

YAMAHA
250Q/L250Q

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Marine

Outboards

250Q/L250Q



SERVICE MANUAL



YAMAHA MOTOR CORPORATION, U.S.A.

LIT-18616-00-73 ●

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SPECIAL TOOLS

SPECIAL TOOLS FOR LOWER UNIT SERVICE (250)

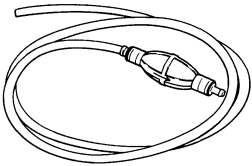
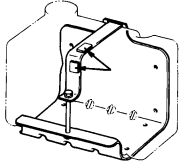
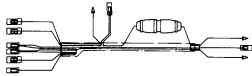
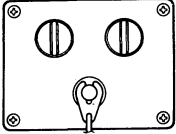
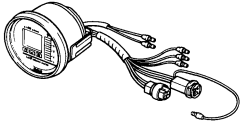

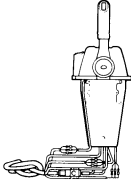

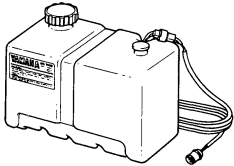
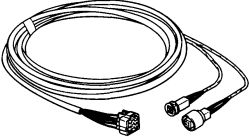
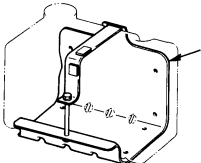

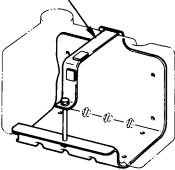

TOOL NAME	PART NO.
Pinion Gear Bushing Installer	YB-6029
Driver Handle-Large	YB-6071
Slide Hammer and Attachments	YB-6096
Universal Puller	YB-6117
Driveshaft Needle Bearing Remover/Installer	YB-6196
Driveshaft Holding Tool	YB-6201
Bearing Housing Puller	YB-6207
Needle Bearing Remover and Installer	YB-6213
Backlash Indicator Gauge	YB-6265
Forward Gear Bearing Cup Installer	YB-6276-A
Forward Bearing Installer	YB-6430
Taper Roller Bearing Installer	YB-6431
Roller Bearing Remover/Installer	YB-6432
Bearing Separator	YB-6436
Bushing Remover/Installer	YB-6437
Shimming Gauge	YB-6439
Pinion Shimming Gauge 1	YB-6441-1
Pinion Shimming Gauge 2	YB-6441-2
Backlash Adjusting Plate	YB-7003
Driveshaft Puller	YB-34449-A
Lower Unit Pressure/Vacuum Tester	YB-35956
Dial Indicator	YU-3097
Feeler Gauge (in)	YU-26900-8
Feeler Gauge (mm)	YU-26900-9
Magnetic Flexible Dial Base	YU-34481



Item	Unit	250	L250												
Remote oil tank level gauge			Unit: Ω												
Resistance at 20°C (68°F)		<table border="1"> <thead> <tr> <th>Float position</th> <th>Lead color</th> <th>B/R B</th> </tr> </thead> <tbody> <tr> <td> </td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>0</td> </tr> <tr> <td></td> <td></td> <td>∞</td> </tr> </tbody> </table>		Float position	Lead color	B/R B						0			∞
Float position	Lead color	B/R B													
		0													
		∞													
Crank position sensor			Unit: Ω												
Resistance at 20°C (68°F)		<table border="1"> <thead> <tr> <th>Lead color</th> <th>Resistance</th> </tr> </thead> <tbody> <tr> <td>G/L-G/W</td> <td>178.5 ~ 241.5</td> </tr> </tbody> </table>		Lead color	Resistance	G/L-G/W	178.5 ~ 241.5								
Lead color	Resistance														
G/L-G/W	178.5 ~ 241.5														
Gap (Sensor to Ring gear)	mm (in)	0.5 ~ 1.5 (0.020 ~ 0.059)	←												
Throttle sensor			Unit: k Ω												
Maximum resistance at 20°C (68°F)		<table border="1"> <thead> <tr> <th></th> <th>Lead color</th> <th>Resistance</th> </tr> </thead> <tbody> <tr> <td>A)</td> <td>P-O</td> <td>4 ~ 6</td> </tr> <tr> <td>B)</td> <td>P-R</td> <td>4 ~ 6</td> </tr> </tbody> </table>			Lead color	Resistance	A)	P-O	4 ~ 6	B)	P-R	4 ~ 6			
	Lead color	Resistance													
A)	P-O	4 ~ 6													
B)	P-R	4 ~ 6													
Thermo sensor		at 20°C (68°F) Unit: k Ω	at 100°C (212°F) Unit: k Ω												
Resistance		<table border="1"> <thead> <tr> <th>Lead color</th> <th>Resistance</th> </tr> </thead> <tbody> <tr> <td>B/Y-B/Y</td> <td>54.2 ~ 69.0</td> </tr> </tbody> </table>	Lead color	Resistance	B/Y-B/Y	54.2 ~ 69.0	<table border="1"> <thead> <tr> <th>Lead color</th> <th>Resistance</th> </tr> </thead> <tbody> <tr> <td>B/Y-B/Y</td> <td>3.12 ~ 3.48</td> </tr> </tbody> </table>	Lead color	Resistance	B/Y-B/Y	3.12 ~ 3.48				
Lead color	Resistance														
B/Y-B/Y	54.2 ~ 69.0														
Lead color	Resistance														
B/Y-B/Y	3.12 ~ 3.48														
Knocking sensor			Unit: k Ω												
Resistance at 20°C (68°F)		<table border="1"> <thead> <tr> <th>Lead color</th> <th>Resistance</th> </tr> </thead> <tbody> <tr> <td>G-Body</td> <td>504 ~ 616</td> </tr> </tbody> </table>		Lead color	Resistance	G-Body	504 ~ 616								
Lead color	Resistance														
G-Body	504 ~ 616														
Trim angle sensor			Unit: Ω												
Maximum resistance at 20°C (68°F)		<table border="1"> <thead> <tr> <th></th> <th>Lead color</th> <th>Resistance</th> </tr> </thead> <tbody> <tr> <td>A)</td> <td>P-O</td> <td>800 ~ 1200</td> </tr> <tr> <td>B)</td> <td>P-B</td> <td>800 ~ 1200</td> </tr> </tbody> </table>			Lead color	Resistance	A)	P-O	800 ~ 1200	B)	P-B	800 ~ 1200			
	Lead color	Resistance													
A)	P-O	800 ~ 1200													
B)	P-B	800 ~ 1200													



Rigging components: L250

Part Name	Illustration	Part Name	Illustration
Fuel pipe complete		Remote-oil tank damper rubber	
Lead wire (Switch panel to tachometer)		Switch panel assembly (Dual type)	
Digital tachometer		Lead wire (Switch panel/remote control box to counter rotation motor)	
Remote control box (704-Dual type)		Lead wire (Multi-function meter to two tachometers)	
Remote-oil tank assembly		Lead wire (Counter rotation motor to tachometer)	
Remote-oil tank bracket		Lead wire (Switch panel/remote control box to counter rotation motor)	
Remote-oil tank holder		Rigging instructions	

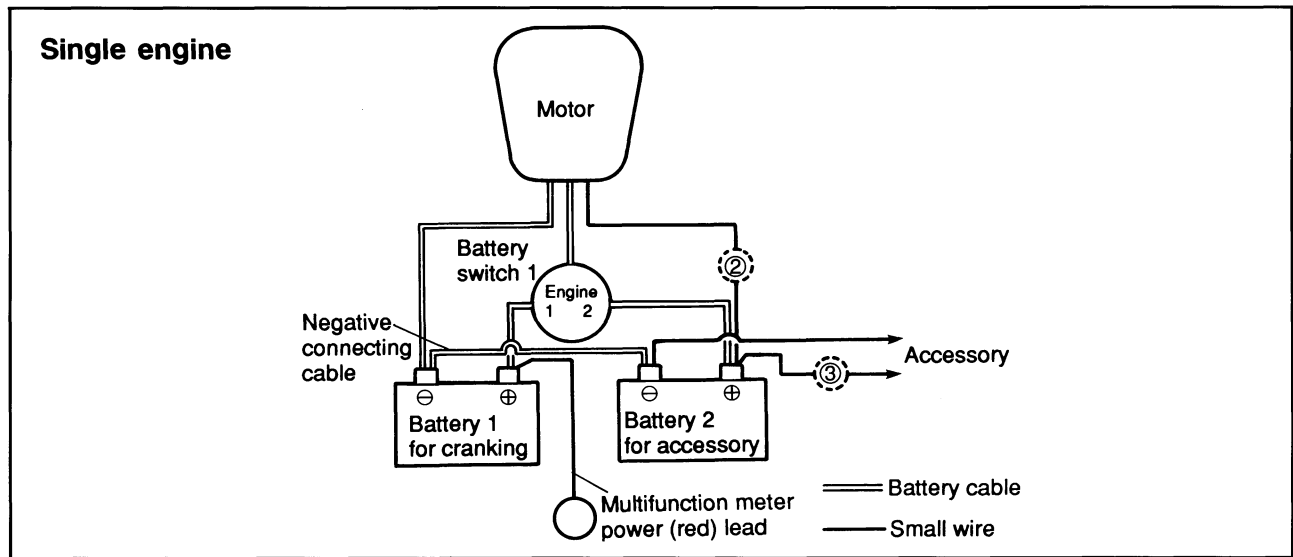
D28530-0

Recommended battery wiring (with accessory battery shut off switch)

⚠ WARNING

Improper battery connections or wire size selection may result in a fire.

1. When one battery is used, connect the two red cables to the (+) terminal. If the smaller red cable is left unconnected, an accidental contact of the red cable with the (-) terminal of the battery will form a short circuit and may cause a fire.
2. When using an accessory battery, a negative connecting cable must be installed between the accessory battery and the main battery. This cable must be made from wire equivalent to the main battery cable. Use of smaller wire could lead to a fire.



BATTERY SWITCH SELECTION

MODE	SWITCH POSITION
SYSTEM OFF	OFF
NORMAL OPERATION	BATTERY 1
BACK-UP CRANKING	BATTERY 2

NOTE:

1. SWITCH POSITION "BOTH" SHOULD NOT BE USED FOR BACK-UP CRANKING. If battery 1 is discharged and the "BOTH" position is selected, then battery 2 will discharge into battery 1.
2. Switch ② is not required, the battery isolator on the motor will prevent current from flowing to the electrical components on the engine, even if the small wire remains connected to the battery. However, the switch ③ can be installed to shut off electrical power to the accessories.



PERIODIC SERVICE

D30002-0

PERIODIC SERVICE

MAINTENANCE SCHEDULE

The following chart may be taken as a helpful guide to the intervals between maintenance procedures.

Intervals		Initial		Every		Reference, page
		10 hours	50 hours (3 months)	100 hours (6 months)	200 hours (1 year)	
1.	Carburetor	○	○	○		3-25
2.	Enrichment line filter				○	3-25
3.	Fuel filter	○	○	○		3-25
4.	Fuel tank and fuel line	○		○		3-25
5.	Throttle link				○	3-26
6.	Carburetor pick-up timing				○	3-29
7.	Throttle sensor				○	3-30
8.	Idling speed	○		○		3-31
9.	Spark plug	○	○	○		3-32
10.	Water drain (Engine oil tank)	○	○	○		3-32
11.	Oil injection pump	○				3-33
12.	PT/T unit				○	3-33
13.	PT/T operation	○	○	○		3-34
14.	Wiring and Connector	○	○	○		3-35
15.	Exhaust leakage	○	○	○		3-35
16.	Water leakage	○	○	○		3-35
17.	Lower unit leakage			○		3-35
18.	Grease points			○		3-36
19.	Gear oil	○		○		3-37
20.	Bolts and Nuts	○	○	○		3-37
21.	Cowling locking and releasing mechanism				○	3-37
22.	Anode			○	○	3-40
23.	Propeller	○	○	○		3-40
24.	Motor exterior	○	○	○		3-40
25.	Battery	○	○	○		3-41
26.	Compression pressure	○	○	○		3-43
27.	Diagnosis	○	○	○		9-2

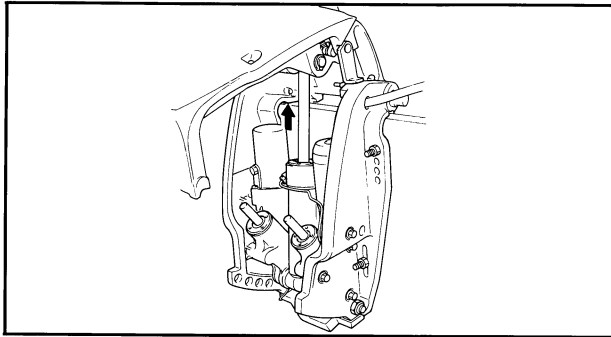


- 5) Re-fit the fluid-level plug, and tighten it.



Recommended fluid:

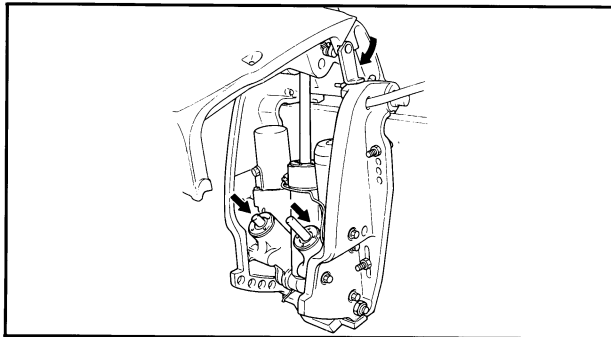
Yamaha power trim and tilt fluid



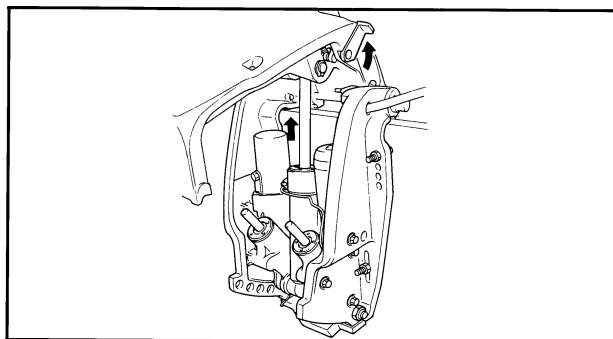
D32500-0

13. PT/T OPERATION

- 1) Tilt up the motor and check that the tilt rod and the trim rods are pushed out completely.



- 2) Tilt-lock the motor. Activate the tilt-down switch to check that the trim rods is put in the cylinder.



- 3) Activate the tilt-up switch. Unlock the tilt lock when the trim rods have been fully pushed out.

- 4) Trim down the motor and check that both the trim rods and the tilt rod are put in the cylinders completely and smoothly.



E10002-1

CHAPTER 4

FUEL SYSTEM AND LUBRICATION

FUEL SYSTEM	4-1
FUEL LINE DIAGRAM	4-1
EXPLODED DIAGRAM	4-2
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EXPLODED DIAGRAM	4-14
REMOVAL	4-15
INSTALLATION AND INSPECTION	4-16
WORK LIST	4-17



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REMOVAL AND DISASSEMBLY

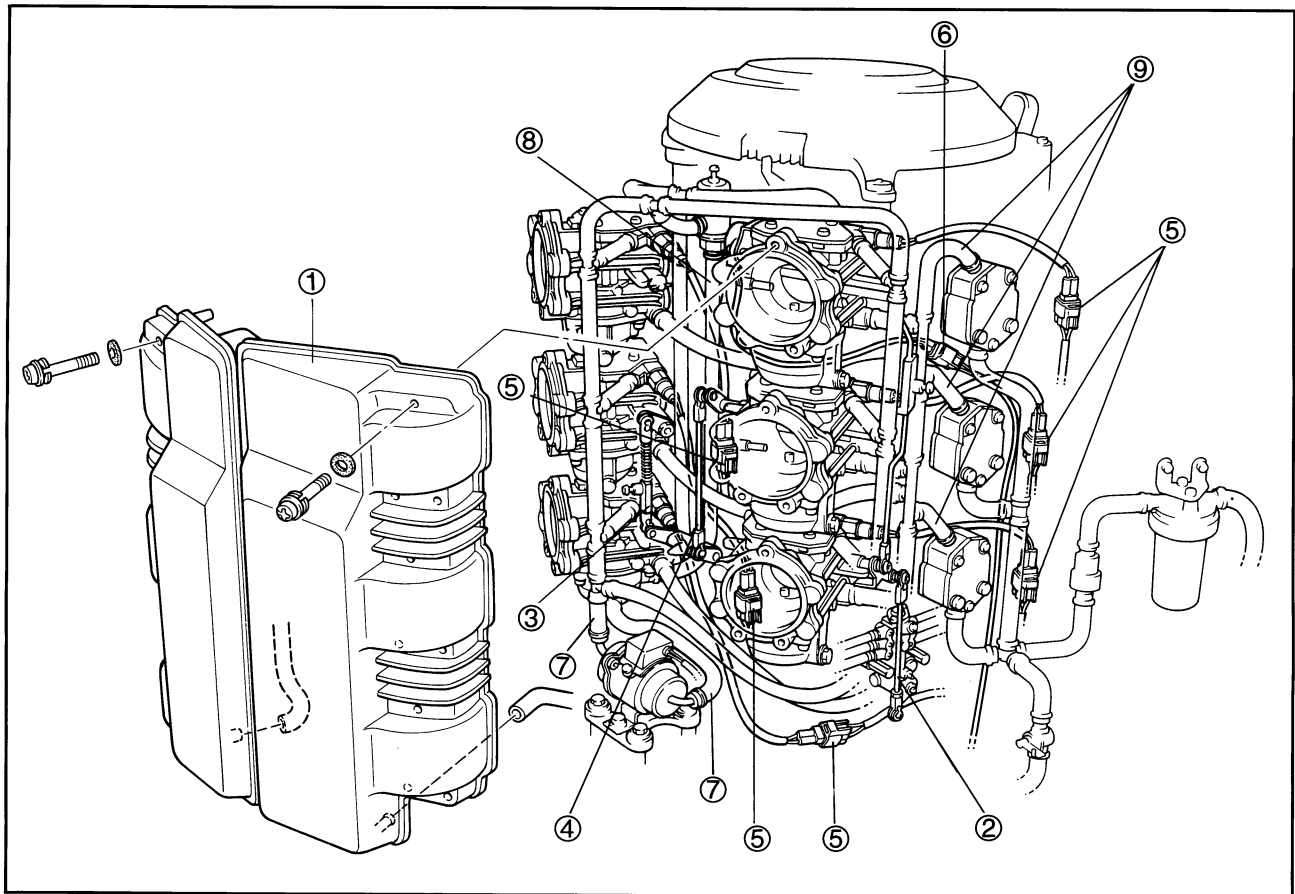
⚠ WARNING

At this step, ensure there is no spillage of gasoline on removing the connections.

1) Remove and Disconnect

When removing the carburetor assembly from the engine, remove or disconnect the following nine parts first.

- | | |
|-----------------------|---|
| ① Intake silencer | ⑤ Connector from the Fuel enrichment solenoid valve |
| ② Oil pump joint link | ⑥ Connector from the Throttle sensor |
| ③ Accelerator link | ⑦ Fuel hose from the Feed pump |
| ④ Joint link | ⑧ Fuel hose from the Fuel regulator |
| | ⑨ Fuel hose from the Fuel pump |



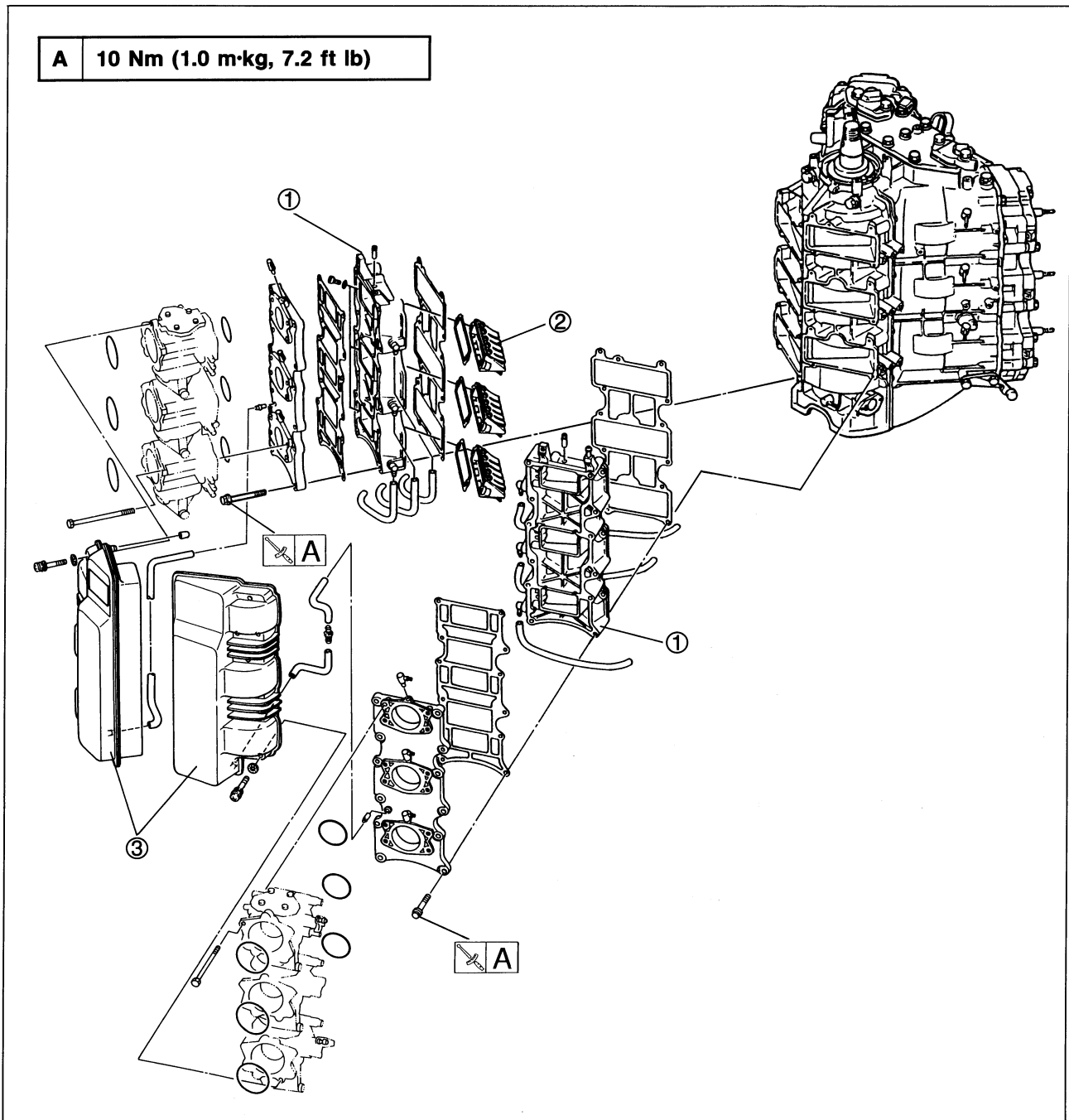
2) Disassembly

Referring to the "EXPLODED DIAGRAM" on page 4-9, disassemble the carburetor.

CAUTION:

Never remove the fuel enrichment solenoid valve, the throttle sensor or the pilot screw from the carburetor body unless absolutely necessary.

A 10 Nm (1.0 m·kg, 7.2 ft lb)



- ① Intake manifold
- ② Reed valve
- ③ Intake silencer



- Using the measured cylinder bore diameter in thrust directions, subtract the piston diameter measurement from the cylinder bore diameter measurement.



Piston clearance
0.135 ~ 0.140 mm
(0.0053 ~ 0.0055 in)

If this clearance is greater than the maximum, replace all pistons to standard to or oversize, and/or rebore all cylinders.

Oversize piston:

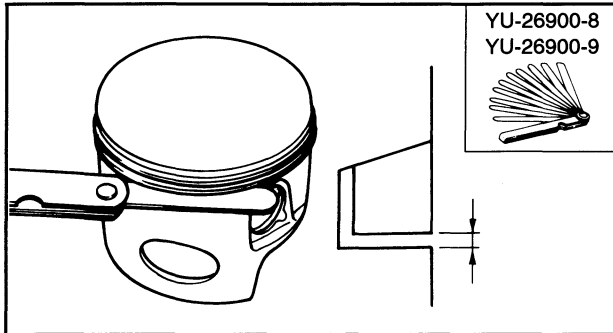
90.37 ~ 90.39 mm (3.557 ~ 3.558 in)

G62505-0

PISTON RING

Inspection

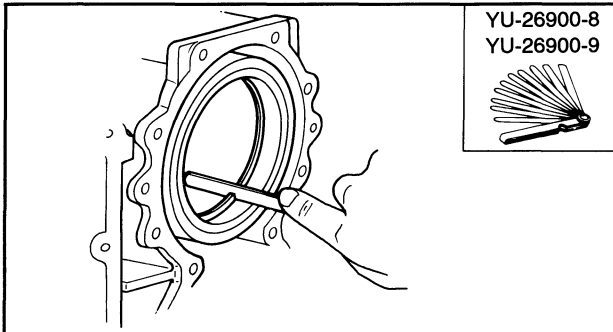
- Using a feeler gauge, measure the clearance between the piston ring and the groove land.



Side clearance:
0.02 ~ 0.06 mm
(0.0008 ~ 0.0024 in)

If the clearance is not within the specifications, replace the piston.

- Insert the piston ring into the cylinder. Using a piston, push the piston ring a little beyond the bottom of the ring travel to a depth of 20 mm (0.8 in) from the top of the cylinder block.



CAUTION:

Take care not to scratch the piston. Using a thickness gauge, measure the end-gap.



Ring end gap:
0.30 ~ 0.40 mm (0.012 ~ 0.016 in)

If the clearance is greater than the maximum, replace the piston-ring and/or piston.

NOTE:

If the clearance is greater than maximum even with a new piston ring, rebore the cylinder and use an over-size piston and piston-ring.

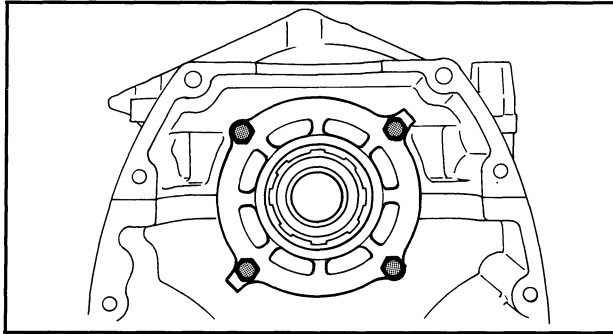
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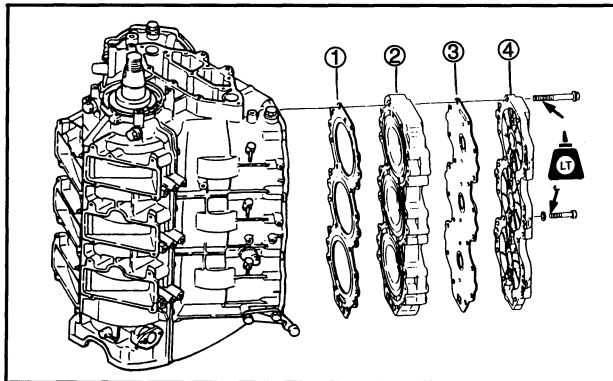
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7) Tighten fixing bolts of the crank lower oil seal housing.

NOTE:

Upon completion of the crank case assembly, check to make sure that the crankshaft turns smoothly.



G75002-0

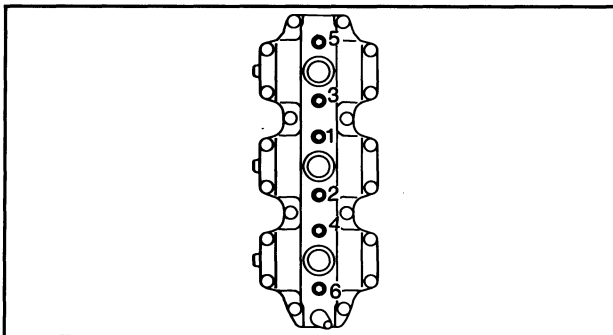
CYLINDER HEAD AND EXHAUST COVER

1) Install following parts to the crank cylinder.

- ① Gasket(New)
- ② Cylinder head
- ③ Gasket(New)
- ④ Cylinder head cover

NOTE:

1. Tighten the cylinder head cover fixing bolts according to the embossed numbers on the cylinder head cover and in two steps.
2. Apply Screw Lock to the thread of each cylinder head cover fixing bolt.



Cylinder head/Cylinder head cover:

M6 bolts:

1st step:

4 Nm (0.4 m·kg, 2.9 ft lb)

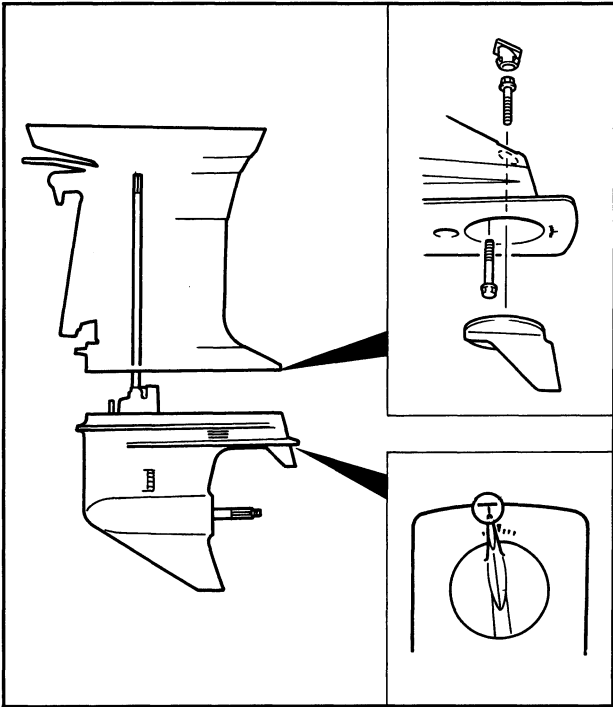
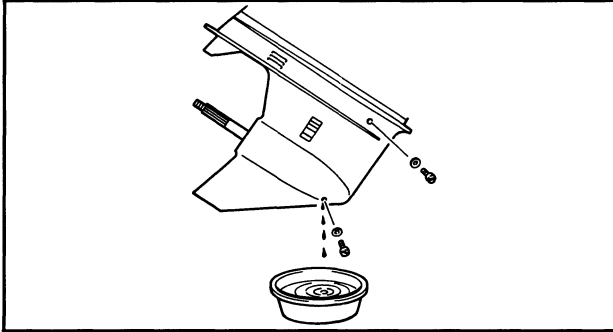
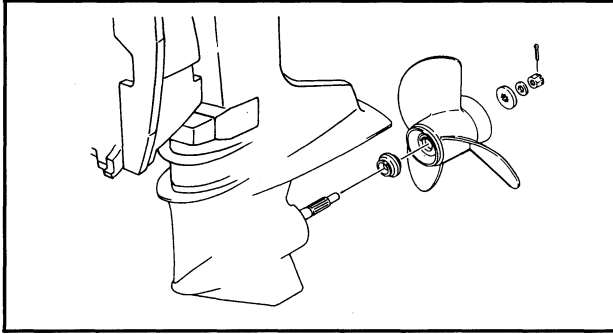
2nd step:

8 Nm (0.8 m·kg, 5.8 ft lb)

LOWR



PREPARATION FOR REMOVAL



120000-0

PREPARATION FOR REMOVAL

- 1) Remove the nut and washer, and remove the propeller and spacer from the propeller shaft.
- 2) Drain the gear oil by removing the plugs from the oil filling hole and the oil level hole.

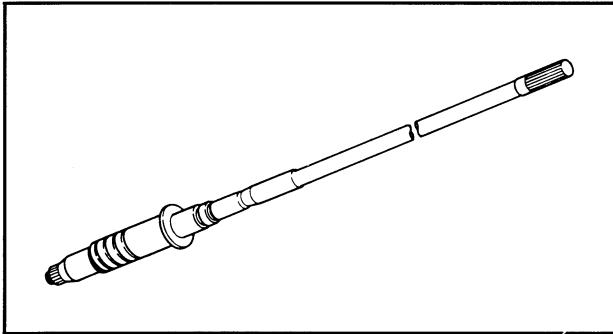
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REMOVAL

- 1) Set the shift lever into the neutral position.
- 2) Remove the bolts and remove the lower unit complete.

NOTE:

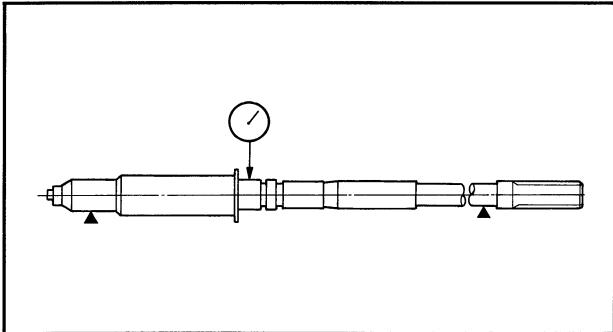
1. One installation bolt is behind the trim tab; therefore, first remove the trim tab, and then remove the installation bolt.
2. Before removing the trim tab, put a mark indicating its position on the anti-cavitation plate.



I56015-0*

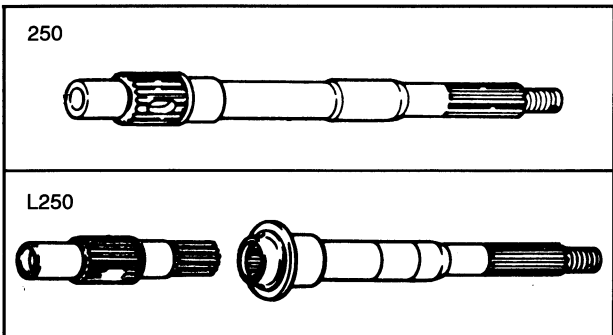
DRIVE SHAFT

- 1) Visually inspect the shaft for grooved wear on the surface in contact with the bearings and oil seals and for wear on the splines. Replace if worn or damaged.



- 2) Check the drive shaft for deflection, using V-blocks and a dial gauge.

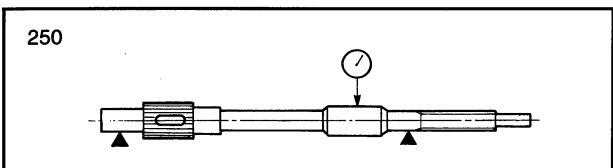
**Maximum drive shaft deflection:
0.50 mm (0.020 in)**



I56025-0*

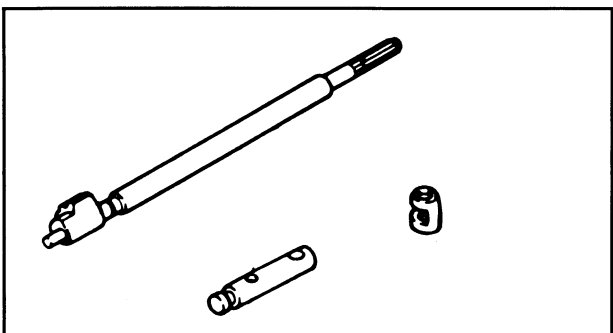
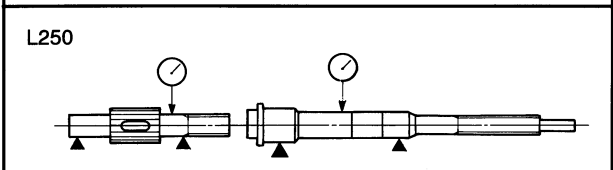
PROPELLER SHAFT

- 1) Visually inspect the shaft for grooved wear on the surface in contact with the bearings and oil seals and for wear on the splines. Replace if worn or damaged.



- 2) Check the propeller shaft for deflection, using V-blocks and a dial gauge.

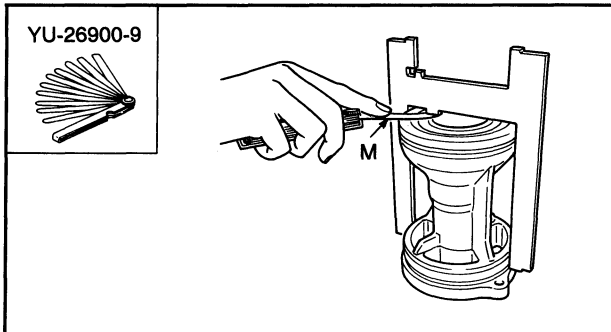
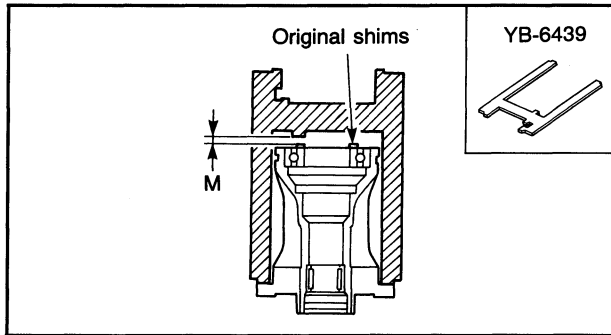
**Maximum propeller shaft deflection:
0.02 mm (0.0008 in)**



I56520

SHIFT CAM AND SHIFT SLIDER

- 1) Visually inspect the shift rod for signs of wear or damage, looking particularly for denting of the shift cam and shift slider, and replace if required.



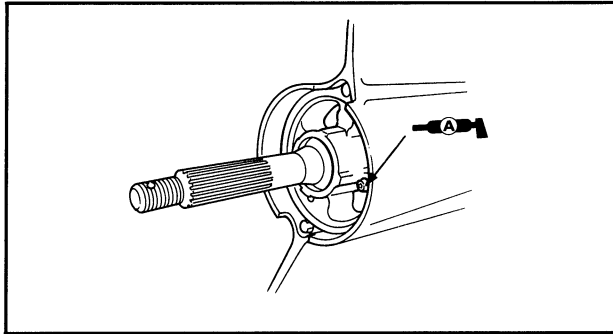
- 3) Place the original shims on the reverse bearing, and place the shimming gauge on the bearing housing as shown in the illustration.

NOTE:

If the original shims are unavailable, start with a 0.50 mm shim.

- 4) Using feeler gauges set at the specified measurement (M) established above, check the fit between the shimming gauge and the top of the shims. Force the shimming gauge against the bearing housing when checking the fit.
- 5) If the feeler gauge(s) will not fit, then add more shims until the feeler gauge(s) (set at the M specification) just fit between the tool and the gear.
- 6) If the feeler gauge(s) fit loosely, then remove shims until the feeler gauge(s) (set at the M specification) just fit between the tool and the gear.

	<p>Available shim thicknesses: 0.10, 0.12, 0.15, 0.18, 0.30, 0.40, and 0.50 mm</p>
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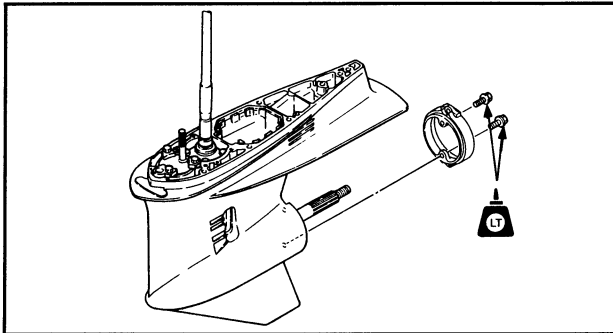


- 2) Using the grease gun, fill water resistant grease into propeller shaft bearing through the grease nipple till it begins to come out around the bearing housing.



Grease nipple:

6 Nm (0.6 m·kg, 4.3 ft lb)



- 3) Attach the lower casing cap.

Forward gear backlash check

- 1) Refer to page 6-41.

Reverse gear backlash check.

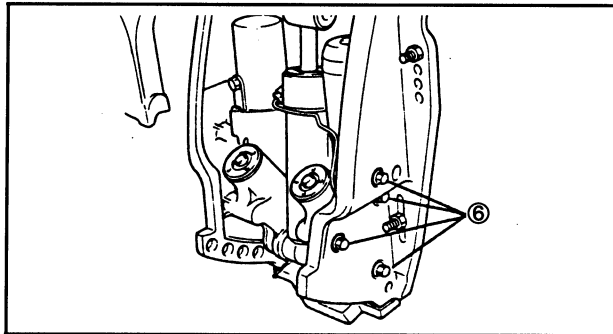
- 1) Refer to page 6-40.



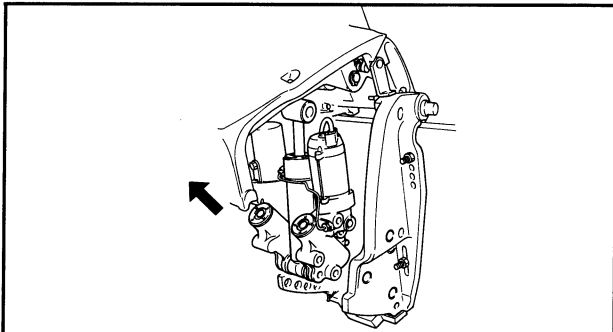
K10003-0

CHAPTER 7 BRACKET UNIT

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⑥ Mount bolts (4 on each side)



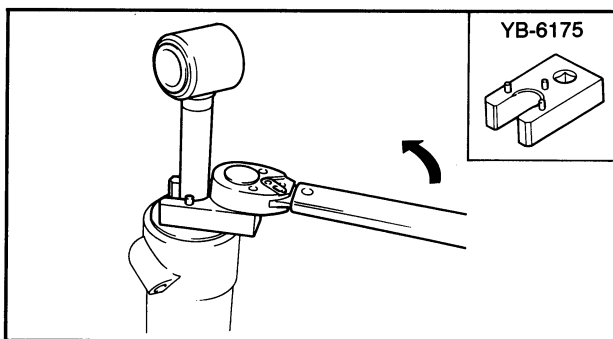
3) Remove the PT/T unit from the clamp bracket by pulling it up diagonally.

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DISASSEMBLY

CAUTION:

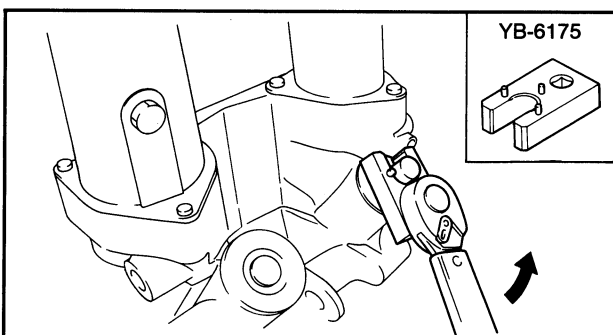
1. Do not wipe components of the hydraulic system with rags, paper tissues, or the like as fibers from such material will cause malfunction if they enter the system.
2. After removing the tilt motor or oil reservoir, do not push down the tilt rod or trim rod. It may cause hydraulic fluid to be ejected from the port.



1) Remove the tilt cylinder end cap.

NOTE:

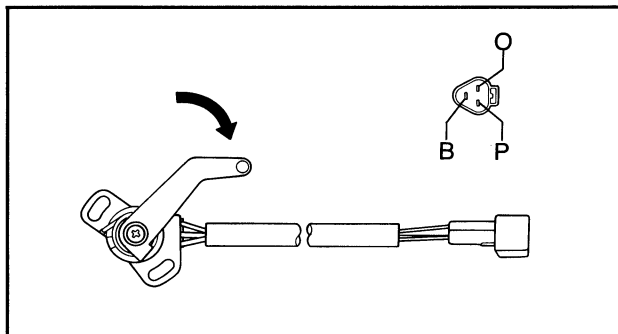
For this removal, remove the tilt cylinder from the PT/T unit first and use a vise to hold it securely.



2) Remove the trim cylinder end cap.

NOTE:

For this removal, use a vise to hold the PT/T unit securely.



2-2) Trim angle sensor

Turn the arm clockwise to the limit. Measure the resistance between terminals to check that it is within specifications.

O: Orange

B: Black

P: Pink

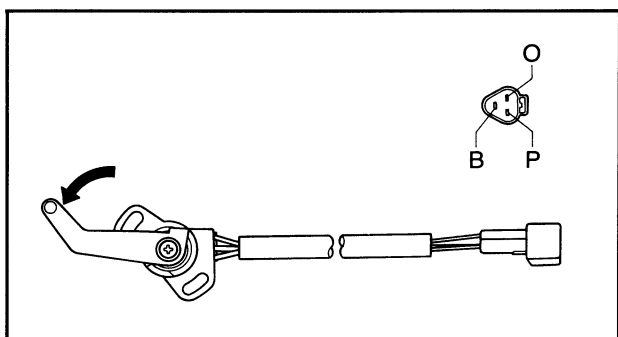


Trim angel sensor resistance:

at 20°C (68°F)

Pink - Black

800 ~ 1200Ω



Turn the arm counterclockwise to the limit. Make sure the resistance is within specifications.

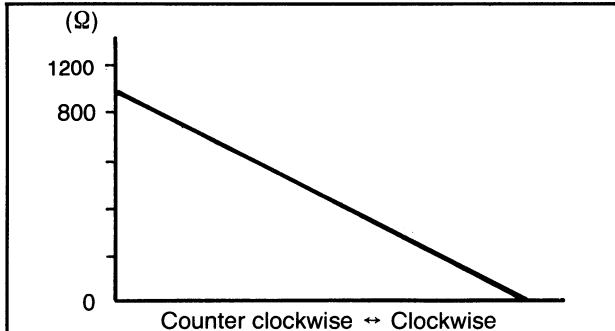


Trim angel sensor resistance:

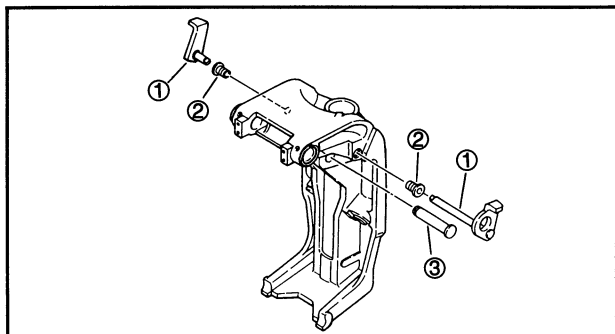
at 20°C (68°F)

Pink - Orange

800 ~ 1200Ω



Move the arm between the stoppers several times to check that the resistance between P and O changes regularly.



K35001-0

ASSEMBLY

- 1) Referring to "EXPLODED DIAGRAM" on page 7-18, assemble the bracket unit.

NOTE:

1. With holes in the tilt lock lever and collar aligned, press-fit the pin.
2. Apply water resistant grease to both inside and outside of the bushing.

- ① Tilt lock lever
- ② Bushing
- ③ Pin

- 2) After assembly, check that the tilt lock lever moves smoothly.



CLEANING, INSPECTION AND REPAIR

For charge coil

Unit: kΩ

- \ +	Br	L	R	B/R	B
Br		200 $\begin{smallmatrix} +200 \\ -200 \end{smallmatrix}$	200 $\begin{smallmatrix} +200 \\ -200 \end{smallmatrix}$	200 $\begin{smallmatrix} +200 \\ -200 \end{smallmatrix}$	50 $\begin{smallmatrix} +50 \\ -25 \end{smallmatrix}$
L	200 $\begin{smallmatrix} +200 \\ -200 \end{smallmatrix}$		1000 $\begin{smallmatrix} +1000 \\ -500 \end{smallmatrix}$	1000 $\begin{smallmatrix} +1000 \\ -500 \end{smallmatrix}$	20 $\begin{smallmatrix} +20 \\ -10 \end{smallmatrix}$
R	150 $\begin{smallmatrix} +150 \\ -75 \end{smallmatrix}$	150 $\begin{smallmatrix} +150 \\ -75 \end{smallmatrix}$		150 $\begin{smallmatrix} +150 \\ -75 \end{smallmatrix}$	100 $\begin{smallmatrix} +100 \\ -50 \end{smallmatrix}$
B/R	200 $\begin{smallmatrix} +200 \\ -100 \end{smallmatrix}$	200 $\begin{smallmatrix} +200 \\ -100 \end{smallmatrix}$	200 $\begin{smallmatrix} +200 \\ -100 \end{smallmatrix}$		150 $\begin{smallmatrix} +150 \\ -75 \end{smallmatrix}$
B	4 ± 2	4 ± 2	4 ± 2	4 ± 2	

For pulser coil

Unit: kΩ

- \ +	W/R	W/B	W/Y	W/G	W/L	W/Br	B
W/R		18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	9 $\begin{smallmatrix} +9 \\ -5 \end{smallmatrix}$
W/B	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$		18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	9 $\begin{smallmatrix} +9 \\ -5 \end{smallmatrix}$
W/Y	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$		18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	9 $\begin{smallmatrix} +9 \\ -5 \end{smallmatrix}$
W/G	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$		18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	9 $\begin{smallmatrix} +9 \\ -5 \end{smallmatrix}$
W/L	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$		18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	9 $\begin{smallmatrix} +9 \\ -5 \end{smallmatrix}$
W/Br	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$	18 $\begin{smallmatrix} +18 \\ -9 \end{smallmatrix}$		9 $\begin{smallmatrix} +9 \\ -5 \end{smallmatrix}$
B	10 $\begin{smallmatrix} +10 \\ -5 \end{smallmatrix}$	10 $\begin{smallmatrix} +10 \\ -5 \end{smallmatrix}$	10 $\begin{smallmatrix} +10 \\ -5 \end{smallmatrix}$	10 $\begin{smallmatrix} +10 \\ -5 \end{smallmatrix}$	10 $\begin{smallmatrix} +10 \\ -5 \end{smallmatrix}$	10 $\begin{smallmatrix} +10 \\ -5 \end{smallmatrix}$	

For ignition coil

Unit: kΩ

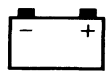
- \ +	B/W1	B/W2	B/W3	B/W4	B/W5	B/W6	B
B/O1		∞	∞	∞	∞	∞	∞
B/W2	∞		∞	∞	∞	∞	∞
B/Y3	∞	∞		∞	∞	∞	∞
B/G4	∞	∞	∞		∞	∞	∞
B/L5	∞	∞	∞	∞		∞	∞
B/Br6	∞	∞	∞	∞	∞		∞
B	4 ± 2	4 ± 2	4 ± 2	4 ± 2	4 ± 2	4 ± 2	

For crank position sensor

Unit: kΩ

- \ +	G/W	G/L	B
G/W		8 ± 4	4 ± 2
G/L	8 ± 4		4 ± 2
B	4 ± 2	4 ± 2	

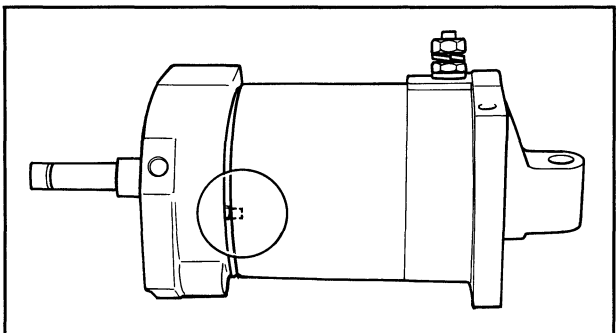
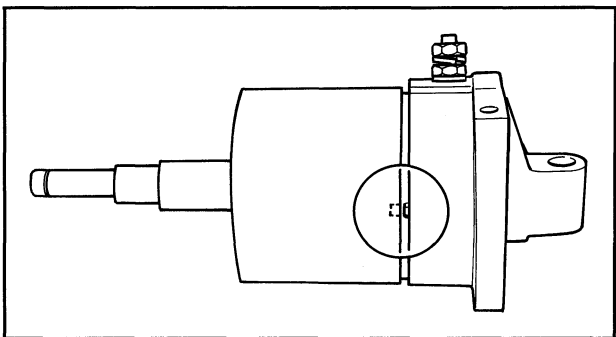
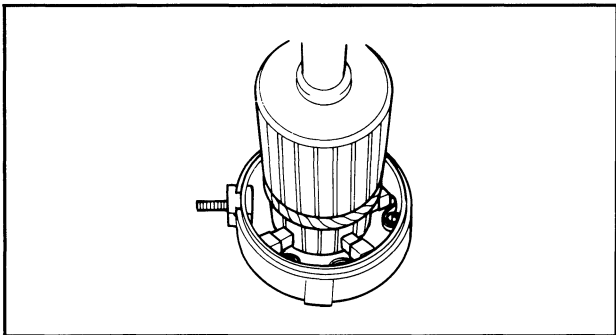
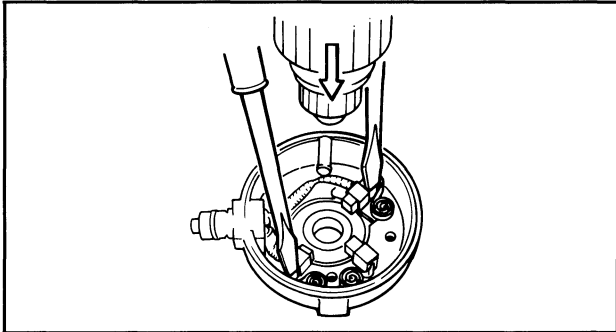
B: Black
 Br: Brown
 L: Blue
 R: Red
 B/R: Black/Red
 B/W: Black/White
 G/L: Green/Blue
 G/W: Green/White
 W/B: White/Black
 W/Br: White/Brown
 W/G: White/Green
 W/L: White/Blue
 W/R: White/Red
 W/Y: White/Yellow



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Assembly

- 1) Apply a thin coat of water resistant grease to the rear cover bushing, and install the armature in the rear cover assembly.

**NOTE:**

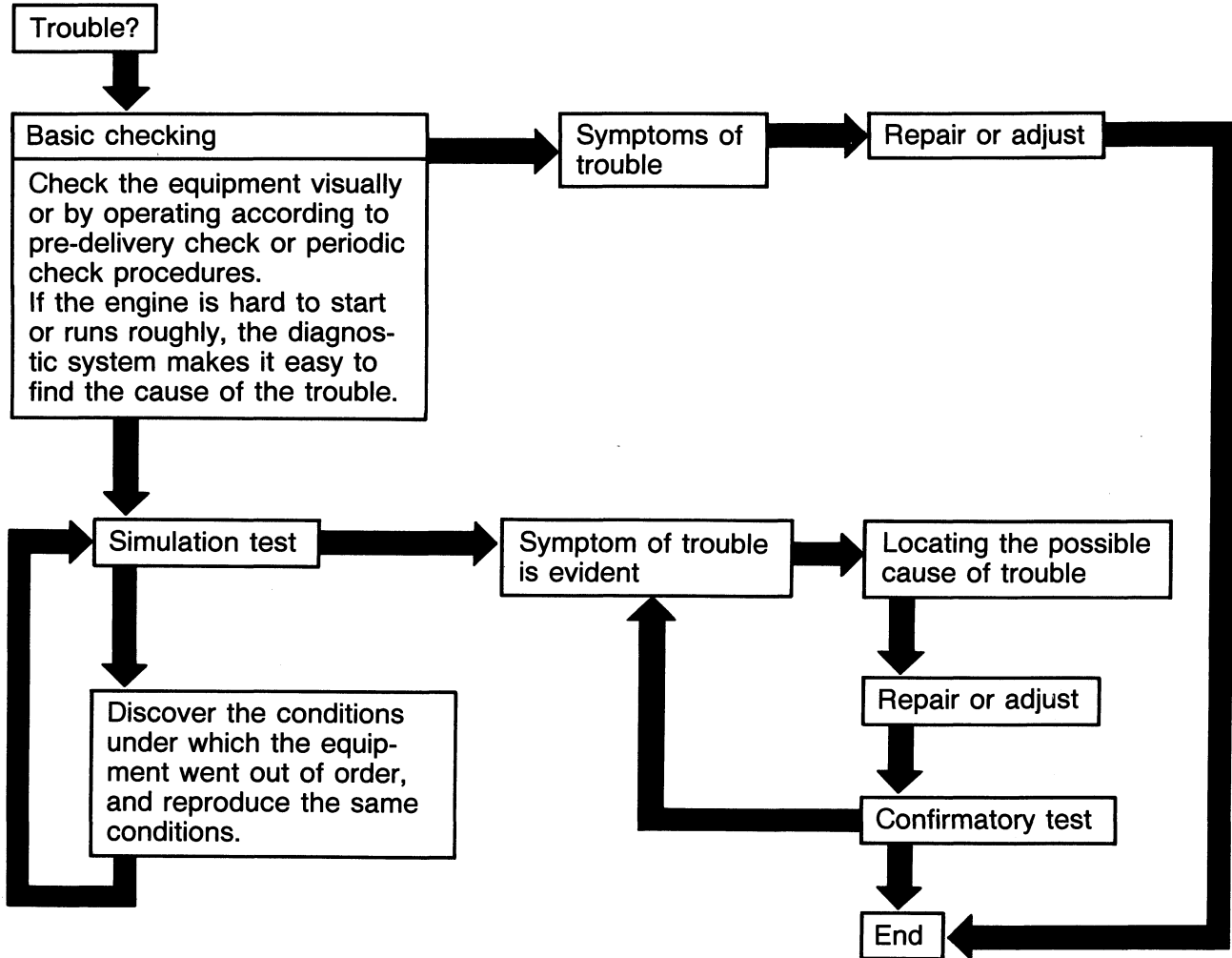
1. Using a slotted-head screwdriver, contract the brush springs (two of the three springs), and insert the armature shaft in the rear cover.
2. Adjust the brush holder position so that the through bolt can move in.
3. Take care not to scratch the brush or contaminate it with grease.

- 2) Assemble the stator, aligning the recess on the rear cover with the projection on the stator, and ensuring that the O-ring fits correctly in the rear cover groove.

- 3) Mount the washer pack on the armature shaft. Sparingly apply water resistant grease to the front cover bushing, ensure that the O-ring fits the armature shaft, and insert the shaft into the front cover.

- 4) Insert the through bolts into the rear cover and screw them into the front cover.

TROUBLESHOOTING DIAGRAM



HOW TO TROUBLESHOOT

- 1) In case of trouble, first check the equipment according to the pre-delivery check and periodic check procedures.
If the engine is hard to start or runs roughly, the diagnostic system makes it easy to find the cause of the trouble.
- 2) Conduct a test under simulated conditions, and investigate the symptom of trouble.
- 3) Repair the defect, and conduct a confirmatory test to make sure that the cause of the trouble has been eliminated.
- 4) When the symptom of trouble cannot be reproduced, set up conditions similar to those in which the trouble occurred, and conduct a test again.

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