YAMAHA

Marine

Outboards

4AC(4MH)
4AS
5C(5MH)
5CS

SERVICE MANUAL

YAMAHA MOTOR CO.,LTD.

LIT-18616-01-20

290214

A20000-1

NOTICE

This manual has been prepared by the Yamaha Motor Company Ltd. primarily for use by Yamaha dealers and their trained mechanics when performing maintenance procedures and repairs to Yamaha equipment. It has been written to suit the needs of persons who have a basic understanding of the mechanical and electrical concepts and procedures inherent in the work, for without such knowledge attempted repairs or service to the equipment could render it unsafe or unfit for use.

Because the Yamaha Motor Company Ltd. has a policy of continuously improving its products, models may differ in detail from the descriptions and illustrations given in this publication. Use only the latest edition of this manual. Authorized Yamaha dealers are notified periodically of modifications and significant changes in specifications and procedures, and these are incorporated in successive editions of this manual.

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4AC(4MH)/4AS/5C(5MH)/5CS
SERVICE MANUAL

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HOW TO USE THIS MANUAL

MANUAL FORMAT

All of the procedures in this manual are organized in a sequential, step-by-step format. The information has been complied to provide the mechanic with an easy to read, handy reference that contains comprehensive explanations of all disassembly, repair, assembly, and inspection operations.
In this revised format, the condition of a faulty component will precede an arrow symbol and the course of action required will follow the symbol, e.g.,

- Bearings
  Pitting/Damage → Replace.

To assist your to find your way about this manual, the Section Title and Major Heading is given at the head of every page.

An Index to contents is provided on the first page of each Section.

MODEL INDICATION

Multiple models are shown in this manual. These indications are noted as follows.

Model name	Indication
4MH(USA, CANADA) 4AC	4AC
4AS	4AS
5MH(USA) 5C	5C
5CS	5CS

THE ILLUSTRATIONS

Some illustrations in this manual may differ from the model you have. This is because a procedure described may relate to several models, though only one may be illustrated. (The name of the model described will be mentioned in the description.)

REFERENCES

These have been kept to a minimum; however, when you are referred to another section of the manual, you are told the page number to go to.

SPECIFICATIONS

These are given in bold type at each procedure. It is not necessary to leave the section dealing with the procedure in order to look up the specifications. It is important to note the differences in specifications of models. Where a procedure relates to more than one model, the main differences in specifications will be shown in a following table:

Item \ Model	4AC	4AS	5C	5CS
Starting system	Manual start	Manual start	Manual start	Manual start
Control system	Manual control	Manual control	Manual control	Manual control
Lubrication system	Pre-mixed	Pre-mixed	Pre-mixed	Pre-mixed

WARNINGS, CAUTIONS AND NOTES

Attention is drawn to the various Warnings, Cautions and Notes which distinguish important information in this manual in the following ways.

⚠ 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.

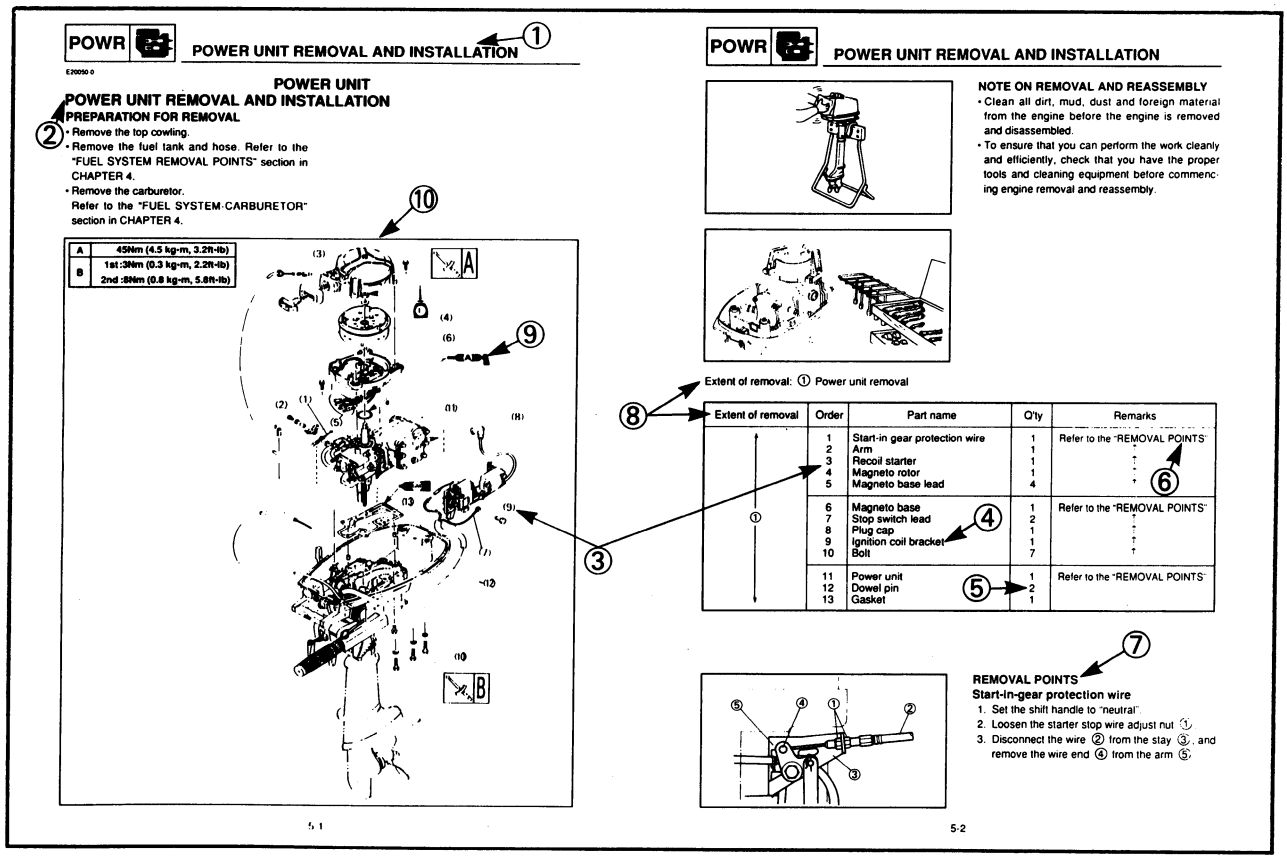
IMPORTANT:

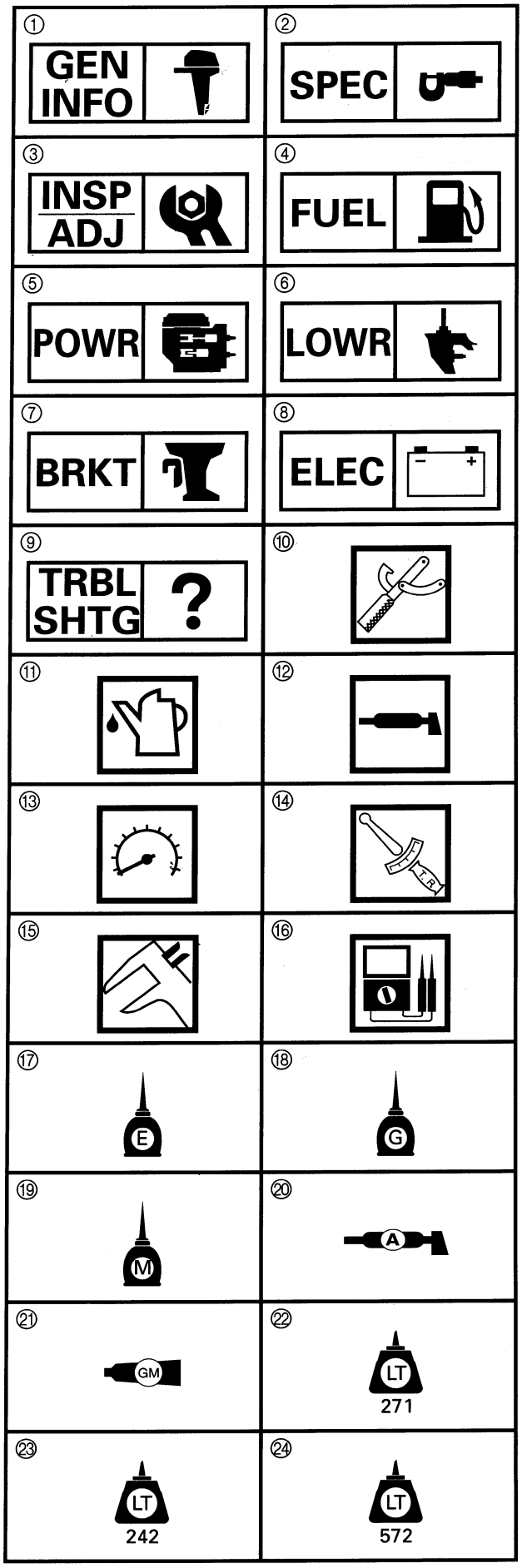
This part has been subjected to change of specification during production.

HOW TO READ DESCRIPTIONS

1. An easy-to-see disassembly illustration is mainly provided for a disassembly job.
2. Numbers are given in the order of a disassembly job in the disassembly illustration.
3. An explanation of jobs and notes is presented in an easy-to-read way by the use of symbol marks. The meanings of the symbol marks are given on the next page.
4. An job instruction chart accompanies the assembly illustration, providing the order of jobs, names of parts, notes in jobs, etc.
5. In addition to the disassembly illustration, "REMOVAL POINTS" is provided to supplement in detail the explanation which does or cannot necessarily cover the main jobs.
6. Jobs necessary before and after those which are not included in the disassembly illustration are explained before the same illustration as related jobs.

① Section
② Preparation for removal
③ Order of removal
④ Part name
⑤ Q'ty
⑥ Remarks
⑦ Removal points
⑧ Extent of removal
⑨ Symbol mark
⑩ Exploded diagram





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SYMBOLS

Symbols ① to ⑨ are designed as thumb-tabs to indicate the content of a chapter.

① General Information
② Specifications
③ Periodic Inspection and Adjustment
④ Fuel System
⑤ Power Unit
⑥ Lower Unit
⑦ Bracket Unit
⑧ Electrical System
⑨ Trouble-shooting

Symbols ⑩ to ⑯ indicate specific data:

⑩ Special service tool
⑪ Specified liquid
⑫ Specified grease
⑬ Specified engine speed
⑭ Specified torque
⑮ Specified measurement
⑯ Specified electrical value
[Resistance (Ω), Voltage (V), Electric current (A)]

Symbol ⑰ to ⑳ in an exploded diagram indicate grade of lubricant and location of lubrication point:

⑰ Apply engine oil
⑱ Apply gear oil
⑲ Apply molybdenum disulfide oil
⑳ Apply water resistant grease (Yamaha marine grease A, Yamaha marine grease)

Symbols ㉑ to ㉔ in an exploded diagram indicate grade of sealing or locking agent, and location of application point:

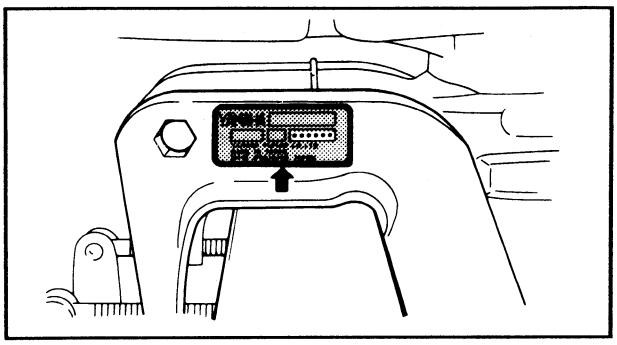
㉑ Apply Gasket maker®
㉒ Apply LOCTITE® No. 271 (Red LOCTITE)
㉓ Apply LOCTITE® No. 242 (Blue LOCTITE)
㉔ Apply LOCTITE® No. 572

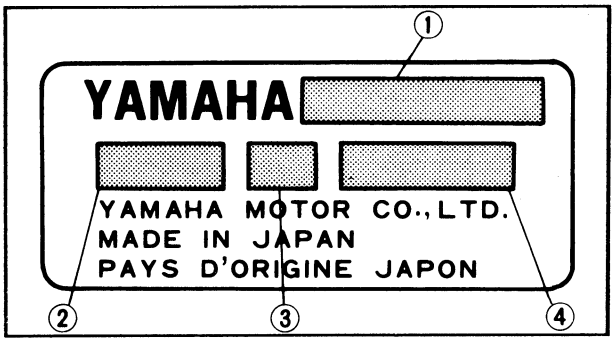
NOTE:

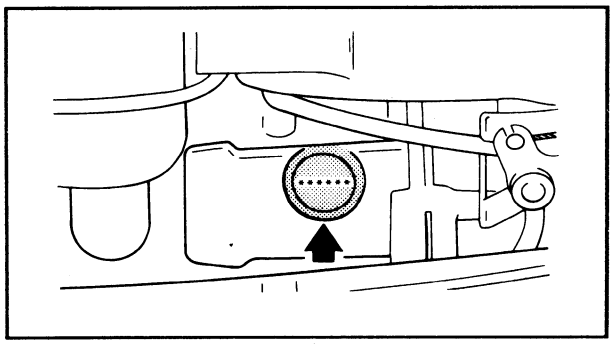
In this manual, the above symbols may not be used in every case.

INDEX

CHAPTER 1
GENERAL INFORMATION







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GENERAL INFORMATION

IDENTIFICATION

SERIAL NUMBER

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

NOTE:

For USA model:
As an anti-theft measure, a special label on which the outboard motor serial number is stamped is bonded to the portside of the clamp bracket. The label is specially treated so that peeling it off causes cracks across the serial number.

① Model name
② Approved model No.
③ Transom height
④ Serial number

ENGINE SERIAL NUMBER

The engine serial number is stamped on the cylinder body.

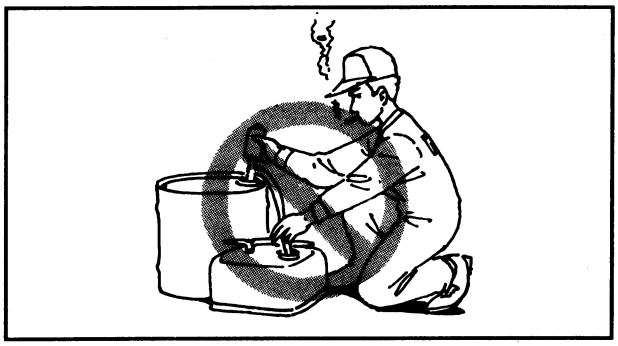
STARTING SERIAL NUMBERS

The starting serial number blocks are as follows:

Model	Approved model No.	Starting serial No.
4AC	6E0	S: 148531 ~ L: 348977 ~
4AS	6E0	S: 238625 ~ L: 515265 ~
5C	6E3	S: 015281 ~ L: 311066 ~
5CS	6E3	S: 173521 ~ L: 443062 ~

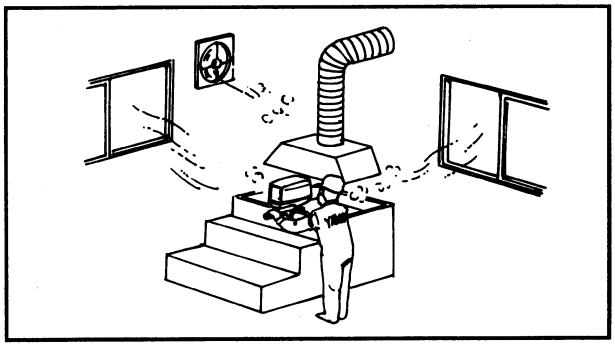
SAFETY WHILE WORKING

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



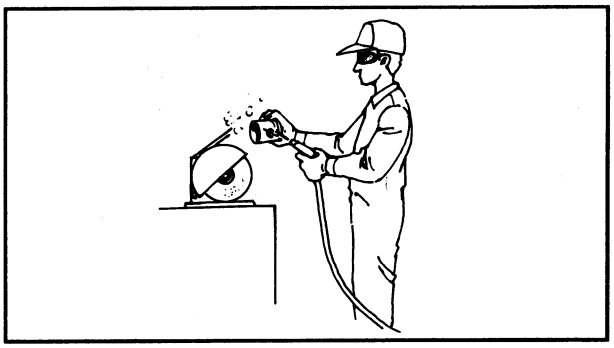
FIRE PREVENTION

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



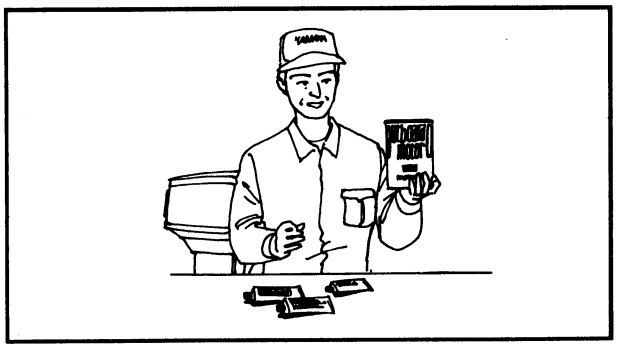
VENTILATION

Petroleum vapor is heavier than air and it inhaled in large quantities will not support life.
Engine exhaust gases are harmful to breathe.
When test-running an engine indoors, maintain good ventilation.



SELF-PROTECTION

Protect your eyes with suitable safety spectacles 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 of appropriate to the work you are doing.



OILS, GREASES AND SEALING FLUIDS

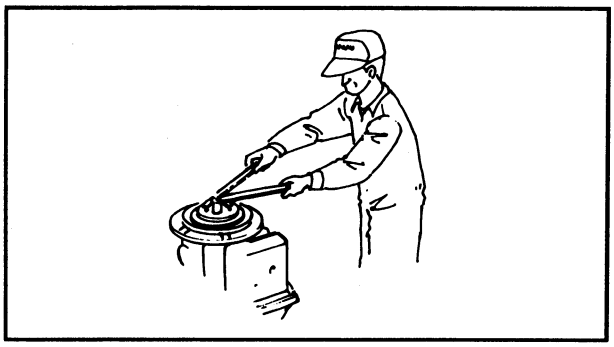
Use only genuine Yamaha oils, greases and sealing fluids or those recommended by Yamaha.

SAFETY WHILE WORKING

Under normal conditions of use, there should be no hazards from the use of the lubricants mentioned in this manual, but safety is all-important, and by adopting good safety practises, any risk is minimized.

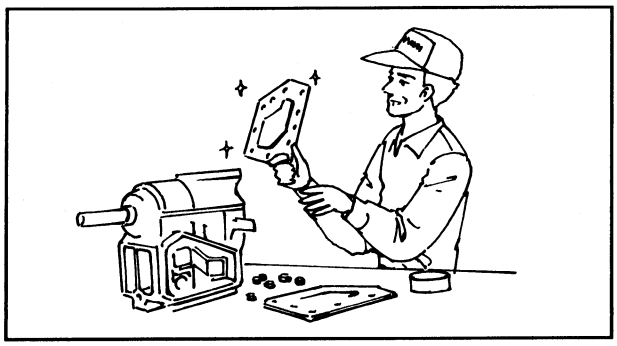
A summary of the most important precautions is as follows:

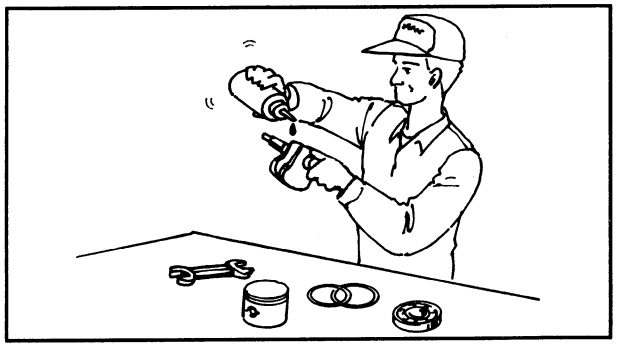
1. While working, maintain good standards of personal and industrial hygiene.
2. Clothing which has become contaminated with lubricants should be changed as soon as practicable, and laundered before further use.
3. Avoid skin contact with lubricants; do not, for example, place a soiled wiping-rag in one's pocket.
4. Hands, and any other part of the body which have been in contact with lubricants or lubricant-contaminated clothing, should be thoroughly washed with hot water and soap as soon as practicable.
5. To protect the skin, the application of a suitable barrier cream to the hands before working is recommended.
6. A supply of clean lint-free cloths should be available for wiping purposes.

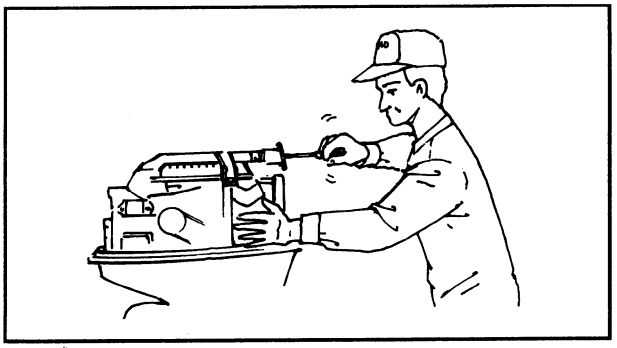


GOOD WORKING PRACTICES

1. **The right tools**
   Use the special tools that are advised to protect parts from damage. Use the right tool in the right manner – don't improvise.
2. **Tightening torque**
   Follow the torque tightening instructions.
   When tightening bolts, nuts and screws, tighten the large sizes first, and tighten inner-positioned fixings before outer-positioned ones.







3. **Non-reusable items**
   Always use new gaskets, packings, O-rings, oil seals, cotter-pins and circlips etc. on reassembly.

DISASSEMBLY AND ASSEMBLY

1. Clean parts with compressed-air on disassembling them.

⚠WARNING

Do not use compressed air to spin the bearings dry. This causes damage to the bearing surfaces and may cause the bearing to explode.

2. Oil the contact surfaces of moving parts on assembly.
3. After assembly, check that moving parts operate normally.
4. Install bearings with the manufacture's markings on the side exposed to view, and liberally oil the bearings.
5. When installing oil seals, apply a light coating of water-resistant grease to the outside diameter, and replenish water resistant grease on the lip surface.

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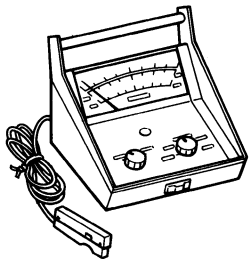
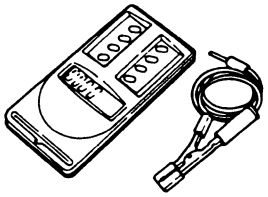
SPECIAL TOOLS

The use of correct special tools recommended by Yamaha will aid the work and enable accurate assembly and tune-up.
Improvisations and use of improper tools can cause damage to the equipment.

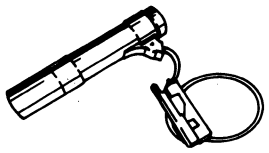
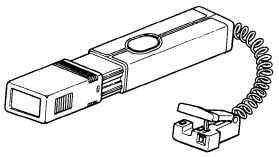
NOTE:

- For U.S.A. and Canada, use part number starting with "YB-", "YU-", "YM-" or "YW-".
- For others, use part number starting with "90890-".

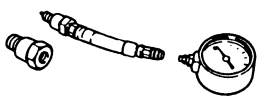
FOR TUNE-UP

YU-8036-A	90890-06760
	

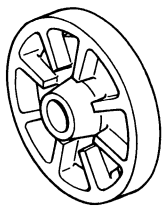
1. Tachometer
   P/N. YU-8036-A, 90890-06760

YM-33277-A	90890-03141
	

2. Timing light
   P/N. YM-33277-A, 90890-03141

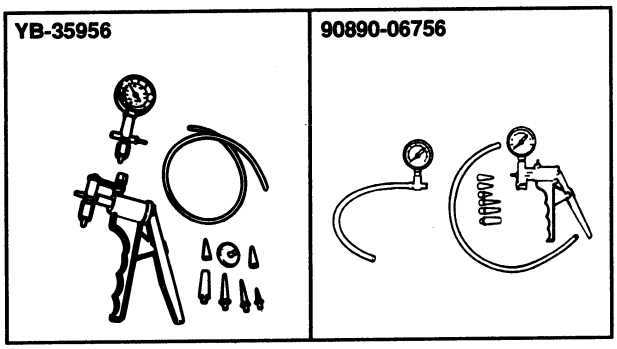
YU-33223	90890-06751
	

3. Compression gauge
   P/N. YU-33223, 90890-06751

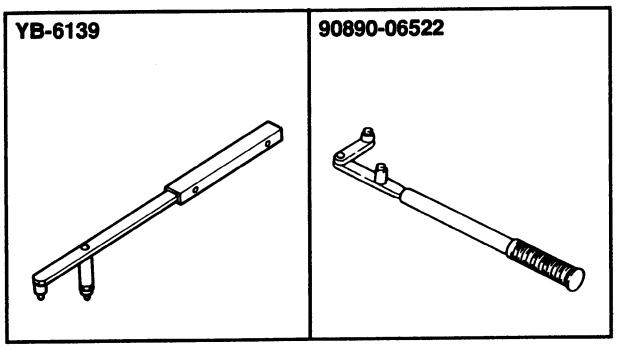
90890-01630


4. Test propeller
   P/N. — , 90890-01630

SPECIAL TOOLS

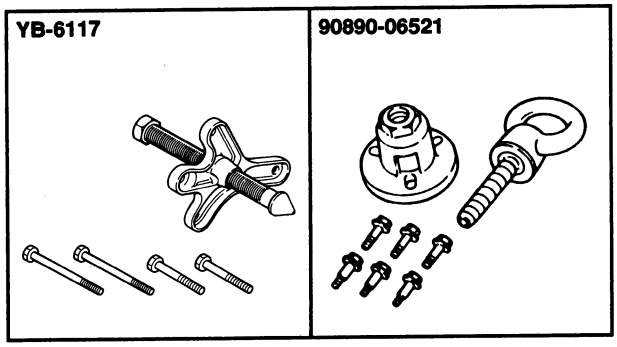


5. Pressure/vacuum tester
   P/N. YB-35956, 90890-06756

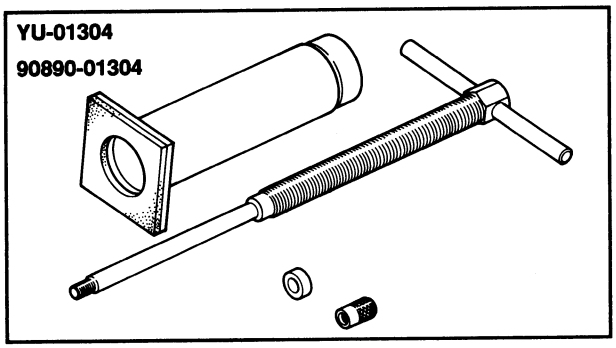


FOR POWER UNIT SERVICE

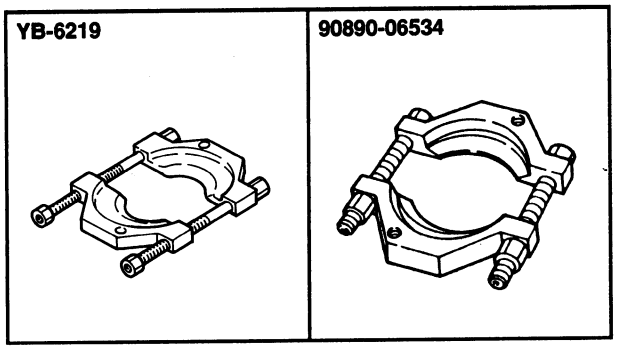
1. Flywheel magneto holder
   P/N. YB-6139, 90890-06522



2. Flywheel magneto puller
   P/N. YB-6117, 90890-06521

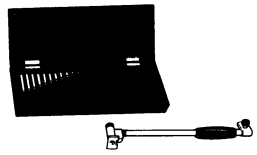
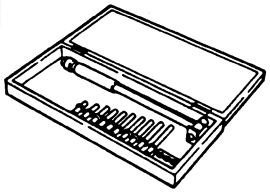


3. Piston pin puller
   P/N. YU-01304, 90890-01304

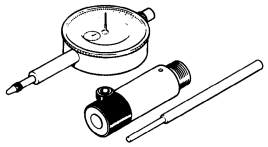
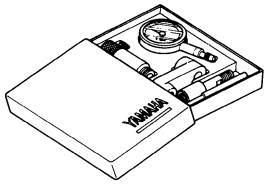


4. Bearing separator
   P/N. YB-6219, 90890-06534

SPECIAL TOOLS

YU-3016	90890-03016
	

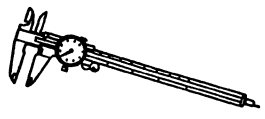
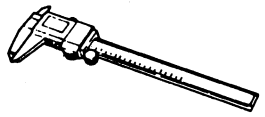
5. Cylinder bore gauge (35 ~ 60mm)
   P/N. YU-3016, 90890-03016

YU-3097 YU-1256	90890-01252
	

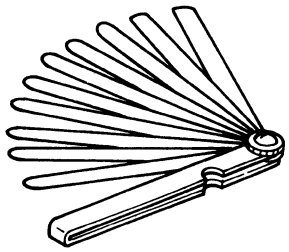
6. Dial gauge
   P/N. YU-3097, 90890-01252
   Attachment
   P/N. YU-1256, —

YU-3007 YU-3008	90890-03007 90890-03008
	

7. Micrometer (25 ~ 50mm)
   P/N. YU-3007, 90890-03007
   Micrometer (50 ~ 75mm)
   P/N. YU-3008, 90890-03008

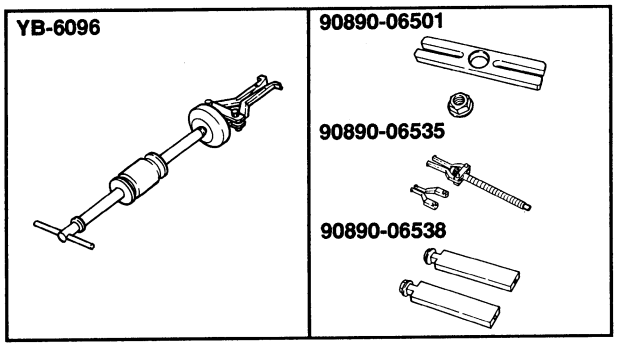
YU-26900-7	90890-06704
	

8. Digital caliper
   P/N. YU-26900-7, 90890-06704

YU-26900-9 YU-26900-8 90890-06054


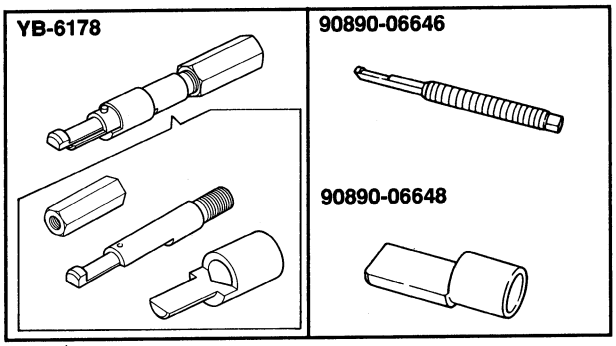
9. Feeler gauge (mm)
   P/N. YU-26900-9, 90890-06054
   Feeler gauge (in)
   P/N. YU-26900-8, —

SPECIAL TOOLS

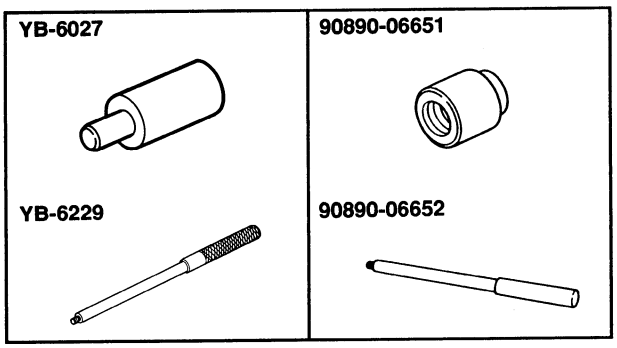


FOR LOWER UNIT SERVICE

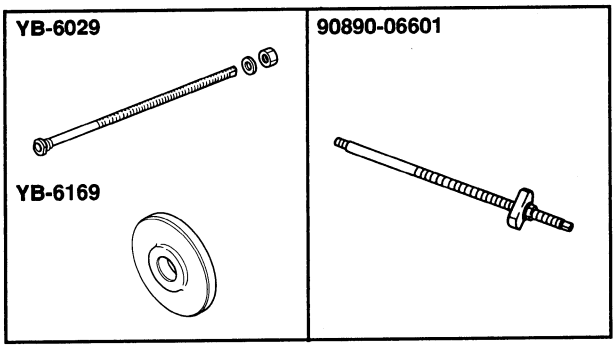
1. Slide hammer set
   P/N. YB-6096, —
   Stopper guide plate
   P/N. — , 90890-06501
   Bearing puller
   P/N. — , 90890-06535
   Stopper guide stand
   P/N. — , 90890-06538



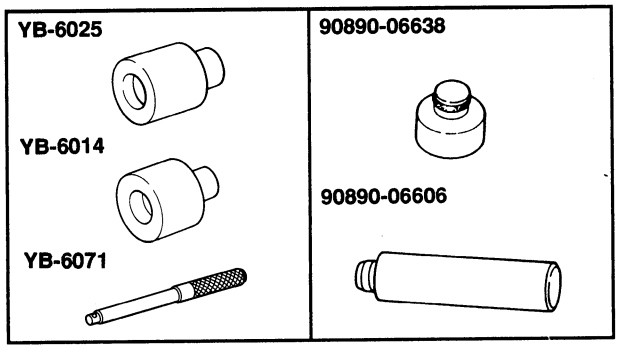
2. Bushing puller
   P/N. YB-6178, 90890-06646
   Bushing puller spacer
   P/N. — , 90890-06648



3. Bushing remover attachment
   P/N. YB-6027, 90890-06651
   Rod driver
   P/N. YB-6229, 90890-06652

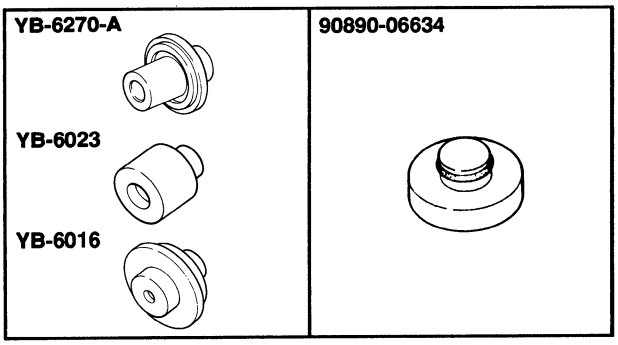


4. Bushing installer
   P/N. YB-6029, 90890-06601
   Bearing installer
   P/N. YB-6169, —

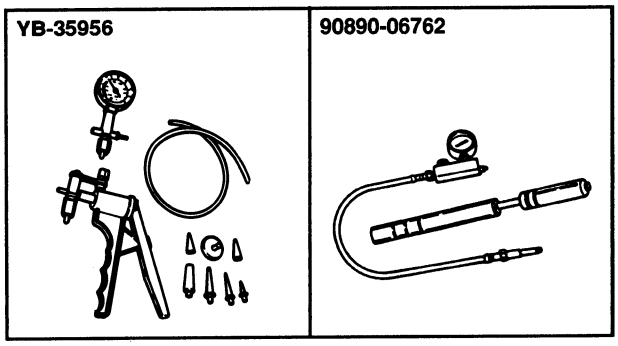


5. Bushing installer attachment
   P/N. YB-6025, —
   Attachment
   P/N. YB-6014, 90890-06638
   Rod driver
   P/N. YB-6071, 90890-06606

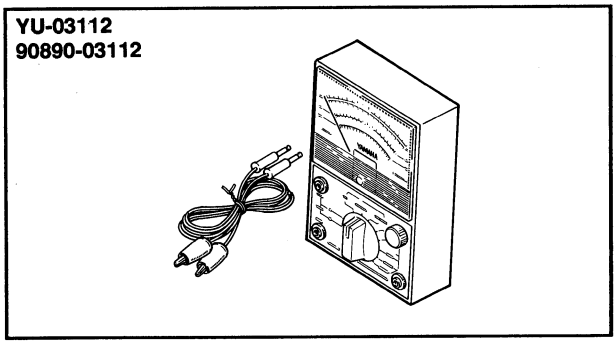
SPECIAL TOOLS



6. Bearing installer
   P/N. YB-6270-A, 90890-06634
   Attachment
   P/N. YB-6023, —
   Bearing installer attachment
   P/N. YB-6016, —

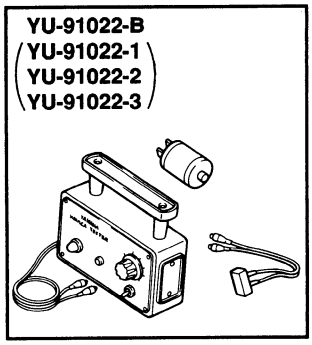


7. Lower unit pressure/vacuum tester
   P/N. YB-35956, 90890-06762

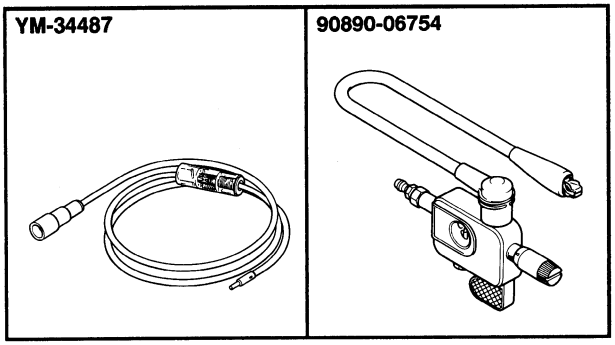


FOR ELECTRICAL COMPONENTS SERVICE

1. Pocket tester
   P/N. YU-03112, 90890-03112



2. CDI tester
   P/N. YU-91022-B, —
   (Consists of:)
   CDI base unit
   P/N. YU-91022-1, —
   Capacitive clip
   P/N. YU-91022-2, —
   Load coil storage box
   P/N. YU-91022-3, —



3. Spark gap tester (dynamic spark tester)
   P/N. YM-34487, 90890-06754

SPEC

A40005-1*

CHAPTER 2
SPECIFICATIONS

2

GENERAL SPECIFICATIONS

Item		Unit	Model			
			4AC	4AS	5C	5CS
APPROVED MODEL NUMBER:			6E0		6E3	
DIMENSIONS:						
Overall length		mm(in)	677 (26.7)			
Overall width		mm(in)	322 (12.7)			
Overall height	S	mm(in)	1.011 (39.8)	978 (38.5)	1,011 (39.8)	978 (38.5)
	L	mm(in)	1.138 (44.8)	1.105 (43.5)	1,138 (44.8)	1,105 (43.5)
Boat transom height	S	mm(in)	381 (15.0)			
	L	mm(in)	508 (20.0)			
O/M transom height	S	mm(in)	444 (17.5)			
	L	mm(in)	571 (22.5)			
Weight (Al.)	S	kg(lb)	21.0 (46.0)	20.5 (45.0)	21.0 (46.0)	20.5 (45.0)
	L	kg(lb)	21.5 (47.0)	21.0 (46.0)	21.5 (47.0)	21.0 (46.0)
PERFORMANCE:						
Full throttle speed range		rpm	4,500 ~ 5,500			
Output (ISO)		kW(hp)/rpm	3.0(4.0)/5,000		3.7(5.0)/5,000	
Maximum fuel consumption		L/h (US gal, Imp gal)	2.2/5,500 (0.58, 0.48)		2.8/5,500 (0.74, 0,62)	
ENGINE:						
Engine type			2-stroke			
Cylinders arrangement			1			
Total displacement		cm^3 (cu. in)	83 (5.07)		103 (6.29)	
Bore × stroke		mm × mm (in × in)	50 × 42 (1.97 × 1.65)		54 × 45 (2.13 × 1.77)	
Compression ratio			7.0 : 1		6.5 : 1	
Compression pressure		kPa (kg/cm^2, psi)	556 ~ 680 (5.7 ~ 6.9, 78 ~ 96)		795 ~ 971 (8.1 ~ 9.9, 113 ~ 138)	
Carburetors number			1 Carb.			
Intake system			Reed valve			
Scavenging system			Cross flow			
Starting system			Manual recoil starter			
Ignition system			CDI			
Alternator output			—			
Carburetor starting system			Choke valve type			
Advance type			Electric automatic			

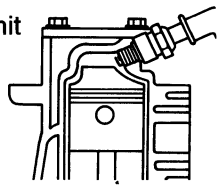
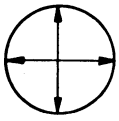
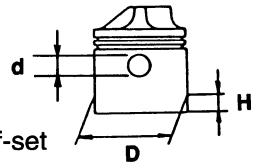
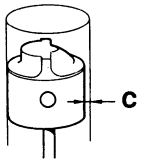
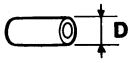
GENERAL SPECIFICATIONS

Item	Unit	Model			
		4AC	4AS	5C	5CS
SPARK PLUG:					
Type [Manufacture]					
Standard type		B7HS [NGK] (Except for CANADA and EUROPE)			
Noise suppressor type		BR7HS [NGK] (For CANADA and EUROPE)			
Exhaust system		Under water			
Cooling system		Water			
Lubrication system		Pre-mixed (fuel and oil)			
FUEL AND LUBRICATION:					
Fuel type		Regular gasoline			
Fuel rating	P.O.N.*1	Min. 86			
Fuel tank capacity	ℓ (US gal, Imp gal)	2.8 (0.74, 0.62)	12.0/14.0 (3.17/3.70, 2.64/3.08)	2.8 (0.74, 0.62)	12.0/14.0 (3.17/3.70, 2.64/3.08)
Mixing ratio		100 : 1			
Engine oil type		Yamaha twocycle outboard motor oil *2			
Engine oil grade		NMMA TC-W3*3			
Gear oil type		Hypoid gear oil-SAE#90*4			
Gear oil quantity	cm³ (US oz, imp oz)	100 (3.38, 3,52)			
BRACKET:					
Tilt angle	degree	4, 8, 12, 16, 20			
Tilt-up angle	degree	76			
Shallow water crusing angle	degree	30, 42, 54			
Steering angle (left + right)	degree	360°			
DRIVE UNIT:					
Gear shift position		F-N-R *5			
Gear ratio		13 : 27 (2.08)			
Gear type		Straight bevel gear			
Clutch type		Clutch dog			
Propeller direction (rear view)		Clockwise			
Propeller drive system		Spline			
Propeller series mark		BA			

*1: Pump Octane Number; (Research octance + Motor octane)/2
*2: YAMALUBE two-cycle outboard motor oil is recommended in USA.
YAMALUBE 1 two-cycle outboard motor oil is recommended in CANADA.
*3: TC-W3 is recommended in USA and CANADA.
TC-WII or TC-W3 is recommended in except for USA and CANADA.
*4: GEAR CASE LUBE is recommended in USA.
*5: Forward-Neutral-Reverse

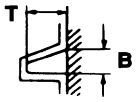
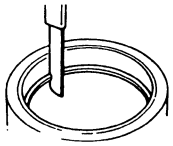
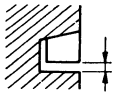
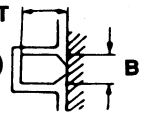
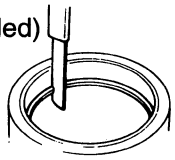
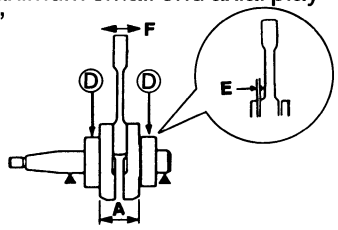
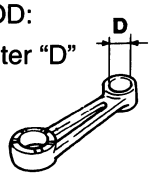
MAINTENANCE SPECIFICATIONS

ENGINE

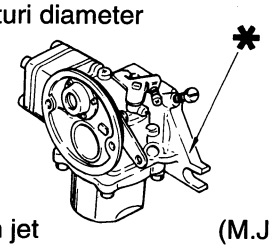
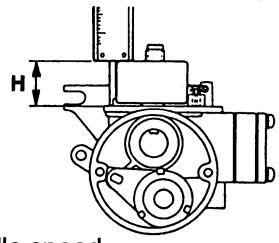
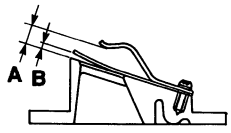
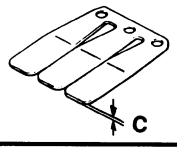
Item	Unit	Model			
		4AC	4AS	5C	5CS
CYLINDER HEAD: Warpage limit  (Lines indicate straightedge)	mm (in)	— *1			
CYLINDER: Bore size	mm (in)	50.00 ~ 50.03 (1.9685 ~ 1.9697)		54.00 ~ 54.02 (2.1260 ~ 2.1268)	
Wear limit 	mm (in)	50.1 (1.972)		54.1 (2.130)	
Taper limit	mm (in)	0.08 (0.003)			
Out of round limit	mm (in)	0.05 (0.002)			
PISTON: Diameter "D"	mm (in)	49.97 ~ 50.00 (1.9673 ~ 1.9685)		53.97 ~ 54.00 (2.1248 ~ 2.1260)	
Measuring point "H" 	mm (in)	10 (0.4)			
Piston off-set	mm (in)	0.5 (0.02)			
Off-set direction		Intake side			
Piston pin boss inside diameter "d"	mm (in)	12.004 ~ 12.015 (0.4726 ~ 0.4730)			
Piston-to-cylinder clearance "C" 	mm (in)	0.030 ~ 0.035 (0.0012 ~ 0.0014)			
Limit	mm (in)	0.10 (0.0039)			
PISTON PIN: Diameter "D" 	mm (in)	11.996 ~ 12.000 (0.4723 ~ 0.4724)			

*1: None separate type

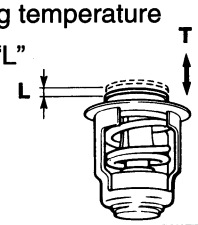
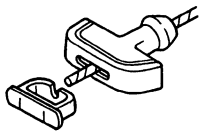
MAINTENANCE SPECIFICATIONS

Item	Unit	Model			
		4AC	4AS	5C	5CS
PISTON RING (TOP):					
Type		Keystone			
Dimensions (B × T) 	mm (in)	2.0 × 2.0 (0.079 × 0.079)			
End gap (installed) 	mm (in)	0.15 ~ 0.35 (0.006 ~ 0.014)			
Limit 	mm (in)	0.55 (0.022)			
Ring side clearance	mm (in)	0.02 ~ 0.06 (0.0008 ~ 0.0024)			
PISTON RING (2ND):					
Type 		Barrel			
Dimensions (B × T)	mm (in)	2.0 × 2.0 (0.079 × 0.079)		2.0 × 2.5 (0.079 × 0.087)	
End gap (installed) 	mm (in)	0.15 ~ 0.35 (0.006 ~ 0.014)			
Limit 	mm (in)	0.55 (0.022)			
Ring side clearance	mm (in)	0.03 ~ 0.07 (0.0012 ~ 0.0028)			
CRANK SHAFT:					
Crank width "A"	mm (in)	39.90 ~ 39.95 (1.571 ~ 1.573)			
Runout limit "D"	mm (in)	0.03 (0.0012)			
Side clearance "E"	mm (in)	0.20 ~ 0.70 (0.008 ~ 0.028)			
Maximum small end axial play "F" 	mm (in)	2.0 (0.08)			
CONNECTING ROD:					
Small end diameter "D" 	mm (in)	15.000 ~ 15.011 (0.5906 ~ 0.5910)			

MAINTENANCE SPECIFICATIONS

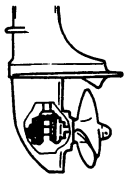
Item	Unit	Model			
		4AC	4AS	5C	5CS
CARBURETOR:					
Identification Mark*		6E0 04		6E3 04	
Venturi diameter 	mm (in)	14.0 (0.55)		15.8 (0.62)	
Main jet (M.J.)		#80			
Main air jet (M.A.J.)	mm (in)	1.2 (0.047)		1.5 (0.059)	
Main nozzle (M.J.)	mm (in)	2.0 (0.079)		2.5 (0.098)	
Pilot jet (P.J.)		#46		#52	
Pilot air jet (P.A.J.)	mm (in)	1.4 (0.055)		1.2 (0.047)	
Pilot screw (P.S.)	turns out	1-3/4 ± 1/4		1-1/2 ± 1/4	
Valve seat size (diameter) (V.S.)	mm (in)	1.2 (0.047)			
Float height "H" (F.H.) 	mm (in)	22 ± 0.5 (0.87 ± 0.02)			
Idle speed	rpm	1,150 ± 50			
Trolling speed	rpm	1,000 ± 50			
REED VALVE:					
Valve stopper height "A"	mm (in)	7.0 ± 0.2 (0.28 ± 0.008)			
Valve warpage limit "B" 	mm (in)	0.2 (0.008)			
Valve thickness "C" 	mm (in)	0.4 (0.016)			

MAINTENANCE SPECIFICATIONS

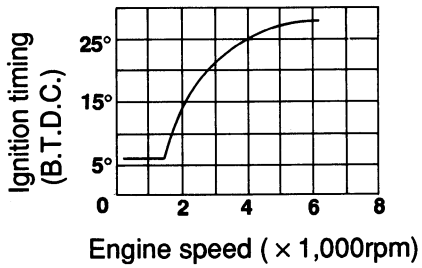
Item	Unit	Model			
		4AC	4AS	5C	5CS
THERMOSTAT:					
Opening temperature "T"	°C (°F)	48 ~ 52 (118 ~ 125)			
Full-opening temperature	°C (°F)	60 (140)			
Valve limit "L" 	mm (in)	More than 3 (0.12)			
RECOIL STARTER:					
Starter rope length 	mm (in)	1,850 (72.8)			

MAINTENANCE SPECIFICATIONS

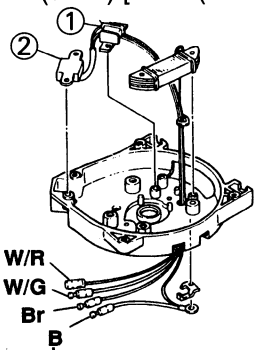
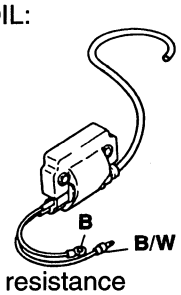
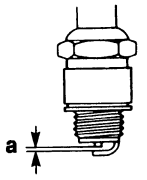
LOWER

Item	Unit	Model			
		4AC	4AS	5C	5CS
GEAR BACKLASH:					
Pinion-forward gear	mm (in)	0.28 ~ 0.71 (0.011 ~ 0.028)			
Pinion-reverse gear	mm (in)	0.28 ~ 0.71 (0.011 ~ 0.028)			
					
PROPELLER:					
Material		Aluminium			
No. of blades × diameter × pitch	in	3 × 7-1/4 × 6-1/2-BA			
		3 × 7-1/2 × 7-BA			
– Propeller series mark		3 × 7-1/2 × 8-BA			
					

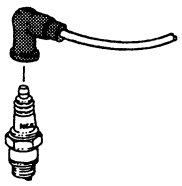
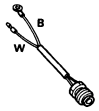
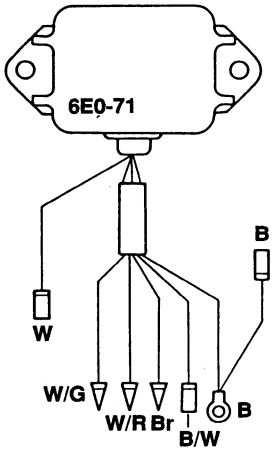
ELECTRICAL

Item	Unit	Model			
		4AC	4AS	5C	5CS
IGNITION SYSTEM:					
Ignition timing (full retarded)	degree/ rpm	B.T.D.C 6 ± 2/900			
(full advanced)	degree/ rpm	B.T.D.C 28 ± 3/5,500			
Advanced timing-start	rpm	1,300 ~ 2,100			
Advancer type		Electrical			
					

MAINTENANCE SPECIFICATIONS

Item	Unit	Model			
		4AC	4AS	5C	5CS
CDI MAGNETO ASSEMBLY:					
Coil resistance					
Pulser coil ① (high speed) (color) [20°C (68°F)]	Ω	30 ~ 36 White/Red (W/R)–Black (B)			
Pulser coil ② (low speed) (color) [20°C (68°F)]	Ω	279 ~ 341 White/Green (W/G)–Black (B)			
Charge coil (color) [20°C (68°F)]	Ω	248 ~ 303 Brown (Br)–Black (B)			
					
Pole number		4			
IGNITION COIL:					
Type 		Single			
Primary coil resistance (color) [20°C (68°F)]	Ω	0.17 ~ 0.25 Black/White (B/W)–Black (B)			
Secondary coil resistance (color) [20°C (68°F)]	kΩ	2.5 ~ 3.7 Black/White (B/W)–High tension cord			
SPARK PLUG:					
Electrode gap "a" 	mm (in)	0.6 ~ 0.7 (0.024 ~ 0.028)			

MAINTENANCE SPECIFICATIONS

Item	Unit	Model			
		4AC	4AS	5C	5CS
SPARK PLUG GAP: Type 		Standard (For USA and OCEANIA) With resistor (For CANADA and EUROPE)			
STOP SWITCH: Continuity  Release button Push button (color)		No continuity Continuity White (W)–Black (B)			
CDI UNIT: Resistance 	kΩ				

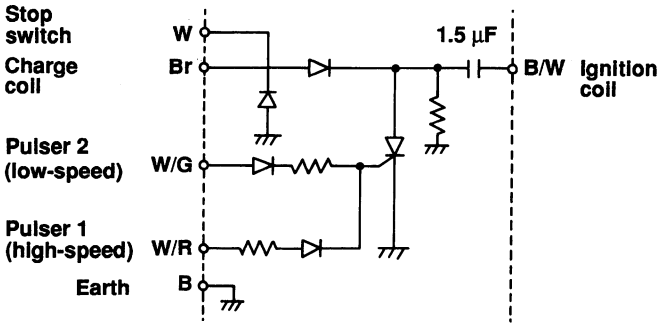
Color
B : Black
Br : Brown
W : White
B/W: Black / White
W/G: White / Green
W/R: White / Red

Tester ⊕ \ Tester ⊖		Stop	Charge coil	Pulser 2 (low speed)	Pulser 1 (high speed)	Earth	Ignition coil
		W	Br	W/G	W/R	B	B/W
Stop	W		0	∞	∞	∞	∞*
Charge coil	Br	0		∞	∞	∞	∞*
Pulser 2 (low speed)	W/G	18.4 ~ 27.6	18.4 ~ 27.6		20 ~ 30	7.2 ~ 10.8	∞
Pulser 1 (high speed)	W/R	16 ~ 24	16 ~ 24	∞		9.6 ~ 14.4	∞
Earth	B	3.2 ~ 4.8	3.2 ~ 4.8	∞	9.6 ~ 14.4		∞*
Ignition coil	B/W	∞	∞	∞	∞	∞	

∞* .....Needle swings once and returns to home position.
∞ .....No continuity.

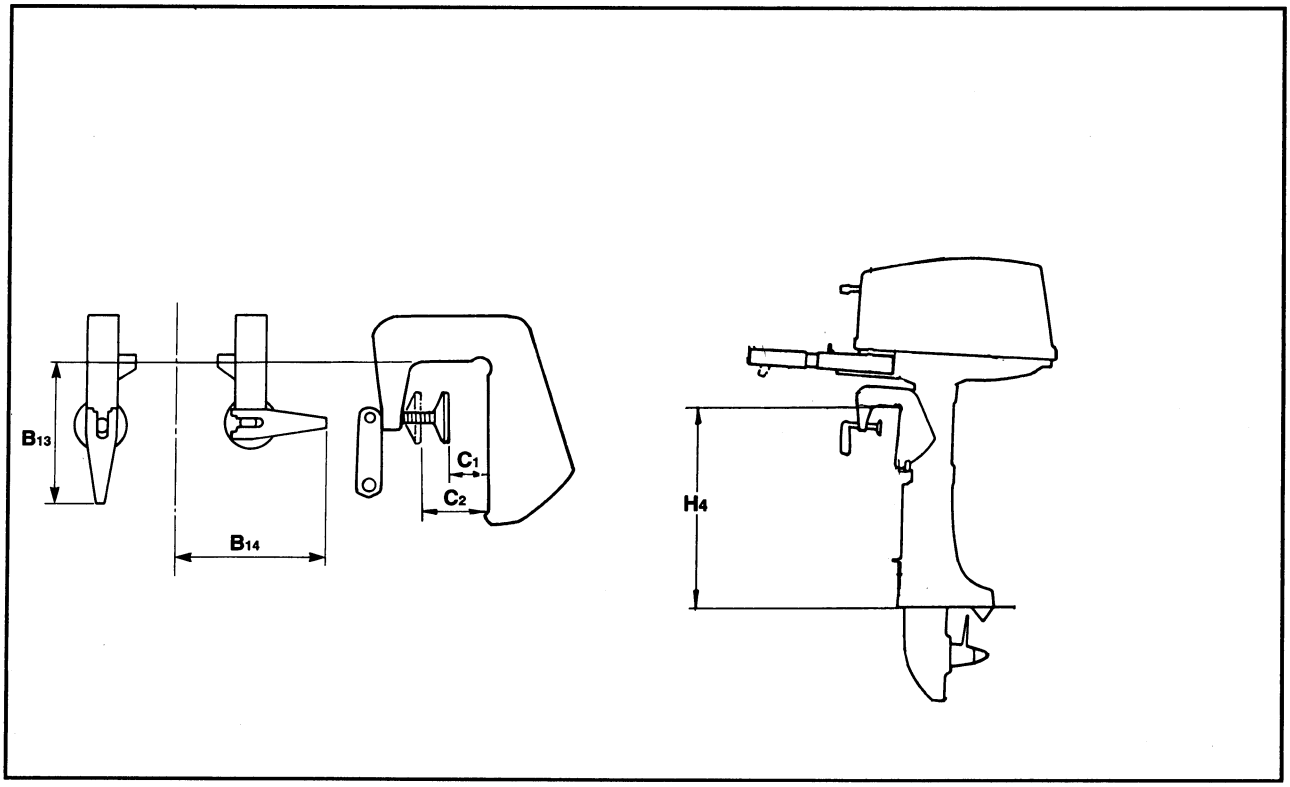
NOTE:

When making a test of "Needle swings once and returns to home position", be sure to touch the ground lead wire with the ignition coil lead wire to discharge the condenser before making the test. Otherwise, the tester needle will not swing at all.



MAINTENANCE SPECIFICATIONS

DIMENSION



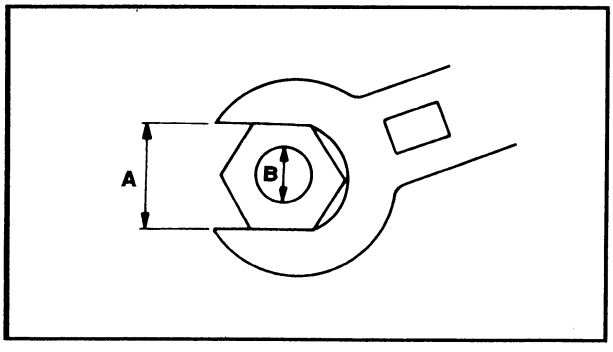
Symbol		Unit	Model			
			4AC	4AS	5C	5CS
HEIGHT						
H4	(S)	mm (in)	444 (17.5)			
	(L)	mm (in)	571 (22.5)			
BRACKET						
B13		mm (in)	113 (4.45)			
B14		mm (in)	120 (4.72)			
CLAMP						
C1		mm (in)	22 (0.87)			
C2		mm (in)	60 (2.36)			

MAINTENANCE SPECIFICATIONS

TIGHTENING TORQUE

Part to be tightened		Part name	Thread size	Q'ty	Tightening torque			Remarks
					Nm	kg·m	ft·lb	
ENGINE:								
Crank case	1st	Bolt	M6	6	6	0.6	4.3	
	2nd				12	1.2	8.7	
Cylinder head cover	1st	Bolt	M6	4	3	0.3	2.2	
	2nd				9	0.9	6.5	
Exhaust cover	1st	Bolt	M6	9	3	0.3	2.2	2/5
	2nd				9	0.9	6.5	
Flywheel		Nut	M10	1	45	4.5	32	3
Power unit mounting	1st	Bolt	M6	7	3	0.3	2.2	
	2nd				8	0.8	5.8	
Spark plug		Bolt	M14	1	25	2.5	18	
UPPER CASING AND GEAR CASE:								
Clamp bracket		Nut	M8	1	13	1.3	9.4	
Shift rod connecter		Bolt	M6	1	10	1.0	7.2	
Shift rod lever		Bolt	M6	1	6	0.6	4.3	
Gear case cap	1st	Bolt	M6	2	3	0.3	2.2	
	2nd				8	0.8	5.8	

NUT (A)	Bolt (B)	General tooque specifications		
		Nm	kg·m	ft·lb
8mm	M5	5.0	0.5	3.6
10mm	M6	8.0	0.8	5.8
12mm	M8	18.0	1.8	13.0
14mm	M10	36.0	3.6	25.0
17mm	M12	43.0	4.3	31.0



GENERAL TORQUE SPECIFICATIONS

This chart specifies the torque for tightening standard fasteners with standard clean dry ISO threads at room temperature. Torque specifications for special components or assemblies are given in applicable sections of this manual. To avoid causing warpage, tighten multifastener assemblies in crisscross fashion, in progressive stages until the specified torque is reached.

CHAPTER 3
PERIODIC INSPECTION AND ADJUSTMENT

PERIODIC INSPECTION AND ADJUSTMENT
PREDELIVERY SERVICE
CONTENTS

PACKING LIST

On unpacking, check that all accessories to the model are included.

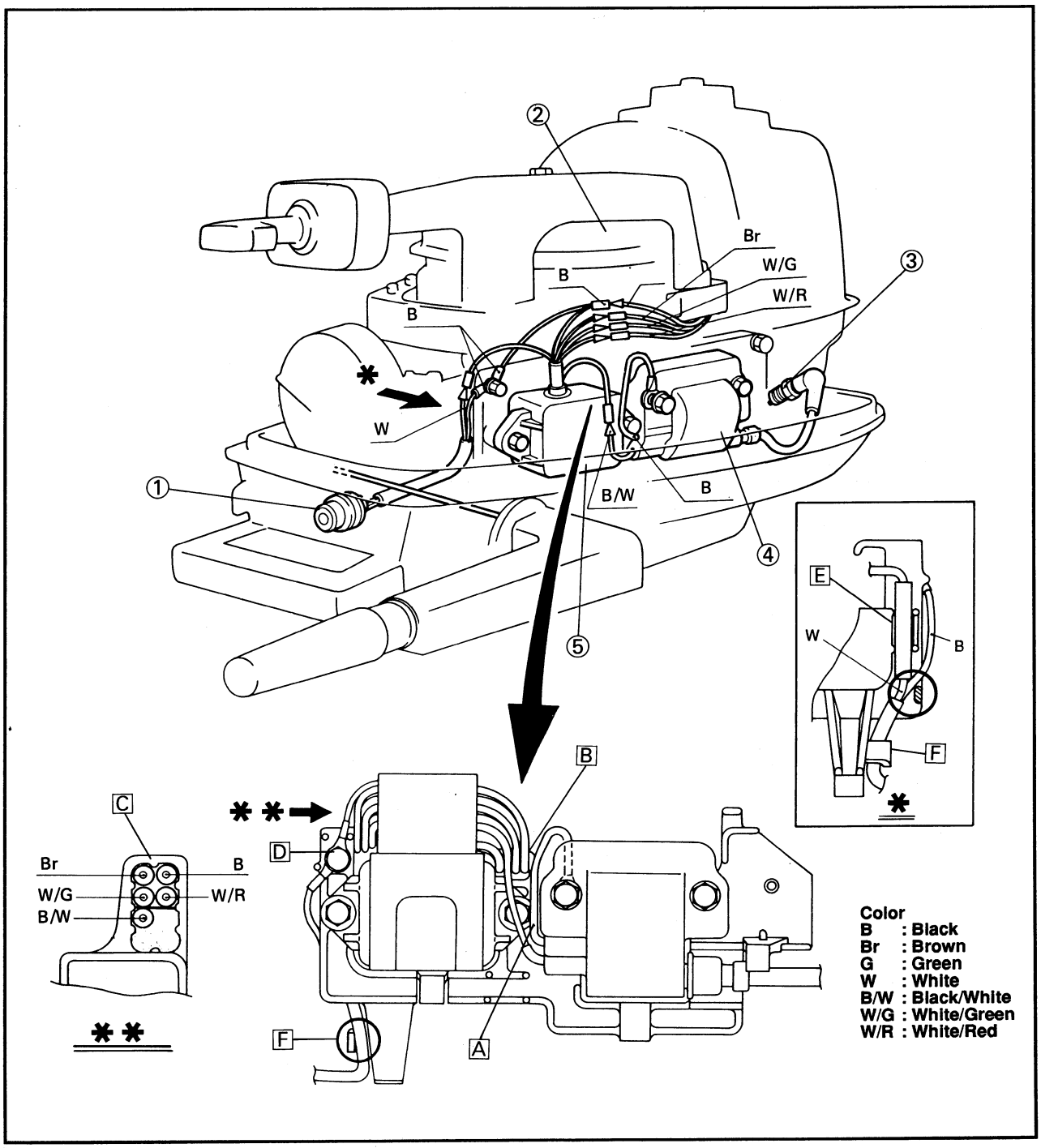
Packing name \ Model	4AC	4AS	5C	5CS
Outboard motor	O	O	O	O
Fuel tank	—	O	—	O
Service tools	O*1	O	O*1	O
Emergency starter rope	O*1	O	O*1	O
Spare spark plug	O*1	O	O*1	O
Owner's manual	O	O	O	O

*1: Except for U.S.A.

ELECTRICAL WIRING

1. Check that all leads and connectors are properly connected.

① Stop switch
② CDI magneto
③ Spark plug
④ Ignition coil
⑤ CDI unit



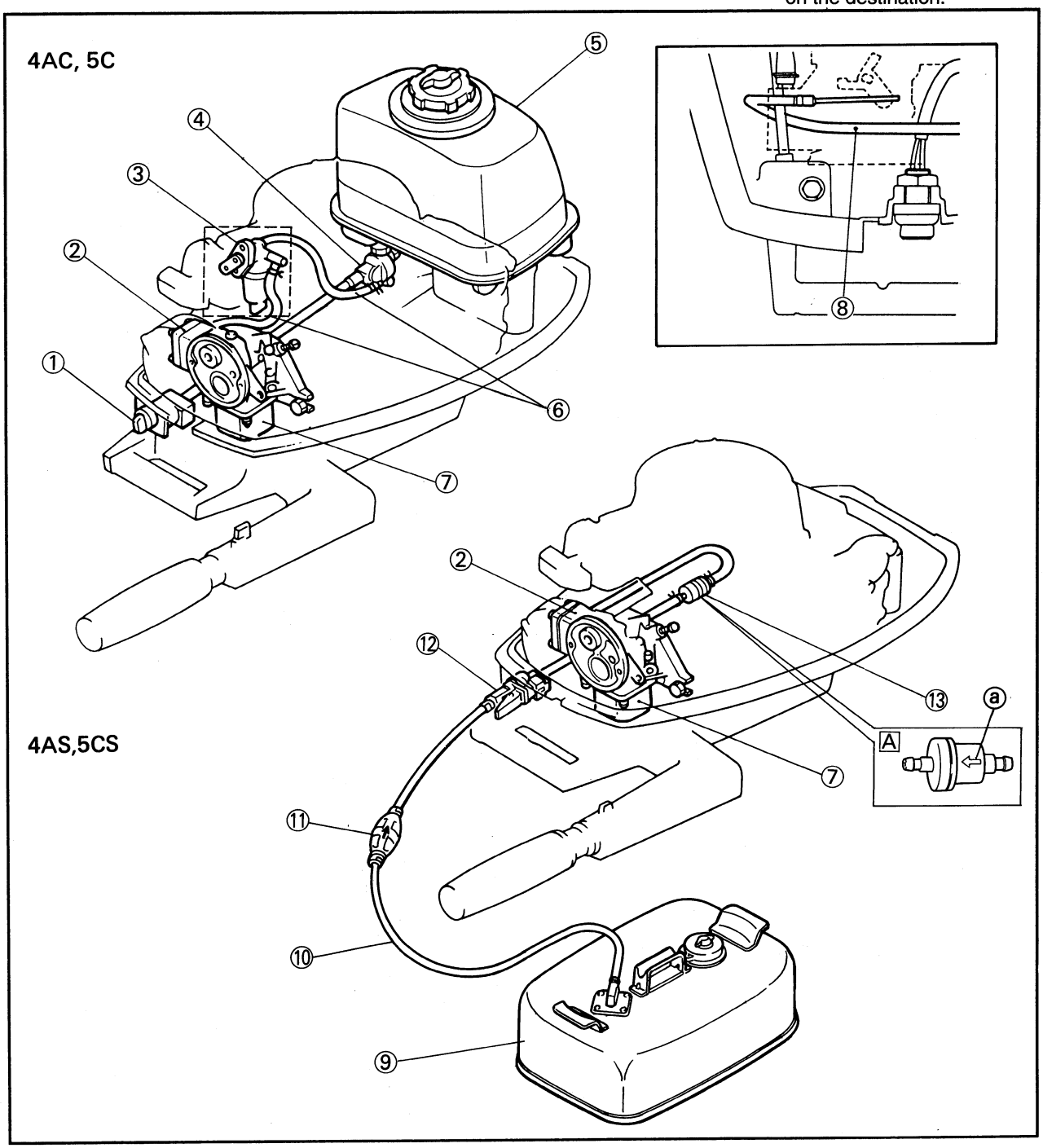
[A] When installing the CDI unit, do not pinch the ignition coil ground lead with the CDI unit mounting bolt.
[B] Pass the magneto base leads through the ignition coil bracket slit.
[C] Pass the magneto base leads and ignition coil lead through the wire harness holder, and insert the lead connectors into the specified position as shown.
[D] Tighten the CDI unit ground lead and stop switch ground lead together.
[E] Insert the stop switch white (W) lead connector into the ignition coil bracket clamp.
[F] Pass the stop switch leads through the cable guide.

FUEL LINE

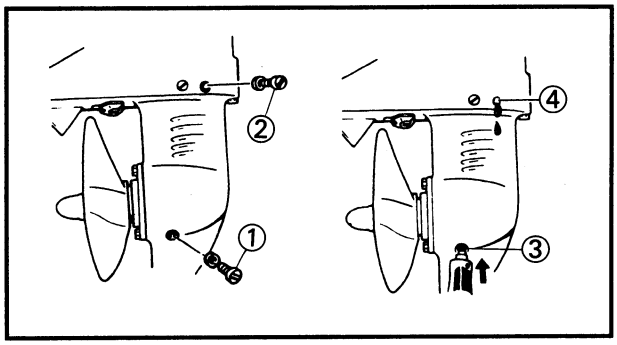
1. Check that the fuel line is correctly installed.
2. Check for fuel leakage.

① Fuel change lever
② Fuel pump
③ Fuel cock 2*
④ Fuel cock 1
⑤ Fuel tank
⑥ Fuel hose
⑦ Carburetor
⑧ Throttle wire
⑨ Fuel tank
⑩ Fuel hose
⑪ Priming pump
⑫ Fuel hose joint
⑬ Fuel Filter

* It is not provided depending on the destination.



A For 4AS/5CS model:
When installing the fuel filter ⑬ direct the arrow mark ⓐ facing foward the carburetor ⑦.



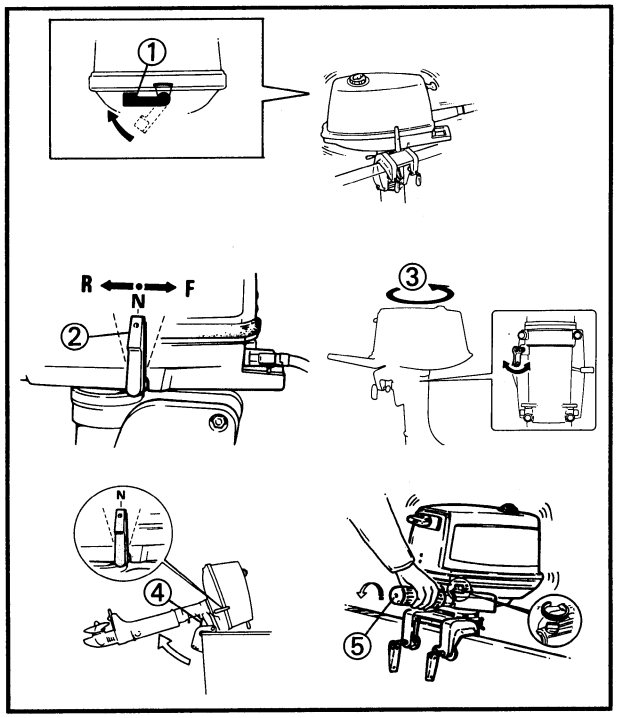
D23000-0

GEAR OIL LEVEL

Remove the oil-drain plug ① and oil-level plug ②,and add the specified gear oil through the oil-drain hole ③ until it overflows from the oil-level hole ④.Refit the plugs. (The oil level plug first.)

NOTE:

Be sure the motor is positioned straight up when checking the oil level.



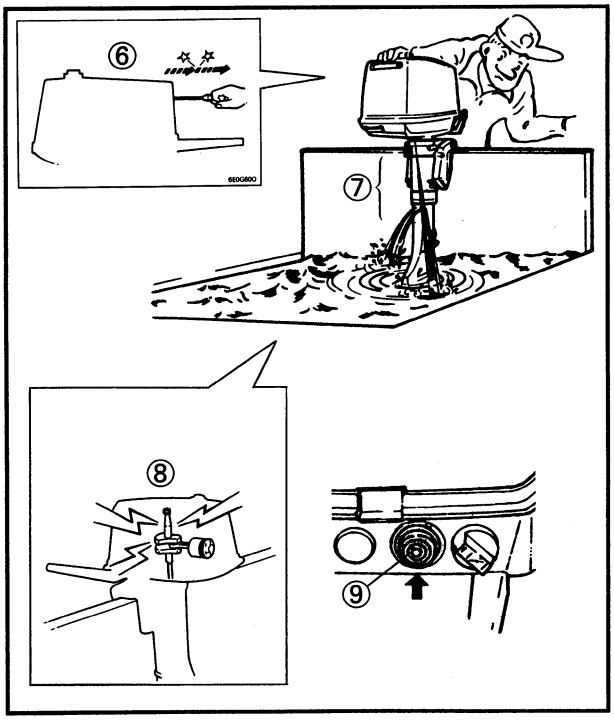
D23504-1

OPERATION OF CONTROLS AND MOVING PARTS

1. Check:
   - Check the cowling lock and release mechanism ① for smooth operation.
   - Check the shift handle ② for smooth operation.
   - Check the steering control ③ for smooth operation.
   - Check the tilt lock lever ④ for proper operation.
   - Check throttle grip ⑤ for smooth operation.
   - Check the recoil starter ⑥ for proper operation.
   - Check the starting system for normal operation.

CAUTION:

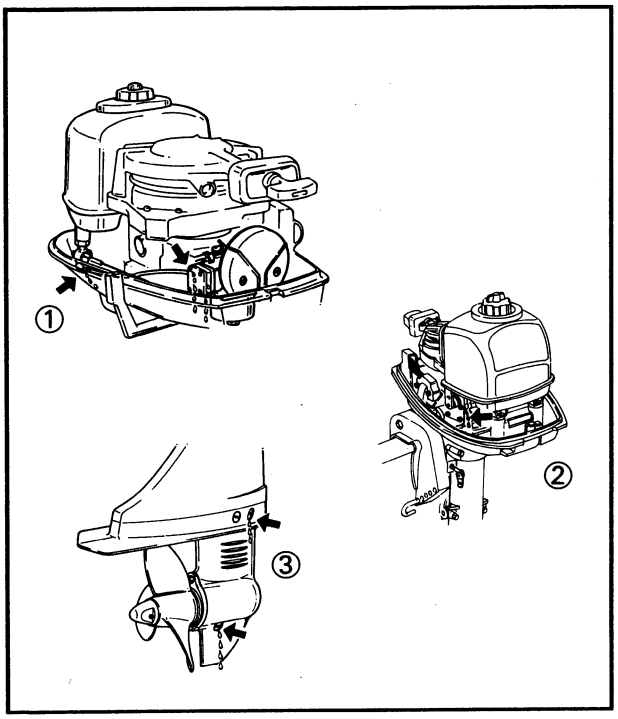
- **Use a 25 : 1 gasoline (petrol) - oil mixture to start the engine.**
- **Be careful not to over-revving the engine.**



⚠ WARNING

The engine is water cooled and therefore, when checking the starting system by cranking the engine, be sure to replace the propeller with the specified test propeller, and make test with the motor placed in a test tank.

- Check to see whether cooling water ⑦ is spouting out of the pilot hole.
- Check the motor for quick response and steady idle.
- Check the motor for abnormal noises ⑧.
- Check for correct operation of the engine stop switch ⑨.



LEAKAGE CHECK

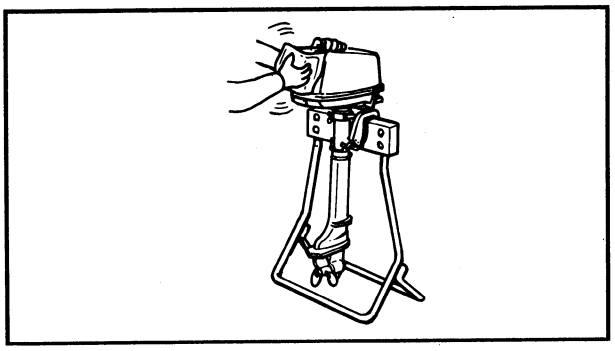
1. Check:
   - Check for fuel leakage ①.
   - Check for water leakage ②.
   - Check for exhaust leakage.
   - Check for gear oil leakage ③.

D26500-0
IDLE SPEED

Check that the engine speed at fully-closed throttle is correct.

D27000-0
IGNITION TIMING

Check that the ignition timing at fully-closed and fully-open throttle positions is correct.



D27500-0
MOTOR EXTERIOR

Check the motor exterior for any flaking of the paint, and if necessary tough-up with paint of the original color.

D28000-1
INSTRUCTING THE NEW OWNER

Instruct the new owner on the operation of all controls and the break-in procedure.
Also advise him on propeller-to-boat matching.

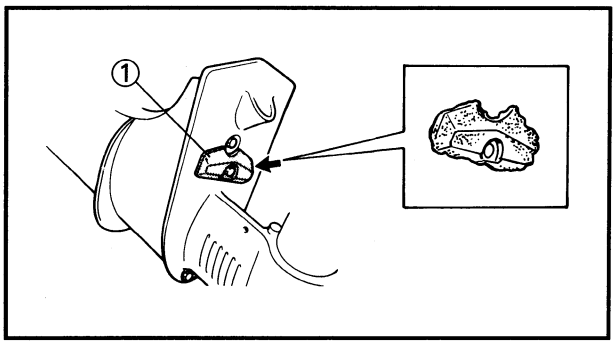
D30000-0

PERIODIC SERVICE

MAINTENANCE SCHEDULE

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

Item	Remarks	Interval		Thereafter every		Refer page
		10 hours (Break-in)	50 hours 3 months	100 hours 6 months	200 hours 12 months	
Anode	Inspection/ Replacement	○	○	○		3-7
Carburetor	Inspection/ Adjustment	○		○		3-7
Cooling water passage	Cleaning		○	○		3-9
Cylinder head cover bolt, engine mounting bolt, fly-wheel nut	Retightening	○		○		3-9
Fuel filter	Cleaning			○	○	3-10
Fuel line	Inspection			○		3-10
Fuel tank	Cleaning			○	○	3-10
Gear oil	Change	○		○		3-11
Grease points	Greasing			○		3-13
Idle speed	Adjustment			○		3-13
Ignition timing	Inspection	○		○		3-15
Propeller	Inspection/ Retightening		○	○		3-17
Spark plug	Cleaning/ Adjustment	○	○	○		3-18
Start-in-gear protection system (except for EUROPE)	Adjustment	○		○		3-19
Throttle wire	Adjustment	○		○		3-20



ANODE

1. Inspect:
   • Anode ①
   Wear/Damage→Replace.
   Scale→Clean.

NOTE:

Inspect the anode. If it is worn out, replace it with a new one. If scaling of the surface is evident, remove the anode and clean it with wire brush.

CAUTION:

Do not paint the anode, or the outboard may be corroded.

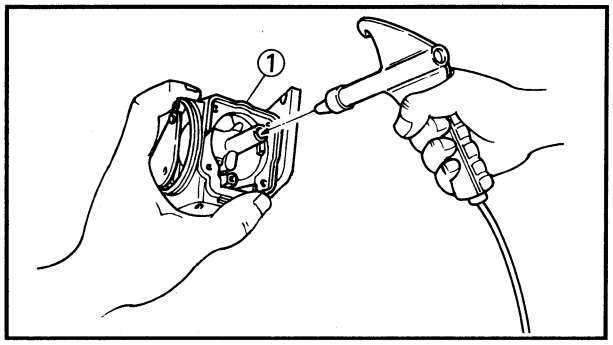
2. Clean:
   • Anode
   Use a wire brush.

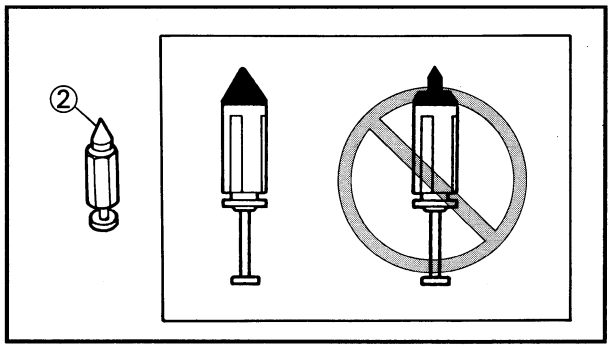
NOTE:

Remove all trace of oil or grease. After cleaning, polish the contact surfaces of the anode mount, and re-install.

CAUTION:

Never paint the anode. To ensure good electrical contact, keep the anode contact surface clean of oil or grease.





CARBURETOR

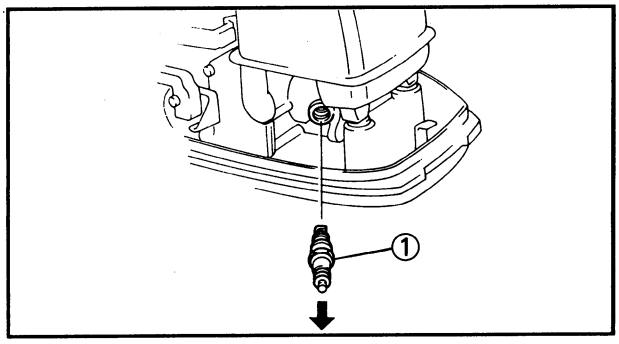
1. Inspect:
   • Carburetor body ①
   • Float chamber body
   • Fuel passage
   • Needle valve ②
   • Valve seat (carburetor body side)
   Wear/Damage→Replace.
   Clog→Clean.
   Refer to the "FUEL SYSTEM-CARBURETOR" section in CHAPTER 4. (page 4-12)

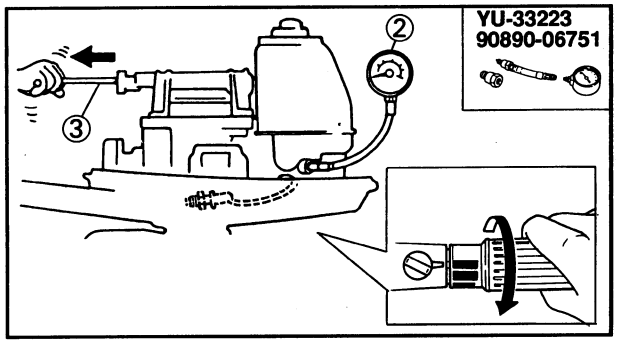
NOTE:

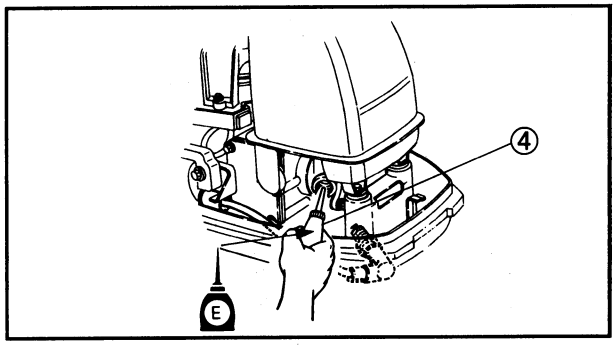
Use a suitable cleaning solvent and blow out clogged passages with compressed air.

⚠WARNING

Protect your eyes with suitable safety spectacles or safety goggles when using compressed air.







COMPRESSION PRESSURE

NOTE:

Insufficient compression pressure will result in performance loss.

1. Measure:
   • Compression pressure

Measurement steps:

- Run the motor for longer than 5 minutes till it warm up, and stop it.
- Remove the spark plug ① from the cylinder. Refer to the "PERIODIC SERVICE-SPARK PLUG" section. (page 3-18)
- Attach the compression gauge ② to the spark plug hole.

Compression gauge:
YU-33223, 90890-06751

- By giving the starter rope ③ a strong pull with the throttle grip fully opened position, check the strength of compression pressure.

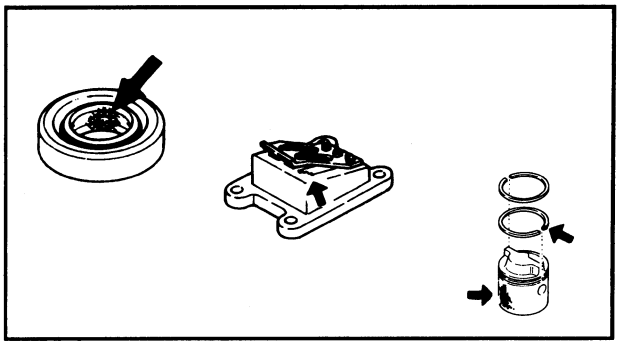
⚠WARNING

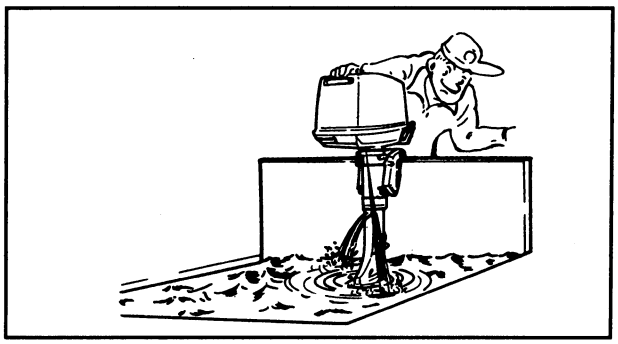
When cranking the engine, ground the spark plug to prevent sparking.

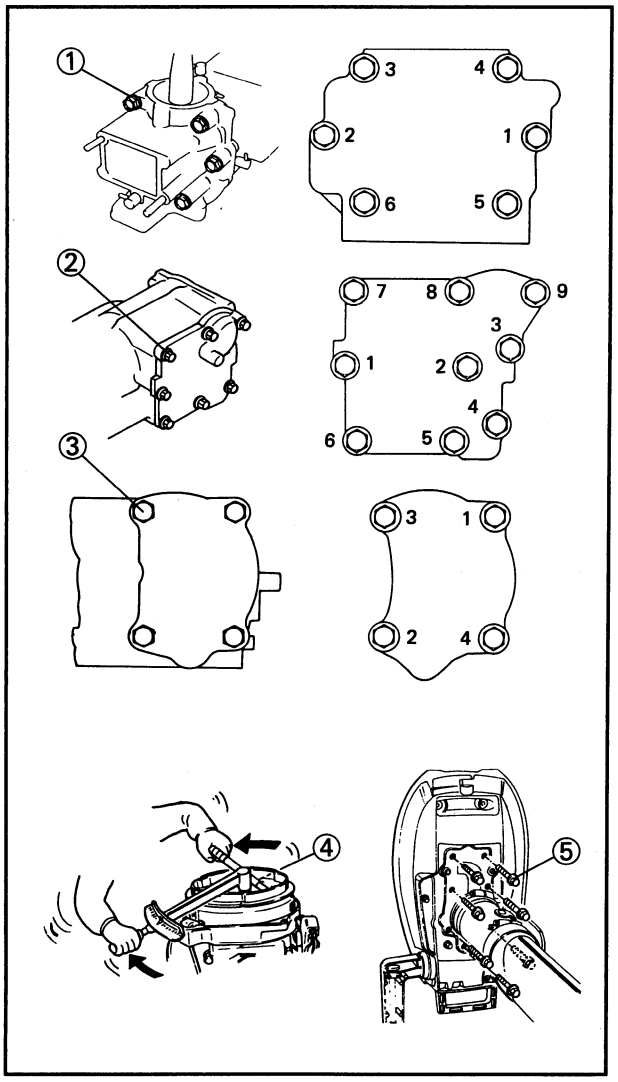
- When a compression pressure jumps across a specified pressure, the compression is considered to be in good condition.

Compression pressure:
4AC , 4AS:556 ~ 680 kPa
(5.7 ~ 6.9 kg/cm², 78 ~ 96 psi)
5C,5CS: 795 ~ 971 kPa
(8.1 ~ 9.9 kg/cm², 113 ~ 138 psi)

- If pressure falls below the minimum specified value:
  1) Squirt a few drops of specified engine oil ④ into the affected cylinder.
  2) Measure the compression again.







Compression pressure (with oil introduced into cylinder)	
Reading	**Diagnosis**
Higher than without oil	Worn or damaged piston.
Same as without oil	Defective ring (s), oil seals, reed valve or piston is possible.
Above maximum specified level	Inspect cylinder head part or piston crown for carbon deposit.

COOLING WATER PASSAGE

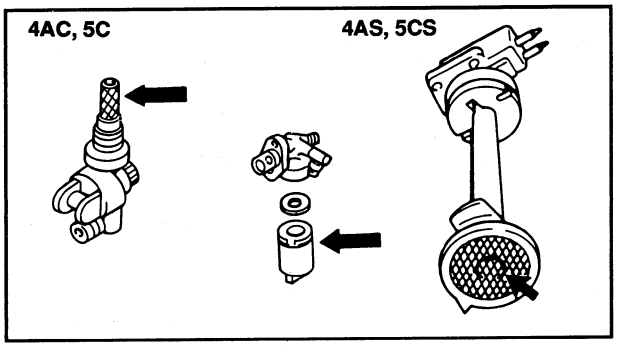
1. Inspect:
   - Cooling water passage
     Clog→Clean.

NOTE:

Check to see whether cooling water is spouting out of the pilot hole.

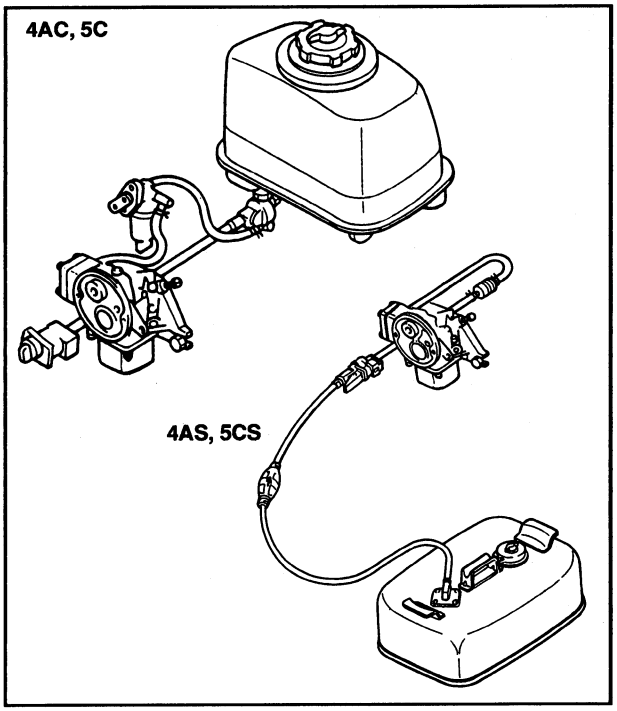
CYLINDER HEAD COVER BOLTS, ENGINE MOUNTING BOLTS, AND FLYWHEEL NUT

1. Check:
   - Crank case bolt ①
   - Exhaust cover bolt ②
   - Cylinder head cover bolt ③
   - Flywheel nut ④
   - Power unit mount bolt ⑤
     Loose→Tighten.
     Refer to the "POWER UNIT-POWER UNIT DISASSEMBLY" section and "POWER UNIT REMOVAL AND INSTALLATION" section in CHAPTER 5. (page 5-11 and page 5-1)



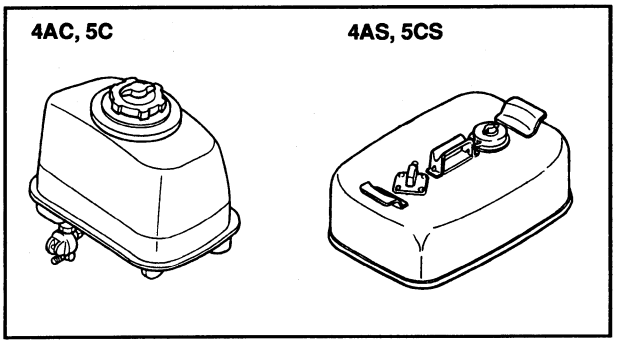
FUEL FILTER

1. Inspect:
   • Fuel filter
   Break/Leak/Damage→Replace.
   Clog→Clean.
   Refer to the "FUEL SYSTEM-FUEL SYSTEM" section in CHAPTER 4. (page 4-1)



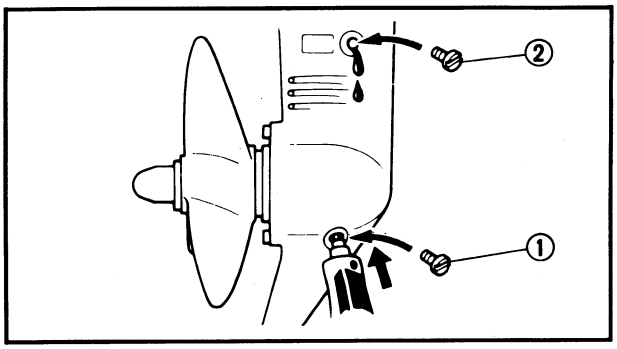
FUEL LINE

1. Inspect:
   • Fuel line
   Break/Leak/Damage→Replace.
   Refer to the "FUEL SYSTEM-FUEL SYSTEM" section in CHAPTER 4. (page 4-1)



FUEL TANK

1. Inspect:
   • Fuel tank
   Crack/Leak/Damage→Replace.
   Dirty fuel tank→Clean.
   Refer to the "FUEL SYSTEM-FUEL SYSTEM" section in CHAPTER 4. (page 4-1)



D23000-0

GEAR OIL LEVEL INSPECTION

1. Inspect:
   • Gear oil level
   Oil level is low→Add oil to proper level.

Inspection steps:

• Place the outboard motor in an upright position.
• Place an empty oil can under the outboard motor gear case.
• Remove the oil drain plug ① (lower) and the oil level plug (upper) ②.

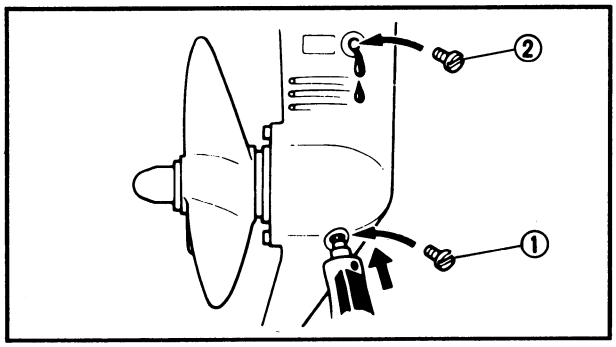
CAUTION:

When removing the oil plugs, the gaskets will fall off. Take care not to lose these parts.

• Add the gear oil through the oil drain hole until it over flows from the oil level hole.

Recommended oil:
GEAR CASE LUBE (USA) or
Hypoid gear oil (SAE #90)

• Re-fit the oil level plug and the lower oil drain plug. (The upper oil level plug first.)



GEAR OIL REPLACEMENT

CAUTION:

Do not allow foreign material to enter the gear case.

1. Drain:
   - Gear oil

Replacement steps:
- Place the outboard motor in an upright position.
- Place an empty oil can under the outboard motor gear case.
- Remove the oil drain plug (lower) ①.
- Next, remote the oil level plug (upper) ②.

CAUTION:

When removing the oil plugs, the gaskets will fall off. Take care not to lose these parts.

- Drain the gear oil thoroughly into a oil can.

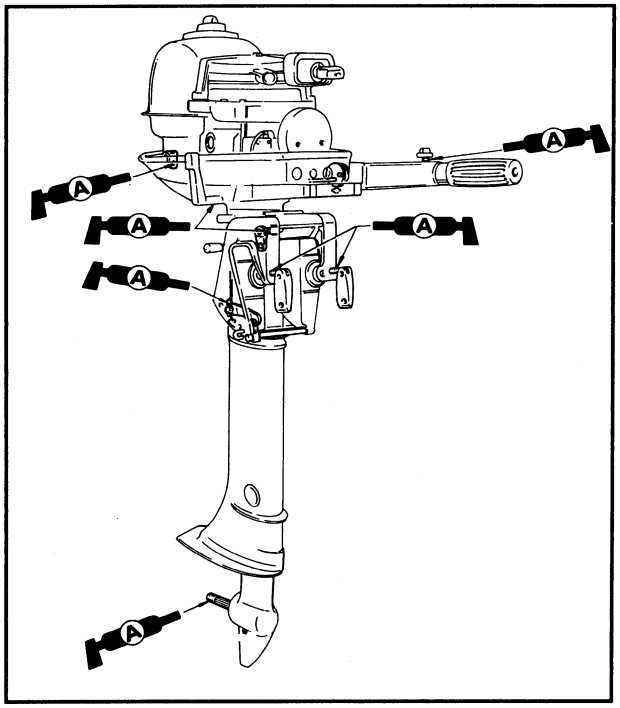
CAUTION:

- **If confirmed mixing the water or metallic in the gear oil, check the gear case oil seals and shift boot for water entry.**

- Add the gear oil through the oil drain hole until it over flows from the oil level plug hole.

Recommended oil:
GEAR CASE LUBE (USA) or
Hypoid gear oil (SAE #90)
Oil capacity:
100 cm³ (3.38 US oz, 3.52 Imp oz)

- Re-fit the oil level plug and the lower oil drain plug. (The upper oil level plug first.)

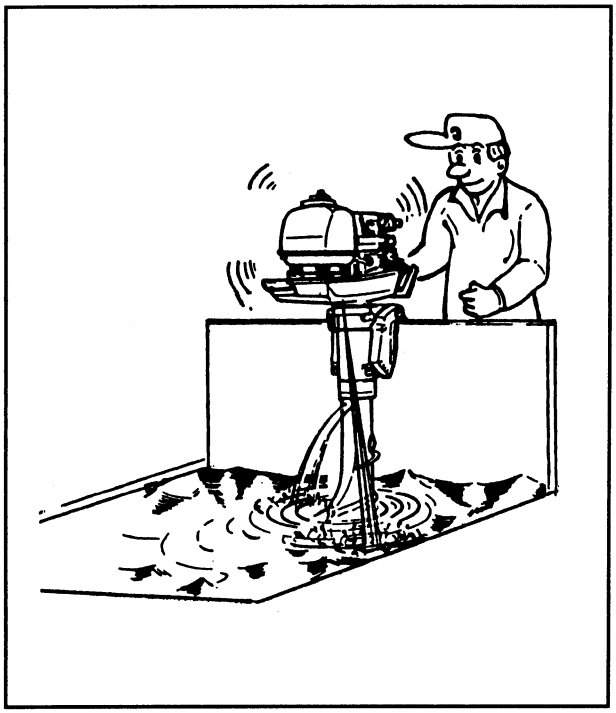


GREASE POINTS

1. Apply:
   • Water resistant grease

NOTE:

To keep moving parts sliding or rotating smoothly, coat them with water resistant grease (Yamaha marine grease A, Yamaha marine grease) or equivalent as shown in the illustration.



IDLE SPEED ADJUSTMENT

⚠WARNING

- **When adjusting the idle speed, be careful not to allow your hand, clothes, or hair to touch any rotating parts such as the flywheel.**
- **Never touch any electrical parts, since high voltage current flows through them.**
- **The engine is water cooled and therefore, when adjusting the idle speed by running the engine, be sure to replace the propeller with the specified test propeller, and make test with the motor placed in a test tank or mounted on a boat.**

NOTE:

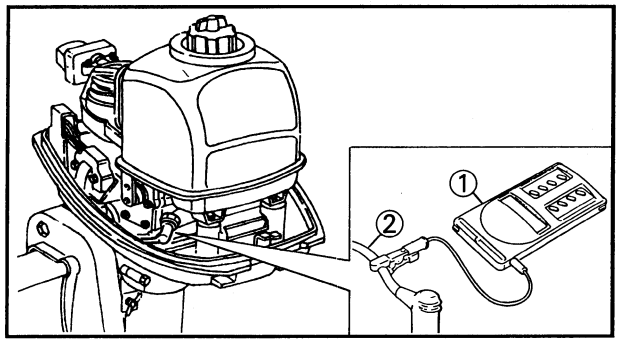
After adjusting the engine idle speed, the throttle wire should be adjusted.

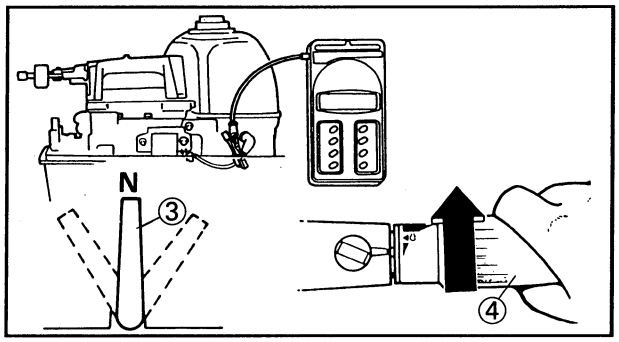
1. Measure:
   • Idle speed
   Out of specification→Adjust.

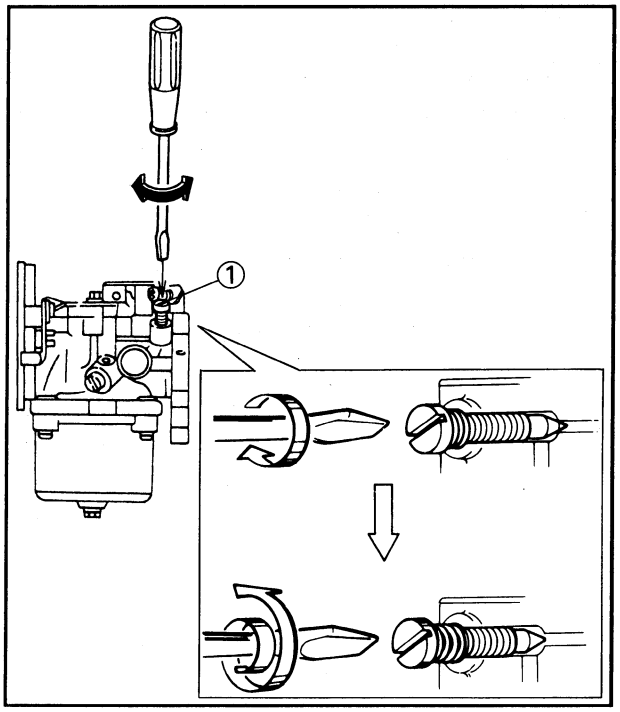
	Idle speed: **1,150±50 rpm**

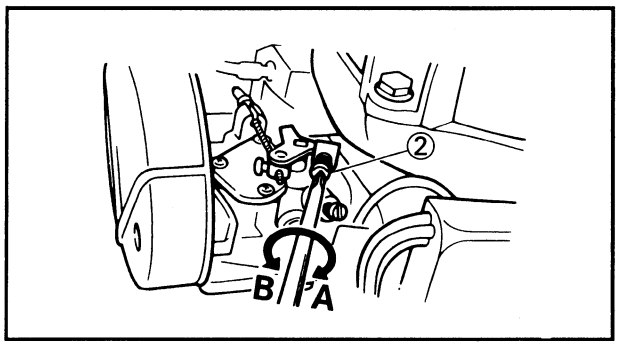
Measuring steps:

• Place the outboard motor in an upright position.









- Start the motor, and warm it up for several minutes, and stop it.
- Attach the tachometer ① to spark plug lead ②.

Tachometer:
YU-8036-A, 90890-06760

- Set the shift handle ③ to "NEUTRAL".
- Start the motor, and set it idle speed by turning the throttle grip ④ to fully closed position, and measure the idle speed.

2. Adjust:
   - Idle speed

Adjustment steps:
- Turn the pilot screw ① clockwise until it is lightly seated.
- Turn out the pilot screw counterclockwise to specification.

Pilot screw:
4AC, 4AS: 1-3/4±1/4 turns out
5C, 5CS: 1-1/2±1/4 turns out

- Start the motor, set it idle speed to the specified level by adjusting the throttle stop screw ②.
  Use a tachometer for checking and adjusting the motor speed.

Turning in (A)→Idle speed becomes higher.

Turning out (B)→Idle speed becomes lower.

Idle speed:
1,150±50 rpm

IGNITION TIMING

⚠WARNING

- **When checking the ignition timing, be careful not to allow your hand, clothes, or hair to touch any rotating parts such as the flywheel.**
- **Never touch any electrical parts, since high-voltage current flows through them.**

CAUTION:

The engine is water cooled and therefore, when checking ignition timing using a timing light, be sure to replace the propeller with the specified test propeller, and make test with the motor placed in a test tank or mounted on a boat.

NOTE:

The 4 and 5 ignition system employs an automatic spark advance system, so that ignition timing adjustment is neither necessary nor impossible.
To check the ignition timing, direct the timing light into the window in the circumfherence of the flywheel magneto base.

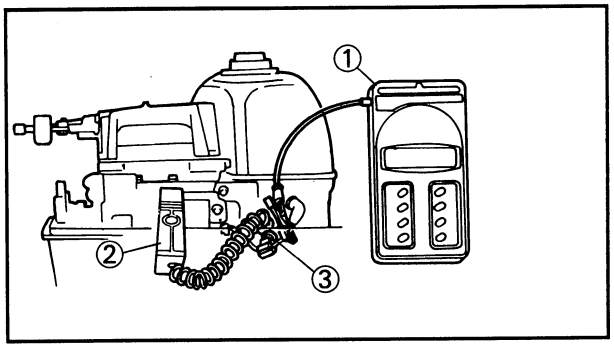
Ignition timing–At low speed (at idling and between 1,700 rpm)

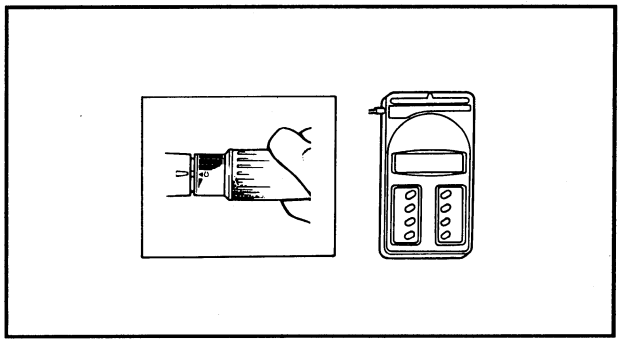
1. Check:
   - Ignition timing (at low speed)
     Incorrect→Check the flywheel, pulser coil and electrical wiring.

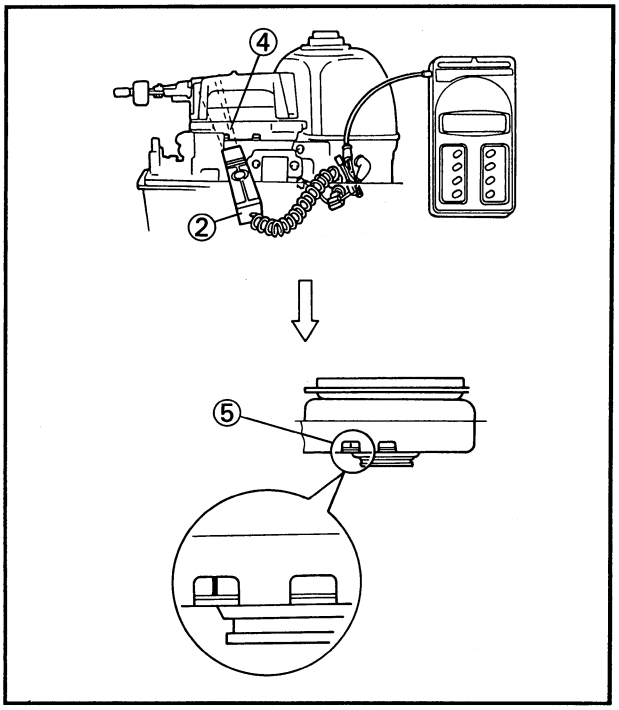
Checking steps:

- Place the outboard motor in an upright position.
- Start the motor, and warm it up for several minutes, and stop it.
- Attach the tachometer ① and timing light ② to spark plug lead ③.

Tachometer:
YU-8036-A, 90890-06760
Timing light:
YM-33277-A, 90890-03141







• Start the motor, and keep the motor running at low speed.

Engine speed:
1,100 ~ 1,700 rpm

• To check the ignition timing, direct the timing light ② into the window ④ in the circumference of the flywheel magneto base.

NOTE:

The ignition timing at speeds from idling to 1,700 rpm should be checked through the left-side window ⑤. In this case, the ignition timing is as below.

Ignition timing (at full retarded):
B.T.D.C. 6°±2°

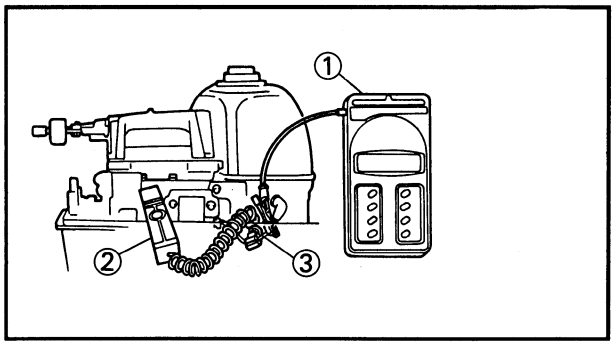
• If the timing mark appears in the left-side window ⑤ in the test using a timing light, the ignition timing is correct.

CAUTION:

If the ignition mark not seen the window, the ignition timing is incorrect and therefore, the CDI system should be inspected.

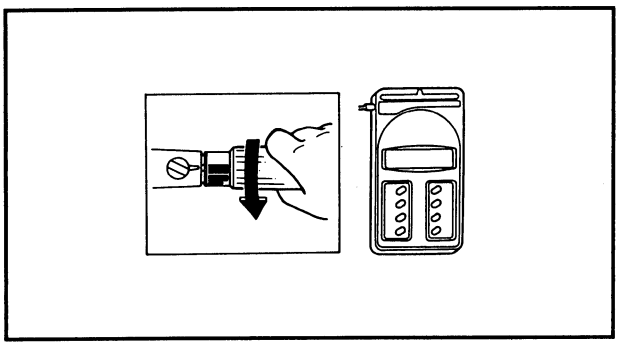
Ignition timing–Full throttle position (4,500 ~ 5,500 rpm)

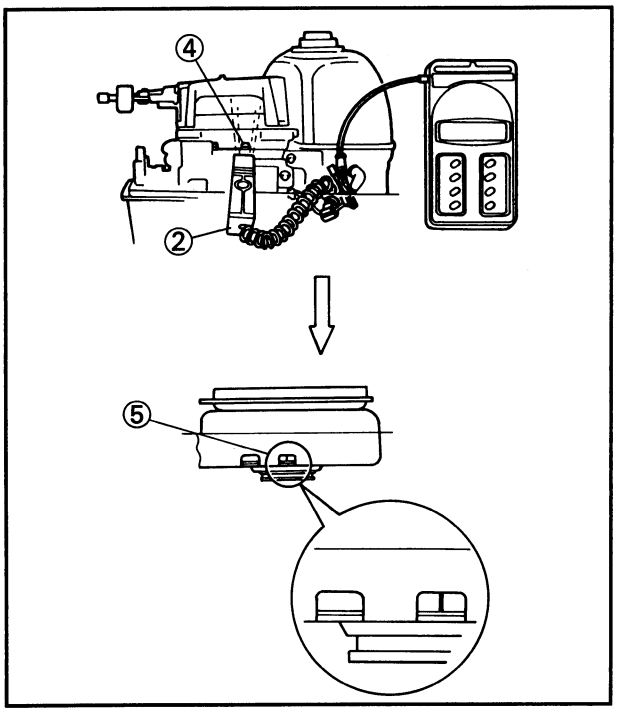
1. Check:
   • Ignition timing (at full throttle)
   Incorrect→Check the flywheel, pulser coil and electrical wiring.



Checking steps:
• Place the outboard motor in an upright position.
• Start the motor, and warm it up for several minutes, and stop it.
• Attach the tachometer ① and timing light ② to spark plug lead ③.

Tachometer:
YU-8036-A, 90890-06760
Timing light:
YM-33277-A, 90890-03141





• Start the motor, and keep the motor running at the full throttle speed.

Engine speed:
4,500 ~ 5,500 rpm

• To check the ignition timing, direct the timing light ② into the window ④ in the circumference of the flywheel magneto base.

NOTE:

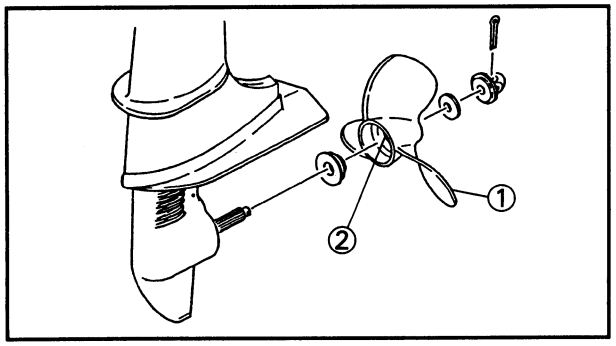
The ignition timing at speeds of more than 4,500 rpm should be checked through the right-side window ⑤.
In this case, the ignition timing is as below.

Ignition timing (at full advanced):
B.T.D.C. 28°±3°

• If the timing mark appears in right-side window ⑤ in the test using a timing light, the ignition timing is correct.

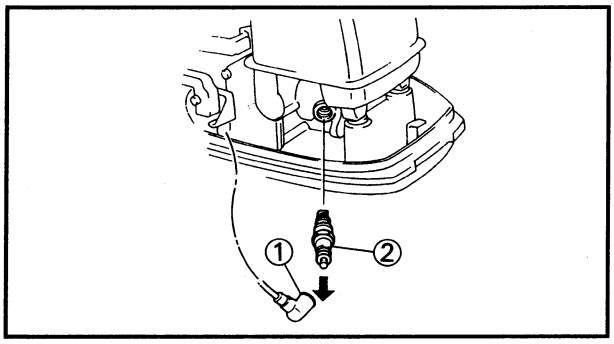
CAUTION:

If the ignition mark not seen the window, the ignition timing is incorrect and therefore, the CDI system should be inspected.



PROPELLER

1. Inspect:
   • Propeller ①
   • Spline ②
   Wear/Cracks/Damage→Replace.



SPARK PLUG

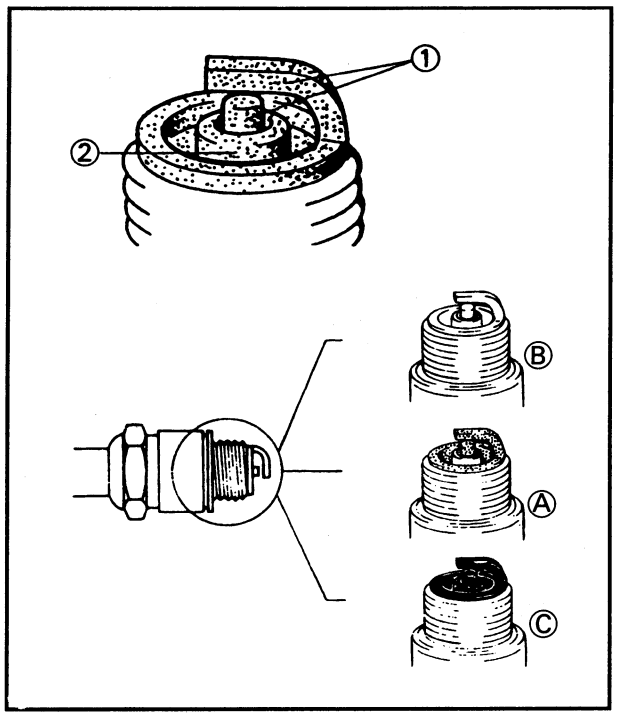
⚠WARNING

To avoid dangers of an electric shock, be sure to stop the engine before removing the following parts.

1. Remove:
   - Spark plug cap ①
   - Spark plug ②

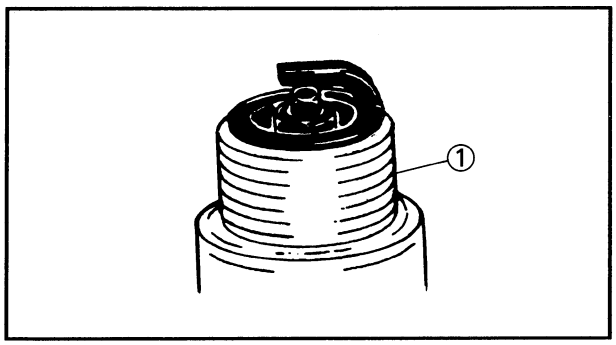
CAUTION:

Before completely removing plug, use compressed air to clean the setting areas to prevent dirt particles from falling into the engine.

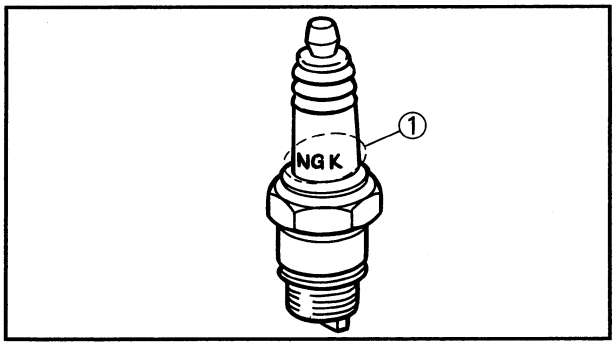


2. Inspect:
   - Electrode ①
     Wear/Damage→Replace.
   - Insulator color ②
     Normal condition is a medium to light tan color Ⓐ.
     Distinctly different color→Check the engine condition.
     Whitish color Ⓑ : Lean fuel mixture
     - Plugged filter, jet
     - Air leak
     - Wrong setting

     Blackish color Ⓒ : Electrical malfunction
     - Defective spark plug

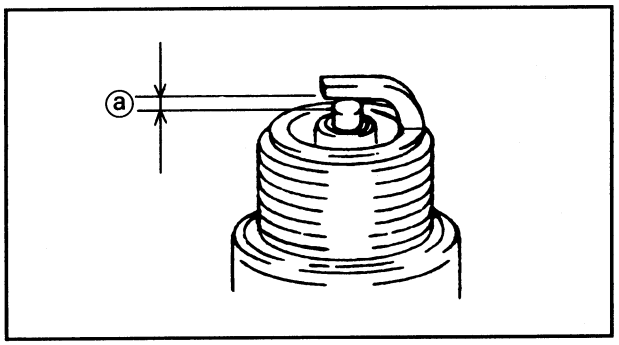


3. Clean:
   - Spark plug ①
     Dirty→Clean.



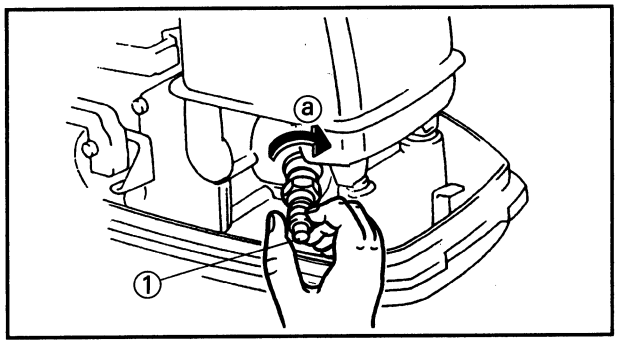
4. Inspect:
   - Spark plug type ①
     Incorrect→Replace.

Standard spark plug:
NGK B7HS
[Except for CANADA and EUROPE]
Noise suppressor type:
NGK BR7HS
[For CANADA and EUROPE]



5. Measure:
   • Electrode gap ⓐ
   Out of specification→Regap.
   Use a wire gauge.

Spark plug electrode gap ⓐ:
0.6 ~ 0.7 mm (0.024 ~ 0.028 in)

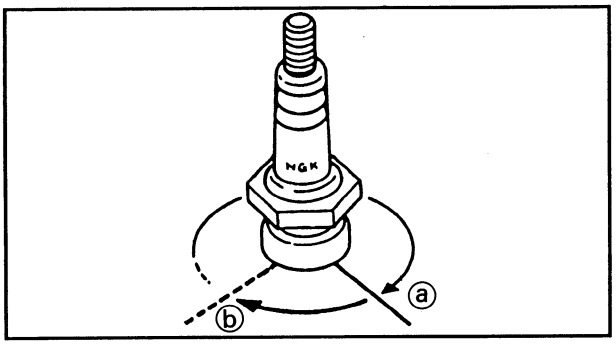


6. Install:
   • Spark plug ①
   • Spark plug cap

NOTE:

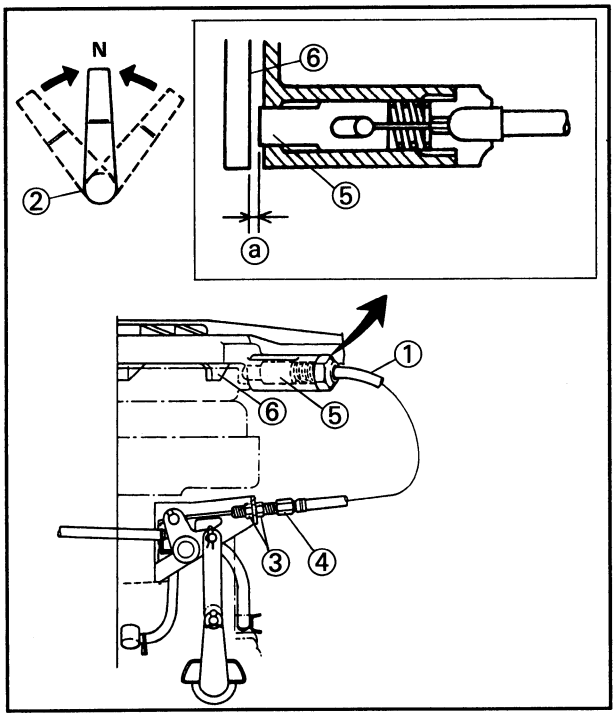
When installing the plug, always clean the gasket surface, wipe off any grime there may be on the surface of the spark plug, and tighten the spark plug to the correct torque.

Spark plug:
25 Nm (2.5 kg•m, 18 ft•lb)



NOTE:

If a torque wrench is not available when you are installing a spark plug, a good estimate of the correct torque is 1/4 to 1/2 turns ⓑ past finger tight ⓐ.
Have the spark plug torqued to the correct value as soon as possible with a torque wrench.



START-IN-GEAR PROTECTION SYSTEM ADJUSTMENT (EXCEPT FOR EUROPE)

1. Check:
   • Start-in-gear protection system operation
   Incorrect→Adjust.
2. Adjust:
   • Start-in-gear protection wire ①

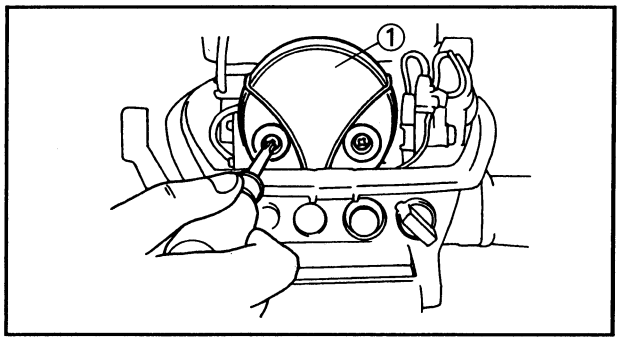
Adjustment steps:
- Set the shift handle ② to "neutral".
- Loosen the starter stop wire adjust nut ③.
- Turn the wire adjust bolt ④ so that proper clearance ⓐ of between the end of the plunger ⑤ and outer surface of the sheave drum ⑥.

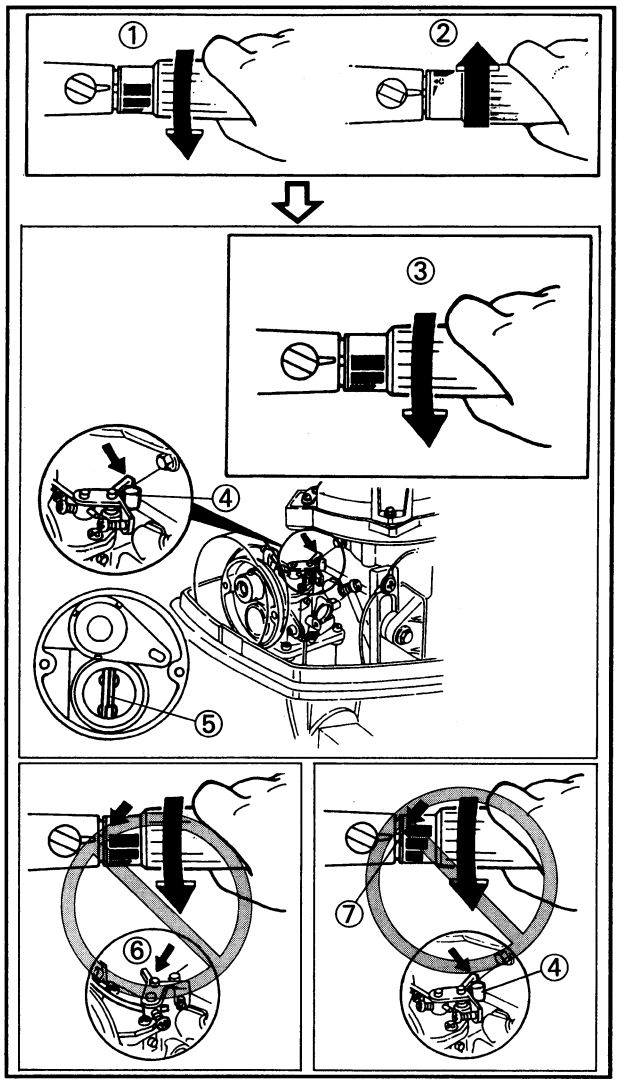
Clearance ⓐ:
0.5 ~ 1.0 mm (0.02 ~ 0.04 in)

• Tighten the adjust nut ③ securely.

CAUTION:

After adjusting the clearance, be sure to check the operation of the starter protection system.





THROTTLE WIRE ADJUSTMENT

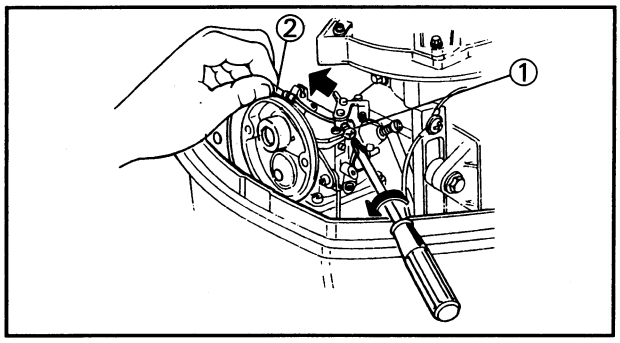
NOTE:

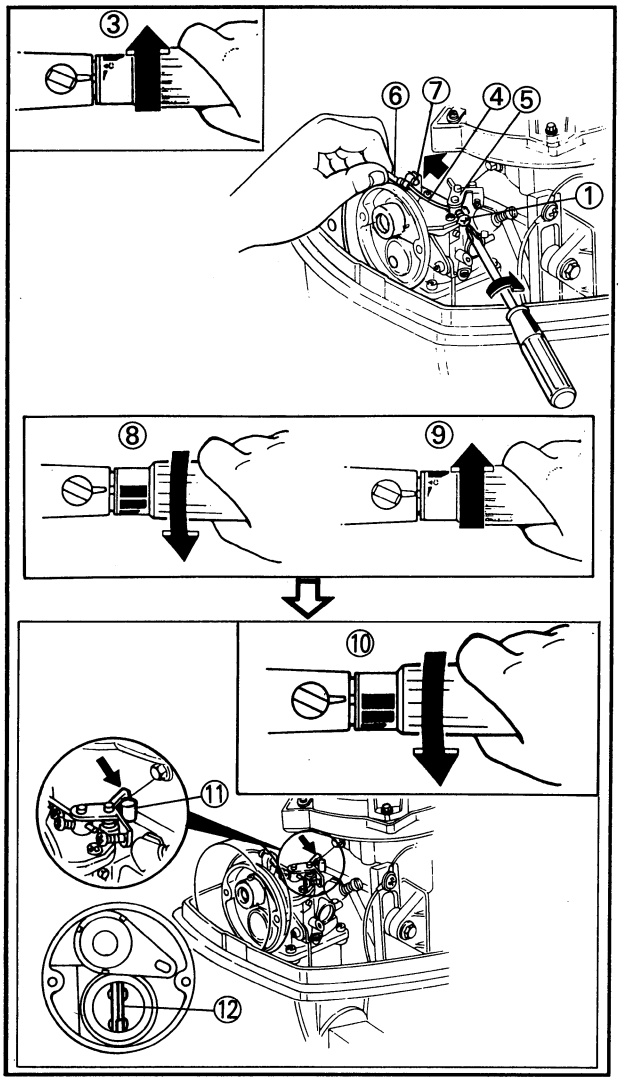
Before adjusting the throttle wire, the engine idle speed should be adjusted.

1. Remove:
   • Silencer cover ①
2. Check:
   • Throttle grip position
   Incorrect→Adjust.

Checking steps:

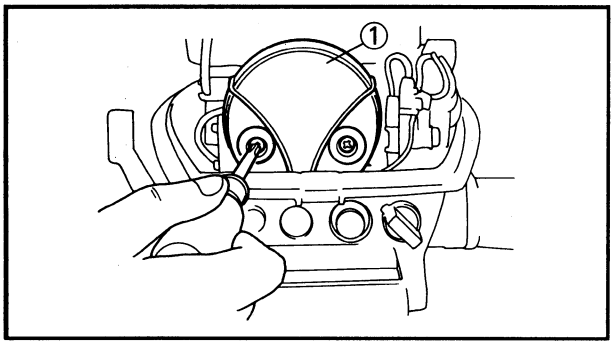
- Turn the throttle grip to "FAST" ① and "SLOW" ② 2 or 3 times.
- Check that when it is at "FAST" ③, the full open side stopper ④ for the throttle valve ⑤ is in contact with the stopper on the carburetor.
- If not ⑥ or if it contacts the stopper ④ on the carburetor before the throttle grip comes to "FAST" ⑦, adjust the throttle wire.





3. Adjust:
   • Throttle wire

Adjustment steps:
- Loosen the screw ① retaining throttle wire and pull out the wire ②.
- Set the throttle grip to "SLOW" ③.
- Insert the inner wire ④ into the hole in the throttle lever ⑤, and lock it with the screw ①.
- Pull out the outer wire ⑥ and hook it onto the wire hook ⑦ on the carburetor.
- Turn the throttle grip to "FAST" ⑧ and "SLOW" ⑨ 2 or 3 times, and check that when it is at "FAST" ⑩, the full-open side stopper ⑪ for the throttle valve ⑫ is in contact with the stopper on the carburetor.



4. Install:
   • Silencer cover ①
   Refer to the "FUEL SYSTEM-CARBURETOR" section in CHAPTER 4. (page 4-12)

CHAPTER 4
FUEL SYSTEM

E20050-0

FUEL SYSTEM

PREPARATION FOR REMOVAL

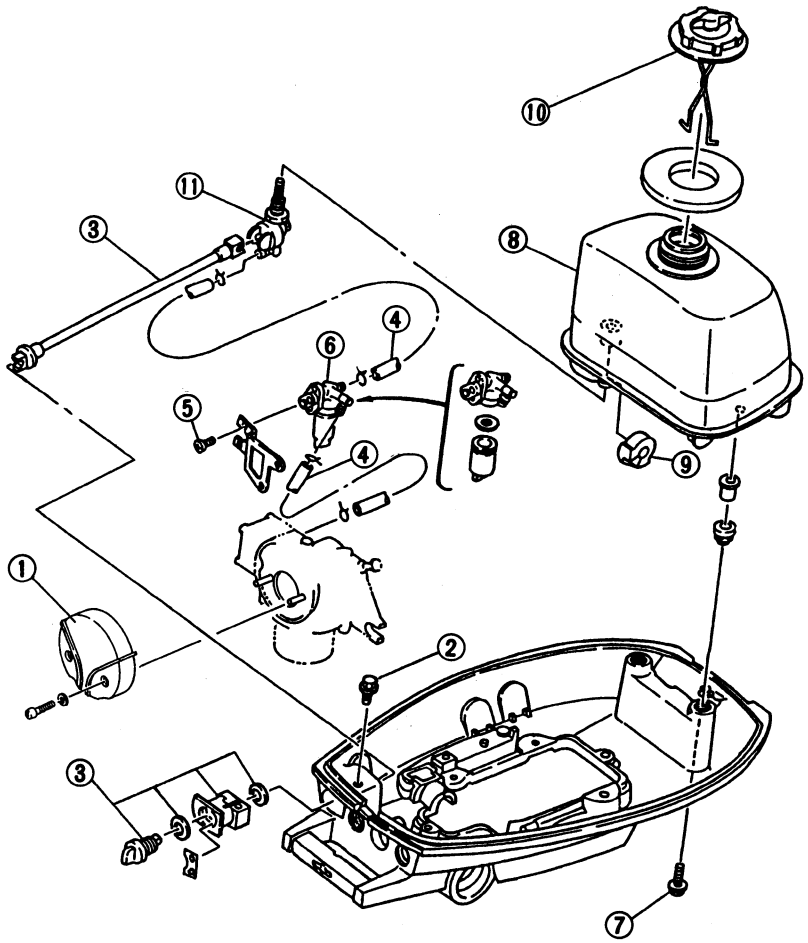
• Removal the top cowling.

⚠ WARNING

- **Gasoline (petrol) is highly inflammable and explosive. Handle with special care.**
- **Failure to check for fuel leakage may result in fire or explosion.**

Fuel tank — built in model (4AC, 5C)

4AC, 5C



Extent of removal:

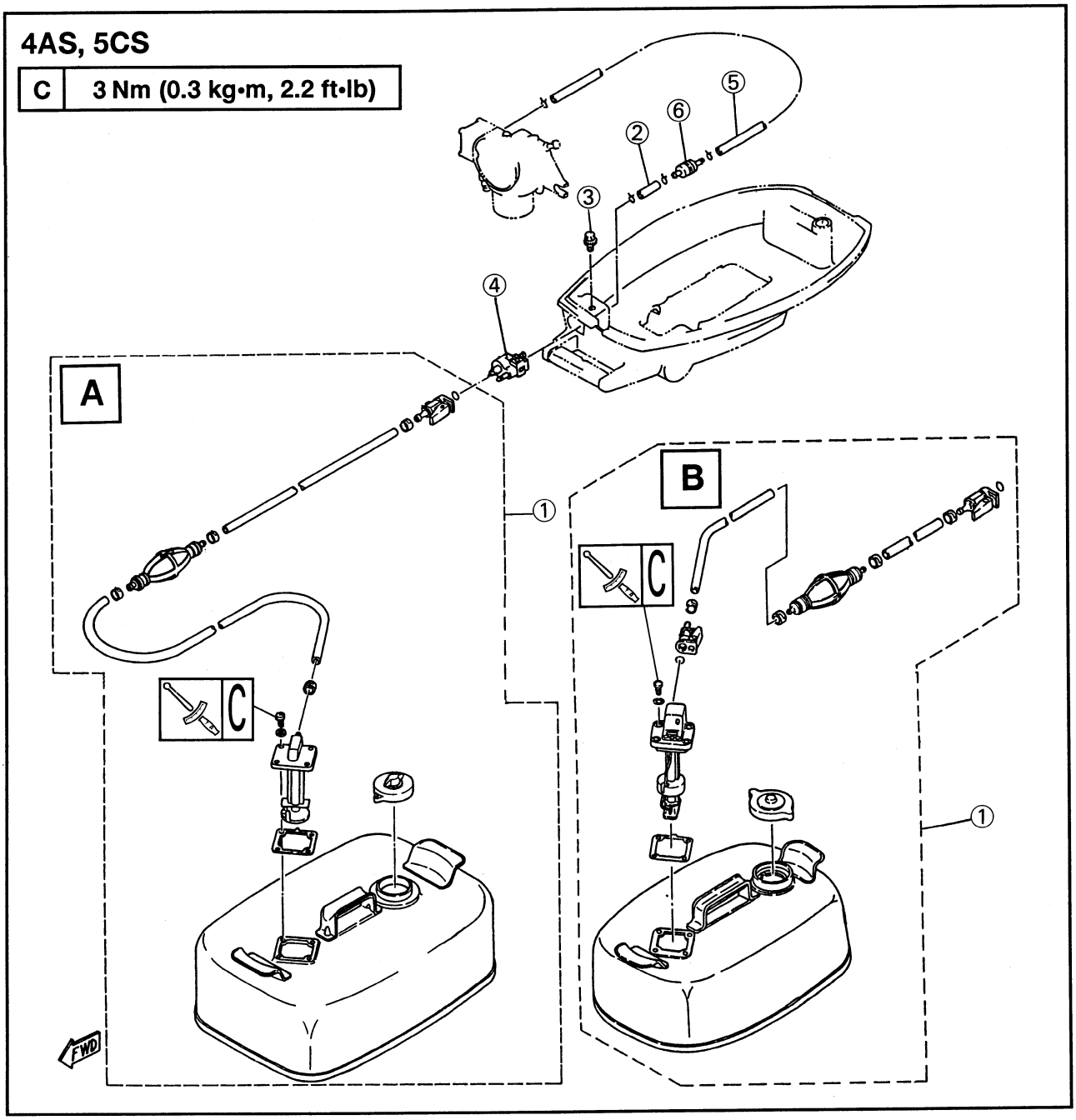
① Fuel cock lever removal
② Fuel cock 2 removal
③ Fuel cock 1 removal

Extent of removal	Order	Part name	Q'ty	Remarks
①	1	Silencer cover	1	
	2	Bolt	1	
	3	Fuel cock lever and shaft	1	
	4	Fuel hose	2	
②	5	Screw	2	Refer to "REMOVAL POINTS".
③	6	Fuel cock 2	1	This part is not provided depending on the destination.
	7	Bolt	2	
	8	Fuel tank	1	
	9	Damper rubber	2	
	10	Fuel tank cap	1	
	11	Fuel cock 1	1	

E20050-0

Fuel tank — separate model (4AS, 5CS)

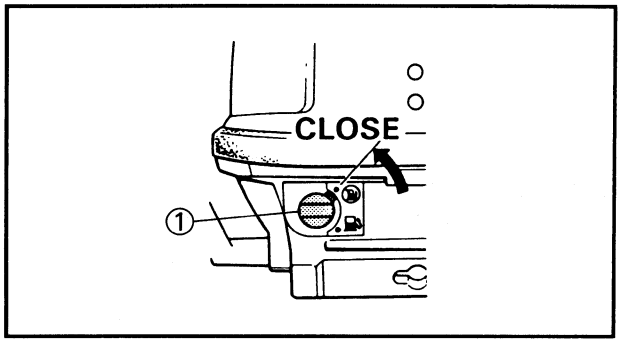
[A]:For EUROPE
[B]:For OCEANIA



Extent of removal:

① Fuel tank removal
② Fuel hose joint
③ Fuel filter

Extent of removal	Order	Part name	Q'ty	Remarks
① ② ③	1	Fuel tank assembly	1	Refer to "REMOVAL POINTS".
	2	Fuel hose	1	
	3	Bolt	1	
	4	Fuel hose joint	1	
	5	Fuel hose	1	
③	6	Fuel filter	1	



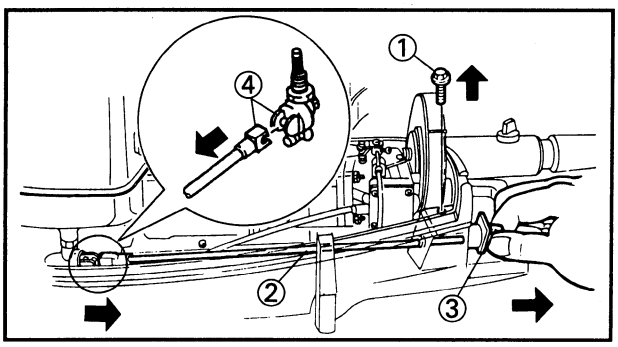
REMOVAL POINTS

Fuel tank — built in model (4AC, 5C)

1. Turn:
   • Fuel cock lever ①

⚠WARNING

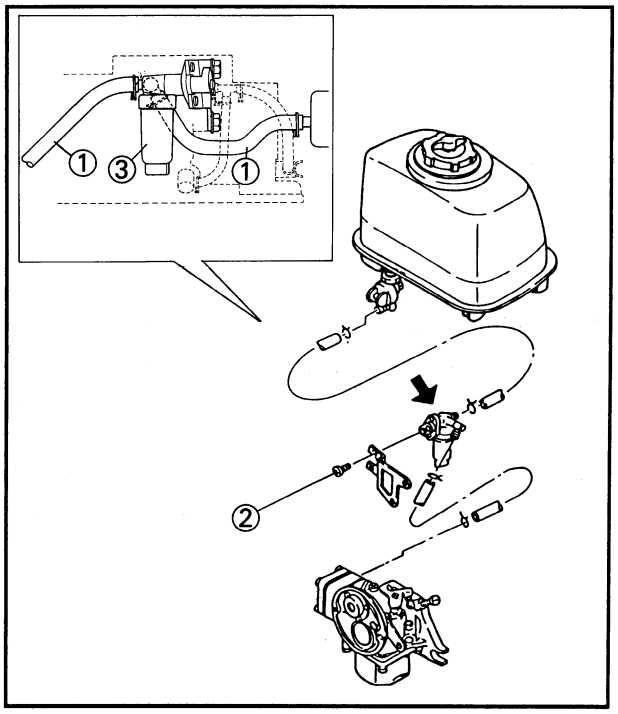
Before removing the fuel tank, be sure to set the fuel cock to "CLOSE".



2. Remove:
   • Bolt ①
3. Disconnect:
   • Fuel cock shaft ②
   (with fuel cock lever ③)

CAUTION:

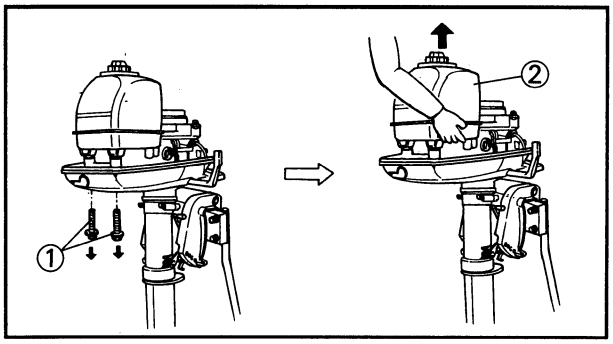
Be careful not to break the joints ④.



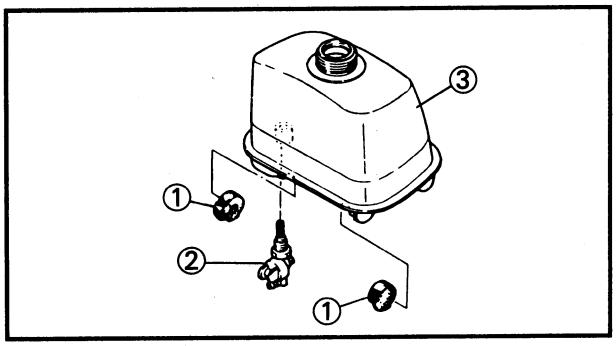
4. Remove:
   • Clip
   • Fuel hose ①
   • Screw ②
   • Fuel cock ③

⚠WARNING

Fuel remains in the fuel hose between the fuel cock and fuel pump. Drain the remaining fuel out into a container or let it be soak it up with a cloth so that the fuel does not spill onto the bottom cowling.



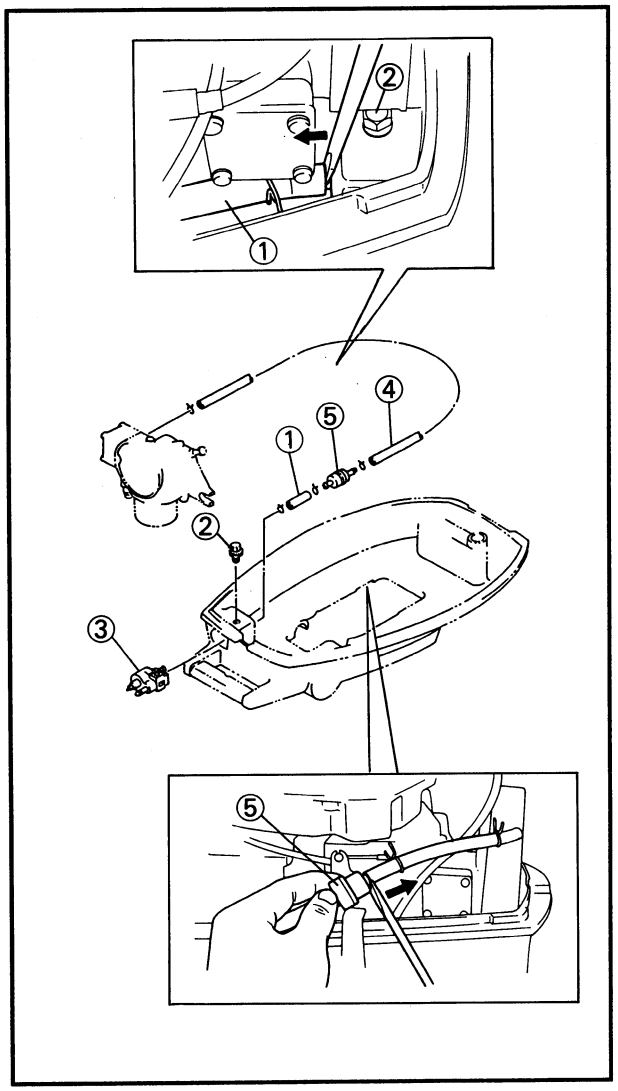
5. Remove:
   • Bolt ①
   • Fuel tank ②



6. Remove:
   - Locating damper rubber ①
   - Fuel cock ②
   - Fuel tank ③

⚠WARNING

Before removing the fuel cock, be sure to completely drain the fuel in the tank into a can. If not drained, the fuel will flow down to the floor or the work bench, thus causing a danger of fire.

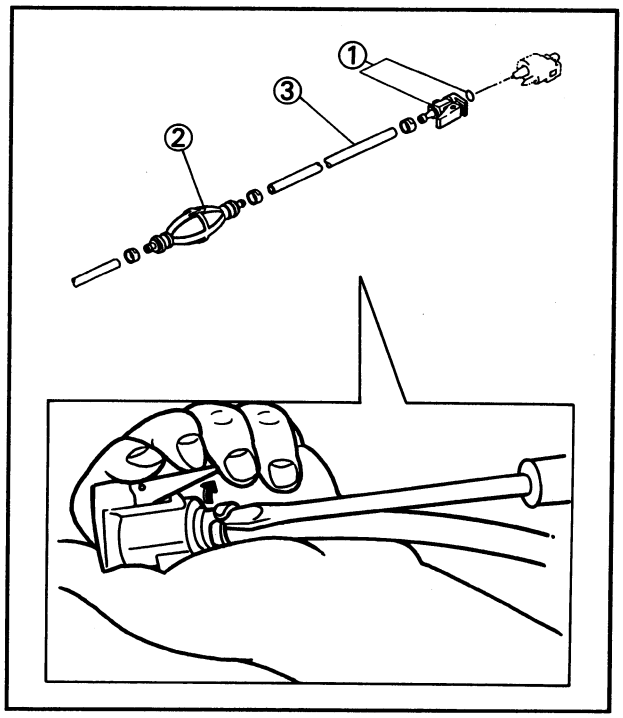


Fuel tank — separate model (4AS, 5CS)

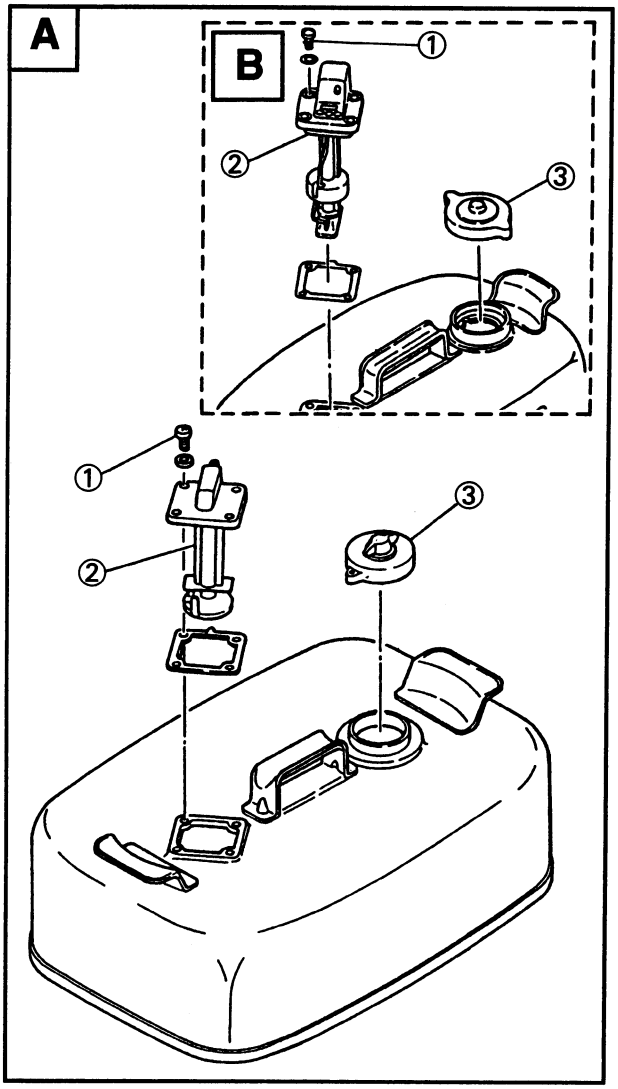
1. Remove:
   - Clip
   - Fuel hose ①
   - Bolt ②
   - Fuel hose joint ③
   - Fuel hose ④
   - Fuel filter ⑤

⚠WARNING

Fuel remains in the fuel hose between the fuel joint and fuel filter, and fuel filter and carburetor.
Drain the remaining fuel out into a container or soak it up with a cloth so that the fuel does not spill on the bottom cowling.



2. Remove:
   - Band
   - Fuel hose joint ①
   - Priming pump ②
   - Fuel hose ③

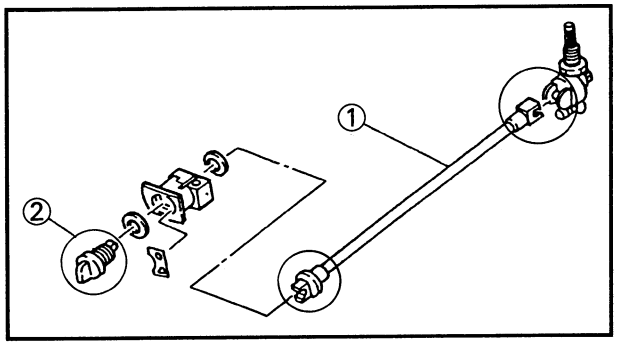


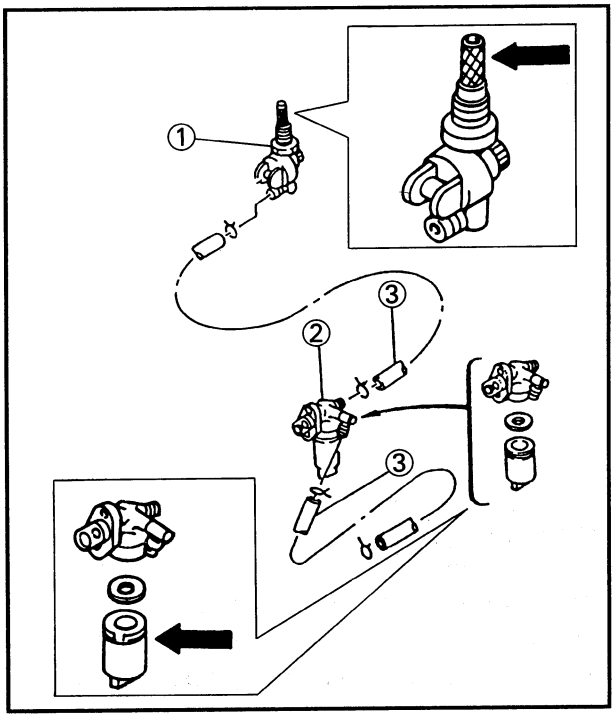
3. Remove:
   - Screw ①
   - Fuel meter ②
   - Fuel tank cap ③

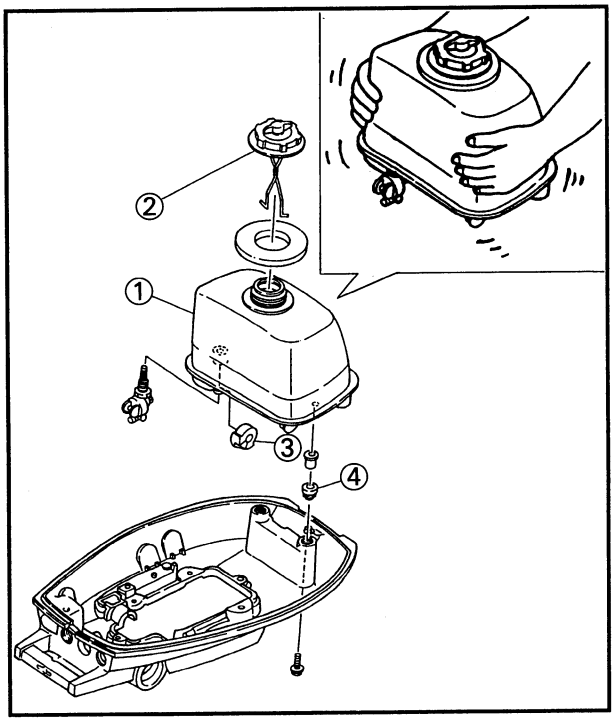
⚠WARNING

Gasoline (petrol) is highly flammable and explosive. Avoid smoking while servicing the fuel system. Also, keep away open flames and sparks.

A:For EUROPE
B:For OCEANIA







CLEANING AND INSPECTION

Fuel tank — built in model (4AC, 5C)

Fuel cock lever

1. Inspect:
   - Fuel cock shaft ①
   - Fuel cock lever ②

   Wear/Crank/Damage→ Replace.

Fuel cock and fuel hose

1. Inspect:
   - Fuel cock 1 ①
   - Fuel cock 2 ②

   Crack/Leak/Damage→Replace.
   Clog→Clean.

NOTE:

- The fuel cock 2 is not provided depending on the destination.
- Thoroughly clean the filter in the fuel cock and the fuel passage with a suitable cleaning solvent, and blow them out with compressed air.

⚠WARNING

Protect your eyes with suitable safety spectacles or safety goggles when using compressed air.

2. Inspect:
   - Fuel hose ③

   Crack/Leak/Damage→Replace.

Fuel tank

1. Inspect:
   - Fuel tank ①
   - Fuel tank cap ②

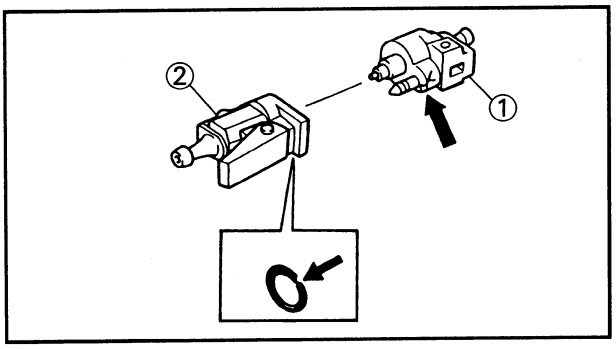
   Crack/Leak/Damage→Replace.
   Dirt→Clean.

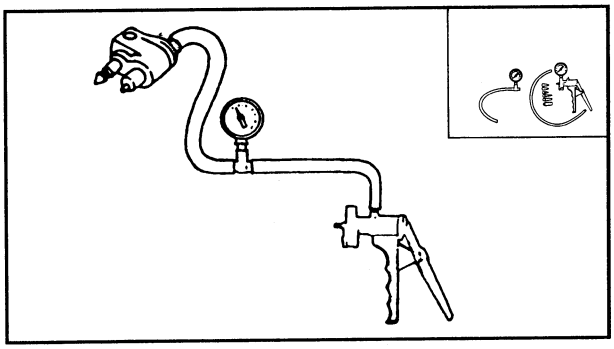
NOTE:

Add a small quantity of suitable cleaning solvent to the fuel tank and thoroughly clean the tank interior by shaking the tank. After cleaning, drain off the solvent completely.

2. Inspect:
   - Locating damper rubber 1 ③
   - Locating damper rubber 2 ④

   Crack/Damage→Replace.



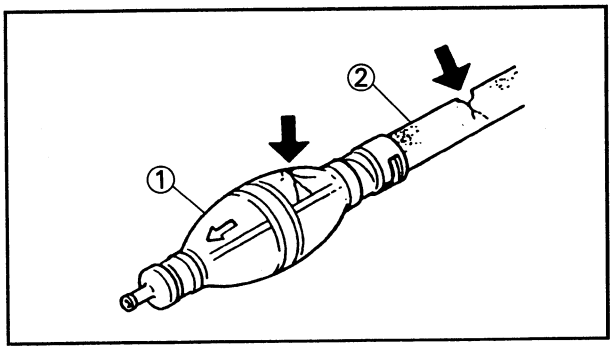


Fuel tank — separate model (4AS, 5CS)

Fuel joint

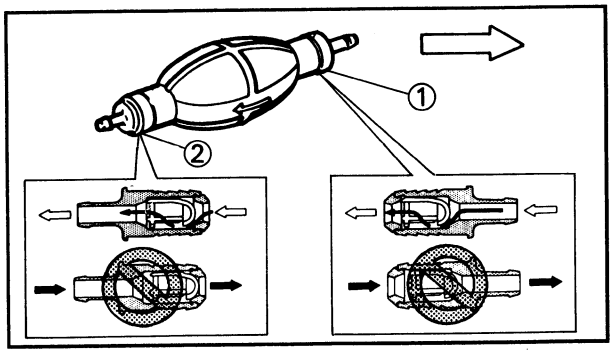
1. Inspect:
   - Fuel hose joint ① (engine side)
   - Fuel hose joint ② (separate fuel tank side)
   Crack/Leak/Damage → Replace.
2. Measure:
   - Fuel joint operation
   Impossible to maintain the specified pressure for 10 sec. → Replace.

Measuring steps:
• Attach the Lower unit pressure/vacuum tester.
Lower unit pressure/vacuum tester. YB-35956, 90890-06756
• Apply the specified pressure.
Specified pressure: 170 kPa (1.7 kg/cm², 24.2 psi)



Priming pump and Fuel hose

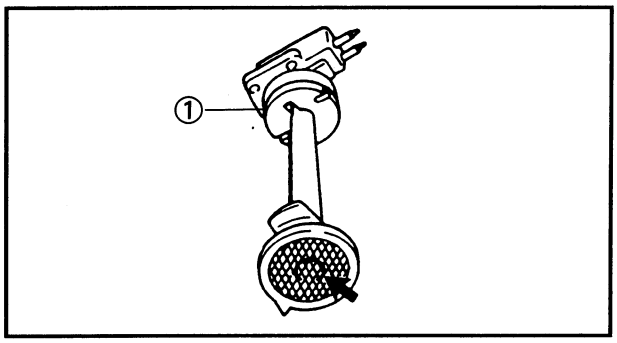
1. Inspect
   - Priming pump ①
   - Fuel hose ②
   Crack/Leak/Damage → Replace.

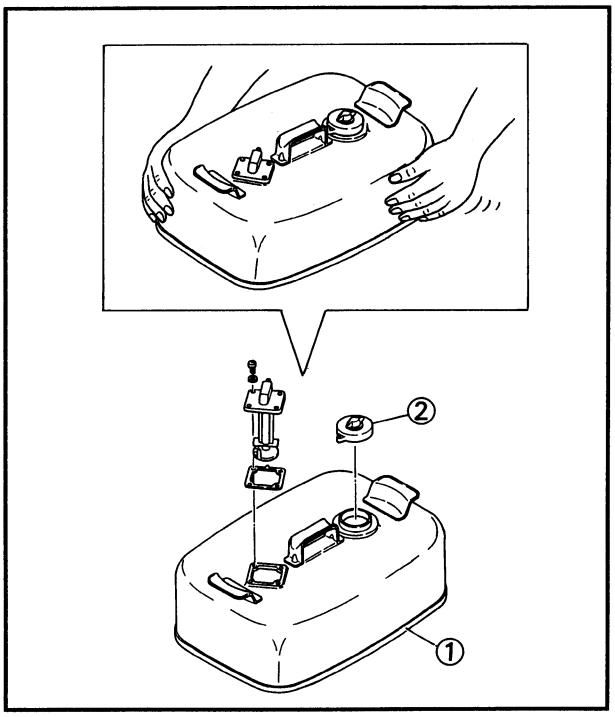


2. Inspect:
   - Check valve ① and ② operation
   Check the operation of the check valve by blowing into it.

NOTE:

The check valves on the inlet ① and outlet ② sides are of the different type. Before checking the check valves, put marks on them so that they can easily be distingushed.





3. Inspect:
   • Fuel meter assembly ①
   Crack/Leak/Damage → Replace.
   Clog → Clean.

NOTE:

Thoroughly clean the strainer on the end of the suction pipe with suitable cleaning solvent, and blow it dry with compressed air. Wash the fuel meter assembly with suitable cleaning solvent, and blow it dry with compressed air.

⚠WARNING

Protect your eyes with suitable safety spectacles or safety goggles when using compressed air.

Fuel tank

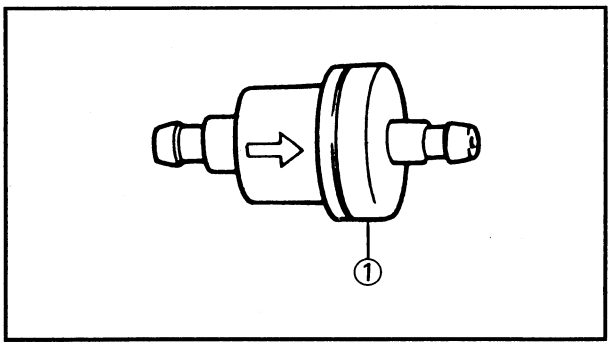
1. Inspect
   • Fuel tank ①
   • Fuel tank cap ②
   Crack/Leak/Damage → Replace.
   Clog → Clean.

NOTE:

Add a small quantity of suitable cleaning solvent to the fuel tank and thoroughly clean the tank interior by shaking the tank. After cleaning, drain off the solvent completely.

⚠WARNING

Gasoline (petrol) is highly flammable and explosive. Avoid smoking while servicing the fuel system. Also, keep away open flames and sparks.



Fuel filter

1. Inspect:
   • Fuel filter ①
   Crack/Leak/Damage → Replace.
   Clog → Replace.

ASSEMBLY AND INSTALLATION

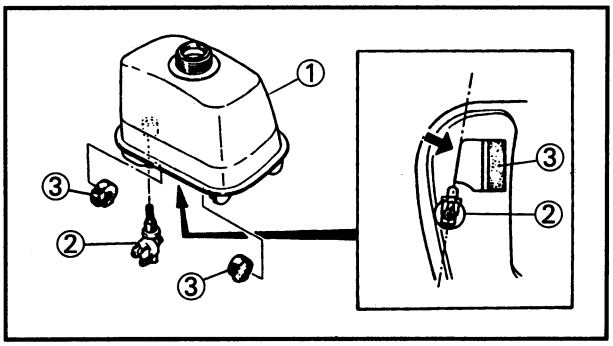
Reverse the "REMOVAL" procedures. Note the following points.

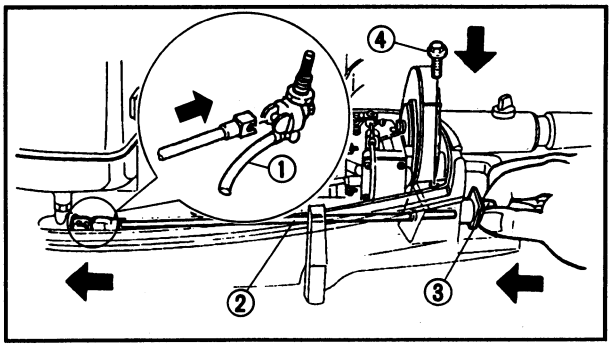
CAUTION:

- **Always use new gaskets to prevent fuel leakage passed joints.**
- **To prevent the fuel from leaking passed the fuel hose joints, replace any fatigued fuel hose bands or clips.**

NOTE:

When connecting the fuel hoses to the fuel pump and fuel filter, follow the direction of flow indicated by the arrow mark.





Fuel tank — built in model (4AC, 5C)

1. Install:
   - Fuel tank ①
   - Fuel cock ②
   - Locating damper rubber ③

NOTE:

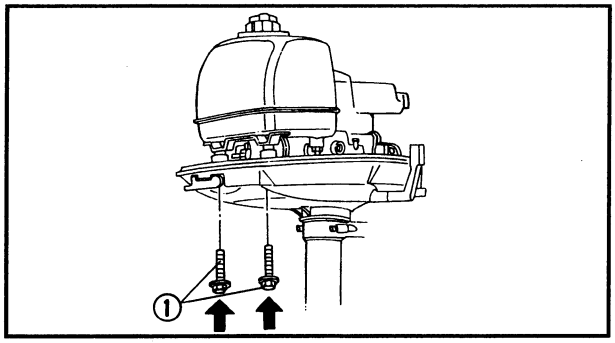
Screw in the fuel cock about 5 turns so that it faces in the direction as shown illustration, and secure it with the lock nut.

	Nut: **5 Nm (0.5 kg•m, 3.6 ft•lb)**

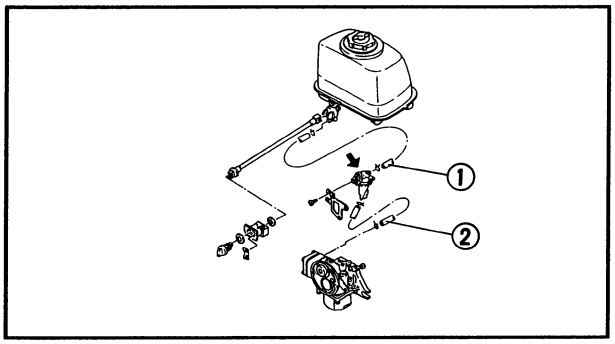
2. Install:
   - Fuel hose ①
   - Fuel cock shaft ②
     (with fuel cock lever ③)
   - Bolt ④

NOTE:

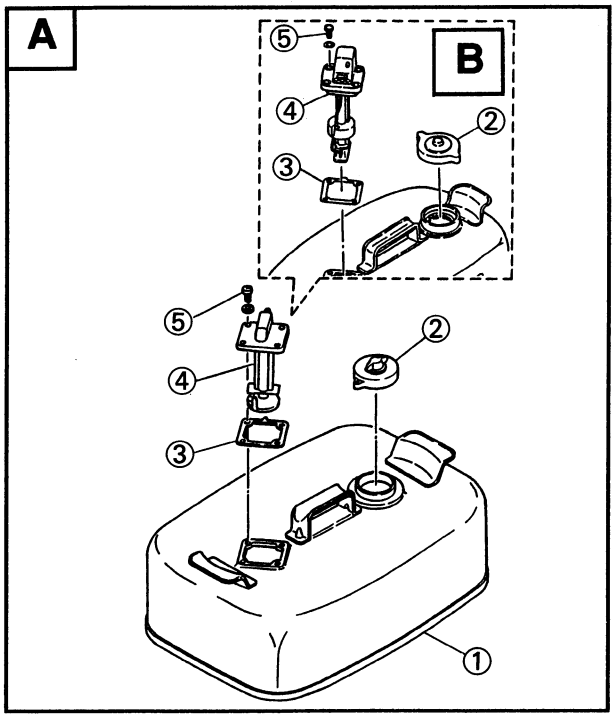
If the fuel cock lever is not connected straight to the cock, loosen the cock nut and adjust the cock position.



3. Install:
   • Bolt ①



4. Install:
   • Fuel hose ① [ℓ = 150 mm (5.9 in)]
   • Fuel hose ② [ℓ = 120 mm (4.7 in)]
   • Clip

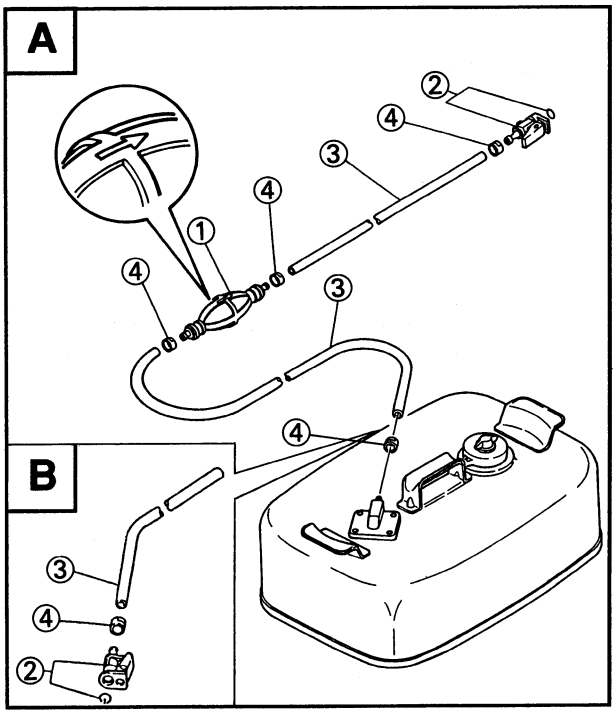


Fuel tank — separate model (4AS, 5CS)

1. Install:
   • Fuel tank ①
   • Fuel tank cap ②
   • Fuel meter gasket ③ (new)
   • Fuel meter assembly ④
   • Screw ⑤

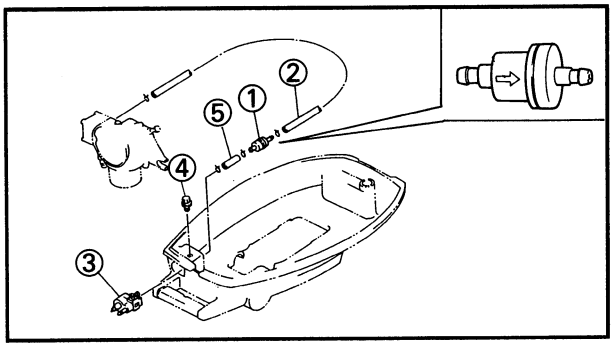
	Screw: **3Nm (0.3 kg•m, 2.2 ft•lb)**

[A]:For EUROPE
[B]:For OCEANIA

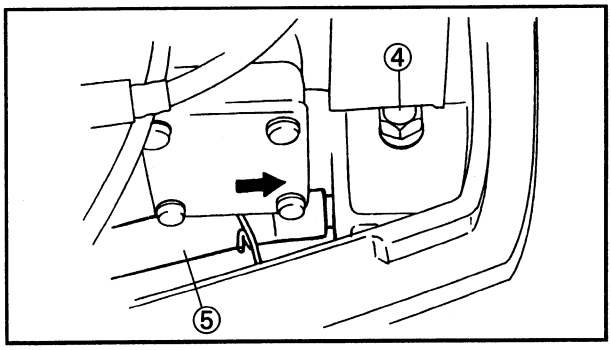


2. Install:
   - Priming pump ①
   - Fuel hose joint ②
   - Fuel hose ③
   - Band ④

A:For EUROPE
B:For OCEANIA



3. Install:
   - Fuel filter ①
   - Fuel hose ②
   - Fuel hose joint ③
   - Bolt ④
   - Fuel hose ⑤
   - Silencer cover



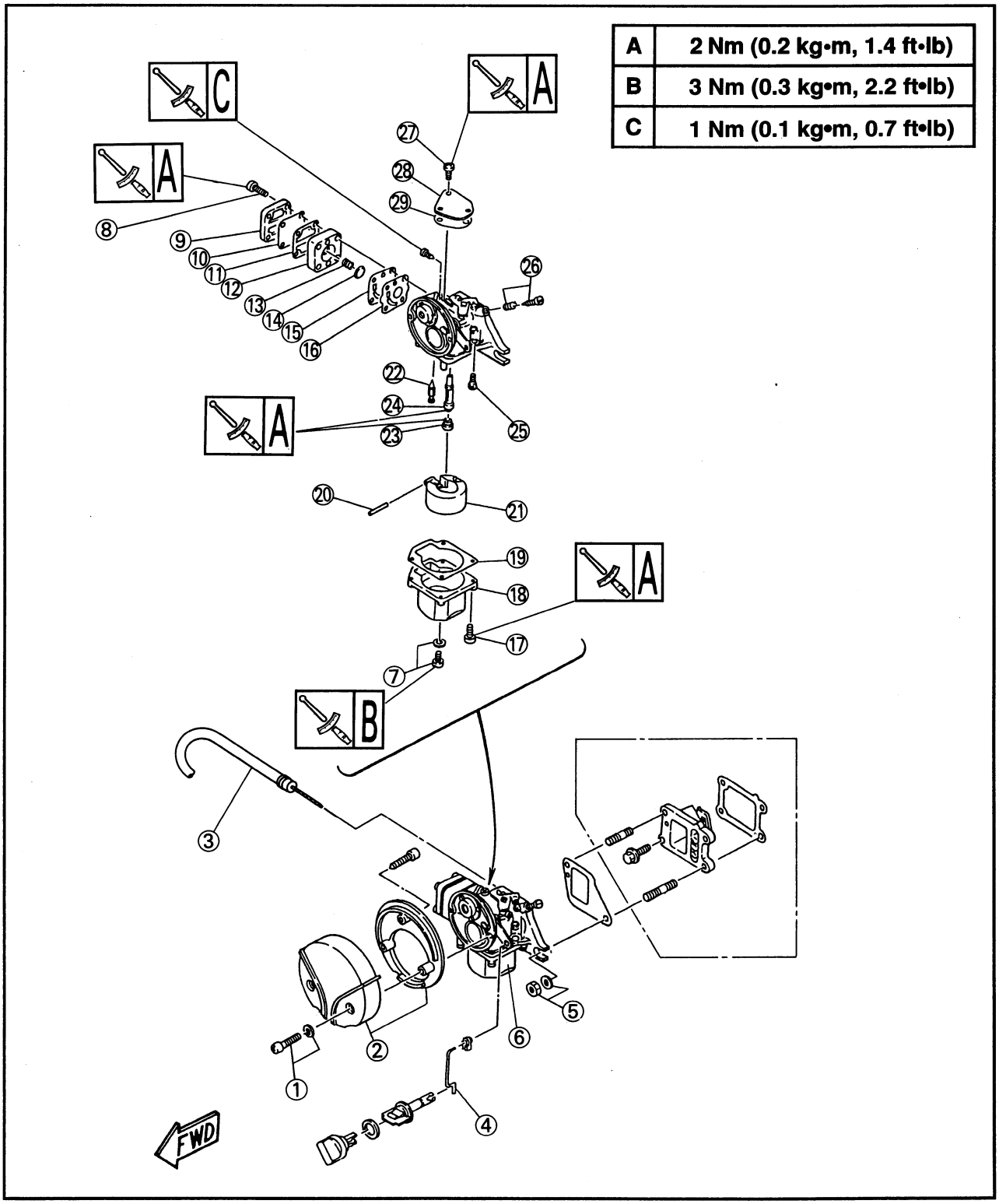
CARBURETOR

PREPARATION FOR REMOVAL

- Remove the top cowling.
- Disconnect the fuel hose at the fuel cock or fuel filter side.
  Refer to "FUEL SYSTEM" section. (page 4-1)

⚠ WARNING

- **Gasoline (petrol) is highly inflammable and explosive. Handle with special care.**
- **Failure to check for fuel leakage may result in fire or explosion.**



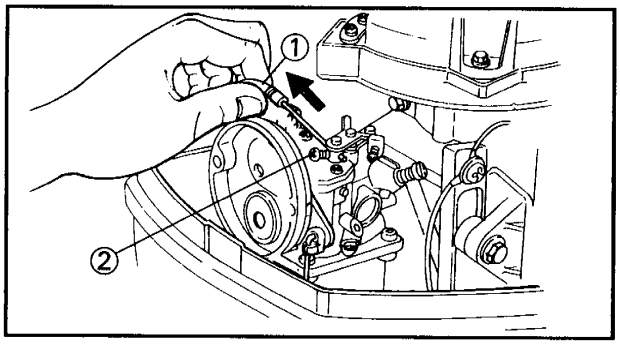
CARBURETOR

NOTE ON REMOVAL AND REASSEMBLY

- With the engine mounted, the following parts can be removed.
- Before inspection, the removed parts should be cleaned and blow out all passages and jets with compressed air.
- After removing the carburetor, cover the reed valve preventing foreign material from entering.

Extent of removal: ① Carburetor removal
② Fuel pump disassembly
③ Carburetor disassembly

Extent of removal	Order	Part name	Q'ty	Remarks
① ② ③	1	Screw	2	
	2	Silencer cover	1	
	3	Throttle wire	1	
	4	Choke link rod	1	
	5	Nut	2	Refer to "REMOVAL POINTS".
② ③	6	Carburetor	1	
	7	Drain screw	1	
	8	Screw	4	
	9	Fuel pump cover	1	
	10	Diaphragm (outer)	1	
③	11	Gasket (outer)	1	
	12	Fuel pump body	1	
	13	Diaphragm spring	1	
	14	Plate	1	
	15	Diaphragm (inner)	1	
③	16	Gasket (inner)	1	
	17	Screw	4	
	18	Float chamber	1	
	19	Float chamber gasket	1	
	20	Float pin	1	
③	21	Float	1	Refer to "REMOVAL POINTS".
	22	Needle valve	1	
	23	Main jet	1	
	24	Main nozzle	1	
	25	Pilot jet	1	
③	26	Pilot screw	1	
	27	Screw	4	
	28	Cover	1	
	29	Gasket	1	



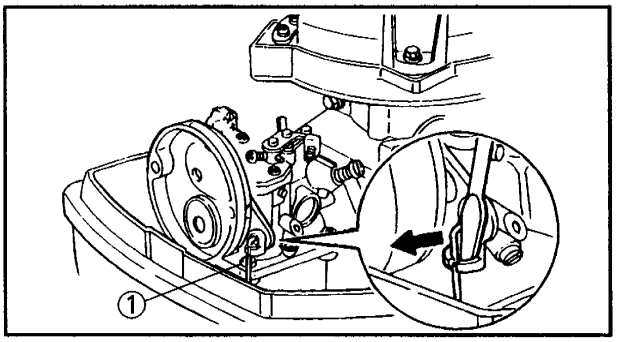
REMOVAL POINTS

Carburetor removal

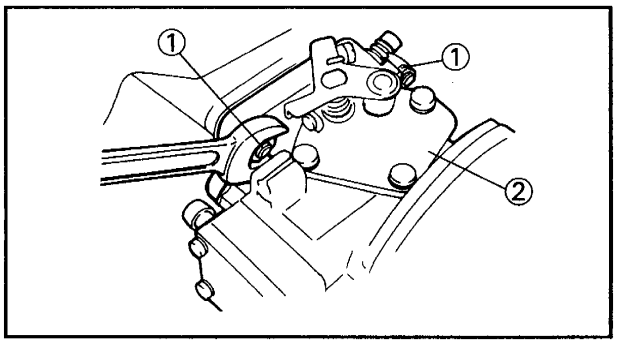
1. Remove:
   - Throttle wire ①

NOTE:

Loosen the screw ② retaining the throttle wire and pull out the wire.



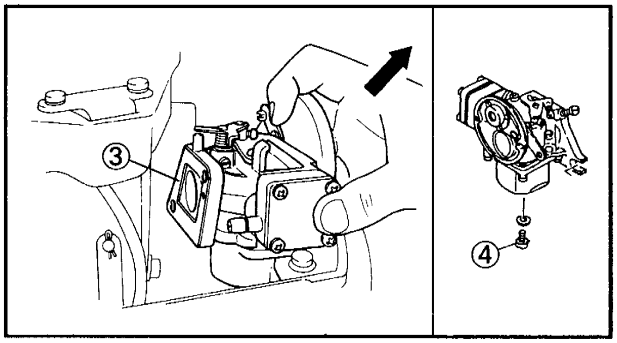
2. Remove:
   • Choke link rod ①



3. Remove:
   • Nut ①
   • Carburetor ②
   • Gasket ③
   • Drain screw ④

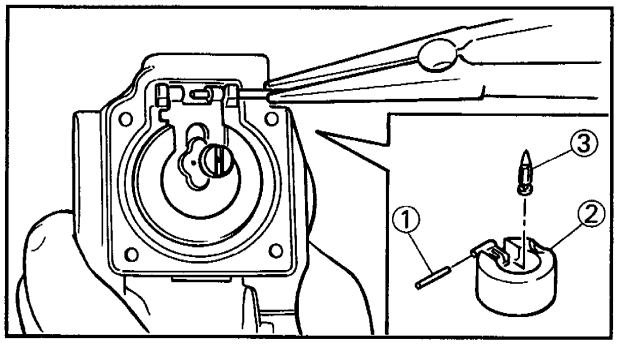
NOTE:

To remove the carburetor, remove the left-hand nut first and then loosen the right-hand nut halfway. Next, pull the carburetor forward, and slide it to the left.

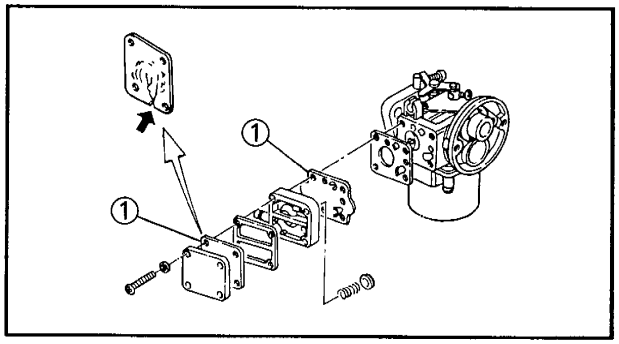


⚠WARNING

Drain the remaining fuel out into a container or let it be soak it up with a cloth so that the fuel does not spill onto the bottom cowling.



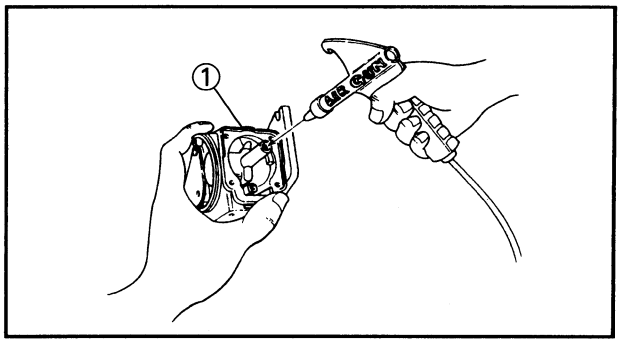
4. Remove:
   • Float pin ①
   • Float ②
   • Needle valve ③

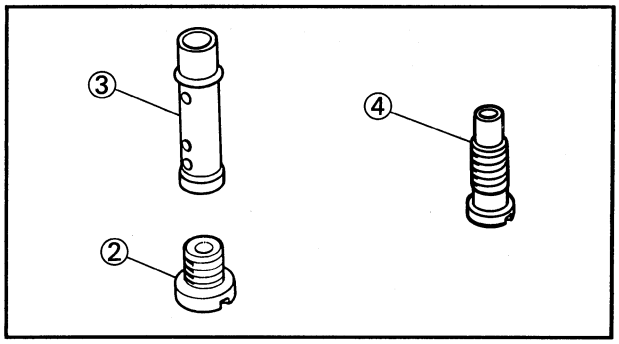


CLEANING AND INSPECTION

Fuel pump

1. Inspect:
   • Diaphragm ①
   Wear/Break/Damage→Replace.





Carburetor body and jets

1. Inspect:
   - Carburetor body ①
   - Main jet ②
   - Main nozzle ③
   - Pilot jet ④

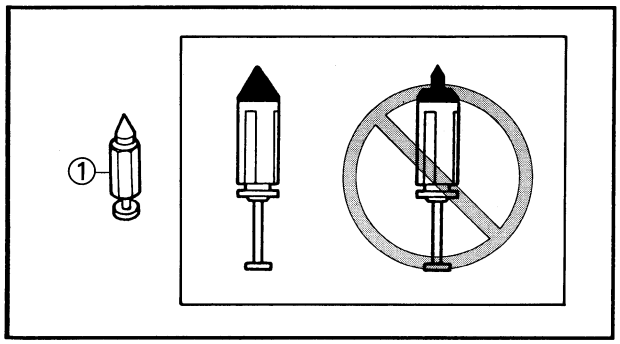
   Crack/Damage→Replace.
   Clog→Clean.

NOTE:

- Check the carburetor body, its parts and the fuel and air passages for fouling or clogging. Clean fouled parts with suitable cleaning solvent, and blow out clogged passages with compressed air.
- Do not use steel wire for cleaning the jets as this may enlarge the jet diameters and seriously affect performance.

⚠WARNING

Be sure to direct compressed air downward as cleaning solvent may get in your eyes or other persons, or small carburetor parts may be blow off.

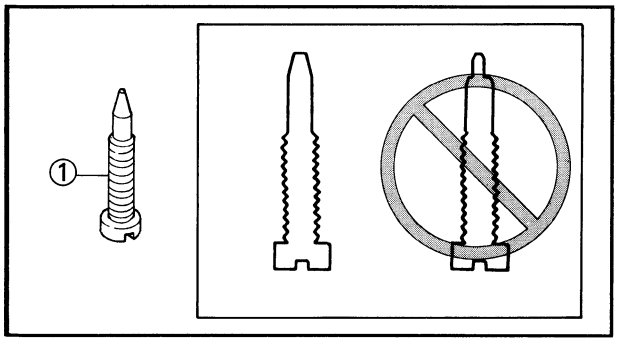


E32056-0

Needle valve

1. Inspect:
   - Needle valve ①

   Grooved wear→Replace.

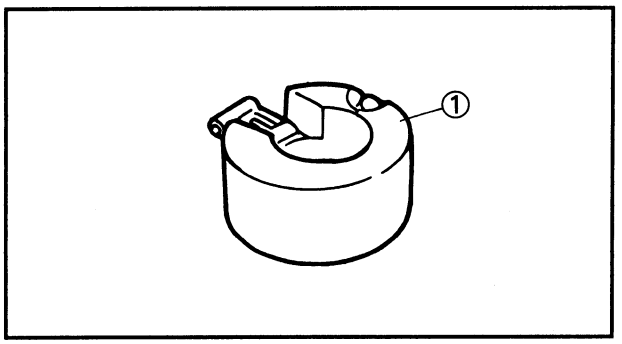


E32052-0

Pilot screw

1. Inspect:
   - Pilot screw ①

   Bend/Wear→Replace.



E32058-0

Float

1. Inspect:
   - Float ①
     Crack/Damage→Replace.

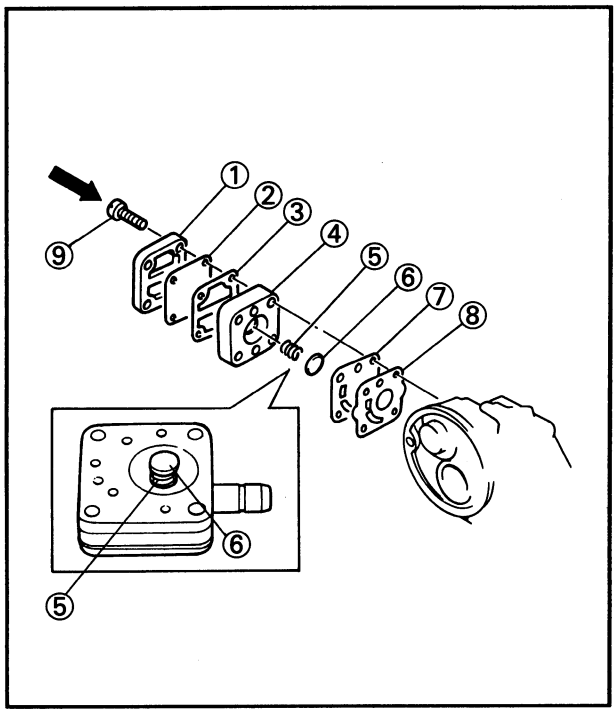
E34050-0

ASSEMBLY AND INSTALLATION

Reverse the "REMOVAL" procedures. Note the following points.

CAUTION:

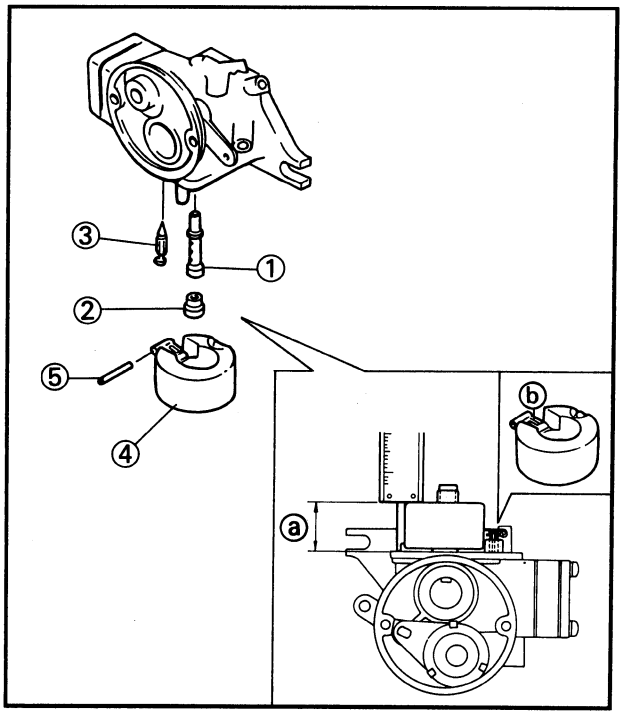
Always use new gaskets as a preventive measure against fuel leakage.



Fuel pump

1. Install
   - Fuel pump cover ①
   - Diaphragm (outer) ②
   - Gasket (outer) ③
   - Fuel pump body ④
   - Spring ⑤
   - Plate ⑥
   - Diaphragm (inner) ⑦
   - Gasket (inner) ⑧
   - Screw ⑨

	Screw: **2 Nm (0.2 kg•m, 1.4 ft•lb)**



Carburetor

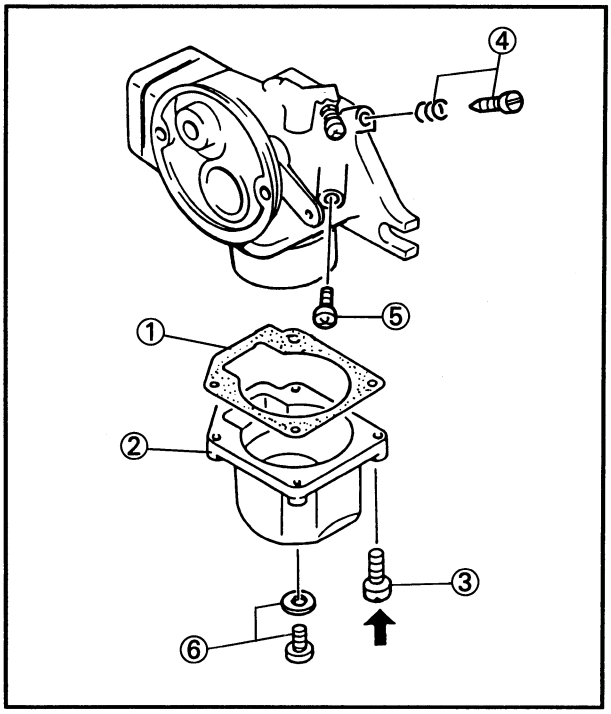
1. Install:
   - Maine nozzle ①
   - Main jet ②
   - Needle valve ③
   - Float ④
   - Float pin ⑤
2. Measure:
   - Float height ⓐ

   Out of specification → Fold the tab ⓑ to adjust float arm height.

Float height ⓐ:
22±0.5 mm (0.87±0.02 in)

NOTE:

- The float should be resting on the needle valve, but not compressing the needle valve.
- Take measurement at the end surface of the float opposite to its pivoted side.



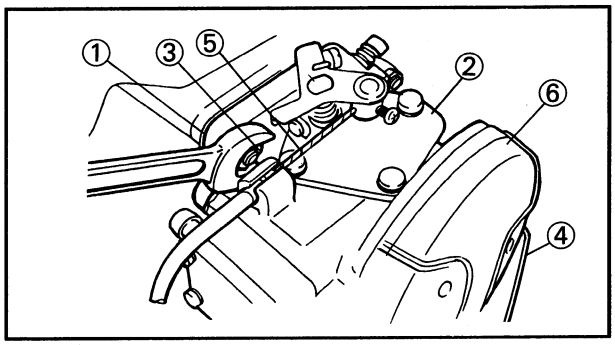
3. Install:
   - Float gasket ①
   - Float chamber ②
   - Screw ③
   - Pilot screw ④
   - Pilot jet ⑤
   - Drain screw ⑥

Screw ③:
2 Nm (0.2 kg•m, 1.4 ft•lb)
Drain screw ⑥:
3 Nm (0.3 kg•m, 2.2 ft•lb)

4. Adjust:
   - Pilot screw

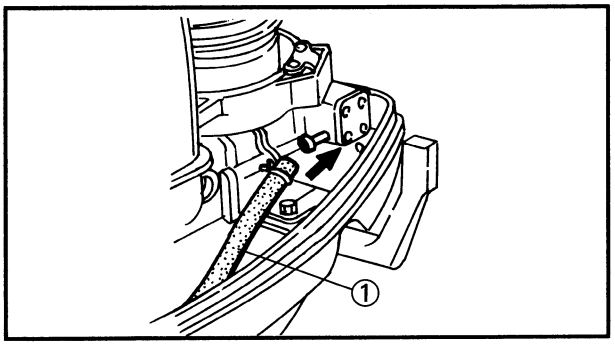
Adjustment steps:
- Screw in the pilot screw until it is lightly seated.
- Back out by the specified number of turns.

Pilot screw:
4AC, 4AS : 1-3/4 ± 1/4
5C, 5CS : 1-1/2 ± 1/4



5. Install:
   - Gasket ①
   - Carburetor ②
   - Nut ③ (with washer)
   - Choke link rod ④
   - Throttle wire ⑤
   - Silencer cover ⑥
6. Adjust:
   - Throttle wire

   Refer to "PERIODIC SERVICE–THROTTLE WIRE ADJUSTMENT" section in CHAPTER 3. (Page 3-20)



7. Install:
   - Fuel hose ①.
8. Adjust:
   - Idle speed

   Refer to "PERIODIC SERVICE-IDLE SPEED" section in CHAPTER 3. (page 3-13)

CHAPTER 5
POWER UNIT

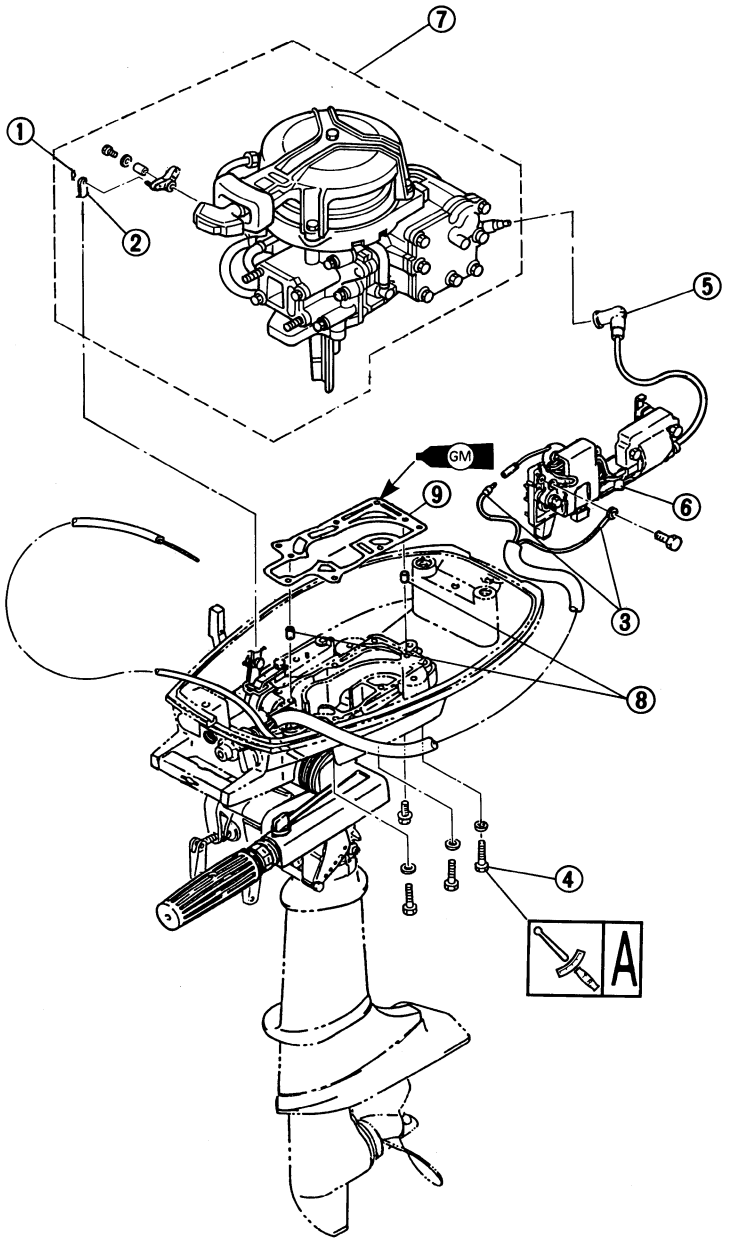
E20050-0

POWER UNIT REMOVAL AND INSTALLATION

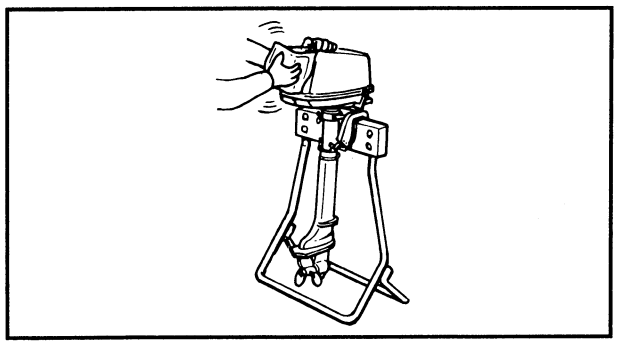
PREPARATION FOR REMOVAL

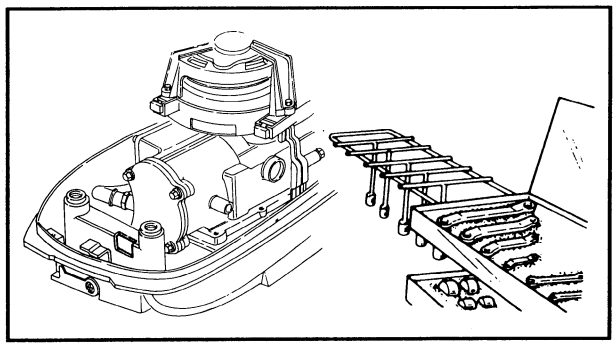
- Remove the top cowling.
- Remove the fuel tank and hose. Refer to the "FUEL SYSTEM REMOVAL POINTS" section in CHAPTER 4. (page 4-1)
- Remove the carburetor.
  Refer to the "FUEL SYSTEM-CARBURETOR" section in CHAPTER 4. (page 4-12)

A	1st:	3Nm (0.3 kg•m, 2.2ft•lb)
	2nd:	8Nm (0.8 kg•m, 5.8ft•lb)



POWER UNIT REMOVAL AND INSTALLATION



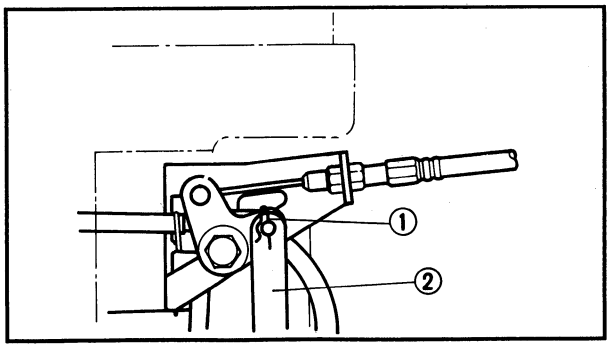


NOTE ON REMOVAL AND REASSEMBLY

- Clean all dirt, mud, dust and foreign material from the engine before the engine is removed and disassembled.
- To ensure that you can perform the work cleanly and efficiently, check that you have the proper tools and cleaning equipment before commencing engine removal and reassembly.

Extent of removal: ① Power unit removal

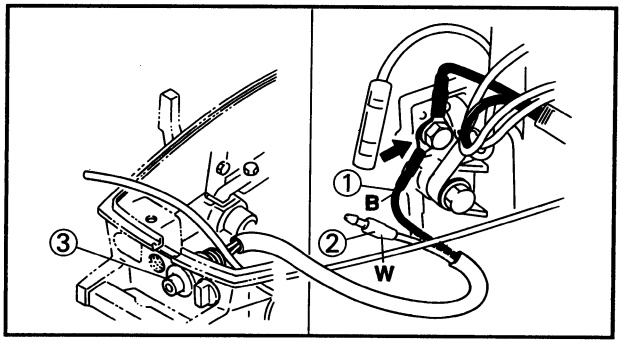
Extent of removal	Order	Part name	Q'ty	Remarks
①	1	Clip (except for EUROPE)	1	Refer to "REMOVAL POINTS".
	2	Link (except for EUROPE)	1	
	3	Stop switch lead	2	
	4	Bolt	9	
	5	Spark plug cap	1	
	6	Ignition coil bracket	1	
	7	Power unit	1	
	8	Dowel pin	2	
	9	Gasket	1	



REMOVAL POINTS

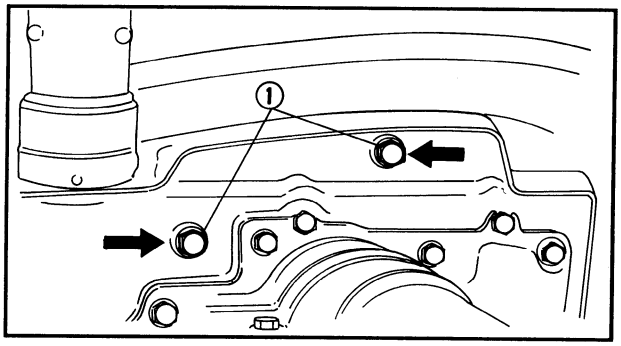
Start-in-gear protection wire (except for EUROPE)

1. Remove:
   - Clip ①
   - Link ②



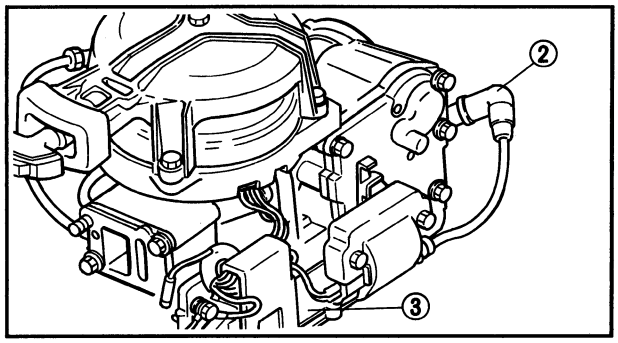
Stop switch lead

1. Remove:
   - Black (B) lead ① (ground lead)
2. Disconnect:
   - White (W) lead ②
3. Remove:
   - Stop switch ③



Ignition coil bracket

1. Remove:
   - Bolt ①
   - Spark plug cap ②
   - Ignition coil bracket ③



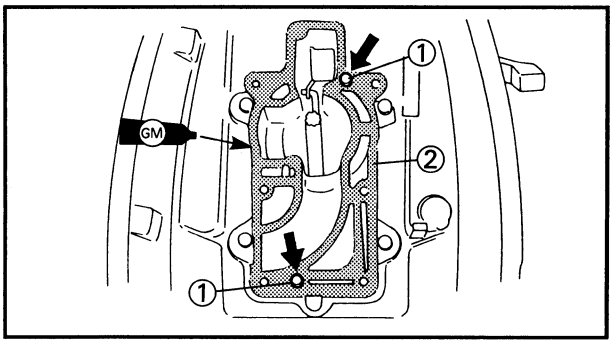
ASSEMBLY AND INSTALLATION

CAUTION:

Always use new gaskets, oil seals and O-rings. The use of any used oil seal or O-ring may result in oil leakage due to invisible scratches or stretches.

Apply grease to parts where specified.

Power unit



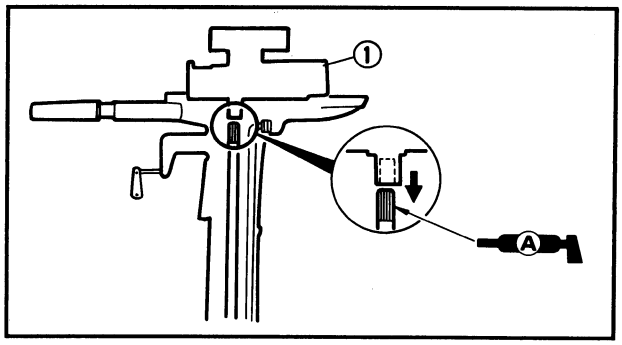
1. Apply:
   - Gasket maker

     Onto both faces of the gasket.

NOTE:

Clean the contacting surfaces of crankcase and bottom cowling.

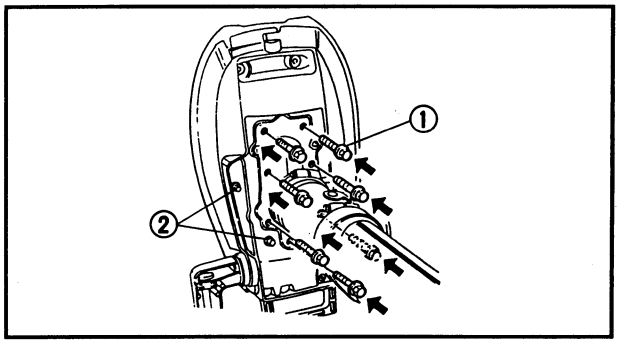
2. Install:
   - Dowel pin ①
   - Gasket ② (new)



3. Install:
   • Power unit ①

NOTE:

Insert the drive shaft into the crankshaft. If the splines will not come in complete mesh, rotate the crankshaft a little so that they are in mesh correctly.

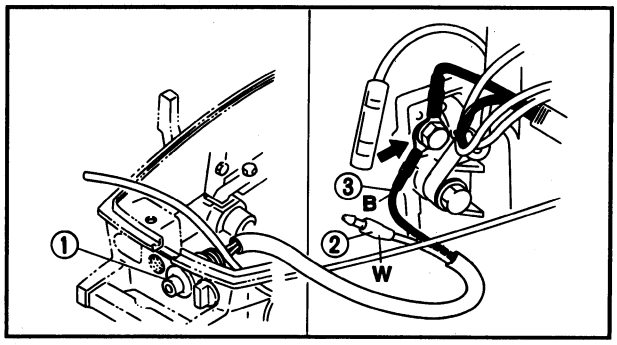


4. Install:
   • Mount bolt ①
   • Mount bolt ②

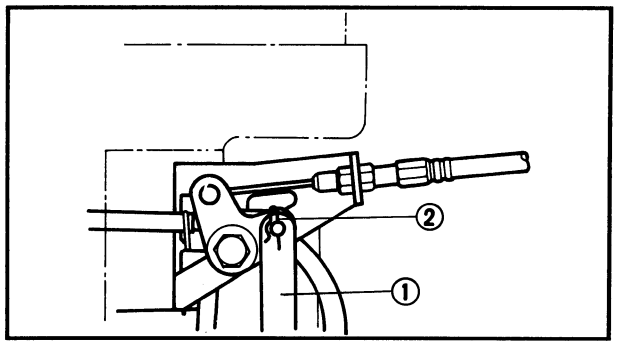
NOTE:

Tighten the bolts in two steps of torque.

Mount bolt:
1st : 3 Nm (0.3 kg•m, 2.2 ft•lb)
2nd: 8 Nm (0.8 kg•m, 5.8 ft•lb)



5. Install:
   • Stop switch ①
   • White lead ②
   • Black lead ③



6. Install:
   • Link ①
   • Clip ②

7. Adjust:
   • Throttle wire
   Refer to the "PERIODIC INSPECTION AND ADJUSTMENT-THROTTLE WIRE ADJUSTMENT" section in CHAPTER 3. (page 3-20)

8. Adjust:
   • Idle speed
   Refer to the "PERIODIC INSPECTION AND ADJUSTMENT-IDLE SPEED ADJUSTMENT" section in CHAPTER 3. (page 3-13)

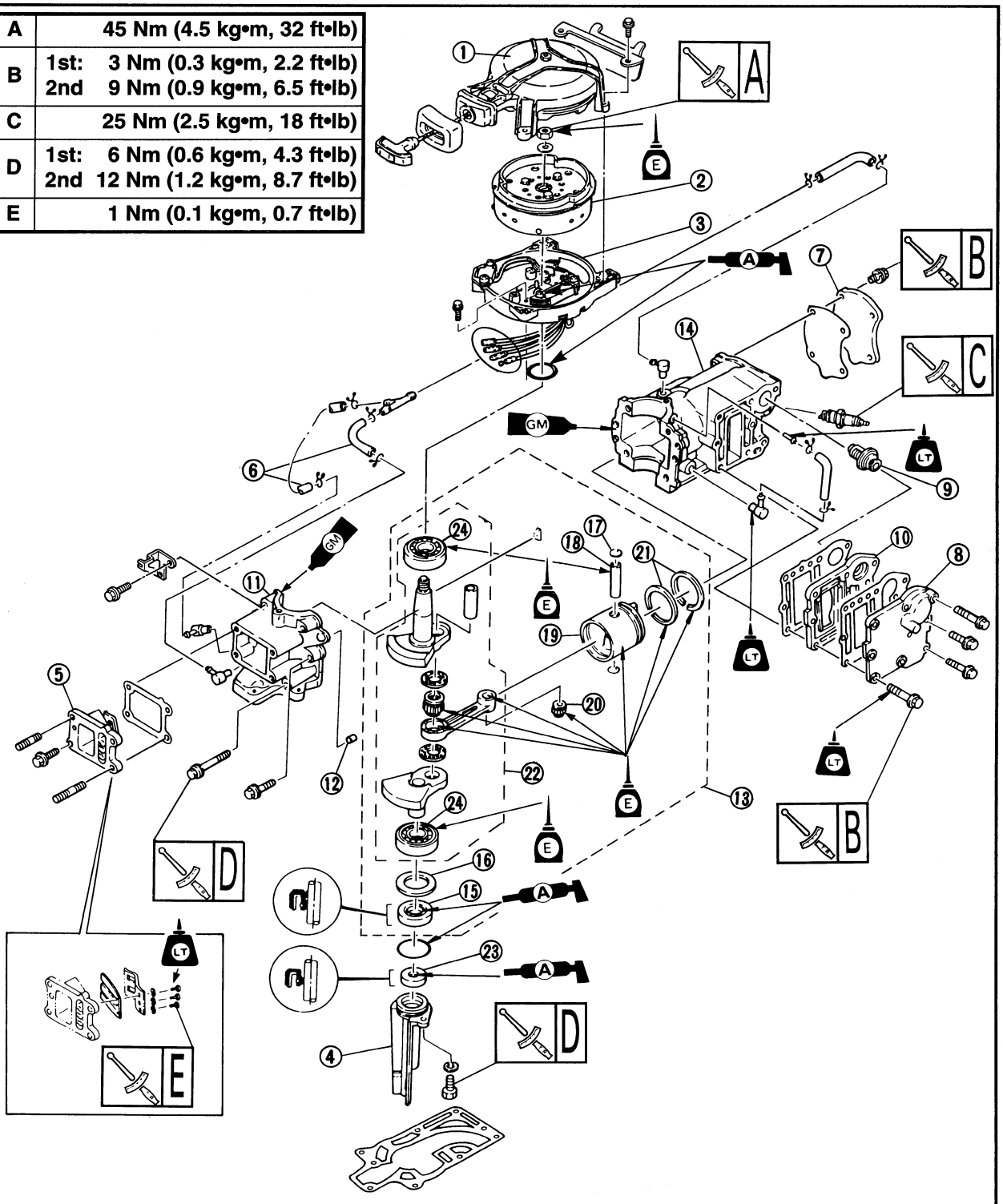
POWER UNIT DISASSEMBLY

PREPARATION FOR DISASSEMBLY

- Remove the power unit.
- Remove the ignition coil bracket.

Refer to the "POWER UNIT REMOVAL AND INSTALLATION (for engine overhaul) " section. (page 5-1)

A	45 Nm (4.5 kg•m, 32 ft•lb)
B	1st: 3 Nm (0.3 kg•m, 2.2 ft•lb) 2nd 9 Nm (0.9 kg•m, 6.5 ft•lb)
C	25 Nm (2.5 kg•m, 18 ft•lb)
D	1st: 6 Nm (0.6 kg•m, 4.3 ft•lb) 2nd 12 Nm (1.2 kg•m, 8.7 ft•lb)
E	1 Nm (0.1 kg•m, 0.7 ft•lb)



POWER UNIT DISASSEMBLY

NOTES ON DISASSEMBLY AND REASSEMBLY

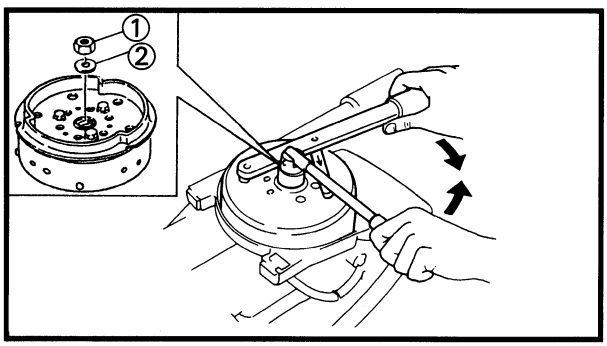
- During engine disassembly, clean all parts and place them in trays in their order disassembly. This wil speed up assembly and help assure that all parts are correctly reinstalled in the engine.
- Secure an engine stand to a bench with a vice.

NOTE:

When disassembling the engine, keep "mated" parts together. This includes cylinder, piston and other parts that have been "mated" through normal wear. "Mated" parts must be reused as an assembly or replaced.

Extent of removal:
① Thermostat removal
② Cylinder body removal
③ Crankshaft and piston removal
④ Crankshaft main bearing removal

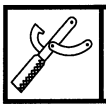
Extent of removal	Order	Part name	Q'ty	Remarks
	1	Recoil starter	1	Refer to "RECOIL STARTER".
	2	Magneto rotor	1	Refer to "REMOVAL POINTS".
	3	Magneto base	1	
③ ④	4	Oil seal housing	1	
	5	Reed valve	1	
③ ④	6	Drainless hose	2	
	7	Cylinder head cover	1	
	8	Exhaust outer cover	1	
① ②	9	Thermostat	1	
	10	Exhaust inner cover	1	
	11	Crankcase	1	Refer to "REMOVAL POINTS".
③ ④	12	Dowel pin	2	
	13	Crankshaft and piston	1	
②	14	Cylinder body	1	
	15	Crankshaft oil seal (lower)	1	
	16	Spacer	1	
	17	Piston pin clip	2	
④	18	Piston pin	1	
	19	Piston	1	
	20	Small end bearing	1	
	21	Piston ring	2	Refer to "REMOVAL POINTS".
	22	Crankshaft	1	
	23	Oil seal (oil seal housing)	1	Refer to "REMOVAL POINTS".
④	24	Crankshaft main bearing	2	



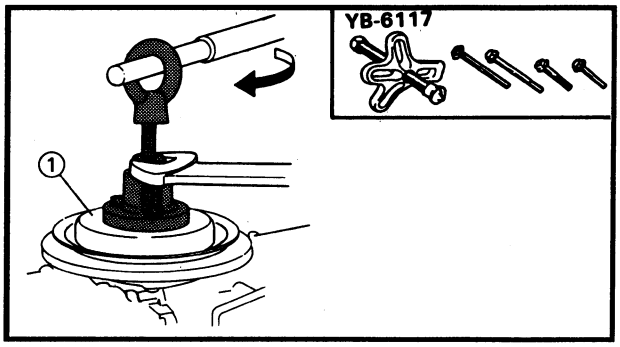
REMOVAL POINTS

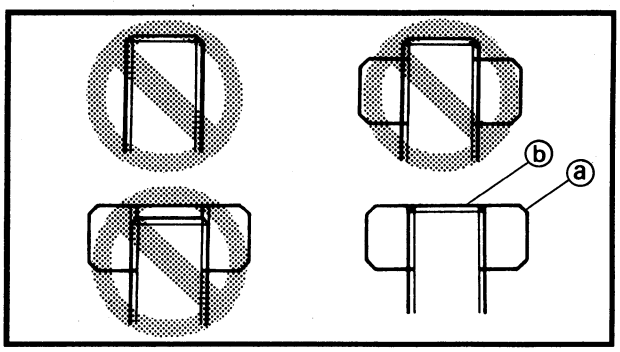
Flywheel magneto

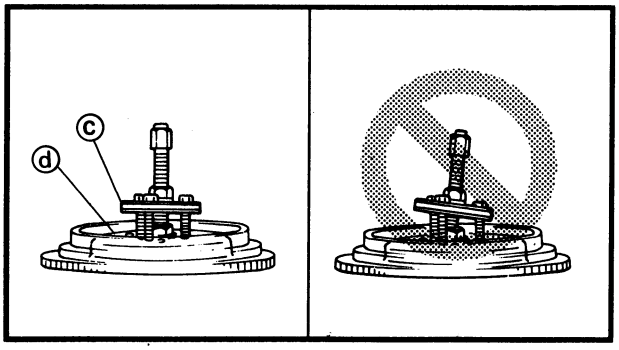
1. Remove:
   - Nut ①
   - Washer ②

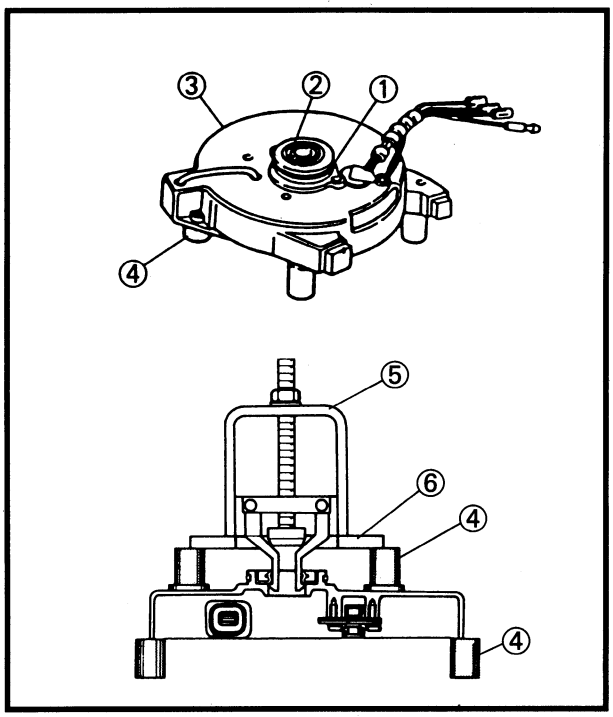


Flywheel holder:
YB-6139/90890-06522









2. Remove:
   - Magneto rotor ①
   - Nut
   - Washer plate

CAUTION:

- **Keep the nut surface ⓐ "flush" with the crankshaft end ⓑ until the flywheel comes off the tapered portion of the crankshaft.**
- **To prevent damage to the crankshaft or tools, screw in the flywheel magneto puller set bolts must be tightened evenly so that the flywheel magneto puller plate ⓒ is held in "parallel" to the rotor top ⓓ.**

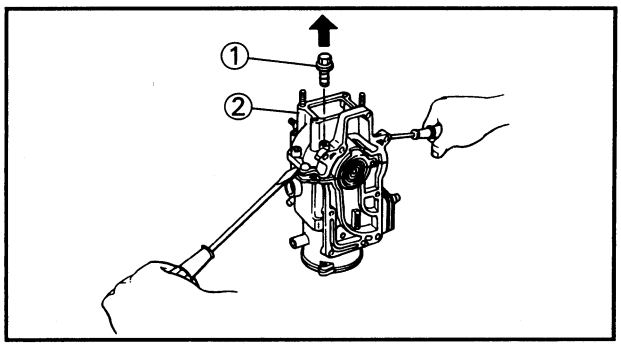
	Flywheel magneto puller: YB-6117, 90890-06521

Magneto base

1. Remove:
   - O-ring ①
   - Oil seal ②

NOTE:

- When removing the oil seal from the magneto base ③, hold it so that its coil side faces downward. The coil just over the flywheel base circumference. So place a block (any type) ④ under the flywheel base to protect the coil against damage.
- As shown, attach the bearing puller ⑤ and plate ⑥, then turn the center bolt so that the claws hold the oil seal.

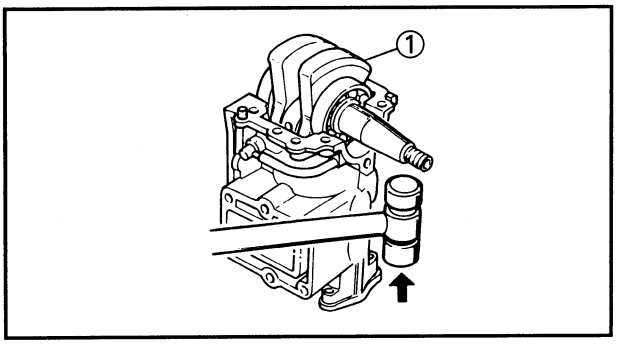


Crankcase and cylinder body

1. Remove:
   - Bolt ①
   - Crankcase ②

NOTE:

Remove the bolts, insert a slotted head screwdriver into the slit between the sealing surfaces of the cylinder body and crankcase, and pry them open. The slit is provided on both right and left sides of the crankcase.

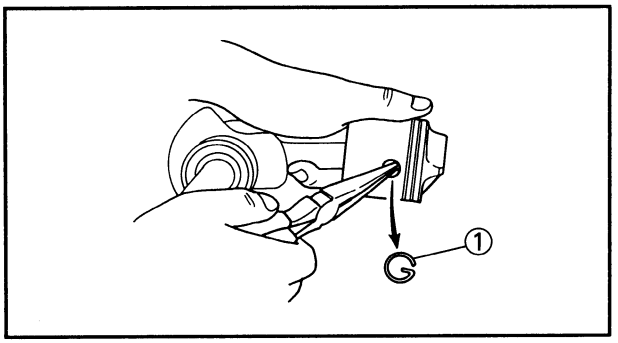


Crankshaft and piston

1. Remove:
   - Crankshaft and piston ①

NOTE:

By tapping the crankshaft with a plastic hammer, slightly move it off its piston.

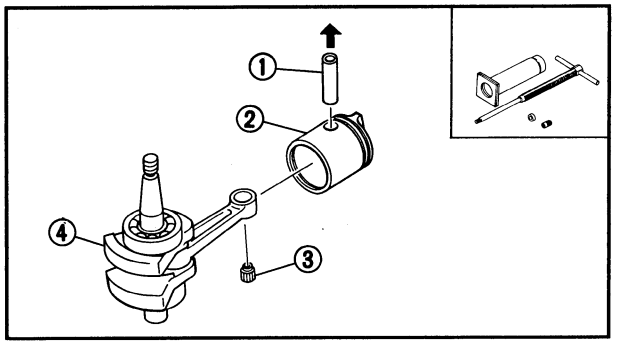


Piston pin and piston

1. Remove:
   - Piston pin clip ①
   - Piston pin ②
   - Piston ③
   - Small end bearing ④
   - Crankshaft ⑤

NOTE:

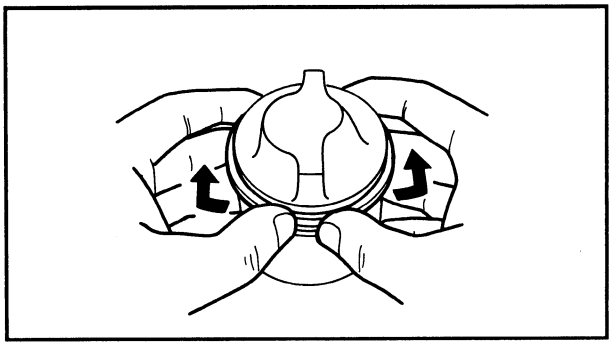
- Take care not to damage piston pin hole edge.
- Remove the outer piston pin clip, and push out the piston pin. If the piston pin groove is deburred and piston pin is still difficult to remove, use Piston pin puller.



	Piston pin puller: **YU-01304, 90890-01304**

CAUTION:

Do not use a hammer to drive the piston pin out.

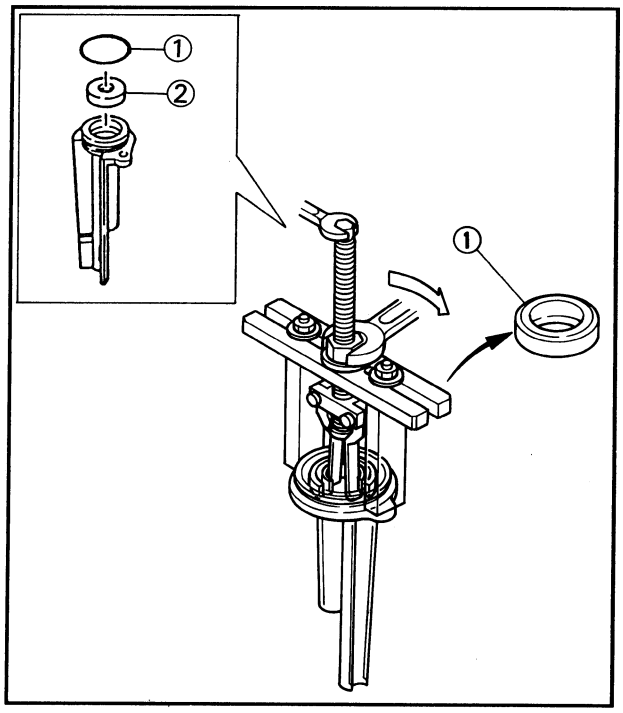


Piston ring

1. Remove:
   - Piston ring

CAUTION:

Remove the piston rings from the piston with minimum expansion.



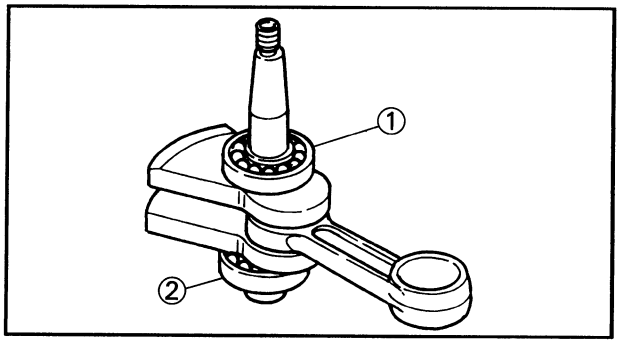
Oil seal (oil seal housing)

1. Remove:
   - O-ring ①
   - Oil seal ②

NOTE:

As shown, attach the bearing puller and turn the center bolt so that the claws hold the oil seal. By tightening the nut, remove the oil seal.

Stopper guide plate:
– , 90890-06501
Bearing puller:
– 90890-06535
Stopper guide stand:
– 90890-06538



Crankshaft main bearing

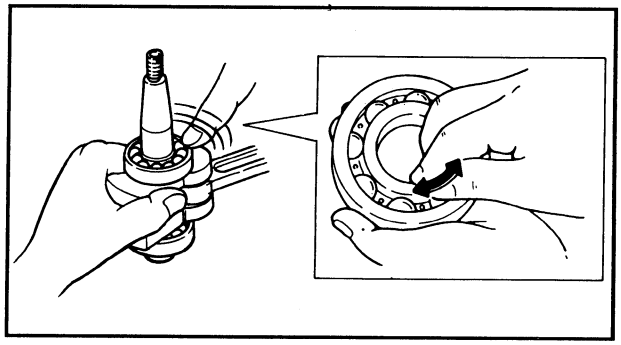
1. Inspect:
   - Crankshaft main bearing
     Pitting/Rumbling → Replace.

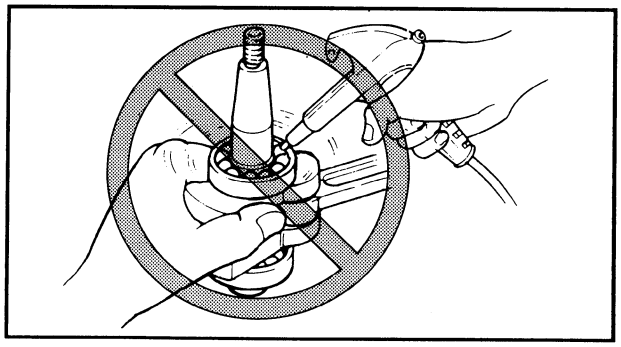
NOTE:

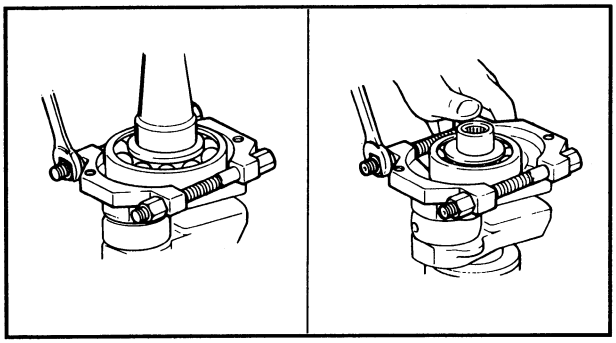
If the bearing moves smoothly, there is no need for its replacement.

CAUTION:

Do not use compressed air to spin the bearings dry. This causes damage to the bearing surfaces and may cause the bearing to explode.



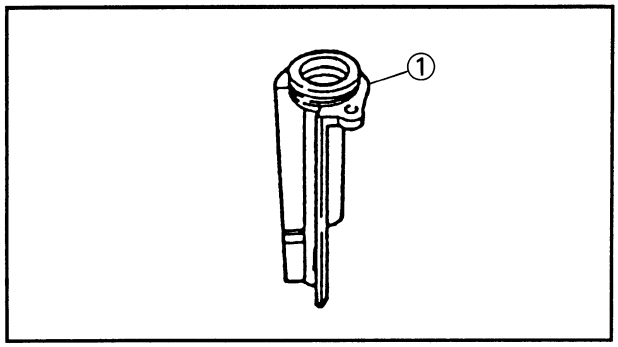




2. Remove:
   • Bearing

NOTE:
Hold the bearing with the bearing separator, and forth out the crankshaft with a press.

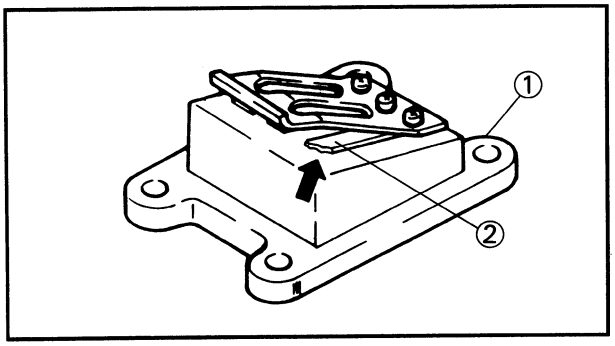
	Bearing separator: **YB-6219, 90890-06534**



INSPECTION AND REPAIR

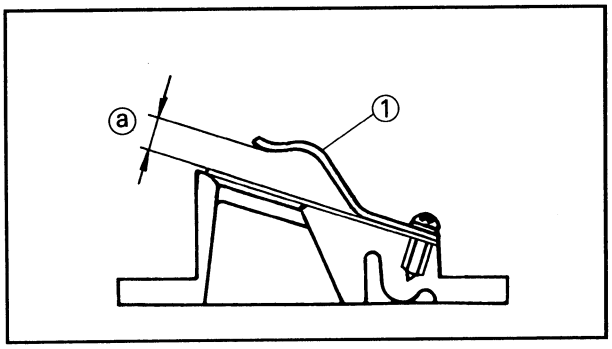
OIL SEAL HOUSING

1. Inspect:
   • Oil seal housing ①
   Crack/Damage→Replace.



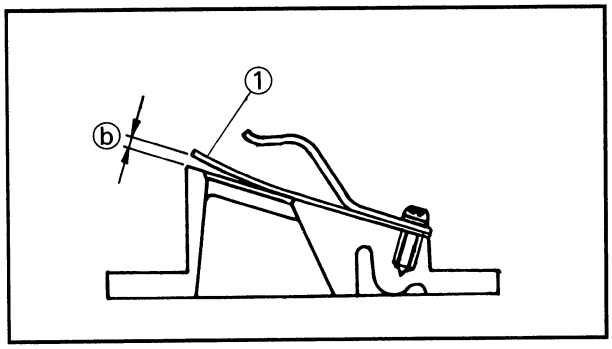
REED VALVE

1. Inspect:
   • Reed valve seat ①
   • Reed valve ②
   Crack/Damage→Replace.



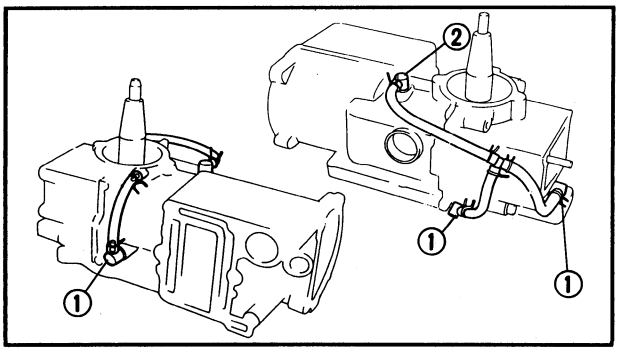
2. Measure:
   • Valve stopper ① height
   Out of specification→Replace.

	Valve stopper height ⓐ: **7 mm±0.2 mm (0.28 in±0.008 in)**



3. Measure:
   • Reed valve ① warpage
   Out of specification→Replace.

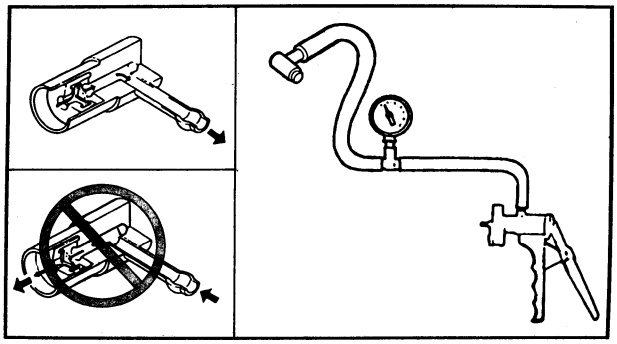
	Valve warpage limit ⓑ: **0.2 mm (0.008 in)**



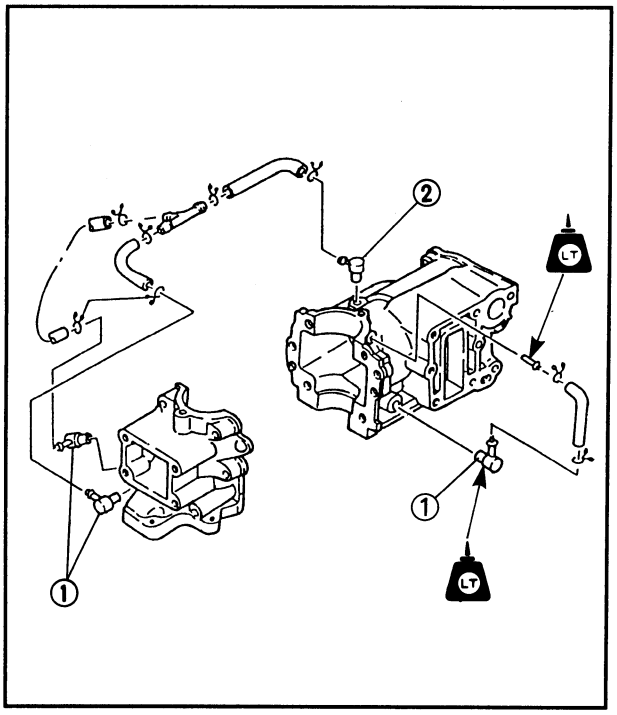
DRAINLESS LINE

1. Inspect:
   • Check valve ①
   Incorrect→Replace.

Lower unit pressure/vacuum tester: YB-35956, 90890-06756



2. Inspect:
   • Hose joint ②
   • Hose
   Clog → Clean.

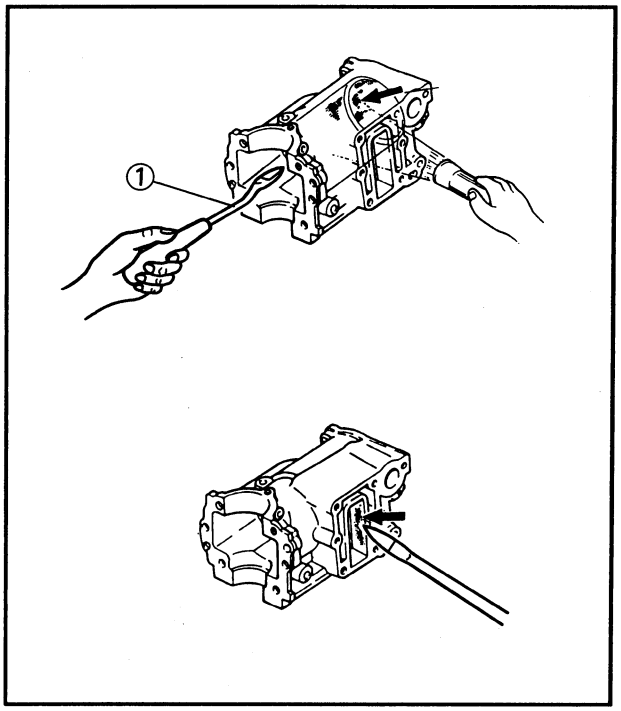


3. Replace (give an example):
   • Check valve ①
   • Hose joint ②

Replacement steps:
• Pull out the check valve using pliers.

NOTE:
Do not pry the valve out. Remove it by rotating.

• Thoroughly clean the hole of the sealing compound.
• Apply the LOCTITE on the check valve.



CYLINDER BODY AND CRANKCASE

Cylinder body

1. Eliminate:
   - Carbon deposit
   - Corrosion or other deposits

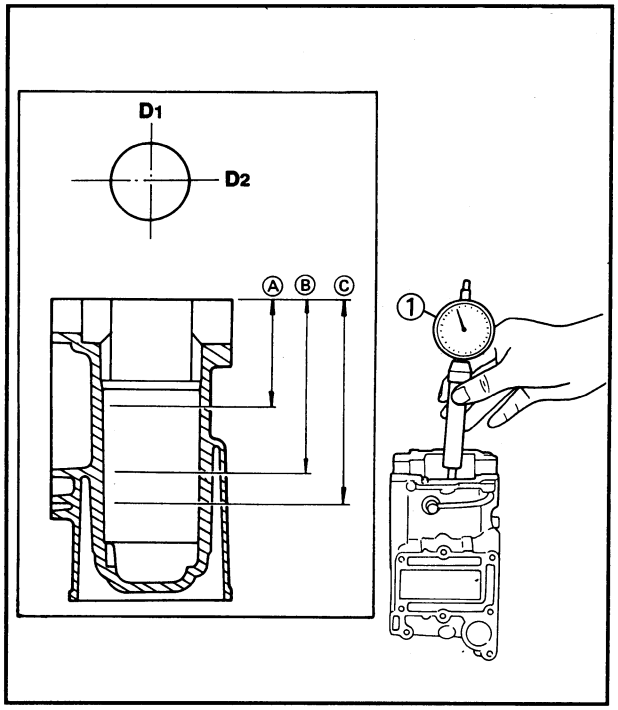
   On the water jacket and cooling water passage.

   Use the rounded scraper ①
2. Inspect:
   - Cylinder wall

   Vertical scratches→Replace cylinder and piston.

CAUTION:

Do not scratch the cylinder wall and the fitting surfaces of the cylinder and exhaust cover.



3. Measure:
   - Cylinder bore "D"

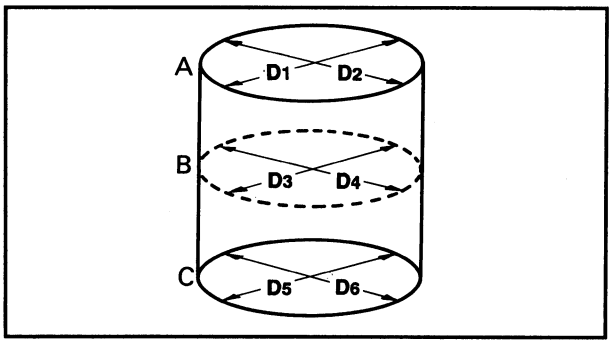
   Use cylinder gauge ①.

   Out of specification→Replace.

NOTE:

Measure the cylinder bore "D" in parallel.
Then, find the average of the measurement.

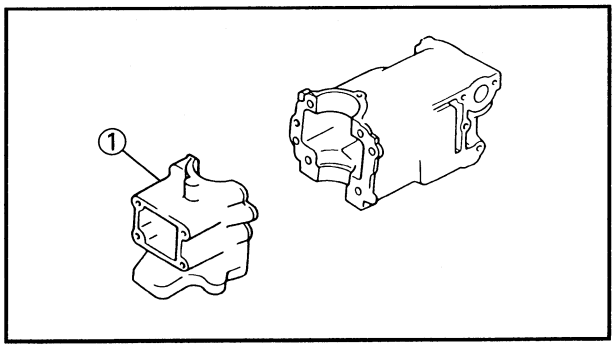
Cylinder bore gauge (35 ~ 60mm):
YU-3016, 90890–03016
Dial gauge:
YU-3097, 90890–01252
Attachment:
YU-1256, –



	Standard	Wear limit
Cylinder bore D:	[4AC, 4AS] 50.00 ~ 50.03 mm (1.9685 ~ 1.9697 in)	50.1 mm (1.972 in)
	[5C, 5CS] 54.00 ~ 54.02 mm (2.1260 ~ 2.1268 in)	54.1 mm (2.130 in)
Cylinder taper T:	—	0.08 mm (0.003 in)

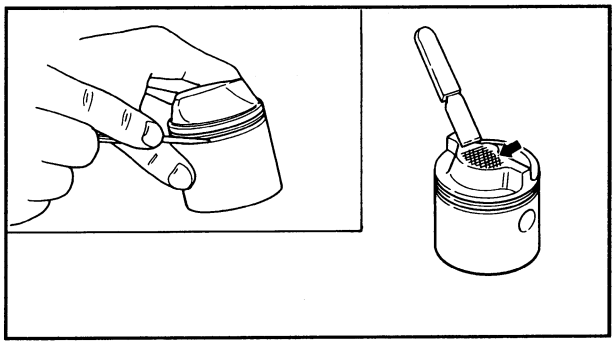
D=Maximum Dia. (D1 – D6)
T=(Maximum D1 or D2) – (Minimum D5 or D6)

Ⓐ : 50 mm (1.97 in)
Ⓑ : 90 mm (3.54 in)
Ⓒ : 115 mm (4.53 in)



Crankcase

1. Inspect:
   • Crankcase ①
   Cracks/Damage→Replace.

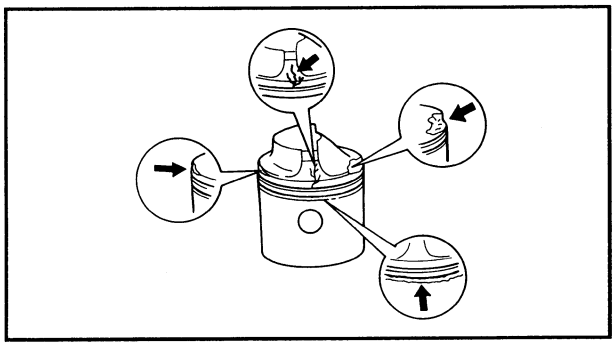


PISTON

1. Eliminate:
   • Carbon deposits
   On the piston crown and ring grooves.

CAUTION:

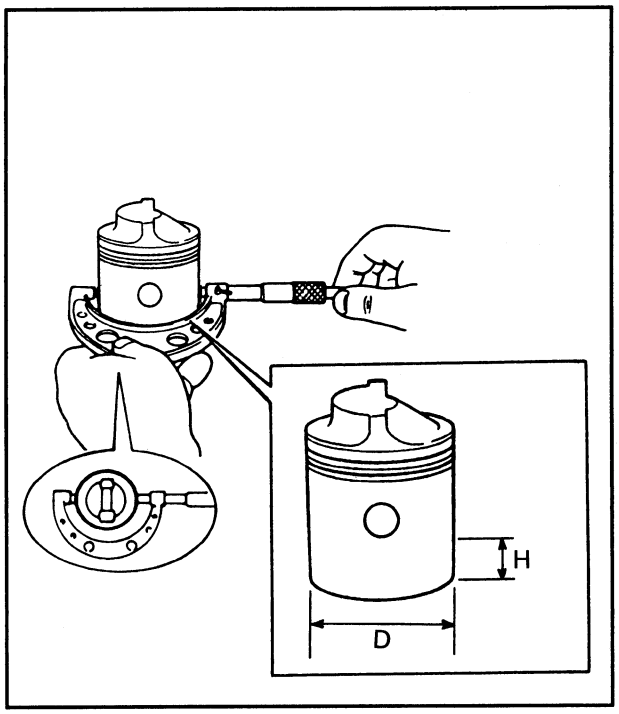
Do not scratch the piston crown.



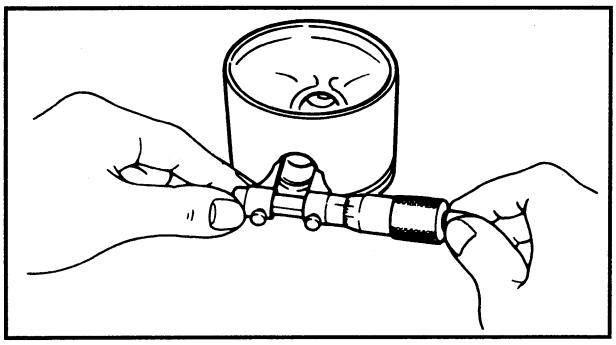
2. Inspect:
   • Piston wall
   Wear/Scratch/Damage→Replace.
   Vertical scratches→Replace.
3. Measure:
   • Piston diameter "D"
   Use a micrometer.
   Out of specification→Replace.

NOTE:

Measurement should be made at a point "H"=10 mm (0.4 in) above the bottom edge of the piston.

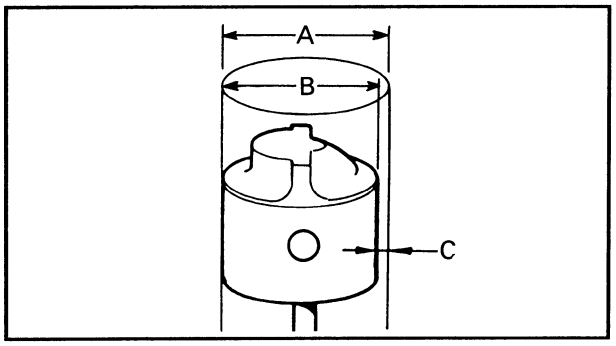


	Measuring point "H"	Piston diameter "D"
Standard	10 mm (0.4 in)	[4AC, 4AS] 49.97 ~ 50.00 mm (1.9673 ~ 1.9685 in)
		[5C, 5CS] 53.97 ~ 54.00 mm (2.1248 ~ 2.1268 in)



4. Measure:
   • Piston pin boss inside diameter
   Use a micrometer.
   Out of specification→Replace.

Piston pin boss inside diameter:
12.004 ~ 12.015 mm
(0.4726 ~ 0.4730 in)



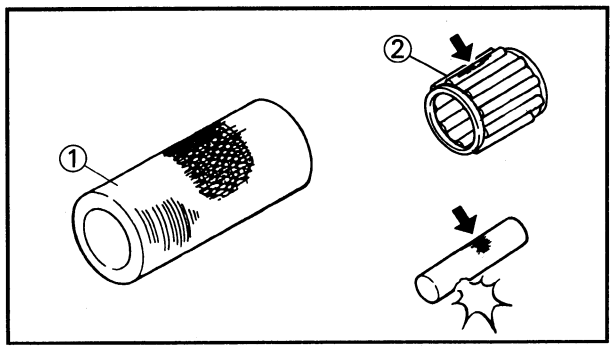
PISTON TO CYLINDER CLEARANCE

1. Calculate:
   • Piston-to-cylinder clearance "C"
   Out of specification→Replace piston and piston ring and/or cylinder.

Piston-to-cylinder clearance "C"	=	Cylinder bore "A"	–	Piston diameter "B"

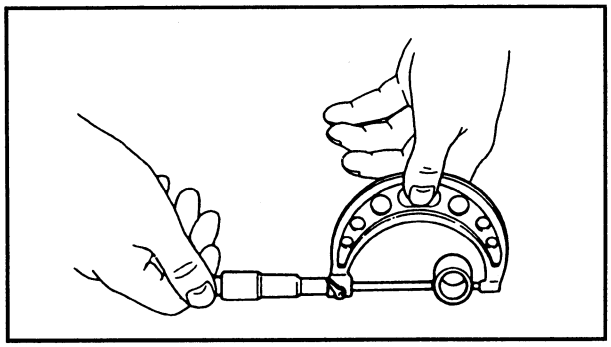
Example:
50.025 mm (1.9695 in)
– 49.990 mm (1.9681 in)
= 0.035 mm (0.0014 in)

Piston-to-cylinder clearance:
0.030 ~ 0.035 mm
(0.0012 ~ 0.0014 in)



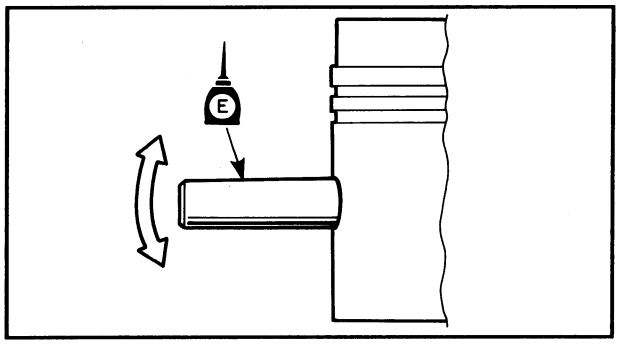
PISTON PIN AND SMALL END BEARING

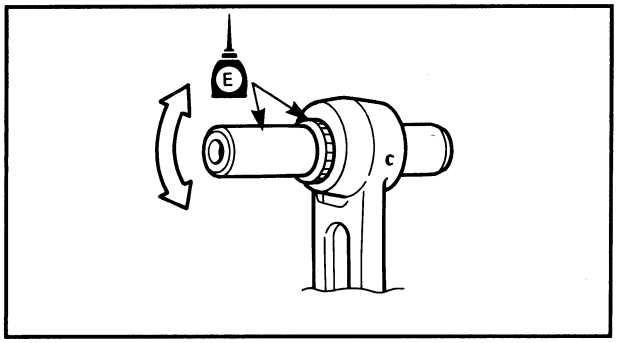
1. Inspect:
   • Piston pin ①
   • Small end bearing ②
   Signs of heat discoloration→Replace.
   Scratch/Damage→Replace.



2. Measure:
   • Piston pin diameter
   Use a micrometer.
   Out of specification→Replace.

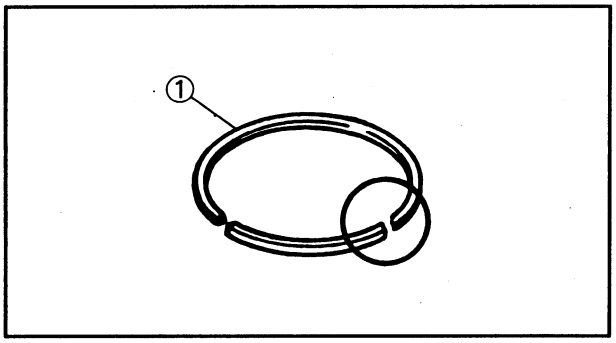
Piston pin diameter:
11.996 ~ 12.000 mm
(0.4723 ~ 0.4724 in)





3. Check:
   - Free play (when the piston pin is place of the piston).
   - Free play (when the piston pin and small end bearing are place of the connecting rod small end).

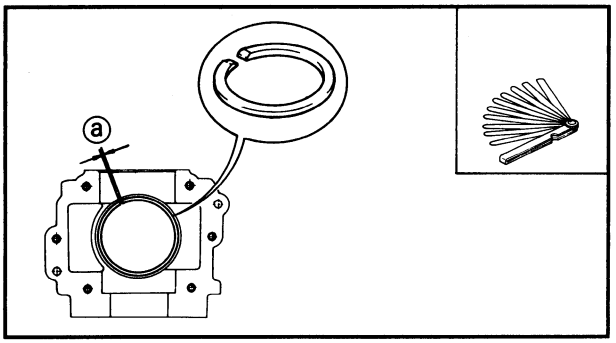
   There should be no noticeable for the play.
   Free play exist → Replace the pin, bearing and/or piston.



PISTON RING

1. Inspect:
   - Piston ring ①

   Breakage/Damage→Replace.

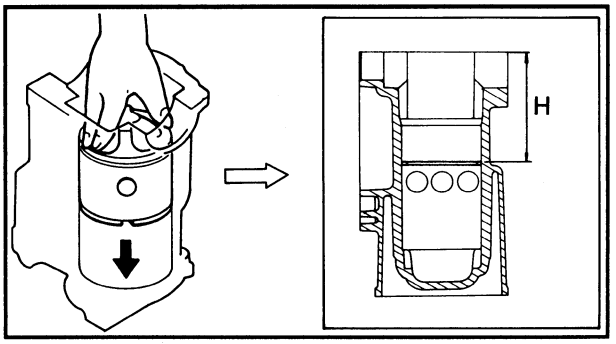


2. Measure:
   - End gap ⓐ

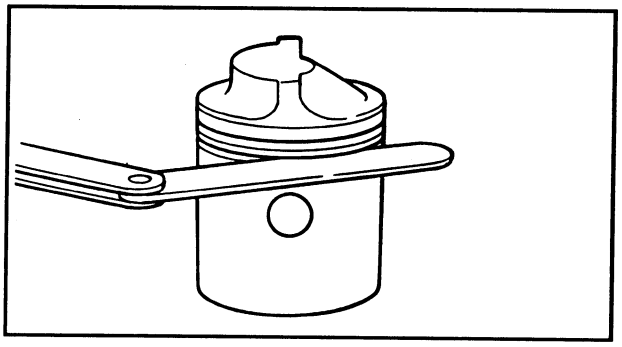
   Use a feeler gauge.
   Out of specification→Replace.

NOTE:

Install the piston ring into the cylinder. Push it in "H"=70 mm (2.76 in) from the contact surface of the cylinder with the crankcase, using the piston skirt.

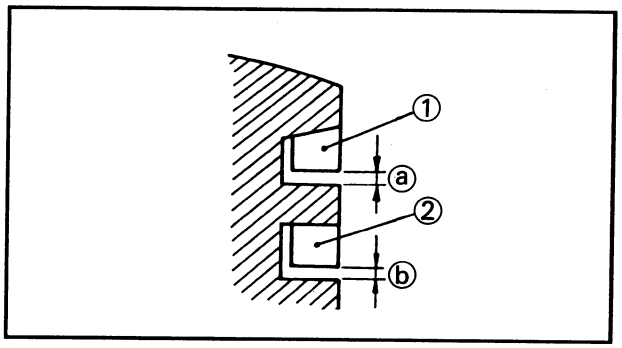


	End gap:	Measuring point "H"
Top	0.15 ~ 0.35 mm (0.006 ~ 0.014 in)	70 mm (2.76 in)
2nd	0.15 ~ 0.35 mm (0.006 ~ 0.014 in)	

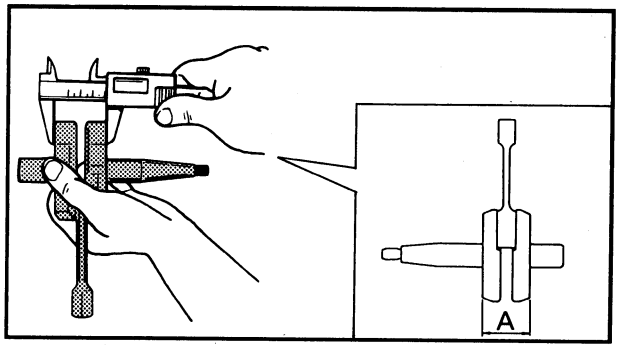


3. Measure:
   • Side clearance
   Use a feeler gauge.
   Out of specification→Replace piston and/or ring.

Side clearance:
Top ⓐ: 0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in)
2nd ⓑ: 0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)



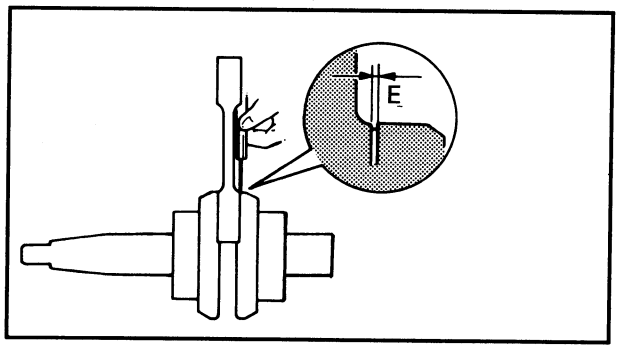
① Top ring
② 2nd ring

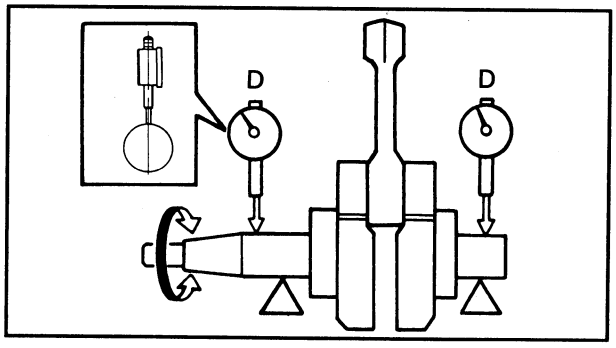


CRANKSHAFT

1. Measure:
   • Crank width "A"
   • Connecting rod side clearance "E"
   Out of specification→Replace.

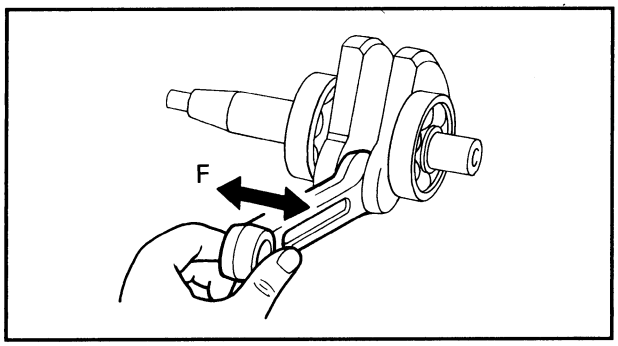
Crank width "A":
39.90 ~ 39.95 mm (1.571 ~ 1.573 in)
Connecting rod side clearance "E":
0.20 ~ 0.70 mm (0.008 ~ 0.028 in)





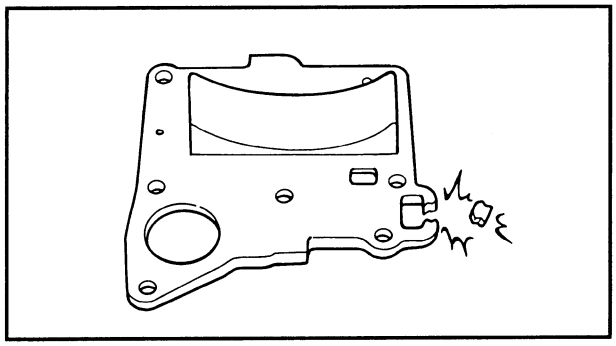
2. Measure:
   • Runout "D"
   Use a V-blocks and dial gauge.
   Out of specification→Replace.

Runout limit:
0.03 mm (0.0012 in)



3. Measure:
   • Axial play "F"
   Out of specification→Replace.

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

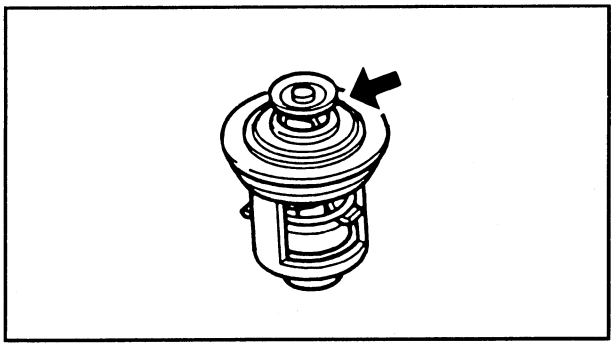


EXHAUST COVER

1. Inspect:
   • Exhaust cover
   Crack/Damage→Replace.
   Carbon deposit → Clean.

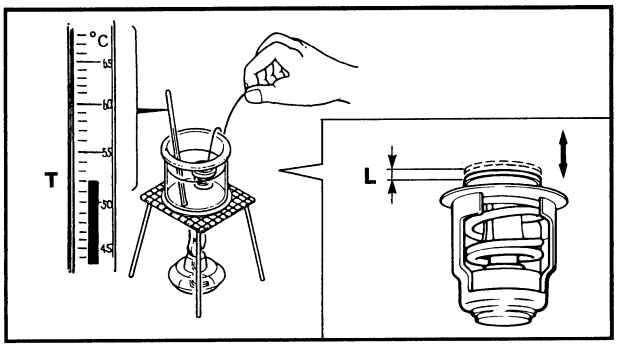
CAUTION:

Do not scratch the fitting surface of the cylinder and exhaust cover.



THERMOSTAT

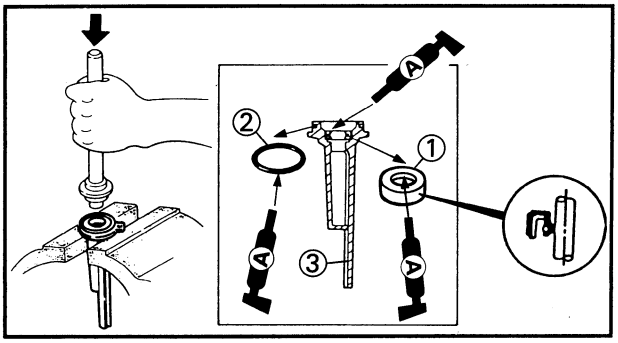
1. Inspect:
   • Thermostat
   Stick/Damage→Replace.
   Corrosion or other deposit → Clean.



2. Measure:
   • Valve opening temperature "T"
   • Valve lift "L"
   Out of specification→Replace.

Measurement steps:
- Suspend thermostat in a vessel.
- Place reliable thermometer in a water.
- Heat water slowly.
- Observe thermometer, while stirring water continually.

	Water temperature "T"	Valve lift "L"
	Below 48 ~ 52 °C (118 ~ 125 °F)	0 mm (0 in)
	Above 60 °C (140 °F)	Min. 3 mm (0.12 in)



ASSEMBLY AND INSTALLATION

OIL SEAL (OIL SEAL HOUSING)

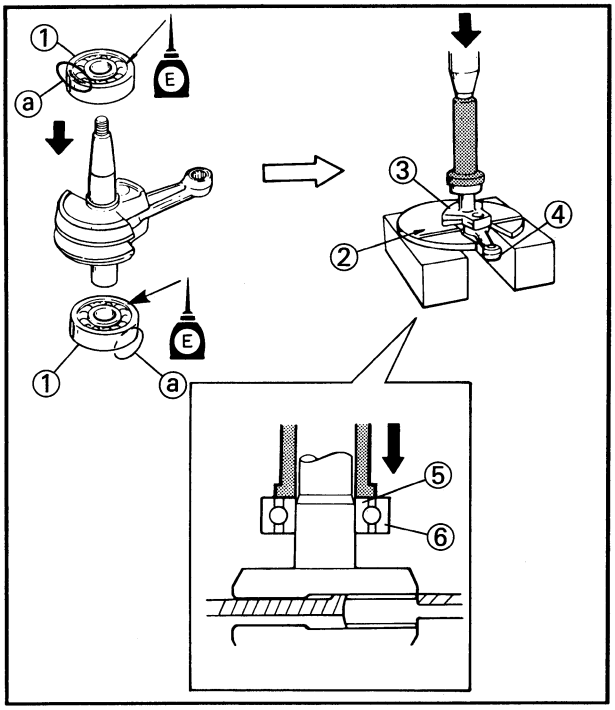
1. Install:
   - Oil seal ①
   - O-ring ②
   - Oil seal housing ③

NOTE:

- Using the jig, press-fit the oil seal ① into seal housing ③.
- After installing the oil seal and O-ring, pack oil seal lip and outer surface of O-ring with water-resistant grease.

CAUTION:

Always use the new oil seal and O-ring.



CRANKSHAFT MAIN BEARING

1. Install:
   - Crankshaft main bearing ①

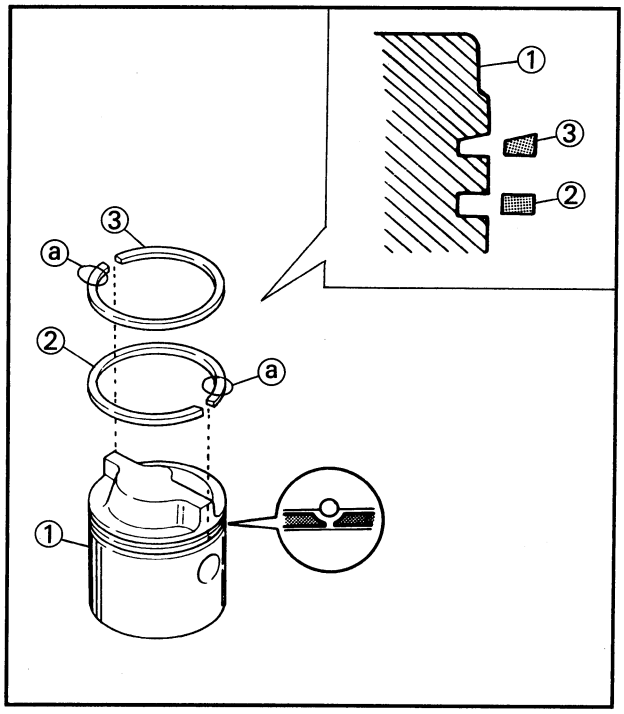
   Use a press.

NOTE:

- Position the main bearing with its stamped mark ⓐ facing outside.
- Place the plate ② under the connecting rod big end, slip the bearing over the crankshaft ③ and press-fit the bearing.
- Apply liberally engine oil to the bearing.

CAUTION:

- **After placing the plate under the big end, make sure the connecting rod ④ is held in a vertical position.**
- **When press-fitting the bearing, be sure to force the inner race ⑤. Do not force the outer race ⑥.**

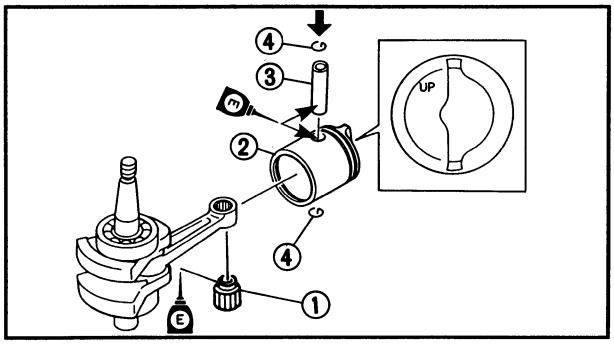


PISTON RING

1. Install:
   - Piston ①
   - Piston ring ② (2nd ring)
   - Piston ring ③ (top ring)

NOTE:

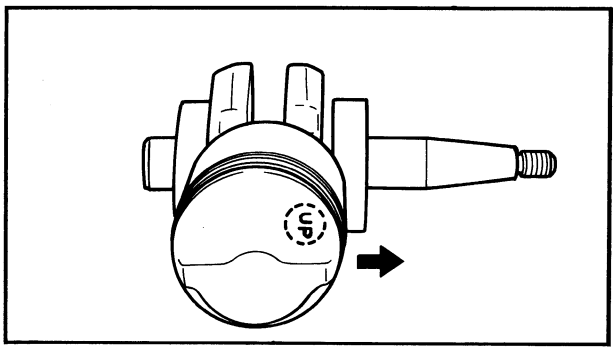
- Take care not to scratch the piston or break piston rings.
- Make sure all piston rings are installed with markings ⓐ facing upward.
- Piston rings should be replaced as a set, when replaced.
- After fitting the rings, check that they move smoothly.



1. Install
   - Small end bearing ①
   - Piston ② (with piston rings)
   - Piston pin ③
   - Piston pin clip ④ (new)

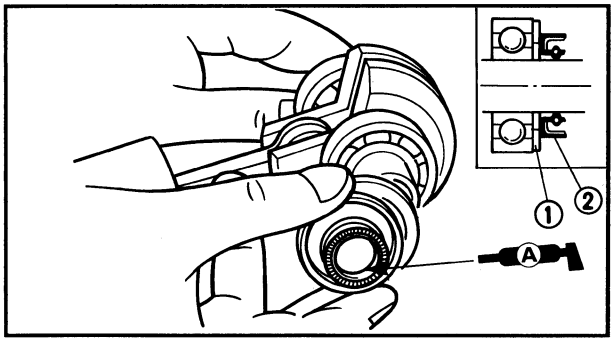
CAUTION:

Always use the new piston pin clips.



NOTE:

With the UP mark facing toward the crankshaft tapered end.



CRANKSHAFT AND PISTON

1. Install:
   - Spacer ①
   - Crankshaft oil seal ② (lower)

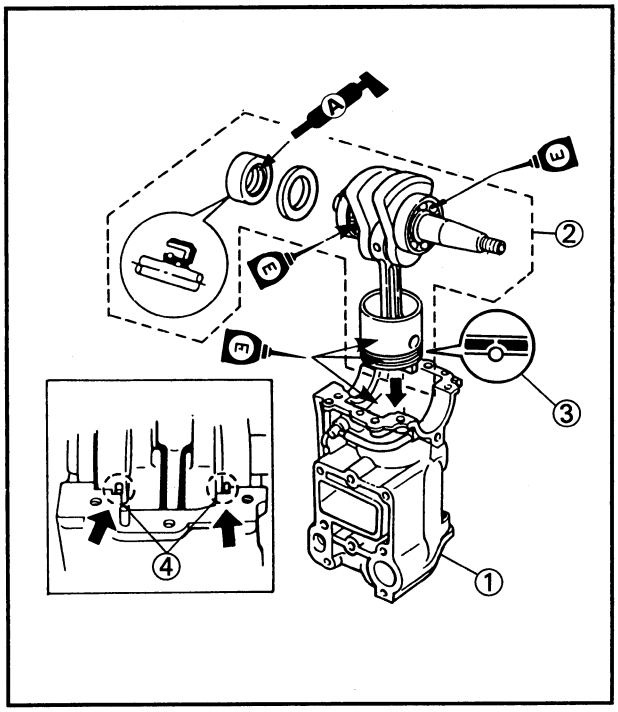
NOTE:

Before installing the oil seal, pack the oil seal lip with water resistant grease.

CRANKCASE AND CYLINDER BODY

NOTE:

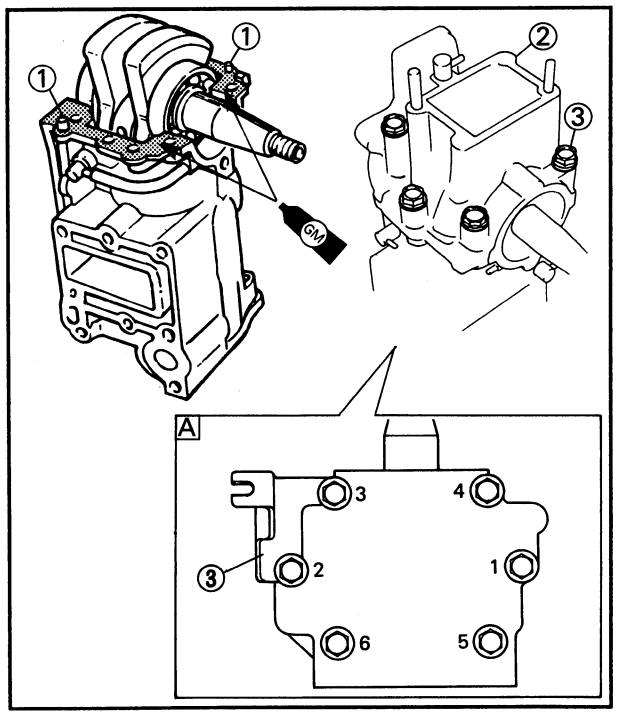
Set the cylinder body on the bench with the head side down.



1. Install:
   - Cylinder body ①
   - Crankshaft and piston ②

NOTE:

- Clean the cylinder wall and connecting surfaces of the crankcase before applying the engine oil.
- Apply engine oil to the cylinder wall, piston and its ring grooves.
- Align the piston ring end gaps with the respective locating pins ③.
- Insert the piston into the cylinder and push down the crankshaft so it fits in the block. Be sure to fit the upper and lower bearing locating pins ④, in the cylinder body.



2. Apply:
   - Gasket maker

   Onto the contacting surfaces of the crankcase and cylinder body.

NOTE:

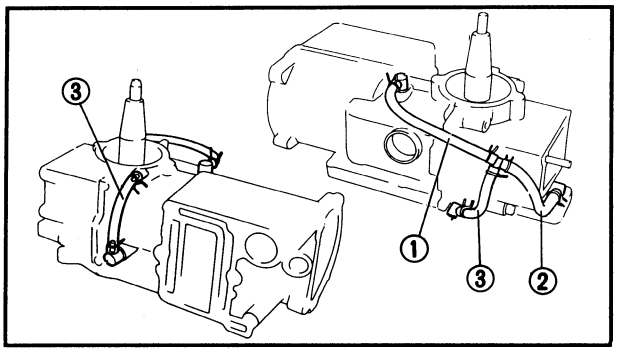
- Clean the connecting surfaces of the crankcase and cylinder body before applying the Gasket maker.
- Gasket maker should be so applied that it does not overflow the contacting surface.

3. Install:
   - Dowel pin ①
   - Crankcase ②
   - Stay ③
   - Bolt ④

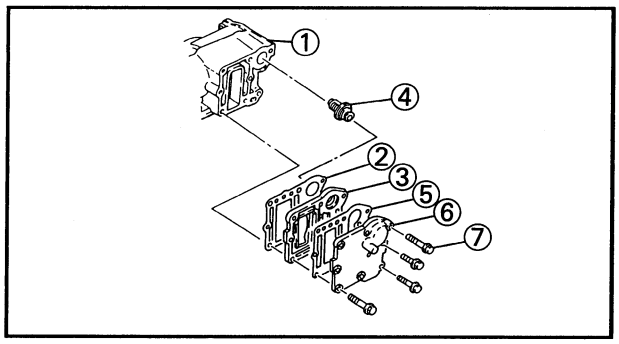
NOTE:

Tighten the bolts in sequence two steps of torque.

Bolt (crankcase):
1st : 6 Nm (0.6 kg•m, 4.3 ft•lb)
2nd : 12 Nm (1.2 kg•m, 8.7 ft•lb)



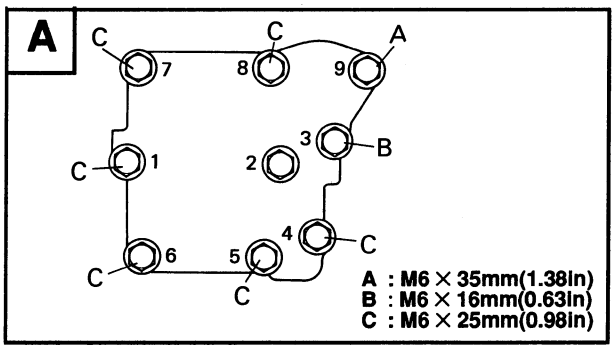
4. Install:
   - Hose ① [ℓ = 120 mm (4.72 in)]
   - Hose ② [ℓ = 100 mm (3.94 in)]
   - Hose ③ [ℓ = 70 mm (2.76 in)]
   - Clip



EXHAUST COVER AND THERMOSTAT

1 . Install:
   - Cylinder body ①
   - Exhaust inner cover gasket ②
   - Exhaust inner cover ③
   - Thermostat ④
   - Exhaust outer cover gasket ⑤
   - Exhaust outer cover ⑥
   - Bolt ⑦

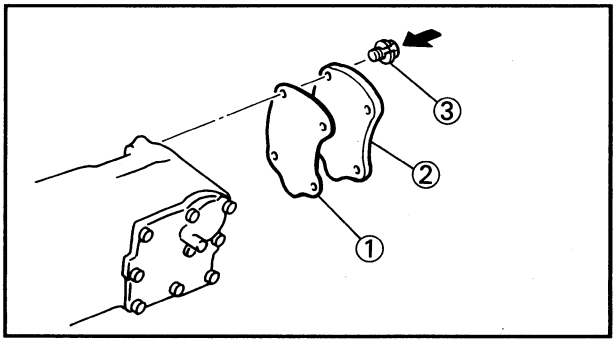
NOTE:
- The exhaust cover bolt are in three different lengths.
- Tighten the bolts in sequence in two steps of torque.



CAUTION:

Always use the new gaskets.

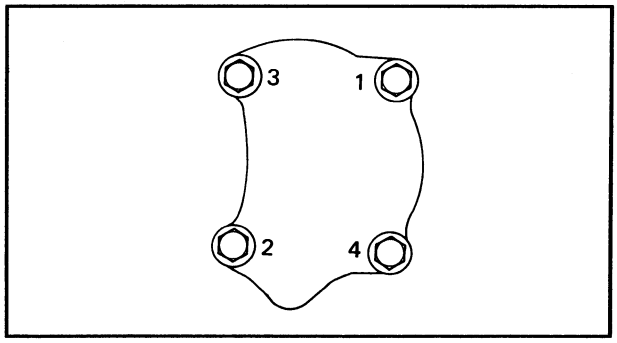
Bolts (exhaust cover):
1st : 3 Nm (0.3 kg•m, 2.2 ft•lb)
2nd : 9 Nm (0.9 kg•m, 6.5 ft•lb)



CYLINDER HEAD COVER

1. Install:
   - Cylinder head cover gasket ①
   - Cylinder head cover ②
   - Bolt ③

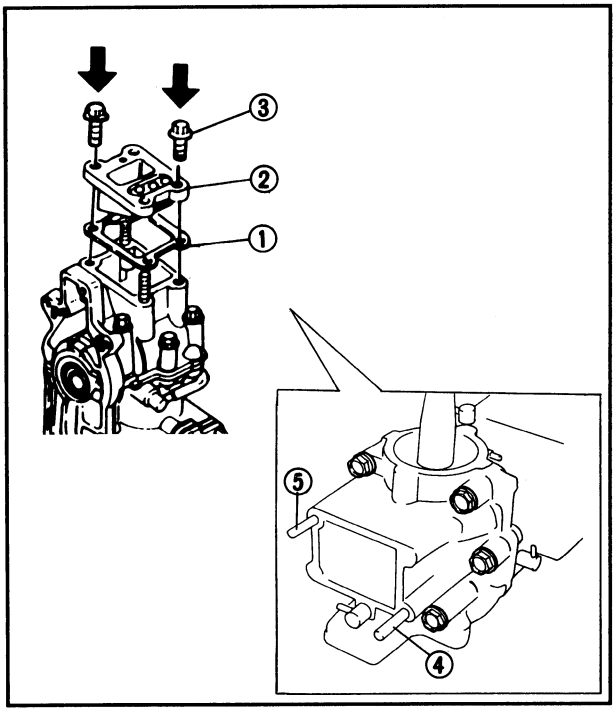
NOTE:
Tighten the bolts in sequence in two steps of torque.



CAUTION:

Always use the new gasket.

Bolts (cylinder head cover):
1st : 3 Nm (0.3 kg•m, 2.2 ft•lb)
2nd : 9 Nm (0.9 kg•m, 6.5 ft•lb)



REED VALVE

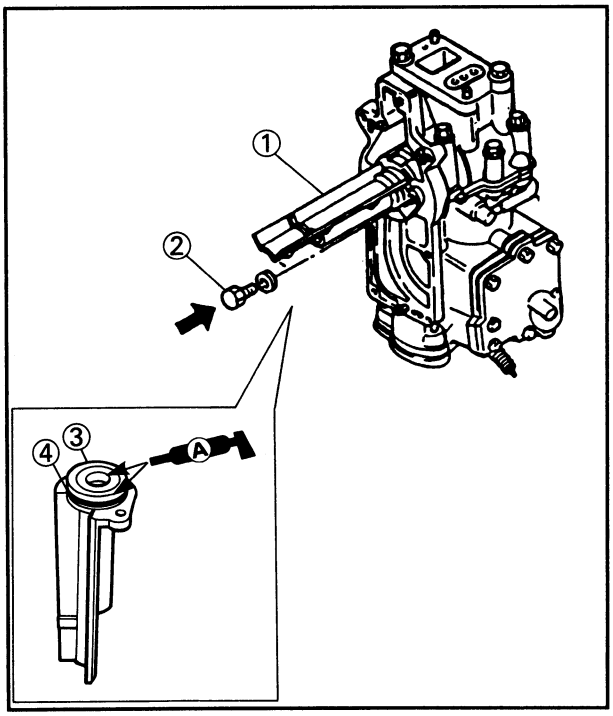
1. Install:
   - Reed valve gasket ①
   - Reed valve ②
   - Bolt ③
   - Spark plug

   Refer to the "PERIODIC SERVICE-SPARK PLUG" section in CHAPTER 3. (page 3-18)

NOTE:

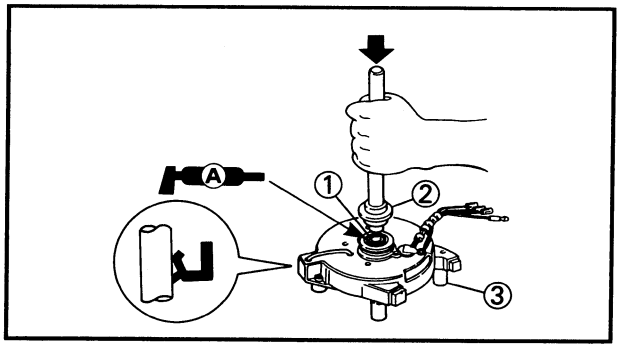
If install two stud bolts in the crankcase, the longer one ④ on the right and the shorter one ⑤ on the left.

Spark plug:
25 Nm (2.5 kg•m, 18 ft•lb)



OIL SEAL HOUSING

1. Install:
   - Oil seal housing ①
   - Bolt ②

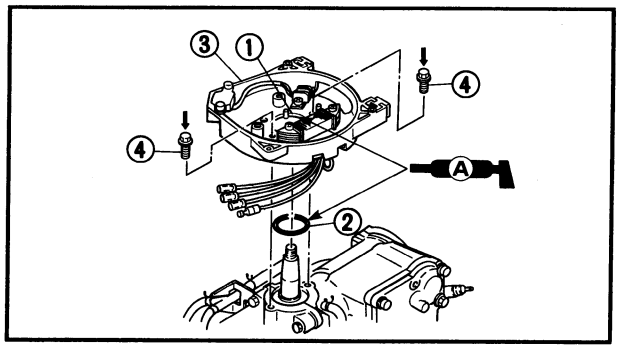


Magneto base

1. Install:
   - Oil seal ①
     Using the attachment ②.

NOTE:

When installing the oil seal onto the magneto base, hold it so that its coil side faces downward. The coil just over the flywheel base circumference. So place a block (any type) ③ under the flywheel base to protect the coil against damage.

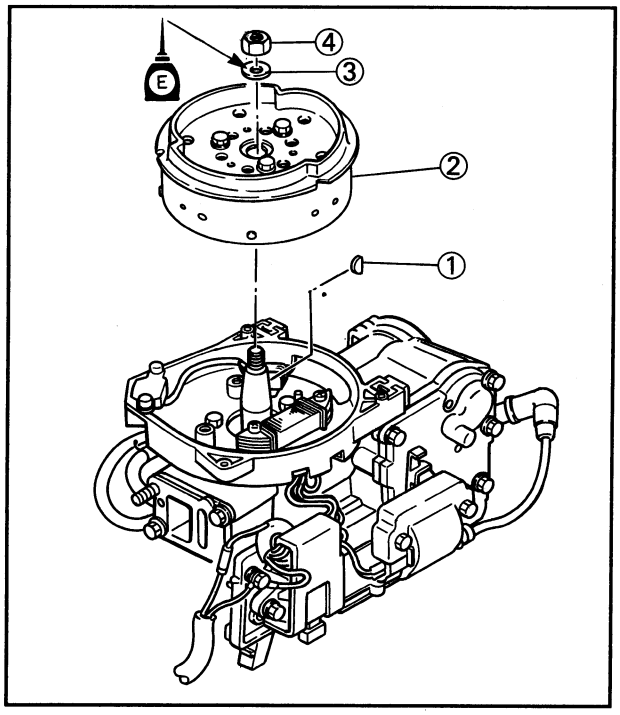


Flywheel magneto

1. Apply:
   - Water resistant grease (Yamaha marine grease A)
     Onto the oil seal lip ① and outer surface of O-ring ②.

NOTE:

Fit the new O-ring in the grooves in the base.



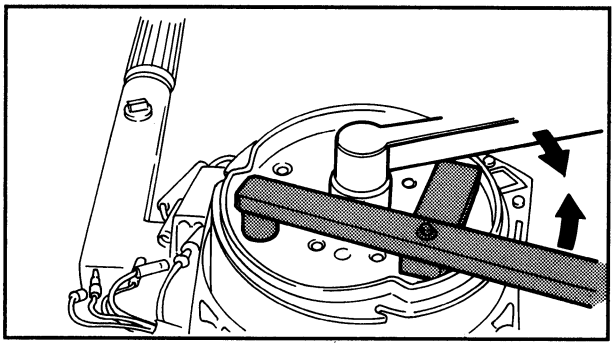
2. Install:
   - Magneto base ③
   - Bolt ④

3. Install:
   - Woodruff key ①
   - Magneto rotor ②
   - Washer plate ③
   - Nut ④

NOTE:

- Install the magneto rotor on the crankshaft so that the woodruff key fits in the keyway in the magneto rotor.
- Lock the magneto rotor with the washer and nut using the flywheel magneto holder and torque wrench.

	**Flywheel magneto holder: YB-6139, 90890-06522**
	**Magneto rotor nut: 45 Nm (4.5 kg•m, 32 ft•lb)**



RECOIL STARTER

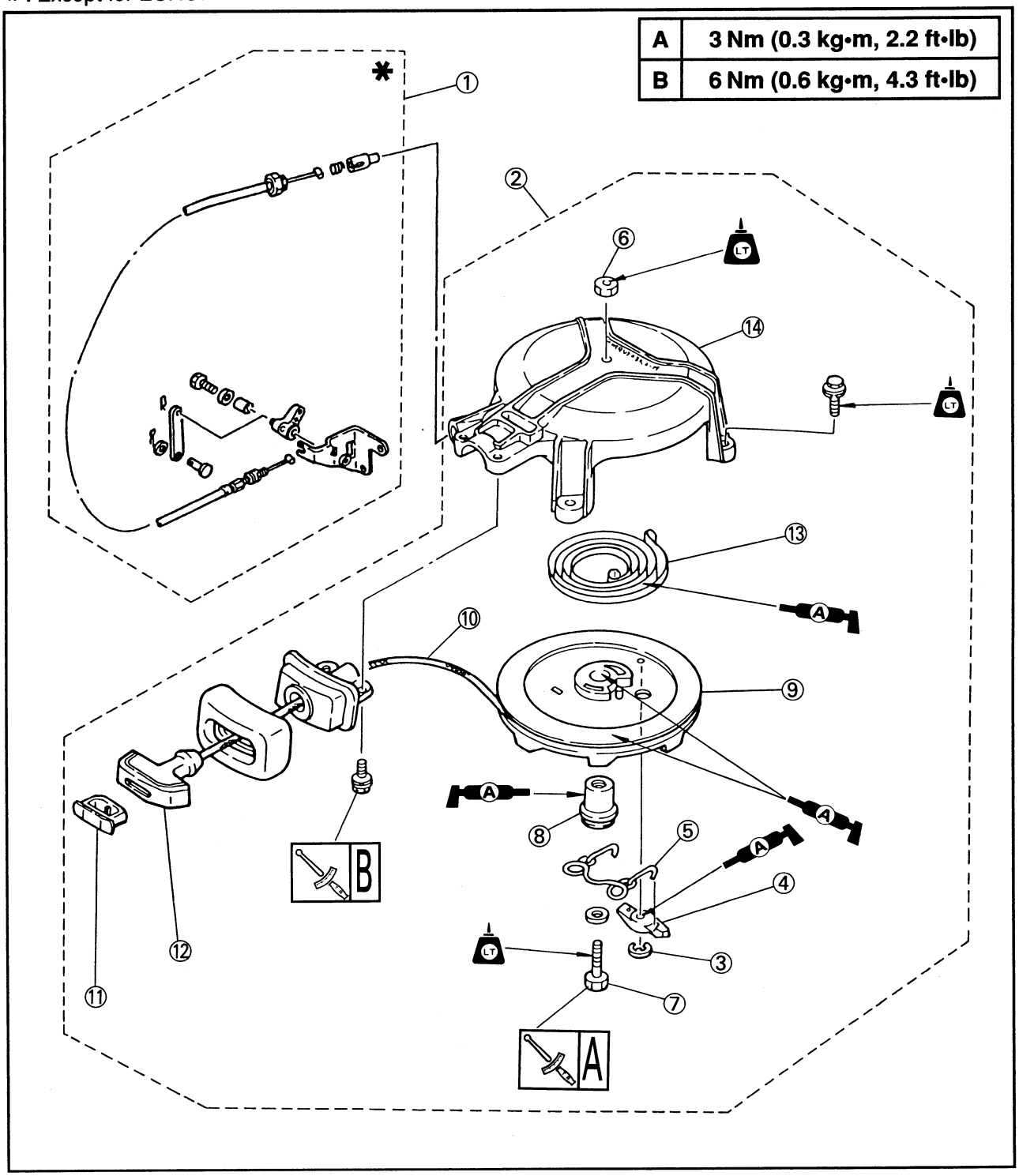
PREPARATION FOR REMOVAL

- Remove the top cowling.

⚠ WARNING

- **Wear a proper safety goggle and gloves for protect your eyes and hands.**
- **Use care, the spiral jumps out and may injure a person.**
- **When removing the sheave drum, use care so that the spiral spring does not jump out.**

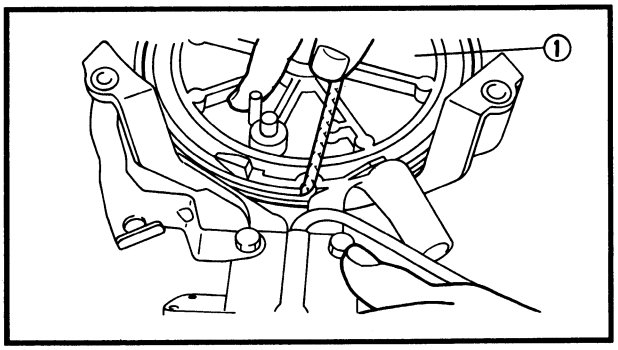
✱ : Except for EUROPE

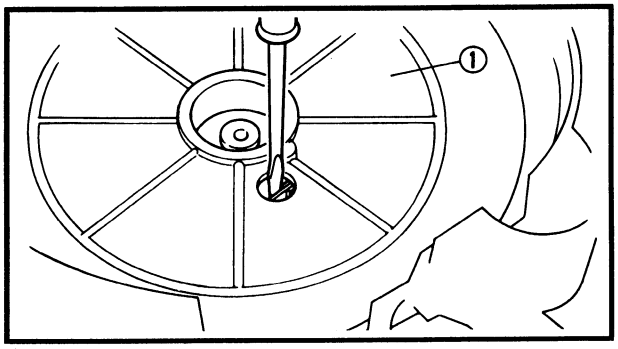


RECOIL STARTER

Extent of removal: ① Recoil starter removal ② Recoil starter disassembly

Extent of removal	Order	Part name	Q'ty	Remarks
①	1	Start-in-gear protection wire (except for EUROPE)	1	
	2	Recoil starter assembly	1	
	3	Circlip	1	
	4	Drive pawl	1	
	5	Drive pawl spring	1	
②	6	Nut	1	
	7	Sheave retainer bolt	1	
	8	Starter housing shaft	1	
	9	Sheave drum	1	Refer to "REMOVAL POINTS".
	10	Rope	1	
	11	Cover	1	
	12	Starter handle	1	
	13	Spiral spring	1	Refer to "REMOVAL POINTS".
	14	Starter case	1	





REMOVAL POINTS

Sheave drum

1. Turn:
   - Sheave drum ①

   Turn the sheave drum clockwise until the spiral spring is free.

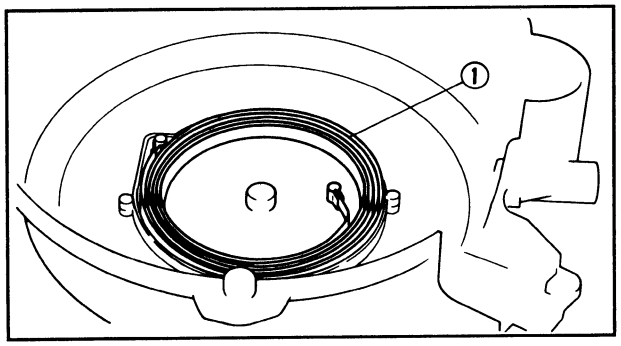
NOTE:

- Turn the sheave drum so that the cutaway on the outer surface of the sheave drum faces toward the starter handle.
- Pass the starter rope through the cut.

2. Remove:
   - Nut
   - Bolt
   - Bushing
   - Sheave drum ①

NOTE:

Insert a slotted-head screwdriver into the hole in the sheave drum, and remove the spiral spring from the sheave drum by pushing the spring.

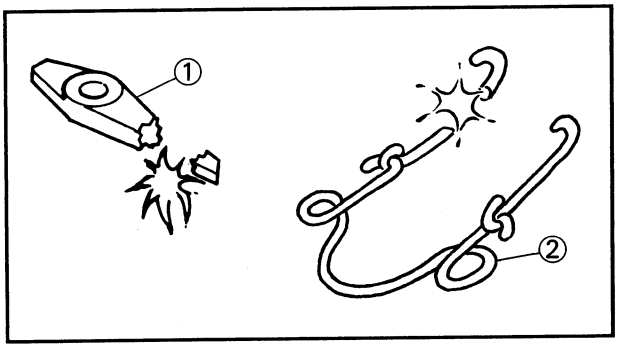


Spiral spring

1. Remove:
   - Spiral spring ①

NOTE:

Be careful so that the spiral spring does not pop out when removing it. Remove it by allowing it out one turn of the winding each time.

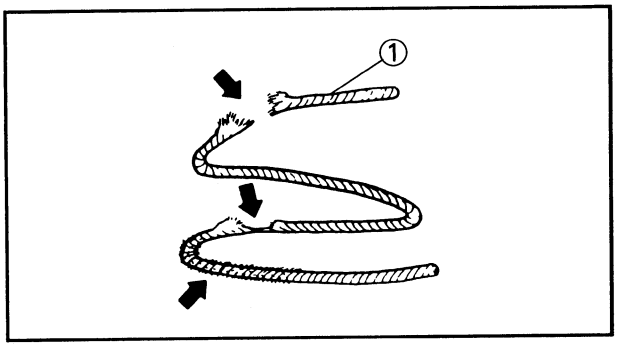


INSPECTION AND REPAIR

Drive pawl and drive pawl spring

1. Inspect:
   - Drive pawl ①
   - Drive pawl spring ②

   Wear/Crack/Damage→Replace.



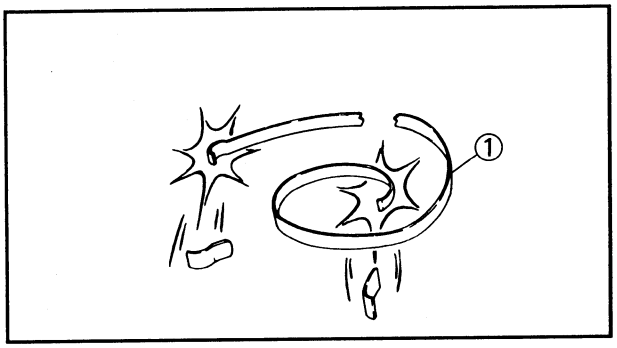
Starter rope

1. Inspect:
   - Starter rope ①

   Wear/Damage→Replace.

NOTE:

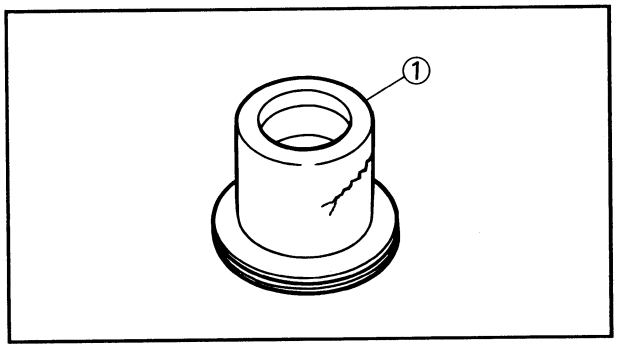
When replacing the starter rope, cut it to the specified length (1,850mm or 72.8in), and burn the rope end so that it will not ravel.



Starter spring

1. Inspect:
   - Starter spring ①

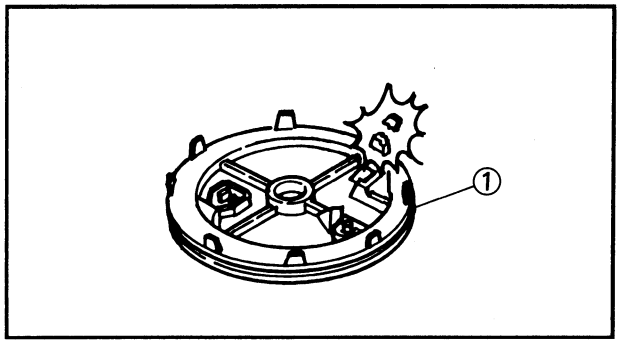
   Bent/Break/Damage→Replace.



Starter housing shaft

1. Inspect:
   - Starter housing shaft ①

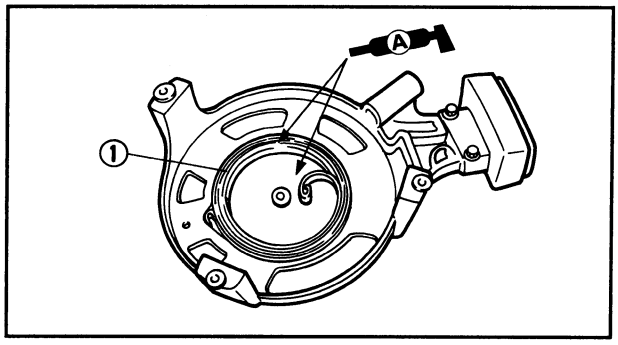
   Crack/Damage→Replace.



Sheave drum

1. Inspect:
   - Sheave drum ①

   Crack/Damage→Replace.



ASSEMBLY AND INSTALLATION

Recoil starter

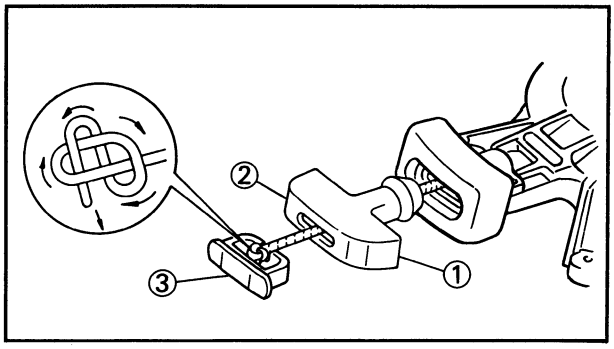
1. Install:
   - Spiral spring ①

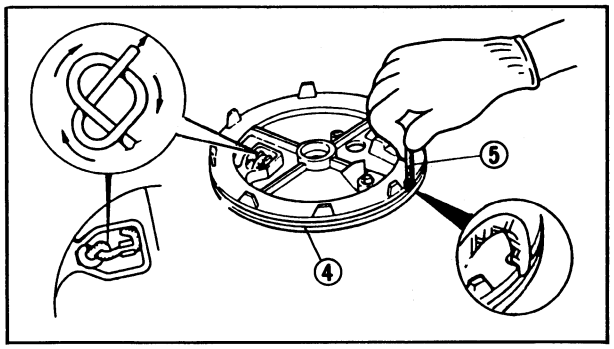
NOTE:

- When installing the new spiral spring, does not cut the wire holding the spring.
- When reusing the spiral spring, set the leading end first in the case and then fit one turn each time.

⚠ WARNING

The spiral spring may jump out so use special care.





Starter rope and sheave drum

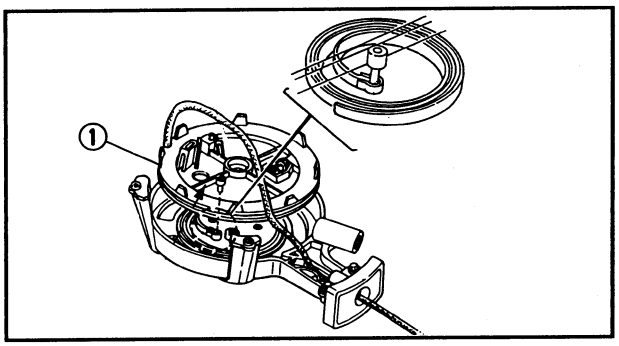
1. Install:
   - Starter handle ①
   - Starter rope ②
   - Cover ③
   - Sheave drum ④
   - Sheave rope ⑤

NOTE:

- Insert the rope through the rope hole and knot the end.
- Wind the rope 2-1/2 turns around the sheave drum.
- Place the rope at the cutaway.

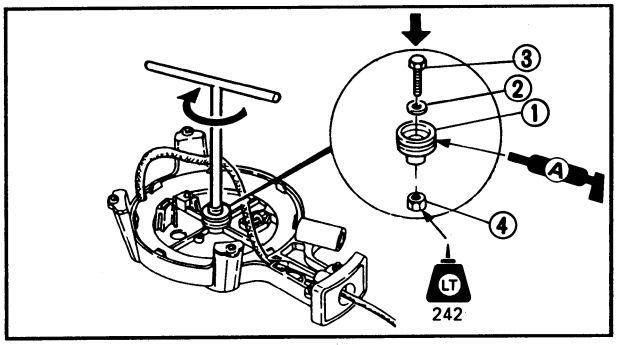
⚠ WARNING

Do not use a damaged starter rope, it could cause injury.



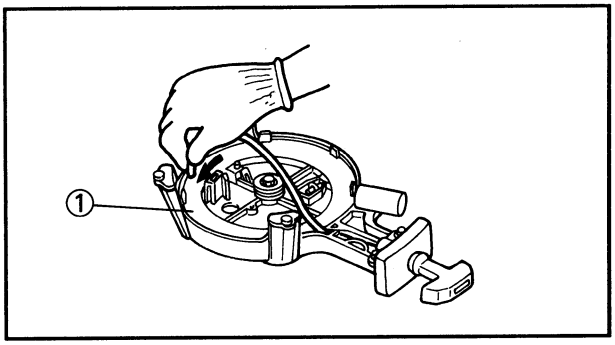
2. Install:
   • Sheave drum ①

NOTE:
Position the inner end of the spiral spring on the retainer post of the sheave drum.



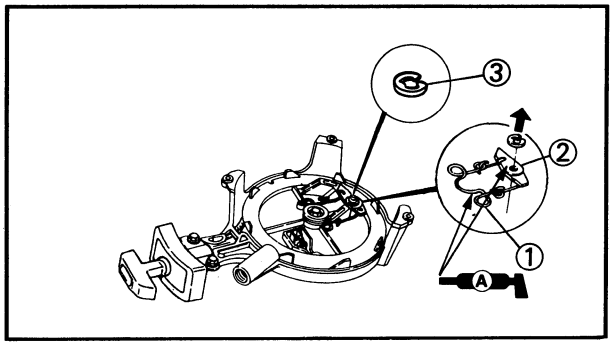
3. Install:
   • Bushing ①
   • Washer ②
   • Bolt ③
   • Nut ④

	**Bolt:** **3 Nm (0.3 m • kg, 2.2 ft • lb)**



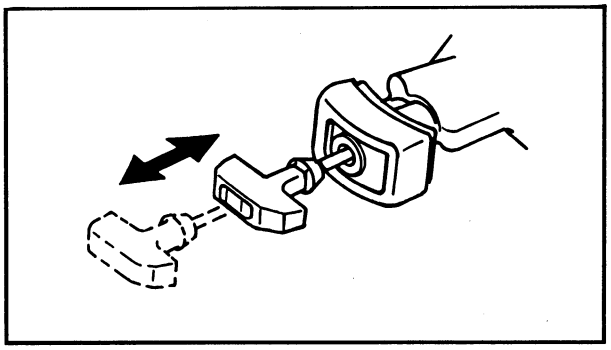
4. Set:
   • Spiral spring

NOTE:
Wind up the spring 2 turns counterclockwise with the starter rope.

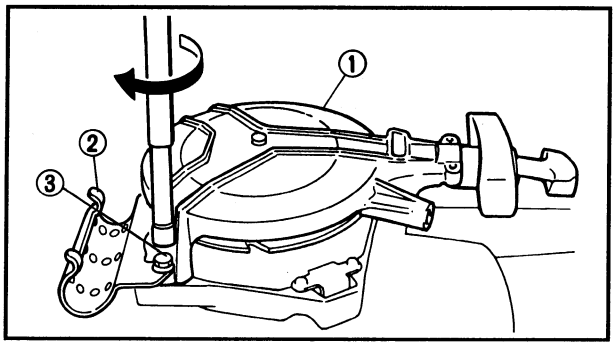


5. Install:
   • Drive pawl spring ①
   • Drive pawl ②
   • Circlip ③

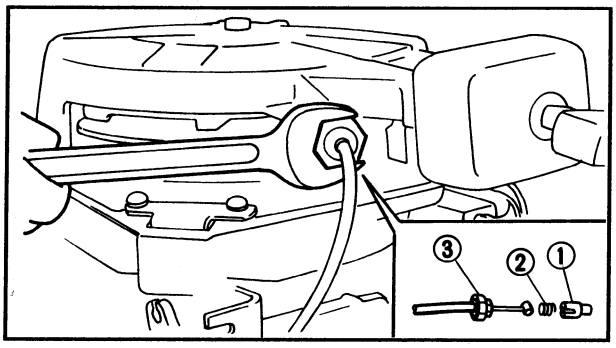
CAUTION:
Always use the new circlip.



6. Check:
   • Starter operation
   Unsmooth operation → Repair.



7. Install:
   - Recoil starter assembly ①
   - Plate ② (for EUROPE)
   - Bolt ③



8. Install:
   - Starter stop plunger ①
   - Compression spring ②
   - Starter stop plunger nut ③

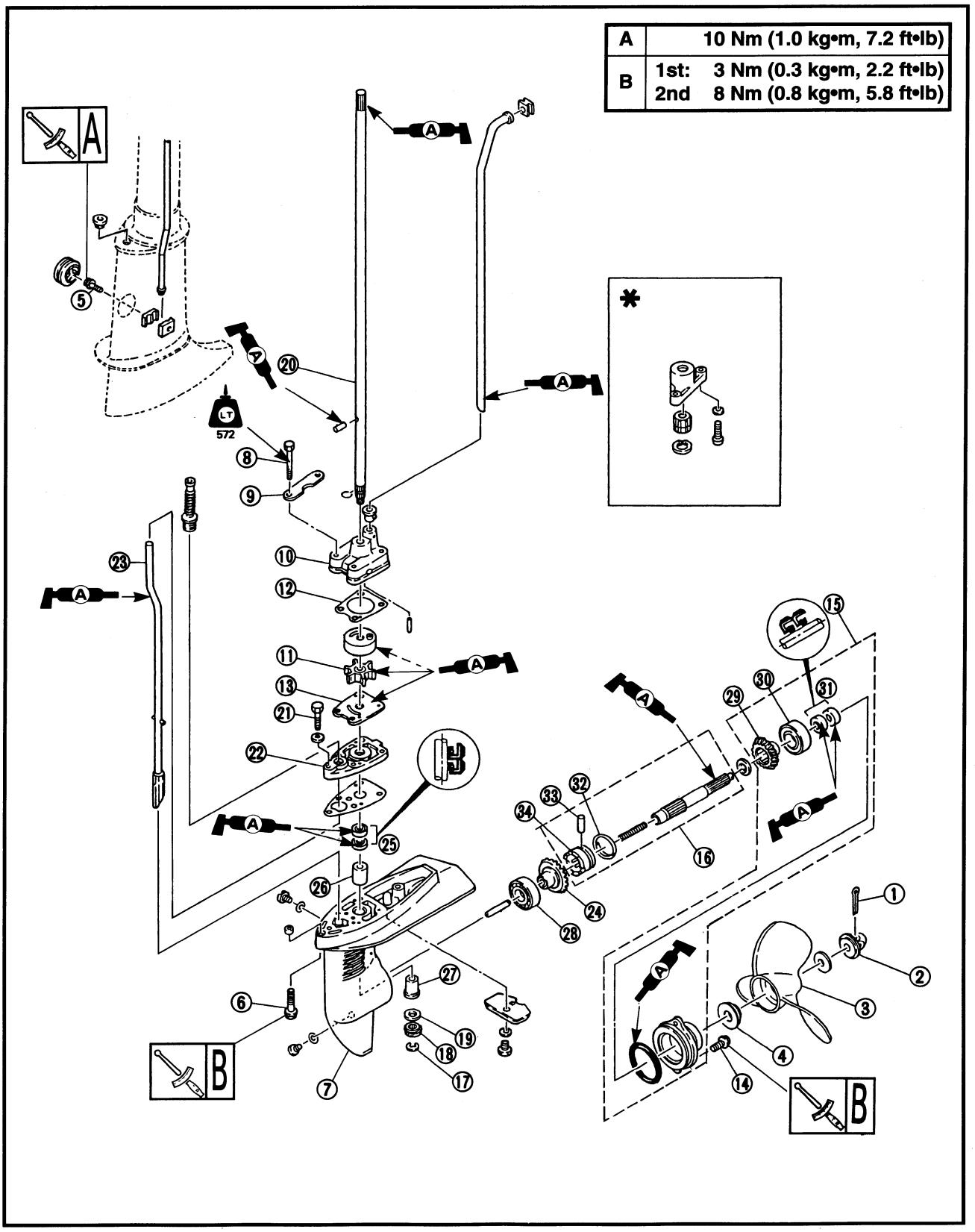
CHAPTER 6
LOWER UNIT

LOWER UNIT

PREPARATION FOR REMOVAL

- Drain the gear oil.

* : For long models-with upper casing.



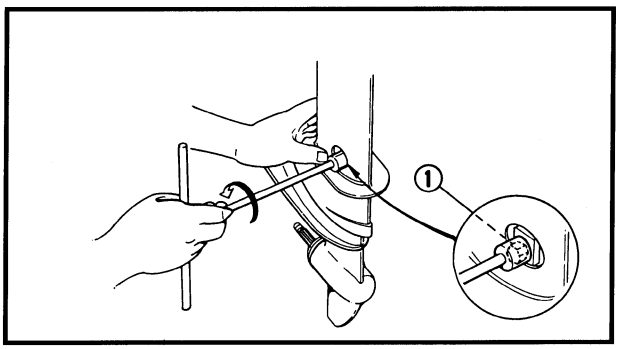
LOWER UNIT

NOTE ON REMOVAL AND REASSEMBLY

- Remove any gasket adhered to the contacting surface.
- For reassembly, the removed parts should be cleaned with solvent.

Extent of removal: ① Lower unit removal ② Impeller remove ③ Lower unit disassembly

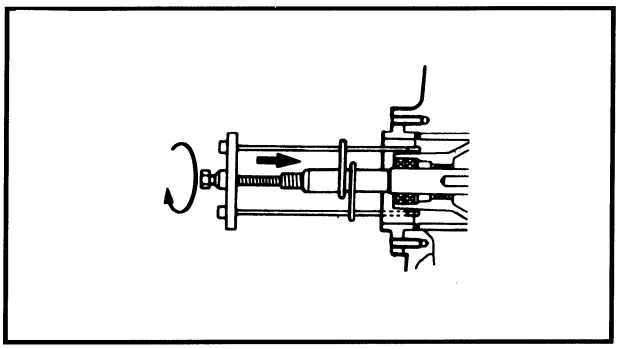
Extent of removal	Order	Part name	Q'ty	Remarks
③	1	Cotter pin	1	
	2	Nut	1	
	3	Propeller	1	
	4	Spacer	1	
①	5	Bolt	1	Refer to "REMOVAL POINTS".
	6	Bolt	4	
	7	Lower unit	1	
②	8	Bolt	4	
	9	Plate	2	
	10	Water pump housing	1	
	11	Impeller	1	
	12	Gasket	2	
	13	Outer plate	1	
	14	Bolt	2	
	15	Reverse gear complete	1	Refer to "REMOVAL POINTS".
	16	Propeller shaft complete	1	
	17	Circlip	1	Refer to "REMOVAL POINTS".
	18	Pinion gear	1	
	19	Washer	1	
	20	Drive shaft	1	
	21	Bolt	1	
	22	Plate	1	
	23	Shift shaft	1	
	24	Forward gear	1	
	25	Oil seal	2	
	26	Bushing	1	Refer to "REMOVAL POINTS".
	27	Bushing	1	
	28	Bearing outer race	1	
	29	Reverse gear	1	
	30	Ball bearing	1	Refer to "REMOVAL POINTS".
	31	Oil seal	2	
	32	Cross pin ring	1	
	33	Cross pin	1	
	34	Dog clutch	1	



REMOVAL POINTS

Shift shaft

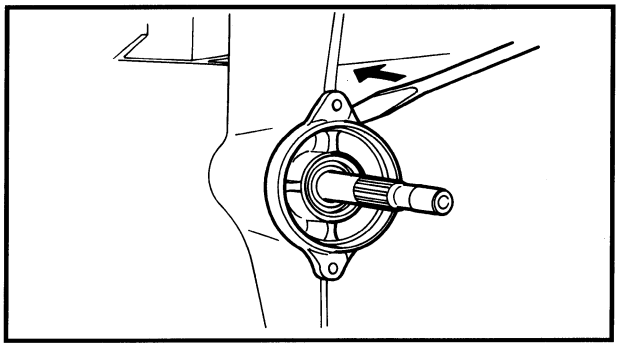
1. Remove:
   - Grommet
   - Bolt ①



Reverse gear complete

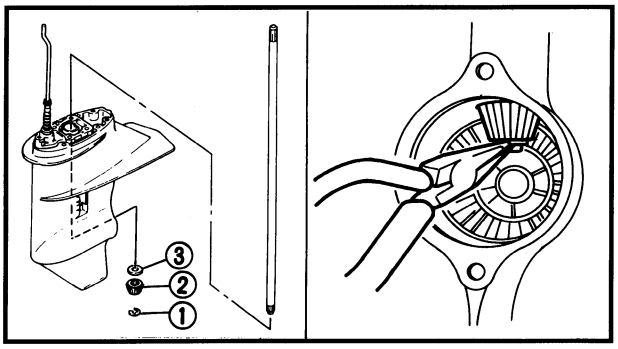
1. Remove:
   - Reverse gear complete

Bearing housing puller:
YB-6234
Universal puller:
YB-6117



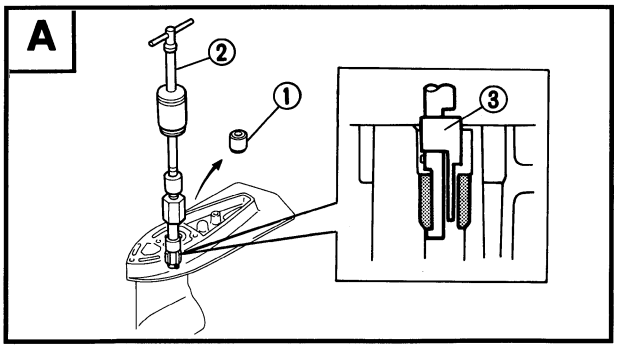
NOTE:

Fit a slottled-head screwdriver into one of the two notches in the bearing housing flange, and pry the housing off slightly.



Pinion gear

1. Remove:
   - Circlip ①
   - Pinion gear ②
   - Pinion gear shim ③

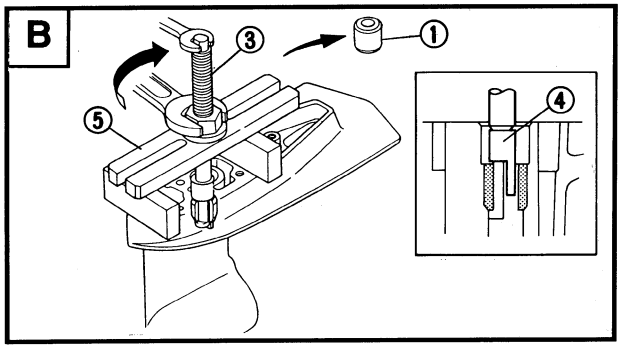


Bushing

1. Remove:
   - Upper bushing ①

NOTE:

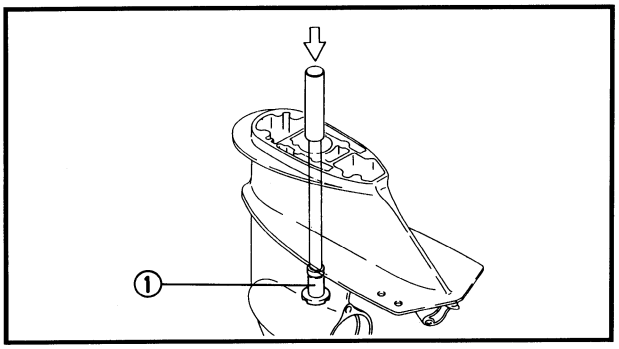
As shown, attach the bushing puller in the upper bushing, and insert the puller so that claw hold the underside of the bushing.



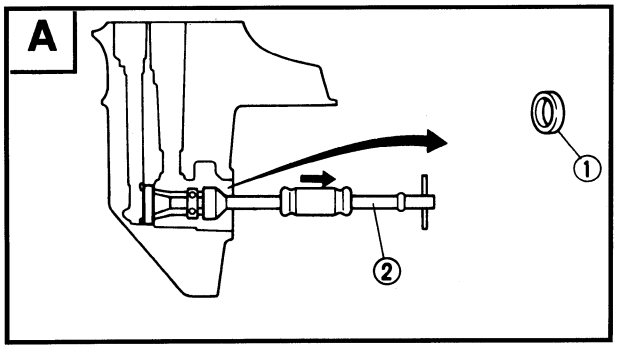
Slide hammer set:
YB-6096 ..... ①
Bushing puller:
YB-6178, 90890-06646 ..... ③
Bushing puller spacer:
90890-06648 ..... ④
Stopper guide plate:
90890-06501 ..... ⑤

A For USA and CANADA
B Except for USA and CANADA

2. Remove:
   • Lower bushing ①



Drive rod:
YB-6229, 90890-06652
Bushing attachement:
YB-6027, 90890-06651

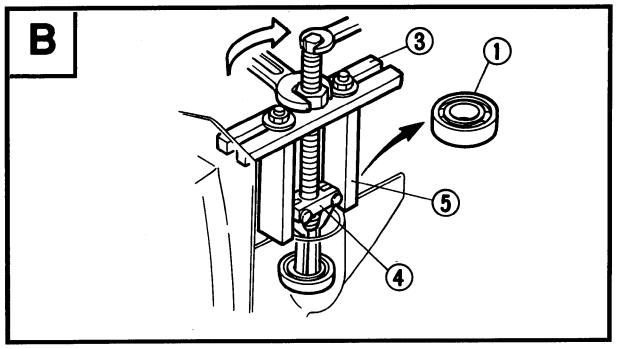


Bearing outer race

1. Remove:
   • Bearing outer race ①

Slide hammer set:
YB-6096 ..... ②
Stopper guide plate:
90890-06501 ..... ③
Bearing puller:
90890-06535 ..... ④
Stopper guide stand:
90890-06538 ..... ⑤

A For USA and CANADA
B Except for USA and CANADA

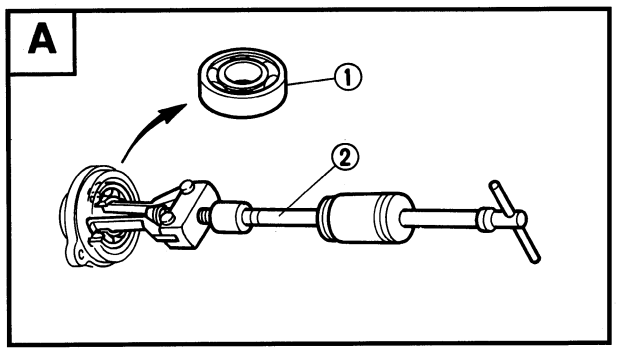


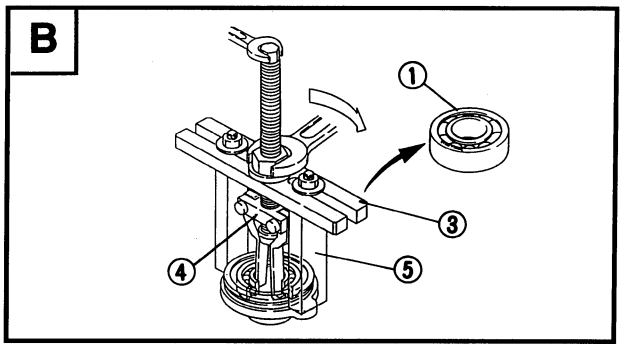
Reverse gear

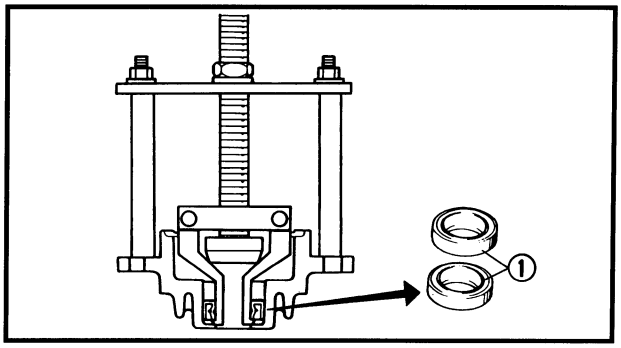
1. Remove:
   • Ball bearing ①

Slide hammer set:
YB-6096 ..... ②
Stopper guide plate:
90890-06501 ..... ③
Bearing puller:
90890-06535 ..... ④
Stopper guide stand:
90890-06538 ..... ⑤

A For USA and CANADA
B Except for USA and CANADA







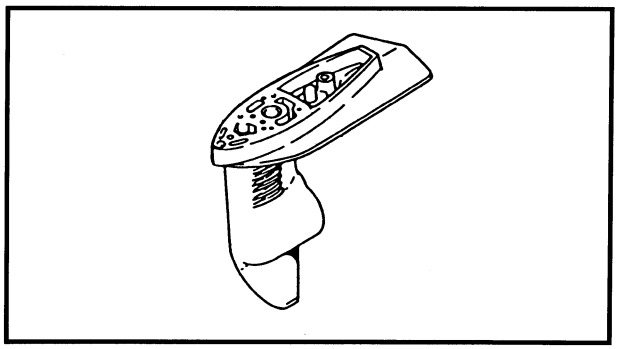
2. Remove:
   - Oil seal ①

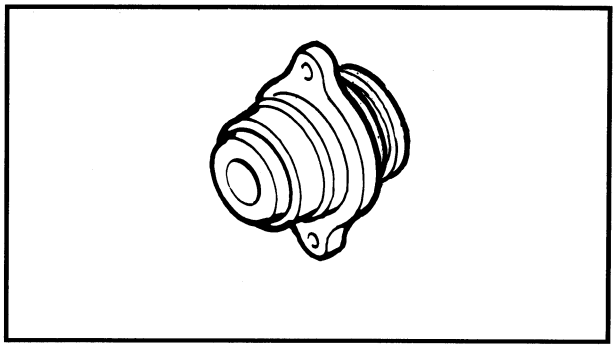
Slide hammer set:
YB-6096, –
Stopper guide plate:
– , 90890-06501
Bearing puller:
– , 90890-06535
Stopper guide stand:
– , 90890-06538

INSPECTION AND REPAIR

Lower case

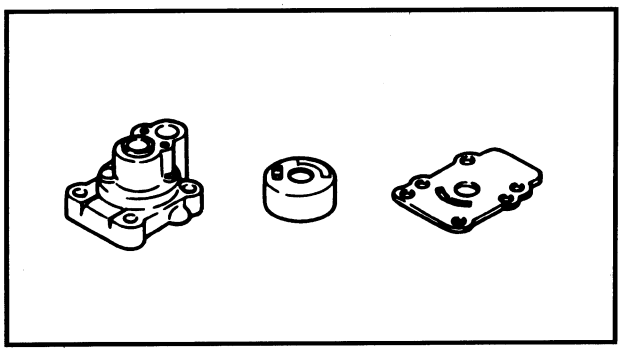
1. Clean:
   - Gear case
   Use a soft brush and solvent.
2. Inspect:
   - Water passage
   Mineral deposits/Corrosion → Clean.
3. Inspect:
   - Lower case
   Crank/Damage → Replace.





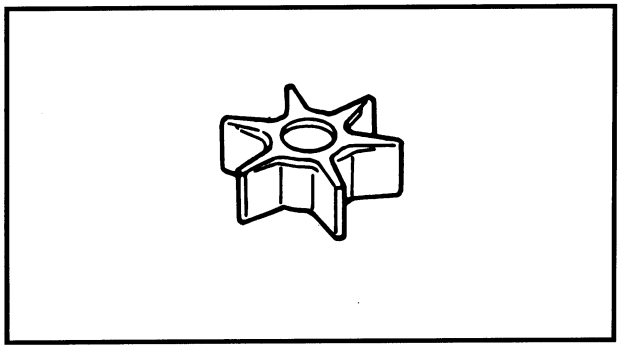
Bearing housing

1. Clean:
   - Bearing housing
   Use a soft brush and solvent.
2. Inspecr:
   - Bearing housing
   Crack/Damage → Replace.



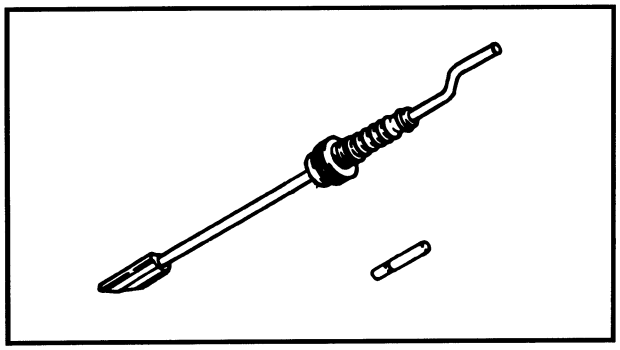
Water pump housing

1. Inspect:
   - Water pump housing
     Crack/Damage → Replace.



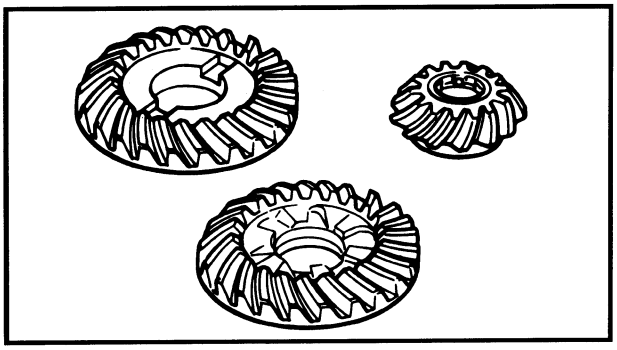
Impeller

1. Inspect:
   - Impeller
     Crack/Damage → Replace.



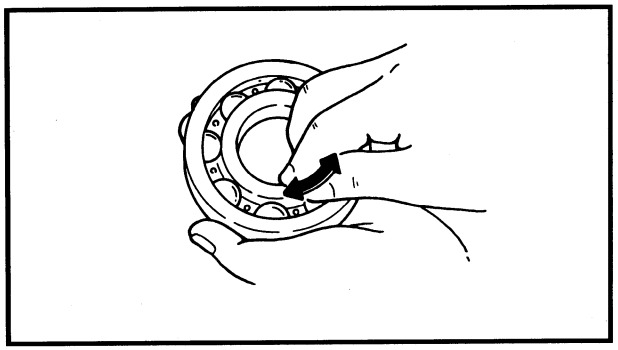
Shift rod

1. Inspect:
   - Shift plunger
     Wear/Damage → Replace.
2. Inspect:
   - Boot
     Break/Damage → Replace.



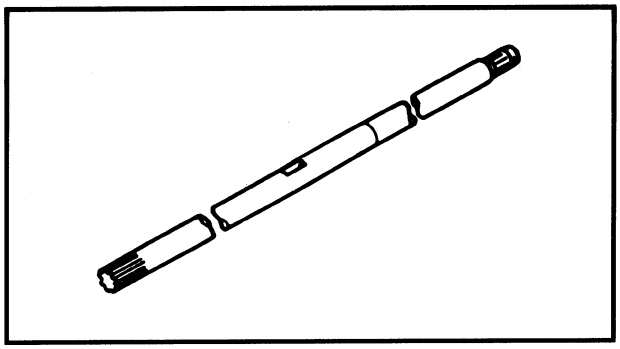
Gear

1. Inspect:
   - Teeth
   - Dogs
     Wear/Damage → Replace.



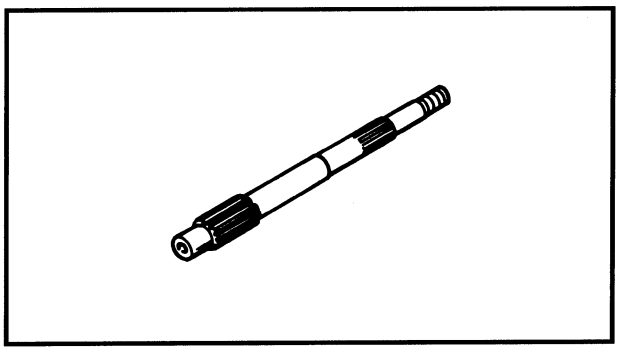
Bearing

1. Inspect:
   - Bearing
     Pitting/Rumbling → Replace.



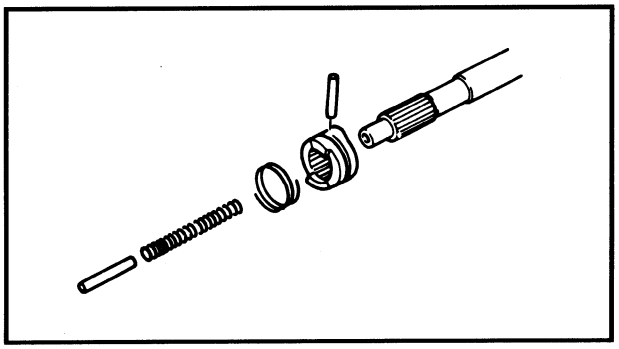
Drive shaft

1. Inspect:
   - Drive shaft
     Bend/Wear/Damage → Replace.



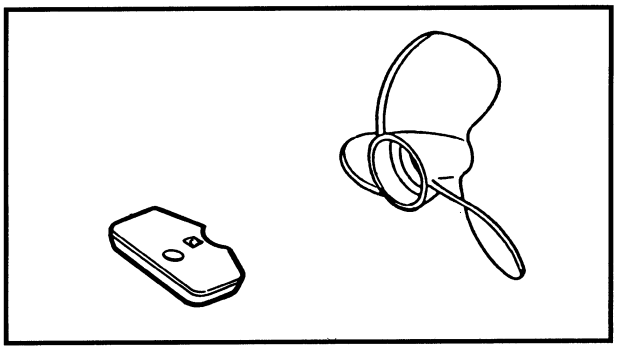
Propeller shaft

1. Inspect:
   - Propeller shaft
     Bend/Wear/Damage → Replace.



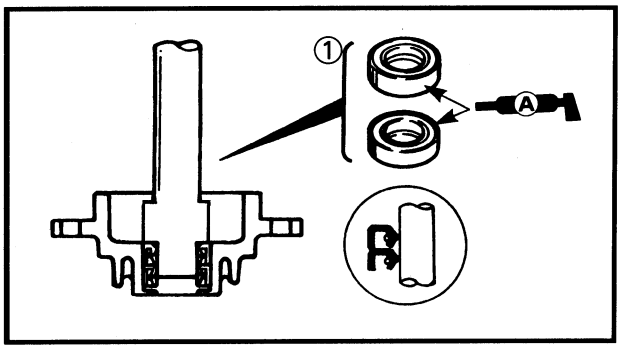
Dog clutch

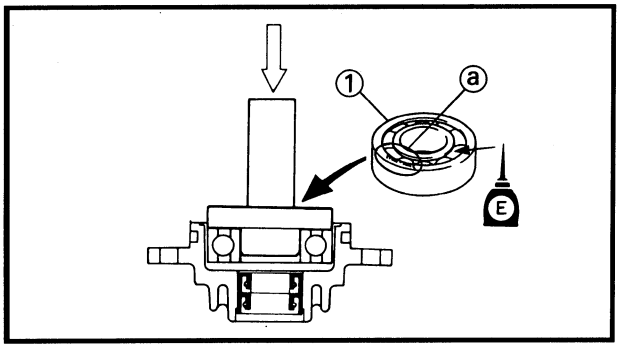
1. Inspect:
   - Dog clutch
     Wear/Damage → Replace.

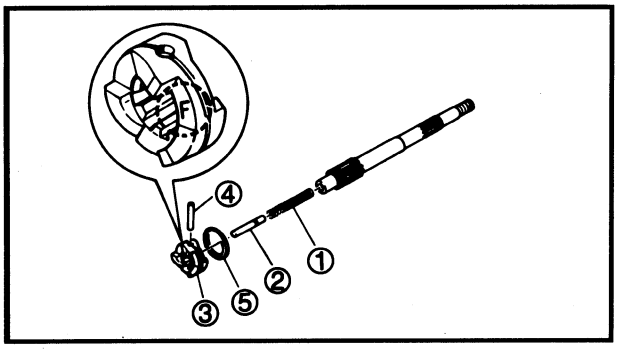


Propeller/Anode

Refer to page 3-7.







ASSEMBLY AND INSTALLATION

Reverse gear

1. Install:
   - Oil seal ①

	Oil seal installer: **YB-6023** **Drive rod:** **YB-6229**

NOTE:

- Install the two oil seals at the same time.
- Press-fit them until they stop.

2. Install:
   - Ball bearing ①

NOTE:

Position the ball bearing so that the stamped mark ⓐ on it is facing upward and press-fit it unit it stop.

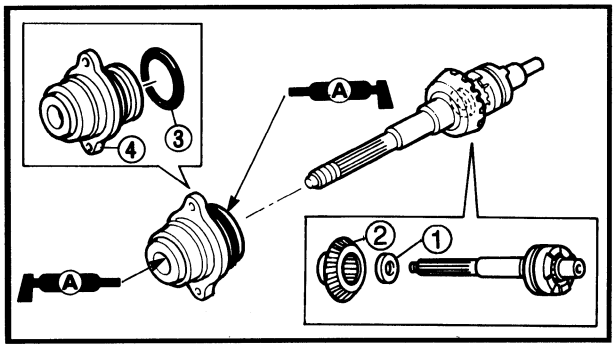
	Bearing installer: **YB-6016, 90890-06634** **Drive rod:** **YB-6071, 90890-06606**

Propeller shaft

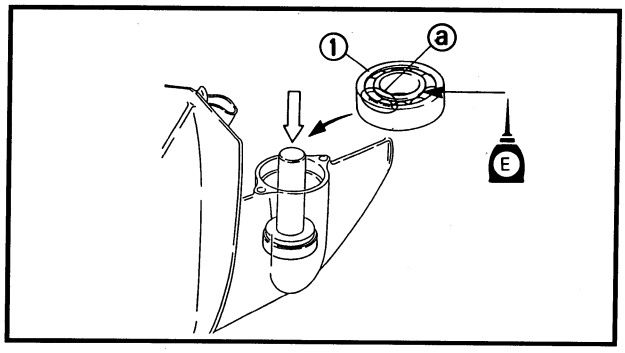
1. Install:
   - Spring ①
   - Plunger ②
   - Dog clutch ③
   - Cross pin ④
   - Cross pin ring ⑤

NOTE:

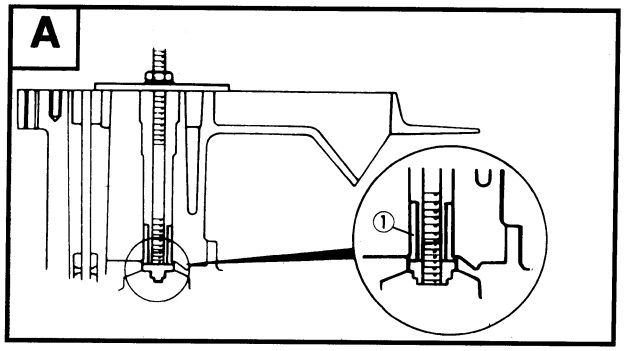
Install the clutch with "F" mark toward the forward gear side.



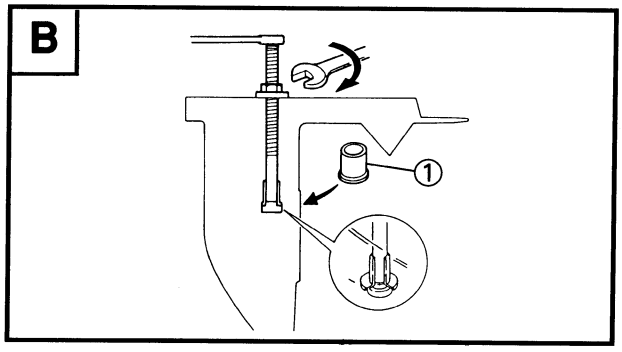
2. Install:
   - Washer plate ①
   - Reverse gear ②
   - O-ring ③
   - Gear case cap ④

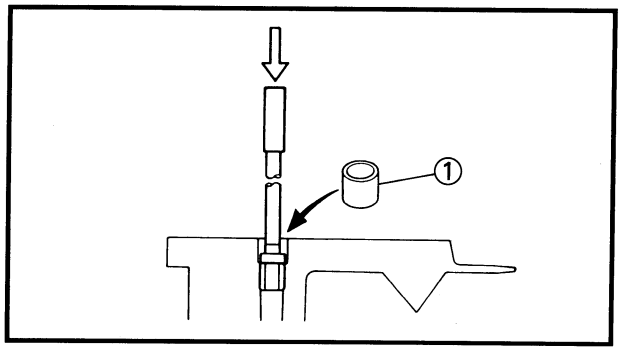


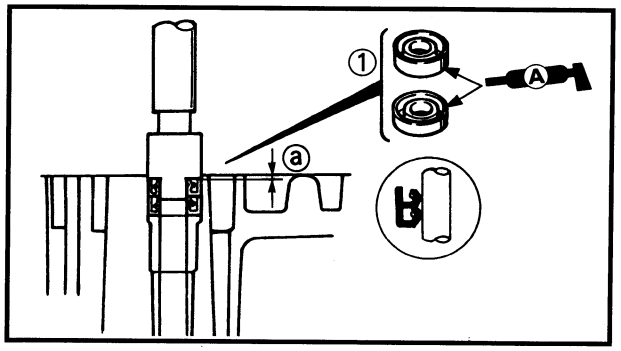
A



B







Lower case

1. Install:
   - Ball bearing ① (forward gear)

NOTE:

Position the ball bearing so that the stamped mark ⓐ on it is facing upward and press-fit it until it contacts the gear case.

Bearing installer:
YB-6270-A, 90890-06634
Rod driver:
YB-6071, 90890-06606

2. Install:
   - Lower bushing ①

Bushing installer:
YB-6029/90890-06601
Needle bearing installer:
YB-6169
Bushing attachment:
YB-6028/90890-06650

Ⓐ For USA and CANADA
Ⓑ Except for USA and CANADA

3. Install:
   - Upper bushing ①

Bushing installer attachment:
YB-6025, 90890-06651
Rod driver:
YB-6229, 90890-06652

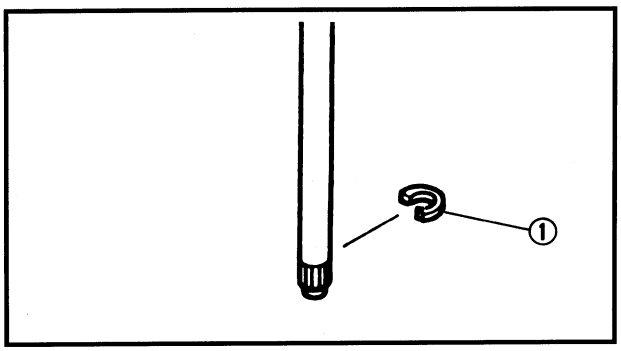
4. Install:
   - Oil seal ①

NOTE:

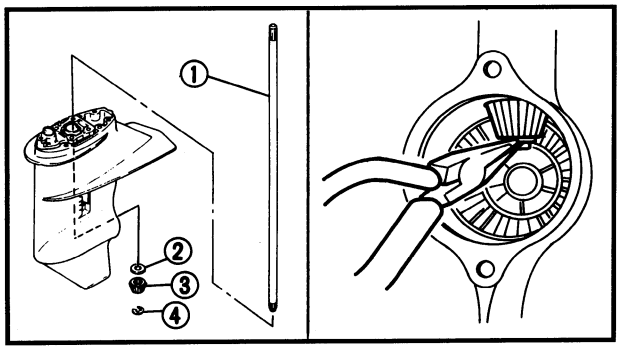
Install the two oil seals at the same time.

Attachment:
YB-6014
Rod driver:
YB-6071

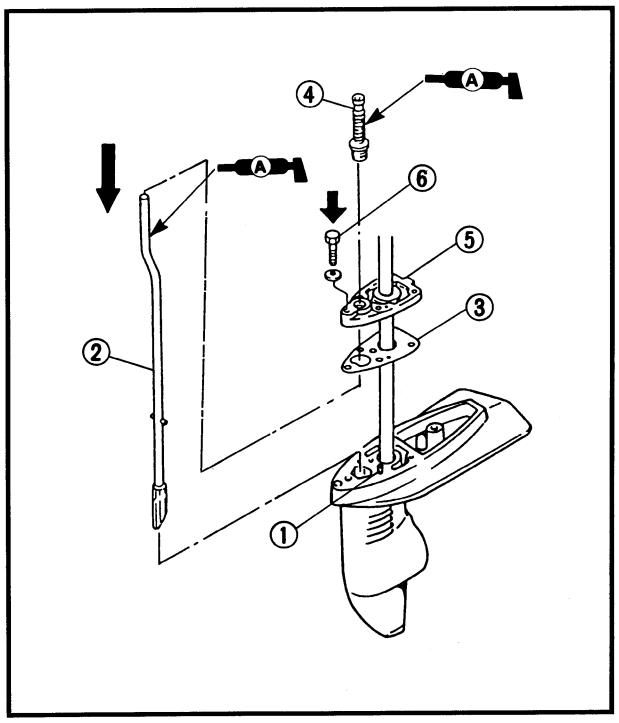
Depth ⓐ:
1.0 ~ 1.5 mm (0.04 ~ 0.06 in)



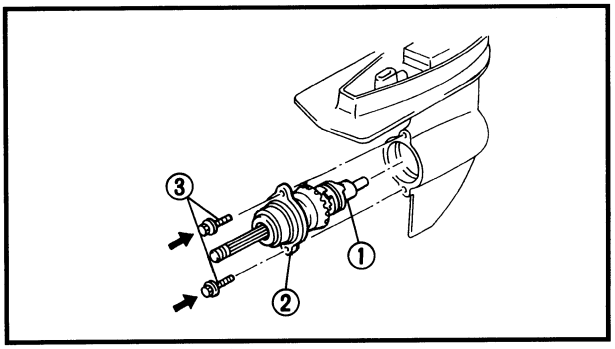
5. Install:
   - Crip ①



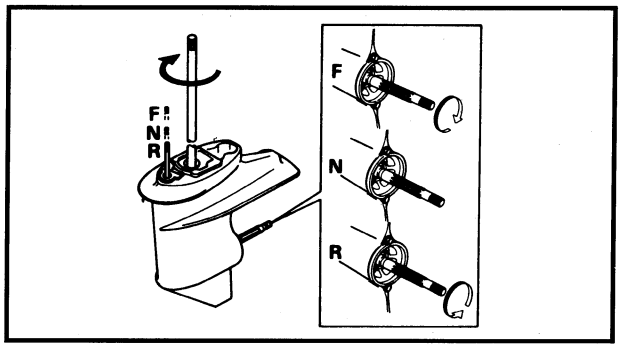
6. Insstall:
   - Drive shaft ①
   - Washer ②
   - Pinion gear ③
   - Circlip ④



7. Install:
   - Dowel pin ①
   - Shift rod ②
   - Gasket ③
   - Shift rod boot ④ (into the plate)
   - Plate ⑤
   - Bolt ⑥



8. Install:
   - Propeller shaft complete ①
   - Gear case cap ②
   - Bolt ③



9. Check:
   - Shift cam operation
     Unsmooth operation → Repair.

NOTE:
Check that the dog clutch shifts to "Forward", "Neutral" and "Reverse" correctly.

Backlash measurement

NOTE:
- Both forward and reverse gear backlash should be measured.
- If both the forward and reverse gear backlash are large than specified, the pinion may be too high.
- If both the forward and reverse gear backlash are smaller than specified, the pinion may be too low.

1. Measure:
   - Forward gear backlush
     Out of specification → Replace.

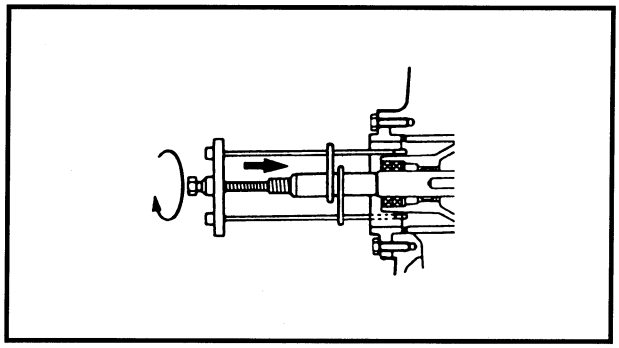
Backlash:
0.28 ~ 0.71 mm

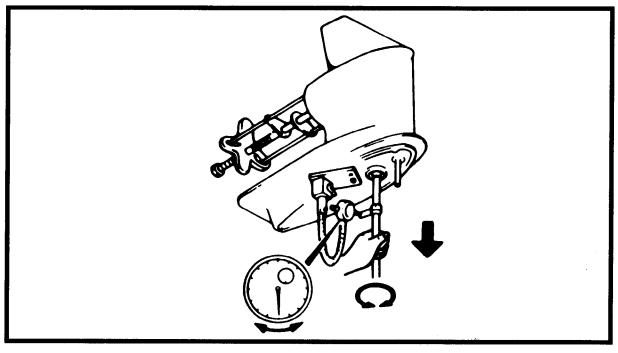
Measuring steps:
- Place the shift shaft in neutral.
- Load the forward gear with the bearing housing puller on the propeller shaft.

NOTE:
Lightly tighten by hand until the pressure of the propeller shaft on the forward gear restricts movement enough to allow backlash measurement.

Bearing housing puller:
YB-6234
Universal puller:
YB-6117

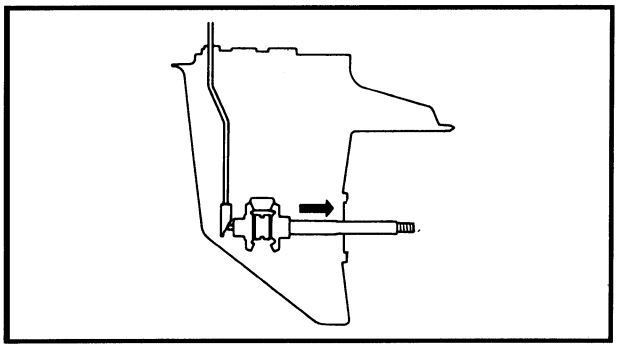
- Set the lower unit upside down.
- Attach the backlash indicator on the drive shaft.
- Attach the dial gauge on the gear case, and make the dial gauge stem contact the mark on the indicator.





Dial gauge:
YU-3097/90890-01252
Magnet base:
YU-34481/90890-06705
Backlash indicator:
YB-6265/90890-06265

- While pulling the drive shaft downward, slowly turn the drive shaft clockwise and counter-clockwise then measure the backlash when the drive shaft stops at each direction.



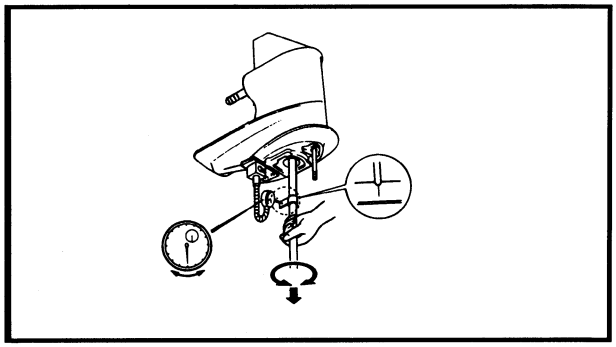
2. Measure:
   - Reverse gear backlash
     Out of specification → Replace.

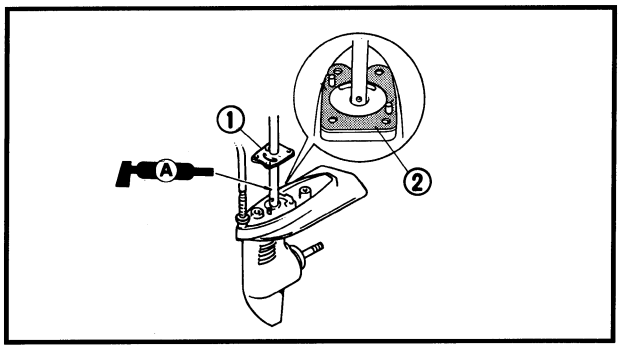
Backlash:
0.28 ~ 0.71 mm

Measuring steps:
- Place the shift shaft in neutral.
- Set the lower unit upside down.
- Attach the backlash indicator on the drive shaft.
- Attach the dial gauge on the gear case, and make the dial gauge stem contact the mark on the indicator.

Dial gauge:
YU-3097/90890-01252
Magneto base:
YU-34481/90890-06705
Backlash indicator:
YB-6265/90890-06265

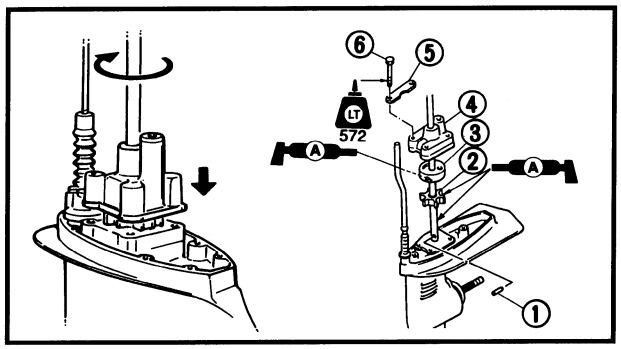
- While pulling the drive shaft downward, slowly turn the drive shaft clockwise and counter-clockwise then measure the backlash when the drive shaft stops at each direction.





Water pump

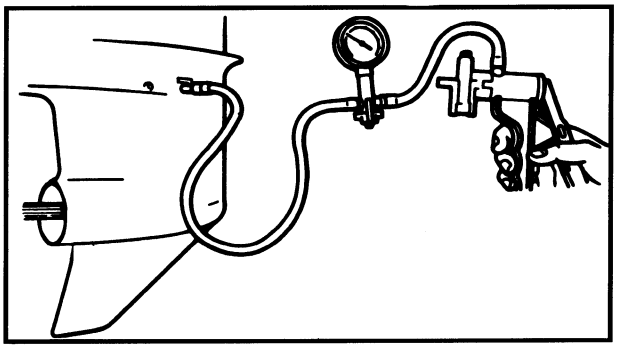
1. Install:
   - Outer plate ①
   - Gasket ②



2. Install:
   - Dowel pin (drive shaft) ①
   - Impeller ②
   - Insert cartridge ③
   - Water pump housing ④
   - Plate ⑤
   - Bolt ⑥

NOTE:

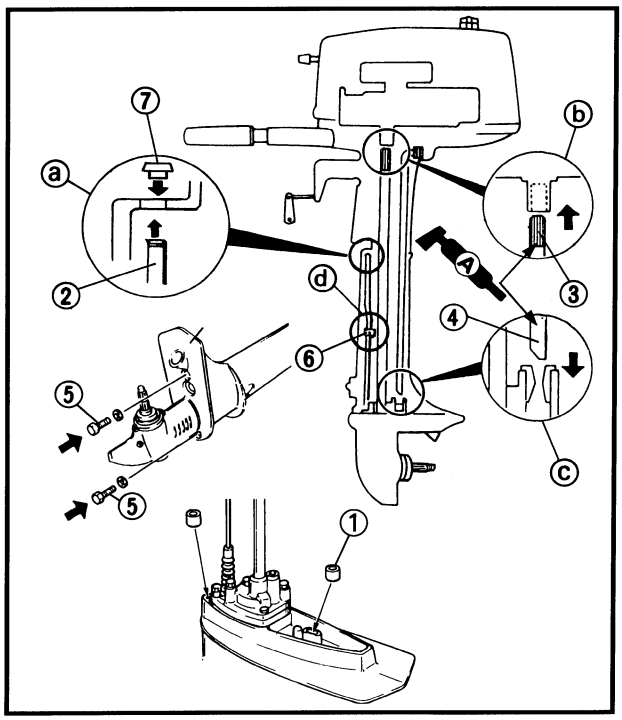
- Apply the impeller with water resistant grease.
- Align the hole in the water pump housing with the projection in the insert cartridge, when assembly-ing them.
- Turn the drive shaft clockwise, when installing the water pump housing.
- Apply Loctite (572) to the bolts.



3. Check:
   - Leakage

   Leak → Reinstall.

Checking steps: • Attach the Mity Vac to the oil level hole.	
	**Mity Vac:** **YB-35956/90890-06756**
• Apply the specified pressure.	
	**Specified pressure:** **100 kPa (1.0 kg/cm², 14.2 psi)**
• Check that the pressure is held at specified pressure for 10 seconds.	

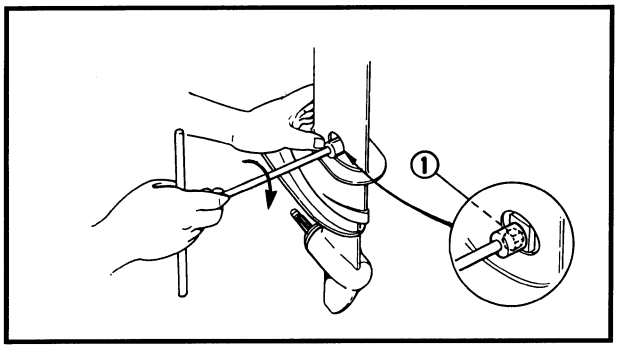


Lower unit

1. Install:
   - Collar ①
   - Shift rod ②
   - Drive shaft ③
   - Water tube ④
   - Bolt ⑤
   - Shift rod connector ⑥
   - Cap ⑦

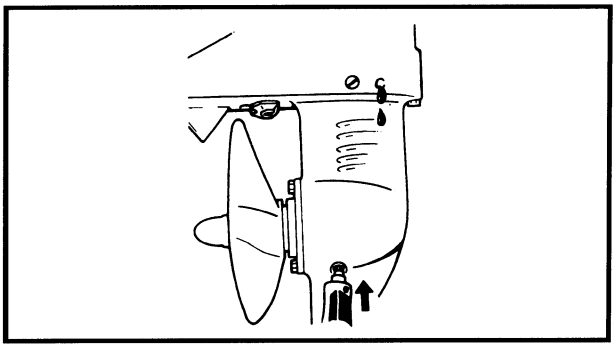
NOTE:

- ⓐ: Insert the shift rod into the upper casing.
- ⓑ: Insert the drive shaft into the crank shaft.
- ⓒ: Insert the water tube into the water seal.
- ⓓ: Insert the shift rod into the shft rod connector.



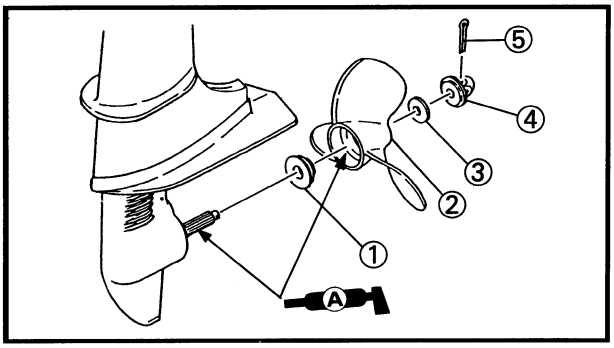
2. Install:
   - Bolt ①
   - Grommet

	Bolt: **10 Nm (1.0 m•kg, 7.2 ft•lb)**



3. Apply:
   - Gear oil

   Refer to page 3-11.



Propeller

1. Install:
   - Spacer ①
   - Propeller ②
   - Washer ③
   - Nut ④
   - Cotter pin ⑤

NOTE:

Align the holes in the propeller nut with the hole in the propeller shaft and insert the cotter pin into the hole. Be sure to bend the cotter pin ends.

CHAPTER 7
BRACKET UNIT

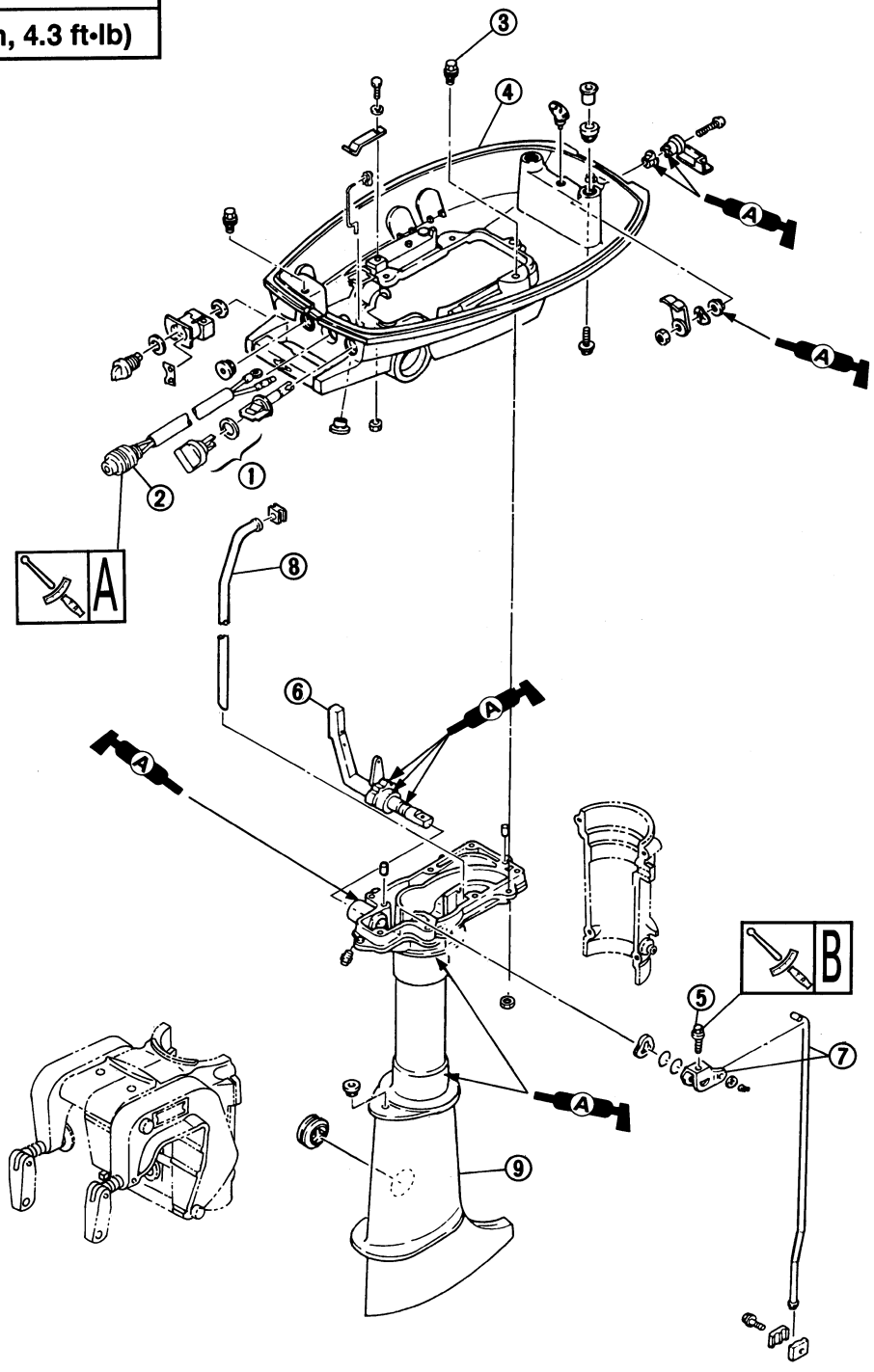
BRACKET UNIT

UPPER CASING AND BOTTOM COWLING

PREPARATION FOR REMOVAL

- Remove the power unit.
- Remove the steering handle.
- Remove the lower unit.
- Remove the bracket unit.

A	5 Nm (0.5 kg•m, 3.6 ft•lb)
B	6 Nm (0.6 kg•m, 4.3 ft•lb)



UPPER CASING AND BOTTOM COWLING

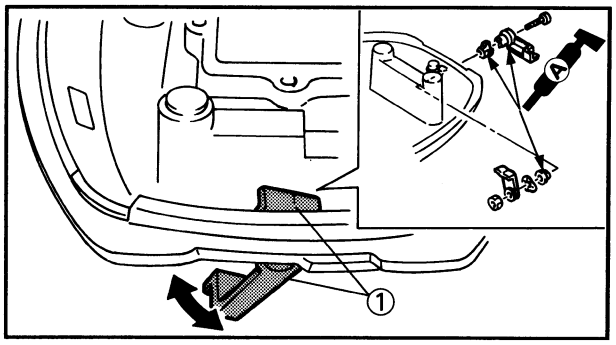
Extent of removal: ① Bottom cowling removal
② Upper casing removal

Extent of removal	Order	Part name	Q'ty	Remarks
①	1	Choke knob	1	
	2	Stop switch	1	
	3	Bolt	4	
	4	Bottom cowling	1	
	5	Bolt	1	
②	6	Shift handle	1	
	7	Shift rod	1	
	8	Water tube	1	
	9	Upper casing	1	

CLEANING AND INSPECTION

⚠ WARNING

Protect your eyes with suitable safety spectacles or safety goggles when using compressed air.

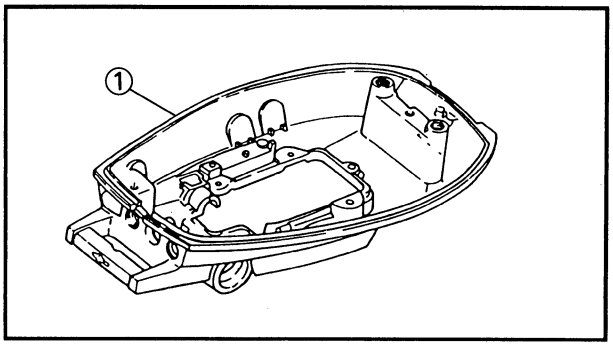


Bottom cowling

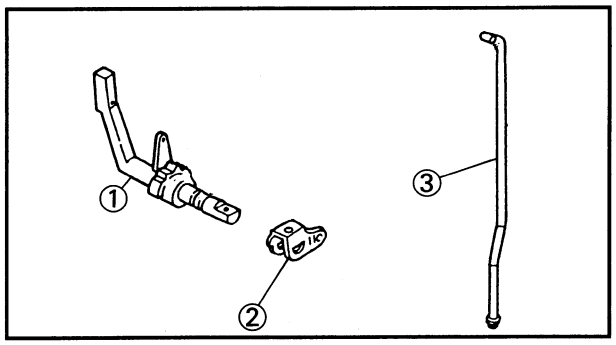
1. Inspect:
   • Clamp lever operation
   unsmooth operation→Repair.

NOTE:

Check the smooth movement of clamp lever ①.
Apply grease as required.



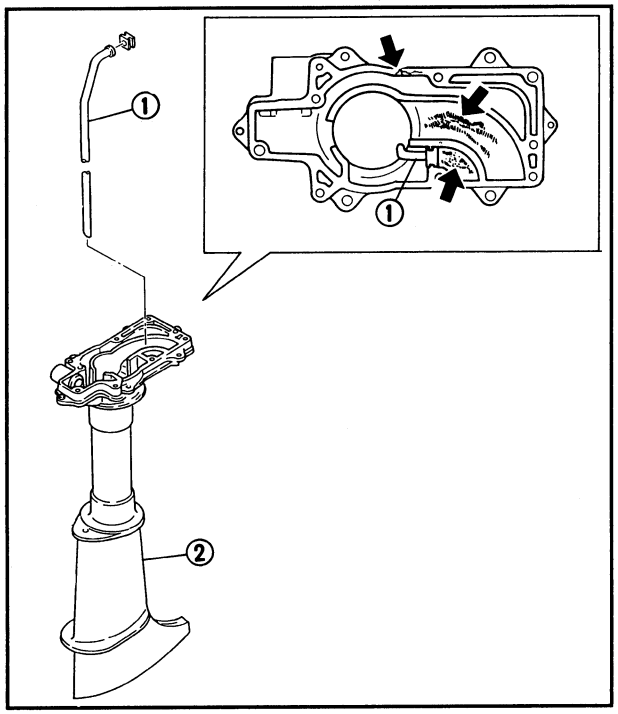
2. Inspect:
   • Bottom cowling ①
   Crack/Damage→Replace.



Shift handle and shift mechanism

1. Inspect:
   - Shift handle ①
   - Shift rod lever ②
   - Shift rod ③

   Wear/Crack/Damage→Replace.



Upper casing and water tube

1. Eliminate:
   - Carbon and salt or other deposits

   Use the round scraper

2. Inspect
   - Water tube ①

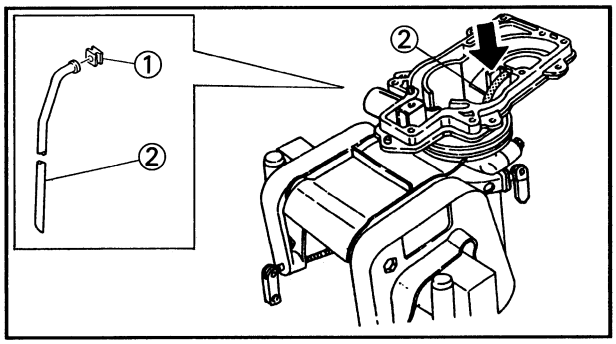
     Clogged/Water leakage/Damage→Replace.
   - Upper casing ②

     Crack/Damage→Replace.

ASSEMBLY AND INSTALLATION

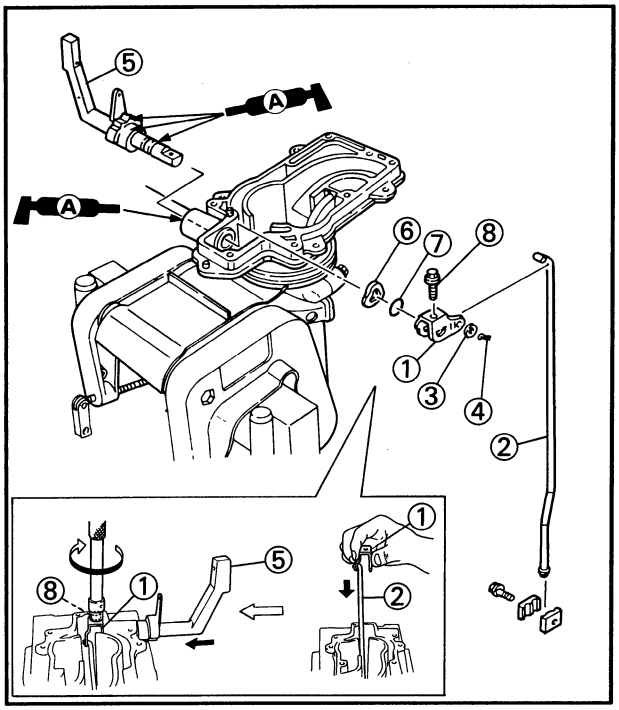
CAUTION:

- **Always use new gaskets, and O-rings.**
- **Apply grease to parts when specified.**



Water tube

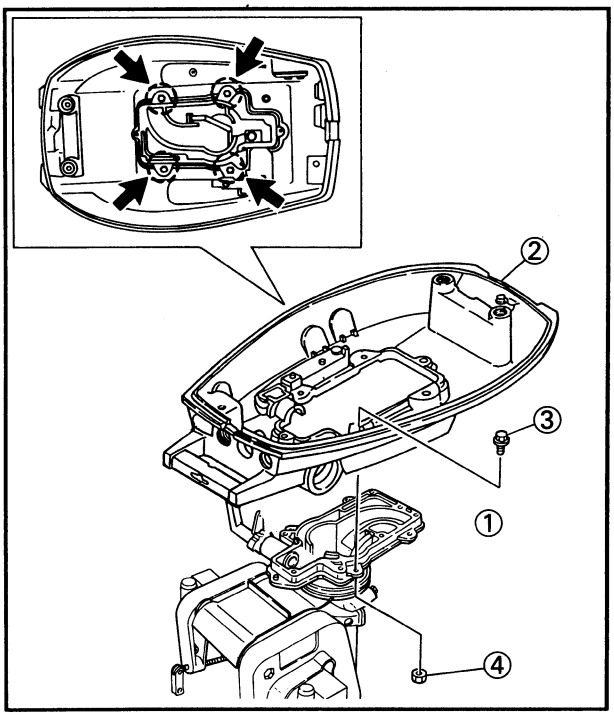
1. Install:
   - Seal rubber ①
   - Water tube ②



Shift handle and shift mechanism

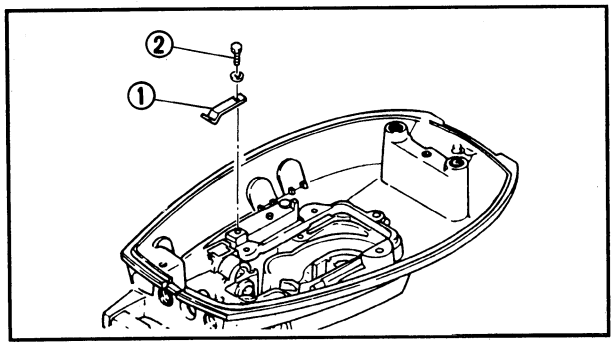
1. Install:
   - Shift rod lever ①
   - Shift rod ②
   - Washer ③
   - Cotter pin ④
   - Shift handle ⑤
   - Wave washer ⑥
   - O-ring ⑦
   - Bolt ⑧

	**Bolt (shift handle):** **6 Nm (0.6 kg•m, 4.3 ft•lb)**

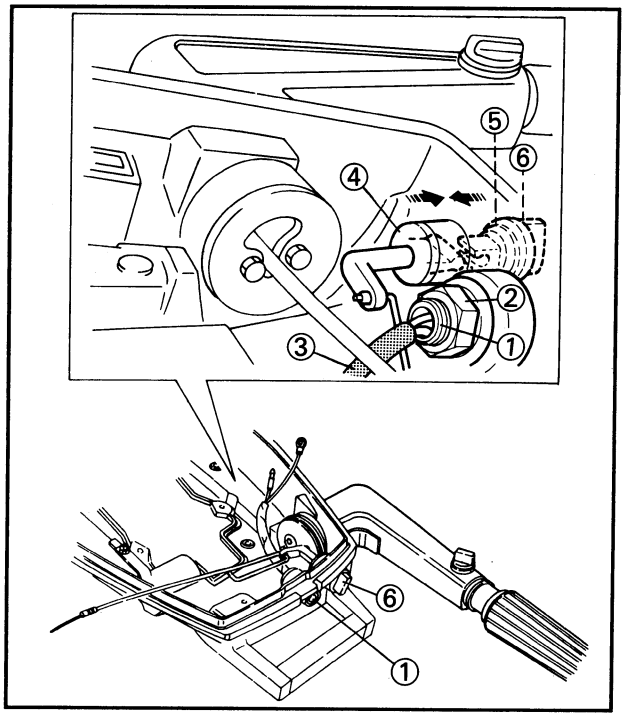


Bottom cowling

1. Install:
   - Upper casing ①
   - Bottom cowling ②
   - Bolt ③
   - Nut ④



2. Install:
   - Shift spring ①
   - Bolt ②



Stop switch

1. Install:
   - Stop switch ①
   - Nut ②

NOTE:

Pass the stop switch lead ③ under the throttle wire.

	Nut (stop switch): **5 Nm (0.5 kg•m, 3.6 ft•lb)**

Choke knob

1. Install:
   - Choke knob 2 ④ (with choke link rod)
   - Washer plate ⑤
   - Choke knob 1 ⑥

NOTE:

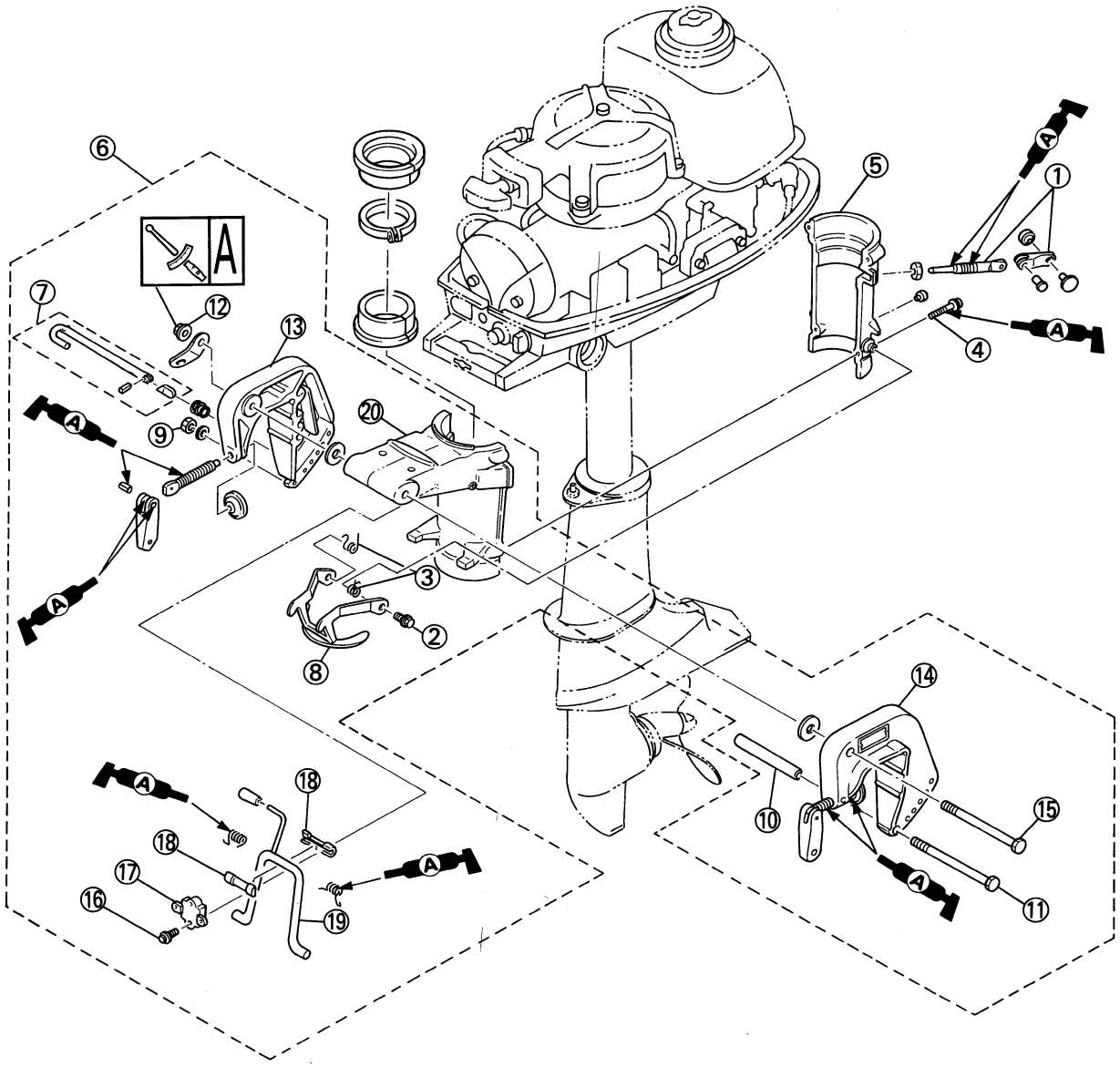
When installing the choke knob, install the choke knob 2 projection to the choke knob 1 joint slot.

BRACKET UNIT

PREPARATION FOR REMOVAL

• Remove the power unit.

A	13 Nm (1.3 kg•m, 9.4 ft•lb)



BRACKET UNIT

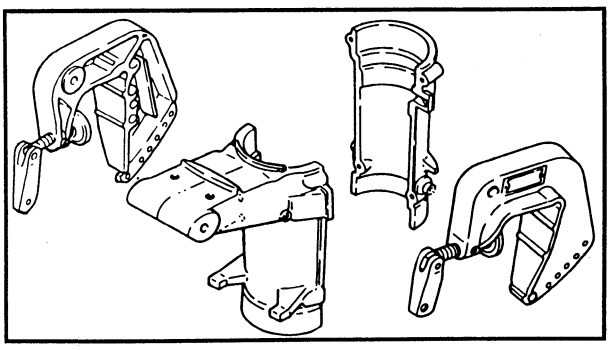
Extent of removal: ① Swivel bracket removal ② Clamp bracket removal ③ Swivel bracket disassembly

Extent of removal	Order	Part name	Q'ty	Remarks
① ③	1	Steering friction piece screw	1	
	2	Bolt	2	
	3	Torsion spring	2	
	4	Bolt	4	
	5	Swivel bracket (rear)	1	
③	6	Swivel bracket (front-with clamp bracket)	1	
	7	Tilt rod	1	
	8	Tilt lock plate	1	
	9	Nut	1	
	10	Collar	1	
②	11	Bolt	1	
	12	Nut	1	
	13	Clamp bracket (starboard side)	1	
	14	Clamp bracket (port side)	1	
	15	Bolt	1	
③	16	Bolt	2	
	17	Cap	1	
	18	Bushing	2	
	19	Tilt stop lever	1	
	20	Swivel bracket (front)	1	

CLEANING AND INSPECTION

⚠ WARNING

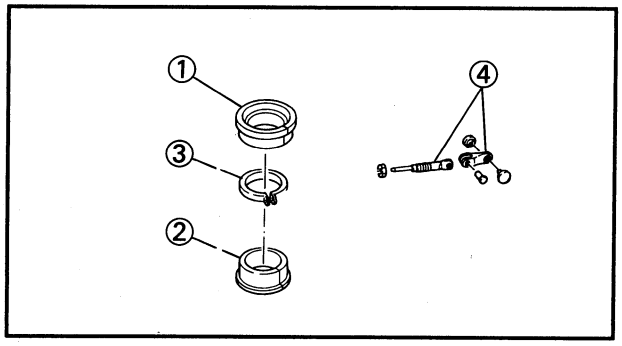
Protect your eyes with suitable safety spectacles or safety goggles when using compressed air.



Clamp bracket and swivel bracket

1. Eliminate:
   - Salt or other deposits
2. Inspect:
   - Clamp bracket
   - Swivel bracket

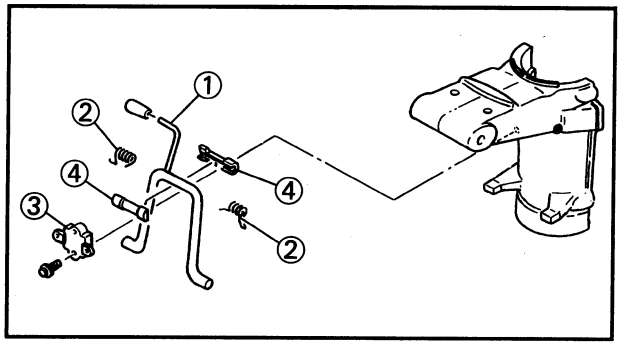
   Crack/Damage→Replace.



Friction pieces

1. Inspect:
   - Pivot shaft bushing ① (upper)
   - Pivot shaft bushing ② (lower)
   - Friction plate ③
   - Steering friction piece screw ④

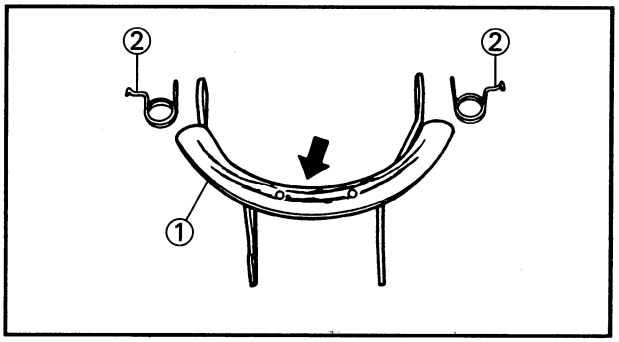
   Wear/Damage→Replace.



Tilt mechanism

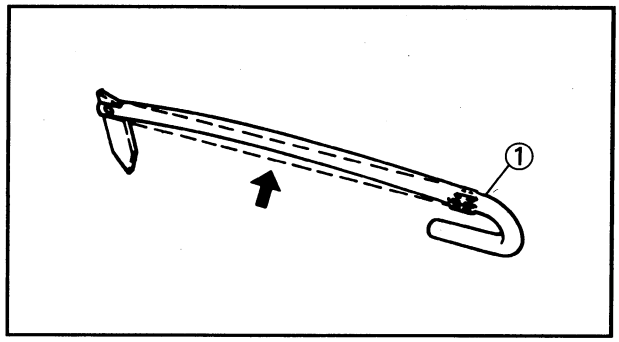
1. Inspect:
   - Tilt stop lever ①
   - Torsion spring ②
   - Cap ③
   - Bushing ④

   Wear/Damage→Replace.



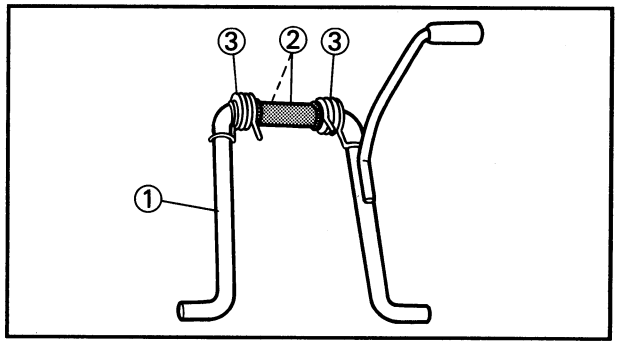
2. Inspect:
   - Tilt lock plate ①
   - Torsion springs ②

   Wear/Damage→Replace.



3. Inspect:
   - Tilt rod ①

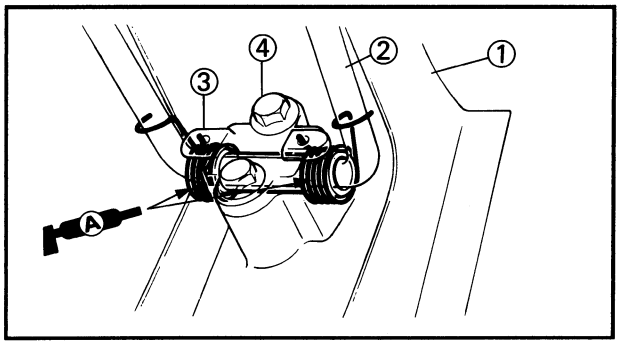
   Bent/Damage→Replace.



ASSEMBLY AND INSTALLATION

Clamp brackets and swivel brackets

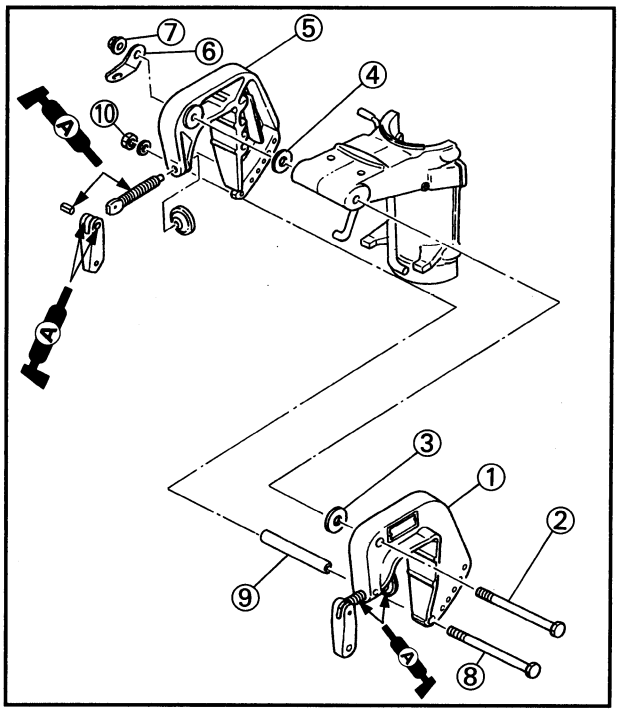
1. Install:
   - Tilt stop lever ①
   - Bushing ②
   - Torsion spring ③



2. Install:
   - Swivel bracket ① (front)
   - Tilt stop lever ② (with bushing and spring)
   - Cap ③
   - Bolt ④

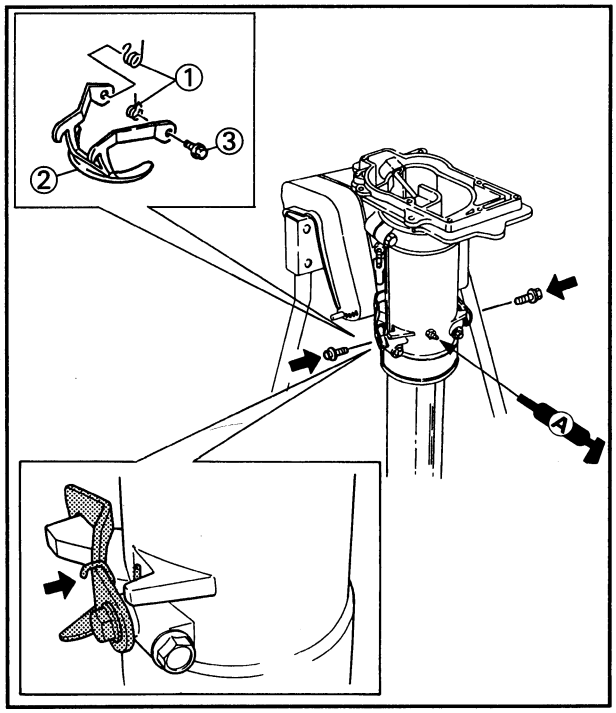
NOTE:

As shown, turn up the tilt stop lever, and install it on the swivel bracket (front). Insert the other end of each spring into the holes in the cap.

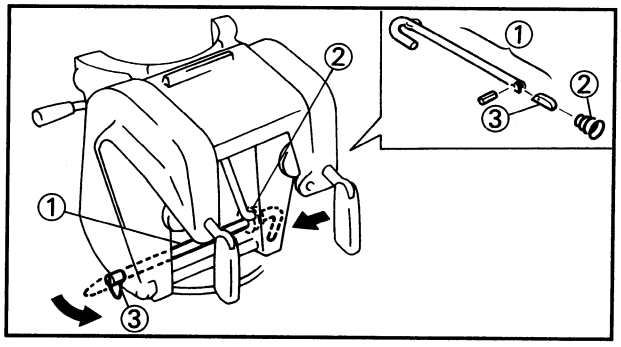


3. Install:
   - Clamp bracket ① (port side)
   - Bolt ②
   - Washer plate ③
   - Washer plate ④
   - Clamp bracket ⑤ (starboard side)
   - Clamp bracket plate ⑥
   - Nut ⑦
   - Bolt ⑧
   - Collar ⑨
   - Nut ⑩

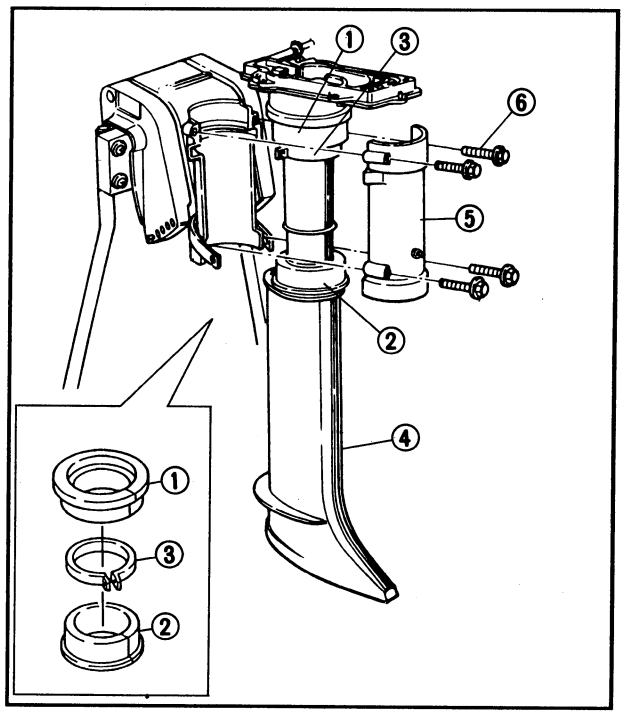
	Nut (clamp bracket): **13 Nm (1.3 kg•m, 9.4 ft•lb)**



4. Install:
   - Torsion spring ①
   - Tilt lock plate ②
   - Bolt ③

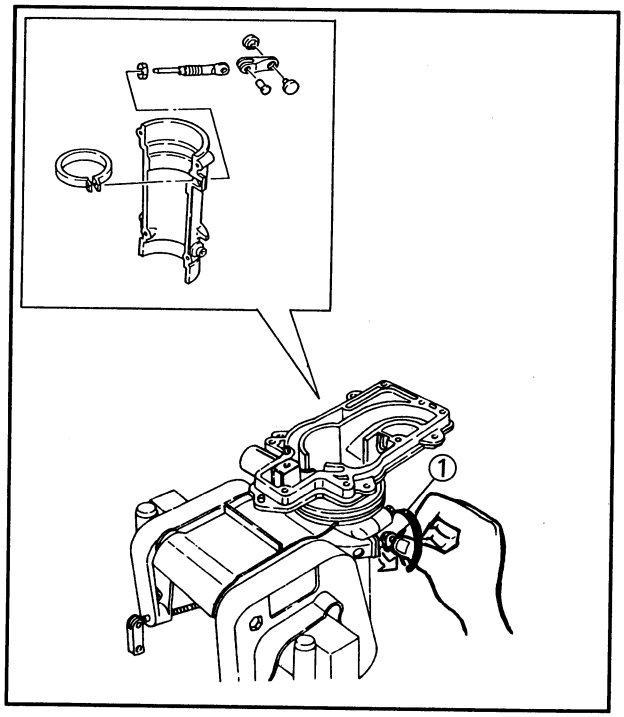


5. Install:
   - Tilt rod ①
   - Conical spring ②
   - Lock plate ③



6. Install:
   - Pivot shaft bushing ①
   - Pivot shaft bushing ②
   - Friction plate ③
   - Upper casing ④
   - Swivel bracket ⑤
   - Bolt ⑥

	Bolt: **8 Nm (0.8 kg•m, 5.8 ft•lb)**



7. Install:
   - Steering friction piece screw ①

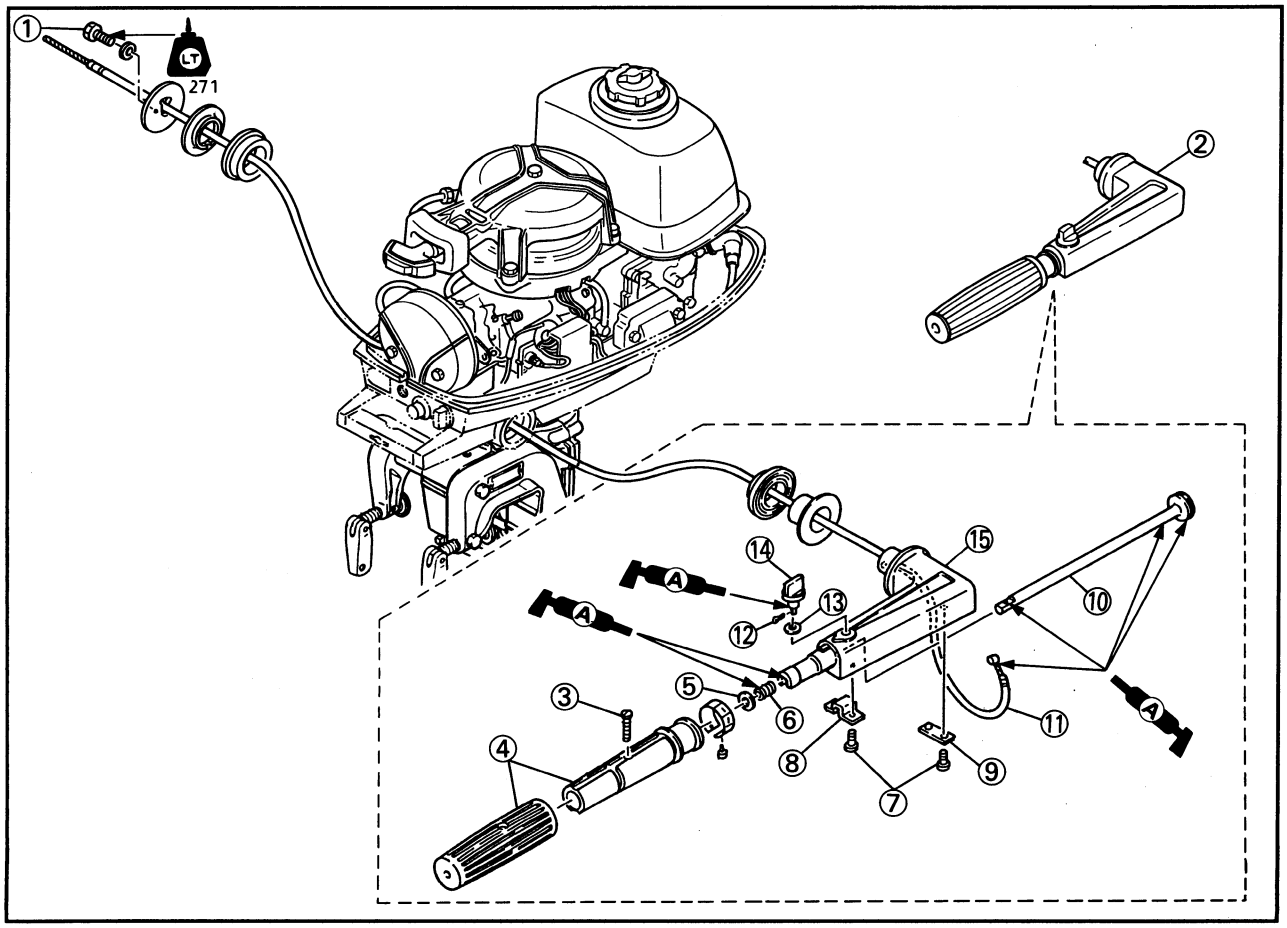
NOTE:

Tighten the friction piece screw, and check to see it the upper casing can be turned smoothly.

STEERING HANDLE

PREPARATION FOR REMOVAL

- Remove the top cowling.
- Remove the throttle wire end (carburetor side).
  Refer to the "FUEL SYSTEM-CARBURETOR" section in CHAPTER 4. (page 4-12)



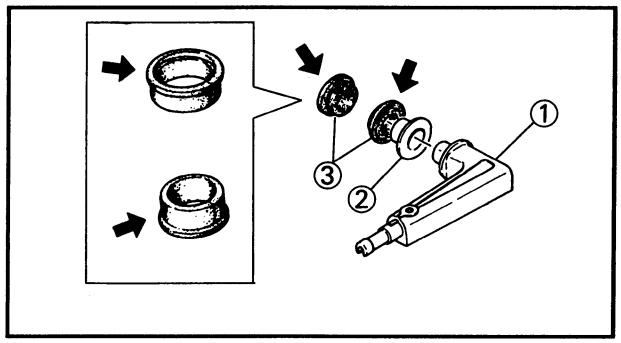
Extent of removal: ① Steering handle assembly removal ② Throttle wire removal ③ Steering handle disassembly

Extent of removal	Order	Part name	Q'ty	Remarks
① ② ③	1	Bolt	2	
	2	Steering handle assembly	1	
	3	Screw	1	
	4	Steering grip	1	
	5	Washer plate	1	
	6	Compression spring	1	
	7	Screw	4	
	8	Throttle shaft cover	1	
	9	Stay	1	
	10	Throttle control shaft	1	
	11	Throttle wire	1	
	12	Cotter pin	1	
	13	Washer plate	1	
	14	Friction adjust bolt	1	
	15	Steering handle	1	

CLEANING AND INSPECTION

⚠ WARNING

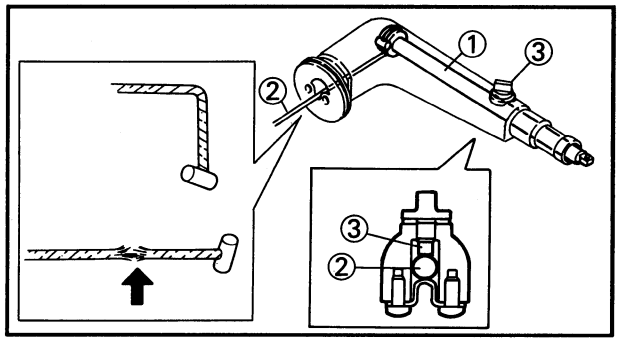
Protect your eyes with suitable safety spectacles or safety goggles when using compressed air.



Steering handle

1. Inspect:
   - Steering handle ①
   - Bush ②
   - Rubber bushing ③

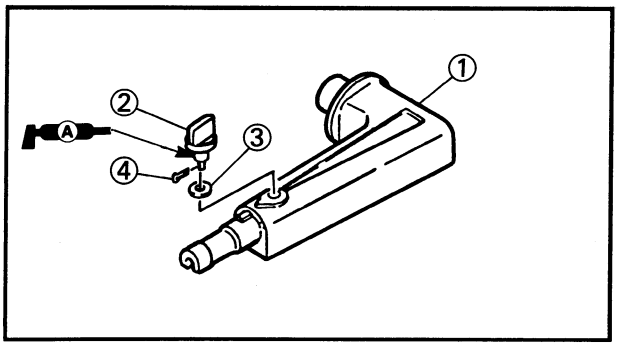
   Wear/Damage→Replace.



Throttle control shaft and throttle wire

1. Inspect:
   - Throttle control shaft ①
   - Throttle wire ②
   - Friction adjust bolt ③

   Wear/Damage→Replace.



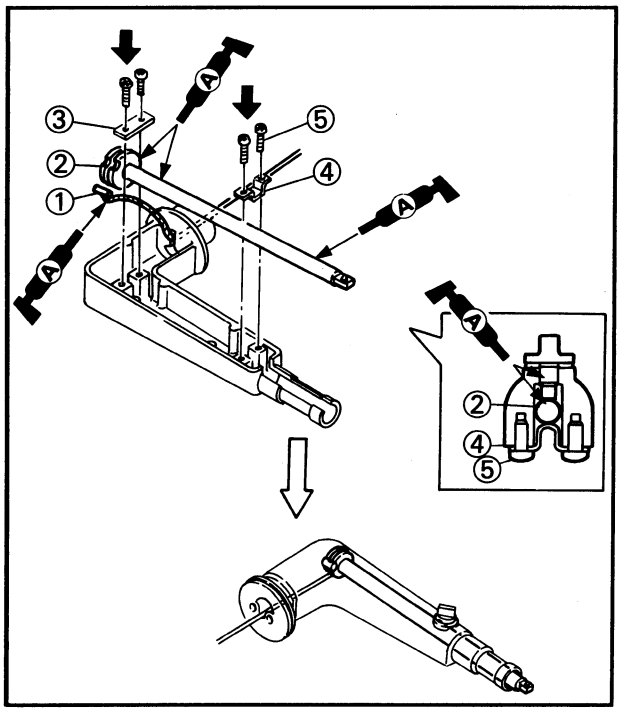
ASSEMBLY AND INSTALLATION

Steering handle

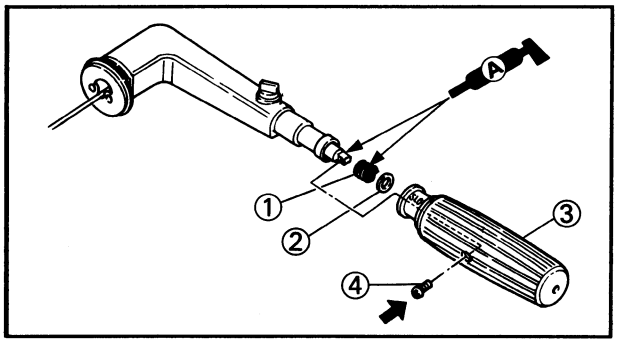
1. Install:
   - Steering handle ①
   - Friction adjust bolt ②
   - Washer plate ③
   - Cotter pin ④

NOTE:

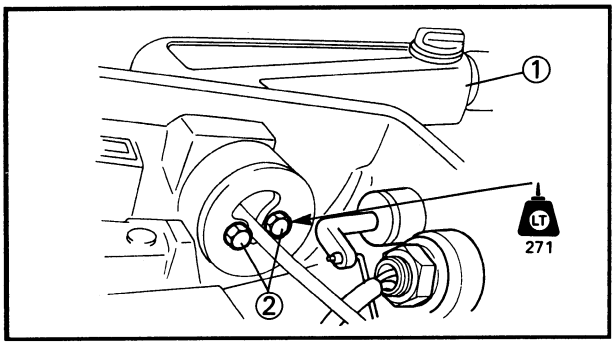
Always use the new cotter pin.



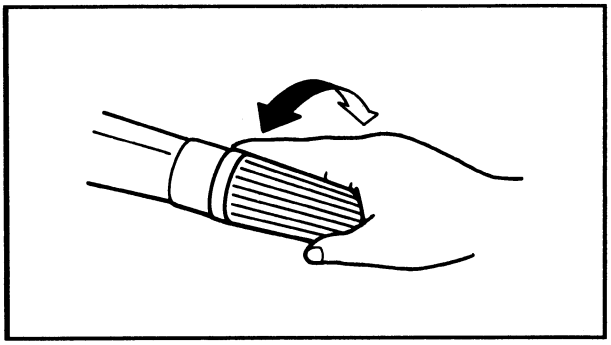
2. Install:
   - Throttle wire ①
   - Throttle control shaft ②
   - Stay ③
   - Throttle shaft cover ④
   - Screw ⑤



3. Install:
   - Compression spring ①
   - Washer plate ②
   - Steering grip ③
   - Screw ④



4. Install:
   - Steering handle assembly ①
   - Bolt ②



5. Check:
   - Steering handle operation
     Unsmooth → Repair.

CHAPTER 8
ELECTRICAL SYSTEM

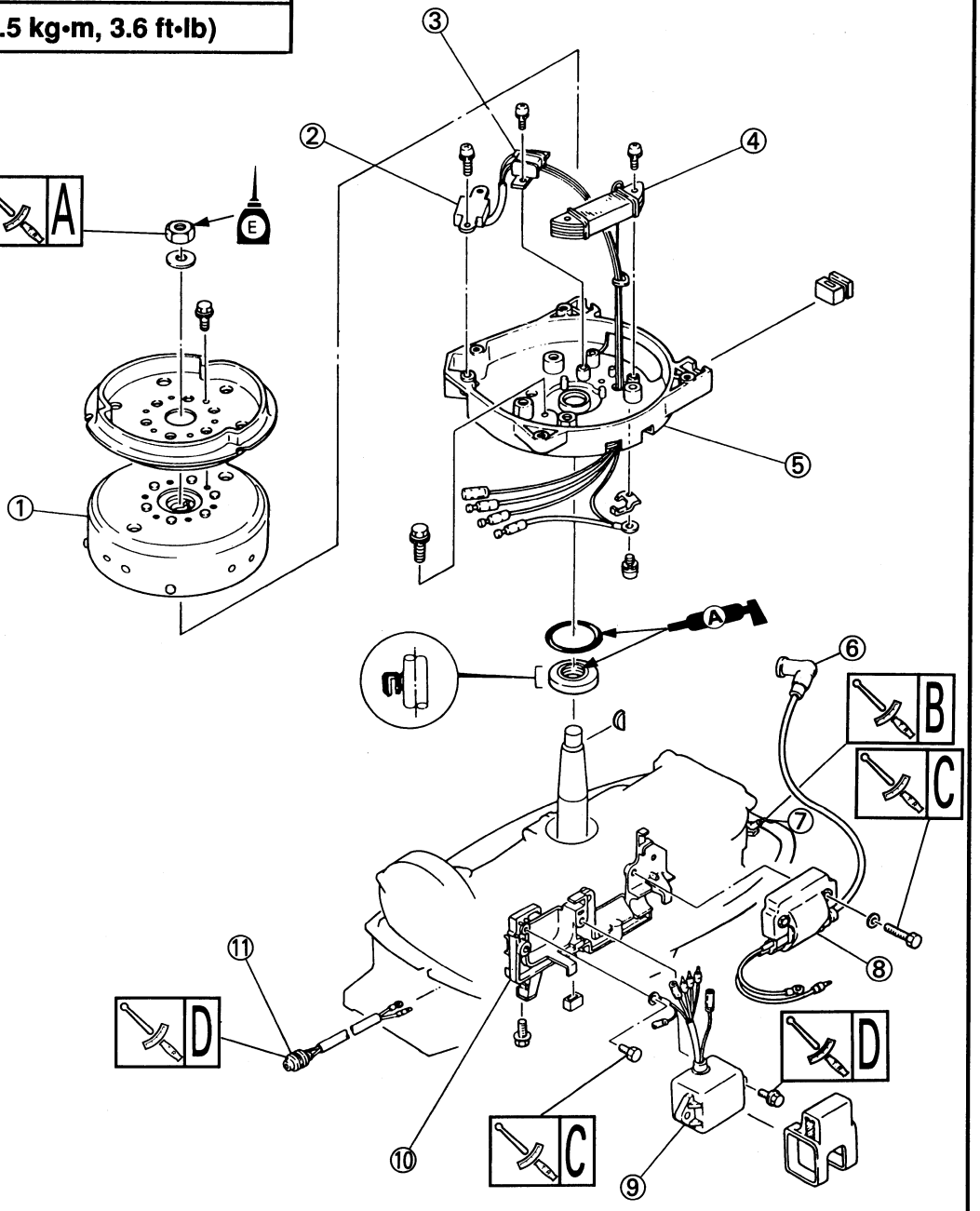
ELECTRICAL SYSTEM

ELECTRICAL COMPONENTS

EXPLODED DIAGRAM

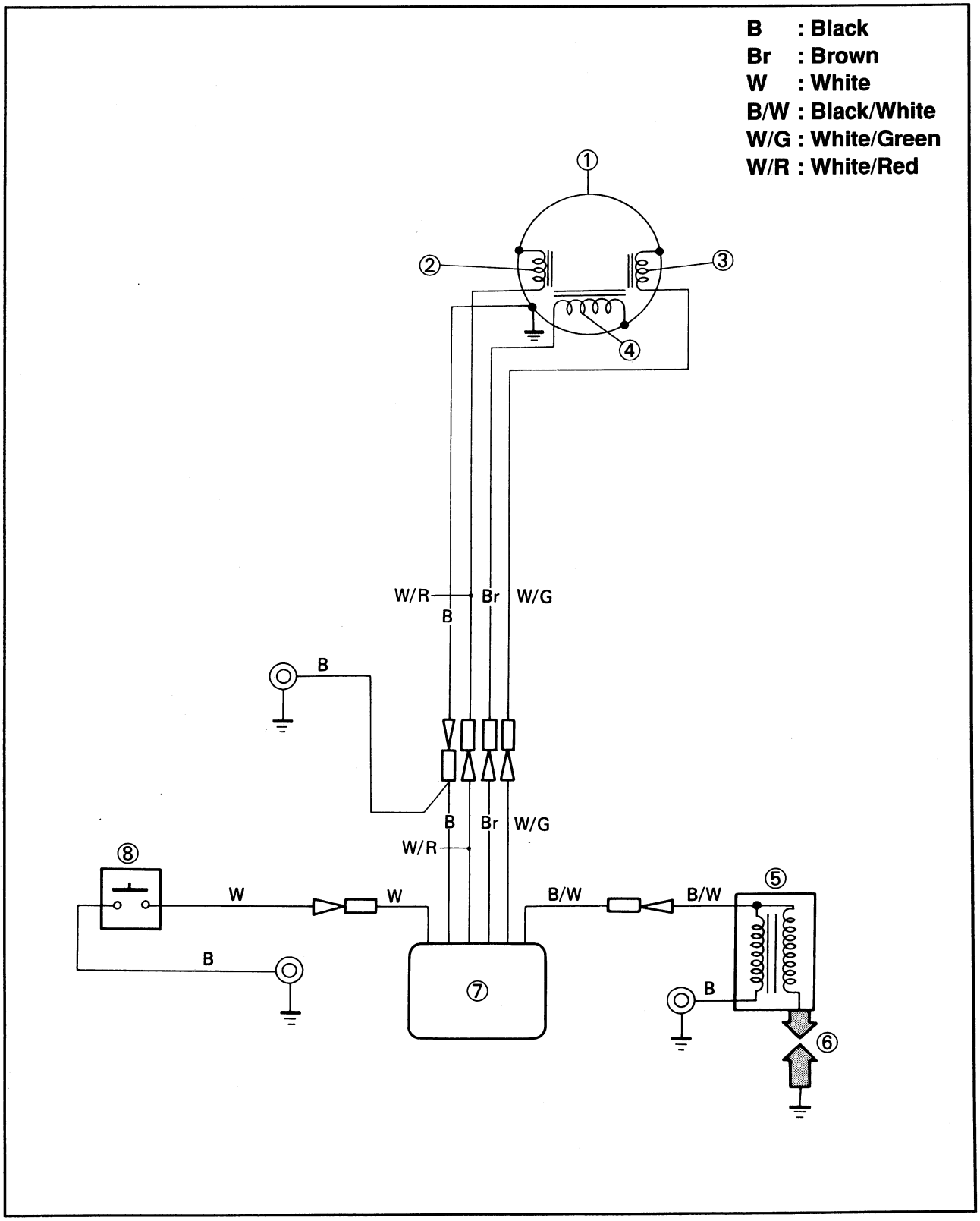
① CDI magneto rotor
② Pulser coil 2 (low speed side)
③ Pulser coil 1 (high speed side)
④ Charge coil
⑤ Magneto base
⑥ Plug cap
⑦ Spark plug
⑧ Ignition coil
⑨ CDI unit
⑩ Bracket
⑪ Stop switch

A	45 Nm (4.5 kg•m, 32 ft•lb)
B	25 Nm (2.5 kg•m, 18 ft•lb)
C	8 Nm (0.8 kg•m, 5.8 ft•lb)
D	5 Nm (0.5 kg•m, 3.6 ft•lb)



WIRING DIAGRAM

① CDI magneto
② Pulser coil 1 (high speed side)
③ Pulser coil 2 (low speed side)
④ Charge coil
⑤ Ignition coil
⑥ Spark plug
⑦ CDI unit
⑧ Stop switch



INSPECTION AND REPAIR

⚠WARNING

Electrical parts should be handled with the following care.
1.Protect it from a severe shock.
2.Keep it away from heat.
3.Avoid getting it wet.

CAUTION:

All measuring instruments should be handled with special care, or the correct measurement is impossible.
On an instrument powered by dry batteries, they should be checked for voltage periodically and replaced, if necessary.

Low resistance measurement

When measuring the resistance of 10Ω or less using the digital tester, the correct measurement cannot be obtained because of the tester's internal resistance.
To obtain the correct value, subtract this internal resistance from the displayed measurement.

Correct value =
Displayed measurement – Internal resistance

NOTE:

The internal resistance of the tester can be obtained by connecting both of its terminals.

DESCRIPTION

These two models use a capacitor discharge ignition (CDI) system employing two pulser coils, respectively, for low and high speeds, and thus ignition timing can be advanced correctly and electronically.

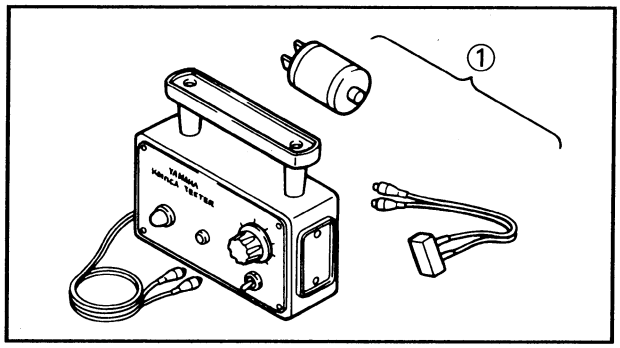
IGNITION SYSTEM INSPECTION AND REPLACEMENT

Testing the CDI System (for USA and CANADA)

Using the Y-1 ignition-tester

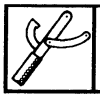
⚠ WARNING

While taking CDI unit check be careful not to touch any connection of lead wires of the "CDI" tester, since high voltage current flows through them.

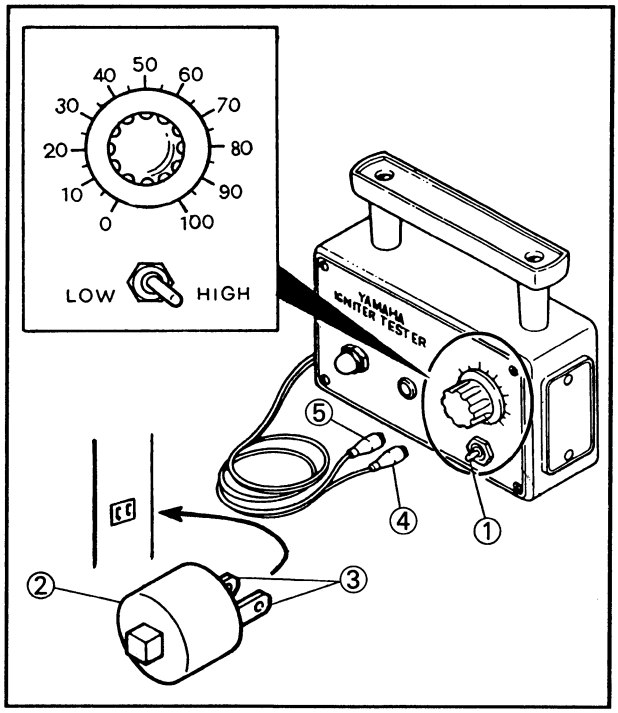


NOTE:

- If there is no spark, or the spark is weak, continue with the CDI test.
- If a good spark is obtained, the problem is not with the CDI system, but possibly the spark plug or other component is defective.
- Use the following special service tool in this inspection.

	**CDI tester ①: YU-91022-B**

- If lamp does not light, check tester batterys. If they are installed correctly and are good, check the clip leads for faulty connections. If no fault can be found, refer to the warranty statement for instructions for sending the tester back to Electro-Specialities, inc.



1. Check:
   - CDI tester for high scale
     No indication → Replace the tester.

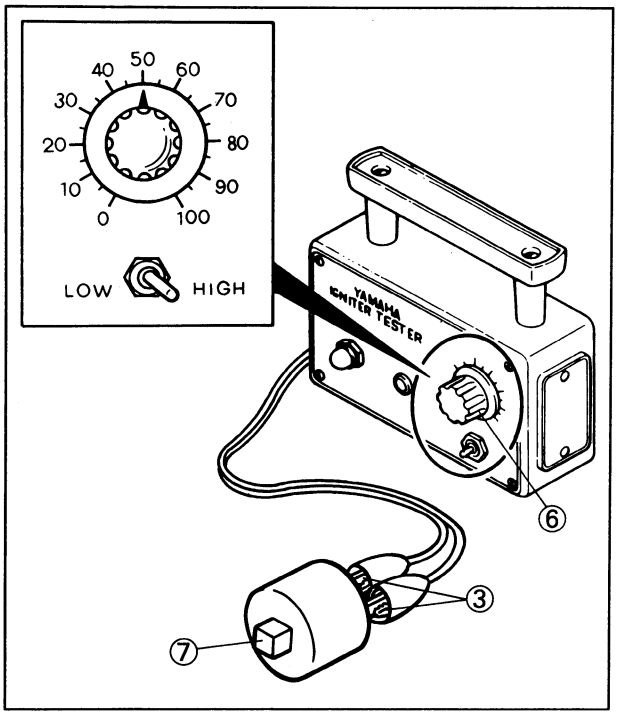
Checking steps:

- Place switch ① in HIGH position.
- Plug the capacitive clip ② into an electric outlet. (117 VAC for ten seconds)

⚠ WARNING

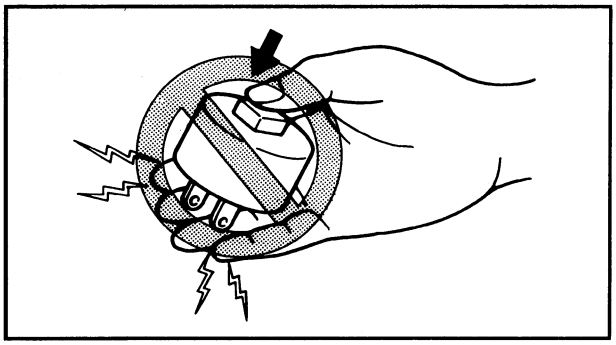
Do not touch the plug pins ③ on the capacitive clip while plugging it and pulling it from an electric outlet. A electric shock will result.

- Remove the capacitive clip from the outlet, and connect the "P" lead (Brown) ④ and "N" lead (Yellow) ⑤ from the tester to the capacitive clip pins ③



"P" lead (Brown) → Capacitive clip P terminal.
"N" lead (Yellow) → Capacitive clip N terminal.

- Set the tester dial ⑥ to 50, or below.
- Depress the button on the capacitive clip.
- The indicator lamp on the tester should light.

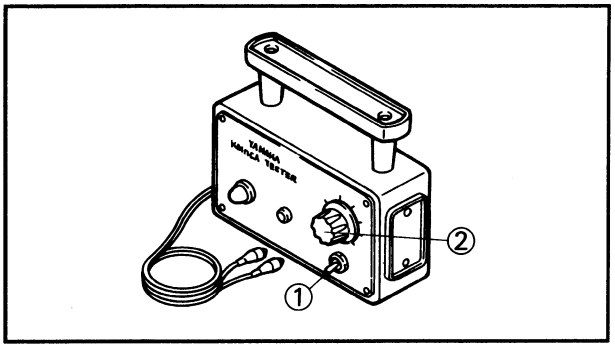


2. Check:
   - CDI tester for low scale
     No indication → Replace the tester.

Checking steps:

- Place switch ① in LOW position.
- Set the tester dial ② to 50, or below.
- Connect the 12V battery.

"P" lead (Brown) → Battery positive (+) terminal.
"N" lead (Yellow) → Battery negative (–) terminal.



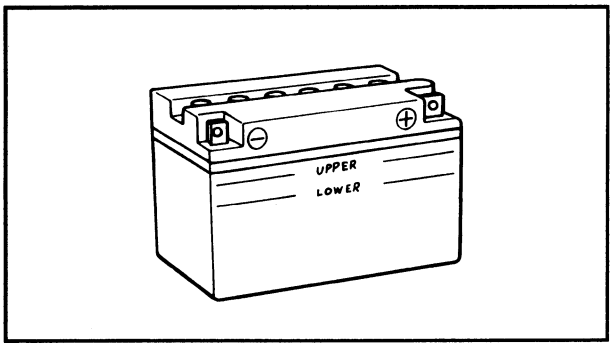
CAUTION:

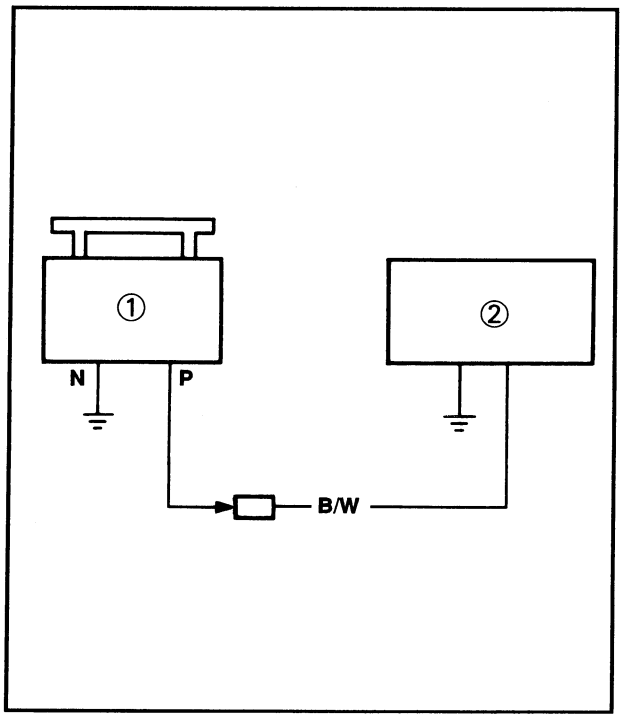
- **When installing the battery connect the positive (+) terminal first.**
- **When removing the battery disconnect the negative (–) terminal first.**

- The indicator lamp on the tester should light.

NOTE:

If lamp does not light, check tester batterys. If they are installed correctly and are good, check the clip leads for faulty connections. If no fault can be found, refer to the warranty statement for instructions for sending the tester back to Electro-Specialities, inc.





3. Check:
   • CDI unit output (test #1)
   No indication → Replace.

Checking steps:
- Disconnect the Black/White (B/W) leads from the ignition coil.
- Remove the spark plug.
- Connect the CDI tester's "P" and "N" clip leads ① to CDI unit ② as shown.

CDI tester:
YU-91022-B

- Set the tester switch and dial to specified.

Range switch	Dial setting
H	75

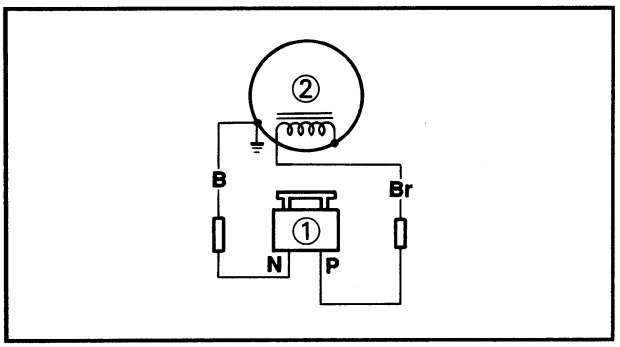
- Cranking the engine.

NOTE:
- The coil output varies greatly cranking speed.
- Cranking the cold engine with the plug in cannot be found proper readings.

- The indicator lamp on the tester should light. If lamp does not light, and dial setting is far from specification, replace the CDI unit.

4. Check:
   • Charge coil output (test #2)
   No indication → Replace.

Checking steps:
- Disconnect the Brown (Br) and Black (B) leads from the charge coil.
- Remove the spark plug.



• Connect the CDI tester's "P" and "N" clip leads ① to charge coil ② as shown.

CDI tester:
YU-91022-B

• Set the tester switch and dial to specified.

Range switch	Dial setting
H	80

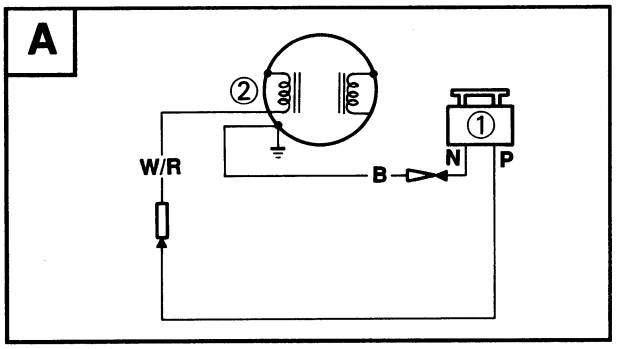
• Cranking the engine.

NOTE:

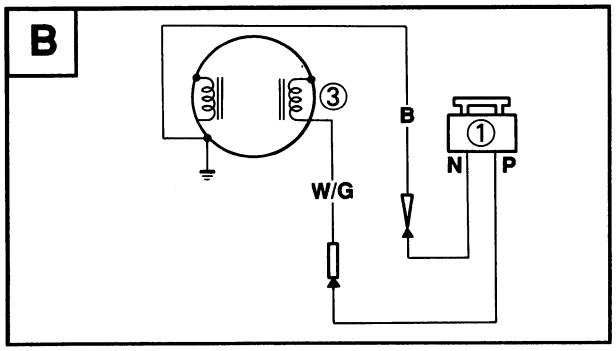
• The coil output varies greatly cranking speed.
• Cranking the cold engine with the plug in cannot be found proper readings.

• The indicator lamp on the tester should light. If lamp does not light, and dial setting is far from specification, replace the charge coil.

A



B



5. Check:
   • Pulser coil (high speed side) output (test #3) A
   • Pulser coil (low speed side) output (test #4) B
   No indication → Replace.

Checking steps:
• Disconnect the White/Red (W/R) or White/Green (W/G) and Black (B) leads from the pulser coil.
• Remove the spark plug.
• Connect the CDI tester's "P" and "N" clip leads ① to pulser coil ② (high speed side) and pulser coil ③ (low speed side) as shown.

CDI tester:
YU-91022-B

• Set the tester switch and dial to specified.

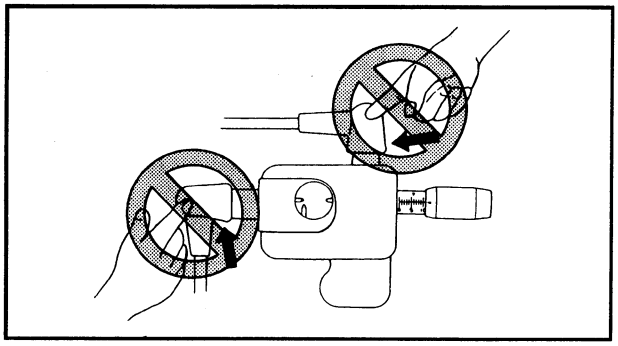
Range switch	Dial setting
Test #3 L (high speed side)	80
Test #4 L (low speed side)	40

• Cranking the engine.

NOTE:

• The coil output varies greatly cranking speed.
• Cranking the cold engine with the plug in cannot be found proper readings.

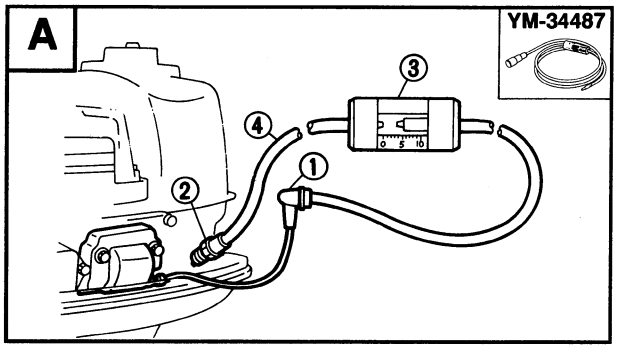
• The indicator lamp on the tester should light. If lamp does not light, and dial setting is far from specification, replace the pulser coil.

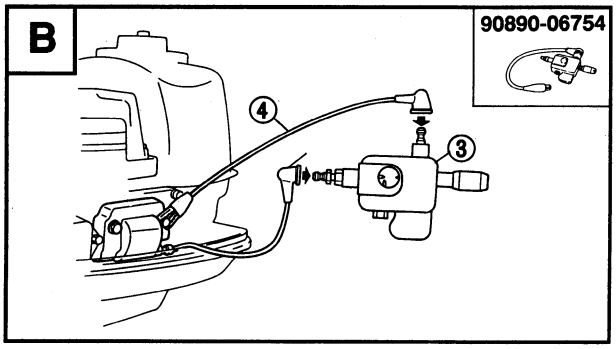


Ignition spark gap test

⚠ WARNING

- **Be careful not to touch the ignition coil and its vicinity while making a test. There are dangers of an electric shock which may inflict injury on you.**
- **This check is likely to produce spark, so be sure that no flammable gas or fluid is in the vicinity.**





1. Check:
   • Ignition spark gap
   Out of specification → Replace.

Checking steps:

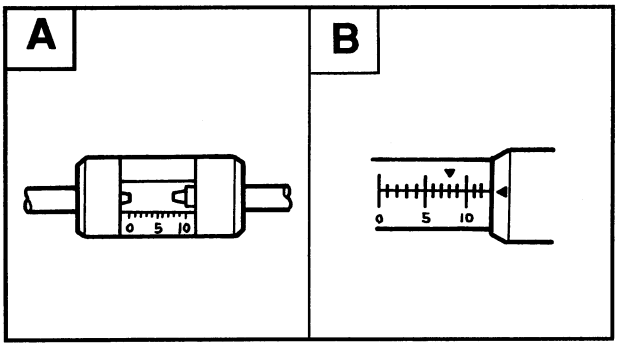
• Remove the spark plug cap ① and remove the spark plug ② from the engine.
• Connect the spark plug cap to the spark gap tester ③.

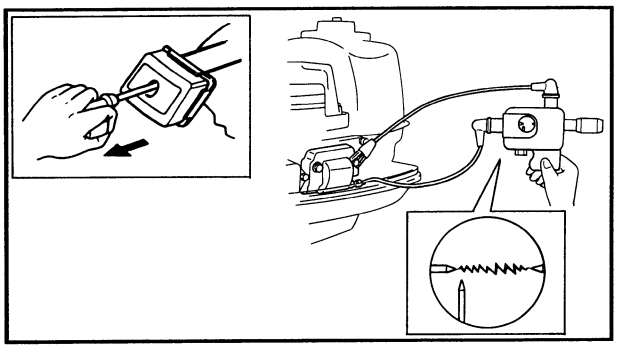
Spark gap tester.
YM-34487, 90890-06754

A : For USA and CANADA
B : Except for USA and CANADA

⚠ WARNING

Be sure and ground the secondary lead wire ④ of the spark gap tester. There are dangers of an electric shock which may inflict injury on you.





• By turning the "GAP ADJUST" knob, set the spark gap to 8mm. (0.31in).

CAUTION:

Use care not to tighten or loosen the gap adjust knob more than necessary.

A : For USA and CANADA
B : Except for USA and CANADA

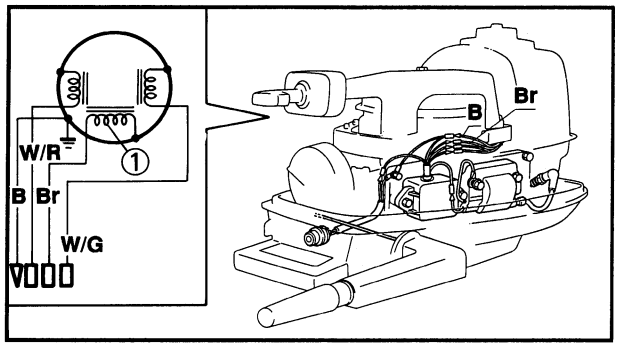
• By giving the starter rope a strong pull, check the strength of spark.
When a spark jumps across an 8mm (0.31in) gap, the ignition coil is considered to be in good condition. If it fails, the ignition coil should be replaced.

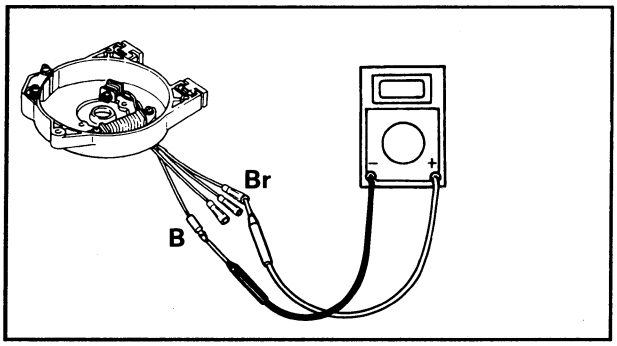
Minimum spark gap:
8mm (0.31in)

• Turn the "GAP ADJUST" knob, and increase the gap to maximum unless misfire occurs first.

NOTE:

The performance of the ignition coil will be affected by heat.
The spark test should therefore be performed at intervals of 5 to 10 minutes for correct test results.





Charging coil

1. Measure:
   - Charging coil ① resistance
     Out of specification → Replace.

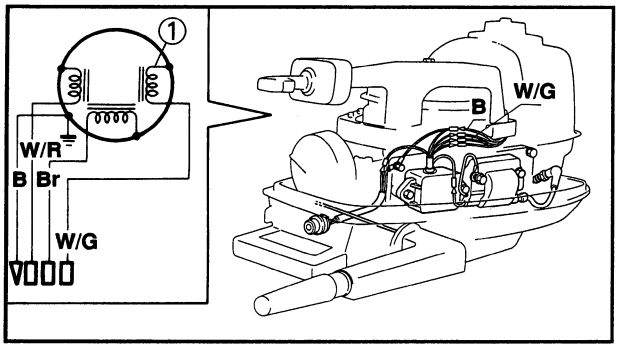
Measurement steps:

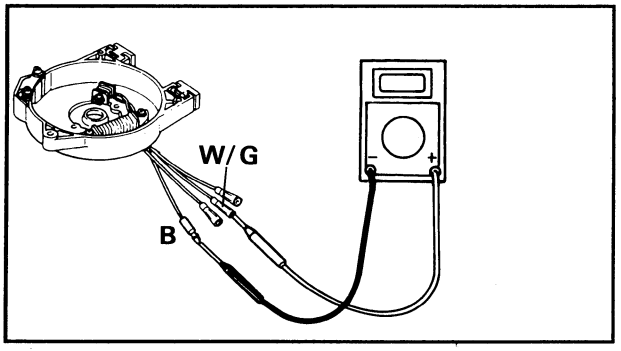
- Disconnect the charging coil leads Brown (Br) and Black (B) from the CDI unit.
- Connect the tester to the charge coil leads as shown.

Tester (+) lead → Brown (Br) lead
Tester (–) lead → Black (B) lead

- Check the resistance of the charging coil windings with the tester. If the resistance is not specification, replace the charge coil assembly.

Charge coil resistance:
Brown (Br) – Black (B)
248 ~ 303Ω at 20°C (68°F)





Pulser coil (on the low speed side)

1. Measure:
   - Pulser coil ① (on the low speed side) resistance
     Out of specification → Replace.

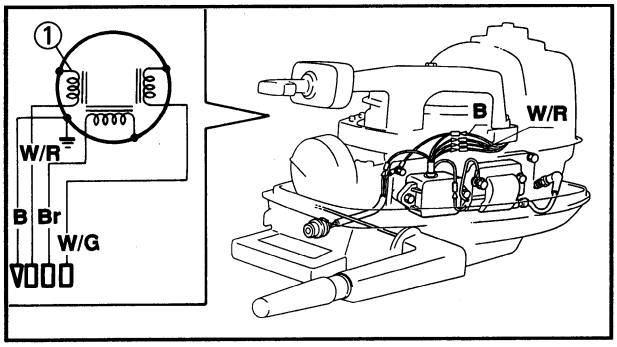
Measurement steps:

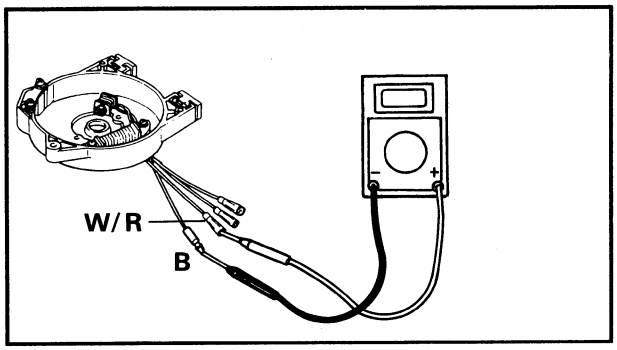
- Disconnect the pulser coil leads (on the low speed side) White/Green (W/G) and Black (B) from the CDI unit.
- Connect the tester to the pulser coil leads (on the low speed side) as shown.

Tester (+) lead → White/Green (W/G) lead
Tester (–) lead → Black (B) lead

- Check the resistance of the pulser coil windings with the tester. If the resistance is not within specification, replace the pulser coil assembly.

Pulser coil (on the low speed side) resistance:
White/Green (W/G) – Black (B)
279 ~ 341Ω at 20°C (68°F)





Pulser coil (on the high speed side)

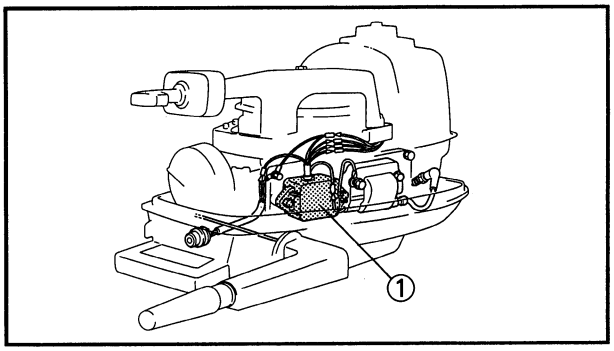
1. Measure:
   • Pulser coil ① (on the high speed side) resistance
   Out of specification → Replace.

Measurement steps:
• Disconnect the pulser coil leads (on the high speed side) White/Red (W/R) and Black (B) from the CDI unit.
• Connect the tester to the pulser coil leads (on the high speed side) as shown.

Tester (+) lead → White/Red (W/R) lead
Tester (–) lead → Black (B) lead

• Check the resistance of the pulser coil windings with the tester. If the resistance is not within specification, replace the pulser coil assembly.

Pulser coil (on the high speed side) resistance:
White/Red (W/R) – Black (B)
30 ~ 36Ω at 20°C (68°F)

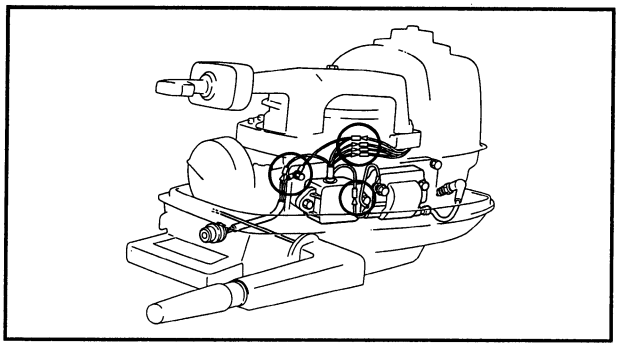


CDI unit

1. Measure:
   • CDI unit ① resistance
   Out of specification → Replace.

NOTE:
• Digitaltester can not be used for this inspection. Use analogue tester.
• CDI resistance values will vary from meter to meter, especially with electronic digital meters. For some testers, polarity of leads is reversed.

INSPECTION AND REPAIR



Measurement steps:

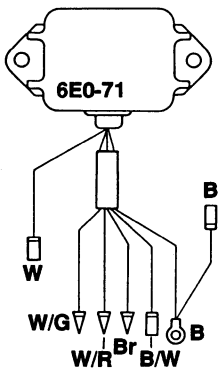
- Disconnect the CDI unit leads from the magneto base, ignition coil and stop switch leads.
- Connect the Pocket tester (R × 1k) to the CDI unit as shown list.

Pocket tester:
YU-03112, 90890-03112

- Measure the CDI unit resistance.

NOTE:

There is a point at which the pointer swings greatly and swings back. Read the point where the point has returned to stop.



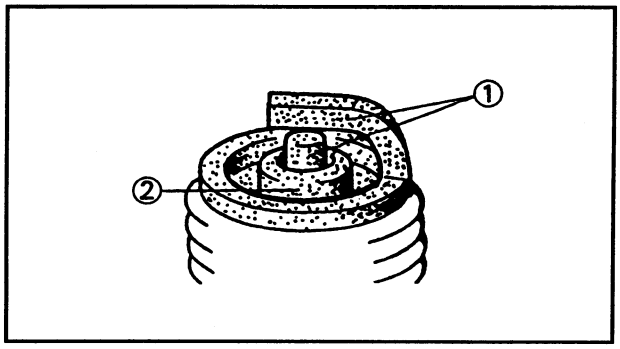
Unit kΩ

(−) Tester \ Tester (+)		Stop	Charge	Pulser 2 (Low speed)	Pulser 1 (High speed)	Earth	Ignition
		W	Br	W/G	W/R	B	B/W
Stop	W		0	∞	∞	∞	∞ *
Charge	Br	0		∞	∞	∞	∞ *
Pulser 2 (Low speed)	W/G	18.4 ~ 27.6	18.4 ~ 27.6		20 ~ 30	7.2 ~ 10.8	∞
Pulser 1 (High speed)	W/R	16 ~ 24	16 ~ 24	∞		9.6 ~ 14.4	∞
Earth	B	3.2 ~ 4.8	3.2 ~ 4.8	∞	9.6 ~ 14.4		∞ *
Ignition	B/W	∞	∞	∞	∞	∞	

∞ : No continuity

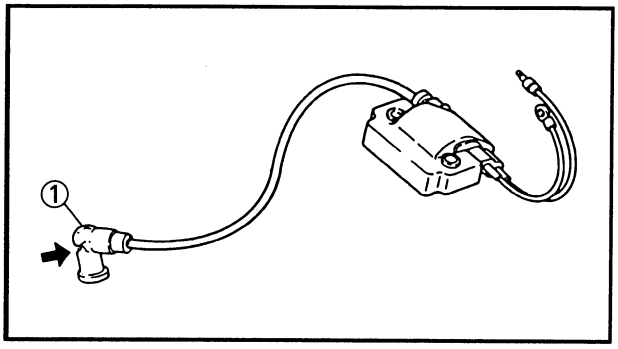
* : Needle swings once and returns to home position

B : Black
Br : Brown
W : White
B/W : Black/White
W/G : White/Green
W/R : White/Red



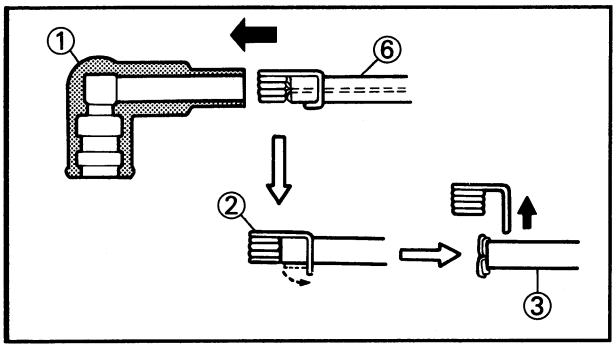
Spark plug

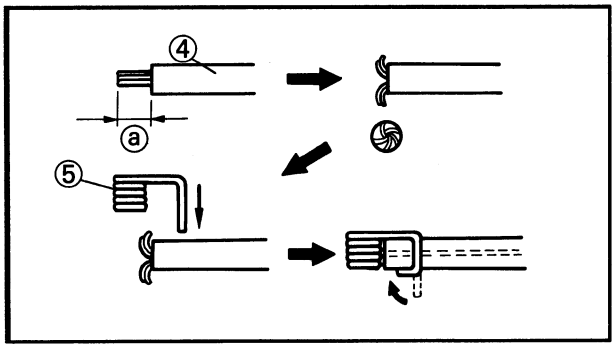
1. Inspect:
   - Electrode ①
     Wear/Damage → Replace.
   - Insulator color ②
     Normal condition is a medium to light tan color.
     Distinctly different color → Check the engine condition.
   - Spark plug type
     Incorrect → Replace.
     Refer to the "PERIODIC SERVICE-SPARK PLUG" section in CHAPTER 3. (page 3-18)



Spark plug cap

1. Inspect:
   - Spark plug cap ①
     Loosen → Tighten.
     Crack/Damage → Replace.



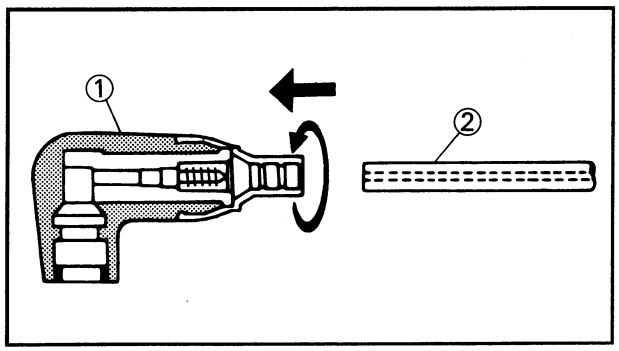


Replacement steps
(Except for CANADA and EUROPE):

- Remove the spark plug cap ① by pulling the cap, and remove the plug cap spring ② from the high-tension cable ③.
- Cut of the end of the high-tension cable ④ about length ⓐ.

Length ⓐ:
5mm (0.2in)

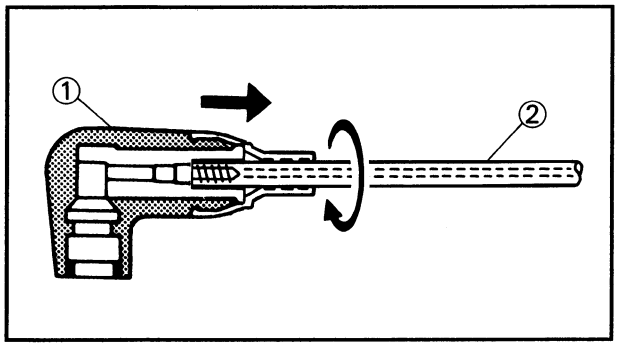
- As shown, strip off the end of the high-tension cord about 5mm (0.2in) and install the plug cap spring ⑤.
- Push the cap spring ⑥ into the plug cap.

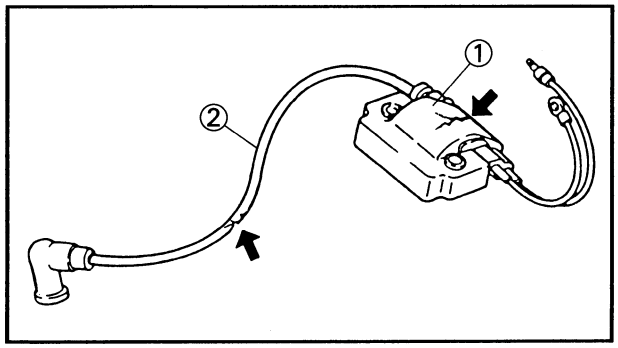


Replacement steps
(For CANADA and EUROPE):
- Remove the spark plug cap ① from the high-tension cable ② by turning the cap counterclockwise.

NOTE:
Avoid removing the plug cap by pulling the high-tension cable hard. Remove it by turning in and out.

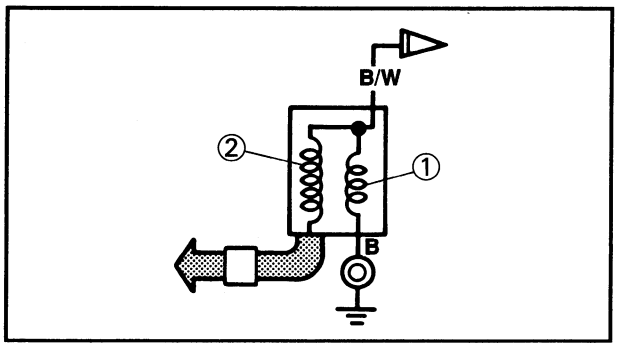
- Install the spark plug cap ① to the high-tension cable ② by turning the cap.





Ignition coil

1. Inspect:
   - Ignition coil ①
   - High-tension cable ②
     Crack/Break/Damage → Replace.



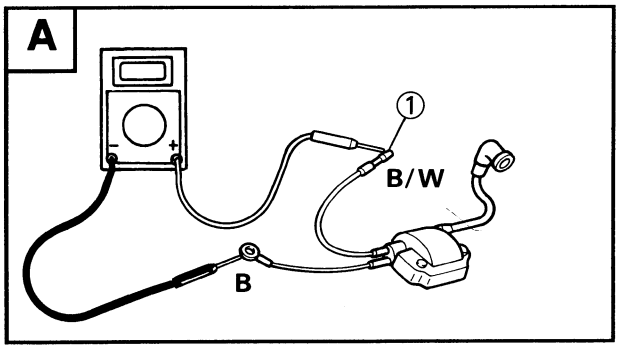
Use the pocket tester to determine resistance and continuity of primary ① and secondary coil ② windings.

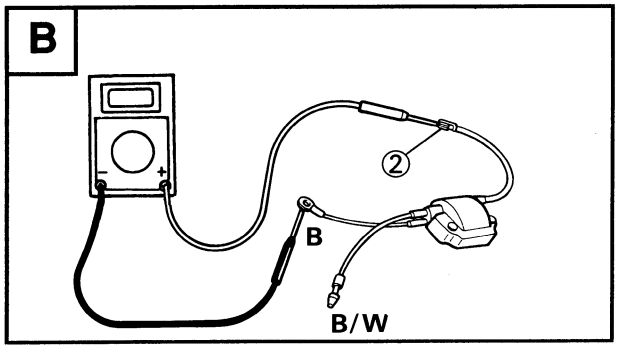
NOTE:
When making secondary leads resistance, test disconnect spark plug cap.

2. Measure:
   - Ignition coil resistance
     Out of specification → Replace.

Resistance measurement steps:
- Disconnect the ignition coil lead Black/White (B/W) from the CDI unit.
- Connect the tester to the (Rx1, Rx1k) ignition coil as shown.

	**Pocket tester:** **YU-03112, 90890-03112**



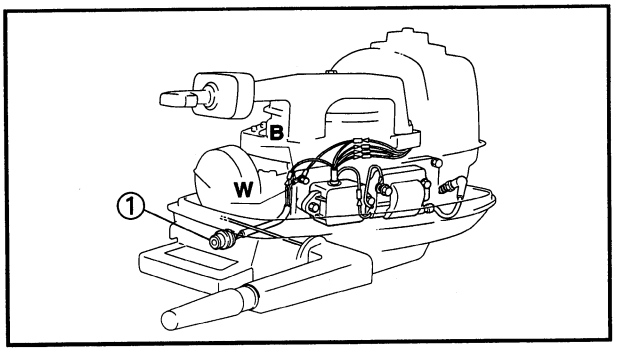


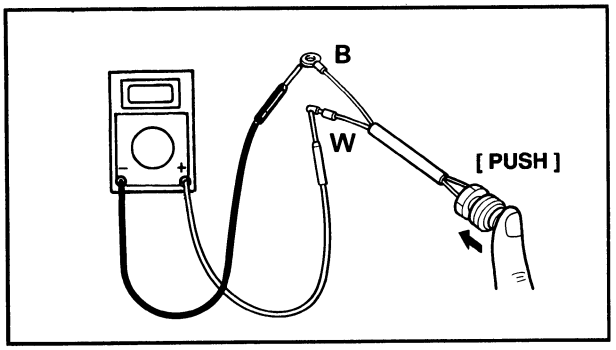
Primary coil A
Tester (+) lead → Black/White (B/W) ①
Tester (–) lead → Ground lead (B)
Secondary coil B
Tester (+) lead → High-tension cable ②
Tester (–) lead → Ground lead (B)

- Measure the primary and secondary coil resistance.

Primary coil resistance:
Black/White (B/W)-Black (B)
0.17 ~ 0.25Ω at 20°C (68°F)
Secondary coil resistance:
High-tension cable-Black (B)
2.5 ~ 3.7 kΩ at 20°C (68°F)

NOTE:
When measuring the resistance of 10 Ω or less using the digital tester, the correct measurement cannot be obtained. Refer to "Lower resistance measurement".





Stop switch (For USA)

1. Check:
   - Stop switch ① continuity
     Out of specification → Replace.

Checking steps:
- Disconnect the White (W) and Black (B) leads from the CDI unit and ground.
- Connect the tester to the stop switch as shown.

Tester (+) lead → White (W) lead
Tester (–) lead → Black (B) lead

- Push the button and check for continuity according to the chart below. If it fails, the ignition coil should be replaced.

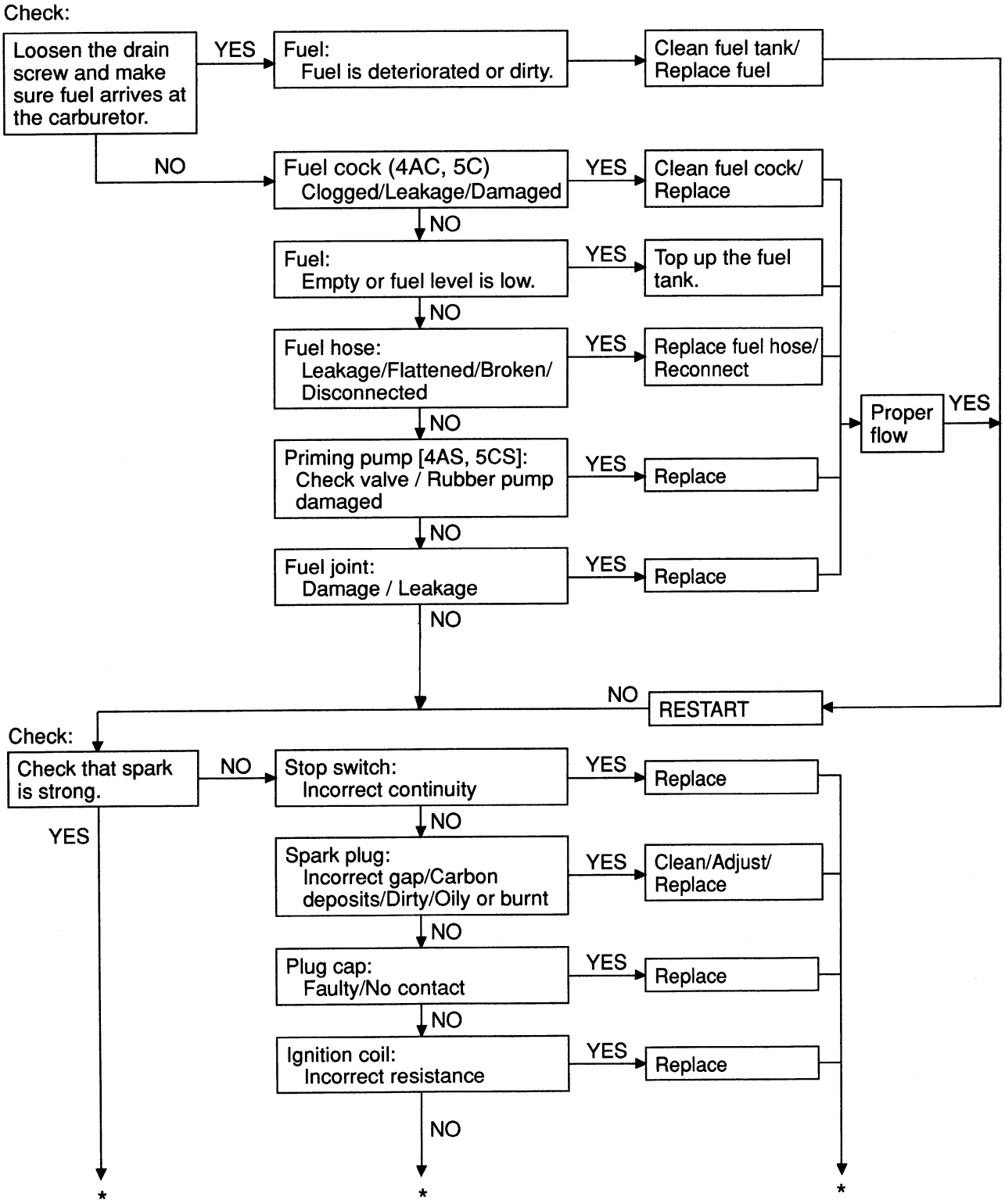
Release the button	**Discontinuity**
Push the button	**Continuity**

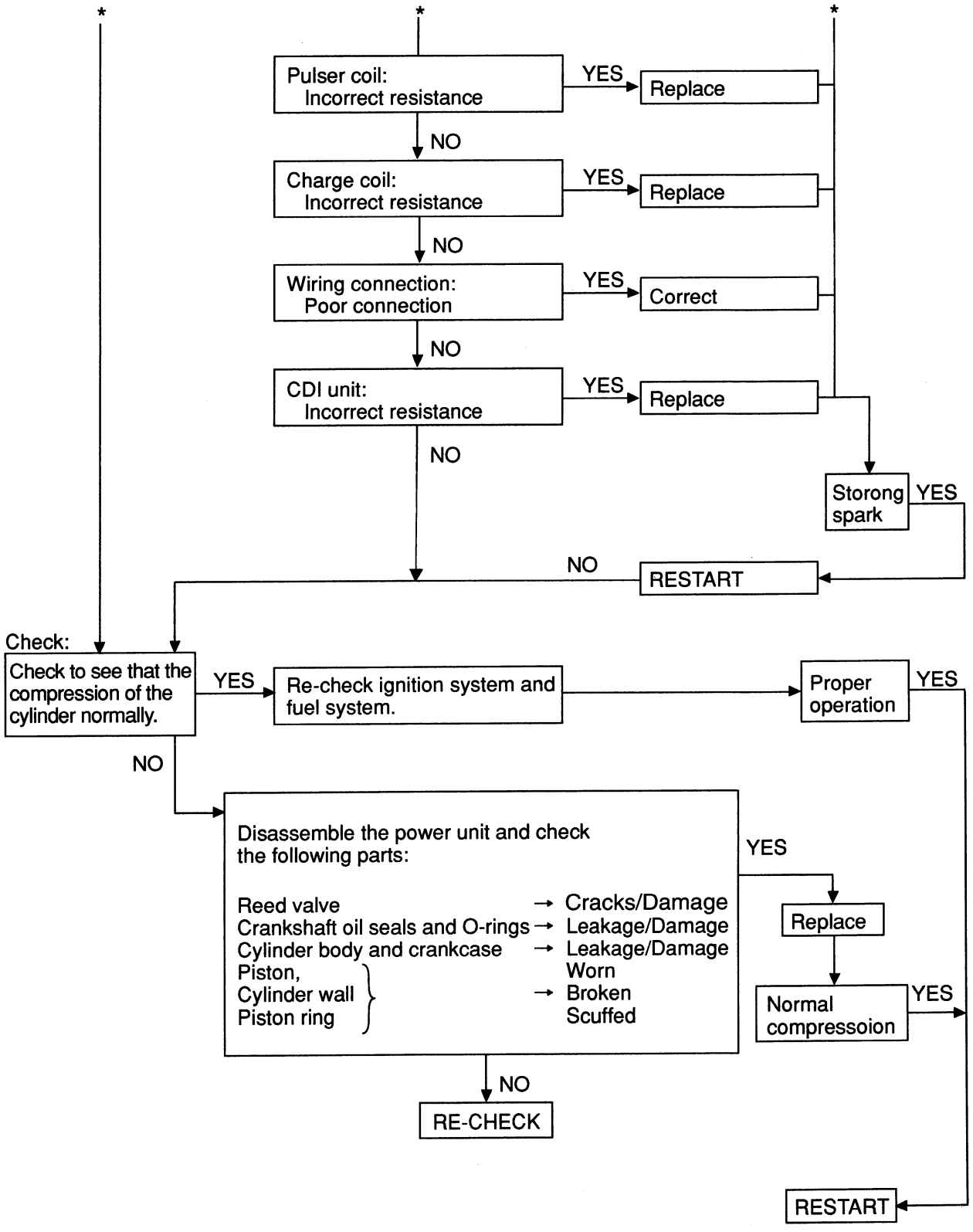
CHAPTER 9
TROUBLESHOOTING

TROUBLESHOOTING

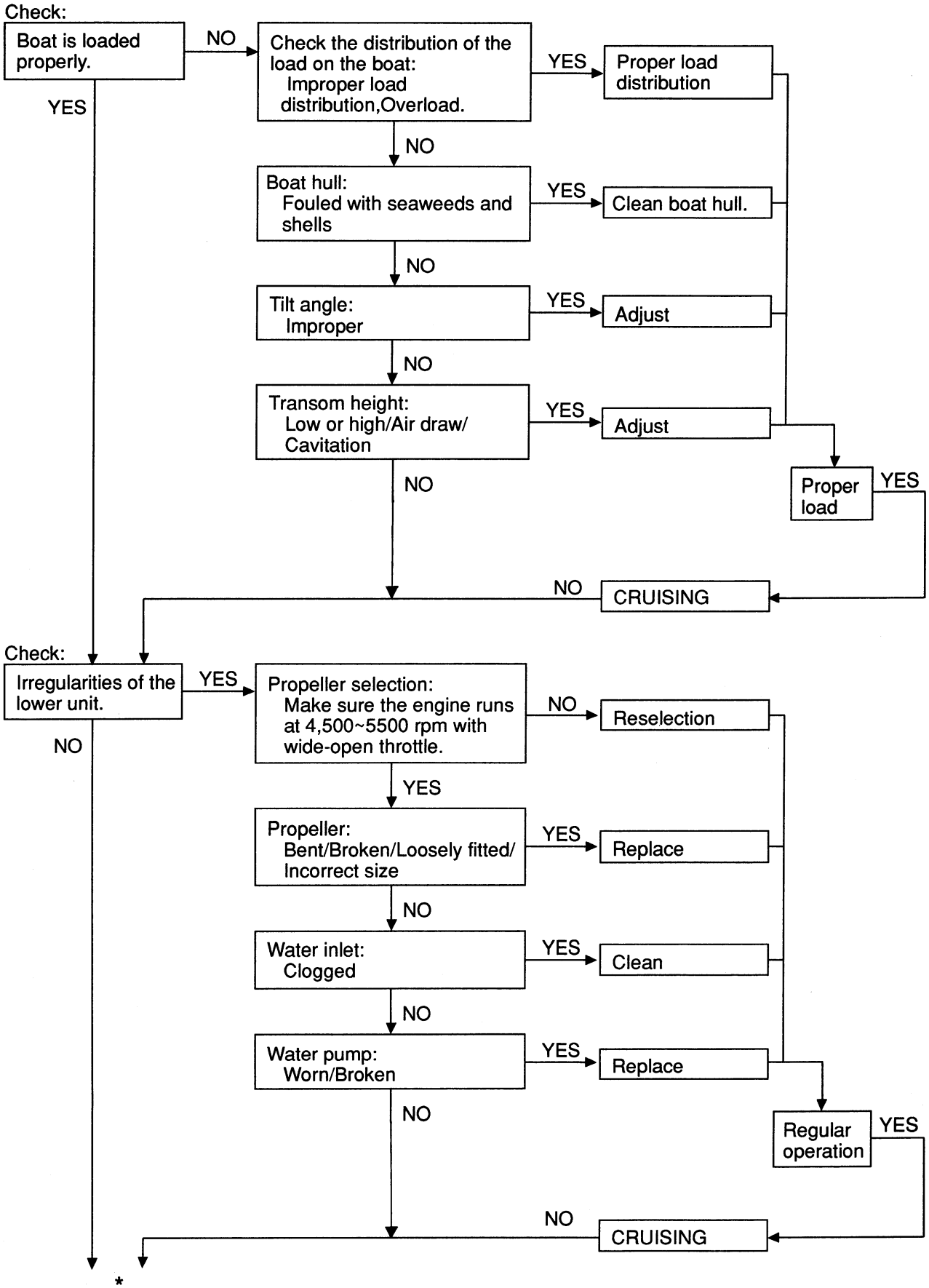
ENGINE AND RELATED PARTS

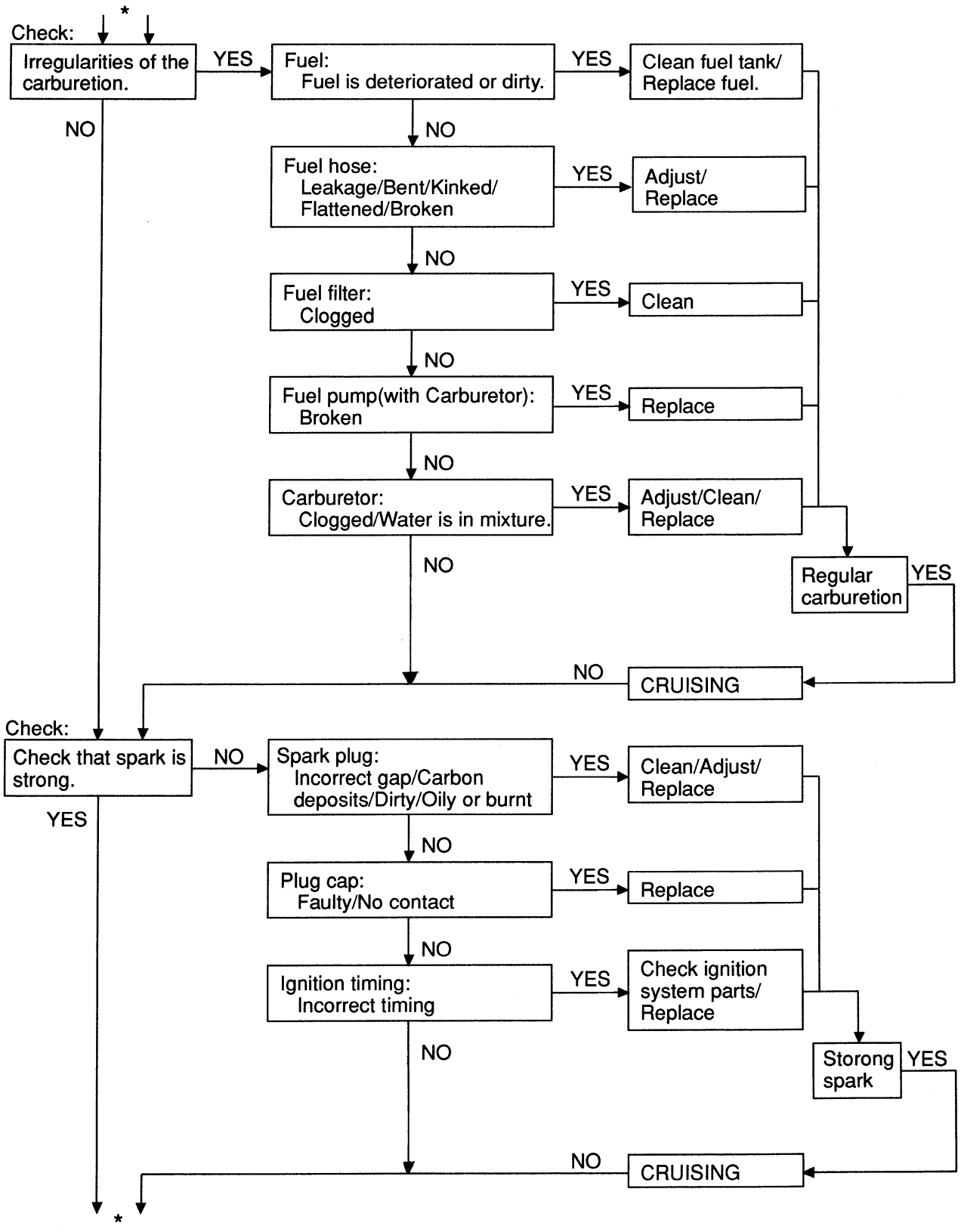
ENGINE DOES NOT START/ENGINE TURNS OVER BUT STALLS/ ENGINE RUNS IRREGULARLY, STOPS OR IDLES ROUGHLY

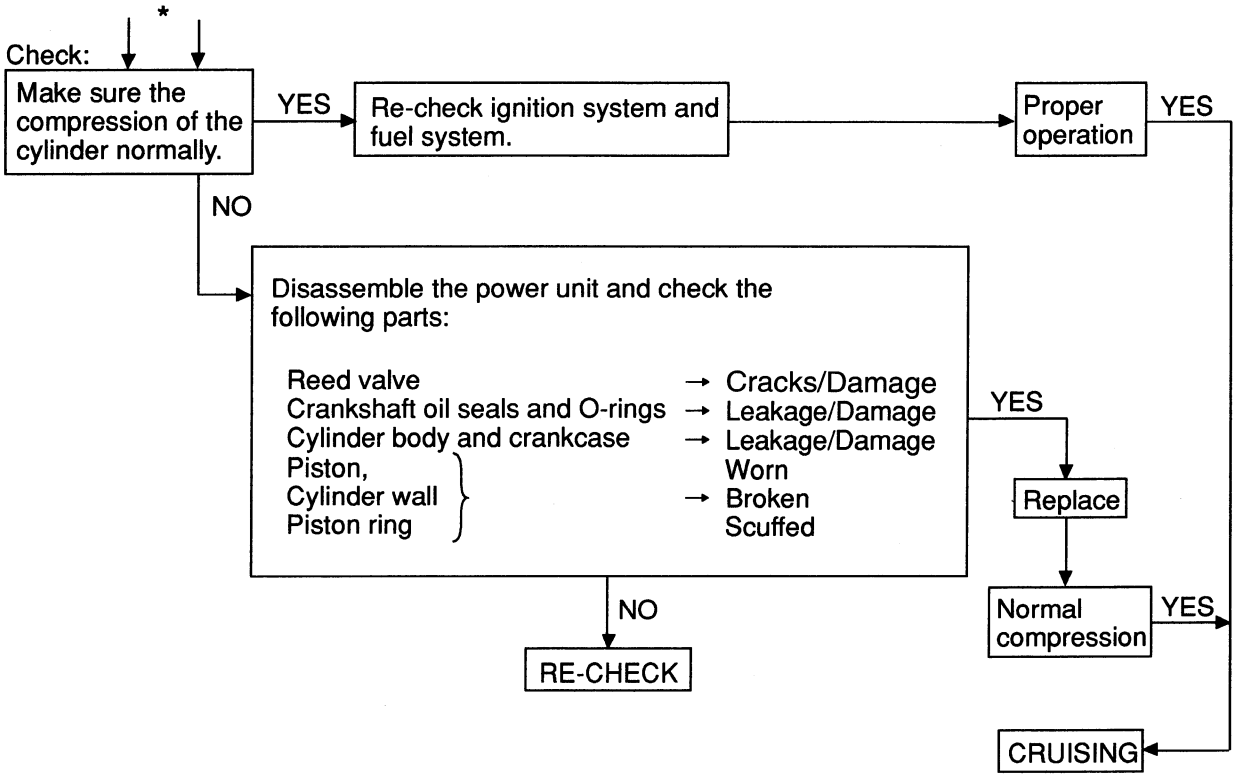



*
*
*
Pulser coil: Incorrect resistance
YES
Replace
NO
Charge coil: Incorrect resistance
YES
Replace
NO
Wiring connection: Poor connection
YES
Correct
NO
CDI unit: Incorrect resistance
YES
Replace
NO
Storong spark
YES
NO
RESTART
Check:
Check to see that the compression of the cylinder normally.
YES
Re-check ignition system and fuel system.
Proper operation
YES
NO
Disassemble the power unit and check the following parts:
Reed valve → Cracks/Damage
Crankshaft oil seals and O-rings → Leakage/Damage
Cylinder body and crankcase → Leakage/Damage
Piston, Cylinder wall, Piston ring → Worn, Broken, Scuffed
YES
Replace
Normal compressoion
YES
NO
RE-CHECK
RESTART

POWER LOSS

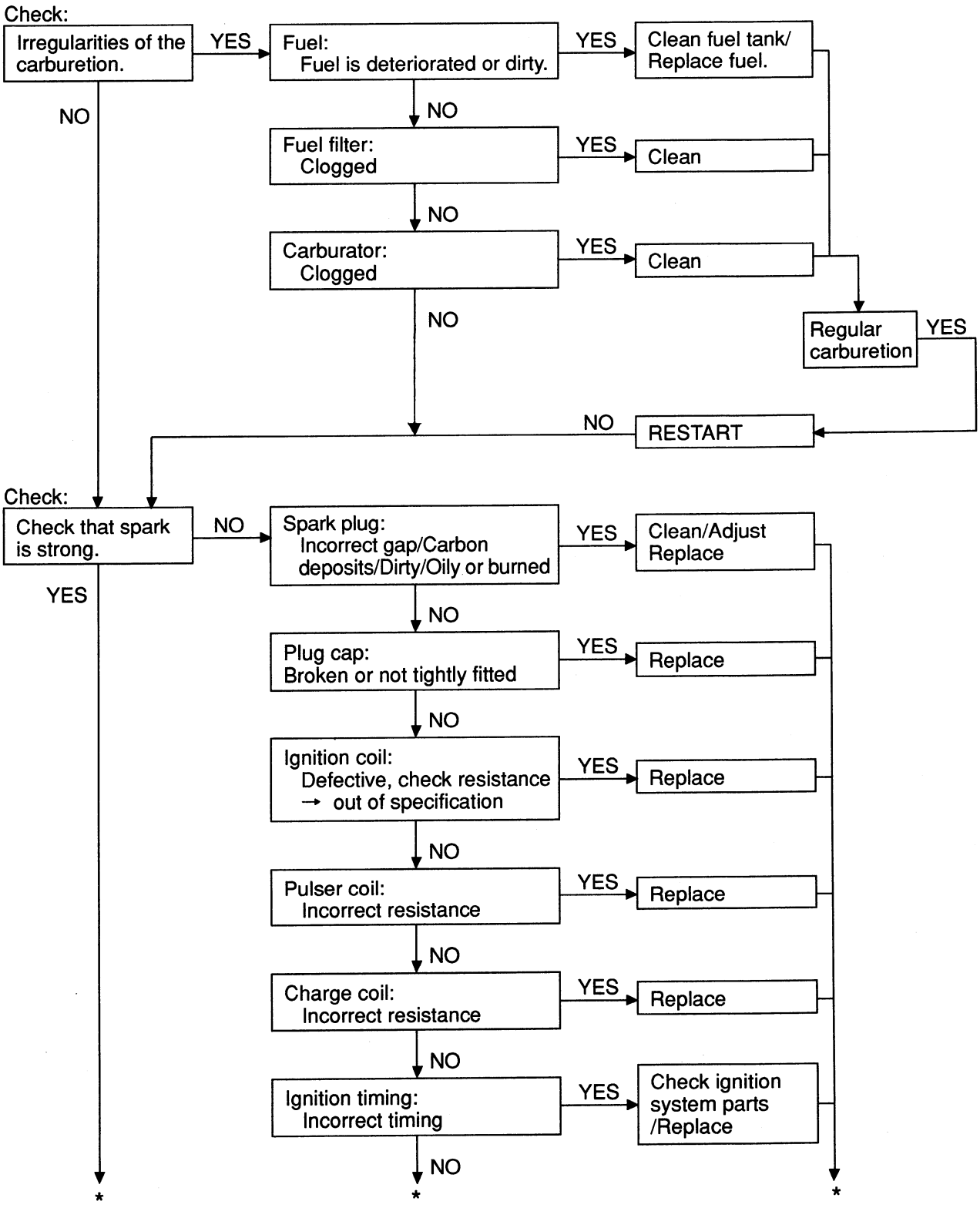

Check:
Boat is loaded properly.
NO
Check the distribution of the load on the boat:
Improper load distribution,Overload.
YES
Proper load distribution
YES
NO
Boat hull:
Fouled with seaweeds and shells
YES
Clean boat hull.
NO
Tilt angle:
Improper
YES
Adjust
NO
Transom height:
Low or high/Air draw/ Cavitation
YES
Adjust
NO
Proper load
YES
NO
CRUISING
Check:
Irregularities of the lower unit.
YES
Propeller selection:
Make sure the engine runs at 4,500~5500 rpm with wide-open throttle.
NO
Reselection
NO
YES
Propeller:
Bent/Broken/Loosely fitted/ Incorrect size
YES
Replace
NO
Water inlet:
Clogged
YES
Clean
NO
Water pump:
Worn/Broken
YES
Replace
NO
Regular operation
YES
NO
CRUISING
*

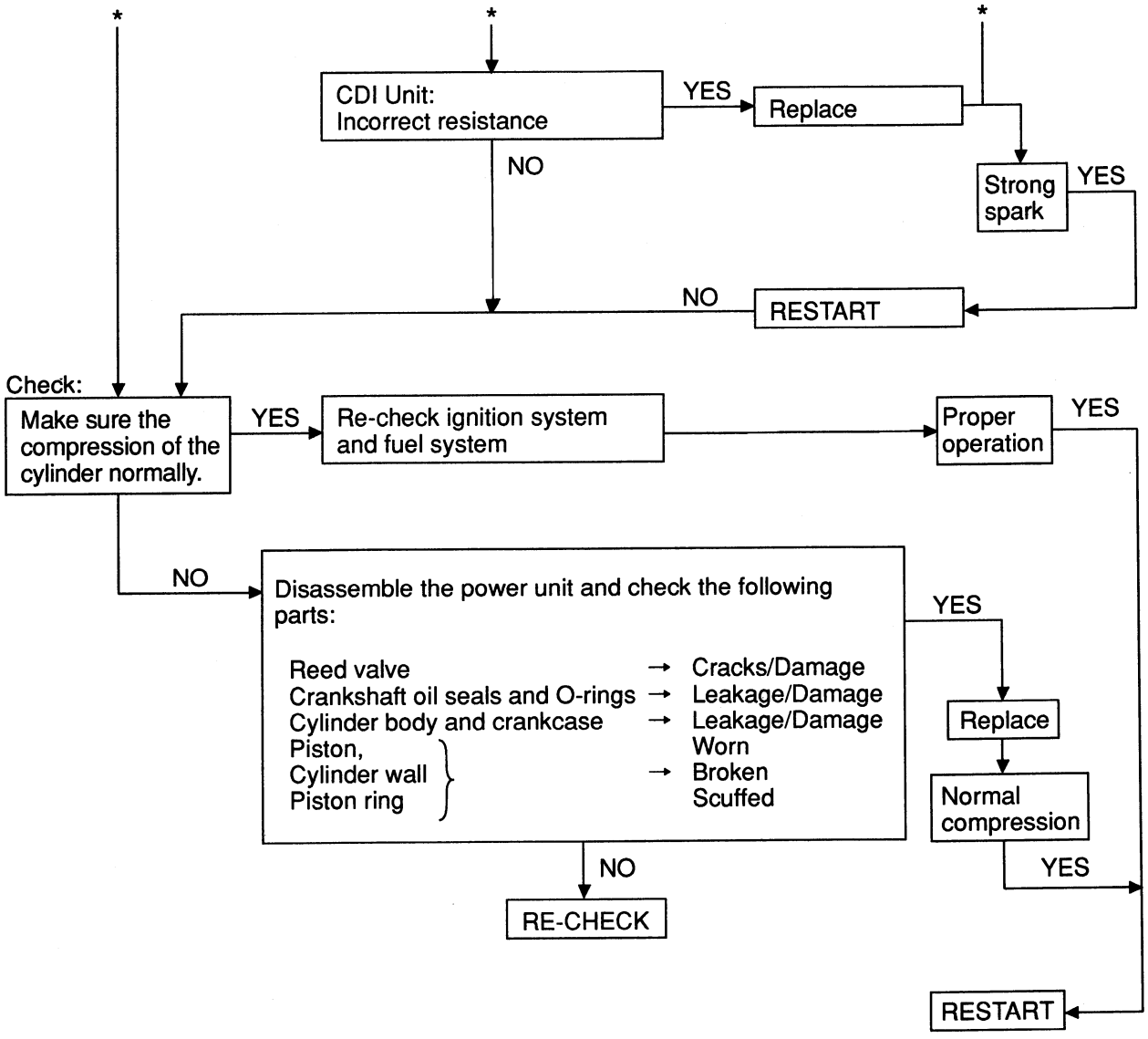

Check:
Irregularities of the carburetion.
YES
Fuel: Fuel is deteriorated or dirty.
YES
Clean fuel tank/ Replace fuel.
NO
NO
Fuel hose: Leakage/Bent/Kinked/ Flattened/Broken
YES
Adjust/ Replace
NO
Fuel filter: Clogged
YES
Clean
NO
Fuel pump(with Carburetor): Broken
YES
Replace
NO
Carburetor: Clogged/Water is in mixture.
YES
Adjust/Clean/ Replace
NO
Regular carburetion
YES
NO
CRUISING
Check:
Check that spark is strong.
NO
Spark plug: Incorrect gap/Carbon deposits/Dirty/Oily or burnt
YES
Clean/Adjust/ Replace
YES
NO
Plug cap: Faulty/No contact
YES
Replace
NO
Ignition timing: Incorrect timing
YES
Check ignition system parts/ Replace
NO
Storong spark
YES
NO
CRUISING


*
Check:
Make sure the compression of the cylinder normally.
YES
Re-check ignition system and fuel system.
Proper operation
YES
NO
Disassemble the power unit and check the following parts:
Reed valve → Cracks/Damage
Crankshaft oil seals and O-rings → Leakage/Damage
Cylinder body and crankcase → Leakage/Damage
Piston, Cylinder wall, Piston ring → Worn, Broken, Scuffed
YES
Replace
Normal compression
YES
NO
RE-CHECK
CRUISING

ENGINE MISFIRES

[First check for spark to find cause.]

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CDI Unit:
Incorrect resistance
YES
Replace
NO
Strong spark
YES
NO
RESTART
Check:
Make sure the compression of the cylinder normally.
YES
Re-check ignition system and fuel system
Proper operation
YES
NO
Disassemble the power unit and check the following parts:
Reed valve → Cracks/Damage
Crankshaft oil seals and O-rings → Leakage/Damage
Cylinder body and crankcase → Leakage/Damage
Piston, Cylinder wall, Piston ring → Worn, Broken, Scuffed
YES
Replace
Normal compression
YES
NO
RE-CHECK
RESTART

GEAR SHIFTING

GEAR SHIFTING IS IMPOSSIBLE

⚠WARNING

Do not start the engine during this inspection.

Move shift handle to "Neutral", "Forward" and "Reverse".
Turn propeller and check that gears are in "Neutral", "Forward" and "Reverse".

Check: