

FT50C

SERVICE MANUAL

290418

62Y-28197-5A-11

NOTICE

This manual has been prepared by Yamaha primarily for use by Yamaha dealers and their trained mechanics when performing maintenance procedures and repairs to Yamaha equipment. It has been written to suit the needs of persons who have a basic understanding of the mechanical and electrical concepts and procedures inherent in the work, for without such knowledge attempted repairs or service to the equipment could render it unsafe or unfit for use.

Because Yamaha has a policy of continuously improving its products, models may differ in detail from the descriptions and illustrations given in this publication. Use only the latest edition of this manual. Authorized Yamaha dealers are notified periodically of modifications and significant changes in specifications and procedures, and these are incorporated in successive editions of this manual.

Important information

Particularly important information is distinguished in this manual by the following notations:

 The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

WARNING

Failure to follow WARNING instructions could result in severe injury or death to the machine operator, a bystander, or a person inspecting or repairing the outboard motor.

CAUTION:

A CAUTION indicates special precautions that must be taken to avoid damage to the outboard motor.

NOTE:

A NOTE provides key information to make procedures easier or clearer.

**FT50C
SERVICE MANUAL
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General information

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How to use this manual

Manual format

The format of this manual has been designed to make service procedures clear and easy to understand. Use the information below as a guide for effective and quality service.

- ① Parts are shown and detailed in an exploded diagram and are listed in the components list.
- ② Tightening torque specifications are provided in the exploded diagrams and after a numbered step with tightening instructions.
- ③ Symbols are used to indicate important aspects of a procedure, such as the grade of lubricant and lubrication point.
- ④ The components list consist of parts and part quantities, as well as bolt screw O-ring and hose dimensions.
- ⑤ Service points regarding removal, checking, and installation are shown in individual illustrations to explain the relevant procedure.

NOTE:

For troubleshooting procedures, see Chapter 9, "Troubleshooting."

POWER **Power unit**

Cylinder head

5-25

62Y5A11

Cylinder head

No.	Part name	Q'ty	Remarks
1	Cylinder head	1	
2	Oil pump	1	
3	Cylinder head cover	1	
4	Bolt	7	M6 × 20 mm
5	Cylinder head cover gasket	1	Not reusable
6	Bolt	10	M9 × 95 mm
7	Spark plug	4	
8	Bolt	5	M6 × 25 mm
9	Dowel pin	2	
10	Cylinder head gasket	1	Not reusable
11	Grommet	4	
12	Anode	4	
13	Cover	4	

④

POWER **Power unit**

Removing the timing belt and sprockets

- Set the cylinder #1 piston position to TDC of the compression stroke by aligning the "1" mark ③ on the driven sprocket with the "▲" mark ④ on the cylinder head.
- Remove the breather hose and loosen the drive sprocket nut ①.
- Remove the tensioner ② and timing belt ⑤ from the driven sprocket side.
- Loosen the driven sprocket bolt ⑥ and remove the driven sprocket ⑦.
- Remove the nut ①, retaining plates ⑧, drive sprocket ⑨, and Woodruff key ⑩.

CAUTION:
Do not turn the drive sprocket counterclockwise, otherwise the valve system may be damaged.

NOTE:
• Use a deep socket ② (M42) for this procedure.
• Do not turn the camshaft when loosening the drive sprocket nut.

NOTE:
Do not turn the camshaft when loosening the driven sprocket bolt.

Flywheel holder: 90890-06522

Crankshaft holder 18 ③:
90890-06562

5-21

62Y5A11

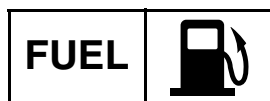
Symbols

The symbols below are designed to indicate the content of a chapter.

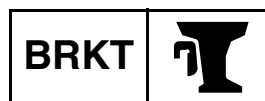
General information



Fuel system



Bracket unit



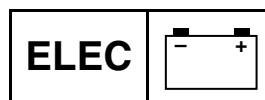
Specifications



Power unit



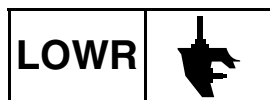
Electrical systems



Periodic checks and adjustments



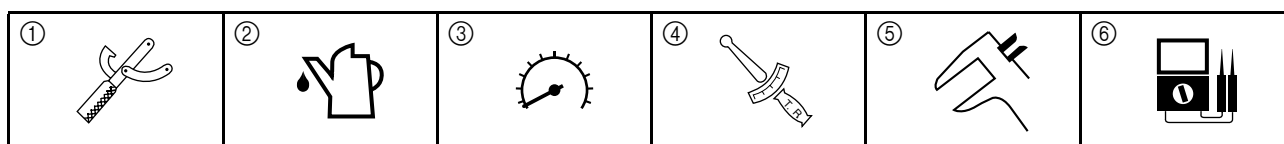
Lower unit



Troubleshooting

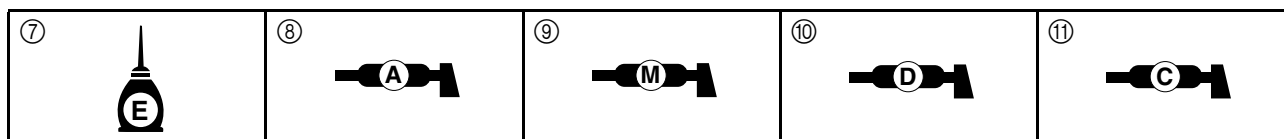


Symbols ① to ⑥ indicate specific data.



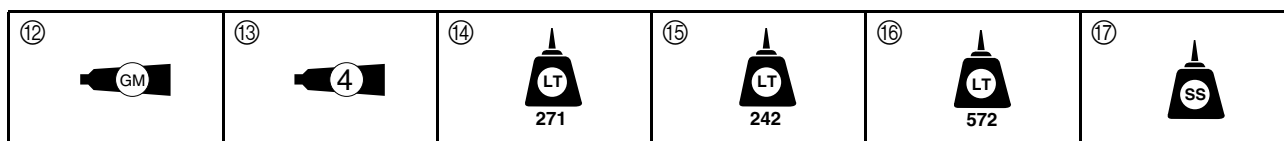
- ① Special tool
- ② Specified oil and fluid
- ③ Specified engine speed
- ④ Specified tightening torque
- ⑤ Specified measurement
- ⑥ Specified electrical value
(Resistance, Voltage, Electric current)

Symbols ⑦ to ⑪ in an exploded diagram indicate the grade of lubricant and the lubrication point.



- ⑦ Apply Yamaha 4-stroke motor oil
- ⑧ Apply water resistant grease (Yamaha grease A)
- ⑨ Apply molybdenum disulfide grease
- ⑩ Apply anti-corrosion grease (Yamaha grease D)
- ⑪ Apply low temperature resistant grease (Yamaha grease C)

Symbols ⑫ to ⑰ in an exploded diagram indicate the type of sealant or locking agent and the application point.



- ⑫ Apply Gasket Maker®
- ⑬ Apply Yamabond No. 4
- ⑭ Apply LOCTITE® No. 271 (Red LOCTITE)
- ⑮ Apply LOCTITE® No. 242 (Blue LOCTITE)
- ⑯ Apply LOCTITE® No. 572
- ⑰ Apply silicon sealant



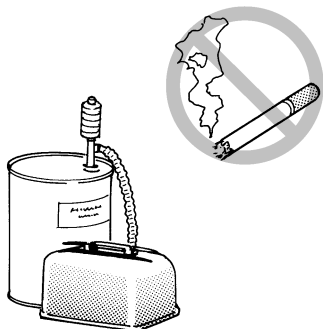
Safety while working

To prevent an accident or injury and to ensure quality service, follow the safety procedures provided below.

Fire prevention

Gasoline is highly flammable.

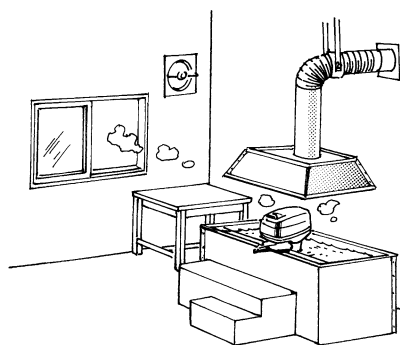
Keep gasoline and all flammable products away from heat, sparks, and open flames.



S62Y1100

Ventilation

Gasoline vapor and exhaust gas are heavier than air and extremely poisonous. If inhaled in large quantities they may cause loss of consciousness and death within a short time. When test running an engine indoors (e.g., in a water tank) be sure to do so where adequate ventilation can be maintained.

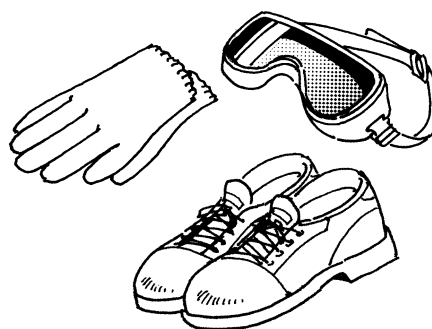


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Self-protection

Protect your eyes by wearing safety glasses or safety goggles during all operations involving drilling and grinding, or when using an air compressor.

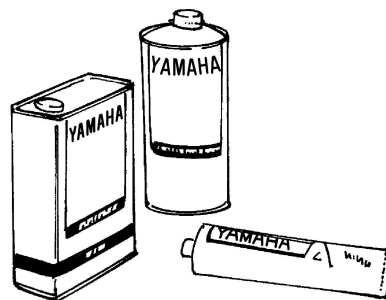
Protect your hands and feet by wearing protective gloves and safety shoes when necessary.



S62Y1120

Parts, lubricants, and sealants

Use only genuine Yamaha parts, lubricants, and sealants or those recommended by Yamaha, when servicing or repairing the outboard motor.



S62Y1130

Under normal conditions, the lubricants mentioned in this manual should not harm or be hazardous to your skin. However, you should follow these precautions to minimize any risk when working with lubricants.

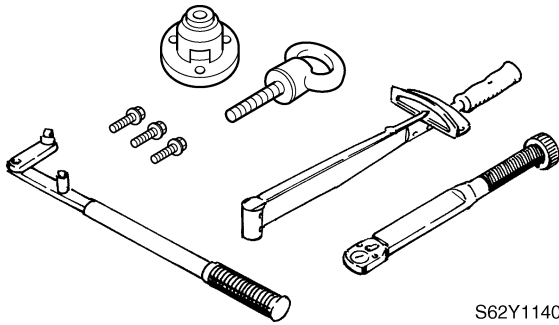
1. Maintain good standards of personal and industrial hygiene.
2. Change and wash clothing as soon as possible if soiled with lubricants.
3. Avoid contact with skin. Do not, for example, place a soiled rag in your pocket.
4. Wash hands and any other part of the body thoroughly with soap and hot water after contact with a lubricant or lubricant soiled clothing has been made.
5. To protect your skin, apply a protective cream to your hands before working on the outboard motor.

6. Keep a supply of clean, lint-free cloths for wiping up spills, etc.

Good working practices

Special tools

Use the recommended special tools to protect parts from damage. Use the right tool in the right manner—do not improvise.

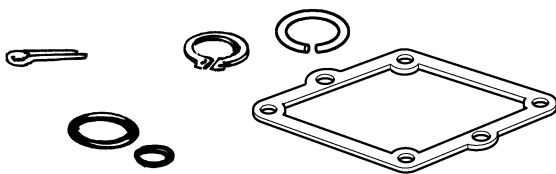


Tightening torques

Follow the tightening torque specifications provided throughout the manual. When tightening nuts, bolts, and screws, tighten the large sizes first, and tighten fasteners starting in the center and moving outward.

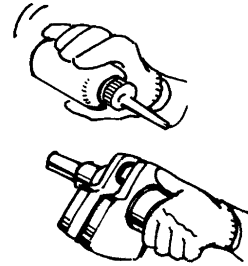
Non-reusable parts

Always use new gaskets, seals, O-rings, cotter pins, circlips, etc., when installing or assembling parts.



Disassembly and assembly

1. Use compressed air to remove dust and dirt during disassembly.
2. Apply engine oil to the contact surfaces of moving parts before assembly.



3. Install bearings with a manufacture identification mark in the direction indicated in the installation procedure. In addition, be sure to lubricate the bearings liberally.
4. Apply a thin coat of water-resistant grease to the lip and out periphery of an oil seal before installation.
5. Check that moving parts operate normally after assembly.

Identification

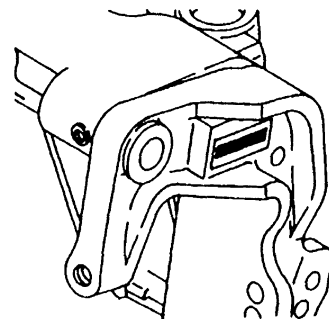
Applicable models

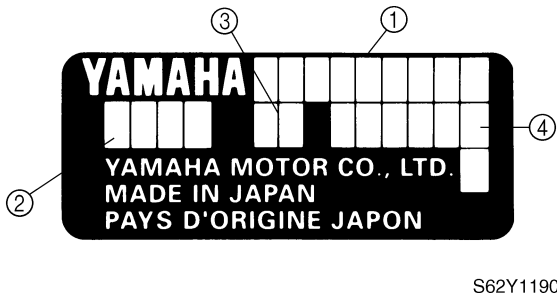
This manual covers the following models.

Applicable models
FT50CEHD, FT50CED, FT50CET

Serial number

The outboard motor serial number is stamped on a label attached to the port clamp bracket.





- ① Model name
- ② Approved model code
- ③ Transom height
- ④ Serial number

Model name	Approved model code	Starting serial No.
FT50CEHD	64J	L: 650101–
FT50CED		L: 550101–
FT50CET		L: 450101–

Features and benefits

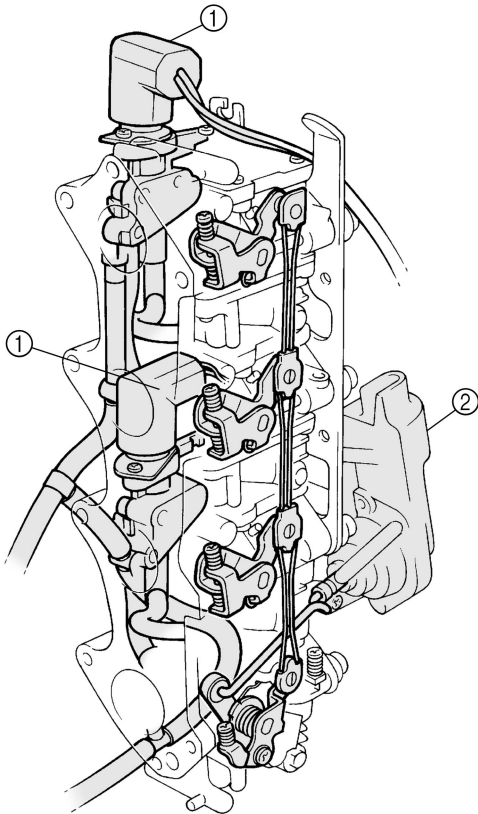
Use of leaded gasoline

New FT50C/F50D is designed for pleasure/light commercial use for all over the world. Therefore, engine components anti-corrosion and reliability has been increased while regular leaded gasoline is used.

However, always use regular unleaded gasoline for longer engine life.

Newly designed four carburetors

Newly designed four carburetors have been based on the current F50A. Prime Start has been adopted for the starting system to further increase starting performance and serviceability. Furthermore, the acceleration pump and the dashpot have been integrated to simplify construction and to ease serviceability. The four carburetors can be accurately and easily adjusted due to the simple construction of the links.



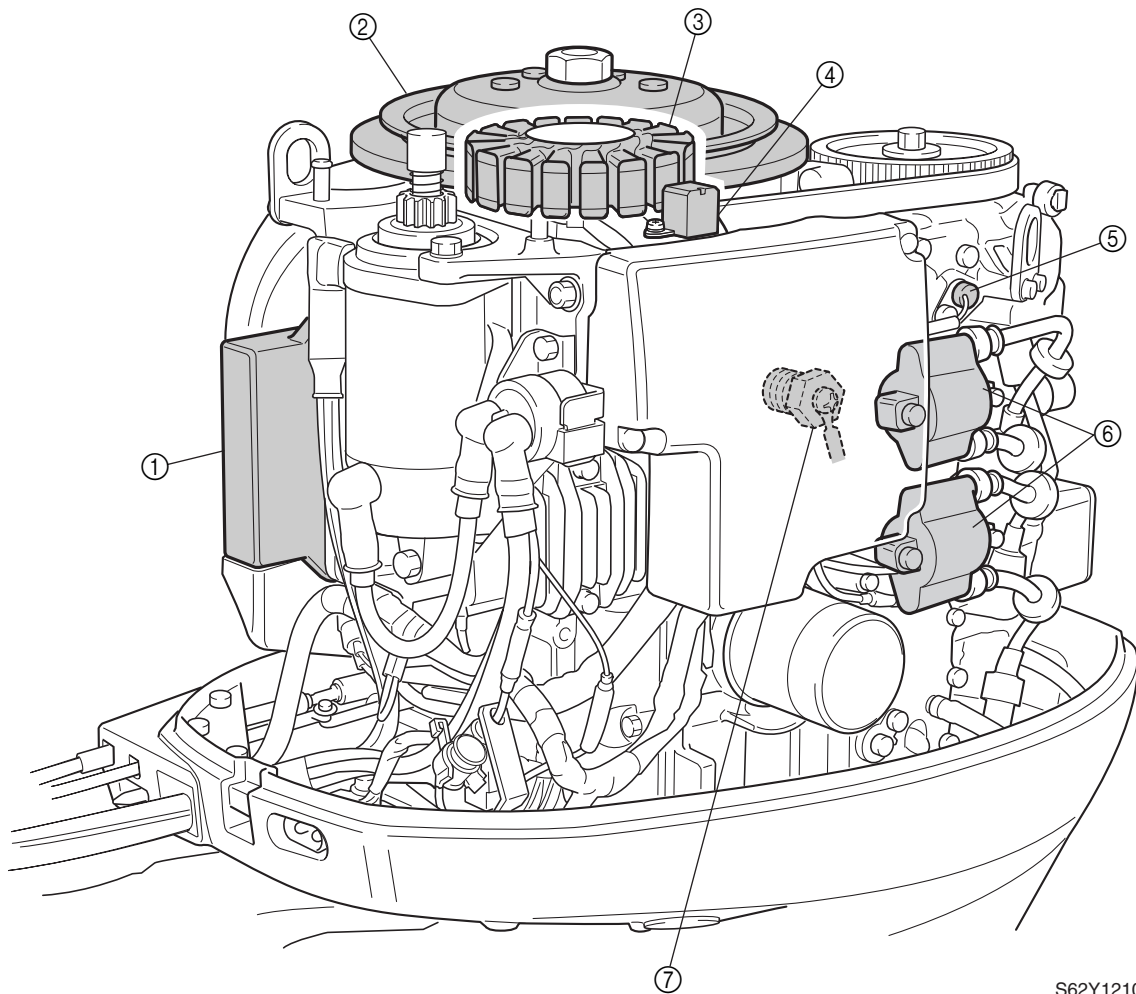
S62Y1200K

- ① Prime Start
- ② Acceleration pump

CDI unit with microcomputer

The ignition system consists of a flywheel, stator, pulser coil, thermoswitch, oil pressure switch, CDI unit, and ignition coil. The CDI unit contains a built-in microcomputer that determines the ignition timing separately for acceleration and for normal operation, based on signals received from the pulser coil, thermoswitch, and oil pressure switch.

1



S62Y1210

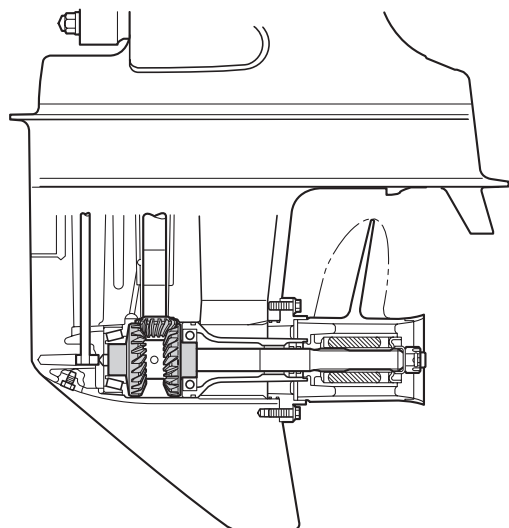
- ① CDI unit
- ② Flywheel
- ③ Stator
- ④ Pulser coil
- ⑤ Thermoswitch
- ⑥ Ignition coil
- ⑦ Oil pressure switch



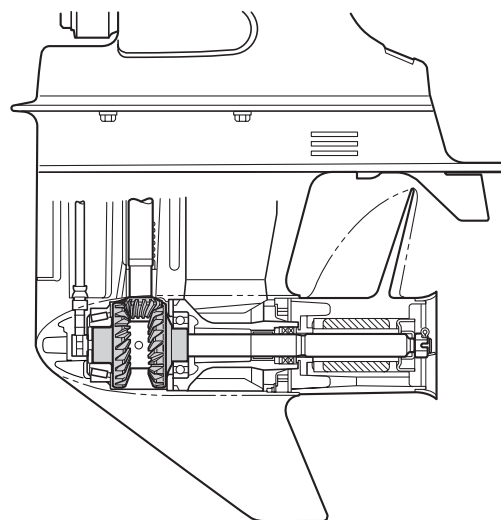
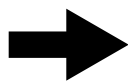
Lower unit

Higher class pinion and gears

The lower unit of the new FT50C uses the same type of large gears that are used in the F100. The use of the same type of gears that are used in a higher class model provides ample durability, making it possible to accommodate a wider range of applications throughout the market.



F50A



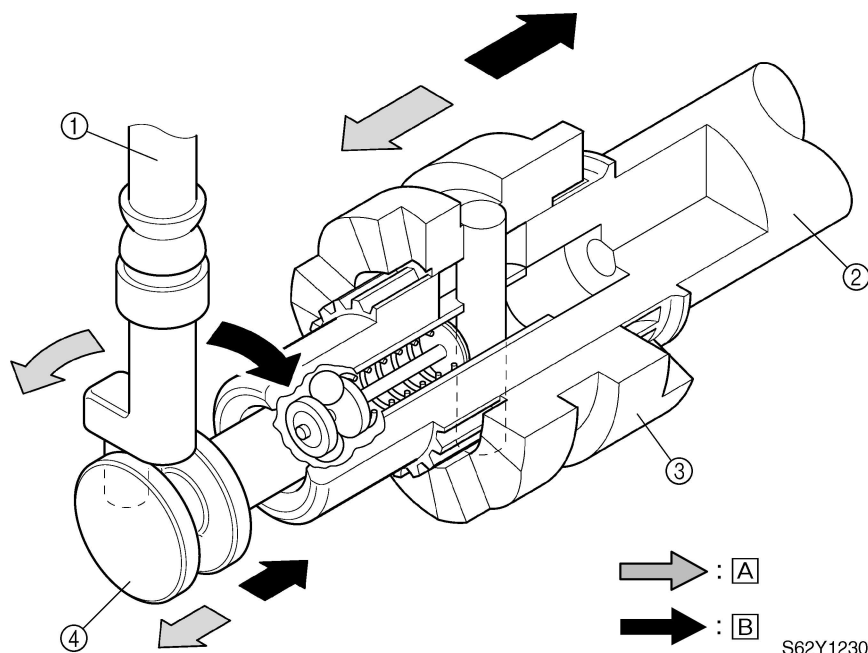
FT50C

S62Y1220K

Model	Pinion		Forward gear		Reverse gear		Gear ratio
	Number of teeth	Diameter (mm)	Number of teeth	Diameter (mm)	Number of teeth	Diameter (mm)	
F50A	13	45	24	74	24	75	1.8
FT50C	13	46	30	95	30	95	2.3

Shift slider type shift mechanism

The FT50C has adopted the shift slider type shift mechanism. This shift mechanism enables a prompt engagement of the dog clutch regardless of the operating speed of the shift lever. Thus, smooth and positive shift operation has been made possible.



- ① Shift rod
- ② Propeller shaft
- ③ Dog clutch
- ④ Shift slider

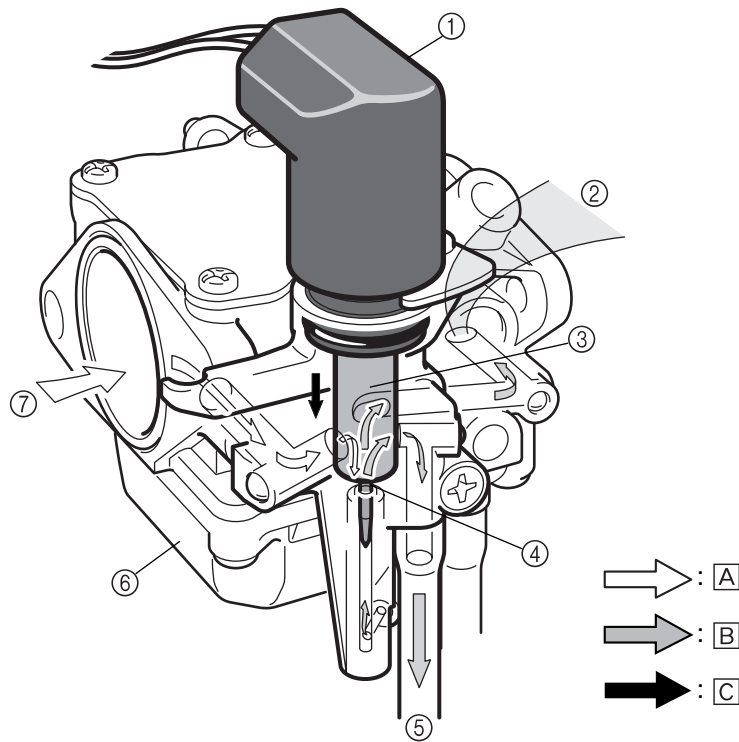
- Ⓐ Forward
- Ⓑ Reverse

Technical tips

Carburetor

Starting system (Prime Start)

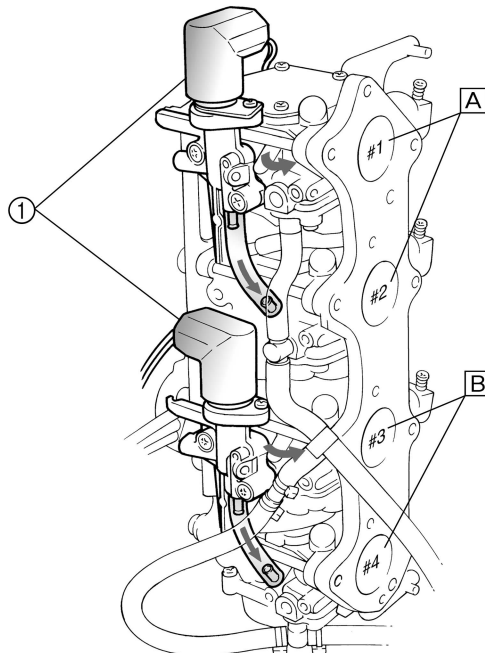
To facilitate the starting of a cold engine, an air-fuel mixture that is richer than normal is required. For this reason, the Prime Start system has been adopted in the FT50C. In the Prime Start system, the thermo heater plunger is in a position that fully opens the fuel enrichment valve while the engine is being started. Thus, fuel enrichment is achieved during the starting of the engine, and continues while the engine is being warmed up. Once the engine starts, current flows from the lighting coil of the to the thermo heater, allowing the wax in the Prime Start unit to expand. The expanded wax moves the thermo heater plunger in the direction to close the enrichment valve. As a result, the volume of fuel that passes through the fuel enrichment valve decreases. A few minutes after the engine has started, the thermo heater plunger completely closes the fuel enrichment valve, thus ending the fuel enrichment by the Prime Start system.



S62Y1240K

- ① Prime Start
- ② Intake manifold of the engine
- ③ Thermo heater plunger
- ④ Fuel enrichment valve
- ⑤ To carburetor #2 or #4

- ⑥ Carburetor
- ⑦ Intake silencer
- A Air
- B Fuel
- C Plunger movement



S62Y1250K

- ① Prime Start
- A The enriched air-fuel mixture is delivered to cylinders #1 and #2 by the Prime Start system attached to carburetor #1.

- B The enriched air-fuel mixture is delivered to cylinders #3 and #4 by the Prime Start system attached to carburetor #3.

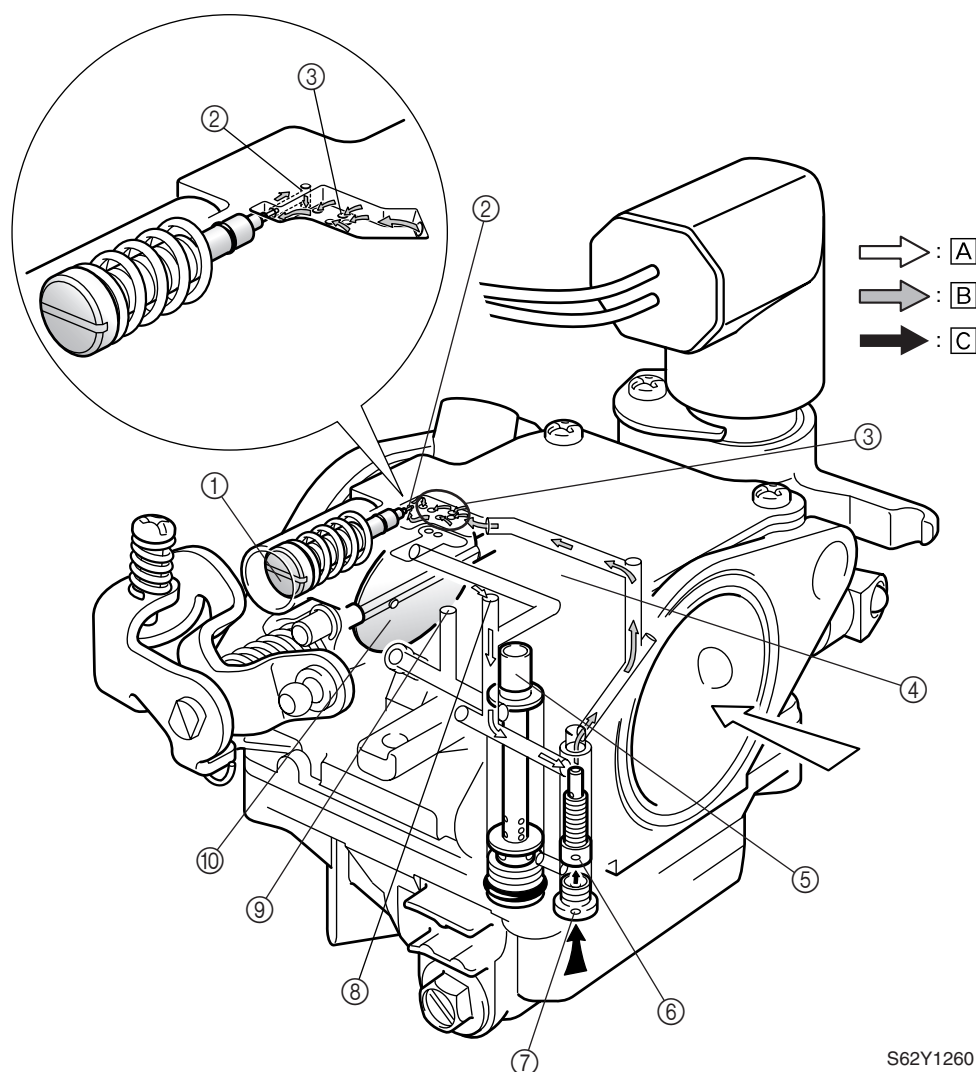
Carburetor operation

1. Idle and low-speed operation

Since the vacuum at the venturi is low when the throttle valve is opened slightly, the main nozzle does not supply any air-fuel mixture to the engine.

When the engine is operating at idle, the fuel that passes through the pilot jet and the air that passes through the pilot air jet mix, enabling the air-fuel mixture that has been regulated by the pilot screw to be fed through the pilot outlet.

Because the throttle valve opens slightly when the engine is operating at low speeds, air-fuel mixture also starts to be fed from the bypass holes.



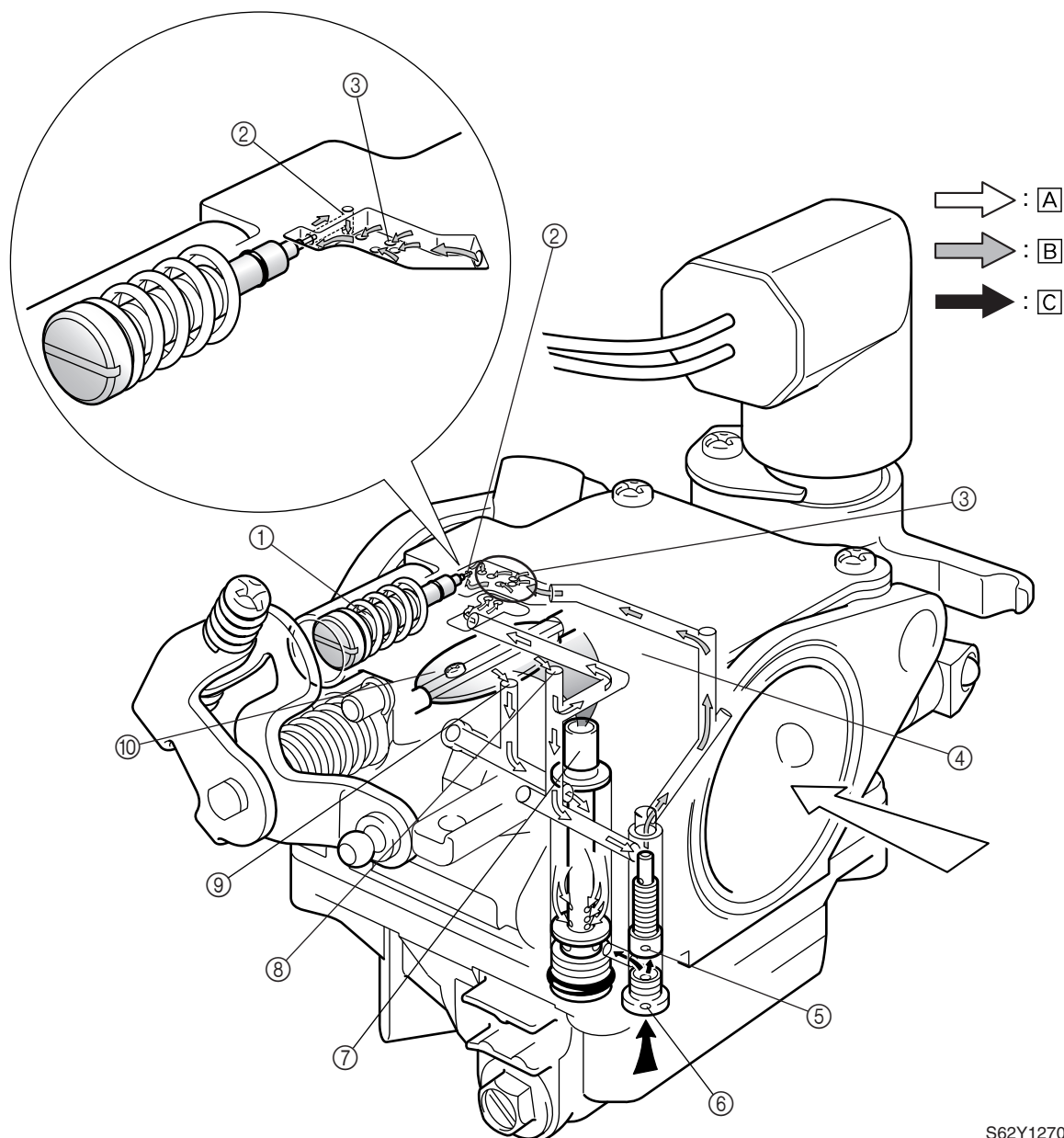
- ① Pilot screw
- ② Pilot outlet
- ③ Bypass holes
- ④ Venturi
- ⑤ Main nozzle
- ⑥ Pilot jet
- ⑦ Main jet
- ⑧ Pilot air jet

- ⑨ Main air jet
- ⑩ Throttle valve
- A Air
- B Air-fuel mixture
- C Fuel



2. Medium speed operation

When the throttle valve opens further, air-fuel mixture is fed from the pilot outlet and all the bypass holes. In addition, air-fuel mixture is also supplied from the main nozzle in accordance with the opening angle of the throttle valve.



S62Y1270

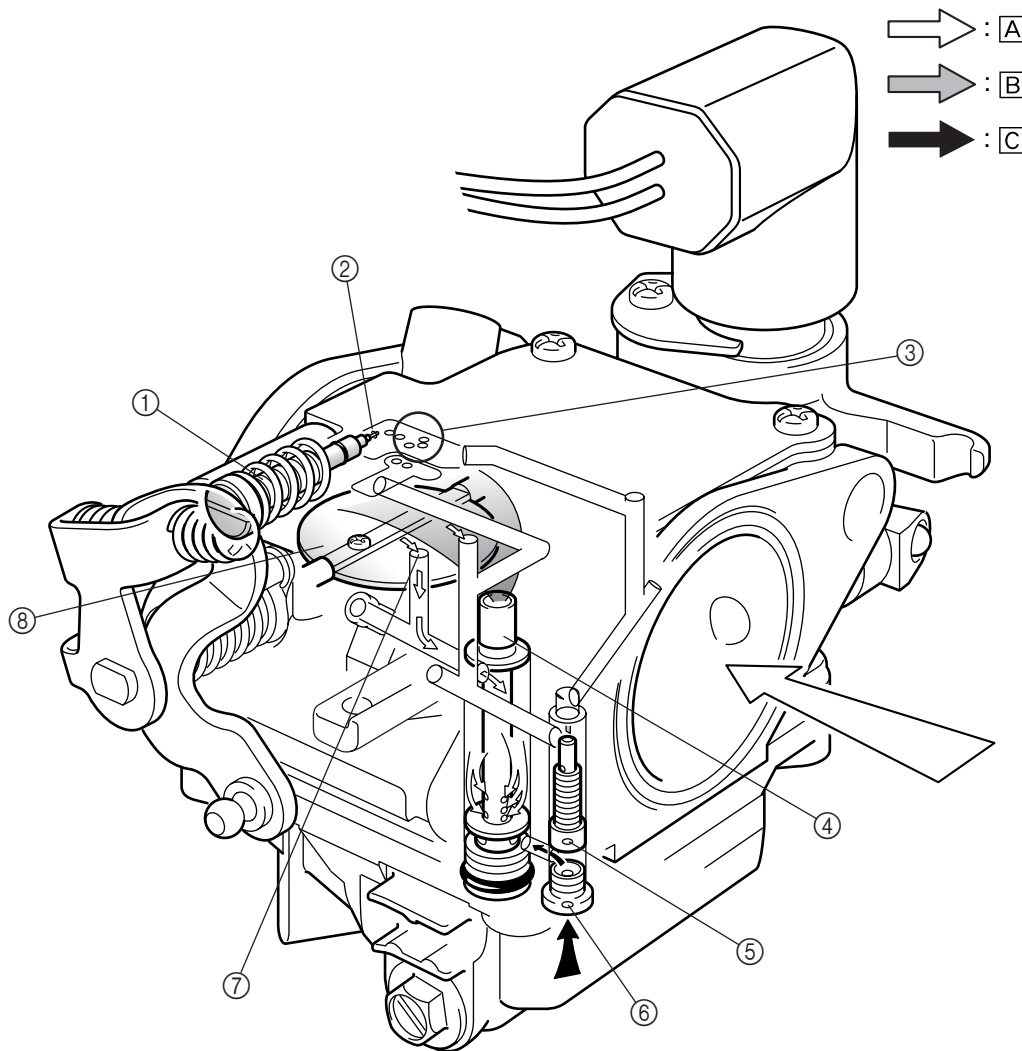
- ① Pilot screw
- ② Pilot outlet
- ③ Bypass holes
- ④ Venturi
- ⑤ Pilot jet
- ⑥ Main jet
- ⑦ Main nozzle
- ⑧ Pilot air jet

- ⑨ Main air jet
- ⑩ Throttle valve
- Ⓐ Air
- Ⓑ Air-fuel mixture
- Ⓒ Fuel

3. High-speed operation

When the throttle valve approaches its fully open position, the fuel that has been regulated by the main jet and the air that has been regulated by the main air jet are mixed in the main nozzle. The resultant mixture is then sprayed by the main nozzle into the venturi. The air-fuel mixture that is sprayed through the venturi is then fed into the engine.

1



S62Y1280

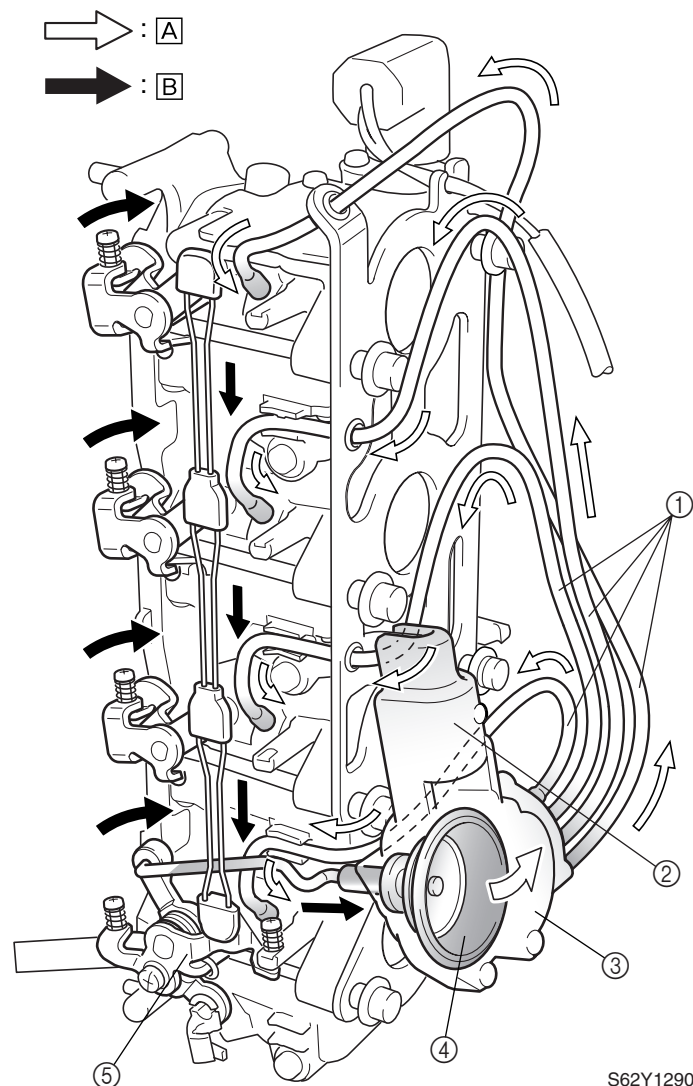
- ① Pilot screw
- ② Pilot outlet
- ③ Bypass holes
- ④ Main nozzle
- ⑤ Pilot jet
- ⑥ Main jet
- ⑦ Main air jet
- ⑧ Throttle valve

- Ⓐ Air
- Ⓑ Air-fuel mixture
- Ⓒ Fuel



Acceleration pump

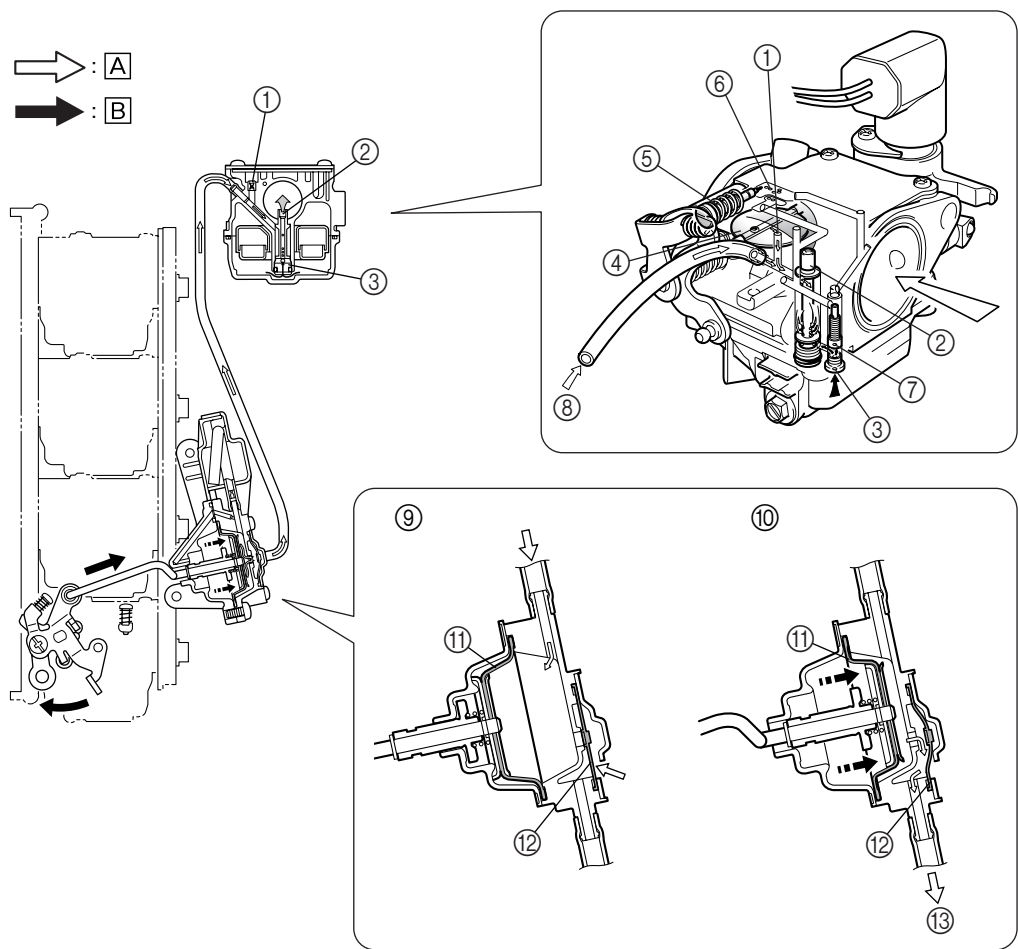
The function of the acceleration pump is to ensure a smooth acceleration by preventing the air-fuel mixture from becoming temporarily lean in case the throttle valve is opened suddenly. When the throttle valve is opened suddenly, a large volume of air is introduced into the engine. However, because fuel is heavier than air, it is not possible to supply the volume of fuel that is necessary for the large volume of air that has been introduced. Thus, because it is not possible to achieve the air-fuel mixture that is required by the engine, bucking or hesitation results. For this reason, the acceleration pump temporarily increases the fuel volume in order to adjust the air-fuel mixture to a ratio that is necessary for the engine in case the throttle valve is opened suddenly.



- ① Bypass hose
- ② Acceleration pump
- ③ Pump chamber
- ④ Diaphragm 1
- ⑤ Throttle lever
- Ⓐ Air flow
- Ⓑ Throttle valve opening direction

Operation

When the throttle is opened suddenly, diaphragm 1 (via the link that is connected to the throttle lever) operates to pressurize the air in the pump chamber. The pressurized air opens diaphragm 2, and becomes distributed to the carburetors by passing through the pipes that are connected to the carburetors. The pressurized and distributed air then utilizes the passage of the main air jet to flow into the main nozzle. The pressure of the air helps suck fuel from the main jet, which increases the fuel in the main nozzle, and thus achieves the fuel enrichment.



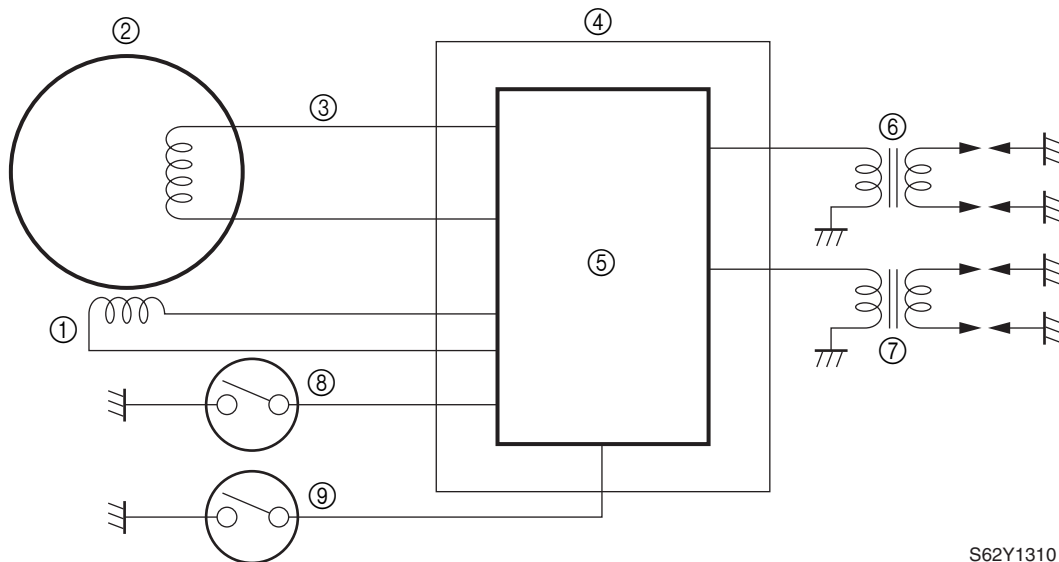
S62Y1300

- | | |
|--------------------------|------------------------------------|
| ① Main air jet | ⑪ Diaphragm 1 |
| ② Main nozzle | ⑫ Diaphragm 2 |
| ③ Main jet | ⑬ To carburetors |
| ④ Throttle valve | A Air flow |
| ⑤ Pilot screw | B Throttle valve opening direction |
| ⑥ Pilot outlet | |
| ⑦ Pilot jet | |
| ⑧ From acceleration pump | |
| ⑨ Throttle valve closing | |
| ⑩ Throttle valve opening | |



Ignition system

In order to determine the optimal ignition timing that is necessary for the proper operation of the engine, the built-in microcomputer in the CDI unit detects the signals from various types of sensors and controls the ignition timing in accordance with a control map that is based on those signals. The microcomputer also effects controls to protect the engine against overheating, over-revolution, and oil pressure drops, as well as to control warning devices.



S62Y1310

- ① Pulser coil
- ② Flywheel
- ③ Charge coil
- ④ CDI unit
- ⑤ Microcomputer

- ⑥ Ignition coils #1 and #4
- ⑦ Ignition coils #2 and #3
- ⑧ Oil pressure switch
- ⑨ Thermoswitch

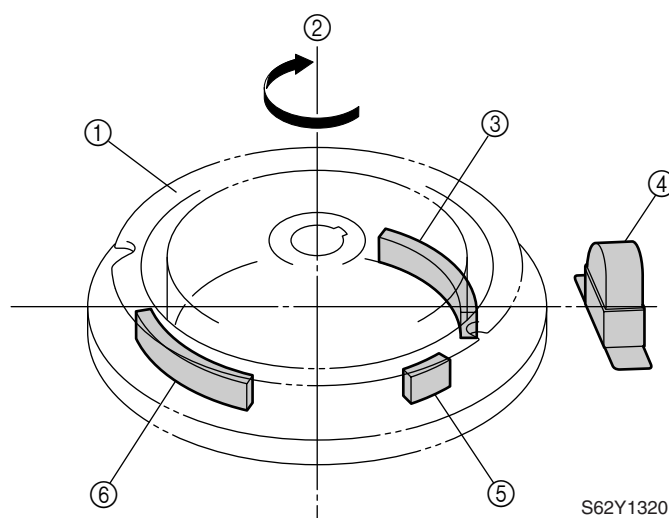
Flywheel

Three protrusions for the pulser coil are provided along the periphery of the flywheel. The purpose of these protrusions is for detecting the engine speed. Two of them are used for ignition signals, and one is used for identifying the cylinders, and these signals are transmitted to the microcomputer.

Pulser coil

The pulser coil transmits the pulser signals, which are generated in the pulser coil in accordance with the rotation of the flywheel, to the CDI unit. Among the two protrusions that are provided for generating signals, one is used for cylinders #1 and #4, and the other for cylinders #2 and #3, thus enabling the pulser coil to simultaneously ignite two cylinders.

To provide ignition signals to the cylinders, the microcomputer determines the ignition cylinder and ignition timing. These are based on the cylinder identification signals generated by the protrusion for identifying cylinders, and on the pulser signals generated by the protrusions for generating ignition signals.

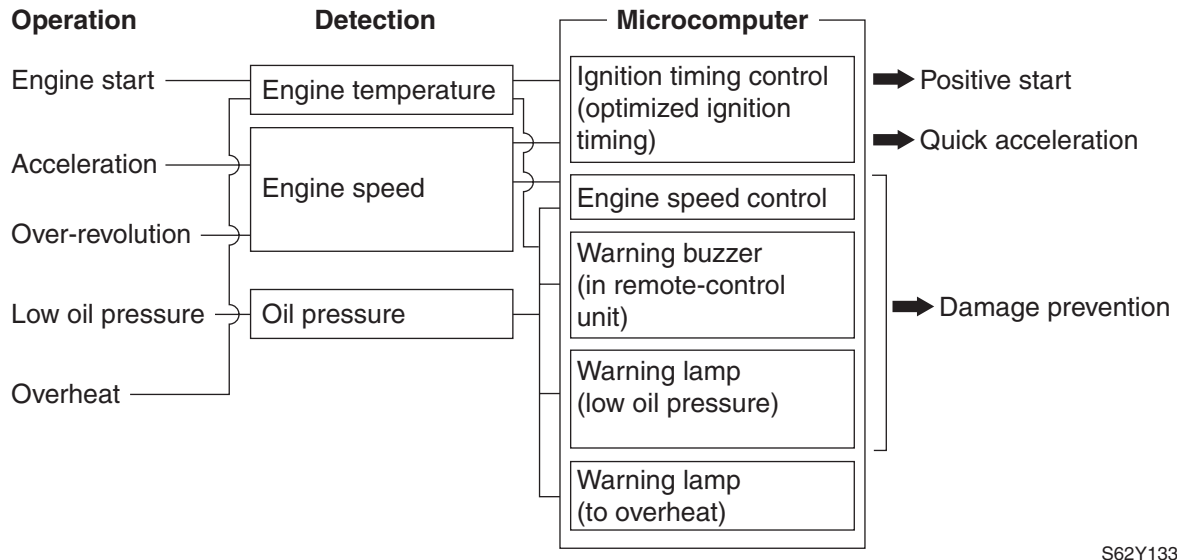


- ① Flywheel
- ② Rotating direction
- ③ Protrusion for cylinders #1 and #4
- ④ Pulser coil
- ⑤ Cylinder identification protrusion
- ⑥ Protrusion for cylinders #2 and #3



Ignition timing control

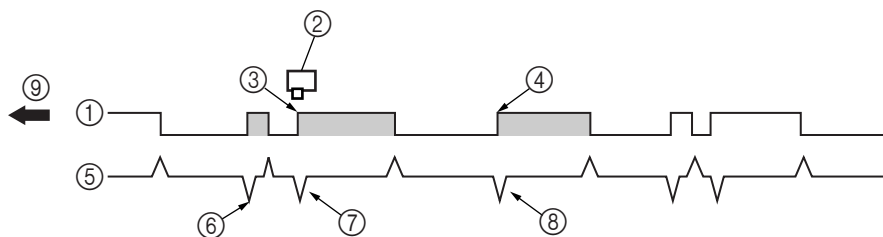
Control circuit diagram



S62Y1330

Basic control

The ignition timing is determined by using the map based on the engine speed (r/min). Then, ignition signals are output from the microcomputer in accordance with the ignition timing map so that ignition can take place at the optimal timing in relation to the engine speed. Then, the microcomputer corrects the ignition timing in accordance with the operating conditions of the engine as detected by the signals that are input from the engine temperature sensor and oil pressure sensor. The pulser signals that are output when the protrusions for cylinders #1 and #4, and for cylinders #2 and #3 pass by the pulser coil, are used to calculate the engine speed. In addition, the pulser signals are used to determine the forecast starting position of the ignition timing.

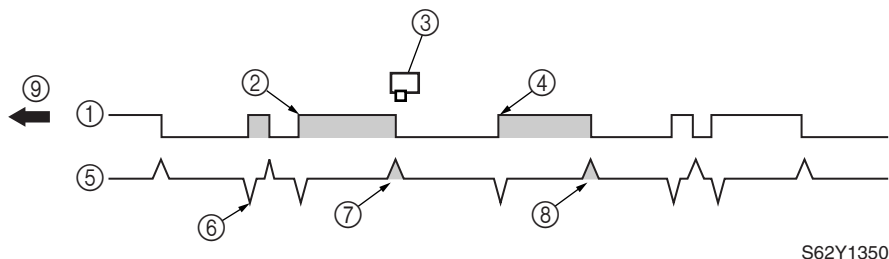


S62Y1340

- | | |
|--------------------------------------|---|
| ① Cylinder identification protrusion | ⑥ Cylinder identification signal |
| ② Pulser coil | ⑦ Identification signal for cylinders #1 and #4 |
| ③ Protrusion for cylinders #1 and #4 | ⑧ Identification signal for cylinders #2 and #3 |
| ④ Protrusion for cylinders #2 and #3 | ⑨ Rotating direction |
| ⑤ Pulser coil signal | |

Starting control

When starting the engine, the timing is set to 5° BTDC until the crankshaft speed maintains 600 r/min for two seconds or longer.

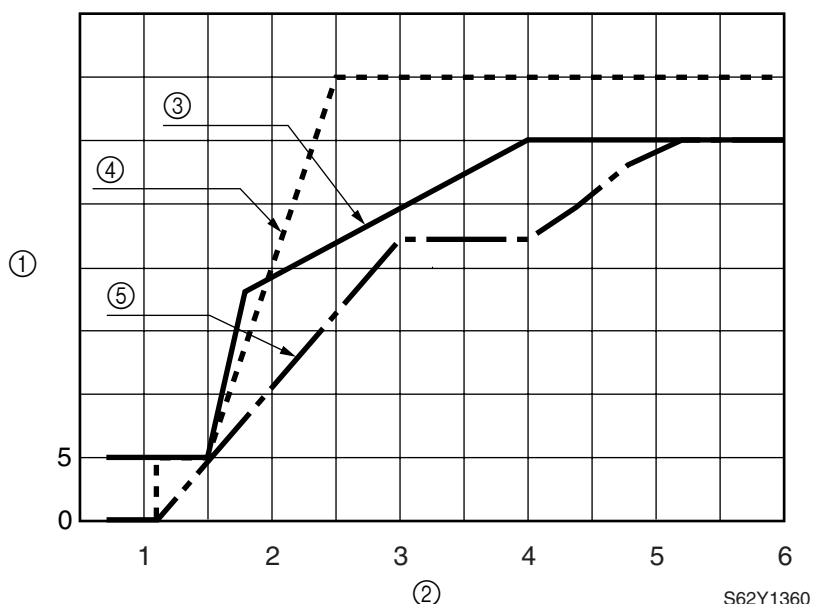


S62Y1350

- ① Cylinder identification protrusion
- ② Protrusion for cylinders #1 and #4
- ③ Pulser coil
- ④ Protrusion for cylinders #2 and #3
- ⑤ Pulser coil signal
- ⑥ Cylinder identification signal
- ⑦ Starting signal (5° BTDC) for cylinders #1 and #4
- ⑧ Starting signal (5° BTDC) for cylinders #2 and #3
- ⑨ Rotating direction

Warm-up control

After the starting control is completed, the control transfers to the ignition timing based on the warm-up map for three minutes. From the time the three-minute warm-up control has been completed, the control transfers to the normal map.



S62Y1360

- ① Ignition timing (BTDC°)
- ② Engine speed (× 1,000 r/min)
- ③ Warm-up map
- ④ Acceleration map
- ⑤ Normal map

**Acceleration control**

This control is activated when the throttle valve is opened suddenly. If the engine speed increases more than the specified figures, the control of the ignition timing transfers to the acceleration map. Thereafter, the control of the ignition timing transfers gradually to the control map before acceleration. If it was under warm-up control, the timing transfers to the warm-up control map, and if it was under normal control, the timing transfers to the normal control map. The control described above will be repeated if the engine is accelerated again.

Over-revolution control

This control operates by detecting the engine speed. If the engine speed increases to over 6,200 r/min, the ignition of cylinders #1 and #4 is stopped in order to regulate the speed. If the engine speed increases further to over 6,300 r/min, the ignition of cylinders #2 and #3 is also stopped. This control will not be deactivated until the engine speed drops below 6,200 r/min.

Overheating control

This control operates in accordance with the engine temperature, which is detected by the signal that is input from the thermoswitch. When the microcomputer detects via the thermoswitch signal that the engine temperature has increased to over 80 °C (176 °F), it outputs a signal to stop the ignition of cylinders #1 and #4, if the engine speed is over 2,000 r/min. At the same time, the microcomputer issues a warning by operating the warning lamp and the warning buzzer. When the overheating control is activated, it will not be deactivated until the engine is stopped or the engine temperature decreases to under 70 °C (158 °F).

The determination of overheating stops when the engine is stopped. However, until the engine temperature decreases to approximately 70 °C (158 °F) or below, the overheating control will be activated upon restarting the engine. Upon restarting, if the engine speed is under 2,000 r/min, the overheating control will not be activated for 75 seconds. However, if the engine is operated at over 2,000 r/min for more than 25 seconds, the overheating control will be activated.

Oil pressure control

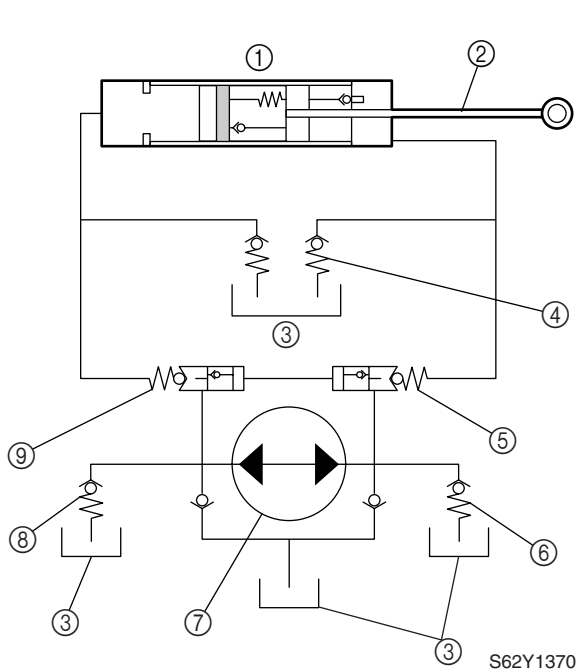
The oil pressure control operates in accordance with the signals from the oil pressure switch. The oil pressure is determined to have dropped if the engine continues to operate at over 2,000 r/min with an oil pressure of under 49 kPa (0.49 kgf/cm², 6.97 psi) for more than one second. When the oil pressure control is activated, the warning buzzer sounds and the warning lamp illuminates. If the engine speed is over 2,000 r/min, the control stops the ignition of cylinders #1 and #4 so that the engine speed will not increase to over 2,000 r/min. Once an oil pressure drop is determined, this control will not be deactivated even if the oil pressure recuperates, until the engine is stopped.

Power trim and tilt

The newly designed power trim and tilt consists of an up-main valve, a down-main valve, an up-relief valve, a single cylinder, and a single ram, which control both trim and tilt functions.

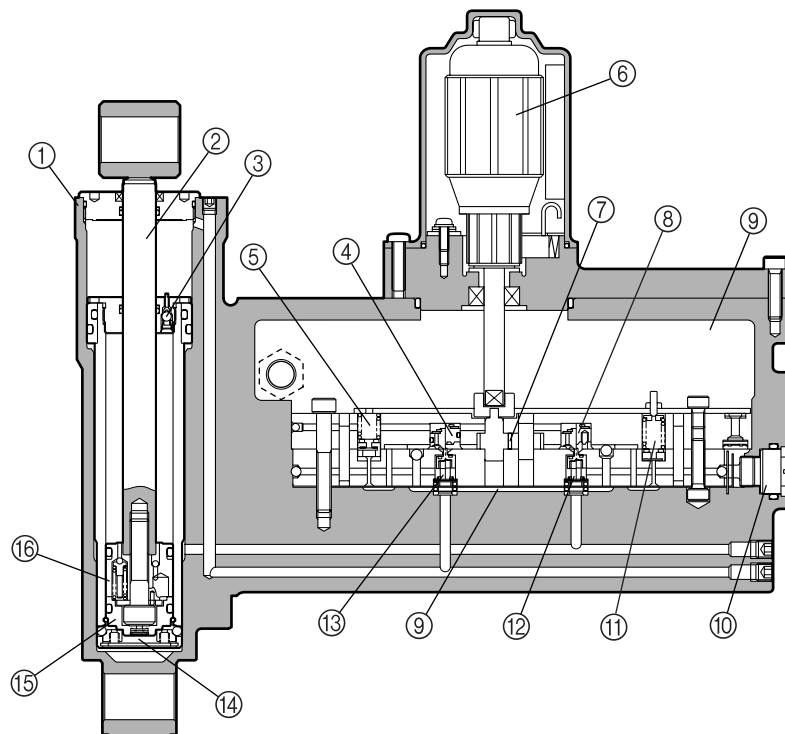
The power trim and tilt cylinder has been integrated with the gear pump housing, the reservoir tank, and the power trim and tilt motor in order to achieve a smaller and more compact unit.

Hydraulic system diagram



- ① Power trim and tilt cylinder
- ② Ram
- ③ Reservoir
- ④ Manual valve
- ⑤ Down-main valve
- ⑥ Down-relief valve
- ⑦ Hydraulic pump
- ⑧ Up-relief valve
- ⑨ Up-main valve

Power trim and tilt components

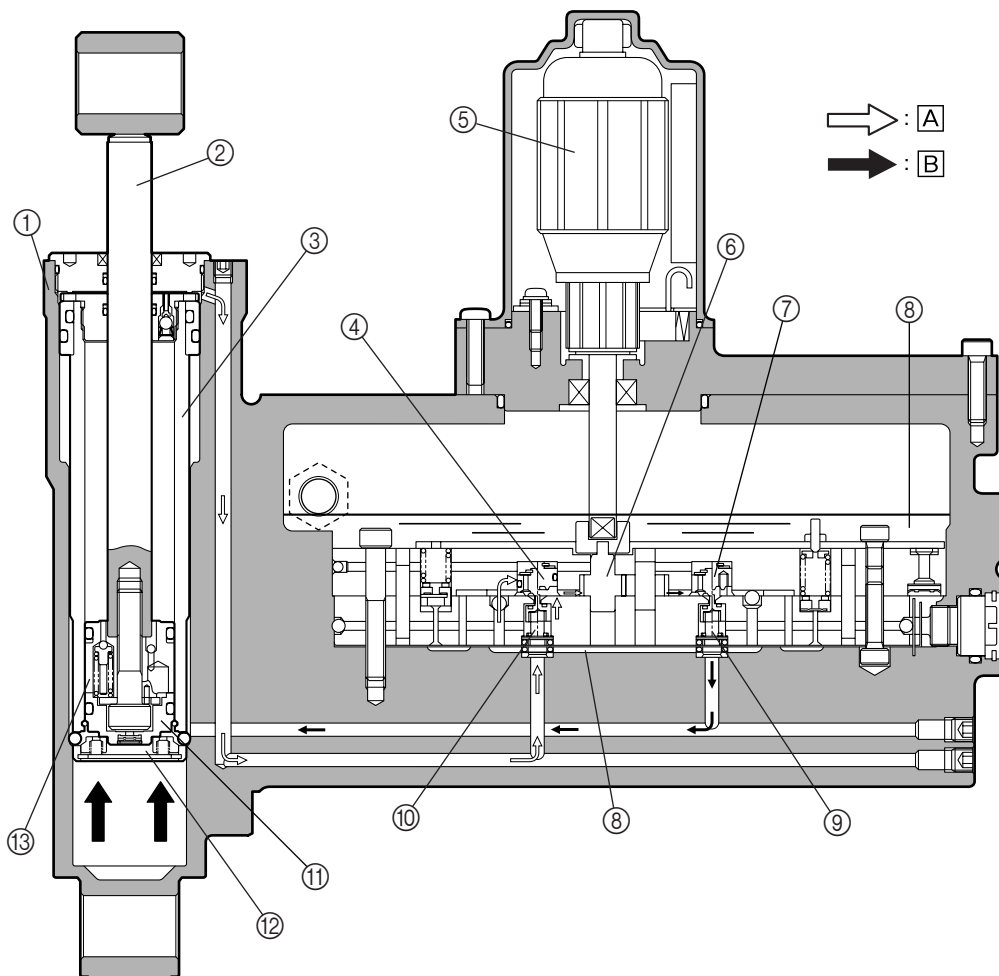


- ① Cylinder
- ② Ram
- ③ Check valve
- ④ Down-main valve
- ⑤ Down-relief valve
- ⑥ Motor
- ⑦ Gear pump
- ⑧ Up-main valve
- ⑨ Reservoir
- ⑩ Manual valve
- ⑪ Up-relief valve
- ⑫ Up-shuffle piston
- ⑬ Down-shuffle piston
- ⑭ Trim cylinder base
- ⑮ Free piston
- ⑯ Tilt piston


Trim-up function

The gear pump pumps power trim and tilt fluid to the up-main valve. As a result, the fluid pressure opens the up-shuttle piston causing the fluid to flow into the lower part of the power trim and tilt cylinder. At the same time, vacuum from the gear pump opens the down-main valve and down-shuttle piston, which causes fluid from the upper part of the power trim and tilt cylinder to return to the gear pump, and also sucks fluid in through the reservoir.

The pressurized fluid forces up the trim cylinder along with the tilt piston, free piston, and trim cylinder base. As the trim cylinder moves up, the ram extends and the outboard motor is trimmed up. The end of the trim range is when the trim cylinder tops out in the power trim and tilt cylinder.



S62Y1390

- ① Power trim and tilt cylinder
- ② Ram
- ③ Trim cylinder
- ④ Down-main valve
- ⑤ Motor
- ⑥ Gear pump
- ⑦ Up-main valve
- ⑧ Reservoir

- ⑨ Up-shuttle piston
- ⑩ Down-shuttle piston
- ⑪ Free piston
- ⑫ Trim cylinder base
- ⑬ Tilt piston
- A Return
- B Send

Trim-down function

When the power trim and tilt switch is pressed to “Down”, the motor turns the gear pump counter-clockwise and the power trim and tilt fluid flows in the opposite direction to that of the trim-up function.

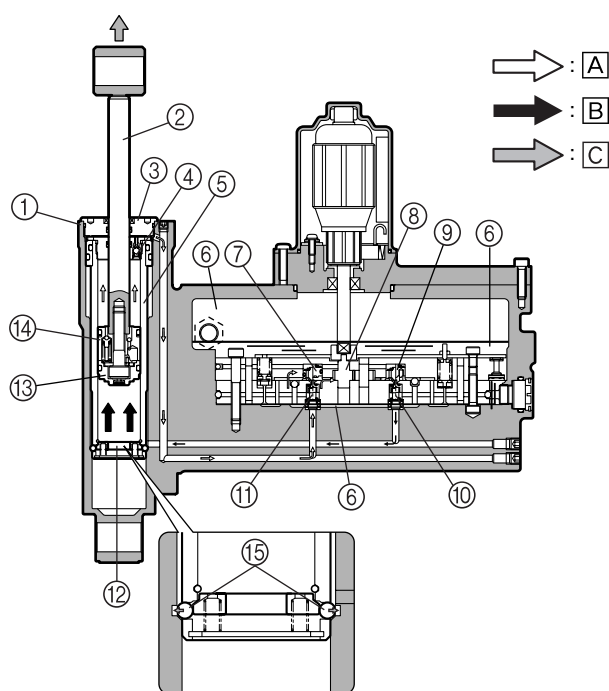
Tilt-up function

When the trim cylinder tops out, the check valve is pushed down by the end screw wall. This causes the ball in the check valve to move down, opening the fluid passage and allowing the power trim and tilt fluid to flow from the upper part of the trim cylinder, through the down-shuttle piston and the down-main valve, and back to the gear pump. In addition, fluid is also sucked in through the reservoir and the pressurized fluid continues to flow into the lower part of the trim cylinder, pushing up the tilt piston and free piston, and further extending the ram.

As the tilt piston moves up and off of the trim cylinder base, the base moves up and pushes the balls outward to fit into holes of the power trim and tilt cylinder. Once the balls have been fitted into the holes the trim cylinder base cannot move.

The end of the tilt-up range is when the tilt piston tops out in the trim cylinder and the ram is fully extended.

The tilt-up function operates when the fluid pressure is under 10 MPa (100 kgf/cm², 1,423 psi). When the fluid pressure in the lower part of the trim cylinder increases to over 10 MPa (100 kgf/cm², 1,423 psi), the up-relief valve opens and allows the pressurized fluid to flow into the reservoir. Thus, the tilt piston and free piston are not pushed up and the ram cannot be extend further.



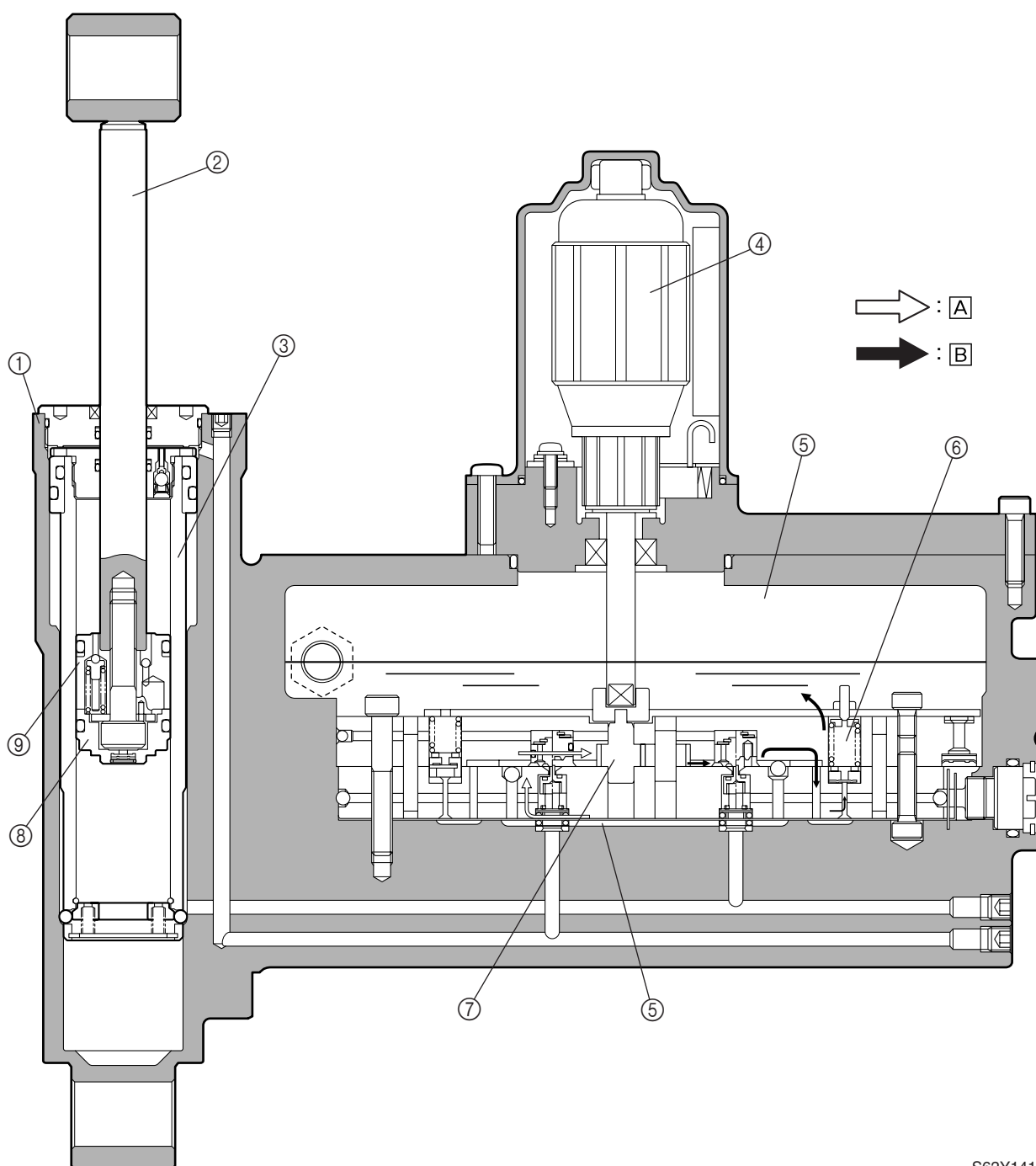
S62Y1400K

- ① Power trim and tilt cylinder
- ② Ram
- ③ End screw
- ④ Check valve
- ⑤ Trim cylinder
- ⑥ Reservoir
- ⑦ Down-main valve
- ⑧ Gear pump
- ⑨ Up-main valve

- ⑩ Up-shuttle piston
- ⑪ Down-shuttle piston
- ⑫ Trim cylinder base
- ⑬ Free piston
- ⑭ Tilt piston
- ⑮ Balls
- A Return
- B Send
- C Moving direction



Circular flow



S62Y1410

- ① Power trim and tilt cylinder
- ② Ram
- ③ Trim cylinder
- ④ Motor
- ⑤ Reservoir
- ⑥ Up-relief valve

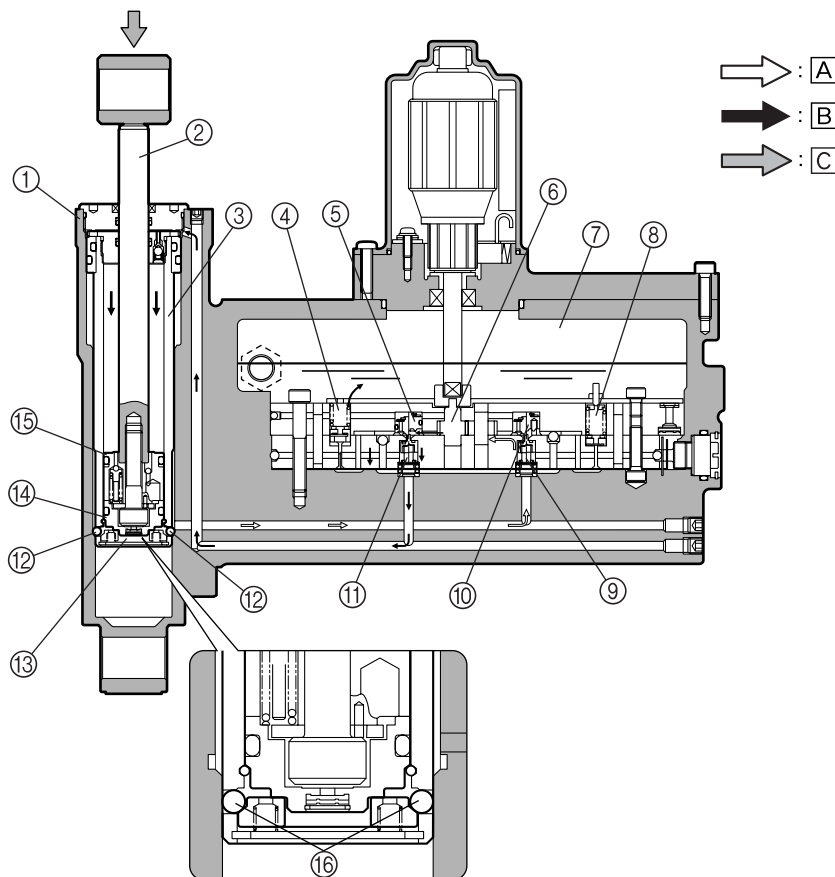
- ⑦ Gear pump
- ⑧ Free piston
- ⑨ Tilt piston
- A Return
- B Send

Tilt-down function

When the power trim and tilt switch is pressed to “Down”, the motor turns the gear pump counter-clockwise, thus pumping the power trim and tilt fluid to the down-main valve. As a result, fluid pressure opens the down-main valve and the down-shuttle piston, which causes fluid to flow into the upper part of the trim cylinder and forces the tilt piston down.

When the tilt piston and the free piston reach the trim cylinder base, it pushes the base down, allowing the balls to move inward. Once the balls move in, the trim cylinder is then able to move down and power trim and tilt fluid continues to flow into the cylinder and pushes the trim cylinder down, along with the tilt piston and ram.

The end of the tilt-down range is when the tilt piston and the free piston bottom out in the trim cylinder base. When the power trim and tilt fluid pushes the trim cylinder down further trim-down is started. The end of the trim-down range is when the trim cylinder arrives at the bottom of the power trim and tilt cylinder. Before the trim cylinder arrives at the bottom of the power trim and tilt cylinder, an amount of fluid equal to the volume of the ram is returned to the reservoir.



S62Y1420K

- ① Power trim and tilt cylinder
- ② Ram
- ③ Trim cylinder
- ④ Down-relief valve
- ⑤ Down-main valve
- ⑥ Gear pump
- ⑦ Reservoir
- ⑧ Up-relief valve
- ⑨ Up-shuttle piston
- ⑩ Up-main valve

- ⑪ Down-shuttle piston
- ⑫ Ball
- ⑬ Trim cylinder base
- ⑭ Free piston
- ⑮ Tilt piston
- ⑯ Balls
- Ⓐ Return
- Ⓑ Send
- Ⓒ Moving direction



Stopping condition

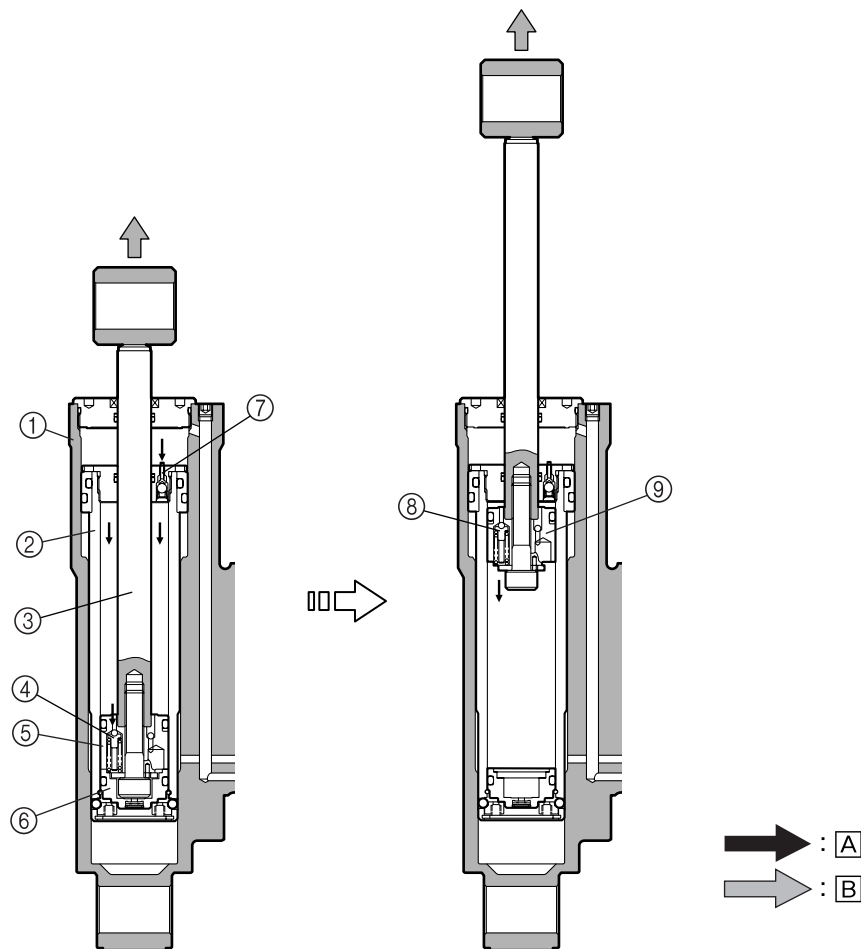
When the power trim and tilt switch is not pushed (released), the gear pump does not pump the fluid, the up-main valve and the down-main valve are closed, and the power trim and tilt fluid pressure in the system remains constant. This allows the ram to maintain its position until the power trim and tilt fluid flows through the system again.

When the outboard motor hits something in the water

The check valve of the trim cylinder and the tilt piston absorber of the tilt piston help to prevent internal damage to the power trim and tilt unit and help to protect the bracket and lower unit from damage in case the outboard motor hits something during operation.

When the outboard motor hits something, highly pressurized fluid in the upper part of the power trim and tilt cylinder pushes down the check valve of the trim cylinder. At the same time, fluid pressure in the upper part of the trim cylinder increases and the tilt piston absorber is pushed down. As a result, the tilt piston and the ram are pushed up without the free piston. The tilt piston is stopped before reaching the top of the trim cylinder by the damper function of the tilt piston absorber to protect the power trim and tilt unit from damage.

Damper function



S62Y1430K

- ① Power trim and tilt cylinder
- ② Trim cylinder
- ③ Ram
- ④ Tilt piston absorber
- ⑤ Tilt piston
- ⑥ Free piston

- ⑦ Check valve
- ⑧ Tilt piston absorber
- ⑨ Tilt piston
- A Send
- B Moving direction

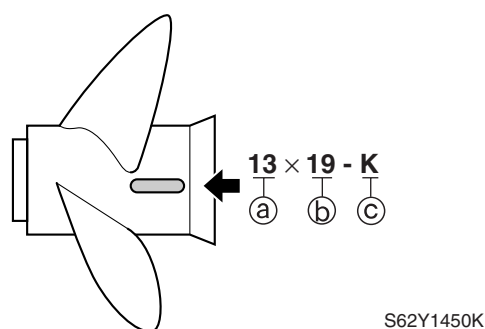
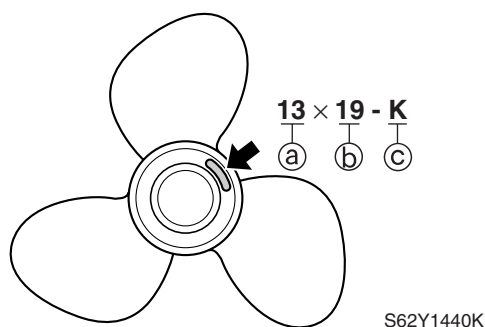
Propeller selection

The performance of a boat and outboard motor will be critically affected by the size and type of propeller you choose. Propellers greatly affect boat speed, acceleration, engine life, fuel economy, and even boating and steering capabilities. An incorrect choice could adversely affect performance and could also seriously damage the motor.

Use the following information as a guide for selecting a propeller that meets the operating conditions of the boat and the outboard motor.

Propeller size

The size of the propeller is indicated on the propeller blade or outside of the propeller boss.



- (a) Propeller diameter (in inches)
- (b) Propeller pitch (in inches)
- (c) Propeller type (propeller mark)

Selection

When the engine speed is at the full throttle operating range (5,000–6,000 r/min) an ideal propeller for the boat is one that provides maximum performance in relation to boat speed and fuel consumption.

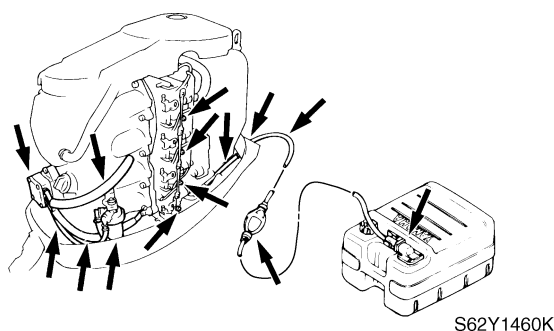
Propeller size (in)	Material
12 5/8 × 21 - K	Aluminum
13 × 19 - K	Aluminum
13 × 23 - K	Aluminum
13 × 25 - K	Aluminum
13 1/4 × 17 - K	Aluminum
13 1/2 × 15 - K	Aluminum
13 5/8 × 13 - K	Aluminum
14 × 11 - K	Aluminum
13 × 17 - K	Stainless
13 × 19 - K	Stainless
13 × 21 - K	Stainless
13 × 23 - K	Stainless
13 × 25 - K	Stainless
13 1/2 × 14 - K	Stainless
13 1/2 × 16 - K	Stainless

Predelivery checks

To make the delivery process smooth and efficient, the predelivery checks should be completed as explained below.

Checking the fuel system

1. Check that the fuel hoses are securely connected and that the fuel tank is full with fuel.



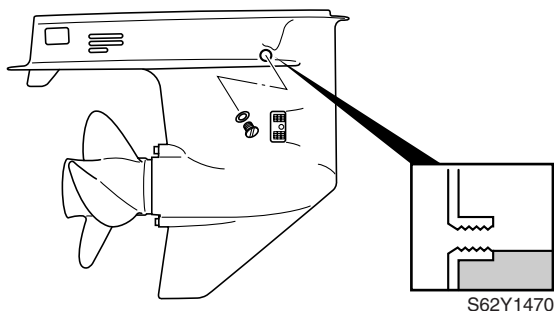
CAUTION:

This is a 4-stroke engine. Do not use pre-mixed fuel and 2-stroke outboard motor oil.



Checking the gear oil

1. Check the gear oil level.

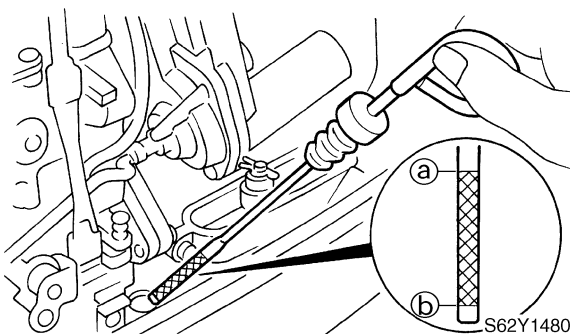


CAUTION:

Do not reuse the gasket, always replace it with a new one.

Checking the engine oil

1. Check the oil level.



NOTE:

- If the engine oil is above the maximum level mark (a), drain sufficient oil until the level is between (a) and (b).
- If the engine oil is below the minimum level mark (b), add sufficient oil until the level is between (a) and (b).



Recommended engine oil:
API: SE, SF, SG, SH
SAE: 10W-30, 10W-40, or 20W-40
Oil capacity:
Without oil filter replacement:
2.0 L (2.1 US qt, 1.8 Imp qt)

Checking the battery

1. Check the capacity, electrolyte level, and specified gravity of the battery.

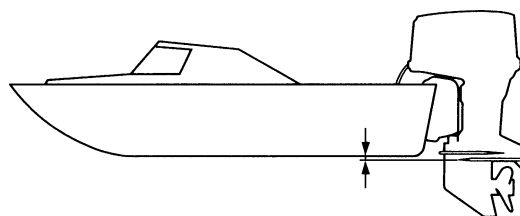


Battery capacity: 70–100 Ah
Minimum cold cranking performance:
380 A
Electrolyte specific gravity:
1.28 at 20 °C (68 °F)

2. Check that the positive and negative battery leads are securely connected.

Checking the outboard motor mounting position

1. Check the position of the anti-cavitation plate.



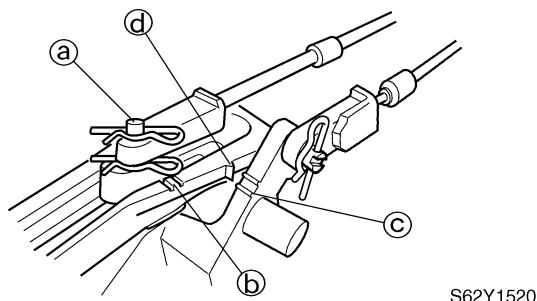
2. Check that the clamp brackets are secured with the clamp bolts.

Checking the remote control cables

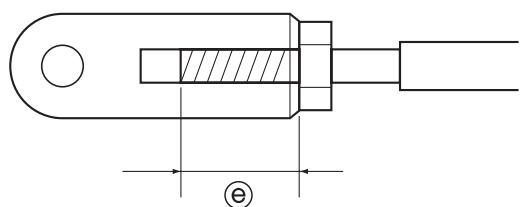
1. Set the remote control lever to the neutral position and fully close the throttle lever/throttle grip.
2. Check that the set pin (a) is aligned with the alignment mark (b). Adjust if necessary.

Predelivery checks

3. Check that the alignment mark ③ is aligned with the mark ④. Adjust if necessary.



S62Y1520



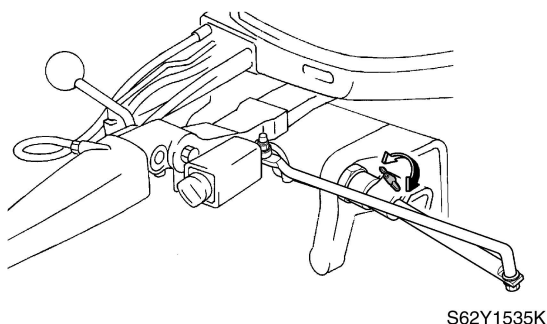
S62Y1530

CAUTION:

The shift/throttle cable joint must be screwed in a minimum of 8.0 mm (0.31 in) ⑤.

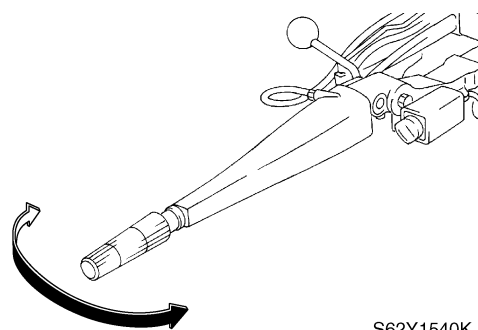
Checking the steering system

1. Check the steering friction for proper adjustment.



S62Y1535K

2. Check the steering for smooth operation.

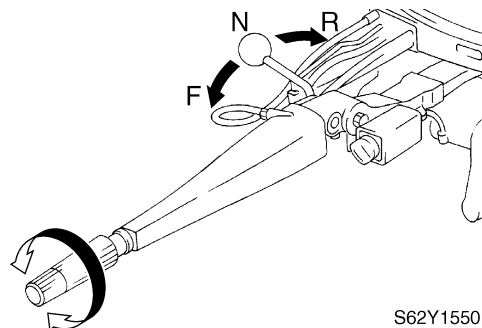


S62Y1540K

3. Check that there is no interference with wires or hoses when the outboard motor is steered.

Checking the gearshift and throttle operation

1. Check that the gearshift operates smoothly when shifting from neutral into forward and reverse.
2. Check that the throttle control lever contacts the respective stoppers when the throttle control lever is closed or fully open.



S62Y1550K

Checking the tilt system

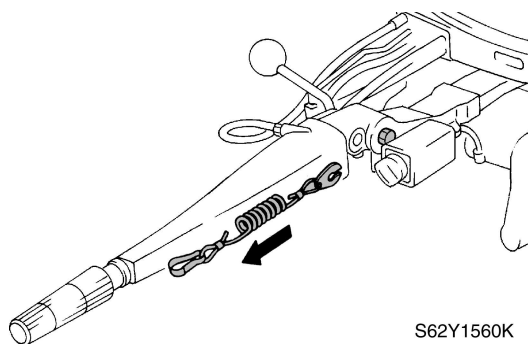
1. Check that the outboard motor can be smoothly tilted up and down by operating the power trim and tilt unit.
2. Check that there is no abnormal noise produced when the outboard motor is tilted up and down.
3. Check that there is no interference with wires and hoses when the tilted-up motor is steered.



4. Check that the trim meter points down when the outboard motor is tilted all the way down.

Checking the engine start switch and engine stop switch/engine shut-off switch

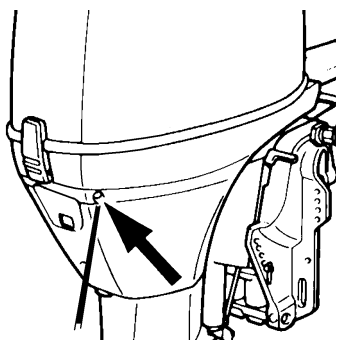
1. Check that the engine starts when the engine start switch is turned to START.
2. Check that the engine turns off when the engine start switch is turned to OFF.
3. Check that the engine turns off when the engine stop switch is pushed/engine shut-off cord is pulled.



S62Y1560K

Checking the pilot water outlet

1. Check that cooling water is discharged from the pilot water outlet.



S62Y1570

Test run

1. Start the engine, and then check for smooth gearshift operation.
2. Check the engine idle speed after the engine has been warmed up.
3. Operate at trolling speed.

4. Run the outboard motor for one hour at 2,000 r/min or at half throttle, then for another hour at 3,000 r/min or at 3/4 throttle.
5. Check that the motor will not tilt up when shifting into reverse and that water will not flow in over the transom.

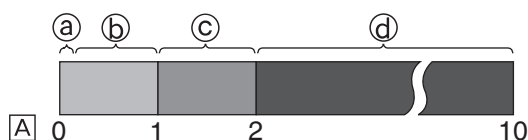
NOTE:

The test run is part of the break-in operation.

Break-in

During the test run, perform the break-in operation in the following four stages.

1. Ten minutes Ⓐ at trolling speed.
2. Fifty minutes Ⓑ at 3,000 r/min or at approximately half throttle.
3. One hour Ⓒ at 4,000 r/min or 3/4 throttle and one minute out of every ten at full throttle.
4. Eight hours Ⓓ at any speed, however, avoid running at full speed for more than five minutes.



S62Y1580K

Ⓐ Hour

After test run

1. Check for water in the gear oil.
2. Check for fuel leakage in the cowling.
3. After a test run and while the engine is at idle, flush the cooling water passage with fresh water using the flushing kit.

Specifications

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General specifications

Item	Unit	Model		
		FT50CEHD	FT50CED	FT50CET
Dimension				
Overall length	mm (in)	1,384 (54.5)	718 (28.3)	
Overall width	mm (in)	361 (14.2)		
Overall height (L)	mm (in)	1,436 (56.5)		
Boat transom height (L)	mm (in)	508 (20.0)		
Weight (with aluminum propeller) (L)	kg (lb)	111.5 (246)	108 (238)	112 (247)
Performance				
Maximum output	kW (hp) @ 5,500 r/min	36.8 (50)		
Full throttle operating range	r/min	5,000–6,000		
Maximum fuel consumption	L (US gal, Imp gal)/hr @ 6,000 r/min	17.3 (4.57, 3.81)		
Power unit				
Type	cm ³ (cu. in) mm (in)	In-line, 4-stroke, OHC, 8 valves		
Cylinder quantity		4		
Displacement		935 (57.1)		
Bore × stroke		63.0 × 75.0 (2.48 × 2.95)		
Compression ratio		9.3		
Carburetor quantity	Degree V, A	4		
Control system		Tiller handle	Remote control	
Starting system		Electric		
Ignition control system		Microcomputer (CDI)		
Ignition timing		TDC–BTDC 30		
Alternator output		12, 10		
Enrichment system		Prime Start		
Choke valve control		—		
Spark plugs		DPR6EA-9 (NGK)		
Cooling system		Water		
Exhaust system		Through propeller boss		
Lubrication system		Wet sump		

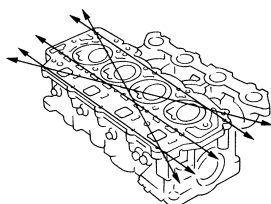
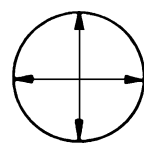
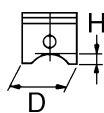
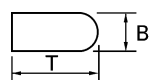
General specifications

Item	Unit	Model		
		FT50CEHD	FT50CED	FT50CET
Fuel and oil				
Fuel type		Unleaded gasoline/leaded gasoline		
Fuel rating	RON*	91		
Engine oil type		4-stroke motor oil		
Engine oil grade	API SAE	SE, SF, SG, SH 10W-30, 10W-40, or 20W-40		
Engine oil quantity (with oil filter replacement)	L (US qt, Imp qt)	2.2 (2.3, 1.9)		
(without oil filter replacement)	L (US qt, Imp qt)	2.0 (2.1, 1.8)		
Gear oil type		Hypoid gear oil		
Gear oil grade	API SAE	GL-4 90		
Gear oil quantity	L (US qt, Imp qt)	0.61 (0.64, 0.54)		
Bracket				
Trim angle (at 12 degree boat transom)	Degree	-4-20		
Tilt-up angle	Degree	69		
Steering angle	Degree	40 + 40		
Drive unit				
Gear shift positions		F-N-R		
Gear ratio		2.31 (30/13)		
Reduction gear type		Spiral bevel gear		
Clutch type		Dog clutch		
Propeller shaft type		Spline		
Propeller direction (rear view)		Clockwise		
Propeller identification mark		K		
Electrical				
Battery capacity	Ah	70-100		
Minimum cold cranking performance	A	380		

* RON: Research Octane Number

Maintenance specifications

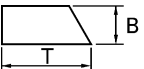
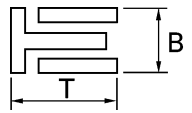
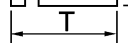
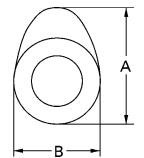
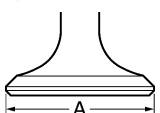
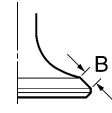
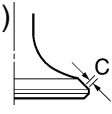
Power unit

Item	Unit	Model		
		FT50CEHD	FT50CED	FT50CET
Power unit Minimum compression pressure* Lubrication oil pressure at 55 °C (131 °F), with 10W-30 engine oil	kPa (kgf/cm ² , psi) kPa (kgf/cm ² , psi) @ 900 r/min	840 (8.4, 122) 100 (1.0, 14)		
Cylinder heads Warpage limit  (lines indicate straightedge position) Cylinder head journal inside diameter	mm (in) mm (in)	0.1 (0.004) 37.00–37.02 (1.4567–1.4575)		
Cylinders Bore size Taper limit Out-of-round limit	 mm (in) mm (in) mm (in)	63.00–63.01 (2.480–2.481) 0.08 (0.003) 0.08 (0.003)		
Pistons Piston diameter (D) Measuring point (H) Piston-to-cylinder clearance Oversize piston diameter 1st 2nd Piston pin boss bore	 mm (in) mm (in) mm (in) mm (in) mm (in) mm (in)	62.95–62.96 (2.478–2.479) 5 (0.2) 0.04–0.06 (0.0016–0.0024) + 0.25 (0.001) + 0.50 (0.002) 15.974–15.985 (0.6289–0.6293)		
Piston pins Outside diameter	mm (in)	15.965–15.970 (0.6285–0.6287)		
Piston rings Top ring Dimension B Dimension T End gap Side clearance	 mm (in) mm (in) mm (in) mm (in)	1.17–1.19 (0.046–0.047) 2.39–2.41 (0.094–0.095) 0.15–0.30 (0.006–0.012) 0.04–0.08 (0.002–0.003)		

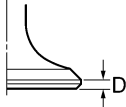
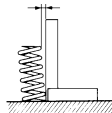
* Measuring conditions:

Ambient temperature 20 °C (68 °F), wide open throttle, with plugs disconnected from all cylinders.
The figures are for reference only.

Maintenance specifications

Item	Unit	Model		
		FT50CEHD	FT50CED	FT50CET
2nd ring Dimension B  Dimension T  End gap Side clearance Oil ring Dimension B  Dimension T  End gap Side clearance	mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in)	1.47–1.49 (0.058–0.059) 2.49–2.51 (0.098–0.099) 0.30–0.50 (0.012–0.020) 0.03–0.07 (0.001–0.003) 2.34–2.46 (0.092–0.097) 2.75 (0.108) 0.20–0.70 (0.008–0.028) 0.05–0.19 (0.002–0.008)		
Camshafts Intake (A)  Exhaust (A) Intake and exhaust (B) Camshaft journal diameter #1 #2, #3, #4 Camshaft journal oil clearance #1 #2, #3, #4 Maximum camshaft runout	mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in)	30.89–30.99 (1.2161–1.2200) 30.82–30.92 (1.2135–1.2175) 25.95–26.05 (1.0217–1.0256) 36.93–36.94 (1.4539–1.4543) 36.94–36.95 (1.4543–1.4547) 0.055–0.100 (0.0022–0.0039) 0.045–0.090 (0.0018–0.0035) 0.04 (0.0016)		
Rocker arm shafts Outside diameter	mm (in)	15.98–15.99 (0.6291–0.6295)		
Rocker arms Inside diameter	mm (in)	16.00–16.01 (0.6299–0.6303)		
Valves Valve clearance (cold) Intake Exhaust Head diameter (A)  Intake Exhaust Face width (B)  Intake Exhaust Seat contact width (C)  Intake Exhaust	mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in)	0.20 ± 0.05 (0.008 ± 0.002) 0.30 ± 0.05 (0.012 ± 0.002) 29.9–30.1 (1.177–1.185) 25.9–26.1 (1.020–1.027) 1.84–2.97 (0.072–0.117) 1.98–3.11 (0.078–0.122) 0.9–1.1 (0.035–0.043) 0.9–1.1 (0.035–0.043)		

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SPEC			Specifications		
Item		Unit	Model		
			FT50CEHD	FT50CED	FT50CET
Margin thickness (D)					
Intake		mm (in)	0.6–1.0 (0.024–0.039)		
Exhaust		mm (in)	0.7–1.1 (0.028–0.043)		
Stem diameter					
Intake		mm (in)	5.48–5.49 (0.2157–0.2161)		
Exhaust		mm (in)	5.46–5.47 (0.2150–0.2153)		
Guide inside diameter					
Intake and exhaust		mm (in)	5.50–5.51 (0.2165–0.2169)		
Stem-to-guide clearance					
Intake		mm (in)	0.01–0.03 (0.0004–0.0012)		
Exhaust		mm (in)	0.03–0.05 (0.0012–0.0020)		
Stem runout limit		mm (in)	0.03 (0.0012)		
Valve springs					
Free length		mm (in)	39.85 (1.569)		
Minimum free length		mm (in)	37.85 (1.490)		
Tilt limit		mm (in)	1.7 (0.07)		
Connecting rods					
Small-end inside diameter		mm (in)	15.985–15.998 (0.6293–0.6298)		
Big-end inside diameter		mm (in)	36.000–36.024 (1.4173–1.4183)		
Crank pin oil clearance		mm (in)	0.016–0.040 (0.0006–0.0015)		
Crankshaft					
Crankshaft journal					
Diameter		mm (in)	42.984–43.000 (1.6923–1.6929)		
Crankshaft pin					
Diameter		mm (in)	32.984–33.000 (1.2986–1.2992)		
Runout limit		mm (in)	0.04 (0.0016)		
Crankcase					
Crankcase main journal inside diameter		mm (in)	46.000–46.024 (1.8110–1.8120)		
Crankshaft main journal oil clearance		mm (in)	0.012–0.036 (0.0005–0.0014)		
Oil pump					
Type			Trochoid		
Outer rotor-to-housing clearance		mm (in)	0.09–0.15 (0.001–0.006)		
Outer rotor-to-inner rotor clearance limit		mm (in)	0.01–0.10 (0.0004–0.0039)		
Rotor-to-cover clearance		mm (in)	0.03–0.08 (0.001–0.003)		
Thermostats					
Opening temperature		°C (°F)	60 (140)		
Fully open temperature		°C (°F)	70 (158)		
Valve open lower limit		mm (in)	3.0 (0.12)		

Maintenance specifications

Item	Unit	Model		
		FT50CEHD	FT50CED	FT50CET
Fuel pump				
Discharge	L (US gal, Imp gal)/hr	70 (18.5, 15.4)		
Pressure	@ 6,000 r/min kPa (kgf/cm ² , psi)	49 (0.49, 7.0)		
Plunger stroke	mm (in)	5.85–9.05 (0.23–0.35)		
Carburetor				
ID mark		62Y30, 62Y50 (for Brazil)		
Main jet	#	#1: 124, #2: 126, #3: 116, #4: 114		
Pilot jet	#	39		
Pilot screw	turns out	#1–#3: 1 3/4–2 3/4, #4: 2–3		
Float height	mm (in)	9.5–10.5 (0.37–0.41)		
Engine idle speed	r/min	850–950		

Lower unit

Item	Unit	Model		
		FT50CEHD	FT50CED	FT50CET
Gear backlash				
Pinion-to-forward gear	mm (in)	0.12–0.45 (0.005–0.018)		
Pinion-to-reverse gear	mm (in)	—		
Pinion shims	mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50		
Forward gear shims	mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50		

Electrical

Item	Unit	Model		
		FT50CEHD	FT50CED	FT50CET
Ignition system				
Ignition timing (engine idle speed)	Degree	TDC		
Charge coil output peak voltage (L – Br)				
@ cranking 1 ^(*)	V	144		
@ cranking 2 ^(*)	V	137		
@ 1,500 r/min	V	169		
@ 3,500 r/min	V	129		
Charge coil resistance ^(*) (L – Br)	Ω	272–408		

(*) Cranking 1: unloaded

Cranking 2: loaded

(*) The figures are for reference only.

SPEC		Specifications
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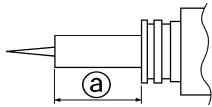
Item	Unit	Model		
		FT50CEHD	FT50CED	FT50CET
Pulser coil output peak voltage (W/R – W/B)				
@ cranking 1 ^(*1)	V		6.3	
@ cranking 2 ^(*1)	V		3.5	
@ 1,500 r/min	V		7.4	
@ 3,500 r/min	V		11.2	
Pulser coil resistance ^(*2) (W/R – W/B)	Ω		396–594	
CDI unit output peak voltage (B/O – B, B/W – B)				
@ cranking 1 ^(*1)	V		126	
@ cranking 2 ^(*1)	V		150	
@ 1,500 r/min	V		151	
@ 3,500 r/min	V		116	
Ignition coil resistance			396–594	
Primary coil (O – B)	Ω		0.08–0.11	
High-tension cord— high-tension cord	kΩ		3.5–4.7	
Spark plug gap	mm (in)		0.9 (0.035)	
Ignition control system				
Oil pressure switch	kPa (kgf/cm ² , psi)		50 (0.5, 7.11)	
Thermoswitch (Gy/B – B)				
OFF → ON	°C (°F)		76–84 (169–183)	
ON → OFF	°C (°F)		63–77 (145–170)	
Starter motor				
Type			Bendix	
Output	kW		1.1	
Cranking time limit	Second		30	
Brushes				
Standard length	mm (in)		16.0 (0.63)	
Wear limit	mm (in)		12.0 (0.47)	
Commutator				
Standard diameter	mm (in)		33.0 (1.30)	
Wear limit	mm (in)		31.0 (1.22)	
Mica				
Standard undercut	mm (in)		0.8 (0.03)	
Wear limit	mm (in)		0.2 (0.01)	

(*1) Cranking 1: unloaded

Cranking 2: loaded

(*2) The figures are for reference only.

Maintenance specifications

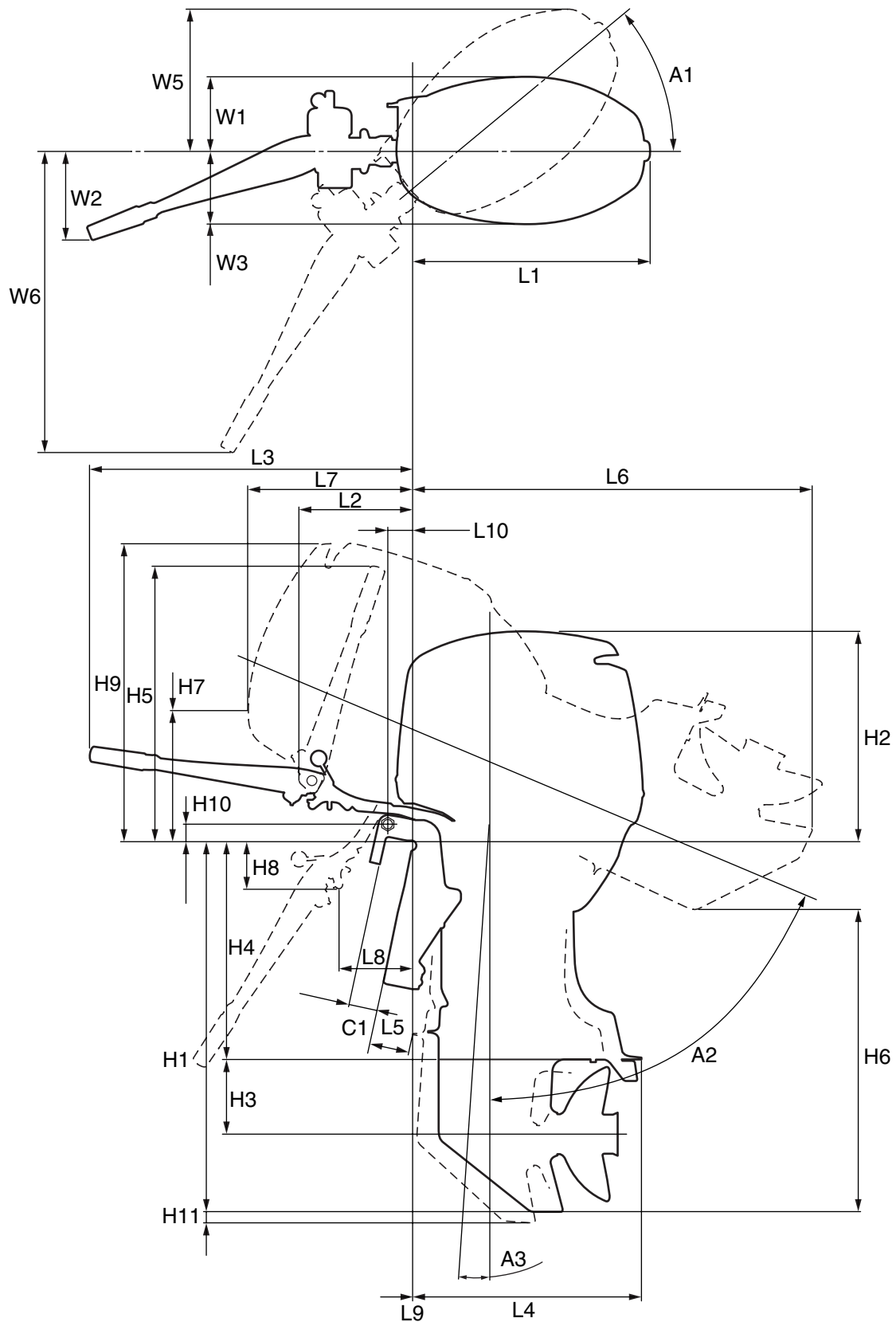
Item	Unit	Model		
		FT50CEHD	FT50CED	FT50CET
Charging system				
Fuse	A	20		
Lighting coil output peak voltage (G – G)				
@ cranking ^(*1)	V	11.9		
@ 1,500 r/min ^(*1)	V	42		
@ 3,500 r/min ^(*1)	V	127		
Lighting coil resistance ^(*2) (G – G)	Ω	1.2–1.8		
Rectifier Regulator output peak voltage (R – B)				
@ 1,500 r/min ^(*1)	V	18.9		
@ 3,500 r/min ^(*1)	V	19.5		
Charging current	A @ 5,000 r/min	10		
Enrichment control system				
Prime Start				
				
Plunger extended length ①	mm (in)	More than 24.6 (0.97)		
Power trim and tilt system				
Trim sensor				
Setting resistance	Ω	9–11		
Resistance (P – B)	Ω	10–288.3		
Fluid type		ATF Dexron II		
Brushes				
Standard length	mm (in)	10 (0.39)		
Wear limit	mm (in)	3.5 (0.14)		
Commutator				
Standard diameter	mm (in)	22.0 (0.87)		
Wear limit	mm (in)	21.0 (0.83)		
Mica				
Standard undercut	mm (in)	1.5 (0.06)		

^(*) Unloaded

^(*) The figures are for reference only.

Dimensions

Exterior



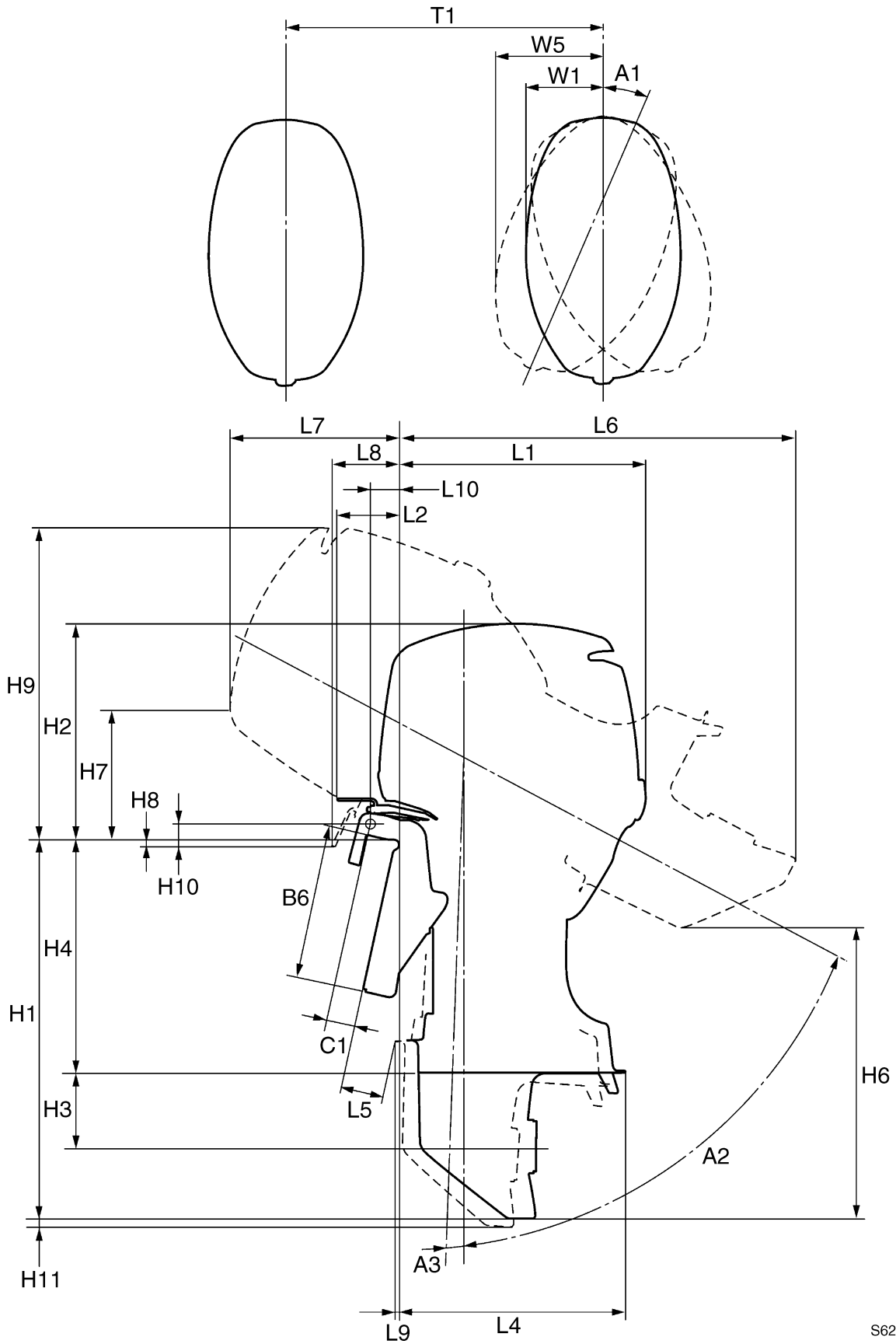
S62Y2230

Maintenance specifications

Symbol	Unit	Model
		FT50CEHD
L1	mm (in)	576 (22.7)
L2	mm (in)	272 (10.7)
L3	mm (in)	797 (31.4)
L4	mm (in)	560 (22.0)
L5	(L) mm (in)	97 (3.8)
	(X) mm (in)	—
L6	(L) mm (in)	990 (39.0)
	(X) mm (in)	—
L7	mm (in)	397 (15.6)
L8	mm (in)	189 (7.4)
L9	(L) mm (in)	0.8 (0.03)
	(X) mm (in)	—
L10	mm (in)	63 (2.5)
H1	(L) mm (in)	917 (36.1)
	(X) mm (in)	—
H2	mm (in)	519 (20.4)
H3	mm (in)	191 (7.5)
H4	(L) mm (in)	536 (21.1)
	(X) mm (in)	—
H5	mm (in)	680 (26.8)
H6	(L) mm (in)	723 (28.5)
	(X) mm (in)	—
H7	mm (in)	330 (13.0)
H8	mm (in)	110 (4.3)
H9	mm (in)	738 (29.1)
H10	mm (in)	44 (1.7)
H11	(L) mm (in)	28 (1.1)
	(X) mm (in)	—
W1	mm (in)	181 (7.1)
W2	mm (in)	213 (8.4)
W3	mm (in)	181 (7.1)
W4	mm (in)	—
W5	mm (in)	345 (13.6)
W6	mm (in)	738 (29.1)
A1	Degree	40
A2	Degree	63
A3	Degree	4
T1	mm (in)	—

2

Exterior



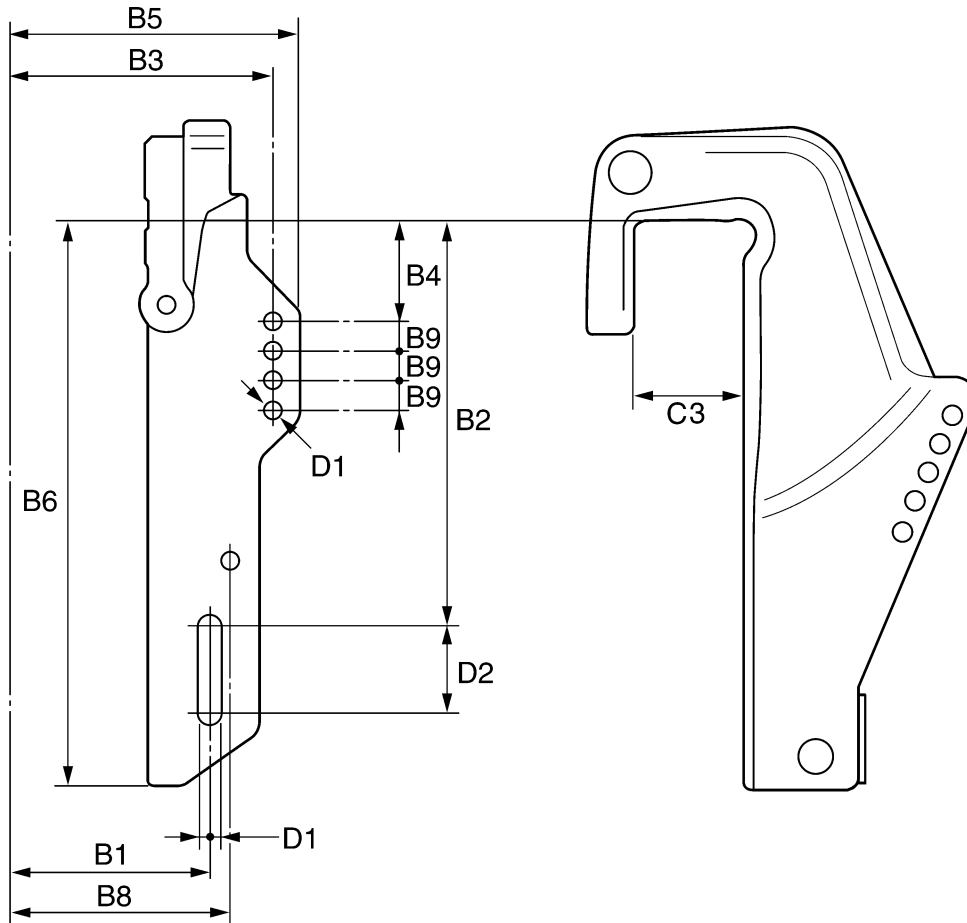
S62Y2240

Maintenance specifications

Symbol	Unit	Model	
		FT50CED	FT50CET
L1	mm (in)	576 (22.7)	
L2	mm (in)	142 (5.6)	
L3	mm (in)	—	
L4	mm (in)	560 (22.0)	
L5	(L) mm (in)	97 (3.8)	
	(X) mm (in)	—	
L6	(L) mm (in)	990 (39.0)	
	(X) mm (in)	—	
L7	mm (in)	397 (15.6)	
L8	mm (in)	149 (5.9)	
L9	(L) mm (in)	0.8 (0.03)	
	(X) mm (in)	—	
L10	mm (in)	63 (2.5)	
H1	(L) mm (in)	917 (36.1)	
	(X) mm (in)	—	
H2	mm (in)	519 (20.4)	
H3	mm (in)	191 (7.5)	
H4	(L) mm (in)	536 (21.1)	
	(X) mm (in)	—	
H5	mm (in)	—	
H6	(L) mm (in)	723 (28.5)	
	(X) mm (in)	—	
H7	mm (in)	330 (13.0)	
H8	mm (in)	0.5 (0.02)	
H9	mm (in)	738 (29.1)	
H10	mm (in)	44 (1.7)	
H11	(L) mm (in)	28 (1.1)	
	(X) mm (in)	—	
W1	mm (in)	181 (7.1)	
W2	mm (in)	—	
W3	mm (in)	181 (7.1)	
W4	mm (in)	—	
W5	mm (in)	345 (13.6)	
W6	mm (in)	—	
A1	Degree	40	
A2	Degree	63	
A3	Degree	4	
T1	mm (in)	560 (22.0)	

2

Clamp bracket



S62Y2250

Symbol	Unit	Model		
		FT50CEHD	FT50CED	FT50CET
B1	mm (in)	126 (5.0)		
B2	mm (in)	254 (10.0)		
B3	mm (in)	163.5 (6.4)		
B4	mm (in)	50.8 (2.0)		
B5	mm (in)	180 (7.1)		
B6	mm (in)	355 (14.0)		
B7	mm (in)	—		
B8	mm (in)	139 (5.5)		
B9	mm (in)	18.5 (0.7)		
C2	mm (in)	—		
C3	mm (in)	69 (2.7)		
D1	mm (in)	13 (0.5)		
D2	mm (in)	55.5 (2.2)		

Maintenance specifications / Tightening torques

Tightening torques Specified torques

Part to be tightened		Thread size	Tightening torques		
			N·m	kgf·m	ft·lb
Power unit					
Flywheel magnet nut		—	160	16	116
Stator base screw		M6	4	0.4	2.9
Cover screw		M6	3	0.3	2.2
Negative battery lead bolt		M8	9	0.9	6.5
Positive battery lead nut		—	7	0.7	5.1
Oil pressure switch		—	9	0.9	6.5
Oil pressure switch lead screw		—	2	0.2	1.4
Ignition coil bolt		M6	7	0.7	5.1
Starter motor bolt		M8	30	3.0	22
Starter motor terminal nut		—	7	0.7	5.1
Power unit bolt		M8	21	2.1	15
Tensioner bolt		—	8	0.8	5.8
Tensioner adjusting bolt		M8	25	2.5	18
Drive sprocket nut		—	140	14	101
Driven sprocket bolt		M10	38	3.8	28
Spark plug		—	18	1.8	13
Cylinder head bolt	1st	M6	6	0.6	4.3
	2nd		12	1.2	8.7
	1st	M9	23	2.3	17
	2nd		47	4.7	34
Adjusting screw locknut		—	14	1.4	10
Oil filter		—	18	1.8	13
Drain bolt		—	18	1.8	13
Exhaust cover bolt	1st	M6	6	0.6	4.3
	2nd		12	1.2	8.7
Crankcase bolt	1st	M6	6	0.6	4.3
	2nd		12	1.2	8.7
	1st	M8	15	1.5	11
	2nd		30	3.0	22
Connecting rod cap bolt	1st	—	6	0.6	4.3
	2nd		17	1.7	12
Lower unit					
Check screw		—	7	0.7	5.1
Lower unit bolt		M10	40	4.0	29
Drain screw		—	7	0.7	5.1
Propeller nut		—	35	3.5	25
Ring nut		—	105	10.5	76
Water inlet cover screw		—	5	0.5	3.6
Pinion nut		M22	95	9.5	69

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SPEC	
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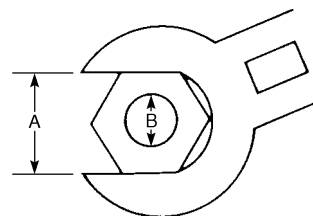
Specifications

Part to be tightened	Thread size	Tightening torques		
		N·m	kgf·m	ft·lb
Bracket unit				
Tiller handle assembly nut	—	37	3.7	27
Throttle cable (short) locknut	—	37	3.7	27
Upper mount nut	—	24	2.4	17
Lower mount nut	—	42	4.2	30
Trim sensor screw	M6	2	0.2	1.4
Clamp bracket self-locking nut	—	23	2.3	17
Power trim and tilt				
Tilt cylinder end screw	—	90	9.0	65
PTT motor bolt	M5	4	0.4	2.9
Reservoir cap	—	6.5	0.65	4.7
Trim cylinder end screw	—	80	8.0	58
Tilt piston bolt	M12	61	6.1	44
Relief valve bracket bolt	M5	5.3	0.53	3.8
Gear pump assembly bolt	M6	6.5	0.65	4.7
Gear pump bracket bolt	M5	5.3	0.53	3.8
Electrical unit				
Pulser coil screw	—	4	0.4	2.9
Starter motor nut	—	9	0.9	6.5

General torques

This chart specifies tightening torques for standard fasteners with a standard ISO thread pitch. Tightening torque specifications for special components or assemblies are provided in applicable sections of this manual. To avoid warpage, tighten multi-fastener assemblies in a crisscross fashion and progressive stages until the specified torque is reached. Unless otherwise specified, torque specifications require clean, dry threads.

Components should be at room temperature.



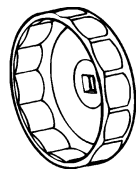
S62Y2260

Nut (A)	Bolt (B)	General torque specifications		
		N·m	kgf·m	ft·lb
8 mm	M5	5	0.5	3.6
10 mm	M6	8	0.8	5.8
12 mm	M8	18	1.8	13
14 mm	M10	36	3.6	25
17 mm	M12	43	4.3	31

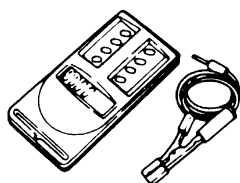


Periodic checks and adjustments

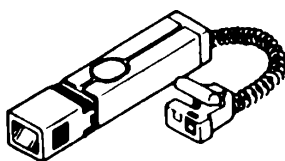
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**Special service tools**

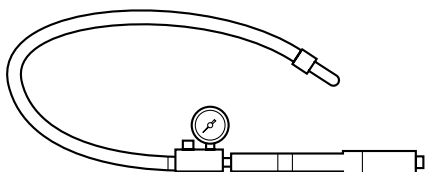
Oil filter wrench
90890-01426



Digital tachometer
90890-06760



Timing light
90890-03141



Leakage tester
90890-06762

Special service tools / Maintenance interval chart

Maintenance interval chart

Use the following chart as a guideline for general maintenance.

Adjust the maintenance intervals according to the operating conditions of the outboard motor.

Item	Remarks	Initial		Every		Refer to page
		10 hours (Break-in)	50 hours (3 months)	100 hours (6 months)	200 hours (1 year)	
Top cowling						
Top cowling fit	Check	○			○	3-3
Fuel system						
Fuel joint and fuel hoses	Check			○		3-3
Fuel filter	Check/replace	○	○	○		3-3
Fuel tank	Cleaning				○	—
Power unit						
Engine oil	Change	○		○		3-4
Oil filter	Change				○	3-4
Timing belt	Check			○		3-5
Valve clearance	Check/adjust	○		○		3-5
Spark plugs	Clean/adjust/replace	○	○	○		3-7
Thermostat	Check				○	3-8
Water leakage	Check	○	○	○		—
Motor exterior	Check		○	○		—
Exhaust leakage	Check	○	○	○		—
Cooling water passage	Clean		○	○		3-8
Control system						
Throttle cable	Check/adjust				○	3-9
Shift cable	Check/adjust				○	3-9
Engine idle speed	Adjust	○		○		3-10
Ignition timing	Check	○			○	3-11
Power trim and tilt unit						
Power trim and tilt	Check	○	○	○		3-11
Lower unit						
Gear oil	Change	○		○		3-13
Lower unit leakage	Check				○	3-14
Propeller	Check		○	○		3-14
General						
Anodes	Check/replace		○	○		3-14
Battery	Check	○ every 1 month				3-15
Wiring and connectors	Check/reconnect	○		○	○	—
Nuts and bolts	Tighten	○		○	○	—
Lubrication points	Lubricate			○		3-16

NOTE:

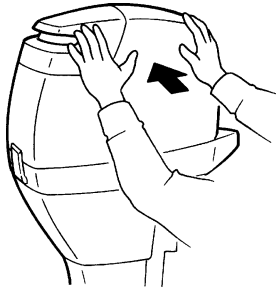
- If operating in salt water, turbid or muddy water, flush the engine with fresh water after each use.
- If leaded gasoline is used regularly, check the engine valves and related parts every 300 hours of operation in addition to the items in the maintenance interval chart.



Top cowling

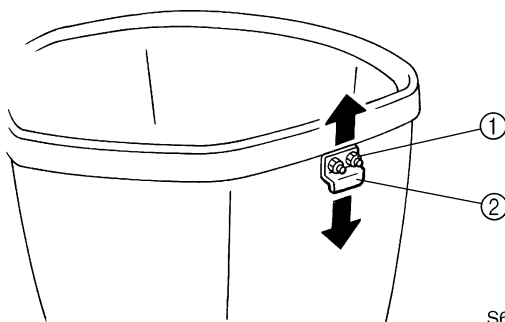
Checking the top cowling

1. Check the fitting by pushing the cowling with both hands. Adjust if necessary.



S62Y3010

2. Loosen the nuts and bolts ①.
3. Move the hook ② up or down slightly to adjust its position.



S62Y3020

NOTE:

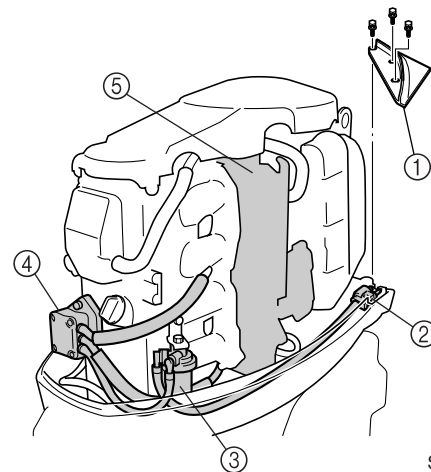
- To loosen the fitting, move the hook toward the seal.
- To tighten the fitting, move the hook away from the seal.

4. Tighten the nuts and bolts.
5. Check the fitting again and, if necessary, repeat steps 2–4.

Fuel system

Checking the fuel joint and fuel hoses (fuel joint-to-carburetor)

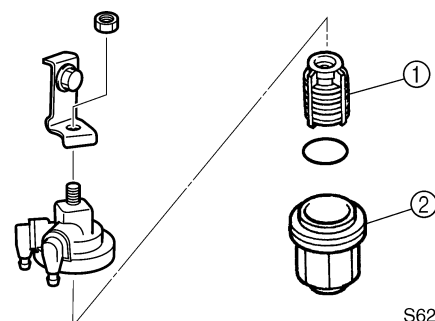
1. Remove the plate ①, and then check the fuel hose connections and fuel joint ② for leaks. Replace if necessary. Also, check the fuel filter ③, fuel pump ④, and carburetor ⑤ for leaks, and the fuel hoses for leaks and deterioration. Replace if necessary.



S62Y3030K

Checking the fuel filter

1. Check the fuel filter element ① for dirt and residue and check the fuel filter cup ② for foreign substances and cracks. Clean with straight gasoline and replace the cup if necessary.



S62Y3040K

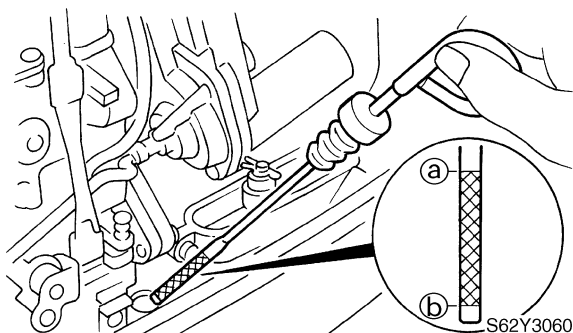
NOTE:

Be sure not to spill any fuel when removing the fuel filter cup.

Power unit

Checking the engine oil

1. Place the outboard motor in an upright position.
2. Remove the engine oil dipstick, wipe it clean, and then insert it back into the oil filler hole.
3. Remove the dipstick again to check the oil level and the oil for discoloration, and its viscosity.

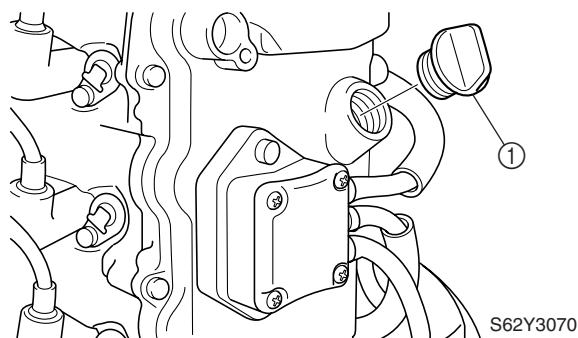


NOTE:

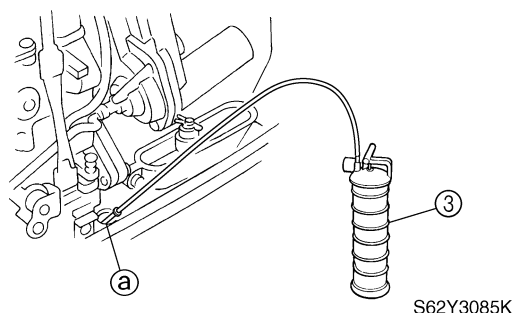
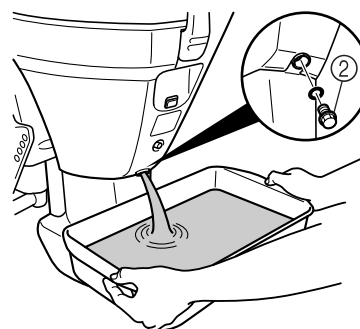
- Replace the oil if it appears milky or black.
- If the engine oil is above the maximum level mark ③, drain sufficient oil until the level is between ③ and ④.
- If the engine oil is below the minimum level mark ④, add sufficient oil until the level is between ③ and ④.

Replacing the engine oil

1. Remove the engine oil dipstick and oil filler cap ①.



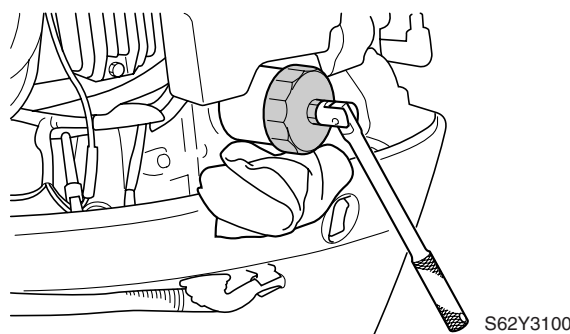
2. Place a drain pan under the drain hole, and then remove the drain bolt ② and let the oil drain completely.



NOTE:

To extract and change the oil through the dipstick hole ③, you can use an oil changer ③ like the one shown in the illustration.

3. Place a rag under the oil filter, and then remove the filter.



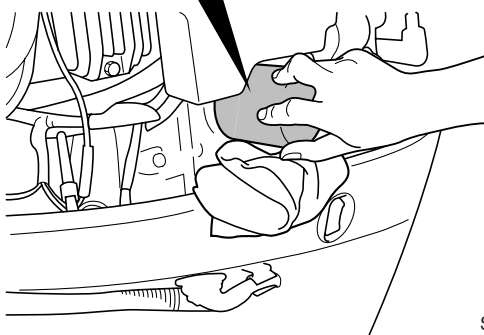
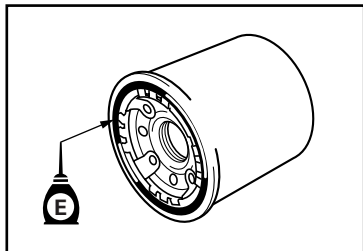
Oil filter wrench: 90890-01426

NOTE:

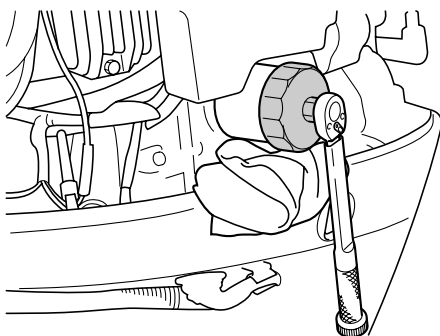
Be sure to clean up any oil spills.



4. Apply a thin coat of the new engine oil to the O-ring of the new oil filter.
5. Install the oil filter, and then tighten it to the specified torque.



S62Y3110



S62Y3115



Oil filter wrench: 90890-01426



Oil filter: 18 N·m (1.8 kgf·m, 13 ft·lb)

6. Install the drain bolt, and then tighten it to the specified torque.



Drain bolt:
18 N·m (1.8 kgf·m, 13 ft·lb)

7. Fill the specified engine oil into the oil filler hole.



Recommended engine oil:

4-stroke motor oil

API: SE, SF, SG, or SH

SAE: 10W-30, 10W-40, or 20W-40

Oil quantity:

With oil filter replacement:

2.2 L (2.3 US qt, 1.9 Imp qt)

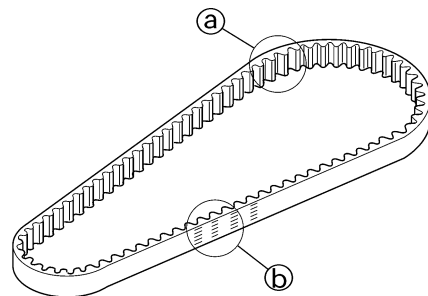
Without oil filter replacement:

2.0 L (2.1 US qt, 1.8 Imp qt)

8. Install the oil filler cap and dipstick, and then start the engine and warm it up for 5 minutes.
9. Turn the engine off, and then check the oil level and correct it if necessary.

Checking the timing belt

1. Remove the flywheel magnet cover.
2. While turning the flywheel magnet clockwise, check the interior (a) and the exterior (b) of the timing belt for cracks, damage, or wear. Replace if necessary.



S62Y3130

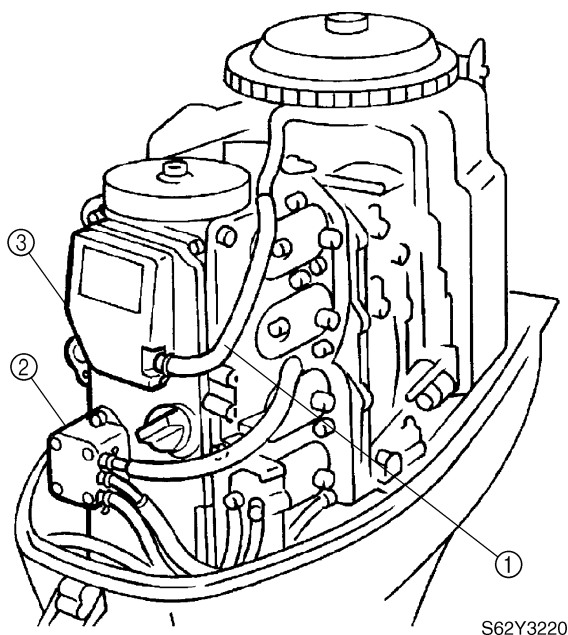
CAUTION:

Do not turn the flywheel magnet counter-clockwise, otherwise the valve system may be damaged.

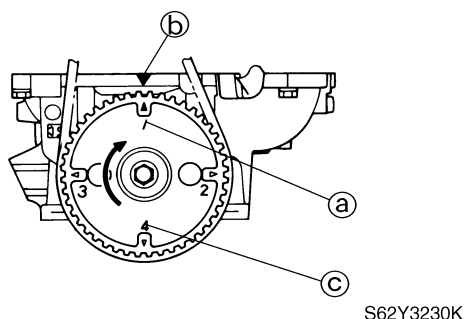
Checking the valve clearance

1. Remove the flywheel magnet cover, and then disconnect the high-tension cords and blowby hose ①.

- Remove the spark plugs, fuel pump ②, and cylinder head cover ③.



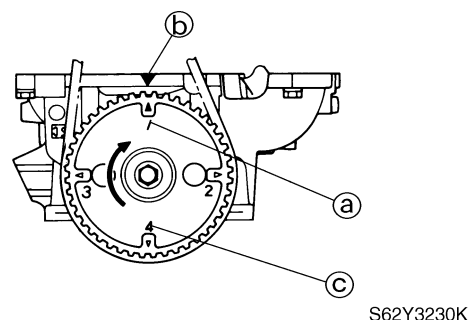
- Turn the flywheel clockwise and align the "1" mark ① on the driven sprocket with the "▲" mark ② on the cylinder head.



CAUTION:

Do not turn the flywheel counterclockwise, otherwise the valve system may be damaged.

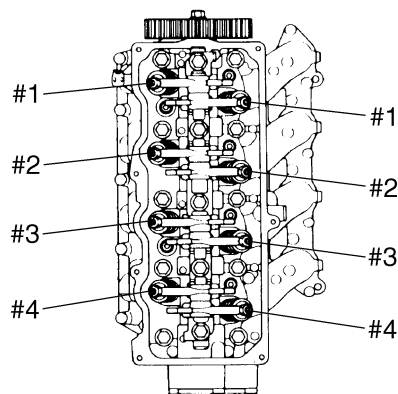
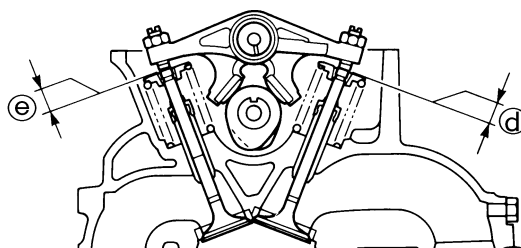
- Check the intake valve clearance for cylinders #1 and #2, and the exhaust valve clearance for cylinders #1 and #3. Adjust if necessary.
- Turn the flywheel clockwise and align the "4" mark ④ on the driven sprocket with the "▲" mark ⑤ on the cylinder head.



CAUTION:

Do not turn the flywheel counterclockwise, otherwise the valve system may be damaged.

- Check the intake valve clearance for cylinders #3 and #4, and the exhaust valve clearance for cylinders #2 and #4. Adjust if out of specification.



NOTE:

Adjust the valve clearance when the engine is cold.



Valve clearance:

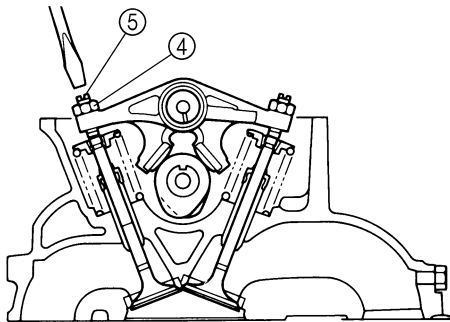
Intake ①:

0.20 ± 0.05 mm (0.008 ± 0.002 in)

Exhaust ②:

0.30 ± 0.05 mm (0.012 ± 0.002 in)

7. Loosen the locknut ④, and then turn the adjusting screw ⑤ until the specified valve clearance is obtained.



S62Y3250

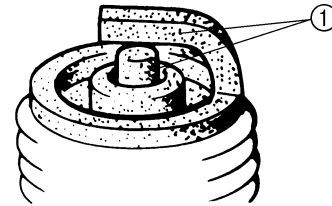
NOTE:

- To decrease the valve clearance, turn the adjusting screw clockwise.
- To increase the valve clearance, turn the adjusting screw counterclockwise.

8. Tighten the locknut, and then check the valve clearances. Adjust if necessary.
9. Install the cylinder head cover, fuel pump, and spark plugs.
10. Connect the blowby hose and high-tension cords, and then install the flywheel magnet cover.

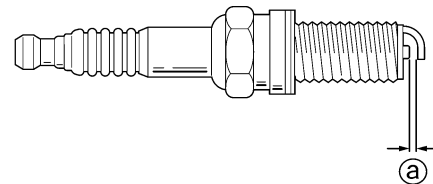
Checking the spark plugs

1. Disconnect the high-tension cords, and then remove the spark plugs.
2. Clean the electrodes ① with a spark plug cleaner or wire brush. Replace the spark plug if necessary.



S62Y3260

3. Check the electrodes for erosion and excessive carbon or other deposits, and the gasket for damage. Replace the spark plug if necessary.
4. Check the spark plug gap ②. Adjust if out of specification.



S62Y3270

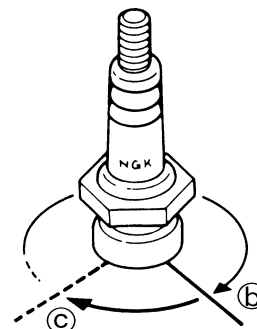


Specified spark plug:

DPR6EA-9 (NGK)

Spark plug gap ②: 0.9 mm (0.035 in)

5. Install the spark plug, tighten it finger tight ③, then to the specified torque with a spark plug wrench ④.



S62Y3280

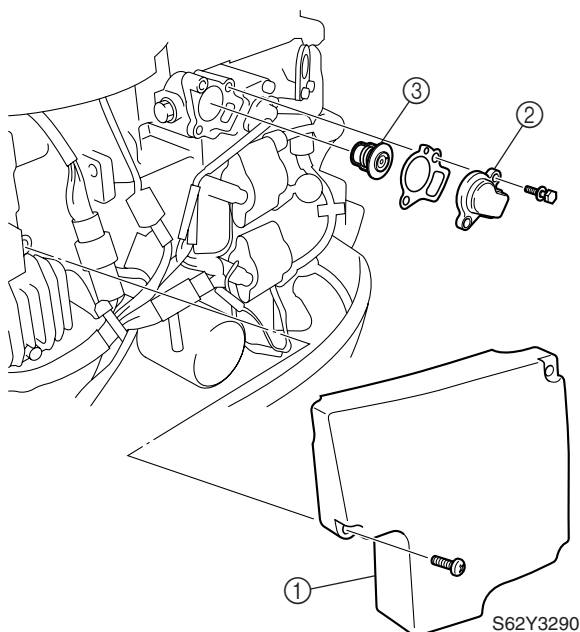


Spark plug:

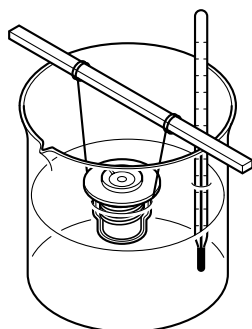
18 N·m (1.8 kgf·m, 13 ft·lb)

Checking the thermostat

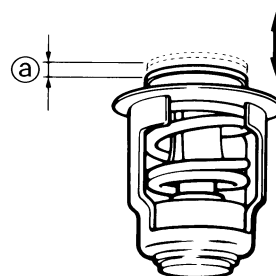
1. Remove the cover ①, thermostat cover ②, and thermostat ③.



2. Suspend the thermostat in a container of water.
3. Place a thermometer in the water and slowly heat the water.



4. Check the thermostat valve opening at the specified water temperatures. Replace if out of specification.



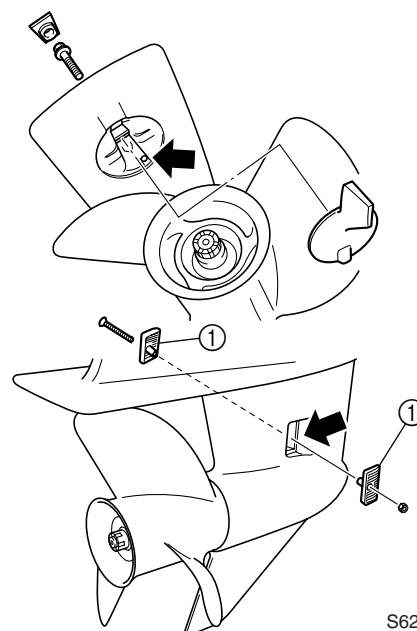
S62Y3310

Water temperature	Valve lift ①
below 60 °C (140 °F)	0 mm (0 in)
above 70 °C (158 °F)	more than 3 mm (0.12 in)

5. Install the thermostat, new gasket, thermostat cover, and cover.

Checking the cooling water passage

1. Check the cooling water inlet cover ① and cooling water inlet for clogs. Clean if necessary.

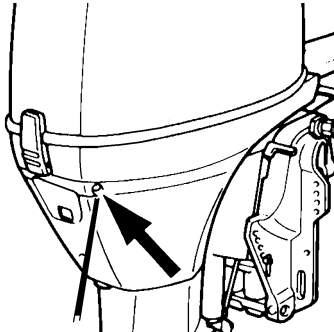


S62Y3320

2. Place the lower unit in water, and then start the engine.

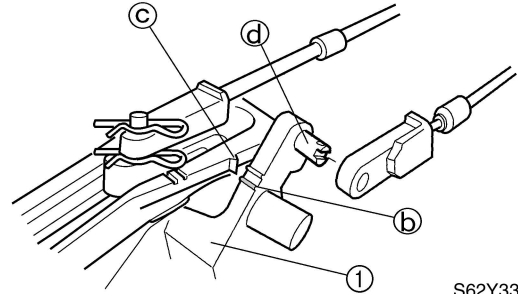


3. Check for water flow at the cooling water outlet. If there is no water flow, check the cooling water passage inside the out-board motor.



S62Y3330

4. Adjust the position of the throttle cable joint until its hole is aligned with the set pin ④ on the throttle cam.

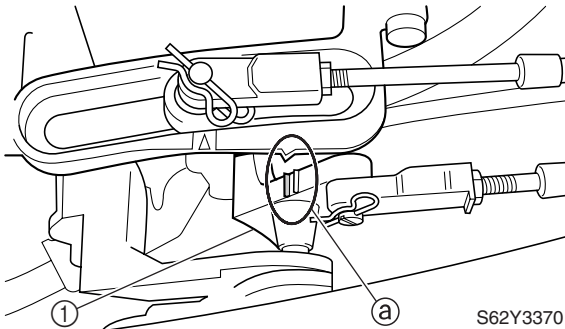


S62Y3390

Control system

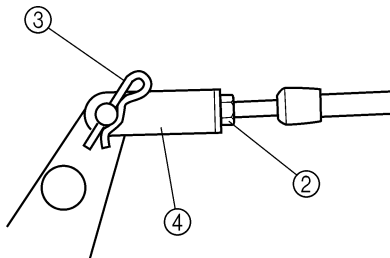
Checking the throttle cable operation

1. Check that the throttle cam ① is at the fully closed position ② when the remote control lever is in neutral or the throttle grip is fully closed. Adjust the throttle cable length if necessary as follows.



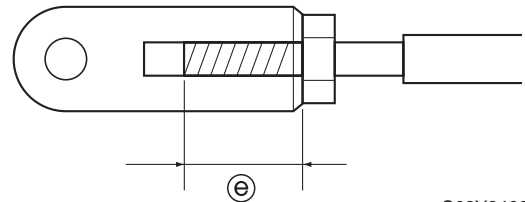
S62Y3370

2. Loosen the locknut ②, remove the clip ③, and then disconnect the throttle cable joint ④.



S62Y3380

3. Align the alignment mark ⑤ on the throttle cam ① with the alignment mark ⑥ on the shift bracket.



S62Y3400

CAUTION:

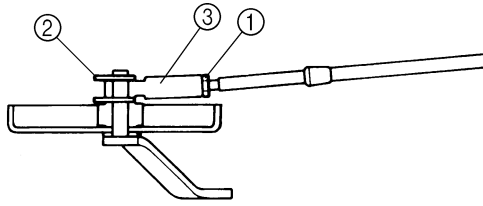
The throttle cable joint must be screwed in a minimum of 8.0 mm (0.31 in) ⑥.

5. Connect the cable joint, install the clip, and then tighten the locknut.
6. Check the throttle cable for smooth operation and adjust the cable length, if necessary, repeating steps 2–6.

Checking the gearshift operation

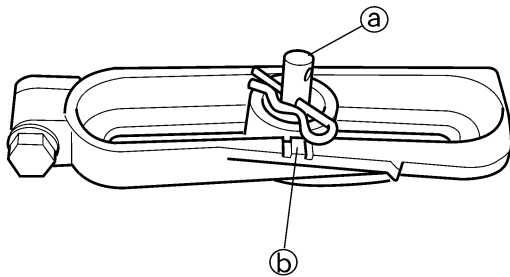
1. Check that the gearshift operates smoothly when shifting from neutral into forward and reverse. Adjust the shift cable length if necessary.
2. Set the gearshift to the neutral position.
3. Loosen the locknut ①, remove the clip ②, and then disconnect the shift cable joint ③.

Power unit / Control system



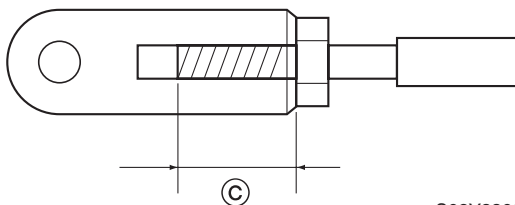
S62Y3340

4. Align the set pin ① in the center of the shift bracket with the alignment mark ② on the bracket.



S62Y3350

5. Adjust the position of the shift cable joint until its hole is aligned with the set pin.



S62Y3360

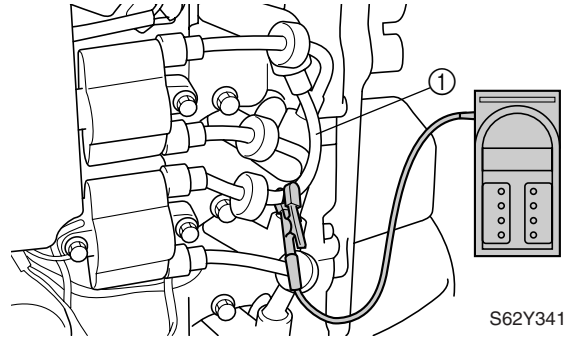
CAUTION:

The shift cable joint must be screwed in a minimum of 8.0 mm (0.31 in) ③.

6. Connect the cable joint, install the clip, and then tighten the locknut.
7. Check the gearshift for smooth operation and adjust the shift cable length, if necessary, repeating steps 3–6.

Checking the engine idle speed

1. Start the engine and warm it up for 5 minutes.
2. Attach the special service tool to high-tension cord #1 ①, and then check the engine idle speed. Adjust if out of specification.



S62Y3410

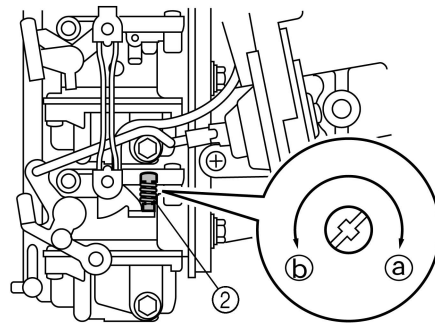


Digital tachometer: 90890-06760



Engine idle speed: 850–950 r/min

3. Turn the throttle stop screw ② in direction ① or ② until the specified engine idle speed is obtained.



S62Y3420

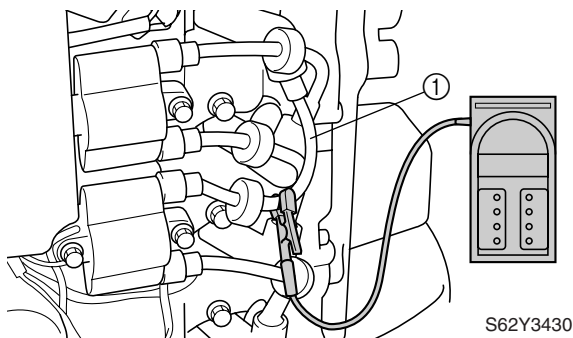
NOTE:

- To increase the idle speed, turn the throttle stop screw in direction ①.
- To decrease the idle speed, turn the throttle stop screw in direction ②.

4. After adjusting the idle speed, rev the engine a few times and let it idle for at least 15 seconds to check the stability of the engine.

Checking the ignition timing

1. Start the engine and warm it up for 5 minutes.
2. Attach the special service tool to high-tension cord #1 ①, and then check the engine idle speed.

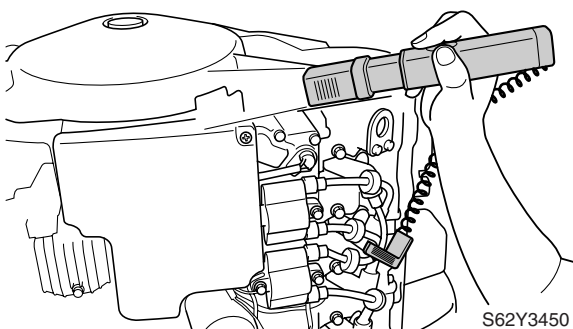
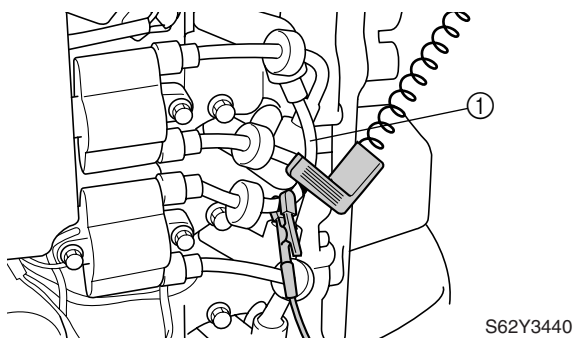


Digital tachometer: 90890-06760



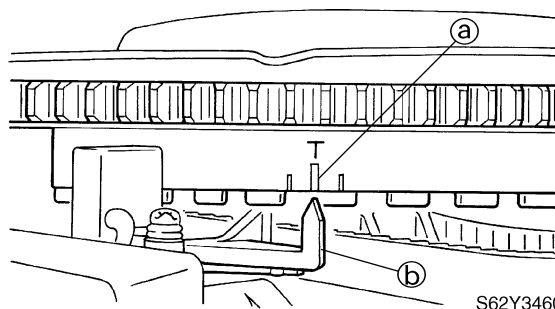
Engine idle speed: 850–950 r/min

3. Attach the special service tool to high-tension cord #1 ①.



Timing light: 90890-03141

4. Check that the TDC “T” mark ① on the flywheel magnet is aligned with the magnet base pointer ②.



Ignition timing: TDC

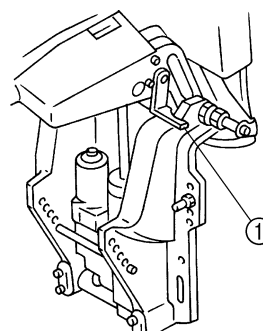
Power trim and tilt unit
Checking the power trim and tilt operation

1. Fully tilt the outboard motor up and down a few times and check the entire trim and tilt range for smooth operation. Check the power trim and tilt fluid level if necessary.

NOTE:

Be sure to listen to the winding sound of the PTT motor for smooth operation.

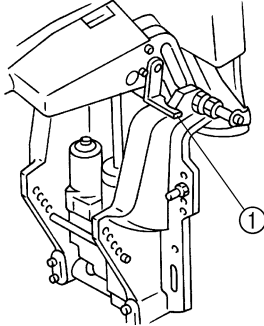
2. Fully tilt the outboard motor up, and then support it with the tilt stop lever ① to check the lock mechanism of the lever.



Control system / Power trim and tilt unit / Lower unit

Checking the power trim and tilt fluid level

1. Fully tilt the outboard motor up, and then support it with the tilt stop lever ①.

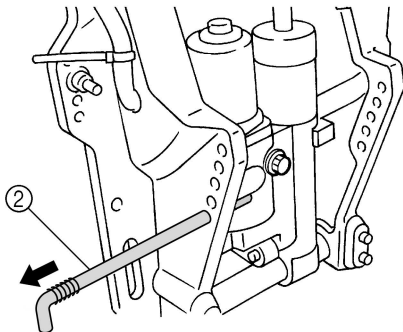


S62Y3490

⚠ WARNING

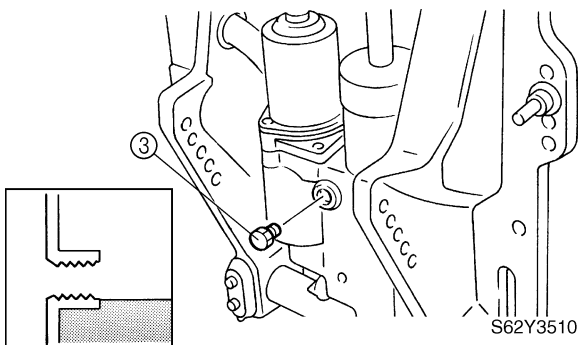
After tilting up the outboard motor, be sure to support it with the tilt stop lever. Otherwise, the outboard motor could suddenly lower if the power trim and tilt unit should lose fluid pressure.

2. Remove the tilt pin ②.



S62Y3500

3. Remove the reservoir cap ③, and then check the fluid level in the reservoir.



S62Y3510

NOTE:

The fluid level should be at the brim of the filler hole.

4. If necessary, add sufficient fluid of the recommended type to the correct level.



Recommended power trim and tilt fluid:

ATF Dexron II

5. Install the reservoir cap, and then tighten it to the specified torque.



Reservoir cap:

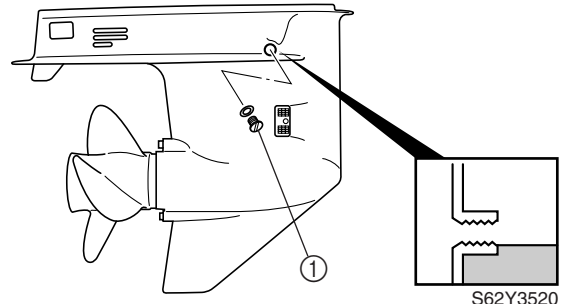
8 N·m (0.8 kgf·m, 5.8 ft·lb)

6. Install the tilt pin to its original position.

Lower unit

Checking the gear oil level

1. Fully tilt the outboard motor down.
2. Remove the check screw ①, and then check the gear oil level in the lower case.



S62Y3520

NOTE:

The gear oil level should be at the brim of the check hole.

3. If necessary, add sufficient gear oil of the recommended type to the correct level.



Recommended gear oil:

Hypoid gear oil

SAE: 90



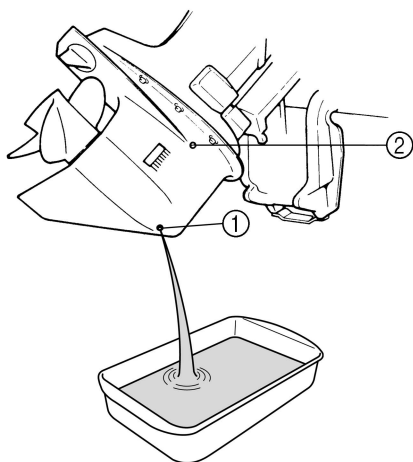
4. Install the check screw, and then tighten it to the specified torque.



Check screw:
7 N·m (0.7 kgf·m, 5.1 ft·lb)

Replacing the gear oil

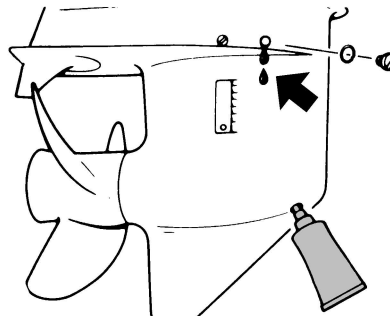
1. Tilt the outboard motor up slightly.
2. Place a drain pan under the drain screw ①, remove the drain screw, then the check screw ② to drain the oil.



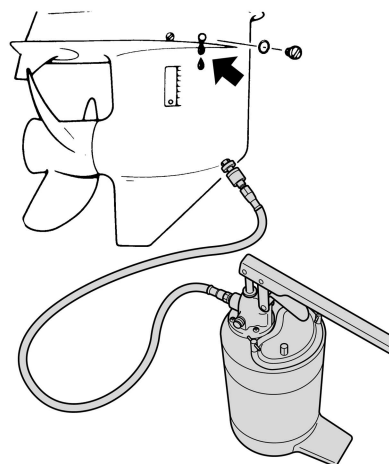
S62Y3550K

3. Check the oil for metal, discoloration, and viscosity. Check the internal parts of the lower case if necessary.

4. Insert the gear oil tube or gear oil pump into the drain hole and slowly fill the gear oil until oil flows out of the check hole and no air bubbles are visible.



S62Y3560



S62Y3570K



Recommended gear oil:
Hypoid gear oil
SAE: 90
Oil quantity:
0.61 L (0.64 US qt, 0.54 Imp qt)

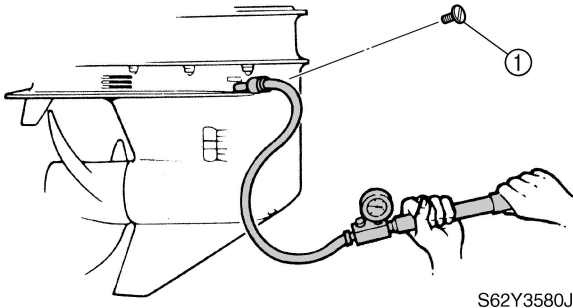
5. Install the check screw, quickly install the drain screw, and then tighten them to the specified torque.



Check and drain screw:
7 N·m (0.7 kgf·m, 5.1 ft·lb)

Checking the lower unit (for air leakage)

1. Remove the check screw ①, and then install the special service tool.



Leakage tester: 90890-06762

2. Apply the specified pressure to check whether the lower unit can hold it for at least 10 seconds.

CAUTION:

- Do not over pressurize the lower unit, otherwise the oil seals may be damaged.
- Cover the check hole with a rag when removing the pressure/vacuum tester from the lower unit, since oil may spray out.

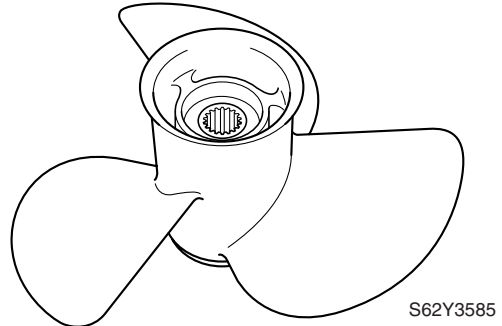


Lower unit holding pressure:
100 kPa (1.0 kgf/cm², 14 psi)

3. If pressure drops below specification, check the drive shaft and propeller shaft oil seals for damage.

Checking the propeller

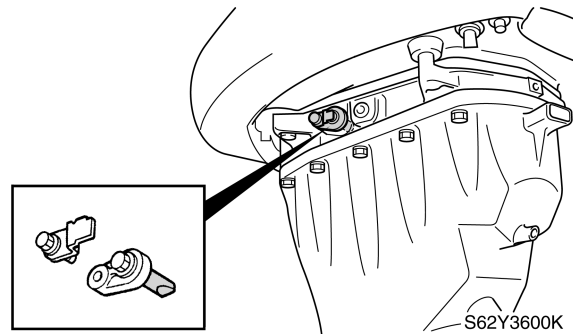
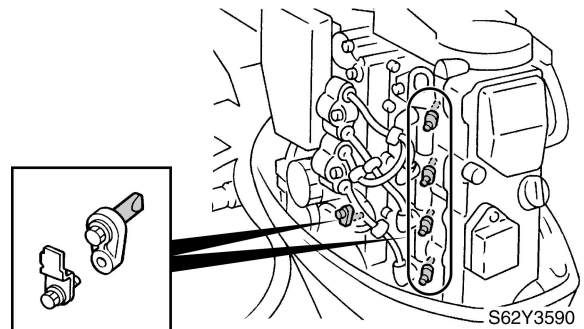
1. Check the propeller blades and splines for cracks, damage, or wear. Replace if necessary.

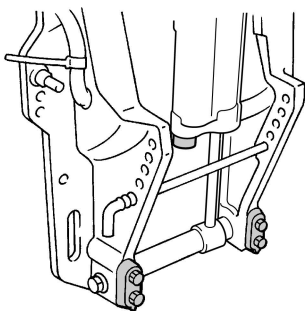


General

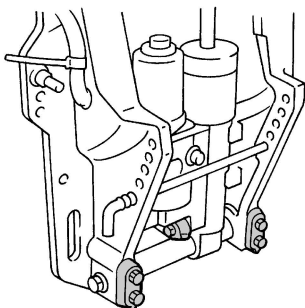
Checking the anodes

1. Check the anodes and trim tab for scales, grease, or oil. Clean if necessary.



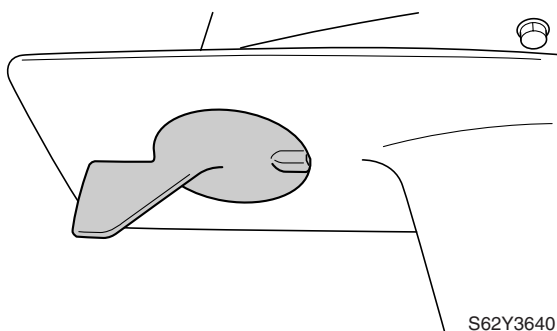
A


S62Y3610J

B


S62Y3620J

A EHD, ED models

B ET model


S62Y3640

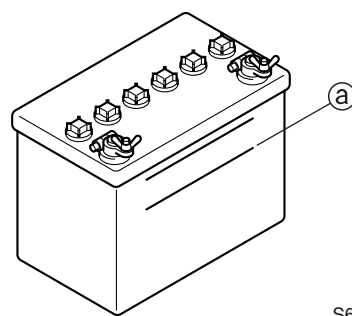
CAUTION:

Do not oil, grease, or paint the anodes, otherwise they will be ineffective.

2. Replace the anodes and trim tab if excessively eroded.

Checking the battery

1. Check the battery electrolyte level. If the level is at or below the minimum level mark (a), add distilled water until the level is between the maximum and minimum level marks.



S62Y3650

2. Check the specific gravity of the electrolyte. Fully charge the battery if out of specification.

⚠ WARNING

Battery electrolyte is dangerous; it contains sulfuric acid which is poisonous and highly caustic.

Always follow these preventive measures:

- Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.
- Wear protective eye gear when handling or working near batteries.

Antidote (EXTERNAL):

- SKIN – Wash with water.
- EYES – Flush with water for 15 minutes and get immediate medical attention.

Antidote (INTERNAL):

- Drink large quantities of water or milk followed with milk of magnesia, beaten egg, or vegetable oil. Get immediate medical attention.

Batteries generate explosive, hydrogen gas. Always follow these preventive measures:

- Charge batteries in a well-ventilated area.
- Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).
- **DO NOT SMOKE** when charging or handling batteries.

KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.

NOTE:

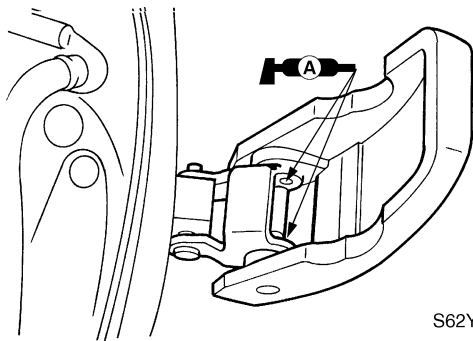
- Batteries vary per manufacturer. The procedures mentioned in this manual may not always apply, therefore, consult the instruction manual of the battery.
- Disconnect the negative lead first, then the positive lead.



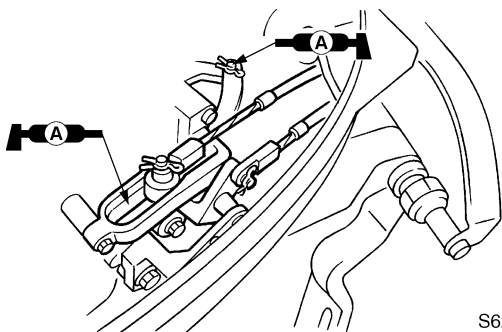
Electrolyte specific gravity:
1.280 at 20 °C (68 °F)

Lubrication

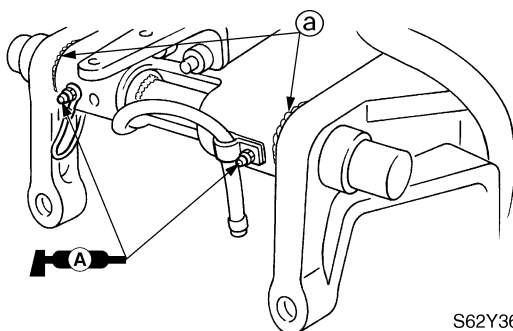
1. Apply water resistant grease to the areas shown.



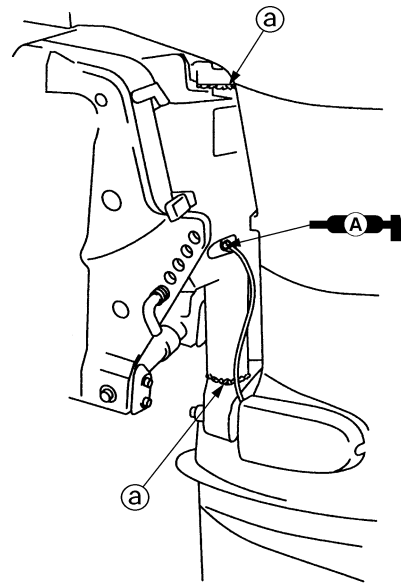
S62Y3660



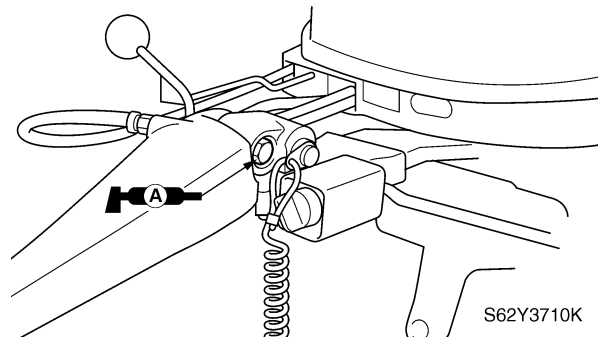
S62Y3670



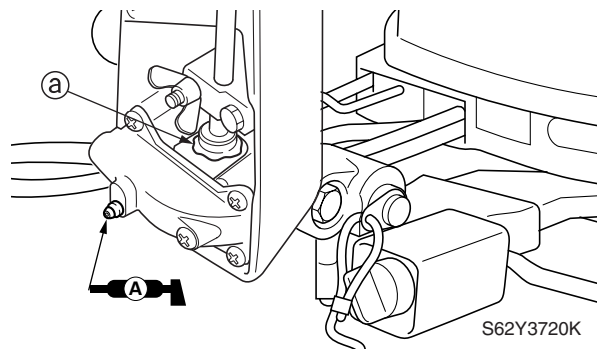
S62Y3680



S62Y3690



S62Y3710K



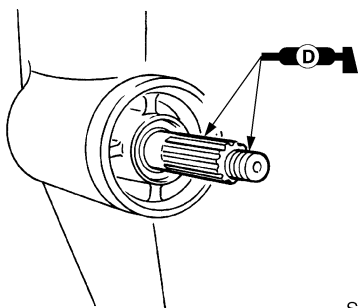
S62Y3720K

NOTE:

Apply grease to the grease nipple until it flows from the bushings (a).



2. Apply anti-corrosion grease to the areas shown.

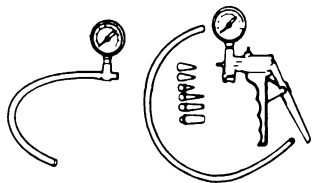


S62Y3730

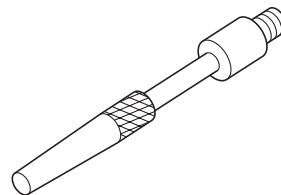


Fuel system

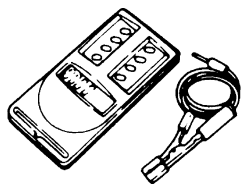
Special service tools	4-1
Hose routing	4-2
Fuel and blowby hoses	4-2
Fuel filter and fuel pump	4-3
Checking the fuel pump	4-5
Disassembling the fuel pump	4-5
Checking the diaphragm and valves	4-6
Assembling the fuel pump	4-6
Carburetor unit	4-7
Carburetor	4-9
Checking the carburetor	4-11
Checking the Prime Start	4-12
Assembling the carburetor	4-12
Adjusting the throttle link rod	4-13
Adjusting the pilot screw	4-13
Synchronizing the carburetors	4-14
Adjusting the dash-pot (acceleration pump)	4-15

**Special service tools**

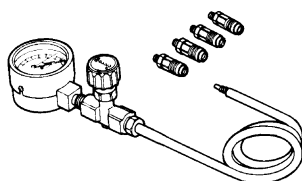
Vacuum/pressure pump gauge set
90890-06756



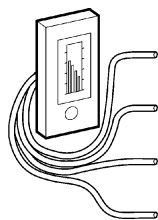
Vacuum gauge adaptor
(commercially obtainable)



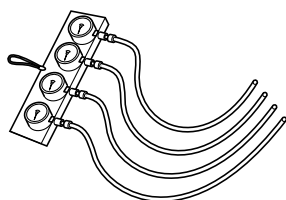
Digital tachometer
90890-06760



Vacuum gauge
90890-03159



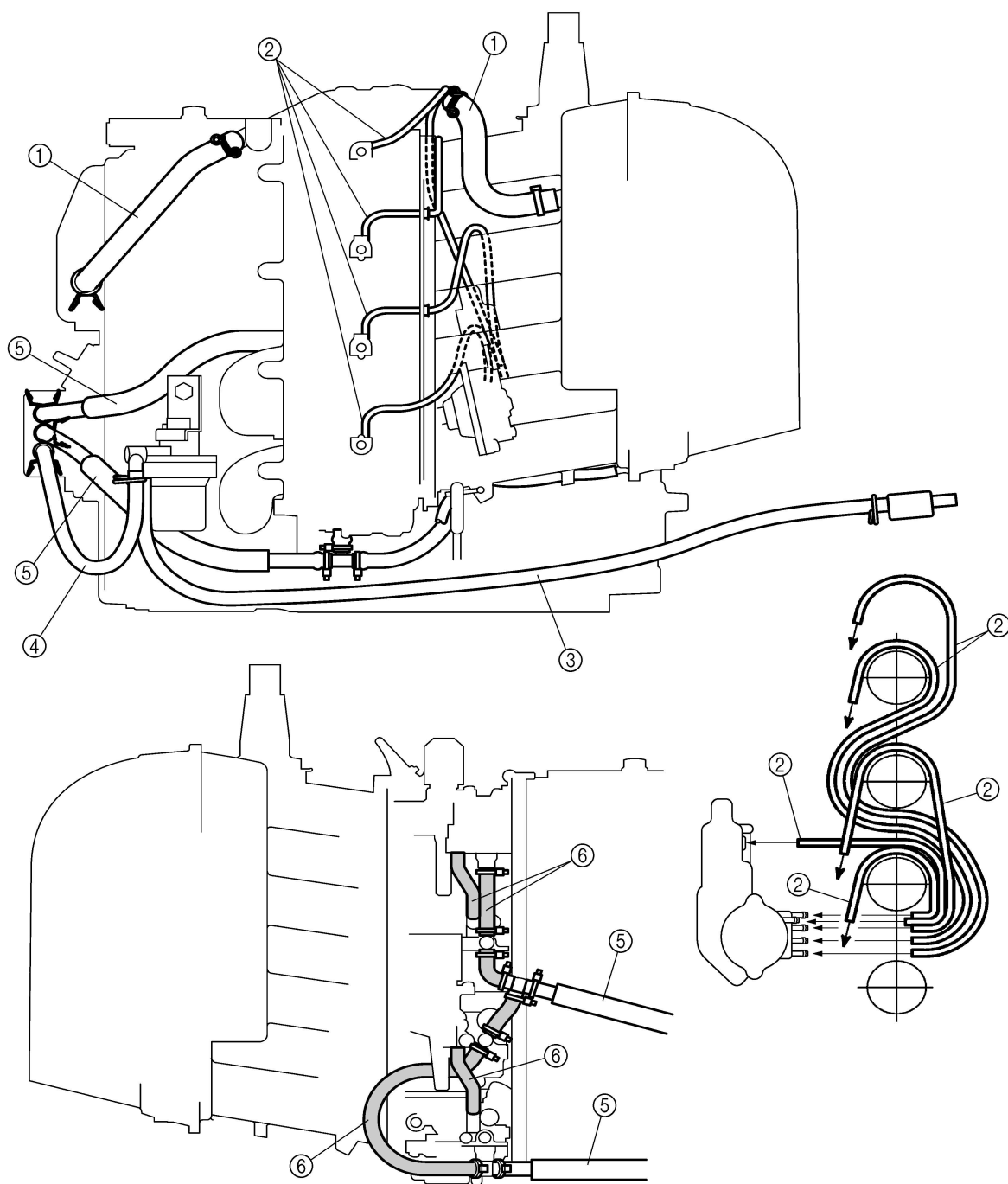
Vacuum gauge (digital)
(commercially obtainable)



Vacuum gauge (4 analog meters)
(commercially obtainable)

Hose routing

Fuel and blowby hoses

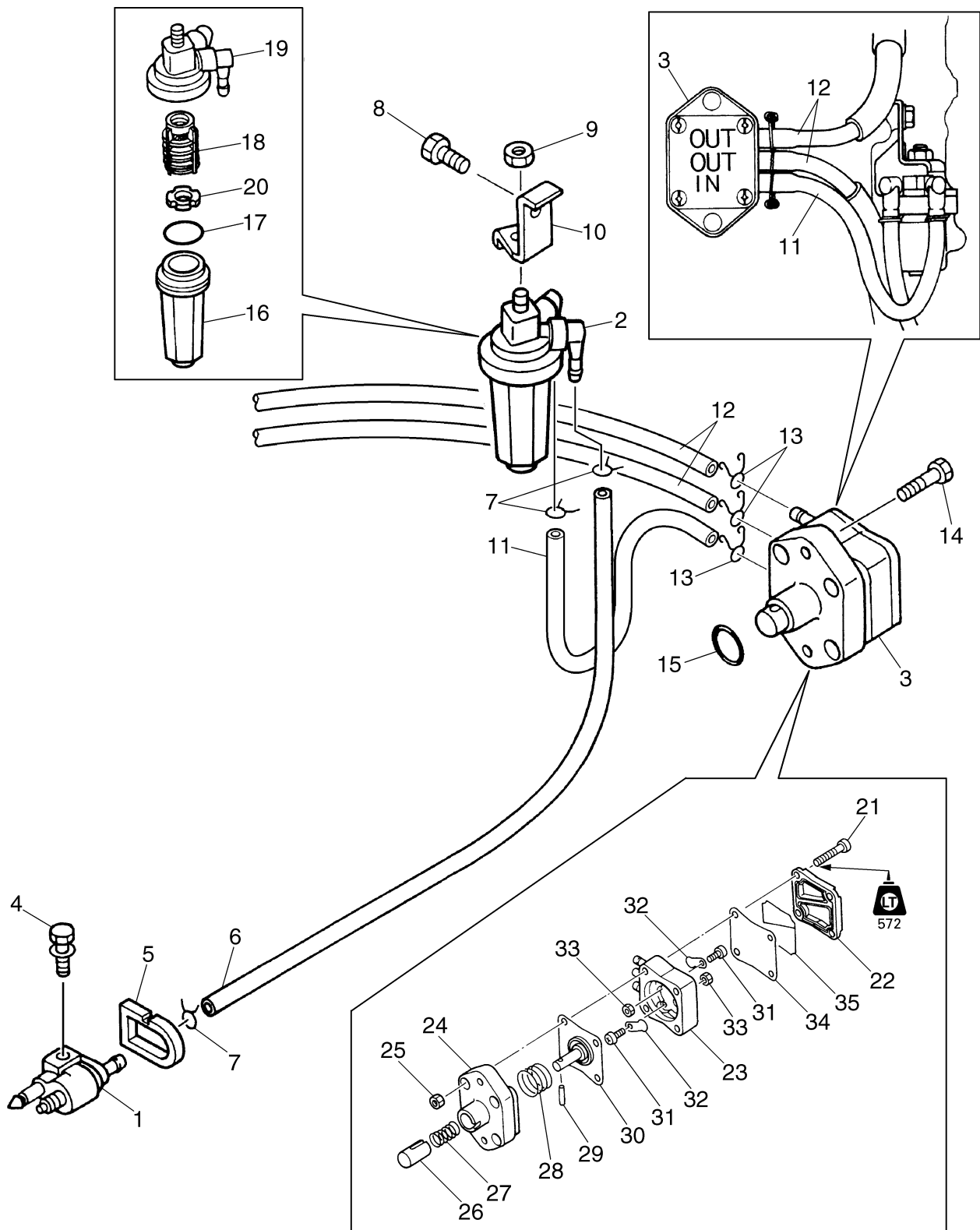


S62Y4010K

- ① Blowby hose
- ② Hose (acceleration pump-to-carburetor)
- ③ Fuel hose (fuel joint-to-fuel filter)
- ④ Fuel hose (fuel filter-to-fuel pump)
- ⑤ Fuel hose (fuel pump-to-carburetor)
- ⑥ Hose (carburetor-to-carburetor)



Fuel filter and fuel pump



S62Y4030K

Fuel filter and fuel pump

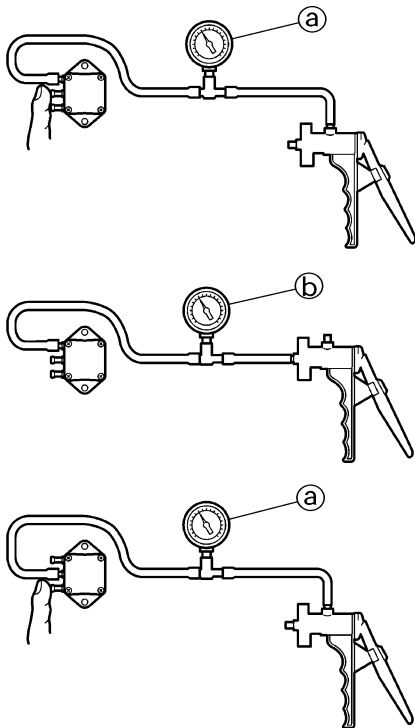
No.	Part name	Q'ty	Remarks
1	Fuel joint	1	
2	Fuel filter	1	
3	Fuel pump	1	
4	Bolt	1	M6 × 25 mm
5	Seal	1	
6	Fuel hose	1	Fuel joint-to-fuel filter
7	Clip	3	
8	Bolt	1	M8 × 14 mm
9	Nut	1	
10	Bracket	1	
11	Fuel hose	1	Fuel filter-to-fuel pump 205.0 mm (8.1 in)
12	Fuel hose	2	Fuel pump-to-carburetor
13	Clip	3	
14	Bolt	2	M6 × 30 mm
15	O-ring	1	Not reusable 24.4 × 3.1 mm
16	Fuel filter cup	1	
17	O-ring	1	Not reusable 32.2 × 2.0 mm
18	Fuel filter element	1	
19	Body	1	
20	Float	1	
21	Screw	4	M5 × 35 mm
22	Cover	1	
23	Fuel pump body 2	1	
24	Fuel pump body 1	1	
25	Nut	4	
26	Plunger	1	
27	Spring	1	
28	Spring	1	
29	Pin	1	
30	Diaphragm	1	
31	Screw	2	M3 × 6 mm
32	Valve	2	
33	Nut	2	
34	Seal	1	Not reusable
35	Gasket	1	Not reusable

4



Checking the fuel pump

1. Install the special service tool onto the fuel pump as shown.



S62Y4050



Vacuum/pressure pump gauge set:
90890-06756

2. Apply the specified pressure to each fuel pump port.
3. If air flow is reversed, check the diaphragm for tears and the valves for cracks. Replace if necessary.

CAUTION:

Do not over pressurize the fuel pump, otherwise excessive pressure may cause air leakage.

NOTE:

- Make sure that air does not escape from the opposite side of the fuel pump.

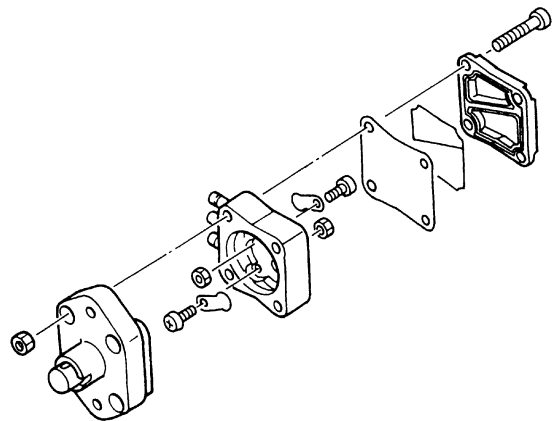
- To eliminate any gaps between the fuel pump valves and the fuel pump body 2, and to ensure a better seal, make sure that the inside of the fuel pump is moist with gasoline.



Fuel pump pressure (a):
50 kPa (0.5 kgf/cm², 7.1 psi)
Fuel pump negative pressure (b):
30 kPa (0.3 kgf/cm², 4.3 psi)

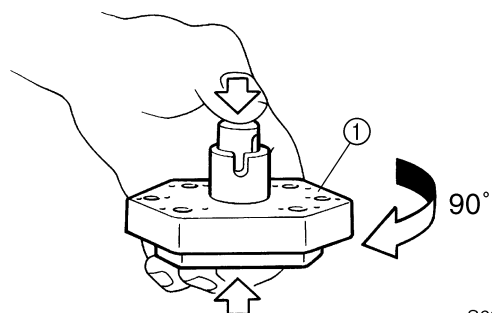
Disassembling the fuel pump

1. Disassemble the fuel pump as shown.

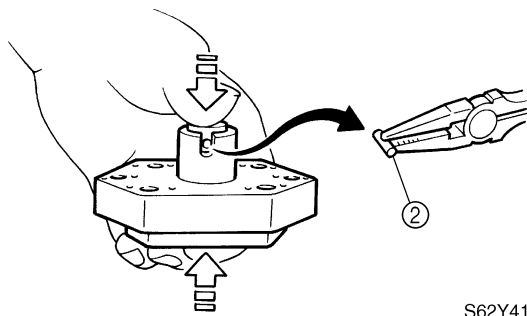


S62Y4090

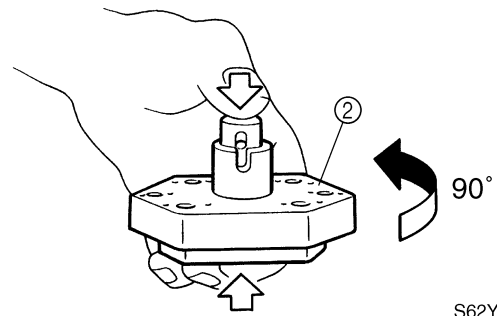
2. Push down on the plunger and the diaphragm, turn the fuel pump body 1 (1) approximately 90° to a position where the pin (2) can be removed easily, and then remove the pin.



S62Y4100



S62Y4110

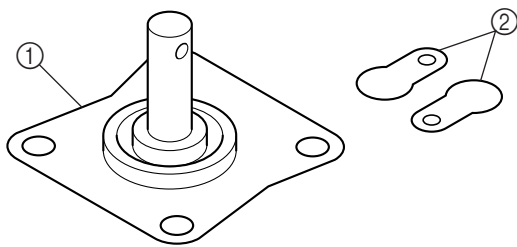


S62Y4150

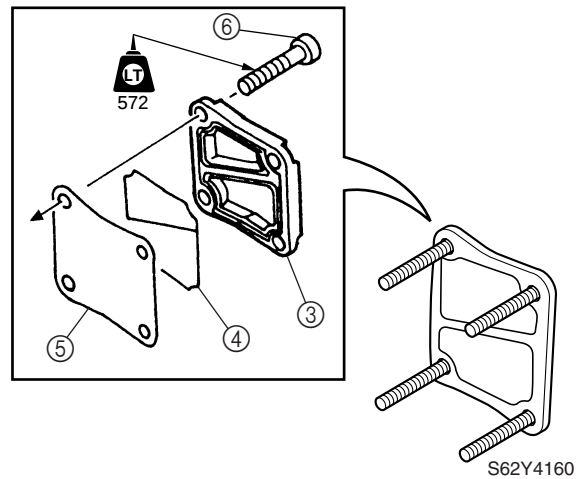
3. Slowly let up on the plunger and diaphragm, and then remove them.

Checking the diaphragm and valves

1. Check the diaphragm (1) for tears and the valves (2) for cracks. Replace if necessary.



S62Y4120

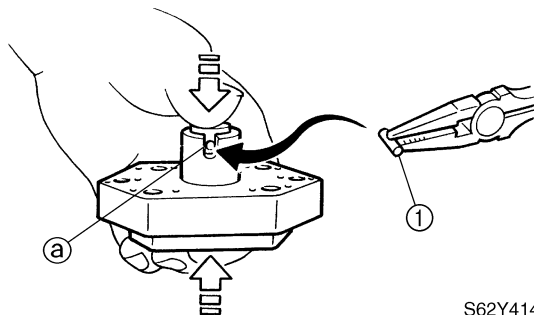


S62Y4160

4

Assembling the fuel pump

1. Align the plunger and diaphragm installation holes (a), and then install the plunger into the diaphragm.
2. Push down on the plunger and the diaphragm, and then install the pin (1).

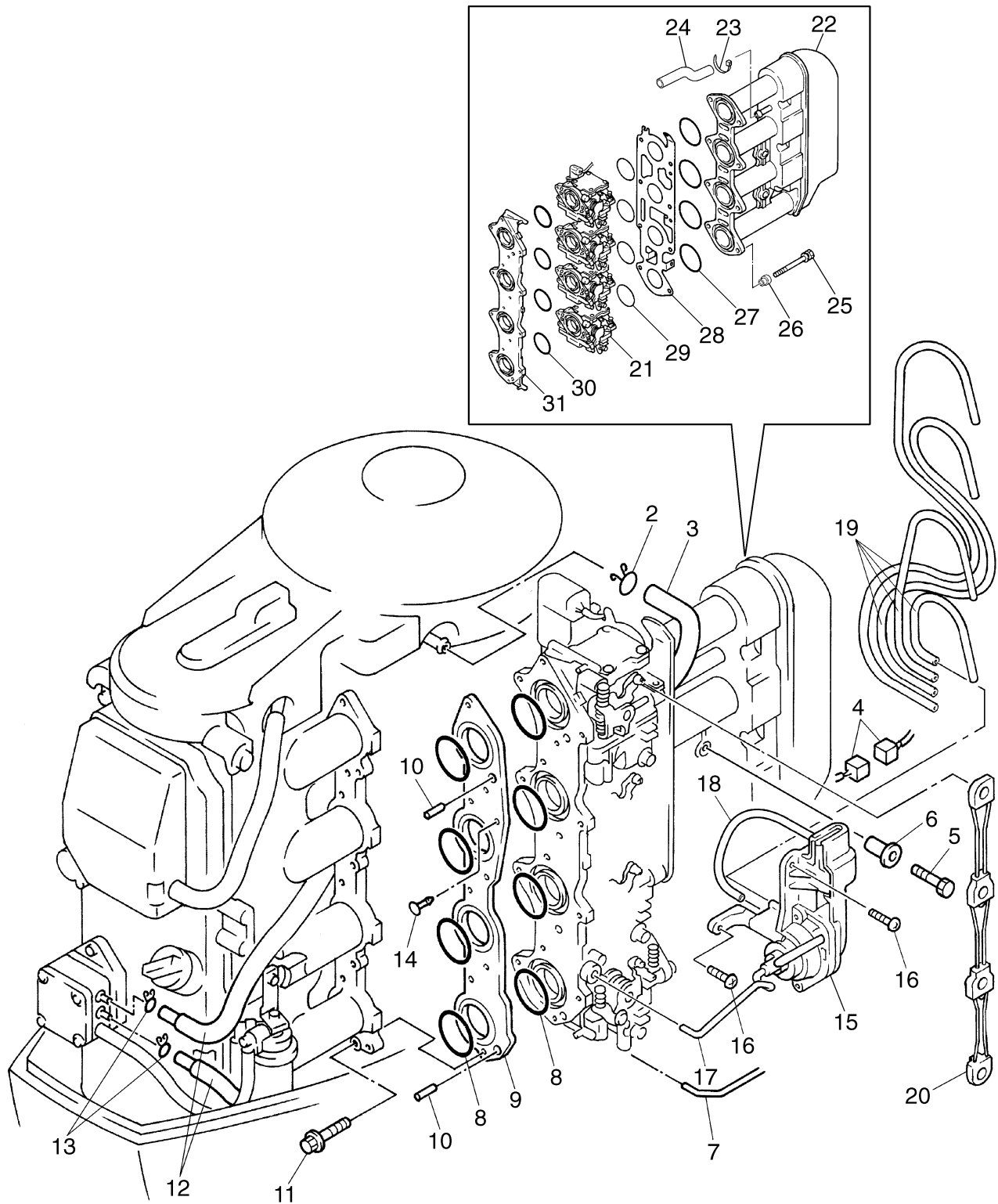


S62Y4140

3. Turn the fuel pump body 1 (2) approximately 90°, and then push down on the plunger several times to make sure that the pin does not come out.



Carburetor unit



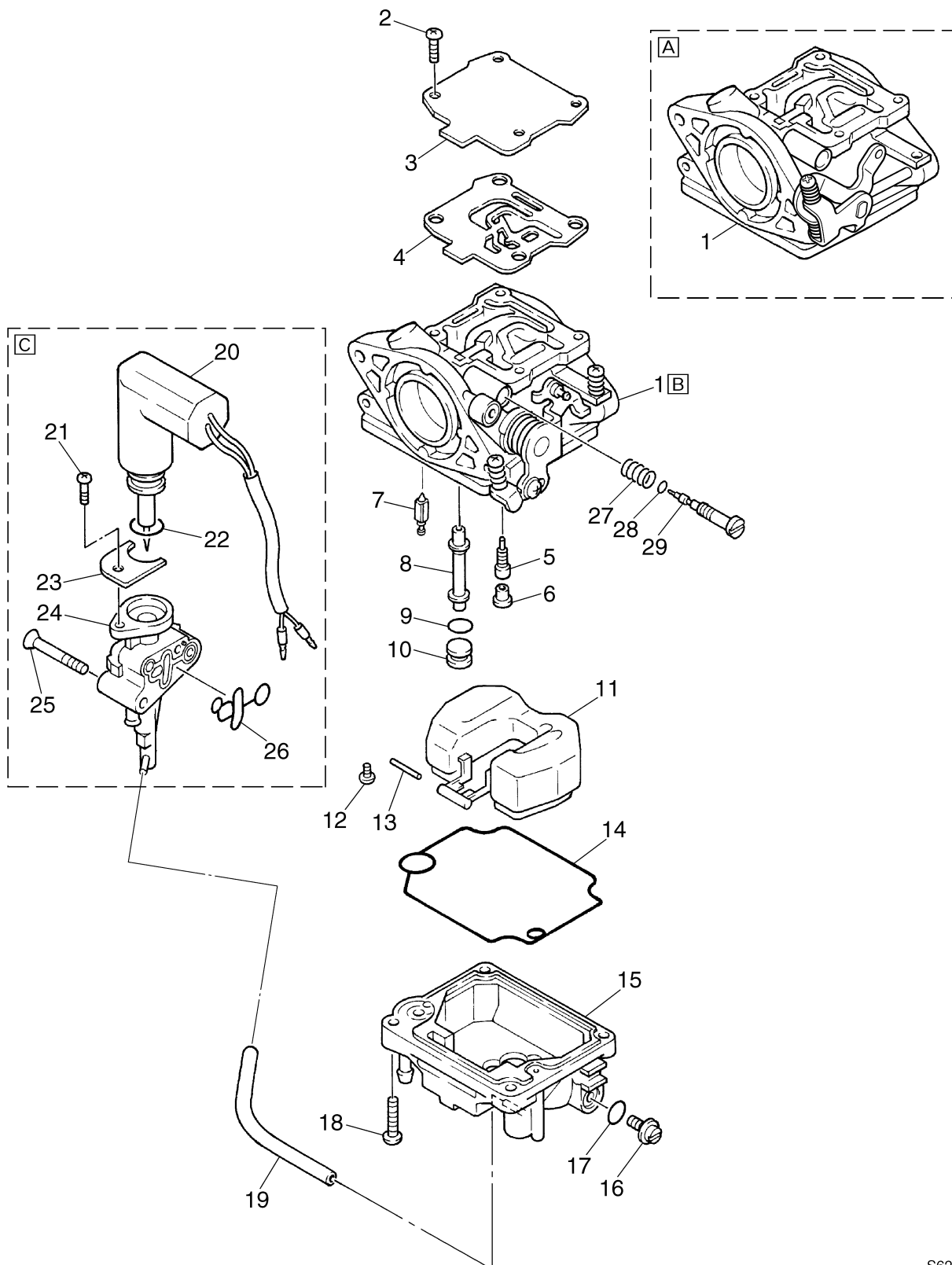
S62Y4170K

Carburetor unit

No.	Part name	Q'ty	Remarks
1	Carburetor assembly	1	Joint-to-silencer
2	Clip	1	
3	Blowby hose	1	
4	Prime Start coupler	1	
5	Bolt	2	M6 × 30 mm
6	Collar	2	
7	Throttle link rod	1	
8	O-ring	8	Not reusable 34.5 × 1.9 mm
9	Insulator	1	
10	Dowel pin	2	
11	Bolt	8	M6 × 25 mm
12	Fuel hose	2	Fuel pump-to-carburetor
13	Clip	2	
14	Rivet	2	
15	Acceleration pump	1	
16	Screw	3	M5 × 9 mm
17	Link rod	1	
18	Hose	1	Acceleration pump-to-acceleration pump
19	Hose	4	Acceleration pump-to-carburetor
20	Link rod	1	
21	Carburetor	4	
22	Silencer	1	
23	Plastic tie	1	Not reusable
24	Blowby hose	1	Silencer-to-joint
25	Bolt	8	M6 × 90 mm
26	Collar	8	
27	O-ring	4	Not reusable 37.7 × 3.5 mm
28	Plate	1	
29	O-ring	4	Not reusable 34.5 × 1.9 mm
30	O-ring	4	Not reusable
31	Joint	1	

4

Carburetor



S62Y4205

Carburetor

No.	Part name	Q'ty	Remarks
1	Carburetor body	1	
2	Screw	4	M4 × 13 mm
3	Cover	1	
4	Seal	1	Not reusable
5	Pilot jet	1	
6	Main jet	1	
7	Needle valve	1	
8	Main nozzle	1	
9	O-ring	1	Not reusable
10	Plug	1	
11	Float	1	
12	Screw	1	M4 × 6 mm
13	Float pin	1	
14	Gasket	1	Not reusable
15	Float chamber	1	
16	Drain screw	1	
17	O-ring	1	Not reusable
18	Screw	4	M4 × 13 mm
19	Fuel hose	1	Float chamber-to-body
20	Prime Start	1	
21	Screw	1	M4 × 7 mm
22	O-ring	1	Not reusable
23	Bracket	1	
24	Body	1	
25	Screw	2	Carburetor #1: M4 × 17 mm Carburetor #3: M4 × 22 mm
26	Gasket	1	Not reusable
27	Spring	1	
28	O-ring	1	Not reusable
29	Pilot screw	1	

☐ A Carburetors #1, #2, and #3

☐ B Carburetor #4

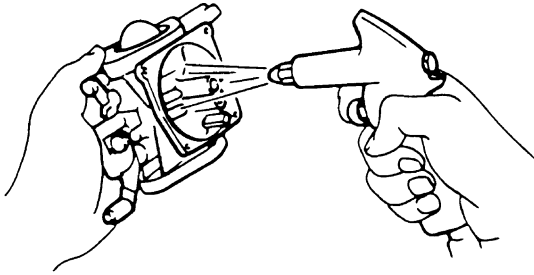
☐ C Carburetors #1 and #3

4



Checking the carburetor

1. Check the air and fuel passages and jets, for dirt and foreign matter. Clean the carburetor body with a petroleum based solvent if necessary.
2. Blow compressed air into all passages and jets.

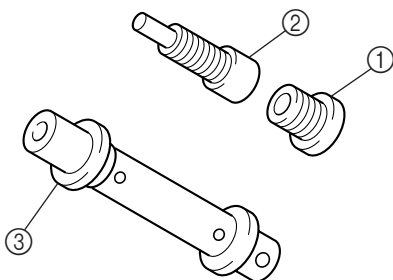


S62Y4220

CAUTION:

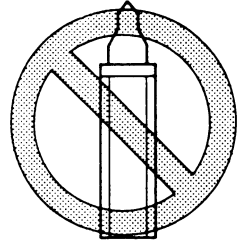
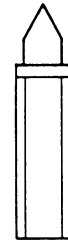
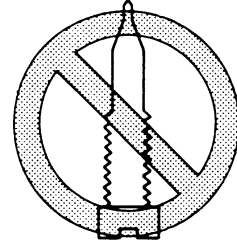
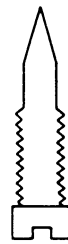
- Direct the compressed air downward, otherwise cleaning solvent may be blown into your eyes or small parts of the carburetor may be blown off.
- Do not use steel wire for cleaning the jets, otherwise the jet diameters may be enlarged, which may seriously affect performance.

3. Check the main jet ①, pilot jet ②, and main nozzle ③ for dirt or residue. Clean if necessary.



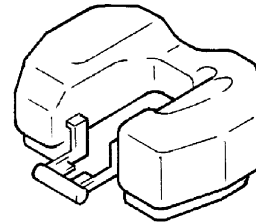
S62Y4230

4. Check the pilot screw and needle valve for bends or wear. Replace if necessary.



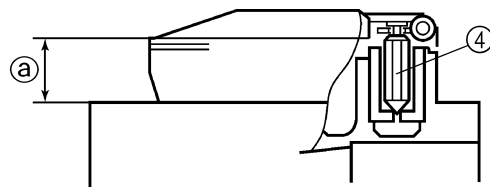
S62Y4240

5. Check the float for deterioration. Replace it necessary.



S62Y4250

6. Measure the float height ①. Replace the float or needle valve, if out of specification.



S62Y4290

NOTE:

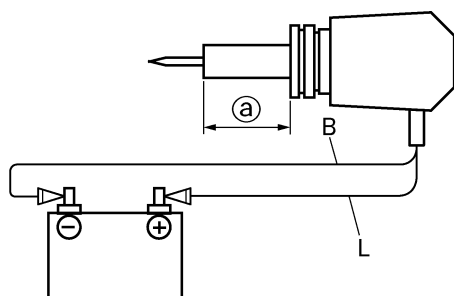
- The float should be resting on the needle valve ④, but not compressing it.
- Take measurements at the top of the float flange opposite its pivoted side.



Float height ①:
9.5–10.5 mm (0.37–0.41 in)

Checking the Prime Start

1. Measure the length of the Prime Start plunger.
2. Connect the positive Prime Start blue (L) lead and the negative Prime Start black (B) lead to a battery as shown.
3. Measure the plunger length ① after applying power for 5 minutes. Replace if out of specification.



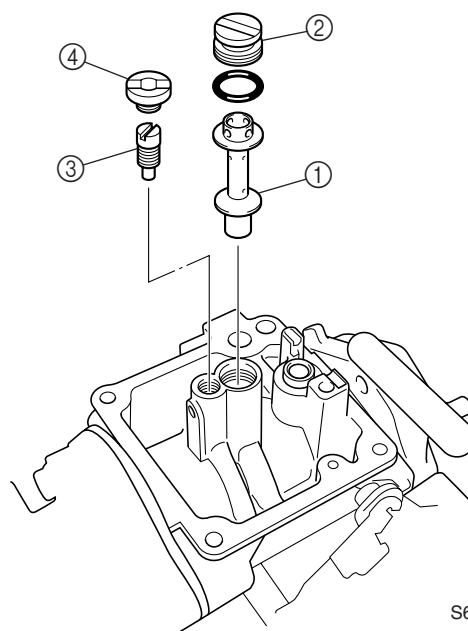
S62Y4260



Prime Start plunger extended length ①:
More than 24.6 mm (0.97 in)

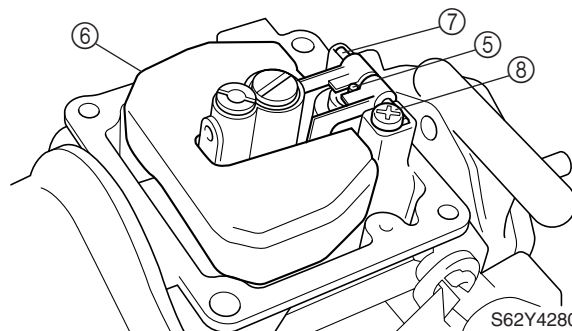
Assembling the carburetor

1. Install the main nozzle ①, plug ②, pilot jet ③, and main jet ④ to the carburetor body as shown.



S62Y4270

2. Install the needle valve ⑤, float ⑥, float pin ⑦, and screw ⑧ as shown, and then check the float for smooth operation.



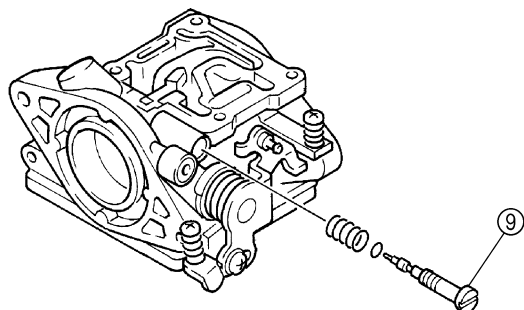
S62Y4280

NOTE:

- Place the needle valve in the valve seat when installing the float to the carburetor body.
- Fit the float pin into the slit on the carburetor body and lock it with the screw.



3. Install the pilot screw ⑨, turn it in until it is lightly seated, then out the specified number of turns.



S62Y4300



Pilot screw setting:

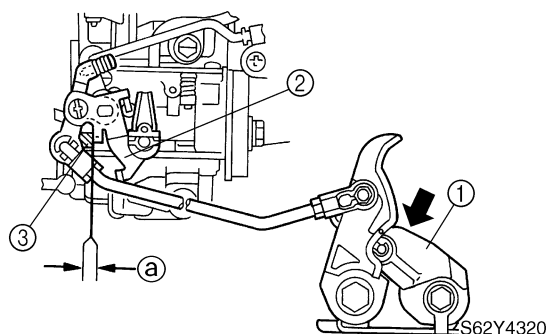
Carburetors #1, #2, and #3:

1 3/4–2 3/4 turns out

Carburetor #4: 2–3 turns out

Adjusting the throttle link rod

1. Push the throttle control lever ① to the fully open position as shown, and then measure the gap between the carburetor throttle lever ② and carburetor stopper ③.
2. If out of specification, adjust the throttle link rod length.

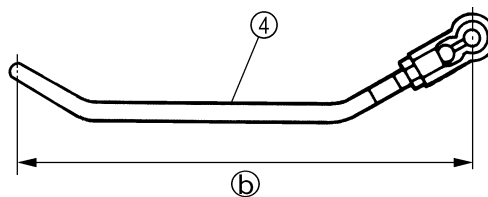


S62Y4320



Gap ②: Less than 0.5 mm (0.02 in)

3. Remove the throttle link rod ④, adjust it to the specified length ⑥, and then install it.

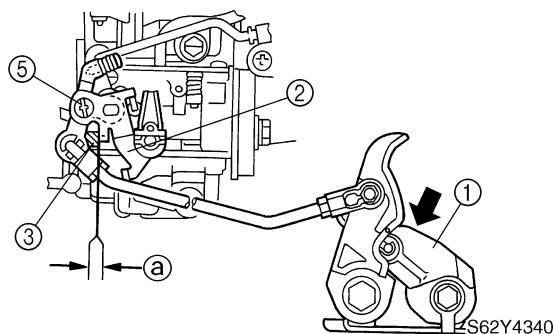


S62Y4330



Throttle link rod length ⑥:
144 mm (5.67 in)

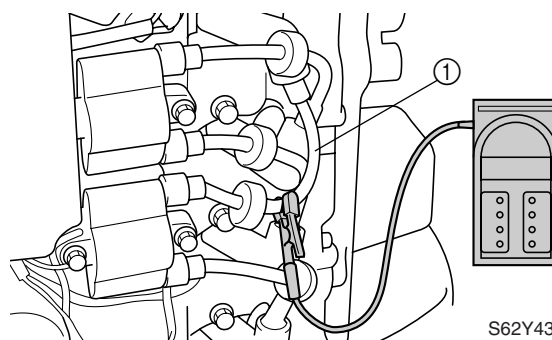
4. Push the throttle control lever ① to the fully open position as shown.
5. While pushing the carburetor throttle lever ② against the carburetor stopper ③, loosen, and then tighten the adjusting screw ⑤.



S62Y4340

Adjusting the pilot screw

1. Start the engine and warm it up for 5 minutes to check the stability of the engine. Adjust the pilot screw if necessary.
2. Attach the special service tool to high-tension cord #1 ①.

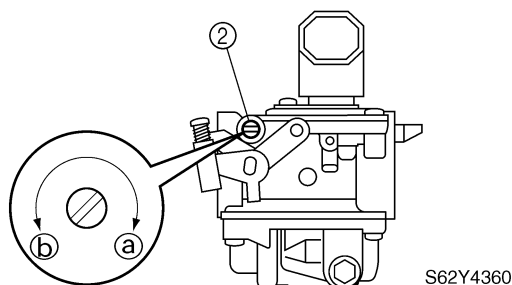
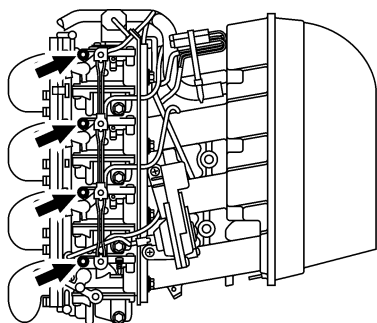


S62Y4350



Digital tachometer: 90890-06760

3. Turn the pilot screws ② in direction ③ until the engine idle speed has decreased to approximately 50 r/min, then in direction ④ 5/8 turn.

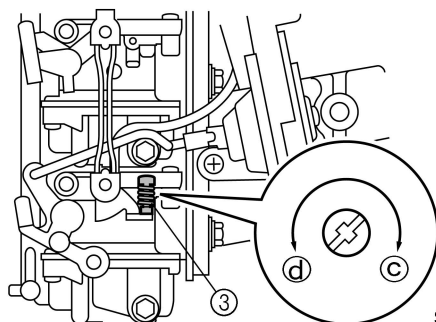


S62Y4360



Engine idle speed: 850–950 r/min

4. Turn the throttle stop screw ③ in direction ③ or ④ until the specified engine idle speed is obtained.



S62Y4370

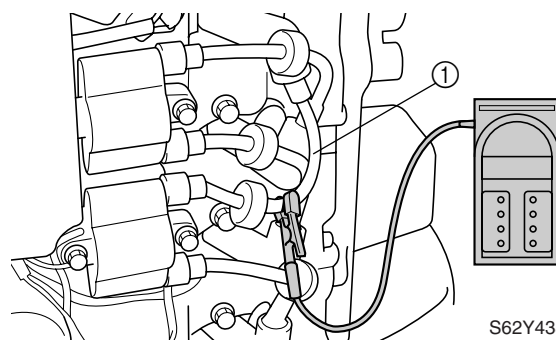
NOTE:

- To increase the idle speed, turn the throttle stop screw in direction ③.
- To decrease the idle speed, turn the throttle stop screw in direction ④.

5. After adjusting the idle speed, rev the engine a few times and let it idle for at least 15 seconds to check the stability of the engine. Adjust the carburetor synchronization if necessary.

Synchronizing the carburetors

1. Start the engine and warm it up for 5 minutes to check the stability of the engine.
2. Attach the special service tool to the high-tension cord #1 ①.

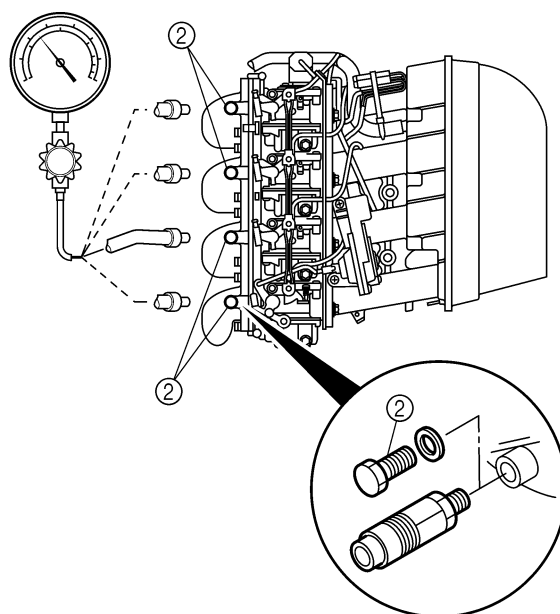


S62Y4380



Digital tachometer: 90890-06760

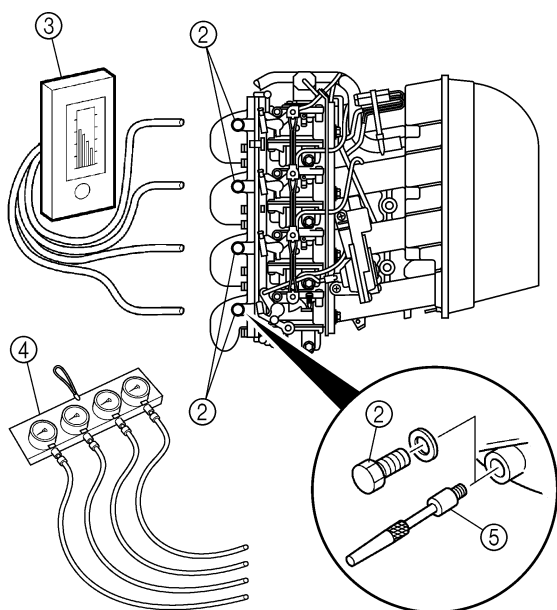
3. Remove all of the plugs ② and attach the special service tool and adapters to the carburetor assembly as shown.



S62Y4390K



Vacuum gauge: 90890-03159

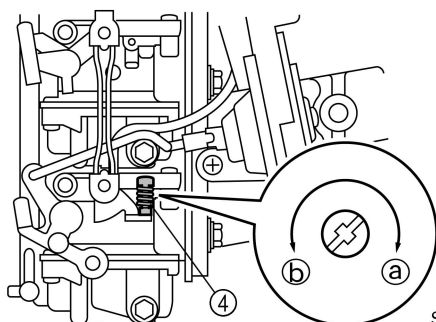


S62Y4400K



Vacuum gauge (digital)
(commercially obtainable) ③:
Vacuum gauge (4 analog meters)
(commercially obtainable) ④:
Vacuum gauge adaptor
(commercially obtainable) ⑤:

4. Adjust the idle speed to 1,000 r/min by turning the throttle stop screw ④ on carburetor #4 in direction ① or ②.



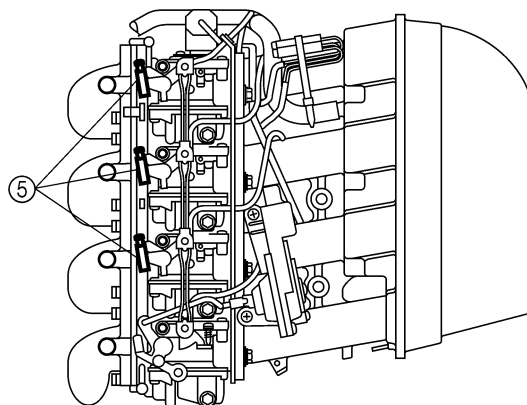
S62Y4410

NOTE:

- To increase idle speed, turn the throttle stop screw in direction ①.
- To decrease idle speed, turn the throttle stop screw in direction ②.

5. Measure the vacuum pressure of carburetor #4.

6. Turn the throttle valve adjusting screws ⑤ to adjust the vacuum pressure of carburetors #1, #2, and #3 to the same vacuum variation as carburetor #4.



S62Y4420

7. Adjust the engine idle speed to specification.

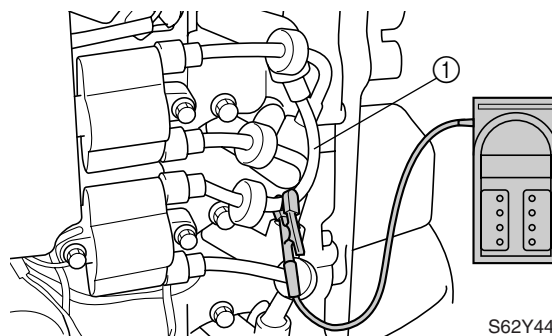


Engine idle speed: 850–950 r/min

8. After adjusting the idle speed, rev the engine a few times and let it idle for at least 15 seconds to check that the vacuum pressures stay within 50 mm Hg (67 m bar, 1.97 in Hg) and to check the stability of the engine.

**Adjusting the dash-pot
(acceleration pump)**

1. Start the engine and warm it up for 5 minutes, and then check the engine speed at the operation point of the dash-pot.
2. Attach the special service tool to high-tension cord #1 ①.

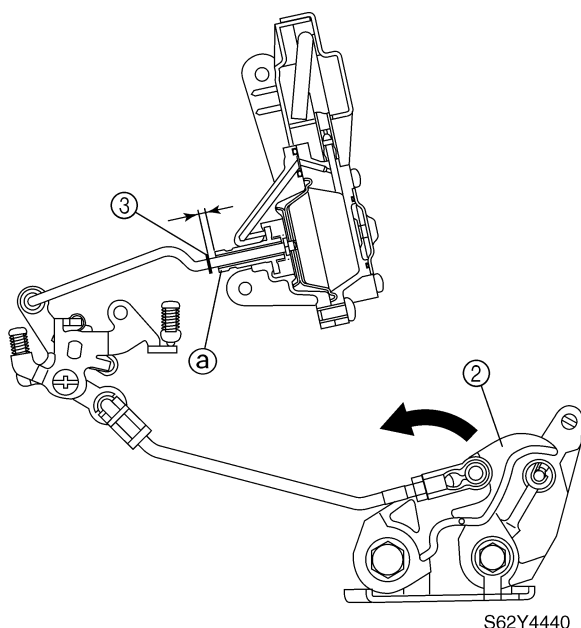


S62Y4430



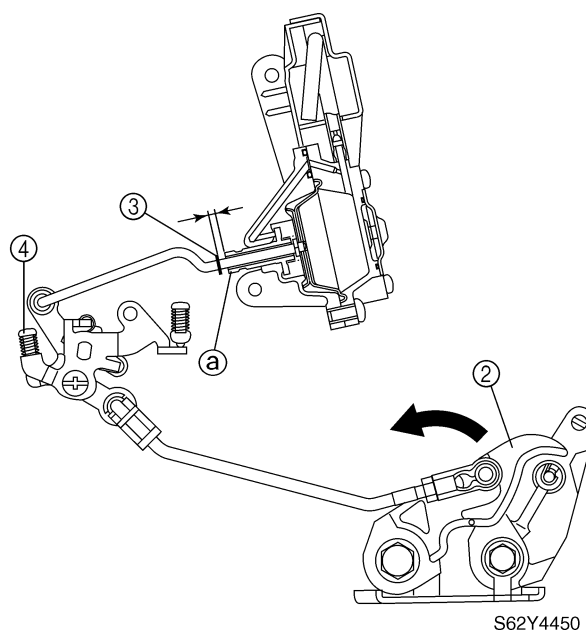
Digital tachometer: 90890-06760

3. Open the throttle cam ② slowly, and check the engine speed when the acceleration pump stopper ③ comes into contact with point ①.



Engine speed: 2,700 r/min

4. If out of specification, adjust the engine speed at the operation point of dash-pot.
5. Open the throttle cam ② slowly, and check that the acceleration pump stopper ③ comes in contact with point ①.
6. Turn the adjusting screw ④ in or out until the specified engine speed is obtained.



7. Open and close the throttle cam a few times, and check the engine speed at the operation point of dash-pot again. Adjust if necessary.

4



Power unit

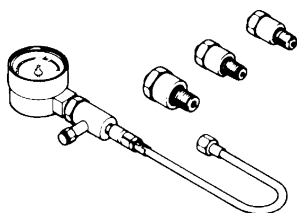
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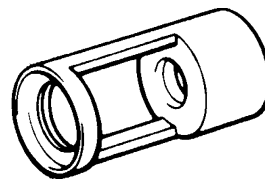


Power unit

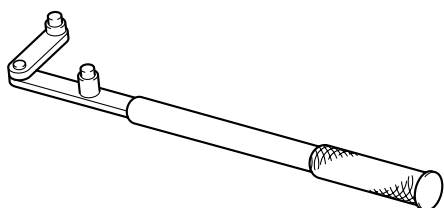
Special service tools



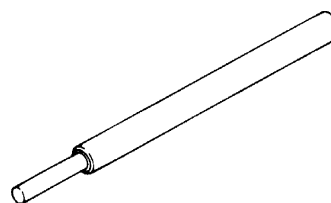
Compression gauge
90890-03160



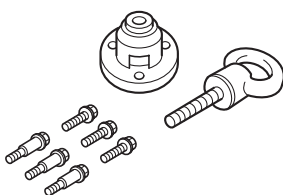
Valve spring compressor attachment
90890-06320



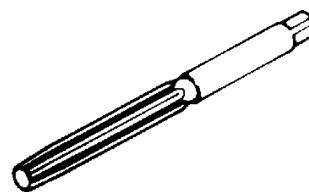
Flywheel holder
90890-06522



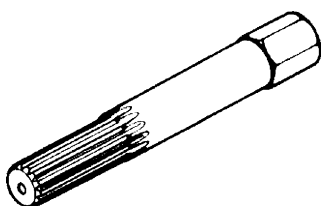
Valve guide remover/installer
90890-06801



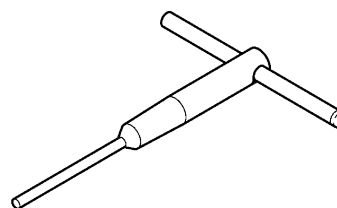
Flywheel puller
90890-06521



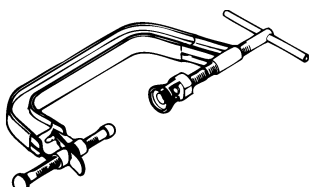
Valve guide reamer
90890-06804



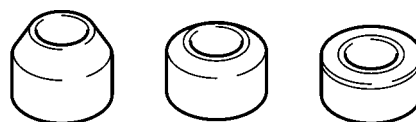
Crankshaft holder 18
90890-06562



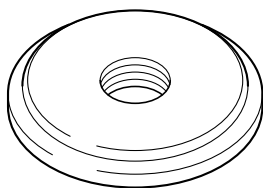
Valve seat cutter holder
90890-06316



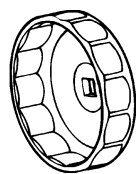
Valve spring compressor
90890-04019



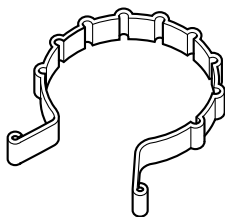
Valve seat cutter
90890-06315, 90890-06323, 90890-06326,
90890-06328, 90890-06555



Bearing outer race attachment
90890-06626

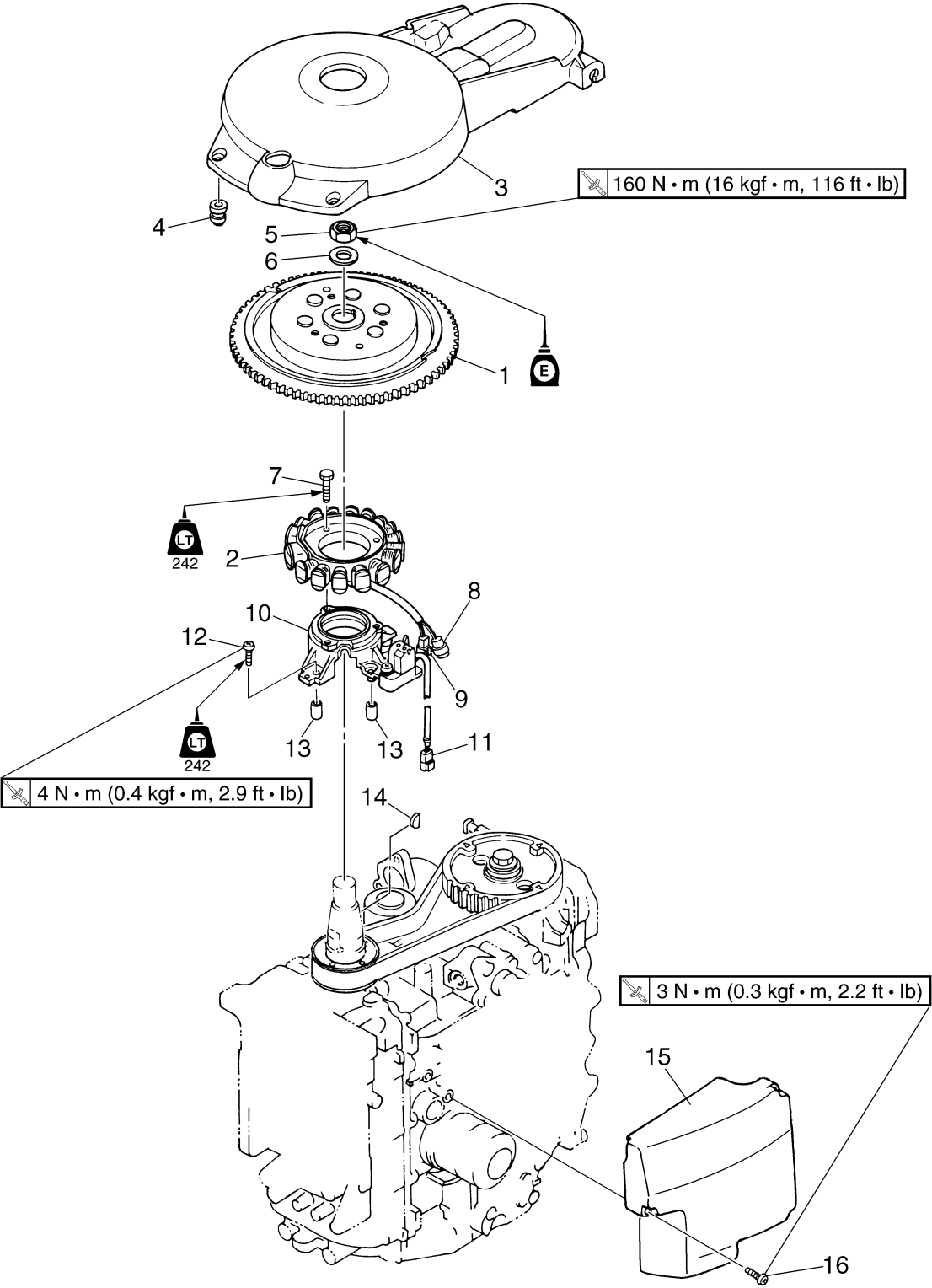


Oil filter wrench
90890-01426



Piston slider
90890-06529

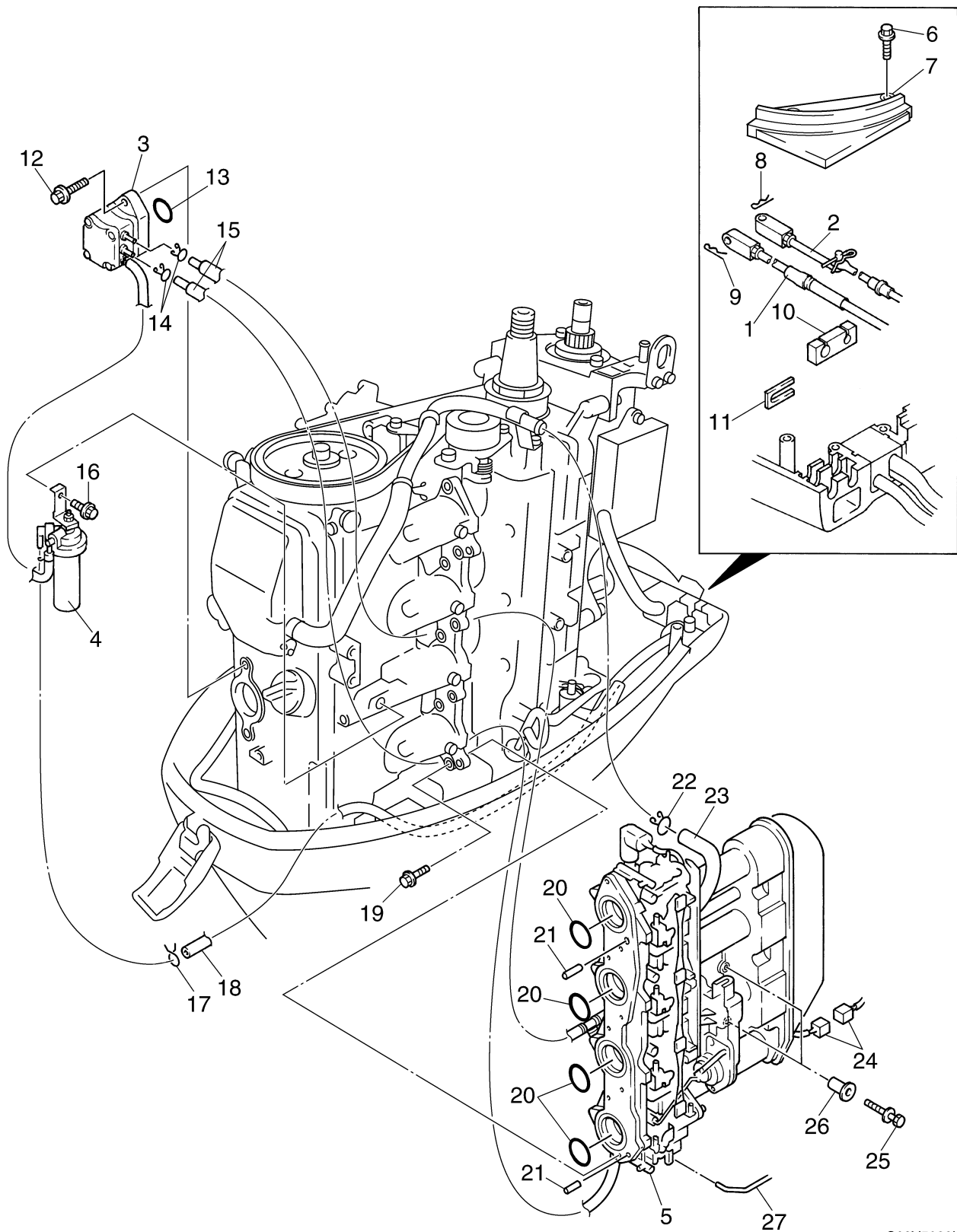
Power unit



S62Y5010K

5

5

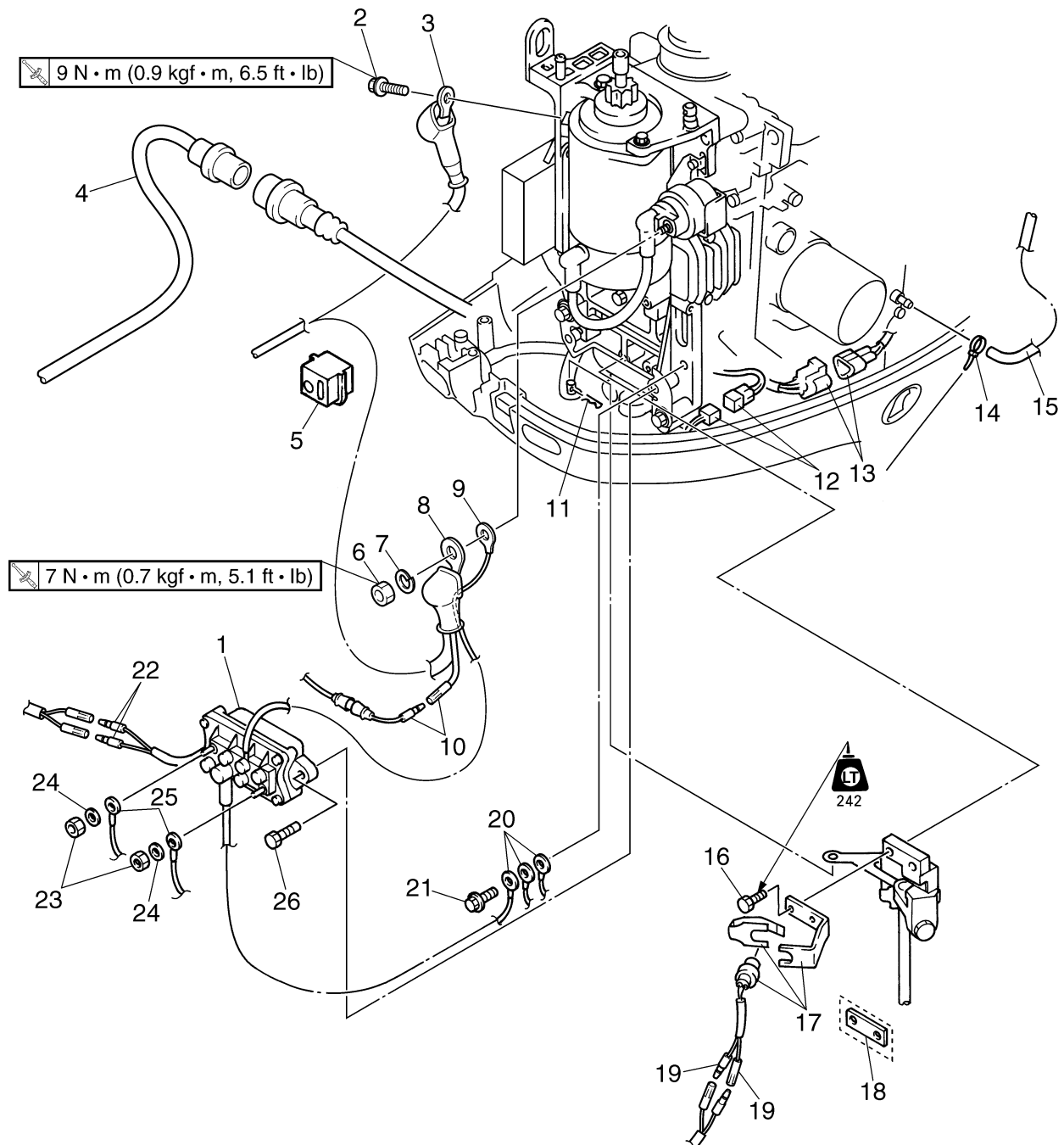


S62Y5020K

Power unit

No.	Part name	Q'ty	Remarks
1	Throttle cable	1	
2	Shift cable	1	
3	Fuel pump	1	
4	Fuel filter assembly	1	
5	Carburetor assembly	1	
6	Bolt	3	M6 × 20 mm
7	Plate	1	
8	Clip	1	
9	Clip	1	
10	Grommet	1	
11	Holder	1	
12	Bolt	2	
13	O-ring	1	Not reusable 24.4 × 3.1 mm
14	Clip	2	
15	Fuel hose	2	Fuel pump-to-carburetor
16	Bolt	1	
17	Clip	1	
18	Fuel hose	1	Fuel filter-to-fuel joint
19	Bolt	8	
20	O-ring	4	Not reusable 34.5 × 1.9 mm
21	Dowel pin	2	
22	Clip	1	
23	Blowby hose	1	
24	Prime Start coupler	1	
25	Bolt	2	M6 × 30 mm
26	Collar	2	
27	Throttle link rod	1	

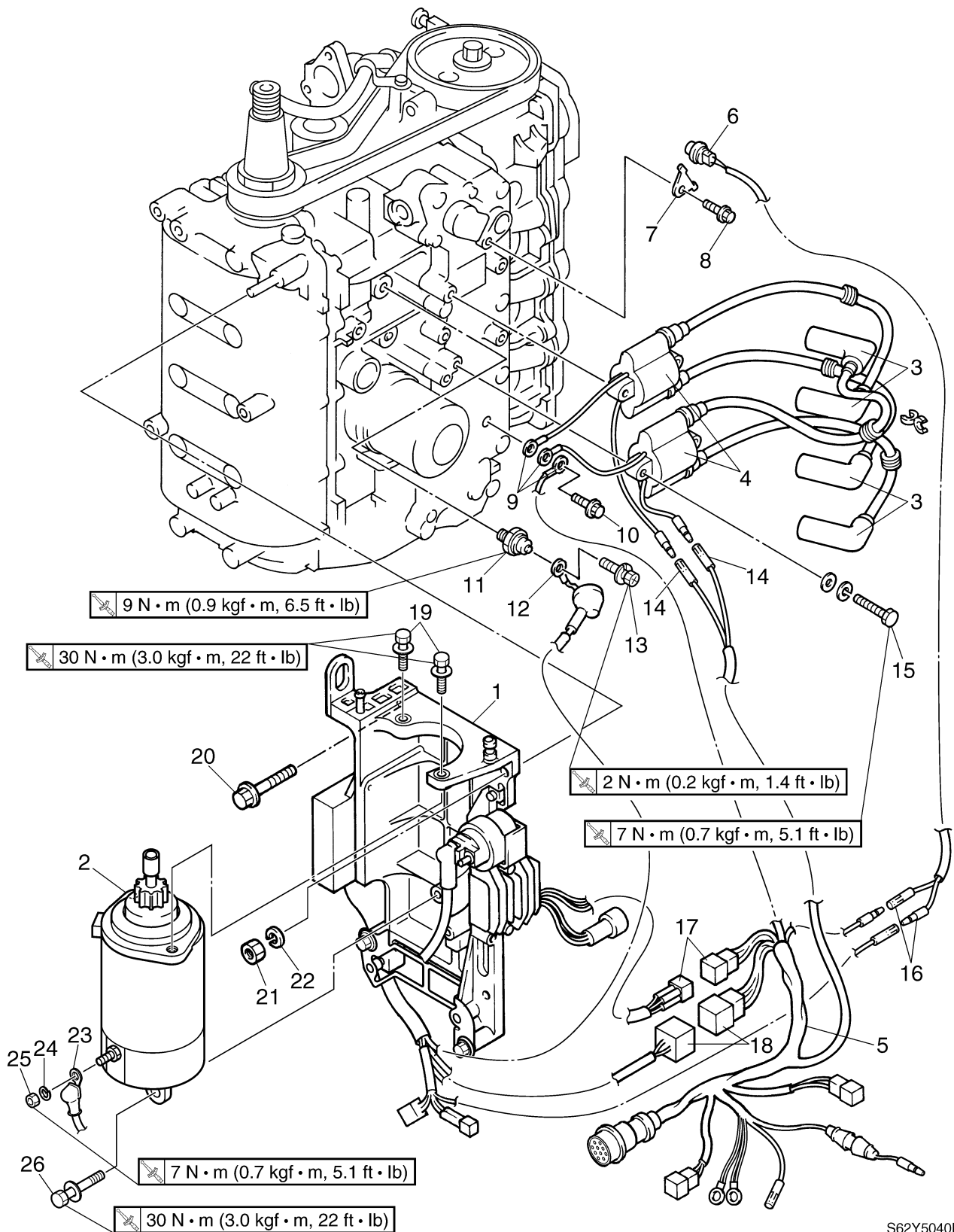
5



S62Y5030K

Power unit

No.	Part name	Q'ty	Remarks
1	Power trim and tilt relay	1	ET model
2	Bolt	1	M8 × 16 mm
3	Negative battery lead	1	
4	Wiring harness extension	1	
5	Grommet	1	
6	Nut	1	
7	Spring washer	1	
8	Positive battery lead	1	
9	PTT relay positive lead	1	ET model
10	Fuse holder lead	1	
11	Clip	1	
12	Warning indicator coupler	1	EHD model
13	Trailer switch coupler	1	ET model
14	Plastic tie	1	Not reusable
15	Pilot water hose	1	110.0 mm (4.3 in)
16	Bolt	2	M6 × 20 mm
17	Neutral switch	1	Tiller handle models
18	Plate	1	Remote control models
19	Neutral switch lead	2	Tiller handle models
20	Ground lead	3	
21	Bolt	1	M6 × 12 mm
22	PTT relay lead	2	ET model
23	Nut	2	ET model
24	Spring washer	2	ET model
25	PTT motor lead	2	ET model Green, blue
26	Bolt	2	M6 × 20 mm ET model

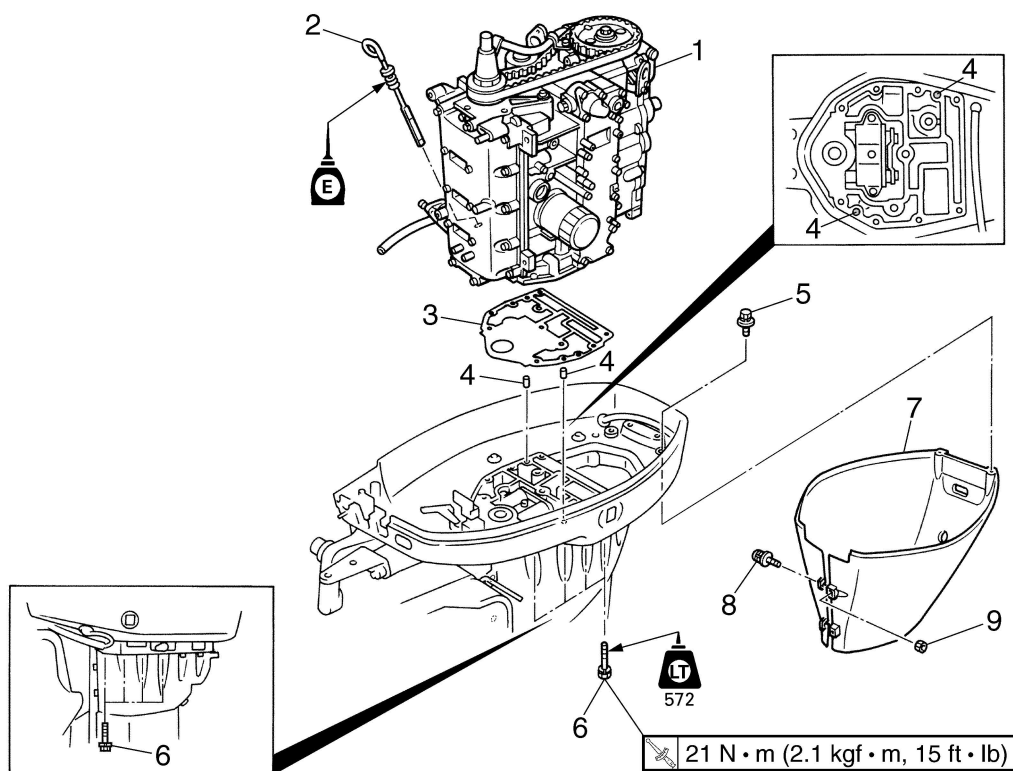


S62Y5040K

Power unit

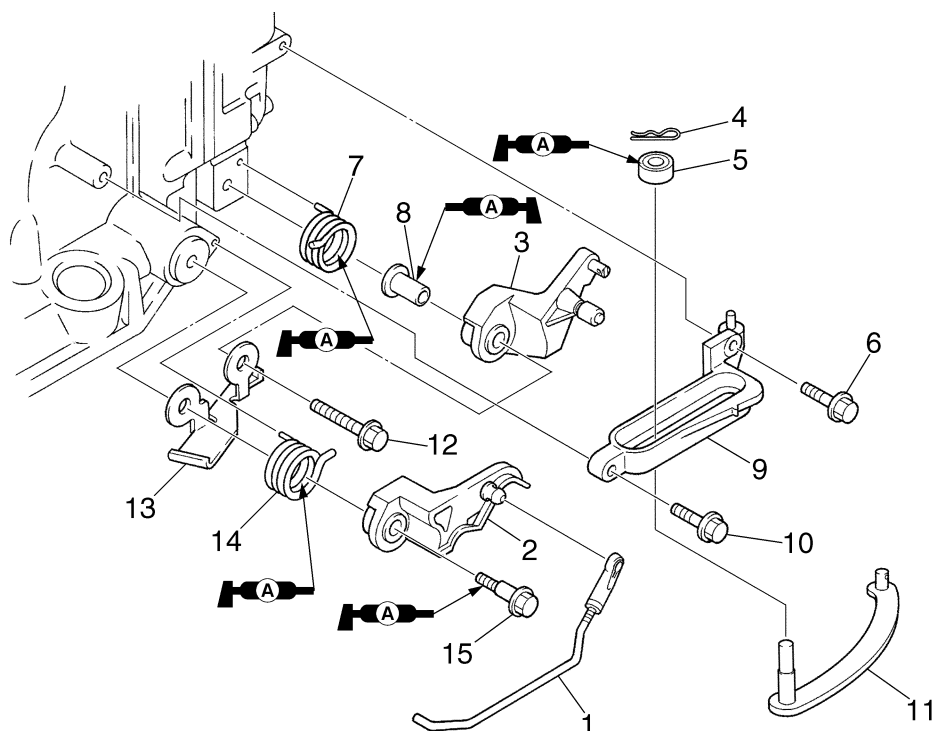
No.	Part name	Q'ty	Remarks
1	Bracket	1	
2	Starter motor	1	
3	Spark plug cap	4	
4	Ignition coil	2	
5	Wiring harness	1	
6	Thermoswitch	1	
7	Holder	1	
8	Bolt	1	M6 × 12 mm
9	Ground lead	3	
10	Bolt	1	M6 × 12 mm
11	Oil pressure switch	1	
12	Oil pressure switch lead	1	
13	Screw	1	
14	Ignition coil lead	2	
15	Bolt	4	M6 × 30 mm
16	Thermoswitch lead	2	
17	Rectifier Regulator coupler	1	
18	CDI unit coupler	1	
19	Bolt	2	M8 × 25 mm
20	Bolt	3	M8 × 35 mm
21	Nut	1	
22	Spring washer	1	
23	Starter motor lead	1	
24	Spring washer	1	
25	Nut	1	
26	Bolt	1	M8 × 45 mm

5



S62Y5050K

No.	Part name	Q'ty	Remarks
1	Power unit	1	
2	Engine oil dipstick	1	
3	Gasket	1	Not reusable
4	Dowel pin	2	
5	Bolt	2	M6 × 16 mm
6	Bolt	8	M8 × 80 mm
7	Apron	1	
8	Screw	2	M6 × 24 mm
9	Nut	2	



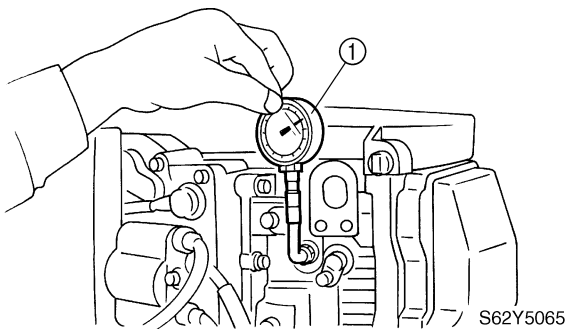
S62Y5060K

No.	Part name	Q'ty	Remarks
1	Throttle link rod	1	
2	Throttle cam	1	
3	Throttle control lever	1	
4	Clip	1	
5	Bushing	1	
6	Bolt	1	M6 × 20 mm
7	Spring	1	
8	Collar	1	
9	Bracket	1	
10	Bolt	1	M6 × 30 mm
11	Shift rod	1	
12	Bolt	1	M6 × 30 mm
13	Bracket	1	
14	Spring	1	
15	Bolt	1	



Checking the compression pressure

1. Start the engine, warm it up for 5 minutes, and then turn it off.
2. Remove the clip from the engine shut-off switch on the remote control box or tiller handle.
3. Remove the all spark plugs, and then install the special service tool to each spark plug hole.



CAUTION:

Before removing the spark plugs, blow compressed air in the spark plug well to clear out any dirt or dust that may fall into the cylinder.



Compression gauge ①:
90890-03160

4. Fully open the throttle, crank the engine until the reading on the compression gauge stabilizes, and then check the compression pressure.



Minimum compression pressure:
840 kPa (8.4 kgf/cm², 122 psi)

5. If the compression pressure is below specification and the compression pressure for each cylinder is unbalanced, add a small amount of engine oil to the cylinder, and then check the pressure again.

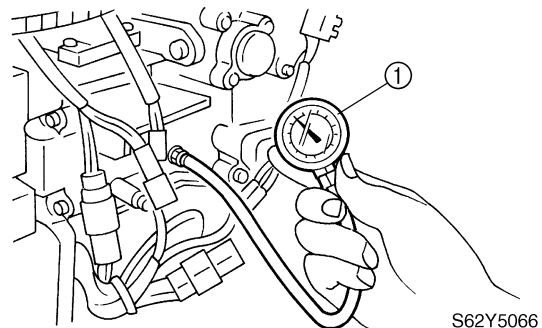
NOTE:

- If the compression pressure increases, check the piston and piston rings for wear. Replace if necessary.

- If the compression pressure does not increase, check the valve clearance, valve, valve seat, cylinder sleeve, cylinder head gasket, and cylinder head. Adjust or replace if necessary.

Checking the oil pressure

1. Start the engine, warm it up for 5 minutes, and then turn it off.
2. Remove the oil pressure switch, and then install an oil pressure gauge ① to the oil pressure switch installation hole.



NOTE:

Use a pressure gauge with an adapter with a 1/8 pitch thread.

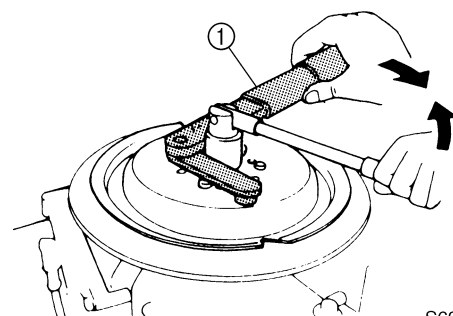
3. Check the oil pressure. Check the oil pump, oil suction pipe, and oil strainer if out of specification.

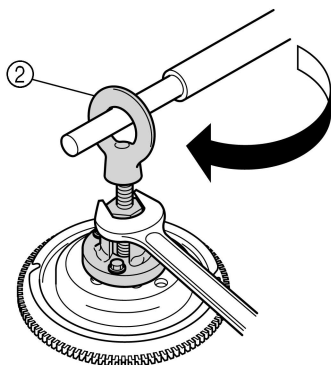


Oil pressure:
100 kPa (1.0 kgf/cm², 14 psi) at
idle speed (850–950 r/min)

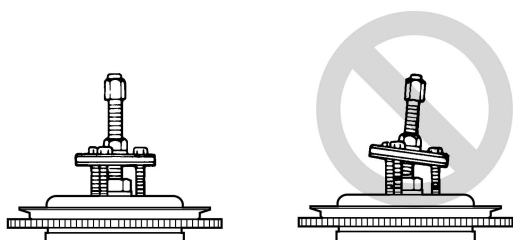
Removing the power unit

1. Remove the flywheel magnet cover and flywheel magnet.





S62Y5080J



S62Y5075

CAUTION:

- Apply force in the direction of the arrows shown, to prevent the flywheel holder from slipping off easily.
- To prevent damage to the engine or tools, screw in the flywheel puller set bolts evenly and completely so that the flywheel puller plate is parallel to the flywheel magnet.

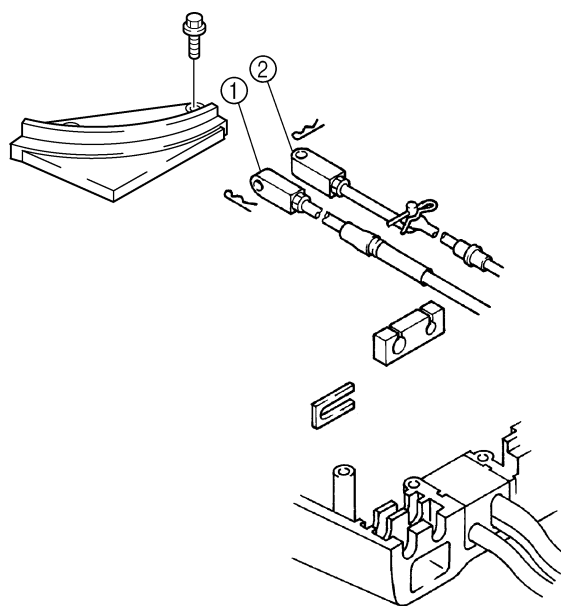
NOTE:

Apply force to the crankshaft end until the flywheel magnet comes off the tapered portion of the crankshaft.



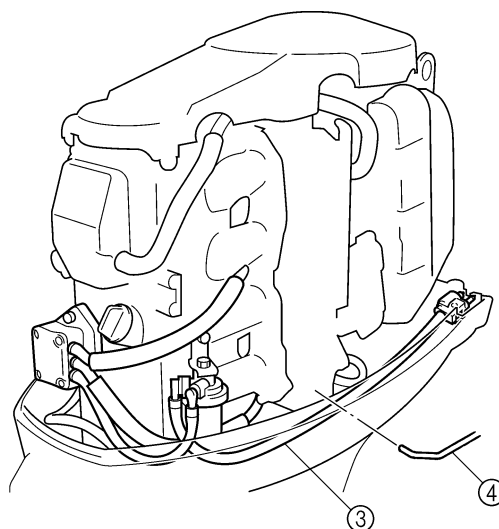
Flywheel holder ①: 90890-06522
Flywheel puller ②: 90890-06521

2. Disconnect the throttle cable ① and shift cable/shift rod ②.



S62Y5081K

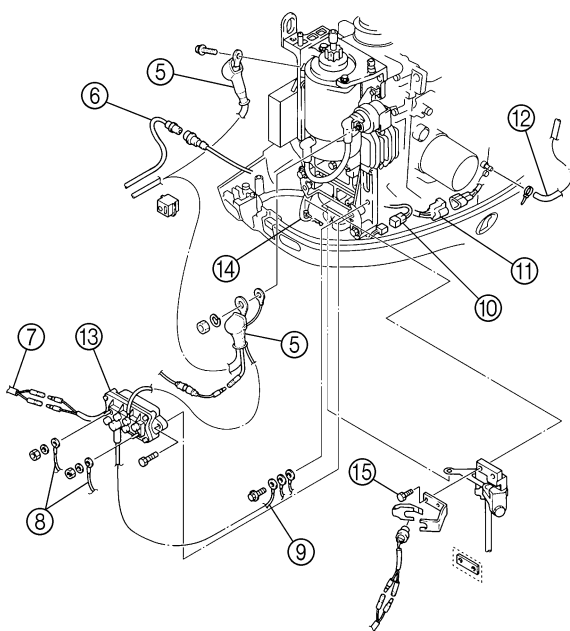
3. Disconnect the fuel hose ③ and throttle link rod ④.



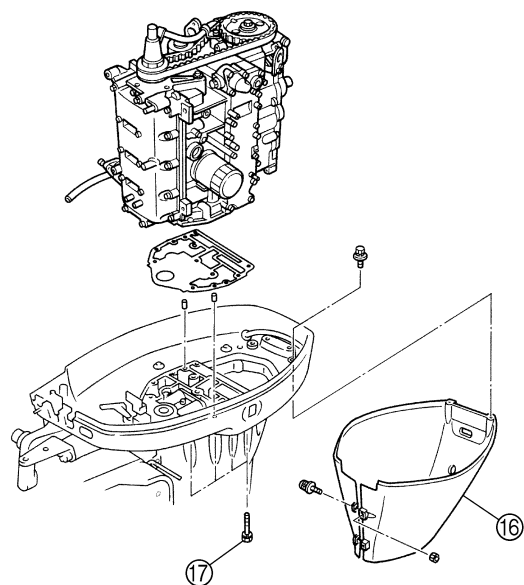
S62Y5082



4. Disconnect the battery leads ⑤, 10-pin coupler ⑥, PTT relay leads ⑦ (ET), PTT motor leads ⑧ (ET), ground lead ⑨ (ET), warning indicator coupler ⑩ (EHD), trailer switch coupler ⑪ (ET), pilot water hose ⑫.
5. Remove the power trim and tilt relay ⑬, shift rod ⑭ and shift rod bolts ⑮.



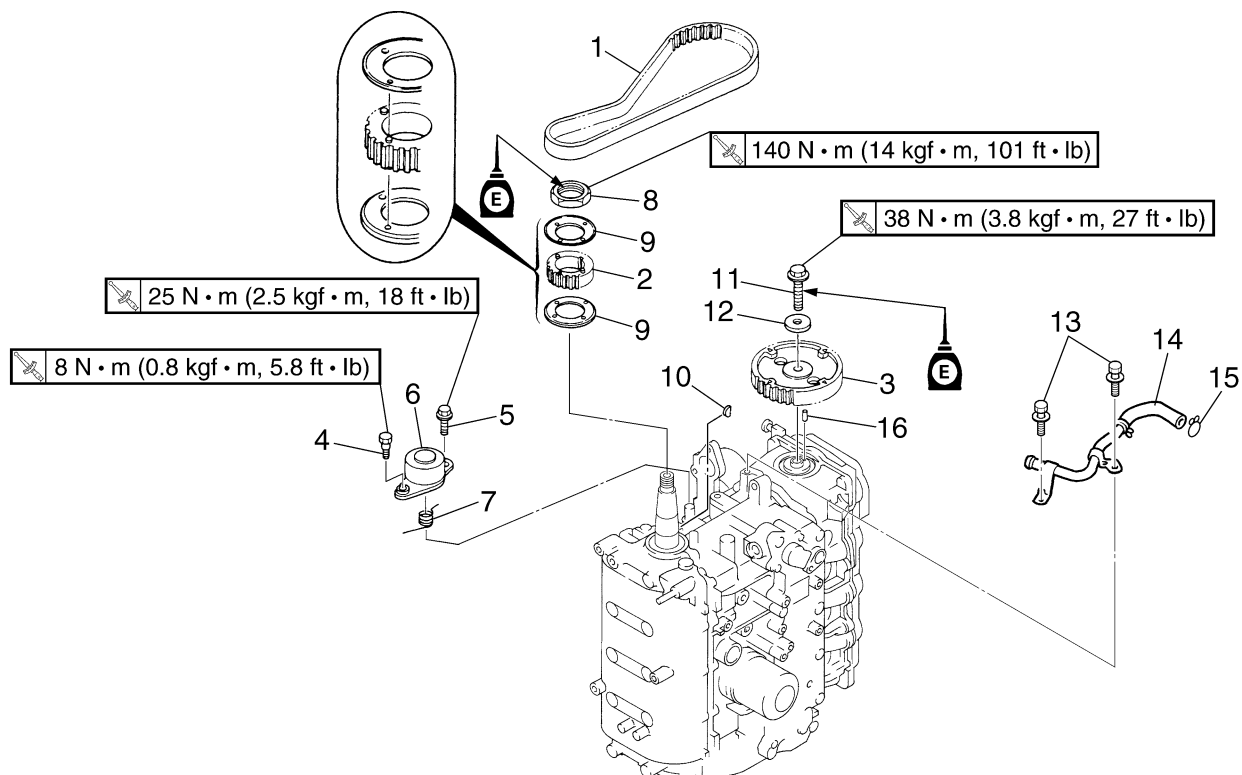
S62Y5083



S62Y5084K

6. Remove the apron ⑯.
7. Remove the power unit by removing the bolts ⑰.

Timing belt and sprockets



S62Y5110K

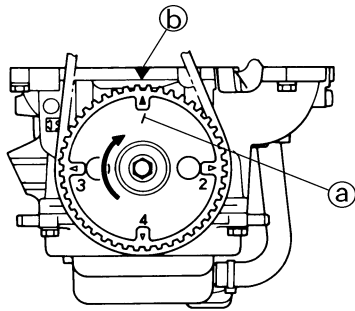
5

No.	Part name	Q'ty	Remarks
1	Timing belt	1	
2	Drive sprocket	1	
3	Driven sprocket	1	
4	Bolt	1	
5	Bolt	1	M8 × 20 mm
6	Tensioner	1	
7	Spring	1	
8	Nut	1	
9	Retaining plate	2	
10	Woodruff key	1	
11	Bolt	1	M10 × 40 mm
12	Washer	1	
13	Bolt	2	M6 × 20 mm
14	Blowby hose	1	
15	Clip	1	
16	Dowel pin	1	



Removing the timing belt and sprockets

1. Set the cylinder #1 piston position to TDC of the compression stroke by aligning the "1" mark (a) on the driven sprocket with the "▲" mark (b) on the cylinder head.

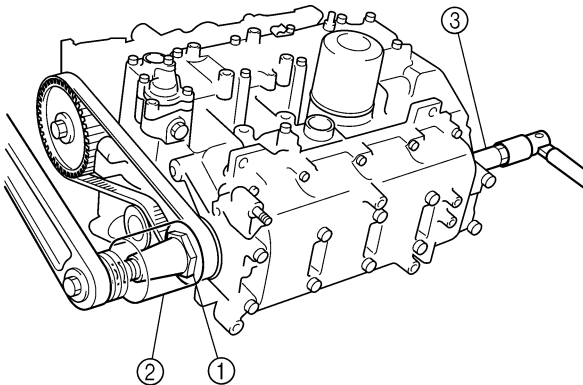


S62Y5120

CAUTION:

Do not turn the drive sprocket counter-clockwise, otherwise the valve system may be damaged.

2. Remove the breather hose and loosen the drive sprocket nut (1).



S62Y5130

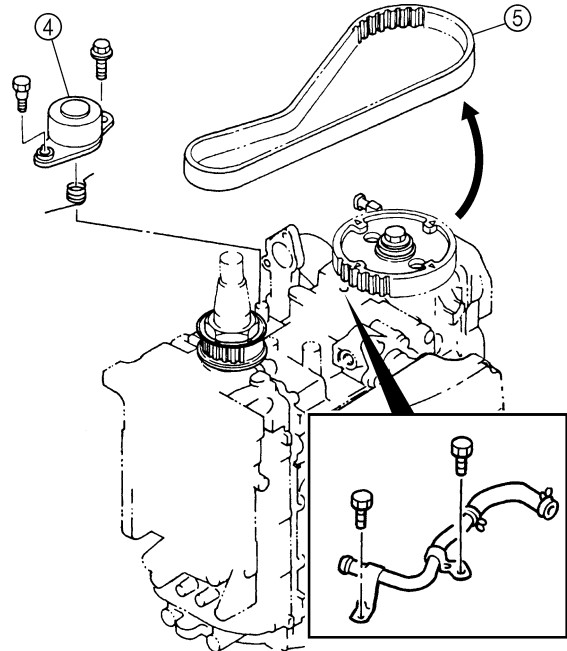
NOTE:

- Use a deep socket (2) (M42) for this procedure.
- Do not turn the camshaft when loosening the drive sprocket nut.



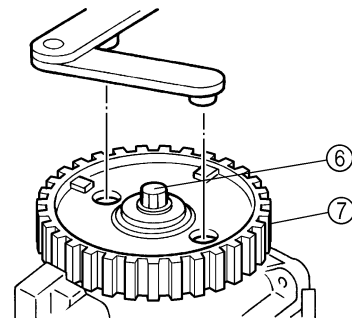
Crankshaft holder 18 (3):
90890-06562

3. Remove the tensioner (4) and timing belt (5) from the driven sprocket side.



S62Y5140

4. Loosen the driven sprocket bolt (6) and remove the driven sprocket (7).



S62Y5150J

NOTE:

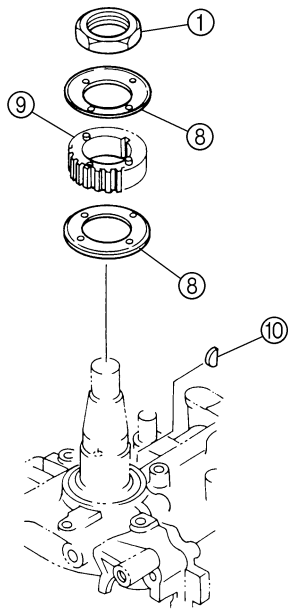
Do not turn the camshaft when loosening the driven sprocket bolt.



Flywheel holder: 90890-06522

5. Remove the nut (1), retaining plates (8), drive sprocket (9), and Woodruff key (10).

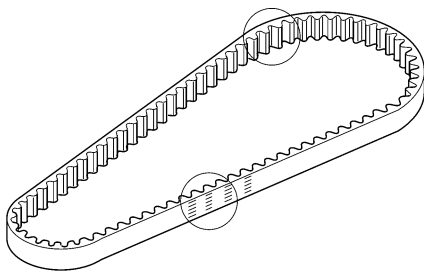
Timing belt and sprockets



S62Y5155

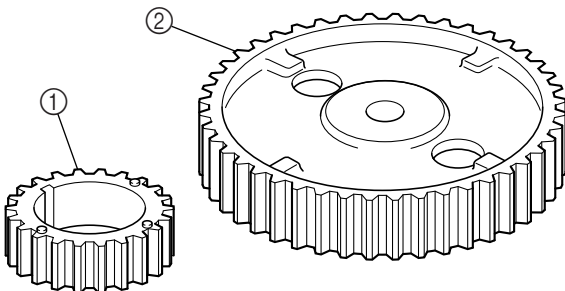
Checking the timing belt and sprockets

1. Check the interior and exterior of the timing belt for cracks, damage, or wear. Replace if necessary.



S62Y5160

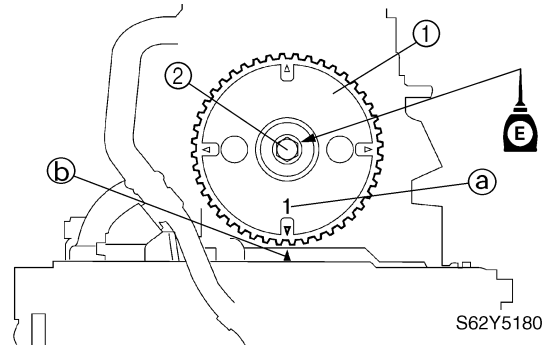
2. Check the drive sprocket (1) and driven sprocket (2) for cracks, damage, or wear. Replace if necessary.



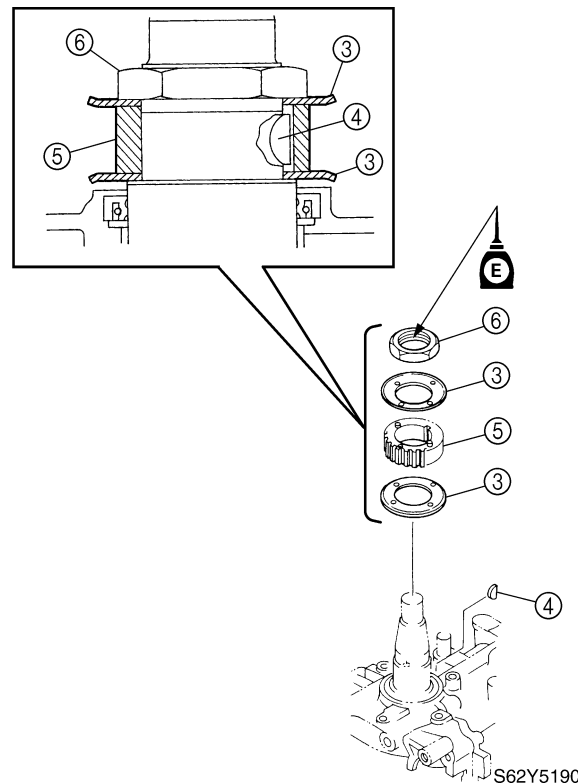
S62Y5170

Installing the sprockets and timing belt

1. Check that the "1" mark (a) on the driven sprocket (1) is aligned with the "▲" mark (b) on the cylinder head, and then tighten the bolt (2).



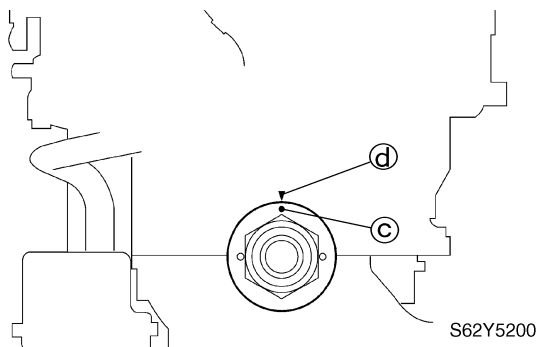
2. Install the retaining plate (3), Woodruff key (4), drive sprocket (5), retaining plate (3), and nut (6), and then tighten the nut.



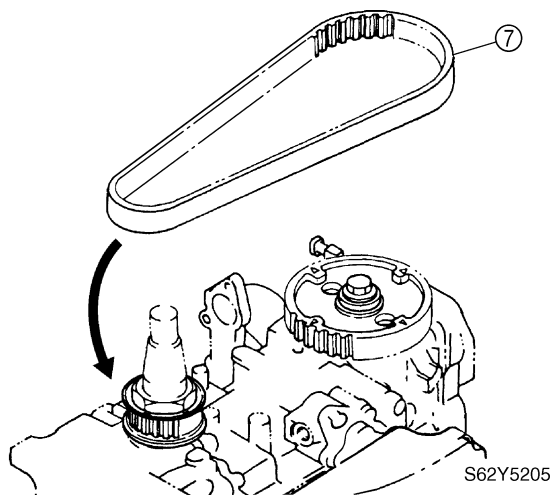
S62Y5190



3. Check that the “●” mark ③ on the retaining plate is aligned with the “▲” mark ④ on the cylinder body.



4. Install the timing belt ⑦ from the drive sprocket side with its part number in the upright position.

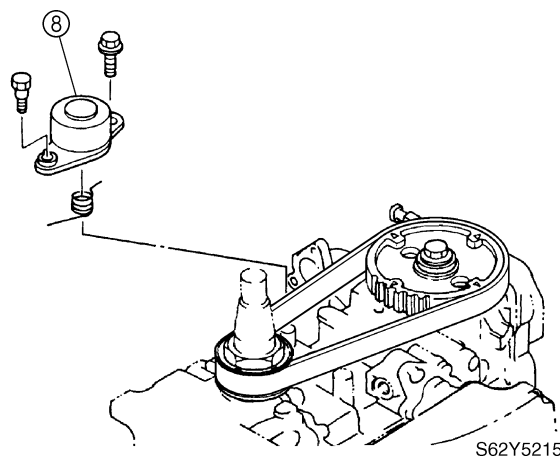


S62Y5210

CAUTION:

- Do not twist, turn inside out, or bend the timing belt beyond the maximum limit of 25 mm (1.0 in) ⑥, otherwise it may be damaged.
- Do not get oil or grease on the timing belt.

5. Install the tensioner ⑧ and bolts, and then tighten the bolts finger tight.

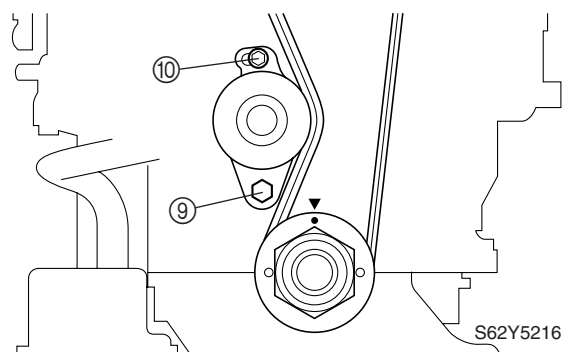


6. Take up the timing belt slack by turning the drive sprocket clockwise at least two full turns.

CAUTION:

Do not turn the sprockets counterclockwise, otherwise the valve system may be damaged.

7. Tighten the tensioner bolts to the specified torque.



Tensioner bolt ⑨:

8 N·m (0.8 kgf·m, 5.8 ft·lb)

Tensioner bolt (adjusting bolt) ⑩:

25 N·m (2.5 kgf·m, 18 ft·lb)

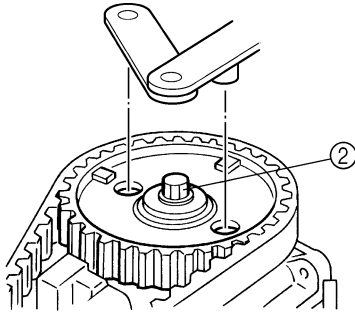
8. Turn the drive sprocket two turns, and then check that the alignment marks are aligned.

Timing belt and sprockets

CAUTION:

Do not turn the sprockets counterclockwise, otherwise the valve system may be damaged.

9. Tighten the driven sprocket bolt ② to the specified torque.



S62Y5220J

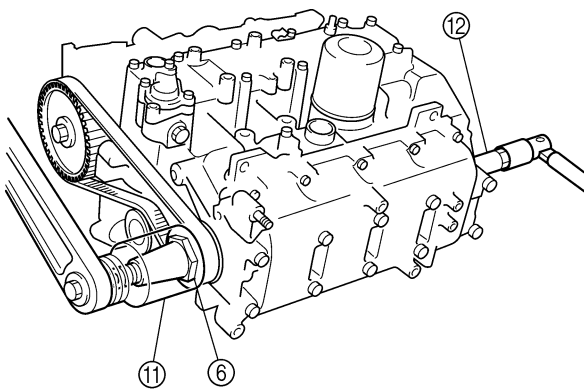


Flywheel holder: 90890-06522



Driven sprocket bolt ②:
38 N·m (3.8 kgf·m, 27 ft·lb)

10. Tighten the drive sprocket nut ⑥ to the specified torque, and then install the breather hose.



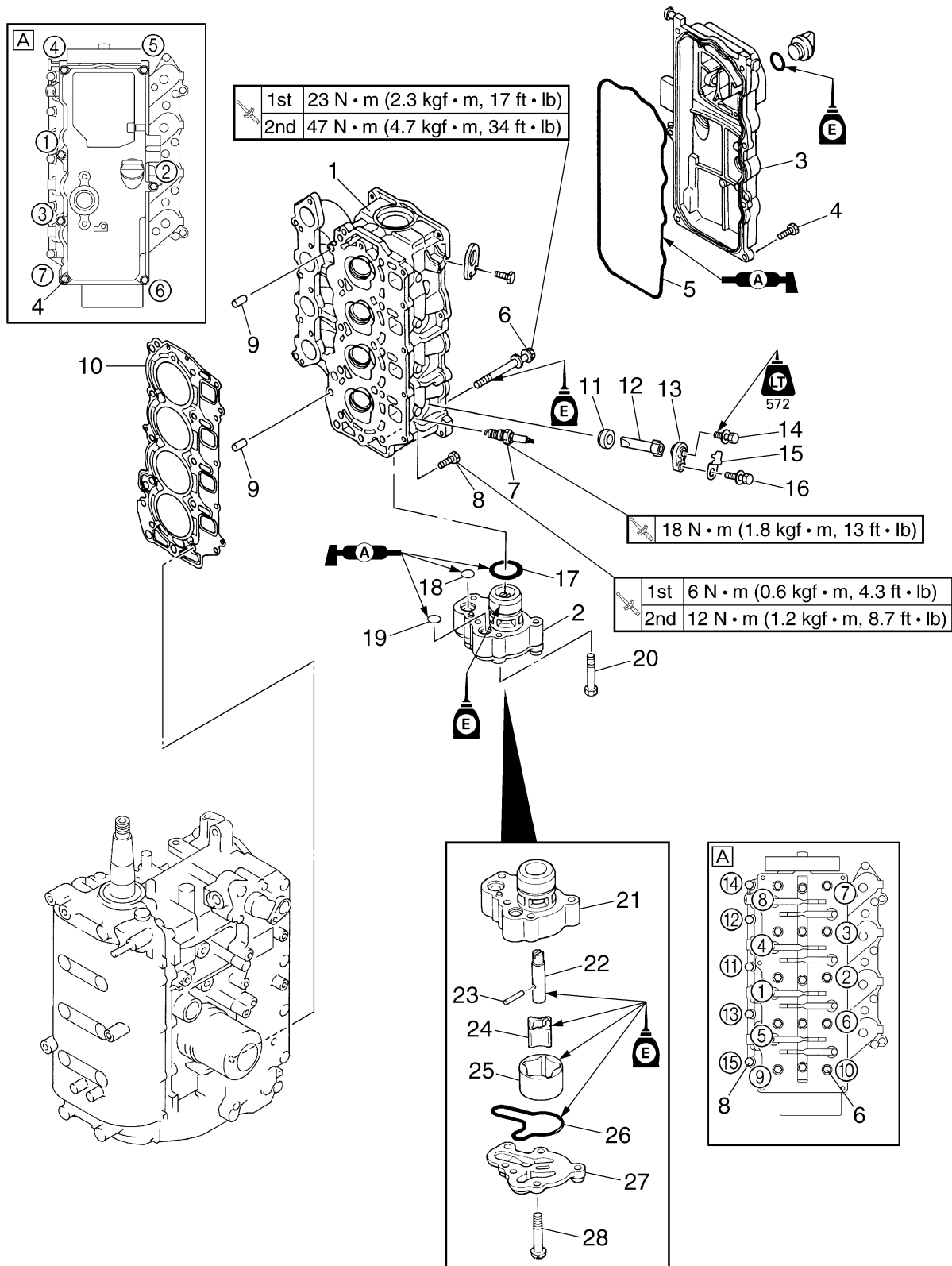
S62Y5230

NOTE:

Use a deep socket ⑪ (M42) for this procedure.



Cylinder head



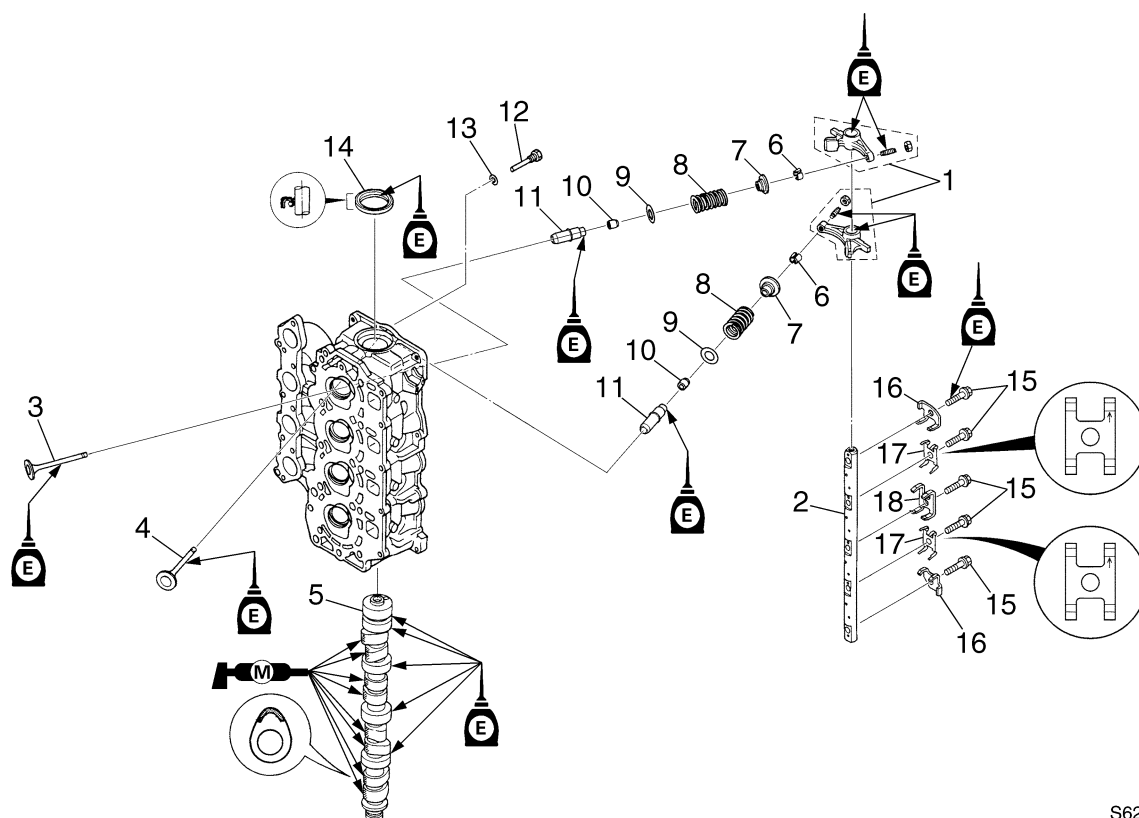
S62Y5240K

Cylinder head

No.	Part name	Q'ty	Remarks
1	Cylinder head	1	
2	Oil pump	1	
3	Cylinder head cover	1	
4	Bolt	7	M6 × 20 mm
5	Cylinder head cover gasket	1	Not reusable
6	Bolt	10	M9 × 95 mm
7	Spark plug	4	
8	Bolt	5	M6 × 25 mm
9	Dowel pin	2	
10	Cylinder head gasket	1	Not reusable
11	Grommet	4	
12	Anode	4	
13	Cover	4	
14	Bolt	4	
15	Cover	4	
16	Bolt	4	
17	O-ring	1	Not reusable 33.0 × 1.9 mm
18	O-ring	1	Not reusable 13.5 × 1.8 mm
19	O-ring	1	Not reusable 11.5 × 1.2 mm
20	Bolt	4	M6 × 40 mm
21	Housing	1	
22	Drive shaft	1	
23	Pin	1	
24	Inner rotor	1	
25	Outer rotor	1	
26	Gasket	1	Not reusable
27	Cover	1	
28	Screw	2	M6 × 20 mm

A Tightening sequence

5

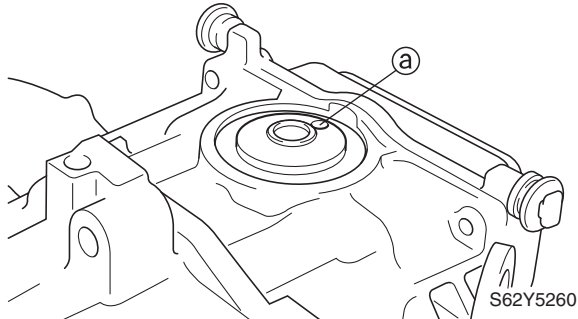


S62Y5250K

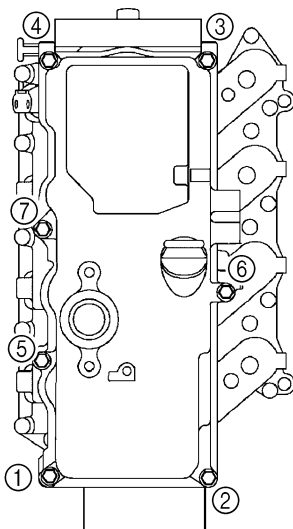
No.	Part name	Q'ty	Remarks
1	Rocker arm assembly	8	
2	Rocker arm shaft	1	
3	Exhaust valve	4	
4	Intake valve	4	
5	Camshaft	1	
6	Valve cotter	16	
7	Spring retainer	8	
8	Valve spring	8	
9	Spring seat	8	
10	Stem seal	8	Not reusable
11	Valve guide	8	Not reusable
12	Retaining bolt	1	
13	Gasket	1	Not reusable
14	Oil seal	1	Not reusable
15	Bolt	5	M8 × 22 mm
16	Rocker arm retainer	2	
17	Tensioner	2	
18	Rocker arm retainer	1	

Removing the cylinder head

1. Check that the camshaft dowel pin hole ① is in the position shown in the illustration. Adjust if necessary.

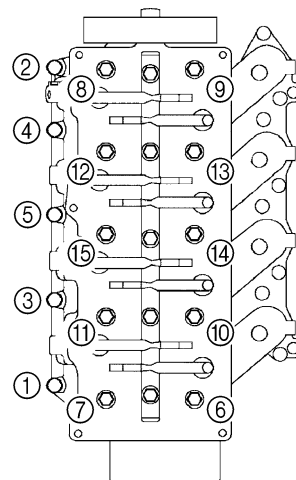


2. Remove the cylinder head cover bolts in the sequence shown.



S62Y5265

3. Remove the cylinder head bolts in the sequence shown.

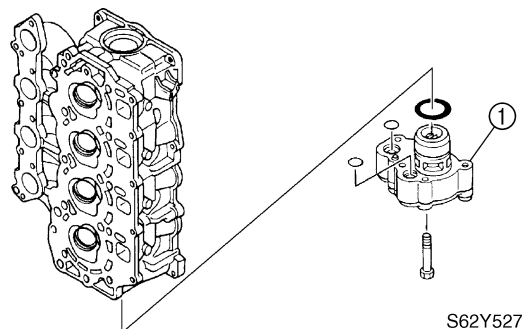


S62Y5270K

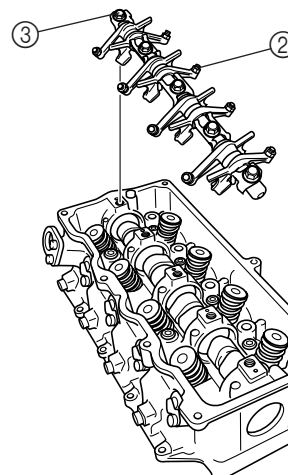
CAUTION:

Do not scratch or damage the mating surfaces of the cylinder head and cylinder body.

4. Remove the oil pump ①, rocker arm assembly ②, and rocker arm shaft ③.



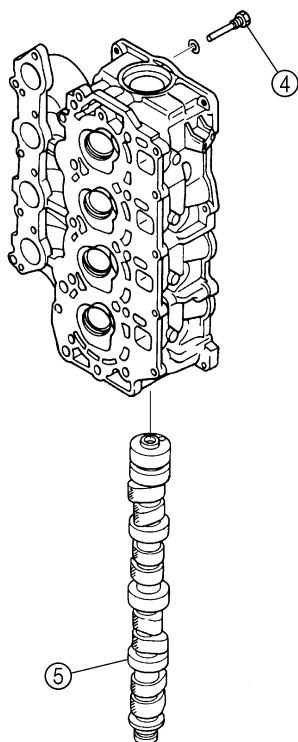
S62Y5275



S62Y5276

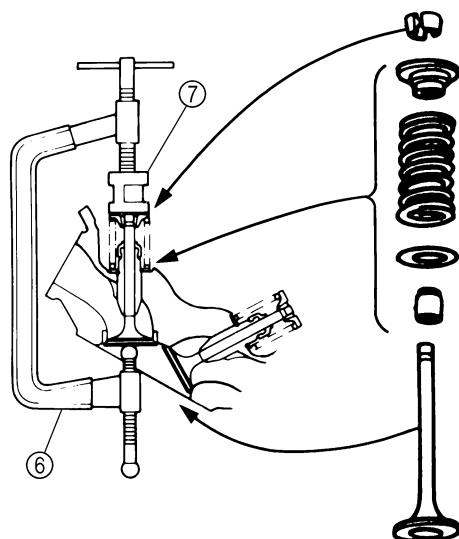


5. Remove the retaining bolt ④, then the camshaft ⑤ by pulling it downward.



S62Y5280

6. Remove the intake valve and exhaust valves.



S62Y5290

NOTE:

- Be sure to keep the valves and other parts in the order that they were removed.

- When replacing the valve, also replace the valve guide and stem seal.



Valve spring compressor ⑥:

90890-04019

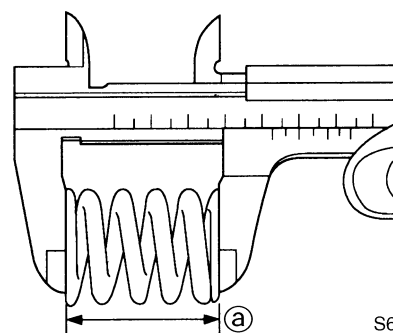
Valve spring compressor attachment

⑦:

90890-06320

Checking the valve springs

1. Measure the valve spring free length ①. Replace if out of specification.



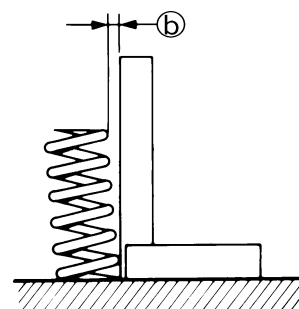
S62Y5300



Valve spring free length limit ①:

37.85 mm (1.490 in)

2. Measure the valve spring tilt ②. Replace if out of specification.



S62Y5310

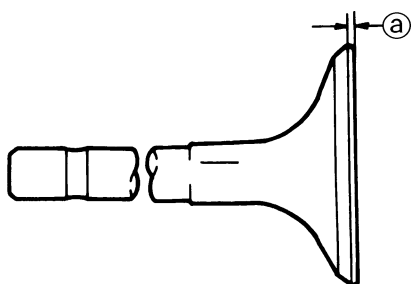


Valve spring tilt limit ②:

1.7 mm (0.07 in)

Checking the valves

1. Check the valve face for pitting or wear. Replace if necessary.
2. Measure the valve margin thickness ③. Replace if out of specification.



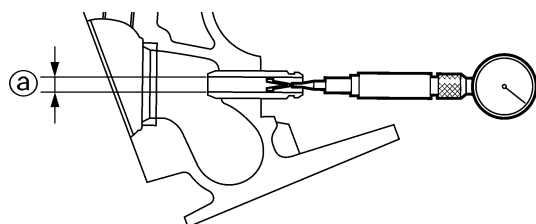
S62Y5320



Valve stem runout:
Intake: 0.03 mm (0.0012 in)
Exhaust: 0.03 mm (0.0012 in)

Checking the valve guides

1. Measure the valve guide inside diameter
a. Replace if out of specification.

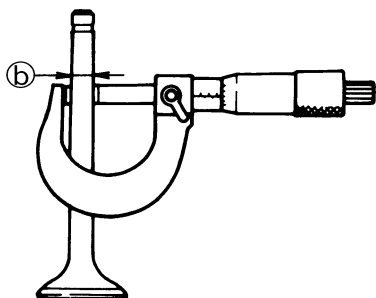


S62Y5350



Valve margin thickness a:
Intake:
0.6–1.0 mm (0.024–0.039 in)
Exhaust:
0.7–1.1 mm (0.028–0.043 in)

3. Measure the valve stem diameter b.
Replace if out of specification.



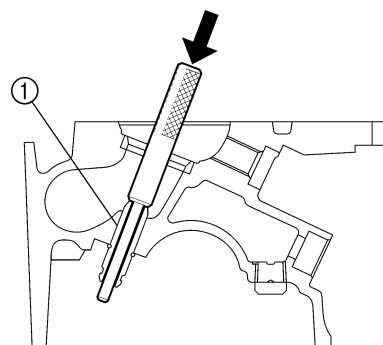
S62Y5330



Valve guide inside diameter limit a:
5.50–5.51 mm (0.2165–0.2169 in)

Replacing the valve guides

1. Remove the valve guide ① by striking the special service tool from the combustion chamber side.

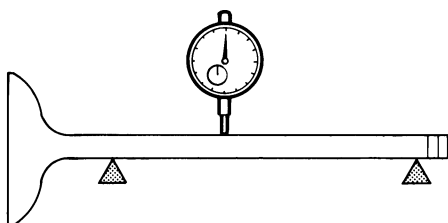


S62Y5360



Valve stem diameter b:
Intake:
5.48–5.49 mm (0.2157–0.2161 in)
Exhaust:
5.46–5.47 mm (0.2150–0.2153 in)

4. Measure the valve stem runout. Replace if out of specification.



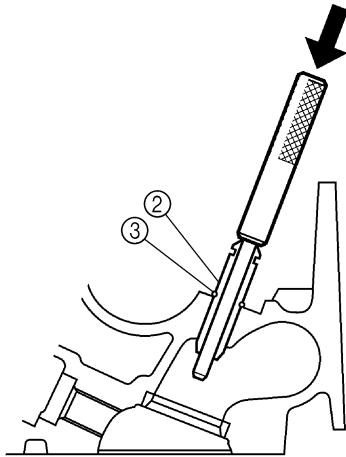
S62Y5340



Valve guide remover/installer:
90890-06801



2. Install the new valve guide ② by striking the special service tool from the camshaft side until the valve guide clip ③ contacts the cylinder head.



S62Y5370

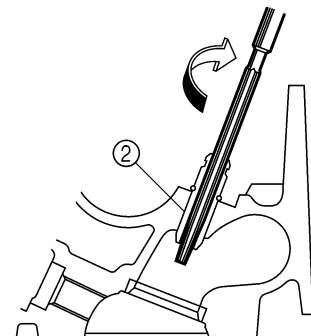
NOTE:

Apply engine oil to the surface of the new valve guide.



Valve guide remover/installer:
90890-06801

3. Insert the special service tool into the valve guide ②, and then ream the valve guide.



S62Y5380

NOTE:

- Turn the valve guide reamer clockwise to ream the valve guide.
- Do not turn the reamer counterclockwise when removing the reamer.



Valve guide reamer: 90890-06804

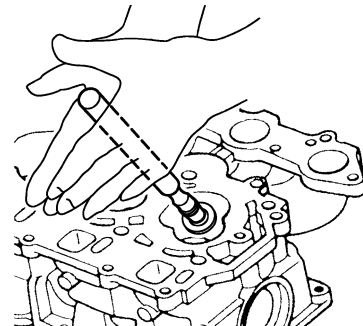
4. Measure the valve guide inside diameter. Replace the valve guide if out of specification.



Valve guide inside diameter:
5.50–5.51 mm (0.2165–0.2169 in)

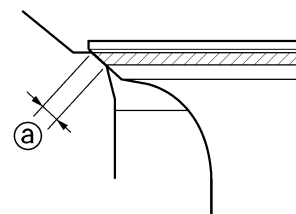
Checking the valve seat

1. Eliminate carbon deposits from the valve with a scraper.
2. Apply a thin, even layer of Mechanic's blueing dye (Dykem) onto the valve seat.
3. Lap the valve slowly on the valve seat with a valve lapper (commercially obtainable) as shown.

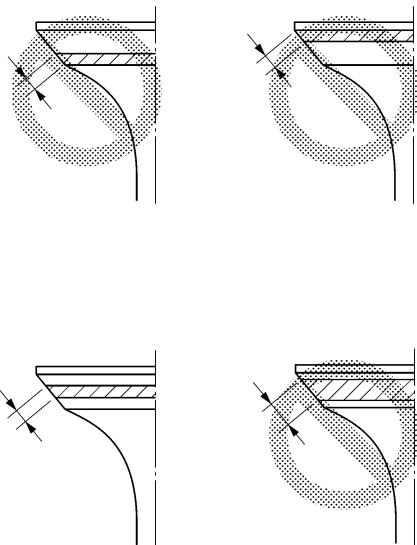


S62Y5400

4. Measure the valve seat contact width ① where the blueing dye is adhered to the valve face. Reface the valve seat if the valve is not seated properly or if the valve seat contact width is out of specification. Replace the valve guide if the valve seat contact is uneven.



S62Y5410

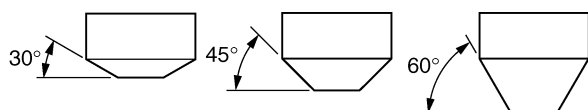


S62Y5420

	Valve seat contact width ①: Intake: 0.9–1.1 mm (0.035–0.043 in) Exhaust: 0.9–1.1 mm (0.035–0.043 in)
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Refacing the valve seat

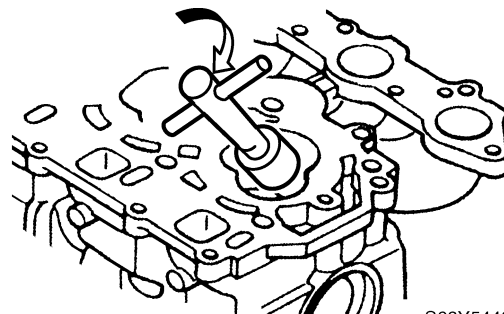
1. Reface the valve seat with the valve seat cutter.



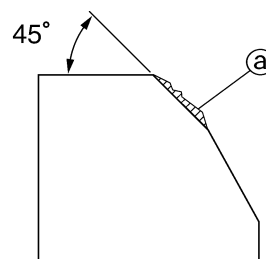
S62Y5430

	Valve seat cutter holder: 90890-06316 Valve seat cutter: 30° (intake): 90890-06326 30° (exhaust): 90890-06328 45° (intake and exhaust): 90890-06555 60° (intake): 90890-06323 60° (exhaust): 90890-06315
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2. Cut the surface of the valve seat with a 45° cutter by turning the cutter clockwise until the valve seat face has become smooth.



S62Y5440



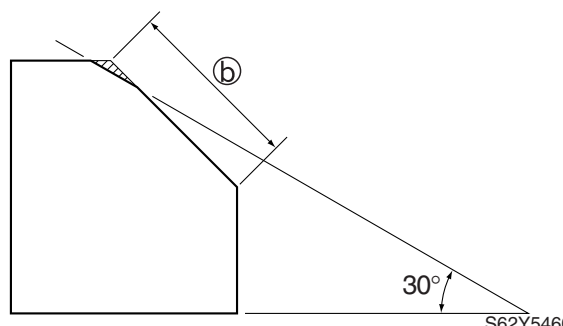
S62Y5450

- ① Slag or rough surface

CAUTION:

Do not over cut the valve seat. Make sure to turn the cutter evenly downward at a pressure of 40–50 N (4–5 kgf, 8.8–11 lbf) to prevent chatter marks.

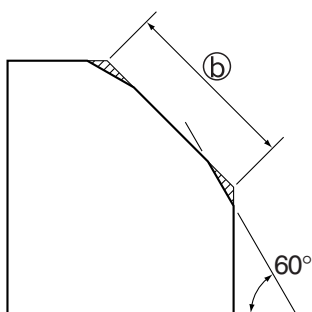
3. Use a 30° cutter to adjust the contact width of the top edge of the valve seat.



S62Y5460

- ② Previous contact width

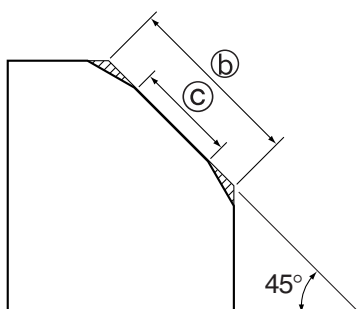
4. Use a 60° cutter to adjust the contact width of the bottom edge of the valve seat.



S62Y5461

(b) Previous contact width

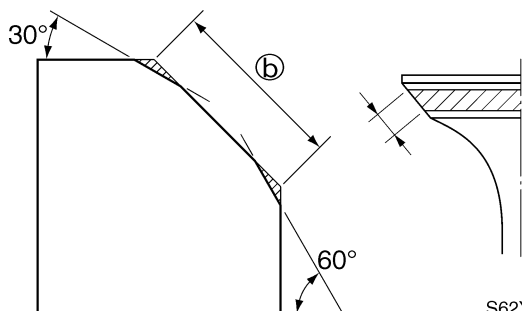
5. Use a 45° cutter to adjust the contact width of the valve seat to specification.



S62Y5462

(b) Previous contact width
(c) Specified contact width

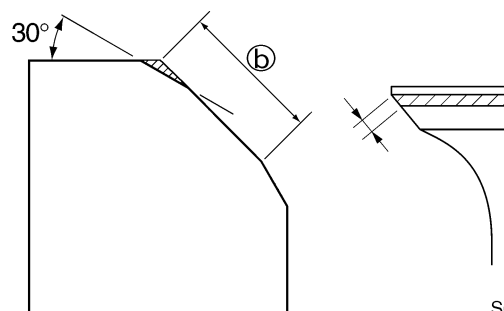
6. If the valve seat contact area is too wide and situated in the center of the valve face, use a 30° cutter to cut the top edge of the valve seat, a 60° cutter to cut the bottom edge to center the area and set its width.



S62Y5490

(b) Previous contact width

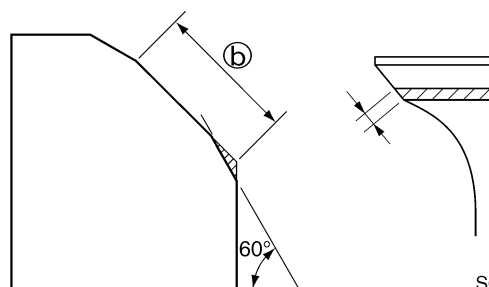
7. If the valve seat contact area is too narrow and situated near the top edge of the valve face, use a 30° cutter to cut the top edge of the valve seat. If necessary, use a 45° cutter to center the area and set its width.



S62Y5470

(b) Previous contact width

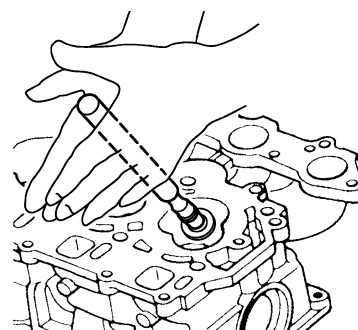
8. If the valve seat contact area is too narrow and situated near the bottom edge of the valve face, use a 60° cutter to cut the bottom edge of the valve seat. If necessary, use a 45° cutter to center the area and set its width.



S62Y5480

(b) Previous contact width

9. Apply a thin, even layer of lapping compound onto the valve seat, and then lap the valve using a valve lapper (commercially obtainable).



S62Y5500

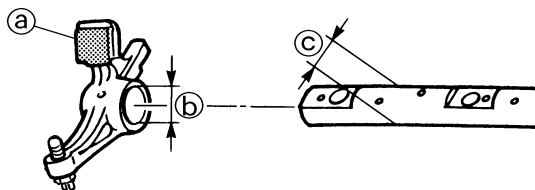
CAUTION:

Do not get the lapping compound on the valve stem and valve guide.

- After every lapping procedure, be sure to clean off any remaining lapping compound from the cylinder head and the valve.
- Check the valve seat contact area of the valve again.

Checking the rocker arms and rocker arm shaft

- Check the rocker arms, rocker arm shaft, and rocker arm contact surface (a) for wear. Replace if necessary.
- Measure the rocker arms inside diameter (b) and rocker arm shaft outside diameter (c). Replace if out of specification.



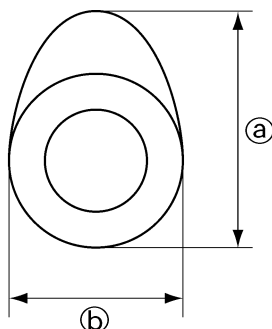
S62Y5510

Rocker arm inside diameter (b):
16.00–16.01 mm
(0.6299–0.6303 in)

Rocker arm shaft outside diameter (c):
15.98–15.99 mm
(0.6291–0.6295 in)

Checking the camshaft

- Measure the cam lobe. Replace if out of specification.



S62Y5520



Cam lobe (a):

Intake:

30.89–30.99 mm
(1.2161–1.2200 in)

Exhaust:

30.82–30.92 mm
(1.2135–1.2175 in)

Cam lobe (b):

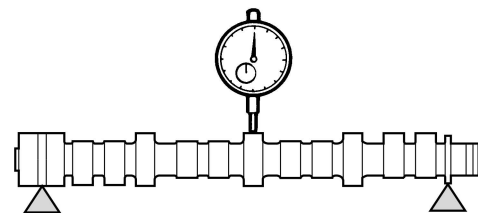
Intake:

25.95–26.05 mm
(1.0217–1.0256 in)

Exhaust:

25.95–26.05 mm
(1.0217–1.0256 in)

- Measure the camshaft runout. Replace if out of specification.



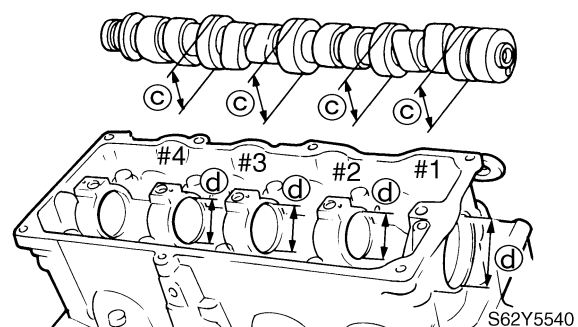
S62Y5530



Camshaft runout limit:

0.04 mm (0.0016 in)

- Measure the camshaft journal diameter (c) and cylinder head journal inside diameter (d). Replace the camshaft and cylinder head if out of specification.



S62Y5540



Camshaft journal diameter ㉟:

#1:

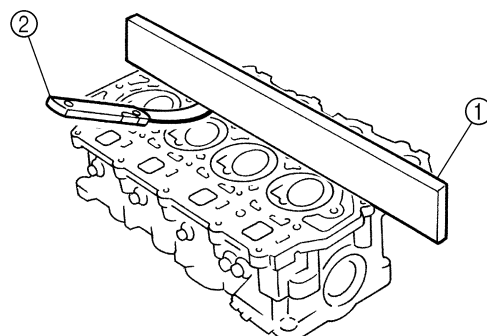
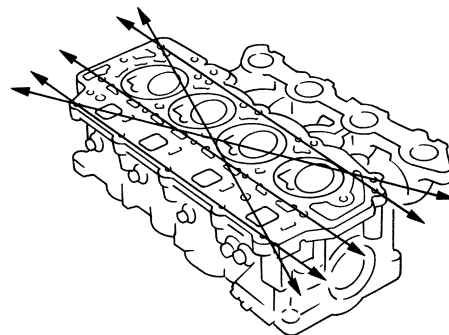
36.93–36.94 mm
(1.4539–1.4543 in)

#2, #3, #4:

36.94–36.95 mm
(1.4543–1.4547 in)

Cylinder head journal inside diameter ㊦:

37.00–37.02 mm
(1.4567–1.4575 in)



S62Y5560



㊥ = ㊦ – ㉟:

#1:

0.06–0.10 mm
(0.0022–0.0039 in)

#2, #3, #4:

0.05–0.09 mm
(0.0018–0.0035 in)



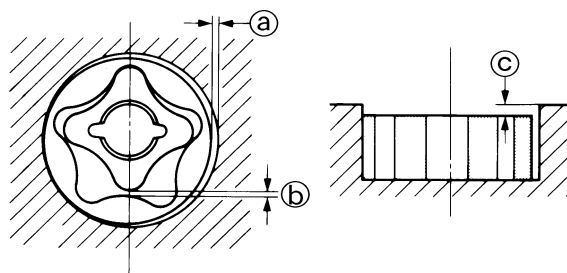
Cylinder head warpage limit:
0.1 mm (0.004 in)

Checking the cylinder head

1. Eliminate carbon deposits from the combustion chambers and check for deterioration.
2. Check the cylinder head warpage using a straightedge ① and thickness gauge ② in five directions as shown. Replace if out of specification.

Checking the oil pump

1. Measure the oil pump rotor clearances as shown. Replace if out of specification.



S62Y5580K



Clearance ㉟:

0.09–0.15 mm (0.004–0.006 in)

Clearance ㊦:

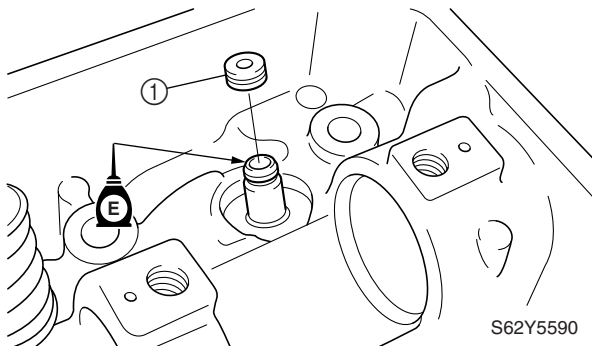
0.01–0.10 mm (0.0004–0.0039 in)

Clearance ㉟:

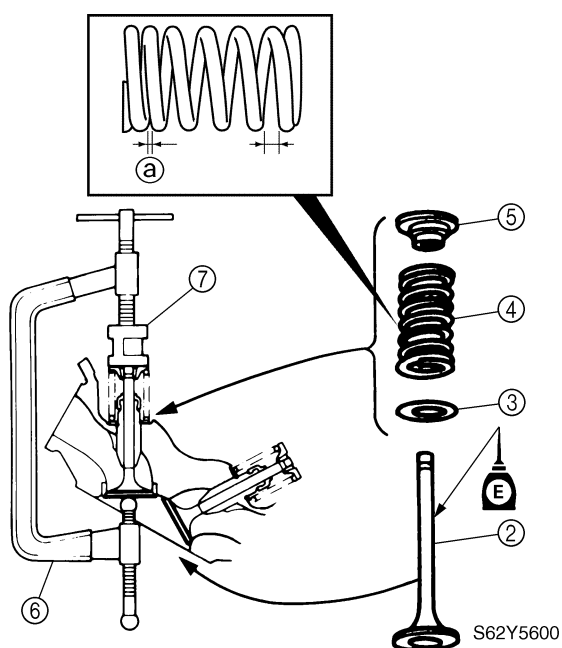
0.03–0.08 mm (0.001–0.003 in)

Installing the valves

1. Install the new valve stem seal ① to the valve guide, and then apply engine oil to the valve guide.



2. Install the valve ②, spring seat ③, valve spring ④, and spring retainer ⑤ in the sequence shown, and then attach the special service tool.



NOTE:

Face the fine pitch side ③ of the valve spring toward the spring seat.



Valve spring compressor ⑥:

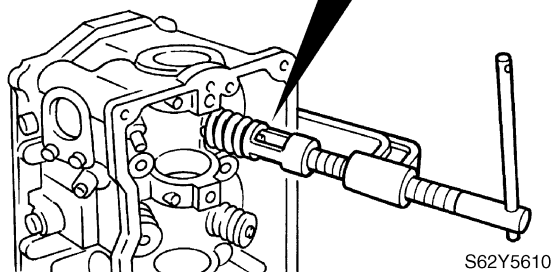
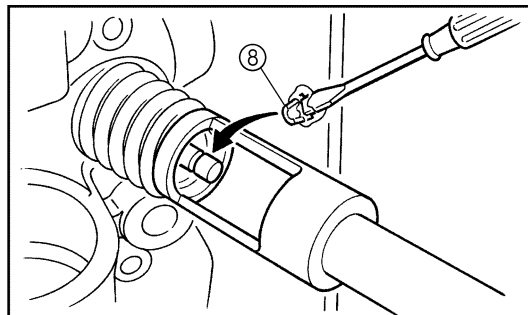
90890-04019

Valve spring compressor attachment

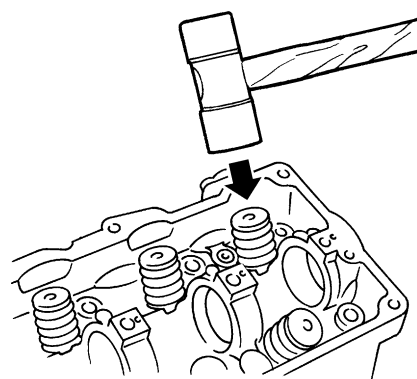
⑦:

90890-06320

3. Compress the valve spring, and then install the valve cotter ⑧ using a thin screwdriver with a small amount of grease applied to it.



4. Lightly tap the spring retainer with a plastic hammer to set the valve cotter securely.

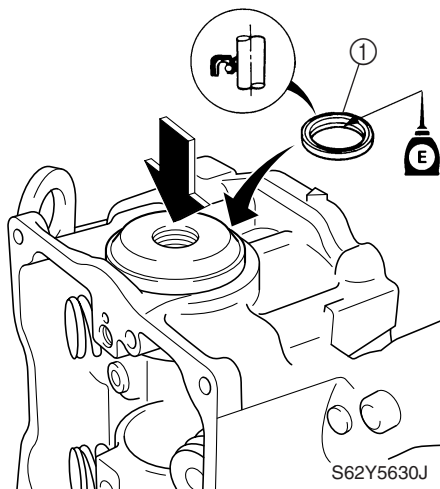


5



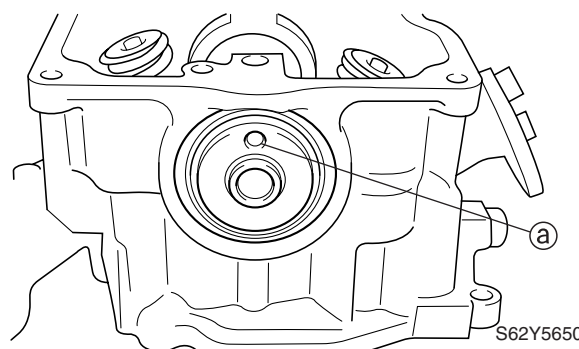
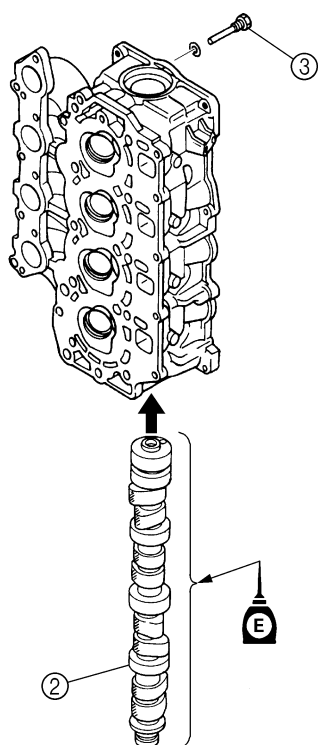
Installing the camshaft

1. Install the new oil seal ①.

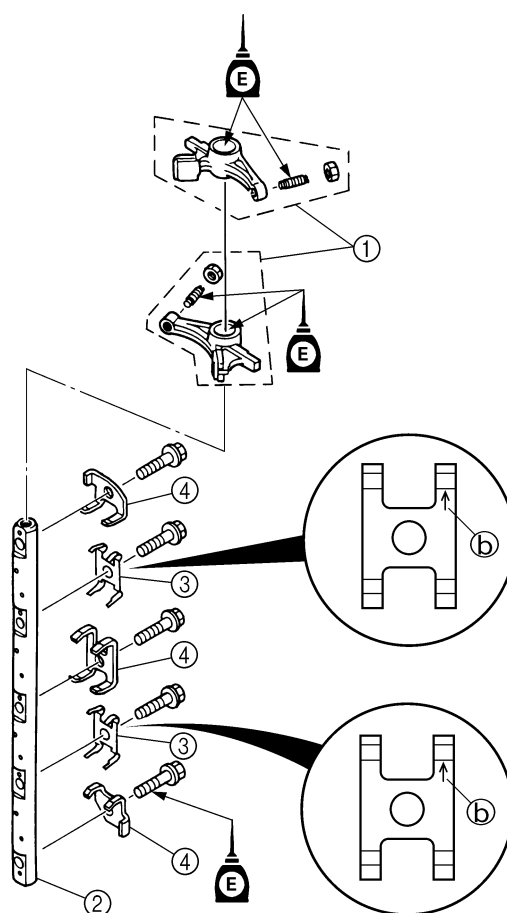


Bearing outer race attachment:
90890-06626

2. Install the camshaft ② in the direction shown, then the retaining bolt ③.



2. Assembly the rocker arm ① and rocker arm shaft ②, and the tensioner ③, rocker arm retainer ④ by installing the bolts.



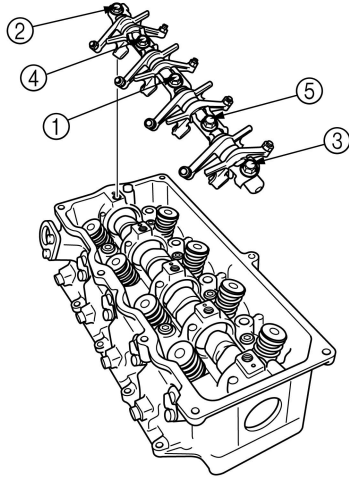
NOTE:

Make sure that the arrow marks ⑥ on the two tensioners are facing up.

Installing the rocker arm assembly

1. Check that the camshaft dowel pin hole ⑥ is in the position shown in the illustration. Adjust if necessary.

3. Install the rocker arm shaft assembly to the cylinder head by installing the bolts, and then tighten them to the specified torque and in the sequence shown.



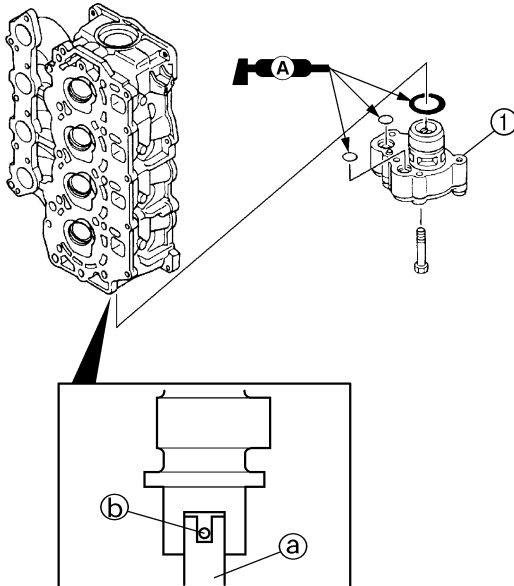
S62Y5665



Bolt: 18 N·m (1.8 kgf·m, 13 ft·lb)

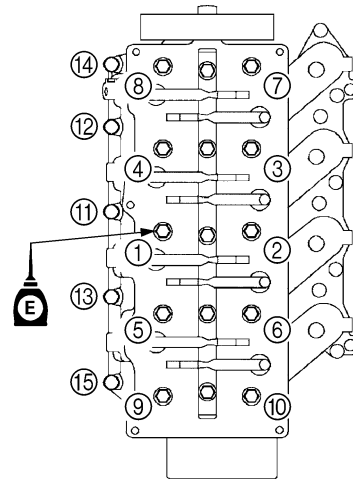
Installing the cylinder head

1. Install the oil pump ① by aligning the oil pump drive shaft ② with the camshaft pin ③.



S62Y5666

2. Tighten the cylinder head bolts to the specified torques in two stages and in the sequence shown.



S62Y5670K

CAUTION:

Do not reuse the cylinder head gasket, always replace it with a new one.

NOTE:

Apply engine oil to the cylinder head bolts (M9) before installation.



Cylinder head bolt (M9):

1st: 23 N·m (2.3 kgf·m, 17 ft·lb)

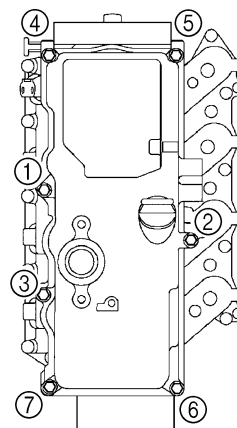
2nd: 47 N·m (4.7 kgf·m, 34 ft·lb)

Cylinder head bolt (M6):

1st: 6 N·m (0.6 kgf·m, 4.3 ft·lb)

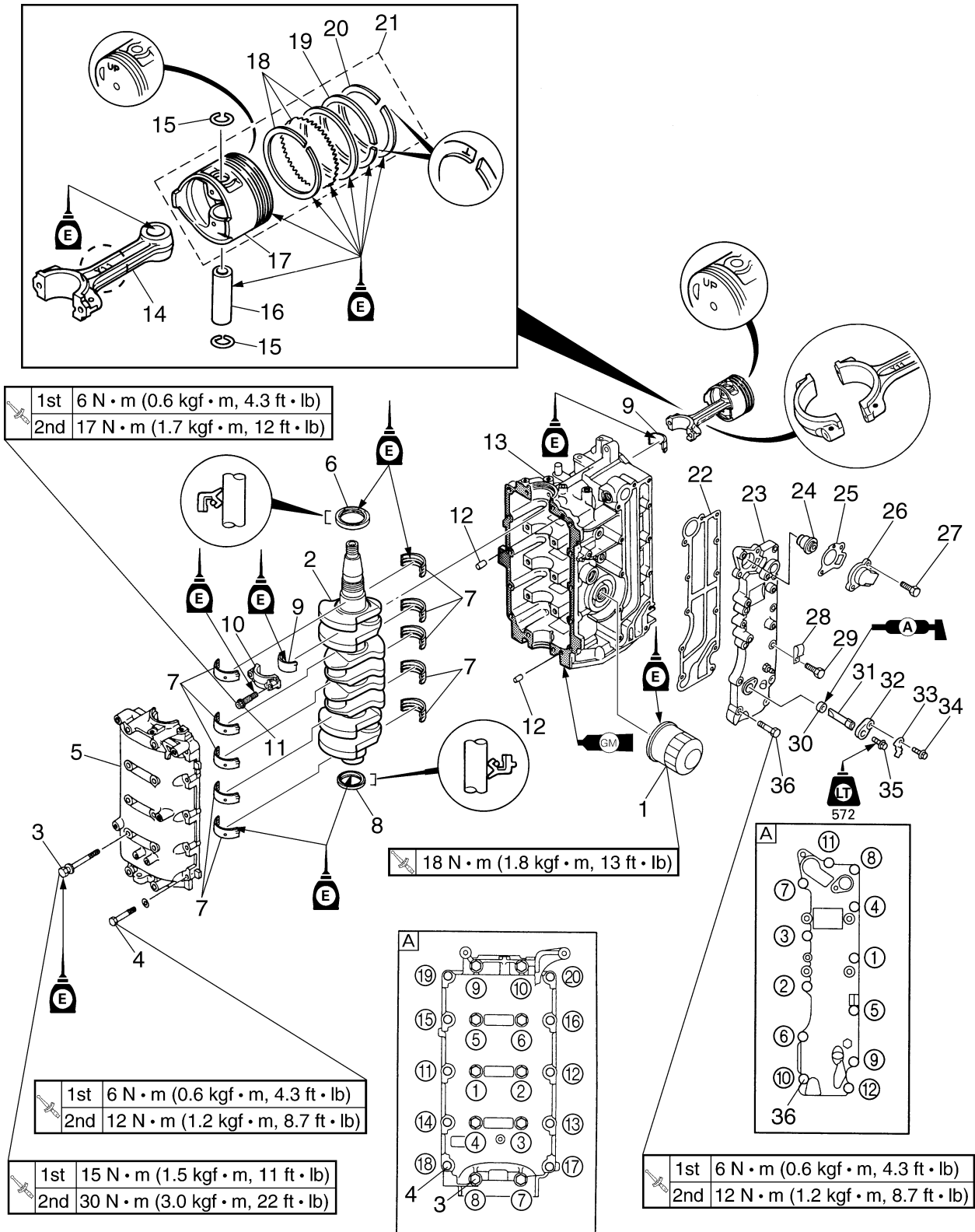
2nd: 12 N·m (1.2 kgf·m, 8.7 ft·lb)

3. Tighten the cylinder head cover bolts in the sequence shown.



S62Y5680K

Cylinder body



S62Y5685K

Cylinder body

No.	Part name	Q'ty	Remarks
1	Oil filter	1	
2	Crankshaft	1	
3	Bolt	10	M8 × 82 mm
4	Bolt	10	M6 × 35 mm
5	Crankcase	1	
6	Oil seal	1	Not reusable
7	Main bearing	10	
8	Oil seal	1	Not reusable
9	Connecting rod bearing	8	
10	Connecting rod cap	4	
11	Bolt	8	
12	Dowel pin	2	
13	Cylinder body	1	
14	Connecting rod	1	
15	Piston pin clip	2	Not reusable
16	Piston pin	1	
17	Piston	1	
18	Oil ring	1	
19	Second ring	1	
20	Top ring	1	
21	Piston assembly	1	
22	Gasket	1	Not reusable
23	Exhaust cover	1	
24	Thermostat	1	
25	Gasket	1	Not reusable
26	Cover	1	
27	Bolt	2	M6 × 35 mm
28	Clamp	1	
29	Bolt	10	
30	Grommet	1	
31	Anode	1	
32	Cover	1	
33	Cover	1	
34	Bolt	1	M6 × 20 mm
35	Bolt	1	M5 × 12 mm
36	Bolt	10	M6 × 35 mm

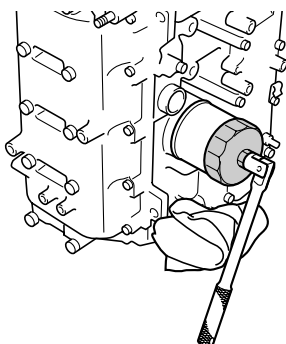
A Tightening sequence

5



Removing and installing the oil filter

1. Place a rag under the oil filter, and then remove the filter.



S62Y5690

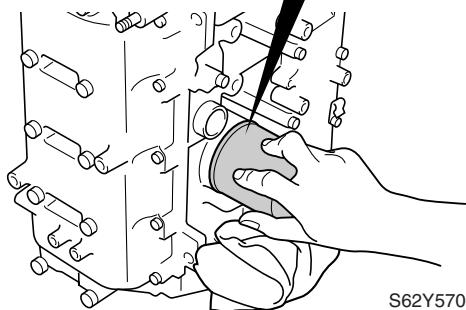
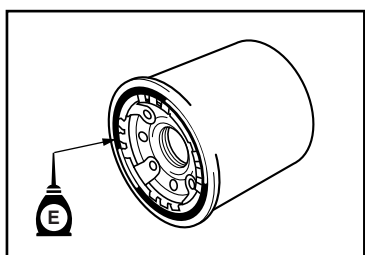


Oil filter wrench: 90890-01426

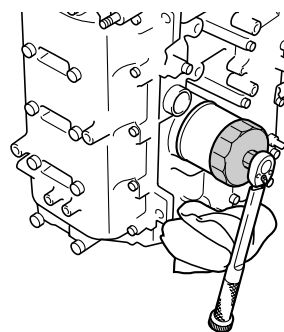
NOTE:

Be sure to clean up any oil spills.

2. Apply a thin coat of the new engine oil to the O-ring of the new oil filter.
3. Install the oil filter, and then tighten it to the specified torque.



S62Y5700



S62Y5710



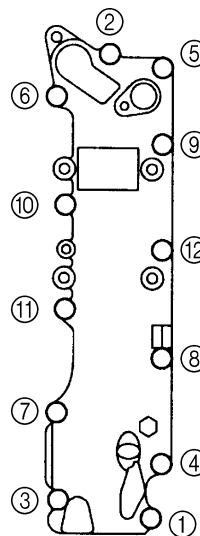
Oil filter wrench: 90890-01426



Oil filter: 18 N·m (1.8 kgf·m, 13 ft·lb)

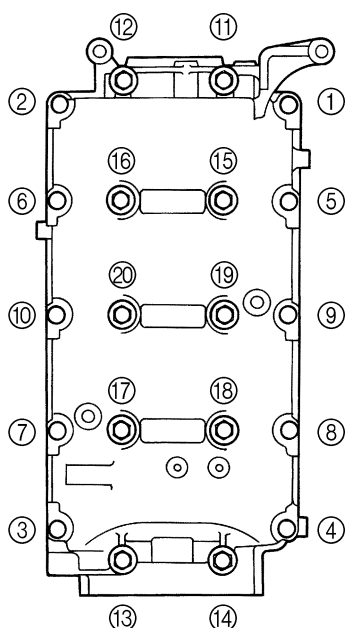
Disassembling the cylinder body

1. Remove the exhaust cover bolts in the sequence shown.



S62Y5720

2. Remove the crankcase bolts in the sequence shown.

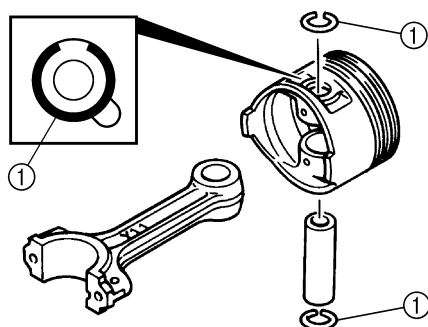


S62Y5730

CAUTION:

Do not scratch or damage the mating surfaces of the cylinder head and cylinder body.

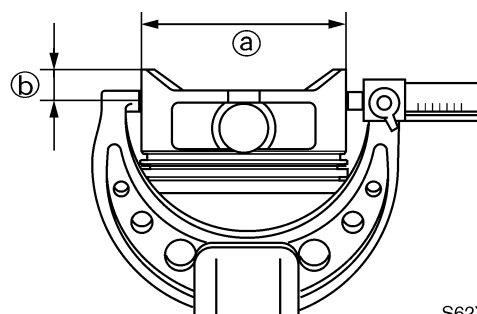
- Remove the connecting rod bolts and the piston assemblies.
- Remove the crankshaft, oil seals, and dowel pins.
- Remove the piston pin clip ① with pliers, and then remove the piston.



S62Y5740

Checking the piston diameter

- Measure the piston outside diameter at the specified measuring point. Replace if out of specification.



S62Y5750



Piston diameter ⑤:

62.95–62.96 mm (2.478–2.479 in)

Measuring point ⑥:

5 mm (0.2 in) up from the bottom of the piston skirt

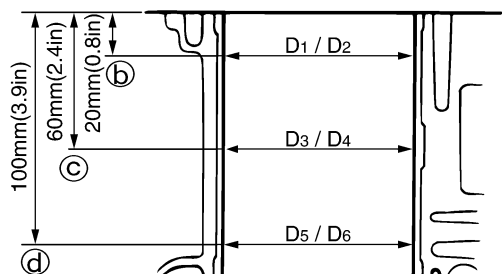
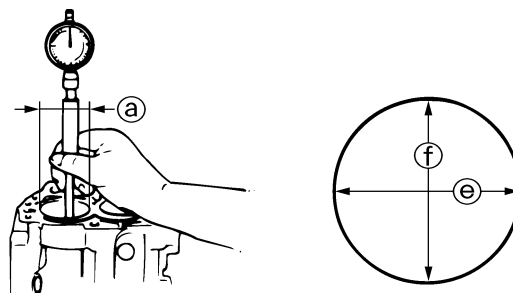
Oversize piston diameter:

Oversize 1: +0.25 mm (0.01 in)

Oversize 2: +0.50 mm (0.02 in)

Checking the cylinder bore

- Measure the cylinder bore (D_1 – D_6) ⑤ at measuring points ⑥, ⑦ and ⑧, and in direction ⑨, which is parallel to the crankshaft, and direction ⑩, which is at a right angle to the crankshaft.



S62Y5760



Cylinder bore ⑤:

63.00–63.01 mm (2.480–2.481 in)



- Calculate the taper limit. Replace or rebores the cylinder body if out of specification.



Taper limit = maximum of D_1 or D_2 – minimum of D_5 or D_6 :
0.08 mm (0.003 in)

- Calculate the out-of-round limit. Replace or rebores the cylinder body if out of specification.



Out-of-round limit = maximum of D_1 , D_3 , or D_5 – minimum of D_2 , D_4 , or D_6 :
0.08 mm (0.003 in)

Checking the piston clearance

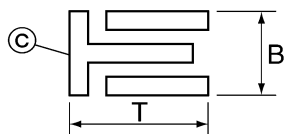
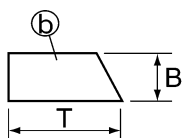
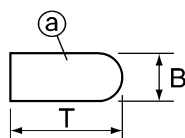
- Rebores the cylinder or replace the piston and piston rings as a set or the cylinder body, or both if out of specification.



Piston clearance:
0.04–0.06 mm (0.0016–0.0024 in)

Checking the piston rings

- Check the piston ring ① dimensions of B and T. Replace if out of specification.



S62Y5770K



Piston ring dimensions:

Top ring ①:

B: 1.17–1.19 mm (0.046–0.047 in)

T: 2.39–2.41 mm (0.094–0.095 in)

Second ring ②:

B: 1.47–1.49 mm (0.058–0.059 in)

T: 2.49–2.51 mm (0.098–0.099 in)

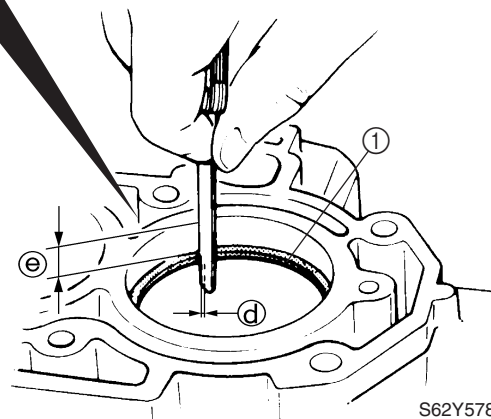
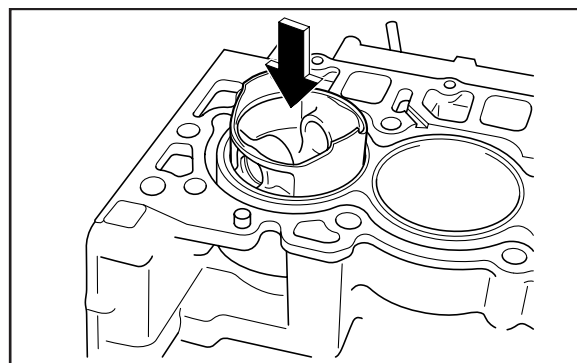
Oil ring ③:

B: 2.34–2.46 mm (0.092–0.097 in)

T: 2.75 mm (0.108 in)

- Level the piston ring ① in the cylinder with the piston crown of an inverted piston.

- Check the piston ring end gap ④ at the specified measuring point. Replace if out of specification.



S62Y5780



Piston ring end gap ④:

Top ring:

0.15–0.30 mm (0.006–0.012 in)

Second ring:

0.30–0.50 mm (0.012–0.020 in)

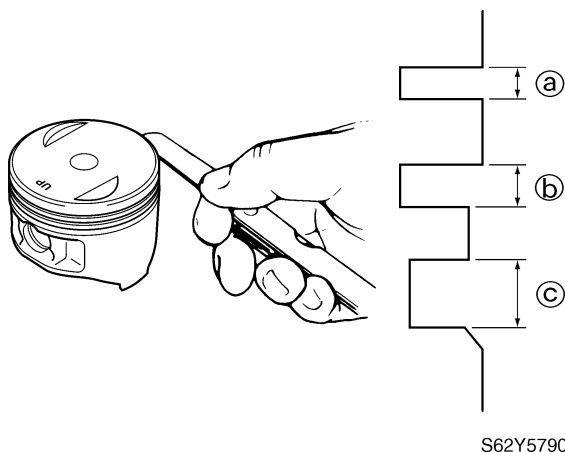
Oil ring:

0.20–0.70 mm (0.008–0.028 in)

Measuring point ⑤: 20 mm (0.8 in)

Checking the piston ring grooves

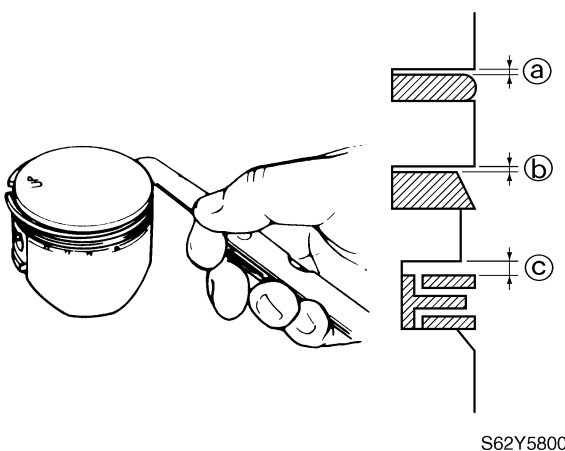
1. Measure the piston ring grooves.
Replace the piston if out of specification.



	Piston ring groove:
	Top ring ①:
	1.23–1.25 mm (0.048–0.049 in)
	Second ring ②:
	1.52–1.54 mm (0.060–0.061 in)
	Oil ring ③:
	2.51–2.53 mm (0.099–0.100 in)

Checking the piston ring side clearance

1. Measure the piston ring side clearance.
Replace the piston and piston rings as a set if out of specification.



Piston ring side clearance:

Top ring ①:

0.04–0.08 mm (0.002–0.003 in)

Second ring ②:

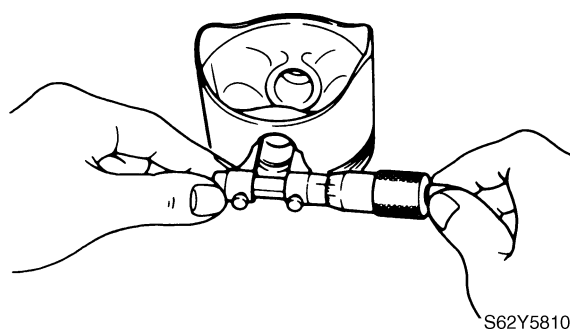
0.03–0.07 mm (0.001–0.003 in)

Oil ring ③:

0.05–0.19 mm (0.002–0.007 in)

Checking the piston pin boss bore

1. Measure the piston pin boss bore.
Replace the piston if out of specification.



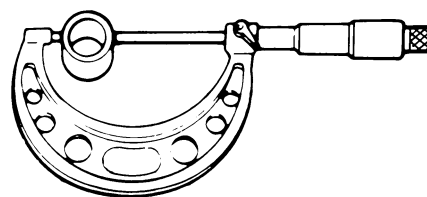
Piston pin boss bore:

15.974–15.985 mm

(0.6289–0.6293 in)

Checking the piston pin

1. Measure the piston pin diameter.
Replace if out of specification.



Piston pin diameter:

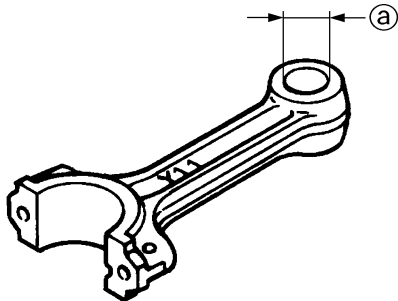
15.965–15.970 mm

(0.6285–0.6287 in)



Checking the connecting rod small end inside diameter

1. Measure the connecting rod small end inside diameter (a). Replace the connecting rod if out of specification.



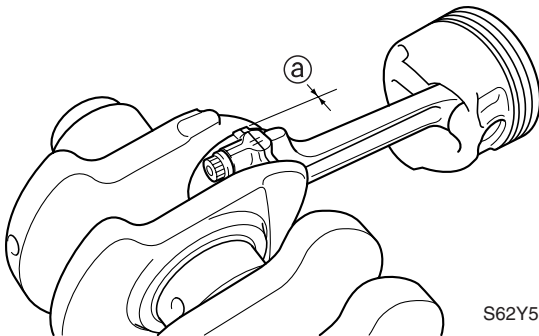
S62Y5830



Connecting rod small end inside diameter (a):
15.985–15.998 mm
(0.6293–0.6298 in)

Checking the connecting rod big end side clearance

1. Measure the connecting rod big end side clearance (a). Replace the connecting rod or crankshaft, or both if out of specification.



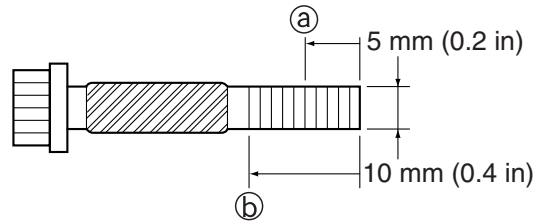
S62Y5840



Connecting rod big end side clearance (a):
0.05–0.22 mm (0.002–0.009 in)

Checking the connecting rod bolt

1. Measure the connecting rod bolt thread diameter at the two points (a) and (b).
2. Calculate the difference between (a) and (b). Replace if out of specification.



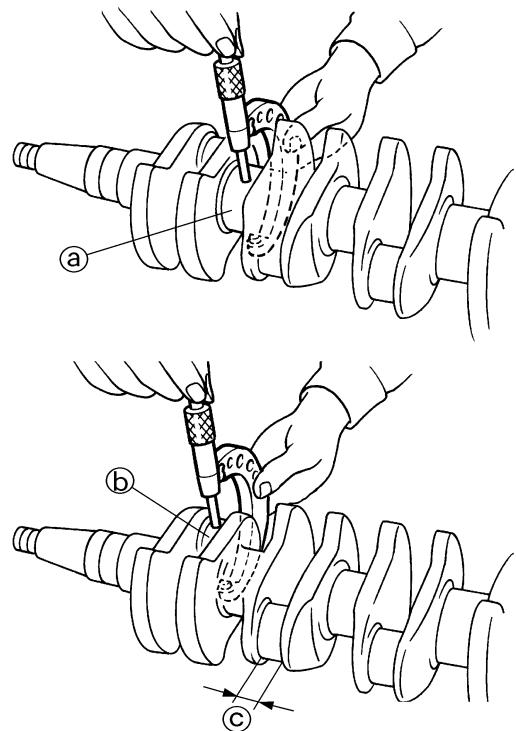
S62Y5850



Connecting rod bolt thread diameter limit (difference between (a) and (b)):
0–0.1 mm (0–0.004 in)

Checking the crankshaft

1. Measure the crankshaft journal diameter (a), crank pin diameter (b), and crank pin width (c). Replace the crankshaft if out of specification.

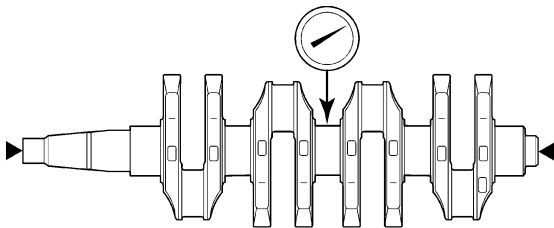


S62Y5860



Crankshaft journal diameter ①:
42.984–43.000 mm
(1.6923–1.6929 in)
Crank pin diameter ②:
32.984–33.000 mm
(1.2986–1.2992 in)
Crank pin width ③:
21.000–21.070 mm
(0.8268–0.8295 in)

2. Measure the crankshaft runout. Replace the crankshaft if out of specification.



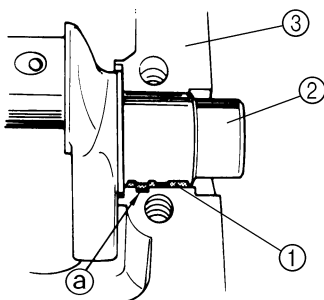
S62Y5870K



Crankshaft runout limit:
0.04 mm (0.0016 in)

Checking the crankshaft main journal oil clearance

1. Clean the bearings, main journals, and bearing portions of the crankcase and cylinder body.
2. Place the cylinder body upside down on a bench.
3. Install half of the bearings ① and the crankshaft ② into the cylinder body ③.



S62Y5910

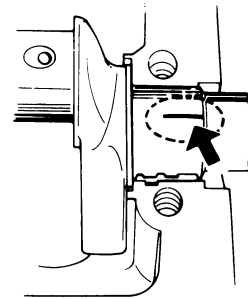
CAUTION:

Install the bearings in their original positions.

NOTE:

Insert the projection ① of the bearing into the notch in the cylinder body.

4. Put a piece of Plastigauge® (PG-1) on each main journal parallel to the crankshaft.



S62Y5920

NOTE:

Do not put the Plastigauge (PG-1) over the oil hole in the main journals of the crankshaft.

5. Install the remaining half of the bearings into the crankcase.

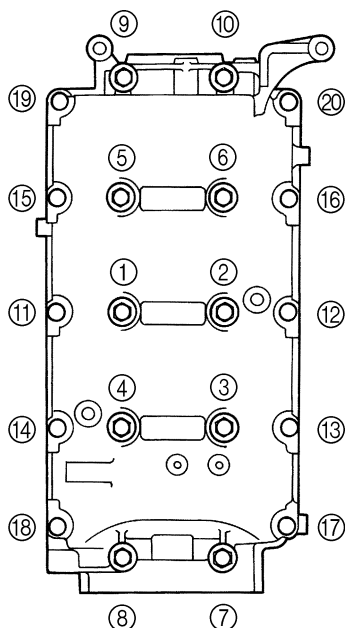
NOTE:

Insert the projection of the bearing into the notch in the crankcase.

6. Install the crankcase onto the cylinder body and apply engine oil onto the threads of the crankcase bolts.



7. Tighten the crankcase bolts to the specified torques in two stages and in the sequence shown.



S62Y5930

NOTE:

Do not move the crankshaft until the main journal oil clearance measurement has been completed.



Crankcase bolt (M8):

1st: 15 N·m (1.5 kgf·m, 11 ft·lb)

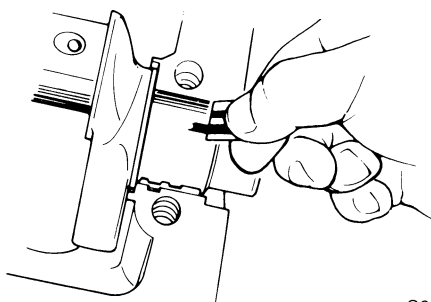
2nd: 30 N·m (3.0 kgf·m, 22 ft·lb)

Crankcase bolt (M6):

1st: 6 N·m (0.6 kgf·m, 4.3 ft·lb)

2nd: 12 N·m (1.2 kgf·m, 8.7 ft·lb)

8. Remove the crankcase and measure the width of the compressed Plastigauge (PG-1) on each main journal. Replace the main bearing if out of specification.



S62Y5940



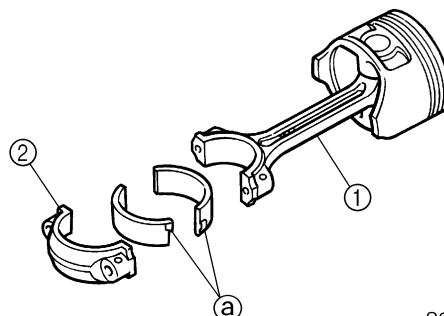
Crankshaft main journal oil clearance:

0.012–0.036 mm

(0.0005–0.0014 in)

Checking the crankshaft pin oil clearance

1. Clean the bearings and the connecting rod.
2. Install the upper half of the bearing into the connecting rod ① and the lower half into the connecting rod cap ②.



S62Y5950

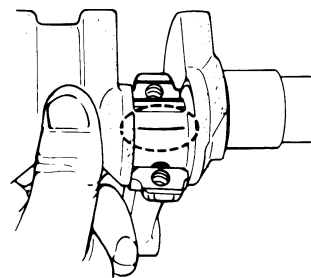
CAUTION:

Install the bearings in their original positions.

NOTE:

Insert the projection ① of the bearing into the slot on the cap and connecting rod.

3. Put a piece of Plastigauge (PG-1) onto the crank pin, parallel to the crankshaft.

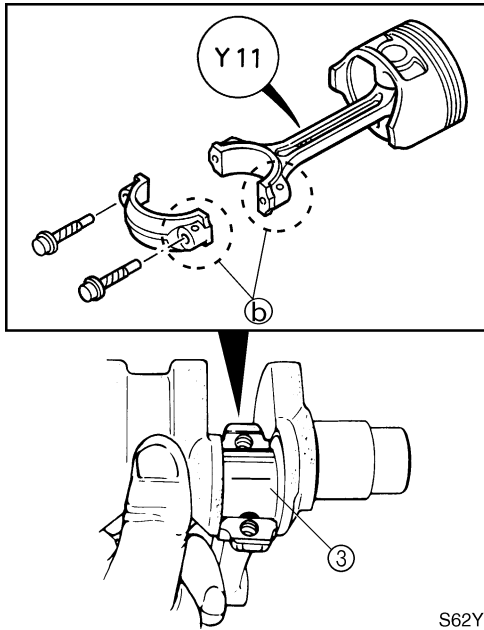


S62Y5960

NOTE:

Be sure not to put the Plastigauge (PG-1) over the oil hole in the crank pin of the crankshaft.

4. Install the connecting rod to the crank pin ③.

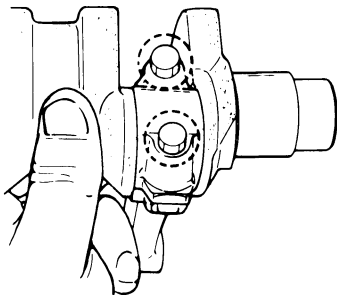


S62Y5970

NOTE:

- Align the alignment marks ⑥ on the connecting rod cap and connecting rod.
- Face the embossed “Y11” mark on the connecting rod toward the flywheel side of the crankshaft.

5. Tighten the connecting rod bolts to the specified torques in two stages.



S62Y5980

NOTE:

Do not turn the connecting rod until the crank pin oil clearance measurement has been completed.

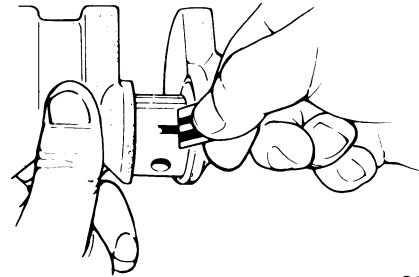


Connecting rod bolt:

1st: 6 N·m (0.6 kgf·m, 4.3 ft·lb)

2nd: 17 N·m (1.7 kgf·m, 12 ft·lb)

6. Remove the connecting rod cap and measure the width of the compressed Plastigauge (PG-1) on each crank pin. Replace the connecting rod bearing if out of specification.



S62Y5990



Crank pin oil clearance:

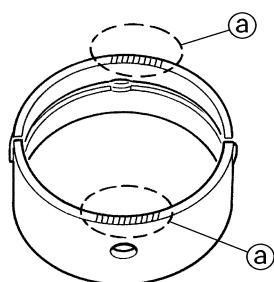
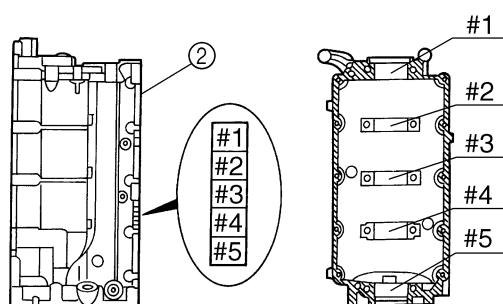
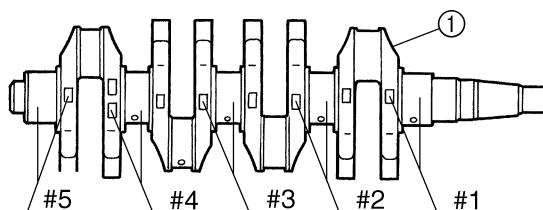
0.016–0.040 mm

(0.0006–0.0015 in)



Selecting the crankshaft main journal bearing

1. When replacing the main bearing, select the suitable bearing as follows.
2. Check the crankshaft journal mark on the crankshaft ① and the cylinder body mark on the cylinder body ②.
3. Select the suitable color ③ for the main bearing from the table.



S62Y5A10

Cylinder body mark	Crankshaft journal mark	Bearing color
A	A	Yellow
A	B	Red
B	A	
B	B	Pink
C	A	
C	B	Green

4. When installing the main bearing, insert the projection of the main bearing into the slot on the cylinder body.

CAUTION:

Remove any small metal particles and oil from the contact surfaces of the cylinder body and the main bearing.

5. Measure the main journal oil clearance with a piece of Plastigauge (PG-1).



Crankshaft main journal oil clearance:

0.012–0.036 mm
(0.0005–0.0014 in)

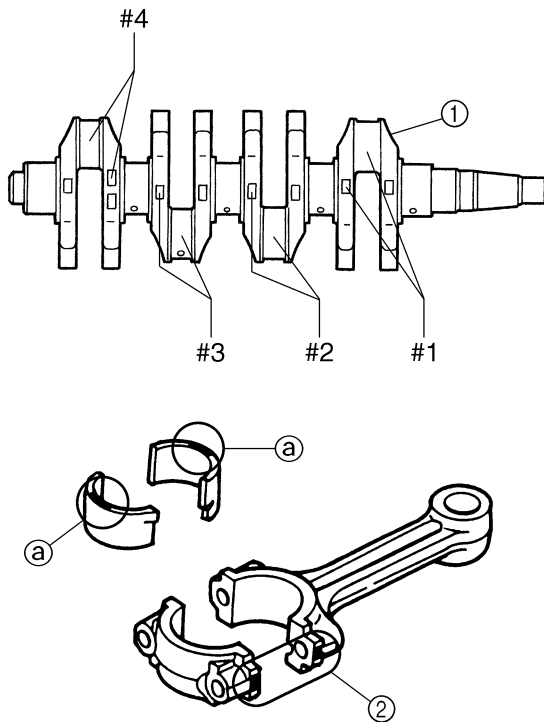
6. If the oil clearance is below specification, check the main bearing color and clean the contact surface of the cylinder body and the main bearing, and then check the main journal oil clearance again.
7. If the oil clearance is over specification, install an oversized main bearing, and then check the main journal oil clearance again.

Selecting the connecting rod big end bearing

1. When replacing the connecting rod bearing, select the suitable connecting rod bearing as follows.
2. Check the crank pin mark on the crankshaft ① and the connecting rod cap mark or painted color on the connecting rod ②.

Cylinder body

3. Select the suitable color ④ for the connecting rod bearing from the table.



S62Y5A20

Connecting rod cap mark/color	Crank pin mark	Bearing color
I/Red	A	Yellow
I/Red	B	Red
II/Blue	A	
II/Blue	B	Pink
III/Yellow	A	
III/Yellow	B	Green

4. When installing the connecting rod bearing, insert the projection of the connecting rod bearing into the slot on the connecting rod.

CAUTION:

Remove any small metal particles and oil from the contact surfaces of the connecting rod and the connecting rod bearing.

5. Measure the crank pin oil clearance with a piece of Plastigauge (PG-1).

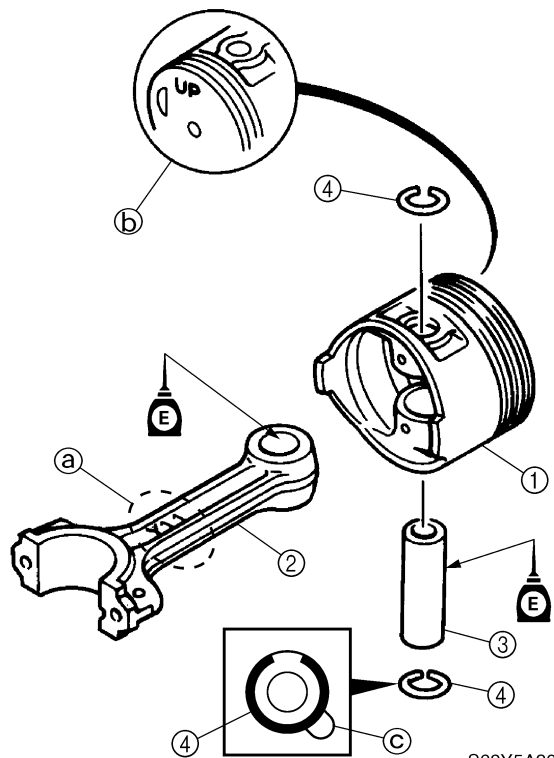


Crank pin oil clearance:
0.016–0.040 mm
(0.0006–0.0015 in)

6. If the oil clearance is below specification, check the connecting rod bearing color and clean the contact surface of the connecting rod and the connecting rod bearing, and then check the crank pin oil clearance again.
7. If the oil clearance is over specification, install an over-sized connecting rod bearing, and then check the crank pin oil clearance again.

Assembling the cylinder body

1. Assemble the piston ①, connecting rod ②, piston pin ③, and piston pin clips ④.



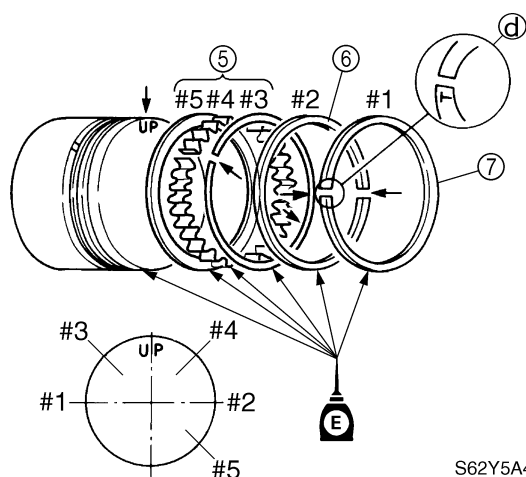
S62Y5A30



NOTE:

- Face the embossed “Y11” mark ① on the connecting rod in the same direction as the “UP” mark ② on the piston.
- Always use new piston pin clips, and do not allow the piston pin clip end to align with the piston pin slot ③.

2. Install the oil ring ⑤, second ring ⑥, and top ring ⑦ to the piston with the “T” mark ④ on the piston rings facing upward.
3. Offset the piston ring end gaps as shown.



S62Y5A40

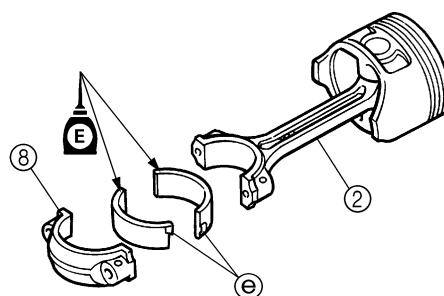
CAUTION:

Do not scratch the piston or break the piston rings.

NOTE:

After installing the piston rings, check that they move smoothly.

4. Install the upper half of the bearing into the connecting rod ② and the lower half into the connecting rod cap ⑧.



S62Y5A45

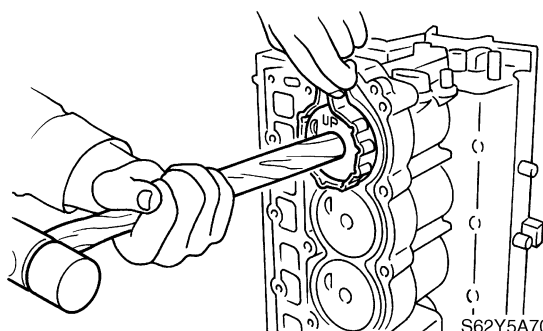
CAUTION:

Install the bearings in their original position.

NOTE:

Insert the projection ③ of the bearing into the slot on the cap and connecting rod.

5. Install the piston with the “UP” mark on the piston crown facing towards the fly-wheel.



S62Y5A70J

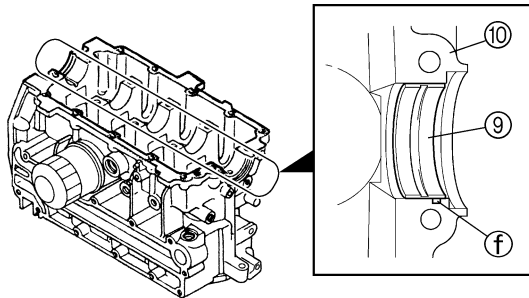
NOTE:

Apply engine oil to the piston assembly before installation.



Piston slider: 90890-06529

6. Install half of the bearings ⑨ into the cylinder body ⑩.

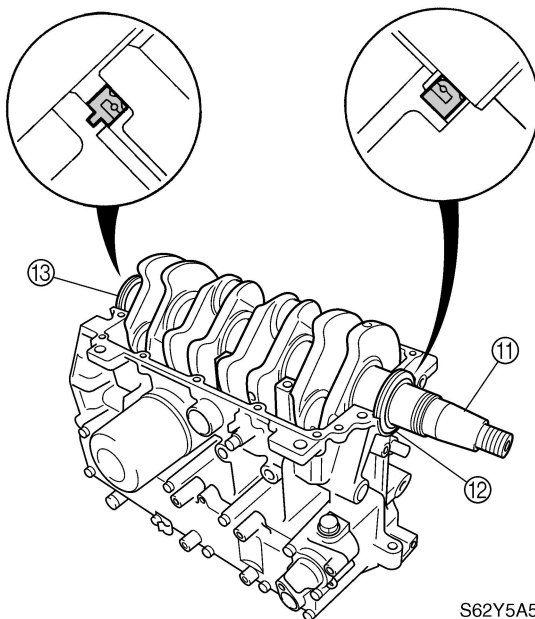


S62Y5A81K

NOTE:

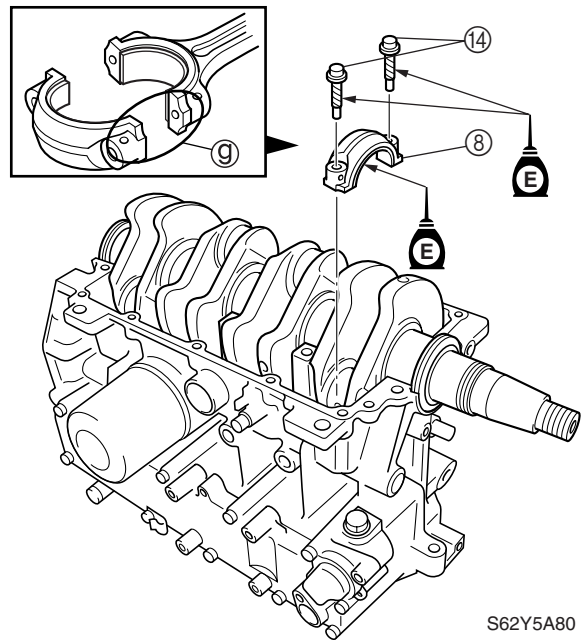
Insert the projection ① of the bearing into the notch in the cylinder body.

7. Set the crankshaft ⑪, and oil seals ⑫ and ⑬ into the cylinder body as shown. Apply engine oil to the inner oil seal, journal bearings, and connecting rod bearing.



S62Y5A50

8. Install the connecting rod cap ⑧ to the connecting rod, and then tighten the connecting rod bolts ⑭ to the specified torques in two stages. Apply engine oil to the connecting rod cap and connecting rod bolt.



S62Y5A80

NOTE:

Align the alignment marks ⑨ on the connecting rod cap and connecting rod.



Connecting rod bolt:

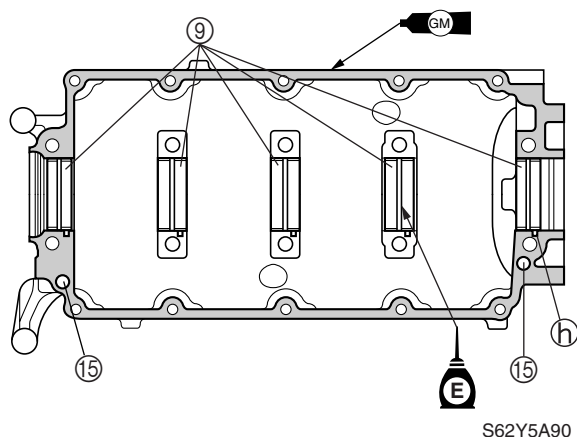
1st: 6 N·m (0.6 kgf·m, 4.3 ft·lb)

2nd: 17 N·m (1.7 kgf·m, 12 ft·lb)

9. Install half of the bearings ⑨ into the crankcase, then dowel pins ⑮.



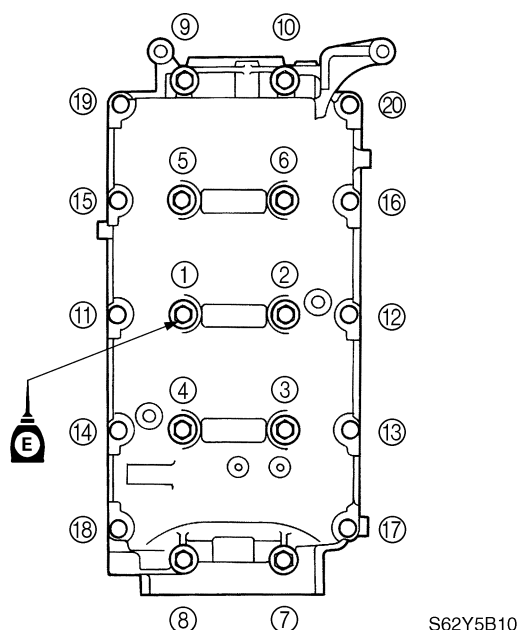
10. Apply Gasket Maker[®] to the mating surface of the crankcase.



NOTE:

- Insert the projection (h) of the bearing into the notch in the crankcase.
- Do not get any Gasket Maker on the journal bearings.

11. Install the crankcase bolts, and then tighten them to the specified torques in two stages and in the sequence shown.



CAUTION:

The oil seals must be installed before tightening the crankcase bolts.

NOTE:

Apply engine oil to the crankcase bolt (M8) before installation.



Crankcase bolt (M8):

1st: 15 N·m (1.5 kgf·m, 11 ft·lb)

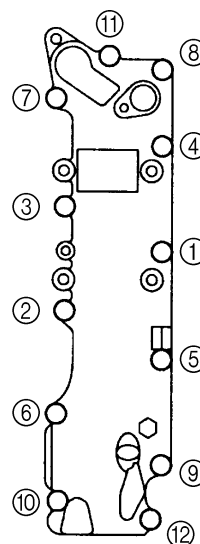
2nd: 30 N·m (3.0 kgf·m, 22 ft·lb)

Crankcase bolt (M6):

1st: 6 N·m (0.6 kgf·m, 4.3 ft·lb)

2nd: 12 N·m (1.2 kgf·m, 8.7 ft·lb)

12. Install the new gasket and exhaust cover, and then tighten the bolts to the specified torques in two stages and in the sequence shown.



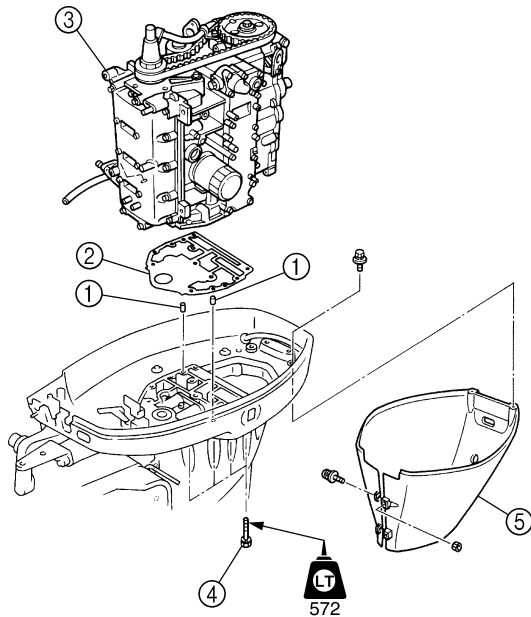
Exhaust cover bolt:

1st: 6 N·m (0.6 kgf·m, 4.3 ft·lb)

2nd: 12 N·m (1.2 kgf·m, 8.7 ft·lb)

Installing the power unit

1. Install the dowel pins (1) and gasket (2).
2. Install the power unit (3) by installing the bolts (4), then tightening them to the specified torque.
3. Install the apron (5).

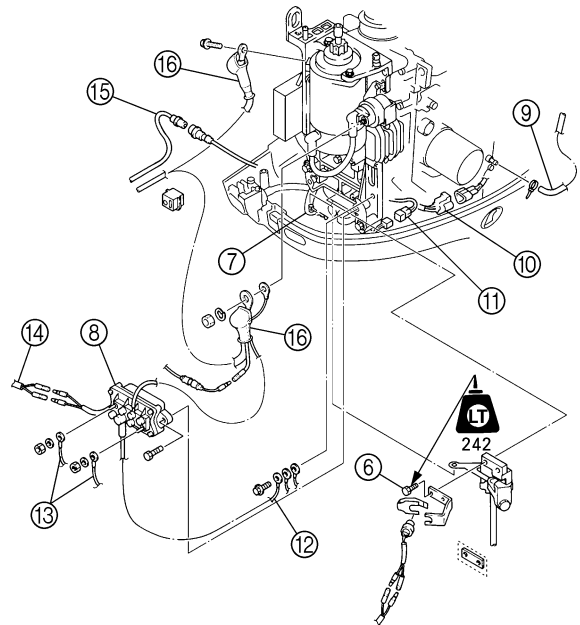


S62Y5086K



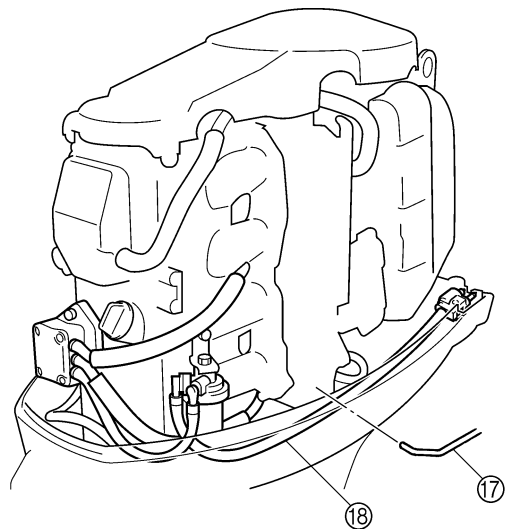
Mounting bolt ④:
21 N·m (2.1 kgf·m, 15 ft·lb)

4. Install the shift rod bolts ⑥, shift rod ⑦ and power trim and tilt relay ⑧.
5. Connect the pilot water hose ⑨, trailer switch coupler ⑩ (ET), warning indicator coupler ⑪ (EHD), ground lead ⑫ (ET), PTT motor leads ⑬ (ET), PTT relay leads ⑭ (ET), 10-pin coupler ⑮, and battery leads ⑯.



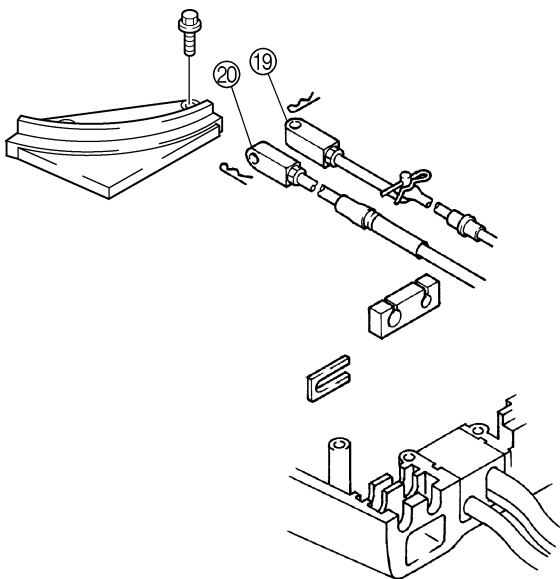
S62Y5088

6. Connect the throttle link rod ⑰ and fuel hose ⑱.



S62Y5089

7. Connect the shift cable/shift rod ⑲ and throttle cable ⑳, and then adjust their lengths. For adjustment procedures, see Chapter 3, "Checking the throttle cable operation," and "Checking the gearshift operation."



S62Y5091K

NOTE: _____
Apply engine oil to the flywheel magnet nut before installation.

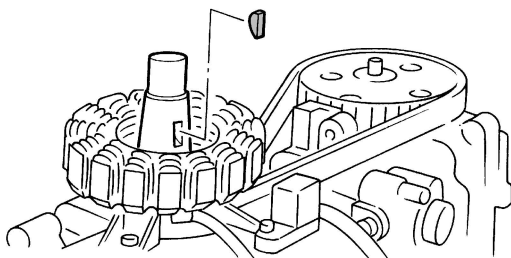


Flywheel holder: 90890-06522



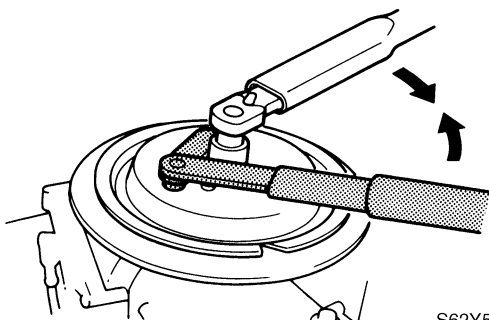
Flywheel magnet nut:
160 N·m (16 kgf·m, 116 ft·lb)

8. Install the Woodruff key.



S62Y5090

9. Install the flywheel magnet and flywheel magnet cover.



S62Y5100J

CAUTION: _____

Apply force in the direction of the arrows shown, to prevent the flywheel holder from slipping off easily.

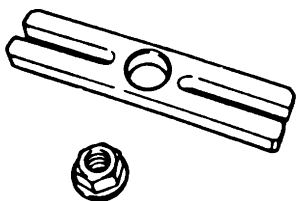


Lower unit

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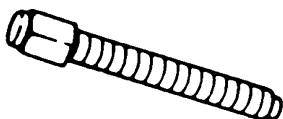
Special service tools



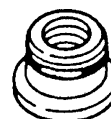
Stopper guide plate
90890-06501



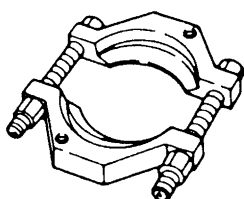
Bearing puller claw 1
90890-06536



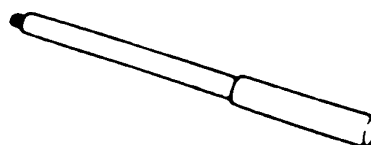
Center bolt
90890-06504



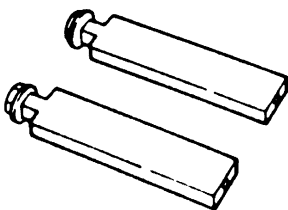
Needle bearing attachment
90890-06610, 90890-06611, 90890-06612,
90890-06614



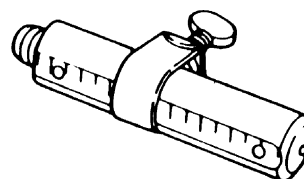
Bearing separator
90890-06534



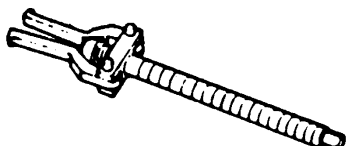
Driver rod L3
90890-06652



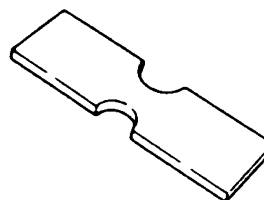
Stopper guide stand
90890-06538



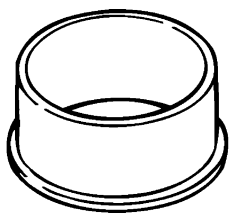
Driver rod SS
90890-06604



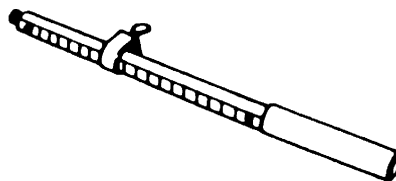
Bearing puller
90890-06535



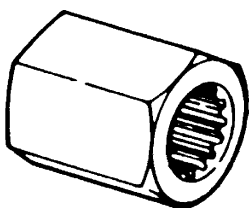
Bearing depth plate
90890-06603



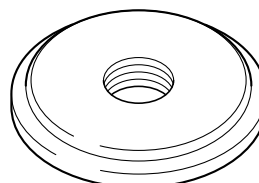
Bearing inner race attachment
90890-06639, 90890-06643, 90890-06661,
90890-06662



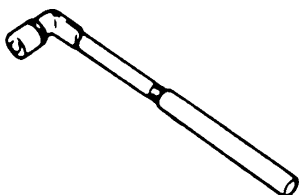
Driver rod SL
90890-06602



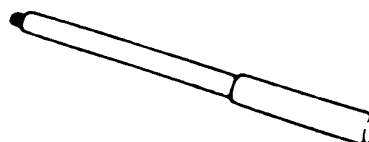
Drive shaft holder 4
90890-06518



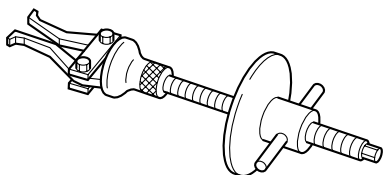
Bearing outer race attachment
90890-06621, 90890-06626



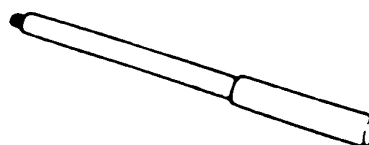
Pinion nut holder
90890-06505



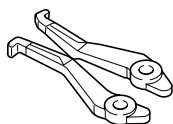
Driver rod LS
90890-06606



Bearing outer race puller
90890-06523



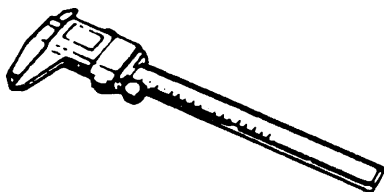
Driver rod LL
90890-06605



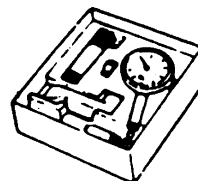
Outer race puller claw A
90890-06532



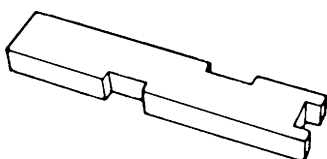
Pinion height gauge
90890-06702



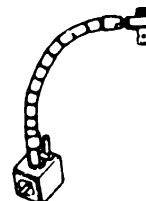
Digital caliper
90890-06704



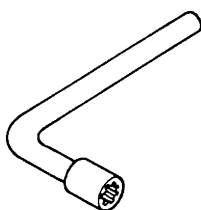
Dial gauge set
90890-01252



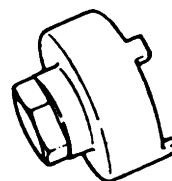
Shimming plate
90890-06701



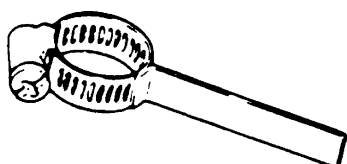
Magnet base
90890-06705



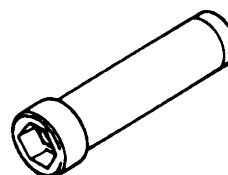
Shift rod push arm
90890-06052



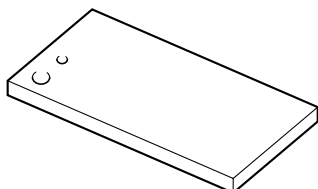
Ring nut wrench 3
90890-06511



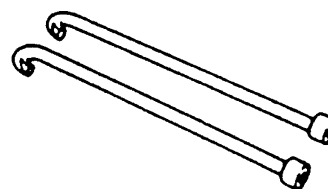
Backlash indicator
90890-06706



Ring nut wrench extension
90890-06513



Magnet base plate
90890-07003



Bearing housing puller claw L
90890-06502



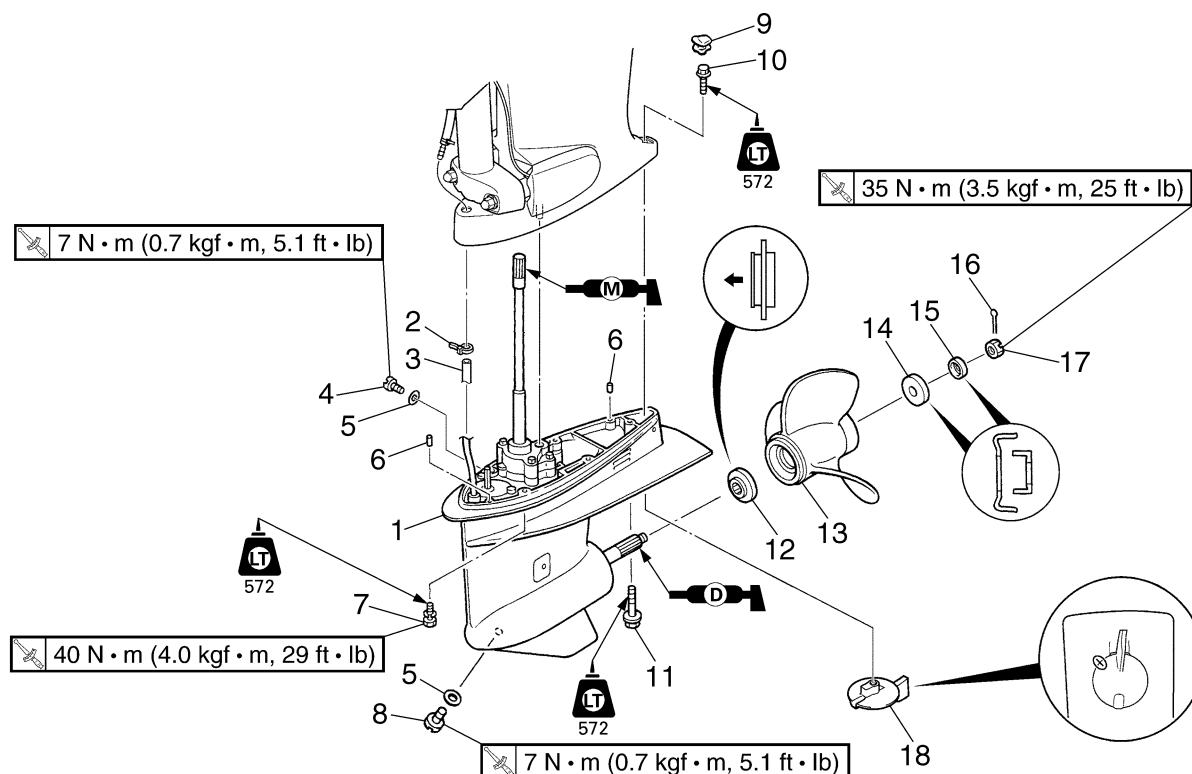
Ball bearing attachment
90890-06655



Socket adapter 2
90890-06507



Lower unit

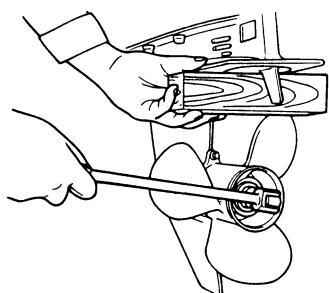


S62Y6480K

No.	Part name	Q'ty	Remarks
1	Lower unit	1	
2	Plastic tie	1	Not reusable
3	Hose	1	
4	Check screw	1	
5	Gasket	2	Not reusable
6	Dowel pin	2	
7	Bolt	4	M10 × 40 mm
8	Drain screw	1	
9	Grommet	1	
10	Bolt	1	M10 × 45 mm
11	Bolt	1	M8 × 60 mm
12	Thrust washer	1	
13	Propeller	1	
14	Washer	1	
15	Washer	1	
16	Cotter pin	1	Not reusable
17	Propeller nut	1	
18	Trim tab	1	

Removing the lower unit

1. Drain the gear oil. For draining procedures, see Chapter 3, "Replacing the gear oil."
2. Set the gearshift to the neutral position, and place a block of wood between the anti-cavitation plate and propeller to keep the propeller from turning, and then remove the propeller nut and propeller.

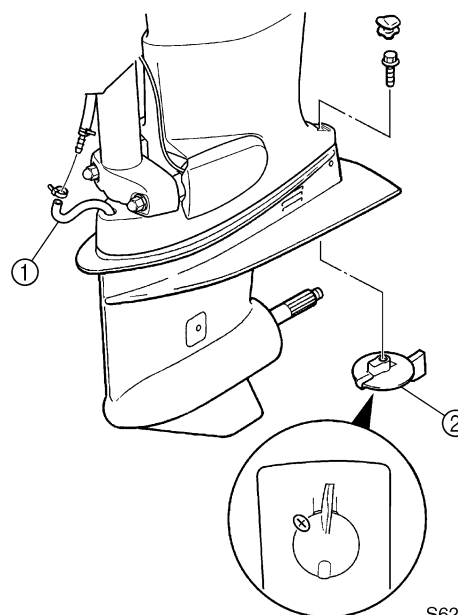


S62Y6485

⚠ WARNING

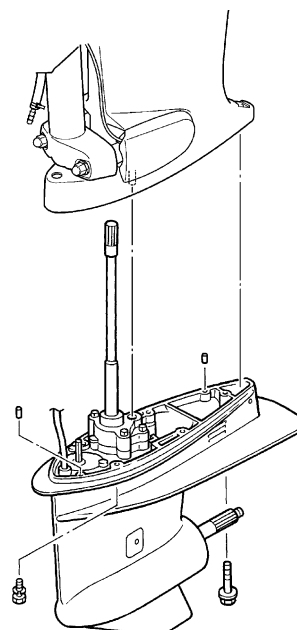
Do not hold the propeller with your hands when loosening or tightening it. Be sure to remove the battery leads from the batteries and the engine shut-off switch. Put a block of wood between the cavitation plate and propeller to keep the propeller from turning.

3. Disconnect the speedometer hose ①.
4. Mark the trim tab ② at the area shown, and then remove it.



S62Y6490K

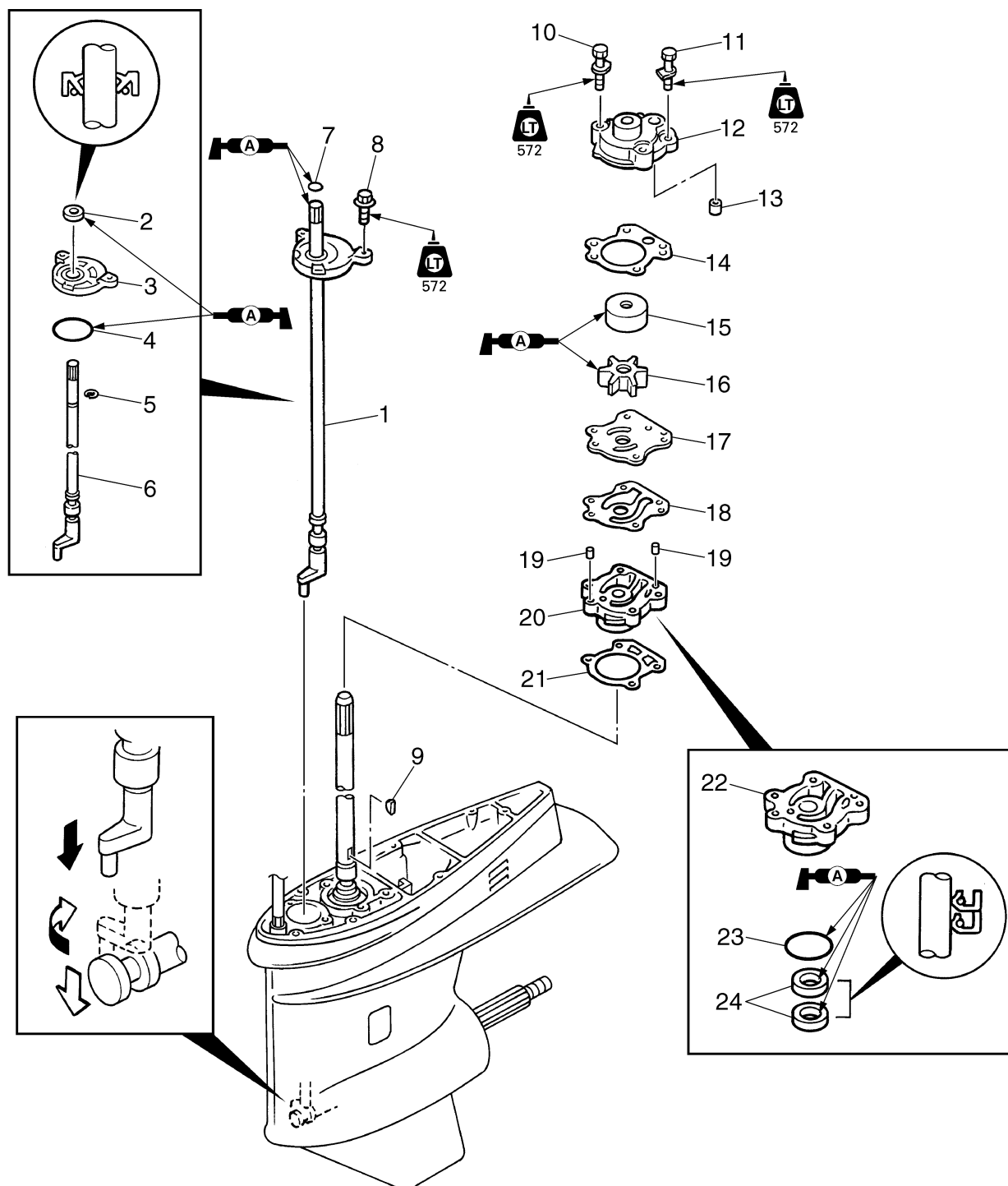
5. Loosen the bolts, and then remove the lower unit from the upper case.



S62Y6500K



Water pump and shift rod



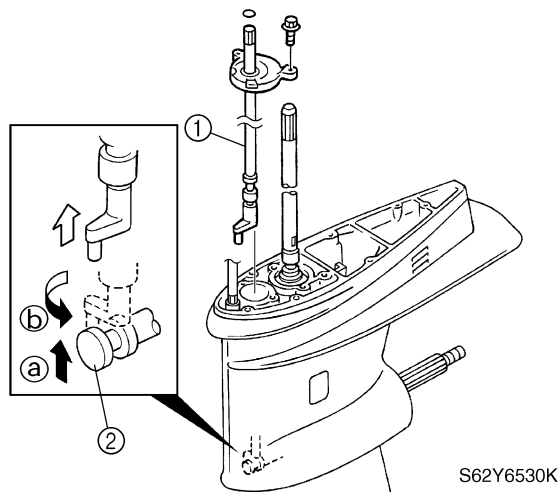
Water pump and shift rod

No.	Part name	Q'ty	Remarks
1	Shift rod assembly	1	
2	Oil seal	1	Not reusable
3	Oil seal housing	1	
4	O-ring	1	Not reusable 49.4 × 3.1 mm
5	Circlip	1	
6	Shift rod	1	
7	O-ring	1	Not reusable 6.8 × 1.9 mm
8	Bolt	2	M6 × 16 mm
9	Woodruff key	1	
10	Bolt	2	M8 × 55 mm
11	Bolt	2	M8 × 45 mm
12	Water pump housing	1	
13	Grommet	1	
14	Gasket	1	Not reusable
15	Insert plate cartridge	1	
16	Impeller	1	
17	Outer plate cartridge	1	
18	Gasket	1	Not reusable
19	Dowel pin	2	
20	Oil seal housing assembly	1	
21	Gasket	1	Not reusable
22	Oil seal housing	1	
23	O-ring	1	Not reusable 46.2 × 3.1 mm
24	Oil seal	2	Not reusable



Removing the water pump and shift rod

1. Remove the water pump assembly and shift rod assembly ①.



NOTE:

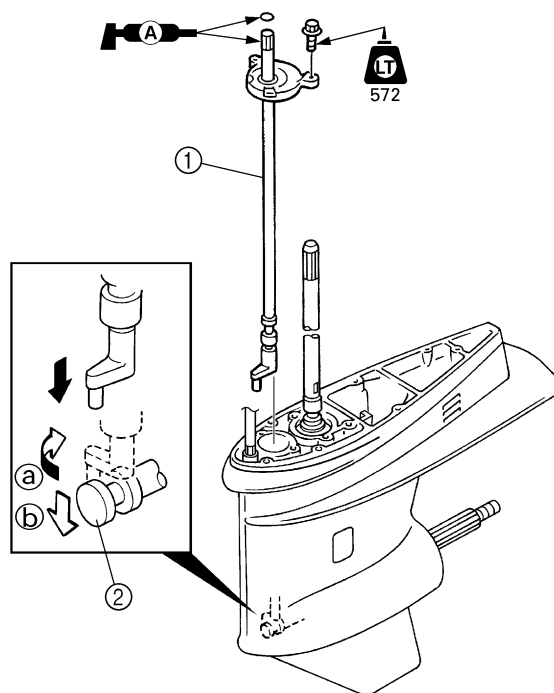
Pull up the shift rod assembly a little ① to disconnect it from the shift slider ②, turn it counterclockwise 90° ②, and then remove it.

Checking the water pump and shift rod

1. Check the pump housing for deformation. Replace if necessary.
2. Check the impeller and insert plate cartridge for cracks or wear. Replace if necessary.
3. Check the Woodruff key and the groove on the drive shaft for wear. Replace if necessary.
4. Check the shift rod for cracks or wear. Replace if necessary.

Installing the water pump and shift rod

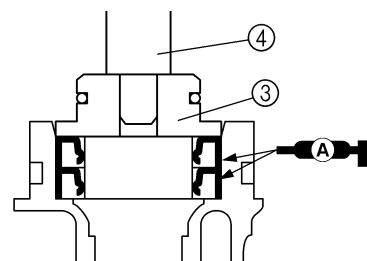
1. Install the shift rod assembly ①.



NOTE:

Install the shift rod assembly into the lower case, turn it clockwise 90° ①, and then push it down ② to connect it to the shift slider ②.

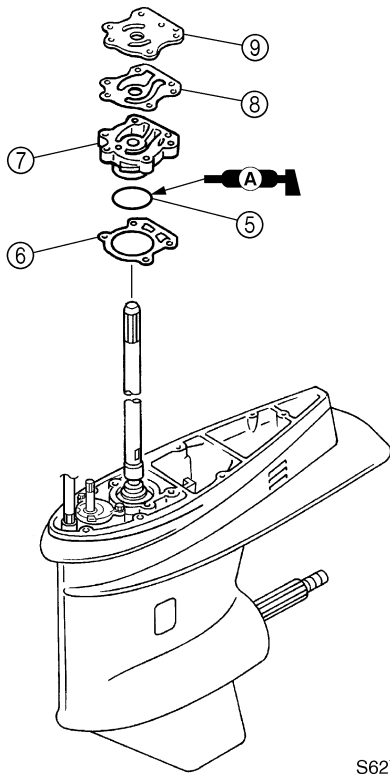
2. Install the new oil seals into the oil seal housing as shown.



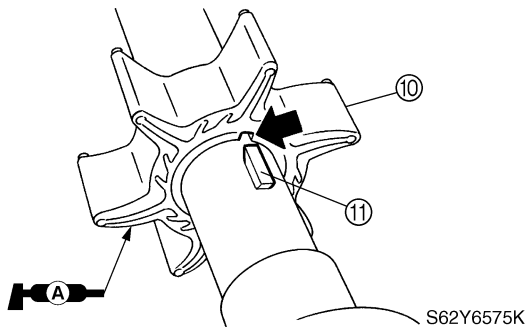
Needle bearing attachment ③:
90890-06610
Driver rod L3 ④: 90890-06652

3. Install the new O-ring ⑤.
4. Install the new gasket ⑥, oil seal housing ⑦, new gasket ⑧, and outer plate cartridge ⑨.

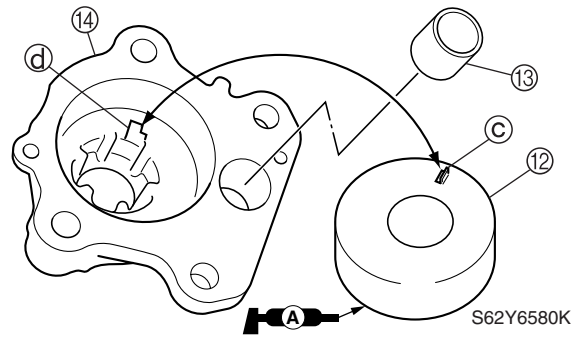
Water pump and shift rod



5. Install the Woodruff key ⑪ into the drive shaft.
6. Align the groove on the impeller ⑩ with the Woodruff key ⑪, and then install it to the drive shaft.

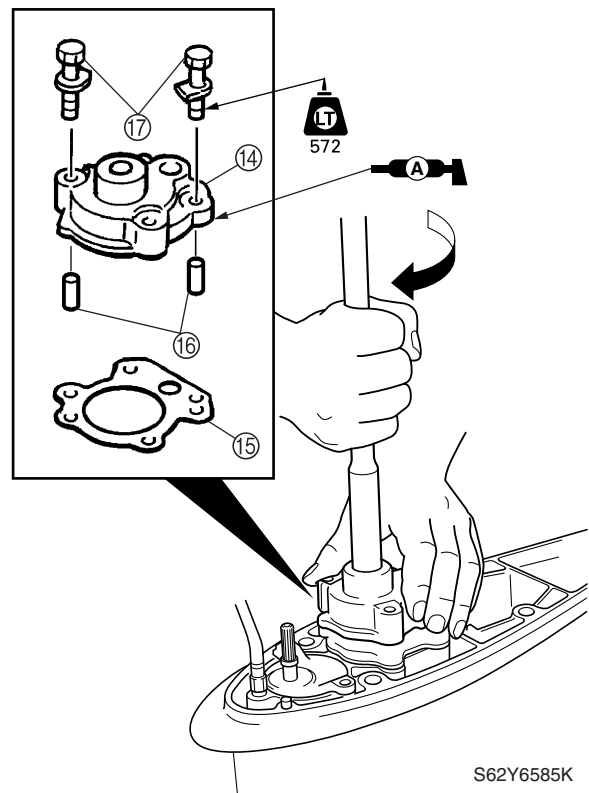


7. Install the insert plate cartridge ⑫ and grommet ⑬ into the pump housing ⑭.



NOTE: Align the insert plate cartridge projection © with the hole ① in the pump housing.

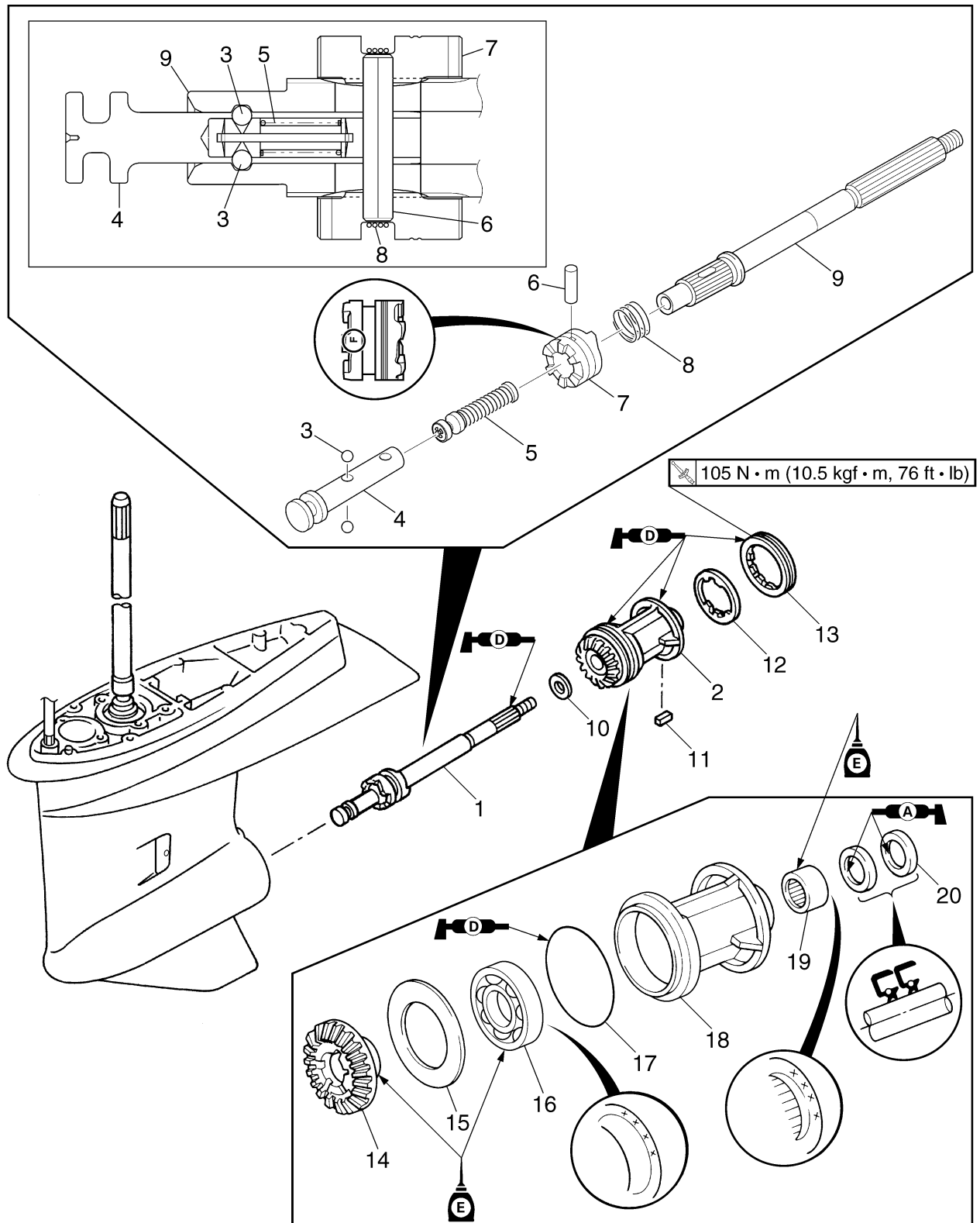
8. Install the new gasket ⑮, pump housing assembly ⑭, and dowel pins ⑯ to the lower case.
9. Install and tighten the bolts ⑰.



NOTE: When installing the pump housing, apply grease to the inside of the housing, and then turn the drive shaft clockwise while pushing down the pump housing.



Propeller shaft housing



S62Y6590K

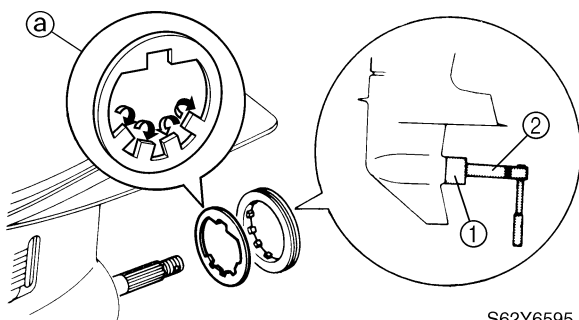
Propeller shaft housing

No.	Part name	Q'ty	Remarks
1	Propeller shaft assembly	1	
2	Propeller shaft housing assembly	1	
3	Ball	2	
4	Slider	1	
5	Shift plunger	1	
6	Cross pin	1	
7	Dog clutch	1	
8	Spring	1	
9	Propeller shaft	1	
10	Washer	1	
11	Straight key	1	
12	Claw washer	1	
13	Ring nut	1	
14	Reverse gear	1	
15	Thrust washer	1	
16	Ball bearing	1	
17	O-ring	1	Not reusable 86.8 × 5.5 mm
18	Propeller shaft housing	1	
19	Needle bearing	1	
20	Oil seal	2	Not reusable



Removing the propeller shaft housing assembly

1. Straighten the claw washer tabs (a), and then remove the ring nut and claw washer.

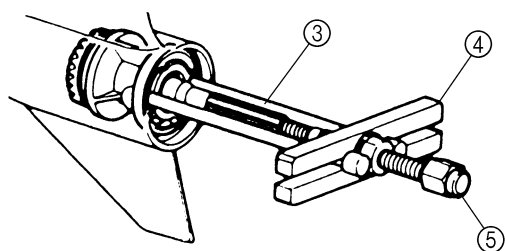


S62Y6595



Ring nut wrench 3 (1): 90890-06511
Ring nut wrench extension (2): 90890-06513

2. Pull out the propeller shaft housing assembly.



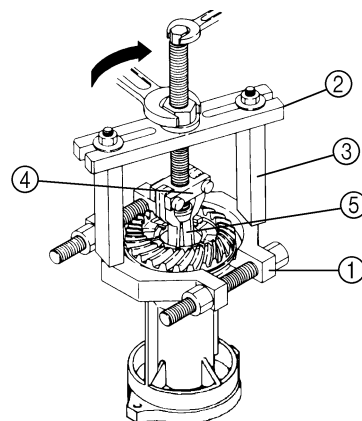
S62Y6605K



Bearing housing puller claw L (3): 90890-06502
Stopper guide plate (4): 90890-06501
Center bolt (5): 90890-06504

Disassembling the propeller shaft housing

1. Remove the reverse gear and thrust washer.



S62Y6615K

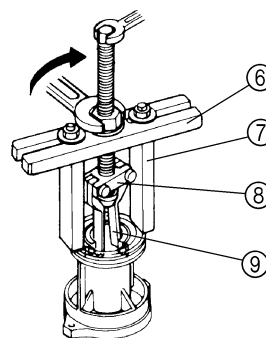


Bearing separator (1): 90890-06534
Stopper guide plate (2): 90890-06501
Stopper guide stand (3): 90890-06538
Bearing puller (4): 90890-06535
Bearing puller claw 1 (5): 90890-06536

NOTE:

Install the bearing separator (1) between the reverse gear and thrust washer completely, then the other special service tools.

2. Remove the ball bearing.

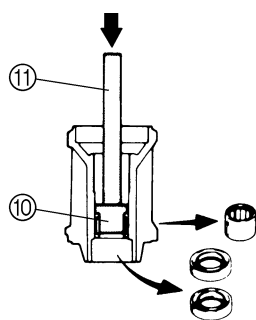


S62Y6625K



Stopper guide plate (6): 90890-06501
Stopper guide stand (7): 90890-06538
Bearing puller (8): 90890-06535
Bearing puller claw 1 (9): 90890-06536

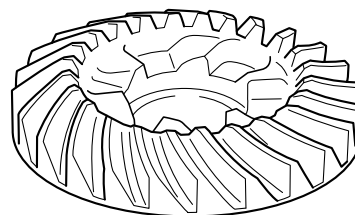
3. Remove the oil seals and needle bearing.



S62Y6630K

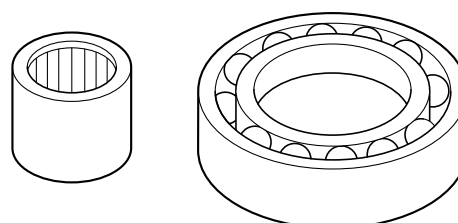


Needle bearing attachment ⑩:
90890-06612
Driver rod L3 ⑪: 90890-06652



S62Y6640

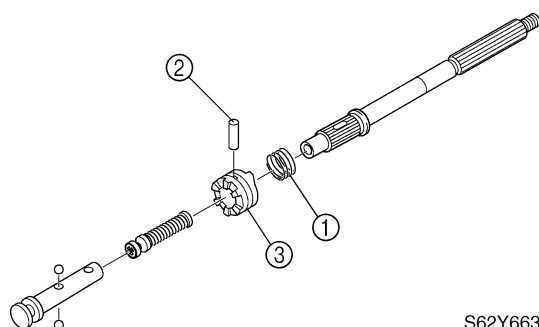
3. Check the bearings for pitting or rumbling. Replace if necessary.



S62Y6645

Disassembling the propeller shaft assembly

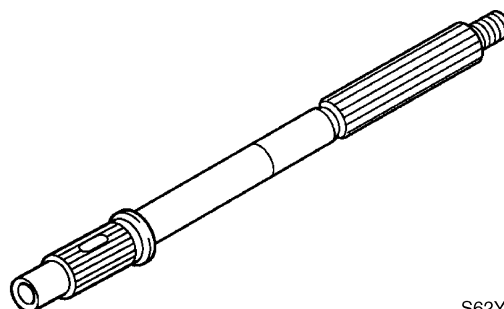
1. Remove the spring ①, and then remove the cross pin ②, dog clutch ③, slider and shift plunger.



S62Y6635

Checking the propeller shaft

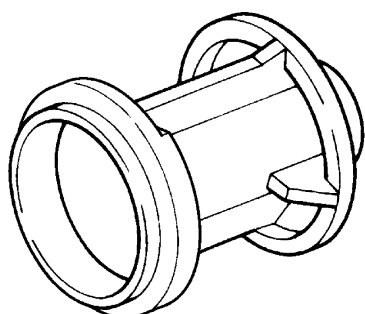
1. Check the propeller shaft for bends or wear. Replace if necessary.



S62Y6660

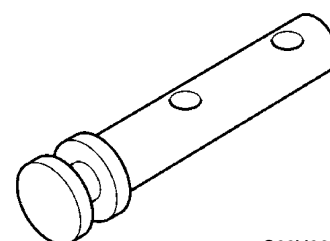
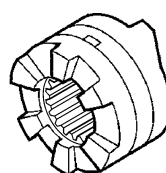
Checking the propeller shaft housing

1. Clean the propeller shaft housing using a soft brush and cleaning solvent, and then check it for cracks. Replace if necessary.



S62Y6650

2. Check the teeth and dogs of the reverse gear for cracks or wear. Replace the gear if necessary.

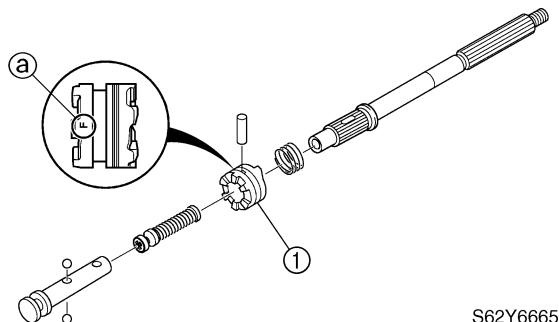


S62Y6655



Assembling the propeller shaft assembly

1. Install the dog clutch as shown.



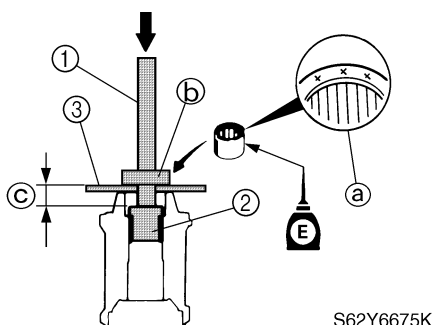
S62Y6665

NOTE:

Install the dog clutch ① with the “F” mark (a) facing toward the shift slider.

Assembling the propeller shaft housing

1. Install the needle bearing into the propeller shaft housing to the specified depth.



S62Y6675K

NOTE:

- Install the needle bearing with the manufacture identification mark (a) facing toward the oil seal (propeller side).
- When using the driver rod, do not strike the special tool in a manner that will force the stopper (b) out of place.

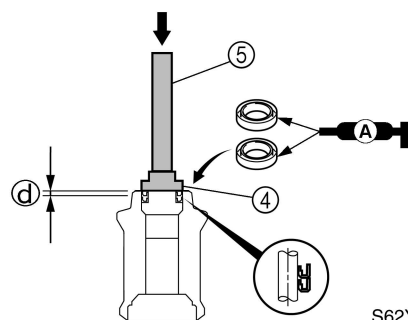


Driver rod SS ①: 90890-06604
Needle bearing attachment ②:
90890-06612
Bearing depth plate ③: 90890-06603



Depth (c):
25.0–25.5 mm (0.98–1.00 in)

2. Apply grease to the new oil seals, and then install them into the propeller shaft housing to the specified depth.



S62Y6685K

NOTE:

Install an oil seal halfway into the propeller shaft housing, then the other oil seal.

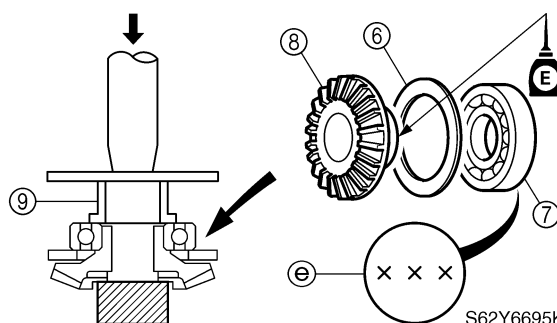


Ball bearing attachment ④:
90890-06655
Driver rod LS ⑤: 90890-06606



Depth (d): 4.5–5.5 mm (0.18–0.22 in)

3. Install the thrust washer (6) and ball bearing (7) to the reverse gear (8) using a press.



S62Y6695K

NOTE:

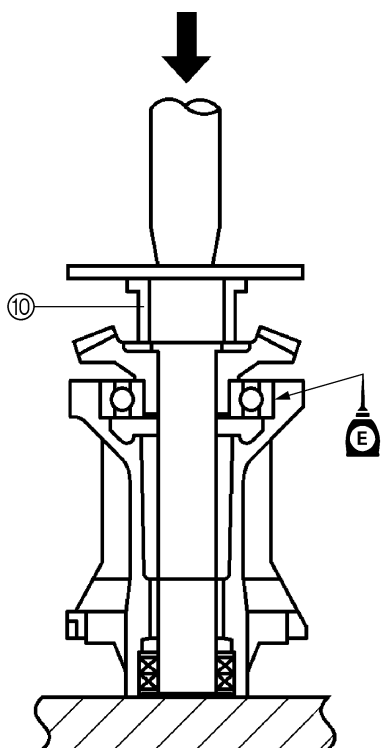
Install the ball bearing with the manufacture identification mark (e) facing outward (propeller side).



Bearing inner race attachment ⑨:
90890-06639

Propeller shaft housing

4. Install the reverse gear assembly to the propeller shaft housing using a press.



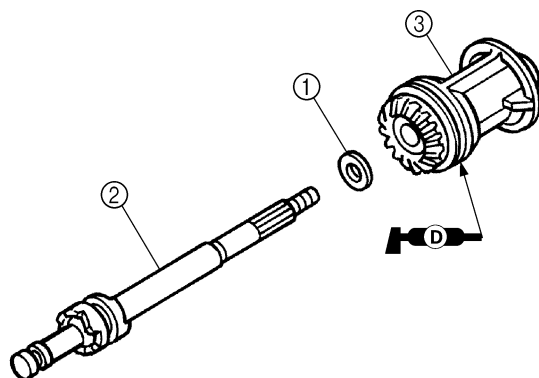
S62Y6700K



Bearing inner race attachment ⑩:
90890-06661

Installing the propeller shaft housing

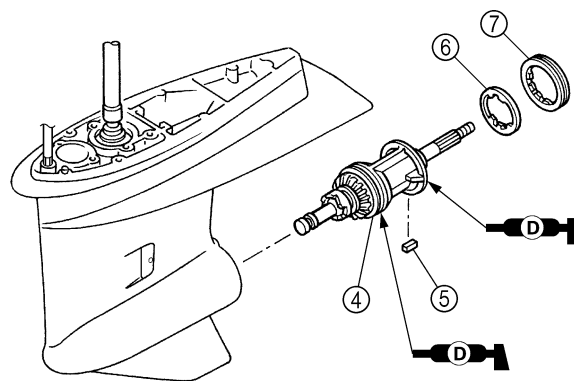
1. Install the washer ①, propeller shaft assembly ②, into the propeller shaft housing assembly ③.
2. Apply grease to the new O-rings.



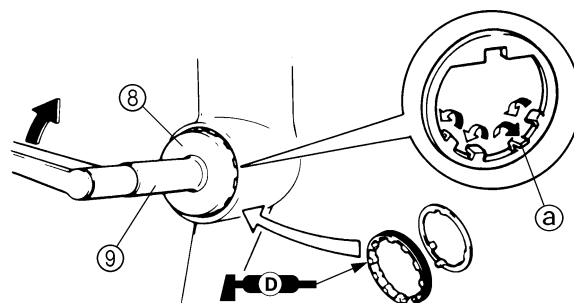
S62Y6705

3. Install the propeller shaft housing assembly ④ into the lower case, and then install the straight key ⑤, claw washer ⑥, and ring nut ⑦.

4. Tighten the nut to the specified torque.



S62Y6710



S62Y6715

NOTE:

Secure the ring nut by bending one tab ① into the slot in the ring nut and the other tabs toward the propeller shaft housing assembly.



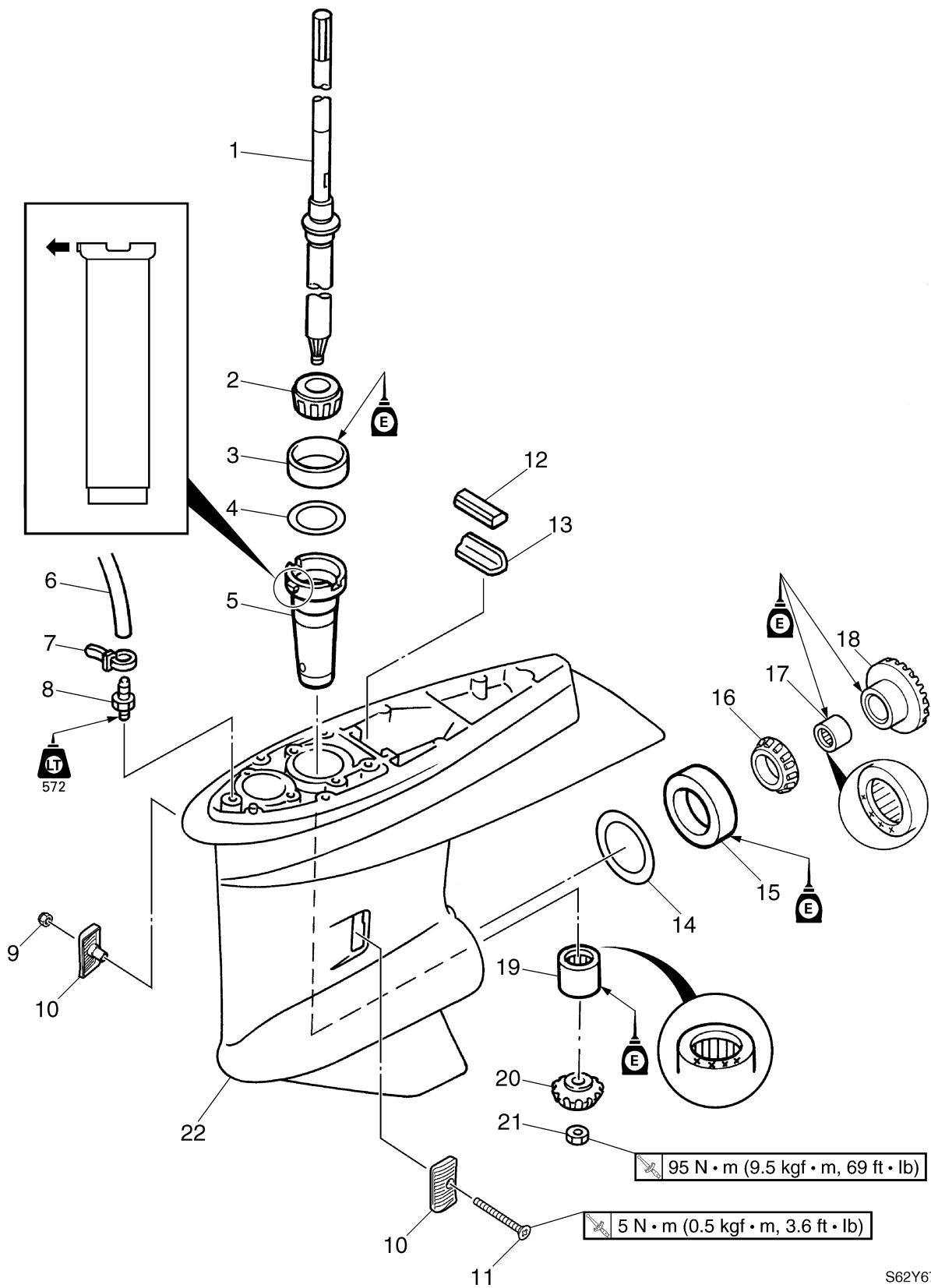
Ring nut wrench 3 ⑧: 90890-06511

Ring nut wrench extension ⑨:
90890-06513



Ring nut ⑦:
105 N·m (10.5 kgf·m, 76 ft·lb)

Drive shaft and lower case



S62Y6720K

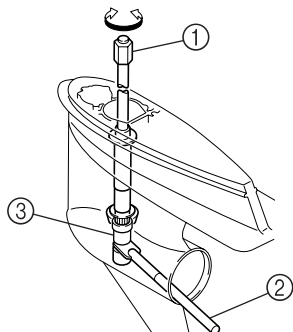
Drive shaft and lower case

No.	Part name	Q'ty	Remarks
1	Drive shaft	1	
2	Taper roller bearing	1	Not reusable
3	Bearing outer race	1	Not reusable
4	Pinion shim	—	As required
5	Sleeve	1	
6	Hose	1	200.0 mm (7.9 in)
7	Plastic tie	1	Not reusable
8	Joint	1	
9	Nut	1	
10	Water inlet cover	2	
11	Screw	1	
12	Seal	1	
13	Plate	1	
14	Forward gear shim	—	As required
15	Bearing outer race	1	Not reusable
16	Taper roller bearing	1	Not reusable
17	Needle bearing	1	
18	Forward gear	1	
19	Needle bearing	1	
20	Pinion	1	
21	Nut	1	
22	Lower case	1	



Removing the drive shaft

1. Remove the drive shaft assembly and pinion, and then pull out the forward gear.



S62Y6850K



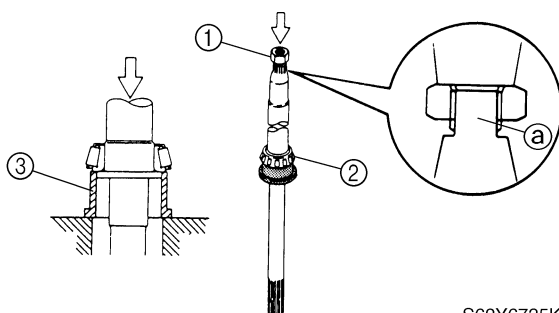
Drive shaft holder 4 (1): 90890-06518

Pinion nut holder (2): 90890-06505

Socket adapter 2 (3): 90890-06507

Disassembling the drive shaft

1. Install the pinion nut (1), tighten it finger tight, and then remove the drive shaft bearing (2) using a press.



S62Y6735K

CAUTION:

- Do not press the drive shaft threads (a) directly.
- Do not reuse the bearing, always replace it with a new one.

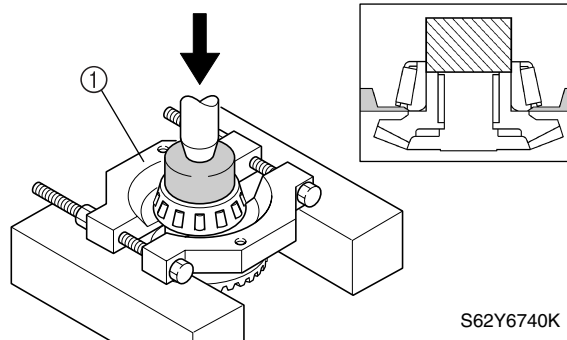


Bearing inner race attachment (3):

90890-06639

Disassembling the forward gear

1. Remove the taper roller bearing from the forward gear using a press.



S62Y6740K

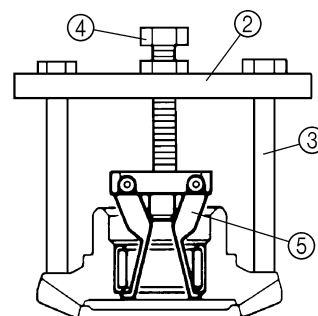
CAUTION:

Do not reuse the bearing, always replace it with a new one.



Bearing separator (1): 90890-06534

2. Remove the needle bearing from the forward gear.



S62Y6750K

CAUTION:

Do not reuse the bearing, always replace it with a new one.



Stopper guide plate (2): 90890-06501

Stopper guide stand (3):

90890-06538

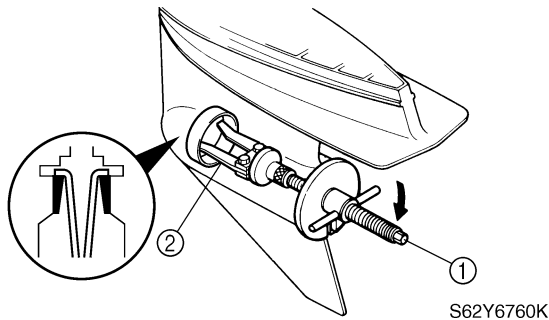
Bearing puller (4): 90890-06535

Bearing puller claw 1 (5):

90890-06536

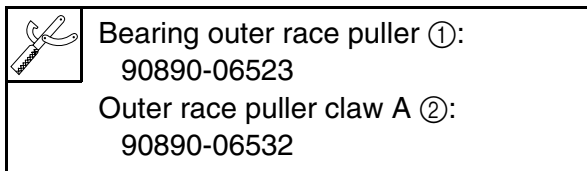
Disassembling the lower case

1. Remove the taper roller bearing outer race and shim(s).

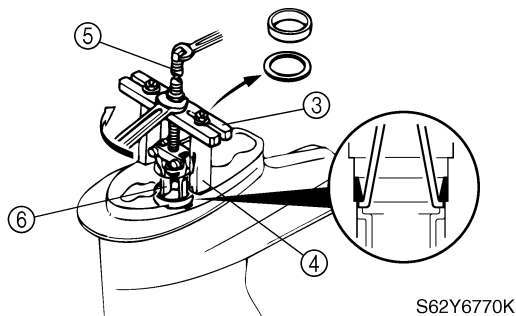


NOTE:

Install the claws as shown.

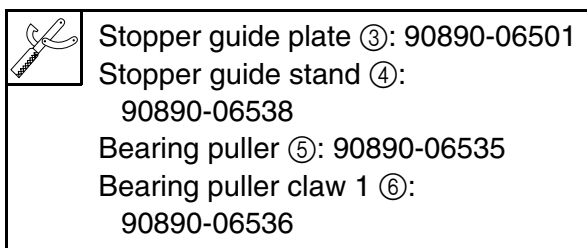


2. Remove the drive shaft bearing outer race, shim(s), and drive shaft sleeve.

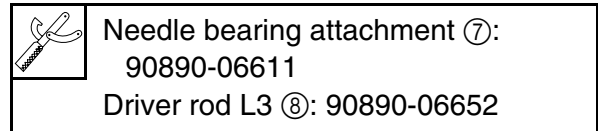
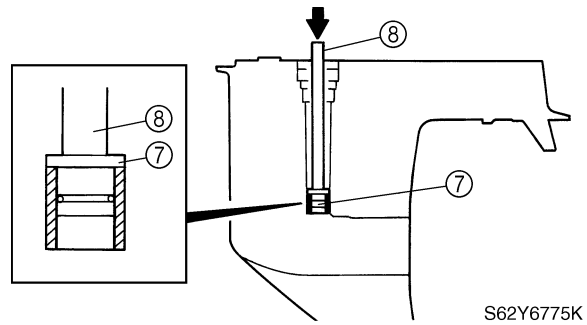


NOTE:

Install the claws as shown.

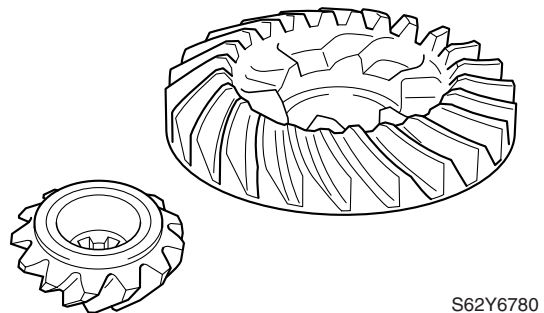


3. Remove the needle bearing.



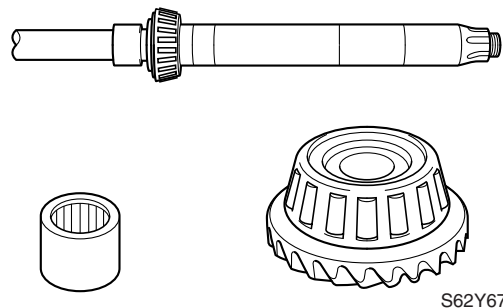
Checking the pinion and forward gear

1. Check the teeth of the pinion, and the teeth and dogs of the forward gear for cracks or wear. Replace if necessary.



Checking the bearings

1. Check the bearings for pitting or rumbling. Replace if necessary.



Checking the drive shaft

1. Check the drive shaft for bends or wear. Replace if necessary.

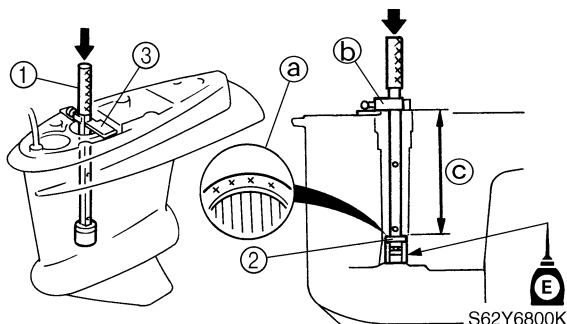


Checking the lower case

1. Check the skeg and torpedo for cracks or damage. Replace if necessary.

Assembling the lower case

1. Install the needle bearing into the lower case to the specified depth.



NOTE:

- Install the needle bearing with the manufacture identification mark (a) facing upward.
- When using the driver rod, do not strike the special tool in a manner that will force the stopper (b) out of place.

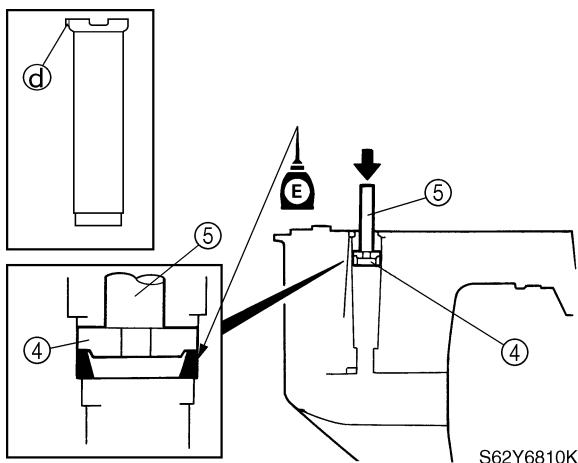


Driver rod SL (1): 90890-06602
Needle bearing attachment (2): 90890-06611
Bearing depth plate (3): 90890-06603



Depth (c):
186.4–188.6 mm (7.34–7.43 in)

2. Install the sleeve, original shim(s), and drive shaft bearing outer race.



CAUTION:

Add or remove shims, if necessary, when replacing the pinion or lower case.

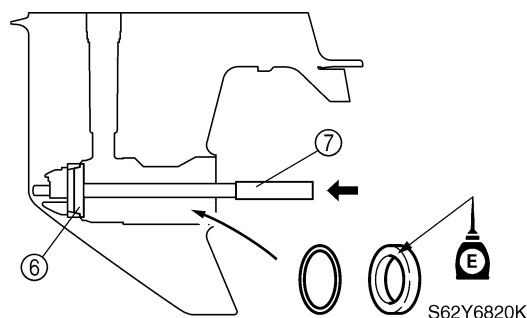
NOTE:

- Apply the gear oil to the inside and outside of the sleeve.
- Install the sleeve by facing the projection (d) forward.



Bearing outer race attachment (4): 90890-06626
Driver rod LL (5): 90890-06605

3. Install the original shim(s) and taper roller bearing outer race.



CAUTION:

Add or remove shims, if necessary, when replacing the forward gear or lower case.

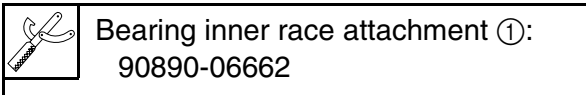
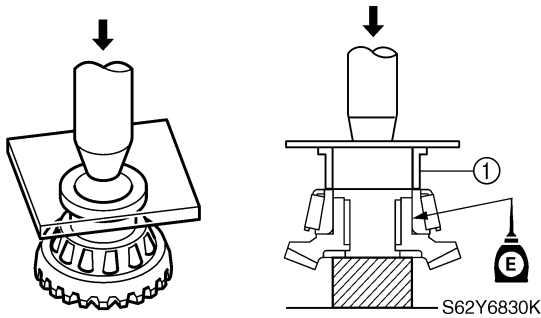


Bearing outer race attachment (6): 90890-06621
Driver rod LL (7): 90890-06605

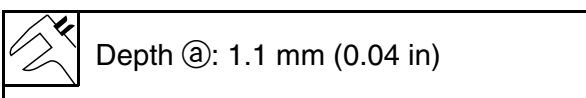
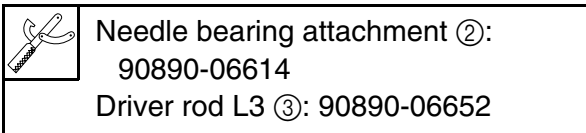
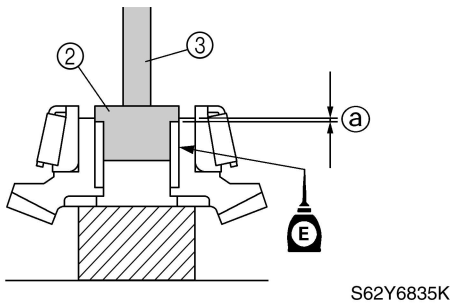
Assembling the forward gear

1. Install the new taper roller bearing into the forward gear using a press.

Drive shaft and lower case

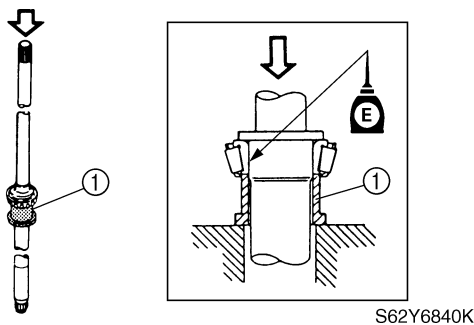


2. Install the new needle bearing into the forward gear to the specified depth.



Assembling the drive shaft

1. Install the new drive shaft bearing into the drive shaft using a press.



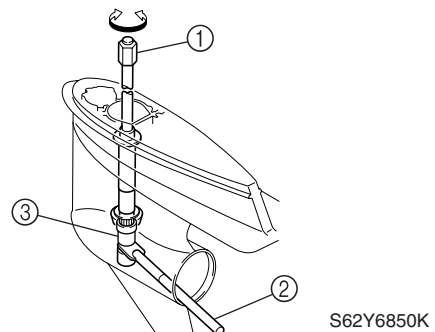
NOTE: Use the special service tool or a general pipe with the specified measurements.



Bearing inner race attachment (1):
90890-06643

Installing the pinion

1. Install the forward gear, then the drive shaft assembly, pinion, and pinion nut, and then tighten the nut to the specified torque.



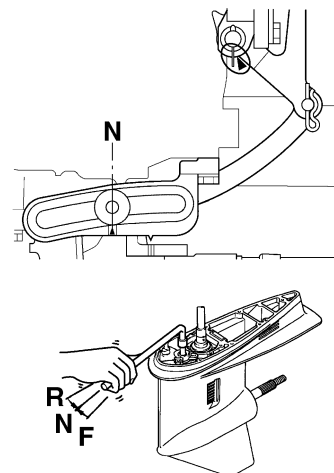
Drive shaft holder 4 (1): 90890-06518
Pinion nut holder (2): 90890-06505
Socket adapter 2 (3): 90890-06507



Pinion nut:
95 N·m (9.5 kgf·m, 68 ft·lb)

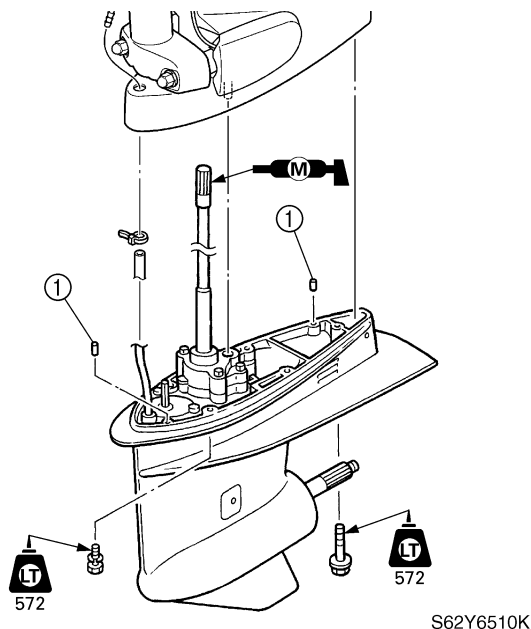
Installing the lower unit

1. Set the gearshift to the neutral position at the lower unit.



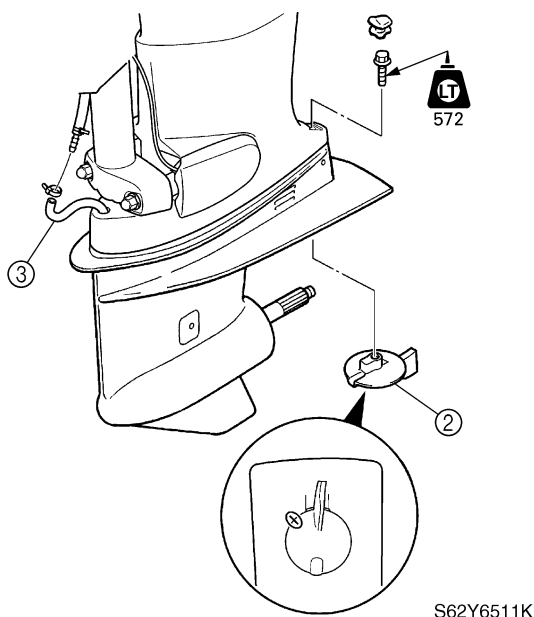


2. Install the two dowel pins ① to the lower unit.
3. Install the lower unit to the upper case, and then tighten the bolts to the specified torque.

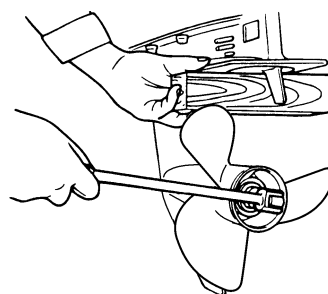
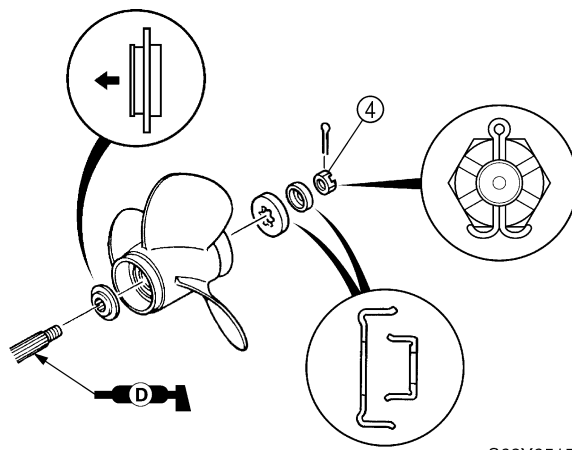


 Mounting bolt:
40 N·m (4.0 kgf·m, 29 ft·lb)

4. Install the trim tab ② to its original position, and then connect the speedometer hose ③.



5. Install the propeller and propeller nut, tighten the nut finger tight. Place a block of wood between the anti-cavitation plate and propeller to keep the propeller from turning, and then tighten the nut to the specified torque.



⚠ WARNING

Do not hold the propeller with your hands when loosening or tightening it. Be sure to remove the battery leads from the batteries and the engine shut-off switch. Put a block of wood between the cavitation plate and propeller to keep the propeller from turning.

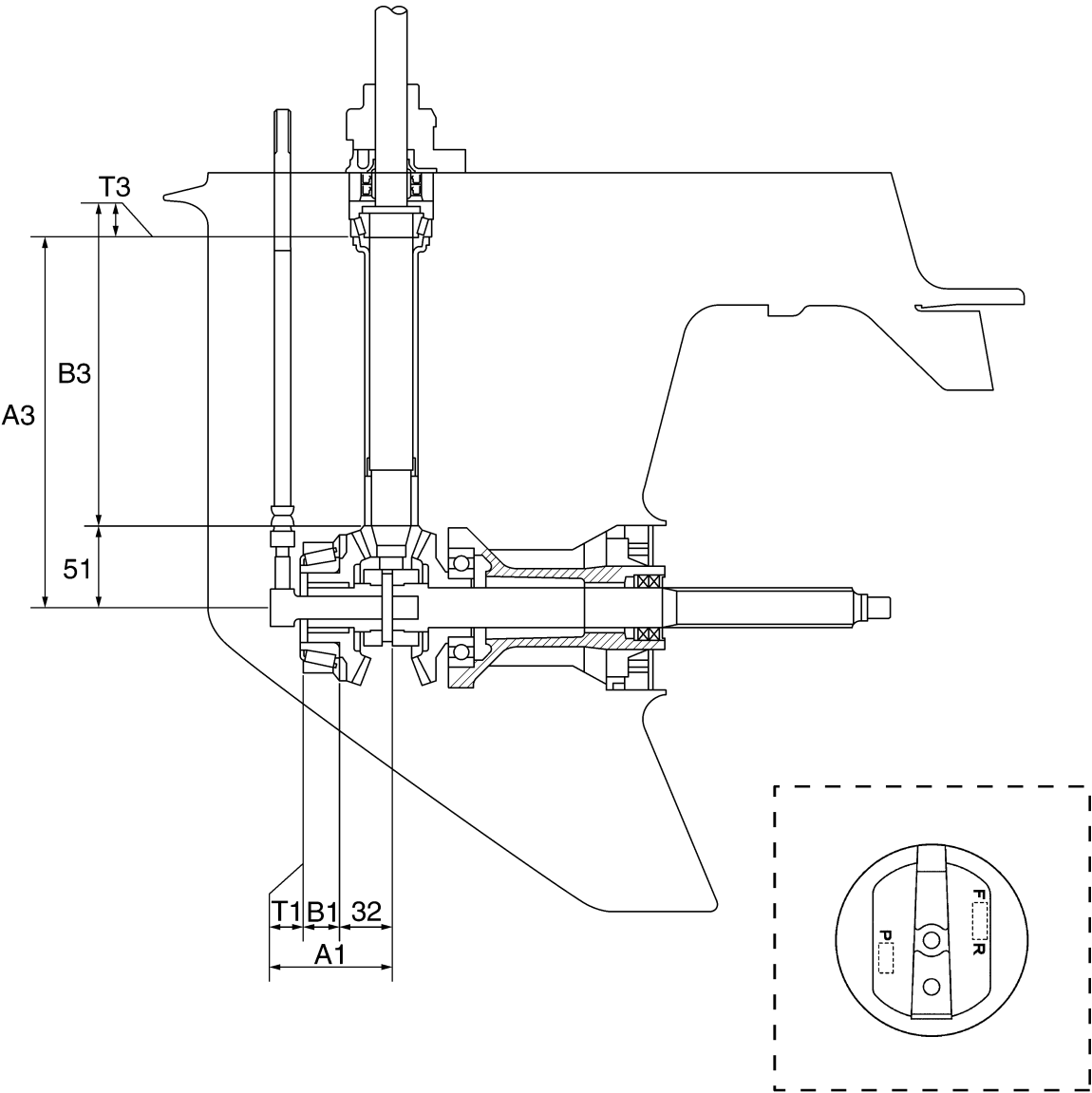
NOTE:

If the grooves in the propeller nut ④ do not align with the cotter pin hole, tighten the nut until they are aligned.



Propeller nut ④:
35 N·m (3.5 kgf·m, 25 ft·lb)

Shimming



6

S62Y6900



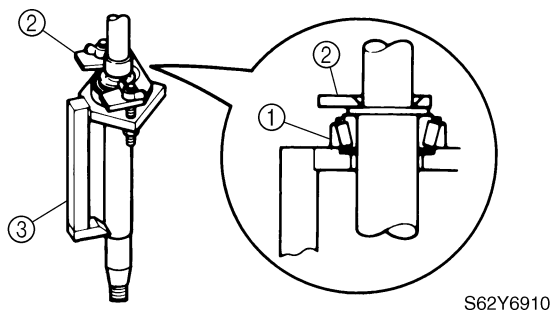
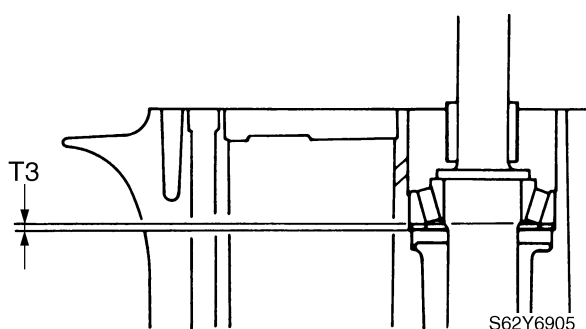
Shimming

NOTE:

- Shimming is not required when assembling the original lower case and inner parts.
- Shimming is required when assembling the original inner parts and a new lower case.
- Shimming is required when replacing the inner part(s).

Selecting the pinion shims

1. Install the drive shaft and drive shaft bearing ① to the shimming tools.



NOTE:

- Select the shim thickness (T3) by using the specified measurement(s) and the calculation formula.
- Install the shimming tool to the drive shaft so that the shaft is at the center of the hole.
- Tighten the wing nuts another 1/4 of a turn after they contact the fixing plate ②.



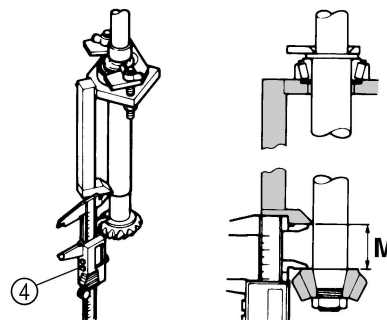
Pinion height gauge ③:
90890-06702

2. Install the pinion and pinion nut, and then tighten the nut to the specified torque.



Pinion nut:
95 N·m (9.5 kgf·m, 69 ft·lb)

3. Measure the distance (M) between the shimming tool and the pinion as shown.



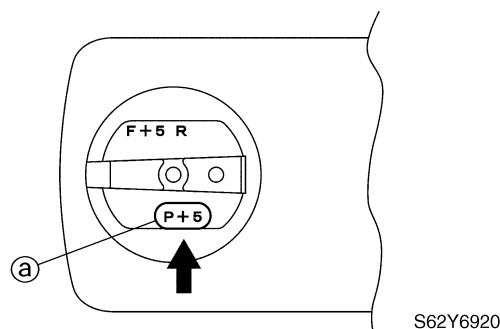
NOTE:

Measure the pinion at three points to find the clearance average.



Digital caliper ④: 90890-06704

4. Calculate the pinion shim thickness (T3) as shown in the examples below.



NOTE:

“P” is the deviation of the lower case dimension from standard. The “P” mark ⑤ is stamped on the trim tab mounting surface of the lower case in 0.01 mm units. If the “P” mark is unreadable, assume that “P” is zero and check the backlash when the unit is assembled.

Pinion shim thickness (T3) =
 $M - 31.50 \text{ mm} - P/100$

Example:

If “M” is “32.10 mm” and “P” is “+5”, then

$$T3 = 32.10 - 31.50 - (+5)/100 \text{ mm} \\ = 0.60 - 0.05 \text{ mm} = 0.55 \text{ mm}$$

If “M” is “32.10 mm” and “P” is “-5”, then

$$T3 = 32.10 - 31.50 - (-5)/100 \text{ mm} \\ = 0.60 + 0.05 \text{ mm} = 0.65 \text{ mm}$$

5. Select the pinion shim(s) (T3) as follows.

Calculated numeral at 1/100 place	Rounded numeral
0, 1	2
2, 3, 4	5
5, 6, 7	8
8, 9	10

Available shim thicknesses:

0.10, 0.12, 0.15, 0.18, 0.30, 0.40, and 0.50 mm

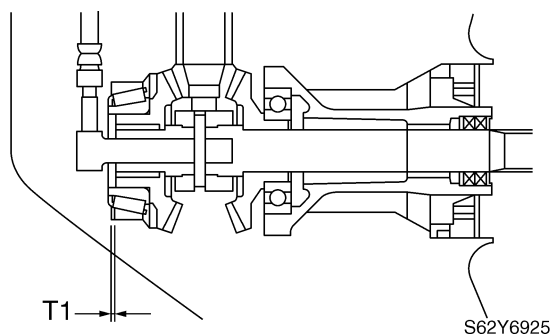
Example:

If “T3” is “0.59 mm”, then the pinion shim is 0.60 mm.

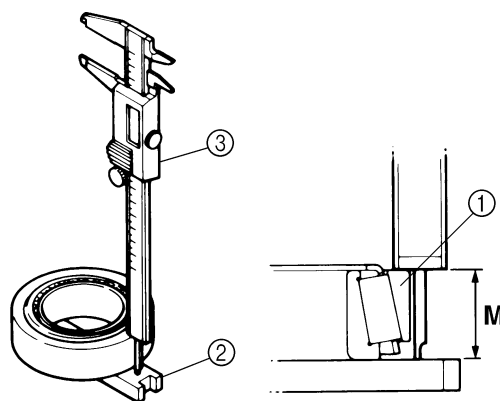
If “T3” is “0.64 mm”, then the pinion shim is 0.65 mm.

Selecting the forward gear shims

- Turn the taper roller bearing outer race ① two or three times to seat the rollers, and then measure the bearing height (M) as shown.



S62Y6925



S62Y6930

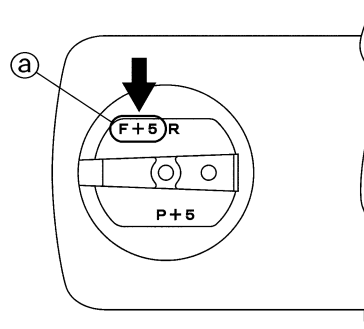
NOTE:

- Select the shim thickness (T1) by using the specified measurement(s) and the calculation formula.
- Measure the bearing outer race at three points to find height average.



Shimming plate ②: 90890-06701
Digital caliper ③: 90890-06704

- Calculate the forward gear shim thickness (T1) as shown in the examples below.



S62Y6935

NOTE:

“F” is the deviation of the lower case dimension from standard. The “F” mark ② is stamped on the trim tab mounting surface of the lower case in 0.01 mm units. If the “F” mark unreadable, assume that “F” is zero and check the backlash when the unit is assembled.

$$\text{Forward gear shim thickness (T1)} = \\ 24.50 + F/100 - M$$



Example:

If "M" is "24.00 mm" and "F" is "+5", then

$$T1 = 24.50 + (+5)/100 - 24.00 \text{ mm} \\ = 0.50 + 0.05 \text{ mm} = 0.55 \text{ mm}$$

If "M" is "24.00 mm" and "F" is "-5", then

$$T1 = 24.50 + (-5)/100 - 24.00 \text{ mm} \\ = 0.50 - 0.05 \text{ mm} = 0.45 \text{ mm}$$

3. Select the forward gear shim(s) (T1) as follows.

Calculated numeral at 1/100 place	Rounded numeral
1, 2	0
3, 4, 5	2
6, 7, 8	5
9, 10	8

Available shim thicknesses:

0.10, 0.12, 0.15, 0.18, 0.30, 0.40, and 0.50 mm

Example:

If "T1" is "0.45 mm", then the forward gear shim is 0.42 mm.

If "T1" is "0.50 mm", then the forward gear shim is 0.48 mm.

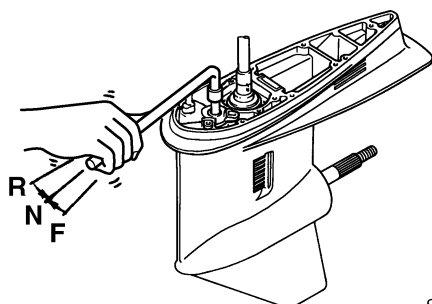
Selecting the reverse gear shims

There is no need to select the reverse gear shims.

Backlash

Measuring the forward gear backlash

1. Remove the water pump assembly.
2. Set the gearshift to the neutral position.

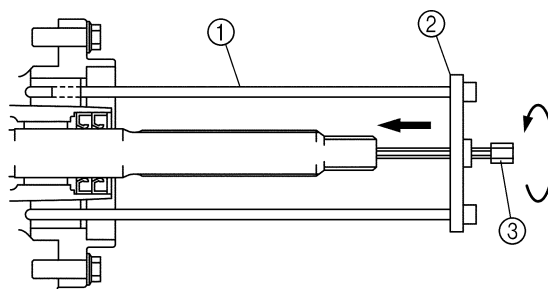


S62Y6940K



Shift rod push arm: 90890-06052

3. Install the special service tool so that it pushes against the propeller shaft.



S62Y6955K

NOTE:

Tighten the universal puller or center bolt while turning the drive shaft until the drive shaft can no longer be turned.

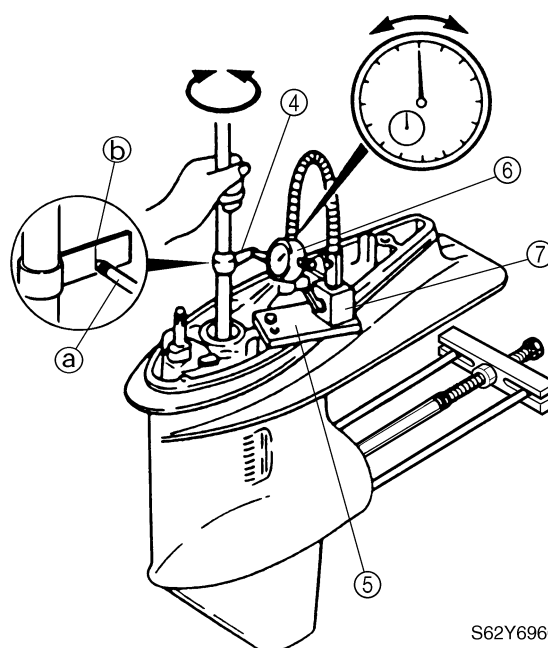


Bearing housing puller claw L ①:
90890-06502

Stopper guide plate ②: 90890-06501

Center bolt ③: 90890-06504

4. Install the backlash indicator onto the drive shaft (18 mm [0.71 in] in diameter), then the dial gauge onto the lower unit.



S62Y6960K

NOTE:

Install the dial gauge so that the plunger ④ contacts the mark ⑤ on the backlash indicator.



Backlash indicator ④: 90890-06706
Magnet base plate ⑤: 90890-07003
Dial gauge set ⑥: 90890-01252
Magnet base ⑦: 90890-06705

5. Slowly turn the drive shaft clockwise and counterclockwise and measure the backlash when the drive shaft stops in each direction.



Forward gear backlash:
0.12–0.45 mm (0.005–0.018 in)

6. Add or remove shims if out of specification.

Forward gear backlash	Shim thickness
Less than 0.12 mm (0.005 in)	To be decreased by $(0.29 - M) \times 0.57$
More than 0.45 mm (0.018 in)	To be increased by $(M - 0.29) \times 0.57$

M: Measurement

Available shim thicknesses:
0.10, 0.12, 0.15, 0.18, 0.30, 0.40, and
0.50 mm

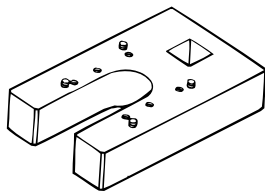
7. Remove the special service tools from the propeller shaft.

Bracket unit

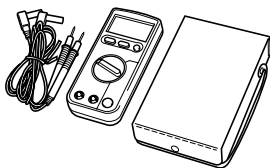
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Special service tools

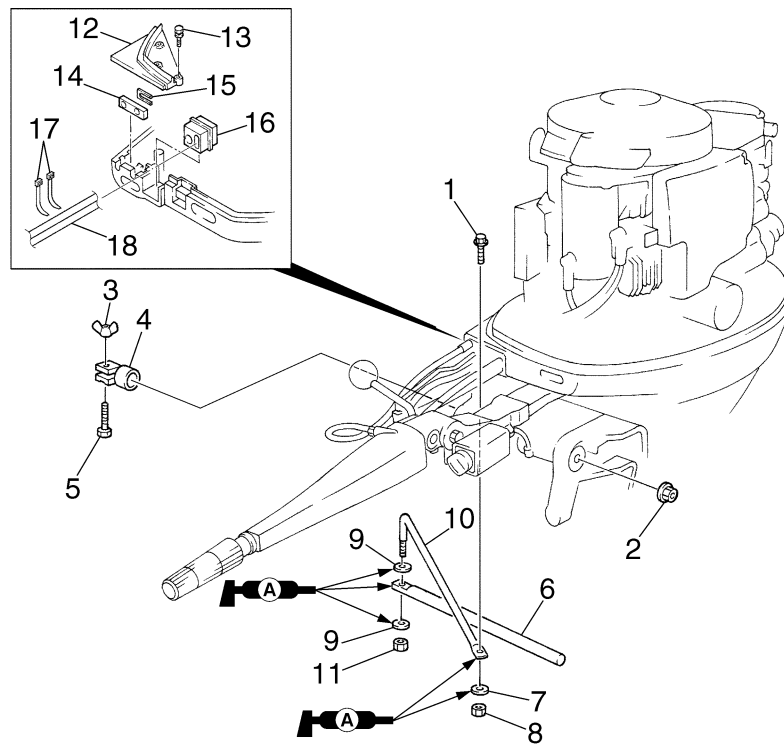


Cylinder-end screw wrench
90890-06544



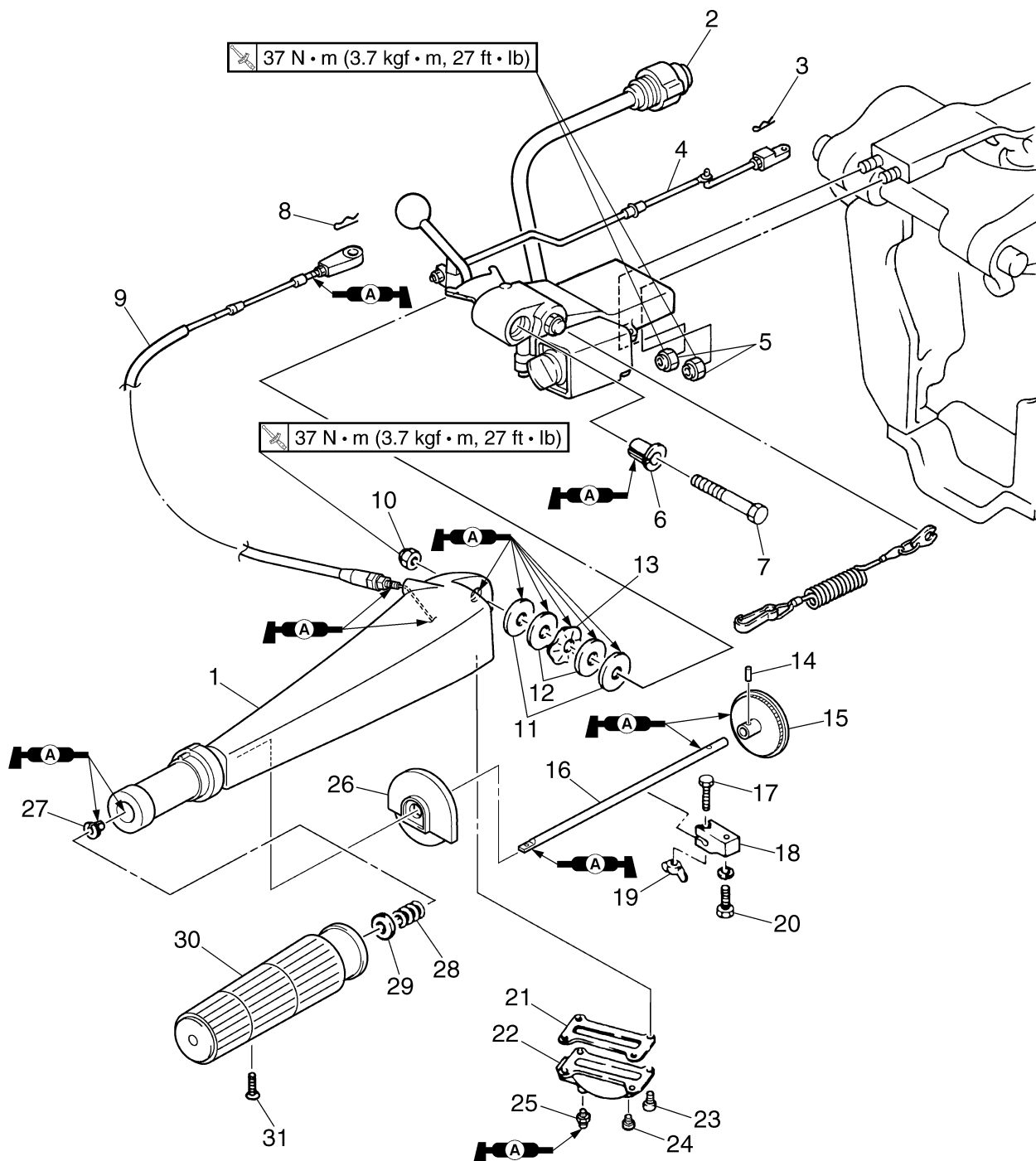
Digital circuit tester
90890-03174

Tiller handle



S62Y7060K

No.	Part name	Q'ty	Remarks
1	Bolt	1	M8 × 30 mm
2	Nut	1	
3	Wing nut	1	
4	Friction piece	1	
5	Bolt	1	M6 × 35 mm
6	Friction rod	1	
7	Washer	1	
8	Nut	1	
9	Washer	2	M6 × 20 mm
10	Link rod	1	
11	Nut	1	
12	Plate	1	
13	Bolt	3	
14	Grommet	1	
15	Cable guide	1	
16	Grommet	1	
17	Plastic tie	2	
18	Battery lead	1	

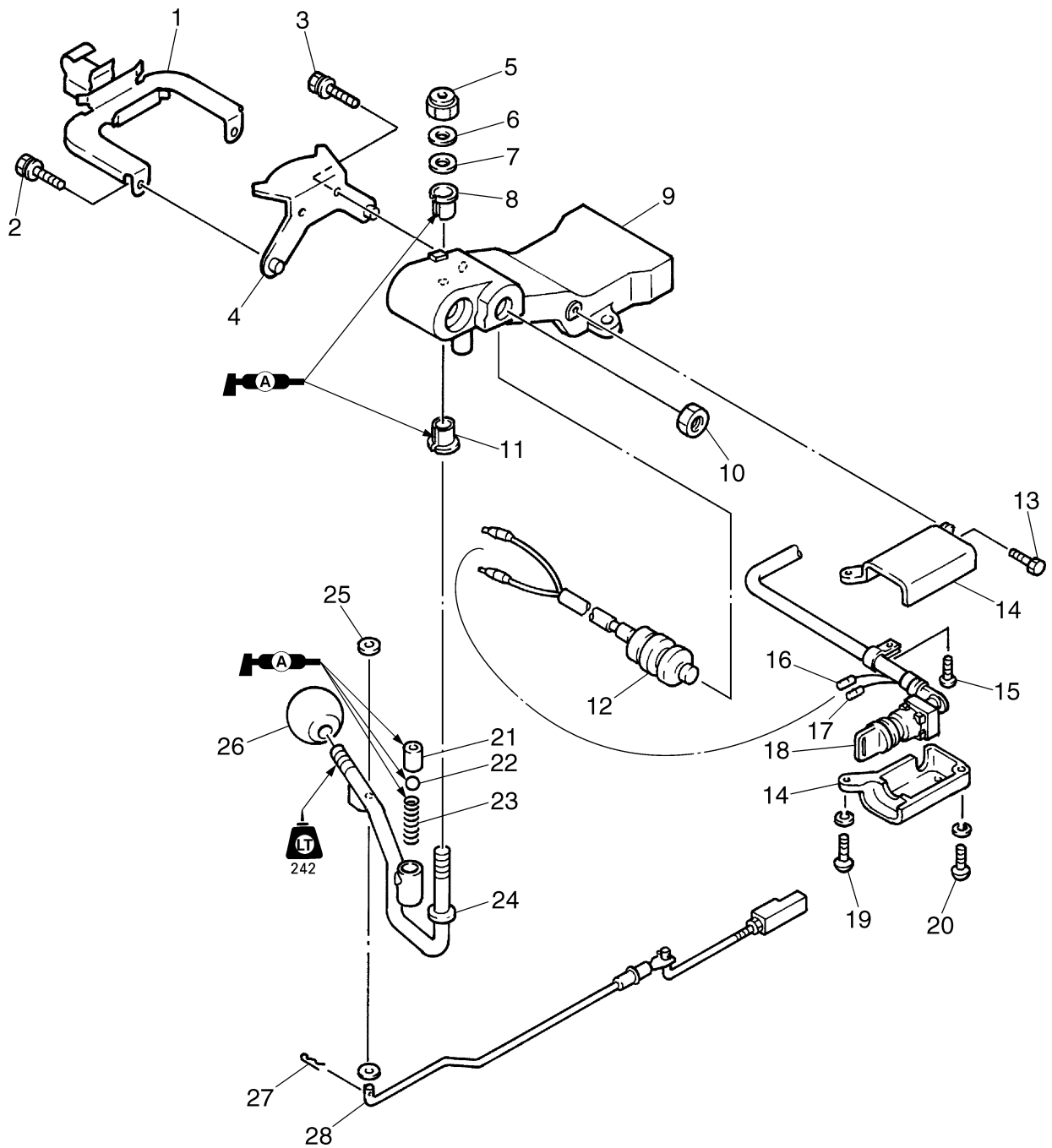


S62Y7070K

Tiller handle

No.	Part name	Q'ty	Remarks
1	Tiller handle	1	
2	Tiller handle wiring harness	1	
3	Clip	1	
4	Shift rod	1	
5	Nut	2	
6	Bushing	1	
7	Bolt	1	M12 × 70 mm
8	Clip	1	
9	Throttle cable	1	
10	Nut	1	
11	Plastic washer	2	
12	Metal washer	2	
13	Wave washer	1	
14	Pin	1	
15	Gear	1	
16	Throttle shaft	1	
17	Bolt	1	M6 × 25 mm
18	Friction piece	1	
19	Wing nut	1	
20	Bolt	1	M6 × 25 mm
21	Gasket	1	
22	Cover	1	
23	Bolt	4	M5 × 14 mm
24	Bolt	1	M6 × 8 mm
25	Grease nipple	1	
26	Case	1	
27	Bushing	1	
28	Spring	1	
29	Washer	1	
30	Throttle grip	1	
31	Screw	1	M5 × 25 mm

7



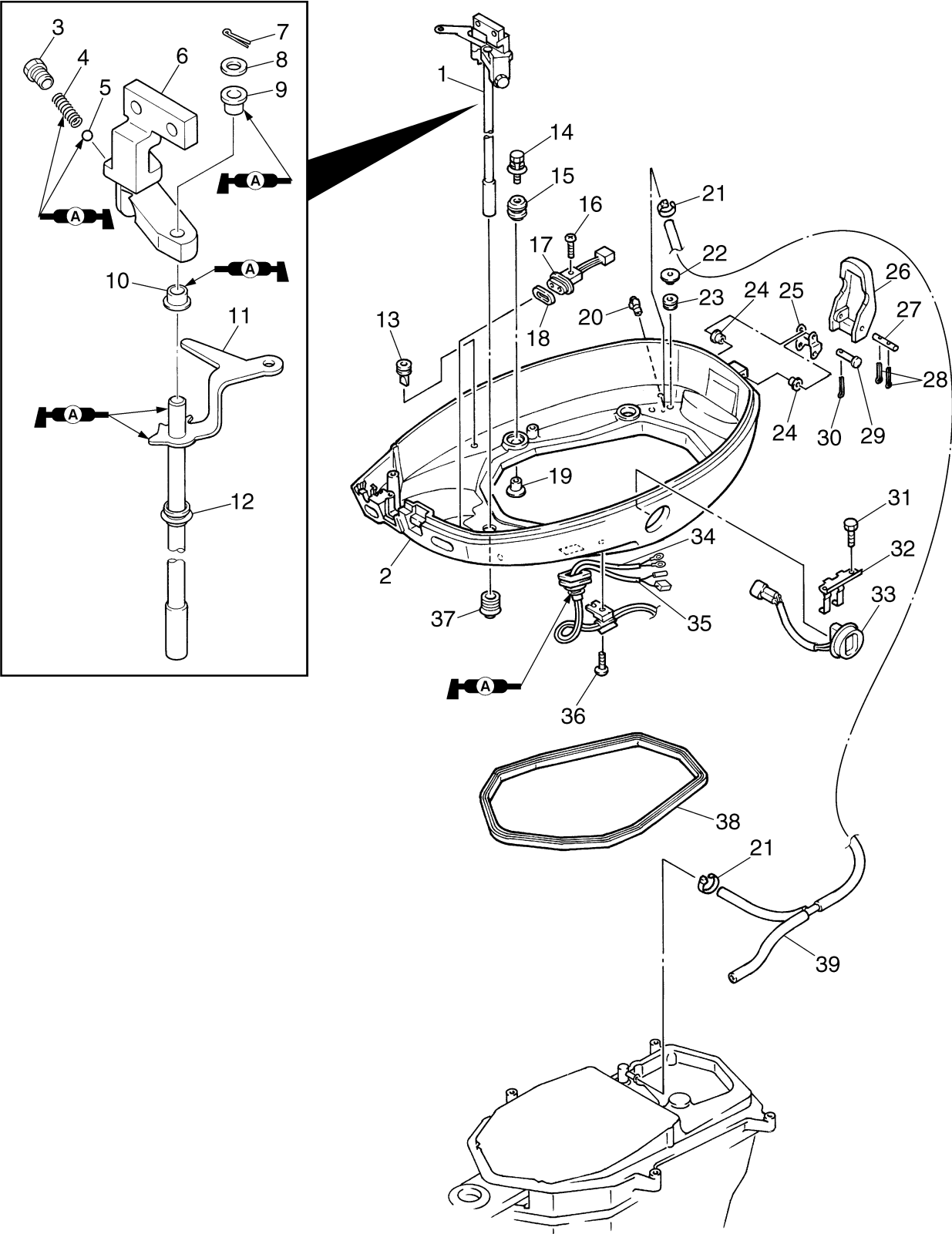
S62Y7080

Tiller handle

No.	Part name	Q'ty	Remarks
1	Bracket	1	
2	Bolt	2	M6 × 16 mm
3	Bolt	2	M6 × 16 mm
4	Shift arm guide	1	
5	Nut	1	
6	Washer	1	
7	Washer	1	
8	Bushing	1	
9	Tiller handle bracket	1	
10	Nut	1	
11	Bushing	1	
12	Engine stop switch	1	
13	Bolt	1	M6 × 20 mm
14	Engine start switch housing	1	
15	Screw	1	M6 × 12 mm
16	Connector	1	Black
17	Connector	1	White
18	Engine start switch	1	
19	Screw	1	M6 × 30 mm
20	Screw	1	M6 × 25 mm
21	Collar	1	
22	Ball	1	
23	Spring	1	
24	Shift arm	1	
25	Washer	1	
26	Shift grip	1	
27	Clip	1	
28	Shift rod	1	

7

Bottom cowling



S62Y7140K

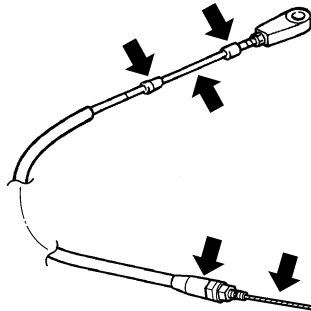
Bottom cowling

No.	Part name	Q'ty	Remarks
1	Shift rod assembly	1	
2	Bottom cowling	1	
3	Bolt	1	
4	Spring	1	
5	Ball	1	
6	Shift rod bracket	1	
7	Cotter pin	1	Not reusable
8	Washer	1	
9	Bushing	1	
10	Bushing	1	
11	Shift rod	1	
12	Grommet	1	
13	Rubber seal	4	
14	Bolt	4	M6 × 30 mm
15	Grommet	4	
16	Screw	1	M6 × 14 mm EHD model
17	Warning indicator	1	EHD model
18	Grommet	1	EHD model
19	Collar	4	
20	Pilot water outlet	1	
21	Plastic tie	2	Not reusable
22	Collar	2	
23	Grommet	2	
24	Bushing	2	
25	Joint	1	
26	Cowling lock lever	1	
27	Pin	1	
28	Cotter pin	2	Not reusable
29	Pin	1	
30	Cotter pin	1	Not reusable
31	Bolt	2	Models with trailer switch
32	Bracket	1	Models with trailer switch
33	Trailer switch	1	Models with trailer switch
34	PTT motor lead	1	ET model
35	Trim sensor coupler	1	ET model
36	Screw	1	M6 × 24 mm ET model
37	Grommet	1	
38	Rubber seal	1	
39	Hose	1	

7

Checking the throttle cable and shift rod

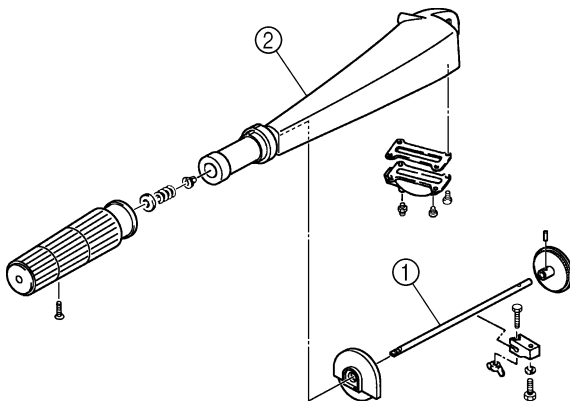
1. Check the operation of the throttle cable and shift rod.
2. Check the inner wire, outer wire of the cable and rod for bends or damage, and the rubber seals for damage. Replace if necessary.



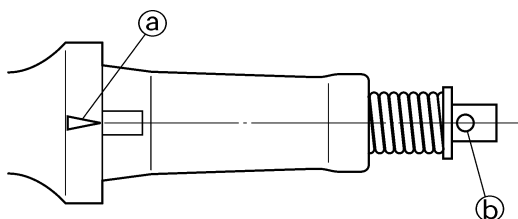
S62Y7090

Assembling the tiller handle

1. Install the throttle shaft ① into the tiller handle ② by aligning the mark "▲" ③ of the tiller handle with the screw hole ④ of the throttle shaft.

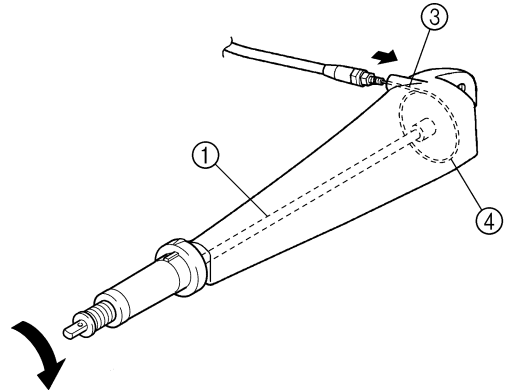


S62Y7100



S62Y7110

2. Install the throttle cable ③ into the gear ④ until the inner cable is engaged with the gear.
3. Turn the throttle shaft ① clockwise to wind the inner cable around the gear ④.



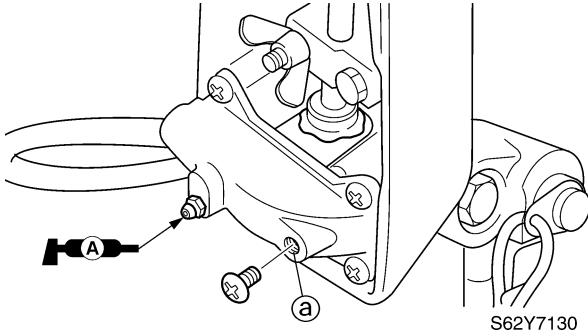
S62Y7120K

NOTE:

Make sure that the throttle grip is fully closed when installing the throttle cable.

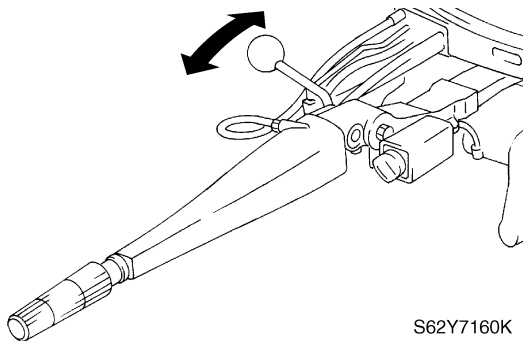
Lubricating the throttle gear

1. Inject grease into the grease nipple until grease comes out from the screw hole
a.

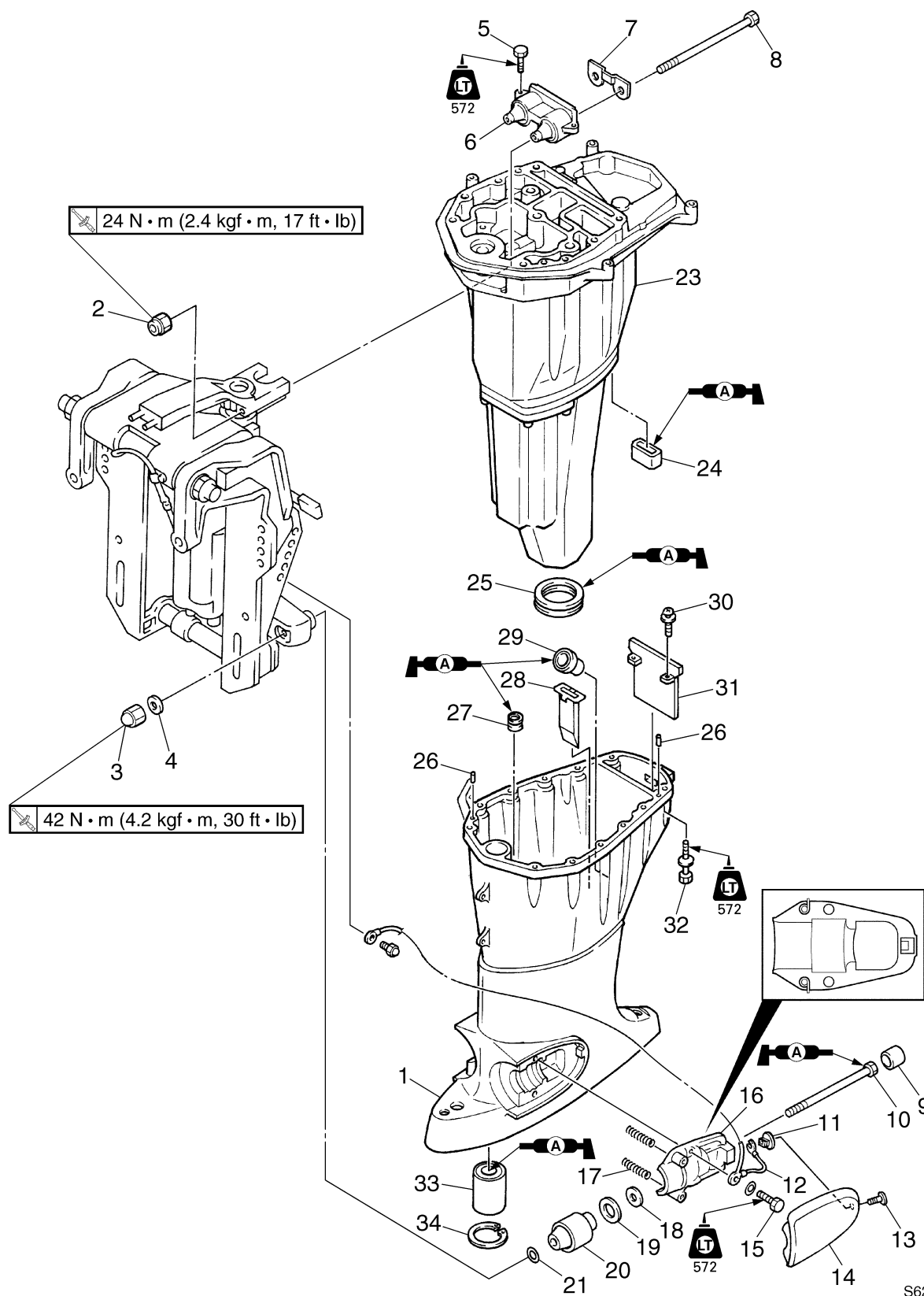


Checking the shift rod assembly operation

1. Check the shift rod assembly and detent for smooth operation.



Upper case

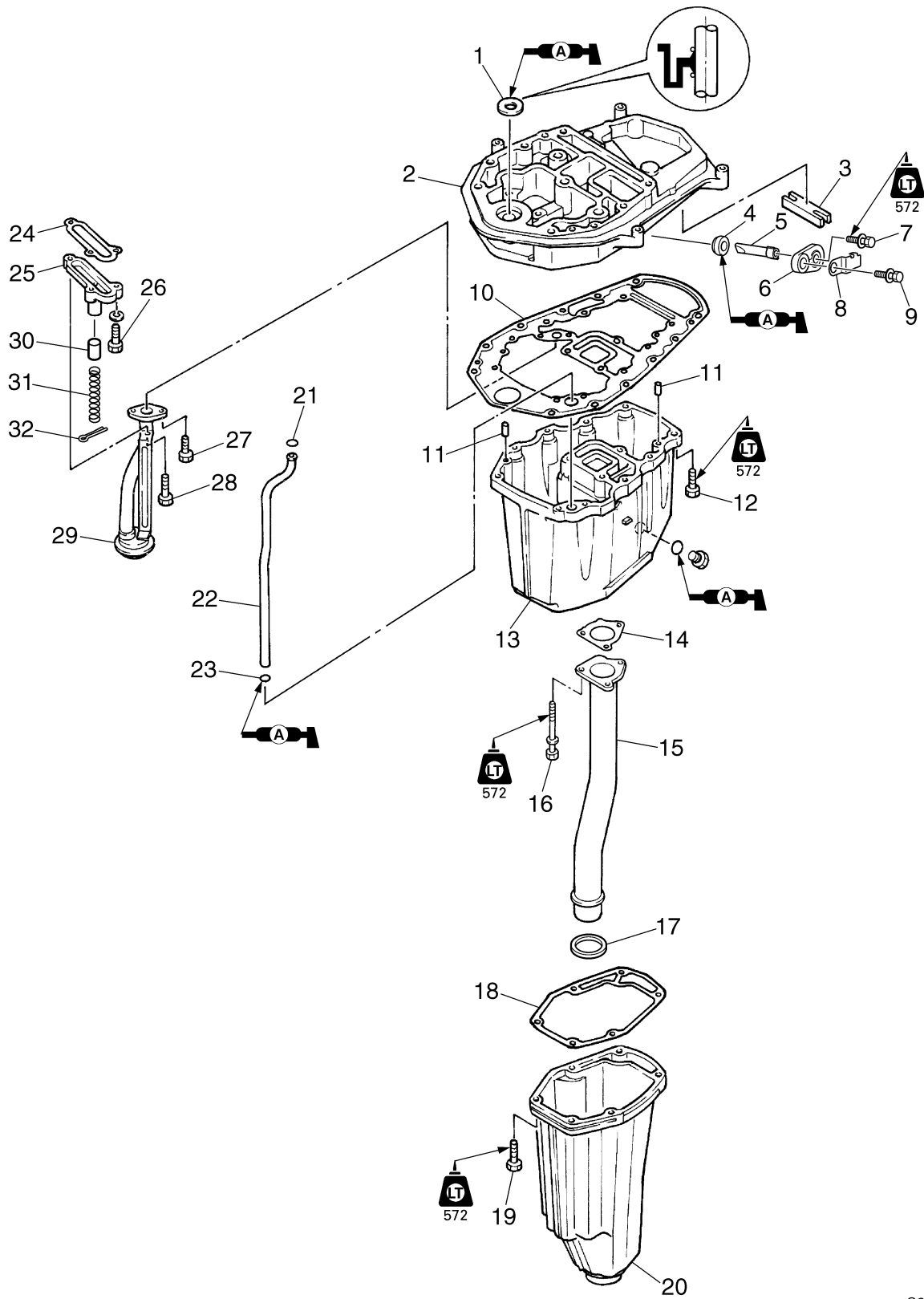


S62Y7170K

Upper case

No.	Part name	Q'ty	Remarks
1	Upper case	1	
2	Nut	2	
3	Nut	2	
4	Washer	2	
5	Bolt	3	M8 × 30 mm
6	Upper mount	1	
7	Plate	1	
8	Bolt	2	M8 × 175 mm
9	Cap	2	
10	Bolt	2	M12 × 160 mm
11	Grommet	2	
12	Ground lead	1	
13	Screw	2	
14	Mount cover	2	
15	Bolt	4	M8 × 25 mm
16	Mount housing	2	
17	Spring	4	
18	Washer	2	
19	Rubber washer	2	
20	Lower mount	2	
21	Washer	2	
22	Grease nipple	1	
23	Muffler assembly	1	
24	Muffler seal	1	
25	Rubber seal	1	
26	Dowel pin	2	
27	Grommet	1	
28	Guide	1	
29	Damper	1	
30	Screw	2	M5 × 16 mm
31	Baffle plate	1	
32	Bolt	4	M8 × 30 mm
33	Drive shaft bushing	1	
34	Circlip	1	

7



S62Y7200

Upper case

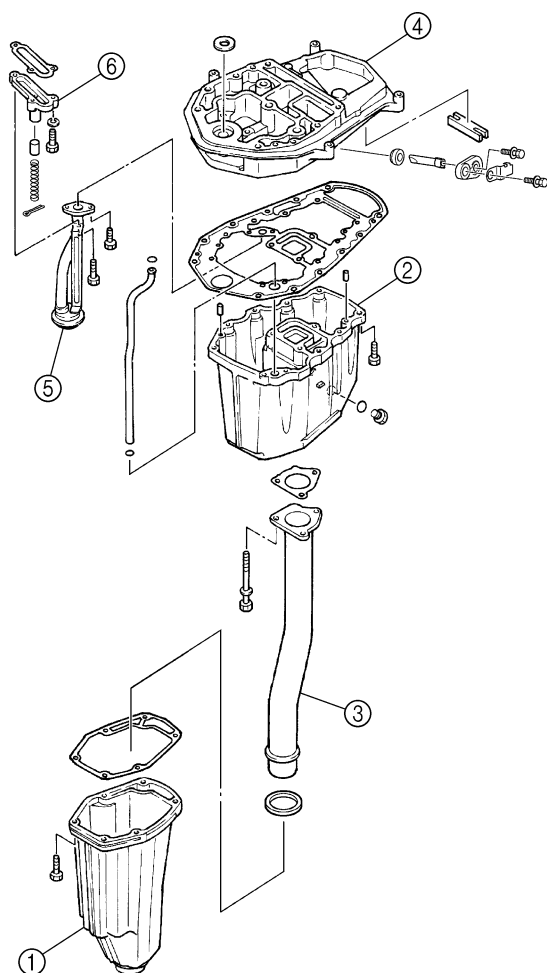
No.	Part name	Q'ty	Remarks
1	Oil seal	1	Not reusable
2	Exhaust guide	1	
3	Grommet	1	
4	Grommet	1	
5	Anode	1	
6	Cover	1	
7	Bolt	1	
8	Cover	1	
9	Bolt	1	
10	Gasket	1	Not reusable
11	Dowel pin	2	
12	Bolt	10	M6 × 25 mm
13	Oil pan	1	
14	Gasket	1	Not reusable
15	Exhaust manifold	1	
16	Bolt	1	M6 × 45 mm
17	Gasket	1	Not reusable
18	Gasket	1	Not reusable
19	Bolt	6	M6 × 25 mm
20	Muffler	1	
21	Gasket	1	Not reusable
22	Pipe	1	
23	Rubber seal	1	Not reusable
24	Gasket	1	Not reusable
25	Relief valve housing	1	
26	Bolt	2	M6 × 25 mm
27	Bolt	2	M6 × 16 mm
28	Bolt	1	M6 × 25 mm
29	Oil strainer	1	
30	Relief valve	1	
31	Spring	1	
32	Cotter pin	1	Not reusable

7



Disassembling the oil pan

1. Remove the muffler ① from the oil pan ②.
2. Remove the exhaust manifold ③ from the oil pan ②.
3. Remove the oil pan ② from the exhaust guide ④.
4. Remove the oil strainer ⑤ and the relief valve housing ⑥.



S62Y7210K

CAUTION:

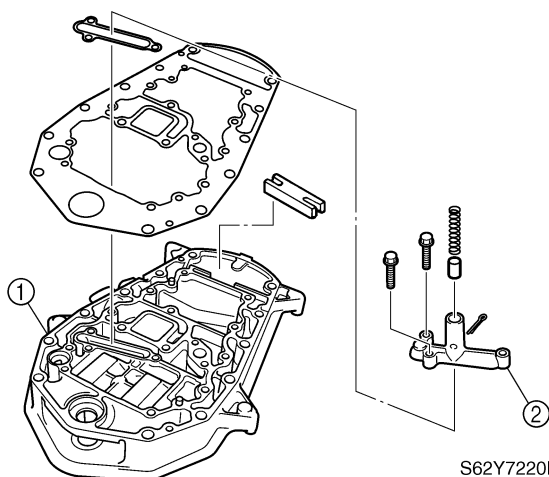
Do not reuse the gaskets, always replace them with a new one.

Checking the oil strainer and the relief valve

1. Check the oil strainer and relief valve for dirt and residue. Clean if necessary.

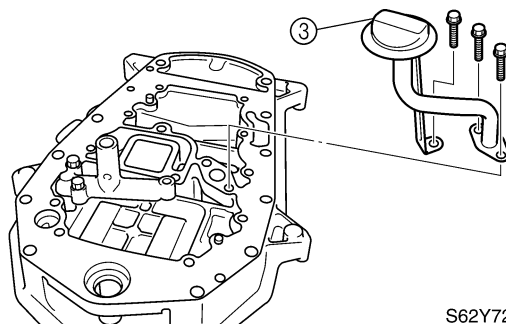
Assembling the oil pan

1. Install the gaskets onto the exhaust guide ①.
2. Install the relief valve assembly ② by installing the bolts, then tightening them finger tight.



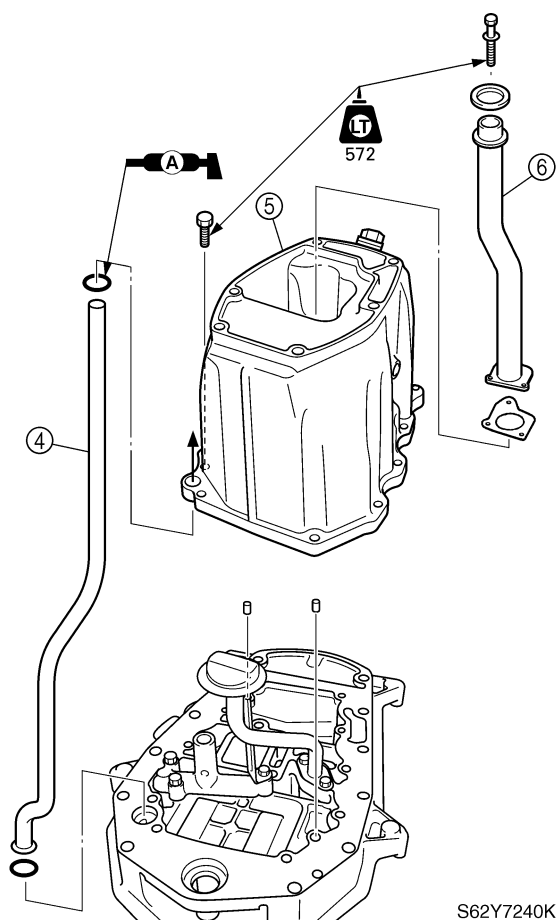
S62Y7220K

3. Install the oil strainer ③ by installing the bolts.

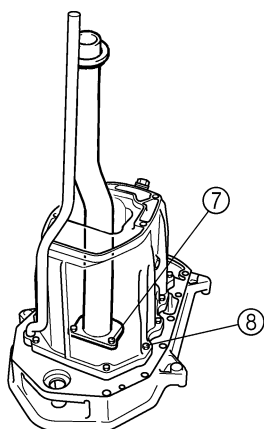


S62Y7230

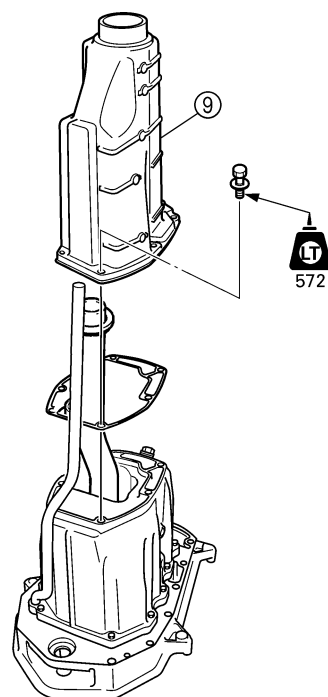
4. Install the water pipe ④.
5. Install the oil pan ⑤ and bolts, and then tighten the bolts finger tight.
6. Install the exhaust manifold ⑥ and bolts, and then tighten the bolts finger tight.



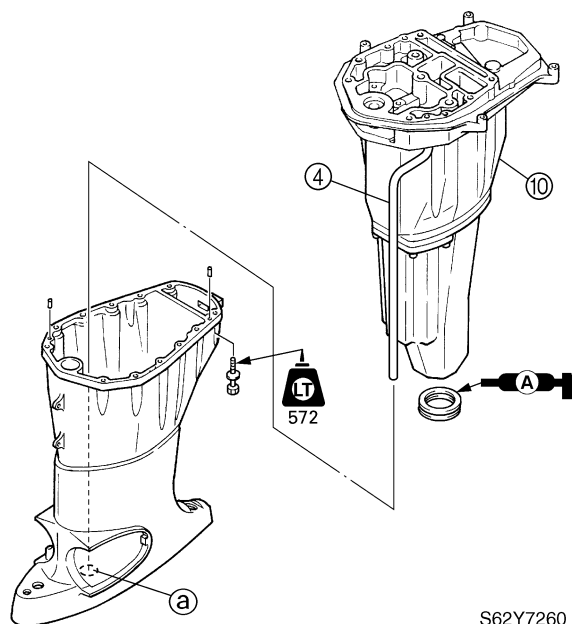
7. Tighten the exhaust manifold bolts (7), then the oil pan bolts (8).



8. Install the muffler (9) into the oil pan.



9. Install the muffler assembly (10) by inserting the tip of the water pipe (4) into the joint hole (a) of the upper case.

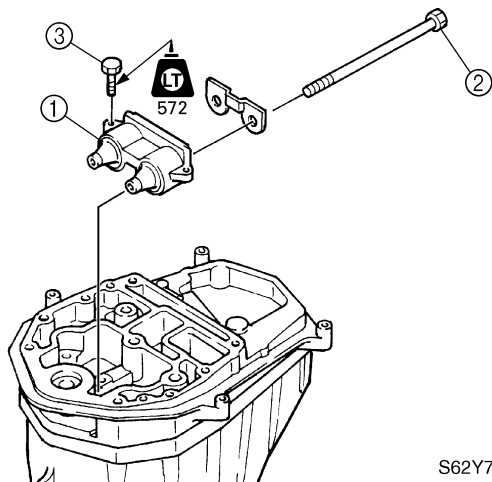


7



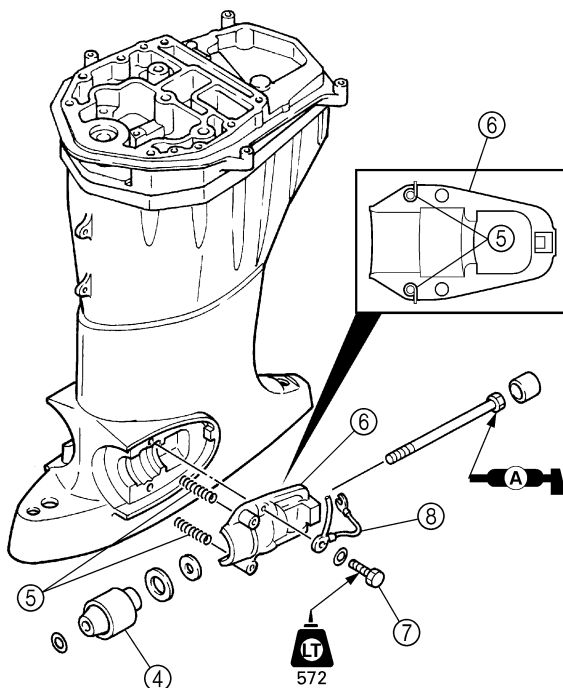
Installing the upper case

1. Install the upper mount ① and bolts ② into the upper case, and then tighten the bolts ③.



S62Y7270

2. Set the lower mounts ④ and bolts to the upper case.
3. Install the end of the spring ⑤ into the groove of the mount housing ⑥, and then tighten the bolts ⑦.

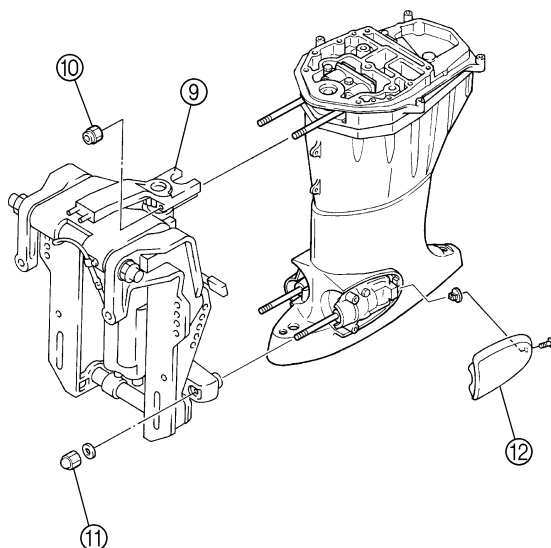


S62Y7280

NOTE:

Be sure to install the ground lead ⑧ into the mount housing ⑥.

4. Install the upper and lower mounting bolts into the swivel bracket ⑨ simultaneously.
5. Install the upper mounting nut ⑩ and lower mounting nut ⑪, and then tighten them to the specified torques.
6. Install the cover ⑫ by installing the screw.

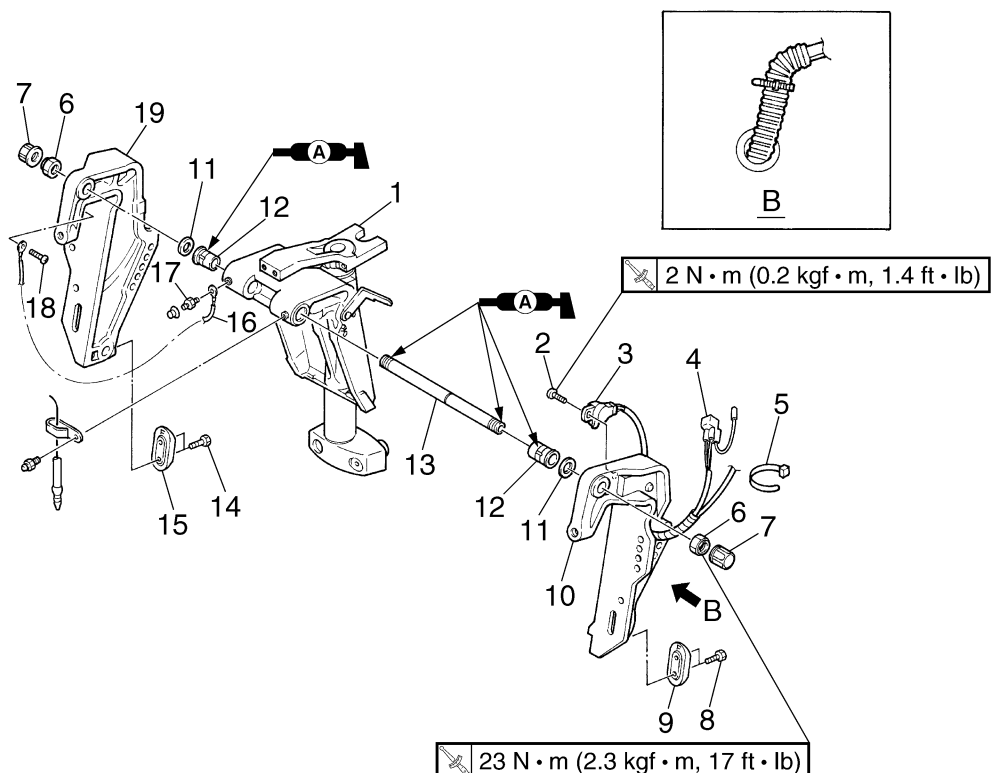


S62Y7290



Upper mounting nut ⑩:
24 N·m (2.4 kgf·m, 17 ft·lb)
Lower mounting nut ⑪:
42 N·m (4.2 kgf·m, 30 ft·lb)

Clamp brackets



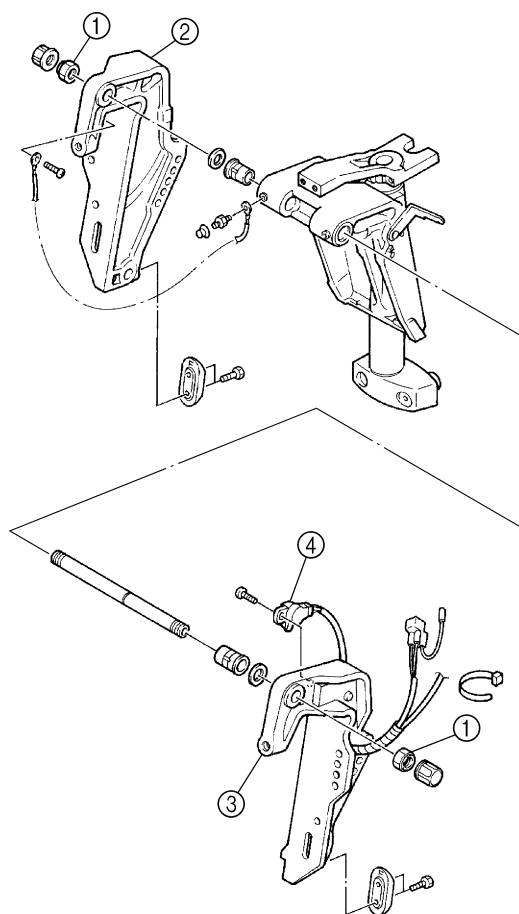
S62Y7300K

No.	Part name	Q'ty	Remarks
1	Swivel bracket assembly	1	
2	Screw	1	M6 × 15 mm ET model
3	Trim sensor	1	ET model
4	Trim sensor coupler	1	ET model
5	Plastic tie	1	Not reusable
6	Self-locking nut	2	
7	Cap	2	
8	Bolt	1	M6 × 25 mm
9	Anode	1	
10	Port clamp bracket	1	
11	Washer	2	
12	Bushing	2	
13	Through tube	1	
14	Bolt	2	M6 × 25 mm
15	Anode	1	
16	Ground lead	1	
17	Grease nipple	1	
18	Screw	1	M6 × 8 mm
19	Starboard clamp bracket	1	



Removing the clamp brackets

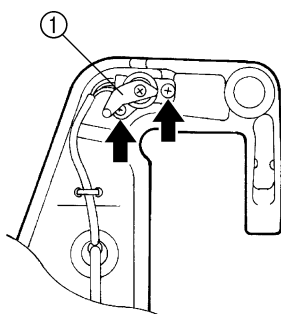
1. Remove the power trim and tilt or hydro tilt. For removing procedures, see "Removing the power trim and tilt/hydro tilt" in this chapter.
2. Loosen the self-locking nuts ①, and then remove clamp brackets ② and ③.
3. Remove the trim sensor ④.



S62Y7310

Installing the clamp brackets

1. Install the trim sensor ① onto the port clamp brackets.

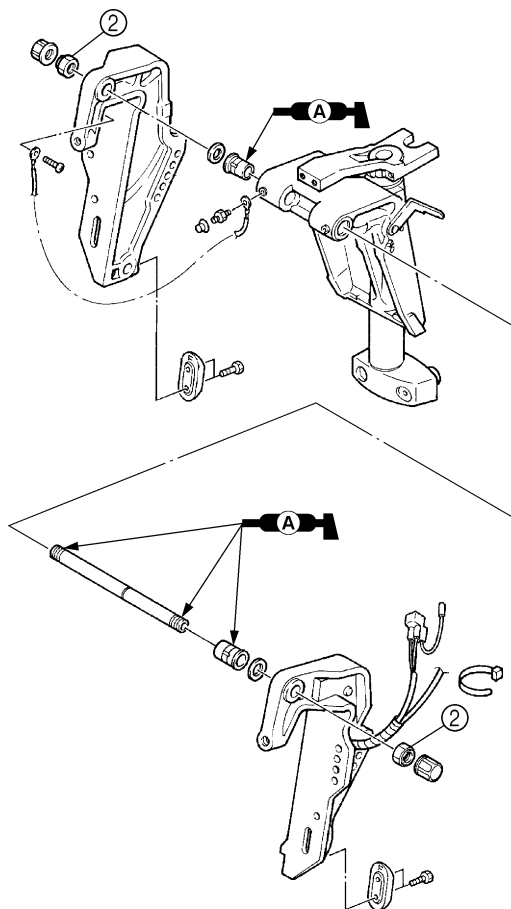


S62Y7320

NOTE:

Adjust the trim sensor after installing the power trim and tilt.

2. Assemble the clamp brackets and the swivel bracket by installing the self-locking nuts ②, then tightening them to the specified torque.



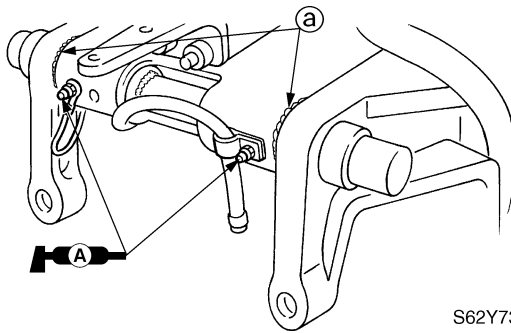
S62Y7330



Self-locking nut ②:
23 N·m (2.3 kgf·m, 17 ft·lb)

3. Install the power trim and tilt or hydro tilt. For installing procedures, see "Installing the power trim and tilt" in this chapter.
4. Inject grease into both grease nipples until grease comes out from the bushings ①.

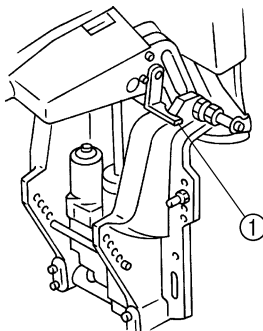
Clamp brackets



S62Y7335

Adjusting the trim sensor

1. Fully tilt the outboard motor up, and then support it with the tilt stop lever ①.

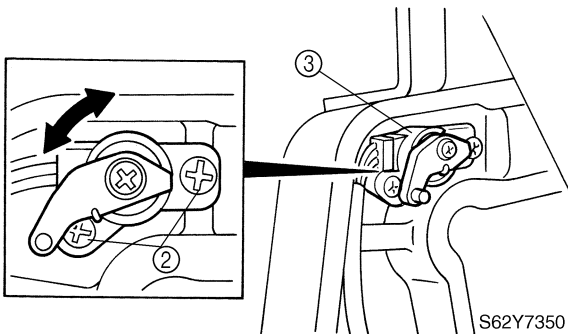


S62Y7340

⚠ WARNING

After tilting up the outboard motor, be sure to support it with the tilt stop lever. Otherwise, the outboard motor could suddenly lower if the power trim and tilt unit should lose fluid pressure.

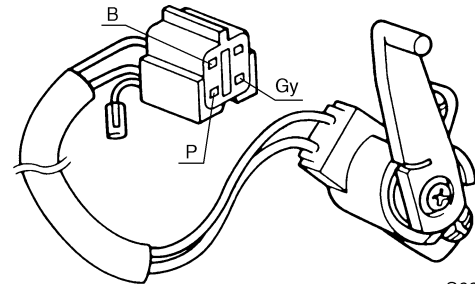
2. Loosen the cam screws ②.
3. Adjust the position of the trim sensor ③, and then tighten the screws ② finger tight.



S62Y7350

4. Fully tilt the outboard motor down.

5. Measure the trim sensor resistance. Repeat steps 1–5 if out of specification.



S62Y7360



Trim sensor setting resistance:
Pink (P) – Black (B)
9–11 Ω at 20 °C (68 °F)

6. Fully tilt the outboard motor up, and then support it with the tilt stop lever.

⚠ WARNING

After tilting up the outboard motor, be sure to support it with the tilt stop lever. Otherwise, the outboard motor could suddenly lower if the power trim and tilt unit should lose fluid pressure.

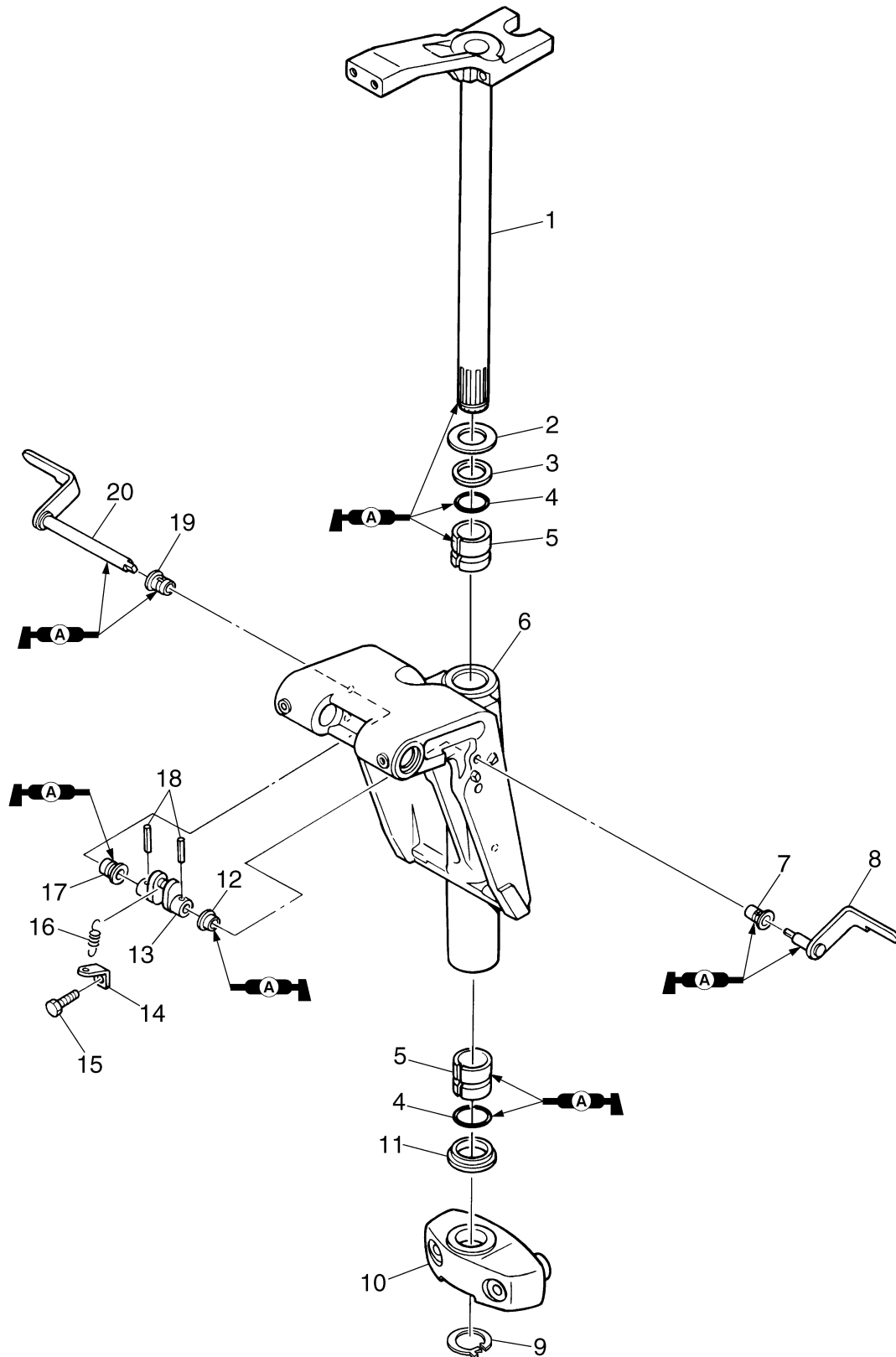
7. Tighten the cam screws ② to the specified torque.



Trim sensor cam screw ②:
2 N·m (0.2 kgf·m, 1.4 ft·lb)

8. Fully tilt the outboard motor down.

Swivel bracket and steering arm



S62Y7370

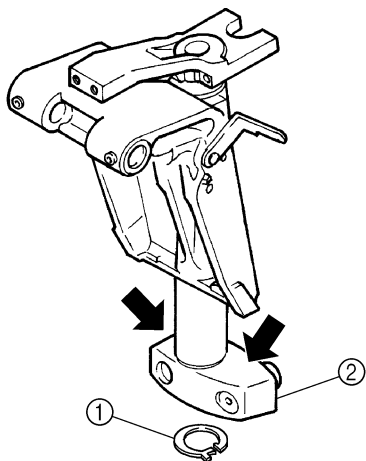
Swivel bracket and steering arm

No.	Part name	Q'ty	Remarks
1	Steering arm	1	Not reusable 28.9 × 3.8 mm M6 × 10 mm
2	Washer	1	
3	Bushing	1	
4	O-ring	2	
5	Bushing	2	
6	Swivel bracket	1	
7	Bushing	1	
8	Port tilt stop lever	1	
9	Circlip	1	
10	Steering yoke	1	
11	Bushing	1	
12	Bushing	1	
13	Tilt stop lever joint	1	
14	Spring holder	1	
15	Bolt	1	
16	Spring	1	
17	Bushing	1	
18	Pin	2	
19	Bushing	1	
20	Starboard tilt stop lever	1	



Removing the steering arm

1. Remove the circlip ①.
2. Remove the steering yoke ② by striking it with a plastic hammer.

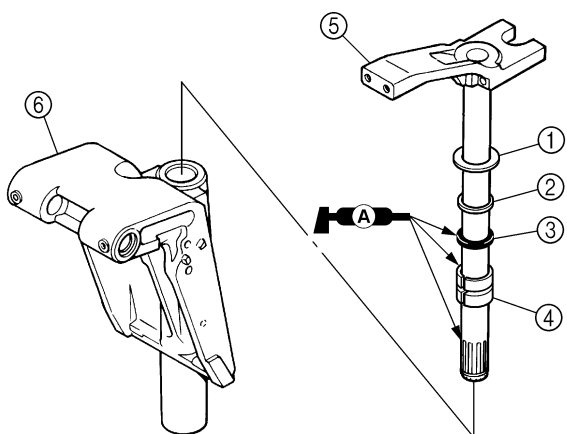


S62Y7380

3. Remove the steering arm from the swivel bracket by pulling the arm off the bracket.

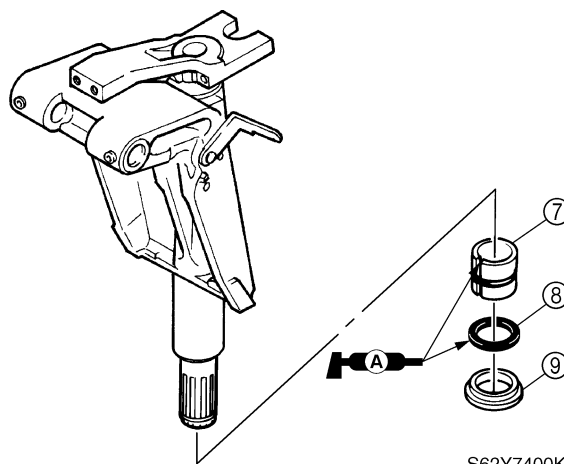
Installing the steering arm

1. Install the washer ①, bushing ②, O-ring ③, and bushing ④ onto the steering arm ⑤.
2. Place the swivel bracket ⑥ in an upright position, and then install the steering arm onto the swivel bracket.



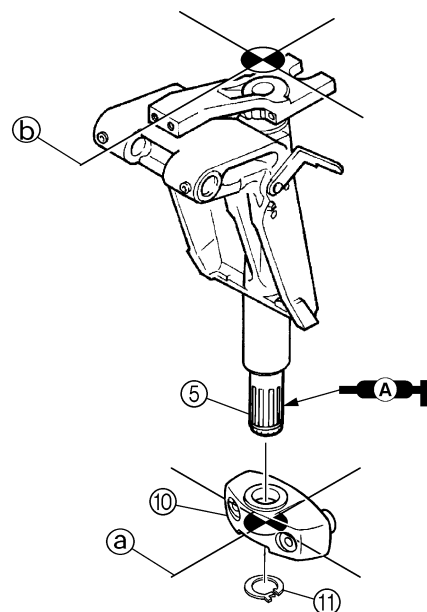
S62Y7390K

3. Install the bushing ⑦, O-ring ⑧, and bushing ⑨ onto the swivel bracket.



S62Y7400K

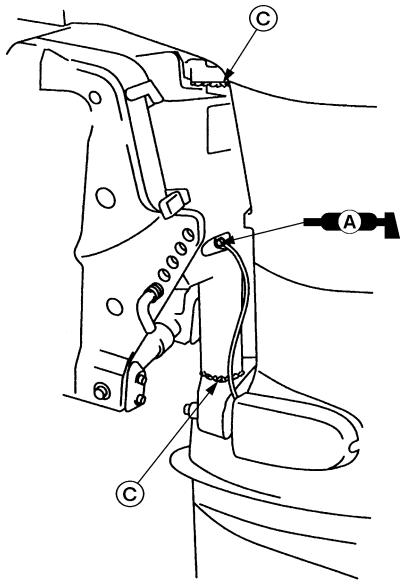
4. Install the steering arm ⑤ into the steering yoke ⑩ by aligning the center ① of the yoke with the center ② of the steering arm.
5. Install the circlip ③.



S62Y7410

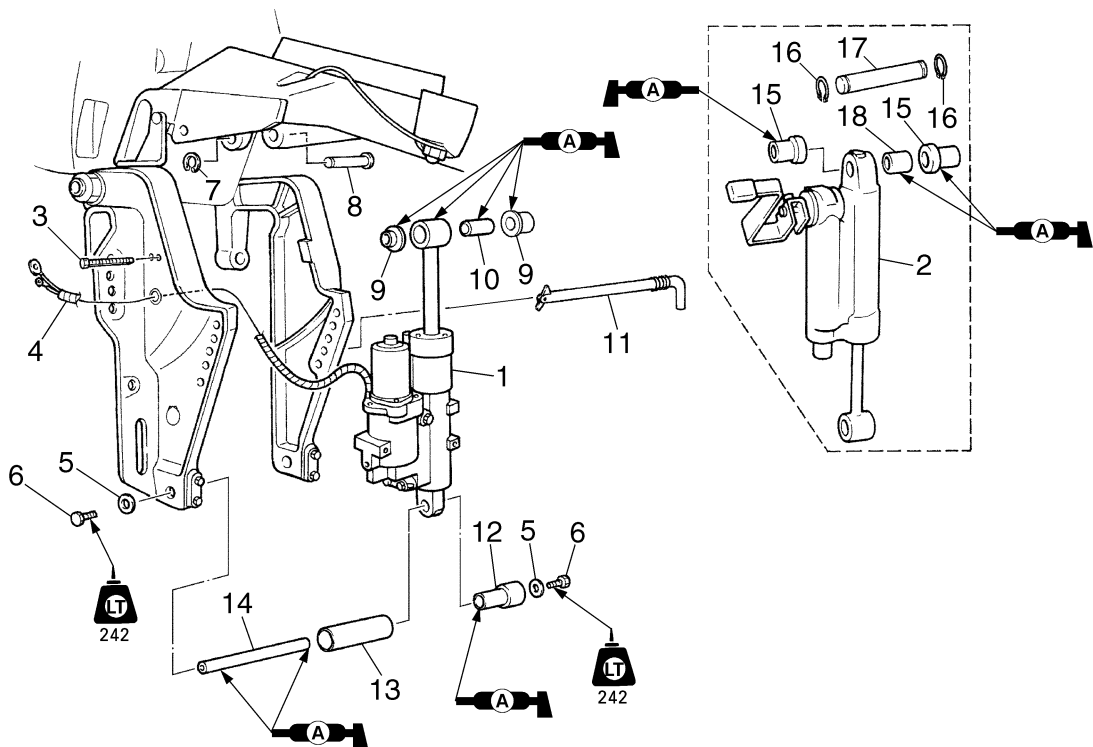
Swivel bracket and steering arm

6. Inject grease into the grease nipple until grease comes out from both the upper and lower bushings ③.



S62Y7420

Power trim and tilt unit

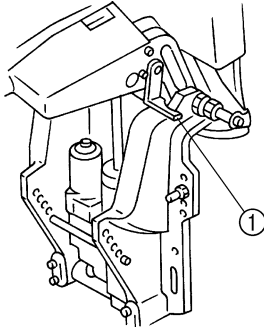


S62Y7430K

No.	Part name	Q'ty	Remarks
1	Power trim and tilt	1	ET model
2	Hydro tilt	1	EHD/ED models
3	Plastic tie	3	Not reusable
4	PTT motor lead	2	
5	Washer	2	
6	Bolt	2	M8 × 16 mm
7	Circlip	1	ET model
8	Shaft	1	ET model
9	Bushing	2	ET model
10	Collar	1	ET model
11	Tilt pin	1	
12	Collar	1	
13	Collar	1	
14	Shaft	1	
15	Bushing	2	EHD/ED models
16	Circlip	2	EHD/ED models
17	Shaft	1	EHD/ED models
18	Collar	1	EHD/ED models

Removing the power trim and tilt/hydro tilt

1. Fully tilt the outboard motor up, and then support it with the tilt stop lever ①.

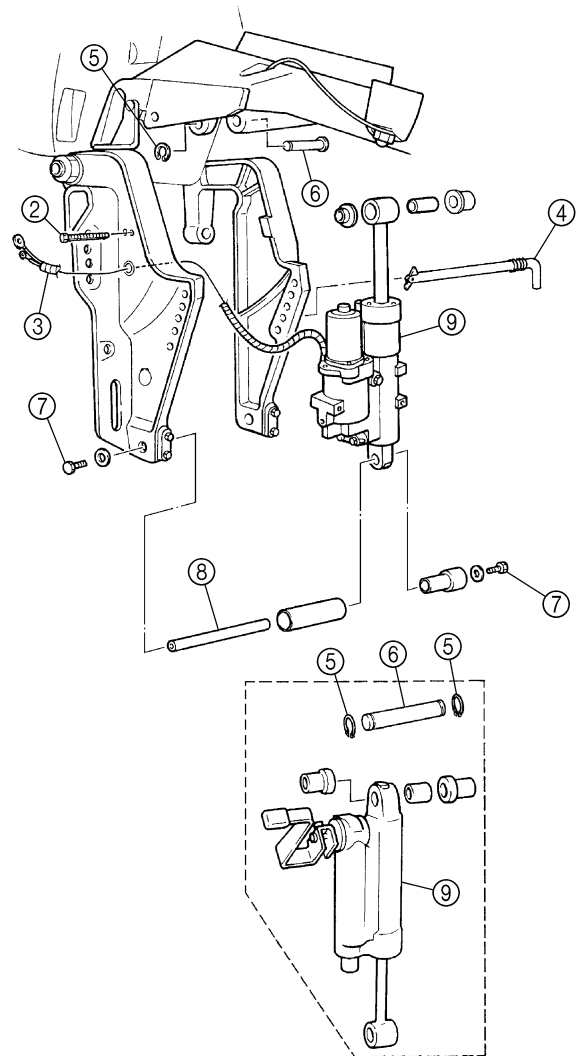


S62Y7440

⚠ WARNING

After tilting up the outboard motor, be sure to support it with the tilt stop lever. Otherwise, the outboard motor could suddenly lower if the power trim and tilt unit should lose fluid pressure.

2. Loosen the plastic locking tie ②, and then pull out the PTT motor lead ③.
3. Remove the tilt pin ④.
4. Remove the circlip(s) ⑤ and the shaft ⑥.
5. Loosen the bolt ⑦, and then remove the shaft ⑧.
6. Remove the power trim and tilt/hydro tilt ⑨.

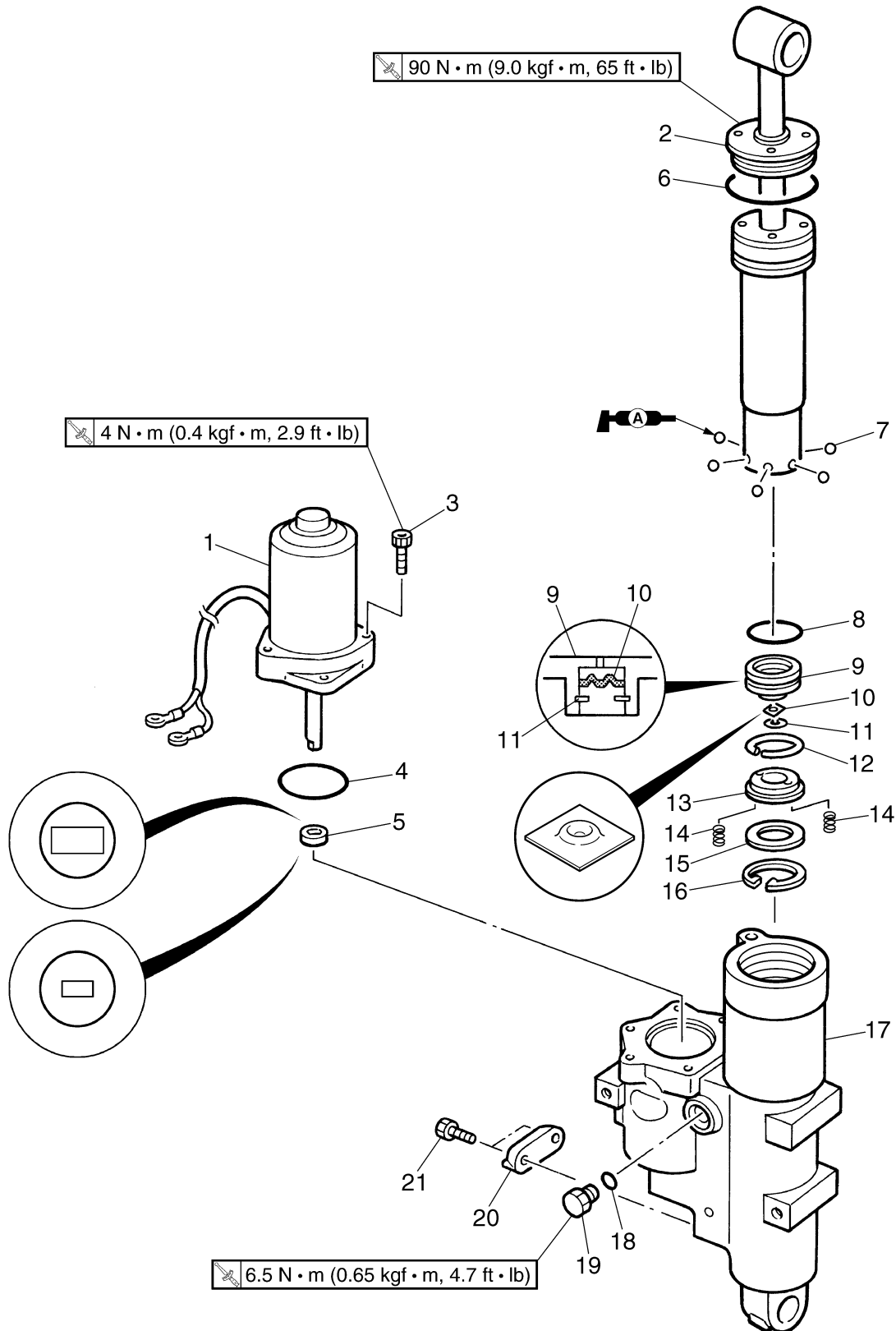


S62Y7450

NOTE:

To remove the power trim and tilt/hydro tilt, lower the tilt rod slightly.

Tilt cylinder and trim cylinder

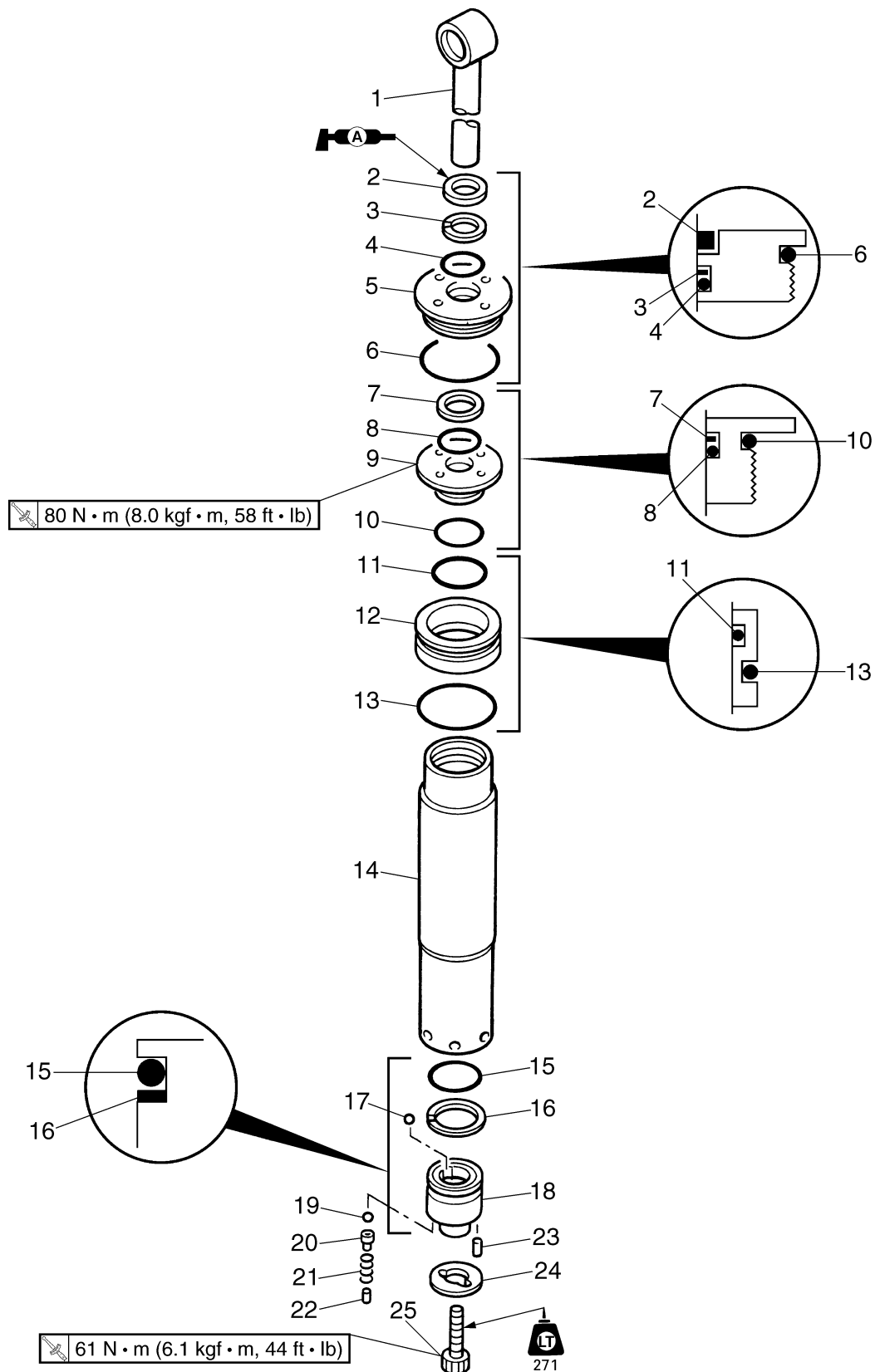


S62Y7460K

Tilt cylinder and trim cylinder

No.	Part name	Q'ty	Remarks
1	Power trim and tilt motor	1	
2	Tilt cylinder end screw	1	
3	Bolt	3	M5 × 20 mm
4	O-ring	1	Not reusable
5	Joint	1	
6	O-ring	1	Not reusable
7	Ball	6	
8	O-ring	1	Not reusable 28.7 × 3.5 mm
9	Free piston	1	
10	Valve seal	1	
11	Circlip	1	
12	Circlip	1	
13	Trim cylinder base	1	
14	Spring	2	
15	Plate	1	
16	Circlip	1	
17	Tilt cylinder assembly	1	
18	O-ring	1	Not reusable 8.8 × 1.9 mm
19	Reservoir cap	1	
20	Anode	1	
21	Bolt	2	M6 × 25 mm

Trim cylinder



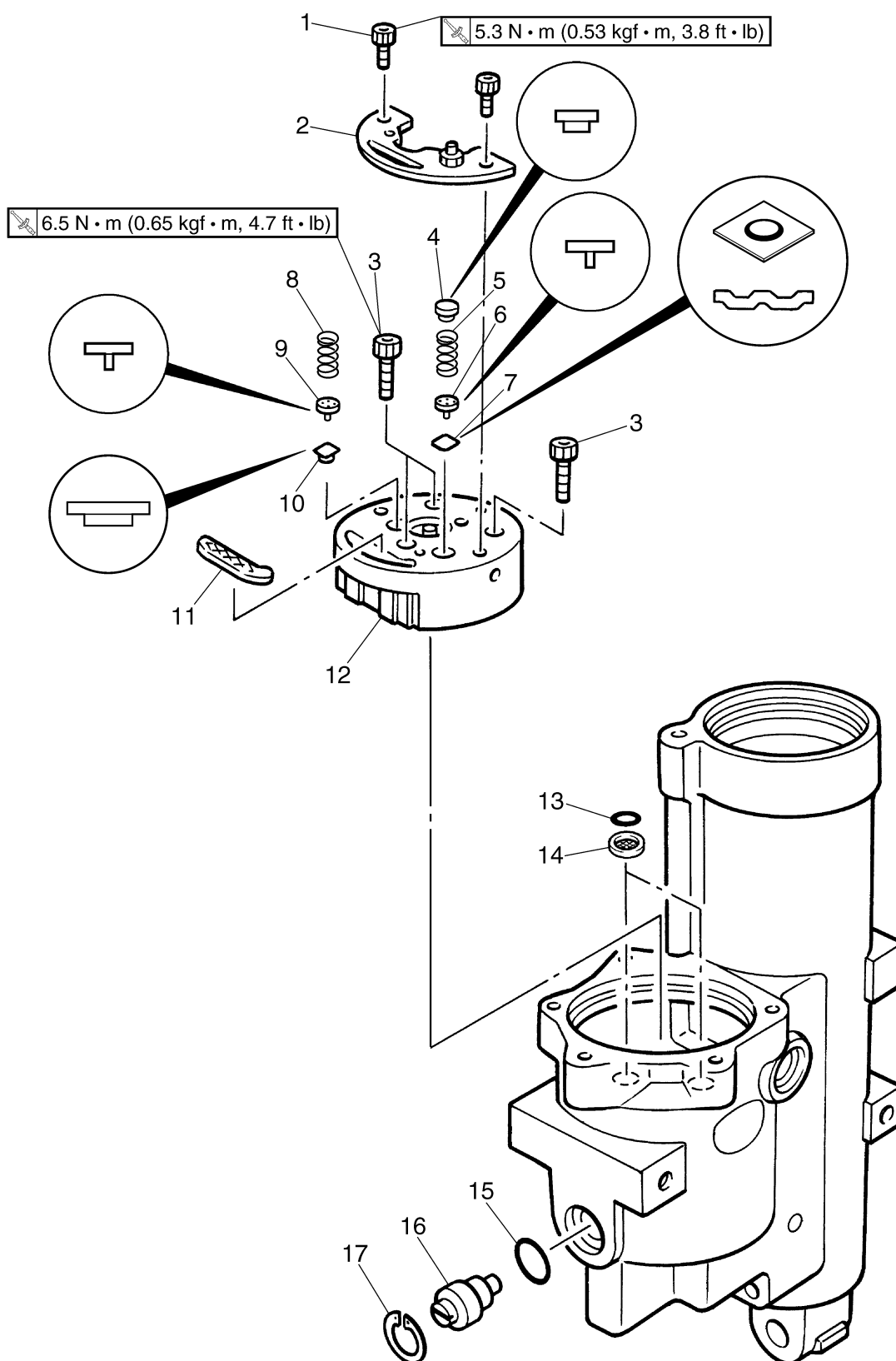
S62Y7470K

Trim cylinder

No.	Part name	Q'ty	Remarks
1	Tilt ram	1	
2	Dust seal	1	Not reusable
3	Backup ring	1	
4	O-ring	1	Not reusable 16.8 × 2.4 mm
5	Tilt cylinder end screw	1	
6	O-ring	1	Not reusable
7	Backup ring	1	
8	O-ring	1	Not reusable 16.8 × 2.4 mm
9	Trim cylinder end screw	1	
10	O-ring	1	Not reusable
11	O-ring	1	Not reusable 43.7 × 3.5 mm
12	Trim piston	1	
13	O-ring	1	Not reusable 47.7 × 3.5 mm
14	Trim cylinder	1	
15	O-ring	1	Not reusable 28.7 × 3.5 mm
16	Backup ring	1	
17	Ball	1	
18	Tilt piston	1	
19	Ball	4	
20	Absorber valve pin	4	
21	Spring	4	
22	Pin	4	
23	Pin	2	
24	Washer	1	
25	Bolt	1	M12 × 45 mm

7

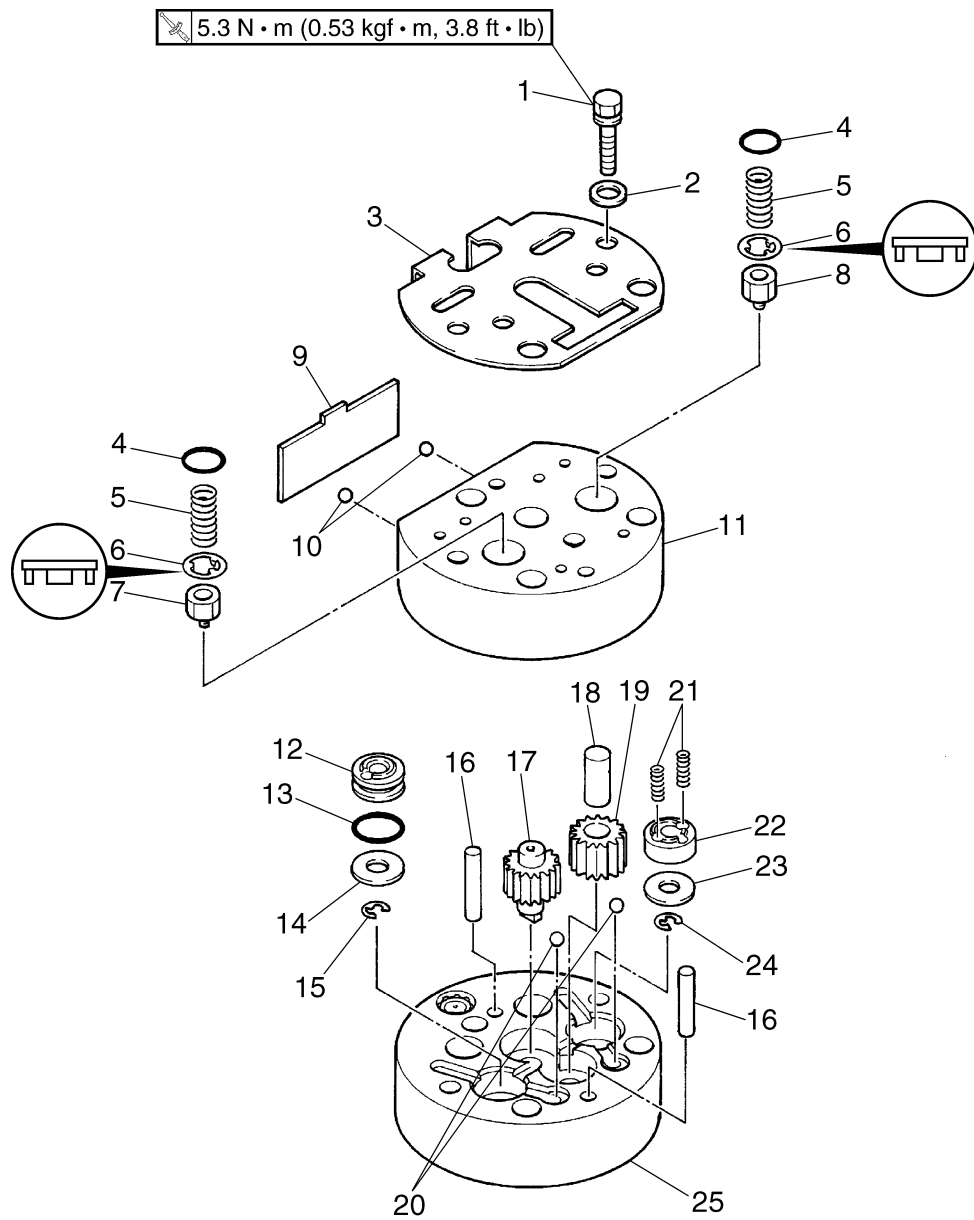
Gear pump



S62Y7480K

Gear pump

No.	Part name	Q'ty	Remarks
1	Bolt	2	M5 × 8 mm
2	Relief valve bracket	2	
3	Bolt	3	M6 × 45 mm
4	Adapter	1	
5	Up-relief spring	1	17.5 mm (0.69 in)
6	Valve support pin	1	
7	Relief valve seal	1	
8	Down-relief spring	1	14.2 mm (0.56 in)
9	Valve support pin	1	
10	Relief valve seal	1	
11	Filter	1	
12	Gear pump	1	
13	O-ring	2	Not reusable 5.8 × 1.9 mm
14	Filter	2	
15	O-ring	1	Not reusable 17.8 × 2.4 mm
16	Manual valve	1	
17	Circlip	1	



S62Y7490K

Gear pump

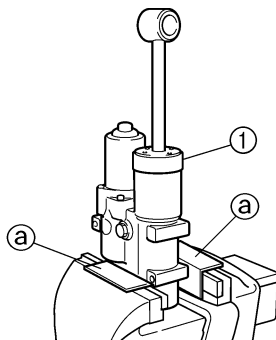
No.	Part name	Q'ty	Remarks
1	Bolt	2	M5 × 20 mm
2	Washer	2	
3	Gear pump bracket	1	
4	O-ring	2	Not reusable 5.8 × 1.9 mm
5	Spring	2	
6	Spacer	2	
7	Down-shuttle piston	2	
8	Up-shuttle piston	1	
9	Manual release spring	1	
10	Ball	2	
11	Gear pump cover	1	
12	Down-main valve	1	
13	O-ring	1	Not reusable
14	Valve seal	1	
15	Circlip	1	
16	Pin	2	
17	Drive gear	1	
18	Shaft	1	
19	Driven gear	1	
20	Ball	2	
21	Return spring	2	
22	Up-main valve	1	
23	Valve seal	1	
24	Circlip	1	
25	Gear pump housing	1	

7



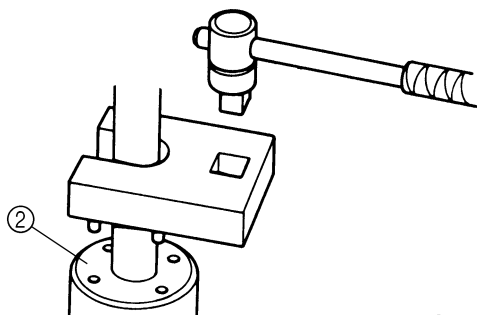
Disassembling the tilt cylinder

1. Hold the power trim and tilt ① in a vise using aluminum plates ② on both sides.



S62Y7500

2. Loosen the tilt cylinder end screw ②, and then remove it.



S62Y7510

⚠ WARNING

Make sure that the ram is fully extended before removing the end screw.

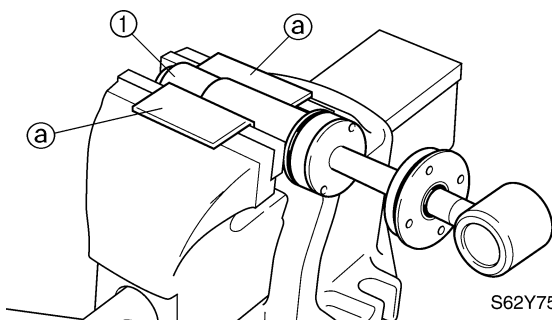


Cylinder-end screw wrench:
90890-06544

3. Drain the fluid.

Disassembling the trim cylinder

1. Hold the trim cylinder ① in a vise using aluminum plates ② on both sides.

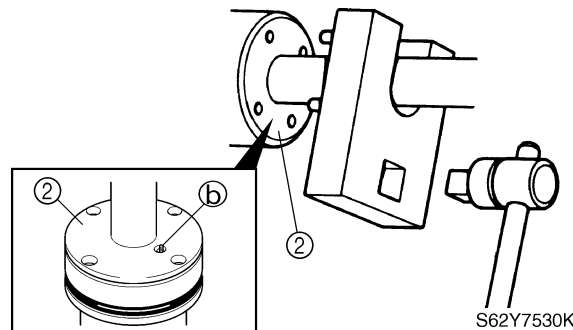


S62Y7520

NOTE:

Place the trim cylinder in the vise horizontally.

2. Loosen the trim cylinder end screw ②, and then remove it.



S62Y7530K

CAUTION:

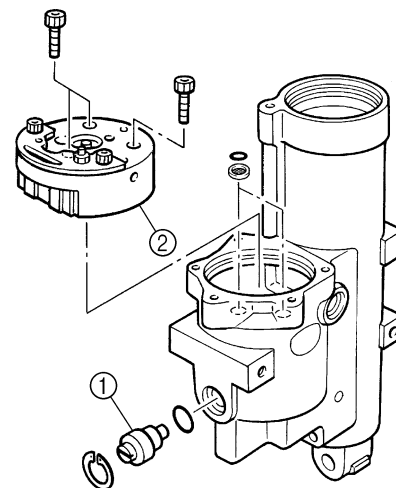
Do not damage the check valve ③ when loosening the end screw.



Cylinder-end screw wrench:
90890-06544

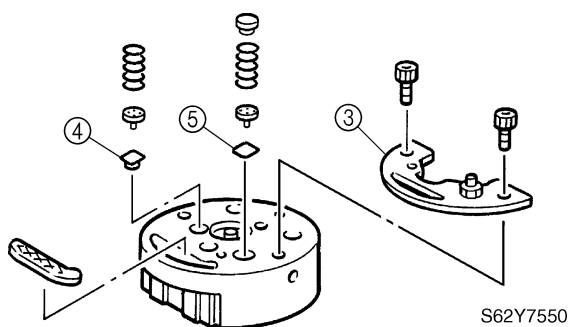
Disassembling the gear pump

1. Remove the manual valve ① and gear pump ②.

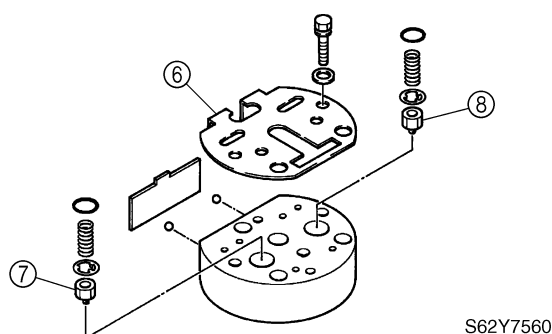


S62Y7540K

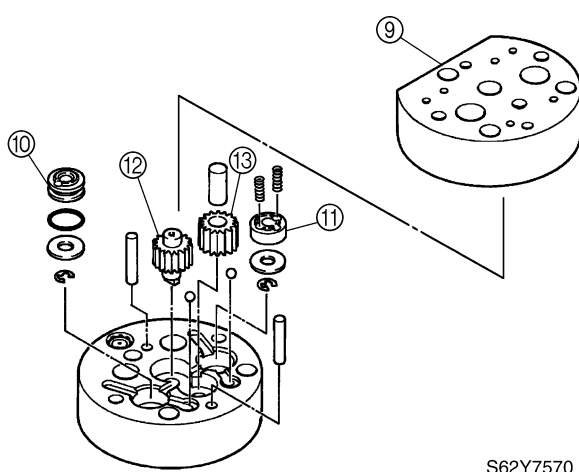
2. Remove the relief valve bracket ③, then the down-relief valve ④ and up-relief valve ⑤.



3. Remove the gear pump bracket ⑥, then the down-shuttle piston ⑦ and up-shuttle piston ⑧.



4. Remove the gear pump cover ⑨, then the down-main valve ⑩ and up-main valve ⑪.
5. Remove the drive gear ⑫ and driven gear ⑬.

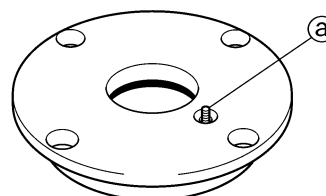


Checking the tilt cylinder and trim cylinder

1. Check the power trim and tilt/hydro tilt for cracks or corrosion. Replace if necessary.
2. Check the inner walls of the trim cylinder and tilt cylinder for scratches. Replace if necessary.
3. Check the outer surface of the tilt piston and free piston for scratches. Replace if necessary.
4. Check the tilt ram for bends or excessive corrosion. Polish with #400–600 grit sandpaper if there is light rust or replace if necessary.

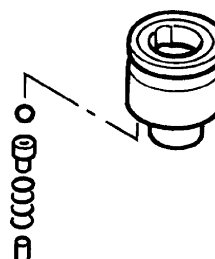
Check the valves

1. Check the operation of the check valve ① of the trim cylinder end screw and check the valve for dirt or residue. Clean if necessary.



S62Y7610

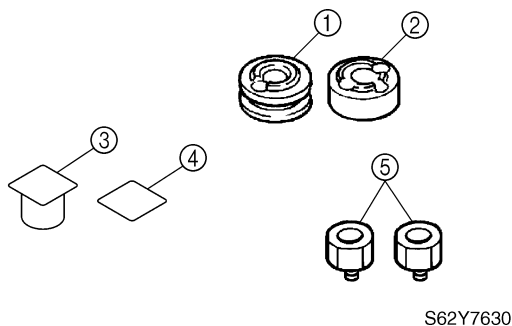
2. Check the operation of the tilt piston absorber valve and check for dirt or residue. Clean if necessary.



S62Y7620

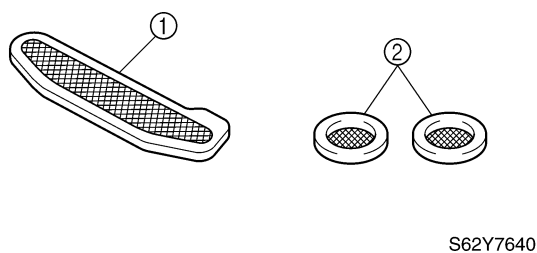
3. Check the down-main valve ① and the up-main valve ② for dirt or residue. Clean if necessary.

4. Check the down-relief valve ③, up-relief valve ④, and shuttle pistons ⑤ for dirt or residue. Clean if necessary.



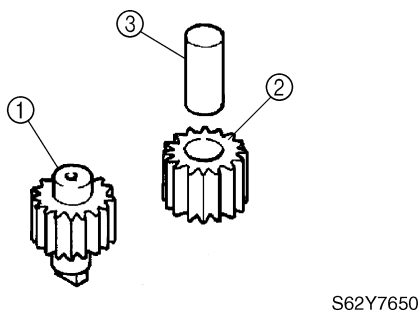
Checking the filters

1. Check the gear pump filter ① and shuttle piston filters ② for dirt or residue. Clean if necessary.



Checking the gear pump

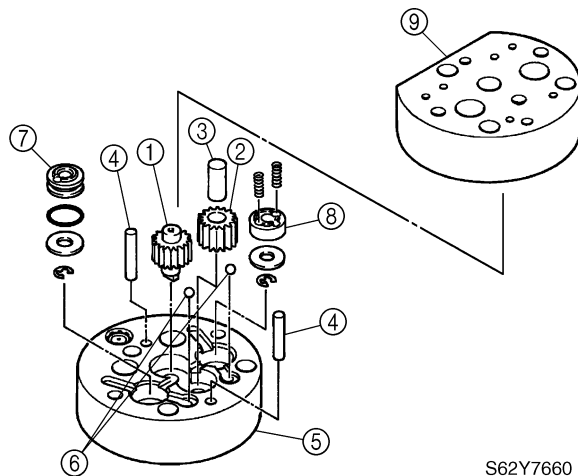
1. Check the drive gear ①, driven gear ②, and shaft ③ for damage or excessive wear. Replace if necessary.



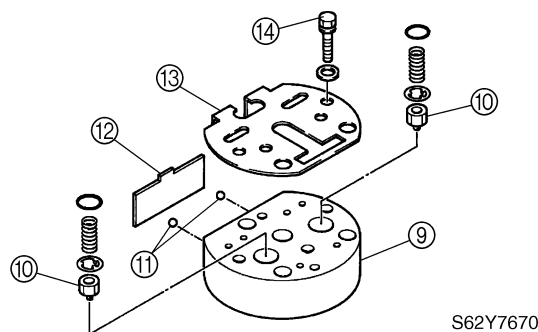
Assembling the gear pump

1. Install the drive gear ①, driven gear ②, shaft ③, and pins ④ into the gear pump housing ⑤.

2. Install the balls ⑥ into the gear pump housing ⑤.
3. Install the down-main valve ⑦ and up-main valve ⑧.
4. Install the gear pump cover ⑨.



5. Install the shuttle pistons ⑩ into the gear pump cover ⑨.
6. Install the balls ⑪ into the gear pump cover ⑨ with the manual release spring ⑫.
7. Install the gear pump bracket ⑬ by installing the bolts ⑭, then tightening them to the specified torque.



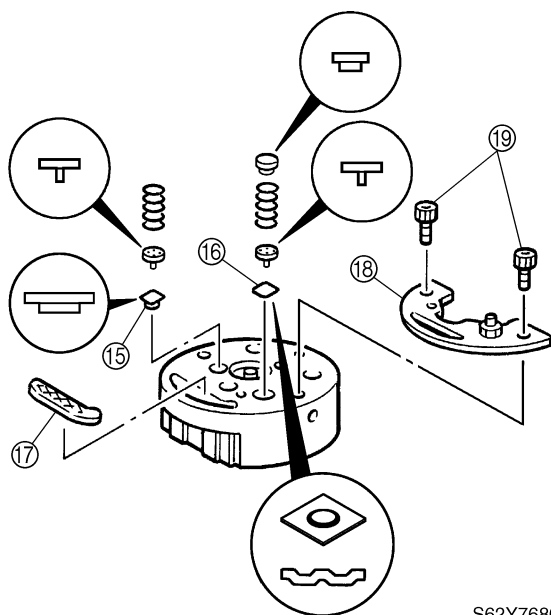


Gear pump bracket bolt ⑭:
5.3 N·m (0.53 kgf·m, 3.8 ft·lb)

8. Install the down-relief valve ⑮, up-relief valve ⑯, and filter ⑰.

Gear pump

9. Install the relief valve bracket ⑮ by installing the bolts ⑲, then tightening them to the specified torque.



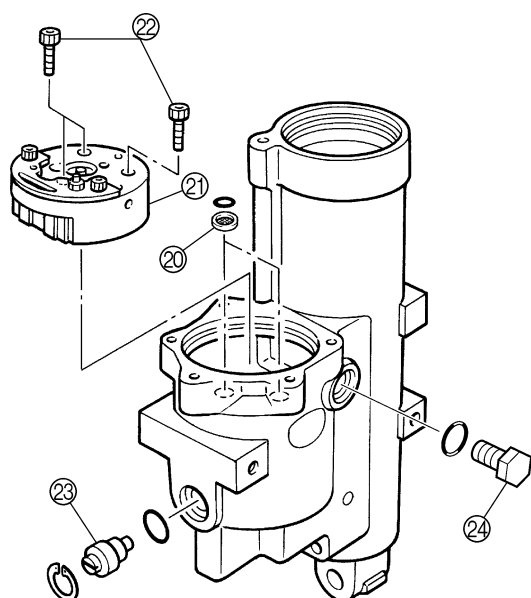
S62Y7680



Relief valve bracket bolt ⑲:
5.3 N·m (0.53 kgf·m, 3.8 ft·lb)

10. Install the filters ⑳ and gear pump ㉑ by installing the bolts ㉒, then tightening them to the specified torque.

11. Install the manual valve ㉓ and reservoir cap ㉔.

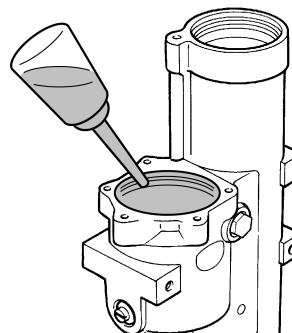


S62Y7690



Gear pump bolt ㉒:
6.5 N·m (0.65 kgf·m, 4.7 ft·lb)

12. Fill the reservoir with the recommended fluid to the correct level as shown.

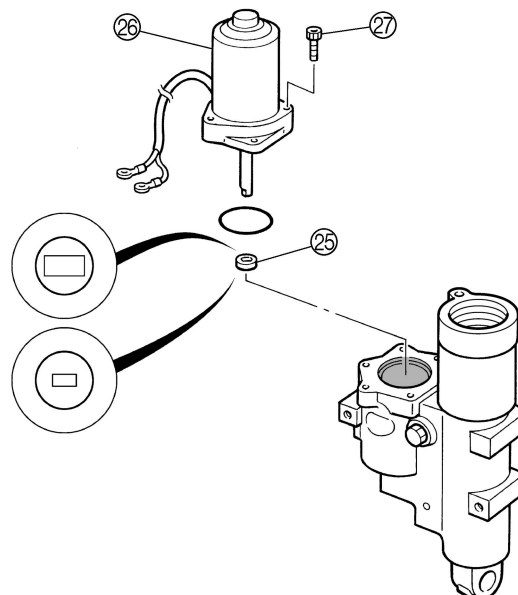


S62Y7700



Recommended power trim and tilt fluid:
ATF Dexron II

13. Install the joint ㉕ and power trim and tilt motor ㉖ by installing the bolts ㉗, then tightening them to the specified torque.



S62Y7710



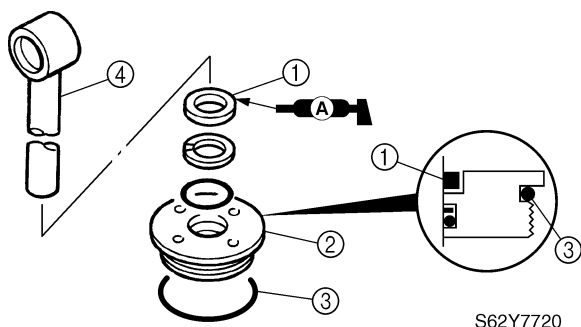
PTT motor bolt ㉗:
4 N·m (0.4 kgf·m, 2.9 ft·lb)

Assembling the trim cylinder

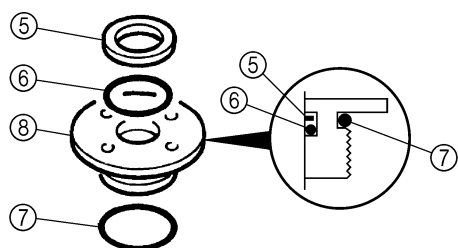
1. Install the dust seal ① into the tilt cylinder end screw ②.

7

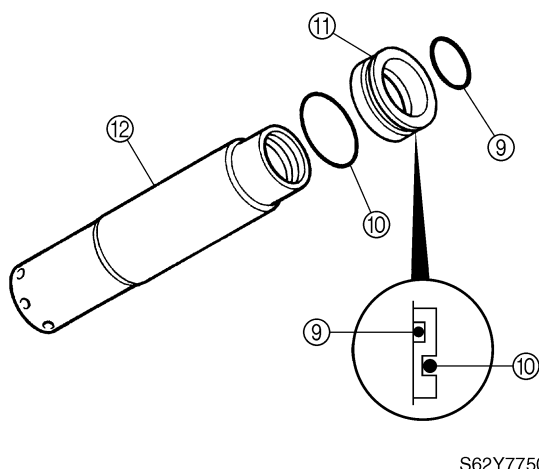
2. Install the O-ring ③ to the end screw.
3. Install the tilt ram ④ into the end screw.



4. Install the backup ring ⑤ and O-rings ⑥ and ⑦ into the trim cylinder end screw ⑧.

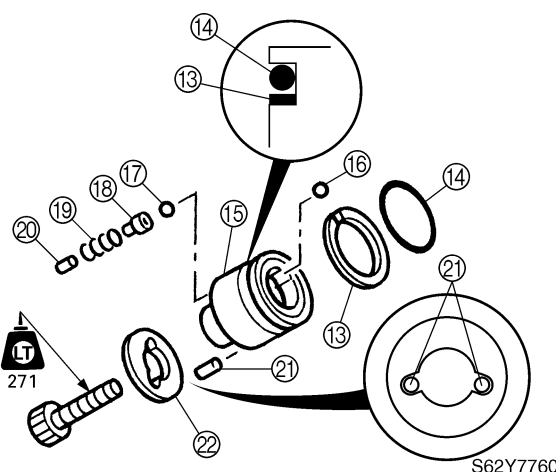


5. Install the trim cylinder end screw onto the tilt ram.
6. Install O-rings ⑨ and ⑩ onto the trim piston ⑪, and then install the trim piston to the trim cylinder ⑫.



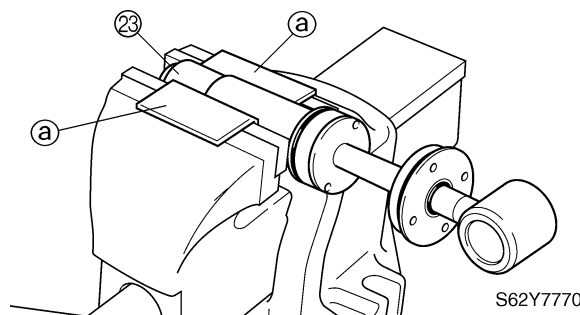
7. Install the backup ring ⑬ and O-ring ⑭ into the tilt piston ⑮.

8. Install balls ⑯ and ⑰, absorber valve pin ⑱, spring ⑲, pins ⑳ and ㉑, and washer ㉒ into the tilt piston.
9. Hold the tilt ram end in a vise using aluminum plates on both sides.
10. Install the tilt piston to the tilt ram by installing the bolt, then tightening it to the specified torque.



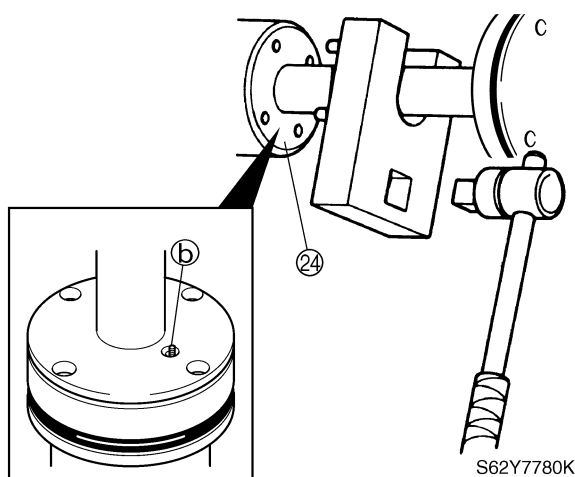
Tilt piston:
61 N·m (6.1 kgf·m, 44 ft·lb)

11. Install the trim cylinder onto the tilt ram.
12. Hold the trim cylinder ㉓ in a vise using aluminum plates ㉔ on both sides.



NOTE: Place the trim cylinder in the vise horizontally.

13. Install the trim cylinder end screw ㉔, and then tighten it to the specified torque.



CAUTION:

Do not damage the check valve (b) when tightening the end screw.



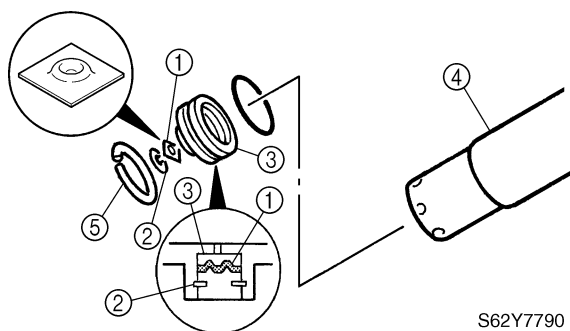
Cylinder-end screw wrench:
90890-06544



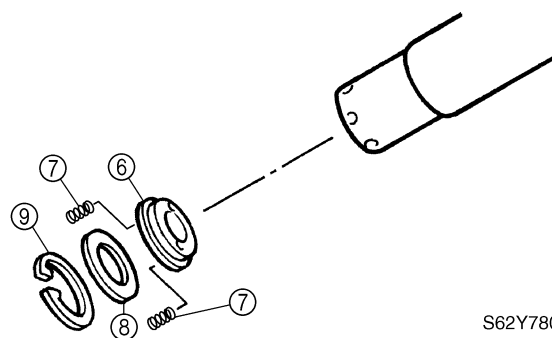
Trim cylinder end screw (24):
80 N·m (8.0 kgf·m, 58 ft·lb)

Assembling the tilt cylinder

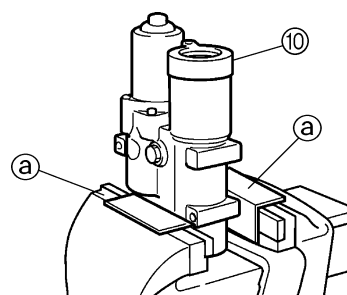
1. Install the valve seal (1) and the circlip (2) into the free piston (3) as shown.
2. Install the free piston into the trim cylinder (4) by installing the circlip (5).



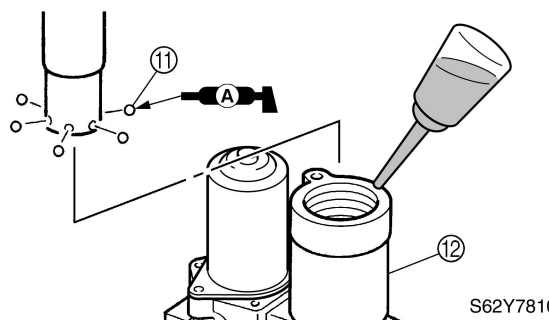
3. Install the trim cylinder base (6), springs (7), and plate (8) into the trim cylinder with the circlip (9).



4. Hold the power trim (10) and in a vise using aluminum plates (a) on both sides.



5. Add fluid of the recommended type to the first level at the bottom of tilt cylinder.
6. Install the balls (11) into the trim cylinder, and then insert the trim cylinder into the tilt cylinder (12).



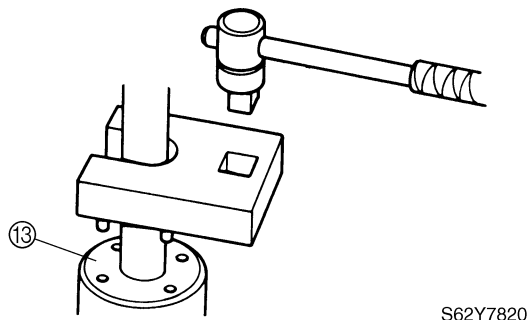
NOTE:

Apply grease to the balls to prevent them from falling out of the cylinder.



Recommended power trim and tilt
fluid:
ATF Dexron II

7. Install the tilt cylinder end screw ⑬, and then tighten it to the specified torque.



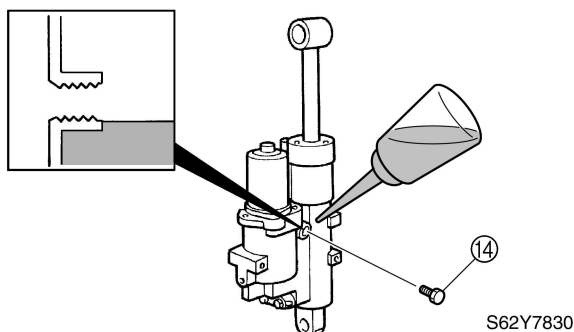
Cylinder-end screw wrench:
90890-06544



Tilt cylinder end screw ⑬:
90 N·m (9.0 kgf·m, 65 ft·lb)

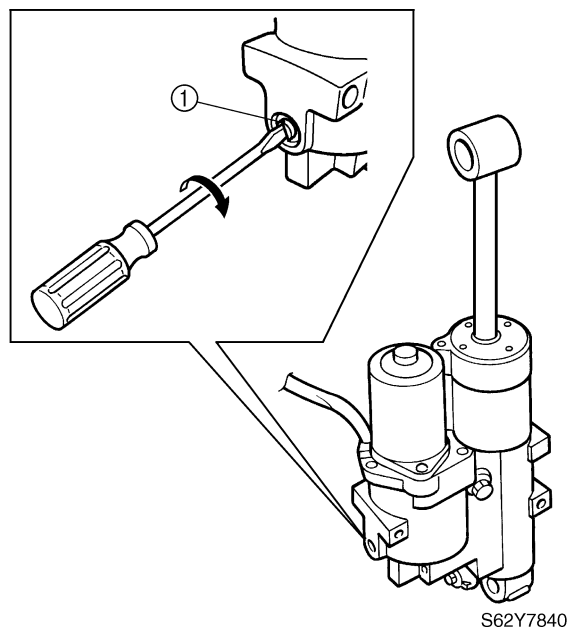
8. Fully extend the tilt rod, and then add sufficient fluid of the recommended type to the correct level.

9. Install the reservoir cap ⑭.



Bleeding the power trim and tilt (not installed)

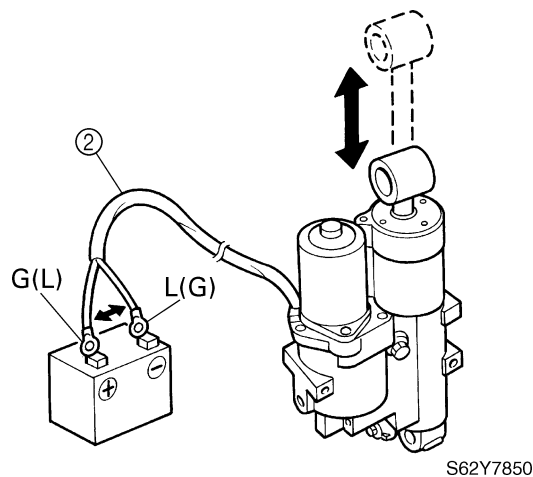
1. Close the manual valve ① by turning it clockwise.



2. Place the power trim and tilt in an upright position.
3. Check the fluid level in the reservoir.

NOTE: _____
The fluid level should be at the brim of the filler hole.

4. If necessary, add sufficient fluid of the recommended type to the correct level.
5. Install the reservoir cap.
6. Connect the PTT motor leads ② to the battery terminals.



Gear pump

Tilt rod	PTT motor lead	Battery terminal
Up	Blue (L)	⊕
	Green (G)	⊖
Down	Green (G)	⊕
	Blue (L)	⊖

- Reverse the PTT motor leads between the battery terminals when the tilt ram is fully extended, and then reverse them again when it is fully compressed.

NOTE:

- Repeat this procedure so that the tilt ram goes up and down four to five times.
- The sound of the power trim and tilt motor will change when the tilt ram is fully extended.

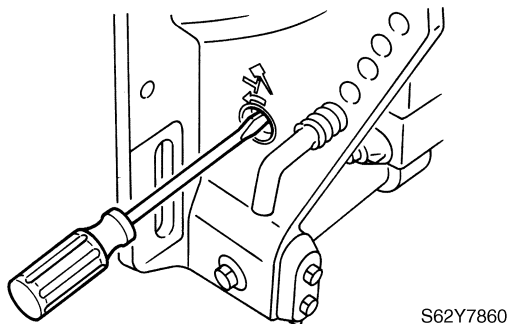
- Check the fluid level again when the tilt ram is fully extended. Add sufficient fluid, if necessary, and then repeat step 7.

NOTE:

Repeat this procedure until the fluid remains at the correct level.

Bleeding the power trim and tilt (built-in)

- Loosen the manual valve by turning it counterclockwise until it cannot be turned further.



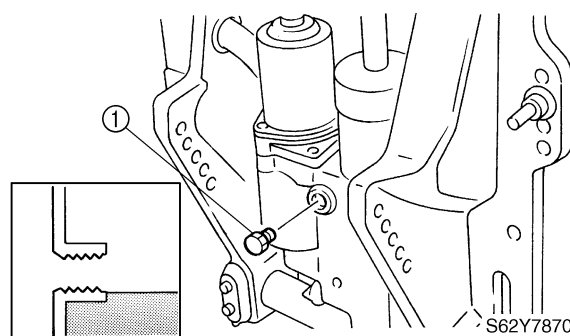
- Fully tilt the outboard motor up, and then release it and let it lower by its own weight four to five times.

- Tighten the manual valve by turning it clockwise.
- Let the fluid settle for 5 minutes.
- Push and hold the power trim and tilt switch in the up position until the outboard motor is fully tilted up.
- Support the outboard motor with the tilt stop lever, and then let the fluid settle for 5 minutes.

⚠ WARNING

After tilting up the outboard motor, be sure to support it with the tilt stop lever. Otherwise, the outboard motor could suddenly lower if the power trim and tilt unit should lose fluid pressure.

- Remove the reservoir cap ①, and then check the fluid level in the reservoir.
- If necessary, add sufficient fluid of the recommended type to the correct level.



NOTE:

The fluid level should be at the brim of the filler hole.



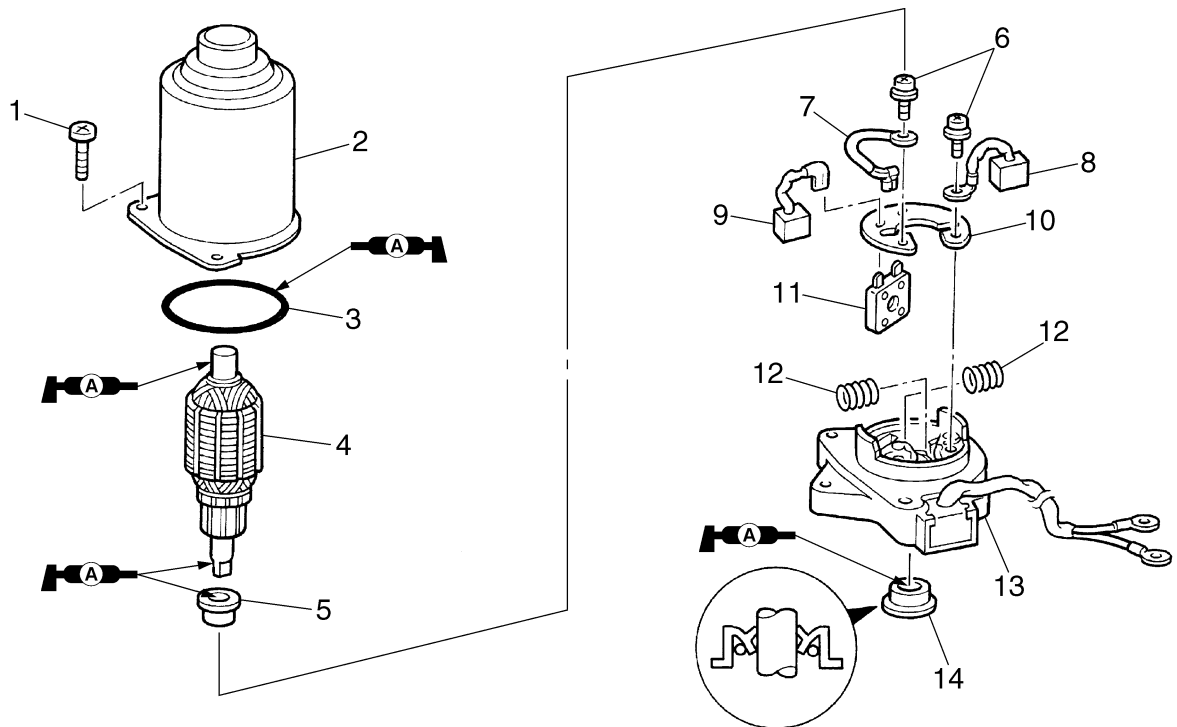
Recommended power trim and tilt fluid:
ATF Dexron II

- Install the reservoir cap.

NOTE:

Repeat this procedure until the fluid remains at the correct level.

Power trim and tilt motor

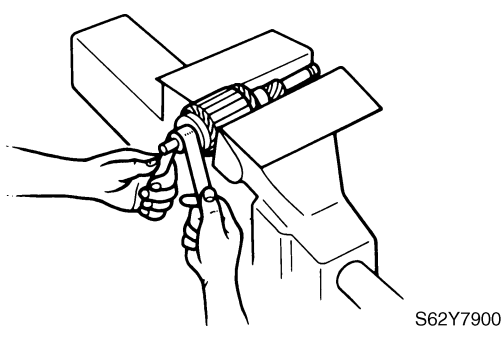


S62Y7890K

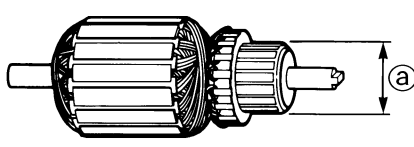
No.	Part name	Q'ty	Remarks
1	Screw	3	M5 × 20 mm
2	Yoke	1	
3	O-ring	1	Not reusable 52.0 × 1.9 mm
4	Armature	1	
5	Bushing	1	
6	Screw	2	M4 × 12 mm
7	Wire lead	1	
8	Brush 2	1	
9	Brush 1	1	
10	Brush holder	1	
11	Circuit breaker	1	
12	Brush spring	2	
13	PTT motor base	1	
14	Oil seal	1	Not reusable

Checking the power trim and tilt motor

- 1. Check the commutator for dirt or foreign substances. Clean with #600 grit sand-paper if necessary.

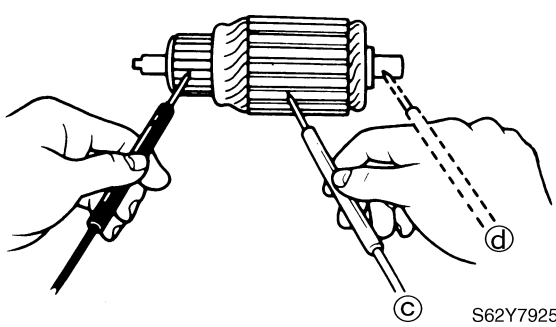
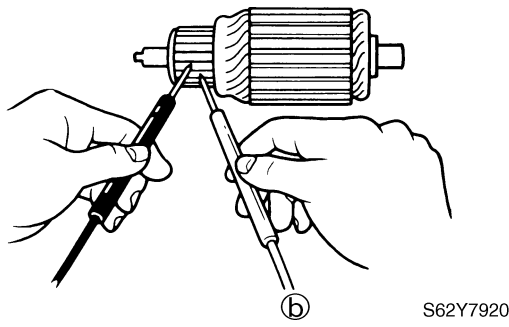


- 2. Check the commutator undercut for dirt or foreign substances. Clean with compressed air if necessary.
- 3. Measure the commutator diameter (a). Replace if out of specification.



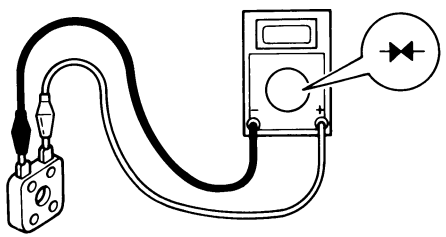
Commutator diameter limit (a):
21 mm (0.83 in)

- 4. Check the armature coil for continuity. Replace if out of specifications.

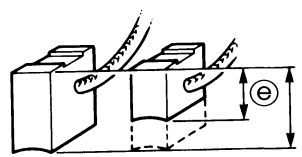


Armature coil continuity	
Commutator segments (b)	Continuity
Segment-laminations (c)	No continuity
Segment-shaft (d)	No continuity

- 5. Check the circuit breaker for continuity. Replace if there is no continuity.

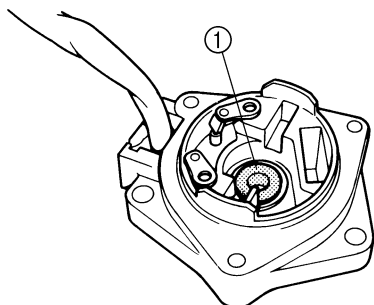


- 6. Measure the brush length. Replace if out of specification.



Brush length limit (e):
3.5 mm (0.14 in)

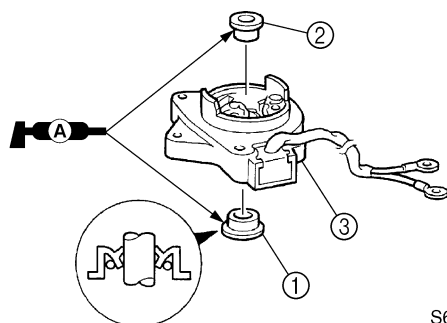
7. Check the base for cracks or damage. Replace if necessary.
8. Check the bushing ① for damage or wear. Replace if necessary.



S62Y7950

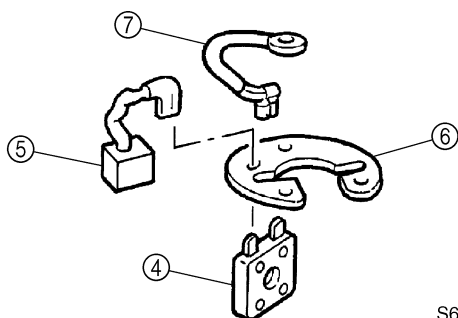
Assembling the power trim and tilt motor

1. Install the oil seal ① and the bushing ② into the motor base ③ as shown.



S62Y7960

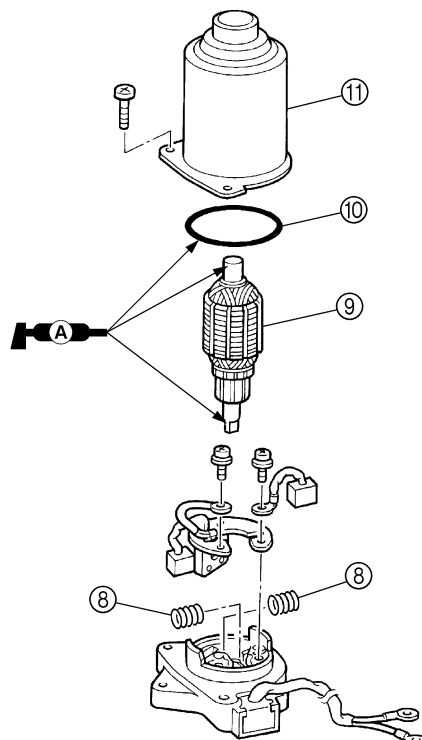
2. Attach the circuit breaker ④ onto brush 1 ⑤ together with the brush holder ⑥ and connect the wire lead ⑦.



S62Y7970

3. Install the springs ⑧ into the motor base, then the brush holder into the motor base together with the brushes and circuit breaker.

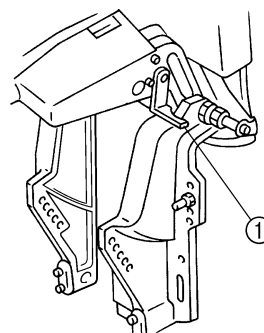
4. Install the armature ⑨, O-ring ⑩, and yoke ⑪.



S62Y7980

Installing the power trim and tilt

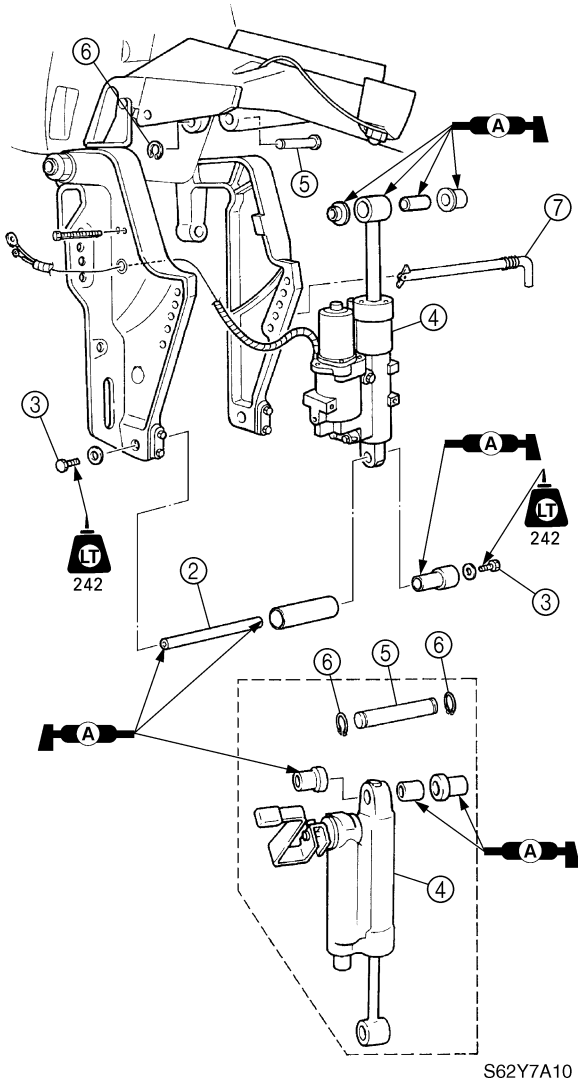
1. Fully tilt the outboard motor up, and then support it with the tilt stop lever ①.



S62Y7990

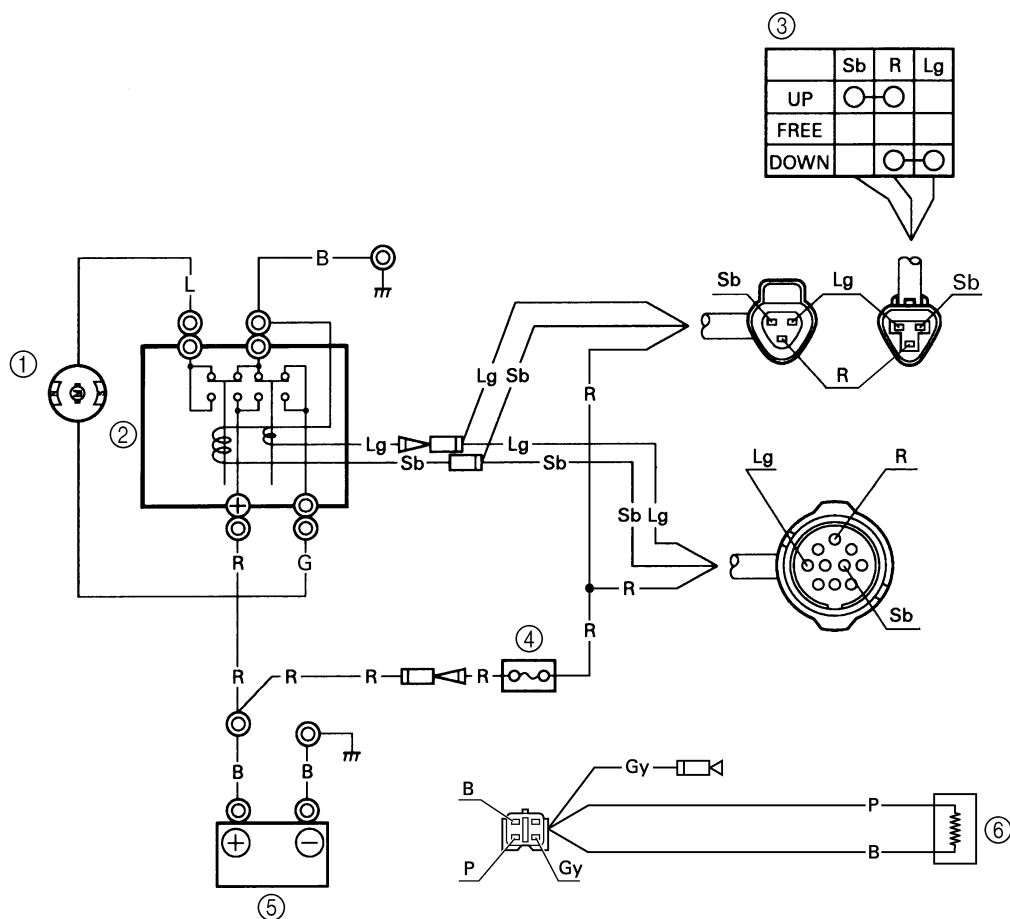
NOTE: After tilting up the outboard motor, be sure to support it with the tilt stop lever.

2. Install the shaft ② and bolts ③ onto both clamp brackets together with the power trim and tilt/hydro tilt ④.
3. Install the tilt ram upper end into the swivel bracket with the shaft ⑤ and circlip(s) ⑥.
4. Install the tilt pin ⑦.





Power trim and tilt electrical system



S62Y7A20K

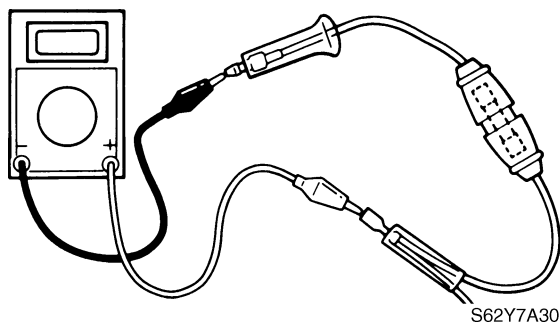
- ① Power trim and tilt motor
- ② Power trim and tilt relay
- ③ Trailer switch
- ④ Fuse
- ⑤ Battery
- ⑥ Trim sensor

B : Black
 G : Green
 Gy : Gray
 L : Blue
 Lg : Light green
 P : Pink
 R : Red
 Sb : Sky blue

Power trim and tilt electrical system

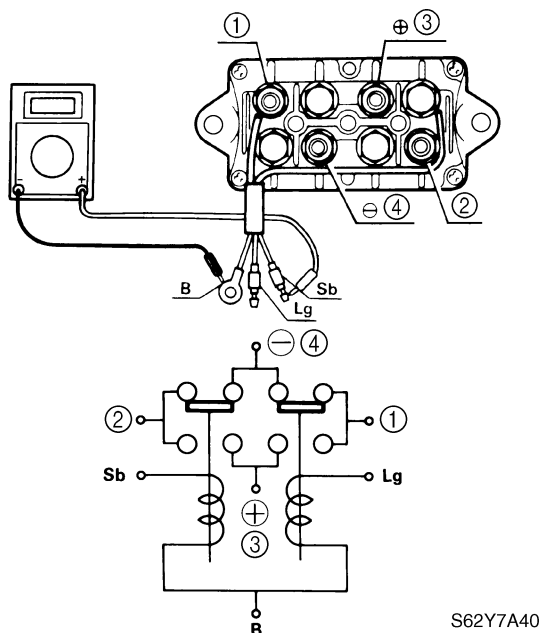
Checking the fuse

1. Check the fuse and fuse holder for continuity. Replace if there is no continuity.



Checking the power trim and tilt relay

1. Check the power trim and tilt relay for continuity. Replace if out of specification.

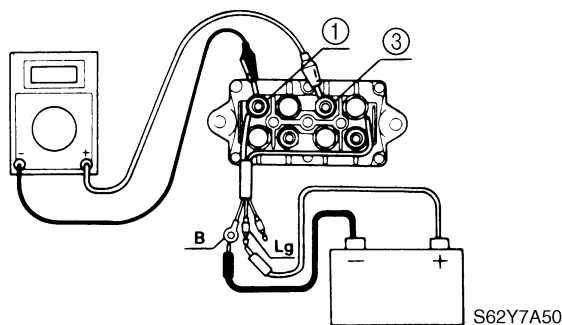


Power trim and tilt relay continuity	
Sky blue (Sb) – Black (B) Light green (Lg) – Black (B)	Continuity
Terminal ① – Terminal ④ Terminal ② – Terminal ④	Continuity
Terminal ① – Terminal ③ Terminal ② – Terminal ③	No continuity

2. Connect the digital circuit tester between power trim and tilt relay terminals ① and ③.

3. Connect the light green (Lg) lead to the positive battery terminal and the black (B) lead to the negative battery terminal as shown.

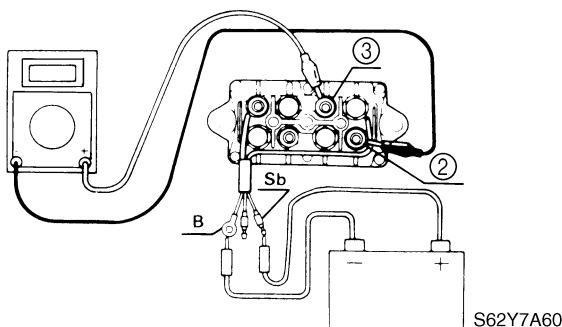
4. Check for continuity between terminals ① and ③. Replace if there is no continuity.



5. Connect the digital circuit tester between power trim and tilt relay terminals ② and ③.

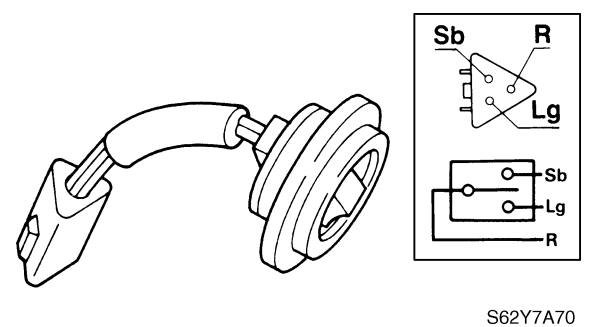
6. Connect the sky blue (Sb) lead to the positive battery terminal and the black (B) lead to the negative battery terminal as shown.

7. Check for continuity between terminals ② and ③. Replace if there is no continuity.



Checking the trailer switch

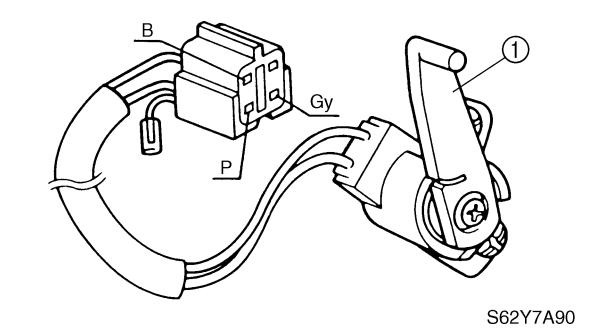
1. Check the trailer switch for continuity.
Replace if out of specification.



	Lead color		
Switch position	Skyblue (Sb)	Red (R)	Light green (Lg)
Up			
Free			
Down			

Checking the trim sensor

1. Measure the trim sensor resistance.
Replace if out of specification.



	Trim sensor resistance: Pink (P) – Black (B) 10–288.3 Ω at 20 °C (68 °F)
---	--

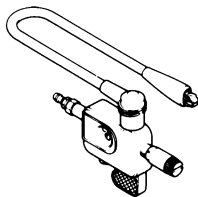
NOTE: _____
Turn the lever ① and measure the resistance as it gradually changes.



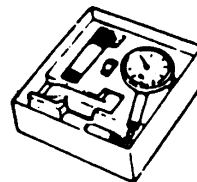
Electrical systems

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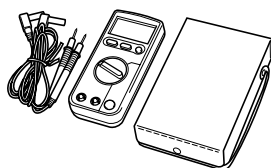
Special service tools



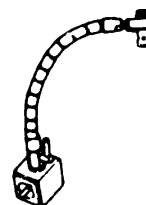
Ignition tester
90890-06754



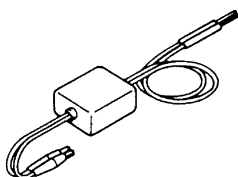
Dial gauge set
90890-01252



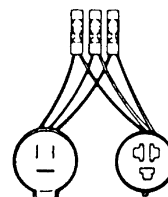
Digital circuit tester
90890-03174



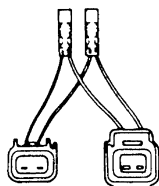
Magnet base
90890-06705



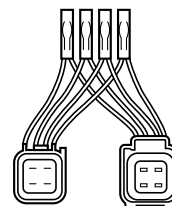
Peak voltage adaptor
90890-03172



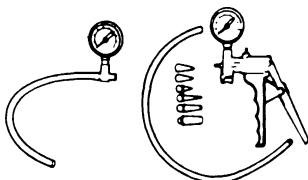
Test harness (3 pins)
90890-06770



Test harness (2 pins)
90890-06767



Test harness (4 pins)
90890-06771

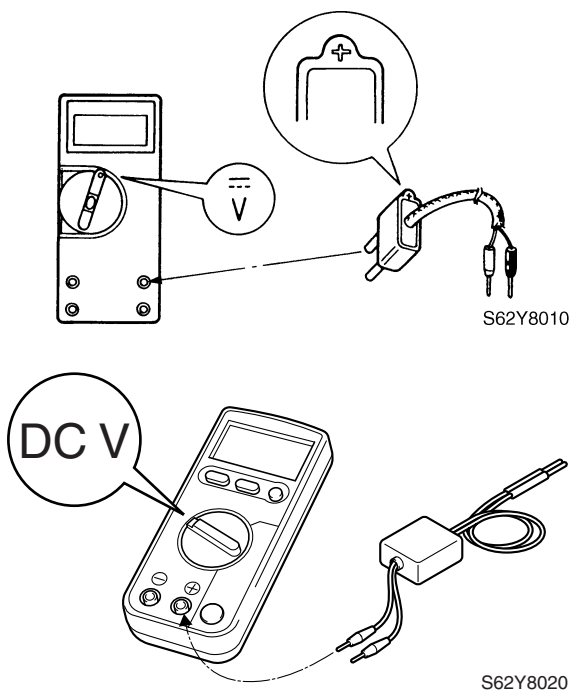


Vacuum/pressure pump gauge set
90890-06756

Checking the electrical components

Measuring the peak voltage

The condition of the ignition system can be determined by measuring the peak voltage. Cranking speed is effected by many factors, such as fouled or weak spark plugs, or a weak battery. If one of these factors is present, the peak voltage will be lower than specification. In addition, if the peak voltage is lower than specification the engine will not operate properly.



When measuring a resistance of $10\ \Omega$ or less with the digital circuit tester, the correct measurement cannot be obtained because of the internal resistance of the tester. To obtain the correct value, subtract the internal resistance from the displayed measurement.

Correct value =
displayed measurement – internal
resistance

NOTE: Obtain the internal resistance of the digital circuit tester by connecting both of its probes and checking the display.

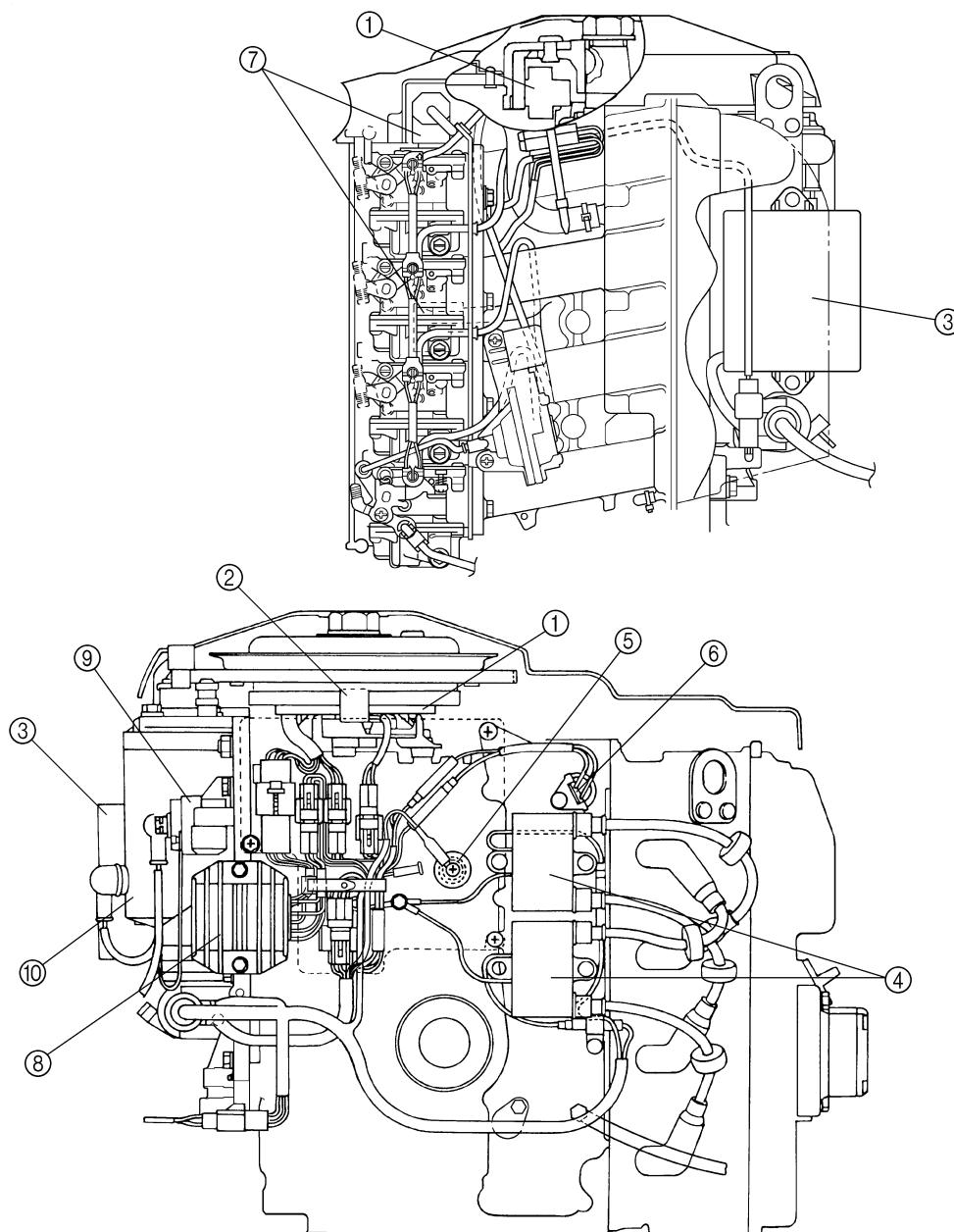
- NOTE:**
- Use the peak voltage adaptor with the digital circuit tester.
 - When measuring the peak voltage, set the selector on the digital circuit tester to the **DC voltage mode**.
 - Connect the positive pin on the peak voltage adaptor to the positive terminal of the digital circuit tester.

Measuring the lower resistance



Electrical components

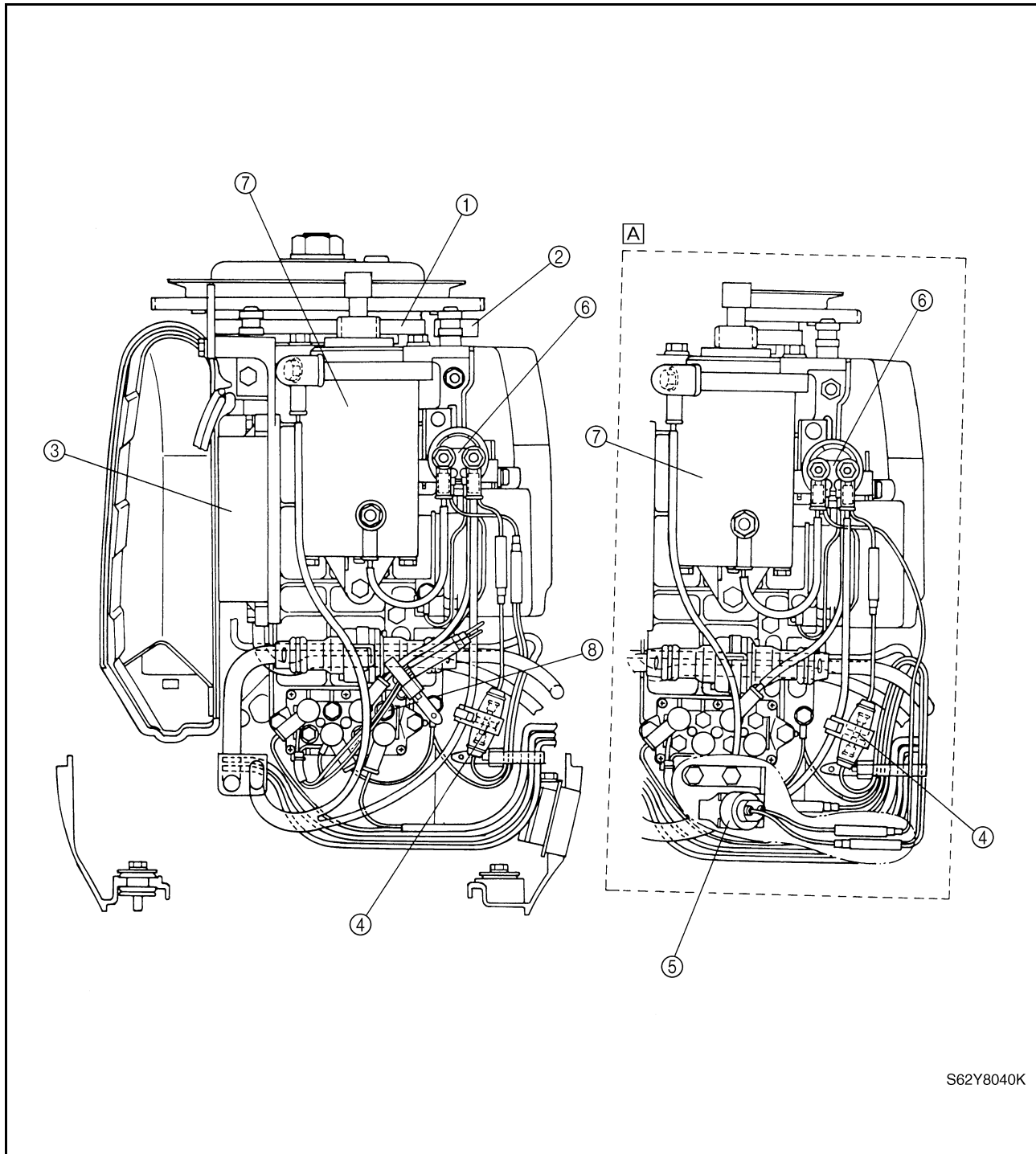
Starboard and port views



S62Y8030K

- | | |
|-----------------------|-----------------|
| ① Stator | ⑨ Starter relay |
| ② Pulser coil | ⑩ Starter motor |
| ③ CDI unit | |
| ④ Ignition coil | |
| ⑤ Oil pressure switch | |
| ⑥ Thermoswitch | |
| ⑦ Prime Start | |
| ⑧ Rectifier Regulator | |

Front view



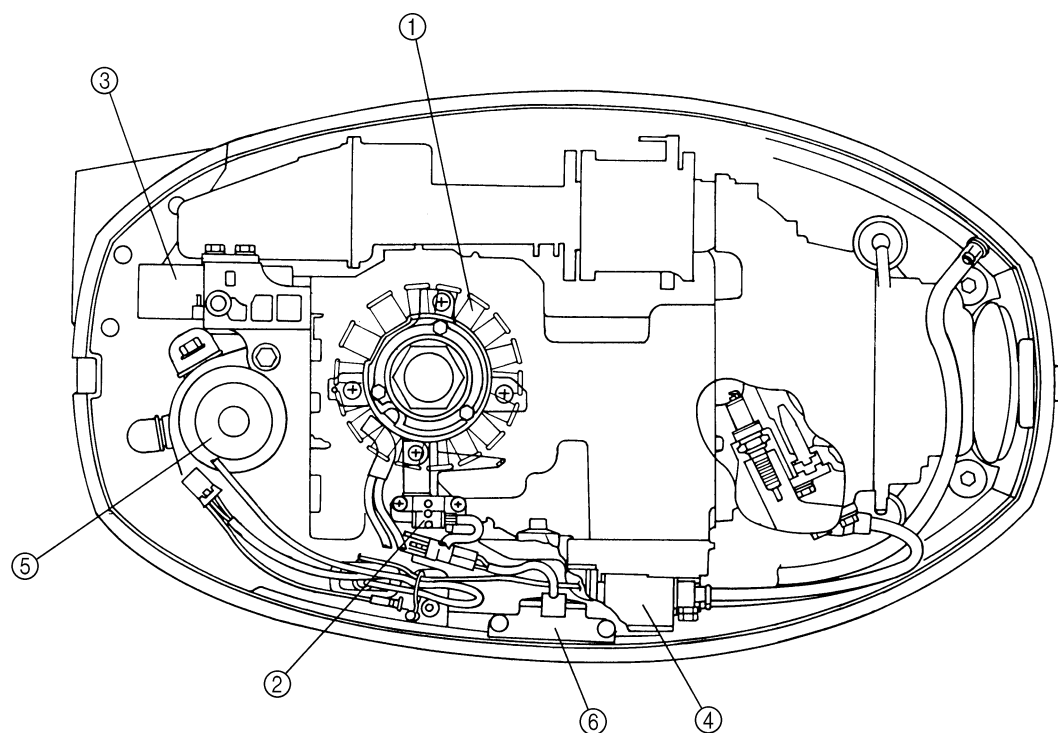
- ① Stator
- ② Pulser coil
- ③ CDI unit
- ④ Fuse
- ⑤ Neutral switch (tiller handle model)
- ⑥ Starter relay
- ⑦ Starter motor
- ⑧ Power trim and tilt relay (power trim and tilt model)

A Tiller handle model

S62Y8040K



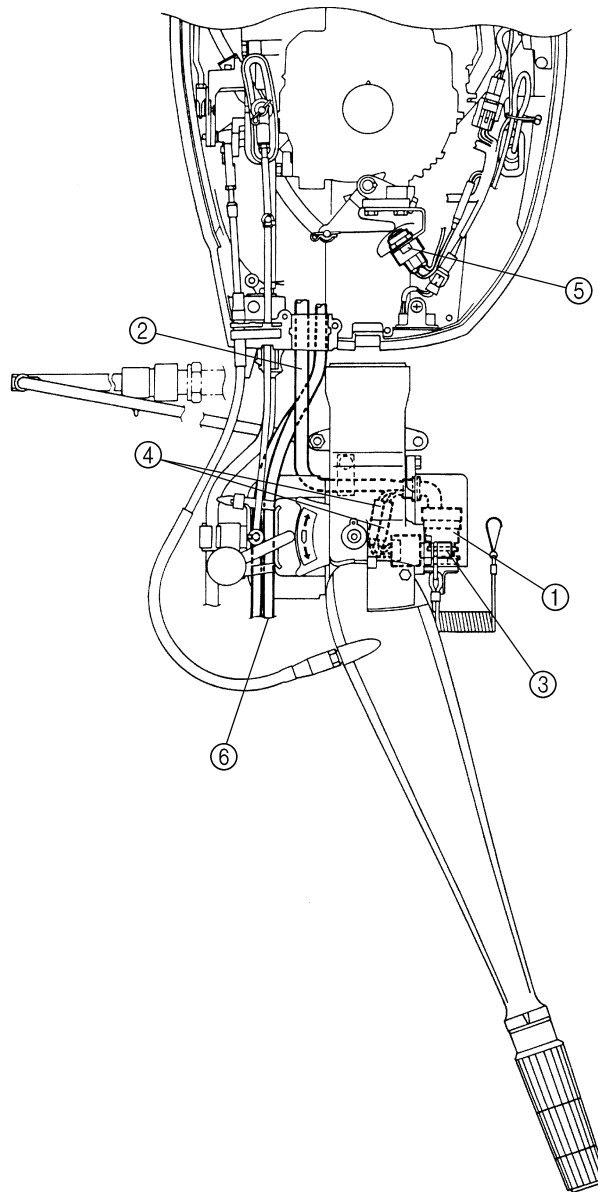
Top view



S62Y8050

- ① Stator
- ② Pulser coil
- ③ CDI unit
- ④ Ignition coil
- ⑤ Starter motor
- ⑥ Trailer switch

Tiller handle model

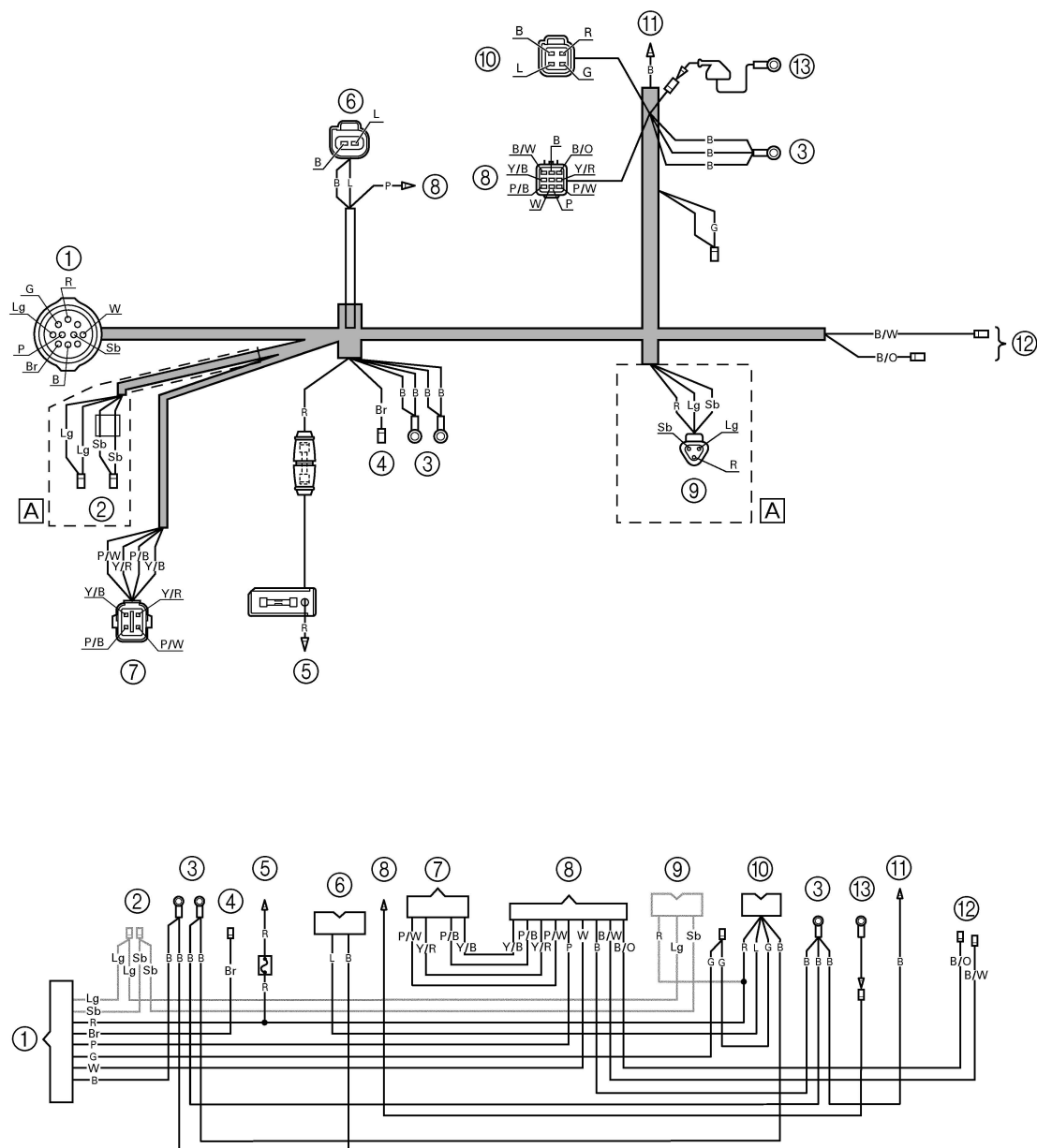


S62Y8070

- ① Engine start switch
- ② Engine start switch harness
- ③ Engine shut-off switch
- ④ Engine shut-off switch connector
- ⑤ Neutral switch
- ⑥ Battery lead



Wiring harness



S62Y8080

Connect to:

- ① Tiller handle main switch or remote control box or wiring harness extension
- ② Power trim and tilt relay
- ③ Ground
- ④ Starter relay
- ⑤ Positive battery lead
- ⑥ Prime Start

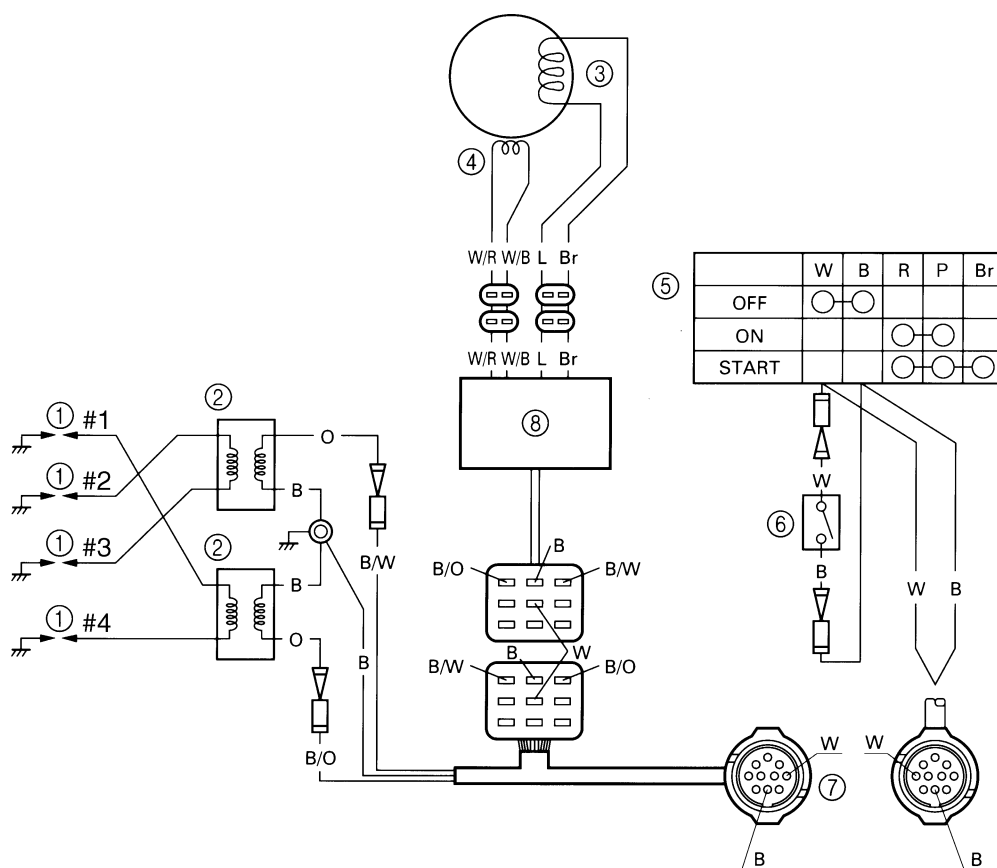
- ⑦ Warning indicator or digital tachometer
- ⑧ CDI unit
- ⑨ Trailer switch
- ⑩ Rectifier Regulator
- ⑪ Thermoswitch
- ⑫ Ignition coil
- ⑬ Oil pressure switch

A Power trim and tilt model

- B : Black
Br : Brown
G : Green
L : Blue
Lg : Light green
P : Pink
R : Red
Sb : Sky blue

- W : White
B/O : Black/orange
B/W : Black/white
P/B : Pink/black
P/W : Pink/white
Y/B : Yellow/black
Y/R : Yellow/red

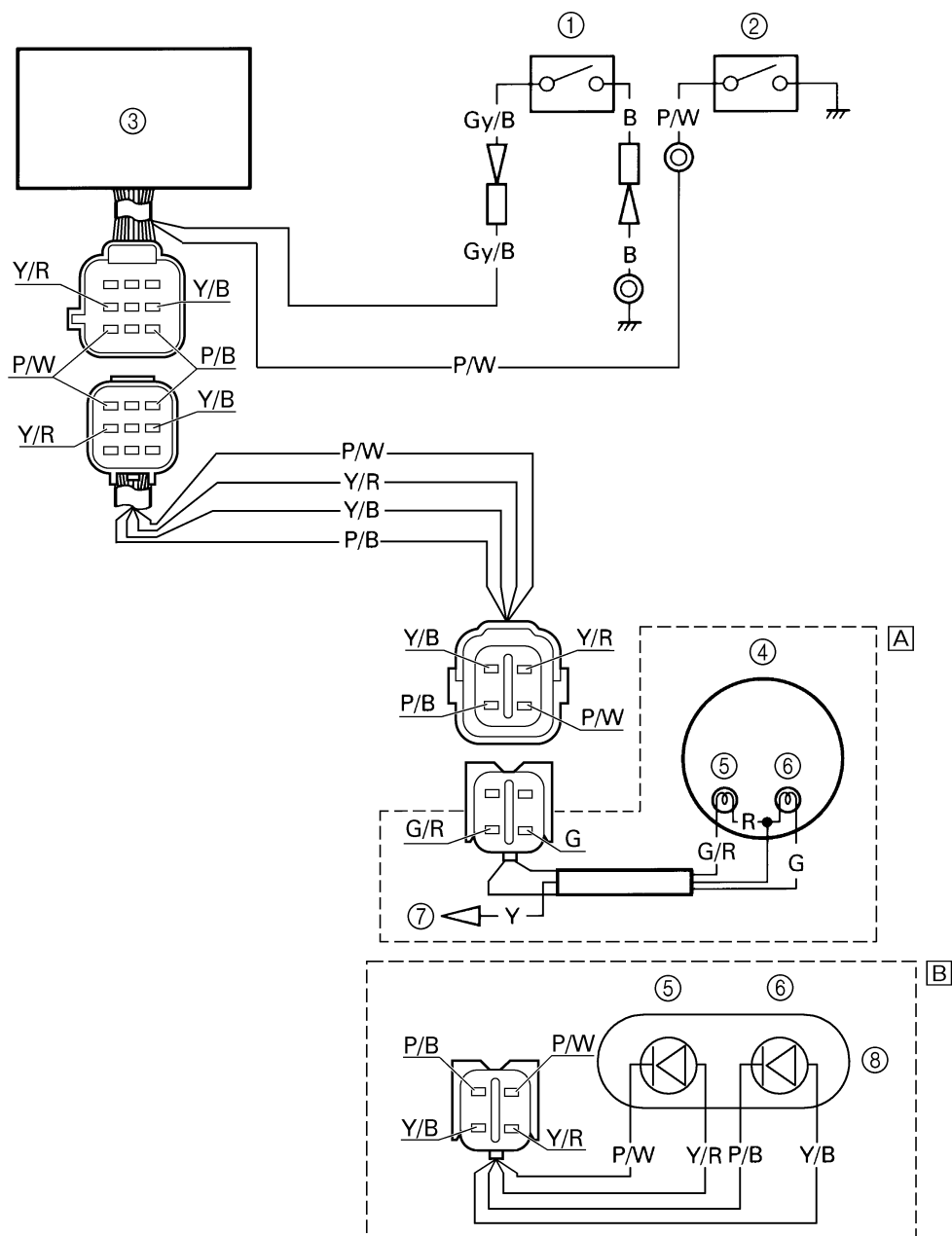
Ignition system and Ignition control system



S62Y8090

- ① Spark plug
- ② Ignition coil
- ③ Charge coil
- ④ Pulser coil
- ⑤ Engine start switch
- ⑥ Engine shut-off switch
- ⑦ 10-pin coupler
- ⑧ CDI unit

- B : Black
- Br : Brown
- L : Blue
- W : White
- B/O : Black/orange
- B/W : Black/white
- W/B : White/black
- W/R : White/red



S62Y8100

- ① Thermoswitch
- ② Oil pressure switch
- ③ CDI unit
- ④ Digital tachometer
- ⑤ Oil pressure warning indicator
- ⑥ Overheat warning indicator
- ⑦ Remote control box
- ⑧ Warning indicator

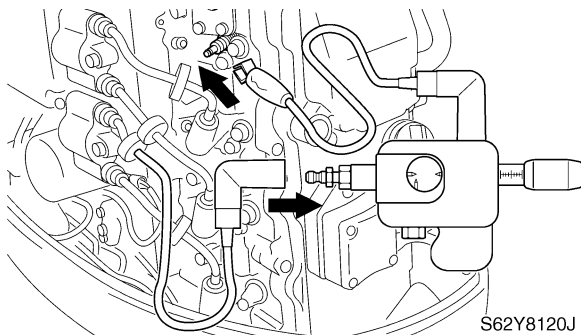
- [A] Remote control model
- [B] Tiller handle model

- B : Black
- G : Green
- R : Red
- Y : Yellow
- Gy/B : Gray/black
- P/B : Pink/black
- P/W : Pink/white
- Y/B : Yellow/black
- Y/R : Yellow/red

Ignition system and Ignition control system

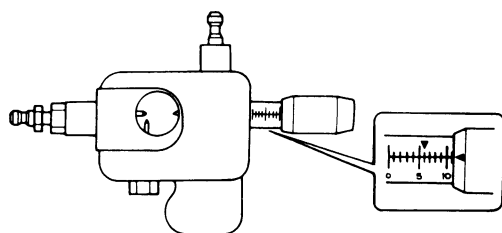
Checking the ignition spark gap

1. Disconnect the spark plug caps from the spark plugs.
2. Connect a spark plug cap to the special service tool.



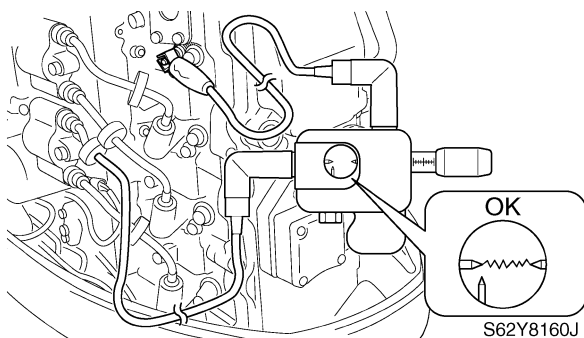
Ignition tester: 90890-06754

3. Set the spark gap length on the adjusting knob.



Ignition spark gap: 9 mm (0.35 in)

4. Crank the engine and observe the spark through the discharge window of the spark gap tester. Check the ignition coil if out of specification.

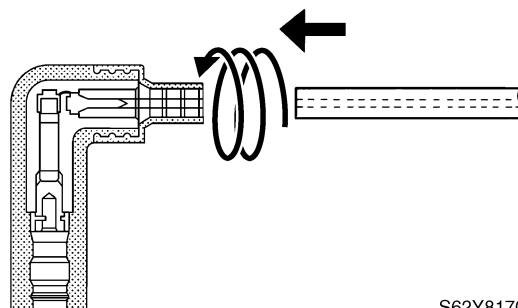


⚠ WARNING

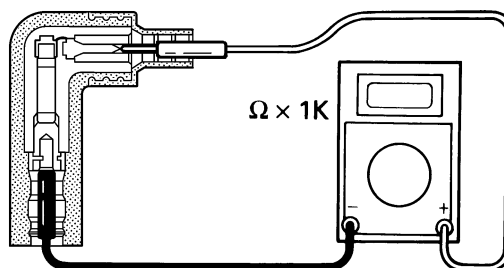
- Do not touch any of the connections of the spark gap tester leads.
- Do not let sparks leak out of the removed spark plug caps.
- Keep flammable gas or liquids away, since this test can produce sparks.

Checking the spark plug caps

1. Remove the spark plug caps from the high-tension cords by turning the caps counterclockwise.



2. Measure the spark plug cap resistance. Replace if out of specification.

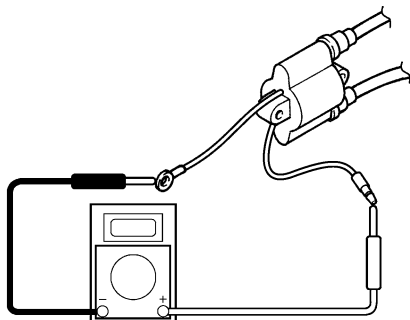


Spark plug cap resistance:
3.75–6.25 k Ω

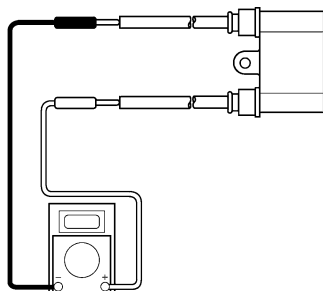


Checking the ignition coil

1. Remove the spark plug caps from the high-tension cords by turning the caps counterclockwise.
2. Measure the ignition coil resistance. Replace if out of specification.



S62Y8185K



S62Y8190K



Ignition coil resistance:

Primary coil:

Orange (O) – Black (B)

0.08–0.11 Ω at 20 °C (68 °F)

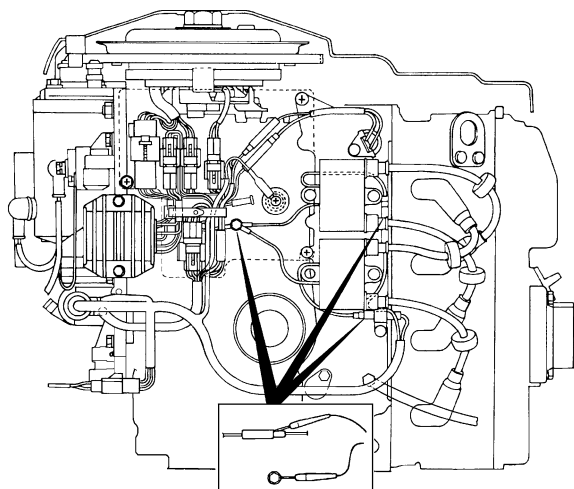
Secondary coil:

High-tension cord – High-tension cord

3.5–4.7 k Ω at 20 °C (68 °F)

Checking the CDI unit

1. Measure the CDI unit output peak voltage. If below specification, measure the charge coil output peak voltage and the pulser coil output peak voltage. Replace the CDI unit if the output peak voltage of both coils is above specification.



S62Y8200

⚠ WARNING

When checking the peak voltage do not touch any of the connections of the digital tester leads.

NOTE:

- Use the peak voltage adaptor with the digital circuit tester.
- When measuring the peak voltage, set the selector on the digital circuit tester to the **DC voltage mode**.



Digital circuit tester: 90890-03174

Peak voltage adaptor: 90890-03172



CDI unit output peak voltage:

Black/orange (B/O) – Black (B)

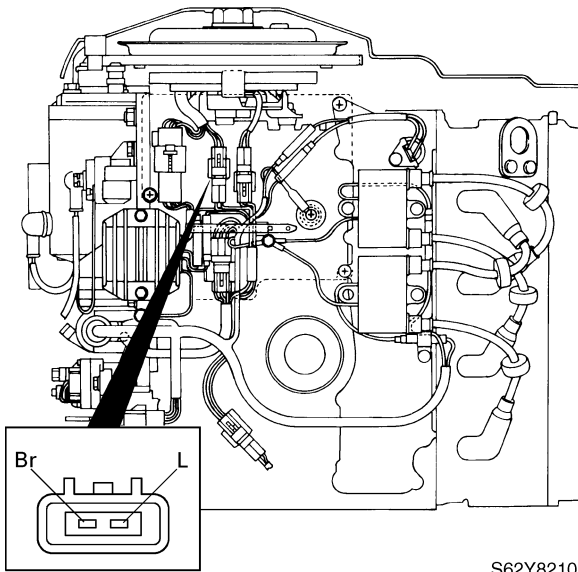
Black/white (B/W) – Black (B)

r/min	Unloaded	Loaded		
		Cranking		
		1,500	3,500	
DC V	126	150	151	116

Checking the charge coil

1. Measure the charge coil output peak voltage. Replace the stator coil if below specification.

Ignition system and Ignition control system



S62Y8210

⚠ WARNING

When checking the peak voltage do not touch any of the connections of the digital tester leads.

NOTE:

- Use the peak voltage adaptor with the digital circuit tester.
- When measuring the peak voltage, set the selector on the digital circuit tester to the **DC voltage mode**.



Digital circuit tester: 90890-03174
Peak voltage adaptor: 90890-03172
Test harness (2 pins): 90890-06767



Charge coil output peak voltage:
Brown (Br) – Blue (L)

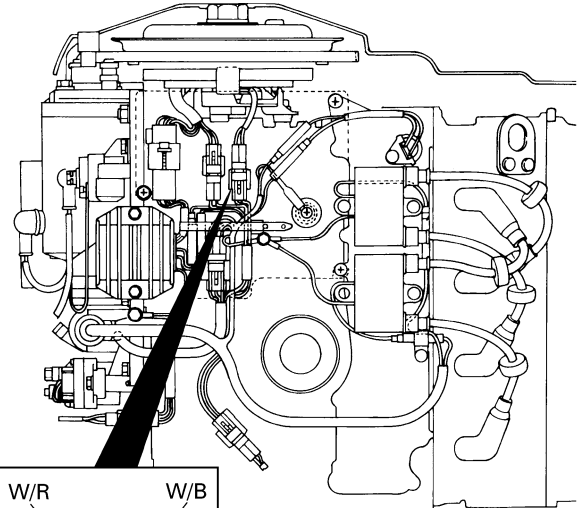
r/min	Unloaded		Loaded	
	Cranking		1,500	3,500
DC V	144	137	169	129



Charge coil resistance (use as reference):
Brown (Br) – Blue (L)
272–408 Ω at 20 °C (68 °F)

Checking the pulser coil

1. Measure the pulser coil output peak voltage. Replace the pulser coil if below specification.



S62Y8220

⚠ WARNING

When checking the peak voltage do not touch any of the connections of the digital tester leads.

NOTE:

- Use the peak voltage adaptor with the digital circuit tester.
- When measuring the peak voltage, set the selector on the digital circuit tester to the **DC voltage mode**.



Digital circuit tester: 90890-03174
Peak voltage adaptor: 90890-03172
Test harness (2 pins): 90890-06767



Pulser coil output peak voltage:
White/red (W/R) – White/black (W/B)

r/min	Unloaded		Loaded	
	Cranking		1,500	3,500
DC V	6.3	3.5	7.4	11.2

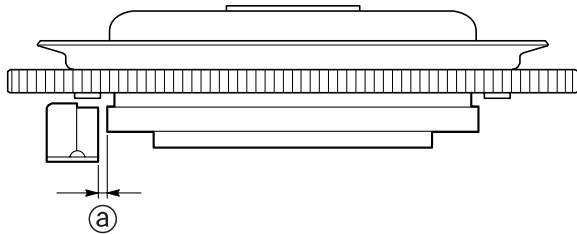


Pulser coil resistance (use as reference):

White/red (W/R) – White/black (W/B)
396–594 Ω at 20 °C (68 °F)

Checking the pulser coil air gap

1. Turn the flywheel clockwise to align the projection of the flywheel with the pulser coil projection.
2. Measure the gap between both projections with a thickness gauge. Adjust if out of specification.

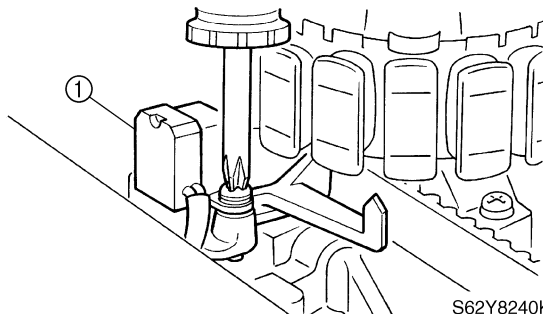


S62Y8230K



Pulser coil air gap ①:
0.5–1.0 mm (0.020–0.039 in)

3. Remove the flywheel magnet nut and flywheel magnet.
4. Loosen the pulser coil screws, adjust the pulser coil ① position, and then tighten the screws finger tight.



S62Y8240K

5. Set the flywheel magnet and then check the gap again and, if necessary, repeat steps 3–5.

6. Tighten the pulser coil screws and flywheel magnet nut to the specified torques.



Pulser coil screw:

4 N·m (0.4 kgf·m, 2.9 ft·lb)

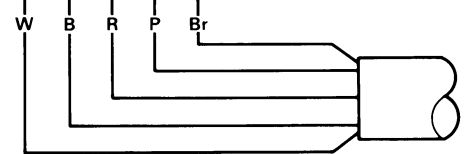
Flywheel magnet nut:

160 N·m (16 kgf·m, 116 ft·lb)

Checking the engine start switch

1. Check the engine start switch for continuity. Replace if there is no continuity.

	W	B	R	P	Br
OFF	○	○			
ON			○	○	
START			○	○	○



S62Y8250

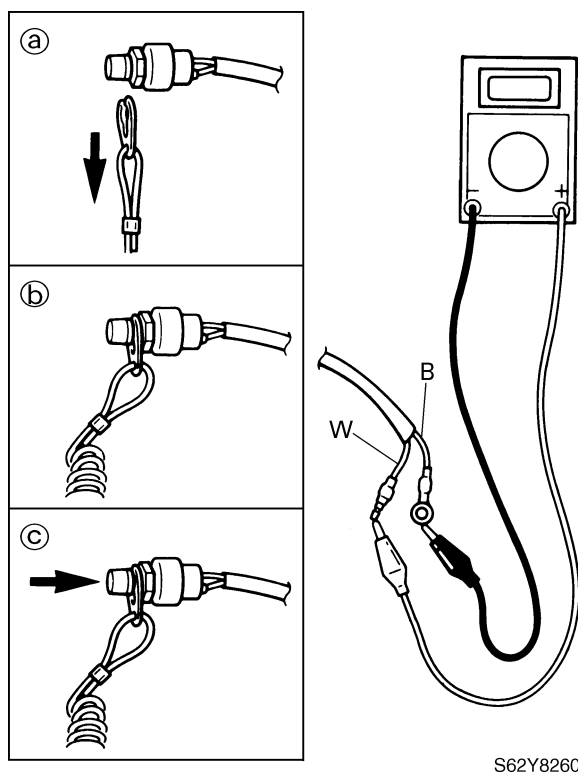


Lead color

Switch position	White (W)	Black (B)	Red (R)	Pink (P)	Brown (Br)
OFF	○	○			
ON			○	○	
START			○	○	○

Checking the engine shut-off switch

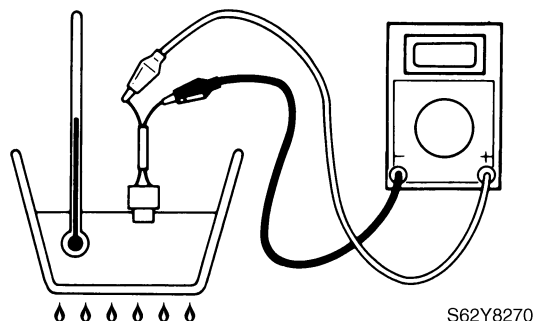
1. Check the engine shut-off switch for continuity. Replace if there is no continuity.



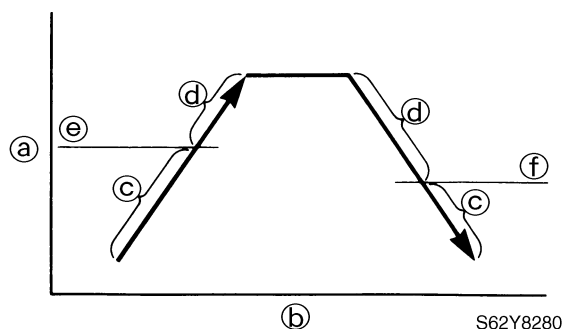
	Lead color	
	White (W)	Black (B)
Remove the lock plate (a)		
Install the lock plate (b)		
Push the button (c)		

Checking the thermoswitch

- Place the thermoswitch in a container of water and slowly heat the water.



- Check the switch for continuity at the specified temperatures. Replace if out of specification.



- (a) Temperature
- (b) Time
- (c) No continuity
- (d) Continuity

Thermoswitch continuity temperature:

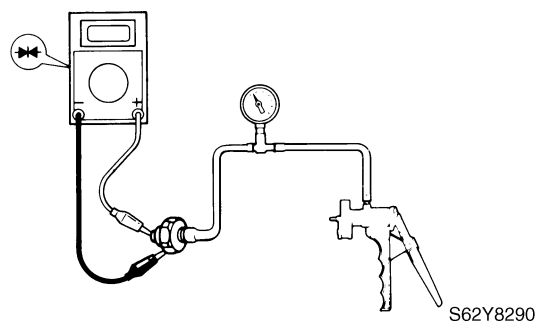
Pink (P) – Black (B)

⊕: 76–84 °C (164–183 °F)

⊖: 63–77 °C (145–170 °F)

Checking the oil pressure switch

- Connect the special service tool to the oil pressure switch.
- Slowly operate the special service tool.



- Check the switch for continuity at the specified pressure. Replace if there is no continuity.

Vacuum/pressure pump gauge set:

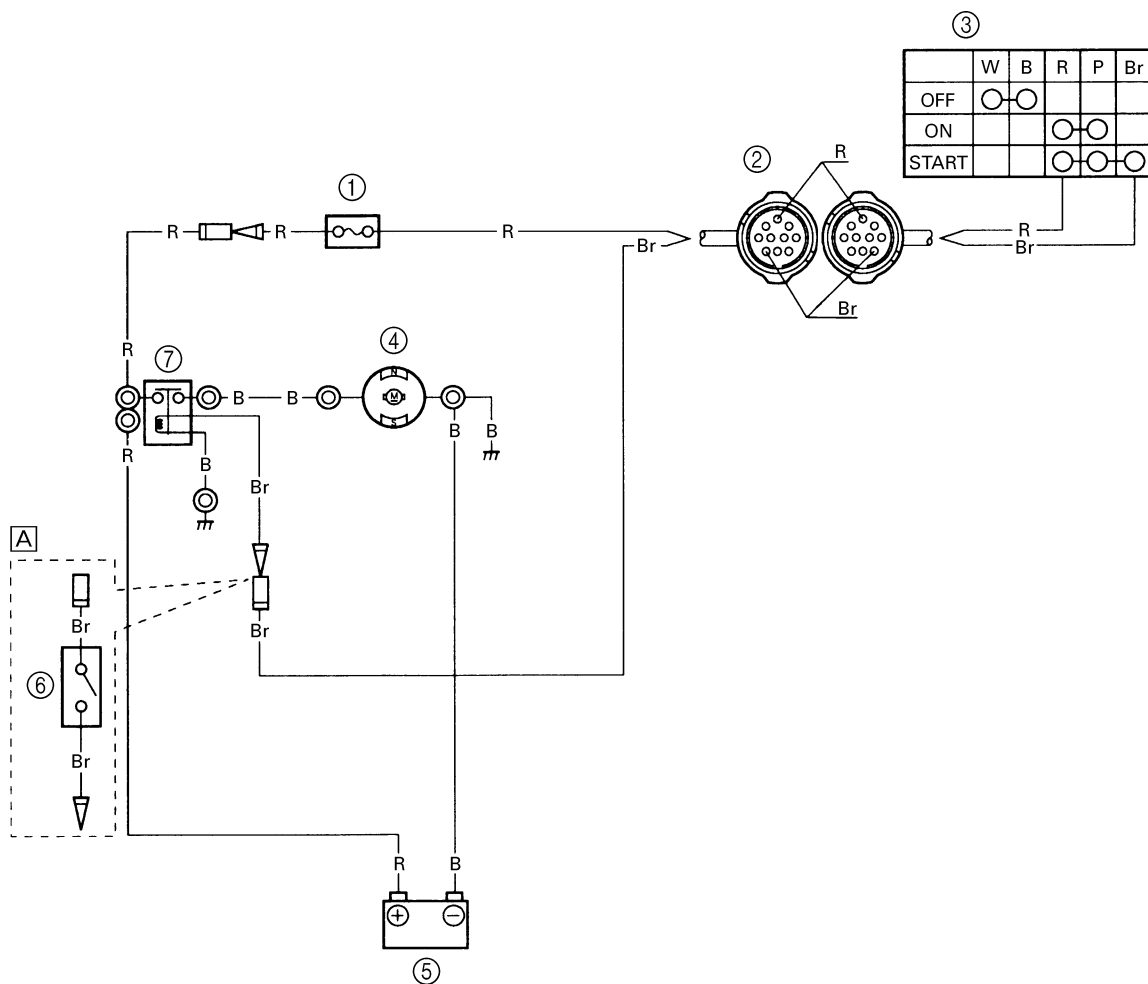
90890-06756

Specified oil pressure:

15 kPa (0.15 kgf/cm², 2.13 psi)



Starting system



S62Y8300

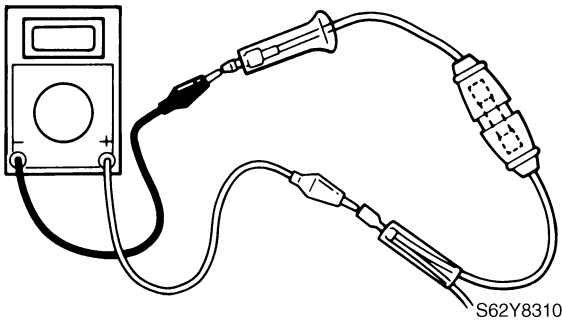
- ① Fuse
- ② 10-pin coupler
- ③ Engine start switch
- ④ Starter motor
- ⑤ Battery
- ⑥ Neutral switch
- ⑦ Starter relay

B : Black
 Br : Brown
 R : Red

A Tiller handle model

Checking the fuse

1. Check the fuse and fuse holder for continuity. Replace if there is no continuity.

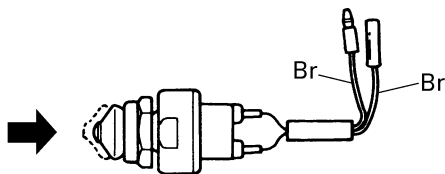


Checking the wiring harness (10 pins)

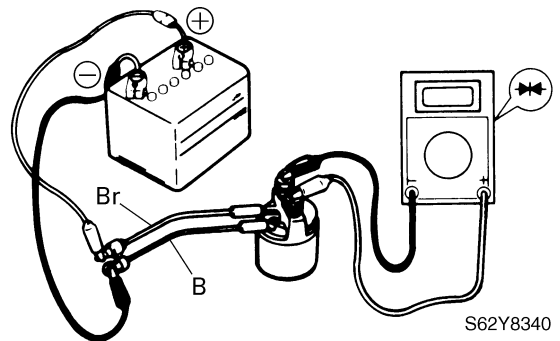
1. Check the wiring harness for continuity. Replace if there is no continuity.

Checking the neutral switch

1. Check the neutral switch for continuity. Replace if there is no continuity.



4. Check for continuity between the starter relay terminals. Replace if there is no continuity.
5. Check that there is no continuity between the starter relay terminals after disconnecting the brown or black lead. Replace if there is continuity.

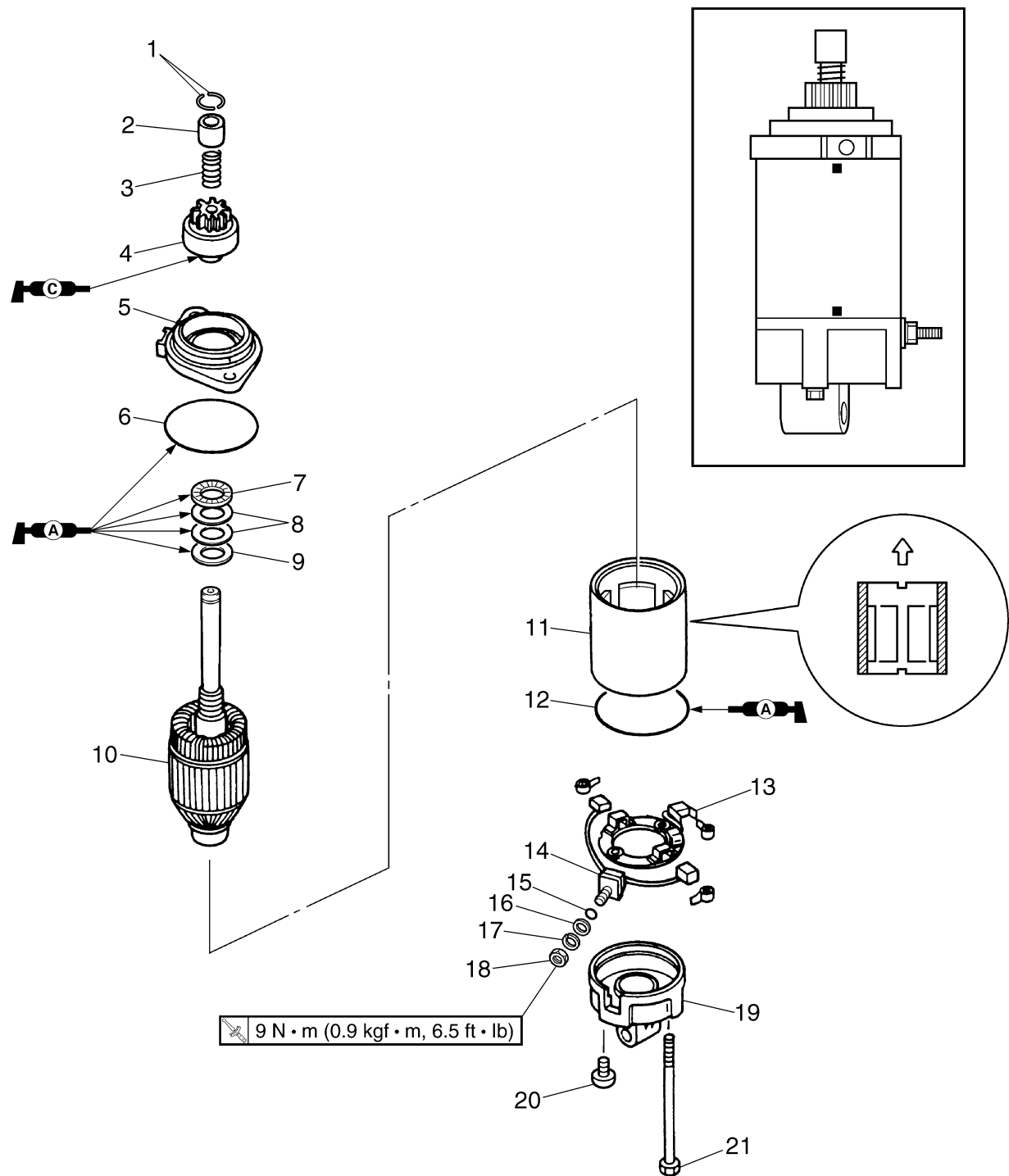


	Lead color	
	Brown (Br)	Brown (Br)
Free		
Push	○	○

Checking the starter relay

1. Connect the digital circuit tester leads to the starter relay terminals.
2. Connect the brown (Br) lead to the positive battery terminal.
3. Connect the black (B) lead to the negative battery terminal.

Starter motor



S62Y8350K

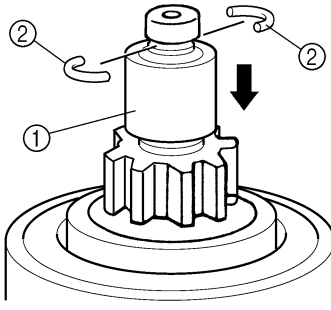
Starter motor

No.	Part name	Q'ty	Remarks
1	Clip	1	
2	Pinion stopper	1	
3	Spring	1	
4	Starter motor pinion	1	
5	Upper bracket	1	
6	O-ring	1	Not reusable
7	Washer 1	1	
8	Shim	—	As required
9	Washer 2	1	
10	Armature	1	
11	Stator	1	
12	O-ring	1	Not reusable
13	Brush holder assembly	1	
14	Brush set	1	
15	O-ring	1	Not reusable
16	Washer	1	
17	Spring washer	1	
18	Nut	1	
19	Lower bracket	1	
20	Screw	2	M4 × 12 mm
21	Bolt	2	M5 × 125 mm



Removing the starter motor pinion

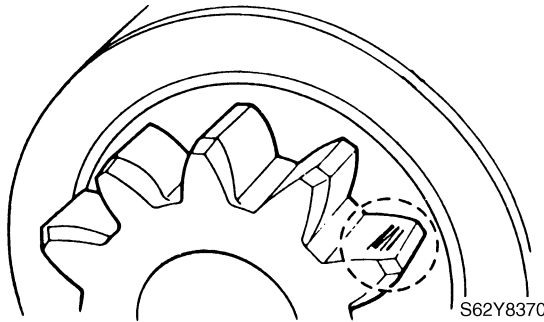
- Slide the pinion stopper ① down as shown, and then remove the clip ②.



S62Y8360

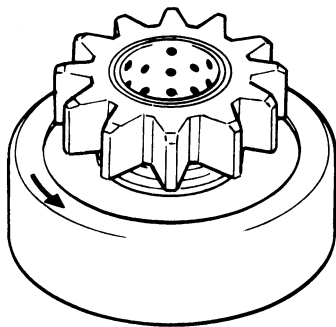
Checking the starter motor pinion

- Check the pinion teeth for cracks or wear. Replace if necessary.



S62Y8370

- Check for smooth operation. Replace if necessary.



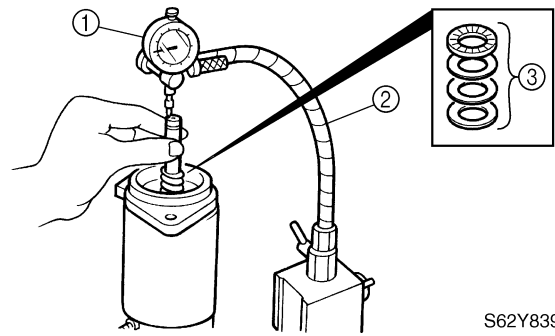
S62Y8380

NOTE:

Turn the pinion clockwise to check that it operates smoothly and turn it counterclockwise to check that it locks.

Checking the armature

- Check the armature axial free play. Replace the washers and shim(s) ③ if out of specification.



S62Y8390

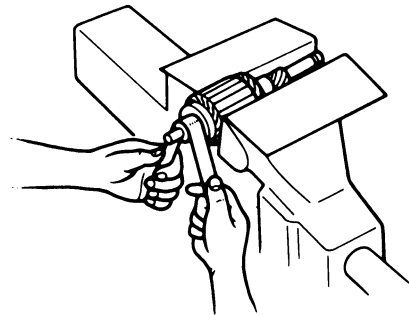


Dial gauge set ①: 90890-01252
Magnet base ②: 90890-06705



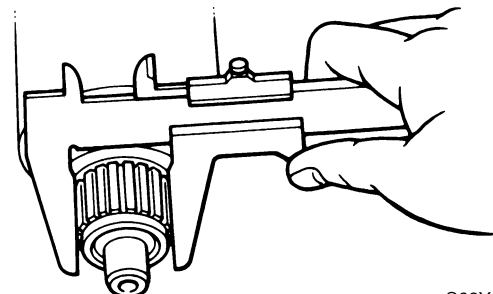
Free play limit: 0.6 mm (0.024 in)

- Check the commutator for dirt. Clean with #600 grid sandpaper and compressed air if necessary.



S62Y8400

- Measure the commutator diameter. Replace the armature if out of specification.

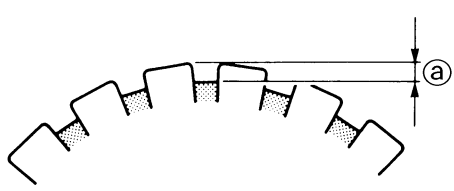


S62Y8410



Diameter limit: 31.0 mm (1.22 in)

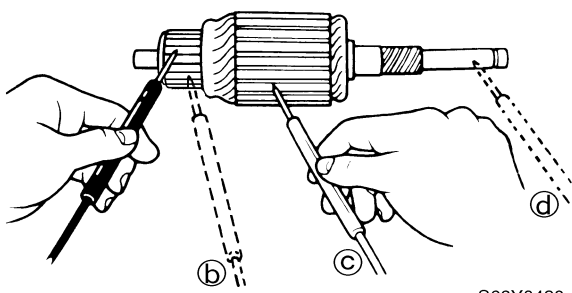
4. Measure the commutator undercut ①. Replace the armature if out of specification.



S62Y8420

	Commutator undercut limit: 0.2 mm (0.01 in)
---	--

5. Check the armature for continuity. Replace if out of specifications.

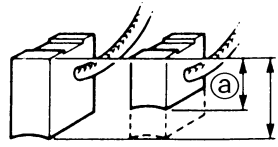


S62Y8430

	Armature continuity	
Commutator segments ①	Continuity	
Segment – Armature core ②	No continuity	
Segment – Armature shaft ③	No continuity	

Checking the brushes

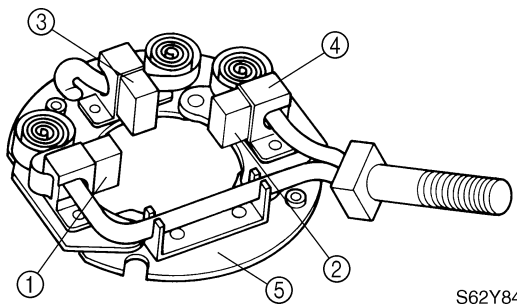
1. Measure the brush length. Replace the brush assembly if out of specification.



S62Y8440

	Brush length limit ①: 12.0 mm (0.47 in)
---	--

2. Check the brush holder for continuity. Replace if out of specifications.



S62Y8450

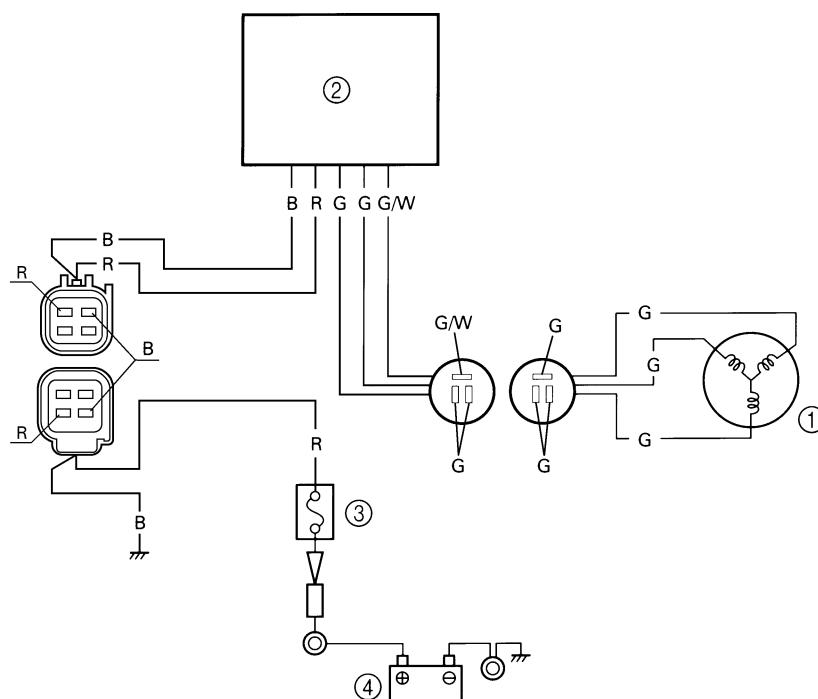
	Brush assembly continuity	
Brush ① – Brush ②	Continuity	
Brush ① – Brush ③	No continuity	
Brush ② – Brush ③		
Brush holder ④ – Brush assembly holder ⑤		

Checking the starter motor operation

1. Check the operation of the starter motor after installing it to the power unit.



Charging system



S62Y8460

- ① Lighting coil
- ② Rectifier Regulator
- ③ Fuse
- ④ Battery

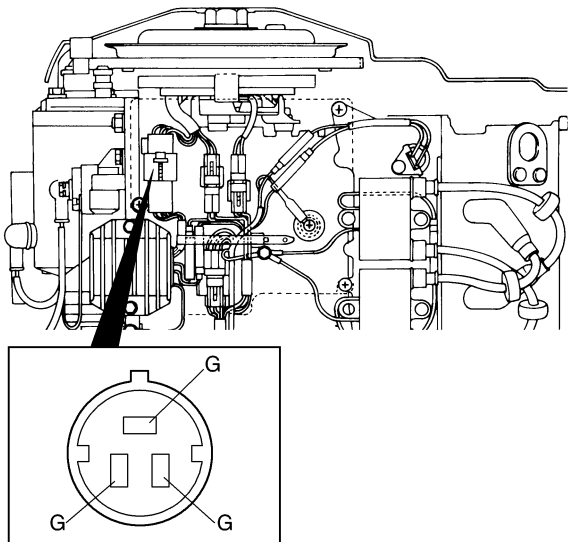
B : Black
 G : Green
 R : Red
 G/W : Green/white

Checking the lighting coil

- 1. Measure the lighting coil output peak voltage. Replace the stator coil if below specification.



Lighting coil resistance (use as reference):
Green (G) – Green (G)
1.2–1.8 Ω at 20 °C (68 °F)



S62Y8470



WARNING
When checking the peak voltage do not touch any of the connections of the digital tester leads.

NOTE:

- Use the peak voltage adaptor with the digital circuit tester.
- When measuring the peak voltage, set the selector on the digital circuit tester to the **DC voltage mode**.



Digital circuit tester: 90890-03174
Peak voltage adaptor: 90890-03172
Test harness (3 pins): 90890-06770



Lighting coil output peak voltage:
Green (G) – Green (G)

r/min	Unloaded		
	Cranking	1,500	3,500
DC V	11.9	42	127

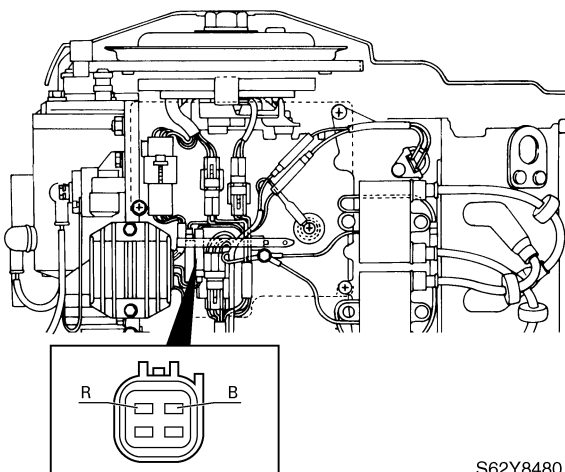


Checking the Rectifier Regulator

1. Measure the Rectifier Regulator output peak voltage. If below specification, measure the lighting coil output peak voltage. Replace the Rectifier Regulator if the output peak voltage of the lighting coil is above specification.

NOTE:

After starting the engine, disconnect the output lead (red lead) of the Rectifier Regulator when measuring the output peak voltage.



S62Y8480

⚠ WARNING

When checking the peak voltage do not touch any of the connections of the digital tester leads.

NOTE:

- Use the peak voltage adaptor with the digital circuit tester.
- When measuring the peak voltage, set the selector on the digital circuit tester to the **DC voltage mode**.



Digital circuit tester: 90890-03174
Peak voltage adaptor: 90890-03172
Test harness (4 pins): 90890-06771



Rectifier Regulator output peak voltage:

Red (R) – Black (B)

r/min	Unloaded	
	1,500	3,500
DC V	18.9	19.5

Troubleshooting

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Bracket unit9-10

Electrical systems.....9-13

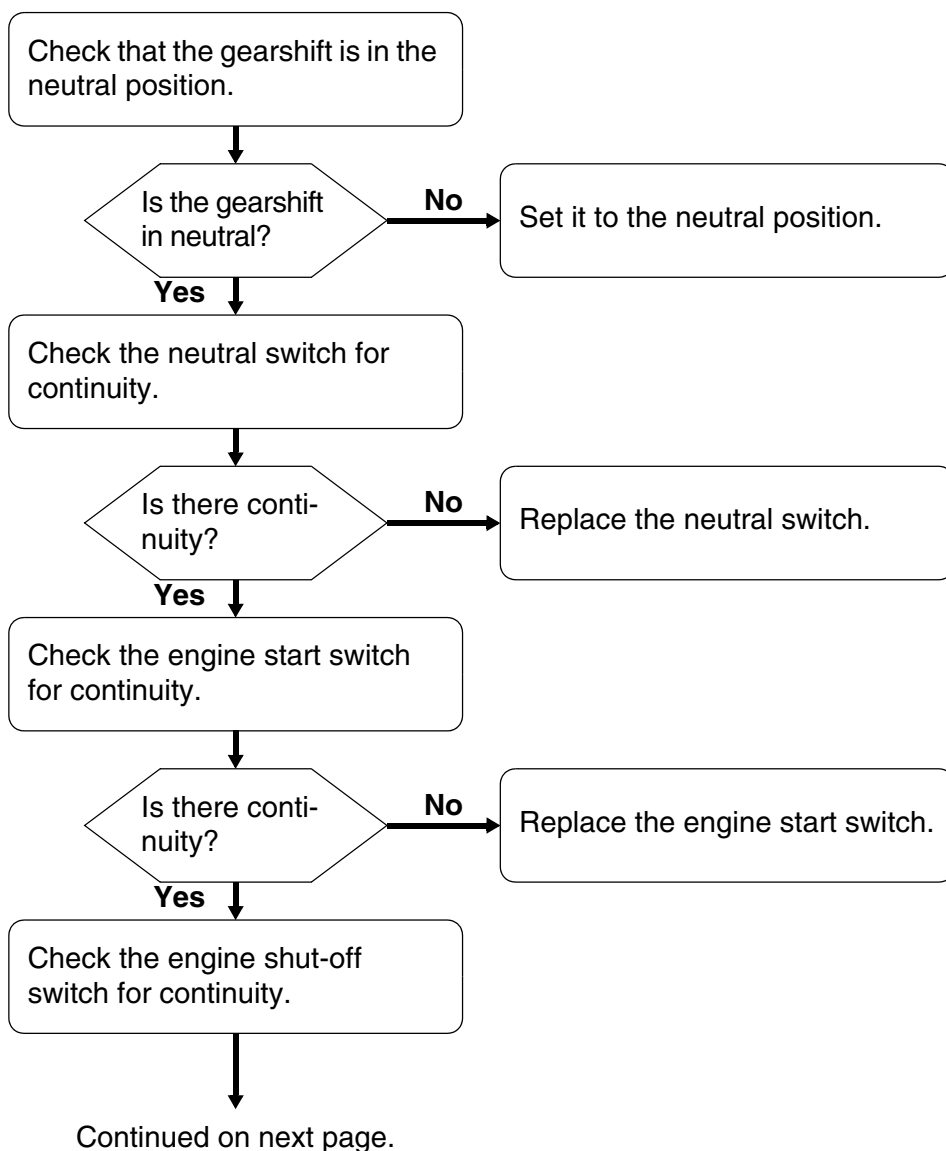
NOTE:

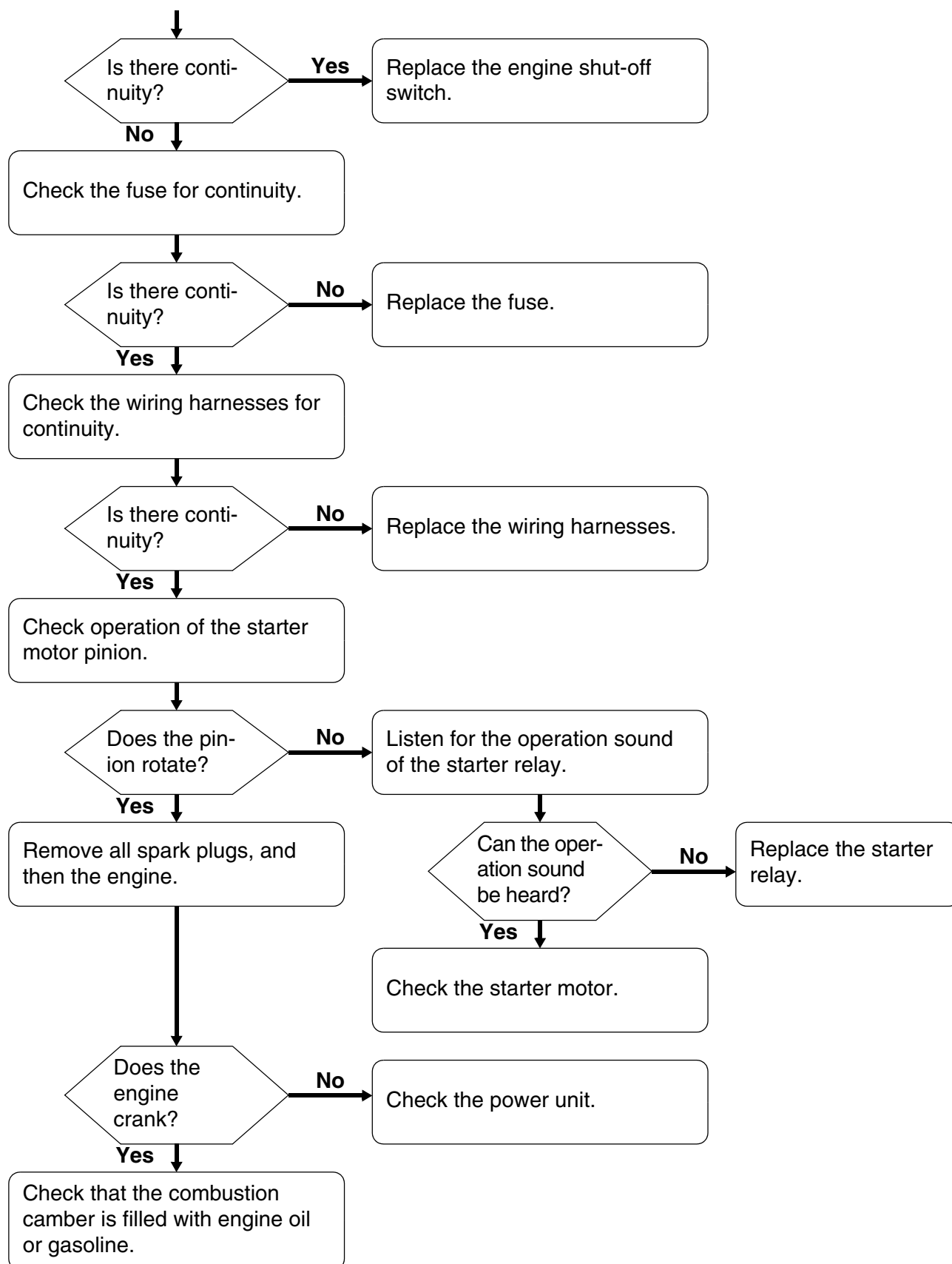
- To diagnose a mechanical malfunction, use the troubleshooting charts pertaining to the trouble located in this chapter. Also, when checking and maintaining the outboard motor, see Chapter 4–8, to check the part necessary to carry out safety maintenance.
- Check that all electrical connections are tight and free from corrosion, and that the battery is fully charged to 12 V.

Power unit

Symptom: Engine does not crank.

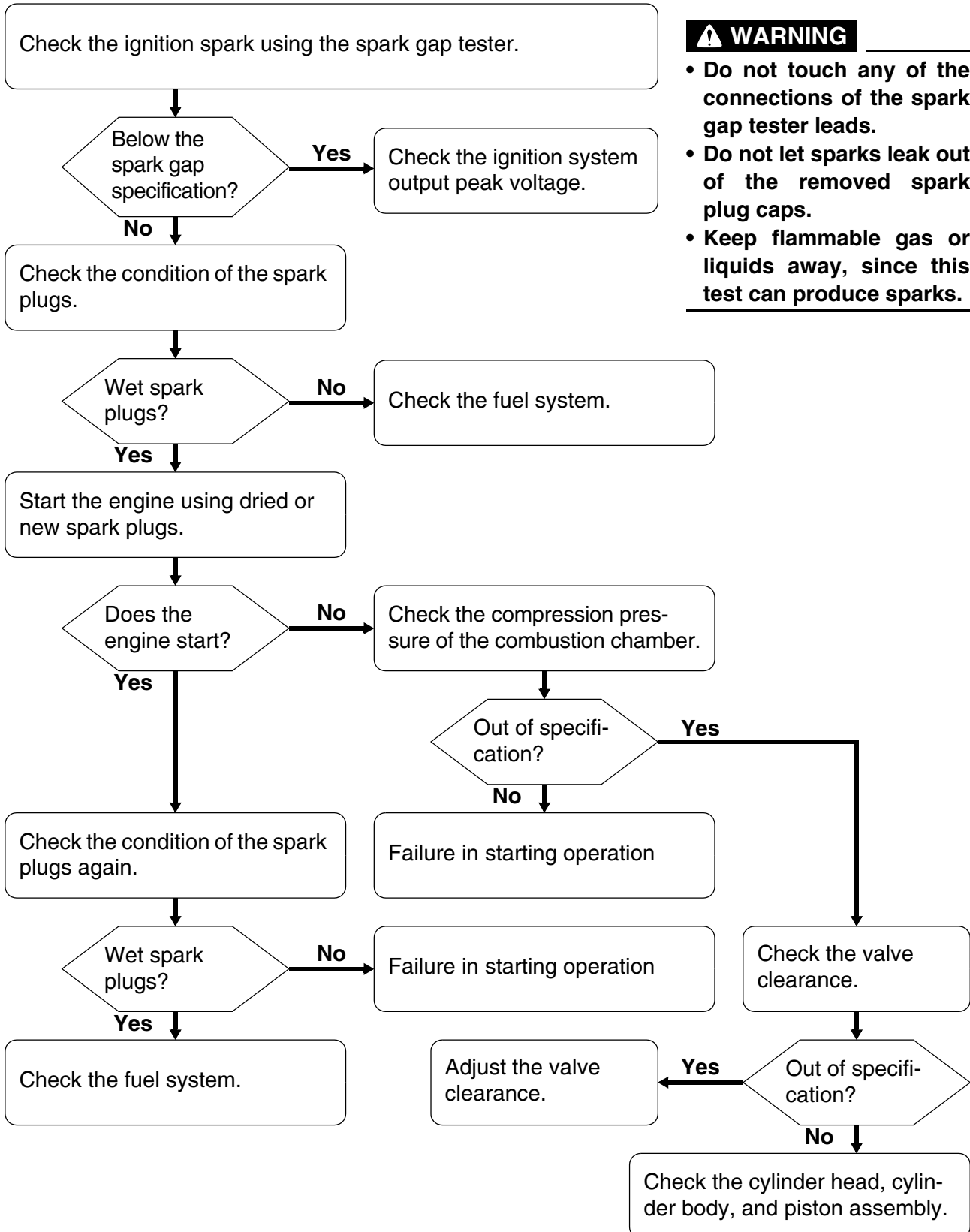
- Check the starting system.
- Check the power unit.





Symptom: Engine cranks, but will not start.

- Check the ignition system.
- Check the fuel system.
- Check the compression pressure of power unit.



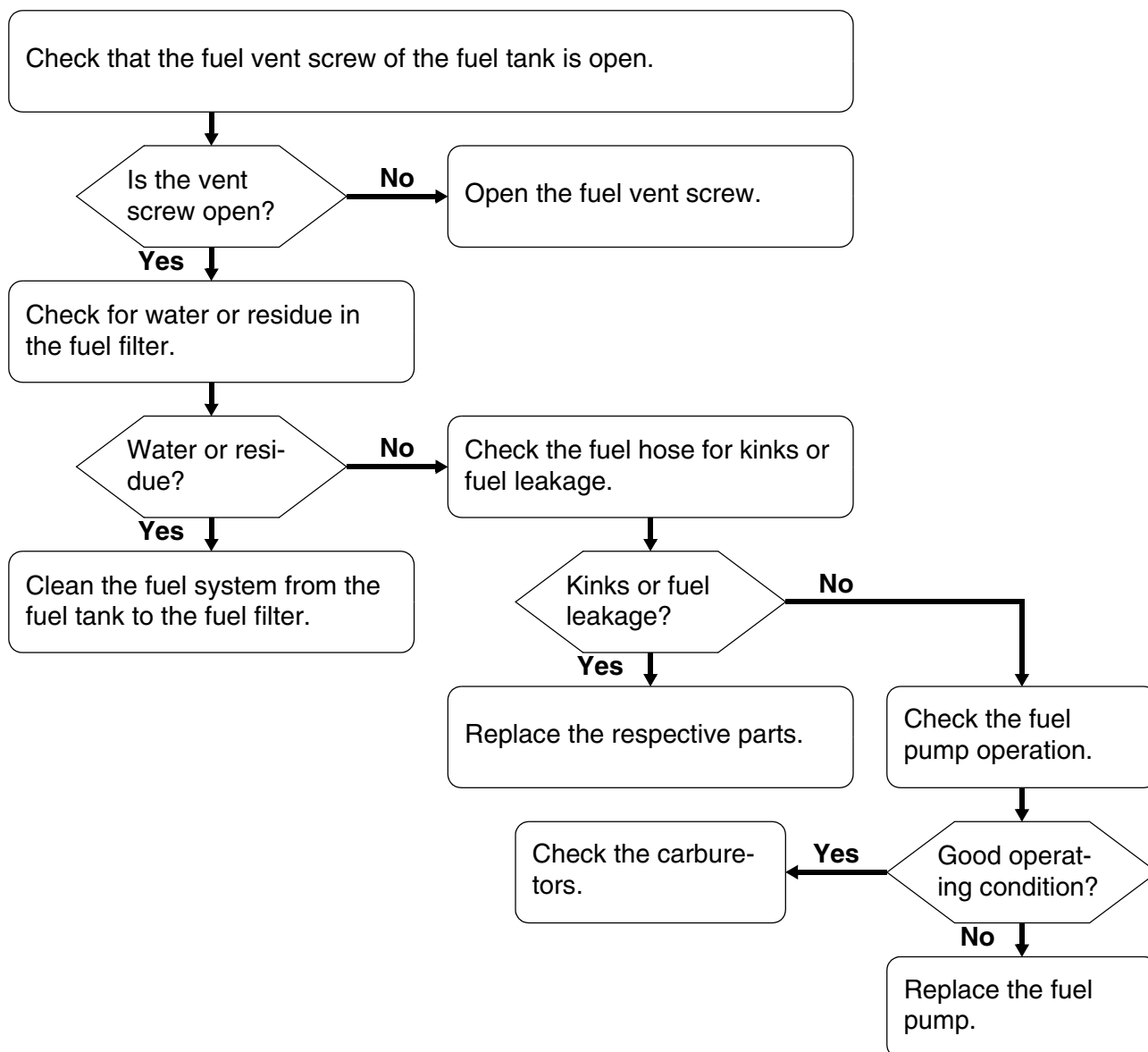
⚠ WARNING

- Do not touch any of the connections of the spark gap tester leads.
- Do not let sparks leak out of the removed spark plug caps.
- Keep flammable gas or liquids away, since this test can produce sparks.

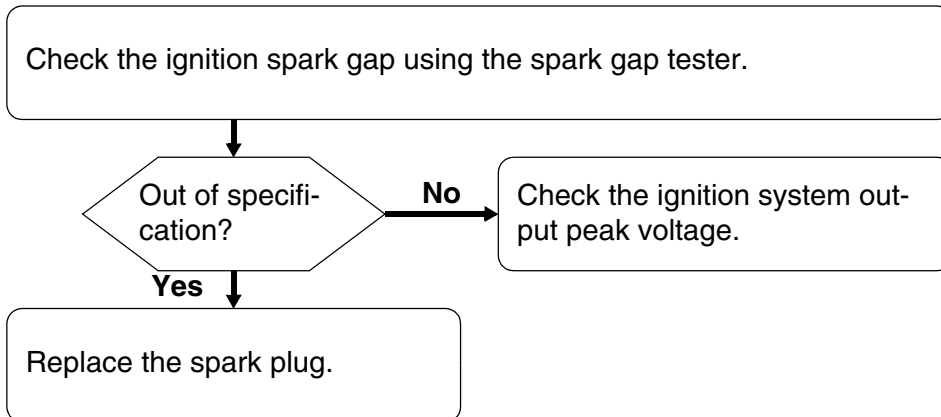
Symptom: Engine can be started, but does not remain on.

- Check the fuel system.
- Check the ignition system.
- Check the compression pressure of power unit.

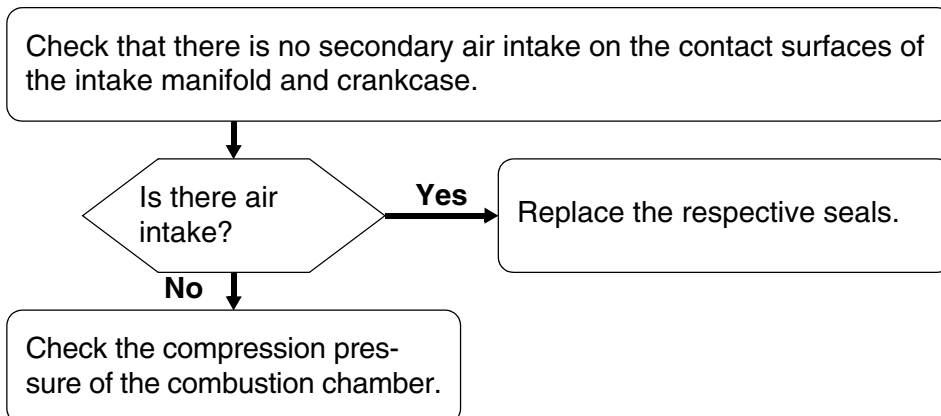
(Fuel system)



(Ignition system)

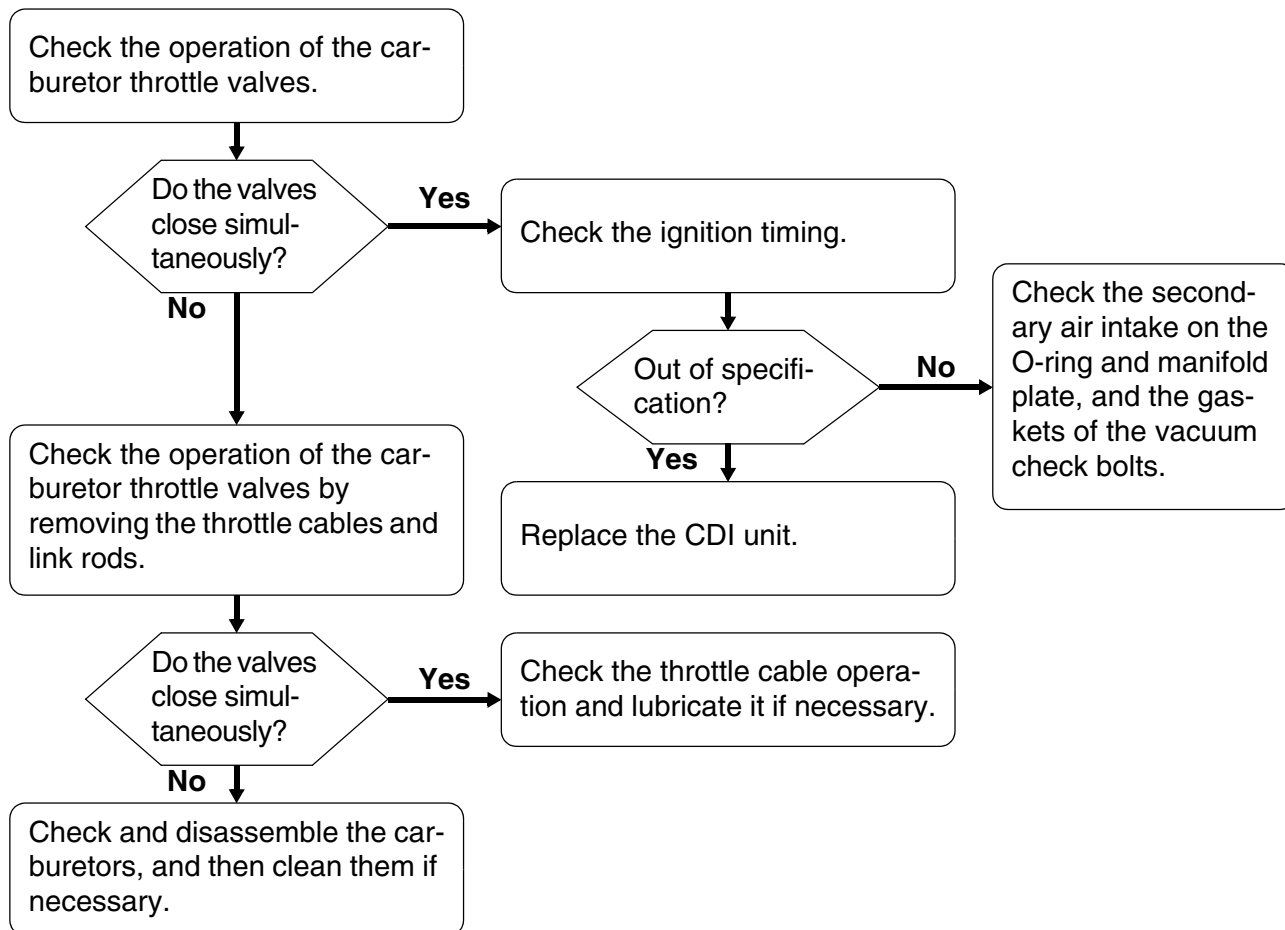


(Compression pressure)



Symptom: The engine idle speed is not steady, but increases or decreases.

- Check the carburetors.
- Check the air intake system.
- Check the ignition system.

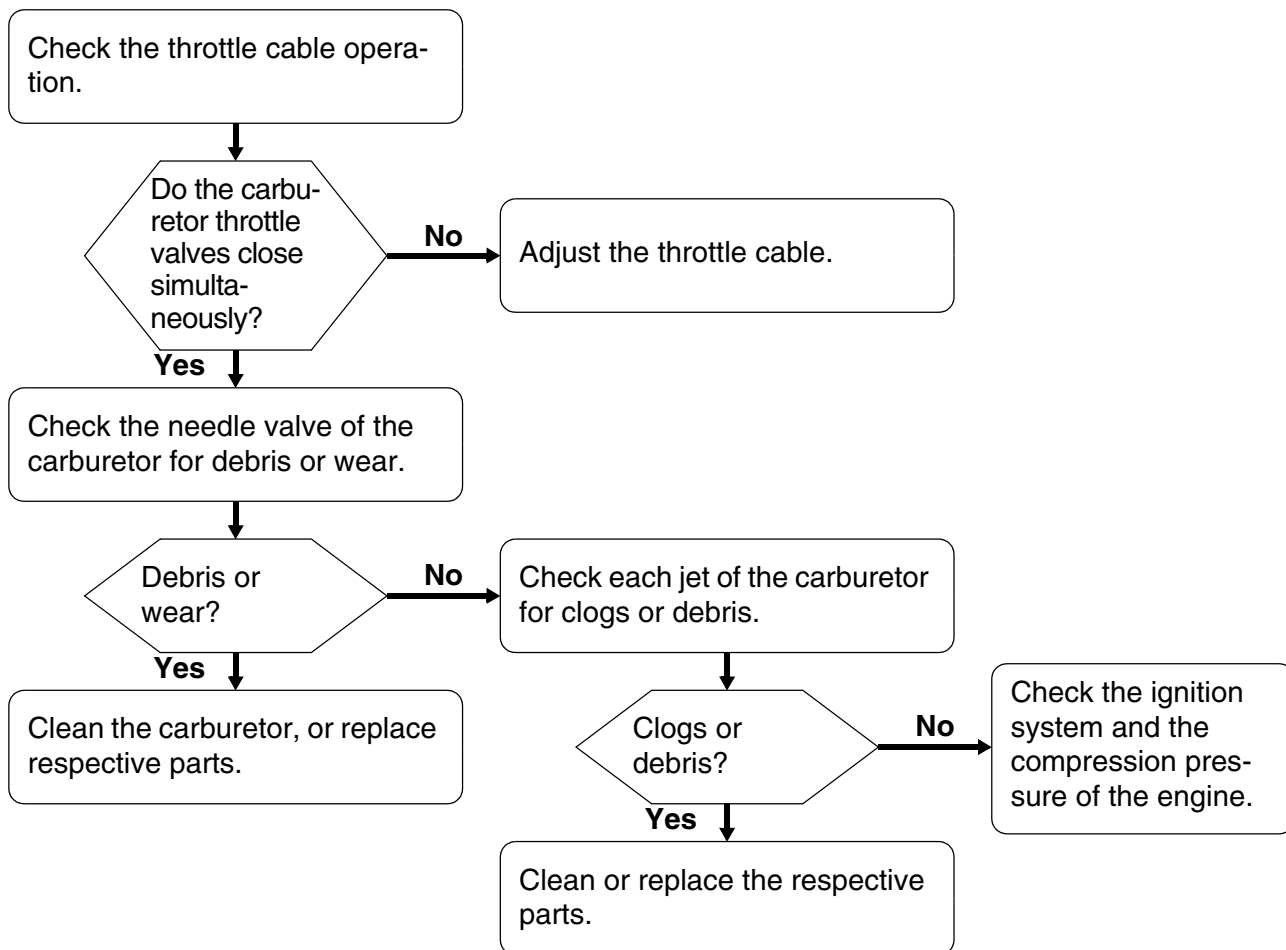


Symptom: Engine does not accelerate when the throttle is opened quickly.

The engine turns off when the throttle is opened quickly.

Acceleration is tardy and the engine is likely to stop at any moment.

- Check the carburetors.
- Check the ignition system.
- Check the compression pressure of power unit.



Symptom: Engine can run, but engine speed will not increase.

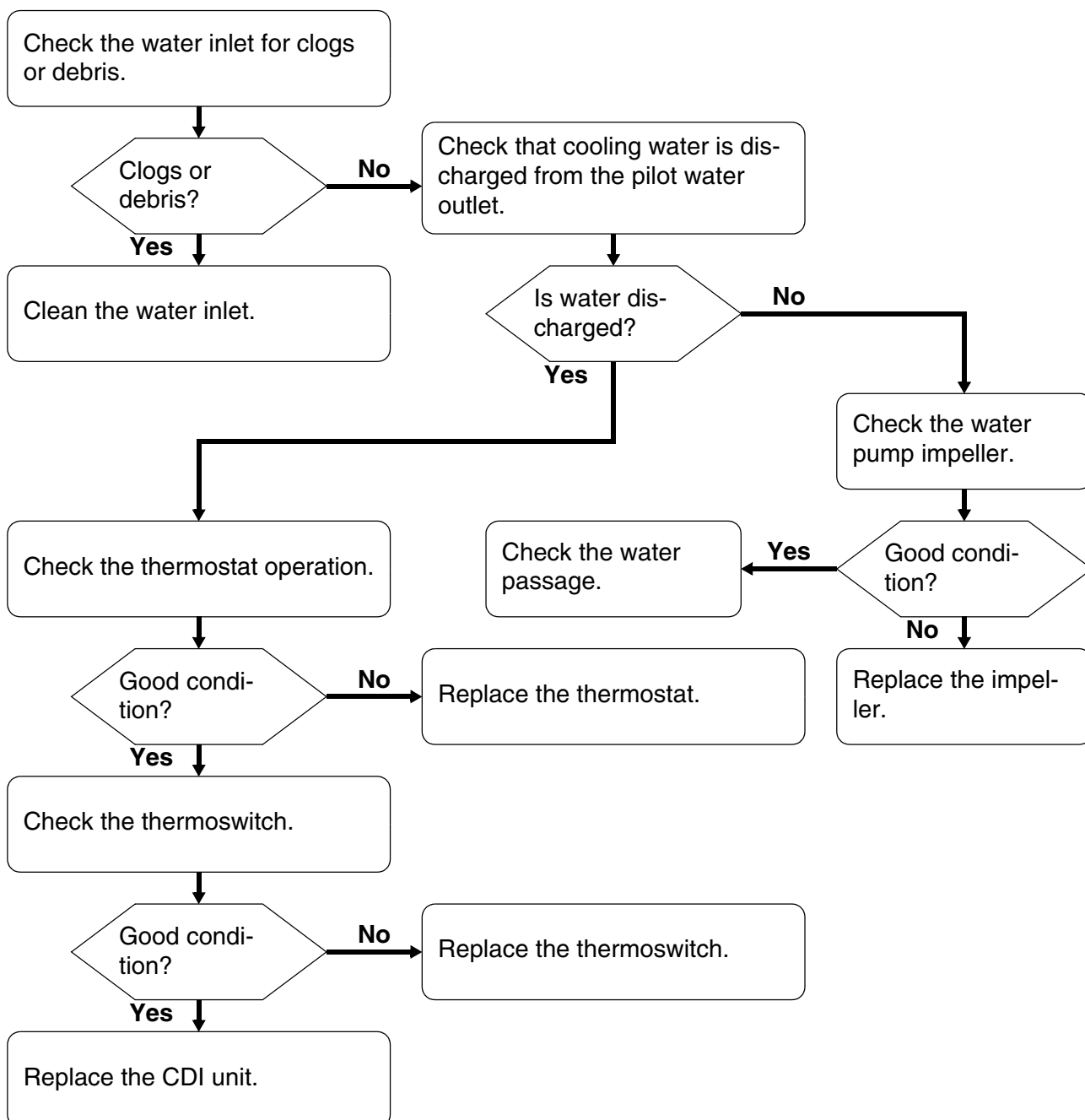
Overheat warning indicator is on.

Oil pressure warning indicator is on.

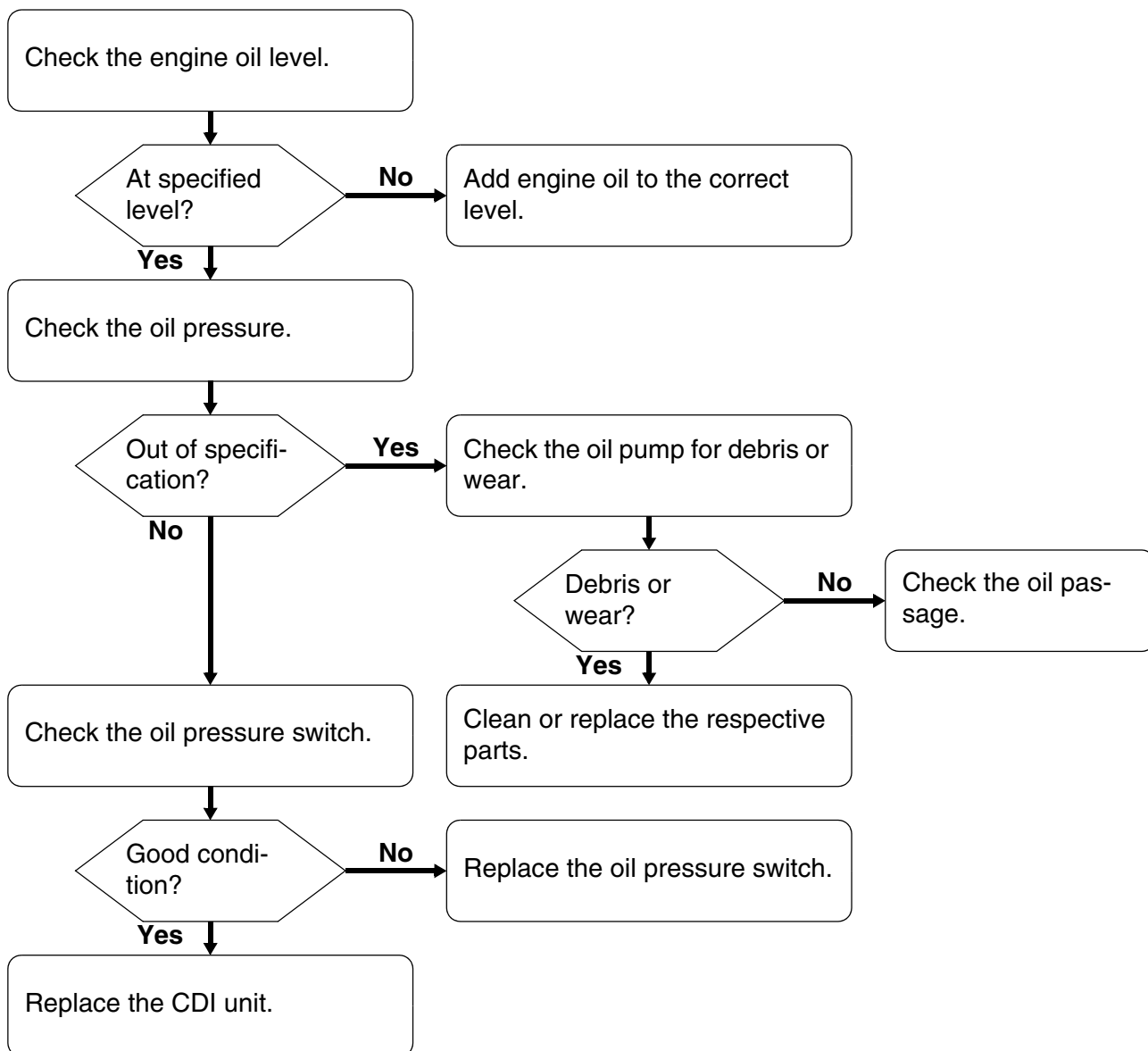
Warning indicator is on and buzzer is sounding.

- Check the water cooling system.
- Check the lubricating system.

(Cooling system)

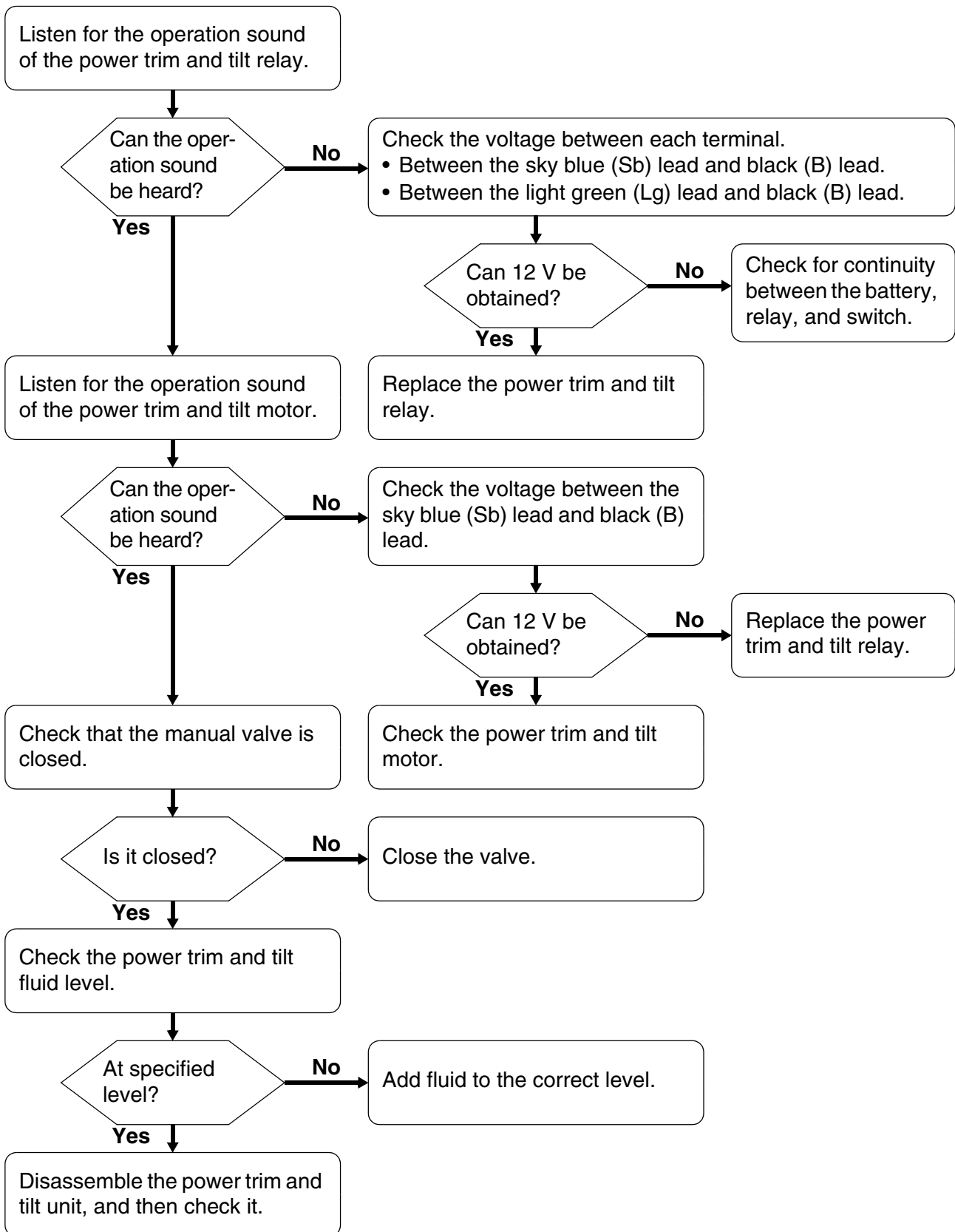


(Lubricating system)

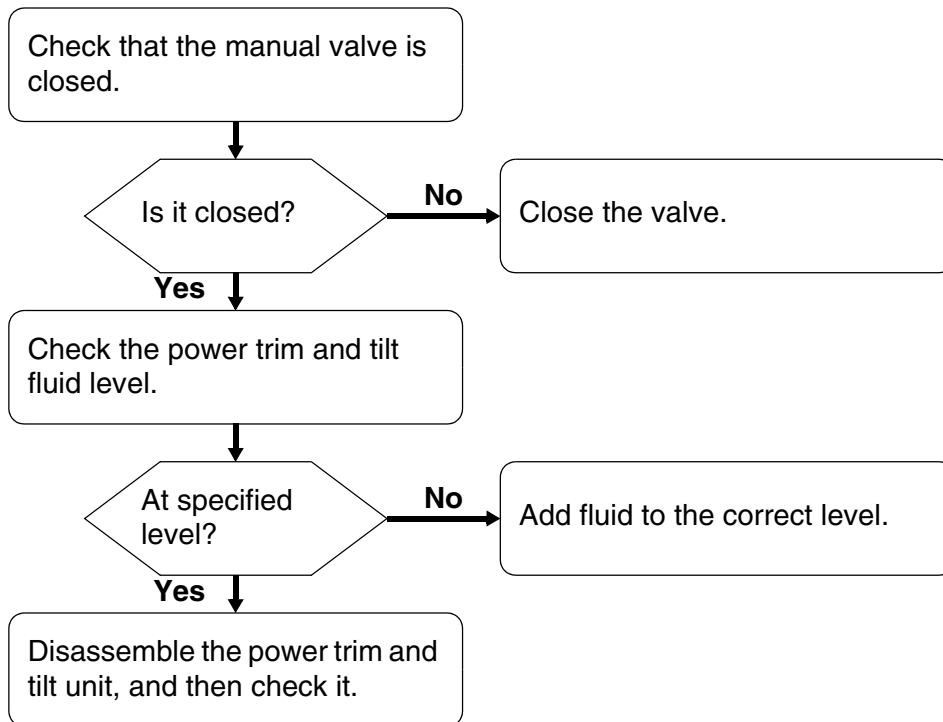


Bracket unit

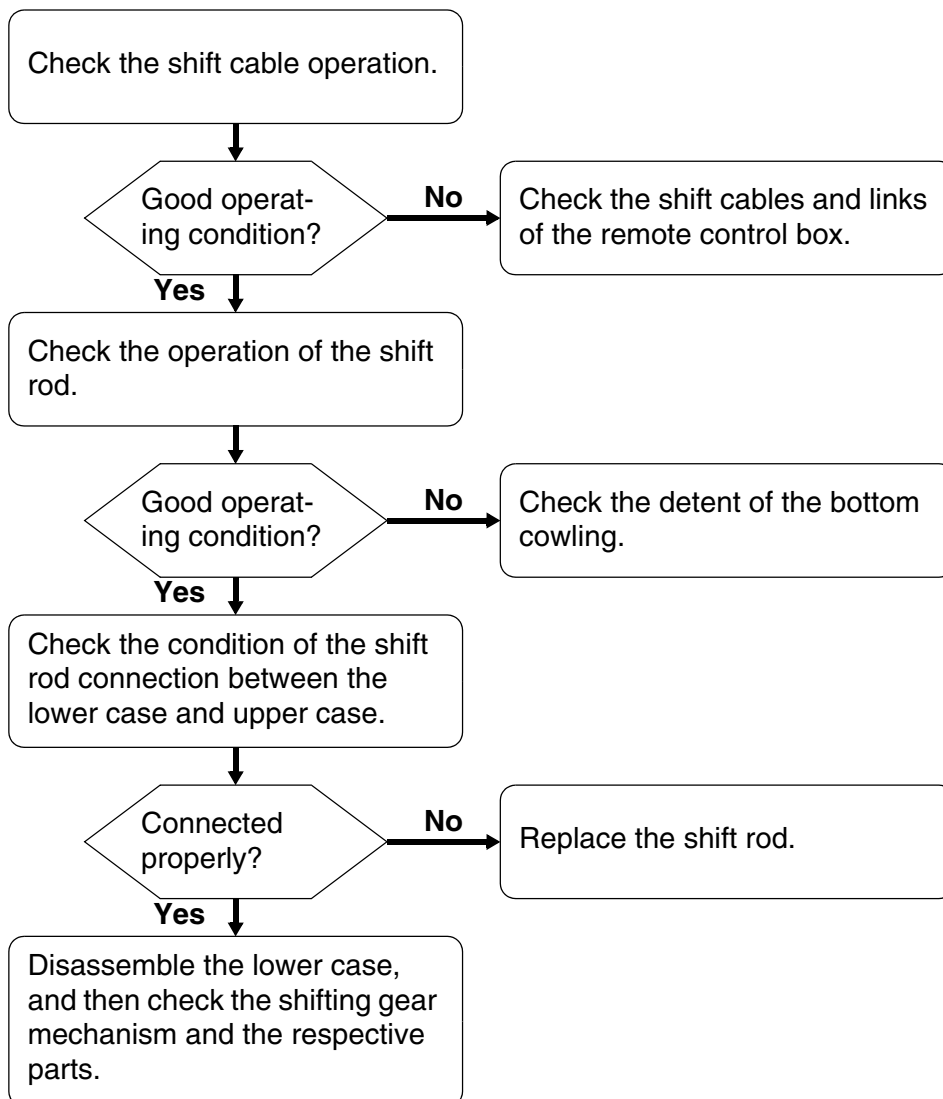
Symptom: Power trim and tilt unit does not operate.



Symptom: Power trim and tilt unit does not hold the outboard motor up.



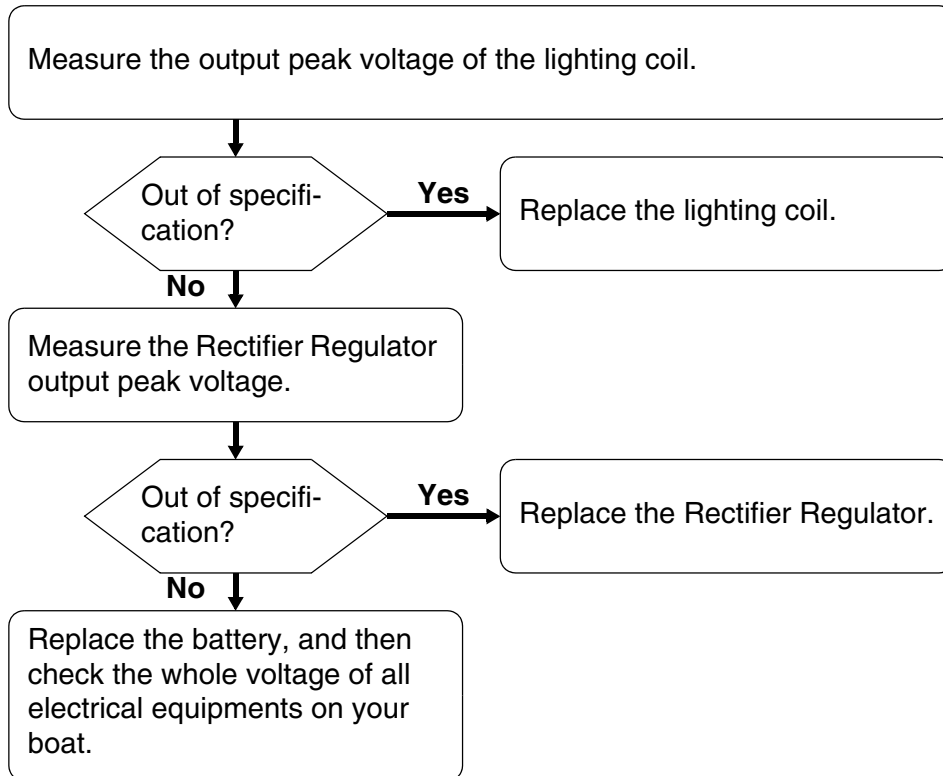
Symptom: Shift mechanism of the forward gear and reverse gear does not operate properly.



Electrical systems

Symptom: Battery becomes weaker quickly.

- Check the charging system.



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Wiring diagram

FT50CEHD, FT50CED

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- ② Engine start switch
- ③ Engine shut-off switch
- ④ Starter motor
- ⑤ Starter relay
- ⑥ Neutral switch
- ⑦ Fuse (20A)
- ⑧ Prime Start
- ⑨ Warning indicator
- ⑩ CDI unit
- ⑪ Thermoswitch
- ⑫ Oil pressure switch
- ⑬ Charge coil
- ⑭ Pulser coil
- ⑮ Lighting coil
- ⑯ Rectifier Regulator
- ⑰ Ignition coil
- ⑱ Spark plug

A EHD

Color code

B	: Black
Br	: Brown
G	: Green
L	: Blue
O	: Orange
P	: Pink
R	: Red
W	: White
B/O	: Black/orange
B/W	: Black/white
B/Y	: Black/yellow
G/W	: Green/white
Gy/B	: Gray/black
P/B	: Pink/black
P/W	: Pink/white
W/B	: White/black
W/R	: White/red
Y/B	: Yellow/black
Y/R	: Yellow/red

Wiring diagram

FT50CET

- ① Battery
- ② Power trim and tilt motor
- ③ Power trim and tilt relay
- ④ Starter motor
- ⑤ Fuse (20A)
- ⑥ Trim sensor
- ⑦ Prime Start
- ⑧ Starter relay
- ⑨ CDI unit
- ⑩ Charge coil
- ⑪ Lighting coil
- ⑫ Pulser coil
- ⑬ Rectifier Regulator
- ⑭ Thermoswitch
- ⑮ Oil pressure switch
- ⑯ Trailer switch
- ⑰ Ignition coil
- ⑱ Spark plug

Color code

B	: Black
Br	: Brown
G	: Green
Gy	: Gray
L	: Blue
Lg	: Light green
O	: Orange
P	: Pink
R	: Red
Sb	: Sky blue
W	: White
B/O	: Black/orange
B/W	: Black/white
B/Y	: Black/yellow
G/W	: Green/white
Gy/B	: Gray/black
P/B	: Pink/black
P/W	: Pink/white
W/B	: White/black
W/R	: White/red
Y/B	: Yellow/black
Y/R	: Yellow/red



YAMAHA MOTOR CO., LTD.

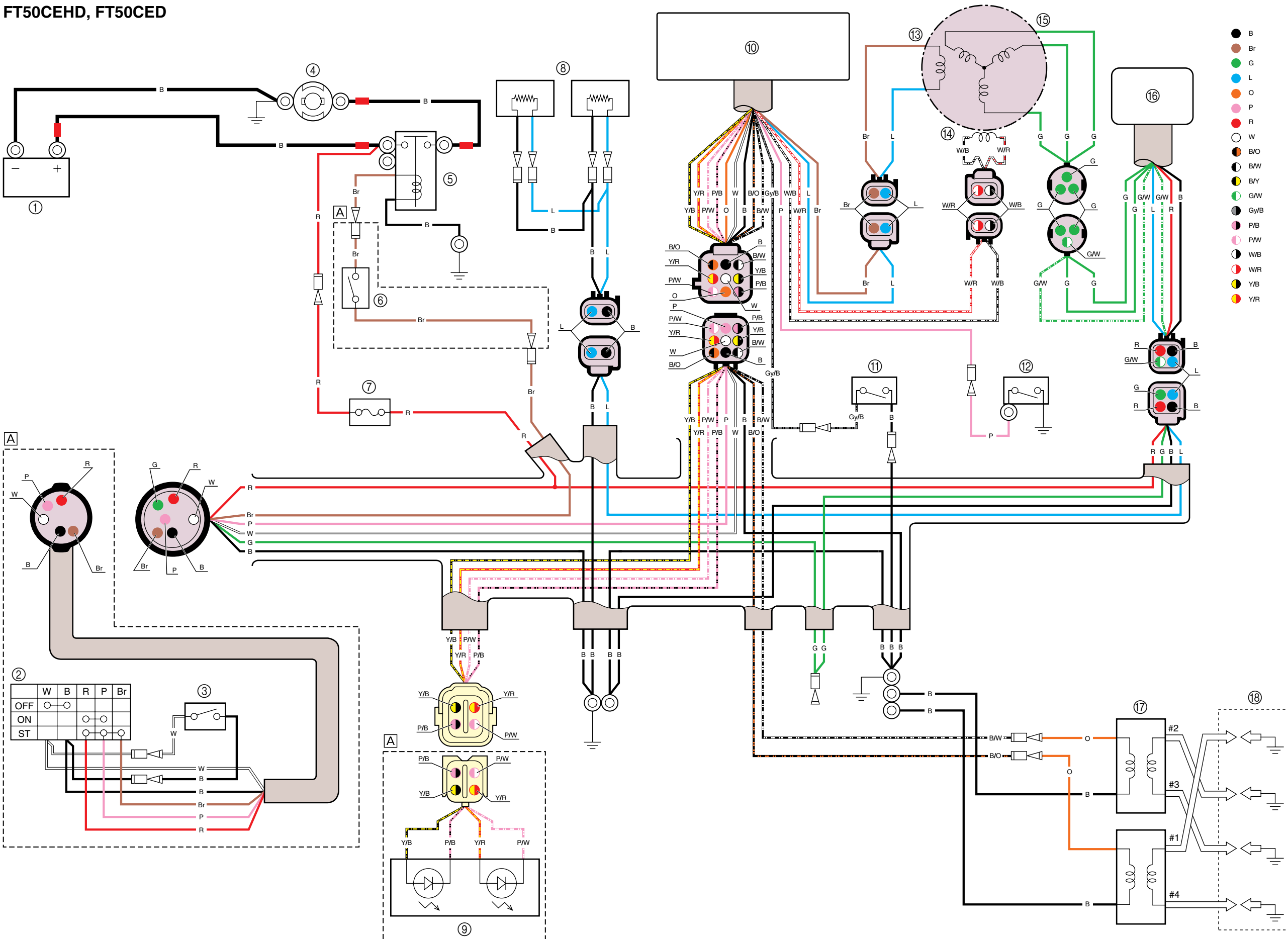
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(FT50CEHD, FT50CED, FT50CET)

(E)

FT50CEHD, FT50CED



FT50CET

