YAMAHA

F2.5A

SERVICE MANUAL

290470

69M-28197-3E-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.

F2.5A
SERVICE MANUAL

Printed in the Netherlands

Contents

General information

How to use this manual

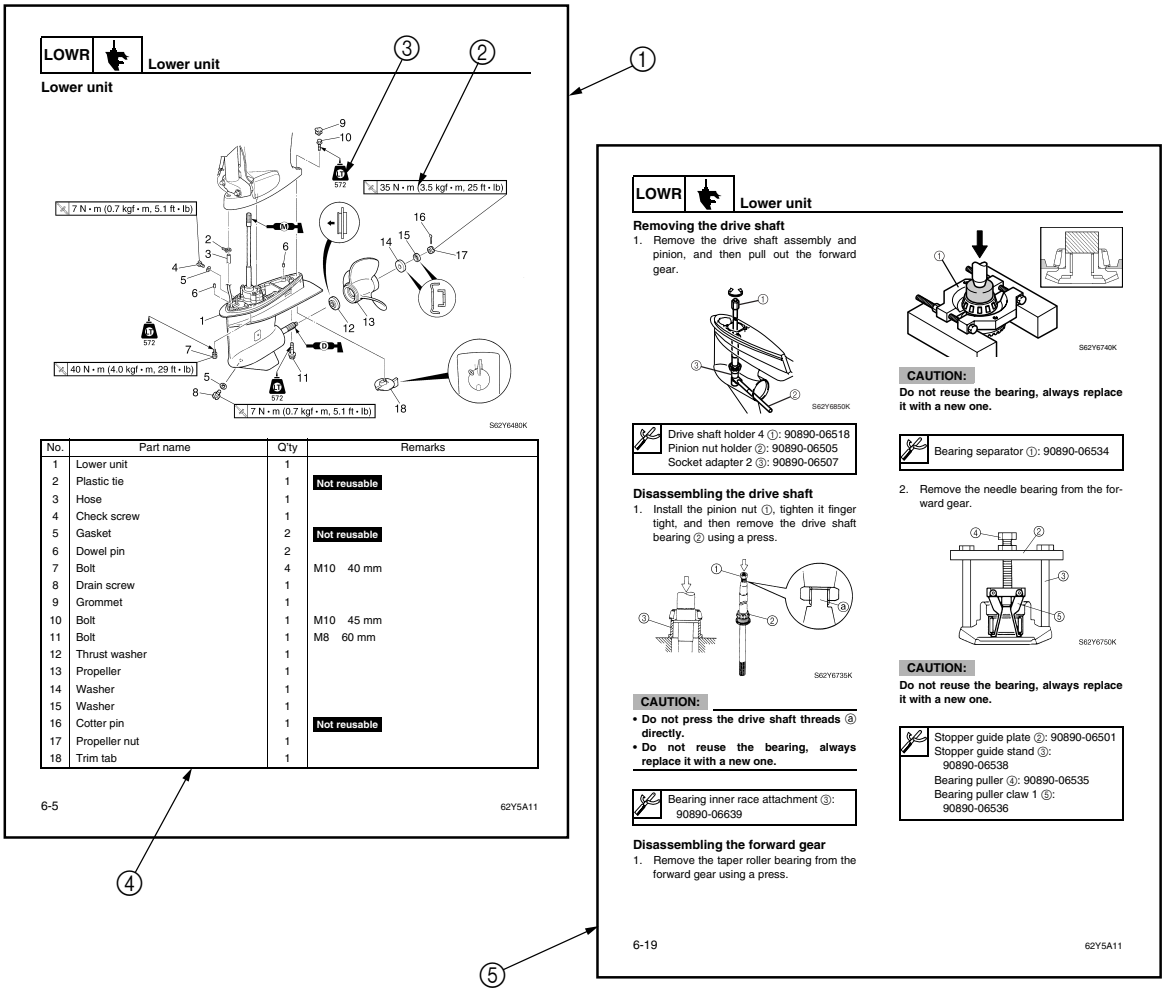
Manual format

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.

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

NOTE:

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



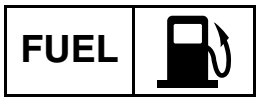
No.	Part name	Q'ty	Remarks
1	Lower unit	1	
2	Plastic tie	1	Not reusable
3	Hose	1	
4	Check screw	1	
5	Gasket	2	Not reusable
6	Dowel pin	2	
7	Bolt	4	M10 40 mm
8	Drain screw	1	
9	Grommet	1	
10	Bolt	1	M10 45 mm
11	Bolt	1	M8 60 mm
12	Thrust washer	1	
13	Propeller	1	
14	Washer	1	
15	Washer	1	
16	Cotter pin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

Symbols

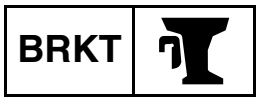
The symbols below are designed to indicate the content of a chapter.

General information

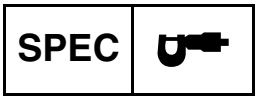
Fuel system



Bracket unit

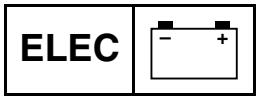


Specifications



Power unit

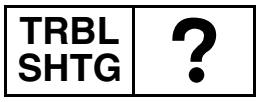
Electrical systems



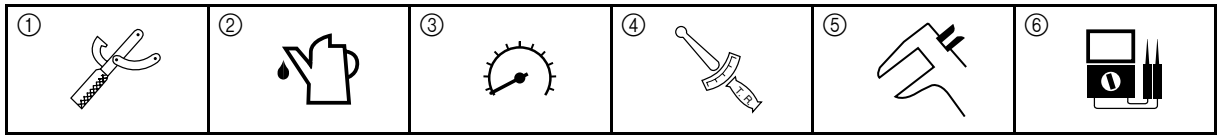
Periodic checks and adjustments

Lower unit

Troubleshooting

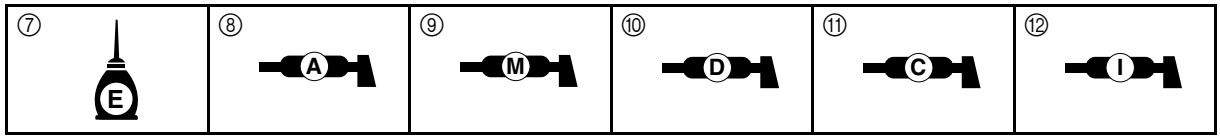


Symbols ① to ⑥ indicate specific data.



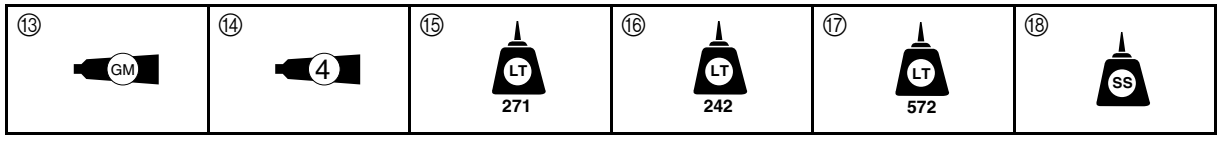
① Special tool
② Specified oil or fluid
③ Specified engine speed
④ Specified tightening torque
⑤ Specified measurement
⑥ Specified electrical value (resistance, voltage, electric current)

Symbols ⑦ to ⑫ in an exploded diagram indicate the grade of lubricant and the lubrication point.



⑦ Apply Yamaha 4-stroke motor oil
⑧ Apply water resistant grease (Yamaha grease A)
⑨ Apply molybdenum disulfide grease
⑩ Apply corrosion resistant grease (Yamaha grease D)
⑪ Apply low temperature resistant grease (Yamaha grease C)
⑫ Apply injector grease

Symbols ⑬ to ⑱ in an exploded diagram indicate the type of sealant or locking agent and the application point.



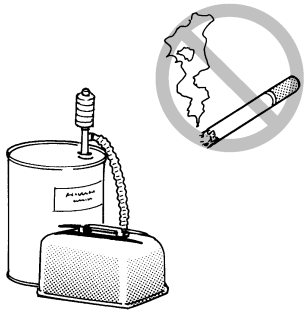
⑬ Apply Gasket Maker
⑭ Apply Yamabond No. 4
⑮ Apply LOCTITE 271 (red)
⑯ Apply LOCTITE 242 (blue)
⑰ Apply LOCTITE 572
⑱ Apply silicon sealant

Safety while working

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

Fire prevention

Gasoline is highly flammable.
Keep gasoline and all flammable products away from heat, sparks, and open flames.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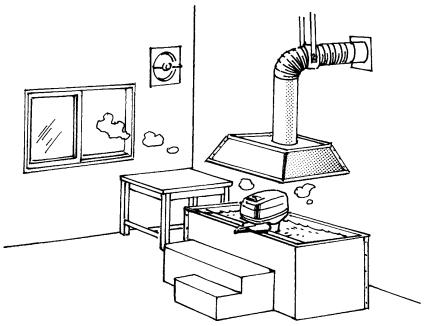
Ventilation

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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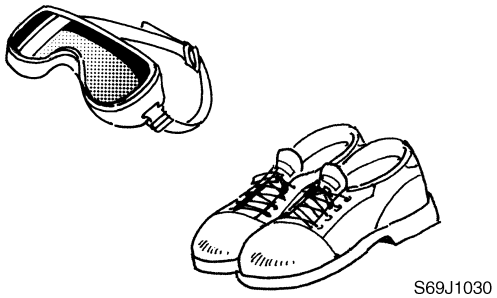
Self-protection

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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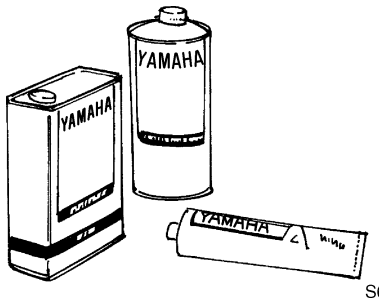
Parts, lubricants, and sealants

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



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

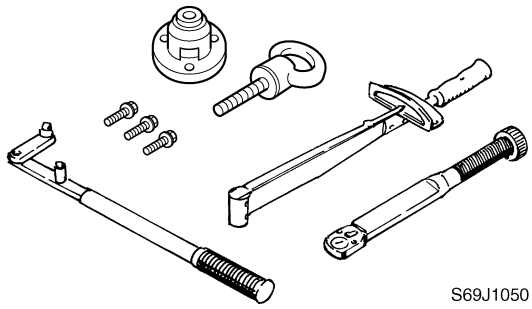
1. Maintain good standards of personal and industrial hygiene.
2. Change and wash clothing as soon as possible if soiled with lubricants.
3. Avoid contact with skin. Do not, for example, place a soiled rag in your pocket.
4. Wash hands and any other part of the body thoroughly with soap and hot water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

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

Good working practices

Special service tools

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



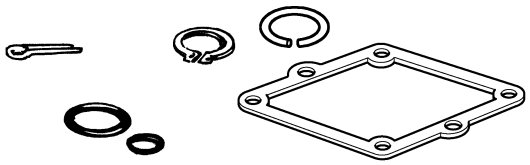
S69J1050

Tightening torques

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

Non-reusable parts

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



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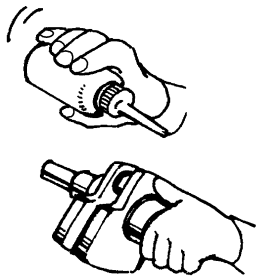
Disassembly and assembly

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

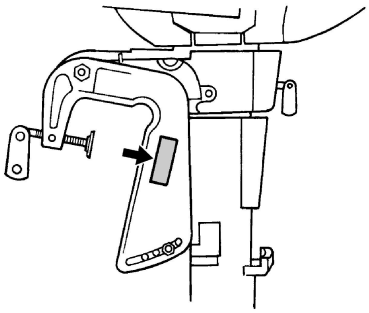
Applicable model

This manual covers the following model.

Applicable model
F2.5AMH

Serial number

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



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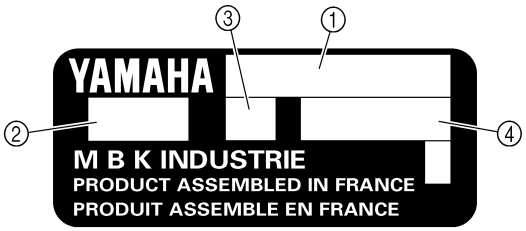


S69M1020

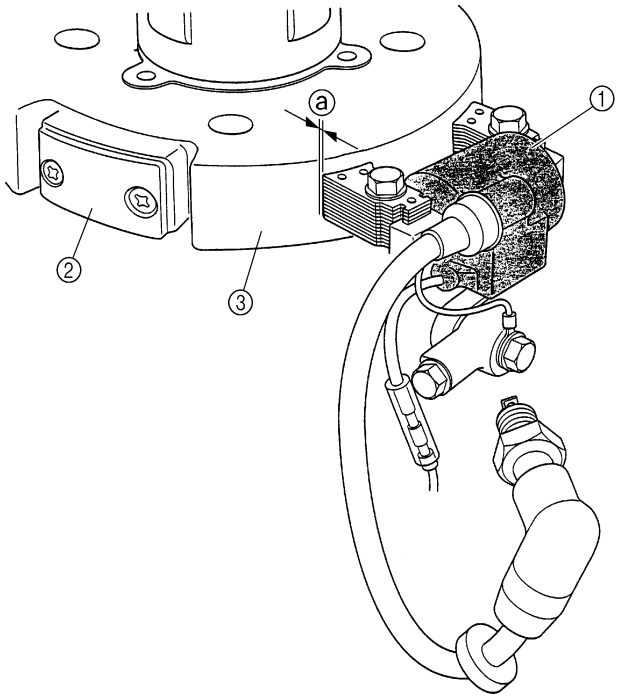
① Model name
② Approved model code
③ Transom height
④ Serial number

Model name	Approved model code	Starting serial No.
F2.5AMH	69M	S: 1000101–
		L: 1000101–

Features and benefits

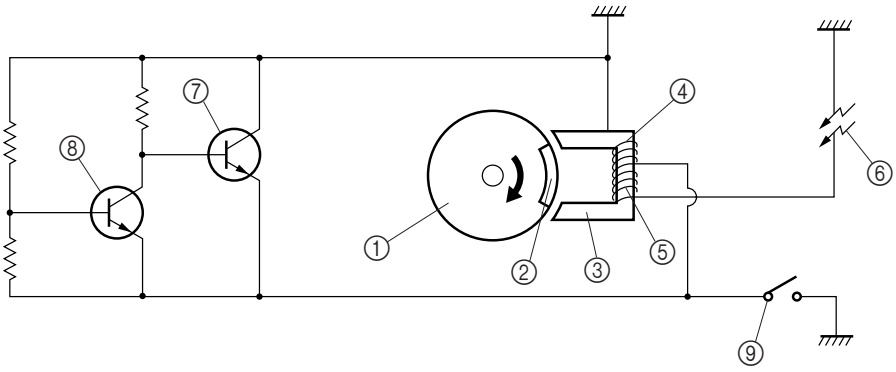
Ignition system

A simple and compact ignition system is adopted. In this ignition system, high voltage is induced in the secondary coil when the electric current produced by the primary coil and the permanent magnet on the rotating flywheel is cut off.
This TCI (Transistor Controlled Ignition) system greatly contributes to a compact and lightweight engine.



S69M1120

① TCI unit
② Permanent magnet
③ Flywheel
ⓐ Air gap: 0.4–0.6 mm (0.016–0.024 in)



S69M1130

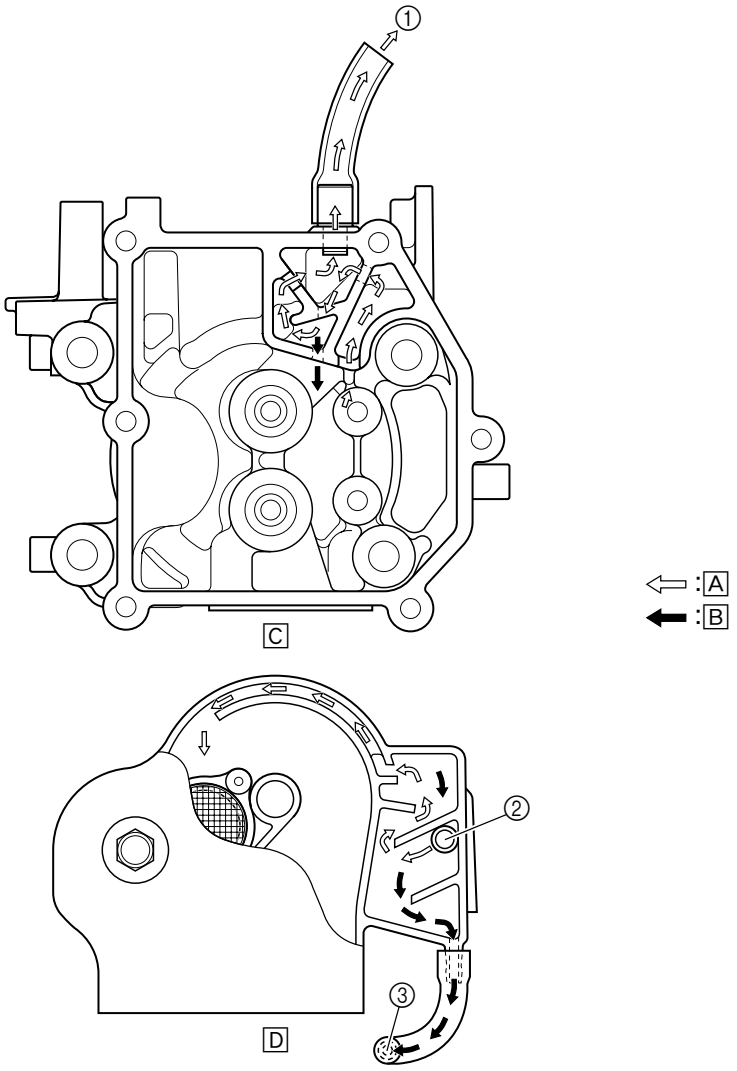
① Flywheel
② Permanent magnet
③ Core
④ Primary coil
⑤ Secondary coil
⑥ Spark plug
⑦ Transistor 1
⑧ Transistor 2
⑨ Engine shut-off switch

Blowby gas reburning system

The splash lubrication system splashes a large quantity of oil into the blowby gases. Therefore, a reburning system is incorporated to separate the oil from the blowby gases in two stages: first in the cylinder head and second in the intake silencer.

Oil is first separated from the blowby gases in the cylinder head labyrinth. The oil flows into the cylinder head and the gases are discharged into the intake silencer.

Blowby gases from the cylinder head flow into the intake silencer and oil is then separated from the gases in the intake silencer labyrinth. The oil flows from the bottom of the intake silencer into the oil pan through the blowby hose and the gases are drawn into the carburetor and reburned in the engine.



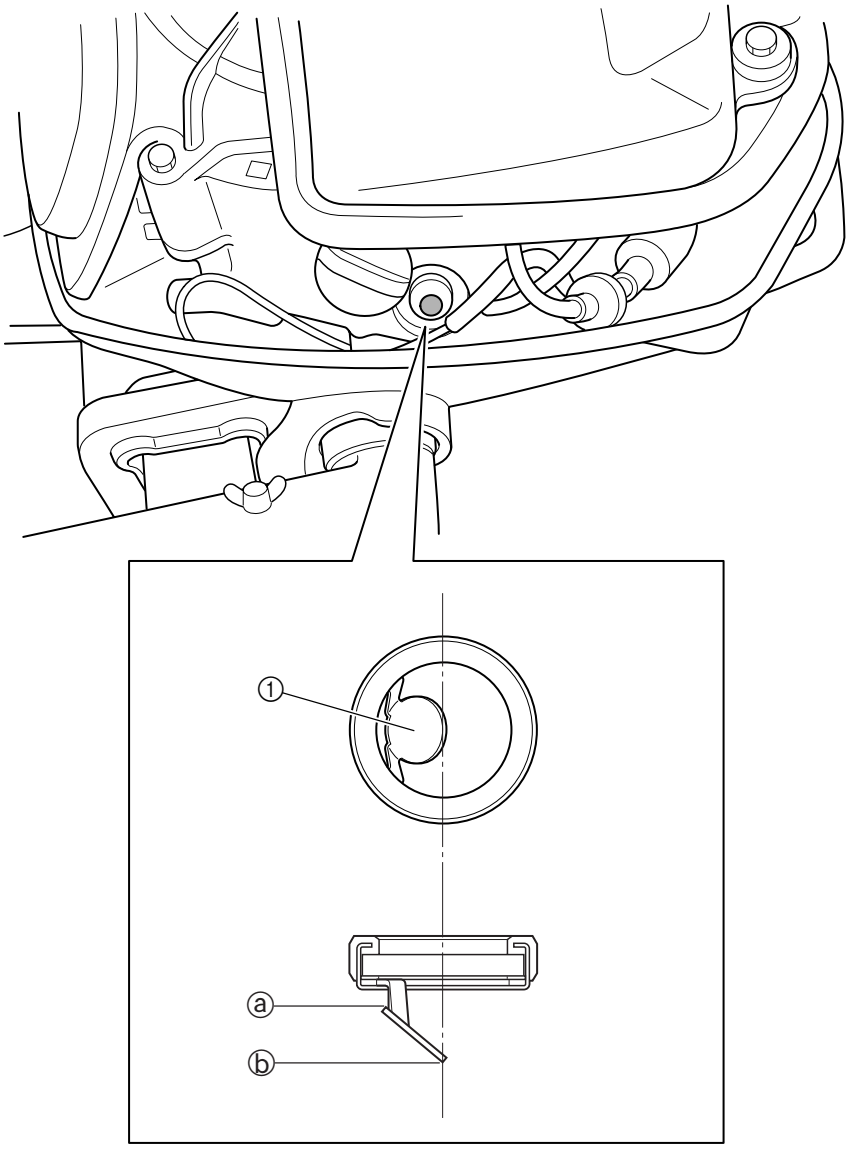
S69M1140

① To intake silencer
② From cylinder head
③ To oil pan

A Blowby gas
B Engine oil
C Cylinder head
D Intake silencer

Oil check window

The F2.5 is equipped with an oil check window to make engine oil level checks easier.
The oil checking plate in the oil check window indicates the proper oil level when the outboard motor is in an upright position.
The end of the oil checking plate indicates the minimum level. The oil level should be between the maximum and minimum levels.

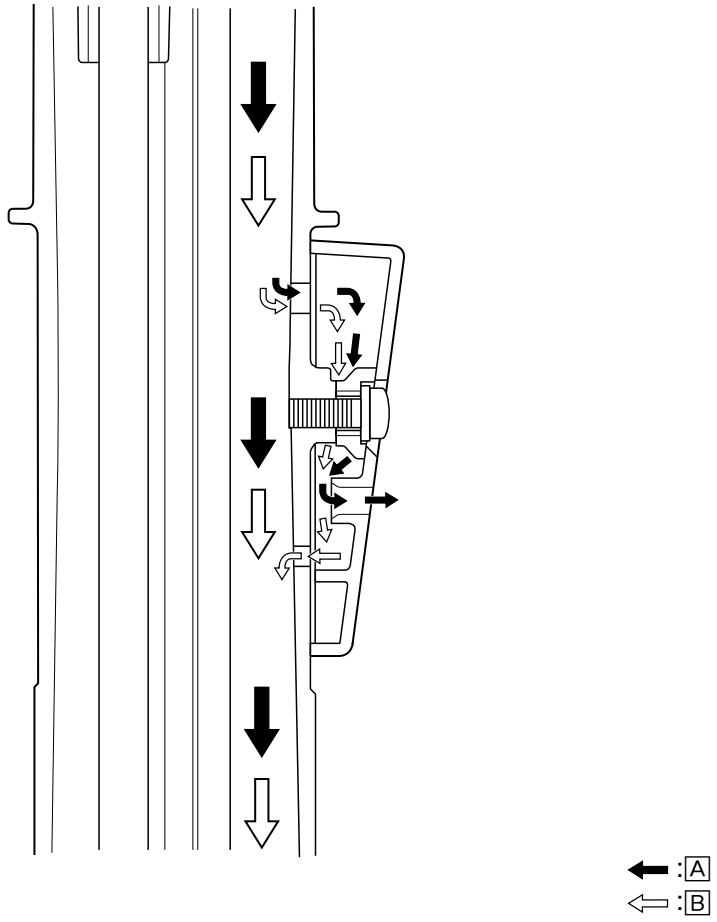


S69M1150

① Oil checking plate
ⓐ Maximum level
ⓑ Minimum level

Idle silencer

The idle silencer is installed to the upper case to reduce exhaust noise and carbon deposits around the exhaust idle port.
Exhaust gases are discharged into the idle silencer from the two upper holes in the upper case. The gases flow and eddy (swirl) inside the silencer and then are discharged from the exhaust idle port of the silencer into the atmosphere.
The cooling water in the silencer flows into lower hole in the upper case.

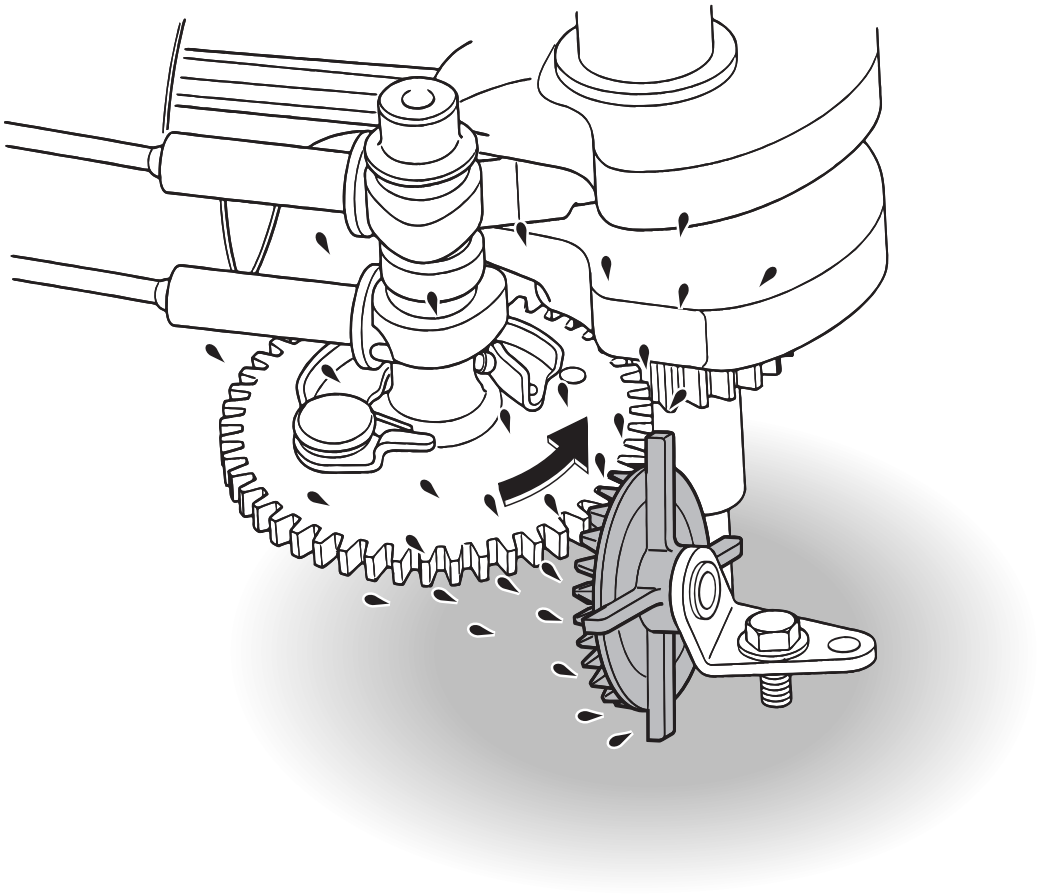


S69M1160

A Exhaust gas
B Cooling water

Splash lubrication system

A simple splash lubrication system design is adopted.
The splasher is driven by the oil splasher gear installed on the camshaft and splashes oil in the oil pan onto the internal parts of the crankcase.



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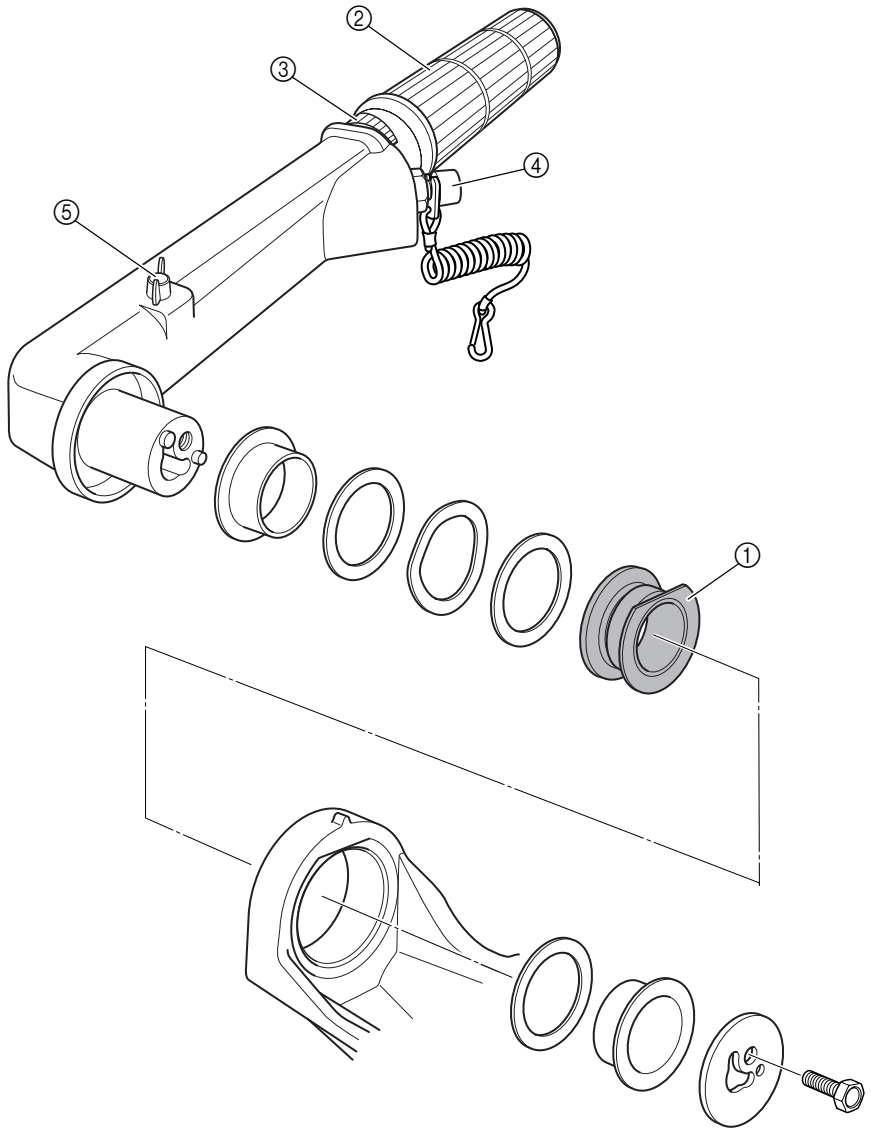
Low vibration tiller handle

The tiller handle is installed near the center of the outboard motor for low vibration.
To help reduce vibration transferring to the tiller handle, a rubber damper is used at the installation point of the handle.
The tiller handle is equipped with a throttle indicator to indicate the throttle angle, an engine shut-off switch to turn the engine off in an emergency, and a throttle friction adjuster to adjust the friction of the throttle lever.



S69M1190

① Rubber damper
② Throttle grip
③ Throttle indicator
④ Engine shut-off switch
⑤ Throttle friction adjuster

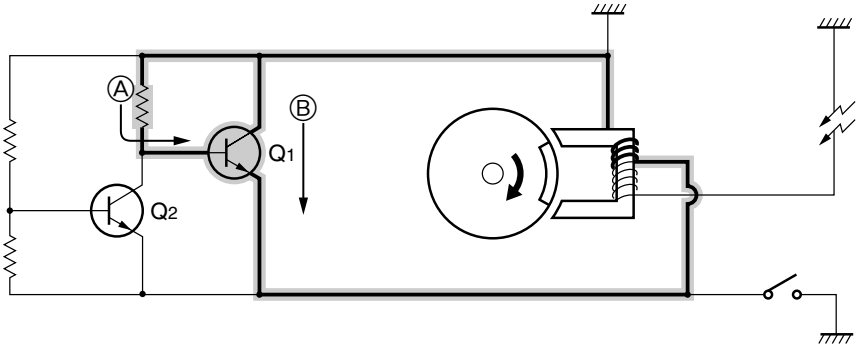
Technical tips

TCI system

The TCI system operates as follows.

Before ignition

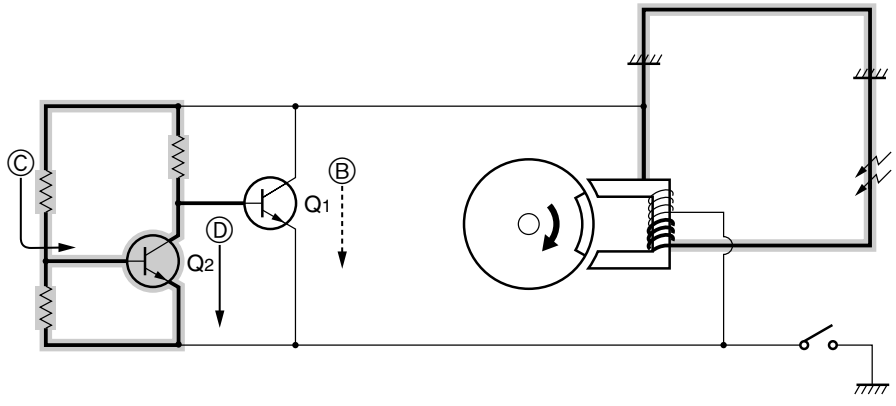
As the flywheel rotates, the primary coil generates a voltage and an electric current Ⓐ. This electric current opens transistor Q1 and, as a result, an electric current Ⓑ flows to the primary coil.



S69M1200

Ignition

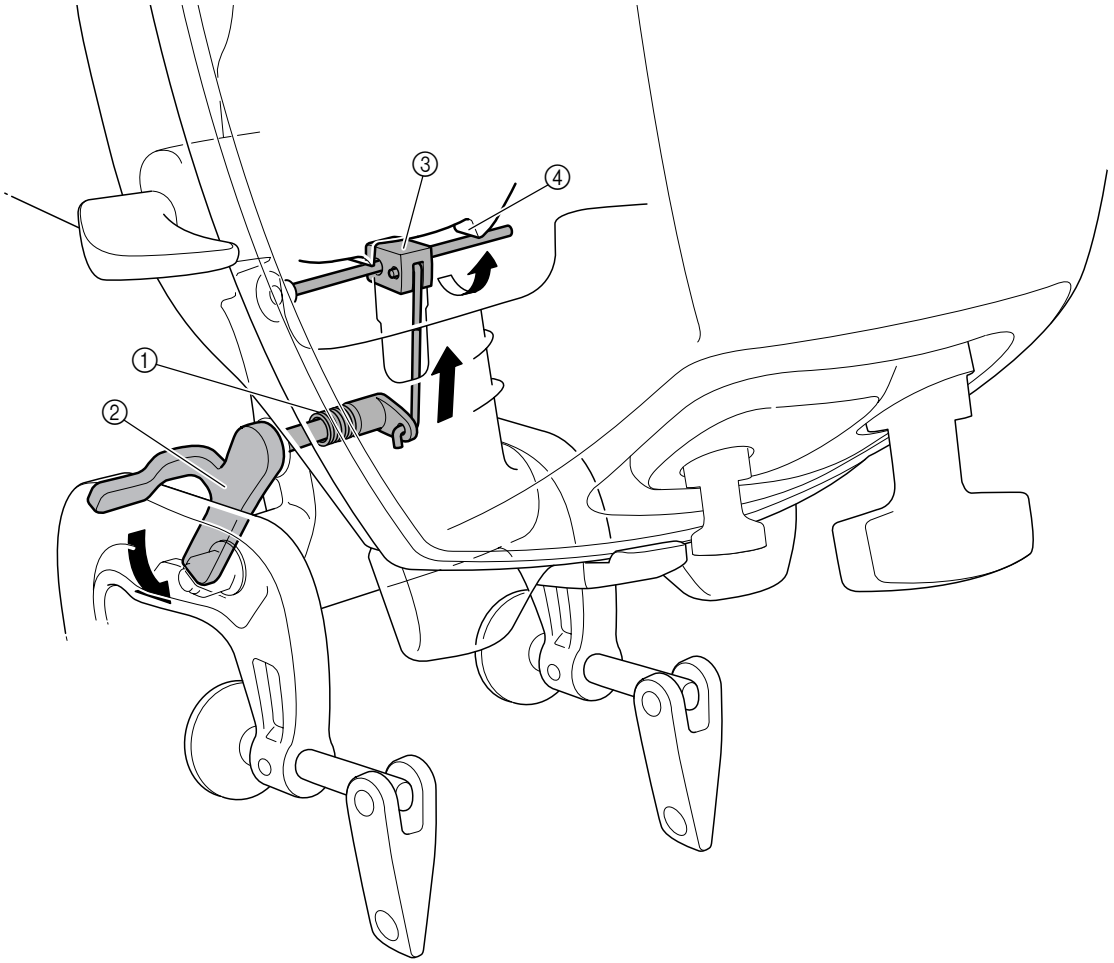
As the flywheel continues to rotate, the voltage generated by the primary coil increases.
When the voltage reaches the operation voltage of transistor Q2, an electric current Ⓒ flows to transistor Q2 and opens it. As a result, electric current Ⓓ flows.
Ignition timing occurs in this instant.
At ignition timing, the electric current Ⓑ flowing to the primary coil through transistor Q1 is cut off, the secondary coil generates a high voltage by electric induction and an ignition spark is fired by the spark plug.



S69M1210

Automatic tilt support and steering pivot immobilization system

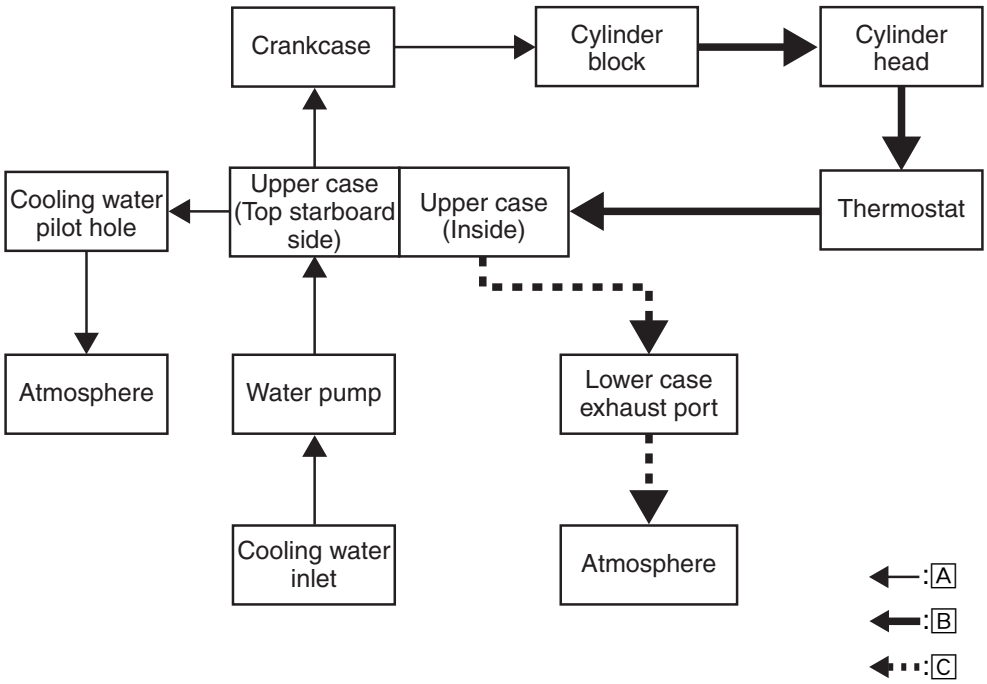
The tilt support lever is constantly pushed against the clamp bracket by the force of a spring.
When the outboard motor is fully tilted up in the forward steering position, the stopper linked to the tilt support lever is inserted into the swivel cutout. At the same time, the tilt support lever automatically supports the outboard motor on the clamp bracket.
If the outboard motor is tilted up with the steering in either direction, the stopper is not inserted into the swivel cutout and the tilt support lever linked to the stopper does not support the outboard motor.
The stopper, which is fitted on the swivel, prevents the outboard motor from swiveling when fully tilted up in the forward steering position.



S69M1220

① Spring
② Tilt support lever
③ Stopper
④ Swivel recess

Cooling water flow chart



S69M1230

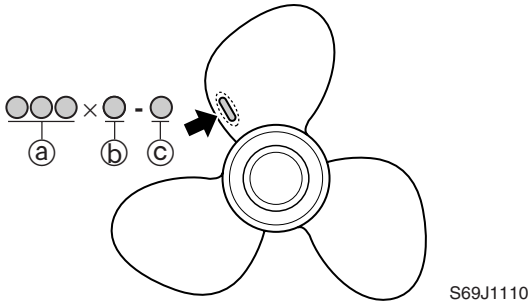
A Cold water
B Hot water
C Exhaust gas and water

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 on the propeller blade.



S69J1110

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

Selection

When the engine speed is at the full throttle operating range (5,250–5,750 r/min), the ideal propeller for the boat is one that provides maximum performance in relation to boat speed and fuel consumption.

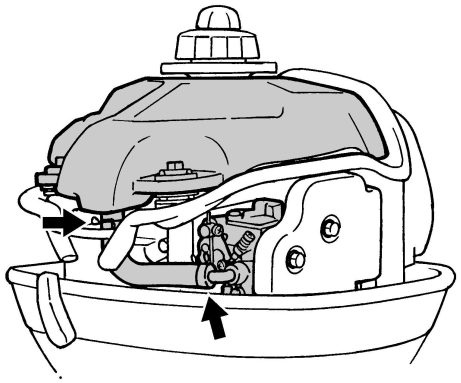
Propeller size (in)	Material
7 1/4 × 6 - BS	Aluminum
7 1/4 × 5 1/2 - BS	
7 1/4 × 7 1/4 - BS	
7 1/4 × 8 1/4 - BS	
7 1/2 × 5 1/2 - BS	

Predelivery checks

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

Checking the fuel system

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



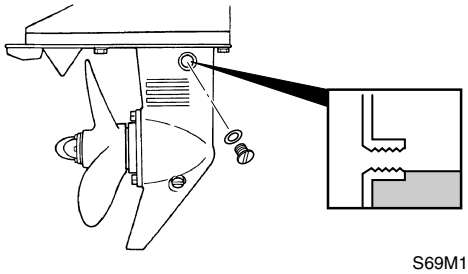
S69M1030

CAUTION:

This is a 4-stroke engine. Never use premixed fuel.

Checking the gear oil

1. Check the gear oil level.



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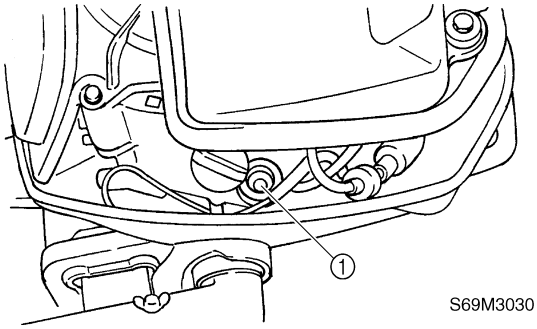
Checking the engine oil

1. Check the oil level through the oil level window ①.



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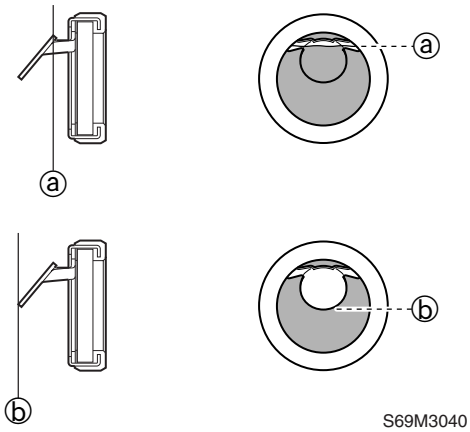


S69M3040

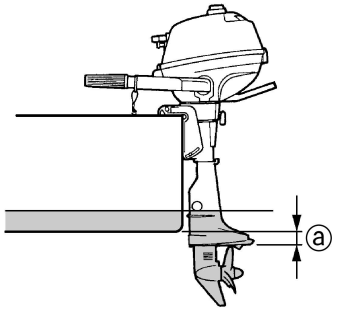
NOTE:

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

Recommended engine oil:
4-stroke motor oil
API: SE, SF, SG, SH, or SJ
SAE: 10W-30 or 10W-40
Oil quantity:
0.35 L (0.09 US gal, 0.08 Imp gal)

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.



S69M1050

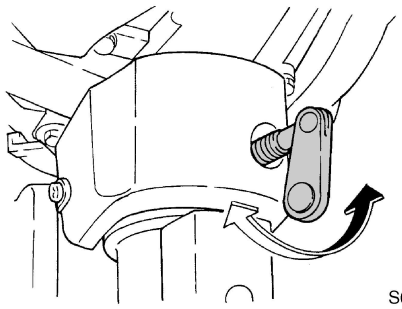
NOTE:

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.

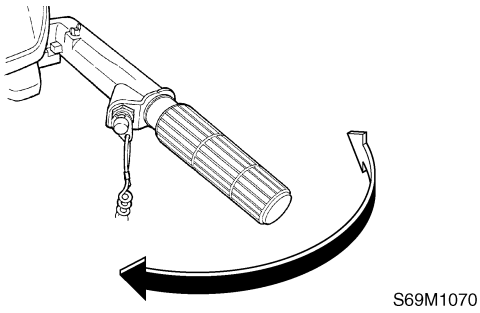
Checking the steering system

1. Check the steering friction for proper adjustment.



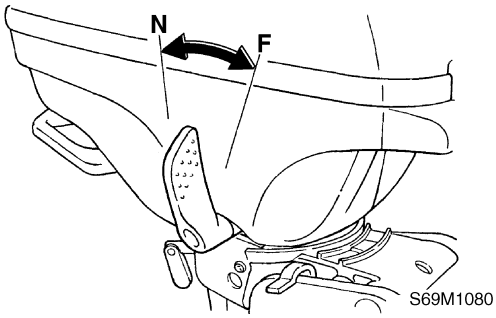
S69M1060

2. Check that the steering operates smoothly.


S69M1070

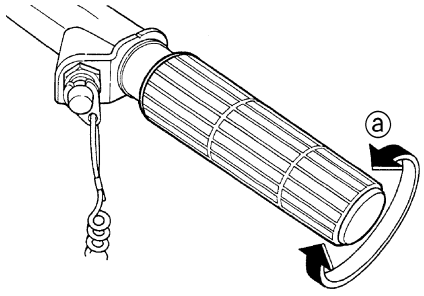
Checking the gear shift and throttle operation

1. Check that the gear shift operates smoothly when the shift lever is shifted from neutral into forward.



S69M1080

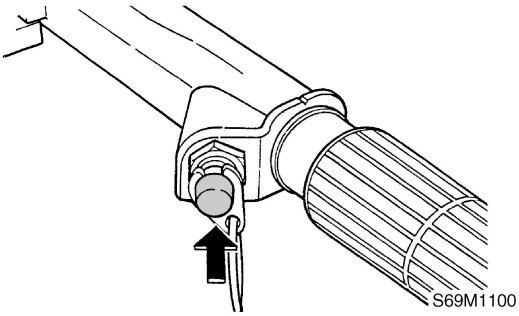
2. Check that the throttle operates smoothly when the throttle grip is turned from the fully closed position to the fully open position ⓐ.

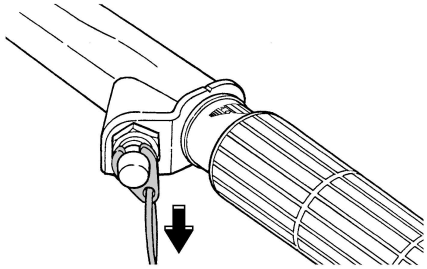


S69M1090

Checking the engine shut-off switch

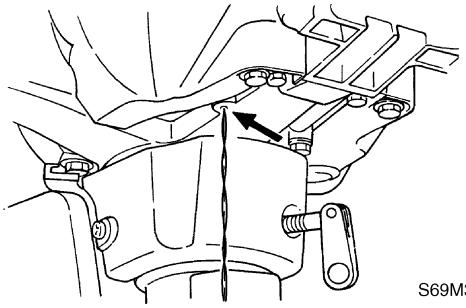
1. Check that the engine turns off when the engine stop switch is pushed or the engine shut-off cord is pulled from the engine shut-off switch.


S69M1100


S69M1110

Checking the cooling water pilot hole

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


S69M3150

Test run

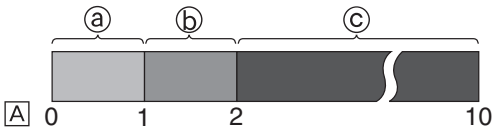
1. Start the engine, and then check that the gear shift operates smoothly.
2. Check the engine idle speed after the engine has been warmed up.
3. Operate at trolling speed.
4. Run the outboard motor for one hour at 2,000 r/min or at half throttle, then for another hour at 3,000 r/min or at 3/4 throttle.

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 three stages.

1. One hour ⓐ at 2,000 r/min or at approximately half throttle
2. One hour ⓑ at 3,000 r/min or 3/4 throttle and one minute out of every ten at full throttle
3. Eight hours ⓒ at any speed, however, avoid running at full speed for more than five minutes



S69J1240

A Hour

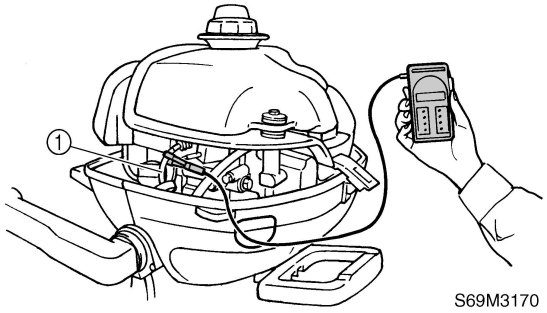
After test run

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

Adjusting the engine idle speed

Adjust the idle speed after completing the break-in period.
With the smallest engine and lowest output, the idle speed tends to rise by the reduction of the engine internal friction due to the break-in.

1. Warm the engine up for 5 minutes, and then turn it off.
2. Attach the special service tool to the spark plug wire ①.



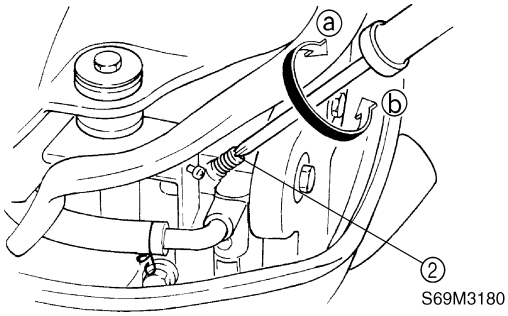
S69M3170

Digital tachometer: 90890-06760

3. Start the engine, and then check the engine idle speed. Adjust if out of specification.

Engine idle speed:
1,800–2,000 r/min

4. Turn the throttle stop screw ② in direction ⓐ or ⓑ until the specified 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. After adjusting the idle speed, rev the engine a few times and let it idle for at least 15 seconds to check the stability of the engine. If necessary, repeat steps 3–5.

Specifications

General specifications

Item	Unit	Model
		F2.5AMH
Dimension		
Overall length	mm (in)	623 (24.5)
Overall width	mm (in)	345 (13.6)
Overall height		
(S)	mm (in)	1,021 (40.2)
(L)	mm (in)	1,148 (45.2)
Boat transom height		
(S)	mm (in)	381 (15.0)
(L)	mm (in)	508 (20.0)
Weight*		
(S)	kg (lb)	17.0 (37.5)
(L)	kg (lb)	17.5 (38.6)
Performance		
Maximum output	kW (hp) at 5,500 r/min	1.8 (2.5)
Full throttle operating range	r/min	5,250–5,750
Maximum fuel consumption	L (US gal, lmp gal)/hr at 5,500 r/min	1.1 (0.29, 0.24)
Power unit		
Type		4-stroke, single cylinder, OHV
Cylinder quantity		1
Displacement	cm^3 (cu. in)	72 (4.4)
Bore × stroke	mm (in)	54.0 × 31.5 (2.13 × 1.24)
Compression ratio		9.0
Control system		Tiller control
Starting system		Manual starter
Enrichment system		Choke valve
Ignition control system		TCI
Ignition timing	Degree	BTDC 30
Spark plug		BR6HS (NGK)
Cooling system		Water
Exhaust system		Under water
Lubrication system		Splash

* Includes an aluminum propeller and excludes oil and fuel.

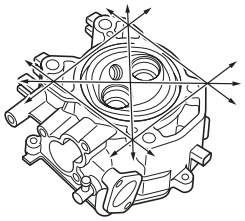
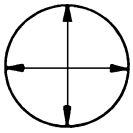
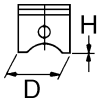
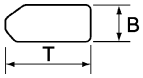
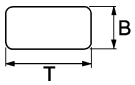
Item	Unit	Model
		F2.5AMH
Fuel and oil		
Fuel type		Regular unleaded gasoline
Fuel rating	PON*	86
	RON	91
Fuel tank capacity	L (US gal, Imp gal)	0.9 (0.24, 0.20)
Engine oil type		4-stroke motor oil
Engine oil grade	API	SE, SF, SG, SH, or SJ
	SAE	10W-30 or 10W-40
Engine oil quantity	L (US gal, Imp gal)	0.35 (0.09, 0.08)
Gear oil type		Hypoid gear oil
Gear oil grade	SAE	90
Gear oil quantity	cm^3 (US oz, Imp oz)	75 (2.5, 2.6)
Bracket		
Trim angle (at 12 degree boat transom)	Degree	0, 4, 8, 12
Tilt-up angle	Degree	80
Steering angle	Degree	360
Drive unit		
Gear shift positions		F-N
Gear ratio		2.08 (27/13)
Reduction gear type		Straight bevel gear
Clutch type		Dog clutch
Propeller shaft type		Spline
Propeller direction (rear view)		Clockwise
Propeller identification mark		BS

* PON: Pump Octane Number (Research Octane Number + Motor Octane Number)/2
RON: Research Octane Number

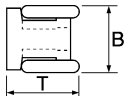
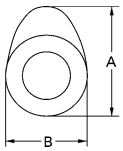
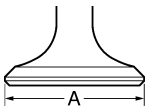
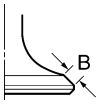
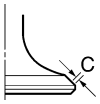
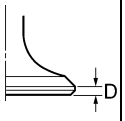
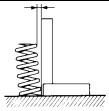
2

Maintenance specifications

Power unit

Item	Unit	Model
		F2.5AMH
Power unit		
Minimum compression pressure*	kPa (kgf/cm^2, psi)	700 (7.0, 102)
Cylinder head		
Warpage limit  (lines indicate straightedge position)	mm (in)	0.1 (0.004)
Cylinder 		
Bore size	mm (in)	54.000–54.015 (2.1260–2.1266)
Taper limit	mm (in)	0.08 (0.0031)
Out-of-round limit	mm (in)	0.05 (0.0020)
Piston 		
Piston diameter (D)	mm (in)	53.950–53.965 (2.1240–2.1246)
Measuring point (H)	mm (in)	0 (0)
Piston-to-cylinder clearance	mm (in)	0.035–0.065 (0.0014–0.0026)
Piston pin boss bore	mm (in)	12.009–12.017 (0.4728–0.4731)
Piston pin		
Outside diameter	mm (in)	11.996–12.000 (0.4723–0.4724)
Piston rings		
Top ring		
Dimension B 	mm (in)	0.97–0.99 (0.0382–0.0390)
Dimension T	mm (in)	1.95–2.15 (0.0768–0.0846)
End gap	mm (in)	0.15–0.30 (0.0059–0.0118)
Side clearance	mm (in)	0.04–0.08 (0.0016–0.0031)
2nd ring		
Dimension B 	mm (in)	1.17–1.19 (0.0461–0.0468)
Dimension T	mm (in)	2.30–2.50 (0.0906–0.0984)
End gap	mm (in)	0.30–0.45 (0.0118–0.0177)
Side clearance	mm (in)	0.02–0.06 (0.0008–0.0024)

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

Item	Unit	Model F2.5AMH
Oil ring		
		
Dimension B	mm (in)	1.87–1.95 (0.0736–0.0768)
Dimension T	mm (in)	2.10–2.40 (0.0827–0.0945)
End gap	mm (in)	0.20–0.70 (0.0079–0.0276)
Side clearance	mm (in)	0.06–0.16 (0.0024–0.0063)
Camshaft		
		
Intake and exhaust (A)	mm (in)	26.139–26.239 (1.0290–1.0330)
Intake and exhaust (B)	mm (in)	21.950–22.050 (0.8642–0.8681)
Camshaft journal diameter	mm (in)	14.965–14.990 (0.5892–0.5902)
Camshaft journal oil clearance	mm (in)	0.010–0.053 (0.0004–0.0021)
Camshaft runout limit	mm (in)	0.03 (0.0012)
Valves		
Valve clearance (cold)		
Intake and exhaust	mm (in)	0.08–0.12 (0.0031–0.0047)
Head diameter (A)		
		
Intake	mm (in)	23.9–24.1 (0.941–0.949)
Exhaust	mm (in)	21.9–22.1 (0.862–0.870)
Face width (B)		
		
Intake and exhaust	mm (in)	1.84–2.26 (0.0724–0.0890)
Seat contact width (C)		
		
Intake and exhaust	mm (in)	0.6–0.8 (0.024–0.031)
Margin thickness (D)		
		
Intake	mm (in)	0.7 (0.028)
Exhaust	mm (in)	1.0 (0.040)
Stem diameter		
Intake	mm (in)	5.475–5.490 (0.2156–0.2161)
Exhaust	mm (in)	5.460–5.475 (0.2150–0.2156)
Guide inside diameter		
Intake and exhaust	mm (in)	5.500–5.512 (0.2165–0.2170)
Stem-to-guide clearance		
Intake	mm (in)	0.010–0.037 (0.0004–0.0015)
Exhaust	mm (in)	0.025–0.052 (0.0010–0.0020)
Stem runout limit	mm (in)	0.03 (0.0012)
Valve springs		
		
Free length	mm (in)	35.0 (1.378)
Tilt limit	mm (in)	1.2 (0.05)

Item	Unit	Model
		F2.5AMH
Connecting rod		
Small end inside diameter	mm (in)	12.006–12.020 (0.4727–0.4732)
Big end inside diameter	mm (in)	24.000–24.015 (0.9449–0.9455)
Big end side clearance	mm (in)	0.2–0.6 (0.008–0.024)
Crankpin oil clearance	mm (in)	0.016–0.046 (0.0006–0.0018)
Crankshaft		
Crankshaft journal diameter	mm (in)	21.980–21.993 (0.8654–0.8659)
Crankpin diameter	mm (in)	23.969–23.984 (0.9437–0.9443)
Crankpin width	mm (in)	21.0–21.1 (0.827–0.831)
Runout limit	mm (in)	0.01 (0.0004)
Thermostat		
Opening temperature	°C (°F)	48–52 (118–126)
Fully open temperature	°C (°F)	60 (140)
Valve open lower limit	mm (in)	3 (0.12)
Carburetor		
ID mark		69M00 69M20
Main jet	#	62
Pilot jet	#	37
Pilot screw	Turns out	2–3
Float height	mm (in)	10.5–11.5 (0.413–0.453)
Engine speed		
Engine idle speed	r/min	1,800–2,000

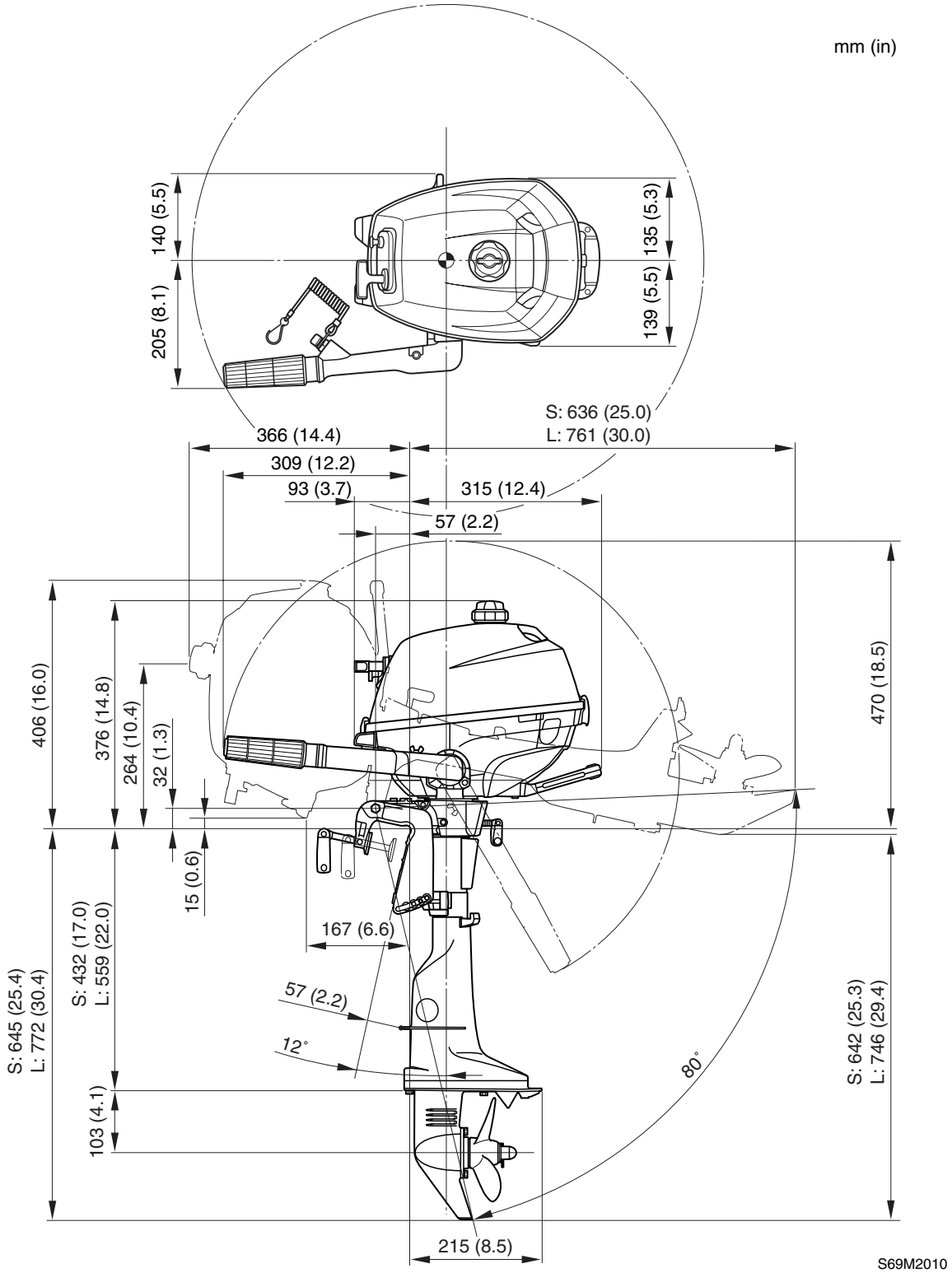
Electrical

Item	Unit	Model
		F2.5AMH
Ignition system		
Ignition timing	Degree	BTDC 30
Ignition spark gap	mm (in)	7 (0.28)
Spark plug cap resistance	kΩ	4.0–6.0
TCI unit air gap	mm (in)	0.4–0.6 (0.016–0.024)
TCI unit resistance		
Primary coil (W – B)	Ω	0.56–0.84
Secondary coil (W – spark plug wire)	kΩ	11.6–17.4

Dimensions

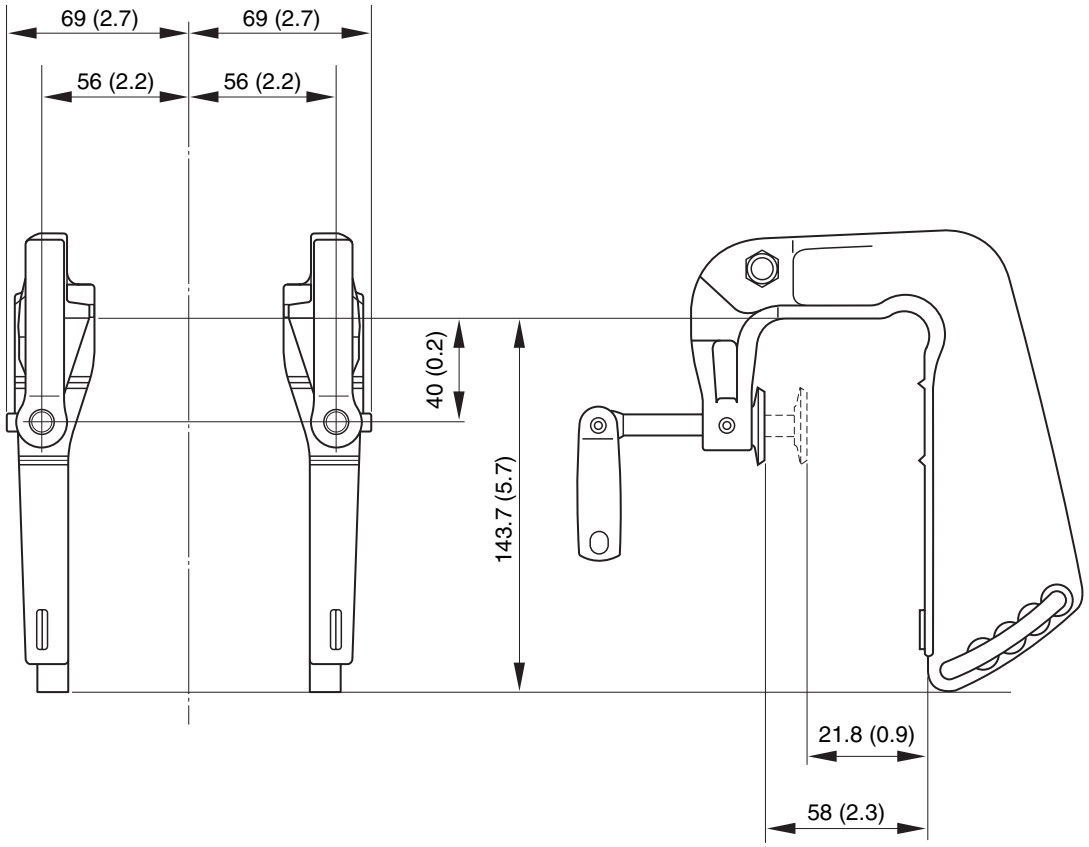
Exterior

mm (in)



Clamp bracket

mm (in)



S69M2020

Tightening torques

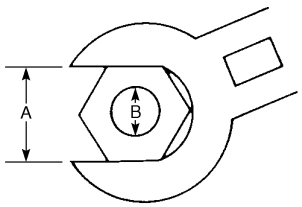
Specified torques

Part to be tightened		Thread size	Tightening torques		
			N·m	kgf·m	ft·lb
Power unit					
Anode screw		M5	2.0	0.2	1.5
Choke knob nut		—	3.5	0.4	2.6
Connecting rod cap	1st	M6	5.0	0.5	3.7
	2nd		9.0	0.9	6.6
Crankcase bolt	1st	M6	5.0	0.5	3.7
	2nd		11	1.1	8.1
Cylinder head bolt	1st	M8	14	1.4	10.3
	2nd		30	3.0	22.1
Cylinder head cover bolt	1st	M6	5.0	0.5	3.7
	2nd		12	1.2	8.9
Drive shaft oil seal housing bolt		M8	18	1.8	13
Exhaust probe bolt		M8	20	2.0	14.8
Flywheel magnet nut		—	44	4.4	32.4
Fuel cock lever screw		M5	0.7	0.1	0.5
Rocker arm locknut		M6	10	1.0	7.4
Rocker arm stud bolt		M6	10	1.0	7.4
Engine oil drain bolt		M8	18	1.8	13.3
Power unit bolt		M6	11	1.1	8.1
Spark plug		—	25	2.5	18.4
Oil splasher gear bolt		M6	13	1.3	9.6
Thermostat cover bolt		M6	8.0	0.8	5.9
Throttle cable lock screw		—	0.4	0.04	0.3
Top cowling lock lever screw		M3	0.4	0.04	0.3
Drive unit					
Gear oil screw		—	8.5	0.9	6.3
Idle silencer screw		M6	2.5	0.3	1.8
Shift rod arm bolt		M5	5.0	0.5	3.7
Shift rod connecting bolt		M6	10	1.0	7.4
Bracket unit					
Apron screw		M6	2.5	0.3	1.8
Bottom cowling screw		M5	2.0	0.2	1.5
Tiller handle bolt		M8	26	2.6	19.2
Carrying handle screw		M4	1.0	0.1	0.7
Engine shut-off switch nut		—	1.8	0.2	1.3
Grease nipple		—	3.0	0.3	2.2
Swivel bracket bolt		M6	12	1.2	8.9
Throttle grip screw		M5	3.5	0.4	2.6
Clamp bracket inner nut		—	5.0	0.5	3.7
Clamp bracket outer nut		—	16	1.6	11.8
Throttle grip shaft cap bolt		M5	3.0	0.3	2.2
Trim rod nut		—	5.0	0.5	3.7

General torques

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

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



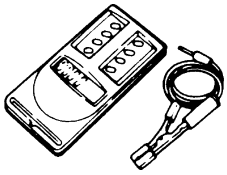
S69J2150

CHK ADJ

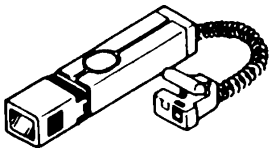
Periodic checks and adjustments

3

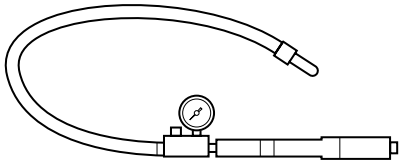
Special service tools



Digital tachometer
90890-06760



Timing light
90890-03141



Leakage tester
90890-06840

Maintenance interval chart

Use the following chart as a guideline for general maintenance.
Adjust the maintenance intervals according to the operating conditions of the outboard motor.

Item	Remarks	Initial		Every		Refer to page
		10 hours (Break-in)	50 hours (3 months)	100 hours (6 months)	200 hours (1 year)	
Fuel system						
Fuel line	Check			○		3-3
Fuel filter	Check/replace	○	○	○		3-3
Power unit						
Engine oil	Change	○		○		3-4
Valve clearance	Check/adjust	○		○		3-4
Spark plug	Clean/adjust/replace	○	○	○		3-5
Thermostat	Check				○	3-6
Outboard motor exterior	Check		○	○		—
Cooling water passage	Clean		○	○		3-7
Control system						
Carburetor	Check	○		○		4-7
Engine idle speed	Adjust	○		○		3-7
Ignition timing	Check	○			○	3-8
TCI unit air gap	Check/adjust	○		○		3-9
Lower unit						
Gear oil	Change	○		○		3-10
Propeller	Check		○	○		3-11
General						
Anodes	Check/replace		○	○		3-11
Bolts and nuts	Tighten	○		○		—
Lubrication points	Lubricate			○		3-12

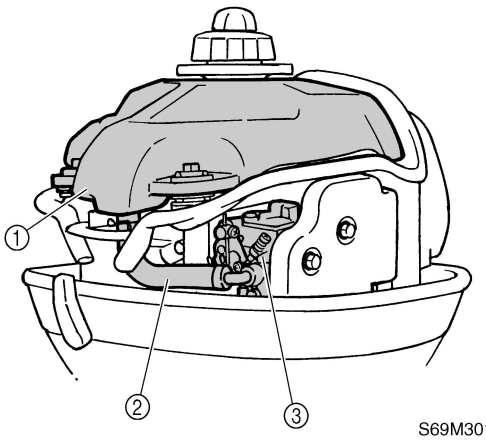
NOTE:

- The engine should be flushed with fresh water after operating in salt, turbid, or muddy water.
- If leaded gasoline is used regularly, check the engine valves and related parts every 100 hours of operation in addition to the items in the maintenance interval chart.

Fuel system

Checking the fuel line

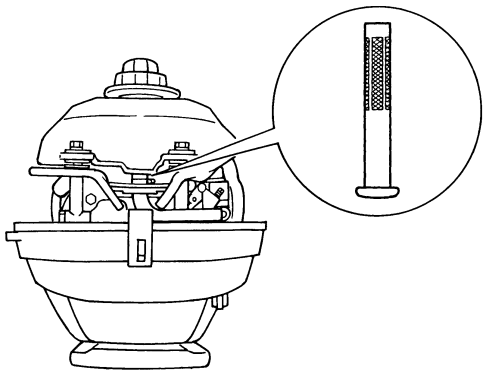
1. Check the fuel tank ① for leaks. Replace if necessary. Also, check the fuel hose ② for leaks and deterioration, and the carburetor ③ and fuel cock for leaks. Replace if necessary.



S69M3010

Checking the fuel filter

1. Check the fuel filter for dirt or residue. Clean with straight gasoline and replace the filter if necessary.

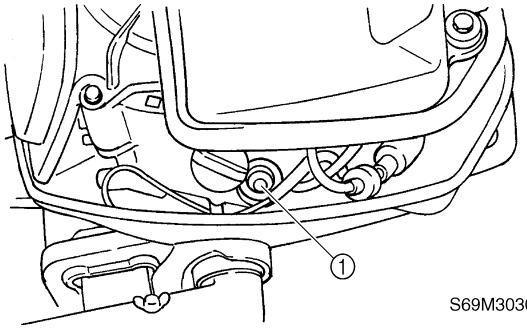

S69M3020

Power unit

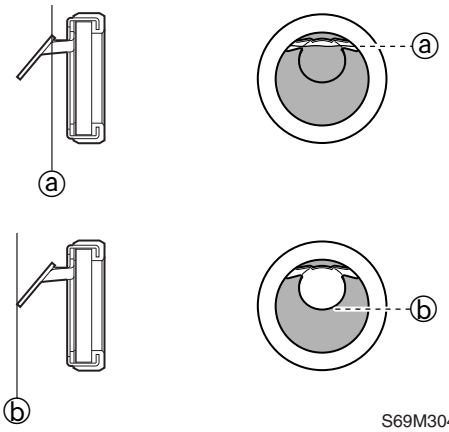
Checking the engine oil

1. Place the outboard motor in an upright position.

2. Check the oil level through the oil level window ①.



S69M3030



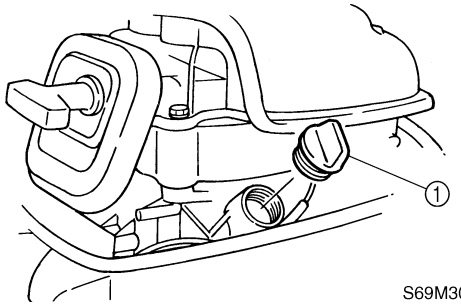
S69M3040

NOTE:

- Change the oil if it appears milky or dirty.
- If the engine oil is above the maximum level ⓐ, drain sufficient oil until the level is between ⓐ and ⓑ.
- If the engine oil is below the minimum level ⓑ, add sufficient oil until the level is between ⓐ and ⓑ.

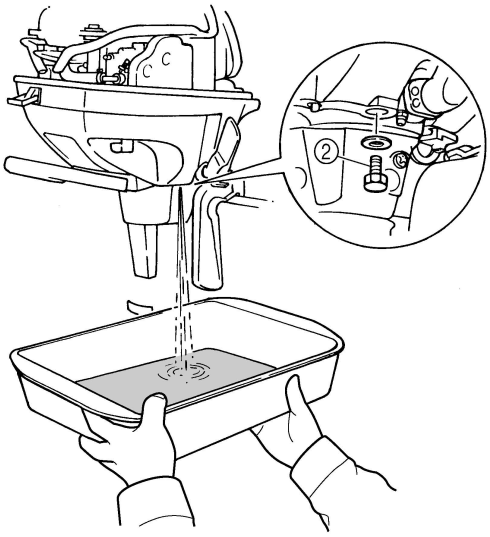
Changing the engine oil

1. Remove the oil filler cap ①.



S69M3050

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



S69M3060

NOTE:
Be sure to clean up any oil spills.

3. Install the drain bolt ②, and then tighten it to the specified torque.

Engine oil drain bolt ②:
18 N·m (1.8 kgf·m, 13.3 ft·lb)

4. Pour the specified amount of the recommended engine oil into the oil filler hole.

Recommended engine oil:
4-stroke motor oil
API: SE, SF, SG, SH, or SJ
SAE: 10W-30 or 10W-40
Oil quantity:
0.35 L (0.09 US gal, 0.08 Imp gal)

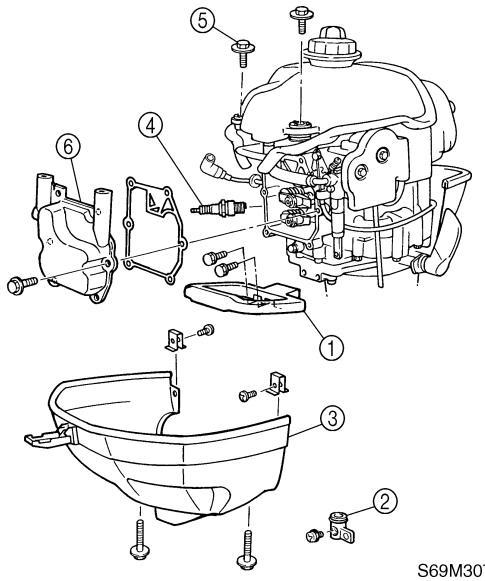
5. Install the oil filler cap, and then start the engine and warm it up for 5 minutes.

6. Turn the engine off, and then check the oil level and correct it if necessary.

Checking the valve clearance

1. Remove the engine shut-off cord from the engine shut-off switch on the tiller handle.

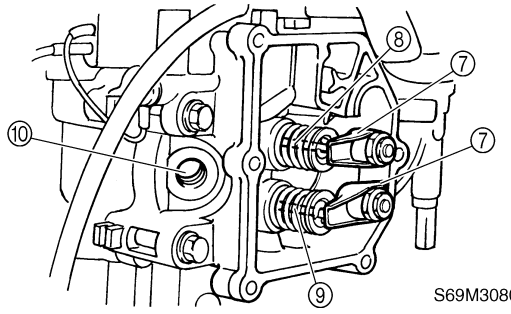
2. Remove the carrying handle ①, fuel cock lever ②, bottom cowling 2 ③, spark plug ④, fuel tank bolts ⑤, and cylinder head cover ⑥.



S69M3070

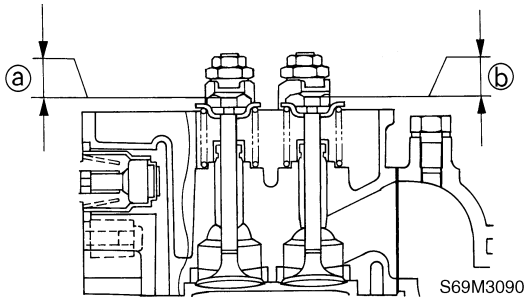
3

3. Slowly pull the starter rope to set the piston position to TDC of the compression stroke.



NOTE:
- Make sure that the rocker arms ⑦ are not pushing the intake valve ⑧ and exhaust valve ⑨.
- Check the position of the piston from the spark plug installation hole ⑩.
- Do not turn the flywheel magnet counterclockwise.

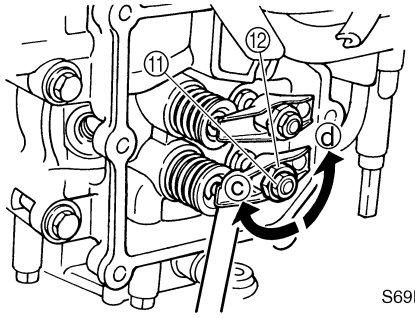
4. Check the valve clearance. Adjust if out of specification.



NOTE:
- Check the valve clearance when the engine is cold.
- Note the measurement.

Valve clearance:
Intake ⓐ:
0.08–0.12 mm
(0.0031–0.0047 in)
Exhaust ⓑ:
0.08–0.12 mm
(0.0031–0.0047 in)

5. Loosen the rocker arm locknuts ⑪, and then turn the rocker arm pivot ⑫ until the specified valve clearance is obtained.



NOTE:
- To decrease the valve clearance, turn the rocker arm pivot in direction ⓒ.
- To increase the valve clearance, turn the rocker arm pivot in direction ⓓ.

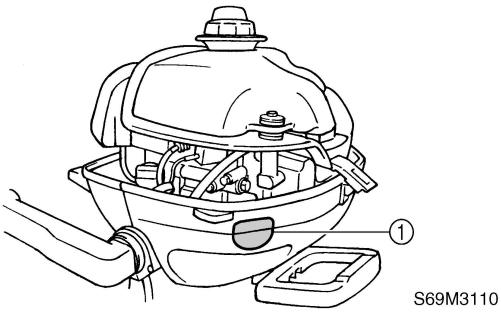
6. Tighten the rocker arm locknuts to the specified torque, and then check the valve clearances. Adjust if necessary.

Rocker arm locknut ⑪:
10 N·m (1.0 kgf·m, 7.4 ft·lb)

7. Install the cylinder head cover, fuel tank bolts, spark plug, bottom cowling 2, fuel cock lever, and carrying handle.

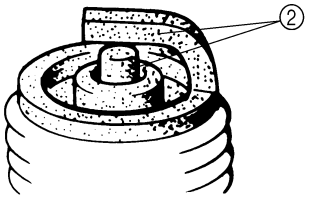
Checking the spark plug

1. Remove the grommet ①.



2. Disconnect the spark plug cap from the spark plug, and then remove the spark plug.

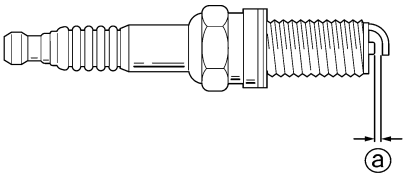
3. Clean the electrodes ② with a spark plug cleaner or wire brush. Replace the spark plug if necessary.



S69M3120

4. Check the electrodes for erosion and excessive carbon or other deposits, and the gasket for damage. Replace the spark plug if necessary.

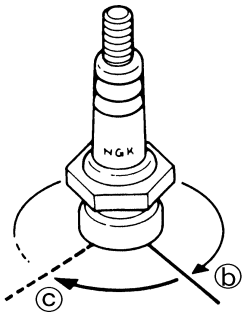
5. Check the spark plug gap ⓐ. Adjust if out of specification.



S69J3200

Specified spark plug: BR6HS (NGK)
Spark plug gap ⓐ:
0.6–0.7 mm (0.024–0.028 in)

6. Install the spark plug, tighten it finger tight ⓑ, then to the specified torque with a spark plug wrench ⓒ.

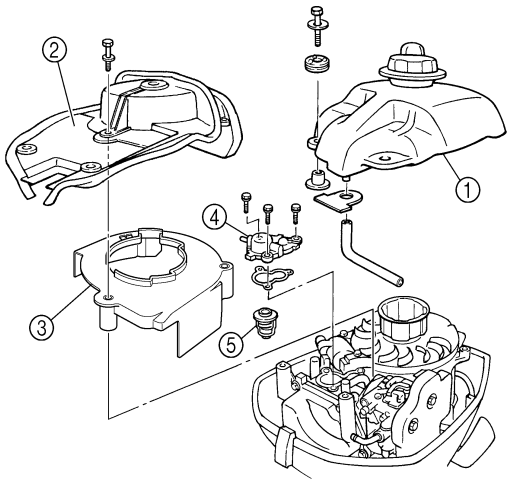


S69J3210

Spark plug:
25 N·m (2.5 kgf·m, 18.4 ft·lb)

Checking the thermostat

1. Remove the fuel tank ①, manual starter ②, flywheel magnet cover ③, thermostat cover ④, and thermostat ⑤.



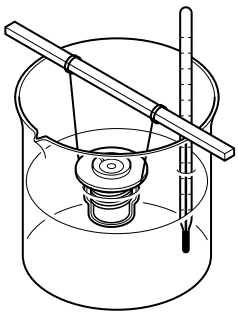
S69M3130

⚠ WARNING

Before removing the fuel tank, fuel hose, and carburetor, let the fuel drain completely.

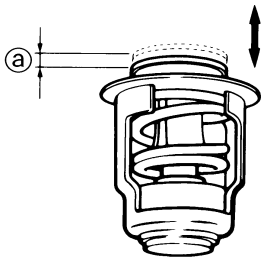
2. Suspend the thermostat in a container of water.

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



S69J5E40

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



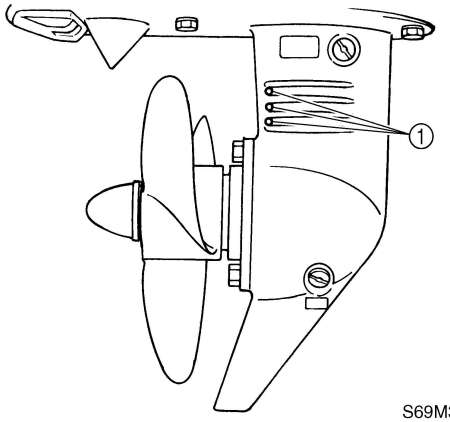
S69J5E50

Water temperature	Valve lift ⓐ
48–52 °C (118–126 °F)	0 mm (0 in) (valve begins to lift)
above 60 °C (140 °F)	more than 3 mm (0.12 in)

5. Install the thermostat, new gasket, thermostat cover, flywheel magnet cover, manual starter, and fuel tank.

Checking the cooling water passage

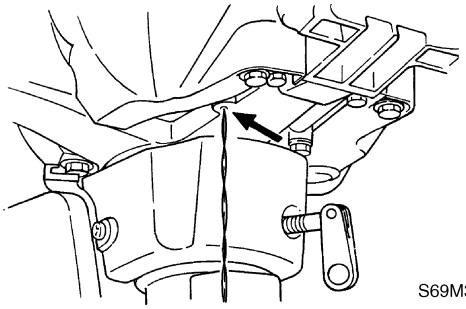
1. Check the cooling water inlet ① for clogs. Clean if necessary.



S69M3140

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

3. Check for water flow at the cooling water pilot hole. If there is no water flow, check the cooling water passage inside the outboard motor.



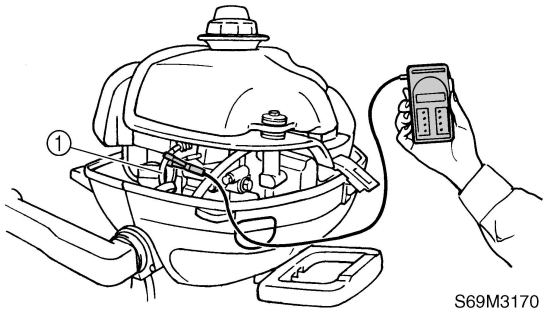
S69M3150

Control system

Checking the engine idle speed

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

2. Attach the special service tool to the spark plug wire ①, and then check the engine idle speed. Adjust if out of specification.

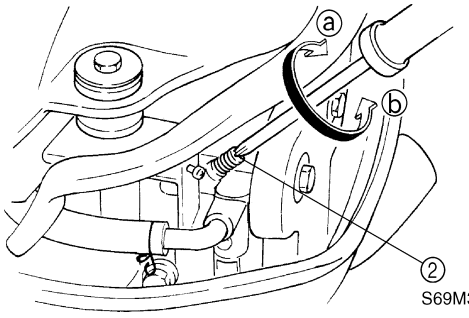


S69M3170

Digital tachometer: 90890-06760

Engine idle speed:
1,800–2,000 r/min

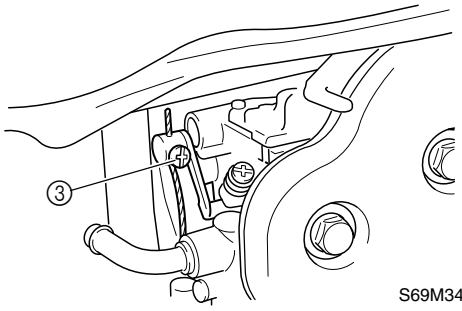
3. Turn the throttle stop screw ② in direction ⓐ or ⓑ until the specified engine idle speed is obtained.



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 ⓑ.
- When turning the throttle stop screw in direction ⓑ, check that the throttle link contacts the screw. If the throttle link does not contact the throttle stop screw, follow steps 4–6.

4. Check that the throttle grip is in the fully closed position.

5. Loosen the throttle cable stop screw ③, and then adjust the engine idle speed.



6. After adjusting the engine idle speed, adjust the throttle cable.

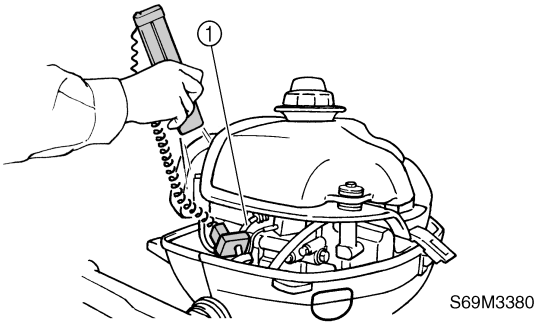
NOTE:
For adjusting procedures, see Chapter 4, “Installing the throttle cable.”

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

Checking the ignition timing

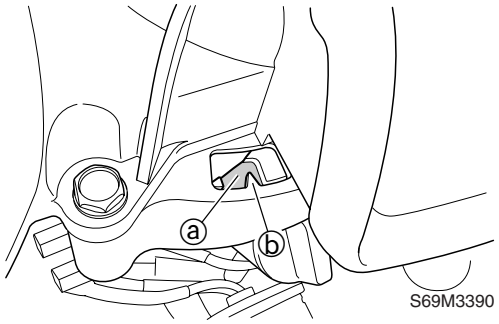
1. Start the engine.

2. Attach the special service tool to the spark plug wire ①.



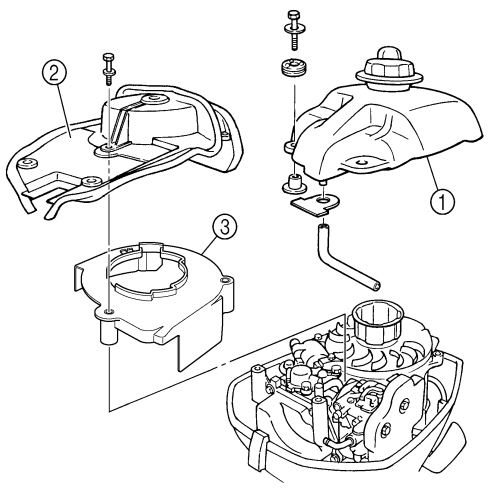
Timing light: 90890-03141

3. Check that the flywheel magnet indent ⓐ is visible through the timing mark ⓑ check window. If not visible, adjust the TCI unit air gap.



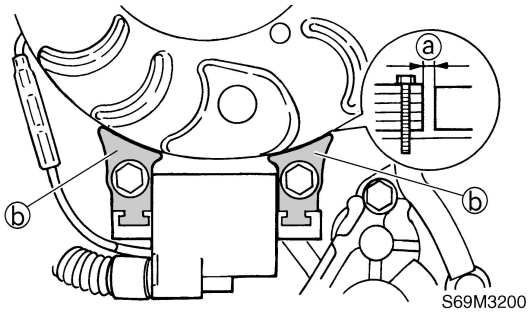
Checking the TCI unit air gap

1. Remove the fuel tank ①, manual starter ②, and flywheel magnet cover ③.



S69M3190

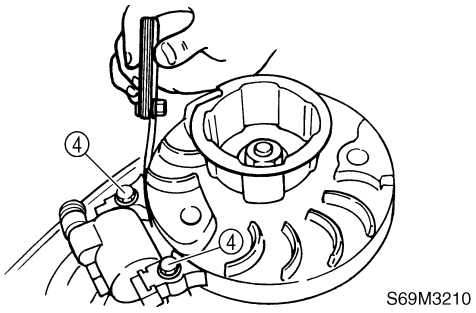
2. Measure the gap ⓐ between both projections ⓑ and flywheel magnet using a thickness gauge. Adjust if out of specification.



S69M3200

TCI unit air gap:
0.4–0.6 mm (0.016–0.024 in)

3. Loosen the bolts ④ and adjust the TCI unit air gap position.



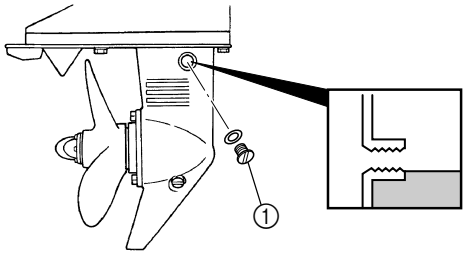
S69M3210

4. Tighten the bolts, and then check the TCI unit air gap. Adjust 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.



S69M3220

NOTE:
If the oil is at the correct level, the oil should overflow out of the check hole when the check screw is removed.

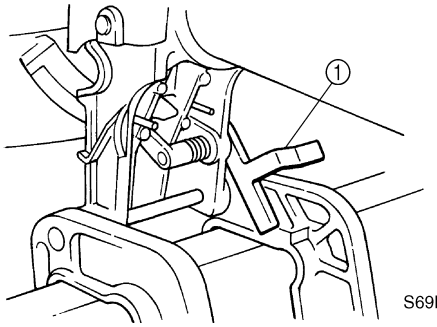
3. If necessary, add sufficient gear oil of the recommended type until it overflows out of the check hole.

Recommended gear oil:
Hypoid gear oil
SAE: 90

4. Install the check screw.

Changing the gear oil

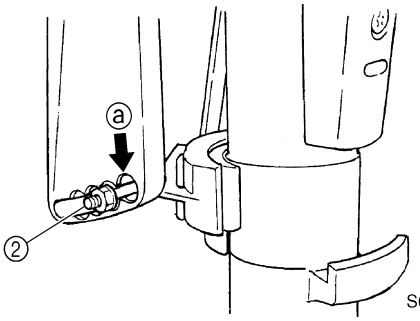
1. Fully tilt the outboard up, and then support it with the tilt stop lever ①.



S69M3230

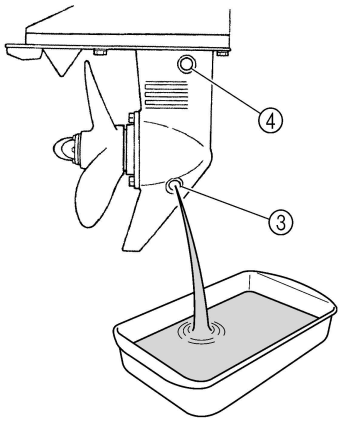
2. Slide the trim rod ② and position it to the upper trim rod position ⓐ.

3. Release the tilt stop lever and tilt the outboard down until it contacts the mount housing.



S69M3240

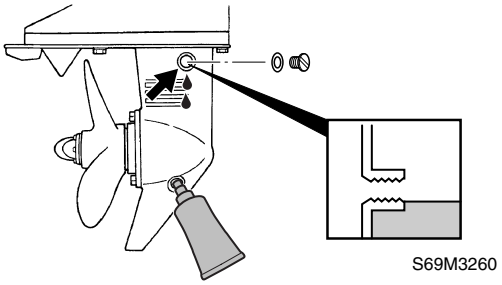
4. Place a drain pan under the drain screw ③, remove the drain screw, then the check screw ④ to drain the oil.

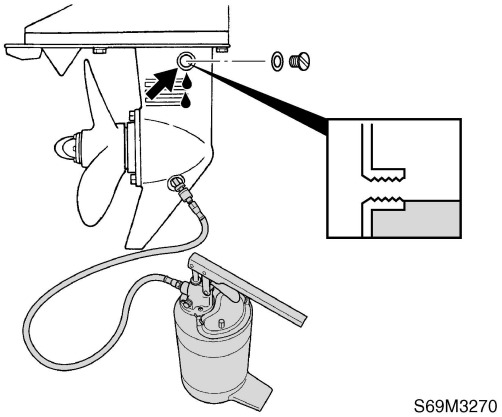


S69M3250

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

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


S69M3260

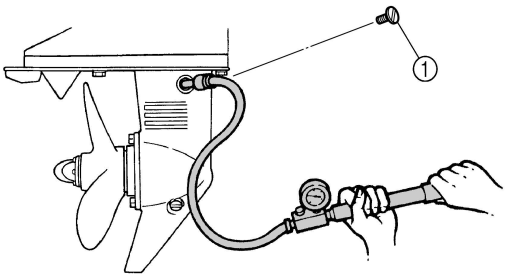

S69M3270

Recommended gear oil:
Hypoid gear oil
SAE: 90
Oil quantity:
75 cm^3 (2.5 US oz, 2.6 Imp oz)

7. Install the check screw, quickly install the drain screw, and then tighten them.

Checking the lower unit for air leakage

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



S69M3290

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.

CAUTION:

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

NOTE:

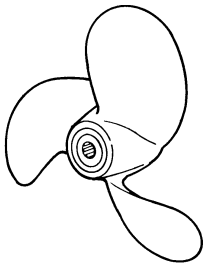
Cover the check hole with a rag when removing the pressure/vacuum tester from the lower unit.

Lower unit holding pressure:
100 kPa (1.0 kgf/cm^2, 14 psi)

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

Checking the propeller

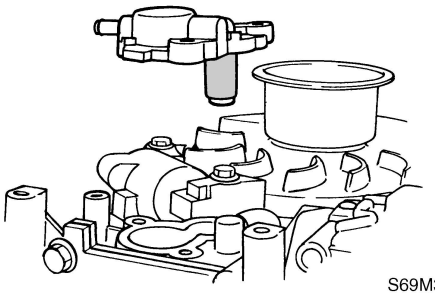
1. Check the propeller blades and splines for cracks, damage, or wear. Replace if necessary.

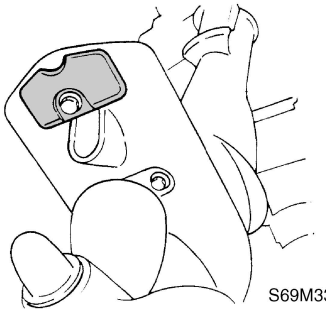

S69M3300

General

Checking the anodes

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


S69M3310


S69M3320

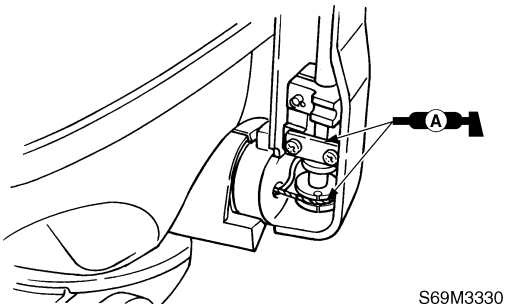
CAUTION:

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

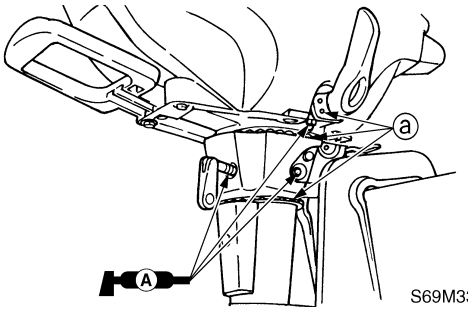
2. Replace the anodes if excessively eroded.

Lubricating the outboard motor

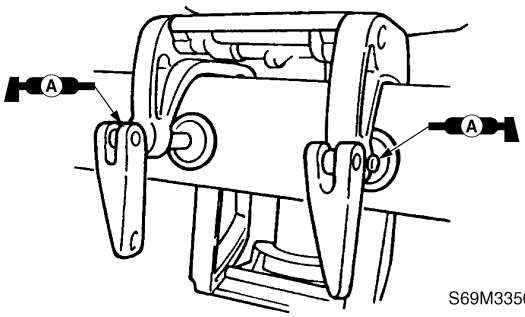
1. Apply water resistant grease to the areas shown.



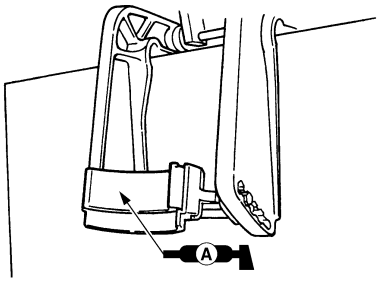
S69M3330



S69M3340



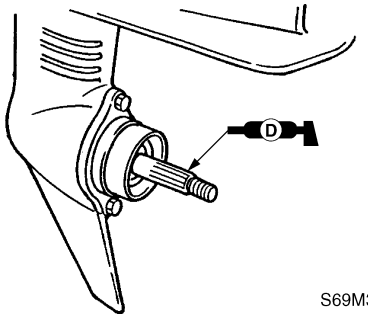
S69M3350



S69M3360

NOTE:
Apply grease to the grease nipple until it flows from the bushings ⓐ.

2. Apply corrosion resistant grease to the area shown.



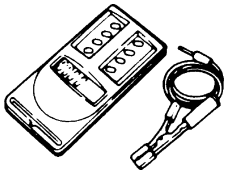
S69M3370

3

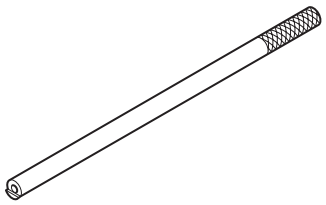
— MEMO —

Fuel system

Special service tools

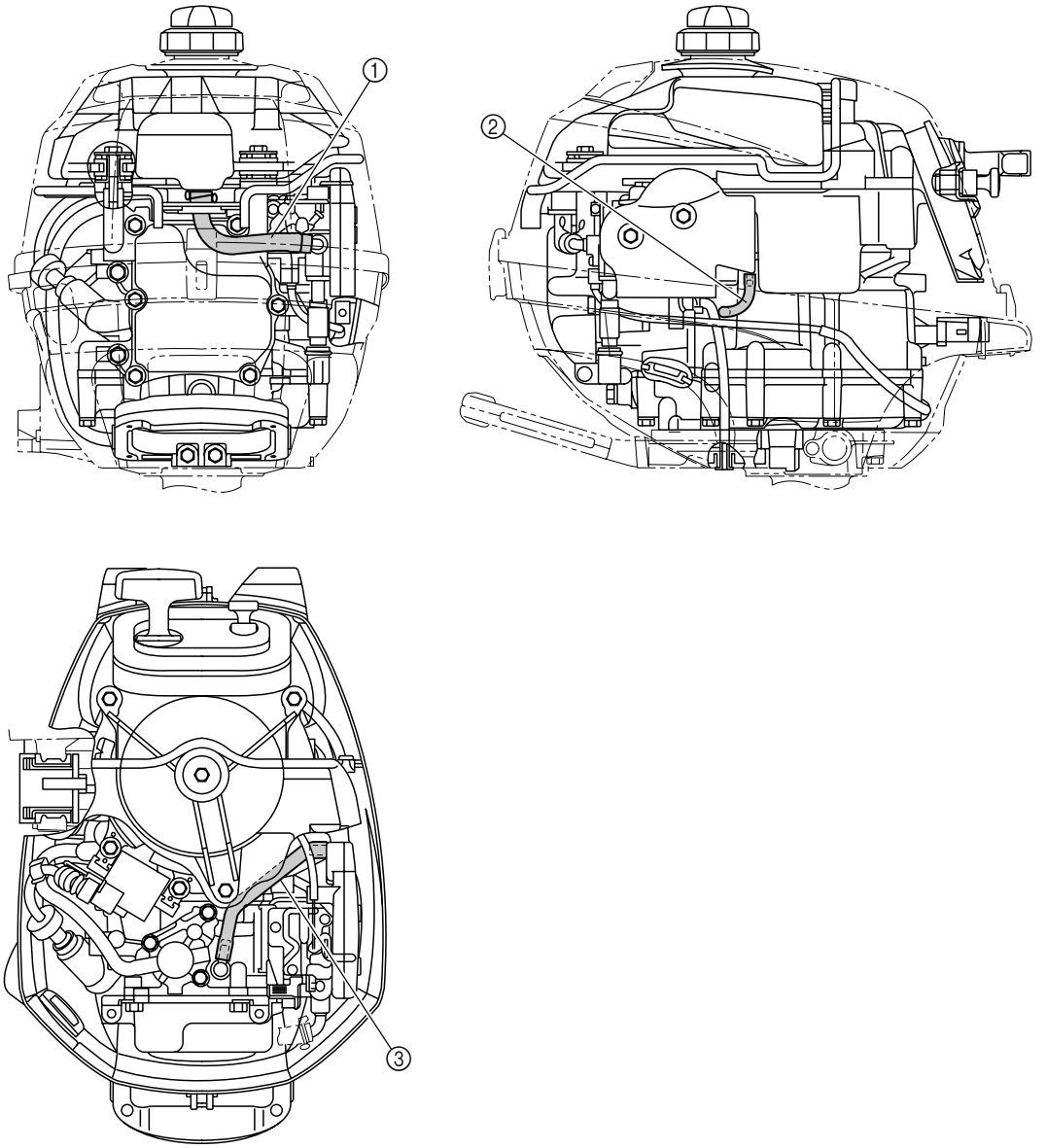


Digital tachometer
90890-06760



Pilot screw wrench
90890-03154

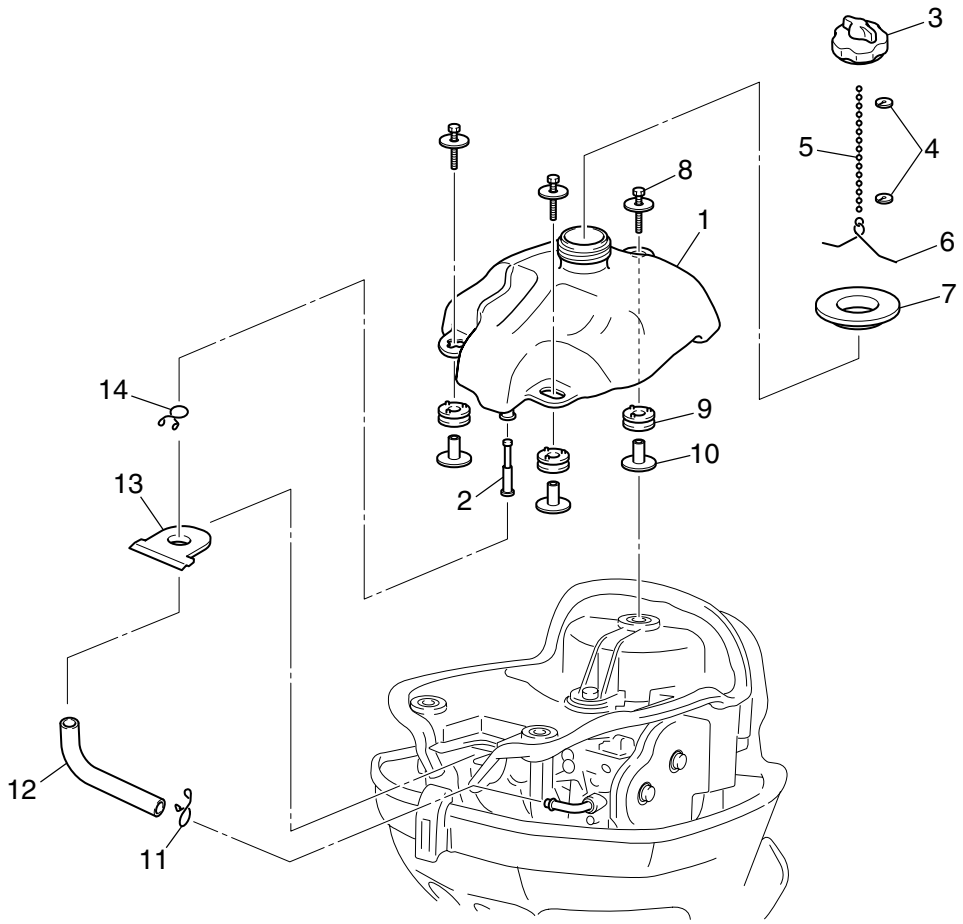
Hose routing
Fuel and blowby hoses



S69M4000

① Fuel hose
② Blowby hose
③ Blowby hose

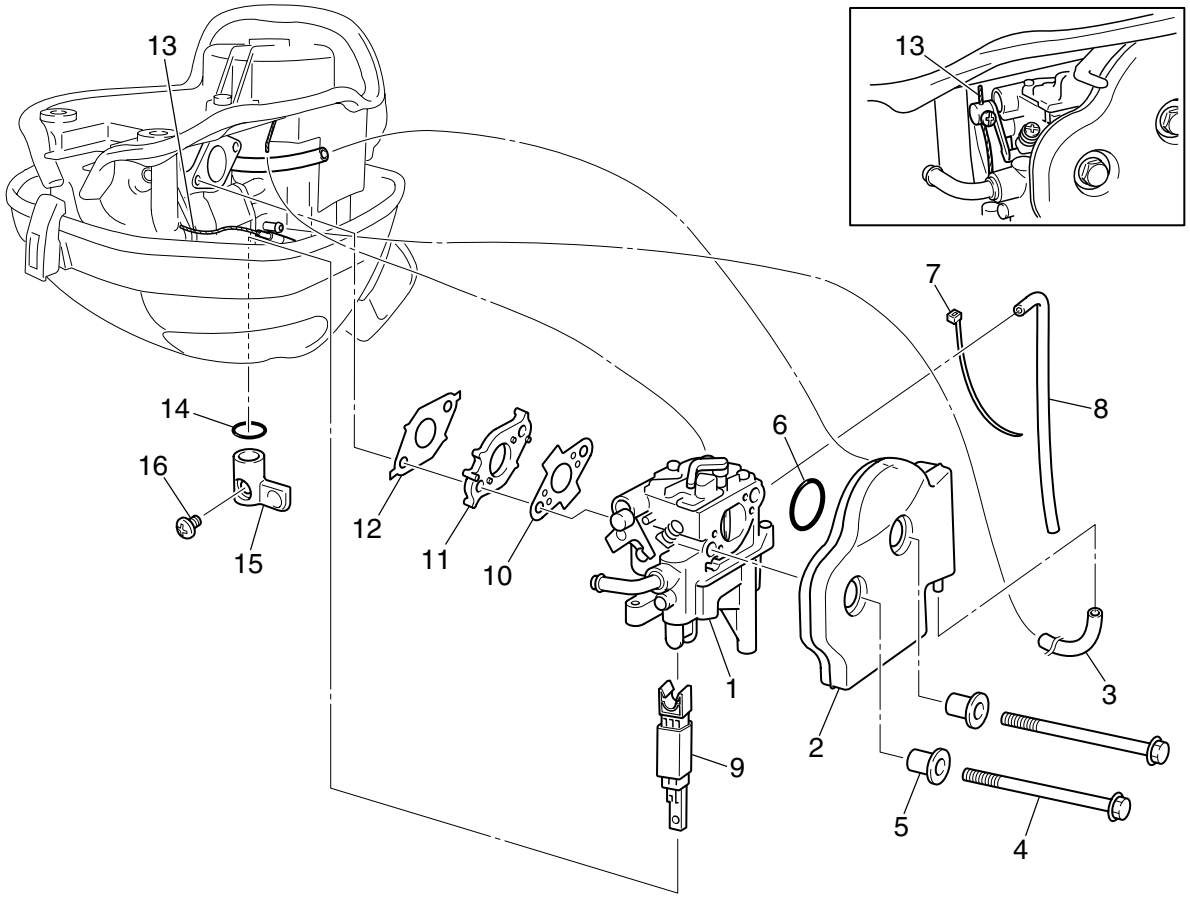
Fuel tank



S69M4010

No.	Part name	Q'ty	Remarks
1	Fuel tank	1	
2	Fuel filter	1	
3	Fuel filler cap	1	
4	Stopper	2	
5	Chain	1	
6	Stopper	1	
7	Gasket	1	
8	Bolt	3	M6 × 35 mm
9	Grommet	3	
10	Collar	3	
11	Clip	1	
12	Fuel hose	1	
13	Damper	1	
14	Clip	1	

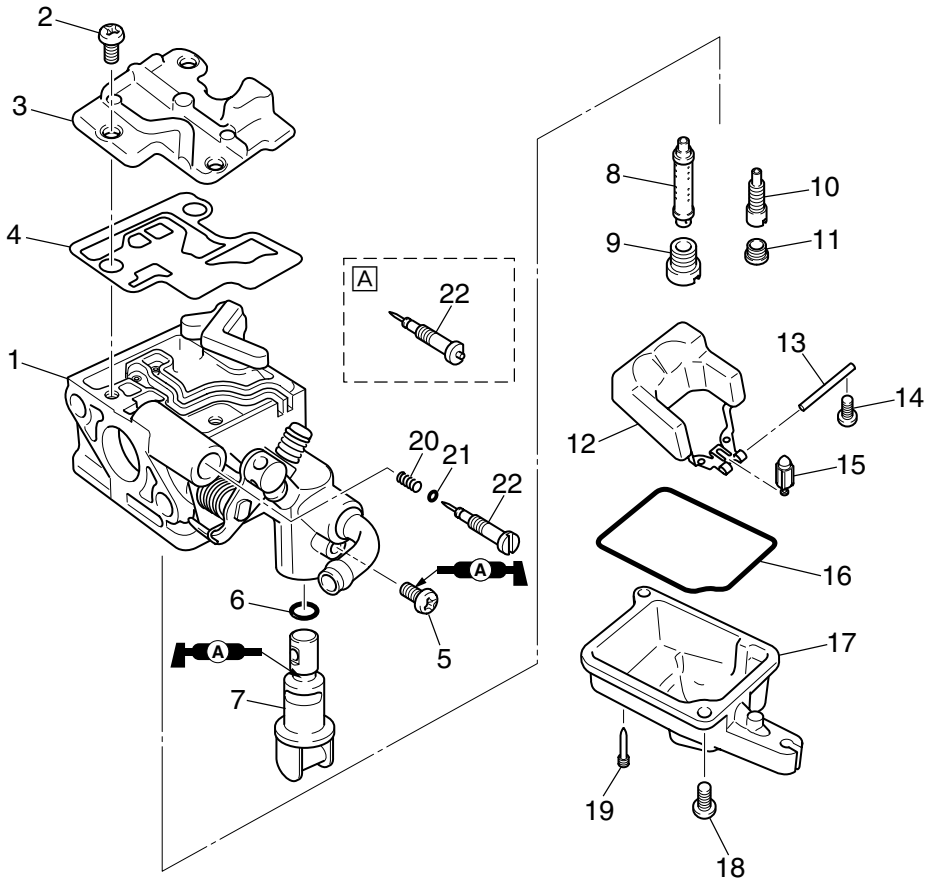
Carburetor and intake silencer



S69M4020

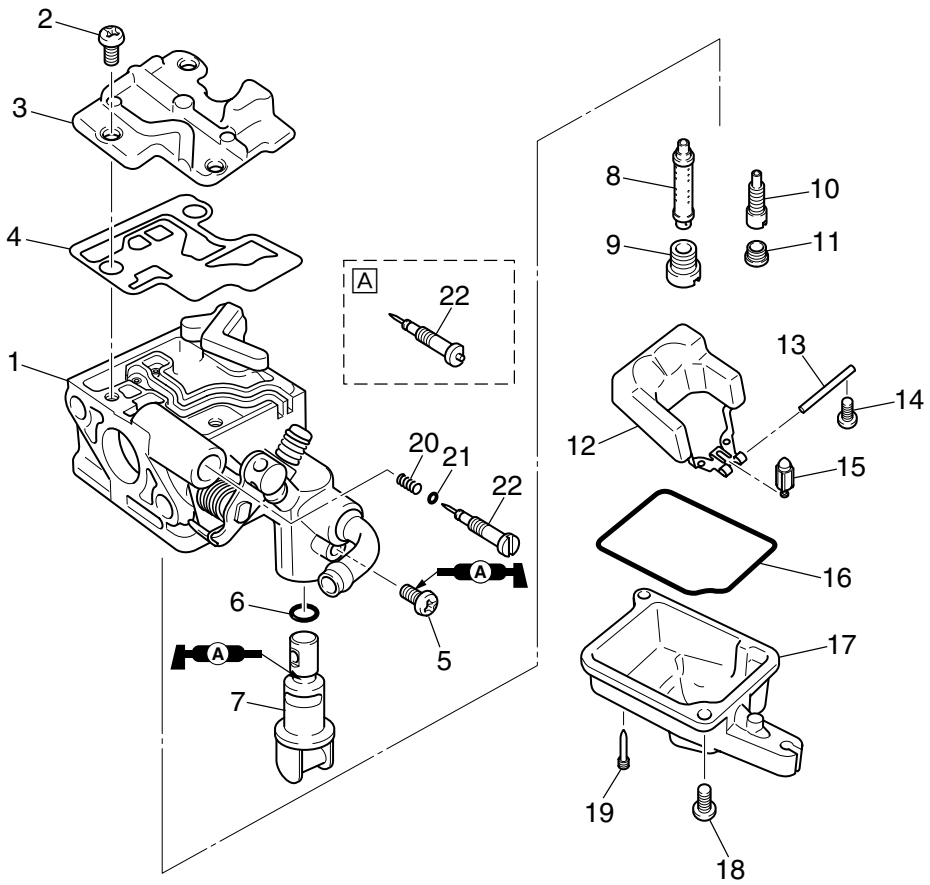
No.	Part name	Q'ty	Remarks
1	Carburetor	1	
2	Intake silencer	1	
3	Blowby hose	1	
4	Bolt	2	M6 × 75 mm
5	Collar	2	
6	O-ring	1	**Not reusable**
7	Plastic tie	1	**Not reusable**
8	Hose	1	
9	Fuel cock	1	
10	Gasket	1	**Not reusable**
11	Gasket	1	
12	Gasket	1	**Not reusable**
13	Throttle cable	1	
14	O-ring	1	
15	Fuel cock lever	1	
16	Screw	1	ø5 × 7 mm

Carburetor



S69M4032

No.	Part name	Q'ty	Remarks
1	Carburetor body	1	
2	Screw	3	ø4 × 10 mm
3	Cover	1	
4	Gasket	1	**Not reusable**
5	Screw	1	ø4 × 8 mm
6	O-ring	1	**Not reusable**
7	Fuel cock	1	
8	Main nozzle	1	
9	Main jet	1	
10	Pilot jet	1	
11	Bushing	1	
12	Float	1	
13	Float pin	1	
14	Screw	1	ø4 × 5 mm
15	Needle valve	1	
16	Gasket	1	**Not reusable**
17	Float chamber	1	



S69M4032

No.	Part name	Q'ty	Remarks
18	Screw	2	ø4 × 10 mm
19	Drain screw	1	
20	Spring	1	
21	O-ring	1	**Not reusable**
22	Pilot screw	1	

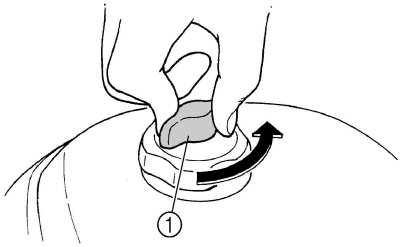
A For Europe

Draining the fuel

⚠ WARNING

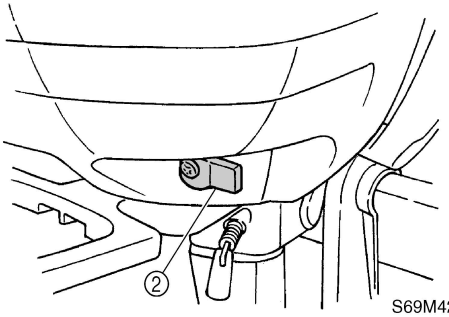
Before removing the fuel tank, fuel hose, and carburetor, let the fuel drain completely.

1. Loosen the air vent screw ① attached to the fuel filler cap.



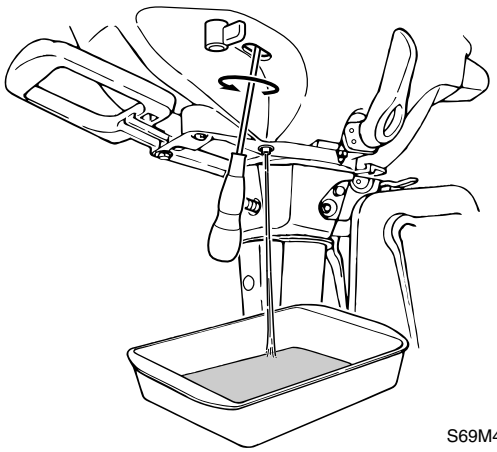
S69M4220

2. Set the fuel cock lever ② to the open position.



S69M4230

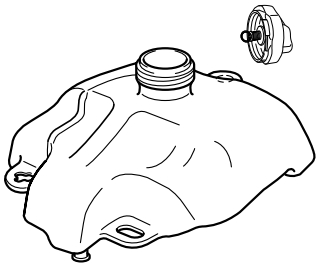
3. Place a drain pan under the drain hose, and then loosen the drain screw and let the fuel drain completely.



S69M4240

Checking the fuel tank and fuel filler cap

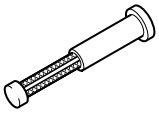
1. Check the fuel tank and fuel filler cap for cracks, leaks, or damage. Replace if necessary.



S69M4040

Checking the fuel filter

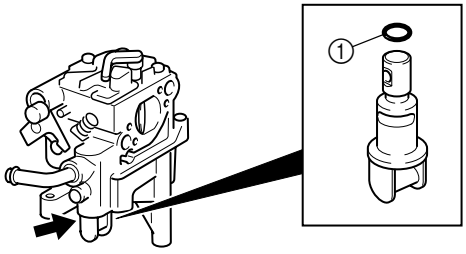
1. Check the fuel filter for dirt or residue. Clean if necessary.



S69M4055

Checking the fuel cock

1. Check the fuel cock for leaks. Replace the O-ring ① or fuel cock if necessary.

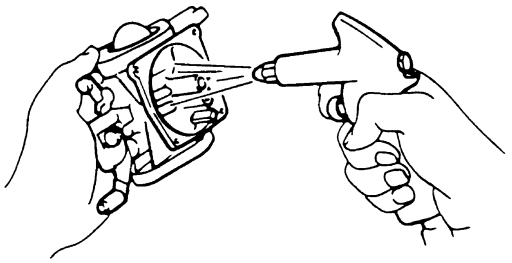


S69M4250

Checking the carburetor

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

2. Blow compressed air into all passages and jets.

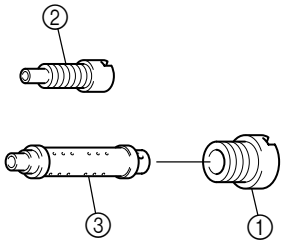


S60C4170

CAUTION:

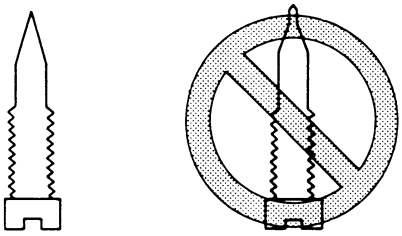
- **Direct the compressed air downward, otherwise cleaning solvent may be blown into your eyes or small parts of the carburetor may be blown off.**
- **Do not use steel wire for cleaning the jets, otherwise the jet diameters may be enlarged, which may seriously affect performance.**

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

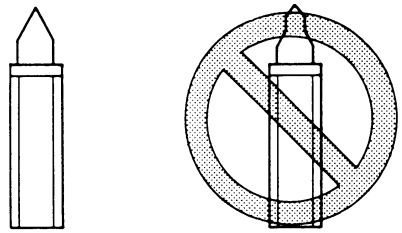


S69M4060

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

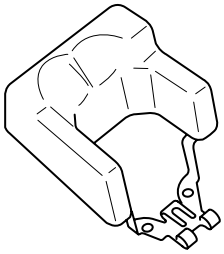


S69M4070



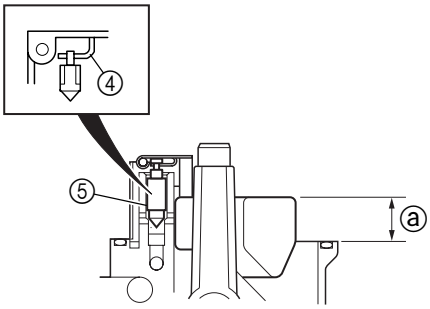
S69M4080

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



S69M4090

6. Measure the float height ⓐ. Adjust the float height by bending the tab ④ if out of specification.



S69M4100

NOTE:

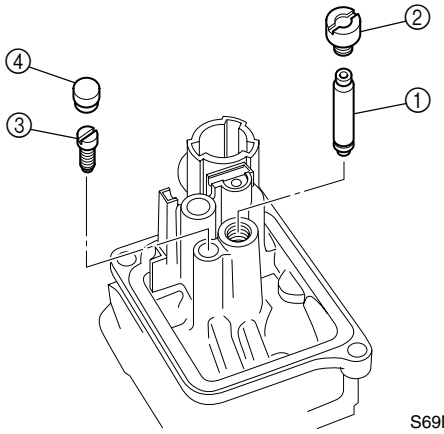
- The float should be resting on the needle valve ⑤, but not compressing it.
- Take measurements at the end of the float opposite its pivoted side.

Float height ⓐ:
10.5–11.5 mm (0.413–0.453 in)

4

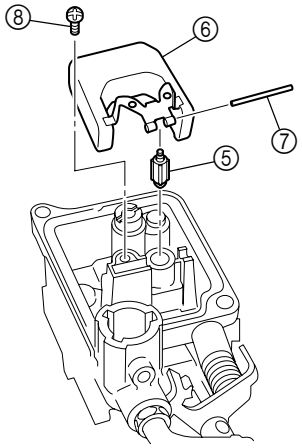
Assembling the carburetor

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



S69M4110

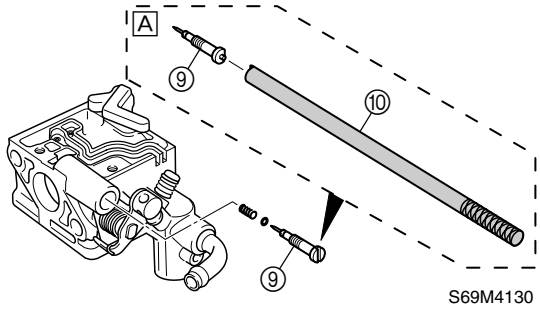
2. Install the needle valve ⑤, float ⑥, float pin ⑦, and screw ⑧ as shown, and then check the float for smooth operation.



S69M4120

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

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



S69M4130

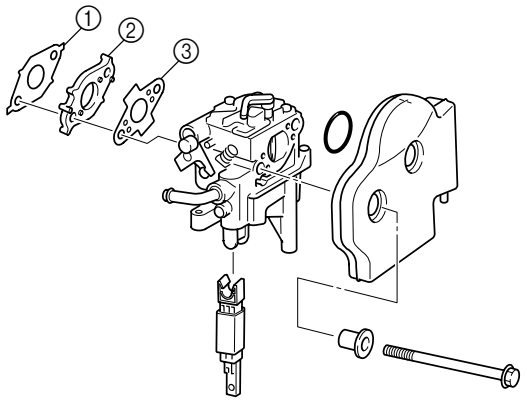
A For Europe


Pilot screw wrench ⑩: 90890-03154

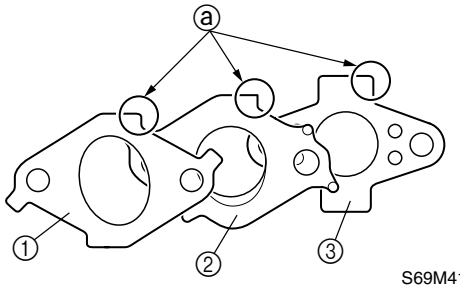

Pilot screw setting: 2–3 turns out

Installing the carburetor

1. Install the carburetor to the power unit.



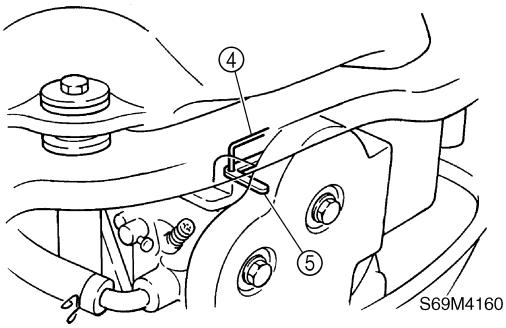
S69M4140



S69M4150

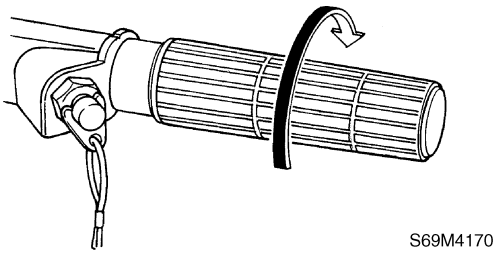
NOTE:
Align the projections ⓐ of gaskets ①, ②, and ③, and then install the carburetor.

2. Install the choke wire ④ to the choke lever ⑤ of carburetor.

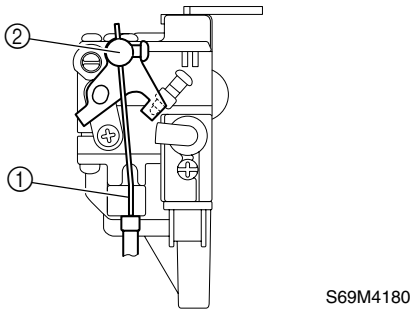


Installing the throttle cable

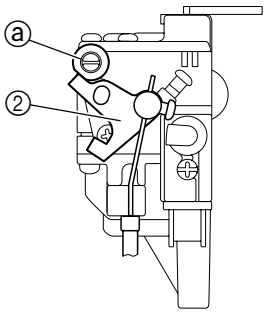
1. Turn the throttle grip to the fully closed position.



2. Make the inner wire ① of the throttle cable taut, and then connect the throttle link ②.



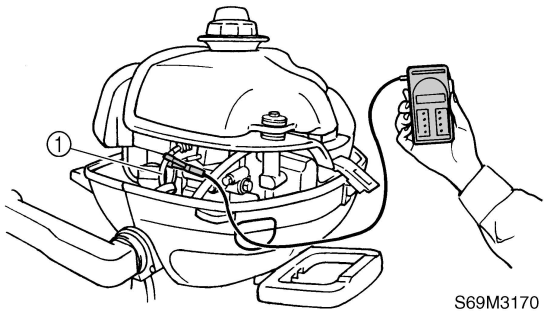
3. Check that the throttle link ② contacts the fully open stopper ⓐ when the throttle grip is turned from the fully closed position to the fully open position.



Adjusting the pilot screw

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

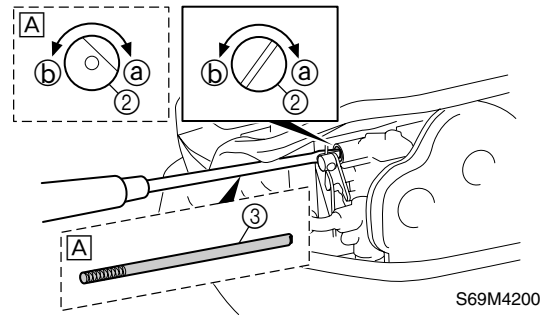
2. Attach the special service tool to the spark plug wire ①.



	Digital tachometer: 90890-06760

4

3. Turn the pilot screw ② in direction ⓐ until it is lightly seated, then in direction ⓑ to the specified number of turns.

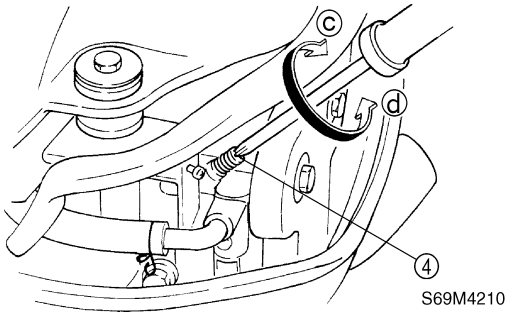


A For Europe

Pilot screw wrench ③: 90890-03154

Pilot screw setting: 2–3 turns out

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



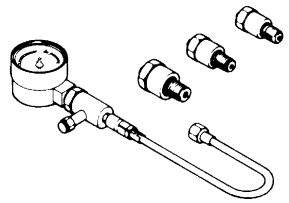
NOTE:
- To increase the idle speed, turn the throttle stop screw in direction ⓒ.
- To decrease the idle speed, turn the throttle stop screw in direction ⓓ.

Engine idle speed:
1,800–2,000 r/min

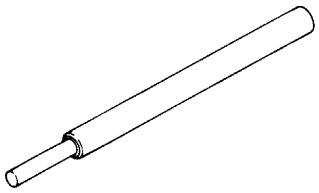
5. After adjusting the idle speed, rev the engine a few times and let it idle for at least 15 seconds to check the stability of the engine.

Power unit

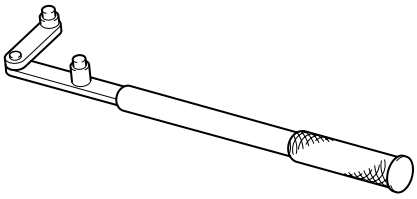
Special service tools



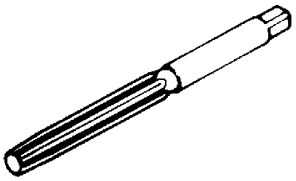
Compression gauge
90890-03160



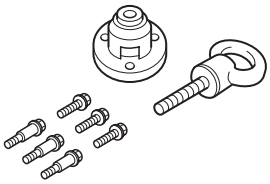
Valve guide remover/installer
90890-06801



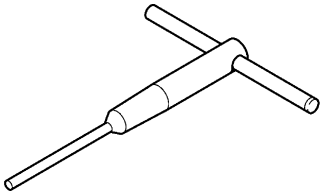
Flywheel holder
90890-06522



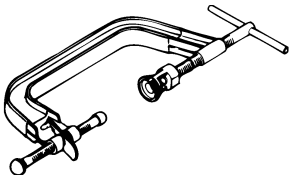
Valve guide reamer
90890-06804



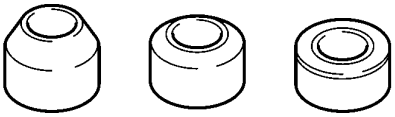
Flywheel puller
90890-06521



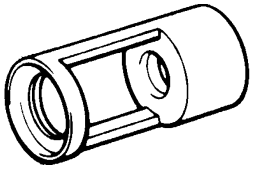
Valve seat cutter holder
90890-06316



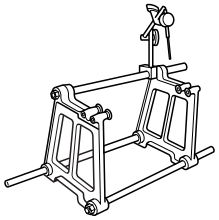
Valve spring compressor
90890-04019



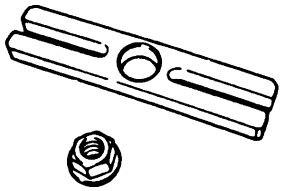
Valve seat cutter
90890-06312, 90890-06315, 90890-06328



Valve spring compressor attachment
90890-06320

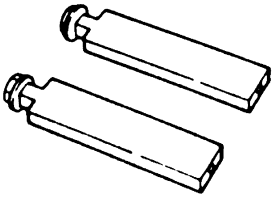


Crank stand alignment
90890-03107

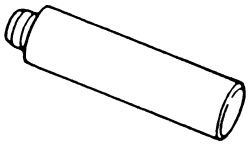


Stopper guide plate
90890-06501

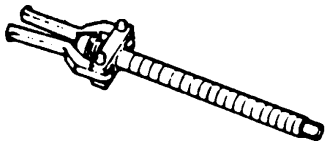
Needle bearing attachment
90890-06613



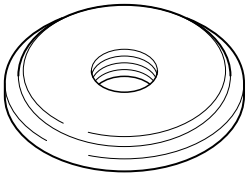
Stopper guide stand
90890-06538



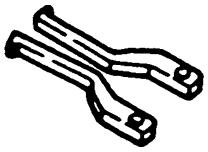
Driver rod LS
90890-06606



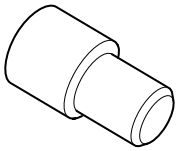
Bearing puller
90890-06535



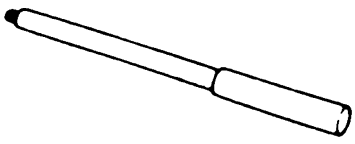
Bearing outer race attachment
90890-06624



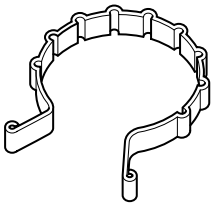
Bearing puller claw 1
90890-06536



Bushing attachment
90890-06649



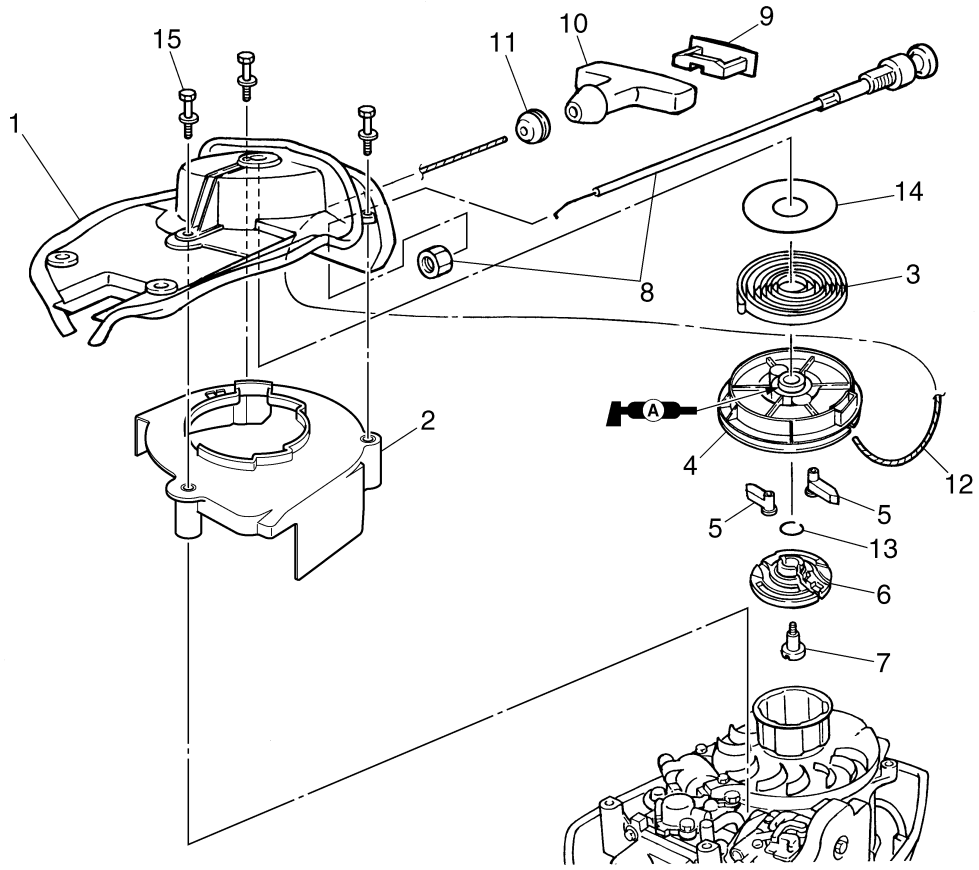
Driver rod L3
90890-06652



Piston slider
90890-06843

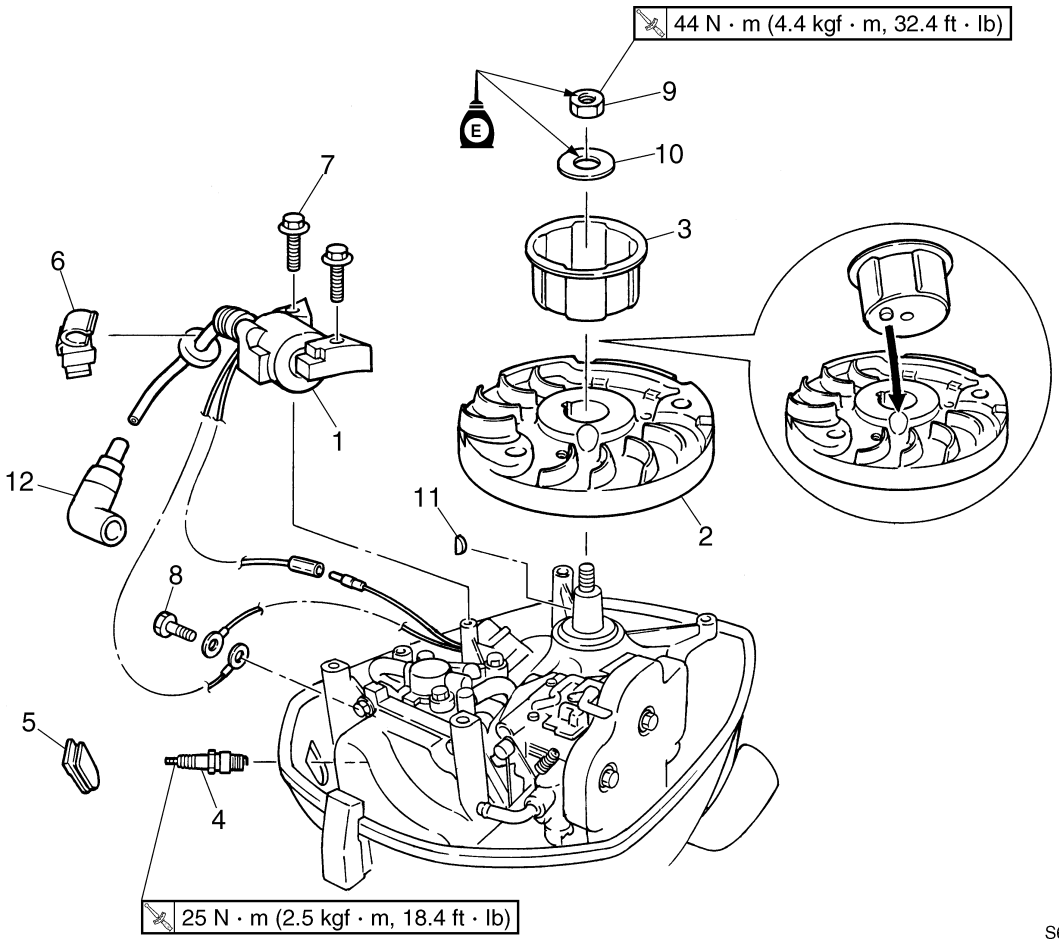
5

Power unit



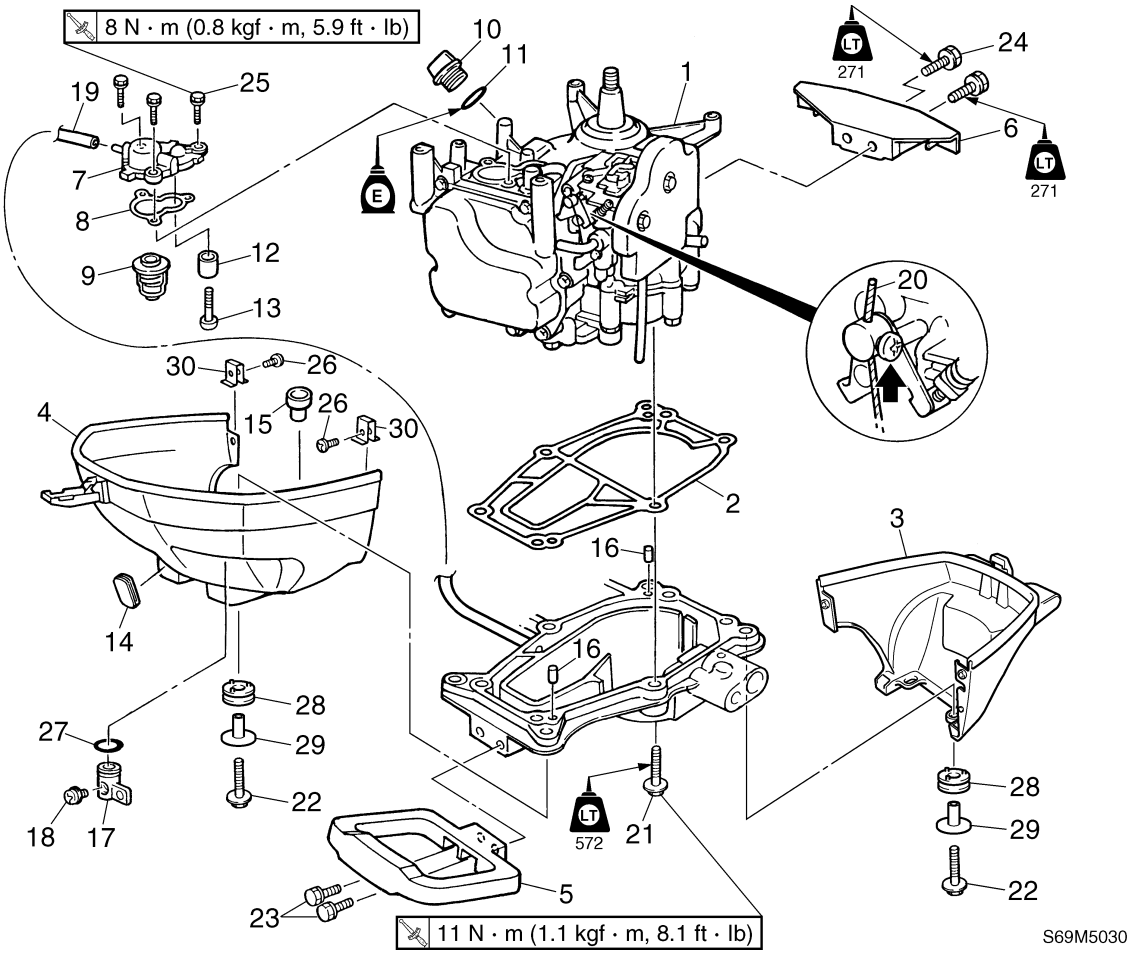
S69M5010

No.	Part name	Q'ty	Remarks
1	Starter case	1	
2	Flywheel magnet cover	1	
3	Spiral spring	1	
4	Sheave drum	1	
5	Drive pawl	2	
6	Drive plate	1	
7	Screw	1	
8	Choke knob assembly	1	
9	Stopper	1	
10	Manual starter handle	1	
11	Damper	1	
12	Starter rope	1	
13	Spring	1	
14	Plate	1	
15	Bolt	3	M6 × 60 mm

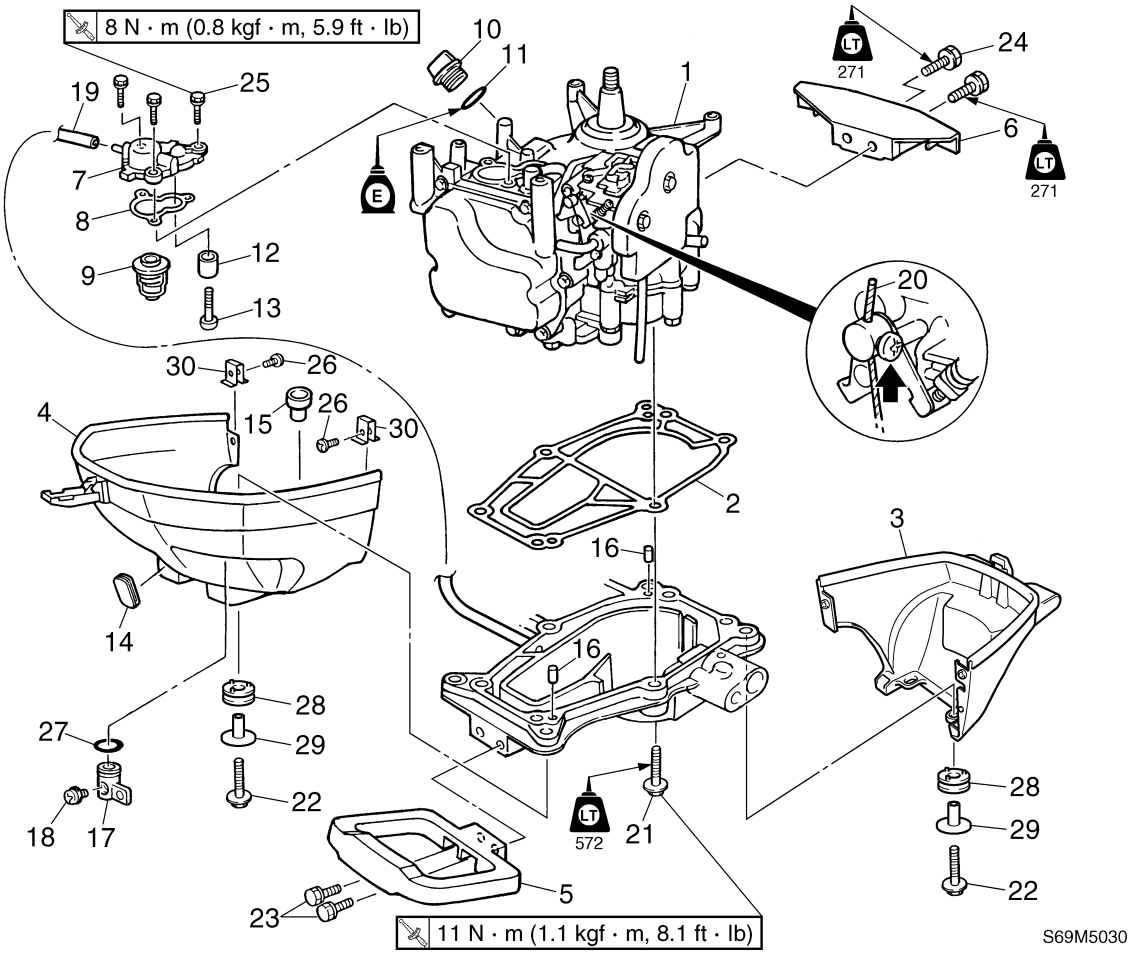


S69M5020

No.	Part name	Q'ty	Remarks
1	TCI unit	1	
2	Flywheel magnet	1	
3	Starter pulley	1	
4	Spark plug	1	
5	Grommet	1	
6	Clamp	1	
7	Bolt	2	M6 × 25 mm
8	Bolt	1	M6 × 12 mm
9	Nut	1	
10	Washer	1	
11	Woodruff key	1	
12	Spark plug cap	1	



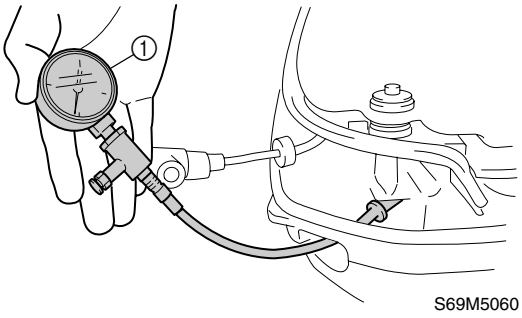
No.	Part name	Q'ty	Remarks
1	Power unit	1	
2	Gasket	1	**Not reusable**
3	Bottom cowling 1	1	
4	Bottom cowling 2	1	
5	Carrying handle	1	
6	Bracket	1	
7	Thermostat cover	1	
8	Gasket	1	**Not reusable**
9	Thermostat	1	
10	Oil filler cap	1	
11	O-ring	1	
12	Anode	1	
13	Screw	1	ø5 × 25 mm
14	Grommet	1	
15	Damper	1	
16	Dowel	2	
17	Fuel cock lever	1	



No.	Part name	Q'ty	Remarks
18	Screw	1	ø5 × 7 mm
19	Cooling water hose	1	
20	Throttle cable	1	
21	Bolt	6	M6 × 36 mm
22	Bolt	4	M6 × 16 mm
23	Bolt	2	M6 × 20 mm
24	Bolt	2	M6 × 20 mm
25	Bolt	3	M6 × 20 mm
26	Screw	2	ø5 × 13 mm
27	O-ring	1	
28	Grommet	4	
29	Collar	4	
30	Spring nut	2	

Checking the compression pressure

1. Start the engine, warm it up for 5 minutes, and then turn it off.
2. Remove the engine shut-off cord from the engine shut-off switch on the tiller handle.
3. Remove the grommet and spark plug, and then install the special service tool to the spark plug hole.



S69M5060

CAUTION:

Before removing the spark plug, 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. Close the fuel cock and air vent screw, fully open the throttle, pull the starter rope 3 times, and then check the compression pressure.

NOTE:

Do not pull the choke knob when checking the compression pressure.

Minimum compression pressure (reference data):
700 kPa (7.0 kgf/cm^2, 102 psi)

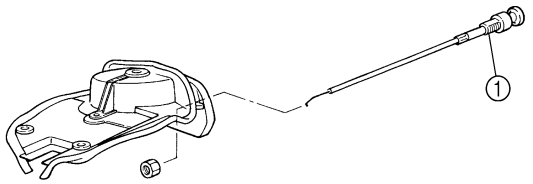
5. If the compression pressure is below specification, add a small amount of engine oil to the cylinder, and then check the pressure again.

NOTE:

- If the compression pressure increases, check the piston and piston rings for wear. Replace if necessary.
- If the compression pressure does not increase, check the valve clearance, valves, valve seat, cylinder sleeve, cylinder head gasket, and cylinder head. Adjust or replace if necessary.

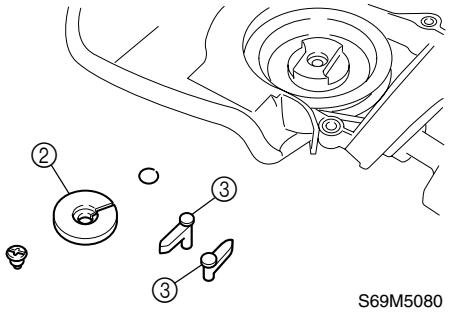
Disassembling the manual starter

1. Remove the choke knob assembly ①.



S69M5070

2. Remove the drive plate ② and drive pawls ③.

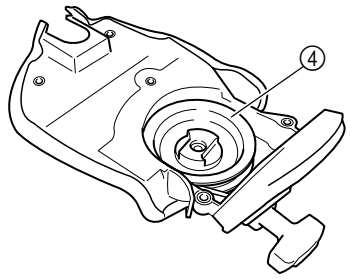


S69M5080

⚠ WARNING

The sheave drum can pop out. Hold the sheave drum with your hand, and then pull it out.

3. Remove the sheave drum ④.

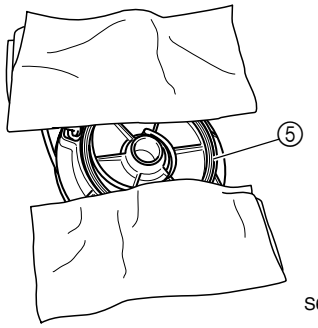


S69M5090

⚠ WARNING

The spiral spring can pop out. Pull the starter rope, and then pull out the sheave drum.

4. Remove the spiral spring ⑤ from the sheave drum.

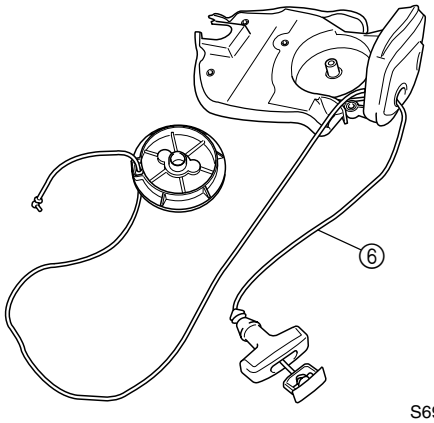


S69M5100

⚠ WARNING

The spiral spring can pop out. To remove the spring, cover it with cloths.

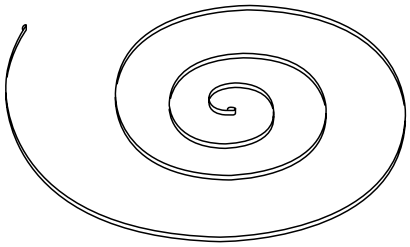
5. Remove the starter rope ⑥.



S69M5110

Checking the spiral spring

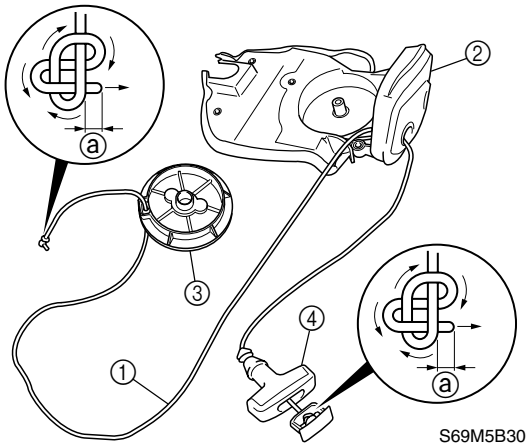
1. Check the spiral spring for cracks, bends, or damage. Replace if necessary.



S69M5120

Assembling the manual starter

1. Pass the starter rope ① through the starter case ②, and then install the starter rope to the sheave drum ③ and manual starter handle ④.



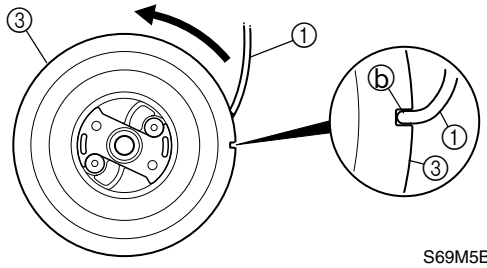
S69M5B30

NOTE:

- Tie a knot at the end of the starter rope as shown in the illustration.
- Be sure to leave 5–10 mm at the end ⓐ of the starter rope.

5

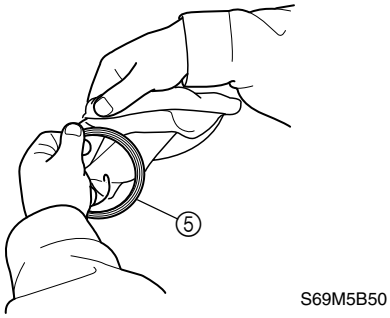
2. Wind the starter rope ① 2 times around the sheave drum ③ in the direction of the arrow shown in the illustration.



S69M5B40

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

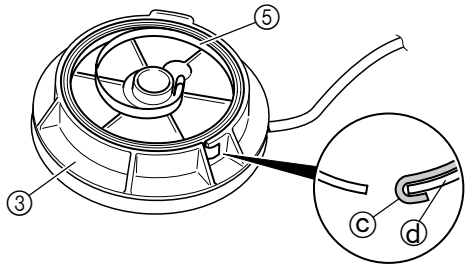
3. Wind the spiral spring ⑤.



S69M5B50

⚠ WARNING
When winding the spiral spring, cover it with cloths.

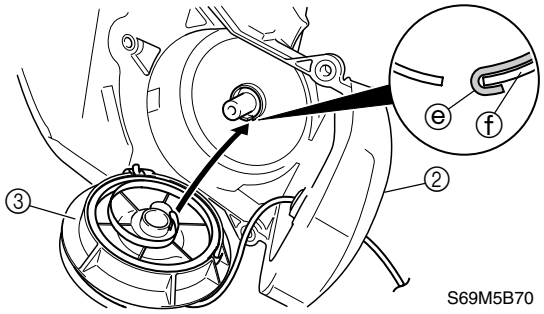
4. Install the spiral spring ⑤ into the sheave drum ③.



S69M5B60

NOTE:
Bend the outer end ⓒ of the spiral spring onto the cutout ⓓ of the sheave drum.

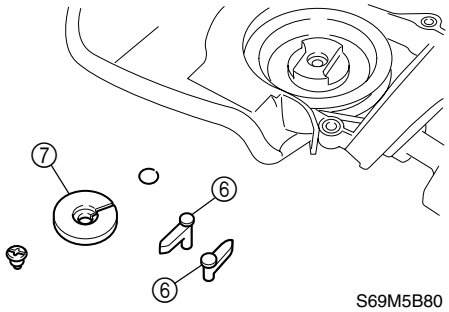
5. Install the sheave drum ③ into the starter case ②.



S69M5B70

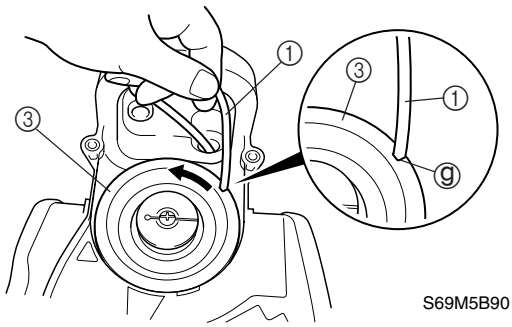
NOTE:
Install the sheave drum so that the inner end ⓔ of the spiral spring can be bent onto the cutout ⓕ of the starter case.

6. Install the drive pawls ⑥ and drive plate ⑦.



S69M5B80

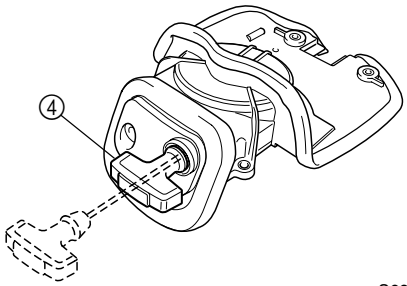
7. Pull the starter rope ① in the direction of the arrow shown in the illustration, turn the sheave drum ③ 3 times, and then remove the starter rope from the notch ⓖ.



S69M5B90

NOTE:
The starter rope ① turns the sheave drum ③ with the force of the spiral spring.

8. Pull the manual starter handle ④ several times to check that the sheave drum turns smoothly and to check the starter rope for slack. Repeat steps 2–7 if necessary.

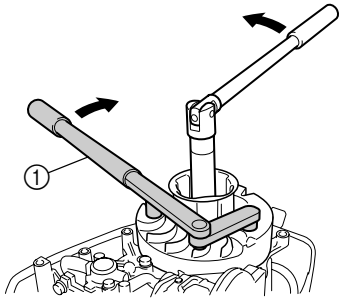


S69M5C00

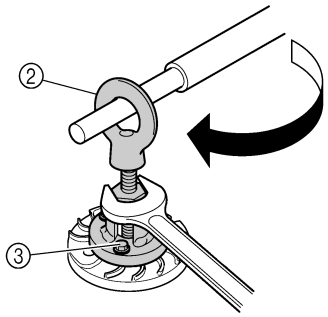
9. Install the choke knob assembly.

Removing the power unit

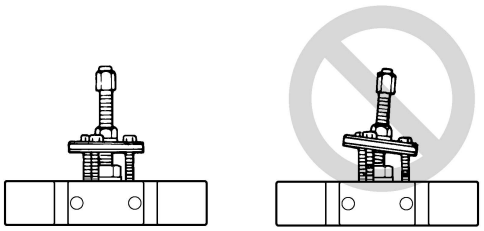
1. Remove the flywheel magnet.



S69M5190



S69M5210


S69M5220

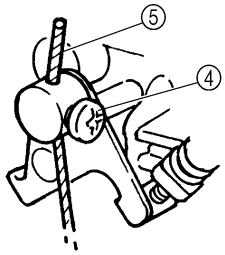
CAUTION:
- **Apply force in the direction of the arrows shown, to prevent the flywheel holder from slipping off easily.**
- **To prevent damage to the engine or tools, screw in the flywheel puller specified bolts evenly and completely so that the flywheel puller plate is parallel to the flywheel magnet.**

NOTE:
- Apply force to the crankshaft end until the flywheel magnet comes off the tapered portion of the crankshaft.
- Use the fuel tank bolts ③ with the specified measurements.

Flywheel holder ①: 90890-06522
Flywheel puller ②: 90890-06521
Fuel tank bolt ③: M6 × 35 mm

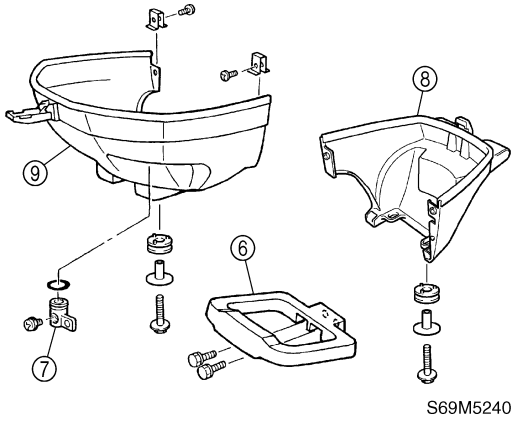
5

2. Loosen the throttle cable stop screw ④ and remove the throttle cable ⑤.



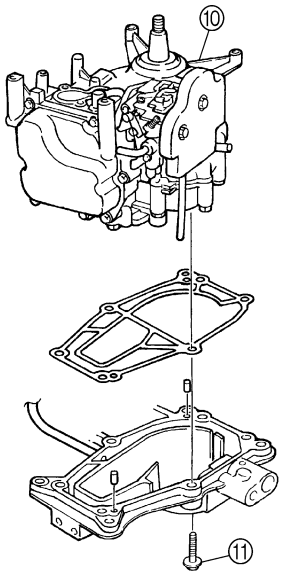
S69M5230

3. Remove the carrying handle ⑥, fuel cock ⑦, bottom cowling 1 ⑧, and bottom cowling 2 ⑨.



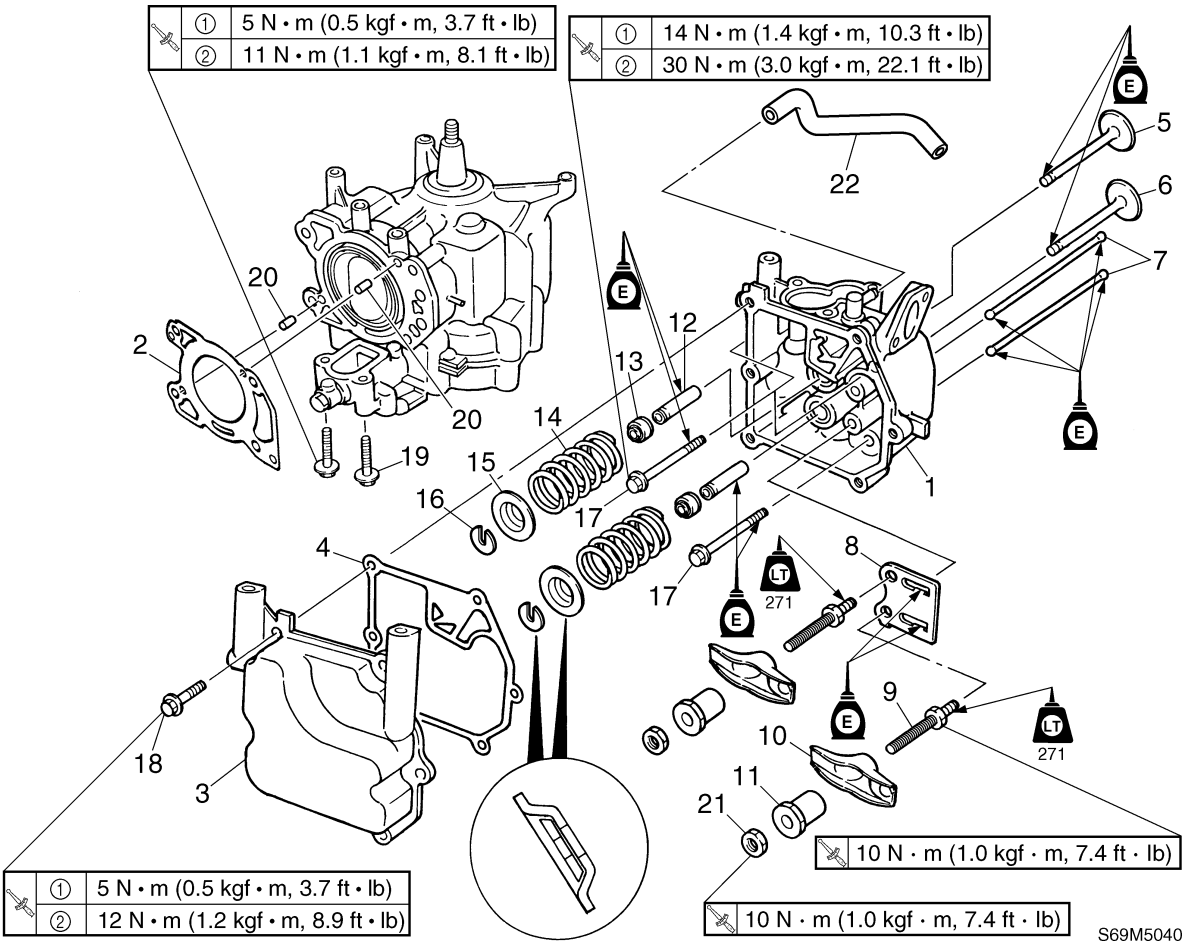
S69M5240

4. Remove the power unit ⑩ by removing the bolts ⑪.

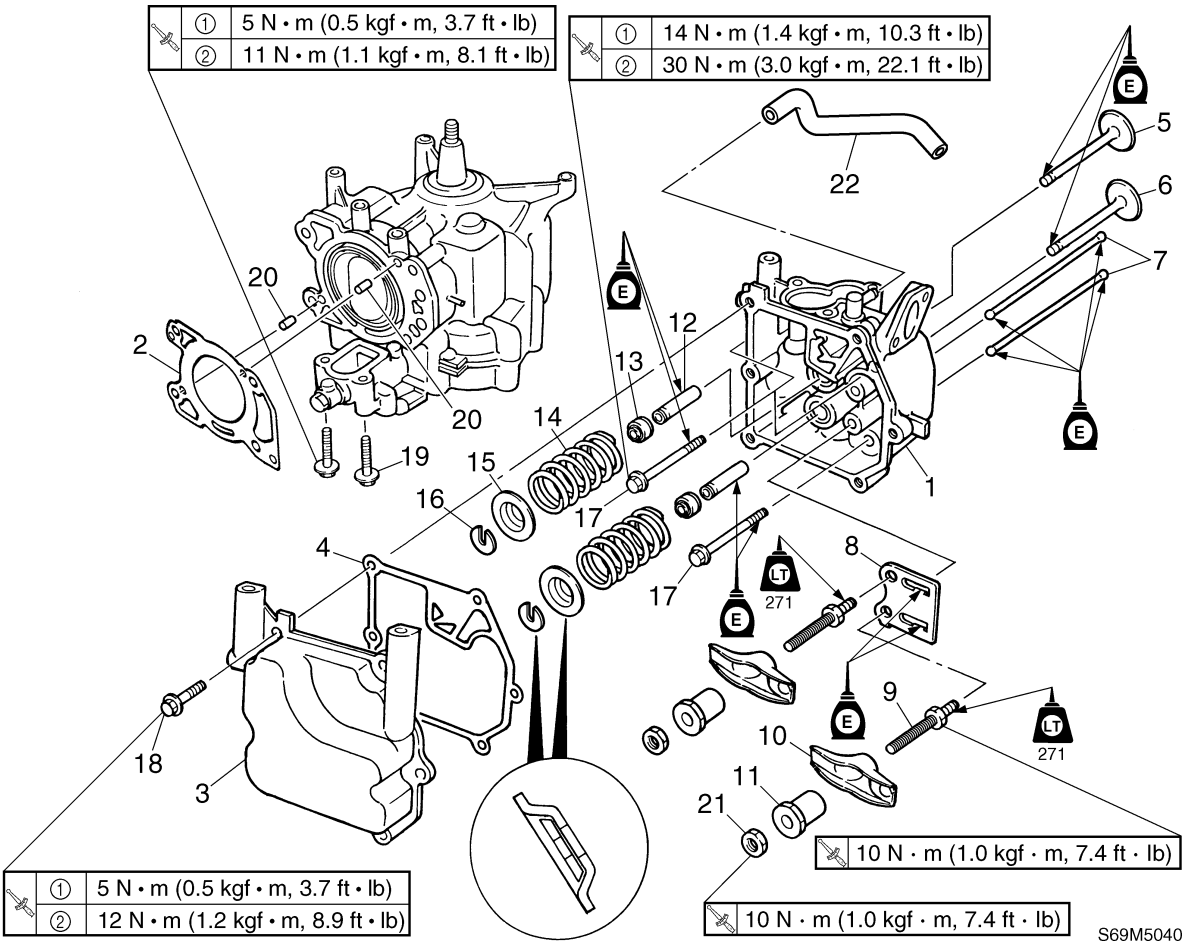


S69M5250

Cylinder head



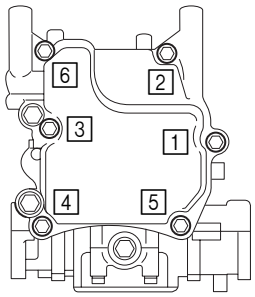
No.	Part name	Q'ty	Remarks
1	Cylinder head	1	
2	Gasket	1	**Not reusable**
3	Cylinder head cover	1	
4	Gasket	1	**Not reusable**
5	Intake valve	1	
6	Exhaust valve	1	
7	Push rod	2	
8	Push rod guide	1	
9	Stud bolt	2	
10	Rocker arm	2	
11	Rocker arm pivot	2	
12	Valve guide	2	**Not reusable**
13	Stem seal	2	**Not reusable**
14	Valve spring	2	
15	Valve spring retainer	2	
16	Valve cotter	2	
17	Bolt	4	M8 × 60 mm



No.	Part name	Q'ty	Remarks
18	Bolt	6	M6 × 16 mm
19	Bolt	2	M6 × 45 mm
20	Dowel	2	
21	Nut	2	
22	Blowby hose	1	

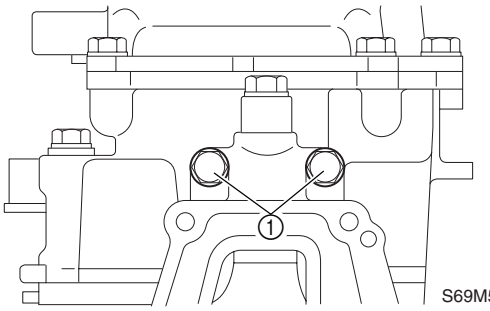
Removing the cylinder head

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



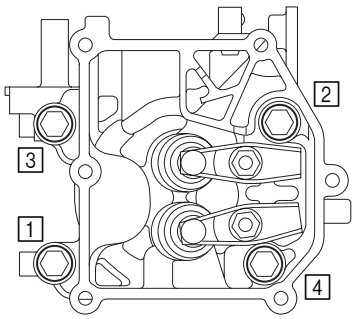
S69M5260

2. Remove the crankcase bolts ①.



S69M5270

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

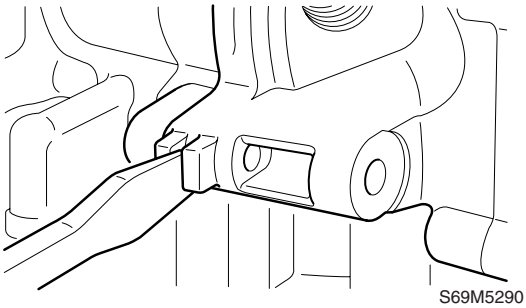


S69M5280

CAUTION:

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

4. Remove the cylinder head, and then remove the push rods.

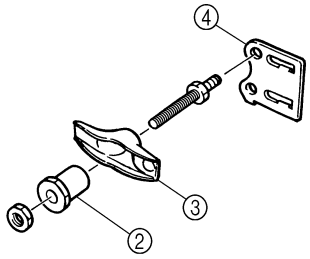


S69M5290

NOTE:

Insert a flat head screwdriver between the tab of the cylinder and the tab of the cylinder head to pry open the two parts.

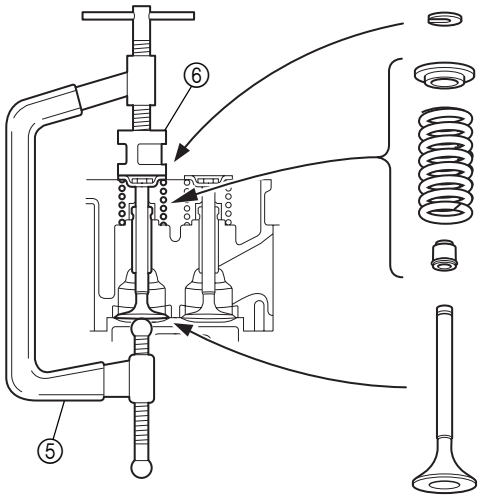
5. Remove the rocker arm pivot ②, rocker arm ③, and push rod guide ④.



S69M5300

5

6. Remove the intake valve and exhaust valve.



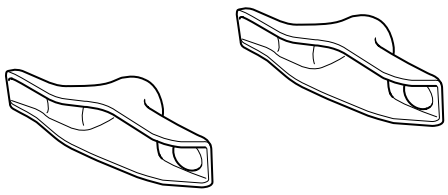
S69M5310

NOTE:
Be sure to keep the valves, springs, and other parts in the order as they were removed.

Valve spring compressor ⑤:
90890-04019
Valve spring compressor attachment ⑥:
90890-06320

Checking the rocker arms

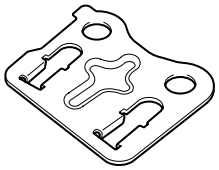
1. Check the rocker arms for cracks, wear, or damage. Replace if necessary.



S69M5320

Checking the push rod guide

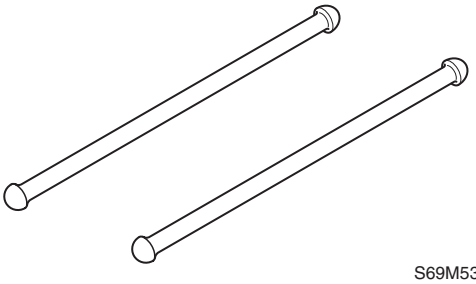
1. Check the push rod guide for cracks or damage. Replace if necessary.



S69M5330

Checking the push rods

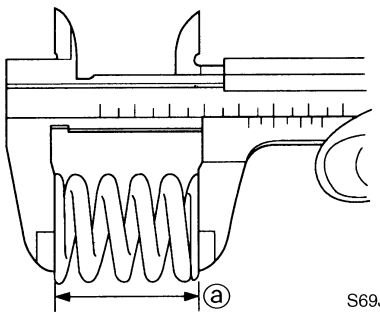
1. Check the push rods for bends, wear, or damage. Replace if necessary.



S69M5340

Checking the valve springs

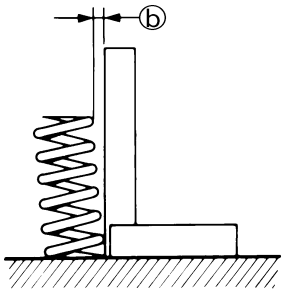
1. Measure the valve spring free length ⓐ. Replace if out of specification.



S69J5720

Valve spring free length ⓐ:
35.0 mm (1.378 in)

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



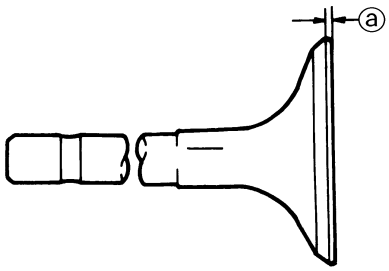
S69J5730

Valve spring tilt limit ⓑ:
1.2 mm (0.05 in)

Checking the valves

1. Check the valve face for pitting or wear. Replace if necessary.

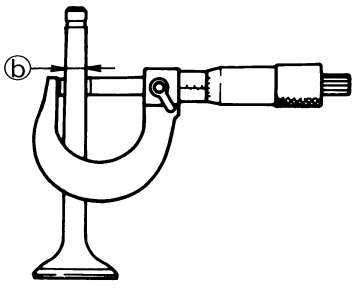
2. Measure the valve margin thickness ⓐ. Replace if out of specification.



S69J5740

Valve margin thickness ⓐ:
Intake: 0.7 mm (0.028 in)
Exhaust: 1.0 mm (0.040 in)

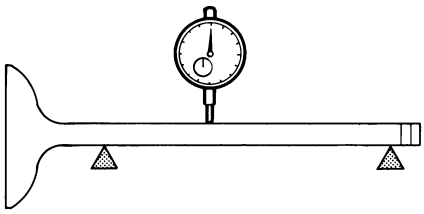
3. Measure the valve stem diameter ⓑ. Replace if out of specification.



S69J5750

Valve stem diameter ⓑ:
Intake:
5.475–5.490 mm
(0.2156–0.2161 in)
Exhaust:
5.460–5.475 mm
(0.2150–0.2156 in)

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

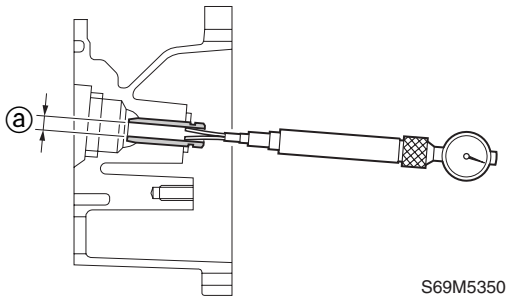

S69J5760

Valve stem runout:
0.03 mm (0.0012 in)

Checking the valve guides

NOTE:
Before checking the valve guide make sure that the valve stem diameter is within specification.

1. Measure the valve guide inside diameter ⓐ.



S69M5350

Valve guide inside diameter ⓐ:
5.500–5.512 mm
(0.2165–0.2170 in)

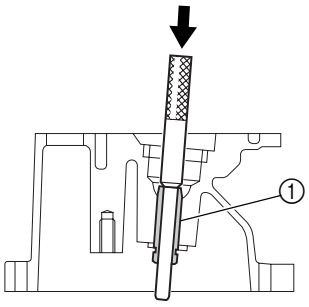
5

2. Calculate the valve stem-to-valve guide clearance as follows. Replace the valve guide if out of specification.

Valve stem-to-valve guide clearance = valve guide inside diameter – valve stem diameter:
Intake:
0.010–0.037 mm
(0.0004–0.0015 in)
Exhaust:
0.025–0.052 mm
(0.0010–0.0020 in)

Replacing the valve guides

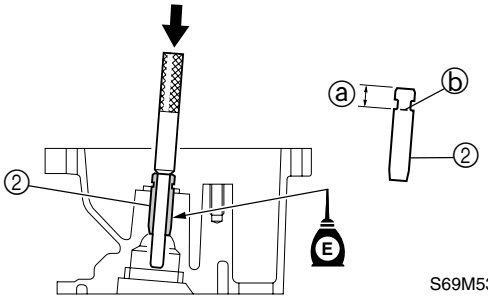
1. Remove the valve guide ① by striking the special service tool from the combustion chamber side.



S69M5360

Valve guide remover/installer:
90890-06801

2. Install the new valve guide ② by striking the special service tool from the rocker arm side until the valve guide reaches the specified installation position ⓐ.



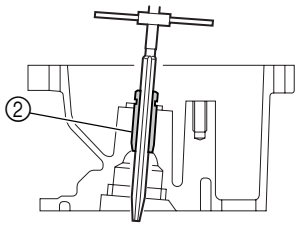
S69M5370

NOTE:
- Before installing the valve guide, mark its installation position ⓑ as shown.
- Apply engine oil to the new valve guide.

Valve guide installation position ⓐ:
5.9 mm (0.23 in)

Valve guide remover/installer:
90890-06801

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



S69M5380

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

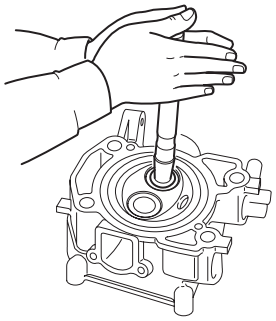
Valve guide reamer: 90890-06804

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

Valve guide inside diameter:
5.500–5.512 mm
(0.2165–0.2170 in)

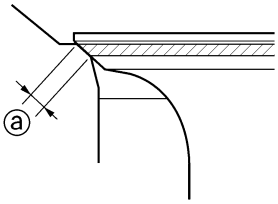
Checking the valve seat

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

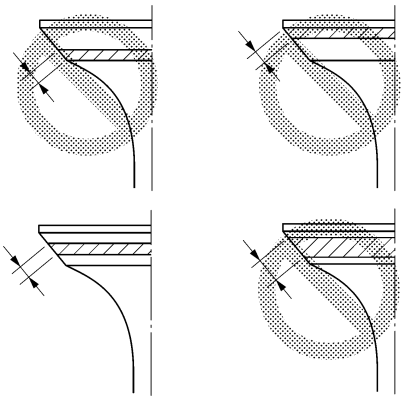


S69M5390

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



S69J5830

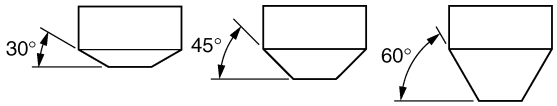


S69J5840

Valve seat contact width ⓐ:
0.6–0.8 mm (0.024–0.031 in)

Refacing the valve seat

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

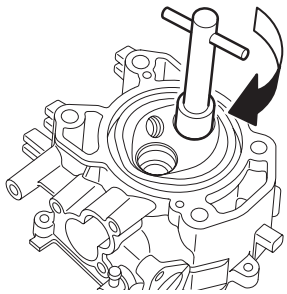


S62Y5430

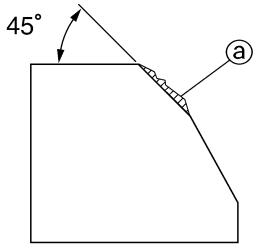
Valve seat cutter holder:
90890-06316
Valve seat cutter:
30°: 90890-06328
45°: 90890-06312
60°: 90890-06315

5

2. Cut the surface of the valve seat with a 45° cutter by turning the cutter clockwise until the valve seat face has become smooth.



S69M5410



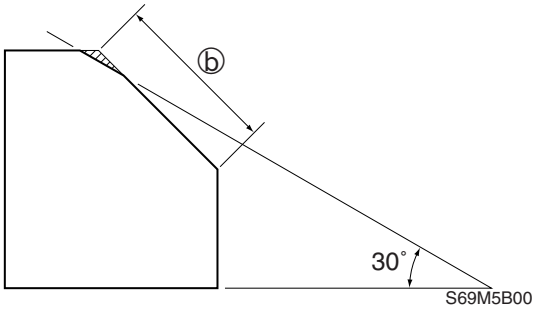
S69J5870

ⓐ Slag or rough surface

CAUTION:

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

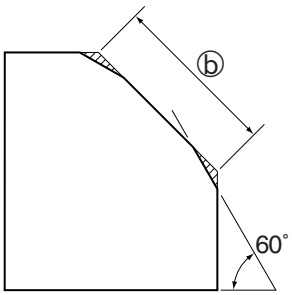
3. Use a 30° cutter to adjust the contact width of the top edge of the valve seat.



S69M5B00

ⓑ Previous contact width

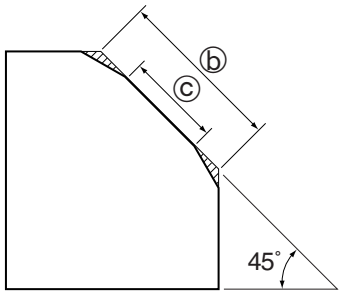
4. Use a 60° cutter to adjust the contact width of the bottom edge of the valve seat.



S69J5890

ⓑ Previous contact width

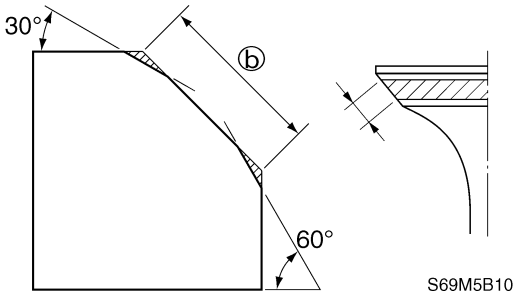
5. Use a 45° cutter to adjust the contact width of the valve seat to specification.



S69J5900

ⓑ Previous contact width
ⓒ Specified contact width

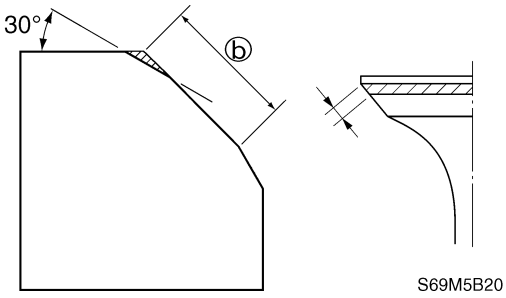
6. If the valve seat contact area is too wide and situated in the center of the valve face, use a 30° cutter to cut the top edge of the valve seat and a 60° cutter to cut the bottom edge to center the area and set its width.



S69M5B10

ⓑ Previous contact width

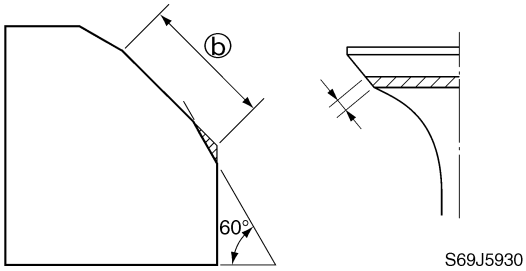
7. If the valve seat contact area is too narrow and situated near the top edge of the valve face, use a 30° cutter to cut the top edge of the valve seat. If necessary, use a 45° cutter to center the area and set its width.



S69M5B20

ⓑ Previous contact width

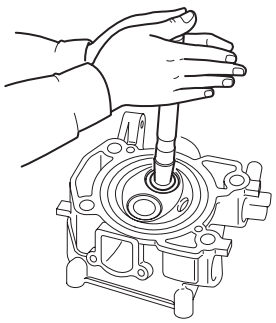
8. If the valve seat contact area is too narrow and situated near the bottom edge of the valve face, use a 60° cutter to cut the bottom edge of the valve seat. If necessary, use a 45° cutter to center the area and set its width.



S69J5930

ⓑ Previous contact width

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


S69M5390

CAUTION:

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

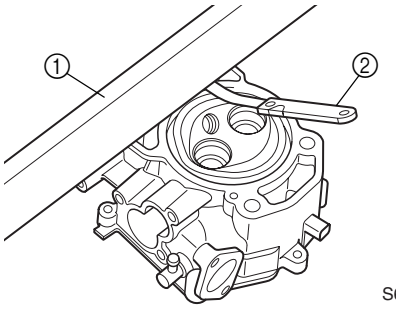
10. After every lapping procedure, be sure to clean off any remaining lapping compound from the cylinder head and the valve.

11. Check the valve seat contact area of the valve again.

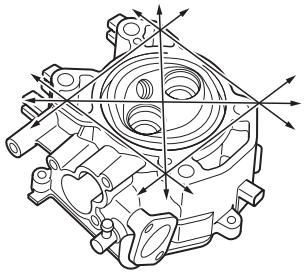
Checking the cylinder head

1. Eliminate carbon deposits from the combustion chambers and check for deterioration.

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



S69M5420

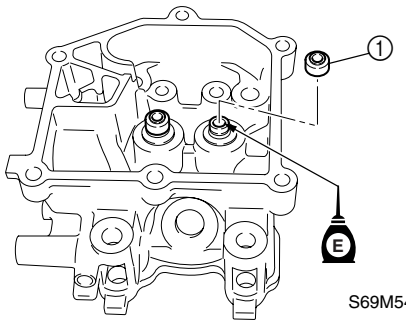

S69M5430

Cylinder head warpage limit:
0.1 mm (0.004 in)

5

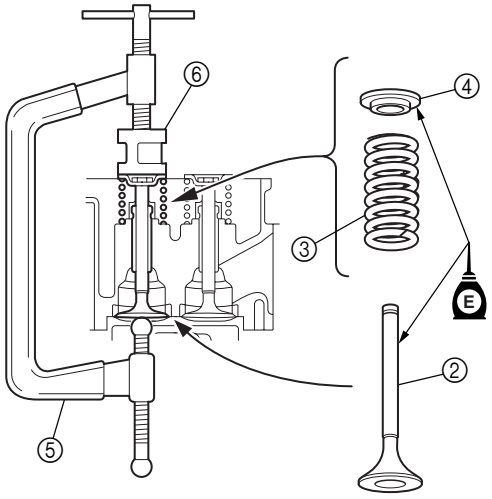
Installing the valves

1. Install the new stem seal ① to the valve guide.



S69M5440

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

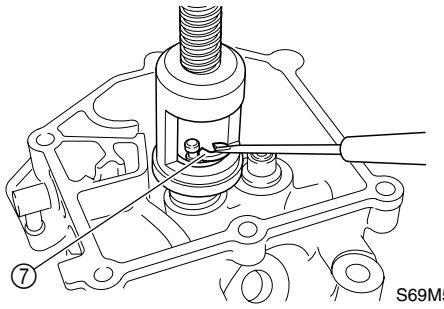


S69M5450

NOTE:
The valve spring can be installed in any direction.

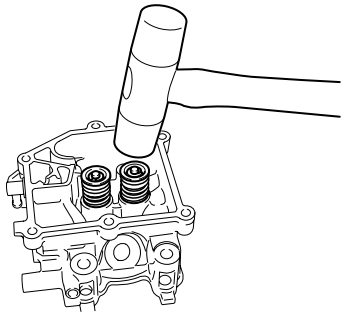
	Valve spring compressor ⑤: 90890-04019 Valve spring compressor attachment ⑥: 90890-06320

3. Compress the valve spring, and then install the valve cotter ⑦ using a thin screwdriver with a small amount of grease applied to it.

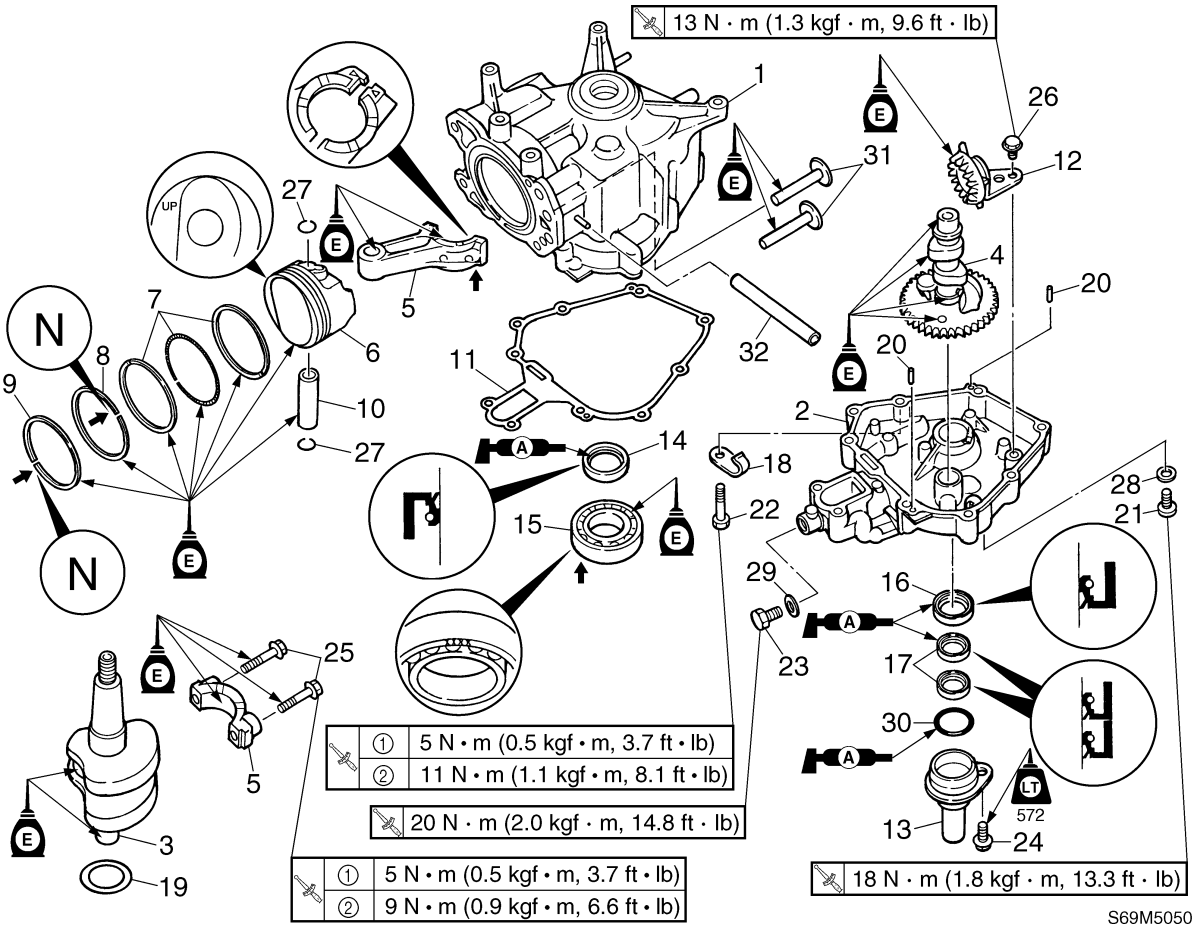


S69M5460

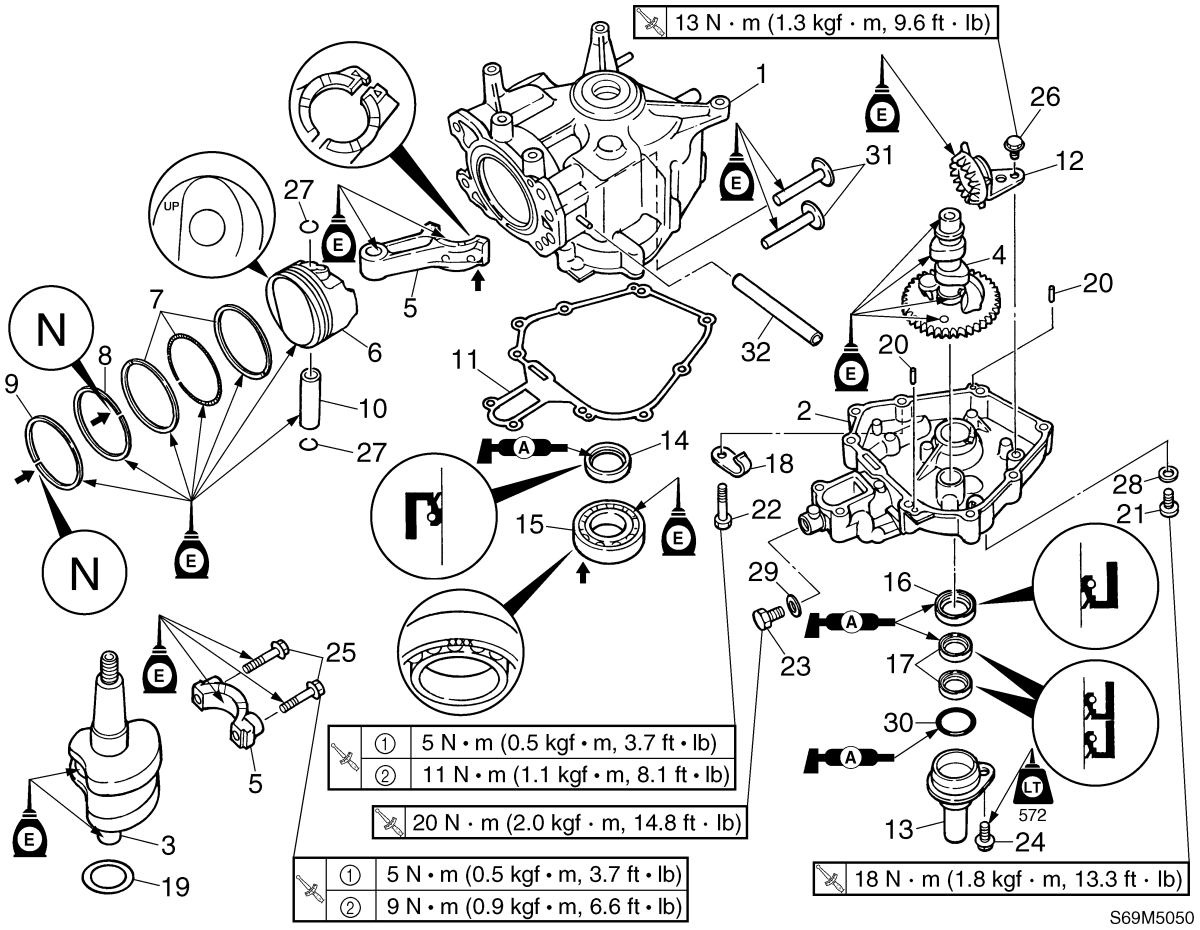
4. Lightly tap the valve spring retainer with a plastic hammer to set the valve cotter securely.


S69M5470

Cylinder block



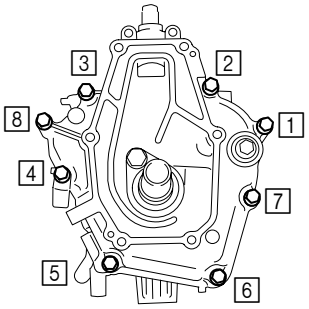
No.	Part name	Q'ty	Remarks
1	Cylinder body	1	
2	Crankcase	1	
3	Crankshaft	1	
4	Camshaft	1	
5	Connecting rod assembly	1	
6	Piston	1	
7	Oil ring	1	
8	Second ring	1	
9	Top ring	1	
10	Piston pin	1	
11	Gasket	1	**Not reusable**
12	Oil splasher gear	1	
13	Oil seal housing	1	
14	Oil seal	1	**Not reusable**
15	Ball bearing	1	**Not reusable**
16	Oil seal	1	**Not reusable**
17	Oil seal	2	**Not reusable**



No.	Part name	Q'ty	Remarks
18	Clamp	1	
19	Washer	1	
20	Dowel	2	
21	Drain bolt	1	M8 × 20 mm
22	Bolt	8	M6 × 45 mm
23	Bolt	1	M8 × 14 mm
24	Bolt	1	M8 × 20 mm
25	Bolt	2	M6 × 29 mm
26	Bolt	1	M6 × 12 mm
27	Piston pin clip	2	**Not reusable**
28	Metal gasket	1	**Not reusable**
29	Metal gasket	1	**Not reusable**
30	O-ring	1	**Not reusable**
31	Valve lifter	2	
32	Hose	1	

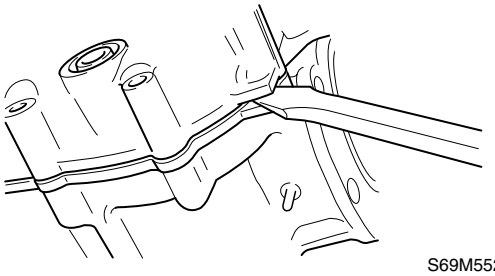
Disassembling the cylinder body

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



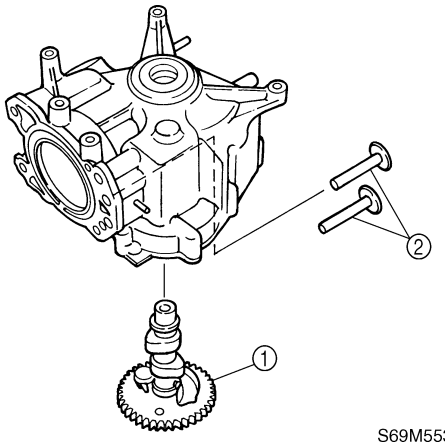
S69M5510

2. Remove the crankcase.


S69M5520

NOTE:
Insert a flat head screwdriver between the tab of the crankcase and the tab of the cylinder block to pry open the two parts.

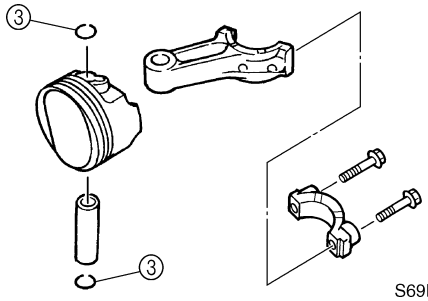
3. Remove the camshaft ①, and then remove the valve lifters ②.



S69M5530

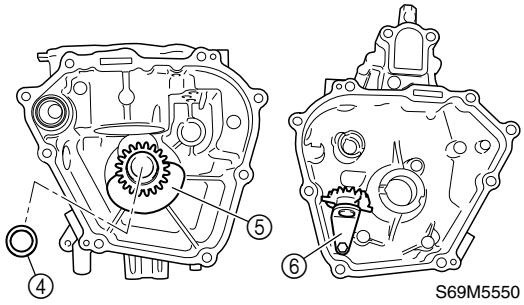
4. Remove the connecting rod bolts and the connecting rod cap, and then remove the connecting rod and piston assembly.

5. Remove the clips ③ with pliers, and then remove the piston.



S69M5540

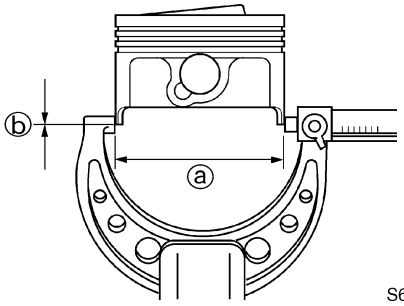
6. Remove the washer ④ and crankshaft ⑤, and then remove the oil splasher gear ⑥.



S69M5550

Checking the piston diameter

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

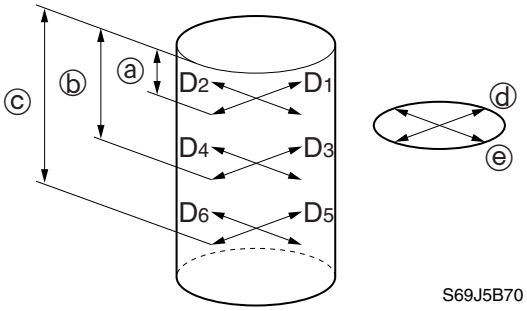


S69M5560

Piston diameter ⓐ:
53.950–53.965 mm
(2.1240–2.1246 in)
Measuring point ⓑ: 0 mm (0 in)

Checking the cylinder bore

1. Measure the cylinder bore (D_1, D_2, D_3, D_4, D_5, 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.



Cylinder bore (D_1, D_2, D_3, D_4, D_5, D_6):
54.000–54.015 mm
(2.1260–2.1266 in)

2. Calculate the taper limit. Replace or rebore the cylinder block if out of specification.

Taper limit:
D_1–D_5 (direction ⓓ)
D_2–D_6 (direction ⓔ)
0.08 mm (0.0031 in)

3. Calculate the out-of-round limit. Replace or rebore the cylinder block if out of specification.

Out-of-round limit:
D_2–D_1 (measuring point ⓐ)
D_6–D_5 (measuring point ⓒ)
0.05 mm (0.0020 in)

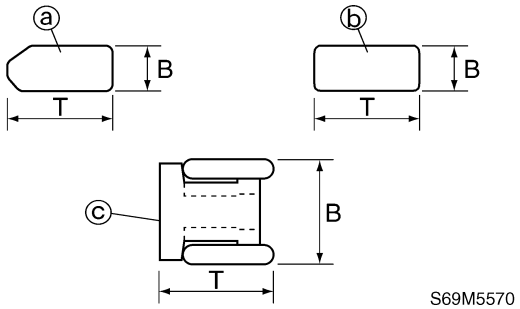
Checking the piston clearance

1. Calculate the piston clearance using the piston outside diameter and the cylinder bore specifications. Replace the piston and piston rings as a set or the cylinder block or all parts, or rebore the cylinder if out of specification.

Piston clearance:
0.035–0.065 mm
(0.0014–0.0026 in)

Checking the piston rings

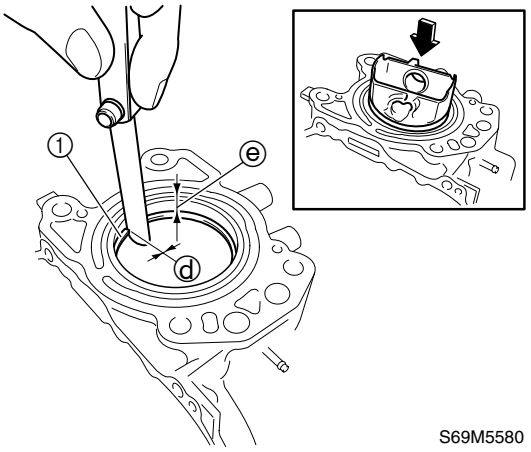
1. Check the piston ring dimensions of B and T. Replace if out of specification.



Piston ring dimensions:
Top ring ⓐ:
B: 0.97–0.99 mm
(0.0382–0.0390 in)
T: 1.95–2.15 mm
(0.0768–0.0846 in)
Second ring ⓑ:
B: 1.17–1.19 mm
(0.0461–0.0468 in)
T: 2.30–2.50 mm
(0.0906–0.0984 in)
Oil ring ⓒ:
B: 1.87–1.95 mm
(0.0736–0.0768 in)
T: 2.10–2.40 mm
(0.0827–0.0945 in)

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

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

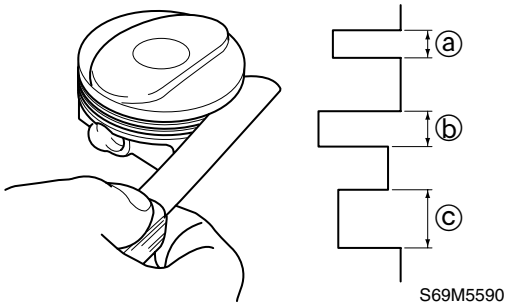


S69M5580

Piston ring end gap ⓓ:
Top ring:
0.15–0.30 mm
(0.0059–0.0118 in)
Second ring:
0.30–0.45 mm
(0.0118–0.0177 in)
Oil ring:
0.20–0.70 mm
(0.0079–0.0276 in)
Measuring point ⓔ: 10 mm (0.39 in)

Checking the piston ring grooves

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

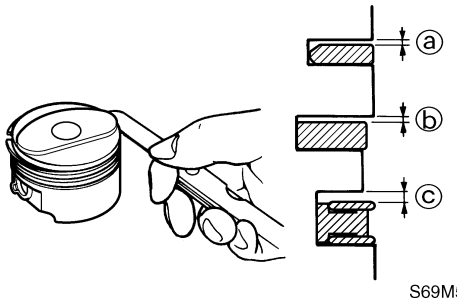


S69M5590

Piston ring groove:
Top ring ⓐ:
1.03–1.05 mm (0.040–0.041 in)
Second ring ⓑ:
1.21–1.23 mm (0.047–0.048 in)
Oil ring ⓒ:
2.01–2.03 mm (0.079–0.080 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.

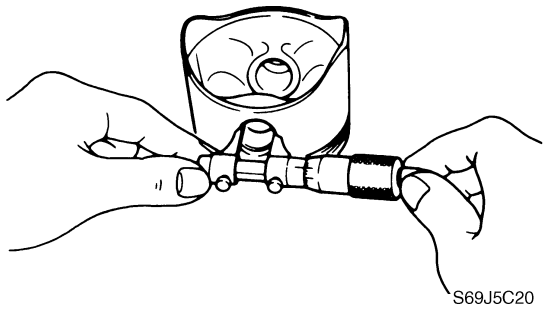


S69M5600

Piston ring side clearance:
Top ring ⓐ:
0.04–0.08 mm
(0.0016–0.0031 in)
Second ring ⓑ:
0.02–0.06 mm
(0.0008–0.0024 in)
Oil ring ⓒ:
0.06–0.16 mm
(0.0024–0.0063 in)

Checking the piston pin boss bore

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

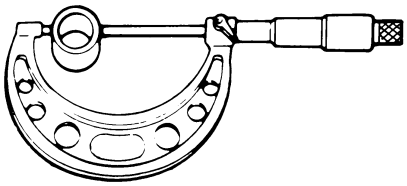

S69J5C20

Piston pin boss bore:
12.009–12.017 mm
(0.4728–0.4731 in)

5

Checking the piston pin

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

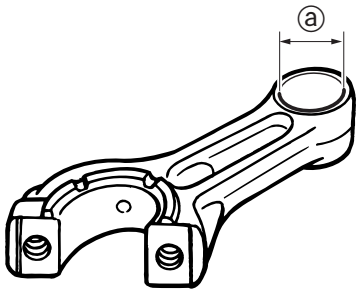


S69J5C30

Piston pin diameter:
11.996–12.000 mm
(0.4723–0.4724 in)

Checking the connecting rod small end inside diameter

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

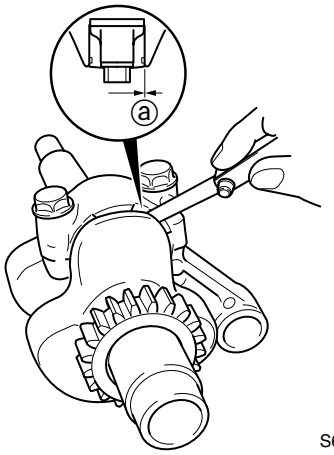


S69M5650

Connecting rod small end inside diameter ⓐ:
12.006–12.020 mm
(0.4727–0.4732 in)

Checking the connecting rod big end side clearance

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

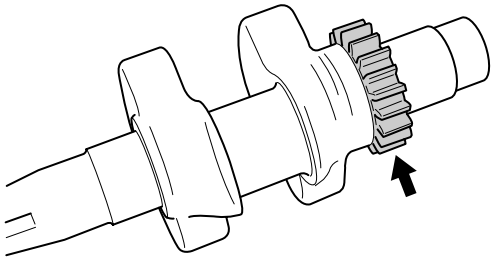


S69M5660

Connecting rod big end side clearance ⓐ:
0.2–0.6 mm (0.008–0.024 in)

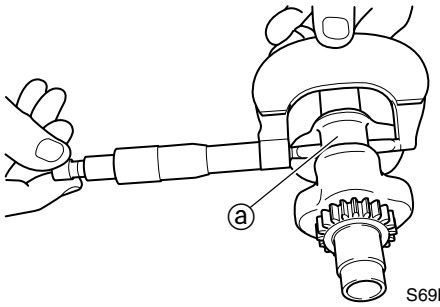
Checking the crankshaft

1. Check the teeth of the crankshaft gear for damage or wear. Replace if necessary.

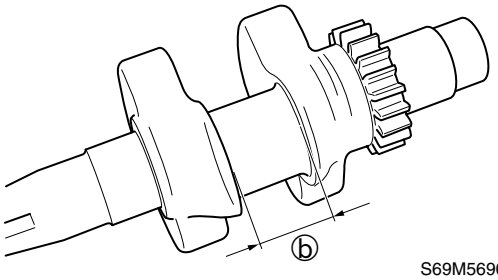


S69M5670

2. Measure the crankpin diameter ⓐ and crankpin width ⓑ. Replace the crankshaft if out of specification.



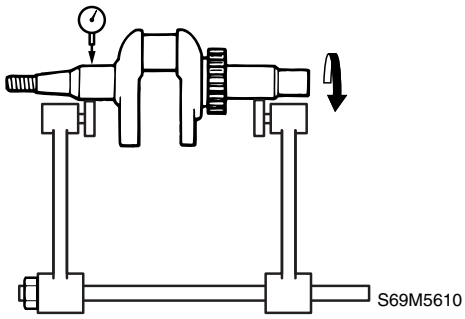
S69M5680



S69M5690

Crankpin diameter ⓐ:
23.969–23.984 mm
(0.9437–0.9443 in)
Crankpin width ⓑ:
21.0–21.1 mm (0.827–0.831 in)

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

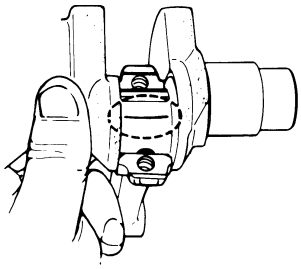

S69M5610

Crank stand alignment:
90890-03107

Crankshaft runout limit:
0.01 mm (0.0004 in)

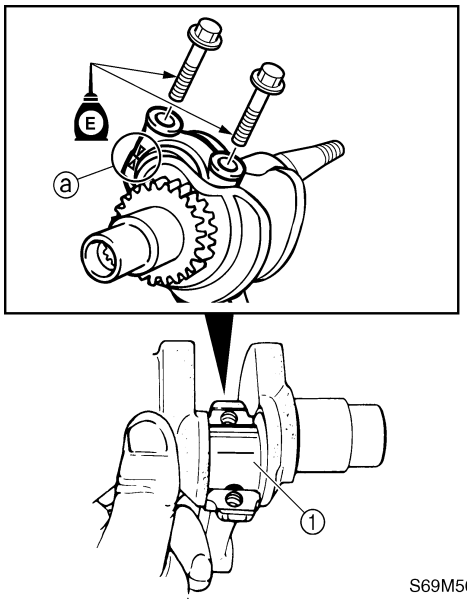
Checking the crankpin oil clearance

1. Clean the connecting rod.
2. Put a piece of Plastigauge® (PG-1) onto the crankpin, parallel to the crankshaft.


S69M5620

NOTE:
Be sure not to put the Plastigauge (PG-1) over the oil hole in the crankpin of the crankshaft.

3. Install the connecting rod to the crankpin ①.

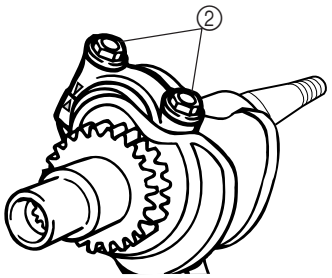


S69M5630

NOTE:
Align the marks ⓐ on the connecting rod cap and connecting rod.

5

4. Tighten the connecting rod bolts ② to the specified torques in two stages.

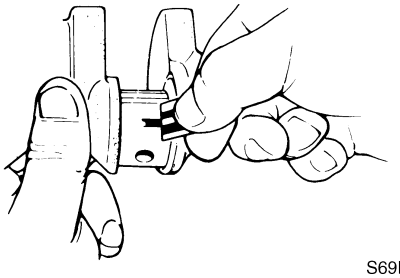


S69M5640

NOTE:
- Reuse the removed connecting rod bolts when checking the oil clearance.
- Do not turn the connecting rod until the crankpin oil clearance measurement has been completed.

Connecting rod bolt:
1st: 5 N·m (0.5 kgf·m, 3.7 ft·lb)
2nd: 9 N·m (0.9 kgf·m, 6.6 ft·lb)

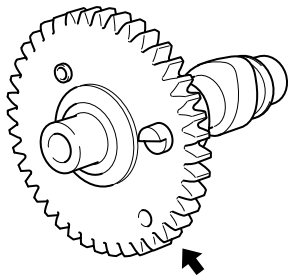
5. Remove the connecting rod cap and measure the width of the compressed Plastigauge (PG-1) on the crankpin. Replace the connecting rod assembly or crankshaft if out of specification.


S69M5700

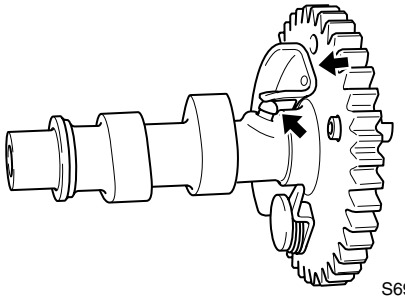
Crankpin oil clearance:
0.016–0.046 mm
(0.0006–0.0018 in)

Checking the camshaft

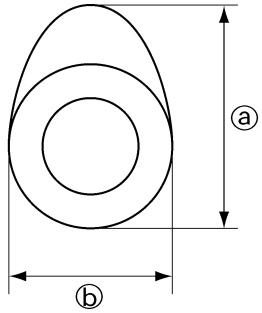
1. Check the teeth of the camshaft gear for damage or wear. Replace the camshaft if necessary.


S69M5710

2. Check the decompressor for damage or wear. Replace the camshaft if necessary.


S69M5720

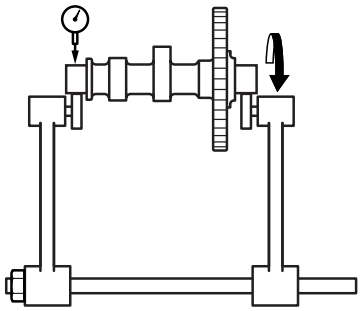
3. Measure the camshaft lobe. Replace if out of specification.



S69J5950

Camshaft lobe ⓐ:
26.139–26.239 mm
(1.0290–1.0330 in)
Camshaft lobe ⓑ:
21.950–22.050 mm
(0.8642–0.8681 in)

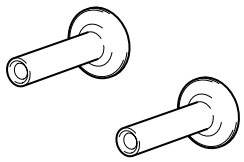
4. Measure the camshaft runout. Replace if out of specification.


S69M5730

Camshaft runout limit:
0.03 mm (0.0012 in)

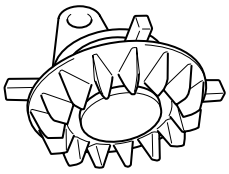
Checking the valve lifters

1. Check the valve lifters for bends or wear. Replace if necessary.


S69M5740

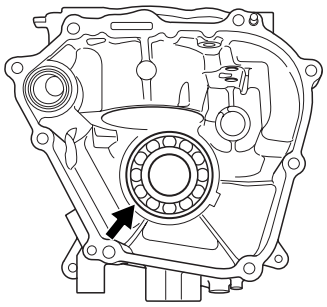
Checking the oil splasher gear

1. Check the teeth of the oil splasher gear for cracks, damage, or wear. Replace if necessary.


S69M5750

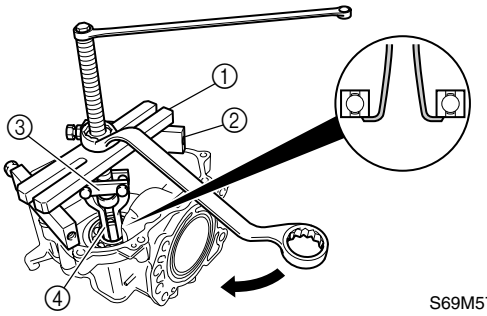
Disassembling the cylinder block

1. Check the ball bearing for pitting or rumbling. Replace if necessary.


S69M5755

NOTE:
Do not remove the ball bearing if not replacing it.

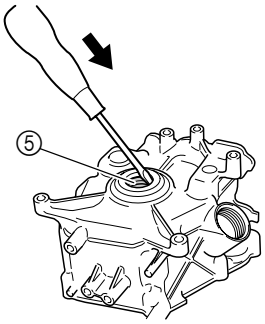
2. Remove the ball bearing.



S69M5770

Stopper guide plate ①: 90890-06501
Stopper guide stand ②:
90890-06538
Bearing puller ③: 90890-06535
Bearing puller claw 1 ④:
90890-06536

3. Remove the oil seal ⑤.

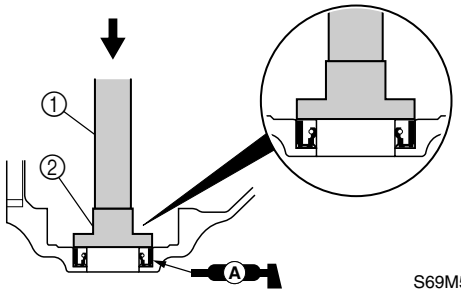


S69M5780

5

Assembling the cylinder block

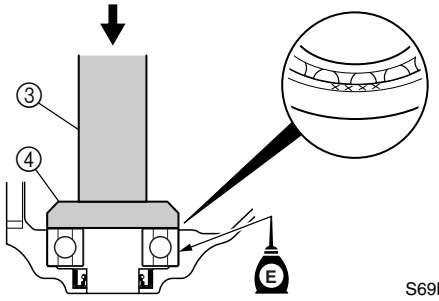
1. Apply grease to the new oil seal, and then install it into the cylinder block.



S69M5800

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

2. Install the new ball bearing into the cylinder block.



S69M5820

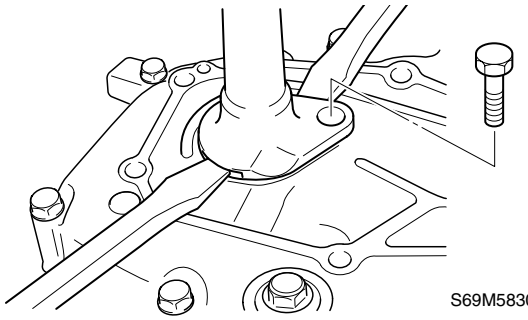
CAUTION:

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

Driver rod LS ③: 90890-06606
Bearing outer race attachment ④: 90890-06624

Disassembling the crankcase

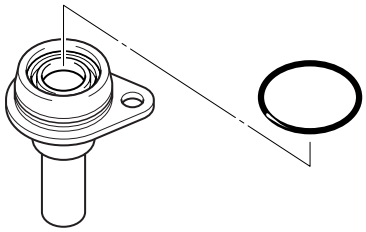
1. Remove the bolt and oil seal housing.


S69M5830

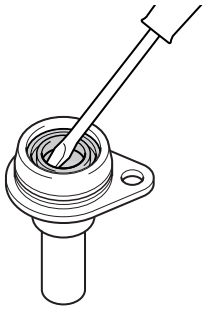
NOTE:

Insert a flat head screwdriver between the tab of the oil seal housing and the tab of the crankcase to pry open the two parts.

2. Remove the O-ring.

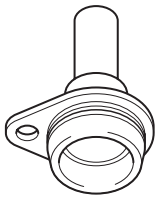

S69M5840

3. Remove the oil seals.


S69M5850

Checking the oil seal housing

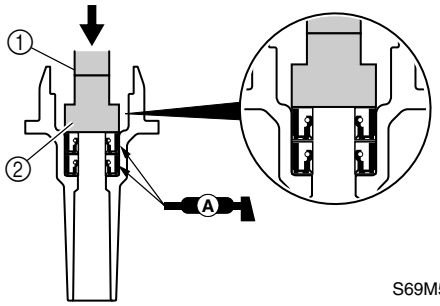
1. Check the oil seal housing for cracks, damage, or corrosion. Replace if necessary.



S69M5860

Assembling the crankcase

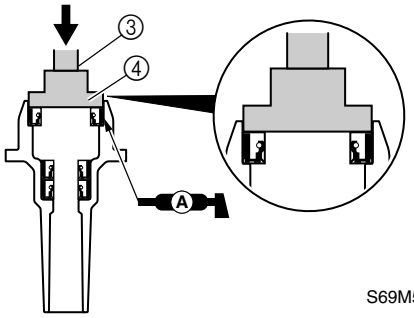
1. Apply grease to the new oil seals, and then install them into the oil seal housing.



S69M5880

	Driver rod L3 ①: 90890-06652 Bushing attachment ②: 90890-06649

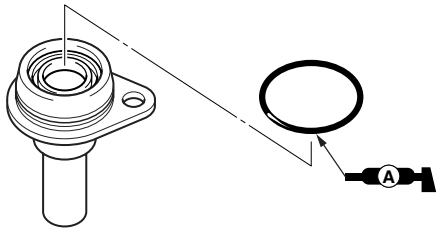
2. Apply grease to the new oil seal, and then install it into the oil seal housing.



S69M5900

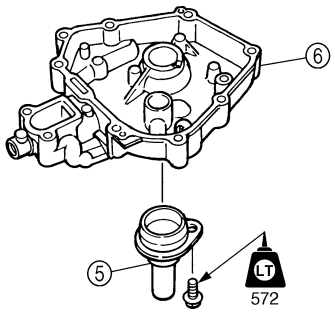
	Driver rod L3 ③: 90890-06652 Needle bearing attachment ④: 90890-06613

3. Install the new O-ring.



S69M5910

4. Install the oil seal housing ⑤ to the crankcase ⑥.

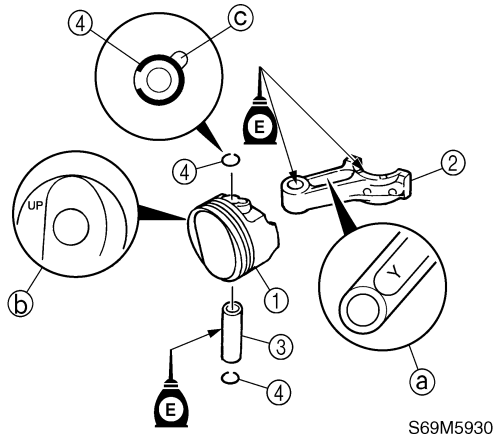


S69M5920

5

Assembling the piston and cylinder block

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

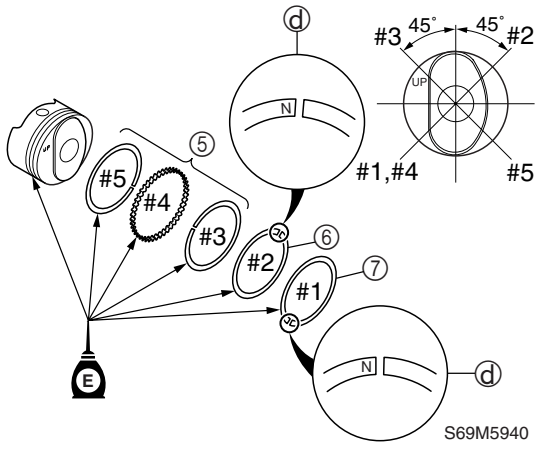


S69M5930

NOTE:
- Face the embossed "Y" mark ⓐ on the connecting rod in the same direction as the "UP" mark ⓑ on the piston.
- Always use new piston pin clips, and do not allow the piston pin clip end to align with the piston pin slot ⓒ.

2. Install the oil ring ⑤, second ring ⑥, and top ring ⑦ to the piston with the "N" marks ⓓ of the top and second ring facing upward.

3. Offset the piston ring end gaps as shown.



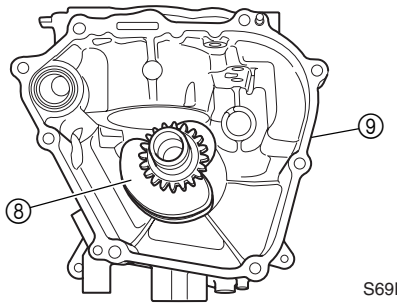
S69M5940

CAUTION:

Do not scratch the piston or break the piston rings.

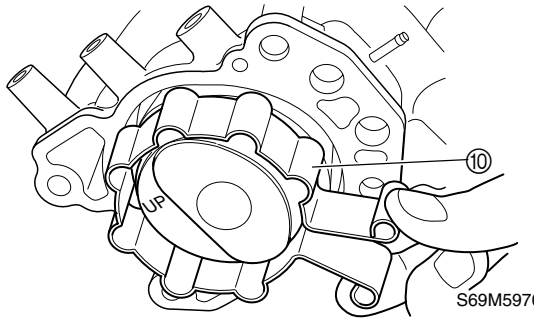
NOTE:
After installing the piston rings, check them for smooth operation.

4. Install the crankshaft ⑧ into the cylinder block ⑨.



S69M5950

5. Install the piston with the "UP" mark on the piston crown facing towards the flywheel magnet.

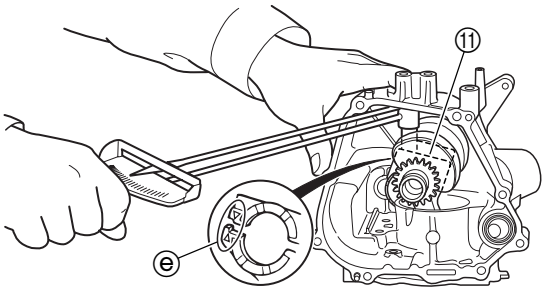


S69M5970

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


Piston slider ⑩: 90890-06843

6. Install the connecting rod cap ⑪ to the connecting rod, and then tighten the connecting rod bolts to the specified torques in two stages.

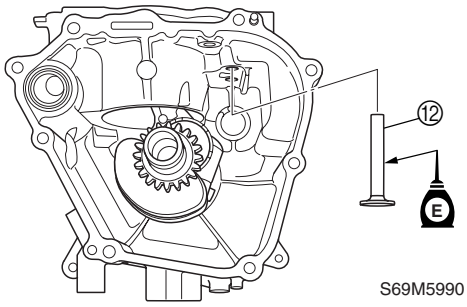


S69M5980

NOTE:
- Apply engine oil to the connecting rod cap and connecting rod bolts before installation.
- Align the marks ⓔ on the connecting rod cap and connecting rod.

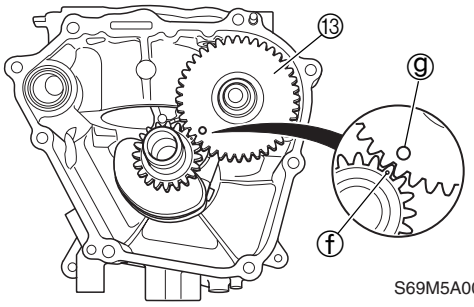
Connecting rod bolt:
1st: 5 N·m (0.5 kgf·m, 3.7 ft·lb)
2nd: 9 N·m (0.9 kgf·m, 6.6 ft·lb)

7. Install the valve lifters ⑫ into the cylinder block.



S69M5990

8. Set the camshaft ⑬ into the cylinder block as shown.

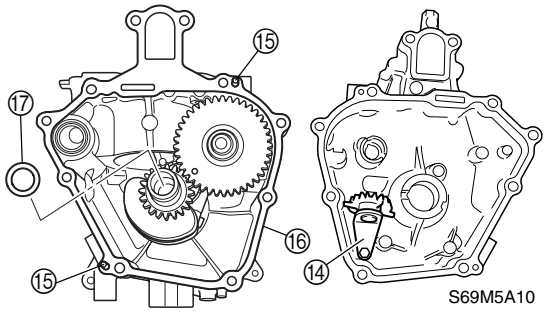


S69M5A00

NOTE:
Align the crankshaft mark ⓕ and the camshaft mark ⓖ.

9. Install the oil splasher gear ⑭, and then tighten the bolt to the specified torque.

10. Install the dowel ⑮, new gasket ⑯, and the washer ⑰.



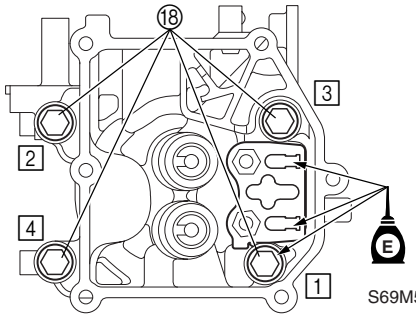
S69M5A10

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

Oil splasher gear bolt:
13 N·m (1.3 kgf·m, 9.6 ft·lb)

5

11. Install the new gasket and cylinder head, and then tighten the cylinder head bolts ⑱ to the specified torques in two stages and in the sequence shown.



S69M5C10

CAUTION:

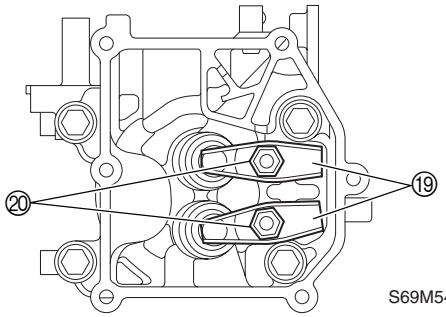
Do not reuse the cylinder head gasket, always replace it with a new one.

NOTE:

Apply engine oil to the cylinder head bolts before installation.

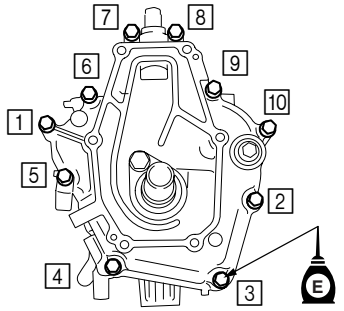
Cylinder head bolt ⑱:
1st: 14 N·m (1.4 kgf·m, 10.3 ft·lb)
2nd: 30 N·m (3.0 kgf·m, 22.1 ft·lb)

12. Install the push rods, rocker arms ⑲, and rocker arm pivots ⑳, and then tighten the rocker arm locknuts.



S69M5480

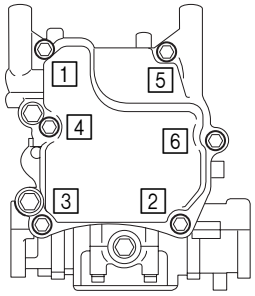
13. Install the crankcase to the cylinder block, and then tighten the crankcase bolts to the specified torques in two stage and in the sequence shown.



S69M5A20

Crankcase bolt:
1st: 5 N·m (0.5 kgf·m, 3.7 ft·lb)
2nd: 11 N·m (1.1 kgf·m, 8.1 ft·lb)

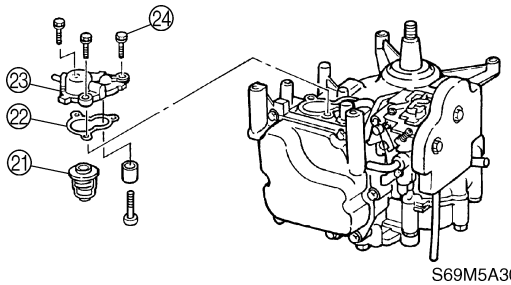
14. Install the new gasket and cylinder head cover, and then tighten the bolts to the specified torques in two stages and in the sequence shown.



S69M5500

Cylinder head cover bolt:
1st: 5 N·m (0.5 kgf·m, 3.7 ft·lb)
2nd: 12 N·m (1.2 kgf·m, 8.9 ft·lb)

15. Install the thermostat ㉑, new gasket ㉒, and thermostat cover ㉓, and then tighten the thermostat cover bolts ㉔ to the specified torque.



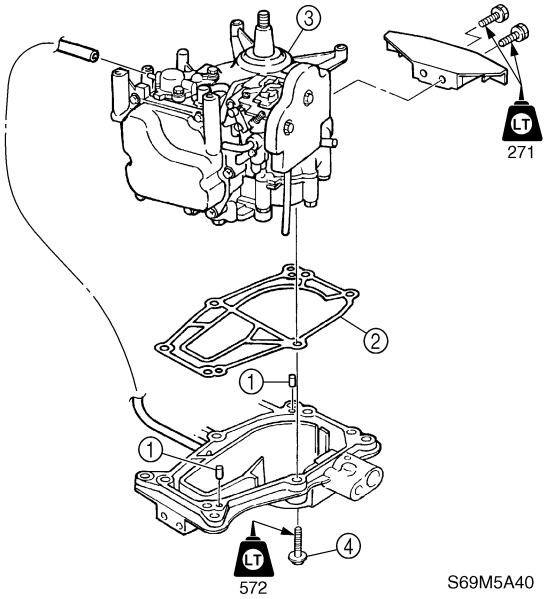
S69M5A30

	Thermostat cover bolt ㉔: 8 N·m (0.8 kgf·m, 5.9 ft·lb)

Installing the power unit

1. Clean the power unit mating surfaces, and then install the dowels ① and the new gasket ②.

2. Install the power unit ③ by installing the bolts ④, and then tighten them to the specified torque.



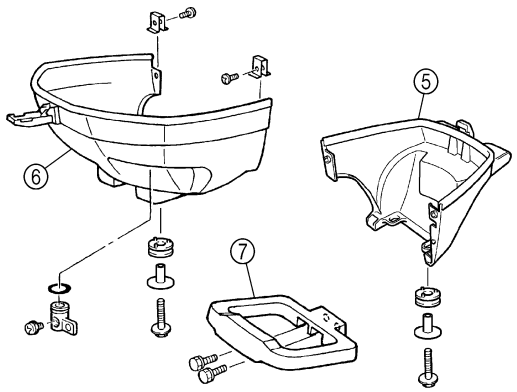
S69M5A40

CAUTION:

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

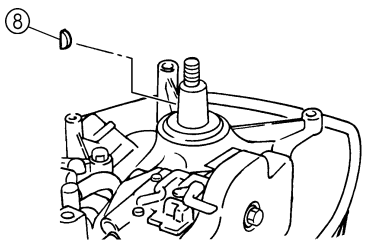
	Power unit bolt ④: 11 N·m (1.1 kgf·m, 8.1 ft·lb)

3. Install bottom cowling 1 ⑤, bottom cowling 2 ⑥, and the carrying handle ⑦.



S69M5A50

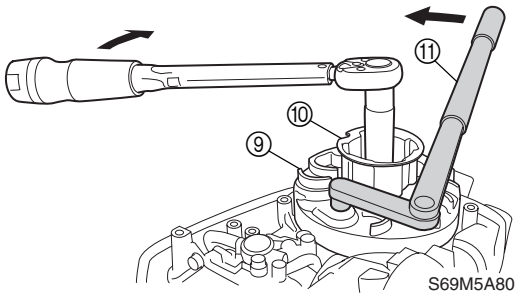
4. Install the Woodruff key ⑧.



S69M5A60

5

5. Install the flywheel magnet ⑨ and starter pulley ⑩, and then 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.

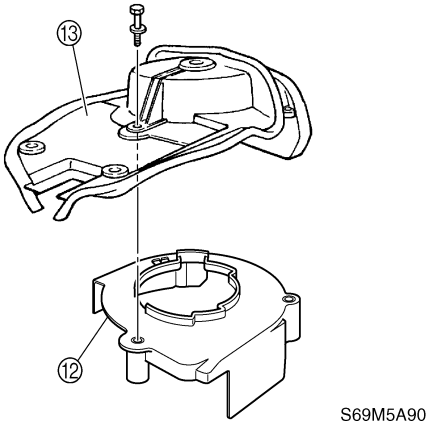
NOTE:

Apply engine oil to the flywheel magnet nut before installation.

	Flywheel holder ⑪: 90890-06522

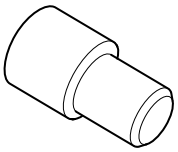
	Flywheel magnet nut: 44 N·m (4.4 kgf·m, 32.4 ft·lb)

6. Install the flywheel magnet cover ⑫ and manual starter ⑬.

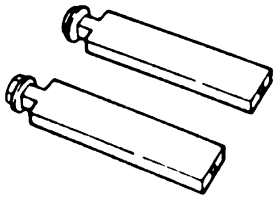


Lower unit

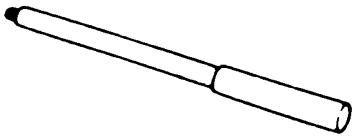
Special service tools



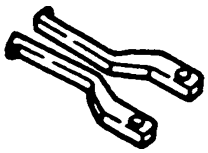
Bushing attachment
90890-06649, 90890-06650



Stopper guide stand
90890-06538



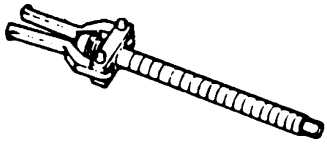
Driver rod L3
90890-06652



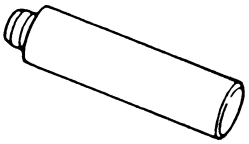
Bearing puller claw 2
90890-06537

Needle bearing attachment
90890-06615, 90890-06617

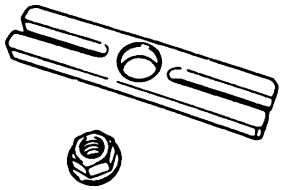
Ball bearing attachment
90890-06637, 90890-06638



Bearing puller
90890-06535

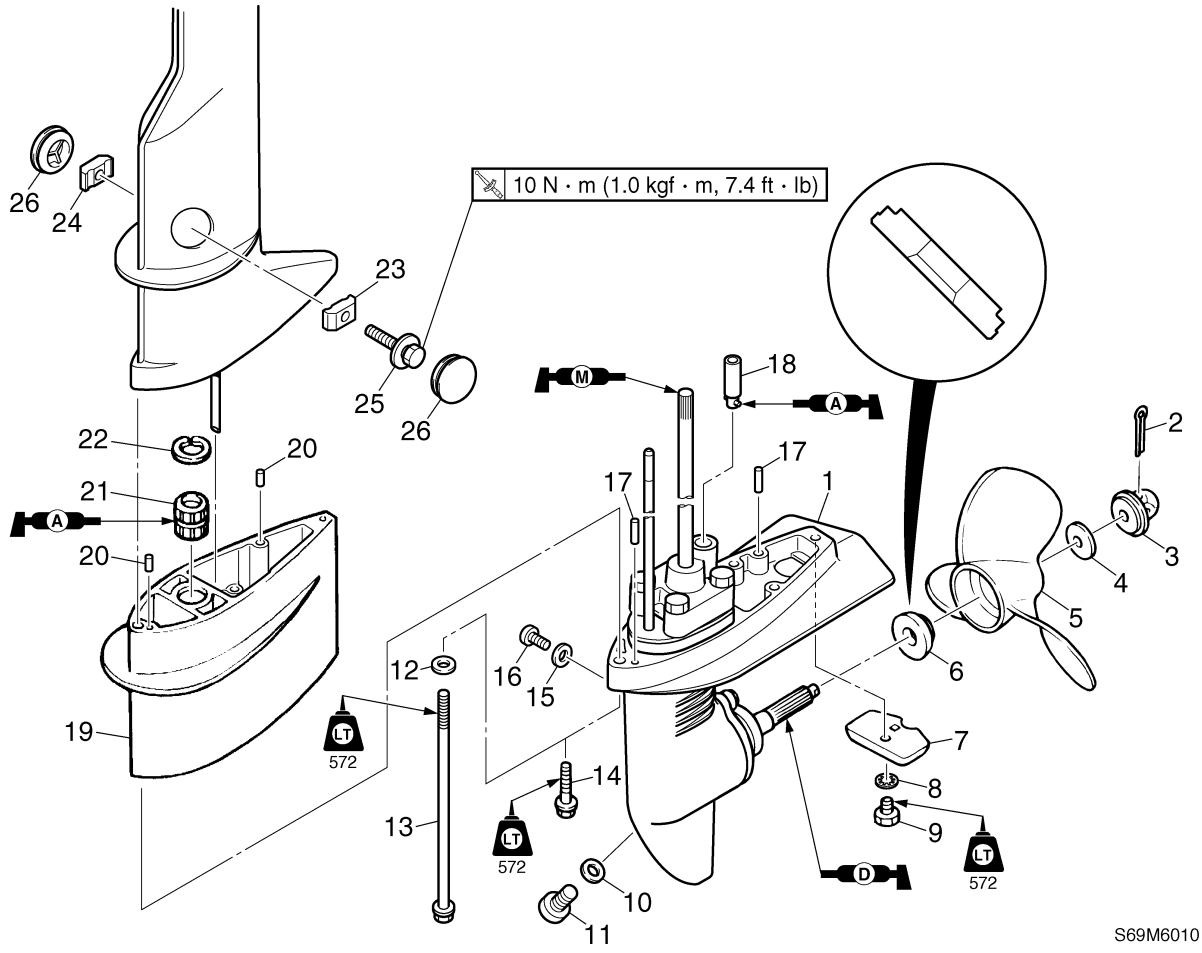


Driver rod LS
90890-06606

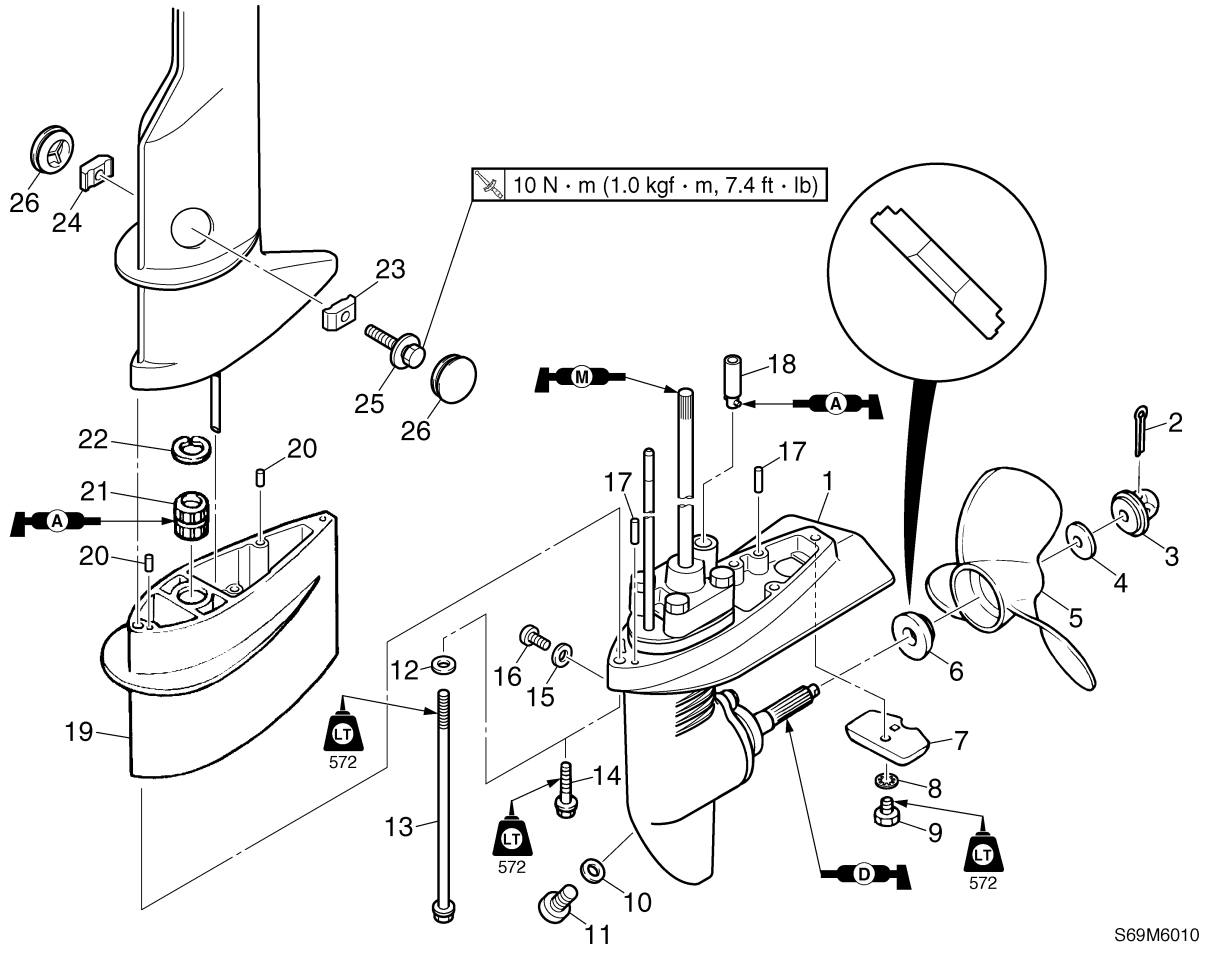


Stopper guide plate
90890-06501

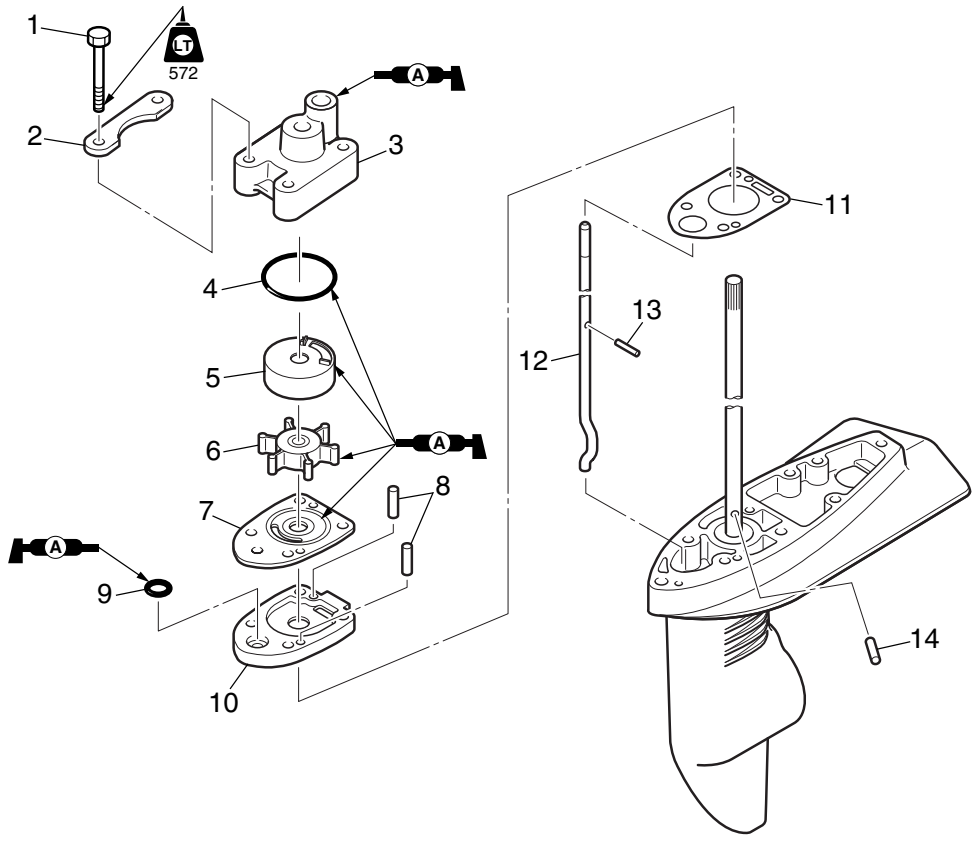
Lower unit



No.	Part name	Q'ty	Remarks
1	Lower unit	1	
2	Cotter pin	1	**Not reusable**
3	Propeller nut	1	
4	Washer	1	
5	Propeller	1	
6	Spacer	1	
7	Anode	1	
8	Lock washer	1	
9	Bolt	1	M6 × 20 mm
10	Gasket	1	**Not reusable**
11	Drain screw	1	
12	Washer	3	L-transom model
13	Bolt	3	M6 × 155 mm / L-transom model
14	Bolt	3	M6 × 30 mm / S-transom model
15	Gasket	1	**Not reusable**
16	Check screw	1	
17	Dowel	2	



No.	Part name	Q'ty	Remarks
18	Rubber seal	1	
19	Extension	1	L-transom model
20	Dowel	2	L-transom model
21	Bushing	1	L-transom model
22	Circlip	1	L-transom model
23	Joint	1	
24	Joint	1	
25	Bolt	1	M6 × 20 mm
26	Cover	2	



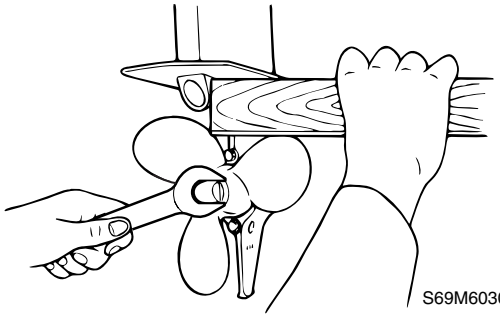
S69M6020

No.	Part name	Q'ty	Remarks
1	Bolt	4	M6 × 40 mm
2	Plate	2	
3	Water pump housing	1	
4	O-ring	1	**Not reusable**
5	Insert cartridge	1	
6	Impeller	1	
7	Outer plate cartridge	1	
8	Dowel	2	
9	O-ring	1	**Not reusable**
10	Plate	1	
11	Gasket	1	**Not reusable**
12	Shift rod	1	S- and L-transom models
13	Dowel	1	
14	Dowel	1	

Removing the lower unit

1. Drain the gear oil. For draining procedures, see Chapter 3, “Changing the gear oil.”

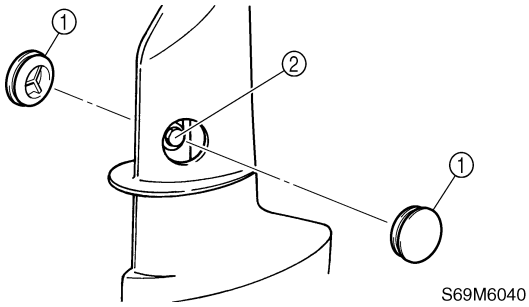
2. Set the gear shift to the neutral position, and place a block of wood between the anti-cavitation plate and propeller to keep the propeller from turning, and then remove the propeller nut and propeller.


S69M6030

⚠ WARNING

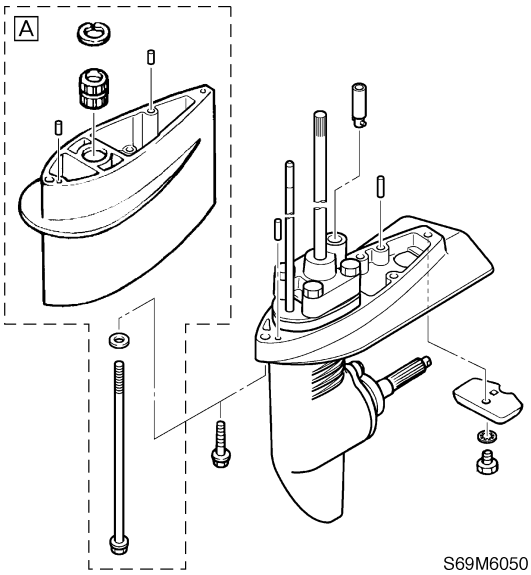
- **Do not hold the propeller with your hands when loosening or tightening it.**
- **Be sure to disconnect the spark plug cap from the spark plug and the clip from the engine shut-off switch.**
- **Put a block of wood between the anti-cavitation plate and propeller to keep the propeller from turning.**

3. Remove the covers ①, and then loosen the bolt ②.



S69M6040

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



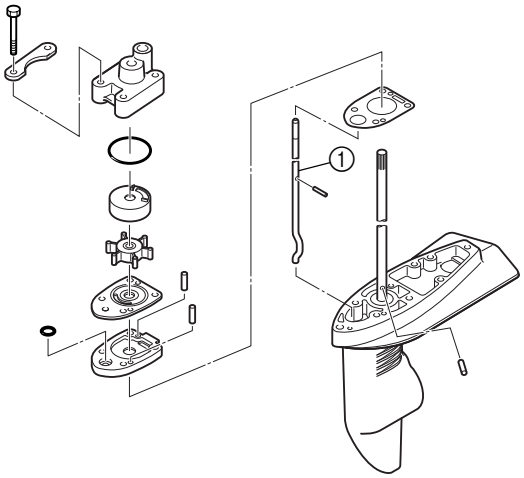
S69M6050

A L-transom model

NOTE:
Check that there is no oil on the spline and check it for rust or wear.

Removing the water pump and shift rod

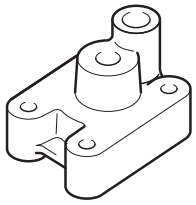
1. Remove the water pump assembly and shift rod ①.



S69M6060

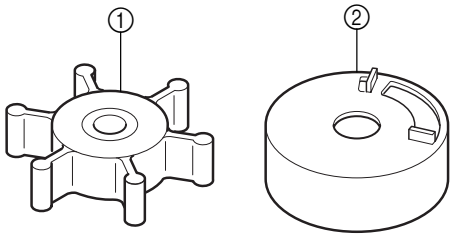
Checking the water pump and shift rod

1. Check the water pump housing for deformation. Replace if necessary.



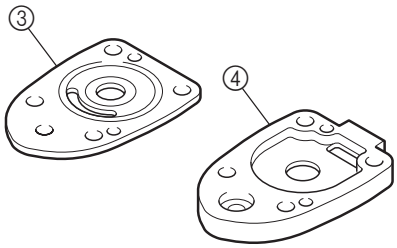
S69M6070

2. Check the impeller ① and insert cartridge ② for cracks or wear. Replace if necessary.



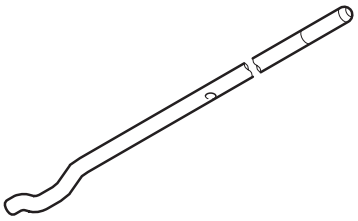
S69M6080

3. Check the outer plate cartridge ③ and the plate ④ for cracks or damage. Replace if necessary.



S69M6090

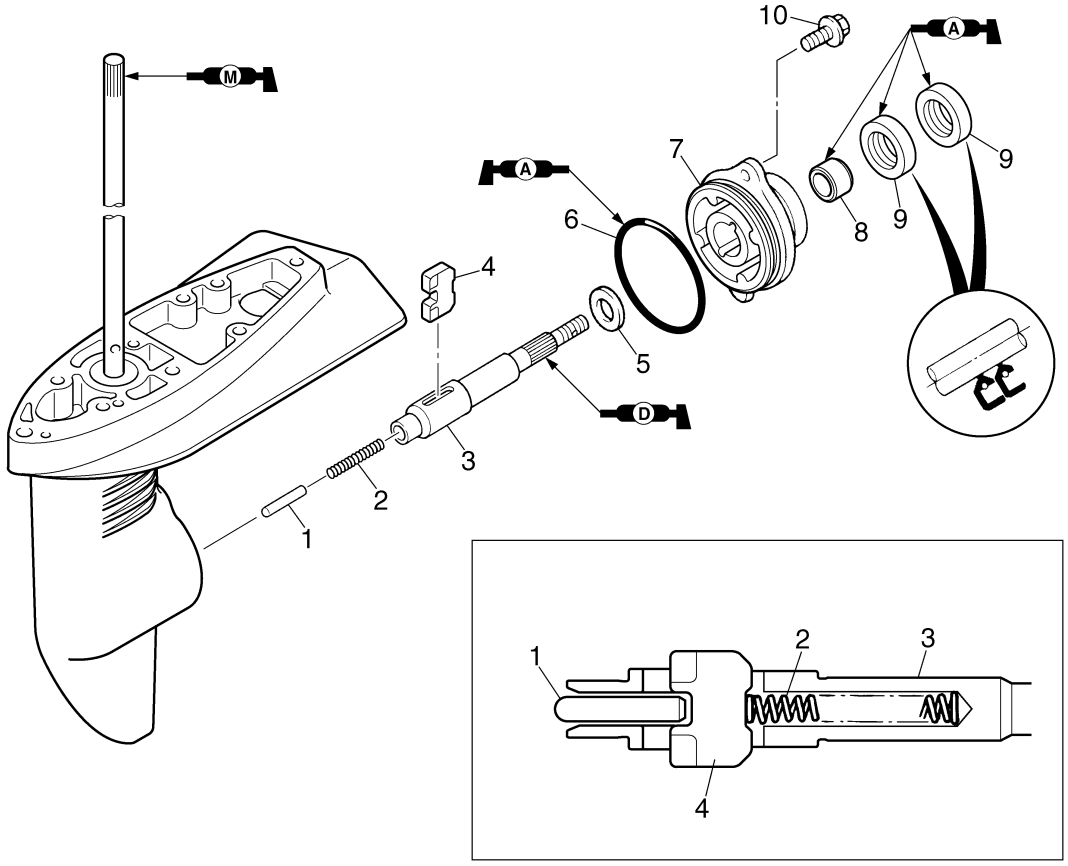
4. Check the shift rod for cracks or wear. Replace if necessary.



S69M6100

6

Propeller shaft housing

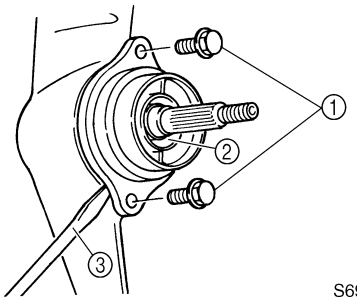


S69M6110

No.	Part name	Q'ty	Remarks
1	Shift plunger	1	
2	Spring	1	
3	Propeller shaft	1	
4	Dog clutch	1	
5	Washer	1	
6	O-ring	1	**Not reusable**
7	Propeller shaft housing	1	
8	Bushing	1	
9	Oil seal	2	**Not reusable**
10	Bolt	2	M6 × 16 mm

Removing the propeller shaft housing assembly

1. Remove the bolts ①, and then pull out the propeller shaft housing assembly ②.



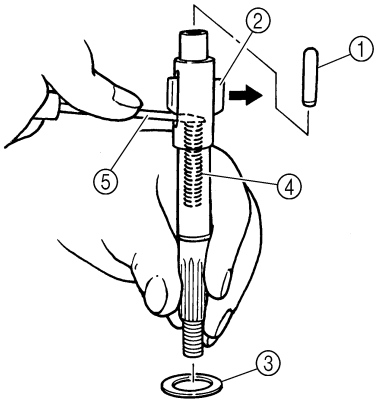
S69M6120

NOTE:

Insert a flat head screwdriver ③ into the slit between the sealing surfaces of the lower case to pry open the two parts.

Disassembling the propeller shaft assembly

1. Remove the shift plunger ①, then the dog clutch ②, washer ③, and spring ④.



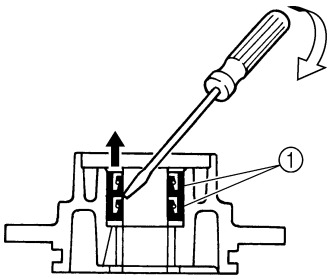
S69M6130

NOTE:

To remove the dog clutch, push the spring down with a flat head screwdriver ⑤.

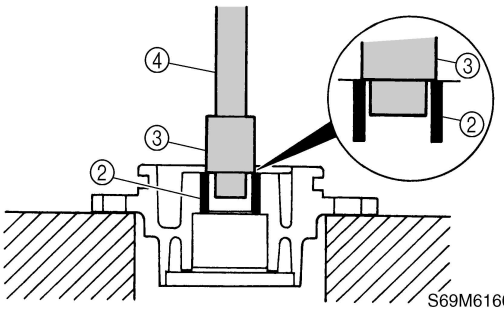
Disassembling the propeller shaft housing

1. Remove the oil seals ①.



S69M6140

2. Remove the bushing ②.

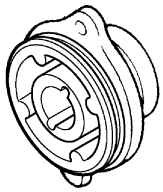


S69M6160

Bushing attachment ③:
90890-06650
Driver rod L3 ④: 90890-06652

Checking the propeller shaft housing

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

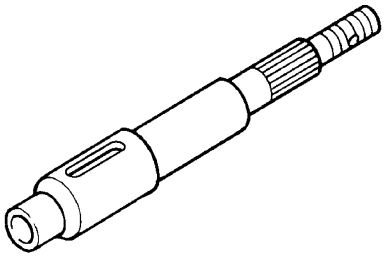


S69M6170

6

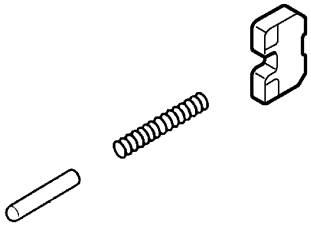
Checking the propeller shaft

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



S69M6180

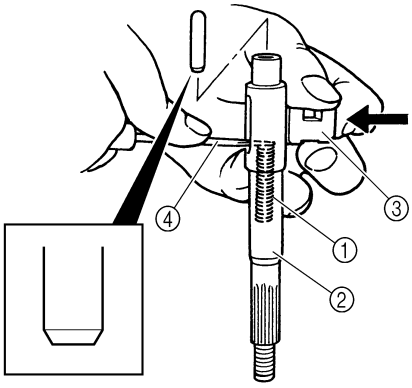
2. Check the dog clutch, shift plunger, and spring for cracks or wear. Replace if necessary.



S69M6190

Assembling the propeller shaft assembly

1. Insert the spring ①, and then install the dog clutch ③ into the propeller shaft ②.

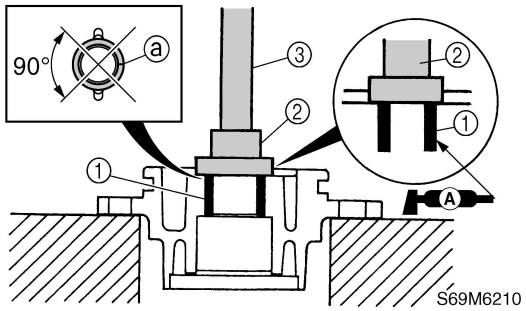


S69M6200

NOTE:
To install the dog clutch, push the spring down with a flat head screwdriver ④.

Assembling the propeller shaft housing

1. Install the bushing ① into the propeller shaft housing.

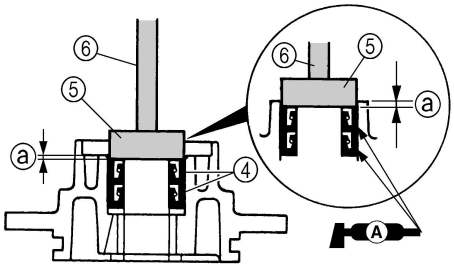


S69M6210

NOTE:
Insert the dog clutch into the bushing slit at a 90° angle as shown in the illustration.

Needle bearing attachment ②: 90890-06615
Driver rod L3 ③: 90890-06652

2. Apply grease to the new oil seals ④, and then install them into the propeller shaft housing to the specified depth.

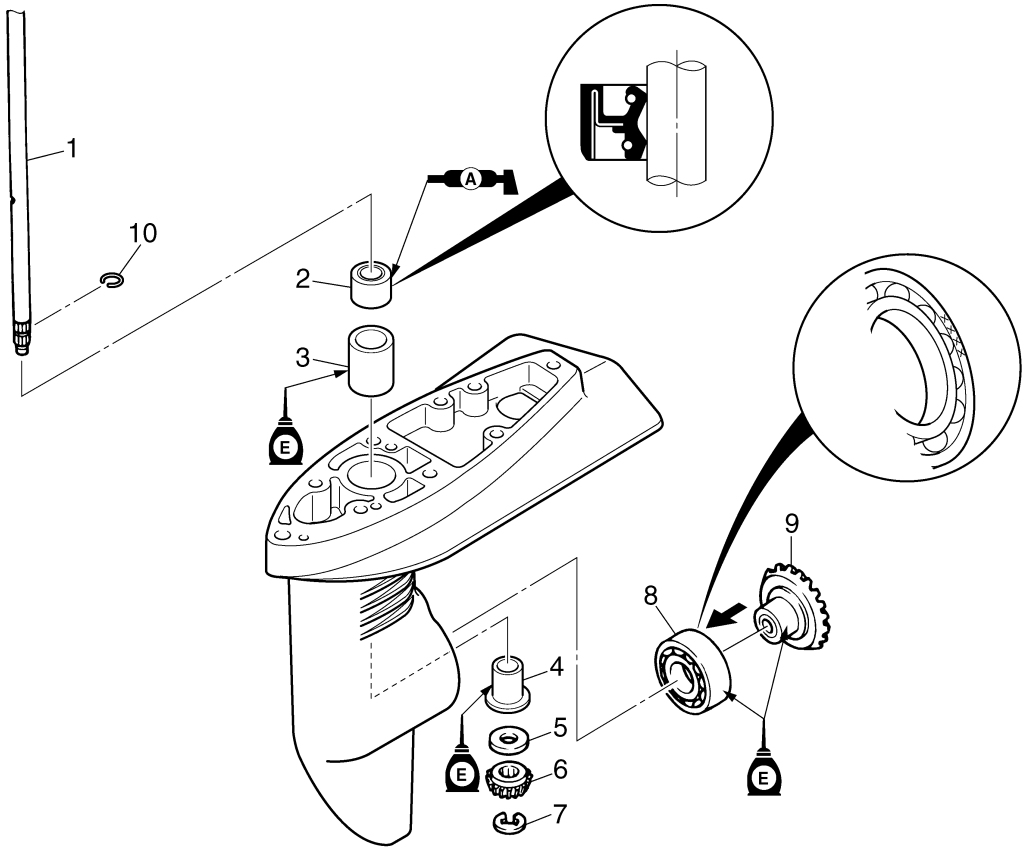


S69M6220

Needle bearing attachment ⑤: 90890-06617
Driver rod L3 ⑥: 90890-06652

Depth ⓐ: 1.0–1.5 mm (0.04–0.06 in)

Drive shaft and lower case



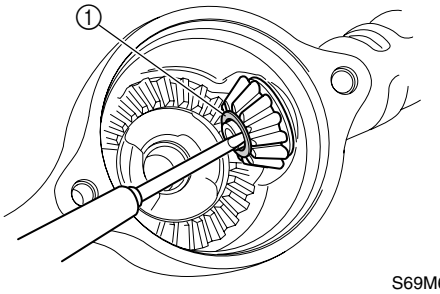
S69M6230

No.	Part name	Q'ty	Remarks
1	Drive shaft	1	S- and L-transom models
2	Oil seal	1	**Not reusable**
3	Bushing 2	1	**Not reusable**
4	Bushing 1	1	**Not reusable**
5	Washer	1	
6	Pinion	1	
7	Circlip	1	
8	Ball bearing	1	**Not reusable**
9	Forward gear	1	
10	Circlip	1	

6

Removing the drive shaft

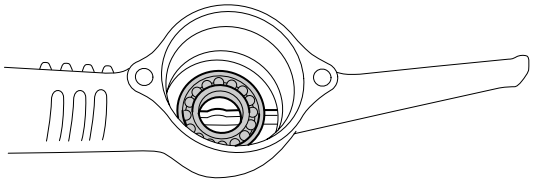
1. Remove the circlip ①, pinion, washer and drive shaft, and then pull out the forward gear.



S69M6240

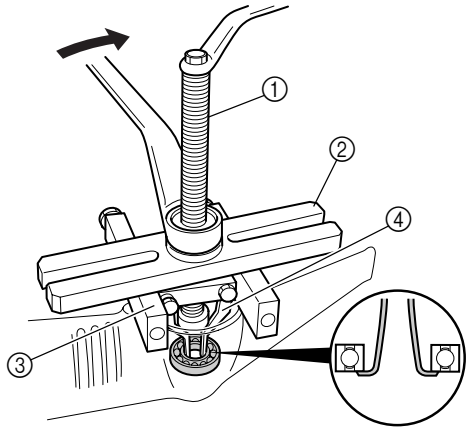
Disassembling the lower case

1. Check the ball bearing for pitting or rumbling. Replace if necessary.



S69M6250

2. Remove the ball bearing.

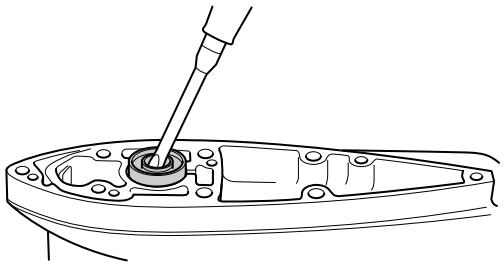


S69M6270

NOTE:
Do not remove the ball bearing if not replacing it.

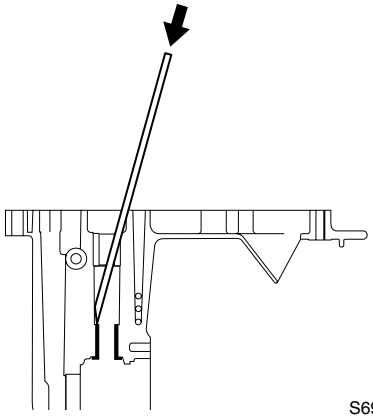
Bearing puller ①: 90890-06535
Stopper guide plate ②: 90890-06501
Stopper guide stand ③: 90890-06538
Bearing puller claw 2 ④: 90890-06537

3. Remove the oil seal.



S69M6280

4. Remove bushing 1.

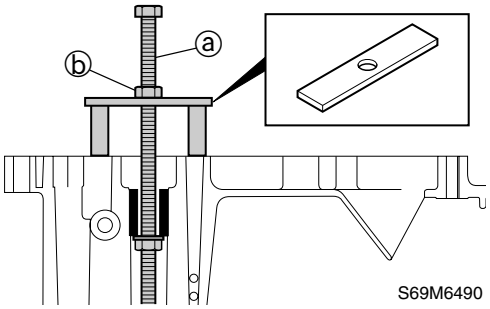


S69M6480

NOTE:
Use a hammer and shaft to remove bushing 1.

5. Use a bolt ⓐ with the specified measurements, two nuts, and a plate as shown in the illustration.

6. Hold the bolt ⓐ and turn the nut ⓑ counterclockwise to pull bushing 2 out.

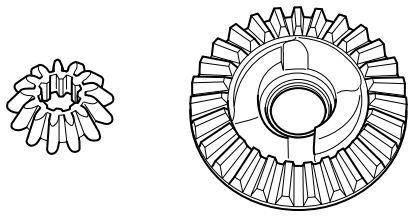


S69M6490

Specified bolt ⓐ: M6 × 120 mm

Checking the pinion and forward gear

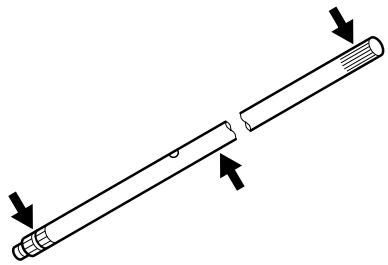
1. Check the teeth of the pinion, and the teeth and dogs of the forward gear for cracks or wear. Replace if necessary.



S69M6290

Checking the drive shaft

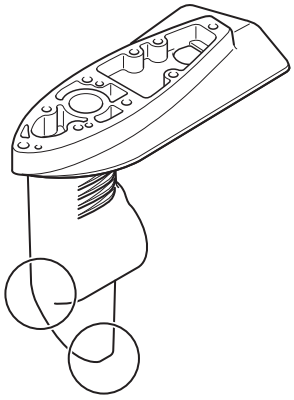
1. Check the drive shaft for bends or wear. Replace if necessary.



S69M6300

Checking the lower case

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

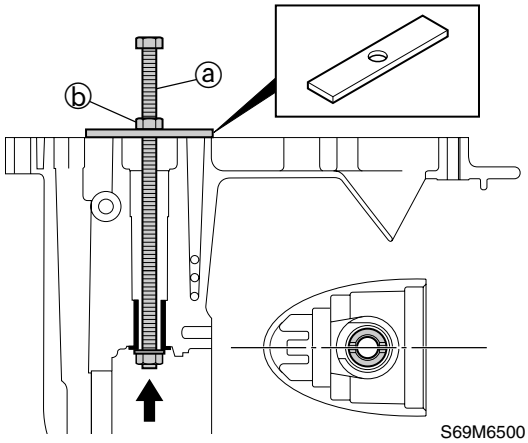


S69M6310

Assembling the lower case

1. Use a bolt ⓐ with the specified measurements, two nuts, and a plate as shown in the illustration.

2. Hold the bolt ⓐ and turn the nut ⓑ counterclockwise to install bushing 1.

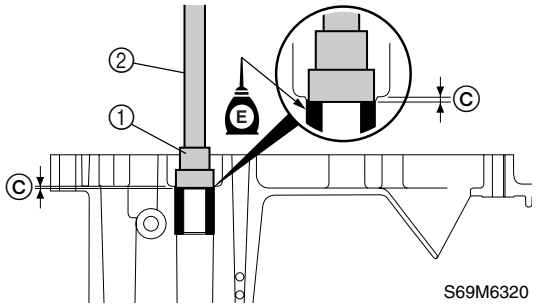


S69M6500

Specified bolt ⓐ: M6 × 120 mm

6

3. Install bushing 2 into the lower case to the specified depth.



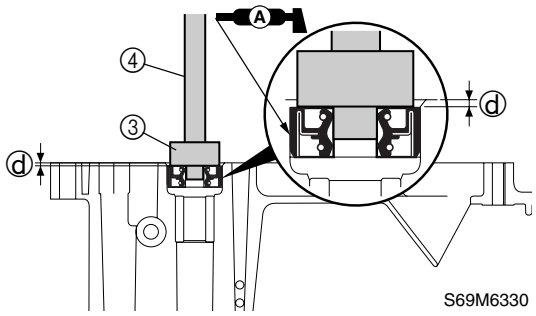
S69M6320

NOTE:
Apply engine oil to bushing 1, 2 before installation.

Bushing attachment ①:
90890-06649
Driver rod L3 ②: 90890-06652

Depth ⓒ: 0.9–1.0 mm (0.03–0.04 in)

4. Apply grease to the new oil seal, and then install it into the lower case to the specified depth.

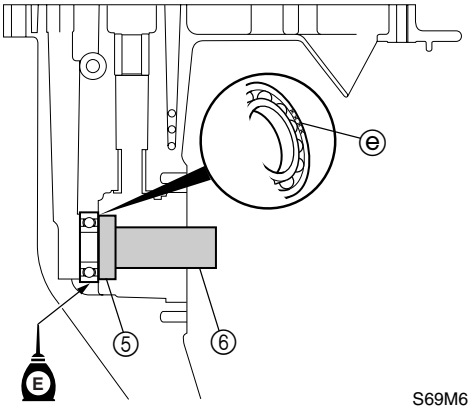


S69M6330

Ball bearing attachment ③:
90890-06638
Driver rod LS ④: 90890-06606

Depth ⓓ: 1.5–2.0 mm (0.06–0.08 in)

5. Install the new ball bearing into the lower case.



S69M6350

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

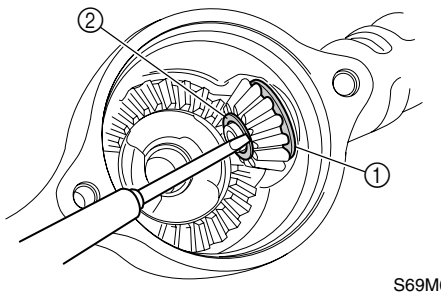
NOTE:
- Install the ball bearing with the manufacture identification mark ⓔ facing toward the forward gear.
- Apply engine oil to the ball bearing before installation.

Ball bearing attachment ⑤:
90890-06637
Driver rod LS ⑥: 90890-06606

Installing the drive shaft

1. Install the forward gear into the lower case.

2. Install the drive shaft into the lower case, and then install the washer ①, pinion, and circlip ② onto the drive shaft.



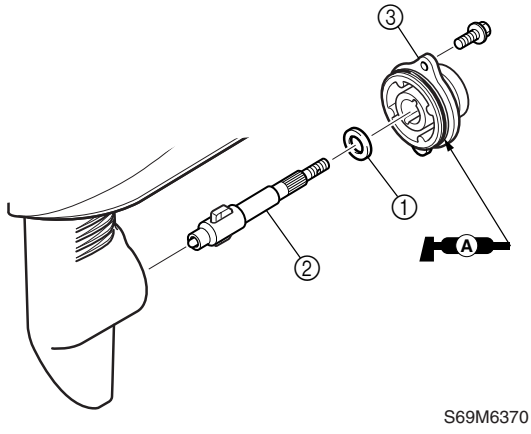
S69M6360

NOTE:
If replacing the washer ①, be sure to replace it with a new one of the same thickness.

Available washer thicknesses:
2.0, 2.1, 2.2, and 2.3 mm

Installing the propeller shaft housing

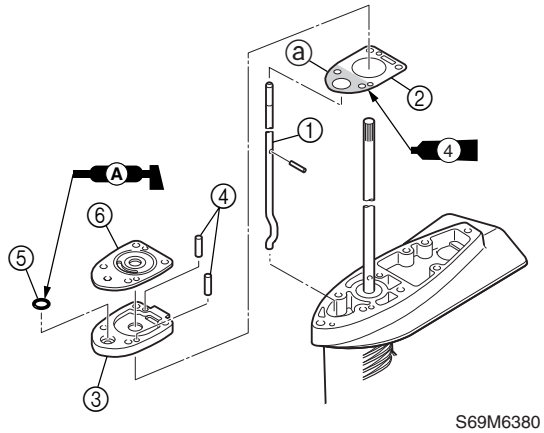
1. Install the washer ① and propeller shaft assembly ② into the propeller shaft housing assembly ③.
2. Apply grease to the new O-rings.
3. Install the propeller shaft housing assembly into the lower case.



S69M6370

Installing the water pump and shift rod

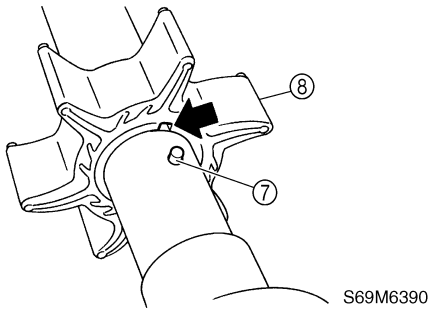
1. Install the shift rod ①, new gasket ②, and plate ③.
2. Install the dowels ④, new O-ring ⑤, and outer plate cartridge ⑥.



S69M6380

NOTE:
Apply Yamabond No. 4 to both sides of section ⓐ of the gasket ②.

3. Install the dowel ⑦ into the drive shaft.
4. Align the groove on the impeller ⑧ with the dowel, and then install the impeller onto the drive shaft.

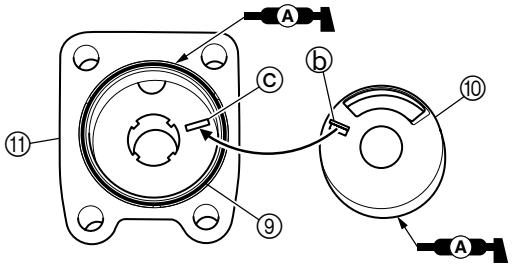


S69M6390

NOTE:
Check the dowel ⑦ for wear. Replace if necessary.

6

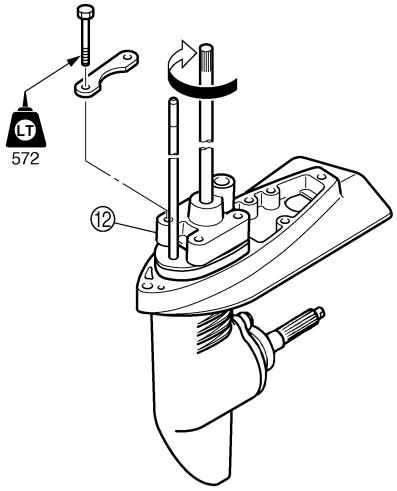
5. Install the new O-ring ⑨ and insert cartridge ⑩ into the water pump housing ⑪.



S69M6400

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

6. Install the water pump housing assembly ⑫ to the lower case.

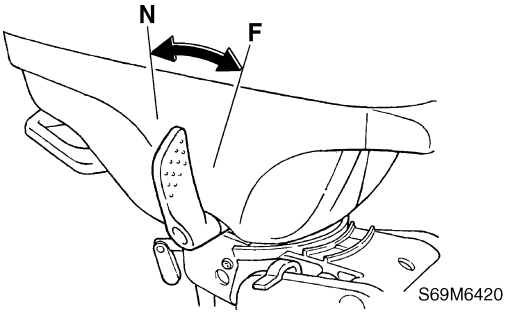


S69M6410

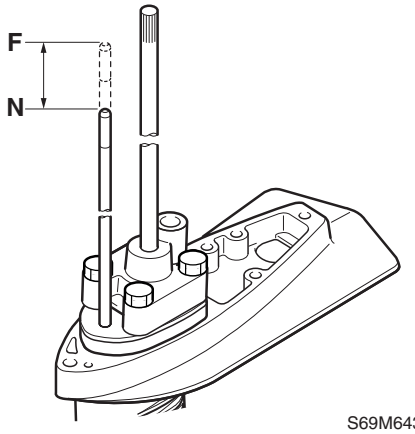
NOTE:
When installing the water pump housing, apply grease to the inside of the housing, and then turn the drive shaft clockwise while pushing the water pump housing down.

Installing the lower unit

1. Set the gear shift to the neutral position at the lower unit.

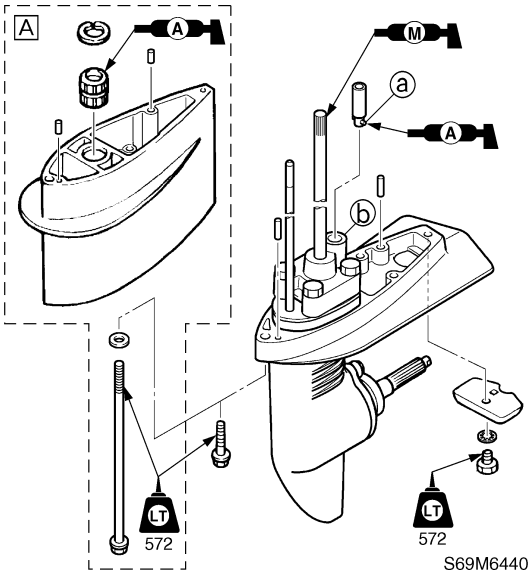


S69M6420



S69M6430

2. Install the lower unit to the upper case.

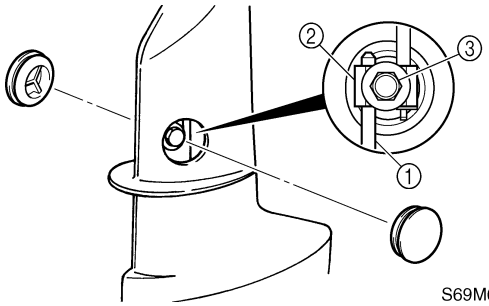


S69M6440

A L-transom model

NOTE:
Align the rubber seal projection ⓐ with the hole ⓑ in the water pump housing.

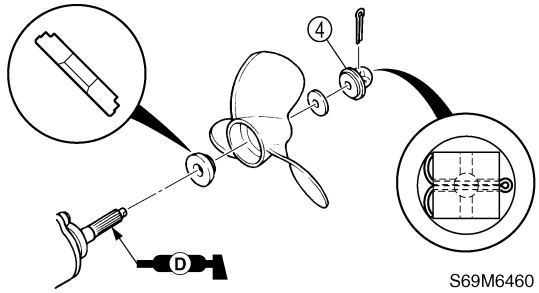
3. Install the shift rod ① to the joint ②, and then tighten the bolt ③ to the specified torque.



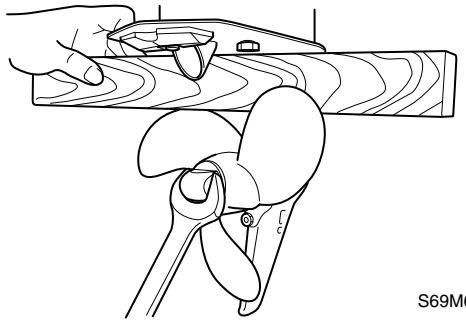
S69M6450

	Joint bolt ③: 10 N·m (1.0 kgf·m, 7.4 ft·lb)

4. Install the propeller and propeller nut ④. Place a block of wood between the anti-cavitation plate and propeller to keep the propeller from turning, and then tighten the nut. If the holes in the propeller nut ④ do not align with the cotter pin hole, loosen the nut until the holes are aligned.



S69M6460


S69M6470

⚠ WARNING

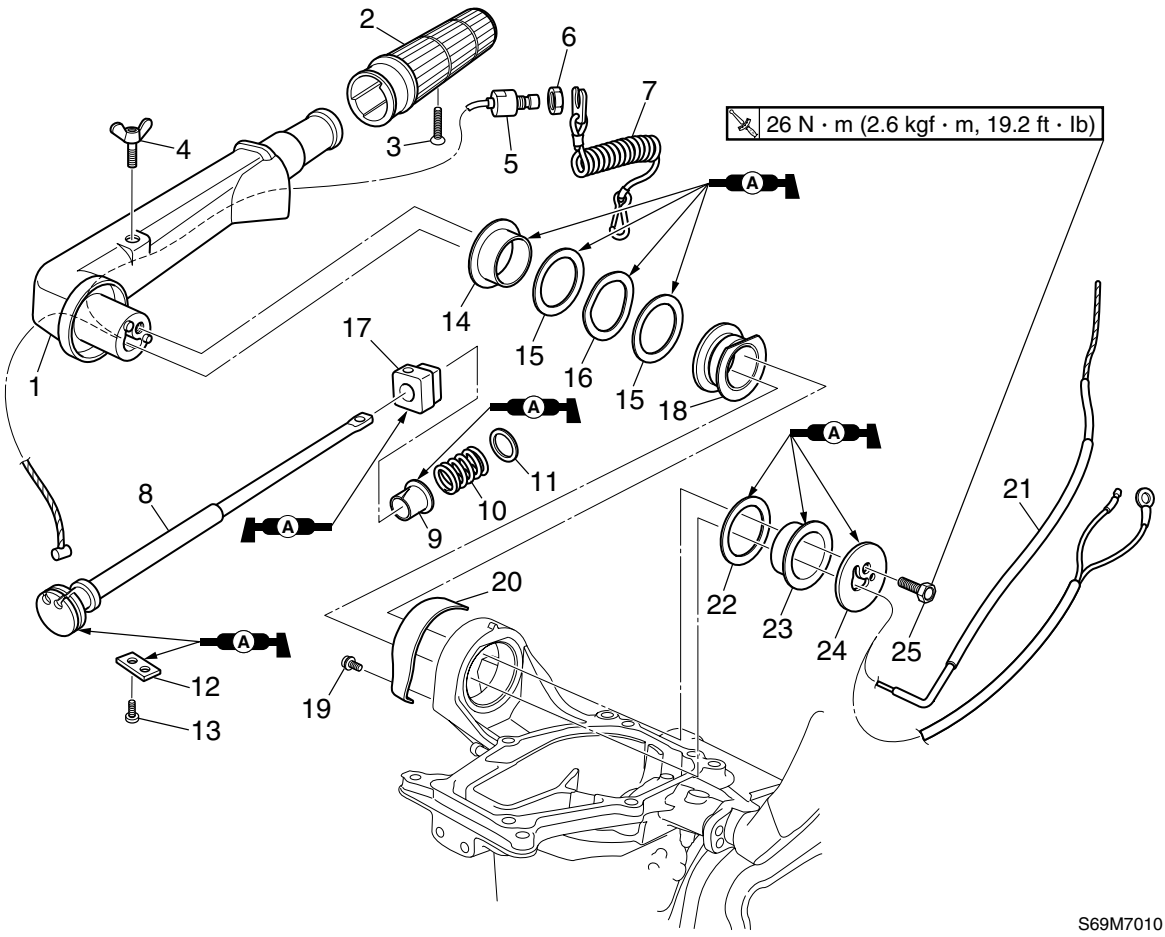
- **Do not hold the propeller with your hands when loosening or tightening it.**
- **Be sure to disconnect the spark plug cap from the spark plug and the clip from the engine shut-off switch.**
- **Put a block of wood between the anti-cavitation plate and propeller to keep the propeller from turning.**

6

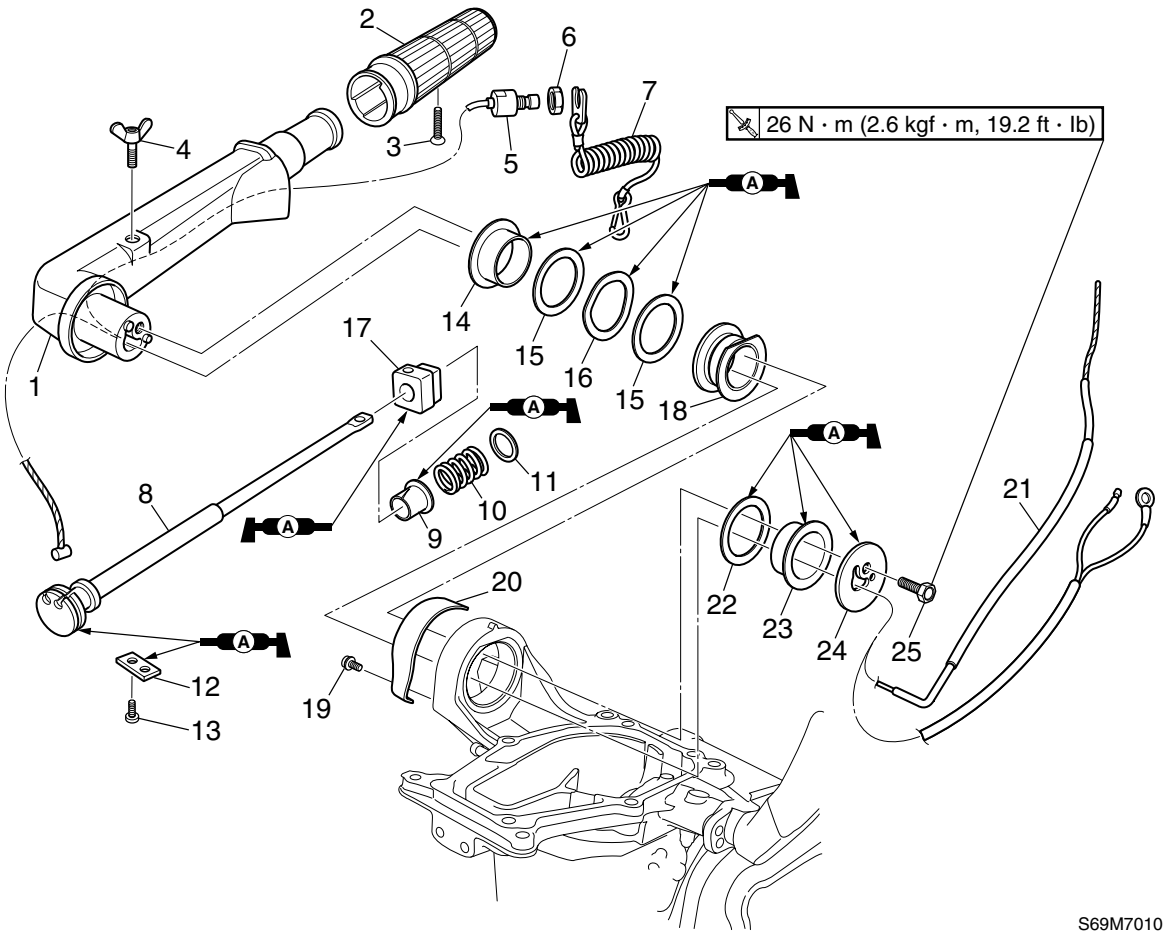
— MEMO —

Bracket unit

Tiller handle



No.	Part name	Q'ty	Remarks
1	Tiller handle	1	
2	Throttle grip	1	
3	Screw	1	ø5 × 21 mm
4	Throttle friction adjuster	1	
5	Engine shut-off switch	1	
6	Nut	1	
7	Engine shut-off cord	1	
8	Throttle lever	1	
9	Bushing	1	
10	Spring	1	
11	Washer	1	
12	Plate	1	
13	Screw	2	ø5 × 12 mm
14	Bushing	1	
15	Washer	2	
16	Wave washer	1	
17	Friction piece	1	

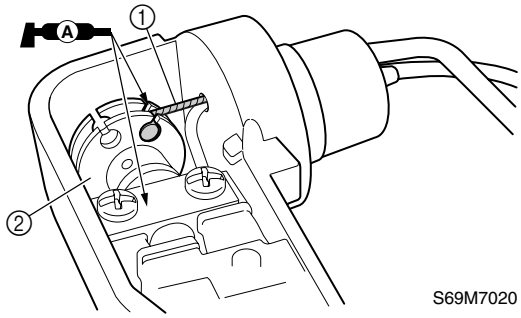


No.	Part name	Q'ty	Remarks
18	Bushing	1	
19	Screw	1	ø5 × 7 mm
20	Cover	1	
21	Throttle cable	1	
22	Washer	1	
23	Bushing	1	
24	Cover	1	
25	Bolt	1	M8 × 25 mm

7

Assembling the tiller handle

1. Install the throttle cable ① to the throttle lever ②.

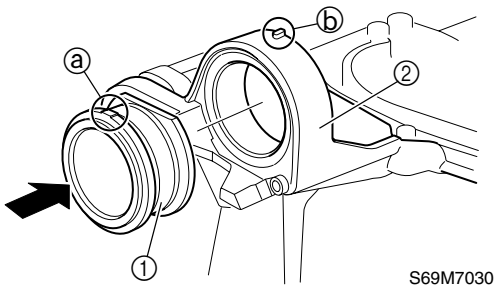


S69M7020

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

Installing the tiller handle

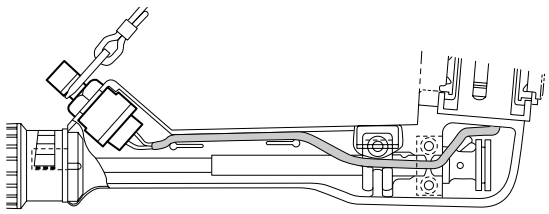
1. Install the bushing ① into the upper case ②.



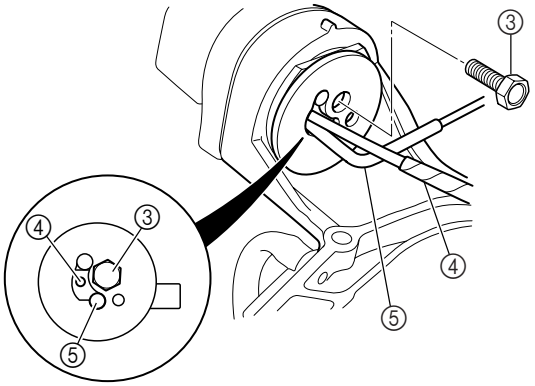
S69M7030

NOTE:
Align the mark ⓐ on the bushing with the mark ⓑ on the upper case.

2. Route the engine shut-off switch lead as shown so that it does not interfere with the throttle lever.


S69M7140

3. Install the tiller handle assembly to the upper case, and then tighten the bolt ③ to the specified torque.

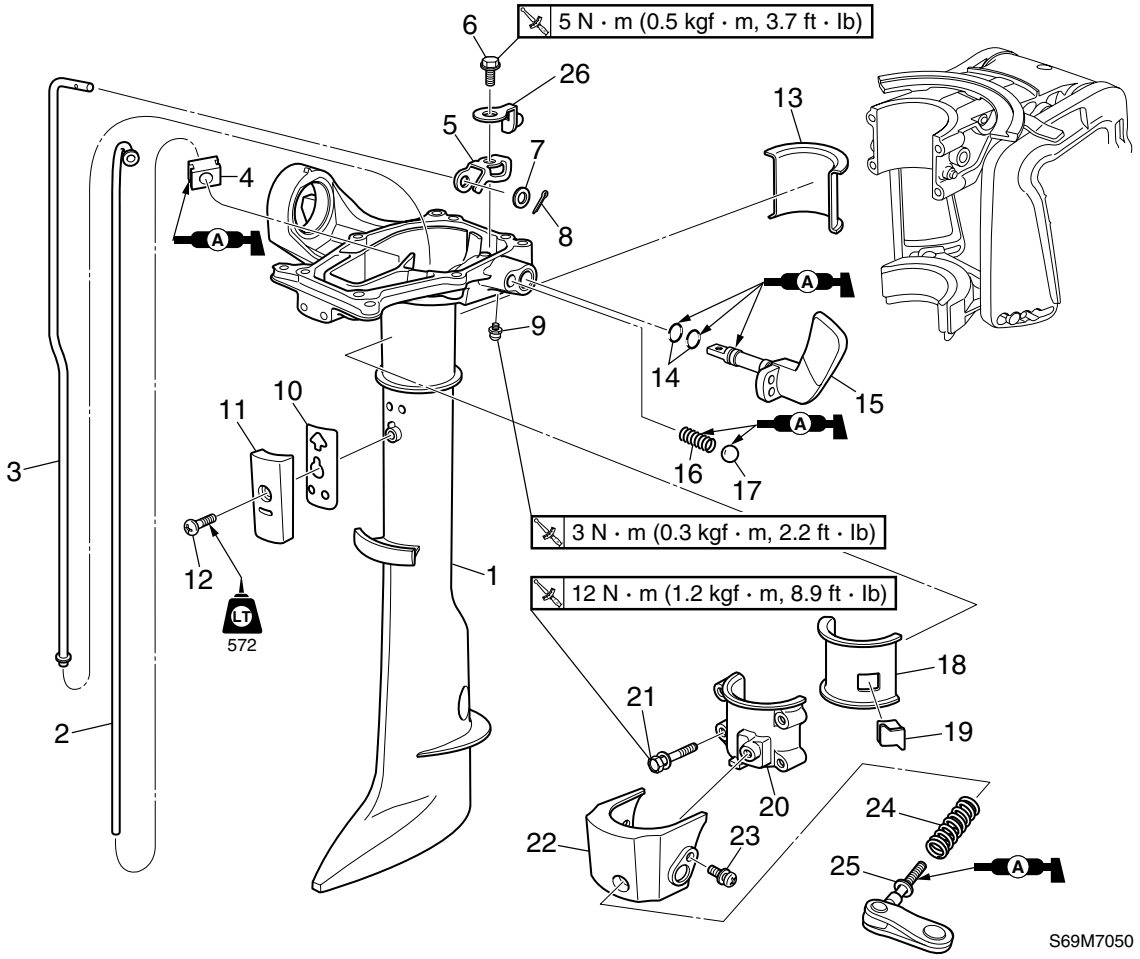


S69M7040

NOTE:
Route the engine shut-off switch lead ④ and throttle cable ⑤ as shown.

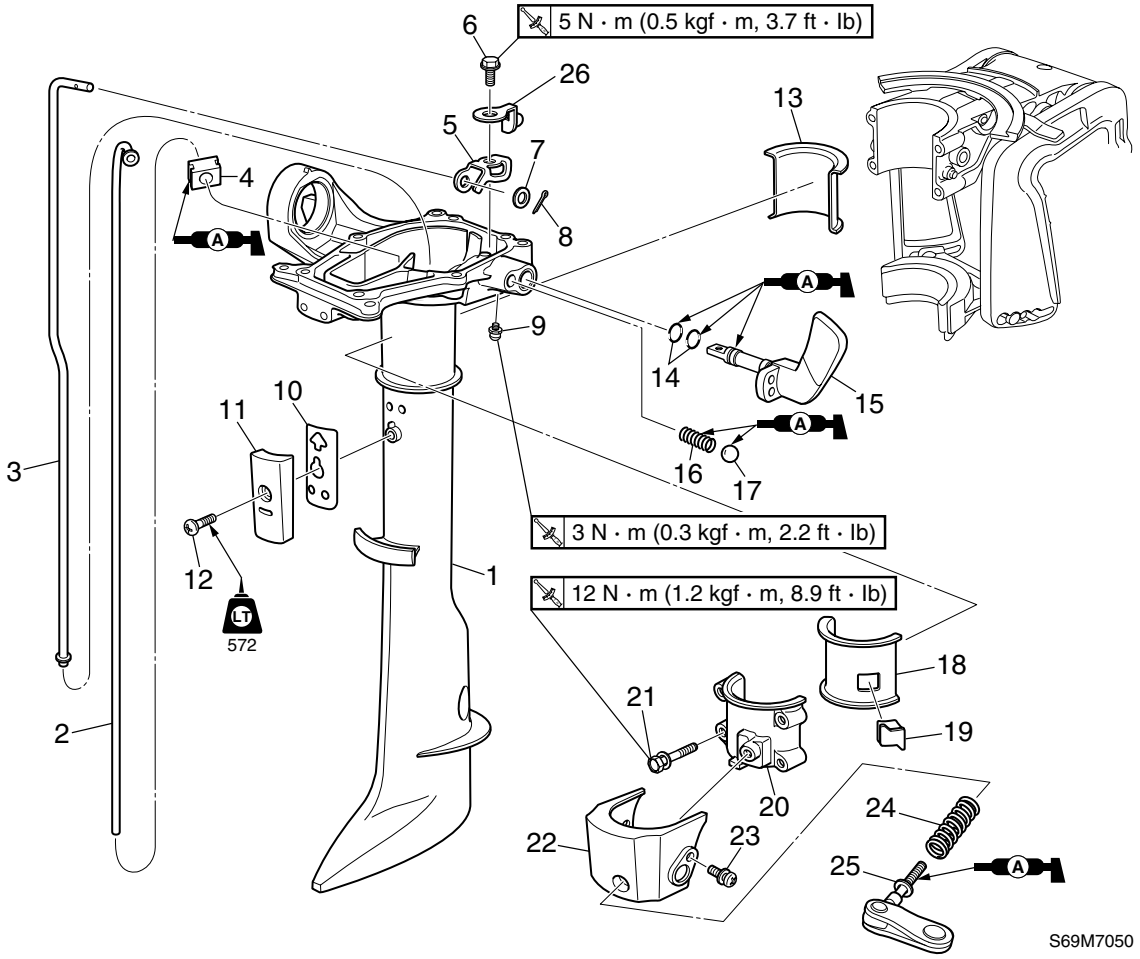
	Tiller handle bolt ③: 26 N·m (2.6 kgf·m, 19.2 ft·lb)

Upper case, swivel bracket, and clamp brackets

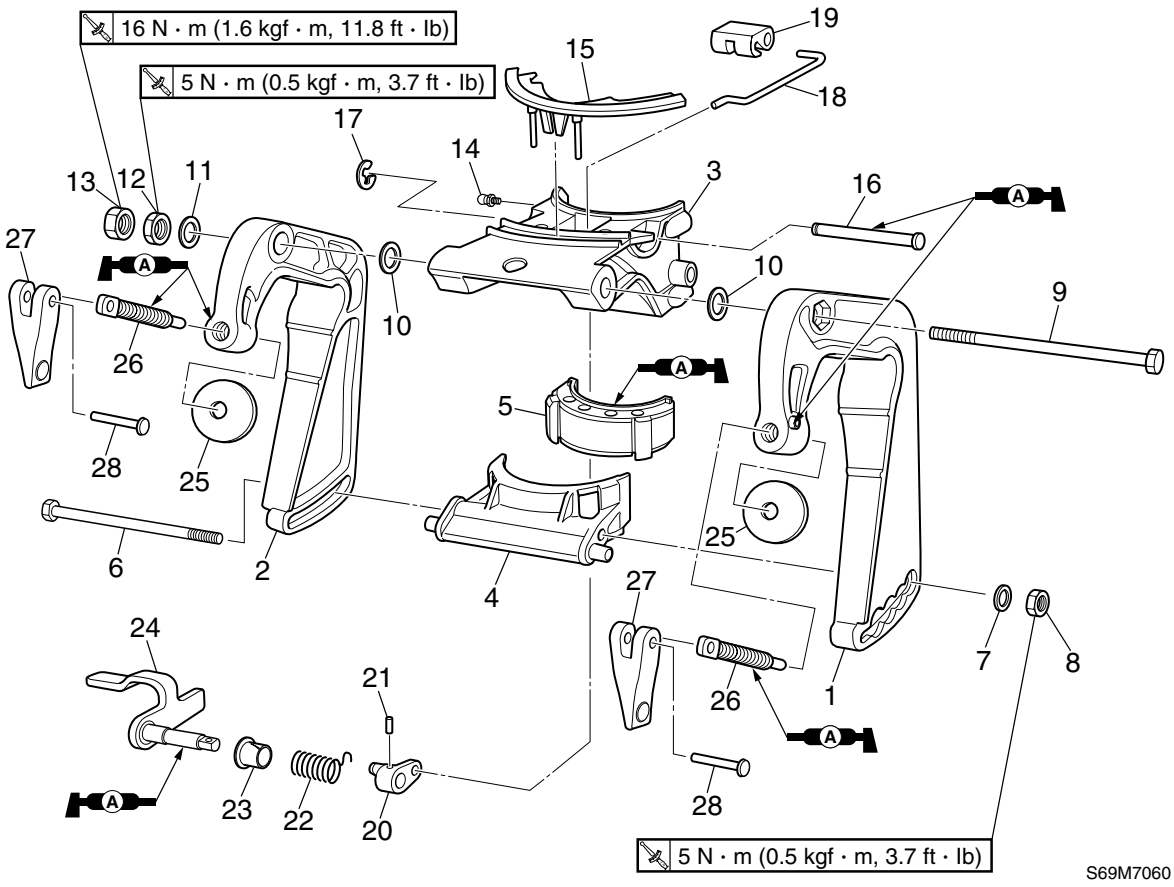


No.	Part name	Q'ty	Remarks
1	Upper case	1	
2	Water pipe	1	S- and L-transom models
3	Shift rod	1	
4	Rubber seal	1	
5	Bracket	1	
6	Bolt	1	M5 × 11 mm
7	Washer	1	
8	Cotter pin	1	**Not reusable**
9	Grease nipple	1	
10	Gasket	1	**Not reusable**
11	Cover	1	
12	Screw	1	ø6 × 15 mm
13	Bushing	1	
14	O-ring	2	**Not reusable**
15	Shift lever	1	
16	Spring	1	
17	Ball	1	

7

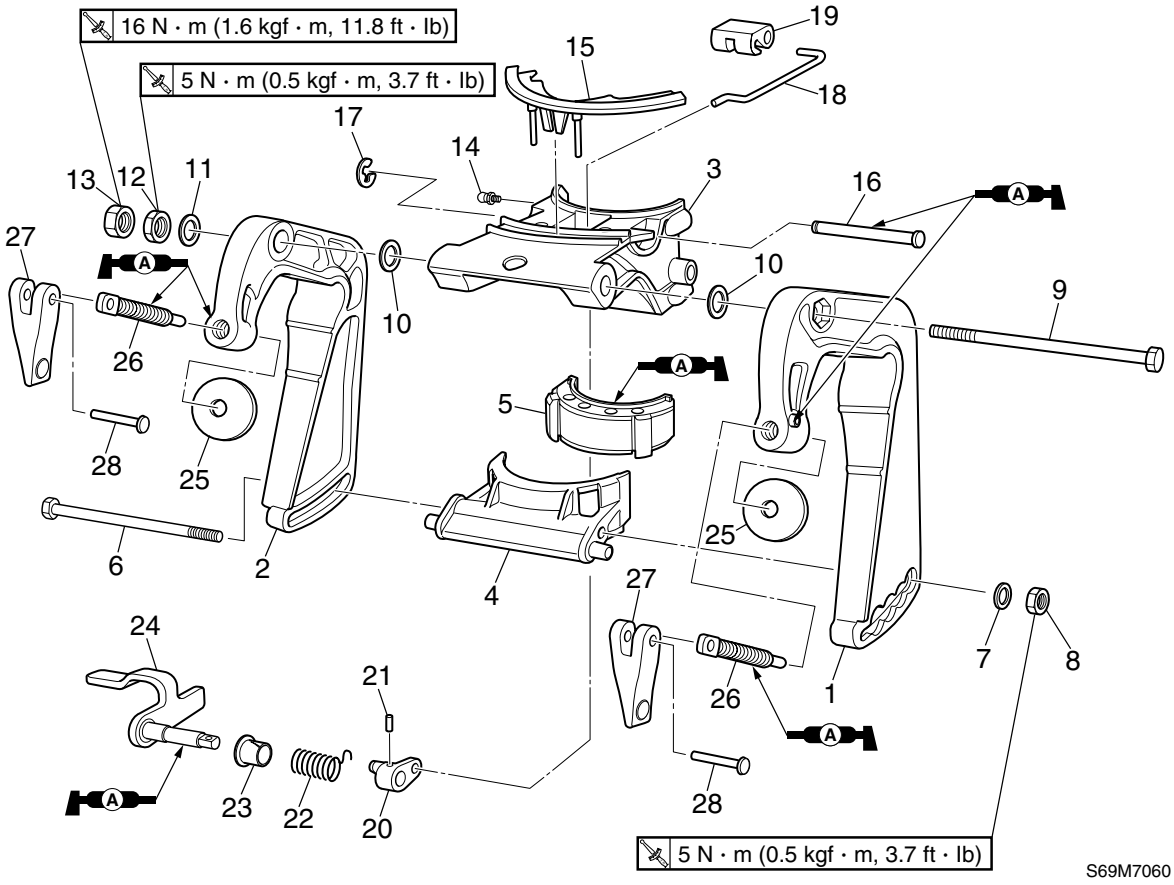


No.	Part name	Q'ty	Remarks
18	Bushing	1	
19	Friction piece	1	
20	Swivel bracket	1	
21	Bolt	4	M6 × 30 mm
22	Cover	1	
23	Screw	2	ø6 × 15 mm
24	Spring	1	
25	Friction screw	1	
26	Shift rod washer	1	



No.	Part name	Q'ty	Remarks
1	Port clamp bracket	1	
2	Starboard clamp bracket	1	
3	Swivel bracket	1	
4	Mount housing	1	
5	Mount	1	
6	Trim rod	1	M6 × 125 mm
7	Washer	1	
8	Nut	1	
9	Bolt	1	M8 × 135 mm
10	Washer	2	
11	Washer	1	
12	Nut	1	
13	Nut	1	
14	Grease nipple	1	
15	Cover	1	
16	Pin	1	
17	Circlip	1	

7

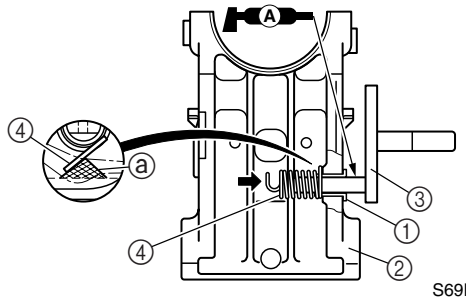


No.	Part name	Q'ty	Remarks
18	Rod	1	
19	Lever	1	
20	Tilt stop lever 2	1	
21	Pin	1	
22	Spring	1	
23	Bushing	1	
24	Tilt stop lever 1	1	
25	Clamp pad	2	
26	Clamp screw	2	
27	Clamp handle	2	
28	Pin	2	**Not reusable**

Assembling the swivel bracket

1. Install the bushing ① into the swivel bracket ②, and then insert tilt stop lever 1 ③ partially into the swivel bracket ②.

2. Hook the spring ④ onto tilt stop lever 1 ③.

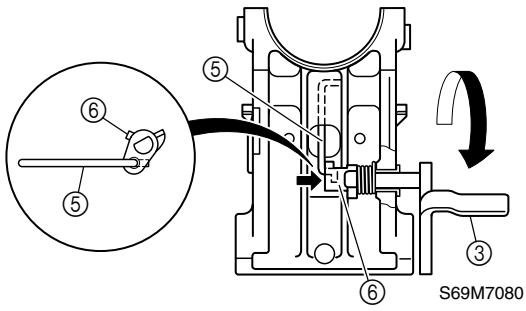


S69M7070

NOTE:
The spring ④ should be hooked on the stopper ⓐ.

3. Turn tilt stop lever 1 ③ in the direction of the arrow shown.

4. Insert the rod ⑤ into tilt stop lever 2 ⑥, and then install tilt stop lever 2 ⑥ onto tilt stop lever 1 ③.



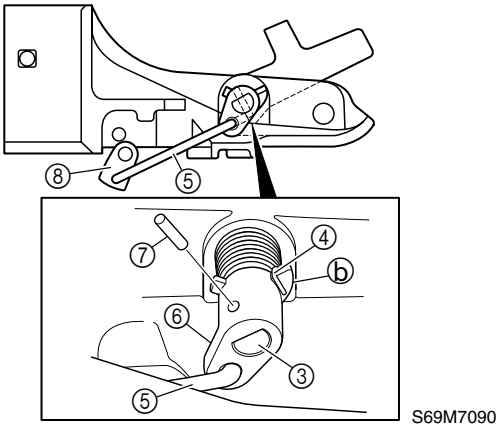
S69M7080

5. Align the cut out sections of tilt stop lever 1 ③ and tilt stop lever 2 ⑥, and then insert lever 1 into lever 2 completely.

6. Use a hammer to insert the pin ⑦ to fix lever 1 to lever 2.

7. Hook the spring ④ to the projection ⓑ of tilt stop lever 2.

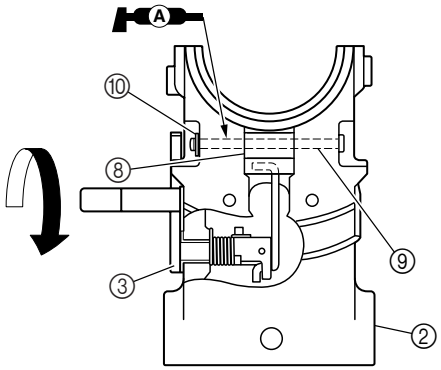
8. Install the rod ⑤ into the lever ⑧.



S69M7090

9. Turn tilt stop lever 1 ③ in the direction of the arrow shown.

10. Insert the pin ⑨ into the swivel bracket ② and lever ⑧, and then install the circlip ⑩ to the pin ⑨.



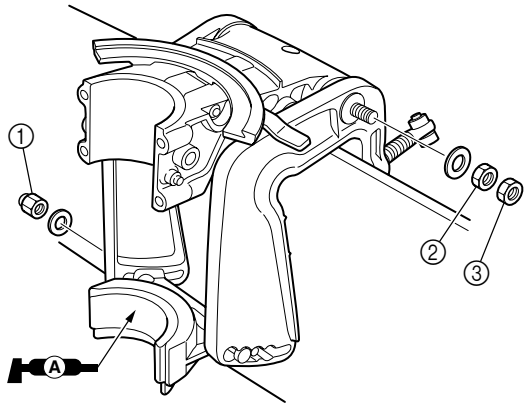
S69M7100

NOTE:
After installation, check tilt stop lever 1 ③ for proper operation.

7

Assembling the clamp brackets

1. Install the swivel bracket and mount housing between the clamp brackets, and then tighten the nuts to the specified torques.



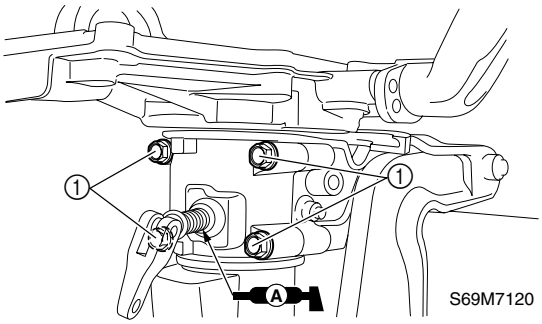
S69M7110

NOTE:
After tightening clamp bracket nut 1 ② to the specified torque, hold the nut with a wrench, and then tighten clamp bracket nut 2 ③ to the specified torque.

Trim rod nut ①:
5 N·m (0.5 kgf·m, 3.7 ft·lb)
Clamp bracket nut 1 ②:
5 N·m (0.5 kgf·m, 3.7 ft·lb)
Clamp bracket nut 2 ③:
16 N·m (1.6 kgf·m, 11.8 ft·lb)

Installing the upper case

1. Install the upper case assembly to the swivel bracket, and then tighten the bolts ① to the specified torque.



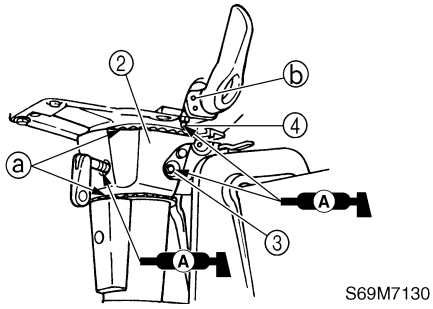
S69M7120

Swivel bracket bolt ①:
12 N·m (1.2 kgf·m, 8.9 ft·lb)

2. Install the cover ② to the swivel bracket.

3. Inject grease into the grease nipple ③ until grease comes out from the bushings ⓐ.

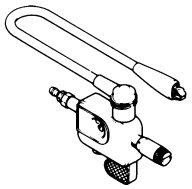
4. Inject grease into the grease nipple ④ until grease comes out from the spring fitting hole ⓑ.



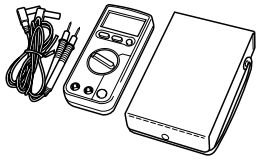
S69M7130

Electrical systems

Special service tools



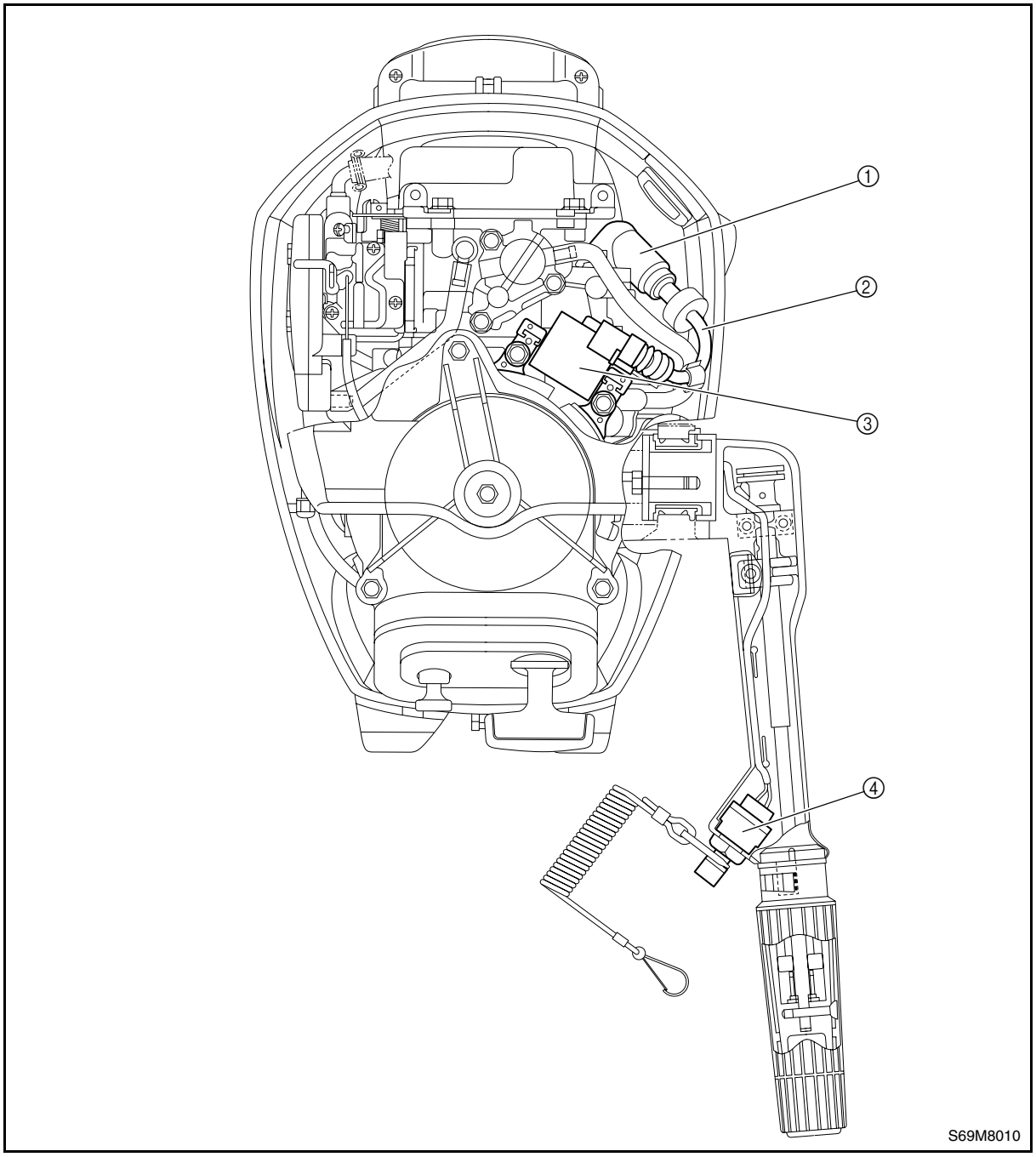
Ignition tester
90890-06754



Digital circuit tester
90890-03174

Electrical components

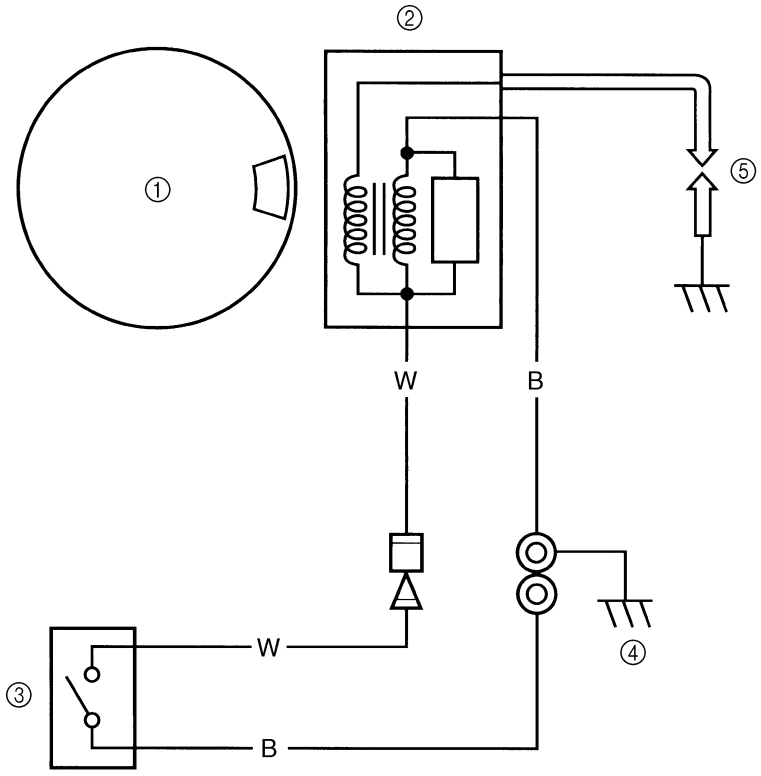
Top view



① Spark plug cap
② Spark plug wire
③ TCI unit
④ Engine shut-off switch

8

Wiring harness



S69M8020

① Flywheel magnet
② TCI unit
③ Engine shut-off switch
④ Ground
⑤ Spark plug

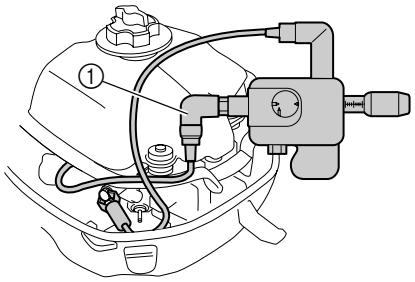
B : Black
W : White

Ignition system

Checking the ignition spark gap

1. Disconnect the spark plug cap ① from the spark plug.

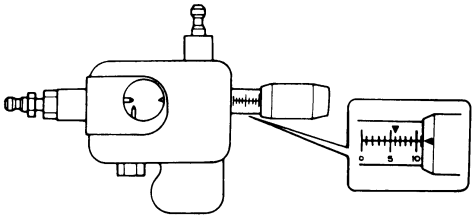
2. Connect the special service tool to the spark plug cap and to the ground bolt.



S69M8040

Ignition tester: 90890-06754

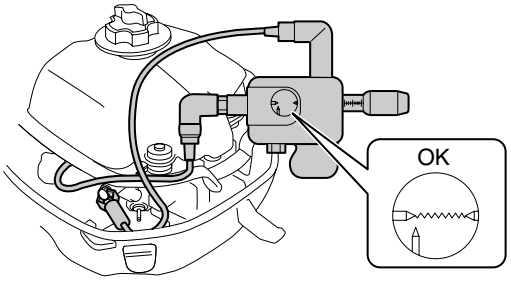
3. Set the spark gap length on the adjusting knob.



S62Y8140

Ignition spark gap: 7 mm (0.28 in)

4. Crank the engine and observe the spark through the discharge window of the spark gap tester. Check the TCI unit or spark plug cap if out of specification.



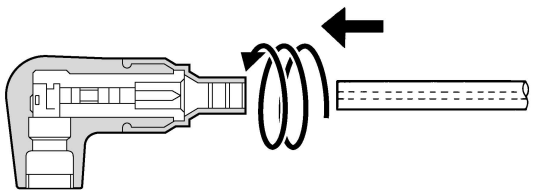
S69M8060

⚠ WARNING

- **Do not touch any of the connections of the spark gap tester leads.**
- **Keep flammable gas or liquids away, since this test can produce sparks.**

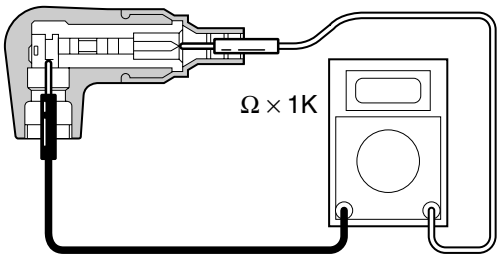
Checking the spark plug cap

1. Remove the spark plug cap from the spark plug wire by turning the cap counterclockwise.



S69M8070

2. Measure the spark plug cap resistance. Replace if out of specification.



S69M8080

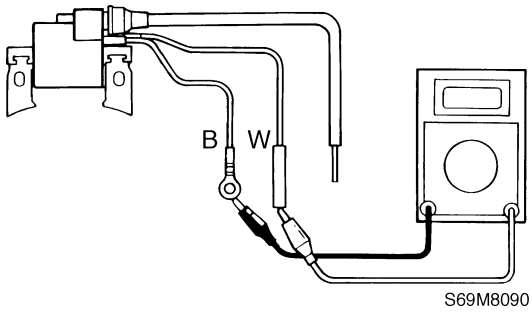
Spark plug cap resistance:
4.0–6.0 kΩ

8

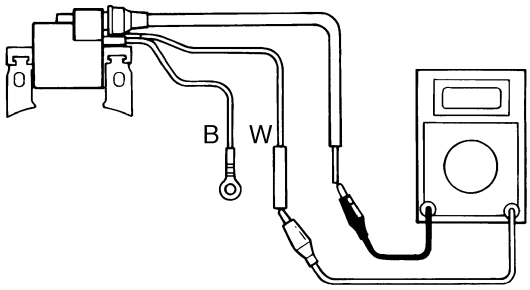
Checking the TCI unit

1. Remove the spark plug cap from the spark plug wire by turning the cap counterclockwise.

2. Measure the TCI unit resistance. Replace if out of specification.



S69M8090

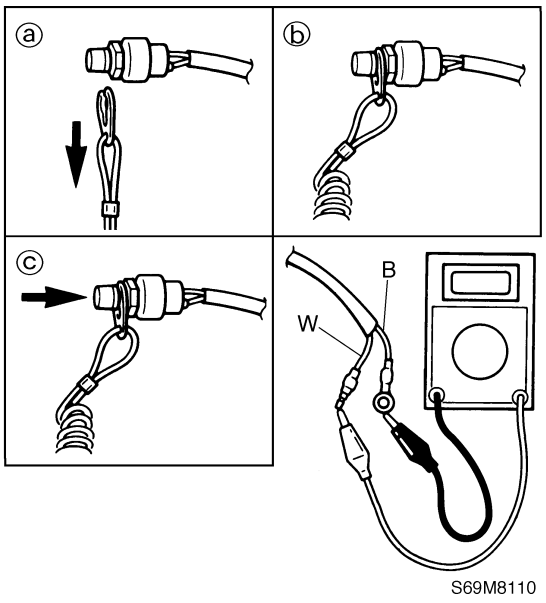


S69M8100

TCI unit resistance:
Primary coil:
White (W) – Black (B)
0.56–0.84 Ω
Secondary coil:
White (W) – Spark plug wire
11.6–17.4 kΩ

Checking the engine shut-off switch

1. Check the engine shut-off switch for continuity. Replace if there is no continuity.



S69M8110

	Lead color	
	White (W)	Black (B)
Clip removed ⓐ	○	○
Clip installed ⓑ		
Engine stop button pushed ⓒ	○	○

TRBL SHTG ?

Troubleshooting

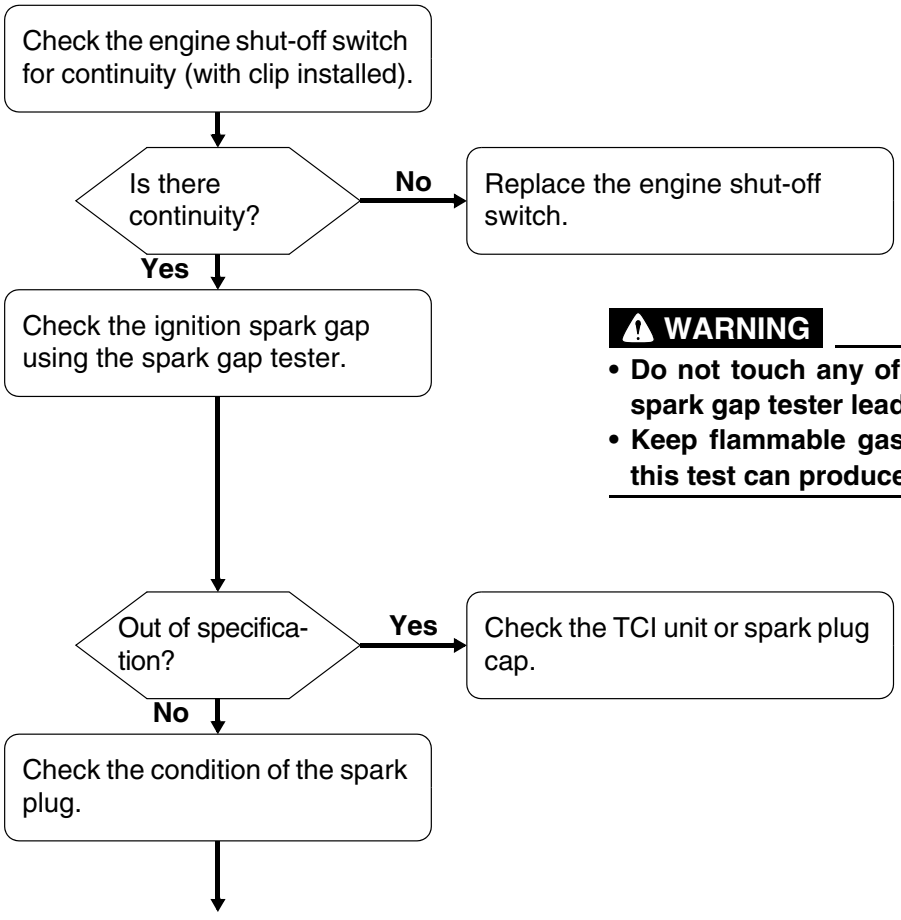
9

69M3E11

NOTE:
- To diagnose a mechanical malfunction, use the troubleshooting charts pertaining to the trouble located in this chapter. Also, when checking and maintaining the outboard motor, see Chapters 4–8 for safe maintenance procedures.
- Check that all electrical connections are tight and free from corrosion.

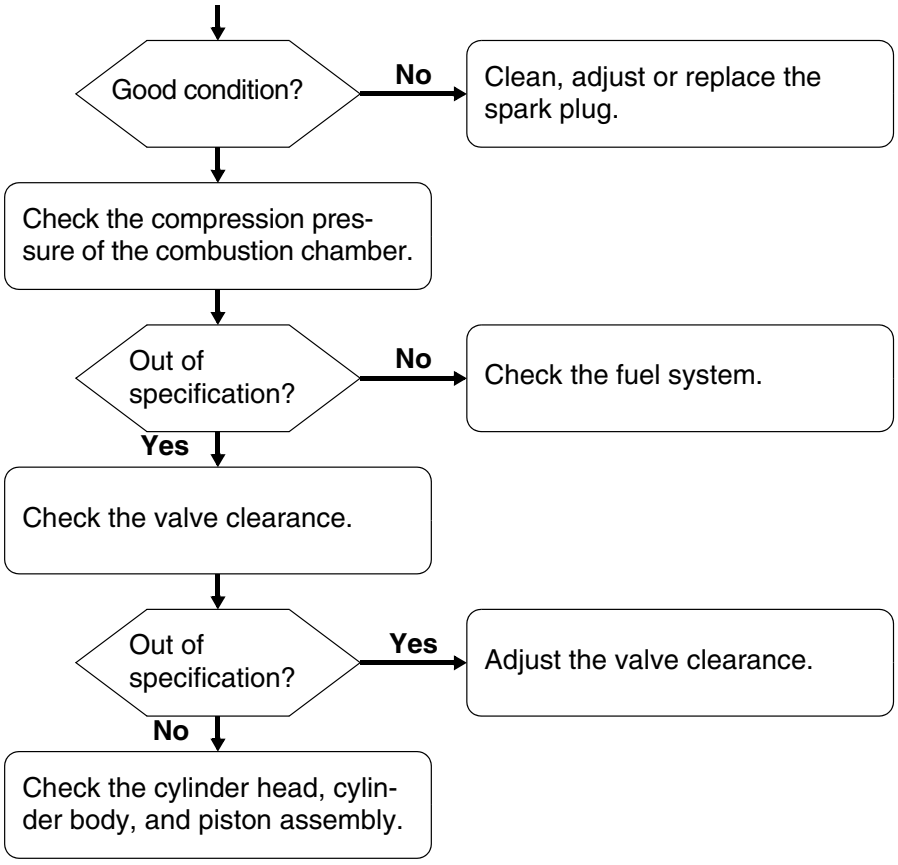
Power unit

Symptom: Engine does not start (manual starter is operating normally).
- Check the ignition system.
- Check the fuel system.
- Check the compression pressure of the power unit.



⚠ WARNING
- **Do not touch any of the connections of the spark gap tester leads.**
- **Keep flammable gas or liquids away, since this test can produce sparks.**

Continued on next page.

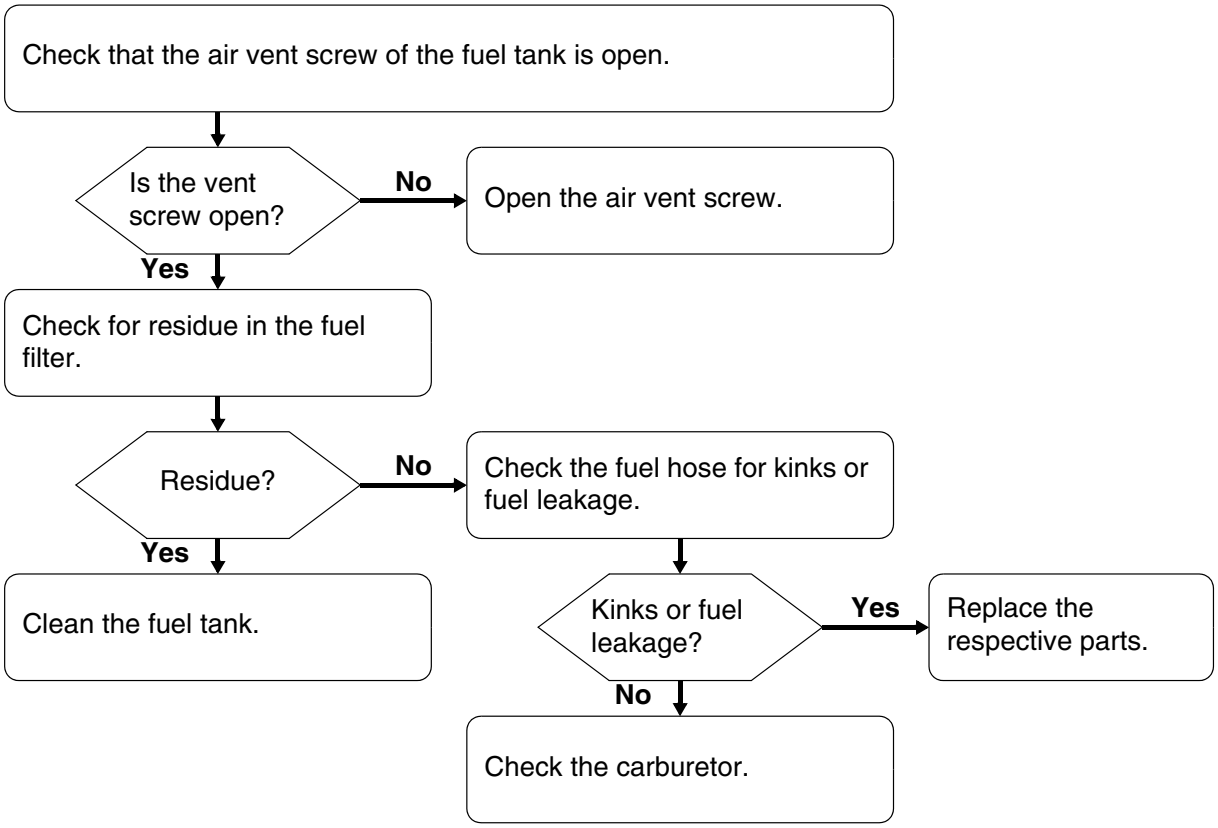


9

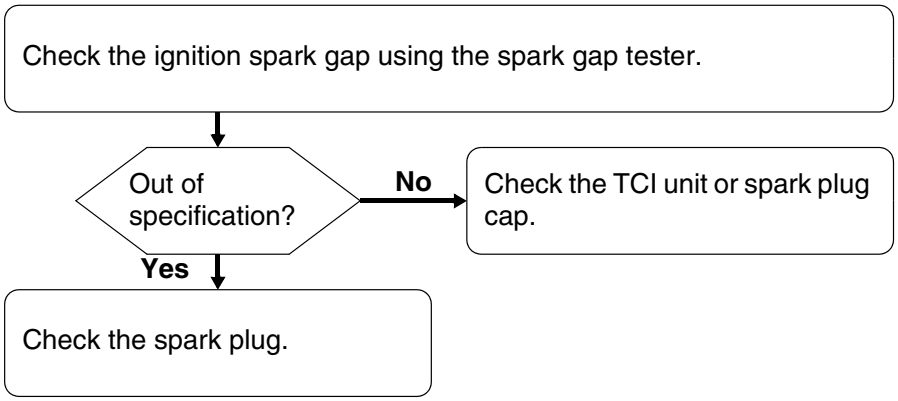
Symptom: Engine can be started, but does not remain on.

- Check the fuel system.
- Check the ignition system.
- Check the compression pressure of the power unit.

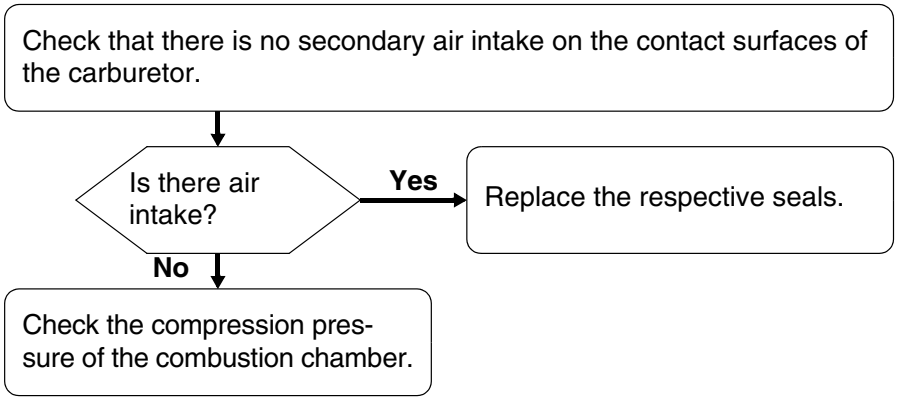
Fuel system



Ignition system

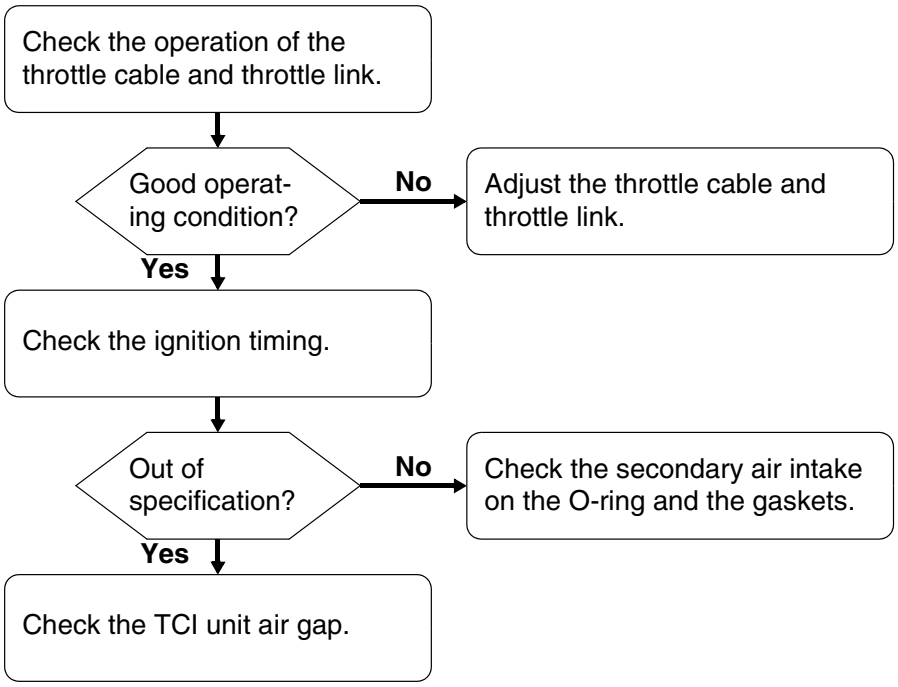


Compression pressure



Symptom: The engine idle speed is not steady, but increases or decreases.

- Check the intake manifold.
- Check the air intake system.
- Check the ignition system.



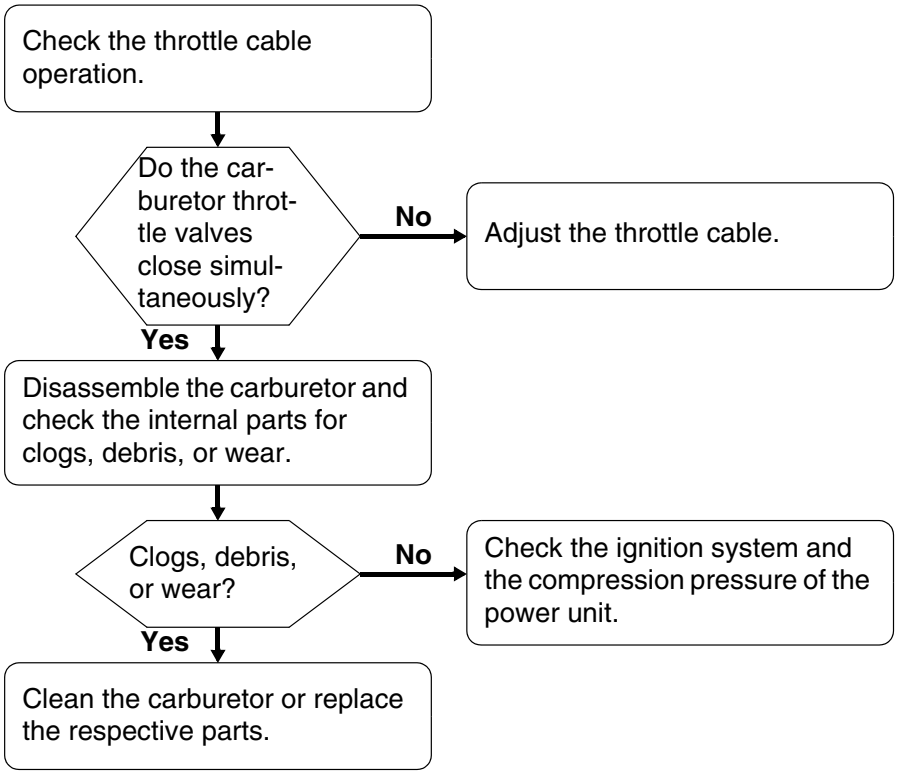
9

Symptom: Engine does not accelerate when the throttle is opened quickly.

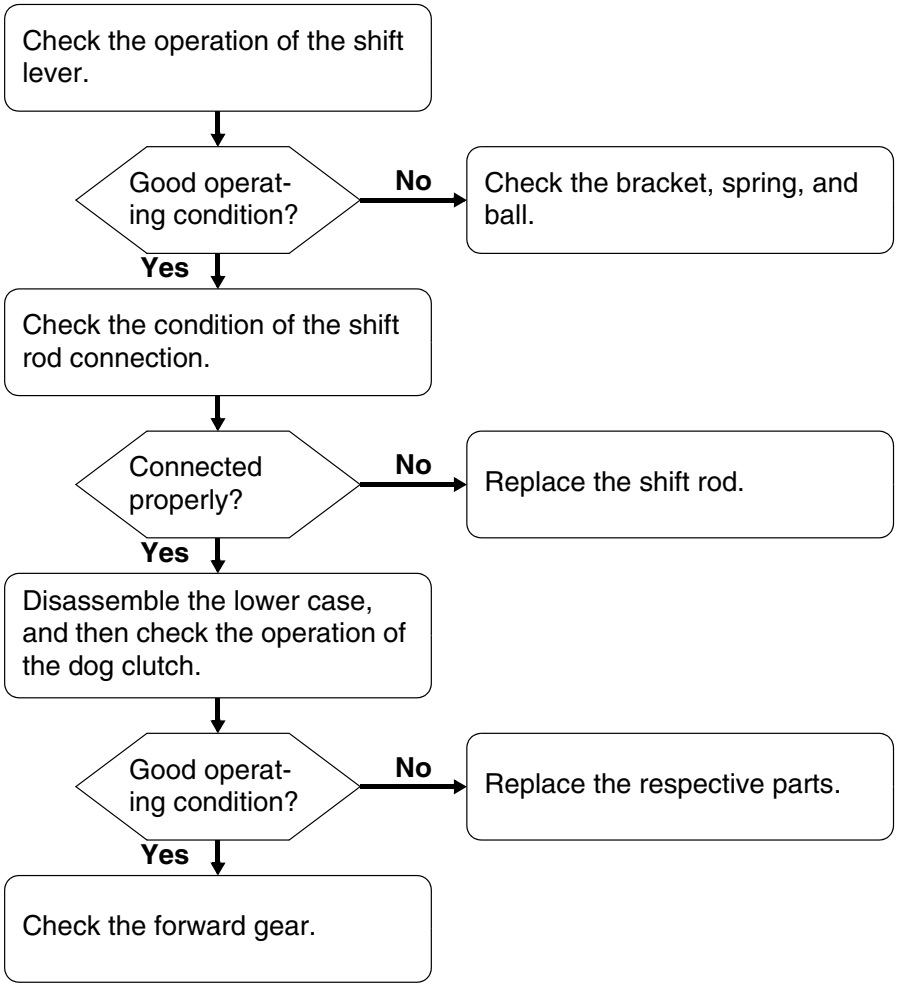
The engine turns off when the throttle is opened quickly.

Acceleration is tardy and the engine is likely to stop at any moment.

- Check the carburetors.
- Check the ignition system.
- Check the compression pressure of the power unit.



Symptom: Shift mechanism of the forward gear does not operate properly.



9

U.

V.

W.

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