

Z300A LZ300A

SUPPLEMENTARY SERVICE MANUAL

NOTICE

This Supplementary Service Manual has been prepared to introduce new service and new data information for the Z300 and LZ300 which are based on the Z250 and LZ250. For complete information on service procedures, it is necessary to use this Supplementary Service Manual together with the following manual.

Z250D, LZ250D SERVICE MANUAL: 60V-28197-3E-11
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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.

CAUTION:

USE UNLEADED STRAIGHT GASOLINE ONLY

- Gasoline containing lead can cause performance loss and engine damage.
- Do not use gasoline mixed with oil during the break-in period or anytime thereafter.

YAMALUBE 2-STROKE OUTBOARD OIL IS RECOMMENDED.

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How to use this manual

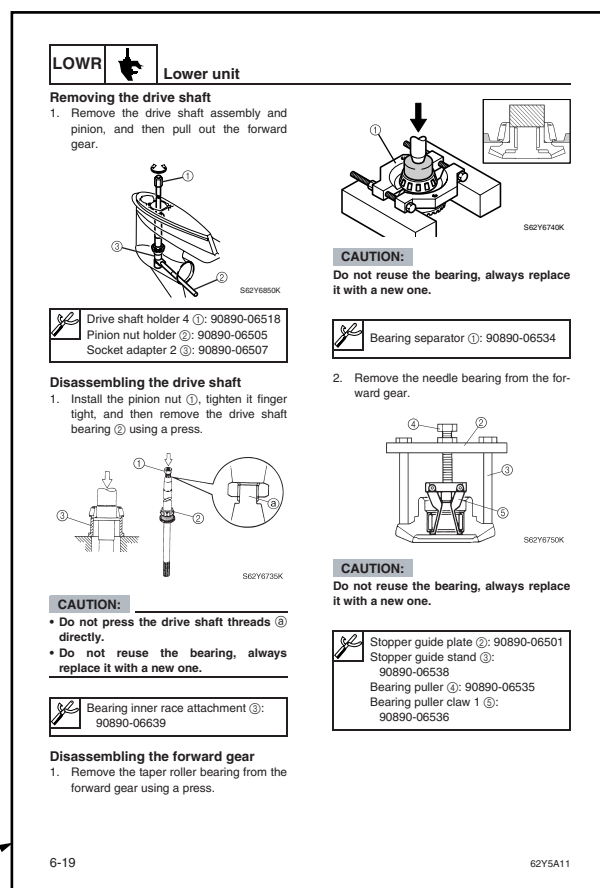
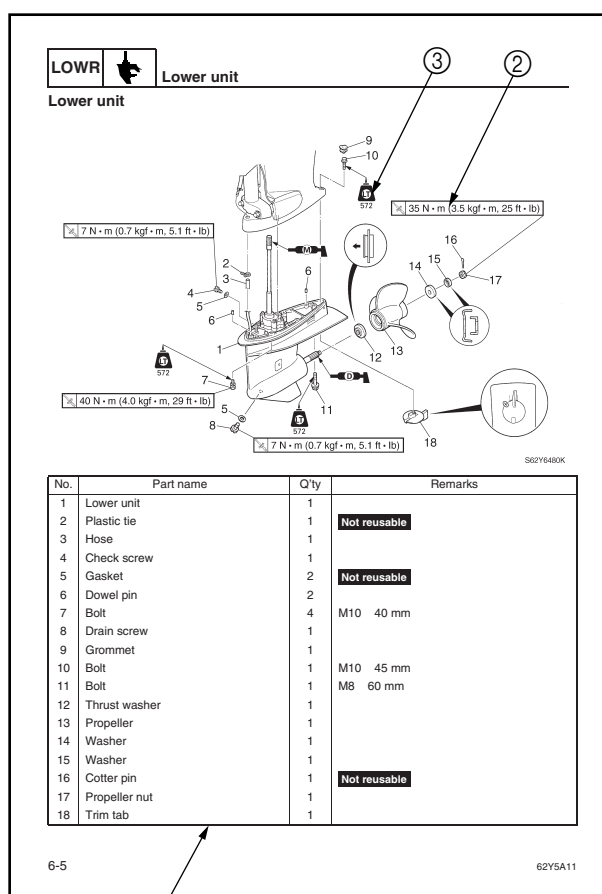
Only chapters containing revisions or additional items in the base manual have been included in this manual.

All special service tools introduced in this manual are mentioned in Chapter 3.

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 consists 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.



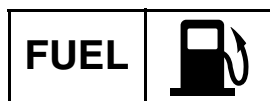
Symbols

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

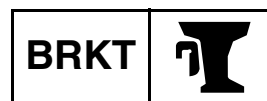
General information



Fuel system



Bracket unit



Specifications



Power unit



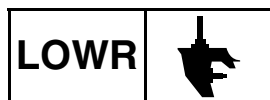
Electrical systems



Periodic checks and adjustments



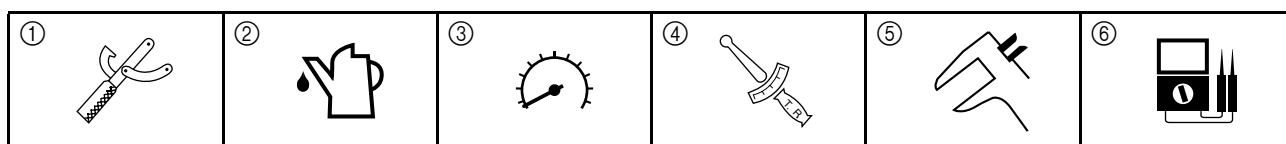
Lower unit



Troubleshooting

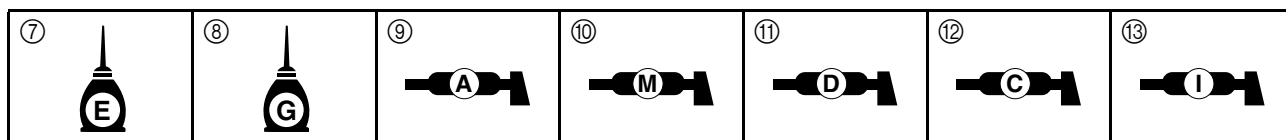


Symbols ① to ⑥ indicate specific data.



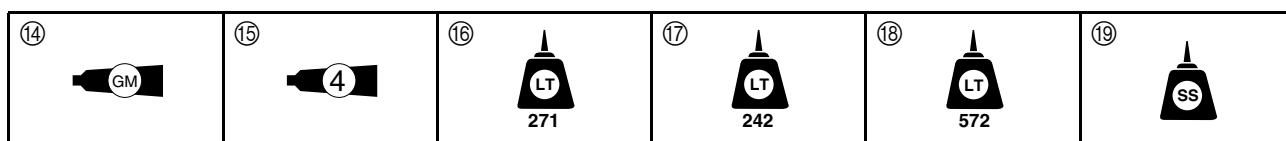
- ① Special tool
- ② Specified oil or fluid
- ③ Specified engine speed
- ④ Specified tightening torque
- ⑤ Specified measurement
- ⑥ Specified electrical value (resistance, voltage, electric current)

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



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

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



- ⑭ Apply Gasket Maker
- ⑮ Apply Yamabond No. 4
- ⑯ Apply LOCTITE 271 (red)
- ⑰ Apply LOCTITE 242 (blue)
- ⑱ Apply LOCTITE 572
- ⑲ Apply silicon sealant

Identification

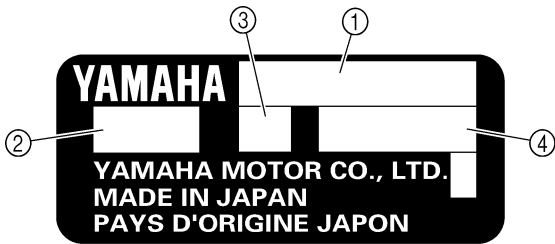
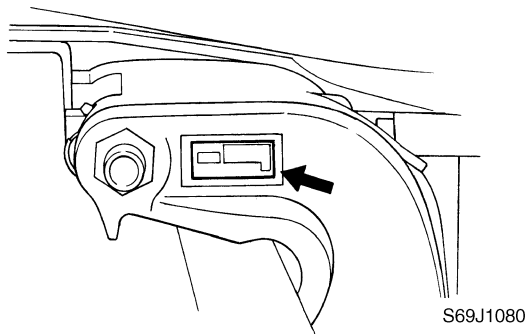
Applicable models

This manual covers the following models.

Applicable models
Z300AETO, LZ300AETO

Serial number

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



S69J1090N

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

Model name	Approved model code	Starting serial No.
Z300AETO	6D0	X: 1000001–
		U: 1000001–
LZ300AETO	6D1	X: 1000001–

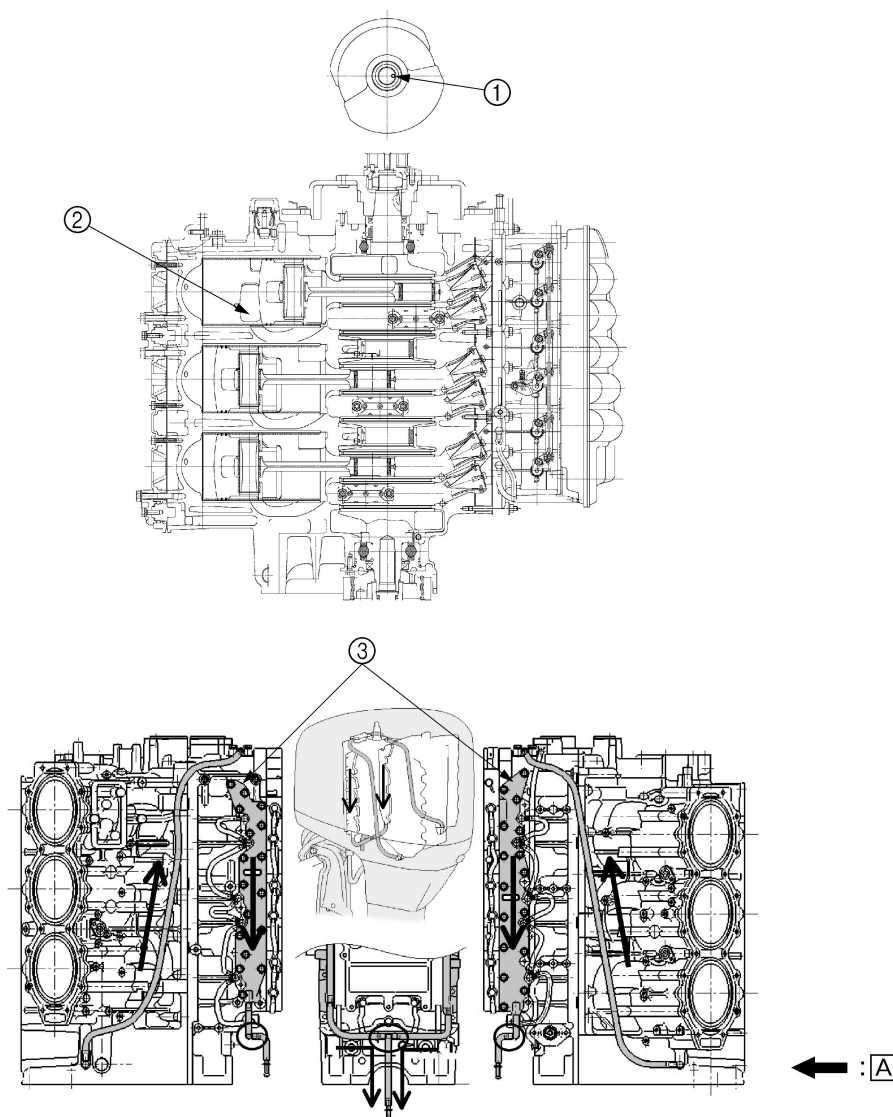
Features and benefits

Crankcase and cylinders

The following modifications have been adopted to increase the output as compared to the Z250 power unit.

- The material of the crankshaft has been changed to a high-grade clean steel^(*1) to increase durability against stress.
- Wider exhaust ports with planed-off edges have been adopted and the exhaust timing has been changed to reduce the exchange loss of the exhaust gas.
- Cooling water jackets have been incorporated to the crankcase to increase engine-cooling ability.

*1: Steel with decreased nonmetallic inclusion content



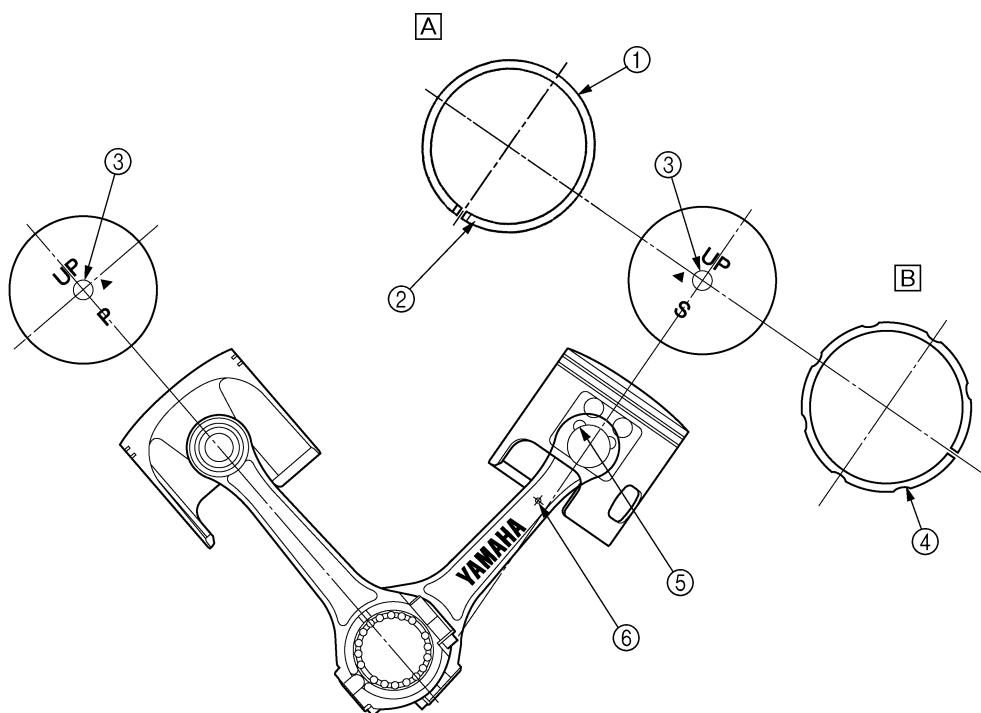
S6D01020

- ① Crankshaft identification
Identification mark: 2 mm (0.079 in) punch mark
- ② Exhaust port
- ③ Crankcase water jackets

[A] Water flow



- Newly-forged lightweight pistons with a hard anodic coating on the piston pin boss have been adopted to increase durability and reduce the inertia mass of the pistons.
- The top piston rings are made of steel and are ion-plated to increase durability.
- The heat treatments for the piston pins and connecting rods have been changed so that there is multiphase carbonization to increase durability.



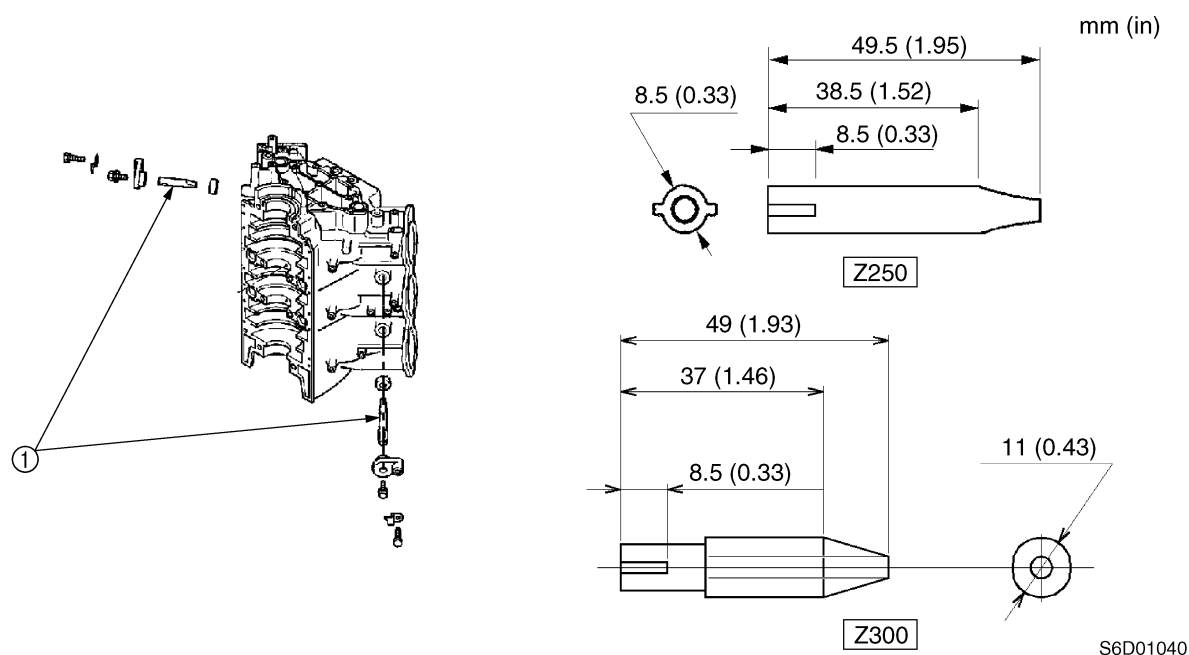
S6D01030

- ① Ion plating (chromium)
- ② Identification mark: R
- ③ Identification mark: 6D0
- ④ Oil groove
- ⑤ Hard anodic coating
- ⑥ Identification mark

- [A] Top ring
- [B] Second ring

Features and benefits

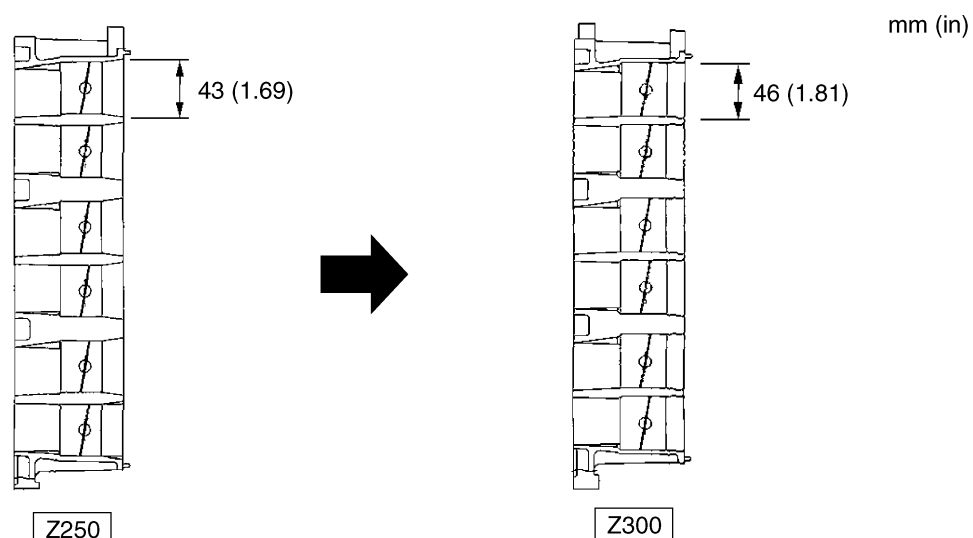
- The anti-corrosion anodes in the cooling water passages of the cylinder block are larger to increase reliability and performance.



① Anodes

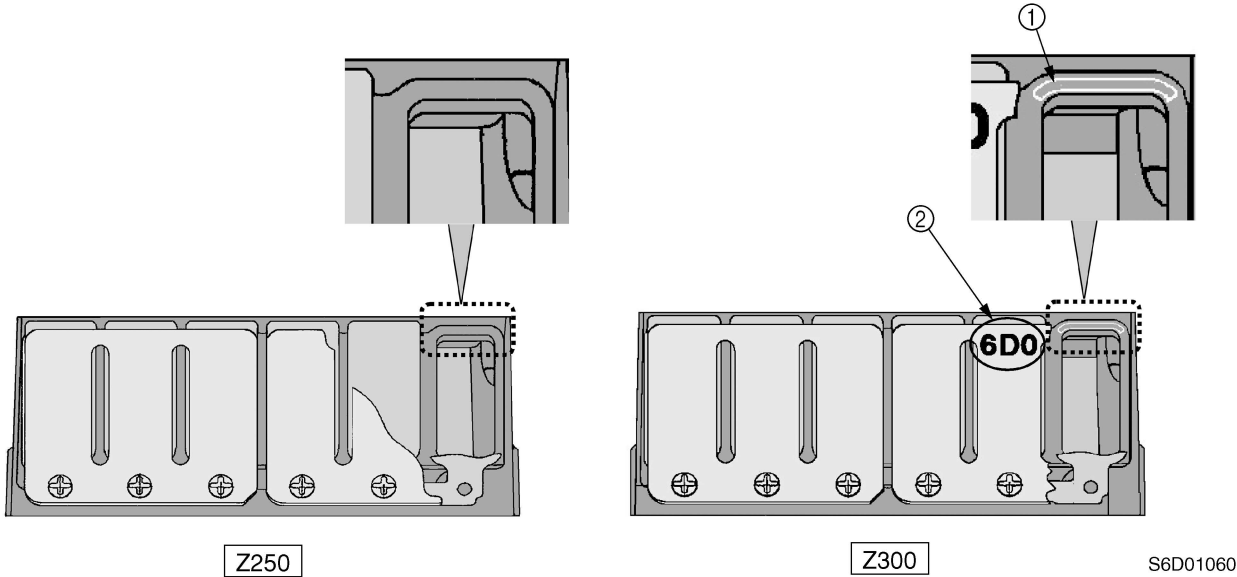
Intake system

The openings in the throttle bodies were enlarged to a 46 mm (1.81 in) diameter to increase power output.



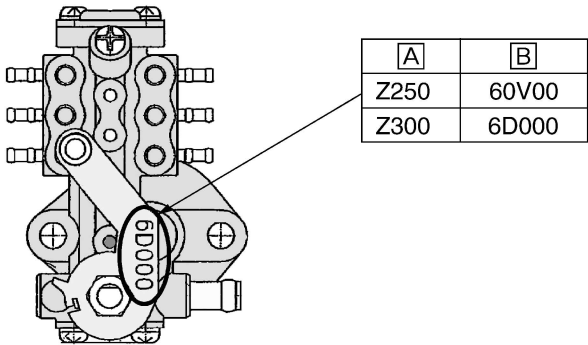
An oil groove has been added to each reed valve seat. Oil in the groove helps to reduce impact when the reed valve contacts the reed valve seat.

The dimensions of the reed valve assembly are the same as those for the Z250.



- ① Oil groove
- ② Identification mark: 6D0

The oil pump has been newly designed to obtain optimal oil supply.



S6D01070

- A Model
- B Identification mark

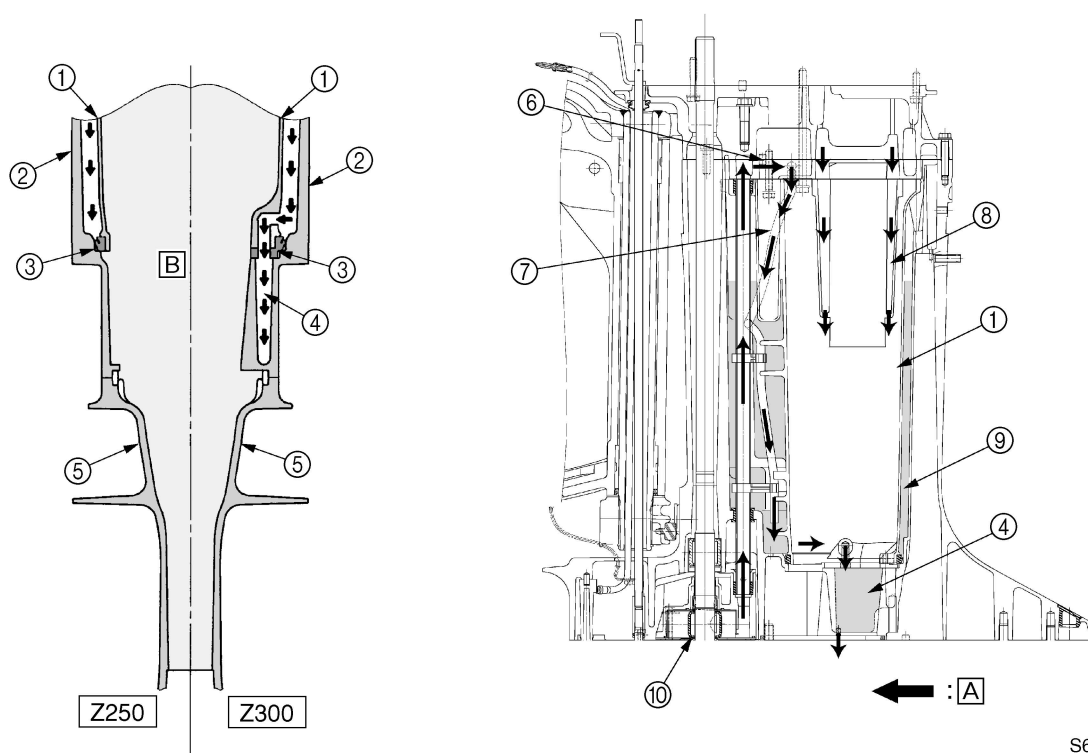
Upper case

Water jackets have been incorporated to both sides of the lower part of the upper case. This structure reduces the heat transfer to the upper case from the exhaust gas.

The cooling water discharged from the water pump is supplied to the upper case around the muffler from the pipe connected to the exhaust guide, flows down into the water jacket, and then drains to the lower case.

Water jackets have been incorporated to the exhaust manifold to protect it from the high-temperature exhaust gas.

Fresh cooling water from the water pump accumulates in the water jacket, and then drains into the muffler.



- ① Muffler
- ② Upper case
- ③ Gasket
- ④ Upper case water jacket
- ⑤ Lower case
- ⑥ Exhaust guide
- ⑦ Hose
- ⑧ Exhaust manifold
- ⑨ Water
- ⑩ Water pump

- Ⓐ Water flow
- Ⓑ Exhaust passage



Lower case

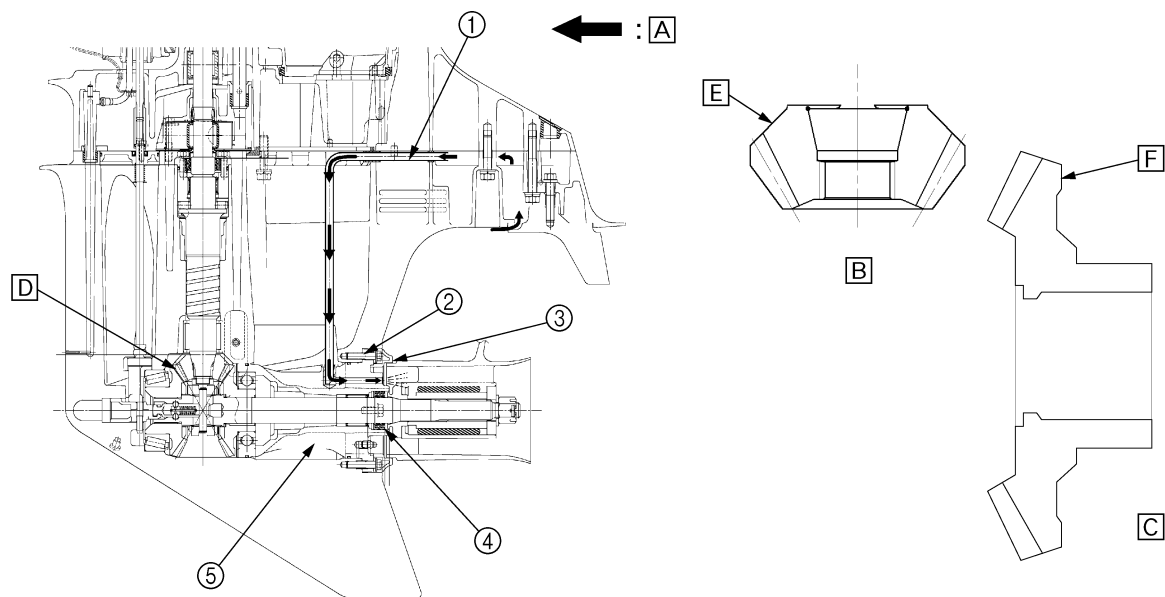
The propeller shaft housing and the ring are newly designed to reduce the exhaust back-pressure and cool the propeller damper.

Cooling water is taken in from the front of the trim tab, flows through the pipe in the lower case and propeller shaft housing, and then is supplied directly to the propeller boss.

This prevents the cooling water from mixing with the exhaust gas in the exhaust passage in the lower case and also prevents the cooling water from obstructing the exhaust gas.

Therefore, the exhaust back-pressure can be reduced.

A low gear ratio has been adopted to match the power output characteristics.



S6D01090

- ① Water pipe (for cooling the propeller boss)
- ② Heli-sert bushing
- ③ Ring
- ④ Fluorine-coated oil seals
- ⑤ Propeller shaft housing (with water passage)

- [A] Water flow
- [B] Pinion gear
- [C] Reduction gear

[D]

Model	Gear ratio
Z250	1.81
Z250F Z300	1.75

[E]

Model	Identification mark	Notes
Z300 LZ300	60X1	Same as Z250F

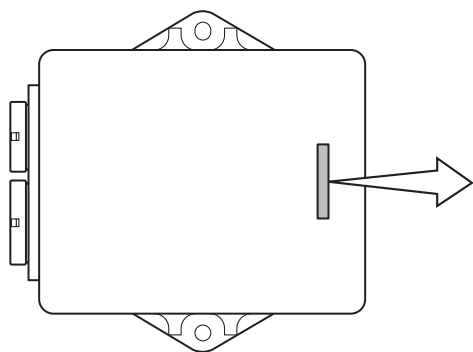
[F]

Model	Identification mark	Notes
Z300	F	60X00
	R	69L00
LZ300	F	6D100
	R	6D100

ECM (Electronic Control Module)

ECMs have been adopted that are specific to each model to control the ignition and injection timing.

NOTE: The diagnostic codes are the same as those for the Z250, and the latest version of the YDIS covers all previous models with fuel injection.



[A]	[B]	[C]
VZ225 (Z250H)	60Y-01	
VZ250 (Z250F)	60X-01	
Z250 (Z250D)	60V-01	
	60V-21	[D]
Z300 (Z300A)	6D0-00	

S6D01100

- [A]

Model
- [B]

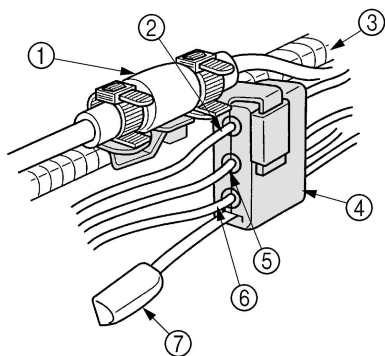
ECM identification
- [C]

Note
- [D]

For Brazil

Wiring harness connector holder

A wiring harness connector holder has been added to the side of bottom cowling to secure the 10-pin main harness, remote oil tank harness, warning indicator harness, and trim meter harness. The wiring harness connector holder helps to organize the harnesses and hold them in place.



S6D01110

- ① 10-pin main harness
- ② Remote oil tank harness (Blue connector)
- ③ Bottom cowling seal
- ④ Holder
- ⑤ Trim meter harness
- ⑥ Warning indicator harness
- ⑦ Isolator lead



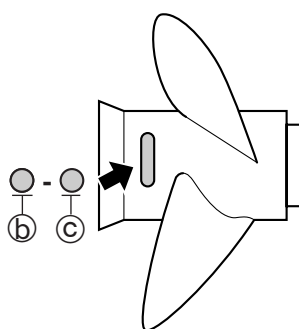
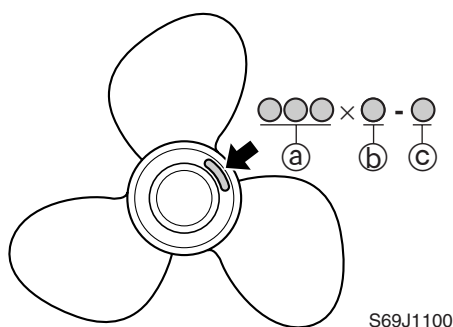
Propeller selection

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 boss end and on the side of the propeller boss.



- Ⓐ Propeller diameter (in inches)
- Ⓑ Propeller pitch (in inches)
- Ⓒ Propeller type (propeller mark)

Selection

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

Regular rotation model

Propeller size (in)	Material
13 3/8 × 23 - M	Stainless
13 3/8 × 25 - M	
13 3/4 × 17 - M2	
13 3/4 × 19 - M2	
13 3/4 × 21 - M	
14 1/2 × 19 - T	
14 1/2 × 21 - T	
14 1/2 × 23 - M	
14 3/4 × 25 - T	
14 7/8 × 21 - M	
15 × 17 - T	
15 1/8 × 27 - T	
15 1/4 × 15 - M	
15 1/4 × 17 - M	
15 1/4 × 19 - M	
15 3/4 × 13 - M	

Counter rotation model

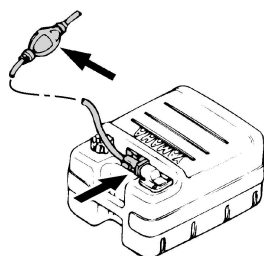
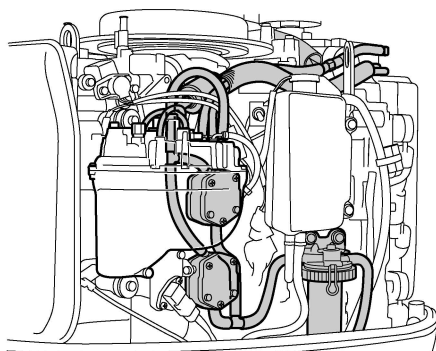
Propeller size (in)	Material
13 3/8 × 23 - ML	Stainless
13 3/4 × 17 - ML1	
13 3/4 × 19 - ML1	
13 3/4 × 21 - ML	
14 1/2 × 19 - TL	
14 1/2 × 21 - TL	
15 × 17 - TL	
15 1/4 × 15 - ML	

Predelivery checks

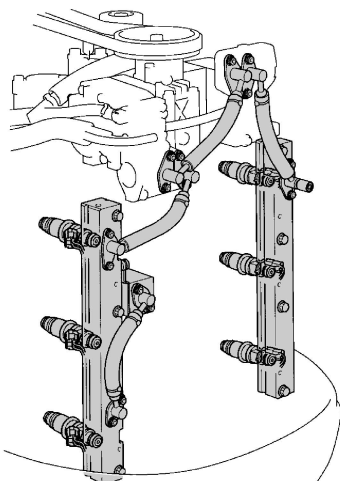
To make the delivery process smooth and efficient, the predelivery checks should be completed as explained below.

Checking the fuel system

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



S6D01010



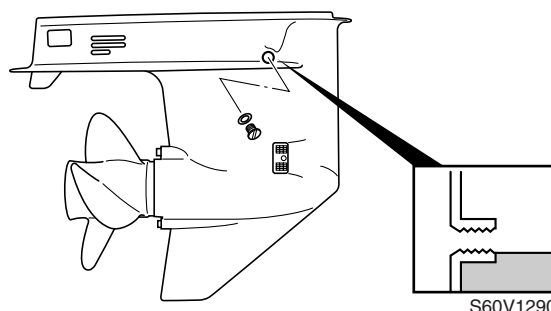
S60V1020

CAUTION:

- Use unleaded straight gasoline only.
- Do not use gasoline mixed with oil (pre-mixed fuel).

Checking the gear oil level

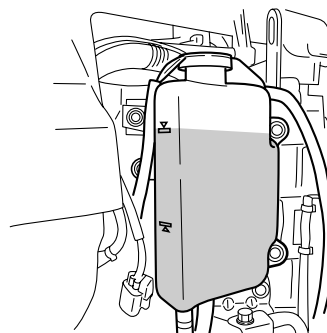
1. Check the gear oil level.



S60V1290

Checking the engine oil level

1. Check that the engine oil level is between the maximum and minimum level marks.



S60V3260



Recommended engine oil:
YAMALUBE 2-stroke outboard
motor oil

Checking the battery

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



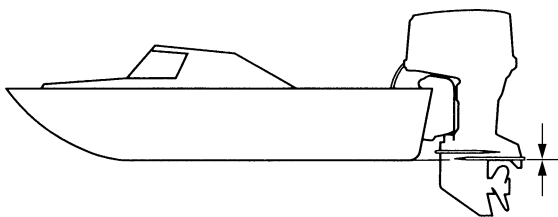
Recommended battery capacity:
CCA/EN: 711 A
20HR/IEC: 100 Ah
Electrolyte specified gravity:
1.280 at 20 °C (68 °F)

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



Checking the outboard motor mounting height

1. Check that the anti-cavitation plate is aligned with the bottom of the boat. 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.



S69J1160

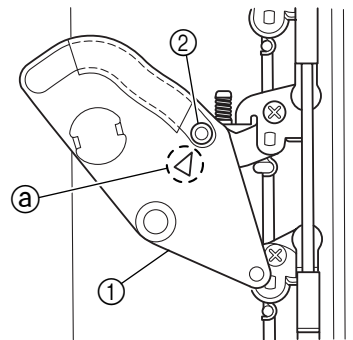
NOTE:

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 bolts.

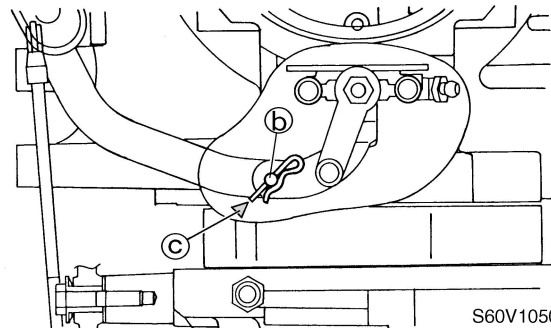
Checking the remote control cables

1. Set the remote control lever to the neutral position and fully close the throttle lever.
2. Check that the throttle cam ① is in its fully closed position and align the center of the throttle cam roller ② with the alignment mark ③.

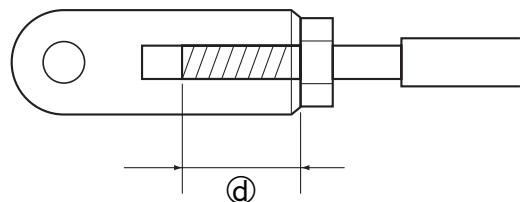


S60V1040

3. Check that the center of the set pin ⑥ is aligned with the alignment mark ⑦ on the bottom cowling.



S60V1050



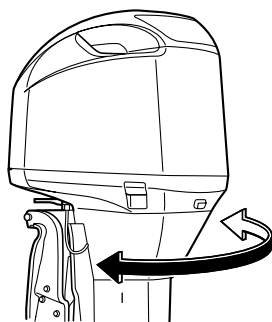
S60C1190

CAUTION:

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

Checking the steering system

1. Check the steering friction for proper adjustment.
2. Check that the steering operates smoothly.

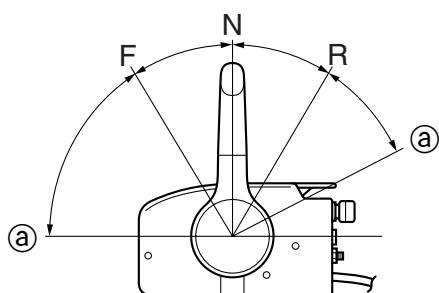


S60V1060

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

Checking the gear shift and throttle operation

1. Check that the gear shift operates smoothly when the remote control lever is shifted from neutral to forward or reverse.
2. Check that the throttle operates smoothly when the remote control lever is shifted from the fully closed position to the fully open position (a).



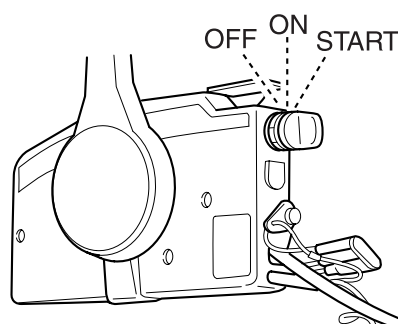
S69J1210

Checking the power trim and tilt system

1. Check that the outboard motor tilts up and down smoothly when operating the power trim and tilt unit.
2. Check that there is no abnormal noise produced when the outboard motor is tilted up or down.
3. Check that there is no interference with wires or hoses when the tilted-up outboard motor is steered.
4. Check that the trim meter points down when the outboard motor is tilted all the way down.

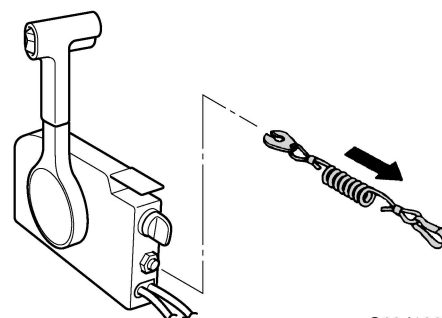
Checking the engine start switch and engine stop lanyard switch

1. Check that the engine starts when the engine start switch is turned to START.
2. Check that the engine turns off when the engine start switch is turned to OFF.



S60V1070

3. Check that the engine turns off when the engine stop lanyard is pulled from the engine stop lanyard switch.

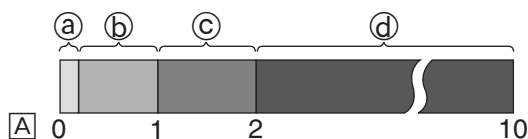
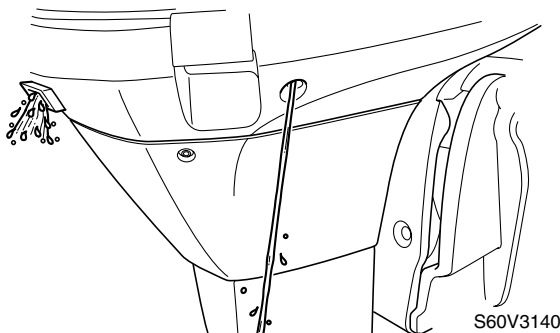


S69J1220



Checking the cooling water pilot hole

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



S60V1120

[A] Hour

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

NOTE:

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

Break-in

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

1. First 10 minutes (a) of operation at idle
2. Fifty minutes (b) at 3,000 r/min or less
3. One hour (c) at 4,000 r/min or less
4. Eight hours (d) at 5,000 r/min or less with repeated wide-open-throttle operation for 5 minutes or less

After test run

1. Check for water in the gear oil.
2. Check for fuel leakage in the cowling.
3. Flush the cooling water passage with fresh water using the flushing kit and with the engine running at idle.

General specifications

Item	Unit	Model	
		Z300AETO	LZ300AETO
Dimension			
Overall length	mm (in)	868 (34.2)	
Overall width	mm (in)	568 (22.4)	
Overall height			
(X)	mm (in)	1,830 (72.0)	
(U)	mm (in)	1,957 (77.0)	—
Boat transom height			
(X)	mm (in)	635 (25.0)	
(U)	mm (in)	762 (30.0)	—
Weight			
(with stainless propeller)			
(X)	kg (lb)	252 (556)	
(U)	kg (lb)	257 (567)	—
Performance			
Maximum output	kW (hp)	220.7 (300) at 5,000 r/min	
Full throttle operating range	r/min	4,500–5,500	
Maximum fuel consumption	L (US gal, Imp gal)/hr	105.0 (27.7, 23.1) at 5,500 r/min	
Engine idle speed	r/min	700–760	
Power unit			
Type		2-stroke, 76°, V6, HPDI	
Total displacement	cm ³ (cu. in)	3,342 (203.9)	
Bore × stroke	mm (in)	93.0 (3.66) × 82.0 (3.23)	
Compression ratio		6.2	
Control system		Remote control	
Starting system		Electric starter	
Enrichment system		Fuel injection	
Ignition control system		TCI	
Maximum generator output	V, A	12, 50	
Spark plug		BKR7EKU (NGK)	
Cooling system		Water	
Exhaust system		Propeller boss	
Lubrication system		Oil injection	

SPEC		Specifications	
Item	Unit	Model	
		Z300AETO	LZ300AETO
Fuel and oil			
Fuel type		Regular unleaded gasoline	
Fuel minimum rating	RON ^(*1)	90	
Engine oil ^(*2)	PON	86	
Engine oil tank capacity		YAMALUBE 2-stroke outboard motor oil	
Oil tank	L (US gal, Imp gal)	1.2 (0.32, 0.26)	
Remote oil tank	L (US gal, Imp gal)	10.5 (2.77, 2.31)	
Gear oil type		Hypoid gear oil	
Gear oil grade	SAE	90	
Gear oil quantity	cm ³ (US oz, Imp oz)	1,150 (38.9, 40.6)	1,000 (33.8, 35.3)
Bracket unit			
Trim angle (at 12° boat transom)	Degree	-3 to 16	
Tilt-up angle	Degree	70	
Steering angle	Degree	30 + 30	
Drive unit			
Gear shift positions		F-N-R	
Gear ratio		1.75 (28/16)	
Reduction gear type		Spiral bevel gear	
Clutch type		Dog clutch	
Propeller shaft type		Spline	
Propeller direction (rear view)		Clockwise	Counterclockwise
Propeller mark		T, M	TL, ML
Electrical			
Battery minimum capacity ^(*3)			
CCA/EN	A	711	
20HR/IEC	Ah	100	

(*1) RON: Research Octane Number

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

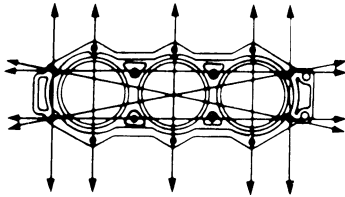
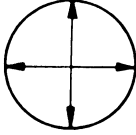
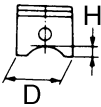
(*2) If 2-stroke outboard motor oil is not available, a 2-stroke NMMA-certified TC-W3 oil of equivalent quality must be used.

(*3) CCA: Cold Cranking Ampere

EN: European Norm (European standard)

IEC: International Electrotechnical Commission

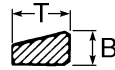
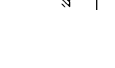
Maintenance specifications**Power unit**

Item	Unit	Model	
		Z300AETO	LZ300AETO
Power unit Minimum compression pressure*	kPa (kgf/cm ² , psi)	580 (5.8, 84)	
Cylinder heads Warpage limit  (lines indicate straightedge position)	mm (in)	0.1 (0.004)	
Cylinders Bore size Bore size limit Taper limit Out-of-round limit 	mm (in) mm (in) mm (in) mm (in)	93.000–93.020 (3.6614–3.6622) 93.100 (3.6654) 0.08 (0.0031) 0.05 (0.0020)	
Pistons Piston diameter (D) Measuring point (H) Piston-to-cylinder clearance Piston pin boss bore Oversize piston 1st 2nd Oversize piston diameter 1st 2nd 	mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in)	92.830–92.850 (3.6547–3.6555) 10 (0.39) 0.165–0.171 (0.0065–0.0067) 26.004–26.015 (1.0238–1.0242) 0.25 (0.010) 0.50 (0.020) 93.080–93.100 (3.6646–3.6653) 93.330–93.350 (3.6744–3.6752)	
Piston pins Outside diameter	mm (in)	25.995–26.000 (1.0234–1.0236)	

* Measuring conditions:

Ambient temperature 20 °C (68 °F), wide open throttle, with spark plugs removed from all cylinders.

The figures are for reference only.

SPEC		Specifications		
Item		Unit	Model	
			Z300AETO	LZ300AETO
Piston rings				
Top ring				
Dimension B		mm (in)	2.05 (0.0807)	
Dimension T		mm (in)	3.00–3.20 (0.118–0.126)	
End gap		mm (in)	0.30–0.50 (0.0118–0.0197)	
Side clearance		mm (in)	0.02–0.06 (0.0008–0.0024)	
2nd piston ring				
Dimension B		mm (in)	2.05 (0.0807)	
Dimension T		mm (in)	2.70–2.90 (0.106–0.114)	
End gap		mm (in)	0.30–0.45 (0.0118–0.0177)	
Side clearance		mm (in)	0.02–0.06 (0.0008–0.0024)	
Connecting rods				
Small end inside diameter		mm (in)	31.000–31.012 (1.2205–1.2209)	
Big end side clearance		mm (in)	0.12–0.26 (0.0047–0.0102)	
Small end axial play limit		mm (in)	2.0 (0.08)	
Crankshaft				
Crankshaft journal diameter		mm (in)	58.975–58.991 (2.3219–2.3225)	
Crankpin diameter		mm (in)	40.485–40.500 (1.5939–1.5945)	
Runout limit		mm (in)	0.02 (0.0008)	
Thermostats				
Opening temperature		°C (°F)	48–52 (118–126)	
Fully open temperature		°C (°F)	60 (140)	
Valve open lower limit		mm (in)	4.3 (0.17)	
Oil pump				
Identification mark			6D000	
Bleeding			Screw type	
Reed valves				
Valve stopper height limit		mm (in)	8 (0.31)	
Valve bending limit		mm (in)	0.2 (0.008)	

Lower unit

Item	Unit	Model	
		Z300AETO	LZ300AETO
Gear backlash			
Pinion-to-forward gear	mm (in)	0.12–0.44 (0.0047–0.0173)	0.30–0.62 (0.0118–0.0244)
Pinion-to-reverse gear	mm (in)	0.61–0.90 (0.0240–0.0354)	
Pinion shims	mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50	
Forward gear shims	mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50	
Reverse gear shims	mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50	
Propeller shaft shims	mm	—	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50
Propeller shaft			
End play	mm (in)	—	0.25–0.35 (0.0098–0.0138)

Electrical

Item	Unit	Model	
		Z300AETO	LZ300AETO
Ignition and ignition control system			
Ignition timing (cylinder #1)	Degree	ATDC 7 at engine idle speed	
	Degree	BTDC 14 at 5,500 r/min	
Spark plug gap	mm (in)	1.5–1.6 (0.059–0.063)	
Ignition coil resistance			
Primary coil (R – B/W) at 20 °C (68 °F)	Ω	1.36–1.84	
Secondary coil (R – spark plug wire) at 20 °C (68 °F)	kΩ	7.31–9.89	
ECM output peak voltage (R – B/W)			
at cranking (loaded)	V	265	
at 1,500 r/min (loaded)	V	240	
at 3,500 r/min (loaded)	V	240	
Pulser coil output peak voltage (W/R, W/B, W/Y, W/G, W/L, W/Br – B)			
at cranking (unloaded)	V	3.5	
at cranking (loaded)	V	3.5	
at 1,500 r/min (loaded)	V	20.0	
at 3,500 r/min (loaded)	V	30.0	

Item	Unit	Model	
		Z300AETO	LZ300AETO
Pulser coil resistance ^(*) (W/R, W/B, W/Y, W/G, W/L, W/Br – B)	Ω	294–398	
Throttle position sensor			
Input voltage (O – R)	V	5	
Output voltage (P – O)	V	0.58–0.62 at engine idle speed (0.48–0.52 at throttle valve full closed)	
Crank position sensor output peak voltage (G/L – G/W)			
at cranking (unloaded)	V	1.5	
at cranking (loaded)	V	1.5	
at 1,500 r/min (loaded)	V	8.0	
at 3,500 r/min (loaded)	V	10.0	
Crank position sensor resistance ^(*) (G/L – G/W)	Ω	178.5–241.5	
Crank position sensor air gap	mm (in)	0.5–1.5 (0.02–0.06)	
Intake air temperature sensor resistance			
at 0 °C (32 °F)	kΩ	5.4–6.6	
at 80 °C (176 °F)	kΩ	0.3–0.4	
Engine temperature sensor resistance (B/Y – B/Y)			
at 20 °C (68 °F)	kΩ	54.2–69.0	
at 100 °C (212 °F)	kΩ	3.12–3.48	
Fuel control system			
Injector driver output peak voltage ^(*) (Pu/R – O/R, Pu/B – O/B, Pu/Y – O/Y, Pu/G – O/G, Pu/L – O/L, Pu/W – O/W)			
at cranking (loaded)	V	70	
at 1,500 r/min (loaded)	V	80	
at 3,500 r/min (loaded)	V	80	
Fuel injector resistance ^(*) at 20 °C (68 °F)	Ω	0.9–1.1	
Fuel pressure sensor output voltage ^(*) (O – P)	V	3.2 at engine idle speed	

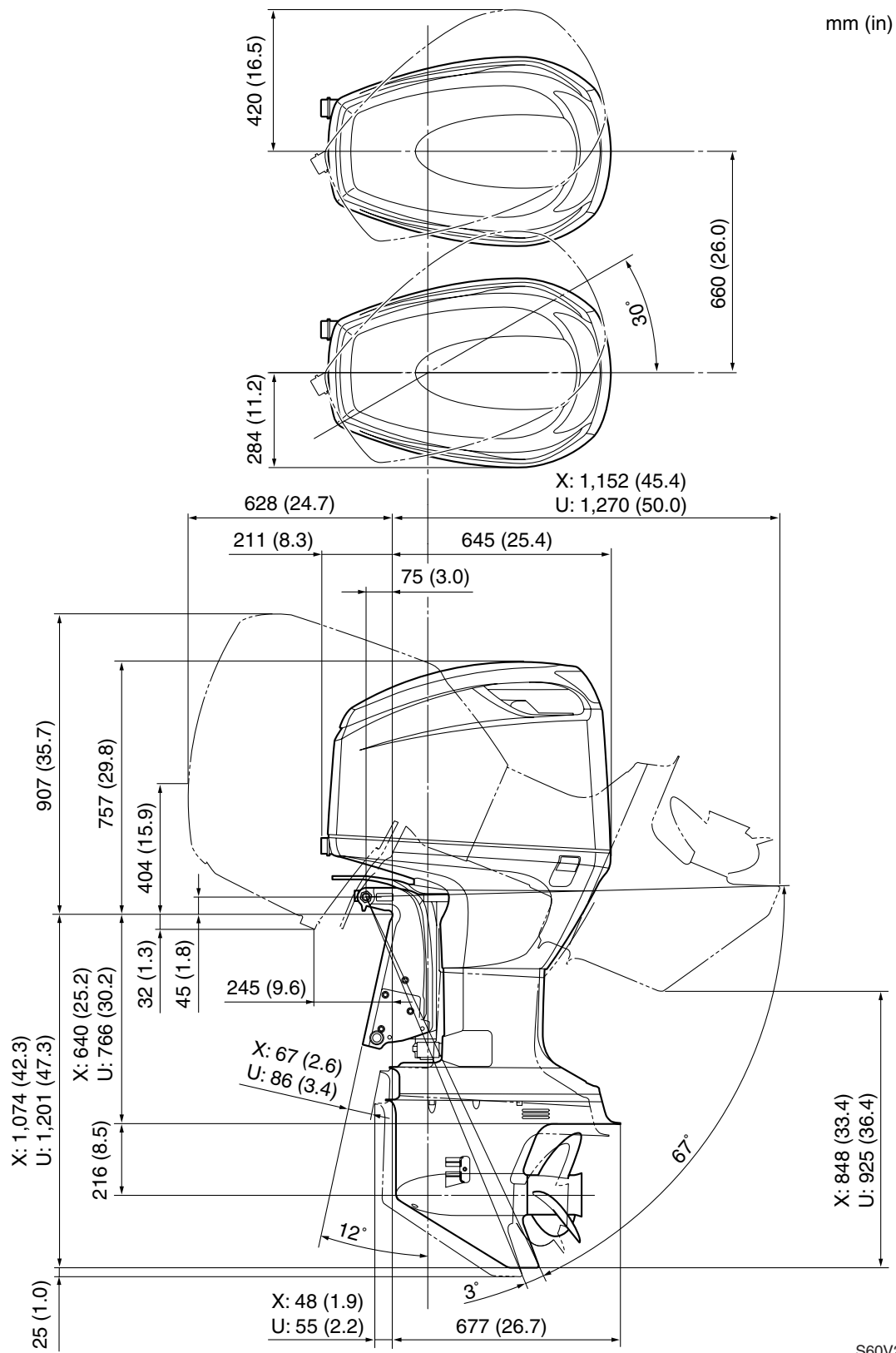
^(*) The figures are for reference only.

Maintenance specifications

Item	Unit	Model	
		Z300AETO	LZ300AETO
Starter motor			
Type		Sliding gear	
Output	kW	1.4	
Cranking time limit	Second	30	
Brushes			
Standard length	mm (in)	15.5 (0.61)	
Wear limit	mm (in)	9.5 (0.37)	
Commutator			
Standard diameter	mm (in)	29.0 (1.14)	
Wear limit	mm (in)	28.0 (1.10)	
Mica			
Standard undercut	mm (in)	0.5–0.8 (0.02–0.03)	
Wear limit	mm (in)	0.2 (0.01)	
Charging system			
Fuse	A	20, 30, 100	
Stator coil output peak voltage (G – G)			
at cranking (unloaded)	V	5.5	
at 1,500 r/min (unloaded)	V	40	
at 3,500 r/min (unloaded)	V	90	
Stator coil resistance ^(*)			
at 20 °C (68 °F) (G – G)	Ω	0.11–0.17	
Rectifier Regulator output peak voltage (R – ground)			
at 1,500 r/min (unloaded)	V	14.5	
at 3,500 r/min (unloaded)	V	14.5	
Power trim and tilt system			
Trim sensor			
Setting resistance	Ω	9–11	
Resistance (P – B)	Ω	9–387.6	
Fluid type		ATF Dexron II	

(*1) The figures are for reference only.

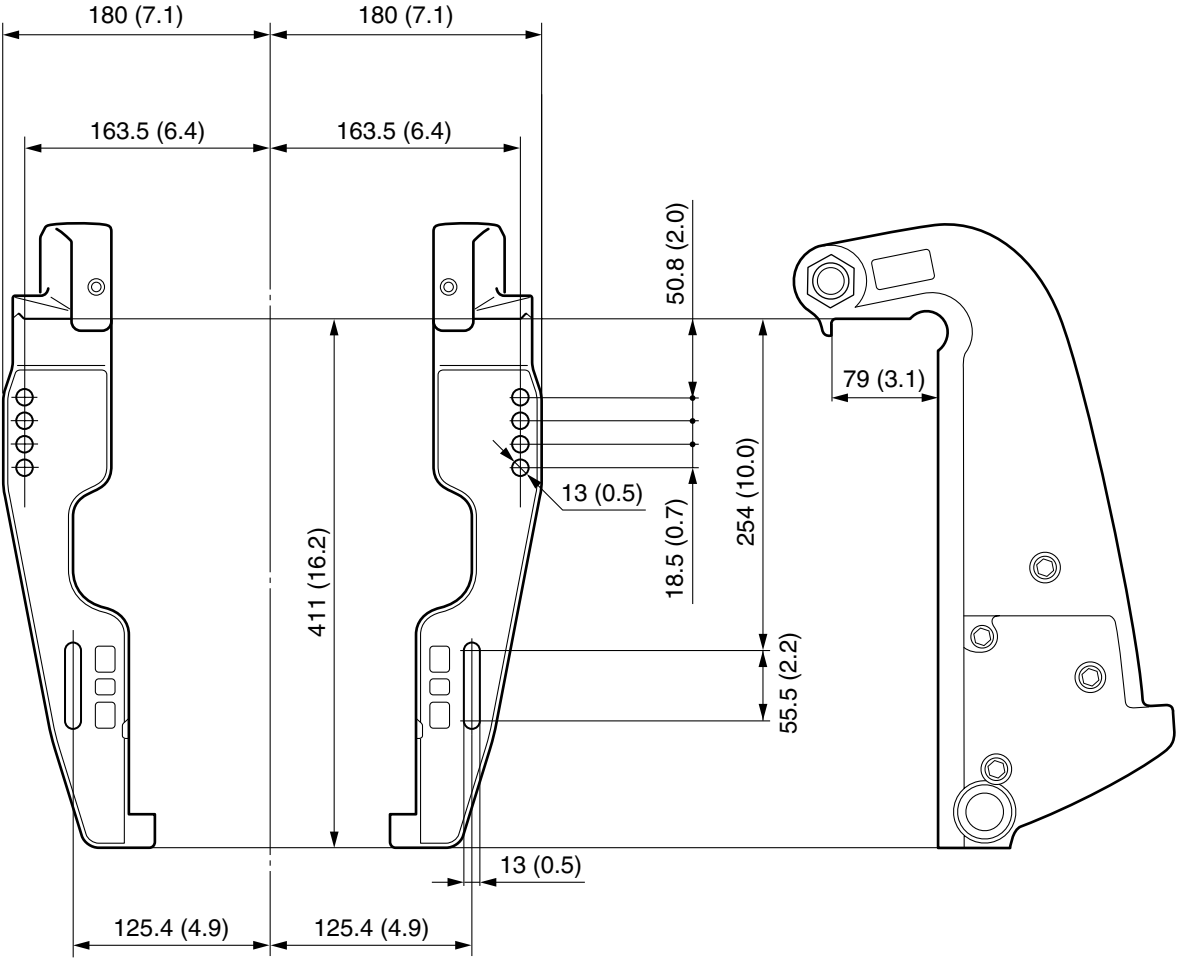
Dimensions
 Exterior



S60V2010

Clamp bracket

mm (in)



S60V2020

Tightening torques

Specified torques

Part to be tightened		Thread size	Tightening torques		
			N·m	kgf·m	ft·lb
Fuel system					
Fuel pump screw		M5	3	0.3	2.2
Emergency switch		—	4	0.4	3.0
High pressure fuel pump bolt		M8	23	2.3	17.0
Power unit					
Negative battery terminal nut		(M8)	12	1.2	8.9
Drive belt tensioner bolt		M10	39	3.9	28.8
Starter motor bolt		M8	29	2.9	21.4
Intake air temperature sensor		—	8	0.8	5.9
Rectifier Regulator bolt	1st	M6	6	0.6	4.4
	2nd		12	1.2	8.9
PTT motor lead bolt		M6	4	0.4	3.0
Shift position switch screw		M4	3	0.3	2.2
Control lever stopper screw		—	2	0.2	1.5
Connecting rod cap	1st	M9	28	2.8	20.7
	2nd		45	4.5	33.2
	3rd		Loosen completely		
	4th		28	2.8	20.7
	5th		45	4.5	33.2
Crankshaft balancer nut		(M32)	100	10.0	73.8
Crankcase bolt	1st	M10	17	1.7	12.5
	2nd		34	3.4	25.1
	1st	M6	4	0.4	3.0
	2nd		9	0.9	6.6
Crankcase cover bolt		M6	11	1.1	8.1
Cylinder head bolt	1st	M8	15	1.5	11.1
	2nd		30	3.0	22.1
Cylinder head cover bolt	1st	M6	5	0.5	3.7
	2nd		11	1.1	8.1
Exhaust outer cover bolt	1st	M6	5	0.5	3.7
	2nd		11	1.1	8.1
Flywheel magnet nut		(M24)	190	19.0	140
Fuel rail mounting bolt		M8	23	2.3	17.0
Fuel filter cup holder mounting bolt		M6	8	0.8	5.9
Injector holder bolt		M8	26	2.6	19.2
Intake silencer mounting screw		M6	3	0.3	2.2
Reed valve mounting screw		M5	3	0.3	2.2
Intake manifold bolt		M6	13	1.3	9.6
Oil pump mounting bolt		M6	7	0.7	5.2
Pressure control valve cover bolt	1st	M6	5	0.5	3.7
	2nd		11	1.1	8.1

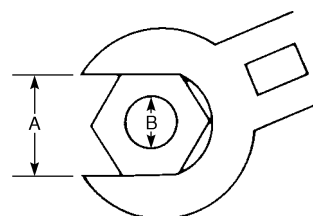
Tightening torques

Part to be tightened		Thread size	Tightening torques		
			N·m	kgf·m	ft·lb
Shift cut switch mounting screw		M4	3	0.3	2.2
Spark plug		M14	25	2.5	18.4
Positive battery terminal nut		(M8)	9	0.9	6.6
Thermostat cover bolt		M6	11	1.1	8.1
Throttle body mounting bolt and nut	1st	M6	4	0.4	3.0
	2nd		10	1.0	7.4
Power unit mounting bolt		M8	32	3.2	23.6
Lower unit (regular rotation model)					
Exhaust guide bolt		M8	32	3.2	23.6
Gear oil check screw		M8	9	0.9	6.6
Lower case mounting bolt		M10	47	4.7	34.7
Pinion nut		(M16)	142	14.2	104.7
Propeller nut		(M18)	54	5.4	39.8
Propeller shaft housing bolt		M8	30	3.0	22.1
Trim tab mounting bolt		M10	42	4.2	31.0
Gear oil drain screw		—	9	0.9	6.6
Grease nipple		—	6	0.6	4.4
Lower unit (counter rotation model)					
Exhaust guide bolt		M8	32	3.2	23.6
Gear oil check screw		M8	9	0.9	6.6
Lower case mounting bolt		M10	47	4.7	34.7
Pinion nut		(M16)	142	14.2	104.7
Propeller nut		(M18)	54	5.4	39.8
Ring nut		—	108	10.8	79.7
Propeller shaft housing bolt		M8	30	3.0	22.1
Trim tab mounting bolt		M10	42	4.2	31.0
Gear oil drain screw		—	9	0.9	6.6
Grease nipple		—	6	0.6	4.4
Bracket unit					
Flushing hose adapter screw		M5	5	0.5	3.7
Upper case mounting bolt		M8	32	3.2	23.6
Lower exhaust guide mounting bolt		M8	22	2.2	16.2
Exhaust manifold mounting bolt		M8	25	2.5	18.4
Muffler mounting bolt		M8	25	2.5	18.4
Lower rubber mount nut		(M14)	72	7.2	53.1
Through tube nut		(M22)	22	2.2	16.2
Trim rod stopper nut		(M10)	36	3.6	26.6
Upper rubber mount nut		(M14)	72	7.2	53.1
Friction plate screw		M6	4	0.4	3.0

Part to be tightened	Thread size	Tightening torques		
		N·m	kgf·m	ft·lb
Power trim and tilt unit				
Blind plug	—	7	0.7	5.2
Gear pump housing mounting screw	M4	2	0.2	1.5
Gear pump housing bolt	M5	4	0.4	3.0
Trim down spring screw	M5	4	0.4	3.0
Main valve	—	11	1.1	8.1
Manual valve	—	2	0.2	1.5
PTT motor unit mounting bolt	M8	19	1.9	14.0
Oil pipe	—	15	1.5	11.1
Relief valve cap screw	M5	4	0.4	3.0
Reservoir mounting bolt	M8	19	1.9	14.0
Reservoir cap	M12	7	0.7	5.2
Tilt cylinder end screw	—	90	9.0	66.4
Tilt rod	—	55	5.5	40.6
Trim cylinder end screw	—	160	16.0	118
Trim rod	—	38	3.8	28.0
Valve plate bolt	M6	7	0.7	5.2
PTT unit mounting bolt	M10	42	4.2	31.0

General torques

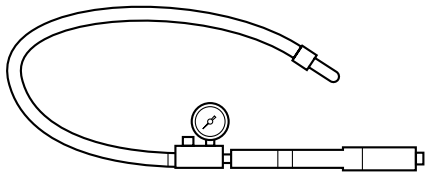
This chart specifies tightening torques for standard fasteners with a standard ISO thread pitch. Tightening torque specifications for special components or assemblies are provided in applicable sections of this manual. To avoid warpage, tighten multi-fastener assemblies in a crisscross fashion and progressive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



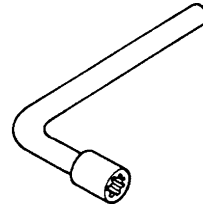
S69J2150

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

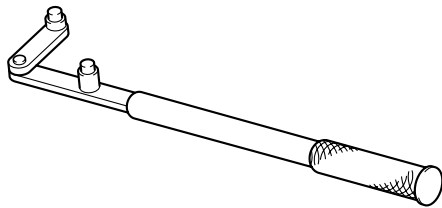
Special service tools



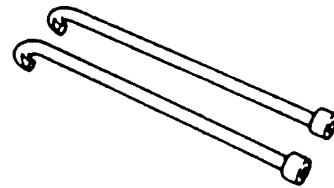
Leakage tester
90890-06840



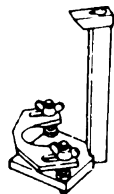
Shift rod push arm
90890-06052



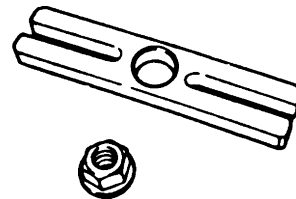
Flywheel holder
90890-06522



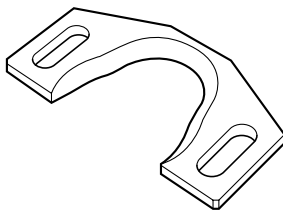
Bearing housing puller claw L
90890-06502



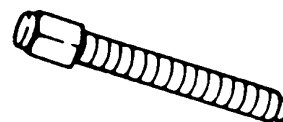
Pinion height gauge
90890-06710



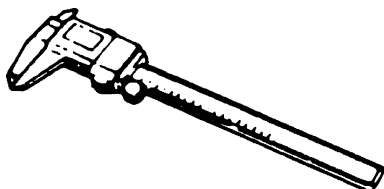
Stopper guide plate
90890-06501



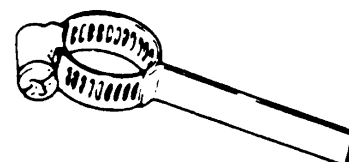
Fixing plate
90890-06711



Center bolt
90890-06504

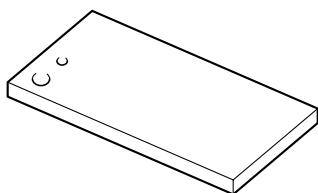


Digital caliper
90890-06704

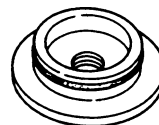


Backlash indicator
90890-06706

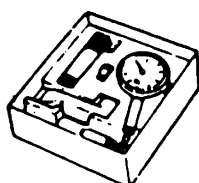
3



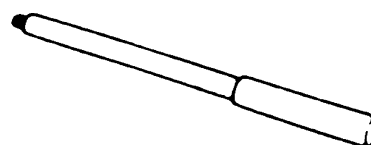
Magnet base plate
90890-07003



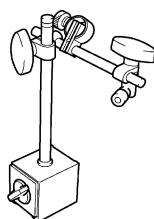
Ball bearing attachment
90890-06657



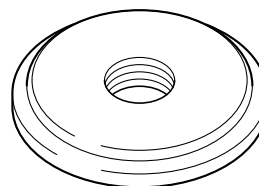
Dial gauge set
90890-01252



Driver rod LL
90890-06605



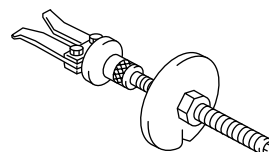
Magnet base B
90890-06844



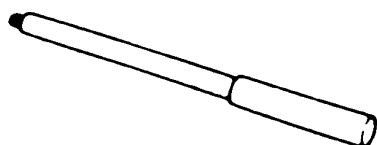
Bearing outer race attachment
90890-06628



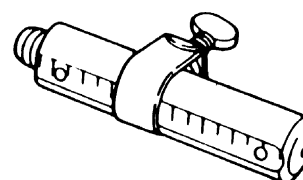
Needle bearing attachment
90890-06653, 90890-06654



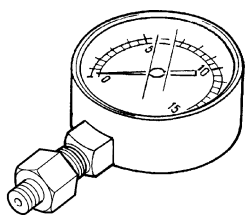
Bearing outer race puller assembly
90890-06523



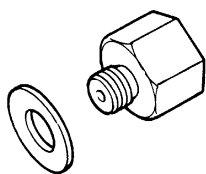
Driver rod L3
90890-06652



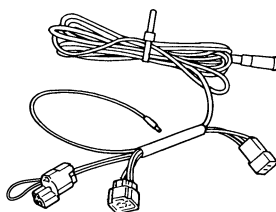
Driver rod SS
90890-06604



PTT oil pressure gauge assembly
90890-06580



PTT oil pressure gauge adapter
90890-06581



Diagnostic flash indicator B
90890-06865



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	
		10 hours (1 month)	50 hours (3 months)	100 hours (6 months)	200 hours (1 year)
Anodes (external)	Check/replace		○	○	
Anodes (internal)	Check/replace				○
Battery	Check/charge	○			
Cooling water passages	Clean		○	○	
Top cowling	Check				○
Fuel filter (can be disassembled)	Check/replace	○	○	○	
Fuel system	Check	○	○	○	
Gear oil	Change	○		○	
Lubrication points	Lubricate			○	
Engine idle speed (EFI models)	Check/adjust				○
PCV (Pressure Control Valve)	Check				○
Power trim and tilt unit	Check				○
Propeller and cotter pin	Check/replace		○	○	
Shift link/shift cable	Check/adjust				○
Thermostat	Check				○
Throttle link/throttle cable/throttle pick-up timing	Check/adjust				○
Water pump	Check				○
Spark plugs	Clean/adjust/replace	○	○	○	
High pressure fuel pump drive belt	Check/replace			○	○
High pressure fuel pump oil level	Check/fill				○
Oil pump	Check/adjust	○			
Oil tank water drain	Check/clean	○	○	○	
Throttle position sensor	Check/adjust				○

NOTE:

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

Item	Remarks	Every	
		500 hours (2.5 years)	1,000 hours (5 years)
High pressure fuel pump drive belt	Replace		○

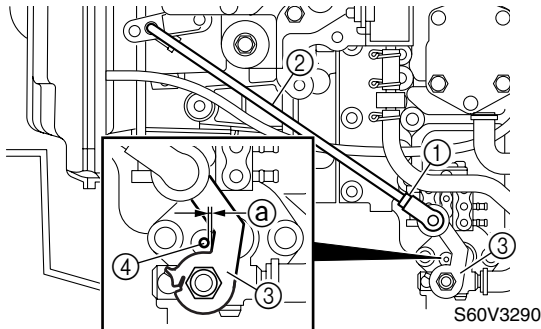
CAUTION:

If the flywheel magnet cover is removed to service the outboard motor, be sure to check that the fuel hoses are routed correctly before installing it.

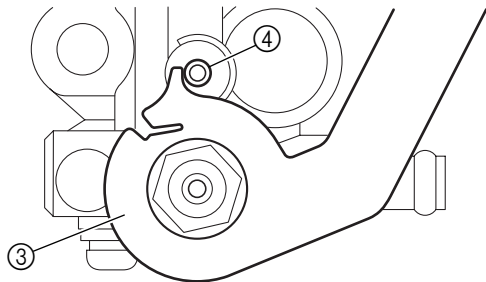
Oil injection system

Adjusting the oil pump link rod

1. Loosen the locknut ① and then disconnect the oil pump link rod ②.
2. Fully close the throttle valves.
3. Adjust the oil pump link rod so that there is a 0.5 mm (0.02 in) gap ③ between the oil pump lever ④ (in the fully closed position) and the stopper ⑤.



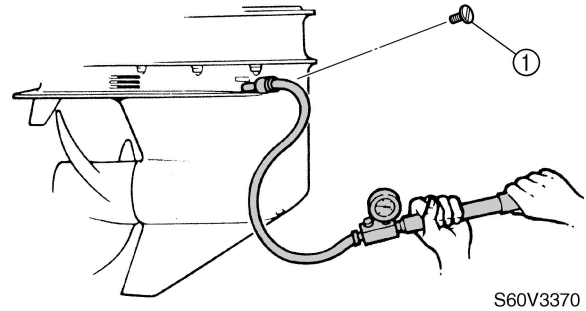
4. Connect the oil pump link rod.
5. Check that the oil pump lever ④ contacts the stopper ⑤ when the throttle valve is in the fully open position.



Lower unit

Checking the lower unit for air leakage

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



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 tester from the lower unit.



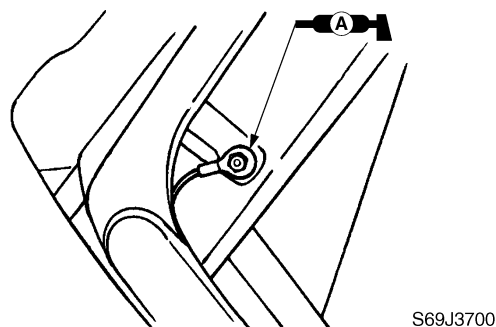
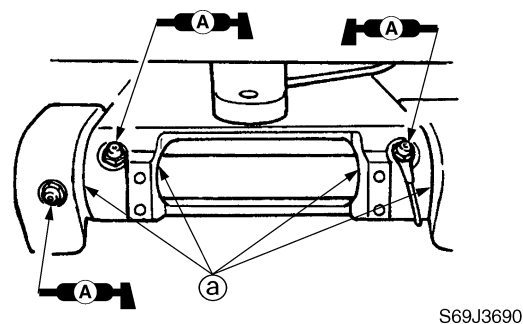
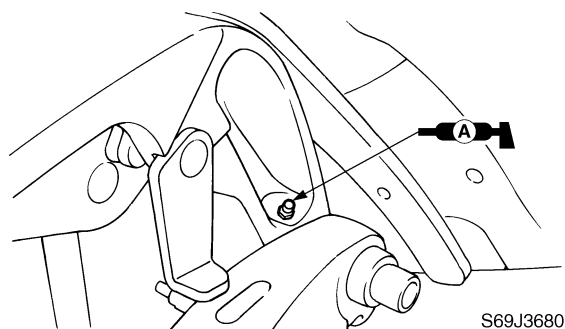
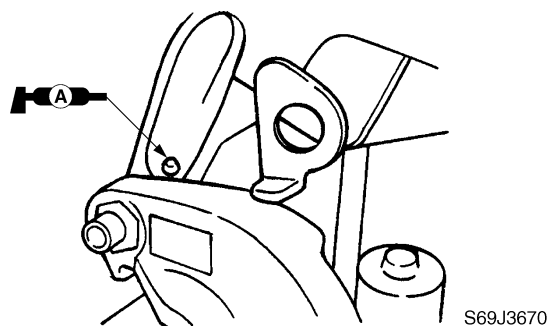
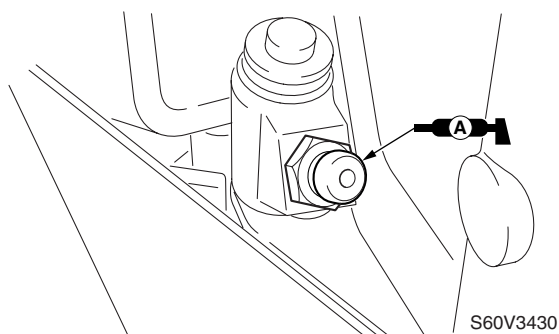
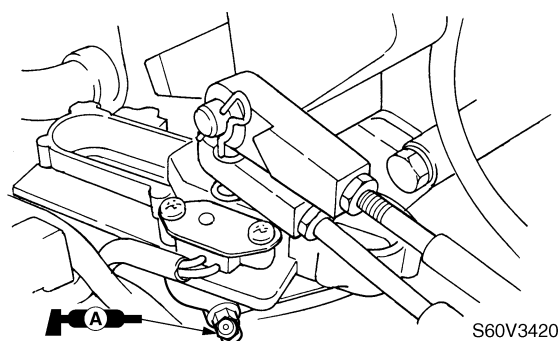
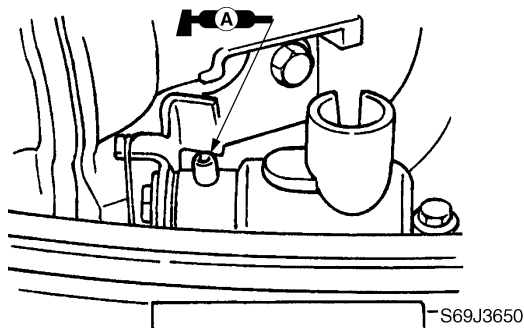
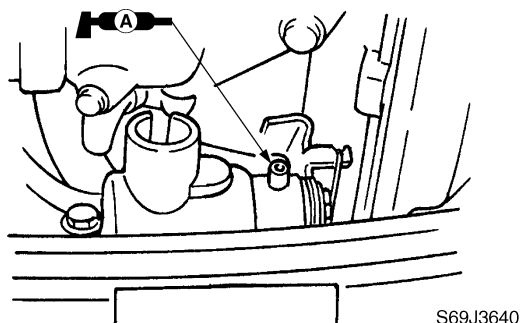
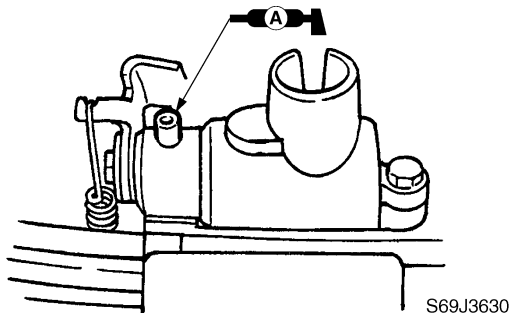
Lower unit holding pressure:
70 kPa (0.7 kgf/cm², 10 psi)

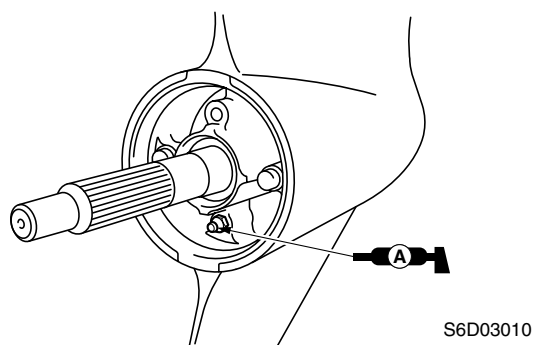
3. If pressure drops below specification, check the drive shaft and propeller shaft oil seals for damage.

General

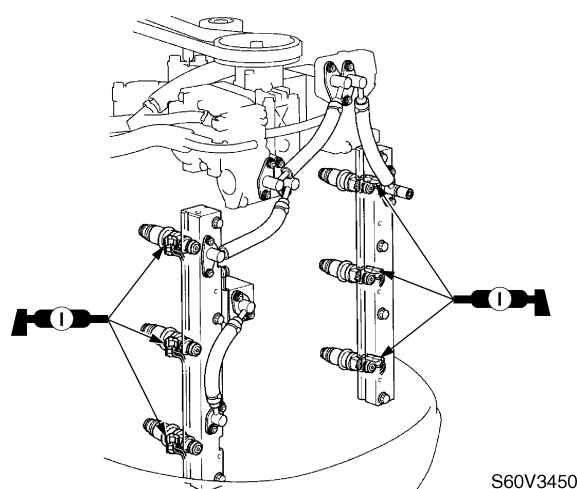
Lubricating the outboard motor

1. Apply water resistant grease to the areas shown.

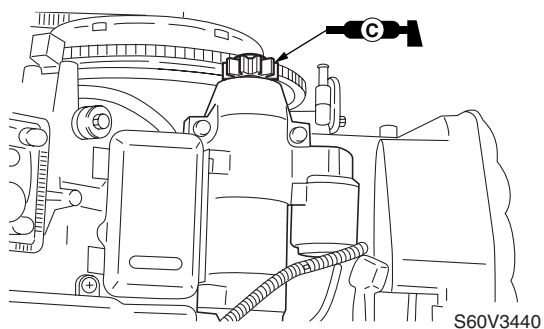




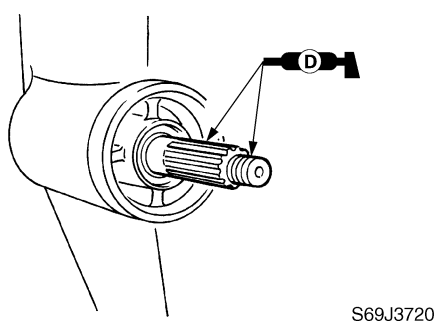
NOTE: _____
 Apply grease to the grease nipple until it flows from the bushings ①.



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



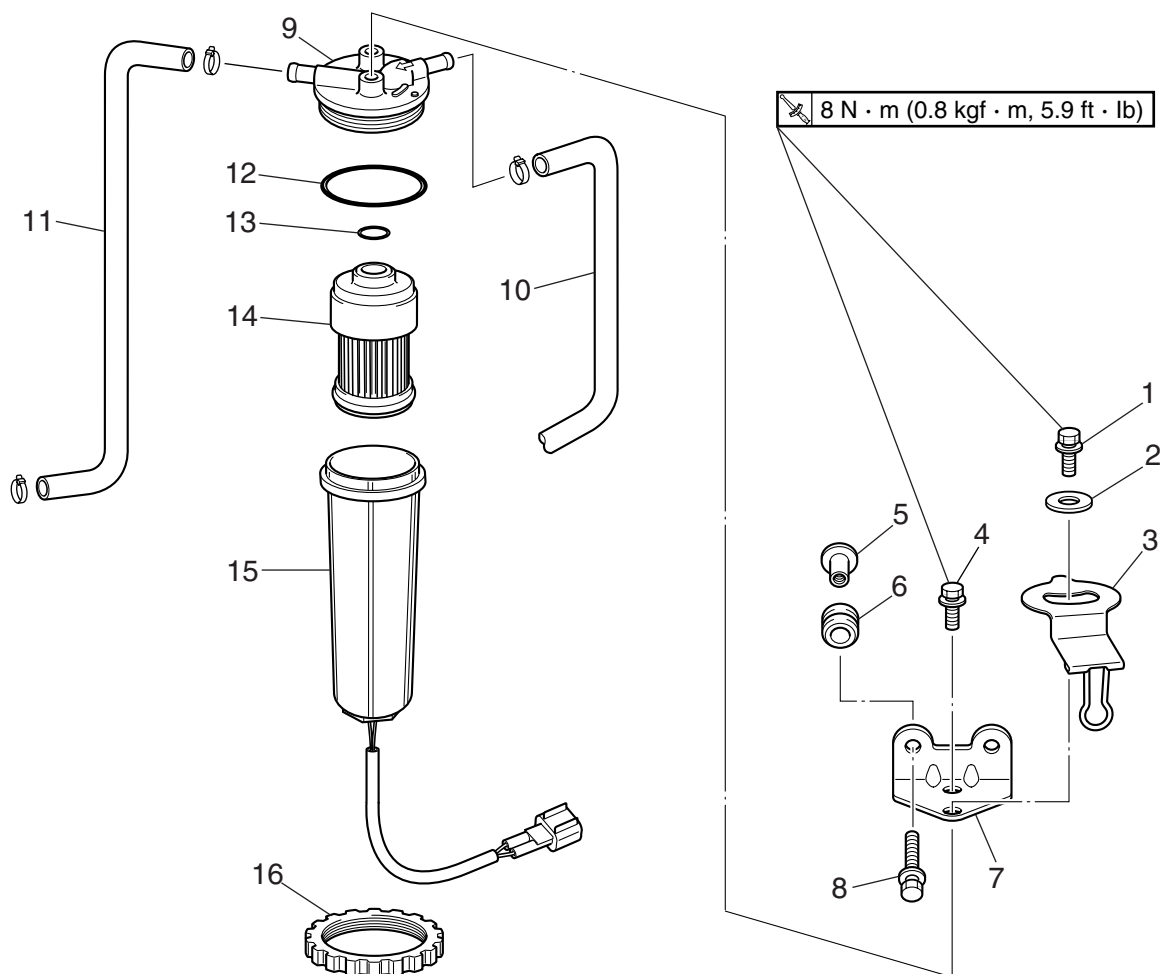
3. Apply corrosion resistant grease to the areas shown.



4. Apply injector grease to the areas shown.



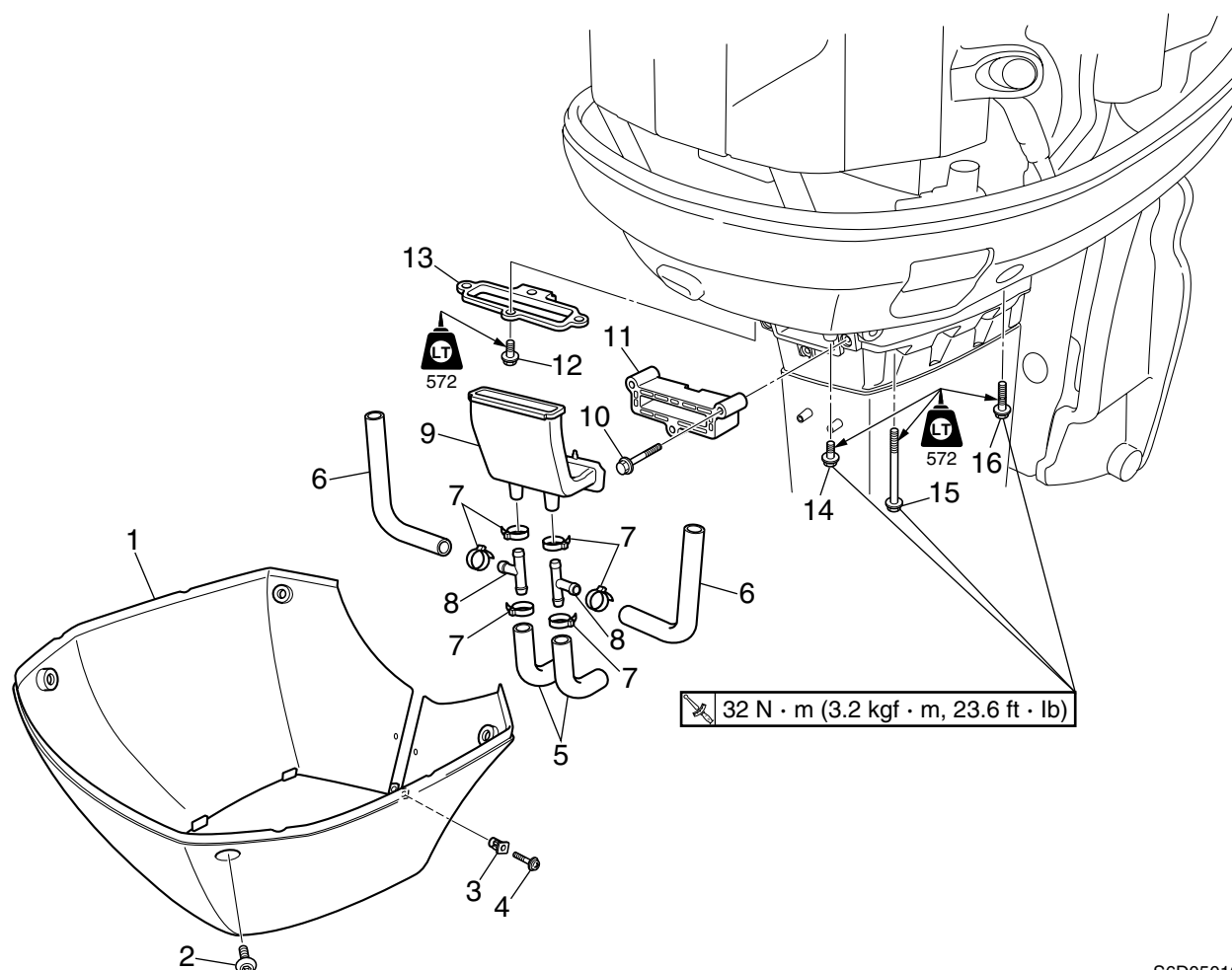
Fuel filter



S6D04010

No.	Part name	Q'ty	Remarks
1	Bolt	1	M6 × 16 mm
2	Washer	1	
3	Holder	1	
4	Bolt	1	M6 × 14 mm
5	Collar	2	
6	Grommet	2	
7	Bracket	1	
8	Bolt	2	M6 × 25 mm
9	Cap	1	
10	Fuel hose	1	
11	Fuel hose	1	
12	O-ring	1	Not reusable
13	O-ring	1	Not reusable
14	Fuel filter element	1	
15	Cup	1	
16	Nut	1	

Power unit



S6D05010

No.	Part name	Q'ty	Remarks
1	Apron	1	
2	Bolt	4	M6 × 16 mm
3	Screw grommet	1	
4	Screw	1	ø4 × 16 mm
5	Hose	2	
6	Hose	2	
7	Plastic tie	6	Not reusable
8	Joint	2	
9	Joint	1	
10	Bolt	3	M8 × 55 mm
11	Bracket	1	
12	Bolt	4	M6 × 20 mm
13	Plate	1	
14	Bolt	2	M8 × 30 mm
15	Bolt	8	M8 × 135 mm
16	Bolt	4	M8 × 45 mm

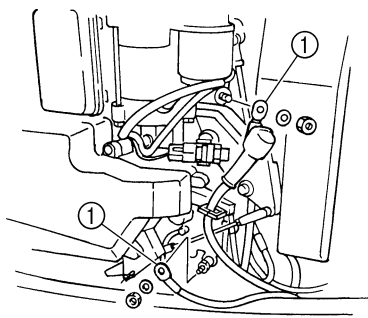


Removing the power unit

NOTE:

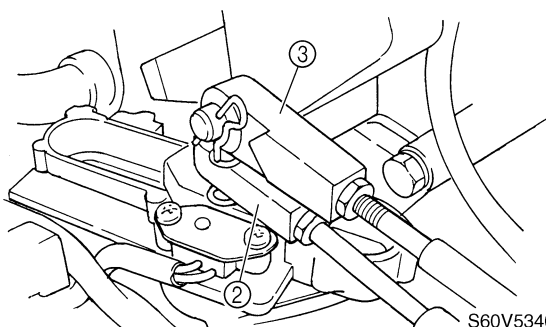
It is recommended to loosen the flywheel magnet nut before removing the power unit to improve working efficiency.

1. Disconnect the battery leads ①.



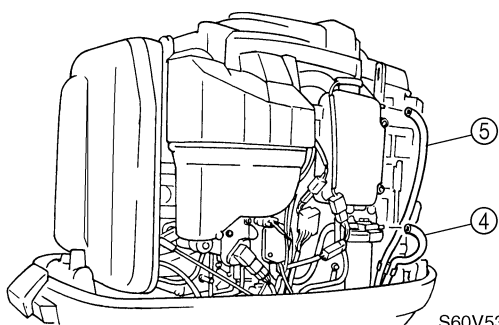
S60V5330

2. Disconnect the shift cable ② and the throttle cable ③.



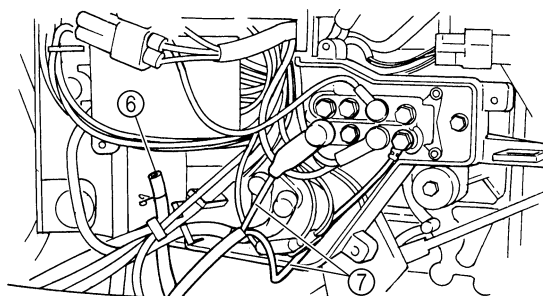
S60V5340

3. Disconnect the fuel hose ④ and the oil hose ⑤.



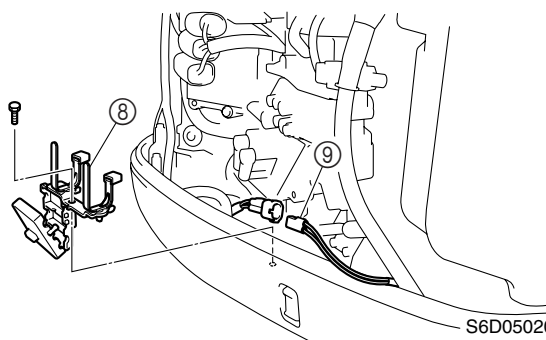
S60V5350

4. Remove the flywheel magnet cover.
5. Remove the junction box cover, and then disconnect the cooling water hose ⑥ and the PTT motor leads ⑦.



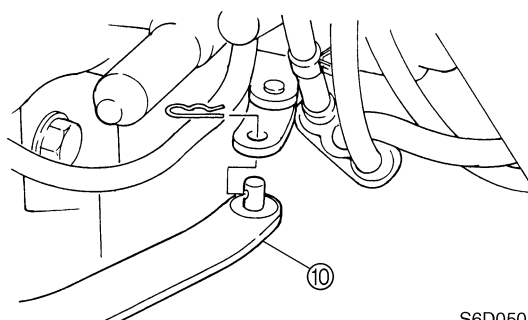
S60V5360

6. Remove the bracket ⑧ and disconnect the trim sensor coupler (or connector) ⑨.



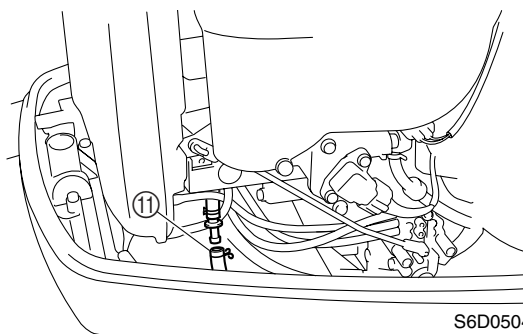
S6D05020

7. Disconnect the PTT switch coupler and the shift lever ⑩.



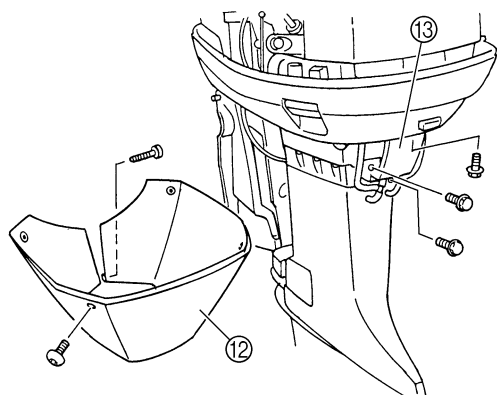
S6D05030

8. Disconnect the cooling water hose ⑪.



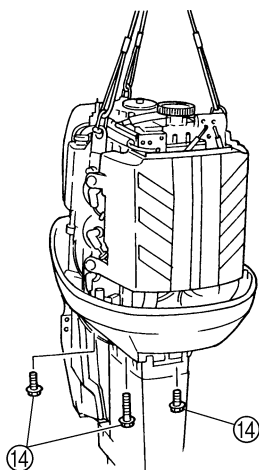
S6D05040

9. Remove the apron ⑫ and the hose joint assembly ⑬.



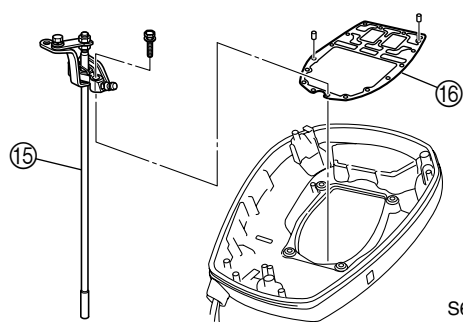
S6D05050

10. Remove the bolts ⑭, then the power unit.



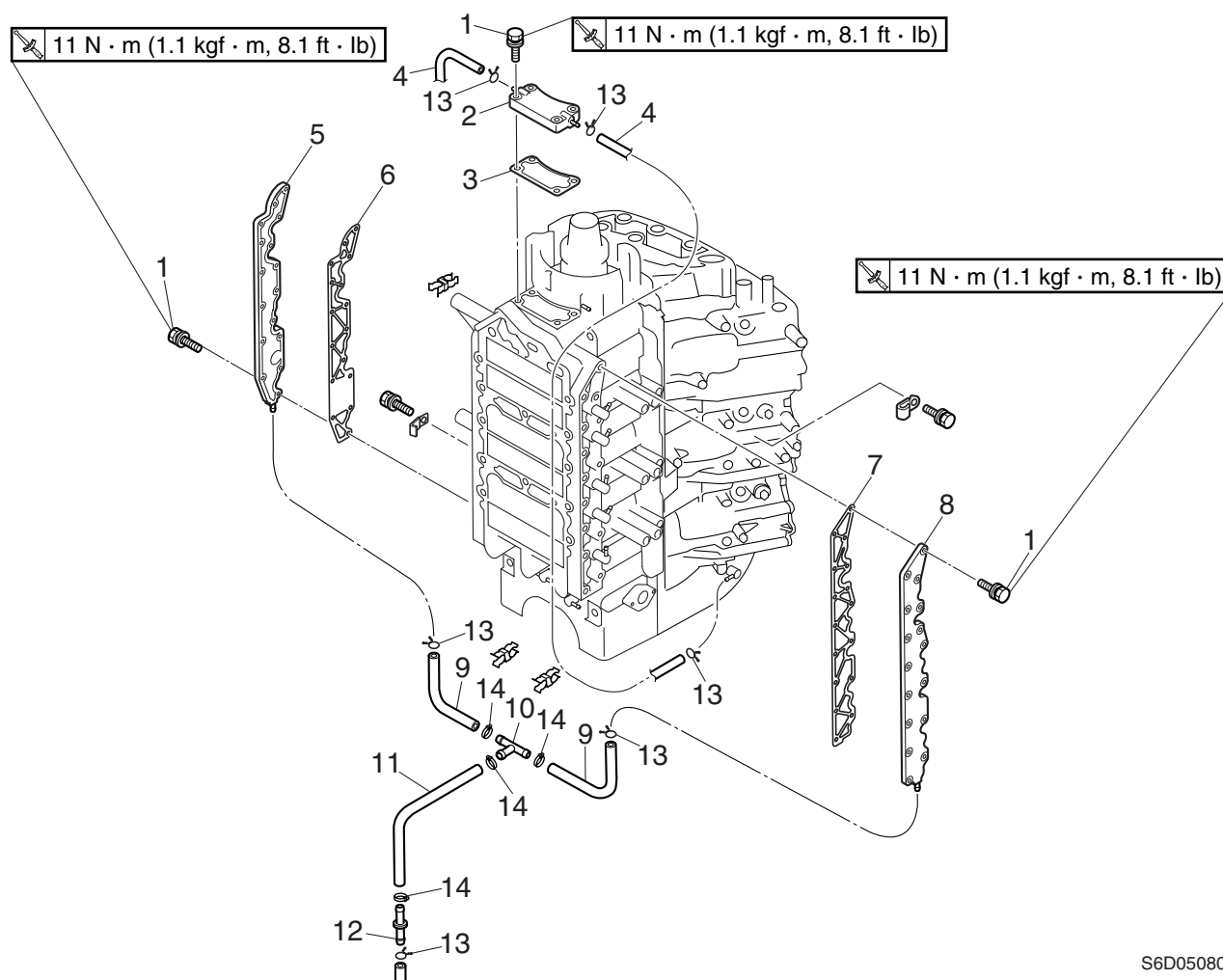
S6D05060

11. Remove the shift rod assembly ⑮ and gasket ⑯.



S6D05070

Crankcase

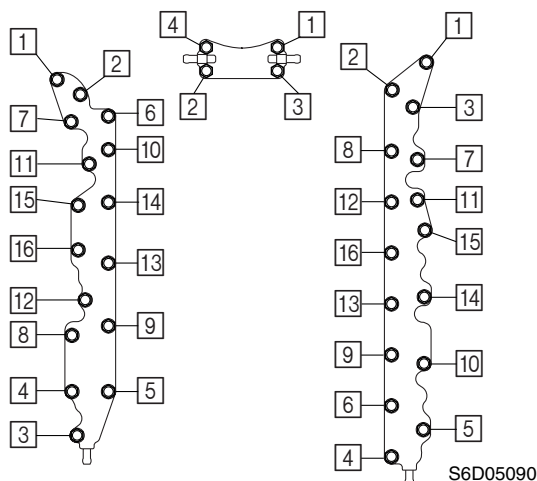


S6D05080

No.	Part name	Q'ty	Remarks
1	Bolt	36	M6 × 25 mm
2	Crankcase cover	1	
3	Gasket	1	Not reusable
4	Hose	2	
5	Crankcase cover	1	
6	Gasket	1	Not reusable
7	Gasket	1	Not reusable
8	Crankcase cover	1	
9	Hose	2	
10	Joint	1	
11	Hose	1	
12	Joint	1	
13	Clip	7	
14	Plastic tie	4	Not reusable

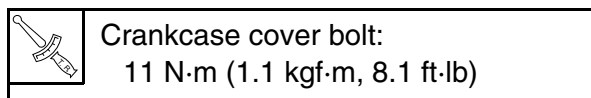
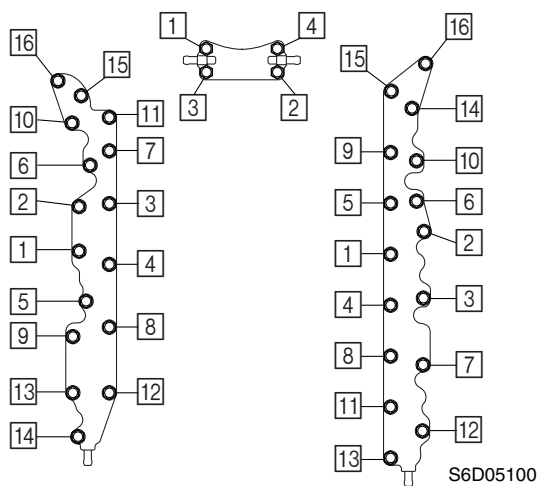
Removing the crankcase covers

1. Disconnect the hoses from the crankcase covers.
2. Remove the crankcase cover bolts in the sequences shown.



Installing the crankcase covers

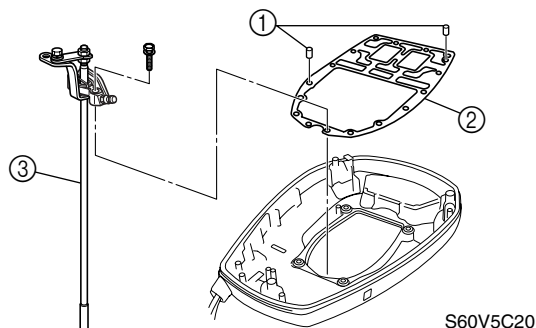
1. Install the new gaskets and crankcase covers, and then tighten the crankcase cover bolts to the specified torque in the sequences shown.



2. Connect the hoses to the crankcase covers.

Installing the power unit

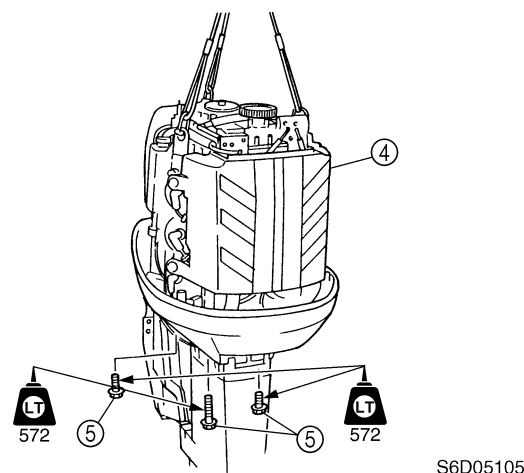
1. Clean the power unit mating surface, and then install new dowels ①, a new gasket ②, and the shift rod assembly ③.



CAUTION:

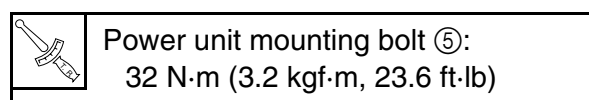
Do not reuse the dowels, always replace them with new ones.

2. Install the power unit ④, and then tighten the power unit mounting bolts ⑤ to the specified torque.



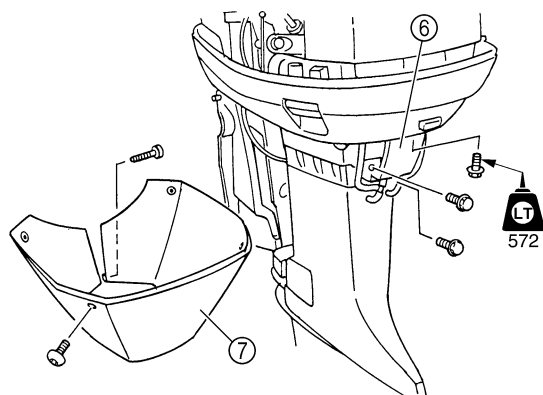
NOTE:

Replace or reuse the power unit mounting bolts. If reusing the power unit mounting bolts, be sure to completely remove any LOCTITE remaining on the bolts.



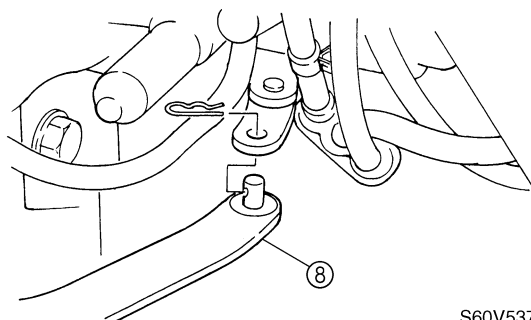


3. Install the hose joint assembly ⑥ and the apron ⑦.



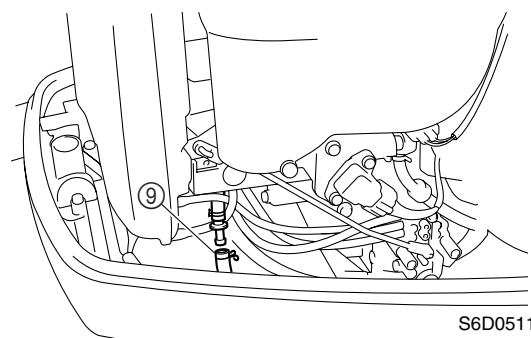
S6D05170

4. Connect the PTT switch coupler and the shift lever ⑧.



S60V5370

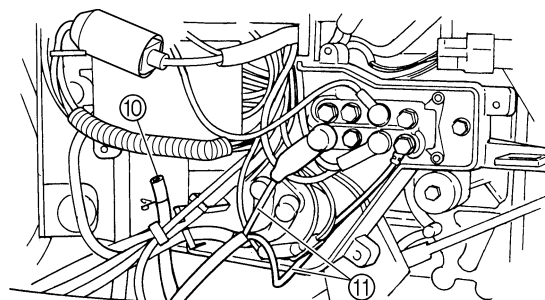
5. Connect the cooling water hose ⑨.



S6D05110

6. Connect the cooling water hose ⑩ to the Rectifier Regulator.

7. Connect the PTT motor leads ⑪, and then tighten the PTT motor lead bolts to the specified torque.

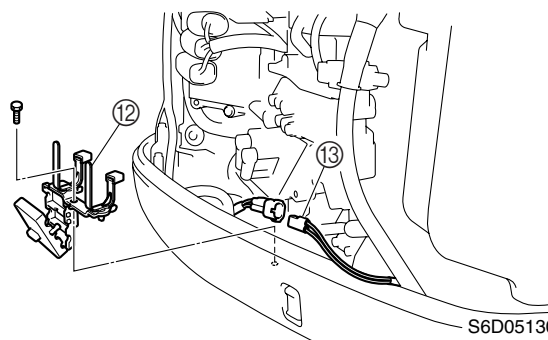


S6D05120



PTT motor lead bolt:
4 N·m (0.4 kgf·m, 3.0 ft·lb)

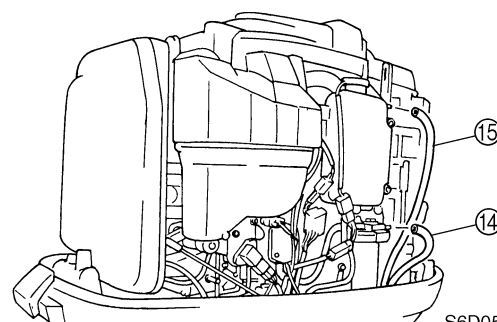
8. Install the bracket ⑫ and connect the trim sensor coupler (or connector) ⑬.



S6D05130

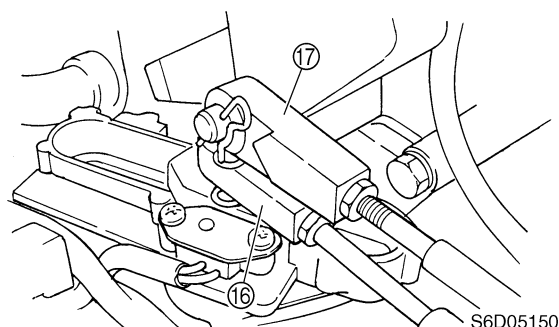
9. Install the junction box cover.

10. Connect the fuel hose ⑭ and oil hose ⑮.

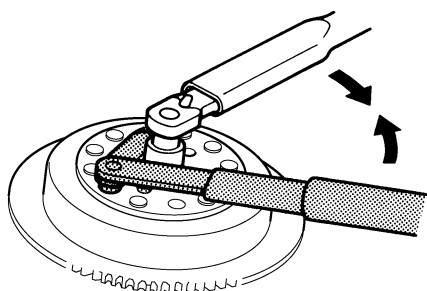


S6D05140

11. Connect the shift cable ⑯ and throttle cable ⑰, and then adjust their lengths.



12. Install the Woodruff key and flywheel magnet.
13. 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.

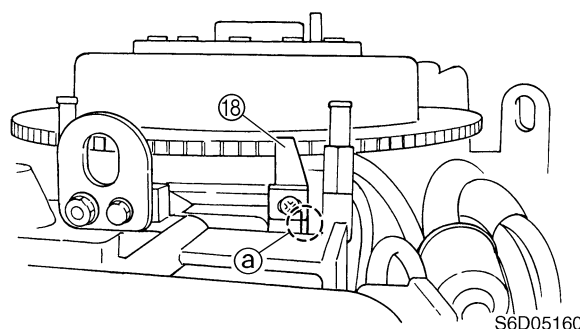


Flywheel holder: 90890-06522



Flywheel magnet nut:
190 N·m (19.0 kgf·m, 140 ft·lb)

14. Install the pointer ⑱.



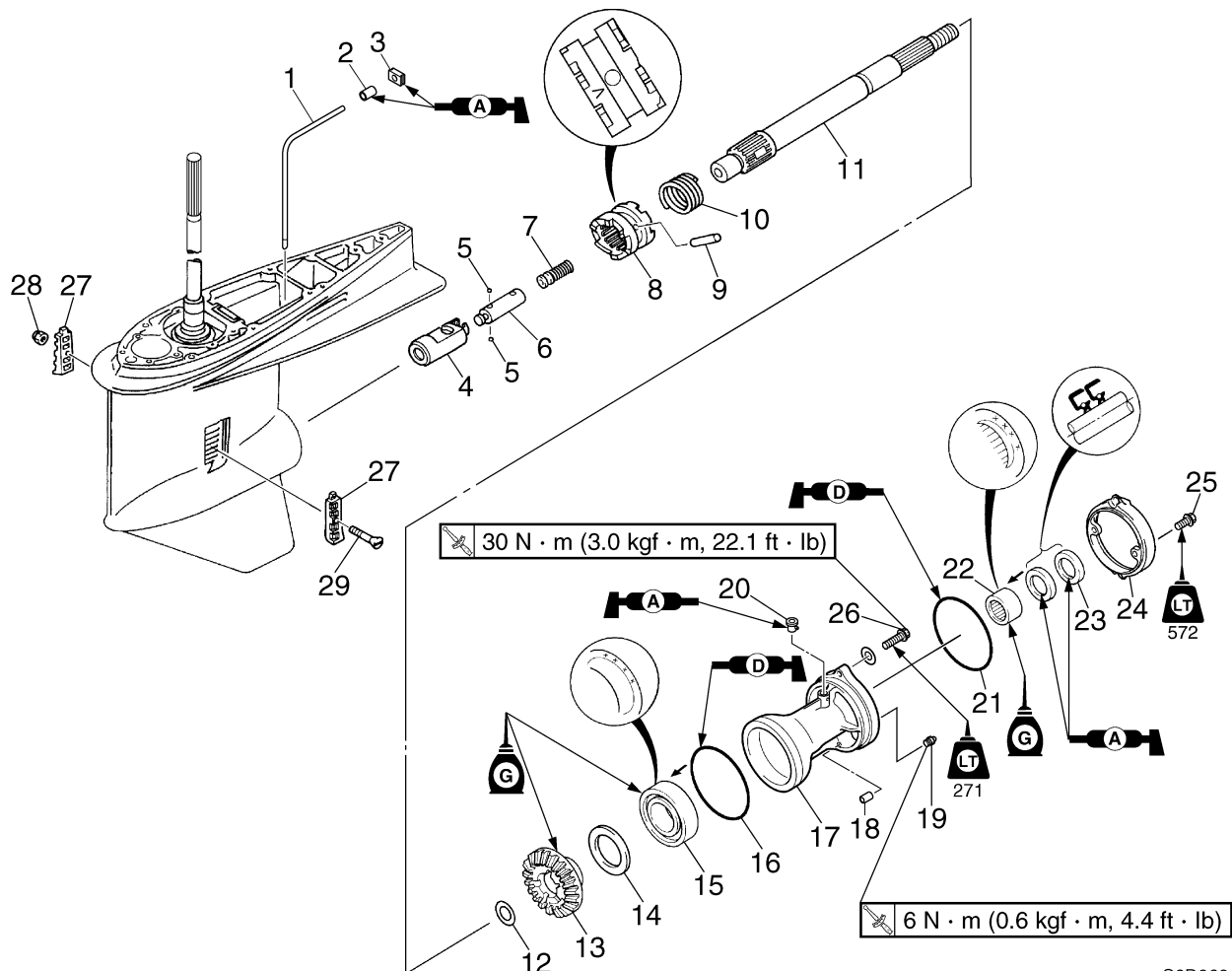
NOTE:

Align the marks ② on the pointer ⑱, which you made during disassembly.

15. Install all removed parts.



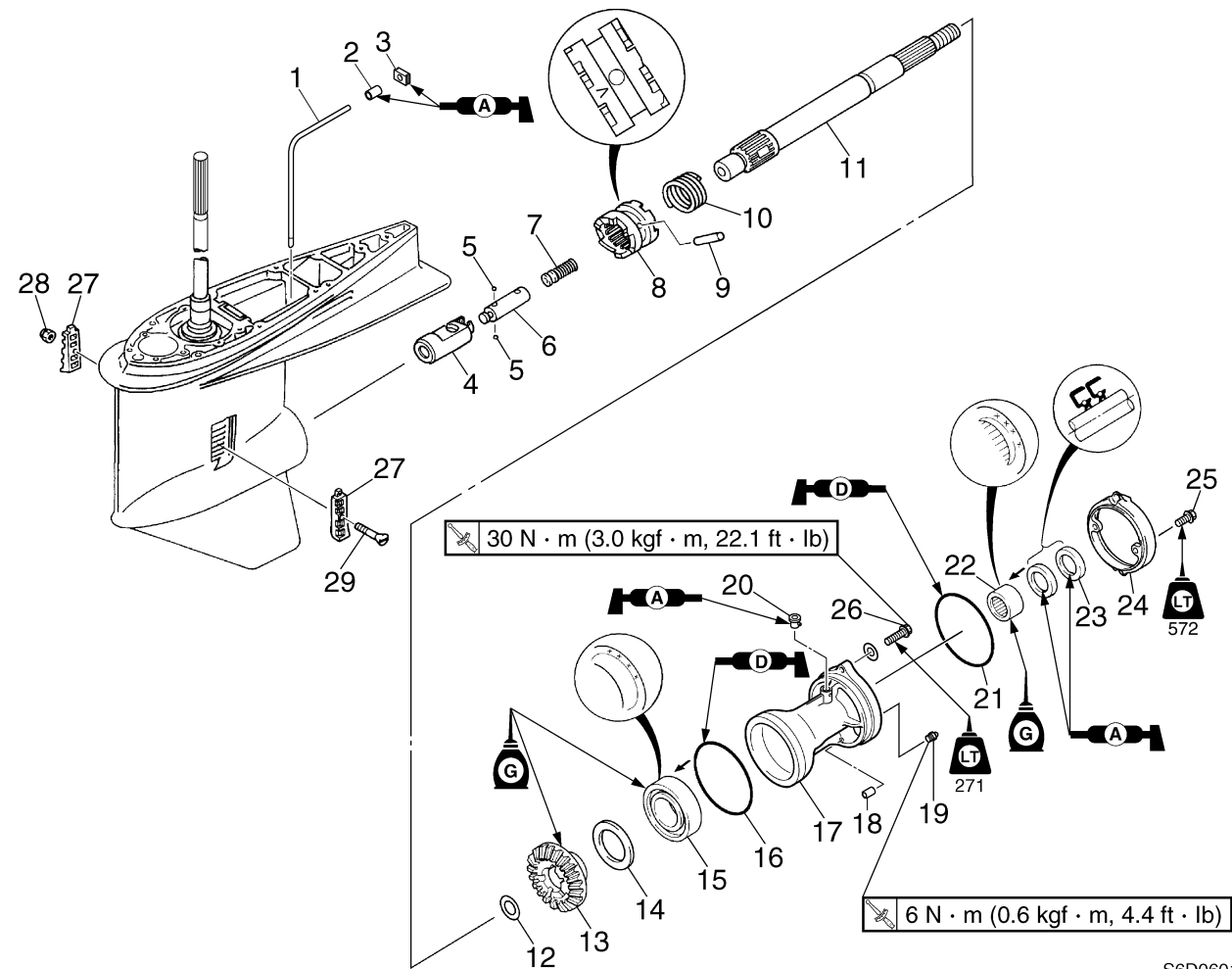
Propeller shaft housing (regular rotation model)



S6D06010

No.	Part name	Q'ty	Remarks
1	Water pipe	1	
2	Rubber seal	1	
3	Rubber seal	1	
4	Shift rod joint	1	
5	Ball	2	
6	Slider	1	
7	Shift plunger	1	
8	Dog clutch	1	
9	Cross pin	1	
10	Spring	1	
11	Propeller shaft	1	
12	Washer	1	
13	Reverse gear	1	
14	Reverse gear shim	—	
15	Ball bearing	1	Not reusable
16	O-ring	1	Not reusable
17	Propeller shaft housing	1	

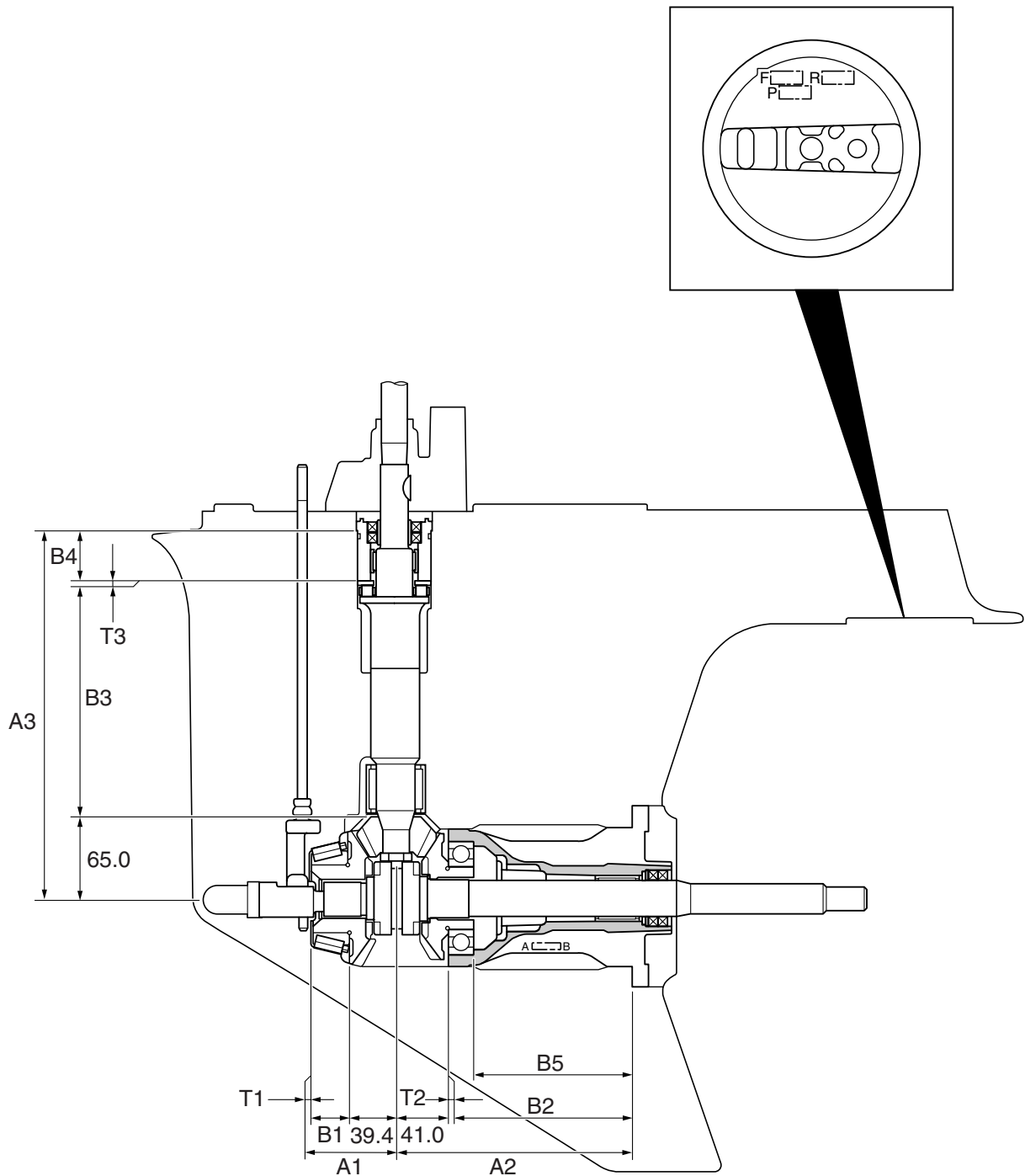
Propeller shaft housing (regular rotation model)



S6D06010

No.	Part name	Q'ty	Remarks
18	Dowel	1	
19	Grease nipple	1	
20	Rubber seal	1	
21	O-ring	1	Not reusable
22	Needle bearing	1	
23	Oil seal	2	Not reusable
24	Ring	1	
25	Bolt	2	M8 × 20 mm
26	Bolt	2	M8 × 33 mm
27	Cooling water inlet cover	2	
28	Nut	1	
29	Screw	1	

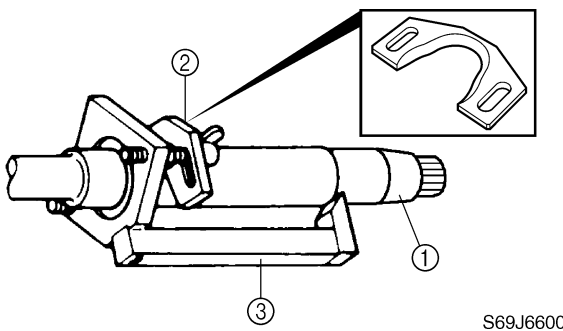
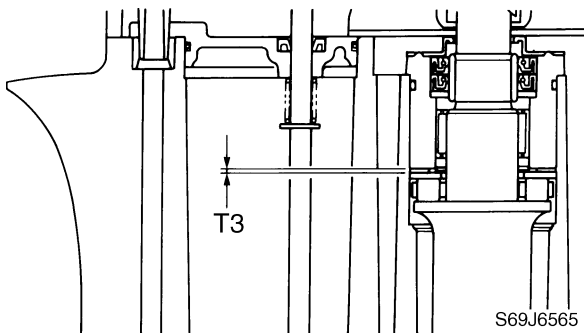
Shimming (regular rotation model)



S6D06020

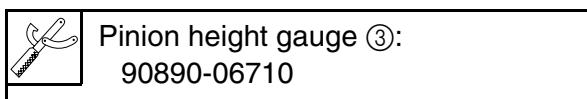
Selecting the pinion shims

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

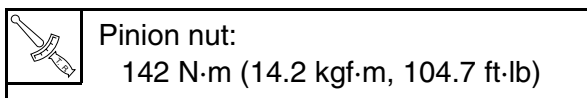


NOTE:

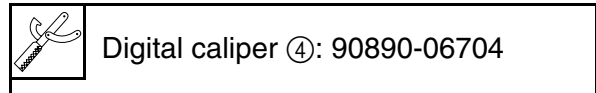
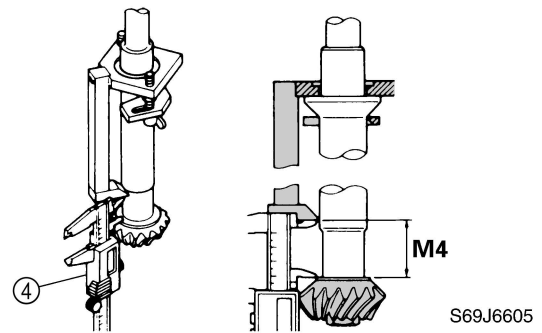
- Select the shim thickness (T3) by using the specified measurement(s) and the calculation formula.
- Install the special service tools onto the drive shaft so that the shaft is at the center of the hole.
- Tighten the wing nuts another 1/4 of a turn after they contact the fixing plate ②.



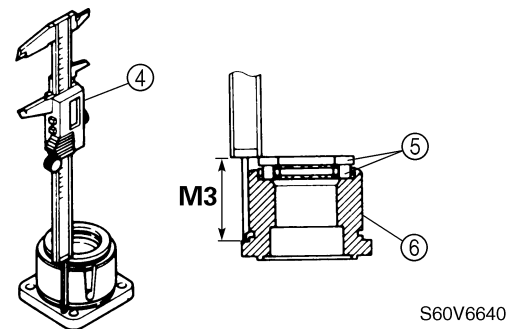
2. Install the pinion and pinion nut, and then tighten the nut to the specified torque.



3. Measure the distance (M4) between the special service tool and the pinion as shown.



4. Turn the thrust bearing ⑤ two or three times to seat the drive shaft housing ⑥, and then measure the housing height (M3) as shown.

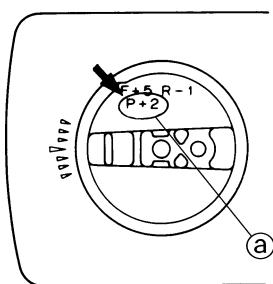


NOTE:

Measure the thrust bearing at three points to find the height average.



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



S69J6555

NOTE:

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

Calculation formula:

$$\text{Pinion shim thickness (T3)} = 82.00 + P/100 - M3 - M4$$

Example:

If "M3" is 50.75 mm and "M4" is 30.52 mm and "P" is (-5), then

$$\begin{aligned} T3 &= 82.00 + (-5)/100 - 50.75 - 30.52 \text{ mm} \\ &= 82.00 - 0.05 - 50.75 - 30.52 \text{ mm} \\ &= 0.68 \text{ mm} \end{aligned}$$

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

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

Available shim thicknesses:

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

Example:

If "T3" is 0.68 mm, then the pinion shim is 0.65 mm.

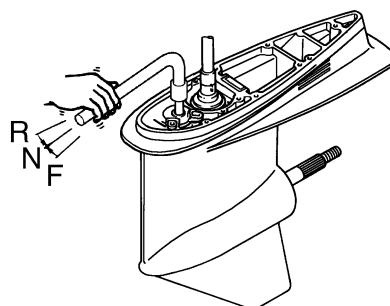
If "T3" is 0.70 mm, then the pinion shim is 0.68 mm.

Backlash

(regular rotation model)

Measuring the forward and reverse gear backlash

1. Remove the water pump assembly.
2. Set the gear shift to the neutral position at the lower unit.

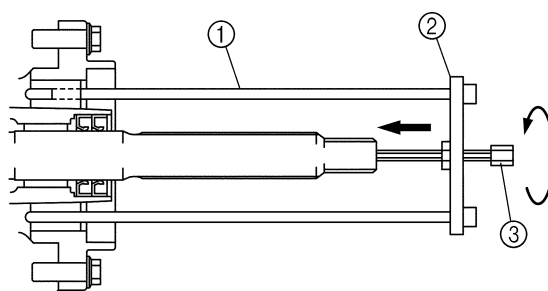


S60V6330



Shift rod push arm: 90890-06052

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



S60V6545

NOTE:

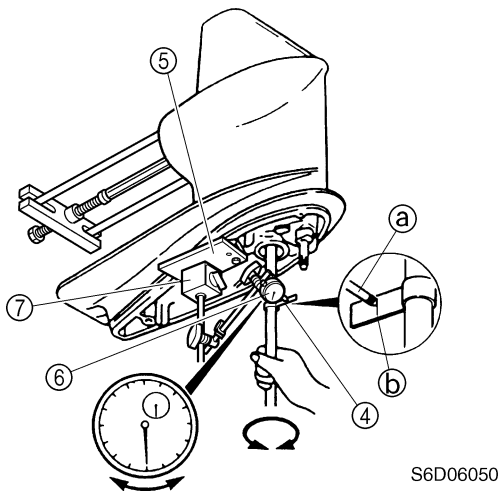
Tighten the center bolt while turning the drive shaft until the drive shaft can no longer be turned.

Shimming (regular rotation model) / Backlash (regular rotation model)



Bearing housing puller claw L ①: 90890-06502
Stopper guide plate ②: 90890-06501
Center bolt ③: 90890-06504

4. Install the backlash indicator onto the drive shaft (22.4 mm [0.88 in] in diameter), then the dial gauge onto the lower unit.
5. Set the lower unit upside down.



NOTE:

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



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

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



Forward gear backlash:
0.12–0.44 mm (0.0047–0.0173 in)

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

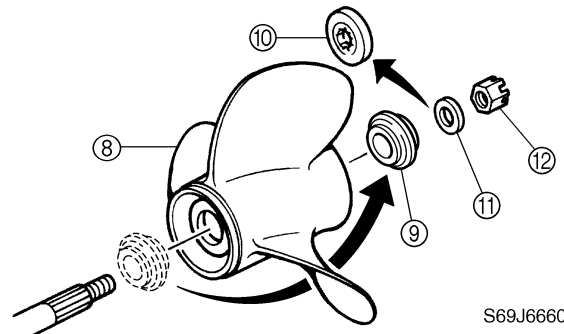
Forward gear backlash	Shim thickness
Less than 0.12 mm (0.0047 in)	To be decreased by $(0.28 - M) \times 0.81$
More than 0.44 mm (0.0173 in)	To be increased by $(M - 0.28) \times 0.81$

M: Measurement

Available shim thicknesses:

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

8. Remove the special service tools from the propeller shaft.
9. Apply a load to the reverse gear by installing the propeller ⑧, the spacer ⑨ (without the washer ⑩), then the washer ⑪ as shown.

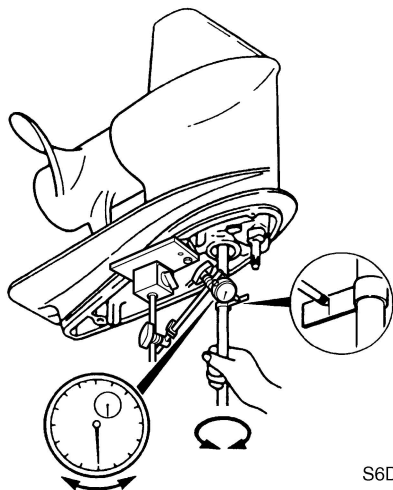


NOTE:

Tighten the propeller nut ⑫ while turning the drive shaft until the drive shaft can no longer be turned.



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



S6D06040


Reverse gear backlash:

0.61–0.90 mm (0.0240–0.0354 in)

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

Reverse gear backlash	Shim thickness
Less than 0.61 mm (0.0240 in)	To be decreased by $(0.76 - M) \times 0.81$
More than 0.90 mm (0.0354 in)	To be increased by $(M - 0.76) \times 0.81$

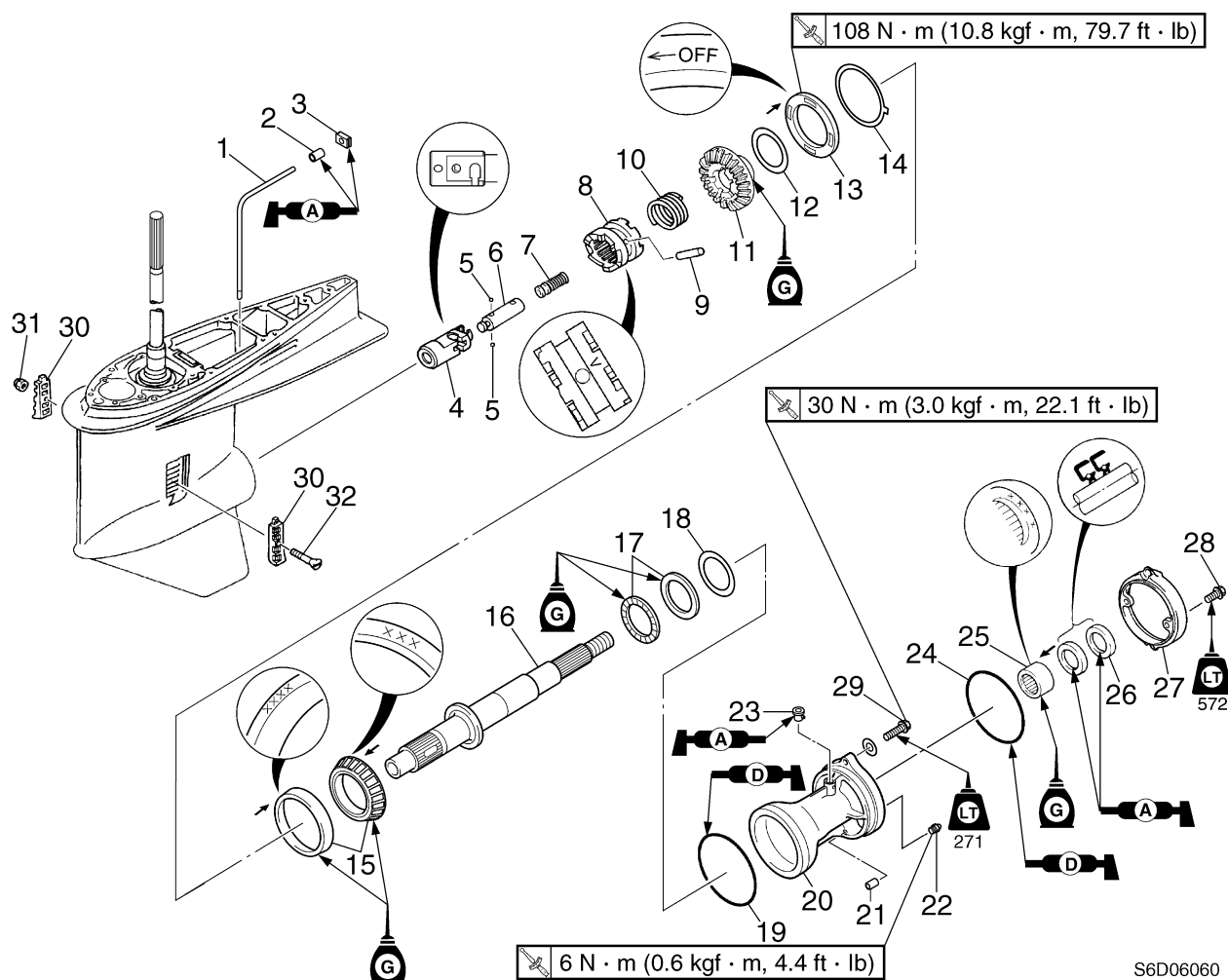
M: Measurement

Available shim thicknesses:

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

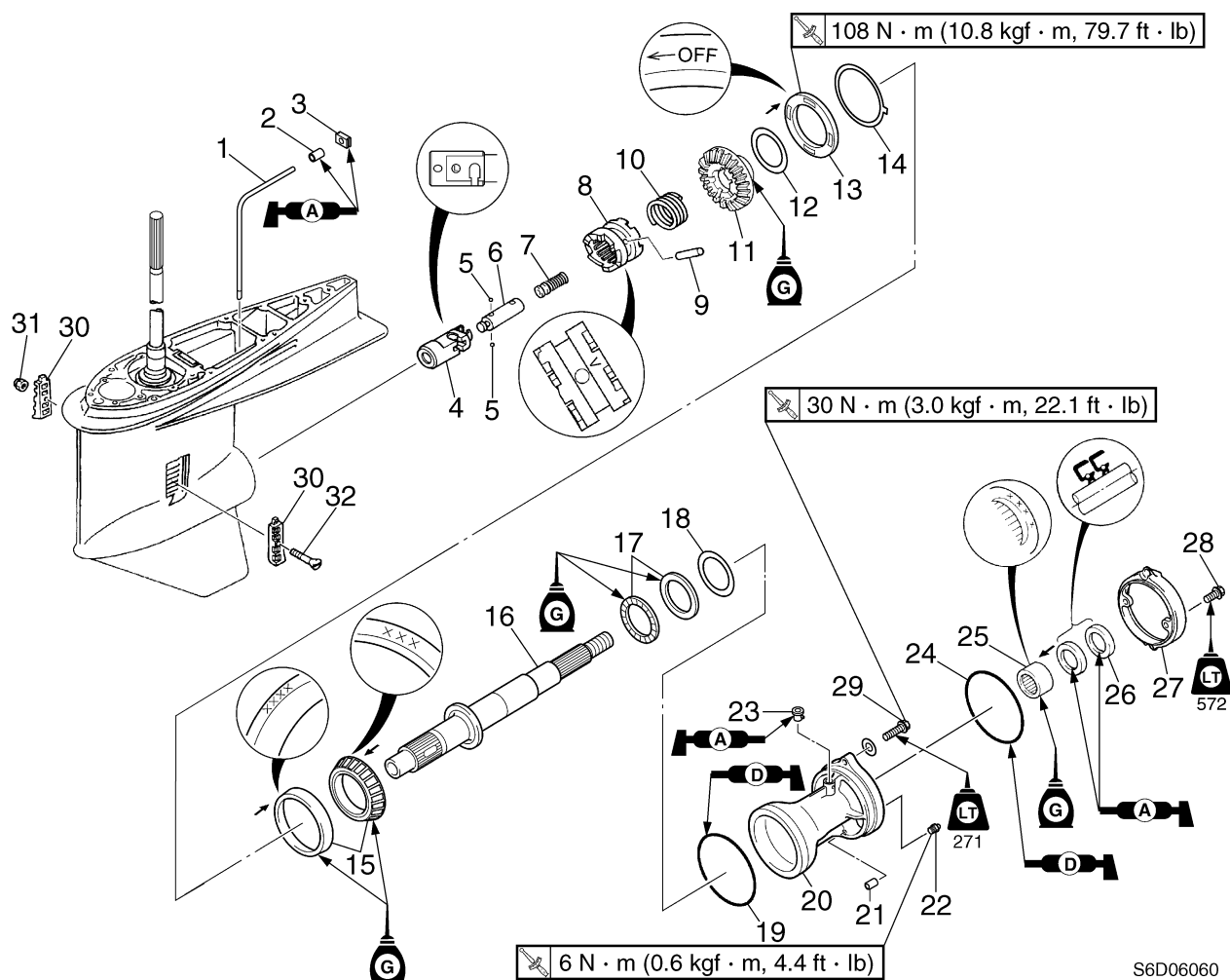
12. Remove the special service tools, and then install the water pump assembly.

Propeller shaft housing (counter rotation model)



S6D06060

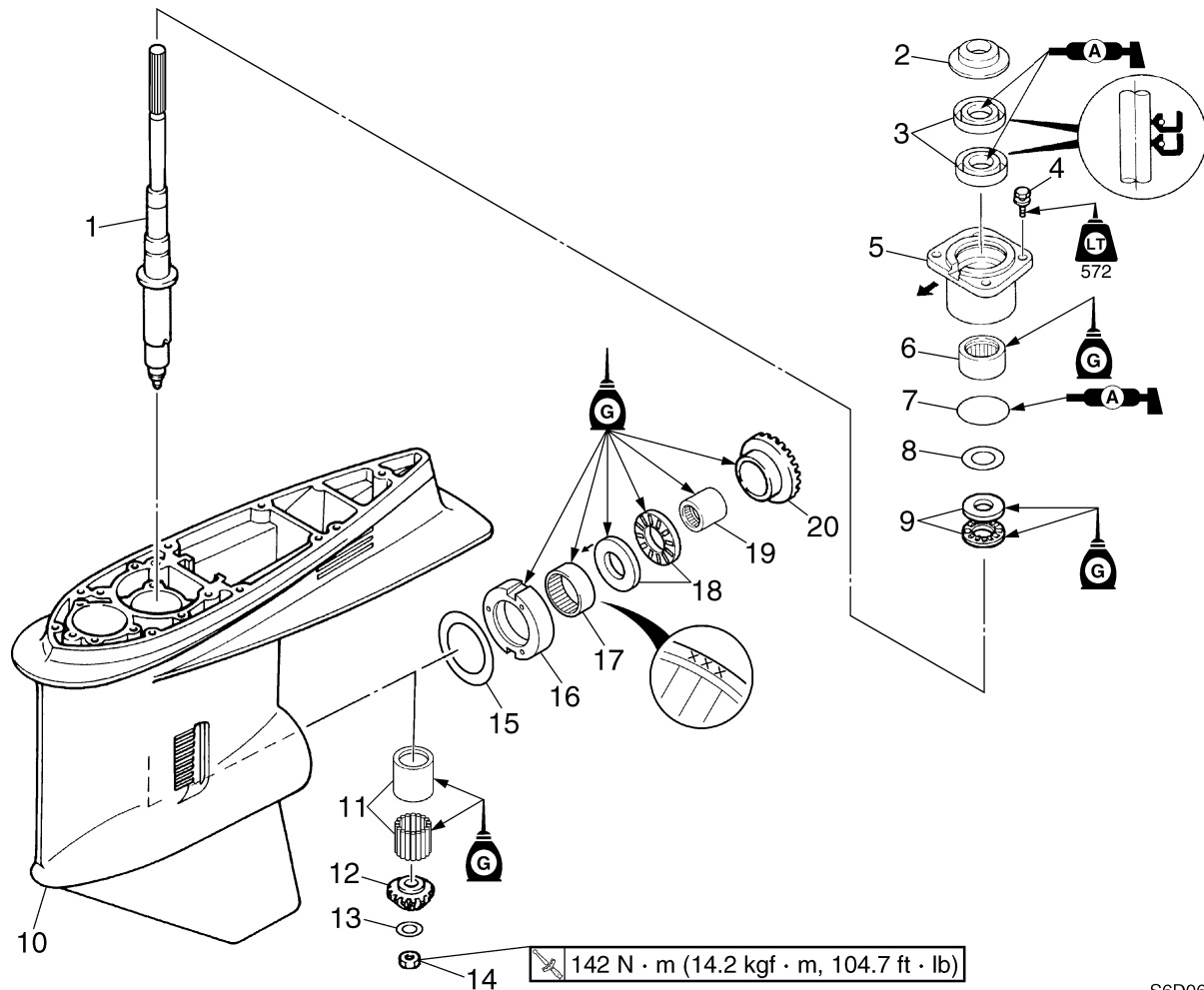
No.	Part name	Q'ty	Remarks
1	Water pipe	1	
2	Rubber seal	1	
3	Rubber seal	1	
4	Shift rod joint	1	
5	Ball	2	
6	Slider	1	
7	Shift plunger	1	
8	Dog clutch	1	
9	Cross pin	1	
10	Spring	1	
11	Forward gear	1	
12	Forward gear shim	—	
13	Ring nut	1	
14	Claw washer	1	
15	Taper roller bearing assembly	1	Not reusable
16	Propeller shaft	1	
17	Thrust bearing	1	



S6D06060

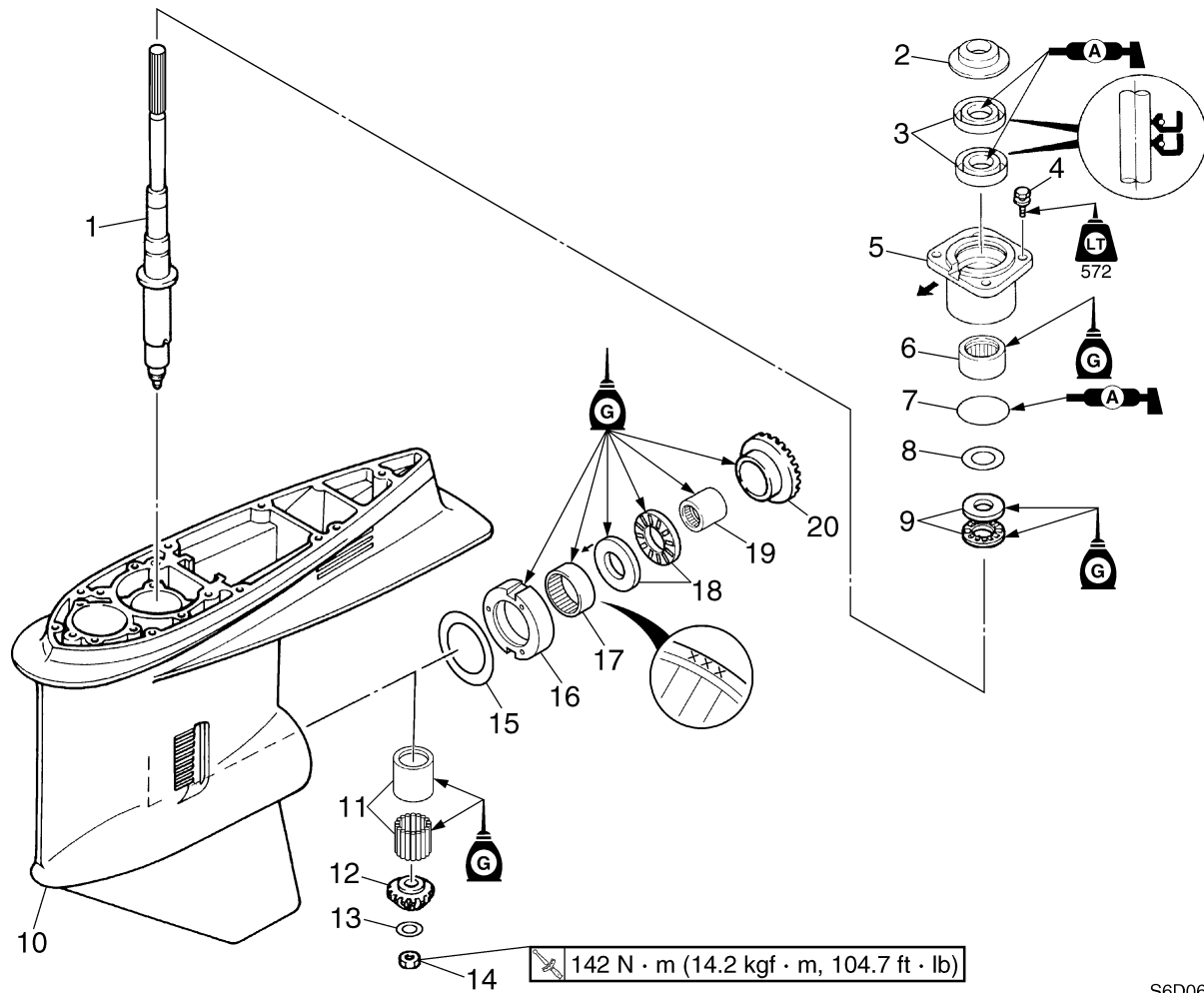
No.	Part name	Q'ty	Remarks
18	Propeller shaft shim	—	
19	O-ring	1	Not reusable
20	Propeller shaft housing	1	
21	Dowel	1	
22	Grease nipple	1	
23	Rubber seal	1	
24	O-ring	1	Not reusable
25	Needle bearing	1	
26	Oil seal	2	Not reusable
27	Ring	1	
28	Bolt	2	M8 × 20 mm
29	Bolt	2	M8 × 33 mm
30	Cooling water inlet cover	2	
31	Nut	1	
32	Screw	1	

Drive shaft and lower case (counter rotation model)



S6D06070

No.	Part name	Q'ty	Remarks
1	Drive shaft	1	
2	Cover	1	
3	Oil seal	2	Not reusable
4	Bolt	4	M8 × 25 mm
5	Drive shaft housing	1	
6	Needle bearing	1	
7	O-ring	1	Not reusable
8	Pinion shim	—	
9	Thrust bearing	1	
10	Lower case	1	
11	Needle bearing	1	
12	Pinion	1	
13	Washer	1	
14	Nut	1	
15	Reverse gear shim	—	
16	Retainer	1	
17	Needle bearing	1	

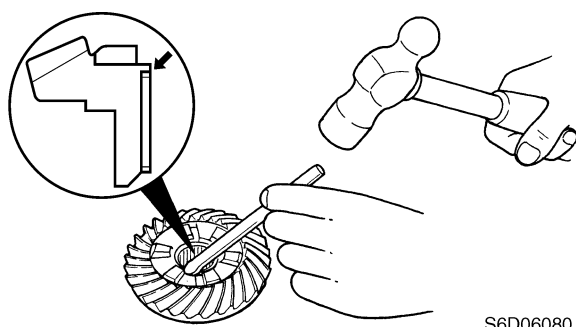


S6D06070

No.	Part name	Q'ty	Remarks
18	Thrust bearing	1	Not reusable
19	Needle bearing	1	
20	Reverse gear	1	

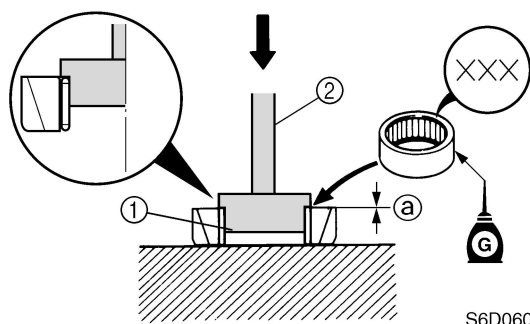
Disassembling the reverse gear

1. Remove the needle bearing from the reverse gear using a chisel.



Assembling the lower case

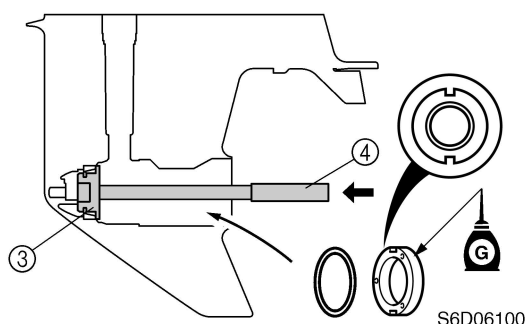
1. Install the needle bearing into the retainer to the specified depth.



	Needle bearing attachment ①: 90890-06654 Driver rod L3 ②: 90890-06652
--	--

	Depth ③: -0.25-0.25 mm (-0.010-0.010 in)
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2. Install the original shim(s) and retainer into the lower case.



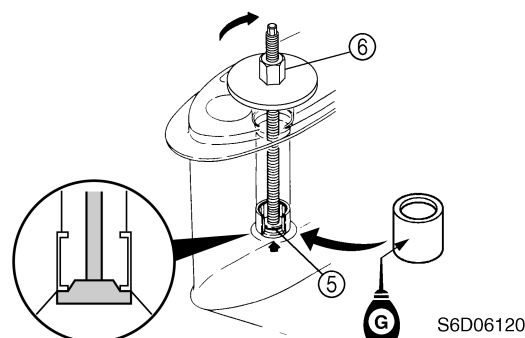
CAUTION:

Add or remove shim(s), if necessary, if replacing the forward gear or lower case.



Ball bearing attachment ③:
90890-06657
Driver rod LL ④: 90890-06605

3. Install the needle bearing outer case into the lower case.



NOTE:

Apply gear oil to the needle bearing outer case before installation.



Bearing outer race attachment ⑤:
90890-06628
Bearing outer race puller
assembly ⑥:
90890-06523

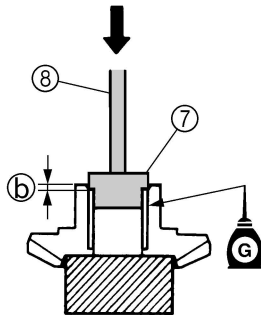
4. Install the needle bearing into the needle bearing outer case.

NOTE:

Apply gear oil or grease to the needle bearing before installation.



5. Install the new needle bearing into the reverse gear to the specified depth.



S6D06140



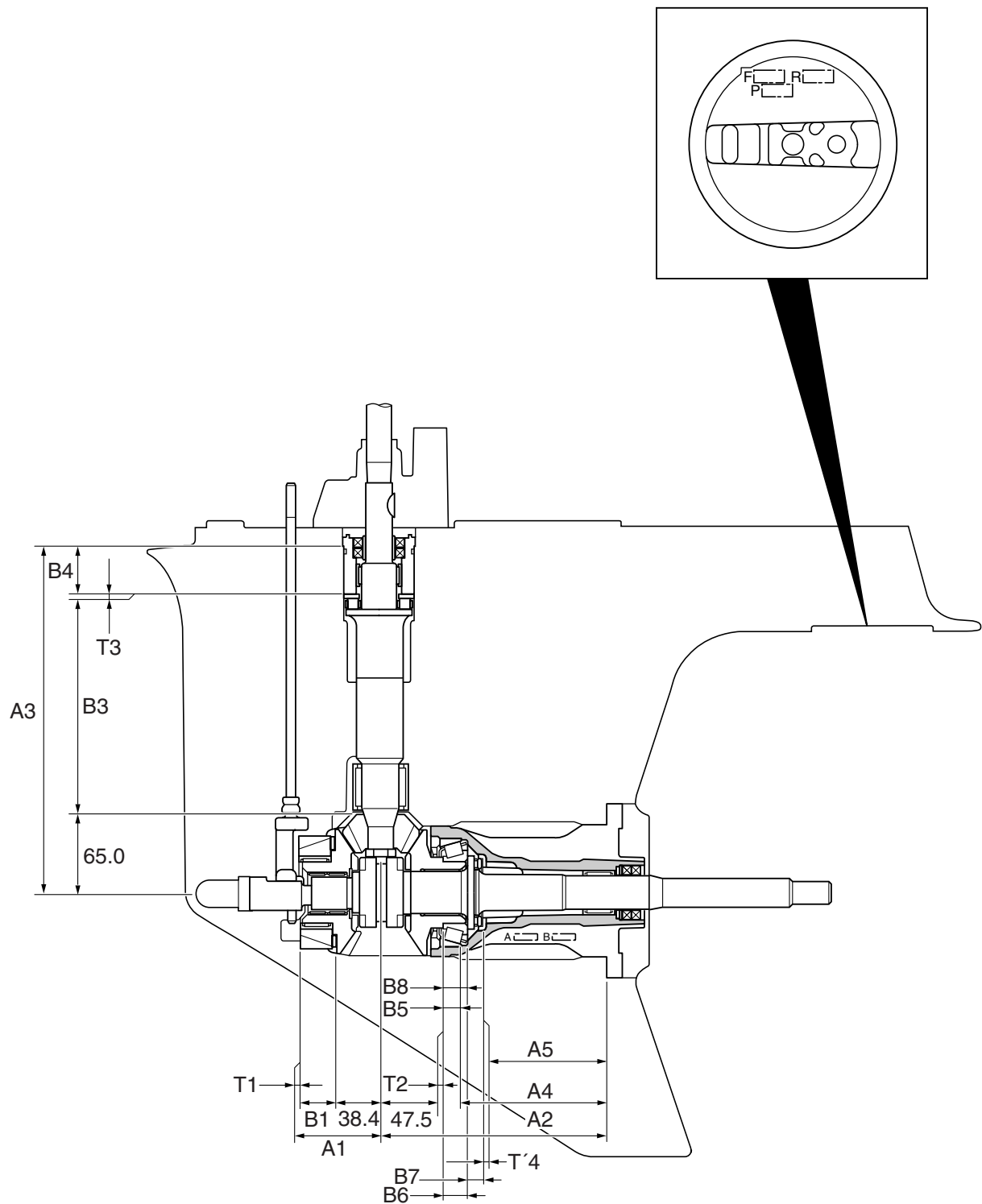
Needle bearing attachment ⑦:
90890-06653
Driver rod SS ⑧: 90890-06604



Depth ⑥:
6.75–7.25 mm (0.266–0.285 in)

6. Install the thrust bearing and reverse gear into the lower case.

Shimming (counter rotation model)

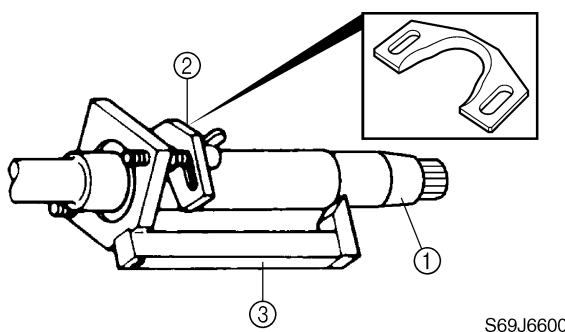
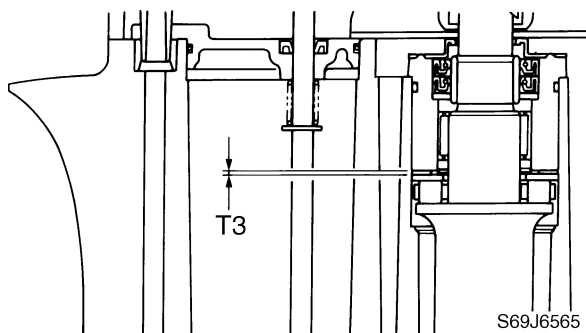


S6D06150



Selecting the pinion shims

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



NOTE:

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



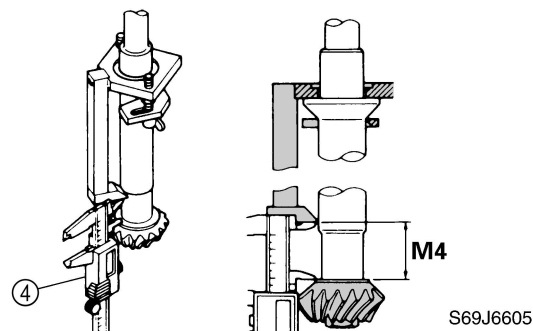
Pinion height gauge ③:
90890-06710

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



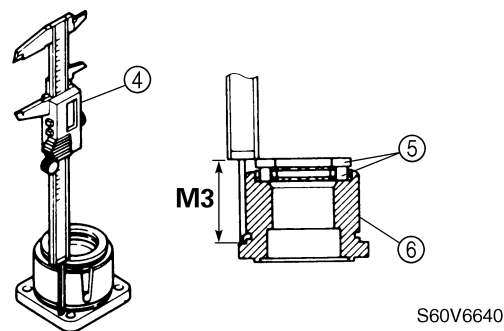
Pinion nut:
142 N·m (14.2 kgf·m, 104.7 ft·lb)

3. Measure the distance (M4) between the special service tool and the pinion as shown.



Digital caliper ④: 90890-06704

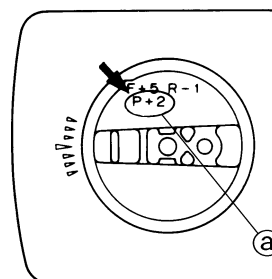
4. Turn the thrust bearing ⑤ two or three times to seat the drive shaft housing ⑥, and then measure the housing height (M3) as shown.



NOTE:

Measure the thrust bearing at three points to find the height average.

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



NOTE:

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

Calculation formula:

$$\text{Pinion shim thickness (T3)} = 82.00 + P/100 - M3 - M4$$

Example:

If “M3” is 50.75 mm and “M4” is 30.52 mm and “P” is (–5), then

$$\begin{aligned} T3 &= 82.00 + (-5)/100 - 50.75 - 30.52 \text{ mm} \\ &= 82.00 - 0.05 - 50.75 - 30.52 \text{ mm} \\ &= 0.68 \text{ mm} \end{aligned}$$

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

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

Available shim thicknesses:

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

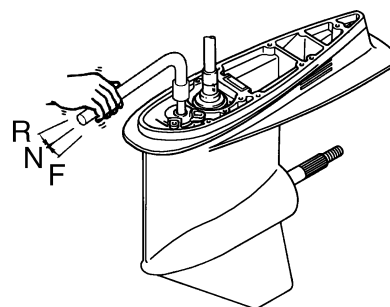
Example:

If “T3” is 0.68 mm, then the pinion shim is 0.65 mm.

If “T3” is 0.70 mm, then the pinion shim is 0.68 mm.

Backlash (counter rotation model) Measuring the forward and reverse gear backlash

1. Remove the water pump assembly.
2. Set the gear shift to the neutral position at the lower unit.

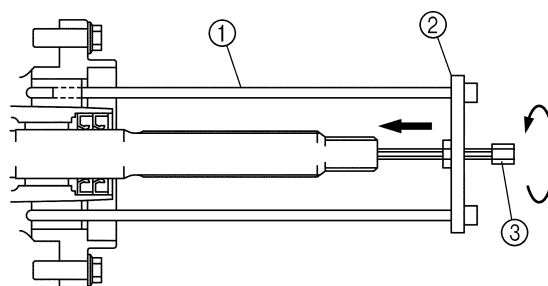


S60V6330



Shift rod push arm: 90890-06052

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



S60V6545

NOTE:

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



Bearing housing puller claw L ①:
90890-06502

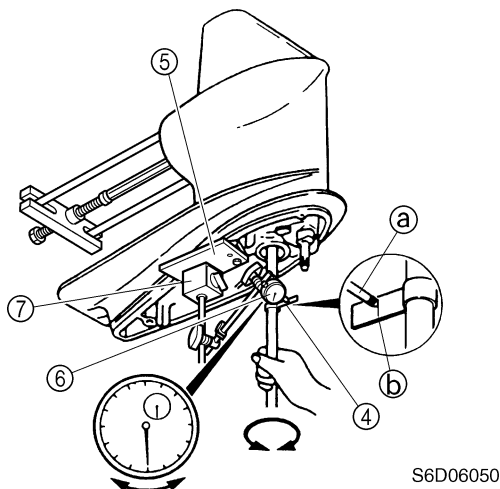
Stopper guide plate ②: 90890-06501

Center bolt ③: 90890-06504

4. Install the backlash indicator onto the drive shaft (22.4 mm [0.88 in] in diameter), then the dial gauge onto the lower unit.



5. Set the lower unit upside down.



NOTE:

Install the dial gauge so that the plunger (a) contacts the mark (b) on the backlash indicator.



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

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



Forward gear backlash:
0.30–0.62 mm (0.0118–0.0244 in)

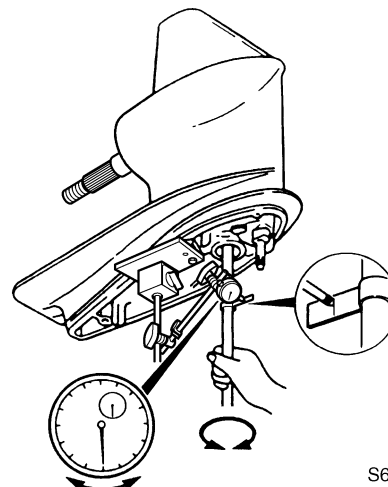
7. Add or remove shim(s) if out of specification.

Forward gear backlash	Shim thickness
Less than 0.30 mm (0.0118 in)	To be decreased by $(0.46 - M) \times 0.81$
More than 0.62 mm (0.0244 in)	To be increased by $(M - 0.46) \times 0.81$

M: Measurement

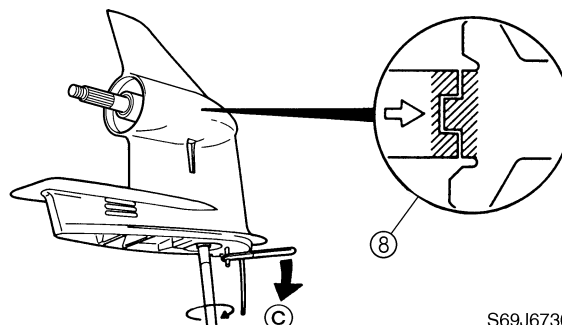
Available shim thicknesses:
0.10, 0.12, 0.15, 0.18, 0.30, 0.40, and 0.50 mm

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



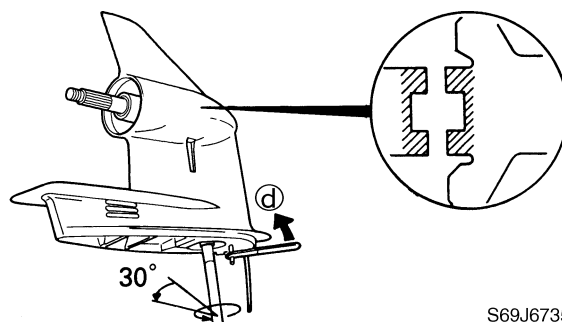
9. Turn the shift rod to the reverse position (c) with the shift rod push arm.

10. Turn the drive shaft clockwise until the dog clutch (8) is fully engaged.

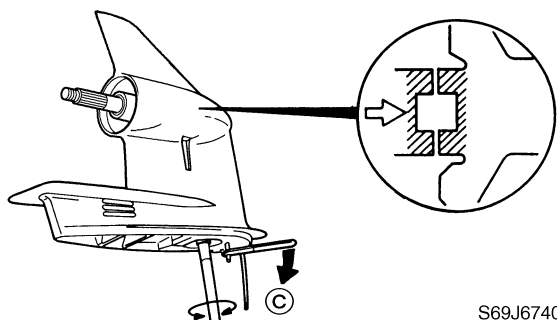


11. Turn the shift rod to the neutral position (d) with the shift rod push arm.

12. Turn the drive shaft counterclockwise approximately 30°.



13. Turn the shift rod to the reverse position © with the shift rod push arm.
14. Slowly turn the drive shaft clockwise and counterclockwise and measure the backlash when the drive shaft stops in each direction.



S69J6740

NOTE:

When measuring the reverse gear backlash, turn the shift rod push arm towards the reverse position © with force.



Reverse gear backlash:
0.61–0.90 mm (0.0240–0.0354 in)

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

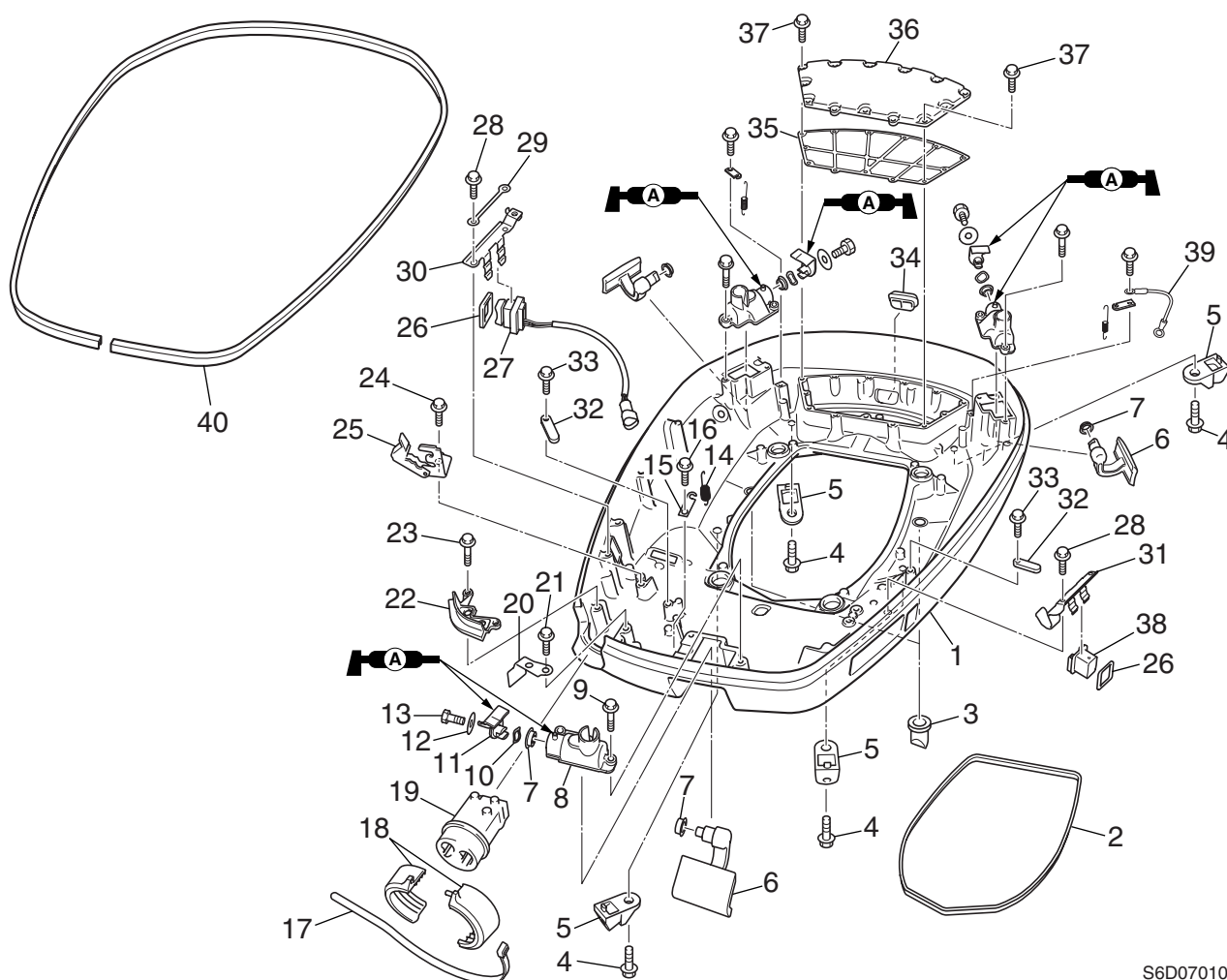
Reverse gear backlash	Shim thickness
Less than 0.61 mm (0.0240 in)	To be decreased by $(0.76 - M) \times 0.81$
More than 0.90 mm (0.0354 in)	To be increased by $(M - 0.76) \times 0.81$

M: Measurement

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

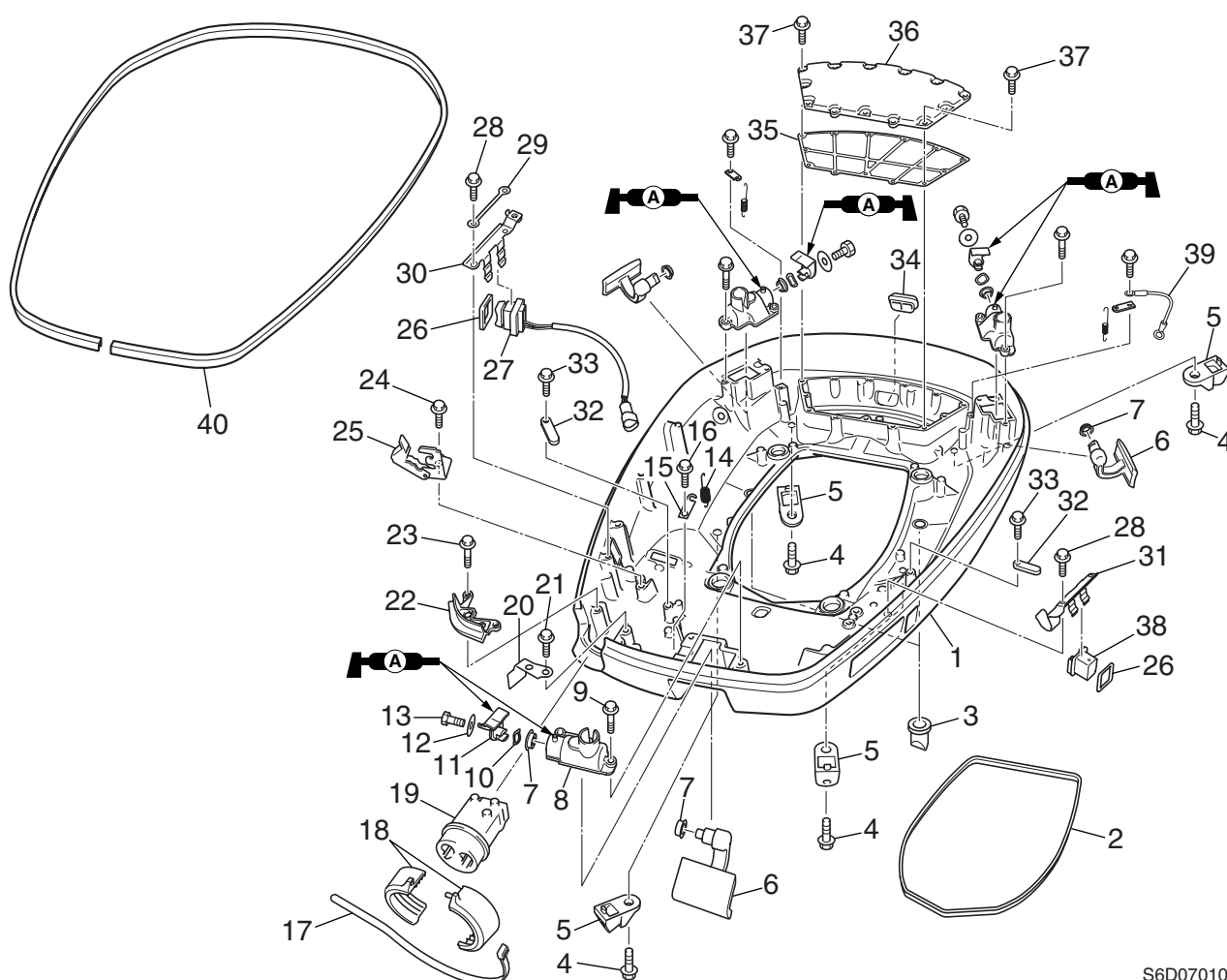
16. Remove the special service tools, and then install the water pump assembly.

Bottom cowling



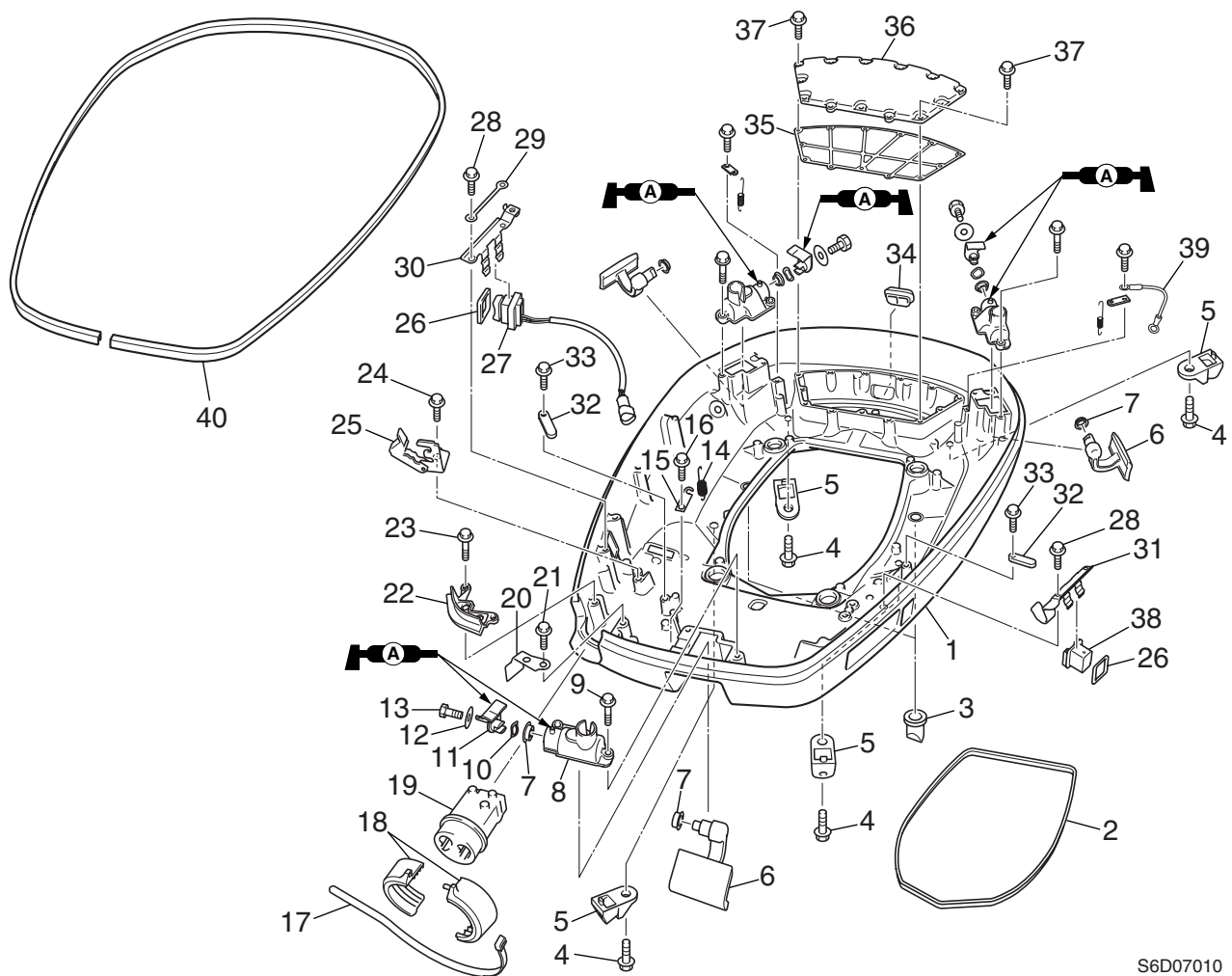
S6D07010

No.	Part name	Q'ty	Remarks
1	Bottom cowling	1	
2	Rubber seal	1	
3	Grommet	2	
4	Bolt	4	M6 × 16 mm
5	Bracket	4	
6	Cowling lock lever	3	
7	Bushing	6	
8	Plate	3	
9	Bolt	6	M6 × 30 mm
10	Wave washer	3	
11	Lever	3	
12	Washer	3	
13	Bolt	3	M6 × 16 mm
14	Spring	3	
15	Hook	3	
16	Bolt	3	M6 × 16 mm
17	Plastic tie	1	



S6D07010

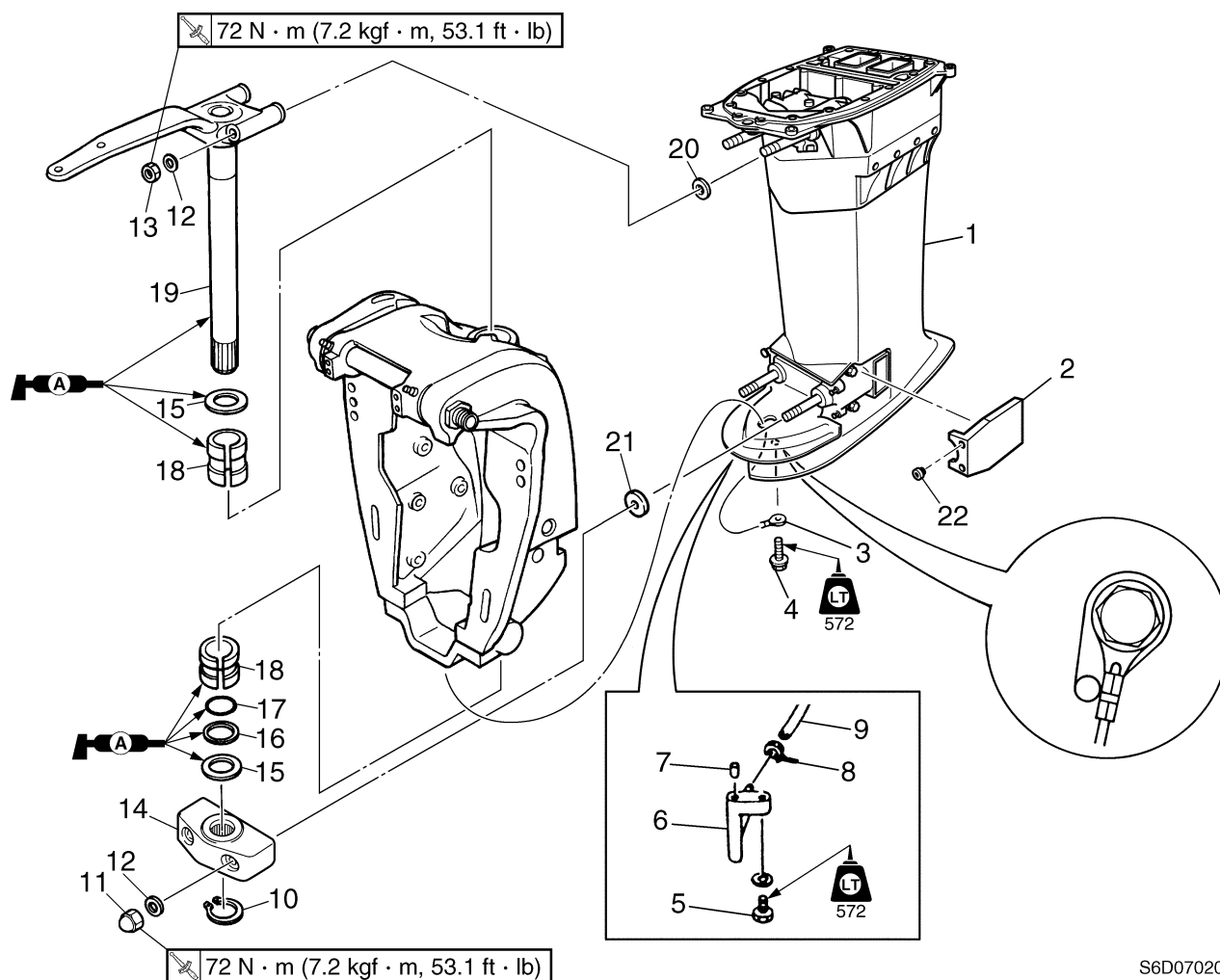
No.	Part name	Q'ty	Remarks
18	Holder	1	
19	Grommet	1	
20	Holder	1	
21	Bolt	1	M6 × 25 mm
22	Retaining plate	1	
23	Bolt	2	M6 × 25 mm
24	Bolt	1	M6 × 16 mm
25	Cable holder	1	
26	Grommet	2	
27	Power trim and tilt switch	1	
28	Bolt	4	M6 × 20 mm
29	Bracket	1	
30	Bracket	1	
31	Bracket	1	
32	Plate	2	
33	Bolt	2	M6 × 20 mm
34	Grommet	1	



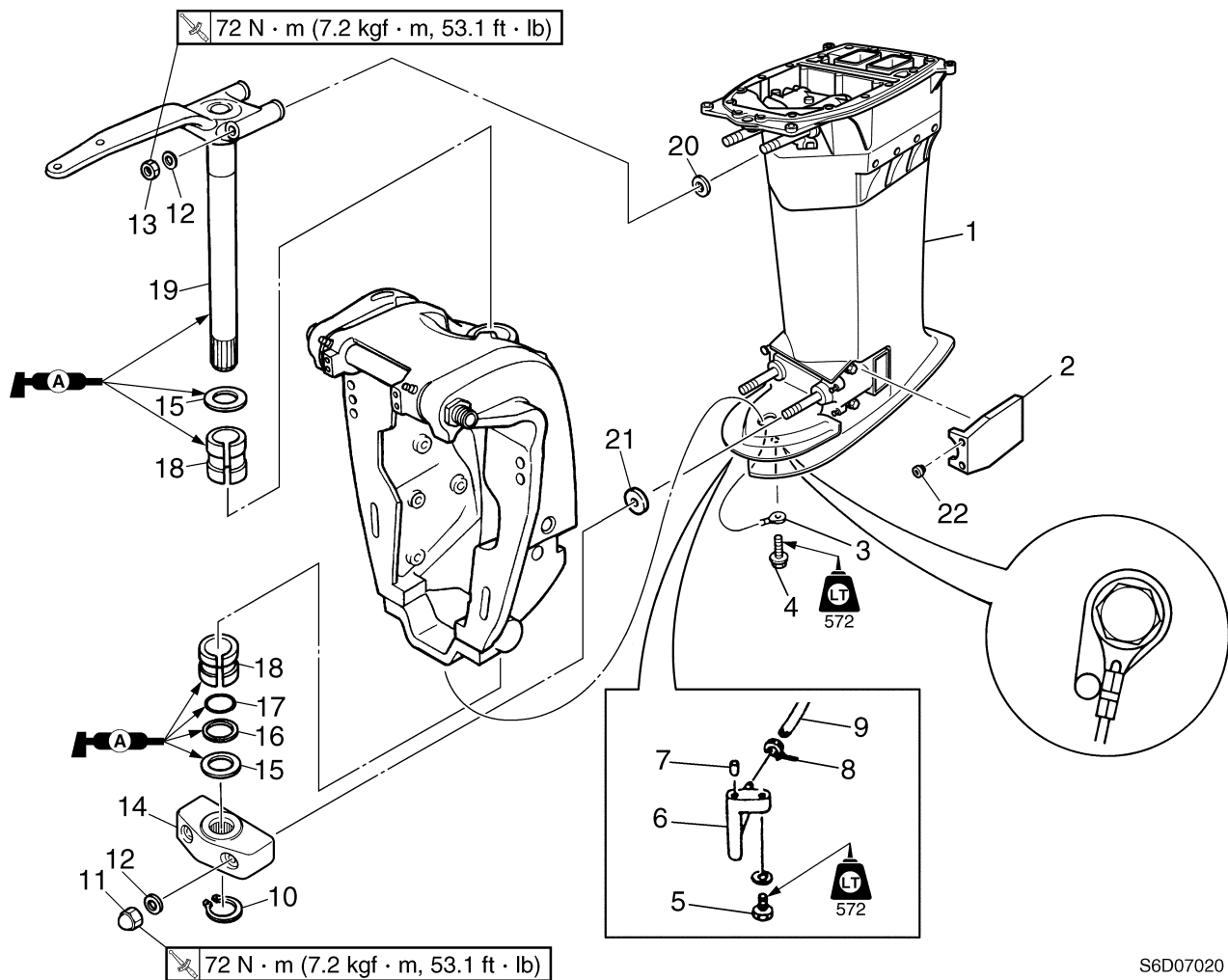
S6D07010

No.	Part name	Q'ty	Remarks
35	Gasket	1	Not reusable M6 × 20 mm
36	Cover	1	
37	Bolt	13	
38	Cover	1	
39	Ground lead	1	
40	Rubber trim	1	

Upper case, steering arm, swivel bracket, and clamp brackets

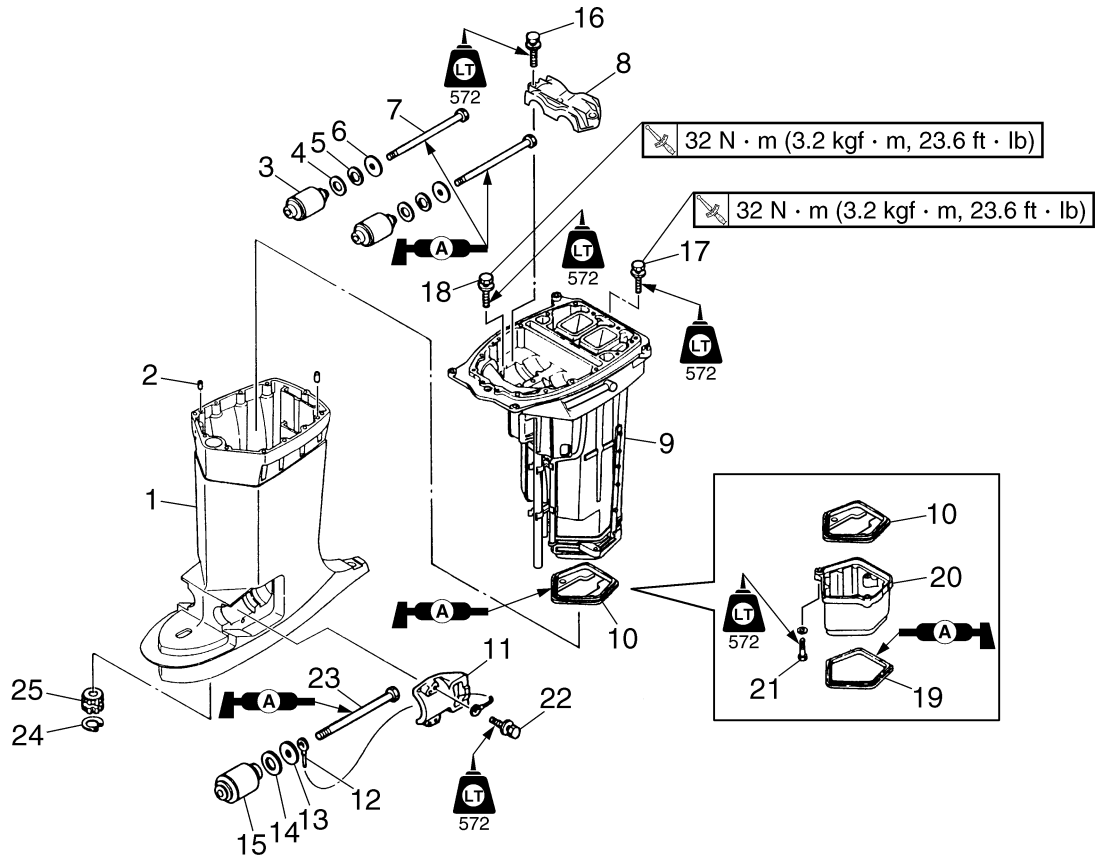


No.	Part name	Q'ty	Remarks
1	Upper case assembly	1	
2	Cover	2	
3	Ground lead	1	
4	Bolt	1	M6 × 10 mm
5	Bolt	1	M6 × 25 mm
6	Adapter	1	
7	Dowel	1	
8	Plastic tie	1	Not reusable
9	Hose	1	
10	Circlip	1	
11	Nut	2	
12	Washer	4	
13	Nut	2	
14	Steering yoke	1	
15	Washer	2	
16	Bushing	1	
17	O-ring	1	Not reusable



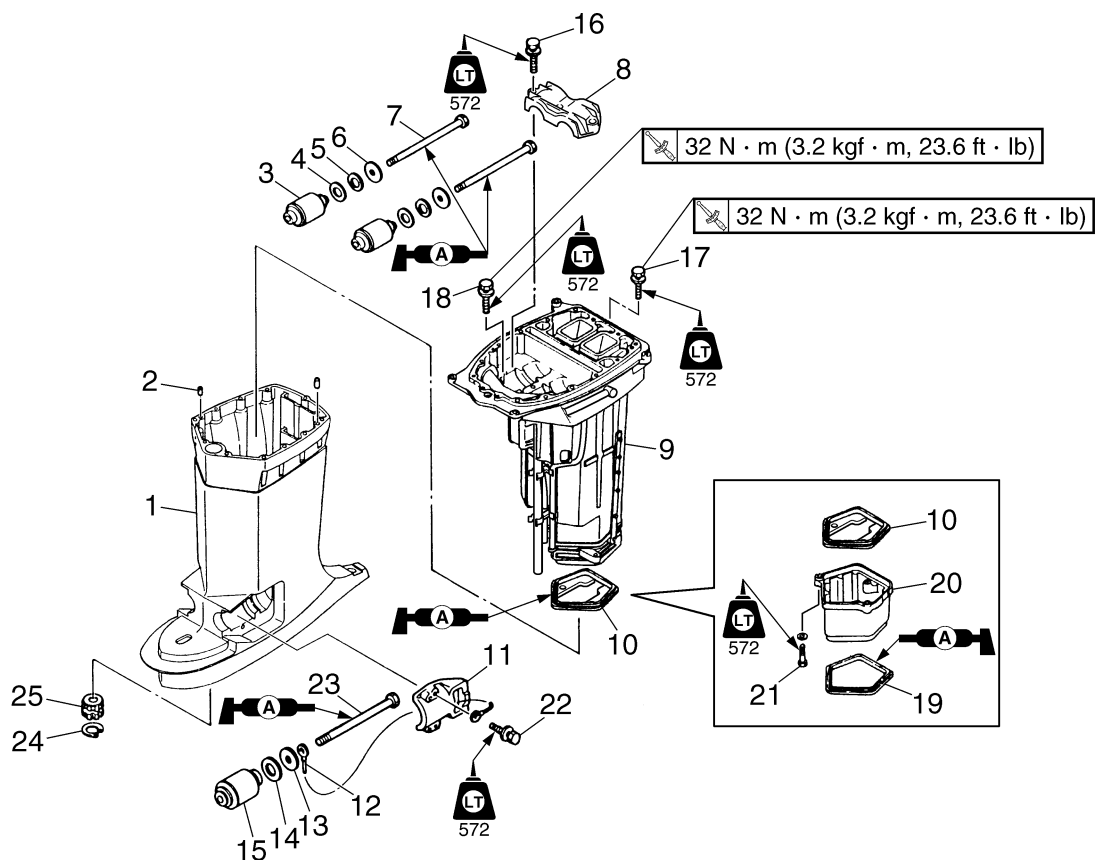
No.	Part name	Q'ty	Remarks
18	Bushing	2	
19	Steering arm	1	
20	Washer	2	
21	Washer	2	
22	Grommet	4	

Upper case, steering arm, swivel bracket, and clamp brackets



S6D07030

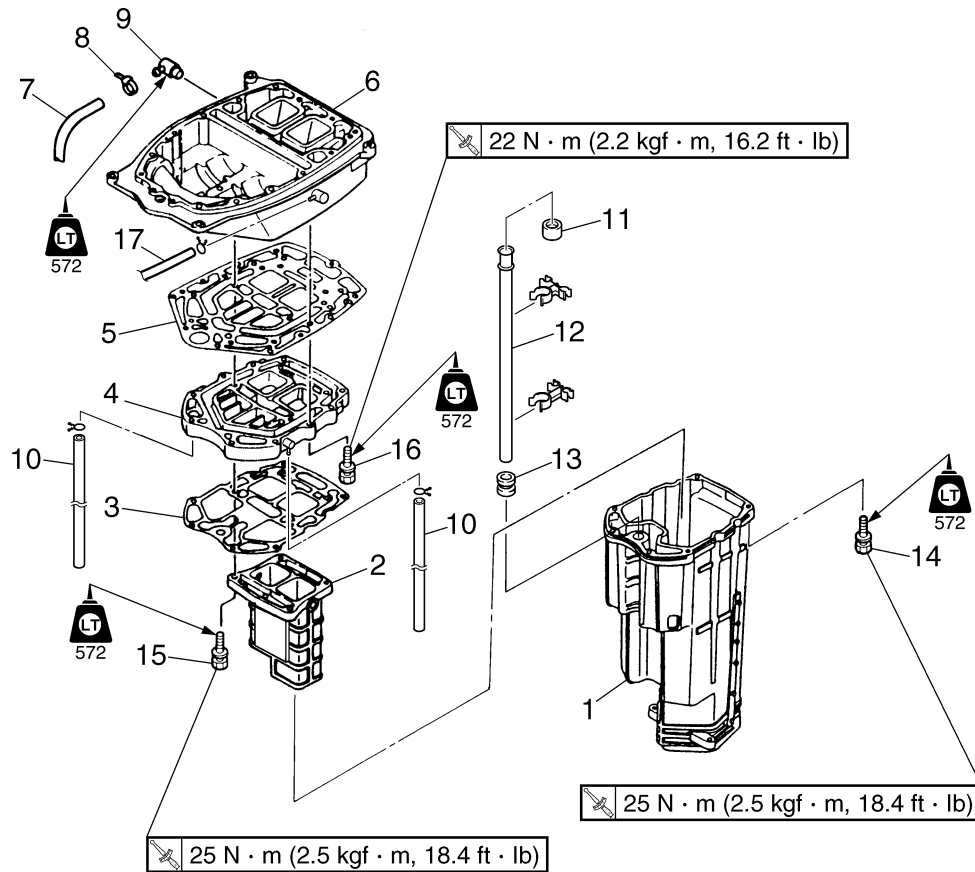
No.	Part name	Q'ty	Remarks
1	Upper case	1	
2	Dowel	2	
3	Upper mount	2	
4	Washer	2	
5	Washer	2	
6	Washer	2	
7	Bolt	2	M14 × 190 mm
8	Bracket	1	
9	Muffler assembly	1	
10	Gasket	1	Not reusable
11	Mount housing	2	
12	Ground lead	1	
13	Washer	2	
14	Washer	2	
15	Lower mount	2	
16	Bolt	3	M10 × 45 mm
17	Bolt	1	M8 × 45 mm



S6D07030

No.	Part name	Q'ty	Remarks
18	Bolt	2	M8 × 30 mm
19	Gasket	1	U-transom model Not reusable
20	Muffler	1	U-transom model
21	Bolt	2	M6 × 35 mm / U-transom model
22	Bolt	4	M10 × 45 mm
23	Bolt	2	M14 × 205 mm
24	Circlip	1	
25	Bushing	1	

Upper case, steering arm, swivel bracket, and clamp brackets



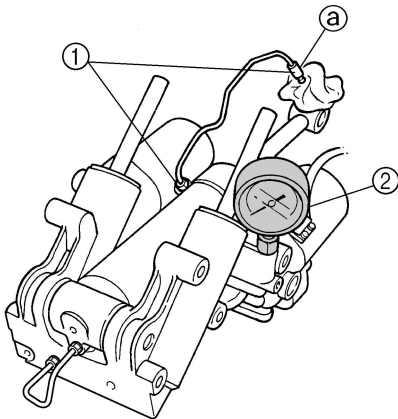
S6D07040

No.	Part name	Q'ty	Remarks
1	Muffer	1	
2	Exhaust manifold	1	
3	Gasket	1	Not reusable
4	Lower exhaust guide	1	
5	Gasket	1	Not reusable
6	Upper exhaust guide	1	
7	Flushing hose	1	
8	Plastic tie	1	Not reusable
9	Joint	1	
10	Hose	2	
11	Rubber seal	1	
12	Pipe	1	
13	Rubber seal	1	
14	Bolt	6	M8 × 50 mm
15	Bolt	4	M8 × 50 mm
16	Bolt	4	M8 × 35 mm
17	Hose	1	

Power trim and tilt unit

Checking the hydraulic pressure

1. Check the hydraulic pressure. Check the internal parts if out of specification.
2. Fully extend the power trim and tilt rams.
3. Loosen the pipe joints ①, and then remove the pipe joint ②.
4. Install the oil pressure gauge ②.



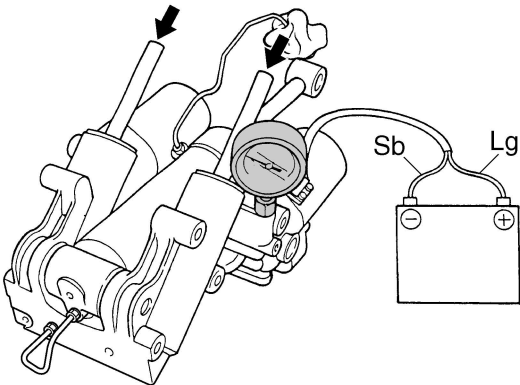
S6D07050

NOTE: _____
 Wrap the removed pipe joint ② in a rag.



PTT oil pressure gauge assembly:
90890-06580

5. Connect the PTT motor leads to the battery terminals to retract the trim ram, and then measure the hydraulic pressure.



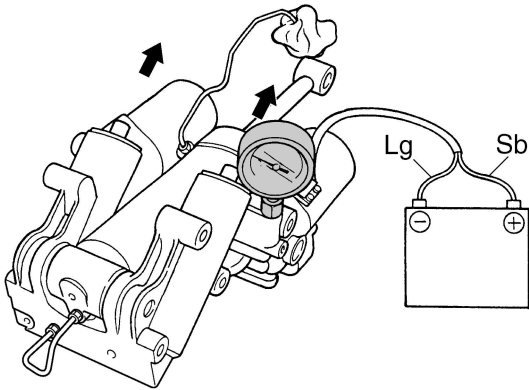
S6D07060

Ram	PTT motor lead	Battery terminal
Down	Light green (Lg)	⊕
	Sky blue (Sb)	⊖



Hydraulic pressure (down):
4.7–6.7 MPa (47–67 kgf/cm²)

6. Reverse the PTT motor leads between the battery terminals to fully extend the trim and tilt rams.



S6D07070

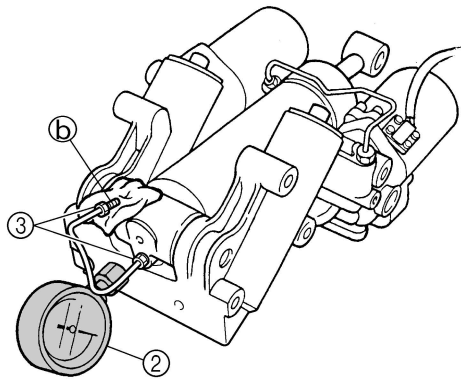
Ram	PTT motor lead	Battery terminal
Up	Sky blue (Sb)	⊕
	Light green (Lg)	⊖

7. Remove the oil pressure gauge ②.
8. Install the pipe joint ②, and then tighten the pipe joints to the specified torque.



Pipe joint ①:
15 N·m (1.5 kgf·m, 11.1 ft·lb)

9. Connect the PTT motor leads to the battery terminals to fully retract the trim and tilt rams.
10. Loosen the pipe joints ③, and then remove the pipe joint ④.
11. Install the oil pressure gauge ②.



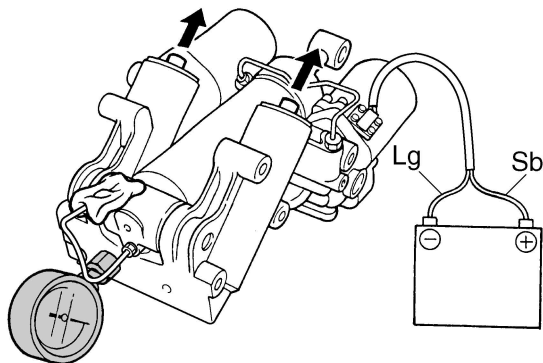
S6D07080

NOTE: _____
Wrap the removed pipe joint (b) in a rag.



PTT oil pressure gauge assembly:
90890-06580

12. Connect the PTT motor leads to the battery terminals to extend the trim ram, and then measure the hydraulic pressure.

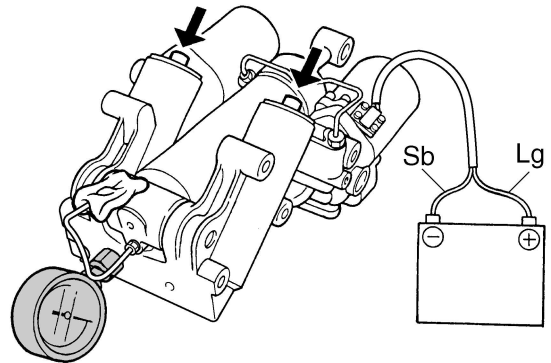


S6D07090



Hydraulic pressure (up):
11.3–13.3 MPa (113–133 kgf/cm²)

13. Reverse the PTT motor leads between the battery terminals to fully retract the trim and tilt rams.



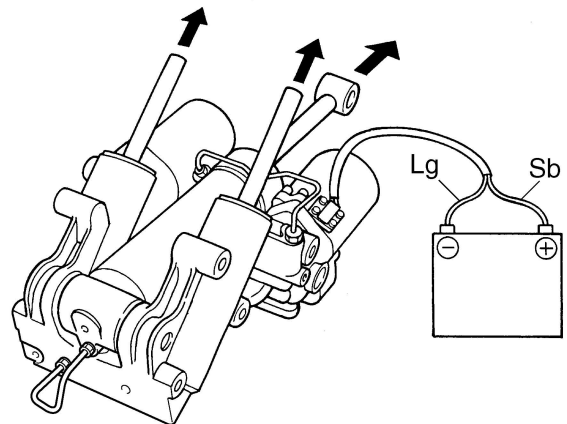
S6D07100

14. Remove the oil pressure gauge (2).
15. Install the pipe joint (b), and then tighten the pipe joints to the specified torque.



Pipe joint (3):
15 N·m (1.5 kgf·m, 11.1 ft·lb)

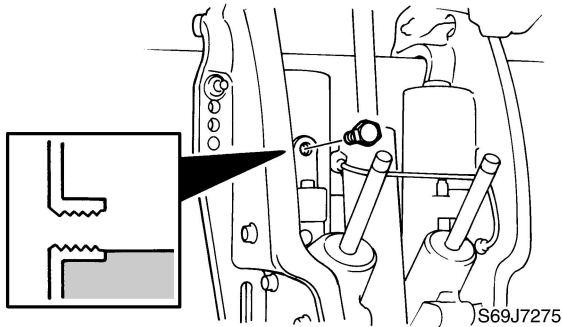
16. After measuring the hydraulic pressure, connect the PTT motor leads to the battery terminals to fully extend the trim and tilt rams.



S6D07110

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

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



NOTE: _____
If the fluid is at the correct level, the fluid should overflow out of the filler hole when the cap is removed.



Recommended power trim and tilt fluid:

ATF Dexron II

19. Install the reservoir cap.

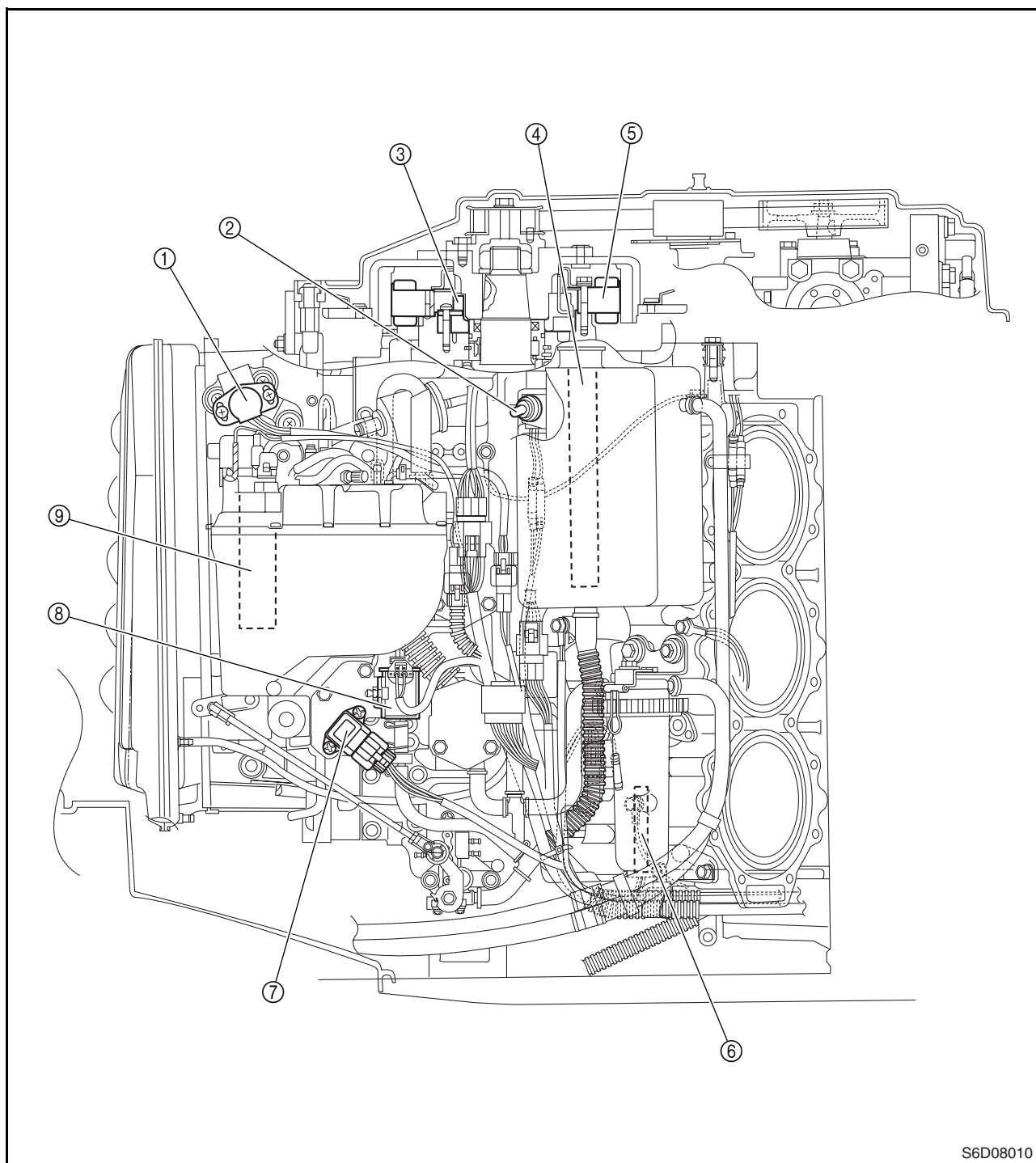


Reservoir cap:

7 N·m (0.7 kgf·m, 5.2 ft·lb)

Electrical components

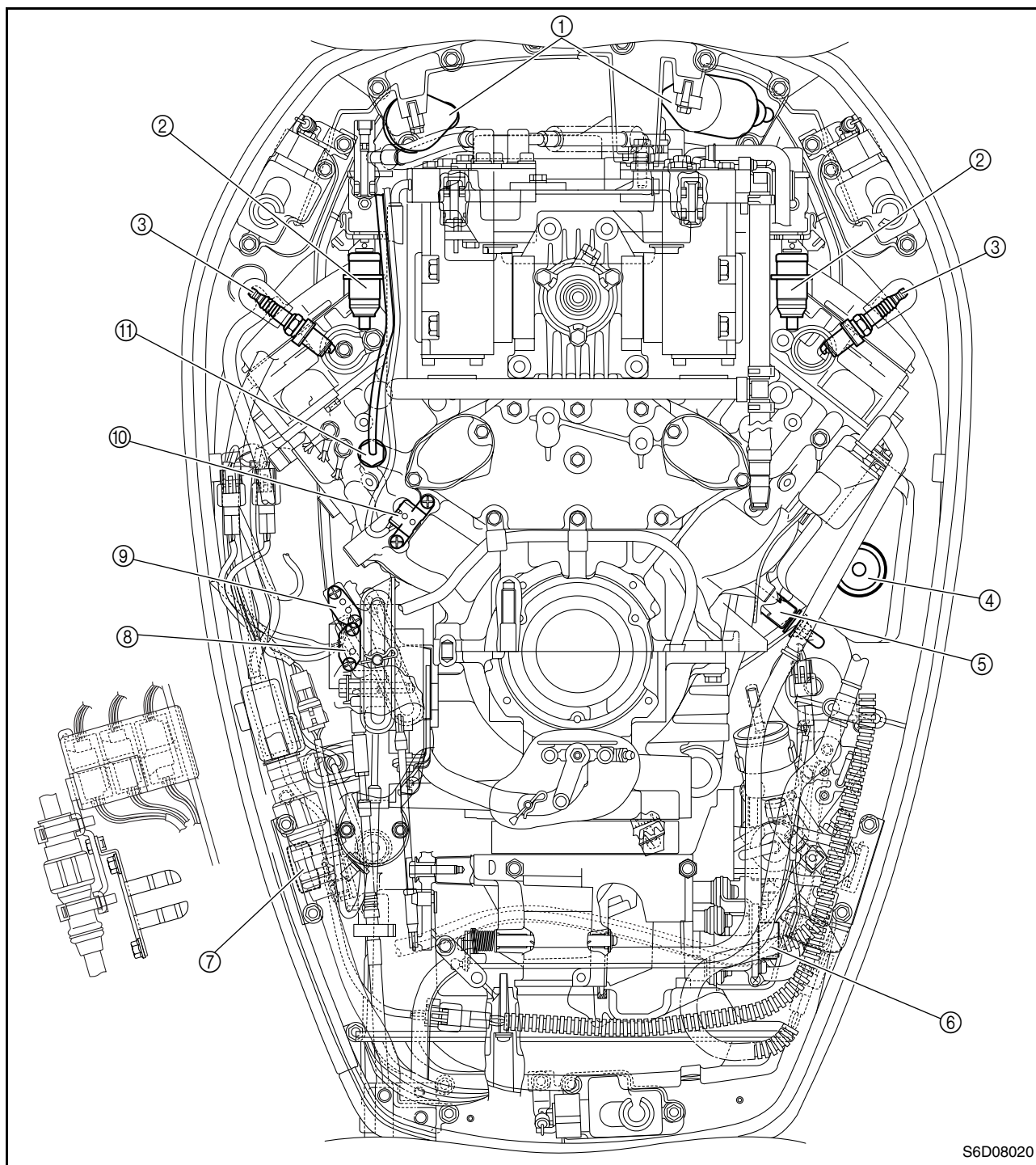
Port view



S6D08010

- ① Throttle position sensor
- ② Emergency switch
- ③ Pulser coil
- ④ Oil level sensor
- ⑤ Stator coil
- ⑥ Water detection switch
- ⑦ Atmospheric pressure sensor
- ⑧ Electric oil pump

- ⑨ Electric fuel pump


Top view


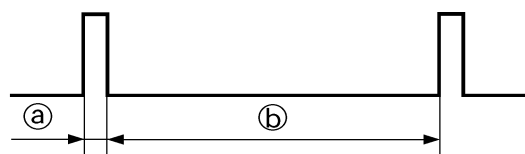
S6D08020

- | | |
|------------------------------|-----------------------------|
| ① Ignition coil | ⑪ Engine temperature sensor |
| ② Fuel injector | |
| ③ Spark plug | |
| ④ Oil level sensor | |
| ⑤ Emergency switch | |
| ⑥ Throttle position sensor | |
| ⑦ Power trim and tilt switch | |
| ⑧ Shift position switch | |
| ⑨ Shift cut switch | |
| ⑩ Crank position sensor | |

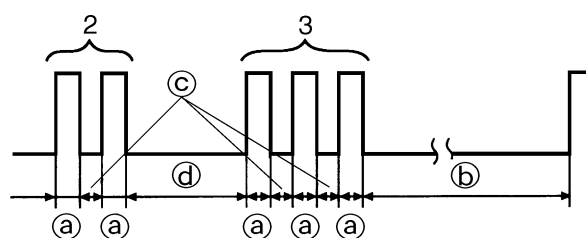
Diagnosing the electronic control system

-

S69J9020



- Trouble code indication
Example: The illustration indicates code number 23.
①: Light on, 0.33 second
②: Light off, 4.95 seconds
③: Light off, 0.33 second
④: Light off, 1.65 seconds



S69J9030

When performing this diagnosis, all of the electrical wires must be properly connected.



Diagnostic flash indicator B:
90890-06865

- Normal condition
(no defective part or irregular processing is found)
- Single flash is given every 4.95 seconds.
 - ①: Light on, 0.33 second
 - ②: Light off, 4.95 seconds

4. If a flash pattern listed in the diagnostic code chart is displayed, check the malfunctioning part according to the flash pattern.

NOTE: _____

When more than one problem is detected, the light of the diagnostic flash indicator flashes in the pattern of the lowest numbered problem. After that problem is corrected, the light flashes in the pattern of the next lowest numbered problem. This continues until all of the problems are detected and corrected.

Code	Symptom
1	Normal
13	Incorrect pulser coil signal
14	Incorrect crank position sensor signal
15	Incorrect engine temperature sensor signal
18	Incorrect throttle position sensor signal
19	Incorrect battery voltage
22	Incorrect atmospheric pressure sensor signal
23	Incorrect intake air temperature sensor signal
25	Incorrect fuel pressure signal
26	Incorrect injector signal
27	Incorrect water in fuel signal
28	Incorrect shift position switch signal
44	Incorrect engine stop lanyard switch signal
62	Low fuel pressure warning

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Checking the engine oil level	12	L.	
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— MEMO —

Wiring diagram

Z300AETO, LZ300AETO

- ① Electric fuel pump
- ② Electric oil pump
- ③ Oil level sensor
- ④ Water detection switch
- ⑤ Throttle position sensor
- ⑥ Emergency switch
- ⑦ Atmospheric pressure sensor
- ⑧ Thermoswitch
- ⑨ Power trim and tilt switch
- ⑩ Fuel pressure sensor
- ⑪ Pulser coil
- ⑫ Stator coil
- ⑬ Crank position sensor
- ⑭ Fuel injector
- ⑮ Fuel pump relay
- ⑯ Injector driver
- ⑰ Ignition coil
- ⑱ Spark plug
- ⑲ ECM
- ⑳ Diode
- ㉑ Engine temperature sensor
- ㉒ Trim sensor
- ㉓ Oil pump (remote oil tank)
- ㉔ Oil level sensor (remote oil tank)
- ㉕ Shift cut switch
- ㉖ Shift position switch
- ㉗ Power trim and tilt relay
- ㉘ Power trim and tilt motor
- ㉙ Intake air temperature sensor
- ㉚ Starter relay
- ㉛ Starter motor
- ㉜ Starting battery
- ㉝ Accessory battery
- ㉞ Fuse holder
- ㉟ Fuse (20 A)
- ㊱ ECM main relay
- ㊲ Injector driver relay
- ㊳ Fuse (100 A)
- ㊴ Fuse (30 A)
- ㊵ Rectifier Regulator

- [A] To personal computer for diagnosis
- [B] To remote control box/switch panel
- [C] To warning indicator
- [D] To trim meter
- [E] To diagnostic flash indicator
(special service tool)

- (*1) Isolator cable (optional)
- (*2) Negative cable (commercially available)

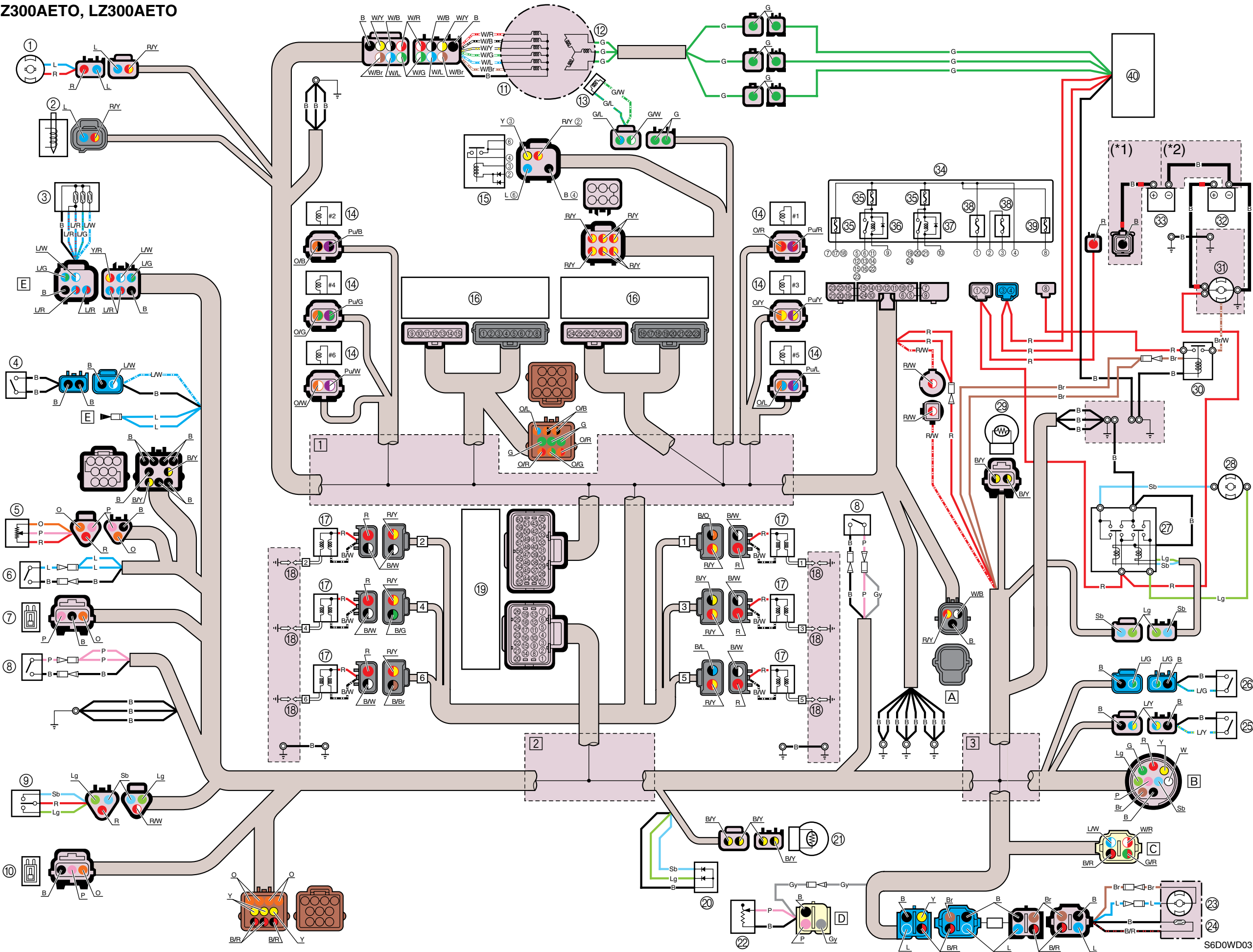
Color code

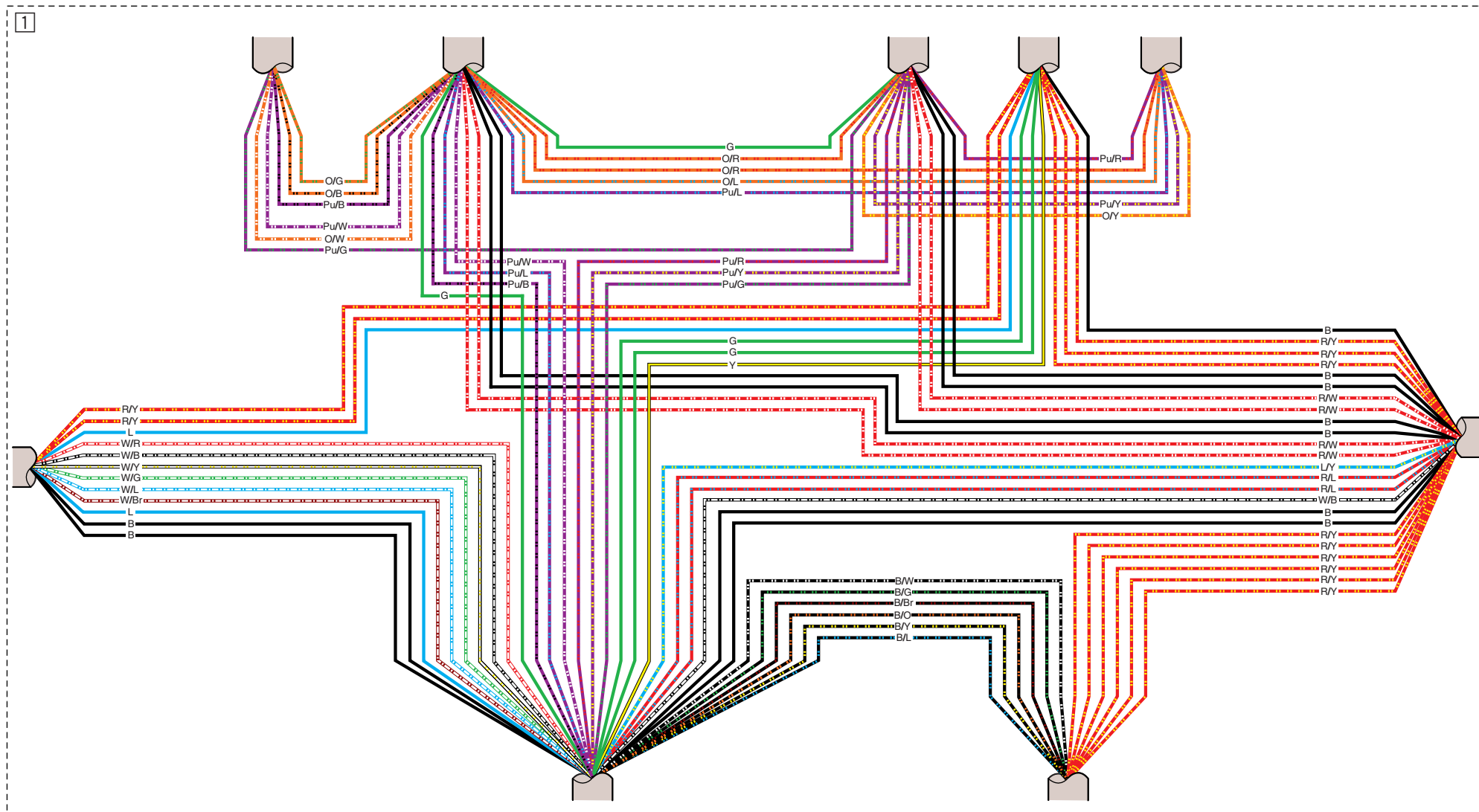
B	: Black
Br	: Brown
G	: Green
Gy	: Gray
L	: Blue
Lg	: Light green
O	: Orange
P	: Pink
R	: Red
Sb	: Sky blue
W	: White
Y	: Yellow
B/Br	: Black/brown
B/G	: Black/green
B/L	: Black/blue
B/O	: Black/orange
B/R	: Black/red
B/W	: Black/white
B/Y	: Black/yellow
G/L	: Green/blue
G/R	: Green/red
G/W	: Green/white
L/G	: Blue/green
L/R	: Blue/red
L/W	: Blue/white
L/Y	: Blue/yellow
O/B	: Orange/black
O/G	: Orange/green
O/L	: Orange/blue
O/R	: Orange/red
O/W	: Orange/white
O/Y	: Orange/yellow
Pu/B	: Purple/black
Pu/G	: Purple/green
Pu/L	: Purple/blue
Pu/R	: Purple/red
Pu/W	: Purple/white
Pu/Y	: Purple/yellow
R/L	: Red/blue
R/W	: Red/white
R/Y	: Red/yellow
W/B	: White/black
W/Br	: White/brown
W/G	: White/green
W/L	: White/blue
W/R	: White/red
W/Y	: White/yellow
Y/R	: Yellow/red



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Z300AETO, LZ300AETO



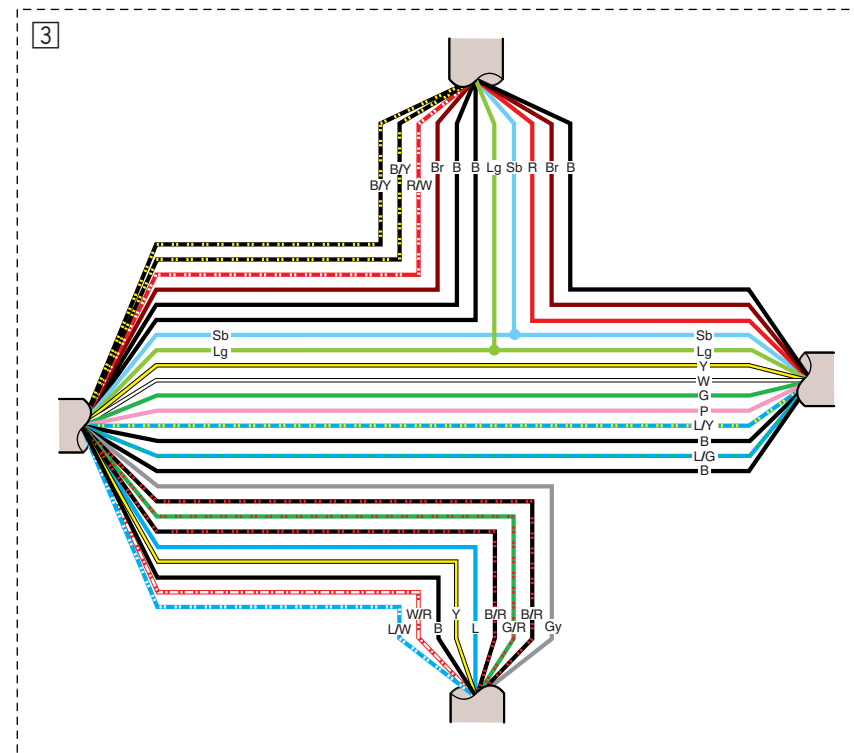
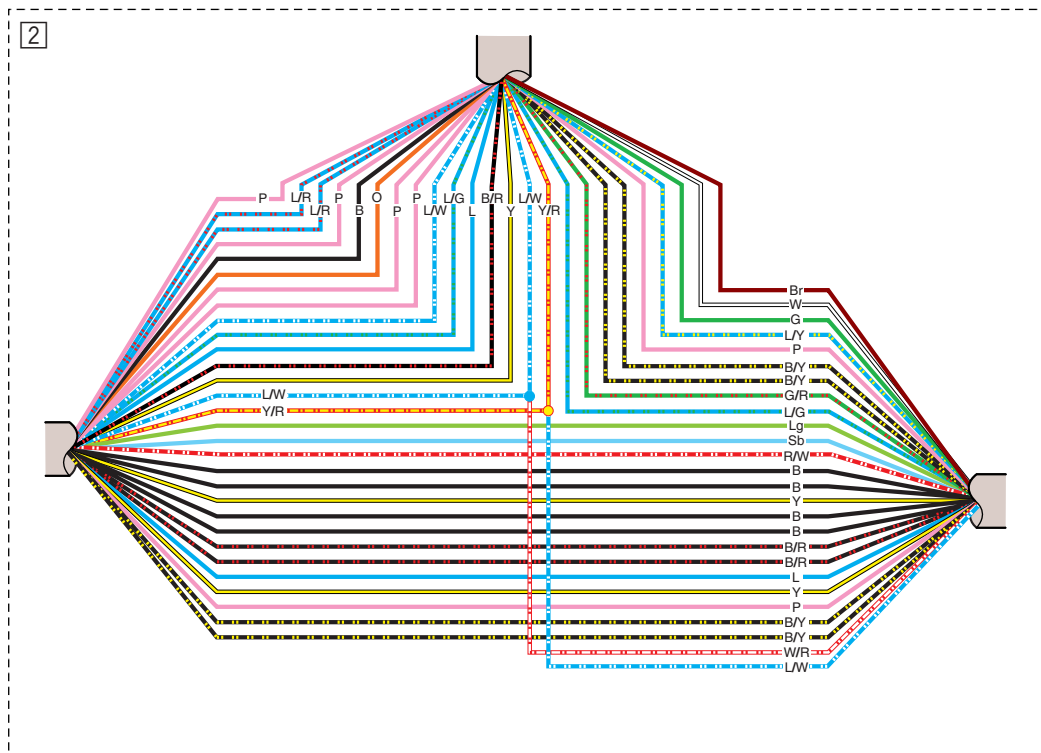


16

1 : B	11 : Pu/B	21 : Pu/Y
2 : R/W	12 : —	22 : —
3 : O/B	13 : Pu/W	23 : O/Y
4 : Pu/B	14 : Pu/L	24 : B
5 : Pu/L	15 : G	25 : R/W
6 : Pu/W	16 : B	26 : Pu/R
7 : —	17 : R/W	27 : —
8 : O/W	18 : O/R	28 : Pu/Y
9 : B	19 : Pu/R	29 : Pu/G
10 : R/W	20 : Pu/G	30 : G

19

1 : L/W	21 : B/R	41 : —
2 : P	22 : G	42 : Y
3 : —	23 : W	43 : B
4 : L/R	24 : Y	44 : B
5 : L/R	25 : Br	45 : W/L
6 : L/G	26 : —	46 : W/R
7 : G/R	27 : R/L	47 : G
8 : P	28 : W/Y	48 : Pu/Y
9 : B	29 : G	49 : W/B
10 : O	30 : G	50 : —
11 : P	31 : Pu/L	51 : B
12 : B/Y	32 : Pu/R	52 : B
13 : B/Y	33 : B/O	53 : W/Br
14 : P	34 : B/W	54 : W/B
15 : P	35 : B/Y	55 : L
16 : L/Y	36 : R/L	56 : —
17 : L/W	37 : W/G	57 : Pu/G
18 : L/G	38 : L/Y	58 : B/Br
19 : Y/R	39 : Pu/W	59 : B/L
20 : L	40 : Pu/B	60 : B/G



34

1 : R	9 : L/Y	17 : R
2 : R	10 : L/Y	18 : R
3 : R	11 : R/Y	19 : R/W
4 : R	12 : R/Y	20 : R/W
5 : R/L	13 : R/Y	21 : R/W
6 : R/L	14 : R/Y	22 : R/W
7 : R/W	15 : R/Y	23 : R/Y
8 : R	16 : R/Y	24 : R/W