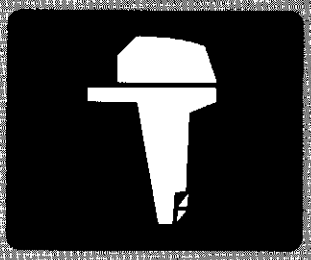
YAMAHA



WORLDWIDE

Z150P, LZ150P, Z150Q, Z175G, Z175H, Z200N, LZ200N

USA, CANADA

Z150Z, LZ150Z, VZ150Z, Z175Z, VZ175Z, Z200Z, LZ200Z

SUPPLEMENTARY SERVICE MANUAL

292067

68L-28197-ZA-AX

PREFACE

This Supplementary Service Manual has been prepared to introduce the modification and additional information for the Z200N and LZ200N. Also, new information for Z150P, LZ150P, Z150Q, Z175G and Z175H based on Z200N and LZ200N is included. For complete service information and procedures, it is necessary to add the following manual with the corresponding sections in this Supplementary Service Manual.

Z200N, LZ200N SERVICE MANUAL: 68F-28197-Z9-A1

CAUTION

USE UNLEADED STRAIGHT GASOLINE ONLY

- Gasoline containing lead can cause performance lose and engine damage.
- Do not use gasoline mixed with oil (premix).
- Use YAMALUBE 2 stroke outboard oil or another 2-stroke engine oil with a BIA-certified TC-W3 rate.

Z150P, LZ150P, Z150Q,
Z175G, Z175H, Z200N, LZ200N
SUPPLEMENTARY SERVICE MANUAL

1st Edition, May 2000

Printed in Japan

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 check 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/scratches → Replace.

To assist you in finding your way through this manual, the section title and major heading is given at the top of every page.

MODEL INDICATION

Multiple models are mentioned in this manual and their model indications are noted as follows.

Model name	Z150PETO	LZ150PETO	Z150QETO	Z175GETO	Z175HETO	Z200NETO	LZ200NETO
USA and Canada name	Z150TR	LZ150TR	VZ150TR	Z175TR	VZ175TR	Z200TR	LZ200TR
Indication	Z150PETO	LZ150PETO	Z150QETO	Z175GETO	Z175HETO	Z200NETO	LZ200NETO

ILLUSTRATIONS

The illustrations within this service manual represent all of the designated models.

CROSS REFERENCES

The cross references have been kept to a minimum. Cross references will direct you to the appropriate section or chapter.

IMPORTANT INFORMATION

In this Service Manual particularly important information is distinguished 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.

HOW TO USE THIS MANUAL

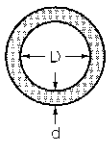
① The main points regarding removing/installing and disassembling/assembling procedures are shown in the exploded views.

② The numbers in the exploded views indicate the required sequence of the procedure and should be observed accordingly.

③ Symbols are used in the exploded views to indicate important aspects of the procedure. A list of meanings for these symbols is provided on the following page.

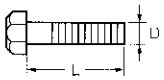
④ It is important to refer to the job instruction charts at the same time as the exploded views. These charts list the sequence that the procedures should be carried out in, as well as providing explanations on part names, quantities, dimensions and important points relating to each relevant task.

Example:
O-ring size 39.5 × 2.5 mm: inside diameter (D) × ring diameter (d)

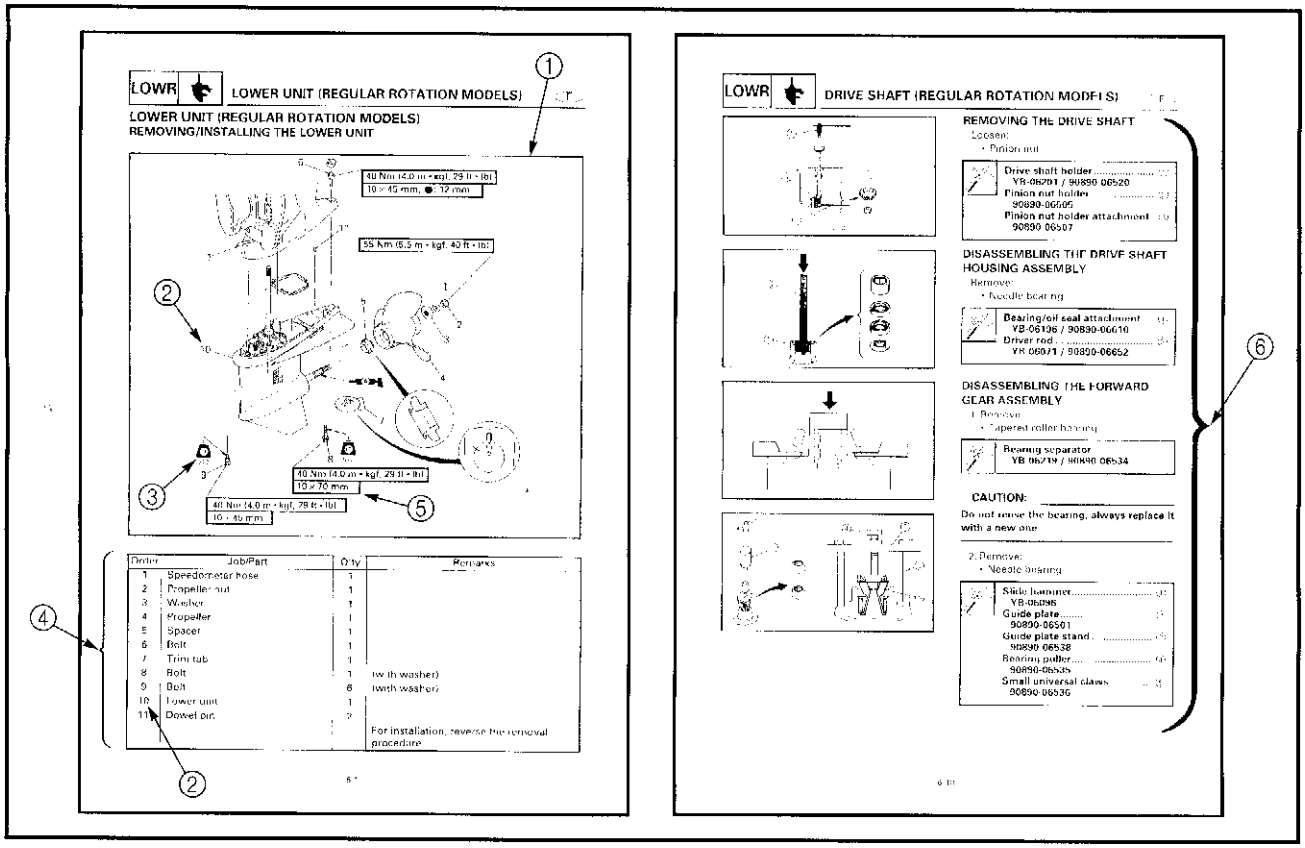


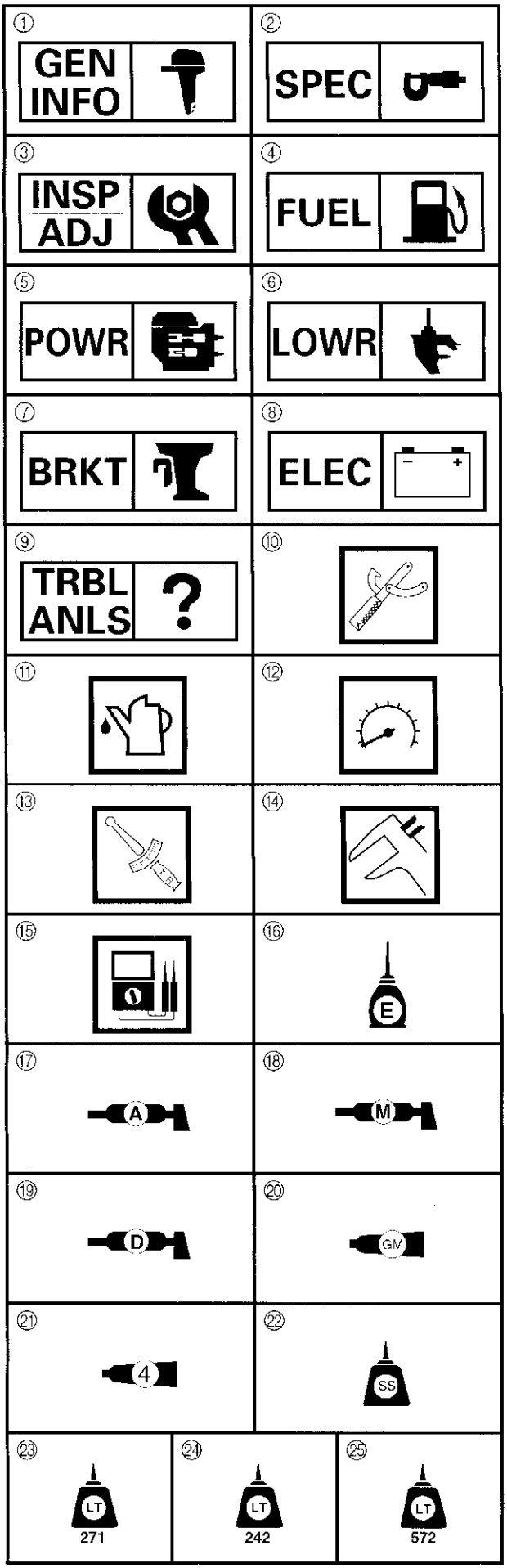
⑤ In addition to tightening torques, the dimensions of the bolts or screws are also mentioned.

Example:
Bolt or screw size 10 × 25 mm : diameter (D) × length (L)



⑥ In addition to the exploded views and job instruction charts, this manual provides individual illustrations when further explanations are required to explain the relevant procedure.





SYMBOLS

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

① General information
② Specifications
③ Periodic inspections and adjustments
④ Fuel system
⑤ Power unit
⑥ Lower unit
⑦ Bracket unit
⑧ Electrical systems
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 value
[Resistance (Ω), Voltage (V), Electric current (A)]

Symbol ⑯ to ⑲ in an exploded diagram indicate the grade of lubricant and the location of the 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
⑲ Apply corrosion resistant grease
(Yamaha grease D)

Symbols ⑳ to ㉕ in an exploded diagram indicate the grade of the sealing or locking agent and the location of the application point.

⑳ Apply Gasket Maker®
㉑ Apply Yamabond #4
(Yamaha bond number 4)
㉒ Apply silicon sealant
㉓ Apply LOCTITE® No. 271 (Red LOCTITE)
㉔ Apply LOCTITE® No. 242 (Blue LOCTITE)
㉕ Apply LOCTITE® No. 572

GENERAL INFORMATION

SPECIFICATIONS

PERIODIC INSPECTION AND ADJUSTMENT

FUEL SYSTEM

POWER UNIT

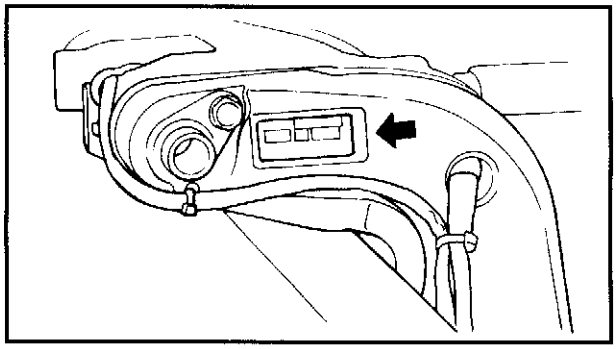
LOWER UNIT

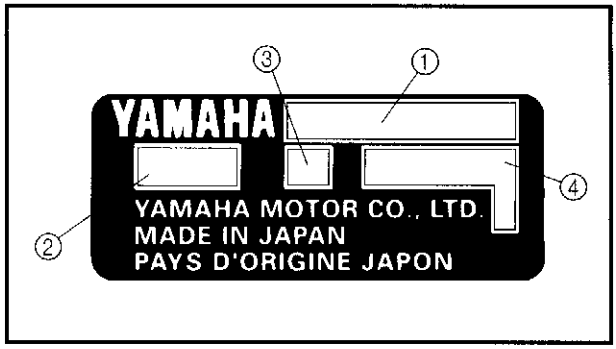
BRACKET UNIT

ELECTRICAL SYSTEM

TROUBLE ANALYSIS

WIRING DIAGRAM





IDENTIFICATION

SERIAL NUMBER

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

NOTE:

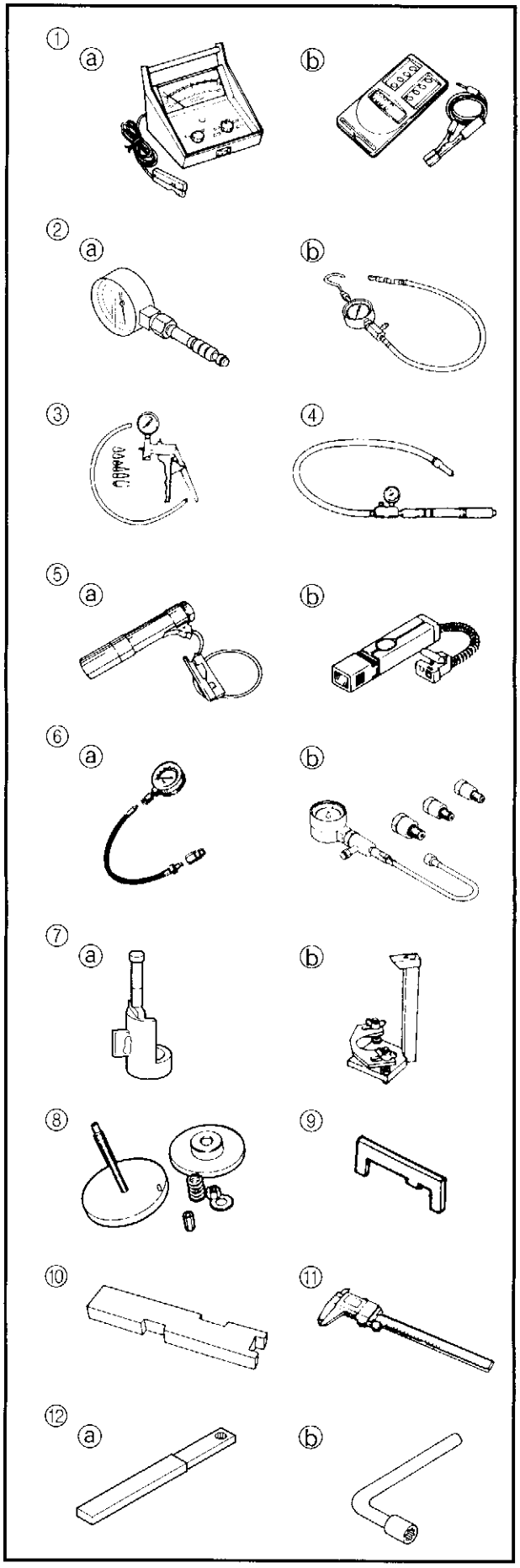
If the serial number label is removed, "VOID" marks will be appear on the label.

① Model name
② Approved model code
③ Transom height
④ Serial number

STARTING SERIAL NUMBERS

The starting serial number blocks are as follows:

Model name			Approved model code	Starting serial number
Worldwide	USA	Canada		
Z150PETO	Z150TR	—	6G4	L: 800101 -
		Z150TR		X: 850101 -
LZ150PETO	LZ150TR	—	6K0	X: 800101 -
Z150QETO	VZ150TR	VZ150TR	6J9	L: 800101 -
Z175GETO	Z175TR	—	6G5	X: 800101 -
Z175HETO	VZ175TR	VZ175TR	62H	L: 800101 -
Z200NETO	Z200TR	—	6G6	L: 150101 -
		Z200TR		X: 100101 -
LZ200NETO	LZ200TR	—	6K1	X: 100101 -



SPECIAL TOOLS

Using the correct special tools recommended by Yamaha, will aid the work and enable accurate assembly and tune-up. Improvising and using improper tools can damage the equipment.

NOTE:

- For USA and Canada, use part numbers that start with "J-", "YB-", "YM-", "YS-", "YU-", "YW-" or "YX-".
- For worldwide, use part numbers that start with "90890-".

MEASURING

① Tachometer
P/N. YU-08036-B ..... ⓐ
90890-06760 ..... ⓑ

② Fuel pressure gauge
P/N. YB-06766 ..... ⓐ
90890-06786 ..... ⓑ

③ Pressure/vacuum tester
P/N. YB-35956-A
90890-06756

④ Leakage tester
P/N. 90890-06762

⑤ Timing light
P/N. YM-33277-A..... ⓐ
90890-03141 ..... ⓑ

⑥ Compression gauge
P/N. YU-33223-1..... ⓐ
90890-03160 ..... ⓑ

⑦ Pinion height gauge
P/N. YB-34432-7, YB-34432-11..... ⓐ
90890-06702 ..... ⓑ

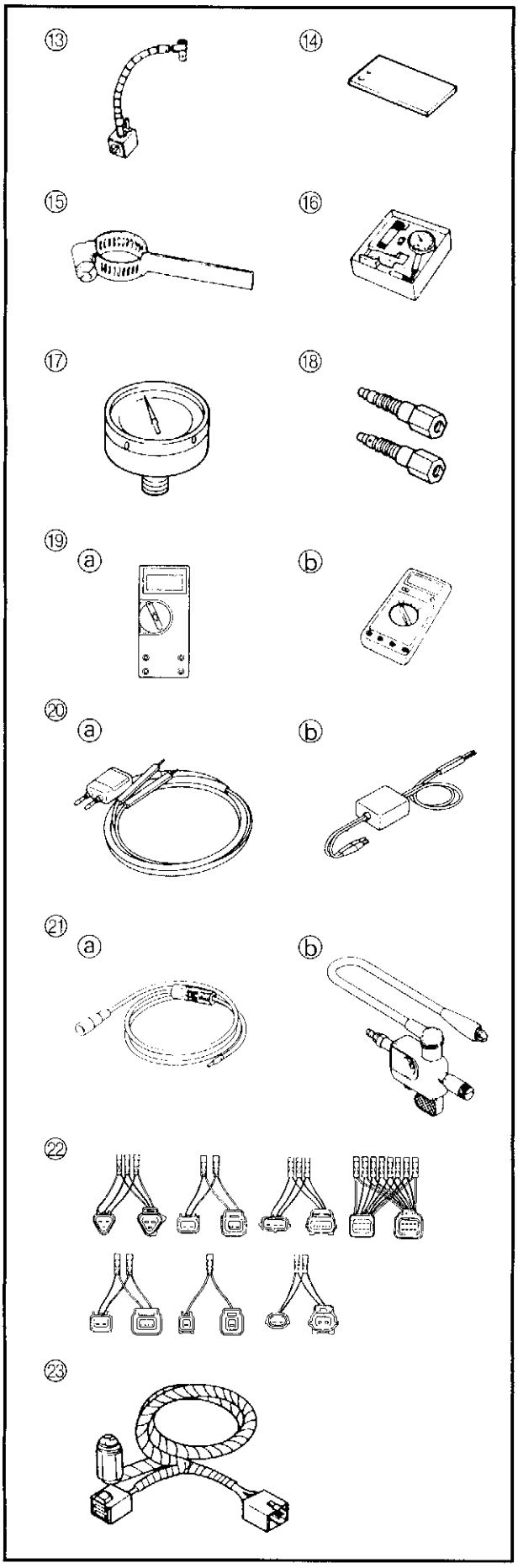
⑧ Shimming gauge
P/N. YB-34446-1, YB-34446-3,
YB-34446-4, YB-34446-7,
YB-34446-8

⑨ Shimming gauge
P/N. YB-34468-1A

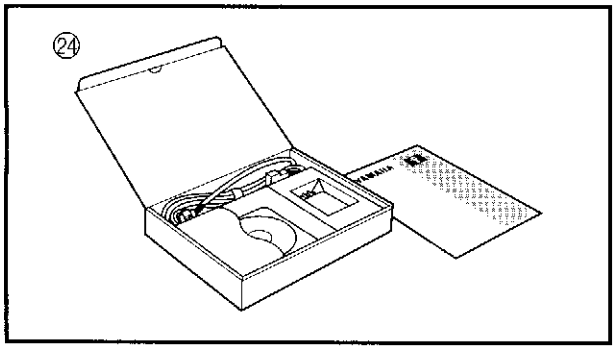
⑩ Shimming plate
P/N. 90890-06701

⑪ Digital caliper
P/N. 90890-06704

⑫ Shift rod wrench
P/N. YB-06052 ..... ⓐ
90890-06052 ..... ⓑ



⑬ Magnetic base
P/N. YU-34481
90890-06705
⑭ Magnetic base attaching plate
P/N. YB-07003
90890-07003
⑮ Backlash indicator
P/N. YB-06265
90890-06706
⑯ Dial gauge set
P/N. YU-03097
90890-01252
⑰ Hydraulic pressure gauge
P/N. 90890-06776
⑱ Up-relief valve attachment
P/N. 90890-06773
Down-relief valve attachment
P/N. 90890-06774
⑲ Digital tester
P/N. YU-34899-A ..... ⓐ
90890-06752 ..... ⓑ
⑳ Peak voltage adapter
P/N. YU-39991 ..... ⓐ
90890-03172 ..... ⓑ
㉑ Spark gap tester
P/N. YM-34487 ..... ⓐ
90890-06754 ..... ⓑ
㉒ Test harness
P/N. YB-06757, YB-06767,
YB-06769, YB-06779,
YB-06787, YB-06788
90890-06757, 90890-06767,
90890-06769, 90890-06779,
90890-06787, 90890-06788
㉓ Diagnostic indicator
P/N. YB-06444
90890-06765



㉔ Yamaha Diagnostic System
P/N. 68F-85300-00

Check the engine condition by using a personal computer when it is connected to the Electronic Control Unit (ECU).

Diagnosis:
Indicates the name of a failed part.

Diagnosis Record:
Displays the name of the part whose diagnosis is detected, along with the engine running total hours.

Engine Monitor:
Indicates information on the sensors and switches by converting it to each value while the engine is running.

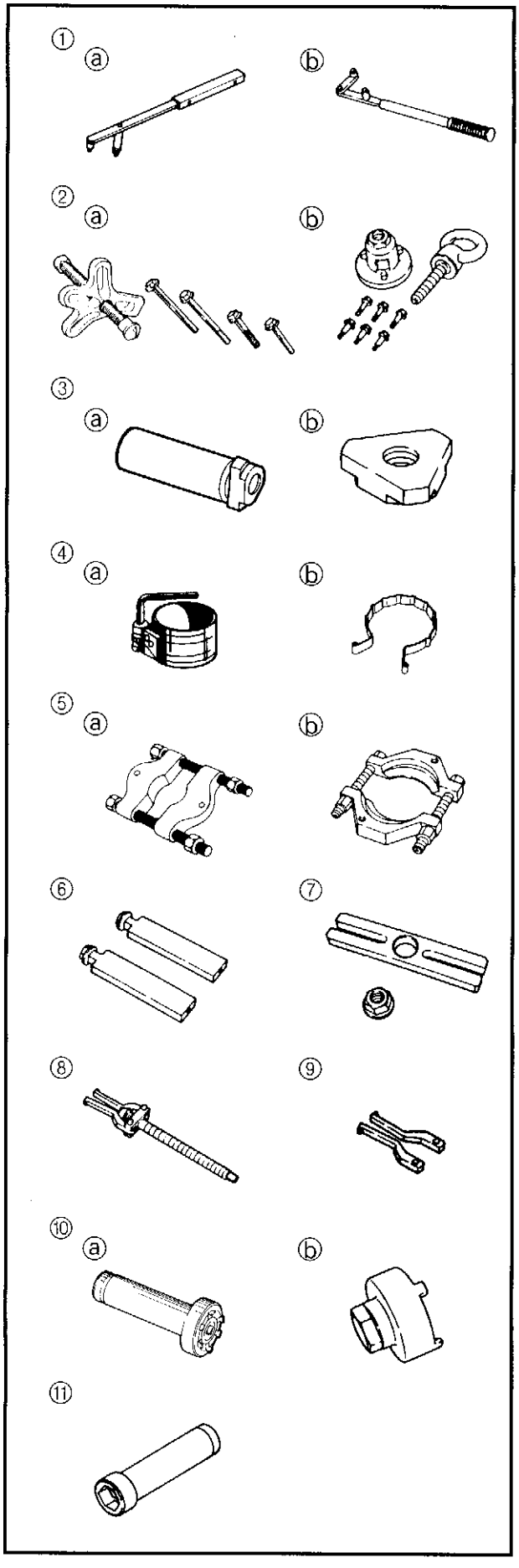
Stationary Test:
Checks operation sound and ignition sparks by activating the electric fuel pump, electric oil pump, injector and spark plug while the engine is stopped.

Active Test:
Checks the engine for operation through any change in its speed by stopping the operation of the spark plug on each cylinder while the engine is in the neutral position.

Data Logger:
Indicates in numeric values the engine speed, throttle opening voltage, oxygen density sensor voltage, water temperature sensor voltage and fuel pressure sensor voltage that occurred within 13 minutes.

ECM No.:
Displays the ECM identification number.

NOTE:
To use any of these functions a personal computer, connection cables, adapter and communication software are required.
The personal computer should be compatible with Windows® 95/98, equipped with a CD-ROM and the RS232C terminal.



REMOVING AND INSTALLING

① Flywheel magnet assembly holder
P/N. YB-06139 ..... ⓐ
90890-06522 ..... ⓑ

② Universal puller
P/N. YB-06117 ..... ⓐ
90890-06521 ..... ⓑ

③ Bearing/oil seal attachment
P/N. YB-06205-1 ..... ⓐ
90890-06663 ..... ⓑ

④ Piston ring compressor
P/N. YU-33294 ..... ⓐ
90890-06530 ..... ⓑ

⑤ Bearing separator
P/N. YB-06219 ..... ⓐ
90890-06534 ..... ⓑ

⑥ Guide plate stand
P/N. 90890-06538

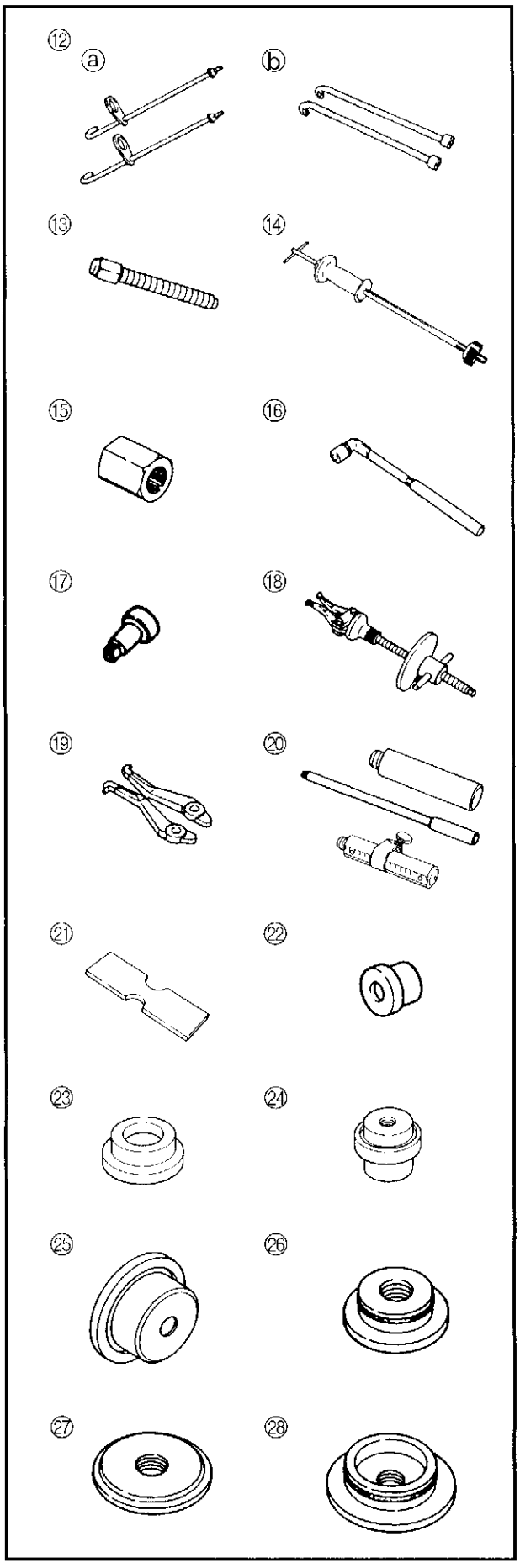
⑦ Guide plate
P/N. 90890-06501

⑧ Bearing puller
P/N. 90890-06535

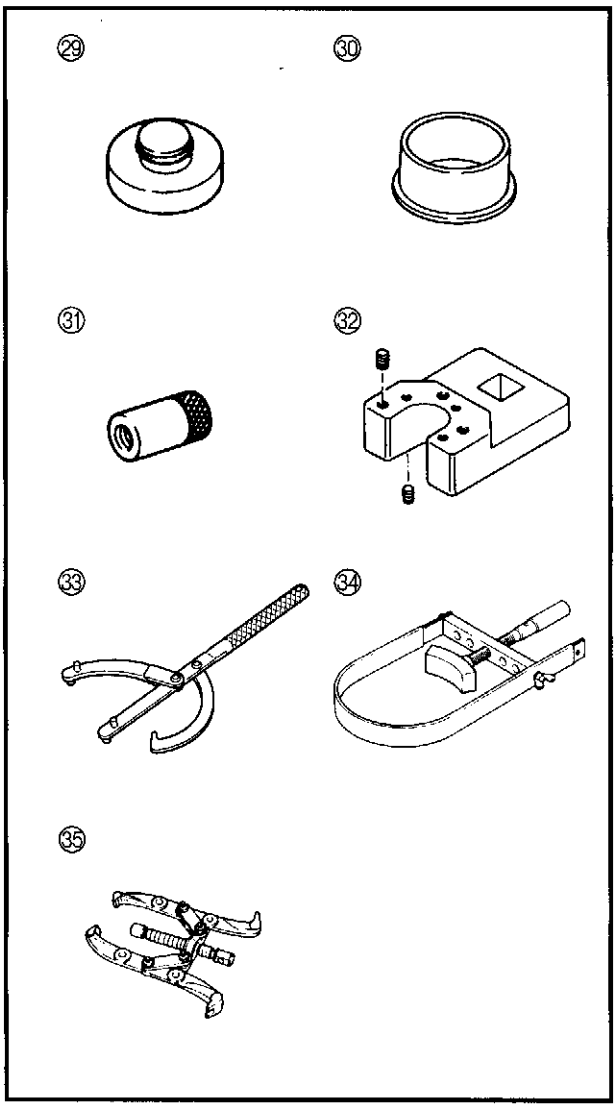
⑨ Small universal claws
P/N. 90890-06536

⑩ Ring nut wrench
P/N. YB-34447 ..... ⓐ
90890-06512 ..... ⓑ

⑪ Ring nut wrench extension
P/N. 90890-06513



⑫ Propeller shaft housing puller
P/N. YB-06207 ..... ⓐ
90890-06502 ..... ⓑ
⑬ Center bolt
P/N. 90890-06504
⑭ Slide hammer
P/N. YB-06096
90890-06531
⑮ Drive shaft holder
P/N. YB-06201
90890-06520
⑯ Pinion nut holder
P/N. 90890-06505
⑰ Pinion nut holder attachment
P/N. 90890-06507
⑱ Bearing puller
P/N. YB-06029, YB-06430
90890-06523
⑲ Large universal claws
P/N. 90890-06532
⑳ Driver rod
P/N. YB-06071, YB-06229
90890-06604, 90890-06605,
90890-06606, 90890-06652
㉑ Bearing/oil seal depth plate
P/N. 90890-06603
㉒ Bearing/oil seal attachment
P/N. YB-06194, YB-06196, YB-06246
㉓ Bearing/oil seal attachment
P/N. YB-06195, YB-06258,
YB-06348, YB-06434
㉔ Bearing/oil seal attachment
P/N. YB-06261
㉕ Bearing/oil seal attachment
P/N. YB-06336, YB-41446
㉖ Bearing/oil seal attachment
P/N. 90890-06610, 90890-06612,
90890-06633, 90890-06636,
90890-06653, 90890-06654,
90890-06655
㉗ Bearing/oil seal attachment
P/N. 90890-06619, 90890-06622
㉘ Bearing/oil seal attachment
P/N. 90890-06629, 90890-06630



㉙ Bearing/oil seal attachment
P/N. 90890-06635
㉚ Bearing/oil seal attachment
P/N. 90890-06640, 90890-06660,
90890-06661, 90890-06662
㉛ Slide hammer attachment
P/N. YB-06335
90890-06514
㉜ End screw wrench
P/N. YB-06175, YX-06765
90890-06548
㉝ Universal holder
P/N. YU-01235
90890-01235
㉞ Sheave holder
P/N. YS-1880-A
90890-01701
㉟ Universal puller
P/N. YB-06540
90890-06540

GENERAL SPECIFICATIONS

Item	Worldwide / USA / Canada	Unit	Model		
	Worldwide		Z150PETO	LZ150PETO	Z150QETO
	USA		Z150TR	LZ150TR	VZ150TR
	Canada		Z150TR	—	VZ150TR
DIMENSION					
Overall length		mm (in)	792 (31.2)		
Overall width		mm (in)	554 (21.8)		
Overall height					
(L)		mm (in)	1,655 (65.2)	—	1,693 (66.7)
(X)		mm (in)	1,782 (70.2)		—
Boat transom height					
(L)		mm (in)	508 (20.0)	—	508 (20.0)
(X)		mm (in)	635 (25.0)		—
WEIGHT					
(with aluminum propeller)					
(L)		kg (lb)	214 (472)	—	215 (474)
(X)		kg (lb)	218 (481)		—
(with stainless steel propeller)					
(L)		kg (lb)	216 (476)	—	217 (478)
(X)		kg (lb)	222 (489)		—
PERFORMANCE					
Maximum output (ISO)		kW (hp) @ 5,000 r/min	110.3 (150)		
Full throttle operating range		r/min	4,500 - 5,500		
Maximum fuel consumption		L (US gal, Imp gal)/hr @ 5,500 r/min	55.0 (14.5, 12.1)		
POWER UNIT					
Type			2 stroke - V		
Number of cylinders			6		
Displacement		cm^3 (cu. in)	2,596 (158.4)		
Bore × stroke		mm (in)	90.0 × 68.0 (3.54 × 2.68)		
Compression ratio			Cylinders #1 - #4: 6.7 Cylinders #5 - #6: 6.4		
Compression pressure*		kPa (kgf/cm^2, psi)	650 (6.5, 92)		
Fuel system			Electronic fuel injection		
Fuel injection system			Sequential injection		
Intake system			Reed valve		
Induction system			Loop charge		
Starting system			Electric		

* Measuring conditions:
Ambient temperature 20 °C (68 °F), wide open throttle, plugs disconnected from all cylinders.
The figures are for reference only.

Item		Unit	Model		
	Worldwide		Z150PETO	LZ150PETO	Z150QETO
	USA		Z150TR	LZ150TR	VZ150TR
	Canada		Z150TR	—	VZ150TR
Ignition control system			Microcomputer		
Alternator output		V - A	12 - 45		
Spark plugs			BKR6ES-11		
Cooling system			Water		
Exhaust system			Through propeller boss		
Lubrication system			Oil injection		
FUEL AND OIL					
Fuel type			Unleaded regular gasoline		
Fuel rating		*PON	86		
		RON	91		
Engine oil type			YAMALUBE 2-stroke outboard engine oil		
Engine oil capacity					
(engine oil tank)		L (US qt, Imp qt)	0.9 (0.95, 0.79)		
(sub-oil tank)		L (US qt, Imp qt)	10.5 (11.1, 9.2)		
Gear oil type			Hypoid gear oil SAE 90		
Gear oil total quantity		cm^3 (US oz, Imp oz)	980 (33.1, 34.5)	870 (29.4, 30.6)	980 (33.1, 34.5)
BRACKET					
Trim angle (at 12° boat transom)		Degree	−4 - 16		
Tilt-up angle		Degree	70		
Steering angle		Degree	32 + 32		
DRIVE UNIT					
Gear shift positions			F-N-R		
Gear ratio			1.86 (26/14)		2.00 (28/14)
Reduction gear type			Spiral bevel gear		
Clutch type			Dog clutch		
Propeller shaft type			Spline		
Propeller direction (rear view)			Clockwise	Counter-clockwise	Clockwise
Propeller mark			M	ML	M
ELECTRICAL					
Battery capacity		Ah (kC)	100 (360)		
Minimum cold cranking performance		A	512		

* PON: Pump Octane Number (Research octane + Motor octane)/2
RON: Research Octane Number

Item	Worldwide / USA / Canada	Unit	Model	
	Worldwide		Z175GETO	Z175HETO
	USA		Z175TR	VZ175TR
	Canada		—	VZ175TR
DIMENSION				
Overall length		mm (in)	792 (31.2)	
Overall width		mm (in)	554 (21.8)	
Overall height				
(L)		mm (in)	—	1,693 (66.7)
(X)		mm (in)	1,782 (70.2)	—
Boat transom height				
(L)		mm (in)	—	508 (20.0)
(X)		mm (in)	635 (25.0)	—
WEIGHT				
(with aluminum propeller)				
(L)		kg (lb)	—	215 (474)
(X)		kg (lb)	218 (481)	—
(with stainless steel propeller)				
(L)		kg (lb)	—	217 (478)
(X)		kg (lb)	222 (489)	—
PERFORMANCE				
Maximum output (ISO)		kW (hp) @ 5,000 r/min	128.7 (175)	
Full throttle operating range		r/min	4,500 - 5,500	
Maximum fuel consumption		L (US gal, Imp gal)/hr @ 5,500 r/min	64.0 (16.9, 14.1)	
POWER UNIT				
Type			2 stroke - V	
Number of cylinders			6	
Displacement		cm^3 (cu. in)	2,596 (158.4)	
Bore × stroke		mm (in)	90.0 × 68.0 (3.54 × 2.68)	
Compression ratio			Cylinders #1 - #4: 6.5 Cylinders #5 - #6: 6.1	
Compression pressure*		kPa (kgf/cm^2, psi)	650 (6.5, 92)	
*Fuel system			Electronic fuel injection	
Fuel injection system			Sequential injection	
Intake system			Reed valve	
Induction system			Loop charge	
Starting system			Electric	
Ignition control system			Microcomputer	
Alternator output		V - A	12 - 45	

* Measuring conditions:
Ambient temperature 20 °C (68 °F), wide open throttle, plugs disconnected from all cylinders.
The figures are for reference only.

GENERAL SPECIFICATIONS

Item	Worldwide / USA / Canada	Unit	Model	
	Worldwide		Z175GETO	Z175HETO
	USA		Z175TR	VZ175TR
	Canada		—	VZ175TR
Spark plugs			BKR7ES-11	
Cooling system			Water	
Exhaust system			Through propeller boss	
Lubrication system			Oil injection	
FUEL AND OIL				
Fuel type			Unleaded regular gasoline	
Fuel rating		*PON	86	
		RON	91	
Engine oil type			YAMALUBE 2-stroke outboard engine oil	
Engine oil capacity				
(engine oil tank)		L (US qt, Imp qt)	0.9 (0.95, 0.79)	
(sub-oil tank)		L (US qt, Imp qt)	10.5 (11.1, 9.2)	
Gear oil type			Hypoid gear oil SAE 90	
Gear oil total quantity		cm^3 (US oz, Imp oz)	980 (33.1, 34.5)	
BRACKET				
Trim angle (at 12° boat transom)		Degree	−4 - 16	
Tilt-up angle		Degree	70	
Steering angle		Degree	32 + 32	
DRIVE UNIT				
Gear shift positions			F-N-R	
Gear ratio			1.86 (26/14)	
Reduction gear type			Spiral bevel gear	
Clutch type			Dog clutch	
Propeller shaft type			Spline	
Propeller direction (rear view)			Clockwise	
Propeller mark			M	
ELECTRICAL				
Battery capacity		Ah (kC)	100 (360)	
Minimum cold cranking performance		A	512	

* PON: Pump Octane Number (Research octane + Motor octane)/2
RON: Research Octane Number

GENERAL SPECIFICATIONS

Item	Worldwide / USA / Canada	Unit	Model	
			Z200NETO / Z200TR / Z200TR	LZ200NETO / LZ200TR / —
DIMENSION				
Overall length		mm (in)	792 (31.2)	
Overall width		mm (in)	554 (21.8)	
Overall height				
(L)		mm (in)	1,655 (65.2)	—
(X)		mm (in)	1,782 (70.2)	
Boat transom height				
(L)		mm (in)	508 (20.0)	—
(X)		mm (in)	635 (25.0)	
WEIGHT				
(with aluminum propeller)				
(L)		kg (lb)	214 (472)	—
(X)		kg (lb)	218 (481)	
(with stainless steel propeller)				
(L)		kg (lb)	216 (476)	—
(X)		kg (lb)	222 (489)	
PERFORMANCE				
Maximum output (ISO)		kW (hp) @ 5,000 r/min	147.1 (200)	
Full throttle operating range		r/min	4,500 - 5,500	
Maximum fuel consumption		L (US gal, Imp gal)/hr @ 5,500 r/min	68.0 (18.0, 15.0)	
POWER UNIT				
Type			2 stroke - V	
Number of cylinders			6	
Displacement		cm^3 (cu. in)	2,596 (158.4)	
Bore × stroke		mm (in)	90.0 × 68.0 (3.54 × 2.68)	
Compression ratio			Cylinders #1 - #4: 6.3 Cylinders #5 - #6: 6.0	
Compression pressure*		kPa (kgf/cm^2, psi)	650 (6.5, 92)	
Fuel system			Electronic fuel injection	
Fuel injection system			Sequential injection	
Intake system			Reed valve	
Induction system			Loop charge	
Starting system			Electric	
Ignition control system			Microcomputer	
Alternator output		V - A	12 - 45	

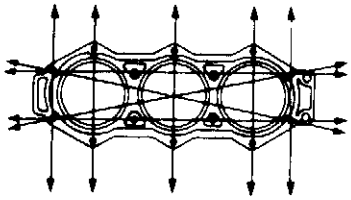
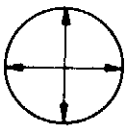
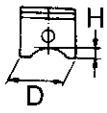
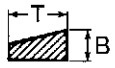
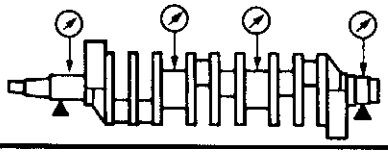
* Measuring conditions:
Ambient temperature 20 °C (68 °F), wide open throttle, plugs disconnected from all cylinders.
The figures are for reference only.

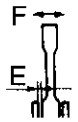
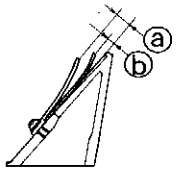
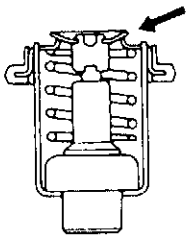
GENERAL SPECIFICATIONS

Item		Unit	Model	
	Worldwide		Z200NETO	LZ200NETO
	USA		Z200TR	LZ200TR
	Canada		Z200TR	—
Spark plugs			BKR7ES-11	
Cooling system			Water	
Exhaust system			Through propeller boss	
Lubrication system			Oil injection	
FUEL AND OIL				
Fuel type			Unleaded regular gasoline	
Fuel rating		*PON	86	
		RON	91	
Engine oil type			2-stroke outboard engine oil	
Engine oil capacity				
(engine oil tank)		L (US qt, Imp qt)	0.9 (0.95, 0.79)	
(sub-oil tank)		L (US qt, Imp qt)	10.5 (11.1, 9.2)	
Gear oil type			Hypoid gear oil SAE 90	
Gear oil total quantity		cm^3 (US oz, Imp oz)	980 (33.1, 34.5)	870 (29.4, 30.6)
BRACKET				
Trim angle (at 12° boat transom)		Degree	−4 - 16	
Tilt-up angle		Degree	70	
Steering angle		Degree	32 + 32	
DRIVE UNIT				
Gear shift positions			F-N-R	
Gear ratio			1.86 (26/14)	
Reduction gear type			Spiral bevel gear	
Clutch type			Dog clutch	
Propeller shaft type			Spline	
Propeller direction (rear view)			Clockwise	Counterclockwise
Propeller mark			M	ML
ELECTRICAL				
Battery capacity		Ah (kC)	100 (360)	
Minimum cold cranking performance		A	512	

* PON: Pump Octane Number (Research octane + Motor octane)/2
RON: Research Octane Number

MAINTENANCE SPECIFICATIONS
POWER UNIT

Item	Worldwide / USA / Canada	Unit	Model				
	Worldwide		Z150PETO	LZ150PETO	Z150QETO	Z175GETO	Z175HETO
	USA		Z150TR	LZ150TR	VZ150TR	Z175TR	VZ175TR
	Canada		Z150TR	—	VZ150TR	—	VZ175TR
CYLINDER HEADS							
Warpage limit		mm (in)	0.1 (0.004)				
 (lines indicate straightedge position)							
CYLINDERS							
Bore size 		mm (in)	90.00 - 90.02 (3.543 - 3.544)				
Wear limit		mm (in)	90.1 (3.55)				
Taper limit		mm (in)	0.08 (0.003)				
Out-of-round limit		mm (in)	0.05 (0.002)				
PISTONS							
Piston diameter (D) 		mm (in)	89.845 - 89.869 (3.5372 - 3.5381)				
Measuring point (H)		mm (in)	10 (0.4)				
Piston-to-cylinder clearance		mm (in)	0.150 - 0.156 (0.0059 - 0.0061)				
<Limit>		mm (in)	0.206 (0.0081)				
Oversize piston diameter							
1st		mm (in)	90.11 (3.548)				
2nd		mm (in)	90.36 (3.557)				
PISTON RINGS							
Type 			Keystone				
(B)		mm (in)	2.0 (0.079)				
(T) 		mm (in)	2.8 (0.110)				
End gap (installed)		mm (in)	0.30 - 0.40 (0.012 - 0.016)				
<Limit> 		mm (in)	0.60 (0.024)				
Side clearance		mm (in)	0.02 - 0.06 (0.001 - 0.002)				
CRANKSHAFT							
Runout limit		mm (in)	0.05 (0.002)				
							

Item	Unit	Model				
Worldwide		Z150PETO	LZ150PETO	Z150QETO	Z175GETO	Z175HETO
USA		Z150TR	LZ150TR	VZ150TR	Z175TR	VZ175TR
Canada		Z150TR	—	VZ150TR	—	VZ175TR
CONNECTING RODS						
Small-end axial play limit (F) 	mm (in)	2.0 (0.08)				
Big-end side clearance (E)	mm (in)	0.12 - 0.26 (0.005 - 0.010)				
OIL INJECTION PUMP						
ID mark		68H00			68L00	
Bleeding		Screw type				
REED VALVES						
Reed valve stopper height ⓐ 	mm (in)	8.1 ± 0.30 (0.32 ± 0.01)				
Warpage limit ⓑ	mm (in)	0.2 (0.008)				
THERMOSTATS						
Opening temperature	°C (°F)	48 - 52 (118 - 126)				
Full-open temperature	°C (°F)	60 (140)				
						
Valve open lower limit	mm (in)	3 (0.12)				
ENGINE SPEED						
Idling speed	r/min	700 ± 30				

LOWER UNIT

Item		Unit	Model				
	Worldwide		Z150PETO	LZ150PETO	Z150QETO	Z175GETO	Z175HETO
	USA		Z150TR	LZ150TR	VZ150TR	Z175TR	VZ175TR
	Canada		Z150TR	—	VZ150TR	—	VZ175TR
GEAR BACKLASH							
Pinion - forward gear		mm (in)	0.25 - 0.46 (0.010 - 0.018)	0.21 - 0.43 (0.008 - 0.017)	0.72 - 1.01 (0.028 - 0.040)	0.25 - 0.46 (0.010 - 0.018)	
Pinion - reverse gear		mm (in)	0.74 - 1.29 (0.029 - 0.051)	0.97 - 1.29 (0.038 - 0.051)	0.79 - 1.39 (0.031 - 0.055)	0.74 - 1.29 (0.029 - 0.051)	
Pinion shims		mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50				
Forward gear shims		mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50				
Reverse gear shims		mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50				

ELECTRICAL

Item		Unit	Model				
	Worldwide		Z150PETO	LZ150PETO	Z150QETO	Z175GETO	Z175HETO
	USA		Z150TR	LZ150TR	VZ150TR	Z175TR	VZ175TR
	Canada		Z150TR	—	VZ150TR	—	VZ175TR
IGNITION SYSTEM							
Ignition timing							
#1 cylinder							
(L) @ idling speed (700 r/min)		Degree	BTDC 3	—	BTDC 3	—	BTDC 3
(X) @ idling speed (700 r/ min)		Degree	BTDC 4	BTDC 4	—	BTDC 3	—
@ 5,500 r/min		Degree	BTDC 17	BTDC 17	BTDC 17	BTDC 20	BTDC 20
#2 cylinder							
(L) @ idling speed (700 r/min)		Degree	BTDC 3	—	BTDC 3	—	BTDC 3
(X) @ idling speed (700 r/min)		Degree	BTDC 4	BTDC 4	—	BTDC 3	—
@ 5,500 r/min		Degree	BTDC 15	BTDC 15	BTDC 17	BTDC 20	BTDC 20
Fuse 1		V-A	12-80				
Fuse 2		V-A	12-30				
Fuse 3		V-A	12-20				
Control unit (B/O, B/Y, B/L, B/Br, B/G, B/W – R/Y)							
Output peak voltage lower limit							
@ cranking 1*		V	—				
@ cranking 2*		V	140				
@ 1,500 r/min		V	205				
@ 3,500 r/min		V	220				

* Cranking 1: unloaded
Cranking 2: loaded

Item	Unit	Model				
Worldwide		Z150PETO	LZ150PETO	Z150QETO	Z175GETO	Z175HETO
USA		Z150TR	LZ150TR	VZ150TR	Z175TR	VZ175TR
Canada		Z150TR	—	VZ150TR	—	VZ175TR
Pulser coil (W/R, W/Y, W/G, W/B, W/L, W/Br – B)						
Output peak voltage lower limit						
@ cranking 1*	V	5.0				
@ cranking 2*	V	5.0				
@ 1,500 r/min	V	20				
@ 3,500 r/min	V	35				
IGNITION CONTROL SYSTEM						
Crank position sensor (G/L)						
Crank-position-sensor-to-flywheel gap	mm (in)	1.0 ± 0.5 (0.04 ± 0.02)				
Output peak voltage lower limit						
@ cranking 1*	V	4.5				
@ cranking 2*	V	4.0				
@ 1,500 r/min	V	13				
@ 3,500 r/min	V	20				
Engine cooling water temperature sensor						
Resistance (B/Y – B/Y)						
@ 5°C (41°F)	kΩ	128				
@ 20°C (68°F)	kΩ	54 - 69				
@ 100°C (212°F)	kΩ	3.02 - 3.48				
Throttle position sensor						
Input voltage (O – R)	V	4.75 - 5.25				
Output voltage (P – O)	V	0.48 - 5.25				
Thermo switch (P – B)						
OFF → ON	°C (°F)	84 - 90 (183 - 194)				
ON → OFF	°C (°F)	60 - 74 (140 - 165)				
FUEL CONTROL SYSTEM						
Oxygen density sensor						
* Heater resistance (R/W – B)	Ω	2 - 100				
Output voltage (Gy – B/W)	V	0.0 - 1.0				
Atmospheric pressure sensor						
Output voltage (at 101.32 kPa) (P – B)	V	3.2 - 4.6				
Intake air temperature sensor						
Resistance (B/Y – B/Y)	kΩ	1.5 - 4.0				

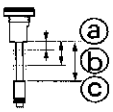
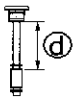
* Cranking 1: unloaded
Cranking 2: loaded

Item	Unit	Model				
Worldwide		Z150PETO	LZ150PETO	Z150QETO	Z175GETO	Z175HETO
USA		Z150TR	LZ150TR	VZ150TR	Z175TR	VZ175TR
Canada		Z150TR	—	VZ150TR	—	VZ175TR
Injector driver (O/R – Pu/R, O/B – Pu/B, O/Y – Pu/Y, O/G – Pu/G, O/L – Pu/L, O/W – Pu/W)						
Output peak voltage lower limit						
@ cranking 1*	V	65				
@ cranking 2*	V	60				
@ 1,500 r/min	V	65				
@ 3,500 r/min	V	65				
Fuel pressure sensor						
Output voltage (P – B)	V	2.8 - 3.2				
STARTER MOTOR						
Type		Sliding gear				
Output	kW	1.4				
Cranking time limit	Second	30				
Brushes						
Standard length	mm (in)	15.5 (0.61)				
Wear limit	mm (in)	9.5 (0.37)				
Commutator						
Standard diameter	mm (in)	29.0 (1.14)				
Wear limit	mm (in)	28.0 (1.10)				
Mica						
Standard undercut	mm (in)	0.5 - 0.8 (0.02 - 0.03)				
Wear limit	mm (in)	0.2 (0.01)				
CHARGING SYSTEM						
Rectifier/regulator (R – B)						
Output peak voltage lower limit						
@ cranking 1*	V	—				
@ cranking 2*	V	7.5				
@ 1,500 r/min	V	12.7				
@ 3,500 r/min	V	12.7				
Lighting coil (G – G)						
Output peak voltage lower limit						
@ cranking (unloaded)	V	5.5				
@ 1,500 r/min (unloaded)	V	37				
@ 3,500 r/min (unloaded)	V	86				

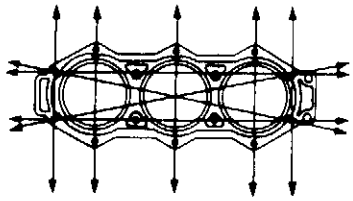
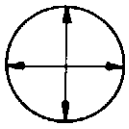
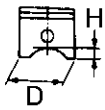
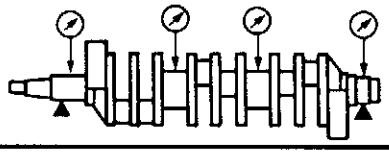
* Cranking 1: unloaded
Cranking 2: loaded

MAINTENANCE SPECIFICATIONS

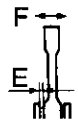
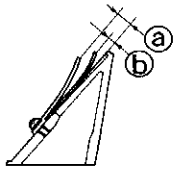
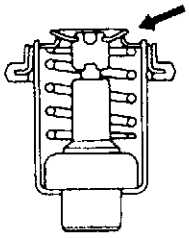
(E)

Item		Unit	Model				
	Worldwide		Z150PETO	LZ150PETO	Z150QETO	Z175GETO	Z175HETO
	USA		Z150TR	LZ150TR	VZ150TR	Z175TR	VZ175TR
	Canada		Z150TR	—	VZ150TR	—	VZ175TR
OIL FEED PUMP CONTROL SYSTEM							
Oil level sensor (engine oil tank)							
Float position ⓐ "OFF"		mm (in)	3 - 6 (0.12 - 0.24)				
Float position ⓑ "ON"		mm (in)	33 - 36 (1.30 - 1.42)				
Float position ⓒ "ON"		mm (in)	53 - 56 (2.09 - 2.20)				
Oil level switch (sub-oil tank)							
Float position ⓓ "ON"		mm (in)	150 - 153 (5.91 - 6.02)				
POWER TRIM AND TILT SYSTEM							
Trim sensor							
Setting resistance		Ω	11 ± 7				
Resistance	(P – B)	Ω	10 - 309				
POWER TRIM AND TILT MOTOR							
Fluid type			ATF Dexron II				
Brushes							
Standard length		mm (in)	9.8 (0.39)				
Wear limit		mm (in)	4.8 (0.19)				
Commutator							
Standard diameter		mm (in)	22.0 (0.87)				
Wear limit		mm (in)	21.0 (0.83)				
Mica							
Standard undercut		mm (in)	1.35 (0.05)				
Wear limit		mm (in)	0.85 (0.03)				

POWER UNIT

Item	Unit	Model	
Worldwide		Z200NETO	LZ200NETO
USA		Z200TR	LZ200TR
Canada		Z200TR	—
CYLINDER HEADS			
Warpage limit	mm (in)	0.1 (0.004)	
 (lines indicate straightedge position)		—	
CYLINDERS			
Bore size 	mm (in)	90.00 - 90.02 (3.543 - 3.544)	
Wear limit	mm (in)	90.1 (3.55)	
Taper limit	mm (in)	0.08 (0.003)	
Out-of-round limit	mm (in)	0.05 (0.002)	
PISTONS			
Piston diameter (D) 	mm (in)	89.845 - 89.869 (3.5372 - 3.5381)	
Measuring point (H)	mm (in)	10 (0.4)	
Piston-to-cylinder clearance	mm (in)	0.150 - 0.156 (0.0059 - 0.0061)	
<Limit>	mm (in)	0.206 (0.0081)	
Oversize piston diameter			
1st	mm (in)	90.11 (3.548)	
2nd	mm (in)	90.36 (3.557)	
PISTON RINGS			
Type 		Keystone	
(B)	mm (in)	2.0 (0.079)	
(T) 	mm (in)	2.8 (0.110)	
End gap (installed)	mm (in)	0.30 - 0.40 (0.012 - 0.016)	
<Limit> 	mm (in)	0.60 (0.024)	
Side clearance	mm (in)	0.02 - 0.06 (0.001 - 0.002)	
CRANKSHAFT			
Runout limit	mm (in)	0.05 (0.002)	
			

MAINTENANCE SPECIFICATIONS

Item		Unit	Model	
	Worldwide		Z200NETO	LZ200NETO
	USA		Z200TR	LZ200TR
	Canada		Z200TR	—
CONNECTING RODS				
Small-end axial play limit (F) 		mm (in)	2.0 (0.08)	
Big-end side clearance (E)		mm (in)	0.12 - 0.26 (0.005 - 0.010)	
OIL INJECTION PUMP				
ID mark			68F00	
Bleeding			Screw type	
REED VALVES				
Reed valve stopper height ⓐ 		mm (in)	9.0 ± 0.35 (0.35 ± 0.01)	
			–	
Warpage limit ⓑ		mm (in)	0.2 (0.008)	
THERMOSTATS				
Opening temperature		°C (°F)	48 - 52 (118 - 126)	
Full-open temperature		°C (°F)	60 (140)	
				
Valve open lower limit		mm (in)	3 (0.12)	
ENGINE SPEED				
Idling speed		r/min	700 ± 30	

LOWER UNIT

Item		Unit	Model	
	Worldwide		Z200NETO	LZ200NETO
	USA		Z200TR	LZ200TR
	Canada		Z200TR	—
GEAR BACKLASH				
Pinion - forward gear		mm (in)	0.25 - 0.46 (0.010 - 0.018)	0.21 - 0.43 (0.008 - 0.017)
Pinion - reverse gear		mm (in)	0.74 - 1.29 (0.029 - 0.051)	0.97 - 1.29 (0.038 - 0.051)
Pinion shims		mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50	
Forward gear shims		mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50	
Reverse gear shims		mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50	

ELECTRICAL

Item		Unit	Model	
	Worldwide		Z200NETO	LZ200NETO
	USA		Z200TR	LZ200TR
	Canada		Z200TR	—
IGNITION SYSTEM				
Ignition timing				
#1 cylinder				
@ idling speed (700 r/min)		Degree	BTDC 4	
@ 5,500 r/min		Degree	BTDC 17	
#2 cylinder				
@ idling speed (700 r/min)		Degree	BTDC 4	
@ 5,500 r/min		Degree	BTDC 15	
Fuse 1		V-A	12-80	
Fuse 2		V-A	12-30	
Fuse 3		V-A	12-20	
Control unit (B/O, B/Y, B/L, B/Br, B/G, B/W – R/Y)				
Output peak voltage lower limit				
@ cranking 1*		V	—	
@ cranking 2*		V	140	
@ 1,500 r/min		V	205	
@ 3,500 r/min		V	220	

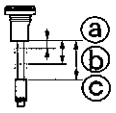
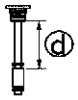
* Cranking 1: unloaded
  Cranking 2: loaded

Item	Worldwide / USA / Canada	Unit	Model	
			Z200NETO / Z200TR / Z200TR	LZ200NETO / LZ200TR / —
Pulser coil (W/R, W/Y, W/G, W/B, W/L, W/Br – B)				
Output peak voltage lower limit				
@ cranking 1*		V	5.0	
@ cranking 2*		V	5.0	
@ 1,500 r/min		V	20	
@ 3,500 r/min		V	35	
IGNITION CONTROL SYSTEM				
Crank position sensor (G/L)				
Crank-position-sensor-to-flywheel gap		mm (in)	1.0 ± 0.5 (0.04 ± 0.02)	
Output peak voltage lower limit				
@ cranking 1*		V	4.5	
@ cranking 2*		V	4.0	
@ 1,500 r/min		V	13	
@ 3,500 r/min		V	20	
Engine cooling water temperature sensor				
Resistance (B/Y – B/Y)				
@ 5°C (41°F)		kΩ	128	
@ 20°C (68°F)		kΩ	54 - 69	
@ 100°C (212°F)		kΩ	3.02 - 3.48	
Throttle position sensor				
Input voltage (O – R)		V	4.75 - 5.25	
Output voltage (P – O)		V	0.48 - 5.25	
Thermo switch (P – B)				
OFF → ON		°C (°F)	84 - 90 (183 - 194)	
ON → OFF		°C (°F)	60 - 74 (140 - 165)	
FUEL CONTROL SYSTEM				
Oxygen density sensor				
Heater resistance (R/W – B)		Ω	2 - 100	
Output voltage (Gy – B/W)		V	0.0 - 1.0	
Atmospheric pressure sensor				
Output voltage (at 101.32 kPa) (P – B)		V	3.2 - 4.6	
Intake air temperature sensor				
Resistance (B/Y – B/Y)		kΩ	1.5 - 4.0	

* Cranking 1: unloaded
Cranking 2: loaded

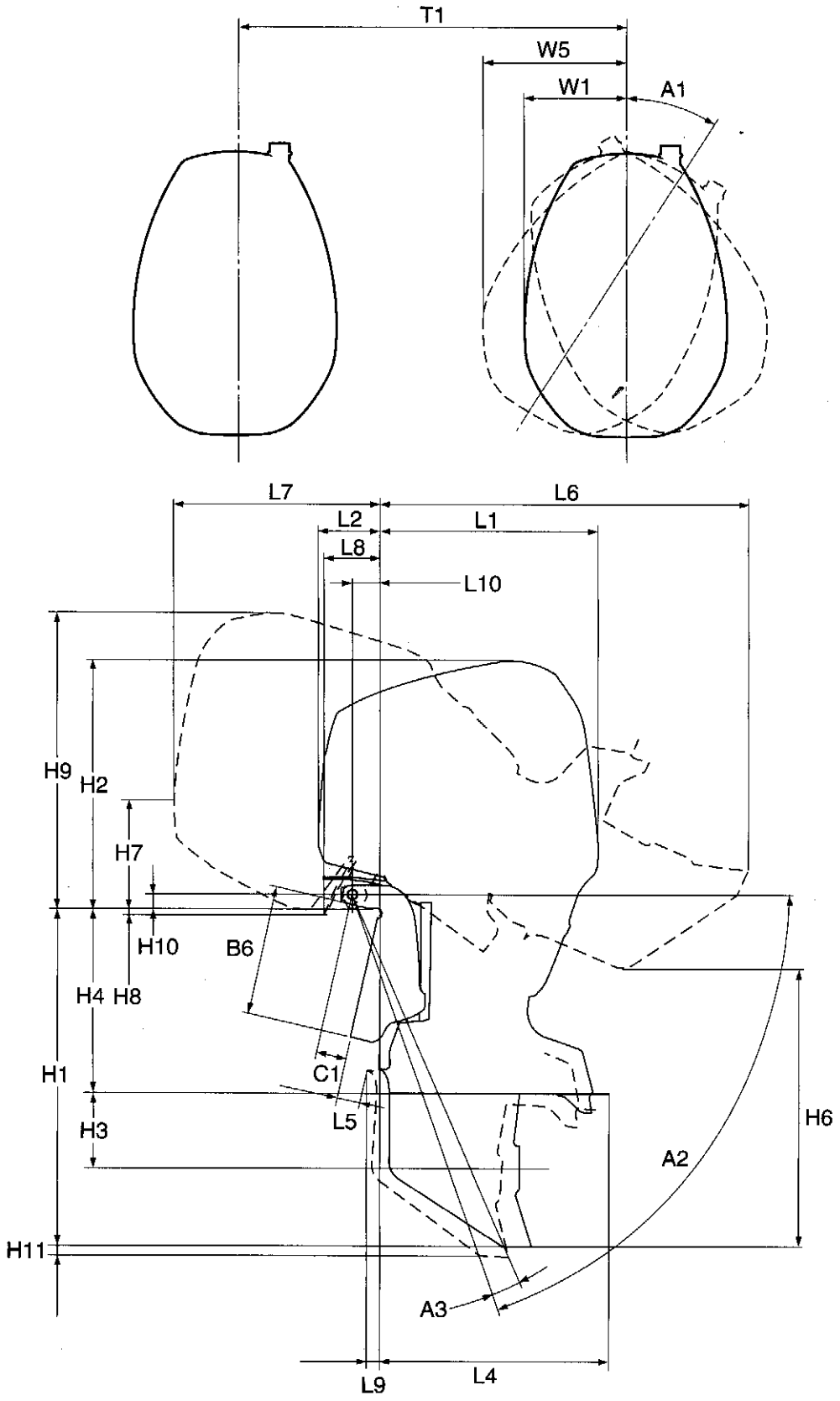
Item		Unit	Model	
	Worldwide		Z200NETO	LZ200NETO
	USA		Z200TR	LZ200TR
	Canada		Z200TR	—
Injector driver (O/R – Pu/R, O/B – Pu/B, O/Y – Pu/Y, O/G – Pu/G, O/L – Pu/L, O/W – Pu/W)				
Output peak voltage lower limit				
@ cranking 1*		V	65	
@ cranking 2*		V	60	
@ 1,500 r/min		V	65	
@ 3,500 r/min		V	65	
Fuel pressure sensor				
Output voltage	(P – B)	V	2.8 - 3.2	
STARTER MOTOR				
Type			Sliding gear	
Output		kW	1.4	
Cranking time limit		Second	30	
Brushes				
Standard length		mm (in)	15.5 (0.61)	
Wear limit		mm (in)	9.5 (0.37)	
Commutator				
Standard diameter		mm (in)	29.0 (1.14)	
Wear limit		mm (in)	28.0 (1.10)	
Mica				
Standard undercut		mm (in)	0.5 - 0.8 (0.02 - 0.03)	
Wear limit		mm (in)	0.2 (0.01)	

* Cranking 1: unloaded
  Cranking 2: loaded

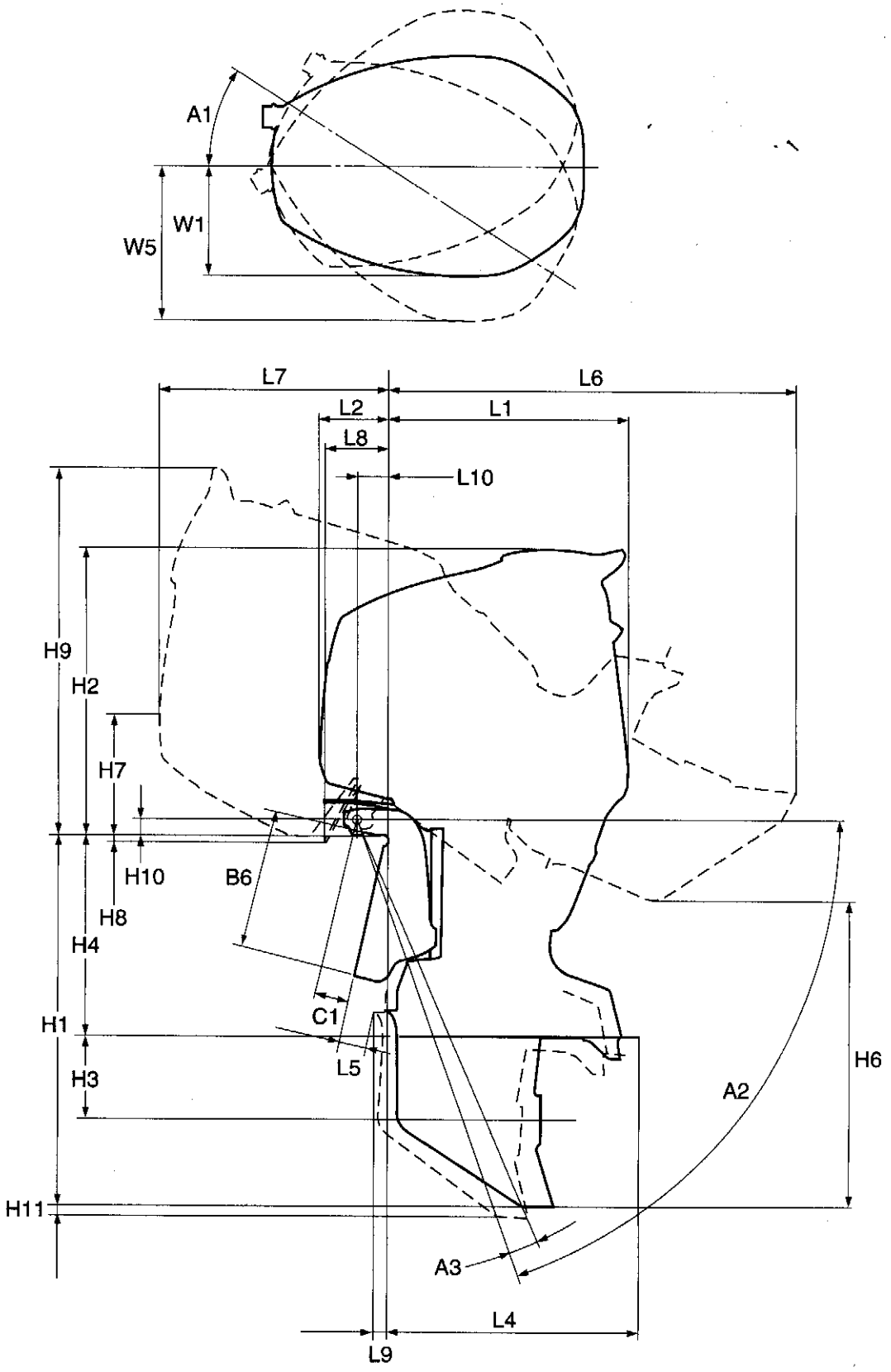
Item	Worldwide / USA / Canada	Unit	Model	
			Z200NETO / Z200TR / Z200TR	LZ200NETO / LZ200TR / —
CHARGING SYSTEM				
Rectifier/regulator (R – B)				
Output peak voltage lower limit				
@ cranking 1*		V	—	
@ cranking 2*		V	7.5	
@ 1,500 r/min		V	12.7	
@ 3,500 r/min		V	12.7	
Lighting coil (G – G)				
Output peak voltage lower limit				
@ cranking (unloaded)		V	5.5	
@ 1,500 r/min (unloaded)		V	37	
@ 3,500 r/min (unloaded)		V	86	
OIL FEED PUMP CONTROL SYSTEM				
Oil level sensor (engine oil tank) 				
Float position ⓐ "OFF"		mm (in)	3 - 6 (0.12 - 0.24)	
Float position ⓑ "ON" 		mm (in)	33 - 36 (1.30 - 1.42)	
Float position ⓒ "ON"		mm (in)	53 - 56 (2.09 - 2.20)	
Oil level switch (sub-oil tank)				
Float position ⓓ "ON"		mm (in)	150 - 153 (5.91 - 6.02)	
POWER TRIM AND TILT SYSTEM				
Trim sensor				
Setting resistance		Ω	11 ± 7	
Resistance (P – B)		Ω	10 - 309	
POWER TRIM AND TILT MOTOR				
Fluid type			ATF Dexron II	
Brushes				
* Standard length		mm (in)	9.8 (0.39)	
Wear limit		mm (in)	4.8 (0.19)	
Commutator				
Standard diameter		mm (in)	22.0 (0.87)	
Wear limit		mm (in)	21.0 (0.83)	
Mica				
Standard undercut		mm (in)	1.35 (0.05)	
Wear limit		mm (in)	0.85 (0.03)	

* Cranking 1: unloaded
Cranking 2: loaded

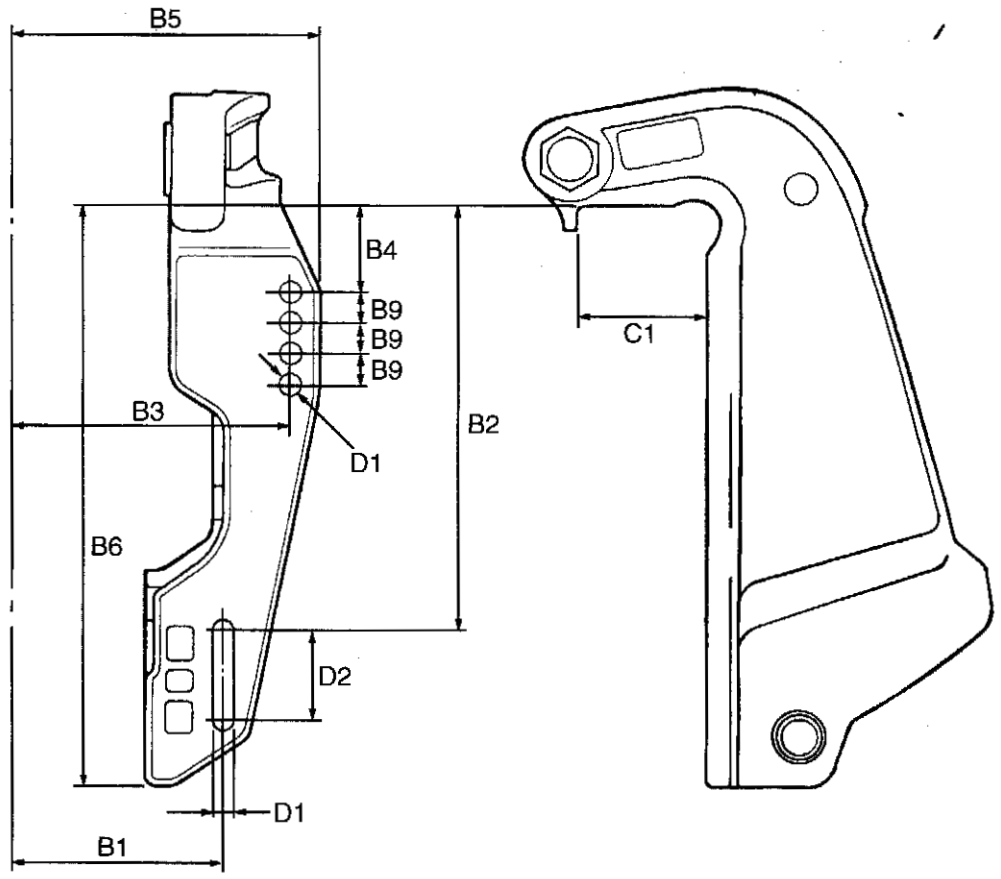
DIMENSIONS


T1
W5
W1
A1
L7
L6
L2
L1
L8
L10
H9
H2
H7
H10
B6
H4
H8
H1
C1
L5
H3
H6
A2
H11
A3
L9
L4

Symbol		Unit	Model				
Worldwide			Z150PETO	LZ150PETO	Z175GETO	Z200NETO	LZ200NETO
USA			Z150TR	LZ150TR	Z175TR	Z200TR	LZ200TR
Canada			Z150TR	—	—	Z200TR	—
L1		mm (in)	613 (24.1)				
L2		mm (in)	180 (7.1)				
L3		mm (in)	—				
L4		mm (in)	646 (25.4)				
L5	(L)	mm (in)	53 (2.1)	—		53 (2.1)	—
	(X)	mm (in)	69 (2.7)				
L6	(L)	mm (in)	1,034 (40.7)	—		1,034 (40.7)	—
	(X)	mm (in)	1,150 (45.3)				
L7		mm (in)	574 (22.6)				
L8		mm (in)	168 (6.6)				
L9	(L)	mm (in)	42 (1.7)	—		42 (1.7)	—
	(X)	mm (in)	50 (2.0)				
L10		mm (in)	74 (2.9)				
H1	(L)	mm (in)	947 (37.3)	—		947 (37.3)	—
	(X)	mm (in)	1,074 (42.3)				
H2		mm (in)	708 (27.9)				
H3		mm (in)	211 (8.3)				
H4	(L)	mm (in)	516 (20.3)	—		516 (20.3)	—
	(X)	mm (in)	643 (25.3)				
H5		mm (in)	—				
H6	(L)	mm (in)	774 (30.5)	—		774 (30.5)	—
	(X)	mm (in)	850 (33.4)				
H7		mm (in)	308 (12.1)				
H8		mm (in)	14 (0.6)				
H9		mm (in)	835 (32.9)				
H10		mm (in)	44 (1.7)				
H11	(L)	mm (in)	32.2 (1.27)	—		32.2 (1.27)	—
	(X)	mm (in)	31.9 (1.26)				
W1		mm (in)	277 (10.9)				
W2		mm (in)	—				
W3		mm (in)	—				
W4		mm (in)	—				
W5		mm (in)	396 (15.6)				
W6		mm (in)	—				
A1		Degree	32				
A2		Degree	70				
A3		Degree	4				
T1		mm (in)	660 (26.0)				


A1
W1
W5
L7
L6
L2
L1
L8
L10
H9
H2
H7
H10
B6
H8
H4
H1
C1
L5
H3
H6
A2
H11
A3
L4
L9

Symbol		Unit	Model	
Worldwide			Z150QETO	Z175HETO
USA			VZ150TR	VZ175TR
Canada			VZ150TR	VZ175TR
L1		mm (in)	613 (24.1)	
L2		mm (in)	180 (7.1)	
L3		mm (in)	—	
L4		mm (in)	646 (25.4)	
L5	(L)	mm (in)	53 (2.1)	
	(X)	mm (in)	—	
L6	(L)	mm (in)	1,034 (40.7)	
	(X)	mm (in)	—	
L7		mm (in)	574 (22.6)	
L8		mm (in)	168 (6.6)	
L9	(L)	mm (in)	42 (1.7)	
	(X)	mm (in)	—	
L10		mm (in)	74 (2.9)	
H1	(L)	mm (in)	947 (37.3)	
	(X)	mm (in)	—	
H2		mm (in)	945 (37.2)	
H3		mm (in)	211 (8.3)	
H4	(L)	mm (in)	516 (20.3)	
	(X)	mm (in)	—	
H5		mm (in)	—	
H6	(L)	mm (in)	774 (30.5)	
	(X)	mm (in)	—	
H7		mm (in)	308 (12.1)	
H8		mm (in)	14 (0.6)	
H9		mm (in)	746 (29.4)	
H10		mm (in)	44 (1.7)	
H11	(L)	mm (in)	32.2 (1.27)	
	(X)	mm (in)	—	
W1		mm (in)	277 (10.9)	
W2		mm (in)	—	
W3		mm (in)	—	
W4		mm (in)	—	
W5		mm (in)	396 (15.6)	
W6		mm (in)	—	
A1		Degree	32	
A2		Degree	70	
A3		Degree	4	
T1		mm (in)	660 (26.0)	



Symbol	Unit	Model						
Worldwide		Z150PETO	LZ150PETO	Z150QETO	Z175GETO	Z175HETO	Z200NETO	LZ200NETO
USA		Z150TR	LZ150TR	VZ150TR	Z175TR	VZ175TR	Z200TR	LZ200TR
Canada		Z150TR	—	VZ150TR	—	VZ175TR	Z200TR	—
B1	mm (in)	125.4 (4.9)						
B2	mm (in)	254 (10.0)						
B3	mm (in)	163.5 (6.4)						
B4	mm (in)	50.8 (2.0)						
B5	mm (in)	180 (7.1)						
B6	mm (in)	367 (14.4)						
B7	mm (in)	—						
B8	mm (in)	—						
B9	mm (in)	18.5 (0.7)						
C1	mm (in)	82 (3.2)						
C2	mm (in)	—						
D1	mm (in)	13 (0.5)						
D2	mm (in)	55.5 (2.2)						

TIGHTENING TORQUES

SPECIFIED TORQUES

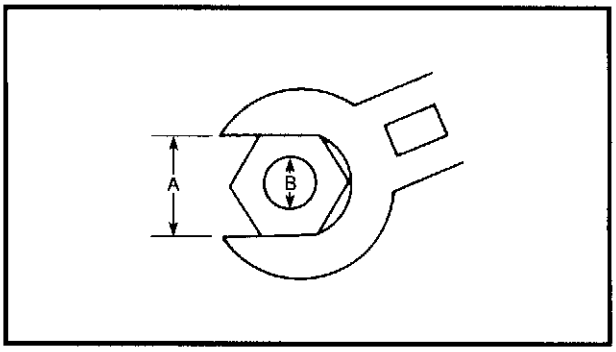
Part to be tightened		Thread size	Tightening torques		
			N•m	kgf•m	ft•lb
POWER UNIT					
Intake silencer		M6	3	0.3	2.2
Electric oil pump		M6	8	0.8	5.8
Fuel injection unit		M6	10	1.0	7.2
Atmospheric pressure sensor		M6	4	0.4	2.9
Electric oil pump bracket		M6	8	0.8	5.8
Throttle position sensor		M5	4	0.4	2.9
Intake air temperature sensor		M12	8	0.8	5.8
Drive belt tensioner		M10	40	4.0	29
Mechanical fuel pump		M8	23	2.3	17
Fuel rail		M8	23	2.3	17
Fuel injector cap		M8	26	2.6	19
Fuel filter nut holder		M6	8	0.8	5.8
Oil pump		M6	7	0.7	5.1
Emergency switch		—	4	0.4	2.9
Flywheel magnet assembly		M20	190	19	137
Negative battery lead		M8	18	1.8	13
Positive battery lead		M8	9	0.9	6.5
Junction box cover		M5	2	0.2	1.4
Power trim and tilt lead (blue, green)		M6	4	0.4	2.9
Apron		M6	8	0.8	5.8
Power unit mount		M8	21	2.1	15
Power trim and tilt lead (red)		—	9	0.9	6.5
Starter relay holder		M5	3	0.3	2.2
Oxygen density sensor cover		M6	9	0.9	6.5
Oxygen density sensor bracket		M6	14	1.4	10
Oxygen density sensor		M18	49	4.9	35
Reed valve assembly		M6	10	1.0	7.2
Reed valve		M5	3	0.3	2.2
Reed valve stopper		M3	1	0.1	0.7
Shift position switch		M4	3	0.3	2.2
Spark plug		M14	25	2.5	18
Thermostat cover	1st	M6	5	0.5	3.6
	2nd		11	1.1	8.0
Cylinder head cover	1st	M6	5	0.5	3.6
	2nd		11	1.1	8.0
Engine cooling water temperature sensor		—	15	1.5	11
Cylinder head	1st	M8	15	1.5	11
	2nd		30	3.0	22
Cooling water pressure control valve cover	1st	M6	4	0.4	2.9
	2nd		8	0.8	5.8

TIGHTENING TORQUES

Part to be tightened		Thread size	Tightening torques		
			N•m	kgf•m	ft•lb
Exhaust port outer cover	1st	M6	4	0.4	2.9
	2nd		8	0.8	5.8
Crankcase	1st	M8	10	1.0	7.2
	2nd		18	1.8	13
	1st	M10	20	2.0	14
	2nd		40	4.0	29
Connecting rod	1st	M8	19	1.9	14
	2nd		37	3.7	27
	3rd		*		
	4th		19	1.9	14
	5th		37	3.7	27
LOWER UNIT					
Propeller		M18	55	5.5	40
Lower unit		M10	40	4.0	29
Ring nut		—	145	14.5	105
Pinion nut		M22	95	9.5	68
Gear oil drain screw		—	7	0.7	5.1
Gear oil level check screw		—	7	0.7	5.1
BRACKET UNIT					
Flushing hose		M5	5	0.5	3.6
Shift rod detent mechanism screw		—	24	2.4	17
Upper mount		M12	53	5.3	38
Lower mount		M14	73	7.3	53
Exhaust manifold assembly		M8	21	2.1	15
Muffler		M8	18	1.8	13
Exhaust manifold		M8	18	1.8	13
Lower exhaust manifold guide		M8	18	1.8	13
Clamp bracket		M22	15	1.5	11
Trim sensor stopper		M6	3	0.3	2.2
Trim stopper		—	37	3.7	27
POWER TRIM AND TILT UNIT					
Power trim and tilt reservoir cap		—	8	0.8	5.8
Power trim and tilt reservoir		1/4"	5	0.5	3.6
Power trim and tilt motor		1/4"	5	0.5	3.6
Manual valve		—	4	0.4	2.9
Tilt ram end screw		—	130	13	94
Tilt piston nut		—	100	10	72
Gear pump unit		5/16"	9	0.9	6.5
Gear pump		—	6	0.6	4.3
Trim ram end screw		—	80	8.0	52

*: Loosen

Nut (A)	Bolt (B)	General torque specifications		
		N•m	kgf•m	ft•lb
8 mm	M5	5	0.5	3.6
10 mm	M6	8	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 TORQUES

This chart specifies tightening torques for standard fasteners with a standard ISO thread pitch. Tightening torque specifications for special components or assemblies are provided in applicable sections of this manual. To avoid warpage, tighten multi-fastener assemblies in a crisscross fashion and progressive stages until the specified tightening torque is reached. Unless otherwise specified, tightening torque specifications require clean, dry threads.
Components should be at room temperature.

MAINTENANCE INTERVAL CHART

Use the following chart as a guide to general maintenance intervals.
Dependant on operating conditions, adjust the maintenance intervals accordingly.

Item	Remarks	Initial		Every	
		10 hours (Break-in)	50 hours (3 months)	100 hours (6 months)	200 hours (1 year)
TOP COWLING					
Top cowling fit	Check				○
FUEL SYSTEM					
Fuel line	Check	○	○	○	
Fuel filter	Clean/check	○	○	○	
Mechanical fuel pump oil(*1)	Check				○
Fuel tank	Clean				○
POWER UNIT					
Water leakage	Check	○	○	○	
Motor exterior	Check	○	○	○	
Exhaust leakage	Check	○	○	○	
Cooling water passage(*2)	Clean		○	○	
CONTROL SYSTEM					
Throttle valve synchronization	Check/adjust				○
Engine idling speed	Check/adjust	○		○	
Throttle position sensor	Check/adjust				○
Remote control shift cable	Check/adjust				○
Remote control throttle cable	Check/adjust				○
Drive belt(*3)	Check				○
OIL INJECTION SYSTEM					
Oil tank water drain	Clean	○	○	○	
Oil pump lever	Check/adjust	○			
POWER TRIM AND TILT UNIT					
Power trim and tilt fluid	Check	○	○	○	
LOWER UNIT					
Gear oil	Change	○		○	
Lower unit leakage	Check				○
Propeller and cotter pin	Check/replace	○	○	○	

(*1) Be sure to replace the mechanical fuel pump oil after every 1,000 hours (5 years) of operation.

(*2) When operating in salt water, turbid or muddy water, the engine should be flushed with clean water after each use.

(*3) Be sure to replace the drive belt after every 1,000 hours (5 years) of operation.

MAINTENANCE INTERVAL CHART

Item	Remarks	Initial		Every	
		10 hours (Break-in)	50 hours (3 months)	100 hours (6 months)	200 hours (1 year)
GENERAL					
Anodes	Check/replace		○	○	
Battery	Check/charge	(every month)			
Spark plugs	Clean/adjust/ replace	○	○	○	
Wiring and connectors	Adjust/reconnect	○	○	○	
Bolts and nuts	Tighten	○	○	○	
Lubrication points	Grease			○	

FUEL SYSTEM

MEASURING THE FUEL PRESSURE (MEDIUM-PRESSURE FUEL LINE)

Measure:

- Fuel pressure (medium-pressure fuel line)

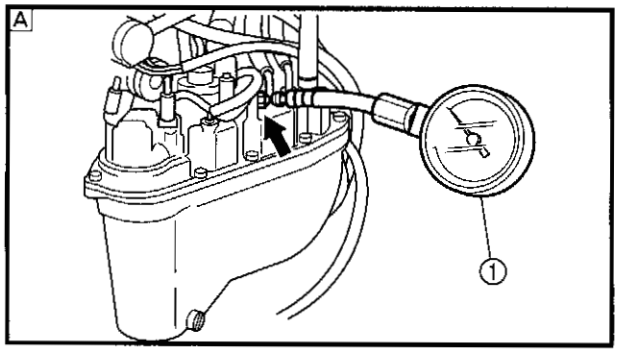
  Out of specification → Check the medium-pressure fuel line.

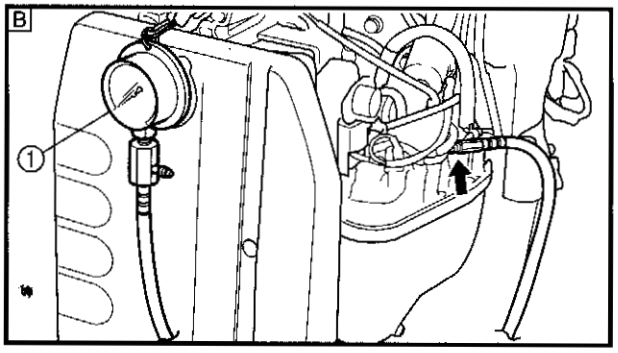
Fuel pressure (medium-pressure fuel line)
280 - 360 kPa
(2.8 - 3.6 kgf/cm², 39.8 - 51.2 psi)

Measuring steps

(1) Install the fuel pressure gauge onto the pressure check valve.

Fuel pressure gauge ..... ①
YB-06766 / 90890-06786



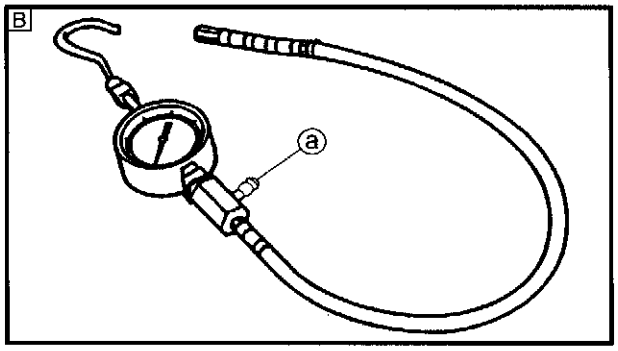


A For USA and Canada
B For worldwide

⚠ WARNING

When attaching the fuel pressure gauge, first cover the connection between the gauge and the vapor separator pressure check valve with a clean, dry rag to prevent fuel from leaking out. Gently screw in the gauge until it is firmly attached.

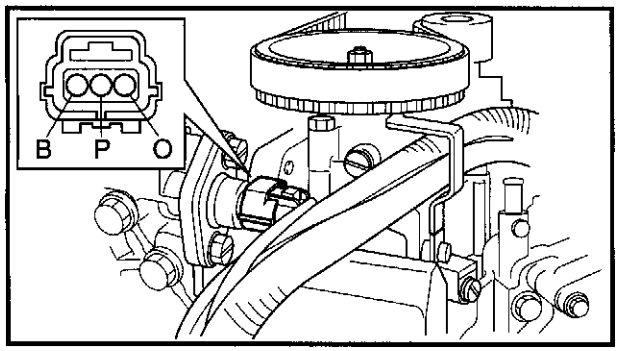
(2) Start the engine, run it at idle speed for 1 minute, and then measure the fuel pressure.
(3) Cover the connection with a rag, and then remove the fuel pressure gauge.



⚠ WARNING

For worldwide B

- **Before measuring the fuel pressure, make sure the breather nut ⓐ is tightened securely.**
- **Do not loosen the breather nut while measuring the fuel pressure. Loosening the breather nut will cause fuel to spray out creating a fire hazard.**
- **After measuring the fuel pressure, cover the end of the hose with a clean, dry rag, point the hose downward, and then loosen the breather nut to drain the remaining fuel from the hose and gauge.**
- **When storing the fuel pressure gauge, make sure the breather nut is tightened securely.**



CHECKING THE FUEL PRESSURE (MECHANICAL FUEL PUMP)

Measure:

- Fuel pressure sensor output voltage
  Out of specification → Check the high-pressure fuel line.

Fuel pressure sensor output voltage
Pink (P) – Black (B)
2.8 - 3.2 V

Measuring steps

(1) Remove the flywheel magnet assembly cover.
(2) Connect the test harness between the fuel pressure sensor and the wire harness as shown.

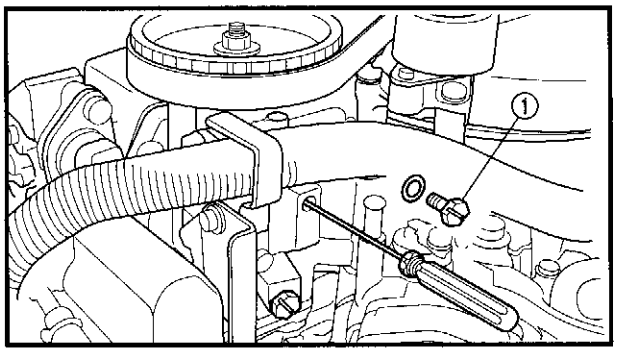
Test harness (3-pin)
YB-06769 / 90890-06769

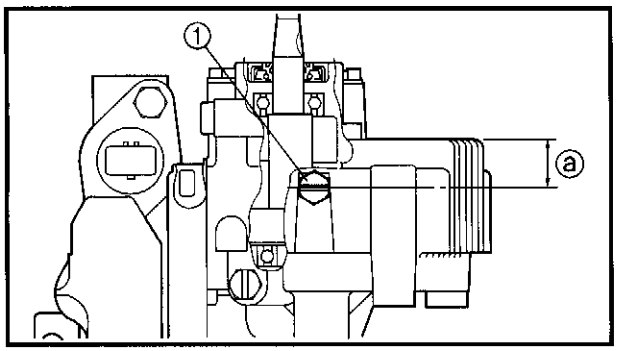
(3) Start the engine, run it at idle speed.
(4) Measure the fuel pressure sensor output voltage.
(5) Install the flywheel magnet assembly cover.

CHECKING THE MECHANICAL FUEL PUMP OIL LEVEL

Check:
- Mechanical fuel pump oil level
  Level is low → Add to the proper level.

Recommended gear oil
GEAR CASE LUBE (USA) or Hypoid gear oil SAE 90
Total amount
47 - 53 cm³ (1.59 - 1.79 US oz, 1.66 - 1.87 Imp oz)





Checking steps
(1) Remove the flywheel magnet assembly cover.
(2) Remove the gear oil level check screw ① and check the oil level using a thin screwdriver.
(3) If the gear oil is insufficient, add gear oil, and then install the gear oil level check screw.

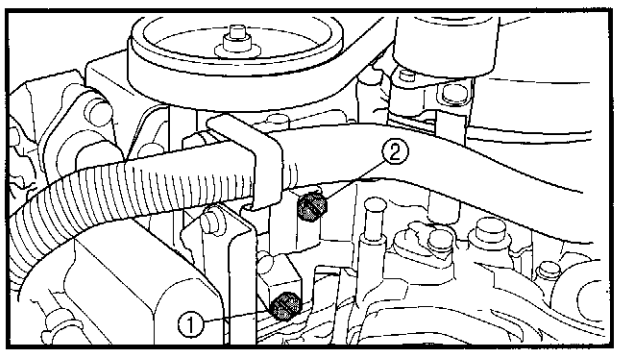
NOTE:
The gear oil level should be about 13 mm (0.51 in) ⓐ below the mating surface of the mechanical fuel pump body and its cover.

(4) Install the flywheel magnet assembly cover.

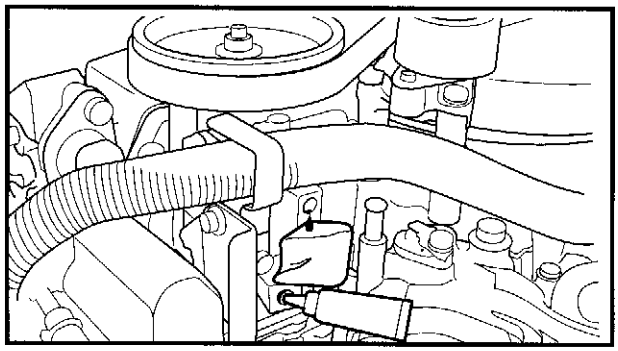
CHANGING THE MECHANICAL FUEL PUMP OIL

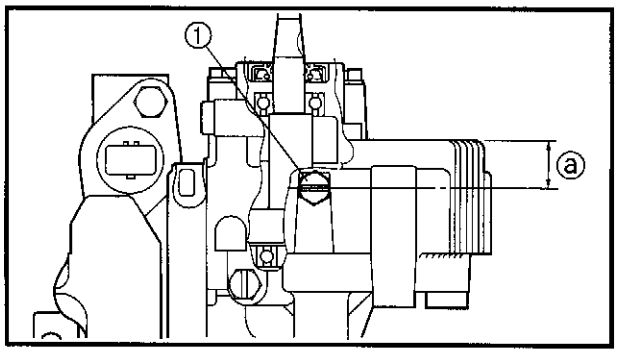
1. Place:
   - Container

NOTE:
Place a container under the gear oil drain screw.



2. Remove:
   - Flywheel magnet assembly cover
   - Gear oil drain screw ①
   - Gear oil level check screw ②
     Drain the gear oil.





3. Fill:
   • Gear oil

Recommended gear oil
GEAR CASE LUBE (USA) or
Hypoid gear oil SAE 90
Total amount
47 - 53 cm³ (1.59 - 1.79 US oz, 1.66 - 1.87 Imp oz)

Filling steps
(1) Insert the gear oil tube into the drain hole and slowly fill the gear oil until oil flows out of the check hole.
(2) Install the gear oil level check screw and then quickly install the gear oil drain screw.

NOTE:
The gear oil level should be about 13 mm (0.51 in) ⓐ below the mating surface of the mechanical fuel pump body and its cover.

4. Install:
   • Flywheel magnet assembly cover

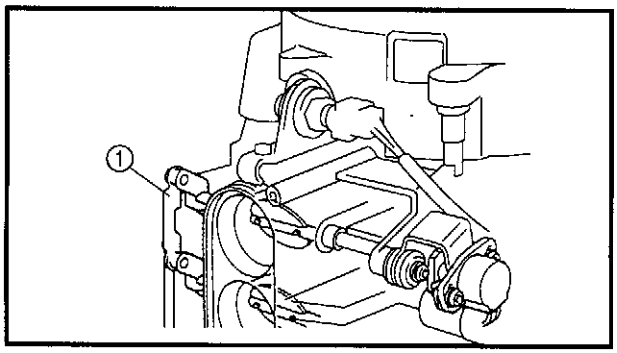
CONTROL SYSTEM

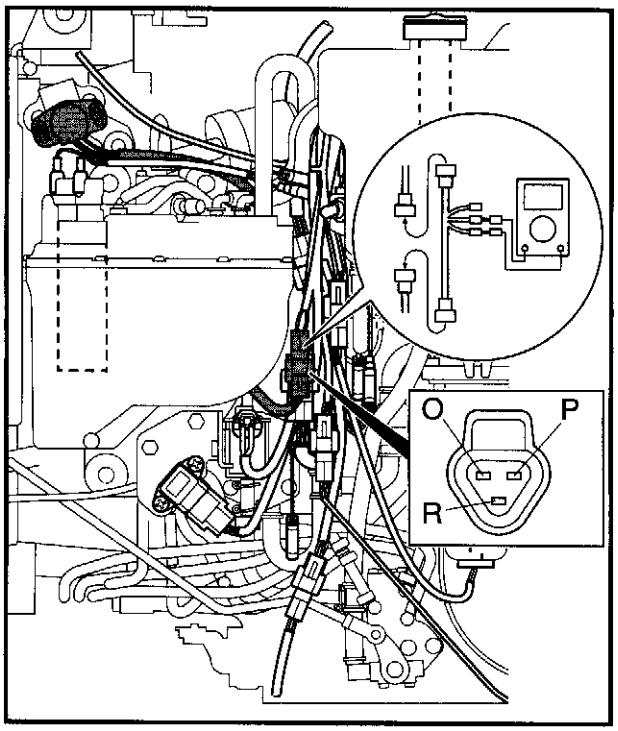
ADJUSTING THE THROTTLE POSITION SENSOR

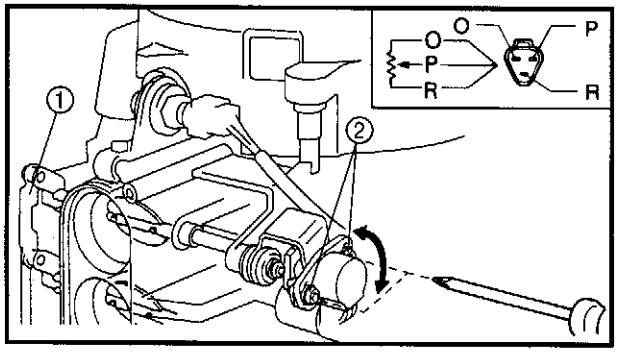
1. Measure:
   • Throttle position sensor output voltage (with the throttle valves fully closed)
   Out of specification → Adjust.

Throttle position sensor output voltage (pink (P) – orange (O))
0.50 ± 0.02 V

NOTE:
- Be sure to adjust the throttle valve's opening before measuring the throttle position sensor output voltage.
- When measuring the throttle position sensor output voltage, set the digital tester to the manual range.







Measuring steps

(1) Disconnect the throttle link rod ① at the #1 throttle valve.
(2) Connect the test harness (3-pin) as shown.

	Test harness (3-pin) **YB-06757 / 90890-06757**

(3) Connect the digital tester probes to the test harness (3-pin) as shown.
(4) Turn the engine start switch on.
(5) Measure the output voltage (with the throttle valves fully closed).

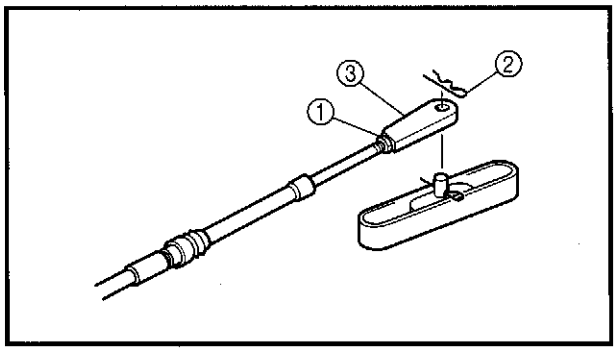
2. Adjust:
   • Throttle position sensor

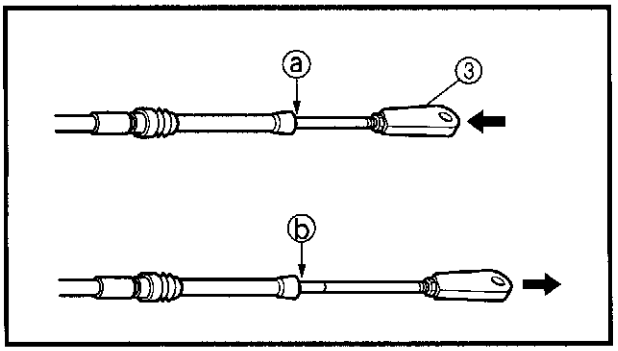
Adjustment steps

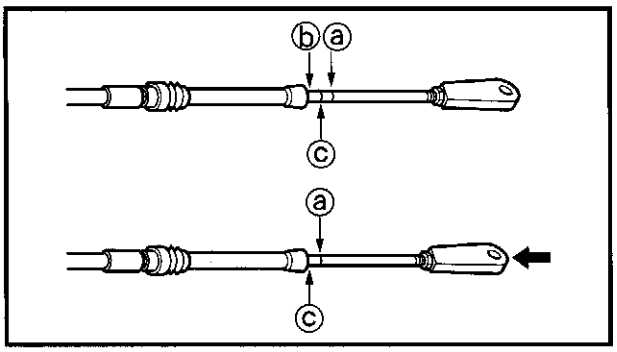
(1) Turn the engine start switch on.
(2) Loosen the screws ②.
(3) Adjust the position of the throttle position sensor until the specified output voltage is obtained.

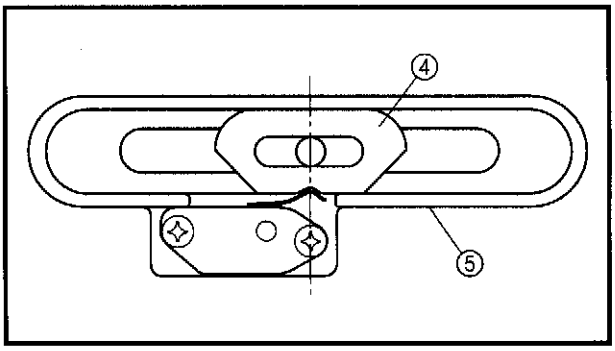
	Throttle position sensor output voltage (pink (P) – orange (O)) **0.50 ± 0.02 V**

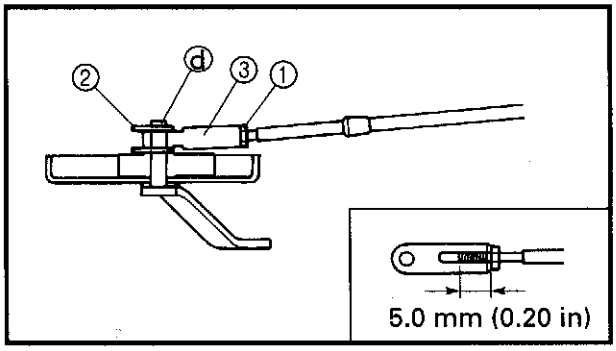
(4) Tighten the screws.
(5) Connect the throttle link rod.
(6) Measure the output voltage again.











ADJUSTING THE REMOTE CONTROL SHIFT CABLE (EXCEPT FOR Z150Q, Z175H/VZ150, VZ175)

1. Check:
   • Shift operation
   Incorrect → Adjust.
2. Adjust:
   • Remote control shift cable length

Adjustment steps

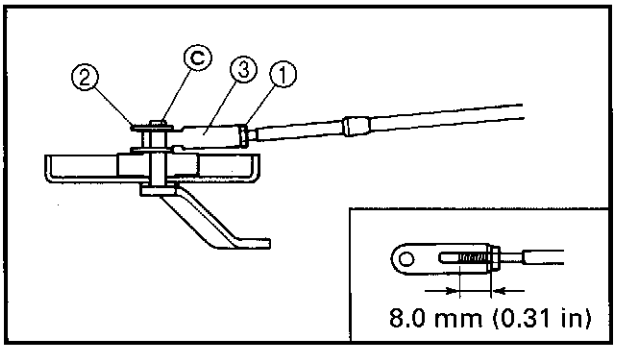
(1) Loosen the locknut ①.
(2) Remove the clip ②.
(3) Disconnect the shift cable joint from the set pin ③.
(4) Shift the remote control lever several times into the forward, neutral, and reverse positions, before setting it into the neutral position.
(5) Push the shift cable joint ③ all the way in, and then mark its position ⓐ on the inner cable as shown in the illustration.
(6) Pull the shift cable joint all the way out, and then mark its position ⓑ on the inner cable as shown in the illustration.
(7) Make the free play mark ⓒ on the inner cable directly between marks ⓐ and ⓑ.
(8) Push the shift cable joint to the free play mark ⓒ as shown in the illustration.
(9) Adjust the shift rod lever bushing ④ so that it is at the center of the shift rod lever bracket ⑤.
(10) Adjust the position of the shift cable joint until its hole aligns with the set pin ⓓ.

The shift cable joint must be screwed in more than 5.0 mm (0.20 in).

(11) Connect the shift cable joint ③ to the set pin.
(12) Install the clip ② and tighten the locknut ①.
(13) Shift the remote control lever into the forward, neutral, and reverse positions to make sure that the shift position switch is working properly. If the switch does not operate properly, repeat the steps above.

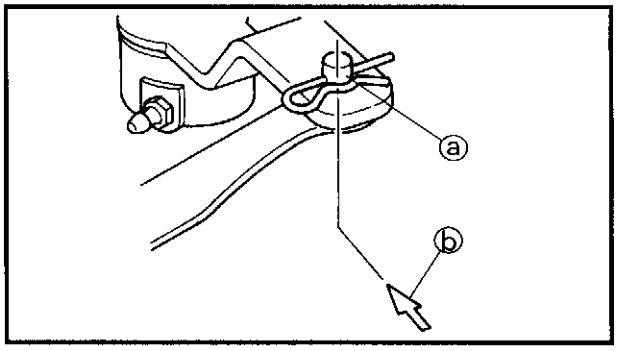
ADJUSTING THE REMOTE CONTROL SHIFT CABLE (FOR Z150Q, Z175H/ VZ150, VZ175)

1. Check:
   • Shift operation
   Incorrect → Adjust.
2. Adjust:
   • Remote control shift cable length



Adjustment steps

(1) Loosen the locknut ①.
(2) Remove the clip ②.
(3) Disconnect the shift cable joint from the set pin ③.
(4) Set the remote control lever to the neutral position.
(5) Align the center of the set pin ⓐ with the mark ⓑ on the bottom cowling.
(6) Adjust the position of the shift cable joint until its hole aligns with the set pin ⓒ.

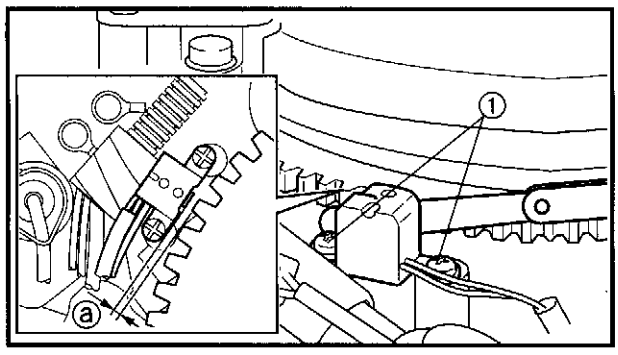


CAUTION

The shift cable joint must be screwed in more than 8.0 mm (0.31 in).

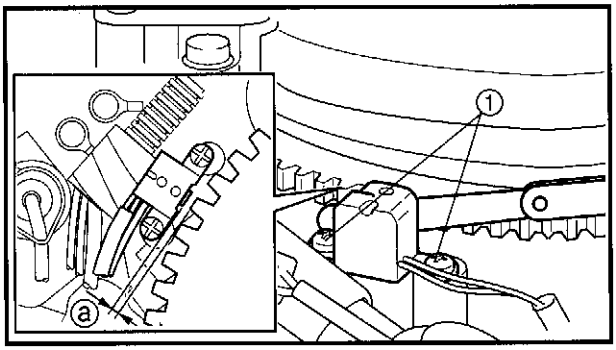
(7) Connect the shift cable joint ③ to the set pin.
(8) Install the clip ② and tighten the locknut ①.

ADJUSTING THE CRANK POSITION SENSOR



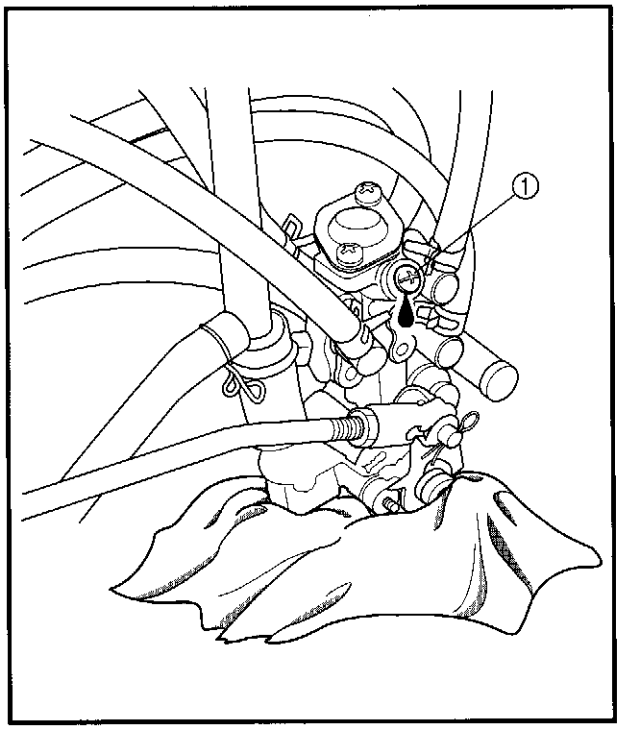
1. Measure:
   • Crank position sensor-to-flywheel magnet assembly clearance ⓐ
   Out of specification → Adjust.
   Use a thickness gauge.

Crank position sensor-to-flywheel magnet assembly clearance
1.0 ± 0.5 mm (0.04 ± 0.02 in)



2. Adjust:
   • Crank position sensor

Adjustment steps
(1) Loosen the screws ①.
(2) Adjust the position of the crank position sensor until the specified clearance is obtained.
(3) Tighten the screws.



OIL INJECTION SYSTEM

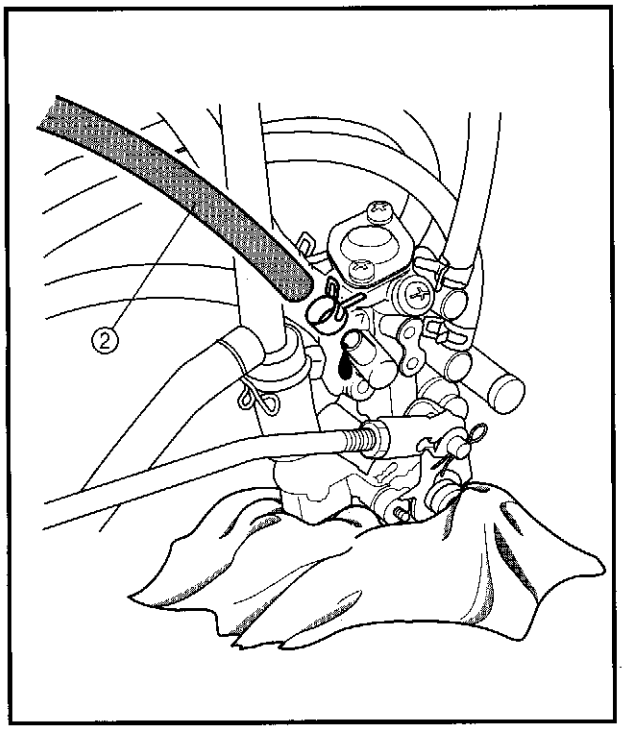
AIR BLEEDING THE OIL INJECTION SYSTEM

CAUTION:
- **DO NOT USE GASOLINE MIXED WITH OIL (PREMIX).**
- **USE UNLEADED STRAIGHT GASOLINE ONLY.**

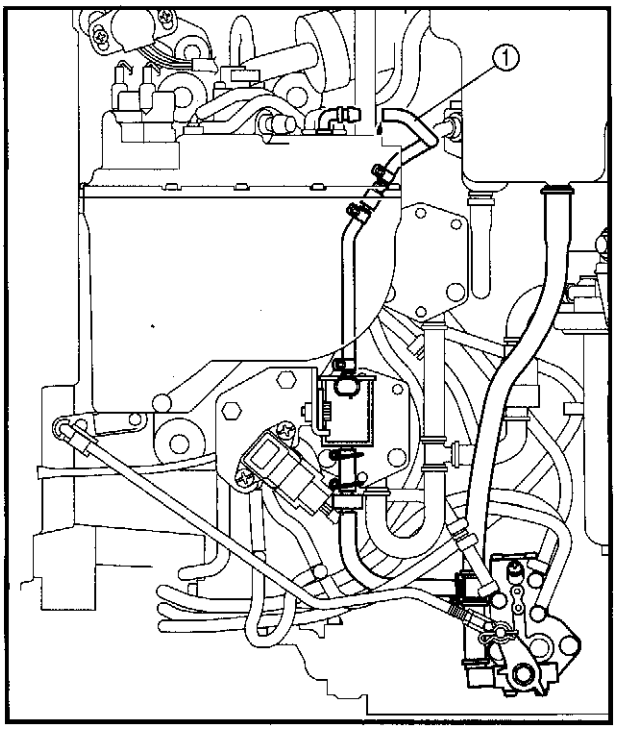
Bleed:
   • Air bubbles
   (from the oil injection system)

Bleeding steps
(1) Place rags around the air bleed screw ① to catch any oil that might spill.
(2) Fill the oil tank with the engine oil.

Recommended engine oil
Engine oil type
2-stroke outboard engine oil



(3) Disconnect the oil pump link rod joint from the oil pump lever.
(4) Start the engine, run it at idle speed.
(5) Loosen the air bleed screw ① and make sure that both the oil and air bubbles flow out.
(6) When there are no air bubbles left, tighten the air bleed screw.
(7) Disconnect an oil pump feed hose ② from the oil pump.
(8) Check the oil flows from the oil pump.
(9) Connect the oil pump feed hose.
(10) Connect the oil pump link rod joint to the oil pump lever.



CHECKING THE ELECTRIC OIL PUMP

NOTICE

- **DO NOT USE GASOLINE MIXED WITH OIL (PREMIX).**
- **USE UNLEADED STRAIGHT GASOLINE ONLY.**

Check:
- Electric oil pump operation
  Incorrect → Replace.

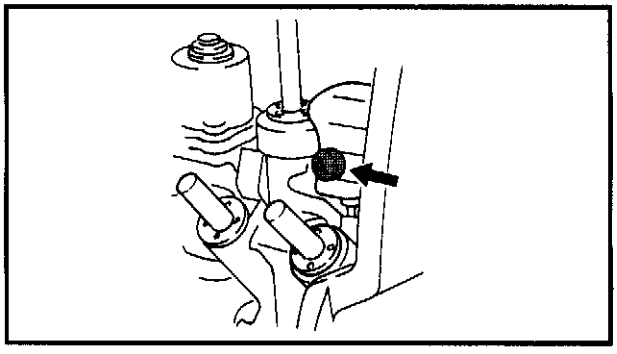
Checking steps
(1) Disconnect the electric oil pump hose ① from the vapor separator.
(2) Place the end of the electric oil pump hose with a rag.
(3) Start the engine, run it at idle speed.
(4) Check the oil flows from the electric oil pump hose end.
(5) Connect the electric oil pump hose.

POWER TRIM AND TILT SYSTEM

CHECKING THE POWER TRIM AND TILT FLUID LEVEL

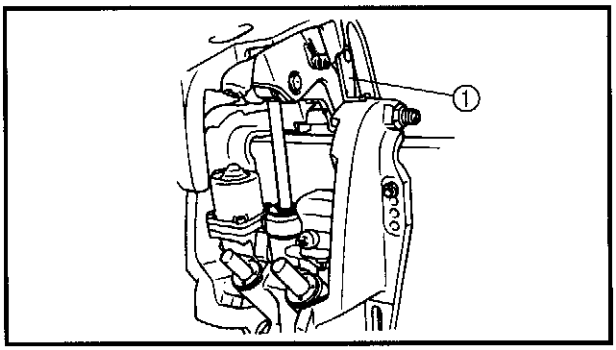
Check:
- Power trim and tilt fluid level
  Level is low → Add power trim and tilt fluid to the proper level.

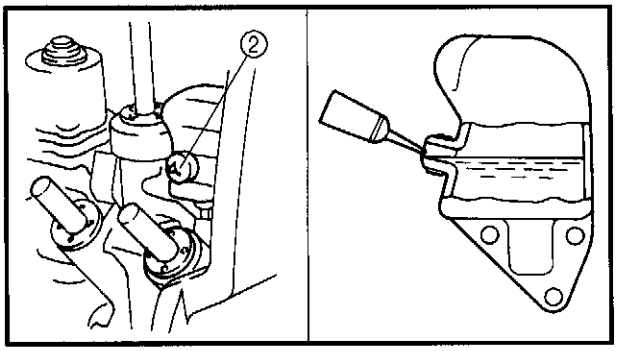
Recommended power trim and tilt fluid
ATF Dexron II



⚠ WARNING

When removing the power trim and tilt reservoir cap, the power trim and tilt fluid may spurt out due to internal pressure. Highly pressurized fluid could sproy out causing serious injury. Therefore, fully tilt up the outboard (the tilt ram assembly fully extended) and then slowly remove the power trim and tilt reservoir cap.





Checking steps

(1) Tilt the outboard all the way up and lock it with the tilt stop levers ①.

⚠ WARNING

After tilting up the outboard, be sure to support it with the tilt stop levers.
Otherwise, the outboard could suddenly lower if the power trim and tilt unit should lose fluid pressure.

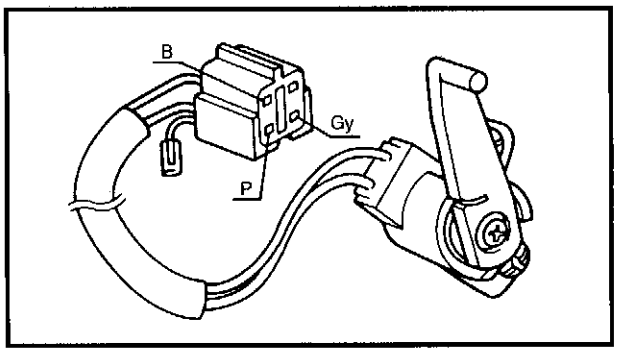
(2) Remove the reservoir cap ② and check the fluid level.

NOTE:

The fluid level should be directly below the check hole as shown.

(3) If the power trim and tilt fluid is insufficient, add fluid, and then install the reservoir cap.

	Reservoir cap **8 N • m (0.8 kgf • m, 5.8 ft • lb)**



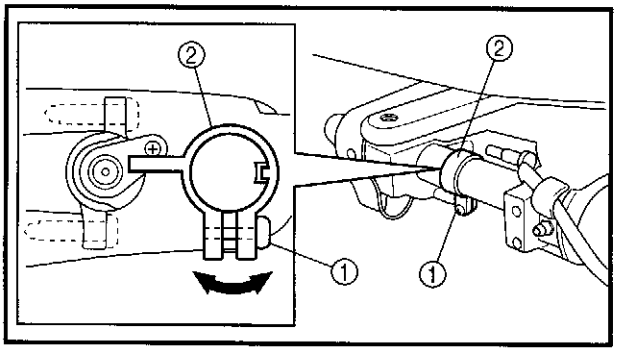
ADJUSTING THE TRIM SENSOR CAM

1. Measure:
   - Trim sensor setting resistance
     Out of specification → Adjust.

	Trim sensor setting resistance **Pink (P) – Black (B)** **11 ± 7 Ω at 20 °C (68 °F)**

Measuring steps

(1) Fully tilt the outboard down.
(2) Measure the trim sensor resistance.



2. Adjust:
   Trim sensor cam position

Adjusting steps
(1) Fully tilt the outboard down.
(2) Loosen the screw ①.
(3) Adjust the position of the trim sensor cam ② until the specified resistance is obtained.

Trim sensor resistance
Pink (P) – Black (B)
11 ± 7 Ω at 20 °C (68 °F)

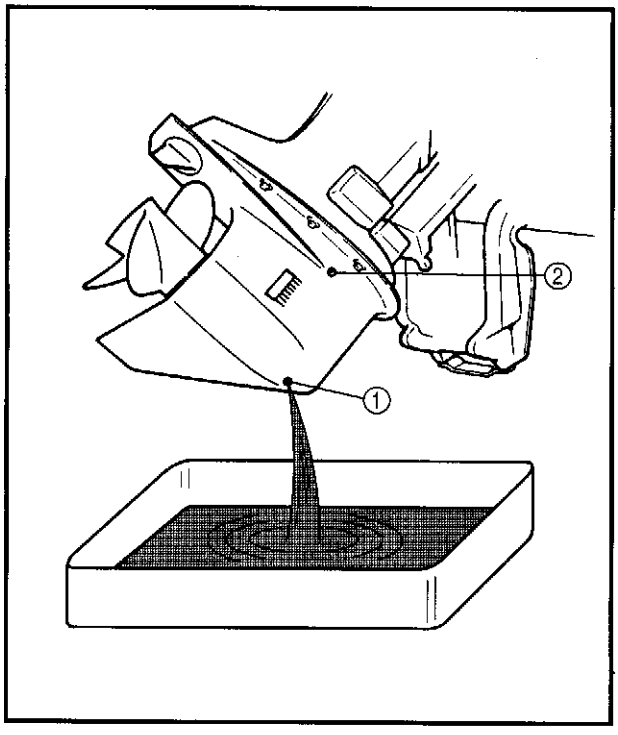
(4) Tighten the screw.

Trim sensor cam screw
3 N • m (0.3 kgf • m, 2.2 ft • lb)

LOWER UNIT

CHECKING THE GEAR OIL LEVEL

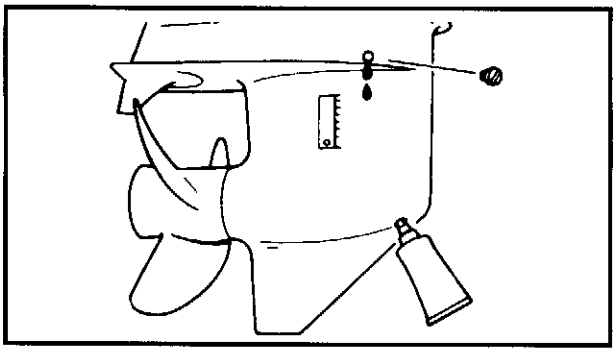
Check:
- Gear oil level
  Level is low → Add gear oil to the proper level.



CHANGING AND CHECKING THE GEAR OIL

1. Check:
   - Gear oil
     Milky oil → Check or replace the oil seal.
     Slag oil → Check the gears, bearings, and clutch dog.

Checking steps
(1) Tilt up the outboard slightly.
(2) Place a container under the gear oil drain screw ①.
(3) Remove the gear oil drain screw and gear oil level check screw ②.



2. Fill:
   • Gear oil
   (with the specified amount of the recommend gear oil)

Recommended gear oil
GEAR CASE LUBE (USA) or Hypoid gear oil, SAE 90
Total amount
Regular rotation models
980 cm³
(33.1 US oz, 34.5 Imp oz)
Counter rotation models
870 cm³
(29.4 US oz, 30.6 Imp oz)

Filling steps
(1) Place the outboard in a vertical position.
(2) Insert the gear oil tube into the drain hole and slowly fill the gear oil until oil flows out of the check hole and no air bubbles are visible.
(3) Install the gear oil level check screw and then quickly install the gear oil drain screw.

Gear oil level check screw
7 N • m (0.7 kgf • m, 5.1 ft • lb)
Gear oil drain screw
7 N • m (0.7 kgf • m, 5.1 ft • lb)

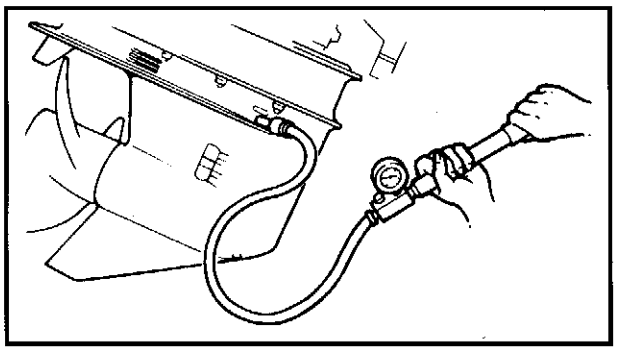
CHECKING THE LOWER UNIT (FOR AIR LEAKS)

Check:
   • Lower unit holding pressure
   Pressure drops → Check the seals and components.

Lower unit holding pressure
100 kPa (1.0 kg/cm², 14.2 psi)

Checking steps

Do not overpressurize the lower unit. Excessive pressure may damage the oil seals.

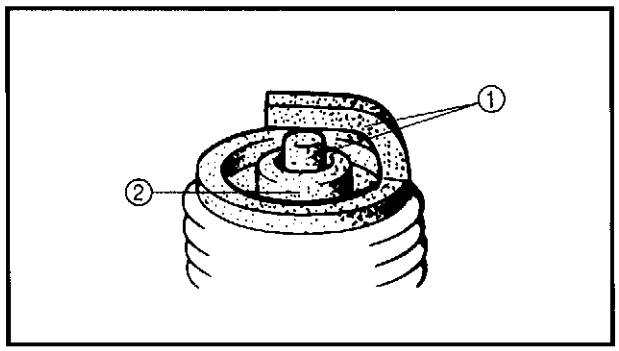


(1) Remove the gear oil level check screw.
(2) Install the leakage tester into the check hole.

	Leakage tester **90890-06762**

(3) Apply the specified pressure.

NOTE:
The lower unit should hold the specified pressure for 10 seconds.



GENERAL

CHECKING THE SPARK PLUGS

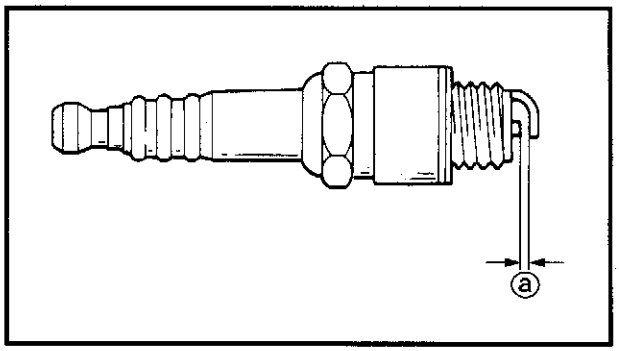
Spark plug type
150 models: BKR6ES-11
175, 200 models: BKR7ES-11

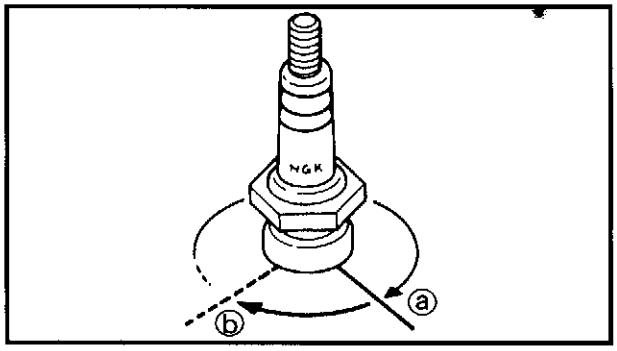
1. Check:
   - Electrodes ①
     Cracks/excessive wear → Replace.
   - Insulator color ②
     Distinctly different color → Check the engine condition.

Color guide
Medium to light tan color
Normal
Whitish color
- **Lean fuel mixture**
- **Plugged jet(-s)**
- **Air leak**
- **Wrong setting**

Blackish color
- **Rich mixture**
- **Excessive oil usage**
- **Defective ignition system**
- **Defective spark plug**

2. Clean:
   - Spark plugs
     (with a spark plug cleaner or wire brush.)





3. Measure:
   • Spark plug gap ⓐ
     Out of specification → Regap.

	Spark plug gap **1.0 - 1.1 mm (0.039 - 0.043 in)**

4. Tighten:
   • Spark plugs

	Spark plug **25 N • m (2.5 kgf • m, 18 ft • lb)**

NOTE:
- Before installing the spark plug, clean the gasket surface and spark plug surface. Also, it is suggested to apply a thin film of anti-seize compound to the spark plug threads to prevent thread seizure.
- If a torque wrench is not available, a good estimate of the correct tightening torque is to finger tighten ⓐ the spark plug and then tighten it another 1/4 to 1/2 of a turn ⓑ.

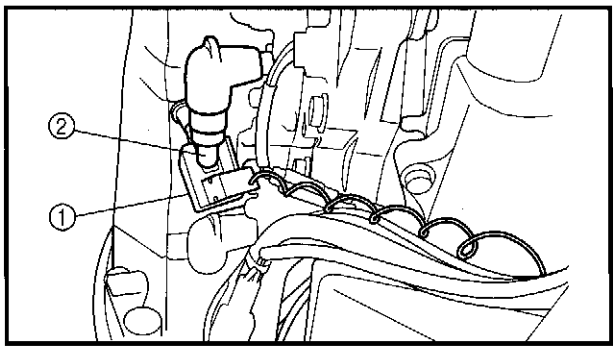
CHECKING THE IGNITION TIMING

NOTE:
- Ignition timing is automatically controlled by the control unit. Therefore, only checking the procedure is shown in this section.
- Before checking the ignition timing, warm-up the engine. Correct checking cannot be obtained when the engine is cold.

Check:
- Ignition timing
  Incorrect firing range → Check the ignition system components.

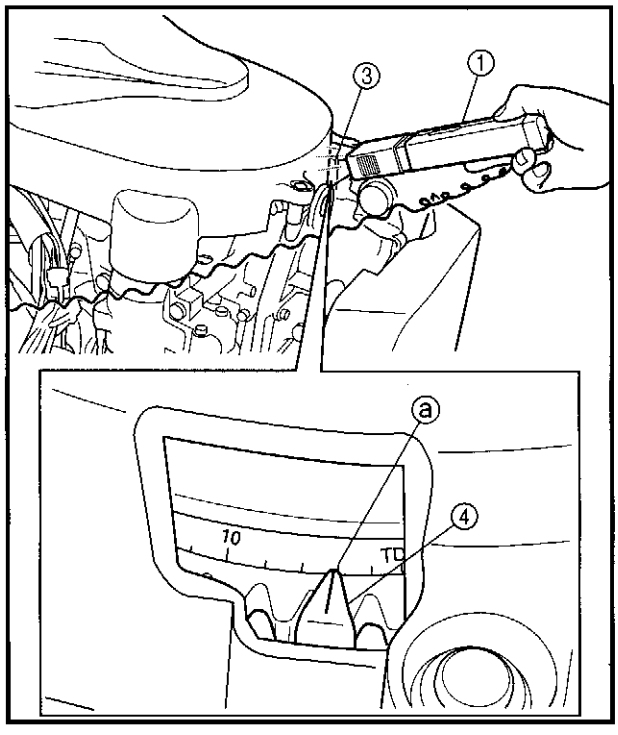
Ignition timing (cylinder #1)
150 (L transom) models
At idling speed (700 r/min): BTDC 3°
At 5,500 r/min: BTDC 17°
175 models
At idling speed (700 r/min): BTDC 3°
At 5,500 r/min: BTDC 20°
150 (X transom), 200 models
At idling speed (700 r/min): BTDC 4°
At 5,500 r/min: BTDC 17°

Checking steps
(1) Start the engine and allow it to warm up for several minutes.
(2) Attach the engine tachometer and the timing light ① to the spark plug lead ② of cylinder #1.



Tachometer
YU-08036-B / 90890-06760
Timing light
YM-33277-A / 90890-03141

(3) Aim the timing light ① at the flywheel cover window ③ and make sure the stationary pointer ④ is with in the firing range ⓐ when engine is running with specified speed.



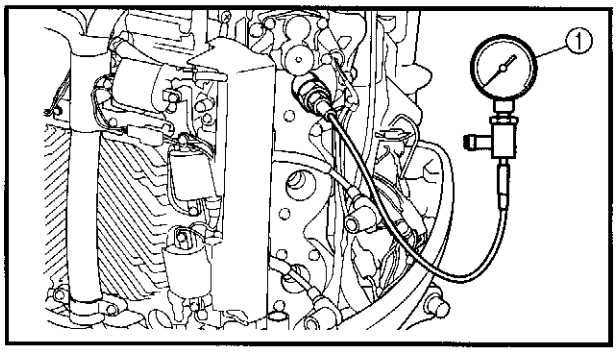
MEASURING THE COMPRESSION PRESSURE

⚠ WARNING

Before removing a spark plug, use compressed air to blow away dirt accumulated in the spark plug well to prevent it from falling into the cylinder that is being tested.

Measure:
- Compression pressure
  Excessive low compression pressure
  → Check the power unit components.

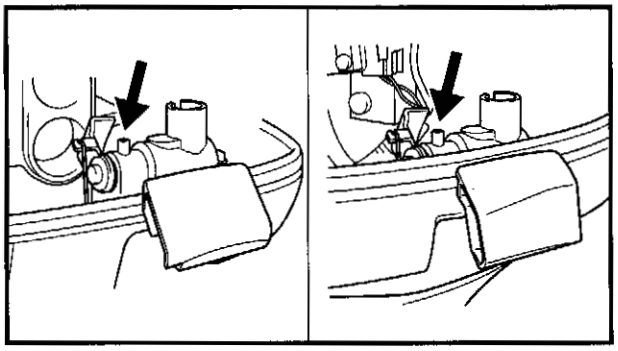
Compression pressure (reference data)
650 kPa (6.5 kgf/cm², 92 psi)

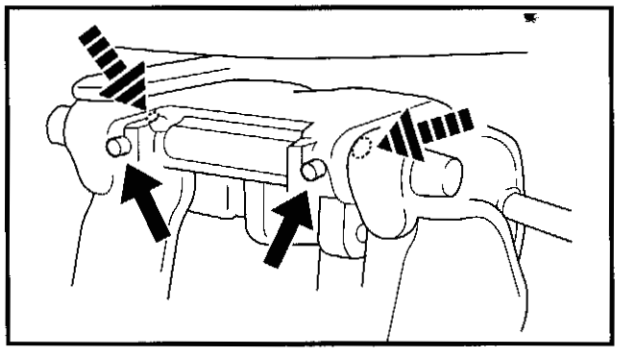


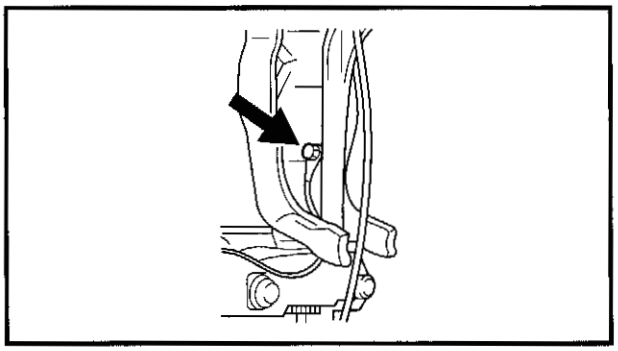
Measuring steps
(1) Start the engine and allow it to warm up for several minutes.
(2) Stop the engine and remove the lock plate from the engine stop lanyard switch on the remote control box.
(3) Remove the all spark plugs (six spark plugs).
(4) Install the compression gauge ① into the spark plug hole.

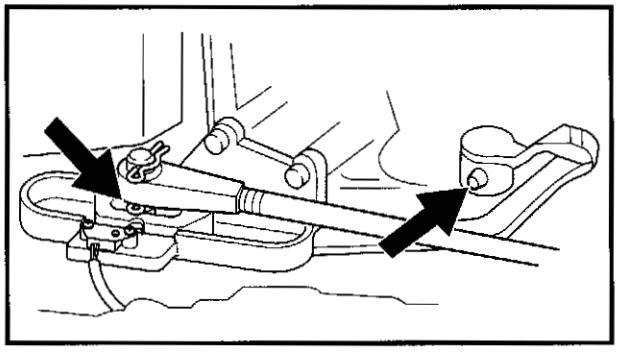
Compression gauge
90890-03160

(5) With the throttle wide open, crank the engine setting the main switch in the START position until the reading on the compression gauge stabilizes.
(6) Remove the compression gauge and reinstall the all spark plugs.



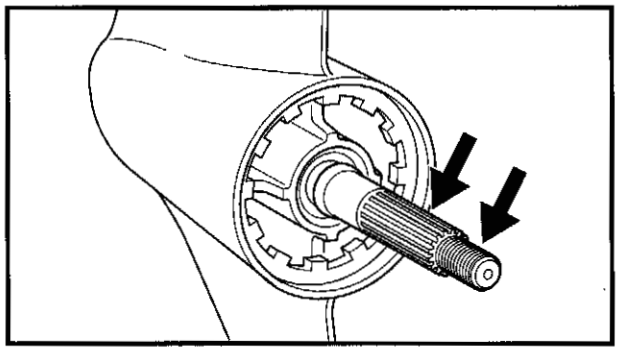




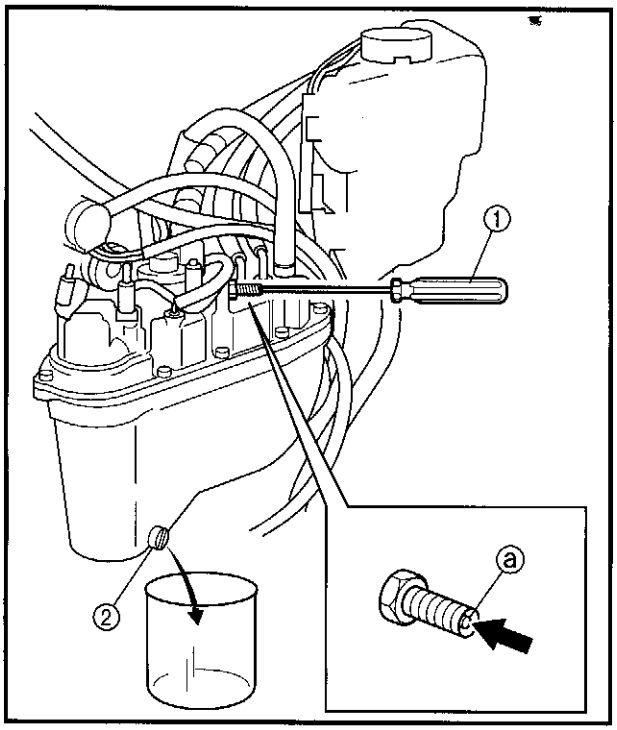


LUBRICATION POINTS

1. Apply:
   - Yamaha marine grease (for USA and Canada)
   - Yamaha grease A (for worldwide)



2. Apply:
   - Yamaha grease D



MEDIUM-PRESSURE FUEL LINE

REDUCING THE FUEL PRESSURE (MEDIUM-PRESSURE FUEL LINE)

⚠ WARNING

Always reduce the fuel pressure in the medium-pressure fuel line before servicing the line or the vapor separator. If the fuel pressure is not released, pressurized fuel may spray out.

1. Reduce:
   - Fuel pressure (medium-pressure fuel line)

NOTE:

To reduce the fuel pressure, cover the pressure check valve ⓐ of the vapor separator with a rag, and then press in the valve using a thin screwdriver ①.

2. Drain:
   - Fuel

⚠ WARNING

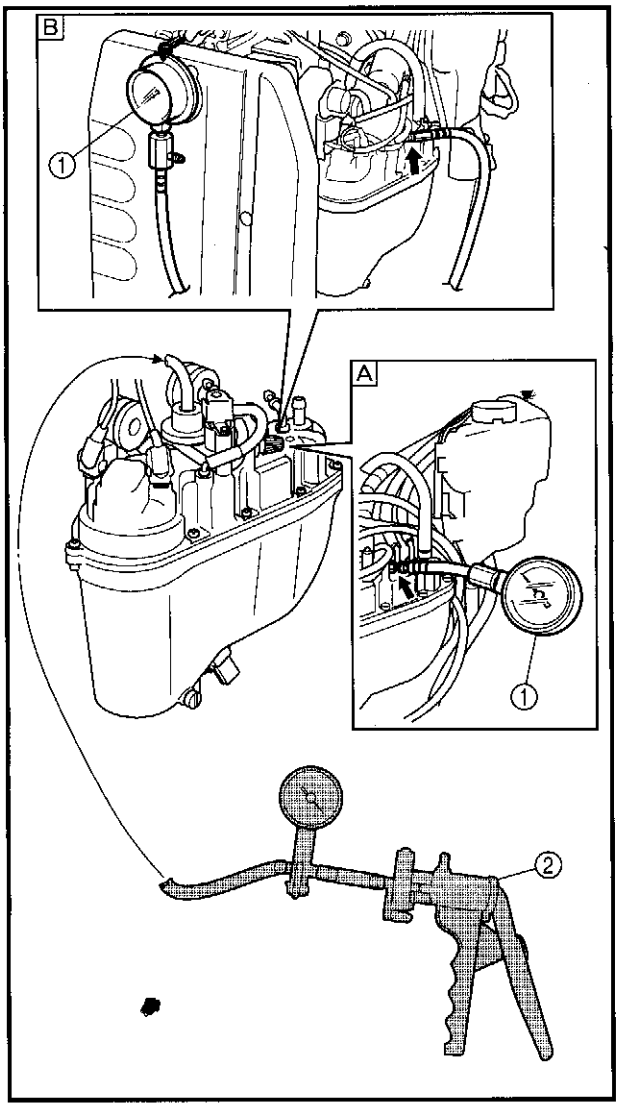
Reduce the fuel pressure before removing the vapor separator drain screw, or pressurized fuel will spray out and may result in serious injury.

NOTE:

To drain the fuel from the vapor separator, place a container under it, and then remove the drain screw ②.

CHECKING THE PRESSURE REGULATOR

Check:
- Fuel pressure displacement
  Faulty → Replace the pressure regulator.



Checking steps

(1) Install the fuel pressure gauge onto the pressure check valve and then install the pressure/vacuum tester onto the pressure regulator vacuum hose.

Fuel pressure gauge ..... ①
YB-06766 / 90890-06786
Pressure/vacuum tester..... ②
YB-35956-A / 90890-06756

A For USA and Canada
B For worldwide

⚠ WARNING

When attaching the fuel pressure gauge, first cover the connection between the gauge and the vapor separator pressure check valve with a clean, dry rag to prevent fuel from leaking out. Gently screw in the gauge until it is firmly attached.

(2) Start the engine run it at idle speed.
(3) Apply vacuum pressure with the pressure/vacuum tester.

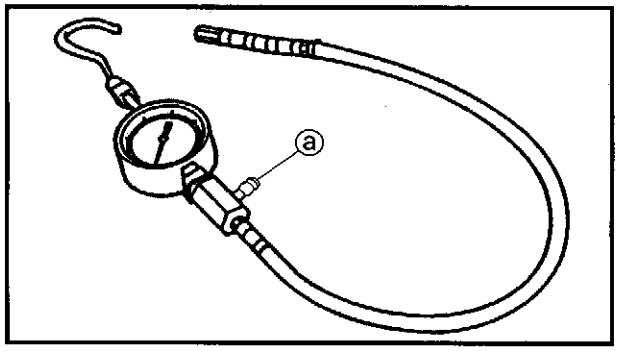
Vacuum pressure
Approx.
35 kPa (0.35 kg/cm², 4.98 psi)

(4) Check the fuel pressure displacement.

NOTE:

Make sure the fuel pressure in the medium-pressure fuel line lowers conversely in relation to the amount of pressure that is applied to the pressure regulator.

(5) Cover the connection with a rag, and then remove the fuel pressure gauge.



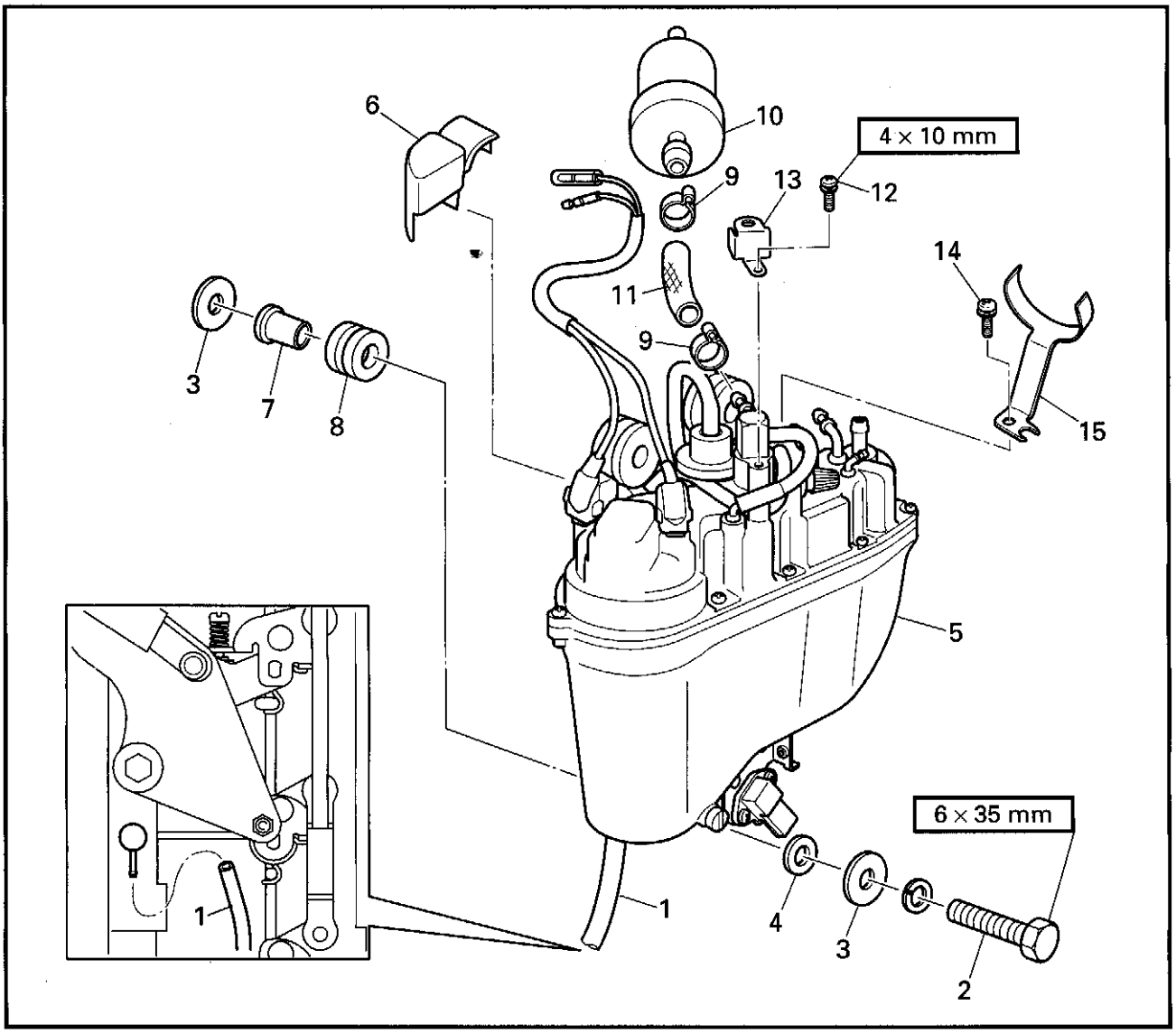
⚠ WARNING

For worldwide B

- **Before measuring the fuel pressure, make sure the breather nut ⓐ is tightened securely.**
- **Do not loosen the breather nut while measuring the fuel pressure. Loosening the breather nut will cause fuel to spray out creating a fire hazard.**
- **After measuring the fuel pressure, cover the end of the hose with a clean, dry rag, point the hose downward, and then loosen the breather nut to drain the remaining fuel from the hose and gauge.**
- **When storing the fuel pressure gauge, make sure the breather nut is tightened securely.**

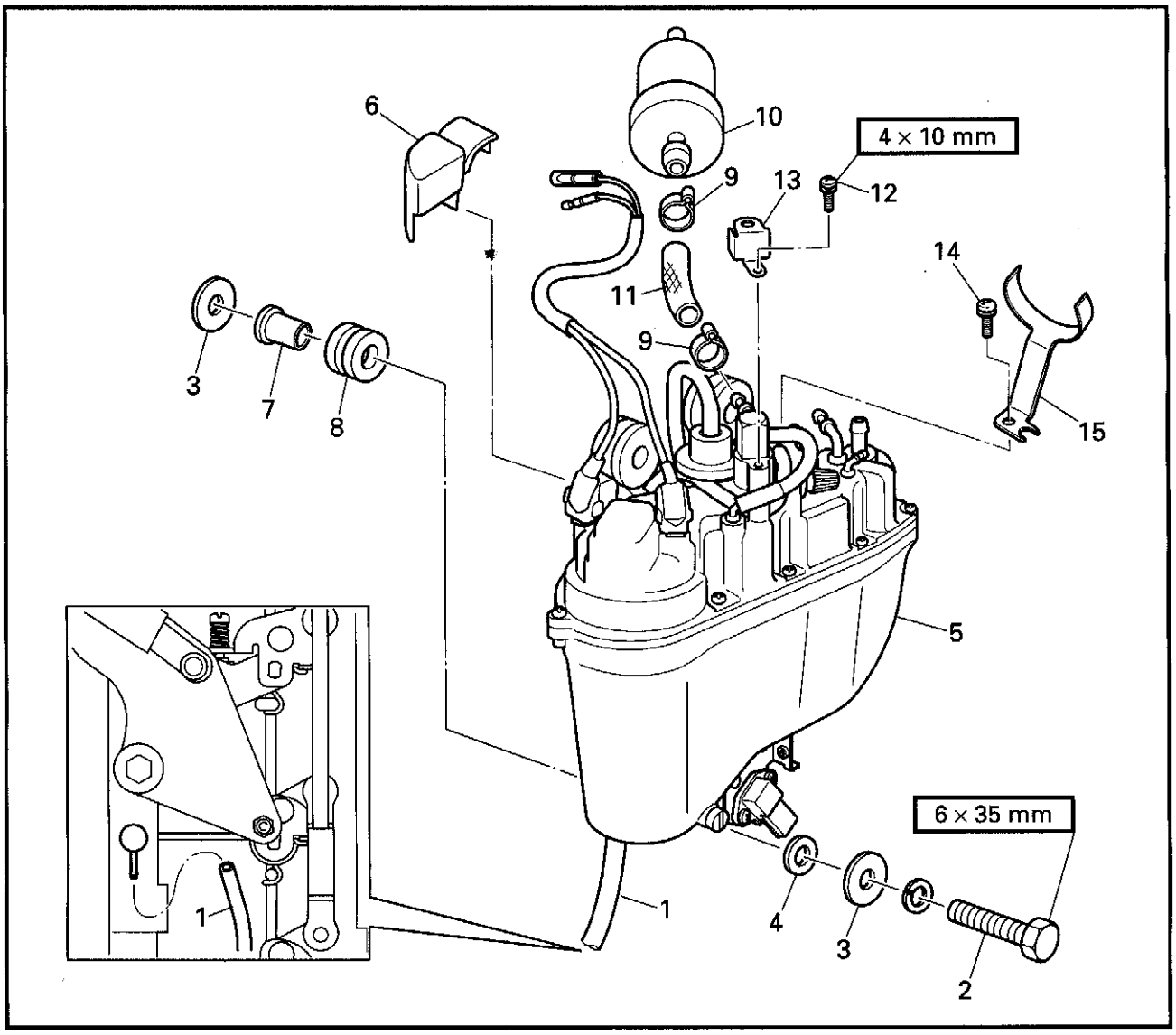
VAPOR SEPARATOR

REMOVING/INSTALLING THE VAPOR SEPARATOR



Order	Job/Part	Q'ty	Remarks
	Atmospheric pressure sensor coupler, electric oil pump coupler, fuel inlet hose, fuel return hoses, electric oil pump hose, electric oil pump assembly, fuel feed hose and electric fuel pump connector		Before performing the following procedure, reduce the fuel pressure (medium-pressure fuel line).
1	Hose	1	(vapor separator and pressure regulator-to-throttle body)
2	Bolt	3	
3	Large washer	6	
4	Small washer	3	
5	Vapor separator	1	

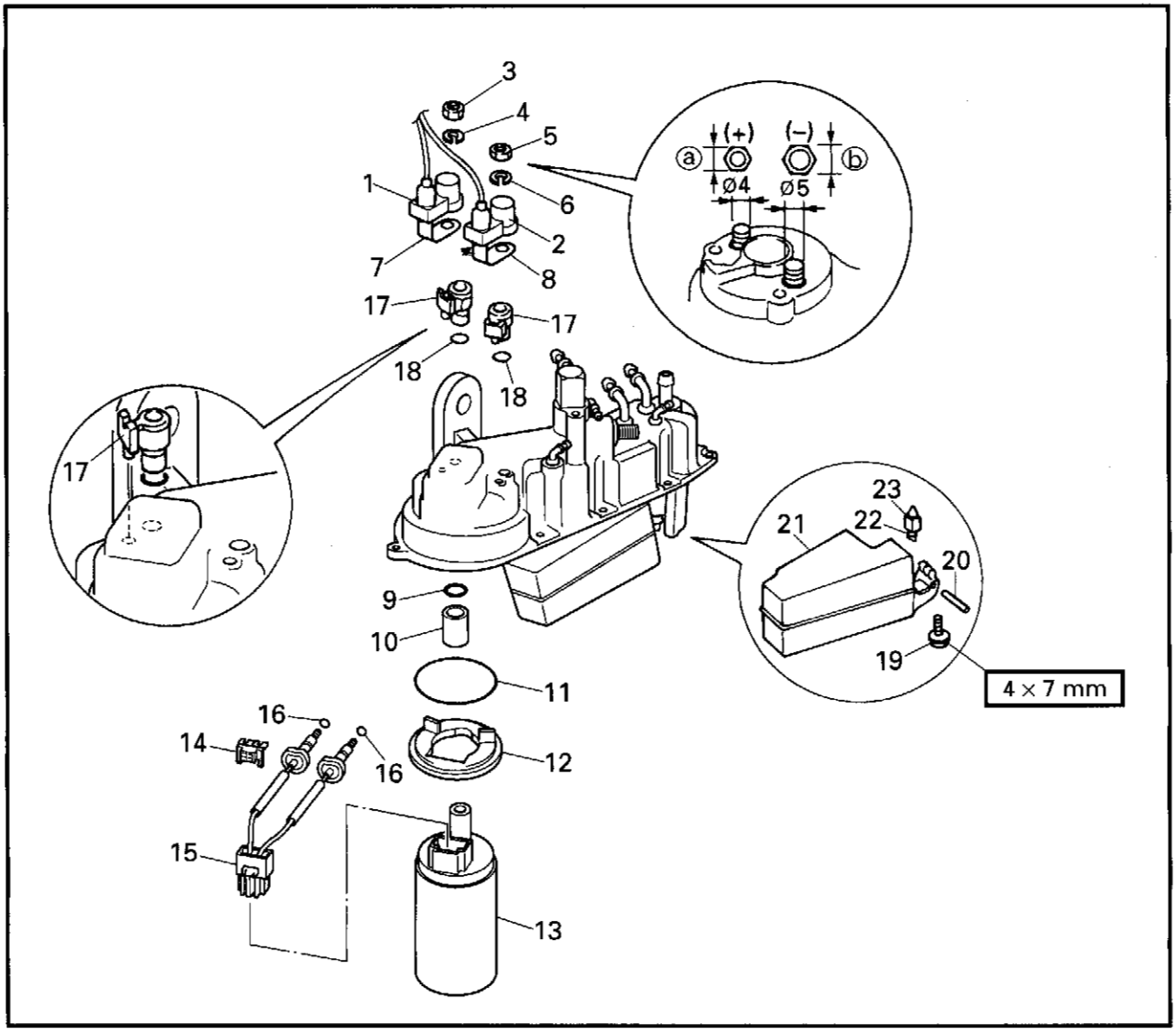
Continued on next page.



Order	Job/Part	Q'ty	Remarks
6	Terminal cover	1	
7	Collar	3	
8	Grommet	3	
9	Hose clamp	2	Not reusable
10	Fuel strainer	1	
11	Fuel hose	1	
12	Screw	1	
13	Fuel hose joint holder	1	
14	Screw	1	
15	Fuel strainer holder	1	
			For installation, reverse the removal procedure.

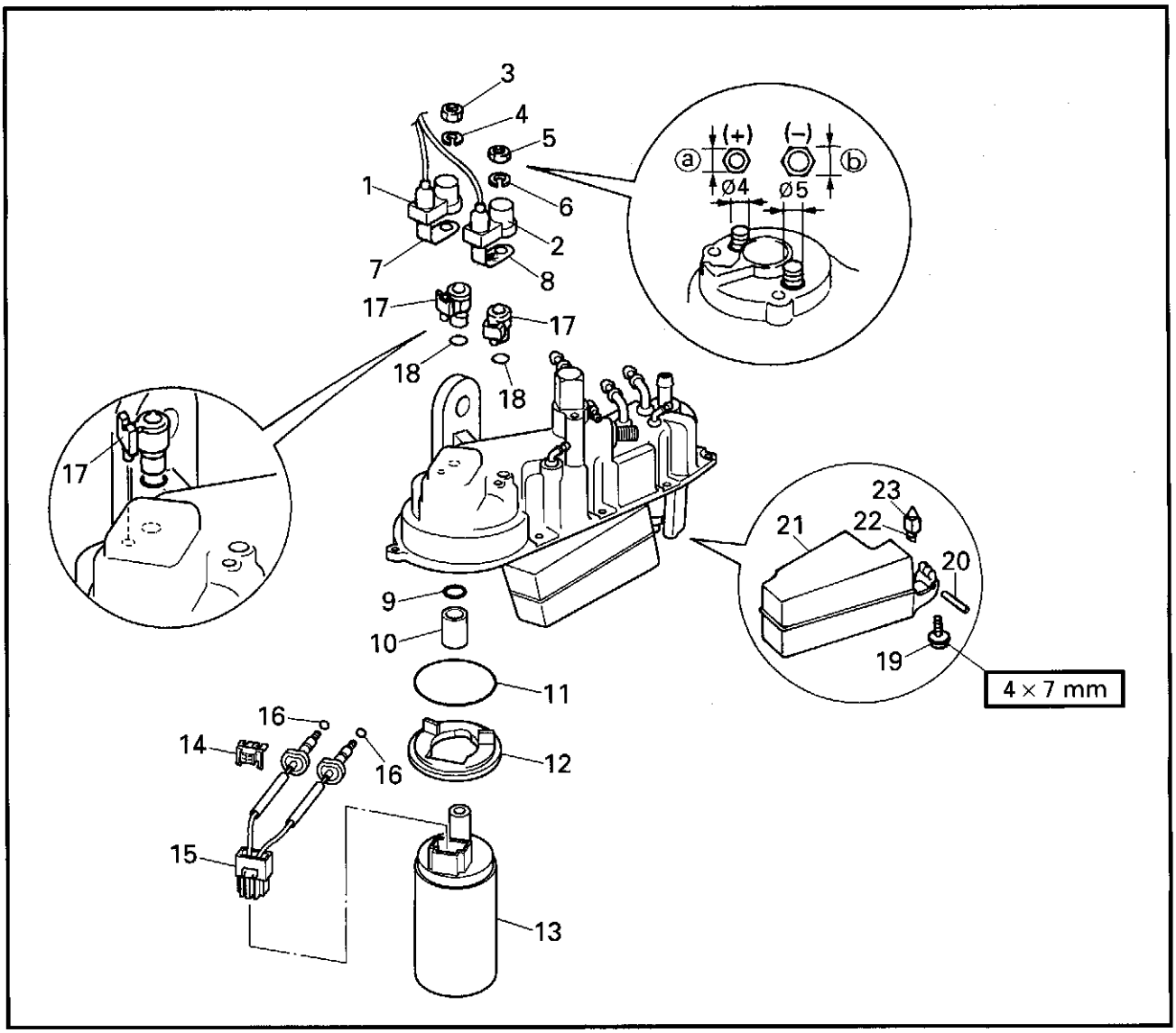
ELECTRIC FUEL PUMP

DISASSEMBLING/ASSEMBLING THE ELECTRIC FUEL PUMP



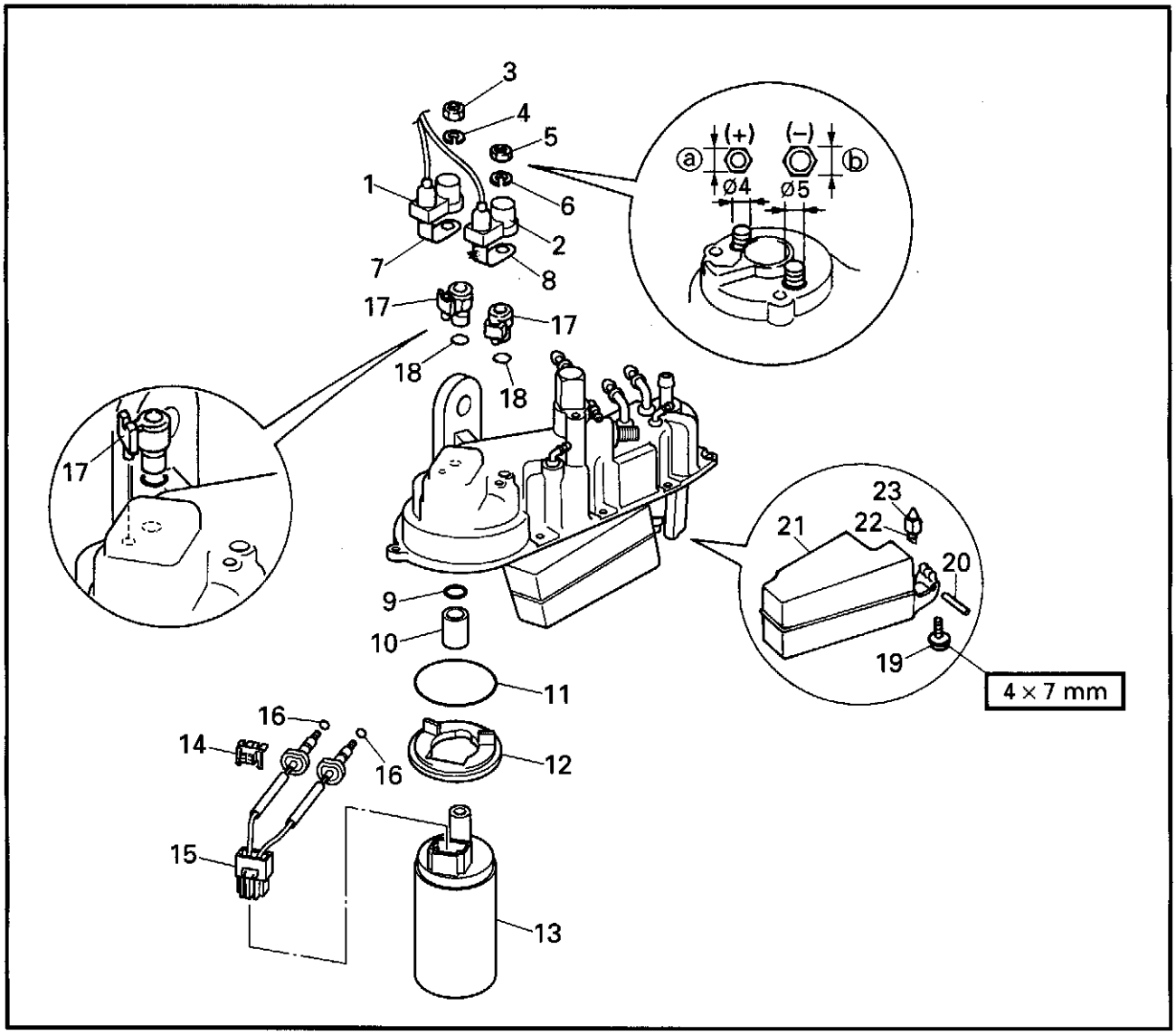
Order	Job/Part	Q'ty	Remarks
1	Positive electric fuel pump terminal cap	1	(red lead)
2	Negative electric fuel pump terminal cap	1	(blue lead)
3	Nut	1	(M4) ⓐ = 7 mm
4	Spring washer	1	
5	Nut	1	(M5) ⓑ = 8 mm
6	Spring washer	1	
7	Positive electric fuel pump terminal	1	

Continued on next page.



Order	Job/Part	Q'ty	Remarks
8	Negative electric fuel pump terminal	1	
9	O-ring	1	
10	Collar	1	
11	O-ring	1	
12	Electric fuel pump guide plate	1	
13	Electric fuel pump	1	
14	Coupler holder	1	
15	Terminal assembly	1	

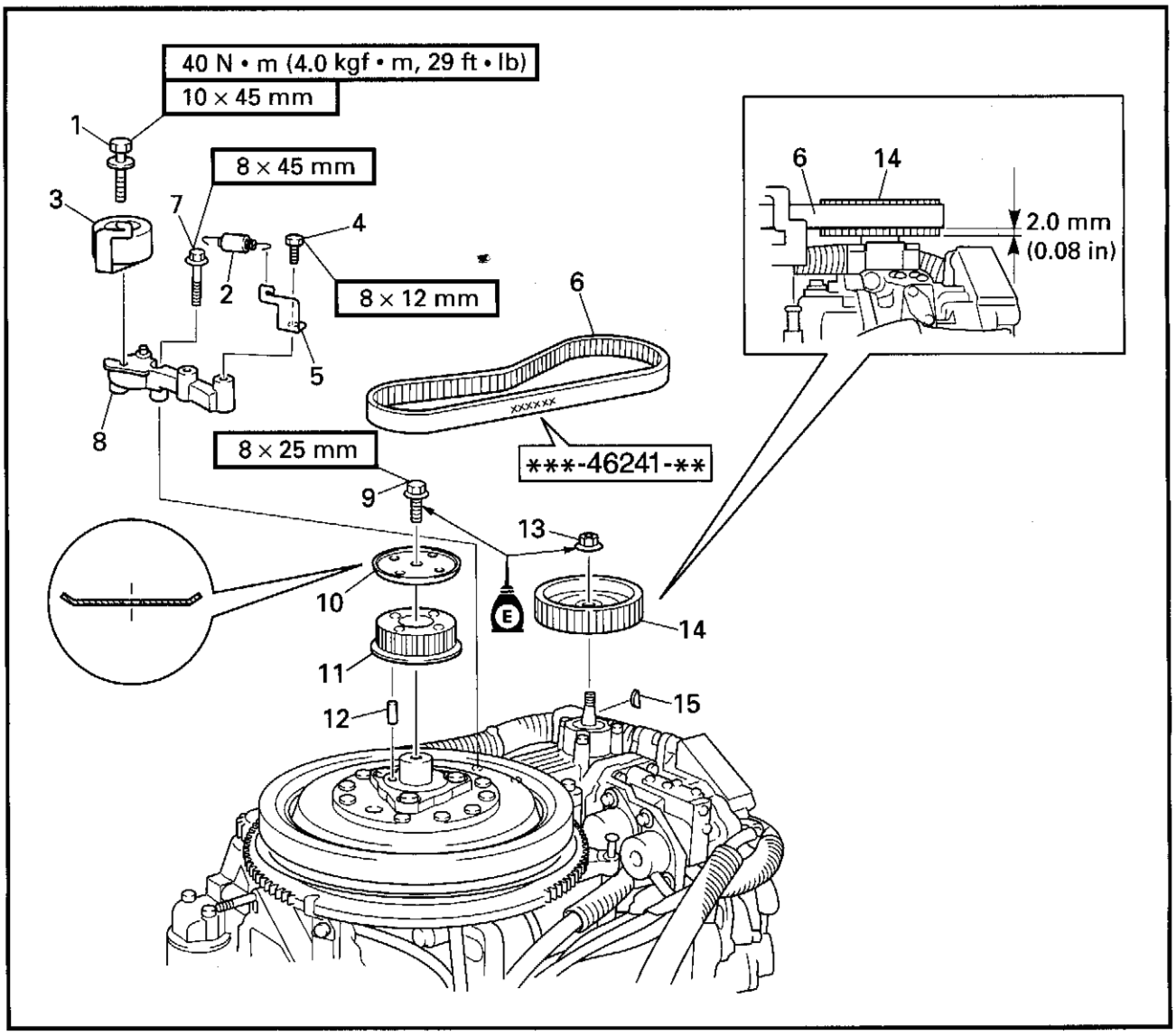
Continued on next page.



Order	Job/Part	Q'ty	Remarks
16	O-ring	2	
17	Insulator	2	
18	O-ring	2	
19	Screw	2	
20	Float pin	1	
21	Float	1	
22	Clip	1	
23	Needle valve	1	
			For assembly, reverse the disassembly procedure.

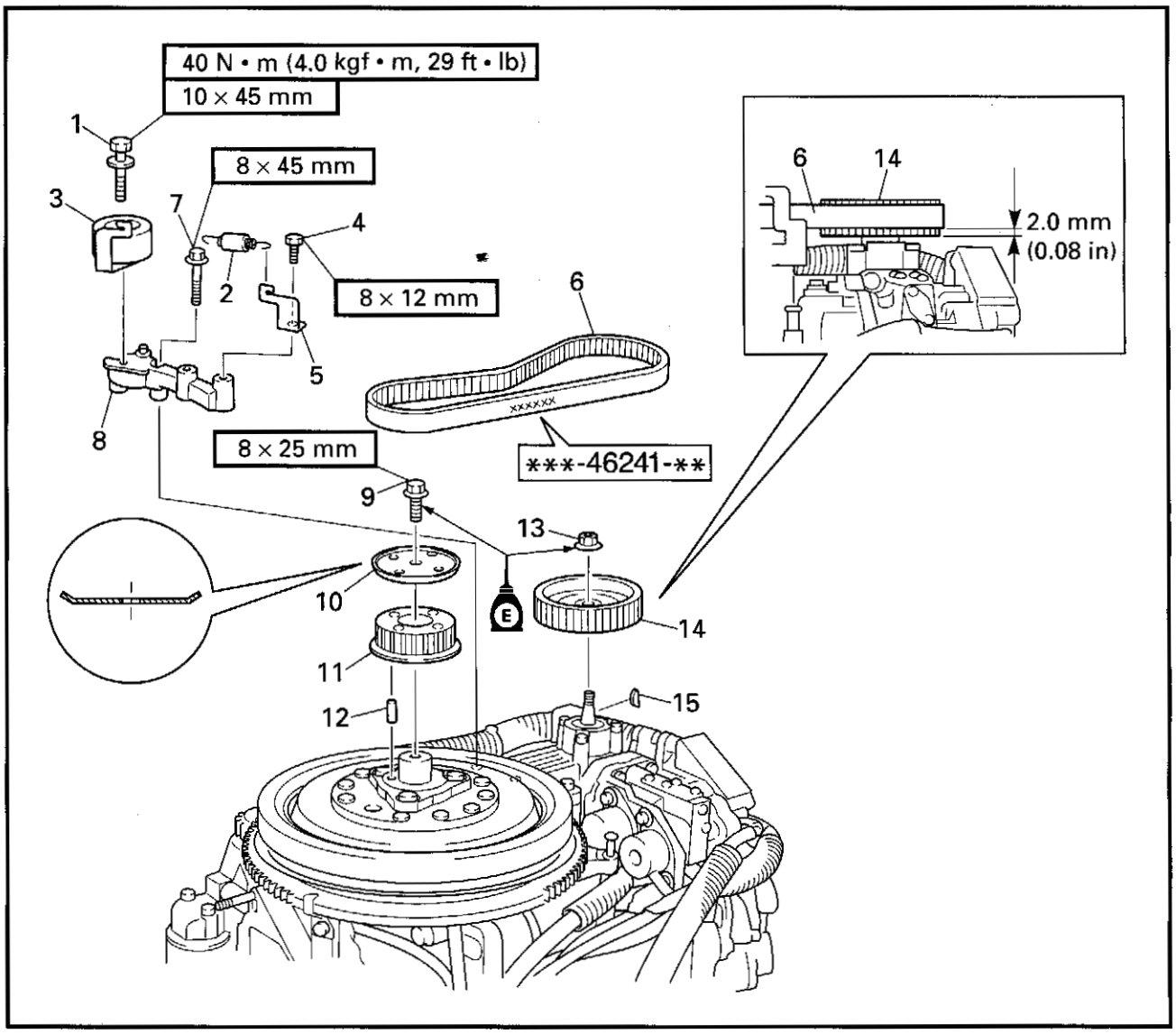
DRIVE BELT

REMOVING/INSTALLING THE DRIVE BELT



Order	Job/Part	Q'ty	Remarks
	Flywheel magnet assembly cover		
1	Bolt	1	
2	Spring	1	
3	Drive belt tensioner	1	
4	Bolt	1	
5	Spring holder	1	
6	Drive belt	1	
7	Bolt	2	

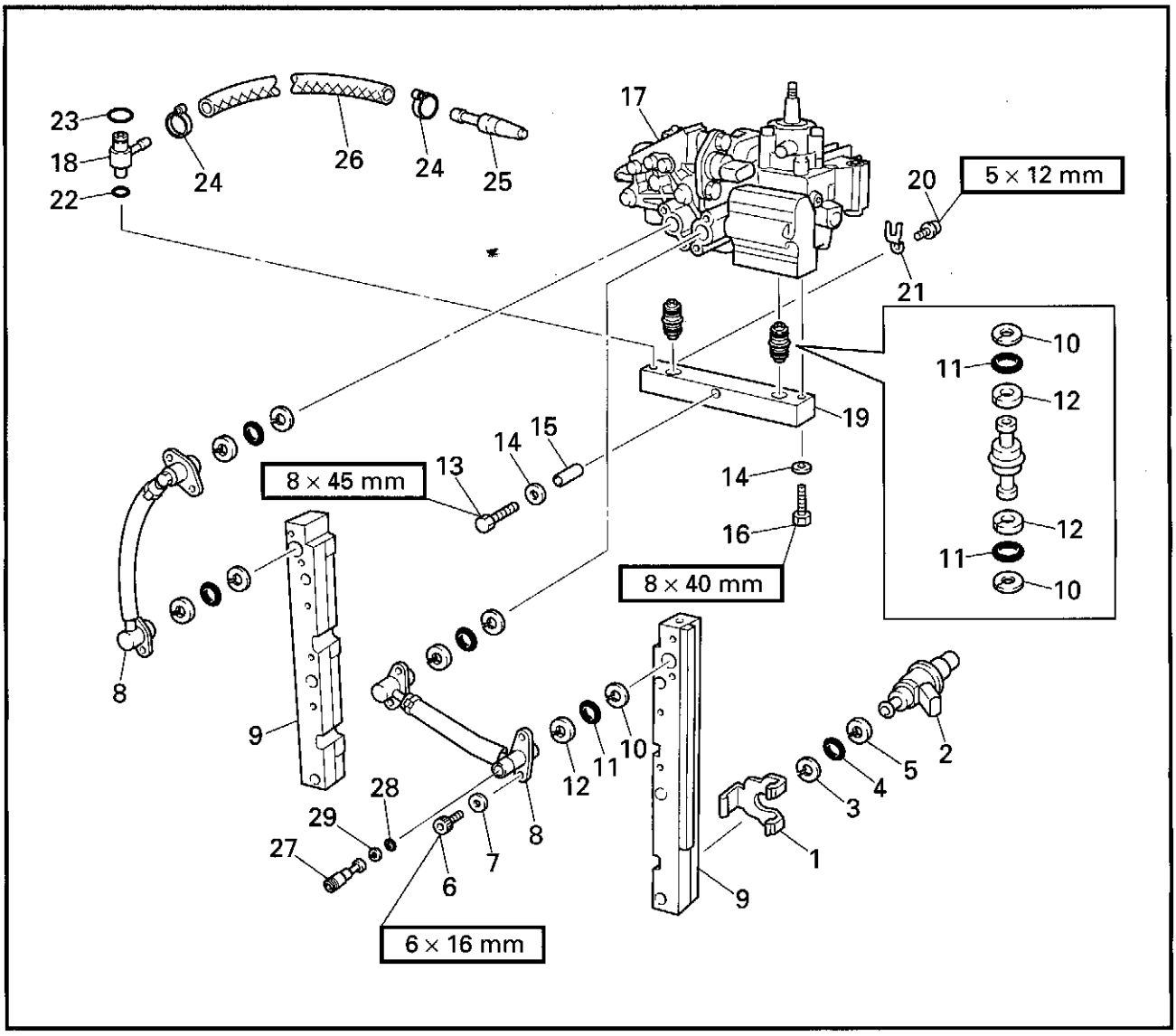
Continued on next page.



Order	Job/Part	Q'ty	Remarks
8	Tensioner bracket	1	
9	Bolt	1	
10	Drive sprocket plate	1	
11	Drive sprocket	1	
12	Dowel pin	1	
13	Nut	1	
14	Driven sprocket	1	
15	Woodruff key	1	
			For installation, reverse the removal procedure.

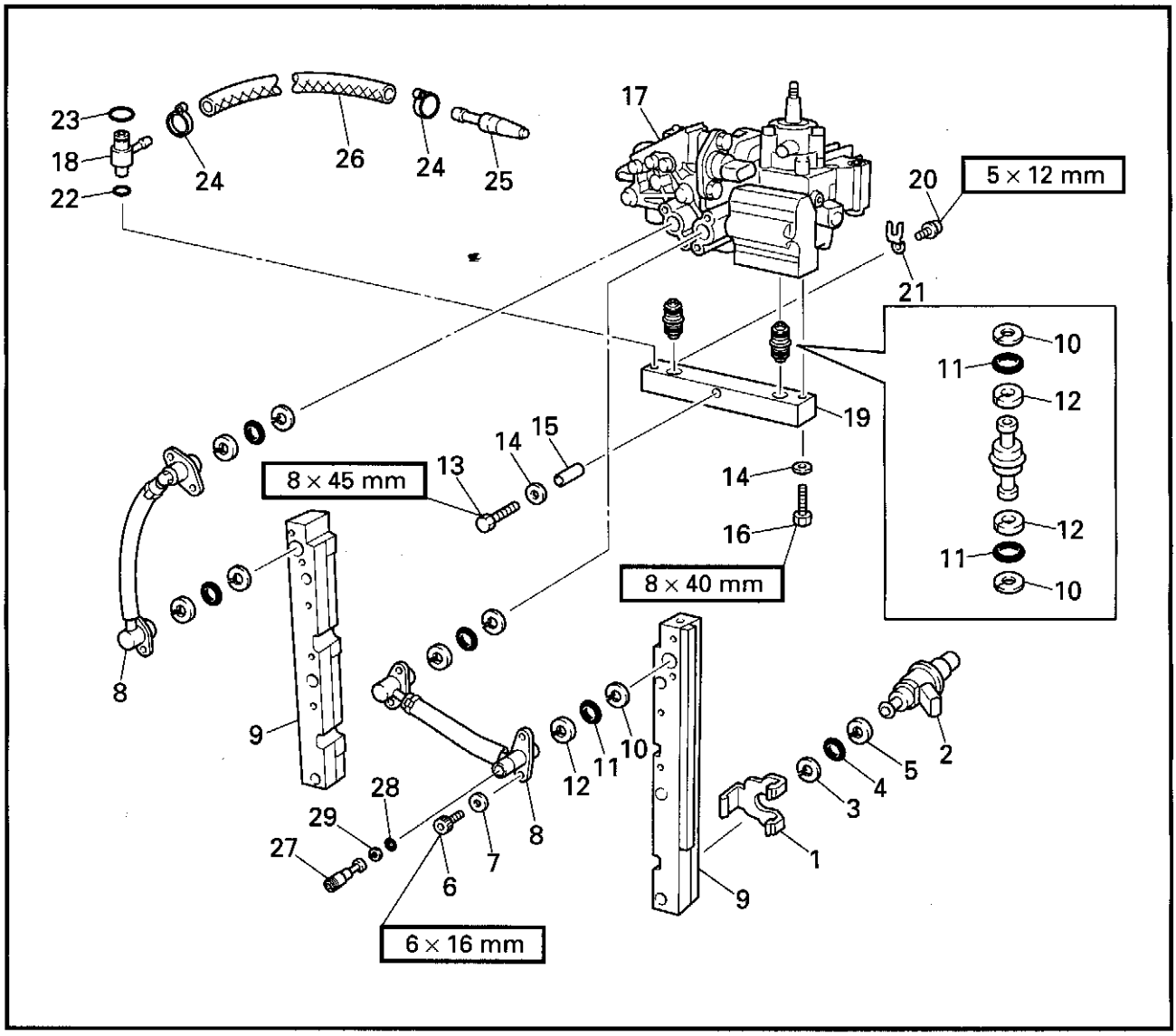
HIGH-PRESSURE FUEL LINE ASSEMBLY

DISASSEMBLING/ASSEMBLING THE HIGH-PRESSURE FUEL LINE ASSEMBLY



Order	Job/Part	Q'ty	Remarks
1	Fuel injector holder	6	
2	Fuel injector	6	
3	Seal ring (thin)	6	Not reusable
4	O-ring	6	Not reusable
5	Seal ring (thick)	6	Not reusable
6	Bolt	8	
7	Washer	8	
8	Fuel pipe	2	
9	Fuel rail	2	
10	Seal ring (thin)	8	Not reusable

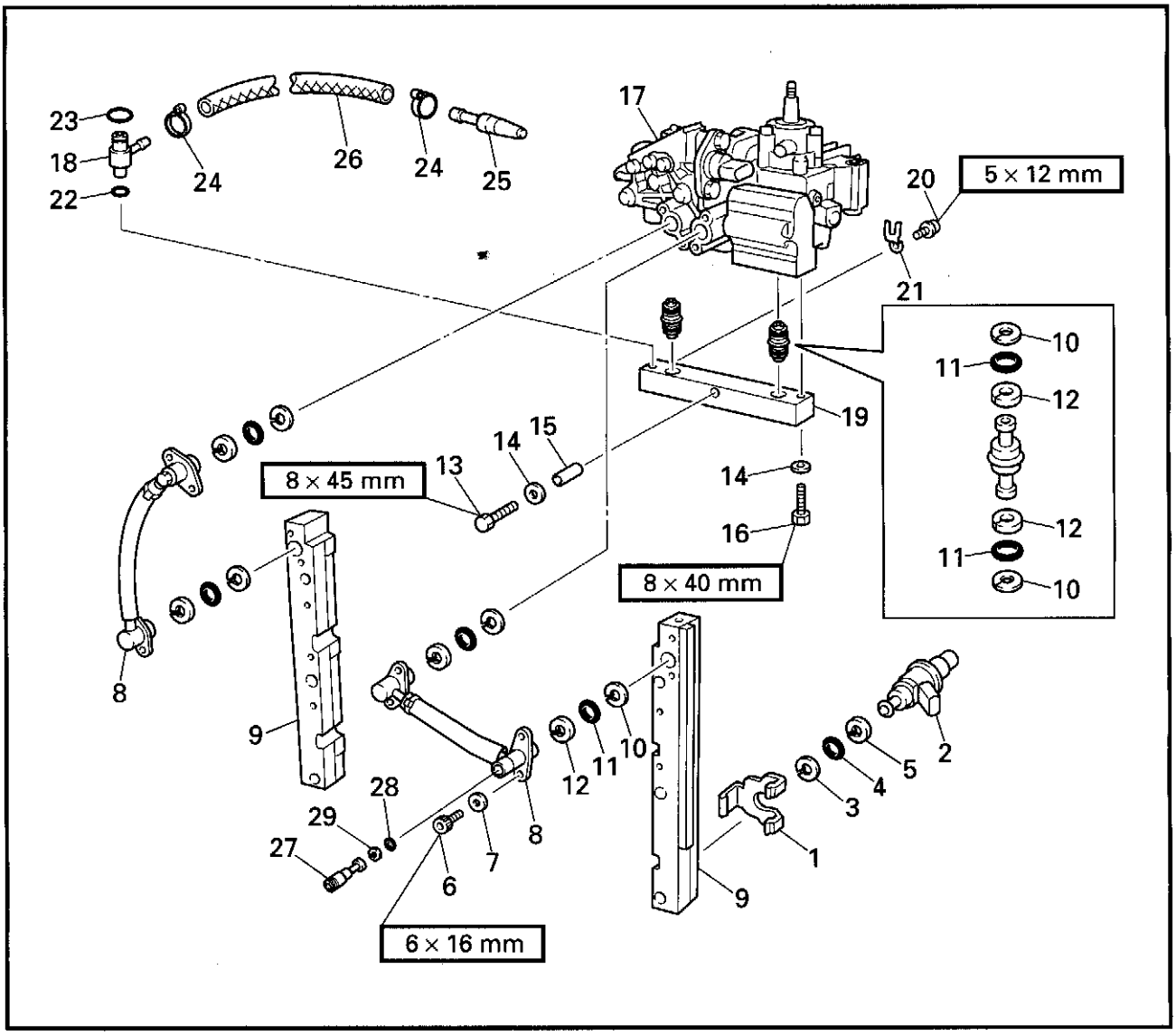
Continued on next page.



Order	Job/Part	Q'ty	Remarks
11	O-ring	8	Not reusable
12	Seal ring (thick)	8	Not reusable
13	Bolt	1	
14	Washer	2	
15	Collar	1	
16	Bolt	1	
17	Mechanical fuel pump assembly	1	
18	Fuel feed hose joint	1	
19	Center fuel rail	1	
20	Screw	1	

Continued on next page.

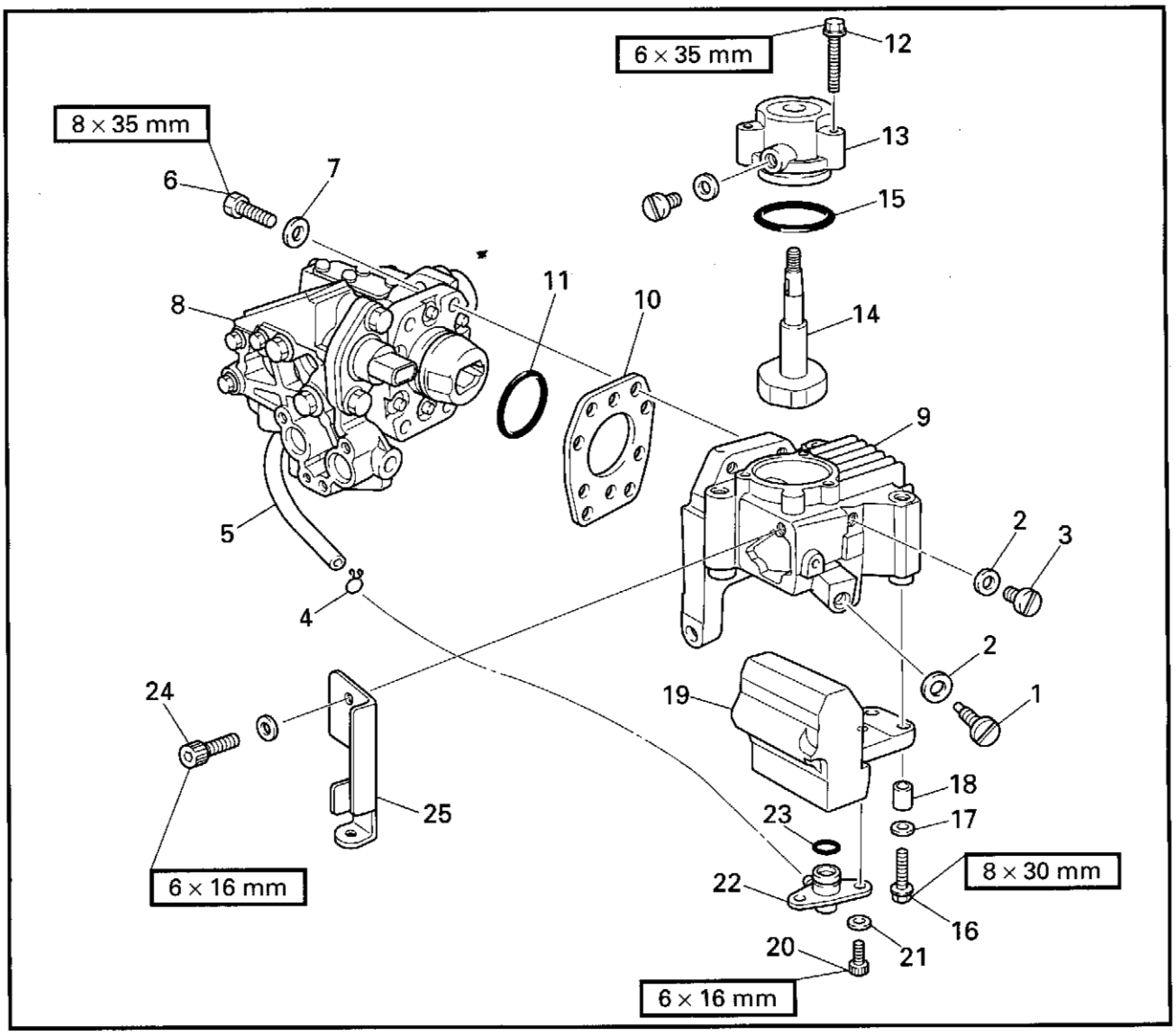
HIGH-PRESSURE FUEL LINE ASSEMBLY



Order	Job/Part	Q'ty	Remarks
21	Fuel feed hose guide	1	
22	O-ring	1	Not reusable
23	O-ring	1	Not reusable
24	Hose clamp	2	Not reusable
25	Fuel feed hose connector	1	
26	Fuel feed hose	1	
27	Plug screw	1	
28	O-ring	1	Not reusable
29	Seal ring	1	Not reusable
			For assembly, reverse the disassembly procedure.

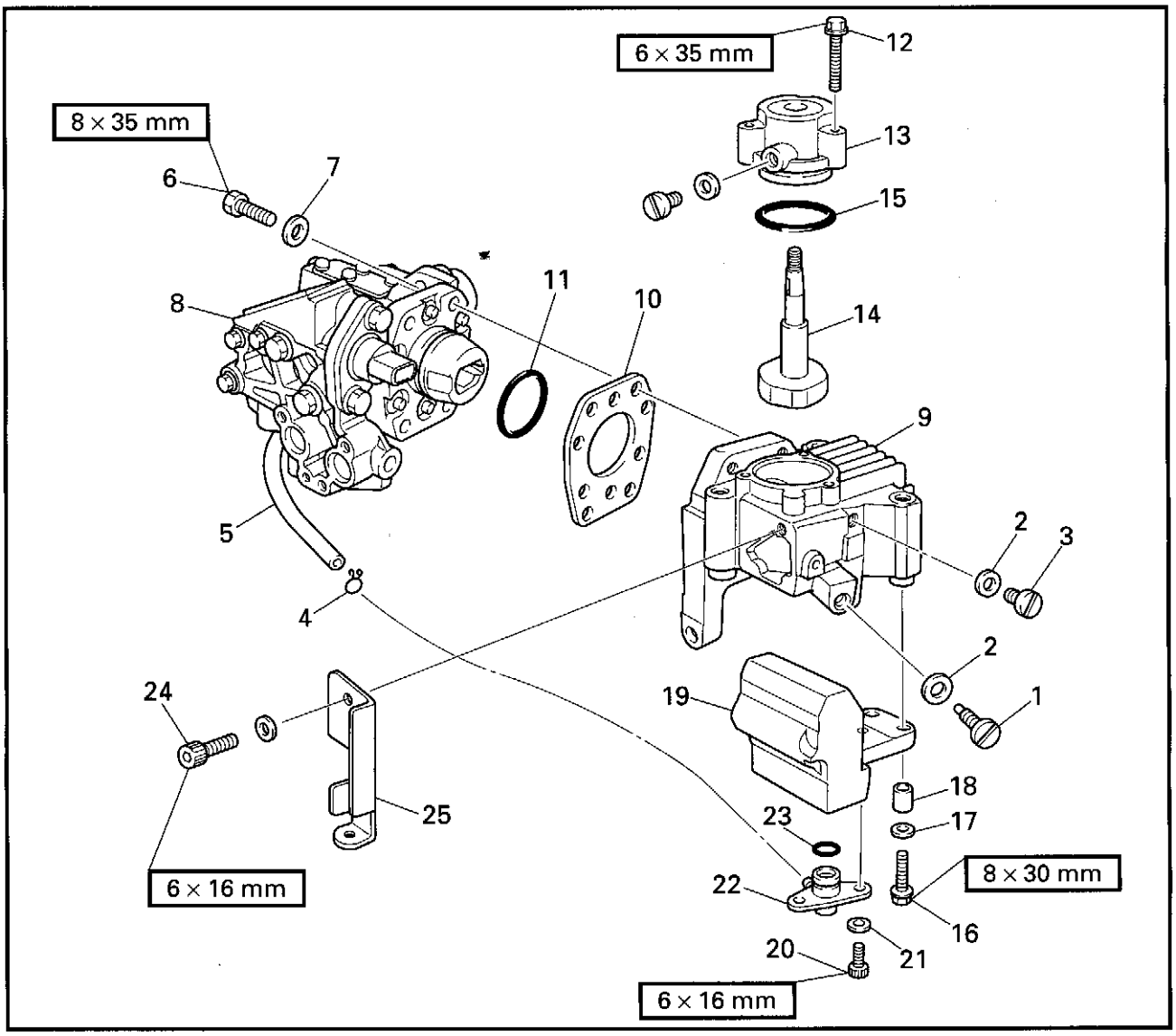
MECHANICAL FUEL PUMP

DISASSEMBLING/ASSEMBLING THE MECHANICAL FUEL PUMP BODY



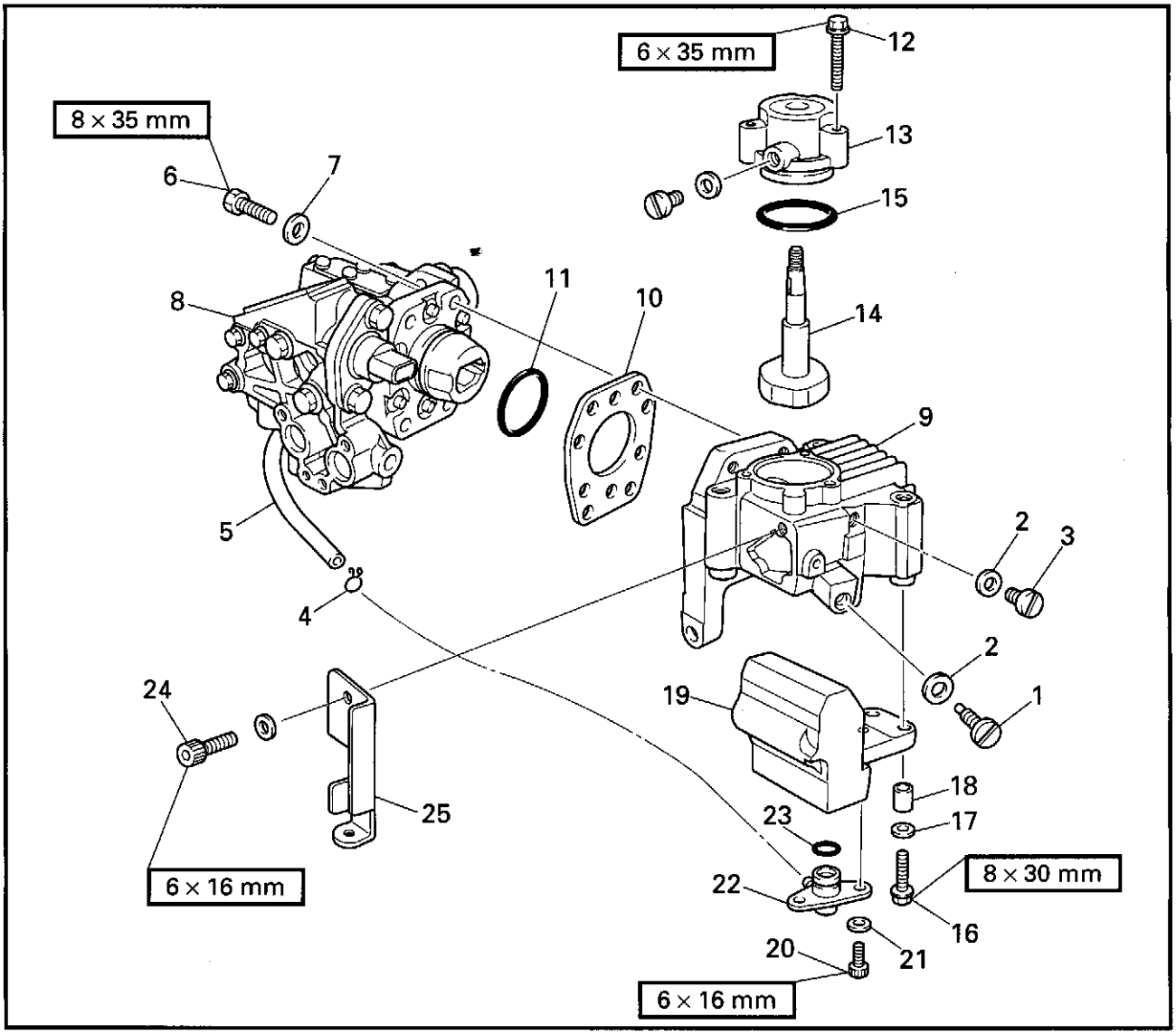
Order	Job/Part	Q'ty	Remarks
	Gear oil		
1	Gear oil drain screw	1	
2	Gasket	2	
3	Gear oil level check screw	1	
4	Clip	1	
5	Fuel return hose	1	(mechanical fuel pump regulator-to-hose joint)
6	Bolt	4	
7	Washer	4	
8	Mechanical fuel pump assembly	1	

Continued on next page.



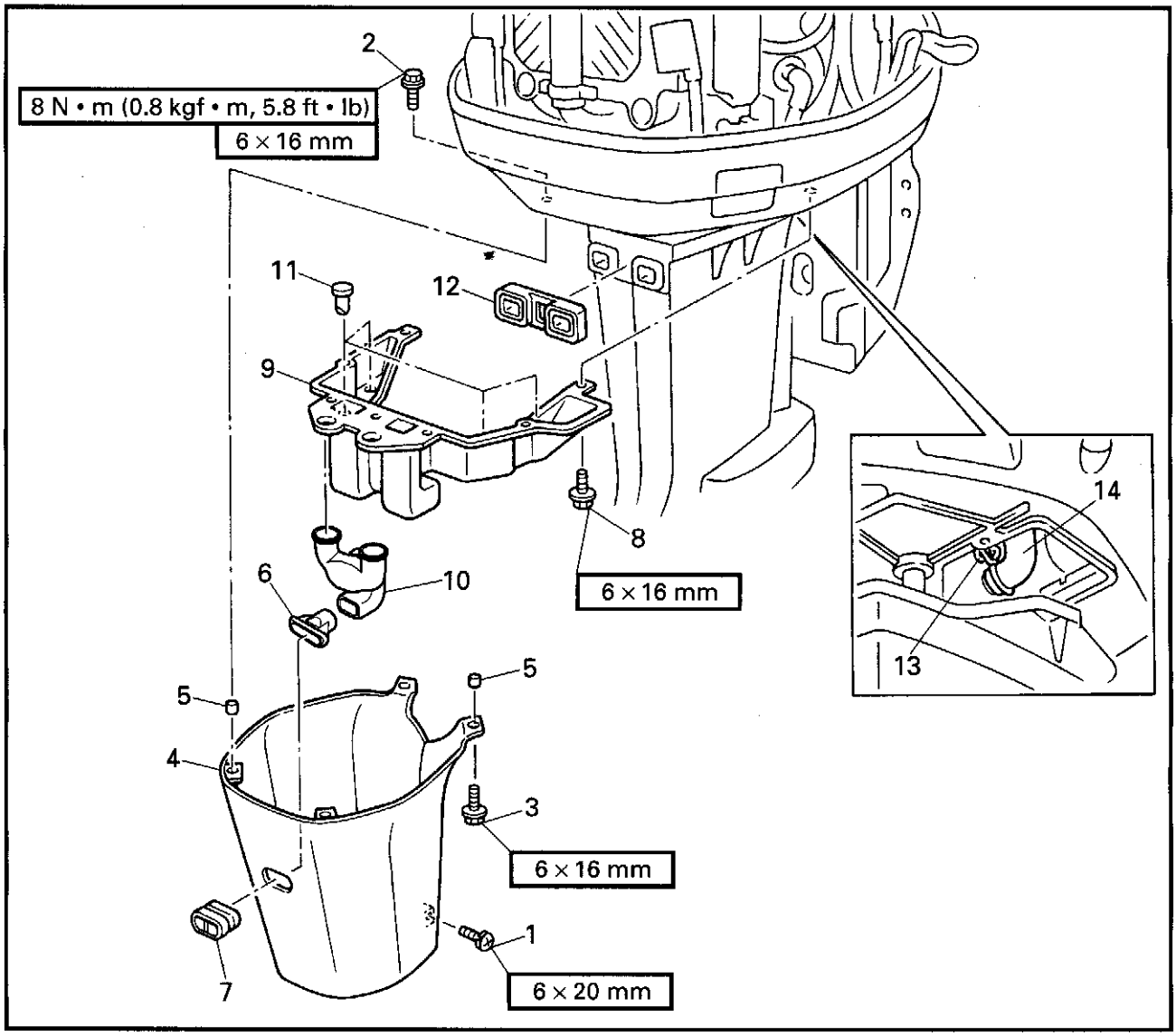
Order	Job/Part	Q'ty	Remarks
9	Mechanical fuel pump body	1	
10	Joint plate	1	
11	O-ring	1	Not reusable
12	Bolt	3	
13	Mechanical fuel pump body cover	1	
14	Camshaft	1	
15	O-ring	1	Not reusable
16	Bolt	2	
17	Washer	2	

Continued on next page.



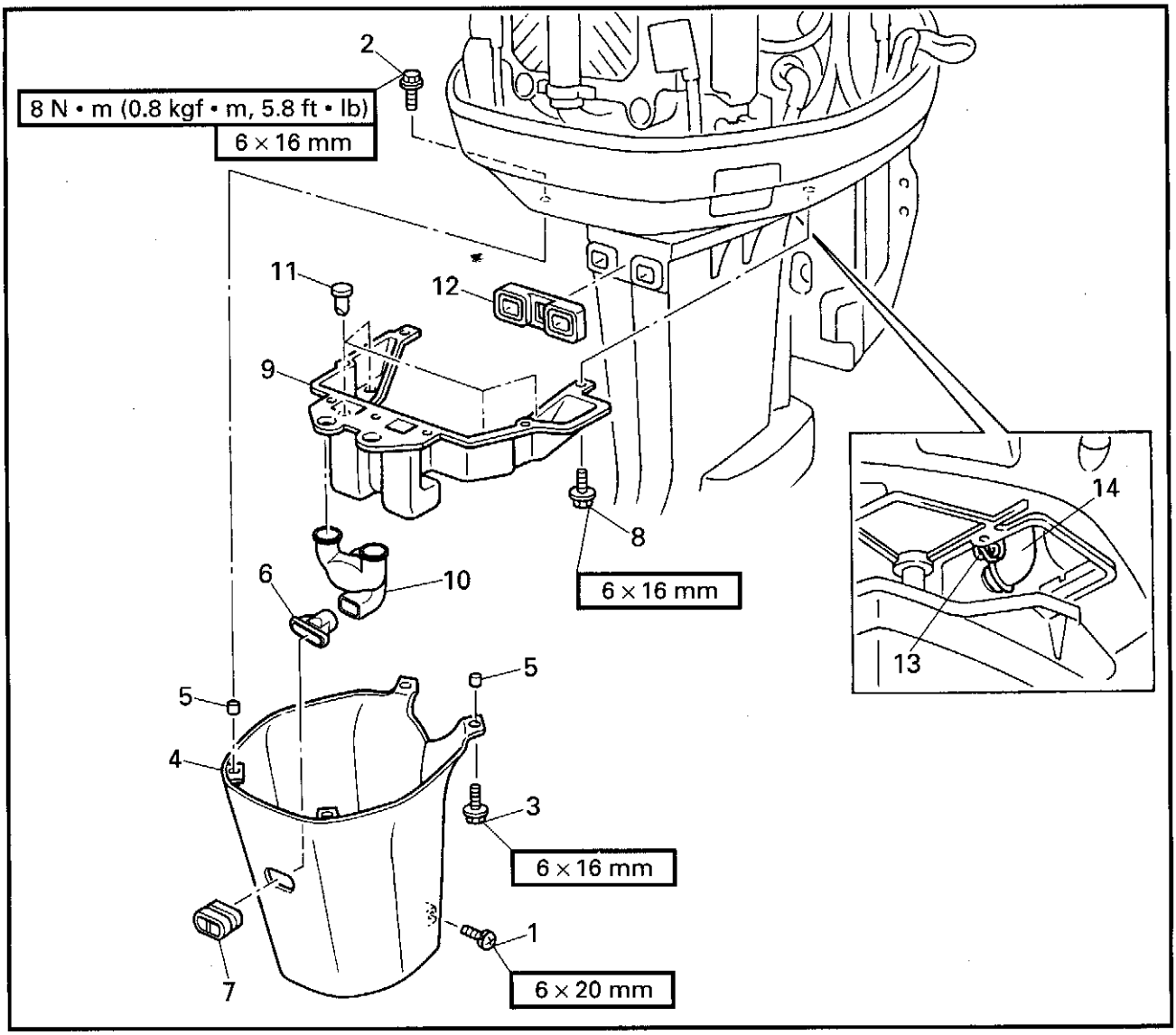
Order	Job/Part	Q'ty	Remarks
18	Collar	2	
19	Mechanical fuel pump regulator	1	
20	Bolt	2	
21	Washer	2	
22	Fuel return hose joint	1	
23	O-ring	1	Not reusable
24	Bolt	1	
25	Joint plate	1	
			For assembly, reverse the disassembly procedure.

POWER UNIT
REMOVING/INSTALLING THE EXHAUST EXPANSION CHAMBER

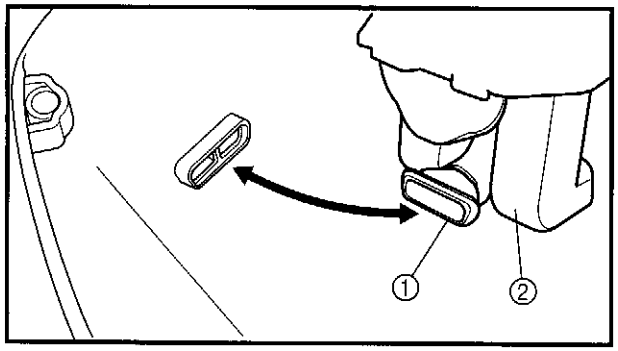


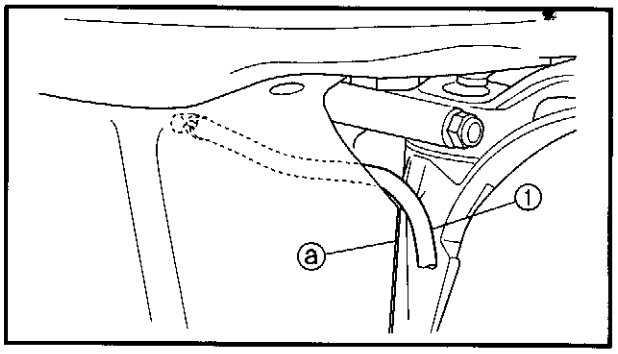
Order	Job/Part	Q'ty	Remarks
1	Screw	1	
2	Bolt	2	
3	Bolt	2	
4	Apron	1	
5	Collar	4	
6	Hose joint	1	
7	Rubber seal	1	
8	Bolt	9	

Continued on next page.



Order	Job/Part	Q'ty	Remarks
9	Exhaust expansion chamber	1	
10	Exhaust expansion chamber hose	1	
11	Rubber seal	4	
12	Rubber seal	1	
13	Clip	1	
14	Cooling water hose	1	(exhaust manifold-to-power unit) For installation, reverse the removal procedure.





INSTALLING THE APRON

1. Install:
   • Hose joint

NOTE:

First insert the hose joint ① in the exhaust expansion chamber hose ②, and then insert the apron securely in the hose joint.

2. Install:
   • Apron

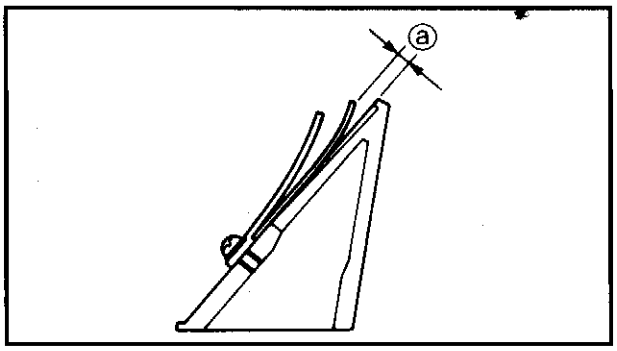
CAUTION:

Make sure not to get the flushing hose ① caught between the mating surfaces ⓐ of the apron when installing it.

REED VALVES

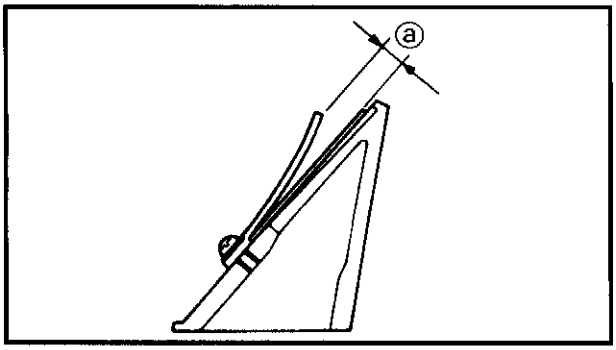
CHECKING THE REED VALVE ASSEMBLY

1. Check:
   • Reed valve
   Cracks/damage → Replace.



2. Measure:
   • Warpage limit ⓐ
   Out of specification → Replace.

Warpage limit
0.2 mm (0.008 in)



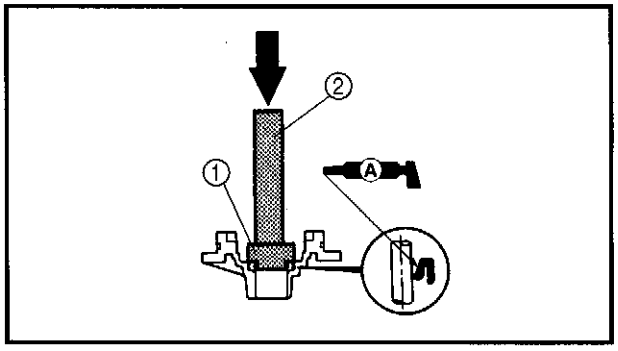
3. Measure:
   • Reed valve stopper height ⓐ
   Out of specification → Replace.

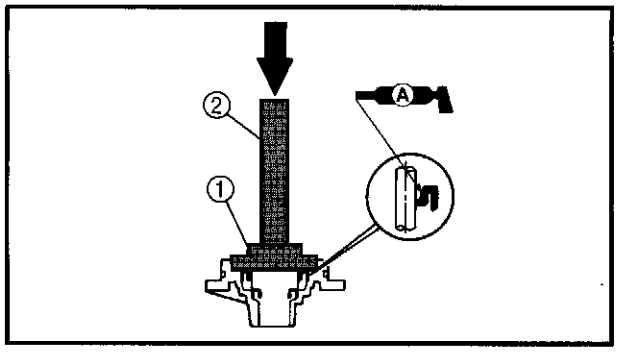
Reed valve stopper height
150, 175 models
8.1 ± 0.30 mm (0.32 ± 0.01 in)
200 models
9.0 ± 0.35 mm (0.35 ± 0.01 in)

CRANKCASE

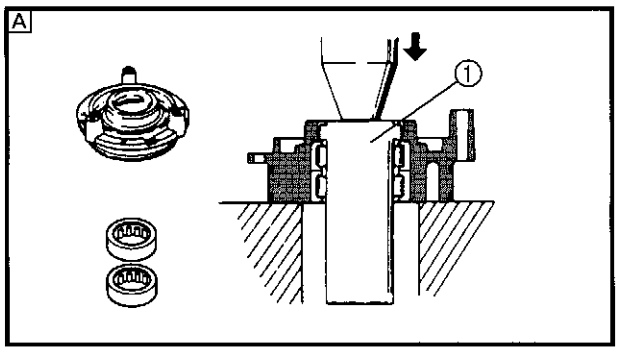
ASSEMBLING THE OIL SEAL HOUSING

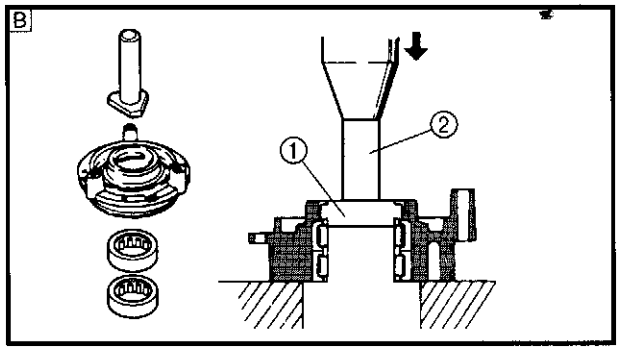
Install:
• Oil seal

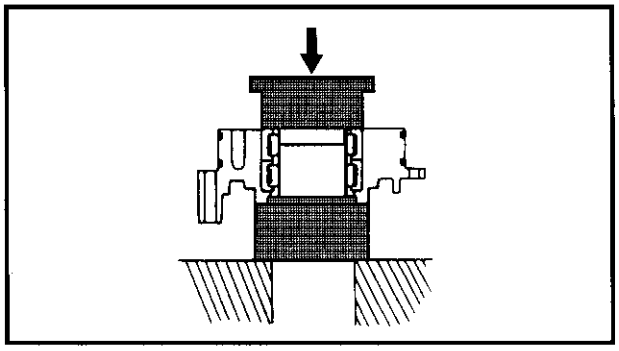


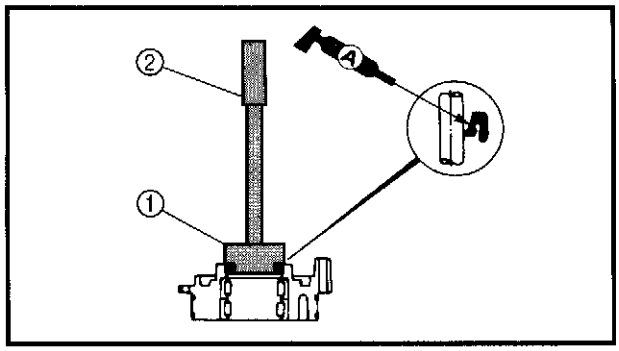


Bearing/oil seal attachment .... ①
YB-06348, YB-41446 /
90890-06635, 90890-06630
Driver rod ..... ②
YB-06229, YB-06071 /
90890-06606









CYLINDER BODY ASSEMBLY

DISASSEMBLING THE UPPER BEARING HOUSING

Remove:
- Needle bearing

	Needle bearing attachment..... ① **YB-06205-1 / 90890-06663** **Driver rod ..... ②** **90890-06606**

A For USA and Canada
B For worldwide

ASSEMBLING THE UPPER BEARING HOUSING

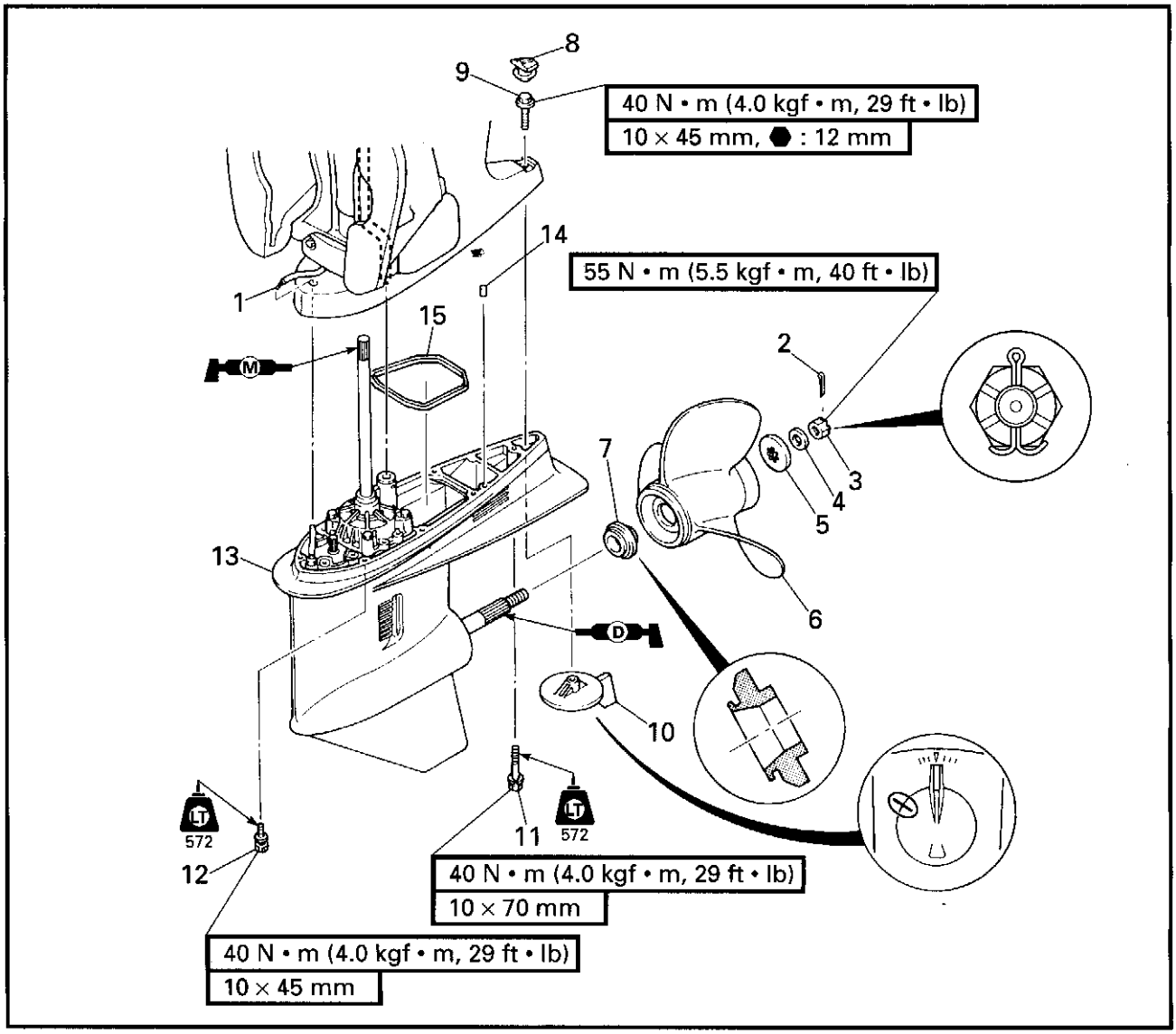
1. Install:
   - Needle bearing

	Needle bearing attachment **N.A. / 90890-06660**

2. Install:
   - Oil seal

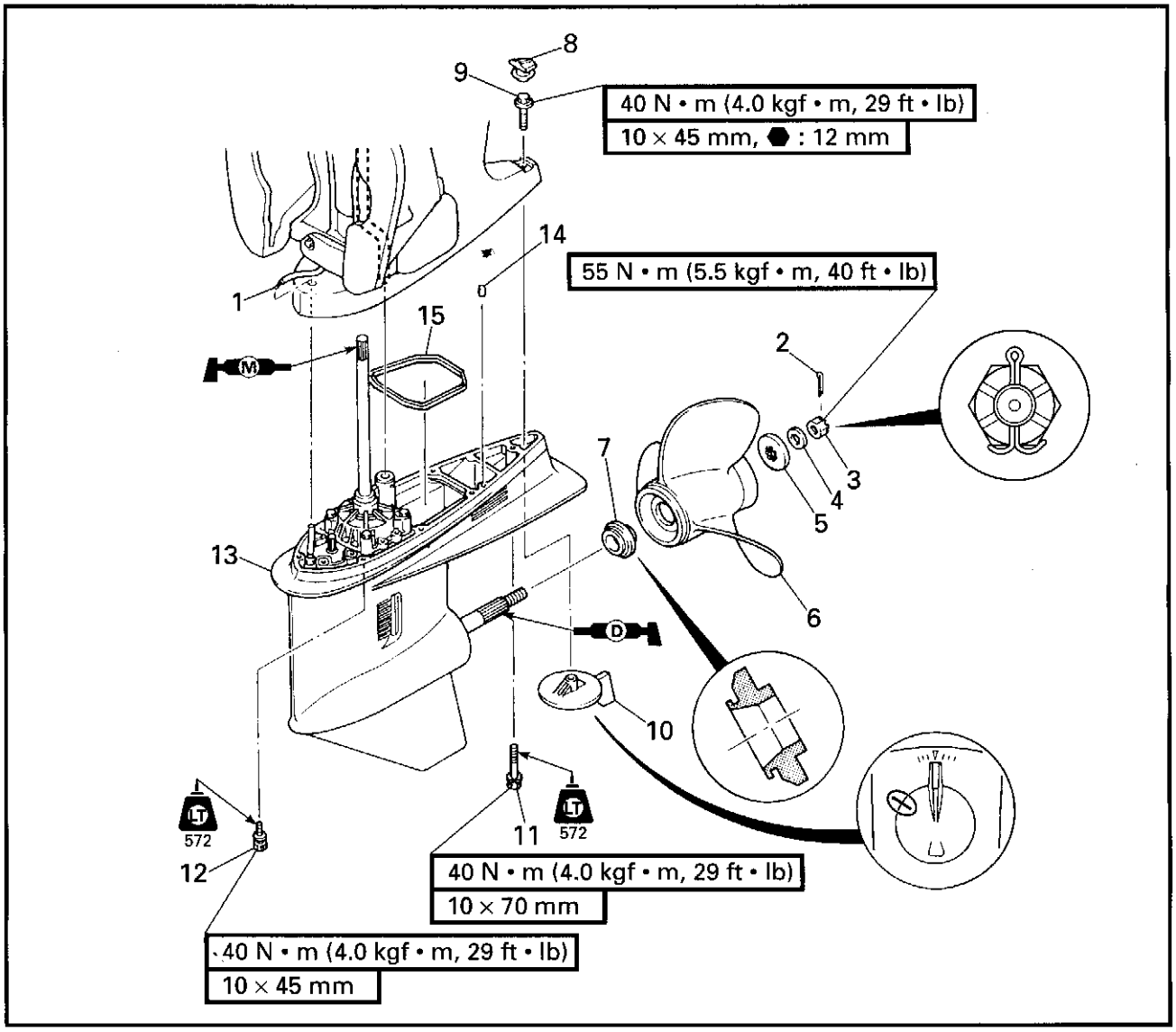
	Bearing/oil seal attachment.... ① **YB-41446 / 90890-06654** **Driver rod ..... ②** **YB-06071 / 90890-06652**

LOWER UNIT (REGULAR ROTATION MODELS)
REMOVING/INSTALLING THE LOWER UNIT



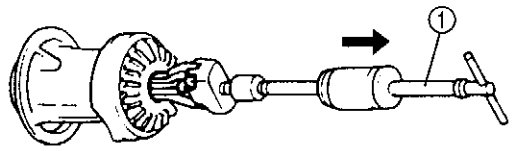
Order	Job/Part	Q'ty	Remarks
1	Speedometer hose	1	
2	Cotter pin	1	
3	Propeller nut	1	
4	Washer	1	
5	Washer	1	
6	Propeller	1	
7	Spacer	1	
8	Cap	1	

Continued on next page.

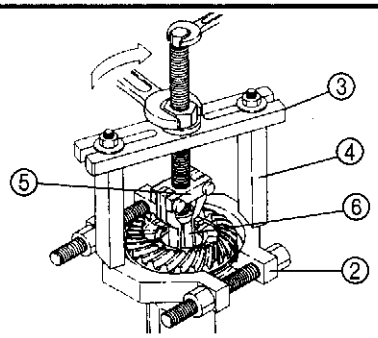


Order	Job/Part	Q'ty	Remarks
9	Bolt	1	
10	Trim tab	1	
11	Bolt	1	
12	Bolt	6	
13	Lower unit	1	
14	Dowel pin	2	
15	Exhaust seal	1	
			For installation, reverse the removal procedure.

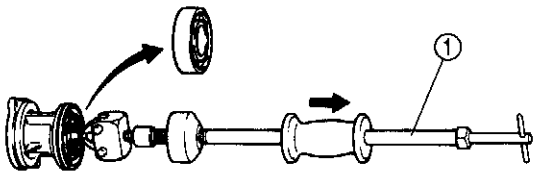
A



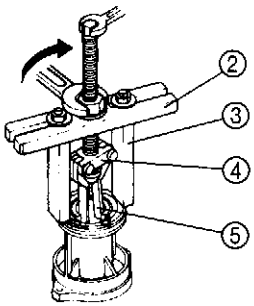
B

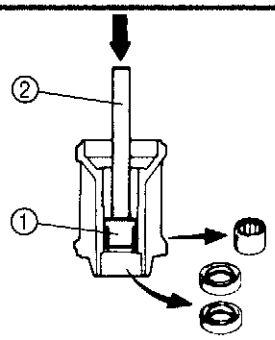


A



B





PROPELLER SHAFT HOUSING ASSEMBLY (REGULAR ROTATION MODELS)

DISASSEMBLING THE PROPELLER SHAFT HOUSING

1. Remove:
   - Reverse gear

Slide hammer	①
YB-06096	
Bearing separator	②
90890-06534	
Guide plate	③
90890-06501	
Guide plate stand	④
90890-06538	
Bearing puller	⑤
90890-06535	
Small universal claws	⑥
90890-06536	

A For USA and Canada
B For worldwide

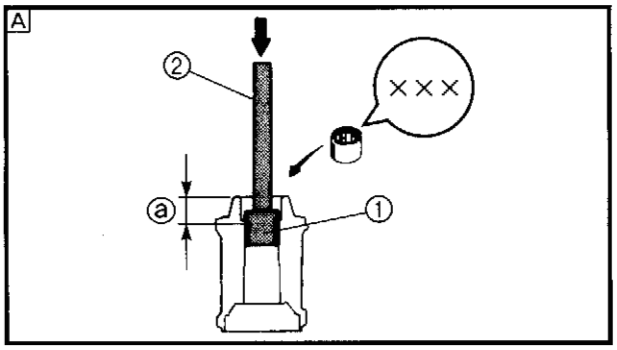
2. Remove:
   - Ball bearing

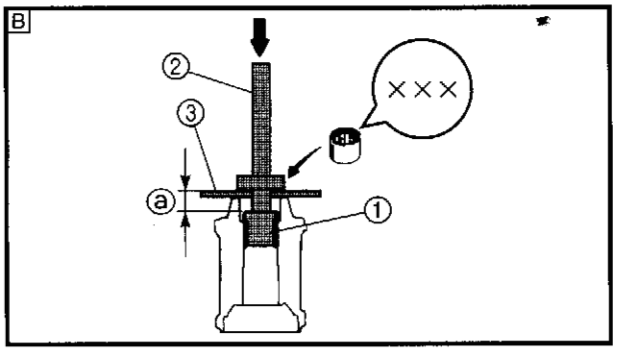
Slide hammer	①
YB-06096	
Guide plate	②
90890-06501	
Guide plate stand	③
90890-06538	
Bearing puller	④
90890-06535	
Small universal claws	⑤
90890-06536	

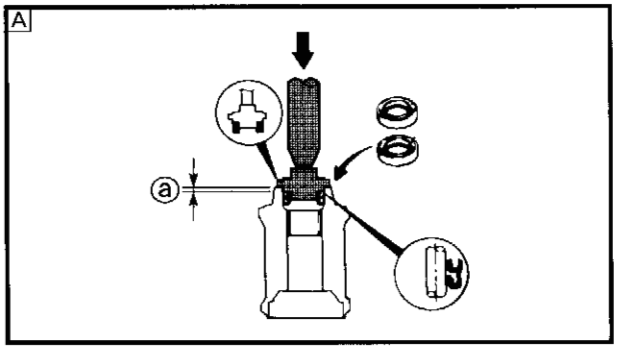
A For USA and Canada
B For worldwide

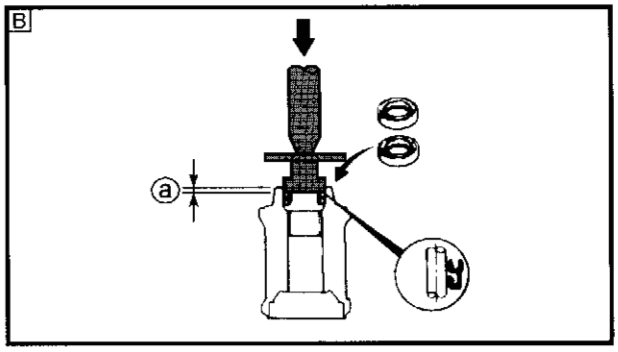
3. Remove:
   - Oil seals
   - Needle bearing

Bearing/oil seal attachment	①
YB-06196 / 90890-06653	
Driver rod	②
YB-06071 / 90890-06652	









ASSEMBLING THE PROPELLER SHAFT HOUSING

1. Install:
   - Needle bearing

Needle bearing installation position ⓐ
24.75 - 25.25 mm
(0.974 - 0.994 in)

Bearing/oil seal attachment .... ①
YB-06196 / 90890-06610
Driver rod ..... ②
YB-06071 / 90890-06604
Bearing/oil seal depth plate .... ③
90890-06603

A For USA and Canada
B For worldwide

2. Install:
   - Oil seals

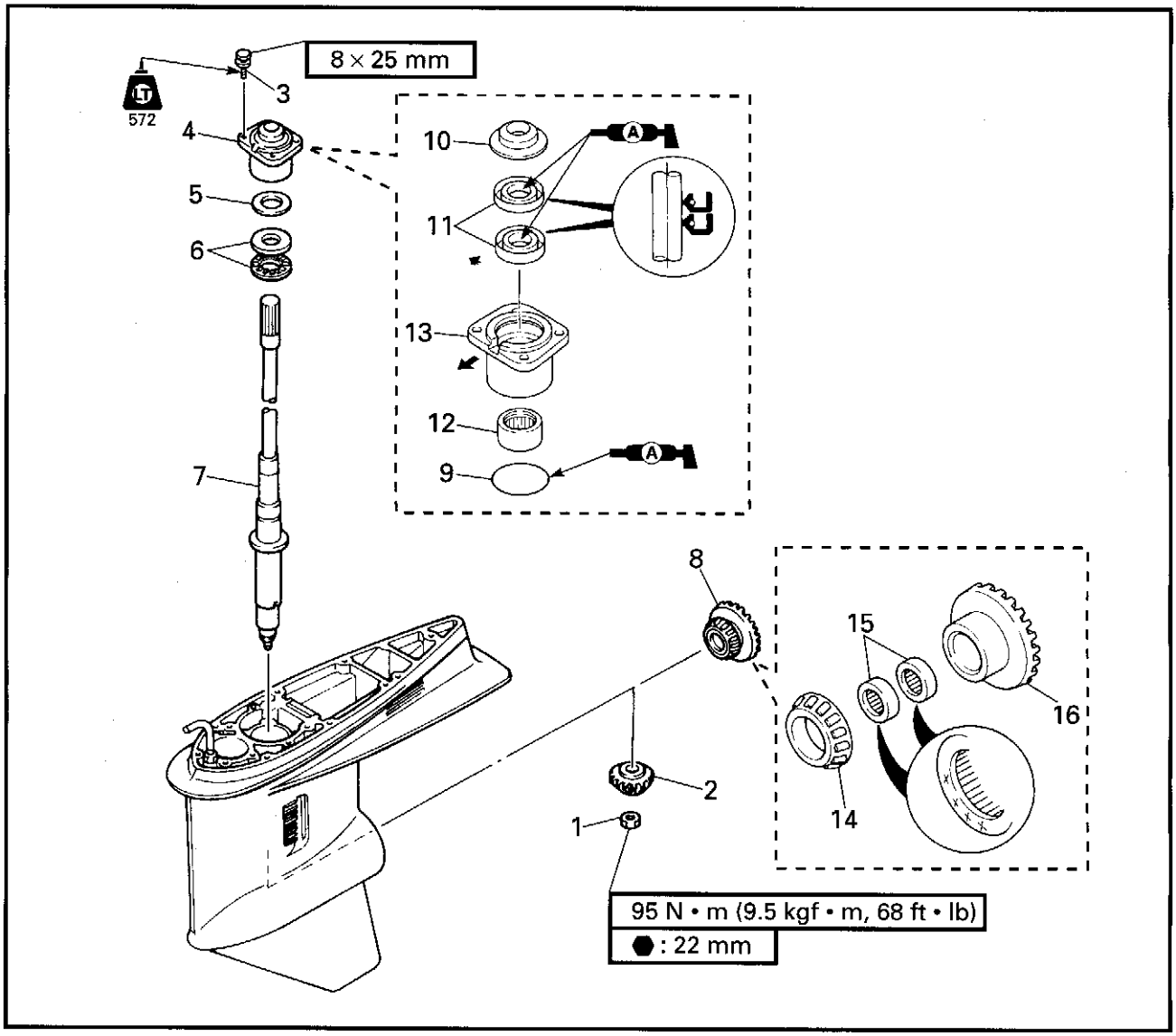
Oil seal installation position ⓐ
4.75 - 5.25 mm (0.187 - 0.207 in)

Bearing/oil seal attachment
YB-06195 / 90890-06640

A For USA and Canada
B For worldwide

DRIVE SHAFT (REGULAR ROTATION MODELS)

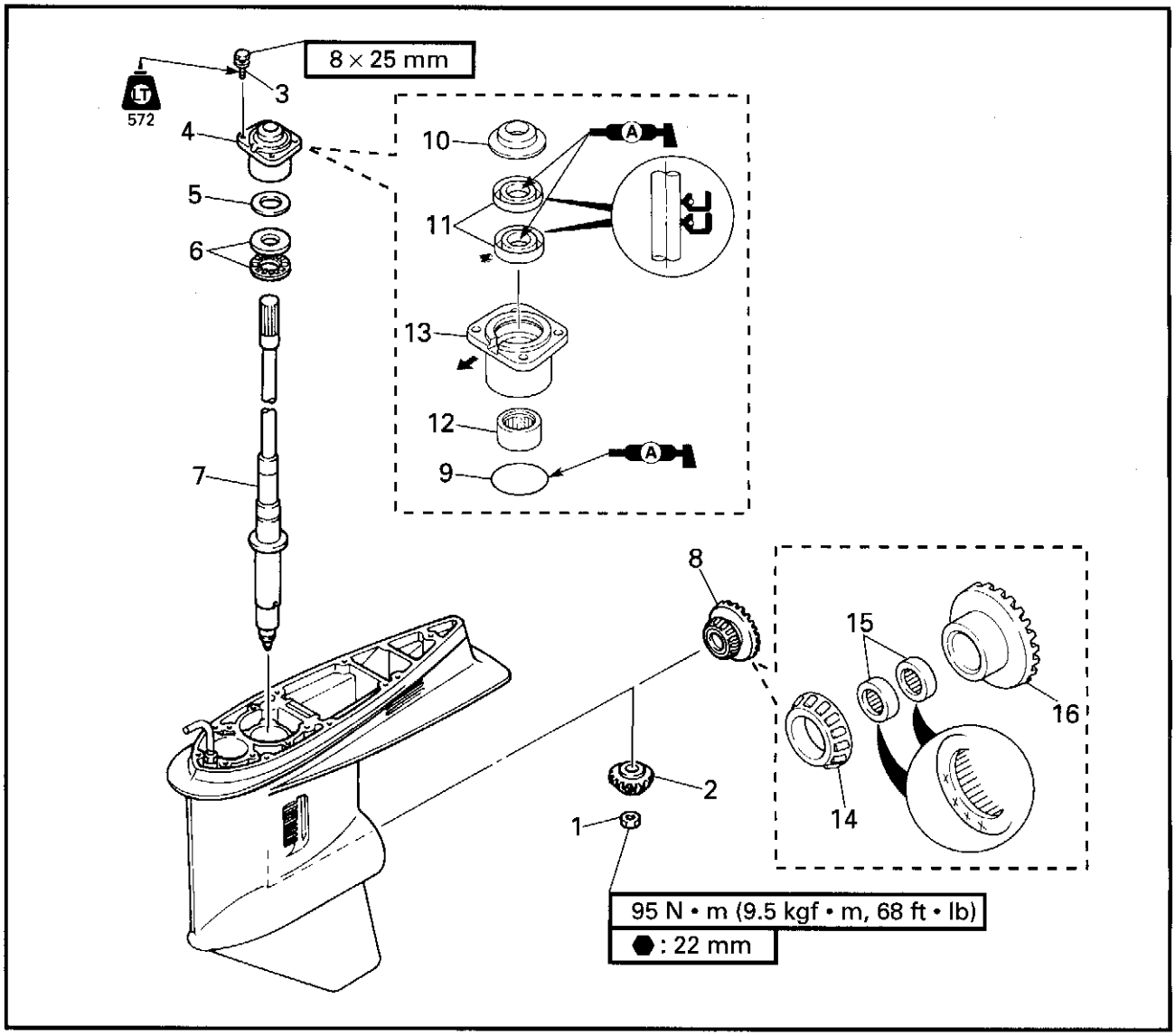
REMOVING/INSTALLING THE DRIVE SHAFT



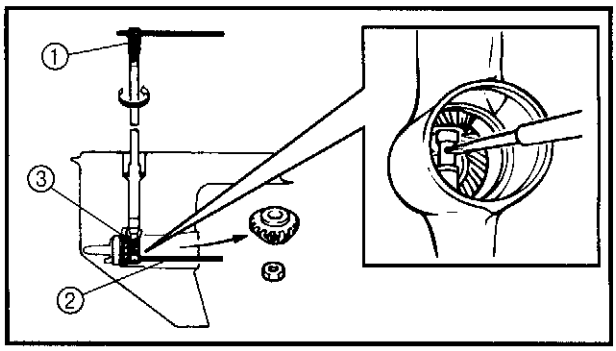
Order	Job/Part	Q'ty	Remarks
	Propeller shaft housing assembly		
1	Pinion nut	1	
2	Pinion	1	
3	Bolt	4	
4	Drive shaft housing assembly	1	
5	Pinion shim	*	
6	Thrust bearing	1	
7	Drive shaft	1	

Continued on next page.

*: As required



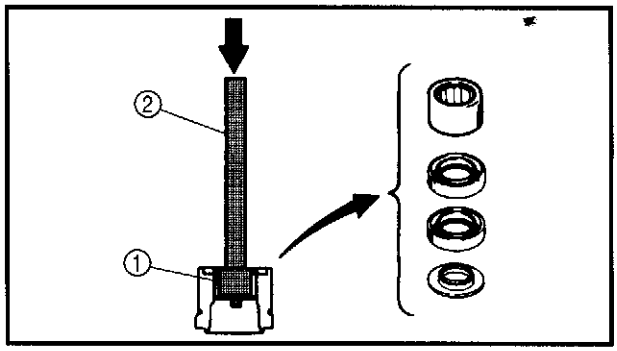
Order	Job/Part	Q'ty	Remarks
8	Forward gear assembly	1	
9	O-ring	1	
10	Oil seal cover	1	
11	Oil seal	2	
12	Needle bearing	1	
13	Drive shaft housing	1	
14	Tapered roller bearing	1	Not reusable
15	Needle bearing	2	Not reusable
16	Forward gear	1	
			For installation, reverse the removal procedure.



REMOVING THE PINION

Remove:
- Pinion nut
- Pinion

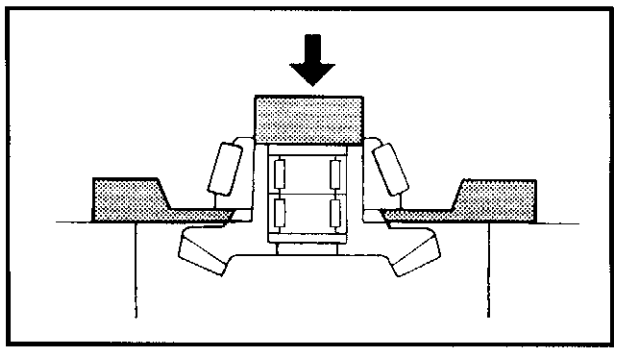
Drive shaft holder ..... ①
YB-06201 / 90890-06520
Pinion nut holder ..... ②
90890-06505
Pinion nut holder attachment . ③
90890-06507



DISASSEMBLING THE DRIVE SHAFT HOUSING ASSEMBLY

Remove:
- Oil seals
- Needle bearing

Bearing/oil seal attachment .... ①
YB-06196 / 90890-06610
Driver rod ..... ②
YB-06071 / 90890-06652

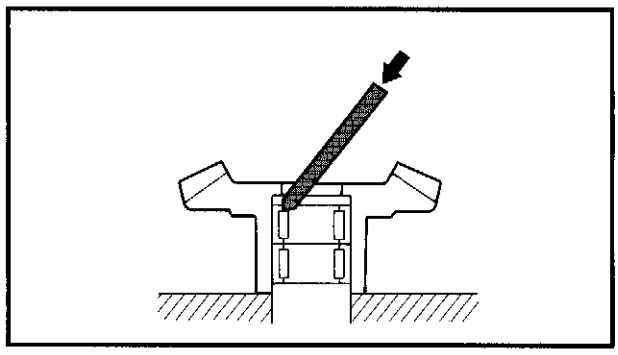


DISASSEMBLING THE FORWARD GEAR ASSEMBLY

1. Remove:
   - Tapered roller bearing

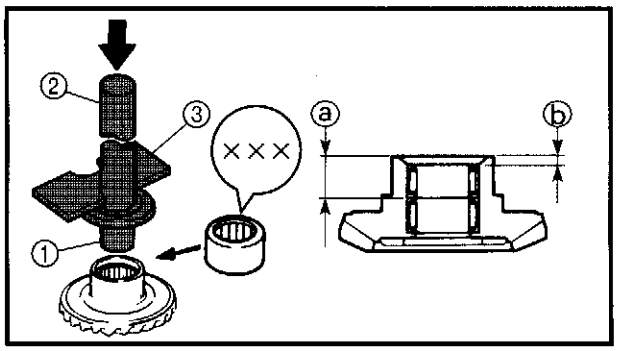
Bearing separator
YB-06219 / 90890-06534

Do not reuse the bearing, always replace it with a new one.



2. Remove:
   - Needle bearings

NOTE:
Do not reuse the bearing, always replace it with a new one.

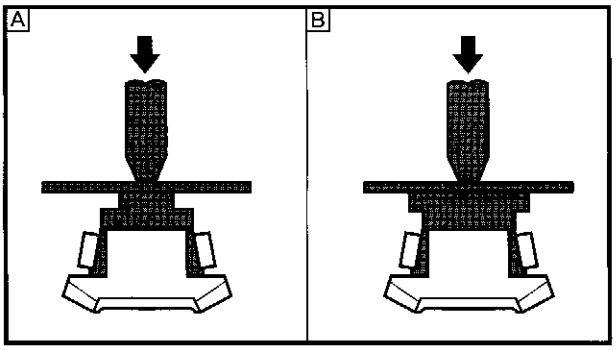


ASSEMBLING THE FORWARD GEAR ASSEMBLY

1. Install:
   • Needle bearings

Needle bearing installation position ⓐ
21.0 - 21.4 mm (0.827 - 0.843 in)
Needle bearing installation position ⓑ
4.5 - 4.9 mm (0.177 - 0.193 in)

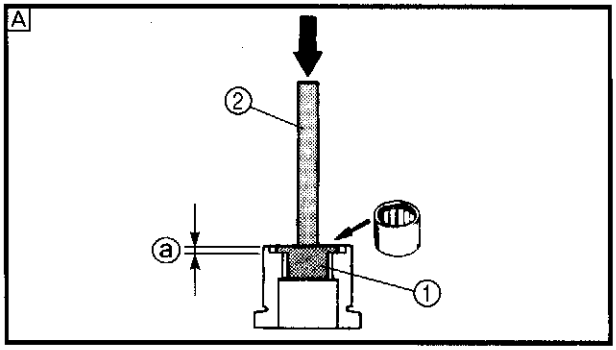
Bearing/oil seal attachment .... ①
YB-06261 / 90890-06612
Driver rod ..... ②
YB-06071 / 90890-06604
Bearing/oil seal depth plate .... ③
90890-06603

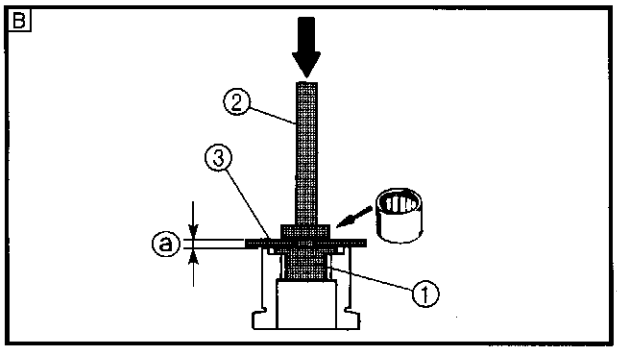


2. Install:
   • Tapered roller bearing

Bearing/oil seal attachment
YB-06434 / 90890-06660

A For USA and Canada
B For worldwide





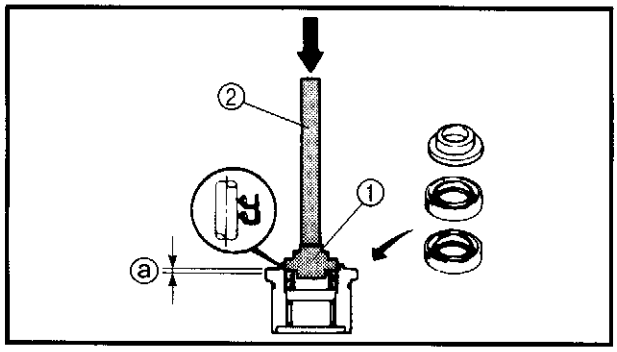
ASSEMBLING THE DRIVE SHAFT HOUSING ASSEMBLY

1. Install:
   • Needle bearing

Position ⓐ
5.75 - 6.25 mm (0.226 - 0.246 in)

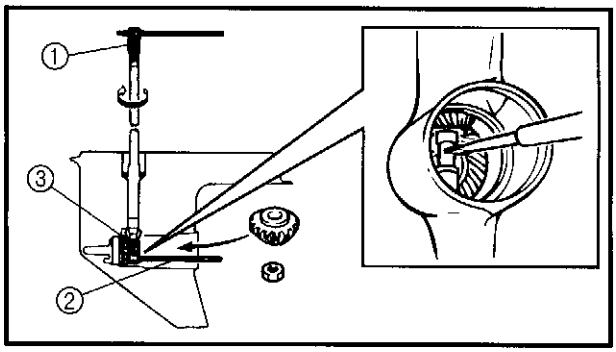
Bearing/oil seal attachment .... ①
YB-06196 / 90890-06610
Driver rod ..... ②
YB-06071 / 90890-06604
Bearing/oil seal depth plate .... ③
90890-06603

A For USA and Canada
B For worldwide



2. Install:
   • Oil seals

	Oil seal installation position ⓐ **0.25 - 0.75 mm (0.010 - 0.030 in)**
	Bearing/oil seal attachment .... ① **YB-06195 / 90890-06633** **Driver rod ..... ②** **YB-06071 / 90890-06606**



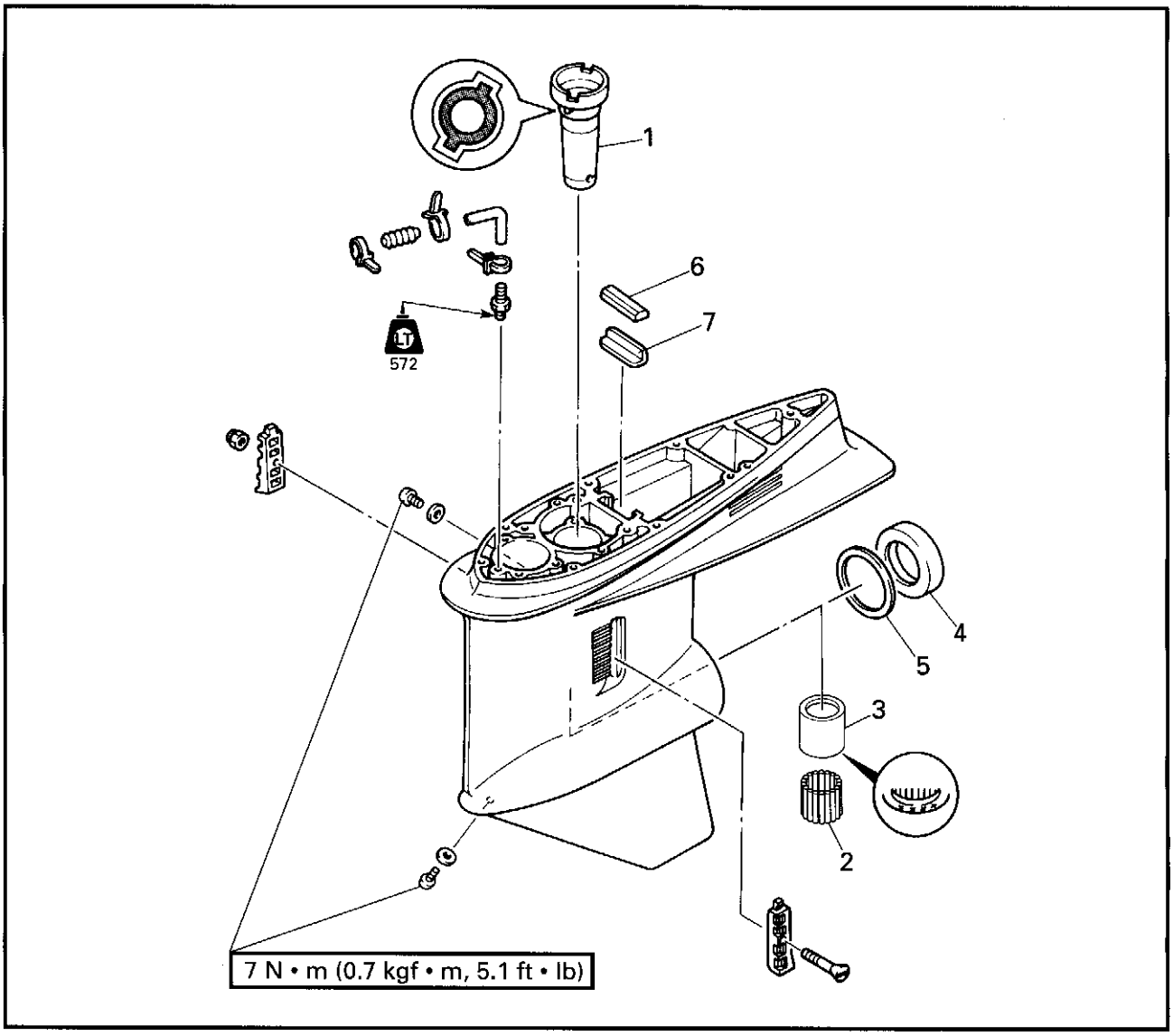
INSTALLING THE PINION

Install:
   • Pinion
   • Pinion nut

	Drive shaft holder ..... ① **YB-06201 / 90890-06520** **Pinion nut holder ..... ②** **90890-06505** **Pinion nut holder attachment . ③** **90890-06507**
	Pinion nut **95 N • m (9.5 kgf • m, 68 ft • lb)**

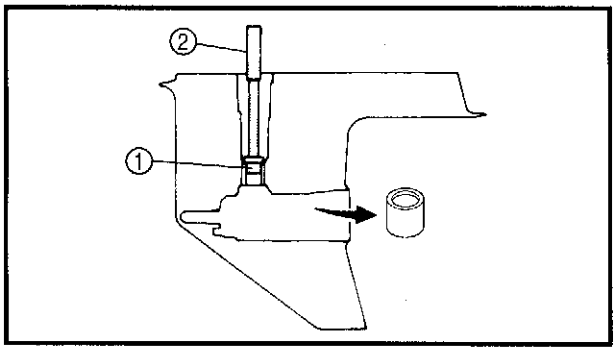
LOWER CASE ASSEMBLY (REGULAR ROTATION MODELS)

DISASSEMBLING/ASSEMBLING THE LOWER CASE ASSEMBLY



Order	Job/Part	Q'ty	Remarks
	Forward gear		
1	Drive shaft sleeve	1	
2	Needle bearing	18	
3	Needle bearing outer race	1	
4	Tapered roller bearing outer race	1	
5	Forward gear shim	*	
6	Water seal	1	
7	Water seal seat	1	
			For assembly, reverse the disassembly procedure.

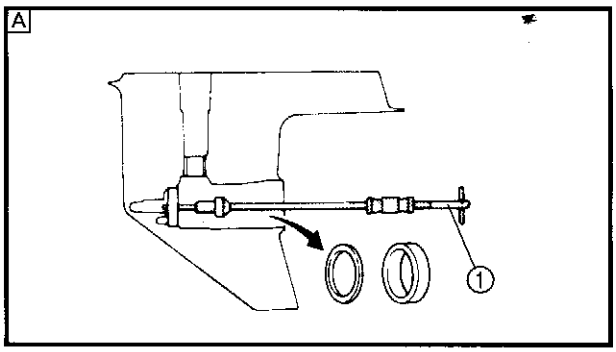
*: As required



DISASSEMBLING THE LOWER CASE ASSEMBLY

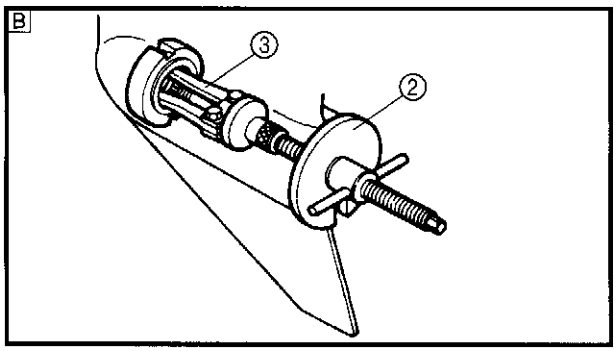
1. Remove:
   • Needle bearing outer race

Bearing/oil seal attachment .... ①
YB-06194 / 90890-06636
Driver rod ..... ②
YB-06071 / 90890-06605

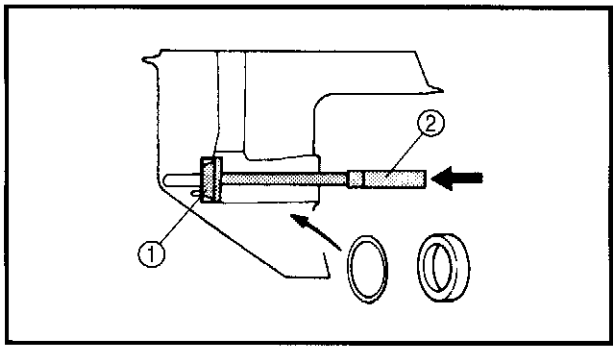


2. Remove:
   • Tapered roller bearing outer race
   • Forward gear shim(s)

Slide hammer..... ①
YB-06096
Bearing puller..... ②
90890-06523
Large universal claws..... ③
90890-06532



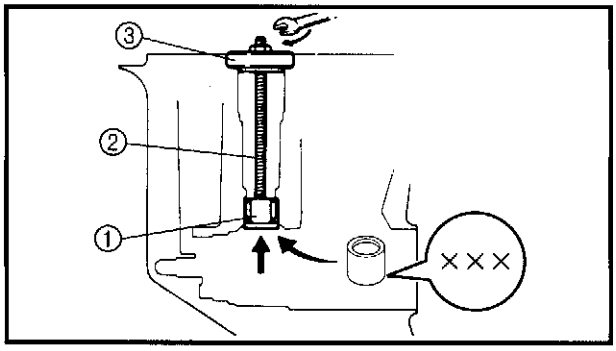
A For USA and Canada
B For worldwide



ASSEMBLING THE LOWER CASE ASSEMBLY

1. Install:
   • Forward gear shim(s)
   • Tapered roller bearing outer race

Bearing/oil seal attachment .... ①
YB-06258 / 90890-06619
Driver rod ..... ②
YB-06071 / 90890-06605

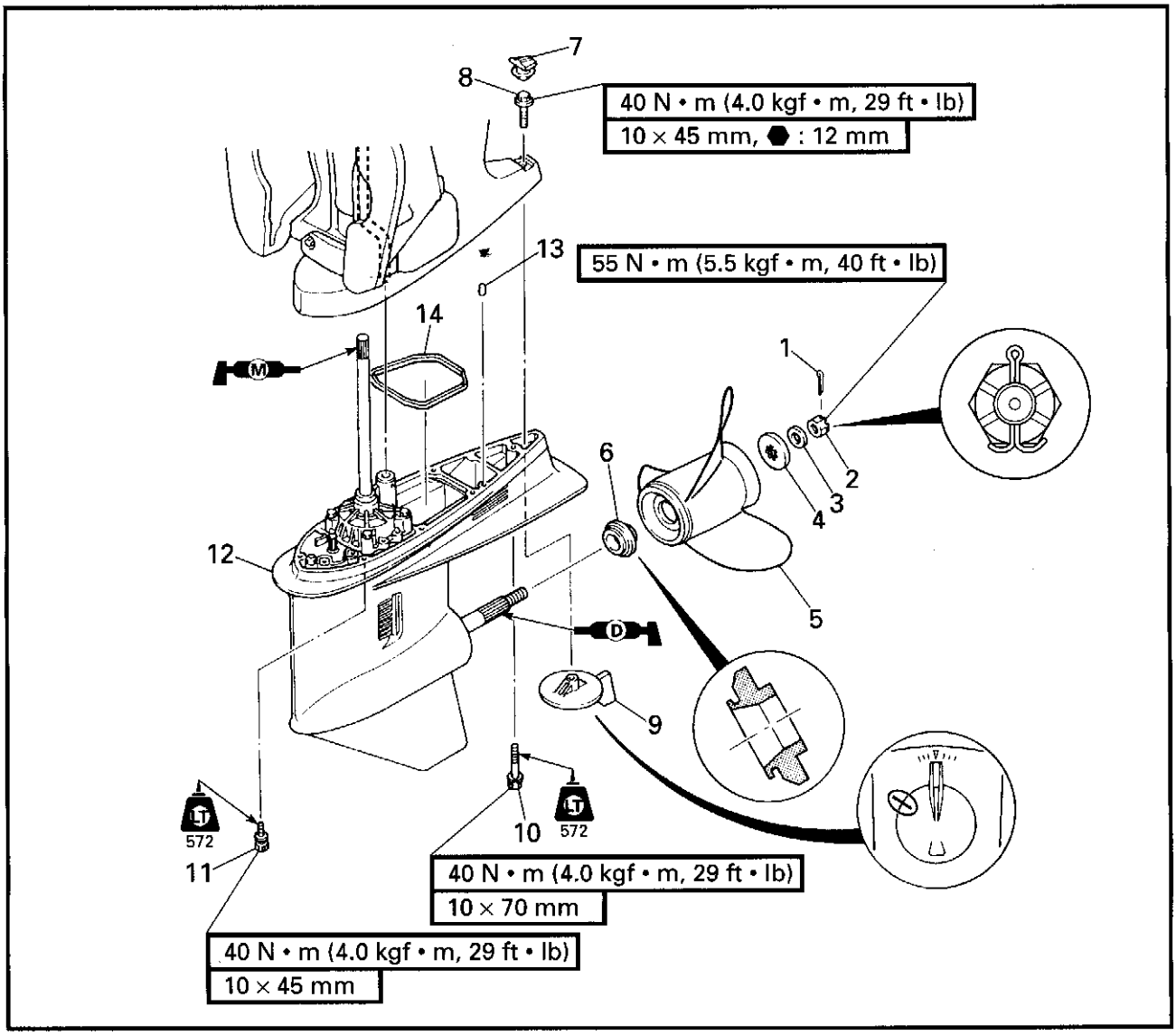


2. Install:
   • Needle bearing outer race

Bearing/oil seal attachment .... ①
YB-06246 / 90890-06655
Bearing puller..... ②
YB-06029 / 90890-06523
Needle bearing installation plate ..... ③
YB-06430

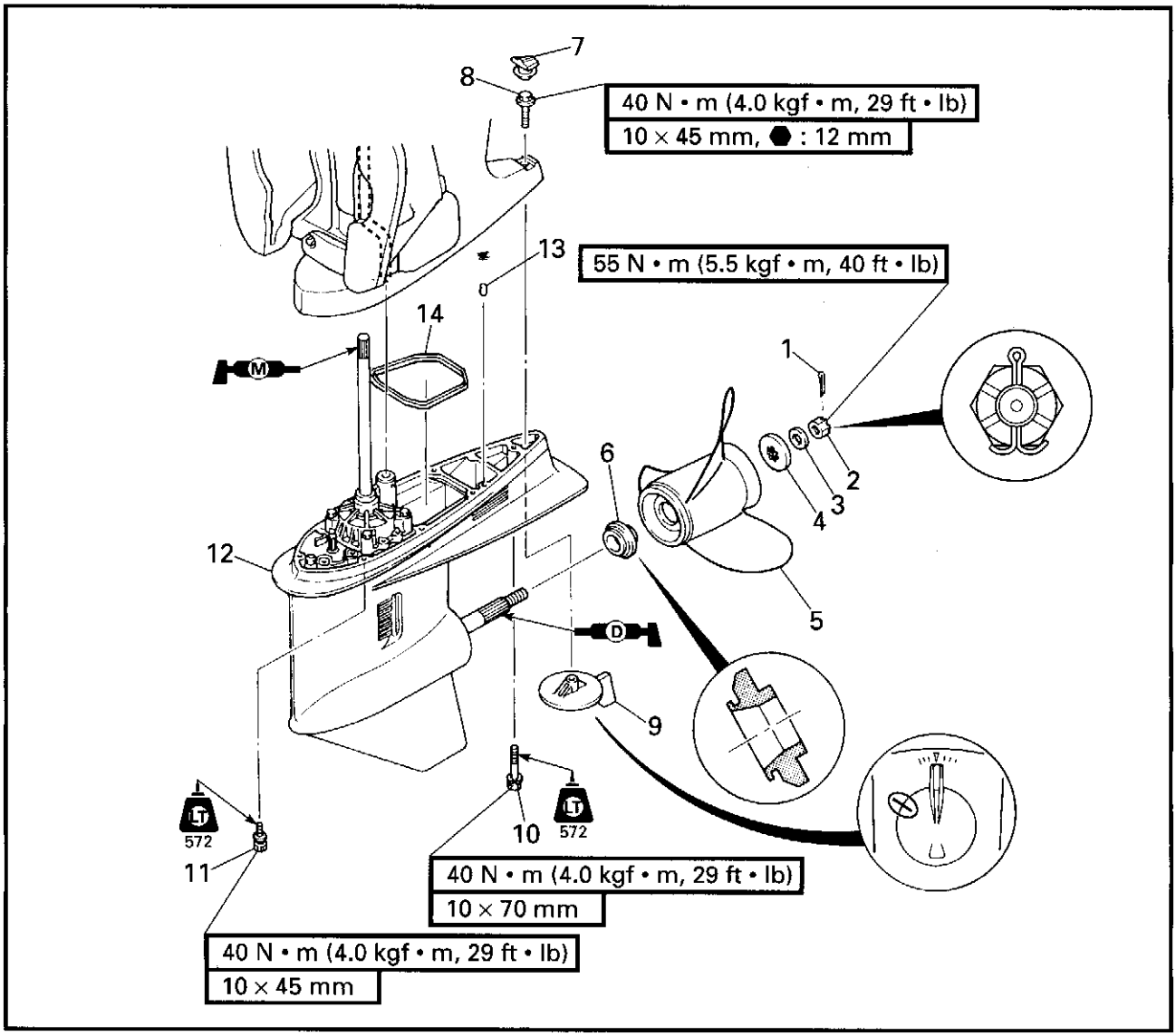
LOWER UNIT (COUNTER ROTATION MODELS)

REMOVING/INSTALLING THE LOWER UNIT



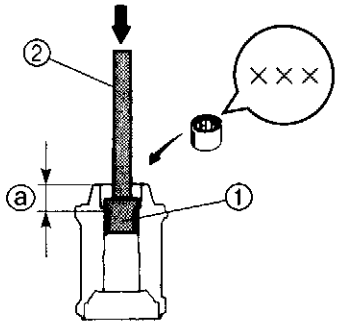
Order	Job/Part	Q'ty	Remarks
1	Cotter pin	1	
2	Propeller nut	1	
3	Washer	1	
4	Washer	1	
5	Propeller	1	
6	Spacer	1	
7	Cap	1	

Continued on next page.

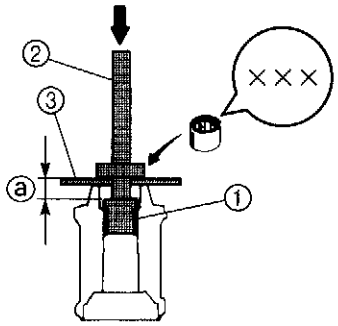


Order	Job/Part	Q'ty	Remarks
8	Bolt	1	
9	Trim tab	1	
10	Bolt	1	
11	Bolt	6	
12	Lower unit	1	
13	Dowel pin	2	
14	Exhaust seal	1	
			For installation, reverse the removal procedure.

A



B



PROPELLER SHAFT HOUSING ASSEMBLY (COUNTER ROTATION MODELS)

ASSEMBLING THE PROPELLER SHAFT HOUSING

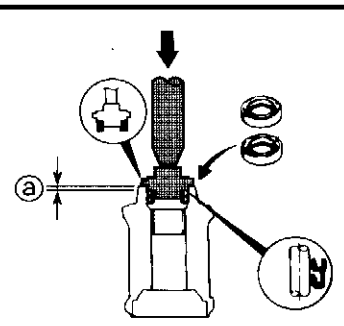
1. Install:
   - Needle bearing

Needle bearing installation position ⓐ
24.75 - 25.25 mm
(0.974 - 0.994 in)

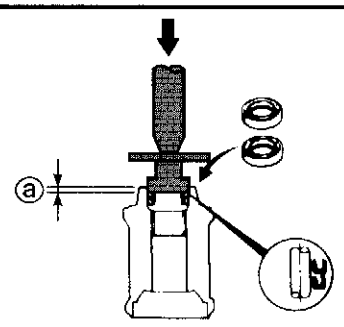
Bearing/oil seal attachment .... ①
YB-06196 / 90890-06610
Driver rod ..... ②
YB-06071 / 90890-06604
Bearing/oil seal depth plate .... ③
90890-06603

A For USA and Canada
B For worldwide

A



B



2. Install:
   - Oil seals

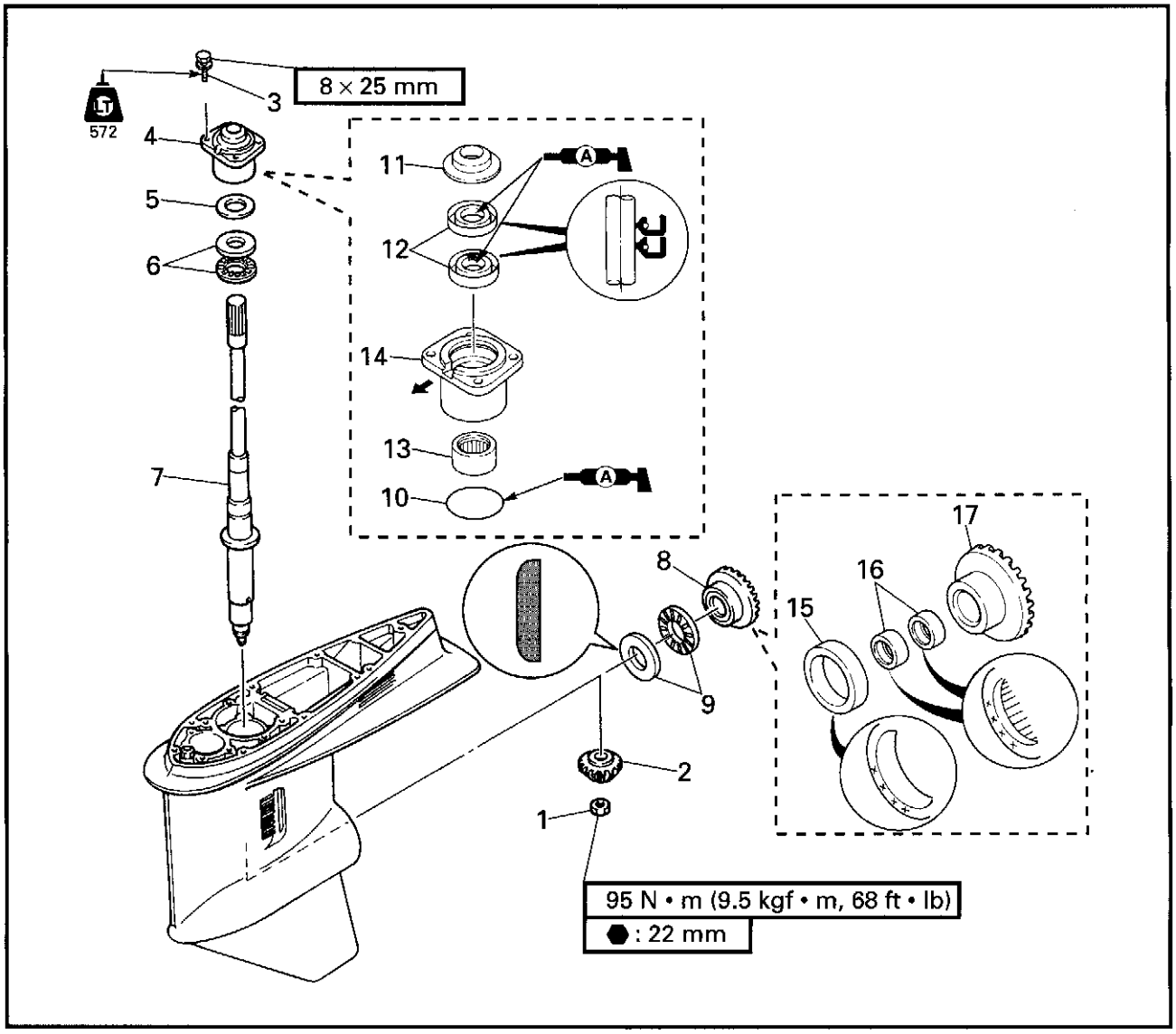
Oil seal installation position ⓐ
4.75 - 5.25 mm (0.187 - 0.207 in)

Bearing/oil seal attachment
YB-06195 / 90890-06640

A For USA and Canada
B For worldwide

DRIVE SHAFT (COUNTER ROTATION MODELS)

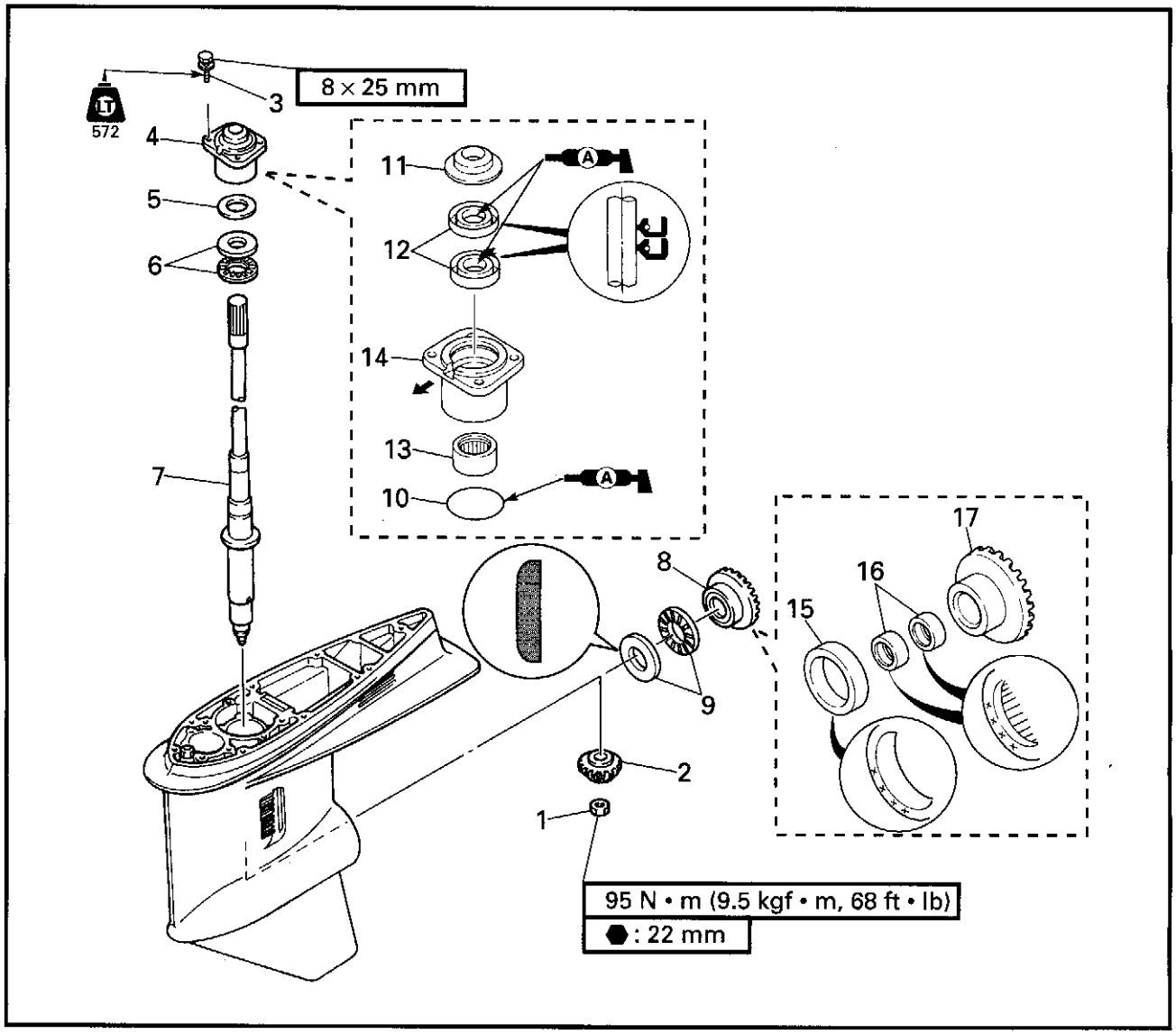
REMOVING/INSTALLING THE DRIVE SHAFT



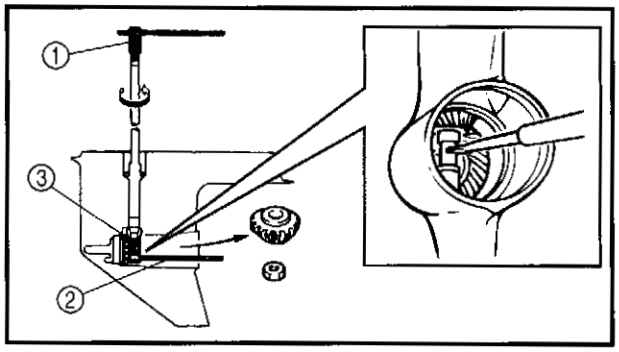
Order	Job/Part	Q'ty	Remarks
	Propeller shaft housing assembly		
1	Pinion nut	1	
2	Pinion	1	
3	Bolt	4	
4	Drive shaft housing assembly	1	
5	Pinion shim	*	
6	Thrust bearing	1	
7	Drive shaft	1	
8	Reverse gear assembly	1	

Continued on next page.

*: As required



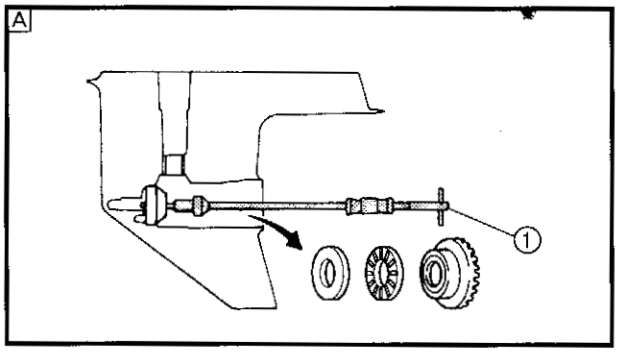
Order	Job/Part	Q'ty	Remarks
9	Thrust bearing	1	
10	O-ring	1	
11	Oil seal cover	1	
12	Oil seal	2	
13	Needle bearing	1	
14	Drive shaft housing	1	
15	Roller bearing inner race	1	
16	Needle bearing	2	Not reusable
17	Reverse gear	1	
			For installation, reverse the removal procedure.



REMOVING THE PINION

Remove:
- Pinion nut
- Pinion

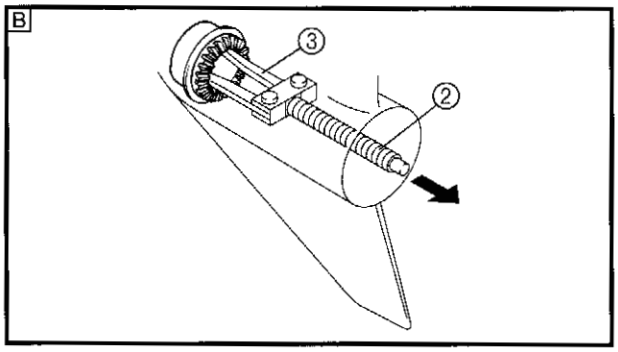
Drive shaft holder ..... ① **YB-06201 / 90890-06520**	
Pinion nut holder ..... ② **90890-06505**	
Pinion nut holder attachment . ③ **90890-06507**	



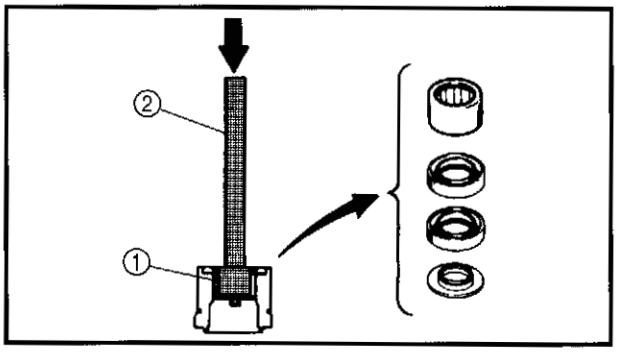
REMOVING THE REVERSE GEAR

Remove:
- Reverse gear assembly
- Thrust bearing

Slide hammer ..... ① **YB-06096**	
Bearing puller ..... ② **90890-06535**	
Small universal claws ..... ③ **90890-06536**	



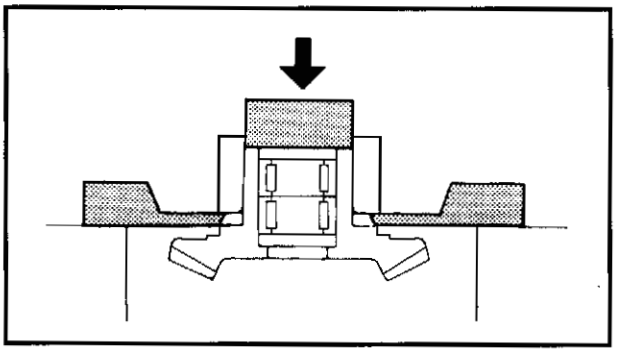
A For USA and Canada
B For worldwide



DISASSEMBLING THE DRIVE SHAFT HOUSING ASSEMBLY

Remove:
- Oil seals
- Needle bearing

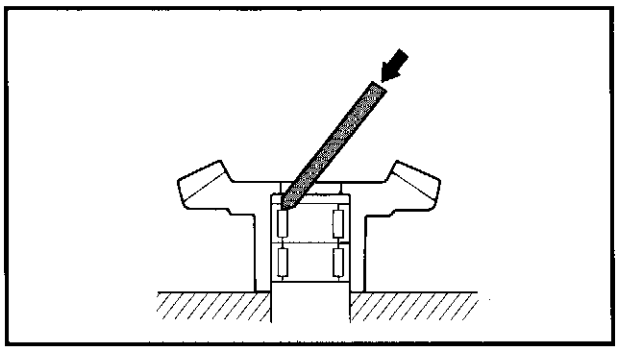
Bearing/oil seal attachment .... ① **YB-06196 / 90890-06610**	
Driver rod ..... ② **YB-06071 / 90890-06652**	



DISASSEMBLING THE REVERSE GEAR ASSEMBLY

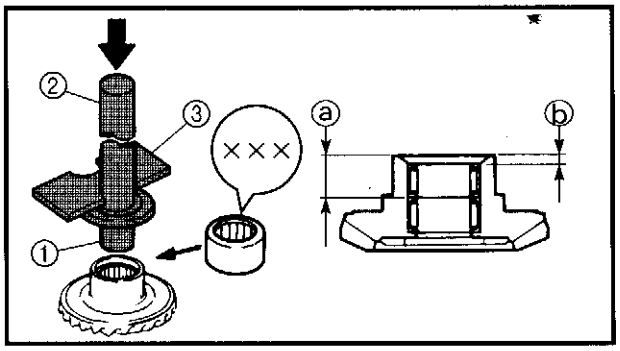
1. Remove:
   - Roller bearing inner race

Bearing separator **YB-06219 / 90890-06534**	



2. Remove:
   • Needle bearings

NOTE:
Do not reuse the bearing, always replace it with a new one.

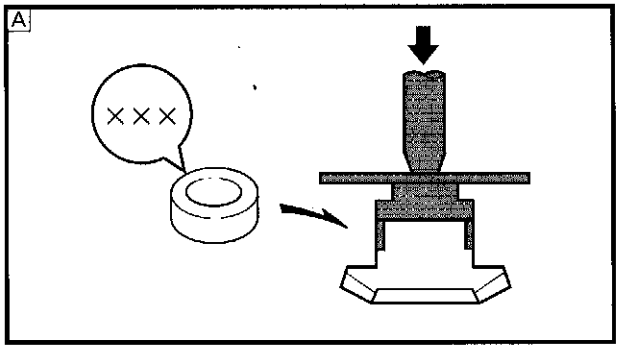


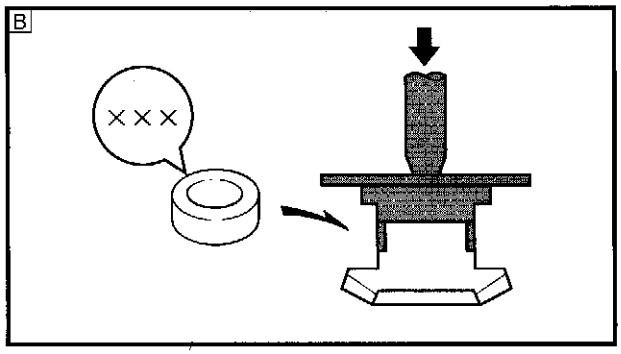
ASSEMBLING THE REVERSE GEAR ASSEMBLY

1. Install:
   • Needle bearings

Needle bearing installation position ⓐ
21.0 - 21.4 mm (0.827 - 0.843 in)
Needle bearing installation position ⓑ
4.5 - 4.9 mm (0.177 - 0.193 in)

Bearing/oil seal attachment .... ①
YB-06261 / 90890-06612
Driver rod ..... ②
YB-06071 / 90890-06604
Bearing/oil seal depth plate .... ③
90890-06603

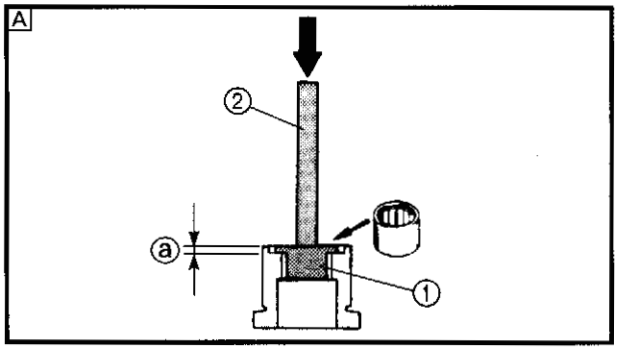


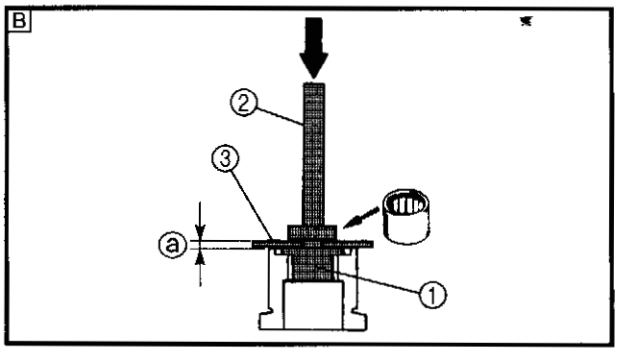


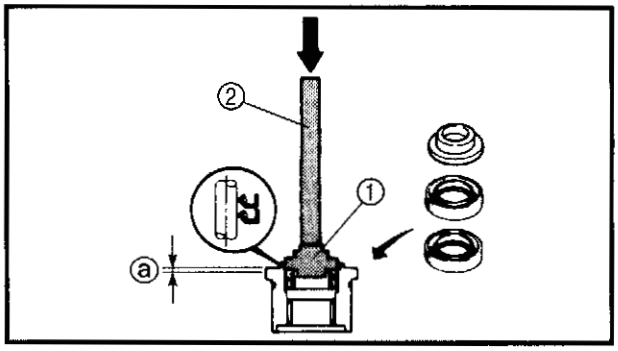
2. Install:
   • Roller bearing inner race

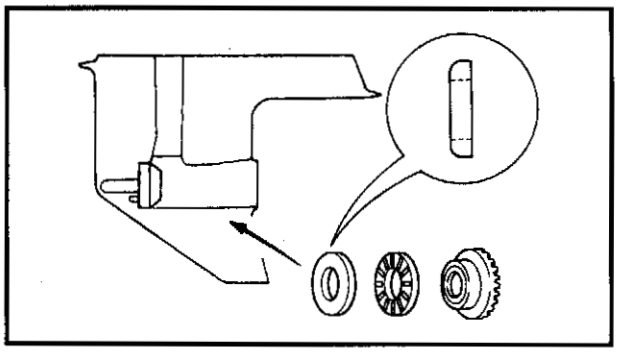
Bearing/oil seal attachment
YB-06434 / 90890-06660

A For USA and Canada
B For worldwide









ASSEMBLING THE DRIVE SHAFT HOUSING ASSEMBLY

1. Install:
   - Needle bearing

Position ⓐ
5.75 - 6.25 mm (0.226 - 0.246 in)

Bearing/oil seal attachment .... ①
YB-06196 / 90890-06610
Driver rod ..... ②
YB-06071 / 90890-06604
Bearing/oil seal depth plate .... ③
90890-06603

A For USA and Canada
B For worldwide

2. Install:
   - Oil seals

Oil seal installation position ⓐ
0.25 - 0.75 mm (0.010 - 0.030 in)

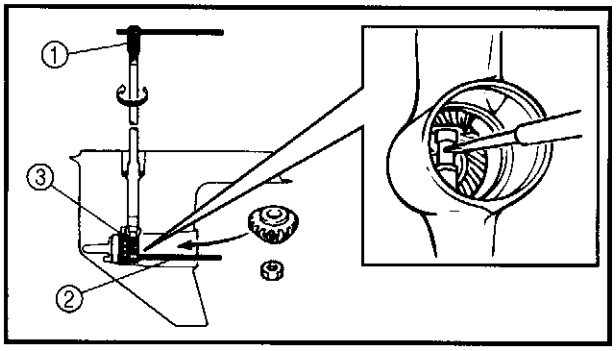
Bearing/oil seal attachment .... ①
YB-06195 / 90890-06633
Driver rod ..... ②
YB-06071 / 90890-06606

INSTALLING THE REVERSE GEAR

Install:
- Thrust bearing
- Reverse gear assembly

NOTE:

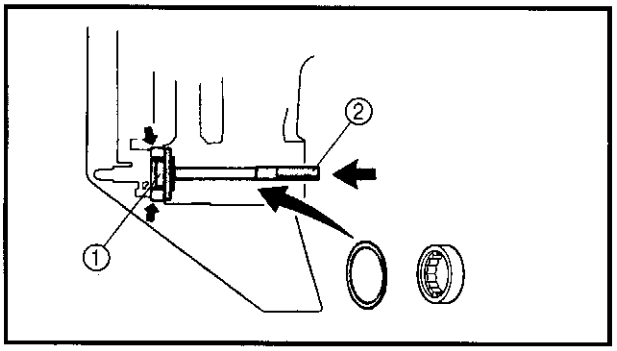
Install the thrust bearing onto the reverse gear assembly and position the thrust bearing so its rounded side faces away from the reverse gear.

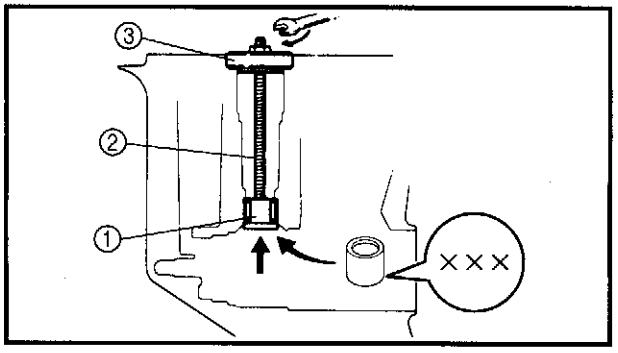


INSTALLING THE PINION

Install:
- Pinion
- Pinion nut

	Drive shaft holder ..... ① **YB-06201 / 90890-06520** **Pinion nut holder ..... ②** **90890-06505** **Pinion nut holder attachment . ③** **90890-06507**
	Pinion nut **95 N • m (9.5 kgf • m, 68 ft • lb)**





LOWER CASE ASSEMBLY (COUNTER ROTATION MODELS)

ASSEMBLING THE LOWER CASE ASSEMBLY

1. Install:
   - Reverse gear shim(s)
   - Roller bearing

	Bearing/oil seal attachment .... ① **YB-06336 / 90890-06629** **Driver rod ..... ②** **YB-06071 / 90890-06605**

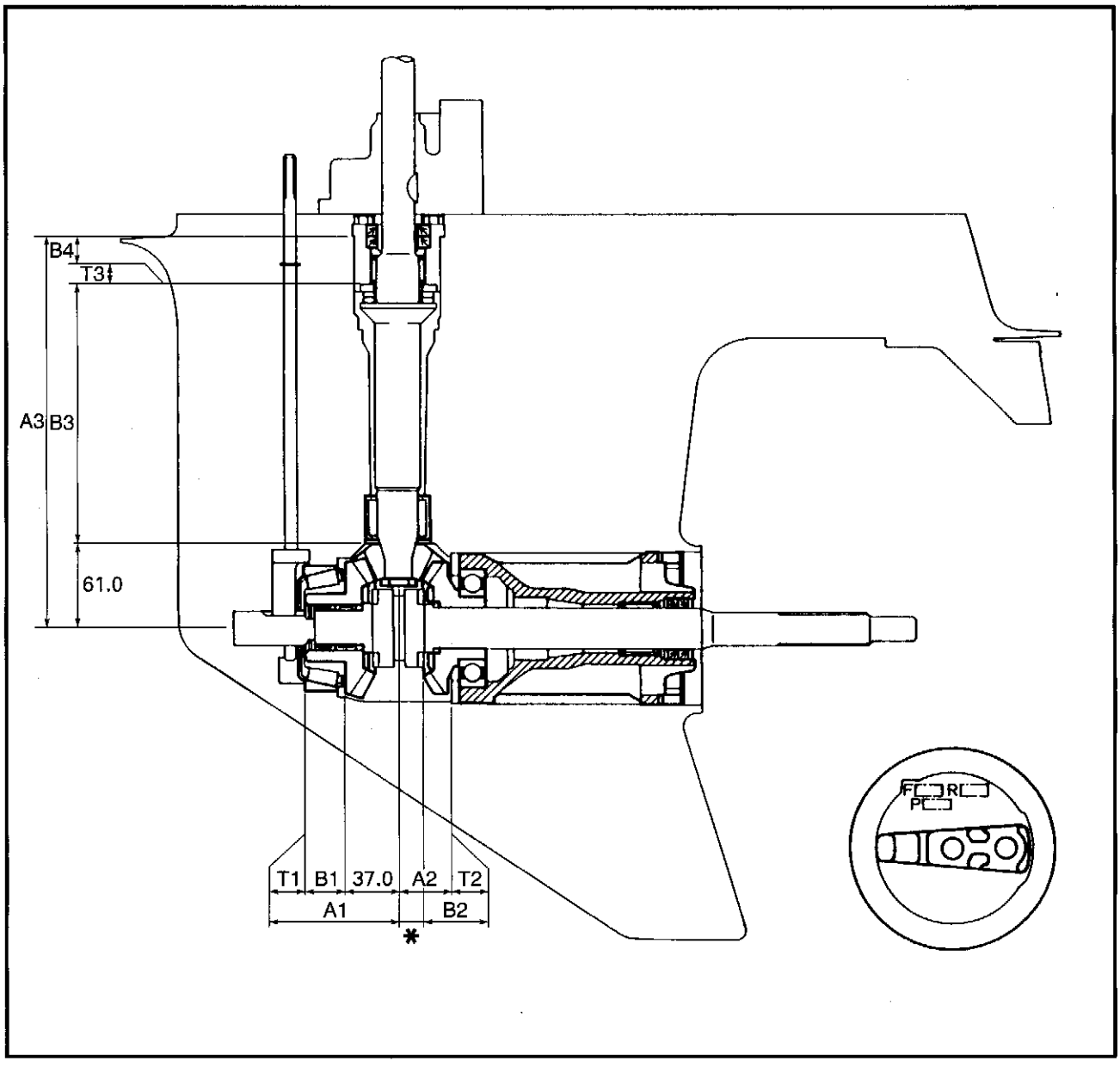
2. Install:
   - Needle bearing outer race

	Bearing/oil seal attachment .... ① **YB-06246 / 90890-06655** **Bearing puller..... ②** **YB-06029 / 90890-06523** **Needle bearing installation plate ..... ③** **YB-06430**

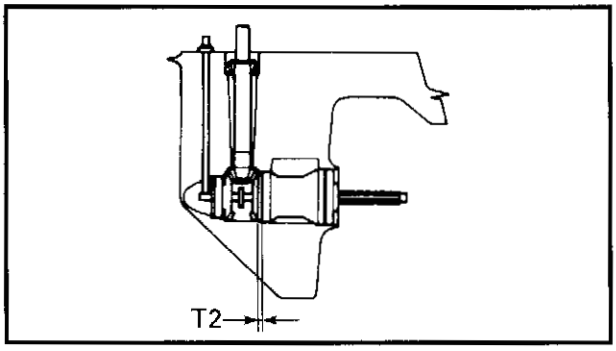
SHIMMING (REGULAR ROTATION MODELS) (FOR USA AND CANADA)

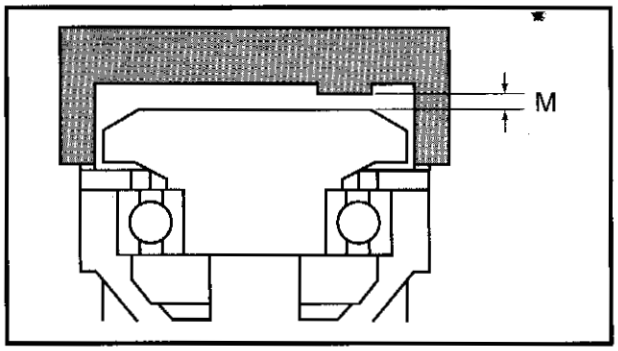
NOTE:
- There is no need to select shims when reassembling with the original case and inner parts.
- Shim calculations are required when reassembling with the original inner parts and a new case (the difference between the original inner parts and the new case).
- Measurements and adjustments are required when replacing the inner part(s).

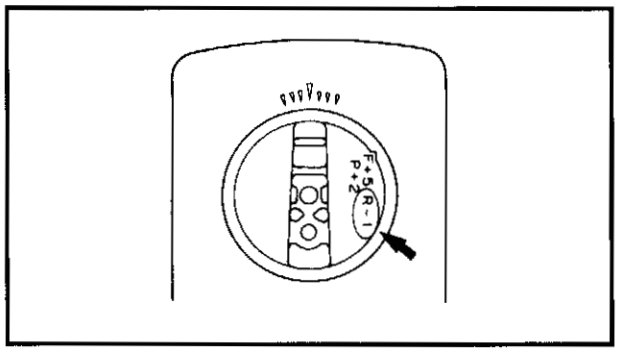
*: 17.2 (except for Z150Q/VZ150)
16.3 (for Z150Q/VZ150)



SHIMMING (REGULAR ROTATION MODELS) (FOR USA AND CANADA)







SELECTING THE REVERSE GEAR SHIMS

NOTE:

Find the shim thickness (T2) by selecting shims until the specified value (M0) is obtained with the special tool.

1. Measure:
   • Specified measurement (M)
   Out of specified value (M0) → Adjust.

Specified value (M0) =
Except for Z150Q/VZ150
1.80 – R/100 mm
For Z150Q/VZ150
0.90 – R/100 mm

Measuring steps
(1) Calculate the specified value (M0).

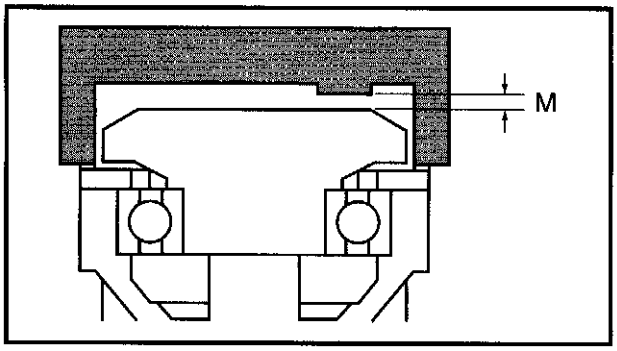
NOTE:

"R" is the deviation of the lower case dimension from standard. It is stamped on the trim tab mounting surface of the lower case in 0.01-mm units. If the "R" mark is missing or unreadable, assume an "R" value of "0", and check the backlash when the unit is assembled.

Example (except for Z150Q/VZ150):
If "R" is "+5", then
M0 = 1.80 – (+5)/100 mm
= 1.80 – 0.05 mm
= 1.75 mm
If "R" is "–3", then
M0 = 1.80 – (–3)/100 mm
= 1.80 + 0.03 mm
= 1.83 mm

Example (for Z150Q/VZ150):
If "R" is "+5", then
M0 = 0.90 – (+5)/100 mm
= 0.90 – 0.05 mm
= 0.85 mm
If "R" is "–3", then
M0 = 0.90 – (–3)/100 mm
= 0.90 + 0.03 mm
= 0.93 mm

SHIMMING (REGULAR ROTATION MODELS) (FOR USA AND CANADA)



(2) Install the shimming gauge, bearing, thrust washer, reverse gear, and shim(s).

	Shimming gauge **YB-34468-1A**

NOTE:

- If the original shim(s) is unavailable, start with a 0.50-mm shim.
- Turn the reverse gear assembly a few times until the gear and bearing are horizontal.

(3) Measure the specified measurement (M).

2. Adjust:
   - Shim thickness (T2)

   Remove or add shim(s).

	Available shim thickness **0.10, 0.12, 0.15, 0.18, 0.30, 0.40 and 0.50 mm**

NOTE:

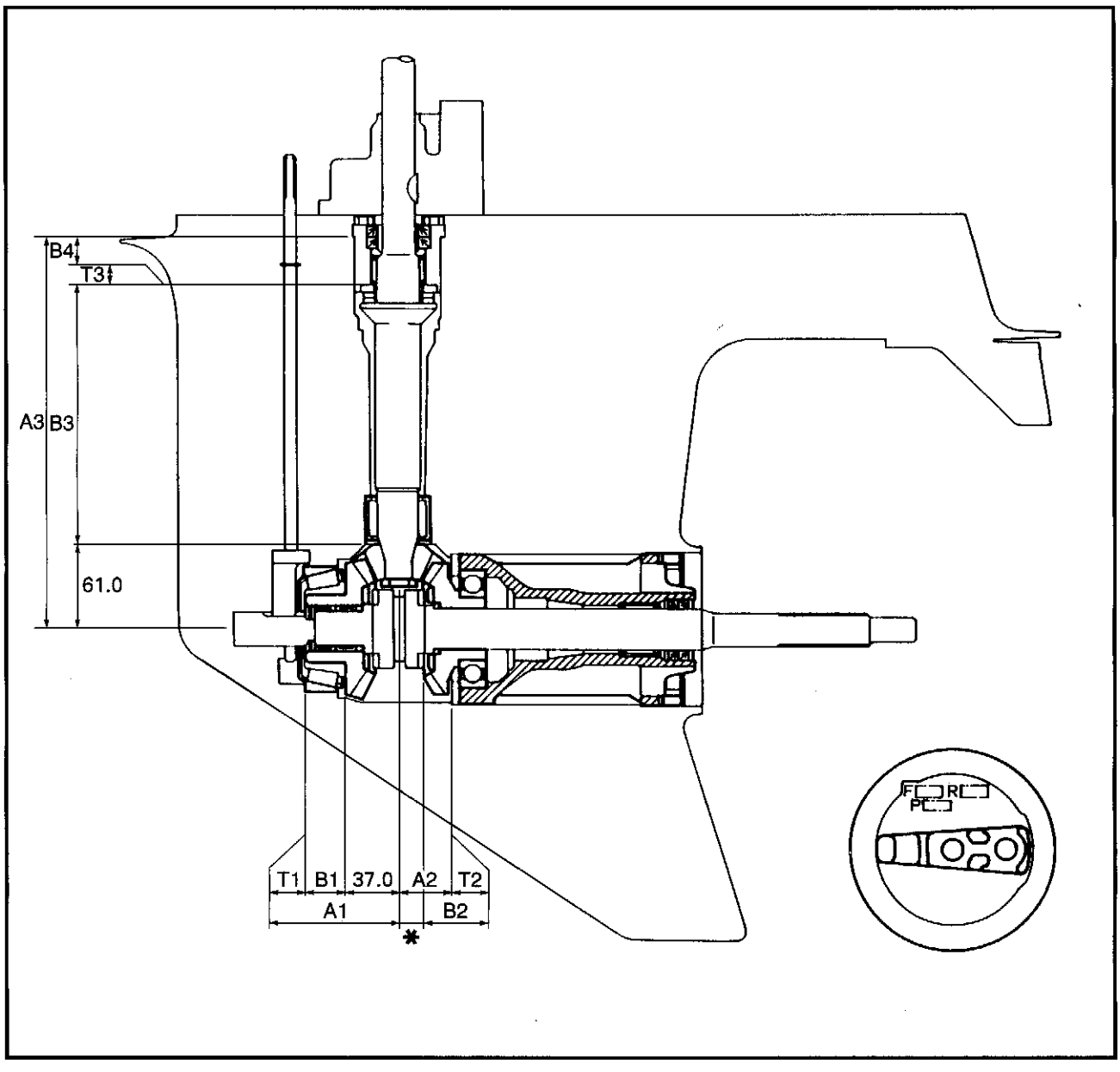
(M0) – (M) should be as close to "0" as possible.

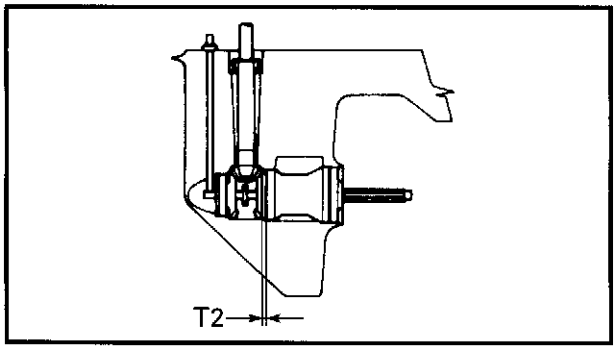
SHIMMING (REGULAR ROTATION MODELS) (FOR WORLDWIDE)

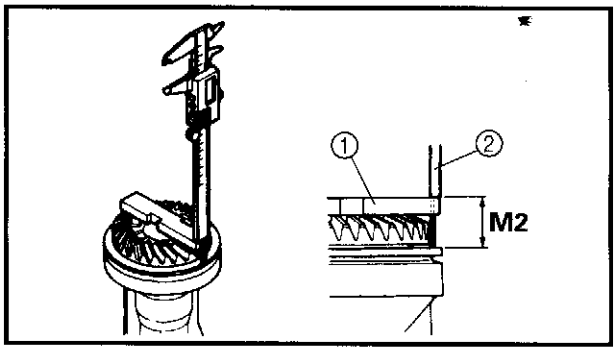
NOTE:

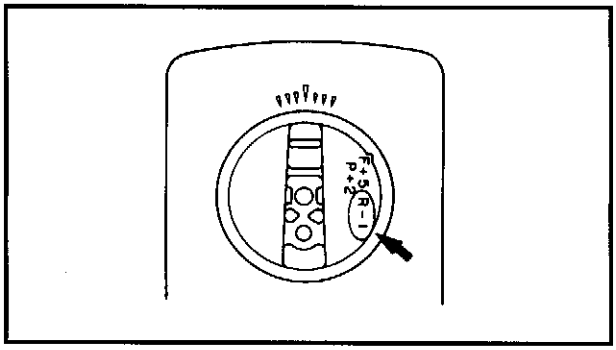
- There is no need to select shims when reassembling with the original case and inner parts.
- Shim calculations are required when reassembling with the original inner parts and a new case (the difference between the original inner parts and the new case).
- Measurements and adjustments are required when replacing the inner part(s).

*: 17.2 (except for Z150Q/VZ150)
16.3 (for Z150Q/VZ150)









SELECTING THE REVERSE GEAR SHIMS

NOTE:

Select the shim thickness (T2) by using the specified measurement(s) and the calculation formula.

Select:
- Shim thickness (T2)

Selecting steps

(1) Measure (M2).

Shimming plate ..... ①
90890-06701
Digital caliper ..... ②
90890-06704

NOTE:

- Measure the height of the gear as shown.
- Perform the same measurement at three points on the gear.
- Find the average of the measurements (M2).

(2) Calculate the reverse gear shim thickness (T2).

Reverse gear shim thickness
Except for Z150Q/VZ150
(T2) = M2 – 29.0 – R/100
For Z150Q/VZ150
(T2) = M2 – 29.9 – R/100

NOTE:

"R" is the deviation of the lower case dimension from standard. It is stamped on the trim tab mounting surface of the lower case in 0.01-mm units. If the "R" mark is missing or unreadable, assume a "R" value of "0", and check the backlash when the unit is assembled.

Example (except for Z150Q/VZ150):
If M2 is "30.50", R is "+2", then
T2 = 30.50 – 29.0 – (+2)/100 mm
= 30.50 – 29.0 – 0.02 mm
= 1.48 mm

Example (for Z150Q/VZ150):
If M2 is "30.50", R is "+2", then
T2 = 30.50 – 29.9 – (+2)/100 mm
= 30.50 – 29.9 – 0.02 mm
= 0.58 mm

(3) Select the reverse gear shim(s) (T2).

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

Available shim thickness
0.10, 0.12, 0.15, 0.18, 0.30, 0.40 and 0.50 mm

BACKLASH (REGULAR ROTATION MODELS)

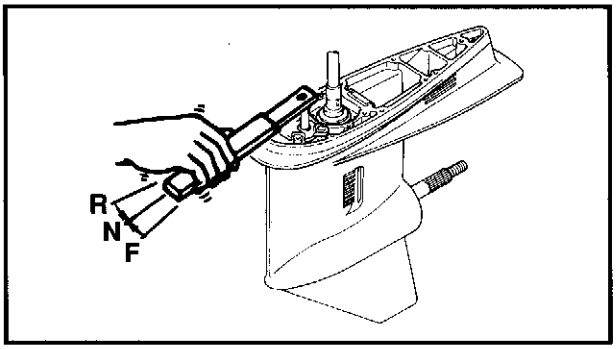
NOTE:

- Do not install the water pump components when measuring the backlash.
- Measure both the forward and reverse gear backlashes.
- If both the forward and reverse gear backlashes are larger than specification, the pinion may be too high.
- If both the forward and reverse gear backlashes are smaller than specification, the pinion may be too low.

MEASURING THE FORWARD GEAR BACKLASH

1. Measure:
   - Forward gear backlash
     Out of specification → Adjust.

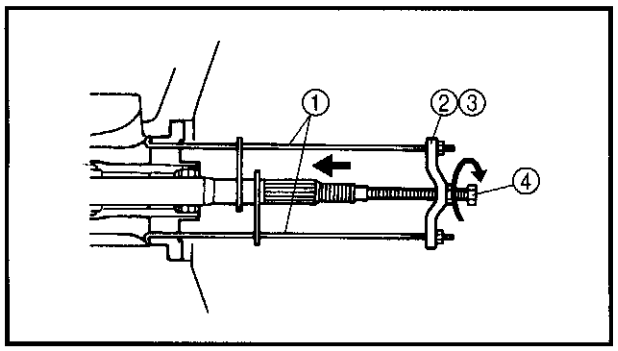
Forward gear backlash
Except for Z150Q/VZ150
0.25 - 0.46 mm
(0.010 - 0.018 in)
For Z150Q/VZ150
0.72 - 1.01 mm
(0.028 - 0.040 in)



Measuring steps

(1) Set the shift rod into the neutral position.

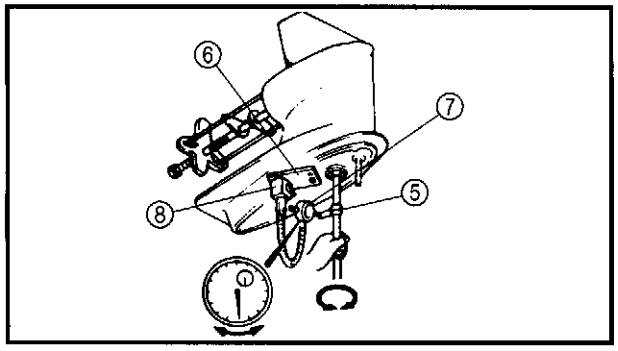
Shift rod wrench
YB-06052 / 90890-06052



(2) Install the propeller shaft housing puller so it pushes against the propeller shaft.

Propeller shaft housing puller. ①
YB-06207 / 90890-06502
Universal puller ..... ②
YB-06117
Guide plate ..... ③
90890-06501
Center bolt ..... ④
90890-06504

Center bolt
10 N • m (1.0 kgf • m, 7.2 ft • lb)



(3) Install the backlash indicator onto the drive shaft (on the 22.4 mm (0.88 in) diameter portion of the drive shaft).

Backlash indicator ..... ⑤
YB-06265 / 90890-06706

(4) Install the dial gauge onto the lower unit and have the dial gauge plunger contact the mark on the backlash indicator.

Magnetic-base plate ..... ⑥
YB-07003 / 90890-07003
Dial gauge set ..... ⑦
YU-03097 / 90890-01252
Magnetic base ..... ⑧
YU-34481 / 90890-06705

(5) Set the lower unit upside down.
(6) Slowly turn the drive shaft clockwise and counterclockwise. When the drive shaft stops in each direction, measure the backlash.

2. Adjust:
   • Forward gear shim
   Remove or add shim(s).

Forward gear backlash (except for Z150Q/ VZ150)	Shim thickness
Less than 0.25 mm (0.010 in)	To be decreased by (0.36 – M) × 0.72
More than 0.46 mm (0.018 in)	To be increased by (M – 0.36) × 0.72

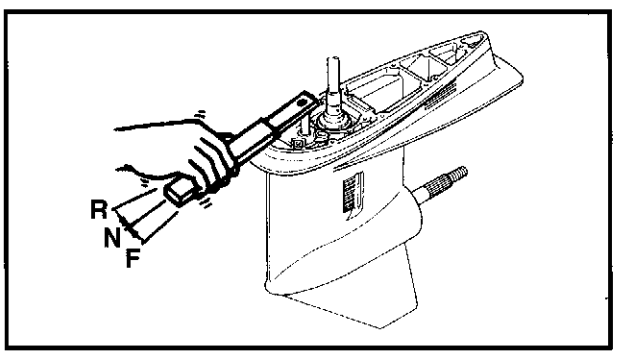
Forward gear backlash (for Z150Q/ VZ150)	Shim thickness
Less than 0.72 mm (0.028 in)	To be decreased by (0.87 – M) × 0.67
More than 1.01 mm (0.040 in)	To be increased by (M – 0.87) × 0.67

M: Measurement

MEASURING THE REVERSE GEAR BACKLASH

1. Measure:
   • Reverse gear backlash
   Out of specification → Adjust.

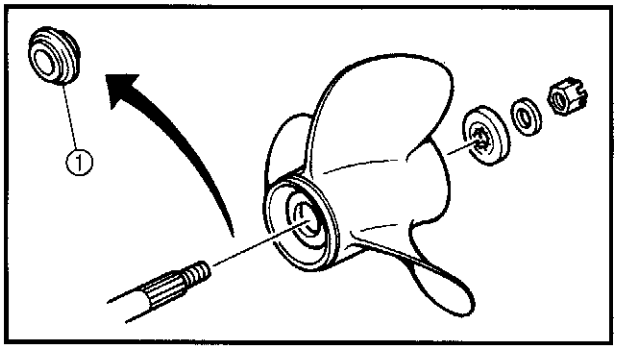
Reverse gear backlash
Except for Z150Q/VZ150
0.74 - 1.29 mm
(0.029 - 0.051 in)
For Z150Q/VZ150
0.79 - 1.39 mm
(0.031 - 0.055 in)



Measuring steps

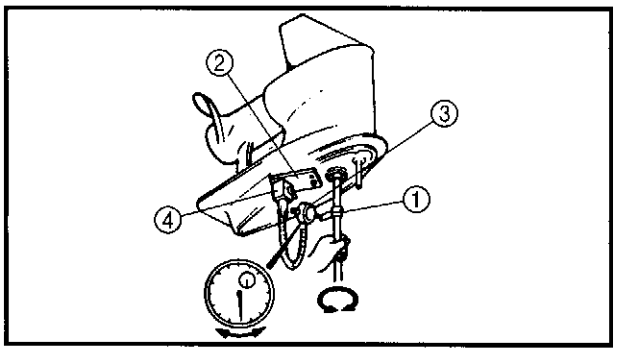
(1) Set the shift rod into the neutral position.

Shift rod wrench
YB-06052 / 90890-06052



(2) Load the reverse gear by installing the propeller without the spacer ① and then tighten the propeller nut.

	Propeller nut **10 N • m (1.0 kgf • m, 7.2 ft • lb)**



(3) Install the backlash indicator onto the drive shaft (on the 22.4 mm (0.88 in) diameter portion of the drive shaft).

	Backlash indicator ..... ① **YB-06265 / 90890-06706**

(4) Install the dial gauge onto the lower unit and have the dial gauge plunger contact the mark on the backlash indicator.

	Magnetic-base plate ..... ② **YB-07003 / 90890-07003** **Dial gauge set** ..... ③ **YU-03097 / 90890-01252** **Magnetic base** ..... ④ **YU-34481 / 90890-06705**

(5) Set the lower unit upside down.
(6) Slowly turn the drive shaft clockwise and counterclockwise. When the drive shaft stops in each direction, measure the backlash.

2. Adjust:
   • Reverse gear shim
   Remove or add shim(s).

Reverse gear backlash (except for Z150Q/ VZ150)	Shim thickness
Less than 0.74 mm (0.029 in)	To be increased by (1.02 – M) × 0.72
More than 1.29 mm (0.051 in)	To be decreased by (M – 1.02) × 0.72

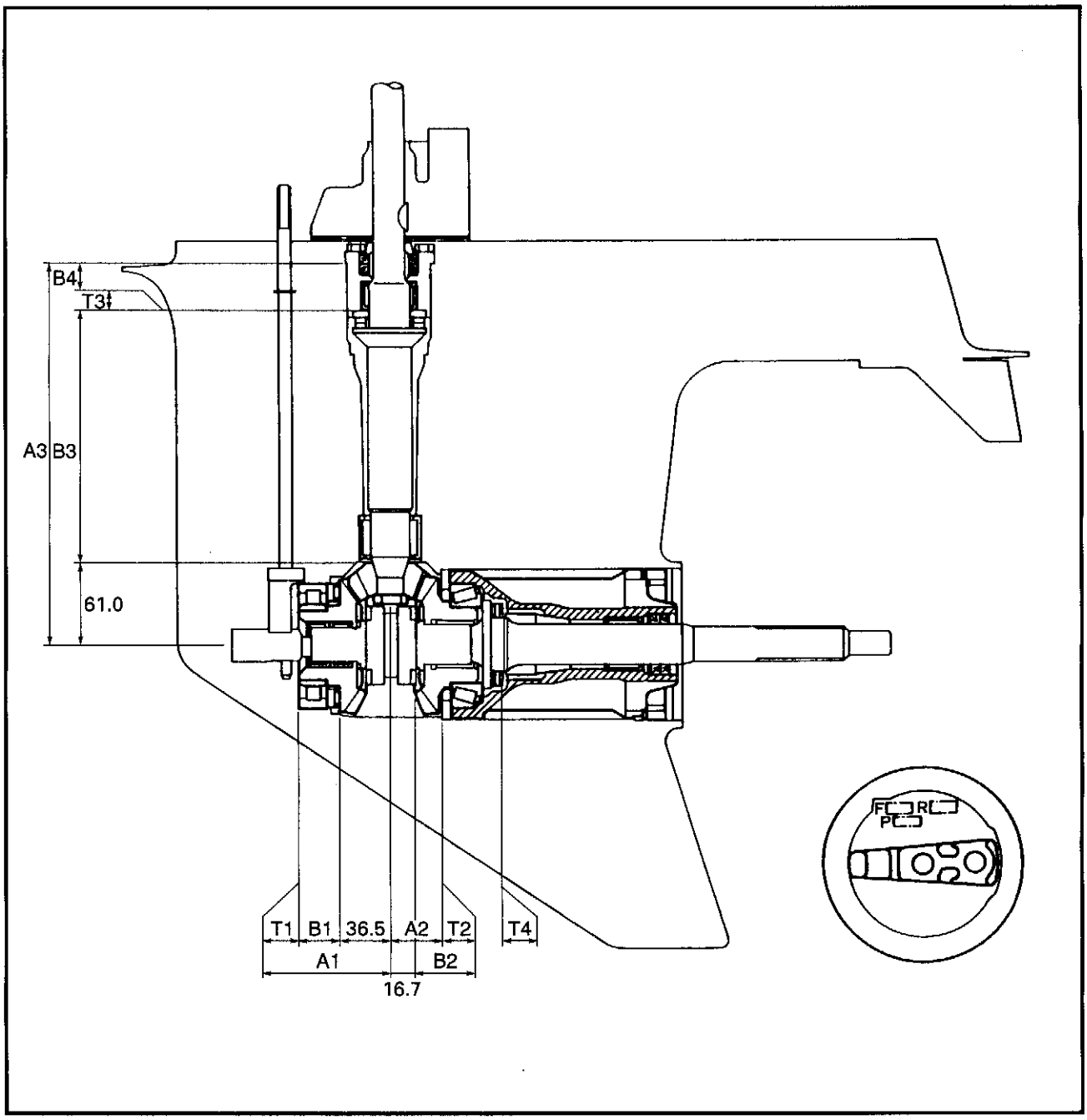
Reverse gear backlash (for Z150Q/ VZ150)	Shim thickness
Less than 0.79 mm (0.031 in)	To be increased by (1.09 – M) × 0.67
More than 1.39 mm (0.055 in)	To be decreased by (M – 1.09) × 0.67

M: Measurement

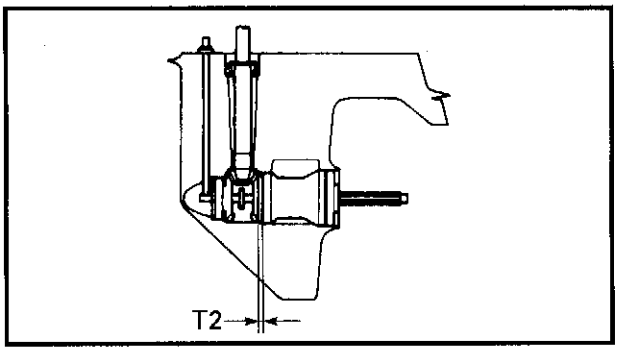
SHIMMING (COUNTER ROTATION MODELS) (FOR USA AND CANADA)

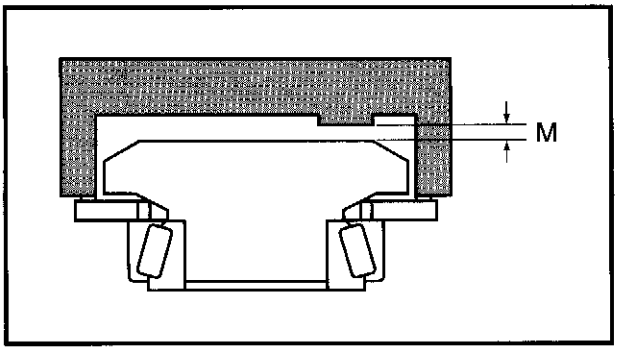
NOTE:

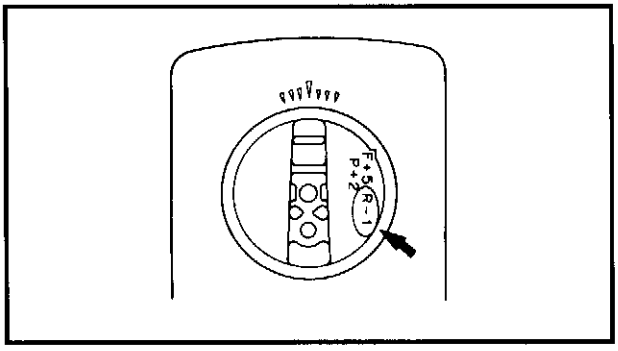
- There is no need to select shims when reassembling with the original case and inner parts.
- Shim calculations are required when reassembling with the original inner parts and a new case (the difference between the original inner parts and the new case).
- Measurements and adjustments are required when replacing the inner part(s).



SHIMMING (COUNTER ROTATION MODELS) (FOR USA AND CANADA)







SELECTING THE FORWARD GEAR SHIMS

NOTE:

Find the shim thickness (T2) by selecting shims until the specified value (M0) is obtained with the special tool.

1. Measure:
   • Specified measurement (M)
   Out of specified value (M0) → Adjust.

Specified value (M0) =
1.30 – R/100 mm

Measuring steps

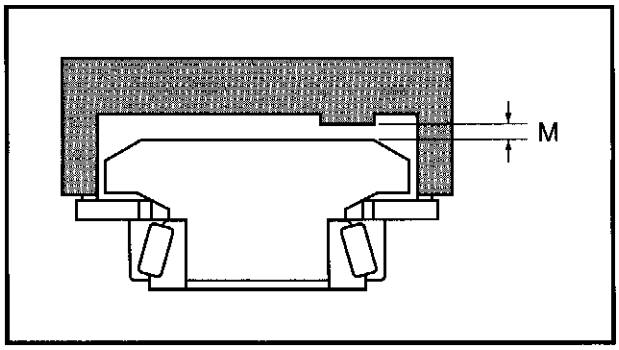
(1) Calculate the specified value (M0).

NOTE:

"R" is the deviation of the lower case dimension from standard. It is stamped on the trim tab mounting surface of the lower case in 0.01-mm units. If the "R" mark is missing or unreadable, assume an "R" value of "0", and check the backlash when the unit is assembled.

Example:
If "R" is "+5", then
M0 = 1.30 – (+5)/100 mm
= 1.30 – 0.05 mm
= 1.25 mm
If "R" is "–3", then
M0 = 1.30 – (–3)/100 mm
= 1.30 + 0.03 mm
= 1.33 mm

SHIMMING (COUNTER ROTATION MODELS) (FOR USA AND CANADA)



(2) Install the shimming gauge, bearing, thrust washer, forward gear, and shim(s).

	Shimming gauge **YB-34468-1A**

NOTE:

- If the original shim(s) is unavailable, start with a 0.50-mm shim.
- Turn the forward gear assembly a few times until the gear and bearing are horizontal.

(3) Measure the specified measurement (M).

2. Adjust:
   - Shim thickness (T2)

   Remove or add shim(s).

	Available shim thickness **0.10, 0.12, 0.15, 0.18, 0.30, 0.40 and 0.50 mm**

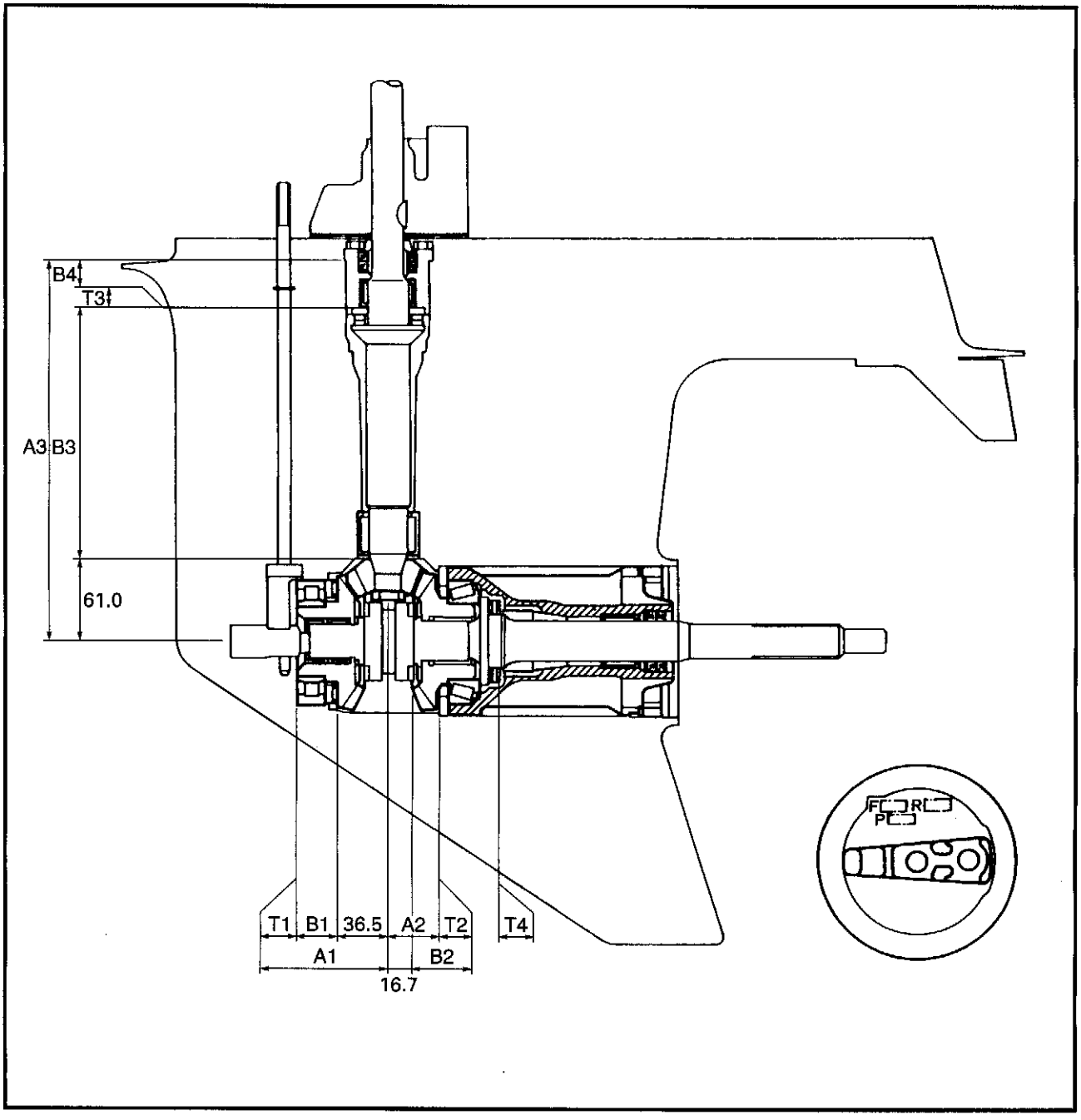
NOTE:

(M0) – (M) should be as close to "0" as possible.

SHIMMING (COUNTER ROTATION MODELS) (FOR WORLDWIDE)

NOTE:

- There is no need to select shims when reassembling with the original case and inner parts.
- Shim calculations are required when reassembling with the original inner parts and a new case (the difference between the original inner parts and the new case).
- Measurements and adjustments are required when replacing the inner part(s).



BACKLASH (COUNTER ROTATION MODELS)

NOTE:

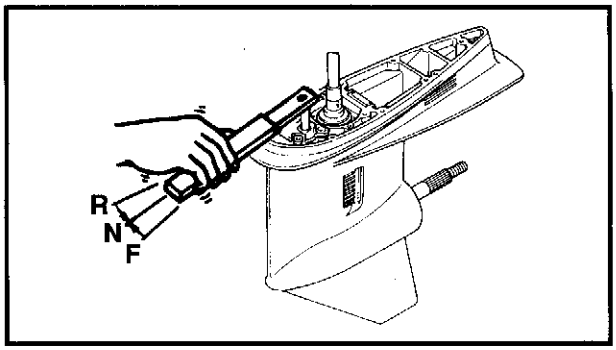
- Do not install the water pump components when measuring the backlash.
- Measure both the forward and reverse gear backlashes.
- If both the forward and reverse gear backlashes are larger than specification, the pinion may be too high.
- If both the forward and reverse gear backlashes are smaller than specification, the pinion may be too low.

MEASURING THE FORWARD GEAR BACKLASH

1. Measure:
   - Forward gear backlash

   Out of specification → Adjust.

	Forward gear backlash **0.21 - 0.43 mm (0.008 - 0.017 in)**

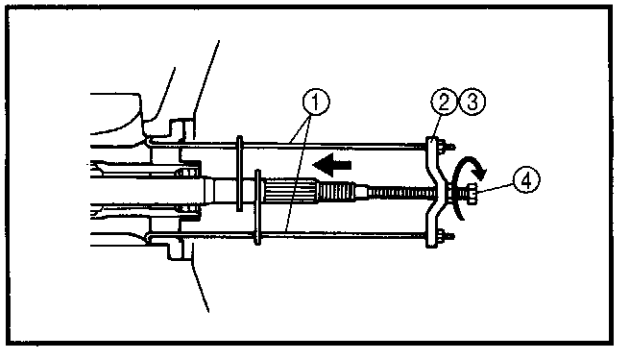


Measuring steps

(1) Set the shift rod into the neutral position.

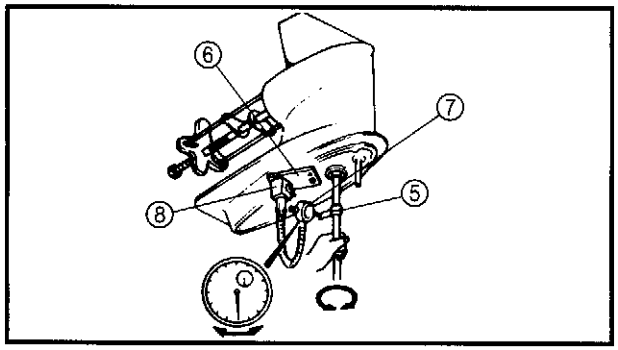
	Shift rod wrench **YB-06052 / 90890-06052**

(2) Install the propeller shaft housing puller so it pushes against the propeller shaft.



	Propeller shaft housing puller . ① **YB-06207 / 90890-06502** **Universal puller** ..... ② **YB-06117** **Guide plate** ..... ③ **90890-06501** **Center bolt** ..... ④ **90890-06504**
	Center bolt **10 N • m (1.0 kgf • m, 7.2 ft • lb)**

BACKLASH (COUNTER ROTATION MODELS)



(3) Install the backlash indicator onto the drive shaft (on the 22.4 mm (0.88 in) diameter portion of the drive shaft).

	Backlash indicator ..... ⑤ **YB-06265 / 90890-06706**

(4) Install the dial gauge onto the lower unit and have the dial gauge plunger contact the mark on the backlash indicator.

	Magnetic-base plate ..... ⑥ **YB-07003 / 90890-07003** **Dial gauge set** ..... ⑦ **YU-03097 / 90890-01252** **Magnetic base** ..... ⑧ **YU-34481 / 90890-06705**

(5) Set the lower unit upside down.
(6) Slowly turn the drive shaft clockwise and counterclockwise. When the drive shaft stops in each direction, measure the backlash.

2. Adjust:
   • Forward gear shim
   Remove or add shim(s).

Forward gear backlash	**Shim thickness**
Less than 0.21 mm (0.008 in)	**To be increased by (0.32 – M) × 0.72**
More than 0.43 mm (0.017 in)	**To be decreased by (M – 0.32) × 0.72**

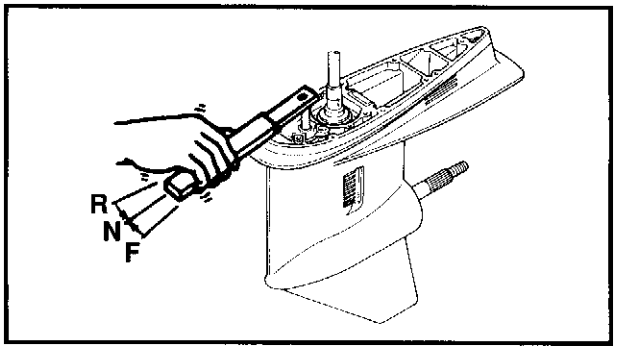
M: Measurement

MEASURING THE REVERSE GEAR BACKLASH

1. Measure:
   • Reverse gear backlash
   Out of specification → Adjust.

	Reverse gear backlash **0.97 - 1.29 mm (0.038 - 0.051 in)**

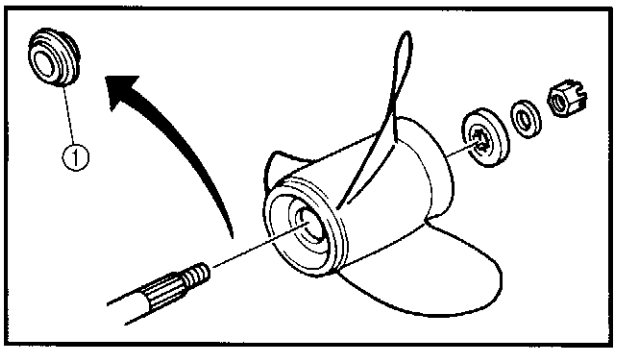
BACKLASH (COUNTER ROTATION MODELS)



Measuring steps

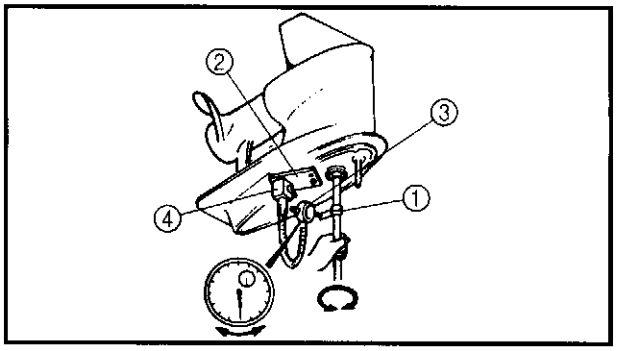
(1) Set the shift rod into the neutral position.

	Shift rod wrench **YB-06052 / 90890-06052**



(2) Load the reverse gear by installing the propeller without the spacer ① and then tighten the propeller nut.

	Propeller nut **5 N • m (0.5 kgf • m, 3.6 ft • lb)**



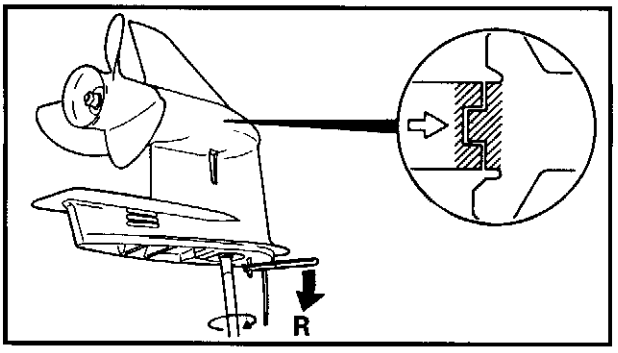
(3) Install the backlash indicator onto the drive shaft (on the 22.4 mm (0.88 in) diameter portion of the drive shaft).

	Backlash indicator ..... ① **YB-06265 / 90890-06706**

(4) Install the dial gauge onto the lower unit and have the dial gauge plunger contact the mark on the backlash indicator.

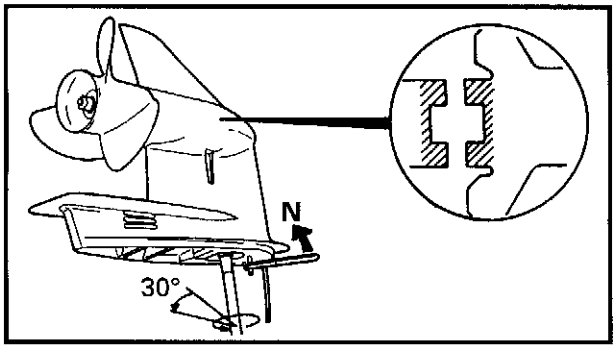
	Magnetic-base plate ..... ② **YB-07003 / 90890-07003** **Dial gauge set** ..... ③ **YU-03097 / 90890-01252** **Magnetic base** ..... ④ **YU-34481 / 90890-06705**

(5) Set the lower unit upside down.

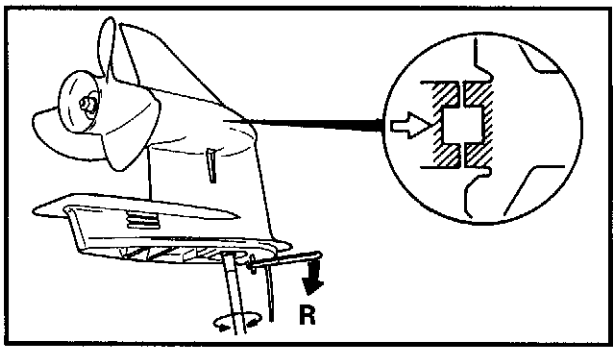


(6) Turn the shift rod into the reverse position with the shift rod wrench.

(7) Turn the drive shaft clockwise until the clutch dog is fully engaged.



(8) Turn the shift rod into the neutral position with the shift rod wrench.
(9) Turn the drive shaft counterclockwise approximately 30° more.



(10) Turn the shift rod into the reverse position with the shift rod wrench.
(11) Slowly turn the drive shaft clockwise and counterclockwise. When the drive shaft stops in each direction, measure the backlash.

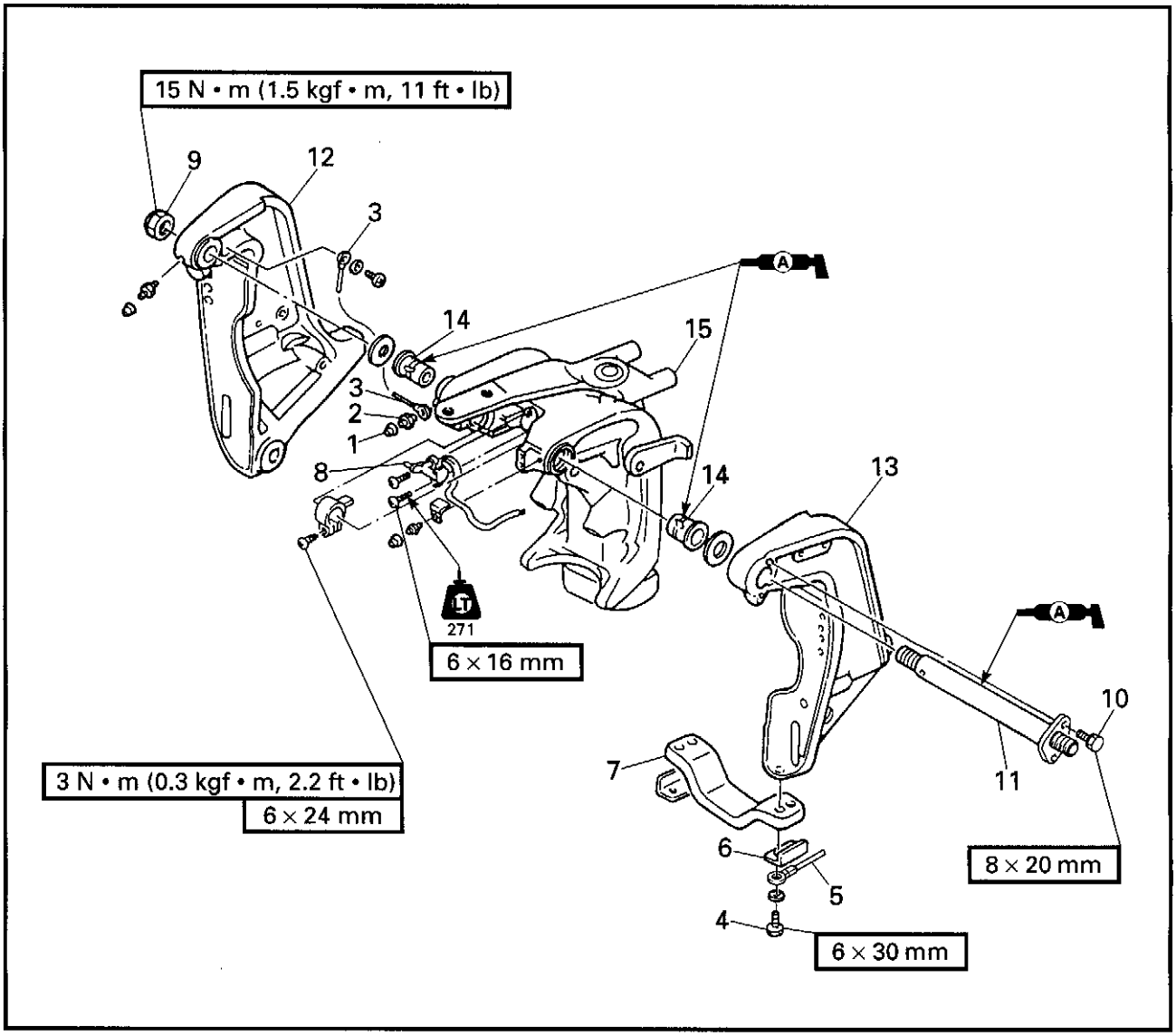
NOTE:
When measuring the reverse gear backlash, turn the shift rod wrench slightly towards the reverse position.

2. Adjust:
   • Reverse gear shim
   Remove or add shim(s).

Reverse gear backlash	Shim thickness
Less than 0.97 mm (0.038 in)	To be decreased by (1.13 – M) × 0.72
More than 1.29 mm (0.051 in)	To be increased by (M – 1.13) × 0.72

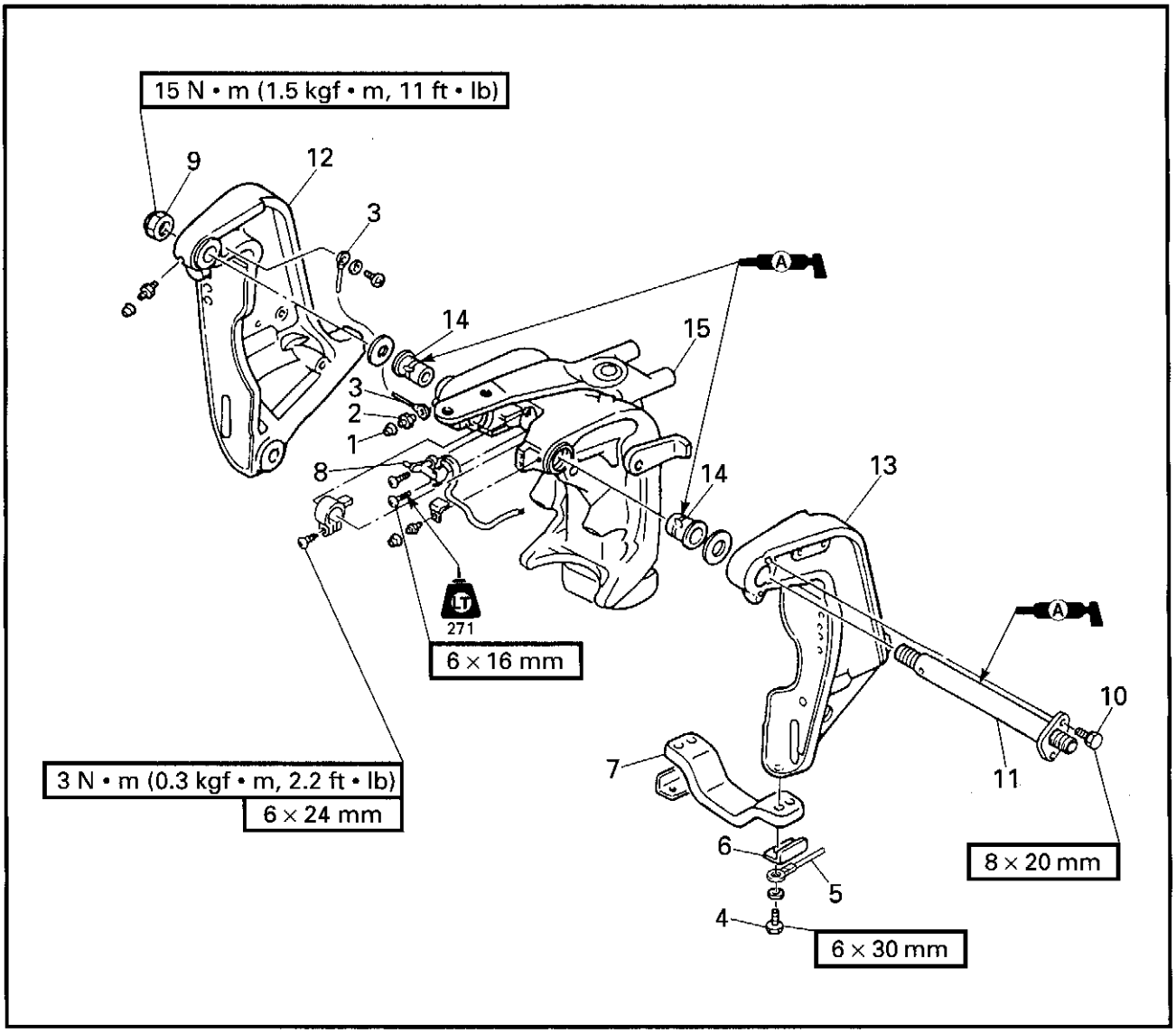
M: Measurement

CLAMP BRACKETS
REMOVING/INSTALLING THE CLAMP BRACKETS



Order	Job/Part	Q'ty	Remarks
	Upper case assembly		
1	Rubber cap	3	
2	Grease nipple	3	
3	Ground lead	1	
4	Bolt	4	
5	Ground lead	1	
6	Anode bracket	2	
7	Anode	1	
8	Trim sensor	1	Refer to "ADJUSTING THE TRIM SENSOR CAM" on page 45.

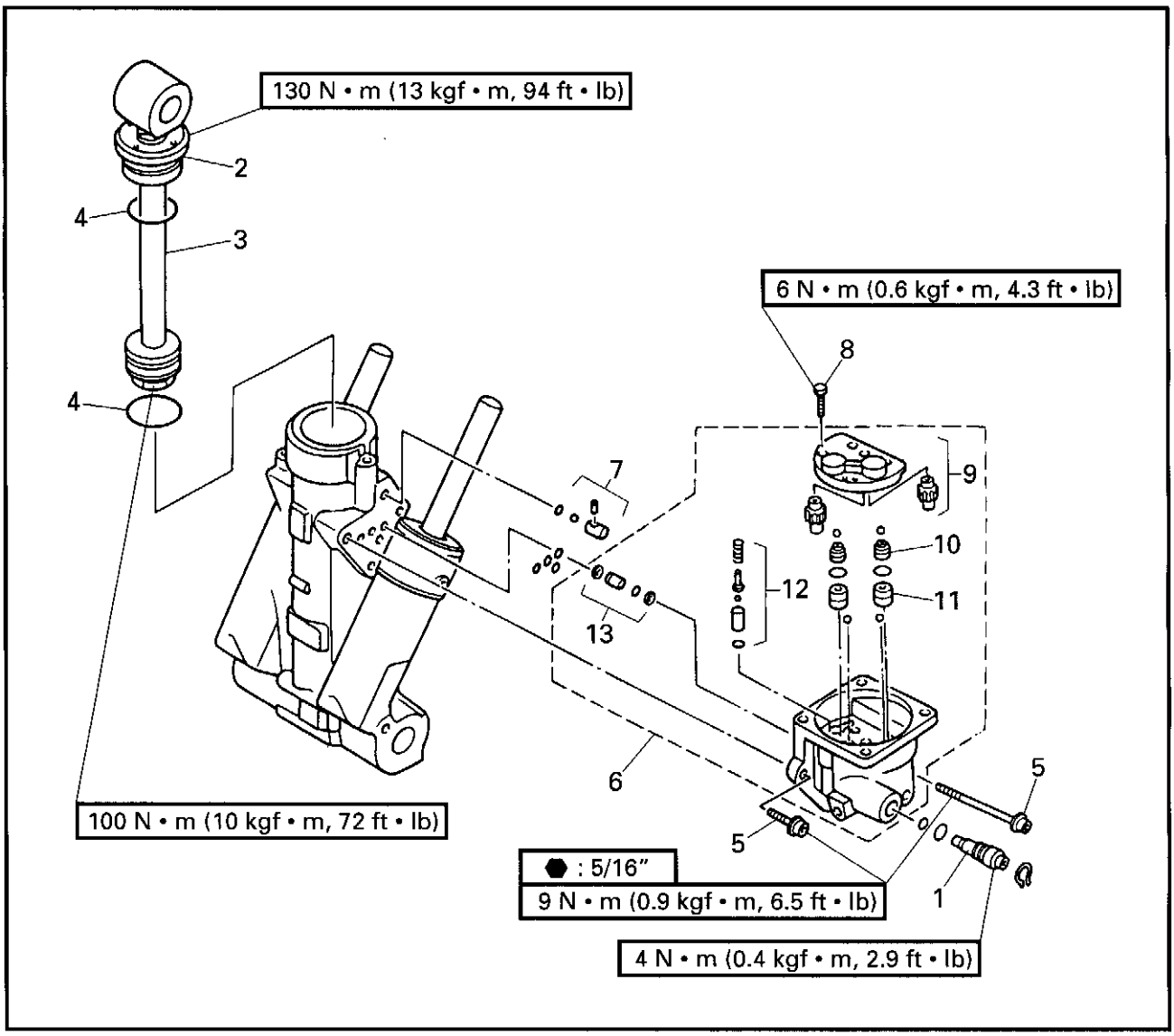
Continued on next page.



Order	Job/Part	Q'ty	Remarks
9	Self-locking nut	1	
10	Bolt	2	
11	Clamp bracket bolt	1	
12	Starboard clamp bracket	1	
13	Port clamp bracket	1	
14	Bushing	2	
15	Swivel bracket assembly	1	
			For installation, reverse the removal procedure.

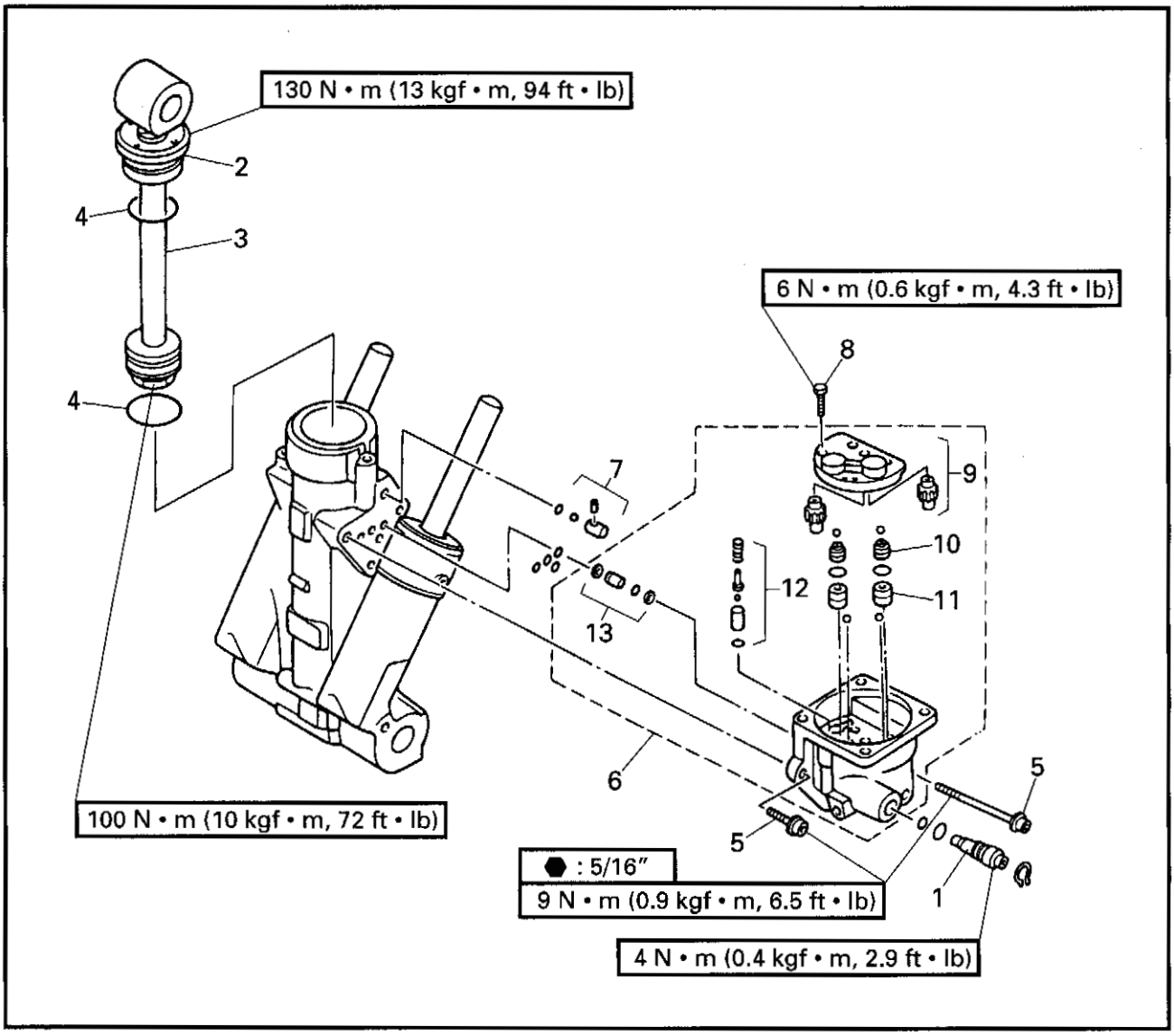
TILT RAM ASSEMBLY AND GEAR PUMP UNIT

REMOVING/INSTALLING THE TILT RAM ASSEMBLY AND GEAR PUMP UNIT

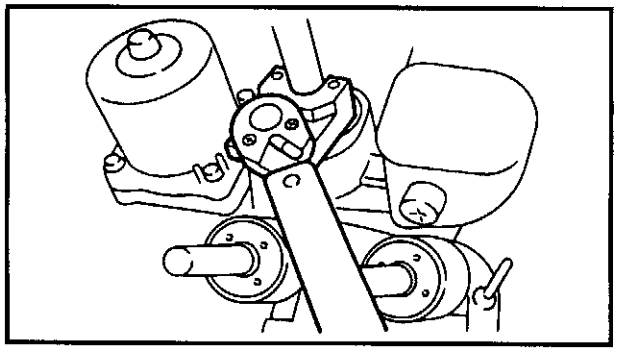


Order	Job/Part	Q'ty	Remarks
	Reservoir and power trim and tilt motor		
1	Manual valve	1	
2	Tilt ram end screw	1	
3	Tilt ram assembly	1	
4	O-ring	2	
5	Bolt	3	
6	Gear pump unit	1	

Continued on next page.



Order	Job/Part	Q'ty	Remarks
7	Check valve assembly	1	
8	Bolt	2	
9	Gear pump	1	
10	Shuttle valve	2	
11	Check valve	2	
12	Up-relief valve assembly	1	
13	Down-relief valve assembly	1	
			For installation, reverse the removal procedure.



REMOVING THE TILT RAM END SCREW

Loosen:
- Tilt ram end screw

	End screw wrench **YX-06765 / 90890-06548**

NOTE:
Hold the power trim and tilt unit in a vise using aluminum plates on both sides.

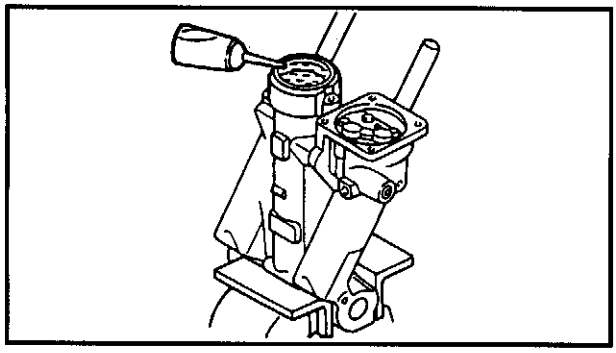
INSTALLING THE TILT RAM ASSEMBLY

⚠ WARNING

To prevent the hydraulic fluid from spurting out due to internal pressure, the tilt ram should be kept at full length.

1. Fill:
   - Tilt ram cylinder

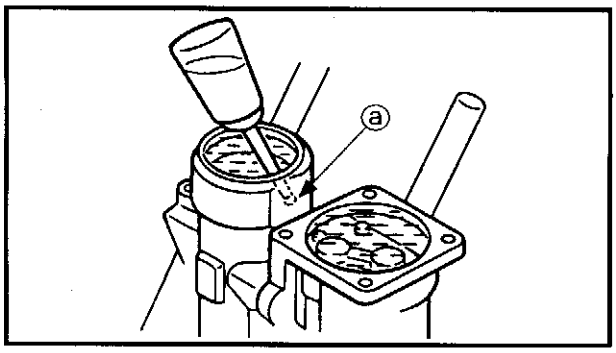
	Recommended power trim and tilt fluid **ATF Dexron II**



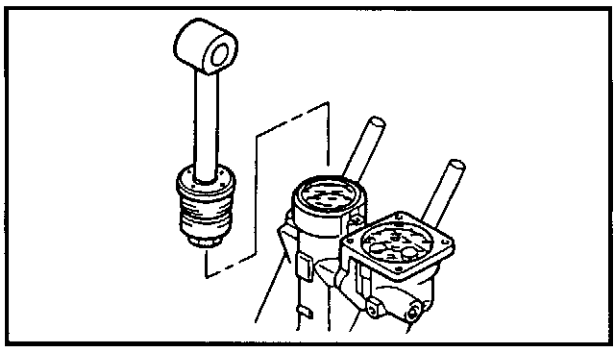
NOTE:
Hold the power trim and tilt unit in a vise using aluminum plates on both sides.

2. Fill:
   - Gear pump housing

	Recommended power trim and tilt fluid **ATF Dexron II**

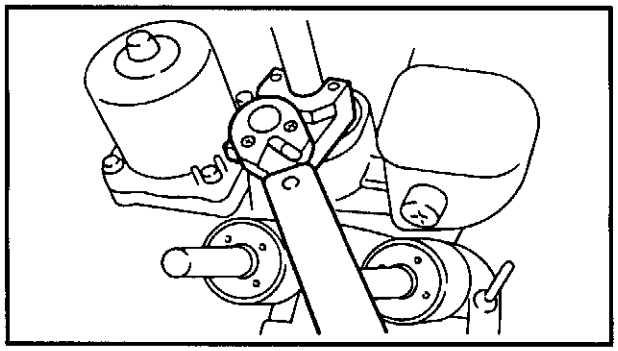


NOTE:
Add power trim and tilt fluid through the hole ⓐ until the fluid level is to the top of the gear pump unit.



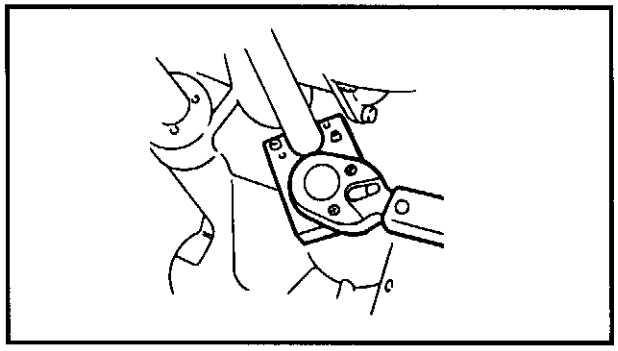
3. Install:
   • Tilt ram assembly

NOTE:
Place the tilt ram end screw at the bottom of the tilt ram and install the tilt ram assembly into the tilt ram cylinder.



4. Tighten:
   • Tilt ram end screw

	End screw wrench **YX-06765 / 90890-06548**
	Tilt ram end screw **130 N • m (13 kgf • m, 94 ft • lb)**



TRIM RAM ASSEMBLIES AND FREE PISTON

REMOVING THE TRIM RAM END SCREWS

Loosen:
   • Trim ram end screws

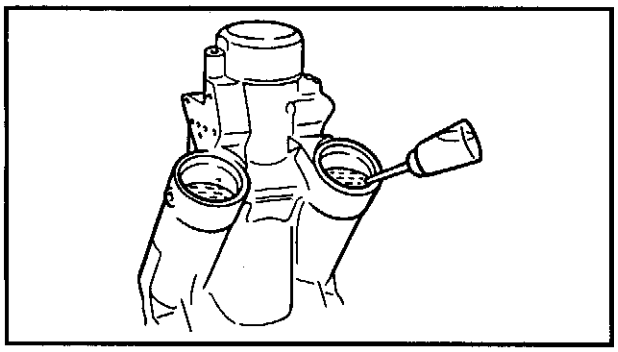
	End screw wrench **YB-06175 / 90890-06548**

NOTE:
Hold the power trim and tilt unit in a vise using aluminum plates on both sides.

INSTALLING THE TRIM RAMS

⚠ WARNING

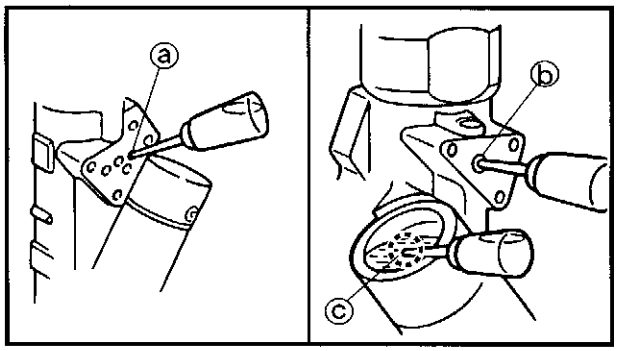
Do not push the trim rams down while installing them into the trim ram cylinders. Otherwise, the hydraulic fluid may spurt out from the unit.



1. Fill:
   • Trim ram cylinders

	Recommended power trim and tilt fluid **ATF Dexron II**

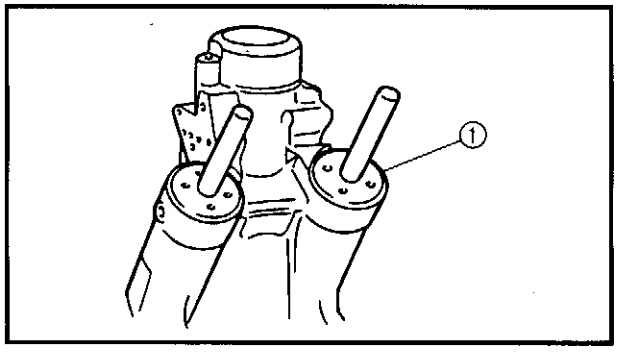
NOTE:
Hold the power trim and tilt unit in a vise using aluminum plates on both sides.



2. Fill:
   • Fluid passages

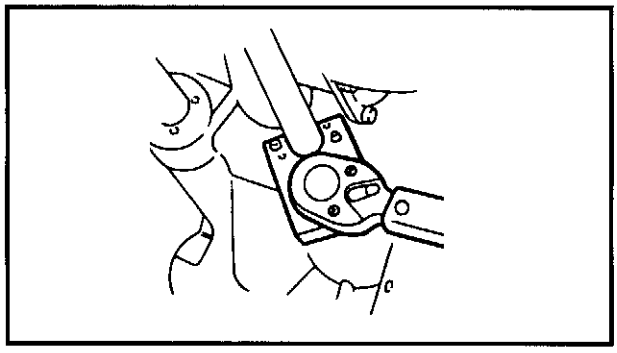
	Recommended power trim and tilt fluid **ATF Dexron II**

NOTE:
Add power trim and tilt fluid through holes ⓐ, ⓑ and ⓒ until all of the passages are filled.



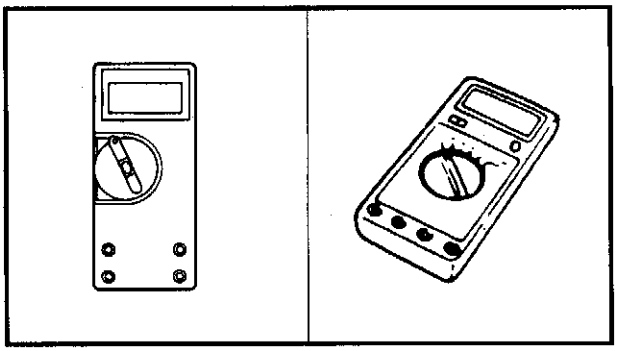
3. Install:
   • Trim ram assemblies ①

NOTE:
Place each trim ram end screw at the bottom of each trim ram and install them into the trim ram cylinders.



4. Tighten:
   • Trim ram end screws

	End screw wrench **YB-06175 / 90890-06548**
	Trim ram end screw **80 N • m (8.0 kgf • m, 58 ft • lb)**



ELECTRICAL COMPONENTS ANALYSIS

DIGITAL CIRCUIT TESTER

	**Digital tester** **YU-34899-A / 90890-06752**

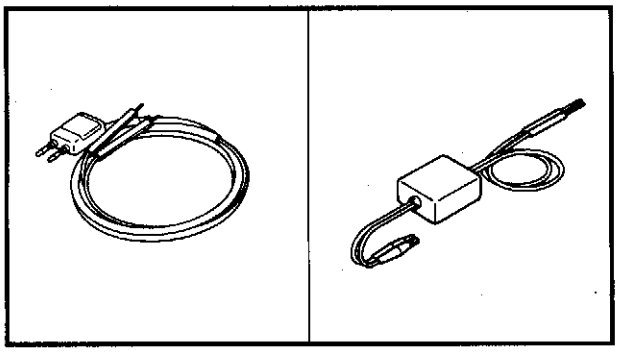
NOTE:

" ○——○ " indicates a continuity of electricity which means a closed circuit at the respective switch position.

MEASURING THE PEAK VOLTAGE

NOTE:

- When checking the condition of the ignition system it is useful to know the peak voltage.
- Cranking speed is dependant on many factors (e.g., fouled or weak spark plugs, a weak battery). If one of these is defective, the peak voltage will be lower than specification.
- If the peak voltage measurement is not within specification the engine will not operate properly.

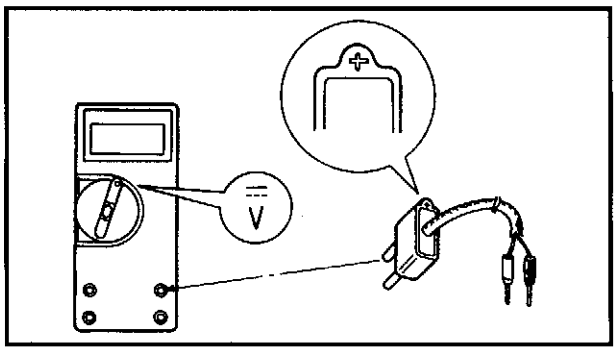


PEAK VOLTAGE ADAPTOR

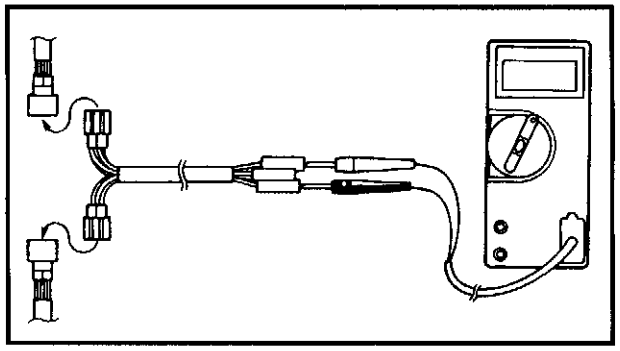
NOTE:

The peak voltage adaptor should be used with the digital circuit tester.

	**Peak voltage adaptor** **YU-39991 / 90890-03172**



NOTE:
- When measuring the peak voltage, set the selector to the DC voltage mode.
- Make sure the peak voltage adaptor leads are properly installed in the digital tester.
- Make sure the positive pin (the "+" mark facing up as shown) on the peak voltage adaptor is installed into the positive terminal of the digital tester.
- The test harness is needed for the following tests.



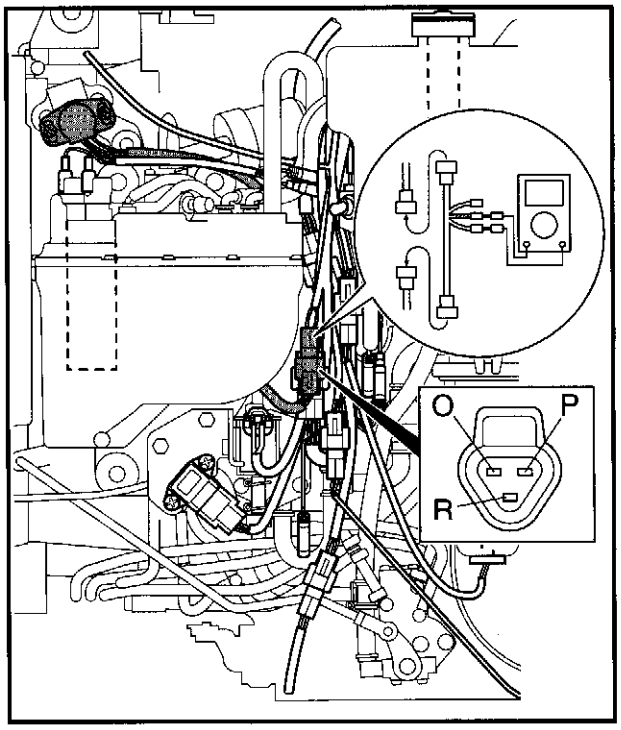
Measuring steps
(1) Disconnect the coupler connections.
(2) Connect the test harness between the couplers.
(3) Connect the peak voltage adaptor probes to the connectors which are being checked.
(4) Start or crank the engine and observe the measurement.

MEASURING A LOW RESISTANCE

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

Correct value
Displayed measurement – internal resistance

NOTE:
The internal resistance of the digital tester can be obtained by connecting both of its probes.



IGNITION CONTROL SYSTEM
MEASURING THE THROTTLE POSITION SENSOR OUTPUT VOLTAGE

Measure:
- Throttle position sensor output voltage

  Out of specification → Check the control unit.

	Throttle position sensor output voltage **Orange (O) – Pink (P)** **0.48 - 5.25 V**

Measuring steps

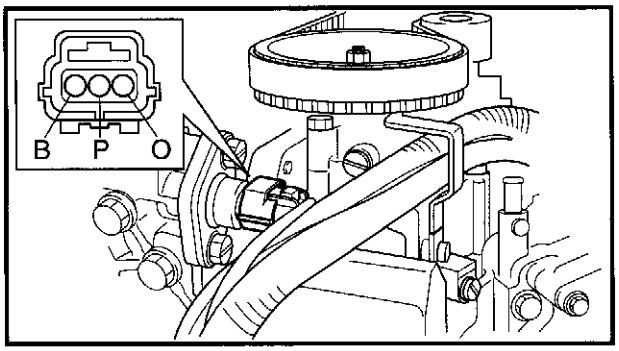
(1) Connect the test harness (3-pin) as shown.

	Test harness (3-pin) **YB-06757 / 90890-06757**

(2) Connect the battery leads to a 12-V battery.
(3) Turn the engine switch to the on position.
(4) Measure the throttle position sensor output voltage.

NOTE:

Make sure the throttle position sensor output voltage is within specification when the throttle is fully closed and fully opened.



FUEL CONTROL SYSTEM

CHECKING THE FUEL PRESSURE SENSOR

Measure:

- Fuel pressure sensor output voltage
  Out of specification → Replace.

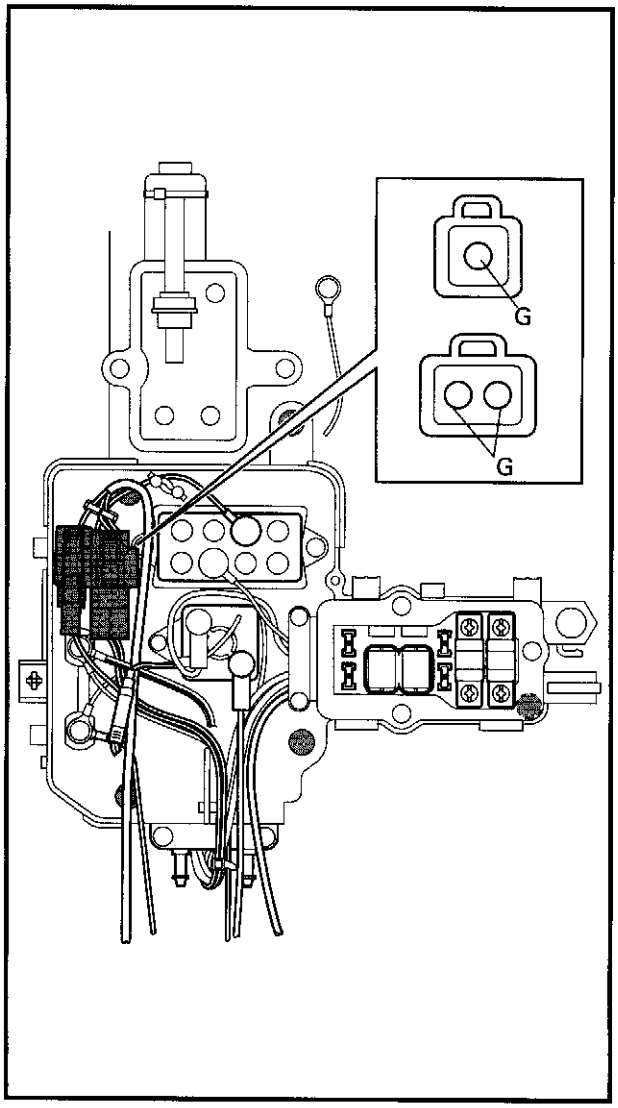
Fuel pressure sensor output voltage
Pink (P) – Black (B)
2.8 – 3.2 V

Measuring steps

(1) Remove the flywheel magnet assembly cover.
(2) Connect the test harness (3-pin) as shown.

Test harness (3-pin)
YB-06769 / 90890-06769

(3) Start the engine, run it at idle speed.
(4) Measure the fuel pressure sensor output voltage.
(5) Install the flywheel magnet assembly cover.



CHARGING SYSTEM

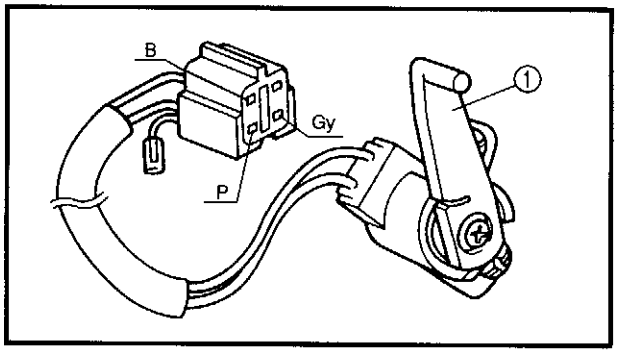
MEASURING THE LIGHTING COIL OUTPUT PEAK VOLTAGE

Measure:

- Lighting coil output peak voltage
  Below specification → Replace the lighting coil.

	Lighting coil output peak voltage Green (G) – Green (G)		
r/min	Unloaded		
	Cranking	1,500	3,500
V	5.5	37	86

Test harness (1-pin)
YB-06788 / 90890-06788
Test harness (2-pin)
YB-06787 / 90890-06787



POWER TRIM AND TILT SYSTEM

MEASURING THE TRIM SENSOR RESISTANCE

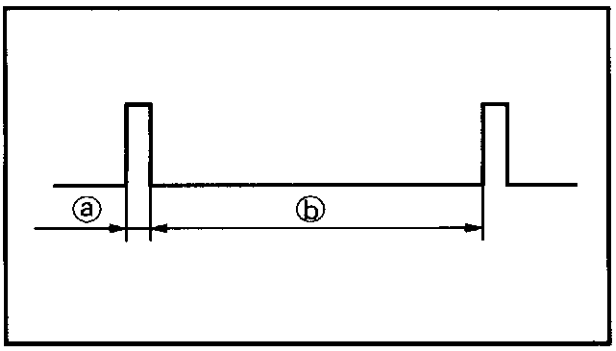
Measure:

- Trim sensor resistance
  Out of specification → Replace.

Trim sensor resistance
Pink (P) – Black (B)
10 - 309 Ω at 20 °C (68 °F)

NOTE:

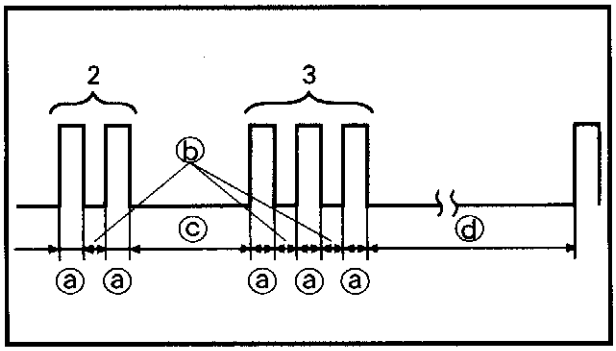
Turn the lever ① and measure the resistance as it gradually changes.



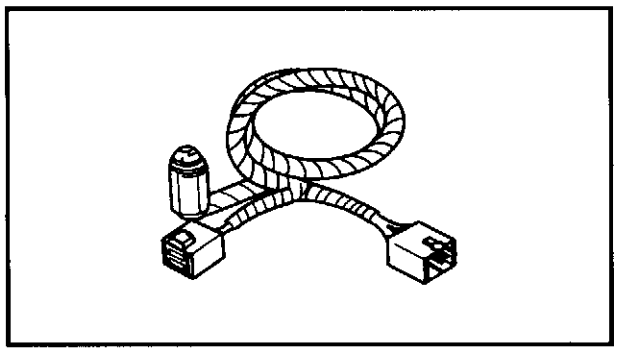
SELF-DIAGNOSIS

DIAGNOSIS CODE INDICATION

1. Normal condition
   (no defective part or irregular processing is found)
   Single flash is given every 5 seconds.
   ⓐ : Light on, 0.3 second
   ⓑ : Light off, 5 seconds



2. Trouble code indication
   Example: The illustration indicates code number 23.
   ⓐ : Light on, 0.3 second
   ⓑ : Light off, 0.3 second
   ⓒ : Light off, 1.7 seconds
   ⓓ : Light off, 5 seconds

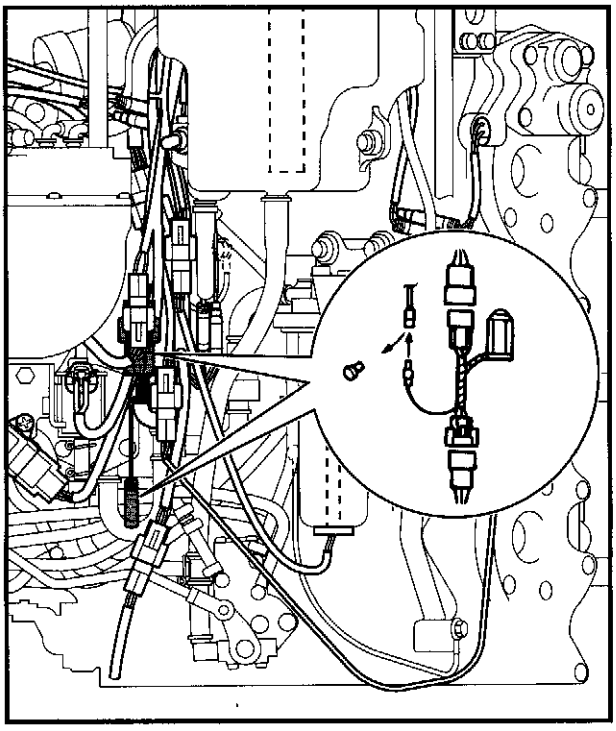


DIAGNOSIS THE ELECTRONIC CONTROL SYSTEM

1. Install:
   • Diagnostic indicator

Diagnostic indicator
YB-06444 / 90890-06765

NOTE:
When performing this diagnosis, all of the electrical wires must be properly connected.



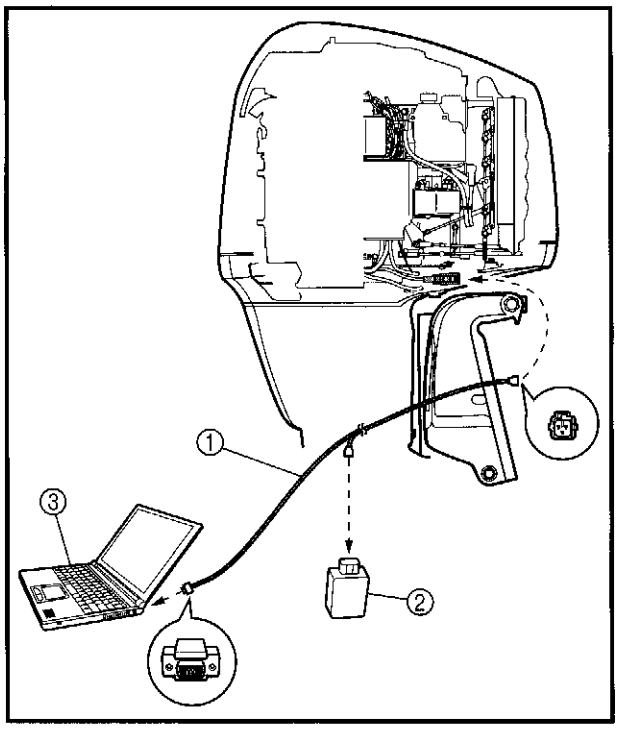
2. Check:
   • Diagnosis code
   Code 1 is indicated → Normal.
   Code 13 - 28 indicated → Check the applicable parts.
   Code 33 - 44 indicated → Microcomputer processing information.

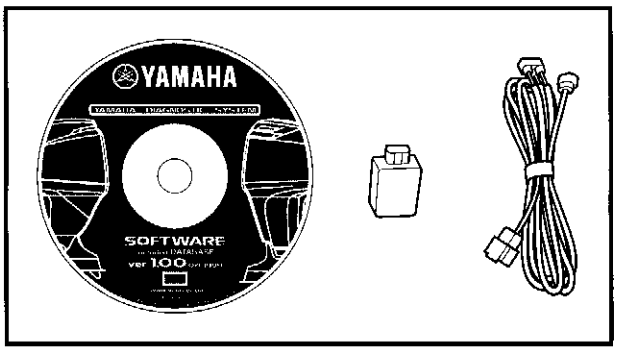
Checking steps
(1) Start the engine and let it idle.
(2) Check the diagnostic indicator's flash pattern to determine if there are any malfunctions.

NOTE:
When more than one problem is detected, the diagnostic indicator's light flashes in the pattern of the lowest numbered problem. After that problem is corrected, the light flashes in the pattern of the next lowest numbered problem. This continues until all of the problems are detected and corrected.

Diagnosis code chart

Code	Symptoms
13	Incorrect pulser coil input signal
14	No crank position sensor input signal
15	Incorrect engine cooling water temperature sensor input signal
18	Incorrect throttle position sensor input signal
19	Low battery input voltage
22	Incorrect atmospheric pressure sensor input signal (out of normal operating range)
23	Incorrect intake air temperature sensor input signal
25	Incorrect fuel pressure sensor input signal
26	No injector operation signals
27	Water detection switch ON
28	Incorrect shift position switch input signal
33 ~ 44	Microcomputer processing information
33	Ignition timing is being slightly corrected (when starting a cold engine)
44	Engine stop switch control operating





YAMAHA DIAGNOSTIC SYSTEM

CONNECTING THE COMPUTER TO THE OUTBOARD

Connect:

- Communication cable ①
- Adapter ②

	Yamaha Diagnostic System 68F-85300-00

NOTE:

Refer to the Yamaha Diagnostic System Instruction Manual for details on installing the software onto an IBM-compatible laptop computer ③.

Connecting steps

(1) Quit any applications that are running, and then turn off the computer.
(2) Connect the communication cable to the 3-pin communication coupler of the outboard, the adapter and the communication port of your computer.

NOTE:

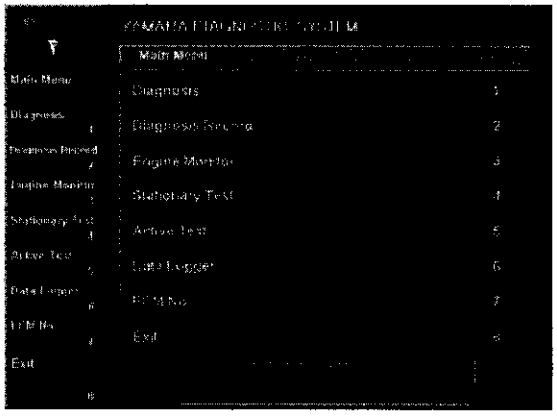
Use either the COM1 or COM2 port, and if necessary, set the serial port as specified in the computer's manual. Set the serial port where the RS232C (Dsub-9 pin) cable is connected to COM1 or COM2.

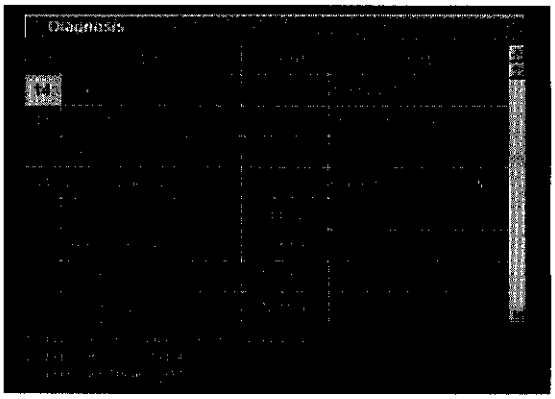
(3) Connect the remote control to the outboard.
(4) Connect the 12 V battery to the outboard.

NOTE:

The following items should be checked before starting the Yamaha Diagnostic System.

- The battery is properly charged and its specified gravity is within specification.
- There are no incorrect wiring connections.
- Wiring connections are properly secured and are not rusty.
- There are enough fuel and oil in each tank.





YAMAHA DIAGNOSTIC SYSTEM FUNCTION

NOTE:

With the 150, 175 and 200 models, the following seven functions of the Yamaha Diagnostic System can be used.

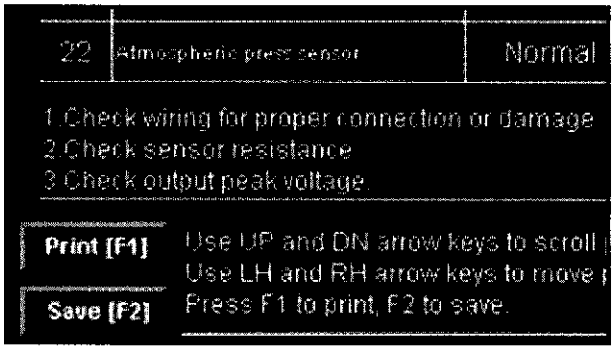
- Diagnosis
- Diagnosis Record
- Engine Monitor
- Stationary Test
- Active Test
- Data Logger
- ECM No.

(1) Diagnosis

With the engine main switch ON, the diagnosis codes of malfunctions recorded in the outboard's ECM, the diagnosis codes' corresponding part name, the results of the diagnosis, and the condition of the part are listed.

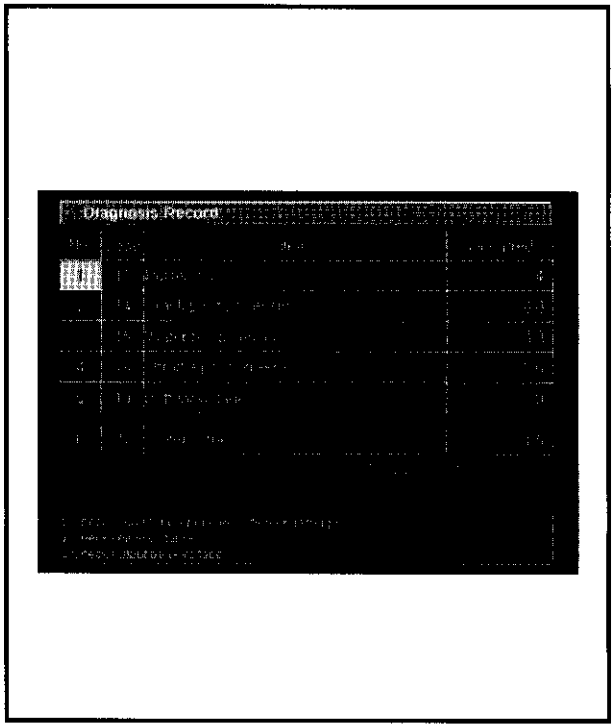
Eight items can be displayed at one time. To check the other items, scroll the display.

Code	Symptoms
13	Incorrect pulser coil input signal
14	No crank position sensor input signal
15	Incorrect engine cooling water temperature sensor input signal
18	Incorrect throttle position sensor input signal
19	Low battery input voltage
22	Incorrect atmospheric pressure sensor input signal (out of normal operating range)
23	Incorrect intake air temperature sensor input signal
25	Incorrect fuel pressure sensor input signal
26	No injector operation signals
27	Water detection switch ON
28	Incorrect shift position switch input signal
44	Engine stop switch control operating



NOTE:

For troubleshooting procedures for sensors that have detected a malfunction, move the cursor to the sensor number, and follow the instructions that are displayed.



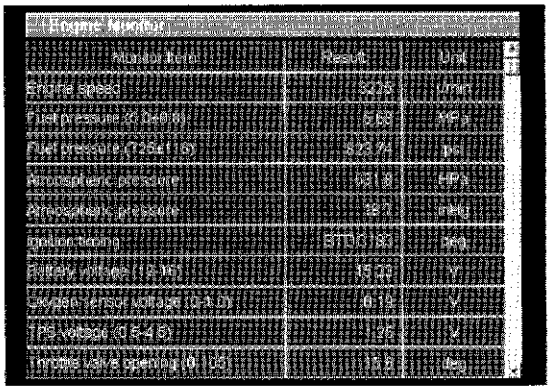
(2) Diagnosis Record

The diagnosis codes of malfunctions that have been recorded in the outboard's ECM, the diagnostic codes' corresponding part name, and the time when the malfunctions occurred are listed.

A maximum of six items can be displayed at one time. The last item displayed is for the water detection switch only. The latest occurrence appears on top. In addition, diagnosis codes stored in the ECM can be deleted.

NOTE:

- The diagnosis codes that are displayed are the same as those in the "Diagnosis" menu.
- For troubleshooting procedures for sensors that have detected a malfunction, move the cursor to the sensor number, and follow the instructions that are displayed.



(3) Engine Monitor

Each sensor status and the ECM data are displayed while the engine is running.

Sensing items:

- Sensors (engine cooling water temperature sensor, throttle position sensor, atmospheric pressure sensor, intake air temperature sensor and fuel pressure sensor)
- Voltage system (battery voltage)
- Switches (water detection switch, shift position switch and engine stop lanyard switch)
- Operation signals (ignition, injectors, electric oil pump)

Engine parameter	Data display	Unit	Comments
Engine speed	##00	r/min	Range: 500 to 7,000, in steps of 500 ("0" is displayed when the engine is stopped.)
Fuel pressure (5.0 ± 0.8)	#0.0	MPa	Range: 0 to 6, in steps of 0.5
Fuel pressure (725 ± 116)	##0.00	psi	Displays the fuel pressure converted to psi
Atmospheric pressure	##0.0	HPa	Displays the atmospheric pressure (in HPa) calculated based on the atmospheric pressure sensor measurement
Atmospheric pressure	#0.0	inHg	Displays the atmospheric pressure converted to inHg
Ignition timing	BTDC### TDC ATDC###	deg	Displays the ignition timing of cylinder #1 ("-" is displayed when the engine is stopped.)
Battery voltage (12 - 16)	#0.00	V	Range: 0 to 16, in steps of 1 V
Oxygen sensor voltage (0 - 1.0)	#.##	V	Range: 0 to 1.5, in steps of 0.1
TPS voltage (0.5 - 4.5)	#.##	V	Range: 0 to 5, in steps of 0.5
Throttle valve opening (0 - 105)	##0.0	deg	Displays the throttle valve opening angle calculated based on the throttle position sensor voltage
Fuel injection duration	##0.00	ms	Displays the fuel injection period for cylinder #1 ("0" is displayed when the engine is stopped.)
Water temperature (below 90)	##0.0	°C	Range: –20 to 100, in steps of 10
Water temperature (below 194)	##0.0	°F	Displays the water temperature converted to °F
Intake temperature (below 70)	##0.0	°C	Range: –20 to 100, in steps of 1
Intake temperature (below 158)	##0.0	°F	Displays the intake temperature converted to °F
Starter switch	ON/OFF		ON: Turned on/OFF: Turned off
Engine stop lanyard switch	ON/OFF		ON: Pushed/OFF: Free
Over-rev control release lead	ON/OFF		ON: Disconnected/OFF: Connected
Main switch	ON/OFF		ON: Turned on/OFF: Turned off
Shift position switch	ON/OFF		ON: In neutral/OFF: In gear
Water detection switch	ON/OFF		ON: Water in fuel filter/OFF: Normal
Oil level switch (remote tank)	ON/OFF		ON: Float on top/OFF: Float on bottom
Oil level switch 1 (engine tank)	ON/OFF		Top float ON: Float on top OFF: Float on bottom
Oil level switch 2 (engine tank)	ON/OFF		Middle float ON: Float on top OFF: Float on bottom

Engine parameter	Data display	Unit	Comments
Oil level switch 3 (engine tank)	ON/OFF		Bottom float ON: Float on top OFF: Float on bottom
Water temp switch (over heat)	ON/OFF		ON: High water temperature OFF: Medium-to-low water temperature
Dual engine system switch	ON/OFF		ON: Turned on/OFF: Turned off
Firing of cylinder #1	Yes/No		Yes: Ignition signal sent from ECM No: No ignition signal sent
Firing of cylinder #2	Yes/No		Yes: Ignition signal sent from ECM No: No ignition signal sent
Firing of cylinder #3	Yes/No		Yes: Ignition signal sent from ECM No: No ignition signal sent
Firing of cylinder #4	Yes/No		Yes: Ignition signal sent from ECM No: No ignition signal sent
Firing of cylinder #5	Yes/No		Yes: Ignition signal sent from ECM No: No ignition signal sent
Firing of cylinder #6	Yes/No		Yes: Ignition signal sent from ECM No: No ignition signal sent
Electric oil pump	Low/High		Low: Low oil injection High: High oil injection

(4) Stationary Test

With the engine off, four operation tests are performed.

- **Ignition coil**

Spark gap tester
YM-34487 / 90890-06754

A voltage is applied to the ignition coil of the selected cylinder, a spark is created in the spark gap tester, and then the ignition system is checked. Five sparks are created within five seconds.

- **Fuel injector**
  A voltage is applied to the injector of the selected cylinder, the injector is activated, and then the fuel system is checked. The fuel is injected 20 items within two seconds.
- **Electric fuel pump**
  A voltage is applied to the electric fuel pump, the electric fuel pump is operated for ten seconds.
- **Electric oil pump**
  The electrical oil pump is operated by a signal sent from the ECM for six seconds. Enables to check if oil has been spurted out from the electrical oil pump

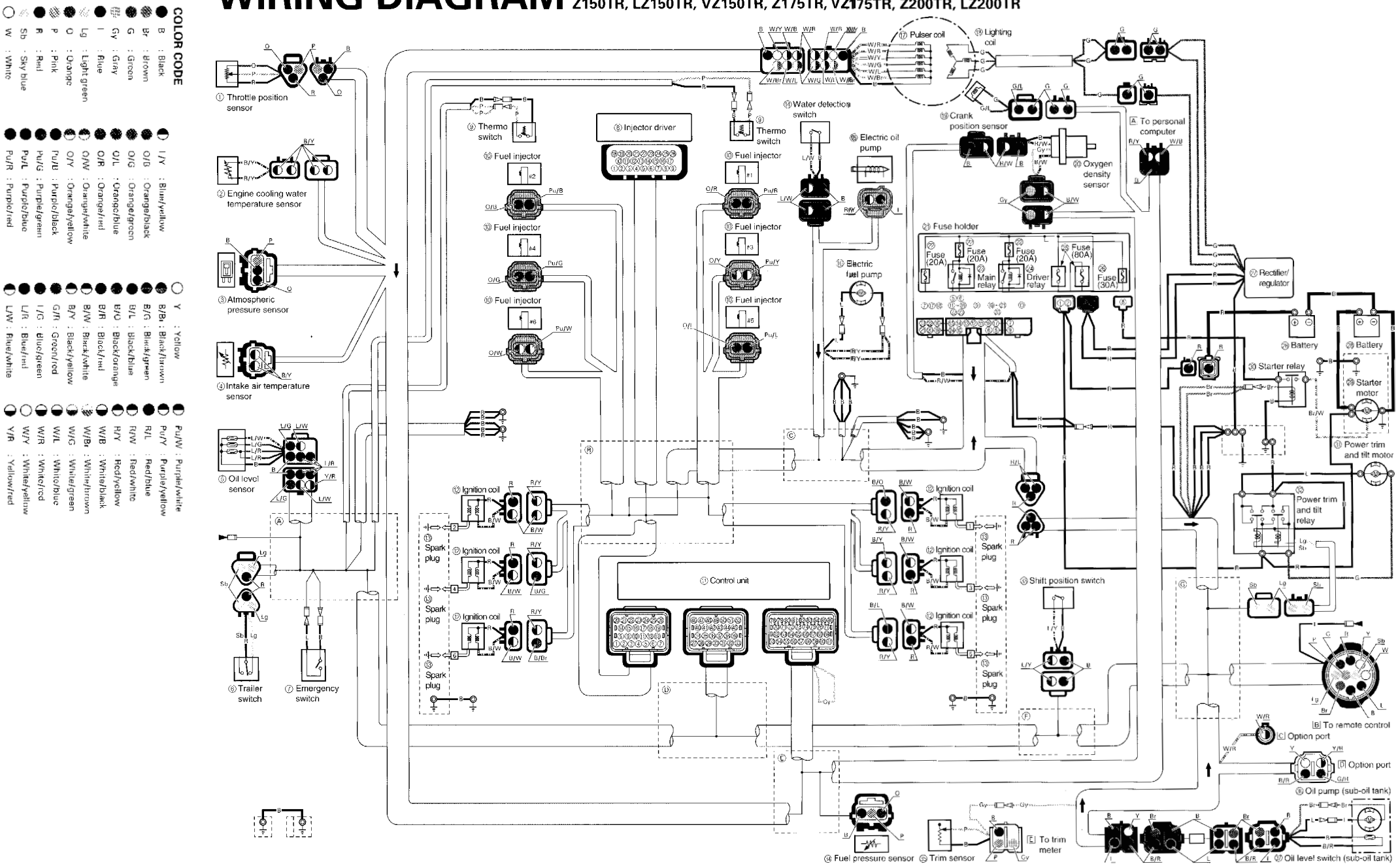
(5) Active Test
The ignition and fuel are cut for each cylinder, one at a time, and the engine speed is checked for changes to determine whether or not the cylinder is malfunctioning. (If there is no change in the engine speed, the cylinder is faulty.)
The ignition signal and the fuel injection are paused for five seconds.

(6) Data Logger
Two out of six items (engine speed, fuel pressure, battery voltage, oxygen density sensor, throttle position, and water temperature), are selected and 13 minutes of their recorded data are displayed on a graph. The operating time as compared to the engine speed and the total operating time are also displayed.

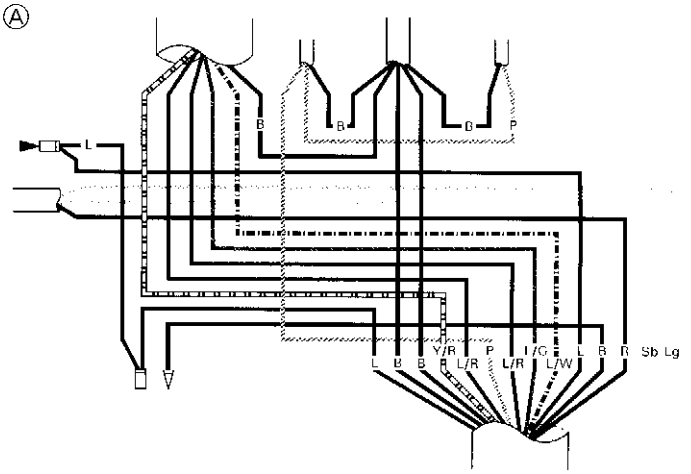
(7) ECM No.
The ECM part number is read from the outboard engine's ECM and is displayed.

WIRING DIAGRAM

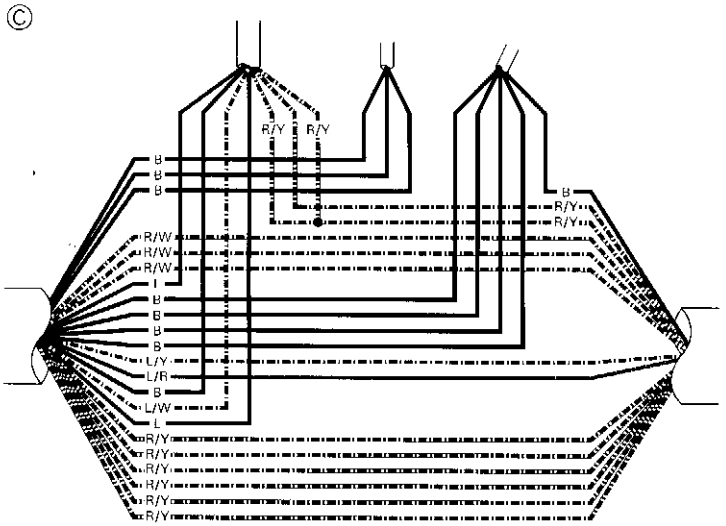
Z150PETO, LZ150PETO, Z150QETO, Z175GETO, Z175HETO, Z200NETO, LZ200NETO/ Z150TR, LZ150TR, VZ150TR, Z175TR, VZ175TR, Z200TR, LZ200TR



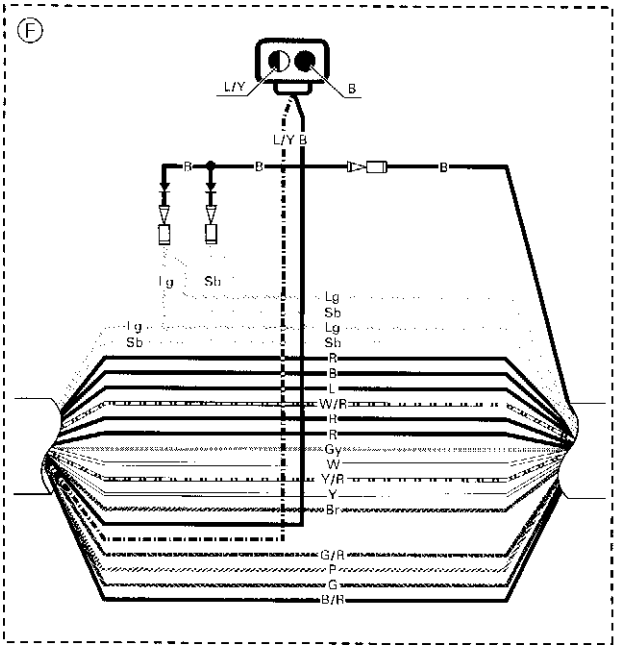
Ⓐ


L
B
B
B
P
L B B R L/R L/R L/W L B R Sb Lg
Y/R P I/G

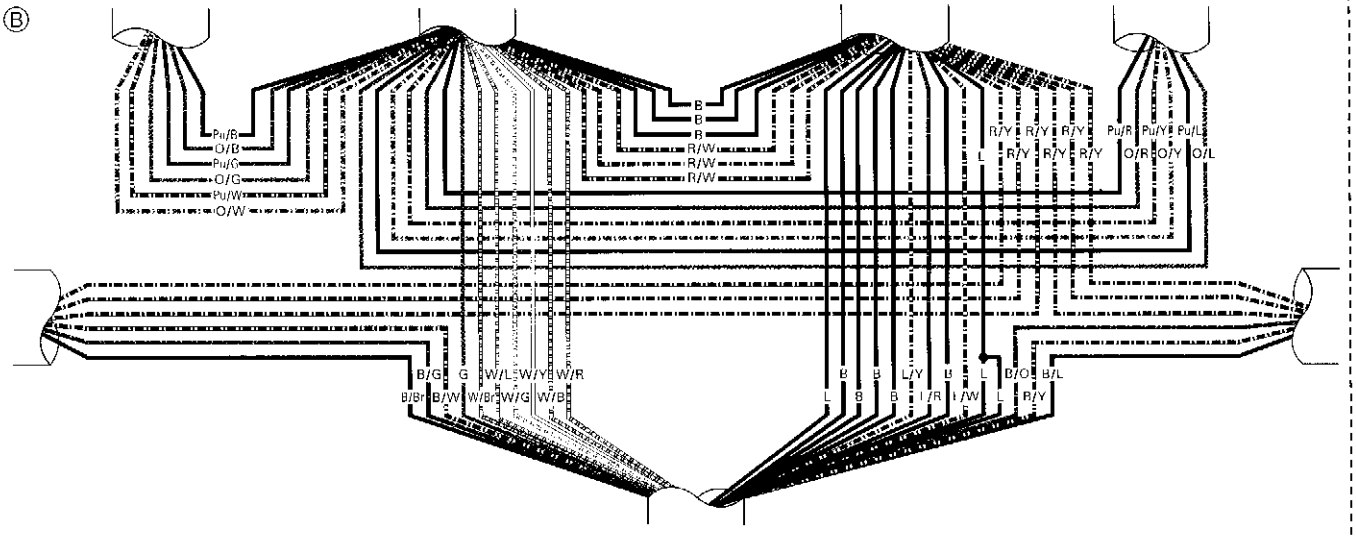
Ⓒ


R/Y R/Y
B
B
B
R/W
R/W
R/W
I
B
B
B
B
L/Y
L/R
B
L/W
L
R/Y
R/Y
R/Y
R/Y
R/Y
R/Y
B
R/Y
R/Y

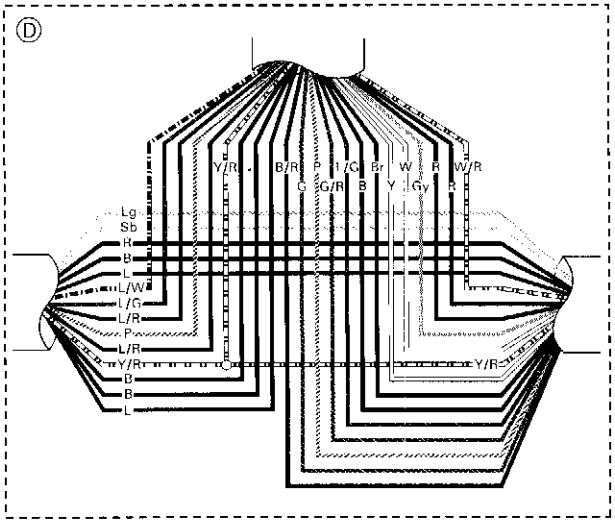
Ⓕ


L/Y
B
L/Y B
R
B
B
Lg
Sb
Lg
Sb
Lg
Sb
Lg
Sb
R
B
L
W/R
R
R
Gy
W
Y/R
Y
Br
G/R
P
G
B/R

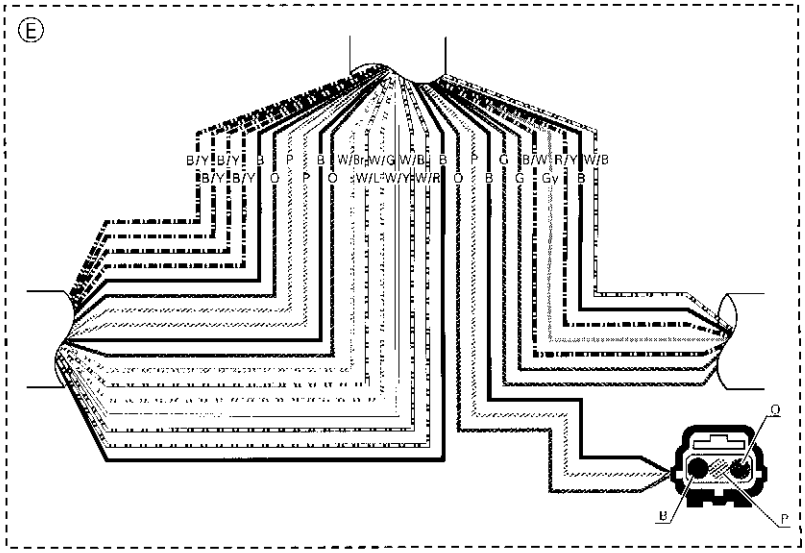
Ⓑ


Pu/B
O/B
Pu/G
O/G
Pu/W
O/W
B
B
B
R/W
R/W
R/W
R/Y
R/Y
R/Y
R/Y
Pu/R
Pu/Y
Pu/L
O/R
O/Y
O/L
B/G
G
W/L
W/Y
W/R
B/Br
B/W
W/Br
W/G
W/B
B
B
L/Y
B
L
B/O
B/L
L
B
B
I/R
I/W
L
R/Y

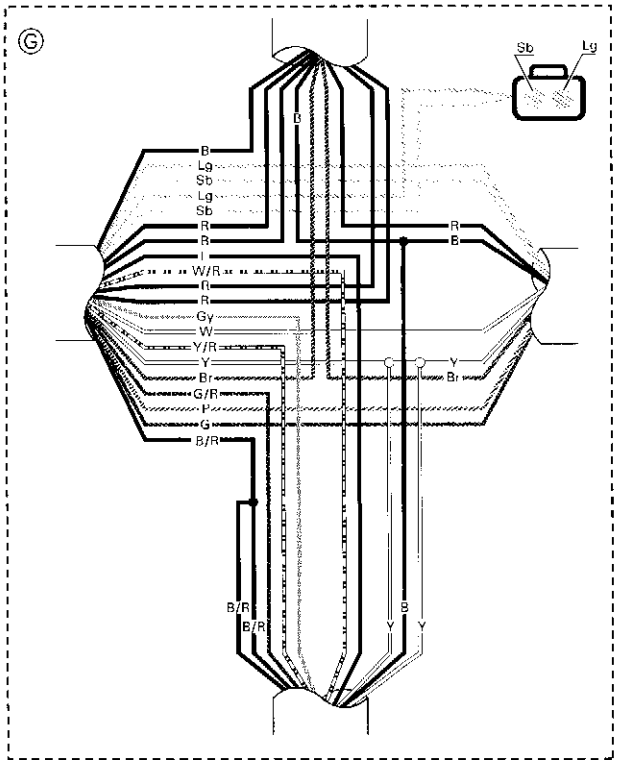
Ⓓ


Y/R
B/R
I/G
Br
W
R
W/R
G
G/R
B
Y
Gy
R
Lg
Sb
R
B
L
L/W
L/G
L/R
P
L/R
Y/R
B
B
L
Y/R

Ⓔ


B/Y
B/Y
B
P
B
W/Br
W/G
W/B
B
P
G
B/W
R/Y
W/B
B/Y
B/Y
O
P
O
W/L
W/Y
W/R
O
B
G
Gy
B
O
B
P

Ⓖ


Sb
Lg
B
B
Lg
Sb
Lg
Sb
R
B
I
W/R
R
R
Gy
W
Y/R
Y
Br
G/R
P
G
B/R
R
B
Y
Br
B/R
B/R
Y
B
Y

COLOR CODE

B	: Black	L/Y	: Blue/yellow
Br	: Brown	O/B	: Orange/black
G	: Green	O/G	: Orange/green
Gy	: Gray	O/L	: Orange/blue
L	: Blue	O/R	: Orange/red
Lg	: Light green	O/W	: Orange/white
O	: Orange	O/Y	: Orange/yellow
P	: Pink	Pu/B	: Purple/black
R	: Red	Pu/G	: Purple/green
Sb	: Sky blue	Pu/L	: Purple/blue
W	: White	Pu/R	: Purple/red
Y	: Yellow	Pu/W	: Purple/white
B/Br	: Black/brown	Pu/Y	: Purple/yellow
B/G	: Black/green	R/L	: Red/blue
B/L	: Black/blue	R/W	: Red/white
B/O	: Black/orange	R/Y	: Red/yellow
B/R	: Black/red	W/B	: White/black
B/W	: Black/white	W/Br	: White/brown
B/Y	: Black/yellow	W/G	: White/green
G/R	: Green/red	W/L	: White/blue
L/G	: Blue/green	W/R	: White/red
L/R	: Blue/red	W/Y	: White/yellow
L/W	: Blue/white	Y/R	: Yellow/red

⑧ Injector driver

1 : G	14 : Pu/G		
2 : W/Br	15 : Pu/Y		
3 : W/L	16 : Pu/B		
4 : R/Y	17 : Pu/R		
5 : B	18 : —		
6 : Pu/W	19 : W/B		
7 : O/W	20 : W/R		
8 : Pu/L	21 : R/Y		
9 : O/L	22 : B		
10 : W/G	23 : O/G		
11 : W/Y	24 : O/Y		
12 : R/Y	25 : O/B		
13 : B	26 : O/R		

⑪ Control unit

1 : W/Br	19 : B	37 : Br	55 : B/Y	73 : W/G	
2 : W/L	20 : B	38 : Y	56 : B/Y	74 : W/Y	
3 : W/G	21 : L/Y	39 : W	57 : —	75 : W/B	
4 : W/Y	22 : L/R	40 : Gy	58 : B/Y	76 : W/R	
5 : W/B	23 : L	41 : B	59 : B/Y	77 : B	
6 : W/R	24 : L/W	42 : B	60 : O	78 : Gy	
7 : G	25 : B	43 : R	61 : P	79 : Gy	
8 : B/Br	26 : B	44 : R	62 : B	80 : R/Y	
9 : B/L	27 : L/W	45 : —	63 : O	81 : B	
10 : B/G	28 : L/G	46 : —	64 : P	82 : W/B	
11 : B/Y	29 : L/R	47 : L/Y	65 : B	83 : —	
12 : B/W	30 : L/R	48 : B	66 : O	84 : —	
13 : B/O	31 : B/R	49 : L	67 : P	85 : —	
14 : B	32 : Y/R	50 : W/R	68 : B	86 : —	
15 : L	33 : G/R	51 : —	69 : B/W		
16 : L	34 : G	52 : —	70 : Gy		
17 : —	35 : P	53 : G	71 : W/Br		
18 : —	36 : P	54 : G	72 : W/L		

㉑ Fuse holder

1 : R	11 : R/Y	21 : R/W
2 : B	12 : R/Y	22 : R/Y
3 : R	13 : R/Y	23 : R/Y
4 : R	14 : R/Y	24 : R/W
5 : R/L	15 : R/Y	25 : —
6 : R/L	16 : R/Y	26 : —
7 : R	17 : R	27 : —
8 : R	18 : R	28 : —
9 : L/Y	19 : R/W	
10 : L/R	20 : R/W	