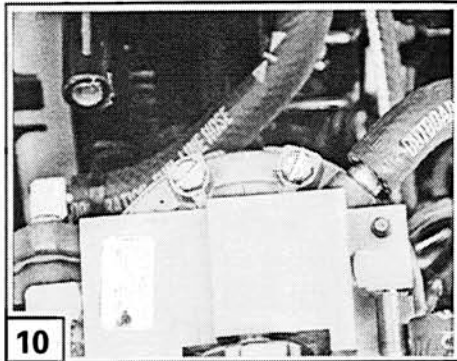
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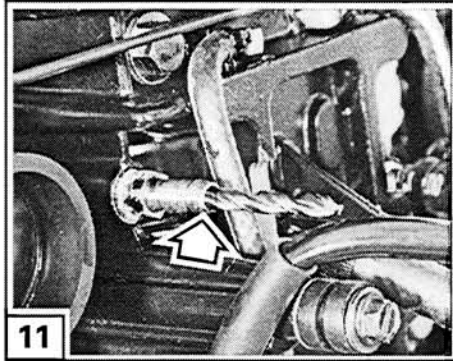
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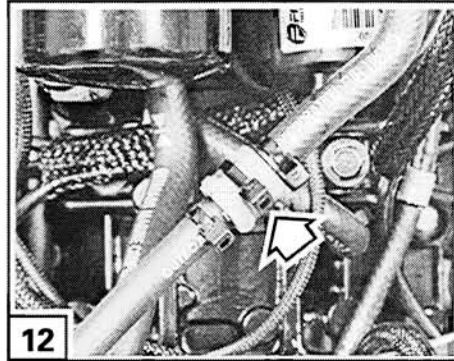
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Repeat steps on the other bank of cylinders.

Reconnect all injector harnesses, temperature switch and sensor, and all spark plug wires.

**Note** If you must replace a spark plug, see the procedure on Page 12.

## REPLACE OIL LIFT PUMP

- 6** Remove the oil inlet (E) and outlet (F) hoses from the oil pump.
- 7 8** Remove the pulse hoses from the crankcase pulse fittings.
- 9** Remove the PORT fuel bracket mounting screw and loosen the remaining two screws. Push fuel bracket to PORT to remove from the remaining two mounts.
- 10** Remove the four oil lift pump retaining screws and remove oil pump from bracket.
- 11** Using a 15/64 in. drill bit, measure the inside diameter of the oil pump pulse passages. If the drill bit will pass through the fitting and into the crankcase, you must replace the fittings. Use *Pipe Sealant with Teflon* on threads of the new fittings.

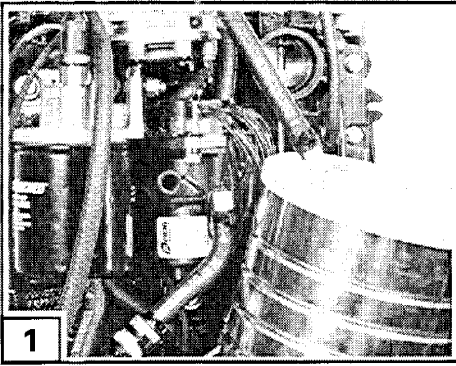
Install the new oil lift pump using the new screws provided. Tighten the screws to 45-55 in. lbs. (5-6 Nm).

Install fuel bracket on crankcase by reversing the order of removal. Be sure to reconnect all hoses. Install clamps on the oil lines and tie straps on the pulse hoses.

**Note** Install worm drive hose clamp (provided) on oil inlet hose instead of using a tie strap.

**Important** Be sure to correctly connect the oil inlet and outlet hoses. Failure to do so will result in powerhead failure.

- 12** Be sure tie strap is installed around oil pressure regulator.



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- 1** Remove oil inlet line connector from oil injector and place in container.

Squeeze oil primer bulb until no air exits oil line.

Install oil line connector in oil injector. Squeeze primer bulb until firm.

#### **ENERGIZE SYSTEM AND CHECK YOUR WORK**

Connect battery. Squeeze fuel primer bulb until firm.

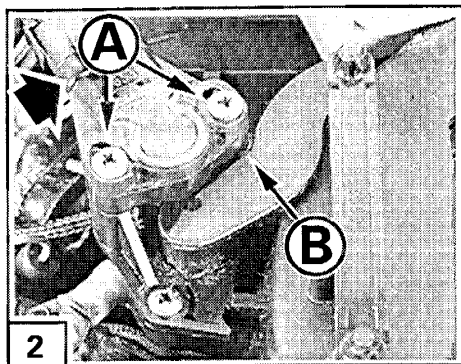
Turn key switch ON to pressurize the system. Check for and correct any fuel leaks.

Turn key switch OFF.

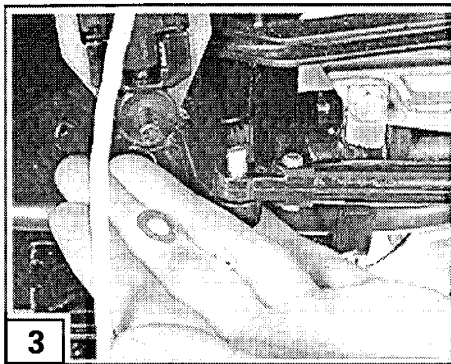
#### **INSTALL NEW MAP**

Connect laptop computer to engine using diagnostic cable. Turn engine key switch ON.

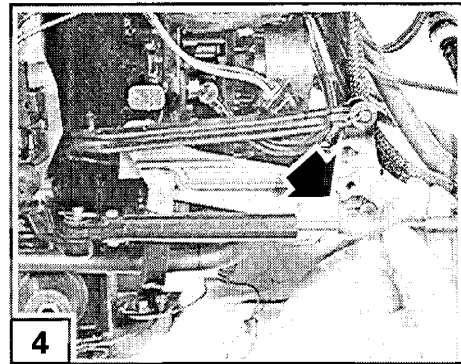
Insert floppy disk into computer and type **A:GO** and press ENTER key. Follow on-screen instructions.



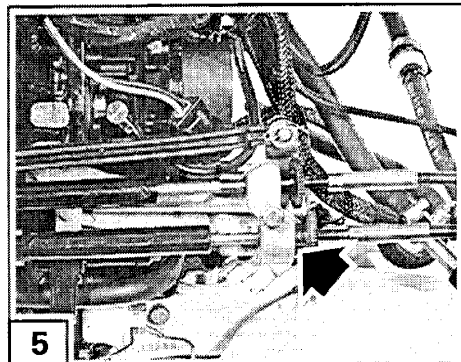
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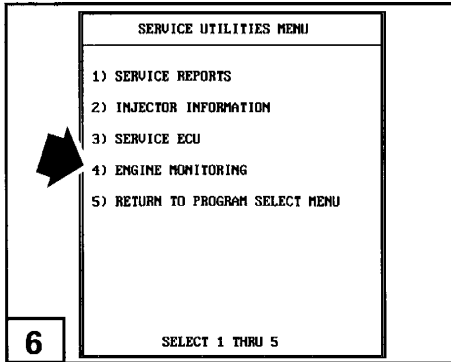
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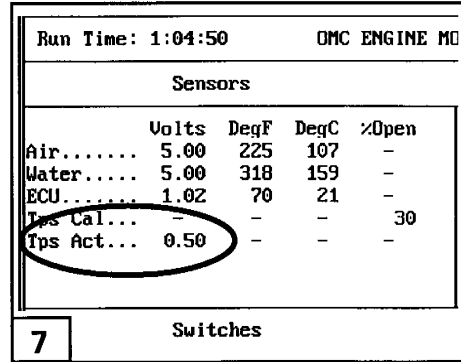
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## CONNECT THROTTLE CABLE TO ENGINE

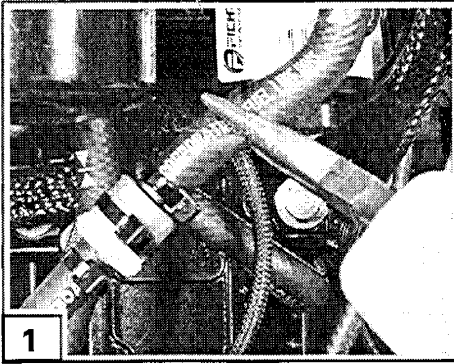
The following procedure will result in a slight pre-load when the throttle is returned to idle:

Move the remote control into NEUTRAL.

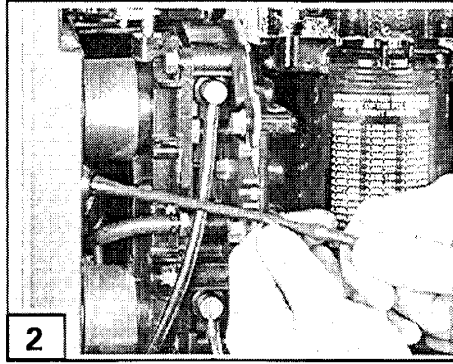
- 2** Loosen two TPS screws **A**.
- 2** Rotate TPS housing **counterclockwise** and hold while tightening screws.
- 3** Install the casing guide to the throttle arm pin. Secure using the retainer and washer.
- 4** Pull slack from cable. Adjust trunnion nut until it will just drop into trunnion pocket.
- 5** Install trunnion cover. Leave screw loose enough that trunnion nut can be rotated.
- 6 7** Use **Diagnostic Software**, Version 1.3 or newer, and verify TPS voltage is greater than 0.42V. Adjust trunnion nut if necessary.
- 2** Protrusion **B** on throttle lever should be touching the TPS as shown. Slight deflection of TPS is common.

Tighten trunnion cover screw and verify TPS voltage. Adjust trunnion nut if necessary.

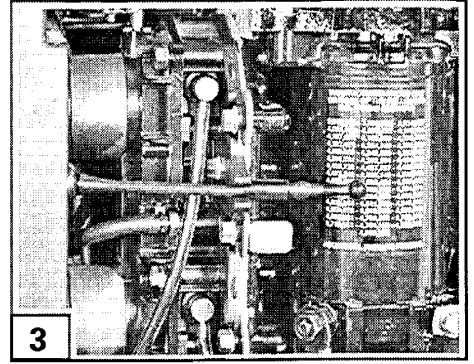
Move remote control to part-throttle position, then return to NEUTRAL. Verify that TPS voltage returns to same value.



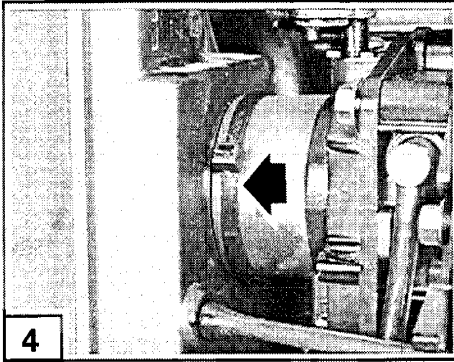
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## PURGE OIL SYSTEM

Supply cooling water to engine. Squeeze oil primer bulb until firm. Start engine and let idle.

**Important** DO NOT INCREASE RPM ABOVE IDLE. ENGINE RUNAWAY OR INADEQUATE LUBRICATION CAN CAUSE POWERHEAD FAILURE.

**1** Pinch off oil return line between oil injector and pressure regulator until all oil distribution hoses are purged of air. Check for oil leaks. Shut engine OFF.

Install lower engine covers and cable entry cover. Connect trim switch.

**2 3** Install spacers on air silencer straps. Stretch air silencer strap to install spacers. Install air silencer with spacers positioned as shown.

**4** Loosely install tie strap, P/N 907833, on each air intake tube. Install air silencer and tighten tie straps in location shown after air silencer straps are secured.



## Important

Timing Verification should be performed after the new map has been installed. The following procedure is from the Diagnostic Software Users Guide.

**TIMING VERIFICATION PROCEDURE**  
VERIFY TDC POINTER LOCATION.  
RUN ENGINE IN NEUTRAL 600-1300 RPM.  
  
CURRENT RPM IS: 620  
  
PRESS <ESC> TO CANCEL  
OR ANY OTHER KEY TO SHOW TIMING

5

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THE ECU TIMING IS: 17 °ATDC  
  
USE A TIMING LIGHT TO READ  
ACTUAL ENGINE TIMING  
ENTER ACTUAL TIMING: TDC  
  
PRESS <ENTER> TO VERIFY TIMING  
PRESS <ESC> TO CANCEL

6

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### Menu Option 5 — Timing Verification

**5** This is the **Timing Verification Procedure** screen. You get to this screen by pressing “5” at the **Main Menu**. This screen provides a method of synchronizing the ECU to the engine’s crankshaft.

**Note** If the flywheel cover or the timing pointer has been moved, you must set the timing pointer before verifying timing. Refer to the Timing Pointer Verification procedure in **General Information** section of the *FFI* Service Manual.

To verify timing, you must run the engine with the laptop attached, and make sure engine is at operating temperature. Remove the spark checker and install all spark plug leads. Attach a flushing adapter and turn on the water. Start the engine, and operate at idle speed. On *FFI* engines, the ECU constantly adjusts engine timing as part of the engine management scheme.

From this screen, you have two options: press any key to freeze the timing and change to the **Timing** screen, or press the “**ESC**” key to return to the **Main Menu**.

**6** When you press any key, except the “**ESC**” key, the computer will freeze the timing and display the **Timing** screen. Check the timing with a timing light.

**Note** The throttle will have no effect on engine speed while the timing is locked.

The ECU Timing is: 17° ATDC

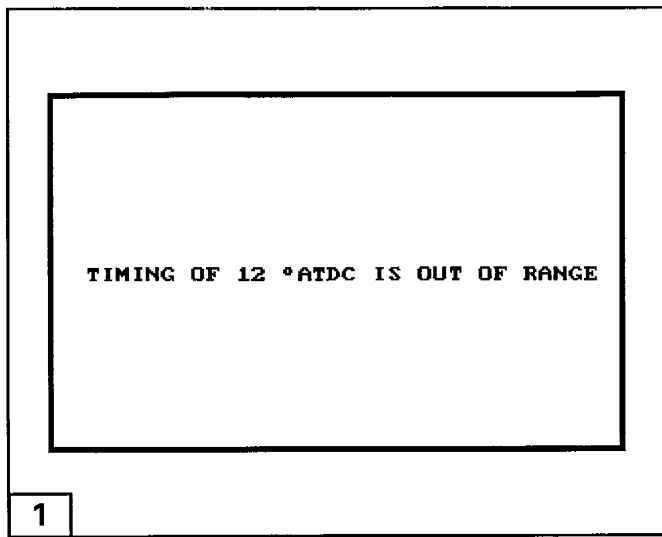
**6** The number that appears here indicates the spark advance programed into the ECU. If the timing is correct, you will get the same reading with your timing light.

The Current RPM is: 700

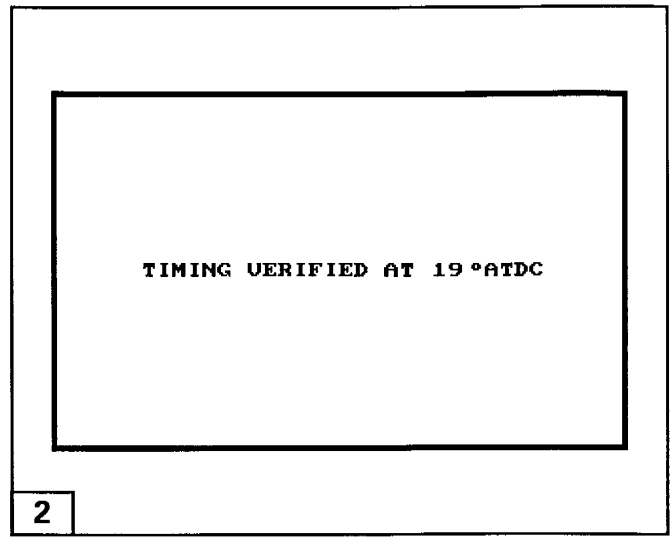
**6** The number that appears here indicates the current engine speed.

Actual Timing is: \_\_\_\_ TDC

**6** If the timing light indicates spark advance different than ECU timing, enter the timing light reading here. Include an “A” or “B” to indicate **A**fter or **B**efore top dead center. In this example, the ECU timing is 17° ATDC. If the timing light indicates 19° ATDC, you would type “19A” on the keyboard, then press “**ENTER**”.



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**1** The number you enter must be within 3 degrees of the ECU timing. In this example, the ECU timing is 17° ATDC. If you enter “**12A**”, the screen will display an invalid entry message, then give you an option to try again.

From this screen, you have two options: enter a valid timing figure and press the “**ENTER**” key to verify the timing, or press the “**ESC**” key to return to the **Main Menu** without changing timing.

**2** When you enter a valid timing figure, the screen will display the message “Timing is Verified at \_\_\_\_” (in this example, 19° ATDC), then return you to the **Main Menu**.

**Note** If the engine dies while the timing is locked, it will not start until the timing is unlocked. You can unlock the timing by performing any one of the following procedures.

On models with a water-cooled ECU

- turn the key OFF

On models with an air-cooled ECU

- reset the ECU by turning the key to the OFF position, and one of the following:
  - disconnect a battery cable
  - remove fuse No. 7 from the power distribution panel
  - let the engine sit for 10 minutes with the key OFF

Turn engine key switch OFF and disconnect diagnostic cable.

**1998 Emission Control Information Label**


Model No. \_\_\_\_\_  
 Serial No. \_\_\_\_\_

To comply with EPA regulations, a new Emission Control Information (ECI) Label must be affixed to the engine to match the new spark plugs and emissions level associated with this kit.

Remove the old ECI label and clear protective cover located on the port side of the valve bracket below the Model and Serial Number Plate. Choose the correct new label from the two labels provided below, by horsepower/shaft length, and affix it to the valve bracket. Protect the label with the supplied cover.

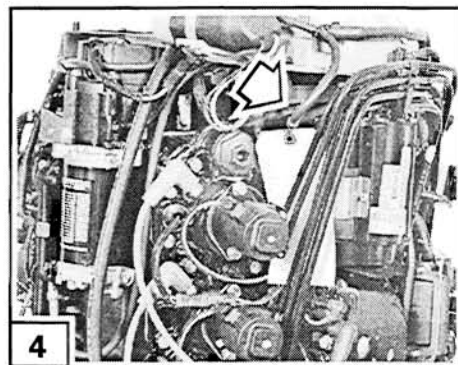
Fill in the engine model and serial numbers in the spaces provided above. Stencil or tape the old label that was removed from the engine, to this form. This form **MUST** be returned with the warranty claim form, with both the old and unused new ECI Labels, and the engine model and serial numbers for payment.

<div style="border: 1px solid black; width: 100px; height: 30px; margin: 10px 0;"></div>	ECI Label for Model Year 1998 150 HP Engine (20 in. and 25 in. shaft length)
<div style="border: 1px solid black; width: 100px; height: 30px; margin: 10px 0;"></div>	ECI Label for Model Year 1998 175 HP Engine (20 in. and 25 in. shaft length)
<div style="border: 1px solid black; width: 100px; height: 30px; margin: 10px 0;"></div>	Clear Protective Cover



3

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## WATER TEST ENGINE

Check performance and runability throughout RPM range. Verify WOT RPM is 4800-5300 RPM for 150 HP, 5300-5800 RPM for 175 HP.

## INSTALL NEW ECI LABEL

**3** Follow the instructions on the Emission Control Information Label sheet. This sheet must be properly completed and attached to the warranty claim form to receive warranty credit.

**4** Attach the Owner Information Tag to the vapor separator vent hose and tuck between the port fuel rails and cylinder head.

## CLEAN BOAT AND ENGINE FOR RETURN TO CUSTOMER.

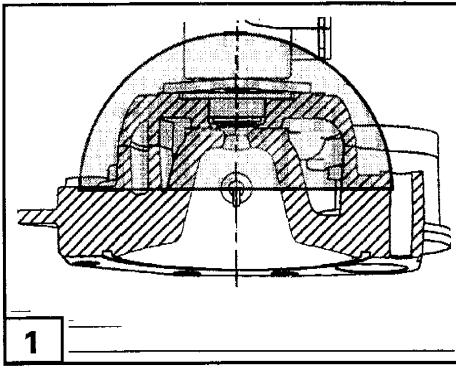
## PACK PARTS FOR RETURN TO BRP

Wrap the original oil lift pump in the plastic bag provided. Place it, the spark plugs, oil injector & manifold assy.\*, warranty claim, and properly completed Emissions Control Information Label sheet in the box provided. Attach the appropriate shipping label (provided) and return to **BRP**.

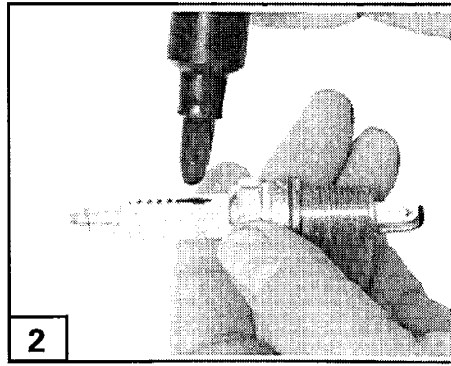
Discard all other parts. Destroy and discard cylinder heads. **DO NOT RETURN HEADS TO BRP.**

**Important** Canadian dealers must use the shipping label addressed to Peterborough, Canada. U.S. dealers must use the label addressed to Waukegan, IL.

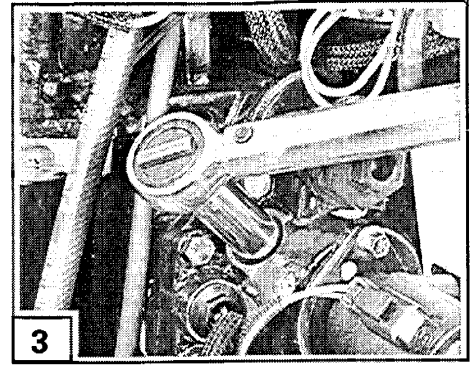
\* Required only if part was replaced



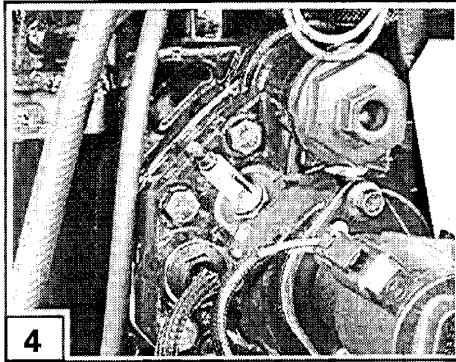
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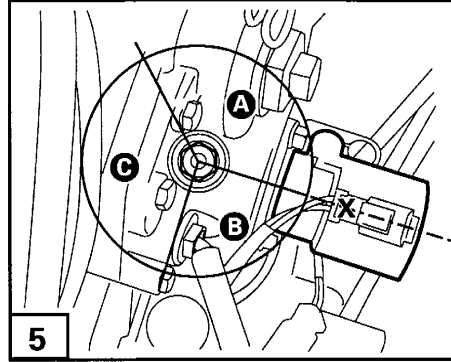
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## SPARK PLUG INDEXING PROCEDURE

**1** *FFI™* outboards benefit from having the open side of the spark plug gap facing the fuel injector. This procedure will orient the spark plug correctly. Ideally, the open side of the ground electrode should directly face the injector, but can be as much as 90° to either side.

**2** Put a mark on the ceramic of the spark plug that is in line with the OPEN side of the ground electrode.

**3** Install all spark plugs and tighten to 15 ft. lbs. (20 N·m).

Check location of mark.

**4 5** If the mark is within range **A**, reset torque wrench to 22 ft. lbs. (30 N·m) and continue to turn until the mark is at line **X** or the torque has been reached, whichever occurs first.

**5** If the mark is in range **B**, do not tighten any more.

**5** If the mark is in range **C**, this spark plug **will not work** on this bank of cylinders but can be used in the opposite bank of cylinders. Try another spark plug and follow the steps above.