YAMAHA

Marine

Outboards

USA, CANADA

9.9V, 15V

SERVICE MANUAL

LIT-18616-01-65

HOW TO USE THIS MANUAL

MANUAL FORMAT

All of the procedures in this manual are organized in a sequential, step-by-step format. The information has been complied to provide the mechanic with an easy to read, handy reference that contains comprehensive explanations of all disassembly, repair, assembly, and inspection operations.

In this revised format, the condition of a faulty component will precede an arrow symbol and the course of action required will follow the symbol, e.g.,

- Bearings
  Pitting/Damage → Replace.

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

On the first page of each Section is an Index of that section's contents.

MODEL INDICATION

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

Model name	9.9F	15F
USA and CANADA name	9.9MH, 9.9EH, 9.9ER	15MH, 15EH
Indication	9.9	15

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 to go to.

HOW TO READ DESCRIPTIONS

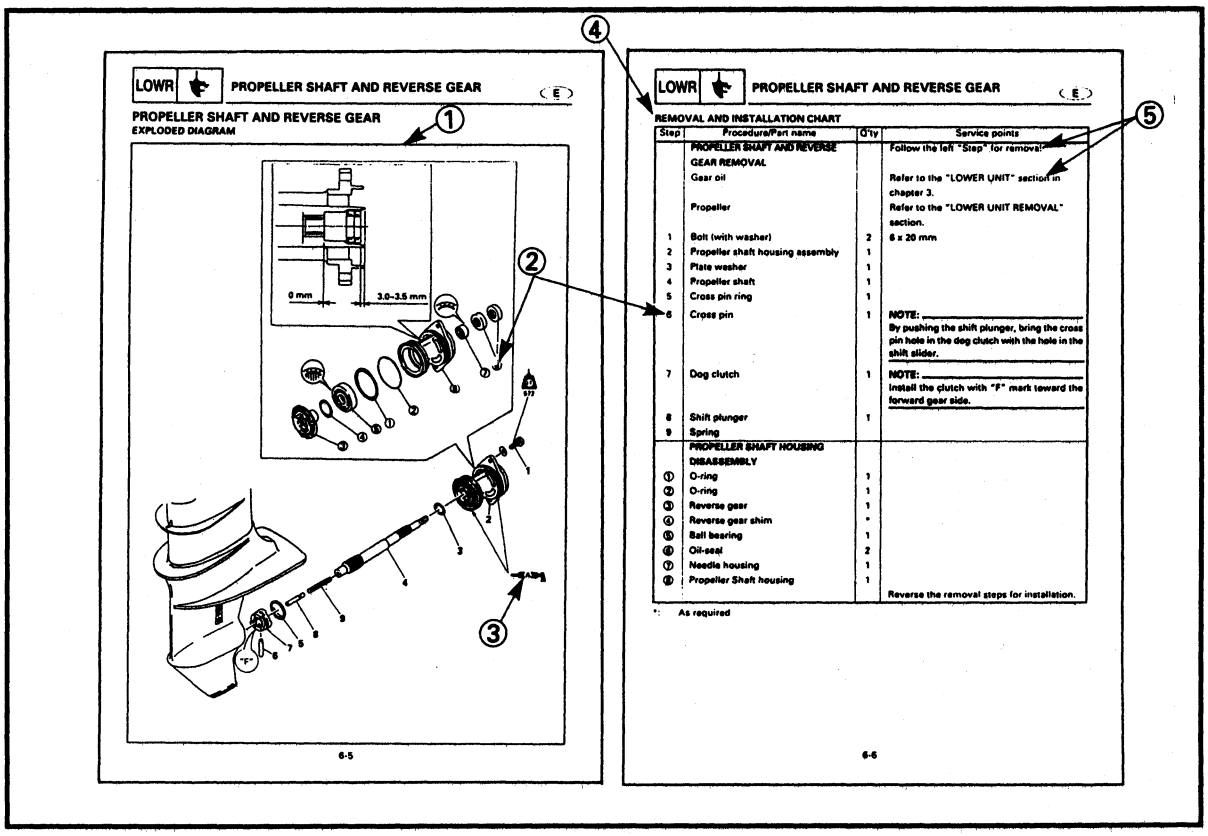
1. A disassembly installation job mainly consists of the exploded diagram ①.

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 or REMOVAL AND INSTALLATION CHART, the Service points requiring the detailed description ⑤ ,etc.



WARNINGS, CAUTIONS AND NOTES

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

⚠ The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

⚠WARNING

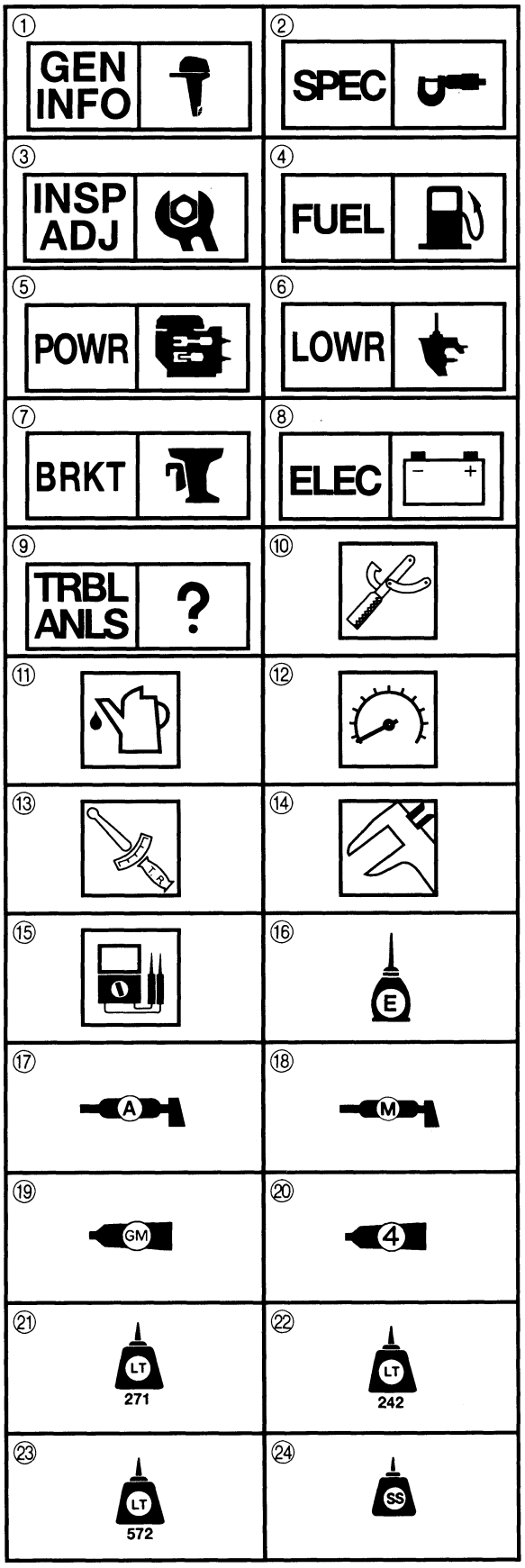
Failure to follow WARNING instructions could result in severe injury or death to the machine operator, a bystander, or a person inspecting or repairing the outboard motor.

CAUTION:

A CAUTION indicates special precautions that must be taken to avoid damage to the outboard motor.

NOTE:

A NOTE provides key information to make procedures easier or clearer.



SYMBOLS

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

① General information
② Specifications
③ Periodic Inspection and Adjustment
④ Fuel system
⑤ Power unit
⑥ Lower unit
⑦ Bracket unit
⑧ Electrical system
⑨ Trouble-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. 572
㉔ Apply Silicon sealant

NOTE:

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

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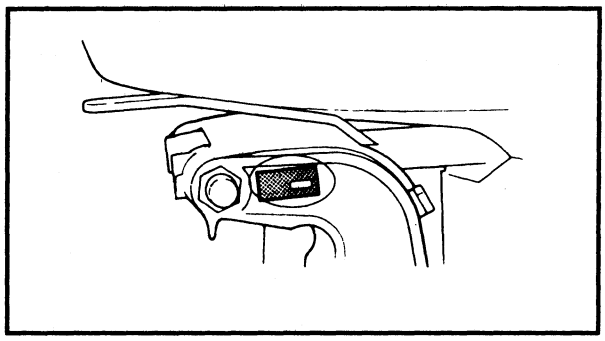
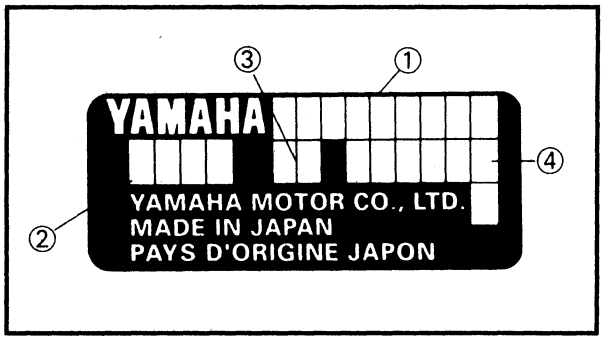
CHAPTER 1
GENERAL INFORMATION





IDENTIFICATION

SERIAL NUMBER

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

NOTE:

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

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

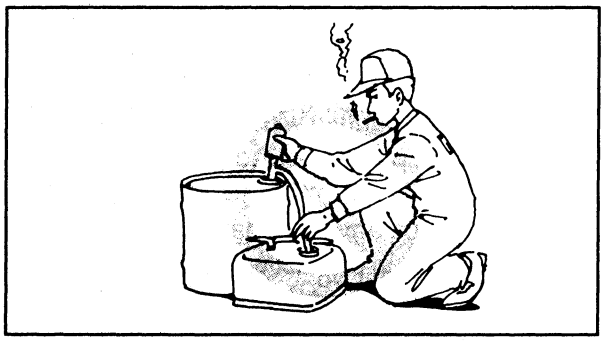
STARTING SERIAL NUMBERS

The starting serial number blocks are as follows:

Model		Approved model code	Starting serial No.
World-wide	USA, CANADA		
9.9FMH	9.9MH	682C	S: 155562~ L: 455181~ SUL: 850196~
9.9FEMH	9.9EH		S: 700301~ L: 600791~ SUL: 900141~
9.9FEMHR	—		S: 630246~ L: 660183~
9.9FEMR	9.9ER		L: 690256~
15FMH	15MH	684C	S: 405497~ L: 153352~ SUL: 830146~
15FEMH	15EH		S: 300231~ L: 600511~ SUL: 900131~
15FEMHR	—		S: 380261~ L: 650243~

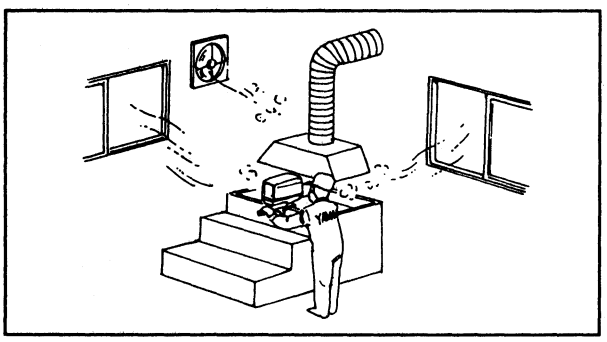
SAFETY WHILE WORKING

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



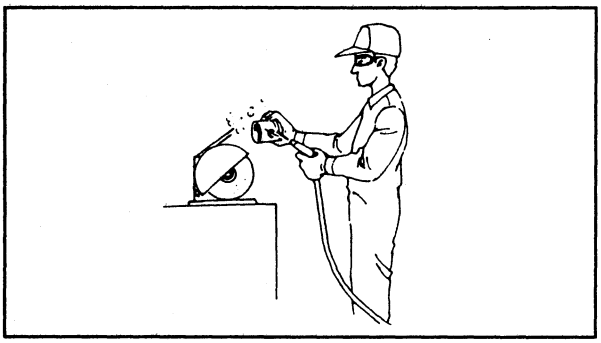
FIRE PREVENTION

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.



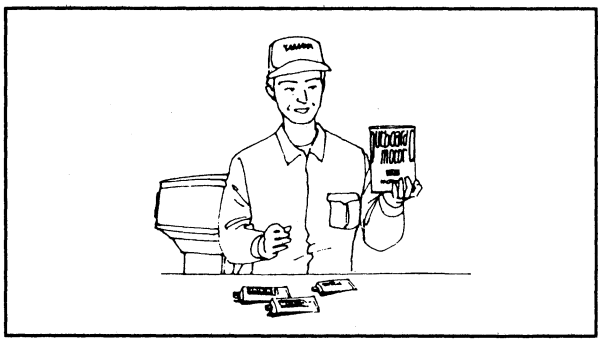
VENTILATION

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 or protective shoes if appropriate to the work you are doing.



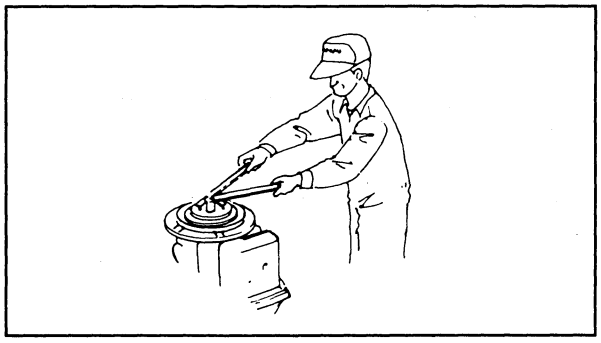
OILS, GREASES AND SEALING FLUIDS

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

SAFETY WHILE WORKING

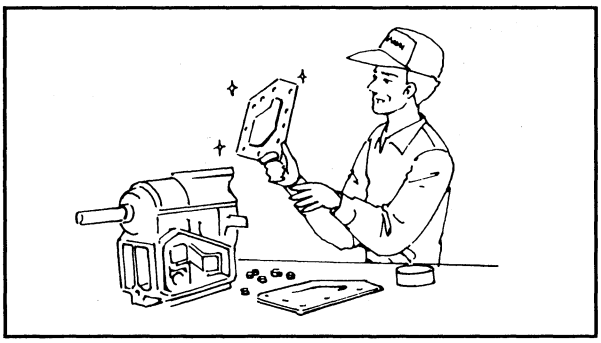
Under normal conditions of use, there should be no hazards from the use of the lubricants mentioned in this manual, but safety is all-important, and by adopting good safety practices, any risk is minimized. A summary of the most important precautions is as follows:

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.

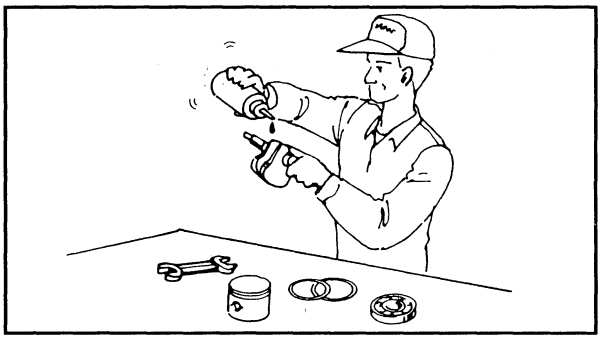


GOOD WORKING PRACTICES

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

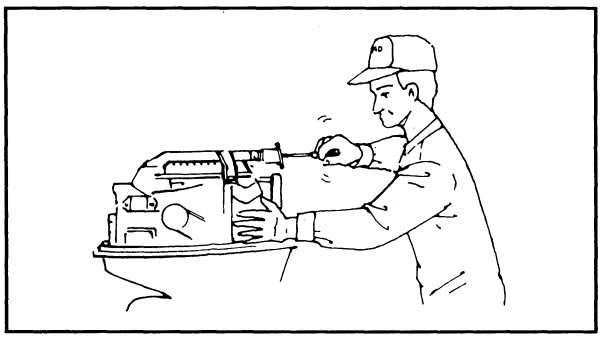


3. **Nonreusable items**
   Always use new gaskets, packings, O-rings, oil seals, split-pins and circlips etc. on reassembly.



DISASSEMBLY AND ASSEMBLY

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

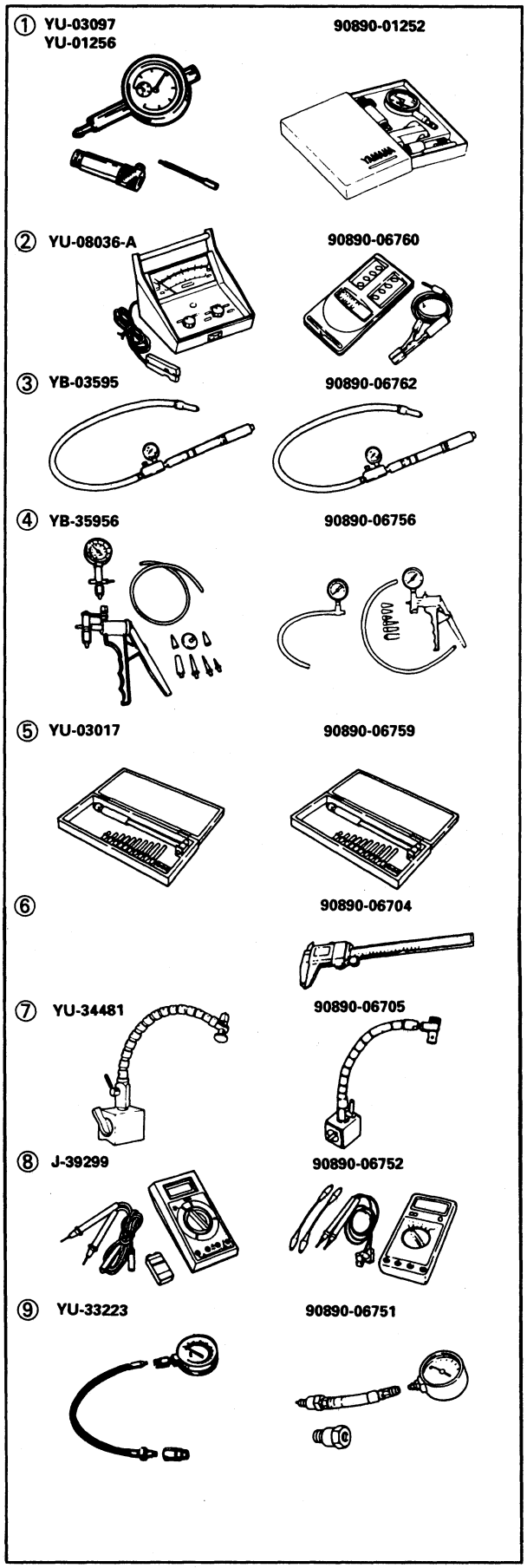


3. After assembly, check that moving parts operate normally.
4. Install bearings with the manufacturer's markings on the side exposed to view, and liberally oil the bearings.

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

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

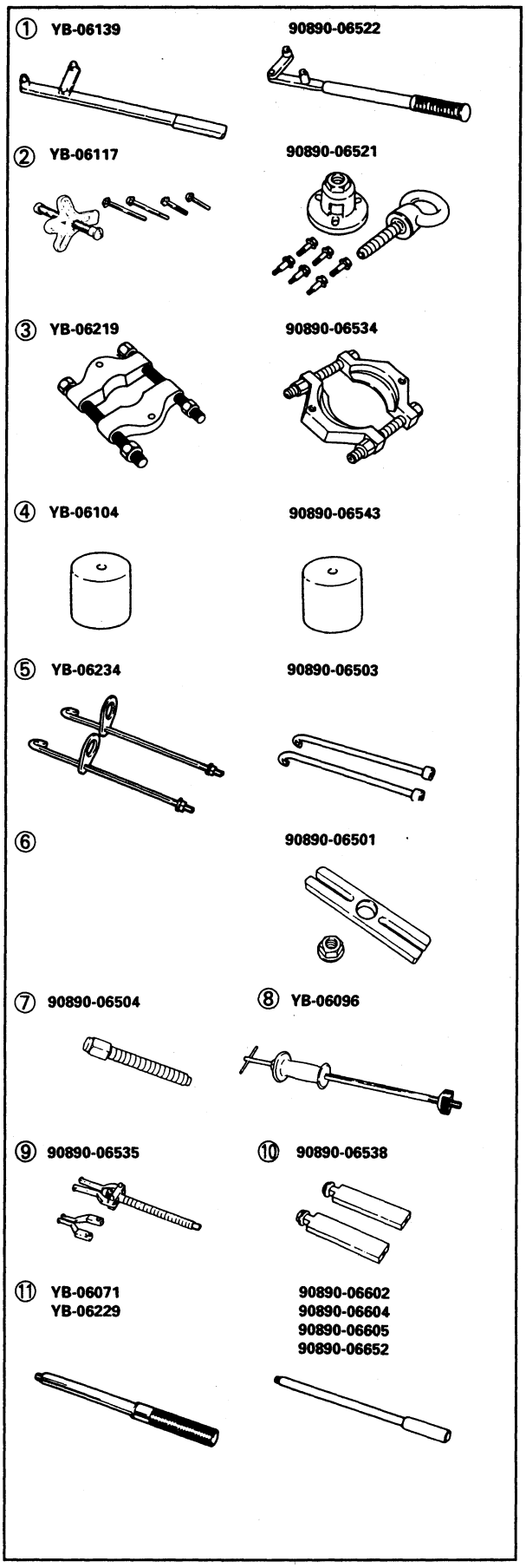
NOTE:

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

MEASURING

1. Dial gauge and stand
   P/N. YU-03097, YU-01256
   90890-01252
2. Tachometer
   P/N. YU-08036-A
   90890-06760
3. Pressure tester
   P/N. YB-03595
   90890-06762
4. Mity vac
   P/N. YB-35956
   90890-06756
5. Cylinder gauge set
   P/N. YU-03017
   90890-06759
6. Digital caliper
   P/N. 90890-06704
7. Magnet base
   P/N. YU-34481
   90890-06705
8. Digital multi meter
   P/N. J-39299
   90890-06752
9. Compression gauge
   P/N. YU-33223
   90890-06751

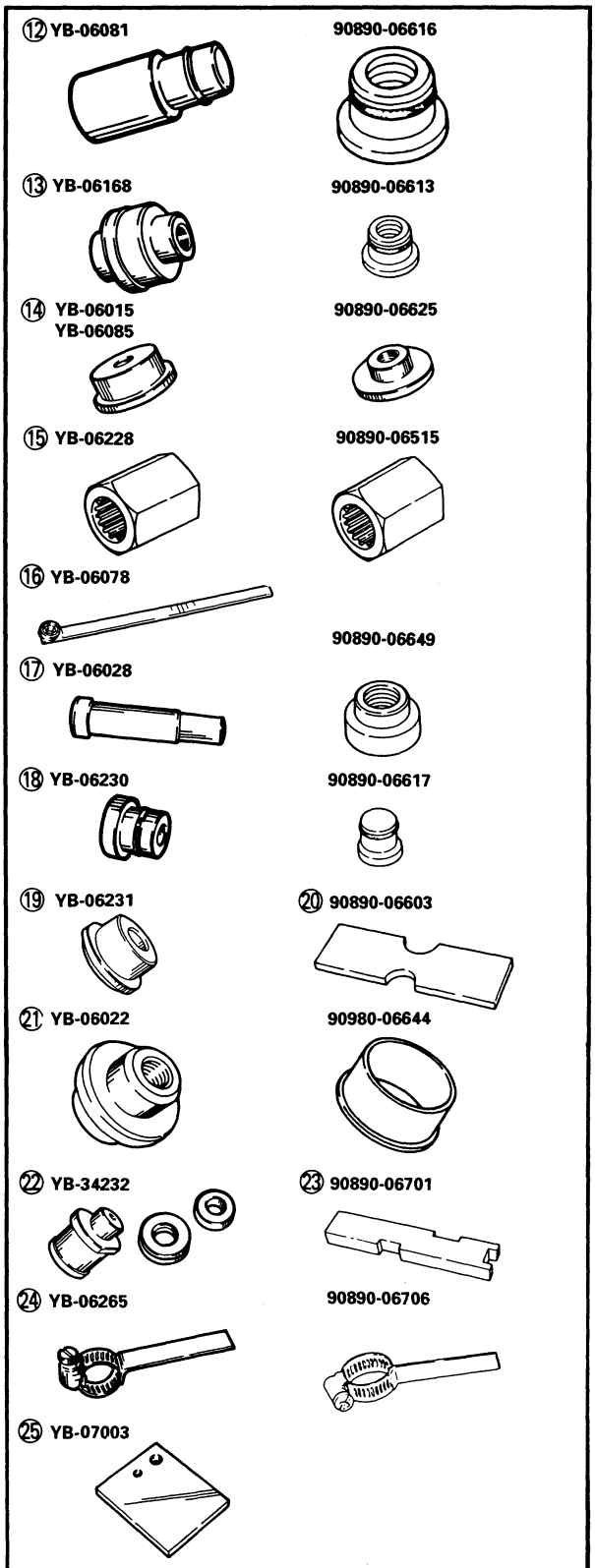
SPECIAL TOOLS



REMOVAL AND INSTALLATION

1. Flywheel holder
   P/N. YB-06139
   90890-06522
2. Flywheel puller
   P/N. YB-06117
   90890-06521
3. Bearing separator
   P/N. YB-06219
   90890-06534
4. Small end bearing needle installer
   P/N. YB-06104
   90890-06543
5. Bearing housing puller
   P/N. YB-06234
   90890-06503
6. Stopper guide plate
   (Propeller shaft housing,
   Reverse gear bearing)
   P/N. 90890-06501
7. Center bolt (Propeller shaft housing)
   P/N. 90890-06504
8. Slide hammer set (Reverse gear bearing)
   P/N. YB-06096
9. Bearing puller (Reverse gear bearing)
   P/N. 90890-06535
10. Stopper guide stand (Reverse gear bearing)
    P/N. 90890-06538
11. Driver rod
    P/N. YB-06071, YB-06229
    90890-06602, 90890-06604,
    90890-06605, 90890-06652

SPECIAL TOOLS



12. Needle bearing attachment
    (Propeller shaft)
    P/N. YB-06081
    90890-06616
13. Oil seal installer (Propeller shaft)
    P/N. YB-06168
    90890-06613
14. Bearing installer
    P/N. YB-06015, (Reverse gear)
    YB-06085 (Forward gear)
    90890-06625 (Forward gear)
15. Drive shaft holder
    P/N. YB-06228
    90890-06515
16. Pinion nut holder
    P/N. YB-06078
17. Bushing attachment
    (Drive shaft housing)
    P/N. YB-06028
    90890-06649
18. Needle bearing attachment
    (Drive shaft)
    P/N. YB-06230
    90890-06617
19. Driver shaft needle bearing depth stop
    P/N. YB-06231
20. Bearing depth plate
    90890-06603
21. Bearing installer
    P/N. YB-06022 (Drive shaft oil seal)
    90980-06644 (Forward gear)
22. Pinion height gauge
    P/N. YB-34232
23. Shimming plate
    P/N. 90890-06701
24. Backlash indicator
    P/N. YB-06265
    90890-06706
25. Backlash adjusting plate
    P/N. YB-07003

CHAPTER 2
SPECIFICATIONS

GENERAL SPECIFICATIONS

Item		Unit	9.9	15
DIMENSION:				
Over-all Length		mm (in)	873 (34.4)	
Over-all Width		mm (in)	332 (13.1)	
Over-all Height	S	mm (in)	1040 (40.9)	
	L	mm (in)	1167 (45.9)	
	SUL	mm (in)	1309 (51.5)	
WEIGHT:				
Weight (Al.)	S	kg (lb)	36 (79.4)	
	L	kg (lb)	37.5 (82.7)	
	SUL	kg (lb)	39 (86.0)	
PERFORMANCE:				
Full Throttle Operating Range		r/min	4500~5500	
Output (ISO)		kW (hp)/ at r/min	7.4 (9.9) / 5000	11.2 (15) / 5000
Maximum Fuel Consumption		L (US gal , Imp gal)/h at r/min	5.1 (1.35,1.12) at 5500	7.3 (1.93,1.61) at 5500
ENGINE:				
Type			2 stroke - L	
Cylinders			2	
Total Displacement		cm^3 (cu. in)	246 (15.01)	
Bore X Stroke		mm (in)	56.0 x 50.0 (2.20 x 1.97)	
Compression Ratio			6.80	
Carburetor Quantity			1	
Intake System			Reed Valve	
Induction System			Loop Charge	
Starting System			MH Manual	EMH (EH), EMHR, EMR (ER) Manual & Electric
Control system			MH, EMH (EH) Tiller control	EMHR Tiller & Remote control / EMR (ER) Remote control
Ignition System			CDI	
Alternator Output			MH 12 - 80W	EMH (EH),EMHR 12 - 6A
Enrichment System			Choke Valve	
Advance Type			Mecanical	
Spark Plug	(NGK)		B7HS-10 BR7HS-10	
Exhaust System			Through Prop Boss	
Cooling System			Water	
Lubrication System			Pre-Mixed Fuel & Oil	
FUEL AND OIL:				
Fuel Type			Reguler Gasoline	
Engine Oil Type / Grade			2 stroke outboard motor oil / TC-W3	
Gear Oil Type			Hypoid Gear Oil-SAE#90	
Gear Oil Quantity		cm^3 (US oz, Imp oz)	250 (8.45,8.80)	
Mixing Ratio			100:1(JPN/GEN 50:1)	

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GENERAL SPECIFICATIONS

Item	Unit	9.9	15
BRACKET:			
Tilt Angle	degrees	8,12,16,20	
Tilt-up Angle	degrees	67	
Shallow Water Crushing Angle	degrees	30,36	
Steering Angle	degrees (left+right)	45+40	
DRIVE UNIT:			
Gear Shift Position		F-N-R	
Gear Ratio		2.08 (27/13)	
Gear Type		Spiral Bevel Gear	
Clutch Type		Dog clutch	
Propeller Direction		Clockwise	
Propeller Drive System		Spline	
Propeller Series Mark		J	
ELECTRICAL:		MH	EMH (EH), EMHR, EMR (ER)
Battery Capacity	Ah (kC)	–	40 (144)
Cold Cranking	Amps	–	210

MAINTENANCE SPECIFICATIONS

ENGINE

Item		Unit	9.9	15
CYLINDER HEAD:				
Warpage limit		mm (in)	0.1 (0.004)	
CYLINDER:				
Bore size		mm (in)	56.00~56.02 (2.205~2.206)	
Wear limit		mm (in)	56.1 (2.21)	
Taper limit		mm (in)	0.08 (0.003)	
Out of round limit		mm (in)	0.05 (0.002)	
PISTON:				
Piston clearance		mm (in)	0.035~0.040 (0.0014~0.0016)	
Limit		mm (in)	0.090 (0.0035)	
Diameter	D	mm (in)	55.940~55.985 (2.2024~2.2041)	
Measuring point	H	mm (in)	10 (0.39)	
Pin boss inside diameter		mm (in)	14.004~14.015 (0.5513~0.5518)	
Ring groove clearance	top	mm (in)	0.02~0.06 (0.001~0.002)	
	2nd	mm (in)	0.04~0.08 (0.002~0.003)	
Over size diameter	1st*1	mm (in)	56.25 (2.215)	
	2nd	mm (in)	56.50 (2.224)	
PISTON PIN:				
Diameter		mm (in)	13.996~14.000 (0.5510~0.5512)	
PISTON RING: 1st				
Type			Keystone	
Dimensions	(B x T)	mm (in)	2.0x2.5 (0.08x0.10)	
End gap	(installed)	mm (in)	0.15~0.35 (0.006~0.014)	
Limit		mm (in)	0.55 (0.022)	
PISTON RING: 2nd				
Type			Barrel	
Dimensions	(B x T)	mm (in)	2.0x2.5 (0.08x0.10)	
End gap	(installed)	mm (in)	0.15~0.35 (0.006~0.014)	
Limit		mm (in)	0.55 (0.022)	
CONNECTING ROD:				
Small end diameter		mm (in)	18.000~18.011 (0.7087~0.7091)	
CRANK SHAFT:				
Crank width	A	mm (in)	46.90~46.95 (1.846~1.848)	
	B	mm (in)	25.90~26.10 (1.020~1.028)	
Runout limit	D	mm (in)	0.03 (0.001)	
Big end side clearance	E	mm (in)	0.30~0.80 (0.012~0.031)	
Maximum small end axial play	F	mm (in)	2.0 (0.08)	
THERMOSTAT:				
Opening temperature		°C (°F)	48~52 (118~126)	
Full-opening temperature		°C (°F)	60 (140)	
Valve lift		mm (in)	3 (0.12)	
REED VALVE:				
Valve stopper height		mm (in)	0.7±0.1 (0.03±0.00)*2 1.3±0.1 (0.05±0.00)*3	6.0±0.1 (0.24±0.00)
Valve warpage limit		mm (in)	0.2 (0.01)	

*1: Except for USA

*2: Except for Europe

*3: For Europe