YAMAHA

(E)25B
25X
(E)30H

SERVICE MANUAL

69R-28197-3J-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.

E25B, 25B, 25X, E30H, 30H
SERVICE MANUAL

1st Edition, July 2006

Printed in Japan

Contents

General information

How to use this manual

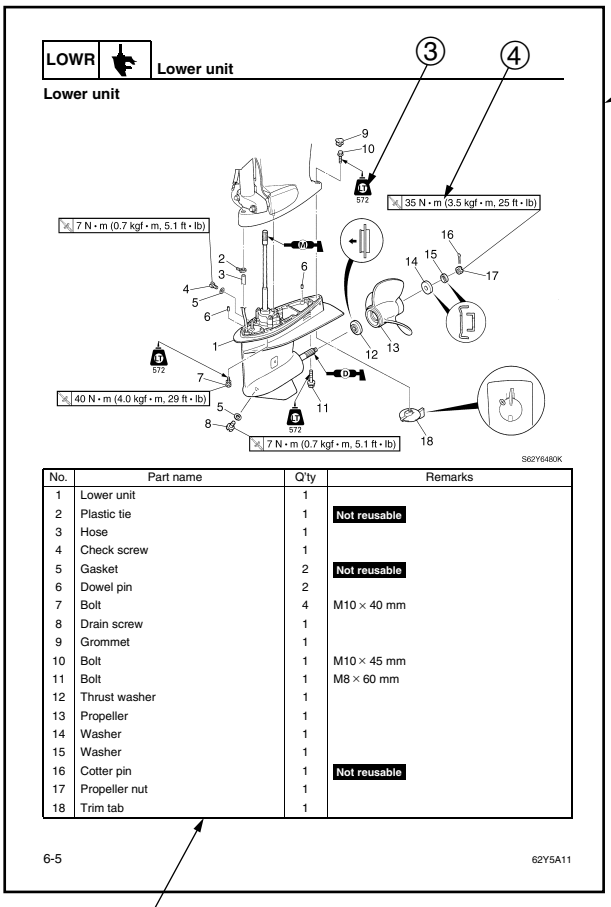
Manual format

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.

- Parts are shown and detailed in an exploded diagram and are listed in the components list (see ① in the figure below for an example page).
- The component list consists of part names and quantities, as well as bolt and screw dimensions (see ② in the figure below).
- Symbols are used to indicate important aspects of a procedure, such as the grade of lubricant and lubrication point (see ③ in the figure below).
- Tightening torque specifications are provided in the exploded diagrams (see ④ in the figure below for an example), and in the related detailed instructions. Some torque specifications are listed in stages as torque figures or angles in degrees.
- Separate procedures and illustrations are used to explain the details of removal, checking, and installation where necessary (see ⑤ in the figure below for an example page).

NOTE:

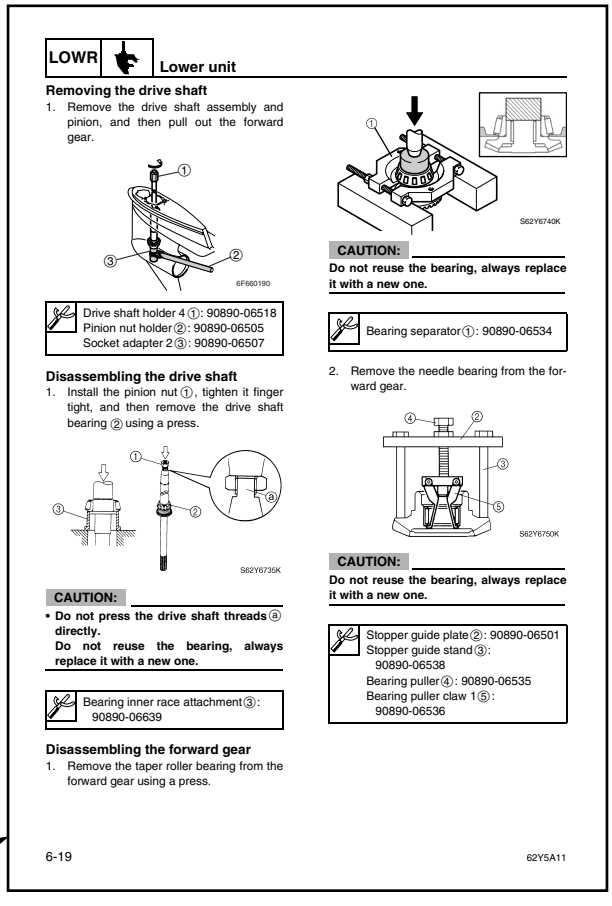
For troubleshooting procedures, see Chapter 9, “Troubleshooting.”



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	

6-5 62Y5A11

②



⑤

Symbol

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

General information

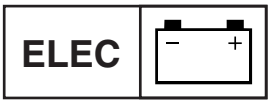
Fuel system

Bracket unit

Specification

Power unit

Electrical system

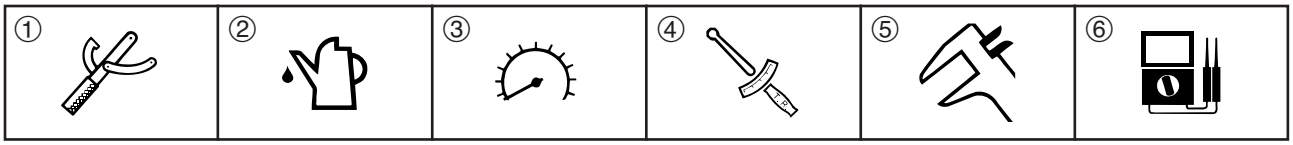


Periodic check and adjustment

Lower unit

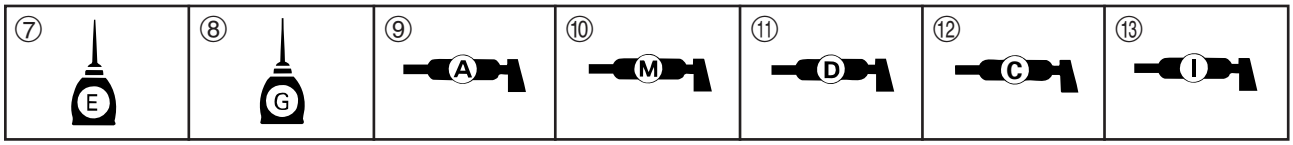
Troubleshooting

Symbols ① to ⑥ indicate specific data.



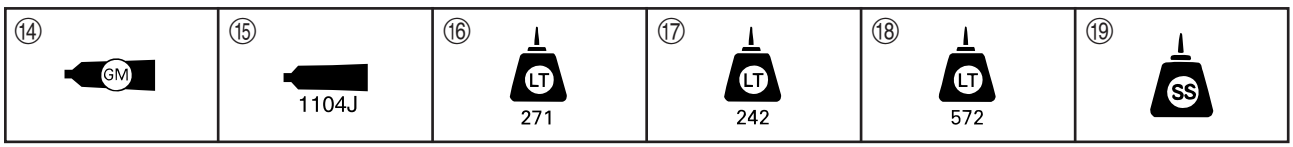
① Special tool
② Specified oil or fluid
③ Specified engine speed
④ Specified tightening torque
⑤ Specified measurement
⑥ Specified electrical value (resistance, voltage, electric current)

Symbols ⑦ to ⑬ in an exploded diagram or illustration indicate the grade of lubricant and the lubrication point.



⑦ Apply Yamaha 2-stroke motor oil
⑧ Apply gear oil
⑨ Apply water resistant grease (Yamaha grease A)
⑩ Apply molybdenum disulfide grease
⑪ Apply corrosion resistant grease (Yamaha grease D)
⑫ Apply low temperature resistant grease (Yamaha grease C)
⑬ Apply injector grease

Symbols ⑭ to ⑲ in an exploded diagram or illustration indicate the type of sealant or locking agent and the application point.



⑭ Apply Gasket Maker
⑮ Apply ThreeBond 1104J
⑯ Apply LOCTITE 271 (red)
⑰ Apply LOCTITE 242 (blue)
⑱ Apply LOCTITE 572
⑲ Apply silicone sealant

Abbreviation

The following abbreviations are used in this service manual.

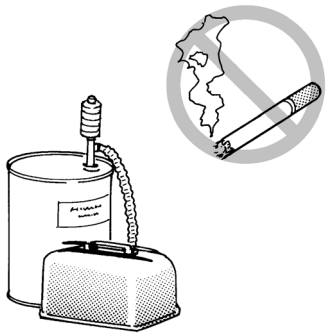
Abbreviation	Description
AFT	Aft end
API	American Petroleum Institute
ATDC	After Top Dead Center
BOW	Bow end
BTDC	Before Top Dead Center
CCA	Cold Cranking Ampere
CDI	Capacitor Discharged Ingnition system
DN	Downside
EN	European Norm (European standard)
F	Forward
IEC	International Electrotechnical Commission
N	Neutral
NMMA	National Marine Manufacturers Association
PORT	Port side
R	Reverse
SAE	Society of Automotive Engineers
STBD	Starboard side
TDC	Top Dead Center
UP	Upside
WD	Wiring Diagram

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.



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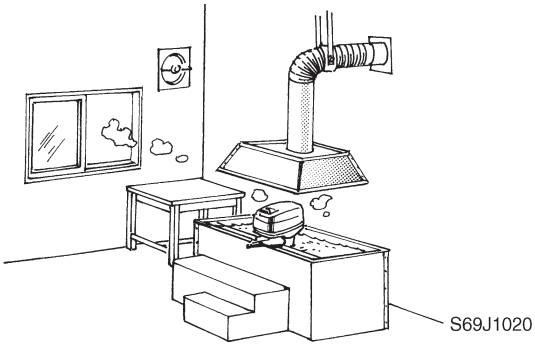
Ventilation

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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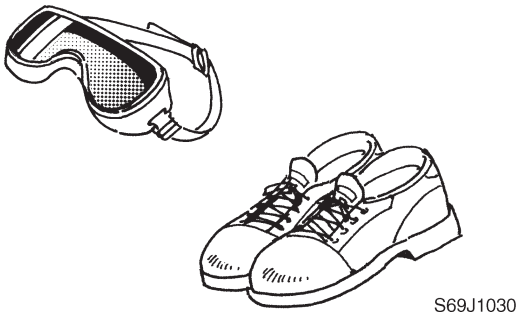
Self-protection

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.



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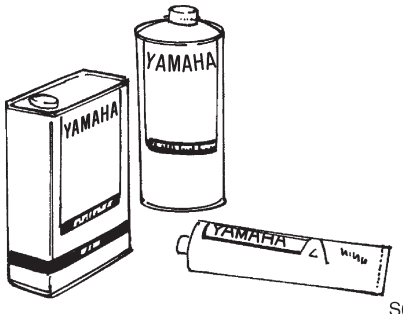
Part, lubricant, and sealant

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



S69J1040

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.

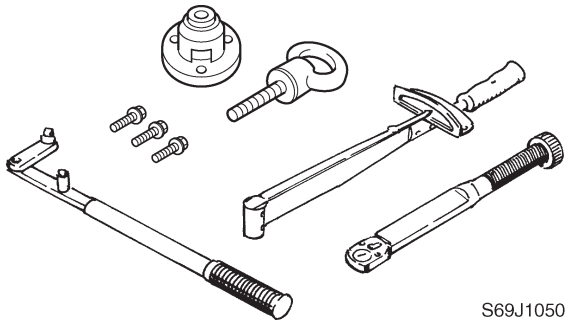
1. Maintain good standards of personal and industrial hygiene.
2. Change and wash clothing as soon as possible if soiled with lubricants.
3. Avoid contact with skin. Do not, for example, place a soiled rag in your pocket.
4. Wash hands and any other part of the body thoroughly with soap and hot water 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 practice

Special service tool

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



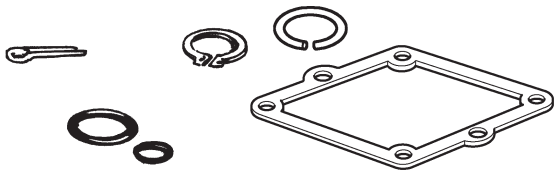
S69J1050

Tightening torque

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 part

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



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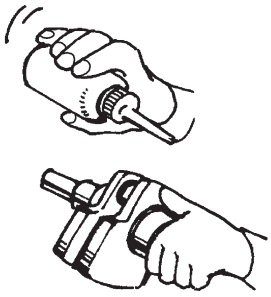
Disassembly and assembly

1. Use compressed air to remove dust and dirt during disassembly.

2. Apply engine oil to the contact surfaces of moving parts before assembly.



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3. Install bearings with the 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 periphery of an oil seal before installation.

5. Check that moving parts operate normally after assembly.

Identification

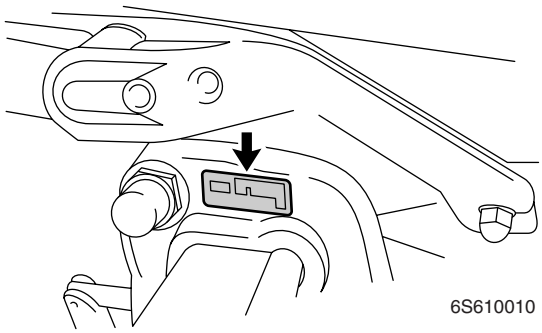
Model

This manual covers the following models.

Applicable model
E25BMH, 25BMH, 25BW, 25BWC, 25XMH E30HMH, 30HMH, 30HWH, 30HW, 30HWC

Serial number

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



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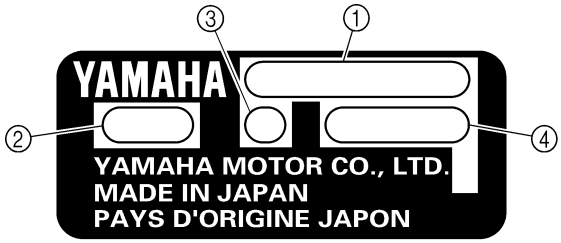
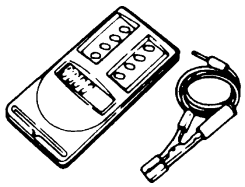


S6AL1D00

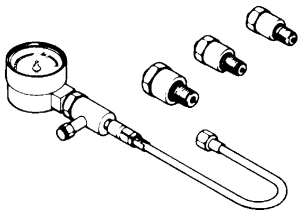
① Model name
② Approved model code
③ Transom height
④ Serial number

Model name	Approved model code	Starting serial No.
E25BMH	69P	1020720
25BMH	69R	1020790
25BW		
25BWC		
25XMH	69X	1000515
E30HMH	60B	1024447
30HMH	69S	1024277
30HWH		
30HW		
30HWC		

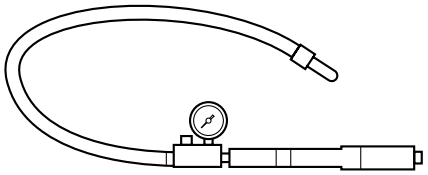
Special service tool



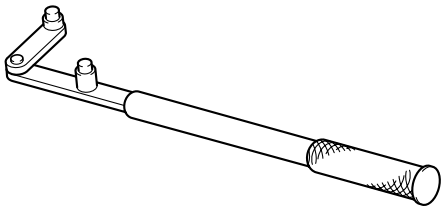
Digital tachometer
90890-06760



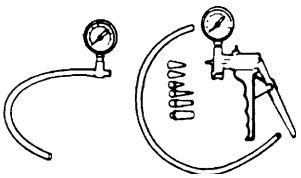
Compression gauge
90890-03160



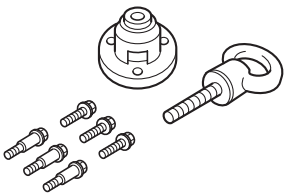
Leakage tester
90890-06840



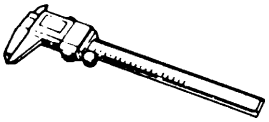
Flywheel holder
90890-06522



Vacuum/pressure pump gauge set
90890-06756



Flywheel puller
90890-06521



Digital caliper
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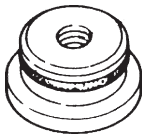

Needle bearing attachment
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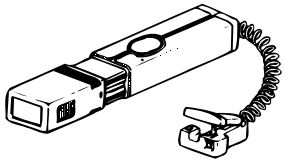

Timing light
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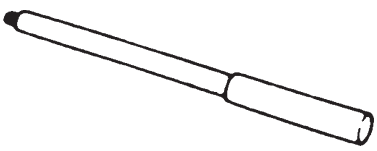

Driver rod L3
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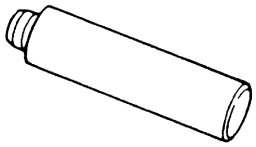

Driver rod LS
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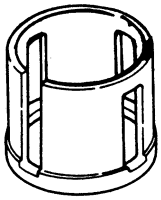
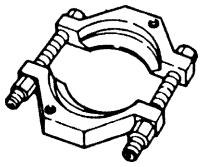


Body
90890-02352



Bearing Separator
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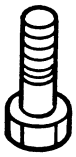

Bolt
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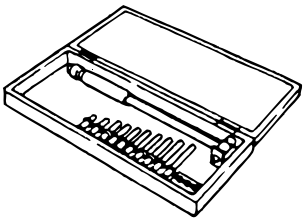
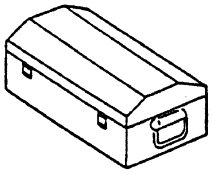
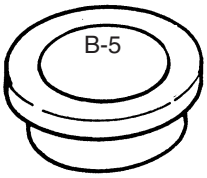


Cylinder gauge
90890-06759

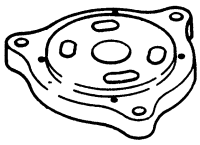
Washer
90890-02354



Crank jig set
90890-02422



Bushing-5
90890-02359



Flange
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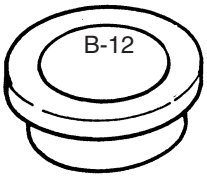

Bushing-12
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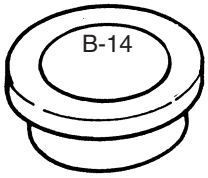

Bushing-14
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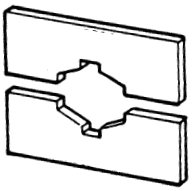
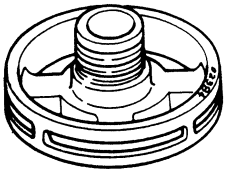
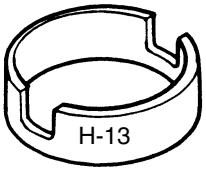


Support
90890-02394



Pressure plate
90890-02384



Height ring-13 (H-13)
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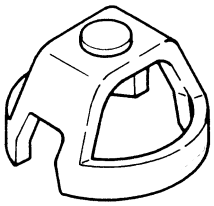


Press body
90890-02385

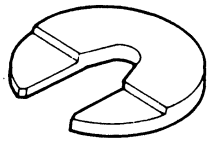
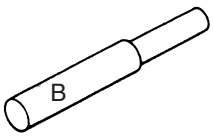


Plate A
90890-02386



Pressure pin B
90890-02390

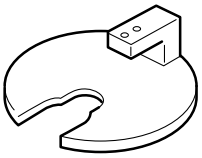


Plate B
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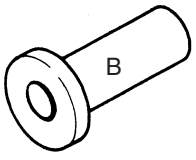
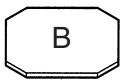
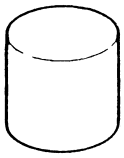


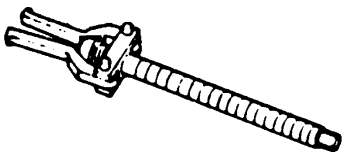
Bearing pressure B
90890-02392



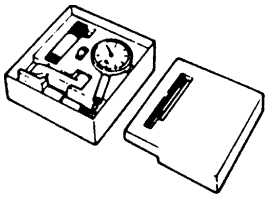
Spacer B
90890-02396



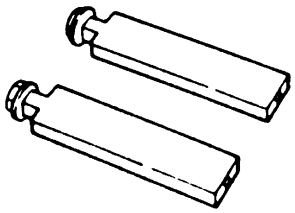
Small end bearing installer
90890-06527



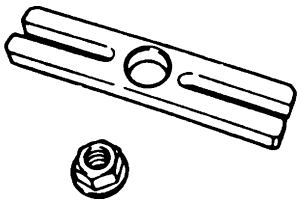
Bearing puller assembly
90890-06535



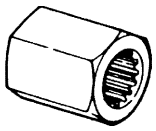
Dial gauge set
90890-01252



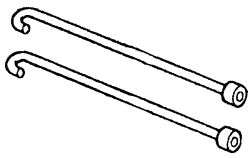
Stopper guide stand
90890-06538



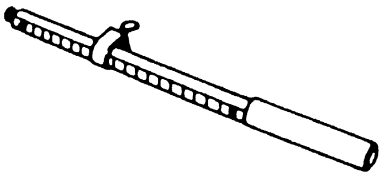
Stopper guide plate
90890-06501



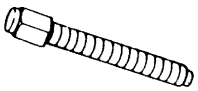
Drive shaft holder 3
90890-06517



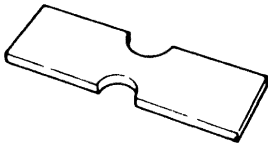
Bearing housing puller claw S
90890-06564



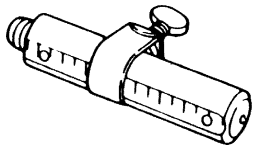
Driver rod SL
90890-06602



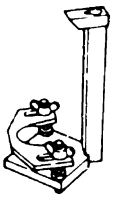
Center bolt
90890-06504



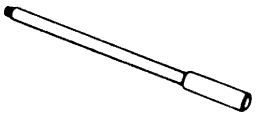
Bearing depth plate
90890-06603



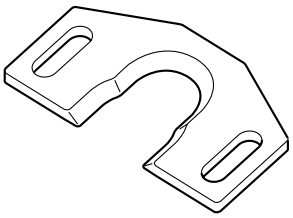
Driver rod SS
90890-06604



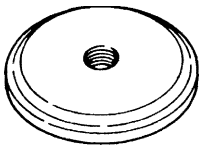
Pinion height gauge
90890-06710



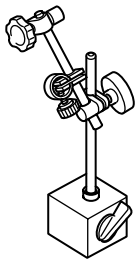
Driver rod LL
90890-06605



Pinion height gauge plate B
90890-06712

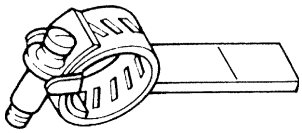


Bearing outer race attachment
90890-06625, 90890-06628

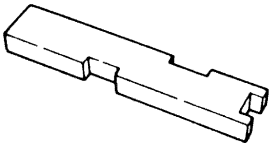


Magnet base B
90890-06844

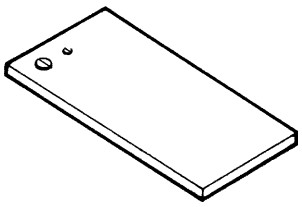
Bearing inner race attachment
90890-06640, 90890-06643, 90890-06644, 90890-06645



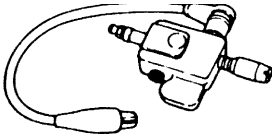
Backlash indicator
90890-06706



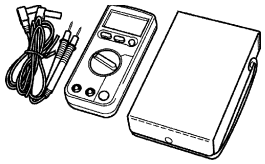
Shimming plate
90890-06701



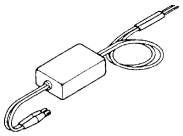
Magnet base plate
90890-07003



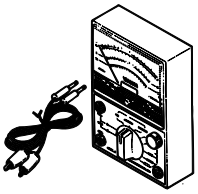
Ignition tester
90890-06754



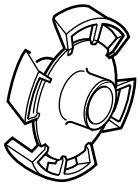
Digital circuit tester
90890-03174



Peak voltage adaptor B
90890-03172



Pocket tester
90890-03112



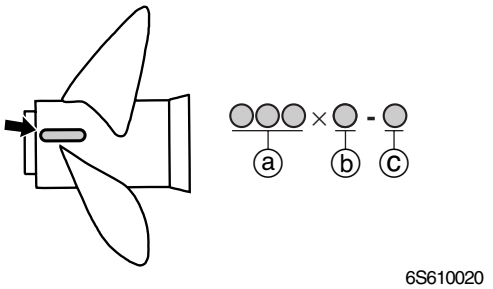
Test propeller
90890-01629

Propeller selection

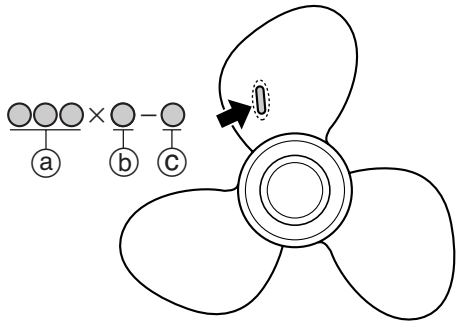
The performance of a boat and outboard motor will be critically affected by the size and type of propeller you choose. Propellers greatly affect boat speed, acceleration, engine life, fuel economy, and even boating and steering capabilities. An incorrect choice could adversely affect performance and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



6S610020



6S610030

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

Selection

When the engine speed is at the full throttle operating range (4,500–5,500 r/min), the ideal propeller for the boat is one that provides maximum performance in relation to boat speed and fuel consumption.

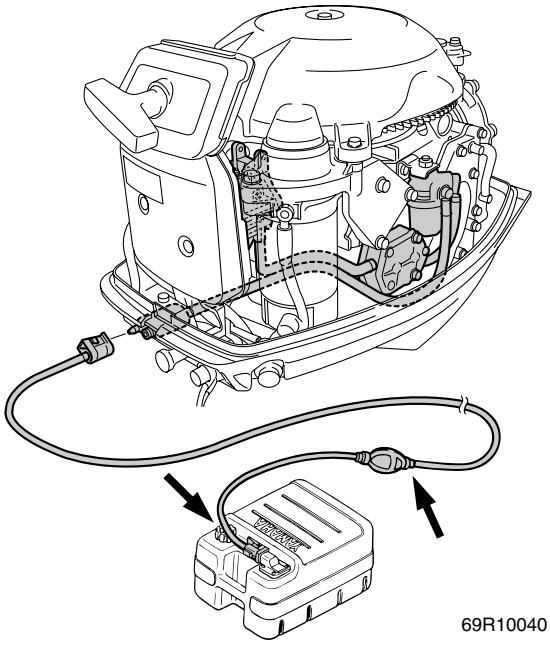
Propeller size (in)	Material
9 7/8 × 8 - F	Aluminum
9 7/8 × 9 - F	
9 7/8 × 10 - F	
9 7/8 × 10 1/2 - F	
9 7/8 × 11 1/4 - F	
9 7/8 × 12 - F	
9 7/8 × 13 - F	
9 7/8 × 14 - F	

Predelivery check

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

Checking the fuel system

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

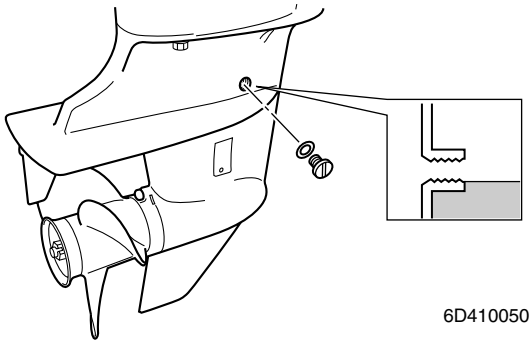

69R10040

CAUTION:

Use pre-mixed fuel only.
Fuel and oil mixing ratio is 50:1. For break-in period, 25:1 mixture shall be used.

Checking the gear oil

1. Check the gear oil level.



6D410050

Recommended gear oil:
Hypoid gear oil
API: GL-4
SAE: 90
Oil quantity:
320 cm^3
(10.82 US oz, 11.29 Imp oz)

Checking the battery (WH, W, WC)

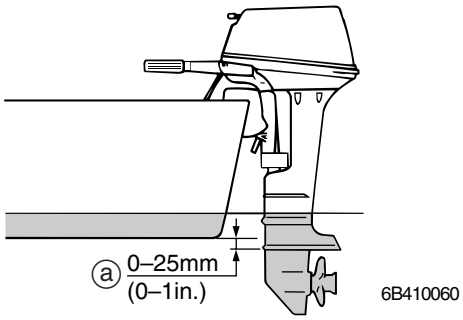
1. Check the capacity, electrolyte level, and specified gravity of the battery.

Recommended battery capacity:
CCA/EN: 347 A
20HR/IEC: 40 Ah
Electrolyte specified gravity:
1.280 at 20°C (68°F)

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

Checking the outboard motor mounting height

1. Check that the anti-cavitation plate is between the bottom of the boat and a maximum of 25 mm (1 in) ⓐ below it. If the mounting height is too high, cavitation will occur and propulsion will be reduced. Also, the engine speed will increase abnormally and cause the engine to overheat. If the mounting height is too low, water resistance will increase and reduce engine efficiency.



6B410060

NOTE:
The optimum mounting height is affected by the combination of the boat and the outboard motor. To determine the optimum mounting height, test run the outboard motor at different heights

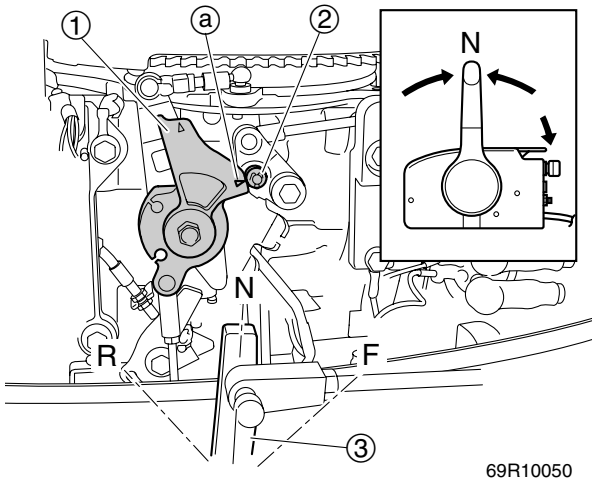
2. Check that the clamp brackets are secured with the clamp screws.

Checking the remote control cable (W, WC)

1. Set the remote control lever to “N” position and the throttle lever to fully-closed position.

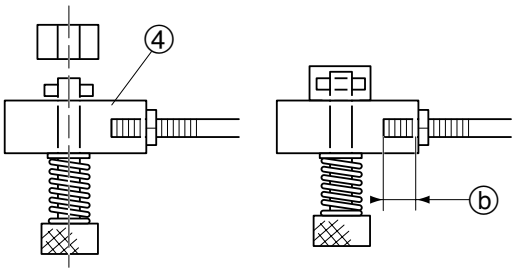
2. Check that the throttle cam ① is in its fully-closed position and align the center of the throttle cam roller ② with the mark ⓐ on the throttle cam.

3. Check that the shift lever ③ is in “N” position.



69R10050

4. Check the screwed length of the shift / throttle cable joint ④ .



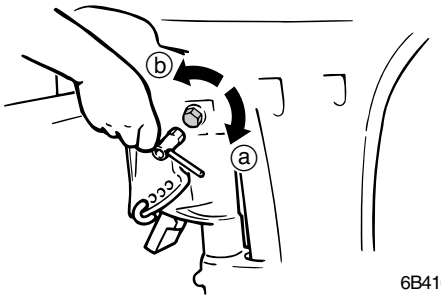
69R10065

⚠WARNING

The shift / throttle cable joint ④ must be screwed in a minimum of 8.0 mm (0.31 in) ⓑ.

Checking the steering system

1. Check the steering friction for proper adjustment.

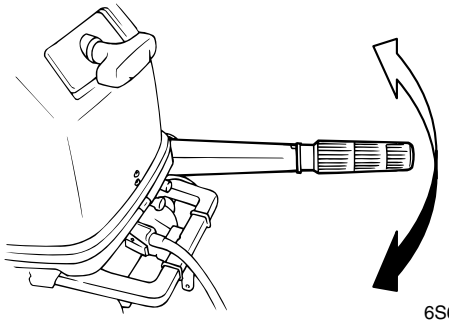


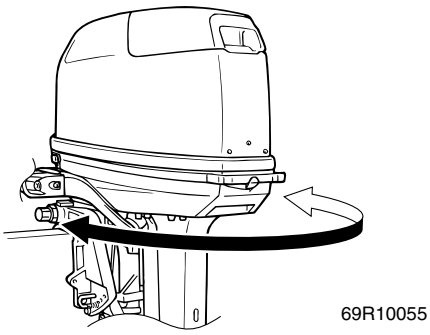
6B410075

NOTE:

- To increase the friction, turn the friction adjusting bolt in direction ⓐ.
- To decrease the friction, turn the friction adjusting bolt in direction ⓑ.

2. Check that the steering operates smoothly.


6S610050

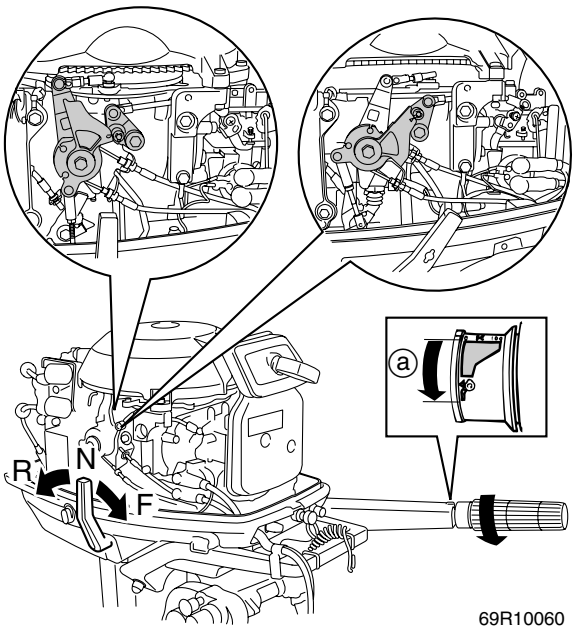

69R10055

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

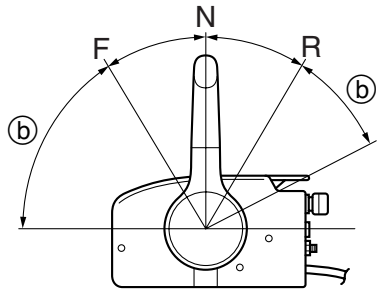
Checking the gear shift and throttle operation

1. Check that the gear shift operates smoothly when the shift lever or remote control lever is shifted from “N” to “F” or “R” position.

2. Check that the throttle operates smoothly when the throttle grip (tiller handle model) is turned from the fully-closed position to the fully-opened position ⓐ.
   Check that the throttle operates smoothly when the remote control lever (remote control model) is shifted from “F” or “R” position to the fully-opened positions ⓑ.



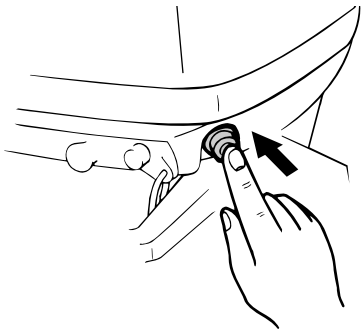
69R10060



6F610120

Checking the engine start button, engine start switch and engine stop lanyard switch

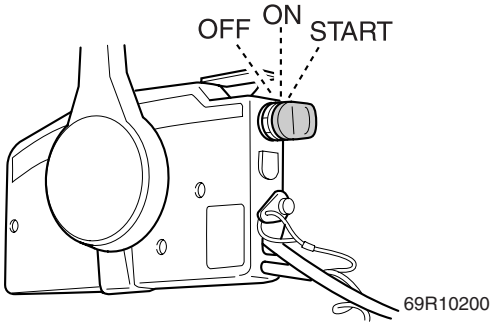
1. Check that the engine starts when the engine start button is pushed to START. (WH, WC)



69R10080

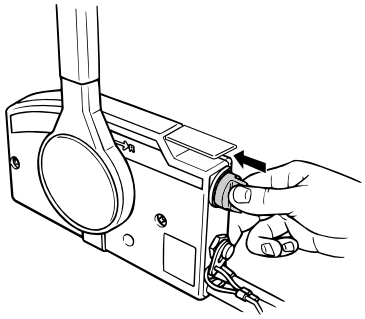
2. Check that the engine starts when the engine start switch is turned to START. (W:703 type remote control box)

3. Check that the engine turns off when the engine start switch is turned to OFF. (W:703 type remote control box)



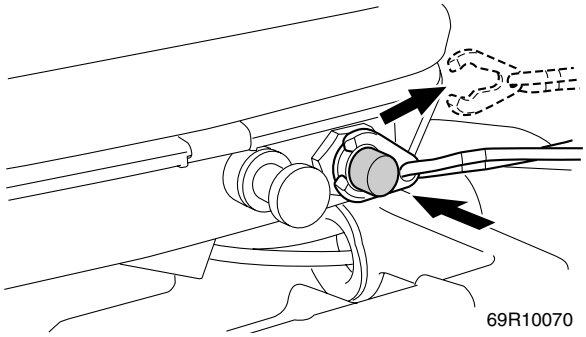
69R10200

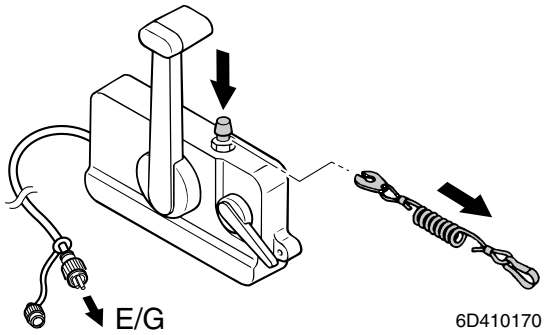
4. Check that the choke solenoid operates when the engine start switch is pushed in. (W:703 type remote control box)



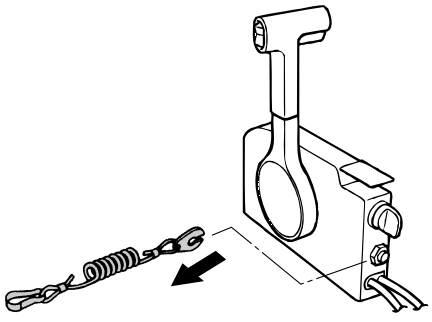
6S310110

5. Check that the engine turns off when the engine stop lanyard switch is pushed or the engine stop lanyard is pulled from the engine stop lanyard switch. (WH, WC, MH)



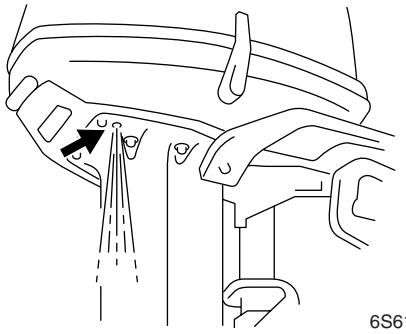


6. Check that the engine turns off when the engine stop lanyard is pulled from the engine stop lanyard switch. (W:703 type remote control box)



Checking the cooling water pilot hole

1. Start the engine, and then check for a water flow from the cooling water pilot hole.



Test run

1. Start the engine, and then check that the gear shift operates smoothly.
2. Check that the engine idle speed after the engine has been warmed up.
3. Operate at trolling speed.
4. Run the outboard motor for 1 hour at 3,000 r/min or at half throttle, then for another hour at 4,000 r/min or at 3/4 throttle.
5. Check that the outboard motor does not tilt up when shifting into reverse and that water does not flow in over the transom.

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

Break-in

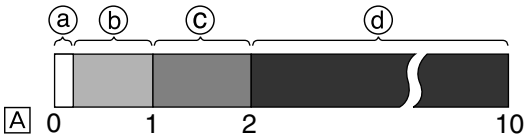
During the test run, perform the break-in operation in the following 5 stages.

1. 10 minutes ⓐ at the lowest possible speed. A fast idle in neutral is best.
2. 50 minutes ⓑ at 1/2 throttle (approximately 3,000 r/min) or less. Vary engine speed occasionally. On an easy-planing boat, accelerate at full throttle onto plane, then immediately reduce the throttle to 3,000 r/min or less.

3. 1 hour ⓒ at 3/4 throttle (approximately 4,000 r/min). Vary engine speed occasionally. Run at full throttle for 1 minute, then allow about 10 minutes of operation at 3/4 throttle or less to let the engine cool.

4. 8 hours ⓓ at any speed, but avoid operating at full throttle for more than 5 minutes at a time. Let the engine cool between full-throttle runs. Vary engine speed occasionally.

5. After the first 10 hours. Use standard premix ratio of fuel and oil. Refer to page 1-13.



6F610180

A Hours

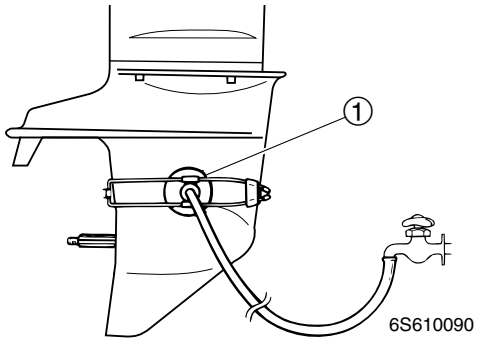
After test run

1. Check for water in the gear oil.

2. Check for fuel leakage in the cowling.

3. Install the flushing kit ①.

4. Set the gear shift to “N” position, and then flush the cooling water passage with engine running at idle.



6S610090

CAUTION:

Be sure to supply sufficient water when flushing the cooling water passage, otherwise the engine may overheat.

⚠WARNING

- **Be sure to remove the propeller before using the flushing kit.**
- **Keep hands, hair and clothes away from the propeller shaft while the engine is running.**

— MEMO —

Specification

General specification

Item	Unit	Model	
		E25BMH	25XMH
Dimension			
Overall length	mm (in)	843 (33.2)	
Overall width	mm (in)	399 (15.7)	
Overall height			
(S)	mm (in)	1,146 (45.1)	
(L)	mm (in)	1,273 (50.1)	—
Boat transom height			
(S)	mm (in)	381 (15.0)	
(L)	mm (in)	508 (20.0)	—
Weight			
(with aluminum propeller)			
(S)	kg (lb)	53.0 (117)	
(L)	kg (lb)	54.5 (120)	—
Performance			
Maximum output	kW (hp)	18.4 (25) at 5,000 r/min	
Full throttle operating range	r/min	4,500–5,500	
Maximum fuel consumption	L (US gal, lmp gal)/hr	11.0 (2.91, 2.42) at 5,500 r/min	
Engine idle speed	r/min	1,050–1,150	
Power unit			
Engine type		2-stroke, L	
Cylinder quantity		2	
Total displacement	cm^3 (cu. in)	496 (30.27)	
Bore x stroke	mm (in)	72.0 × 61.0 (2.83 × 2.40)	
Compression ratio		6.2 : 1	7.0 : 1
Intake system		Reed valve	
Scavenging system		Loop charge	
Control system		Tiller	
Starting system		Manual	
Fuel system		Carburetor	
Ignition control system		CDI	
Alternator output	V, W	12, 80	
Starting enrichment		Choke valve	
Spark plug		B7HS-10 (NGK) BR7HS-10 (NGK)	B8HS-10 (NGK) BR8HS-10 (NGK)
Cooling system		Water	
Exhaust system		Propeller boss	
Lubrication system		Pre-mixed fuel and oil	

Item	Unit	Model	
		E25BMH	25XMH
Fuel and oil			
Fuel type		Regular unleaded gasoline	
Engine oil		2-stroke outboard motor oil	
Engine oil grade		NMMA-certified TC-W3	
Gear oil type		Hypoid gear oil	
Gear oil grade (*1)	API	GL-4	
	SAE	90	
Gear oil quantity	cm^3 (US oz, Imp oz)	320 (10.82, 11.29)	
Bracket unit			
Trim angle (at 12° boat transom)	Degree	4.0, 8.0, 12.0, 16.0, 20.0	
Tilt-up angle	Degree	76.0	
Steering angle	Degree	40.0 + 40.0	
Drive unit			
Gear shift positions		F-N-R	
Gear ratio		2.08 (27/13)	
Reduction gear type		Spiral bevel gear	
Clutch type		Dog clutch	
Propeller shaft type		Spline	
Propeller direction (rear view)		Clockwise	
Propeller ID mark		F	

(*1) Meeting both API and SAE requirements

Item	Unit	Model		
		25BMH	25BW	25BWC
Dimension				
Overall length	mm (in)	843 (33.2)	608 (23.9)	843 (33.2)
Overall width	mm (in)	399 (15.7)	358 (14.1)	399 (15.7)
Overall height				
(S)	mm (in)	1,146 (45.1)	—	1,146 (45.1)
(L)	mm (in)	1,273 (50.1)		—
(X)	mm (in)	1,359 (53.5)	—	
Boat transom height				
(S)	mm (in)	381 (15.0)	—	381 (15.0)
(L)	mm (in)	508 (20.0)		—
(X)	mm (in)	635 (25.0)	—	
Weight				
(with aluminum propeller)				
(S)	kg (lb)	53.0 (117)	—	56.5 (125)
(L)	kg (lb)	54.5 (120)	55.5 (122)	—
(X)	kg (lb)	56.5 (125)	—	
Performance				
Maximum output	kW (hp)	18.4 (25) at 5,000 r/min		
Full throttle operating range	r/min	4,500–5,500		
Maximum fuel consumption	L (US gal, lmp gal)/hr	11.0 (2.91, 2.42) at 5,500 r/min		
Engine idle speed	r/min	1,050–1,150		
Power unit				
Engine type		2-stroke, L		
Cylinder quantity		2		
Total displacement	cm^3 (cu. in)	496 (30.27)		
Bore x stroke	mm (in)	72.0 × 61.0 (2.83 × 2.40)		
Compression ratio		6.2 : 1		
Intake system		Reed valve		
Scavenging system		Loop charge		
Control system		Tiller	Remote control	Tiller and remote control
Starting system		Manual	Manual and electric	
Fuel system		Carburetor		
Ignition control system		CDI		
Alternator output	V, W	12, 80	—	
Maximum generator output	V, A	—	12, 6.0	
Starting enrichment		Choke valve		
Spark plug		B7HS-10 (NGK) BR7HS-10 (NGK)		
Cooling system		Water		
Exhaust system		Propeller boss		
Lubrication system		Pre-mixed fuel and oil		

Item	Unit	Model		
		25BMH	25BW	25BWC
Fuel and oil				
Fuel type		Regular unleaded gasoline		
Engine oil		2-stroke outboard motor oil		
Engine oil grade		NMMA-certified TC-W3		
Gear oil type		Hypoid gear oil		
Gear oil grade (*1)	API	GL-4		
	SAE	90		
Gear oil quantity	cm^3 (US oz, Imp oz)	320 (10.82, 11.29)		
Bracket unit				
Trim angle (at 12° boat transom)	Degree	4.0, 8.0, 12.0, 16.0, 20.0		
Tilt-up angle	Degree	76.0		
Steering angle	Degree	40.0 + 40.0		
Drive unit				
Gear shift positions		F-N-R		
Gear ratio		2.08 (27/13)		
Reduction gear type		Spiral bevel gear		
Clutch type		Dog clutch		
Propeller shaft type		Spline		
Propeller direction (rear view)		Clockwise		
Propeller ID mark		F		
Electrical				
Battery minimum capacity (*2)				
CCA/EN	A	—	347	
20HR/IEC	Ah	—	40	

(*1) Meeting both API and SAE requirements

(*2) CCA: Cold Cranking Ampere
EN: European Norm (European standard)
IEC: International Electrotechnical Commission

Item	Unit	Model		
		E30HMH	30HMH	30HWH
Dimension				
Overall length	mm (in)	843 (33.2)		
Overall width	mm (in)	399 (15.7)		
Overall height				
(S)	mm (in)	1,146 (45.1)		—
(L)	mm (in)	1,273 (50.1)		
(X)	mm (in)	—		1,359 (53.5)
Boat transom height				
(S)	mm (in)	381 (15.0)		—
(L)	mm (in)	508 (20.0)	—	508 (20.0)
(X)	mm (in)	—		635 (25.0)
Weight				
(with aluminum propeller)				
(S)	kg (lb)	53.0 (117)		—
(L)	kg (lb)	54.5 (120)		58.0 (128)
(X)	kg (lb)	—		60.0 (132)
Performance				
Maximum output	kW (hp)	22.1 (30) at 5,000 r/min		
Full throttle operating range	r/min	4,500–5,500		
Maximum fuel consumption	L (US gal, lmp gal)/hr	12.0 (3.17, 2.64) at 5,500 r/min		
Engine idle speed	r/min	1,050–1,150		
Power unit				
Engine type		2-stroke, L		
Cylinder quantity		2		
Total displacement	cm^3 (cu. in)	496 (30.27)		
Bore x stroke	mm (in)	72.0 × 61.0 (2.83 × 2.40)		
Compression ratio		7.0 : 1		
Intake system		Reed valve		
Scavenging system		Loop charge		
Control system		Tiller		
Starting system		Manual		Manual and electric
Fuel system		Carburetor		
Ignition control system		CDI		
Alternator output	V, W	12, 80		—
Maximum generator output	V, A	—		12, 6.0
Starting enrichment		Choke valve		
Spark plug		B8HS-10 (NGK)		
		BR8HS-10 (NGK)		
Cooling system		Water		
Exhaust system		Propeller boss		
Lubrication system		Pre-mixed fuel and oil		

Item	Unit	Model		
		E30HMH	30HMH	30HWH
Fuel and oil				
Fuel type		Regular unleaded gasoline		
Engine oil		2-stroke outboard motor oil		
Engine oil grade		NMMA-certified TC-W3		
Gear oil type		Hypoid gear oil		
Gear oil grade (*1)	API	GL-4		
	SAE	90		
Gear oil quantity	cm^3 (US oz, Imp oz)	320 (10.82, 11.29)		
Bracket unit				
Trim angle (at 12° boat transom)	Degree	4.0, 8.0, 12.0, 16.0, 20.0		
Tilt-up angle	Degree	76.0		
Steering angle	Degree	40.0 + 40.0		
Drive unit				
Gear shift positions		F-N-R		
Gear ratio		2.08 (27/13)		
Reduction gear type		Spiral bevel gear		
Clutch type		Dog clutch		
Propeller shaft type		Spline		
Propeller direction (rear view)		Clockwise		
Propeller ID mark		F		
Electrical				
Battery minimum capacity (*2)				
CCA/EN	A	—		347
20HR/IEC	Ah	—		40

(*1) Meeting both API and SAE requirements

(*2) CCA: Cold Cranking Ampere
EN: European Norm (European standard)
IEC: International Electrotechnical Commission

Item	Unit	Model	
		30HW	30HWC
Dimension			
Overall length	mm (in)	608 (23.9)	843 (33.2)
Overall width	mm (in)	358 (14.1)	399 (15.7)
Overall height			
(S)	mm (in)	1,146 (45.1)	
(L)	mm (in)	1,273 (50.1)	—
Boat transom height			
(S)	mm (in)	381 (15.0)	
(L)	mm (in)	508 (20.0)	—
Weight			
(with aluminum propeller)			
(S)	kg (lb)	56.5 (125)	
(L)	kg (lb)	58.0 (128)	—
Performance			
Maximum output	kW (hp)	22.1 (30) at 5,000 r/min	
Full throttle operating range	r/min	4,500–5,500	
Maximum fuel consumption	L (US gal, lmp gal)/hr	12.0 (3.17, 2.64) at 5,500 r/min	
Engine idle speed	r/min	1,050–1,150	
Power unit			
Engine type		2-stroke, L	
Cylinder quantity		2	
Total displacement	cm^3 (cu. in)	496 (30.27)	
Bore x stroke	mm (in)	72.0 × 61.0 (2.83 × 2.40)	
Compression ratio		7.0 : 1	
Intake system		Reed valve	
Scavenging system		Loop charge	
Control system		Remote control	Tiller and remote control
Starting system		Manual and electric	
Fuel system		Carburetor	
Ignition control system		CDI	
Maximum generator output	V, A	12, 6.0	
Starting enrichment		Choke valve	
Spark plug		B8HS-10 (NGK)	
		BR8HS-10 (NGK)	
Cooling system		Water	
Exhaust system		Propeller boss	
Lubrication system		Pre-mixed fuel and oil	

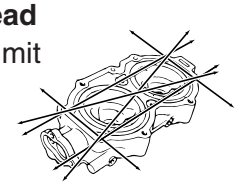
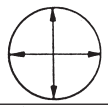
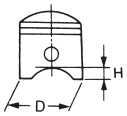
Item	Unit	Model	
		30HW	30HWC
Fuel and oil			
Fuel type		Regular unleaded gasoline	
Engine oil		2-stroke outboard motor oil	
Engine oil grade		NMMA-certified TC-W3	
Gear oil type		Hypoid gear oil	
Gear oil grade (*1)	API	GL-4	
	SAE	90	
Gear oil quantity	cm^3 (US oz, Imp oz)	320 (10.82, 11.29)	
Bracket unit			
Trim angle (at 12° boat transom)	Degree	4.0, 8.0, 12.0, 16.0, 20.0	
Tilt-up angle	Degree	76.0	
Steering angle	Degree	40.0 + 40.0	
Drive unit			
Gear shift positions		F-N-R	
Gear ratio		2.08 (27/13)	
Reduction gear type		Spiral bevel gear	
Clutch type		Dog clutch	
Propeller shaft type		Spline	
Propeller direction (rear view)		Clockwise	
Propeller ID mark		F	
Electrical			
Battery minimum capacity (*2)			
CCA/EN	A	347	
20HR/IEC	Ah	40	

(*1) Meeting both API and SAE requirements

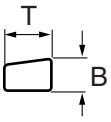
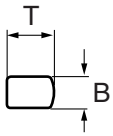
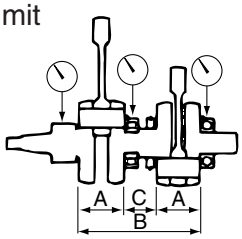
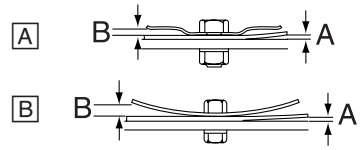
(*2) CCA: Cold Cranking Ampere
EN: European Norm (European standard)
IEC: International Electrotechnical Commission

Maintenance specification

Power unit (E25BMH, 25XMH models)

Item	Unit	Model	
		E25BMH	25XMH
Power unit			
Minimum compression pressure (*1)	kPa (kgf/cm², psi)	470 (4.7, 68)	
Cylinder head			
Warpage limit  (lines indicate straightedge position)	mm (in)	0.1 (0.0039)	
Cylinder			
Bore size 	mm (in)	72.000–72.020 (2.8346–2.8354)	
Piston			
Piston diameter (D) 	mm (in)	71.935–71.960 (2.8321–2.8331)	
Measuring point (H)	mm (in)	10.0 (0.39)	
Piston clearance (reference data)	mm (in)	0.060–0.065 (0.0024–0.0026)	
Piston pin boss bore	mm (in)	19.904–19.915 (0.7836–0.7841)	
Oversize piston			
1st	mm (in)	0.25 (0.010)	
2nd	mm (in)	0.50 (0.020)	
Oversize piston diameter			
1st	mm (in)	72.185–72.210 (2.8419–2.8429)	—
2nd	mm (in)	72.435–72.460 (2.8518–2.8528)	—
Piston pin			
Outside diameter	mm (in)	19.895–19.900 (0.7833–0.7835)	

(*1) Measuring conditions:
Ambient temperature 20°C (68°F), wide open throttle, with spark plugs removed from all cylinders.
The figures are for reference only.

Item	Unit	Model	
		E25BMH	25XMH
Piston ring			
Top piston ring			
Dimension B 	mm (in)	1.970–1.990 (0.0776–0.0783)	
Dimension T	mm (in)	2.900–3.100 (0.1142–0.1220)	
End gap	mm (in)	0.20–0.35 (0.0079–0.0138)	
Side clearance	mm (in)	0.02–0.06 (0.0008–0.0024)	
Oversize outside diameter			
1st	mm (in)	72.25 (2.8445)	
2nd	mm (in)	72.50 (2.8543)	
2nd piston ring			
Dimension B 	mm (in)	1.970–1.990 (0.0776–0.0783)	
Dimension T	mm (in)	2.900–3.100 (0.1142–0.1220)	
End gap	mm (in)	0.20–0.35 (0.0079–0.0138)	
Side clearance	mm (in)	0.03–0.07 (0.0012–0.0028)	
Oversize outside diameter			
1st	mm (in)	72.25 (2.8445)	
2nd	mm (in)	72.50 (2.8543)	
Connecting rod			
Small-end inside diameter	mm (in)	23.904–23.917 (0.9411–0.9416)	
Big-end inside diameter	mm (in)	32.000–32.016 (1.2598–1.2605)	
Connecting rod big-end side clearance	mm (in)	0.200–0.700 (0.0079–0.0276)	
Small-end axial play limit	mm (in)	2.0 (0.08)	
Crankshaft			
Crankshaft width A	mm (in)	56.90–56.95 (2.2401–2.2421)	
Crankshaft width B	mm (in)	153.70–154.00 (6.05–6.06)	
Crankshaft width C	mm (in)	39.9–40.1 (1.5709–1.5787)	
Crankpin diameter	mm (in)	23.995–24.000 (0.9447–0.9449)	
Runout limit 	mm (in)	0.03 (0.0012)	
Thermostat			
Opening temperature	°C (°F)	48–52 (118.4–125.6)	
Fully open temperature	°C (°F)	60 (140)	
Valve open lower limit	mm (in)	3.0 (0.12)	
Reed valve			
Valve bending limit A	mm (in)	0.2 (0.0079)	
Valve stopper height B 	mm (in)	1.7–2.3 (0.0669–0.0906)	4.75–5.75 (0.1870–0.2264)

A E25B B 25X

Item		Unit	Model	
			E25BMH	25XMH
Carburetor				
ID mark			69P00	69S00
Main jet	(M.J.)	#	130	
Main air jet	(M.A.J.)	mm (in)	2.0 (0.0787)	
Main nozzle	(M.N.)	mm (in)	4.0 (0.16)	
Pilot jet	(P.J.)	#	68	
Slow air jet	(S.A.J.)	mm (in)	0.8 (0.0315)	
Pilot screw	(P.S.)	turns out	1/2–2	
Valve seat size		mm (in)	1.2 (0.05)	
Float height		mm (in)	14.5–15.5 (0.57–0.61)	

Lower unit (E25BMH, 25XMH models)

Item	Unit	Model	
		E25BMH	25XMH
Gear backlash			
Pinion-to-forward gear	mm (in)	0.31–0.72 (0.0122–0.0283)	
Pinion-to-reverse gear	mm (in)	0.93–1.65 (0.0366–0.0650)	
Pinion gear shims	mm	0.7, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6	
Forward gear shims	mm	1.0, 1.1, 1.2, 1.3, 1.4	
Reverse gear shims	mm	1.0, 1.1, 1.2, 1.3	

Electrical (E25BMH, 25XMH models)

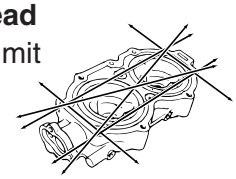
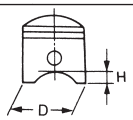
Item	Unit	Model	
		E25BMH	25XMH
Ignition and ignition control system			
Spark plug gap	mm (in)	0.9–1.0 (0.035–0.039)	
Spark plug cap resistance	kΩ	4.0–6.0	
Ignition timing (full retard)	Degree	TDC–ATDC 4	
Ignition timing (full advanced)	Degree	BTDC 20–24	BTDC 23–27
Ignition coil resistance			
Primary coil (B/W–B) at 20°C (68°F)	Ω	0.18–0.24	
Secondary coil (B/W–spark plug wire) at 20°C (68°F)	kΩ	2.72–3.68	

Coil resistance and peak voltage are reference data.
Measuring conditions:
Ambient temperature 20°C (68°F).

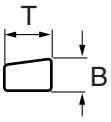
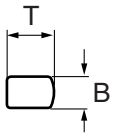
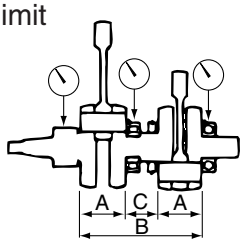
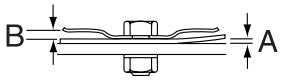
Item	Unit	Model	
		E25BMH	25XMH
CDI unit output peak voltage (#1:B/O–B, #2:B/W–B)			
at Cranking (loaded)	V	130	
at 1,500 r/min (loaded)	V	135	
at 3,500 r/min (loaded)	V	135	
Pulser coil output peak voltage (W/R–B, W/B–B)			
at Cranking (unloaded)	V	6.8	
at Cranking (loaded)	V	6.7	
at 1,500 r/min (loaded)	V	16.0	
at 3,500 r/min (loaded)	V	26.0	
Pulser coil resistance (W/R–B, W/B–B) at 20°C (68°F)	Ω	311–381	
Charge coil output peak voltage (Br–L)			
at Cranking (unloaded)	V	146	
at Cranking (loaded)	V	146	
at 1,500 r/min (loaded)	V	150	
at 3,500 r/min (loaded)	V	150	
Charge coil resistance (Br–L) at 20°C (68°F)	Ω	342–418	
Charging system			
Lighting coil output peak voltage (G–G)			
at Cranking (unloaded)	V	4.6	
at 1,500 r/min (unloaded)	V	15.0	
at 3,500 r/min (unloaded)	V	30.0	
Lighting coil resistance (G–G) at 20°C (68°F)	Ω	0.31–0.37	

Coil resistance and peak voltage are reference data.
Measuring conditions:
Ambient temperature 20°C (68°F).

Power unit (25BMH, 25BW, 25BWC models)

Item	Unit	Model		
		25BMH	25BW	25BWC
Power unit				
Minimum compression pressure (*1)	kPa (kgf/cm², psi)	470 (4.7, 68)		
Cylinder head				
Warpage limit  (lines indicate straightedge position)	mm (in)	0.1 (0.0039)		
Cylinder				
Bore size 	mm (in)	72.000–72.020 (2.8346–2.8354)		
Piston				
Piston diameter (D) 	mm (in)	71.935–71.960 (2.8321–2.8331)		
Measuring point (H)	mm (in)	10.0 (0.39)		
Piston clearance (reference data)	mm (in)	0.060–0.065 (0.0024–0.0026)		
Piston pin boss bore	mm (in)	19.904–19.915 (0.7836–0.7841)		
Oversize piston				
1st	mm (in)	0.25 (0.010)		
2nd	mm (in)	0.50 (0.020)		
Oversize piston diameter				
1st	mm (in)	72.185–72.210 (2.8419–2.8429)		
2nd	mm (in)	72.435–72.460 (2.8518–2.8528)		
Piston pin				
Outside diameter	mm (in)	19.895–19.900 (0.7833–0.7835)		

(*1) Measuring conditions:
Ambient temperature 20°C (68°F), wide open throttle, with spark plugs removed from all cylinders.
The figures are for reference only.

Item	Unit	Model		
		25BMH	25BW	25BWC
Piston ring				
Top piston ring				
Dimension B 	mm (in)	1.970–1.990 (0.0776–0.0783)		
Dimension T	mm (in)	2.900–3.100 (0.1142–0.1220)		
End gap	mm (in)	0.20–0.35 (0.0079–0.0138)		
Side clearance	mm (in)	0.02–0.06 (0.0008–0.0024)		
Oversize outside diameter				
1st	mm (in)	72.25 (2.8445)		
2nd	mm (in)	72.50 (2.8543)		
2nd piston ring				
Dimension B 	mm (in)	1.970–1.990 (0.0776–0.0783)		
Dimension T	mm (in)	2.900–3.100 (0.1142–0.1220)		
End gap	mm (in)	0.20–0.35 (0.0079–0.0138)		
Side clearance	mm (in)	0.03–0.07 (0.0012–0.0028)		
Oversize outside diameter				
1st	mm (in)	72.25 (2.8445)		
2nd	mm (in)	72.50 (2.8543)		
Connecting rod				
Small-end inside diameter	mm (in)	23.904–23.917 (0.9411–0.9416)		
Big-end inside diameter	mm (in)	32.000–32.016 (1.2598–1.2605)		
Connecting rod big-end side clearance	mm (in)	0.200–0.700 (0.0079–0.0276)		
Small-end axial play limit	mm (in)	2.0 (0.08)		
Crankshaft				
Crankshaft width A	mm (in)	56.90–56.95 (2.2401–2.2421)		
Crankshaft width B	mm (in)	153.70–154.00 (6.05–6.06)		
Crankshaft width C	mm (in)	39.9–40.1 (1.5709–1.5787)		
Crankpin diameter	mm (in)	23.995–24.000 (0.9447–0.9449)		
Runout limit 	mm (in)	0.03 (0.0012)		
Thermostat				
Opening temperature	°C (°F)	48–52 (118.4–125.6)		
Fully open temperature	°C (°F)	60 (140)		
Valve open lower limit	mm (in)	3.0 (0.12)		
Reed valve				
Valve bending limit A	mm (in)	0.2 (0.0079)		
Valve stopper height B 	mm (in)	1.7–2.3 (0.0669–0.0906)		

Item		Unit	Model		
			25BMH	25BW	25BWC
Carburetor					
ID mark			69P00		
Main jet	(M.J.)	#	130		
Main air jet	(M.A.J.)	mm (in)	2.0 (0.0787)		
Main nozzle	(M.N.)	mm (in)	4.0 (0.16)		
Pilot jet	(P.J.)	#	68		
Slow air jet	(S.A.J.)	mm (in)	0.8 (0.0315)		
Pilot screw	(P.S.)	turns out	1/2–2		
Valve seat size		mm (in)	1.2 (0.05)		
Float height		mm (in)	14.5–15.5 (0.57–0.61)		

Lower unit (25BMH, 25BW, 25BWC models)

Item	Unit	Model		
		25BMH	25BW	25BWC
Gear backlash				
Pinion-to-forward gear	mm (in)	0.31–0.72 (0.0122–0.0283)		
Pinion-to-reverse gear	mm (in)	0.93–1.65 (0.0366–0.0650)		
Pinion gear shims	mm	0.7, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6		
Forward gear shims	mm	1.0, 1.1, 1.2, 1.3, 1.4		
Reverse gear shims	mm	1.0, 1.1, 1.2, 1.3		

Electrical (25BMH, 25BW, 25BWC models)

Item	Unit	Model		
		25BMH	25BW	25BWC
Ignition and ignition control system				
Spark plug gap	mm (in)	0.9–1.0 (0.035–0.039)		
Spark plug cap resistance	kΩ	4.0–6.0		
Ignition timing (full retard)	Degree	TDC–ATDC 4		
Ignition timing (full advanced)	Degree	BTDC 20–24		
Ignition coil resistance				
Primary coil (B/W–B) at 20°C (68°F)	Ω	0.18–0.24		
Secondary coil (B/W–spark plug wire) at 20°C (68°F)	kΩ	2.72–3.68		

Coil resistance and peak voltage are reference data.
Measuring conditions:
Ambient temperature 20°C (68°F).

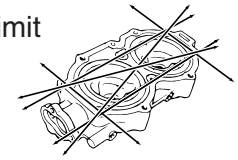
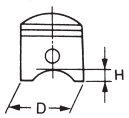
Item	Unit	Model		
		25BMH	25BW	25BWC
CDI unit output peak voltage (#1:B/O–B, #2:B/W–B)				
at Cranking (loaded)	V		130	
at 1,500 r/min (loaded)	V		135	
at 3,500 r/min (loaded)	V		135	
Pulser coil output peak voltage (W/R–B, W/B–B)				
at Cranking (unloaded)	V		6.8	
at Cranking (loaded)	V		6.7	
at 1,500 r/min (loaded)	V		16.0	
at 3,500 r/min (loaded)	V		26.0	
Pulser coil resistance (W/R–B,W/B–B) at 20°C (68°F)	Ω		311–381	
Thermoswith				
ON temperature	°C (°F)	—	106–114 (222.8–237.2)	—
OFF temperature	°C (°F)	—	88–102 (190.4–215.6)	—
Charge coil output peak voltage (Br–L)				
at Cranking (unloaded)	V		146	
at Cranking (loaded)	V		146	
at 1,500 r/min (loaded)	V		150	
at 3,500 r/min (loaded)	V		150	
Charge coil resistance (Br–L) at 20°C (68°F)	Ω		342–418	
Starter motor				
Type		—	Bendix	
Output	kW	—	0.6	
Brushes				
Standard length	mm (in)	—	12.5 (0.49)	
Wear limit	mm (in)	—	9.0 (0.35)	
Commutator				
Standard diameter	mm (in)	—	30.0 (1.18)	
Wear limit	mm (in)	—	29.0 (1.14)	
Standard undercut	mm (in)	—	0.8 (0.03)	
Wear limit	mm (in)	—	0.2 (0.01)	

Coil resistance and peak voltage are reference data.
Measuring conditions:
Ambient temperature 20°C (68°F).

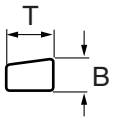
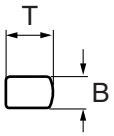
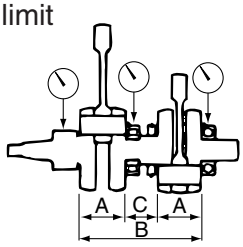
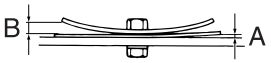
Item	Unit	Model		
		25BMH	25BW	25BWC
Charging system				
Lighting coil output peak voltage (G–G)				
at Cranking (unloaded)	V		4.6	
at 1,500 r/min (unloaded)	V		15.0	
at 3,500 r/min (unloaded)	V		30.0	
Lighting coil resistance (G–G) at 20°C (68°F)	Ω		0.31–0.37	
Rectifier output peak voltage (R–B)				
at 1,500 r/min (unloaded)	V	—	13	
at 3,500 r/min (unloaded)	V	—	13	

Coil resistance and peak voltage are reference data.
Measuring conditions:
Ambient temperature 20°C (68°F).

Power unit (E30HMH, 30HMH, 30HWH models)

Item	Unit	Model		
		E30HMH	30HMH	30HWH
Power unit				
Minimum compression pressure (*1)	kPa (kgf/cm², psi)	570 (5.7, 83)		
Cylinder head				
Warpage limit  (lines indicate straightedge position)	mm (in)	0.1 (0.0039)		
Cylinder				
Bore size 	mm (in)	72.000–72.020 (2.8346–2.8354)		
Piston				
Piston diameter (D) 	mm (in)	71.935–71.960 (2.8321–2.8331)		
Measuring point (H)	mm (in)	10.0 (0.39)		
Piston clearance (reference data)	mm (in)	0.060–0.065 (0.0024–0.0026)		
Piston pin boss bore	mm (in)	19.904–19.915 (0.7836–0.7841)		
Oversize piston				
1st	mm (in)	0.25 (0.010)		
2nd	mm (in)	0.50 (0.020)		
Oversize piston diameter				
1st	mm (in)	72.185–72.210 (2.8419–2.8429)		
2nd	mm (in)	72.435–72.460 (2.8518–2.8528)		
Piston pin				
Outside diameter	mm (in)	19.895–19.900 (0.7833–0.7835)		

(*1) Measuring conditions:
Ambient temperature 20°C (68°F), wide open throttle, with spark plugs removed from all cylinders.
The figures are for reference only.

Item	Unit	Model		
		E30HMH	30HMH	30HWH
Piston ring				
Top piston ring				
Dimension B 	mm (in)	1.970–1.990 (0.0776–0.0783)		
Dimension T	mm (in)	2.900–3.100 (0.1142–0.1220)		
End gap	mm (in)	0.20–0.35 (0.0079–0.0138)		
Side clearance	mm (in)	0.02–0.06 (0.0008–0.0024)		
Oversize outside diameter				
1st	mm (in)	72.25 (2.8445)		
2nd	mm (in)	72.50 (2.8543)		
2nd piston ring				
Dimension B 	mm (in)	1.970–1.990 (0.0776–0.0783)		
Dimension T	mm (in)	2.900–3.100 (0.1142–0.1220)		
End gap	mm (in)	0.20–0.35 (0.0079–0.0138)		
Side clearance	mm (in)	0.03–0.07 (0.0012–0.0028)		
Oversize outside diameter				
1st	mm (in)	72.25 (2.8445)		
2nd	mm (in)	72.50 (2.8543)		
Connecting rod				
Small-end inside diameter	mm (in)	23.904–23.917 (0.9411–0.9416)		
Big-end inside diameter	mm (in)	32.000–32.016 (1.2605)		
Connecting rod big-end side clearance	mm (in)	0.200–0.700 (0.0079–0.0276)		
Small-end axial play limit	mm (in)	2.0 (0.08)		
Crankshaft				
Crankshaft width A	mm (in)	56.90–56.95 (2.2401–2.2421)		
Crankshaft width B	mm (in)	153.70–154.00 (6.05–6.06)		
Crankshaft width C	mm (in)	39.9–40.1 (1.5709–1.5787)		
Crankpin diameter	mm (in)	23.995–24.000 (0.9447–0.9449)		
Runout limit	mm (in)	0.03 (0.0012)		
				
Thermostat				
Opening temperature	°C (°F)	48–52 (118.4–125.6)		
Fully open temperature	°C (°F)	60 (140)		
Valve open lower limit	mm (in)	3.0 (0.12)		
Reed valve				
Valve bending limit A	mm (in)	0.2 (0.0079)		
Valve stopper height B	mm (in)	4.75–5.75 (0.1870–0.2264)		
				

Item		Unit	Model		
			E30HMH	30HMH	30HWH
Carburetor					
ID mark			69S00		
Main jet	(M.J.)	#	130		
Main air jet	(M.A.J.)	mm (in)	1.0 (0.0394)		
Main nozzle	(M.N.)	mm (in)	4.0 (0.16)		
Pilot jet	(P.J.)	#	68		
Slow air jet	(S.A.J.)	mm (in)	0.8 (0.0315)		
Pilot screw	(P.S.)	turns out	1/2–2		
Valve seat size		mm (in)	1.2 (0.05)		
Float height		mm (in)	14.5–15.5 (0.57–0.61)		

Lower unit (E30HMH, 30HMH, 30HWH models)

Item	Unit	Model		
		E30HMH	30HMH	30HWH
Gear backlash				
Pinion-to-forward gear	mm (in)	0.31–0.72 (0.0122–0.0283)		
Pinion-to-reverse gear	mm (in)	0.93–1.65 (0.0366–0.0650)		
Pinion gear shims	mm	0.7, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6		
Forward gear shims	mm	1.0, 1.1, 1.2, 1.3, 1.4		
Reverse gear shims	mm	1.0, 1.1, 1.2, 1.3		

Electrical (E30HMH, 30HMH, 30HWH models)

Item	Unit	Model		
		E30HMH	30HMH	30HWH
Ignition and ignition control system				
Spark plug gap	mm (in)	0.9–1.0 (0.035–0.039)		
Spark plug cap resistancce	kΩ	4.0–6.0		
Ignition timing (full retard)	Degree	TDC–ATDC 4		
Ignition timing (full advanced)	Degree	BTDC 23–27		
Ignition coil resistance				
Primary coil (B/W–B) at 20°C (68°F)	Ω	0.18–0.24		
Secondary coil (B/W–spark plug wire) at 20°C (68°F)	kΩ	2.72–3.68		

Coil resistance and peak voltage are reference data.
Measuring conditions:
Ambient temperature 20°C (68°F).

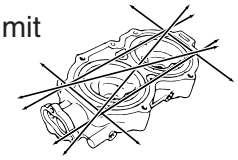
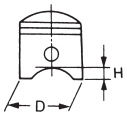
Item	Unit	Model		
		E30HMH	30HMH	30HWH
CDI unit output peak voltage (#1:B/O–B, #2:B/W–B)				
at Cranking (loaded)	V		130	
at 1,500 r/min (loaded)	V		135	
at 3,500 r/min (loaded)	V		135	
Pulser coil output peak voltage (W/R–B, W/B–B)				
at Cranking (unloaded)	V		6.8	
at Cranking (loaded)	V		6.7	
at 1,500 r/min (loaded)	V		16.0	
at 3,500 r/min (loaded)	V		26.0	
Pulser coil resistance (W/R–B, W/B–B) at 20°C (68°F)	Ω		311–381	
Charge coil output peak voltage (Br–L)				
at Cranking (unloaded)	V		146	
at Cranking (loaded)	V		146	
at 1,500 r/min (loaded)	V		150	
at 3,500 r/min (loaded)	V		150	
Charge coil resistance (Br–L) at 20°C (68°F)	Ω		342–418	
Starter motor				
Type		—		Bendix
Output	kW	—		0.6
Brushes				
Standard length	mm (in)	—		12.5 (0.49)
Wear limit	mm (in)	—		9.0 (0.35)
Commutator				
Standard diameter	mm (in)	—		30.0 (1.18)
Wear limit	mm (in)	—		29.0 (1.14)
Standard undercut	mm (in)	—		0.8 (0.03)
Wear limit	mm (in)	—		0.2 (0.01)

Coil resistance and peak voltage are reference data.
Measuring conditions:
Ambient temperature 20°C (68°F).

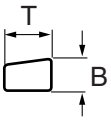
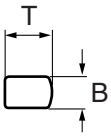
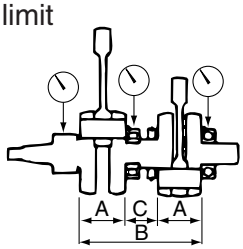
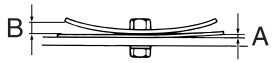
Item	Unit	Model		
		E30HMH	30HMH	30HWH
Charging system				
Lighting coil output peak voltage (G–G)				
at Cranking (unloaded)	V	4.6		
at 1,500 r/min (unloaded)	V	15.0		
at 3,500 r/min (unloaded)	V	30.0		
Lighting coil resistance (G–G) at 20°C (68°F)	Ω	0.31–0.37		
Rectifier output peak voltage (R–B)				
at 1,500 r/min (unloaded)	V		—	13
at 3,500 r/min (unloaded)	V		—	13

Coil resistance and peak voltage are reference data.
Measuring conditions:
Ambient temperature 20°C (68°F).

Power unit (30HW, 30HWC models)

Item	Unit	Model	
		30HW	30HWC
Power unit			
Minimum compression pressure (*1)	kPa (kgf/cm², psi)	570 (5.7, 83)	
Cylinder head			
Warpage limit  (lines indicate straightedge position)	mm (in)	0.1 (0.0039)	
Cylinder			
Bore size 	mm (in)	72.000–72.020 (2.8346–2.8354)	
Piston			
Piston diameter (D) 	mm (in)	71.935–71.960 (2.8321–2.8331)	
Measuring point (H)	mm (in)	10.0 (0.39)	
Piston clearance (reference data)	mm (in)	0.060–0.065 (0.0024–0.0026)	
Piston pin boss bore	mm (in)	19.904–19.915 (0.7836–0.7841)	
Oversize piston			
1st	mm (in)	0.25 (0.010)	
2nd	mm (in)	0.50 (0.020)	
Oversize piston diameter			
1st	mm (in)	72.185–72.210 (2.8419–2.8429)	
2nd	mm (in)	72.435–72.460 (2.8518–2.8528)	
Piston pin			
Outside diameter	mm (in)	19.895–19.900 (0.7833–0.7835)	

(*1) Measuring conditions:
Ambient temperature 20°C (68°F), wide open throttle, with spark plugs removed from all cylinders.
The figures are for reference only.

Item	Unit	Model	
		30HW	30HWC
Piston ring			
Top piston ring			
Dimension B 	mm (in)	1.970–1.990 (0.0776–0.0783)	
Dimension T	mm (in)	2.900–3.100 (0.1142–0.1220)	
End gap	mm (in)	0.20–0.35 (0.0079–0.0138)	
Side clearance	mm (in)	0.02–0.06 (0.0008–0.0024)	
Oversize outside diameter			
1st	mm (in)	72.25 (2.8445)	
2nd	mm (in)	72.50 (2.8543)	
2nd piston ring			
Dimension B 	mm (in)	1.970–1.990 (0.0776–0.0783)	
Dimension T	mm (in)	2.900–3.100 (0.1142–0.1220)	
End gap	mm (in)	0.20–0.35 (0.0079–0.0138)	
Side clearance	mm (in)	0.03–0.07 (0.0012–0.0028)	
Oversize outside diameter			
1st	mm (in)	72.25 (2.8445)	
2nd	mm (in)	72.50 (2.8543)	
Connecting rod			
Small-end inside diameter	mm (in)	23.904–23.917 (0.9411–0.9416)	
Big-end inside diameter	mm (in)	32.000–32.016 (1.2598–1.2605)	
Connecting rod big-end side clearance	mm (in)	0.200–0.700 (0.0079–0.0276)	
Small-end axial play limit	mm (in)	2.0 (0.08)	
Crankshaft			
Crankshaft width A	mm (in)	56.90–56.95 (2.2401–2.2421)	
Crankshaft width B	mm (in)	153.70–154.00 (6.05–6.06)	
Crankshaft width C	mm (in)	39.9–40.1 (1.5709–1.5787)	
Crankpin diameter	mm (in)	23.995–24.000 (0.9447–0.9449)	
Runout limit	mm (in)	0.03 (0.0012)	
			
Thermostat			
Opening temperature	°C (°F)	48–52 (118.4–125.6)	
Fully open temperature	°C (°F)	60 (140)	
Valve open lower limit	mm (in)	3.0 (0.12)	
Reed valve			
Valve bending limit A	mm (in)	0.2 (0.0079)	
Valve stopper height B	mm (in)	4.75–5.75 (0.1870–0.2264)	
			

Item		Unit	Model	
			30HW	30HWC
Carburetor				
ID mark			69S00	
Main jet	(M.J.)	#	130	
Main air jet	(M.A.J.)	mm (in)	1.0 (0.0394)	
Main nozzle	(M.N.)	mm (in)	4.0 (0.16)	
Pilot jet	(P.J.)	#	68	
Slow air jet	(S.A.J.)	mm (in)	0.8 (0.0315)	
Pilot screw	(P.S.)	turns out	1/2–2	
Valve seat size		mm (in)	1.2 (0.05)	
Float height		mm (in)	14.5–15.5 (0.57–0.61)	

Lower unit (30HW, 30HWC models)

Item	Unit	Model	
		30HW	30HWC
Gear backlash			
Pinion-to-forward gear	mm (in)	0.31–0.72 (0.0122–0.0283)	
Pinion-to-reverse gear	mm (in)	0.93–1.65 (0.0366–0.0650)	
Pinion gear shims	mm	0.7, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6	
Forward gear shims	mm	1.0, 1.1, 1.2, 1.3, 1.4	
Reverse gear shims	mm	1.0, 1.1, 1.2, 1.3	

Electrical (30HW, 30HWC models)

Item	Unit	Model	
		30HW	30HWC
Ignition and ignition control system			
Spark plug gap	mm (in)	0.9–1.0 (0.035–0.039)	
Spark plug cap resistance	kΩ	4.0–6.0	
Ignition timing (full retard)	Degree	TDC–ATDC 4	
Ignition timing (full advanced)	Degree	BTDC 23–27	
Ignition coil resistance			
Primary coil (B/W–B) at 20°C (68°F)	Ω	0.18–0.24	
Secondary coil (B/W–spark plug wire) at 20°C (68°F)	kΩ	2.72–3.68	

Coil resistance and peak voltage are reference data.
Measuring conditions:
Ambient temperature 20°C (68°F).

Item	Unit	Model	
		30HW	30HWC
CDI unit output peak voltage (#1:B/O–B, #2:B/W–B)			
at Cranking (loaded)	V	130	
at 1,500 r/min (loaded)	V	135	
at 3,500 r/min (loaded)	V	135	
Pulser coil output peak voltage (W/R–B, W/B–B)			
at Cranking (unloaded)	V	6.8	
at Cranking (loaded)	V	6.7	
at 1,500 r/min (loaded)	V	16.0	
at 3,500 r/min (loaded)	V	26.0	
Pulser coil resistance (W/R–B, W/B–B) at 20°C (68°F)	Ω	311–381	
Thermoswith			
ON temperature	°C (°F)	106–114 (222.8–237.2)	—
OFF temperature	°C (°F)	88–102 (190.4–215.6)	—
Charge coil output peak voltage (Br–L)			
at Cranking (unloaded)	V	146	
at Cranking (loaded)	V	146	
at 1,500 r/min (loaded)	V	150	
at 3,500 r/min (loaded)	V	150	
Charge coil resistance (Br–L) at 20°C (68°F)	Ω	342–418	
Starter motor			
Type		Bendix	
Output	kW	0.6	
Brushes			
Standard length	mm (in)	12.5 (0.49)	
Wear limit	mm (in)	9.0 (0.35)	
Commutator			
Standard diameter	mm (in)	30.0 (1.18)	
Wear limit	mm (in)	29.0 (1.14)	
Standard undercut	mm (in)	0.8 (0.03)	
Wear limit	mm (in)	0.2 (0.01)	

Coil resistance and peak voltage are reference data.
Measuring conditions:
Ambient temperature 20°C (68°F).

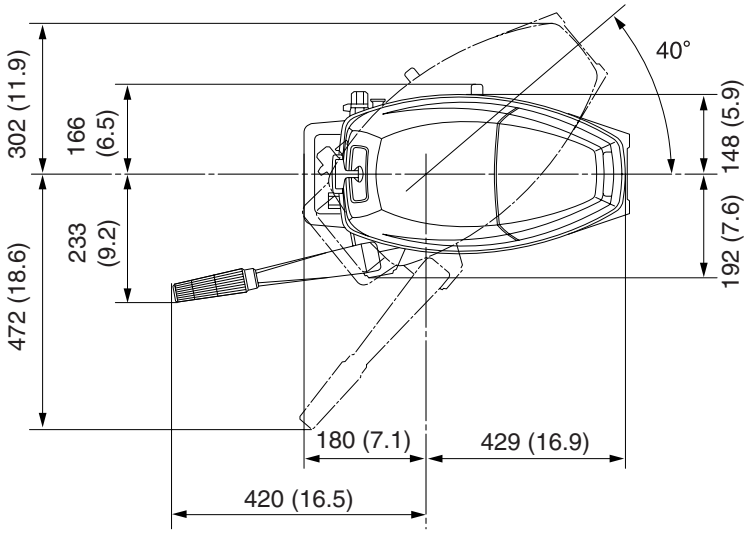
Item	Unit	Model	
		30HW	30HWC
Charging system			
Lighting coil output peak voltage (G–G)			
at Cranking (unloaded)	V	4.6	
at 1,500 r/min (unloaded)	V	15.0	
at 3,500 r/min (unloaded)	V	30.0	
Lighting coil resistance (G–G) at 20°C (68°F)	Ω	0.31–0.37	
Rectifier output peak voltage (R–B)			
at 1,500 r/min (unloaded)	V	13	
at 3,500 r/min (unloaded)	V	13	

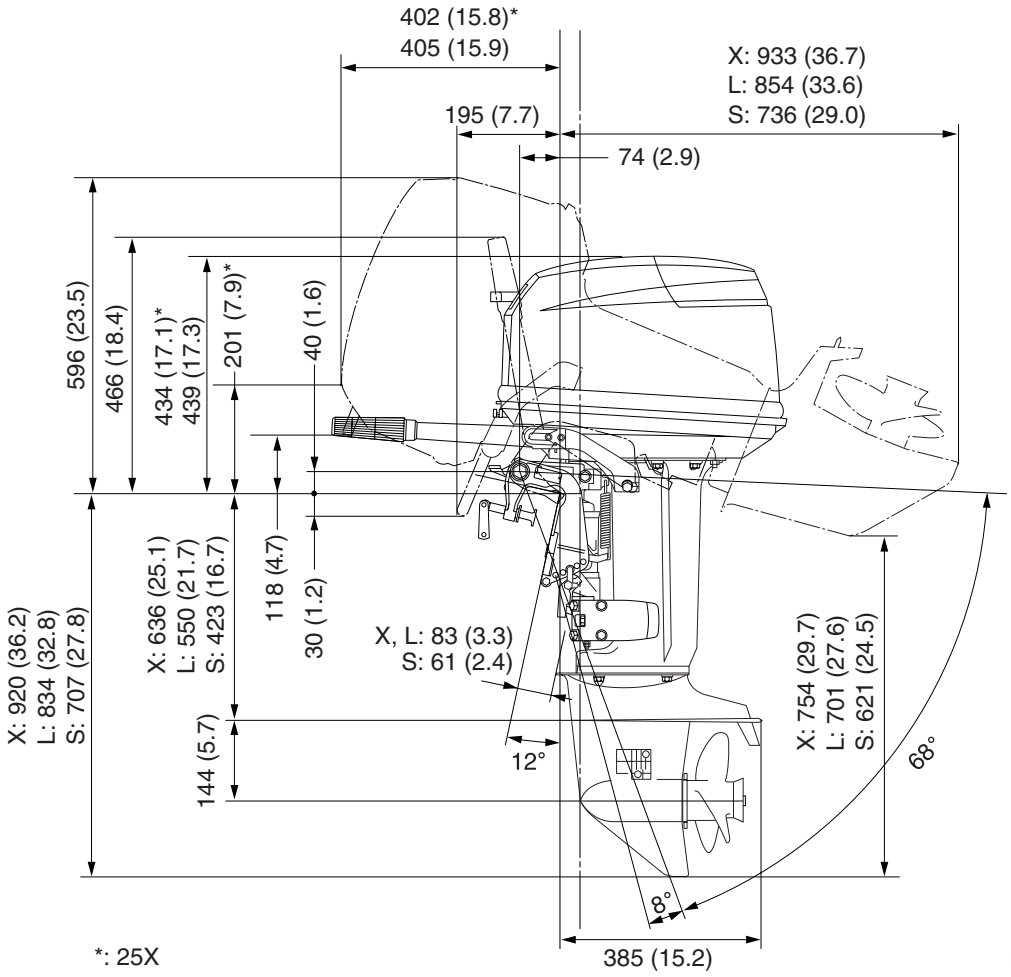
Coil resistance and peak voltage are reference data.
Measuring conditions:
Ambient temperature 20°C (68°F).

Dimension

Exterior E25BMH, 25XMH, 25BMH, 25BWC, E30HMH, 30HMH, 30HWH, 30HWC

mm (in)





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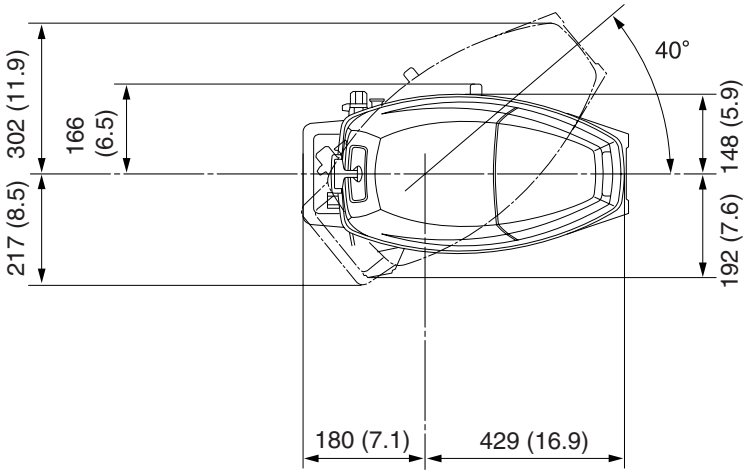
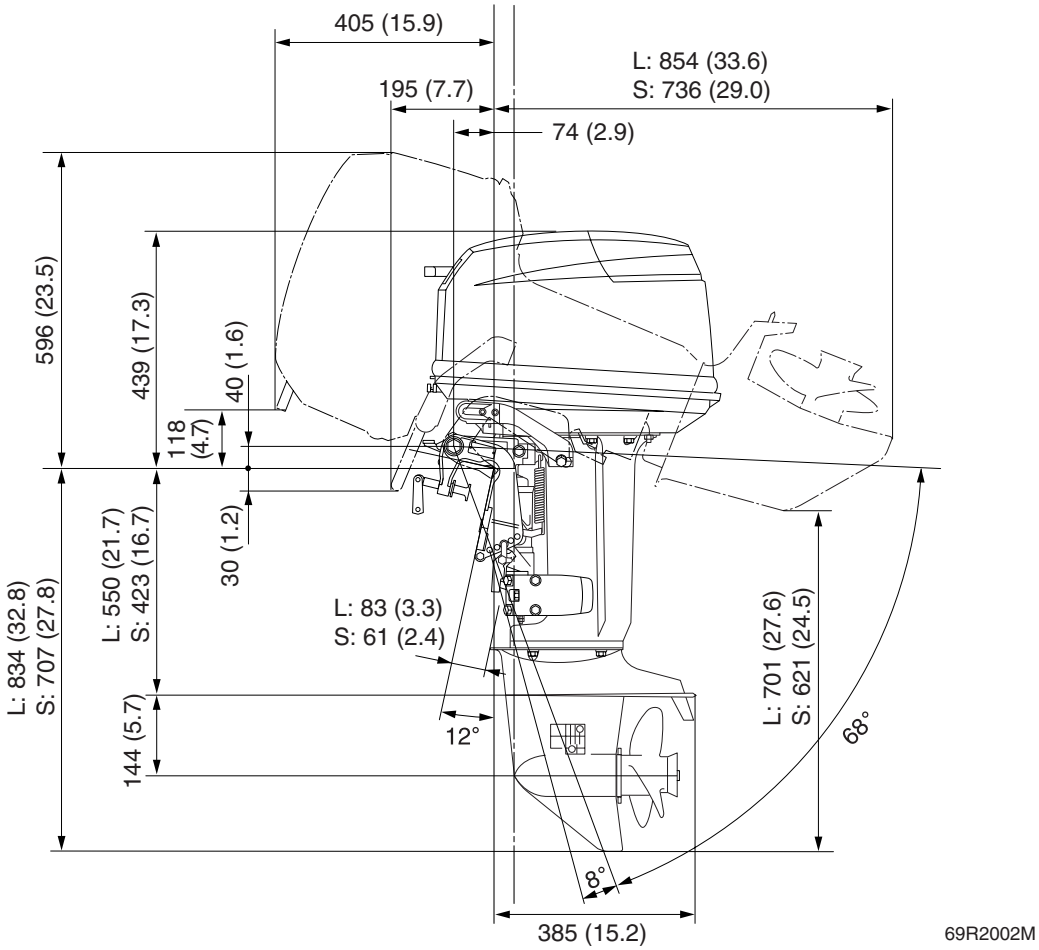
Exterior 25BW, 30HW

mm (in)

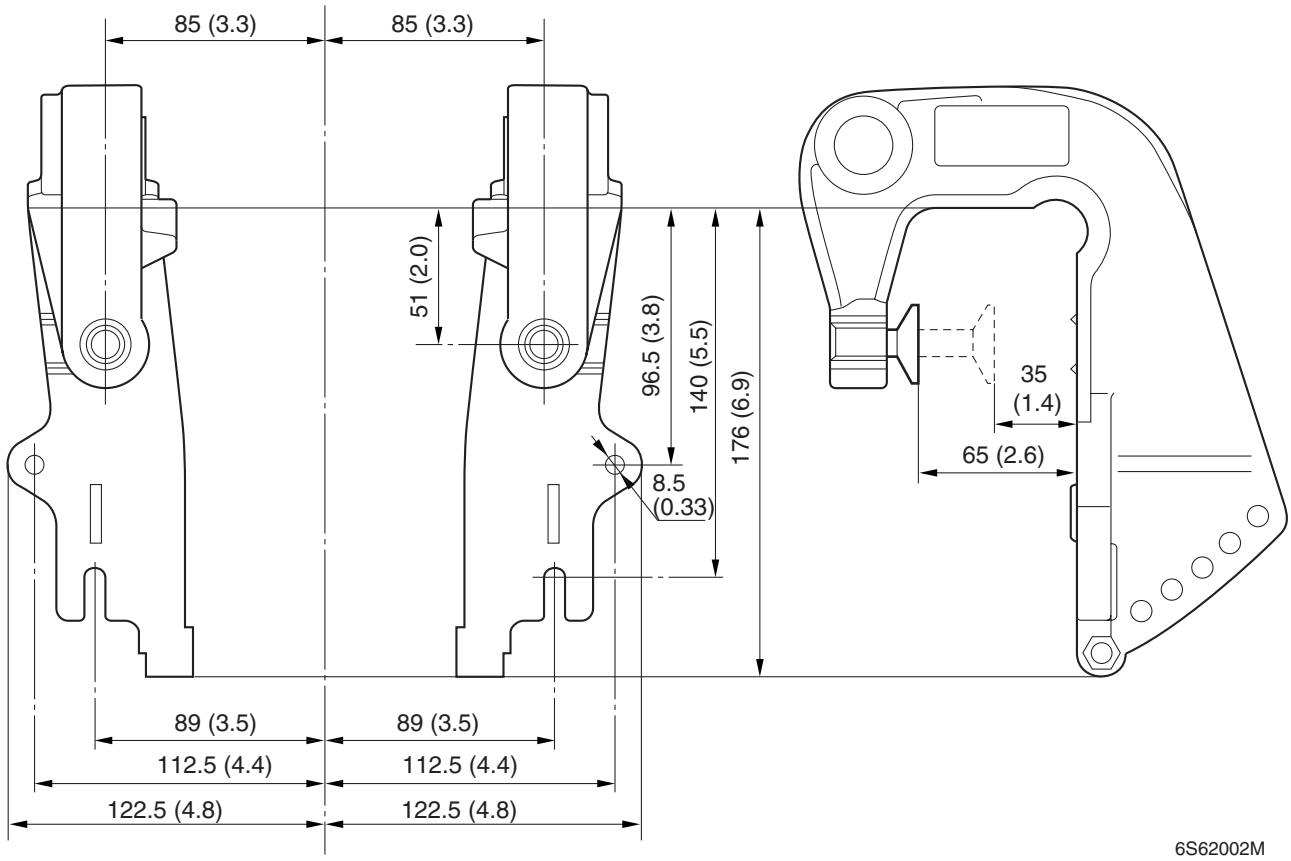




69R2002M

Clamp bracket

mm (in)



Tightening torque

Specified torque

Part to be tightened		Thread size	Tightening torques		
			N·m	kgf·m	ft·lb
Fuel system					
Cover screw		—	1.5	0.15	1.1
Main jet		—	2	0.2	1.5
Pilot jet		—	1.2	0.12	0.9
Float pin screw		—	2	0.2	1.5
Float chamber screw		—	2	0.2	1.5
Drain screw		—	1.5	0.15	1.1
Power unit					
Start-in-gear protection cable cap		—	4	0.4	3.0
Manual starter nut		—	10	1.0	7.2
Drive plate bolt		M8	15	1.5	11.1
Manual starter mount bolt		M6	12	1.2	8.9
Power unit mount bolt		M8	22	2.2	16.2
Flywheel magnet nut		—	140	14	103
Reed valve stopper nut		—	4.5	0.45	3.3
Cylinder head bolt	1st	M8	15	1.5	11.1
	2nd		27	2.7	19.9
Exhaust outer cover bolt	1st	M6	4	0.4	3.0
	2nd		8	0.8	5.8
Crankcase bolt	1st	M8	15	1.5	11.1
	2nd		27	2.7	19.9
Spark plug		M14	25	2.5	18
Lower unit					
Check screw		—	9	0.9	6.6
Drain screw		—	9	0.9	6.6
Lower case mount bolt (nut)		M10	37	3.7	27.3
Cooling water inlet cover screw		M5	4	0.4	3.0
Propeller nut		—	35	3.5	25.3
Propeller housing bolt		M6	11	1.1	8.1
Pinion nut		—	50	5.0	36.9
Bracket unit					
Shift actuator mount bolt		M6	11	1.1	8.1
Shift actuator mount nut		—	17	1.7	12.5
Shift lever bolt		M6	11	1.1	8.1
Upper mount nut		—	17	1.7	12.5
Steering bracket bolt		M6	11	1.1	8.1
Throttle grip screw (WH, WC, MH)		—	3	0.3	2.2
Engine stop lanyard switch nut		—	3	0.3	2.2
Start button ring nut (WH, WC)		—	3	0.3	2.2
Self locking nut		—	45	4.5	33
Grease nipple		—	3	0.3	2.2

Part to be tightened	Thread size	Tightening torques		
		N·m	kgf·m	ft·lb
Electrical unit				
CDI unit	M6	4	0.4	3.0
Ignition coil	M6	8	0.8	5.8
Starter relay terminal nut (WH, W, WC)	—	4	0.4	3.0
Starter motor mount bolt (WH, W, WC)	M8	21	2.1	15.5
Positive battery cable nut (WH, W, WC)	—	4	0.4	3.0
Negative battery cable bolt (WH, W, WC)	M8	15	1.5	11.1

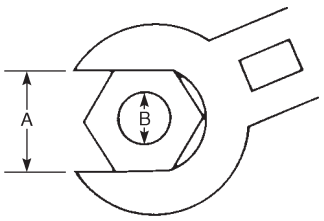
General torque

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.

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	26
17 mm	M12	43	4.3	31



— MEMO —

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Periodic check and adjustment

3

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	Actions	Initial		Every		Refer to page
		10 hours (1 month)	50 hours (3 months)	100 hours (6 months)	200 hours (1 year)	
Anode (s) (external)	Check / replace		○	○		3-16
Anode (s) (internal)	Check / replace				○	3-15
Battery	Check / charge	○				3-16
Cooling water passages	Clean		○	○		3-4
Cowling clamp	Check				○	3-2
Fuel filter (can be disassembled)	Check / clean	○	○	○		3-2
Fuel system	Check	○	○	○		3-2
Fuel tank (Yamaha portable tank)	Check / clean				○	—
Gear oil	Change	○		○		3-14
Lubrication points	Lubricate			○		3-17
Idle speed	Check / adjust	○		○		3-10
Propeller and cotter pin	Check / replace		○	○		3-15
Shift link / shift cable	Check / adjust				○	3-11
Thermostat	Check / replace				○	3-3
Throttle link / throttle cable / throttle pick-up timing	Check / adjust				○	3-4 3-5 3-7
Water pump	Check / replace				○	6-7
Spark plugs	Clean / adjust / replace	○	○	○		3-3

NOTE:

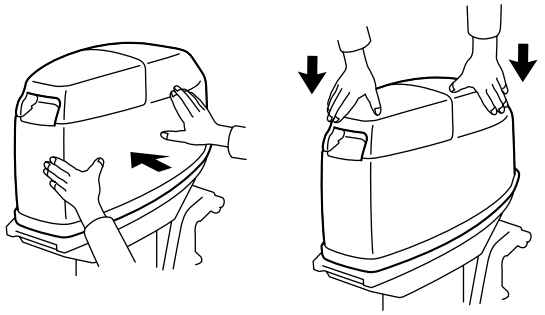
When operating in salt water, turbid or muddy water, the engine should be flushed with clean water after each use.

Top cowling

Checking the top cowling

1. Check the top cowling. Replace the top cowling if cracked or other damaged.

2. Check the fitting by pushing the top cowling with both hands. Adjust the fittings of the top cowling following the below procedures if improperly.



6S630370

3. Check the rubber trim. Replace the rubber trim if worn, deteriorated or damaged.

4. Check the lock lever, bushings and washers. Replace if worn or damaged.

5. Check the hooks and rivets. Replace the hooks and rivets if worn or damaged.

Fuel system

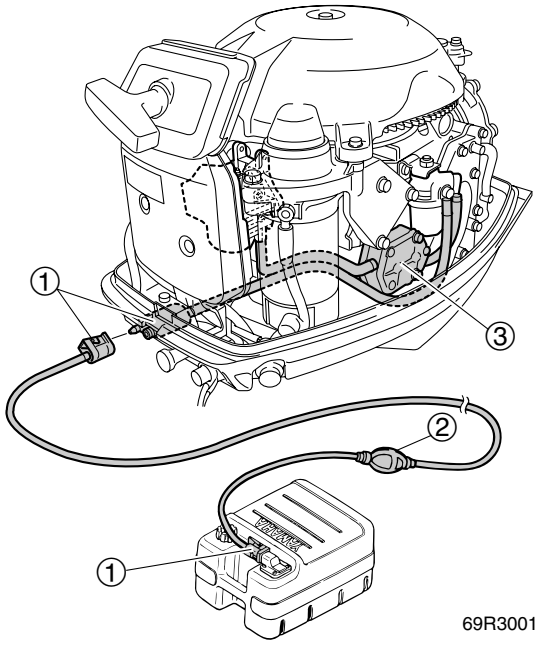
CAUTION:

Checking the fuel system procedures will allow some fuel to spill. Catch fuel in a rag. Wipe up any spilled fuel immediately.

Checking the fuel joint and fuel hose (fuel tank-to-carburetor)

1. Check the fuel hose, fuel joints ① and primer pump ②. Replace them if kinked, leaked or clogged.

2. Check the fuel pump ③. Replace the fuel pump gaskets if there are leaked.



69R30010

Checking the fuel filter

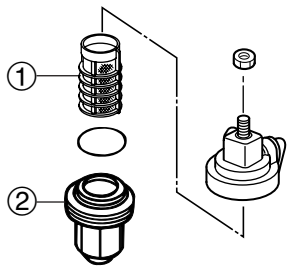
1. Remove the fuel filter cap assembly.

NOTE:

Be sure not to spill any fuel when removing the fuel cap assembly.

2. Check the fuel filter element ①. Replace if there is dirt or residue.

3. Check the fuel filter cap ②. Clean with the straight gasoline if there are foreign substance or replace if cracked.



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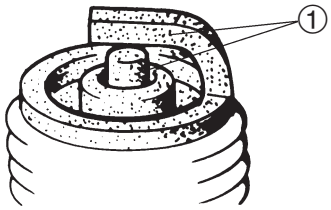
Power unit

Checking the spark plug

1. Disconnect the spark plug caps, and then remove the spark plugs.

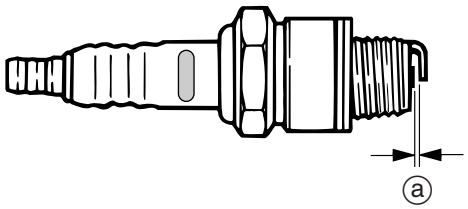
2. Clean the electrodes ① with a spark plug cleaner and wire brush.



6B430025

3. Check the electrodes ① and the gasket. Replace the spark plug for erosion, excessive carbon, other deposits or damage.

4. Check the spark plug gap ⓐ. Adjust if out of specification.



6B430030

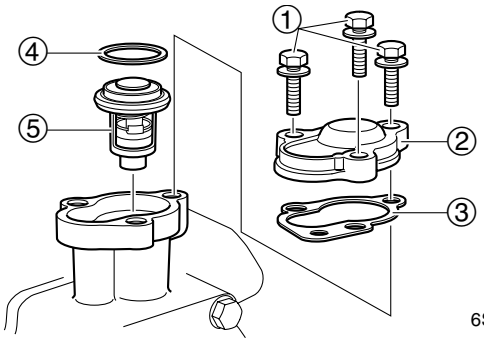
Specified spark plug:
E25B, 25B:
B7HS-10, BR7HS-10 (NGK)
25X, E30H, 30H:
B8HS-10, BR8HS-10 (NGK)
Spark plug gap ⓐ:
0.9–1.0 mm (0.035–0.039 in)

5. Install the spark plug temporary tight, and then tighten it to the specified torque with a spark plug wrench.

Spark plug:
25 N·m (2.5 kgf·m, 18 ft·lb)

Checking the thermostat

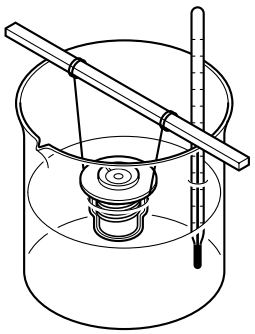
1. Remove the thermostat cover bolts ①, thermostat cover ②, gasket ③, washer ④ and thermostat ⑤.



6S630020

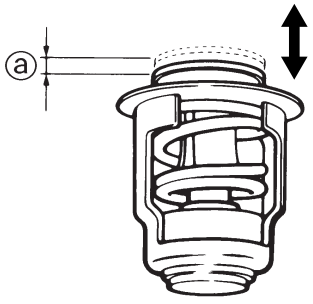
2. Suspend the thermostat ⑤ in a container with water.

3. Place a thermometer in the water and slowly heat the water.



6B430060

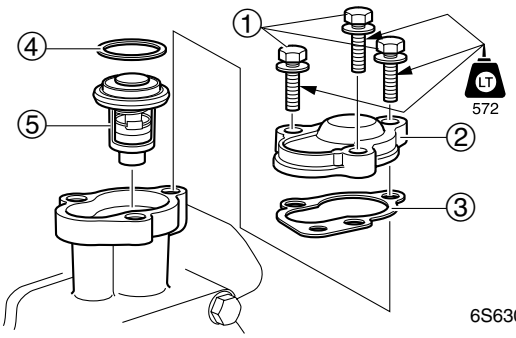
4. Check the thermostat valve opening at the specified water temperatures. Replace if out of specification.



6B430070

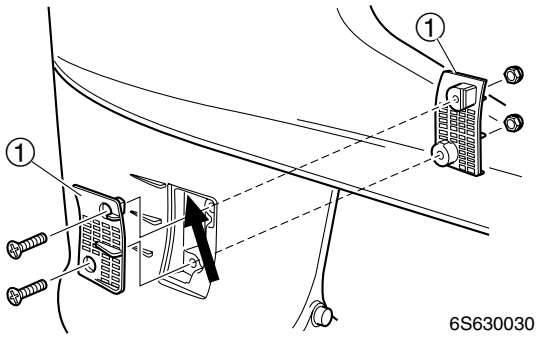
Water temperature	Valve lift ⓐ
48–52°C (118.4–125.6°F)	0.05 mm (0.002 in) (valve begins to lift)
above 60°C (140°F)	more than 3.0 mm (0.12 in)

5. Install the thermostat ⑤, washer ④, a new gasket ③ and thermostat cover ②, and then tighten the thermostat cover bolts ①.



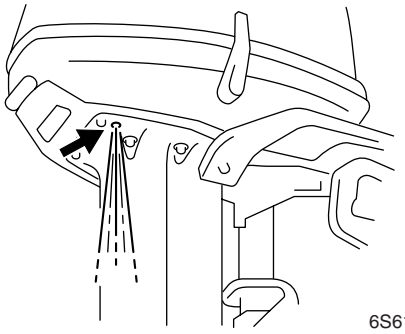
Checking the cooling water passage

1. Check the cooling water inlet covers ① and cooling water inlet. Clean the water inlet cover and cooling water inlet if clogged.



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

3. Check for a water flow from the cooling water pilot hole. Stop the engine. If there is no water flow, check the water pump and cooling water passage.



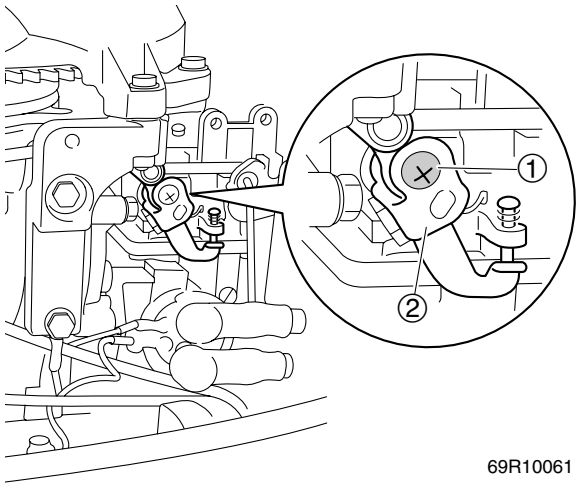
Control system

Adjusting the throttle cable (WH, WC, MH)

NOTE:

WC for remote control model, refer to page 3-5.

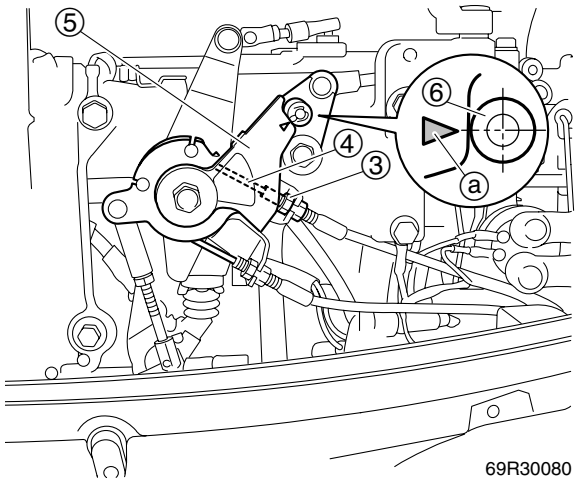
1. Loosen the screw ① on the carburetor throttel lever ②.



NOTE:

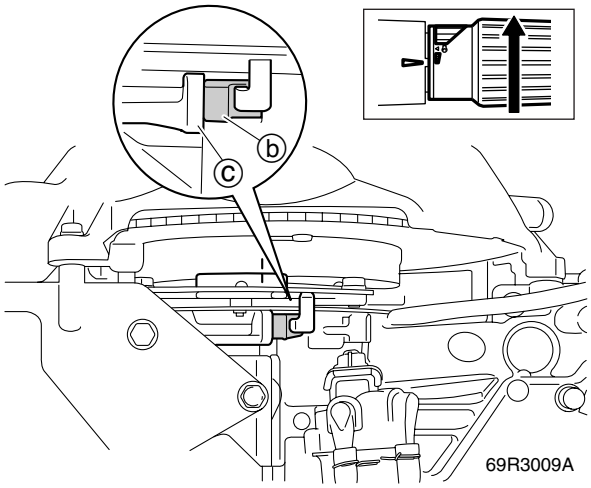
The screw ① is left hand thread.

2. Turn the throttle to fully-opened position, then loosen the locknut ③ and adjust the throttle cable ④ to align the full-open mark ⓐ on the throttle cam ⑤ with the center of cam roller ⑥.

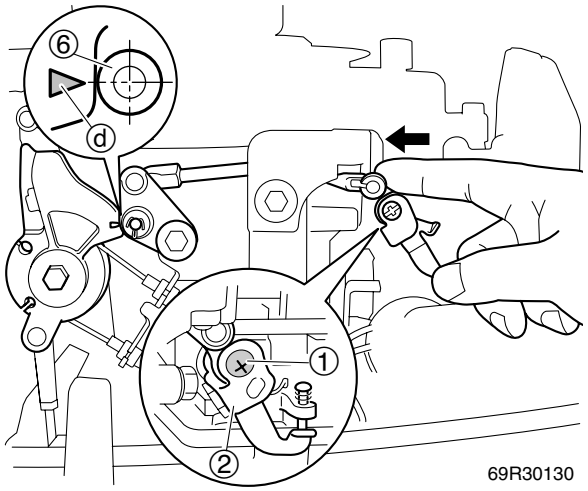


3. Check the throttle cable ④ tensioned completely, and then tighten the locknut ③.

4. Turn the throttle to fully-closed position, and then check that the stopper ⓑ comes in contact with the stopper ⓒ (full retard) of the crankcase.



5. While pushing the carburetor throttle lever ② with finger, tighten the screw ① so that the full-close mark ⓓ is aligned with the center of cam roller ⑥.

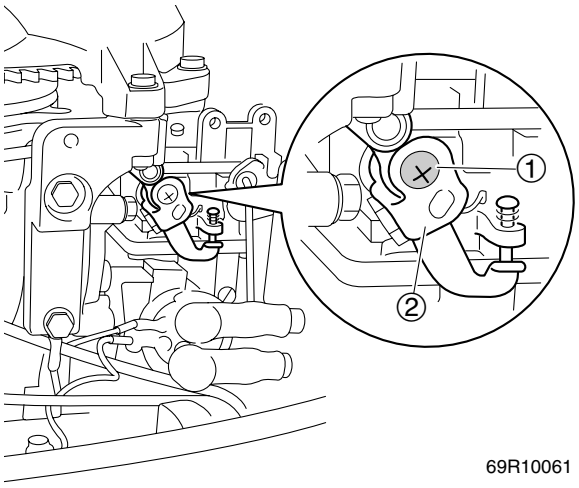


NOTE:
The screw ① is left hand thread.

6. Lastly turn the throttle to fully-closed position and to fully-opened position to check the throttle cable operation.

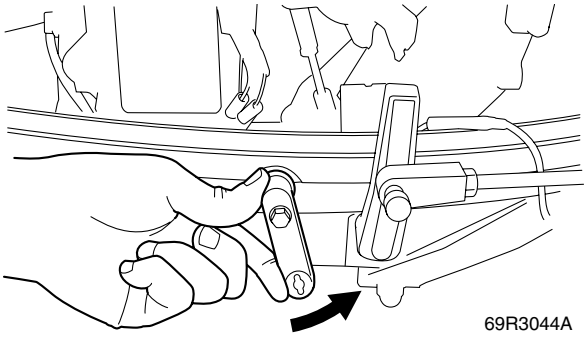
Adjusting the throttle cable (W, WC)

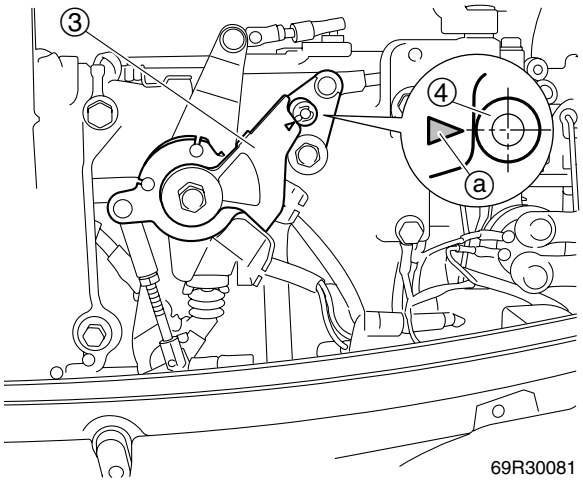
1. Disconnect the throttle cable.
2. Loosen the screw ① on the carburetor throttle lever ②.



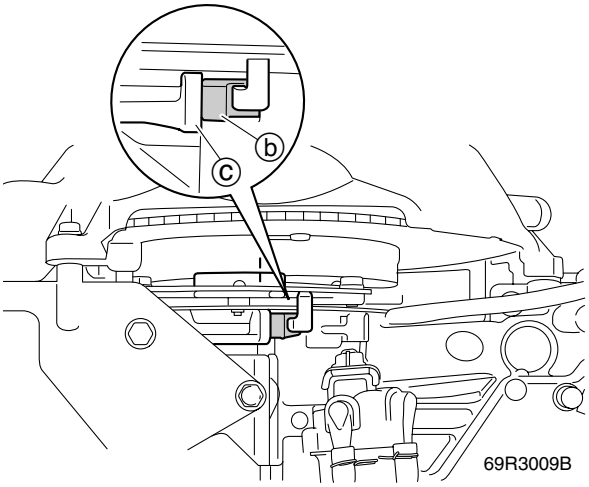
NOTE:
The screw ① is left hand thread.

3. Turn the throttle to fully-opened position, then check that the full-open mark ⓐ on the throttle cam ③ aligned with the center of cam roller ④.





4. Turn the throttle to fully-closed position and then check that the stopper ⓑ comes in contact with the stopper ⓒ (full retard) of crankcase.



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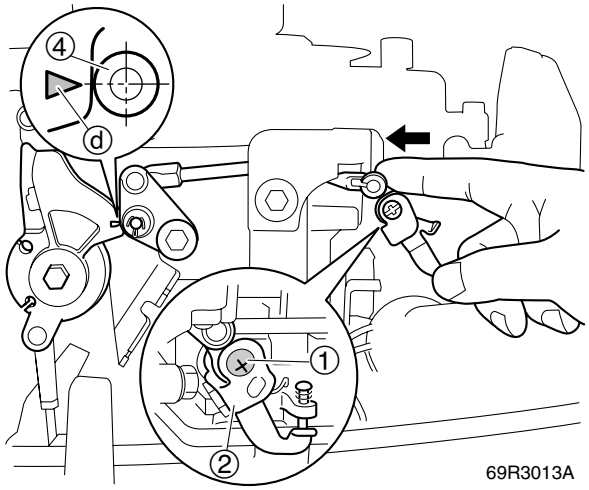
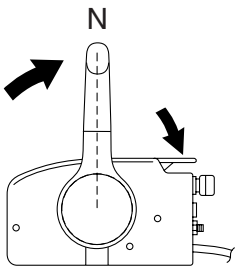
5. While pushing the carburetor throttle lever ② with finger, tighten the screw ① so that the full-close mark ⓓ is aligned with the center of cam roller ④.



69R3013A

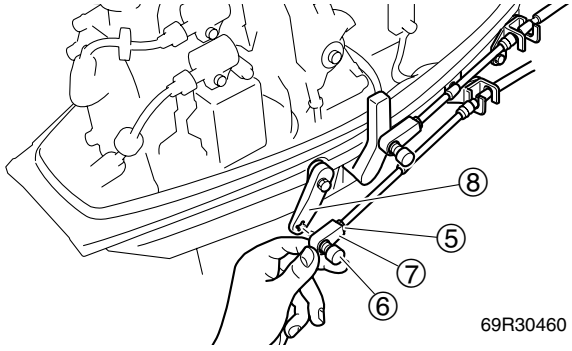
NOTE:
The screw ① is left hand thread.

6. Set the remote control lever to the fully-closed position.



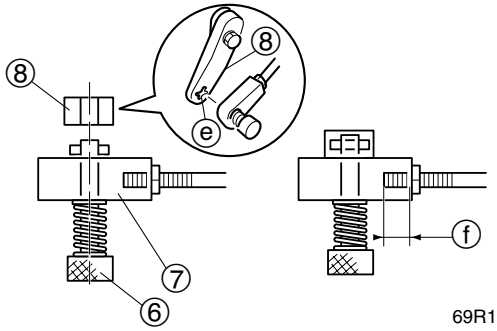
69R30450

7. Loosen the locknut ⑤, turn the pin ⑥, and then remove the throttle cable joint ⑦.



69R30460

8. Adjust the position of the throttle cable joint ⑦ until its pin ⑥ is aligned with the hole ⓔ on throttle lever ⑧.

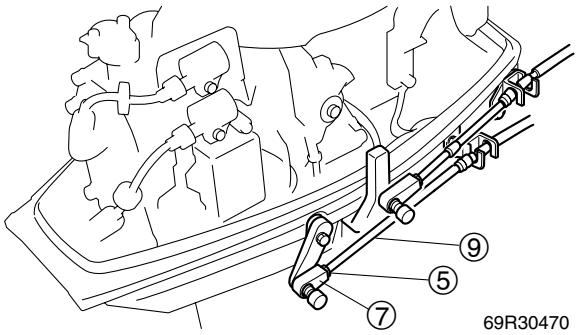


69R10065

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

NOTE:
Pull the cable toward the engine to remove any free play in the cable before adjusting the position of the cable joint.

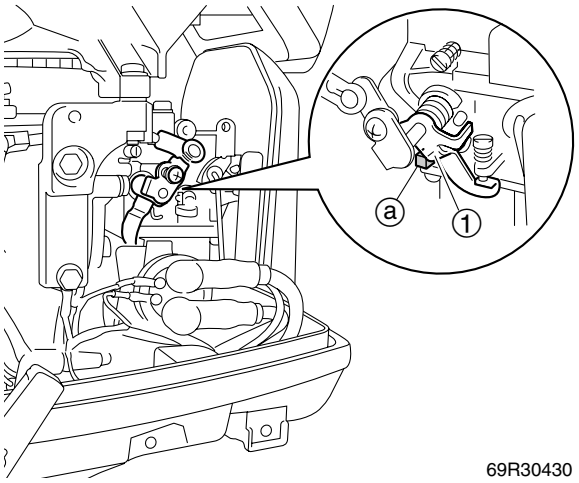
9. Connect the throttle cable joint ⑦, tighten the locknut ⑤, and then install the throttle cable ⑨.



10. Lastly turn the throttle to fully-closed position and to fully-opened position to check the throttle cable operation.

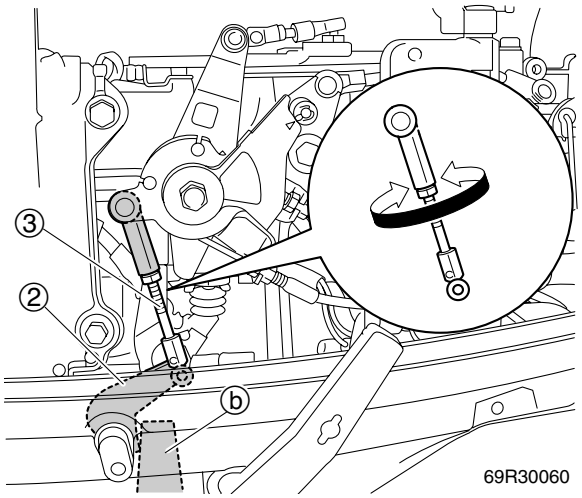
Adjusting the throttle control lever link

1. Turn the throttle to fully-opened position until the carburetor throttle lever ① stops at the full open stopper ⓐ.



2. Check that the throttle control lever ② comes in contact with the stopper ⓑ on the bottom cowling.

3. If it is not contact, remove the throttle control lever link ③, then loosen the lock nut and adjust the throttle control link lever.



Checking the ignition timing

NOTE:

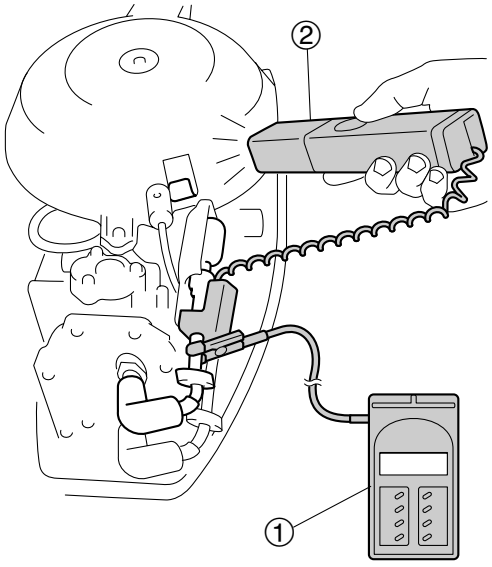
Install the test propeller, when checking the ignition timing.

Test propeller : 90890-01629

1. Place the lower unit in water, and then start the engine and warm it 5 minutes.

2. Turn off the engine when warmed it up completely.

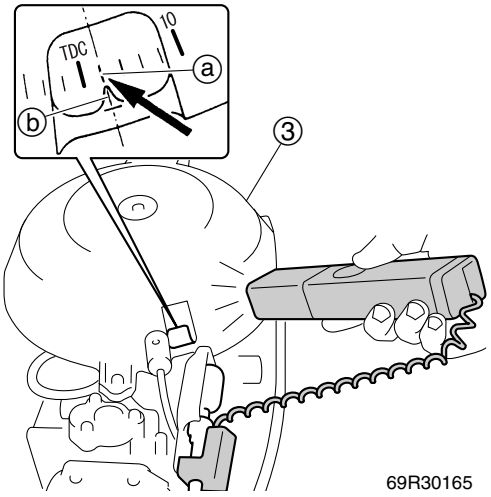
3. Attach the special service tool ① and ② to the spark plug wire #1, and then start the engine. Check the engine idle speed and ignition timing.



Digital tachometer ①: 90890-06760
Timing light ②: 90890-03141

Engine idle speed:
1,050–1,150 r/min

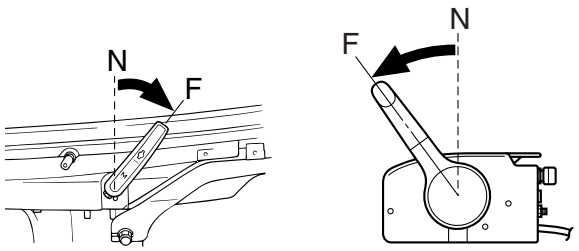
4. Check that the specified position ⓐ on the flywheel magnet is aligned with the pointer ⓑ on the manual starter case ③, when the engine is idle speed.



69R30165

Specified position:
TDC–ATDC 4°

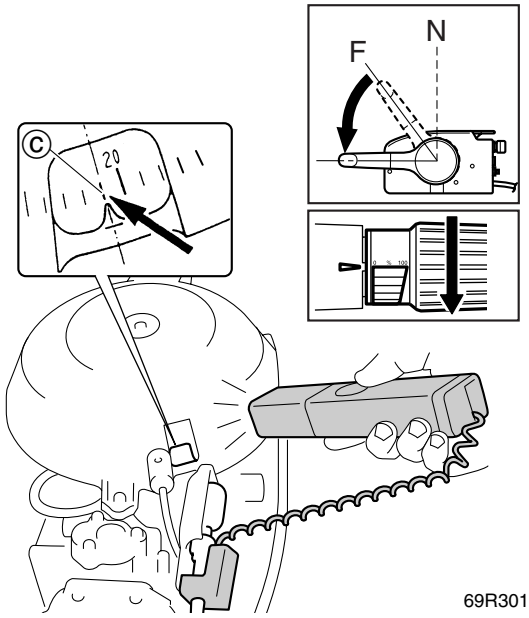
5. Set the gear shift to “F” position.



69R3031A

6. Check that the specified position ⓒ on the flywheel magnet is advances to specified position, when the throttle is fully-opened position.

NOTE:
To adjust the ignition timing, refer to page 3-9.



69R30175

Specified position ⓒ:
E25B, 25B:
BTDC 20–24°
25X, E30H, 30H:
BTDC 23–27°

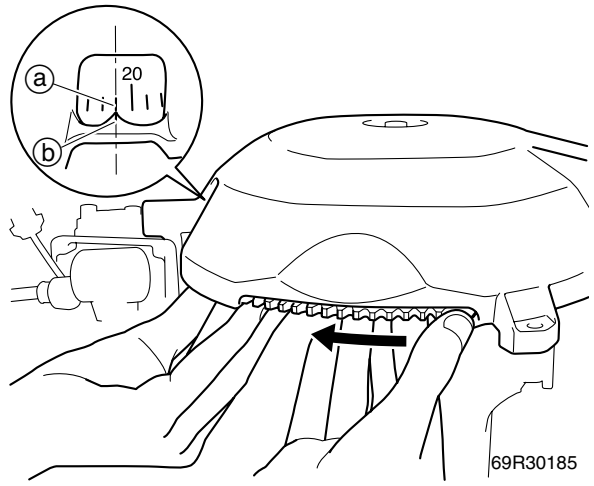
7. Stop the engine, and then remove the special service tools.

Adjusting the ignition timing

NOTE:

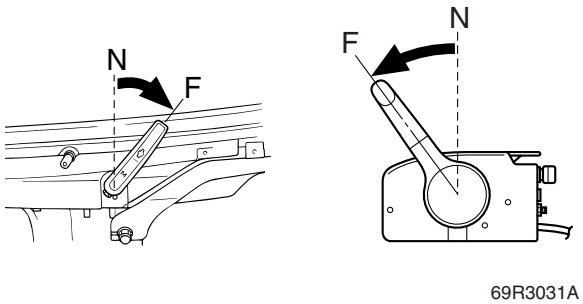
Remove the all spark plugs and the engine stop lanyard switch lock plate before adjusting the ignition timing.

1. Slowly turn the flywheel magnet clockwise to align the specified position ⓐ with the pointer ⓑ on the manual starter case.

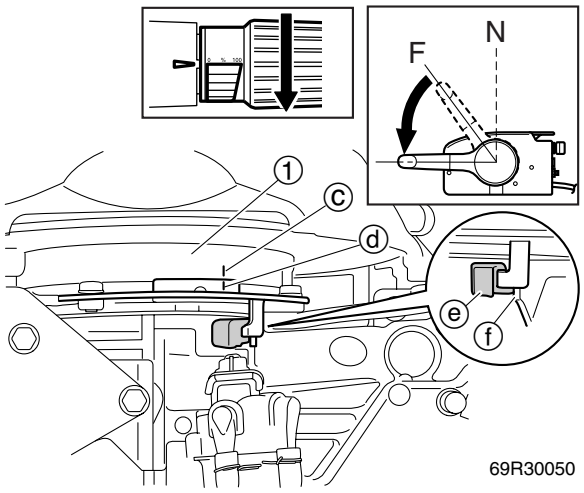


Specified position ⓐ: (full advanced)
E25B, 25B:
BTDC 22°
25X, E30H, 30H:
BTDC 25°

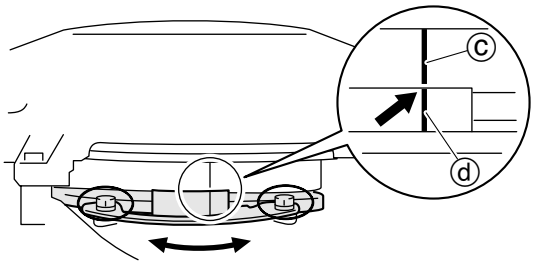
2. Set the gear shift to “F” position.



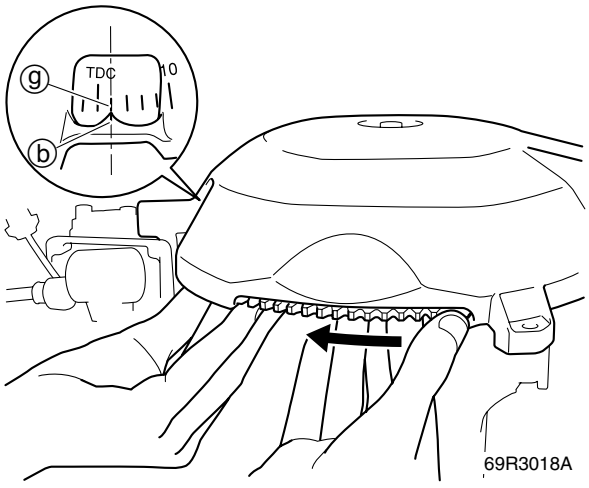
3. Align the line ⓒ on the flywheel magnet ① with the mark ⓓ on the magnet base, and then check that the stopper ⓔ on the magnet base comes in contact with the stopper ⓕ (full advanced) on the crankcase.



4. If it is not aligned, loosen the bolts on the magnet base and adjust the position until the line ⓒ aligns with the mark ⓓ, and then tighten the bolts.



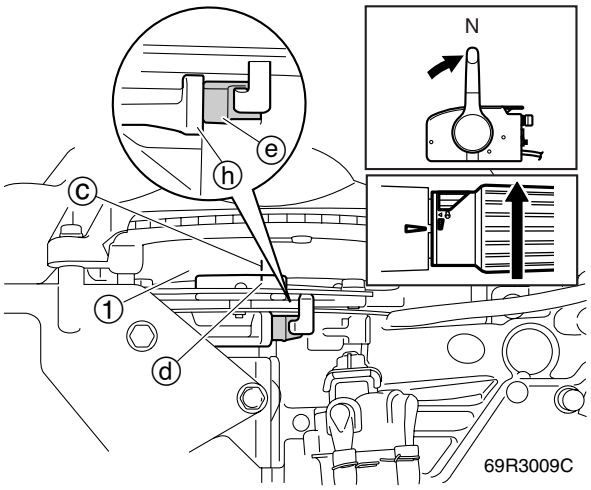
5. Slowly turn the flywheel magnet clockwise to align the specified position ⓖ with the pointer ⓑ on the manual starter case.



Specified position ⓖ:
ATDC 2°

6. Turn the throttle to fully-closed position.

7. Align the line ⓒ on the flywheel magnet ① with the mark ⓓ on the magnet base, and then check that the stopper ⓔ on the magnet base comes in contact with the stopper ⓗ (full retard) on the crankcase.



8. Set the gear shift to "N" position, then install the spark plugs and spark plug caps.

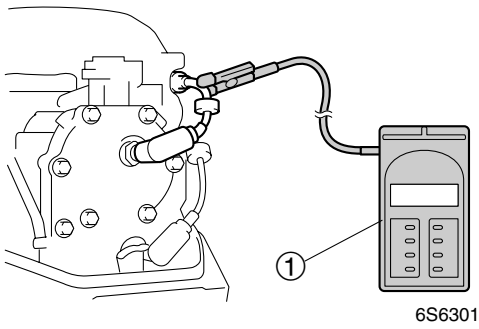
9. Lastly turn the throttle to fully-closed position and to fully-opened position to check the throttle cable operation.

Checking the engine idle speed

1. Start the engine and warm it up for 5 minutes, and then stop the engine.

2. Attach the special service tool ① to spark plug wire #1, and then start the engine.

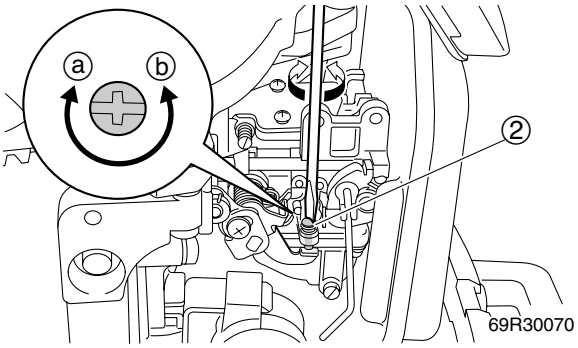
3. Check the engine idle speed. Adjust the engine idle speed if out of specification.



Digital tachometer ①: 90890-06760

Engine idle speed:
1,050–1,150 r/min

4. Turn the throttle stop screw ② in direction ⓐ or ⓑ until the specified engine idle speed is obtained.



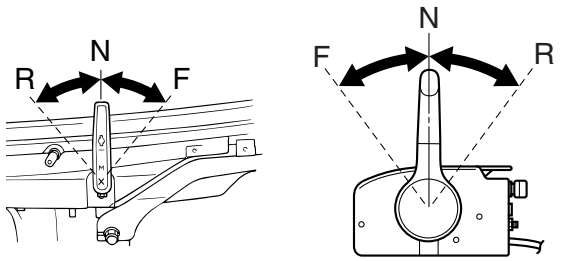
NOTE:
- To increase the idle speed, turn the throttle stop screw in direction ⓐ.
- To decrease the idle speed, turn the throttle stop screw in direction ⓑ.

5. If the specified engine idle speed can not be obtained, adjust the pilot screw or adjust the length of the throttle cable.

NOTE:
- To adjust the pilot screw, refer to page 4-12.
- To adjust the throttle cable, refer to page 3-4 (WH, WC, MH) or 3-5 (W).

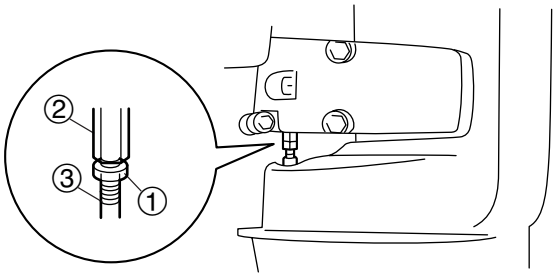
Checking the gear shift operation

1. Check that the gear shift operates smoothly when shifting from “N” to “F” or “R”. Adjust the shift rod if necessary by turning the adjuster of the shift rod.



6S630120

2. Set the gear shift to “R” position, then loosen the locknut ① and turn the adjuster ② to adjust the shift rod ③. Check the lower unit if it can not be adjusted.



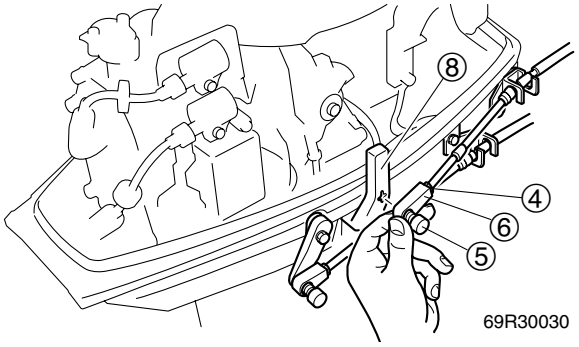
69R30530

3. Tighten the locknut ①, after adjusting.

NOTE:

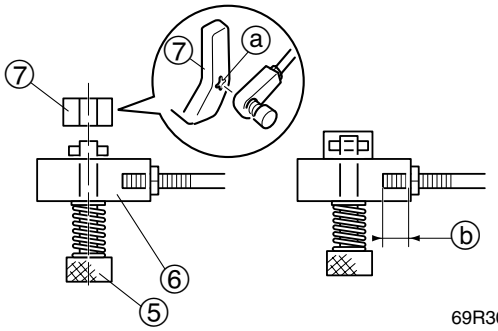
- After adjusting the shift rod, operate the shift lever “F” to “N” to “R” position 5–6 times and check the smooth operation.
- Be sure to set the gear shift to “N” position, after adjusting the shift rod.

4. Loosen the locknut ④, turn the pin ⑤ and then remove the shift cable joint ⑥.



69R30030

5. Adjust the position of the shift cable joint ⑥ until its pin ⑤ is aligned with the hole ⓐ on the shift lever ⑦.



69R30550

⚠WARNING

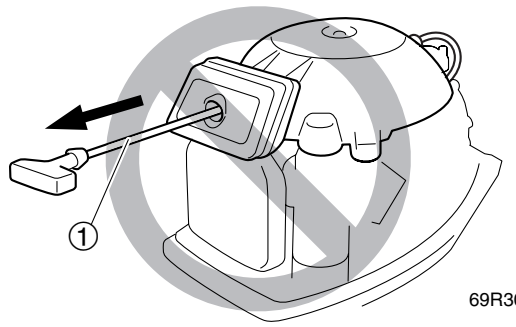
The shift cable joint must be screwed in a minimum of 8.0 mm (0.31 in) ⓑ.

NOTE:

Pull the cable toward the engine to remove any free play in the cable before adjusting the position of the cable joint.

Checking the start-in-gear protection

1. Set the gear shift to “F” or “R” position, and then check that the manual starter rope ① can not be pulled out.

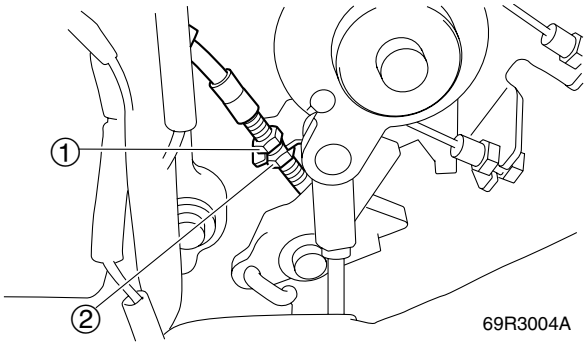


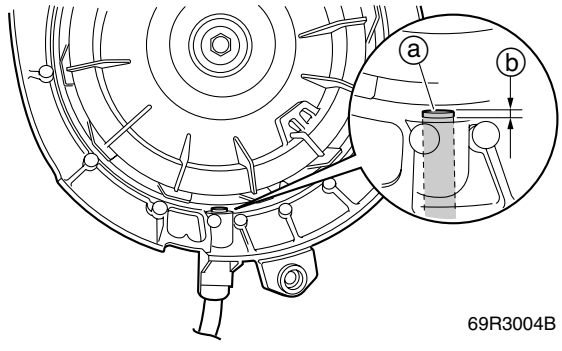
2. Set the gear shift to “N” position.

Adjusting the start-in-gear protection

1. Set the gear shift to “N” position, and then remove the manual starter case.

2. Loosen the locknut ①, and then adjust the start-in-gear protection adjusting nut ② until the top of the plunger ⓐ put out the specified length ⓑ.





Specified length ⓑ:
1 mm (0.04 in)

3. Tighten the locknut ①, after adjusting.

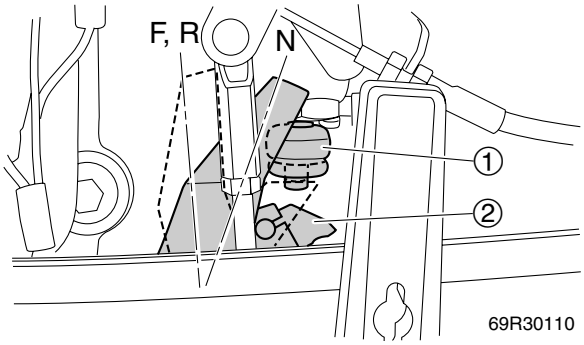
4. Install the manual starter case, then set the gear sift to “F” or “R” position and check that the manual starter rope can not be pulled out.

Checking the neutral switch operation (WH, WC)

⚠WARNING

Remove the all spark plug caps from all cylinder, while checking the neutral switch.

1. Check that the neutral switch ① is pushing by the lever ②, when the gear shift is in the “F” or “R” position.



2. Check that the starter motor can not operate, when the engine start switch pushed in.

NOTE:

To check the neutral switch continuity, refer to page 8-13.

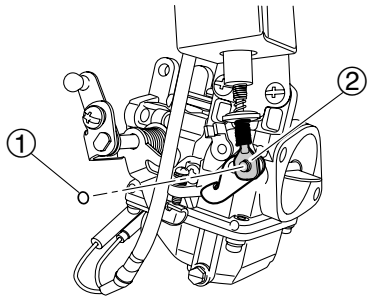
Checking the choke solenoid operation (W)

1. Remove the choke link rod and throttle control rod from carburetor.

2. Remove the intake silencer.

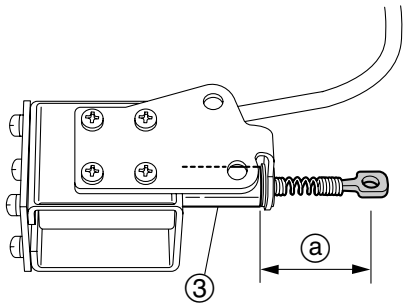
3. Remove the choke solenoid with carburetor assembly.

4. Remove the O-ring ① from the choke lever, and then remove the plunger end ②.



69R30170

5. Check the length ⓐ of the choke solenoid plunger ③.



69R30180

Standard length ⓐ:
31.2 mm (12.28 in)

6. Check the choke solenoid continuity.

NOTE:
To check the choke solenoid continuity, refer to page 8-13.

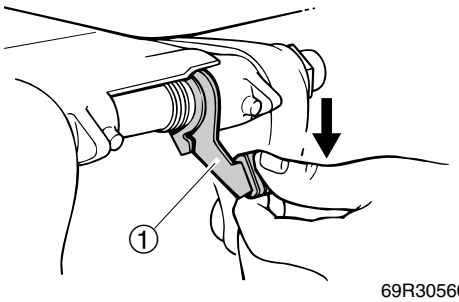
7. Install the choke solenoid, and then check the choke solenoid operation.

NOTE:
To check the choke solenoid operation, refer to page 1-16.

Bracket

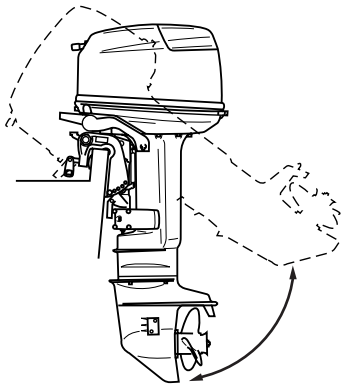
Checking the tilt operation

1. Set the tilt lock lever ① to release position.

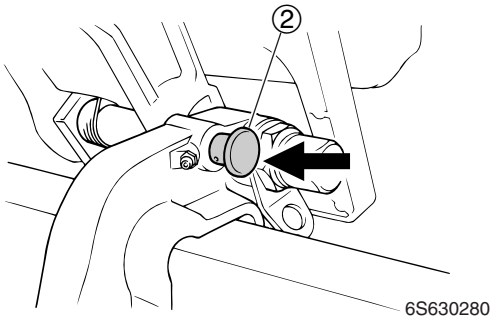


69R30560

2. Fully tilt the outboard motor up and down 2-3 times and check the entire tilt range for smooth operation.


6S630270

3. Fully tilt the outboard motor up, and then support it with the tilt support knob ② to check the tilt support knob of the bracket.



6S630280

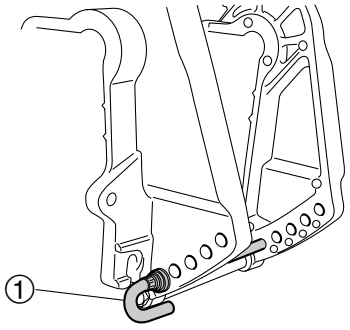
4. Release the tilt support knob to fully tilt the outboard motor down, and then check that the tilt lock lever return automatically.

5. Check that the outboard motor can not tilt up when the gear shift all position.

69R3J11

Checking the tilt pin

1. Check the tilt pin ①. Replace the tilt pin if corroded, worn or bent.



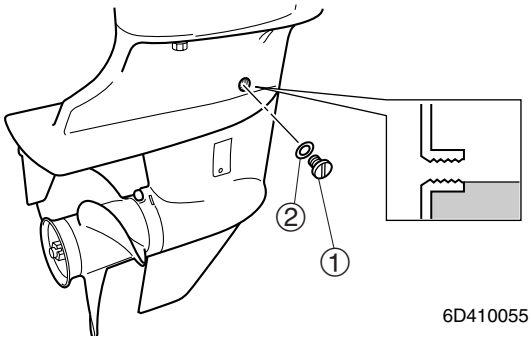
2. Check the standard of the tilt pin ① position. Adjust the standard position by trimming of the boat if necessary.

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.



NOTE:

If the fluid is at the correct level, the fluid should overflow out of the filler hole when the check screw is removed.

3. If necessary, add sufficient gear oil of the recommended type until it overflows out of the check hole.

Recommended gear oil:
Hypoid gear oil
API: GL-4
SAE: 90

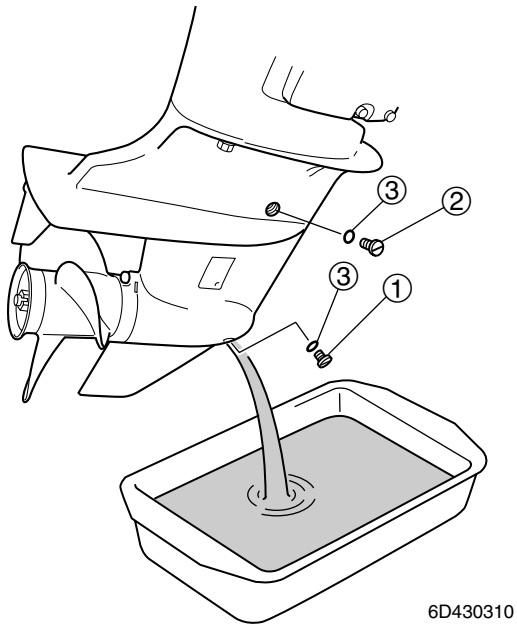
4. Install the new gasket ②, check screw ①, and then tighten it to the specified torque.

Check screw ①:
9 N·m (0.9 kgf·m, 6.6 ft·lb)

Changing the gear oil

1. Tilt the outboard motor so that the gear oil drain hole is at the lowest point possible.

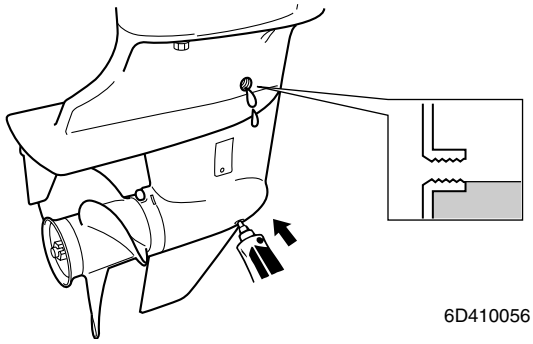
2. Place a drain pan under the drain hole, remove the drain screw ①, and then remove the check screw ② and let the oil drain completely.



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

4. Fully tilt the outboard motor down.

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


6D410056

Recommended gear oil:
Hypoid gear oil
API: GL-4
SAE: 90
Oil quantity:
320 cm³
(10.82 US oz, 11.29 Imp oz)

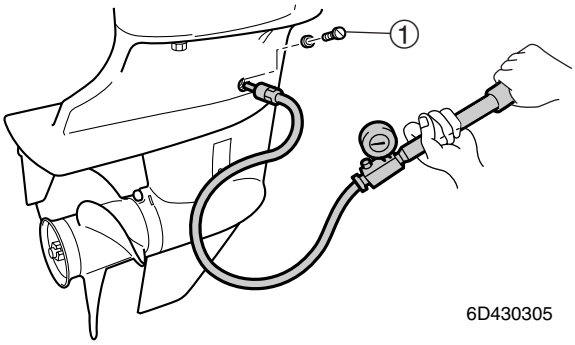
6. Install the new gaskets ③, check screw ②, drain screw ① quickly, and then tighten them to the specified torque.

Check screw ② and drain screw ①:
9 N·m (0.9 kgf·m, 6.6 ft·lb)

Checking the lower unit for air leakage

CAUTION:
Do not over pressurize the lower unit, otherwise the oil seals may be damaged.

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



6D430305

Leakage tester: 90890-06840

2. Apply the specified pressure to check that the pressure is maintained in the lower unit for at least 10 seconds.

NOTE:
Cover the check hole with a rag when removing the special service tool from the lower unit.

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

3. If the pressure is not mainteined, check the drive shaft, propeller shaft, oil seals, O-rings of propeller shaft housing, shift rod oil seal, and gasket of drain screw. Replace if damaged.

Check screw ①:
9 N·m (0.9 kgf·m, 6.6 ft·lb)

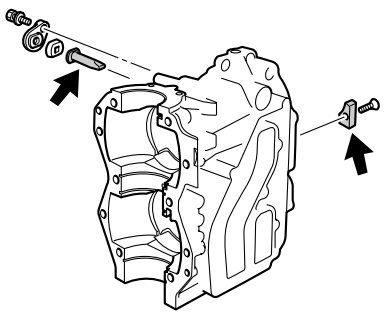
Checking the propeller

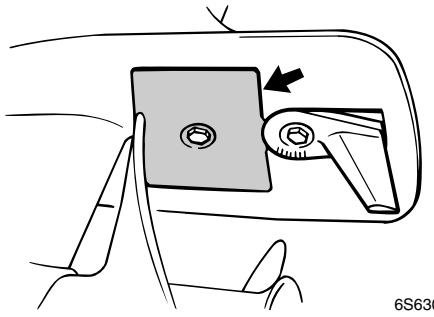
1. Check the propeller blades. Replace if cracked. Check the splines. Replace if damaged or worn.

General

Checking the anode

1. Check the anodes. Clean if there are scales, grease, or oil.


6S650330


6S630300

CAUTION:

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

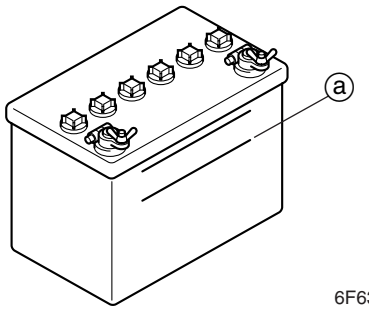
NOTE:

If it is necessary to disassemble the outboard motor to check an anode, refer to chapter 5 or 6.

2. Replace the anodes if excessively eroded.

Checking the battery (WH, W, WC)

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



6F630240

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

⚠WARNING

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

- **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.**
- **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 battery cable first, then the positive battery cable.

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

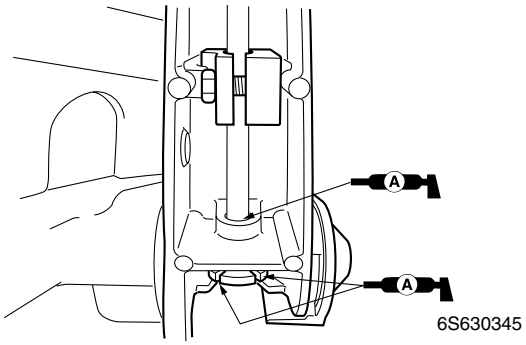
3

Lubricating the outboard motor

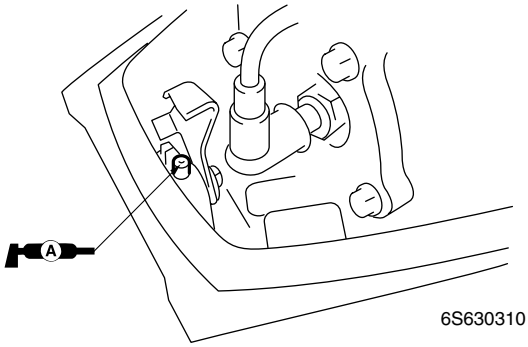
1. Apply Yamaha grease A to the areas shown.

NOTE:

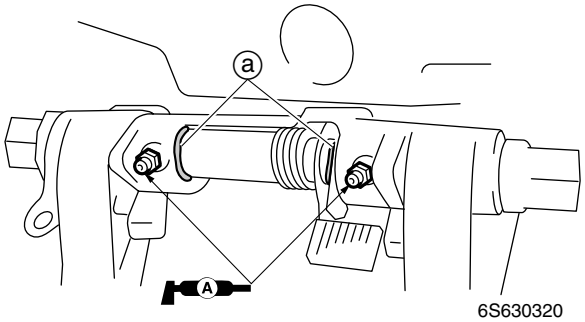
Apply Yamaha grease A to the grease nipple until it flows from the bushings ⓐ.



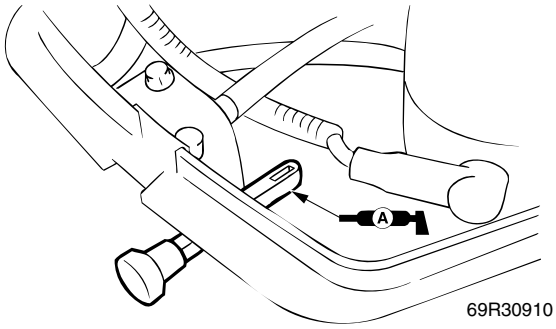
6S630345



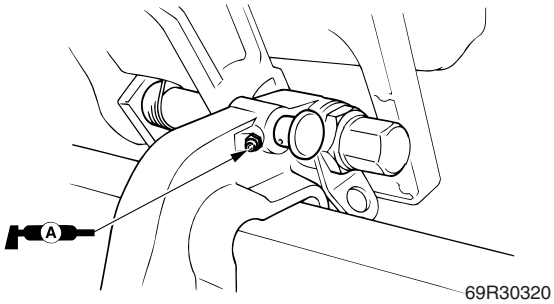
6S630310



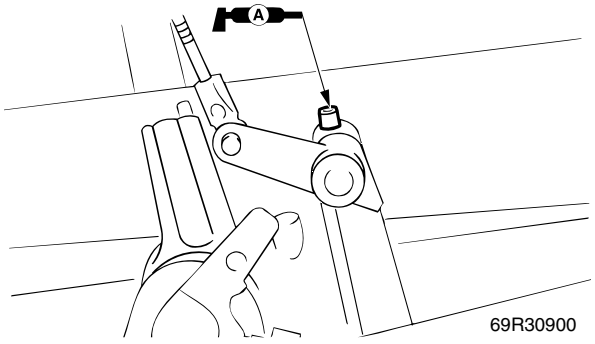
6S630320



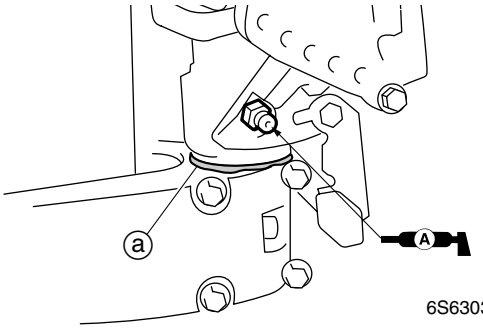
69R30910



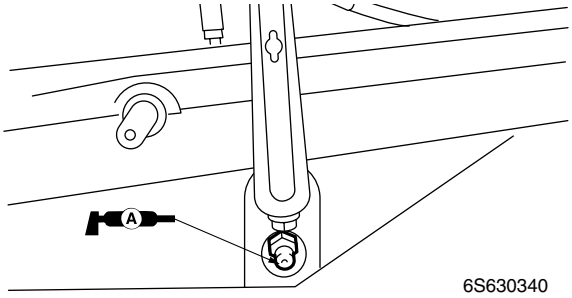
69R30320



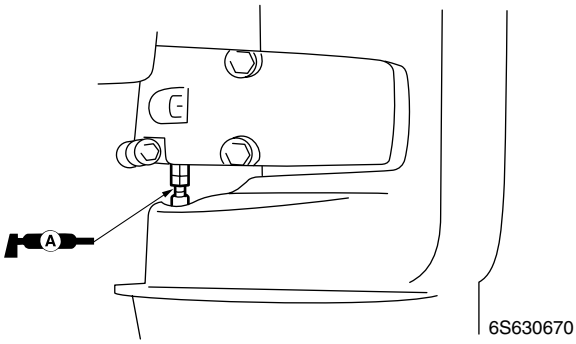
69R30900



6S630330

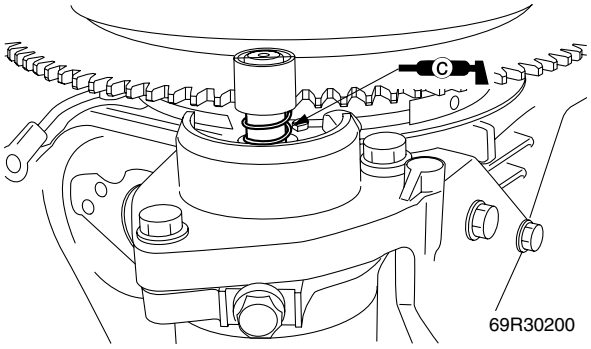


6S630340

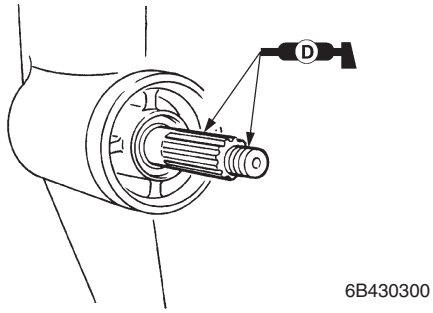


6S630670

2. Apply low temperature resistant grease to the area shown.



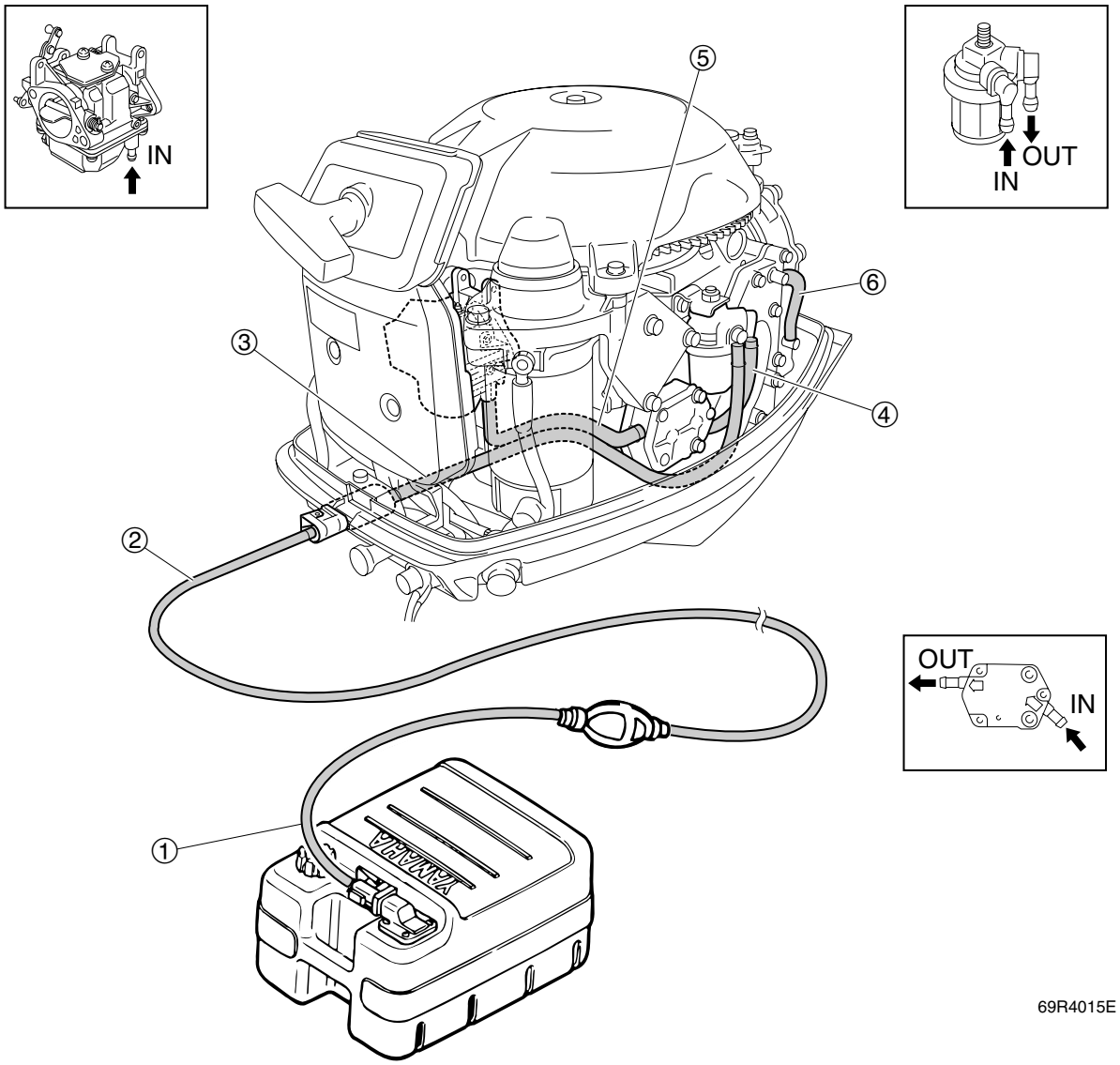
3. Apply corrosion resistant grease to the area shown.



— MEMO —

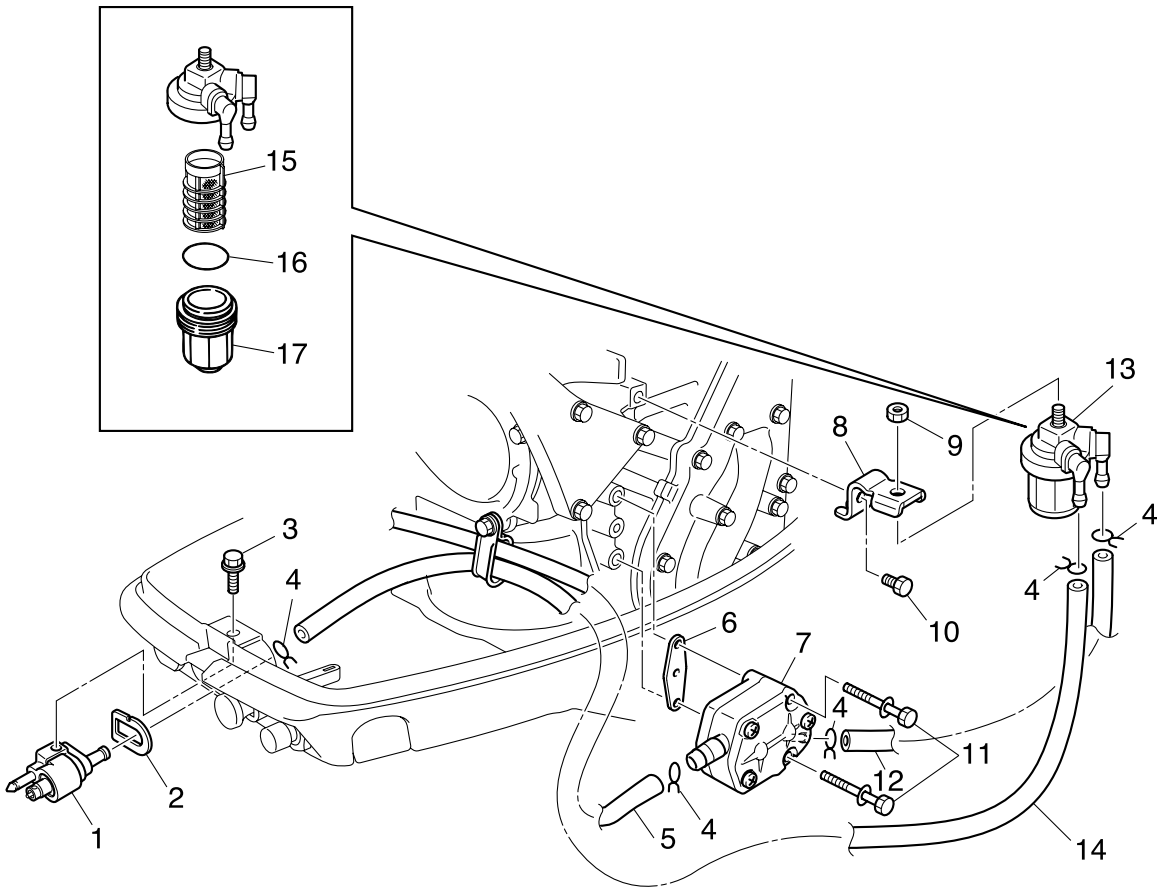
Fuel system

Hose routing



① Fuel hose (Fuel tank-to-primer pump)
② Fuel hose (Primer pump-to-fuel joint)
③ Fuel hose (Fuel joint-to-fuel filter)
④ Fuel hose (Fuel filter-to-fuel pump)
⑤ Fuel hose (Fuel pump-to-carburetor)
⑥ Cooling water hose

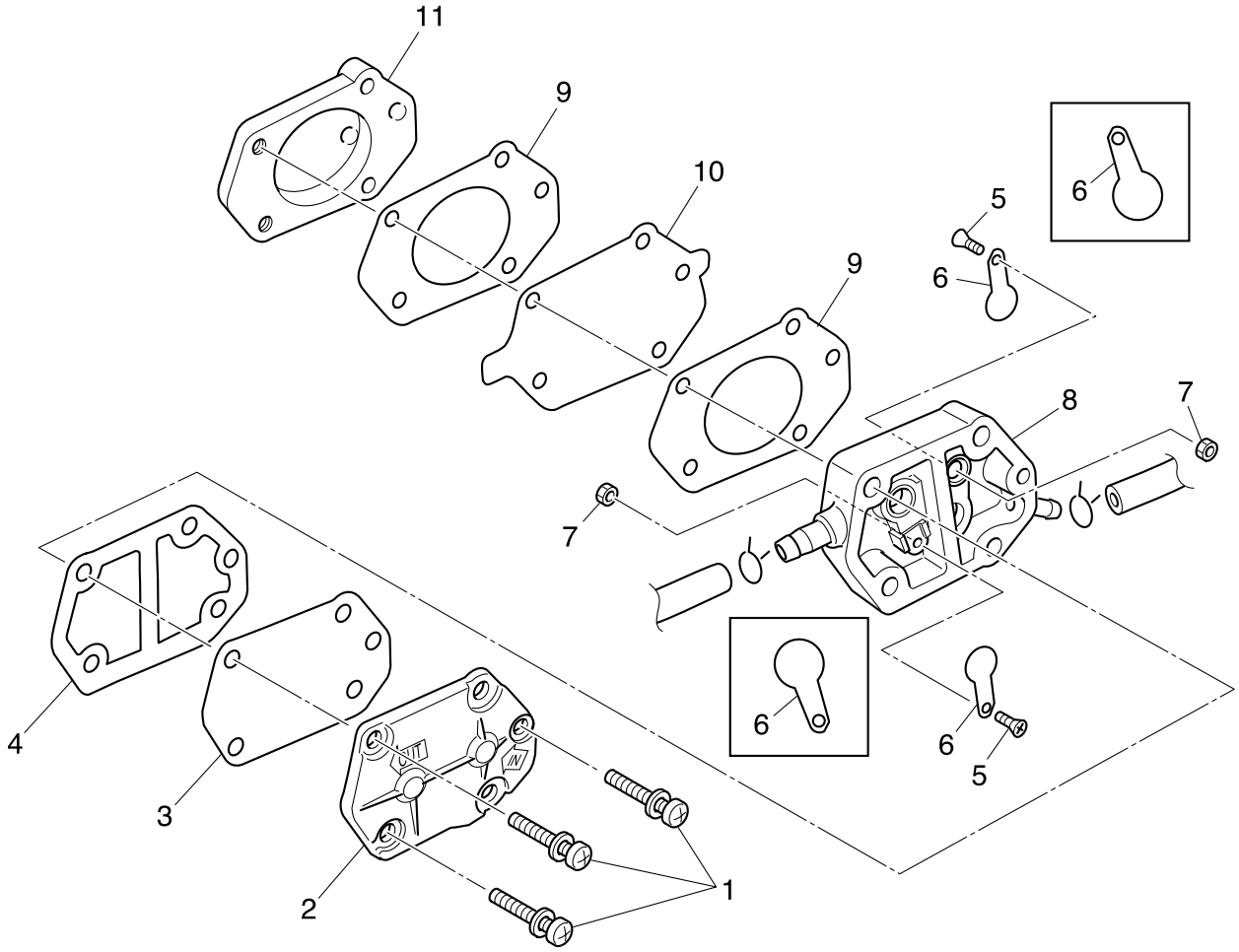
Fuel line



69R4030E

No.	Part name	Q'ty	Remarks
1	Fuel joint	1	
2	Grommet	1	
3	Bolt	1	M6 × 20 mm
4	Clip	5	
5	Hose	1	
6	Gasket	1	Not reusable
7	Fuel pump	1	
8	Bracket	1	
9	Nut	1	
10	Bolt	1	M6 × 14 mm
11	Bolt	2	M6 × 40 mm
12	Fuel hose	1	
13	Fuel filter	1	
14	Fuel hose	1	
15	Fuel filter element	1	
16	O-ring	1	Not reusable
17	Cup	1	

Fuel pump



69R4050E

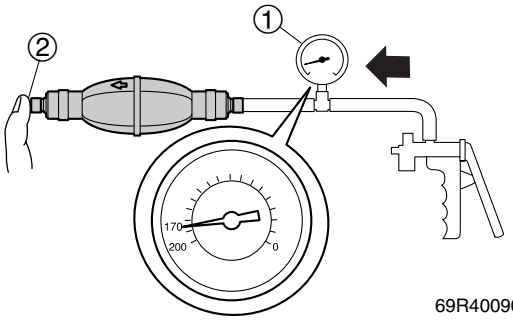
No.	Part name	Q'ty	Remarks
1	Screw	3	ø5 × 30 mm
2	Cover	1	
3	Diaphragm	1	
4	Gasket	1	Not reusable
5	Screw	2	ø3 × 6 mm
6	Check valve	2	
7	Nut	2	
8	Fuel pump body	1	
9	Gasket	2	Not reusable
10	Diaphragm	1	
11	Base	1	

Checking the primer pump

1. Place the drain pan under the fuel hose connections, and then disconnect the fuel hose from the primer pump.

2. Connect the vacuum/pressure pump gange to the primer pump inlet ①.

3. Cover the fuel outlet ② with a finger and then apply the specified positive pressure. Replace the primer pump if the specified pressure cannot be maintained for at least 30 seconds.



69R40090

NOTE:
Use a commercially available vaccum/pressure pump gauge and meter that can be preasurized up to 200 kPa (2.0 kgf/cm², 29.0 psi).

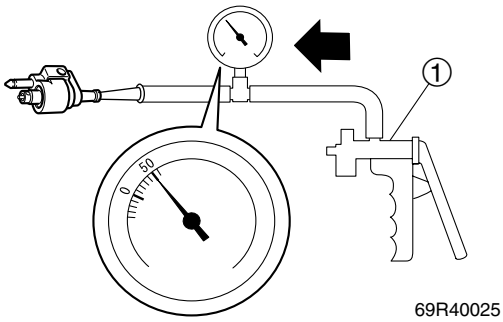
Specified positive pressure:
170 kPa (1.7 kgf/cm², 25 psi)

Checking the fuel joint

1. Check the fuel joint for cracks or damage.

2. Connect the special service tool ① at the outlet of fuel joint.

3. Apply the specified pressure to check that the positive pressure is maintained for 10 seconds. Replace the fuel joint if it is not maintained.



69R40025

Vacuum/pressure pump gauge set ①:
90890-06756

Specified positive pressure:
50 kPa (0.5 kgf/cm², 7.3 psi)

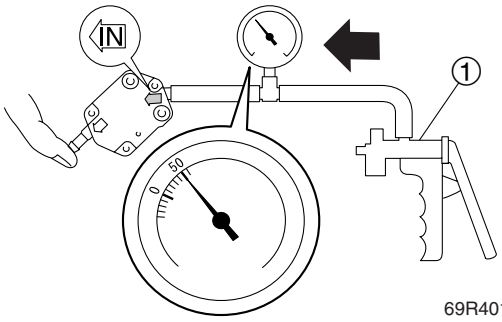
4

Checking the fuel pump

1. Place a drain pan under the fuel hose connections, and then disconnect the fuel hoses from the fuel pump.

2. Connect the special service tool ① to the fuel pump inlet.

3. Cover the fuel pump outlet with a finger, and then apply the specified positive pressure. Check that there is no air leakage.

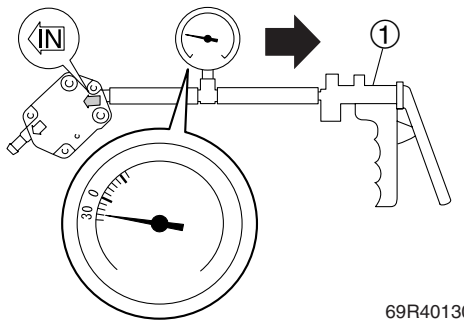


69R40120

Vacuum/pressure pump gauge set ①:
90890-06756

Specified positive pressure:
50 kPa (0.5 kgf/cm², 7.3 psi)

4. Apply the specified negative pressure and check that there is no air leakage.

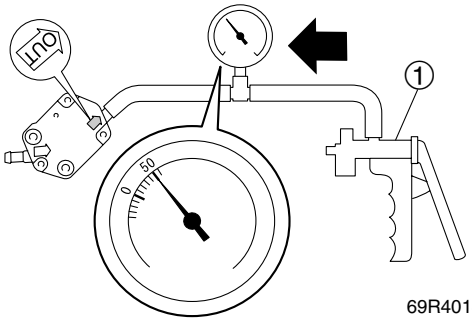


69R40130

Specified negative pressure:
30 kPa (0.3 kgf/cm², 4.4 psi)

5. Connect the special service tool to the fuel pump outlet.

6. Apply the specified positive pressure and check that there is no air leakage. Disassemble the fuel pump if air leaked.

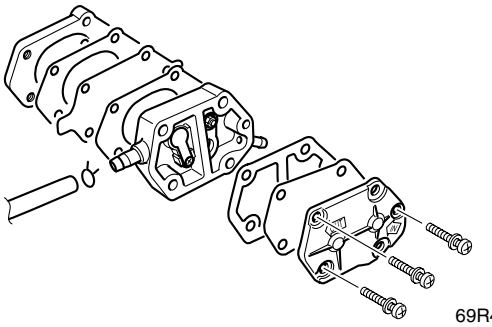


69R40140

Specified positive pressure:
50 kPa (0.5 kgf/cm², 7.3 psi)

Disassembling the fuel pump

1. Remove the 3 screws securing the pump together.


69R40201

NOTE:
To disassemble the fuel pump, refer to page 4-3.

2. Check the diaphragm. Replace the diaphragm if deteriorated or tears.

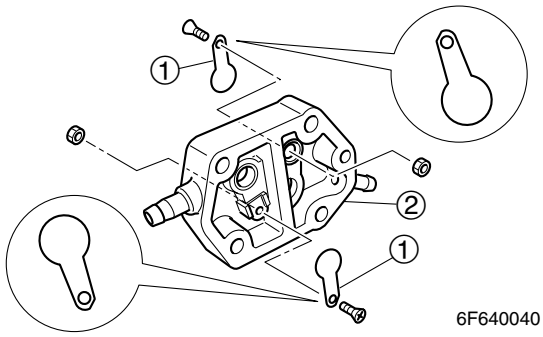
3. Check the check valves. Replace the check valve if bend or damaged. Also, check the fuel pump body. Replace the fuel pump body if damaged.

Assembling the fuel pump

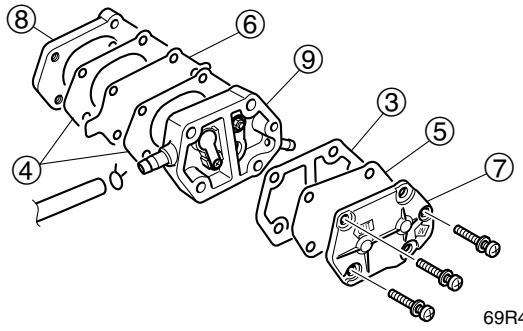
NOTE:

Clean the parts and soak the valves and the diaphragms in gasoline before assembly.

1. Install the check valves ① onto the fuel pump body ②.



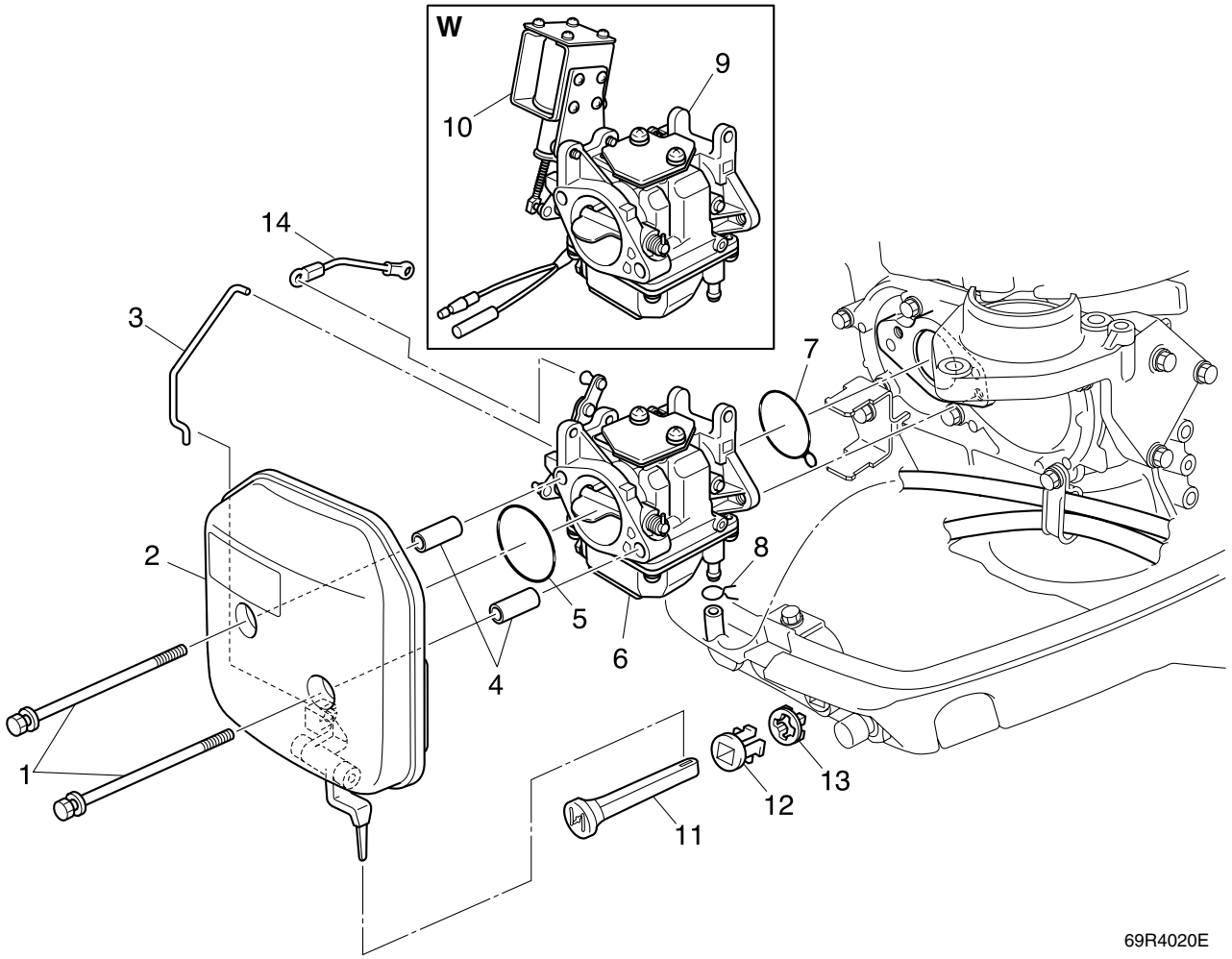
2. Install the new gaskets ③, ④, diaphragms ⑤, ⑥, cover ⑦ and base ⑧ to the fuel pump body ⑨.



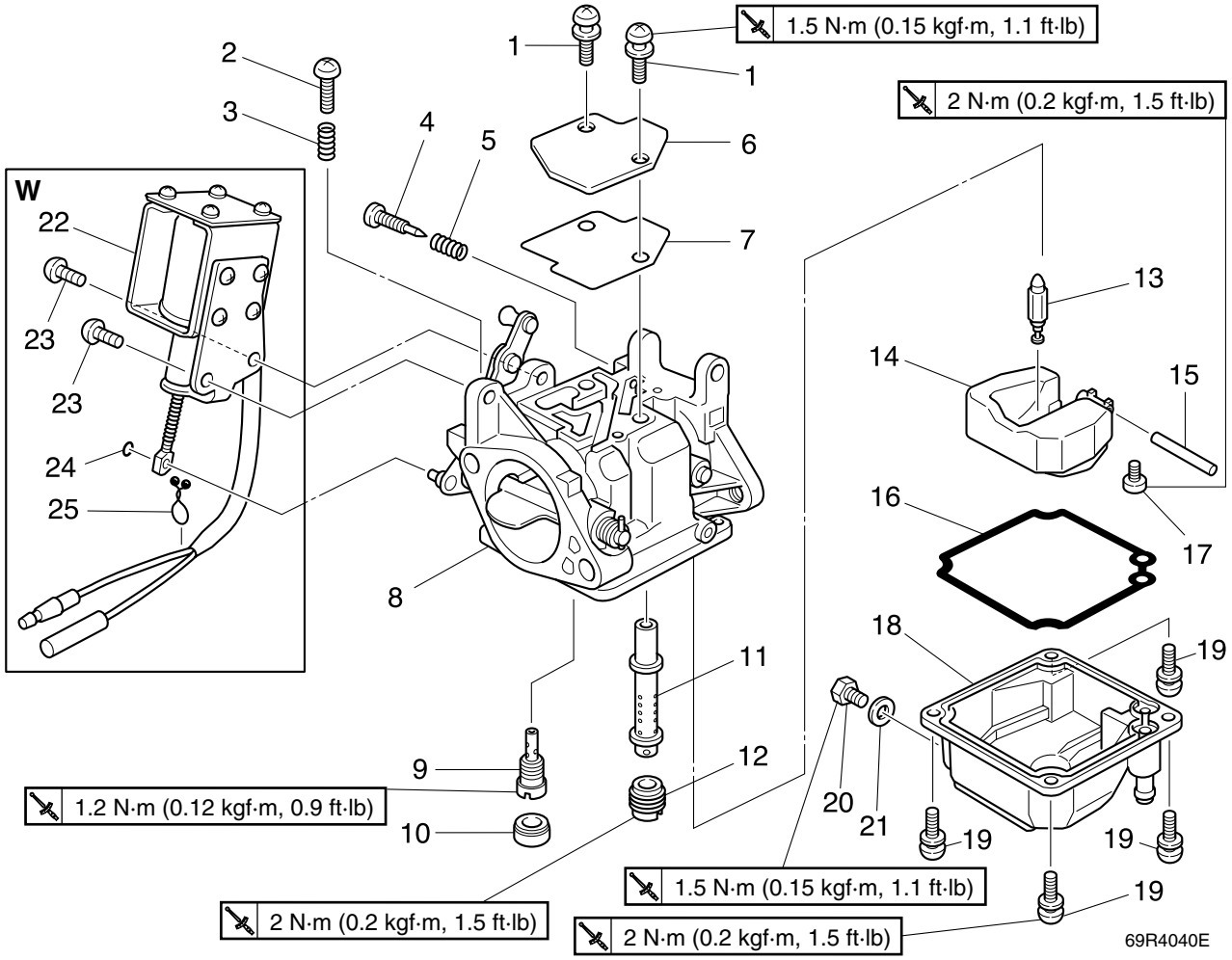
NOTE:

- Make sure that the gaskets ③, ④ and diaphragms ⑤, ⑥ are kept in place through the assembly process.
- After assembling, check the fuel pump air leakage again.

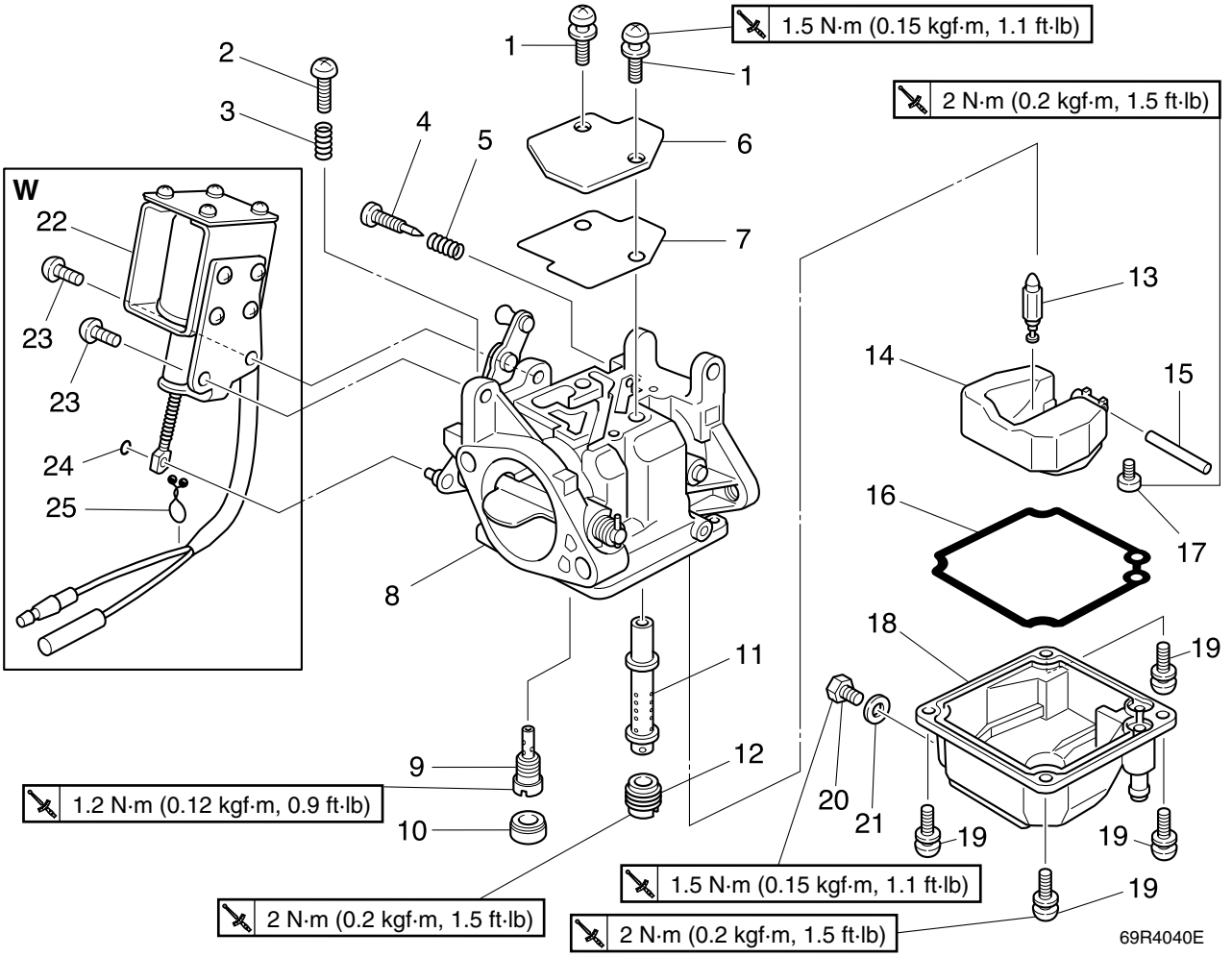
Carburetor



No.	Part name	Q'ty	Remarks
1	Bolt	2	M6 × 115 mm
2	Intake silencer	1	
3	Rod	1	
4	Collar	2	
5	O-ring	1	Not reusable
6	Carburetor assembly	1	
7	O-ring	1	Not reusable
8	Clip	1	
9	Carburetor assembly	1	W
10	Choke solenoid	1	W
11	Coke knob	1	
12	Grommet	1	
13	Gasket	1	
14	Rod	1	



No.	Part name	Q'ty	Remarks
1	Screw	2	
2	Throttle stop screw	1	
3	Spring	1	
4	Pilot screw	1	
5	Spring	1	
6	Cover	1	
7	Gasket	1	Not reusable
8	Carburetor body	1	
9	Pilot jet	1	
10	Cap	1	
11	Main nozzle	1	
12	Main jet	1	
13	Needle valve	1	
14	Float	1	
15	Float pin	1	
16	Gasket	1	Not reusable
17	Screw	1	ø4 × 6 mm



No.	Part name	Q'ty	Remarks
18	Float chamber	1	
19	Screw	4	ø4 × 12 mm
20	Drain screw	1	
21	Metal gasket	1	
22	Choke solenoid	1	W
23	Screw	2	ø5 × 12 mm : W
24	O-ring	1	W
25	Clamp	1	W

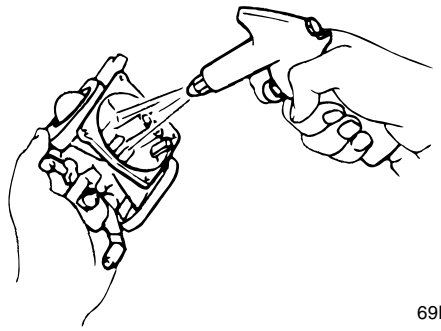
Disassembling the carburetor

NOTE:

Disassembled jets and other components should be sorted out and kept in order, so that they can be re-assembled in their original positions.

Checking the carburetor

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



69R40090

⚠WARNING

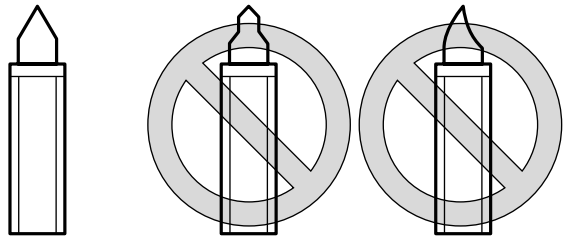
Wear appropriate protective eye gear during the cleaning process to prevent any eye injury by the blown-off debris or liquid.

3. Check the main jet, pilot jet and main nozzle. Clean if dirt or residue.

CAUTION:

Do not use steel wire for cleaning the jets, otherwise the jet diameters may be enlarged, which may seriously affect performance.

4. Check the pilot screw and needle valve. Replace the pilot screw and needle valve if bend or worn.

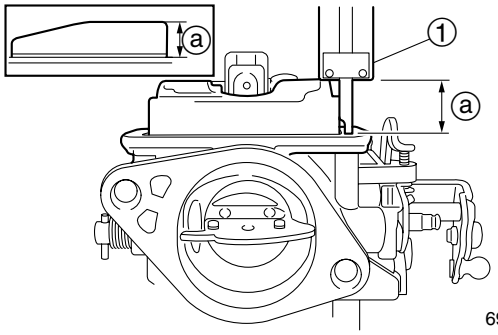


6B440040

5. Check the float. Replace the float if cracked or damaged.

Checking the float height

1. Measure the float height. Replace the float and needle valve as a set, if out of specification.



69R40010

NOTE:

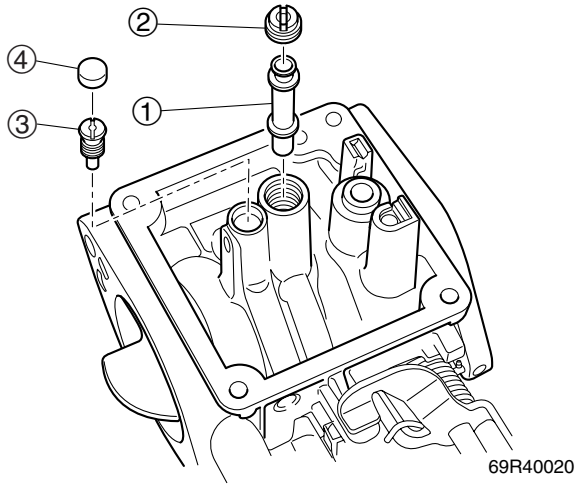
- When measure the float height, the float should not be compressing.
- Measure the height ⓐ without the gasket.

	Digital caliper ①: 90890-06704
	Float height ⓐ: 14.5–15.5 mm (0.57–0.61 in)

Assembling the carburetor

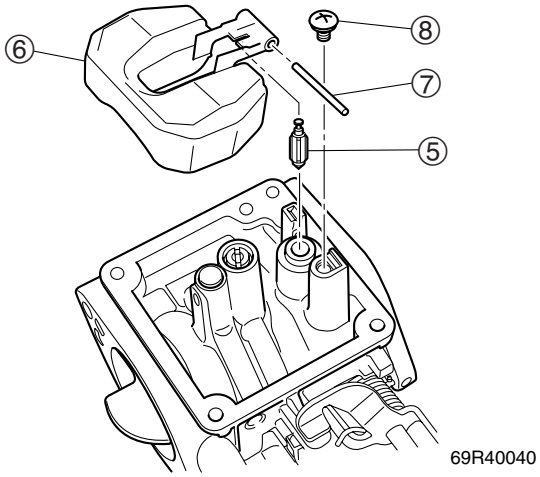
1. Install the main nozzle ① and main jet ②.

2. Install the pilot jet ③ and cap ④.



Main jet ②:
2 N·m (0.2 kgf·m, 1.5 ft·lb)
Pilot jet ③:
1.2 N·m (0.12 kgf·m, 0.9 ft·lb)

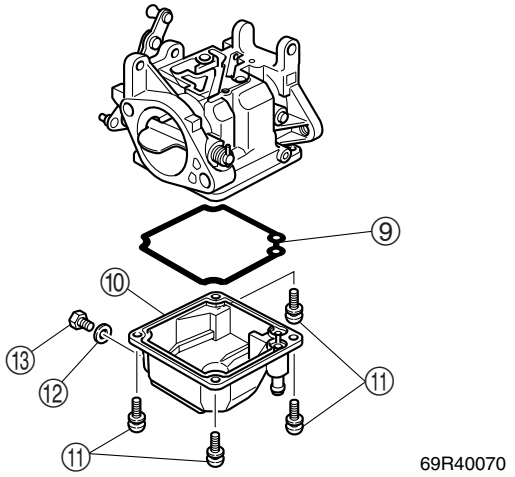
3. Install the needle valve ⑤ to the float ⑥, then install the float pin ⑦ into the float ⑥ and float screw ⑧.



Float pin screw ⑧:
2 N·m (0.2 kgf·m, 1.5 ft·lb)

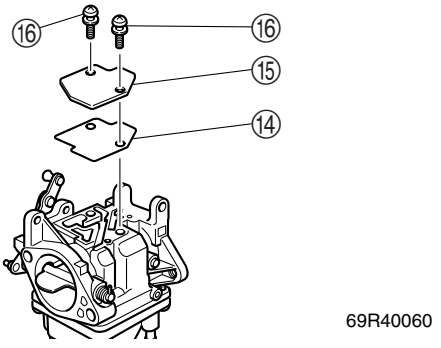
4. Install a new gasket ⑨, float chamber ⑩, and then tighten the float chamber screws ⑪ to specified torque.

5. Install the metal gasket ⑫ and then tighten the drain screw ⑬ to specified torque.



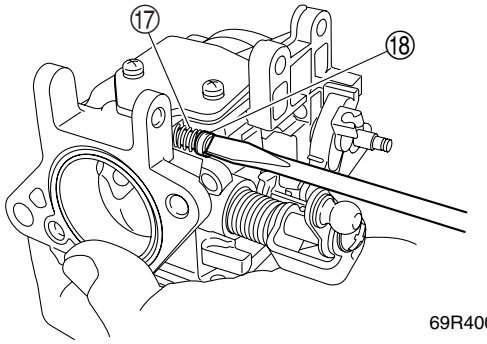
Float chamber screw ⑪ :
2 N·m (0.2 kgf·m, 1.5 ft·lb)
Drain screw ⑬:
1.5 N·m (0.15 kgf·m, 1.1 ft·lb)

6. Install a new gasket ⑭, cover ⑮, and then tighten the cover screws ⑯ to specified torque.

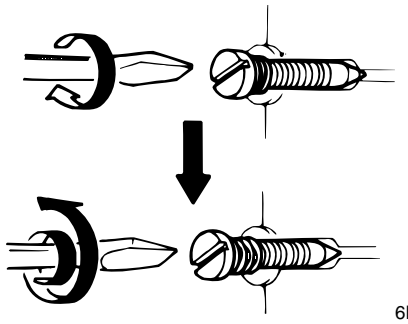


Cover screw ⑯:
1.5 N·m (0.15 kgf·m, 1.1 ft·lb)

7. Install the spring ⑰, pilot screw ⑱, then turn it in until it is lightly seated, and then turn it out the specified number of turns.



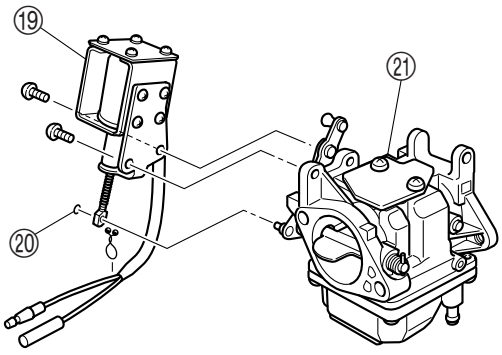
69R40050



6F640100

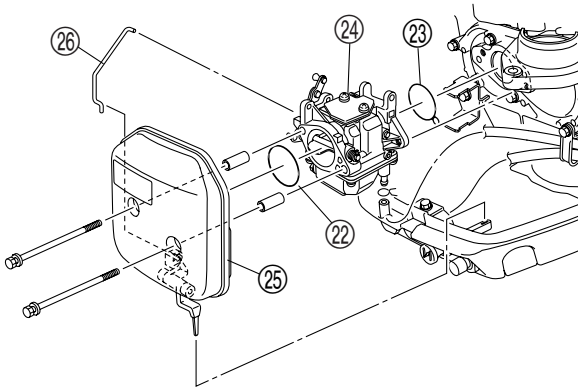
Pilot screw setting:
1/2–2 turns out

8. Install the choke solenoid ⑲ and O-ring ⑳ to the carburetor assembly ㉑ (W).



69R40080

9. Install the new O-rings ㉒, ㉓ and carburetor assembly ㉔, intake silenser ㉕, then install the choke link rod ㉖.



69R40210

NOTE:

- Adjust the throttle cable and engine idle speed whenever the carburetor has been disassembled.
- For adjustment procedures, refer to chapter 3.

4

Power unit

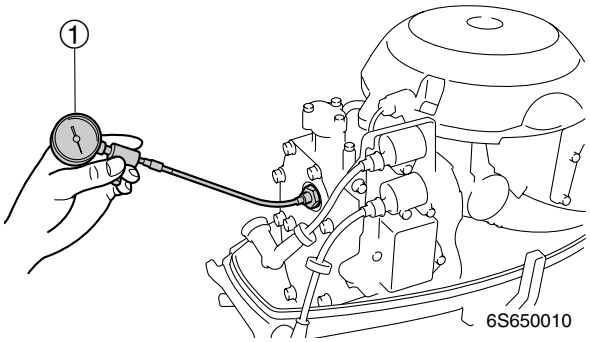
Power unit

Checking the compression pressure

1. Start the engine, warm it up for 5 minutes, and then turn it off.

2. Remove the lock plate from the engine stop lanyard switch.

3. Remove the all spark plug caps and all spark plugs, and then install the special service tool ① into a 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, and then crank the engine until the reading on the compression gauge stabilizes.

NOTE:

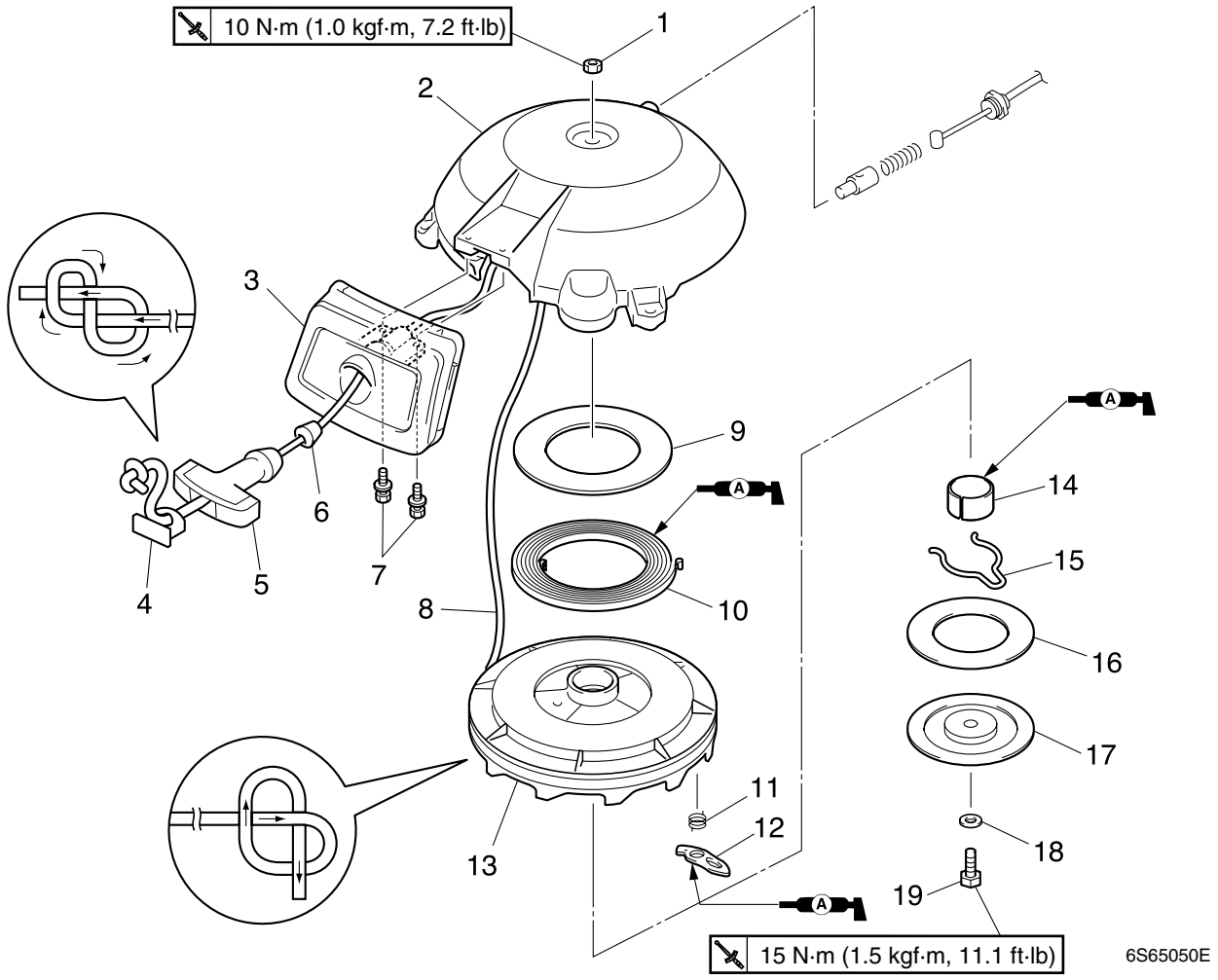
- Disconnect the throttle cable joint from the throttle control lever, and then place hold the lever in the fully-opened position of the throttle (W, WC).
- Do not pull the choke knob when checking the compression pressure.
- Keep each cylinder measurement numeral 3 times to find the compression average.

Minimum compression pressure (reference data):
E25B, 25X, 25B
470 kPa (4.7 kgf/cm², 68 psi)
E30H, 30H
570 kPa (5.7 kgf/cm², 83 psi)

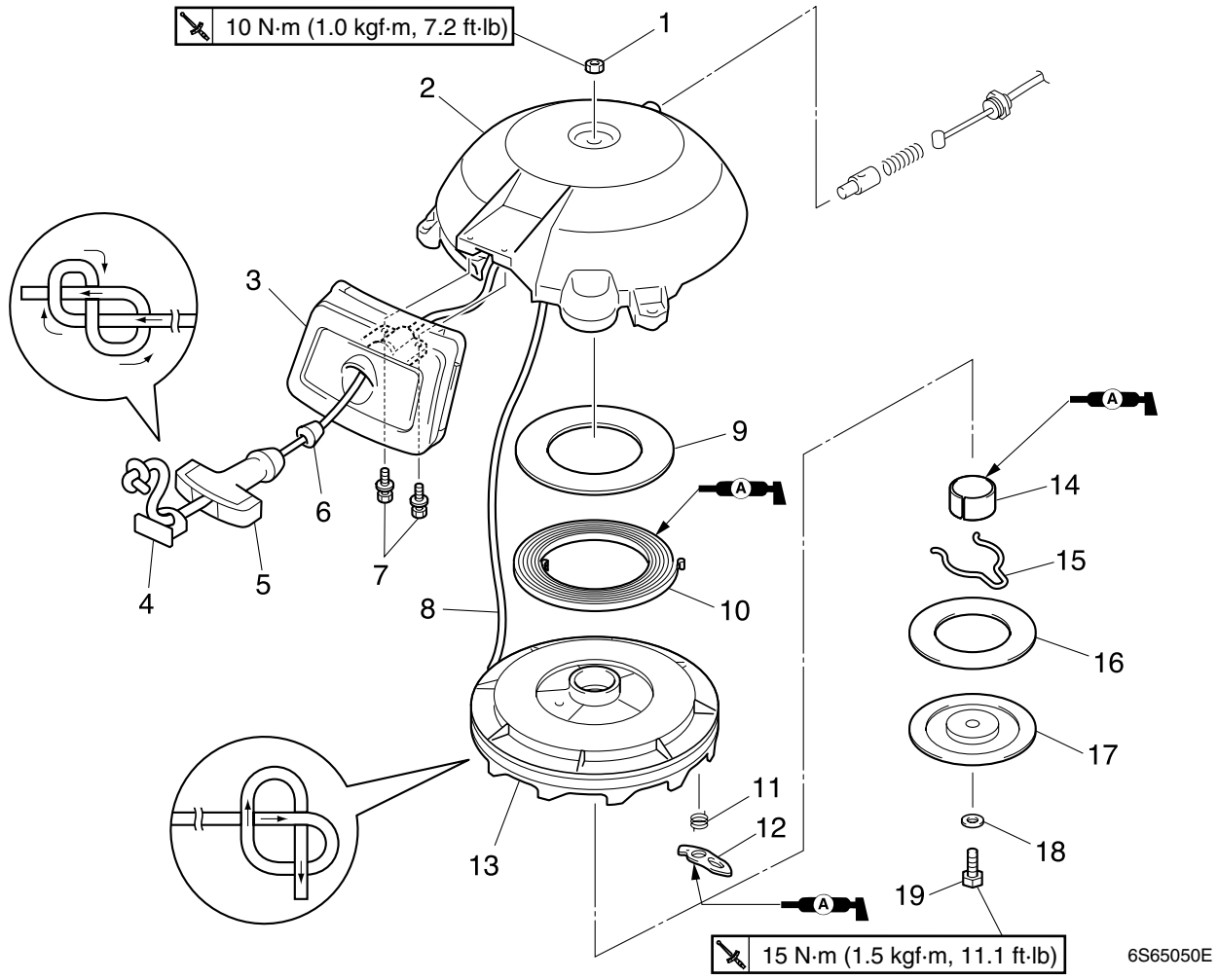
5. If the compression pressure is below specification and the compression pressure for each cylinder is unbalanced, add a small amount of engine oil to the cylinders, and then check the compression pressure again.

NOTE:

- If the compression pressure increases, check the pistons and piston rings. Replace if worn.
- If the compression pressure does not increase, check the cylinder head gasket and cylinder head. Replace if necessary.



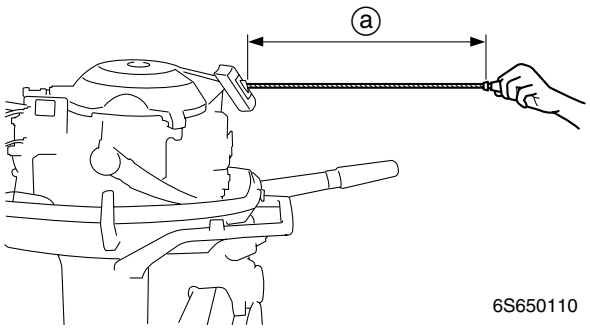
No.	Part name	Q'ty	Remarks
1	Nut	1	
2	Manual starter case	1	
3	Starter rope guide	1	
4	Cover	1	
5	Manual starter handle	1	
6	Damper	1	
7	Bolt	2	M6 × 30 mm
8	Starter rope	1	
9	Plastic washer	1	
10	Spiral spring	1	
11	Spring	1	
12	Drive pawl	1	
13	Sheave drum	1	
14	Collar	1	
15	Spring	1	
16	Plastic washer	1	
17	Drive plate	1	



No.	Part name	Q'ty	Remarks
18	Washer	1	
19	Bolt	1	M8 × 30 mm

Checking the starter rope

1. Pull the manual starter handle completely, then measure the starter rope length. If the starter rope length ⓐ is out of specification, adjust the starter rope by the rewind times.



6S650110

NOTE:

To adjust the starter rope, refer to page 5-6.

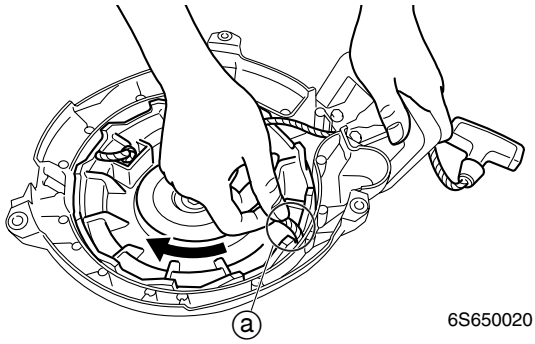
Starter rope length ⓐ:
1,400–1,600 mm (55.1–62.9 in)

Disassembling the manual starter

⚠WARNING

The sheave drum and spiral spring can pop out. Wear suitable protective gloves and cover the spiral spring with cloths, then pull out the sheave drum.

1. Pull the starter rope slightly and hook with the notch ⓐ.
2. Turn the sheave drum clockwise until the spiral spring is free.

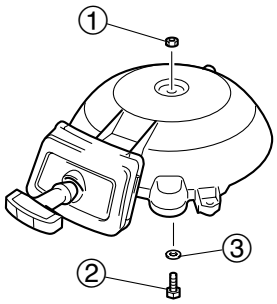


6S650020

NOTE:

- Turn the sheave drum to hook the starter rope with the notch on the sheave drum easily.
- Pass the starter rope through the notch ⓐ.

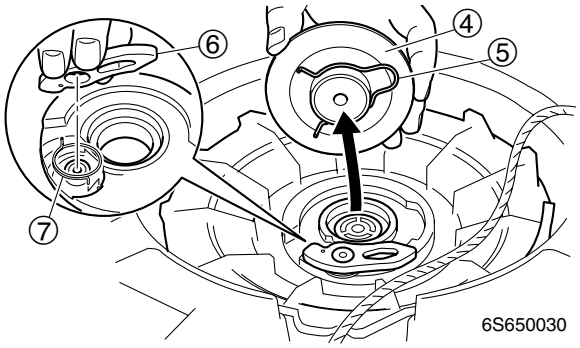
3. Remove the nut ①, drive plate bolt ② and washer ③.



69R5001E

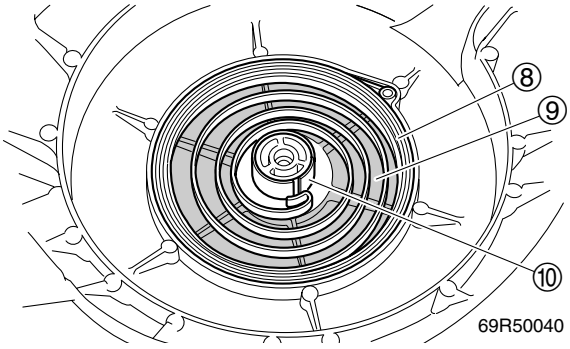
4. Remove the drive plate ④, spring ⑤, drive pawl ⑥ and drive pawl spring ⑦.

5. Remove the sheave drum.



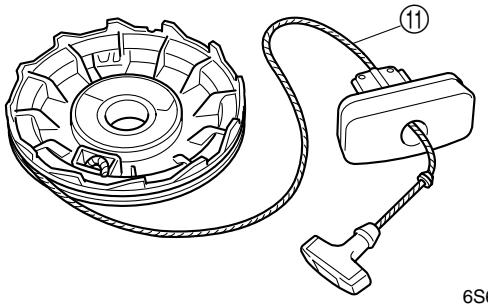
6S650030

6. Remove the spiral spring ⑧, plastic washer ⑨ and collar ⑩ from the manual starter case.



69R50040

7. Remove the starter rope ⑪.



6S650050

5

Checking the spiral spring
1. Check the spiral spring. Replace the spiral spring if cracked, bend or damaged.

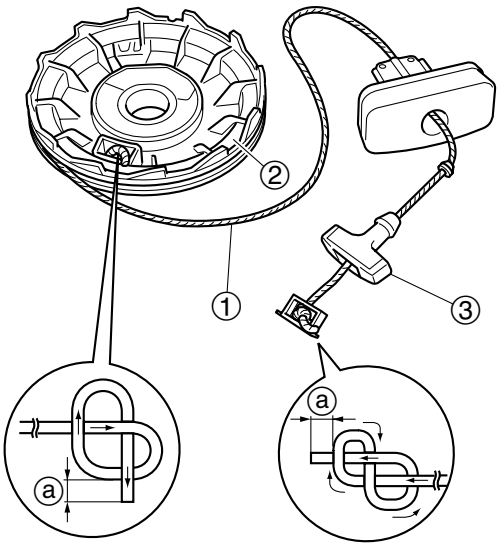
Checking the drive pawl
1. Check the drive pawl. Replace the drive pawl if worn or damaged.

Measuring the starter rope
1. Measure the starter rope length. Replace the starter rope if the length is below specification.

Starter rope length:
1,900 mm (74.8 in)

Assembling the manual starter
1. Install the starter rope ① into the sheave drum ②.

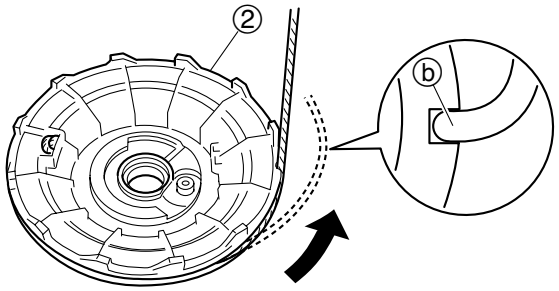
2. Install the manual starter handle ③.



69R50060

NOTE:
- Tie a knot at the end of the starter rope as shown in the illustration.
- Be sure to leave 5.0–10.0 mm (0.2–0.4 in) at the end ⓐ of the starter rope.

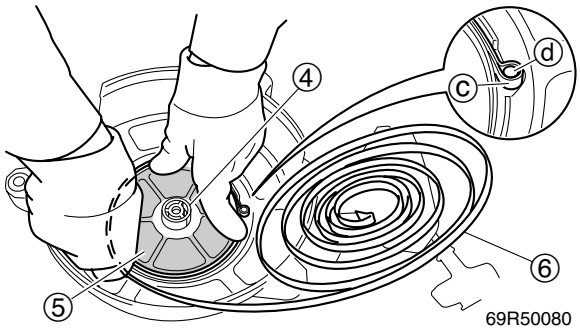
3. Wind the starter rope 1-1/2 times around the sheave drum ② in the direction of the arrow shown in the illustration.



6F650070

NOTE:
After winding the starter rope around the sheave drum ②, install the starter rope in the notch ⓑ.

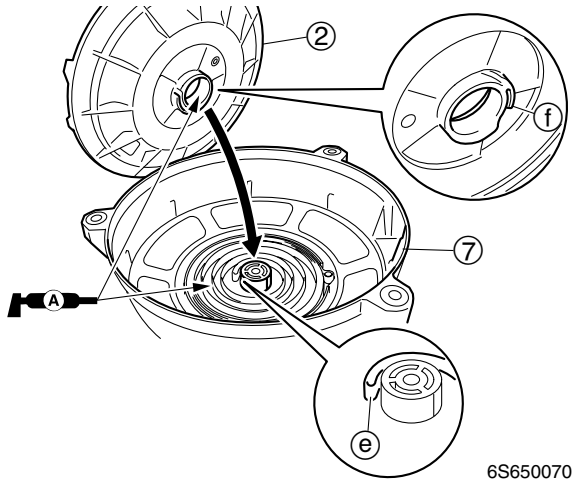
4. Install the collar ④, plastic washer ⑤ and spiral spring ⑥ into the manual starter case.



69R50080

NOTE:
Install the outer end ⓒ of the spiral spring on the pin ⓓ of the manual starter case.

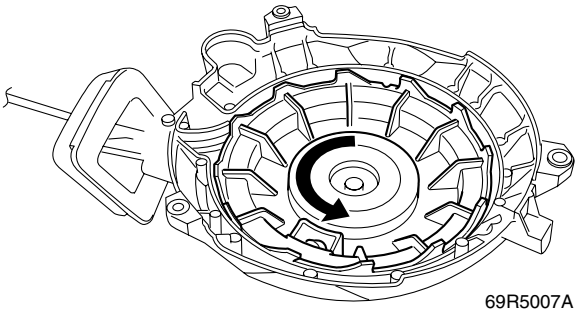
5. Install the sheave drum ② into the manual starter case ⑦.



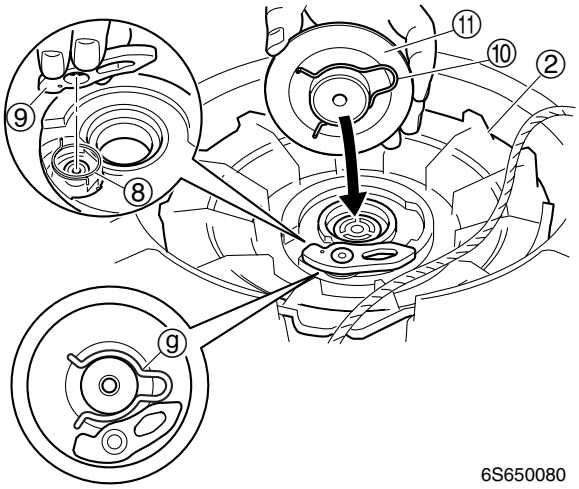
6S650070

NOTE:
Align the spiral spring inner end ⓔ with groove ⓕ on the sheave drum ②.

6. Check the spiral spring by turning counter clockwise in the sheave drum.


69R5007A

7. Install the drive pawl spring ⑧, drive pawl ⑨, spring ⑩ and drive plate ⑪.



6S650080

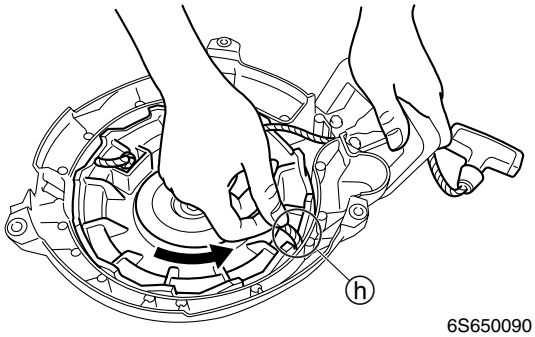
NOTE:
Install the part ⓖ of spring ⑩ as shown when set into the sheave drum ②.

8. Install the drive plate bolt, nut, and then tighten them to specified toque.

	Drive plate bolt: 15 N·m (1.5 gf·m, 11.1 ft·lb) Nut: 10 N·m (1.0 kgf·m, 7.2 ft·lb)

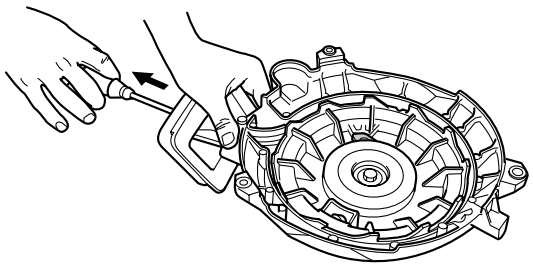
9. Turn the sheave drum 3-1/2 times in the direction of the arrow shown.

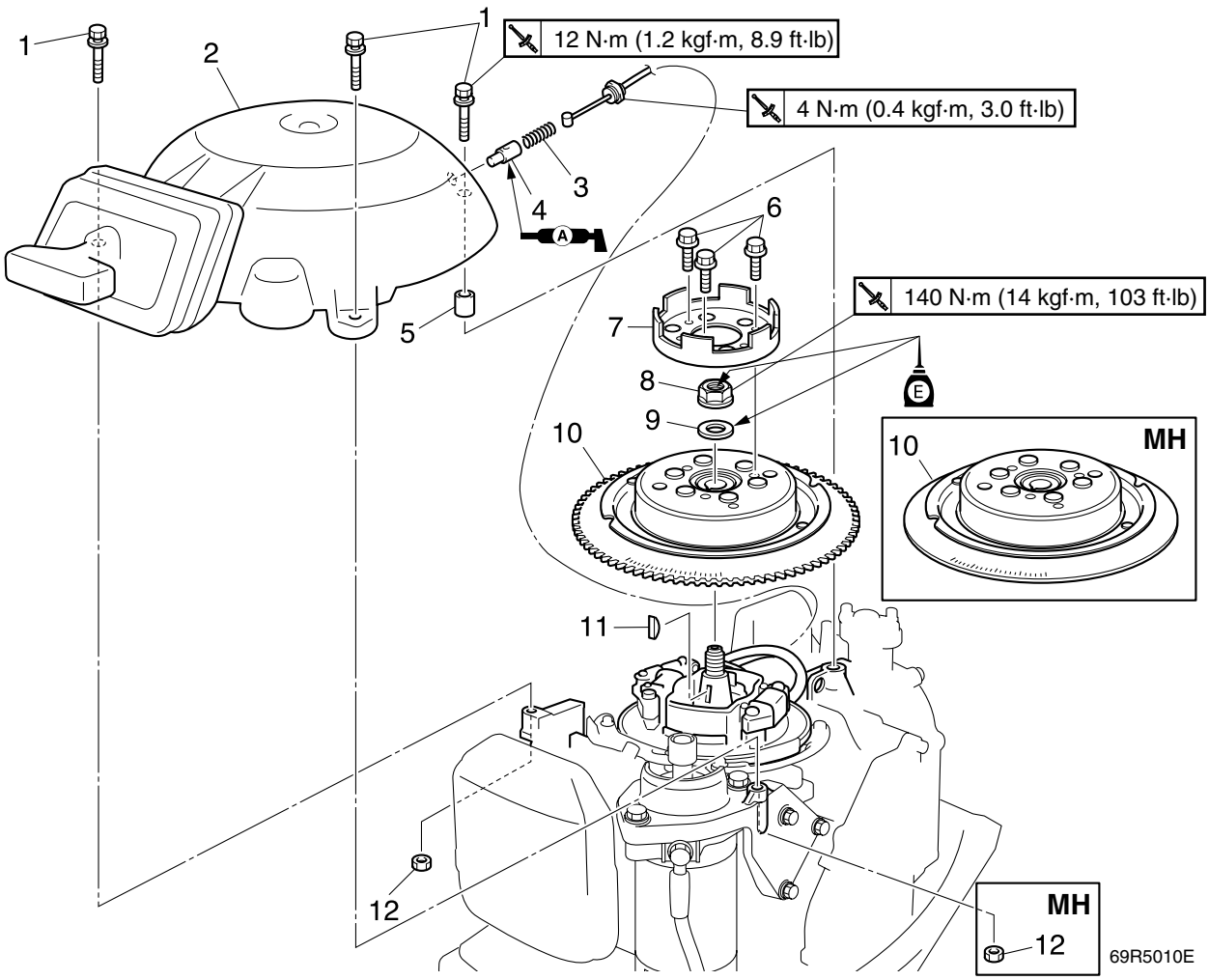
10. Align the notch to manual starter handle side, and then remove the starter rope from the notch ⓗ.



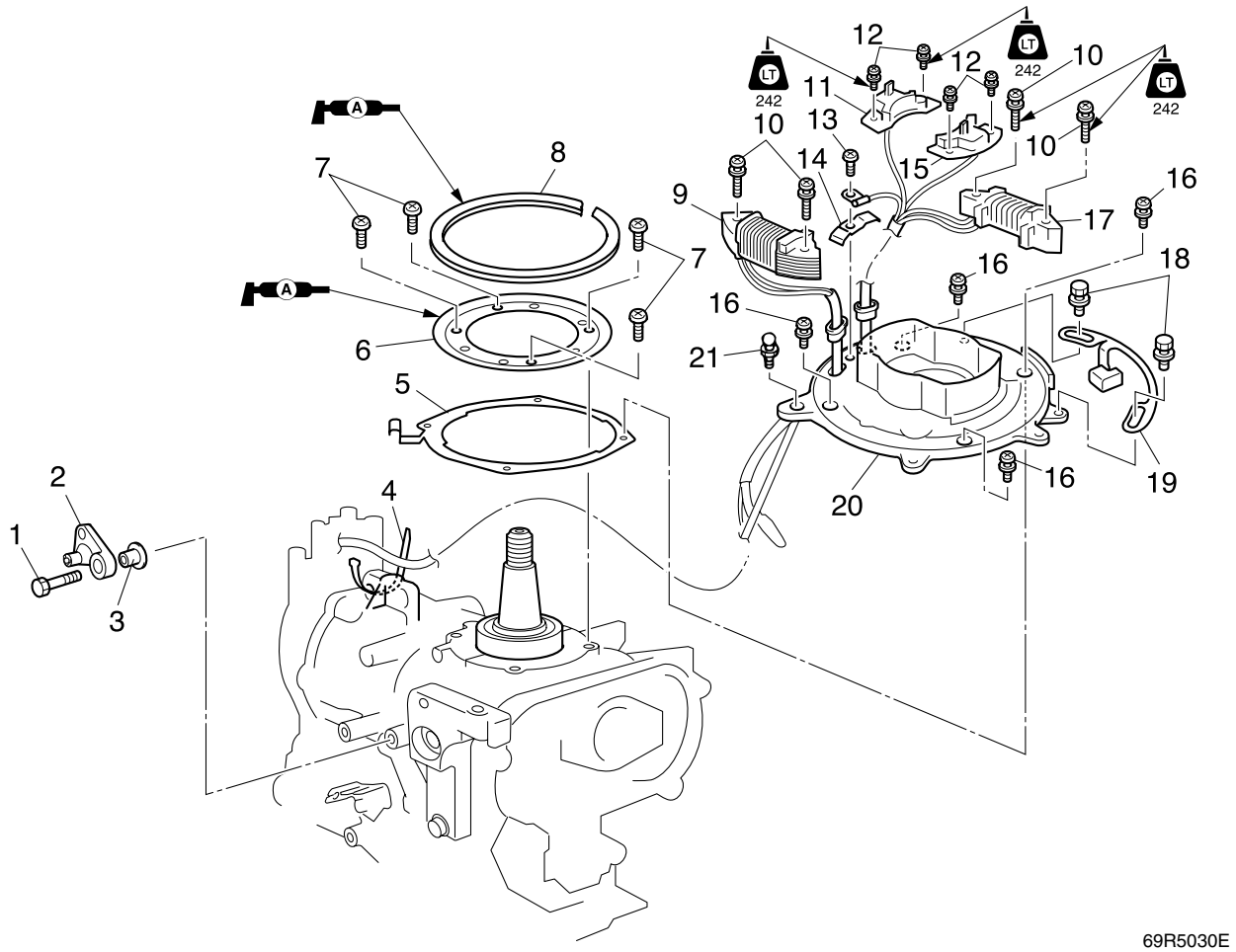
6S650090

11. Pull the manual starter handle 5–6 times to check that the sheave drum turns smoothly, to check that the drive pawl operate normally and to check the starter rope for slack. Repeat steps 3–10 if necessary.


69R50090

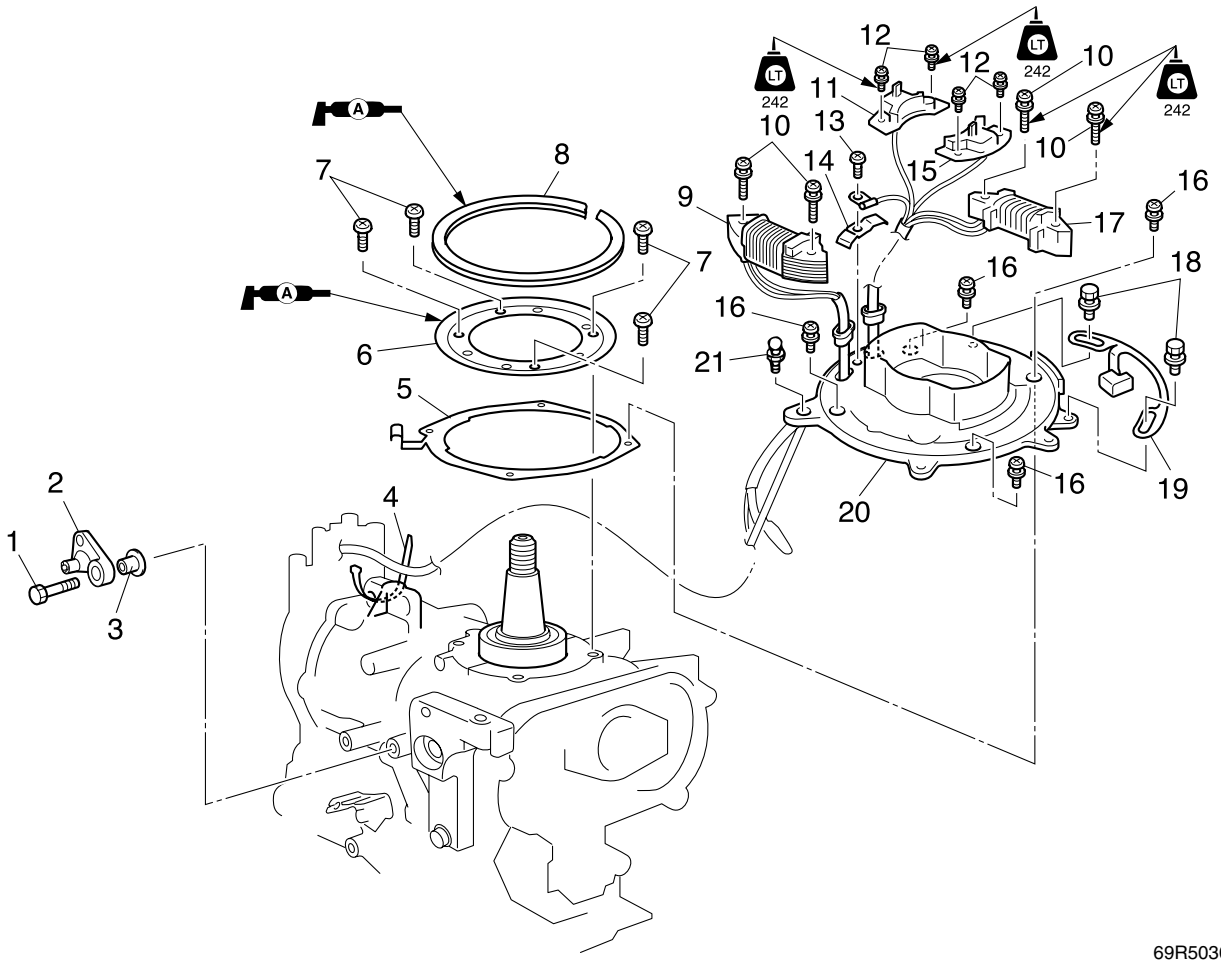


No.	Part name	Q'ty	Remarks
1	Bolt	3	M6 × 35 mm
2	Manual starter assembly	1	
3	Spring	1	
4	Plunger	1	
5	Collar	1	
6	Bolt	3	M8 × 14 mm
7	Starter pulley	1	
8	Nut	1	
9	Washer	1	
10	Flywheel magnet	1	WH, W, WC
	Flywheel magnet	1	MH
11	Woodruff key	1	
12	Nut	1	WH, W, WC
	Nut	2	MH

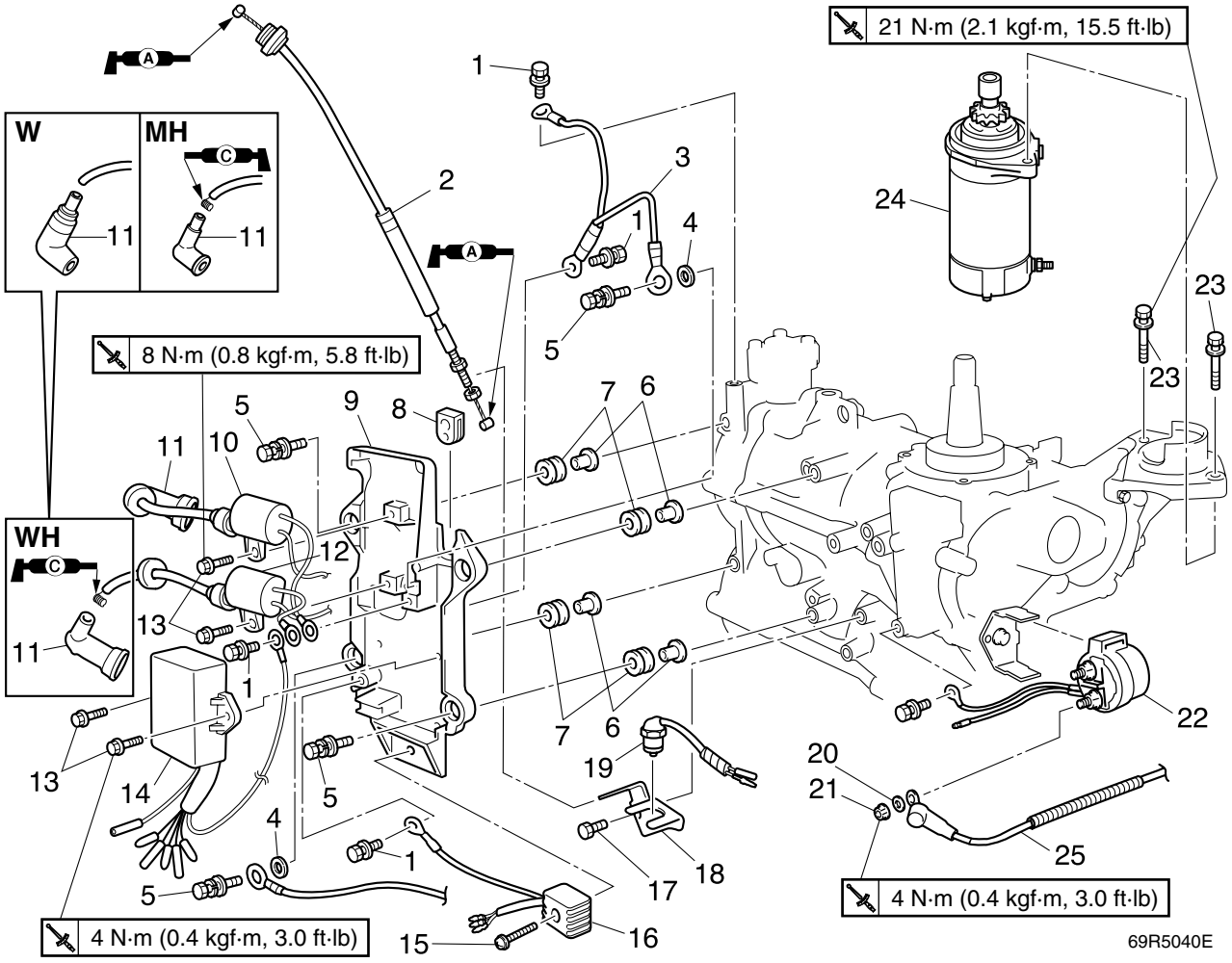


69R5030E

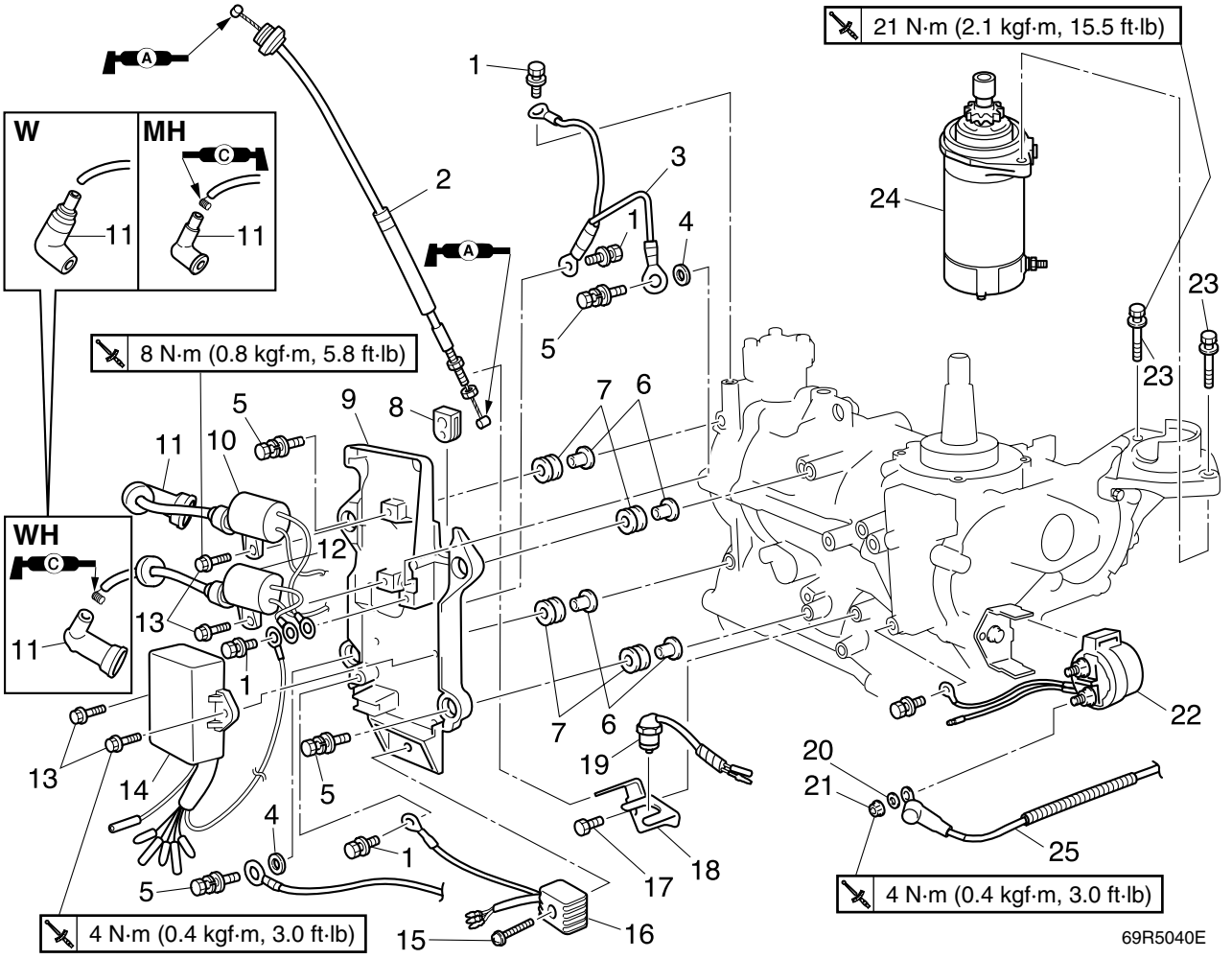
No.	Part name	Q'ty	Remarks
1	Bolt	1	M6 × 25 mm
2	Control lever	1	
3	Coller	1	
4	Clamp	1	
5	Plate	1	
6	Retainer	1	
7	Screw	4	ø5 × 12 mm
8	Retainer	1	
9	Light coil	1	
10	Screw	4	ø5 × 25 mm
11	Pulser coil #1	1	
12	Screw	4	ø4 × 12 mm
13	Screw	1	ø4 × 6 mm
14	Clamp	1	
15	Pulser coil #2	1	
16	Screw	4	ø5 × 12 mm
17	Charge coil	1	



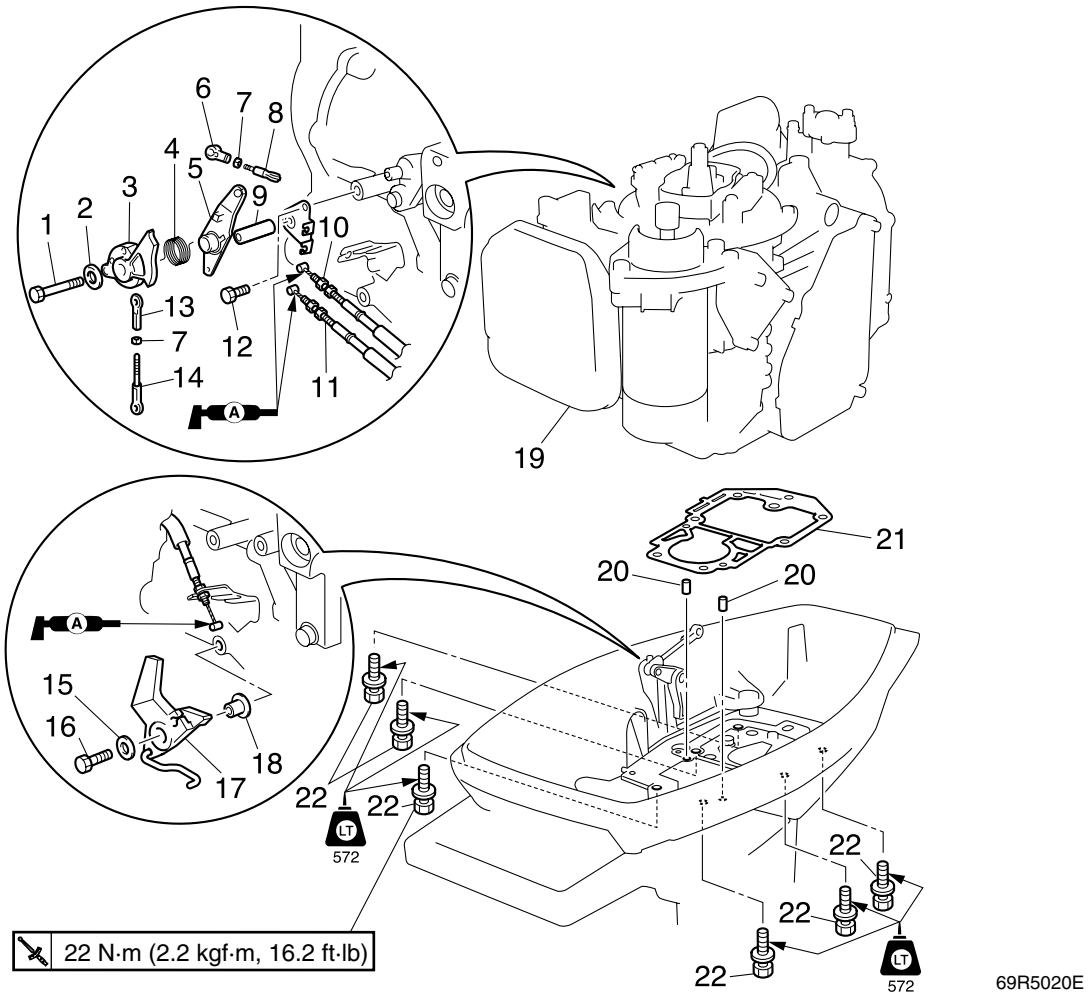
No.	Part name	Q'ty	Remarks
18	Bolt	2	M6 × 10 mm
19	Stopper	1	
20	Magnet base	1	
21	Ball joint	1	



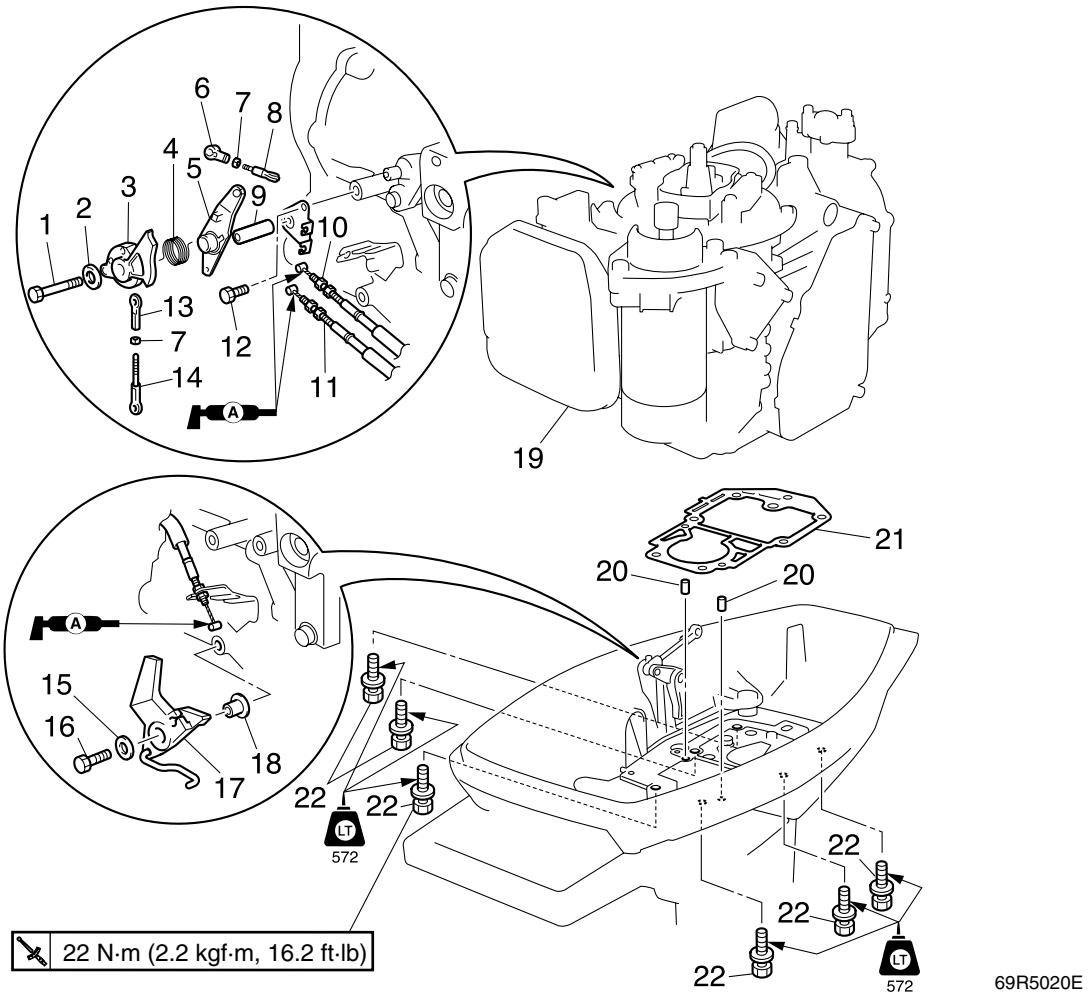
No.	Part name	Q'ty	Remarks
1	Bolt	4	M6 × 12 mm
2	Start-in-gear protection cable	1	
3	Ground lead	1	
4	Washer	2	
5	Bolt	4	M6 × 30 mm
6	Collar	4	
7	Damper	4	
8	Grommet	1	
9	Bracket	1	
10	Ignition coil #1	1	
11	Spark plug cap	2	
12	Ignition coil #2	1	
13	Bolt	4	M6 × 20 mm
14	CDI unit assembly	1	
15	Screw	1	ø5 × 25 mm
16	Rectifier	1	WH, W, WC
17	Bolt	1	M6 × 10 mm



No.	Part name	Q'ty	Remarks
18	Bracket	1	
19	Neutral switch	1	WH, WC
20	Spring washer	1	
21	Nut	1	
22	Starter relay	1	WH, W, WC
23	Bolt	2	M8 × 30 mm : WH, W, WC
24	Starter motor	1	WH, W, WC
25	Positive starter relay cable	1	WH, W, WC



No.	Part name	Q'ty	Remarks
1	Bolt	1	M6 × 45 mm
2	Washer	1	
3	Throttle cam	1	
4	Spring	1	
5	Arm	1	
6	Joint	1	
7	Lock nut	2	
8	Magnet control link	1	
9	Collar	1	
10	Throttle cable	1	WH, WC, MH
11	Throttle cable	1	WH, WC, MH
12	Bolt	1	M6 × 12 mm
13	Joint	1	
14	Throttle control lever link	1	
15	Washer	1	
16	Bolt	1	M6 × 20 mm
17	Arm	1	

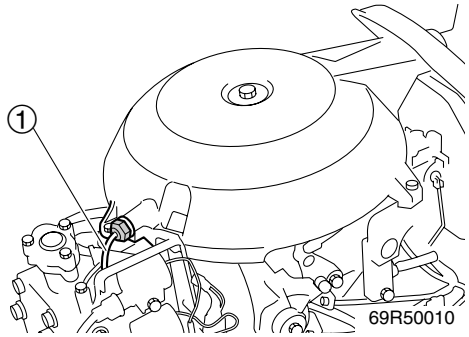


No.	Part name	Q'ty	Remarks
18	Collar	1	
19	Power unit	1	
20	Dawel	2	
21	Gasket	1	Not reusable
22	Bolt	6	M8 × 30 mm

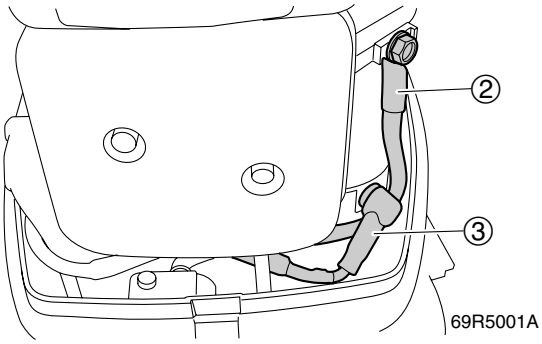
Removing the power unit

NOTE:
It is recommended to loosen the flywheel magnet nut before removing the power unit to improve working efficiency.

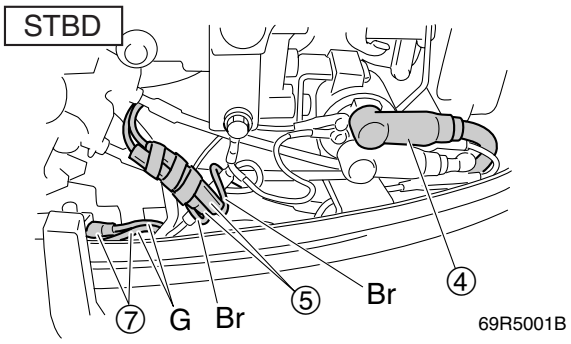
1. Remove the start-in-gear protection cable ①, and then remove the manual starter.

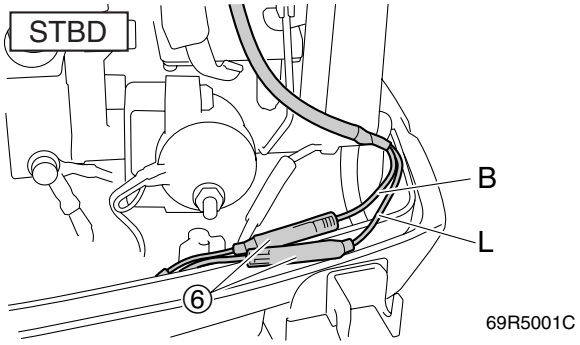


2. Disconnect the negative battery cable ② and positive relay cable ③. (WH, W, WC)

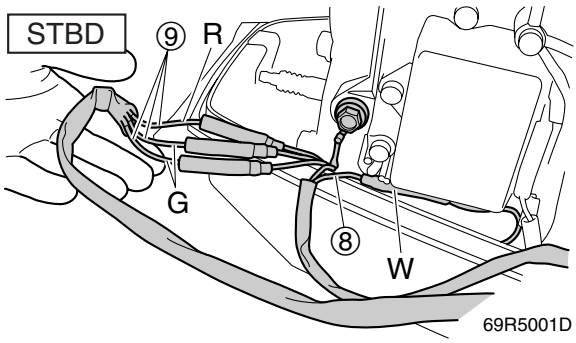


3. Disconnect the positive battery cable ④ (WH, W, WC), neutral switch connectors ⑤ (WH, WC), choke solenoid connectors ⑥ (W) and the light coil connectors ⑦.

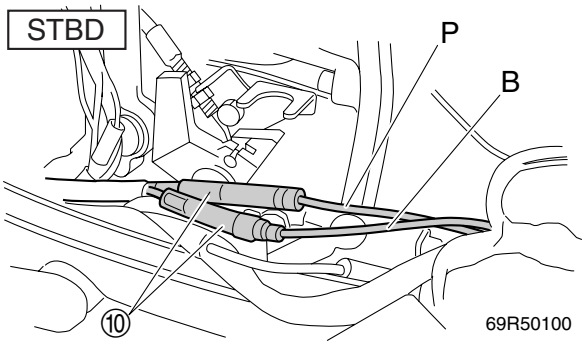




4. Disconnect the engine stop lanyard switch connectors or engine stop button connectors ⑧ (WH, WC, MH) and Rectifier connectors ⑨ (WH, W, WC).



5. Disconnect the thermoswitch connectors ⑩ (W).

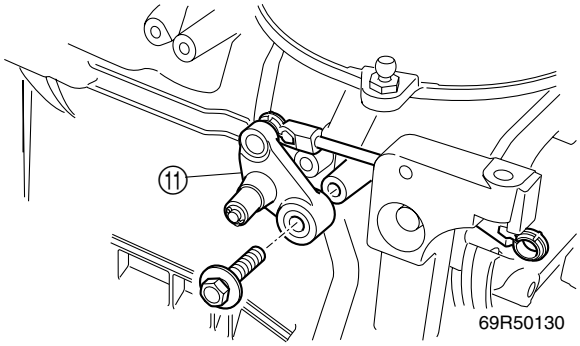


6. Disconnect the fuel hose and fuel systems.

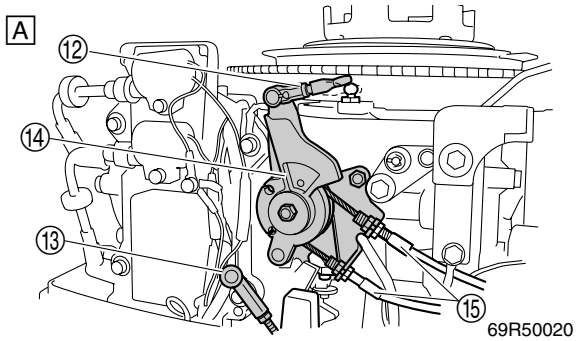
NOTE:
To disconnect, refer to page 4-2, 4-3 and 4-7.

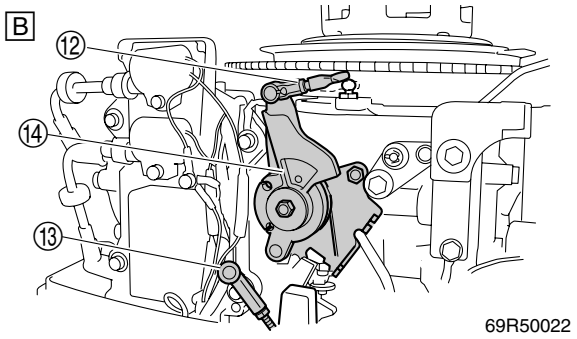
5

7. Remove the throttle control lever ⑪.



8. Remove the magnet control link ⑫, throttle control lever link ⑬, and then remove the throttle cam ⑭ with the throttle cables ⑮ (WH, WC, MH).



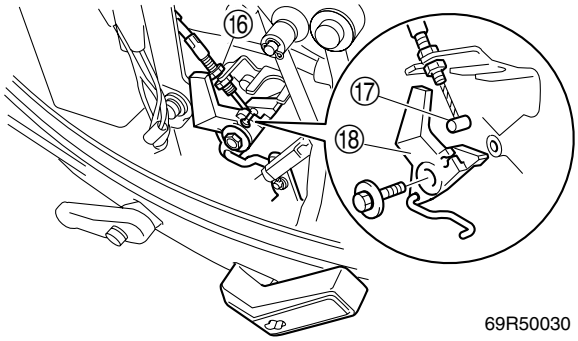


A WH, WC, MH
B W

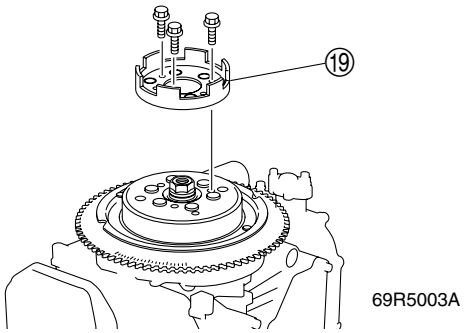
9. Set the gear shift to “F” position.

10. Loosen the lock nut ⑯, and then remove the start-in-gear protection cable end ⑰.

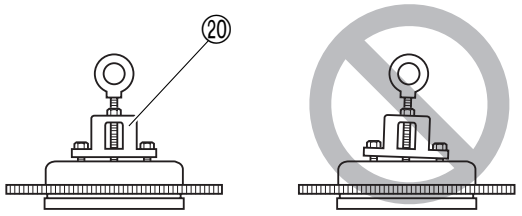
11. Remove the arm ⑱, and then remove from the bracket.



12. Remove the starter pulley ⑲.



13. Install the special service tool ⑳ as shown.

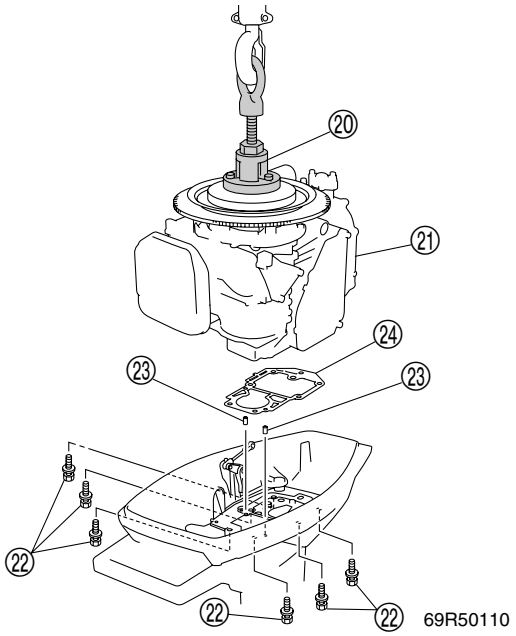


CAUTION:

To prevent damage to the engine or tools, screw in the flywheel puller set bolts evenly and completely so that the flywheel puller is parallel to the flywheel magnet.

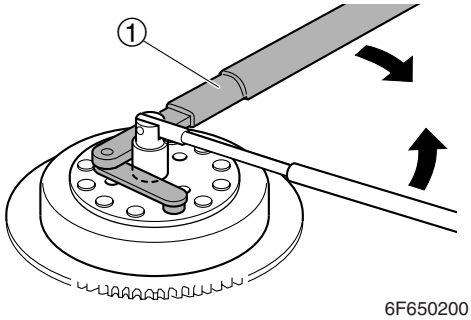
Flywheel puller ⑳: 90890-06521

14. Lift up the power unit ㉑ after removing the bolts ㉒, and then remove the dowels ㉓ and gasket ㉔.



Removing the flywheel magnet

1. Loosen the flywheel magnet nut.

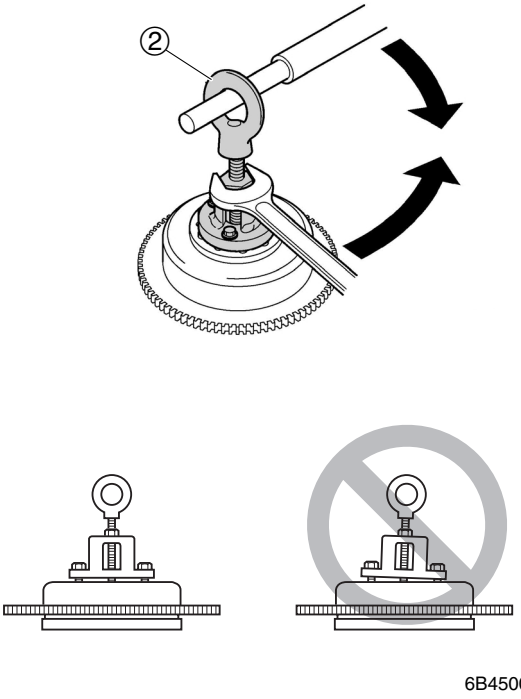


CAUTION:

Apply force in the direction of the arrows shown. While working, do not allow the flywheel holder to slip off the flywheel magnet.

	Flywheel holder ① : 90890-06522

2. Remove the flywheel magnet.



CAUTION:

To prevent damage to the engine or tools, screw in the flywheel puller set bolts evenly and completely so that the flywheel puller is parallel to the flywheel magnet.

NOTE:

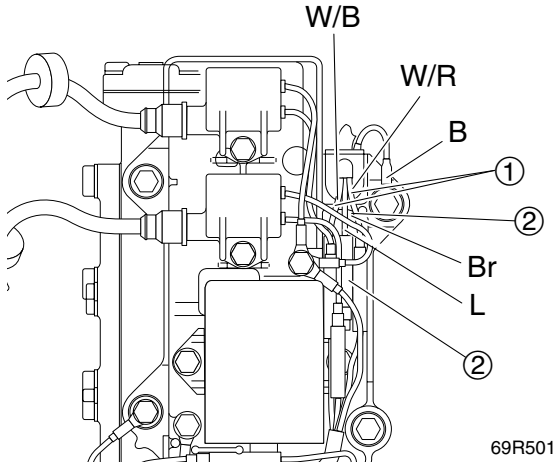
Apply force to the crankshaft end until the flywheel magnet comes off the tapered portion of the crankshaft.

	Flywheel puller ② : 90890-06521

3. Remove the Woodruff key.

Removing the electrical component

1. Disconnect the pulser coil connectors ①, ground lead and charge coil connectors ②.

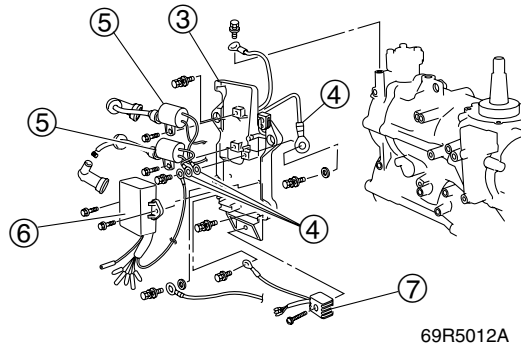


2. Remove the spark plug caps from the spark plugs.

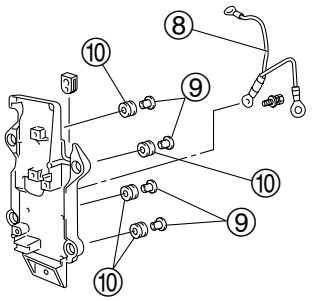
3. Disconnect the CDI unit connectors, and then remove the bracket ③.

4. Remove the ground leads ④.

5. Remove the ignition coil ⑤, CDI unit ⑥, Rectifier ground lead and Rectifier ⑦ (WH, W, WC).

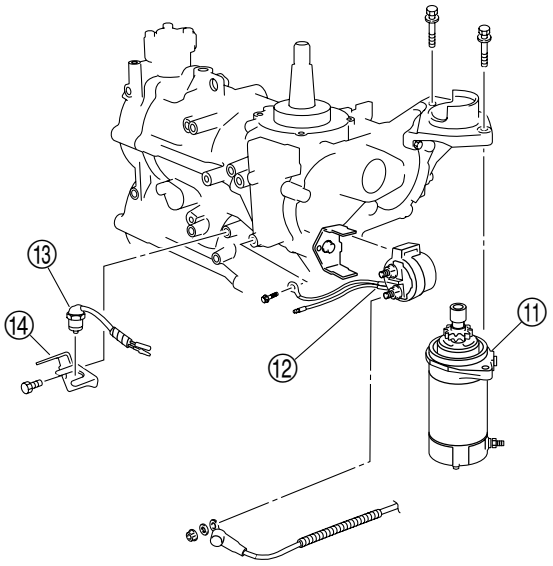


6. Remove the ground lead ⑧, collars ⑨ and dampers ⑩.



7. Remove the starter motor ⑪ and starter relay ⑫ (WH, W, WC).

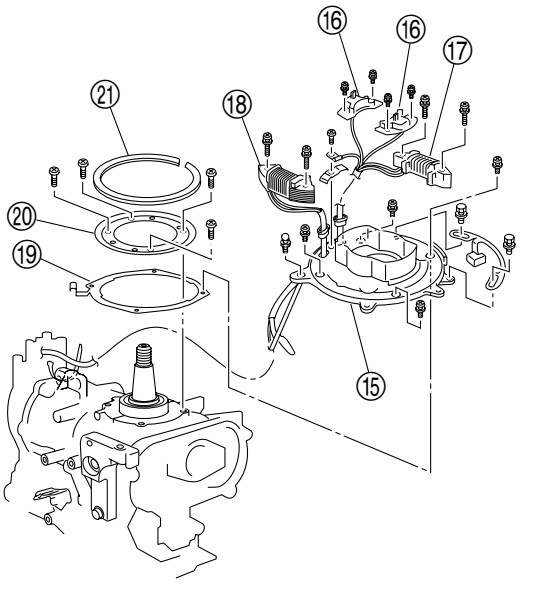
8. Remove the neutral switch ⑬ (WH, WC) and bracket ⑭.



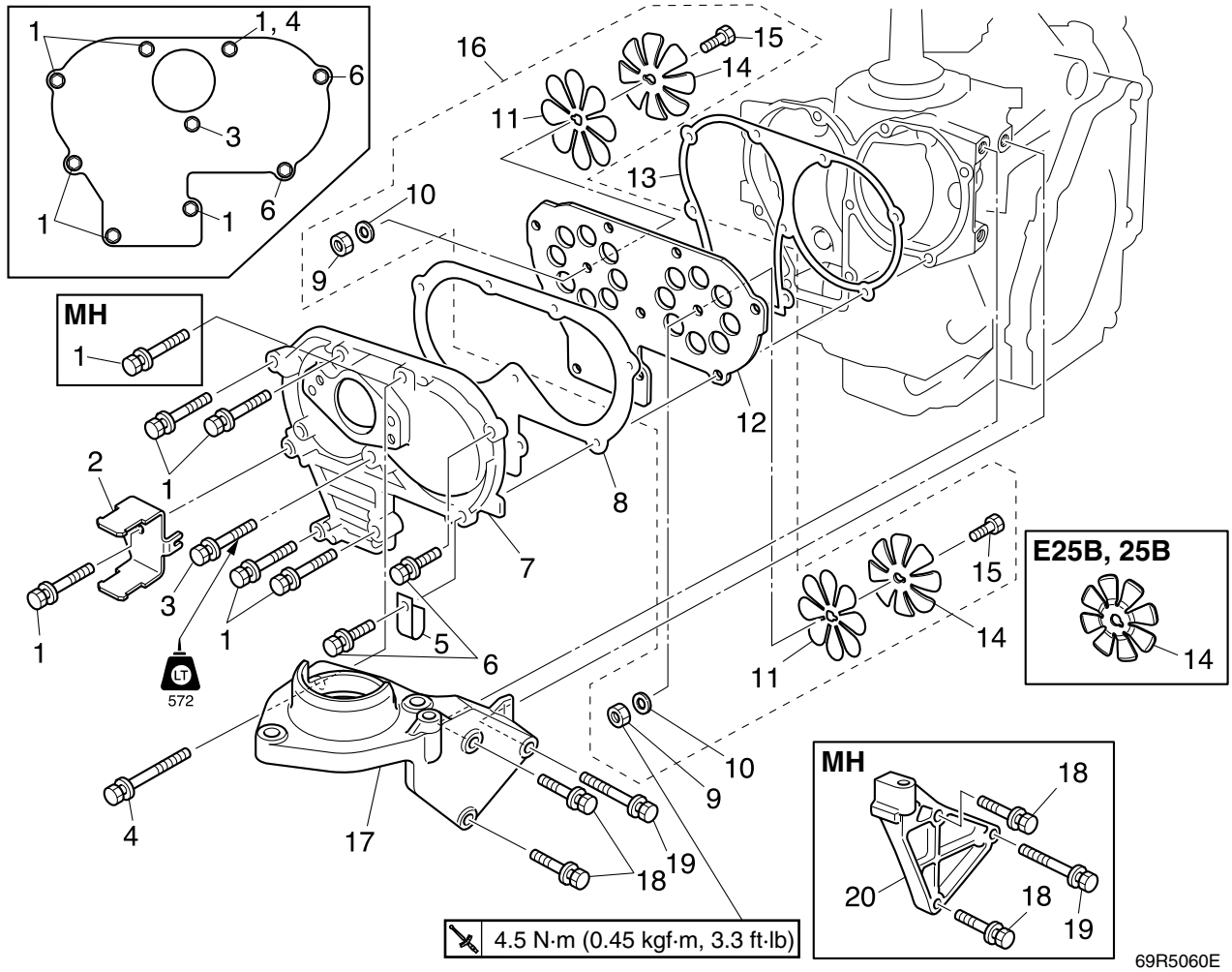
9. Remove the magnet base ⑮.

10. Remove the pulser coils ⑯, charge coil ⑰ and light coil ⑱.

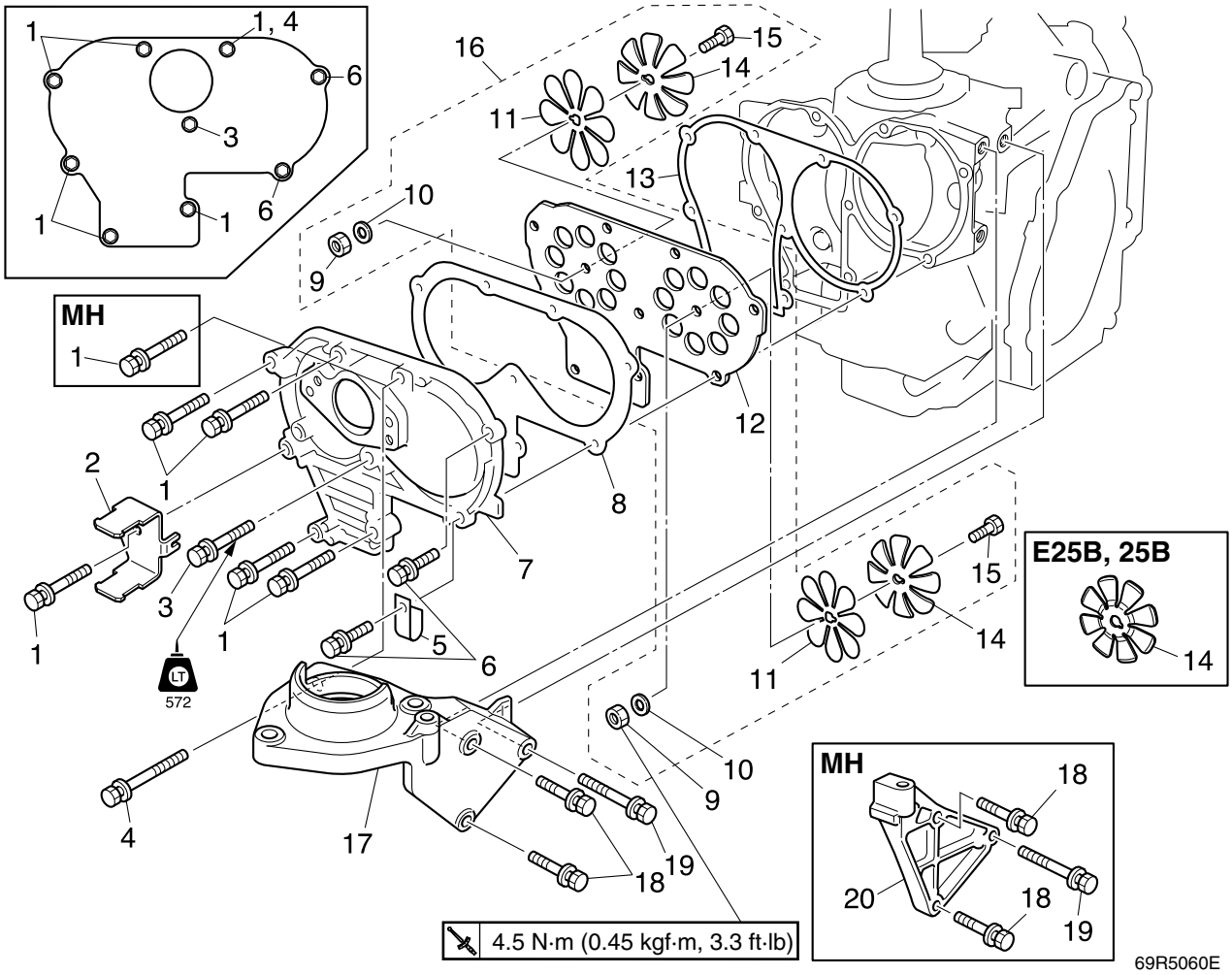
11. Remove the plate ⑲, retainer ⑳ and retainer ㉑.



Intake manifold



No.	Part name	Q'ty	Remarks
1	Bolt	5	M6 × 35 mm : WH, W, WC
	Bolt	6	M6 × 35 mm : MH
2	Blacket	1	WH, W, WC
3	Bolt	1	M6 × 35 mm
4	Bolt	1	M6 × 50 mm : WH, W, WC
5	Clamp	1	
6	Bolt	2	M6 × 25 mm
7	Intake manifold	1	
8	Gasket	1	Not reusable
9	Nut	2	
10	Washer	2	
11	Reed valve	2	
12	Reed valve seat	1	
13	Gasket	1	Not reusable
14	Reed valve stopper	2	25X, E30H, 30H
	Reed valve stopper	2	E25B, 25B
15	Bolt	2	

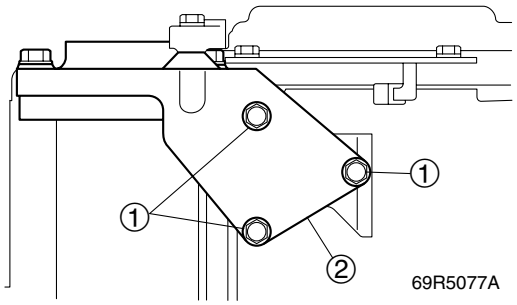


No.	Part name	Q'ty	Remarks
16	Reed valve stopper	1	
17	Bracket	1	WH, W, WC
18	Bolt	2	M6 × 30 mm : WH, W, WC
	Bolt	2	M6 × 25 mm : MH
19	Bolt	1	M6 × 45 mm
20	Bracket	1	MH

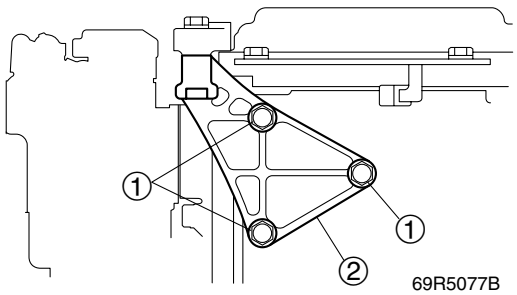
Removing the reed valve assembly

1. Remove the bracket bolts ① and bracket ②.

A

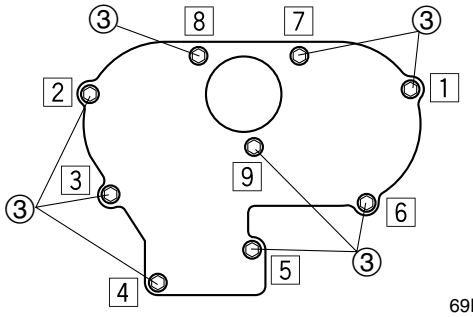


B



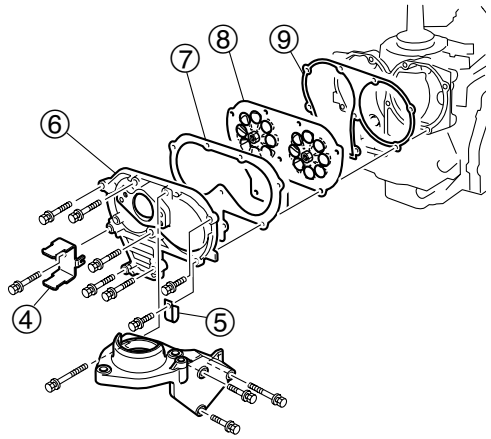
A WH, W, WC
B MH

2. Remove the intake manifold bolts ③ in the sequence shown.

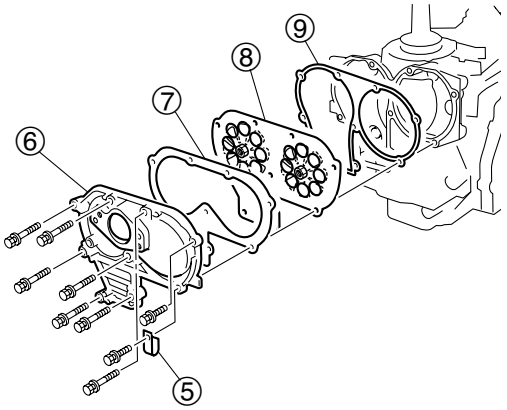


3. Remove the starter relay bracket ④ (WH, W, WC), clamp ⑤, and then remove the intake manifold ⑥, gasket ⑦, reed valve assembly ⑧ and gasket ⑨.

A



B



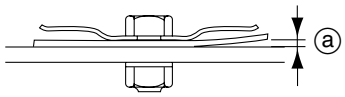
A WH, W, WC
B MH

5

Checking the reed valve

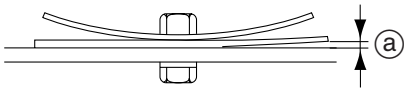
1. Check the reed valves for bends ⓐ. Replace the reed valves if above specification.

A



69R5020B

B



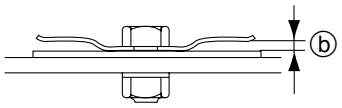
6S650200

Valve bend limit ⓐ:
0.2 mm (0.0079 in)

A E25B, 25B
B 25X, E30H, 30H

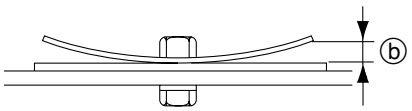
2. Measure the reed valve stopper height ⓑ. Replace the reed valve stopper if out of specification.

A



69R5020A

B

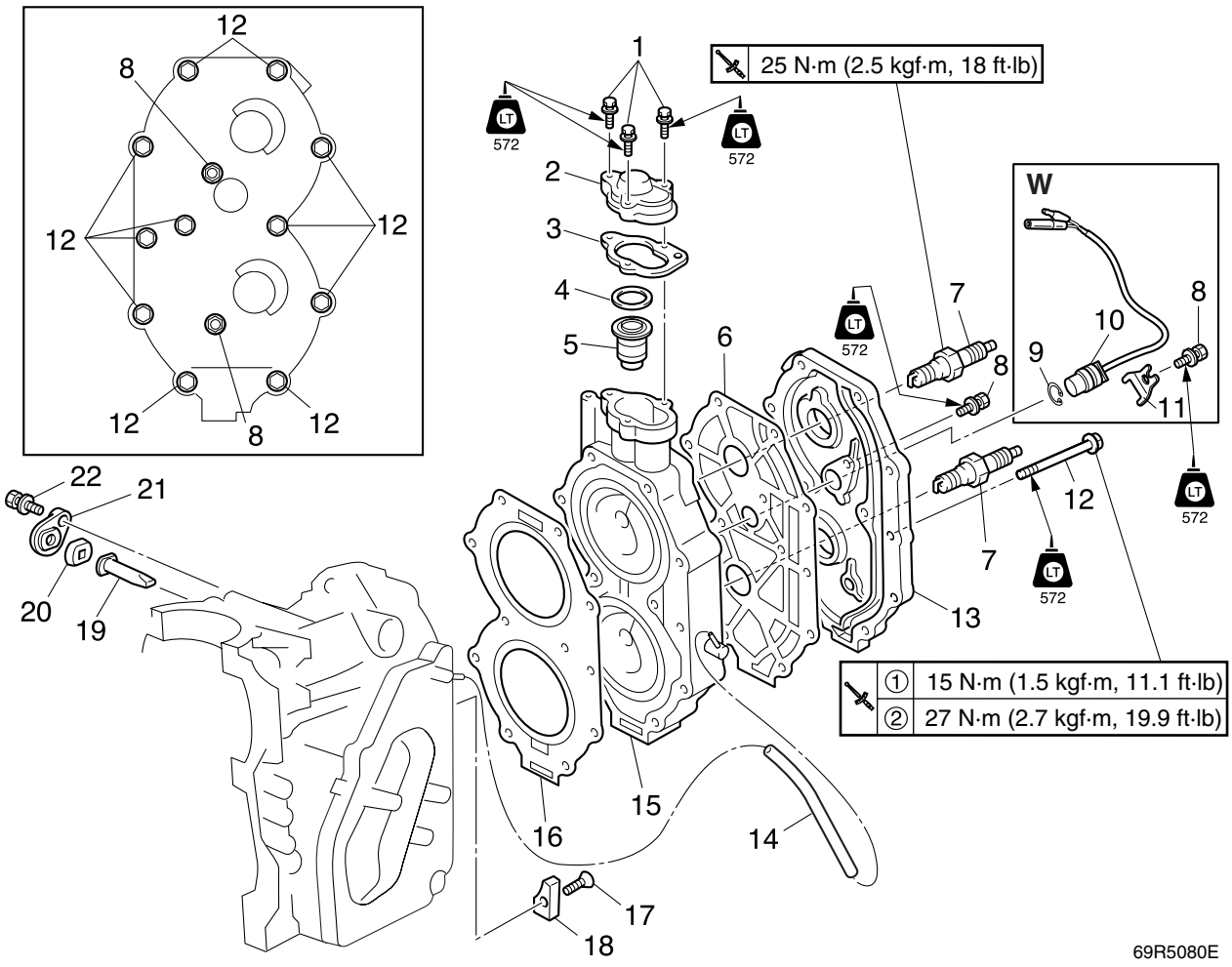


6S650210

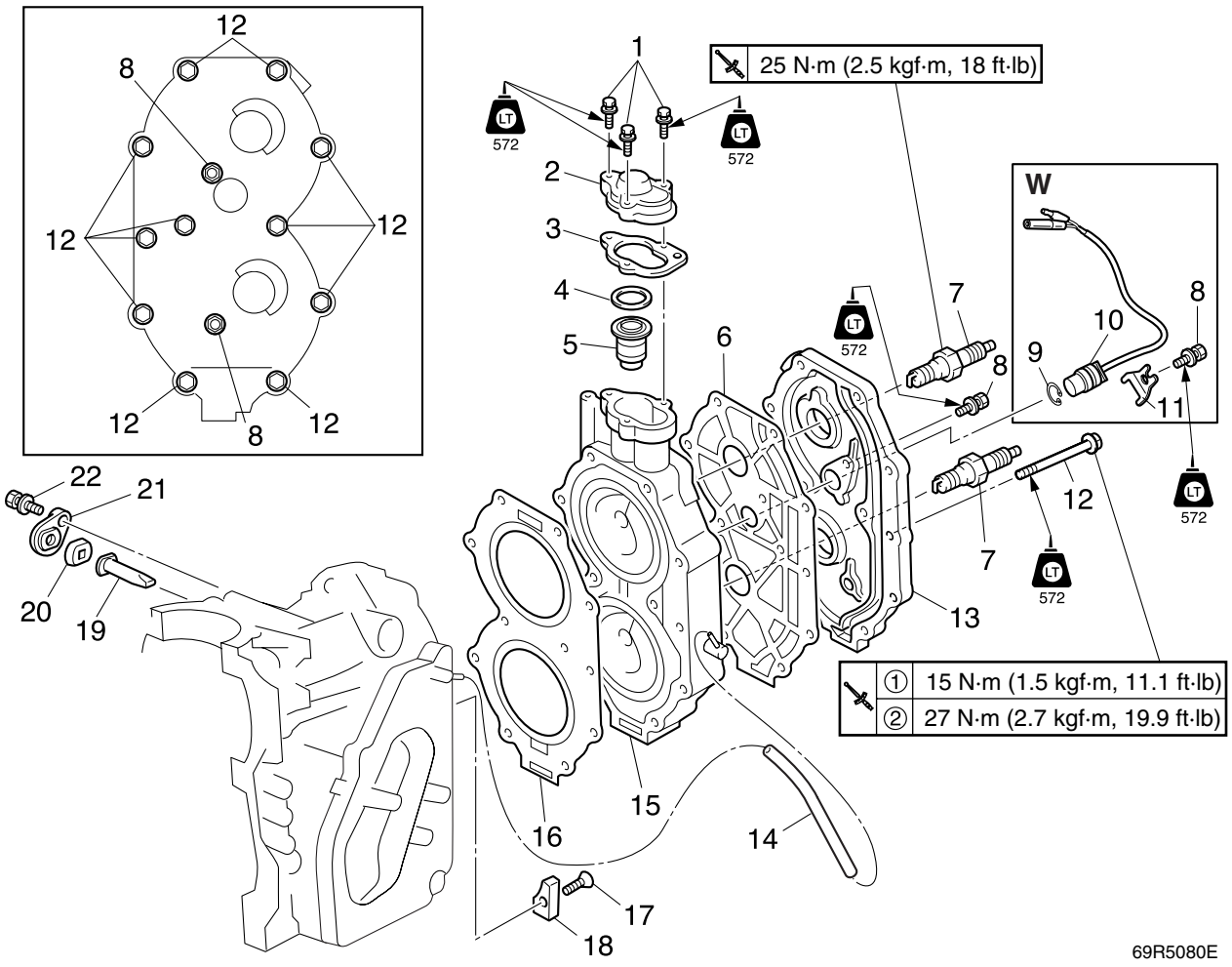
Valve stopper height ⓑ:
E25B, 25B: 1.7–2.3 mm
(0.0669–0.0906 in)
25X, E30H, 30H: 4.75–5.75 mm
(0.1870–0.2264 in)

A E25B, 25B
B 25X, E30H, 30H

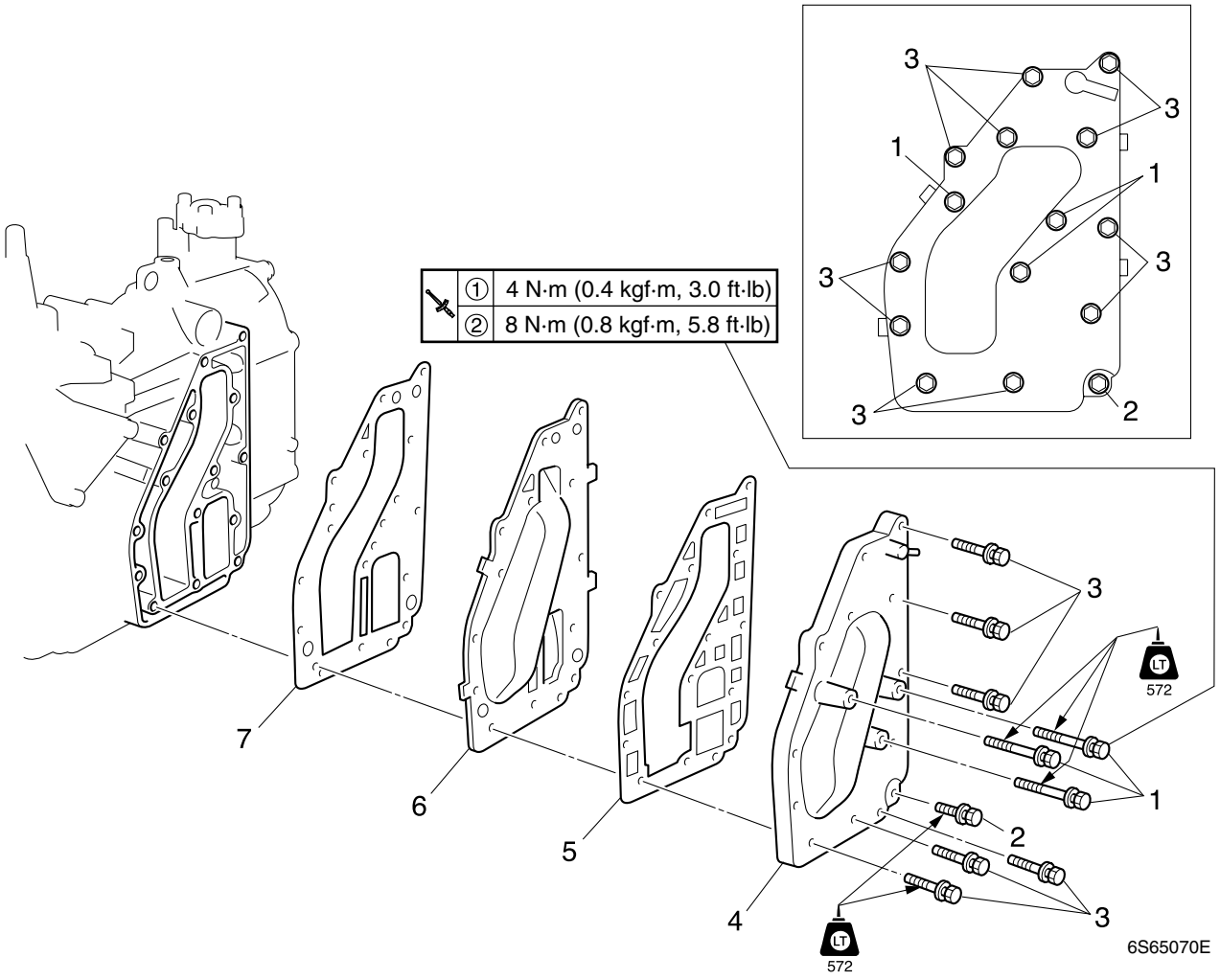
Cylinder head, exhaust cover



No.	Part name	Q'ty	Remarks
1	Bolt	3	M6 × 20 mm
2	Thermostat cover	1	
3	Gasket	1	Not reusable
4	Washer	1	
5	Thermostat	1	
6	Gasket	1	Not reusable
7	Spark plug	2	B7HS-10, BR7HS-10 : E25B, 25B B8HS-10, BR8HS-10 : 25X, E30H, 30H
8	Bolt	2	M6 × 20 mm
9	Circlip	1	W
10	Thermoswitch	1	W
11	Holder	1	W
12	Bolt	11	M8 × 65 mm
13	Cylinder head cover	1	
14	Hose	1	
15	Cylinder head	1	
16	Gasket	1	Not reusable
17	Screw	1	ø6 × 16 mm



No.	Part name	Q'ty	Remarks
18	Anode	1	
19	Anode	1	
20	Grommet	1	
21	Cover	1	
22	Bolt	1	M6 × 16 mm

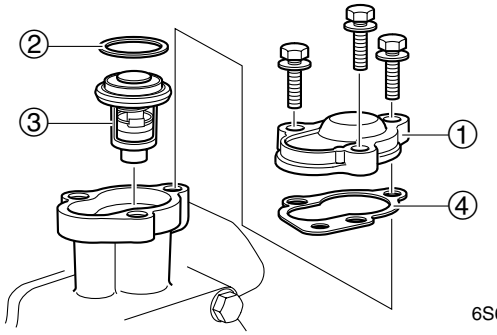


No.	Part name	Q'ty	Remarks
1	Bolt	3	M6 × 50 mm
2	Bolt	1	M6 × 25 mm
3	Bolt	11	M6 × 30 mm
4	Exhaust outer cover	1	
5	Gasket	1	Not reusable
6	Exhaust inner cover	1	
7	Gasket	1	Not reusable

Removing the cylinder head

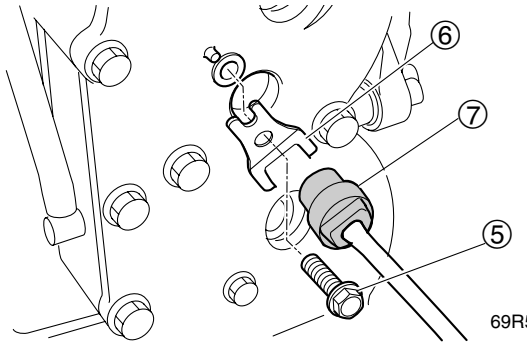
1. Remove the spark plugs.

2. Remove the thermostat cover ①, then remove the washer ②, thermostat ③ and gasket ④.



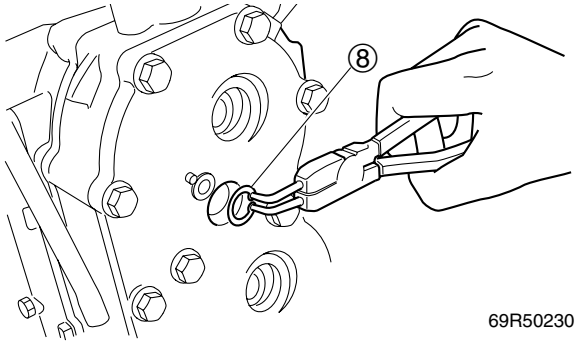
6S630020

3. Remove the cylinder head cover bolt ⑤, holder ⑥ and thermoswitch ⑦ (W).



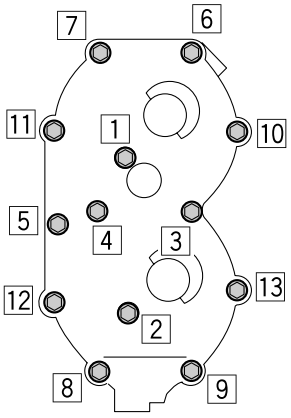
69R50240

4. Remove the circlip ⑧ (W).



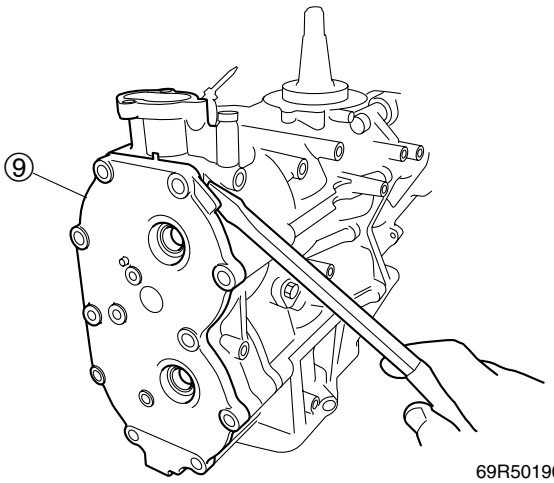
69R50230

5. Remove the cylinder head cover bolts and cylinder head bolts in the sequence shown.

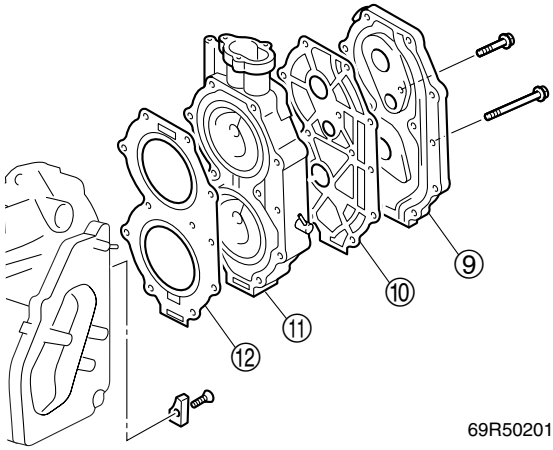


69R5056A

6. Remove the cylinder head cover ⑨, gasket ⑩, cylinder head ⑪ and gasket ⑫.



69R50190



69R50201

CAUTION:

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

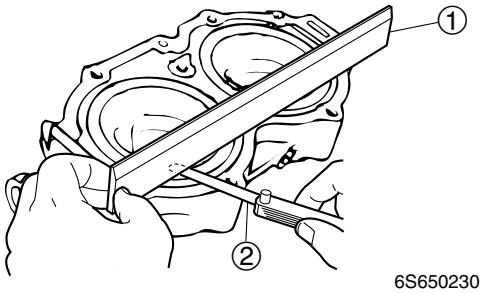
Checking the cylinder head

1. Clean the carbon deposits from the combustion chambers. Check the cylinder head cover and cylinder head. Replace the cylinder head cover or cylinder head if cracked or corroded.

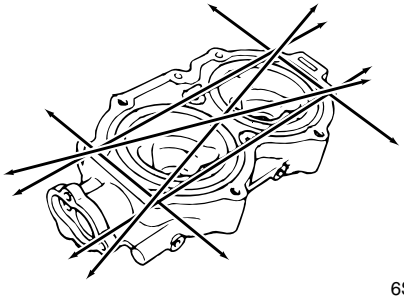
NOTE:

To check the cylinder anode, refer to page 3-15.

2. Check the cylinder head warpage using a straightedge ① and thickness gauge ② in directions as shown. Replace the cylinder head if above specification.



6S650230

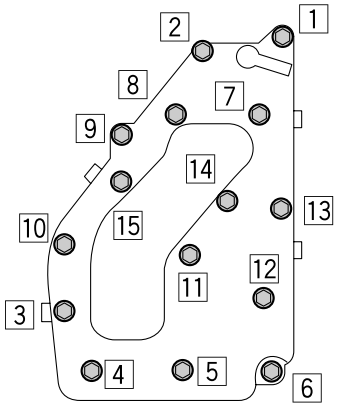


6S650240

Cylinder head warpage limit:
0.1 mm (0.0039 in)

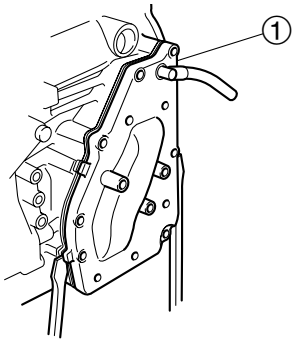
Removing the exhaust cover

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

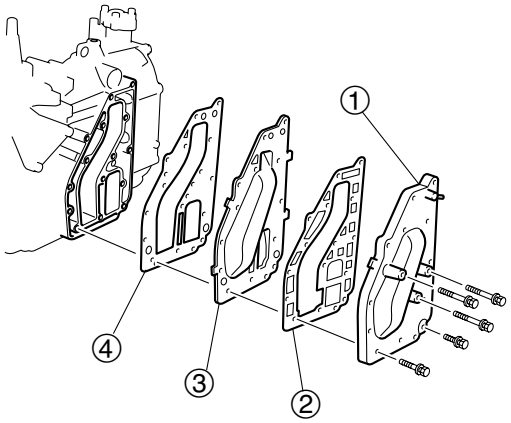


6S650250

2. Remove the exhaust outer cover ①, gasket ②, exhaust inner cover ③ and gasket ④.



69R50170



69R5053A

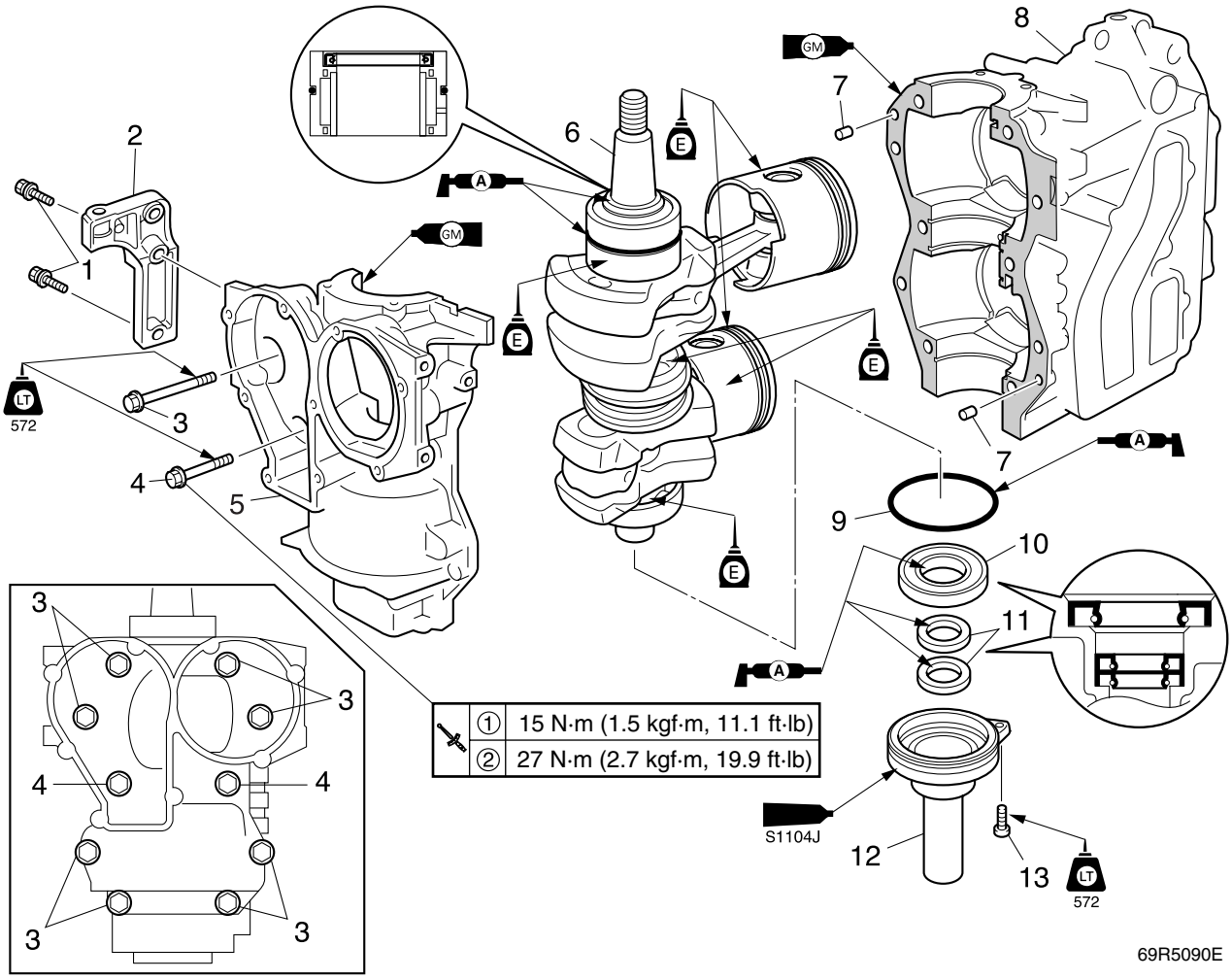
NOTE:

Insert a flat-head screw driver between the pry tabs to pry off the exhaust covers.

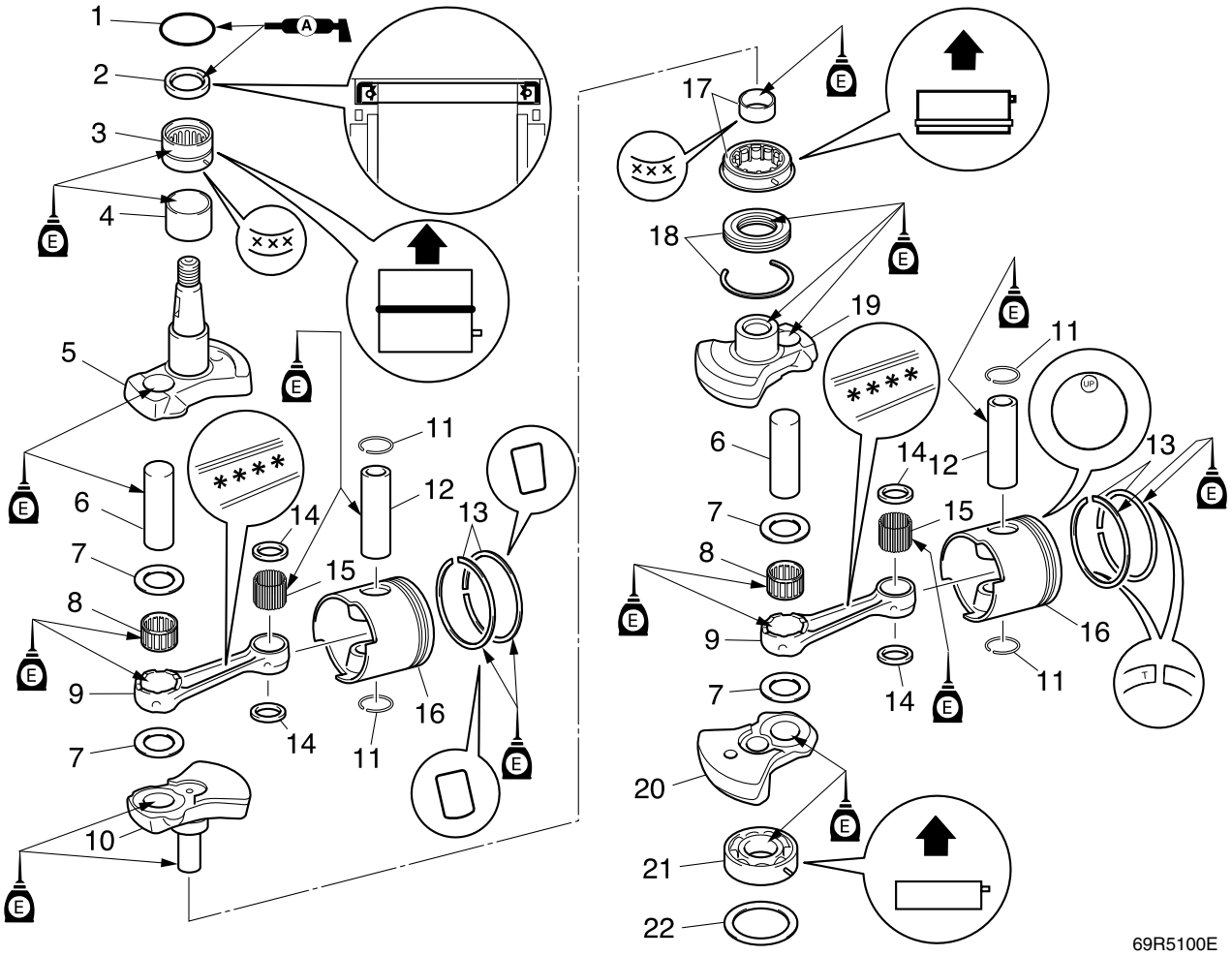
Checking the exhaust cover

1. Check the exhaust cover. Replace the exhaust cover if cracked or corroded.

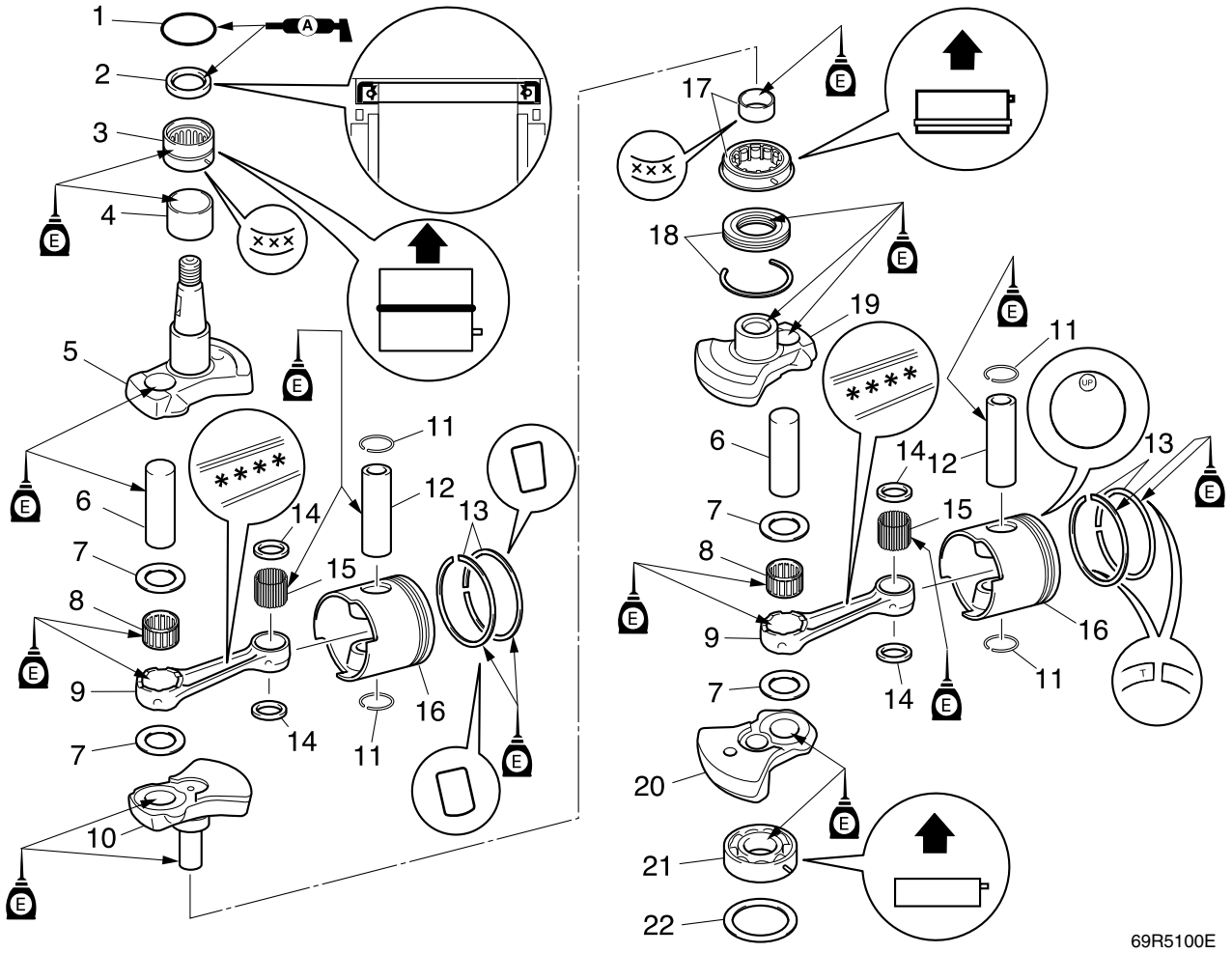
Crankcase



No.	Part name	Q'ty	Remarks
1	Bolt	2	M6 × 25 mm
2	Bracket	1	
3	Bolt	8	M8 × 60 mm
4	Bolt	2	M8 × 45 mm
5	Crankcase	1	
6	Crankshaft assembly	1	
7	Dowel	2	
8	Cylinder block	1	
9	O-ring	1	Not reusable
10	Oil seal	1	Not reusable
11	Oil seal	2	Not reusable
12	Oil seal housing	1	
13	Bolt	1	M6 × 22 mm



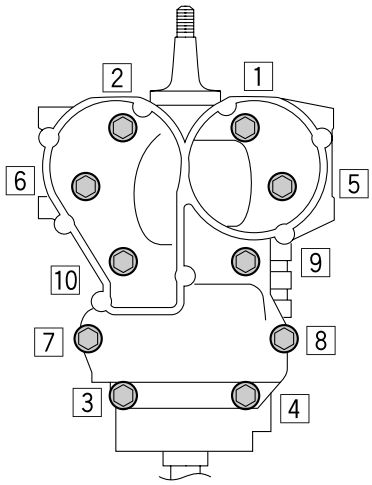
No.	Part name	Q'ty	Remarks
1	O-ring	1	Not reusable
2	Oil seal	1	Not reusable
3	Roller bearing	1	Not reusable
4	Collar	1	
5	Crank 1	1	
6	Crank pin	2	
7	Washer	4	
8	Roller bearing	2	Not reusable
9	Connecting rod	2	
10	Crank 2	1	
11	Circlip	4	Not reusable
12	Piston pin	2	
13	Piston ring set	2	
14	Washer	4	
15	Needle bearing	68	
16	Piston	2	
17	Roller bearing	1	



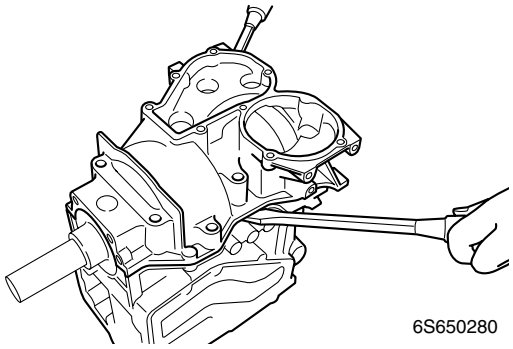
No.	Part name	Q'ty	Remarks
18	Labyrinth seal	1	
19	Crank 3	1	
20	Crank 4	1	
21	Ball bearing	1	Not reusable
22	Washer	1	

Removing the crankcase

1. Remove the crankcase bolts in the sequence shown.



6S650270



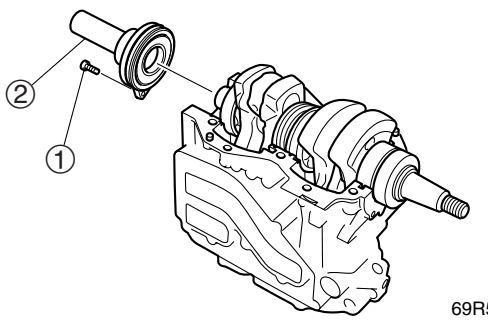
6S650280

NOTE:

Insert a flat-head screw driver between the pry tabs to pry off the crankcase.

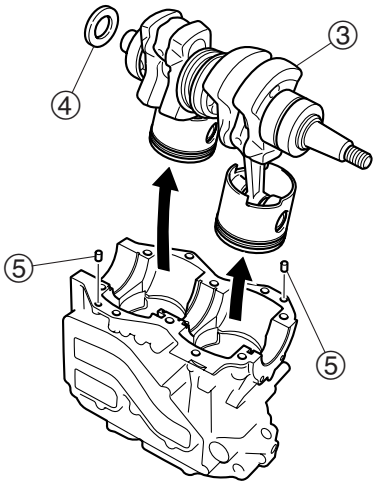
Removing the crankshaft assembly and oil seal housing

1. Remove the oil seal housing bolt ① and oil seal housing ②.



69R50260

2. Remove the crankshaft assembly ③, washer ④ and dowels ⑤.



69R50270

Disassembling the piston

1. Remove the clips, and then remove the piston pin.
2. Remove the piston from the connecting rod.
3. Remove the bearings and washers at the connecting rod small end.
4. Remove the top and 2nd piston ring.

NOTE:

To check the piston, refer to page 5-31.

Checking the cylider block

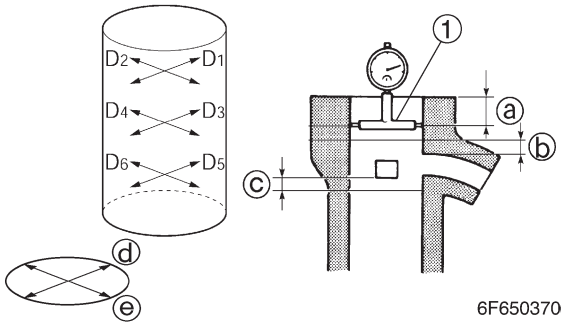
CAUTION:

Do not scratch the mating surfaces of the cylinder head and cylinder block.

1. Check the cylinder sleeves. Replace the cylinder block if cracked or damaged.
2. Remove any rust or deposits on the cooling water passage walls, and check the cooling water passage walls. Clean or replace the cylinder block for residue.
3. Remove the carbon deposits on the exhaust passage walls, and check the exhaust passage walls. Replace the cylinder block if cracked or damaged.

Checking the cylinder bore

1. Measure the cylinder bore (D_1–D_6) at measuring points ⓐ, ⓑ, and ⓒ, and in direction ⓓ (D_1, D_3, D_5), which is parallel to the crankshaft, and direction ⓔ (D_2, D_4, D_6), which is at a right angle to the crankshaft.



6F650370

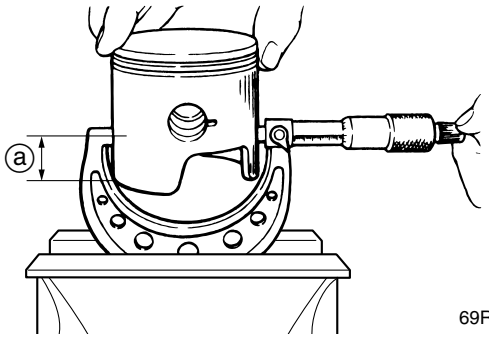
ⓐ:10.0 mm (0.39 in) from the cylinder head top surface
ⓑ:5.0 mm (0.20 in) above the exhaust port upper edge
ⓒ:5.0 mm (0.20 in) below the scavenging port lower edge

Cylinder bore diameter (D_1–D_6):
72.000–72.020 mm
(2.8346–2.8354 in)

Cylinder gauge ①:
90890-06759

Checking the piston diameter

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

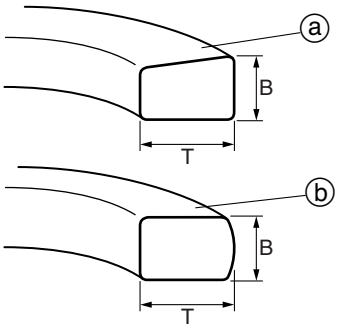


69R50310

Piston outside diameter:
71.935–71.960 mm
(2.8321–2.8331 in)
Measuring point ⓐ:
10.0 mm (0.39 in) up from the bottom of the piston skirt.
Oversize piston diameter:
1st:
72.185–72.210 mm
(2.8419–2.8429 in)
2nd:
72.435–72.460 mm
(2.8518–2.8528 in)

Checking the piston ring

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

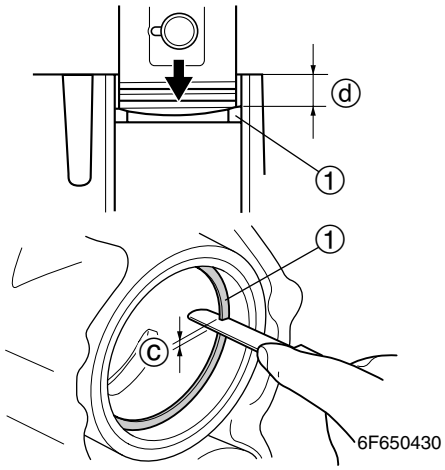


6B450460

Piston ring dimensions
Top ⓐ and 2nd piston ring ⓑ:
B: 1.970–1.990 mm
(0.0776–0.0783 in)
T: 2.900–3.100 mm
(0.1142–0.1220 in)

2. Level the piston rings ① in a cylinder with a piston crown.

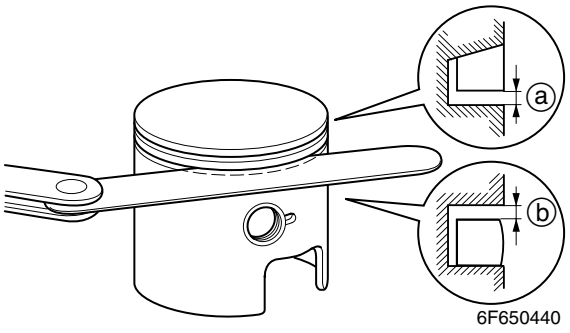
3. Measure the piston ring end gap ⓒ at the specified measuring point. Replace the piston ring set if out of specification.



Piston ring end gap ⓒ: (reference data)
Top and 2nd piston ring:
0.20–0.35 mm
(0.0079–0.0138 in)
Measuring point ⓓ:
10.0 mm (0.39 in)

Checking the piston ring side clearance

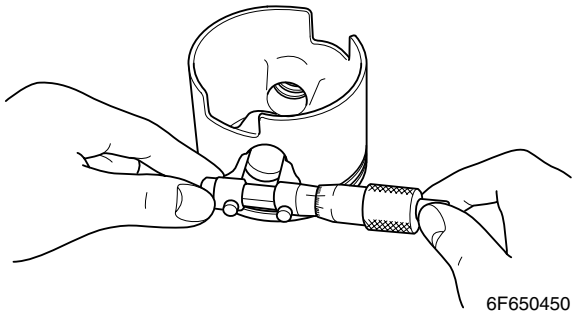
1. Measure the piston ring side clearance. Replace the piston and piston rings as a set if out of specification.



Piston ring side clearance:
Top piston ring ⓐ:
0.02–0.06 mm
(0.0008–0.0024 in)
2nd piston ring ⓑ:
0.03–0.07 mm
(0.0012–0.0028 in)

Checking the piston pin boss bore

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

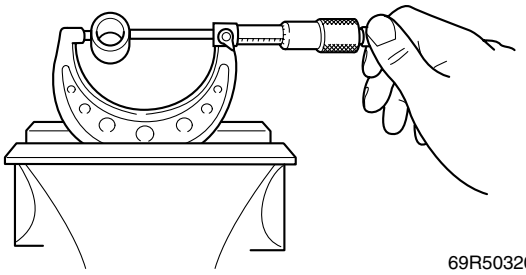


Piston pin boss bore:
19.904–19.915 mm
(0.7836–0.7841 in)

5

Checking the piston pin

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

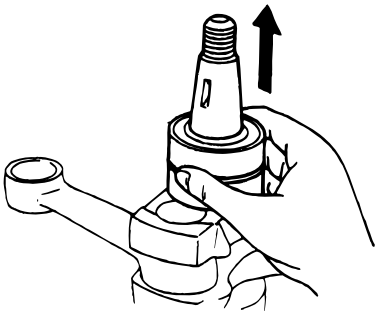


Piston pin outside diameter:
19.895–19.900 mm
(0.7833–0.7835 in)

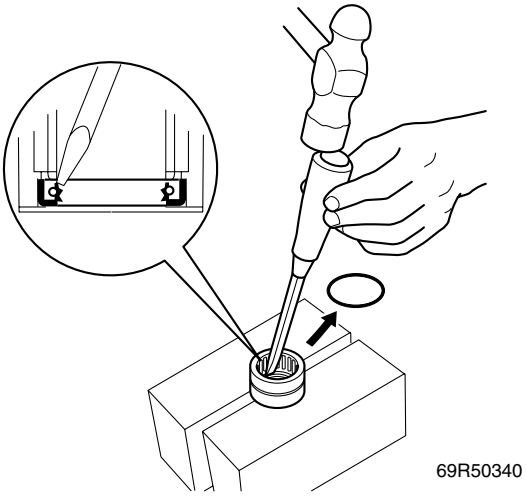
Disassembling the crankshaft assembly

NOTE:
Mark the identification to the crankpin, crank and connecting rod before disassembly.

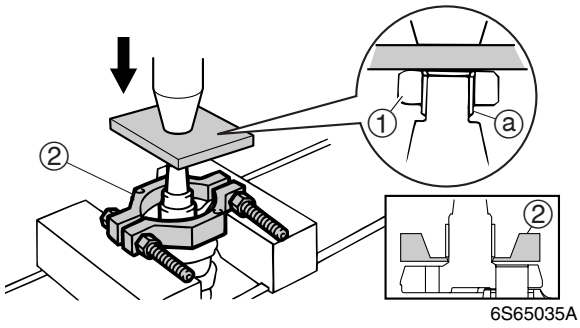
1. Remove the roller bearing.



2. Remove the oil seal and O-ring.



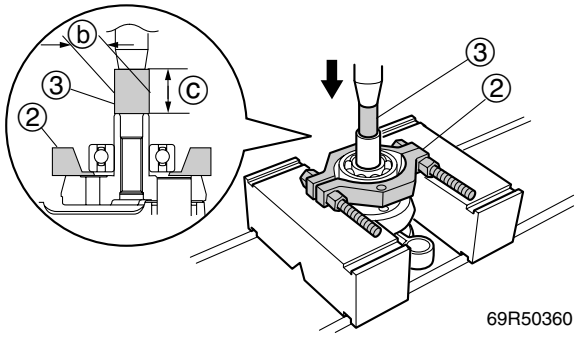
3. Install the flywheel magnet nut ① and tighten it temporary tight, then remove the collar using a press.



CAUTION:
- **Do not flush the surfaces of flywheel magnet nut and crankshaft.**
- **Do not press the crank shaft threads ⓐ directly.**

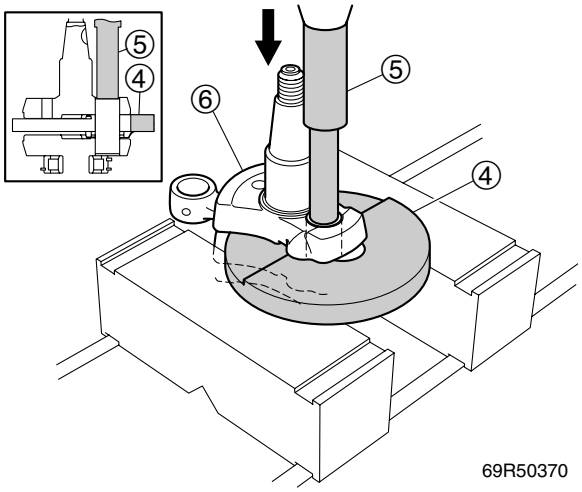
Bearing separator ②: 90890-06534
or commercially available tool.

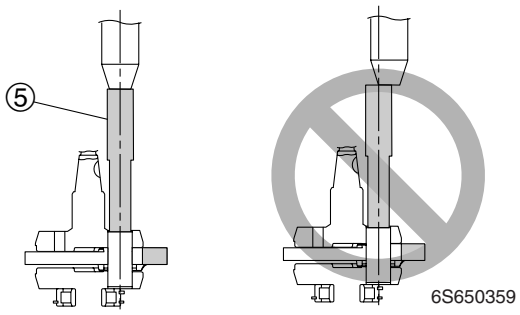
4. Turn the crankshaft upside down as shown, and then remove the ball bearing using a press.



Bearing separator ②: 90890-06534 or commercially available tool.
Appropriate rod ③:
ⓑ: 24 mm (0.94 in)
ⓒ: 50 mm (1.97 in)

5. Install the plate A ④ and pressure pin B ⑤ to remove the crank 1 ⑥ using a press.





CAUTION:

- **Apply pressure to pressure pin B ⑤ slowly.**
- **Hold the pressure pin B ⑤ in line with the press screw spindle.**

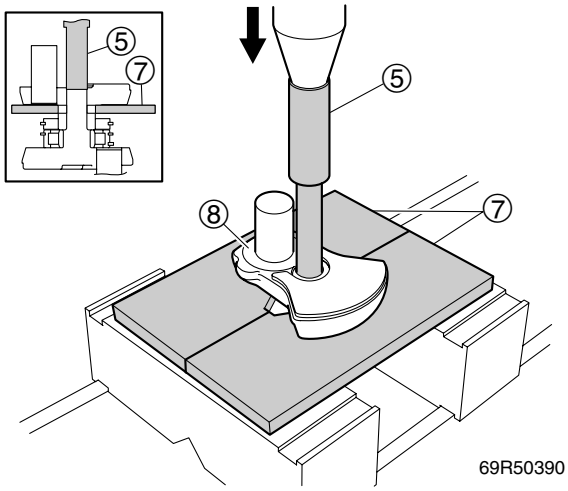
NOTE:

- When forcing out the crank pin, use care so that the crank does not fall.
- To remove the crank 4, follow the same procedure.

Plate A ④: 90890-02386
Pressure pin B ⑤ : 90890-02390

6. Remove the washers, roller bearing and connecting rod.

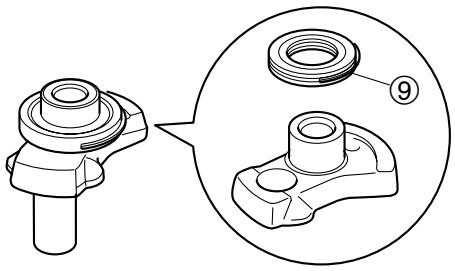
7. Set the support ⑦ and install the pressure pin B ⑤ to remove the crank 3 ⑧ using a press.



Pressure pin B ⑤: 90890-02390
Support ⑦: 90890-02394

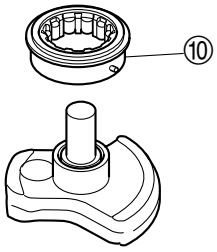
5

8. Remove the labyrinth seal ⑨.



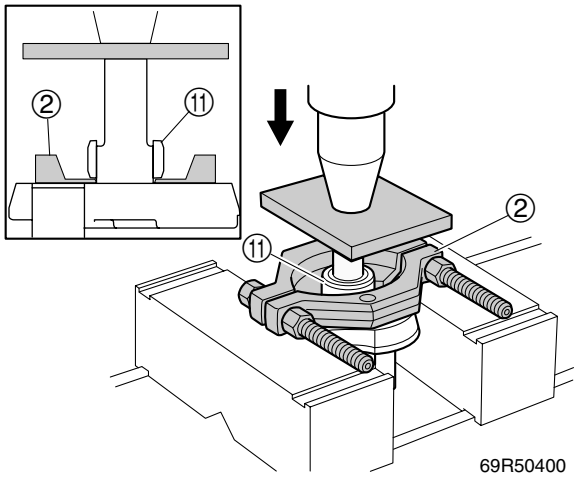
6S650360

9. Remove the roller bearing ⑩.



6F650470

10. Install the bearing separator ② to remove the inner race ⑪ from the crankshaft using a press.



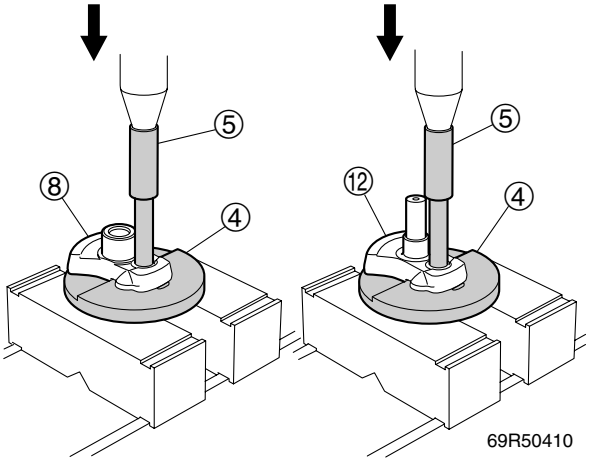
69R50400

NOTE:

- Install the bearing separator craw securely and slightly move the inner race.
- Use care not to scratch the shaft.

Bearing separator ②: 90890-06534
or commercially available tool.

11. Install the plate A ④ and pressure pin B ⑤ to remove the crank pin from the crank 2 ⑫ and crank 3 ⑧ using a press.



69R50410

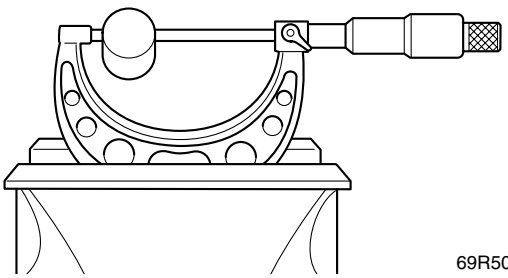
CAUTION:

- **Apply pressure to pressure pin B ⑤ slowly.**
- **Hold the pressure pin B ⑤ in line with the press screw spindle.**

Plate A ④: 90890-02386
Pressure pin B ⑤: 90890-02390

Checking the crankpin

1. Measure the crankpin diameter. Replace the crank pin if out of specification.



69R50420

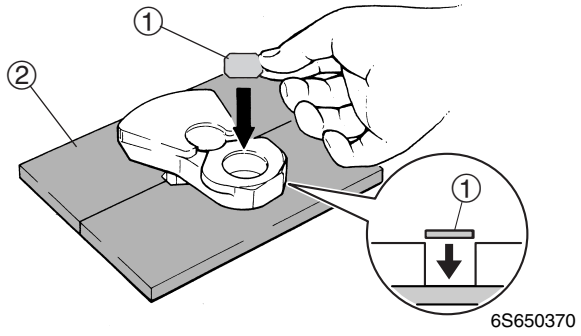
Crankpin diameter:
23.995–24.000 mm
(0.9447–0.9449 in)

Assembling the crankshaft assembly

CAUTION:

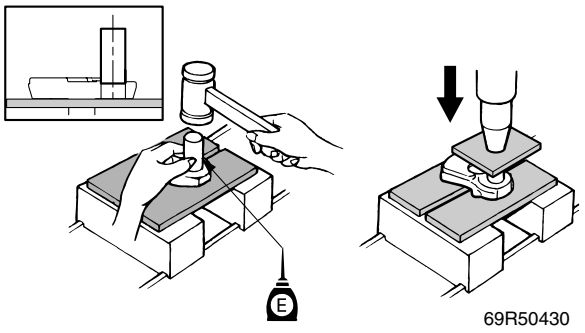
- **When reassembling the crankshaft, wash all component parts in clean kerosene (do not use gasoline).**
- **Do not reuse bearings, always replace them with new ones.**

1. Insert the spacer B ① into the crankpin hole of crank 2 or crank 4.



Spacer B ①: 90890-02396
Support ②: 90890-02394

2. Apply engine oil to the crankpin and install it onto the crank, then tap with a copper hammer. Install the crank pin using a press.

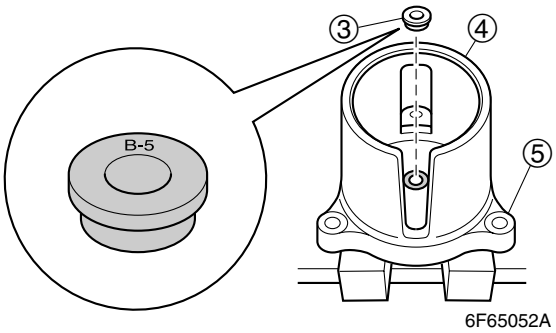


CAUTION:

- **Take care so that the crank pin is set vertically into the crank web.**
- **Do not apply force in excess of 5 tons.**

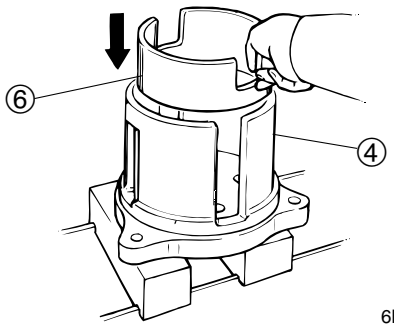
NOTE:
Follow the same procedure for crank 2 and crank 4 to install the crankpins.

3. Install the bushing ③ into the body ④.



Bushing-5 ③: 90890-02359
Body ④: 90890-02352
Flange ⑤: 90890-02351

4. Install the height ring ⑥ in the body ④.

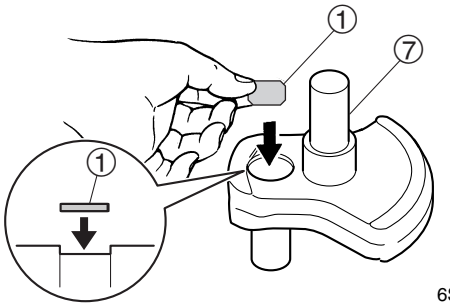


NOTE:
Align the slot in the height ring with the slot in the body.

Body ④: 90890-02352
Height ring-13 (H13) ⑥:
90890-02379

5

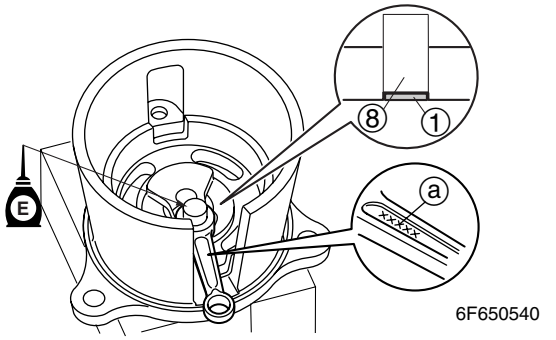
5. Install the spacer B ① on the crank 2 ⑦ or crank 4.



Spacer B ①: 90890-02396

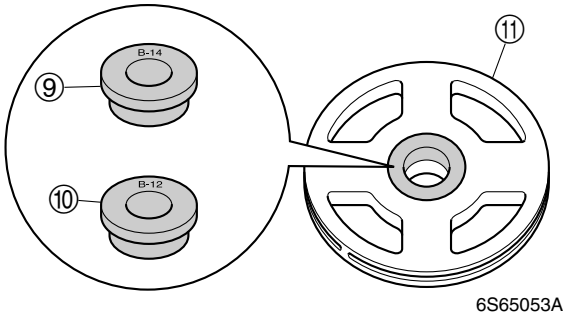
6. Turn the crank 2 or crank 4 upside down, and then install the special service tool.

7. Install the washers, roller bearing, and connecting rod on the crankpin ⑧.



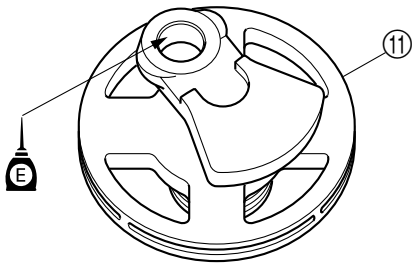
NOTE:
- Turn the crank upside down so that the crankpin is on top, and then insert the crank into the special service tool.
- Take care so that spacer B ① is not out of the crank.
- The model number ⓐ on the connecting rod should face up.

8. Install the bushing ⑨ or ⑩ on the pressure plate ⑪.

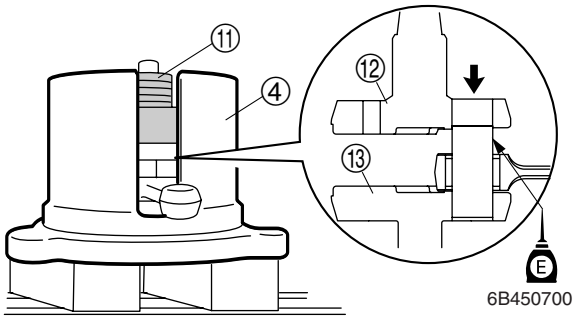


Bushing-14 ⑨ (for crank 1): 90890-02419
Bushing-12 ⑩ (for crank 3): 90890-02366
Pressure plate ⑪: 90890-02384

9. Install the crank 1 or crank 3 to the pressure plate ⑪.



10. Align the crankpin hole in crank 1 ⑫ or crank 3 with the crankpin fitted to crank 2 ⑬ or crank 4 and install the pressure plate ⑪ in the body ④.

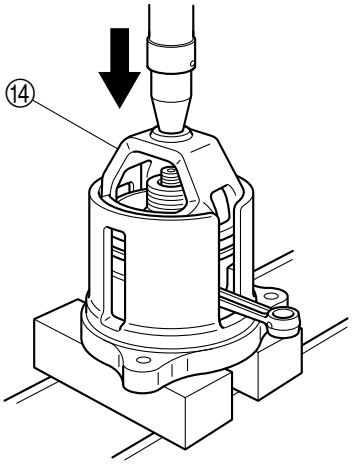


NOTE:
Apply engine oil to the crankpin.

11. Install the press body ⑭ and install the crank 1 or crank 3 onto the crank 2 or crank 4 using a press.

CAUTION:

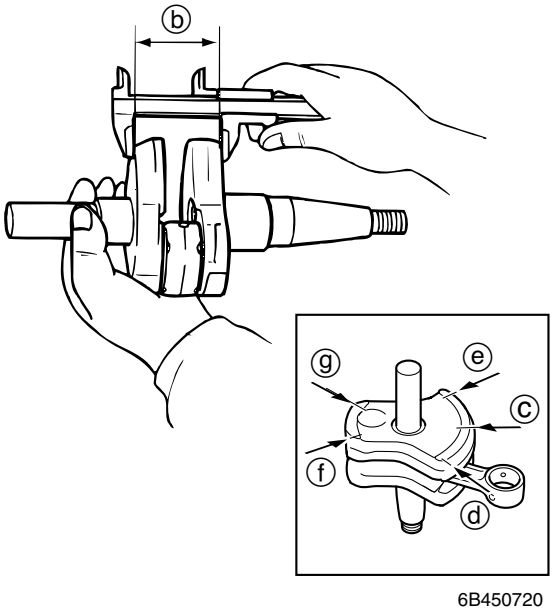
Do not apply force in excess of 5 tons.



69R50715

Press body ⑭: 90890-02385

12. Measure the width ⓑ of the assembled crankshaft using calipers. Measurements should be made at positions ⓒ to ⓖ.



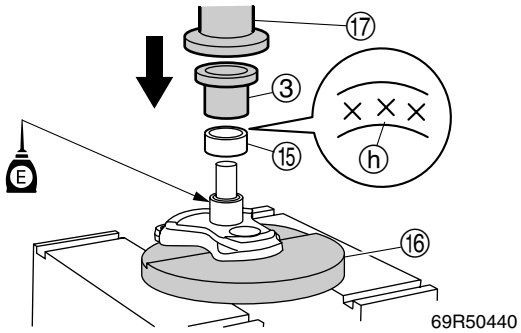
6B450720

NOTE:

If the measurements ⓒ–ⓖ are out of specification, reassemble the crankshaft.

Crankshaft width ⓑ:
56.90–56.95 mm
(2.2401–2.2421 in)

13. Install the inner race ⑮ onto crank 2 using a press and the bushing ③. Carefully press the inner race onto the crankshaft.



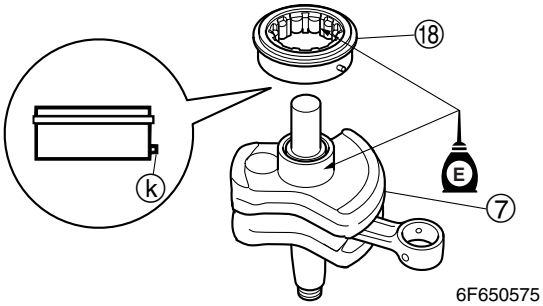
69R50440

NOTE:

Install the inner race with the identification mark ⓗ facing toward the lower case side.

Plate A ⑯: 90890-02386
Bushing-5 ③: 90890-02359
Bearing preassur B ⑰: 90890-02392

14. Install the roller bearing ⑱ onto the crank 2 ⑦.



6F650575

NOTE:

Make sure the pin ⓚ side of the roller bearing faces crank 2.

5

15. Install the plate A ⑯ to the crank 3 then install the labyrince seal ⑲.

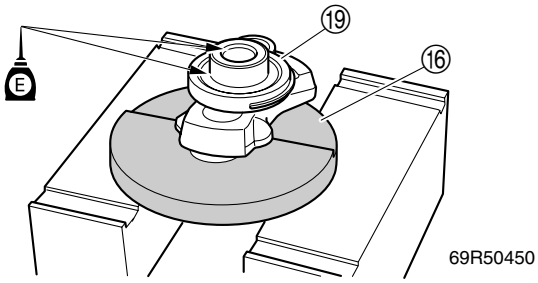
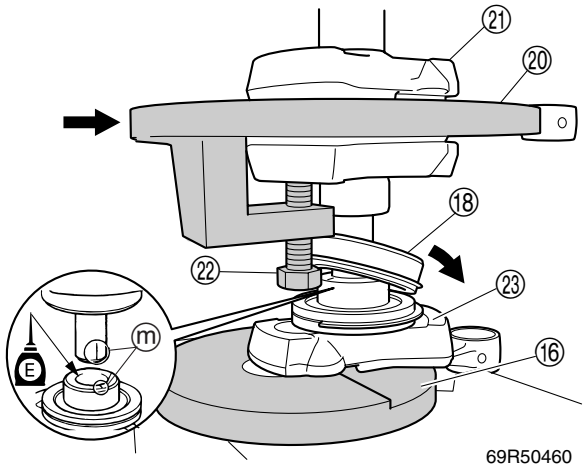


Plate A ⑯: 90890-02386

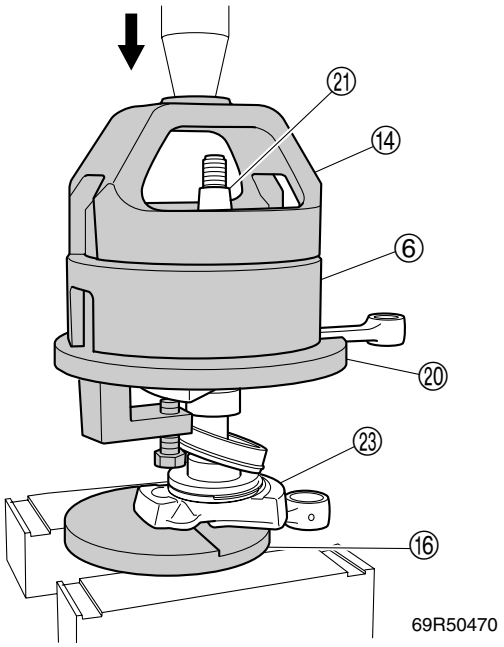
16. Install the plate B ⑳ to the crank assembly 1 ㉑, and then install them onto the crank assembly 2 ㉓.



NOTE:
- Align the marks ⓜ on the crank 2 and crank 3.
- Change the position of the roller bearing ⑱ to avoid interfering to the plate B.
- Push the plate B completely, and then install the bolt ㉒ to hold the crank 2.

Plate A ⑯: 90890-02386
Plate B ⑳: 90890-02387

17. Install the height ring ⑥, press body ⑭ on the plate B ⑳, and then install the crank assembly 1 ㉑ into the crank assembly 2 ㉓ using a press to 2/3 enters.



CAUTION:
- **Hold the crank assembly in line to press, otherwise the crankshaft may be damaged.**
- **Take care to press so that the the crank assembly 1 does not come in contact with the roller bearing.**

NOTE:
- Install the height ring to the centered position on the crankshaft.
- Apply pressure gradually and check the crankshaft runout during this procedure.

Plate A ⑯: 90890-02386
Plate B ⑳: 90890-02387
Height ring-13 (H-13) ⑥: 90890-02379
Press body ⑭: 90890-02385

18. Release the pressure, then remove the bolt ㉒ to pull the plate B ⑳ outside.

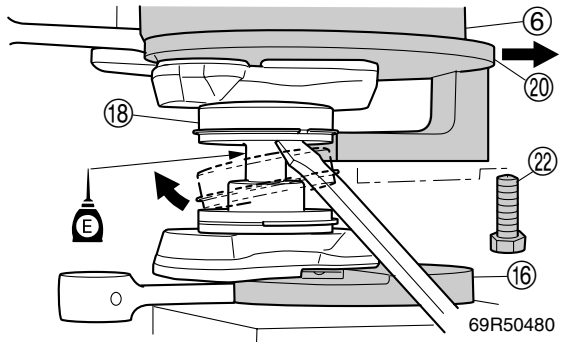


Plate A ⑯: 90890-02386
Plate B ⑳: 90890-02387
Height ring-13 (H13) ⑥: 90890-02379
Press body ⑭: 90890-02385

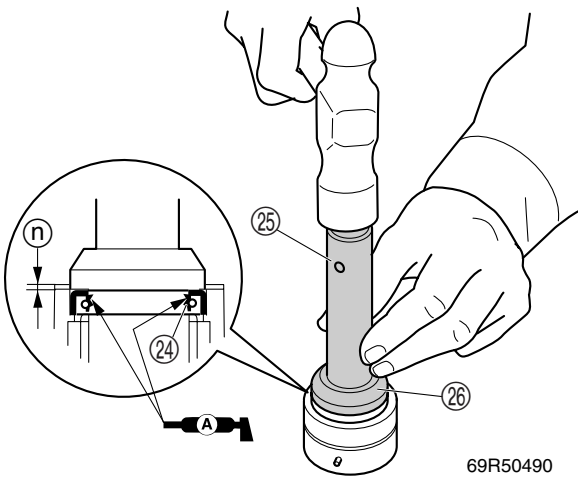
NOTE:
Change the position of the plate B ⑳ when the arm of the plate B pass the roller bearing ⑱.

19. Press the press body to carefully and completely using a press.

CAUTION:
Do not apply force in excess of 10 tons.

NOTE:
Be sure to measure the crankshaft widths and runout, refer to page 5-41. Reassemble the crankshaft if out of specifications.

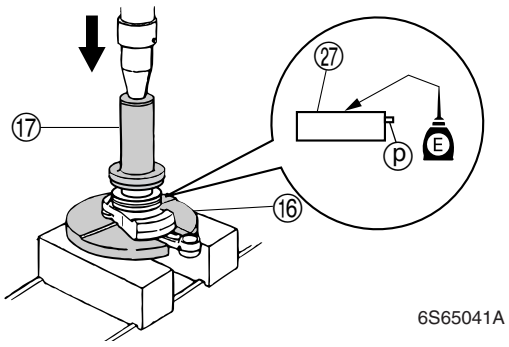
20. Install a new oil seal ㉔ to the roller bearing.



Driver rod LS ㉕: 90890-06606
Bearing outer race attachment ㉖: 90890-06628

Installation depth ⓝ: 0.5 mm (0.0197 in)

21. Install the bearing pressure B ⑰ and plate A ⑯ to install the ball bearing ㉗.

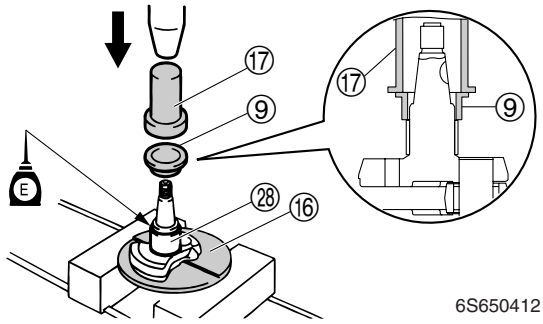


CAUTION:
Do not reuse bearings, always replace them with new ones.

NOTE:
Install the ball bearing so that the pin ⓟ faces the flywheel magnet side.

5

22. Install the bushing-14 ⑨ and bearing pressure B ⑰ to install the collar ㉘ using a press, then install the roller bearing with hands.



6S650412

CAUTION:

Do not reuse bearings, always replace them with new ones.

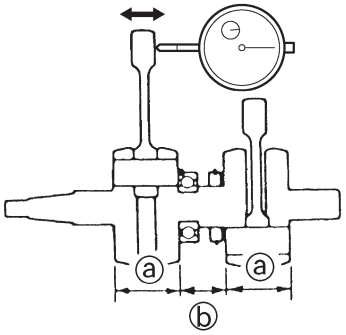
Bearing pressure B ⑰:
90890-02392
Bushing-14 ⑨: 90890-02419
Plate A ⑯: 90890-02386

23. Slowly turn the crankshaft and connecting rods. If it does not turn smoothly, disassemble the crankshaft and adjust or replace any parts as necessary.

Checking the crankshaft

1. Measure the crankshaft widths ⓐ and ⓑ. Repair or reassemble the crankshaft if out of specification.

2. Measure the connecting rod small end axial play when disassemble the crankshaft. Replace the bearing and connecting rod if above specification.



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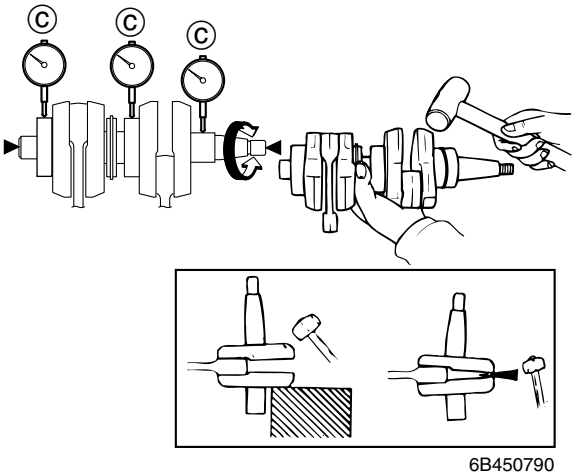
Crankshaft width ⓐ:
56.90–56.95 mm
(2.2401–2.2421 in)
Crankshaft width ⓑ:
39.9–40.1 mm
(1.5709–1.5787 in)
Small-end axial play limit:
2.0 mm (0.08 in)

3. Measure the crankshaft runout. Repair or reassemble the crankshaft if above specification.

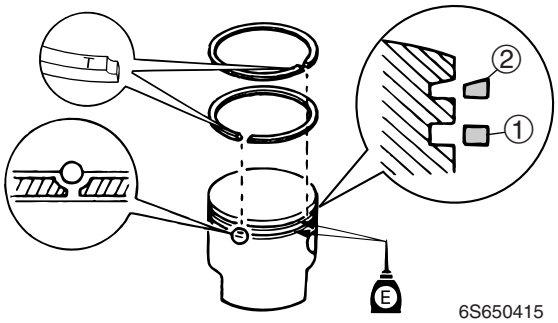


6B450790

Crankshaft runout limit ⓒ:
0.03 mm (0.0012 in)

Assembling the piston

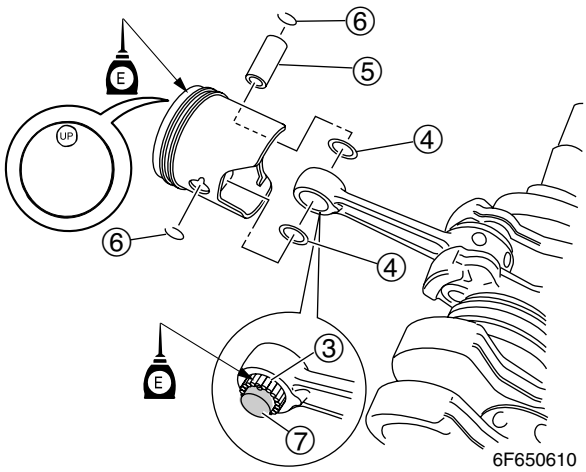
1. Install the 2nd piston ring ① and top piston ring ②.



NOTE:

- Install the 2nd piston ring to lower slot and install the top piston ring to upper slot so that they are positioned properly.
- Install the piston rings with the recess for the locating pin facing up toward the piston crown.

2. Install the needle bearings ③, washers ④, piston pin ⑤ and new clips ⑥.



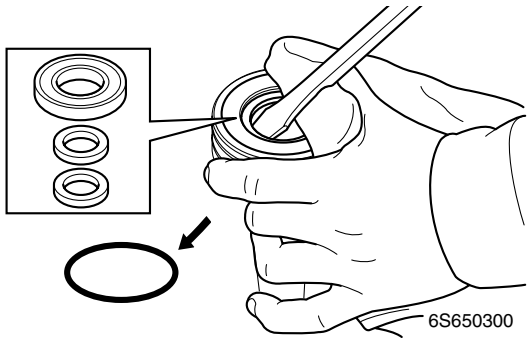
NOTE:

- Make sure that the piston, piston pin and needle bearings are installed in their original combination.
- Make sure that the up mark on the piston crown faces the flywheel magnet side.

Small end bearing installer ⑦:
90890-06527

Disassembling the oil seal housing

1. Remove the O-ring and oil seals.

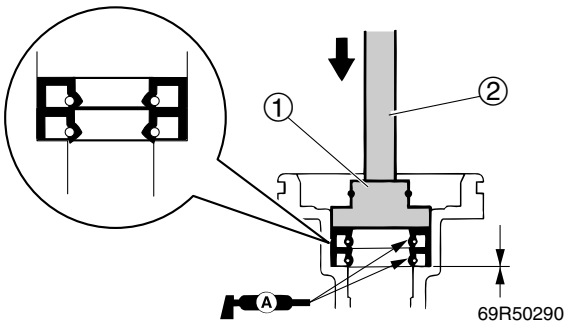


Checking the oil seal housing

1. Check the oil seal housing. Replace the oil seal housing if cracked, damaged, or corrosion.

Assembling the oil seal housing

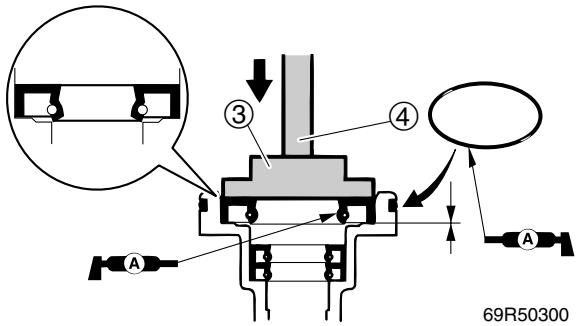
1. Apply grease to new oil seals, and then install them into the oil seal housing.



Needle bearing attachment ①:
90890-06613
Driver rod L3 ②: 90890-06652

5

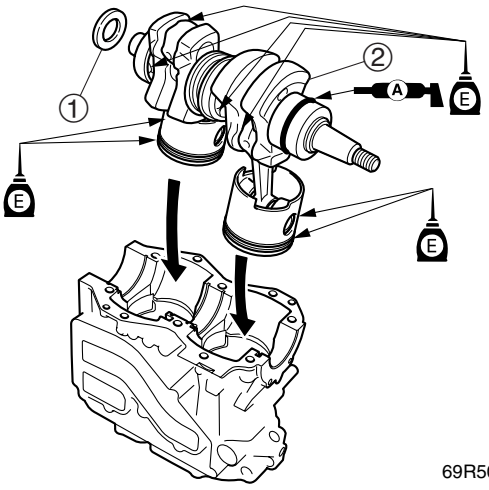
2. Apply grease to new oil seal, new O-ring, and then install them into the oil seal housing.



Needle bearing attachment ③: 90890-06632
Driver rod LS ④: 90890-06606

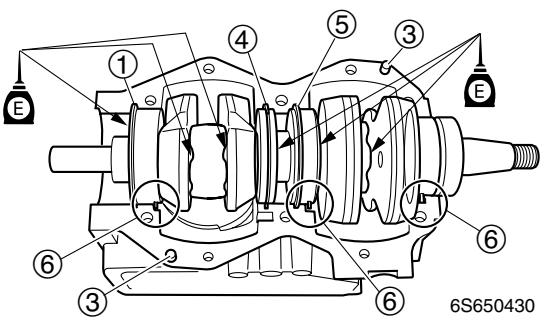
Assembling the power unit

1. Install the washer ① to the crankshaft assembly ② into the cylinder block.



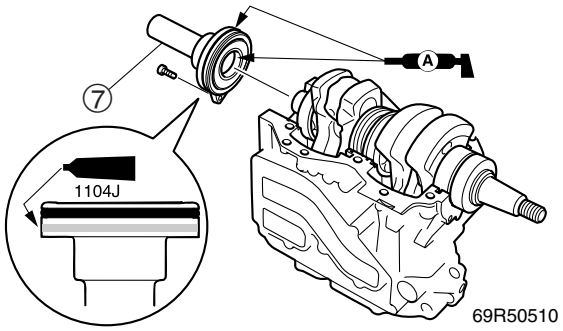
NOTE:
Apply engine oil to the pistons, piston rings and bearings before installation.

2. Install the dowels ③.

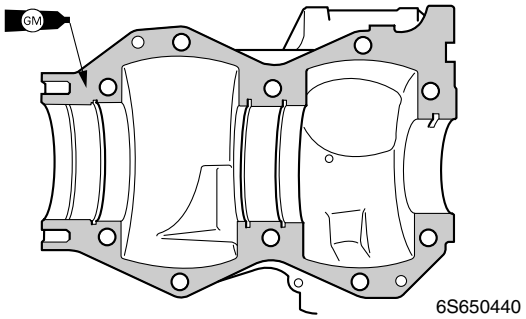


NOTE:
- Align the washer ①, clip ④, ring ⑤ with the grooves in the cylinder block.
- Align the pins of the bearings with the slots ⑥ on the cylinder block.

3. Install the oil seal housing ⑦ to the cylinder block, and then tighten the oil seal housing bolt.

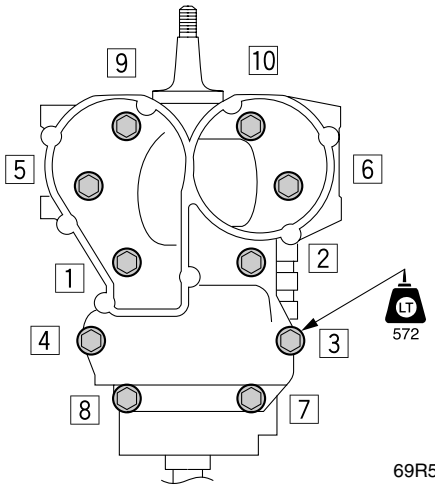


4. Apply gasket maker to the mating surface of the crankcase.



NOTE:
- Remove the any oil or grease from the crankcase mating surfaces.
- Do not get any gasket maker on the journals.

5. Install the crankcase onto the cylinder block, and then tighten the crankcase bolts to the specified torques in 2 stages and in the sequence as shown.



69R50520

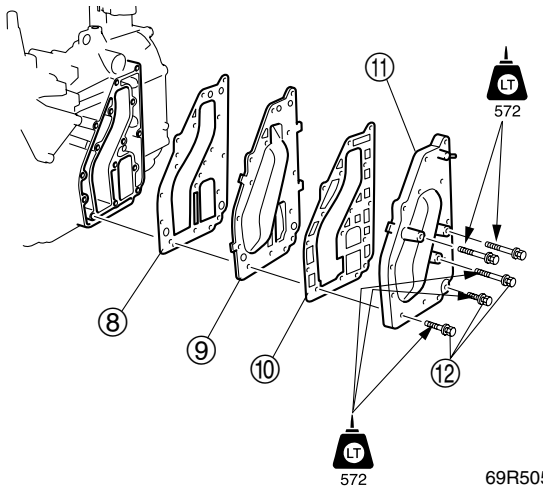
	Crankcase bolt: 1st: 15 N·m (1.5 kgf·m, 11.1 ft·lb) 2nd: 27 N·m (2.7 kgf·m, 19.9 ft·lb)

6. Slowly turn the crankshaft. If it does not turn smoothly, disassembled the crankshaft and adjust or replace any parts as necessary.

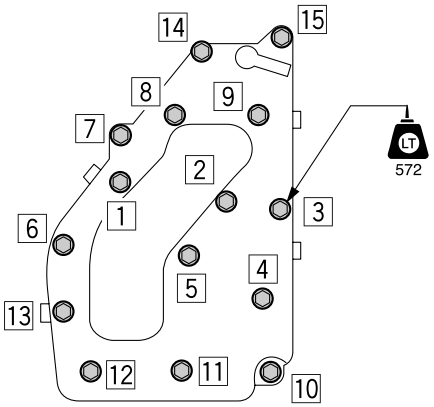
NOTE:

To disassemble the crankshaft, refer to page 5-33.

7. Install the new gasket ⑧, exhaust inner cover ⑨, new gasket ⑩, exhaust outer cover ⑪, and then tighten the bolts ⑫ to the specified torques in 2 stages in the sequence as shown.



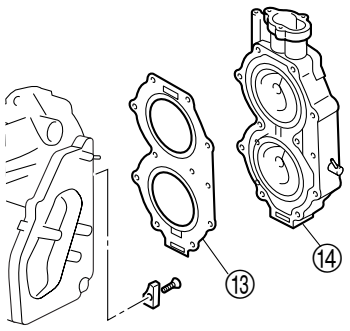
69R50530



6S650460

	Exhaust outer cover bolt: 1st: 4 N·m (0.4 kgf·m, 3.0 ft·lb) 2nd: 8 N·m (0.8 kgf·m, 5.8 ft·lb)

8. Install the new gasket ⑬ and cylinder head ⑭.



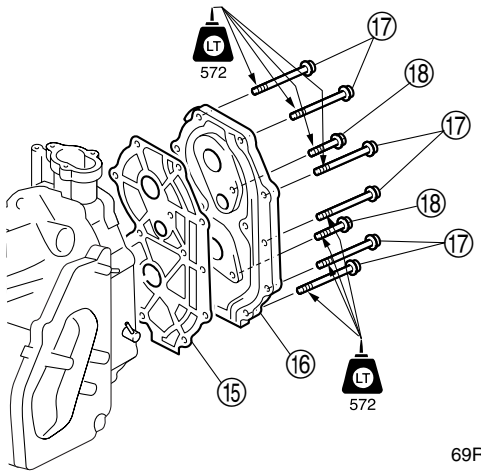
69R50220

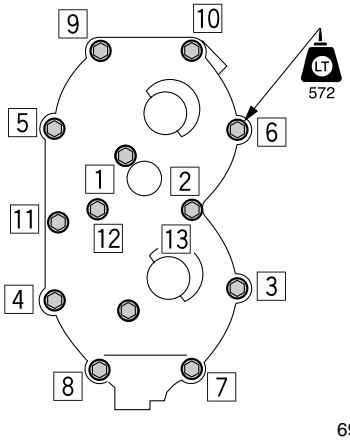
NOTE:

Remove the any oil or grease from the cylinder head mating surfaces.

5

9. Install the new gasket ⑮, cylinder head cover ⑯, and then tighten the cylinder head bolts ⑰ to the specified torques in 2 stages and in the sequence as shown. Then tighten the cylinder head cover bolts ⑱.

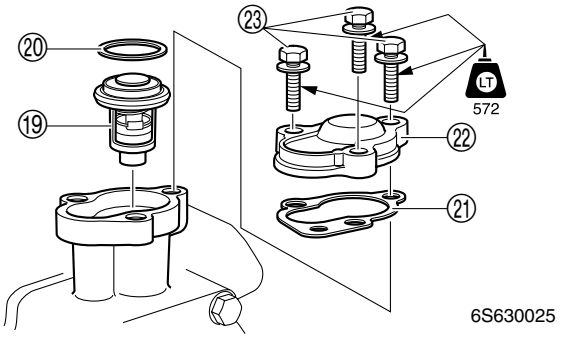




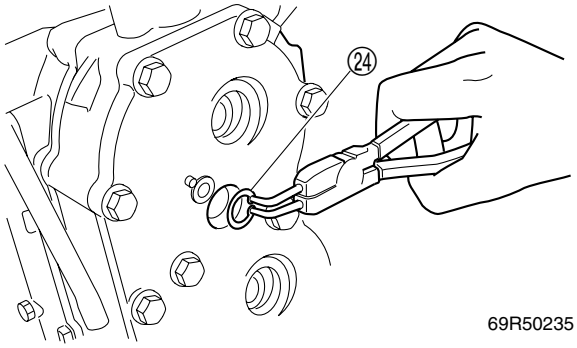
NOTE:
Remove the any oil or grease from the cylinder head and cylinder head cover mating surfaces.

Cylinder head bolt ⑰:
1st: 15 N·m (1.5 kgf·m, 11.1 ft·lb)
2nd: 27 N·m (2.7 kgf·m, 19.9 ft·lb)
Cylinder head cover bolt ⑱:
8 N·m (0.8 kgf·m, 5.8 ft·lb)

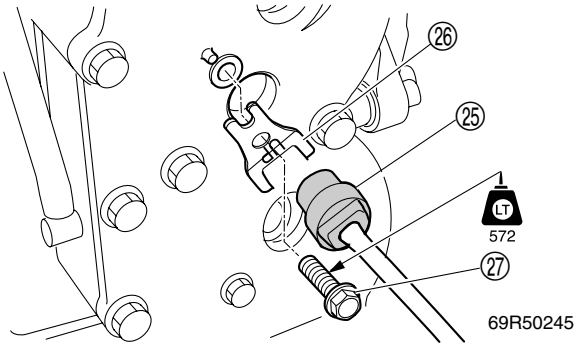
10. Install the thermostat ⑲, washer ⑳, new gasket ㉑, thermostat cover ㉒, and then tighten the bolts ㉓.



11. Install the circlip ㉔ (W).



12. Install the thermoswitch ㉕, holder ㉖, and then tighten the cylinder head cover bolt ㉗ (W).

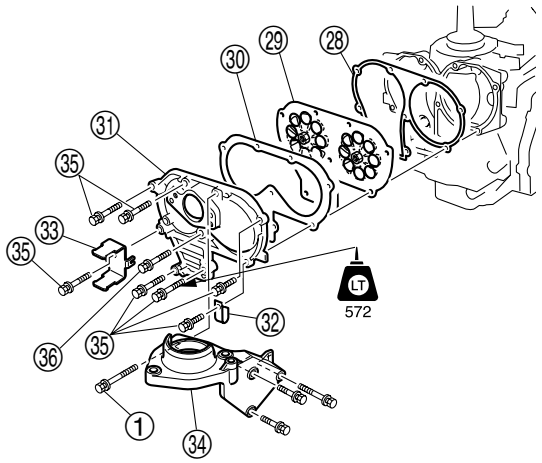


NOTE:
Face the “UP” mark to the front.

13. Install the new gasket ㉘, reed valve assembly ㉙, new gasket ㉚ and intake manifold ㉛.

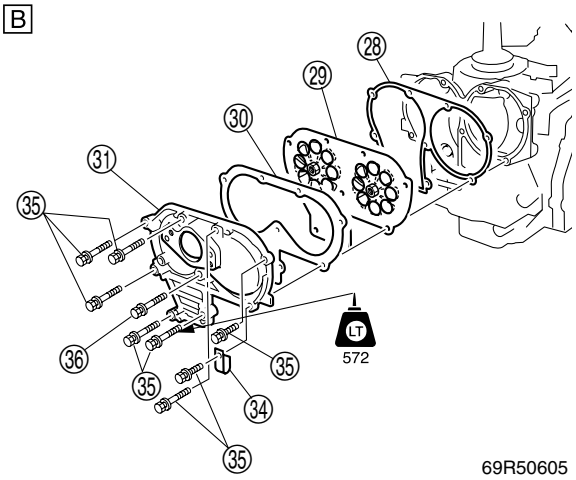
14. Install the cramp ㉜, starter relay bracket ㉝, bracket ㉞ (WH, W, WC), and then tighten the intake manifold bolts ㉟, ㊱ into the sequence as shown.

A



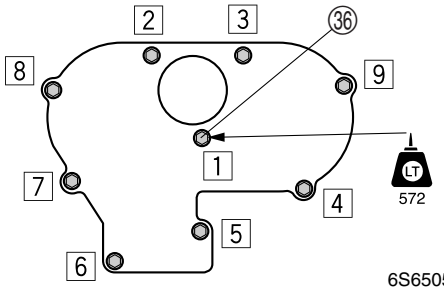
69R50600

B



69R50605

A WH, W, WC
B MH



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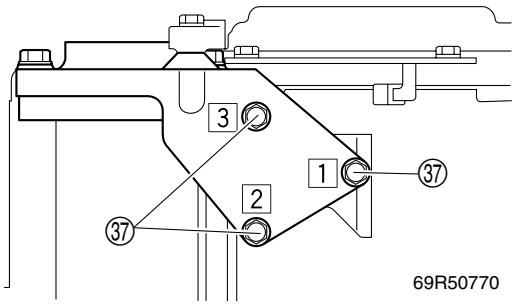
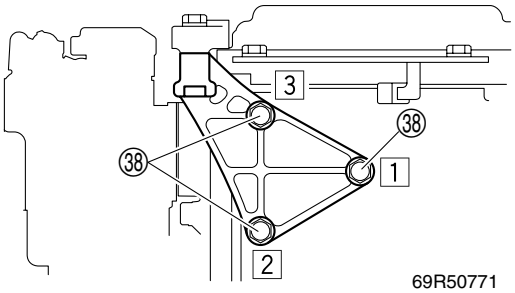
15. Tighten the bracket bolts ㊲ into the sequence as shown (WH, W, WC).



69R50770

16. Install the bracket, and then tighten the bracket bolts ㊳ into the sequence as shown (MH).



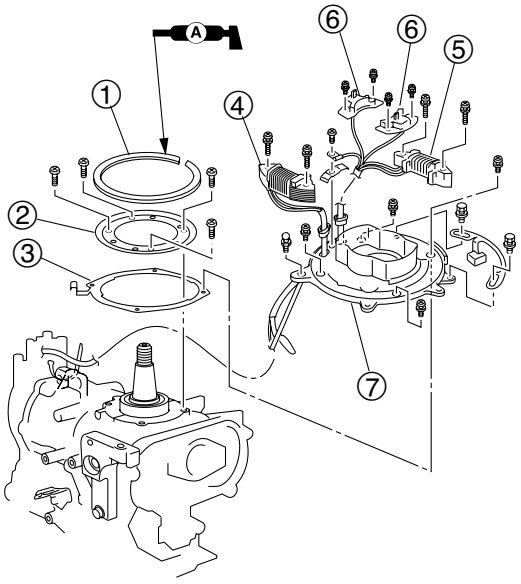
69R50771

Installing the electrical component

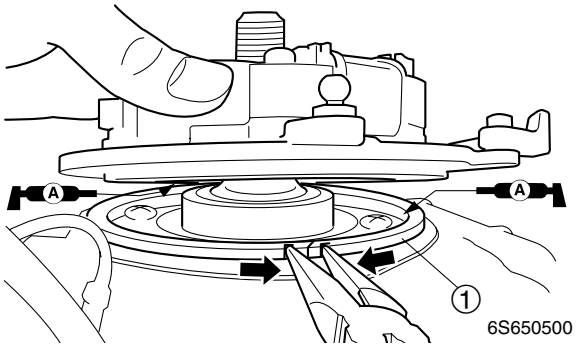
1. Install the retainer ①, retainer ② and plate ③.

2. Install the light coil ④, charge coil ⑤ and pulser coils ⑥.

3. Install the magnet base ⑦ onto the plate ③.



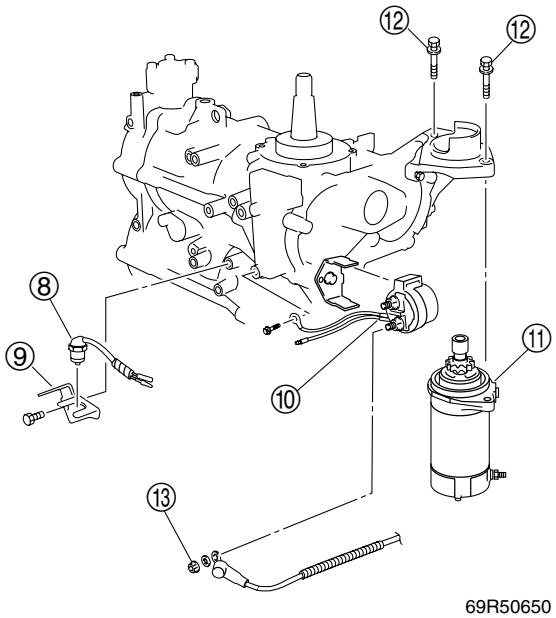
69R5013B



NOTE:
When install the magnet base, pinch the retainer ①.

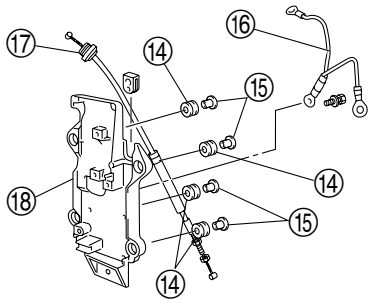
4. Install the neutral switch ⑧ (WH, WC) and bracket ⑨.

5. Install the starter relay ⑩ and starter motor ⑪ (WH, W, WC).



Starter motor mount bolt ⑫:
21 N·m (2.1 kgf·m, 15.5 ft·lb)
Starter relay terminal nut ⑬:
4 N·m (0.4 kgf·m, 3.0 ft·lb)

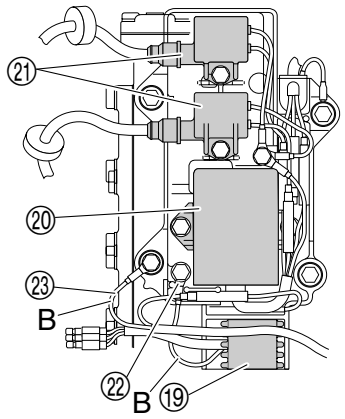
6. Install the dampers ⑭, collars ⑮, ground lead ⑯ and start-in-gear protection cable ⑰ to the bracket ⑱.



NOTE:
Set the start-in-gear protection cable as shown.

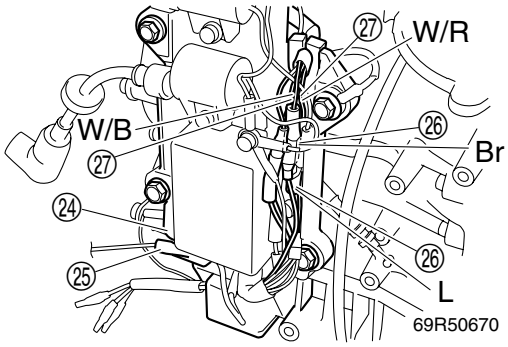
7. Install the Rectifier ⑲ (WH, W, WC) and CDI unit ⑳, ignition coil ㉑ and Rectifier ground lead ㉒ (WH, W, WC).

8. Install the ground lead ㉓.



9. Install the bracket ㉔, then connect the CDI unit connectors and engine stop lanyard switch connectors ㉕ (WH, MH).

10. Connect the charge coil connectors ㉖, ground lead and pulser coil connectors ㉗.



11. Install the spark plugs, tighten them temporary tight, then to the specified torque with a spark plug wrench.

	Spark plug: 25 N·m (2.5 kgf·m, 18 ft·lb)

12. Install the spark plug caps to the spark plugs.

Installing the power unit

1. Install the carburetor and fuel system.

NOTE:

To install the fuel system, refer to page 4-2, 4-3 and 4-7.

2. Install the dowels ① and a new gasket ②.

NOTE:

Remove the any oil or grease from the power unit mating surfaces.

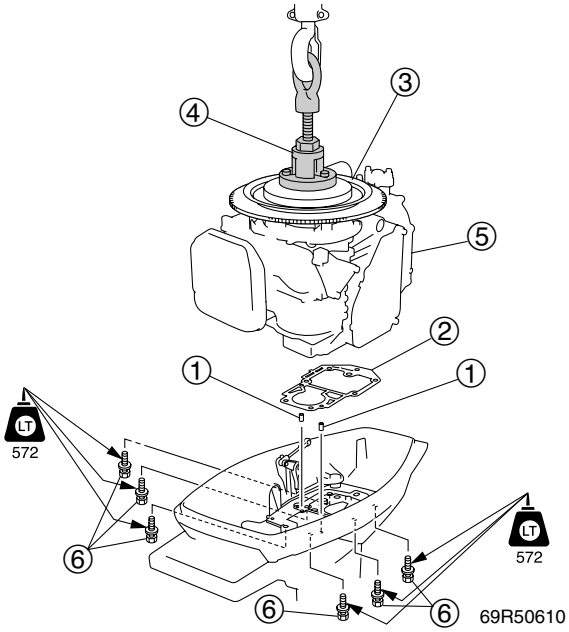
3. Install the Woodruff key and flywheel magnet ③ temporally tighten, and then install the special service tool ④, lift up the power unit ⑤.

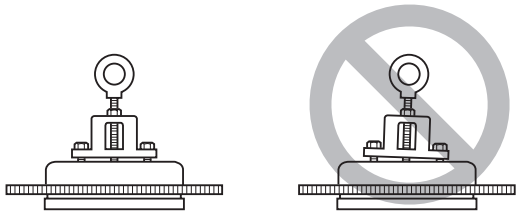
NOTE:

Apply engine oil to the flywheel magnet nut before installation.

	Flywheel puller ④: 90890-06521

4. Install the power unit ⑤, and then tighten the power unit mount bolts ⑥ to the specified torque.





6B450090

CAUTION:

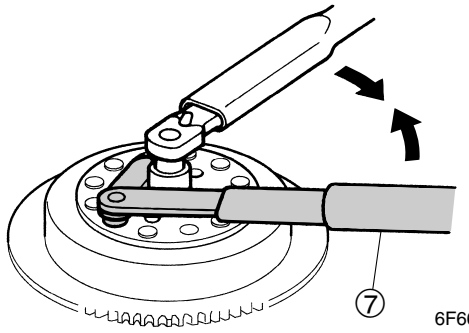
To prevent damage to the engine or tools, screw in the flywheel puller set bolts evenly and completely so that the flywheel puller is parallel to the flywheel magnet.

	Power unit mount bolt ⑥: 22 N·m (2.2 kgf·m, 16.2 ft·lb)

5. Remove the special service tool from the flywheel magnet.

5

6. Tighten the flywheel magnet nut to the specified torque.

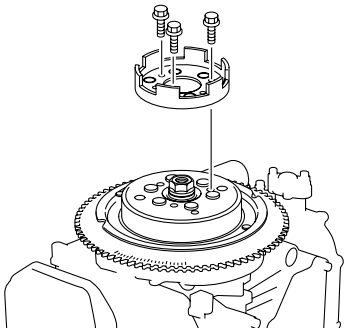


CAUTION:

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

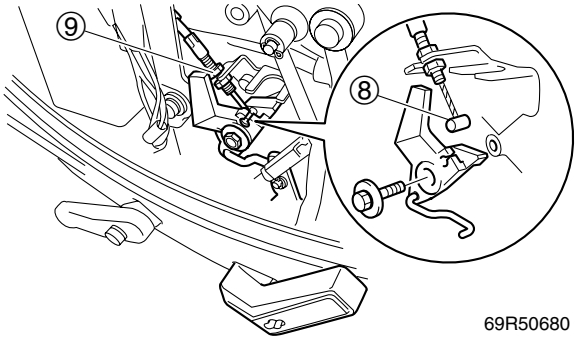
	Flywheel holder ⑦: 90890-06522
	Flywheel magnet nut: 140 N·m (14 kgf·m, 103 ft·lb)

7. Install the starter pulley.



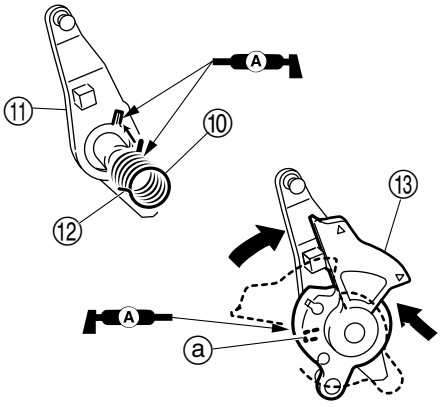
8. Set the gear shift to “F” position.

9. Install the arm, start-in-gear protection cable end ⑧, and then tighten the lock nut ⑨.



10. Set the gear shift to “N” position.

11. Install the spring ⑩ to the arm lever ⑪.

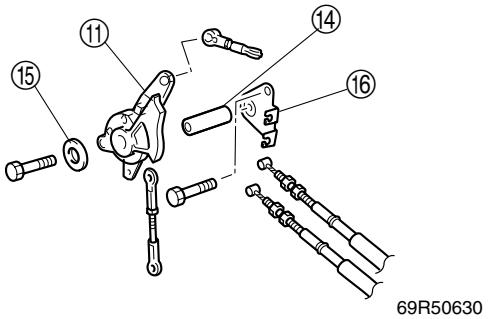


NOTE:

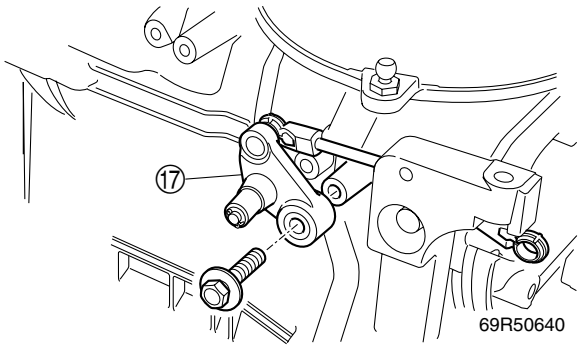
Put the spring claw ⑫ into the groove ⓐ on the throttle cam ⑬.

12. Install the collar ⑭ and washer ⑮.

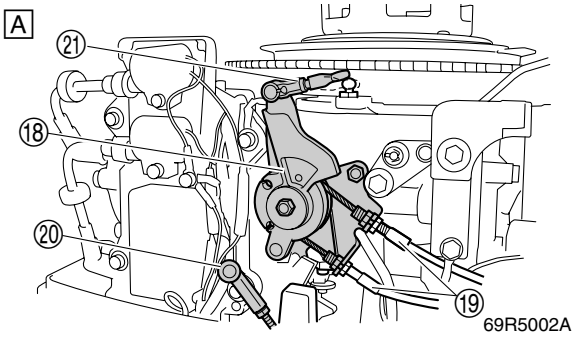
13. Install the arm ⑪ and bracket ⑯ to the cylinder block.

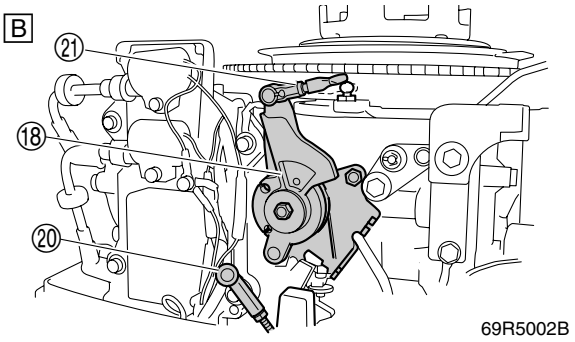


14. Install the throttle control lever ⑰.



15. Install the throttle cam ⑱ with the throttle cables ⑲ (WH, WC, MH), throttle control link ⑳, and then install the magnet control link ㉑.





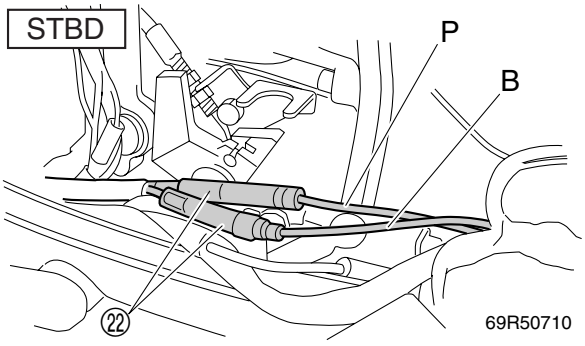
A WH, WC, MH
B W

16. Adjust the throttle cables.

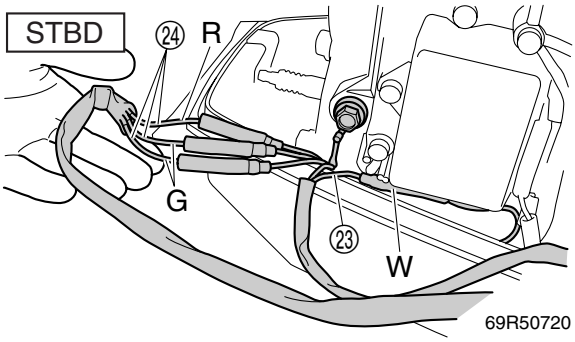
NOTE:
To adjust the throttle cables, refer to page 3-4 (WH, WC, MH) or 3-5 (W).

17. Connect the fuel hose.

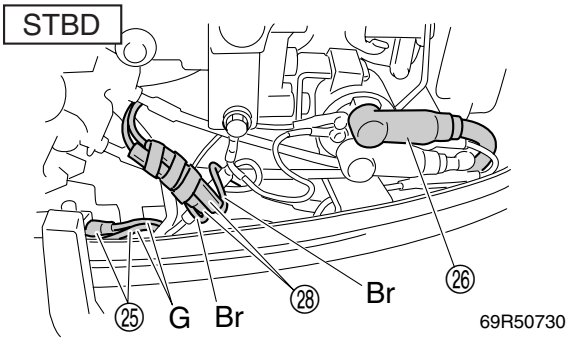
18. Connect the thermoswitch connectors ㉒ (W).

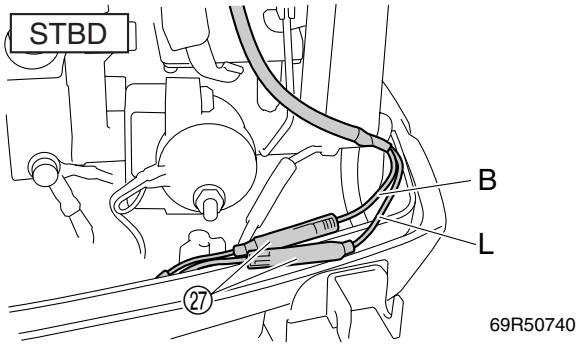


19. Connect the engine stop lanyard switch connectors ㉓, Rectifier connectors ㉔ (WH, W, WC).



20. Connect the light coil connectors ㉕, positive battery cable ㉖ (WH, W, WC), choke solenoid connectors ㉗ (W) and neutral switch connectors ㉘ (WH, WC).

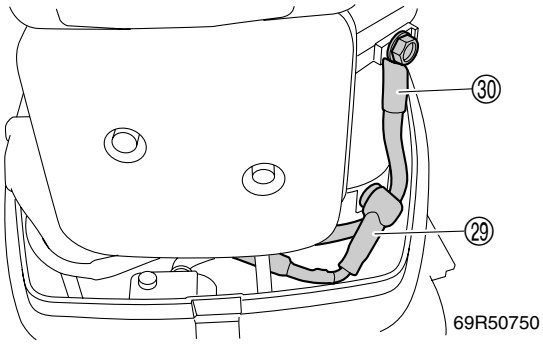




	Starter relay terminal nut: 4 N·m (0.4 kgf·m, 3.0 ft·lb)

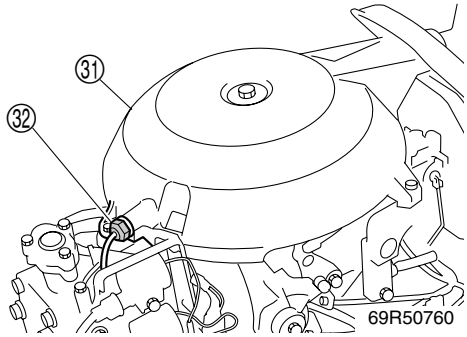
5

21. Connect the positive relay cable ㉙ and negative battery cable ㉚ (WH, W, WC).



Negative battery cable bolt:
15 N·m (1.5 kgf·m, 11.1 ft·lb)

22. Install the manual starter ㉛, connect the start-in-gear protection cable cap ㉜, and then adjust it's length.

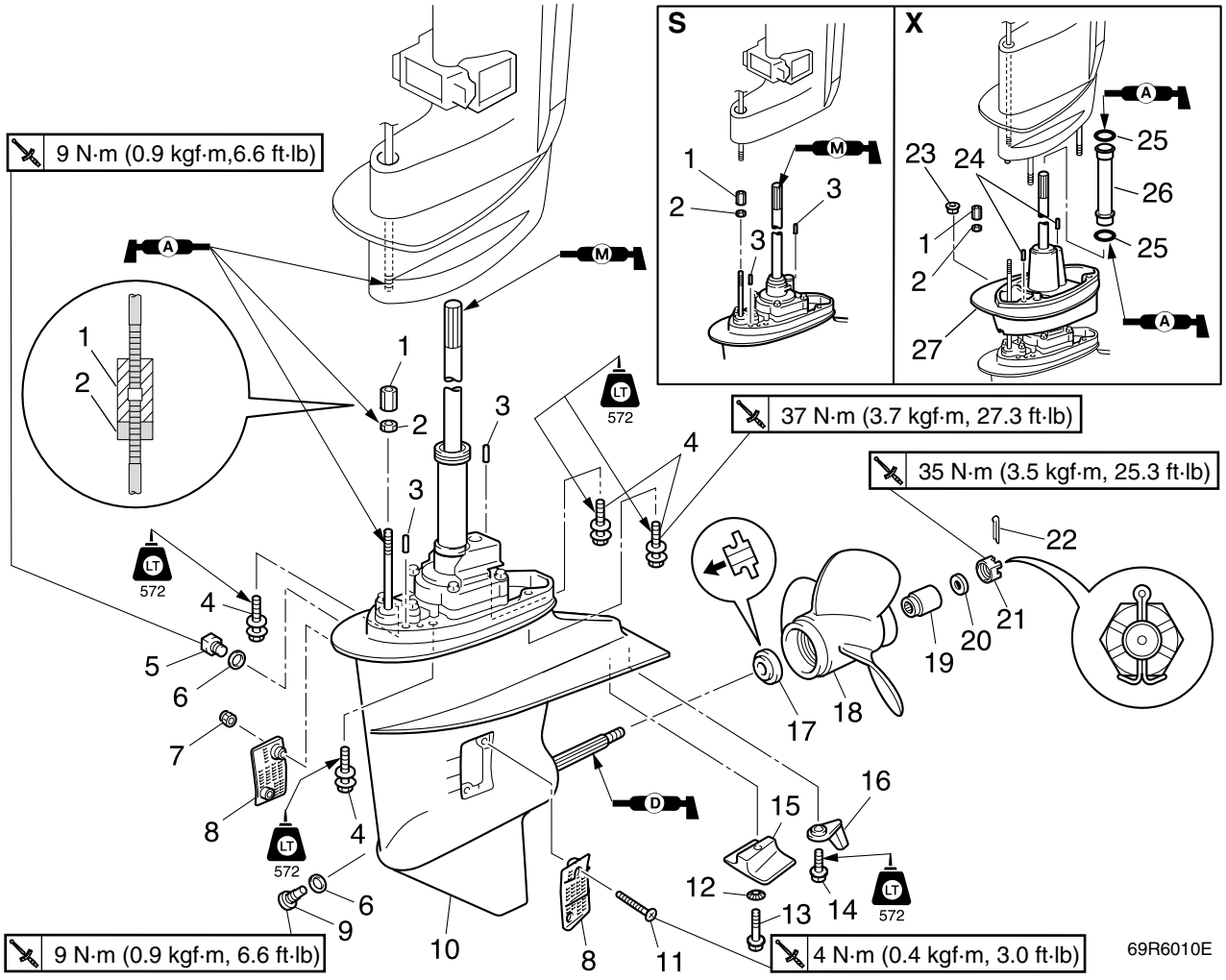


Start-in-gear protection cable cap ㉜:
4 N·m (0.4 kgf·m, 3.0 ft·lb)

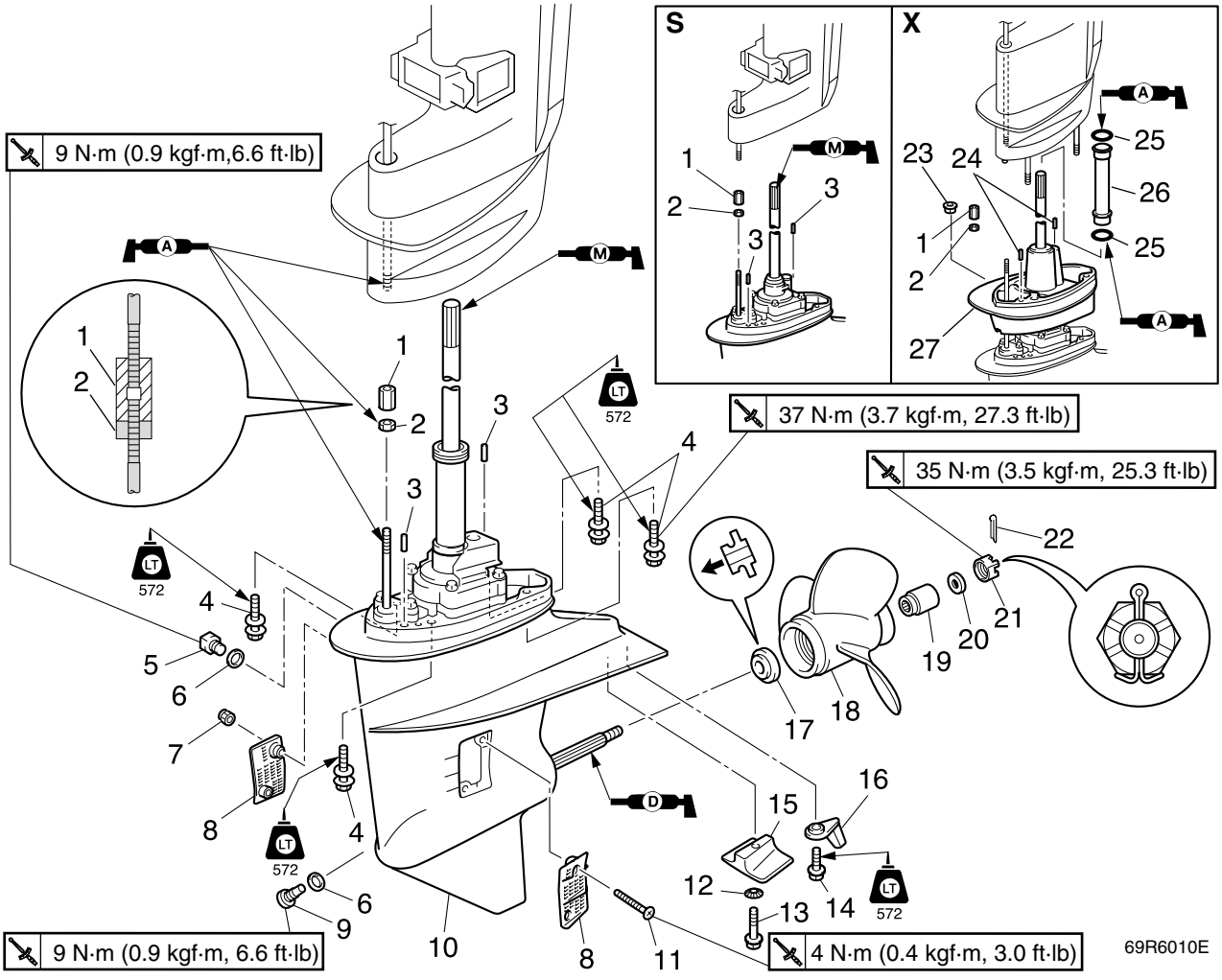
NOTE:
To adjust the start-in-gear protection, refer to page 3-12.

Lower unit

Lower unit

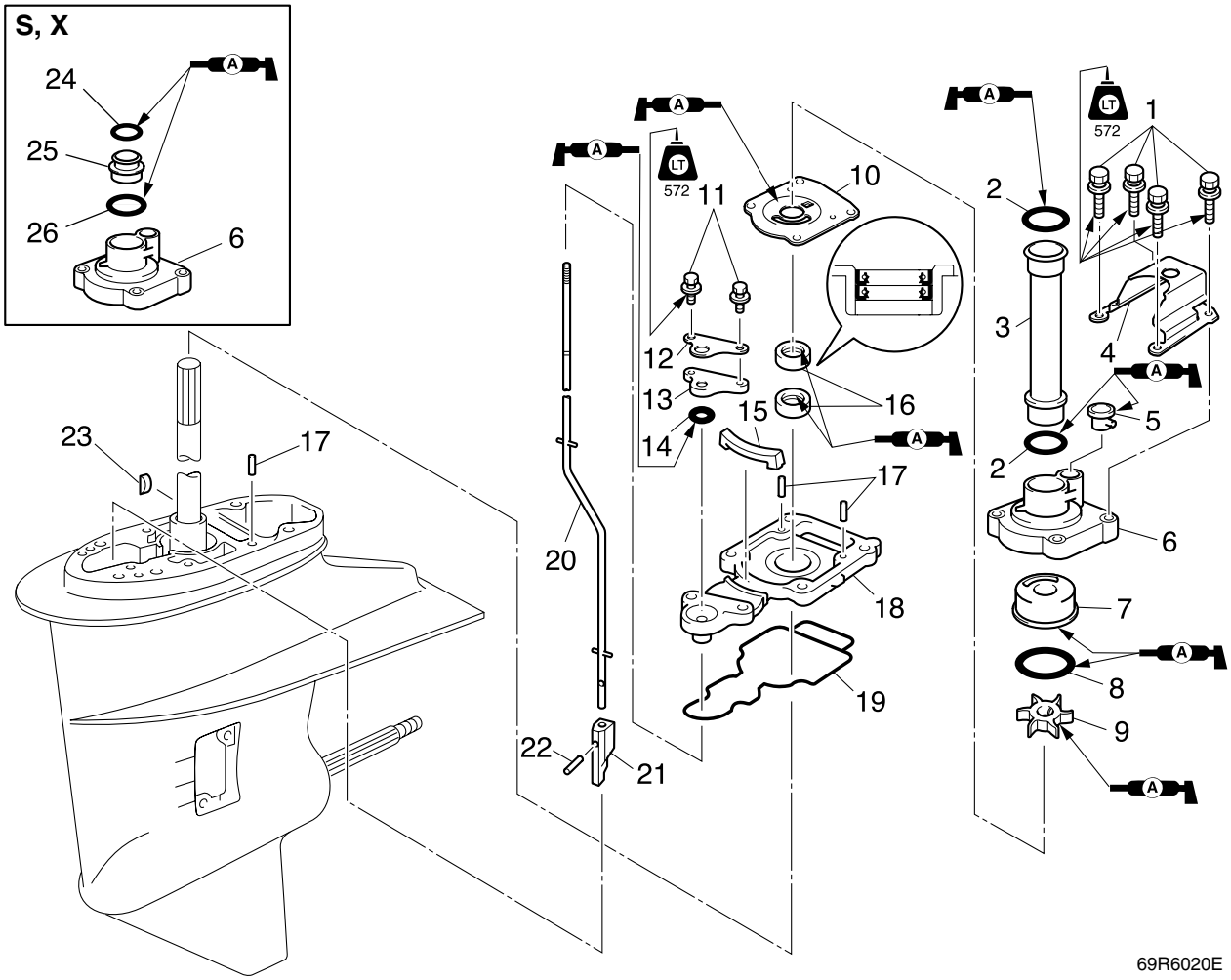


No.	Part name	Q'ty	Remarks
1	Adjuster	1	
2	Lock nut	1	
3	Dowel	2	
4	Bolt	4	M10 × 35 mm
5	Check screw	1	
6	Gasket	2	Not reusable
7	Nut	2	
8	Cooling water inlet cover	2	
9	Drain screw	1	
10	Lower unit	1	
11	Screw	2	ø5 × 26 mm
12	Washer	1	
13	Bolt	1	M6 × 35 mm
14	Bolt	1	M6 × 20 mm
15	Anode	1	
16	Trim tab	1	
17	Spacer	1	

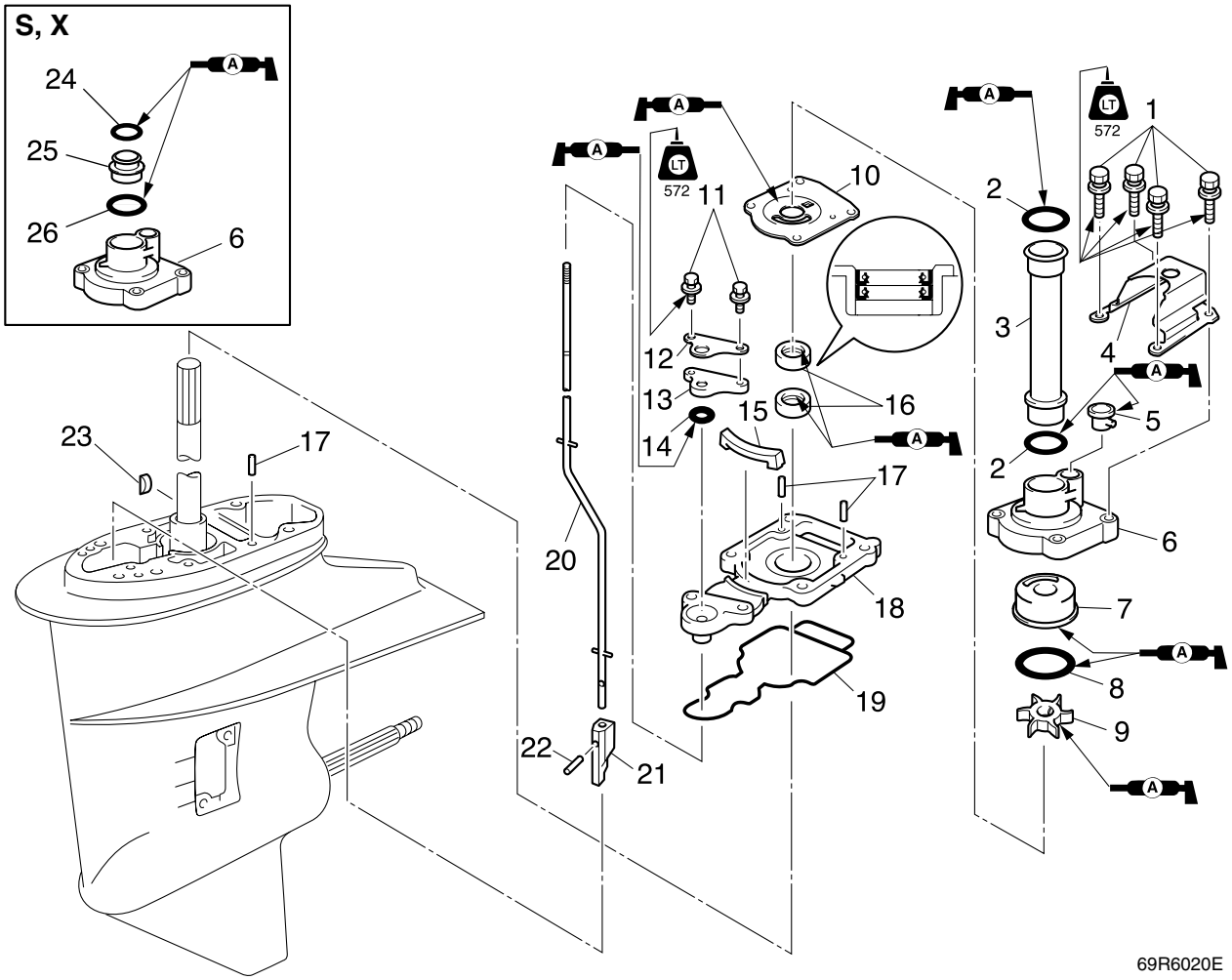


No.	Part name	Q'ty	Remarks
18	Propeller	1	
19	Collar	1	
20	Washer	1	
21	Nut	1	
22	Cotter pin	1	Not reusable
23	Nut	4	
24	Dowel	2	
25	O-ring	2	Not reusable
26	Water tube	1	
27	Extension	1	

6



No.	Part name	Q'ty	Remarks
1	Bolt	4	M6 × 40 mm
2	O-ring	2	Not reusable
3	Tube	1	
4	Water pump cover bracket	1	L-transom
5	Rubber seal	1	
6	Water pump housing	1	
7	Insert cartridge	1	
8	O-ring	1	Not reusable
9	Impeller	1	
10	Outer plate cartridge	1	
11	Bolt	2	M6 × 25 mm
12	Bracket	1	
13	Plate	1	
14	O-ring	1	Not reusable
15	Rubber seal	1	
16	Oil seal	2	Not reusable
17	Dowel	3	



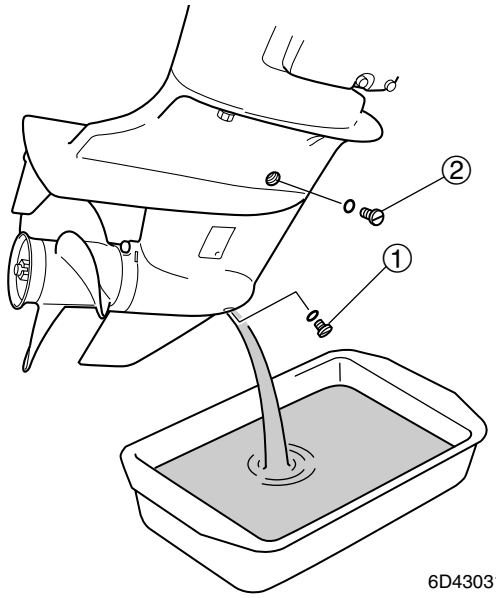
No.	Part name	Q'ty	Remarks
18	Oil seal housing	1	
19	Gasket	1	Not reusable
20	Shift rod	1	
21	Shift cam	1	
22	Pin	1	
23	Woodruff key	1	
24	O-ring	1	Not reusable: S, X-transom
25	Tube	1	S, X-transom
26	O-ring	1	Not reusable: S, X-transom

6

Removing the lower unit

1. Remove the lock plate from the engine stop lanyard switch.

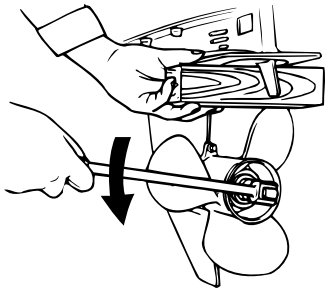
2. Place a drain pan under the drain hole, and then remove the drain screw ①, and then remove the check screw ② to drain the gear oil.



6D430310

3. Remove the cotter pin.

4. Place a block of wood between the anti-cavitation plate, propeller, and then remove the propeller.

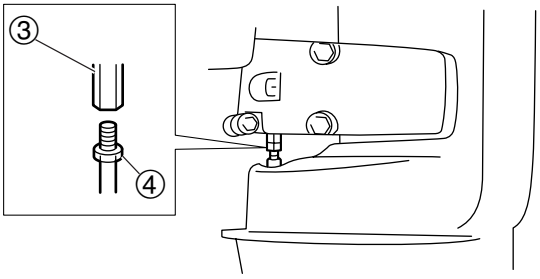


69R60010

⚠WARNING

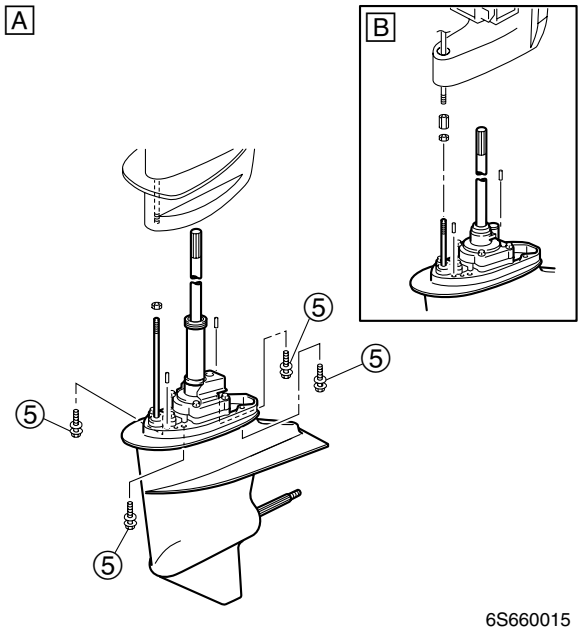
- **Do not hold the propeller with your hands when loosening or tightening it.**
- **Be sure to disconnect the battery cables from the battery and the lock plate from the engine stop lanyard switch.**
- **Put a block of wood between the anti-cavitation plate and propeller to prevent the propeller from turning.**

5. Set the gear shift to “R” position.
6. Loosen the adjuster ③ while holding the lock nut ④, and then disconnect the shift rod.



69R60126

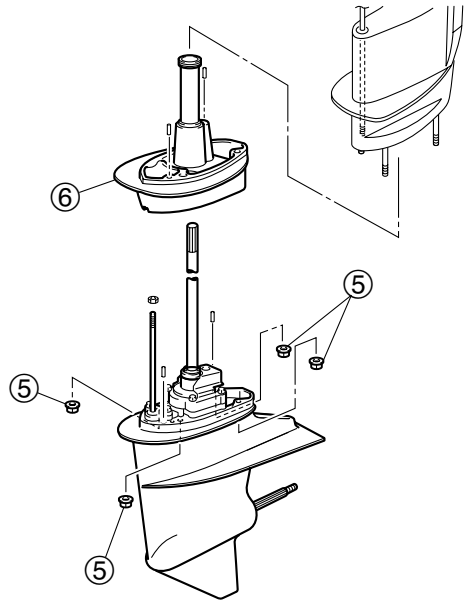
7. Loosen the bolts(nuts) ⑤, and then remove the lower unit (X-transom: and extension ⑥) from the upper case.



6S660015

A L-transom
B S-transom

C



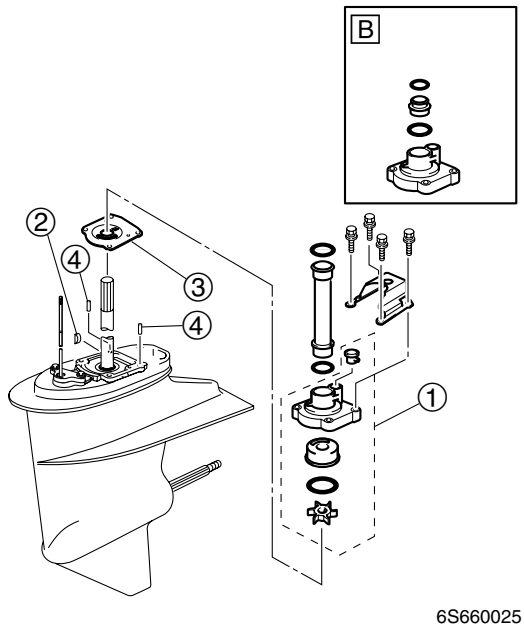
6S660016

C X-transom

Removing the water pump and shift rod

1. Remove the water pump assembly ①.

A



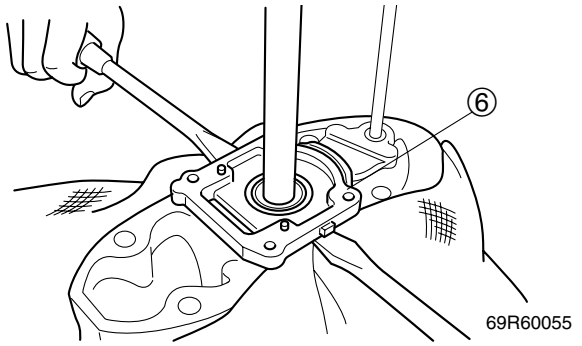
6S660025

A L-transom
B S-transom, X-transom

2. Remove the Woodruff key ② from the drive shaft, and then remove the outer plate cartridge ③.

3. Remove the dowels ④.

4. Remove the bolts ⑤, then remove the oil seal housing ⑥ and gasket ⑦.

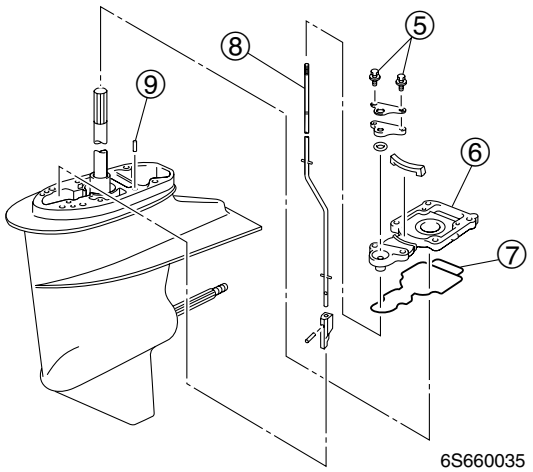


69R60055

NOTE:

Insert a flat-head screw driver between the pry tabs to pry off the oil seal housing ⑥.

5. Remove the shift rod ⑧ and dowels ⑨.



6S660035

6

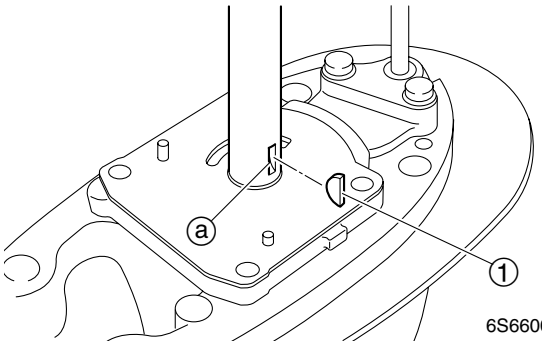
Checking the water pump and shift rod

1. Check the water pump housing. Replace the water pump housing if deformed.

2. Check the impeller and insert cartridge. Replace the impeller and insert cartridge if cracked or worn.

3. Check the Woodruff key ①. Replace the wood ruff key if worn.

4. Check the groove ⓐ on the drive shaft. Replace the drive shaft if worn.

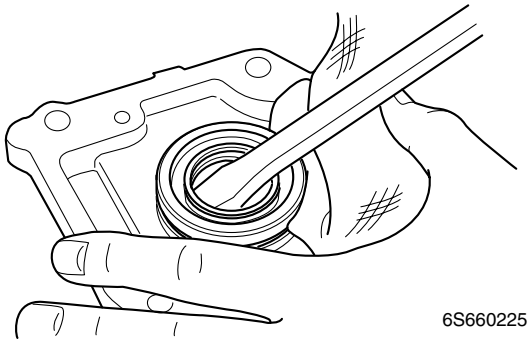


6S660040

5. Check the shift rod. Replace the shift rod if cracked or worn.

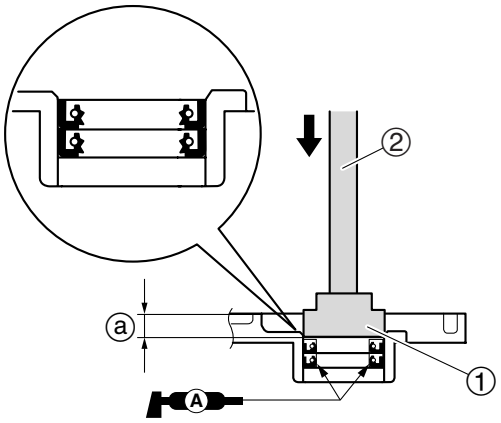
Disassembling the oil seal housing

1. Remove the oil seals as shown.


6S660225

Assembling the oil seal housing

1. Install the new oil seals onto the oil seal housing to specified depth.

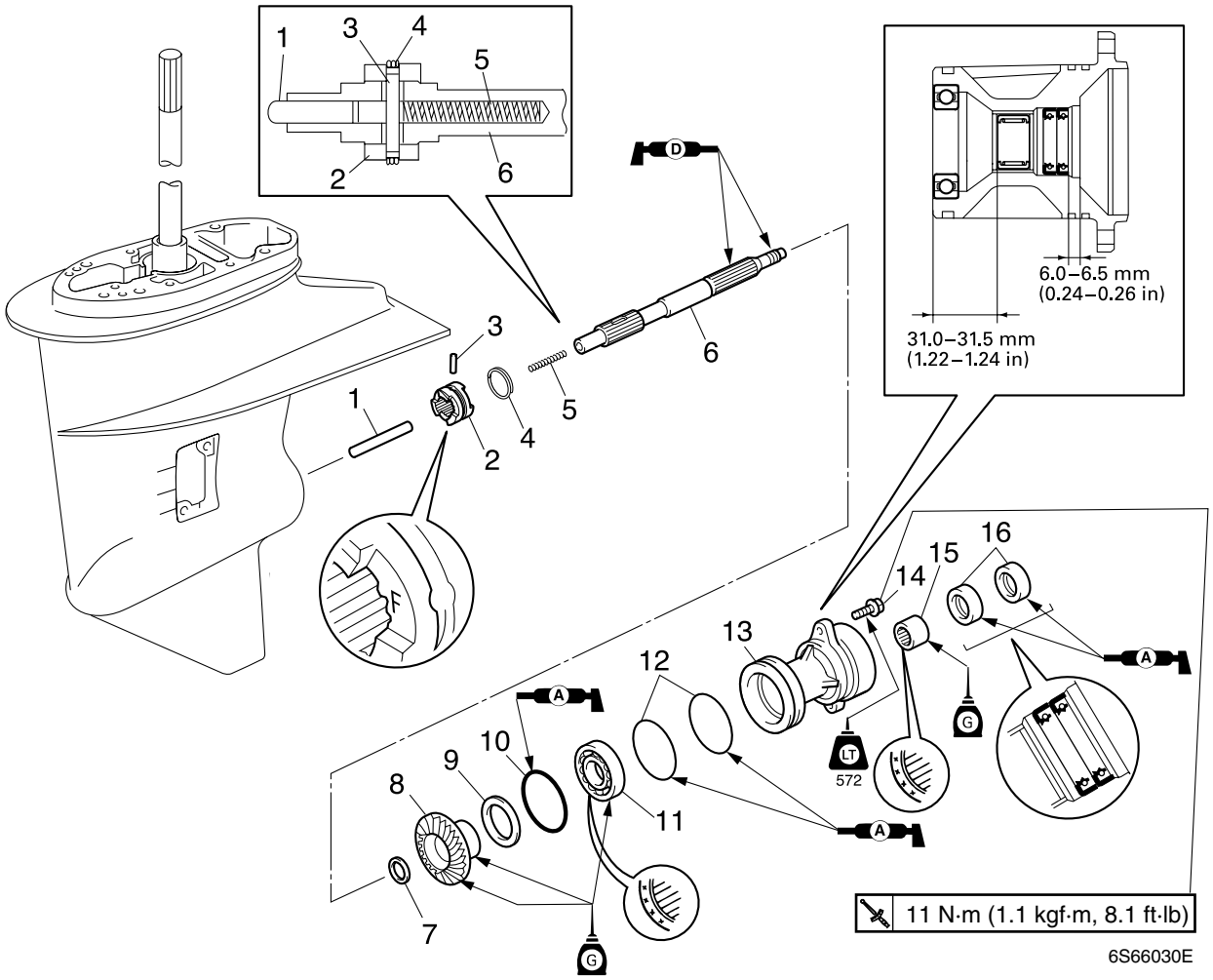


69R60060

Needle bearing attachment ①:
90890-06653
Driver rod L3 ②:
90890-06652

Installation depth ⓐ:
5.5–6.0 mm (0.22–0.24 in)

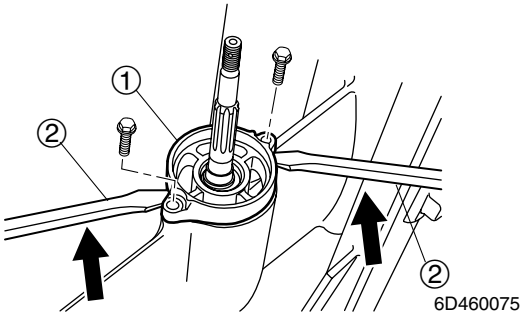
Propeller shaft housing



No.	Part name	Q'ty	Remarks
1	Shift plunger	1	
2	Dog clutch	1	
3	Cross pin	1	
4	Spring	1	
5	Spring	1	
6	Propeller shaft	1	
7	Washer	1	
8	Reverse gear	1	
9	Reverse gear shim	—	
10	O-ring	1	Not reusable
11	Ball bearing	1	Not reusable
12	O-ring	2	Not reusable
13	Propeller shaft housing	1	
14	Bolt	2	M6 × 20 mm
15	Needle bearing	1	Not reusable
16	Oil seal	2	Not reusable

Removing the propeller shaft housing assembly

1. Remove the bolts.
2. Remove the propeller shaft housing assembly ①.

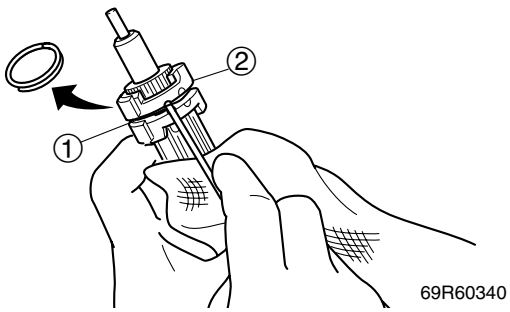


NOTE:
Insert a flat-head screw driver ② between the pry tabs to pry off the propeller shaft housing ①.

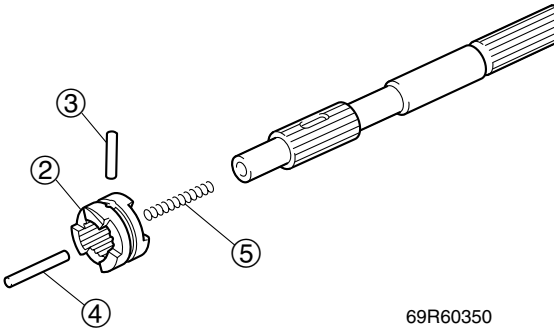
3. Remove the propeller shaft assembly from propeller shaft housing.

Disassembling the propeller shaft assembly

1. Remove the spring ① from dog clutch ②.



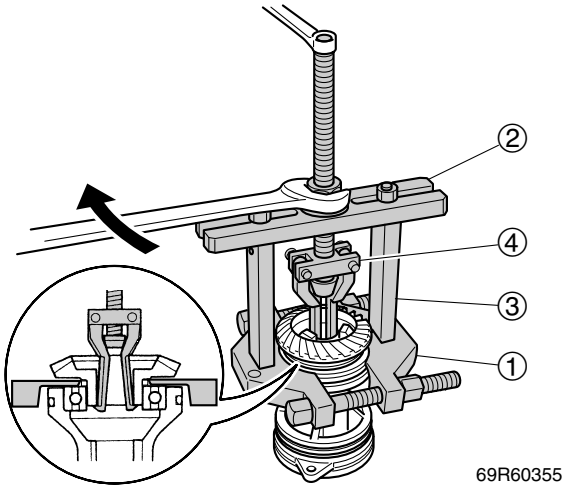
2. Remove the cross pin ③, and then remove the dog clutch ②.



3. Remove the shift plunger ④ and spring ⑤.

Disassembling the propeller shaft housing

1. Set the special service tools as shown.
2. Remove the reverse gear and shim.

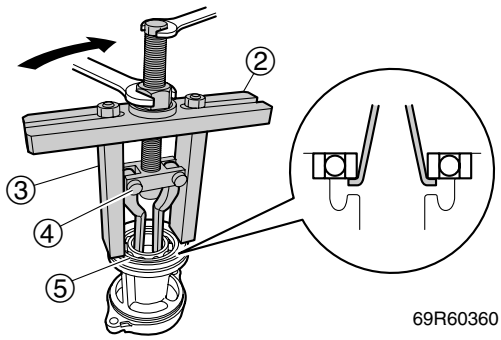


NOTE:
Install the bearing separator as shown, when remove the reverse gear.

Bearing separator ①: 90890-06534
Stopper guide plate ②: 90890-06501
Stopper guide stand ③: 90890-06538
Bearing puller assembly ④: 90890-06535

3. Set the special service tools as shown.

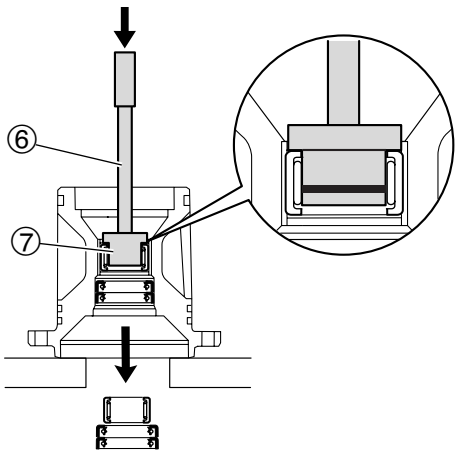
4. Remove the ball bearing ⑤ from the propeller shaft housing.



69R60360

Stopper guide plate ②:
90890-06501
Stopper guide stand ③:
90890-06538
Bearing puller assembly ④:
90890-06535

5. Remove the oil seals with needle bearing.



6B460125

Driver rod L3 ⑥:
90890-06652
Needle bearing attachment ⑦:
90890-06615

Checking the propeller shaft housing

1. Check the propeller shaft housing. Replace the propeller shaft housing if cracked or corroded.

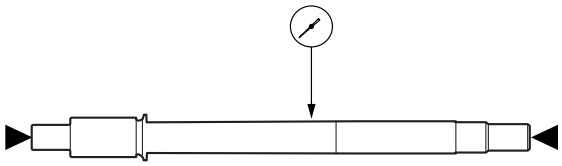
Checking the reverse gear

1. Check the teeth and dogs of the reverse gear. Replace the reverse gear if cracked or worn.

Checking the propeller shaft

1. Check the propeller shaft spline. Replace the propeller shaft if bent or worn.

2. Measure the propeller shaft runout.

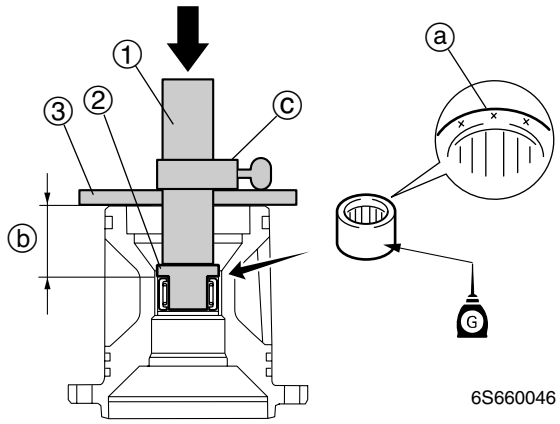

6F660130

Runout limit: 0.02 mm (0.0008 in)

6

Assembling the propeller shaft housing

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



6S660046

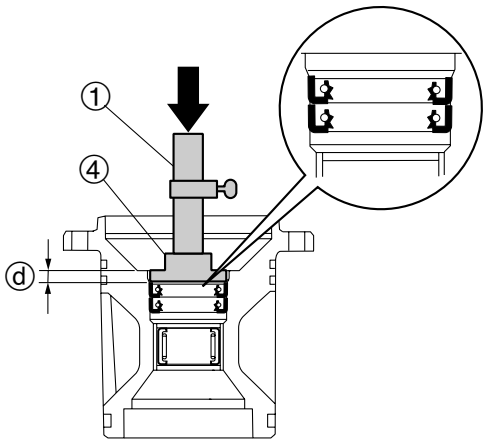
NOTE:

- Install a new needle bearing with the identification mark ⓐ facing toward the foreword gear side.
- Be careful not to let the stopper ⓒ get out of position when using the driver rod SS ① .

Driver rod SS ①:
90890-06604
Needle bearing attachment ②:
90890-06615
Bearing depth plate ③ :
90890-06603

Installation depth ⓑ :
31.0–31.5 mm (1.22–1.24 in)

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



6B460165

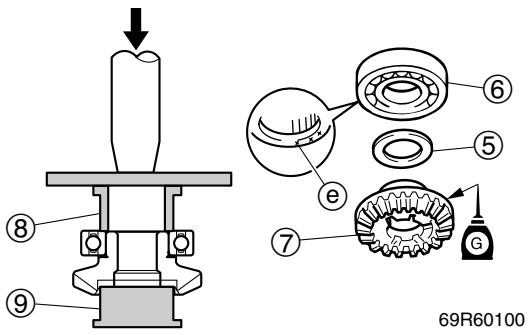
NOTE:

Use the special service tools to install the specified depth.

Driver rod SS ①:
90890-06604
Needle bearing attachment ④:
90890-06611

Installation depth ⓓ:
6.0–6.5 mm (0.24–0.26 in)

3. Install the shim(s) ⑤ and new ball bearing ⑥ onto the reverse gear ⑦ using a press.



69R60100

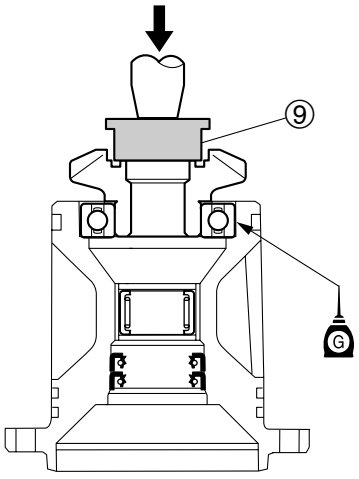
CAUTION:

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

NOTE:
- Install a new ball bearing with the identification mark ⓔ facing toward the foward gear side.
- Be sure to select the reverse gear shim(s) if replacing the propeller shaft housing or ball bearing.
- To select the shim(s), refer to page 6-24.

Bearing inner race attachment ⑧:
90890-06640
Needle bearing attachment ⑨:
90890-06607

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



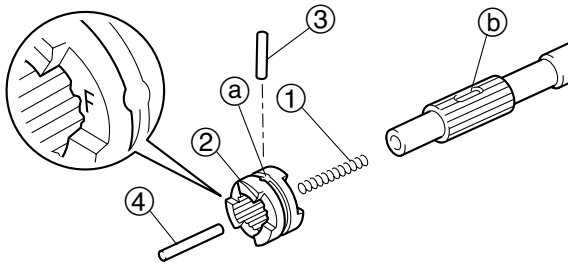
69R60110

NOTE:
After installing the reverse gear, check that the reverse gear rotates smoothly.

Needle bearing attachment ⑨:
90890-06607

Assembling the propeller shaft assembly

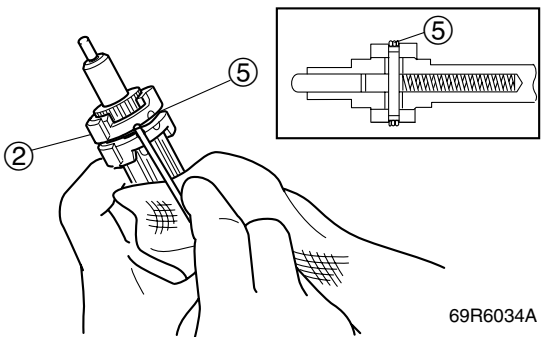
1. Install the spring ①, dog clutch ②, cross pin ③, and then install the plunger ④ temporarily.



69R60385

NOTE:
- Align the hole ⓐ of the dog clutch ② with the slot ⓑ of the propeller shaft and then install the dog clutch ②.
- Install the dog clutch ② with the “F” mark facing toward the forward gear.

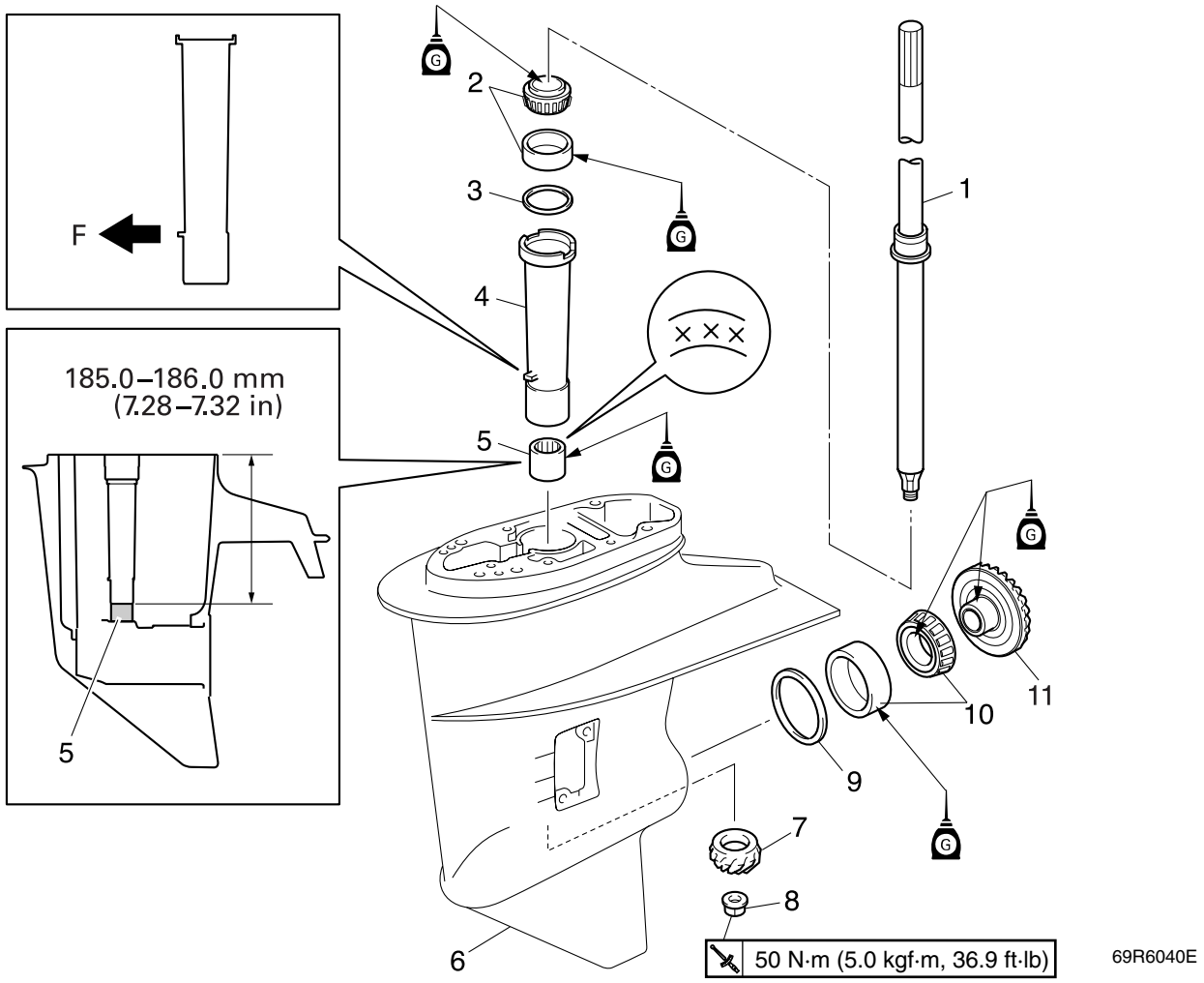
2. Install the spring ⑤ onto the dog clutch ②.



69R6034A

6

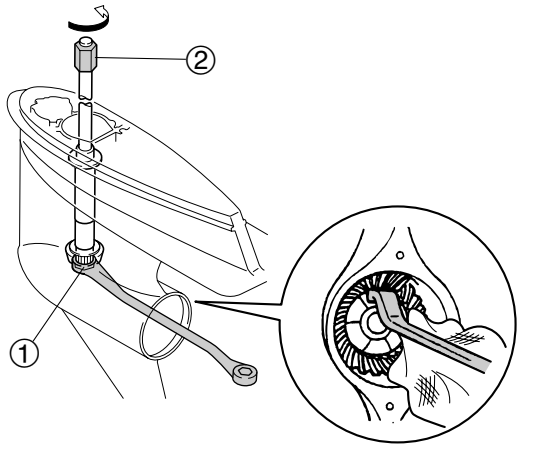
Drive shaft and lower case



No.	Part name	Q'ty	Remarks
1	Drive shaft	1	
2	Taper roller bearing	1	Not reusable
3	Pinion shim	—	
4	Sleeve	1	
5	Needle bearing	1	Not reusable
6	Lower case	1	
7	Pinion	1	
8	Nut	1	
9	Forward gear shim	—	
10	Taper roller bearing	1	Not reusable
11	Forward gear	1	

Removing the drive shaft

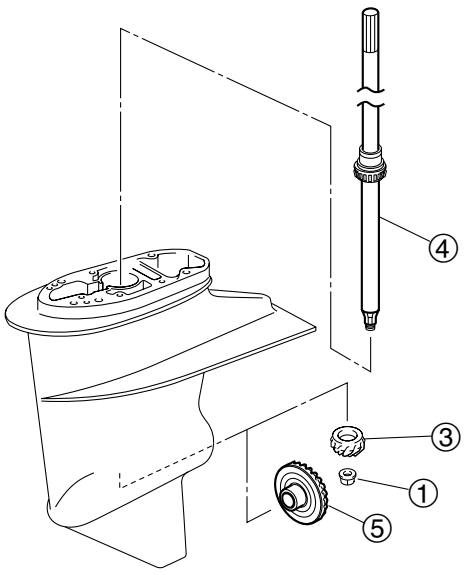
1. Loosen the pinion nut ① as shown.



69R60120

Drive shaft holder 3 ②:
90890-06517

2. Remove the pinion nut ①, pinion ③, drive shaft ④, and then remove the forward gear ⑤ as shown.

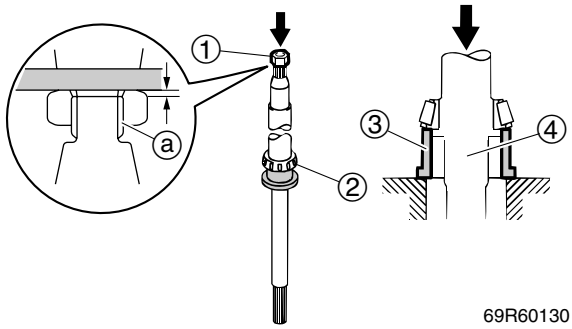


69R6012A

Disassembling the drive shaft

1. Install the pinion nut ①, and then tighten it temporarily.

2. Remove the taper roller bearing ② using a press.



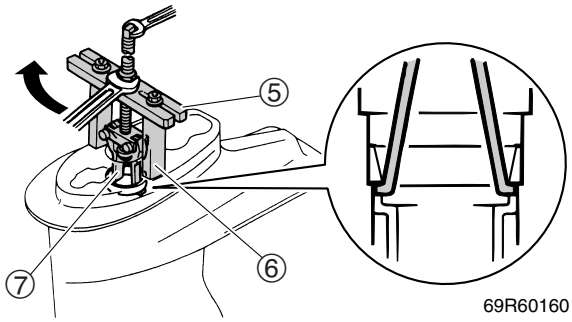
69R60130

CAUTION:

- **Do not press the drive shaft threads ⓐ directly.**
- **When removing the taper roller bearing, do not damage the drive shaft collar ④.**

Bearing inner race attachment ③:
90890-06643

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

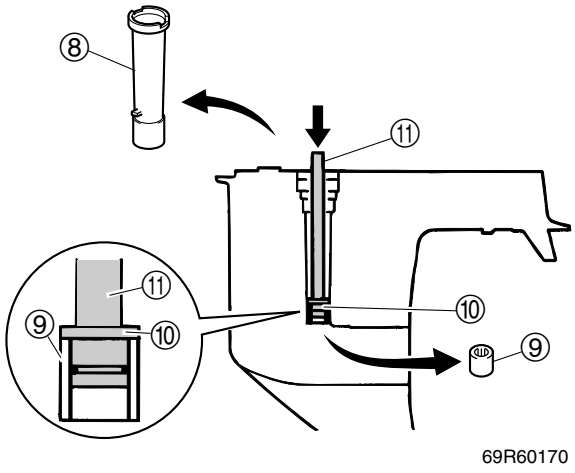


69R60160

Stopper guide plate ⑤:
90890-06501
Stopper guide stand ⑥:
90890-06538
Bearing puller assembly ⑦:
90890-06535

6

4. Remove the sleeve ⑧ and needle bearing ⑨.

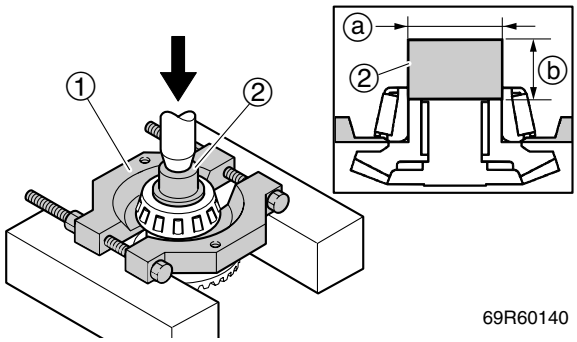


69R60170

Needle bearing attachment ⑩: 90890-06615
Driver rod L3 ⑪: 90890-06652

Disassembling the forward gear

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

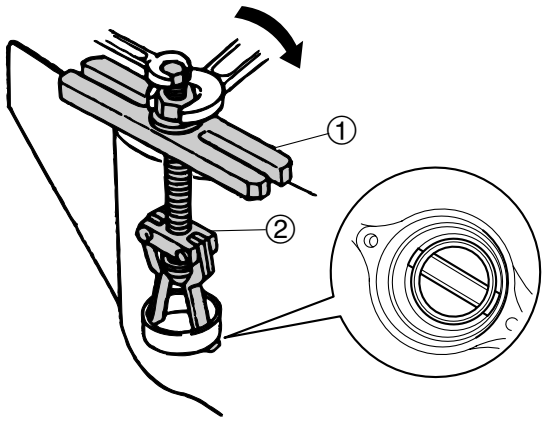


69R60140

Bearing separator ①: 90890-06534 or commercially available tool
Appropriate rod ②:
ⓐ: 22 mm (0.866 in)
ⓑ: 20 mm (0.78 in)

Disassembling the lower case

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



69R60150

Stopper guide plate ①: 90890-06501
Bearing puller assembly ②: 90890-06535

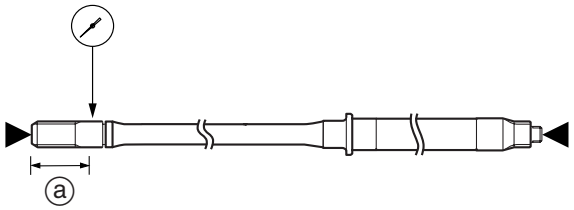
Checking the pinion and forward gear

1. Check the theeth and dogs of pinion and forward gear. Replace the pinion and forward gear if cracked or worn.

Checking the drive shaft

1. Check the drive shaft spline. Replace the drive shaft if bent or worn.

2. Measure the drive shaft runout.



69D60110

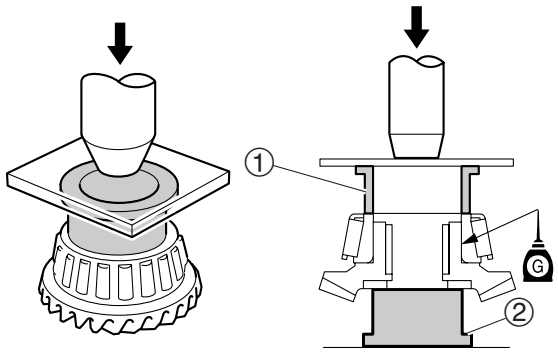
Runout limit: 0.5 mm (0.020 in)
ⓐ: 60 mm or more

Checking the lower case

1. Check the skeg, cavitation plate and torpedo. Replace the lower case if cracked or damaged.

Assembling the forward gear

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



69R60210

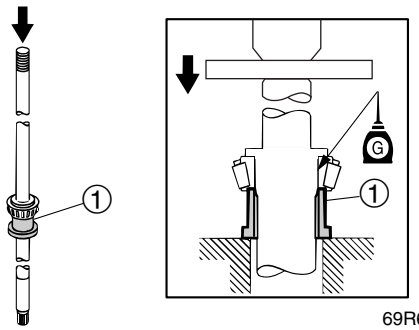
CAUTION:

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

Bearing inner race attachment ①: 90890-06644
Needle bearing attachment ②: 90890-06607

Assembling the drive shaft

1. Install a new taper roller bearing onto the drive shaft using a press.



69R60220

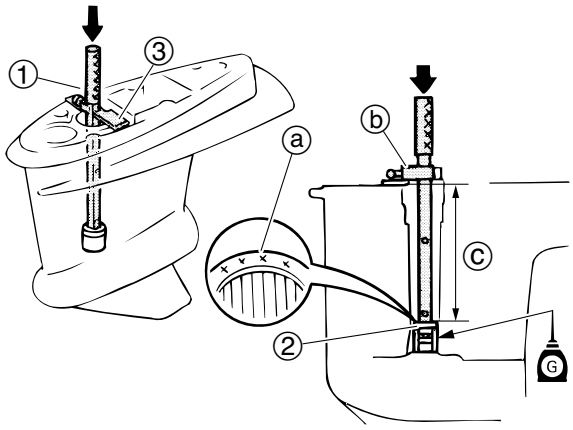
CAUTION:

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

Bearing inner race attachment ①: 90890-06645

Assembling the lower case

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



6F660280

CAUTION:

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

NOTE:

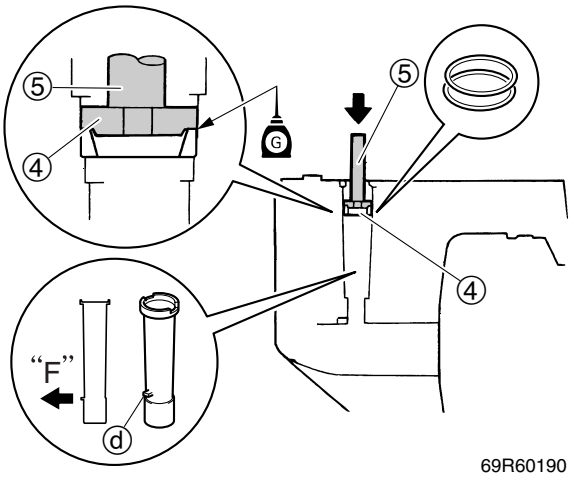
- Install the needle bearing with the identification mark ⓐ facing up.
- Apply gear oil to the needle bearing before installation.
- Be careful not to let the stopper ⓑ get out of position when using the driver rod.

Driver rod SL ①: 90890-06602
Needle bearing attachment ②: 90890-06615
Bearing depth plate ③: 90890-06603

Installation depth ⓒ: 185.0–186.0 mm (7.28–7.32 in)

6

2. Install the sleeve, shim(s) and new taper roller bearing outer race.



69R60190

CAUTION:

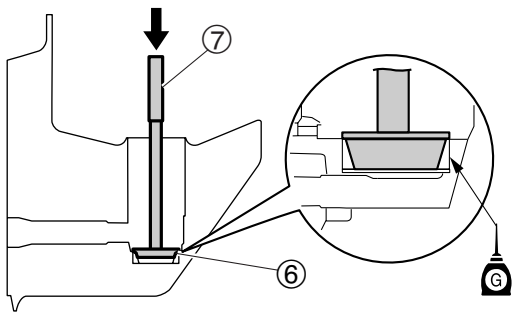
Do not reuse the bearing, always replace it with a new one.

NOTE:

- Be sure to select the pinion shim(s) if replacing the lower case or taper roller bearing.
- To select the shim(s), refer to page 6-24.
- Install the sleeve with the projection ⓓ facing forward.

Bearing outer race attachment ④: 90890-06628
Driver rod LS ⑤: 90890-06606

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



69R60200

CAUTION:

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

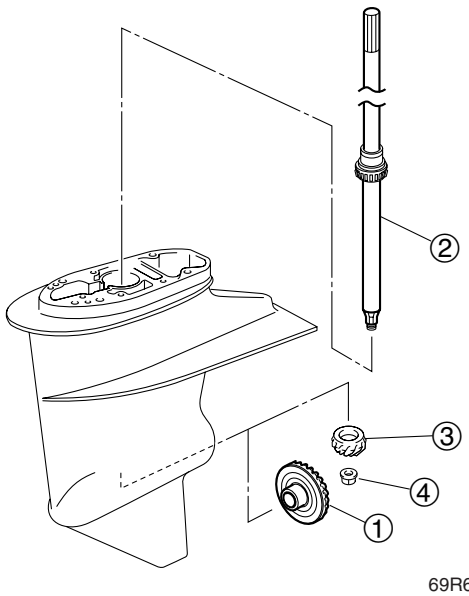
NOTE:

- Be sure to select the forward gear shim(s) if replacing the lower case or taper roller bearing.
- To select the shim(s), refer to page 6-24.
- Apply gear oil to the inside and outside of the taper roller bearing outer race before installation.

Bearing outer race attachment ⑥: 90890-06625
Driver rod LL ⑦: 90890-06605

Installing the drive shaft

1. Install the forward gear ①, drive shaft ②, pinion ③ and pinion nut ④.

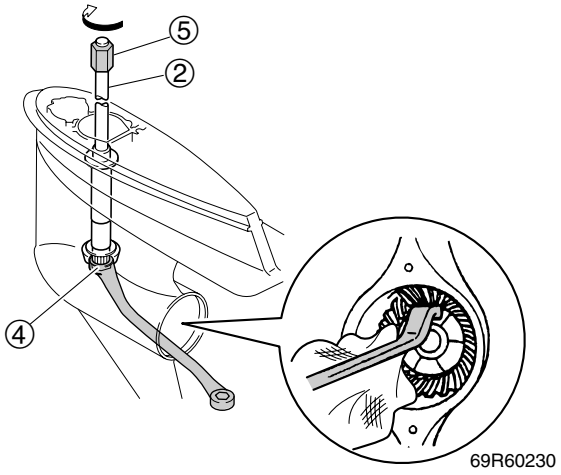


69R6012C

NOTE:

Install the drive shaft ② by lifting it up slightly, and then aligning its splines with the pinion ③.

2. Tighten the pinion nut ④ to the specified torque.

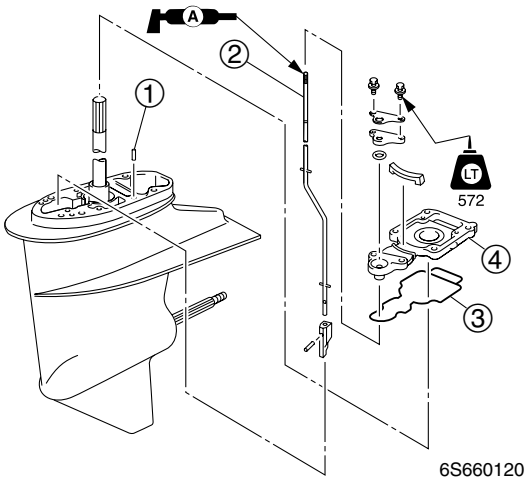


	Drive shaft holder 3 ⑤: 90890-06517

	Pinion nut ④: 50 N·m (5.0 kgf·m, 36.9 ft·lb)

Installing the shift rod

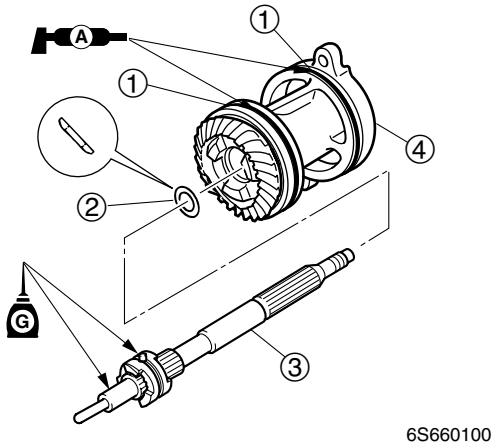
1. Install the dowel ①, shift rod assembly ②, new gasket ③ and oil seal housing ④.



Installing the propeller shaft housing

1. Install the new O-rings ①.

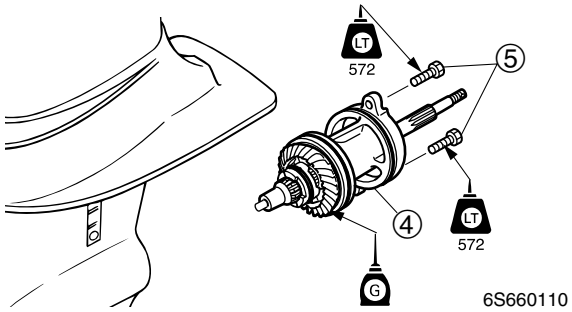
2. Install the washer ②, propeller shaft assembly ③ into the propeller shaft housing assembly ④.



NOTE:

Set the gear shift to “F” position after installing the propeller shaft housing assembly.

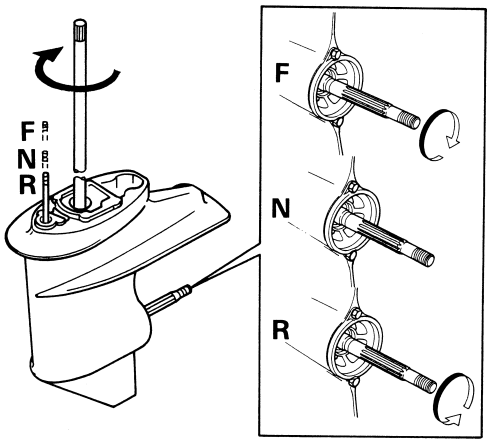
3. Install the propeller shaft housing assembly ④, and then tighten the bolts ⑤ to specified torque.



	Propeller shaft housing bolt ⑤: 11 N·m (1.1 kgf·m, 8.1 ft·lb)

6

4. Make sure check the shift operation. Disassemble and assemble the lower case if improperly.

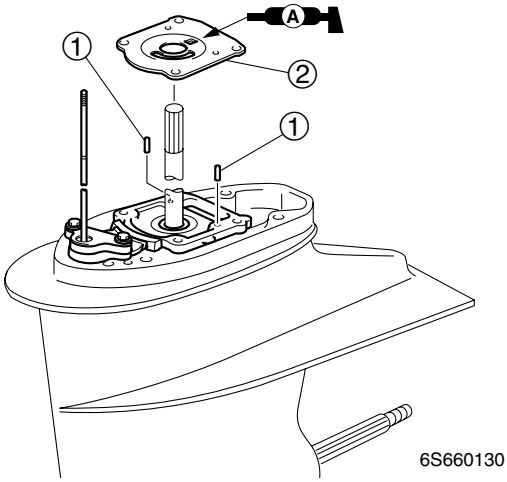


6B460430

NOTE:
- Change the shift rod position to “F”, “R” and “N” position.
- Make sure that the propeller shaft rotating direction is correct in “F” and in “R” position.
- Make sure that the position is correct in “N” position.

Installing the water pump

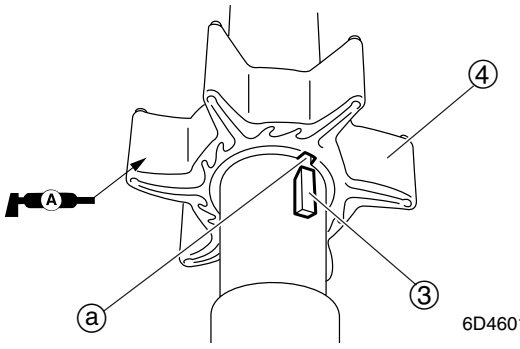
1. Install the dowels ①, and then install the outer plate cartridge ②.



6S660130

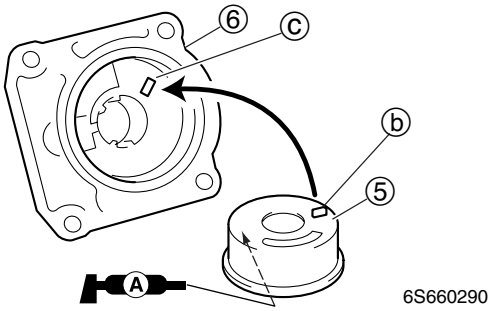
2. Install the Woodruff key ③ onto the drive shaft groove.

3. Align the groove ⓐ in the impeller ④ with the Woodruff key ③, and then install the impeller.



6D460165

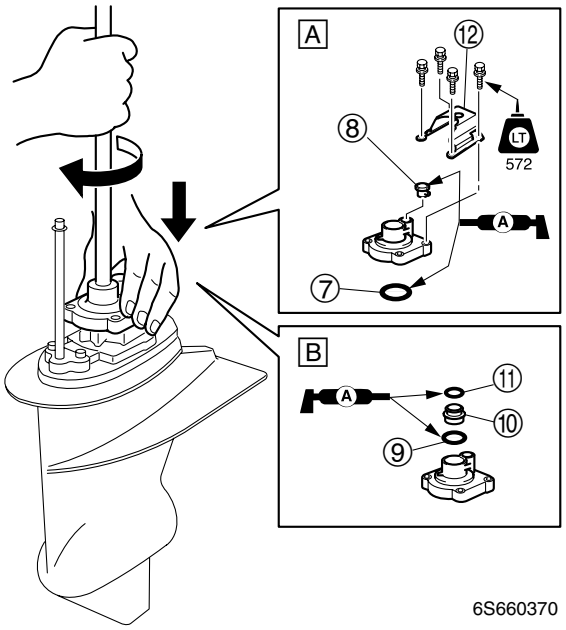
4. Install the insert cartridge ⑤ into the water pump housing ⑥.



6S660290

NOTE:
Align the insert cartridge projection ⓑ with the hole ⓒ in the water pump housing.

5. Install the new O-ring ⑦, water seal rubber ⑧ (for S, X transom: new O-ring ⑨, water tube ⑩, new O-ring ⑪) and water pump cover bracket ⑫ onto the water pump housing, then install onto the lower case.



A L-transom
B S-transom, X-transom

CAUTION:

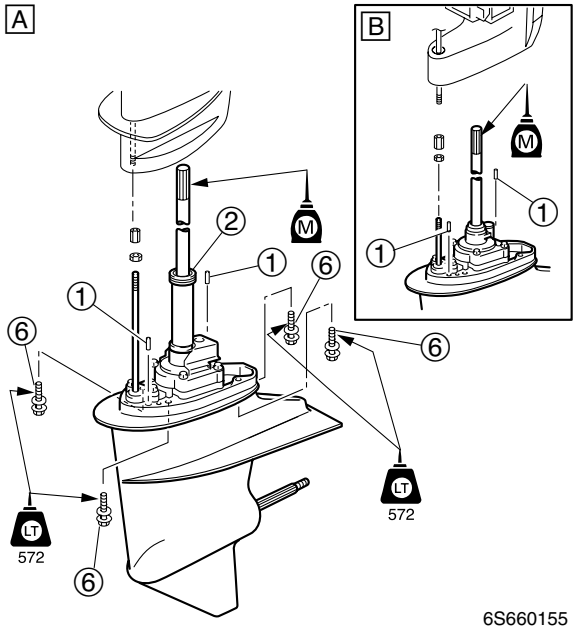
Do not turn the drive shaft counterclockwise, otherwise the water pump impeller may be damaged.

NOTE:

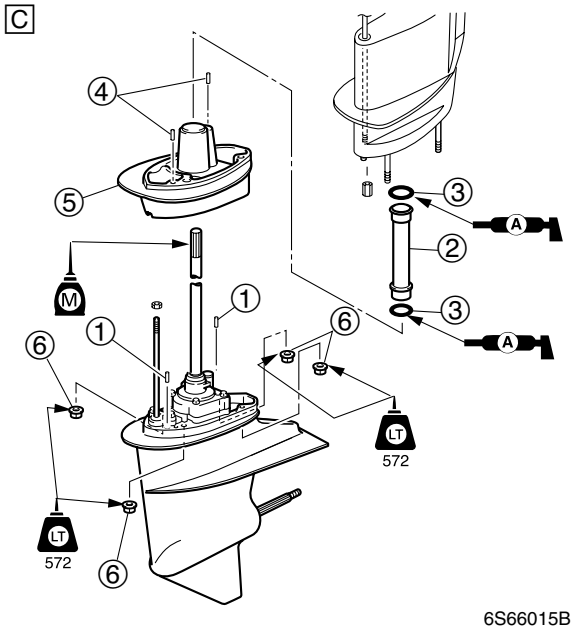
When installing the water pump housing, turn the drive shaft clockwise while pushing down the pump housing.

Installing the lower unit

1. Install the dowels ① and tube ②, new O-rings ③ and dowels ④ onto the extension ⑤ (X-transom).



A L-transom
B S-transom



C X-transom

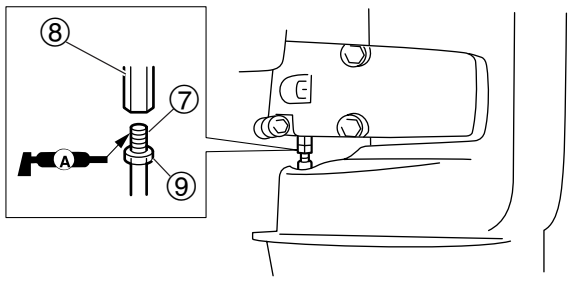
2. Push the shift rod down to shift into “R” position.

3. Set the gear shift to “R” position. Install the lower unit to the upper case, and then tighten the lower case bolts (nut) ⑥ to the specified torque.

	Lower case bolt (nut) ⑥: 37 N·m (3.7 kgf·m, 27.3 ft·lb)

4. Connect the shift rod ⑦.

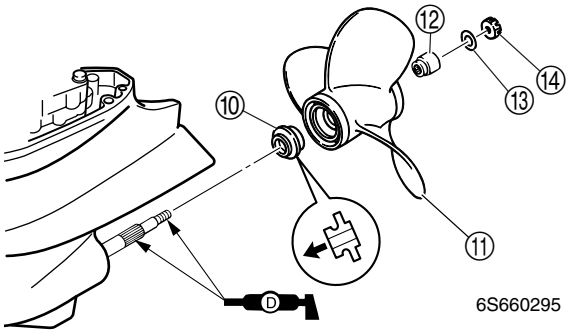
NOTE:
Screw in the adjuster ⑧ and then tighten the locknut ⑨.



69R60126

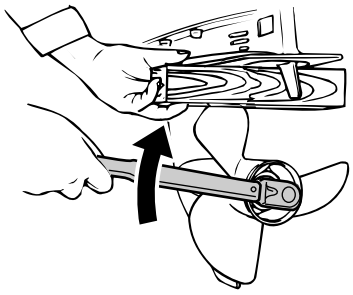
5. Check that the gear shift operates smoothly by moving the gear shift to "N", "F" and "R" position.

6. Install the spacer ⑩, propeller ⑪, collar ⑫, washer ⑬ and the propeller nut ⑭.



6S660295

7. Place a block of wood between the anti-cavitation plate and the propeller, and then tighten the nut to the specified torque.

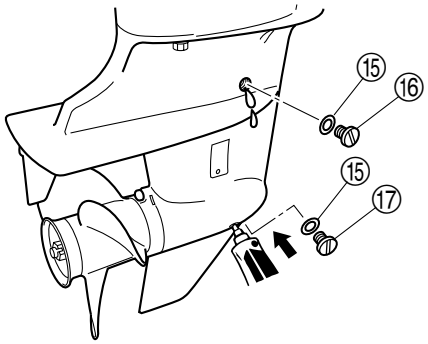

69R60285

⚠WARNING
- **Do not hold the propeller with your hands when loosening or tightening it.**
- **Be sure to disconnect the battery cables from the battery and remove the lock plate from the engine stop lanyard switch.**
- **Put a block of wood between the anti-cavitation plate and propeller to prevent the propeller from turning.**

NOTE:
If the grooves in the propeller nut ⑭ do not align with the propeller shaft hole, tighten the nut until they are aligned.

Propeller nut ⑭:
35 N·m (3.5 kgf·m, 25.3 ft·lb)

8. Install a new cotter pin to the propeller shaft.
9. Insert a gear oil tube into the drain hole and slowly fill the gear oil until oil flows out of the check hole and no air bubbles are visible.



6D430320

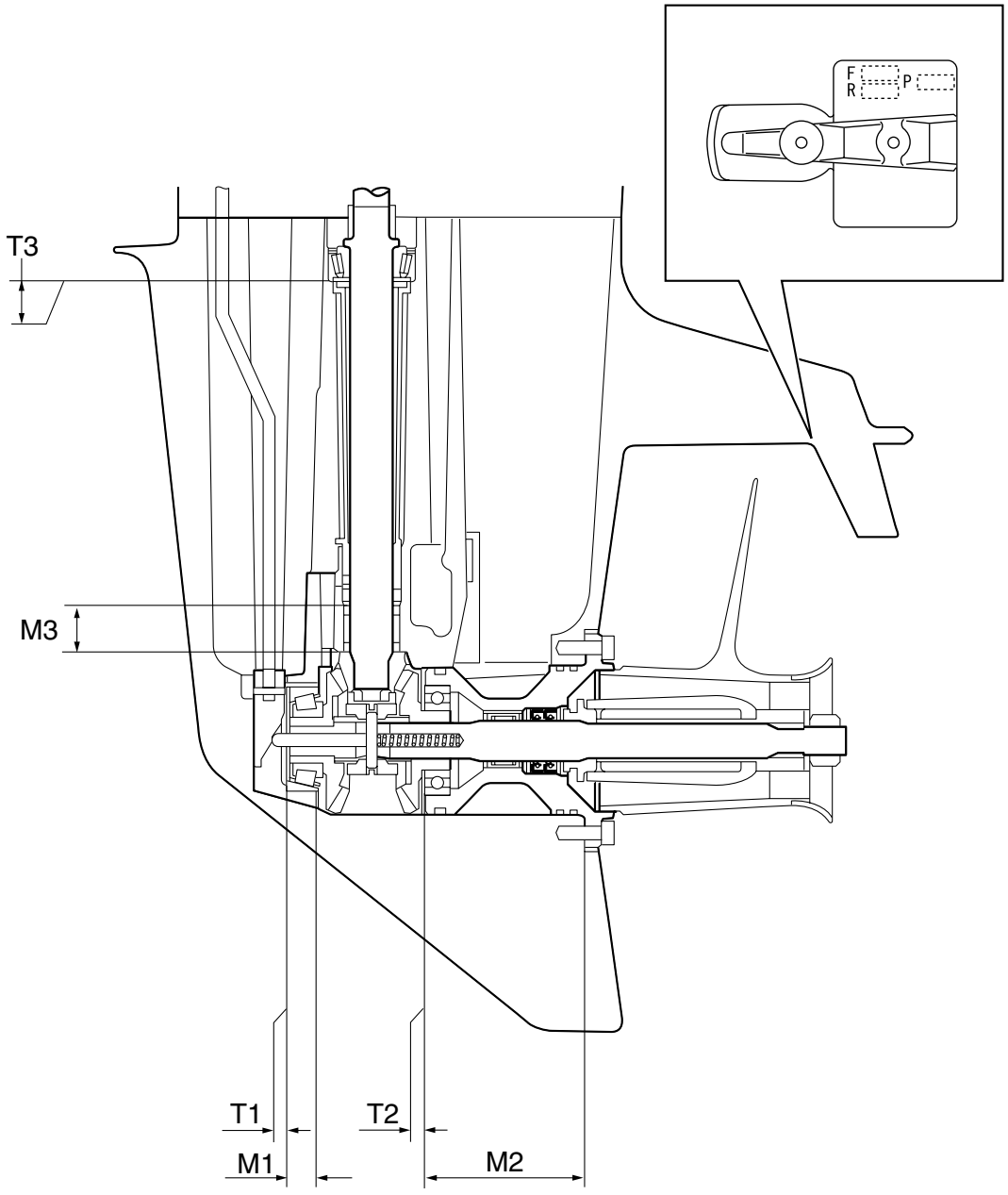
NOTE:
To check the gear oil, refer to page 3-14.

Recommended gear oil:
Hypoid gear oil
API:GL-4
SAE: 90
Oil quantity:
320 cm³
(10.82 US oz, 11.29 Imp oz)

10. Install the new gaskets ⑮, check screw ⑯, drain screw ⑰ quickly, and then tighten to specified torgue.

Check screw ⑯ and drain screw ⑰:
9 N·m (0.9 kgf·m, 6.6 ft·lb)

Shimming



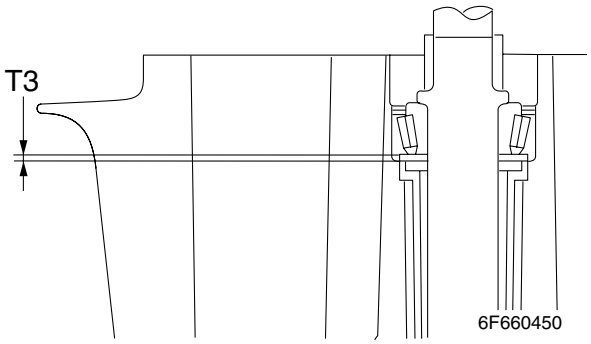
6S660180

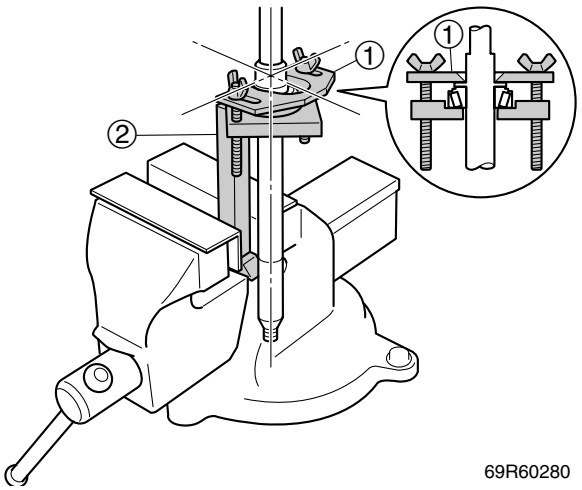
Shimming

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

Selecting the pinion shim

1. Install the special service tools onto the drive shaft.





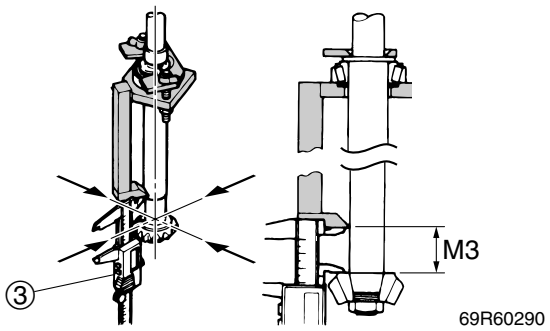
NOTE:
- Select the shim thickness (T3) by using the specified measurement(s) and the calculation formula.
- Install the special service tools onto the drive shaft so that the taper roller bearing outer race is at the center of the hole.
- Tighten the wing nuts another 1/4 of a turn after they contact the pinion height gauge plate.

	Pinion height gauge plate B ①: 90890-06712 Pinion height gauge ②: 90890-06710

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

	Pinion nut: 50 N·m (5.0 kgf·m, 36.9 ft·lb)

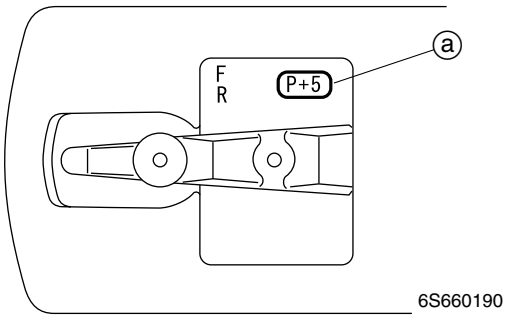
3. Measure the distance (M3) between the special service tool and the pinion as shown.



NOTE:
- Measure the pinion at 4 points to find the distance average.
- Keep the each measurement numeral.

	Digital caliper ③: 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 ⓐ 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.

Calculation formula:
Pinion shim thickness (T3) =
M3 – 27.00 – P/100

Example:
If "M3" is 28.30 mm and "P" is (+5), then
T3 = 28.30 – 27.00 – (+5)/100 mm
= 1.30 – 0.05 mm
= 1.25 mm

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

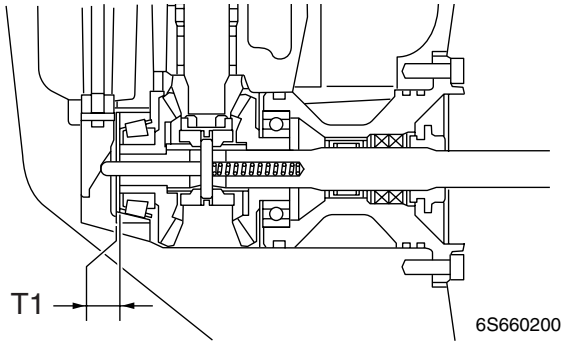
Calculated numeral at 1/100th place		Use shim
more than	less than	
1.10	1.20	1.2
1.20	1.30	1.3
1.30	1.40	1.4
1.40	1.50	1.5
1.50	1.60	1.6
1.60	1.70	0.7 and 1.0
1.70	1.83	0.7 and 1.1

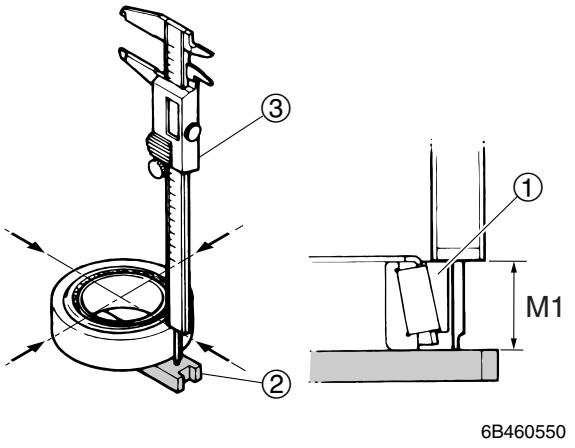
Available shim thicknesses:
0.7, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5 and 1.6 mm

Example:
If "T3" is 1.25 mm, then the pinion shim is 1.3 mm.
If "T3" is 1.66 mm, then the pinion shim is 0.7 and 1.0 mm.

Selecting the forward gear shim

1. Turn the taper roller bearing outer race ① 2 or 3 times to seat the rollers, and then measure the bearing height (M1) as shown.



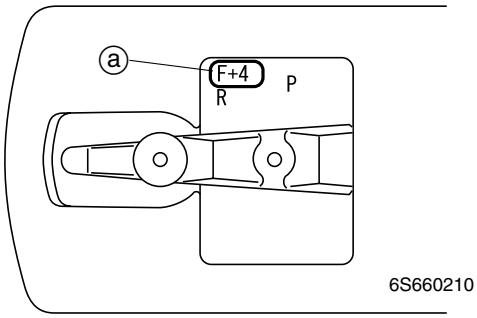


NOTE:

- Select the shim thickness (T1) by using the specified measurement(s) and the calculation formula.
- Measure the bearing outer race at 4 points to find the height average.
- Keep the each measurement numeral.

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

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



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

Calculation formula:
Forward gear shim thickness (T1) =
17.50 + F/100 – M1

Example:
If "M1" is 16.25 mm and "F" is (+4), then
T1 = 17.50 + (+4)/100 – 16.25 mm
= 17.50 + 0.04 – 16.25 mm
= 1.29 mm

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

Calculated numeral at 1/100th place		Use shim
more than	less than	
1.00	1.10	1.0
1.10	1.20	1.1
1.20	1.30	1.2
1.30	1.40	1.3
1.40	1.50	1.4

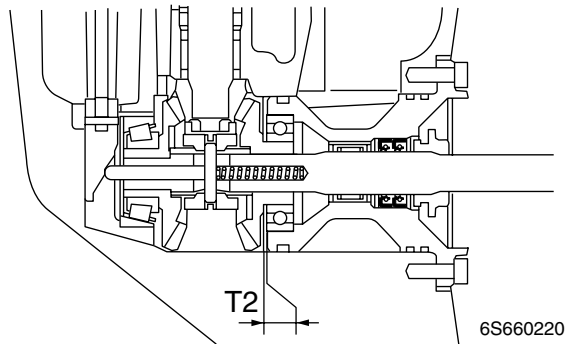
Available shim thicknesses:
1.0, 1.1, 1.2, 1.3 and
1.4 mm

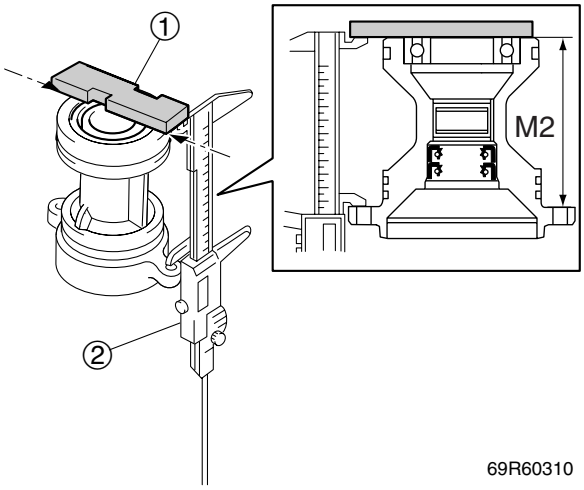
Example:
If "T1" is 1.29 mm, then the forward gear shim is 1.2 mm.
If "T1" is 1.44 mm, then the forward gear shim is 1.4 mm.

Selecting the reverse gear shim

1. Install the ball bearing to the propeller shaft housing.

2. Measure the propeller shaft housing height (M2) as shown.



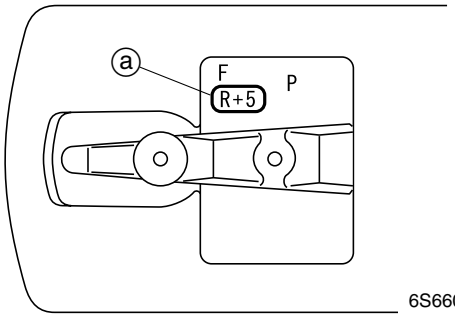


NOTE:
- Select the shim thickness (T2) by using the specified measurement(s) and the calculation formula.
- Measure the reverse gear at 2 points to find the height average.
- Keep the each measurement numeral.

Shimming plate ①: 90890-06701
Digital caliper ②: 90890-06704

6

3. Calculate the reverse gear shim thickness (T2) as shown in the examples below.



NOTE:
"R" is the deviation of the lower case dimension from standard. The "R" mark ⓐ is stamped on the trim tab mounting surface of the lower case in 0.01 mm units. If the "R" mark is unreadable, assume that "R" is zero and check the backlash when the unit is assembled.

Calculation formula:
Reverse gear shim thickness (T2) = 80.00 + R/100 – M2

Example:
If "M2" is 78.79 mm and "R" is (+5), then
T2 = 80.00 mm + (+5)/100 – 78.79 mm
= 80.05 – 78.79
= 1.26 mm

4. Select the reverse gear shim(s) (T2) as follows.

Calculated numeral at 1/100th place		Use shim
more than	less than	
1.00	1.10	1.0
1.10	1.20	1.1
1.20	1.30	1.2
1.30	1.32	1.3

Available shim thicknesses:
1.0, 1.1, 1.2 and 1.3 mm

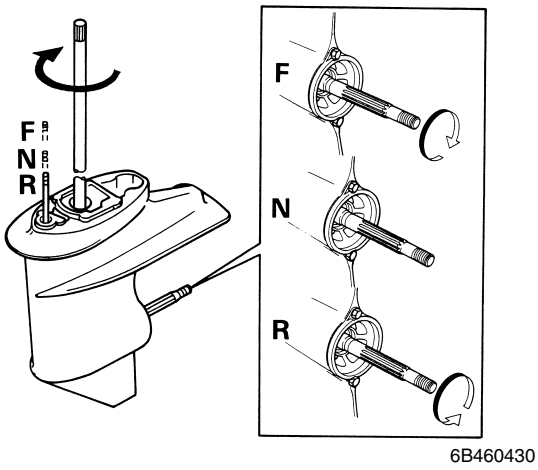
Example:
If "T2" is 1.26 mm, then the reverse gear shim is 1.2 mm.
If "T2" is 1.31 mm, then the reverse gear shim is 1.3 mm.

Backlash

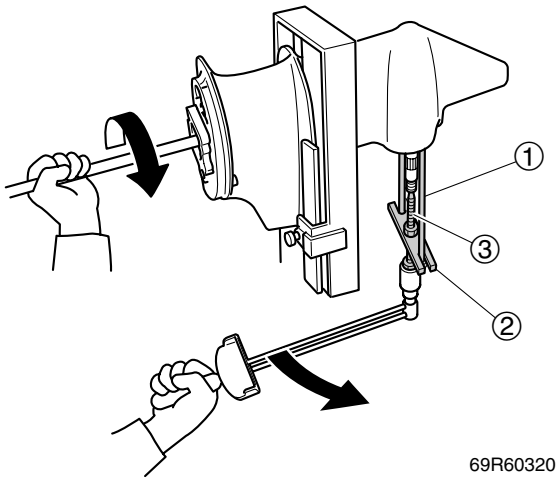
Measuring the forward and reverse gear backlash

1. Remove the water pump assembly.

2. Set the gear shift to "N" position.



3. Install the special service tools so that it pushes against the propeller shaft, and then turn the lower unit 90° to the upside position.

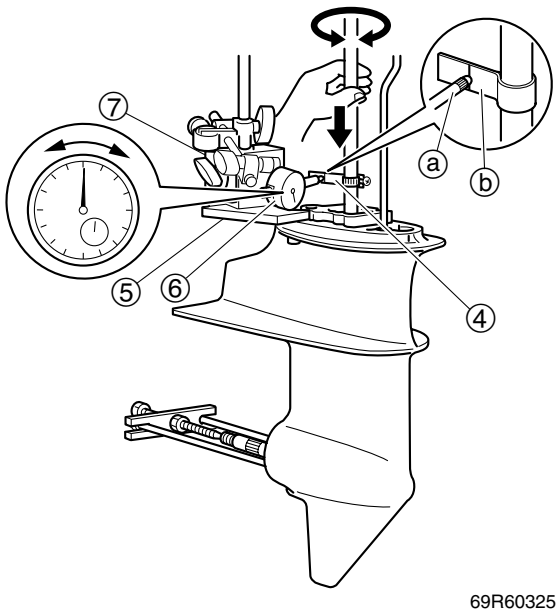


NOTE:
While turning the drive shaft clockwise 5–6 times so that the forward gear taper roller bearing is seated evenly tighten the center bolt ③ to specified torque.

Bearing housing puller claw S ①:
90890-06564
Stopper guide plate ②:
90890-06501
Center bolt ③:
90890-06504

Center bolt ③:
5 N·m (0.5 kgf·m, 3.7 ft·lb)

4. Install the backlash indicator onto the drive shaft (16.0 mm [0.63 in] in diameter), then the dial gauge onto the lower unit as shown.



69R60325

NOTE:
Install the dial gauge so that the plunger ⓐ contacts the mark ⓑ on the backlash indicator.

Backlash indicator ④: 90890-06706
Magnet base plate ⑤: 90890-07003
Dial gauge set ⑥: 90890-01252
Magnet base B ⑦: 90890-06844

5. While pushing the drive shaft slightly, turn the drive shaft slowly clockwise and counterclockwise, then measure the backlash when the drive shaft stops in each direction.

Forward gear backlash:
0.31–0.72 mm (0.0122–0.0283 in)

6. Add or remove shim(s) if out of specification.

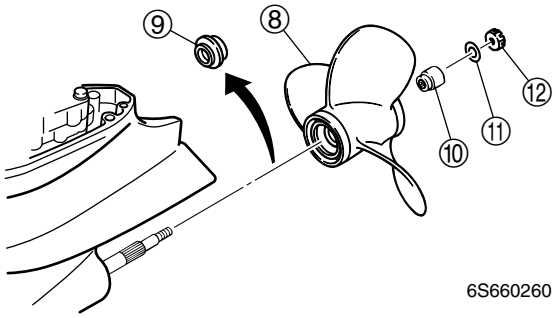
Forward gear backlash	Shim thickness
Less than 0.31 mm (0.0122 in)	To be decreased by (0.51 – M) × 0.49
More than 0.72 mm (0.0283 in)	To be increased by (M – 0.51) × 0.49

M: Measurement

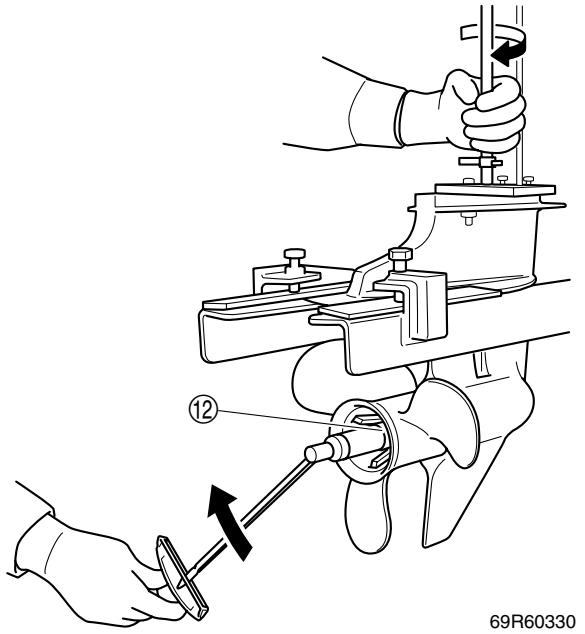
Available shim thicknesses:
1.0, 1.1, 1.2, 1.3 and 1.4 mm

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

8. Apply a load to the reverse gear by installing the propeller ⑧ without the spacer ⑨ , then install the collar ⑩, washer ⑪ and propeller nut ⑫ as shown.



6S660260

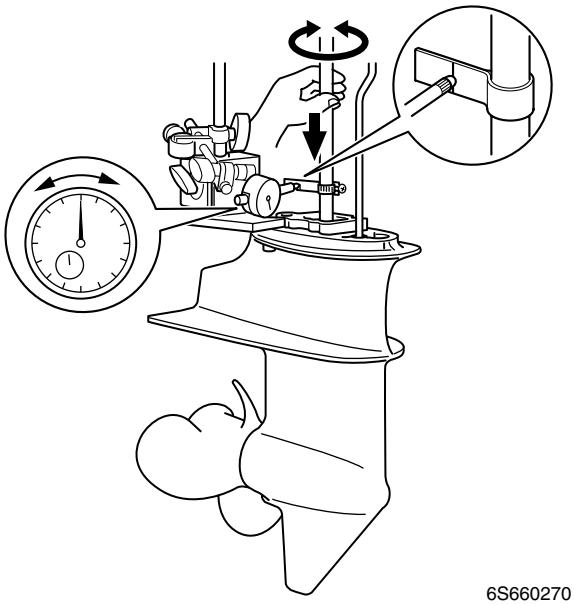


69R60330

NOTE:
Tighten the propeller nut ⑫ to specified torque.

Propeller nut ⑫:
5 N·m (0.5 kgf·m, 3.7 ft·lb)

9. While pushing the drive shaft slightly, turn the drive shaft slowly clockwise and counterclockwise, then measure the backlash when the drive shaft stops in each direction.



6S660270

Reverse gear backlash:
0.93–1.65 mm
(0.0366–0.0650 in)

10. Add or remove the shim(s) if out of specification.

Reverse gear backlash	Shim thickness
Less than 0.93 mm (0.0366 in)	To be decreased by (1.29 – M) × 0.49
More than 1.65 mm (0.0650 in)	To be increased by (M – 1.29) × 0.49

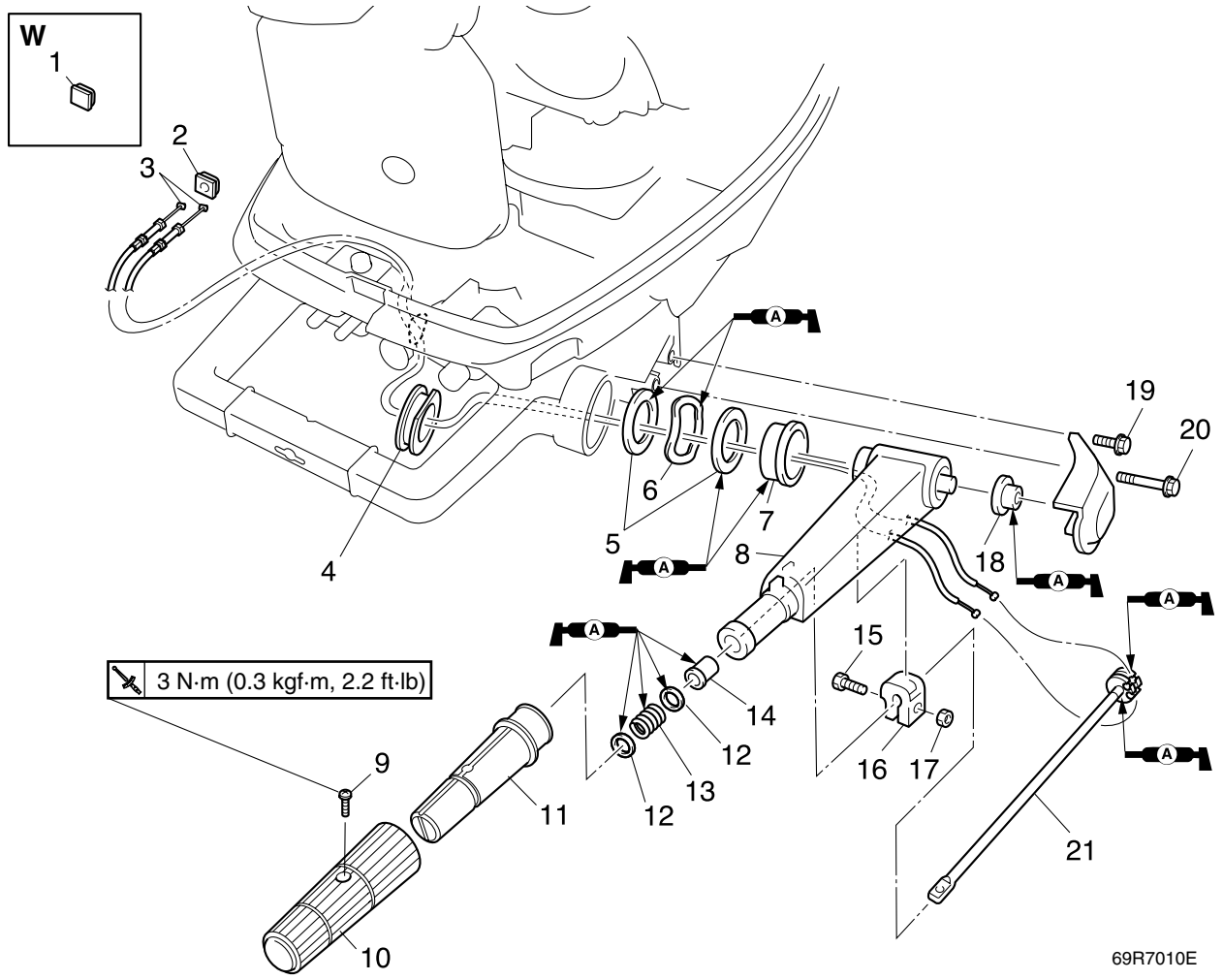
M: Measurement

Available shim thicknesses:
1.0, 1.1, 1.2 and 1.3 mm

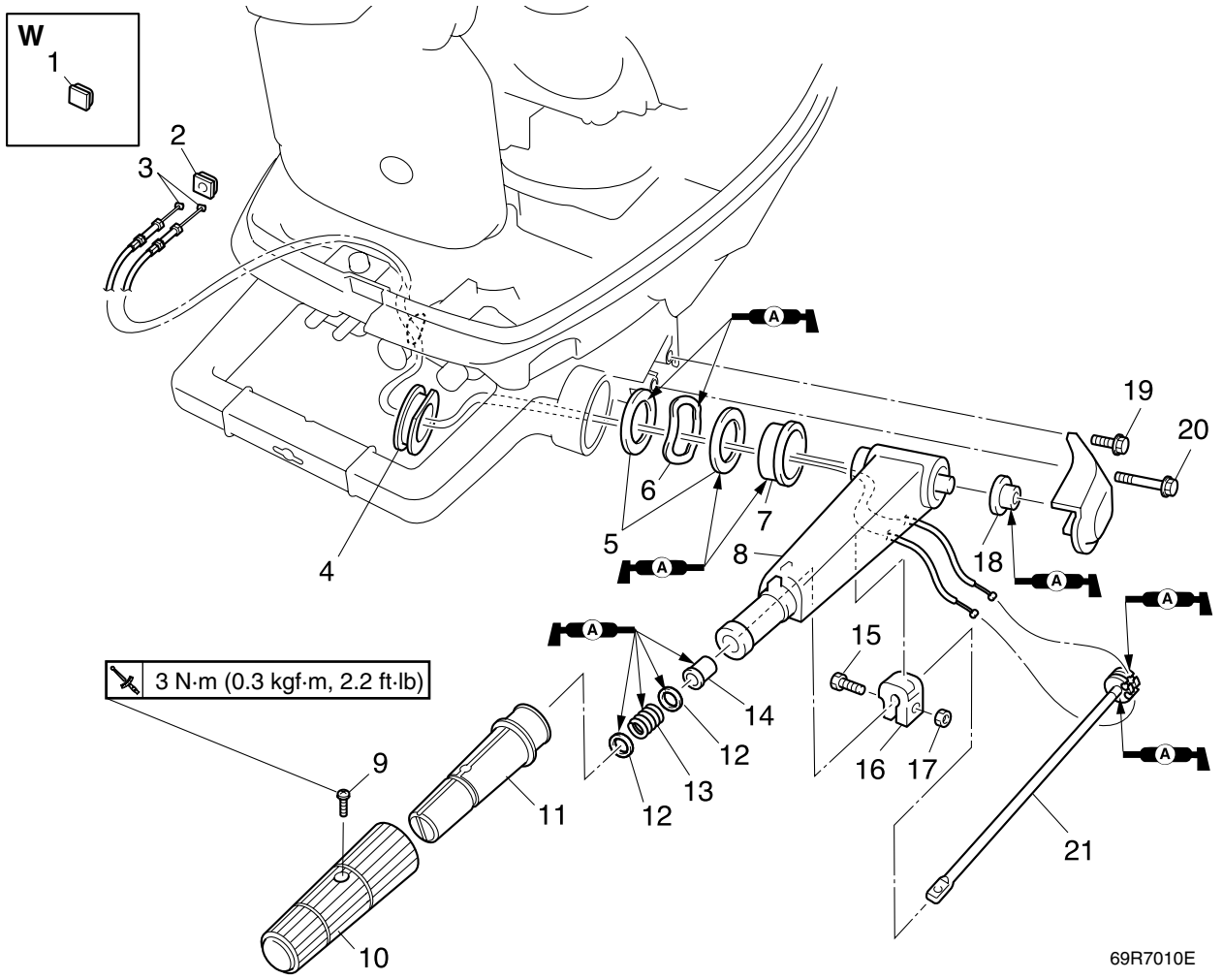
11. Remove the special service tools, and then install the water pump assembly.

Bracket unit

Tiller handle



No.	Part name	Q'ty	Remarks
1	Grommet	1	W
2	Grommet	1	WH, WC, MH
3	Throttle cable	2	
4	Grommet	1	
5	Washer	2	
6	Wave washer	1	
7	Bushing	1	
8	Tiller handle	1	
9	Screw	1	ø5 × 22 mm
10	Rubber grip	1	
11	Throttle grip	1	
12	Washer	2	
13	Spring	1	
14	Bushing	1	
15	Bolt	1	M6 × 20 mm
16	Friction piece	1	
17	Nut	1	

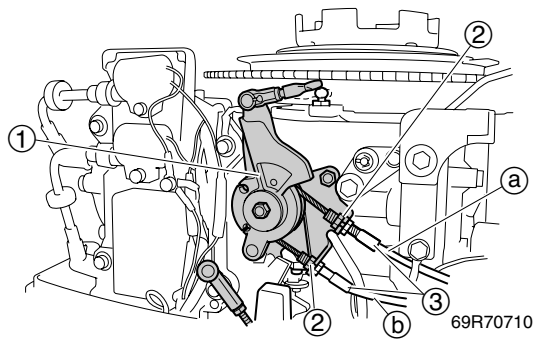


No.	Part name	Q'ty	Remarks
18	Bushing	1	
19	Bolt	1	M6 × 20 mm
20	Bolt	1	M6 × 50 mm
21	Throttle shaft	1	

Disassembling the tiller handle

1. Remove the throttle cam ① from power unit.

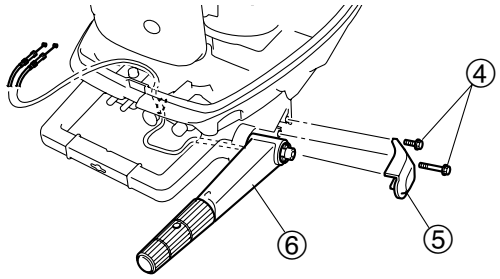
2. Loosen the locknuts ②, and then disconnect the throttle cables ③ from throttle cam ①.



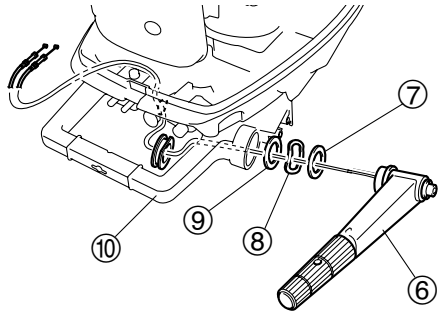
ⓐ Accelate
ⓑ Decelate

NOTE:
Mark the throttle cable identification ⓐ and ⓑ before disconnect the throttle cables.

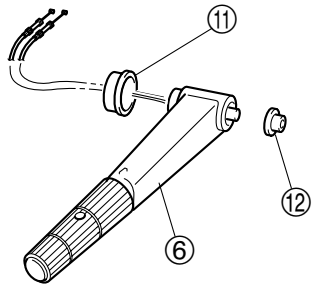
3. Remove the bolts ④, and then remove the cover ⑤ from tiller handle ⑥.



4. Remove the tiller handle ⑥, washer ⑦, wave washer ⑧ and washer ⑨ from steering bracket ⑩.

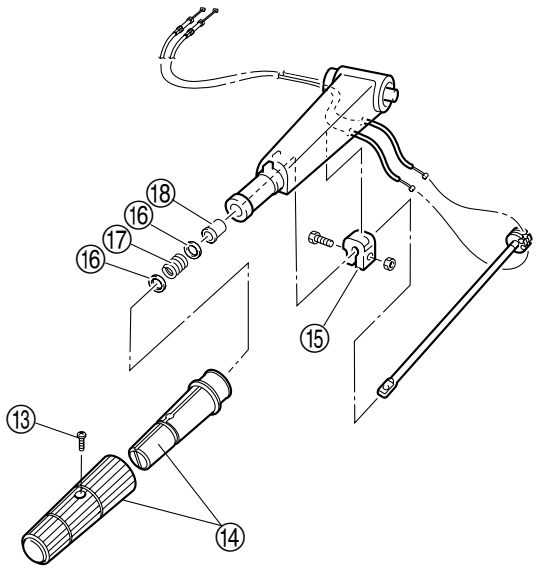


5. Remove the bushing ⑪ and busing ⑫ from tiller handle ⑥.



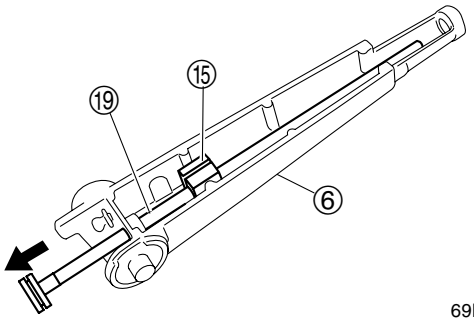
6. Remove the screw ⑬, and then remove the throttle grip with rubber gripe ⑭.

7. Loosen the friction piece ⑮, washer ⑯, spring ⑰, washer ⑯ and bushing ⑱.



8. Remove the throttle cables.

9. Remove the throttle shaft ⑲ from the tiller handle ⑥, and then remove the friction piece ⑮.

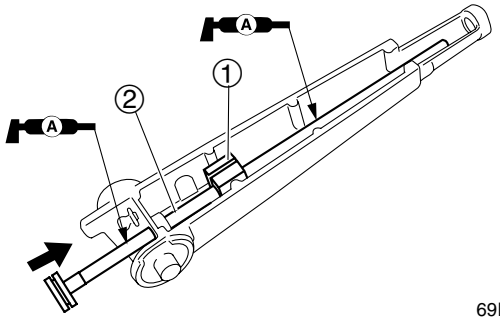


Checking the tiller handle

1. Check the grommet, cable and friction piece. Replace the grommet, cable and friction piece if worn or damaged.

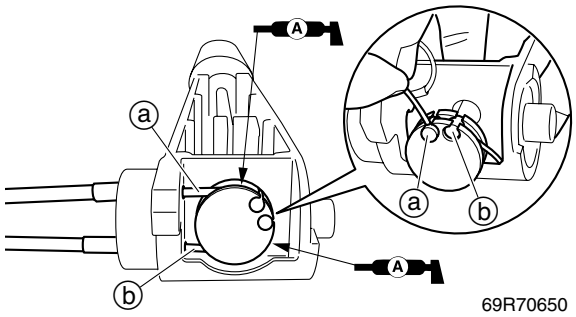
Assembling the tiller handle

1. Install the friction piece ①, and then install the throttle shaft ②.



69R70675

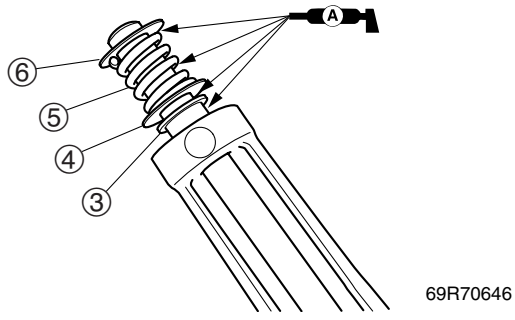
2. Install the throttle cable ⓐ and ⓑ as shown.



69R70650

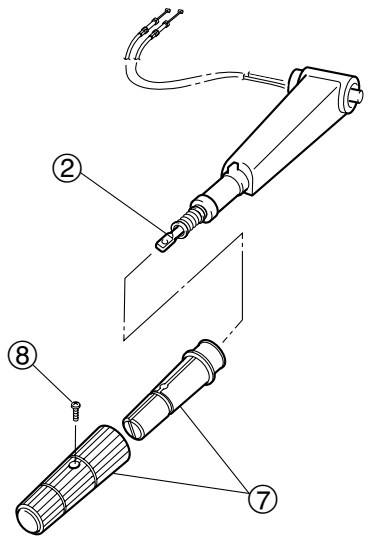
ⓐ Accelate
ⓑ Decelate

3. Install the bushing ③, washer ④, spring ⑤ and washer ⑥.



69R70646

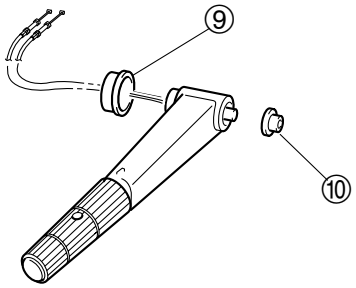
4. Install the throttle grip with rubber gripe ⑦ to the throttle shaft ②.



69R70647

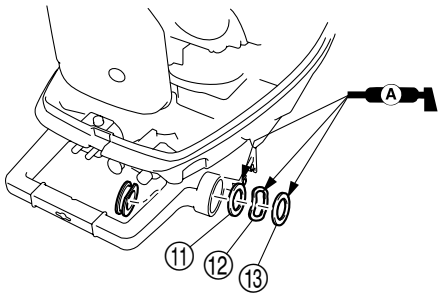
	Throttle grip screw ⑧: 3 N·m (0.3 kgf·m, 2.2 ft·lb)

5. Install the bushing ⑨ and bushing ⑩.



69R70755

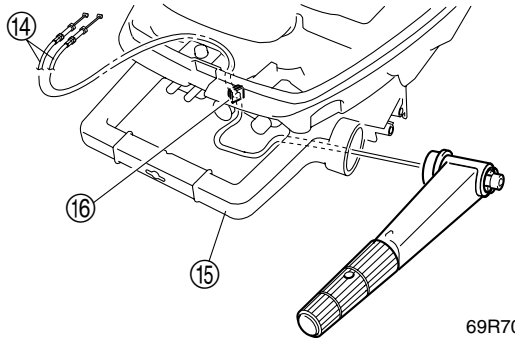
6. Install the washer ⑪, wave washer ⑫ and washer ⑬ into the steering bracket.



69R7077A

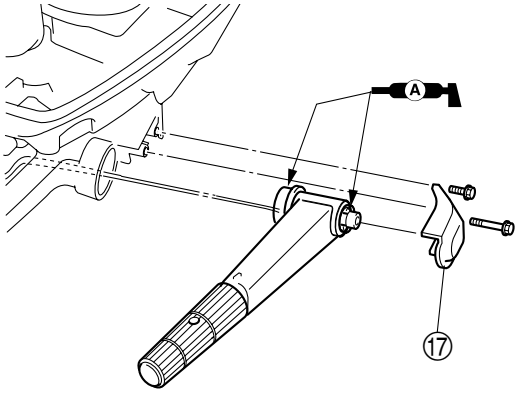
7

7. Install the throttle cables ⑭ into the steering bracket ⑮ and the grommet ⑯ of the bottom cowling.



69R7077B

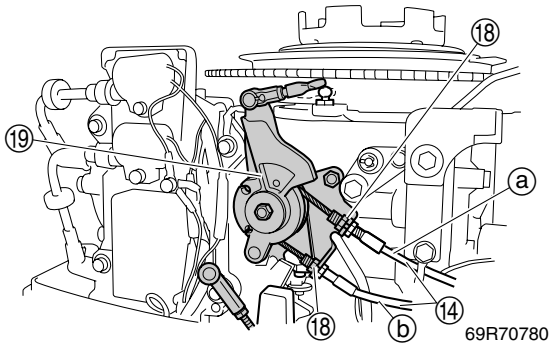
8. Install the tiller handle to the steering bracket, and then install the cover ⑰.



69R70770

9. Connect the throttle cables ⑭ identification marked position to the throttle cam.

10. Temporary tighten the lock nuts ⑱, and then install the throttle cam ⑲ to the power unit.

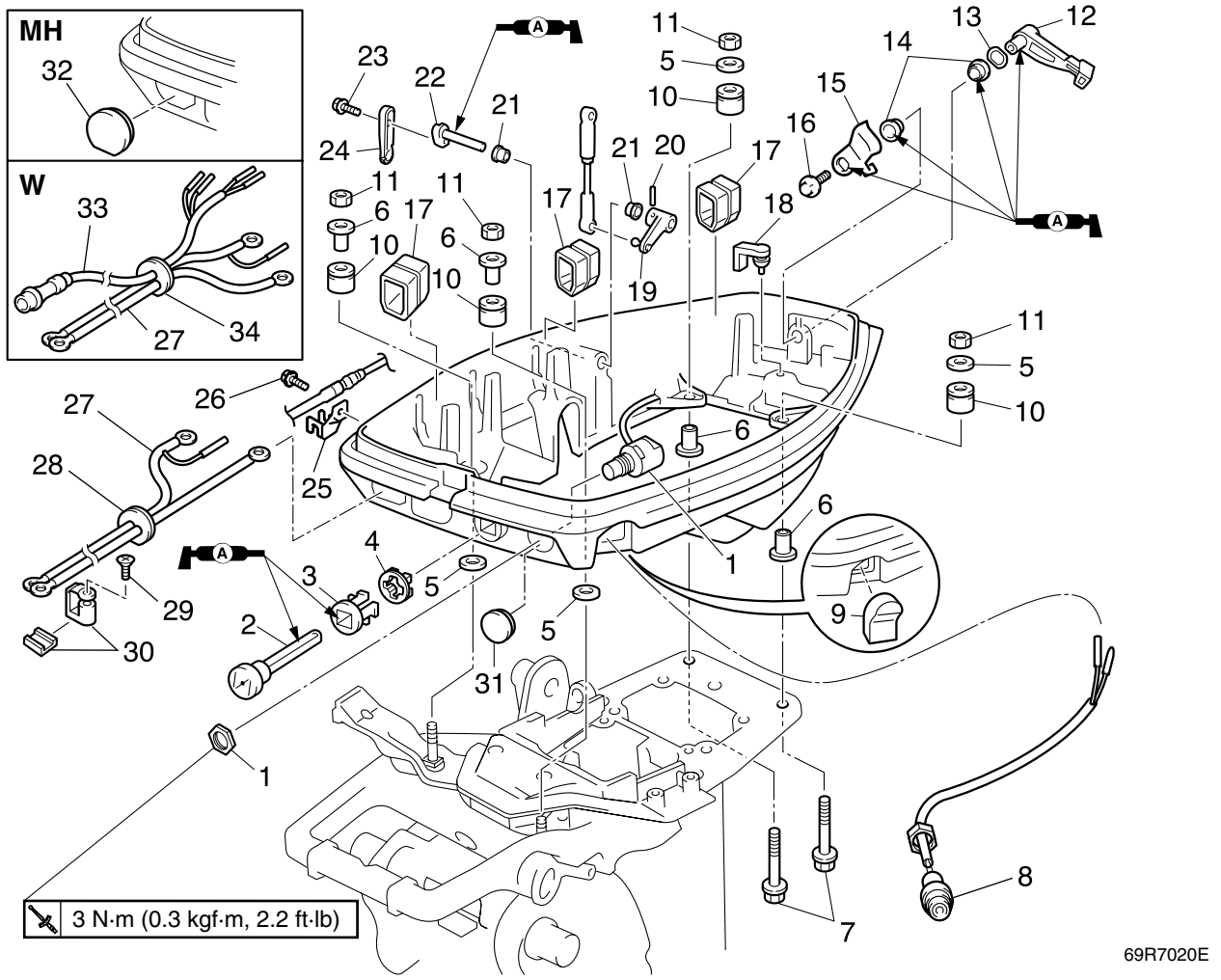


69R70780

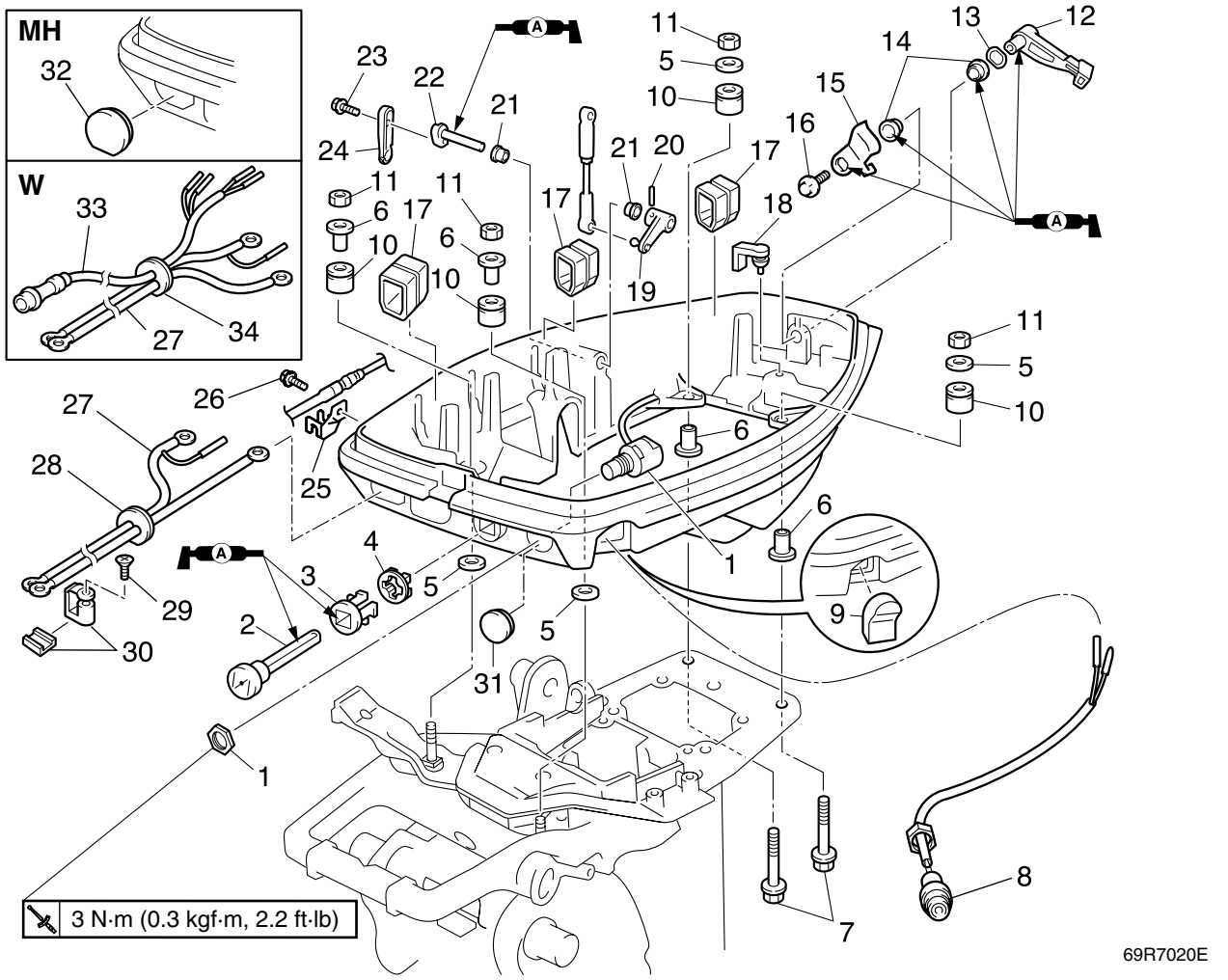
ⓐ Accelate
ⓑ Decelate

NOTE:
- Make sure to adjust the throttle cable freeplay, always remove the throttle cables.
- To adjust the throttle cables, refer to page 3-4.

Bottom cowling

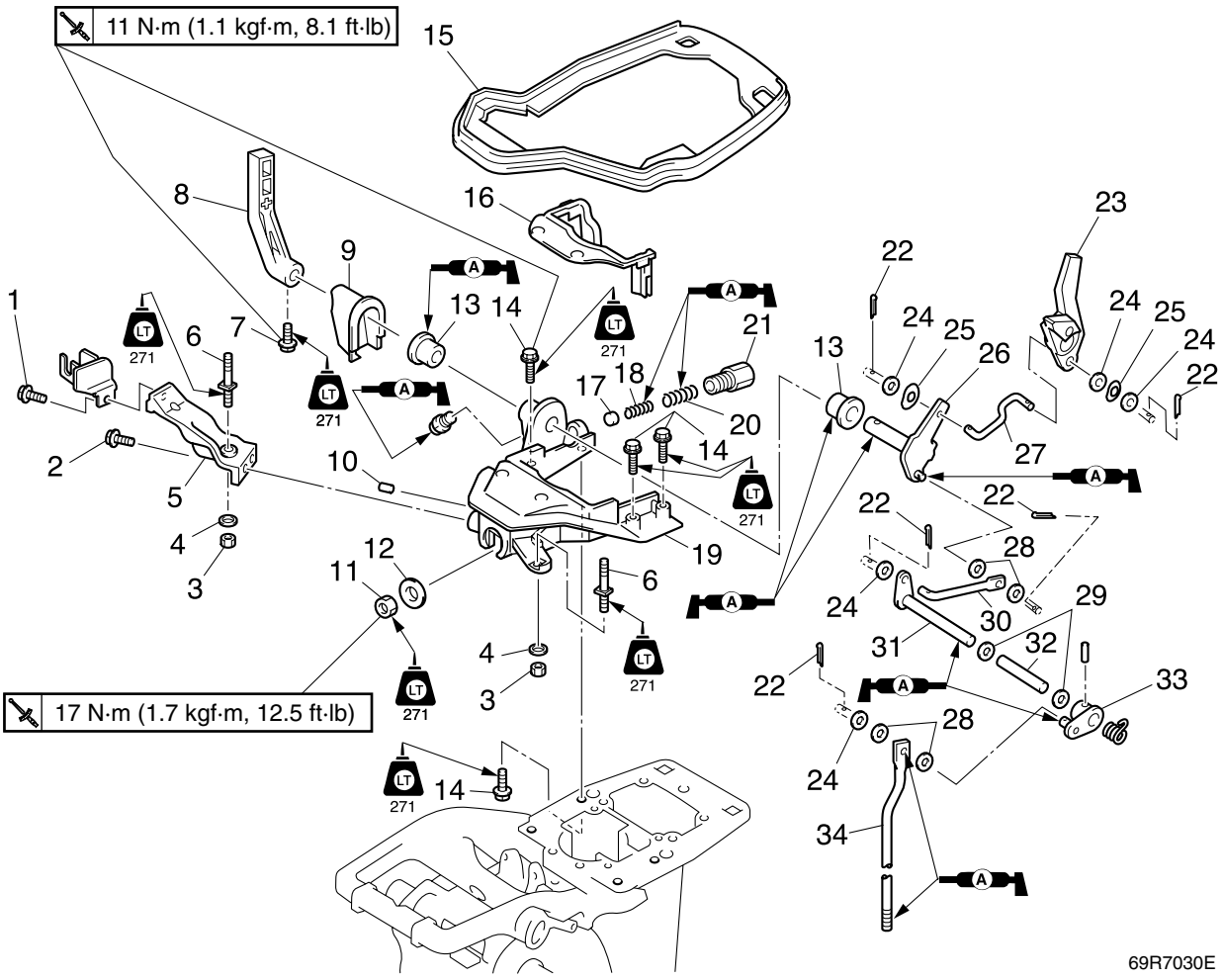


No.	Part name	Q'ty	Remarks
1	Engine stop lanyard switch assembly	1	WH, WC, MH
2	Choke knob	1	
3	Grommet	1	
4	Gasket	1	
5	Washer	4	
6	Collar	4	
7	Bolt	2	M6 × 55 mm
8	Engine start button	1	WH, WC
9	Grommet	1	W
10	Grommet	4	
11	Nut	4	
12	Lever	1	
13	Wave washer	1	
14	Bushing	2	
15	Lever	1	
16	Bolt	1	M6 × 12 mm
17	Holder	2	MH
		3	WH, W, WC

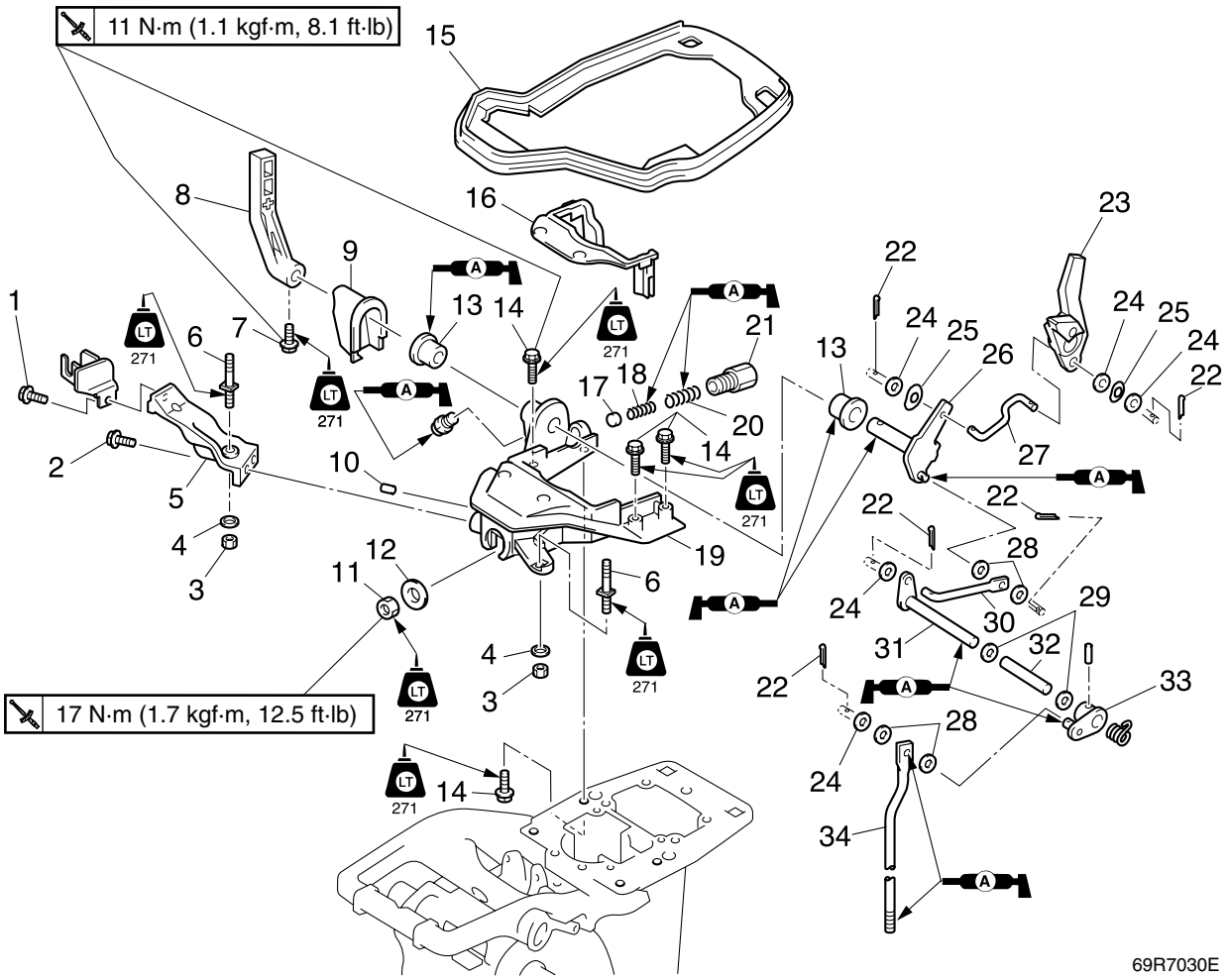


No.	Part name	Q'ty	Remarks
18	Spacer	1	
19	Lever	1	
20	Pin	1	
21	Collar	2	
22	Shaft	1	
23	Bolt	1	M6 × 12 mm: W, WC
24	Lever	1	W, WC
25	Bracket	1	W, WC
26	Bolt	1	M6 × 15 mm: W, WC
27	Battery cable	1	WH, W, WC
28	Grommet	1	WH, WC
29	Screw	1	WH, W, WC
30	Clamp	1	WH, W, WC
31	Grommet	1	W
32	Grommet	1	MH
33	Wirharness	1	W: 7P
34	Grommet	1	W

Shift actuator



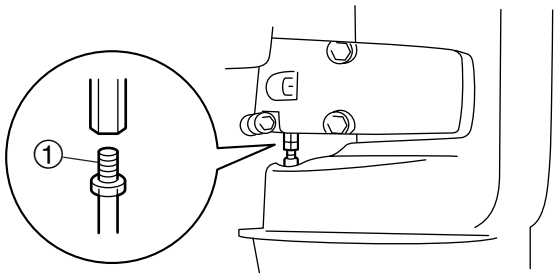
No.	Part name	Q'ty	Remarks
1	Bolt	1	M6 × 16 mm : W, WC
2	Bolt	1	M6 × 18 mm
3	Nut	2	
4	Washer	2	
5	Bracket	1	
6	Bolt	2	
7	Bolt	1	M6 × 20 mm
8	Shift lever	1	
9	Rubber seal	1	
10	Dowel	1	
11	Nut	1	
12	Washer	1	
13	Bushing	2	
14	Bolt	4	M6 × 25 mm
15	Rubber seal	1	
16	Rubber seal	1	
17	Plunger	1	



No.	Part name	Q'ty	Remarks
18	Spring	1	
19	Shift actuator	1	
20	Spring	1	
21	Bolt	1	
22	Cotter pin	5	
23	Arm	1	
24	Washer	5	
25	Wave washer	2	
26	Lever	1	
27	Rod	1	
28	Plastic washer	4	
29	Plastic washer	2	
30	Rod	1	
31	Shift rod lever	1	
32	Collar	1	
33	Lever	1	
34	Shift rod	1	

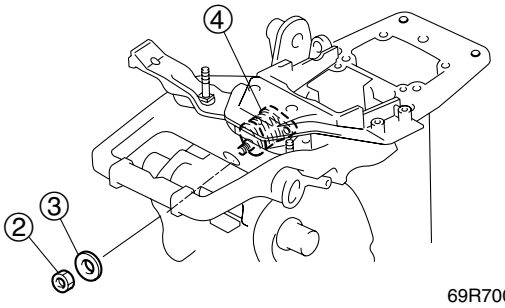
Removing the shift actuator

1. Set the gear shift to “R” position, and then disconnect the shift rod ①.



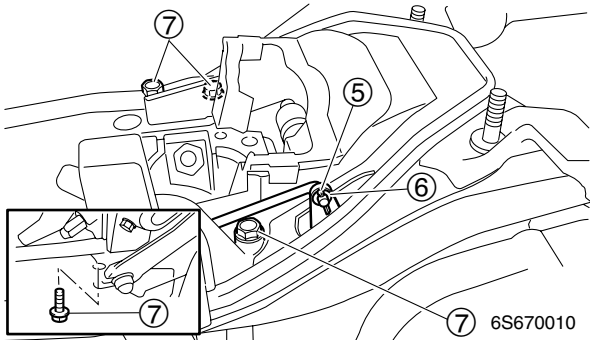
69R70790

2. Remove the nut ② and washer ③ on the rubber mount ④.



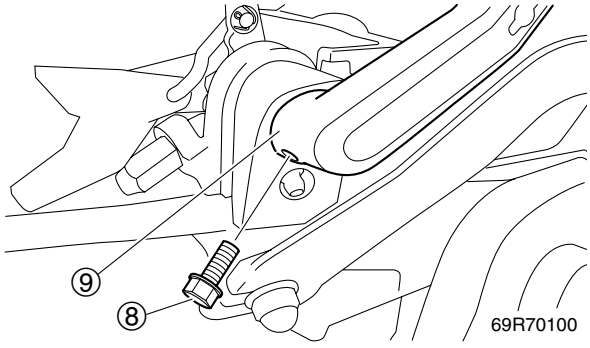
69R70080

3. Remove the cotter pin ⑤, washer ⑥ from the shift rod lever and then remove the bolts ⑦.



6S670010

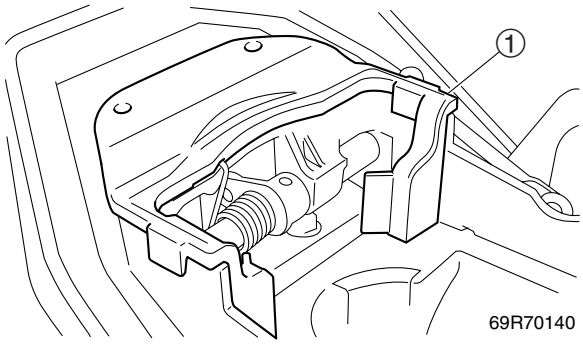
4. Set the gear shift to “F” position, and then remove the bolt ⑧ and shift lever ⑨.



69R70100

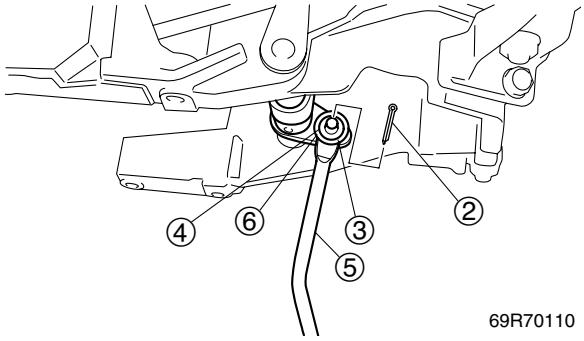
Disassembling the shift actuator

1. Remove the rubber seal ①.



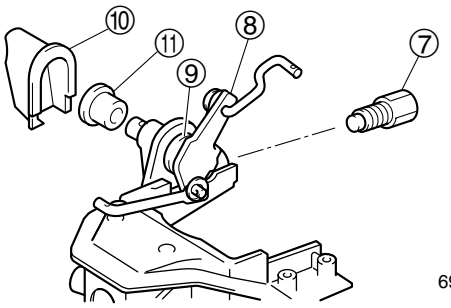
69R70140

2. Remove the cotter pin ②, plate washer ③, plastic washer ④, shift rod ⑤ and plastic washer ⑥.



69R70110

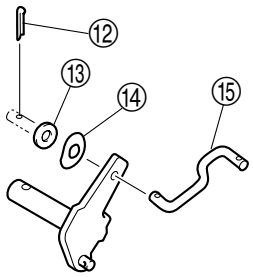
3. Remove the plunger ⑦, lever ⑧, bushing ⑨, rubber cover ⑩ and bushing ⑪ from the shift actuator.



69R70130

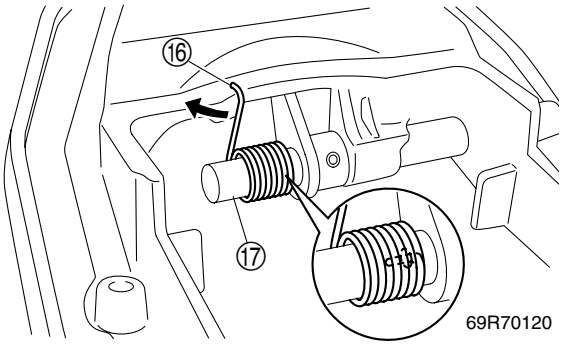
7

4. Remove the cotter pin ⑫, washer ⑬, wave washer ⑭ and rod ⑮ from the lever.



69R70800

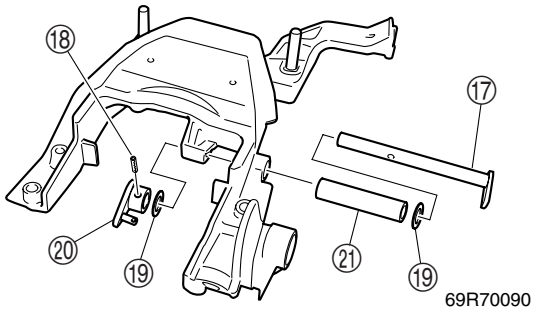
5. Remove the spring ⑯ from the shift lever rod ⑰.



69R70120

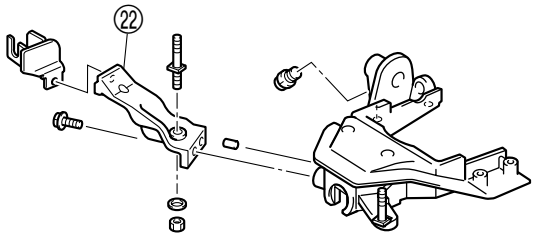
NOTE:
Remove the other side spring end.

6. Remove the pin ⑱, and then remove the shift lever rod ⑰, plastic washer ⑲, lever ⑳, collar ㉑ and plastic washer ⑲.



69R70090

7. Remove the bracket ㉒ from the shift actuator.



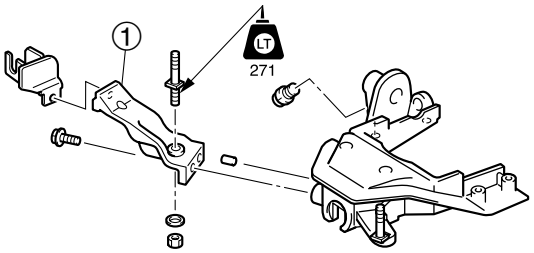
69R70810

Checking the shift actuator

1. Check the bushing, spring, shift rod and plunger. Replace the bushing, spring, shift rod and plunger if worn or damaged.

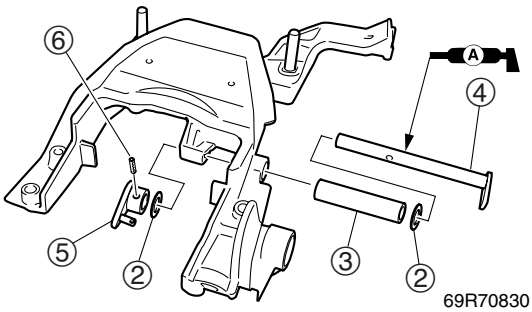
Assembling the shift actuator

1. Install the bracket ① to the shift actuator.



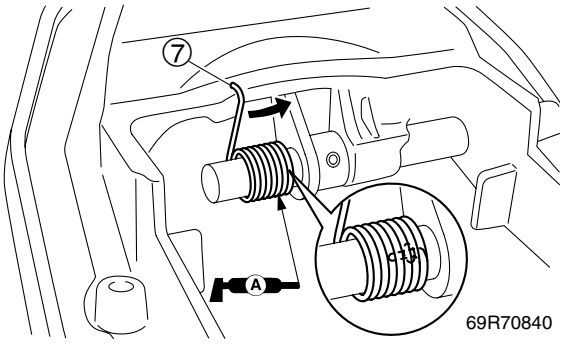
69R70820

2. Install the plastic washer ②, collar ③, shift lever rod ④, plastic washer ②, lever ⑤, and then install the pin ⑥.

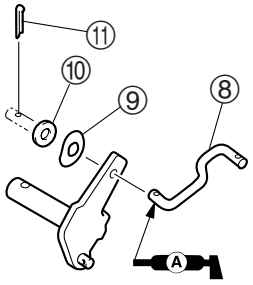


69R70830

3. Install the spring ⑦ as shown.

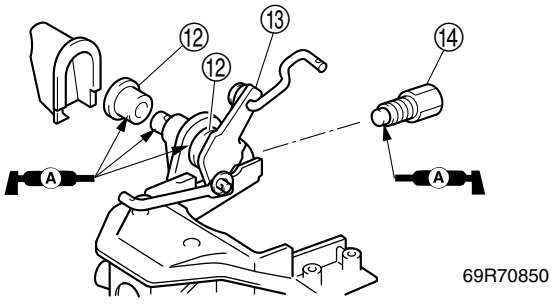


4. Install the rod ⑧, wave washer ⑨, washer ⑩ and cotter pin ⑪ to the lever.

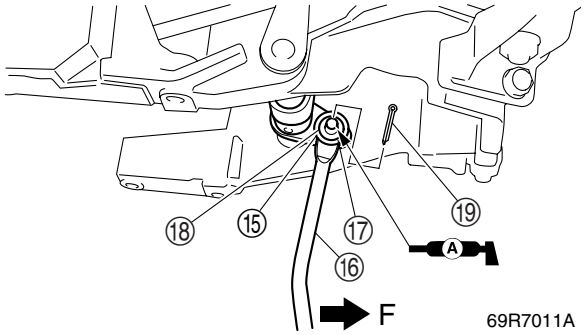


5. Install the bushings ⑫ both side, rubber cover and lever ⑬.

6. Install the plunger ⑭ to the shift actuator.

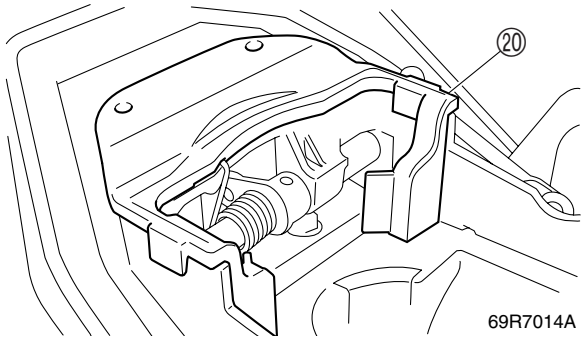


7. Install the plastic washer ⑮, shift rod ⑯, plastic washer ⑰, plate washer ⑱ and cotter pin ⑲.



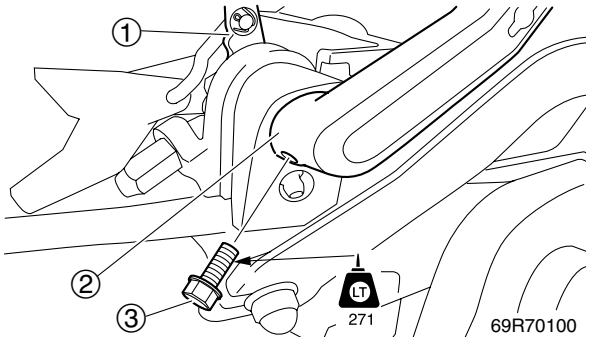
NOTE:
Install the shift rod ⑯ direction as shown.

8. Install the rubber seal ⑳.



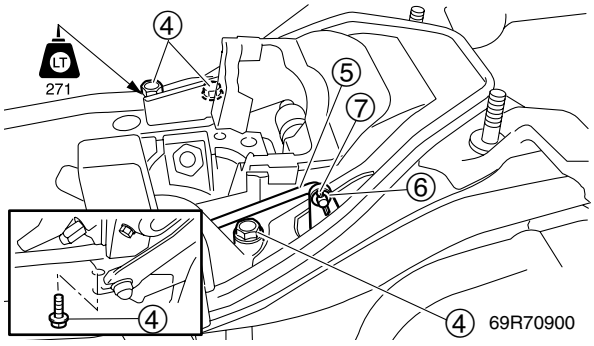
Installing the shift actuator

1. Set the shift lever shaft ① to "F" position before install the shift lever ② and bolt ③.

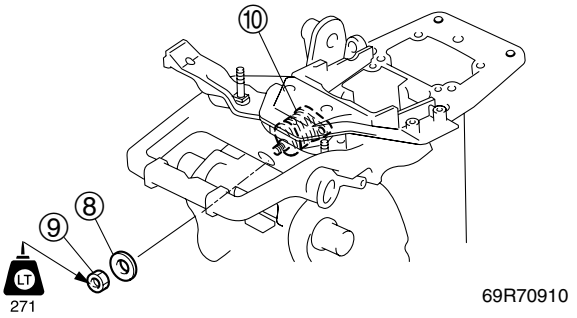


7

2. Install the bolts ④, rod ⑤, and then install the washer ⑥, cotter pin ⑦ to the rod ⑤.

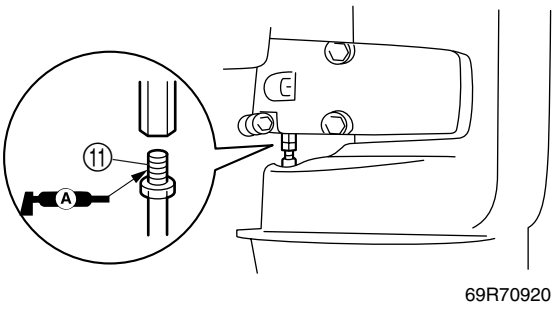


3. Install the washer ⑧ and nut ⑨ to the rubber mount ⑩.



	Shift actuator mount nut ⑨: 17 N·m (1.7 kg·m, 12.5 ft·lb)

4. Set the gear shift to “R” position, and then connect the shift rod ⑪.

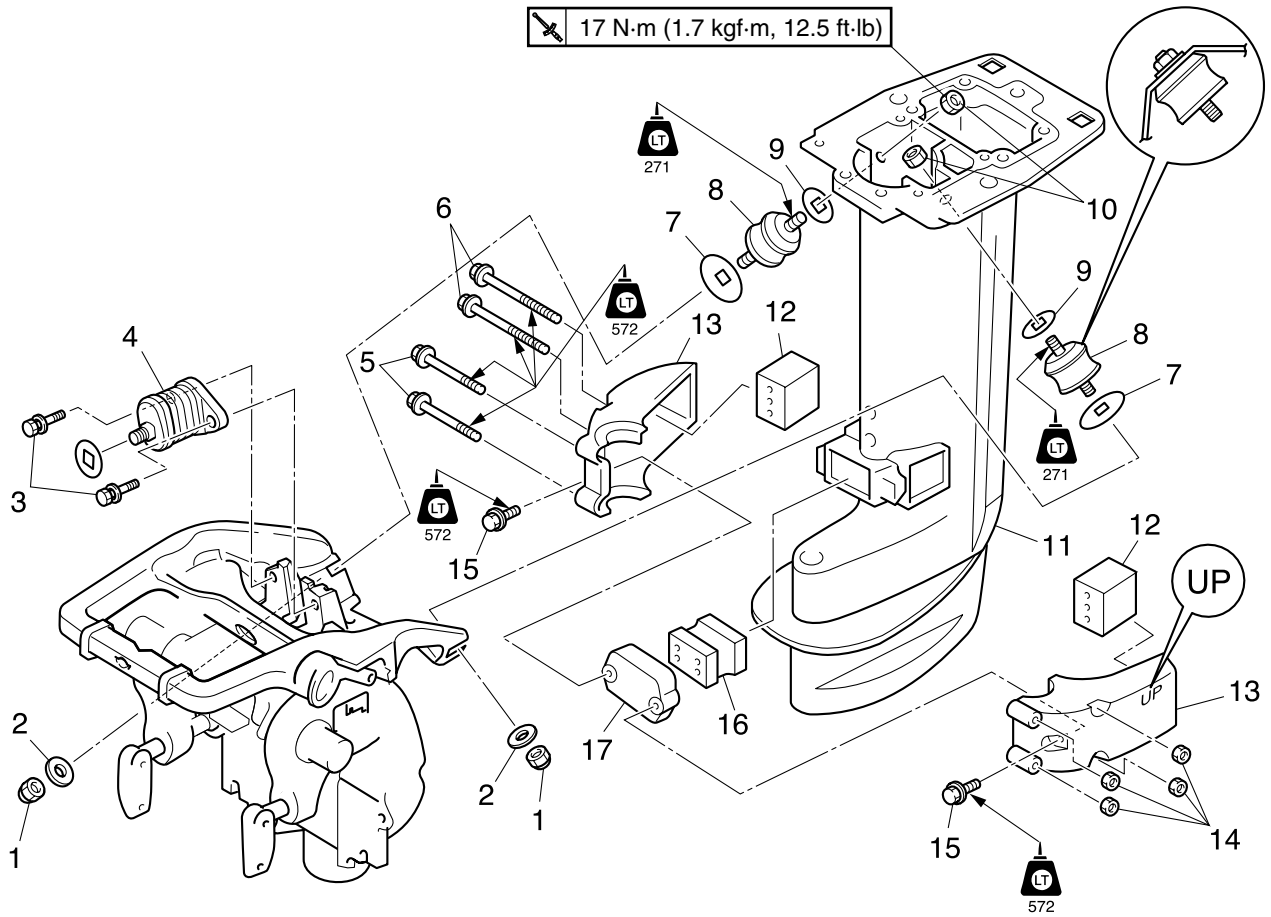


NOTE:
To adjust the shift rod, refer to page 3-11.

5. Check the shift actuator. Check the shift actuator if it is unsmooth operation.

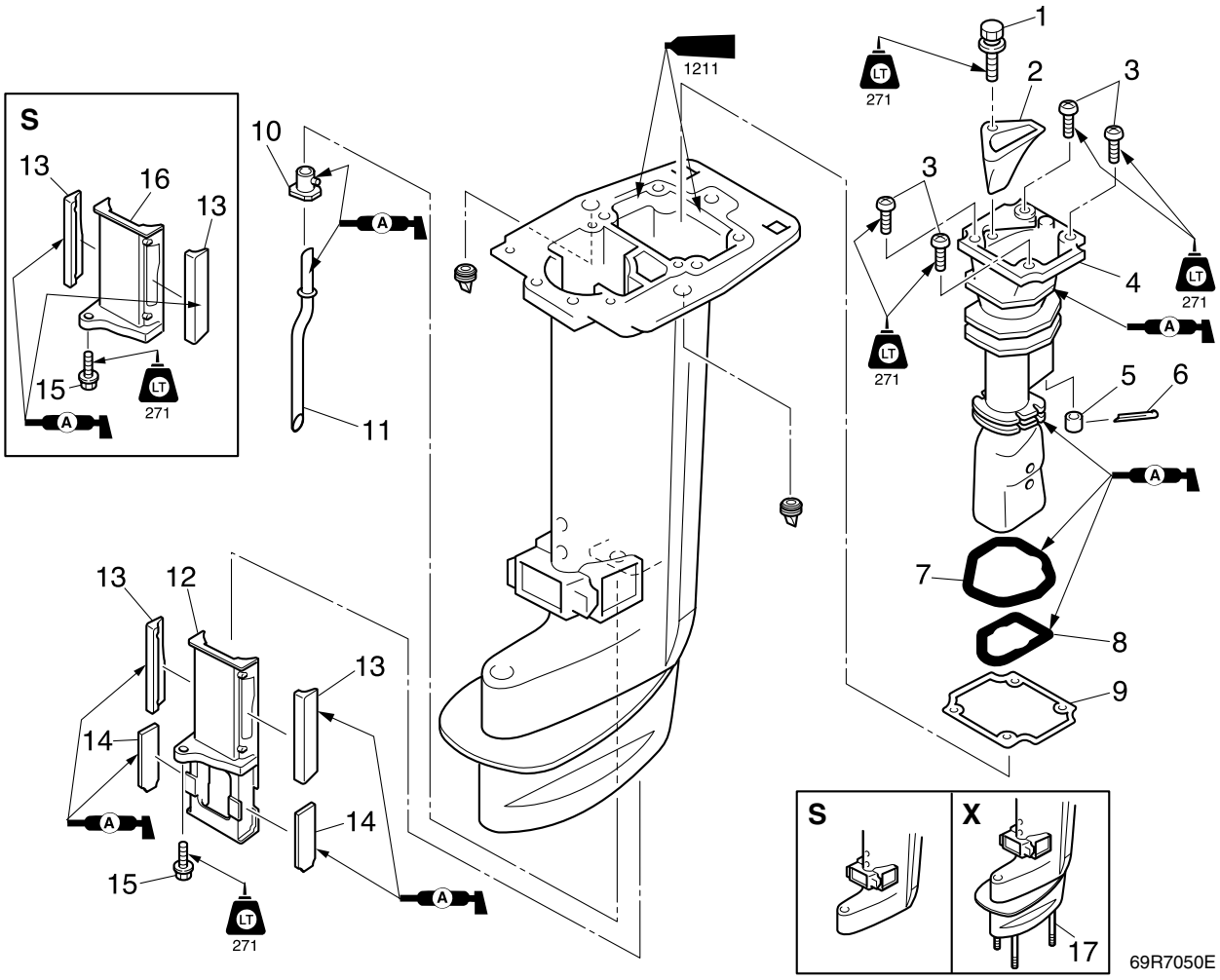
NOTE:
To check the shift actuator, refer to page 7-11.

Upper case



No.	Part name	Q'ty	Remarks
1	Nut	2	
2	Washer	2	
3	Bolt	2	M6 × 20 mm
4	Rubber mount	1	
5	Bolt	2	M8 × 65 mm
6	Bolt	2	M8 × 100 mm
7	Gasket	2	Not reusable
8	Upper mount	2	
9	Gasket	2	Not reusable
10	Nut	2	
11	Upper case	1	
12	Rubber mount	2	
13	Lower mount housing	2	
14	Nut	4	
15	Bolt	2	M8 × 25 mm
16	Rubber mount	1	
17	Cover	1	

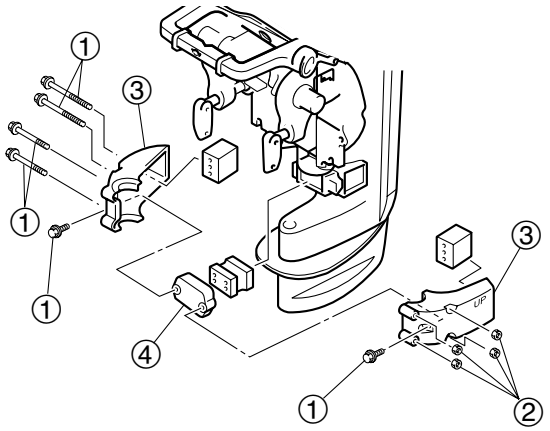
7



No.	Part name	Q'ty	Remarks
1	Bolt	1	M8 × 20 mm
2	Exhaust guide	1	
3	Screw	4	ø6 × 15 mm
4	Exhaust manifold	1	
5	Gasket	1	Not reusable
6	Cotter pin	1	
7	Rubber seal	1	Not reusable
8	Rubber seal	1	Not reusable
9	Gasket	1	Not reusable
10	Rubber seal	1	Not reusable
11	Cooling water pipe	1	
12	Guide plate	1	
13	Rubber seal	2	Not reusable
14	Rubber seal	2	Not reusable: L, X-transom
15	Bolt	1	M6 × 20 mm
16	Guide plate	1	S-transom
17	Stud bolt	4	X-transom

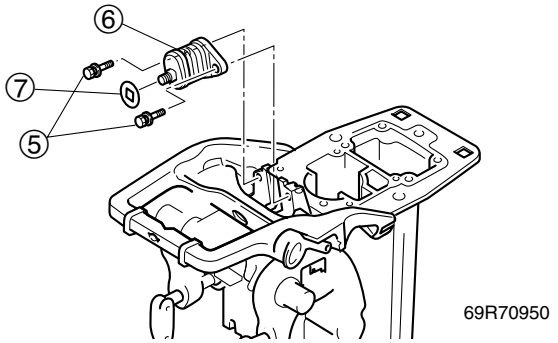
Removing the upper case

1. Remove the bolts ①, nuts ②, and then remove the lower mount housings ③, cover ④.



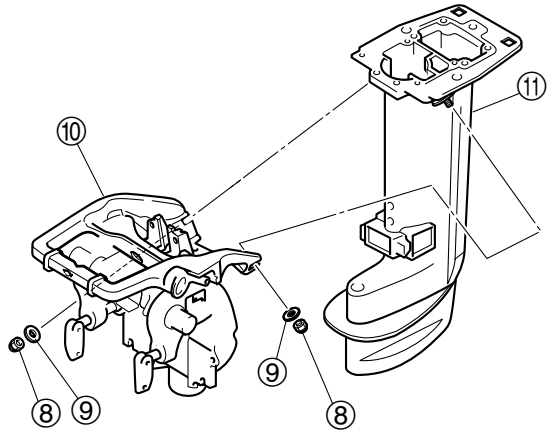
69R70930

2. Remove the bolts ⑤, rubber mount ⑥ and rubber gasket ⑦.



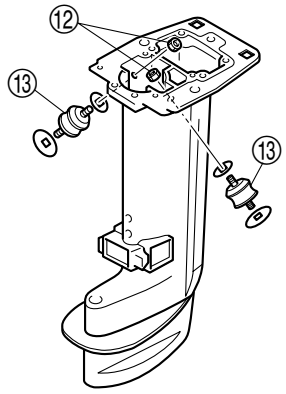
69R70950

3. Remove the nuts ⑧, washer ⑨ from the steering bracket ⑩, and then remove the upper case ⑪.



69R7094A

4. Remove the nuts ⑫, and then remove the upper mounts ⑬.

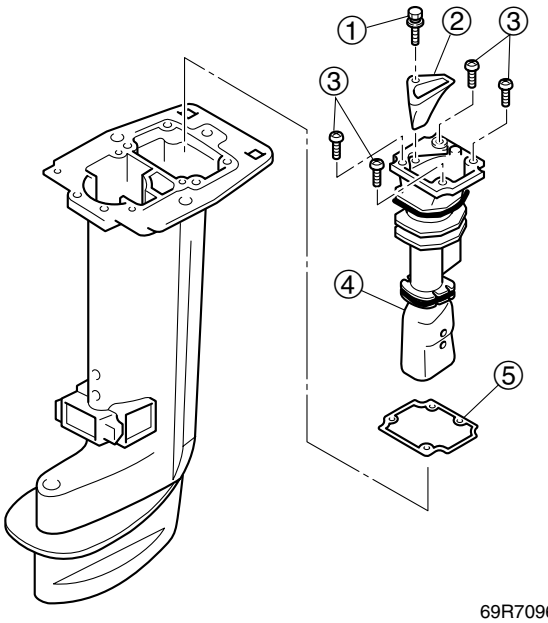


69R70940

Disassembling the upper case

1. Remove the bolt ①, and then remove the exhaust guide ②.

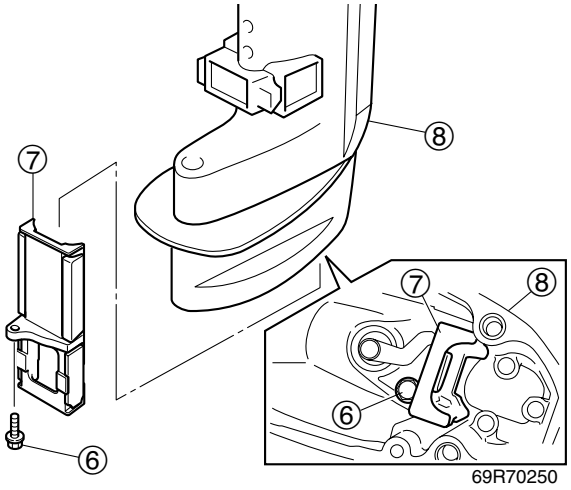
2. Remove the screws ③, exhaust manifold ④ and gasket ⑤.



69R70960

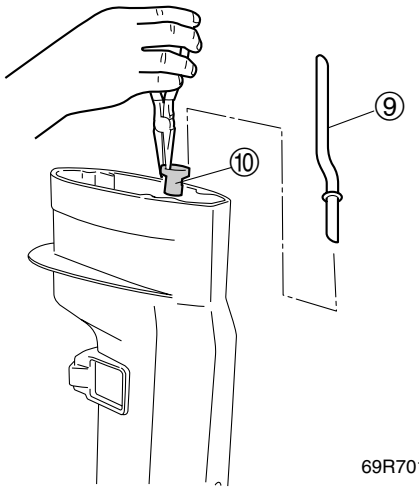
7

3. Remove the bolt ⑥ and guide plate ⑦ from the upper case ⑧ at lower side.



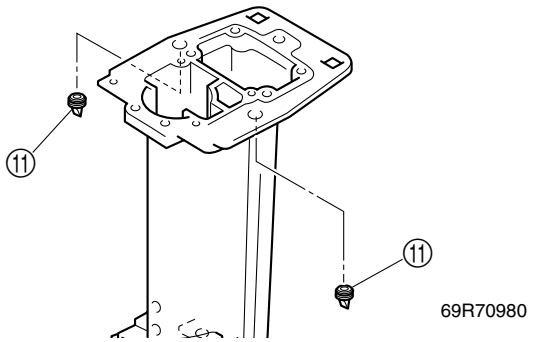
69R70250

4. Remove the cooling water pipe ⑨ and rubber seal ⑩.



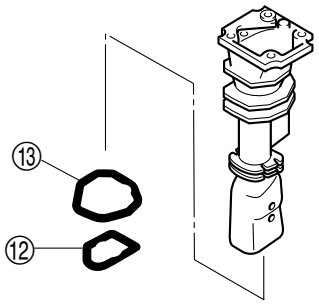
69R70150

5. Turn the uppecase original position, and then remove the grommets ⑪.



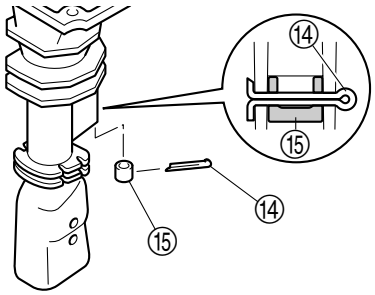
69R70980

6. Remove the rubber seal ⑫ and ⑬.



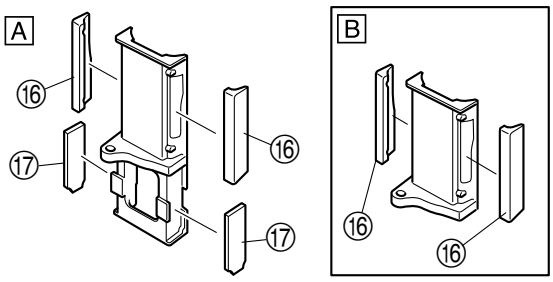
69R70970

7. Remove the cotter pin ⑭ and gasket ⑮.



69R71000

8. Remove the robber seals ⑯ and ⑰ from the guide plate.



69R71010

A L-transom, X-transom
B S-transom

Checking the upper case

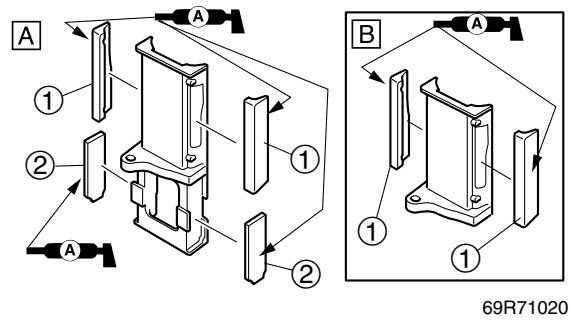
1. Check the upper case. Replace the upper case if corroded, deformed or cracked.

2. Check the cooling water pipe. Replace the cooling water pipe if corroded, deformed or cracked.

3. Check the exhaust guide and exhaust manifold. Replace the exhaust guide and exhaust manifold if corroded, deformed or cracked.

Assembling the upper case

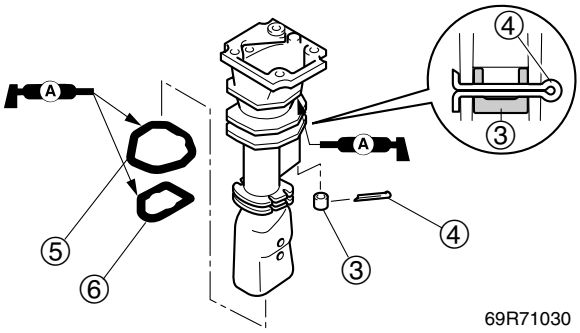
1. Install new rubber seals ① and ②.



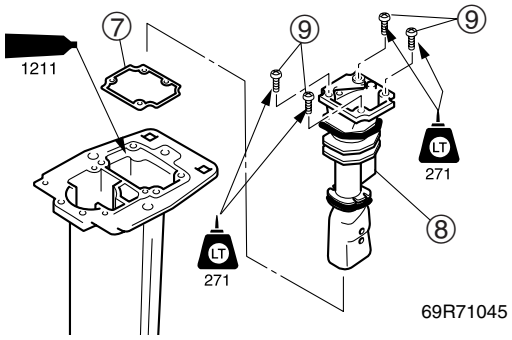
A L-transom, X-transom
B S-transom

2. Install a new gasket ③ and cotter pin ④.

3. Install new robber seals ⑤ and ⑥.

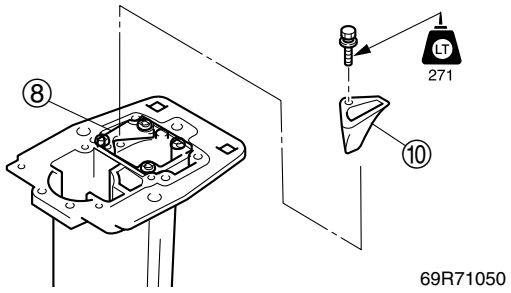


4. Install a new gasket ⑦ then install the exhaust manifold ⑧ and tighten the screws ⑨.

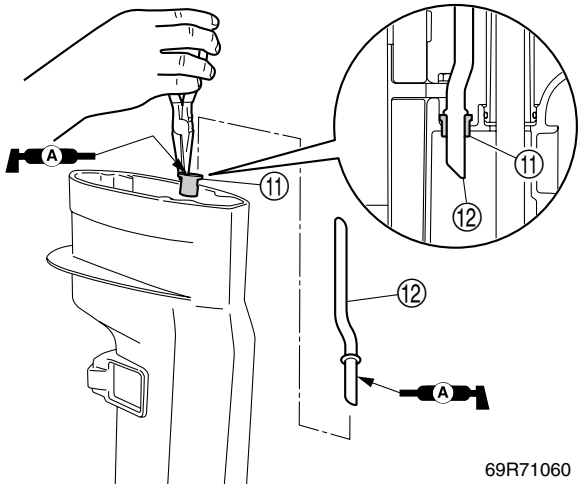


NOTE:
- Remove the oil or grease from gasket mating surfaces before assembling the upper case.
- Apply sealant as shown before installing the exhaust manifold ⑧.

5. Install the exhaust guide ⑩ onto the exhaust manifold ⑧.

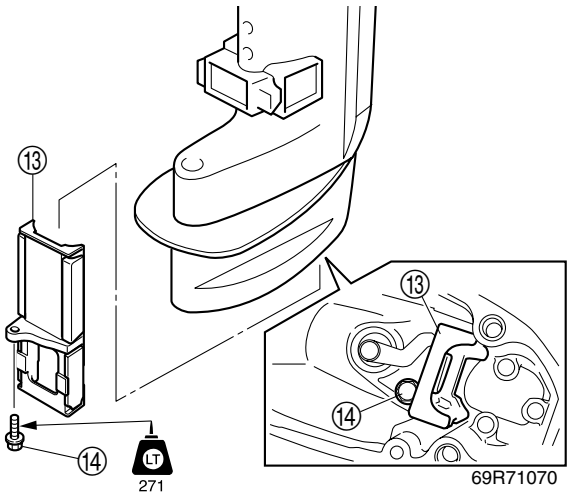


6. Install a new rubber seal ⑪, cooling water pipe ⑫ into the upper case.



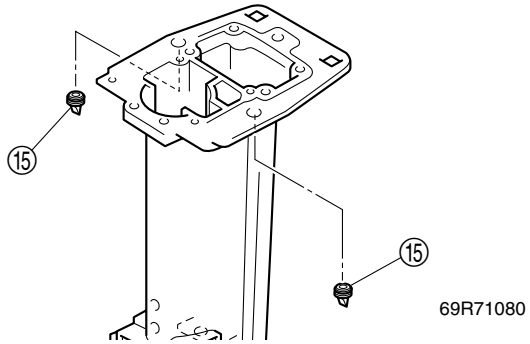
NOTE:
Install the cooling water pipe ⑫ as shown.

7. Install the guide plate ⑬ into the lower side of the upper case, and then tighten the bolt ⑭.



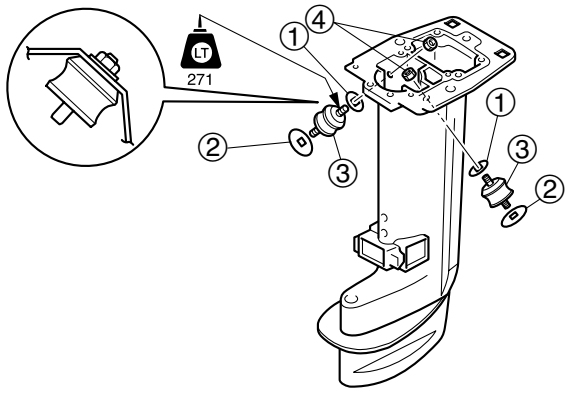
7

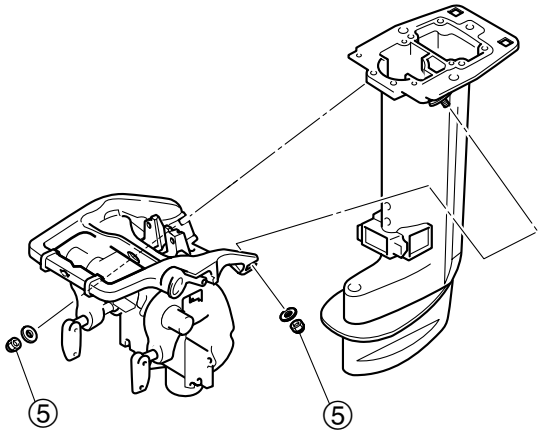
8. Turn the upper case original position, and then install the gromets ⑮.



Installing the upper case

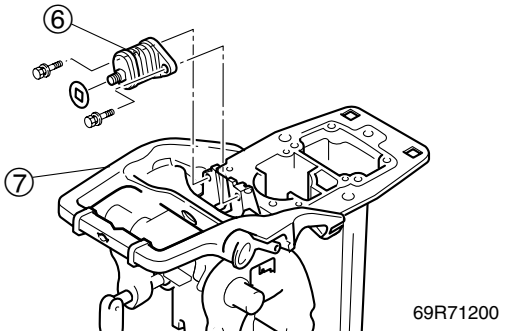
1. Install new gaskets ① and ② to the upper mounts ③, and then tighten the nuts ④, ⑤.



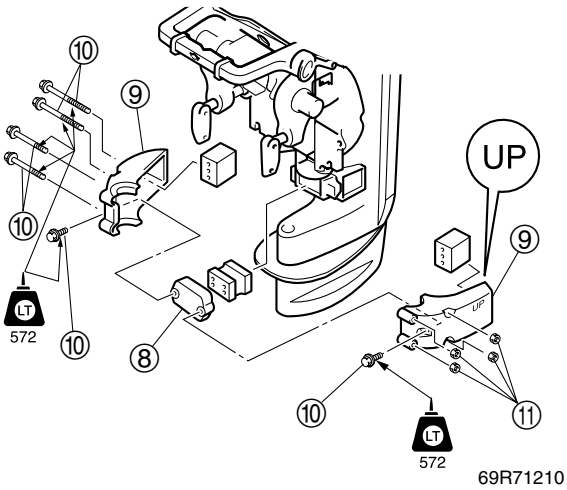


	Upper mount nut ④: 17 N·m (1.7 kg·m, 12.5 ft·lb)

2. Install the rubber mount ⑥ to the steering bracket ⑦.



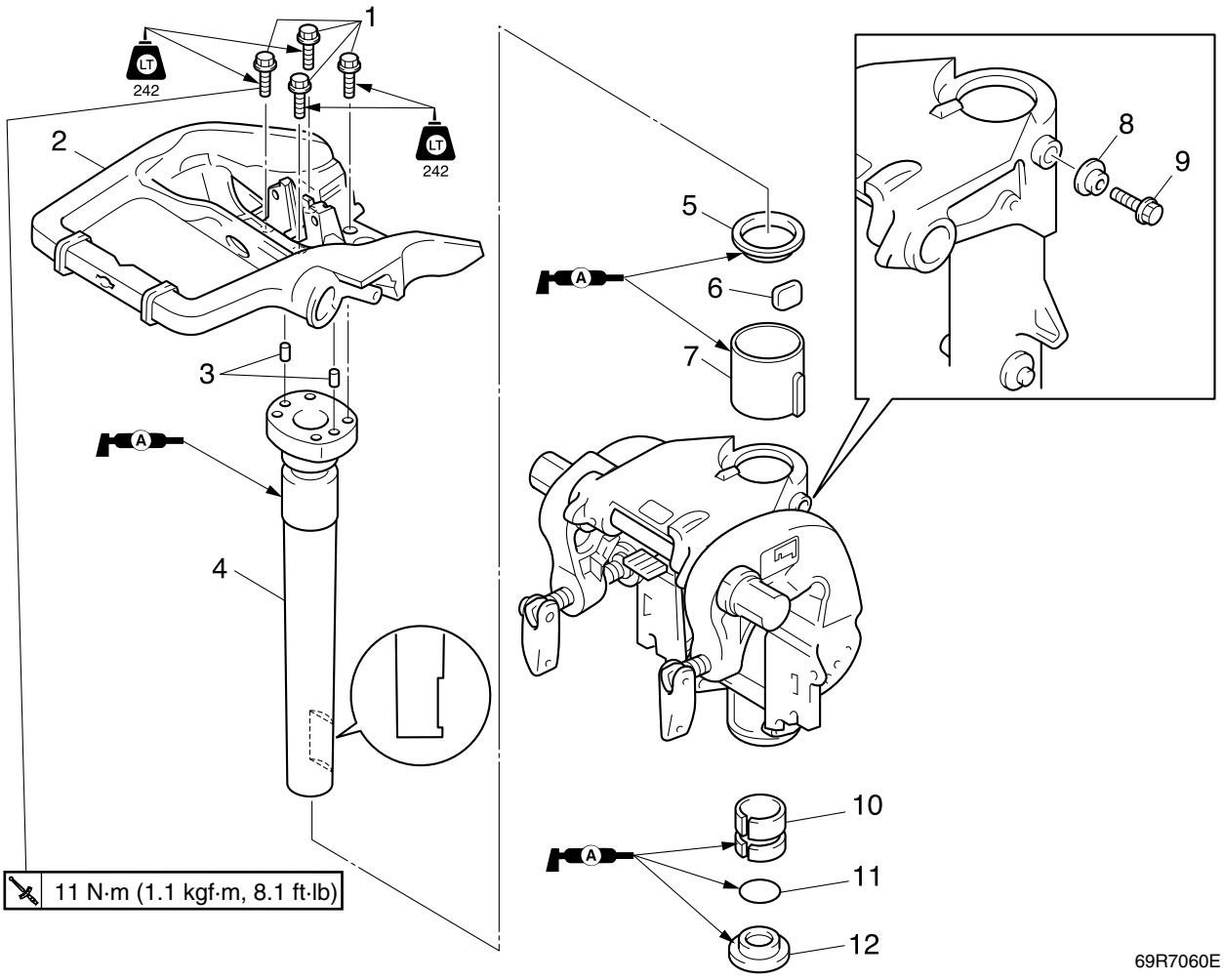
3. Install the the cover ⑧, lower mount housings ⑨ with bolts ⑩ and nuts ⑪.



NOTE:

Make sure the lower mount housings ⑨ facing “UP” mark upward to install.

Pivot shaft



No.	Part name	Q'ty	Remarks
1	Bolt	4	M6 × 20 mm
2	Steering bracket	1	
3	Dowel	2	
4	Pivot shaft	1	
5	Washer	1	
6	Friction plate	1	
7	Bushing	1	
8	Damper	1	
9	Bolt	1	M6 × 22 mm
10	Bushing	1	
11	O-ring	1	Not reusable
12	Washer	1	

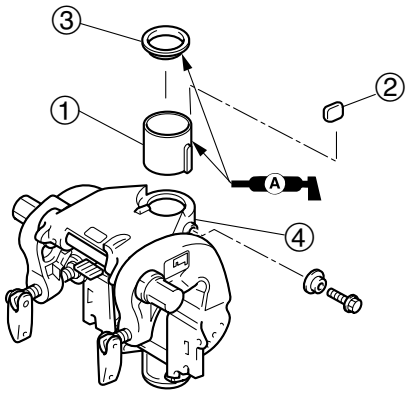
7

Checking the pivot shaft

1. Check the pivot shaft and steering shaft. Replace the pivot shaft and steering if cracked or damaged.

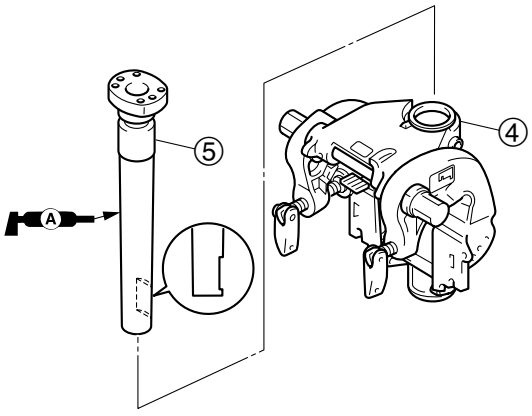
Installing the pivot shaft

1. Install the bushing ①, friction plate ② and washer ③ into the swivel bracket ④.



69R71130

2. Install the pivot shaft ⑤ into the swivel bracket ④.

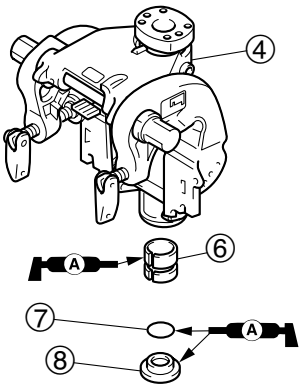


69R71150

NOTE:

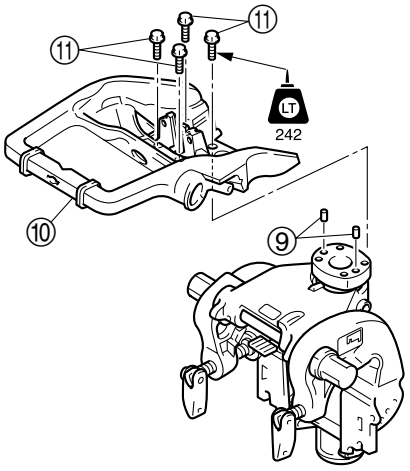
Make sure the pivot shaft flat side facing to aft and then install it into the swivel bracket.

3. Install the bushing ⑥, new O-ring ⑦ and washer ⑧ into the swivel bracket ④.



69R71160

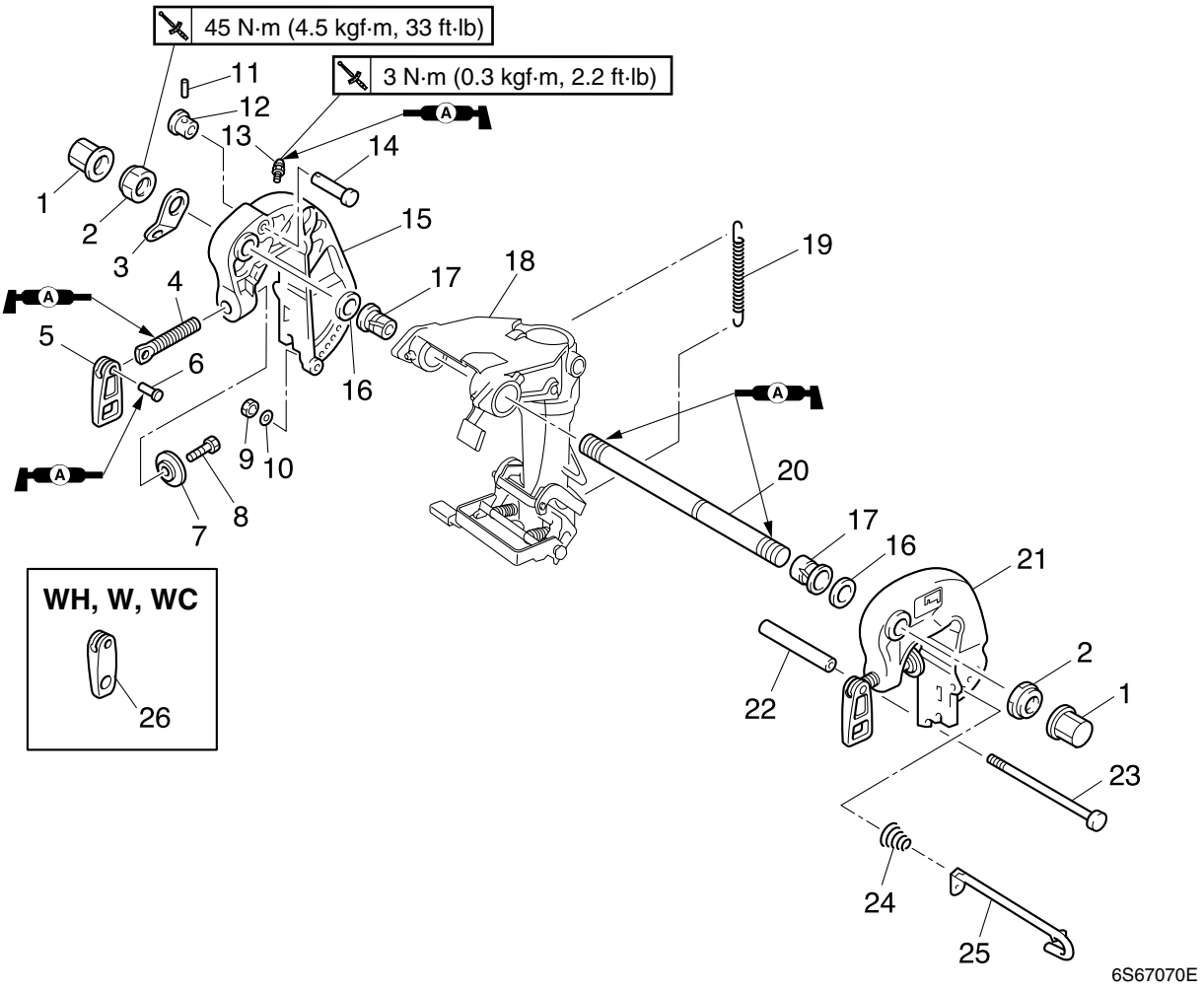
4. Install the dowels ⑨, steering bracket ⑩ and tighten the bolts ⑪ to specified torque.



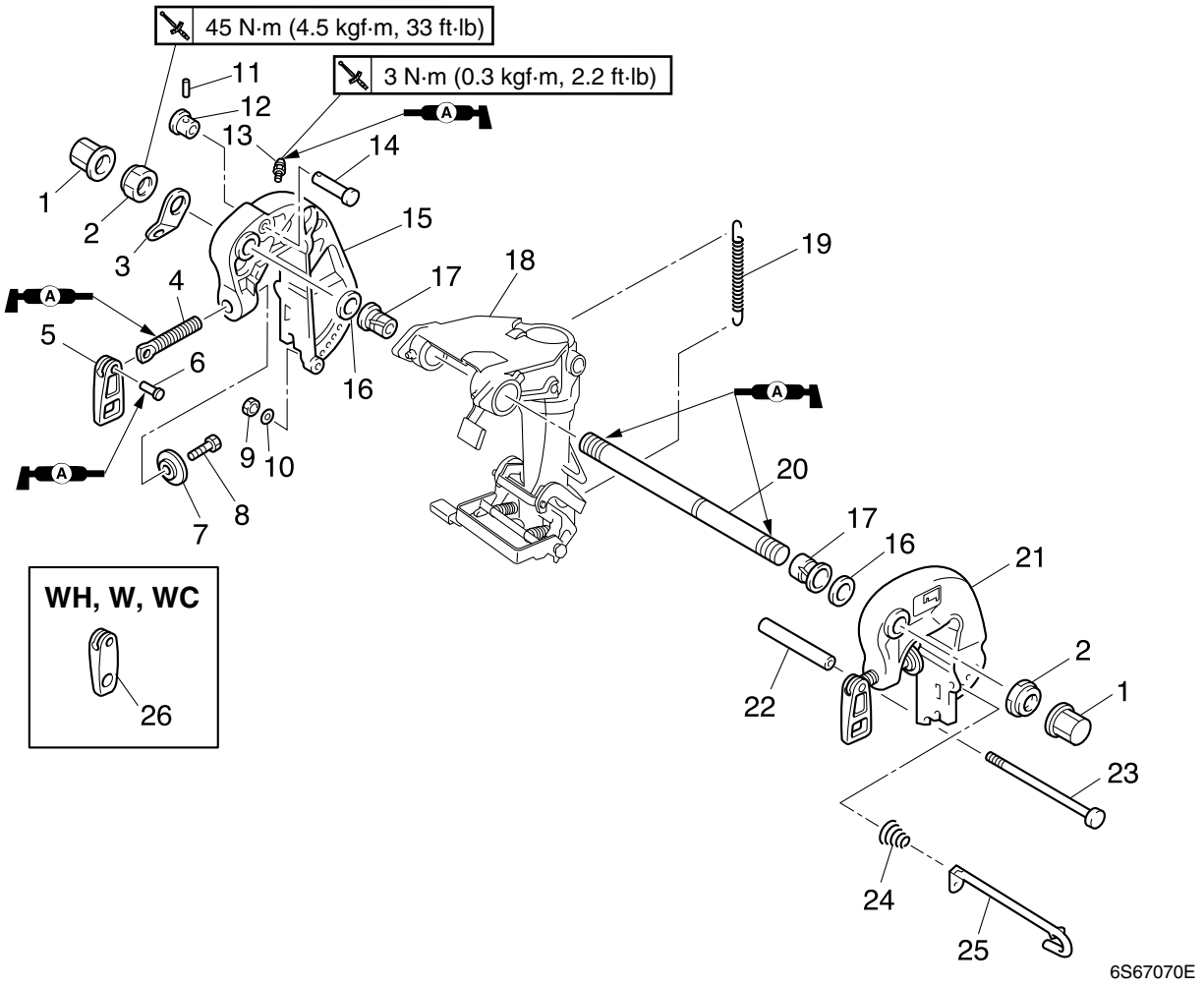
69R71170

	Steering bracket bolt ⑪: 11 N·m (1.1 kgf·m, 8.1 ft·lb)

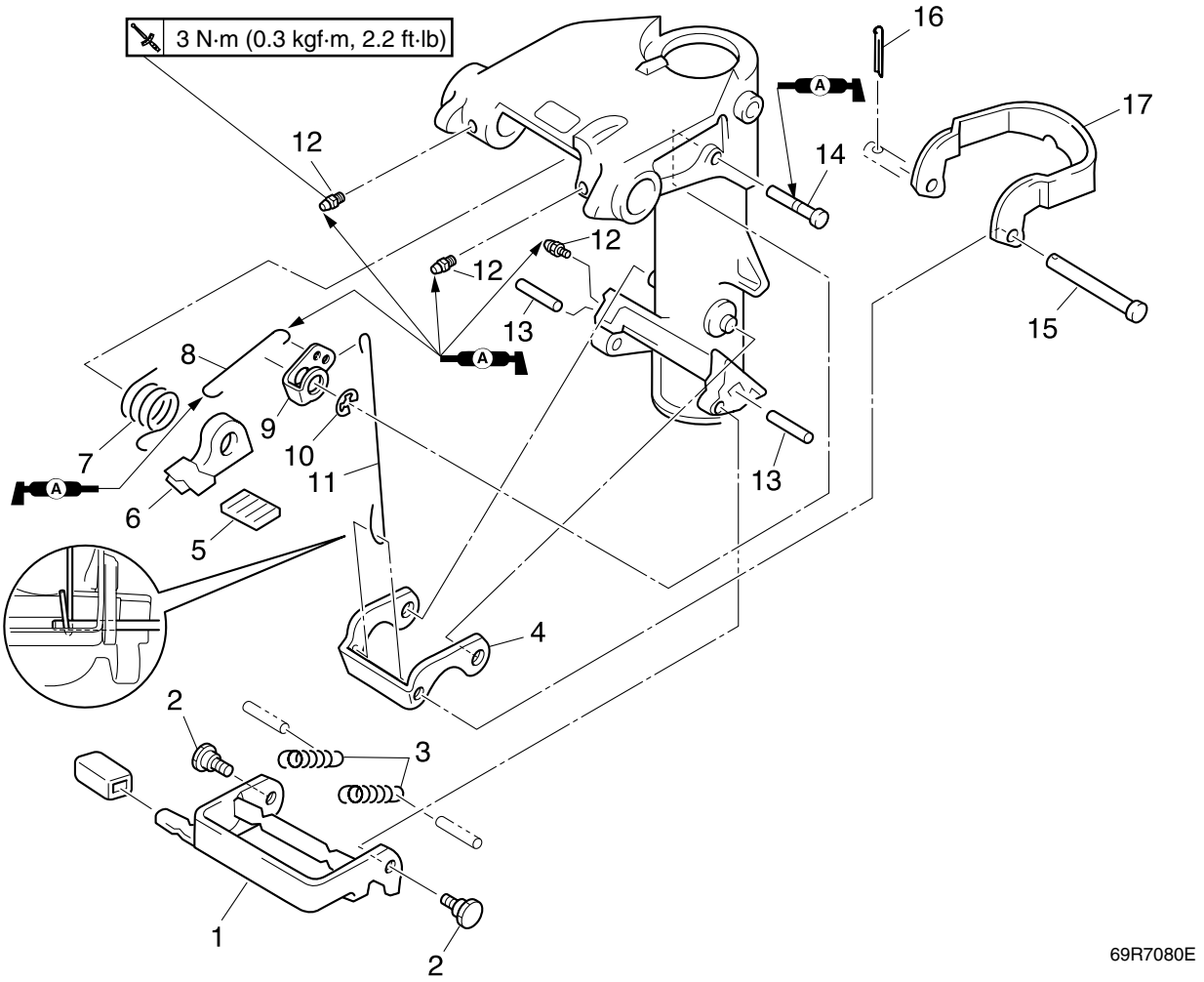
Clamp bracket, swivel bracket



No.	Part name	Q'ty	Remarks
1	Cap	2	
2	Self-locking nut	2	
3	Plate	1	
4	Clamp screw	2	
5	Clamp handle	2	MH
6	Pin	2	
7	Clamp pad	2	
8	Bolt	2	
9	Nut	1	
10	Washer	1	
11	Pin	1	
12	Knob	1	
13	Grease nipple	1	
14	Tilt stopper	1	
15	Clamp bracket	1	
16	Washer	2	
17	Bushing	2	



No.	Part name	Q'ty	Remarks
18	Swivel bracket	1	
19	Spring	1	
20	Through tube	1	
21	Clamp bracket	1	
22	Collar	1	
23	Clamp bracket bolt	1	M8 × 155 mm
24	Spring	1	
25	Tilt pin	1	
26	Clamp handle	2	WH, W, WC

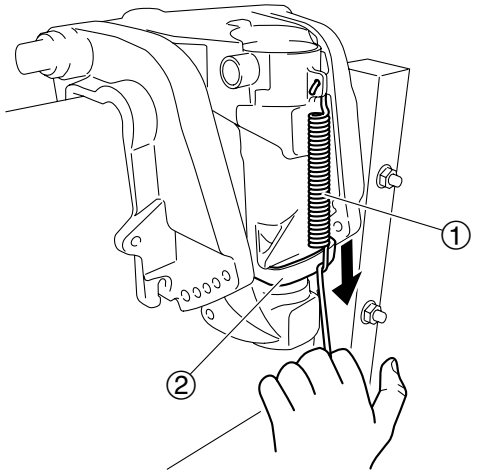


No.	Part name	Q'ty	Remarks
1	Shallow water lever	1	
2	Bolt	2	
3	Spring	2	
4	Tilt lock arm 2	1	
5	Cap	1	
6	Tilt lock lever	1	
7	Spring	1	
8	Rod	1	
9	Lever	1	
10	Circlip	1	
11	Rod	1	
12	Grease nipple	3	
13	Spring pin	2	
14	Pin	1	
15	Pin	1	
16	Cotter pin	1	
17	Tilt lock arm 1	1	

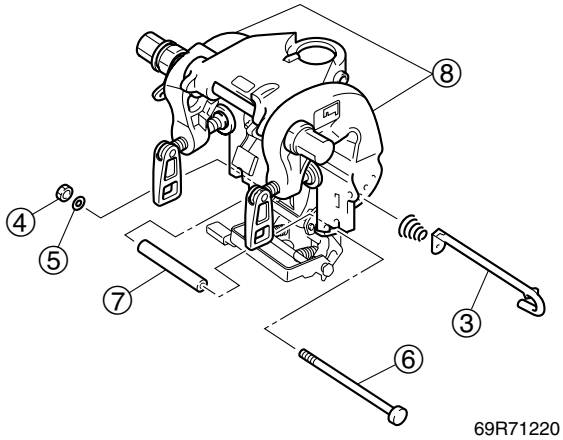
Disassembling the bracket

1. Remove the pivot shaft.

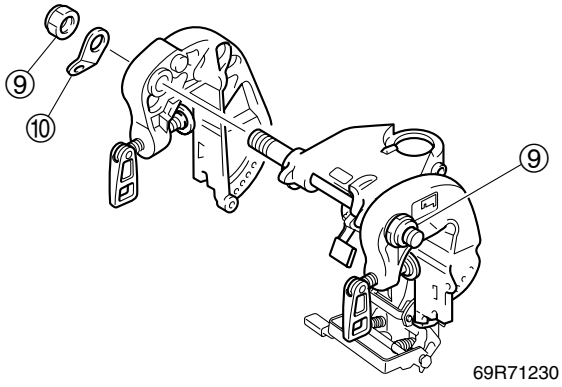
2. Remove the arm spring ① from the tilt lock arm 1 ②.



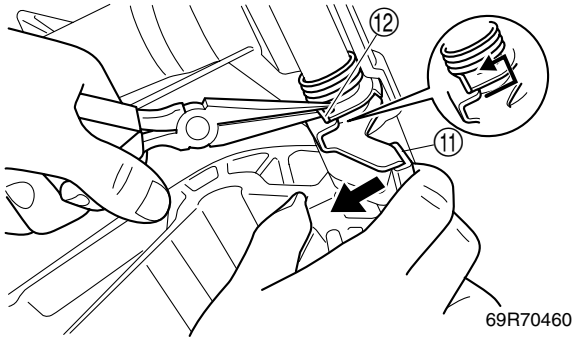
3. Remove the tilt pin ③, nut ④, washer ⑤, clamp bracket bolt ⑥ and collar ⑦ from the clamp brackets ⑧.



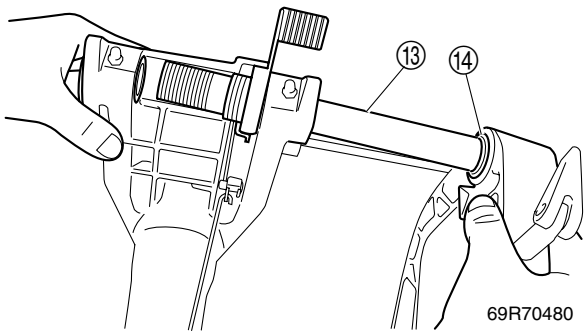
4. Remove the self-locking nuts ⑨ and plate ⑩.



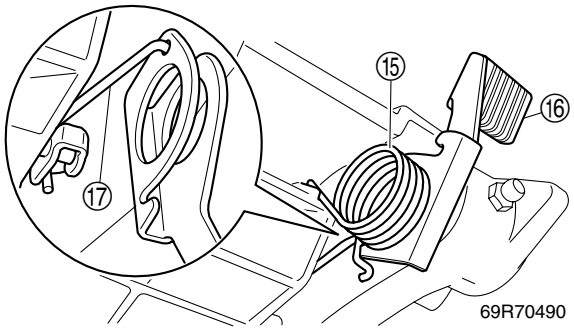
5. Set the tilt lock lever ⑪ to release position, and then remove the spring end ⑫.



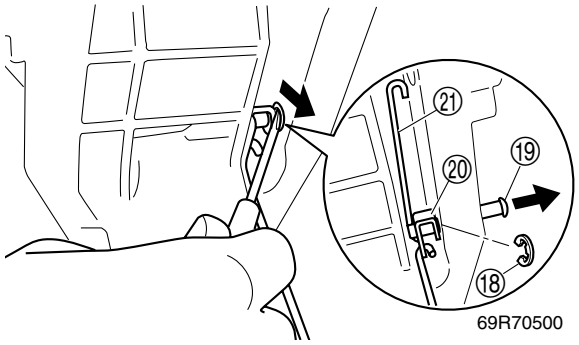
6. Remove the through tube ⑬, washers ⑭ and clamp blackets.



7. Remove the spring ⑮ with tilt lock lever ⑯, and then remove the rod ⑰.

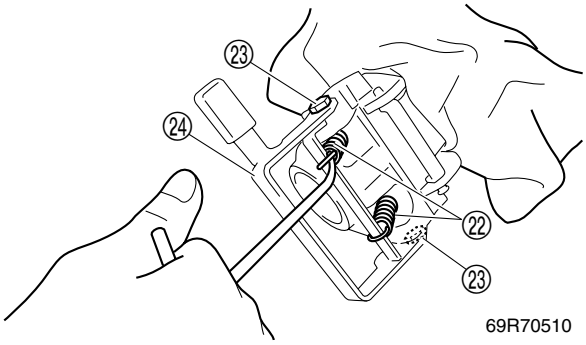


8. Remove the circlip ⑱, then pull out the pin ⑲, lever ⑳ and rod ㉑.



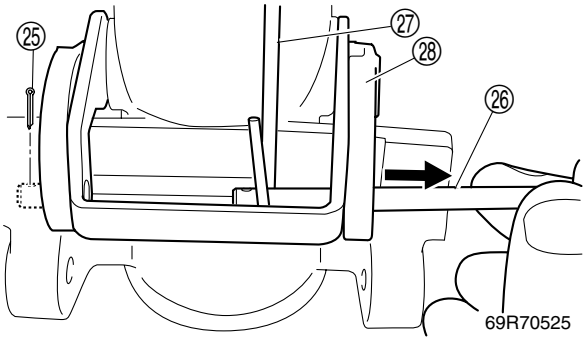
69R70500

9. Remove the springs ㉒, and then remove the bolts ㉓, sallow water lever ㉔.



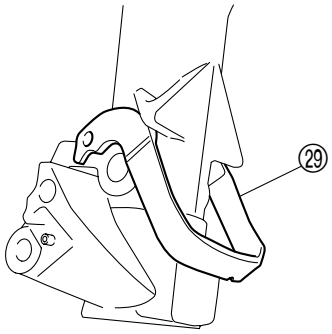
69R70510

10. Remove the cotter pin ㉕, pin ㉖, rod ㉗ and tilt lock arm 2 ㉘.



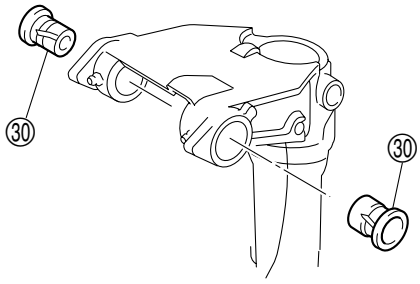
69R70525

11. Remove tilt lock arm 1 ㉙.



69R70520

12. Remove the bushings ㉚.



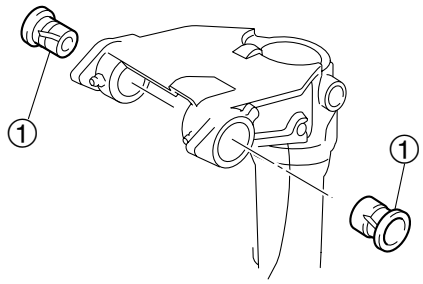
69R71240

Checking the bracket

1. Checking the bracket. Replace the bracket if cracked or corroded. Replace the spring, arm and stopper if damaged or corroded.

Assembling the swivel bracket

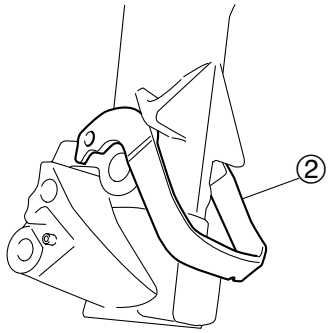
1. Install the bushings ①.



69R71250

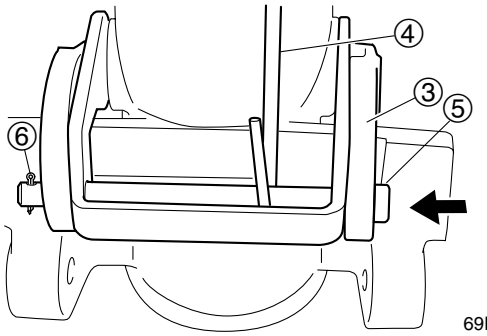
7

2. Install the tilt lock arm 1 ②.



69R70555

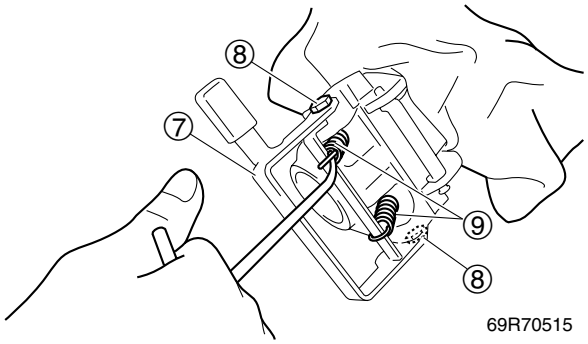
3. Install the tilt lock arm 2 ③, rod ④, and then install the pin ⑤, cotter pin ⑥.



69R70550

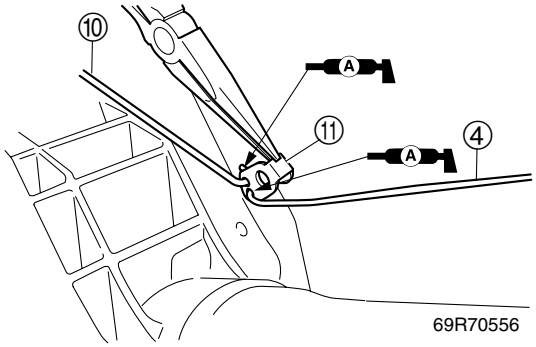
4. Install the shallow water lever ⑦.

5. Install the bolts ⑧, and then install the springs ⑨.



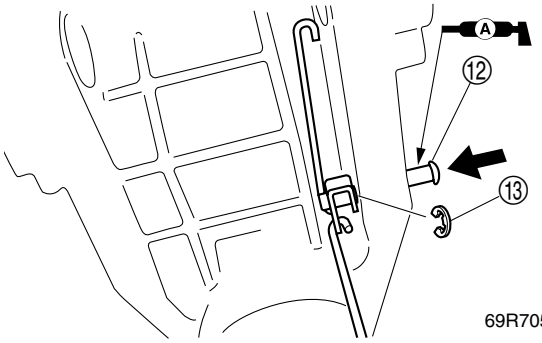
69R70515

6. Install the rod ④ and ⑩ to the lever ⑪.



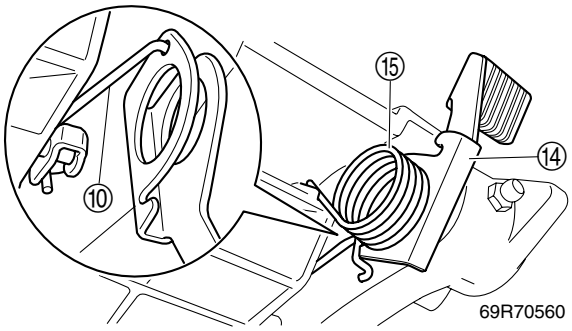
69R70556

7. Install the pin ⑫, and then insert the circlip ⑬.



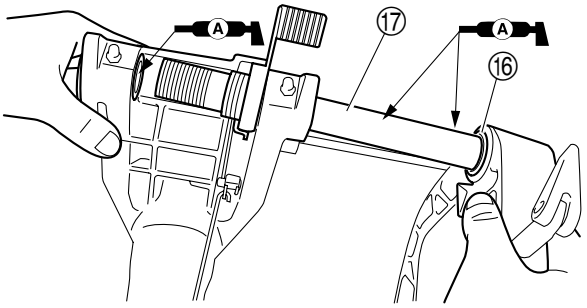
69R70540

8. Install the rod ⑩, and then install the tilt lock lever ⑭ with spring ⑮.



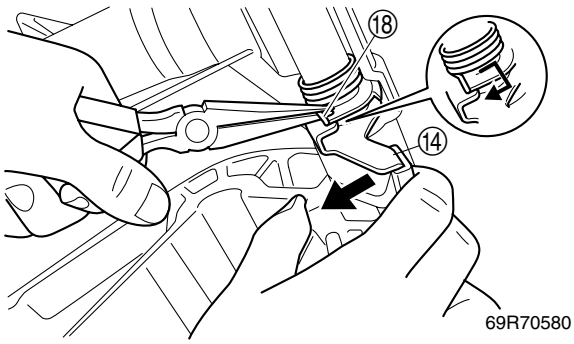
69R70560

9. Install the washers ⑯ to the through tube ⑰, and then install them to the swibel bracket.



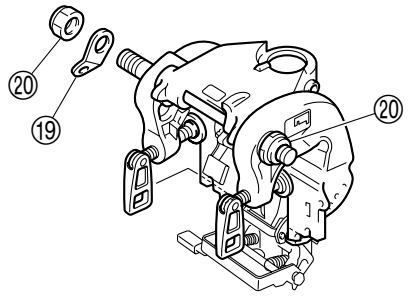
69R70570

10. Set the tilt lock lever ⑭ to release position, and then install the spring end ⑱.



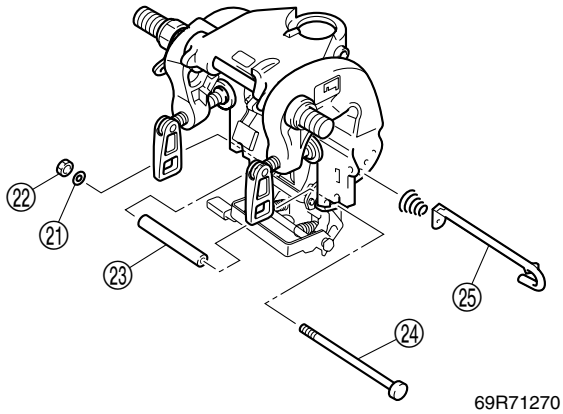
69R70580

11. Install the plate ⑲ and self-locking nuts ⑳.



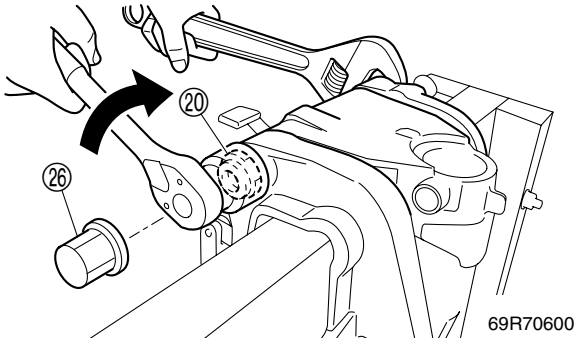
69R71260

12. Install the washer ㉑, nut ㉒, collar ㉓, clamp bracket bolt ㉔ and tilt pin ㉕ to the clamp bracket.



69R71270

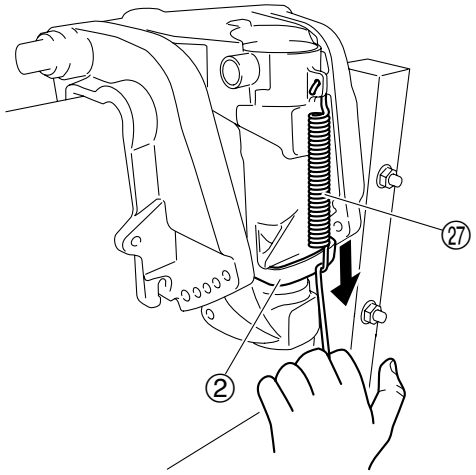
13. Tighten the self-locking nuts ⑳ to specified torque, and then install the caps ㉖ to the through tube end.



69R70600

	Self-locking nut ⑳: 45 N·m (4.5 kgf·m, 33 ft·lb)

14. Install the arm spring ㉗ to the tilt lock arm 1 ②.



69R71280

15. Install the pivot shaft.

NOTE:
To install the pivot shaft, refer to page 7-21.

16. Apply Yamaha grease A to the grease nipples.

NOTE:
Apply Yamaha grease A until it comes out of the bushings.

17. After assembling, check the bracket for smooth operation and lock the tilt lock lever to properly.

7

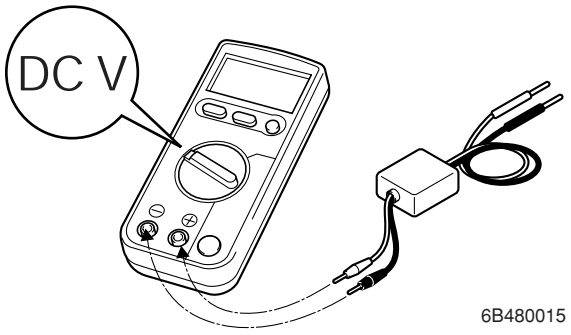
— MEMO —

Electrical system

Checking the electrical component

Measuring the peak voltage

To check the electrical components or measure the peak voltage, use the special service tools. A faulty electrical component can be easily checked by measuring the peak voltage. The specified engine speed when measuring the peak voltage is effected by many factors such as fouled spark plugs or a weak battery. If one of these factors is present, the peak voltage cannot be measured properly.



⚠WARNING

When checking the peak voltage, do not touch any of the connections of the digital circuit tester leads.

CAUTION:

When testing the voltage between the terminals of an electrical component with the digital tester, do not allow any of the leads to touch any metal parts. If touched, the electrical component can short and be damaged.

NOTE:

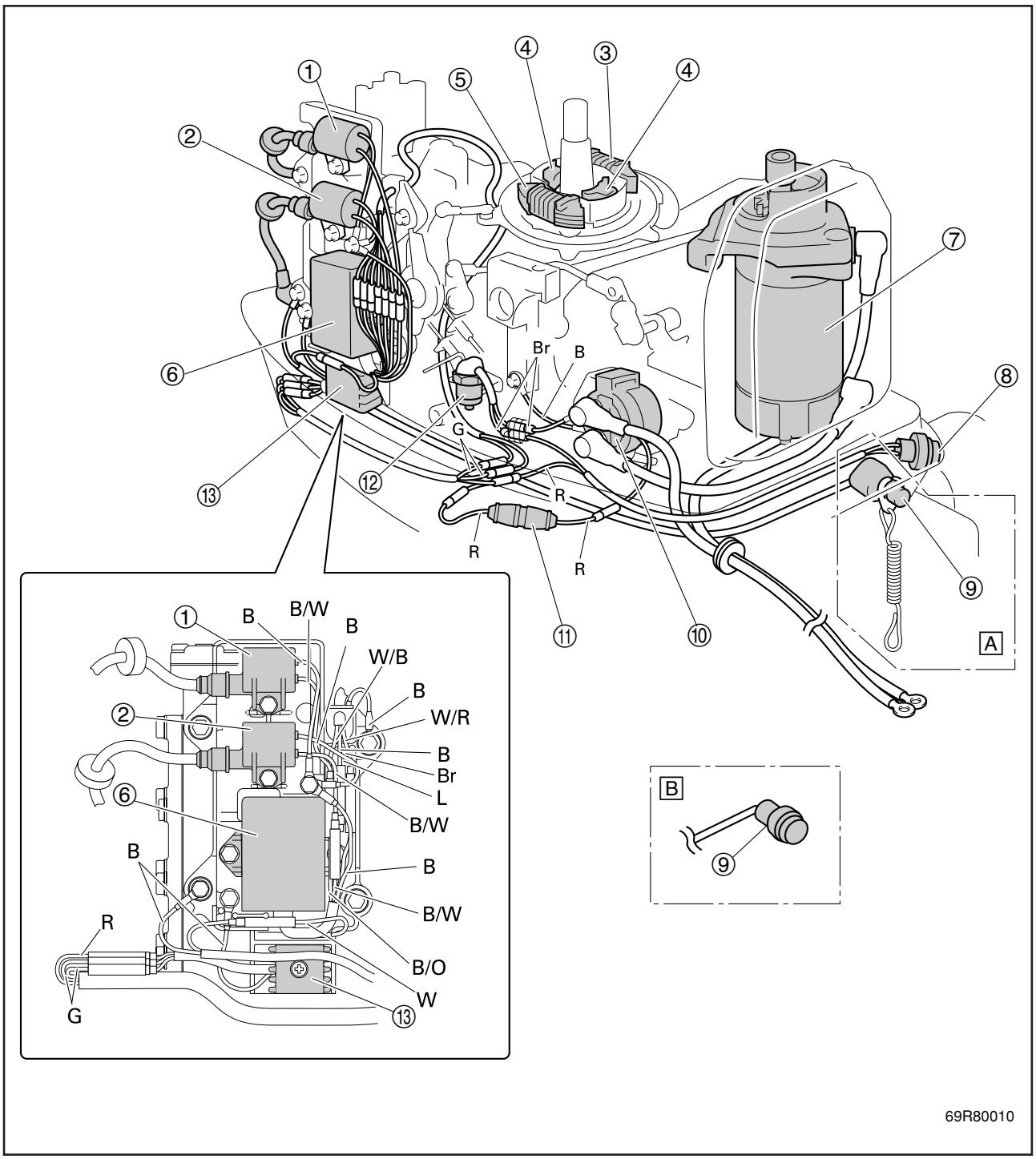
- Before measuring the peak voltage, check all wiring for proper connection and corrosion, and check that the battery is fully charged.
- Use the peak voltage adapter B with the recommended digital circuit tester.
- Connect the positive pin of the peak voltage adapter B to the positive terminal of the digital tester, and the negative pin to the negative terminal.
- 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 B:
90890-03172

Electrical component

Starboard view

25BWC, 30HWH, 30HWC



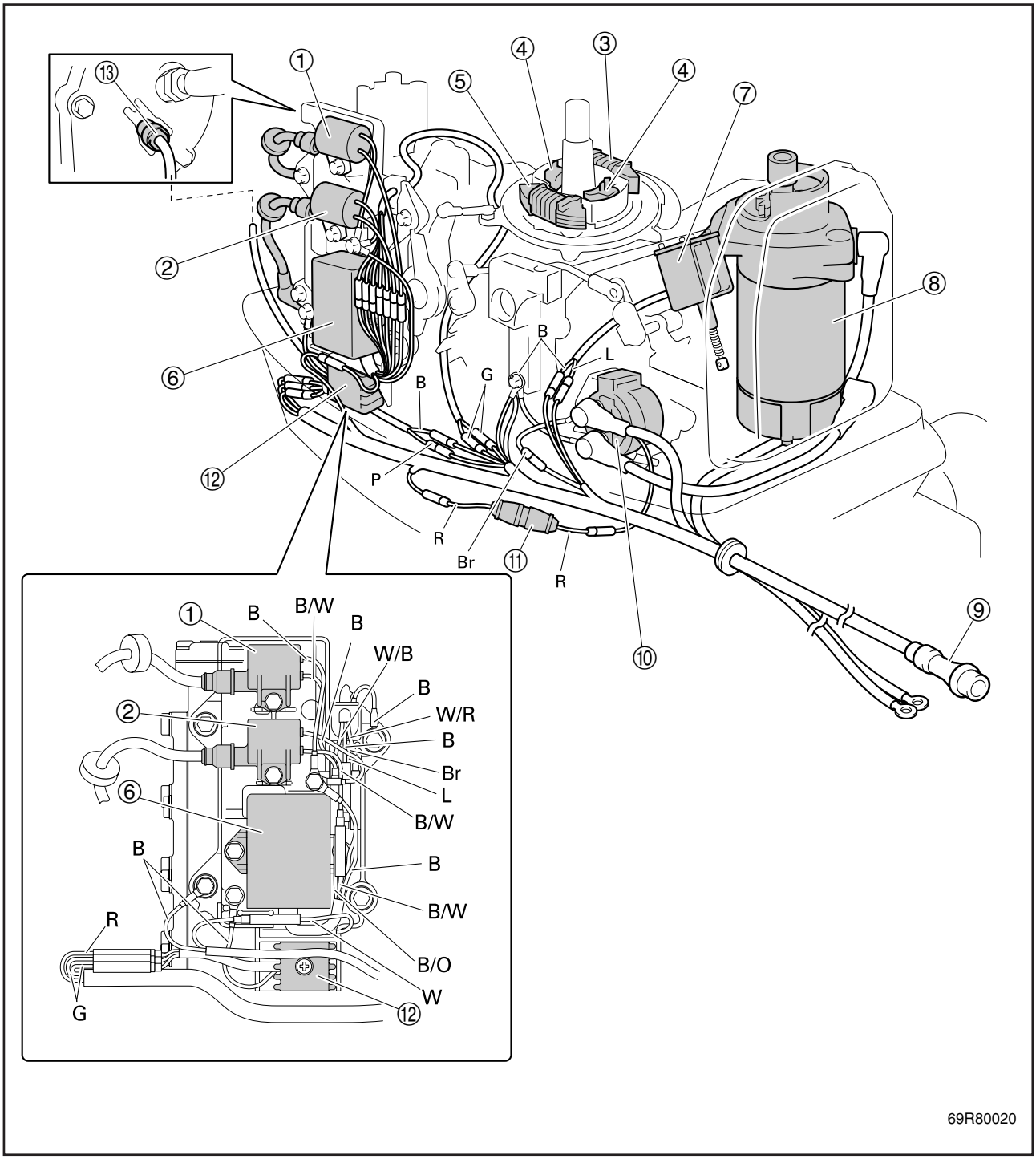
① Ignition coil #1
② Ignition coil #2
③ Charge coil
④ Pulser coil
⑤ Lighting coil
⑥ CDI unit
⑦ Starter motor
⑧ Engine start button
⑨ Engine stop lanyard switch/ Engine stop switch
⑩ Starter relay
⑪ Fuse (20A)
⑫ Neutral switch
⑬ Rectifier

B : Black
Br : Brown
G : Green
L : Blue
R : Red
W : White
B/O : Black/orange
B/W : Black/white
W/B : White/black
W/R : White/red

A 30HWH B 25BWC, 30HWC

69R3J11

25BW, 30HW

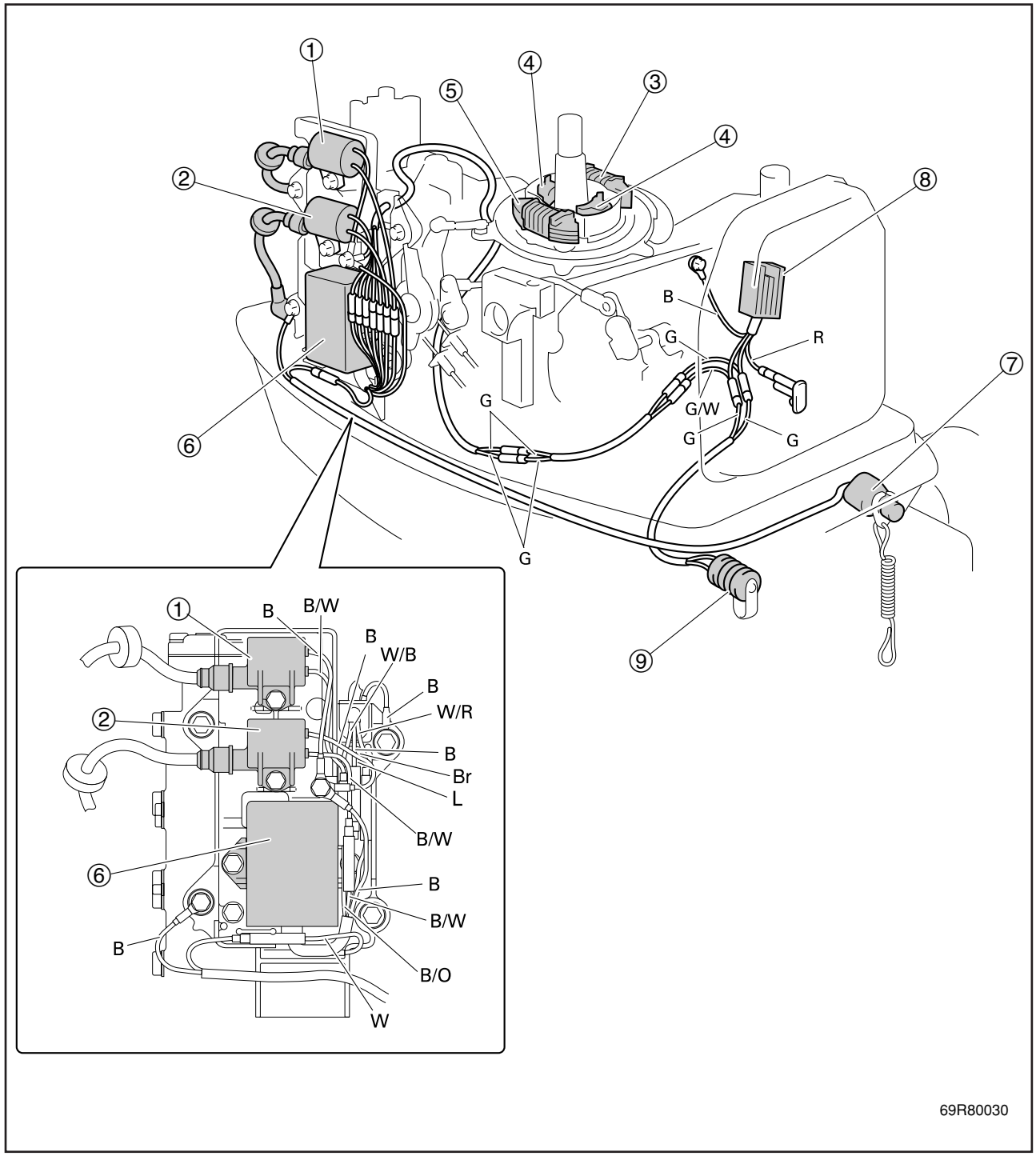


① Ignition coil #1
② Ignition coil #2
③ Charge coil
④ Pulser coil
⑤ Lighting coil
⑥ CDI unit
⑦ Choke solenoid
⑧ Starter motor
⑨ 7P-coupler
⑩ Starter relay
⑪ Fuse (20A)
⑫ Rectifier
⑬ Thermoswitch

B : Black
Br : Brown
G : Green
L : Blue
P : Pink
R : Red
W : White

B/O : Black/orange
B/W : Black/white
W/B : White/black
W/R : White/red

E25BMH, 25BMH, 25XMH, E30HMH, 30HMH



① Ignition coil #1
② Ignition coil #2
③ Charge coil
④ Pulser coil
⑤ Lighting coil
⑥ CDI unit
⑦ Engine stop lanyard switch
⑧ Rectifier Regulator (optional)
⑨ 2P-Coupler (optional)

B : Black
Br : Brown
G : Green
L : Blue
R : Red
W : White
B/O : Black/orange
B/W : Black/white
G/W : Green/white
W/B : White/black
W/R : White/red

8

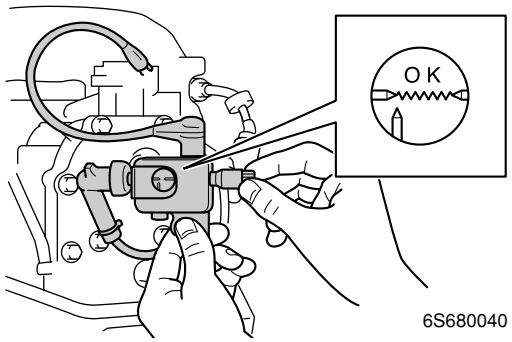
Ignition and ignition control system

Checking the ignition spark gap

1. Disconnect the all spark plug caps from the all spark plugs.
2. Connect a spark plug cap to the special service tool.

Ignition tester: 90890-06754

3. Crank the engine and check for a spark. If there is no spark. Check the ignition system.



6S680040

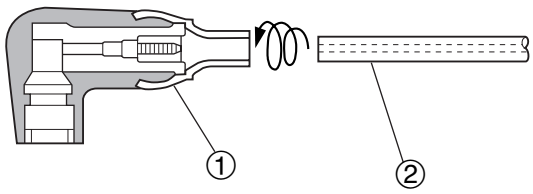
Ignition tester: 90890-06754

⚠WARNING

- **Do not touch any of the connections of the ignition tester leads.**
- **Keep flammable gas or liquids away, since this test can produce sparks.**

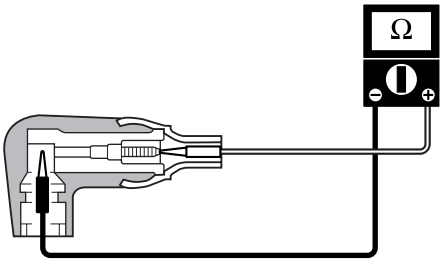
Checking the spark plug cap (with resister type)

1. Check the spark plug caps. Replace the spark plug caps if cracked or damaged.
2. Remove the spark plug cap ① from the spark plug wire ② by turning the cap counterclockwise.



6B480080

3. Measure the spark plug cap resistance. Replace the spark plug cap if out of specification.



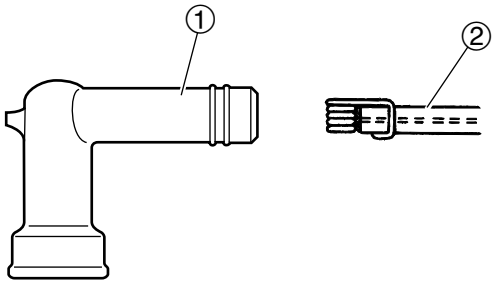
69R80060

Spark plug cap resistance:
4.0–6.0 kΩ at 20°C (68°F)

Checking the spark plug cap

1. Check the spark plug caps. Replace the spark plug caps if cracked or damaged.

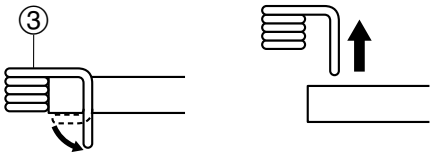
2. Remove the spark plug cap ① from the spark plug wire ②.



6S680060

3. Check the spark plug wire terminal ③. Replace the spark plug wire terminal if damaged or corrosion.

4. Install the spark plug wire terminal.



61U80180

Checking the ignition coil

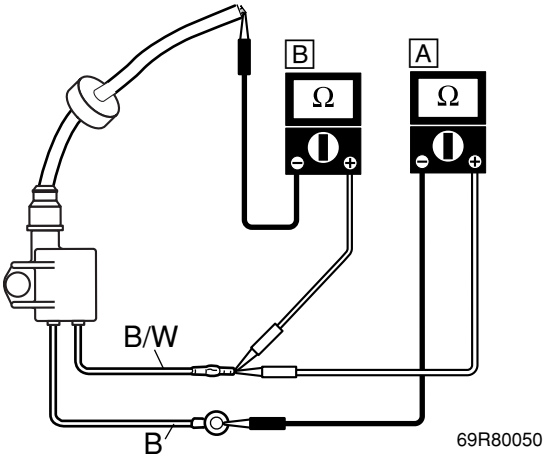
1. Disconnect the all spark plug caps from the all spark plugs.

2. Disconnect the ignition coil connector, and then remove the spark plug cap.

3. Remove the ignition coil from the power unit.

4. Check the spark plug wire. Replace the ignition coil if cracked or corrosion.

5. Measure the ignition coil resistance. Replace the ignition coil if out of specification.



69R80050

Ignition coil resistance
(reference data):
A Primary coil:
Black/white (B/W)–Black (B)
0.18–0.24Ω at 20°C (68°F)
B Secondary coil:
Black/white (B/W)–
Spark plug wire
2.72–3.68 kΩ at 20°C (68°F)

8

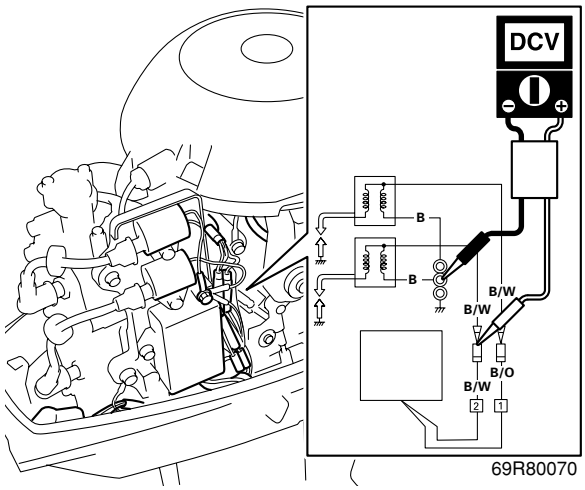
Checking the CDI unit

NOTE:
Be sure to install the test propeller before checking the peak voltage.

Test propeller: 90890-01629

1. Connect the digital circuit tester with peak voltage adaptor B to the ignition coil lead and the ground.

2. Measure the CDI unit output peak voltage. If less than specification, measure the charge coil output peak voltage and CDI unit resistance. Replace the CDI unit if the output peak voltage of the charge coil is more than specification.



CDI unit output peak voltage:
[1] Black/orange (B/O)–Ground (B)
[2] Black/white (B/W)–Ground (B)

r/min	Loaded		
	Cranking	1,500	3,500
DC V	130	135	135

[1] #1 cylinder
[2] #2 cylinder

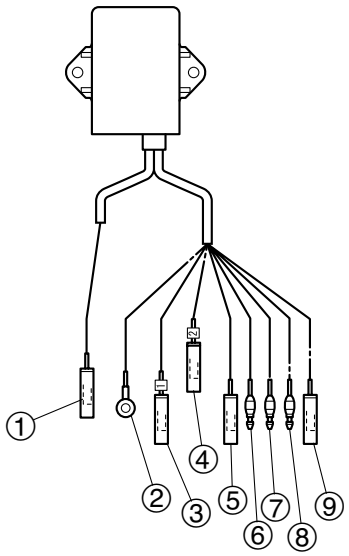
NOTE:
Remove the all spark plug caps, when measuring the CDI unit peak voltage at loaded engine cranking.

3. Remove the CDI unit from power unit.

4. Connect the pocket tester to the CDI unit connector.

NOTE:
Be sure to use the pocket tester for measuring the CDI unit resistance.

5. Measure the CDI unit resistance. Replace the CDI unit resistance if out of specification.



Pocket tester: 90890-03112

① W : White
② B : Black (#1)
③ B/O : Black/orange
④ B/W : Black/white
⑤ B : Black (#2)
⑥ W/R : White/red
⑦ W/B : White/black
⑧ Br : Brown
⑨ L : Blue
∞ : No continuity

NOTE:
CDI unit resistance are reference data.

(E)25B, (E)30H

Unit:Ω

Tester negative lead \ Tester positive lead	Engine stop lanyard	Ground	Ignition #1	Ignition #2	Ground	Pulser #1	Pulser #2	Charge	
	W	B (#1)	B/O	B/W	B (#2)	W/R	W/B	Br	L
W		∞	∞	∞	∞	∞	∞	∞	∞
B (#1)	100 k–∞		2 k–8 k	2 k–8 k	Zero	3.4 k–14 k	5 k–20 k	3 k–10 k	Zero
B/O	∞	∞		∞	∞	∞	∞	∞	∞
B/W	∞	∞	∞		∞	∞	∞	∞	∞
B (#2)	100 k–∞	Zero	2 k–8 k	2 k–8 k		3.4 k–14 k	5 k–20 k	3 k–10 k	Zero
W/R	100 k–∞	5 k–20 k	5 k–20 k	8 k–35 k	5 k–20 k		10 k–40 k	8 k–35 k	5 k–20 k
W/B	100 k–∞	5 k–20 k	8 k–35 k	5 k–20 k	5 k–20 k	8 k–35 k		8 k–35 k	5 k–20 k
Br	80 k–1 M	80 k–300 k	80 k–1 M	80 k–1 M	80 k–300 k	80 k–300 k	80 k–300 k		80 k–300 k
L	100 k–∞	Zero	2 k–8 k	2 k–8 k	Zero	3.4 k–14 k	5 k–20 k	3 k–10 k	

25X

Unit:Ω

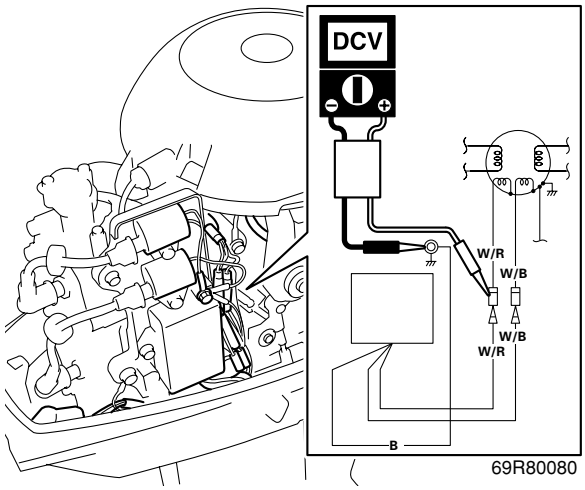
Tester negative lead \ Tester positive lead	Engine stop lanyard	Ground	Ignition #1	Ignition #2	Ground	Pulser #1	Pulser #2	Charge	
	W	B (#1)	B/O	B/W	B (#2)	W/R	W/B	Br	L
W		∞	∞	∞	∞	∞	∞	∞	∞
B (#1)	100 k–∞		2 k–8 k	2 k–8 k	Zero	5 k–20 k	5 k–20 k	3 k–10 k	Zero
B/O	∞	∞		∞	∞	∞	∞	∞	∞
B/W	∞	∞	∞		∞	∞	∞	∞	∞
B (#2)	100 k–∞	Zero	2 k–8 k	2 k–8 k		5 k–20 k	5 k–20 k	3 k–10 k	Zero
W/R	100 k–∞	5 k–20 k	5 k–20 k	8 k–35 k	5 k–20 k		10 k–40 k	8 k–35 k	5 k–20 k
W/B	100 k–∞	5 k–20 k	8 k–35 k	5 k–20 k	5 k–20 k	10 k–40 k		8 k–35 k	5 k–20 k
Br	80 k–1 M	80 k–300 k	80 k–1 M	80 k–1 M	80 k–300 k	80 k–300 k	80 k–300 k		80 k–300 k
L	100 k–∞	Zero	2 k–8 k	2 k–8 k	Zero	5 k–20 k	5 k–20 k	3 k–10 k	

8

Checking the pulser coil

1. Connect the digital circuit tester with peak voltage adaptor B to the pulser coil lead and the ground.

2. Measure the pulser coil output peak voltage. If the measurement is less than specification, measure the pulser coil resistance.



Pulser coil output peak voltage:
White/red (W/R)–Ground (B)
White/black (W/B)–Ground (B)

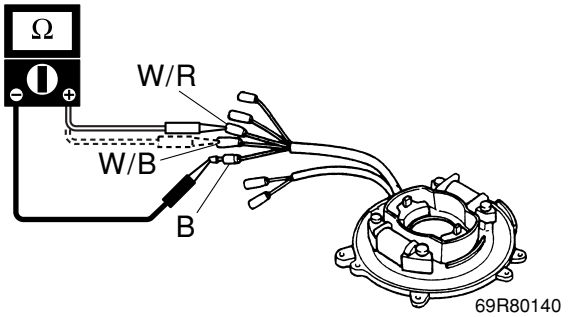
r/min	Unloaded	Loaded		
	Cranking		1,500	3,500
DC V	6.8	6.7	16.0	26.0

NOTE:
Remove the all spark plug caps, when measuring the pluser coil peak voltage at loaded engine cranking.

3. Disconnect the pulser coil connector.

4. Connect the digital circuit tester to the pulser coil connector.

5. Measure the pulser coil resistance. Replace the pulser coil if out of specification.

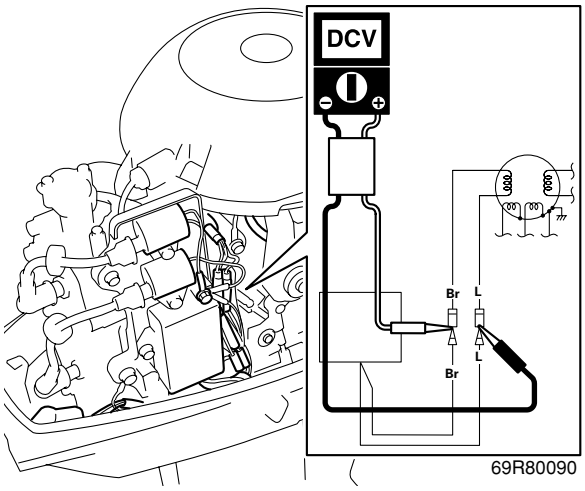


Pulser coil resistance
(reference data):
White/red (W/R)–Ground (B)
White/black (W/B)–Ground (B)
311–381 Ω at 20°C (68°F)

Checking the charge coil

1. Connect the digital circuit tester with peak voltage adaptor B to the charge coil.

2. Measure the charge coil output peak voltage. If the measurement is less than specification, measure the charge coil resistance.

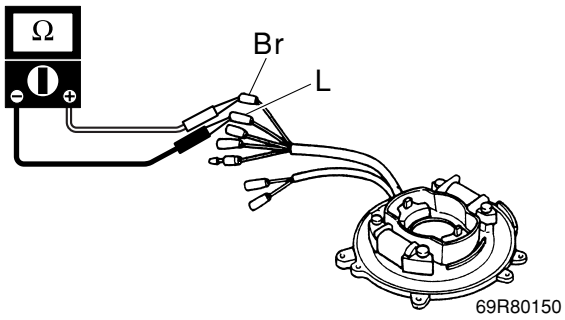


Charge coil output peak voltage:
Brown (Br)–Blue (L)

r/min	Unloaded	Loaded		
	Cranking		1,500	3,500
DC V	146	146	150	150

NOTE:
Remove the all spark plug caps, when measuring the charge coil peak voltage at loaded engine cranking.

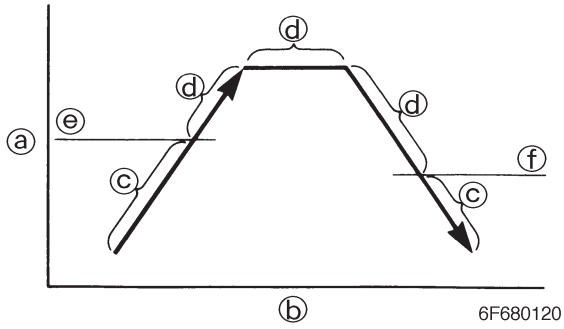
3. Disconnect the charge coil connector.
4. Connect the digital circuit tester to the charge coil connector.
5. Measure the charge coil resistance. Replace the charge coil if out of specification.



Charge coil resistance
(reference data):
Brown (Br)–Blue (L)
342–418 Ω at 20°C (68°F)

Checking the thermoswitch (W)

1. Check the switch for continuity.



ⓐ Temperature
ⓑ Time
ⓒ No continuity
ⓓ Continuity

Thermoswitch continuity
temperature (reference data):
Pink (P)–Black (B)
ⓔ: 106–114 °C (222.8–237.2°F)
ⓕ: 88–102 °C (190.4–215.6°F)

8

Starting system

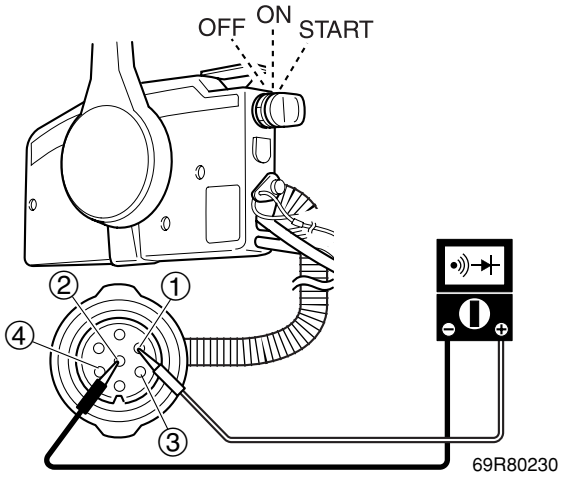
Checking the fuse (WH, W, WC)

1. Remove the fuse from fuse holder.
2. Check the fuse (20A) for continuity. Replace the fuse if there is no continuity.

Checking the engine start switch (W)

1. Disconnect the main harness coupler.

2. Check the engine start switch for continuity at the main harness coupler. Check the wiring harness or replace the engine start switch of the remote control box if it is not shown as the below chart.

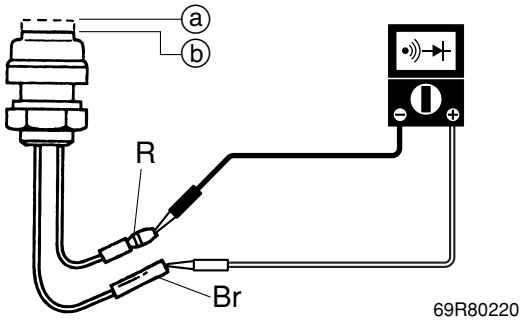


	Lead color			
Switch position	White (W) ①	Black (B) ②	Red (R) ③	Pink (P) ④
OFF	○——○			
ON			○——○	
START			○——○	

Checking the engine start button (WH, WC)

1. Disconnect the engine start button connector.

2. Check the engine start button for continuity at the engine start button connector. Check the wiring harness or replace the engine start button if it is not shown as the below chart.

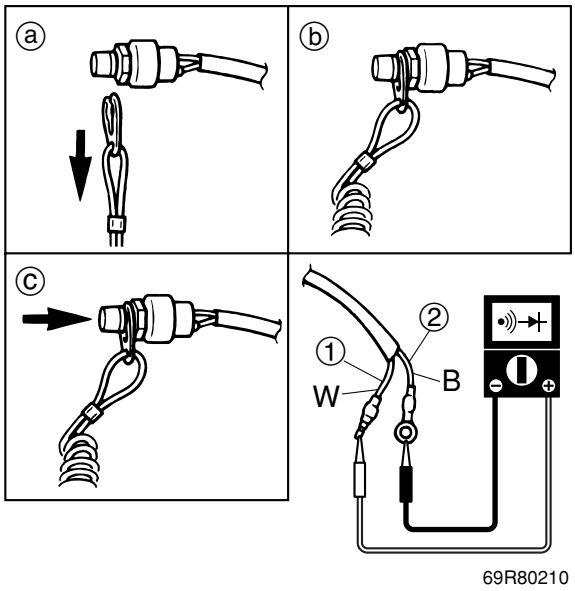


Switch position	Lead color	
	Brown (Br)	Red (R)
Free ⓐ		
Push ⓑ	○———	———○

Checking the engine stop lanyard switch

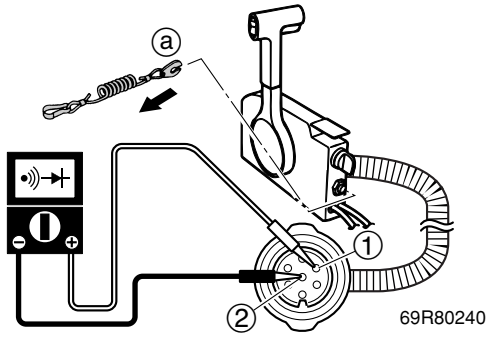
1. Check the engine stop lanyard switch for continuity. Replace the engine stop lanyard switch if it is not shown as the below chart.

A



69R80210

B



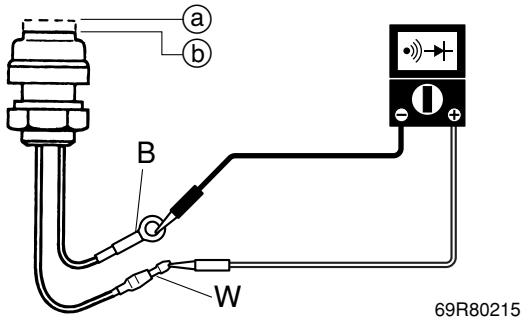
69R80240

Switch position	Lead color	
	White (W) ①	Black (B) ②
Clip removed ⓐ	○——	——○
Clip installed ⓑ		
Engine stop button pushed ⓒ	○——	——○

A WH, MH
B W

Checking the engine stop button (WC)

1. Check the engine stop button. Replace the engine stop button if it is not shown as the below chart.



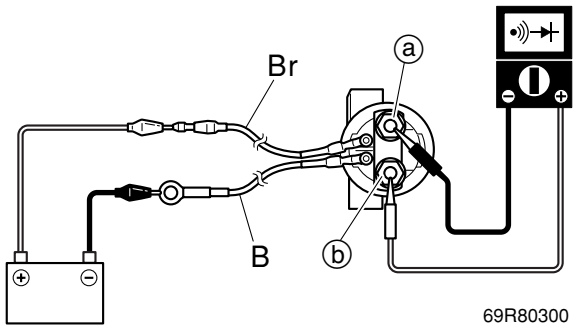
69R80215

Switch position	Lead color	
	White (W)	Black (B)
Engine stop button free ⓐ		
Engine stop button pushed ⓑ	○——	——○

8

Checking the starter relay (WH, W, WC)

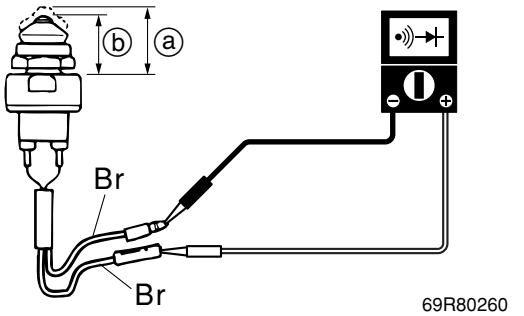
1. Remove the starter relay.
2. Connect the digital circuit tester leads to the starter relay terminals.
3. Check the starter relay for continuity. Replace the starter relay if it is not shown as the below chart.



Battery lead position	Terminal	
	ⓐ	ⓑ
Battery connected	○	○
Battery disconnected		

Checking the neutral switch continuity (WH, WC)

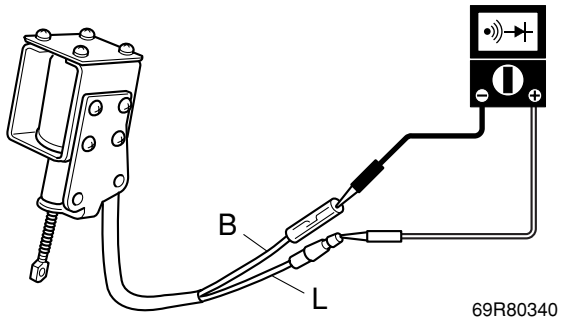
1. Disconnect the neutral switch connector.
2. Connect the digital circuit tester to the neutral switch connector.
3. Set the gear shift to “F” or “R” position.
4. Check the neutral switch for continuity. Replace the neutral switch if it is not shown as the below chart.



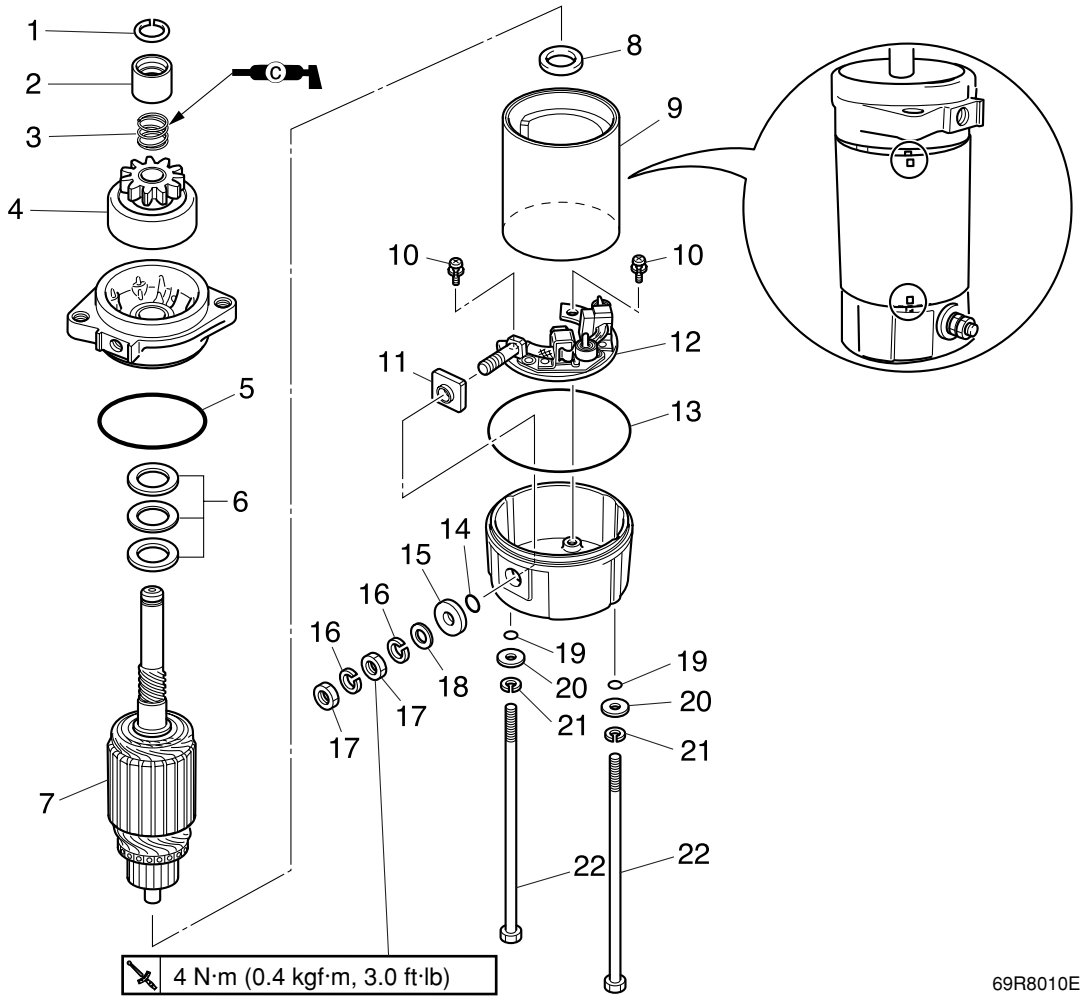
Switch position	Lead color	
	Brown (Br)	Brown (Br)
Free ⓐ (“N” position)		
Push ⓑ (“F” or “R” position)	○	○

Checking the choke solenoid continuity (W)

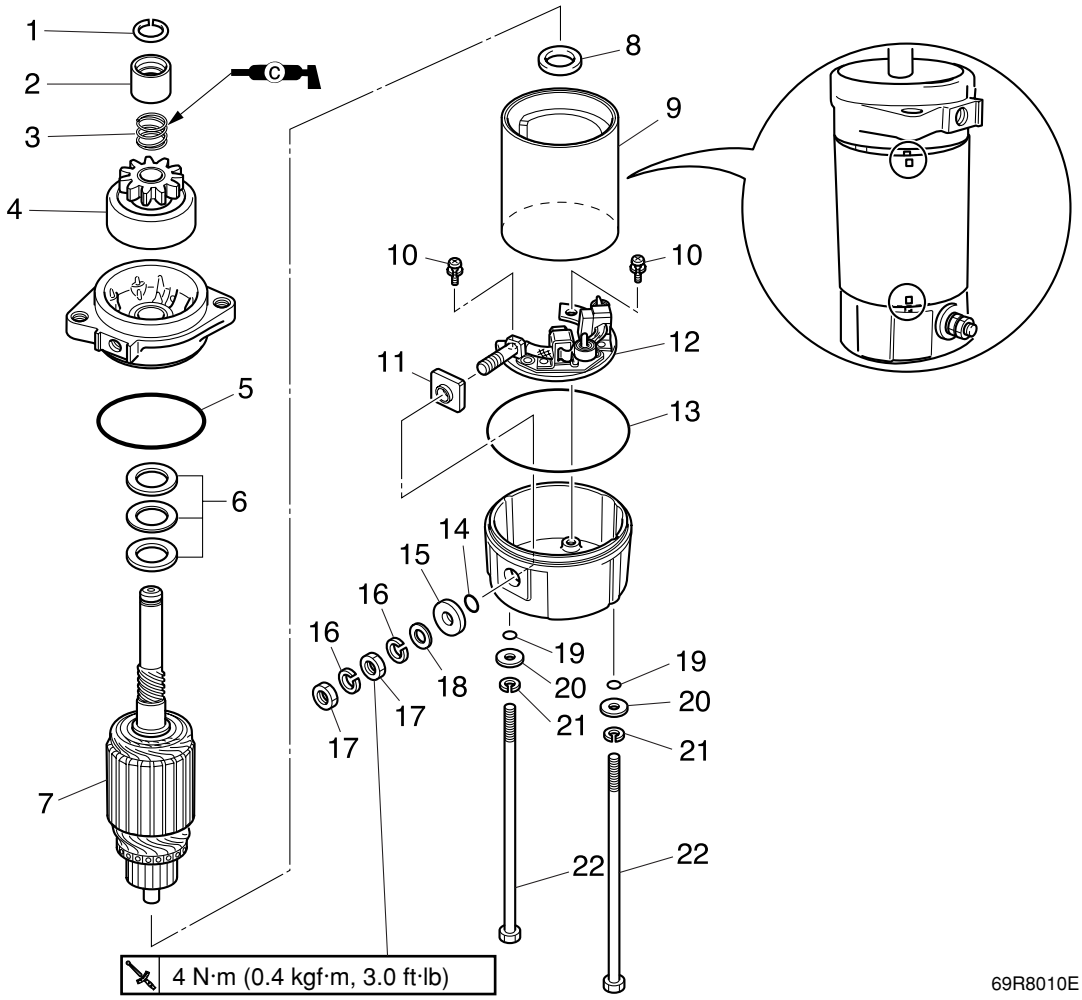
1. Disconnect the choke solenoid connector.
2. Connect the digital circuit tester to the choke solenoid connector.
3. Check the choke solenoid for continuity. Replace the choke solenoid if there is no continuity.



Starter motor (WH, W, WC)



No.	Part name	Q'ty	Remarks
1	Clip	1	Not reusable
2	Pinion stopper	1	
3	Spring	1	Not reusable
4	Pinion	1	
5	O-ring	1	Not reusable
6	Washer	—	
7	Armature	1	
8	Washer	1	
9	Stator	1	
10	Screw	2	ø4 × 7 mm
11	Bush	1	
12	Brush holder	1	
13	O-ring	1	Not reusable
14	O-ring	1	Not reusable
15	Bush	1	
16	Spring washer	2	
17	Nut	2	



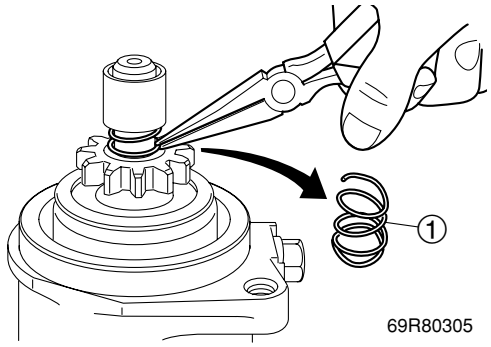
No.	Part name	Q'ty	Remarks
18	Washer	1	
19	O-ring	2	Not reusable
20	Washer	2	
21	Spring washer	2	
22	Bolt	2	M5 x 120 mm

Removing the starter motor pinion

1. Remove the starter motor from the power unit.

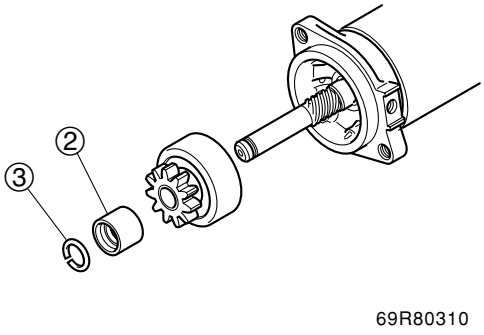
NOTE:
To remove the starter motor, refer to page 5-10.

2. Remove the spring ① from the starter motor.



NOTE:
Do not reuse the spring ①.

3. Slide the pinion stopper ②, and then remove the clip ③ and starter motor pinion.



NOTE:
Do not reuse the clip ③.

Checking the starter motor pinion

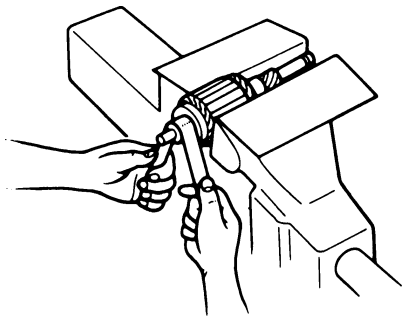
1. Check the teeth of the pinion. Replace the pinion if cracked or worn.

2. Check the pinion. Replace the pinion if un-smooth operation.

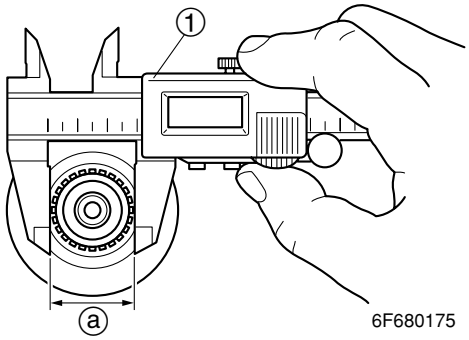
NOTE:
Turn the pinion counterclockwise to check that it operates smoothly and turn it clockwise to check that it locks in place.

Checking the armature

1. Check the commutator. Clean with 600–grit sandpaper and compressed air if dirt.



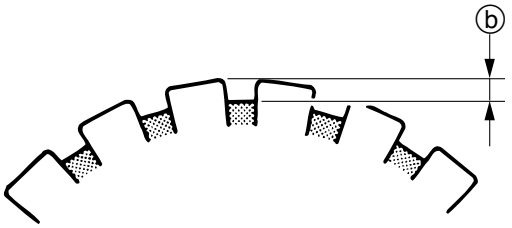
2. Measure the commutator diameter ⓐ. Replace the armature if below specification limit.



	Digital caliper ①: 90890-06704

Standard diameter ⓐ: 30.0 mm (1.18 in) Wear limit: 29.0 mm (1.14 in)	

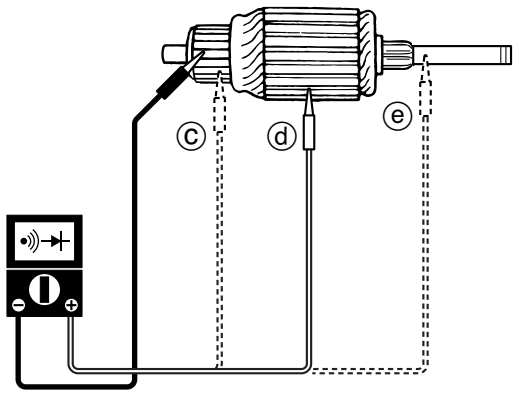
3. Measure the commutator undercut ⓑ. Replace the armature if below specification limit.



6F680180

Standard undercut ⓑ: 0.8 mm (0.03 in) Wear limit: 0.2 mm (0.01 in)	

4. Check the armature for continuity. Replace the armature if it is not shown as the below chart.

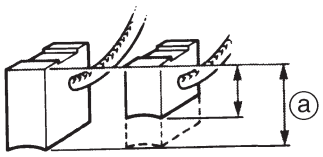


69R80320

Armature continuity	
Commutator segments ⓒ	Continuity
Segment–Armature core ⓓ	No continuity
Segment–Armature shaft ⓔ	No continuity

Checking the brush

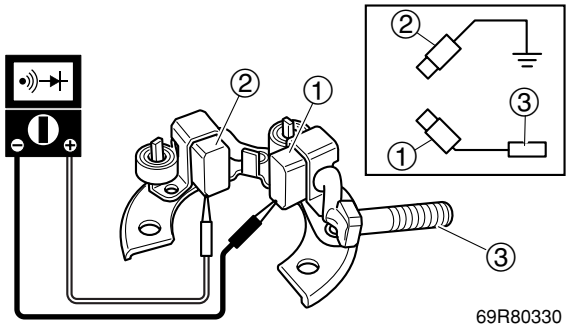
1. Measure the brush length ⓐ. Replace the brush assembly if below specification limit.



6G470330

Standard length ⓐ: 12.5 mm (0.49 in) Wear limit: 9.0 mm (0.35 in)	

2. Check the brush holder assembly for continuity. Replace the brush holder if it is not shown as the below chart.



69R80330

Brush continuity:	
Brush ①–Brush ②	No continuity
Brush ②–Terminal ③	No continuity
Brush ①–Terminal ③	Continuity

Checking the starter motor operation

1. Check the operation of the starter motor.

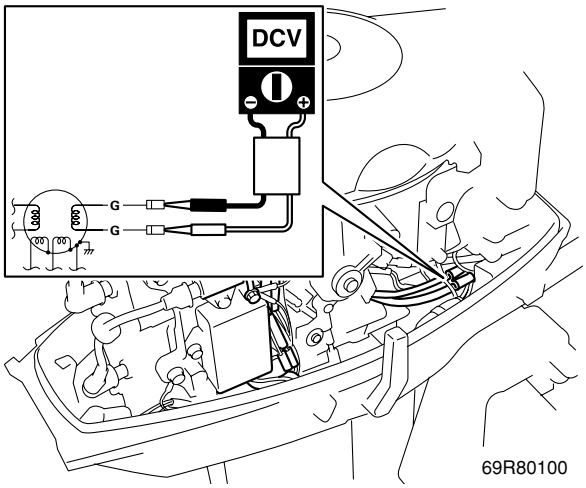
Charging system

Checking the lighting coil

1. Disconnect the lighting coil connector.

2. Connect the digital circuit tester with peak voltage adaptor B to the lighting coil.

3. Measure the lighting coil output peak voltage. If the measurement is less tan specification, measure the lighting coil resistance.



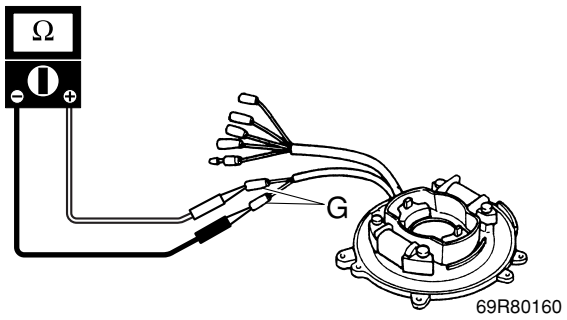
Lighting coil output peak voltage:
Green (G)–Green (G)

r/min	Unloaded		
	Cranking	1,500	3,500
DC V	4.6	15.0	30.0

NOTE:
Remove the all spark plug caps, when measuring the lighting coil peak voltage at engine cranking.

4. Connect the digital circuit tester to the lighting coil connector.

5. Measure the lighting coil resistance. Replace the lighting coil if out of specification.

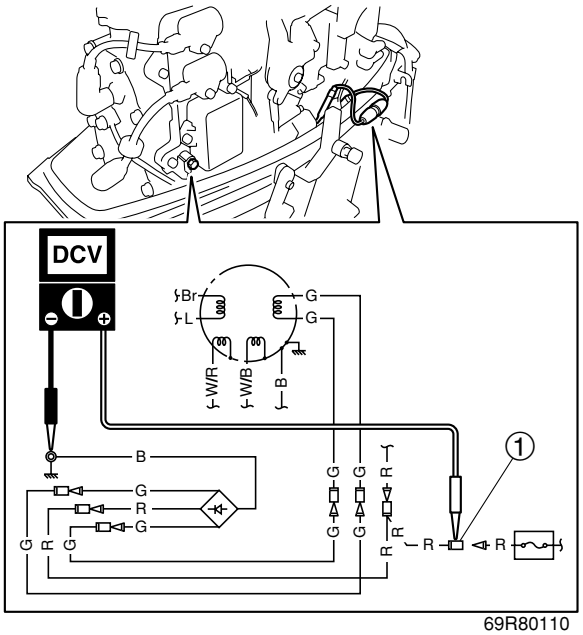


Lighting coil resistance
(reference data):
Green(G)–Green (G)
0.31–0.37 Ω at 20°C (68°F)

Checking the Rectifier (WH, W, WC)

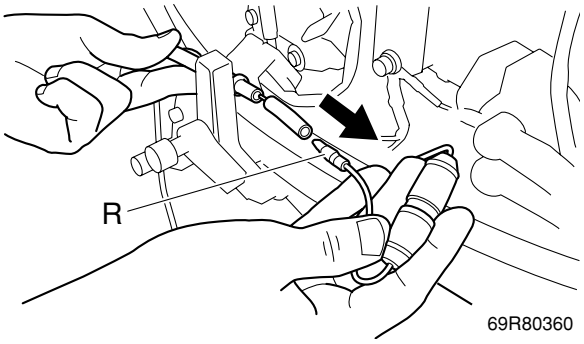
NOTE:
Do not use the peak voltage adaptor when measuring the output peak voltage of the Rectifier.

1. Connect the digital circuit tester positive probe to the connector ① and connect the negative probe to the ground.



8

2. Start the engine, and then disconnect the connector (R).



NOTE:
Be sure to disconnect the connector (R) after engine started.

3. Measure the Rectifier output peak voltage. If less than specification, measure the lighting coil output peak voltage. Replace the Rectifier if the output peak voltage of the lighting coil is more than specification.

Rectifier Regulator output peak voltage:
Red (R)–Ground (B)

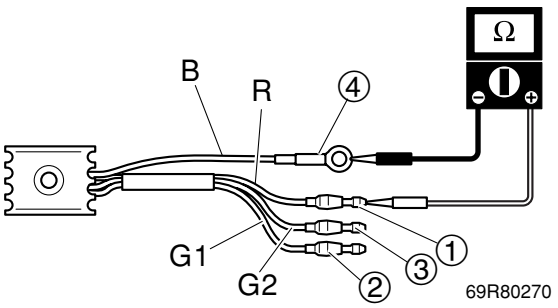
r/min	Unloaded	
	1,500	3,500
DC V	13	13

4. Remove the Rectifier from the power unit.

5. Connect the pocket tester to the Rectifier.

Pocket tester: 90890-03112

6. Check the Rectifier for continuity. Replace the Rectifier if it is not shown as the below chart.



Rectifier continuity

Tester lead ⊕	Tester lead ⊖	
R ①	G1 ②	Continuity (reference data)
R ①	G2 ③	
R ①	B ④	
G1 ②	B ④	
G2 ③	B ④	
G1 ②	G2 ③	Discontinuity
G2 ③	R ①	
B ④	R ①	
B ④	G1 ②	
B ④	G2 ③	
G1 ②	R ①	
G2 ③	G1 ②	

NOTE:
Use the pocket tester for checking the Rectifier continuity.

TRBL SHTG ?

Troubleshooting

9

Troubleshooting the power unit

Troubleshooting the power unit

Symptom 1: Specific trouble conditions.
Symptom 2: Trouble conditions of an area or individual part.
Cause 1: The content considered as the trouble factors of symptom 2.
Cause 2: The content considered as the trouble causes of cause 1 (described if necessary).

Symptom 1: Engine does not crank

Symptom 2	Cause 1	Cause 2	Checking step	Refer to page
Manual starter does not operate	Gear shift not in the neutral position	—	Set the gear shift to “N” position.	3-11
	Start-in-gear protection system malfunction	—	Check and adjust or replace the start-in-gear protection cable.	3-12
	Broken spiral spring and drive pawl spring	—	Disassemble and check the spiral spring or drive pawl spring.	5-4
Starter motor does not operate	Gear shift not in the neutral position	—	Set the gear shift to “N” position	3-11
	Loose connection of battery terminal	—	Check the battery terminal connection.	—
	Discharged battery	—	Check the battery for electrolyte level, gravity and voltage.	3-16
	Blown fuse (20A)	—	Check the fuse (20A).	8-11
	Engine start switch malfunction	—	Check the engine start switch.	8-11
	Starter relay malfunction	—	Check the starter relay.	8-13
	Short or open connection in starter motor circuit	—	Check the wiring harness continuity.	WD
	Starter motor malfunction	—	Disassemble and check the starter motor.	8-16

WD: See the wiring diagram

Symptom 1: Engine dose not crank

Symptom 2	Cause 1	Cause 2	Checking step	Refer to page
—	Broken woodruffkey	—	Disassemble and check the power unit.	5-14
	Stuck piston, piston and crank shaft			
	Piston lock due to water in the combustion chamber			
	Salt buildup on the drive shaft	—	Disassemble and check the oil seal housing.	5-42

Symptom 1: Engine will not start (engine cranks)

Symptom 2	Cause 1	Cause 2	Checking step	Refer to page
—	Deterioration or dirty fuel	—	Replace the new fuel.	—
Fuel not supplied	Fuel supplied to the carburetor improperly	Kinked fuel hose	Check the fuel hose kinked. Repair the fuel hose.	3-2
		Fuel joint malfunction	Check the fuel joint pressure.	4-4
		Fuel filter element malfunction	Check the fuel filter for clog.	3-2
		Fuel pump malfunction	Check the fuel pump.	4-5
	Carburetor malfunction	—	Adjust and check the carburetor.	4-10
Spark plug does not spark	Engine stop lanyard switch malfunction	—	Check for continuity.	8-12
	Spark plug malfunction	Spark plug gap improperly	Check the spark plug gap and condition.	3-3
	Short, open or loose connection in ignition coil circuit and ground circuit	—	Check the wiring harness continuity.	WD
	Ignition coil malfunction	Ignition coil resistance out of specifications	Change the ignition coil and check the ignition spark.	5-10 8-6

WD: See the wiring diagram

Symptom 2	Cause 1	Cause 2	Checking step	Refer to page
Spark plug does not spark	CDI unit malfunction	CDI unit output peak voltage less than specifications	Measure the charge coil output peak voltage and resistance.	8-9
			Check the CDI unit resistance.	5-10 8-7
	Pulser coil malfunction	Pulser coil output peak voltage less than specifications	Measure the pulser coil resistance.	8-9
			Change the pulser coil and check the ignition spark.	5-8 8-5
	Charge coil malfunction	Charge coil output peak voltage less than specifications	Measure the charge coil resistance.	8-9
			Change the charge coil and check the ignition spark.	5-8 8-5
Low compression pressure	Cylinder head gasket malfunction	—	Check the compression pressure and disassembling the cylinder head.	5-1 5-25
	Reed valves malfunction	—	Disassemble and check the reed valves.	5-20
	Scratched piston or wear the piston rings	—	Check the compression pressure and disassembling the power unit.	5-1 5-30
	Scratched cylinder			

Symptom 1: Unstable engine idle speed, poor acceleration

Symptom 2	Cause 1	Cause 2	Checking step	Refer to page
—	Throttle stop screw adjusting improperly	—	Check and adjust the throttle stop screw.	3-10
	Pilot screw adjusting improperly	—	Check and adjust the pilot screw.	4-12
	Throttle cable adjusting improperly	—	Check and adjust the throttle cable.	3-4 3-5
	Throttle link length improperly	—	Check and adjust the throttle link length.	3-7
Fuel not supplied properly	Fuel supplied to the carburetor improperly	Kinked fuel hose	Check the fuel hose kinked. Repair the fuel hose.	3-2
		Fuel joint malfunction	Check the fuel joint pressure.	4-4
		Fuel filter element malfunction	Check the fuel filter for clog.	3-2
		Fuel pump malfunction	Check the fuel pump.	4-5
	Carburetor malfunction	Pilot screw settings improperly	Check and adjust the pilot screw settings.	4-12
		Throttle valve stuck or damage	Disassemble and check the carburetor.	—
		Jet or nozzle clogged and or float damaged		4-10
		Float height improperly		
—	Deterioration or dirty fuel	—	Replace new fuel	—

9

Symptom 1: Poor performance

Symptom 2	Cause 1	Cause 2	Checking step	Refer to page
Spark plug sparks improperly	Spark plug malfunction	Spark plug gap improperly	Check the spark plug gap and condition.	3-3
	Short or open connection in ignition coil circuit and ground circuit	—	Check the wiring harness continuity.	WD
	Ignition coil malfunction	Ignition coil resistance out of specifications	Change the ignition coil and check the ignition spark.	5-10 8-6
	CDI unit malfunction	CDI unit output peak voltage less than specifications	Measure the charge coil output peak voltage and resistance.	8-9
			Check the CDI unit resistance.	5-10 8-7
Ignition timing improperly	Does not advance	Ignition control link broken	Check and adjust the link rod.	—
Low compression pressure	Cylinder head gasket malfunction	—	Check the compression pressure and disassembling the cylinder head.	5-1 5-25
	Reed valves malfunction	—	Disassemble and check the reed valves.	5-20
	Scratched piston or wear the piston rings	—	Check the compression pressure and disassembling the power unit.	5-1 5-30
	Scratched cylinder			
—	Propeller selection improperly	—	Check the propeller matching.	1-13
—	Outboard motor mounting height improperly	—	Check the outboard motor mounting height.	1-14
—	Gear damaged (pinion, forward, reverse)	—	Disassemble the lower case and check the pinion, forward, revese gear.	6-9 6-10 6-15

WD: See the wiring diagram

Troubleshooting the lower unit

Symptom 1: Gear shift does not operate properly

Symptom 2	Cause 1	Cause 2	Checking step	Refer to page
—	Remote control box malfunction	—	Check and adjust the remote control box.	—
	Shift cable and shift cable end malfunction	—	Check the shift cable and shift cable end.	3-11
			Adjust the shift cable.	3-11
	Shift rod operation malfunction	—	Disassemble the lower case, shift rod, plunger and dog clutch.	6-7
		Shift rod connection malfunction	Check the shift rod connection.	6-21
	Plunger spring malfunction	—	Disassemble the lower case and check the plunger spring.	6-9
	Crosspin brokened	—	Disassemble the lower case and check the crosspin.	6-9
	Dog clutch worn	—	Disassemble the lower case and check the dog clutch.	—

A.

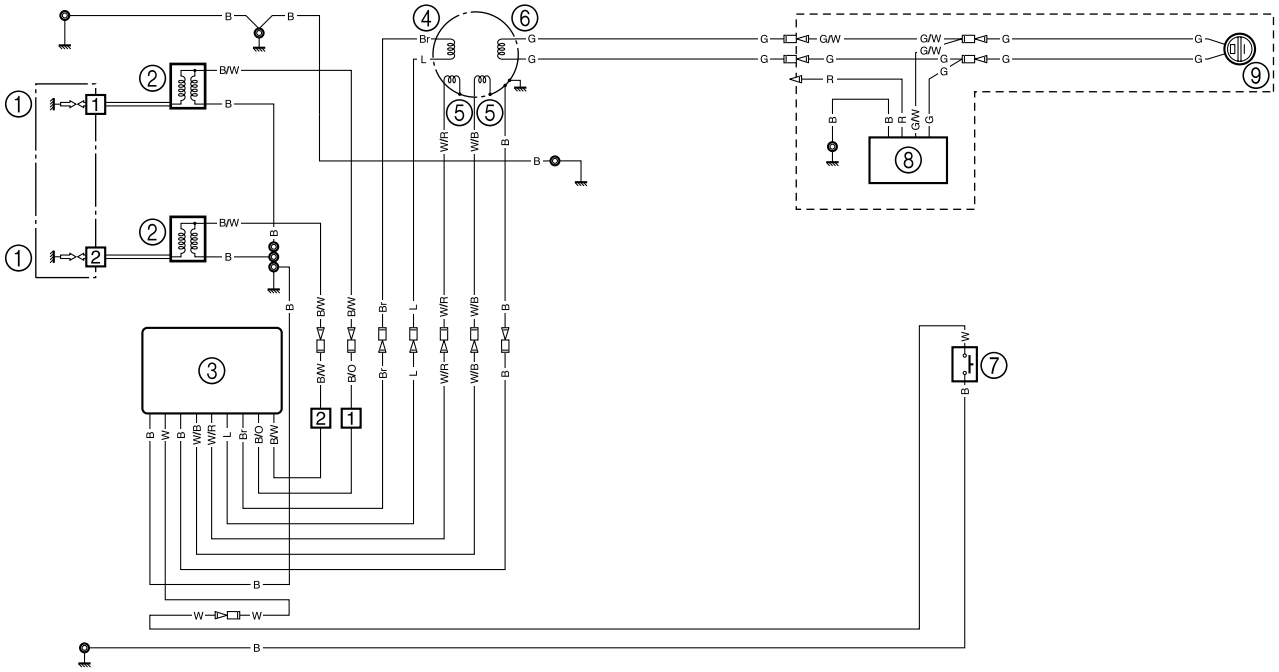
B.

C.

— MEMO —

— MEMO —

Wiring diagram
(E)25BMH, 25XMH, (E)30HMH



① Spark plug
② Ignition coil
③ CDI unit
④ Charge coil
⑤ Pulser coil
⑥ Lighting coil
⑦ Engine stop lanyard switch
⑧ Rectifier Regulator (25BMH, 30HMH: option)
⑨ 2P-connector (25BMH, 30HMH: option)

Color code

B : Black
Br : Brown
G : Green
L : Blue
R : Red
W : White
B/O : Black/orange
B/W : Black/white
G/W : Green/white
W/B : White/black
W/R : White/red

30HWH

① Spark plug
② Ignition coil
③ CDI unit
④ Rectifier
⑤ Charge coil
⑥ Pulser coil
⑦ Lighting coil
⑧ Starter motor
⑨ Starter relay
⑩ Neutral switch
⑪ Fuse (20A)
⑫ Engine start button
⑬ Engine stop lanyard switch
⑭ Battery

Color code

B : Black
Br : Brown
G : Green
L : Blue
W : White
B/O : Black/orange
B/W : Black/white
W/B : White/black
W/R : White/red

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Printed in Japan
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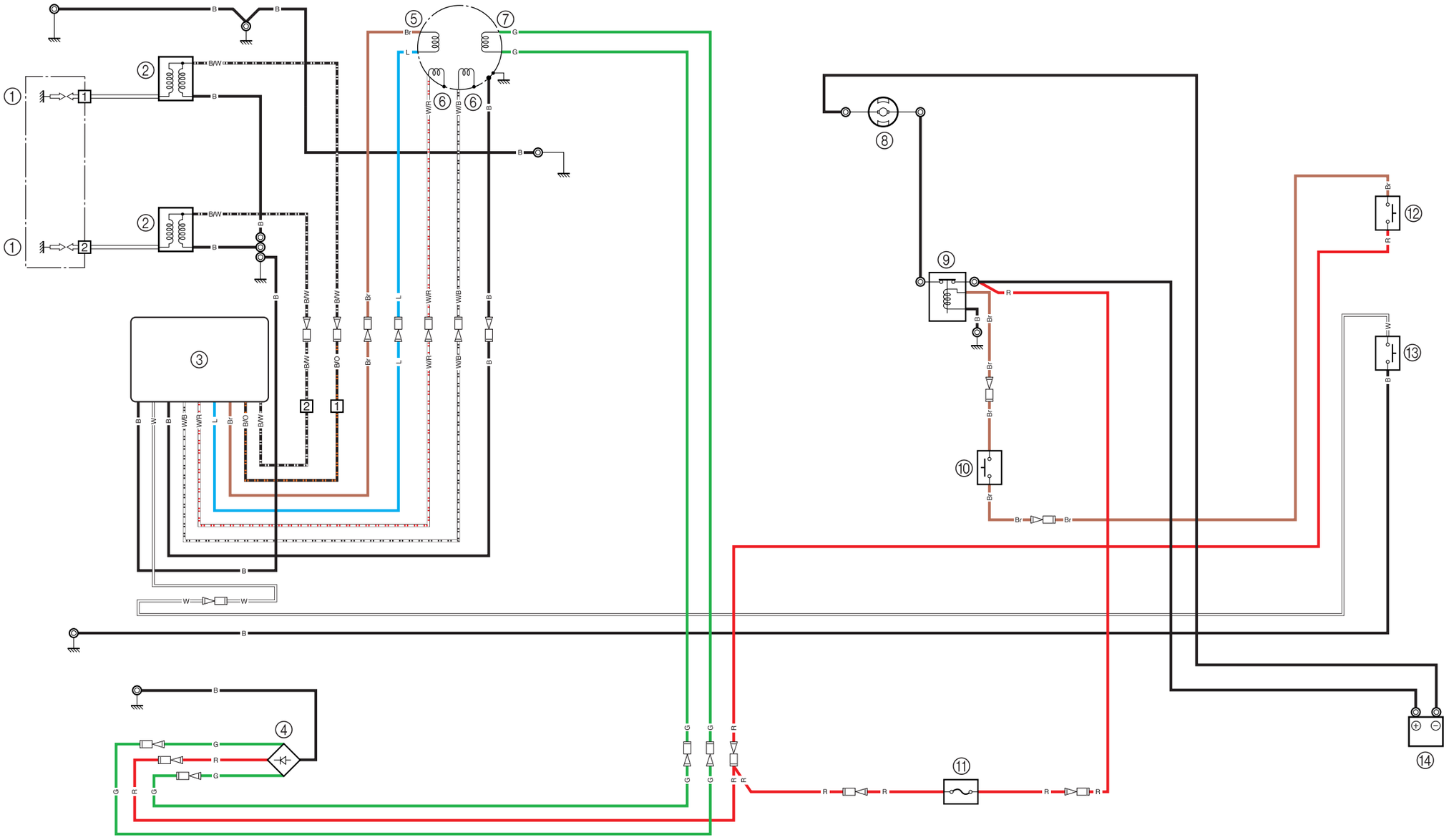
(E)

Printed on recycled paper

30HWH



69RCWD02

25BW, 30HW

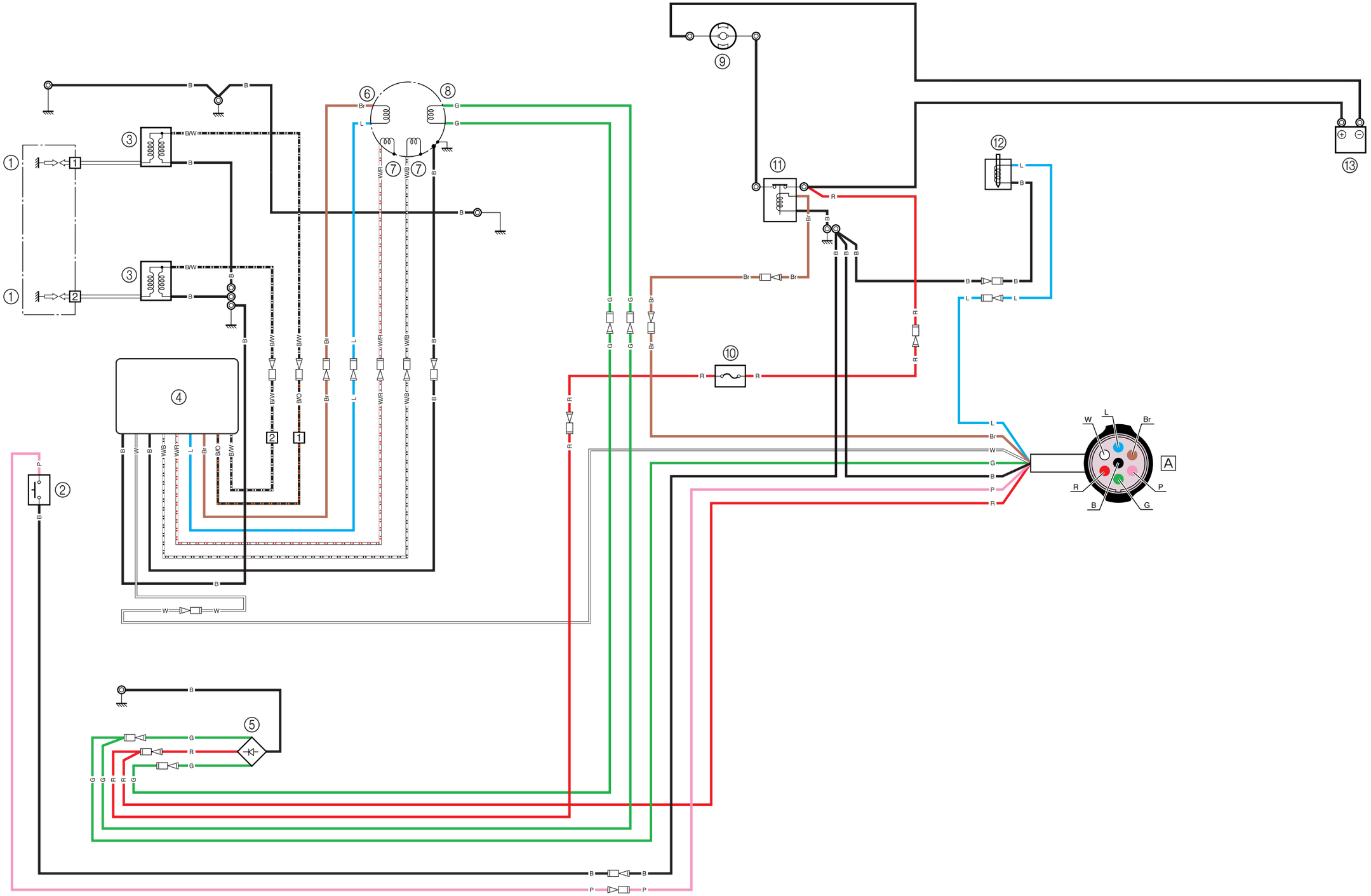
① Spark plug
② Thermoswitch
③ Ignition coil
④ CDI unit
⑤ Rectifier
⑥ Charge coil
⑦ Pulser coil
⑧ Lighting coil
⑨ Starter motor
⑩ Fuse (20A)
⑪ Starter relay
⑫ Choke solenoid
⑬ Battery

[A] To remote control box

Color code

B : Black
Br : Brown
G : Green
L : Blue
P : Pink
W : White
B/O : Black/orange
B/W : Black/white
W/B : White/black
W/R : White/red

25BW, 30HW



69RCWD03

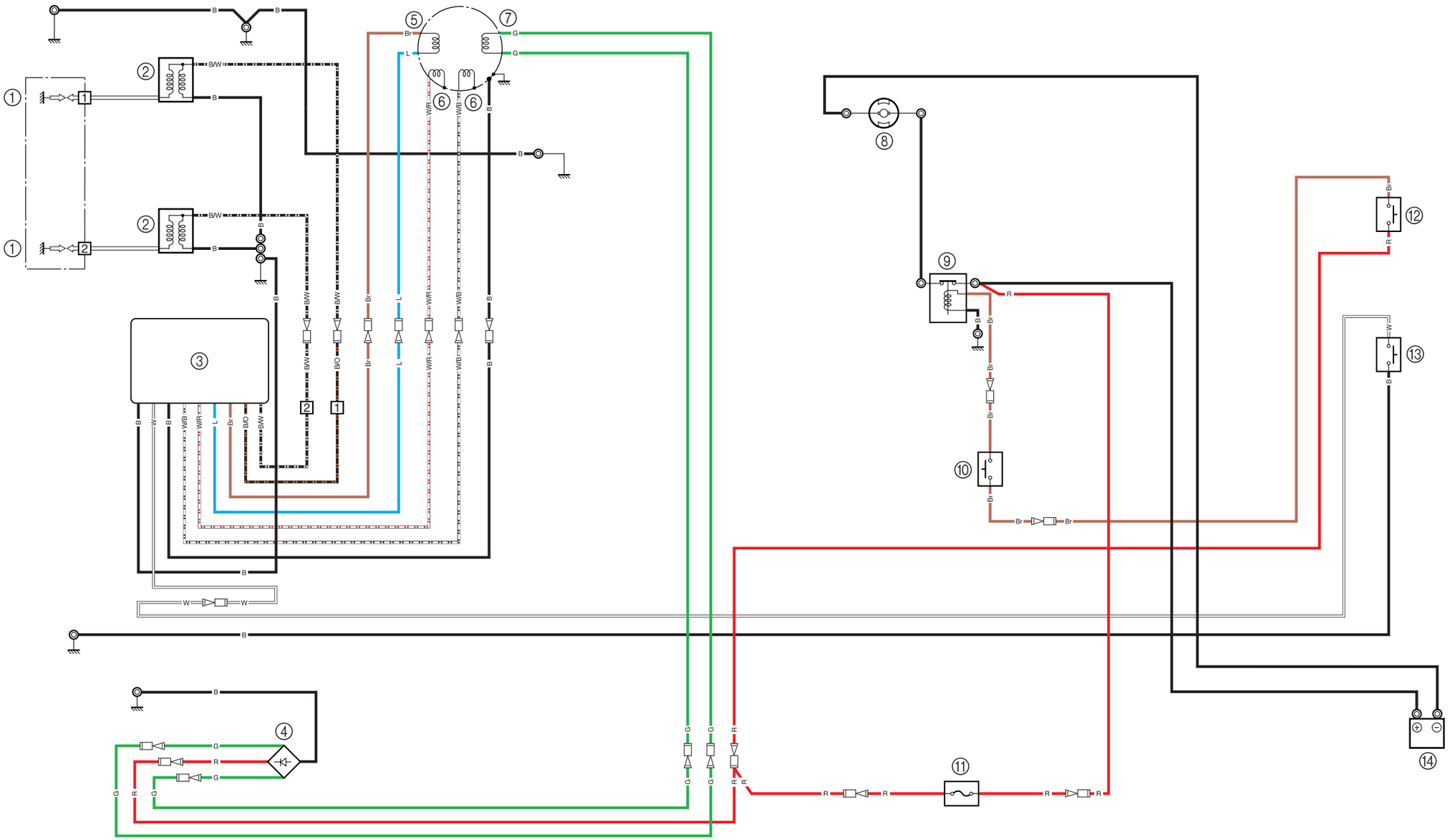
25BWC, 30HWC

① Spark plug
② Ignition coil
③ CDI unit
④ Rectifier
⑤ Charge coil
⑥ Pulser coil
⑦ Lighting coil
⑧ Starter motor
⑨ Starter relay
⑩ Neutral switch
⑪ Fuse (20A)
⑫ Engine start button
⑬ Engine stop button
⑭ Battery

Color code

B : Black
Br : Brown
G : Green
L : Blue
W : White
B/O : Black/orange
B/W : Black/white
W/B : White/black
W/R : White/red

25BWC, 30HWC



69RCWD05