1. Specifications

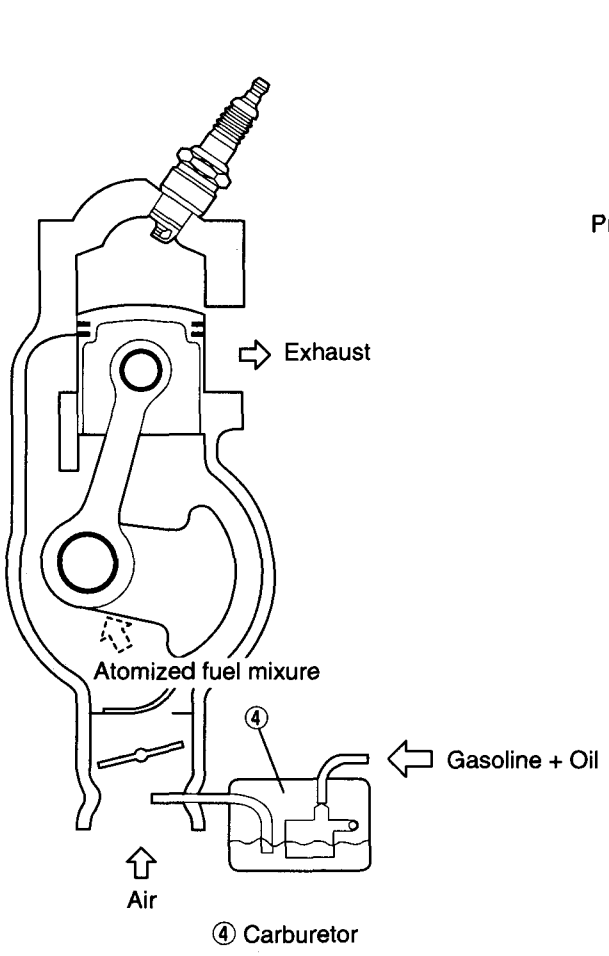
Item \ Model		70B	90B
		EPTO	
Overall length		747 mm (29.4 in)	
Overall width		390 mm (15.4 in)	
Overall height	(L)	1477 mm (58.1 in)	
	(UL)	1604 mm (63.1 in)	
Weight	(L)	143 kg (315 lb)	
	(UL)	146 kg (322 lb)	
Transom length (Apporox.)	(L)	517 mm (20.3 in)	
	(UL)	644 mm (25.3 in)	
Engine type		Two-stroke gasoline engine with direct fuel injection	
Piston displacement		1267 ml (77.3 cu.in)	
Bore & stroke		86 mm (3.39 in) × 72.7 mm (2.86 in)	
No. of cylinders		3	
Maximum output		51.5 kW (70PS)	66.2 kW (90PS)
WOT rpm range		5150~5850 rpm	
Trolling		700/800/900 rpm(3 stages variable)	
Idling		700/800/900 rpm(3 stages variable)	
Fuel consumption (approx.)		24.4 L/Hr (6.45 US gal)	30 L/Hr (7.93 US gal)
Starting system		Electric starter motor	
Intake system		Reed valve	
Induction system		5-port loop charge	
Exhaust system		Through hub	
Lubrication system		Oil injection	
Cooling system		Water-cooling	
Water temp. control		Thermostat (with pressure relief valve)	
Ignition system		Inductive ignition	
Ignition timing control		ECU	
Firing order		1-2-3	
Spark plug		NGK:PZFR6H	
Alternator		12V 280W (MAX.)	
Battery	more than 0°C(32°F)	12V 100AH(600CCA or 750MCA)	
	0°C(32°F) & Below	12V 120AH (700CCA or 850MCA)	
Trim angle		8° to 24°	
Trim angle steps		2	
Maximum tilt-up angle		75°	
Transom thickness		31 – 70 mm (1.22 – 2.76 in)	
Maximum steering angle		66°	
Gear shift		Dog clutch (F-N-R)	
Gear ratio		2.33 (12 : 28)	2.0 (13 : 26)
Throttle control		Remote control	
Fuel tank		25L (6.60 US gal)	
Oil tank		4L (4.2 US qt)	
Fuel		Unleaded regular gasoline	
Engine oil		Genuine MD Platinum or Equivalent	
Gear oil		Genuine gear oil or API GL5, SAE #80 to #90 900 ml (30.4 fl.oz)	

3. What is TLDI ?

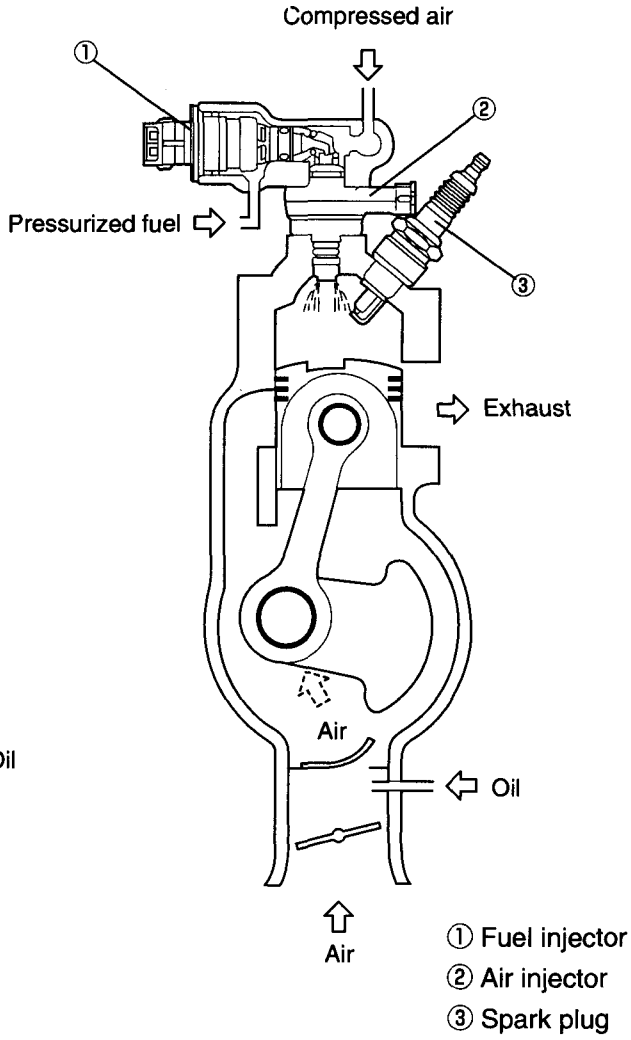
The abbreviation TLDI stands for Two-stroke Low-pressure Direct fuel Injection and is the name Tohatsu applies to direct fuel-injection system engines.

1. Two-Stroke Low-Pressure Direct fuel Injection (TLDI)
   TLDI is the name Tohatsu uses for two-stroke engines that utilize the air-assisted, low-pressure direct injection system.
   The air-assisted, low-pressure direct fuel injection system has been combined with the Inductive ignition system and Engine Control Unit (ECU), which performs precision control of fuel mixture, injection timing and ignition timing to maximize combustion efficiency in the TLDI engine. The result is excellent fuel economy and low emission maintaining superior advantage of powerful two-stroke engine characteristics.

2. Air-Assisted Low-Pressure Direct fuel Injection
   The air-assisted, low-pressure direct fuel injection process involves using an air compressor to pressurize the fuel supplied by the fuel pump to inject it directly into combustion chambers in the form of a finely atomized mixture to achieve maximum combustion efficiency.



ENGINE WITH CARBURETOR



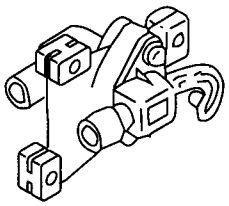
TLDI

Inductive Ignition System(Battery Ignition System)

TLDI is now using the inductive ignition system to maximamize combustion efficiency and fuel economy, and to minimize exhaust emissions. The inductive ignition system offers even longer sparking period of time via spark plug than earlier TLDI models using L-CDI(Long Arc Duration CDI) which offers longer sparking period of time than the conventional CDI systems. The TLDI engine runs more smoothly for better running quality.

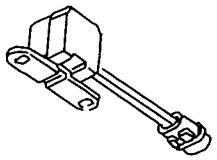
Throttle-Position Sensor (TPS)

Throttle-position sensor system is comprised of TPS1 and TPS2. These are used in combination to detect throttle butterfly valve position and advancer arm position to relay the information to and ECU.



Crank-Position Sensor (CPS)

Crank-position sensor is designed to sense the encoder located above the ring gear on the flywheel in order to detect crankshaft position and transmit the information to ECU.



Water-Temperature Sensor

Positioned on the water jacket installed on the cylinder, water-temperature sensor is used to detect temperature of cooling water in the cylinder and relay the information to ECU.

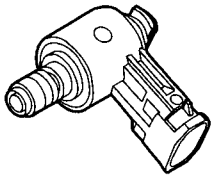
Oil Level Sensor

Oil level sensor is used to detect the level of remaining oil in oil tank and relay the information to the ECU.

The oil level sensor operates by turning on the oil level warning lamp on the tachometer and sounding the beeper in remote control when engine oil is low.

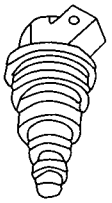
Air Injectors

Air injectors are used to inject a fine mist of fuel and compressed air into each combustion chamber. The ECU determines the mixture and timing for injecting fuel according to current engine operating conditions based on information relayed from the various sensors.



Fuel Injector

Fuel injectors supply the fuel in the air rail to the air injectors via the set pieces. The ECU determines the mixture for injecting fuel according to current engine operation based on information relayed from the various sensors.



1. General Precautions

Users of this manual should observe the following general precautions carefully when conducting disassembly and assembly work.

(1) The outboard engine remains hot for a time after it is shut off. Allow the engine to cool down before starting work.
(2) Make sure that the outboard motor is securely mounted on a work stand before starting work.
(3) TLDI utilizes high fuel pressure and air pressure. Be sure to release pressure from the fuel and air passages when working.
(4) Take care not to scratch or damage painted surfaces and the mating surfaces where cylinders, the cylinder head, the crankcase and other parts are joined.
(5) Always replace packing, gaskets, snap ring, O-rings and split pins with new ones when reassembling engine parts.
(6) When replacing, be sure to use Tohatsu genuine parts and lubricants or products recommended by Tohatsu.
(7) Always use the recommended special tools to ensure work is done properly.
(8) When disassembling and assembling components, make note of position marks, adding your own marks if none are provided, as a way to ensure the various parts and components are properly mated when being reassembled.
(9) To prevent smaller parts, such as bolts, nuts and washers from getting lost or damaged, where possible, lightly insert or tighten them back in their original locations.
(10) As normal practice, check disassembled parts for any wear or damage by first wiping them clean; then washing them in solvent.
(11) With reassembly operations it is essential to observe precise detail in centering, vacuum sealing, lubricating (with oil or grease), packing parts and components, and connecting wiring and piping. Also ensure there are no blockages in fluid lines.

1) When reassembling parts requiring numerous nuts and bolts (cylinder, crankcase, etc.), when the sequence in which bolts should be tightened is indicated with numbers follow the indicated sequence. When the sequence is not indicated, proceed as follows. Tighten the bolts in several stages, making sure to tighten each bolt equally. First tighten the inner bolts, then the outer bolts, moving diagonally or in a circular motion. This will ensure that engine parts are assembled evenly and securely. (Use the same procedure in the reverse sequence when disassembling the parts.)

2) When installing oil seals, be careful not to scratch or reverse the sides that mate with the shaft and always apply grease to the lip surfaces.

3) Confirm the correct quantity and thickness when applying sealant. Applying excessively will result in the excess portion being excreted into or outside of the case, potentially causing damage. Adhere strictly to the written instructions when applying adhesives.

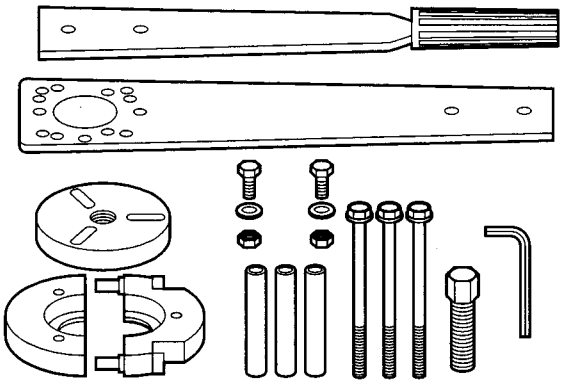
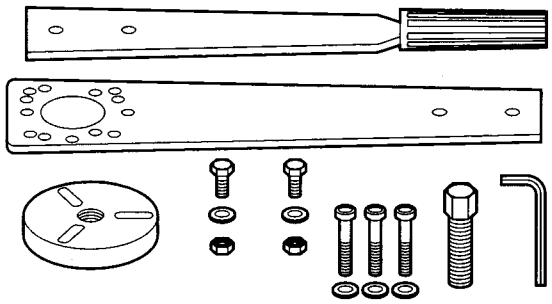
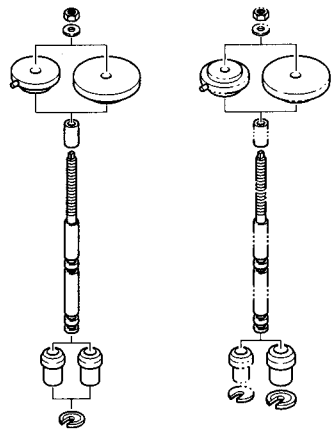
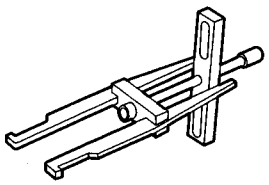
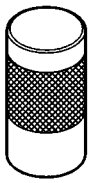
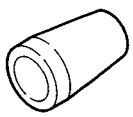
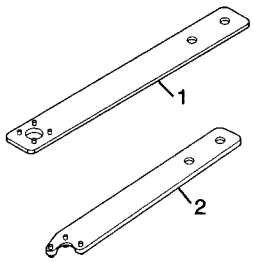
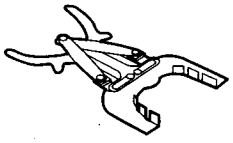
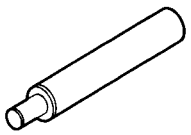
4) Apply penetrating oil spray to nuts or bolts that are difficult to remove due to rust and wait 5 minutes before removing.

5) For the various inspection specifications, torque values, special tools, and the points where sealant, adhesive and grease are to be applied, refer to the relevant tables.

6) The various nuts, bolts and washers referred to in this manual are listed below.

Name	Type	Diameter	Length
H820	Hexagon bolt	8 mm (0.31 in)	20 mm (0.79 in)
N8	Hexagon Nut (Medium Height Nut)	8 mm (0.31 in)	
L8	Hexagon Nut (Thin Nut)	8 mm (0.31 in)	
W8	Plain washer	8 mm (0.31 in)	
SW8	Spring washer	8 mm (0.31 in)	
Screw 620	Pan head screw	6 mm (0.24 in)	20 mm (0.79 in)

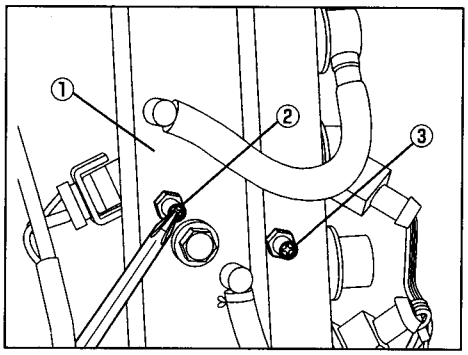
(12) Observe all necessary safety procedures to prevent accidents and injury during work operations.

<table>
<tr><td> 
Drive pulley puller assembly
3T5-72890-0</td><td colspan="2"> 
Flywheel puller kit
3C7-72211-1</td></tr>
<tr><td>For removing drive pulley.</td><td colspan="2">For removing and installing flywheel.</td></tr>
<tr><td> 
Needle bearing puller kit
3C7-72700-0</td><td> 
Bevel gear A bearing puller assembly
3B7-72224-0</td><td> 
Bevel gear A bearing set tool
3B7-72719-0</td></tr>
<tr><td colspan="2">For removing and installing gear case needle bearing and propeller shaft housing.</td><td>For removing bevel gear A bearing outer race.</td><td>For installing bevel gear A bearing.</td></tr>
<tr><td> 
Clutch pin snap tool
345-72229-0</td><td> 
1. Trim rod guide wrench
3B7-72792-0
2. Tilt rod guide wrench
3C8-72791-0</td><td> 
Piston ring tool
353-72249-0</td><td> 
Piston pin tool
353-72215-0</td></tr>
<tr><td>For installing clutch pin snap ring.</td><td>For removing and installing PT&T piston rod assembly.</td><td>For removing and installing piston ring.</td><td>For removing and installing piston pin.</td></tr>
</table>

2) Air Supply System

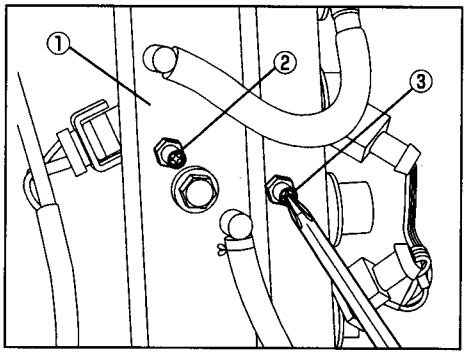
Prior to Removing Peripheral Components

1 Press on the core of the air valve ② located on the air rail ① to release pressure from the air lines.



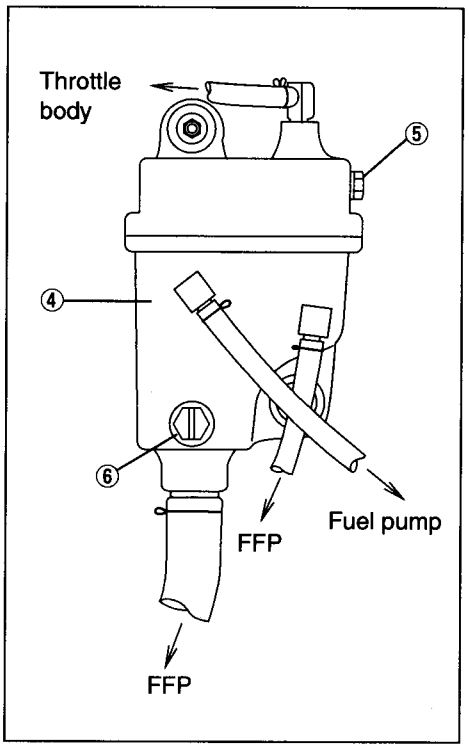
2 Press on the core of the fuel valve ③ located on the air rail ① to release pressure from the fuel lines.

> Be sure to cover the fuel valve with a clean cloth, as fuel will spurt out when pressure is released

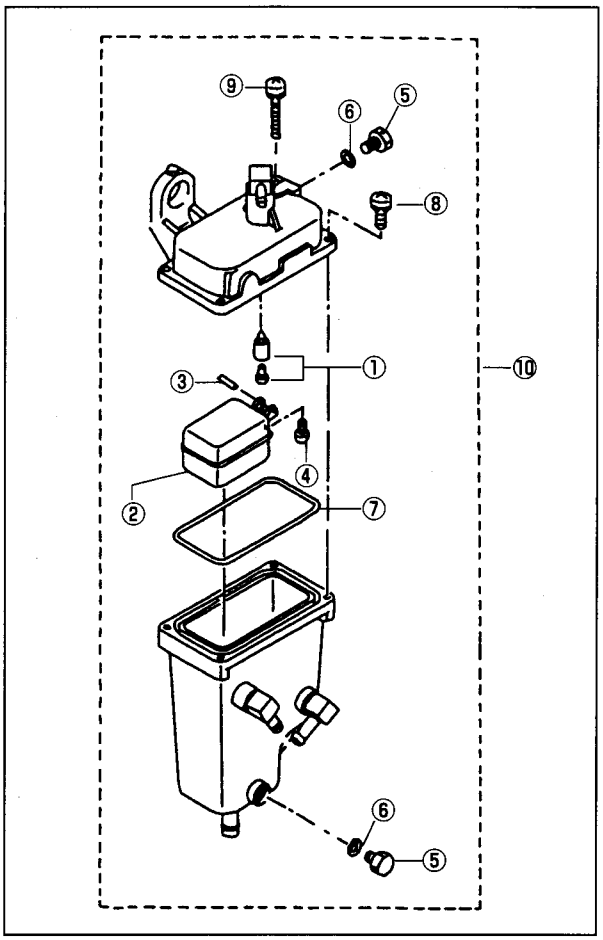


3 After loosening the plug ⑤ on the upper section of the vapor separator ④ in order to release pressure, loosen the drain plug ⑥ on the lower section and drain out the fuel.

> Hold a cloth against the drain plug to absorb the fuel as it drains out.



Vapor Separator Configuration



Inspecting Vapor Separator

No.	Components	Points to check
①	Float valve	• Wear, deterioration and damage.
②	Float	• Presence of cracks. • Contamination by fuel.
⑥, ⑦	O-rings	• Wear, deterioration and damage.
⑩	Vapor separator assembly	• Contaminants attached to nipple openings. • Damage or cracks on the body.

Assembling Advancer Arm

Assemble following components.

- Advancer arm
- Throttle link rod
- TPS link rod
- Bolt: type H835
- Washers
- Collar
- Bushing

Install following components.

- Throttle link ball joint cap
- TPS link ball joint cap

Install ball joint and cap by hand using a pinching motion.

Take care not to apply force to the TPS lever.

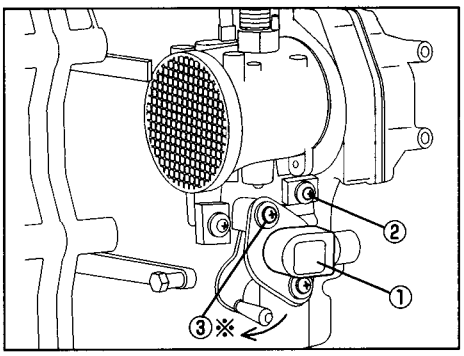
Disassembling TPS

Disassemble following components.

① TPS assembly

② Screw: type 420 panhead at 3 locations

- Washers (3)
- Collars (3)
- Mount rubber (3)



Remove following component.

① TPS assembly

• Confirm whether the arm springs back in the ※ direction • Confirm that arm moves smoothly. • Check the connectors for damage.

• Never loosen small screw ③ that s locked in place using paint. • Doing so will change the 0 point setting, making it unusable.

Refer to chapter 5 when conducting electrical inspections.

Assembling Crankcase

Degrease the mating surface of the crankcase and cylinder.

Caution:

Insufficient degreasing will render sealant less effective, resulting in oil leakage.

Apply sealant evenly over the mating surface on the cylinder.
Sealant: Loctite #518

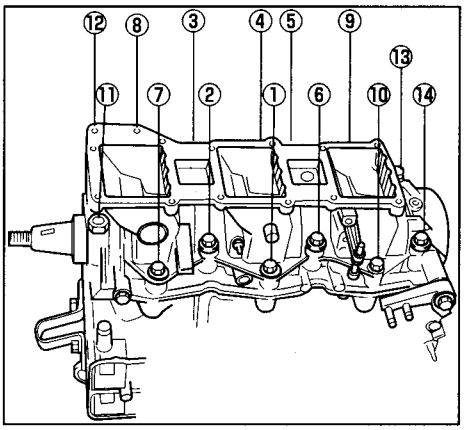
Apply evenly inside the bolt holes so that there are no bare patches. Be careful not to apply too much.

Tap in knock pins at 2 locations on the cylinder; then install crankcase.

Install by tapping with a plastic hammer to ensure that there is an even clearance across the mating face.

Install the crankcase bolts and nut.

Tighten in the sequence shown in the figure to the right.



M8 partial torque	12 – 15 N-m (1.2 – 1.5 kg-m) [8.7 – 11 ft-lb]
M8 full torque	24 – 26 N-m (2.4 – 2.6 kg-m) [17 – 19 ft-lb]
M10 partial torque	17 – 23 N-m (1.7 – 2.3 kg-m) [12 – 17 ft-lb]
M10 full torque	37 – 41 N-m (3.8 – 4.2 kg-m) [28 – 30 ft-lb]

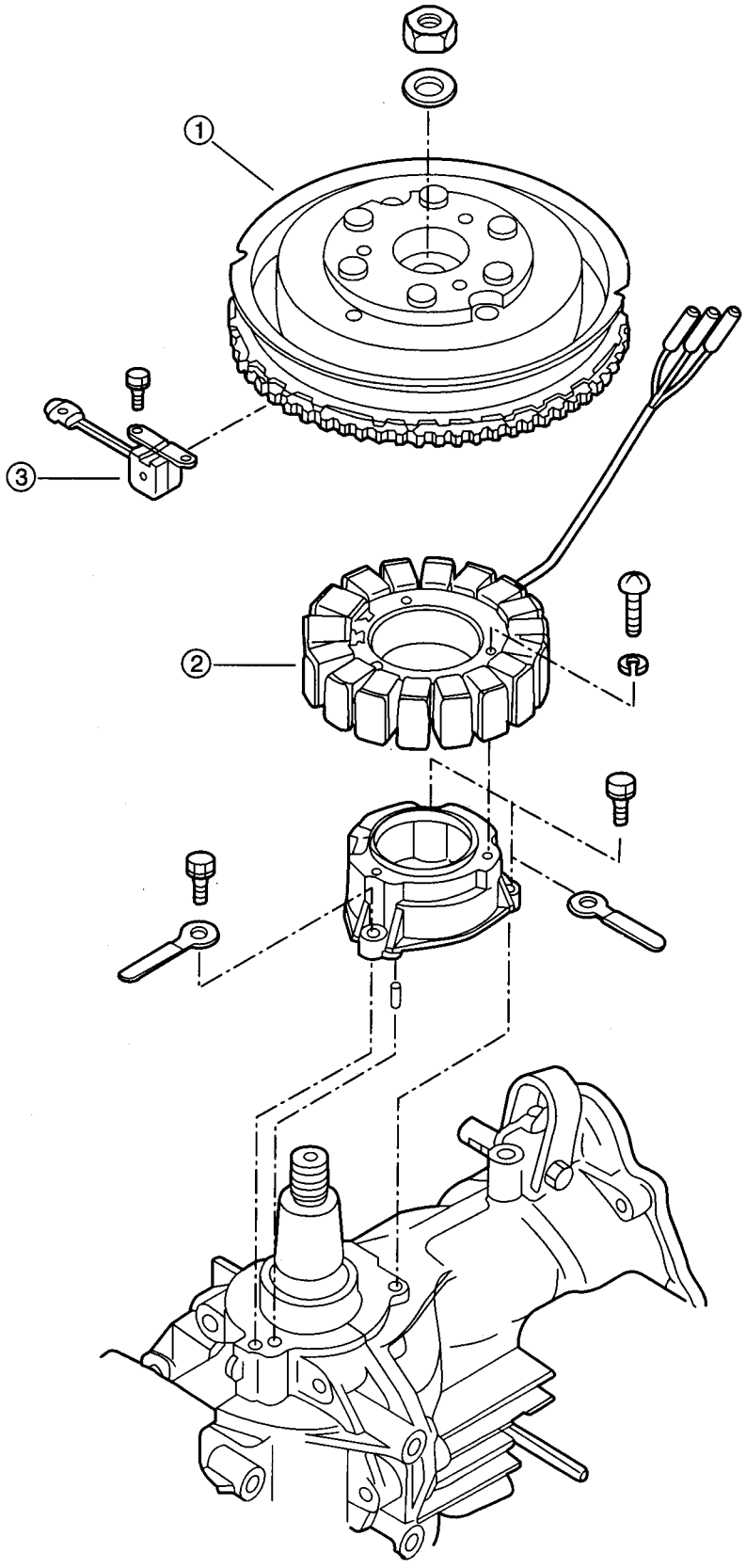
Assembling Cylinder Head

Degrease all mating surfaces on cylinder, cylinder head and head cover.

Install following components.

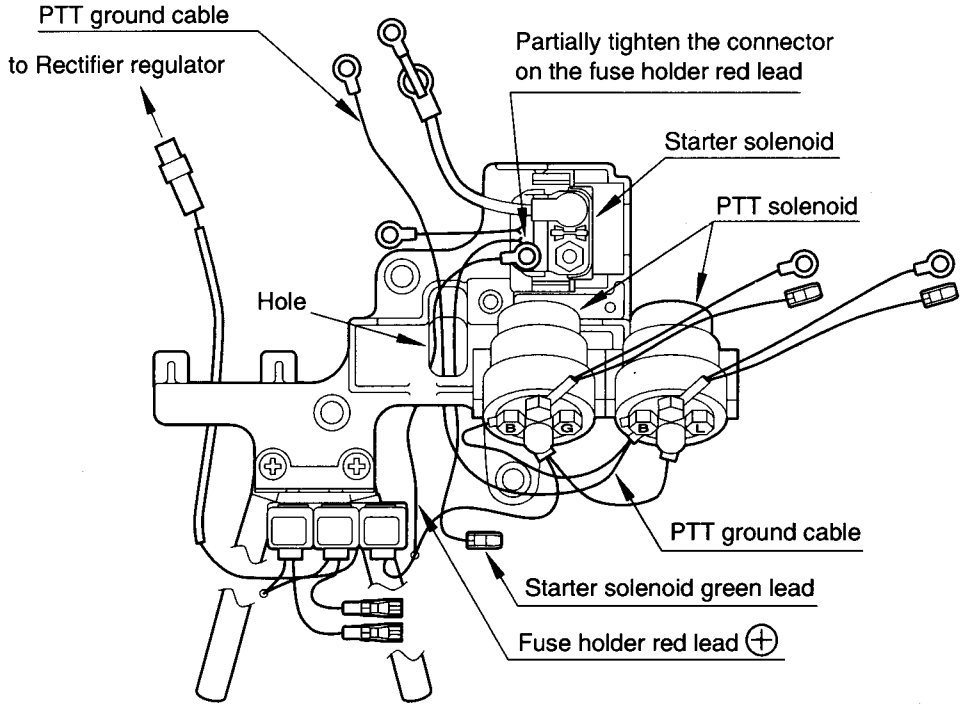
- Anode
- Knock pins at 2 locations
- Head gasket ⇨ Replace with new one.
- Cylinder head
- Knock pins at 2 locations
- Head cover gasket ⇨ Replace with new one.
- Head cover
- Washer
- Bolt

MAGNETO

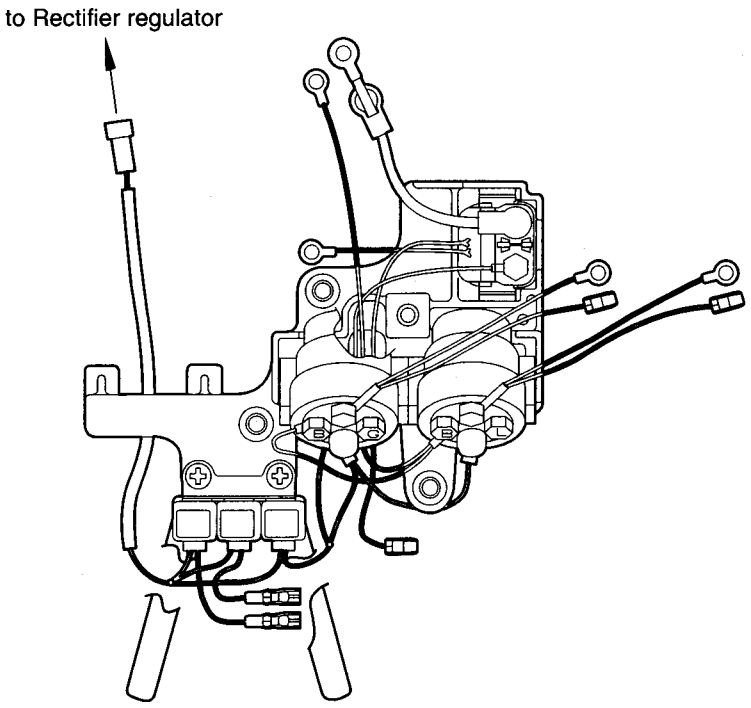


Pre-Assembly Step 4

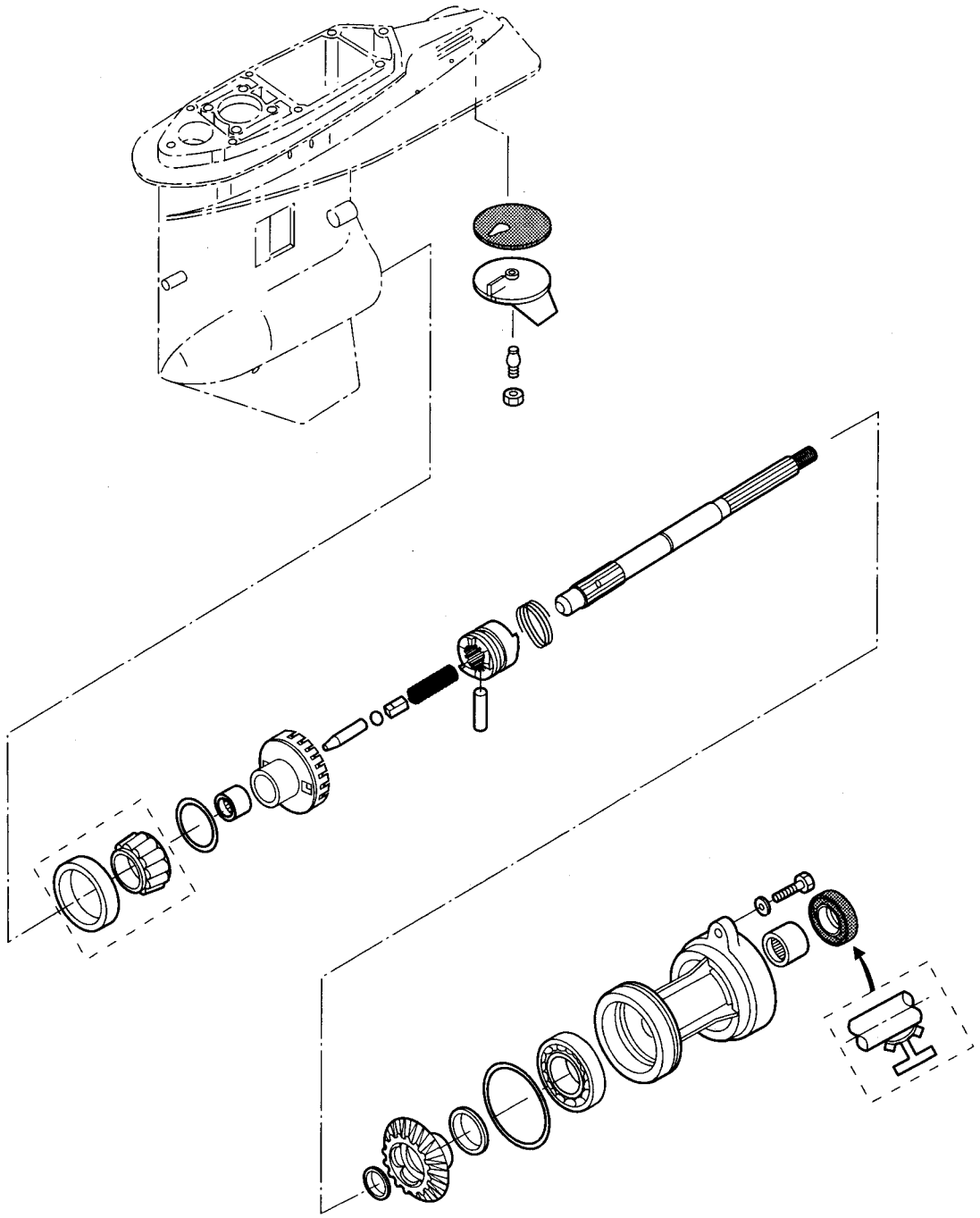
Pass the fuse holder red lead⊕, PTT solenoid goround cable and starter solenoid green lead through the hole in the center of the solenoid bracket; Then attach the starter solenoid, PTT solenoid, and fuse holder to the bracket.



Completed Pre-Assembly



GEAR CASE (PROPELLER SHAFT)



2. Disassembly

Caution:

- Begin the procedure by first removing the spark plug caps and then removing the spark plugs.
- When working with the outboard engine tilted full up, make sure to secure the engine firmly in place using a tilt up stopper.

Disassembling Gear Case

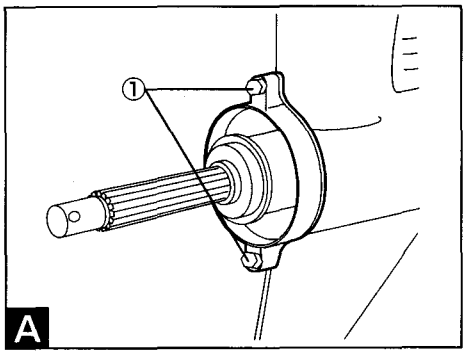
The gear case can be disassembled from this outboard engine without having to remove the power unit.

Refer to Section 5 and Section 7 of Chapter 3 for information about propeller disassembly, gear case disassembly and oil drain and water pump impeller disassembly.

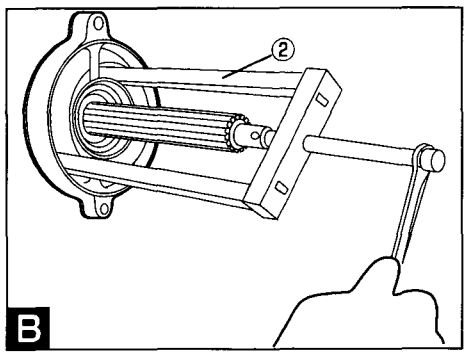
Caution:

- During disassembly be sure to securely mount the gear case using a holding tool (for instance, a vise). Drain all gear case oil into a receptacle and inspect to determine whether metal pieces are mixed in with the oil.
- Small metal pieces mixed in with the oil may be the result of natural wear to the gear, bearing, or shaft. The presence of large metal pieces usually suggests severe internal damage. When inspecting internal components be sure to make a note of any observations for future reference.

	Special tool	Part number
2	Propeller shaft housing puller	353-72252-0
4	Drive shaft socket	3B7-72232-0
5	Bevel gear B nut wrench	3B7-72231-0



A : 1. Remove propeller shaft housing bolts ①.
B : 2. Attach the propeller shaft housing puller ② and tighten the bolt until the propeller shaft housing separates from the gear case.

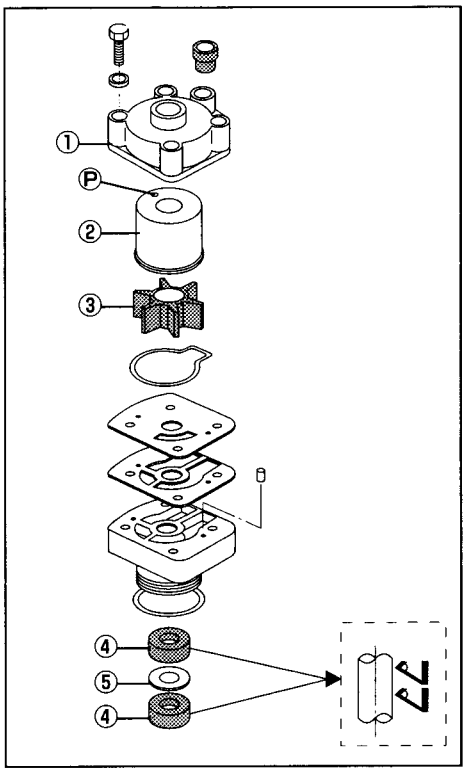


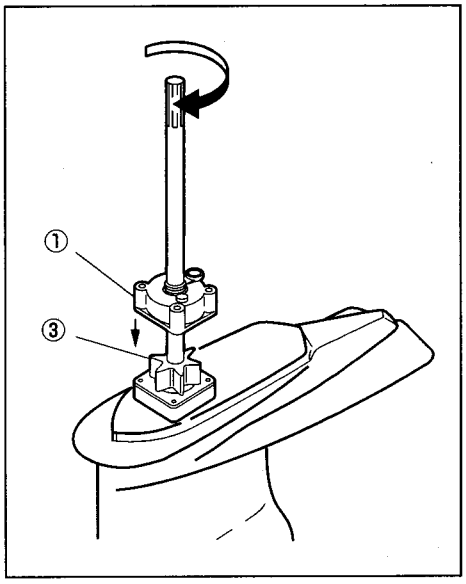
Assembling Water Pump

Install following components.

Refer to Section 7 Inspecting Cooling System of Chapter 3 Inspection and Maintenance for detailed descriptions of components.

- Confirm the alignment of the oil seals ④.
- Apply gear oil to the lip area of the oil seals ④.
- Insert the shim ⑤ between the oil seals ④.
- Insert the drive shaft into the pump case, taking care not to scratch the lip area of the oil seals ④.
- Carefully fit the protruding side Ⓟ of the pump case liner ② into the recession in the upper pump case ①.
- Insert the pump impeller key firmly into the drive shaft.
- Apply OBM grease in the pump case liner ②.
- When installing the pump impeller ③ in the upper pump case ①, rotate the drive shaft as shown in the figure to the bottom right an push. (Make sure that the pump impeller ③ blades are correctly aligned.)





1. Configuration