

# **YAMAHA**

## **Marine**

# **Outboards**

WORLD WIDE

**40V, 50H**

USA/CANADA

**40W, 50W**

**SERVICE  
MANUAL**

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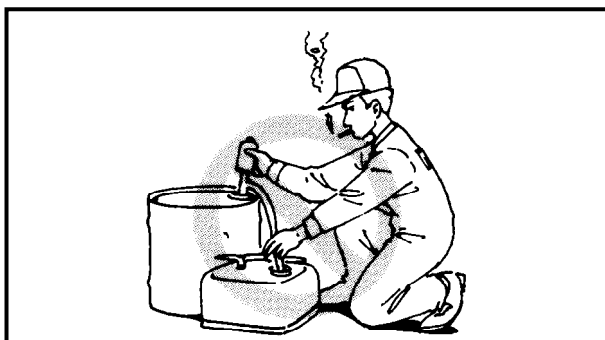


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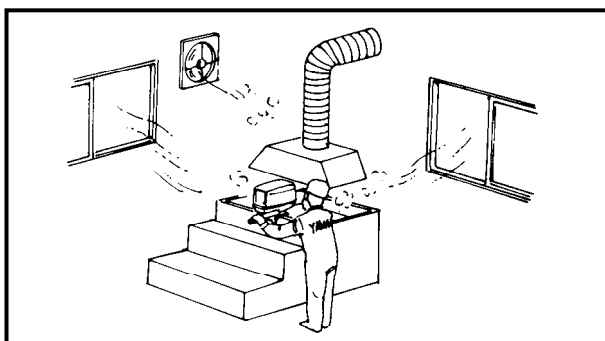
### **SAFETY WHILE WORKING**

The procedures given in this manual are those recommended by Yamaha to be followed by Yamaha dealers and their mechanics.



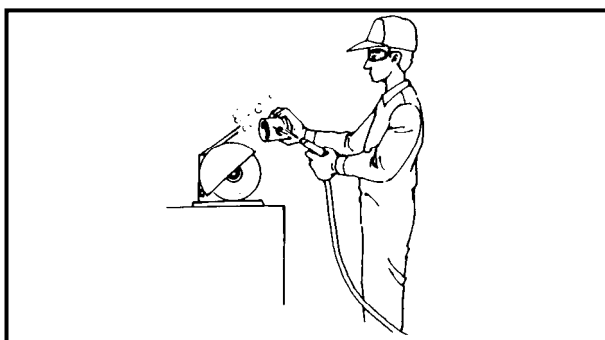
#### **FIRE PREVENTION**

Gasoline (petrol) is highly flammable. Petroleum vapor is explosive if ignited. Do not smoke while handling, and keep it away from heat, sparks, and open flames.



#### **VENTILATION**

Petroleum vapor is heavier than air and is deadly if inhaled in large quantities. Engine exhaust gases are harmful to breathe. When test-running an engine indoors, maintain good ventilation.



#### **SELF-PROTECTION**

Protect your eyes with suitable safety glasses or safety goggles when using compressed air, when grinding or when doing any operation which may cause particles to fly off. Protect hands and feet by wearing safety gloves or protective shoes if appropriate to the work you are doing.



#### **OILS, GREASES AND SEALING FLUIDS**

Use only genuine Yamaha oils, greases and sealing fluids or those recommended by Yamaha.

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## CHAPTER 2 SPECIFICATIONS

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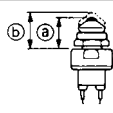
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**ELECTRICAL**

Item	Unit	Model	
		40 hp	50 hp
<b>IGNITION TIMING:</b>			
Ignition timing (full retarded)	degree	A.T.D.C. $7 \pm 1$	
(full advanced)	degree	B.T.D.C. $25 \begin{smallmatrix} +3 \\ -1 \end{smallmatrix}$	
(cam roller pick-up)	degree	A.T.D.C. 7	
Piston position (full advanced)	mm (in)	B.T.D.C. $3.93 \begin{smallmatrix} +0.97 \\ -0.30 \end{smallmatrix}$ ( $0.155 \begin{smallmatrix} +0.038 \\ -0.012 \end{smallmatrix}$ )	
<b>STARTER MOTOR:</b>			
Type		Bendix	
Output	kW	0.6	
Brush length	mm (in)	12.5 (0.49)	
Wear limit	mm (in)	9.0 (0.35)	
Commutator diameter	mm (in)	30.0 (1.18)	
Limit	mm (in)	29.0 (1.14)	
Commutator under cut	mm (in)	0.8 (0.03)	
Limit	mm (in)	0.2 (0.01)	
Clutch type		Over running	
Pinion-ring gear gap	mm (in)	3.0 ~ 5.0 (0.12 ~ 0.20)	
Rating	Sec.	30	
<b>RECTIFIER REGURATOR:</b>			
Output peak voltage (R – B)			
@ cranking	V	8.5	
@ 1,500 r/min	V	25	
@ 3,500 r/min	V	25	
<b>NEUTRAL SWITCH:</b>			
Length ① (on)	mm (in)	18.5 ~ 19.5 (0.73 ~ 0.77)	
Length ② (off)	mm (in)	19.5 ~ 20.5 (0.77 ~ 0.81)	
			
<b>FUSE:</b>			
Rating	V-A	12-10	
<b>THERMO SWITCH (Pink lead):</b>			
On temperature	°C (°F)	90 ~ 96 (194.0 ~ 204.8)	
Off temperature	°C (°F)	76 ~ 90 (168.0 ~ 194.0)	
<b>THERMO SWITCH (Orange lead):</b>			
On temperature	°C (°F)	38 ~ 52 (100.4 ~ 125.6)	
Off temperature	°C (°F)	26 ~ 34 (78.8 ~ 93.2)	
<b>WARNING LAMP:</b>			
Rating	V	1.7	
<b>TRIM SENSOR:</b>			
Resistance 1 (max)	Ω (color)	360 ~ 540 (P — B)	
Resistance 2 (max)	Ω (color)	800 ~ 1,200 (O — B)	
<b>STATOR ASSEMBLY:</b>			
Pulser coil resistance 1	Ω (color)	168 ~ 252 (W/R — B)	
Pulser coil resistance 2	Ω (color)	168 ~ 252 (W/B — B)	
Pulser coil resistance 3	Ω (color)	168 ~ 252 (W/G — B)	

## CHAPTER 3

### PERIODIC INSPECTION AND ADJUSTMENT

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**NOTE:** \_\_\_\_\_

- Batteries vary among manufacturers. Therefore the following procedures may not always apply. Consult your battery manufacturer's instructions.
- Disconnect the black negative lead first to prevent the risk of shorting.

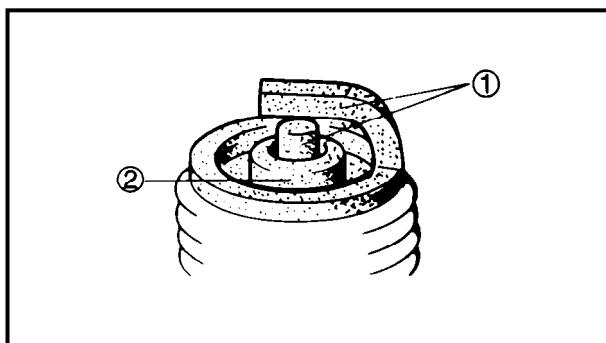
1. Inspect:

- Battery fluid level
- Battery fluid specific gravity

**Spark plug**

1. Inspect:

- Electrode ①  
Worn/Damaged → Replace.
- Insulator color ②  
Distinctly different color → Check the engine condition.



**Color guide:**

**Normal:**

**Medium to light tan color**

**Whitish color: Lean fuel mixture**

- Plugged fuel mixture
- Air leak
- Wrong setting

**Blackish color:**

**Electrical malfunction**

- Defective spark plug
- Defective ignition system
- Rich mixture
- Excessive idling

2. Clean:

- Spark plug  
Clean the spark plug with a plug cleaner or wire brush.

3. Inspect:

- Spark plug type



**Standard spark plug:**

**40hp: B7HS-10**

**For CANADA and Europe:  
BR7HS-10**

**50hp: B8HS-10**

**For CANADA and Europe:  
BR8HS-10**



**REMOVAL AND INSTALLATION CHART**

Step	Procedure/Part name	Q'ty	Service points
	<b>CARBURETOR DISASSEMBLY</b>		Follow the left "Step" for removal. Refer to "CARBURETOR REMOVAL".
	Carburetor ass'y		
1	Drain screw	1	
2	O-ring	1	
3	Screw (with washer)	3	4 × 14 mm
4	Carburetor cover	1	
5	Cover packing	1	
6	Pilot adjusting screw	1	<div style="background-color: #cccccc; padding: 2px;"><b>CAUTION:</b> _____</div> <p><b>Do not damage the tip of the pilot screw by over-tighten it.</b></p> <hr/>
7	Spring	1	
8	Stopping screw	1	} Middle carburetor only
9	Spring	1	
10	Screw (with washer)	4	
11	Float chamber	1	4 × 14 mm
12	Float chamber packing	1	
13	Screw	1	4 mm
14	Arm pin	1	
15	Float	1	<div style="background-color: #cccccc; padding: 2px;"><b>NOTE:</b> _____</div> <p>The float is removed together with the needle valve and the clip.</p> <hr/>
16	Needle valve	1	
17	Needle valve clip	1	
18	Valve seat	1	
19	O-ring	1	
20	Main jet	1	
21	Main nozzle	1	
22	Cap	1	
23	Pilot jet	1	
24	Carburetor body	1	
			Reverse the removal steps for installation.

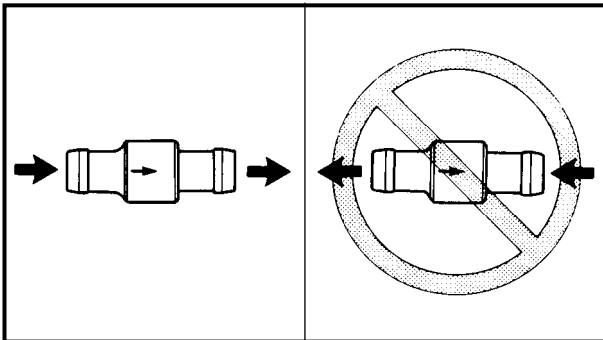
**SERVICE POINTS**

**Oil tank inspection**

- 1. Inspect:
  - Oil tank
  - Crack → Replace.

**Oil strainer inspection**

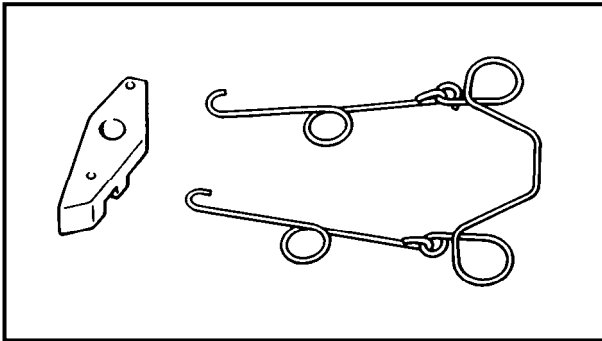
- 1. Inspect:
  - Oil strainer
  - Crack/Clog → Replace.
  - Contamination → Clean.



**Check valve inspection**

- 1. Check:
  - Check valve operation
  - Does not function → Replace.

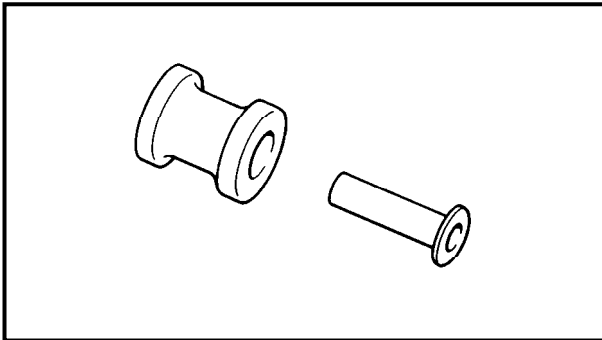
**NOTE:** \_\_\_\_\_  
Check the operation of the check valve to ensure the air is blown only in the arrow direction.  
\_\_\_\_\_



**Drive pawl and spring inspection**

1. Inspect:

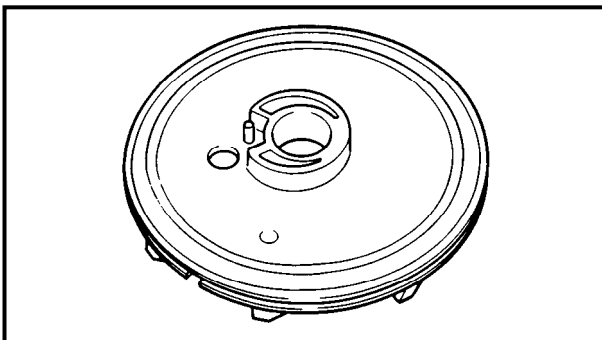
- Drive pawl  
Crack/Wear/Damage → Replace.
- Drive pawl spring  
Broken/Bent/Damage → Replace.



**Rope roller and collar inspection**

1. Inspect:

- Rope roller
- Collar  
Crack/Wear/Damage → Replace them as a set.



**Bushing inspection**

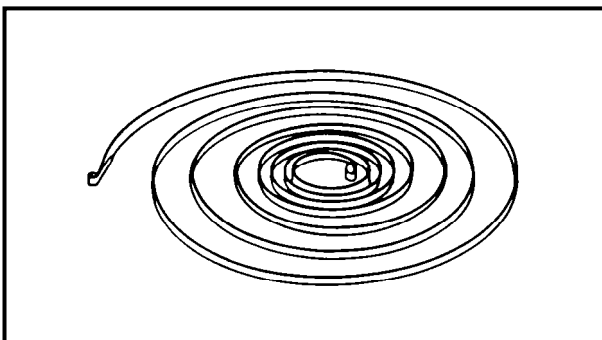
1. Inspect:

- Bushing  
Crack/Damage → Replace.

**Sheave drum inspection**

1. Inspect:

- Sheave drum  
Crack/Damage → Replace.



**Spiral spring inspection**

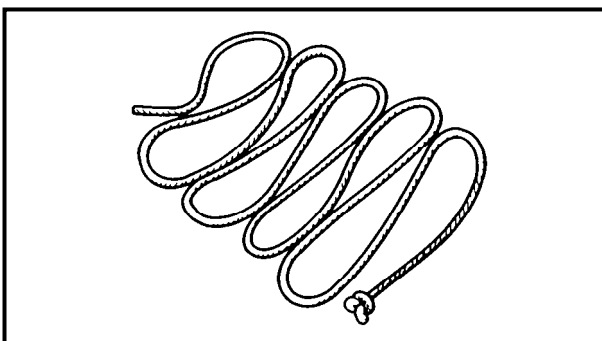
1. Inspect:

- Spiral spring  
Broken/Bent/Damage → Replace.

**Starter rope inspection**

1. Inspect:

- Starter rope  
Fray/Wear/Damage → Replace.



**NOTE:**

When replacing the rope, cut it to the specified length and burn the rope end so that it will not travel.



**Starter rope length:**  
2,095 mm (82.5 in)



**REMOVAL AND INSTALLATION CHART**

Step	Procedure/Part name	Q'ty	Service points
	<b>ELECTRICAL UNIT DISASSEMBLY</b>		Follow the left "Step" for removal. Refer to "ELECTRICAL UNIT REMOVAL".
	Electrical unit		
1	Fuse	1	
2	Clamp	1	
3	Bolt (with washer)	1	
4	Clamp	1	
5	Bolt (with washer)	1	
6	Rectifier regulator	1	
7	Nut	2	
8	Spring washer	1	
9	Bracker	1	
10	Relay holder	1	
11	Starter relay	1	
12	Bolt (with washer)	2	PTT model
13	Bolt (with washer)	1	
14	Bolt (with washer)	2	
15	PTT relay	1	
16	Bracket	1	
17	Collar	3	
18	Grommet	3	



**REMOVAL AND INSTALLATION CHART**

Step	Procedure/Part name	Q'ty	Service points
	<b>CRANK CASE AND CYLINDER BODY REMOVAL</b>		Follow the left "Step" for removal.
	Oil tank ass'y		Refer to "OIL TANK" in chapter 4.
	Oil pump		Refer to "OIL PUMP" in chapter 4.
	Carburetor ass'y		Refer to "CARBURETOR REMOVAL" in chapter 4.
	Recoil starter ass'y		Refer to "RECOIL STARTER".
	Magneto base ass'y		Refer to "FLYWHEEL MAGNETO AND MAGNETO BASE".
	Power unit		Refer to "POWER UNIT REMOVAL".
1	Clip	8	
2	Drain less hose	1	200 mm
3	Drain less hose	1	310 mm
4	Drain less hose	1	360 mm
5	Drain less hose	1	240 mm
6	Bolt (with washer)	6	6 mm
7	Bolt (with washer)	8	8 mm
			<b>NOTE:</b> _____ Tighten the bolts in sequence and in two steps of torque.
8	Crank case	1	
9	Cylinder body	1	<b>NOTE:</b> _____ Film-coat the crank case mating surface with Gasket Maker or equivalent.
10	Dowel pin	2	
	<b>CRANK CASE DISASSEMBLY</b>		
①	Bolt (with washer)	2	6 × 14 mm
②	Engine hanger	1	
③	Bolt (with washer)	3	6 × 25 mm
④	Stay (left)	1	
⑤	Bolt (with washer)	1	6 × 20 mm
⑥	Bolt (with washer)	2	8 × 25 mm
⑦	Stay (right)	1	
⑧	Bolt (with washer)	1	6 × 14 mm
⑨	Fuel filter bracket	1	
⑩	Collar	1	Oil injection model
⑪	Plate washer	1	
⑫	Oil pump driven gear	1	
⑬	O-ring	1	

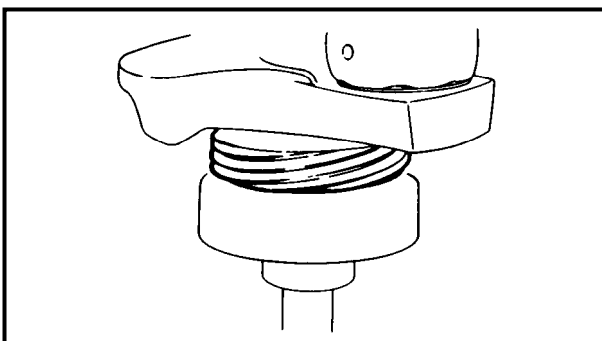
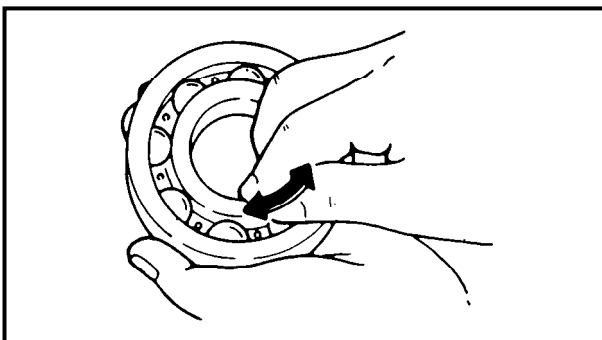
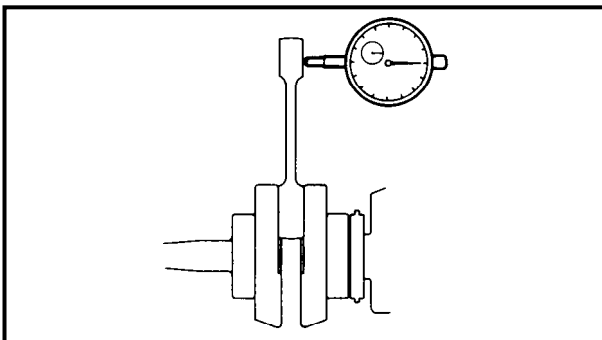
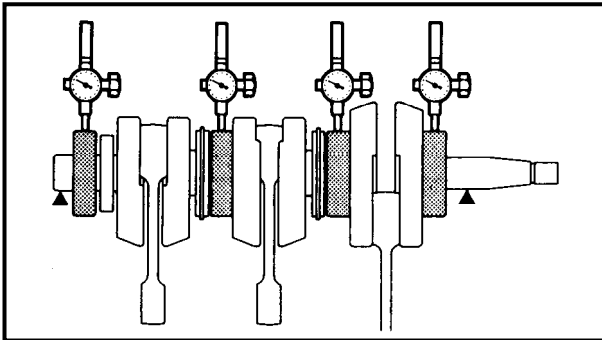
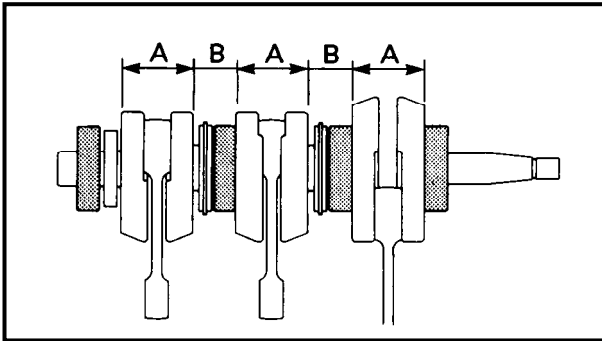
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**Crankshaft inspection**

1. Measure:

- Crank width A
  - Crank width B
- Out of specification → Replace.



**Crank width A:**  
53.90 ~ 53.95 mm  
(2.122 ~ 2.124 in)  
**Crank width B:**  
32.88 ~ 33.10 mm  
(1.294 ~ 1.303 in)

2. Measure:

- Runout
- Use a V-blocks and dial gauge.  
Out of specification → Replace.



**Runout limit:**  
0.03 mm (0.001 in)

3. Measure:

- Axial play
- Out of specification → Replace.



**Axial play limit:**  
2.0 mm (0.08 in)

4. Inspect:

- Crankshaft bearing
- Pitting/Rumbling → Replace.

**CAUTION:** \_\_\_\_\_

- Do not spin bearing with air blower; this can damage the bearing.
- Also take care not to scratch the bearing balls when cleaning.

5. Inspect:

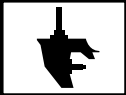
- Oil pump drive gear
- Crack/Pitting/Wear → Replace.

**REMOVAL AND INSTALLATION CHART**

Step	Procedure/Part name	Q'ty	Service points
	<b>PROPELLER SHAFT AND REVERSE GEAR REMOVAL</b>		Follow the left "Step" for removal.
	Gear oil		Refer to "LOWER UNIT" in chapter 3.
	Propeller		Refer to "LOWER UNIT REMOVAL".
1	Flange bolt	2	
2	Propeller shaft housing ass'y	1	
3	Plane washer	1	
4	Propeller shaft ass'y	1	
	<b>PROPELLER SHAFT HOUSING DISASSEMBLY</b>		
①	Reverse gear	1	
②	Reverse gear shim	*	
③	Ball bearing	1	<b>NOTE:</b> _____ Install the bearing with its manufacture's marks or numbers facing outward.
④	O-ring	1	
⑤	O-ring	2	
⑥	Oil seal	2	
⑦	Needle bearing	1	<b>NOTE:</b> _____ Install the bearing with its manufacture's marks or numbers facing outward.
⑧	Propeller shaft housing	1	
	<b>PROPELLER SHAFT DISASSEMBLY</b>		
⑨	Cross pin ring	1	
⑩	Cross pin	1	<b>NOTE:</b> _____ By pushing the shift plunger, bring the cross pin hole in the clutch dog with the hole in the shift slider.
⑪	Shift plunger	1	
⑫	Shift slider	1	
⑬	Spring	1	
⑭	Dog clutch	1	<b>NOTE:</b> _____ Install the clutch with "F" mark toward the forward gear side.
⑮	Propeller shaft	1	
			Reverse the removal steps for installation.

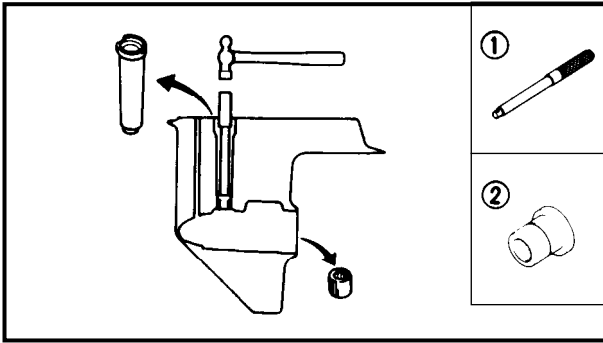
\*: As required

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# DRIVE SHAFT, FORWARD GEAR AND SHIFT ROD

**E**



2. Remove:

- Drive shaft needle bearing

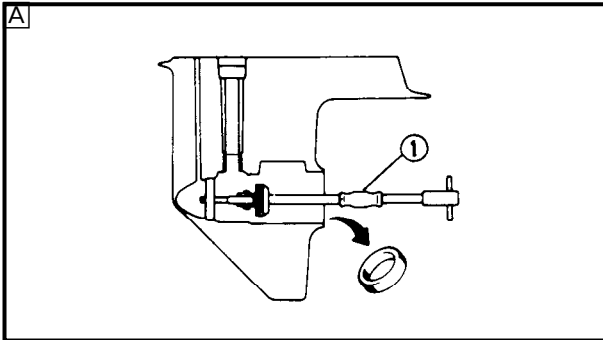


**Needle bearing attachment:**

**YB-06063/90890-06614..... ①**

**Driver rod:**

**YB-06071/90890-06652..... ②**



3. Remove:

- Forward gear bearing outer race



**Slide hammer set:**

**YB-06096..... ①**

**Bearing outer race puller:**

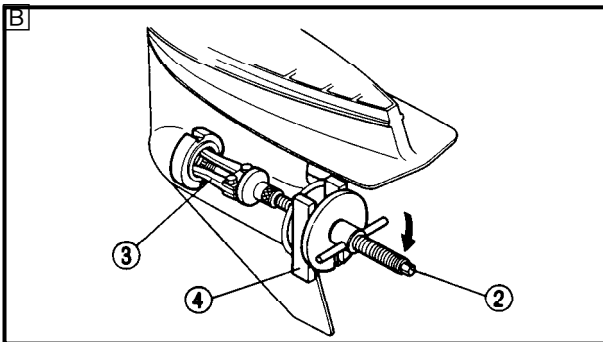
**90890-06523..... ②**

**Bearing outer race puller claw:**

**90890-06532..... ③**

**Stopper guide stand:**

**90890-06538..... ④**



**A** For USA and CANADA

**B** Except for USA and CANADA

## Pinion and forward gear inspection

1. Inspect:

- Tooth
- Dog

Wear/Damage → Replace.

## Drive shaft inspection

1. Inspect:

- Drive shaft

Wear/Damage → Replace.

## Shift cam inspection

1. Inspect:

- Shift cam

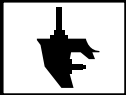
Wear/Damage → Replace.

## Bearing inspection

1. Inspect:

- Bearing

Pitting/Rumbling → Replace.



3. Select:

- Forward gear shim

Calculated numeral at 1/100th place		Rounded numeral
more than	or less	
0.00	0.02	0.00
0.02	0.05	0.02
0.05	0.08	0.05
0.08	0.10	0.08

**Available shim thickness:  
0.05, 0.08, 0.12, 0.30 and 0.50 mm**

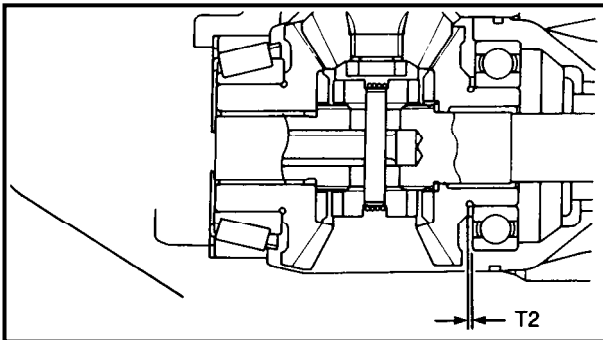
Example:

If T1 is "0.45 mm",

then forward gear shim = 0.42 mm

If T1 is "0.50 mm",

then forward gear shim = 0.48 mm



**Reverse gear shim**

**NOTE:** \_\_\_\_\_

- Find reverse gear shim thickness (T2) by backlash measurement.
- Measure the backlash with the original shim(s).
- If the original shim(s) is unavailable, start with a 0.50 mm shim.

**Available shim thickness:  
0.05, 0.08, 0.12, 0.30 and 0.50 mm**

**BACKLASH MEASUREMENT**

**NOTE:** \_\_\_\_\_

- Do not install the water pump components when measuring the backlash.
- Both forward and reverse gear backlashes should be measured.
- If both the forward and reverse gear backlashes are large than specified, the pinion may be too high.
- If both forward and reverse gear backlashes are smaller than specified, the pinion may be too low.
- If either of these conditions exists, then check the pinion shim selection.



**REMOVAL AND INSTALLATION CHART**

Step	Procedure/Part name	Q'ty	Service points
	<b>TILLER HANDLE DISASSEMBLY</b>		Follow the left "Step" for removal. Refer to "TILLER HANDLE REMOVAL".
	Tiller handle ass'y		
1	Screw	4	6 × 16 mm
2	Screw	3	6 × 40 mm
3	Cover	1	
4	Nut	1	
5	Engine stop switch ass'y	1	
6	Clamp	1	
7	Cable clamp	2	
8	Circlip	2	
9	Throttle cable	1	Shorter cable
10	Shift cable	1	Longer cable
11	Bolt (with washer)	2	6 × 16 mm
12	Cable bracket	1	
13	Screw (with washer)	2	
14	Shift lever cover	1	
15	Bolt (with washer)	4	<b>NOTE:</b> _____ Loosen the bolts temporarily.
16	Screw	1	
17	Handle grip ass'y	1	
18	Plain washer	1	
19	Spring	1	
20	Bushing	1	
21	Bolt (with washer)	1	
22	Shift lever	1	
23	Bushing	1	
24	Washer	1	
25	Cotter pin	1	
26	Friction knob	1	
27	Nut	1	
28	Bolt (with washer)	4	6 × 16 mm <b>NOTE:</b> _____ When installing the bolts, tighten them temporarily.
29	Link ass'y	1	
30	Friction piece	1	
31	Grommet	1	
32	Nylon nut	1	
33	Plane washer	1	
34	Bolt	1	



**REMOVAL AND INSTALLATION CHART**

Step	Procedure/Part name	Q'ty	Service points
	<b>UPPER CASE AND EXHAUST MANIFOLD</b>		Follow the left "Step" for removal.
	Upper case ass'y		Refer to "UPPER CASE REMOVAL".
1	Bolt (with washer)	2	
2	Upper case	1	
3	Dowel pin	2	
	<b>EXHAUST MANIFOLD REMOVAL</b>		
4	Muffler seal	1	
5	Seal rubber	1	
6	Bolt (with washer)	4	8 × 30 mm
7	Exhaust guide	1	
8	Grommet	1	
9	Water tube	1	
10	Seal rubber	1	
11	Washer	1	
12	Upper case gasket	1	
13	Bolt (with washer)	3	8 × 30 mm
14	Exhaust manifold	1	
15	Exhaust manifold gasket	1	
16	Muffler	1	
			Reverse the removal steps for installation.

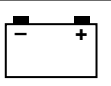


**REMOVAL AND INSTALLATION CHART**

Step	Procedure/Part name	Q'ty	Service points
	<b>SWIVEL BRACKET REMOVAL (Hydro tilt, power trim and tilt)</b>		Follow the left "Step" for removal.
	Upper case ass'y		Refer to "UPPER CASE REMOVAL".
	Clamp bracket		Refer to "CLAMP BRACKET".
	Steering bracket		Refer to "STEERING BRACKET".
1	Bolt (with washer)	1	6 × 10 mm
2	Spring hook	1	
3	Spring	1	
4	Spring pin	2	
5	Distance collar ass'y	1	
6	Tilt support lever 1	1	
7	Bushing	1	
8	Bushing	1	
9	Tilt support lever 2	1	
10	Bushing	2	
11	Swivel bracket	1	
			Reverse the removal steps for installation.

**REMOVAL AND INSTALLATION CHART**

Step	Procedure/Part name	Q'ty	Service points
	<b>PUMP HOUSING DISASSEMBLY</b>		Follow the left "Step" for removal.
	Pump housing ass'y		Refer to "TILT CYLINDER, PUMP HOUSING AND MOTOR REMOVAL".
1	Socket bolt	4	
2	Gear pump	1	
3	O-ring	2	8.5 × 5.5 mm
4	Bolt (with washer)	4	
5	Bottom cover	1	
6	O-ring	1	78.5 × 74.5 mm
7	Clip	1	
8	Inlet hose	1	55 ~ 59 mm
9	Screw	2	
10	Retaining plate	1	
11	Spring	1	8.8 × 4.3 mm
12	Valve support pin	1	
13	Valve seat	1	
14	Spring	1	8.8 × 21.8 mm
15	Valve seat	1	
16	Valve support pin	1	
17	Valve seat	1	
18	O-ring	1	13.7 × 10.7 mm
19	Filter	1	
20	Main valve	2	
21	O-ring	2	17.1 × 12.3 mm
22	O-ring	2	14.5 × 11.5 mm
23	Shuttle piston	1	
24	O-ring	1	12.6 × 8.8 mm
25	Circlip	1	
26	Valve body	1	
27	O-ring	1	10.6 × 6.8 mm
28	O-ring	1	9.6 × 5.8 mm
29	Valve seal	1	
30	Spring	1	6.2 × 27.0 mm
31	Pin	1	
32	Valve seal	1	
33	Circlip	1	
34	Manual valve	1	
35	Ball	1	3.97 mm
36	O-ring	1	22.6 × 17.8 mm
37	Pump housing	1	
			Reverse the removal steps for installation.



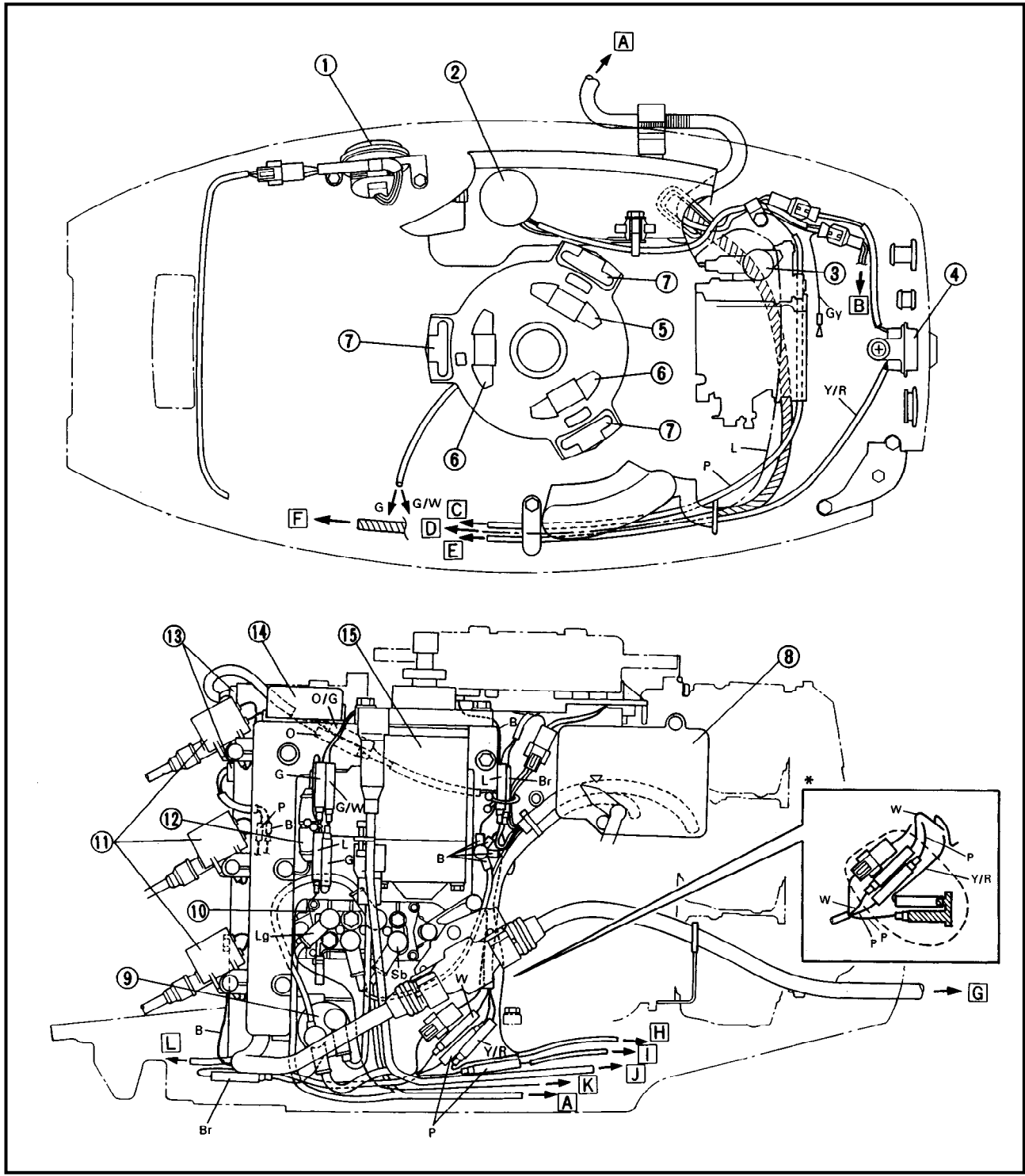
**ET, ETO MODEL**

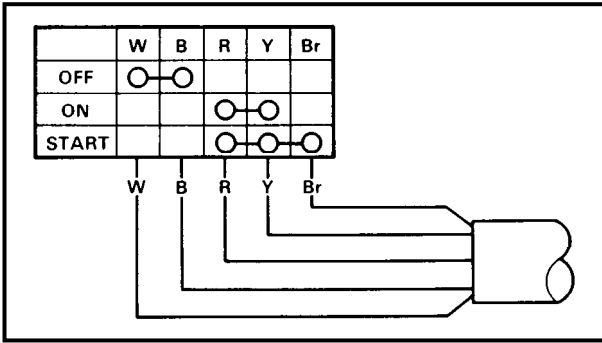
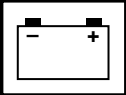
- ① P.T.T. switch
- ② Oil level sensor
- ③ Electrothermal valve
- ④ Oil level warning lamp
- ⑤ Charge coil
- ⑥ Lighting coil
- ⑦ Pulser coil
- ⑧ CDI unit
- ⑨ Starter relay
- ⑩ P.T.T. relay

- ⑪ Ignition coil
  - ⑫ Fuse
  - ⑬ Thermo switch
  - ⑭ Rectifier regulator
  - ⑮ Starter motor
- A** To P.T.T. motor  
**B** To trim meter  
**C** To wire harness  
**D** To ⑥

- E** To ⑧  
**F** To ⑩  
**G** To remote control  
**H** To ④  
**I** To ②  
**J** To battery  
**K** To ③  
**L** To ①  
 \*: ET model

- B** : Black  
**Br** : Brown  
**B/O** : Black/Orange  
**B/W** : Black/White  
**B/Y** : Black/Yellow  
**L** : Blue  
**Lg** : Light green  
**O** : Orange  
**O/G** : Orange/Green  
**P** : Pink  
**Sb** : Sky blue  
**Y/R** : Yellow/Red  
**W** : White






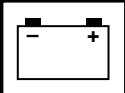
**MAIN SWITCH**

1. Check:

- Continuity

Out of specification → Replace.

	Checking leads color				
Switch position	White	Black	Red	Yellow	Brown
<b>OFF</b>	○—○				
<b>ON</b>			○—○		
<b>START</b>			○—○—○		



## REMOVAL AND INSTALLATION CHART

Step	Procedure/Part name	Q'ty	Service points
	<b>STARTER MOTOR DISASSEMBLY</b> Starter motor ass'y		Follow the left "Step" for removal. Refer to "ELECTRICAL UNIT REMOVAL" in chapter 5.
1	Clip	1	<b>NOTE:</b> _____ Using a pry bar, pry off the clip.
2	Pinion stopper	1	
3	Spring	1	
4	Pinion	1	
5	Through bolt	2	
6	Front cover	1	
7	Washer	1	25 × 1.0 mm
8	Washer	2	25 × 0.15 mm
9	Washer	1	25 × 2.0 mm
10	Starter ass'y	1	
11	Armature ass'y	1	
12	Washer	1	16 × 0.25 mm
13	Nut	1	
14	Spring washer	1	
15	Plain washer	1	
16	Bushing	1	
17	O-ring	1	
18	Bushing	1	
19	Screw	2	
20	Brush holder	1	
21	Brush (+)	1	
22	Rear cover	1	
23	O-ring	2	
			Reverse the removal steps for installation.

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