

 **YAMAHA**
WATERCRAFT

LST2000



1999 LST1200X Service Manual

Lit-18616-02-06

PREFACE

This manual has been prepared by Yamaha primarily for use by Yamaha dealers and their trained mechanics when performing maintenance procedures and repairs to Yamaha equipment. It is not possible to put an entire mechanic's education into one manual, so it is assumed that persons using this book to perform maintenance and repairs on Yamaha machines have a basic understanding of the mechanical concepts and procedures inherent in machine repair technology. Without such knowledge, attempted repairs or service to this model may render it unfit to use and/or unsafe.

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

LS2000
LST1200 Service Manual - 1999
First Edition
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Printed in U.S.A.

*Specifications, features and options are subject to
change without notice.*

99-057

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 compiled 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 you in finding 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.

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 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.

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 jet boat.

CAUTION:

A **CAUTION** indicates special precautions that must be taken to avoid damage to the jet boat.

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

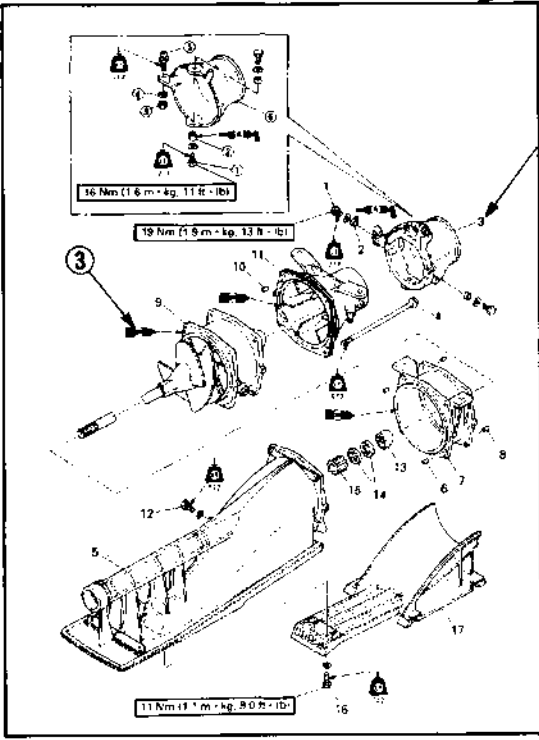
1. A disassembly/installation job instruction mainly consists of the exploded diagram ①.
2. The numerical figures represented by the number ② indicates the order of the job steps.
3. The symbols represented by the number ③ indicates the contents and notes of the job.

For the meanings of the symbols, refer to the next page(s).


4. The REMOVAL AND INSTALLATION CHART ④ is attached to the exploded diagram and explains the job steps, part names, notes for the jobs, etc.
5. The SERVICE POINTS, other than the exploded diagram, explains in detail the items difficult to explain in the exploded diagram of REMOVAL AND INSTALLATION CHART, the Service points requiring the detailed description ⑤, etc.

JET PUMP  **NOZZLE, DUCT AND INTAKE**

**NOZZLE, DUCT AND INTAKE
EXPLODED DIAGRAM**



























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JET PUMP  **NOZZLE, DUCT AND INTAKE**

REMOVAL AND INSTALLATION CHART

Step	Procedure/Part name	Qty	Service points
NOZZLE, DUCT AND INTAKE DISASSEMBLY			Follow the left "Step" for removal
	Jet pump unit		Refer to the "JET PUMP UNIT REMOVAL" section
1	Bolt (with washer)	2	
2	Collar	2	
3	Nozzle deflector assembly	1	
4	Bolt	4	
5	Intake duct	1	
6	Pin	2	
7	Housing	1	
8	Pin	2	
9	Impeller duct assembly	1	
10	Pin	2	
11	Nozzle	1	
12	Bolt (with washer)	1	
13	Spacer	1	
14	Oil seal	2	
15	Bushing	1	
16	Bolt (with washer)	6	
17	Intake screen	1	
NOZZLE DEFLECTOR DISASSEMBLY			
①	Bolt (with washer)	2	6 × 20 mm
②	Collar	2	
③	Nut	1	M6
④	Plate washer	2	
⑤	Ball joint	1	M6
⑥	Nozzle deflector	1	
⑦	Nut	1	M8
⑧	Plate washer	2	
⑨	Ball joint	1	M8
⑩	Trim ring	1	
			Reverse the removal steps for installation

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① GEN INFO 	② SPEC 
③ INSP ADJ 	④ FUEL 
⑤ POWR 	⑥ JET PUMP 
⑦ ELEC 	⑧ HULL DECK 
⑨ TRBL ANLS 	⑩ 
⑪ 	⑫ 
⑬ 	⑭ 
⑮ 	⑯ 
⑰ 	⑱ 
⑲ 	⑳ 
㉑ 	㉒ 
㉓ 	㉔ 

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 Jet Pump Unit
- ⑦ Electrical System
- ⑧ Hull and Deck
- ⑨ Trouble Analysis

Symbols ⑩ to ⑮ indicate specific data:

- ⑩ Special Tool
- ⑪ Specified liquid
- ⑫ Specified engine speed
- ⑬ Specified torque
- ⑭ Specified measurement
- ⑮ Specified electrical valve
[Resistance (Ω), Voltage (V),
Electric current (A)]

Symbol ⑯ to ⑱ in an exploded diagram indicate grade of lubricant and location of lubrication point:

- ⑯ Apply Yamaha 2-stroke outboard motor oil
- ⑰ Apply water resistant grease (Yamaha grease A, Yamaha marine grease)
- ⑱ Apply molybdenum disulfide grease






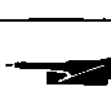
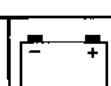

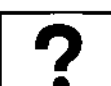
Symbols ⑲ to ㉔ in an exploded diagram indicate grade of sealing or locking agent, and location of application point:

- ⑲ Apply Gasket Maker®
- ⑳ Apply Yamabond #4 (Yamaha bond No. 4)
- ㉑ Apply LOCTITE® No. 271 (Red LOCTITE)
- ㉒ Apply LOCTITE® No. 242 (Blue LOCTITE)
- ㉓ Apply LOCTITE® No. 567 (PST)
- ㉔ Apply Silicone sealant

NOTE:

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

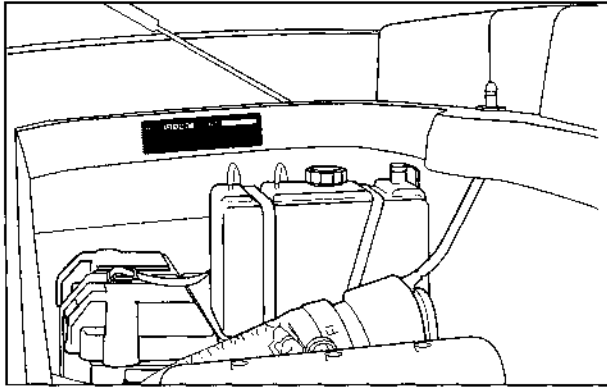
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CHAPTER 1

GENERAL INFORMATION

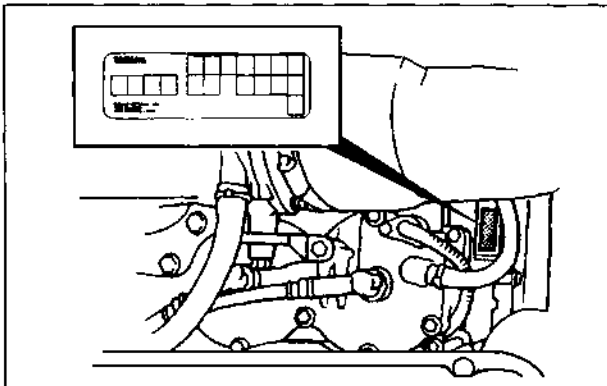
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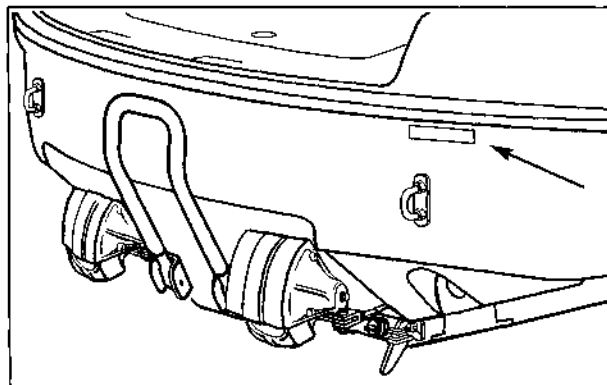
A60700-0*

IDENTIFICATION NUMBERS**PRIMARY I.D. NUMBER**

The primary I.D. number is stamped on a label attached to the deck under the rear seat.

Starting Primary I.D. Number:**F0R-000101~****ENGINE SERIAL NUMBER**

The engine serial number is stamped on a label attached to the crankcase.

Starting Serial Number:**66H: 002700~****HULL IDENTIFICATION NUMBER (H.I.N.)**

The H.I.N. is stamped into the hull on the starboard side of the stern.



SAFETY WHILE WORKING

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

FIRE PREVENTION

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

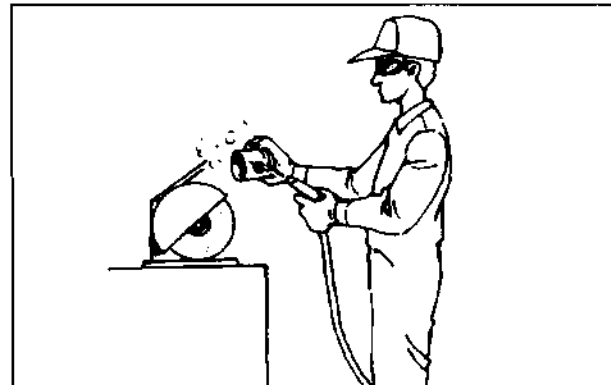
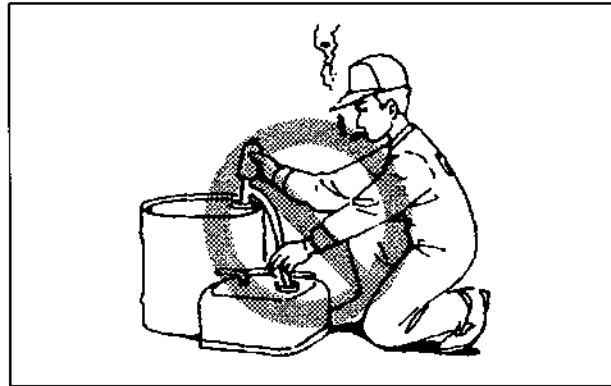
VENTILATION

Petroleum vapor is heavier than air and if 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 and protective shoes if appropriate to the work you are doing.

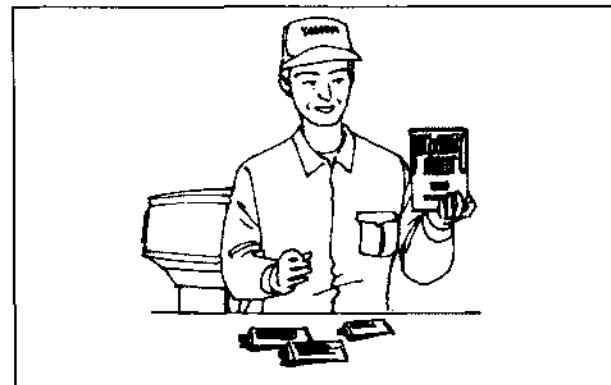


OILS, GREASES AND SEALING FLUIDS

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

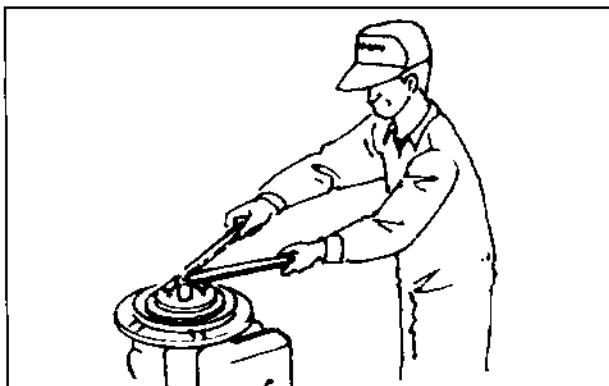
Under normal conditions of use, there should be no hazards from the use of the lubricants mentioned in this manual, but safety is all-important, and by adopting good safety practices, any risk is minimized. A summary of the most important precautions is as follows:

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.



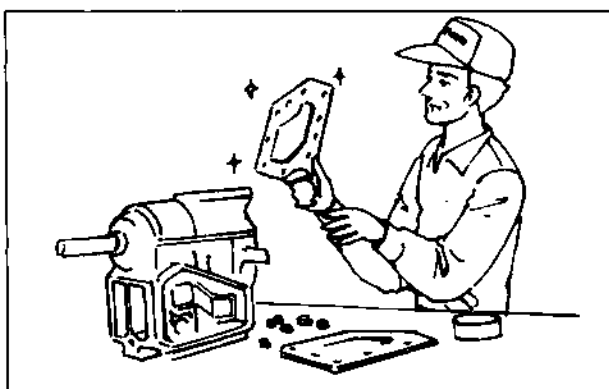


3. Avoid skin contact with lubricants; do not, for example, place a soiled wiping-rag in one's pocket.
4. Hands, and any other part of the body which have been in contact with lubricants or lubricant-contaminated clothing, should be thoroughly washed with hot water and soap as soon as practicable.
5. 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.



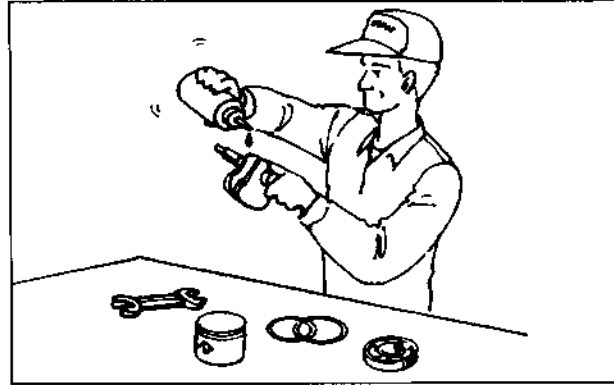
GOOD WORKING PRACTICES

1. The right tools
Use the special tools that are designed 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 larger sizes first, and tighten inner-positioned fasteners before outer-positioned ones.
3. Non-reusable items
Always use new gaskets, packings, o-rings, oil seals, split-pins and circlips, etc. on reassembly.



**DISASSEMBLY AND ASSEMBLY**

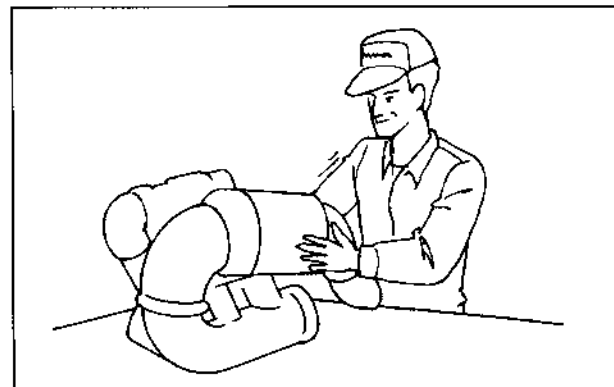
1. Clean parts with solvent and compressed-air on disassembling them.
2. Oil the contact surfaces of moving parts on assembly.



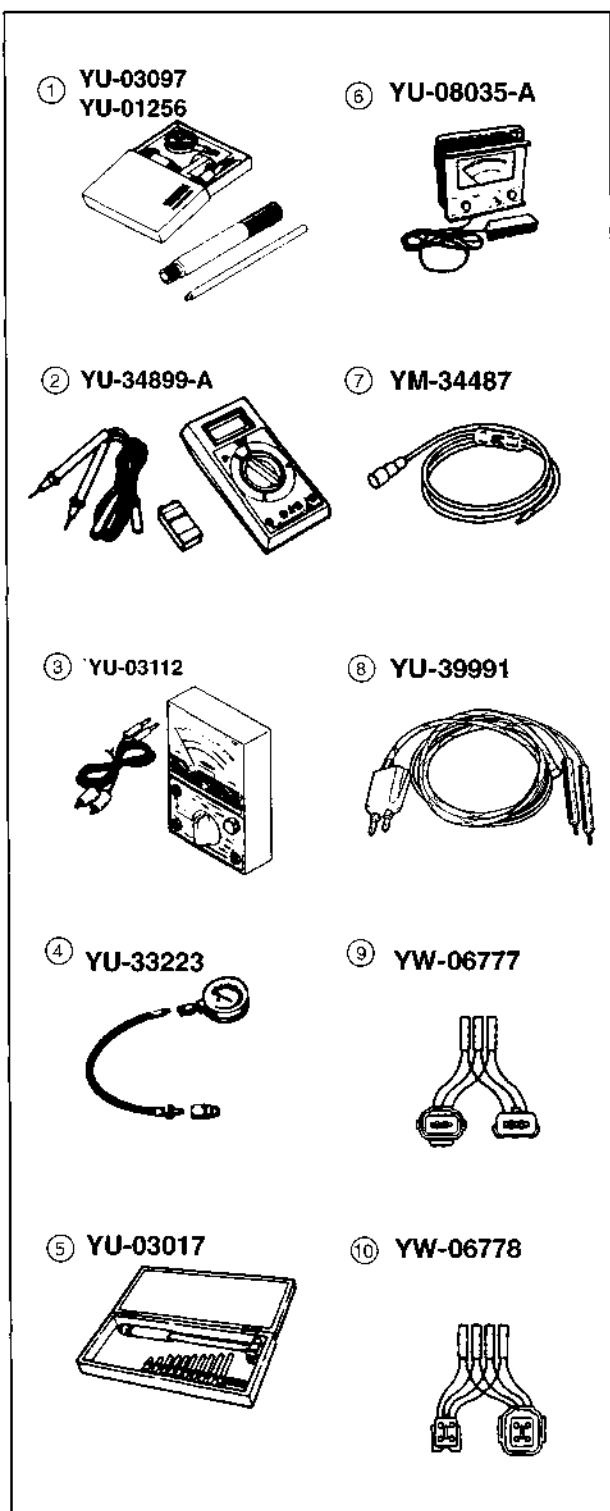
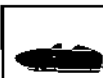
3. After assembly, check that moving parts operate normally.
4. Install bearings with the manufacturer's markings on the side exposed to view, and liberally oil the bearings.

CAUTION:

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



5. When installing oil seals, apply a light coating of water-resistant grease to the outside diameter.

**SPECIAL TOOLS**

Use of the 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. All special tools are available from Kent-Moore tools.

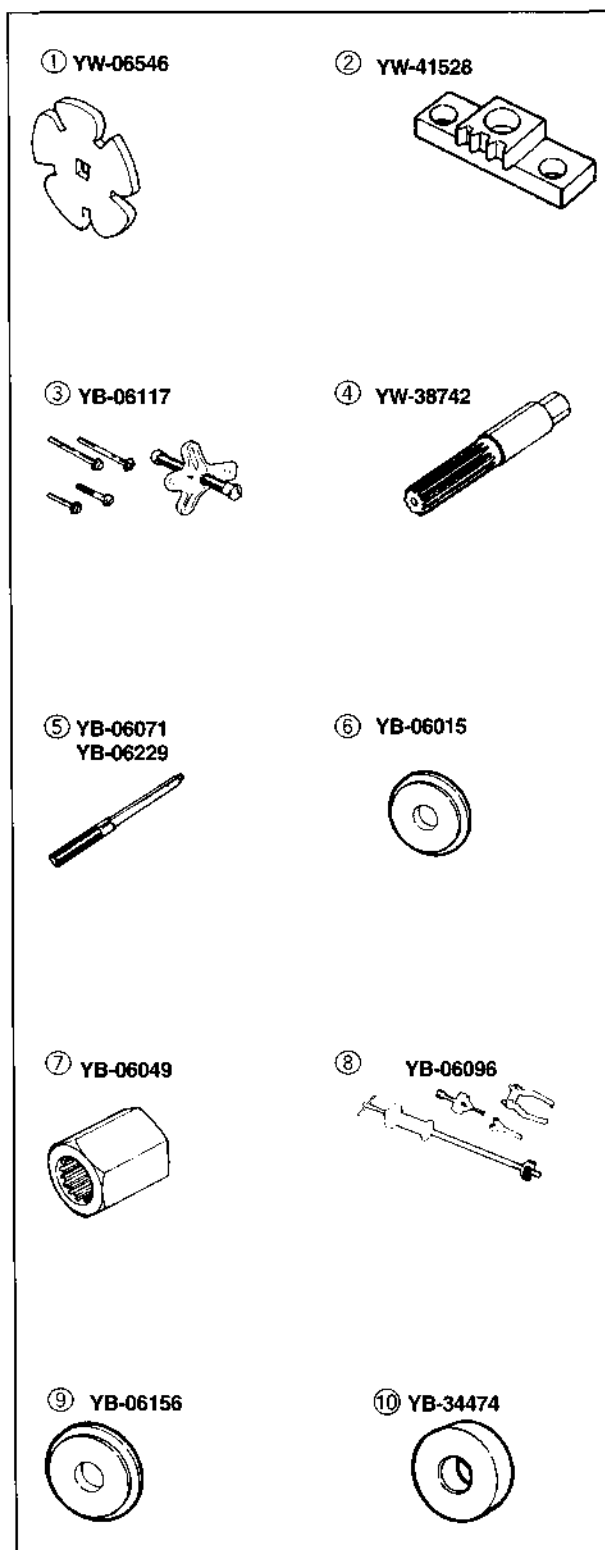
MEASURING

- ① Dial gauge and stand
K/M # YU-03097, YU-01256
- ② Digital multi meter
K/M # YU-34899-A
- ③ Pocket tester
K/M # YU-03112
- ④ Compression gauge
K/M # YU-33223
- ⑤ Cylinder gauge set
K/M # YU-03017
- ⑥ Engine tachometer
K/M # YU-08036-A
- ⑦ Spark gap tester
K/M # YM-34487
- ⑧ Peak Voltage Adaptor
K/M# YU-39991
- ⑨ 3 Pins Test Harness
K/M# YW-06777
- ⑩ 4 Pins Test Harness
K/M# YW-06778



REMOVAL AND INSTALLATION

- ① Coupler wrench
K/M # YW-06546
- ② Flywheel holder
K/M # YW-41528
- ③ Flywheel puller
K/M # YB-06117
- ④ Shaft holder (Intermediate shaft)
K/M # YW-38742
- ⑤ Driver rod
(Intermediate shaft and jet pump)
K/M # YB-06071, YB-06229
- ⑥ Bearing outer race attachment
(Intermediate shaft)
K/M # YB-06015
- ⑦ Drive shaft holder (Impeller)
K/M # YB-06049
- ⑧ Slide hammer set (Jet pump bearing)
K/M # YB-06096
- ⑨ Ball bearing attachment
(Jet pump oil seal)
K/M # YB-06156
- ⑩ Bearing inner race attachment
(Jet pump bearing)
K/M # YB-34474



CHAPTER 2

SPECIFICATIONS

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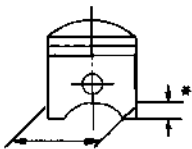
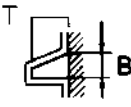
GENERAL SPECIFICATIONS

Model Code: Hull Engine	LST1200 F0R 66H
Dimensions: Length Width Draft Dry weight	19'6" (5.9 m) 8' (2.4 m) 18" (.5 m) 2100 lb. (955 kg)
Performance: Maximum output (each engine) Maximum fuel consumption (W.O.T.) Cruising range	135hp @ 6750 28.0 gal/hr (106 L/hr) @ 6730rpm 1.5 hr @ W.O.T.
Engine (each): Type Number of cylinders Displacement Bore x Stroke Compression ratio Carburetor type Number of carburetors Starting enrichment Intake system Induction system Lubrication system Starting system Spark plug (NGK) Recommended battery Battery capacity	2 stroke 3 1131cc 84mm x 68mm 6.0:1 Triple Mikuni BN 44 3 <hr/> Reed valve Loop charge Oil injection Electric BR8HS Marine Grade Group 24 12 volt/100Ah
Jet Pump (each): Jet pump type Impeller material Impeller rotating direction (seen from rear) Impeller pitch (leading / trailing) Steering nozzle angle	Axial flow, single stage Stainless steel Counter clockwise 15.1° 23 ±1°
Fuel and Oil: Fuel Rating Fuel tank capacity reserve Oil tank capacity	Regular unleaded gasoline Minimum research octane: 90 Minimum pump octane: 86 42 gallons (159 liters) 7 gallons (27 liters) 2.6 gallons (10 liters)

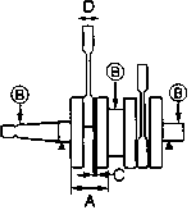


MAINTENANCE SPECIFICATIONS

ENGINE

Item	Unit	LST1200
Cylinder Head: Warpage limit Compression pressure	in (mm) kg/cm ² (KPa)	0.004" (0.1mm) —
Cylinder: Bore size Taper limit Out of round limit Wear limit	in (mm) in (mm) in (mm) in (mm)	3.307 ~ 3.308" (84.00 ~ 84.02mm) 0.003" (0.08mm) 0.002" (0.05mm) 3.31" (84.1mm)
Piston: Diameter Measuring point* Piston clearance Wear limit Piston pin bore inside diameter	 in (mm) in (mm) in (mm) in (mm) in (mm)	3.3032 ~ 3.3040" (83.902 ~ 83.921mm) 0.39" (10mm) 0.0039 ~ 0.0041" (0.100 ~ 0.105mm) 0.0061" (0.155mm) 0.7876 ~ 0.7884" (20.004 ~ 20.025mm)
Piston Ring: Top Type Dimensions (B x T) End gap (installed) Ring groove clearance (installed) 2nd Type Dimensions (B x T) End gap (installed) Ring groove clearance (installed)	 in (mm) in (mm) in (mm) in (mm) in (mm) in (mm)	Keystone 0.06 x 0.12" (1.5 x 3.0mm) 0.008 ~ 0.016" (0.20 ~ 0.40mm) 0.001 ~ 0.003" (0.02 ~ 0.07mm) Keystone 0.06 x 0.12" (1.5 x 3.0mm) 0.008 ~ 0.016" (0.20 ~ 0.40mm) 0.001 ~ 0.003" (0.02 ~ 0.07mm)
Piston Pin: Diameter Wear limit	in (mm) in (mm)	0.7872 ~ 0.7874" (19.995 ~ 20.000mm) 0.786" (19.98mm)



Item	Unit	LST1200
Crankshaft Assembly: Crank width "A" Deflection limit "B" Big end side clearance "C" Maximum small end axial play "D" 	in (mm) in (mm) in (mm) in (mm)	2.439 ~ 2.441" (61.95 ~ 62.00mm) 0.002" (0.05mm) 0.010 ~ 0.030" (0.25 ~ 0.75mm) 0.08" (2.0mm)
Carburetor (each engine): Type Manufacturer Number of carburetors Identification mark Main nozzle (M.N.) Main jet (M.J.) Pilot jet (P.J.) Low speed screw Throttle valve Valve seat size High speed screw Trolling speed	in (mm) turns out in (mm) turns out r/min.	Floatless Mikuni 3 66H (01) (02) (03) 0.13" (3.2mm) 135 100 (01) / 95 (02) / 97.5 (03) 1 ± 1/4 130 0.05" (1.2mm) 3/4 (01, 03) / 1 (02) ± 1/4 1,300 ± 50
Reed Valve: Thickness Valve stopper height Valve warpage unit	in (mm) in (mm) in (mm)	0.02" (0.5mm) 0.49 ± 0.01" (12.5 ± 0.2mm) 0.01" (0.2mm)

JET UNIT

Item	Unit	LST1200
Jet Pump (each): Impeller material Number of impeller blades Impeller pitch Impeller clearance Impeller clearance limit Drive shaft runout limit Nozzle diameter	degree in (mm) in (mm) in (mm) in (mm)	SUS 3 15.1 0.010 ~ 0.014" (0.25 ~ 0.35mm) 0.024" (0.6mm) 0.012" (0.3mm) 3.386" (86.0mm)



HULL AND HOOD

Item	Unit	LST1200
Free Play:		
Throttle lever free play	in (mm)	0.16 ~ 0.28" (4 ~ 7mm)
Choke cable free play	in (mm)	0.04 ~ 0.24" (1 ~ 6mm)

ELECTRICAL

Item	Unit	LST1200
Battery:		
Type		Marine group 24 dual purpose 675cca
Capacity	A•h (V/kC)	100 (12/68.4)
Ignition Timing:		
Ignition timing (at 1,200 r/min.)	degree	15 BTDC
Ignition timing (at 5,500 r/min.)	degree	F:22, C: 19, R: 17BTDC
Pulser Coil:		
Test points	Color code	B-W/R, B-W/B, B-W/G
Resistance	Ω	248 ~ 372
Peak voltage (open cranking)	V	3.2 (min)
Peak voltage (closed cranking)	V	2.4 (min)
Peak voltage (2000 RPM)	V	11.1 (min)
Peak voltage (3500 RPM)	V	21.1 (min)
Charge Coil 1:		
Test points	Color code	Br-B/R
Resistance	Ω	172.0 ~ 258.0
Peak voltage (open cranking)	V	22.3 (min)
Peak voltage (closed cranking)	V	21.0 (min)
Peak voltage (2000 RPM)	V	46.4 (min)
Peak voltage (3500 RPM)	V	65.2 (min)
Charge Coil 2:		
Test points	Color code	L ~ B/R
Resistance	Ω	656.0 ~ 984.0
Peak voltage (open cranking)	V	90.2 (min)
Peak voltage (closed cranking)	V	90.0 (min)
Peak voltage (2000 RPM)	V	95.9 (min)
Peak voltage (3500 RPM)	V	97.1 (min)
CDI Output:		
Test points	Color code	B/W ~ B (ea. coil)
Peak voltage (closed cranking)	V	95.5 (min)
Peak voltage (2000 RPM)	V	100.5 (min)
Peak voltage (3500 RPM)	V	101.4 (min)

























Item	Unit	LST1200
Lighting Coil: Test points Resistance Peak voltage (open cranking) Peak voltage (closed cranking) Peak voltage (2000 RPM) Peak voltage (3500 RPM) Charging current	Color code Ω V V V V A/rpm	G~G 0.56 ~ 0.84 5.6 (min) 5.6 (min) 23.8 (min) 28.1 (min) 4 ~ 6/5, 500
Spark Plug: Type Gap	 In (mm)	BR8HS 0.024 ~ 0.028 (0.6 ~ 0.7)
Ignition Coil: Minimum spark gap Primary coil resistance Secondary coil resistance	in (mm) Ω (color) k Ω (color)	0.35" (9mm) 0.048 ~ 0.072 (B/W - B) 2.7 ~ 4.1 (High tension cord-B)
Rectifier-Regulator: Regulated voltage	V	14.5 ~ 15.5
Thermo Switch: On temperature Off temperature	$^{\circ}\text{F}$ ($^{\circ}\text{C}$) $^{\circ}\text{F}$ ($^{\circ}\text{C}$)	194 ~ 205 $^{\circ}\text{F}$ (90 ~ 96 $^{\circ}\text{C}$) 194 ~ 168.8 $^{\circ}\text{F}$ (90 ~ 76 $^{\circ}\text{C}$)
Starter Motor: Brush length Wear limit Commutator undercut Limit Commutator diameter Limit	in (mm) in (mm) in (mm) in (mm) in (mm) in (mm)	0.49" (12.5mm) 0.26" (6.5mm) 0.028" (0.7mm) 0.01" (0.2mm) 1.10" (28.0mm) 1.06" (27mm)
Fuse: Rating	V-A	12-10 (Engine)
Lighting: Stern navigation lamp Bow light Instrument light		Type 1004, 12V 8W 12V 8W Type 194, 12V 3.4W
Circuit Breakers: Main accessory lead Accessory switch Blower Bilge Radio Lights Horn		12V20 amp 12V10 amp 12V10 amp 12V 5 amp 12V 5 amp 12V 5 amp 12V10 amp



TIGHTENING TORQUE

SPECIFIED TORQUE

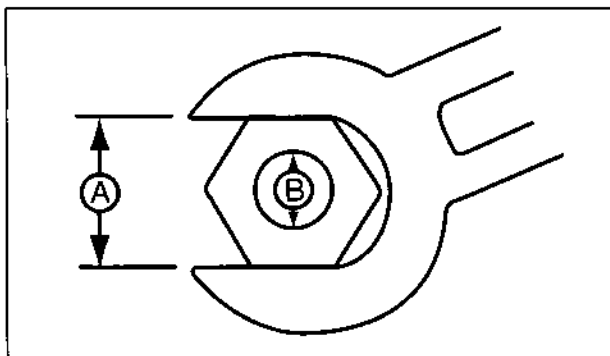
Part To Be Tightened		Part Name	Size	Qty	Nm	m•kg	ft•lb	Remarks
Engine:								
Electric box		Bolt	M8	3	17	1.7	12	 271
Mounting bolt		Bolt	M8	4	17	1.7	12	 271
Reed valve		Screw	M4	24	1	0.1	0.7	 242
Exhaust ring		Bolt	M8	4	30	3.0	22	 271
Muffler stay		Bolt	M10	4	40	4.0	29	 271
Exhaust Chamber Ass'y	1st	Bolt	M10	2	2	0.2	1.4	 271
	3rd				47	4.7	34	
	2nd				40	4.0	29	
Muffler 2								
Muffler 1	1st	Bolt	M8	12	15	1.5	11	 271
	2nd				30	3.0	22	
Cylinder body	1st	Bolt	M10	-	23	2.3	17	 567
	2nd				40	4.0	29	
Cylinder head	1st	Bolt	M8	14	15	1.5	11	 567
	2nd				32	3.2	23	
Cylinder head cover	1st	Bolt	M8	15	15	1.5	11	 567
	2nd				30	3.0	22	
	1st	Bolt	M6	2	4	0.4	2.9	 567
	2nd				8	0.8	5.8	
Spark plug		Bolt	M14	3	25	2.5	18	 E
Flywheel bolt		Bolt	M10	1	70	7.0	50	
Crankcase	1st	Bolt	M8	8	15	1.5	11	 567
	2nd				28	2.8	20	
Mount bracket	1st	Bolt	M10	9	23	2.3	17	 271
	2nd				53	5.3	38	
Coupling		Nut	M27	1	37	3.7	27	 567
Flame arrestor cover		Bolt	M6	8	2	0.2	1.4	 567
Starter motor terminal nut		Nut	M6	1	5	0.5	3.6	
Jet Unit:								
Mounting Bolt		Bolt	M8	2	19	1.9	13.7	 242
Intake duct		Bolt	M8	4	19	1.9	13.7	 242
Intake grate		Bolt	M8	3	19	1.9	13.7	 242
Impeller (left-hand threads)		Bolt	M20	1	18	1.8	13	 567
Coupling		Nut	M27	1	37	3.7	27	 567
Intermediate housing		Bolt	M8	3	17	1.7	12	 271



Nut A	Bolt B	General Torque Specifications		
		Nm	M•kg	ft•lb
8 mm	M5	5.0	0.5	3.6
10 mm	M6	8.0	0.8	5.8
12 mm	M8	18	1.8	13
14 mm	M10	36	3.6	25
17 mm	M12	43	4.3	31

GENERAL TORQUE

This chart specifies the torques 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 a criss-cross fashion, in progressive stages until the specified torque is reached.



Bolt Dia.	General Torque Specifications		
	Nm	M•kg	ft•lb
6-32	1.1	0.11	0.8
8-32	2.3	0.23	1.65
10-24	2.6	0.26	1.9
1/4-20	8.6	0.86	6.25
5/16-18	15	1.5	11.0

CHAPTER 3

PERIODIC INSPECTION AND ADJUSTMENT

MAINTENANCE INTERVAL CHART	3-1
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MAINTENANCE INTERVAL CHART

The following chart should be considered strictly as a guide to general maintenance intervals.

Depending on operating conditions, the intervals of maintenance may need to be adjusted.

Item	Remarks	Initial		Every		Refer to page
		10 Hours (Break-in)	50 Hours (3 Months)	100 Hours (6 Months)	200 Hours (1 Year)	
CONTROL SYSTEM:						
Steering cable	Inspection/Adjustment	O		O		3-2
Throttle cable	Inspection/Adjustment	O		O		3-3
Carburetor throttle shaft	Inspection	O		O		4-13
Choke cable	Inspection/Adjustment	O		O		3-5
Shift cable	Inspection/Adjustment	O		O		3-3
Shift system	Inspection/Adjustment	O		O		3-4
FUEL SYSTEM:						
Fuel tank	Cleaning			O		4-2
Fuel filter	Cleaning/Replacement			O		3-6
Fuel line	Inspection	O		O		4-1
Trolling speed	Inspection/Adjustment	O		O		3-6
Carburetor setting	Inspection/Adjustment	O		O		3-7
OIL INJECTION SYSTEM:						
Oil injection system	Inspection/Cleaning	O			O	3-8
POWER UNIT:						
Spark plug	Inspection/Cleaning/Adj.	O	O	O		3-10
Cooling-water passage	Cleaning/Flushing	O	O			-
Coupling rubber	Inspection				O	5-3
ELECTRICAL:						
Battery	Inspection	O				3-11
AUXILIARY ELECTRICAL:						
Bilge pump		O				7-25
Blower		O				7-25
Navigation lights		O				-
JET PUMP UNIT:						
Impeller	Inspection	O	O	O		3-14
GENERAL:						
Bolt and nut	Retightening	O		O		2-5
Drain plug	Inspection/Replacement				O	3-15
Greasing point	Greasing	O		O		3-15
Bearing housing	Greasing	O *1		O *2		3-15

*1: Grease capacity 33.0 ~ 35.0 cm³ (1.11 ~ 1.18 oz.)

*2: Grease capacity 6.0 ~ 8.0 cm³ (0.20 ~ 0.27 oz.)

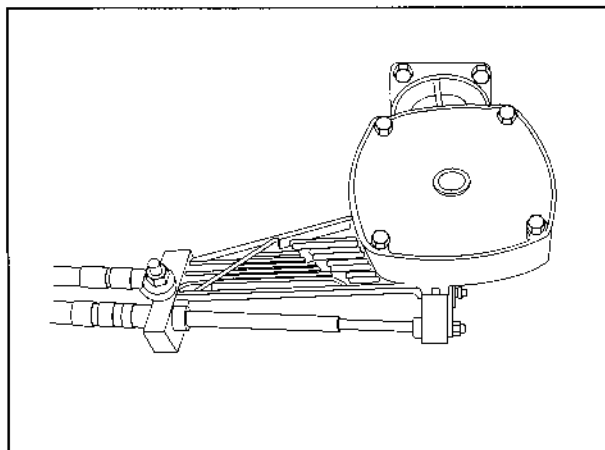


PERIODIC SERVICE

CONTROL SYSTEM

Steering helm inspection

1. Check:
 - Friction
Excessively heavy →
Replace the steering helm unit.
2. Check:
 - Free play
Excessive free play →
Replace the steering helm unit.

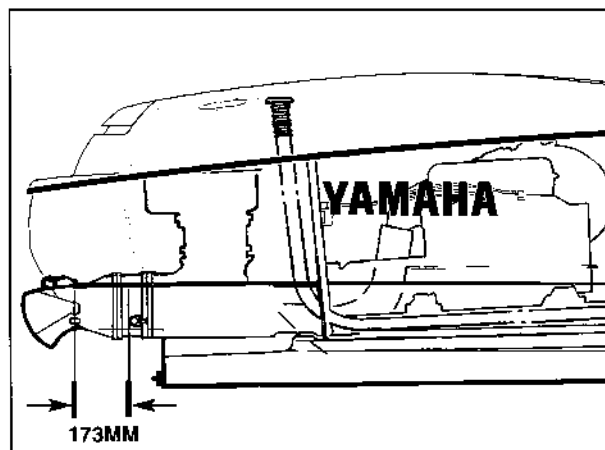


Steering cable adjustment

1. Measure:
 - Distance between the center of the steering nozzle joint and the cooling water casting boss on the right side of the pump. Incorrect distance → Adjust steering cable joint at nozzle end.

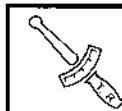


Steering Adjustment Distance:
6.8 in (173mm)

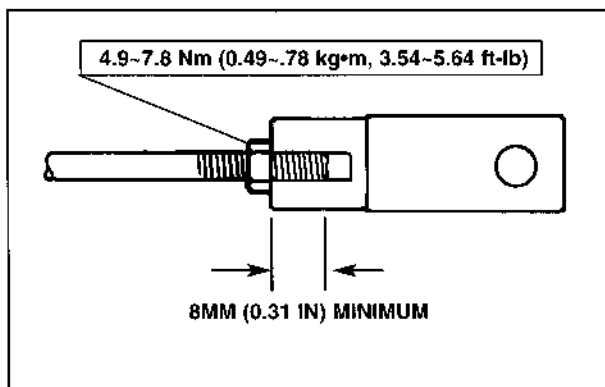


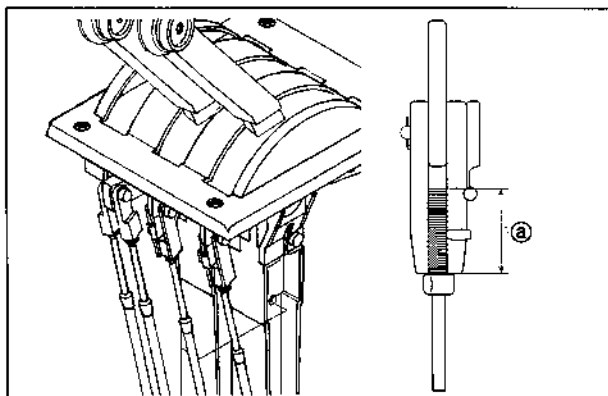
⚠ WARNING

The cable joints must be screwed in more than 8mm (0.31 in).

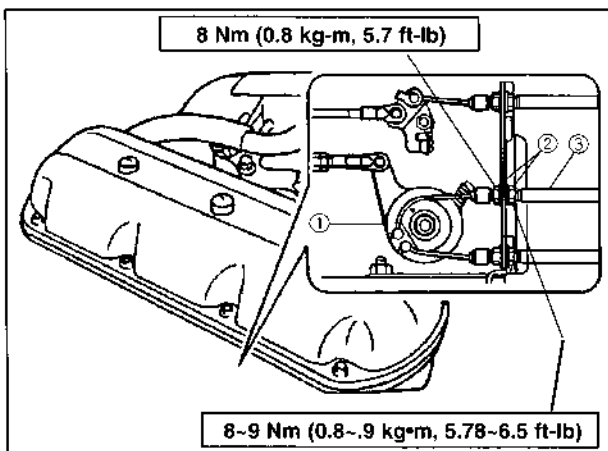


Lock Nut: 4.9 ~ 7.8Nm
(0.49~0.78 kg·m, 3.54~5.64 ft·lb)

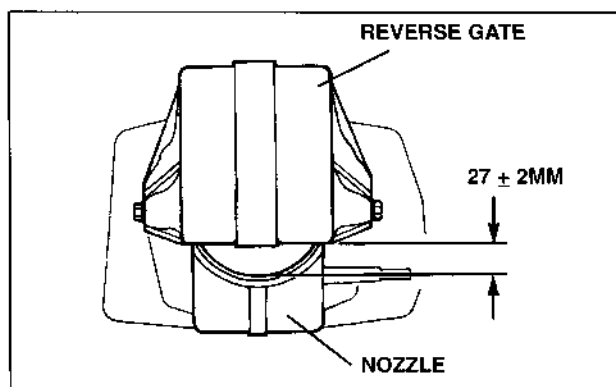




Throttle Cable Joint Set Position
 a: .67 in (17mm)
 min. engagement .5 in (12.5mm)



- ① Cable Wheel
- ② Locknuts
- ③ Throttle Cable



REMOTE CONTROL UNIT

1. Check throttle:
 - Throttle lever at wide-open-throttle (W.O.T.) position.
Throttle cable wheel, clearance to stop on carburetor incorrect → Adjust.
 - Throttle lever at idle position.
Throttle cable wheel does not touch idle screw → Adjust.
No free play → Adjust.

Throttle cable inspection and adjustment

Throttle Cable Adjustment Steps:

- a) Remove the four screws holding the remote control unit cover. Remove the four screws holding the remote control unit to the deck. Lift the remote control unit.
- b) Check that throttle cable joints are set at .67 in (17mm) of thread engagement at the control end. Adjust if necessary.
- c) Adjust each throttle cable so that the cable wheel has 0.001 in (0.025mm) to 0.079 in (2.0mm) clearance to the stop when the levers are pushed to the wide-open-throttle (W.O.T.) position.
- d) Check that the cable wheel hits the idle screw when the throttle levers are pulled back to the idle position, and that there is free play in the cable. If adjustment is necessary, loosen the locknuts at the carburetor end and turn the cable adjuster. Tighten the locknuts.

2. Check shifting:
 - Reverse gate clearance with shift lever in Neutral position.
Out of specification → Adjust.

Reverse Gate Clearance:
 1.06 ± 0.08 in (27 ± 2mm)



Shift cable inspection and adjustment

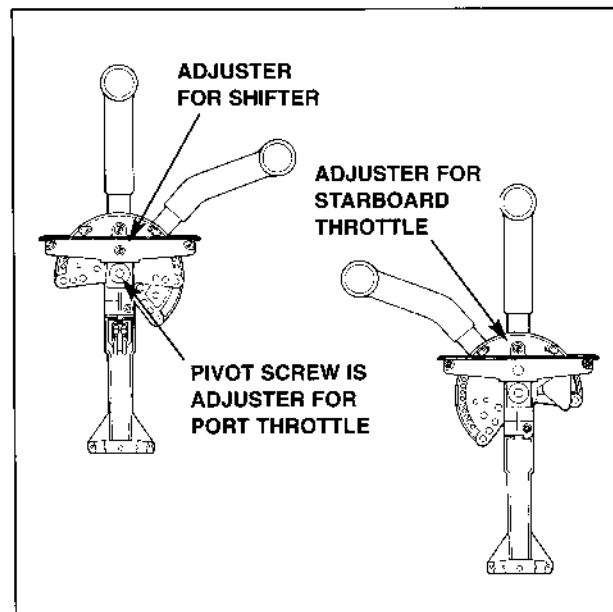
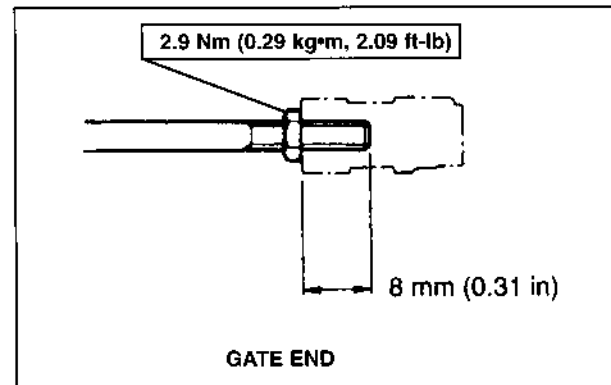
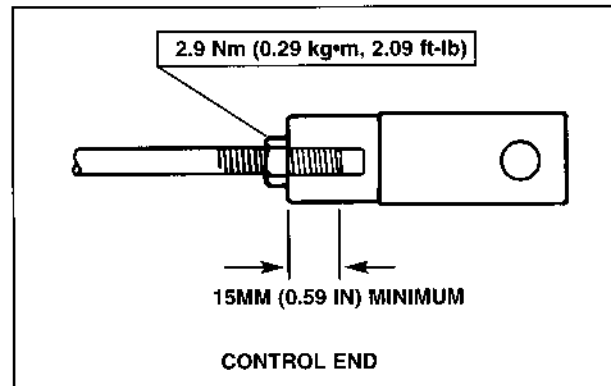
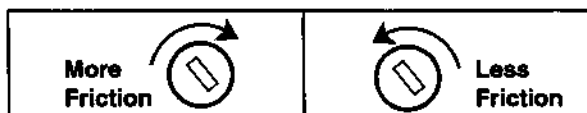
Shift Cable Adjustment Steps:

- a) Remove the four screws holding the remote control unit cover. Remove the four screws holding the remote control unit to the deck. Lift the remote control unit.
- b) Check that shift cable joint has 15mm (0.6 in) thread engagement at the control end. Adjust if necessary.
- c) Put the shift lever in Neutral. Check that the shift cable joint at the reverse gate end has 8mm (0.31 in) thread engagement.
- d) Measure the clearance between the reverse gate and the bottom of the nozzle. If adjustment is necessary, screw the shift cable joint in or out until adjustment is correct.

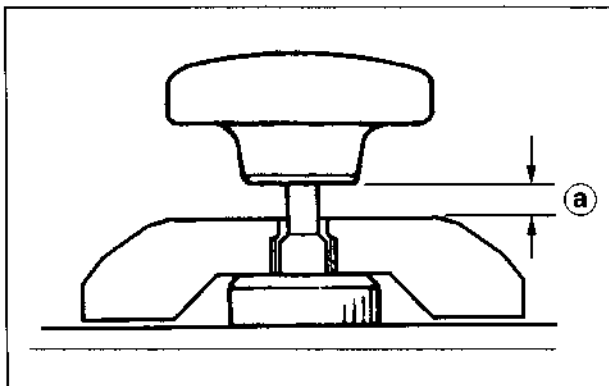
⚠ WARNING

The cable joints must have more than 8mm (0.31 in) engagement after adjustment is complete.

3. Check:
 - Mechanical interlock
Shift lever can move when throttle levers are not in idle position → Replace interlock.
4. Check:
 - Neutral switch
Refer to the "STARTING SYSTEM" section in Chapter 7.
5. Check:
 - Friction
Loose/stiff → Adjust the friction control screw

**NOTE:**

- Starboard throttle tension can be adjusted with the remote control in place.
- The remote control unit must be raised to adjust port throttle and the shifter.

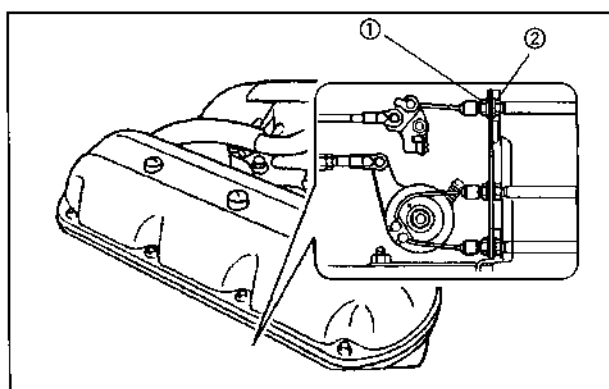


Choke cable inspection and adjustment

1. Measure:
 - Choke cable free play ①
 - Out of specification → Adjust.



Choke cable free play:
0.04~0.24 in (1~6mm)



2. Adjust:
 - Choke cable free play

Adjustment Steps:

- Loosen the lock nut ①.
- Turn the adjuster ② in/out until the specified free play is obtained.

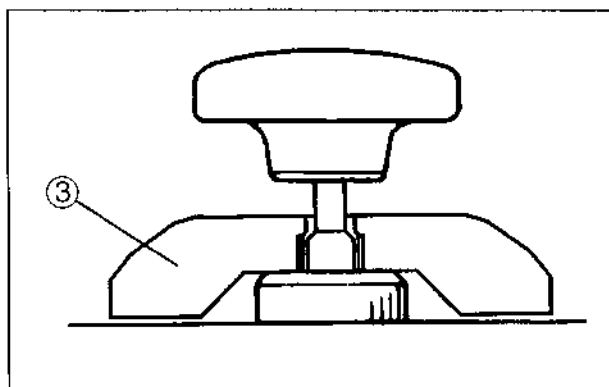
Turn in	Free play is increased.
---------	-------------------------

Turn out	Free play is decreased.
----------	-------------------------

- Tighten the lock nut.



Lock nut:
9 Nm (0.9 m•kg, 6.5 ft•lb)



3. Inspect:
 - Pull knob out completely and release
 - Knob automatically returns → Adjust.
4. Adjust:
 - Adjust nut ③
 - Turn in to stop automatic return.



FUEL SYSTEM

⚠ WARNING

- Stop the engine, set the fuel cock to "OFF" and loosen the fuel filler cap before a fuel system service.
- Remember the fire hazard associated with gasoline (petrol). Do not smoke, and keep away from open flames or sparks.
- When removing fuel system parts, hold them in a cloth and take care that no fuel spills into the engine compartment.

Fuel filter inspection

1. Inspect:
 - Filter element
Contamination → Replace
 - Filter body
Cracks/Damage → Replace
 - Filter assembly
Water contamination → Replace and check the fuel tank. If water or contamination are present, drain and clean fuel tank.

Trolling speed inspection and adjustment

1. Check:
 - Trolling speed
Out of specification → Adjust



Trolling Speed:
 $1,300 \pm 50$ r/min

Checking Steps: (boat in water):

- Start the engine and allow it to warm up for a few minutes.
- Attach the engine tachometer to the spark plug lead.



Engine Tachometer:
YU-08036-A

- Measure the engine trolling speed.



2. Adjust:

- Trolling speed

Adjustment Steps:

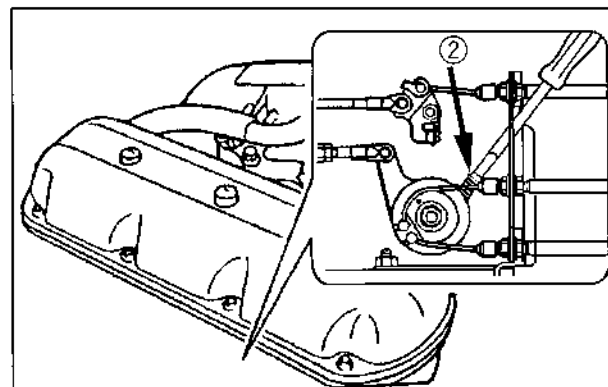
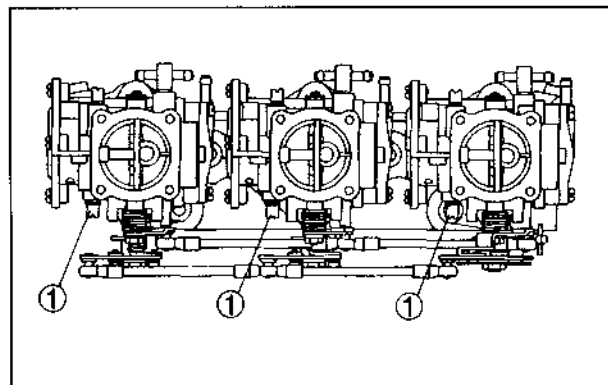
- Screw in the low speed screws ① until they are lightly seated.
- Back the screws out by the specified number of turns.



Low Speed Screw Setting:
 $1 \pm 1/4$ turn out

- Start the engine and allow it to warm up for a few minutes.
- Turn the throttle stop screw ② in or out until the specified speed is obtained.

Turning in	Increase trolling speed.
Turning out	Decrease trolling speed.



Carburetor adjustment

1. Adjust:

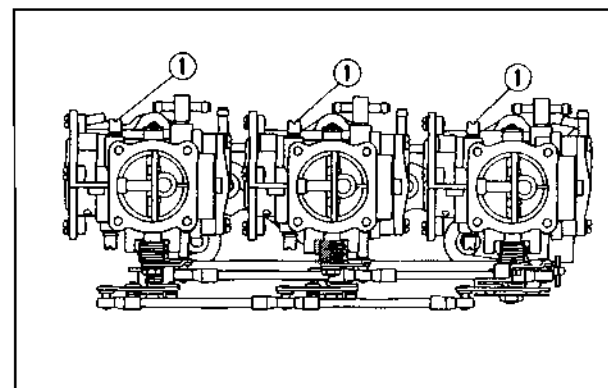
- High speed screw

Adjustment Steps:

- Screw in the high speed screws ① until they are lightly seated.
- Back the screws out by the specified number of turns.



High Speed Screw Setting:
 $3/4 \pm 1/4$ (#1, #3) turn out
 $1 \pm 1/4$ (#2) turn out





OIL INJECTION SYSTEM

Oil filter inspection

1. Inspect:

- Filter element
Contamination → Replace
- Filter body
Cracks/Damage → Replace
- Filter assembly
Water contamination → Replace and check the oil tank. If water or contamination are present, drain and clean oil tank.

Oil pump cable inspection and adjustment

1. Check:

- Oil pump lever position
Incorrect → Adjust.

Checking Steps:

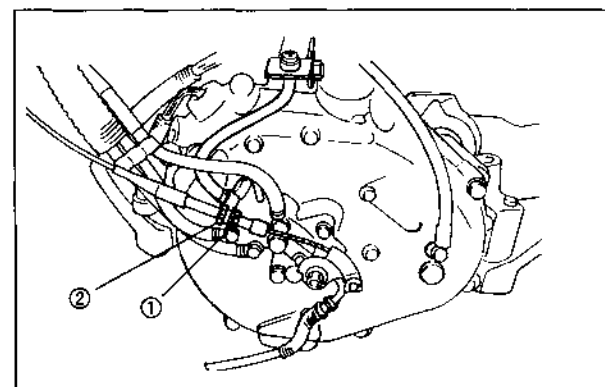
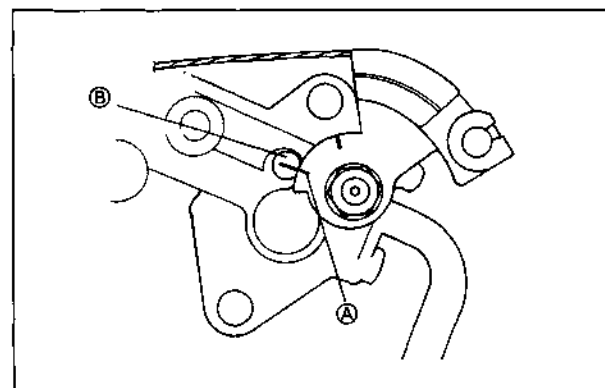
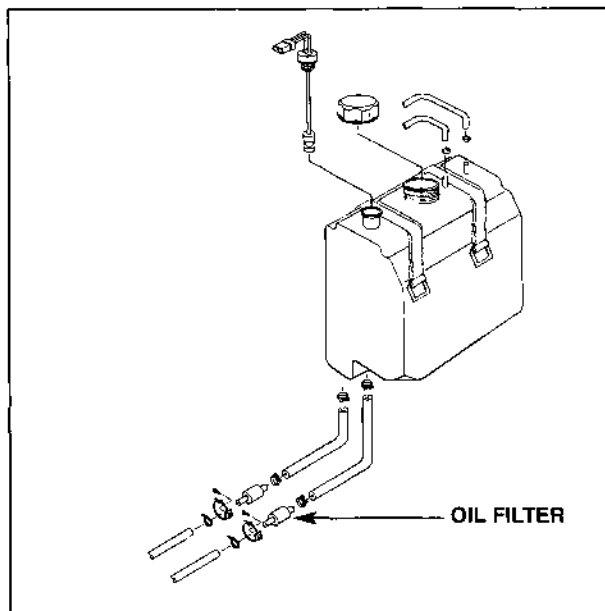
- Fully close the carburetor throttle valve.
- Check that mark (A) on the pump lever is aligned with mark (B) on the pump body.

2. Adjust:

- Oil pump cable

Adjustment Steps:

- Loosen the locknut ① and adjust nut ②.
- Fully close the carburetor throttle valve.
- Adjust the oil pump cable so that mark (A) on the pump lever aligns the mark (B) on the pump body.
- Tighten the locknut.



Oil injection air pump bleeding

NOTE:

Bleed the oil injection system if:

- The system has been disassembled.
- The oil has been completely used during operation.

1. Bleed:

- Air

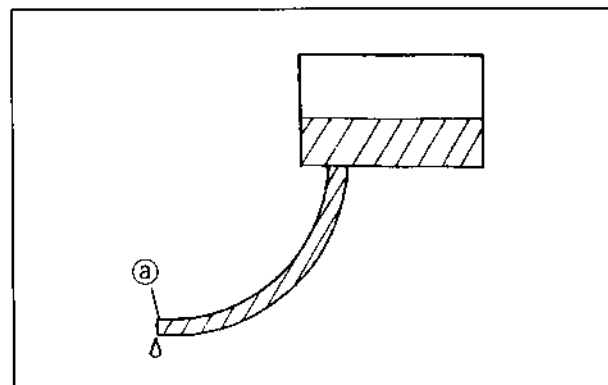
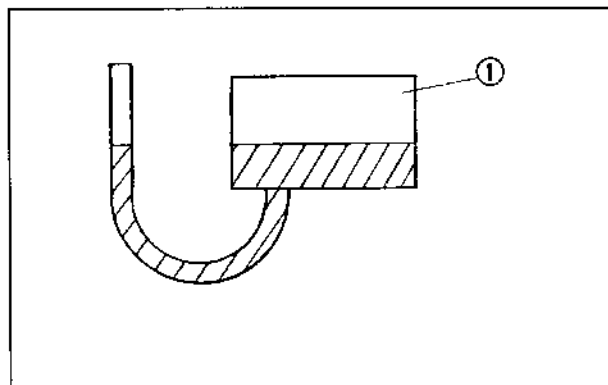
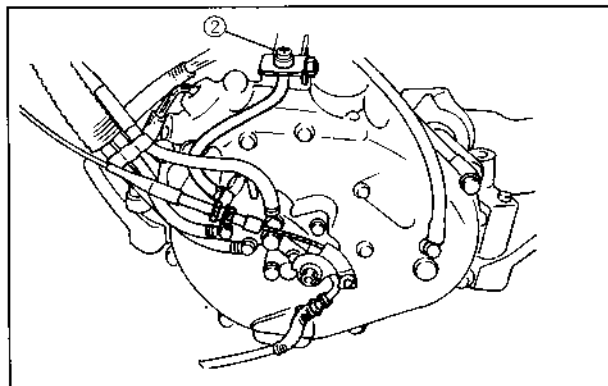
Air Bleeding Steps:

- a. Place rags under the oil pump to catch any oil that spills out.
- b. Disconnect the oil hose from the oil pump.
- c. Position the oil hose end above the oil tank 1.
- d. Put 2 liters of oil or more in the oil tank and leave it for 2 minutes.
- e. Then, lower the oil hose end and make sure the oil flows out of the oil hose.
- f. Connect the oil hose to the oil pump.
- g. Clamp the oil hose with the hose tie.
- h. Loosen the air bleed screw ② 2 turns, and make sure both oil and air bubbles flow out.
- i. If oil does not come out, squeeze the oil hose ③ near the oil pump inlet a maximum 20 times.
- j. When no air bubbles remain, tighten the air bleed screw.
- k. Wipe up any spilled oil.



Screw:

5Nm (0.5m•kg, 3.6 ft•lb)





POWER UNIT

Spark plug inspection

1. Inspect:

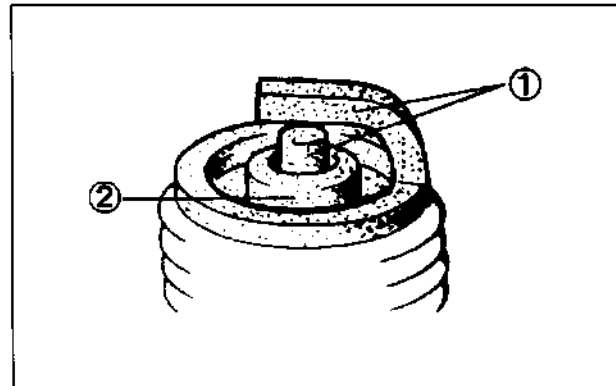
- Electrode ①
Wear/Damage → Replace.
- Insulator color ②
Discolor → Check the engine condition.

Color Guide:

Medium to light tan color:
Normal

Whitish color:
Lean fuel mixture
Plugged fuel mixture
Air leak
Incorrect settings

Blackish color:
Overly rich mixture
Electrical malfunction
Excess oil used
Defective spark plug

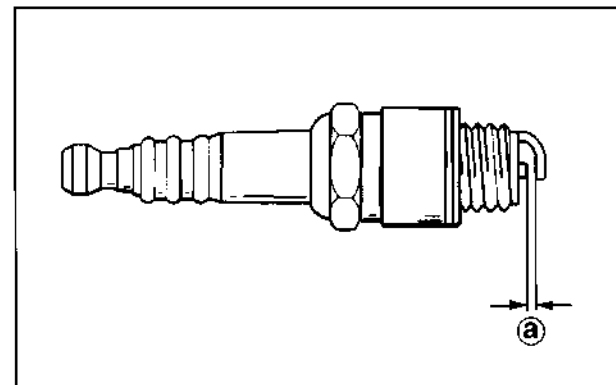


2. Clean:

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

3. Measure:

- Spark plug gap ③
Out of specification → Alter gap.
Use a wire gauge.



Spark Plug Gap:
0.024~0.028 in (0.6~0.7mm)

4. Tighten:

- Spark plug

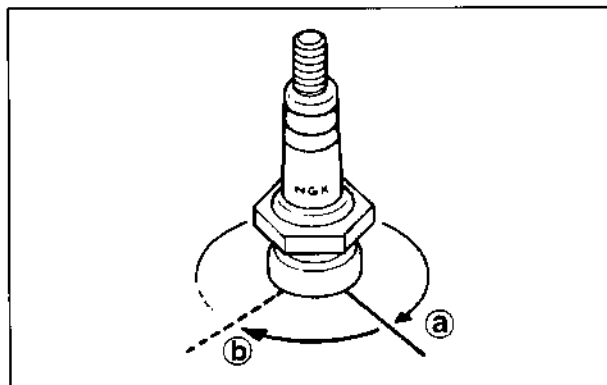


Spark Plug:
25 Nm (2.5m•kg, 18 ft•lb)



NOTE:

- Before installing a spark plug, clean the gasket surface and plug surface. Also it is advisable to apply a thin film of Anti Seize Compound to the spark plug threads to prevent future thread seizure.
- If a torque wrench is not available, a good estimate of the correct torque for the spark plug (with a new gasket) is 1/4 to 1/2 turn (b) past finger tight (a).



ELECTRICAL

Battery inspection

CAUTION:

Be careful not to place the battery on its side. Before adding the battery fluid or recharging, be sure to remove it from the engine compartment.

WARNING

- Battery electrolyte is poisonous and dangerous, causing severe burns, etc. Contains sulfuric acid.
- Avoid contact with skin, eyes or clothing.
- Antidote:
EXTERNAL - Flush with water.
INTERNAL - Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg or vegetable oil. Call a physician immediately.
EYES: Flush with water for 15 minutes and get prompt medical attention. (Batteries produce explosive gases.)
- Keep sparks, flame, cigarettes, etc., away. Ventilate when charging or using in an enclosed space. Always shield your eyes when working near batteries.
- KEEP OUT OF REACH OF CHILDREN.

**Battery inspection (cont'd.)**

1. Remove:
 - Battery

⚠ WARNING

- **When removing the battery, disconnect the negative lead first.**
-

NOTE: These general guidelines apply to many commonly used battery types (but not, for example, to maintenance-free batteries). Consult the battery manufacturer's instructions before performing battery maintenance.

2. Inspect:
 - Battery fluid level
Battery fluid level low → Top up with distilled water.

Filling Steps:

- Remove each filler cap.
- Fill with distilled water using a jug.
- When the fluid reaches the UPPER LEVEL, allow the cell to stand for 20 minutes. If the level has dropped, add more distilled water up to the UPPER LEVEL once again.

CAUTION:

Water other than distilled water contains minerals which are harmful to a battery; top up only with distilled water.

3. Inspect:
 - Battery fluid specific gravity
Out of specification → Charge.



Specific gravity at 68°F (20°C):
1.280
Charging current:
1.9 Amps x 10 Hrs (68.4 kC)

Battery inspection (cont'd.)

4. Install:
 - Filler cap

CAUTION:

Rinse off any acid from the battery case and wipe the battery dry prior to installation.

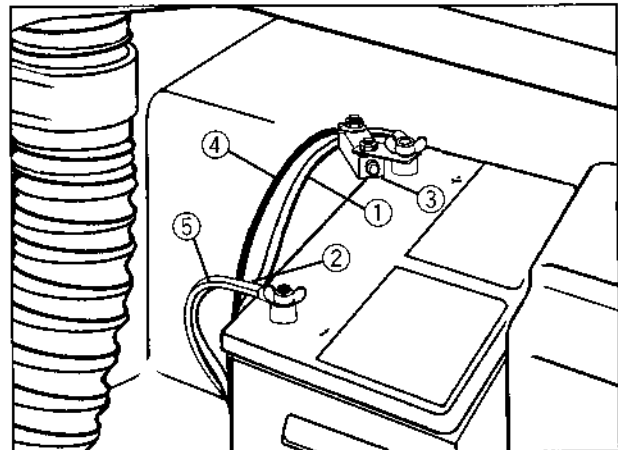
Install:

- Red battery cables and red/black accessory lead (circuit breaker) to (+) battery terminal.
- Black battery cables and black accessory lead to (-) battery terminal.

- ① Positive (+) battery cable (red)
- ② Negative (-) battery cable (black)
- ③ Circuit breaker (20A)
- ④ Accessory (+) lead (red/black)
- ⑤ Accessory (-) lead (black)

CAUTION:

- **Connect the positive red lead (+) to the battery first.**
- **Make sure battery leads are connected properly. Reversing the leads can damage the electrical system.**
- **Coat the terminals with a water-resistant grease to minimize terminal corrosion.**





JET PUMP UNIT

Impeller inspection

1. Remove:
 - Battery
Refer to "BATTERY" section.
2. View impeller condition through intake grate:
 - Impeller ①
 - Intake grate ②
Wear/Damage → Replace.
Scratch/Nick → File/Grind.
3. Remove:
 - Clean-out cap ①
4. Measure:
 - Impeller clearance ① ② ③
Out of specification → Replace.



Measure at all three points with feeler gauge.

**Impeller clearance limit:
0.024 in (0.6mm)**

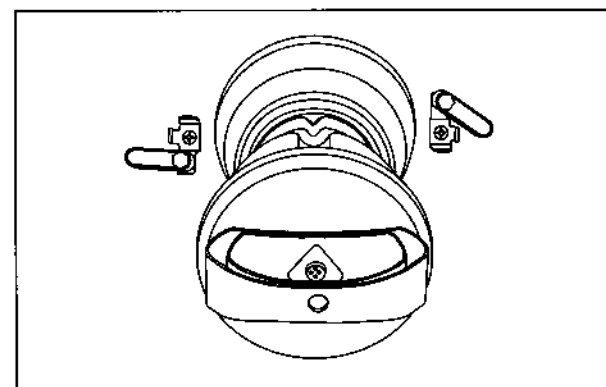
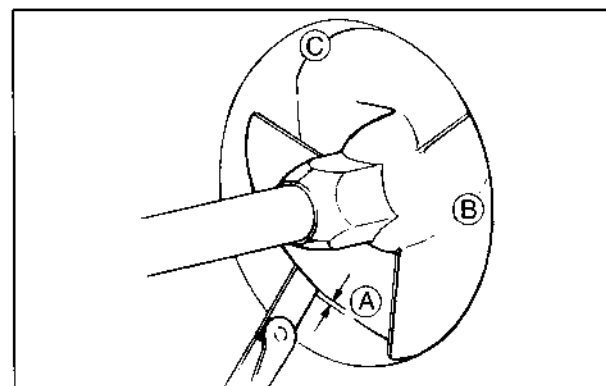
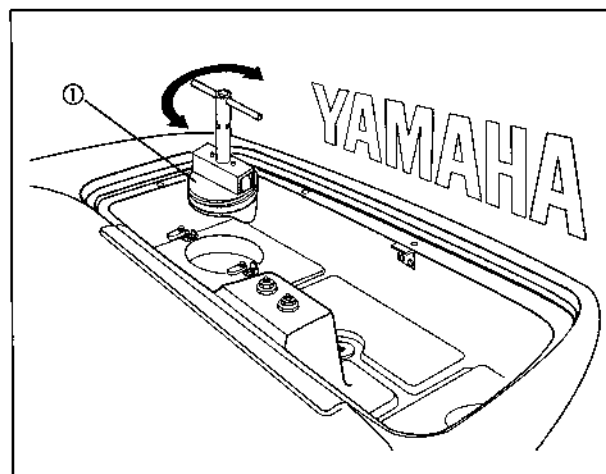
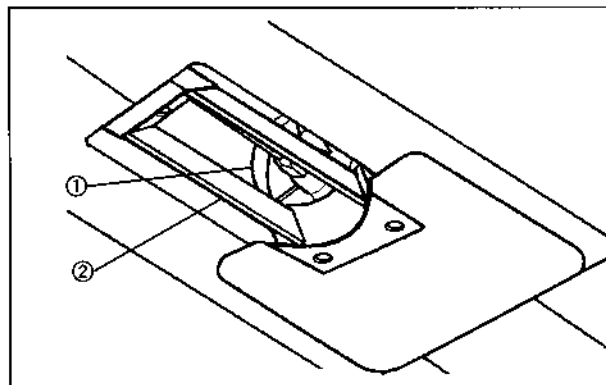
5. Install:
 - Clean-out cap

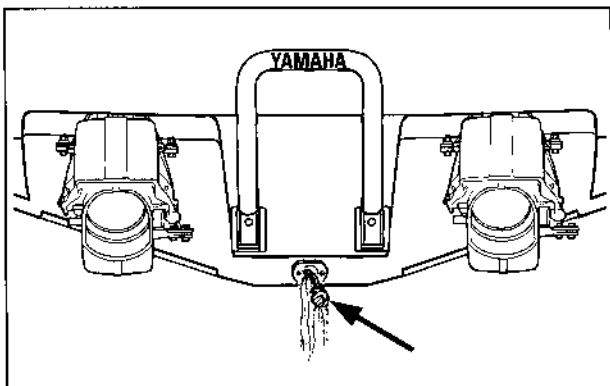
NOTE:

- Align the recess on the side of rubber block with the projection on the inspection hole.
- Hand tighten cap, then tighten with supplied wrench up to 1/4 turn more until either set of lower holes in the wrench align with the clamps.
- Be sure pointed metal tip in center of cap points straight ahead toward bow when cap is reinstalled.
- Slide "T" handle through holes and lock with clamps.

CAUTION:

Be sure the cap is tightened securely and the cap wrench is locked in place. Otherwise the cap could loosen and be forced out of the access ports by water pressure, causing loss of performance and possible damage.





GENERAL

Drain plug inspection

1. Inspect:
 - Drain plug
Crack/Damage → Replace.
 - O-Ring
Crack/Wear → Replace.
 - Screw threads
Dirt/Sand → Clean.

Greasing points

1. Apply:
 - Throttle cable inner wire
 - Choke cable inner wire
 - Shift control cable
 - Cable joint
 - Steering cable



Recommended Grease:
Water resistant grease

NOTE:

Remove the cable joint and apply a small amount of grease to the following parts.

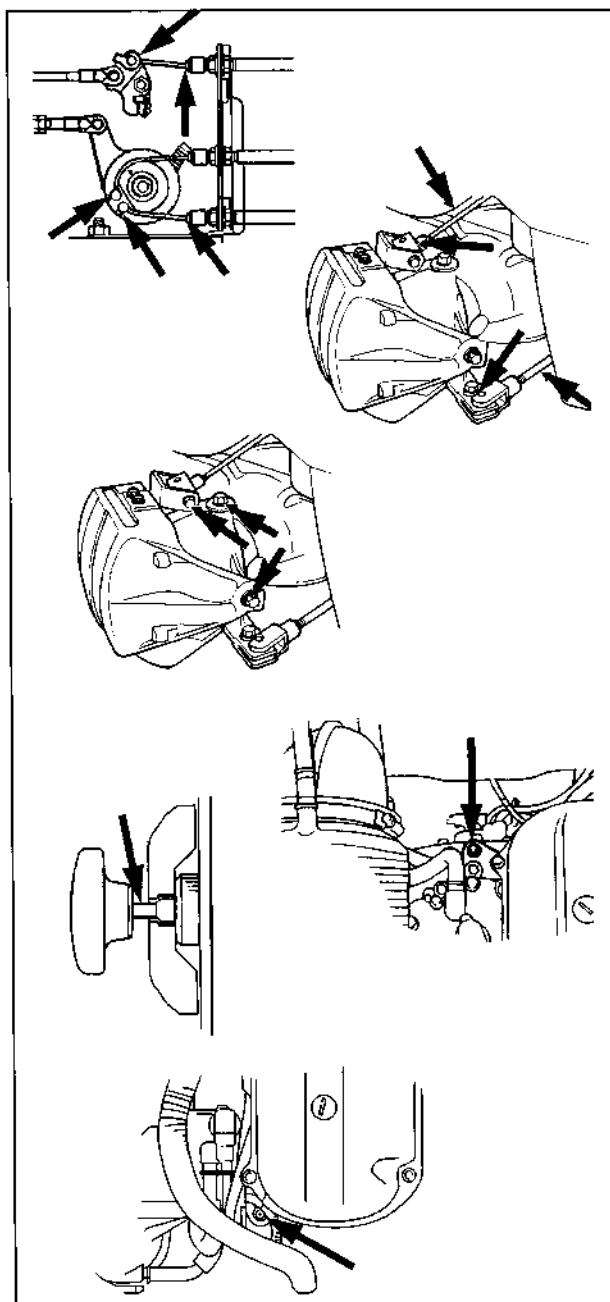
- Nozzle pivot shaft collar
- Steering pivot shaft bearing
- Choke knob shaft
- Bearing housing
- Starter idle gear



Recommended Grease:
Water resistant grease

NOTE:

- Fill in the bearing housing with water resistant grease from a nipple.
- Fill the grease slowly and carefully, as it can damage the hose and the joints.
- Refer to the "MAINTENANCE INTERVAL CHART" Section.



CHAPTER 4

FUEL SYSTEM

FUEL AND OIL SYSTEM

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FUEL TANK

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FUEL PUMP

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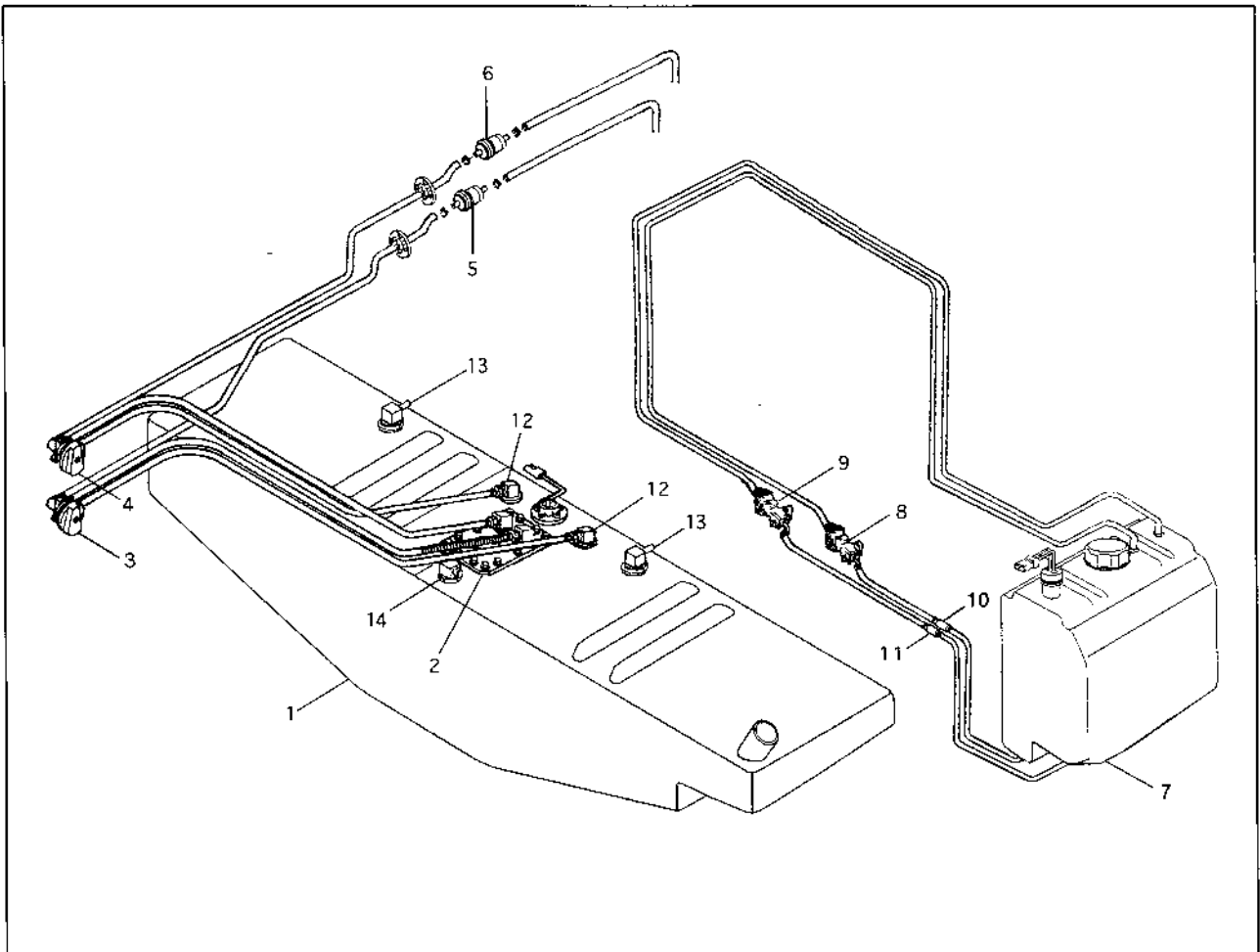
OIL PUMP EXPLODED DIAGRAM

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FUEL AND OIL SYSTEM

EXPLODED DIAGRAM



FUEL LINE AND OIL SYSTEM

- | | |
|---------------------------|--------------------------|
| 1. Fuel Tank | 9. Starboard Oil Pump |
| 2. Main Fuel Pickup | 10. Port Oil Filter |
| 3. Port Fuel Petcock | 11. Starboard Oil Filter |
| 4. Starboard Fuel Petcock | 12. Res Fuel Pickup |
| 5. Port Fuel Filter | 13. Fuel Return |
| 6. Starboard Fuel Filter | 14. Vent |
| 7. Oil Tank | |
| 8. Port Oil Pump | |

PREPARATION FOR REMOVAL

⚠ WARNING

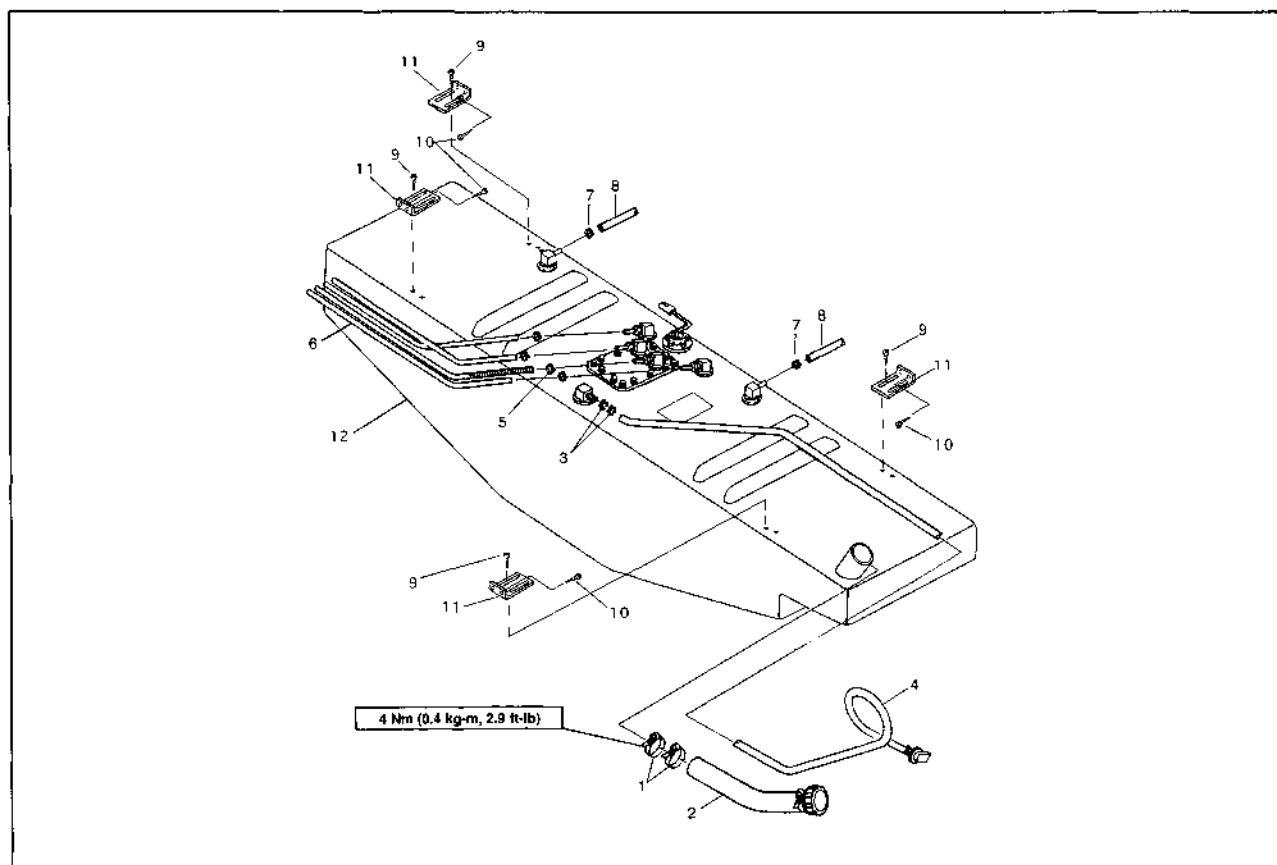
Petrol (gasoline) is highly flammable and explosive. Handle with special care.

- Place the fuel cock in the "OFF" position.
- Remove the battery.
- Loosen the fuel filler cap.



FUEL TANK

EXPLODED DIAGRAM



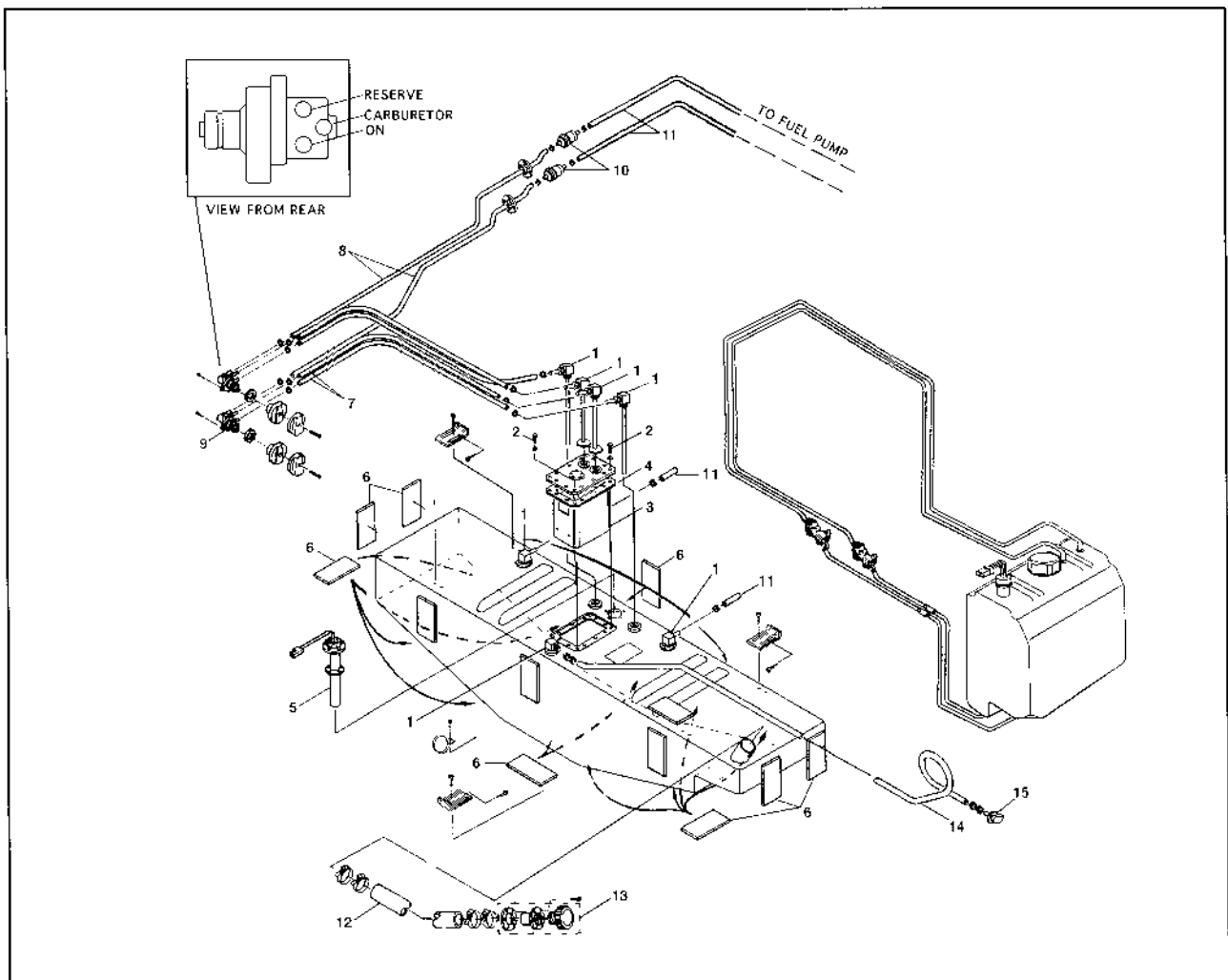
REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	FUEL TANK REMOVAL		
	Fuel		Follow the "Step" order for removal. Remove the fuel in the tank.
	Seat Assembly		Refer to "SEAT FITTINGS" in Chapter 8.
1	Hose Band	2	
2	Fuel Filler Hose	1	
3	Hose Band	2	
4	Air Vent Hose	1	
5	Hose Tie	4	
6	Fuel Pipe	4	
7	Hose Tie	2	
8	Fuel Return Pipe	2	
9	Machine Screw	8	
10	Tapping Screw	8	
11	Tank Stay Bracket	4	
12	Fuel Tank Assembly	1	Reverse the removal steps for installation.



FUEL SYSTEM

EXPLODED DIAGRAM



REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	FUEL SYSTEM DISASSEMBLY		Follow the "Step" order for removal.
1	Hose Fitting	7	
2	Screw	1	
3	Insert, Fuel Tank	1	
4	Gasket	1	
5	Fuel Level Sensor	1	
6	Pad, Fuel Tank	18	

Fuel level sensor inspection

Refer to the "INSTRUMENT" section in Chapter 7.

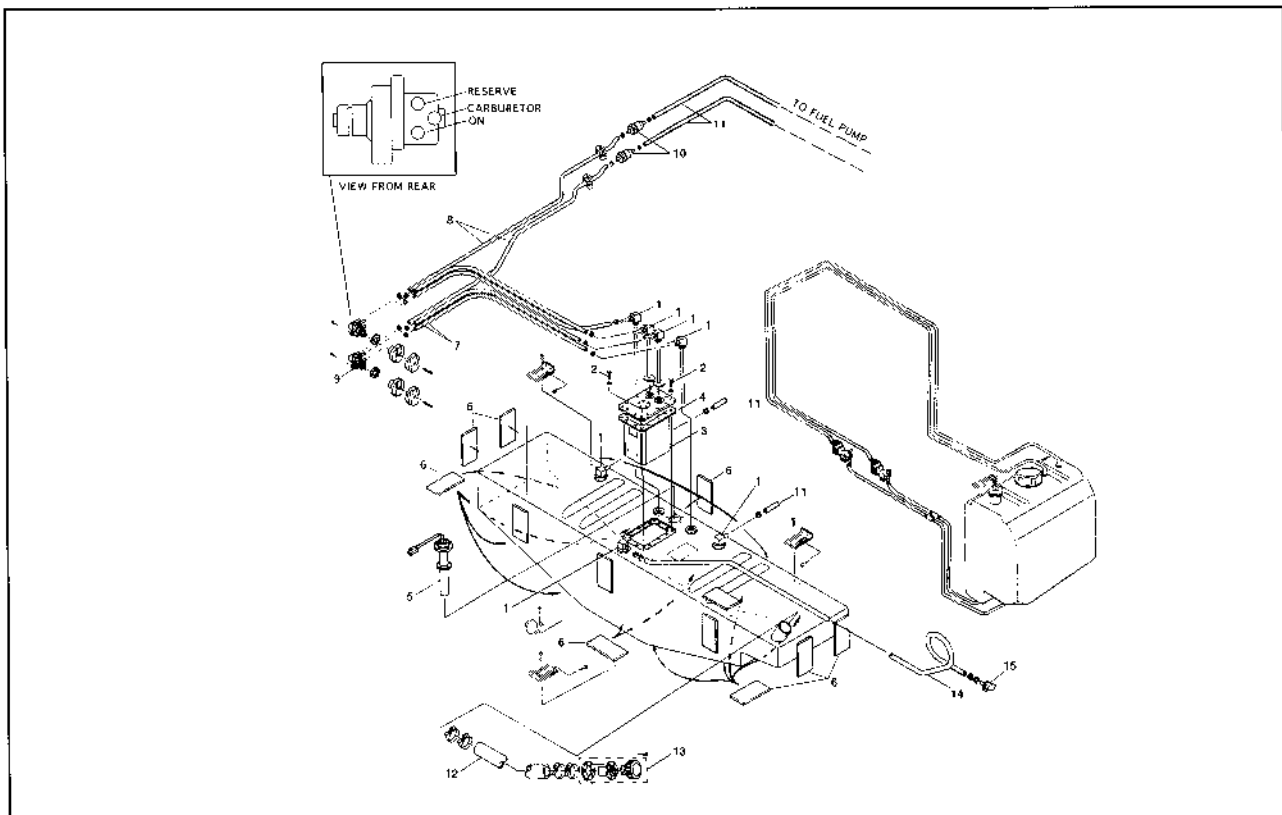
Fuel tank inspection

- Inspect:
Fuel Tank
Cracks/Damage → Replace.



FUEL SYSTEM

EXPLODED DIAGRAM

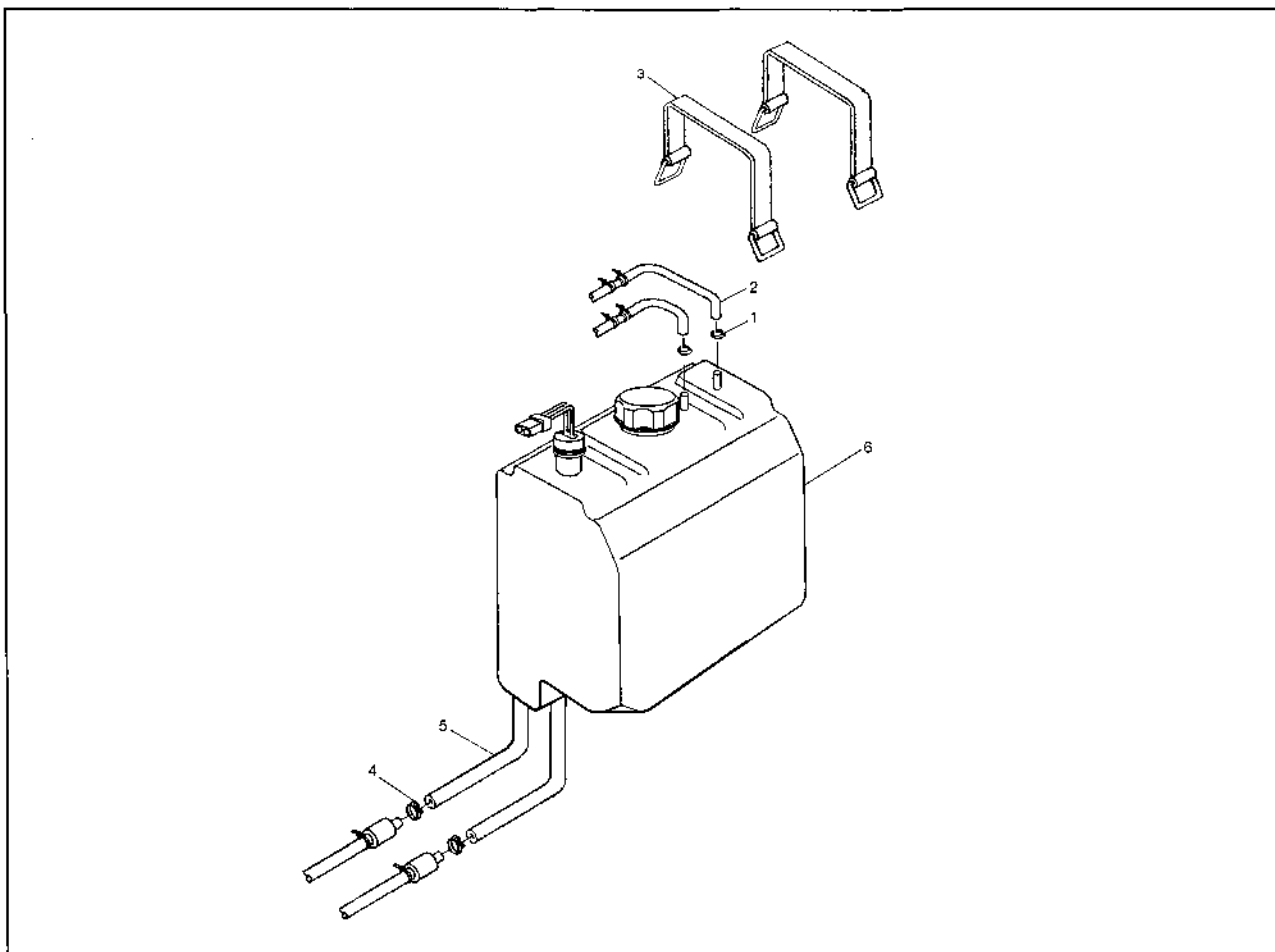


REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	FUEL SYSTEM DISASSEMBLY		Follow the "Step" order for removal.
	Remote Control Assembly	1	Remove for Fuel Petcock Access Refer to "REMOTE CONTROL UNIT" in Chapter 3.
7	Fuel Hose 1	4	Pickup
8	Fuel Hose 2	2	To Filter
9	Fuel Petcock	2	
10	Fuel Filter	2	CAUTION: _____ Arrow direction faces fuel pump.
11	Fuel Hose 3	2	To Carburetor
	Seat Back Cushion	1	Remove for inspection plate access.
	Inspection Plate	1	Refer to "SEAT FITTINGS" in Chapter 8.
12	Fuel Filler Hose	1	
13	Fuel Filler	1	
14	Air Vent Hose	1	
15	Air Vent, Through Hull	1	Reverse the removal steps for installation.



OIL TANK EXPLODED DIAGRAM

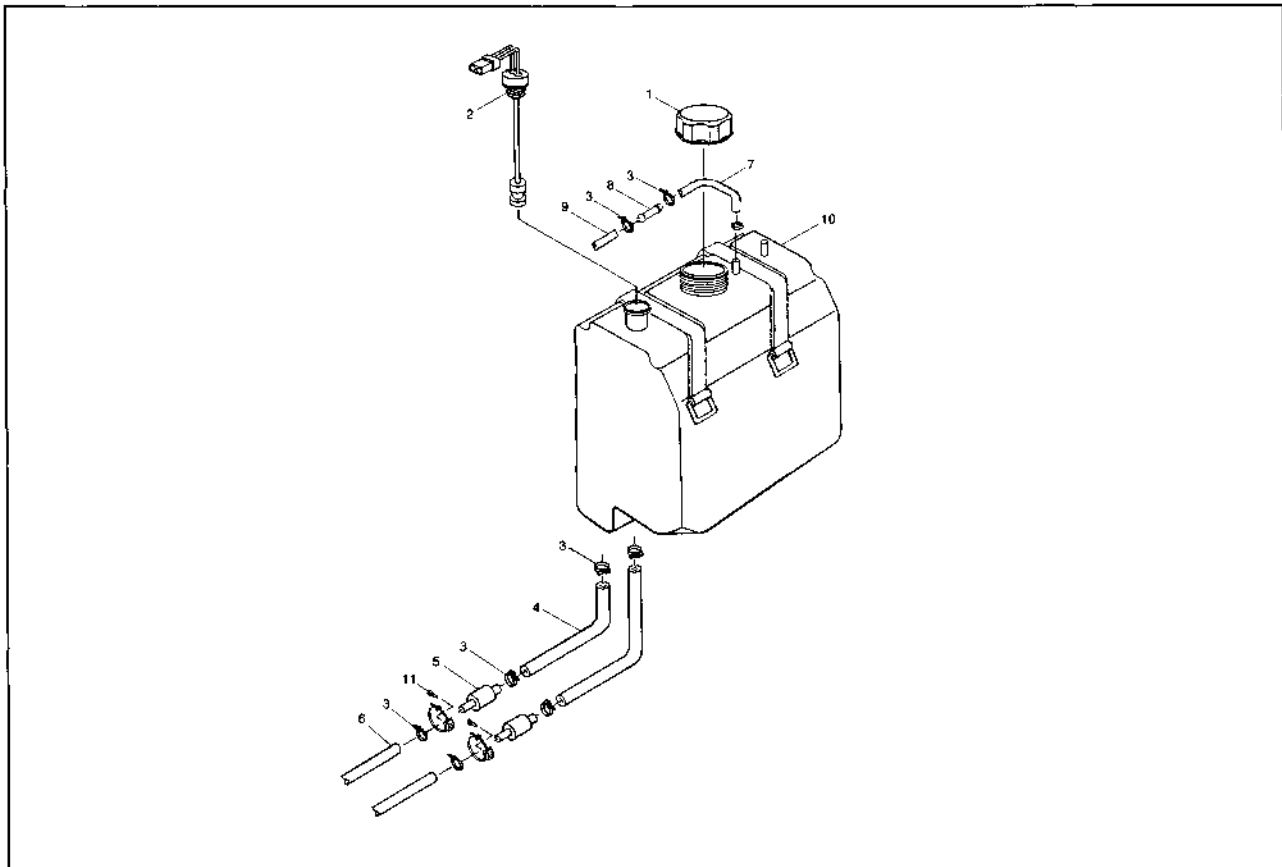


REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	OIL TANK REMOVAL		
	Oil		Follow the "Step" order for removal. Remove the oil in the tank.
1	Hose Tie	2	
2	Oil Return Hose	2	
3	Installation Band	2	
4	Hose Tie	2	
5	Oil Pipe	2	NOTE: _____ Plug the outlet pipes to prevent remaining oil from draining (except for dry tank). _____
6	Oil Tank Assembly	1	Reverse the removal steps for installation.



OIL SYSTEM EXPLODED DIAGRAM



REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
OIL SYSTEM DISASSEMBLY			
1	Oil Filler Cap	1	Follow the "Step" order for removal.
2	Oil Sending Unit	1	
3	Hose Tie	8	
4	Oil Delivery Hose 1	2	
5	Oil Filter	2	
6	Oil Delivery Hose 2	2	
7	Oil Return Hose	2	
8	Oil Line Fitting	2	
9	Oil Return Hose	2	
10	Oil Tank	1	
			Reverse the removal steps for installation.

Oil level sensor inspection

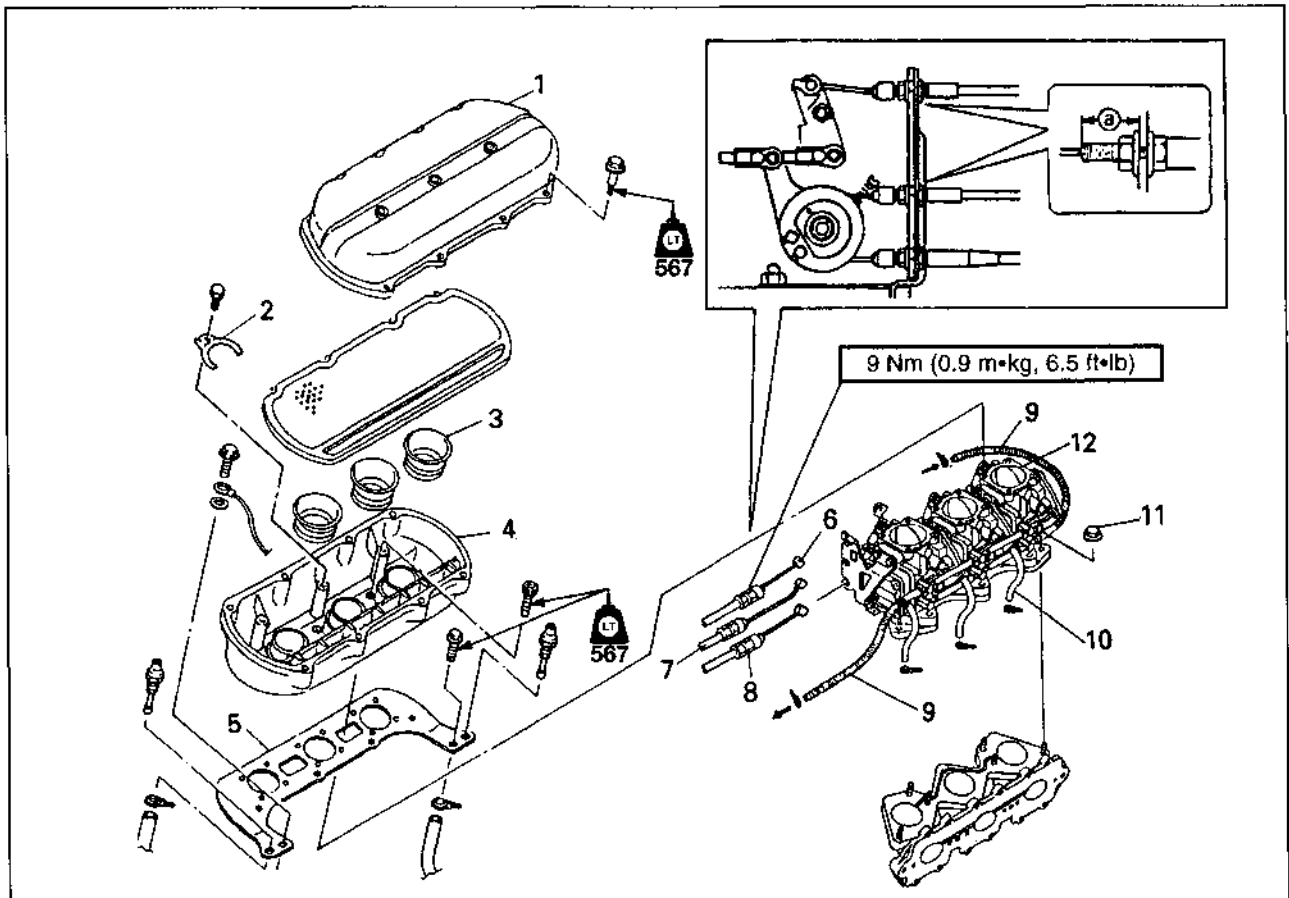
Refer to the "INSTRUMENT" section in Chapter 7.

Oil tank inspection


1. Inspect: Cracks/Damage → Replace.



CARBURETOR UNIT EXPLODED DIAGRAM



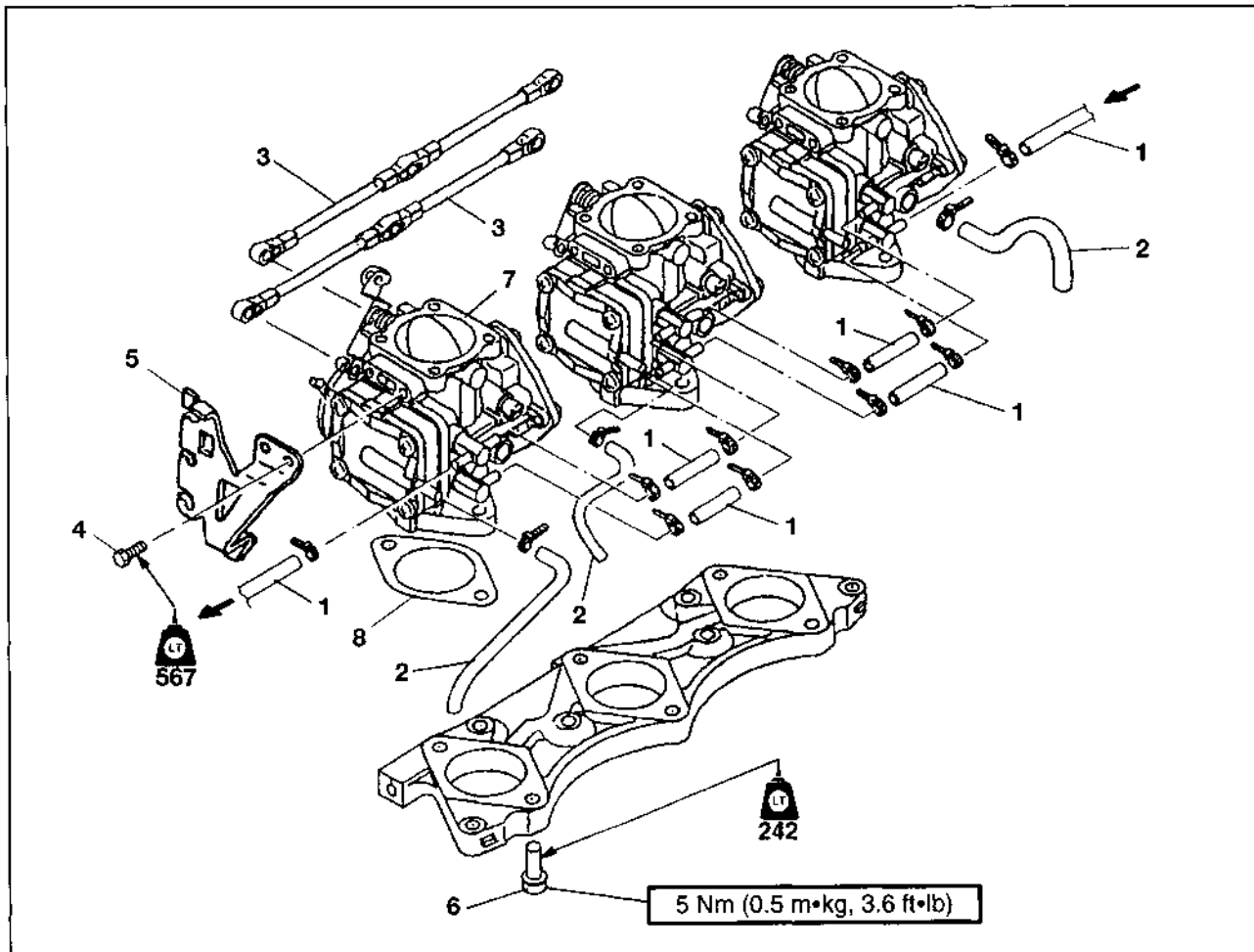
REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	CARBURETOR UNIT REMOVAL		Follow the "Step" order for removal. NOTE: Turn the fuel cock to "OFF."
1	Carburetor cover 1	1	 Choke cable guide set position @: 0.55 in. (14mm) Throttle cable guide set position @: 0.67 in (17mm) Oil pump guide set position @: 0.67 in (17mm)
2	Funnel hold down	3	
3	Funnel	3	
4	Carburetor cover 2	1	
5	Plate	1	
6	Choke cable	1	
7	Throttle cable	1	
8	Oil pump cable	1	
9	Fuel hose	2	
10	Pulse hose	3	
11	Nut	6	
12	Carburetor unit	1	
			Reverse the removal steps for installation.



CARBURETOR REMOVAL

EXPLODED DIAGRAM



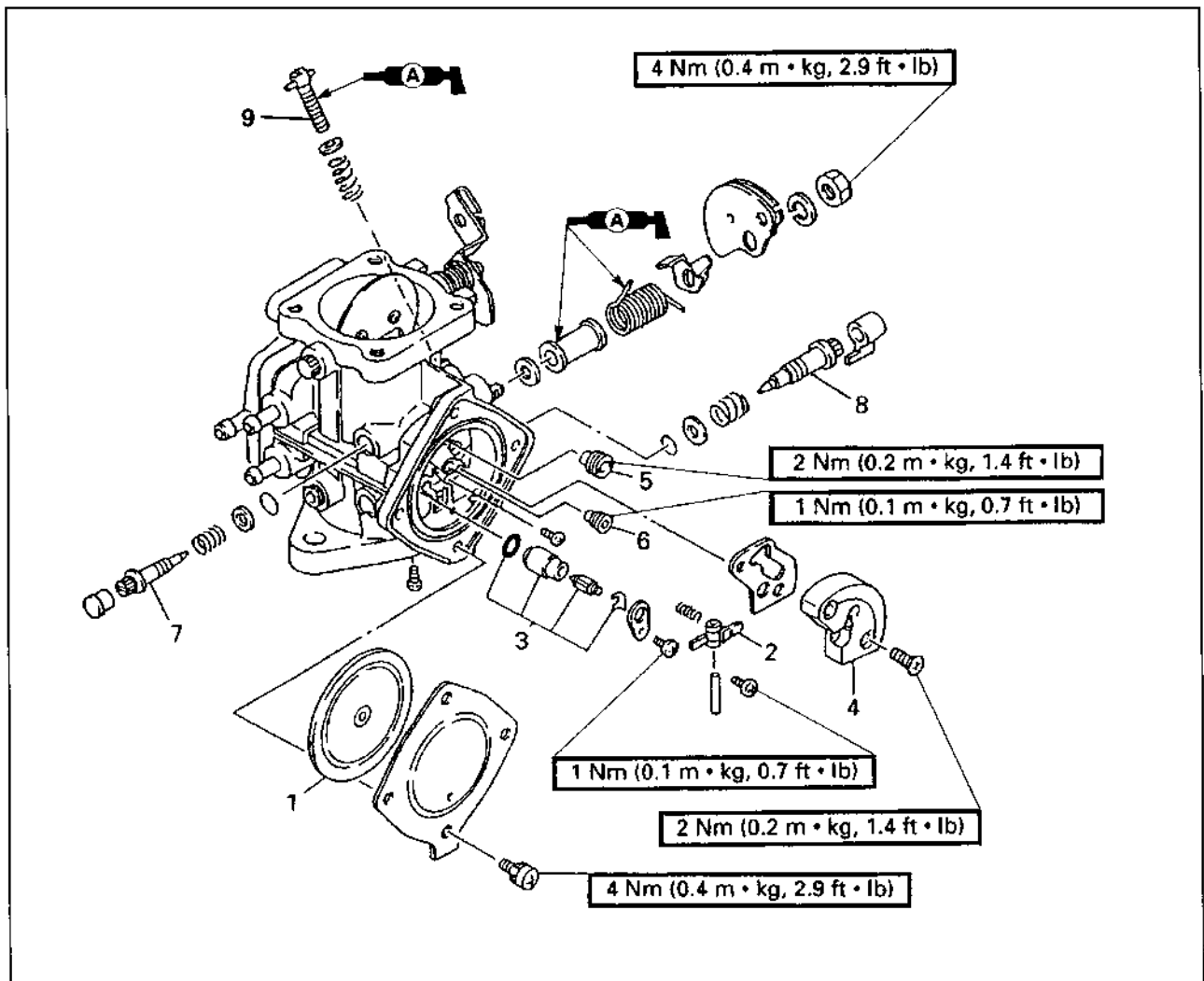
REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	CARBURETOR UNIT SEPARATION		Follow the "Step" order for removal.
1	Carburetor unit	1	Refer to "CARBURETOR UNIT REMOVAL;"
1	Fuel hose	6	
2	Pulse hose	3	
3	Link joint	2	
4	Bolt	3	
5	Cable Bracket	1	
6	Bolt	6	
7	Carburetor assembly	3	
8	Gasket	3	
			Reverse the removal steps for installation.



CARBURETOR DISASSEMBLY

EXPLODED DIAGRAM



REMOVAL AND INSTALLATION CHART

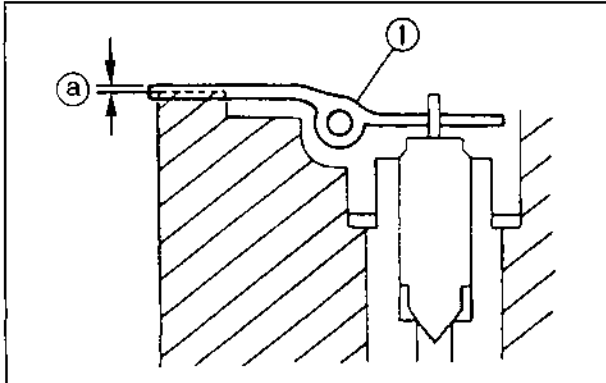
Step	Procedure / Part Name	Qty	Service Points
	CARBURETOR DISASSEMBLY		Follow the "Step" order for removal. Refer to "CARBURETOR REMOVAL."
1	Diaphragm	1	
2	Float Arm	1	
3	Needle Valve Assembly	1	
4	Body Assembly	1	
5	Main Jet	1	
6	Pilot Jet	1	
7	High Speed Screw	1	
8	Low Speed Screw	1	
9	Idle Set Screw	1	
			Reverse the removal steps for installation.



SERVICE POINTS

CAUTION:

Do not use steel wire for cleaning the jets as this may enlarge the jet diameters and seriously affect performance.



Diaphragm inspection

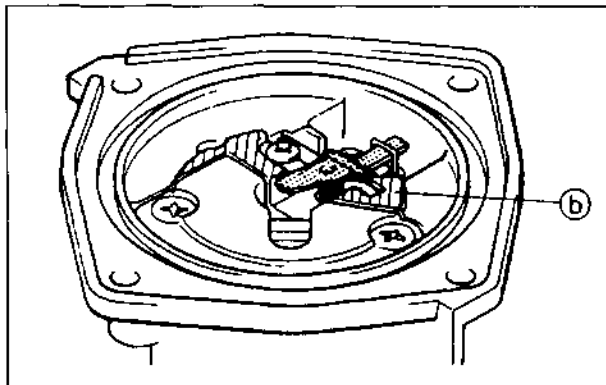
1. Inspect:
 - Diaphragm assembly
Damage → Replace.

Float arm inspection

1. Inspect:
 - Float arm ①
Bend/Damage → Repair or replace.
2. Measure:
 - Float arm height ②

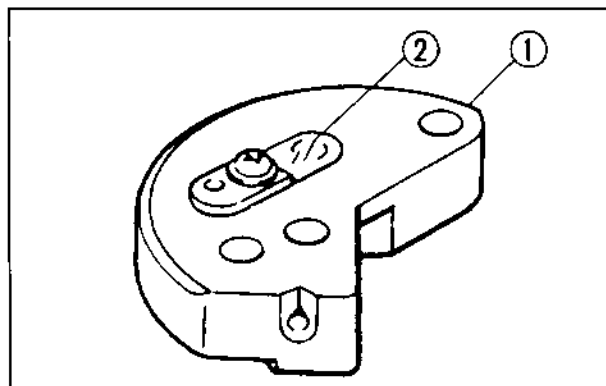


Float Arm Height:
0~0.008 in (0~0.2mm)



NOTE:

- Measure the distance between the surface ② of the carburetor body and the top surface of the float arm.
- The float arm should be resting on the needle valve, but not compressing the needle valve.



Body assembly inspection

1. Inspect:
 - Body assembly ①
Contamination → Clean.
 - Valve ②
Damage → Replace.

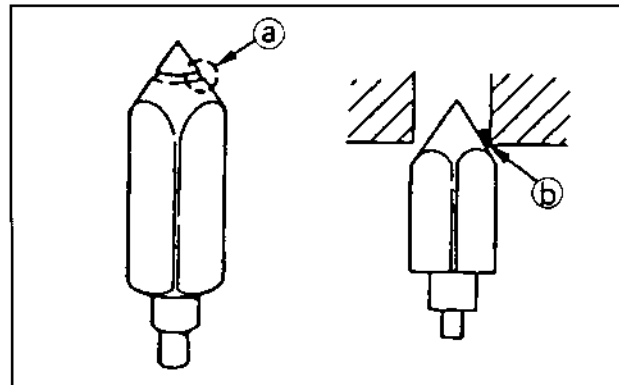
Filter inspection

1. Inspect:
 - Filter
Contamination → Clean.
Damage → Replace.

**Needle valve inspection**

1. Inspect:
 - Needle valve
 - Valve seat
 - Grooved wear (a) → Replace.
 - Dust (b) → Clean

NOTE: _____
Always replace the needle valve and valve seat as a set.

**Jet and carburetor body inspection**

1. Inspect:
 - Main jet
 - Pilot jet
 - Carburetor body
 - Contamination → Clean.

High and low speed screws inspection

1. Inspect:
 - High speed screw
 - Low speed screw
 - Bend/Wear → Replace.

High and low speed screws adjustment

1. Adjust:
 - High speed screw
 - Low speed screw

CARBURETOR ASSEMBLY

1. Adjust:
 - Trolling speed
 - Refer to "FUEL SYSTEM" in Chapter 3.

**Adjustment Steps:**

- Screw in the high speed screw ① or lower speed screw ② until it is lightly seated.
- Back out by the specified number of turns.

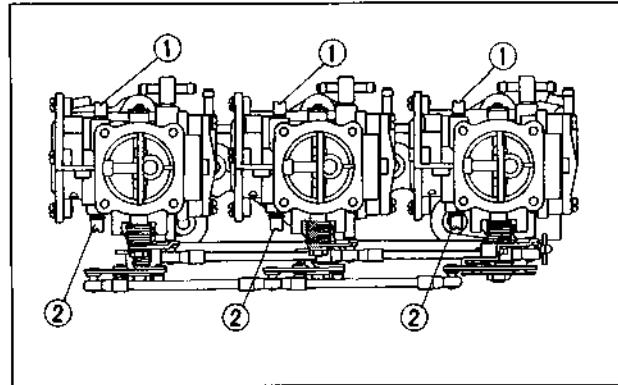
**High speed screw:**

$3/4 \pm 1/4$ (#1, #3)

$1 \pm 1/4$ (#2) turn out

Low speed screw:

$1 \pm 1/4$ turn out

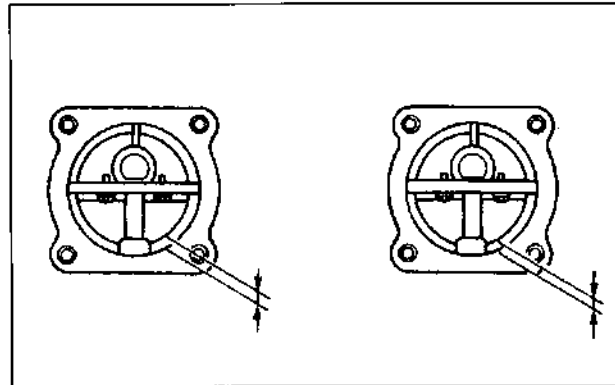
**Throttle valve synchronization inspection and adjustment**

1. Check:

- Throttle valve synchronization
Out of specification → Adjust.

Checking Steps:

- While moving the throttle lever, check the opening of all throttle valves.



2. Adjust:

- Throttle valve synchronization

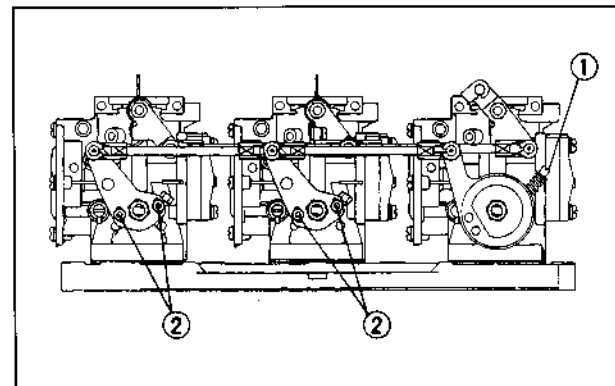
Adjustment Steps:

- Turn out the idle adjust screw ① until its tip is apart from the throttle lever.

NOTE:

Record the set position of the idle adjust screw.

- Loosen the screws ②.
- Tighten the screws ②.
- Turn in the idle adjust screw to the set position.



**Choke valve synchronization inspection and adjustment**

1. Check:

- Choke valve synchronization
Out of specification → Adjust.

Checking Steps:

- While moving the throttle lever, check the opening of all throttle valves.

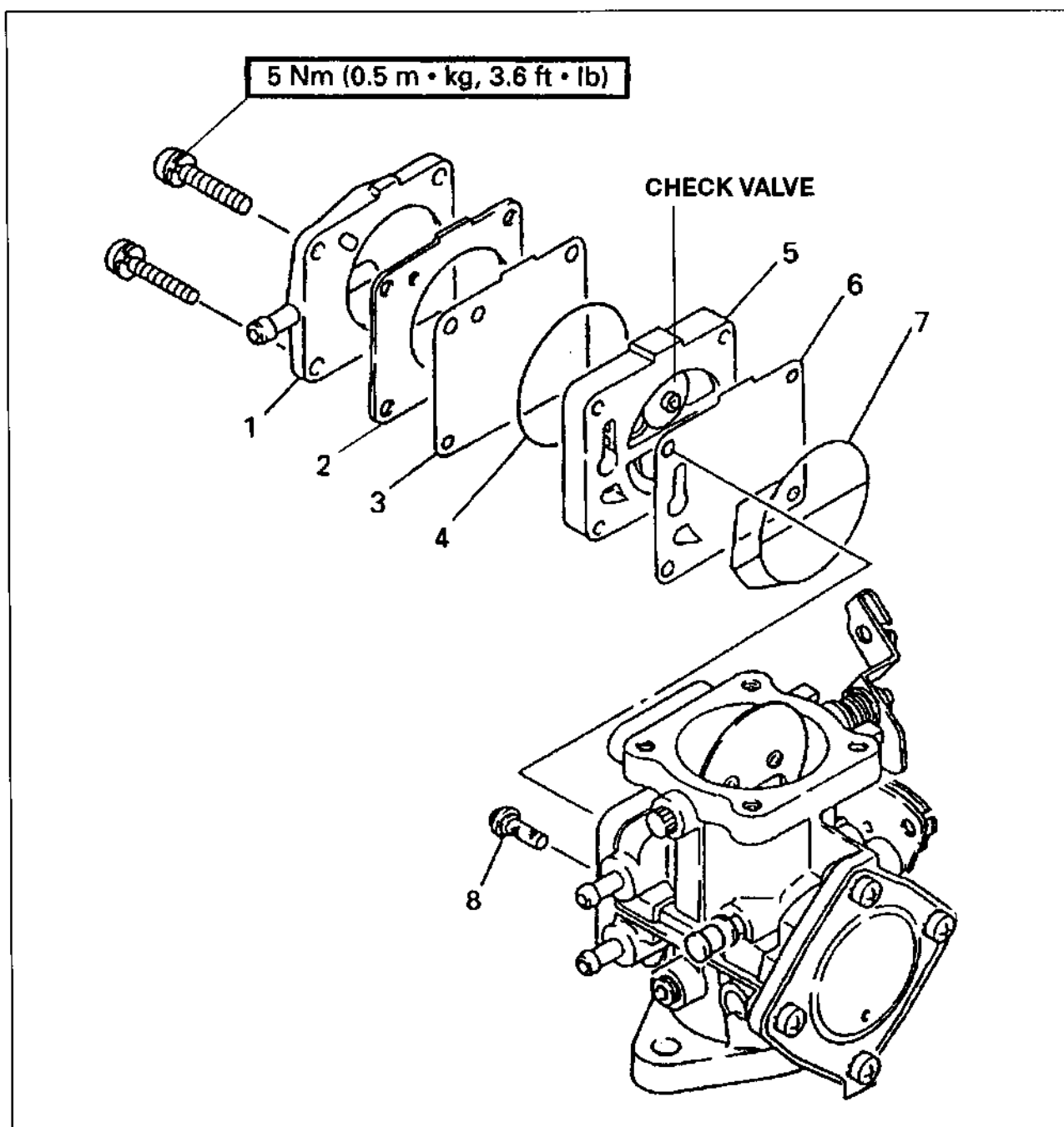
2. Adjust:

- Trolling speed
Refer to the "INSPECTION AND ADJUSTMENT" section in Chapter 3.



FUEL PUMP

EXPLODED DIAGRAM



**REMOVAL AND INSTALLATION CHART**

Step	Procedure / Part Name	Qty	Service Points
	FUEL PUMP DISASSEMBLY		Follow the "Step" order for removal. Refer to "CARBURETOR REMOVAL."
	Carburetor Assembly		
1	Pump Cover	1	
2	Gasket	1	
3	Clear Diaphragm	1	
4	O-ring	1	
5	Diaphragm Body Assembly	1	
6	Diaphragm	1	
7	O-Ring	1	
8	Filter	1	Reverse the removal steps for installation.

SERVICE POINTS**Fuel pump inspection**

1. Inspect:

- Diaphragm
Holes/Damage → Replace.
- Diaphragm body assembly
Damage → Replace.
- Check valves
Crease/Damage → Replace
diaphragm body assembly.

Filter inspection

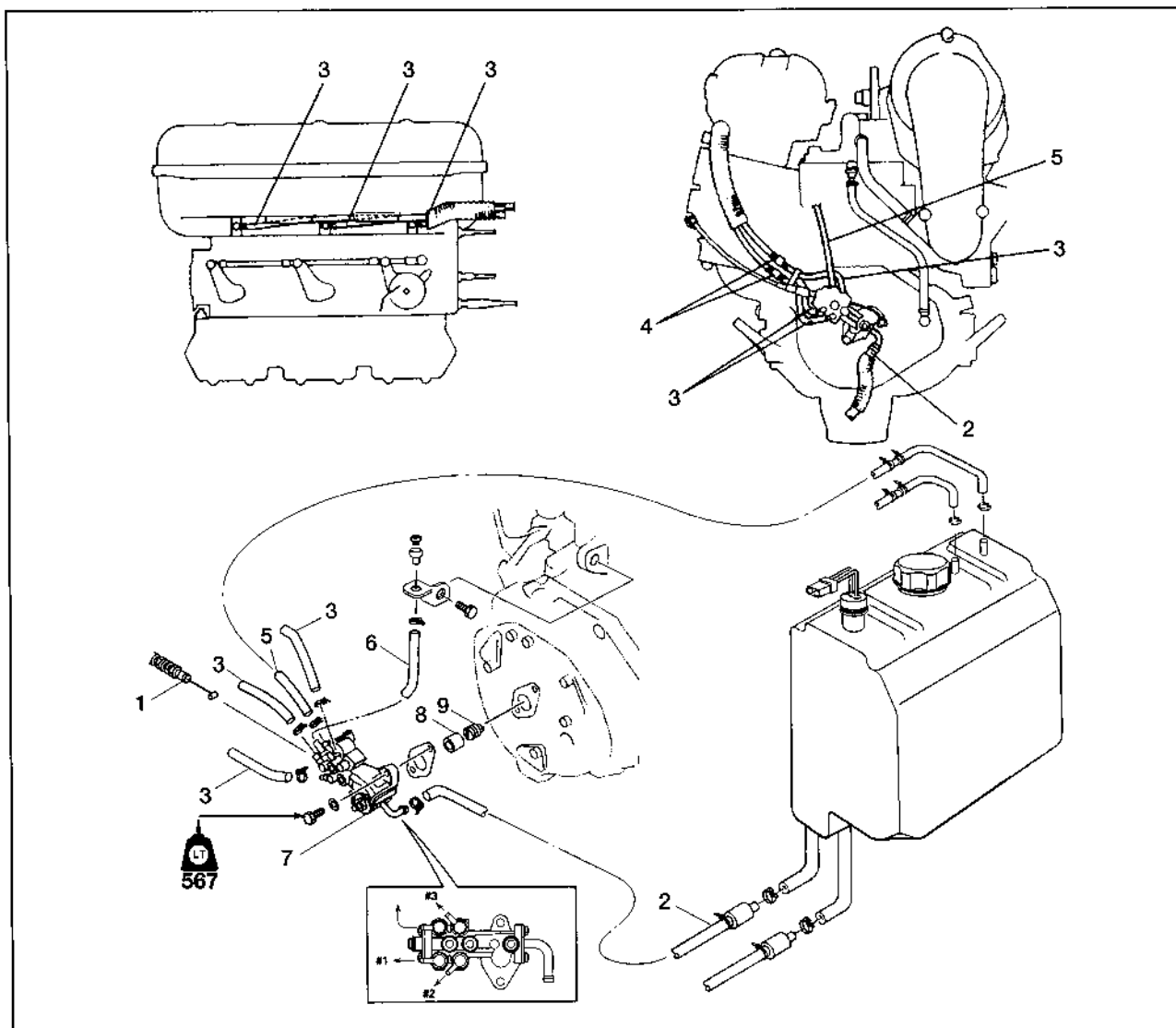
1. Inspect:

- Filter
Contamination → Clean.
Damage → Replace.



OIL PUMP

EXPLODED DIAGRAM



REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	OIL PUMP REMOVAL		
	Carburetor Cover 2		Follow the "Step" order for removal. Refer to "CARBURETOR REMOVAL."
1	Oil Pump Cable	1	
2	Oil Hose	1	
3	Delivery Hose	3	
4	Check Valve	3	NOTE: Arrow faces carburetor.
5	Return Hose	1	
6	Bleed Hose	1	
7	Oil Pump	1	
8	Rubber Ring	1	
9	Joint	1	Reverse the removal steps for installation.

**SERVICE POINTS****Oil pump inspection**

1. Inspect:

- Oil pump
Clog → Clean.
- Driving tooth
Wear/Damage → Replace.

Oil hose inspection

1. Inspect:

- Oil hose
Wear/Damage → Replace.

CAUTION:

- If the delivery hoses are not full of oil, fill them up with oil.
- After installing the oil injection system, bleed the system of air. Refer to "OIL INJECTION SYSTEM" in Chapter 3.

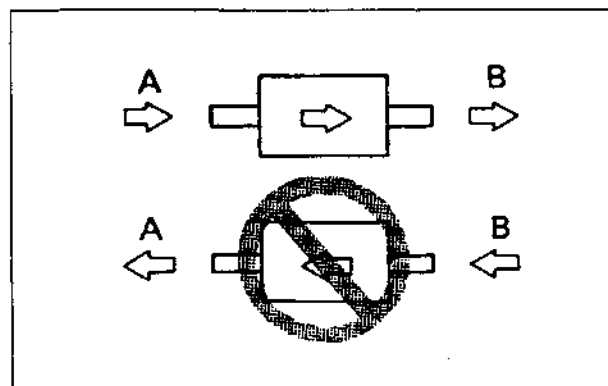
Check valve inspection

1. Check:

- Check valve
Out of specification → Replace.



Flow from A to B

**Ring rubber inspection**

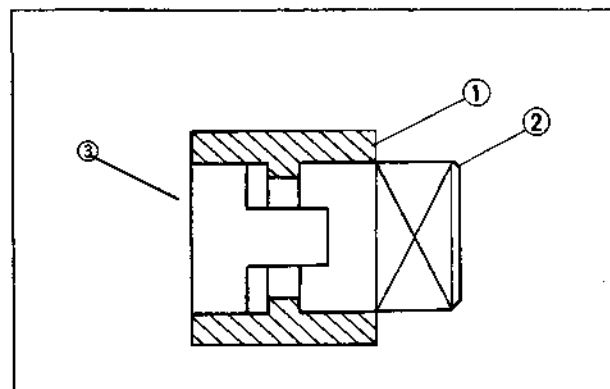
1. Inspect:

- Ring rubber
Wear/Damage → Replace.
- Joint
Wear/Damage → Replace.

Ring rubber installation

1. Install:

- Ring rubber ①
- Joint ②
- Oil pump ③

**NOTE:**

Install the joint into the joint rubber until the rubber stopper fits in the joint groove. Make sure the joint and oil pump are fully engaged.

CHAPTER 5

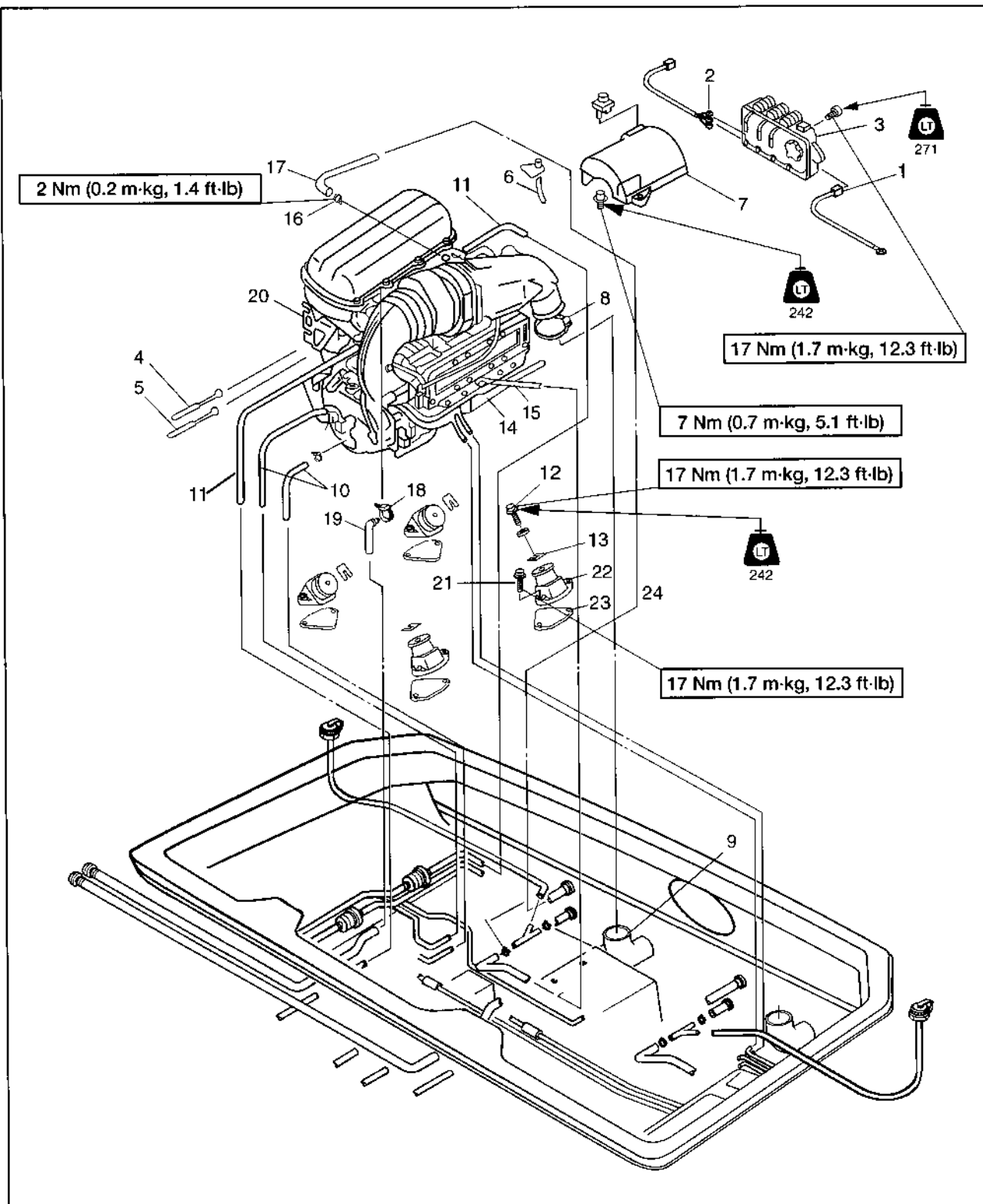
POWER UNIT

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ENGINE UNIT EXPLODED DIAGRAM





REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	ENGINE UNIT REMOVAL		Follow the "Step" order for removal.
1	Battery Lead	2	
2	Harness Lead Coupler	3	
3	Electrical Box	1	Refer to "ELECTRICAL UNIT REMOVAL."
4	Choke Cable	1	
5	Throttle Cable	1	
6	Grease Hose	1	
7	Coupler Cover	1	
8	Exhaust Hose Clamp	1	
9	Exhaust Hose	1	
10	Oil Hose	2	NOTE: _____
11	Fuel Hose	2	Before removing the mounting bolt, mark the engine mounting shim packs for ease of reassembly and coupling alignment.
12	Engine Mounting Bolt	4	
13	Shim	*	
14	Clamp	1	
15	Water Inlet Hose	1	
16	Clamp	1	
17	Water Outlet Hose	1	
18	Hose Tie	1	
19	Pilot Water Hose	1	
20	Engine Unit	1	
21	Bolt (with/washer)	8	
22	Mount Bracket	4	
23	Mount Bracket Spacer	*	Reverse the removal steps for installation.

*As Required

SERVICE POINTS

Mount bracket inspection

- Inspect:
 - Mount bracket
 - Crack/Damage → Replace.



Clearance ①:
0~0.020 in (0~0.5mm)

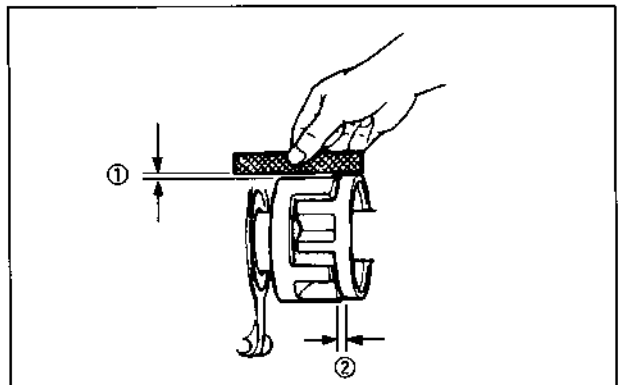
Clearance ②:
0.079 ~ 0.157 (2~4mm)

Coupling clearance inspection

- Measure:
 - Clearance ①
 - Clearance ②
 - Out of specification → Adjust using shim.

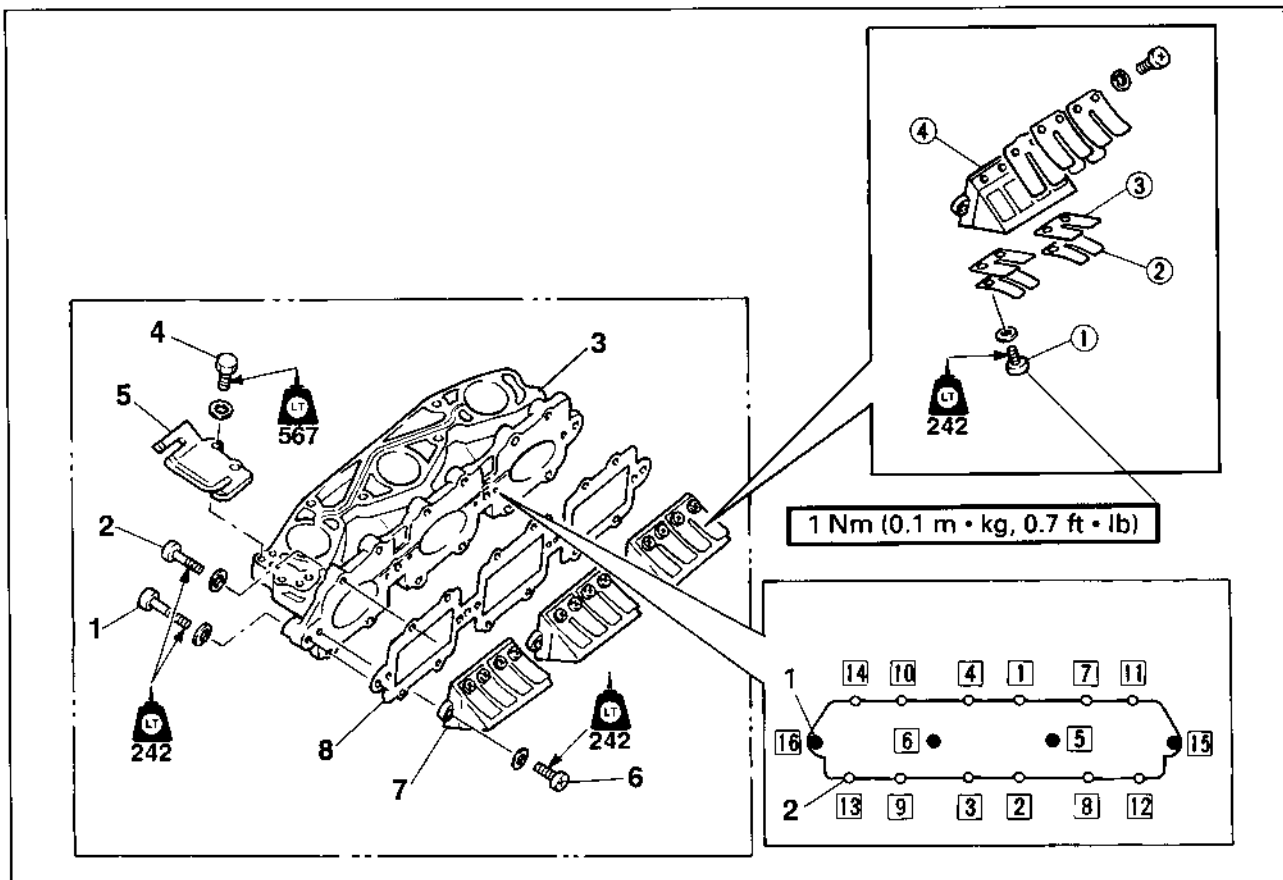
NOTE: _____

- Before measuring the clearance, remove the coupling rubber.
- Attach a straight edge and a thickness gauge.





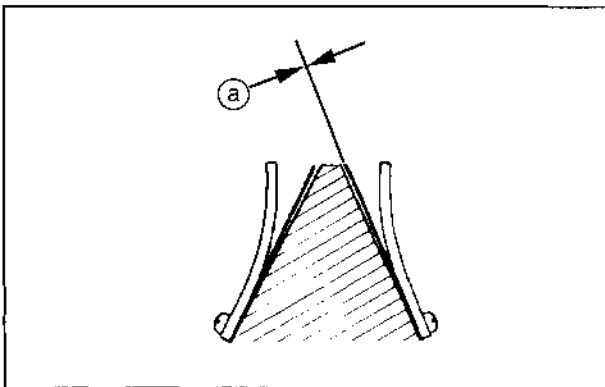
REED VALVE EXPLODED DIAGRAM





REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	REED VALVE REMOVAL Carburetor Assembly		Follow the "Step" order for removal. Refer to the "CARBURETOR REMOVAL" in Chapter 4.
1	Bolt (with washer)	4	6 x 35mm
2	Bolt (with washer)	12	6 x 25mm
			CAUTION:
			Tighten the bolts in sequence.
3	Intake Manifold Assembly	1	
4	Bolt (with washer)	2	6 x 16mm
5	Cable Bracket	1	
6	Screw	6	5 x 16mm
7	Reed Valve Assembly	3	
8	Gasket	1	
	REED VALVE DISASSEMBLY		
①	Screw	8	
②	Valve Stopper	4	
③	Reed Valve	4	
④	Reed Valve Body	1	
			Reverse the removal steps for installation.



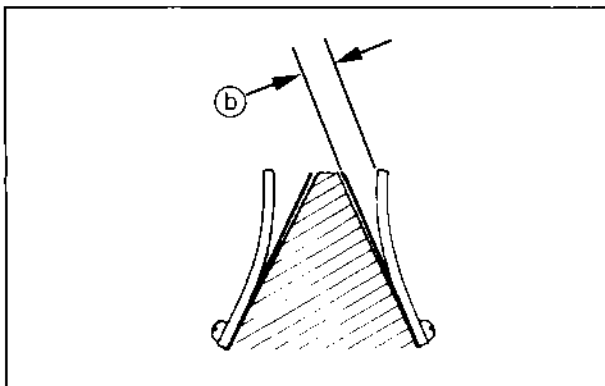
SERVICE POINTS

Reed valve inspection

- Inspect:
 - Reed Valve
Crack/Damage → Replace.
- Measure:
 - Valve Bending ①
Out of specification → Replace.



Valve bending limit:
0.008 in. (0.2mm)



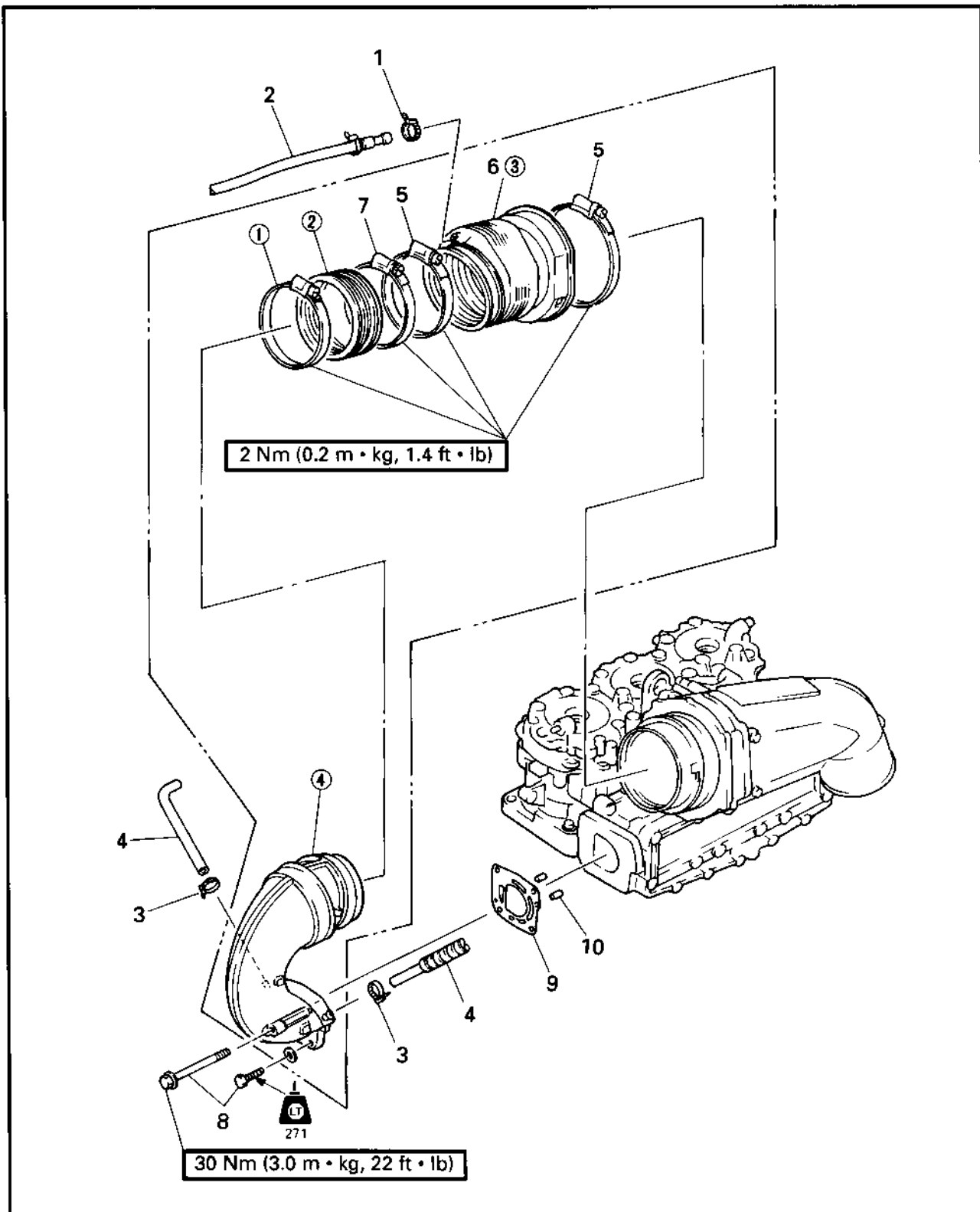
- Measure:
 - Valve stopper height ②
Out of specification → Adjust or replace.



Valve stopper height:
0.49 ±0.01 in (12.5 ±0.2mm)



EXHAUST RING EXPLODED DIAGRAM





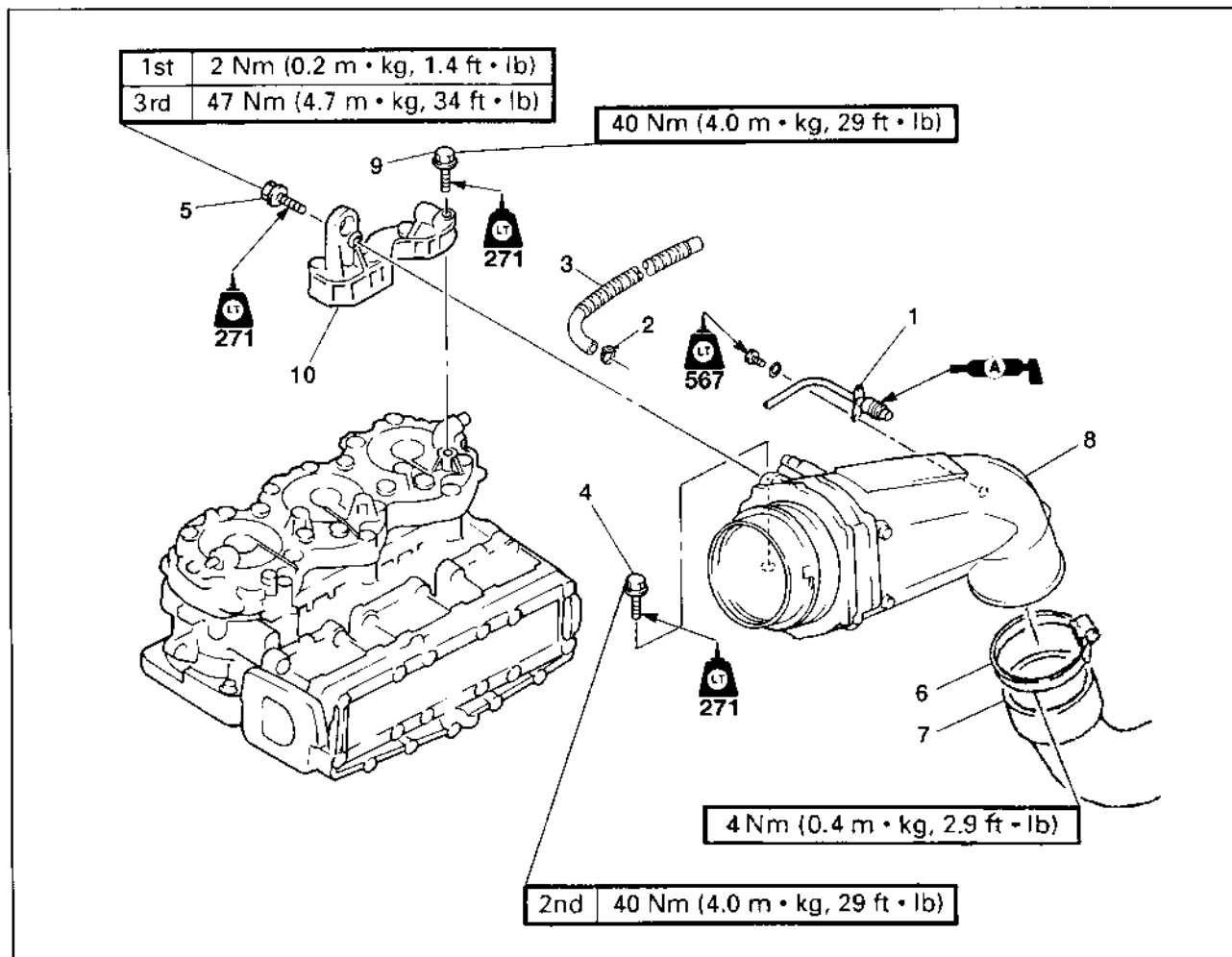
REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	EXHAUST RING REMOVAL		Follow the "Step" order for removal.
1	Hose Tie	1	
2	Pilot Water Hose	1	
3	Clamp	2	
4	Water Hose	2	To cylinder head
5	Clamp	2	
6	Exhaust Joint	1	NOTE: _____ ● Pull and slide the exhaust joint. ● Loosen the clamp (7) on the chamber side.
7	Clamp	1	
8	Bolt (with washer)	4	
9	Gasket	1	
10	Pin Dowel	2	
	RING DISASSEMBLY		
①	Clamp	1	CAUTION: _____ Tighten the clamp before installing the ring on the muffler.
②	Joint	1	
③	Exhaust Joint	1	
④	Ring Joint	1	
			Reverse the removal steps for installation.



EXHAUST CHAMBER REMOVAL

EXPLODED DIAGRAM



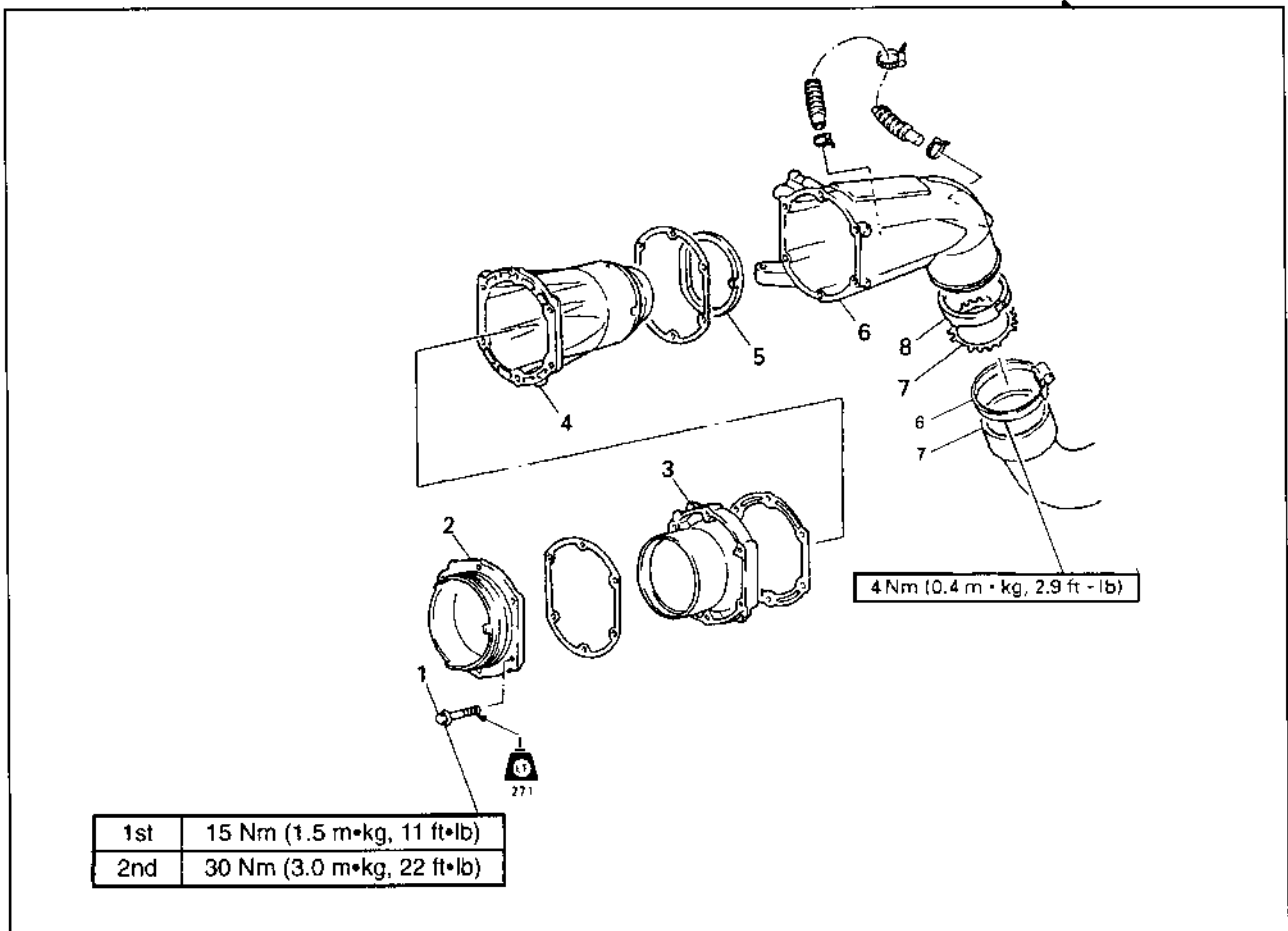
REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	EXHAUST CHAMBER REMOVAL Ring Assembly		Follow the "Step" order for removal. Refer to "EXHAUST RING JOINT."
1	Thermo Switch	1	
2	Clamp	1	
3	Bypass Hose	1	
4	Bolt (with washer)	2	M8 x 35mm • 12
5	Bolt (with washer)	2	M8 x 35mm • 14
6	Clamp	1	
7	Exhaust Outlet Pipe	1	NOTE: _____
8	Exhaust Chamber Assembly	1	Tighten the bolt in sequence. _____
9	Bolt (muffler stay)	4	M10 x 45mm
10	Muffler Stay	1	
			Reverse the removal steps for installation.



EXHAUST CHAMBER DISASSEMBLY

EXPLODED DIAGRAM

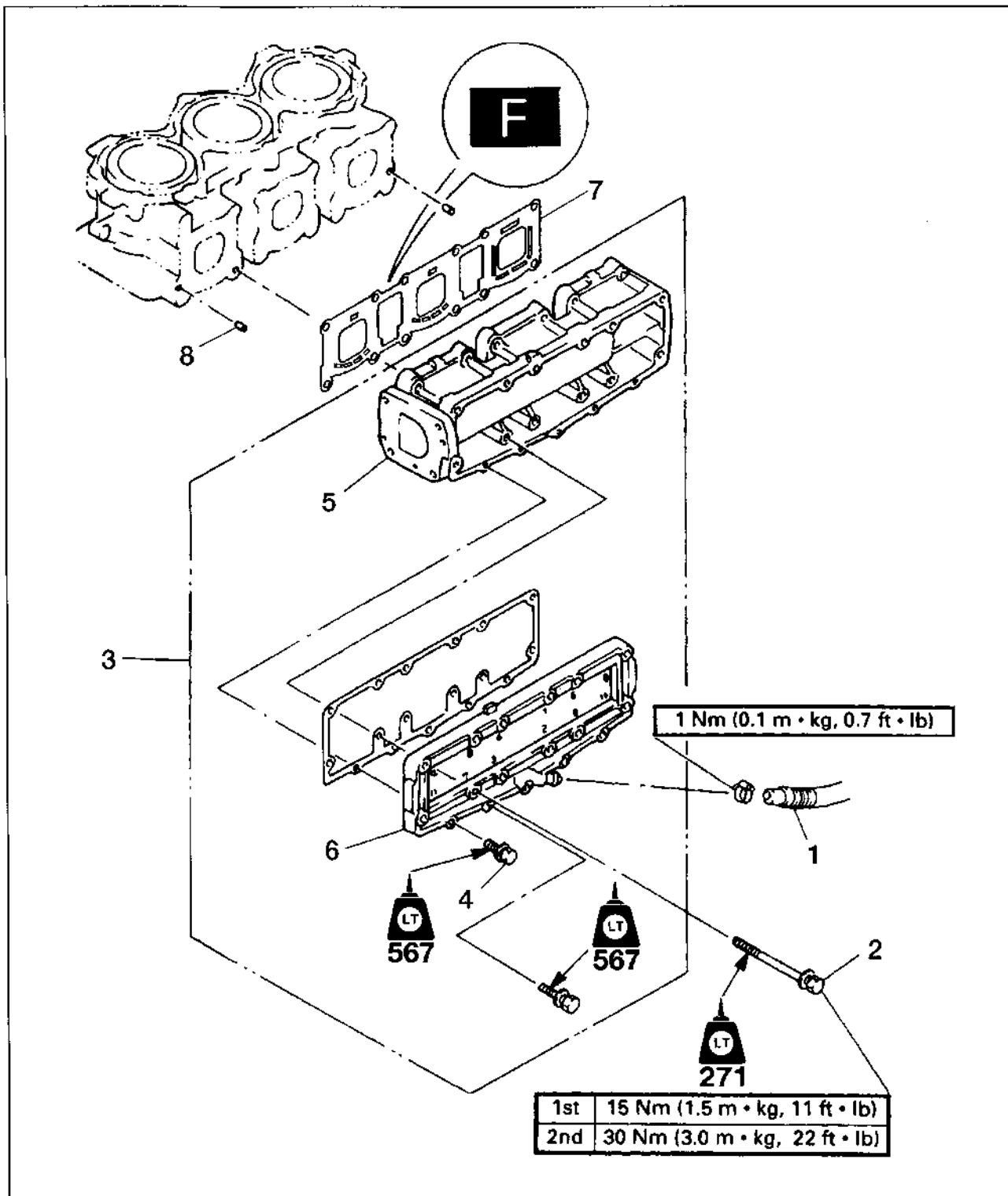


REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	EXHAUST CHAMBER DISASSEMBLY		Follow the "Step" order for removal. Refer to "EXHAUST CHAMBER REMOVAL."
1	Bolt (with washer)	6	M8 x 60mm
2	Exhaust Outer Cover 1	1	
3	Muffler 2	1	NOTE: _____
4	Exhaust Inner Cover	1	Tighten the bolt in sequence.
5	Seal	1	
6	Exhaust Outer Cover 2	1	
7	Stopper	1	
8	Seal	1	
9	Hose Tie	2	
10	Hose	1	Inspect hose and fittings for debris. Reverse the removal steps for installation.



MUFFLER EXPLODED DIAGRAM



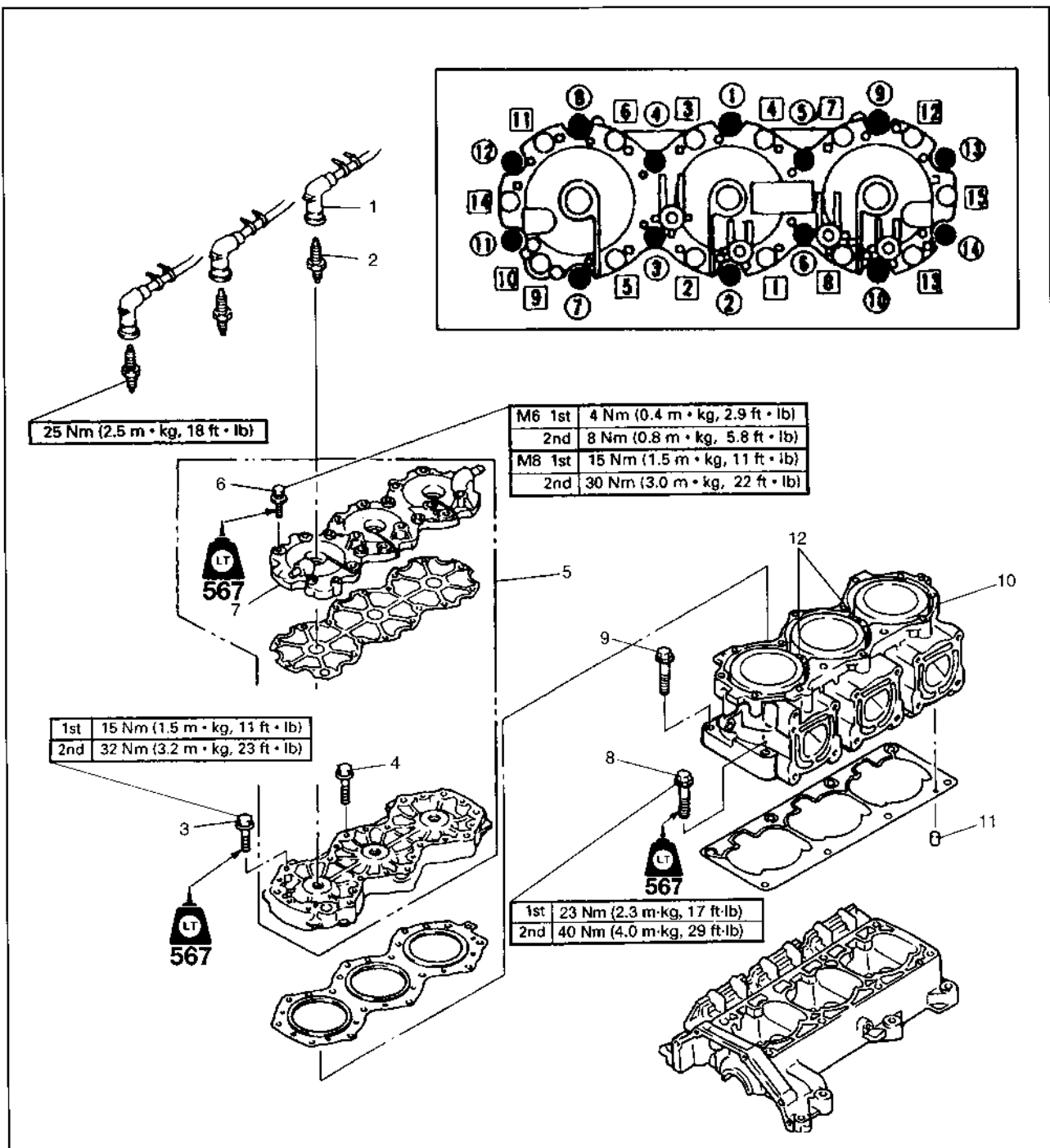


REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	MUFFLER REMOVAL Exhaust Chamber Assembly		Follow the "Step" order for removal. Refer to "EXHAUST CHAMBER REMOVAL."
1	Water Inlet Hose	1	
2	Bolt (with washer)	12	M8 x 120mm
3	Muffler Assembly	1	NOTE: _____
4	Bolt (with washer)	5	Tighten the bolt in sequence and in two steps of torque.
5	Muffler 1	1	
6	Muffler Cover	1	
7	Gasket	1	NOTE: _____
			Position the "F" between cylinders #1 & #2.
8	Dowel Pin	2	Reverse the removal steps for installation.



CYLINDER HEAD, CYLINDER AND PISTON EXPLODED DIAGRAM





REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	CYLINDER HEAD REMOVAL Muffler Stay		Follow the "Step" order for removal. Refer to "EXHAUST CHAMBER."
1	Spark Plug Cap	3	
2	Spark Plug	3	
3	Bolt (with washer)	10	M8 x 50mm
4	Bolt (with washer)	4	M8 x 65mm
5	Cylinder Head Assembly	1	NOTE: _____ Tighten the bolt in sequence and in two steps of torque. Tighten ① ~ ⑭ first, then tighten ① ~ ⑮
6	Bolt (with washer)	15	
7	Cylinder Head Cover	1	
	CYLINDER REMOVAL Cylinder Head		Refer to "CYLINDER HEAD."
8	Bolt (with washer)	2	M10 x 55mm
9	Bolt (with washer)	6	M10 x 40mm
10	Cylinder	1	NOTE: _____ Tighten the bolts in sequence and in two steps of torque.
11	Pin Dowel	2	NOTE: _____ After installing, check the smooth movement of the piston.
12	Anode	2	Reverse the removal steps for installation.



SERVICE POINTS

Cylinder head inspection

1. Eliminate:
 - Carbon deposits
Use a rounded scraper ①

NOTE:

Take care to avoid damaging the spark plug threads. Do not use a sharp instrument. Avoid scratching the aluminum.

2. Inspect:
 - Cylinder head water jacket
Mineral deposits/Corrosion → Clean.
3. Measure:
 - Cylinder head warpage
Out of specification → Resurface.



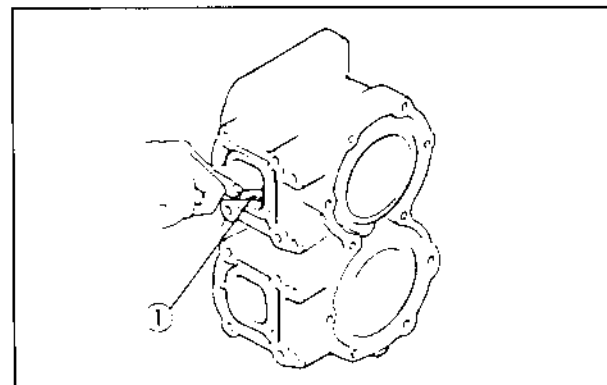
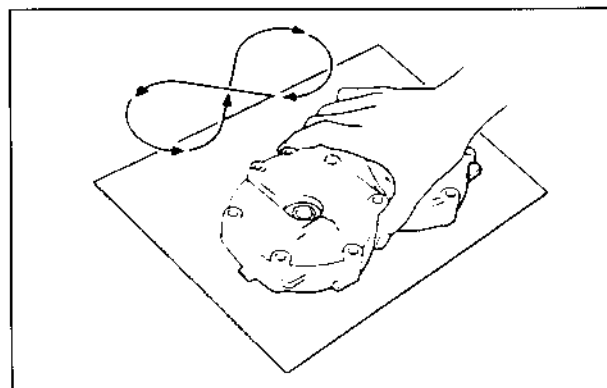
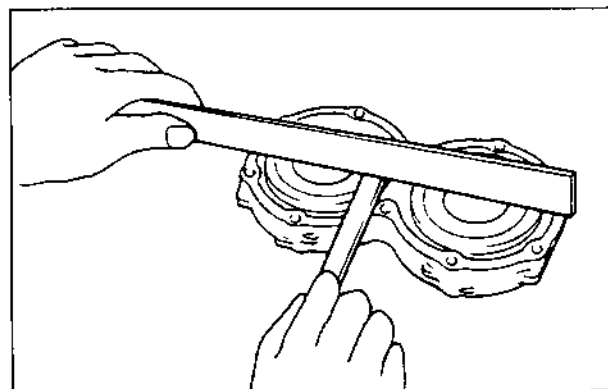
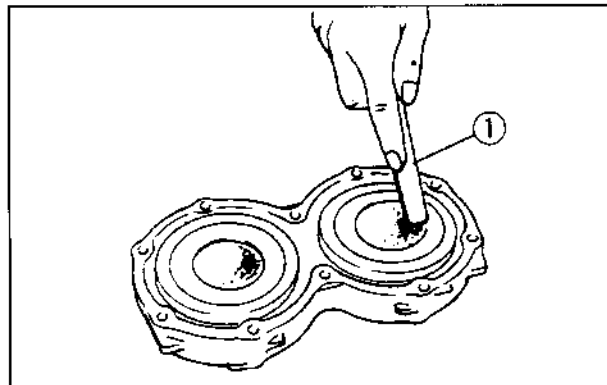
Warpage Limit:
0.004 in. (0.1mm)

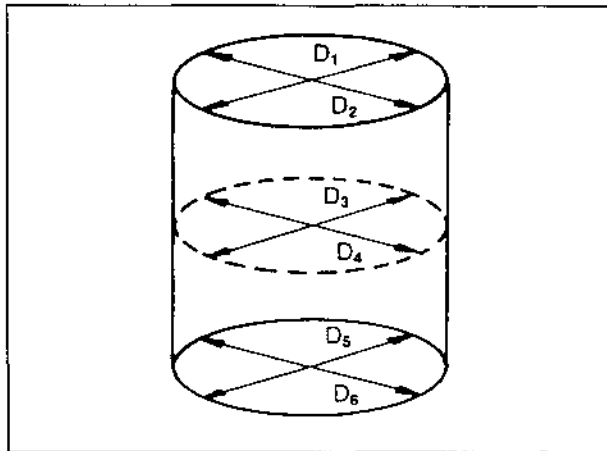
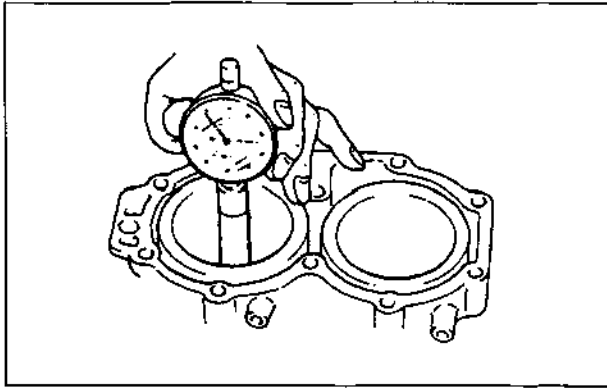
Warpage measurement and resurfacing steps:

- Attach a straight edge and a thickness gauge to the cylinder head.
- Measure the warpage.
- If the warpage is out of specification, resurface the cylinder head.
- Place a piece of 400 ~ 600 grit wet sand paper on the surface plate, and resurface the head using a figure-eight sanding pattern.

Cylinder inspection

1. Eliminate:
 - Carbon deposits
Use a rounded scraper ①
2. Inspect:
 - Cylinder head water jacket
Mineral deposits/Corrosion → Clean.
 - Cylinder inner surface
Score marks → Repair or replace.
Use #600 ~ #800 grit wet sandpaper.






3. Measure:

- Cylinder bore "D"
Use cylinder gauge.
Out of specification → Replace.

NOTE:

Measure the cylinder bore "D" in several different directions. Then, find the average of the measurements.

	Standard	Limit
Cylinder bore "D"	3.307~3.308 in (84.00~84.02mm)	3.31 in 84.1mm
Taper "T"	—	0.003 in (0.08mm)
Out of round "R"	—	0.002 in (0.05mm)
D = (Maximum D1 - D6) T = (Maximum D1 or D2) - (Maximum D5 or D6) R = (Maximum D1, D3, or D5) - (Minimum D2, D4, or D6)		

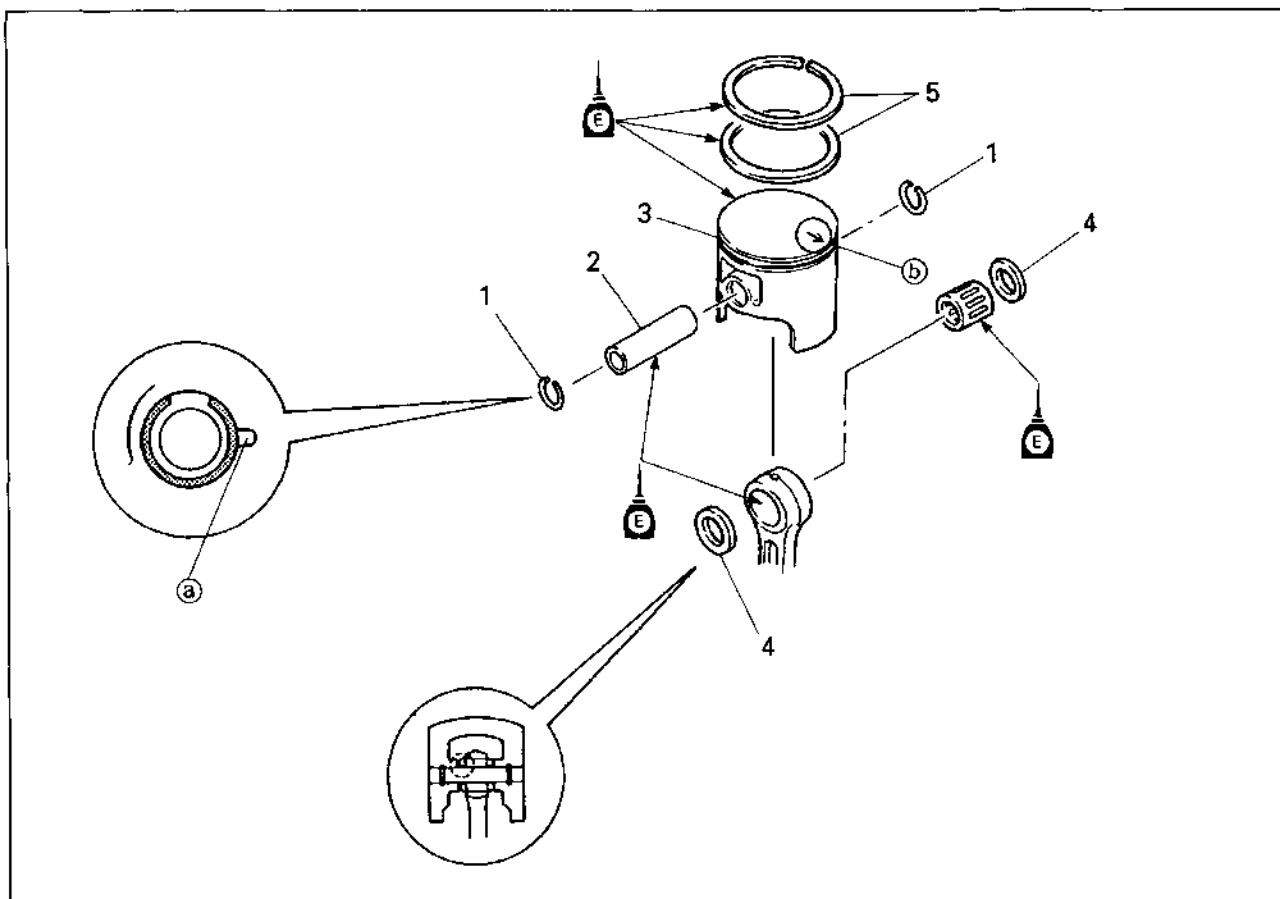
4. Inspect:

- Zinc anode
Depleted → Replace.



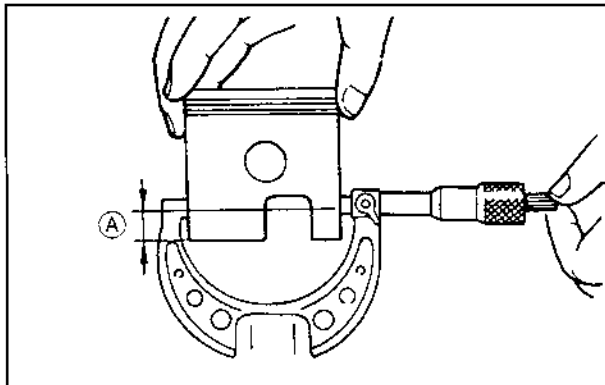
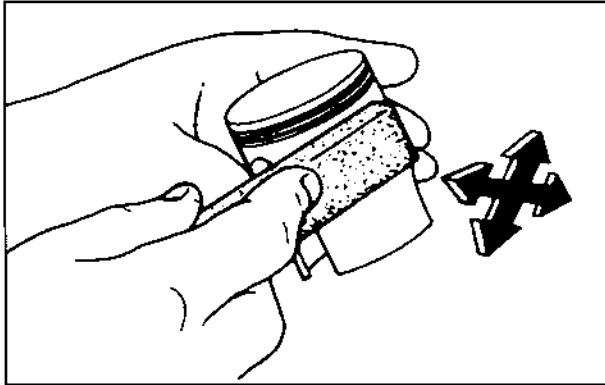
PISTON

EXPLODED DIAGRAM



REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	PISTON REMOVAL		
	Cylinder		Follow the "Step" order for removal. Refer to "CYLINDER."
1	Piston Pin Clip	2	CAUTION: _____ Do not allow the clip open ends to meet the piston pin slot ①. _____
2	Piston Pin	1	NOTE: _____
3	Piston	1	Be sure the arrow ② side is positioned to the exhaust pipe. _____
4	Washer	2	CAUTION: _____
5	Piston Ring	2	Align each end gap with the locating pin. _____
			Reverse the removal steps for installation.




Piston inspection

1. Eliminate:
 - Carbon deposits
From the piston crown and ring groove.
2. Inspect:
 - Piston wall
Score marks → Repair or replace.
Use #600 ~ 800 grit wet sandpaper.

NOTE:


Sand in a criss-cross pattern. Do not sand excessively.

3. Measure:
 - Piston skirt diameter
Use micrometer.
Out of specification → Replace.

	Piston Diameter	Distance ②
	3.3032 ~ 3.3040 in. (83.902 ~ 83.921mm)	0.39 in (10mm)

4. Calculate:
 - Piston clearance
Out of specification → Replace piston
piston rings as a set.

PISTON CLEARANCE	=	CYLINDER BORE	—	PISTON DIAMETER
---------------------	---	------------------	---	--------------------

	Piston Clearance: 0.0039 ~ 0.0041 in. (0.100 ~ 0.105mm)
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Piston ring inspection

1. Measure:

- Side clearance
Out of specification → Replace piston and/or ring.
Use a thickness gauge ①.



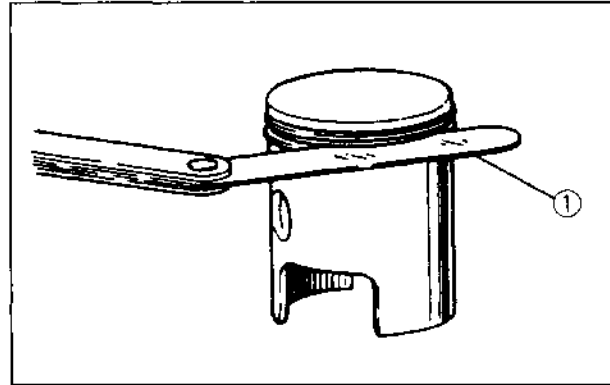
Side Clearance

Top

2nd

0.001 ~ 0.003 in.

(0.02 ~ 0.07mm)



2. Measure:

- End gap
Out of specification → Replace rings as a set.
Use a thickness gauge ①.

NOTE:

- Install the piston ring in the cylinder.
- Push the ring with the piston crown.



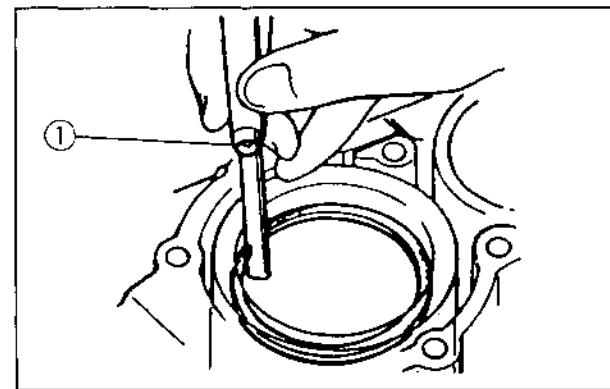
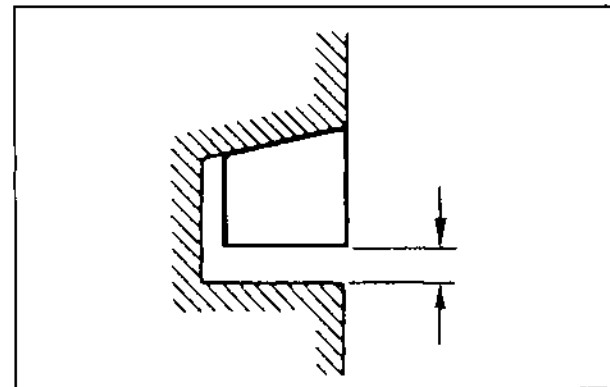
End Gap:

Top

2nd

0.008 ~ 0.016 in.

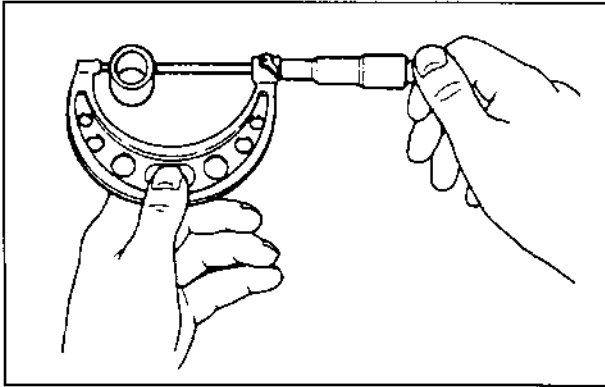
(0.2 ~ 0.4mm)



**Piston pin and bearing inspection**

1. Inspect:

- Piston pin
 - Bearing
- Signs of heat discoloration → Replace.



2. Measure:

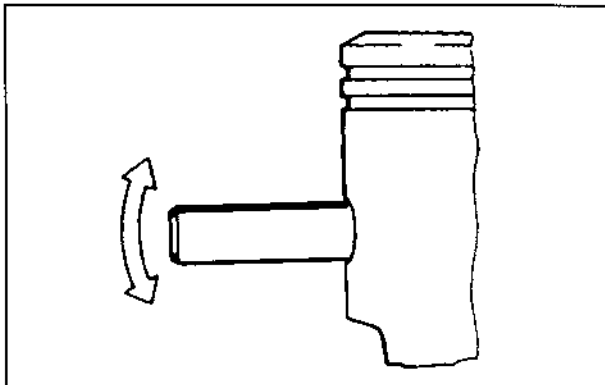
- Piston pin outside diameter
- Use micrometer.
Out of limit → Replace.

**Piston Pin Outside Diameter:****Standard**

0.7872~0.7874 in
(19.995~20.000mm)

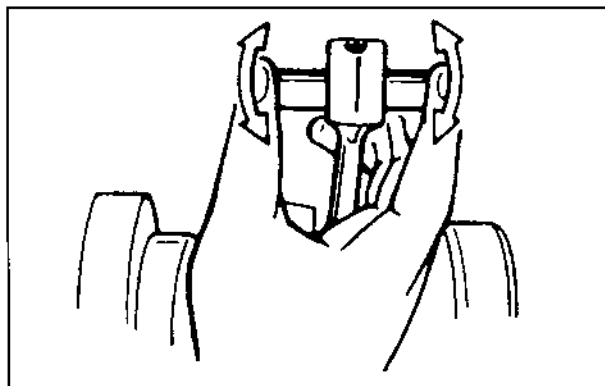
Limit

0.786 in (19.98mm)



3. Check:

- Free play (when the piston pin is in, place in the piston).
- There should be no noticeable free play.
Free play is noticeable → Replace piston pin and/or piston.

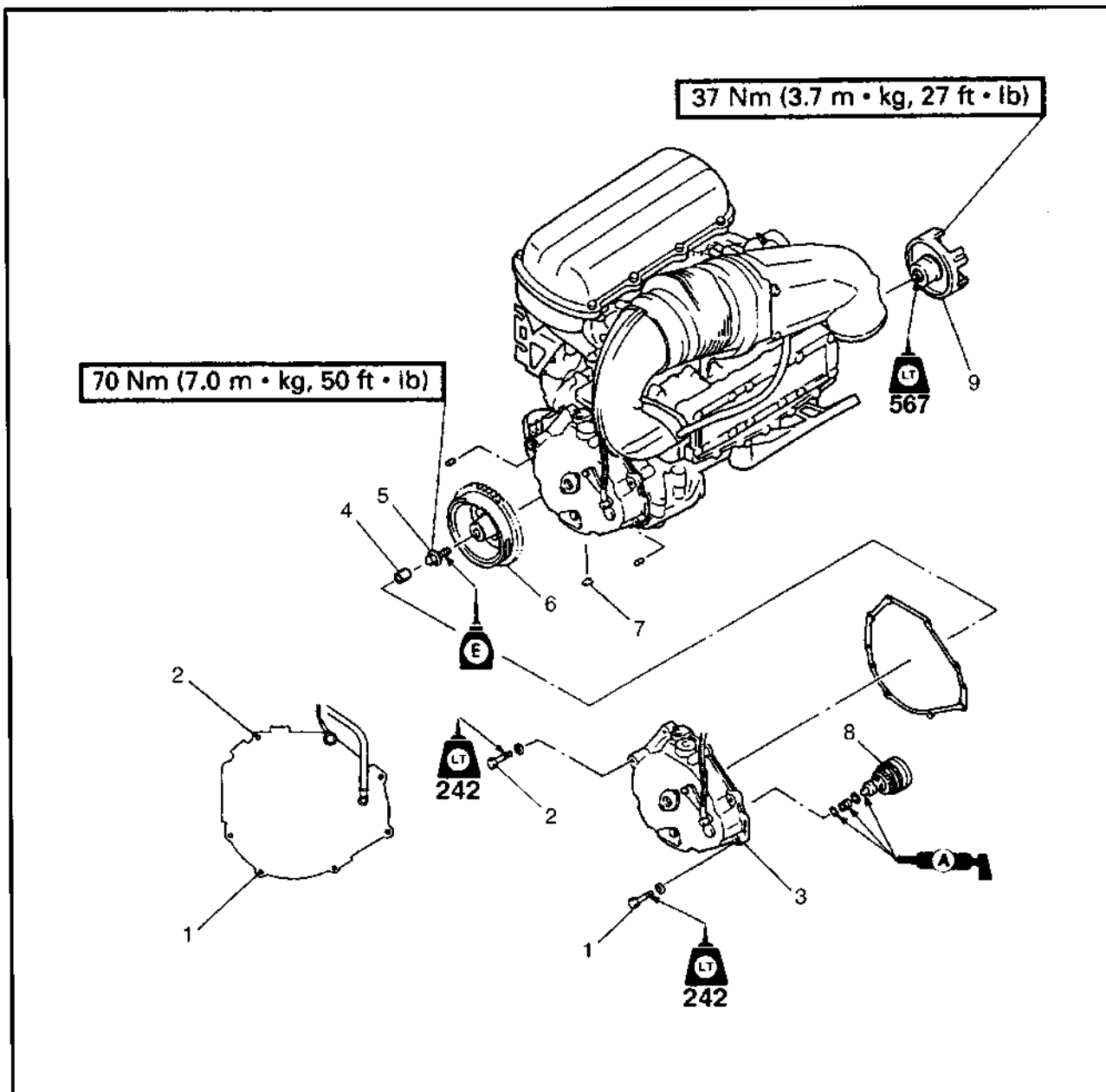


4. Check:

- Free play
- There should be no noticeable free play.
Free play is noticeable → Inspect the connecting rod for wear/Replace the pin and/or connecting rod as required.



FLYWHEEL COVER AND FLYWHEEL MAGNETO EXPLODED DIAGRAM





REMOVAL AND INSTALLATION CHART

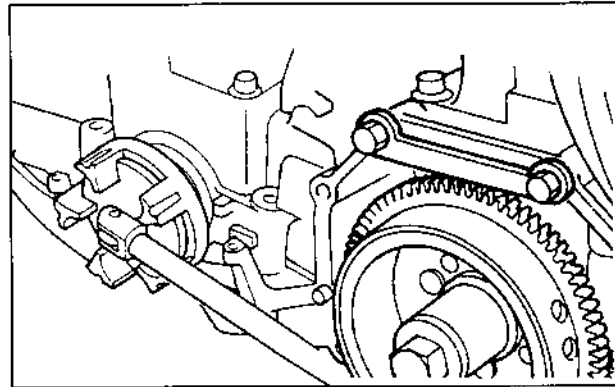
Step	Procedure / Part Name	Qty	Service Points
	FLYWHEEL MAGNETO AND BASE DISASSEMBLY		Follow the "Step" order for removal.
1	Oil Pump	8	Refer to "OIL PUMP" in Chapter 4.
2	Bolt (with washer)	1	M8 x 30mm
3	Bolt (with washer)	1	M8 x 55mm
4	Flywheel Cover Assembly	1	
5	Ring Rubber	1	
5	Flange Bolt	1	
	Engine Unit		Refer to "ENGINE UNIT REMOVAL."
6	Flywheel Magneto	1	NOTE: _____ Grease the fly wheel cover groove at the idle gear assembly with water resistant grease. _____
7	Woodruff Key	1	
8	Idle Gear Assembly	1	
9	Coupling Flange	1	
			Reverse the removal steps for installation.

**SERVICE POINTS****Coupling flange removal and installation**

1. Removal and install:
 - Coupling flange



Coupler wrench:
YW-06546
Flywheel holder:
YW-41528

**Flywheel magneto removal and installation**

1. Removal and install:
 - Bolt



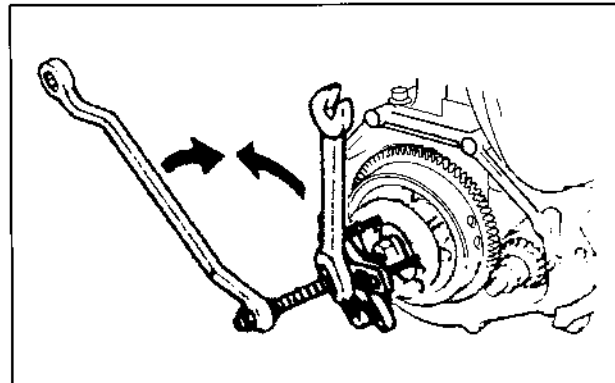
Flywheel holder:
YW-41528

2. Remove:
 - Flywheel magneto



Flywheel puller:
YB-06117

Bolt:
M8 x 80mm

**CAUTION:**

To prevent damage to the engine or tools, screw in the flywheel puller set bolts evenly and completely so that the puller plate is parallel to the flywheel.

**Coupling flange inspection**

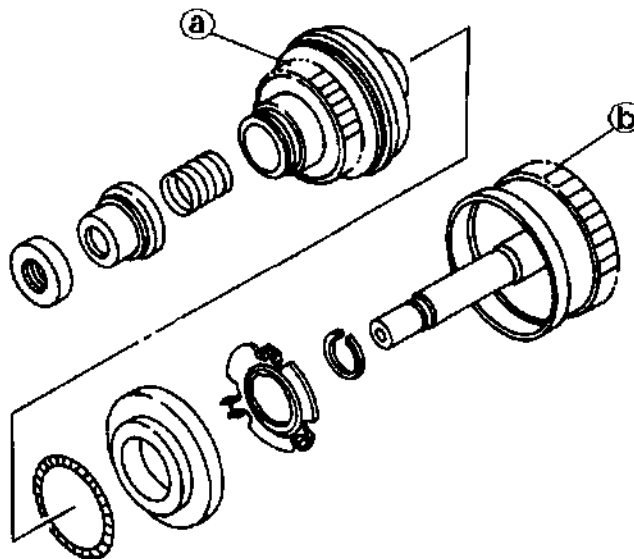
1. Inspect:
 - Coupling flange
Wear/Damage → Replace.

Flywheel magneto inspection

1. Inspect:
 - Flywheel gear
Wear/Damage → Replace.

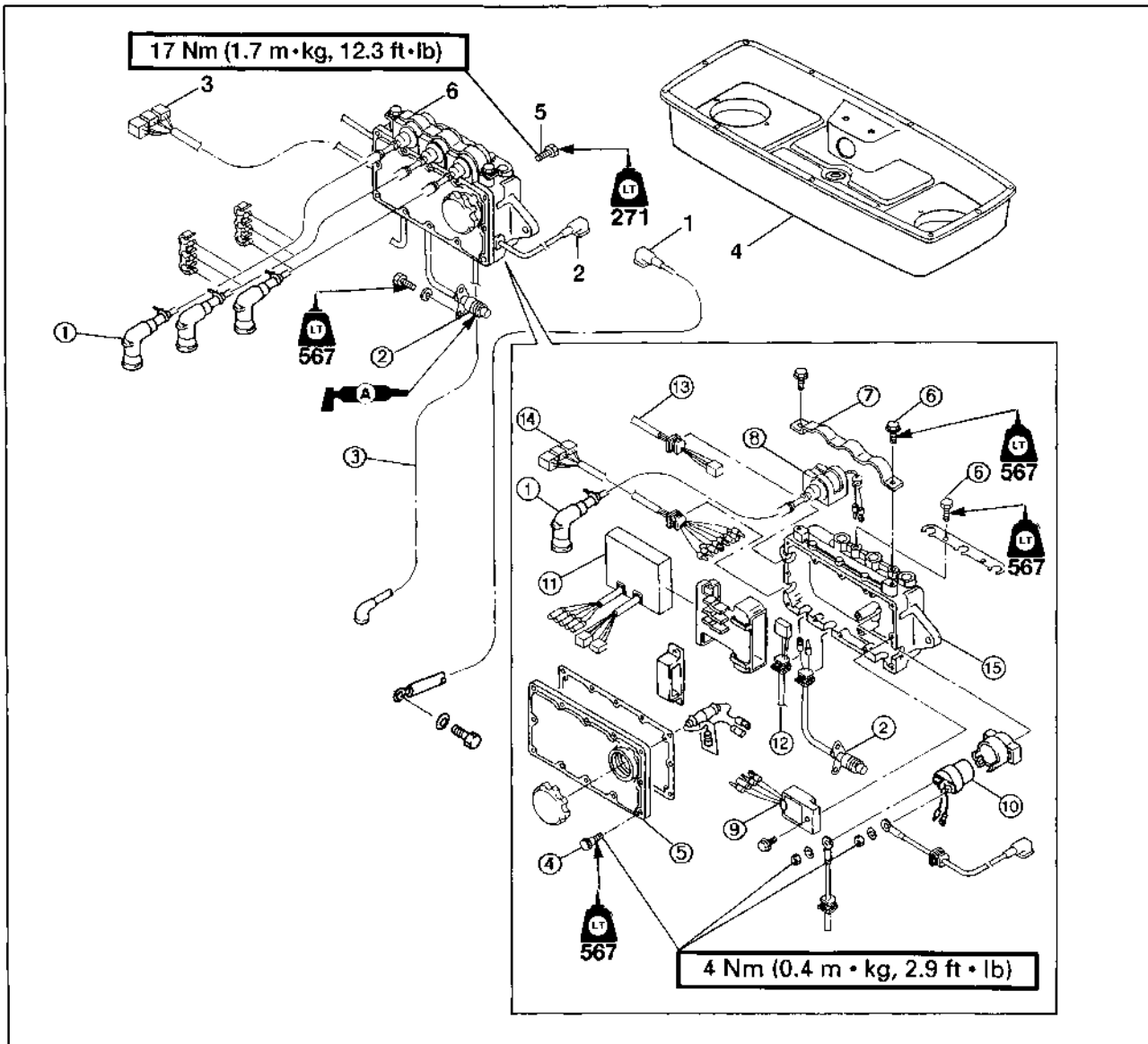
Idle gear assembly inspection

1. Inspect:
 - Pinion gear ①
 - Inner gear ②
 - Wear/Damage → Replace.
2. Check:
 - Clutch movement
 - Unsmooth movement → Replace.





ELECTRICAL UNIT EXPLODED DIAGRAM



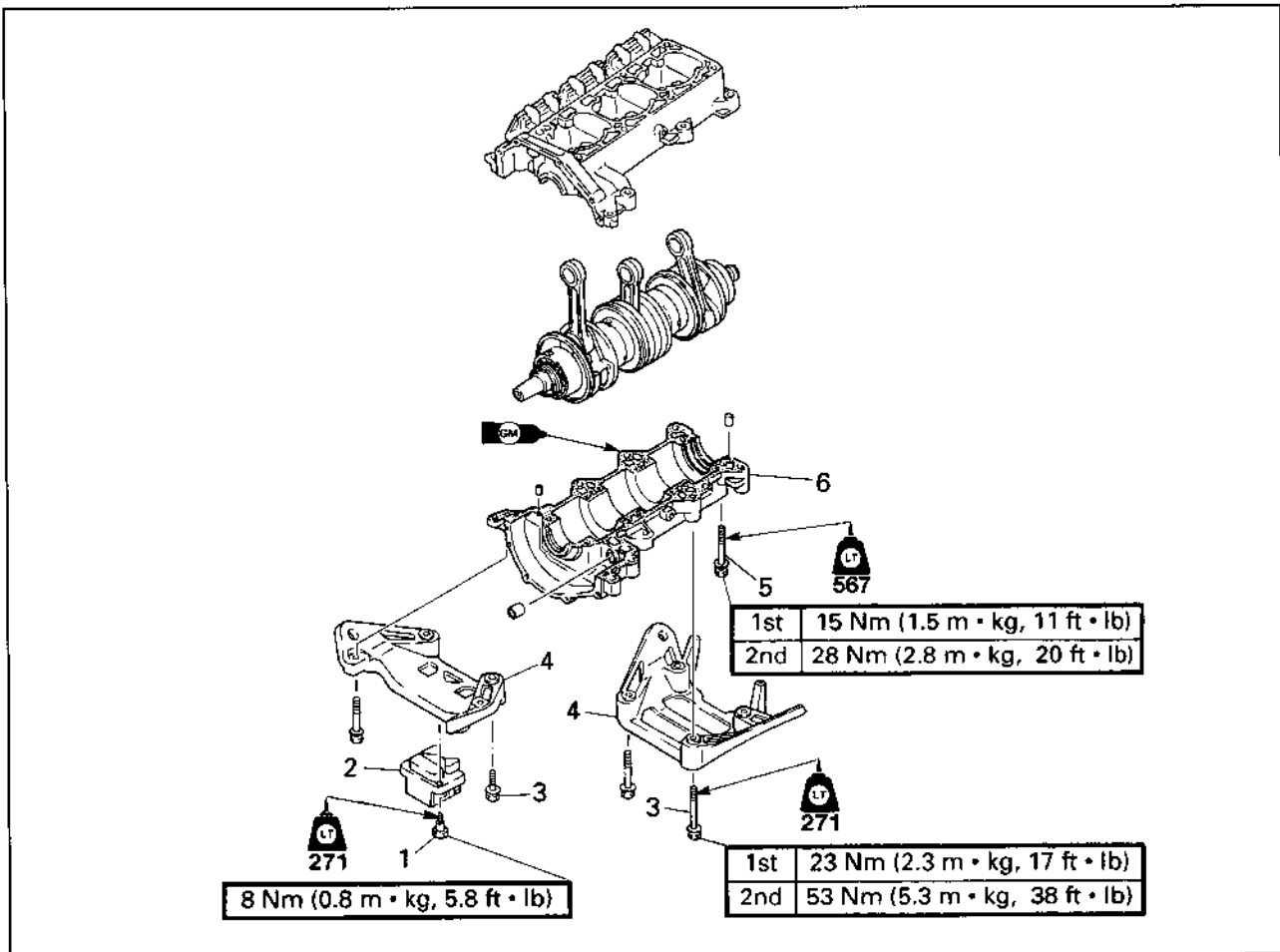


REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	ELECTRICAL UNIT REMOVAL (with engine)		Follow the "Step" order for removal.
1	Battery Cable (Negative)	2	Remove from battery
2	Battery Cable (Positive)	2	
3	Harness Lead	1	Refer to "JET PUMP CLEAN-OUT PORTS" in Chapter 6.
4	Clean Out Tray	1	
5	Bolt	3	
6	Electrical Unit	1	
	ELECTRICAL UNIT DISASSEMBLY		Follow the "Step" order for removal.
①	Spark Plug Cap	3	
②	Thermo Switch	1	
③	Starter Motor Positive Lead	1	
④	Bolt	12	
⑤	Cover	1	
⑥	Bolt	4	
⑦	Bracket	2	
⑧	Coil	3	
⑨	Reg/Rectifier	1	
⑩	Starter Relay	1	
⑪	CDI Unit	1	
⑫	Stator Lead	1	
⑬	Pulser Lead	1	
⑭	Harness Lead	1	
			Reverse the removal steps for installation.



CRANKCASE EXPLODED DIAGRAM

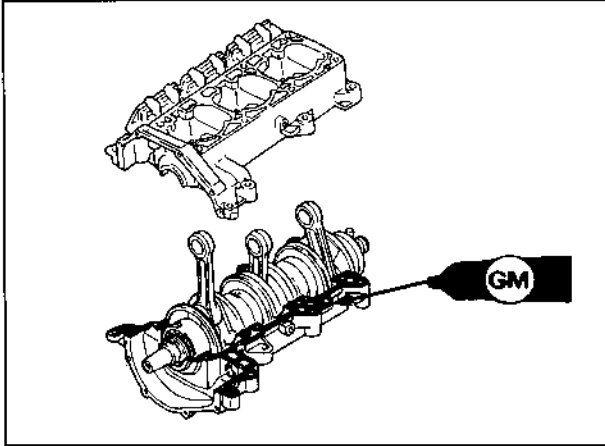


REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	CRANKCASE DISASSEMBLY		
	Base Assembly		Follow the "Step" order for removal. Refer to "FLYWHEEL MAGNETO AND BASE."
	Starter Motor		Refer to "STARTER MOTOR" in Chapter 7.
	Piston		Refer to "PISTON" section.
1	Bolt	2	
2	Mount Rubber	1	
3	Bolt (with washer)	9	
4	Engine Mount Bracket	2	
5	Bolt (with washer)	8	
6	Crankcase	1	
			NOTE: _____ Tighten the bolts in sequence and in two steps of torque. _____ Reverse the removal steps for installation.

**SERVICE POINTS****Crankcase inspection**

1. Inspect:
 - Contacting surface
Scratch → Replace.

**Crankcase installation**

1. Apply:
 - Gasket Maker

NOTE:

Clean the contacting surface of crankcase before applying the Gasket Maker.

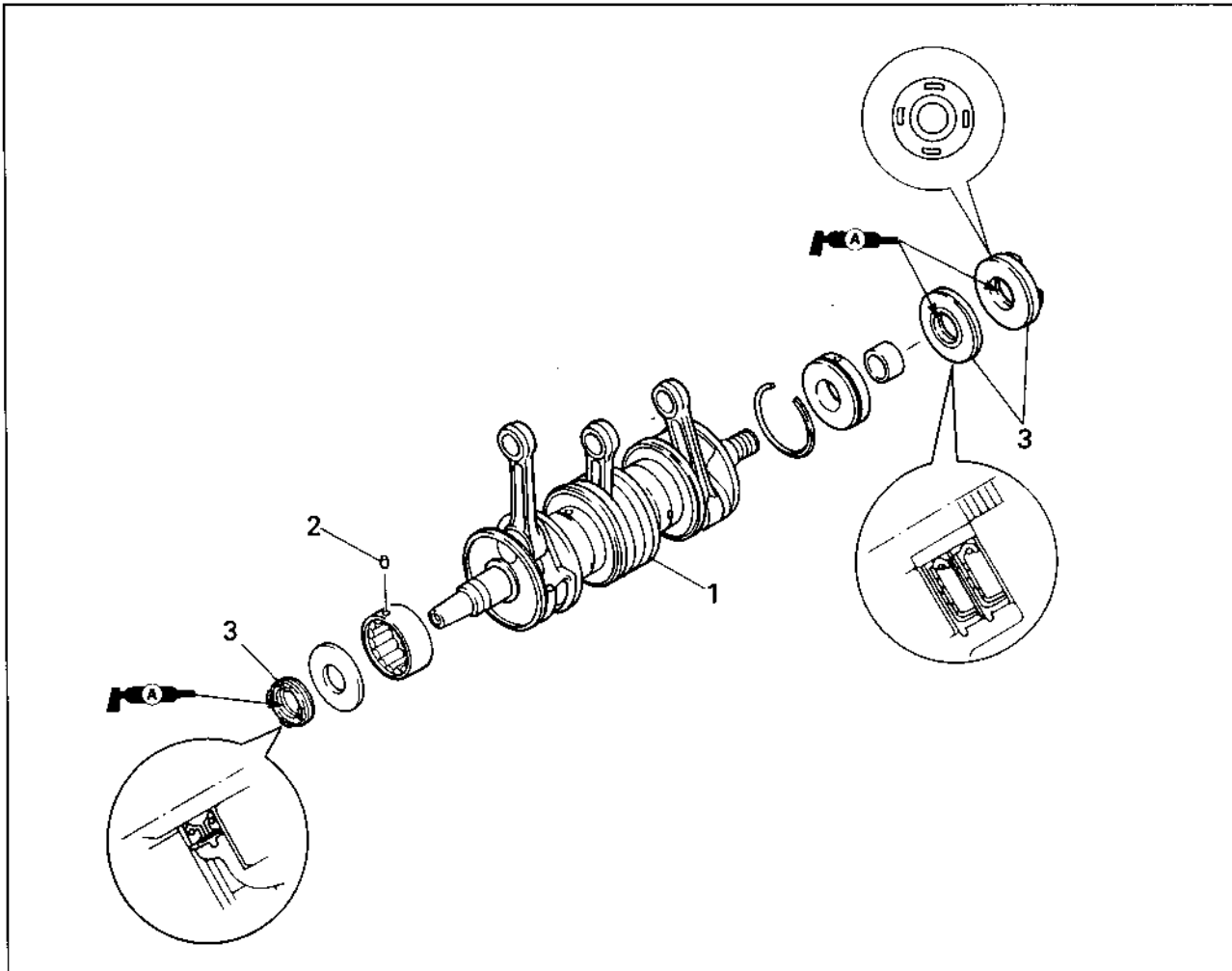
2. Check:
 - Crankshaft
Rough action → Repair.

NOTE:

After installing, check the smooth movement of the crankshaft.

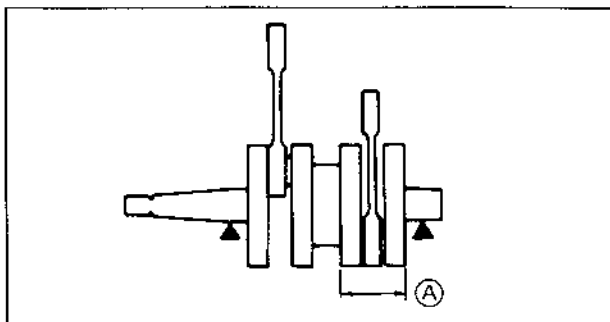


CRANKSHAFT EXPLODED DIAGRAM



REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	CRANKSHAFT REMOVAL		
1	Crankcase Crankshaft Assembly	1	Follow the "Step" order for removal. Refer to "CRANKCASE" section. CAUTION: _____ <ul style="list-style-type: none"> Do not allow the bearing clip open ends to meet the crankcase contacting surface. Place the locating pins on the bearing into the crankcase body groove.
2	Dowel Pin	8	
3	Oil Seal	3	
			Reverse the removal steps for installation.



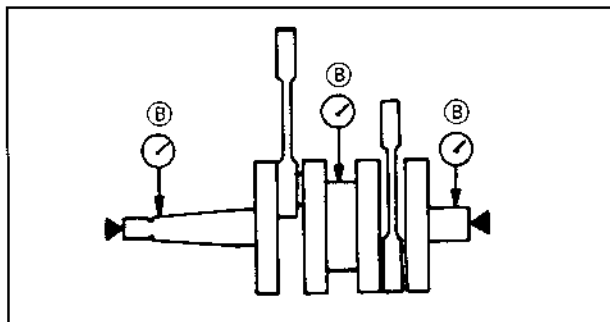
SERVICE POINTS

Crankshaft inspection

- Measure:
 - Crank width (A)
Out of specification → Replace.



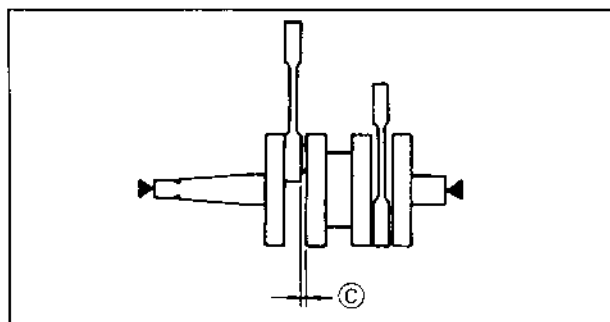
Crank Width:
2.439~2.441 in
(61.95~62.00mm)



- Measure:
 - Deflection (B)
Out of specification → Replace.



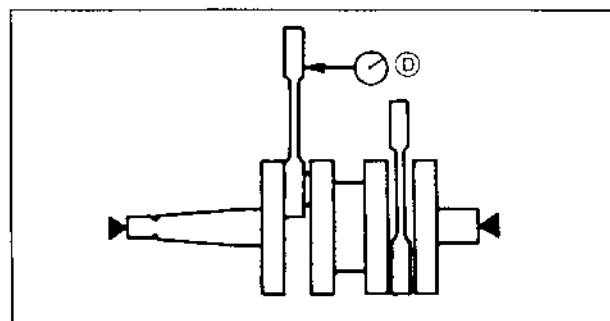
Maximum Deflection:
0.002 in
(0.05mm)



- Measure:
 - Big end side clearance (C)
Use thickness gauge.
Out of specification → Replace.



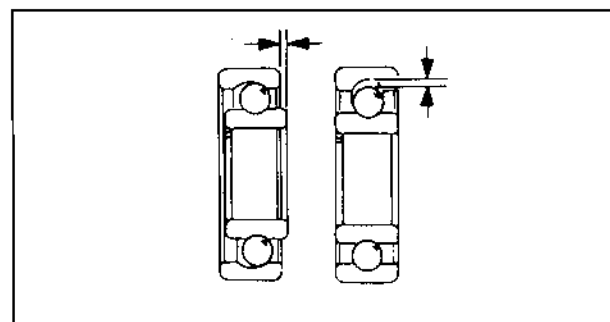
Big End Side Clearance:
0.010~0.030 in
(0.25~0.75mm)



- Measure:
 - Small end free play (D)
Use dial gauge.
Out of specification → Replace.



Small End Free Play:
0.08 in
(2.0mm)



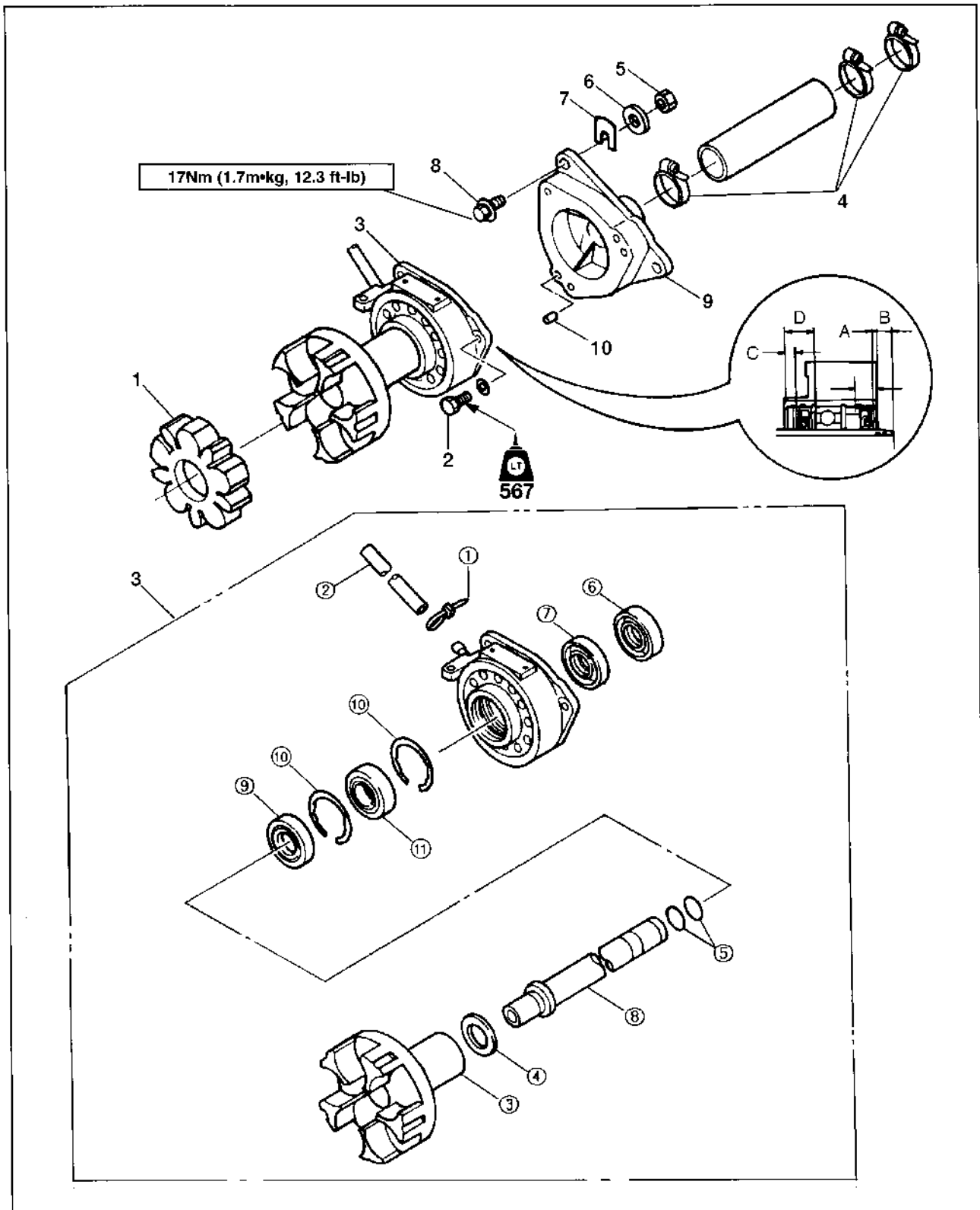
- Measure:
 - Crankshaft bearing
Pitting/Damage → Replace.

NOTE:

Lubricate the bearings immediately after examining them to prevent rusting.



INTERMEDIATE SHAFT AND HOUSING EXPLODED DIAGRAM





REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	BEARING HOUSING UNIT REMOVAL		Follow the "Step" order for removal.
	Engine Unit	1	Refer to "ENGINE UNIT REMOVAL."
1	Coupling Rubber	1	
2	Bolt (with washer)	3	
3	Bearing Housing Unit Assembly	1	
	INTERMEDIATE HOUSING REMOVAL		
	Cleanout tray		Refer to "JET PUMP CLEANOUT PORTS" in Chapter 6.
4	Hose Band	3	
5	Nut	3	
6	Washer	3	
7	Shim	1 set	Mark shim location for proper reinstallation.
8	Bolt (with washer)	3	8 x 55mm
9	Intermediate Housing	1	
10	Locating Pin	2	
	BEARING HOUSING UNIT DISASSEMBLY		
①	Hose Tie	1	
②	Grease Hose	1	
③	Coupling	1	
④	Washer	1	
⑤	O-Ring	2	
⑥	Oil Seal	1	
⑦	Bearing	1	
⑧	Intermediate Shaft	1	
⑨	Oil Seal	1	
⑩	Circlip	2	
⑪	Ball Bearing	1	
			Reverse the removal steps for installation.



Distance ①: 0.06~0.08 in (1.6~2.0mm)
 Distance ②: 0.37~0.41 in (9.5~10.5mm)
 Distance ③: 0.27~0.28 in (6.8~7.2mm)
 Distance ④: 0.69~0.70 in (17.6~17.7mm)



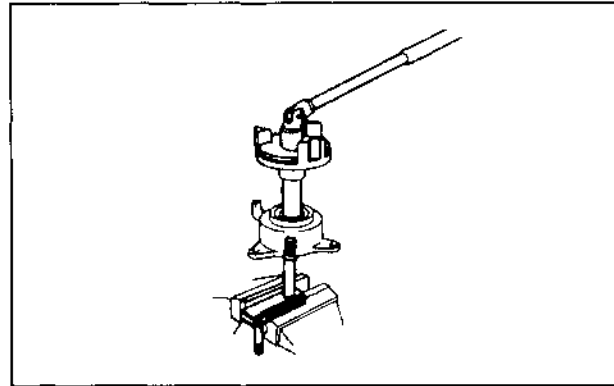
SERVICE POINTS

Coupling removal and installation

1. Remove and install:
 - Coupling



Coupler Wrench:
YW-06546
Shaft holder:
YW-38742

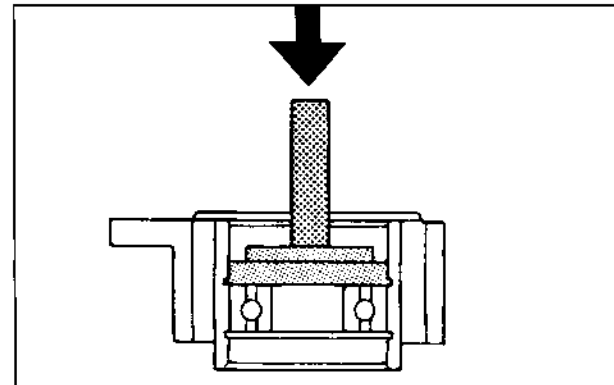


Bearing removal and installation

1. Remove:
 - Bearing

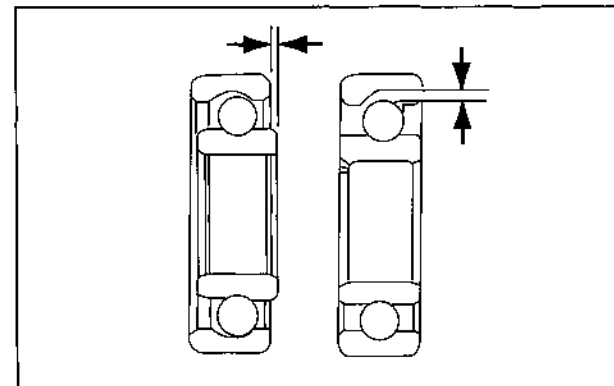


Driver Rod:
YB-06071
Bearing Outer Race Attachment:
YB-06015



Bearing inspection

1. Inspect:
 - Bearing
Rotate inner race by hand.
Rough spots/Seizure → Replace.
 - Shaft
Pitting/Damage → Replace.
 - Hose
Wear/Cracks → Replace.



Coupling installation

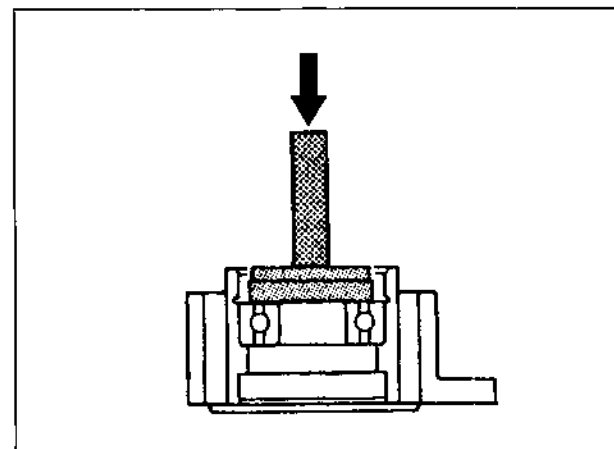
1. Inspect:
 - Coupling flange
 - Coupling Rubber
Wear/Damage → Replace.

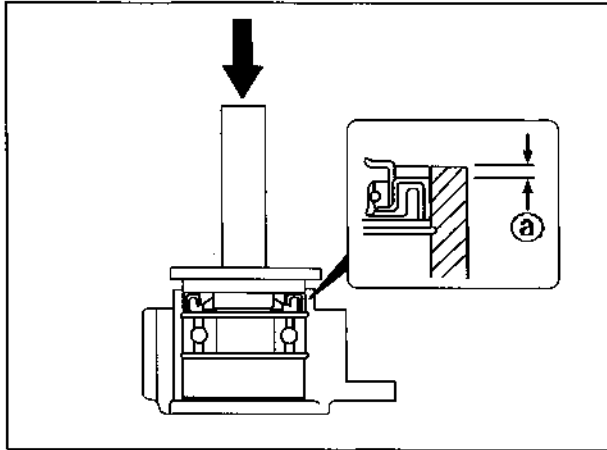
Bearing installation

1. Install:
 - Bearing



Driver Rod:
YB-06071
Bearing Outer Race Attachment:
YB-06156



**Oil seal installation**

1. Install:

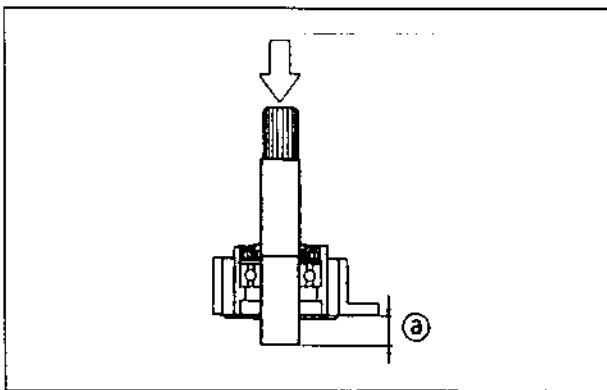
- Oil seal [T = 0.31 in (8mm)]

**Distance @**

0.27~0.28 in. (6.8~7.2mm)

**Driver Rod:****YB-06071****Bearing Outer Race Attachment:****YB-06156****NOTE:**

Fill the water resistant grease on the clip inner circumference before installing the oil seal.

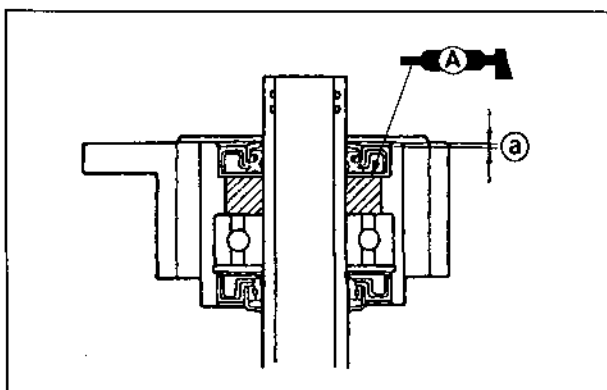


2. Install:

- Shaft

**Distance @**

0.37~0.41 in. (9.5~10.5 mm)



3. Install:

- Oil Seal [T - 10mm (0.38 in)]

**Distance @**

0.06~0.08 in. (1.6~2.0 mm)

NOTE:

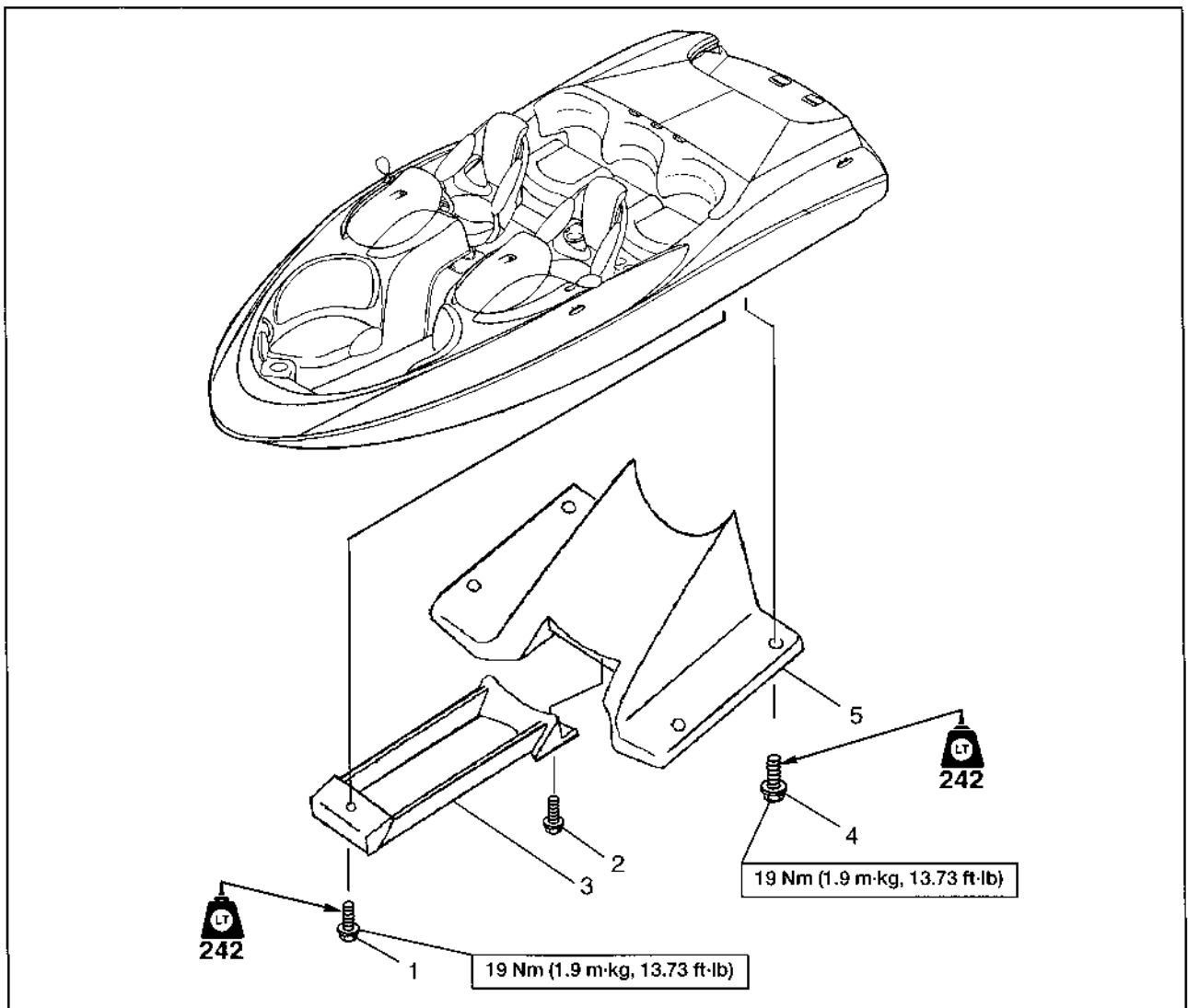
Fill the water resistant grease on the housing inner circumference before installing the oil seal.

CHAPTER 6

JET PUMP UNIT

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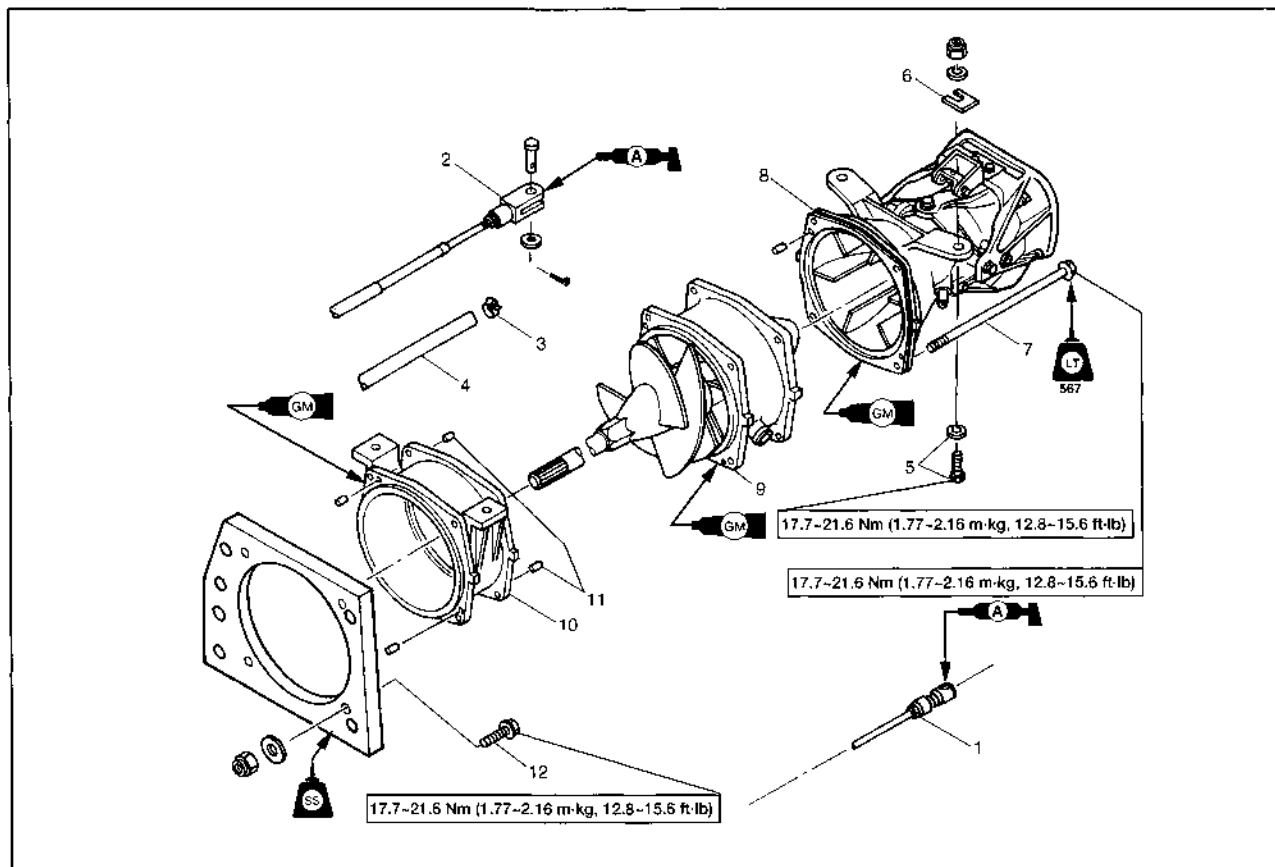
INTAKE GRATING EXPLODED DIAGRAM



REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty (ea)	Service Points
	INTAKE GRATING REMOVAL		Follow the left "Step" order for removal.
1	Bolt	1	8 x 35mm
2	Bolt	2	8 x 20mm
3	Intake Grating	1	
4	Bolt	6	8 x 35mm
5	Intake Duct	1	
			Reverse the removal steps for installation.

PUMP UNIT EXPLODED DIAGRAM

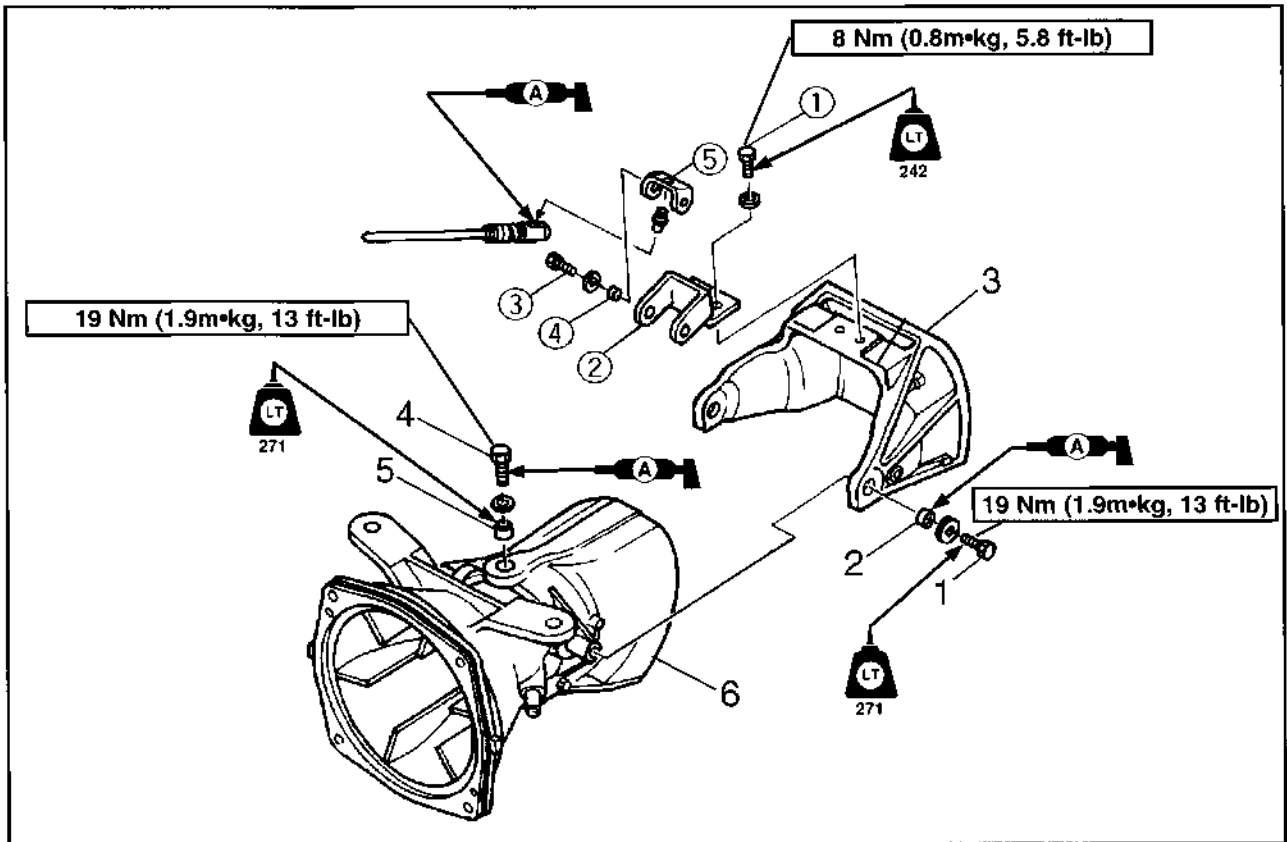


REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty (ea.)	Service Points
	PUMP UNIT REMOVAL		Follow the "Step" order for removal.
1	Shift Cable Joint	1	
2	Steering Cable Joint	1	
3	Hose Band	1	
4	Cooling Water Hose	1	
5	Bolt (with washer)	2	8 x 25mm
6	Shim	1	NOTE: _____ Mark the location of the original shim packs for ease of reassembly.
7	Bolt	4	Long Bolt
8	Nozzle	1	
9	Duct	1	
10	Impeller Housing Assembly	1	
11	Dowel Pin	6	
12	Bolt (with nut & washer)	4	8 x 35mm
13	Transom Plate	1	Reverse the removal steps for installation.



REVERSE GATE AND DEFLECTOR EXPLODED DIAGRAM

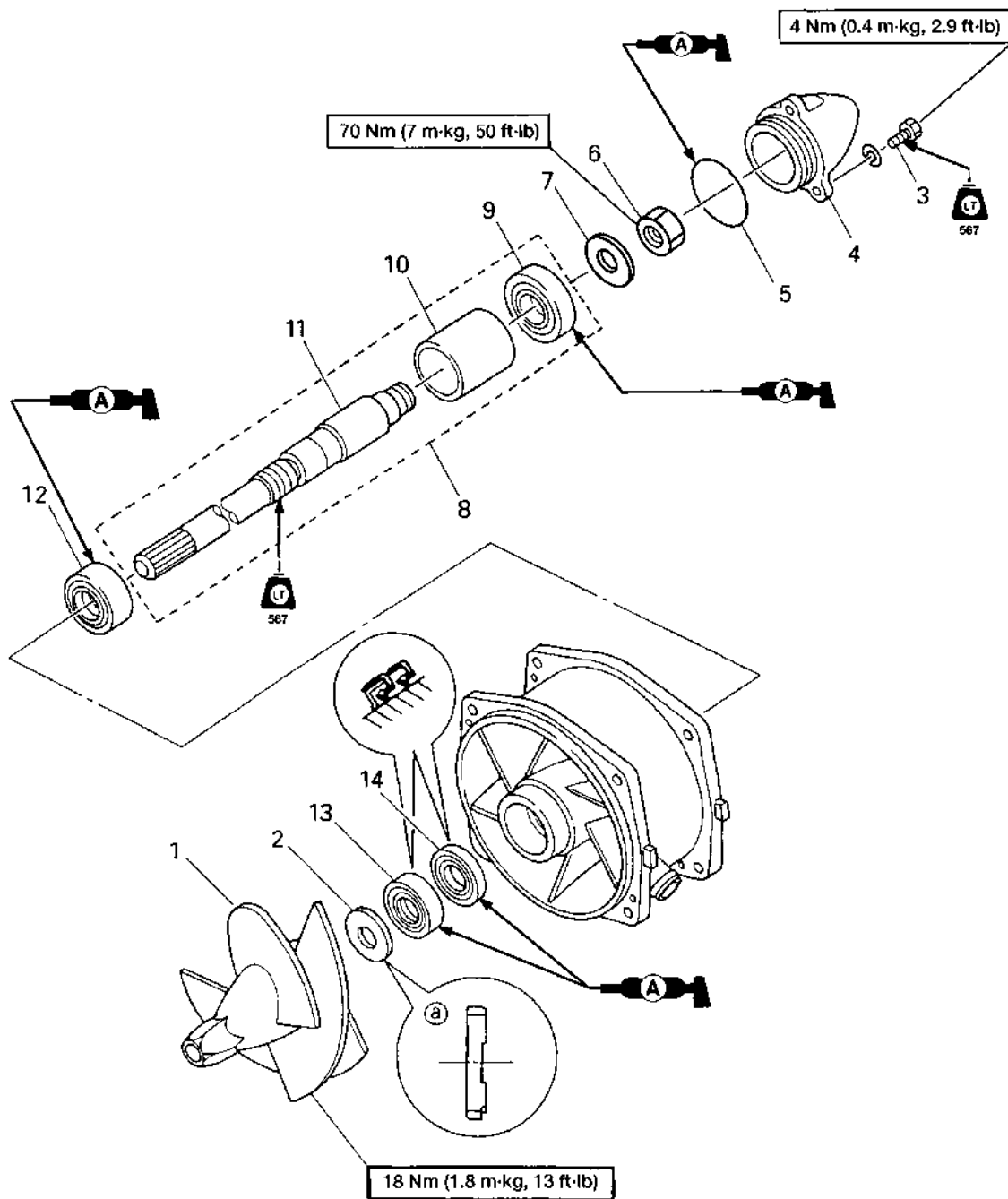


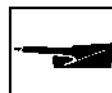
REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty (ea)	Service Points
	REVERSE GATE AND NOZZLE DEFLECTOR REMOVAL		Follow the "Step" order for removal.
1	Bolt (with washer)	2	8 x 20mm
2	Collar	2	
3	Reverse Gate	1	
4	Bolt (with washer)	2	8 x 20mm
5	Collar	2	
6	Nozzle Deflector	1	
	REVERSE GATE DISASSEMBLY		
①	Bolt (with washer)	2	6 x 16mm
②	Gate Control Arm	1	
③	Bolt (with washer)	2	
④	Collar	2	
⑤	Swivel	1	
			Reverse the removal steps for installation.



IMPELLER AND DRIVE SHAFT EXPLODED DIAGRAM





REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty (ea)	Service Points
	IMPELLER AND DRIVE SHAFT DISASSEMBLY		Follow the "Step" order for removal.
	Impeller Housing		Refer to the "PUMP UNIT REMOVAL" section.
1	Impeller	1	NOTE: _____ The impeller has a left-hand thread. Turn the impeller clockwise to loosen it.
2	Washer	1	NOTE: _____ The flat face Ⓐ of the washer should be positioned on the impeller side.
3	Bolt (with washer)	3	
4	Cap	1	
5	O-Ring	1	
6	Nut	1	
7	Washer	1	
8	Drive Shaft Assembly	1	
9	Bearing (rear)	1	NOTE: _____ Install the bearing with its manufacturer's numbers facing outward.
10	Spacer	1	
11	Drive Shaft	1	
12	Bearing (front)	1	NOTE: _____
13	Oil Seal	1	Install the bearing with its manufacturer's numbers facing outward.
14	Oil Seal	1	
			Reverse the removal steps for installation.

SERVICE POINTS**Drive shaft removal**

1. Remove:
 - Impeller



Driver Shaft Holder:
YB-06049

NOTE:

The impeller has a left-hand thread. Turn the impeller clockwise to loosen it.

2. Remove:

- Nut ①



Driver Shaft Holder:
YB-06049

3. Remove:

- Drive shaft and bearing (rear) ①
- Bearing (rear) ②

NOTE:

Use a press.

4. Remove:

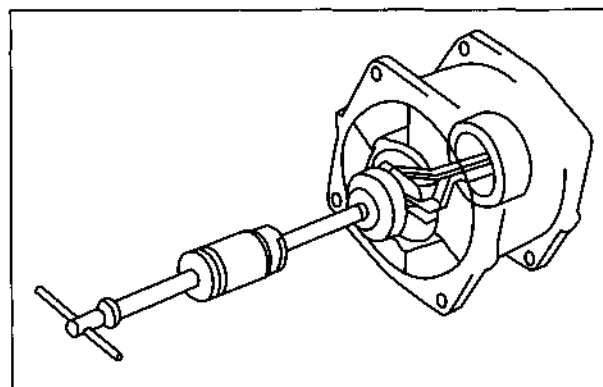
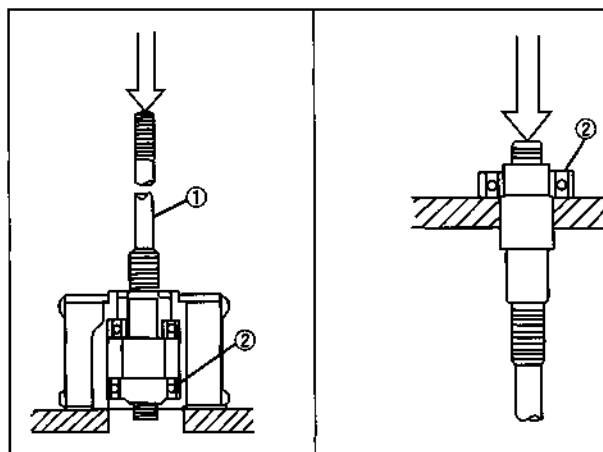
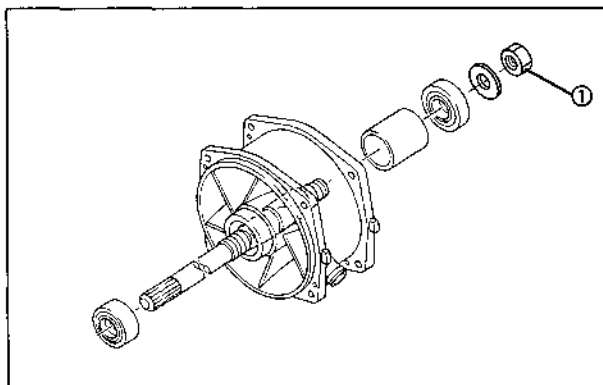
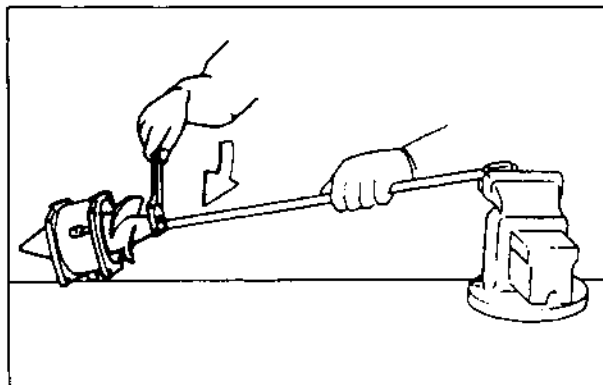
- Bearing (front)

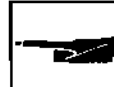


Slide Hammer Set:
YB-06096

Impeller inspection

Refer to "JET PUMP UNIT" in Chapter 3.



**Drive shaft inspection**

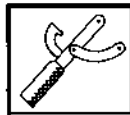
1. Inspect:
 - Drive shaft
 - Damage → Replace.

Bearing inspection

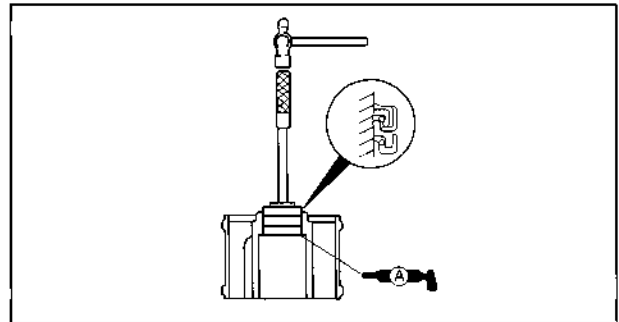
1. Inspect:
 - Bearing (front and rear)
Rotate inner race by hand.
Rough spot/seizure → Replace.

Oil seal and bearing installation

1. Install:
 - Oil seal



Driver Rod:
YB-06071
Ball Bearing Attachment:
YB-06156

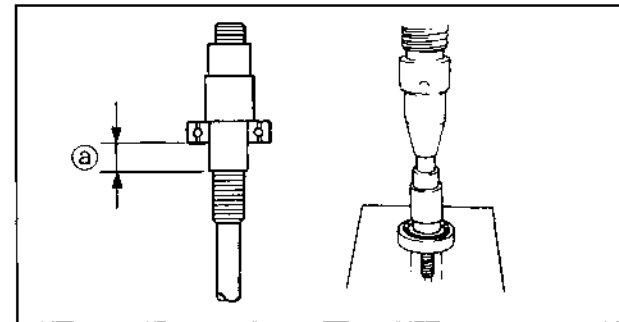


2. Install:
 - Bearing (front)
 - Drive shaft and bearing

NOTE:
Use a press.



Distance @:
 $23 \pm 0.1\text{mm}$ ($0.91 \pm 0.004\text{ in}$)



3. Install:
 - Spacer
4. Fill:
 - Between the drive shaft and duct



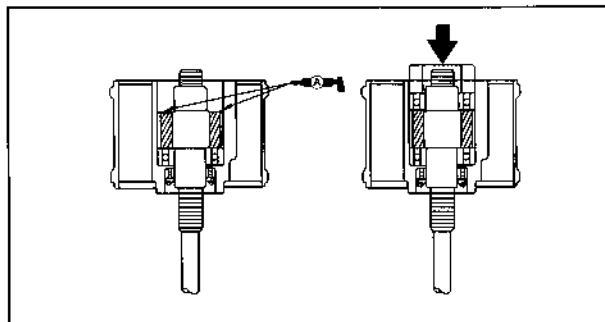
Water Resistant Grease:
1.45 cu. in (24 cm^3)

5. Install:

- Bearing (rear)



Bearing Inner Race Attachment:
YB-34474

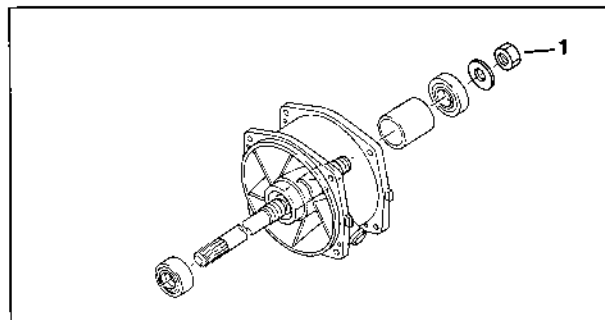


6. Install:

- Nut ①
- Washer



Drive Shaft Holder:
YB-06049

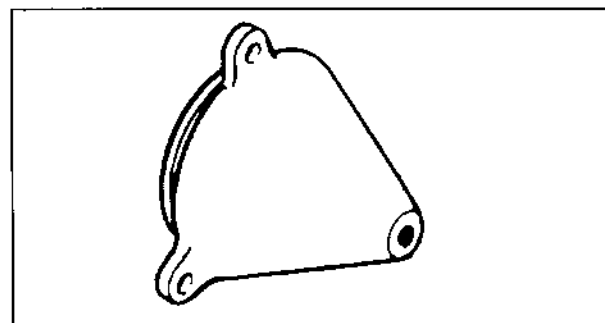


7. Fill:

- Into the cap

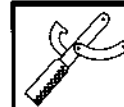


Water Resistant Grease:
1.3 cu. in (21 cm³)

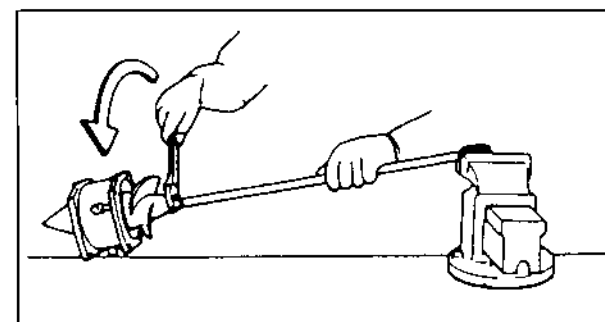
**Impeller installation**

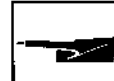
1. Install:

- Impeller

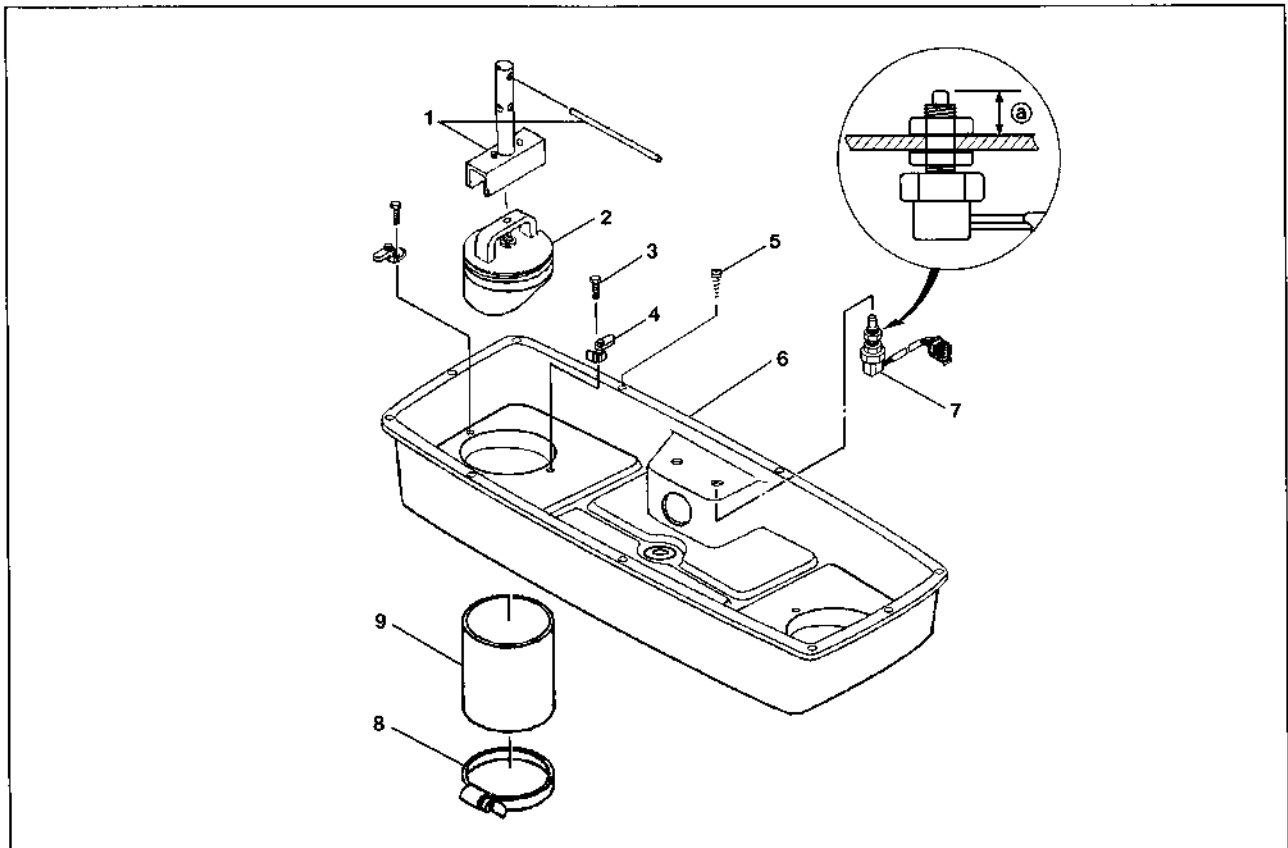


Drive Shaft Holder:
YB-06049





JET PUMP CLEAN-OUT PORTS EXPLODED DIAGRAM



1

REMOVAL AND INSTALLATION CHART

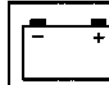
Step	Procedure / Part Name	Qty (ea.)	Service Points
	JET PUMP CLEAN-OUT PORTS REMOVAL		Follow the "Step" order for removal.
1	Hold Down Tool	1	NOTE: _____ Follow cap installation instructions in <u>"JET PUMP UNIT INSPECTION," Chapter 3.</u> Set height @ = 0.5" (12.5mm) Reverse the removal steps for installation.
2	Cap	1	
3	Screw	2	
4	Clip	2	
5	Screw	15	
6	Clean-out Tray	1	
7	Hatch Interlock Switch	1	
8	Clamp	1	
9	Hose	1	

CHAPTER 7

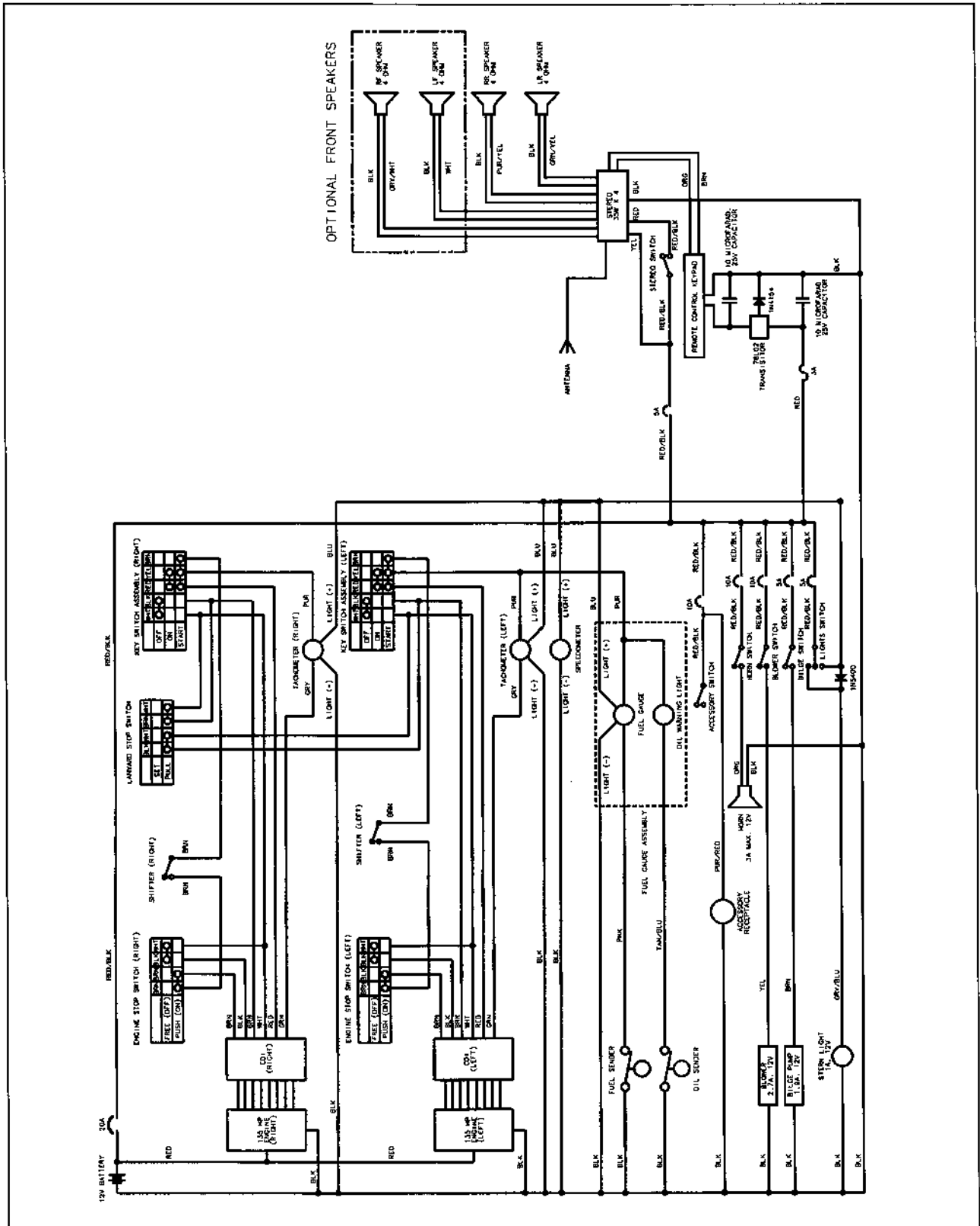
ELECTRICAL SYSTEM

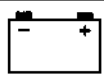
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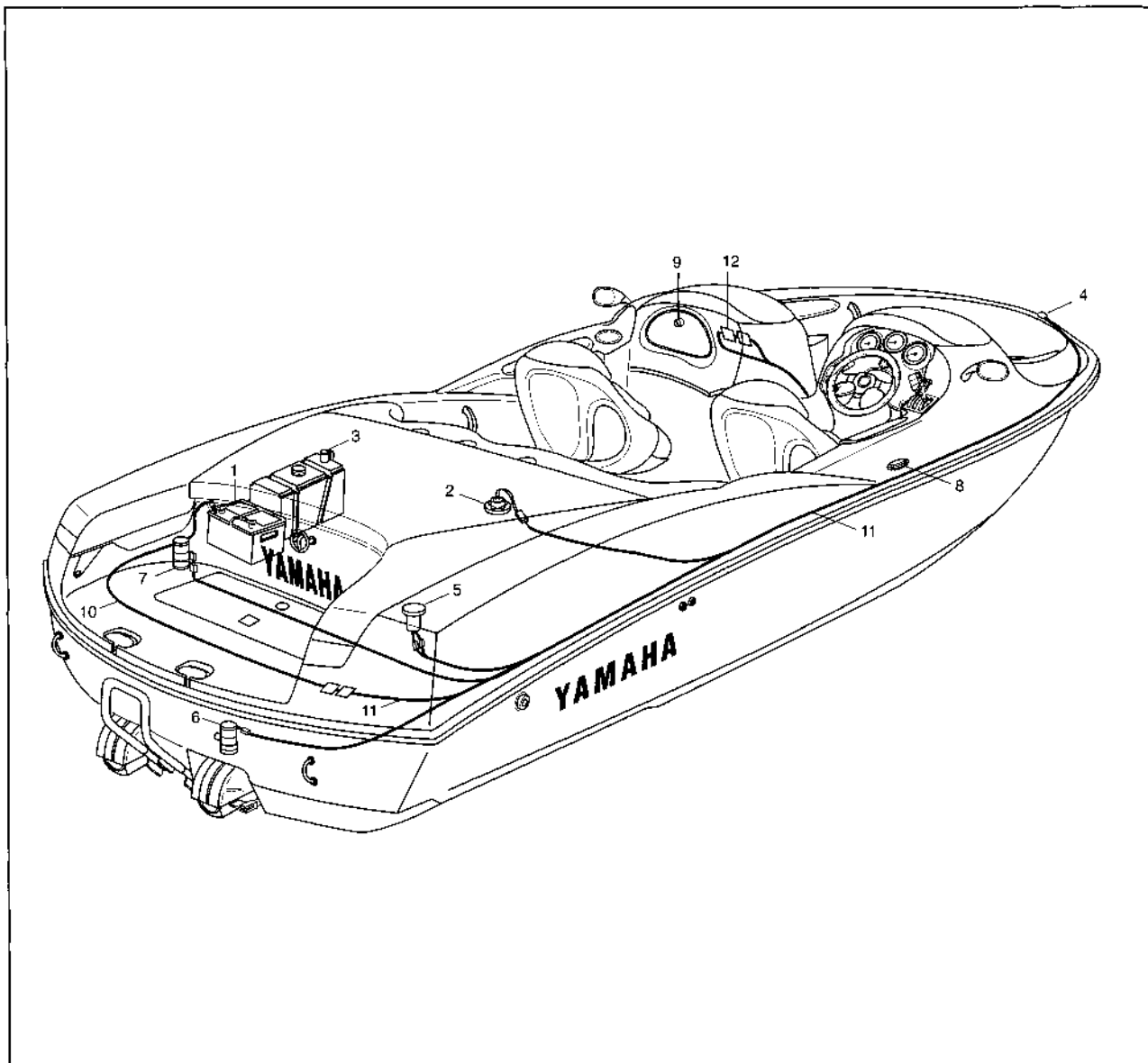


ELECTRICAL SYSTEM WIRING DIAGRAM





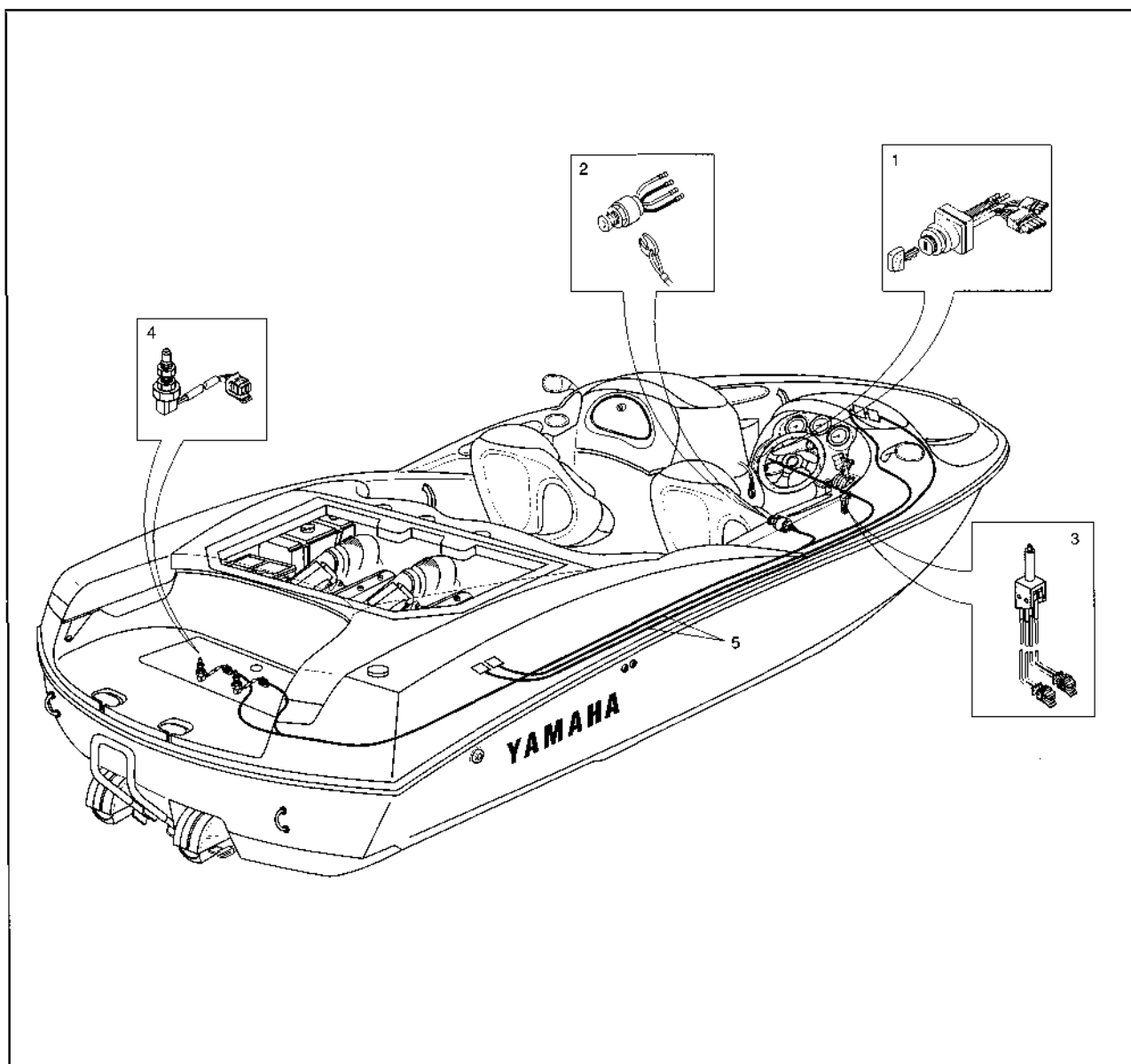
MAIN COMPONENT LOCATION WIRING DIAGRAM



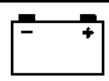
- | | |
|--------------------------|----------------------|
| 1. Battery | 7. Blower Motor |
| 2. Fuel Level Sensor | 8. Horn |
| 3. Oil Level Sensor | 9. Accessory outlet |
| 4. Bow Light | 10. Hull Harness #3 |
| 5. Stern Light Connector | 11. Deck Harness |
| 6. Bilge Pump | 12. Radio Harness #5 |



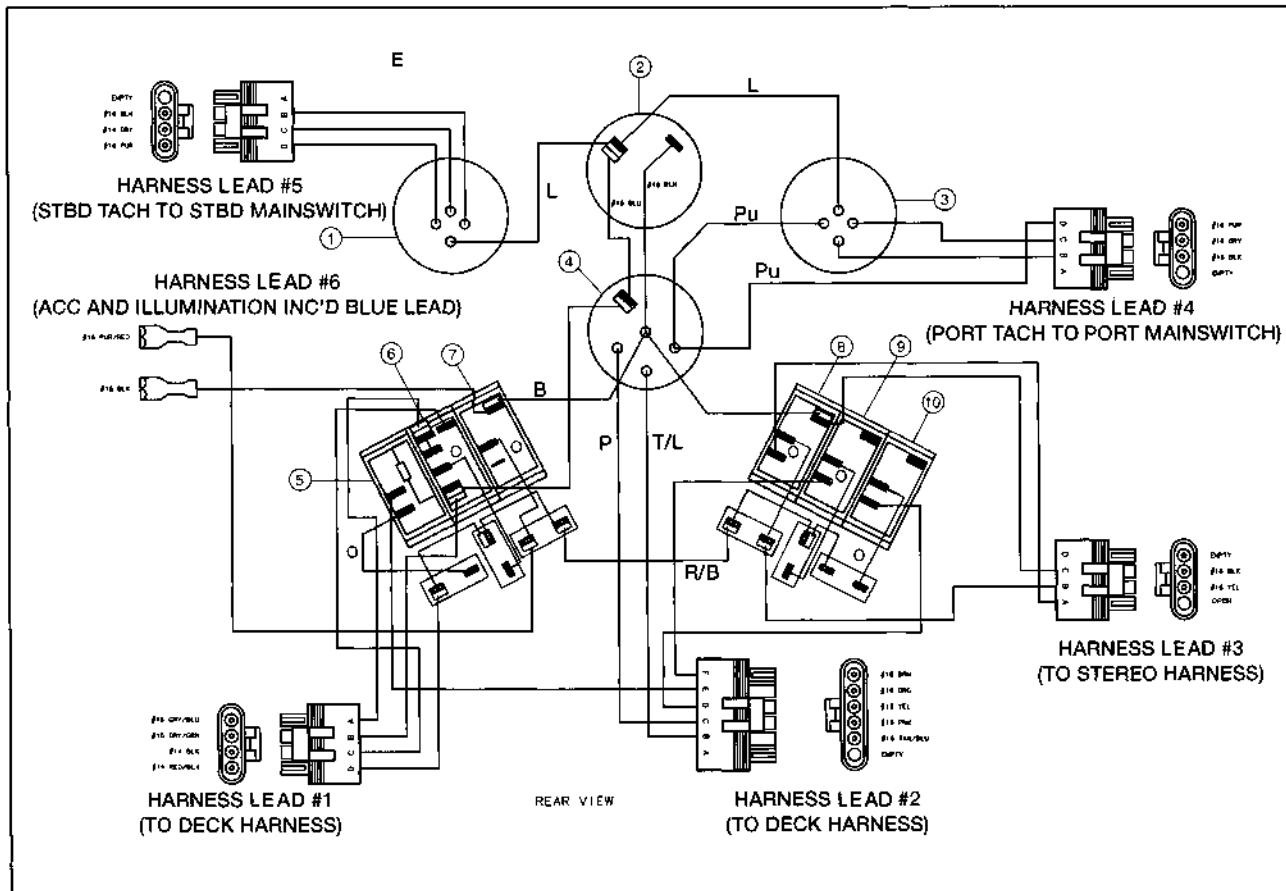
SWITCH LOCATION WIRING DIAGRAM



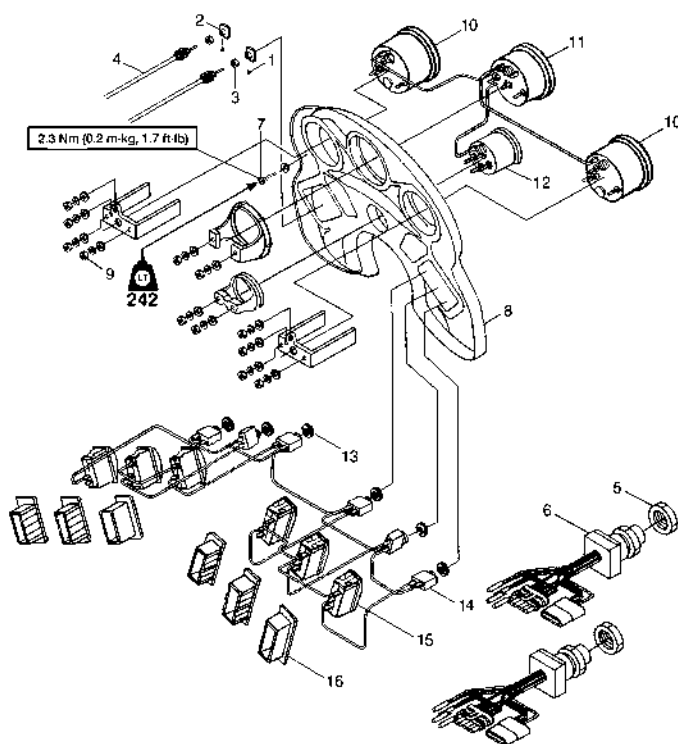
1. Key Switches
2. Lanyard Switch
3. Neutral Switch
4. Hatch Interlock Switches
5. Engine Harness #2



METER PANEL BACK VIEW WIRING DIAGRAM

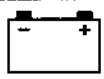


- | | |
|------------------|---------------------|
| ① Starboard Tach | ⑥ Nav Lights Switch |
| ② Speedometer | ⑦ Accessory Switch |
| ③ Port Tach | ⑧ Radio Switch |
| ④ Fuel Gauge | ⑨ Bilge Switch |
| ⑤ Horn Switch | ⑩ Blower Switch |

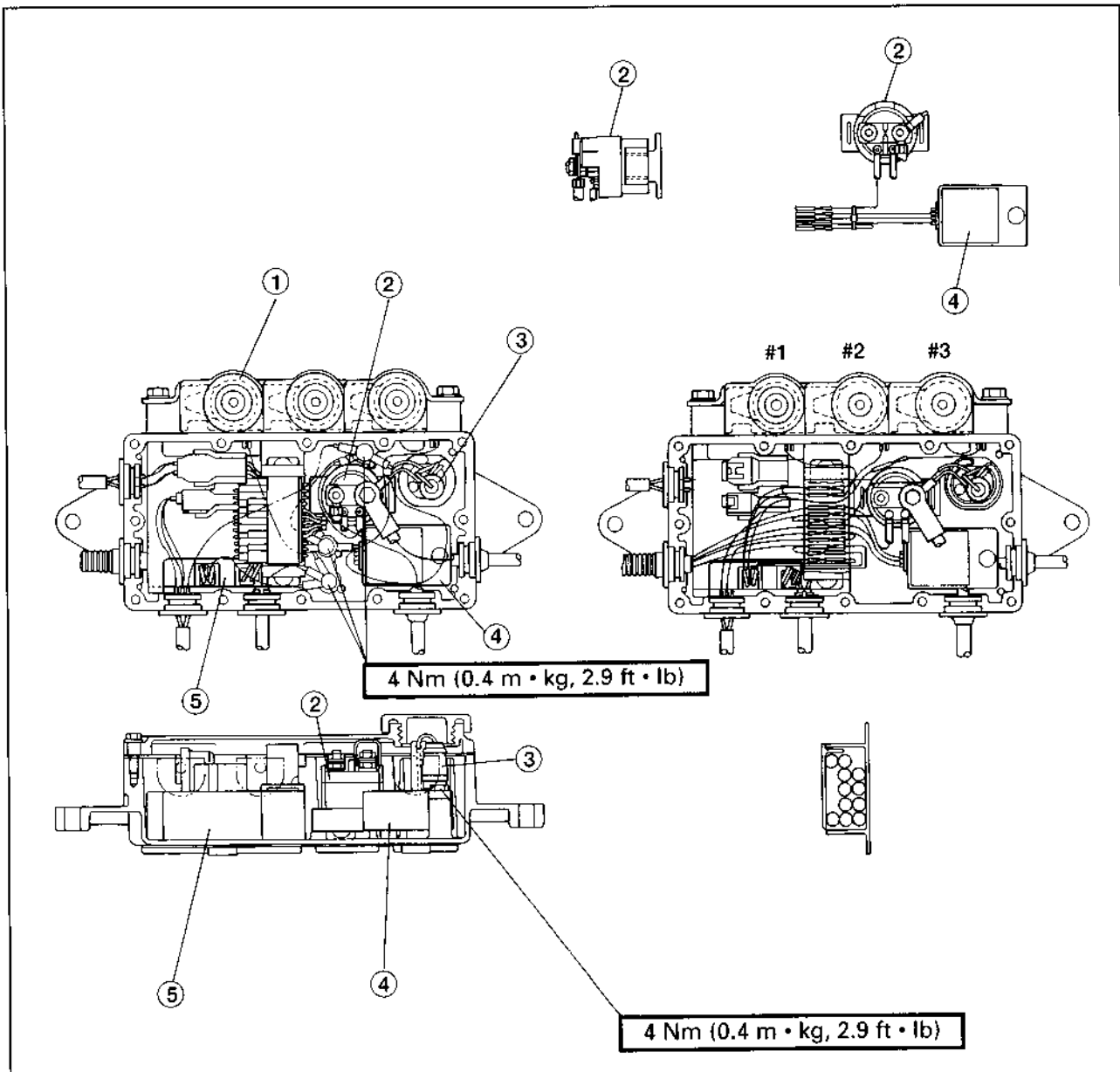


REMOVAL AND INSTALLATION CHART

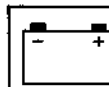
Step	Procedure / Part Name	Qty (ea.)	Service Points
	METER PANEL DISASSEMBLY		Follow the "Step" order for removal.
	Disconnect Wiring		
1	Set Screw	2	
2	Choke Knob	2	
3	Nut	2	
4	Choke Cable	2	
5	Nut	2	
6	Main Switch	2	
7	Screw (w/ washer)	8	
8	Meter Panel Ass'y	1	
9	Nut (w/ flat and lock washer)	12	
10	Tachometer	1	
11	Speedometer	1	
12	Fuel Gauge	1	
13	Nut	6	
14	Breaker	6	
15	Switch	6	
16	Switch Housing	6	
			Reverse the removal steps for installation.



ELECTRICAL UNIT WIRING DIAGRAM



- ① Ignition Coil
- ② Starter Relay
- ③ Fuse
- ④ Rectifier/Regulator
- ⑤ CDI Unit



ELECTRICAL ANALYSIS INSPECTION

- All measuring instruments should be handled with special care, or correct measurement is impossible.
- On an instrument powered by a dry battery, the battery's voltage should be checked periodically and the battery replaced, if necessary.

NOTE:

"O—O" indicates the terminals between which there is electrical continuity; i.e., a closed circuit in the given switch position.

Low resistance measurement

When using a digital meter for a resistance test of less than 10Ω , the correct measurement cannot be obtained because of the tester's internal resistance.

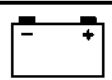
To obtain the correct value, subtract this internal resistance from the displayed measurement.



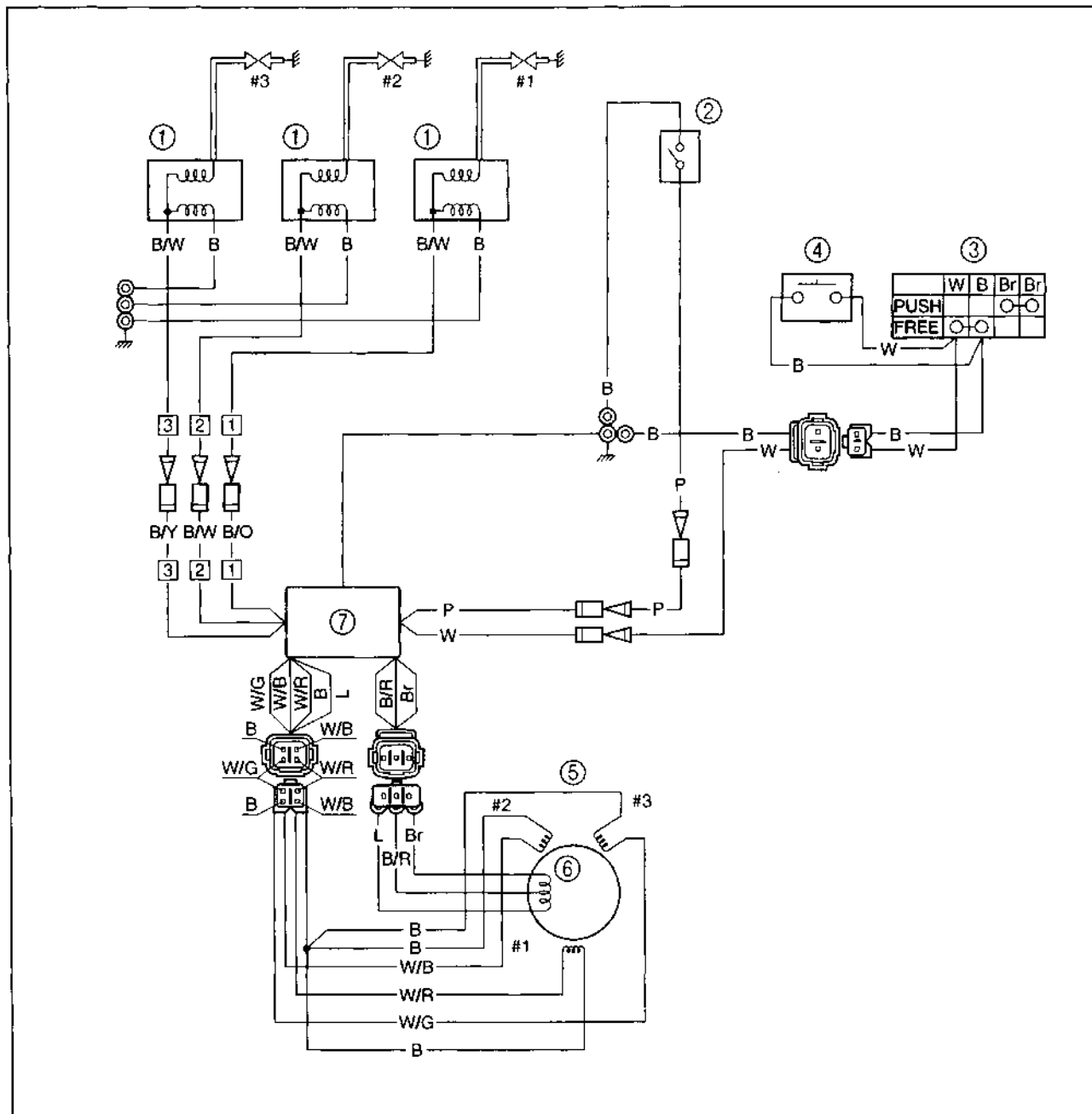
**Correct value =
Displayed measurement minus
Internal resistance**

NOTE:

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



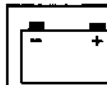
IGNITION SYSTEM WIRING DIAGRAM



- ① Ignition Coil
- ② Thermo Switch
- ③ Hatch Interlock Switch
- ④ Engine Stop Switch
- ⑤ Pulser Coil
- ⑥ Charge Coil
- ⑦ CDI Unit

B : Black
 B/O : Black/Orange
 B/R : Black/Red
 B/W : Black/White
 B/Y : Black/Yellow
 Br : Brown
 L : Blue

P : Pink
 W : White
 W/B : White/Black
 W/G : White/Green
 W/R : White/Red



IGNITION SPARK GAP

⚠ WARNING

- While making a spark check, be careful not to touch any of the "ignition spark gap tester" lead wires.
- When doing the spark test, take special care not to allow leakage from the removed plug cap.
- This check is likely to produce sparks, so be sure that no flammable gas or fluid is in the vicinity.

1. Check:

- Ignition spark gap
Out of specification → Replace.



Spark Gap:
0.35 in (9mm)

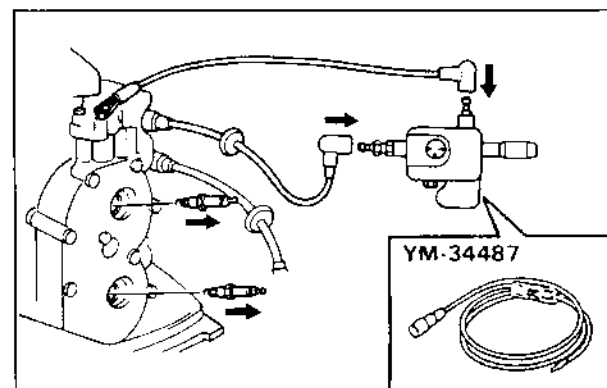
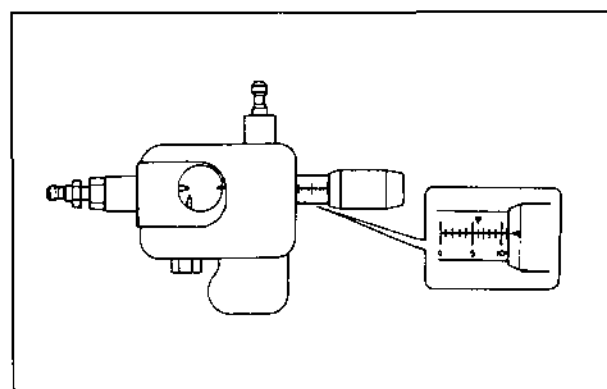
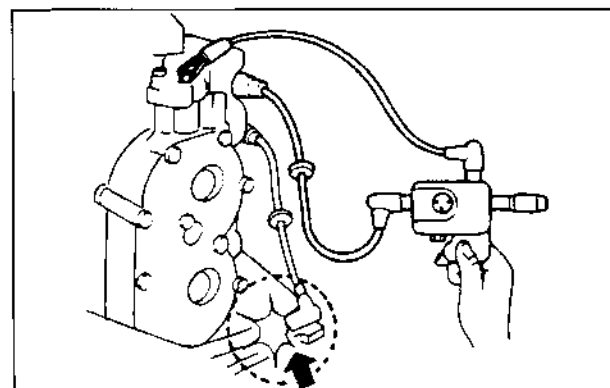
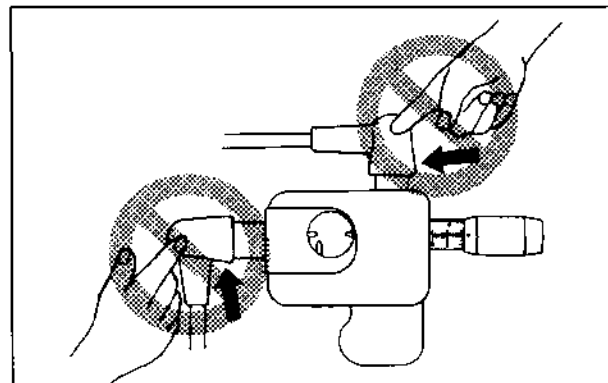
Checking Steps:

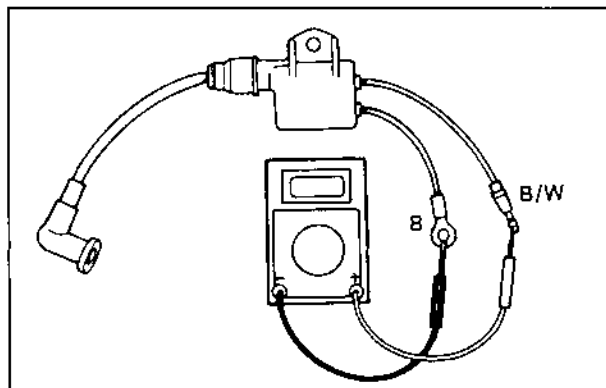
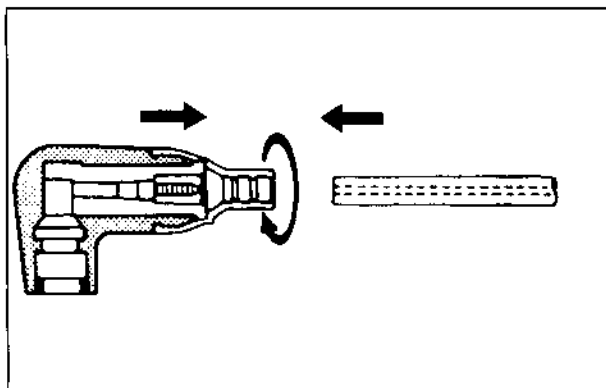
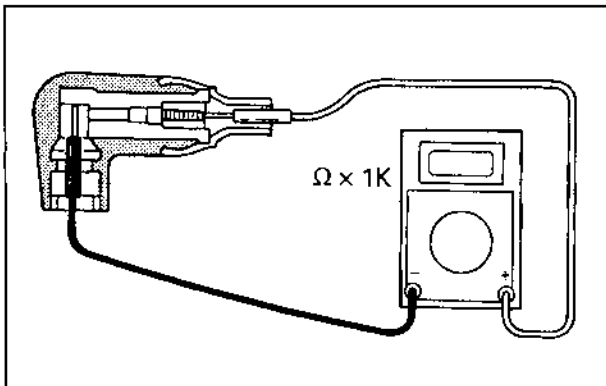
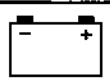
- Adjust the spark gap to specification by turning the adjusting knob.



Spark Gap Tester:
YM-34487

- Connect the spark plug cap to the spark gap tester.
- Remove the spark plugs from the engine.
- Crank the engine and check the sparks from the ignition system through the discharge window.





SPARK PLUG

Refer to "ELECTRICAL" in Chapter 3.

SPARK PLUG CAP

1. Inspect:
 - Spark plug cap
Loosen → Tighten.
Crack/Damage → Replace.
2. Measure:
 - Spark plug cap resistance
Out of specification → Replace.



Spark Plug Cap Resistance:
4.0~6.0 kΩ

Replacement Steps

- Remove the spark plug cap by turning the cap counterclockwise.
- Install the spark plug cap by turning the cap clockwise until it stops.

IGNITION COIL

1. Inspect:
 - High tension cord
Cracks/Damage → Replace.
2. Measure:
 - Primary coil resistance
Out of specification → Replace.

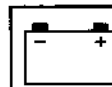


Primary Coil Resistance:
Black/White (B/W) — Black (B)
0.048~0.027Ω at 68°F (20°C)

NOTE:

When measuring the resistance of 10Ω or less using the digital tester, the correct measurement cannot be obtained. Refer to "Low Resistance Measurement" (page 7-7).

3. Access:
 - Disassemble electrical unit.
Refer to "ELECTRICAL UNIT" in Chapter 5.



3. Measure:

- Secondary coil resistance
Out of specification → Replace.



Secondary Coil Resistance:
High tension cord - Black (B)
2.7~4.1 k Ω at 68°F (20°C)

NOTE:

Remove the spark plug cap from the high tension cord.

KEY SWITCH

Refer to the "STARTING SYSTEM" section.

HATCH INTERLOCK SWITCH

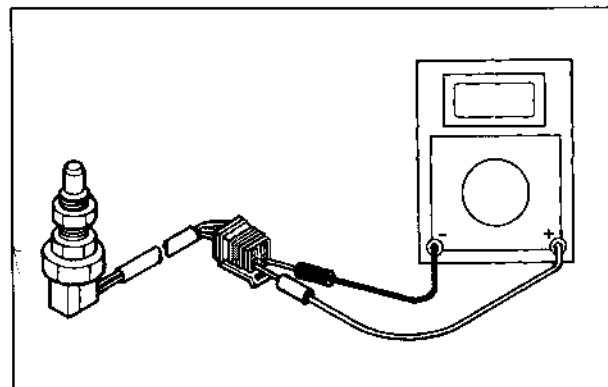
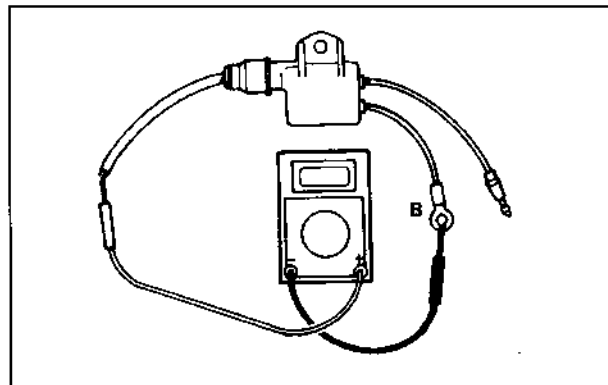
1. Check:

- Continuity
Out of specification → Replace.

Hatch Interlock Switch Continuity:				
Condition	Leads			
	W	B	Br	Br
Push			○	○
Free	○	○		

2. Access:

- Remove clean-out port tray
Refer to "JET PUMP CLEAN-OUT PORTS" in Chapter 6.




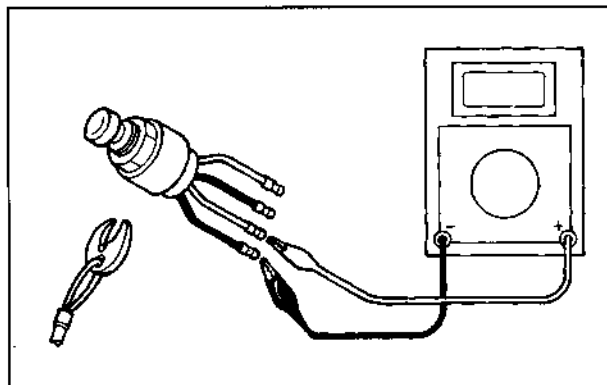


ENGINE STOP SWITCH

1. Check:

- Continuity
Out of specification → Replace.

 Engine Stop Switch Continuity: (Black coupler)			
Lock Plate	Position	Leads	
		White	Black
Installed	Free		
	Push	○—○	○—○
Removed	Free	○—○	○—○
	Push	○—○	○—○



2. Access:

- Remove remote control unit.
Refer to "REMOTE CONTROL UNIT SYSTEM" in Chapter 8.


NOTE:

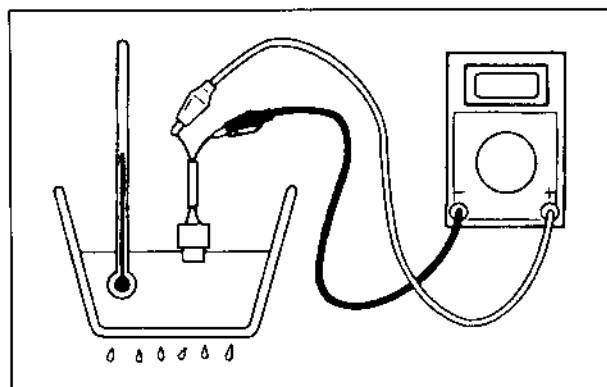
The switch has two independent circuits for port and starboard engines. Be sure to check both.

THERMOSWITCH

1. Measure:

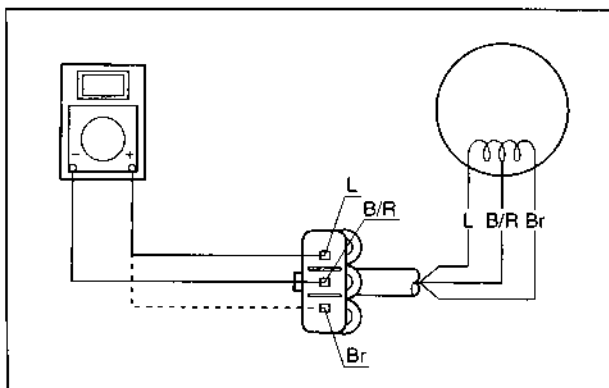
- Thermoswitch continuity
Out of specification → Replace.

 Thermoswitch Continuity Temperature:		
OFF → ON: 194~204.8°F (90~96°C) ON → OFF: 194~168.8°F (90~76°C)		
Condition	Leads	
	Pink	Black
OFF		
ON	○—○	○—○



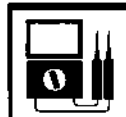
2. Access:

- Disassemble electrical unit.
Refer to "ELECTRICAL UNIT" in Chapter 5.

**CHARGE COIL**

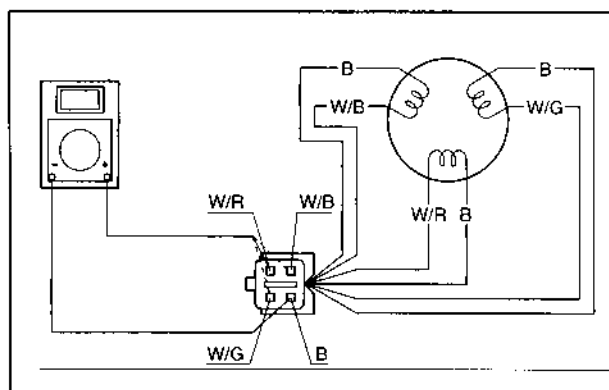
1. Measure:

- Charge coil resistance
Out of specification → Replace.
- Charge coil peak voltage
Out of specification → Replace.



Black/Red (B/R) - Brown (Br)
172.0~258.0 Ω at 68°F (20°C)

Black/Red (B/R) - Blue (L)
656.0~984.0 Ω at 68°F (20°C)

**PULSER COIL**

1. Measure:

- Pulser coil resistance
Out of specification → Replace.
- Pulser coil peak voltage
Out of specification → Replace.

**Pulser Coil Resistance:**

White/Red (W/R) - Black (B)
White/Black (W/B) - Black (B)
White/Green (W/G) - Black (B)
248~372 Ω at 68°F (20°C)

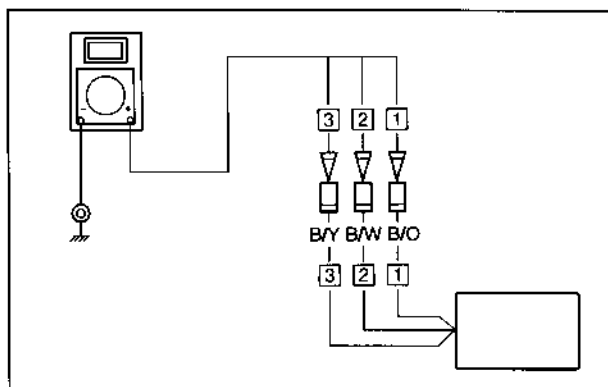
2. Access for Stator Components:

Testing:

- Disassemble Electrical Unit
Refer to "ELECTRICAL UNIT" in Chapter 5.

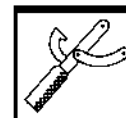
3. Replacement:

- Remove flywheel cover

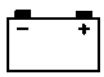
**CDI UNIT**

1. Measure:

- CDI unit peak voltage
Out of specification → Replace.



Pocket Tester:
YU-03112



PEAK VOLTAGE MEASUREMENT CHART

		Connector Color	Test Harness (YW-*****)	Open Cranking	Cranking	Connected 2000 r/min.	3500 r/min.
A	Charge Coil Output	L - B/R Br - B/R	06777 06777	90.2 22.3	90.9 21.0	95.9 46.4	97.1 65.2
B	Lighting Coil Output	G - G	—	5.6	5.6	23.8	28.1
C	Rectifier Regulator Output	R - B	—	—	5.0	23.0	27.3
D	Pulser Coil Output	W/B - B, W/G - B W/R - B	06778	3.2	2.4	11.1	21.1
E	CDI Output	B/W - B	—	—	95.5	100.5	101.4

NOTE:

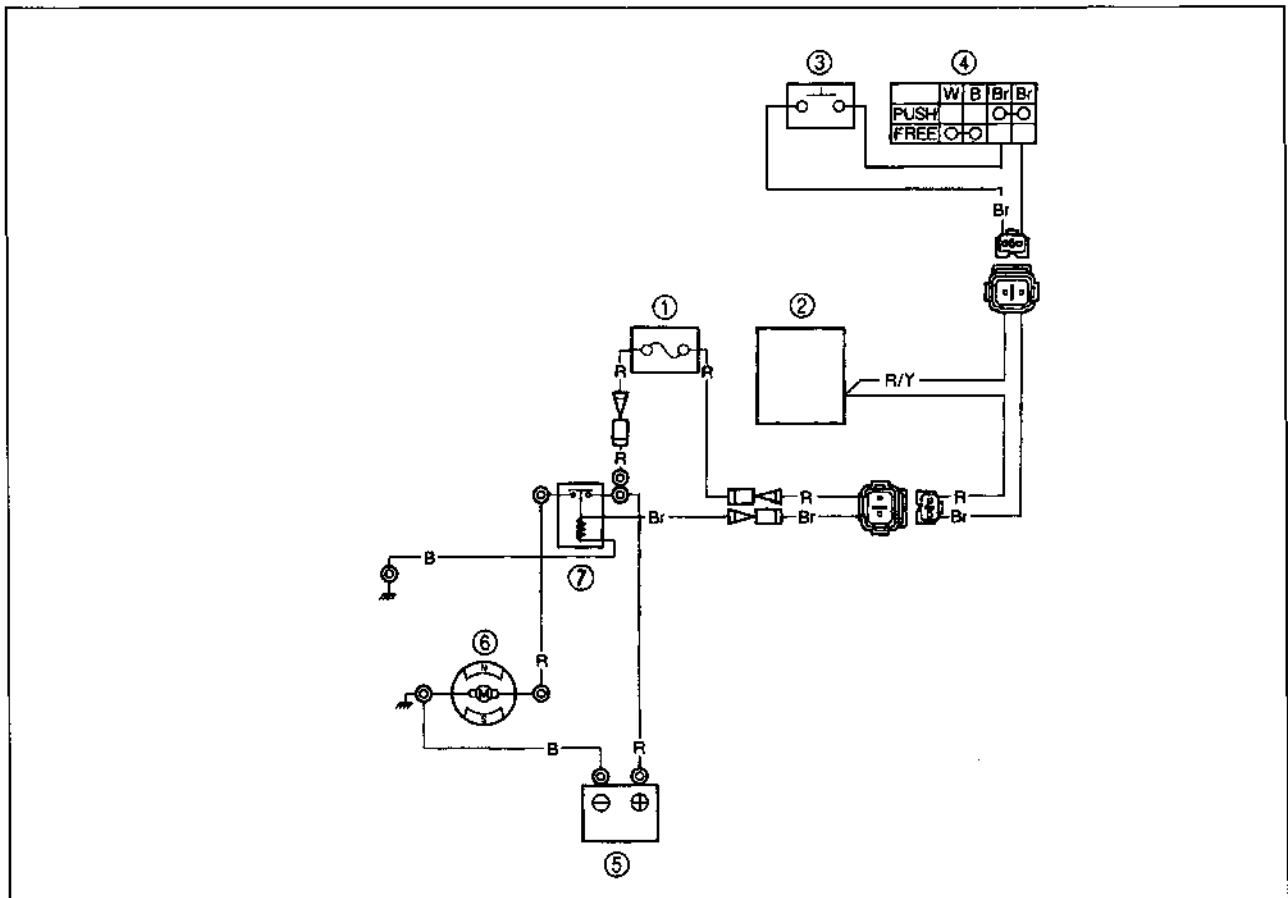
The specified values indicate the lower limit. The component is okay when indicated readings are higher. For more detailed Peak Voltage test procedures, refer to the Jet Boat Peak Voltage Measurement Guide (LIT-18507-00-99).



Peak Voltage Adapter:
YU-39991
3-Pin Test Harness:
YW-06777
4-Pin Test Harness:
YW-06778



STARTING SYSTEM WIRING DIAGRAM



- ① Fuse
- ② Key Switch
- ③ Neutral Switch
- ④ Hatch Interlock Switch
- ⑤ Battery
- ⑥ Starter Motor
- ⑦ Starter Relay

B : Black
 B/R: Black/Red
 R : Red
 Br : Brown



BATTERY

Refer to the "GENERAL" section in Chapter 3.

WIRING CONNECTION

1. Check:

- Wiring connection
- Poor connection → Replace.

FUSE

1. Check:

- Fuse
- Blown → Replace.



Fuse Rating:
12V / 10A

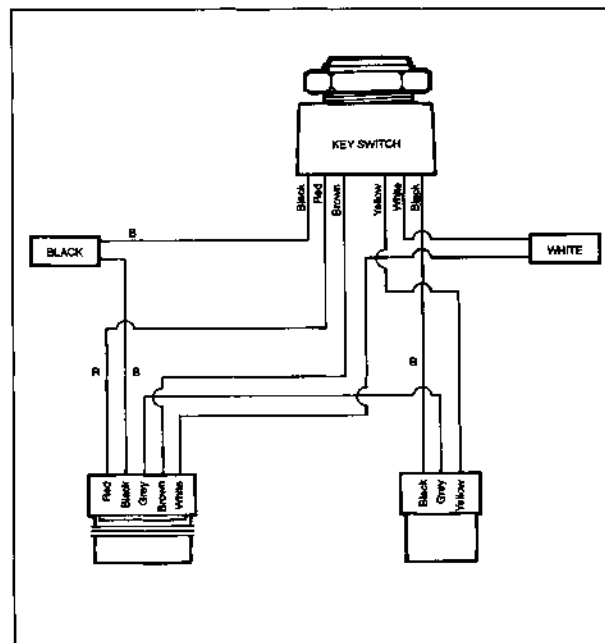
KEY SWITCH

1. Check:

- Continuity
- Out of specification → Replace.

Key Switch Continuity:

	Leads				
	B	W	R	Y	Br
OFF	○	○			
ON			○	○	
START			○	○	○



NEUTRAL SWITCH

1. Check:

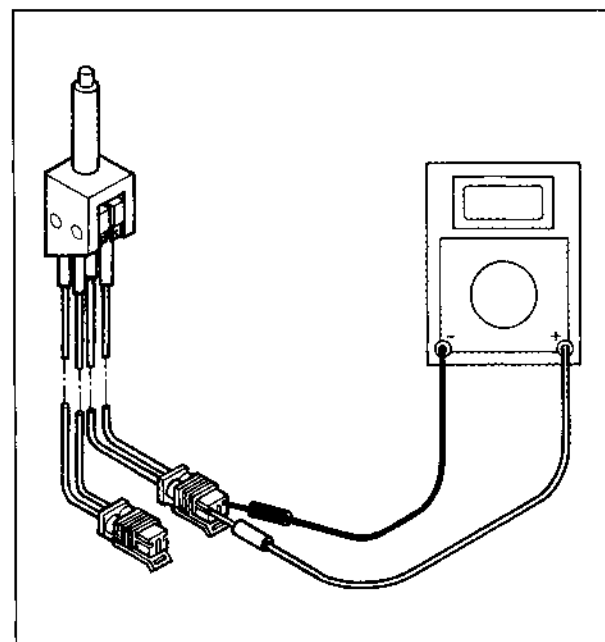
- Continuity
- Out of specification → Replace.

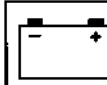
Neutral Switch Continuity:

Condition	Leads	
	Black	Black
Push	○	○
Free		

2. Access:

- Remove Remote Control Assembly
- Refer to "REMOTE CONTROL SYSTEM" in Chapter 8.

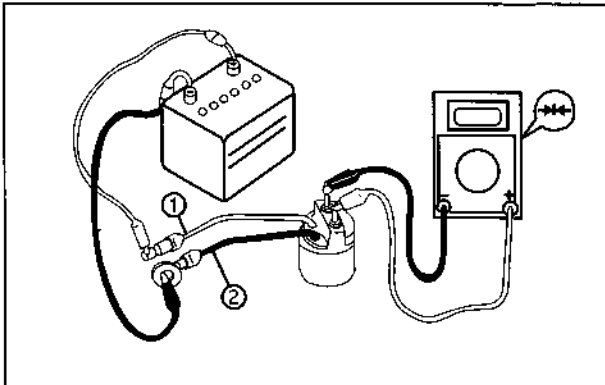


**HATCH INTERLOCK SWITCH**

Refer to the "IGNITION SYSTEM" section in Chapter 7.

STARTER RELAY

1. Inspect:
 - Brown lead terminal
 - Black lead terminal
 - Loose → Tighten.
2. Check:
 - Relay operation
 - Does not function → Replace.

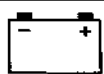
**Checking Steps:**

- Connect the tester between the terminals of the starter relay as shown.
- Connect a 12V battery.

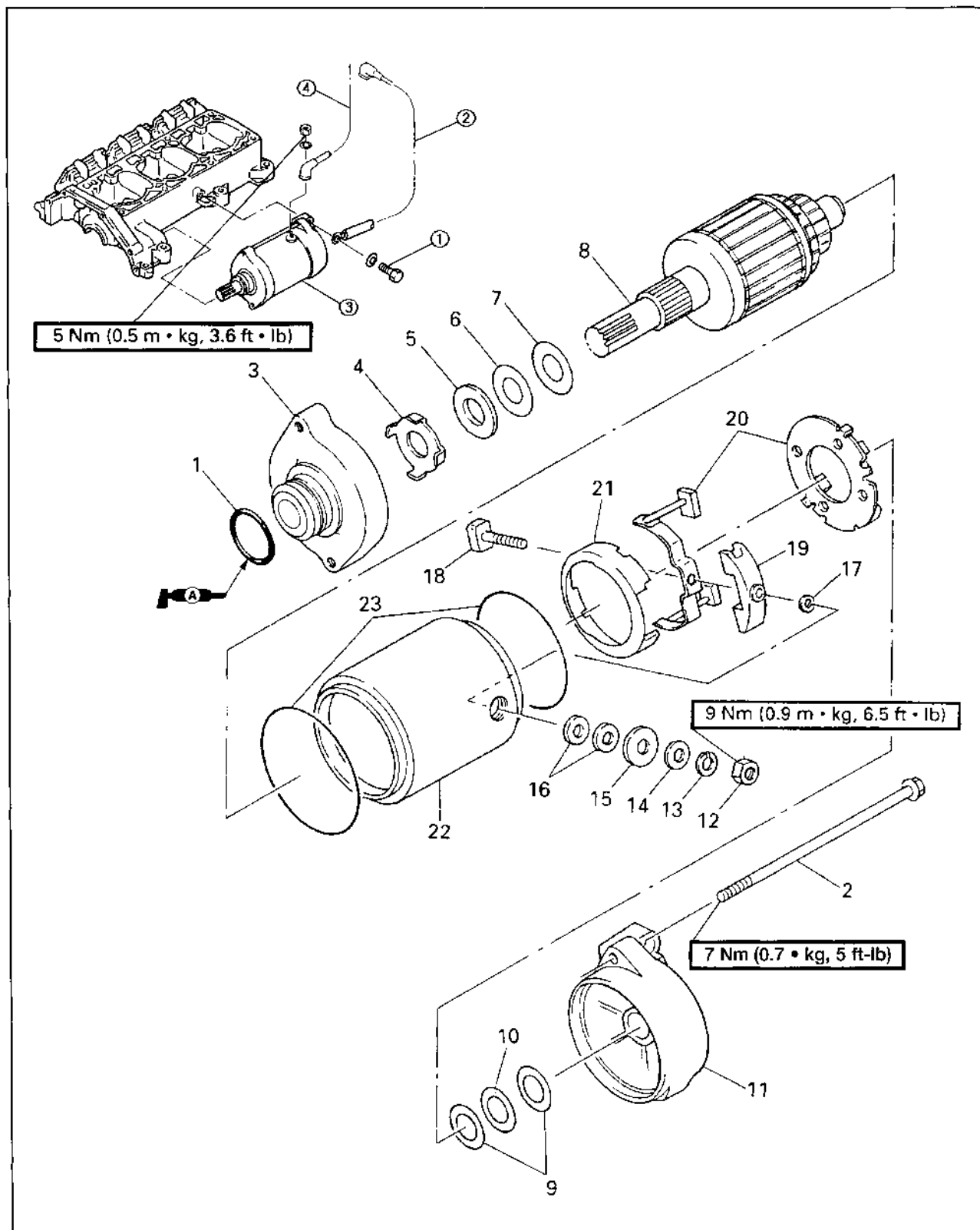
Brown lead ① → Positive terminal
Black lead ② → Negative terminal

- Check that there is continuity between the starter relay terminals.

3. Access:
 - Disassemble Electrical Unit
 - Refer to "ELECTRICAL UNIT" in Chapter 5.



STARTER MOTOR EXPLODED DIAGRAM





REMOVAL AND INSTALLATION CHART

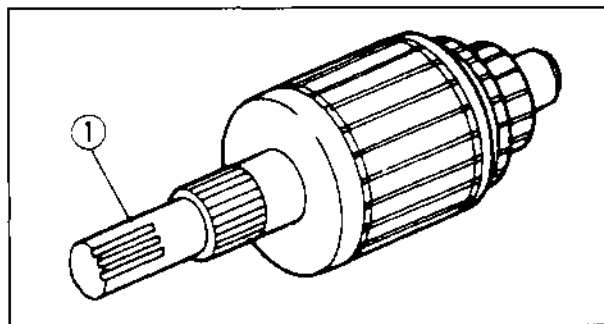
Step	Procedure / Part Name	Qty (ea.)	Service Points
	STARTER MOTOR REMOVAL		Follow the "Step" order for removal.
①	Bolt (with washer)	2	
②	Negative Lead	1	
③	Starter Motor	1	
④	Positive Lead	1	
	STARTER MOTOR DISASSEMBLY		Follow the "Step" order for removal.
	Starter Motor Assembly		
1	O-Ring	1	
2	Through Bolt	2	
3	Front Bracket	1	
4	Thrust Supporter	1	
5	Insulator Washer	1	
6	Washer	1	0.2mm
7	Washer	1	0.5mm
8	Armature Assembly	1	
9	Washer	2	0.2mm
10	Washer	1	0.8mm
11	Rear Bracket	1	
12	Nut	1	
13	Spring Washer	1	
14	Plate Washer	1	
15	Insulator Washer	1	
16	Insulator Washer	2	
17	O-Ring	1	
18	Bolt	1	
19	Terminal Insulator	1	
20	Brush Holder	1	
21	Plate Cover	1	
22	Yoke Assembly	1	
23	Packing	2	
			Reverse the removal steps for installation.



SERVICE POINTS

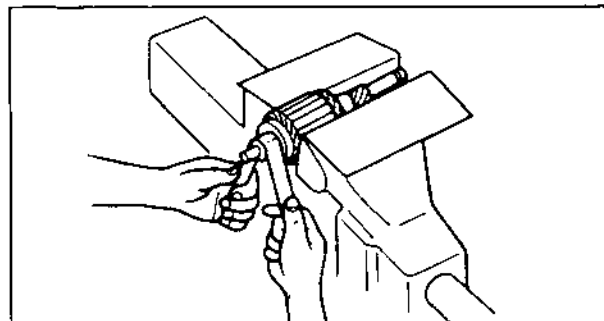
Pinion inspection

1. Inspect:
 - Pinion teeth ①
Wear/Damage → Replace.

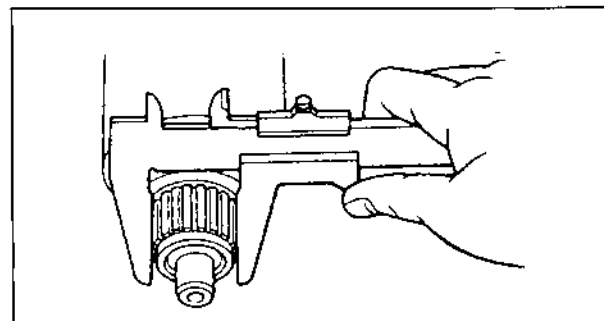


Armature inspection

1. Inspect:
 - Commutator
Dirty → Clean with #600 abrasive paper.



2. Measure:
 - Commutator diameter
Out of specification → Replace.



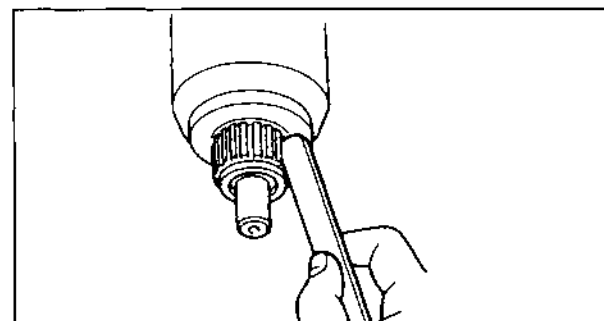
3. Check:
 - Commutator undercut
Clog/Dirt → Clean.



Commutator Diameter:
Limit 1.06 in

NOTE:

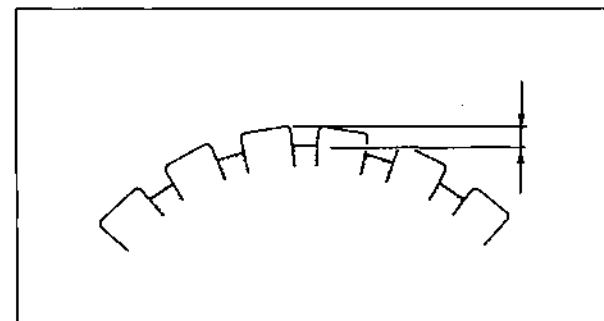
Remove all particles of mica and metal using compressed air.

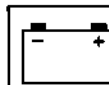


4. Measure:
 - Commutator undercut
Out of specification → Replace.




Commutator Undercut:
Limit 0.01 in (0.2mm)

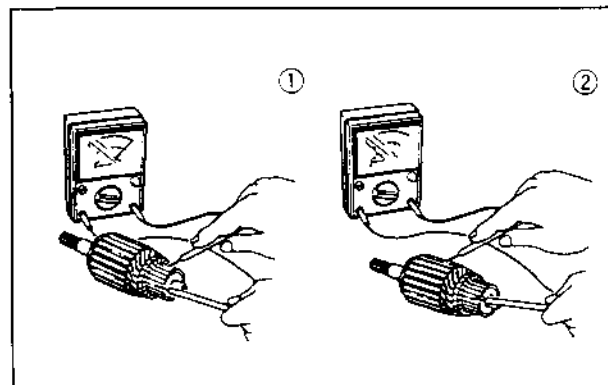




5. Inspect:


- Armature coil continuity
Out of specification → Replace.

 Armature Coil Continuity:	
Commutator segments ①	Continuity
Segment - Laminations ②	No Continuity
Segment - Shaft	No Continuity

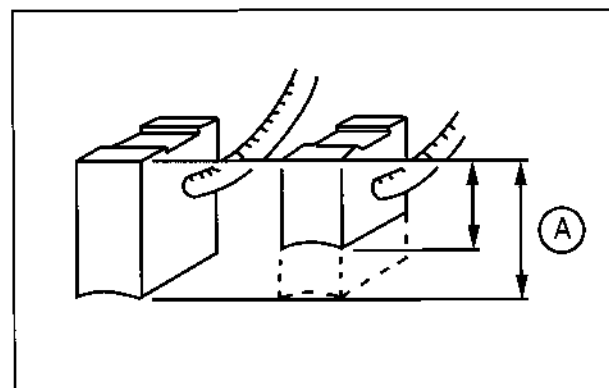
**Brush holder inspection**

1. Inspect:

- Brush length (A)


 Brush Length: Wear Limit Limit 0.26 in (6.5mm)	
---	--

Out of specification → Replace.

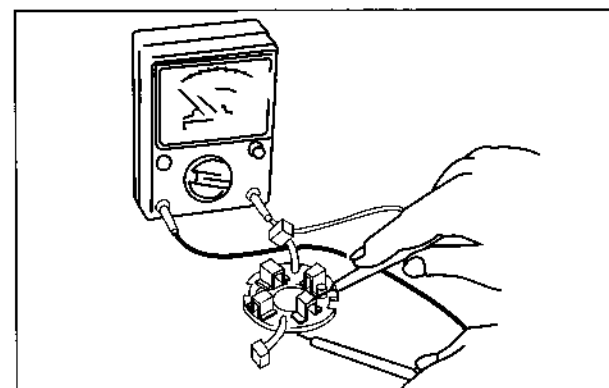


2. Check:

- Brush holder continuity

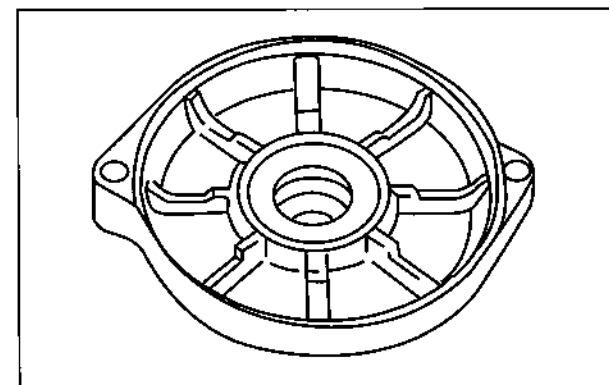
 Brush Holder Continuity:	
Brush holder - Base	No Continuity

Out of specification → Replace.

**Cover inspection**

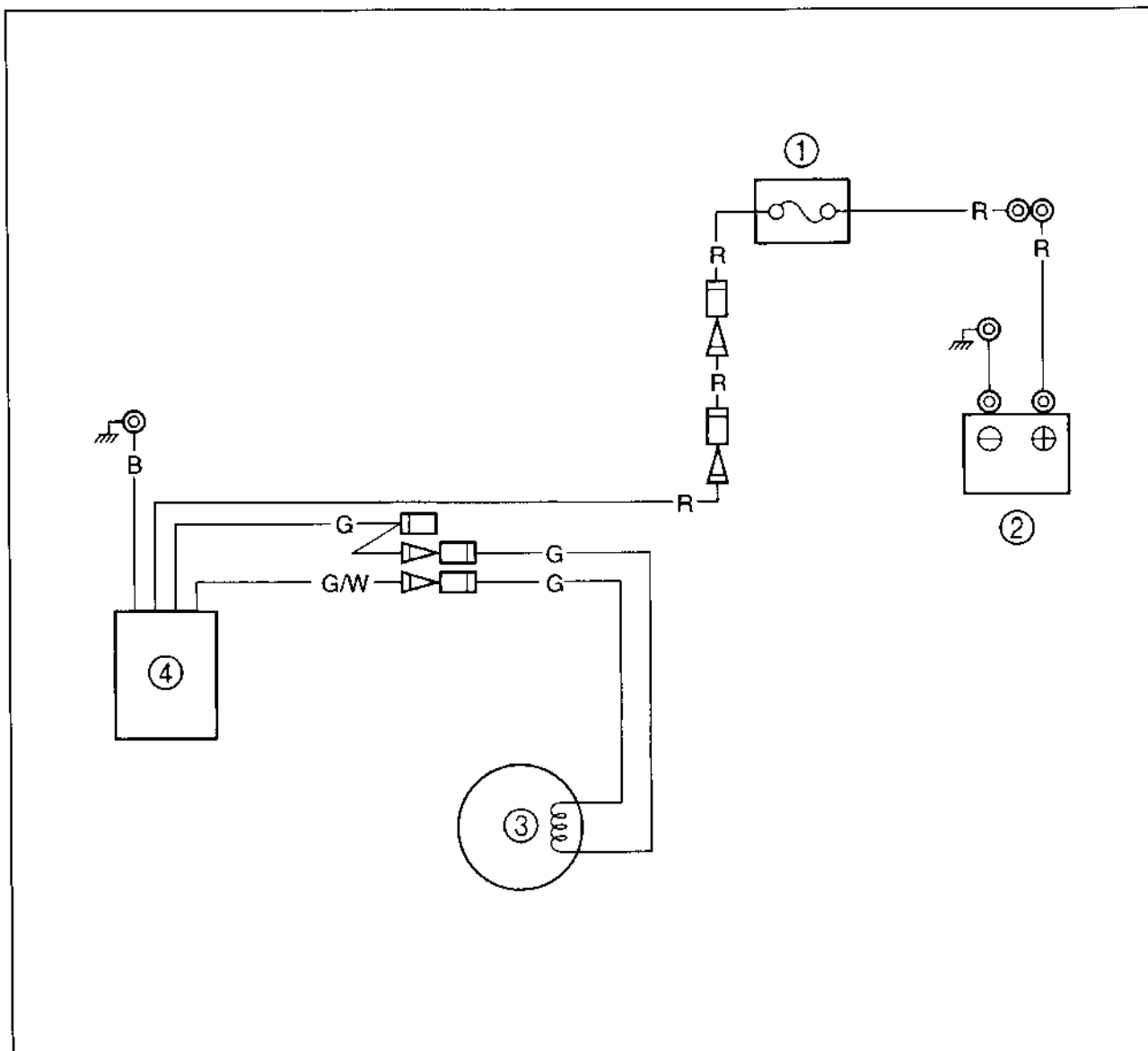
1. Inspect:

- Cover bushing
Wear/Damage → Replace the cover.



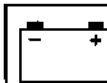


CHARGING SYSTEM WIRING DIAGRAM



- ① Fuse
- ② Battery
- ③ Lighting Coil
- ④ Rectifier Regulator

- B : Black
- G : Green
- G/W : Green/White
- R : Red



FUSE

Refer to the "STARTING SYSTEM" section.

BATTERY

Refer to "ELECTRICAL" in Chapter 3.

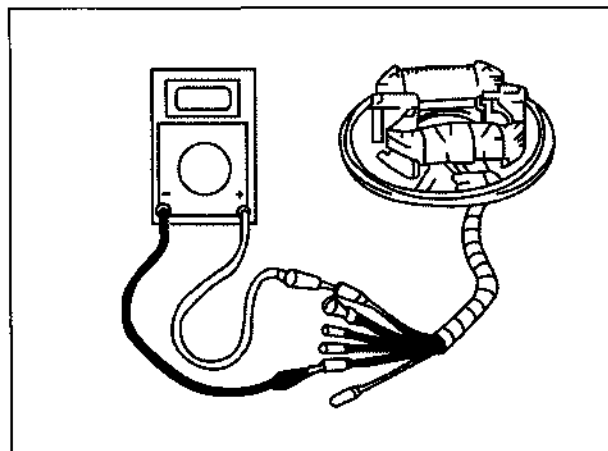
LIGHTING COIL

1. Measure:

- Lighting coil resistance
Out of specification → Replace.
- Peak voltage
Out of specification → Replace.
Refer to Peak Voltage Chart in the "IGNITION" section.

NOTE:

When measuring the resistance of 10Ω or less using the digital tester, the correct measurement cannot be obtained. Refer to "Low Resistance Measurement" (page 7-7).



Lighting Coil Resistance:
Green (G) - Green (G)
 $0.56 \sim 0.84\Omega$ at 68°F (20°C)

2. Testing:

- Disassemble Electrical Unit
Refer to "ELECTRICAL UNIT" in Chapter 5.

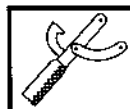
3. Replacement:

- Remove to Flywheel Cover
Refer to "FLYWHEEL COVER" in Chapter 5.

RECTIFIER REGULATOR

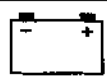
1. Check:

- Continuity
Out of specification → Replace.
- ∞ : Discontinuity O: Continuity

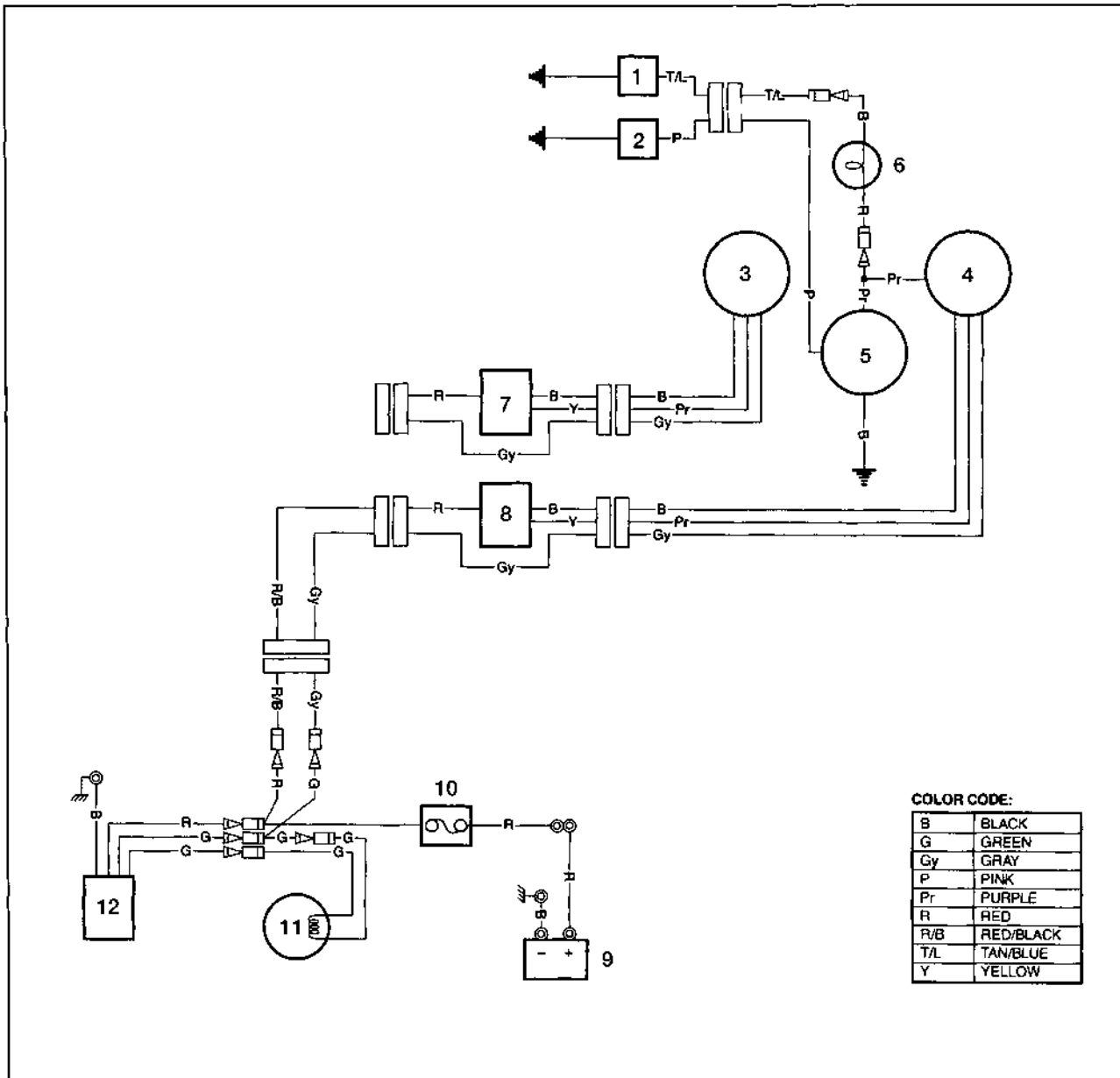


Pocket Tester:
YU-03112

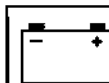
\oplus	\ominus	R	B	G	G/W
R			∞		∞
B		O		O	O
G		O	∞		∞
G/W		O	O	O	



INSTRUMENTS SYSTEM WIRING DIAGRAM



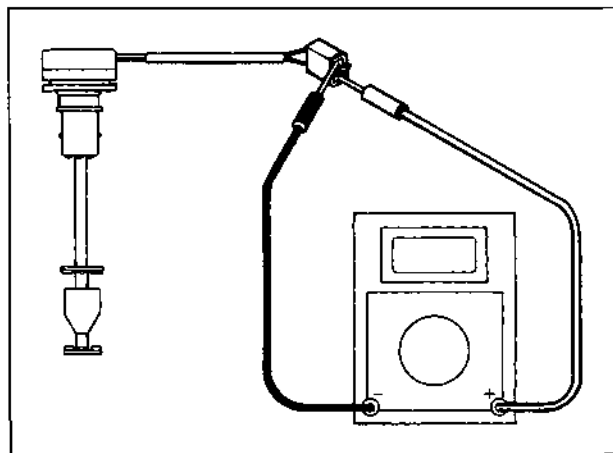
- | | |
|--------------------------|--------------------------|
| ① Oil Switch | ⑦ Key Switch (Port) |
| ② Fuel Level Sensor | ⑧ Key Switch (Starboard) |
| ③ Tachometer (Port) | ⑨ Battery |
| ④ Tachometer (Starboard) | ⑩ Fuse |
| ⑤ Fuel Gauge | ⑪ Lighting Coil |
| ⑥ Oil Warning | ⑫ Rectifier Regulator |

**OIL SWITCH**

1. Check:

- Continuity
Out of specification → Replace.

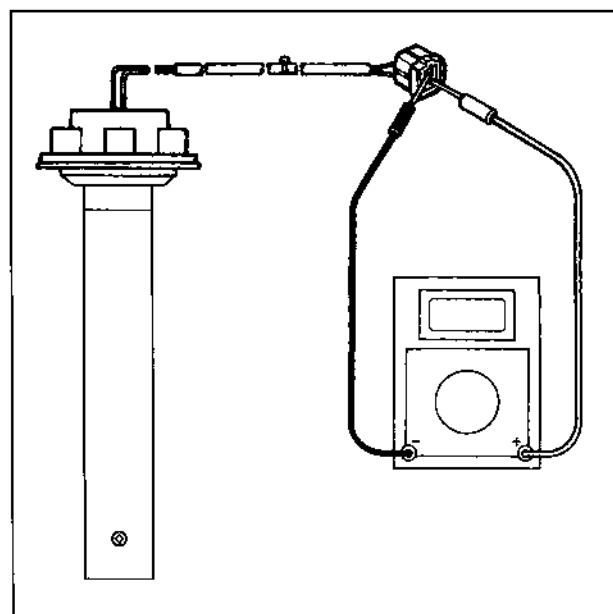
Oil Switch Continuity:		
Position	Leads	
	Purple	Yellow
Top		
Bottom	○ — ○	○ — ○

**FUEL LEVEL SENSOR**

1. Check:

- Resistance
Out of specification → Replace.

Fuel Level Sensor Resistance:		
Position	Leads	
	Pink	Black
Top	32Ω	
Bottom	250Ω	



2. Access:

- Remove rear seat base.
Refer to "SEAT FITTINGS" in Chapter 8.

FUEL GAUGE

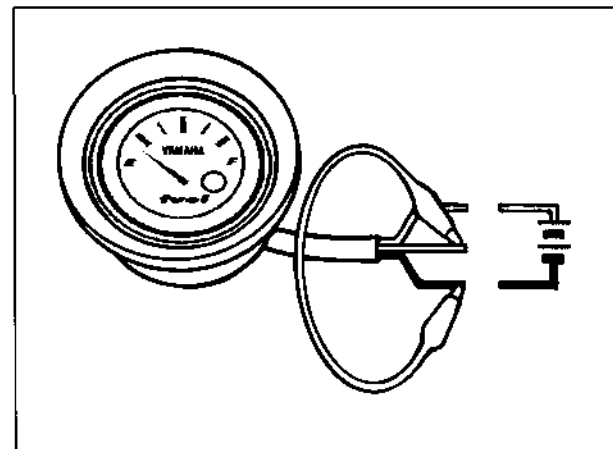
1. Check:

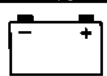
- Indication
Out of specification → Replace.

Fuel Meter Indication:		
Indication	Leads	
	Pink	Black
"F"	○ — ○	○ — ○
"E"		

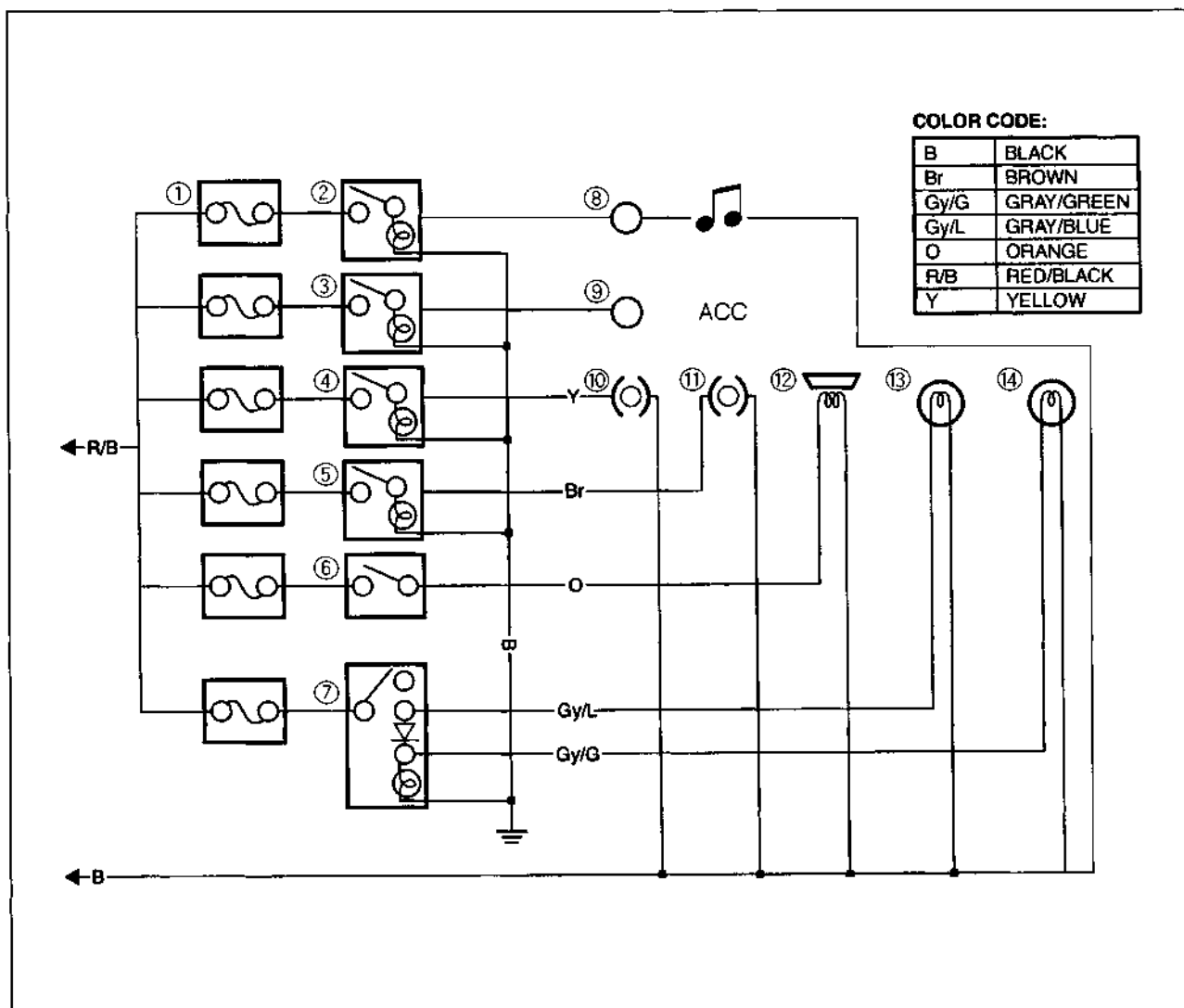
NOTE:

The meter should be battery powered for this inspection.

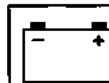




SWITCH AND COMPONENT WIRING DIAGRAM



- | | |
|---------------------------|------------------|
| ① Circuit Breaker | ⑧ Radio |
| ② Stereo Switch | ⑨ Accessory Lead |
| ③ Accessory Switch | ⑩ Blower Motor |
| ④ Blower Switch | ⑪ Bilge Pump |
| ⑤ Bilge Pump Switch | ⑫ Horn |
| ⑥ Horn Switch | ⑬ Stern Light |
| ⑦ Navigation Light Switch | ⑭ Bow Light |



KEY SWITCH

Refer to the "STARTING SYSTEM" section.

CIRCUIT BREAKER

1. Check:

- Continuity
- Discontinuity → Replace.

NOTE:


Push the button once and recheck it.

PANEL SWITCHES

Panel switch continuity

1. Check:

- Continuity
- Out of specification → Replace.

	Panel Switch Continuity:	
	Leads	
	1	2
On	O	O
Off		


Navigation light switch continuity

1. Check:

- Continuity
- Out of specification → Replace.

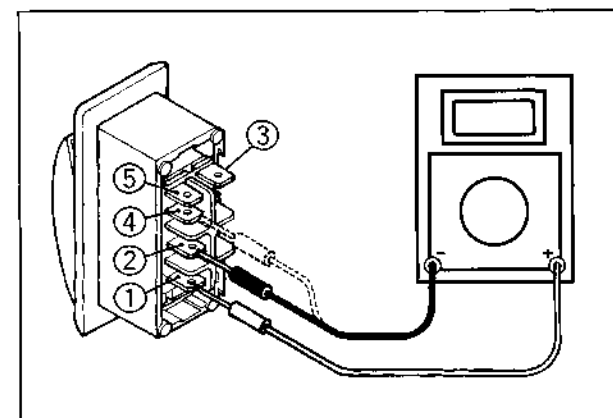
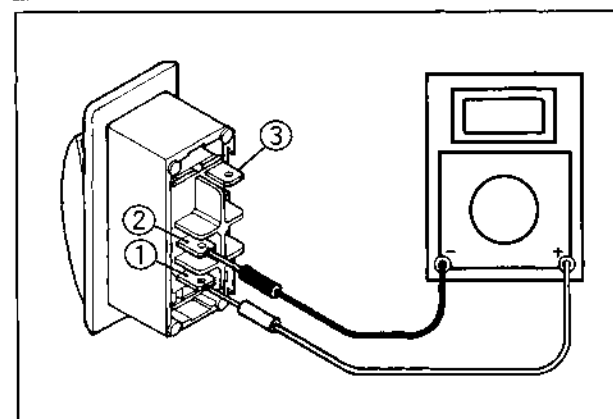
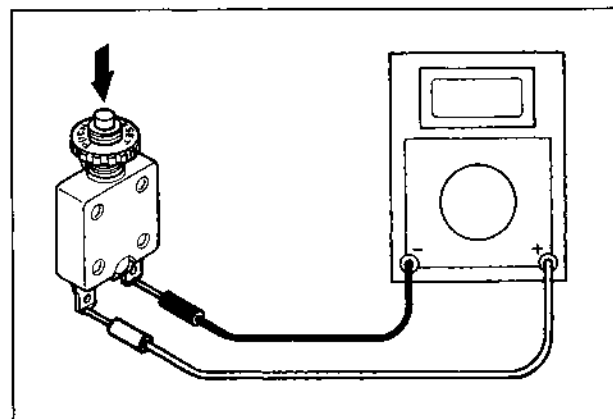
2. Check:

- Diode
- No continuity, continuity both directions → Replace.

	Navigation Light Switch Continuity:		
	Leads		
	1	2	4
Top in	O	O	
Bottom in		O	O
Off			

NOTE:

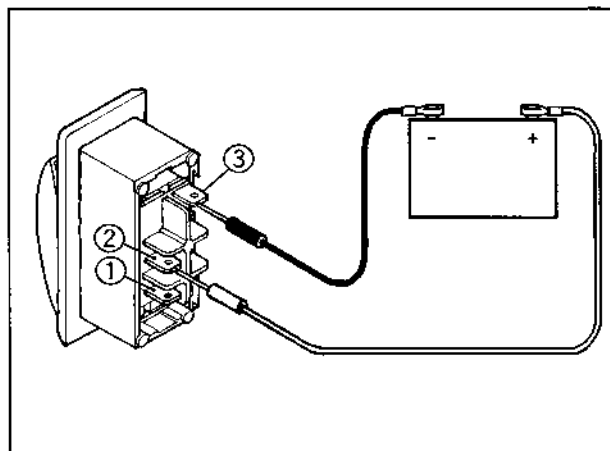
The navigation light switch test is with the diode and jumper wire removed.





	Panel Switch Light:	
	Leads	
	2	3
On	0	0
Off		

NOTE: The horn switch has no light.



BLOWER MOTOR

1. Check:

- Motor running
Malfunction →
Check switch and wiring → Replace.

BILGE PUMP

1. Check:

- Turn on switch - pump should cycle for approximately 1 second.
Malfunction →
Check switch and wiring → Replace.

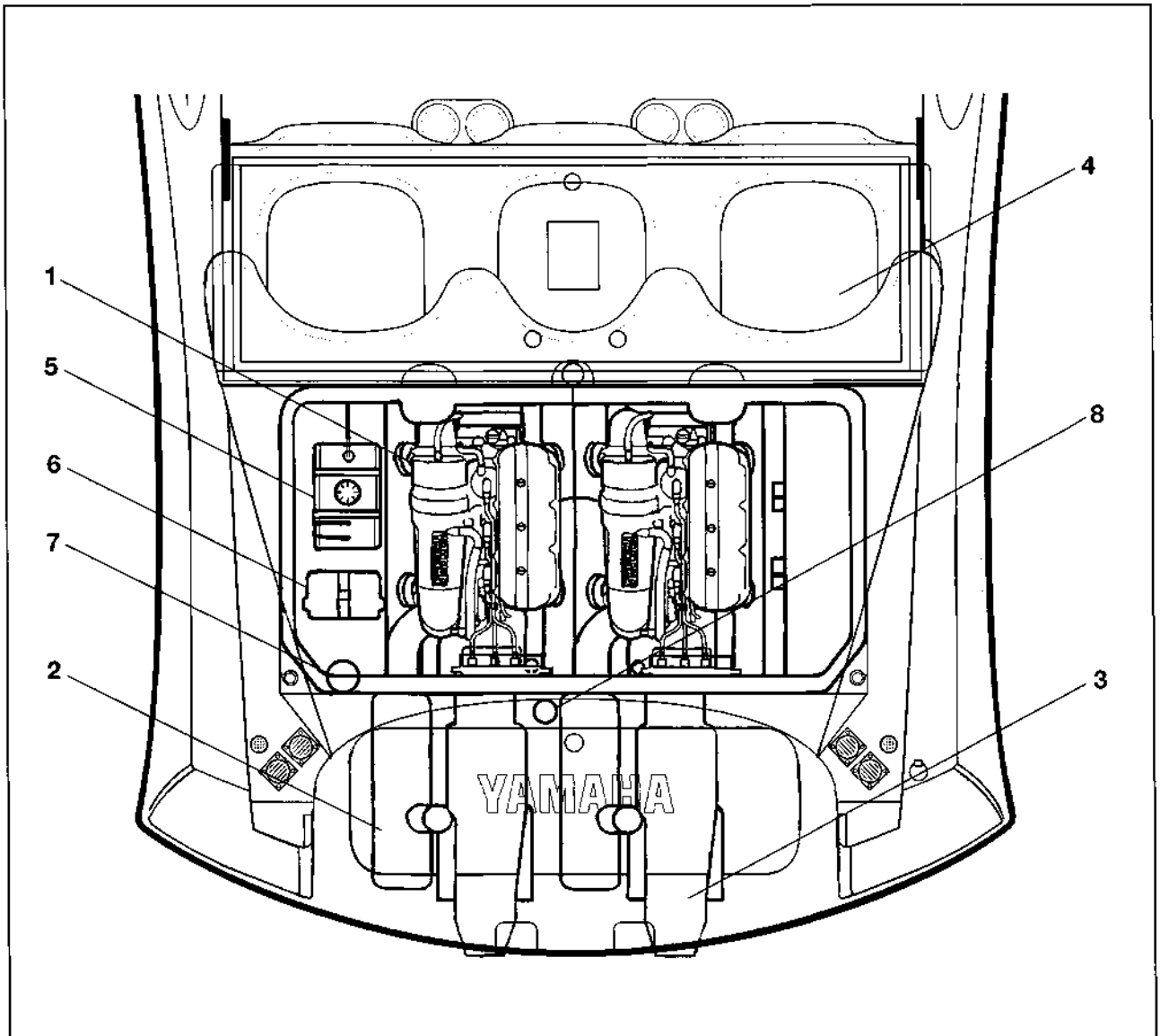
CHAPTER 8

HULL AND DECK

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ENGINE COMPARTMENT LAYOUT EXPLODED DIAGRAM

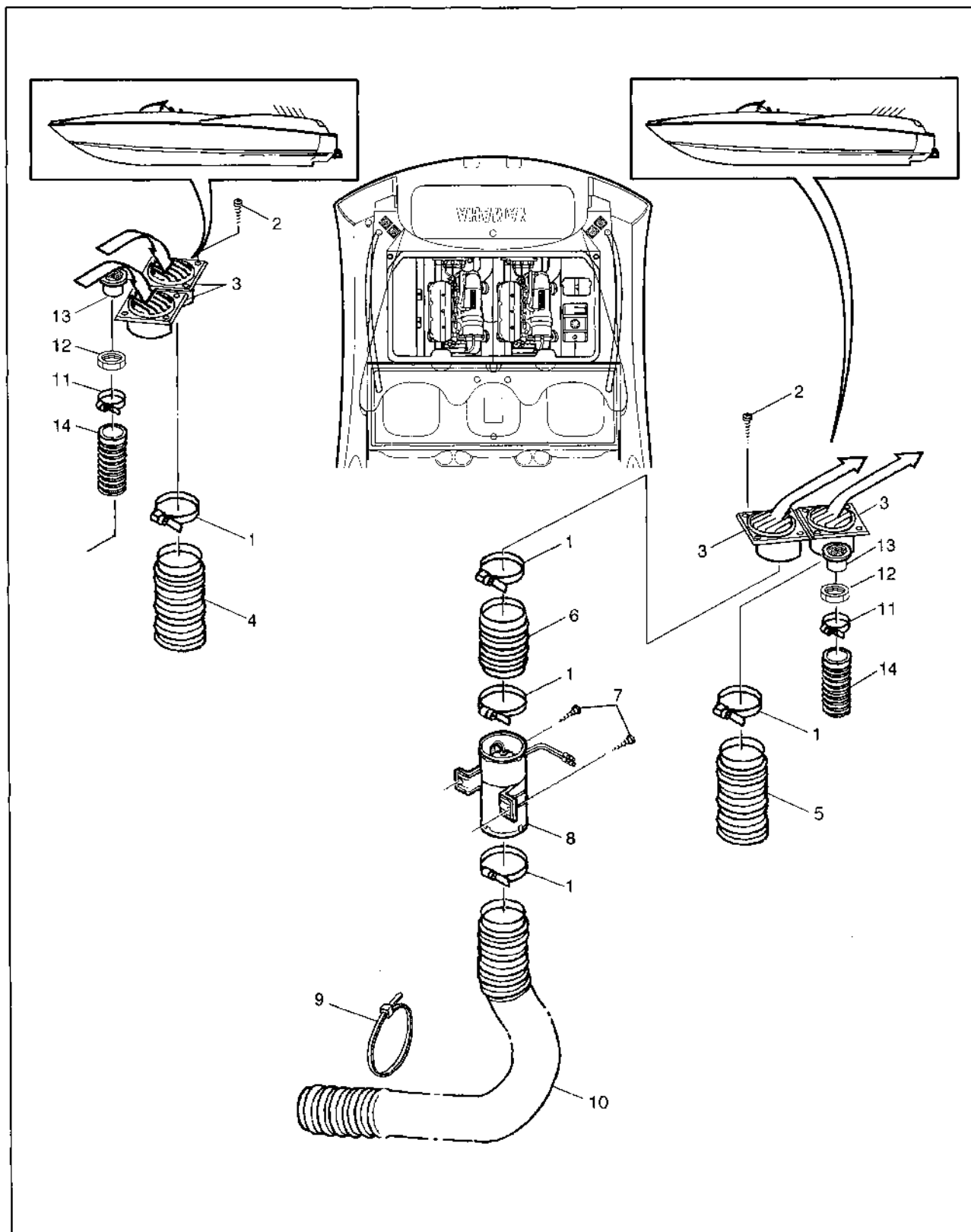


- 1. Engine
- 2. Water Lock
- 3. Jet Pump
- 4. Fuel Tank

- 5. Oil Tank
- 6. Battery
- 7. Blower
- 8. Bilge Pump



VENTILATION SYSTEM EXPLODED DIAGRAM



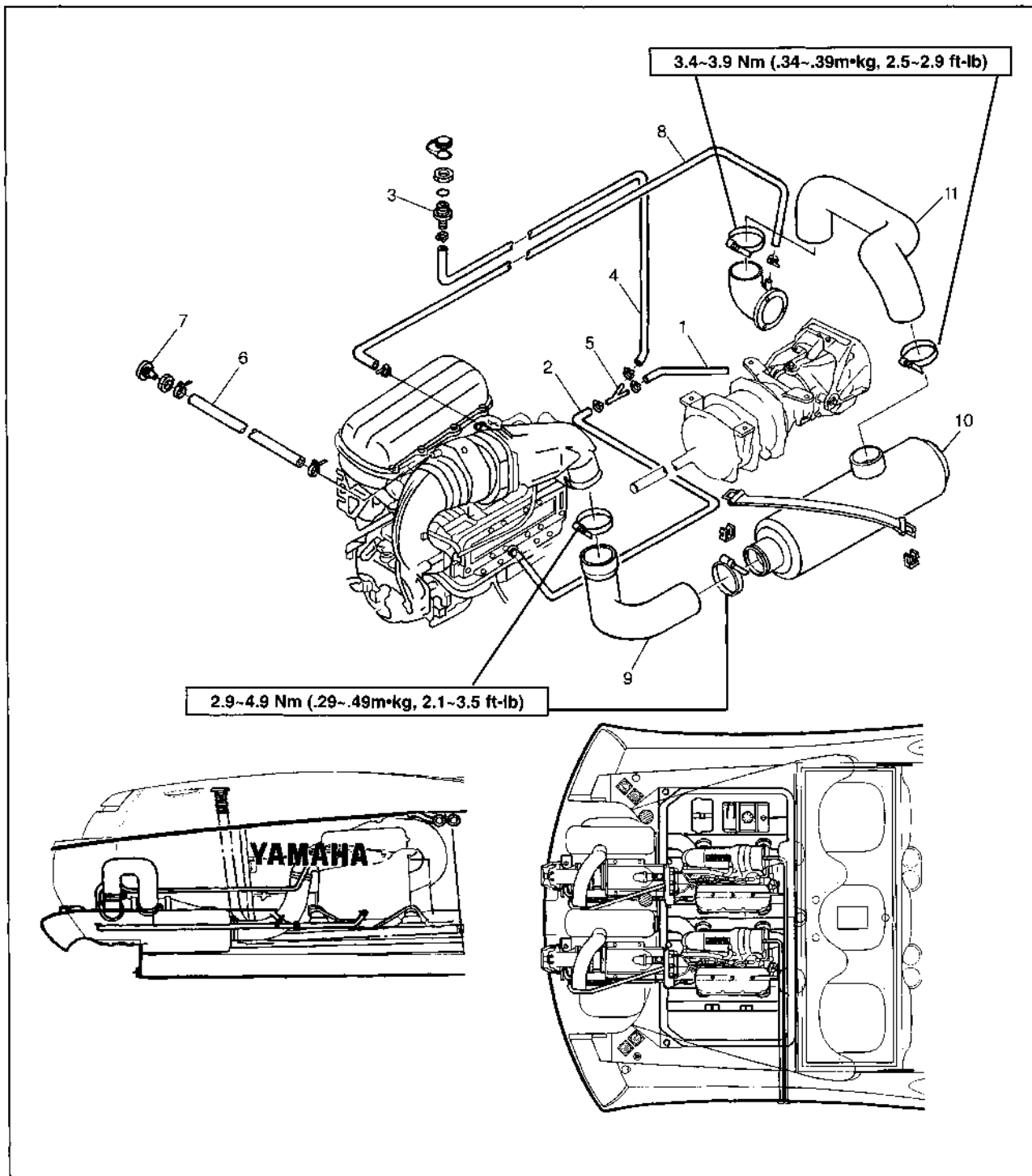


REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	VENTILATION SYSTEM DISASSEMBLY		Follow the "Step" order for removal.
1	Tie Wrap	6	
2	Screw, Oval Head Tapping	16	
3	Ventilator 1	4	
4	Hose, Ventilation	2	Intake 28"
5	Hose, Ventilation	1	Exhaust 50"
6	Hose, Ventilation	1	Exhaust 36"
7	Screw, Truss Head Tapping	2	
8	Blower Assembly	1	
9	Tie Wrap	1	
10	Hose, Ventilation	1	Exhaust 19"
11	Tie Wrap	2	
12	Nut, Ventilator 2	2	
13	Ventilator 2	2	
14	Hose, Ventilation	2	Tank Room
			Reverse the removal steps for installation.



COOLING SYSTEM EXPLODED DIAGRAM



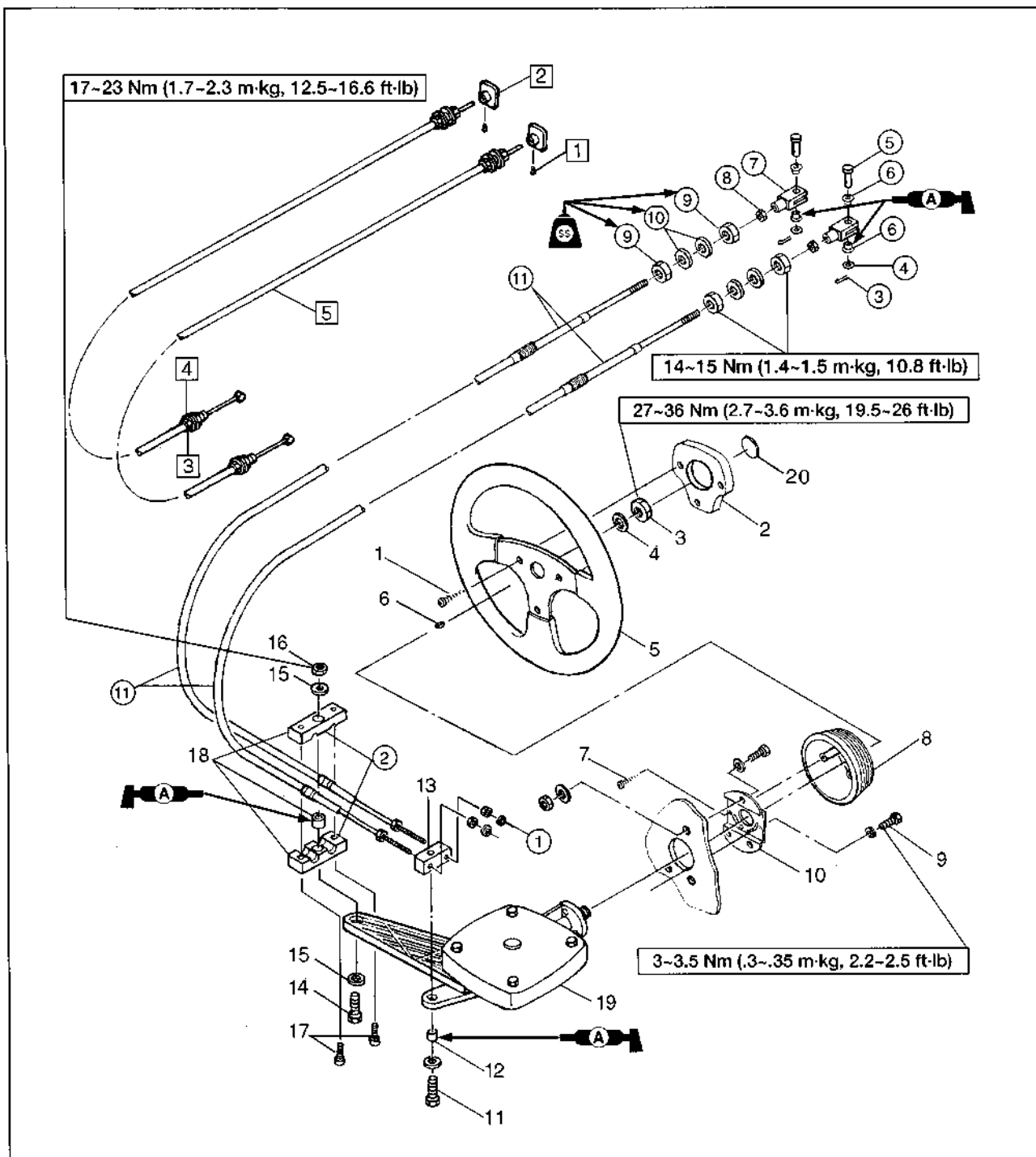


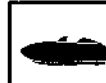
REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	COOLING SYSTEM REMOVAL		Follow the "Step" order for removal.
1	Inlet Water Hose 1	1	
2	Inlet Water Hose 2	1	
3	Flushing Device	1	
4	Flushing Water Hose	1	
5	Y Fitting	1	
6	Pilot Water Hose	1	
7	Through Hull Fitting (pilot outlet)	1	
8	Bypass Water Hose	1	
9	Exhaust Hose 1	1	
10	Water Lock	1	
11	Exhaust Hose 2	1	
			Reverse the removal steps for installation.



STEERING SYSTEM EXPLODED DIAGRAM



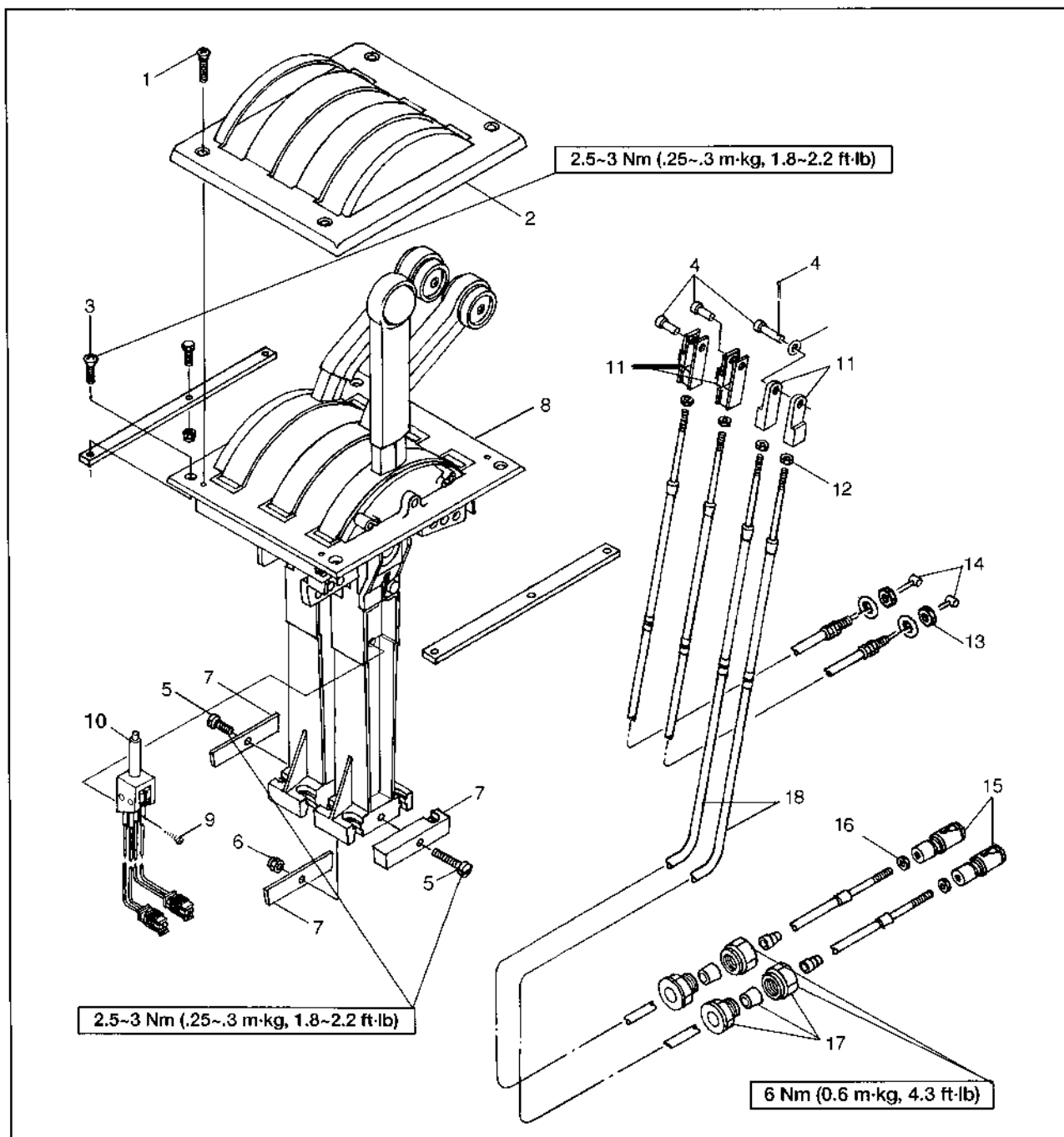


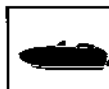
REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	STEERING HELM REMOVAL		Follow the "Step" order for removal.
1	Screw, Tapping	3	Loosen for cable removal
2	Steering Wheel Cover	1	
3	Nut	1	
4	Washer	1	
5	Steering Wheel	1	
6	Key	1	
7	Screw, Tapping	2	
8	Helm, Bezel	1	
9	Bolt (with washer)	3	
10	Mount, Steering	1	
11	Bolt, Flange	1	
12	Bearing, Brass	1	
13	Block, Pivot Arm	1	
14	Bolt	1	
15	Washer, Flat	2	
16	Locknut	1	
17	Screw, Panhead	2	
18	Connector Sub Assembly	1	
19	Steering Master Assembly	1	
20	Emblem Steering Wheel	1	
	STEERING CABLE		Loosen for cable removal
①	Nut (with washer)	2	
②	Connector Sub-Assembly	1	
③	Cotter Pin	2	
④	Washer	2	
⑤	Clevis Pin	2	
⑥	Bushing, Nylon	4	
⑦	Steering Clevis	2	
⑧	Nut	2	
	Clean-out Tray		Refer to "JET PUMP CLEAN-OUT PORTS" in Chapter 6.
⑨	Anchor Nut	4	Seal on inside of hull.
⑩	Washer	4	
⑪	Steering Cable Assembly	2	
	Seat Base		Refer to "SEAT FITTINGS" in Chapter 6.
	CHOKE CABLE		Refer to "SEAT FITTINGS" in Chapter 6.
1	Screw, Set	2	
2	Choke Knob	2	
3	Nut, Cable End	2	
4	Washer, Cable End	2	
	Seat Base		Refer to "SEAT FITTINGS" in Chapter 6.
5	Choke Cable Assembly	2	
			Reverse the removal steps for installation.



REMOTE CONTROL SYSTEM EXPLODED DIAGRAM



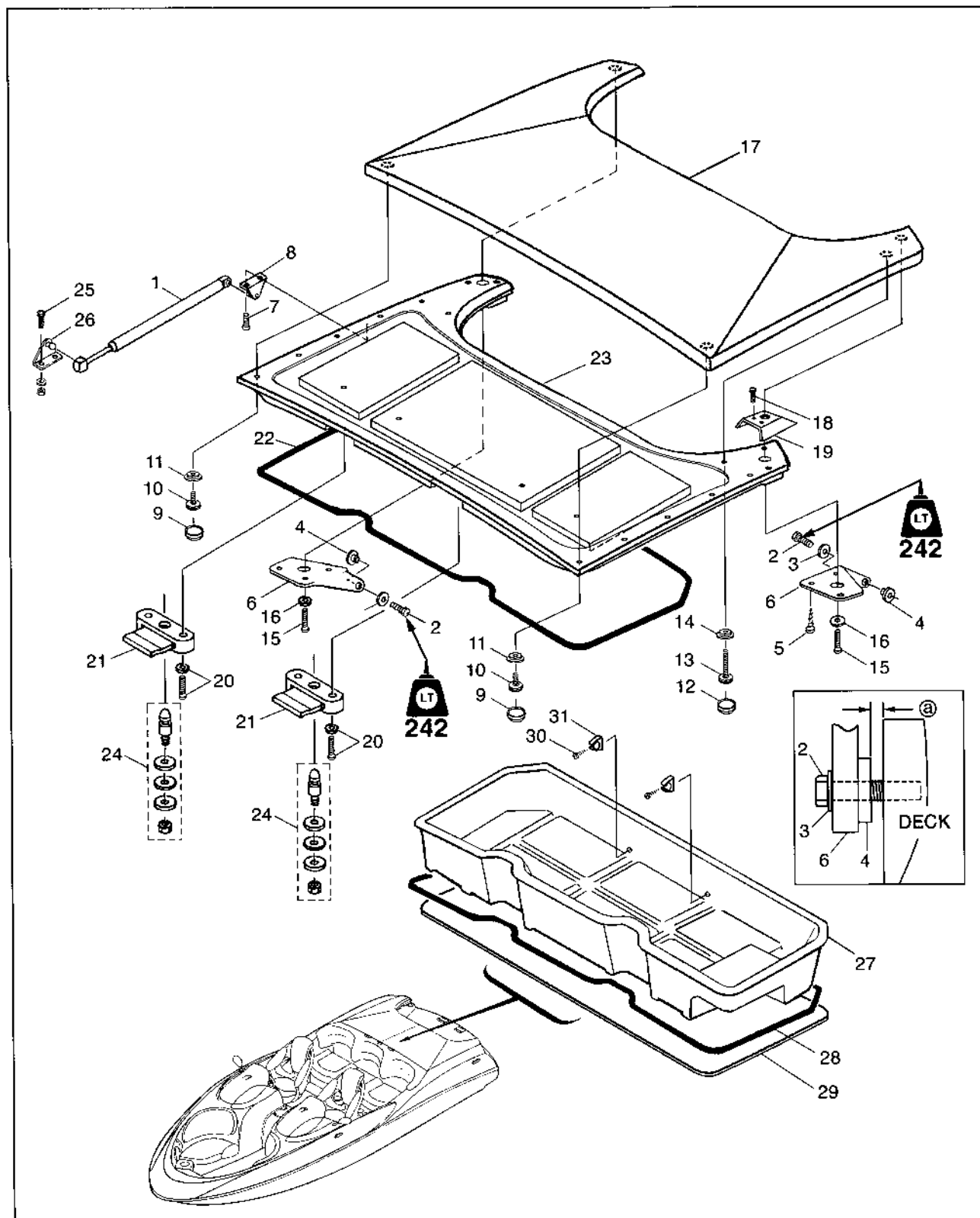


REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	REMOTE CONTROL UNIT REMOVAL		Follow the "Step" order for removal.
1	Screw, Oval Head	4	
2	Plate, Remote Control	1	
3	Screw, Flat Head	4	
4	Clevis Pin	4	
5	Screw, Plate	2	
6	Nut	1	
7	Plate, Retaining	2	
8	Remote Control Assembly	1	
9	Screw	1	
10	Switch, Neutral	1	
	CABLE REMOVAL		
11	Clevis Assembly	4	
12	Nut	4	
13	Nut	2	
14	Cable, Throttle	2	
15	Shaft Joint Ball	2	
16	Nut	2	
	Clean-out Tray		Refer to "JET PUMP CLEAN-OUT PORTS" in Chapter 6.
17	Thru-hull Fitting	2	
18	Cable, Shift	2	
			Reverse the removal steps for installation.




ENGINE HATCH EXPLODED DIAGRAM





REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	ENGINE HATCH REMOVAL AND DISASSEMBLY		Follow the "Step" order for removal.
1	Hatch Support	1	⚠ WARNING Do not overtighten the engine hatch pivot bolt.
2	Bolt	2	
3	Nylon Washer	2	
4	Bushing	2	 Engine Hatch Hinge to Deck Clearance: @: 0.02" (0.5mm)
5	Screw	6	
6	Hinge	2	
7	Screw	2	1-1/2" Long
8	Top Support Bracket	1	
9	Cap	18	
10	Screw, Pan Head	18	3" Long
11	Washer, Stepped	18	
12	Cap	2	
13	Screw, Pan Head	2	3" Long
14	Washer, Stepped	2	
15	Screw, Pan Head	2	
16	Washer, Flat	2	
17	Pad, Engine Hatch	1	
18	Screw	9	
19	Hinge Cover	2	
20	Screw, Pan Head (w/Washer)	4	
21	Latch	2	
22	Gasket, Hatch	1	
23	Engine Hatch	1	
24	Latch Pin Assembly	2	
25	Bolt (w/nut and washer)	2	
26	Support Bracket, Lower	1	
27	Tray	1	
28	Gasket	1	
29	Foam	1	
30	Screw	2	
31	Stern Light Pole Clip	2	Reverse the removal steps for installation.

SERVICE POINTS

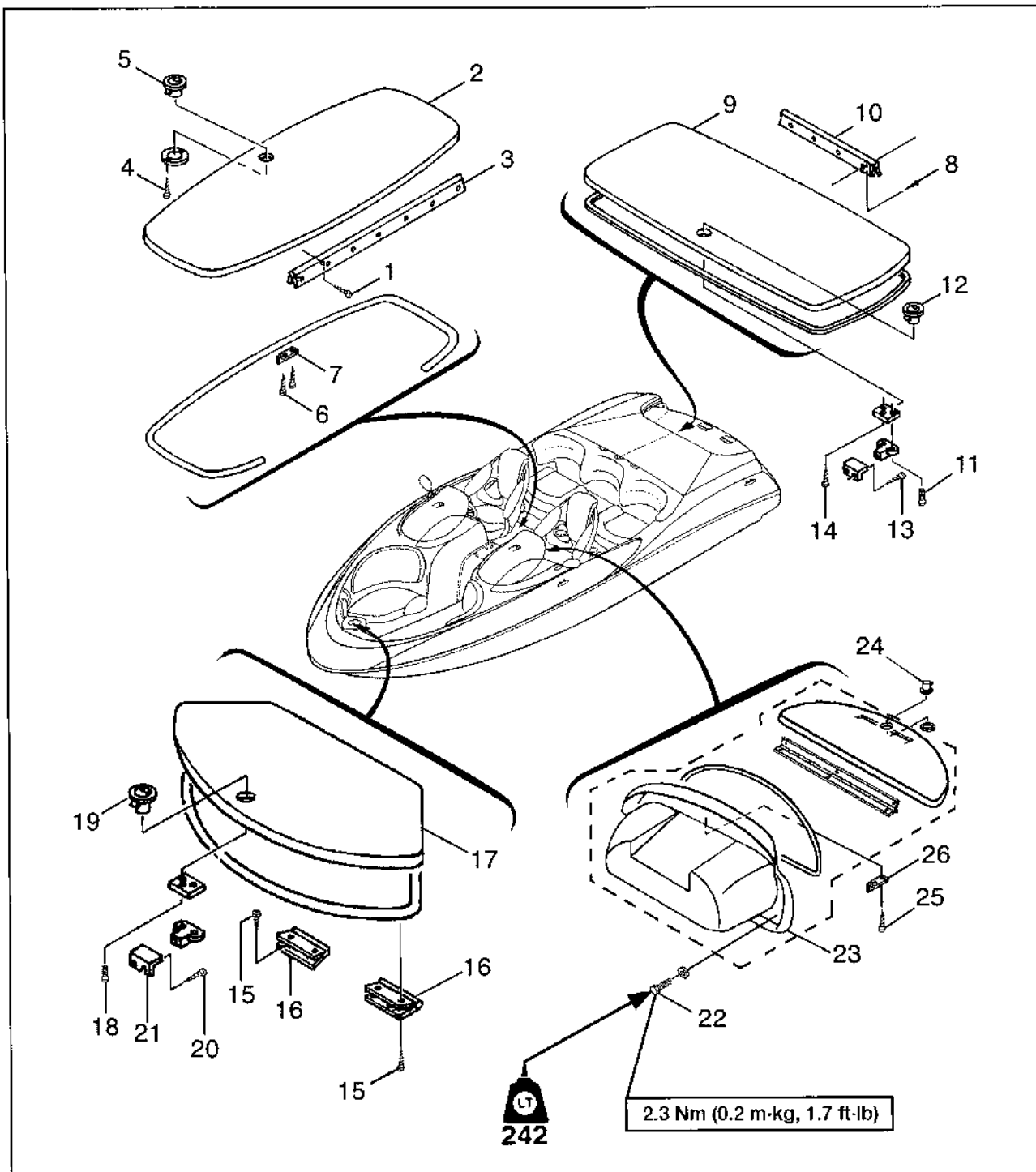
Engine hatch installation

Install the engine hatch pivot bolts using Loctite #242.

Tighten the bolt until a 0.02" (0.5mm) gap is achieved between the hinge bushing and the deck.



HATCH FITTINGS EXPLODED DIAGRAM



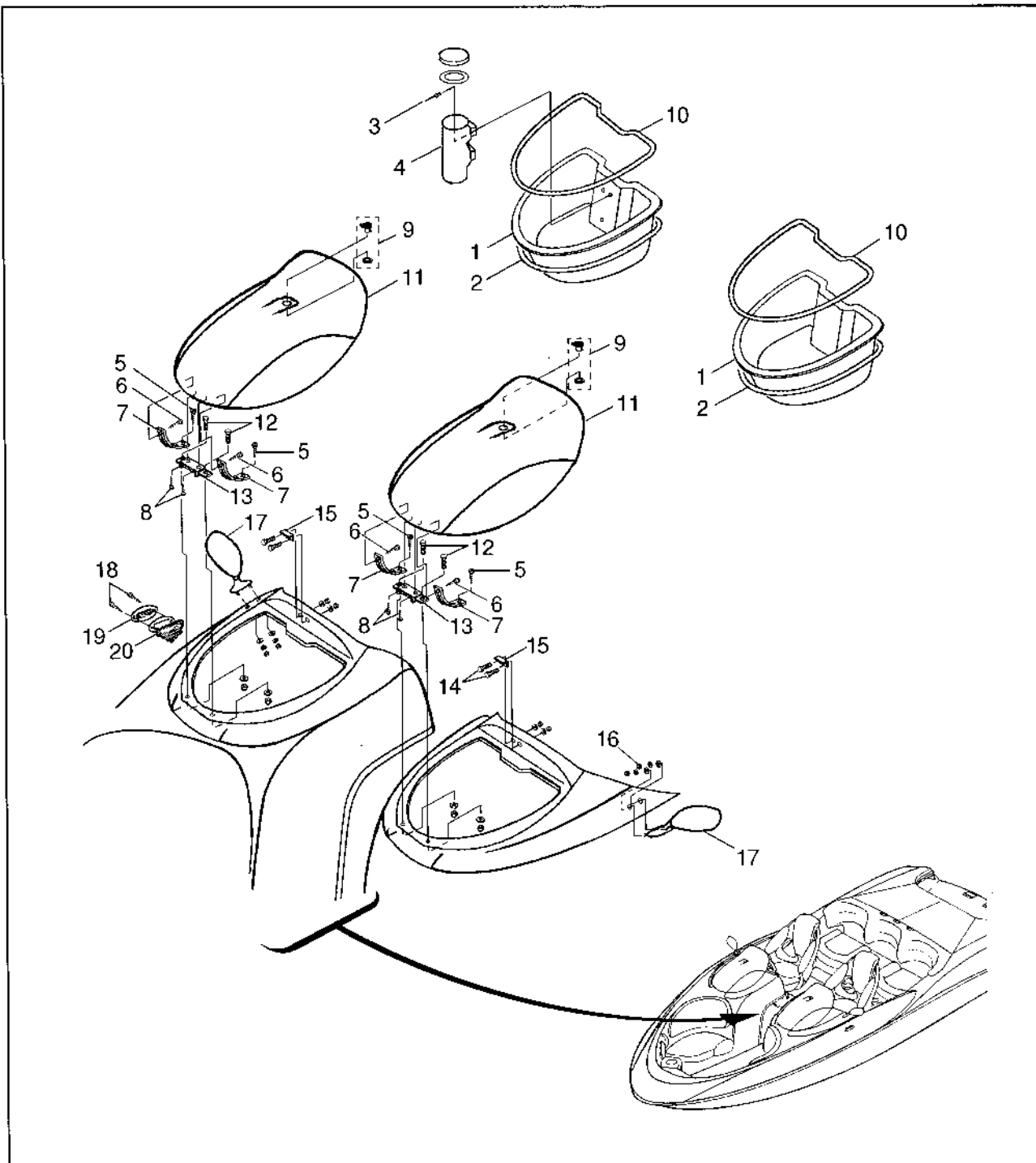


REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	SKI LOCKER HATCH DISASSEMBLY		Follow the "Step" order for removal.
1	Screw, Tapping	12	
2	Ski Locker Hatch	1	
3	Hinge	1	
4	Screw, Pan Head	2	
5	Latch	1	
6	Screw, Tapping	2	
7	Latch Plate	1	
	CLEAN-OUT HATCH DISASSEMBLY		
8	Screw, Tapping	16	
9	Clean-out Hatch	1	
10	Hinge	1	
11	Screw, Pan Head	2	
12	Latch	1	
13	Screw, Tapping	2	
14	Latch Plate	1	
	BOW HATCH DISASSEMBLY		Reverse the removal steps for installation.
15	Screw, Tapping	8	
16	Hinge	2	
17	Hatch	1	
18	Screw, Pan Head	2	
19	Latch	1	
20	Screw, Tapping	2	
21	Latch Plate	1	
	GLOVE BOX DISASSEMBLY		
22	Screw (w/ washer)	5	
23	Glove Box Assembly	1	
24	Latch	1	
25	Screw, Tapping	2	
26	Latch Plate	1	



HELM POD DISASSEMBLY EXPLODED DIAGRAM



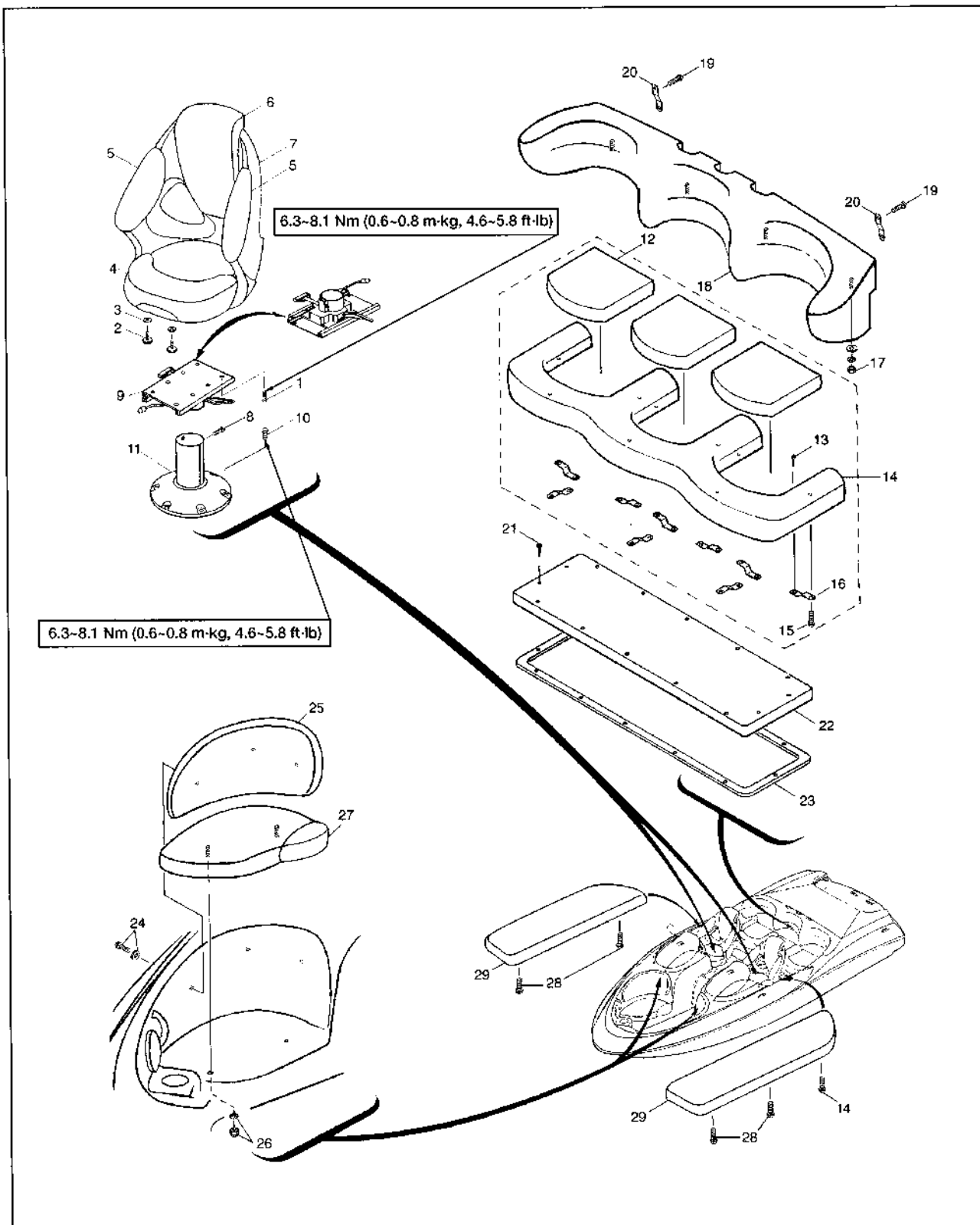


REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	HELM POD DISASSEMBLY		Follow the "Step" order for removal.
1	Locker, Console	2	
2	Seal, Locker	2	
3	Rivet (w/ washer)	3	
4	Fire Extinguisher Case (w/cap)	1	
5	Screw	4	
6	Screw	4	
7	Lid Support	4	
8	Screw	4	
9	Latch	2	
10	Seal, Windshield	2	
11	Windshield	2	
12	Screw (w/ washer and nut)	4	
13	Hinge	2	
14	Screw (w/ washer and nut)	4	
15	Latch Plate	2	
16	Nut (w/ washers)	4	
17	Mirror	2	
18	Screw	2	
19	Horn Grill	1	
20	Horn	1	
			Reverse the removal steps for installation.



SEAT FITTINGS EXPLODED DIAGRAM



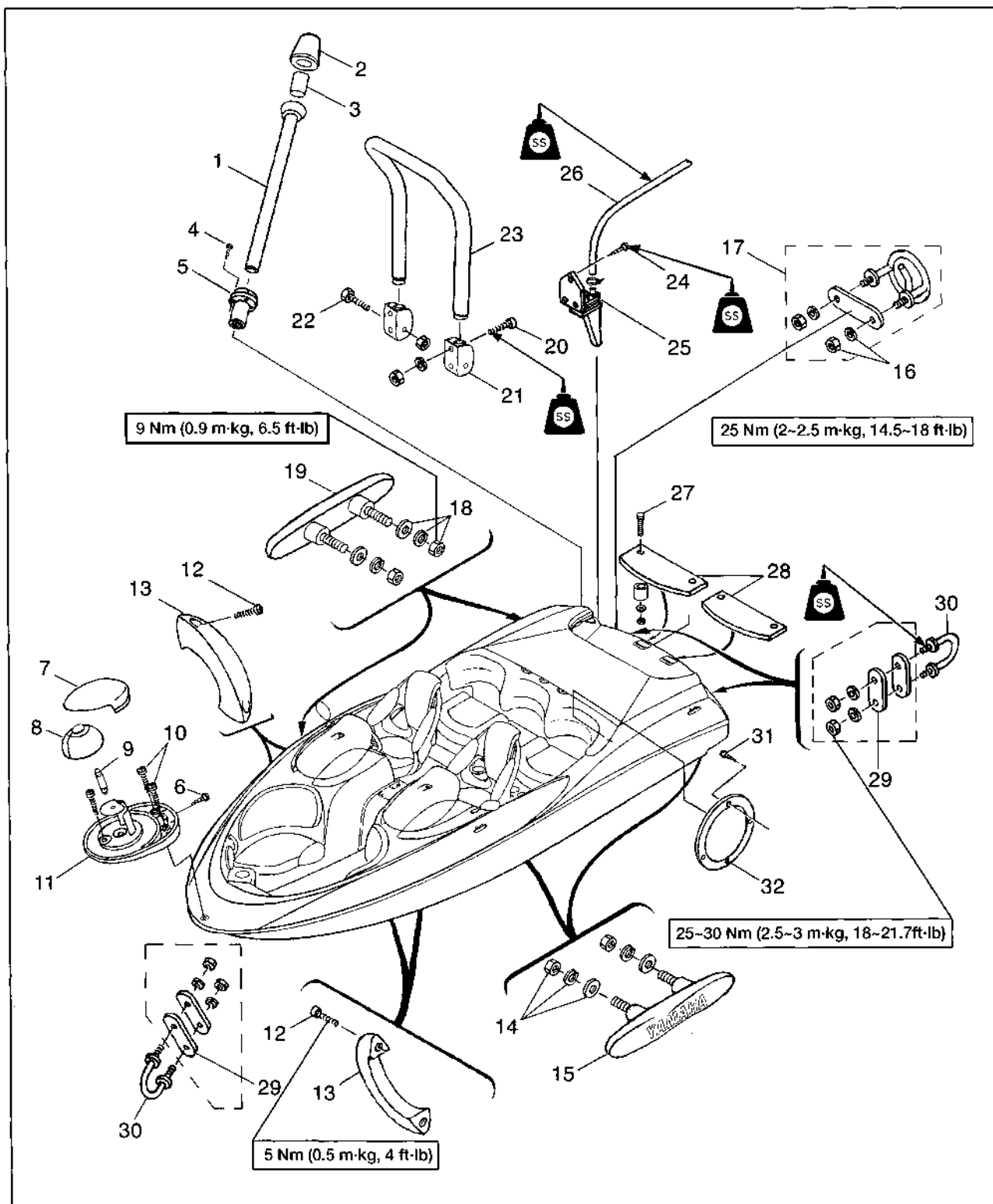


REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	SEAT FITTING DISASSEMBLY		Follow the "Step" order for removal.
1	Screw, Pan Head	16	
2	Screw, Pan Head	8	
3	Washer, Flat	8	
4	Lower Seat Cushion	2	
5	Side Cushions	4	Carefully lift the cushion to disengage the plastic retaining pins.
6	Back Cushion	2	
7	Seat	2	Disengage the lower portion of the back cushion first by pulling forward then lift to release the top.
8	Bolt	4	
9	Pedestal Slide	2	
10	Screw	12	
11	Pedestal Base	2	
	REAR SEAT		
12	Cushion	3	
13	Screw, Tapping	9	
14	Bottom Cushion	1	
15	Screw	9	
16	Bracket, Cushion	9	
	Engine Room Tray		
17	Nut (w/ washers)	4	
18	Back Cushion	1	Lift up to disengage the back brackets.
19	Screw	4	
20	Bracket	2	
21	Screw, Tapping	14	
22	Seat Base Board	1	
23	Seal	1	
	BOW SEAT		
24	Screw, Pan Head (w/ washer)	18	
25	Back Cushion	2	
26	Nut (w/ washer)	4	
27	Bottom Cushion	2	
28	Screw	5	
29	Arm Cushion	2	
			Reverse the removal steps for installation.



DECK FITTINGS EXPLODED DIAGRAM



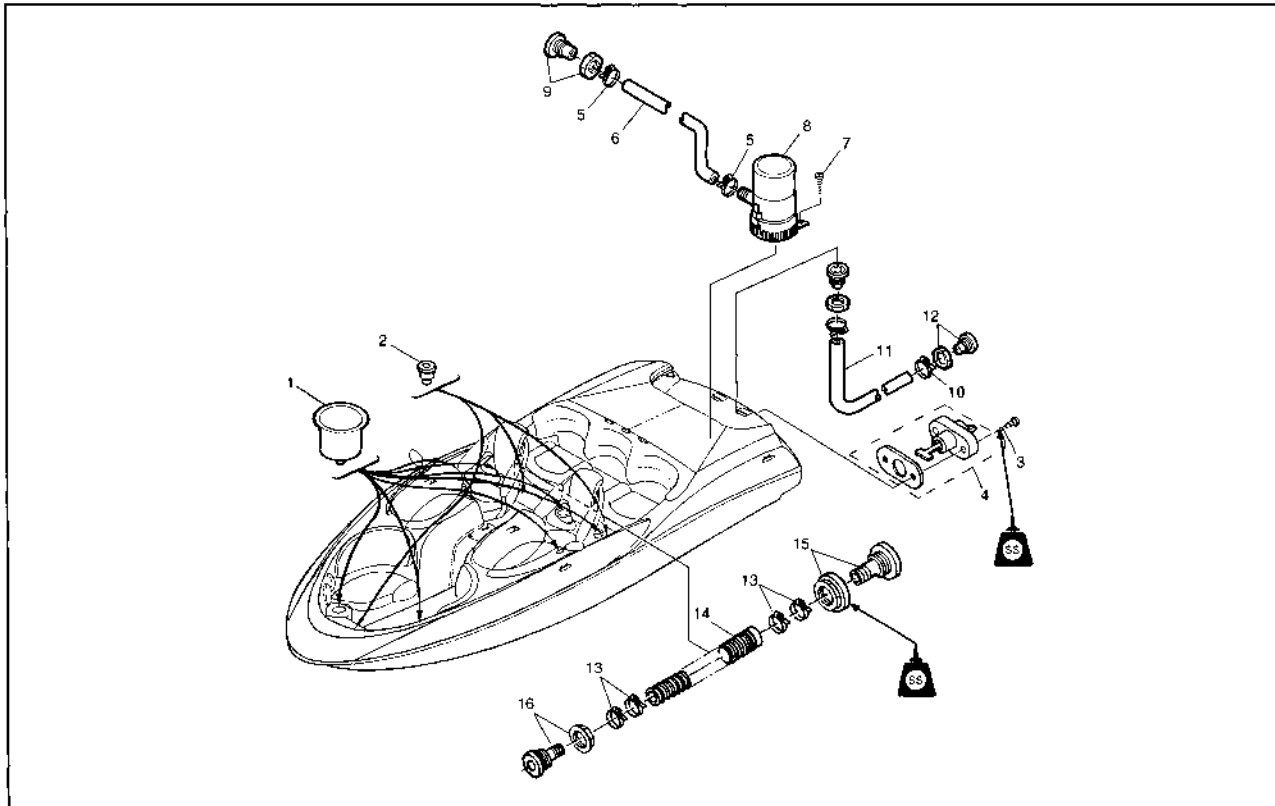


REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	DECK FITTINGS REPLACEMENT STERN LIGHT		Follow the "Step" order for removal.
1	Stern Light Assembly	1	Unscrew to remove.
2	Lens	1	
3	Bulb	1	
4	Screw, Tapping	3	
5	Socket Assembly	1	
	BOW LIGHT		
6	Screw, Tapping	1	Pry cover at pry point. Rotate 45° counter-clockwise.
7	Cover	1	
8	Lens	1	
9	Bulb	1	
10	Screw	3	
11	Socket Assembly	1	
	DECK FITTINGS		
12	Screw	10	
13	Hand Grip	5	
14	Nut (w/ washers)	4	
15	Front Cleat	2	
16	Nut (w/ washers)	2	
17	Ski Eye	1	
	Remove Clean-out Tray for Access		Refer to "JET PUMP CLEAN-OUT PORTS" in Chapter 6.
18	Nut (w/ washers)	4	Seal on the inside of hull.
19	Rear Cleat	2	
20	Screw (w/ nut and washers)	4	
21	Swim Step Bracket	2	
22	Bolt	2	
23	Swim Step	1	Seal where hose passes through hull.
24	Screw, Tapping	3	
25	Speedometer Sensor	1	
26	Hose	1	
27	Screw (w/ nut, washer & spacer)	4	
28	Plate, Hand Grip	2	Seal on the inside of hull. Refer to "SEAT FITTINGS."
29	Plate (w/nut and washer)	3	
30	Bow and Stern Eyes	3	
	Seat Back		
31	Screw	4	
32	Inspection Plate	1	Reverse the removal steps for installation.



THROUGH HULL AND DRAIN FITTINGS EXPLODED DIAGRAM

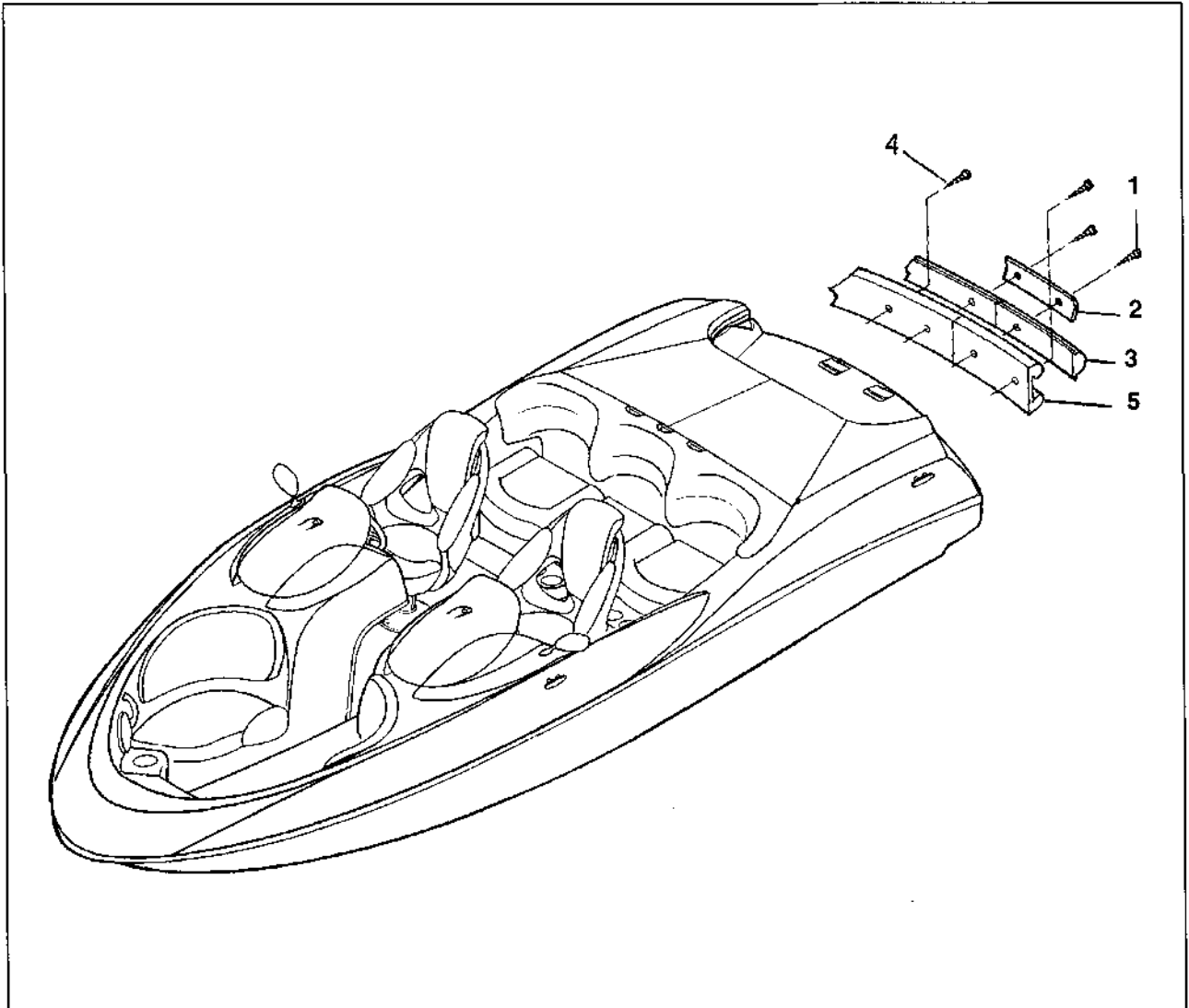


REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	THROUGH HULL AND DRAIN FITTINGS		Follow the "Step" order for removal.
1	Drink Holder	8	Secure with Silicone Sealer
2	Drain	3	
3	Screw, Tapping	10	Refer to "JET PUMP CLEAN-OUT PORTS" in Chapter 6.
4	Hull Drain Assembly	5	
5	Clean-out Tray	1	
6	Clamp	2	
7	Hose, Bilge	1	
8	Screw, Tapping	3	Refer to "SEAT FITTINGS."
9	Bilge Pump	1	
10	Through Hull Fitting	1	
11	Clamp	2	
12	Hose, Clean-out Tray	1	
13	Drain Assembly	2	Seal on the inside of the hull.
14	Remove Seat Base	1	
15	Clamp	4	Reverse the removal steps for installation.
16	Hose, Deck Drain	1	



GUNWALE EXPLODED DIAGRAM



REMOVAL AND INSTALLATION CHART

Step	Procedure / Part Name	Qty	Service Points
	GUNWALE REMOVAL		Follow the "Step" order for removal.
1	Tapping Screw	2	
2	Gunwale Cover	1	
3	Inner Gunwale	1	Heat in warm water for installation.
4	Tapping Screw	130	
5	Gunwale	3	Reverse the removal steps for installation.



HULL CONSTRUCTION AND CARE

The LS2000 hull is built of a material called FRP. This is then finished with a very hard product called gelcoat to protect the fiberglass and provide a durable finish.

WHAT IS FRP?

FRP stands for *Fiberglass Reinforced Plastic*. It is a composite material in which a fiberglass reinforcement material such as chopped strand mat (mat) and/or a woven fabric (cloth) is impregnated with a catalyzed polyester resin and allowed to cure into a rigid state. Also, included in this definition are fabrics impregnated with epoxy resins and hardeners.

CHARACTERISTICS OF FRP

FRP has the following characteristics:

1. High strength yet light-weight
2. Excellent malleability
3. Corrosion free
4. Easy to care for and easy to repair. On the other hand, it is liable to get scratched and is vulnerable to shocks and, therefore, must be handled with care.

NOTE: Should any of the FRP or Gelcoat require repair, refer to the *Basic Hull Repair Video and Workbook* (VID-10660-00-43).

MAINTENANCE OF FRP

Routine care is important for FRP as it helps in maintaining the high luster. During maintenance, any damage to the FRP can be detected early so repairs can be easily accomplished ensuring long service life.

After use, wash down the hull with fresh water. Wax the hull with a non-abrasive wax such as Yamaha Ultra-gloss Cleaner Wax or other wax designed for marine gelcoat.

Take the following additional steps when necessary:

1. Maintenance of luster
The gelcoat layer is 0.3 to 0.5mm (0.12 to 0.20 in) thick. When it has faded or has lost its luster, the original luster can be restored by polishing to remove the oxidized layer.

Polishing procedures:
 - a. Clean the gelcoat surface with water and neutral detergent.
 - b. Polish with a fine rubbing compound. If no polisher is available, polish with a rag and compound.
 - c. After polishing, apply several coats of a good marine wax, allowing each coat to dry prior to buffing and applying the next coat.
2. Fading and discoloration
How to clean:
 - a. Fading may require the use of a heavy duty rubbing compound and subsequent polishing to restore the original gelcoat luster. If this does not work, see item "d" below.
 - b. Discoloration due to oil stains, fuel stains, or environmental factors may be removed with detergents or industrial solvents if needed. A rag or sponge moistened with acetone may also help. However, avoid excessive exposure of gelcoat to acetone as the surface may become permanently damaged.
 - c. Marine growth can be scraped off using sharpened wooden sticks. Avoid metal putty knives, etc. as they will tend to scratch the gelcoat.
 - d. If all else fails, use a wet/dry sandpaper to color sand the gelcoat down to consistent color. Use extreme care as too much sanding will remove all the gelcoat and new gelcoat will have to be applied. Start with #600 grit and end with #1200 to #1500 grit with lots of water. For best results, final sanding should always be in the same directions (e.g. back and forth). Follow with polishing procedures given above.
 - e. If none of the above helps, it is time to re-gelcoat.

CHAPTER 9

TROUBLE ANALYSIS

TROUBLE ANALYSIS	9-1
TROUBLE ANALYSIS CHART	9-1

TROUBLE ANALYSIS

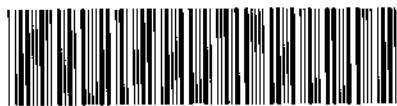
NOTE:

Verify the following before "trouble analysis":

1. Battery is charged and its specific gravity is in specification.
2. All wire connections are correct.
3. Wiring connections are securely made and without any corrosion.
4. Lanyard is installed on the engine stop switch.
5. Fuel is coming to the carburetor.

Trouble mode										Items to be checked	
ENGINE WILL NOT START	ROUGH IDLING	ENGINE STALLS	ENGINE WILL NOT STOP	POOR PERFORMANCE	OVERHEATING	LOOSE STEERING	BILGE INCREASE	IRREGULAR WARNING INDICATION	POOR BATTERY CHARGING	Relative part	Reference Chapter
FUEL SYSTEM											
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fuel tank	4
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Air vent hose	4
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fuel hose	4
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fuel filter	4
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fuel pump	4
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Carburetor	4
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Low speed screw setting	4
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	High speed screw setting	4
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Carburetor synchronization	4
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Trolling speed	3
POWER UNIT											
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<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Cylinder head gasket	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Piston ring	5
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<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Piston	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Bearing	5
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Trouble mode										Items to be checked	
ENGINE WILL NOT START	ROUGH IDLING	ENGINE STALLS	ENGINE WILL NOT STOP	POOR PERFORMANCE	OVERHEATING	LOOSE STEERING	BILGE INCREASE	IRREGULAR WARNING INDICATION	POOR BATTERY CHARGING	Relative part	Reference Chapter
POWER UNIT (cont.)											
					○		○			Pilot water hose	5
					○		○			Water hose	5
					○		○			Water passage	5
JET PUMP UNIT											
				○	○		○			Duct	6
				○						Impeller	6
				○						Intake screen	6
				○						Bearing	6
				○						Duct intake	6
					○		○			Water inlet hose	6
							○			Bilge hose	6
							○			Bilge strainer	6
							○			Bilge hose joint	6
ELECTRICAL											
○	○	○	○	○	○					Ignition system	7
○										Starting system	7
								○		Indication system	7
									○	Charging system	7
HULL AND HOOD											
						○				Column bearing	8
				○			○			Water lock	8
		○		○			○			Exhaust hose	8
				○			○			Muffler	8
							○			Drain plug	8



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YAMAHA MOTOR CORPORATION, U.S.A.
