



Service Manual





NOTICE

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

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

Important information

Particularly important information is distinguished in this manual by the following notations:

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

WARNING

Failure to follow WARNING instructions <u>could result in severe injury or death</u> 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.

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ru t			

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

CAUTION:

USE UNLEADED STRAIGHT GASOLINE ONLY

- Gasoline containing lead can cause performance loss and engine damage.
- Do not use gasoline mixed with oil during the break-in period or anytime thereafter.

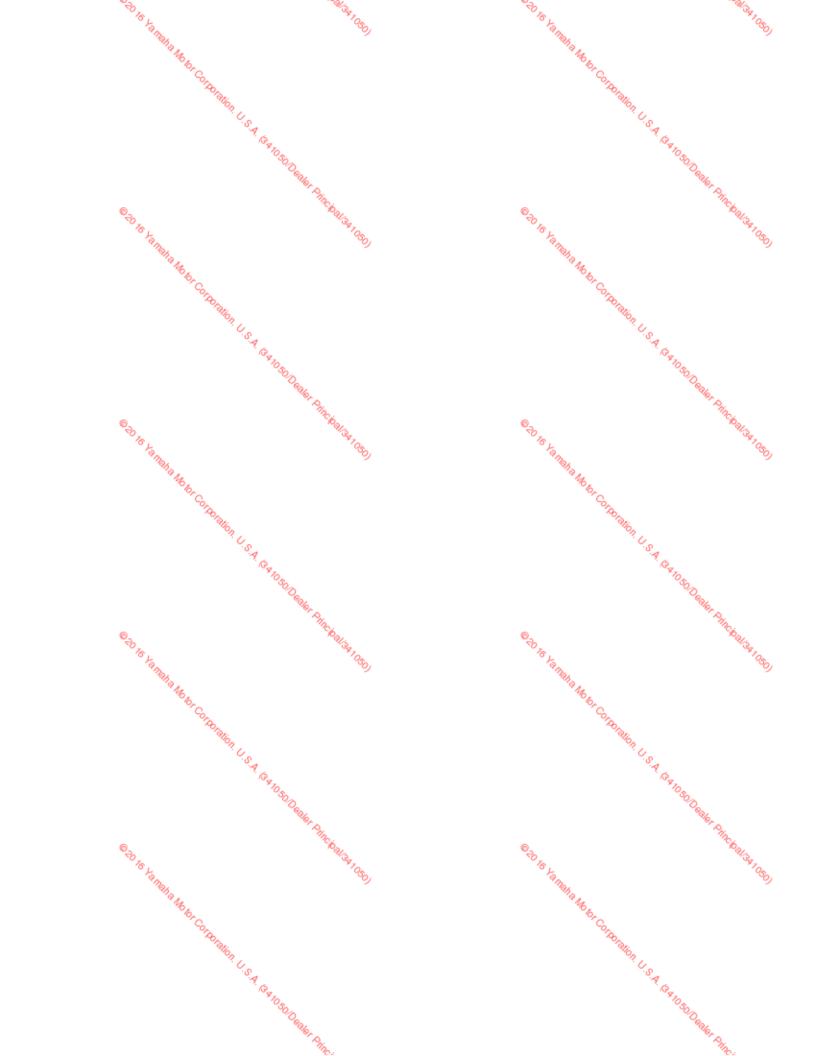
YAMALUBE 2-STROKE OUTBOARD OIL IS RECOMMENDED.

Z250C, LZ250C
SERVICE MANUAL
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Printed in USA
LIT-18616-02-78



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General information

How to use this manual

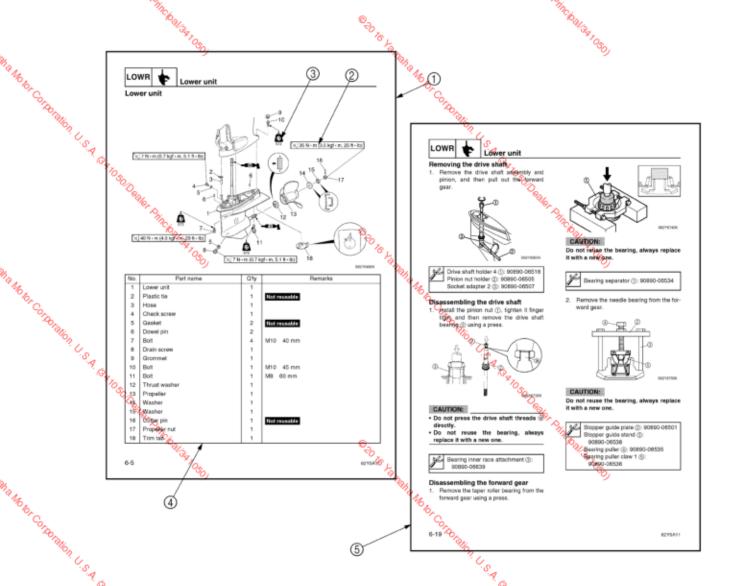
Manual format

The format of this manual has been designed to make service procedures clear and easy to understand. Use the information below as a guide for effective and quality service.

- 1) Parts are shown and detailed in an exploded diagram and are listed in the components list.
- ② Tightening torque specifications are provided in the exploded diagrams and after a numbered step with tightening instructions.
- ③ Symbols are used to indicate important aspects of a procedure, such as the grade of lubricant and lubrication point.
- 4 The components list consists of part names and part quantities, as well as bolt and screw dimensions
- ⑤ Service points regarding removal, checking, and installation are shown in individual illustrations to explain the relevant procedure.

NOTE:

For troubleshooting procedures, see Chapter 9, "Troubleshooting."



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Symbols

The symbols below are designed to indicate the content of a chapter.

General information



Specifications

SPEC



Fuel system



Power unit

POWF



Bracket unit





Electrical systems





Periodic checks and adjustments Lower unit











Troubleshooting





Symbols ① to ⑥ indicate specific data.















- Special tool
- Specified oil or fluid
- ③ Specified engine speed
- ④ Specified tightening torque

- Specified measurement
- Specified electrical value (resistance, voltage, electric current)

Symbols 7 to 12 in an exploded diagram indicate the grade of lubricant and the lubrication point.

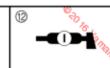








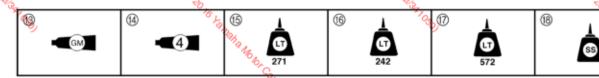




- ⑦ Apply 2-stroke outboard motor oil
- Apply water resistant grease (Yamaha grease A)
- Apply molybdenum disulfide grease
- Apply corrosion resistant grease (Yamaha grease D)

- Apply low temperature resistant grease (Yamaha grease C)
- ② Apply injector grease

Symbols (3) to (8) in an exploded diagram indicate the type of sealant or locking agent and the application point.



- Apply Gasket Maker
- 4 Apply Yamabond No. 4
- (§ Apply LOCTITE 271 (red)

- Apply LOCTITE 242 (blue)
- ① Apply LOCTITE 572
- (8) Apply silicon sealant

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Safety while working

To prevent an accident or injury and to ensure quality service, follow the safety procedures provided below.

Fire prevention

Gasoline is highly flammable.

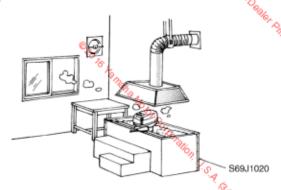
Keep gasoline and all flammable products away from heat, sparks, and open flames.



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Ventilation

Gasoline vapor and exhaust gas are heavier than air and extremely poisonous. If inhaled in large quantities they may cause loss of consciousness and death within a short time. When test running an engine indoors (e.g., in a water tank) be sure to do so where adequate ventilation can be maintained.



Self-protection

Protect your eyes by wearing safety glasses or safety goggles during all operations involving drilling and grinding, or when using an air compressor.

Protect your hands and feet by wearing protective gloves and safety shoes when necessary.



Parts, lubricants, and sealants

Use only genuine Yamaha parts, lubricants, and sealants or those recommended by Yamaha, when servicing or repairing the out-



Under normal conditions, the lubricants mentioned in this manual should not harm or be hazardous to your skin. However, you should follow these precautions to minimize any risk when working with lubricants.

- Maintain good standards of personal and industrial hygiene.
- 2. Change and wash clothing as soon as possible if soiled with lubricants.
- Avoid contact with skin. Do not, for example, place a soiled rag in your pocket.
- Wash hands and any other part of the body thoroughly with soap and hot water after contact with a lubricant or lubricant soiled clothing has been made.
- To protect your skin, apply a protective cream to your hands before working on the outboard motor.

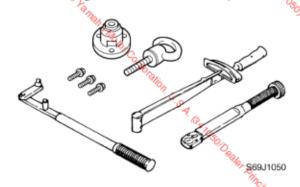
1-3 60V1E11

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Keep a supply of clean, lint-free cloths for wiping up spills, etc.

Good working practices Special service tools

Use the recommended special service tools to protect parts from damage. Use the right tool in the right manner—do not improvise:



Tightening torques

Follow the tightening torque specifications provided throughout the manual. When tightening nuts, bolts, and screws, tighten the large sizes first, and tighten fasteners starting in the center and moving outward.

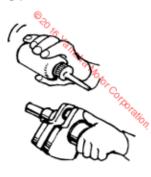
Non-reusable parts

Always use new gaskets, seals, O-rings, cotter pins, circlips, etc., when installing or assembling parts.



Disassembly and assembly

- Use compressed air to remove dust and dirt during disassembly.
- Apply engine oil to the contact surfaces of moving parts before assembly.



S69J1070

- Install bearings with the manufacture identification mark in the direction indicated in the installation procedure. In addition, be sure to lubricate the bearings liberally.
- 4. Apply a thin coat of water-resistant grease to the lip and periphery of an oil seal before installation.
- Check that moving parts operate normally after assembly.

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General information

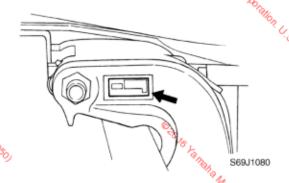
Identification

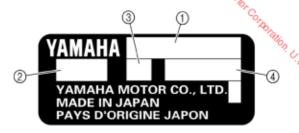
Applicable models

This manual covers the following models.

Applicable models	
Z250TR, LZ250TR	

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





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

Model name	Approved model code	Starting serial No.	
Z250TR	60V	1002362-	
LZ250TR	60W	1001037-	

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Solo Yangha Mobi Corporation U.S.A. S.A.

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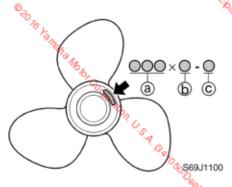
Propeller selection

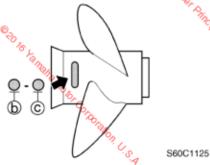
The performance of a boat and outboard motor will be critically affected by the size and type of propeller you choose. Propellers greatly affect boat speed, acceleration, engine life, fuel economy, and even boating and steering capabilities. An incorrect choice could adversely affect performance and could also seriously damage the engine.

Use the following information as a guide for selecting a propeller that meets the operating conditions of the boat and the outboard motor.

Propeller size

The size of the propeller is indicated on the propeller boss end and on the side of the propeller boss.





- a Propeller diameter (in inches)
- (b) Propeller pitch (in inches)
- © Propeller type (propeller mark)

Selection

When the engine speed is at the full throttle operating range (4,500–5,500 r/min), the ideal propeller for the boat is one that provides maximum performance in relation to boat speed and fuel consumption.

Regular rotation model

Dropollor size (in)	Material Material
Propeller size (in)	🥎 wateriai
13 3/8 × 23 - M	MAT CA
13 3/8 × 25 - M	TAO TAIL
13 3/4 × 17 - M2	A Colposation U.S.A. Co.
13 3/4 × 19 - M2	, A .
13 3/4 × 21 - M]
14 1/2 × 19 - T	
14 1/2 × 21 - T]
14 1/2 × 23 - M	Ctainless
14 3/4 × 25 - T	Stairliess
14 7/8 × 21 - M	na Ma
15 × 17 - T	Or Cop.
15 1/8 × 27 - T	O Pallio
15 1/4 × 15 - M	3,4%
15 1/4 × 17 - M	Stainless Stainless Other Corporation U.S. A. R.
15 1/4 × 19 - M]
15 3/4 × 13 - M	1

Counter rotation model

Propeller size (in)	Material
13 3/8 × 23 - ML	18 May
13 3/4 × 17 - ML1	Stainless S.A.
13 3/4 × 19 - ML1	*Oralion
13 3/4 × 21 - ML	Stainland
14 1/2 × 19 - TL	Stalliless Y
14 1/2 × 21 - TL	
15 × 17 - TL	
15 1/4 × 15 - ML _◎	

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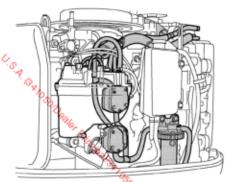
General information

Predelivery checks

To make the delivery process smooth and efficient, the predelivery checks should be completed as explained below.

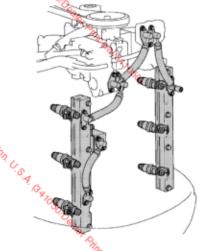
Checking the fuel system

 Check that the fuel hoses are securely connected and that the fuel tank is full with fuel.





S6D01010



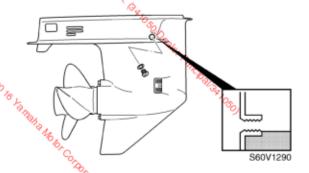
S60V1020

CAUTION:

- Use unleaded straight gasoline only.
- Do not use gasoline mixed with oil (premixed fuel).

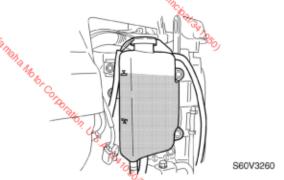
Checking the gear oil level

1. Check the gear oil level.



Checking the engine oil level

- 1. Check the engine oil level.
- Make sure the oil level is between the upper and lower level marks.





Recommended engine oil: YAMALUBE 2-stroke outboard motor oil

1-7 % 60V1E11

Checking the battery

Check the capacity, electrolyte level, and specified gravity of the battery.



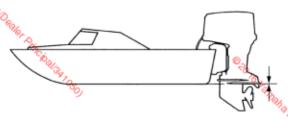
Recommended battery capacity:

CCA/SAE: 512 A MCA/ABYC: 675 A RC/SAE: 182 Minute Electrolyte specified gravity: 1.280 at 20 °C (68 °F)

Check that the positive and negative battery leads are securely connected.

Checking the outboard motor mounting height

1% Check that the anti-cavitation plate is aligned with the bottom of the boat. If the mounting height is too high, cavitation will occur and propulsion will be reduced. Also, the engine speed will increase abnormally and cause the engine to overheat. If the mounting height is too low, water resistance will increase and reduce engine efficiency.



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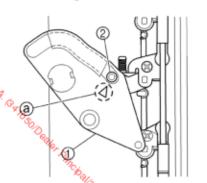
NOTE:

The optimum mounting height is affected by the combination of the boat and the outboard motor. To determine the optimum mounting height, test run the outboard motor at different heights.

Check that the clamp brackets are secured with the clamp bolts.

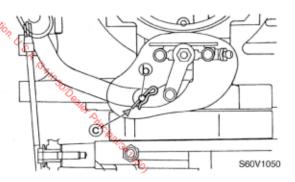
Checking the remote control cables

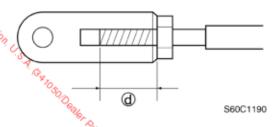
- 1.6. Set the remote control lever to the neutral position and fully close the throttle lever.
- 2. Check that the throttle cam (1) is in its fully closed position and align the center of the throttle cam roller (2) with the alignment mark @.



S60V1040

3. Check that the center of the set pin (b) is aligned with the alignment mark © on the bottom cowling.





CAUTION:

The shift/throttle cable joint must be screwed in a minimum of 8.0 mm (0.31 in) ⓓ.

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Checking the steering system

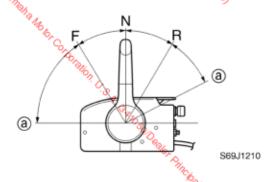
- 1. Check the steering friction for proper adjustment.
- 2. Check that steering the operates smoothly.



3. Check that there is no interference with wires or hoses when the outboard motor is steered.

Checking the gear shift and throttle operation

- 1. Check that the gear shift operates smoothly when the remote control lever is shifted from neutral into forward or reverse.
- 2. Check that the throttle operates smoothly when the remote control lever is shifted from the fully closed position to the fully open position @.

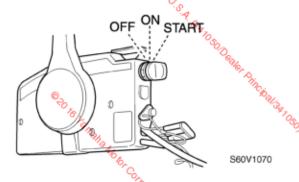


Checking the power trim and tilt system

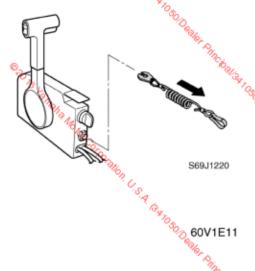
- 1. Check that the outboard motor tilts up and down smoothly when operating the power trim and tilt unit.
- 2. Check that there is no abnormal noise produced when the outboard motor is tilted up or down.
- 3. Check that there is no interference with wires or hoses when the tilted-up outboard motor is steered.
- 4. Check that the trim meter points down when the outboard motor is tilted all the way down.

Checking the engine start switch and engine stop lanyard switch

- 1. Check that the engine starts when the engine start switch is turned to START.
- 2. Check that the engine turns off when the engine start switch is turned to OFF.

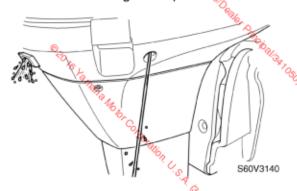


3. Check that the engine turns off when the engine stop lanyard is pulled from the engine stop lanyard switch,



Checking the cooling water pilot hole

Check that cooling water is discharged from the cooling water pilot hole.



Test run

- 1. Start the engine, and then check that the gear shift operates smoothly.
- 2. Check the engine idle speed after the engine has been warmed up.
- Operate at trolling speed.
- 4. Run the outboard motor for 1 hour at 3,000 r/min or at half throttle, then for another hour at 4,000 r/min or at 3/4 throttle.
- Check that the outboard motor does not tilt up when shifting into reverse and that water does not flow in over the transom.

NOTE:

The test run is part of the break-in operation.

Break-in

During the test run, perform the break-in operation in the following four stages.

- 1. First 10 minutes (a) of operation at idle
- Fifty minutes (b) at 3,000 r/min or less
- One hour © at 4,000 r/min or less
- Eight hours repeated wide ope.
 5 minutes or less or le Eight hours at 5,000 r/min or less with repeated wide-open-throttle operation for



S60V1120

A Hour

After test run

- Check for water in the gear oil.
- Check for fuel leakage in the cowling?
- 3. Flush the cooling water passage with fresh water using the flushing kit and with the engine running at idle.



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© 20 IS YA TRANS MAN DO COTO TO BRIGHT U.S.A. SA TO SO DE BARRET PINE



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Specifications

U -	**************************************	To Is Yanaha Motor	**************************************	
GROTATION U.S.A.	Specifica	tions	Mon U.S.A	
General specification	ons		2-1 ^{©y} / ₀	
). 		SODER46	
Power unit			2-3	
Lower unit		, to 1/2, 1/2, 1/2, 1/2, 1/2, 1/2, 1/2, 1/2,	2-4	
Electrical	······· \	To Mayor	2-5	
Dimensions			2-8	1
TO BOTO		°6,		=
Tightening torques			2-10	
Specified torque	S		2-10	
A ROSO	Dealer Drinchaliae	® 30 × 20	A SA TO SO Dealer Dinchal 34	
Plaha A	(96 ₀₎	*anaha	(Ab)	



General specifications

		, (9)	Mo	dal	- 'Vs
Ø _g	Item	Unit 7	Z250TR	LZ250TR	- CSA OF
GANDSOD BEREF PHIK POBLISH	Dimension		868 (568 (1,830	LZZSOTT	- 1
edler S	Overall length	mm (in)	868 (34.2)	
Tinch	Overall width	` ′	568 (
al/ag	Overall height	,	alia,	30%	
	Overall width Overall height (X)	mm (in)	1,830	(72.0)	no.
	(U)	🗽 mm (in)	1,957	(77.0)	173 14
	Boat transom height	mm (in)			O Co
	(X)	mm (in)	635 (25.0)	TOPO
	(U)	mm (in)	762 (30.0)	Tion /
	Weight	, O. A.			Mobor Corporation U.S.A. G.S.
Gy TO A	(without propeller)	/G	70.		Ø _₹
DO.	(X)	kg (lb)	247 (545)	
aller D.	(U)	kg (lb)	252 (556)	
GANGOD BELL ARREST	Performance _©		Mc do .	⊚ _	
TO S	Maximum output	kW (hp)	183.9 (250) a	t 5,000 r/min 🧦 🦠	
	Full throttle operating range 🍇	r/min	9 4,500 to	t 5,000 r/min	na,
	Maximum fuel consumption	🛵 L (US gal,	74 (19.6, 16.3)		To Mo to Corporation U.S.A. G.S.
		Imp gal)/hr			Orco.
	Idle speed	r/min	670-	-730	To ray
	Power unit	"On U_			10h U -
ő.	Type	, S.A.	2-stroke, 76		· SA
8705-	Total displacement	cm3 (cu. in)	3,342 (,	, S
DO	Bore × stroke	mm (in)	93 (3.66) >	, ,	
"Or Par	Compression ratio		6.		
GANOSONOBARA PARICEDALISA	Control system		93 (3.66) > 6. Remote	(O)	
, GA	Control system Starting system Enrichment system		Electric	starter %	
	Enrichment system		Fuel in	jection	² nas
	Ignition control system	4.	T	اد	18.
	Maximum generator output	^{్ర} ్క V, A	12,		Or Co.
	Spark plug	Motor Colonation U.S.A.	BKR6EK	'	The late Corporation U.S.A. G.S.
	Cooling system	"On U	Wa		"On U
á	Exhaust system	. S. A.	Propell	er boss	, S.A.
A TOS	Lubrication system	/6	Oil inj	ection	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
D.O.			00		

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46.			Φ.	
Item Non C	Unit		odel No.	
, S. A		Z250TR	LZ250TŘ	
Fuel and oil			Og To	
Fuel type	DOM/		aded gasoline	b.
Fuel minimum rating	% RON(*1)	I -	00	Mar Age
F	PON		36	"Incho
Engine oil ^(*2)	A SA TO	YAMALUBE 2-Strok	e outboard motor oil	7.
Engine oil tank capacity	L (UC col	10/00	10 0 00 00 N	
Oil tank %	L (US gal,	1.2 (0.3	2, 0.26)	
Remote oil tank	Imp gal)	10.5 /2	77 2 21\ 0	
Hemote on tank	L (US gal,	10.5 (2.1	(1, 2.31) *A	
Gear oil type	Imp gal)	GEARCA	ASE LUBE	
Gear oil grade	SAE		00 A	
Gear oil type Gear oil grade Gear oil quantity	cm ³ (US oz,	1,150 (38.9, 40.5)	1,000 (33.8, 35.2)	
dear on quantity	(03 02,	1,150 (56.9, 40.5)	1	b.
Bracket unit	% inip 02)			der Dincipalisa IOSO)
Trim angle	Degree		o 16	"Incipos
(at 12° boat transom)	Degree	0/2	%,	GA 10
Tilt-up angle	Degree	7	'O TO	ap)
Steering angles	Degree	30 + 30		
Drive unit	Dog. oc	00 + 00 °C		
Gear shift positions		F-1	N-R	
Gear ratio			29/16)	
Reduction gear type		,	evel gear	
Clutch type			clutch	
Propeller shaft type	D _{egy}		line	2/
Propeller direction (rear view)	TO PAIN	Clockwise	Counterclockwise	Prin
Propeller ID mark	*Challa	T, M	TL, ML	Chall
Electrical	105	-	64	er Dinchalias Octo
Battery minimum capacity ^(*3)	9		*Inah	70)
CCA/SAE %	A	5	12	
MCA/ABYC Co.	A	6	75 O _D	
RC/SAE	Minute	11	12	
(*1) RON: Research Octane Number			* 4.0	
PON: Pump Octane Number = (RC			A O	
(*2) If 2-stroke outboard motor oil is not available, a 2-stroke NMMA-certified TC-W3 oil of equivalent quality				
must be used. (*3) CCA: Cold Cranking Ampere			TO RECEIVED TO SERVICE OF THE PERSON OF THE	%.
MCA: Marine Cranking Ampere	Prince			Print
ABYO American Boat and Yacht C		© _₹		Ballo
SAE: Society of Automotive Engine	ers 7000	Ŭ	6 Land	der Principalisa IOSO)
RC: Reserve Capacity	9		That I a	9



Specifications

Maintenance specifications Power unit

		Y.	
Item	Unit	Model	
		Z250TR LZ250TF	₹
Rower unit		** Anna and an	
Minimum compression	kPa	5 60 (5.6, 81)	
pressure*	(kgf/cm², psi)	- Saldin	
Cylinder heads	a mah	9	
Warpage limit	mm (in)	0.1 (0.004)	
(lines indicate straightedge	[C	Ration U.S.A. SA 1050 Dealer Philip	
position)	0_	70 ₀₀	
Cylinders Bore size Bore size limit	mm (in) mm (in)	93.000–93.020 (3.6614–3.6622) 93.100 (3.6654)	
Taper limit	mm (in)	0.08 (0.0031)	
Out-of-round limit	mm (in) 🌂	0.05 (0.0020)	
Pistons Piston diameter (D) Measuring point (H) Piston-to-cylinder clearance Piston pin boss bore	mm (in) mm (in) mm (in) mm (in)	92.830–92.850 (3.6547–3.6555) 10 (0.39) 0.165–0.171 (0.0065–0.0067) 26.004–26.015 (1.0238–1.0242)	
Oversize piston	0_	TC Day	
1st,	mm (in)	0.25 (0.010)	
2nd D	mm (in)	0.50 (0.020)	
Oversize piston diameter	816 p		
1st	mm (in)	93.080–93.100 (3.6646–3.6653)	
2nd	mm (in) 🤏	93.330–93.350 (3.6744–3.6752)	
Piston pins		OR C.	
Outside diameter	mm (in)	25.995–26.000 (1.0234–1.0236)	
* Measuring conditions: Ambient temperature 20 °C (68 ° cylinders. The figures are for reference only		hrottle, with spark plugs removed from all	
**TOSO)	16 Yantaha ka	Clinchalisa roso,	
	* Obr Corp	Oration U.S.A. S.A. D.Soldenker Princ.	
2-3		A CANDODO	60V1E11
Wer .		786, D.	
Mr.		The.	

^{*} Measuring conditions:

toration U.S.A. G. A.D. Sold 2-3 60V1E11

'A.				
Item	Unit	Model		
	, O.	Z250TR	LZ250TR	
Piston rings	, Oak			
Top ring _{←T→}	ľ	D. Comments of the Comment of the Co		
Dimension B	mm (in)	2.05 (0	0.0807)	
Dimension T	mm (in)	3.00–3.20 (0).118–0.126)	
End gap	mm (in)	0.30-0.50 (0.0	0118–0.0197) 🇞	
Side clearance →115	mm (in)	0.02-0.06 (0.0	0008–0.0024) 🐾	
2nd piston ring			Taha A	
Dimension B	🏡 mm (in)	2.05 (0).0807)	
Dimension T	mm (in)	2.70-2.90 (0).106–0.114)	
End gap	mm (in)	0.30-0.45 (0.	0118–0.0177)	
Side clearance	mm (in)	0.02-0.06 (0.0	0008-0.0024)	
Connecting rods	, Q ²			
Small end inside diameter	mm (in)	31.000–31.012 (1.2205–1.2209)		
Big end side clearance	mm (in)	0.12-0.26 (0.0047-0.0102)		
Small end axial play limit	mm (in)	2.0 (0.08)		
Crankshaft %		Raliza .	% ₇	
Crankshaft journal diameter	mm (in)	58.975-58.991	(2.3219–2.3225) 🐾	
Crankpin diameter	mm (in)	40.485–40.500 (1.5939–1.5945)		
Runout limit	🛵 mm (in)	0.02 (0	0.0008)	
Thermostats	COTAD			
Opening temperature	°C(°F)	48-52 (118-126)		
Fully open temperature	°C (°F)	60 (140)	
Valve open lower limit	mm (in) 🔩	4.3 (0.17)	
Oil pump		Polo		
ID mark		60\	/11	
Bleeding		Screv Screv	v type	
Reed valves		No. of the last of	50 /s	
Valve stopper height limit 🔩	mm (in)	8 (0.31)		
Valve bending limit	mm (in)	0.2 (0	.31) ************************************	
~	6,		~	

Lower unit

	0,,				
Item	Unit	Model			
item	One	Z250TR	LZ250TR		
Gear backlash	, Q*				
Pinion-to-forward gear	mm (in)	0.13-0.42	0.32-0.64		
		(0.0051–0.0165)	(0.0126-0.0252)		
Pinion-to-reverse gear	mm (in)	0.64-0.93 (0.	0252-0.0366)		
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 🍇		
Propeller shaft shims	mm	_	0.10, 0.12, 0.15, 0.18,4		
	Or Co		0.30, 0.40, 0.50		
Propeller shaft	TO TO				
End play	mm (in)	_	0.25-0.35		
	, s, A		(0.0098-0.0138)		

60V1E11 2-4



Specifications

Electrical

	³ / _{dtem}	Unit	Unit Modely		
	70.		Z250TR	LZ250TR	
	Ignition and ignition control			TO ROLL	
	system %			DC 9	
0	Ignition timing		® ₃ ,	Charles	
® do la Yannal	Cylinder #1 at engine idle speed	Degree	ATI	OC 9	
* mail	at engine idle speed 🦠	Degree Degree	ATL	OC 19	
	1 %.	_	1.561.6.0	059–0.063)	
	Spark plug gap	mm (in)	1.5-4.6 (0.	059-0.063)	
	Ignition coil resistance		*Orallic		
	Primary coil (R – B/W)	Ω	1 26	[?] ∠ −1:84	
	at 20 °C (68 °F)	1 22	1.30	1 2	
	Secondary coil (B/W – spark plug wire)			*1050	
	- C	kΩ	7 21.	-9.89	
	at 20 °C (68 °F)	N32	7.31	-3.03 V/A//	
® do ya maj	ECM output peak voltage (R 28/W)		_©	-9.89 ***********************************	
16 K	at crapking (loaded)	V	10 % L	60	
a maj	at cranking (loaded) % at 1,500 r/min (loaded)	V	S Inaly O	60	
	at 3,500 r/min (loaded)	V	8 Mg 2	-9.89 *** *** **** ***** ****************	
	Pulser coil output peak voltage	1	1 Or Cop. 2	00	
	(W/R, W/B, W/Y, W/G,		*Oralia		
	W/L, W/Br – B)		9	200	
	at cranking (unloaded)	V	9	5 6	
	at cranking (leaded)	v	3	5	
	at 1,500 r/min (loaded)	V	20	0.0	
	at 3 500 r/min (loaded)	v	30	0.0	
02	Pulser coil resistance	Ω	© 294.	-398	
16 K	(W/R, W/B, W/Y, W/G,		10 to	Jay Jose	
® do la Yannal	W/L, W/Br – B)		a mah.	30	
	Throttle position sensor		30 294- 294- 2016 Yangha Makar Corporation 0.58-		
	Input voltage (O – R)	V	Or Cox	5	
	Output voltage (P – O)		AD PORTO		
	at engine idle speed	V	0.58	-0.62	
	Crank position sensor output		0.00	7.0	
	peak voltage (G/L – G/W)			*10 Sn	
	at cranking (unloaded)	V		.5 %	
	at cranking (loaded)	V	1	.5	
©	at 1,500 r/min (loaded)	V		.0 Replacement	
10 K	at 3,500 r/min (loaded)	V	10/20	Y.	
a maj	at 1,500 r/min (loaded) at 3,500 r/min (loaded) The figures are for reference or	nlv	analy,	, yy	
	May 190 190 100 100 100 100 100 100 100 100		"Mon		
	T COPE		T COP		
	*Orallo		*Orallic		
	77. U.S.		9	? U ₀	
	A.G.			A.G.	
	2-5			7000 00ME11	
	C1) The figures are for reference of the figures are for reference			C.O. Con	
	* Alip			or Pring	
	°€.			°€.	

Sala Salaha Mobi Co

		Ph.		
	ltono	Na Strange	Model	
	Item	Unit?	Z250TR LZ250TR	
A GA TO SO DE REF PRINCIPALIS	Crank position sensor	Ω	178 5_2/1 5	
10802	resistance(*1) (G/L - G/W)		0.5–1.5 (0.02–0.06) 0.5–1.5 (0.02–0.06) 0.3–0.4	
88/6.	Crank position sensor air gap	mm (in)	0.5–1.5 (0.02–0.06)	
Prince	Intake air temperature sensor	, ,	Anna.	
· ballo	resistance		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	h
3	%, at 0 °C (32 °F)	kΩ	5.4-6.6	o le kaman
	-+ 00 00 (470 0F)	kΩ	0.3–0.4	"Day
	Engine temperature sensor	kΩ kΩ _{On} U _S		- 1
	resistance (B/Y – B/Y)	Cor		
	at 20 °C (68 °F)	kΩ	54.2-69.0	
	at 100 °C (212 °F)	kQ V	3.12–3.48	
SANOSODERIEF PARCHOLISE	Fuel control system	1,22 .5	5.1E 5.70	+
A TOS	Injector driver output peak	^	×705	
D.O.S.	voltage ^(*1)		TOD .	
War Pa	(Pu/R – O/R, Pu/B – O/B,		*6r Ag.	
The box	Pu/Y – O/Y, Pu/G – O/G,		Mr.bis.	
1/3	Pu/L – O/L, Pu/W – O/W)		Way,	b.
	at cranking (loaded)	v	OSODester Principalisariosoj 70	To taman
	at 1,500 r/min (loaded)	4 V	80	W.
	at 3,500 r/min (loaded)	OFC. V	80	
	Fuel injector resistance(*1)	V Maker Corporation U.S.A.		
	at 20 °C (68 °F)	C Non	0.9–1.1	
	Fuel pressure sensor output	V .S.	3.2	
Q _Z	voltage (engine idle speed)(*1)	V * 4	3.2	
500	(O – P)		SON THE PROPERTY OF THE PROPER	
SANOSOD BERET PRINCIPALIS	Starter motor			+
Chine	Type		Sliding gear og 1.4	
Palis	Type	kW	Silulity year o	b,
1	October 0/2	Cocond	1.4	o Is yanga
	Cranking time limit	Second	30	TRAIN
	Brushes	inm (in)	45.5 (0.04)	
	Standard length	mm (in)	15.5 (0.61)	
	Wedi iiiiii	mm (in)	9.5 (0.37)	
	Commutator	300		
Ø,	Standard diameter	mm (in) 🤫	29.0 (1.14)	
*1050	Wear limit	mm (in)	28.0 (1.10)	
ORAL	Mica		TO ROME	
Pr. Prin	Standard undercut	mm (in)	0.5–0.8 (0.02–0.03)	
SANSODERE PARCHAIS	Wear limit	mm (in)	0.2 (0.01)	
, G	The figures are for reference on	ly.	**************************************	16 Xamana
	a ray		<i>*</i> 9	amah
	Ĭ	are,		1
		Or Cox		
		Porali		
		"On 1.		

2-6 60V1E11

SPEC U

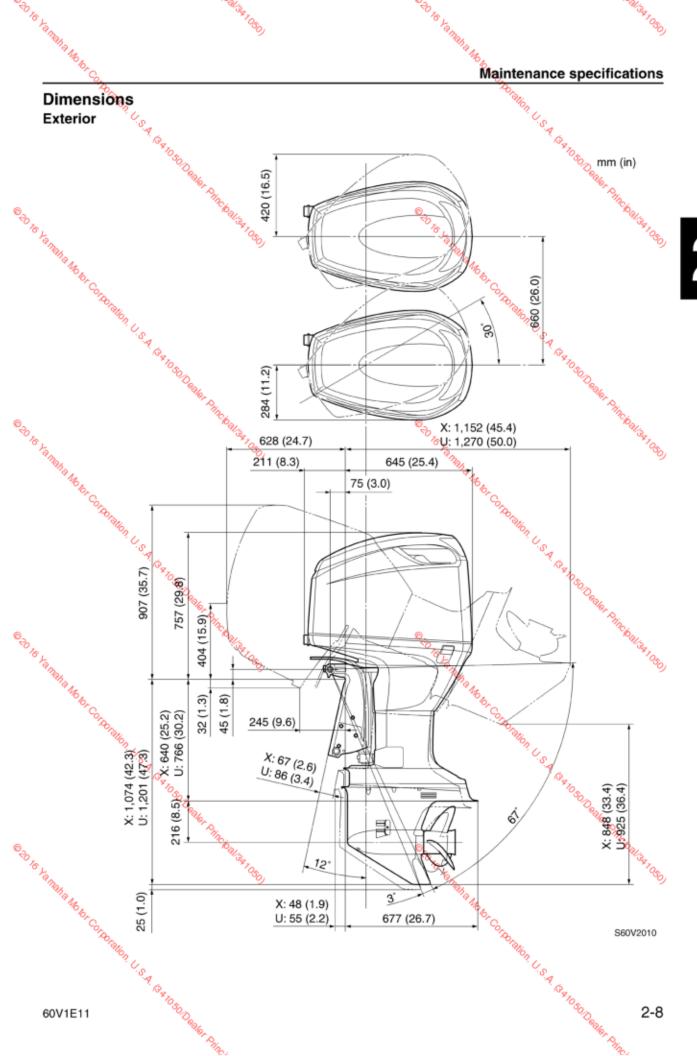
Specifications

TO IS YOU	M341080)	R Sam	- W. S. C.
SPEC Specification	าร	S Xa Raha Motor Color	
Item 17 C.S.	Unit	Model %, Z250TR LZ250TR	
Fuse Stator coil output peak voltage	Α	20, 30, 100 Ray	
(G – G) at cranking (unloaded) at 1,500 r/min (unloaded)	inchallage V	5.5 40 90	de ballisa roso,
at 3,500 r/min (unloaded) Stator coil resistance ⁽¹⁾ at 20 °C (68°F) (G – G) Rectifier Regulator output	Ω	*Mobile	
peak voltage (R ground) at 1,500 r/min (unloaded) at 3,500 r/min (unloaded)	V V	0.11-0.17 O _{ROPARION U.S.} 14.5 14.5	
Power trim and tilt system Trim sensor Setting resistance Resistance (P – B)	inchal _{3ex} Ω	9–11 9–387.6	achalisa 1050,
Fluid type (*1) The figures are for reference on		ATF Dexron II	
O'ROTATION U.S.A. C.A. TOSO DE RAF.	Sinchal Salor	© AD IS YOR REAL RANGE TO SA T	ochalist, o.
Sanaha Mobo	9)	© 30 le Va Raha No. Le.	Y)

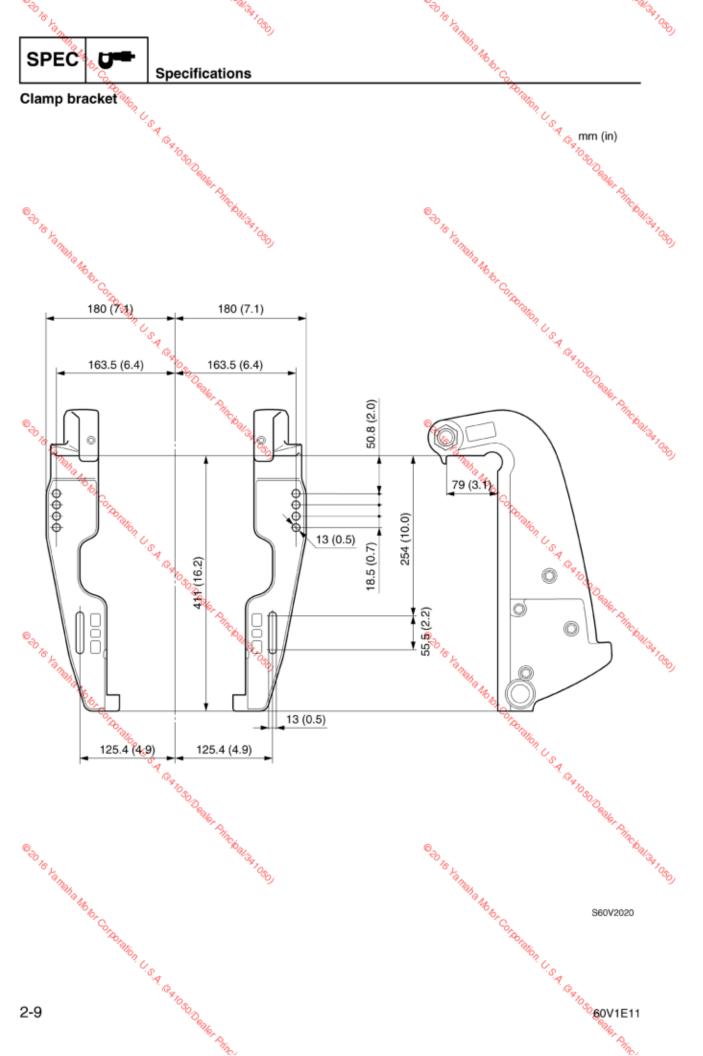
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© R. S. A. R. A. R



41.34 TOSO



Tightening torques Specified torques

Dada ba data a	G _V	Tightening torques			
Part to be tightened	Thread size	N⋅m	kgf⋅m	ft⋅lb	
Fuel system		Por Por		_	
Fuel pump screw		M5 %	3	0.3	2.2
Emergency switch		_ %	4	0.4	3.0
High-pressure fuel pump bolt		M8	[®] 26	2.6	19.2 %
Power unit					*
Negative battery terminal nut	O _r Co.	M8	12	1.2	8.9
Drive belt tensioner bolt	AD Par	M10	39	3.9	28.8
Starter motor bolt	100 L	M8	29	2.9	21.4
Intake air temperature sensor	2.4	_	8	0.8	5.9
Destifier Descriptor helt	1st	° _{y,to} o M6	6	0.6	4.4
Rectifier Regulator bolt	2nd	POINID	12	1.2	8.9
PTT motor lead bolt		M6 ₂	4	0.4	3.0
Shift position switch screw		M4 %	3	0.3	2.2
Control lever stopper screw ,		_ ~	2	0.2	1.5,
ang,	1st		[®] 28	2.8	20.7 %
⁷⁷ 2 Ag	2nd		45	4.5	33.2
Connecting rod cap	3rd	M9	Loo	sen comple	tely
	4th		28	2.8	20.7
	5th		45	4.5	33.2
Crankshaft balancer nut	, 2, A	M32	100	10.0	73.8
	1st	ANTO	17	1.7	12.5
Crankasas halt	2nd	%M10	34	3.4	25.1
Crankcase bolt	1st	NACO.	4	0.4	3.0
⊚ _	2nd	M676	9	0.9	6.6
©ylinder head bolt	1st	NO. 100	15	1.5	184,
©ylinder head bolt	2nd	M8	³⁹ 29	2.9	21.4 %
· Ao	1st	Me	5	0.5	3.7
Cylinder head cover bolt	2nd	M6	11	1.1	8.1
Fuhavist avitari saviari halt	² 1st	MC	5	0.5	3.7
Exhaust outer cover bolt	2nd	M6	11	1.1	8.1
Flywheel nut	24	M24	190	19.0	140
Fuel rail mounting bolt		₹ _% M8	23	2.3	17.0
Fuel filter cup holder mounting bolt		M6	8	0.8	5.9
Injector holder bolt		MB	26	2.6	19.2
Intake silencer mounting screw		M6 %,	3	0.3	2.2
Reed valve mounting screw %		M5	3	0.3	2.2
Intake manifold bolt		M6	[®] 13	1.3	9.6
Oil pump mounting bolt		M6	7	0.7	5.2
Drogouro control vehic sever helt	് _{റ,} 1st	Me	5	0.5	3.7
Pressure control valve cover bolt	2nd	M6	11	1.1	8.1
Shift cut switch mounting screw	100	M4	3	0.3	2.2

60V1E11 2-10

WGW TOSO

Minchalist 1000,

Anchalas Icho,

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Anchalas I Oso,

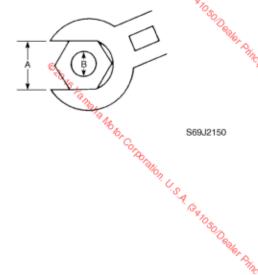
No to		**************************************		30 % Y	naha Mobor Co	
		9			naha na	
SPEC Specifications					** An Con	
Donat de l'altre		T1	Tig	htening torq	ues	l,
Part to be tightened ?		Thread size	N⋅m	kgf⋅m	ft-lb	N. U.S.A. ISA NOSOD BERKER DIJI
Spark plug	· Pa	M14	25	2.5	18.4	W. Co.
Positive battery terminal nut	350	M8	9	0.9	6.6	0500
Thermostat cover bolt	edler.	M6	11	1.1	8.1	edler.
Throttle hade maring helt and not	1st	No.	4	0.4	3.0	1 Pag
Throttle body mounting bolt and nut	2nd	% M6	10	1.0%	7.4	1
Power unit mounting bolt		M8	32	3.2 %	23.6	1
Lower unit (regular rotation model)					ahan.	1
Gear oil check screw		M8	9	0.9	6,6	1
Lower case mounting bolt		M10	47	4.7	34.7	1
Pinion nut		M16	142	14.2	104.7	
Propeller nut)	M18	54	5.4	39.8	0.82
Propeller shaft housing bolt	· Ogy	M8	30	3.0	22.1	O. S. A. S. A. D. S. O. D. C. B. R. P. P. P. P. R. P.
Trim tab mounting bolt	300	M10	42	4.2	31.0	050
Gear oil drain screw	16 Alex	_	9	0.9	6.6	ea _{ler}
Grease nipple		no. —	6	0.6	4.4	`^n
Lower unit (counter rotation model)	A STORY		€.		1
Gear oil check screw	,	M8	9	0.9 %	6.6	1
Lower case mounting bolt		M10	47	4.7	34.7	1
Pinion nut		M16	142	14.2	104.7	1
Propeller nut		M18	54	5.4	39.8	1
Ring nut		_	108	10.8	79.7	
Propeller shaft housing bolt)	M8	30	3.0	22.1	1.00
Trim tab mounting bolt	₹	M10	42	4.2	31.0	A. 62
Gear oil drain screw	**************************************	_	9	0.9	6.6	*10 ₅₀
Grease nipple		_	6	0.6	4.4	SA SANOSODERHAT PAIN
Bracket unit	~~~	n _{in}		0.0		**************************************
Flushing hose adapter screw		M5	5	0.5	3.7	1
Upper case mounting bolt		M ₈	32	3.2	23.6	1
Lower exhaust guide mounting bolt		M8	22	2.2	16.2	1
Exhaust guide bolt		M8	32	3.2	23.6	1
Exhaust manifold mounting bolt		M8	25	2.5	18.4	1
Muffler mounting bolt		M8	25	2.5	18.4	
Lower rubber mount nut)	M14	72	7.2	53.1	200
Through tube nut	<u>4</u>	M22	22	2.2	16.2	A. 6-
Trim rod stopper nut	No.	M10	36	3.6	26.6	1050
Upper rubber mount nut	-0 84	M14	72	7.2	53.1	*O _{RRAL}
Friction plate screw	Top.	M6	4	0.4	3.0	N. U.S.A. ISA NOSOD BERKE DIJA
Power trim and tilt unit		TVIO IVIO	-7	0.4	0.0	1
Blind plug		A STATE OF THE STA	7	0.7	5.2	1
Gear pump housing mounting screw		M4	2	0.7	1.5	-
Gear pump housing bolt		M5	4	0.2	3.0	1
Trim down spring screw		M5	4	0.4	3.0	{
Main valve			11	1.1	~~	l
3.4		_	2		8.1 ³	30
Manual valve	4		2	0.2	1.5	1 4
0.11	705m					S.A. S.A.D.SO.D.B. Role P. Philip
2-11	DO				60V1E11	TO Dear
	Wer L	<u>.</u>				Wet Par
	TO A	nno.				*6

Rangha Make Co	W. R. OSO,	Tightening torque		
TO SUID		Tig	htening torq	70,
Part to be tightened	Thread size	N⋅m	kgf·m	ft⋅lb
PTT motor unit mounting bolt	M8	19	1.9	14.0
Oil pipe	_	15	1.5	11.1
Relief valve cap screw	M5	4	0.4	3.0
Reservoir mounting bolt	M8	19	1.9	14.0
Reservoir cap	% M12	7	0.7	5.2
Tilt cylinder end screw	(%)—	90	9.0 6	66.4
Tilt rod	_	55	5.5	40.6
Trim cylinder end screw 6	_	160	16.0	%,118
Trim rod	_	38	3.8	28.0
Valve plate bolt	M6	7	0.7	5.2%
PTT unit mounting bolt	M10	42	4.2	31.0

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 torque is reached. Unless otherwise specified, torque specifications require clean, dry threads. Components should be at room temperature.

		General torque				
Nut (A)	Bolt (B)	specifications				
	⊚_	N⋅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 [°] C	3.6	25		
17 mm	M12	43	⁶ ∕4.3	31		



60V1E11





Periodic checks and adjustments

Special service tools	3-1 *** ₇₀
The state of the s	OD.
Maintenance interval chart	3-1 ************************************
Maintenance interval chart	O-Z Princ.
Fop cowling	Palis
Top cowling	3-4 *** ₇₀ ,
Checking the top cowling	3-4
70 Mg	
Fuel system	3-4
Fuel system	3-4
Checking the fuel filter	(A)
Checking the high-pressure fuel pump gear oil level	
Changing the high-pressure fuel pump gear oil	3-5
onanging the mgc procedure reci pump goal oliminimi	70.

Power unit	
Checking the engine oil level	3-6 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
Checking the drive belt	3-6 P _{N/S}
Replacing the drive belt Replacing the drive belt	3-6 You
Checking the spark plugs	3-6
Checking the thermostats	3-7
Checking the cooling water passage	3-8
TO TANK	0,
Control system	3-8
Checking the engine idle speed	
Adjusting the throatle cable	3-0
Checking the gear shift operation	3-9 %
Checking the gear spin operation	-10 %
•	****
Oil injection system3 Adjusting the oil pump link rod.2	nne
©Oil injection system3	-11 ~~ _{W₂}
مِي Adjusting the oil pump link rod مِنْ Adjusting the oil pump link rod مِنْ اللهِ عَلَيْمَ اللهِ عَلَيْمَ ال	-11 ***********************************
*May	9
Power trim and tilt unit	-11
Checking the power trim and tilt operation	
Checking the power trim and tilt fluid level	સ્ત્ર <u>1</u>
Chocking the power than and the hard lover minimum.	Mich.
	100
Lower unit3	-12
Checking the gear cil level3	-12 ************************************
Changing the gear oil	-12 °O
Checking the lower unit for air leakage	-12
Checking the propeller	-14 %
© TO STORE OF STORE O	Way.
General 3	-14
Checking the anodes3	-14
Checking the battery3	
A A A A A A A A A A A A A A A A A A A	Pa.
Lubricating the outboard motor	-15 Palice U.S.A. GANOSODERIE PARE
	· 64
· Age	· Qg
1	0 ₈₀
· · · · · · · · · · · · · · · · · · ·	O Ralle
*** An.	"T Phy.
The state of the s	76.



Periodic checks and adjustments

Special service tools



© 30 16 Ya Raha Mobi Coronalion U.S.A. Inductive self-powered tachometer YU-08036-B



Battery powered timing light YM-33277-A



Pressure/vacuum tester YB-35956-A

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Maintenance interval chart

Use the following chart as a guideline for general maintenance.

Adjust the maintenance intervals according to the operating conditions of the outboard motor.

	1000	Initial Every			ery	Referto
Item	Remarks	10 hours	50 hours	100 hours	-	page
	- Ting	(1 month)	(3 months)	(6 months)	(1 year)	page
Top cowling	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
Top cowling fit	Check/adjust 7	b ,			15 O	3-4
Fuel system					"ahan	
Fuel system %	Check	0	0	0	*Obr	3-4
Fuel filter	Clean/replace	0	0	0		3-5
(water separator)	Pation,					Rition
Fuel tank	Clean				0	
High-pressure fuel pump	Check				0	3-5
oil ^(*1)	1050 x					
Power unit	O83/6.					
Drive belt ^(*2)	Check %				0	3-6
Spark plugs	Clean/adjust/replace	0	0	0 🗞		3-6
Cooling water	Clean	2	0	0	5	3-8
passages ^(*3)		9			"mah	
Oil tank water drain 🐾	Check/clean	0	0	0	S Ya Maha Mobor	_
Outboard motor exterior	Check	0	0	0	,	<u> </u>
Control system	Pa _{llis}					Oralin .
Idle speed	Check/adjust	0		0		3-8
Throttle position sensor	Check/adjust				0	4-26
Throttle link	Check/adjust				0	4-24
Throttle pick-up timing	Check/adjust				0	4-24
Power trim and tilt unit	Or Ani					
Power trim and tilt unit	Check			0,	0	3-11
Power trim and tilt	Check	0	0	0 ~	5,	3-11
operation %		b)			a mah	
Lower unit					14.	
Gear oil	Change	0		0	- P	3-12
Propeller	Check	0	0	0		²⁰ 3 _₹ 13
General	, M. C.					100 C
Anodes	Check/replace		0	0		3-14
Battery	Check/charge	0				3-14
,						
	76, D.	month)				
Bolts and nuts	Tighten %	o ´		0,		_
Lubrication points	Tighten Lubricate Check			0 %	5 ,	3-15
Exhaust leakage	Check	9 0	0	0	tana,	_
Water leakage	Check	0	0	0	S Xanaha Mobro	_
Wiring and connectors	Check/reconnect	0	0	0	bro	_
7	2					26.

60V1E11 3-



Periodic checks and adjustments

NOTE:

- (*1) Be sure to change the high-pressure fuel pump oil every 1,000 hours of operation or every 5 years.
- (*2) Be sure to replace the drive belt every 1,000 hours of operation or every 5 years.
- (*3) The engine should be flushed with fresh water after operating in salt, turbid, or muddy water.

CAUTION:

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If the flywheel magnet cover is removed to service the outboard motor, be sure to check that the fuel hoses are routed correctly before installing it.

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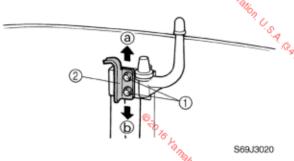
Sad is tannella the borcore de la constant la sad is a formation de la constant la sad is a formation de la constant la consta

Top cowling Checking the top cowling

Check the fitting by pushing the cowling
 with both hands. Adjust if necessary.



- Loosen the bolts ①.
- Move the hook ② up or down slightly to adjust its position.

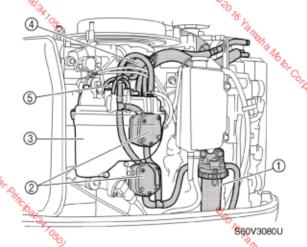


NOTE:

- To loosen the fitting, move the hook in direction a.
- To tighten the fitting, move the hook in direction (b).
- Tighten the bolts.
- Check the fitting again and, if necessary, repeat steps 2–4.

Fuel system Checking the fuel joint and fuel hoses (fuel joint-to-fuel injector)

- Remove the flywheel magnet cover and ignition coil cover.
- 2. Check the low-pressure fuel hose connections and fuel joints for leaks. Replace if necessary. Also, check the fuel filter ① and fuel pumps ② for leaks or deterioration. Replace if necessary.
- Check the medium-pressure fuel hose connections and fuel joints for leaks. Replace if necessary. Also, check the vapor separator ③, fuel filter ④, and pressure regulator ⑤ for leaks or deterioration. Replace if necessary.

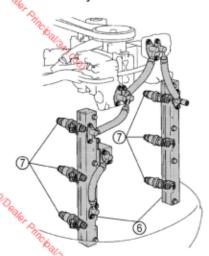


60V1E11 % 3-4



Periodic checks and adjustments

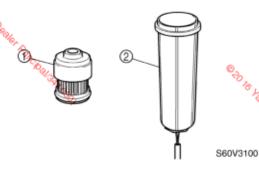
Check the high-pressure fuel hose connections for leaks. Replace if necessary.
 Also, check the fuel rails ⑥ and fuel injectors ⑦ for leaks or damage. Replace if necessary.



S60V3090

Checking the fuel filter

 Check the fuel filter element ① for dirt and residue and check the fuel filter cup ② for foreign substances and cracks. Clean the cup with straight gasoline and replace the element if necessary.

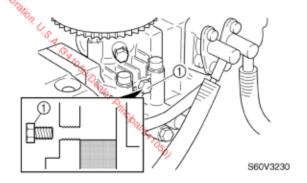


NOTE:

Be sure not to spill any fuel when removing the fuel filter cup.

Checking the high-pressure fuel pump gear oil level

- 1. Remove the flywheel magnet cover.
- Remove the check bolt ①, and then check the gear oil level in the high-pressure fuel pump.



NOTE:

If the oil is at the correct level, the oil should overflow out of the check hole when the check bolt is removed.

 If necessary, add sufficient gear oil of the recommended type until it overflows out of the check hole.

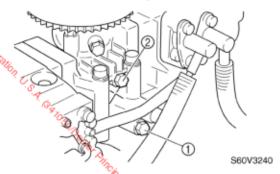


Recommended gear oil: GEAR CASE LUBE

4. Install the check bolt.

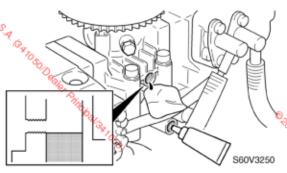
Changing the high-pressure fuel pump gear oil

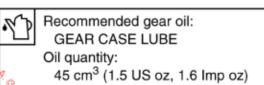
- 1. Remove the flywheel magnet cover.
- Place a drain pan under the drain bolt, remove the drain bolt ①, then the check bolt ② to drain the oil.



 Insert a 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.

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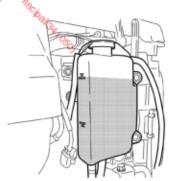


- Install the check bolt and quickly install the drain bolt.
- 5. Install the flywheel magnet cover.

Power unit

Checking the engine oil level

- Place the outboard motor in an upright position.
- 26 Check the engine oil level.
- Make sure the oil level is between the upper and lower level marks.



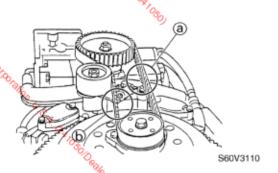
S60V3260



Recommended engine oil: YAMALUBE 2-stroke outboard motor oil

Checking the drive belt

- 1. Remove the flywheel magnet cover.
- While turning the flywheel magnet clockwise, check the interior (a) and the exterior (b) of the drive belt for cracks, damage, or wear. Replace if necessary.



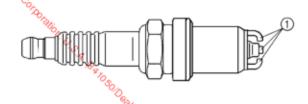
Replacing the drive belt

NOTE: _

For replacement procedures, see Chapter 5, "Removing the drive belt and sprockets" and "fastalling the sprockets and drive belt."

Checking the spark plugs

- Disconnect the spark plug wires, and then remove the spark plugs.
- Clean the electrodes ① with a spark plug cleaner or wire brush. Replace the spark plug if necessary.



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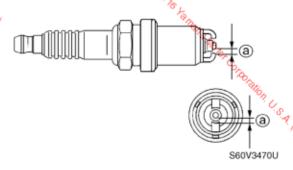
60V1E₂₁ 3-6



Periodic checks and adjustments

- Check the electrodes for erosion and excessive carbon or other deposits, and the gasket for damage. Replace the spark plug if necessary.
- Check the spark plug gap

 Adjust if out of specification.

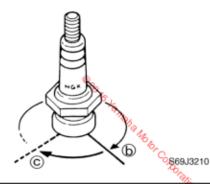




Specified spark plug: BKR6EKU (NGK) Spark plug gap @:

1.5-1.6 mm (0.059-0.063 in)

Install the spark plugs, tighten them finger tight b, then to the specified torque with a spark plug wrench c.



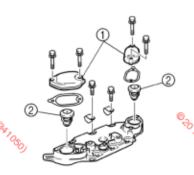


Spark plug:

25 N·m (2.5 kgf·m, 18.4 ft·lb)

Checking the thermostats

- 1. Remove the flywheel magnet cover.
- 2. Remove the covers and thermostats 2.



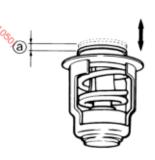
S60V3120

- Suspend the thermostats in a container of water.
- Place a thermometer in the water and slowly heat the water.



S69J5E40

 Check the thermostat valve opening at the specified water temperatures.
 Replace if out of specification.



S69J5E50

Water temperature	Valve lift @
48–52 °C (118–126 °F)	0 mm (0 in) (valve begins to lift)
above 60 °C (140 °F)	more than 4.3 mm (0.17 in)

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 Install the thermostats and covers, and then tighten the cover bolts to the specified torque.

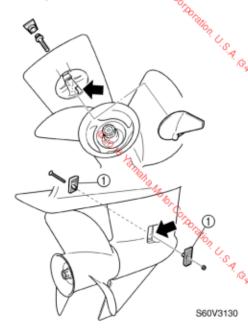


Thermostat cover bolt:

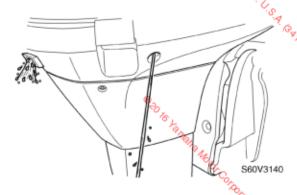
11 N·m (1.1 kgf·m, 8.1 ft·lb)

Checking the cooling water passage

Check the cooling water inlet cover ①
 and cooling water inlet for clogs. Clean if
 necessary.

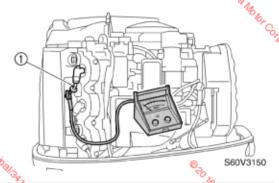


- 2. Place the lower in water, and then start the engine.
- Check for water flow at the cooling water pilot hole. If there is no water flow, check the cooling water passage inside the outboard motor.



Control system Checking the engine idle speed

- Start the engine and warm it up for 5 minutes.
- Attach the special service tool to spark plug wire #1 ①, and then check the engine idle speed. Adjust if out of specification.



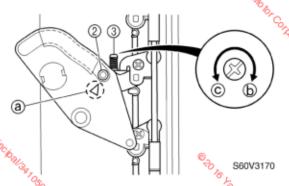


Inductive self-powered tachometer: YU-08036-B



Engine idle speed: 670-730 r/min

- Check that the center of the throttle cam roller ② is aligned with the alignment mark ③.
- 4. Turn the throttle stop screw in direction of or of until the specified engine idle speed is obtained.



NOTE:

- To increase the idle speed, turn the throttle stop screw in direction

 .
- To decrease the idle speed, turn the throttle stop screw in direction ©.

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Periodic checks and adjustments

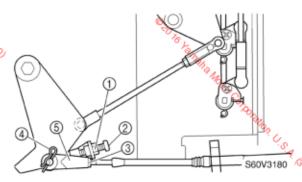
 Press down on the throttle came and tighten throttle adjusting screw #4 by turning it counterclockwise.

Adjusting the throttle cable

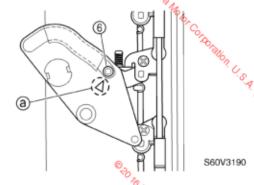
NOTE:

- Be sure to synchronize the throttle valves before adjusting the throttle cable.
- For synchronizing procedures, see Chapter 4, "Synchronizing the throttle valves."
- Loosen the locknut ① and stopper screw
 ②.
- Loosen the locknut ③, remove the clip

 4, and then disconnect the throttle cable joint ⑤.

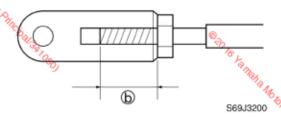


- Set the remote control lever to the fully closed position.
- Align the center of the throttle cam roller
 with the alignment mark a.



- 5. Tighten the stopper screw until it contacts the throttle lever.
- Tighten the locknut.

Adjust the position of the throttle cable joint until its hole is aligned with the set pin on the throttle lever.



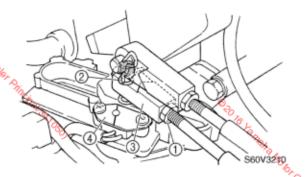
CAUTION:

The throttle cable joint must be screwed in a minimum of 8.0 mm (0.31 in) (b).

- 8. Connect the cable joint, install the clip, and then tighten the locknut.
- Check the throttle cable for smooth operation and adjust the cable length, if necessary, repeat steps 1–8.

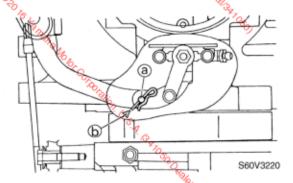
Checking the gear shift operation

- Check that the gear shift operates smoothly when shifting from neutral into forward or reverse. Adjust the shift cable length if necessary.
- Set the gear shift to the neutral position.
- Loosen the locknut ①, remove the clip
 ②, and then disconnect the shift cable
 joint ③.

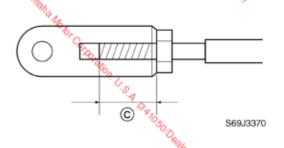


3-9

- Adjust the position of the shift lever until the pin on the lever is aligned with the line on the shift position switch plate 4.
- Align the center of the set pin (a) with the alignment mark (b) on the bottom cowling.



6. Adjust the position of the shift cable joint until its hole is aligned with the set pin.



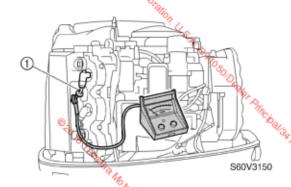
CAUTION:

The shift cable joint must be screwed in a minimum of 8.0 mm (0.31 in) ©.

- Connect the cable joint, install the clip, and then tighten the locknut.
- Check the gear shift for smooth operation and adjust the shift cable length, if necessary, repeat steps 3–76.

Checking the ignition timing

- Start the engine and warm it up for 5 minutes.
- Attach the special service tool to spark plug wire #1 ①, and then check the engine idle speed.



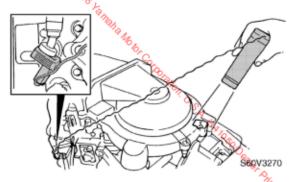


Inductive self-powered tachometer: YU-08036-B



Engine idle speed: 670-730 r/min

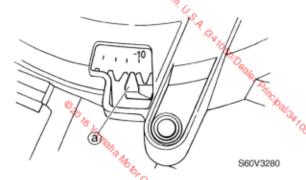
Attach the special service tool to spark plug wire #1.





Battery powered timing light: YM-33277-A

 Check that the pointer (a) is within the specified ignition timing range on 8the flywheel magnet.





Ignition timing at engine idle speed: ATDC 6°-ATDC 12°



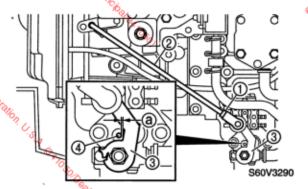
Periodic checks and adjustments

Oil injection system Adjusting the oil pump link rod

1. Loosen the locknut ①, then disconnect the oil pump link rod ②.

NOTE: Review "Synchronizing the throttle valves" (page 4-24 of the Service Manual) and "Adjusting the throttle position sensor" (page 4-26 of the Service Manual) before proceeding.

- Loosen the throttle stop screw until it no longer contacts the idle stopper. Check that all throttle plates are fully closed.
- 3. Adjust the oil pump link rod so the gap @ between the oil pump lever ③ (in the fully closd position) and the stopper (roll pin) ④ is less than 0.5mm (0.02 in), but not touching the roll pin.



- Connect the link rod and tighten locknut ①.
- Turn the throttle stop screw in until the throttle sensor voltage is within specification (see "Adjusting the throttle position sensor" (page 4-26 of the Service Manual).

Power trim and tilt unit Checking the power trim and tilt operation

 Fully tilt the outboard motor up and down a few times and check the entire trim and tilt range for smooth operation. Check the power trim and tilt fluid level if necessary.

NOTE:

Be sure to listen to the winding sound of the power trim and till motor for smooth operation.

2. Fully tilt the outboard motor up, and then support it with the tilt stop lever ① to check the lock mechanism of the lever.



Checking the power trim and tilt fluid level.

1. Fully tilt the outboard motor up, and then support it with the tilt stop lever ①.

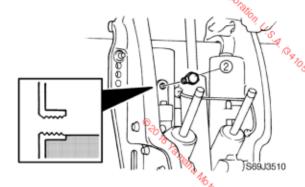


▲ WARNING

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

2. Remove the reservoir cap 2 and then check the fluid level in the reservoir.

3-11 % 60V1E11



NOTE:.

If the fluid is at the correct level, the fluid should overflow out of the filler hole when the reservoir cap is removed.

 If necessary, add sufficient fluid of the recommended type until it overflows out of the filler hole.



Recommended power trim and tilt fluid:

ATF Dexron II

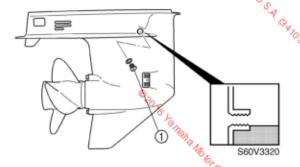
4. Install the reservoir cap, and then tighten it to the specified torque.



Reservoir cap:

7 N·m (0.7 kgf·m, 5.2 ft·lb)

- Fully tilt the outboard motor down.
- Remove the check screw 1, and then check the gear oil level in the lower case.



NOTE:

If the oil is at the correct level, the oil should overflow out of the check hole when the check screw is removed.

If necessary, add sufficient gear oil of the recommended type until it overflows out of the check hole.

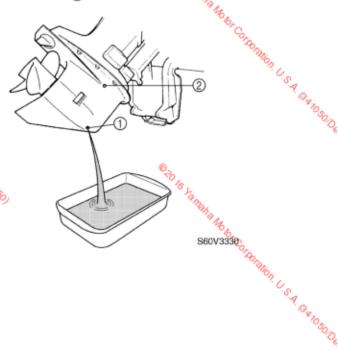


Recommended gear oil: GEAR CASE LUBE

Install the check screw.

Changing the gear oil

- Tilt the outboard motor up slightly.
- Place a drain pan under the drain screw , remove the drain screw, then the check screw ② to drain the oil.



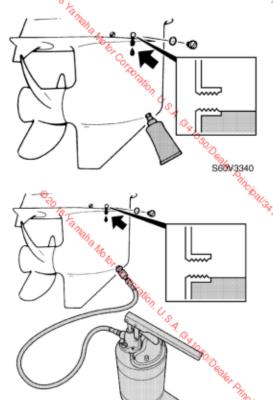
*Oralion

3 - 12



Periodic checks and adjustments

- Check the oil for metal discoloration, and its viscosity. Check the internal parts of the lower case if necessary.
- Insert a gear oil tube or gear oil pump into the drain hole and slowly fill the gear oil until oil flows out of the check hole and no air bubbles are visible.

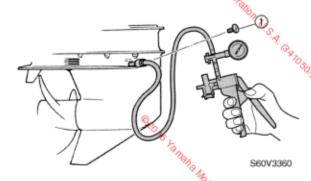




Install the check screw and quickly install the drain screw.

Checking the lower unit for air leakage

 Remove the check screw ①, and then install the special service tool.





Pressure/vacuum tester: YB-35956-A

Apply the specified pressure to check that the pressure is maintained in the lower unit for at least 10 seconds.

CAUTION:

Do not over pressurize the lower unit, otherwise the oil seals may be damaged.

NOTE:

Cover the check hole with a rag when removing the pressure/vacuum tester from the lower unit.



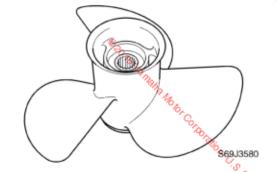
S60V3350

Lower unit holding pressure: 70 kPa (0.7 kgf/cm², 10 psi)

 If pressure drops below specification, check the drive shaft and propeller shaft oil seals for damage.

Checking the propeller

 Check the propeller blades and splines for cracks, damage, or wear. Replace if necessary.

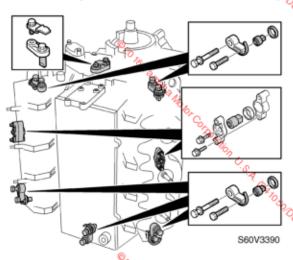


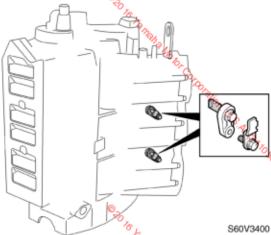
3-13 60V1E11

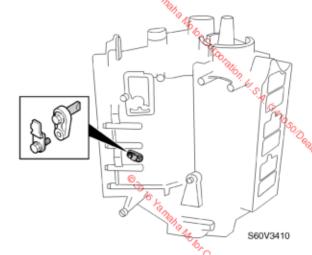
General

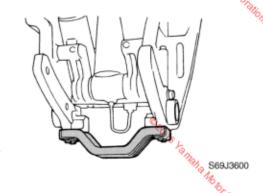
Checking the anodes

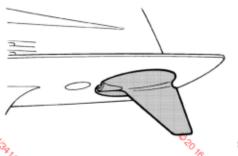
 Check the anodes and trim tab for scales, grease, or oil. Clean if necessary.











S69J3610

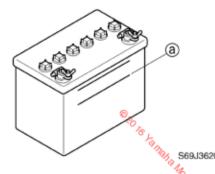
CAUTION:

Do not oil, grease, or paint the anodes or the trim tab, otherwise they will be ineffective.

Replace the anodes or trim tab if excessively eroded.

Checking the battery

 Check the battery electrolyte level. If the level is at or below the minimum level mark @, add distilled water until the level is between the maximum and minimum level marks.



60V1E11 3-14



Periodic checks and adjustments

Check the specific gravity of the electrolyte. Fully charge the battery if out of specification.

▲ WARNING

Battery electrolyte is dangerous; it contains sulfuric acid which is poisonous and highly caustic.

Always follow these preventive measures:

- Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.
- Wear protective eye gear when handling or working near batteries.

Antidote (EXTERNAL):

- SKIN Wash with water.
- EYES Flush with water for 15 minutes and get immediate medical attention.

Antidote (INTERNAL):

 Drink large quantities of water or milk followed with milk of magnesia, beaten egg, or vegetable oil. Get immediate medical attention.

Batteries generate explosive, hydrogen gas. Always follow these preventive measures:

- Charge batteries in a well-ventilated
- · Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).
- DO NOT SMOKE when charging or handling batteries.

KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.

NOTE:

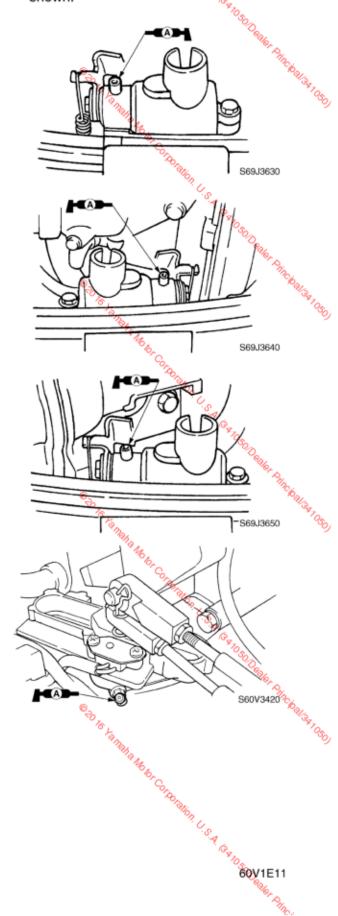
- · Batteries vary per manufacturer. The procedures mentioned in this manual may not always apply, therefore, consult the instruction manual of the battery.
- Disconnect the negative battery lead first, then the positive battery lead.



Electrolyte specific gravity: 1.280 at 20 °C (68 °F)

Lubricating the outboard motor

 Apply water resistant grease to the areas shown.



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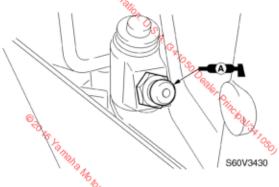
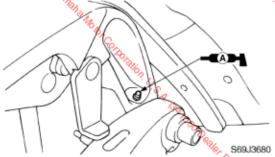
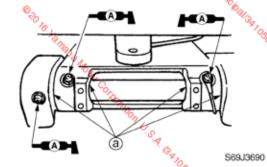
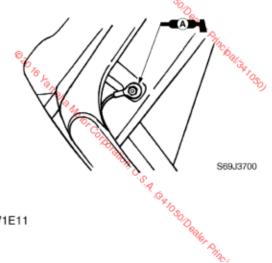


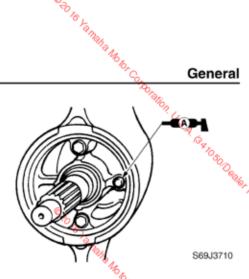
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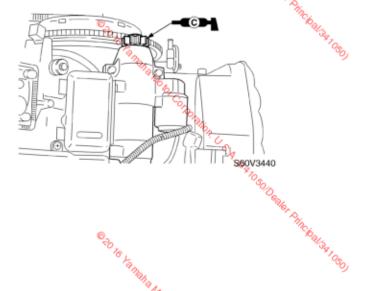




NOTE: _

Apply grease to the grease nipple until it flows from the bushings @.

2. Apply low temperature resistant grease to the areas shown.



© 30 16 Xanana Mater Cortonalion U.S.A. (S.A. (S



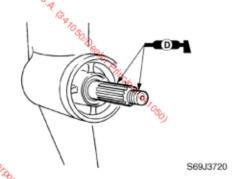
Periodic checks and adjustments

Ted to Sallaha Motor Co

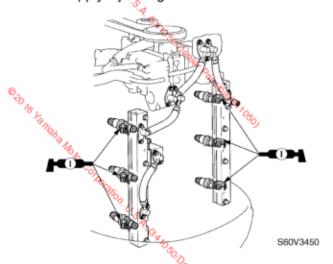
TOTALON U.S.A. GANGO DERIET PRINCIPALISA (OSO)

© 30 16 Vanella Mater Cortotalion U.S.A. (S. 4 1050 Dealer Principal Ser 1050)

Apply corrosion resistant grease to the areas shown.



4. Apply injector grease to the areas shown.



© 30 % Variona Maker Corporation. U.S.A. G. & 10.50 Dealer Principal Son Oscol.

© RO 16 Variable About Corbotation U.S.A. (S. 4 OSO Dealer Principalisa 1080) © RO 16 Ya Repla Ma bar Corto Fallon, U.S. A. & R. R. R. O.S.O. D. R. O.S. O. D. R. O. D. O. D.

60V1E11

© 20 Is Xanaha Makar Cordoration U.S.A. & A. O. S.O. Dealer Philip

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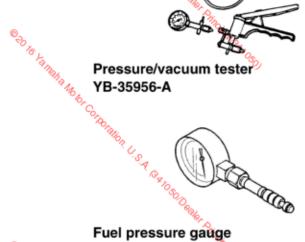
So Is Ya Raha Mobi Co Fuel system

" GA TOSO/	Special service tools	, 6 ⁸	4-1
Pol		D. D. C.	
	Hose routing	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	4-2
	Fuel filter Fuel pump Checking the fuel pumps Disassembling the fuel pumps		4-2
	Way,		Way,
۵.	Fuel filter		⁽³) 4-3
(allian	N _a	,	
Report Coronation, U.S.A. SA 1080/	First minus	66.	
Con	Charling the fuel number		4-4
*Oratio	Disassembling the fuel numps		4-6
37.0	Disassembling the fuel pumps Assembling the fuel pumps		4-0
N. A.	Assembling the fuel pumps	······	4-7
Na No.	Oil injection system	Na No.	
Of the state of th	Oil injection system		4-8
	Checking the check valve	%,	4-10
	Checking the oil filter		
	Checking the oil tank		
	Assembling the oil tank		4-10
Teh.	Installing the oil pumpBleeding the oil injection system		4-11
May 1	Bleeding the oil injection system	6 <u></u>	4-11
Relia Mahar Cordoration, U.S.A. SA 1080/		Or Co.	
TO TON	Throttle body assembly and vapor sepa	arator	4-12
"On I	Measuring the fuel pressure (medium-	-pressure fuel line)	4-21
, S. A	Checking the pressure regulator		4-21
, @ ⁸ 20	Reducing the fuel pressure (medium-p		
30)	Disconnecting the medium-pressure for		
	Removing the throttle body assembly		
	Removing the medium-pressure fuel h		
	Installing the medium-pressure fuel ho		
	Removing the electric fuel pump filter		4-23
By.	Checking the vapor separator		4-23
"alla	Installing the electric fuel pump filters,	6.	4-24
Or Co	Synchronizing the throttle volves		4-24
OTAGE.	Adjusting the throttle position concer	976 _{0,2}	4-24
allon	Adjusting the throttle position sensor	······································	4-26
0.5		· Co	
, Q*	High-pressure fuel line	······································	4-27
1050		050	
~	🍇 High-pressure fuel pump		4-30
	Installing the joints	······································	4-33
	Installing the fuel pipes		k.,4-33
	Installing the fuel injectors		4-33
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"atton	Checking the vapor separator	"Rition	
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	The state of the s	*Or Age	
	%.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Na Company

anaha Mobre Special service tools



Pressure/vacuum tester



San Is Ya maha Make Corto Talion U.S.A. Fuel pressure gauge



Digital multimeter YU-34899-A

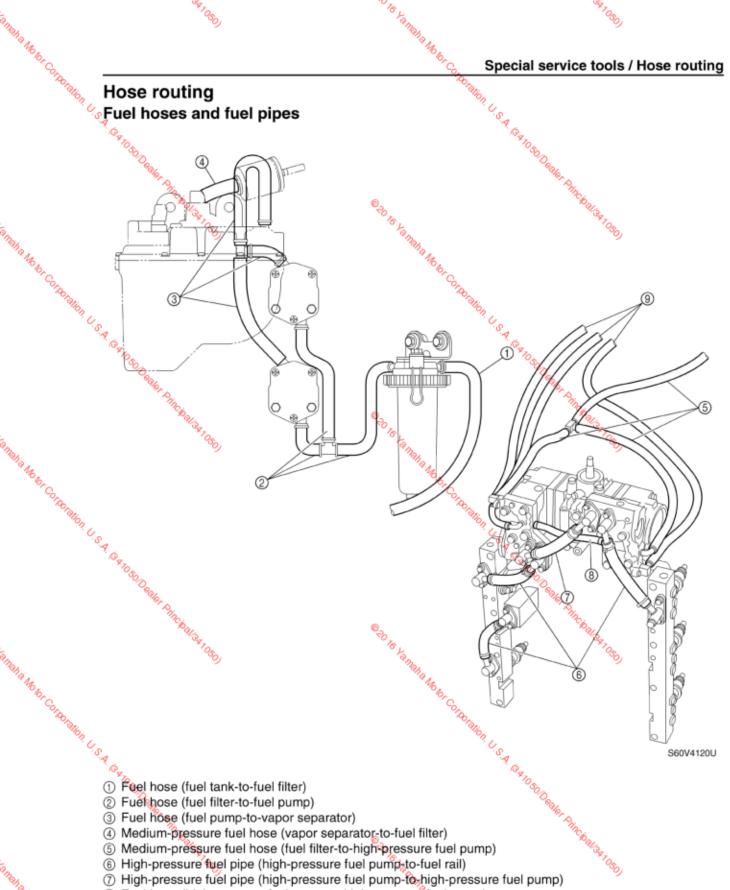


Test harness (3 pins) YB-06757



© do lo taliblia Mobi Corbo alion U.S.A. S.A. ISA IOSO DEBERT Phile

Set to Sa Maha Mobin Co



- ② Fuel hose (fuel filter-to-fuel pump)
- 3 Fuel hose (fuel pump-to-vapor separator)

Fuel hose (1)

Medium-pressure fuel hose (10)

Medium-pressure fuel hose (10)

Medium-pressure fuel hose (10)

High-pressure fuel pipe (high-pressure fuel pump-10)

Fuel hose (high-pressure fuel pump-to-high-pressure fuel pump,

Fuel hose (high-pressure fuel pump-to-vapor separator)

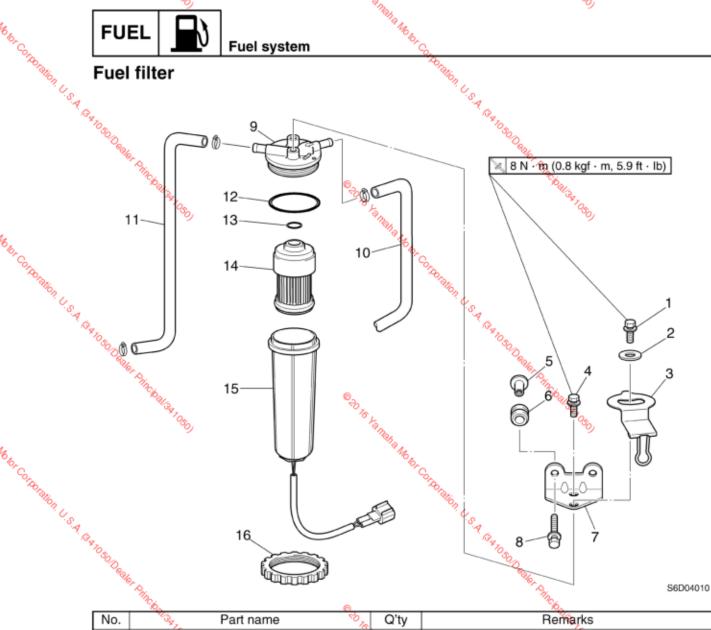
Fuel hose (high-pressure fuel pump-to-vapor separator)

A RANDARD anaha Mahr Cordialion U.S.A. Gano 60V1EH1

4-2



Fuel filter



Ta la Ya Raha Mahar Co

		~6 <u>,</u>	<u>a</u>			
	No.	Part name	50%	Q'ty	Remarks	\neg
	1	Bolt 🦠		a _{nah} 1 1 ho	M6 × 16 mm	٦
L	2	Washer		Who As		-
Obr	3	Holder		106,		-
Of the same	4	Bolt		1	M6 × 14 mm	-
Schor Corpolation U.S.A. &	5	Collar		2	alion .	-
100	6	Grommet		2	*U.S.A.	-
7, Q		Bracket		1	[· · · · · · · · · · · · · · · · · · ·	-
	%8 9‰	Bolt		2	M6 × 25 mm	-
	7/4	Cap		1	0886.	-
	10	Fuel hose		1	T Ann	-
	11	Fuel hose	© 30 16	1	Not reusable Not reusable	-
	12	O-ring	′6	1	Not reusable	-
	13			anahambar	Not reusable	-
E.	14	Fuel filter element		My .		-
Or Con	15	Cup		1 %	O _A	-
Polar.	16	Nut		1	(A)	
Corporation U.S.A. O.	r.				GOV1E	
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	ea/e	.			GRAGE.	
		Pine.			Anne.	

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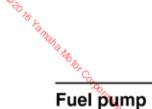
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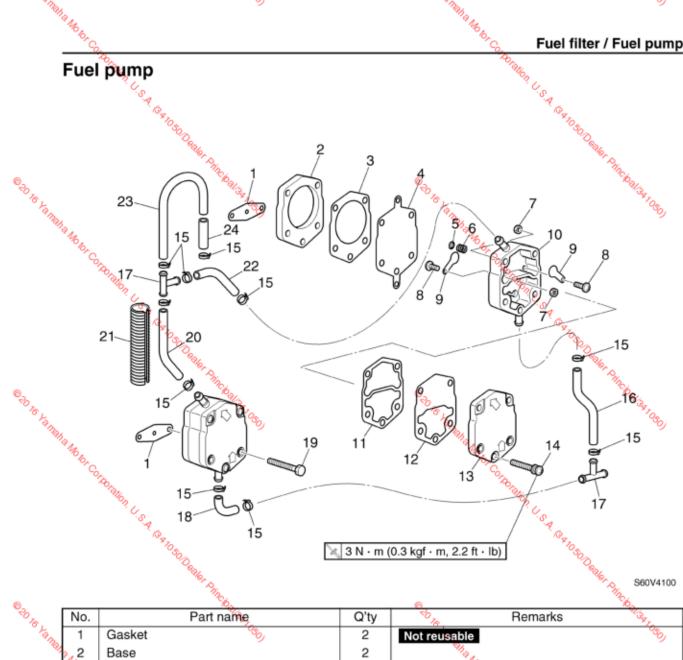
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© 30 16 Ya Maha Mot

Sanaha Mak

Sala Kallaha Mabor Co





©_		*Ø		<u> </u>
80%	No.	Part name	Q'ty	Remarks 🐾
© To Valle	1	Gasket %	2	Not reusable
18/	2/2	Base	2	No.
	3,	Gasket	2	Not reusable 6
	4 %	Diaphragm	2	- Copp
	5	Plate	2	Tallo,
	6	Spring	2	"U ₈
	7	Nut 7	8	A (0-
	8	Screw ************************************	8	ø3×6 mm
	9	Valve 🐾	8	70 ₈₀
	10	Nut Screw Valve Body Gasket Diaphragm Cover	2	Ø3 × 6 mm Not reusable Not reusable
©_	11	Gasket %	2	Not reusable
© do ta no	12	Diaphragm	2	76 L
Tanno.	13	Cover	2	To,
77	114	Screw	6	ø5 × 35 mm
	15	Plastic tie	10	Not reusable 6
	16	Fuel hose	1	- Olaber
	17	Joint	2	**************************************

5.5.4 GAIOSO Dealer Phin. 4-4 60V1E11

ODealer Dricoals and Octo

& Dealer Dinchall SA (OSO)

O Dealer Drichallan (Oso)

CORDISION U.S.A. GANGOL © 20 16 Ya Mala Motor Cortoration U.S.A. GA 10801 *5 Tola Motor Corporation U.S.A. GADSON 15 3 N om (0.3 kgf ⋅ m, 2.2 ft ⋅ lb)

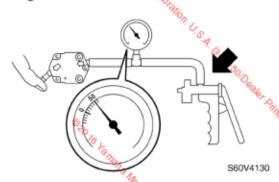
B _a		15	3 Norm (0.3 kgf ⋅ m, 2.2 ft ⋅ lt	b)		1050
OD Callet Principalisa 1080.			O	der Princip		S60V4100	~
aliga,	No.	Part name	Q'ty	Od.	Remarks	50/6	
000	18	Fuel hose	1	80)		Tam	
	19	Bolt	4	M6 × 50 mm		anaha Ma	
	20	Fuel hose Corrugated tube Fuel hose	1			**************************************	
	21	Corrugated tube	1			Co	à.
	22	Fuel hose	1				Talion
	23	Fuel hose	1				100
	24	Hose	⁷ ©_1				A W
DO Caller			TO SO De	26,			Oration U.S.A. GAIOSOL

© 20 to Yamaha Makar Corkolation U.S.A. G. A. IOSO Dealer Phine © 20 to Yamaha Motor Cortoration U.S.A. GA DOOL 4-5

4

Checking the fuel pumps

- Place a drain pan under the fuel hose connections, and then disconnect the fuel hoses from the fuel pumps.
- Connect the special service tool to the fuel pump inlet.
- Cover the fuel pump outlet with a finger, and then apply the specified positive pressure. Check that there is not air leakage.



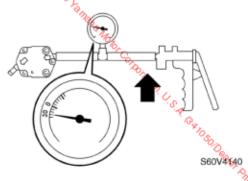


Pressure/vacuum tester: YB-35956-A



Specified pressure: 50 kPa (0.5 kgf/cm², 7.3 psi)

 Apply the specified negative pressure and check that there is no air leakage.

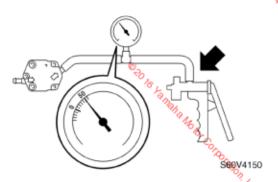


K

Specified pressure: 30 kPa (0.3 kgf/cm², 4.4 psi)

5. Connect the special service tool to the fuel pump outlet.

 Apply the specified positive pressure and check that there is no air leakage. Disassemble the fuel pump if necessary.





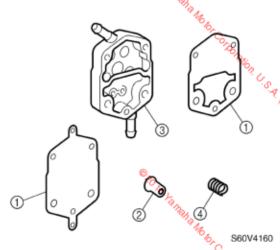
Specified pressure: 50 kPa (0.5 kgf/cm², 7.3 psi)

NOTE:

Assemble the fuel pump valve to the fuel pump body, and moister the inside of fuel pump with gasoline to ensure a better seal.

Disassembling the fuel pumps

- Disassemble the fuel pumps.
- Check the diaphragms ① for tears or damage. Replace if necessary.
- Check the valves ② for bends or damage. Replace if necessary. Also, check the fuel pump bodies ③ and springs ④ for damage. Replace if necessary.



Clean the fuel pump bodies.

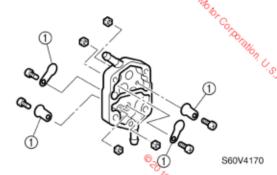
4-6

Assembling the fuel pumps

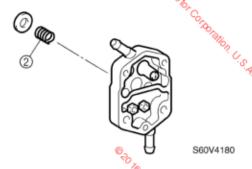
NOTE: _

Clean the parts and soak the valves and the diaphragms in gasoline before assembly to & Chinchell San Co.]. obtain prompt operation of the fuel pumps when starting the engine.

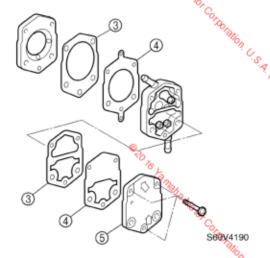
Install the valves 1 onto the fuel pump body.



Install the spring ②.



Install new gaskets ③, the diaphragms 4), and cover 5).



NOTE: _

Make sure that the gaskets and diaphragms are kept in place through the assembly pro-

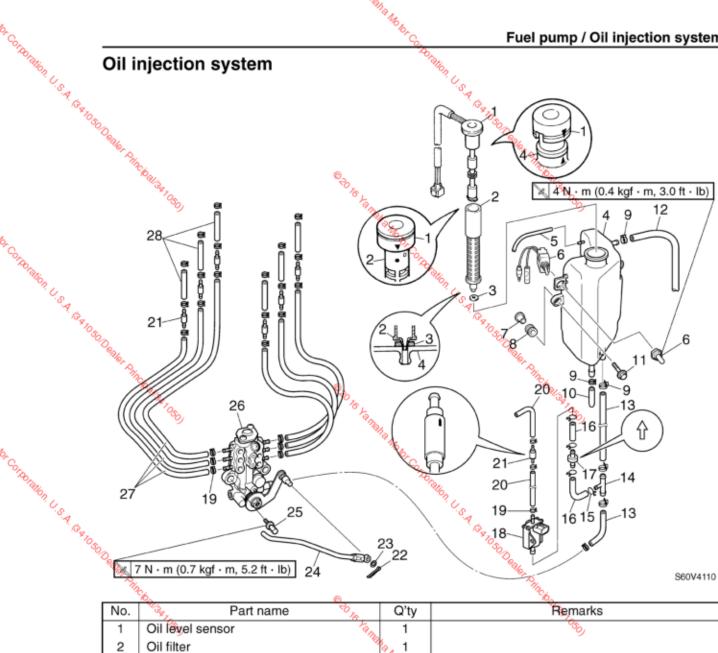
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So is Yangha Motor Corporation. U.S.A. RADS.

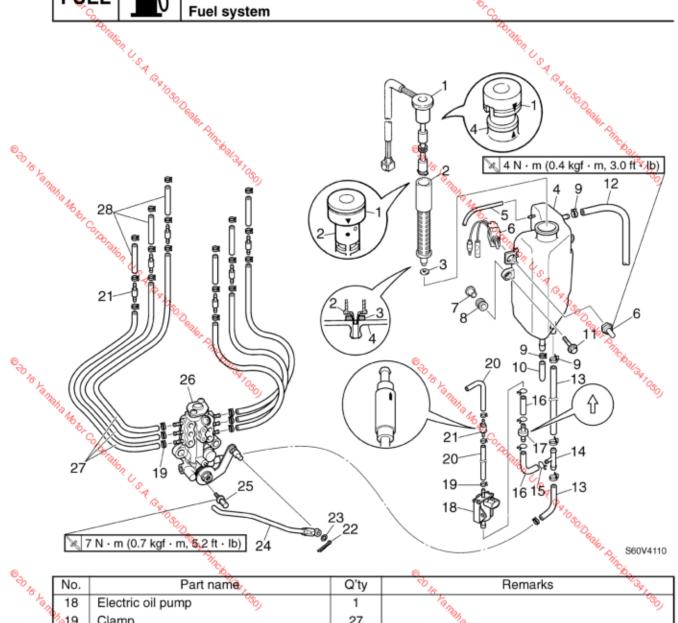
Store Valuable Make Corporation, U.S.A. GARDS

Sab Is Ya Raha Maker (

Oil injection system



	78	W.	6		To the second se
	No.	Part name	50%	Q'ty	Remarks
	1	Oil level sensor	^{Fa} na	1	The state of the s
	2	Oil filter	16	o, 1	
6,	3	Washer		್ಯಾರ್ಡ್ಗ	
Corps	4	Oil tank		1 Colo	
Tallon	5	Air vent hose		1 1	No.
100	6	Emergency switch		1	Non U.S.A.
4	7	Collar		3	A.6°
Or Corporation U.S.A. S.A. D.S.O.	8	Grommet		3	*1030
	₈ 9	Plastic tie		6	Not reusable
	100	Сар		1	* A _{li}
	11	Bolt	© do la kana	3	M6 × 30 mm
	12	Oithose	10 L	1	SATO.
	13	Oil hose	(anne	2	9
	14	Joint	Ì	P/6 1	
φ _C	15	Clip		40	
TADIS	16	Oil hose		2 %	
"lion !	17	Check valve		1	Mon.
,S.4					· S.A
Of Colibbration U.S.A. G.A. 1050					4-8
0,80	60V1E	11			4-8
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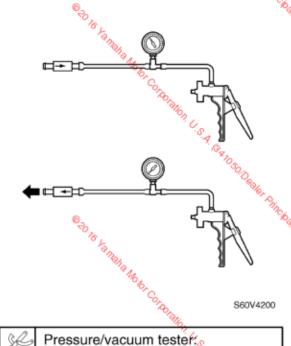


Tes to tallaha Mobil Co

@				
© Rotan	No.	Part name	Q'ty	Remarks Remarks
tan	18	Electric oil pump	1	Ta _M
1	19	Clamp	27	NI AL
	205	Oil hose	2	**************************************
	21	Check valve	7	Copp
	22	Pin	1	Traille,
	23	Washer	1	30
	24	Oil numing limbs road	1	7,0
	25	Bolt	2	M6 × 20 mm
	26	Oil pump	1	OD S
	27	Oil hose	6	**************************************
0.	28	Oil pump Oil hose Oil hose	6	M6 × 20 mm
O TO KANA	Tha Mobile	Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hose Oil hos		© 30 IS Vandalia Maker Cornolation U.S.A. 184 NOSON 60V1E11
	4-9	GA TO SO Dealer Print.		Garosop 60V1E11

Checking the check valve

- Connect the special service tool to the check valve.
- Apply pressure to each check valve port. Replace if necessary.





Check that no air comes out of the opposite end of the check valve.

Checking the oil tilter

YB-35956-A

 Check the oil filter for dirt, residue, or cracks. Clean or replace if necessary.



S60V4210

Checking the oil tank

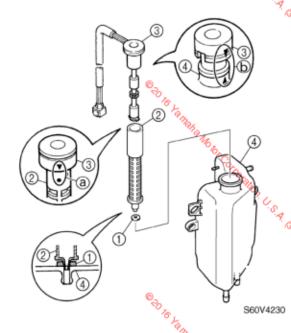
 Check the oil tank for cracks, leaks, or damage. Replace if necessary.



S60V4220

Assembling the oil tank

1. Install the washer ①, oil filter ②, and oil level sensor ③ into the oil tank ④.



NOTE: .

- Align the alignment marks @ on the oil filter
 ② and oil level sensor ③.
- Align the alignment marks (b) on the oil level sensor (3) and oil tank (4).

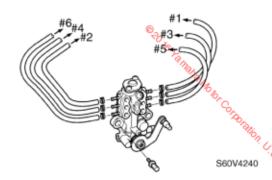
60V1E11 4-1



Fuel system

Installing the oil pump

- 1. Connect the oil hoses to the oil pump.
- Install the oil pump, and then tighten the bolts to the specified torque.





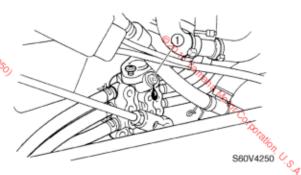
Oil pump bolt:

7 N·m (0.7 kgf·m, 5.2 ft·lb)

Bleeding the oil injection system

CAUTION:

- · Use unleaded straight gasoline only.
- Do not use gasoline mixed with oil (premixed fuel).
- Place rags around the air bleed screw ①
 to catch any oil that might spill.



Fill the oil tank with engine oil.

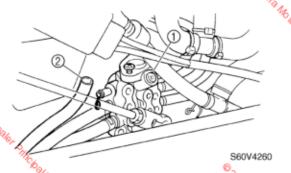


Recommended engine oil:

YAMALUBE 2-stroke outboard
motor oil

- 3. Disconnect the oil pump link rod joint from the oil pump lever.
- 4. Start the engine and let it idle.

- 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.
- Disconnect an oil pump feed hose ② from the oil pump.



- 8. Check that oil flows from the oil pump.
- Connect the oil pump feed hose.
- Connect the oil pump link rod joint to the oil pump lever.

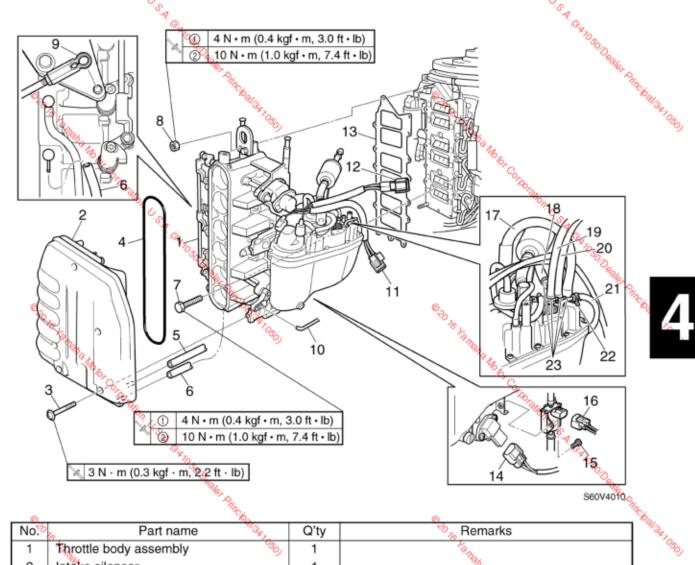
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Corporation

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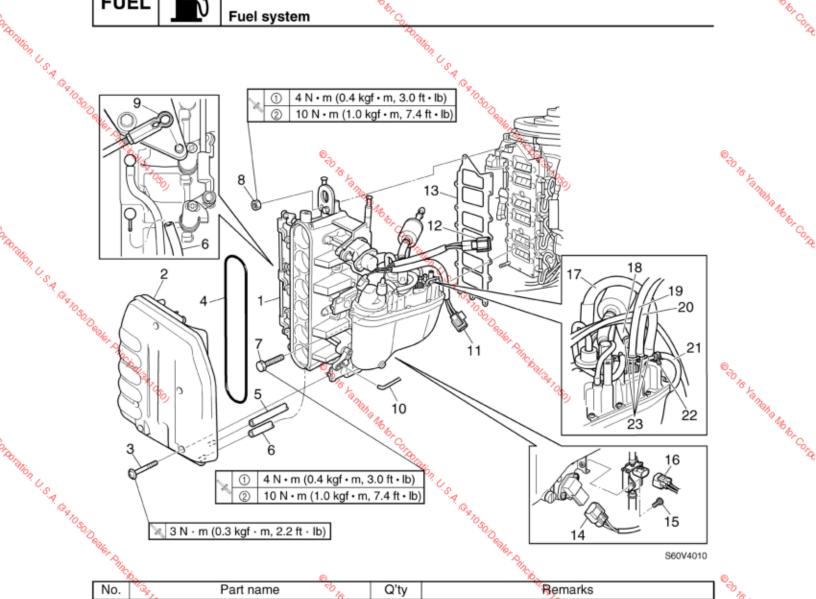
60V1E11

Throttle body assembly and vapor separator



<u></u>	<u>"0, </u>		
No.º	Part name	Q'ty	% Remarks
1	Throttle body assembly	1	Fam
2	Intake silencer	1	Na A
3	Screw	6	ø6 × 45 mm
4	Seal O	1	Ø6 × 45 mm M6 × 60 mm M6 × 60 mm
5	Hose Tolon	1	Tallo,
6	Hose "Co	1	* U _S
7	Hose Hose Bolt Nut	12	M6 × 60 mm
8	Nut ************************************	2	**************************************
9	Throttle link rod	1	100 mg/
10	Oil pump link rod	1	*\
14	Throttle position sensor coupler	1	⊚_
12	¿Electric fuel pump coupler	1	**************************************
13	Gasket	1	Not reusable
14	Atmospheric pressure sensor coupler	1	"Na Na
15	Bolt 6	1	M6 × 12 mm
16	Electric oil pump coupler	1	Not reusable M6 × 12 mm
17	Fuel inlet hose	1	ation .

5.5.4 (S. 10.50 4-12 60V1E11



Sa la Ya Raha Motor Corta

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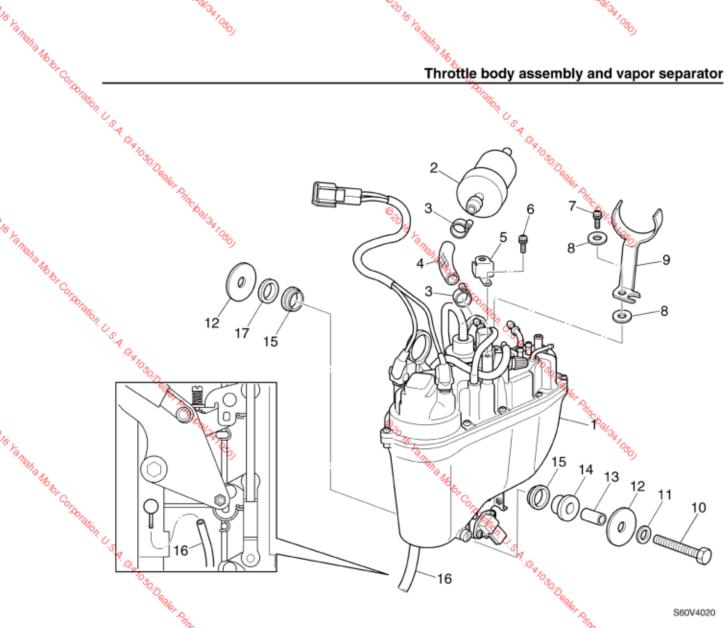
		2,		<u></u>		70 ₂
	No.	Way -	Part name	50%	Q'ty	Remarks
	18	Fuelhose		Tan.	1 1 166,1	80)
	19	Fuel hose		34	1	
	20	Fuel hose			86,1	
Orto.	21	Oil hose			10/2	
Tallon	22	Clamp			1 1	6 ,
" US	23	Plastic tie			4	Not reusable
ORDIRION U.S.A. GARDSON	ealer Princy	Palisan OSO		®30 In Value	la.	* GA TO SO DE BEET DING BOLISA TOSO
					1/6	

TROBANDE U.S.A. GANDAN A-13

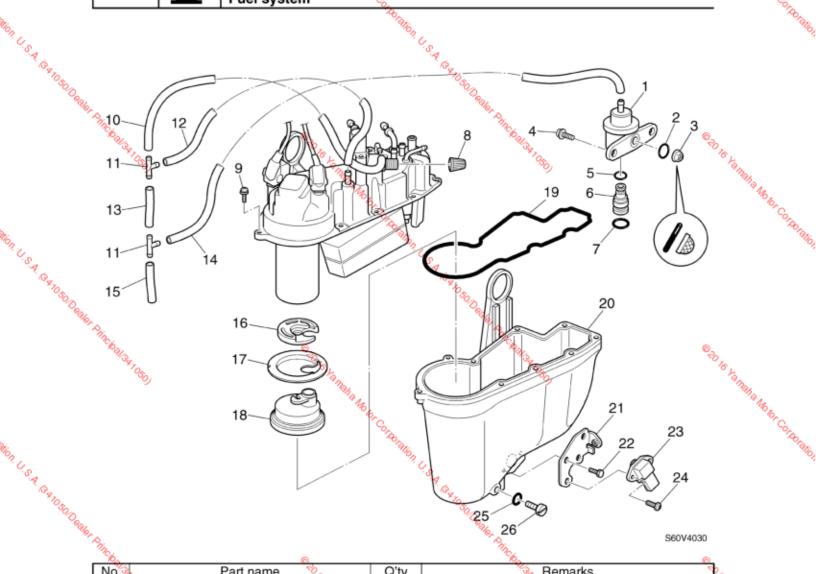
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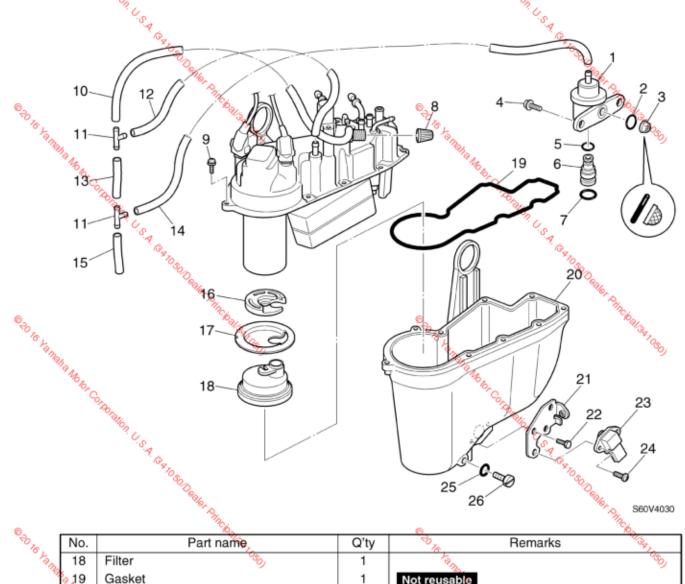


		The state of the s	@	The base of the second
76 .	No.	Part name	'Q'ty	Remarks
Tan.	1	Vapor separator	150	(%)
aha no	2	Fuel filter	1	Pop.
TOBOTO	3	Clamp	2	Not reusable
COTA	4	Fuel hose	1	Olas
Se Santala Motor Cortolation	5	Holder	1	Of the Ritory
*		Screw	1	Ø4 × 10 mm∕ _€
	700	Screw	1	Ø4 × 15 mm **
	8	Washer	2	*to _{sb}
	9	Holder	1	70 ₈₄
	10	Bolt	3	M6 × 35 mm
	11	Washer	⊚ 3	Tr. bay
6 L	12	Washer ***	© 3 6 3 **/n	**************************************
ana,	13	Collar		,
19 Mg	14	Grommet	3	O.M.
Op. C.	15	Collar	6	*6,c
Of TOP	16	Hose	1	O/RODE
So Santalia Motor Cotto Palion	17	Grommet	3	Re Motor Colinarion
	S.A. GA			·6.4
	, 6 ⁸			· Ogy
	60V1E1	ika		4-14
		Teallon .		Rate.
		Pine.		4-14



Se is Sanaha Motor Cornoration

	nnc p				The p.	6	
	No.	Part name	80%	Q'ty	Remarks	5	76.
	1	Pressure regulator	To Yallaha Maka	1	80)		S & Fallaha Motor Cortoralio.
	2	O-ring	"aha na	1	Not reusable		ahan.
	3	Filter	**************************************	1			TOROTO
	4	Screw		0/2	M6 × 14 mm		COTAN
No.	5	O-ring		19/6	Not reusable		Talio
100	6	Joint		1 *	\$		*
NON U.S.A. G.A. DOOD BENEF	7	O-ring		1	Not reusable		
*1050 ·	8	Cap		1	*10 sp.		
**************************************	9	Screw		9	ø4 × 16 mm		
***	V. I U	Hose		1	* An		
	"Aday	Joint	©	2	*Chall	⊚_	
	12	Hose	76 L	1	ø4×16 mm	``	6 L
	13	Hose	ana	1	30		ana,
	14	Hose	1914	1			19 Mg
	15	Hose	-	ک _ی 1			TO, C.
	16	Damper		TO TO			OF ROPE
On .	17	Holder	© do la Namaha Ma	1100			S to Xa Righa Motor Cortoralio.
·S.4				(SA		
· Gg					OF TO		
30 D	4-15				TOO O	60V1E11	
Non U.S.A. G. A. IO. S.O. Dealer	^				S.A. G.A.D.SO.D. Beller Philo.		
,	nno.				"Mile.		



TED IS YARRAMA MODOLOGO

Part name	Q'ty	Remarks
Filter %	1	Te My
Gasket	1	Not reusable
Float chamber	1	TO BOY
Bracket	1	Corps
Bolt	2	M6 × 20 mm
Atmospheric pressure sensor	1	* C ₃
Screw 7	2	M6 × 20 mm Ø6 × 20 mm Not reusable
O-ring ************************************	1	Not reusable
Drain screw 🐾	1	OF SAL
** Dinchalisa Osto,		© do lo Yanne
	Filter Gasket Float chamber Bracket Bolt Atmospheric pressure sensor Screw O-ring Drain screw	Filter 1 Gasket 1 Float chamber 1 Bracket 1 Bolt 2 Atmospheric pressure sensor 1 Screw 2 O-ring 1 Drain screw 1

Cook tangle labor Corbonation U.S.A. GANGO Dealer Princ © RO TO YA RIANGA MODOF COTOR BIOTO U.S.A. G. A. R. A. 4-16

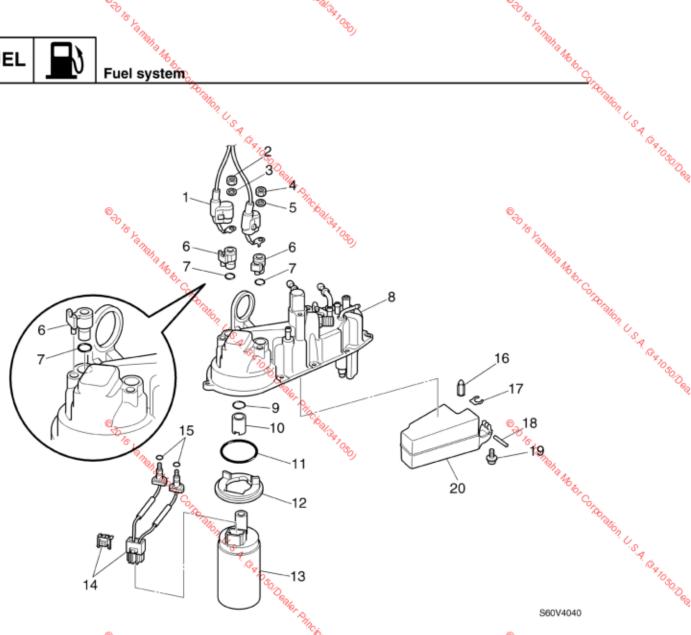
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Dealer Principal SA 1050)

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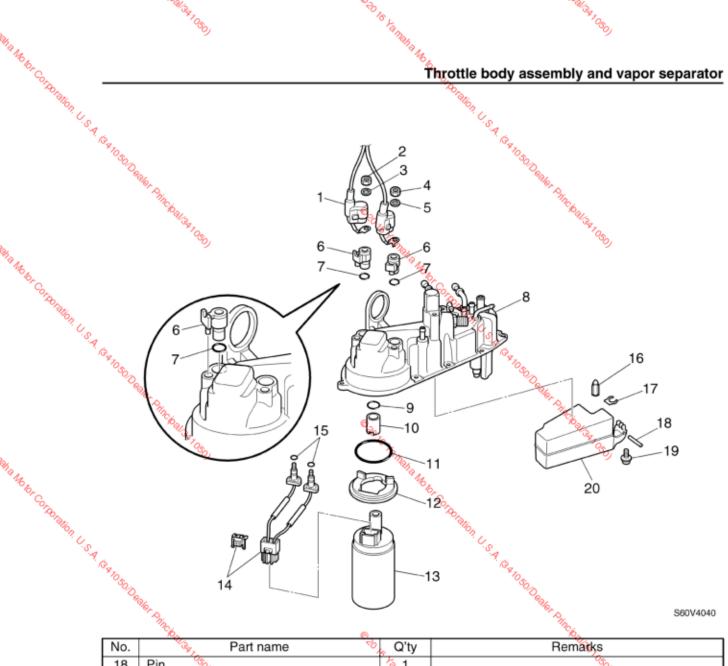
Dealer Principalisa 1050)



			100		<u></u>
No.	Partname	Q'ty	, Salar	Remarks	50/A.
1	Electric fuel pump lead	1	80)		S Ya Raha Motor C
2	Nut Way	1	ø4 mm		Wha As
3	Washer %	1			*Other
4	Nut	1	ø5 mm		Ara.
5	Washer	1			*Talion
6	Insulator	2			* U.S.
7	Electric fuel pump lead, Nut Washer Nut Washer Insulator O-ring Cover O-ring	<u>و</u> 2	Not reusable		Polition U.S.A. C.A. 1050De
8	Cover	10st			**************************************
9	O-ring	100	Not reusable		
10	Collar	1 👋	O _n		l
11	O-ring _©	1	Not reusable		© 30 16 Ya Maha Mobor C
12	Plate	1	SA ¹⁰		016 L
13	Electric fuel pump	1	36)		(ang.
14	Terminal Terminal	1			**************************************
15	O-ring	2	Not reusable		No.
16	Needle valve	1			120°
17	O-ring Plate Electric fuel pump Terminal O-ring Needle valve Clip	1			allon
	, A	GA TOSO DEBLO			60V1E11
		G _Z			· Gy
4-17		300			60V1E11
		edle,			~
			Princ.		

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SO IS Vanahis



	10,		(P)	
No.	A SAL	Part name	Q'ty	Remarks
18	Pin 🦠		Tan 1	%)
19	Screw		Way.	ø4×7 mm
20	Float		1 ***	A
\$4030D@	Nor Principalis		⊗ _Q	CORDRIGION U.S.A. G. N. D. B.O. D. Baller Principal San OSO)
	*1050		16 Yanaha Mo.	*1080)
		No.	No. Part name	No. Part name Q'ty

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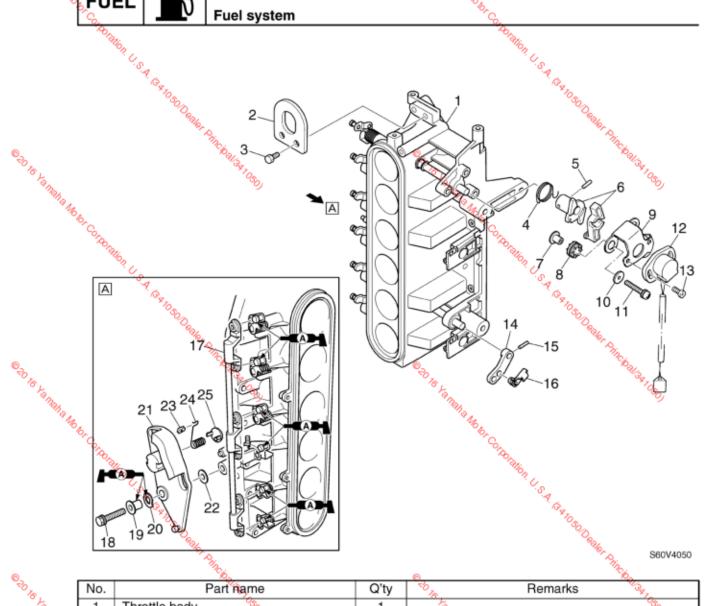
4-18

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*NOTE 11

W341050)





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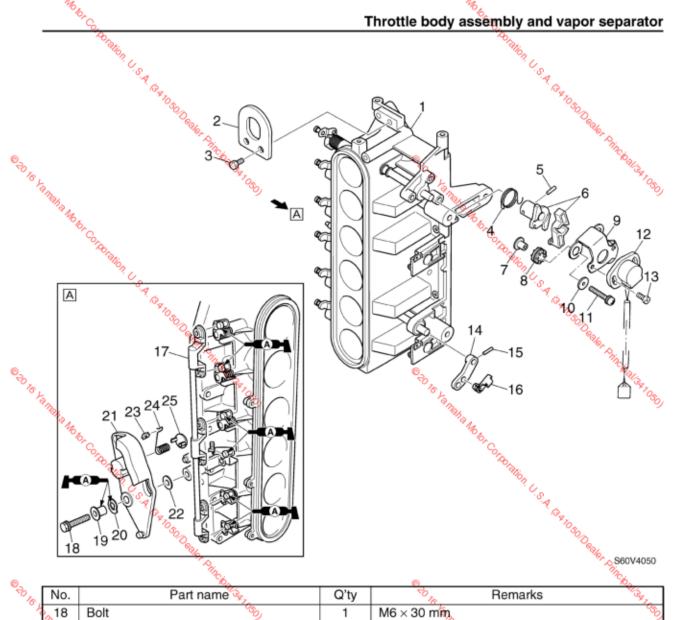
WGW TOSO,

	Philips		S80V4050
No.	Part name	Q'ty	Remarks
1	Throttle body	1	Tank, togo,
2	Engine hanger	1	M6 × 20 mm. Coltabellon U.S.A. GAIOSON BERNET PRINCESSAN TORON
9	Bolt	1	M6 × 20 mm
C40	Spring	1	College
5 🗖	Pin	1	Tallon .
6	Leyer	1	* 0,5
7	Collar	3	A Go
8	Grommet	3	**************************************
9	Bracket 🐾	1	70 est
10	Washer %	3	** Ay.
11	Screw	3	ø5 × 30 mm
12	Throttle position sensor	1	76 L
13	Screw	2	ø5 × 12 mm
14	Lever	1	70 Ag.
⁵ -15	Pin	1	*6 _{rC}
16	Joint	1	O'TAD _{IA}
17	Link rod	1	Na Mobi Coltagain
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 6 7	Spring Spring Pin Lever Collar Bracket Washer Throttle position sensor Screw Lever Pin Joint	No. Part name Q'ty 1 Throttle body 1 2 Engine hanger 1 3 Bolt 1 5 Pin 1 6 Leyer 1 7 Collar 3 8 Grommet 3 9 Bracket 1 10 Washer 3 11 Screw 3 12 Throttle position sensor 1 13 Screw 2 14 Lever 1 15 Pin 1 16 Joint 1

17 OLink roa

4-19

60V1E11



				6 You
る,	No.	Part name 🦤	Q'ty	Remarks %
1	18	Bolt %	1	M6 × 30 mm
	19	Collar	1	3/1 ₀ / ₁
	200	Wave washer	1	"Obr
	21	Throttle cam	1	Copp
	22	Washer	1	Talio,
	23	Stopper.	1	*'U ₈
	24	Spring 7	1	4
	25	Cap ************************************	1	**************************************

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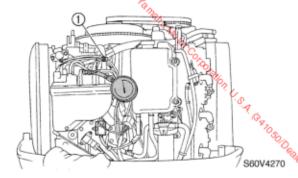
4-20

Sa la Sa Raha Mobit Co



Measuring the fuel pressure (medium-pressure fuel line)

- 1. Remove the flywheel magnet cover.
- 2. Remove the cap 1.
- Connect the fuel pressure gauge to the pressure check valve.





Fuel pressure gauge: YB-06766

WARNING

- When connecting 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 connected.
- 4. Turn the engine start switch to ON, and then measure the fuel pressure within 5 seconds.

NOTE:

The fuel pressure decreases 5 seconds after the engine start switch is turned to ON.



Fuel pressure:

350 kPa (3.5 kgf/cm², 50.8 psi)

 Measure the fuel pressure 5 seconds after turning the engine start switch to ON.



Fuel pressure:

300 kPa (3.0 kgf/cm², 43.5 psi)

 Start the engine, warm it up for 5 minutes, and then measure the fuel pressure. If below specification, check the medium-pressure fuel line and the vapor separator.

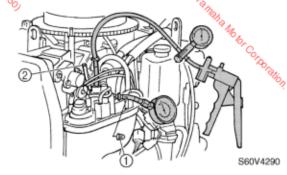


Fuel pressure:

350 kPa (3.5 kgf/cm², 50.8 psi)

Checking the pressure regulator

- Remove the flywheel magnet cover.
- 2. Remove the cap ①.
- Connect the fuel pressure gauge to the pressure check valve.
- Disconnect the pressure regulator hose
 and then connect the special service tools to the pressure regulator.





Fuel pressure gauge YB-06766

Pressure/vacuum tester YB-35956-A

▲ WARNING

- When connecting 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 connected.
- 5. Start the engine and let it idle.

4-21 60V1E11

6. Check that the fuel pressure reduces when vacuum pressure is applied to the pressure regulator. If the fuel pressure does not reduce, replace the pressure regulator.

NOTE:

When the vacuum pressure reaches the specified level, the fuel pressure reduces.

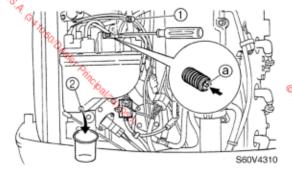
Reducing the fuel pressure (medium-pressure fuel line)

- Remove the flywheel magnet cover.
- Remove the cap ①.
- Cover the pressure check valve @ of the vapor separator with a rag, and then press in the pressure check valve @ using a thin screwdriver to release the fuel pressure.

▲ 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.

- Place a container under the vapor separator.
- Press in the pressure check valve using a thin screwdriver, and then remove the drain screw ② to drain the fuel from the vapor separator.

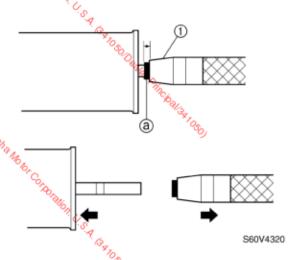


▲ WARNING

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

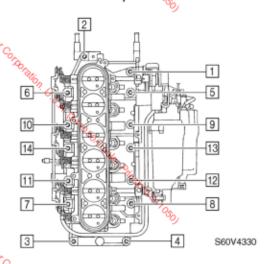
Disconnecting the medium-pressure fuel hose joint

1.6 Push the collar (a) into the hose joint (1) with a flat head screwdriver, and then slide the fuel filter out from the hose joint.



Removing the throttle body assembly

 Remove the throttle body assembly bolts and nuts in the sequence shown.



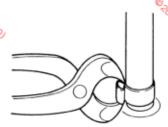
50V1E11% 4-22



Fuel system

Removing the medium-pressure fuel hose clamps

 Remove the medium-pressure fuel hose clamps by cutting the crimped section of the clamp.



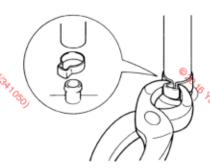
S69J4030

CAUTION:

If the medium-pressure fuel hose clamps are removed without cutting the crimp first, the fuel hose could be damaged.

Installing the medium-pressure fuel hose clamps

 Crimp the medium-pressure fuel hose clamps properly to securely fasten them.



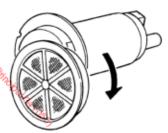
S69 M040

▲ WARNING

Do not reuse the fuel hose clamps, always replace them with new ones.

Removing the electric fuel pump filter

 Remove the electric fuel pump filter, damper holder, and rubber damper from the electric fuel pump.



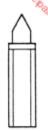
S60V4335

NOTE:

To remove the filter, turn it clockwise.

Checking the vapor separator

 Check the needle valve for bends or wear. Replace if necessary.





S69J4080

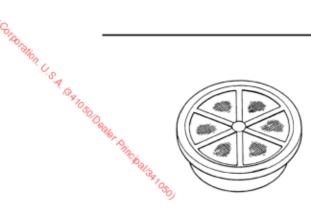
Check the float for deterioration. Replace if necessary.



S60V4340

Check the filter for dirt or residue. Clean if necessary.

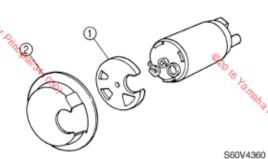
4-23 60V1E11

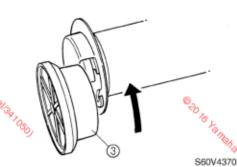


S60V4350

Installing the electric fuel pump filter

 Install the rubber damper ①, damper holder ②, and electric fuel pump filter ③ onto the electric fuel pump.



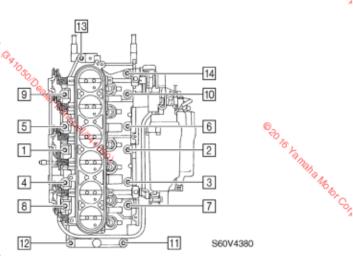


NOTE:

- Make sure that the damper holder is correctly installed on the rubber damper.
- To install the filter, firmly push it onto the electric fuel pump, and then turn it counterclockwise until it clicks.

Installing the throttle body assembly

1. Install the new gasket and throttle body assembly, and then tighten the bolts and nuts to the specified torque in two stages and in the sequence shown.

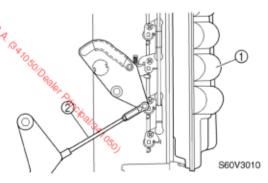


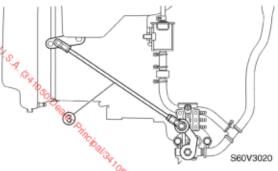


Throttle body bolt and nut: 1st: 4 N·m (0.4 kgf·m, 3.0 ft·lb) 2nd; 10 N·m (1.0 kgf·m, 7.4 ft·lb)

Synchronizing the throttle valves

- Remove the intake silencer ①.
- Disconnect the throttle link rod ② and the oil pump link rod ③.



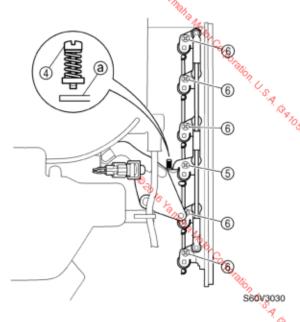


60V1E11 4-24



Fuel system

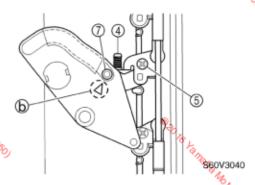
- Loosen the throttle stop screw until it no longer contacts the stopper a.
- Loosen throttle adjusting screw #4 (5) by turning it clockwise.
- 5. Check that all the throttle valves are fully closed.



NOTE:

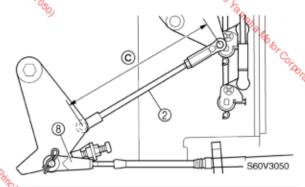
If all the throttle valves are not fully closed, loosen throttle adjusting screws #1, #2, #3, #5, and #6 6 by turning them counterclockwise, and then tighten them.

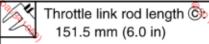
- Connect the oil pump link rod.
- Align the center of the throttle cam roller
 with the alignment mark b, and then turn throttle adjusting screw #4 5 counterclockwise.
- 8. Turn the throttle stop screw ④ in until the throttle valves start to open.
- Connect the test harness (3 pins) to the throttle position sensor.
- 10. Turn the engine start switch to ON, and then turn the throttle stop screw in until the throttle position sensor output voltage is within specification.



Throttle position sensor output voltage at engine idle speed:
Pink (P) – Orange (O)
0.58–0.62 V

- 11. Disconnect the throttle cable joint ®.
- 12. Adjust the throttle link rod length ©, and then connect the throttle link rod ②.





- 13. Install the intake silencer.
- 14. Adjust the throttle cable length.

NOTE:

For adjustment procedures, see Chapter 3, "Adjusting the throttle cable."

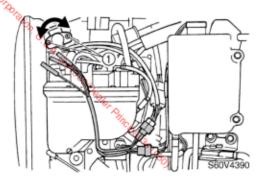
4

Adjusting the throttle position sensor

NOTE:

Before adjusting the throttle position sensor output voltage, synchronize the throttle valves.

- Remove the flywheel magnet cover.
- Loosen the throttle stop screw until it no longer contacts the stopper.
- Connect the test harness (3 pins) to the throttle position sensor.
- 4. Turn the engine start switch to ON.
- 5. Loosen the throttle position sensor screws ①.
- 6. Adjust the position of the throttle position sensor until the specified output voltage is obtained.





Test harness (3 pins): YB-06757 Digital multimeter: YU-34899-A



Throttle position sensor output voltage with throttle fully closed: Pink (P) Orange (O) 0.48–0.52 V

- Tighten the throttle position sensor screws.
- 8.6 Turn the throttle stop screw in until the throttle valves start to open.

 Turn the throttle stop screw in until the throttle position sensor output voltage is within specification.



Throttle position sensor output voltage at engine idle speed:

Pink (P) – Orange (O) 0.58–0.62 V

- 10. Start the engine and let it idle.
- Check the throttle position sensor output voltage is within specification. If out of specification, repeat steps 1–10.

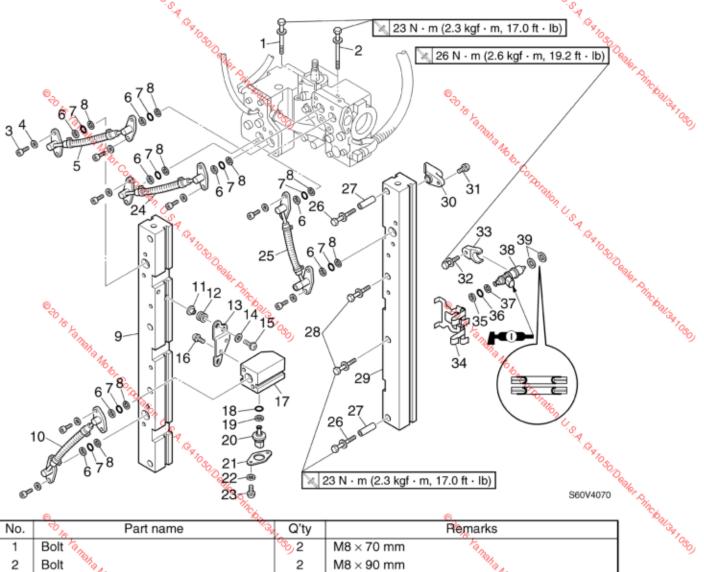
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High-pressure fuel line



Salaha Mabr.

No.	Part name	Q'ty		Remarks	Palis 10so
1	Bolt Sand	%)2	M8 × 70 mm	Remarks A Replace Albert Corporation U.S.A. GAROSOL	250
2	Bolt 🗽	2	M8 × 90 mm	*eha n	
3	Bolt Washer Fuel pipe Backup ring O-ring Backup ring Fuel rail (port side) Fuel pipe Gollar Grammet	16	M6 × 16 mm	*Obr	
4	Washer O _A	16		Colta	
5	Fuel pipe	1		Talion	
6	Backup ring	8	Not reusable	100	
7	O-ring	8	Not reusable	A CO	
8	Backup ring	8	Not reusable	70 ₅₀	
9	Fuel rail (port side)	1		3	Sale.
10	Fuel pipe	1			Rater Principalisas (OSO)
11	Collar	3		<u>⊚</u>	Chall
12	Grammet	3 3 1		16 k	A100
13	Bracket	1 P		a mah	9)
14	Washer %	3		an.	
15	Screw %	3	ø5 × 25 mm	Or C.	
16	Screw Screw Fuel rail	2	ø5 × 14 mm	Toler	
17	Fuel rail	1		Sanaha Motor Corporation	
	· · · · · · · · · · · · · · · · · · ·			.S.A.G.	
	Og The			N S N S N S N S N S N S N S N S N S N S	
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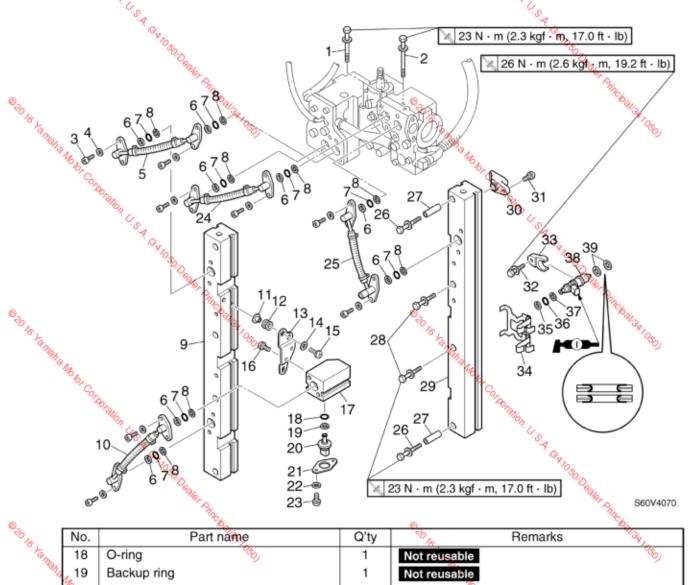
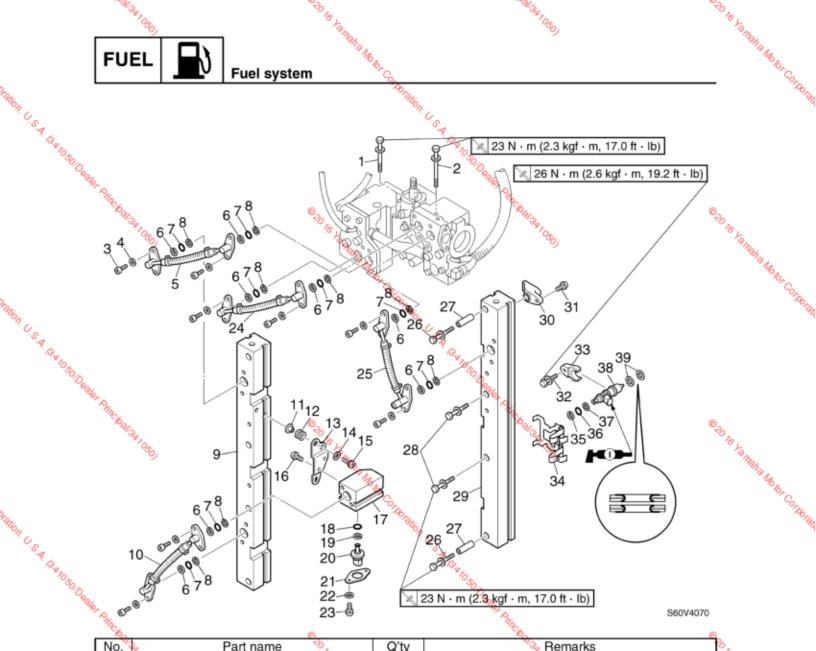


Table Sallaha Mebr.

Teo to Sallaha Motor Co

No. 18	Part name	Q'ty	Remarks			
18	O		200			
	O-ring %	1	Not reusable			
19	Backup ring	1	Not reusable			
20	Fuel pressure sensor	1	"O.b.			
21%	Plate	1	Copy			
22	Washer	2	Tallo,			
23	Bolt	2	M6 × 16 mm			
24	Fuel pipe	1	`*************************************			
25	Fuel pipe o	1	7000			
26	Bolt	4	M8 × 70 mm			
27	Collar	4	M6 × 16 mm M8 × 70 mm M8 × 55 mm M8 × 10 mm			
28	Bolt	4	M8 × 55 mm			
29	Fuel rail (starboard side)	1	**************************************			
30	Insulator	4	Tanga So			
431	Screw	4	ø4 × 10 mm			
32	Bolt	6	M8 × 25 mm 6/2			
33	Holder	6	O TANK			
34	Holder	6	⁸ tion			
60V1E11 4-2						
	21 22 23 24 25 26 27 28 29 30 31 32 33 34	Plate Washer Bolt Fuel pipe Separate Separat	21 Plate 1 22 Washer 2 23 Bolt 2 24 Fuel pipe 1 25 Fuel pipe 1 26 Bolt 4 27 Collar 4 28 Bolt 4 29 Fuel rail (starboard side) 1 30 Insulator 4 31 Screw 4 32 Bolt 6 33 Holder 6			

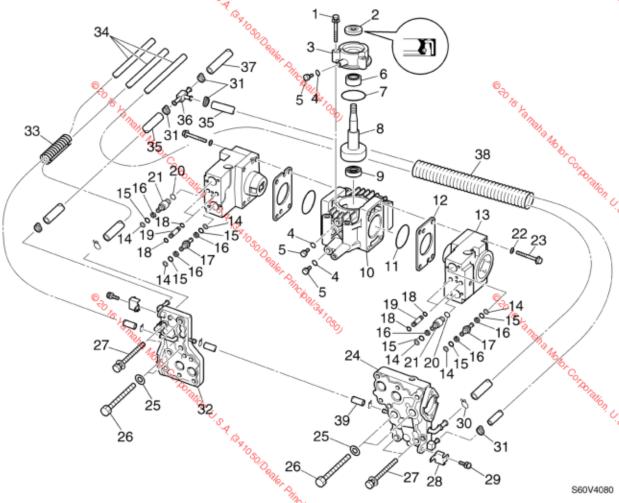


Politic Control of the Control of th	No. 35 36 37 38 39	Gasket O-ring Gasket Fuel injector Gasket	Part name	So to Tallalla Me	Q'ty 6 6 6 6 6	Not reusable Not reusable Not reusable Not reusable	33074076	No Salvana Medio Cordolate
Relich U.S.A. G.A. 1050 Deale	Chinchal .	² 81080 _j		© do sanaha Mo	*	U.S.A. G.S.O.D. Cealer Principalisa OSO,	® _Q	To Sanaha Mo

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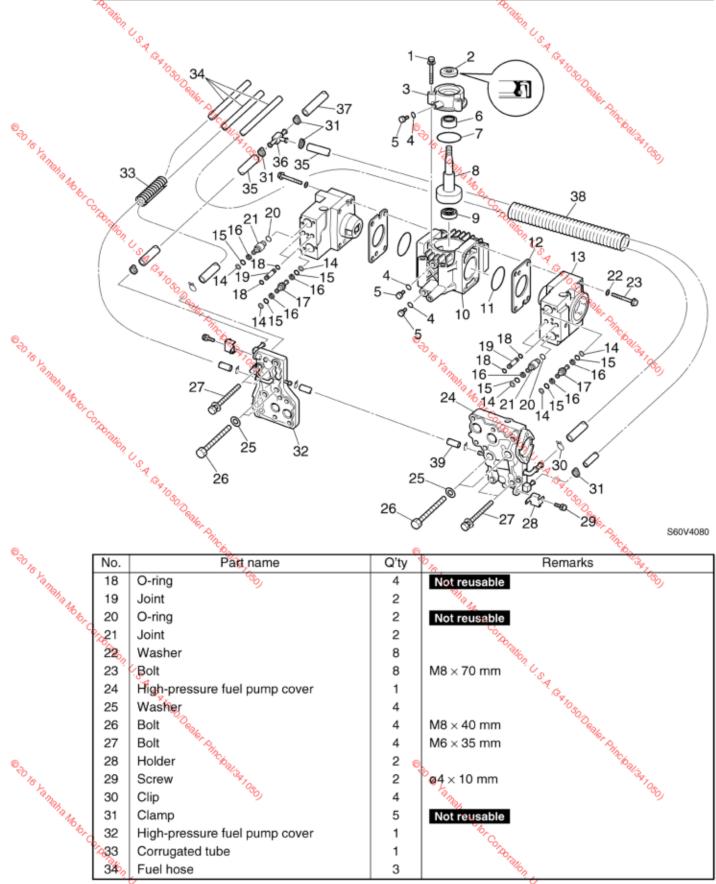
High-pressure fuel pump



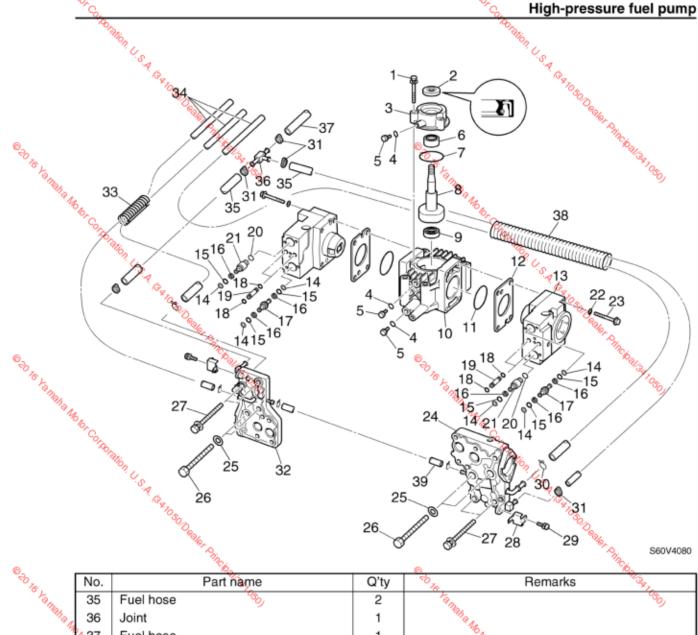
	<u> </u>	6	<u> </u>
No.	🎭 Part name	Q'ty	Remarks 6
1	Bolt 6	3	M6 × 35 mm 5/2
2	Oil seal Cover O-ring Bolt Ball bearing O-ring Camshaft Ball bearing	1	Not reusable Not reusable M8 × 10 mm
3	Cover ***	1	* Ohn
4	O-ring	3	Not reusable
5	Bolt	3	M8 × 10 mm
6	Ball bearing	1	Not reusable
7	O-ring	1	Not reusable
8	Camshaft ************************************	1	
9	Ball bearing	1	Not reusable
10	High-pressure fuel pump body	⁸ / ₂₀₁ 1	
11	O-ring 😜	1 6, 0, 1 20, 1	Not reusable S
12	Gasket %	2 📆	Not reusable %
13	High-pressure fuel pump	2	Pb) Physical Control of the control
14	Backup ring	6	Not reusable
15	O-ring	6	Not reusable
16	Backup ring	6	Not reusable
17	Joint Why	2	Not reusable Not reusable Not reusable Not reusable Not reusable Not reusable

60V1E11 4-30





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				<u> </u>
	No.	Part name	Q'ty	Remarks 🔖
- [35	Fuel hose %	2	Fa _M
14	36	Joint	1	3/1 _{0/1}
78	6,37	Fuel hose	1	**Obj
	38	Corrugated tube	1	Sa Ralia Motor Corporation
	39	Fuel hose	1	Talion .
		Tuel nose		© 20 to Sa Plays
14		*Idb)		© 20 16 Yangha Ma

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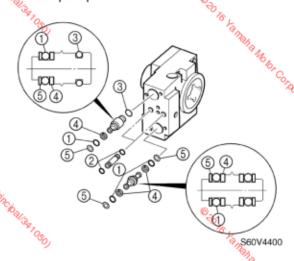
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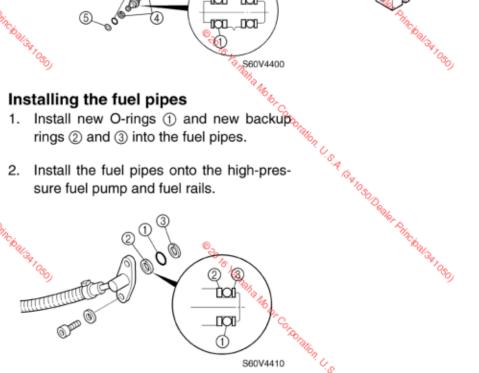
Fuel system

Installing the joints

- 1. Install new O-rings ①, ②, and ③, and new backup rings (4) and (5) onto the joints.
- Install the joints into the high-pressure fuel pump.

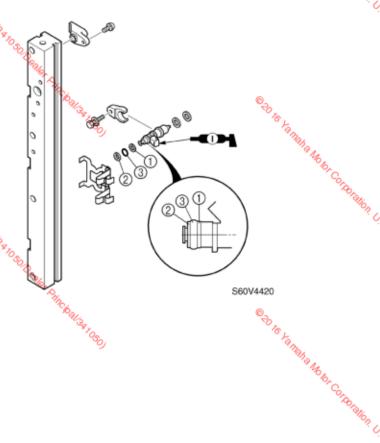






Installing the fuel injectors

- 1. Install new gaskets (1) and (2), and new O-ring 3.
- 2. Install the fuel injectors onto the fuel rails.



4-33

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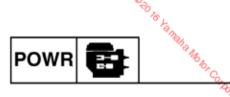
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Power unit

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Special service tools	ver unit	5-1 SA SA TOSODREAM5-2
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Special service tools		5-1
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Power unit		5-2
	ure	
Checking the drive belt and spro	ckets%, kets%,	E 4 E
	belt	5-16
		5-17
		5-19 Č
Removing the stator coil and puls	er coil	5-20
Removing the starter motor		5-20
, A		A.A.
Intake manifold		5-21
Removing the intake manifold	Q	5-22
Checking the reed valve		5-16 May 15-16 May 15-16 May 15-17 May 15-19 May 15-20 May 15-20 May 15-20 May 15-21 May 15-22 May 15
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	crankshaft assembly5	-37 ^{%9} 7 ₀
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©,	Checking the bearings	-39
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	Checking the connecting rod small end axial play	-41 6
	Checking the connecting rod big end side clearance	-41 %
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©	Assembling the crankshall roller bearings	-43 %
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	Assembling the crankshaft roller bearings	40
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Power unit

Special service tools



Compression gauge YU-33223-1



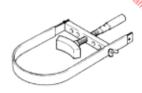
Driver handle YB-06071



Universal magnet and rotor holder YU-01235



Crank upper and lower seal installer YB-06244



Primary sheave holder YS-01880



Piston ring compressor



Flywheel magnet holder YB-06139



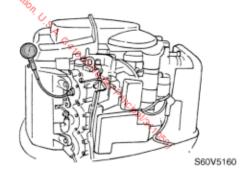
Universal puller YB-06117

5

Power unit

Checking the compression pressure

- Start the engine, warm it up for 5 minutes, and then turn it off.
- Remove the engine stop lanyard from the engine stop lanyard switch on the remote control box.
- Remove all spark plugs, and then install the special service tools into a spark plug hole.



CAUTION:

Before removing the spark plugs, blow compressed air in the spark plug well to clear out any dirt or dust that may fall into the cylinder.



Compression gauge: YU-33223-1

Fully open the throttle, and then crank the engine until the reading on the compression gauge stabilizes.



Minimum compression pressure (reference data):

560 kPa (5.6 kgf/cm², 81 psi)

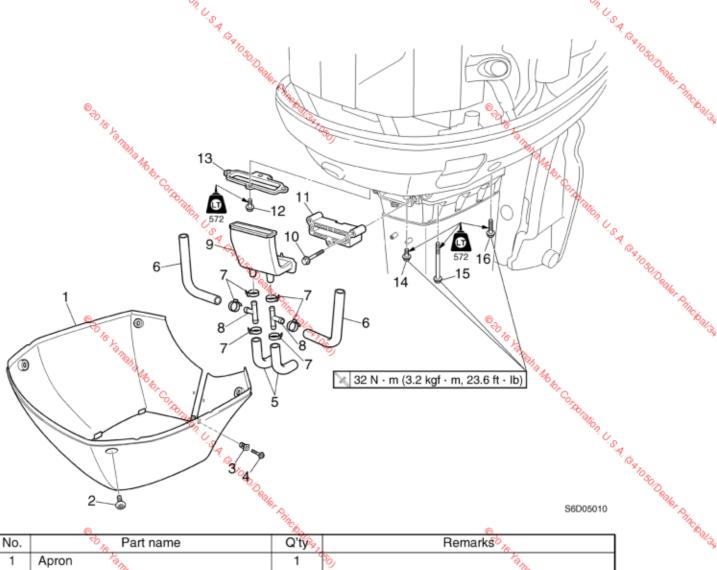
5. If the compression pressure is below specification and the compression pressure for each cylinder is unbalanced, add a small amount of engine oil to the cylinders, and then check the compression pressure again.

NOTE: _

- If the compression pressure increases, check the pistons and piston rings for wear.
 Replace if necessary.
- If the compression pressure does not increase, check the cylinder sleeves, cylinder head gasket, and cylinder head. Replace if necessary.

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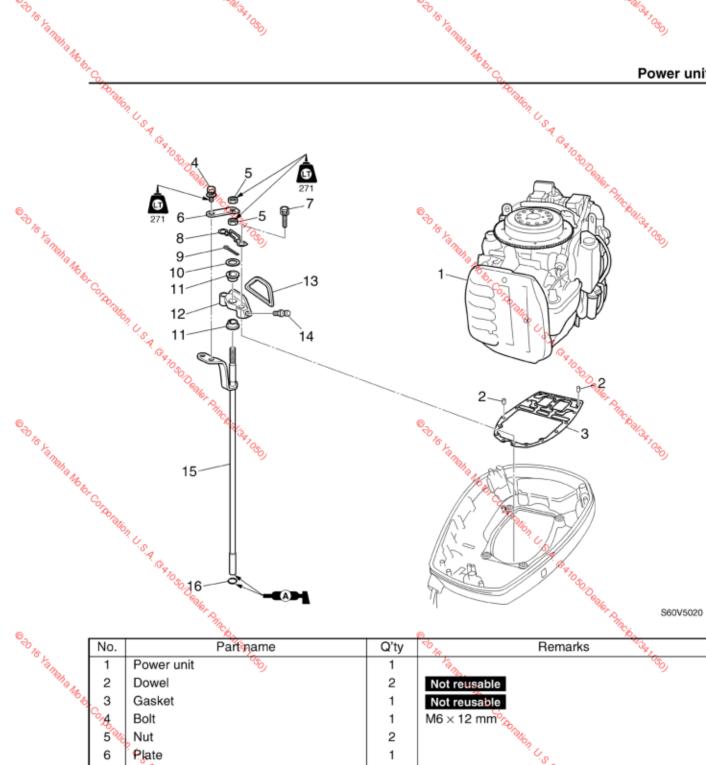


No.	Part name	Q'ty		Remarks] ************************************
-		G ty-y	5-	Helliarks	"
1 1	Apron Tong	1 1	9	a map	
2	Bolt	4	M6 × 16 mm	19 Mg	
3	Clamp	1		The state of the s	
4	Screw	1	ø4 × 16 mm	Of the	
5	Hose Total	2		Talion	
6	Hose	2		Sanaha Motor Corporation U.	
7	Apron Bolt Clamp Screw Hose Hose Plastic tie Joint Joint Bolt	6	Not reusable		4. C. 4. D. S.O. D. C. G. Ber Philopolice
8	Joint ************************************	2			*105n
9	Joint	1			O Co
10	Bolt	3 3	M8 × 55 mm		*Gr.An
11	Bracket _⊘	Anne 1 3 4 5 4 7 1		©_	The things
12	Bolt %,	4 97	M6 × 20 mm	₹0 ₇₆ ,	**************************************
13	Plate	1 1	8)	Tanno.	
14	Plate Bolt Bolt	2	M8 × 30 mm	Tha Ma	
15	Bolt	8	M8 × 135 mm	° top	
16	Bolt %.	4	M8 × 45 mm	© 30 Is Ya Raha Motor Colton	
	THON U.S.A. G.A. D.S.O.D. Ball				•
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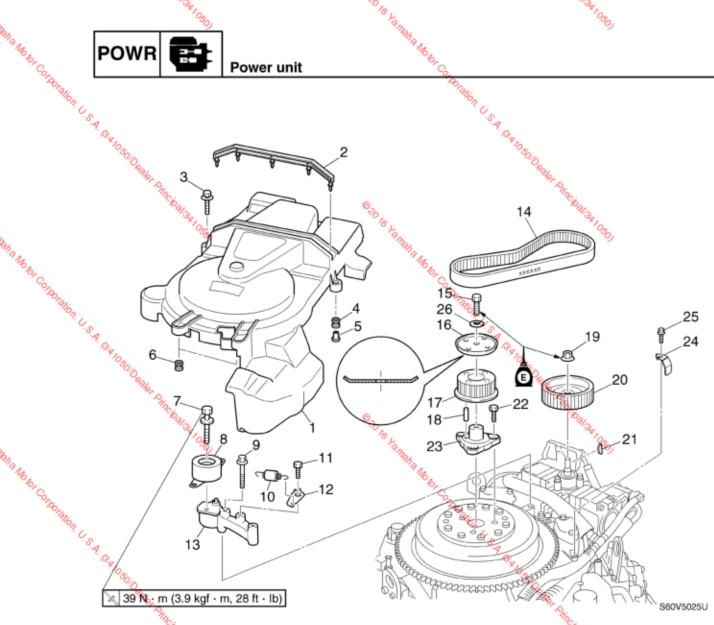
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W. S. 1050

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50 %.	No.	Part name	Q'ty	Nemarks ***
© 30 to Yallialia Make	1	Power unit %	1	(a)
Wha As	2	Dowel	2	Not reusable
**************************************	3	Gasket	1	Not reusable
	CO/46.	Bolt	1	M6 × 12 mm
	5%	Nut	2	Talion
	6	Plate	1	* C _S
	7	Bolt	2	M6 × 30 mm
	8	Spring plate	1	*7050
	9	Pin 🖏	1	Not reusable
	10	Washer 🐾	1	** An
©_	11	Bushing	2	0 7 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
80 % ,.	12	Bracket	1	10 10 1 Salve
© co to yanaha Mok	13	Washer Bushing Bracket Grommet	1	Not reusable Not reusable M6 × 12 mm Totalian L. S. A. G. A. D. S. D. B. D. S. D.
" A4	14	Grease nipple	1	700 Mg
6	15	Shift rod	1	· br
	*16	O-ring	1	Not reusable by
	*100	4		Wor.
		N.S.A.		· S. A
		· G		· Age
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		ealer.		* Raker
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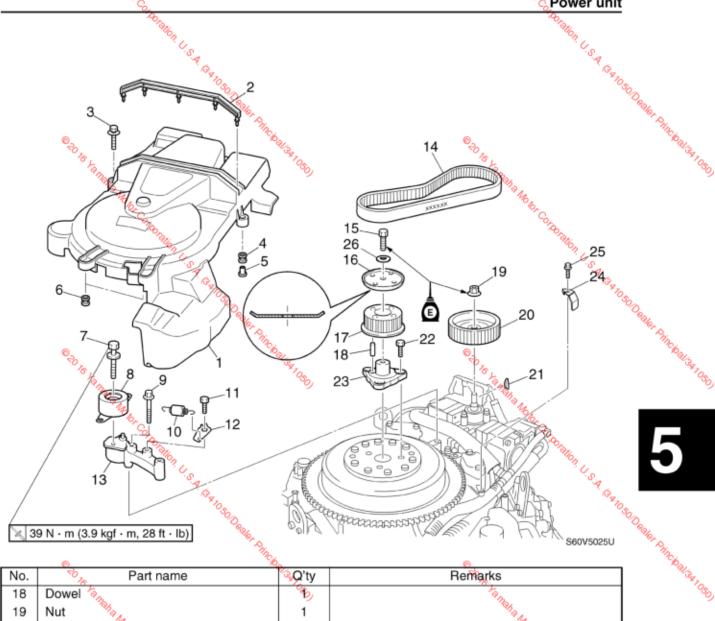
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		6	@	6 0.
	No.	Part name	Q'ty	Remarks
à.	1	Flywheel magnet cover	Tal _{naha}	<i>₹</i> 0,
aha As	2	Damper	1 1 1 1	
Obj	3	Bolt	2	M6 × 30 mm
CONTRO.	4	Grommet	2	O _{TA}
Tallon	5	Collar	2	Tation .
Bla Motor Coronation U.S.	6	Grommet	2	100
Ì	⁷ .⊘7 80°∞	Bolt	1	M10 × 45 mm
	8℃ _∞	Tensioner	1	1030 N
	9	Bolt	2	M8 × 55 mm
	10	Spring	1	* Ann
	11	Bolt Co.	⊚ 1	M8 × 55 mm M8 × 12 mm M8 × 12 mm
	12	riolder 700	To	**************************************
Rh.	13	Bracket ⁹	*Day	9
°M,	14	Drive belt	1 %	
Or Co.	15	Bolt	1	M8 × 25 mm
PO TON	16	Plate	1	TO T
"On U	17	Drive sprocket	1	"On
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Bla Motor Corporation U.S.	Rayo.			[™]
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No.	™ Part name	Q'ty	Remarks	Sal.
18	Dowel 6	(P)	Tanh.	Palisa 1080)
19	Nut %	1	Nha A	
20	Driven sprocket	1	*Obr	
21	Woodruff key	1	Corps	
22	Bolt	3	M8 × 12 mm	
23	Bolt Bracket Clamp Bolt	1	M8 × 12 mm	
24	Clamp	1	76	
25	Bolt ************************************	1	M5 × 12 mm	
26	Washer	1	To the state of th	
	T. Chi.		***	Pinchal Sa 1050
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	To L	Palisa 1080)	% L	GA YOU
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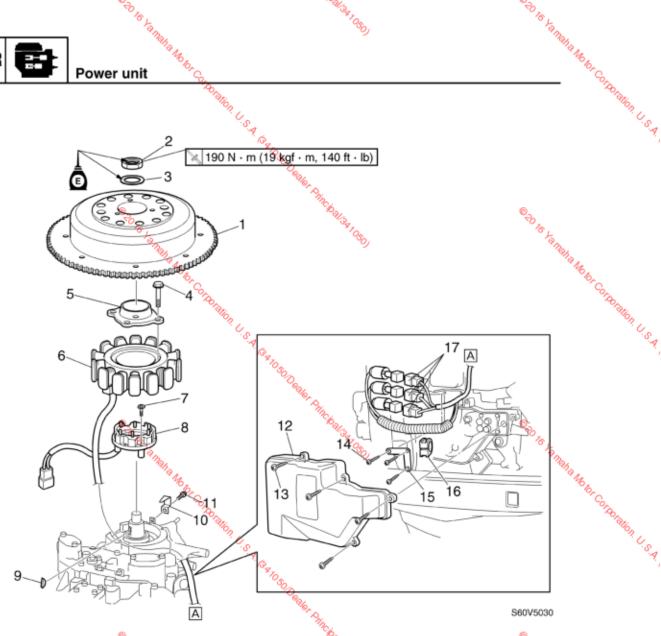
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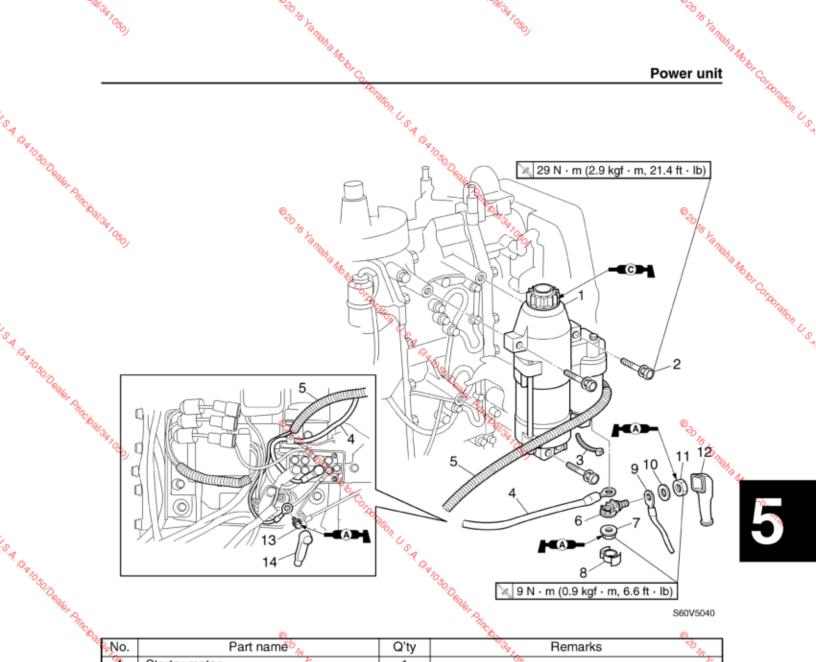
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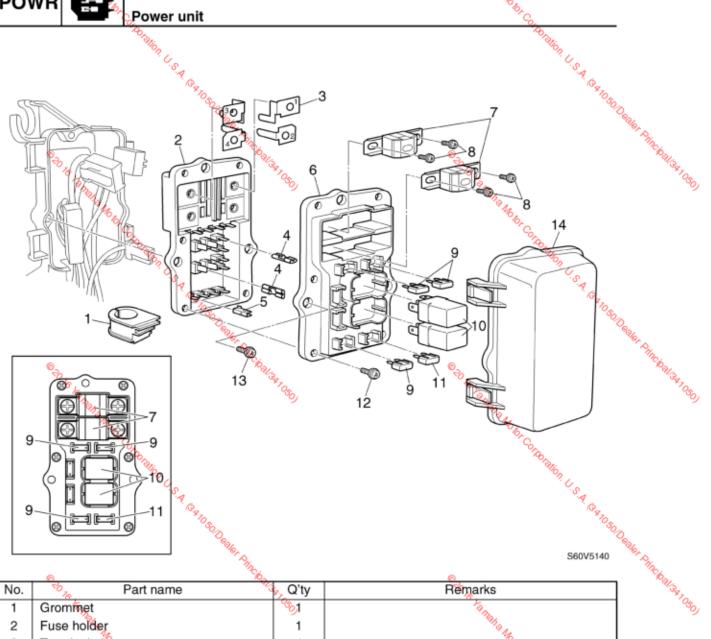
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Pal	No.	Part name	Q'ty	100 No.	Remarks 50%	\neg
	70 10,	Flywheel magnet Nut Washer Bolt Holder	1	700	***************************************	5
	2	Nut	1			The state of the s
	3	Washer	1			Motor Contraction
	4	Bolt	o ₂ 4	M6 × 35 mm		Corp
	5	Holder	1 (1 ₀ 3 ^A (0)			The la Motor Cortolation U.S.A.
P	6	Stator coil	3,00			300
	7	Screw	3 4	ø5 × 30 mm		7,
S.A. 10-4 10-50 Dealer Principal	8	Pulser coil	1 1	OSD.		
O	9	Woodruff key	1	O SAL		
* Pr	10	Pointer	1	Or An		
TC BOOK	11	Screw Cover Screw Screw Holder Grommet	1	ø6 × 10 mm	© 30 %	
Ì	*),2	Cover	1	GA ₁₀	**************************************	L
	13	Screw	4	(OSO)	•	^Q N _Q
	14	Screw	3	ø5 × 16 mm		18 Mg.
	15	Holder	្គ 1			O _F C _O
	16	Grommet	TO 1			TADIS
	17	Stator coil coupler	10 _A			"Tion !
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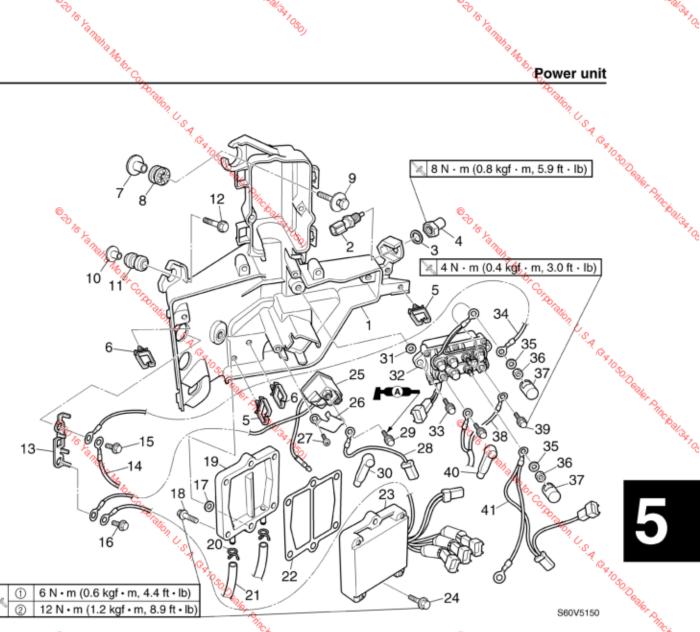
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*	No.	Part na	me ^o ⁄	Q'ty	A SAL	Remarks	₹0 _{/6} .	
	8	Starter motor	S A Relia Motor Colton	1	No.		tan	
	2	Bolt	Wha As	3	M8 × 45 mm		1	na ra
	3	Plastic tie	Obj	1	Not reusable			Obr
	4	PTT relay lead	TO/AD.	1				Na Mo to Corporation U.S.
	5	Starter relay lead	7	1 to 1				Callion
S.	6	Terminal		, cle				* C _S
A. C.	7	Nut		170	,			**
7050 C	8	Сар		1 1	650			
ORAL	9	Positive battery lead		1	October 1			
S.A. G. NOSOD Beder Principal	10	Washer		1	* Phi			
"Coa	11	Nut	©	1	"Char		⊚_	
	**/\Z	Сар	76 L	1	SA TON		© ROTE LAN	
	13	Bolt	ana,	1	M6 × 10 mm 🦠		(an	24
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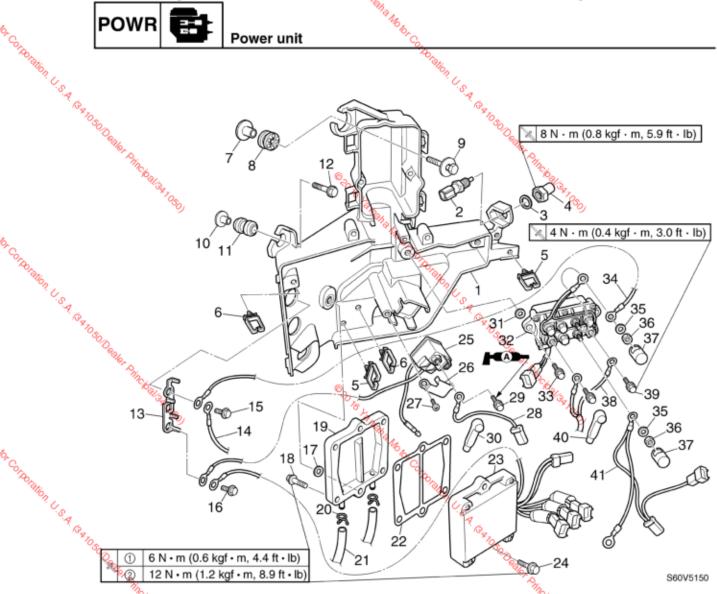
	(A)		
No.	Part name	Q'ty	Remarks Challer Total
1	Grommet	⁶ 65/1	To May 1980
2	Fuse holder	1	**************************************
3	Terminal plate	4	**Obr
4	Terminal 🗞	8	Copp
5	Terminal %	8	Tallo,
6	Fuse holder	1	300
7	Fuse	2	100 A
8	Terminal Terminal Fuse holder Fuse Screw Fuse Relay Fuse Screw Screw	4	100 A ø5 × 10 mm 20 A
9	Fuse	3	20 A 30 A \$\tilde{\text{93}} \times 10 \text{ mm} \$\tilde{\text{95}} \times 16 \text{ mm} \$\text{95} \times 16 \text{ mm}
10	Relay	2	™ _A
11	Fuse	1	30 A
12	Screw	6	ø3 × 10 mm
13	Screw	* ₇₀ 6 6003	ø5 × 16 mm
14	C 17/2	1	30 A
	Cover ** Alberton U.S. A. G. A. NO. SO. D. G. S. A. G. A. NO. SO. D. G. S. A. G. A. NO. SO. D. G. S. G. A. R. A. R. A. NO. S. G.		COLD E SE
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	<u> </u>	10 ₀	<u> </u>	"(O _O)
No.	Part name	Q'ty	Remarks	**************************************
1	Junction box	1%)	Ta _{III}	- વ્ય
2	Intake air temperature sensor	1	8/1 ₀ / ₁	
3	Washer %	1	*Obs.	
4	Nut So	1	Corps	
5	Holder	2	Talio,	
6	Holder	2	1. C.S.	
7	Washer Nut Holder Holder Collar Grommet Bolt Collar Grommet	3	Sa Ralia Modor Corporation U.S.A. S.	
8	Grommet ***********************************	3	1.	30
9	Bolt	3	M6 × 35 mm	OSO Dealer Principal Service
10	Collar	1		Pr An
11	Grommet	ار ار	⊚_	"ACIDO"
12	Bolt %,	"Sel	M6 × 25 mm	SA TO
13	Connector	1%	Tanna .	~
14	Ground lead 🗽	1	**************************************	
15	Bolt 6	1	M6 × 12 mm	
16	Bolt	1	M6 × 12 mm	
17	Washer	2	M6 × 25 mm M6 × 12 mm M6 × 12 mm	

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		Co.	@		Co.	
	No.	Part name	50%	Q'ty	Remarks	
	18	Bolt %	ta,	4	M6 × 25 mm	
	19	Cover		26, 1		
6,	20	Clip		26,		
COPAD.	21	Cooling water hose		2 %	8 .	
Talion	22	Gasket		1	Not reusable	
100	23	Rectifier Regulator		1	100	
Or Corpolation U.S.A. GARD	24	Bolt		2	M6 × 30 mm	
~~ ₀	25	Starter relay		1	*1050	
	26	Holder		1	O _{Rak}	
	27	Screw		1	ø6 × 20 mm M6 × 10 mm	
	28	Starter relay lead	© 70 /6 /a/	1	*Cha/	
	29	Bolt	10 K	1	M6 × 10 mm	
	30	Cap 🤟	(4)	1	9)	
	31	Washer		1 1000 1000		
Op. C.	32	Power trim and tilt relay		10,0		
TADE .	33	Bolt		2 🖔	M6 × 30 mm	
Or Cortolellion U.S.A. GAROS	34	Ground lead		1	No.	
, S. A					, s, A	
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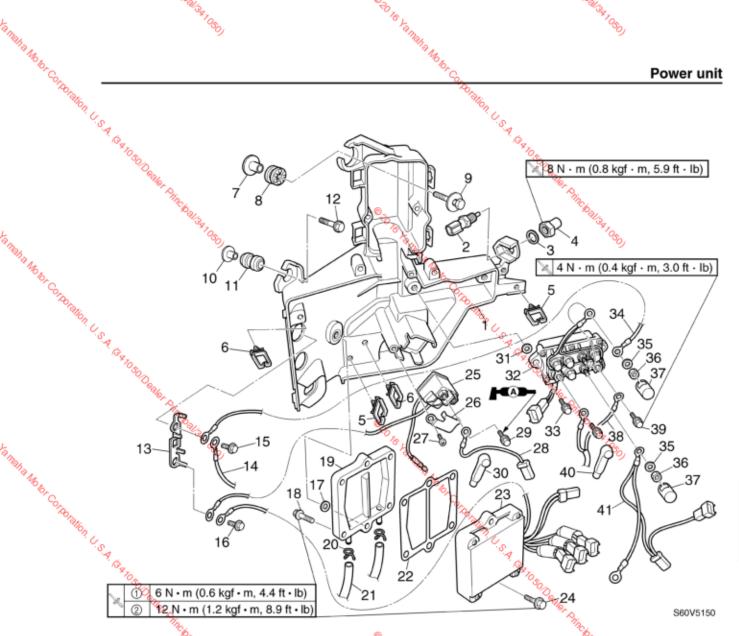
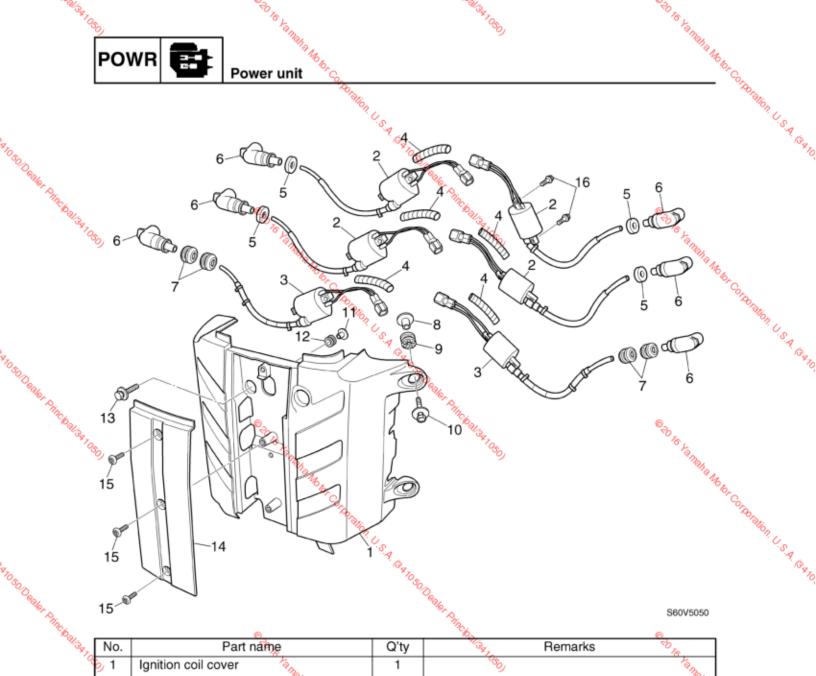


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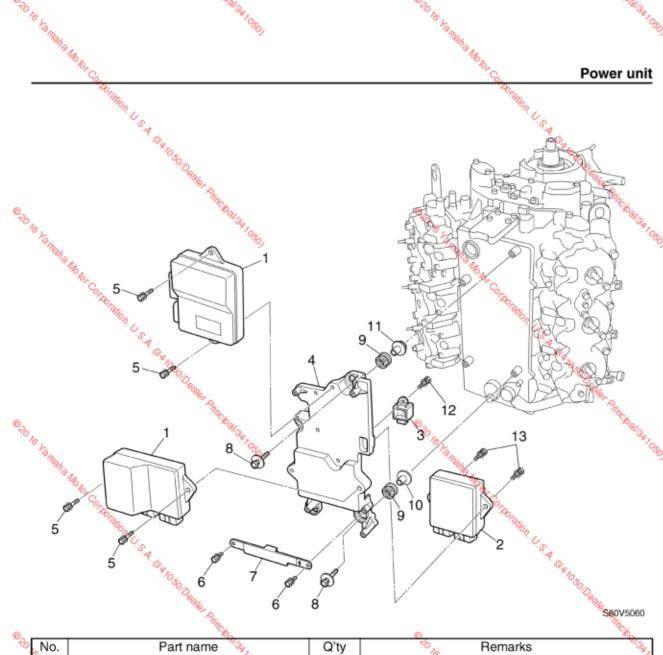
			0)	No.
	No.	Part name	[™] Q'ty	Remarks
an.	35	Washer 🦠	2,	80)
Wha ke	36	Nut	2 %	
*Obr	37	Cap	2	O O
COLA	38	PTT motor lead	1	CO _{TA}
A Malia Motor Corporation (39	Bolt	2	M6 × 10 mm
" O.	40	Сар	1	* U _S
	₹ <u>#1</u>	PTT relay lead	1	A. 62
	100	O Deale Tank	ā)	TO SO Dealer Principaliza 1080)
A Raha A		** Principalisa (OSO)	ad 16 Yamaha	*113 ₈₁ 030 ₀

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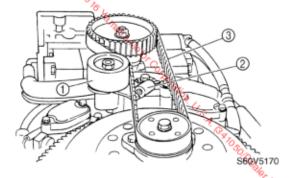
Do.		(A)			6		<u> </u>	
ballay,	No.	Part nam	e	Q'ty	100gy-	Remarks	50%	
	% 1	Ignition coil cover	Tan.	1	80)		Ta maha n	
	2	Ignition coil	Wha ke	4	Cylinders #1, #2	2, #3, and #4	Wha h	
	3	Ignition coil	TOROTO	2	Cylinders #5 and	d #6	P6	2
	4	Hose	Orab.	5				COTAD.
	5	Grommet	Saliella Motor Cortoration	4				Copposition U.S.A. SA.D.
	6	Spark plug cap		·s 6				100
	7	Grommet		6 4 4 70sp				A. W.
7050 A	8	Collar			•			76
Contract of the contract of th	9	Grommet		4	O _{Rale}			
ROSODesler Principalisas,	10	Bolt		4	M6×35 mm			
Chall	11	Collar		4	Challa		© ₂	
97		Grommet	to ya maha Motor Cortor	4	870s		© RO TO	
	213	Bolt	a mah.	4	M6 × 30 mm⁄		A Mah.	
	14	Cover	are a	1			845,	
	15	Bolt	**************************************	3	M6 × 14 mm		"	°C ₀ .
	16	Bolt	TO,	12	M5 × 20 mm			TO TO
			"On	6				**On ()
				. O. A.				Corporation U.S.A. S.A. D.
870.				Page 10.				R. A. Zo
300	5-13			S	O _C		60V1E11	7
NO SO Dealer Princ.					Dealer Dine.			
"inc.					The.			

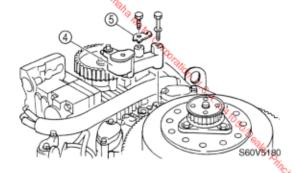


6		"Co		6 Total
© 70	No.	Part name	Q'ty	Remarks Sy
	Zaha 2ha	Injector driver	2	To any
	2 %	ECM	1	**************************************
	3	Fuel pump relay	1	*O.br
	4	Bracket	1	College
	5	Bolt %	4	M6 × 20 mm
	6	Bolt C	2	M6 × 14 mm
	7	Holder	1	7.62
	8	Bolt ***	4	M6 × 35 mm
	9	Grommet	4	70 ₈₀₄
	10	Collar	2	**************************************
©_0	11	Collar	2	©3
0	5,12	Bolt	1	M6 × 20 mm M6 × 14 mm M6 × 35 mm M6 × 25 mm M6 × 25 mm
	93	Bolt Mon Bolt Bolt Bolt Bolt Bolt Bolt Bolt Bolt	2	M6 × 25 mm %
	70	Bolt Maker Cortonalion U.S.A. G. A. D. Bolt 11		M6 × 25 mm No. Report Collaboration U.S.A. Galloson 5-14
	60V1E	11 TOSO Dealer Princ.		**************************************

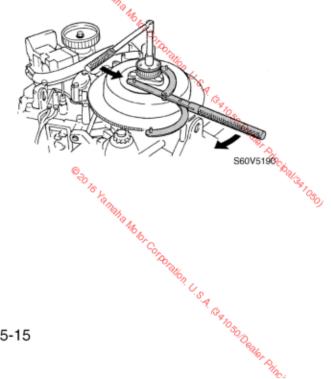
Removing the drive belt and sprockets

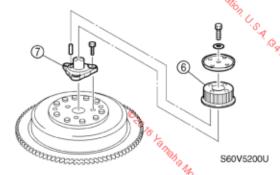
- Remove the flywheel magnet cover.
- 2. Remove the drive belt tensioner (1) and the tensioner spring ②, and then remove the drive belt 3.





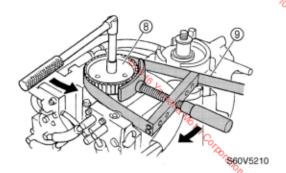
4. Remove the drive sprocket 6 and the drive sprocket bracket 7.

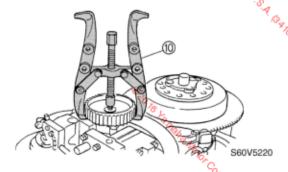




Universal magnet and rotor holder: YU-01235

5. Remove the driven sprocket ®.







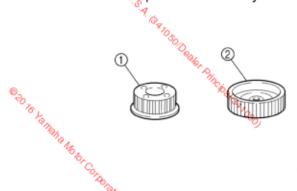
Primary sheave holder @: YS-01880 Universal puller 10: (commercially available)

Checking the drive belt and sprockets

1. Check the interior and exterior of the drive belt for cracks, damage, or wear. Replace if necessary.



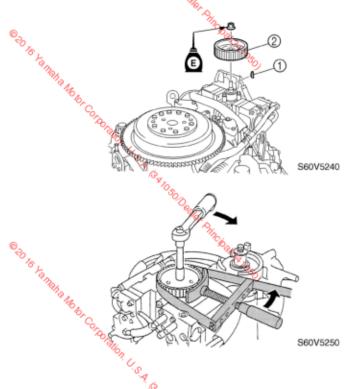
Set to Yallalla Maker C.



S60V5230

Installing the sprockets and drive belt

1. Install the Woodruff key 1, then the driven sprocket 2.

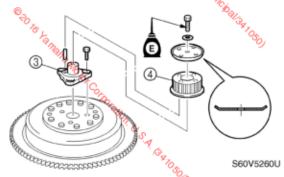


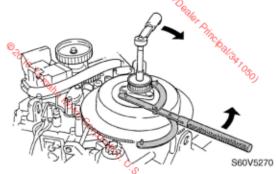
60V1E11



Primary sheave holder: YS-01880

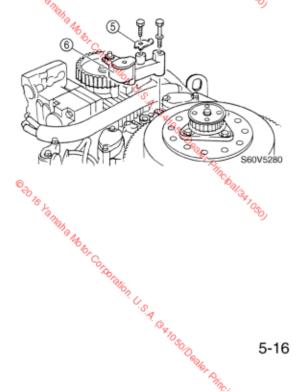
Install the drive sprocket bracket 3 and the drive sprocket 4.





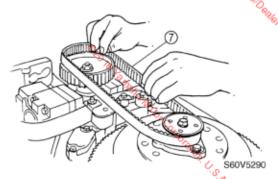
Universal magnet and rotor holder: YU-01235

3. Install the spring holder ⑤ and tensioner bracket ⑥.

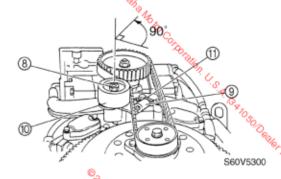


Power unit

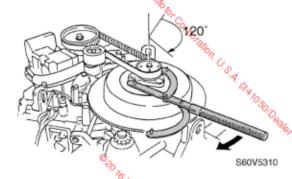
 Install the drive belt ① from the drive sprocket side with its part number in the upright position, and then turn the belt a half turn counterclockwise to align it.



- 5. Finger tighten the drive belt tensioner bolt ®, and then loosen it 90°.
- 6. Install the tensioner spring (9) onto the drive belt tensioner (10) and spring holder (11).



 Turn the flywheel magnet 120° clockwise to take up the drive belt slack.



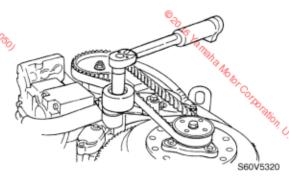
NOTE:

Do not turn the flywheel magnet counter-clockwise.



Universal magnet and rotor holder: YU-01235

8. Tighten the drive belt tensioner bolt to the specified torque.





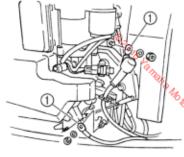
Drive belt tensioner bolt: 39 N·m (3.9 kgf·m, 28.8 ft·lb)

Removing the power unit

NOTE:

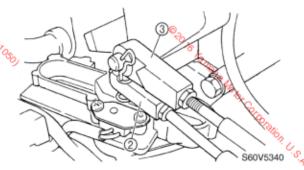
It is recommended to loosen the flywheel magnet nut before removing the power unit to improve working efficiency.

1. Disconnect the battery leads ①.



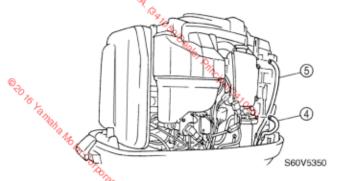
S60V5330

Disconnect the shift cable ② and the throttle cable ③.

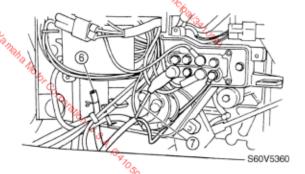


3. Disconnect the fuel hose 4 and the oil hose 🖔 🏡

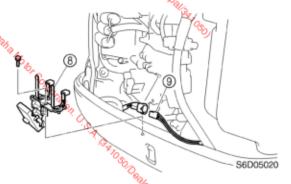
Salaha Mobor



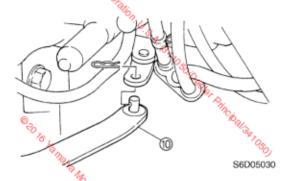
- Remove the flywheel magnet cover.
- 5. Remove the junction box cover, and then disconnect the cooling water hose (6) and the PTT motor leads 7.



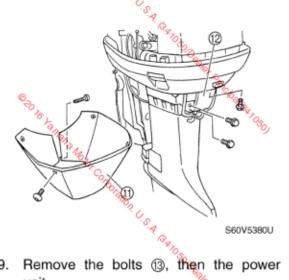
6. Remove the bracket (8) and disconnect the trim sensor coupler 9.



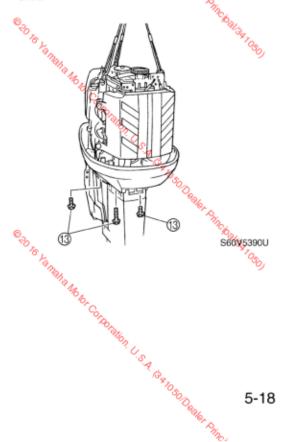
7. Disconnect the PTT switch coupler and



8. Remove the apron (1) and the hose joint assembly 12.

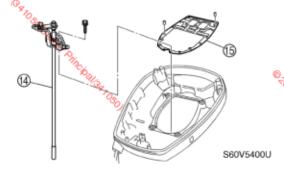


unit.



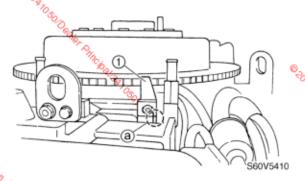
Power unit

10. Remove the shift rod assembly (4) and gasket (5).



Removing the flywheel magnet

17 Remove the pointer ①.



NOTE:

Make an alignment mark (a) at the installation point of the pointer, and then remove the pointer (3).

2. Loosen the ffywheel magnet nut.



S60V5420

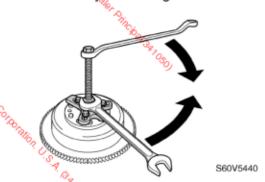
CAUTION:

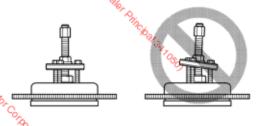
Apply force in the direction of the arrows shown, to prevent the flywheel magnet holder from slipping off easily.



Flywheel magnet holder: YB-06139

3. Remove the flywheel magnet.





S60V5450

60V1E11

CAUTION:

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

NOTE:

Apply force to the crankshaft end until the flywheel magnet comes off the tapered portion of the crankshaft.



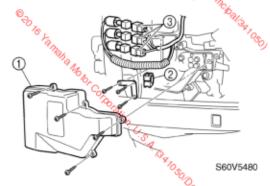
Universal puller: YB-06117

Remove the Woodruff key.

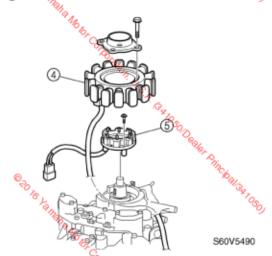
5-19⁰%

Removing the stator coil and pulser coil

- 1. Remove the junction box cover ①, and then remove the grommet (2).
- 2. Disconnect the stator coil couplers 3.

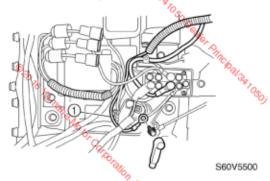


- 3. Disconnect the pulser coil coupler.
- Remove the stator coil 4 and pulser coil

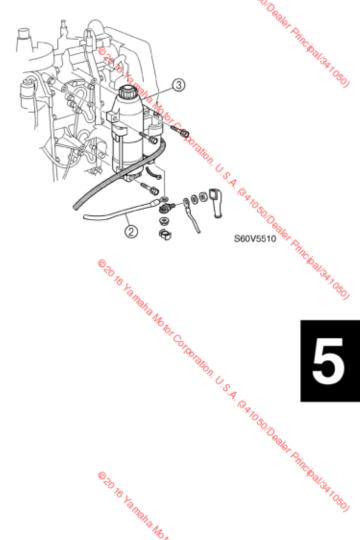


Removing the starter motor

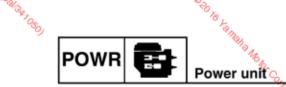
1. Disconnect the starter relay lead ① from the starter relay.



- Disconnect the PTT relay lead 2 from the starter motor.
- 3. Remove the starter motor 3.

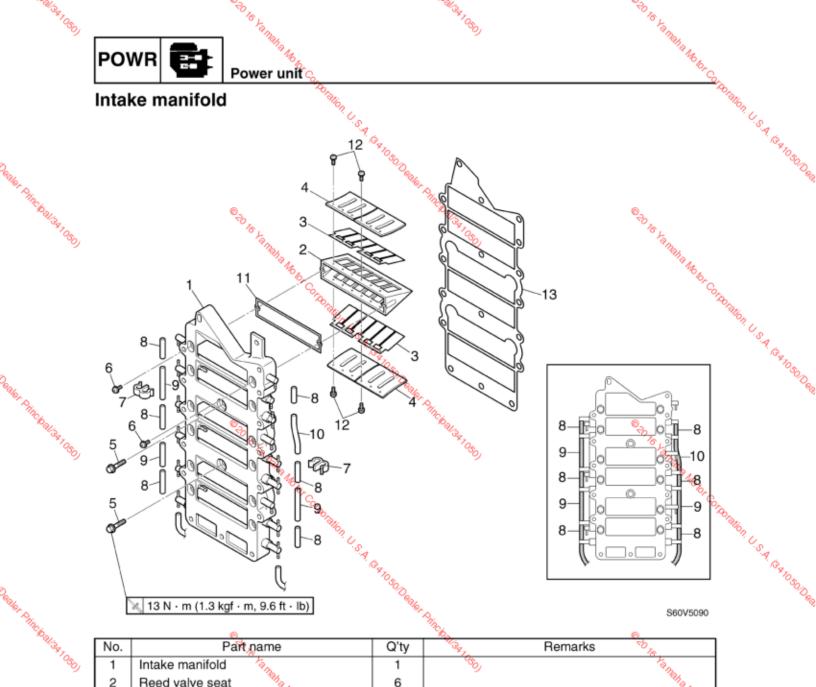


© RO 16 Variable Maker Cornolation. U.S.A. (S. & 10.50) Dealer Principalist (OSO)



Intake manifold

Dealer Principalisa 1050)



	<u> </u>		6		<u> </u>
No.	Part name	Q'ty	W. Say	Remarks	50/6
1	Intake manifold	1	30)		Tan
2	Reed valve seat	6			Sha A
3	Reed valve	24			Fanaha Mobro
4	Stopper	24			G
5	Intake manifold Reed valve seat Reed valve Stopper Bolt Screw Holder	2	M6 × 30 mm		
6	Screw	12	ø5 × 16 mm		
7	Holder	2			
8	Hose	2 7036 3%			
9	Hose	3%			
10	Hose	1 **	S _k		
11	Gasket _©	6	Not reusable		⊚_
12	Gasket Screw	72	ø3 × 6 mm		Solo Far
13	Gasket 🧖	1	Not reusable		Tanna,

5-21 60V1E11

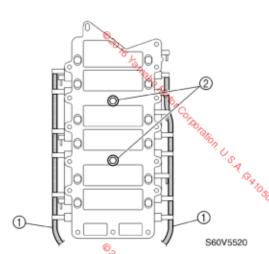
Valve stopper height (b):

8 mm (0.31 in)

San Is Yangha Maker Cornola

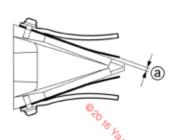
Removing the intake manifold

- 1. Disconnect the hoses ①.
- Remove the intake manifold bolts ②, and the intake manifold.



Checking the reed valve

1. Check the reed valves for bends @. Replace if out of specification.

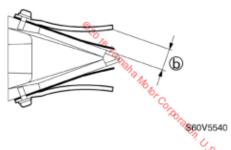


S60V5530



Valve bend limit @: 0.2 mm (0.008 in)

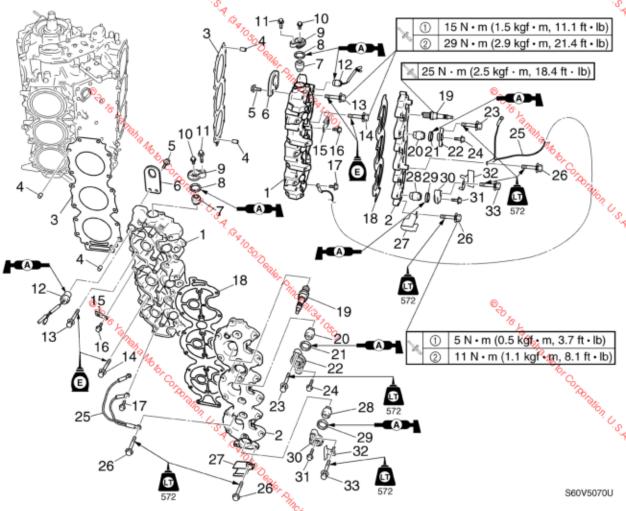
2. Measure the valve stopper height. b. Replace if out of specification.



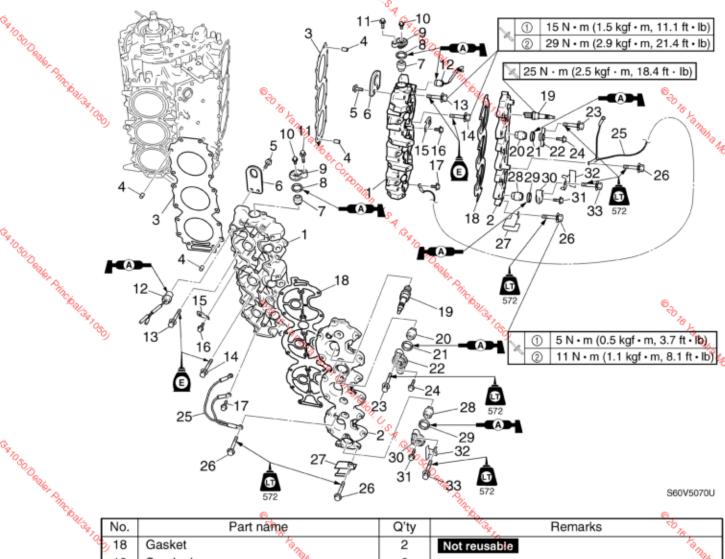
60V1E11



Cylinder head



	<u> </u>	0	<u> </u>	Dalla
No.	∿ Part name	Q'ty	Remarks / _{/c}	Way.
1	Cylinder head	2	8) San	
2	Cylinder head cover	2	**************************************	
3	Gasket ***	2	Not reusable	
4	Dowel	4	College	
5	Bolt	4	Not reusable M6 × 20 mm	
6	Gasket Dowel Bolt Engine hanger Anode Grommet Cover	2	* U	
7	Anode	2]	Ø_
8	Grommet ***********************************	2		1050
9	Cover	2		"Dear
10	Bolt	2 2	M6 × 20 mm	SANOSODERIEF Principalis
11	Bolt 💿	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	M8 × 35 mm _☉	"Report
12	Thermoswitch	2 3/	™ ₆ ,	"G
13	Bolt The State of	36	M8 × 70 mm	
14	Bolt No.	4	M8 × 60 mm	
15	Plate 6	3	No.	
16	Bolt	3	M6 × 12 mm	
17	Bolt Plate Bolt Bolt Bolt	2	M8 × 35 mm M8 × 70 mm M8 × 60 mm M6 × 12 mm M6 × 12 mm	



TO.					Top.			
"Chalisa,	No.		Part name	Q'ty	. J.	Remarks	SOIG	
7	18	Gasket	Tan.	2	Not reusable		a naha	
	19	Spark plug	a Ralla No to Col Politica	6			Wha h	
	20	Anode	*Obr	2			76	h-
	21	Grommet	OTA	2				COLAD
	22	Cover	Tallon	2				Corporation U.S.A. G.S.
	23	Bolt	*	·, 4	M8 × 50 mm			100
Q_	24	Bolt		2 to s	M6 × 20 mm			A W
*1050.	25	Ground lead		200				*>
TO ROLL	26	Bolt		36	M6 × 30 mm			
* Pr	27	Holder		2	TO PA			
CA 10 50 Dealer Dinchalon	28	Anode	⊚ _	2	Char		©_	
, gar	29	Grommet	76 L	2	Chalisa 1050		© 30 Is yantaha h	
	30	Cover	(ang)	2	36		(ana	
	31	Bolt	77.Q A.M.	2	M6 × 20 mm		70 A	
	32	Plate	TO TO	2			(6)	² C
	33	Bolt	© do to Ya Maha Mo to Co Too Tay	2	M8 × 50 mm			OF ROTE
			ThO _R	USA				Allon 1
			,	, v.				, S. A
Q _Z				N. 1050				Corporation U.S.A. R.A.
30 D	60V1E	11		J.O.	à		5-24	

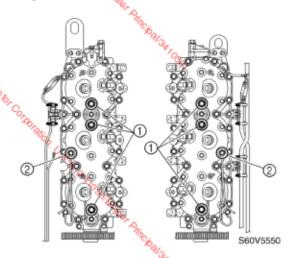
5-24 60V1E11



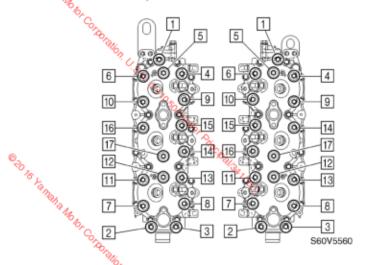
Power unit

Removing the cylinder head

- 1. Remove the spark plugs.
- Remove the anode cover bolts 1 and ground lead bolts 2.



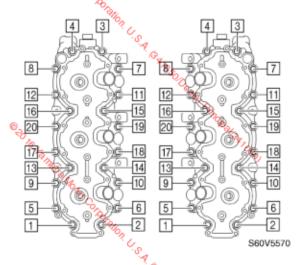
3. Remove the cylinder head cover bolts in the sequence shown.



4. Remove the cylinder head bolts in the sequence shown.

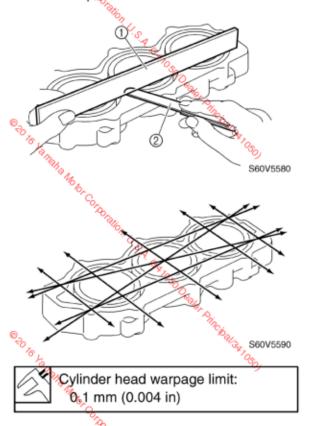
CAUTION:

© 20 16 Sanaha Makar Cordoration U.S.A. @ Anosonealer Ain Do not scratch or damage the mating surfaces of the cylinder head and cylinder



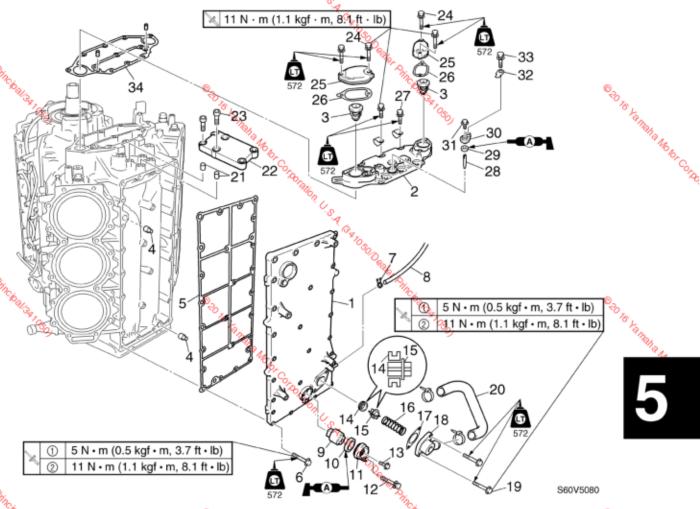
Checking the cylinder head

- 1. Eliminate carbon deposits from the combustion chambers and check for deterioration.
- Check the cylinder head warpage using a straightedge (1) and thickness gauge (2) in four directions as shown. Replace if out of specification.

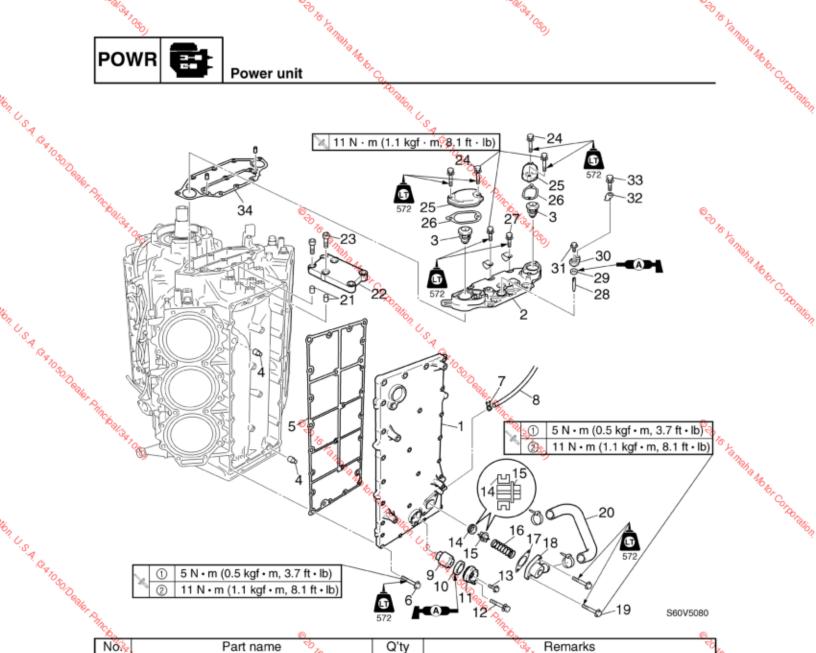


60V1E11

Exhaust and cylinder cover



	100		@			ର
	No.	Part name	**************************************	Q'ty	Remarks	1
	1	Exhaust outer cover	Sa maha A	1	80)	
	2	Cover	"Than	1		
	3	Thermostat	7	⁸ هـ 2		
24.	4	Collar		2 2 2 2 1		
Talion	5	Gasket		1 8%	Not reusable	
100	6	Bolt		25	1 √46 × 25 mm	
4	7	Clamp		1	7 6.	
ADDRIGHT U.S.A. C.A. 1050Des	8	Hose		1	M8 × 30 mm M6 × 20 mm	
(A)	9	Anode		1	O _{RM}	
	40	Grommet		1	** Ang	
	110	Cover	©	1	*Co	0
	12	Bolt	10 K	1	M8 × 30 mm	ľ
	13	Bolt	(ana)	1	M6 × 20 mm	
	14	Grommet	194	1		
	15	Pressure control valve		6/c1		
TO _{FR}	16	Spring	© do la halia A	10		
Tion .	17	Gasket		1 %	Not reusable	
, S. A					· S.A	
ADORBION U.S.A. GANOSODERI					· Gg	
300	60V1E	11			SO D	5-26
· Sala	6,				Rate,	
	Princ.				S.A. G.A. IOSO Dealer Princ.	

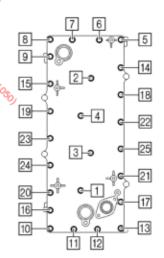


_	Co.		<u>a</u>			6	
	No.	Part name	SO /6	Q'ty	Remarks	40	6 .
	18	Cover	S Tanaha Mobi	1	® ₀		Tam.
	19	Bolt	The Ro	2	M6 × 20 mm		Wha ke
	20	Hose	26	1			Obj
	21	Dowel		0/202			Orton
6,	22	Bracket		Corto 2			S Sa Raha Motor Coltofallon
, C.S.	23	Bolt		4 0	M8 × 25 mm		· ·
A. War	24	Bolt		4	M ₆ × 55 mm		
ion U.S.A. G.A. D.S.O.D. Baller	25	Cover		2			
0ea/6.	26	Gasket		2	Not reusable		
~	Ch.	Bolt		7	M6 × 20 mm		
	28	Anode	So is yanaha Molo,	1	Te hall an lotto	@ ₂	
	29	Grommet	16 K	1	**/Q5	ĭ	64
	30	Cover	A Mah	1			to sa malla Moder Cortoration
	31	Bolt	4 Mg/	1	M5 × 12 mm		a Mon
	32		9	Corpol			Or Cox
8	33	Bolt		TO Ston	M6 × 20 mm		'Abran
⁰⁰¹ ()	34	Gasket		100	Not reusable		, ou
. S. A.					S.A.		
On U.S.A. (S.A. 10.SO) Dealer A.					S.A. R. A. NO.SO. Dealer Phine.		
OD	5-27				D. Commence of the commence of	60V1E11	
"aller to					Wer participation of the second		
. 70	20.				The.		

S60V5620

Removing the exhaust cover

 Remove the exhaust cover bolts in the sequence shown.

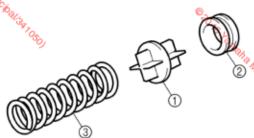


S60V5600

Pressure control valve cover bolt: 1st: 5 N·m (0.5 kgf·m, 3.7 ft·lb) 2nd: 11 N·m (1.1 kgf·m, 8.1 ft·lb)

Checking the pressure control valve

- 1. Remove the pressure control valve.
- Check the pressure control valve (1) for wear or damage. Replace if necessary.
- Check the grommet ② for deformation. Replace if necessary.
- Check the spring ③ for fatigue or deformation. Replace it if necessary.



S60V5610

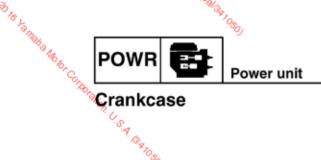
Installing the pressure control valve

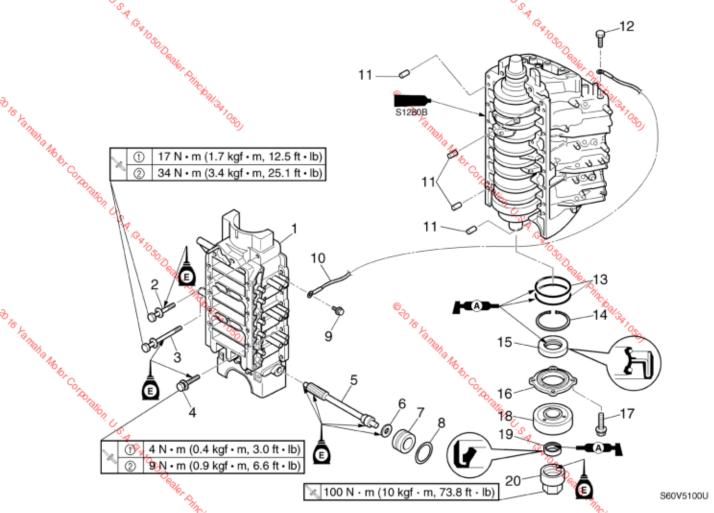
Install a new gasket and the pressure control valve, and then tighten the bolts to the specified torques in two stages.

Analion U.S.A. GAIOSO Deal

5

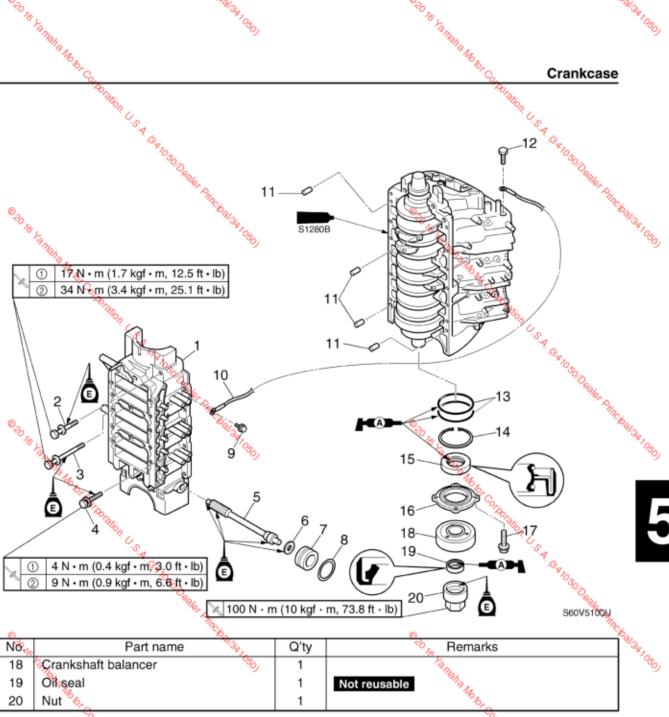
Order alich U.S.A. (S.A. TOSO) Deselber Dr.





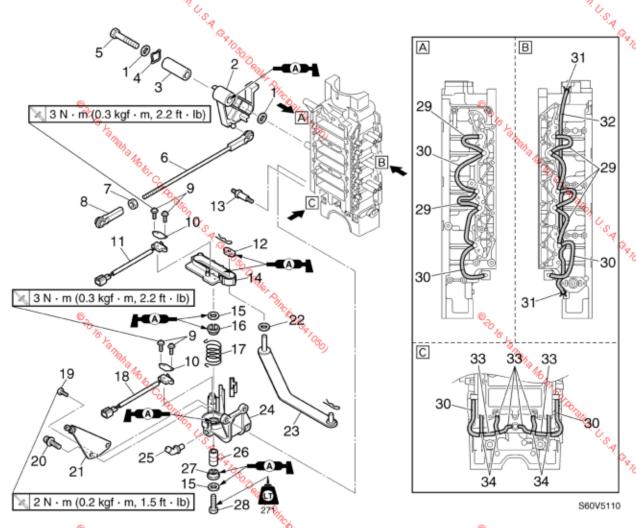
Ta la Sa Maha Mahar

		line to	8	ne h
® Is Sa Mala Mater Cortora	No.	Part name	Q'ty_	Remarks 🗽
tam	1	Crankcase %	1 4	P _M
Wha As	2	Bolt	4	M10 × 90 mm
*Obj.	3	Bolt	4	M10 [®] ≰130 mm
COLA	4	Bolt	14	M6 × 30 mm
76	95	Oil pump driven gear	1	Tallon,
	້6 _ຫ ຼ	Washer	1	* C _S
	7 7	Grommet	1	A.62
	8	O'ring	1	Not reusable M6 × 12 mm M6 × 12 mm M6 × 12 mm M6 × 12 mm
	9	Bolt	1	M6 × 12 mm
	10	Ground lead	1	** A _{II}
5	11	Dowel Bolt O-ring	4	ACD _{BA}
8 L	12	Bolt	€ 10%	M6 × 12 mm
(ana)	13	O-ring	2	Not reusable
na Na	14	Circlip	1	700 14
"OFC.	15	Oil seal	1	Not reusable
® IS YA MADO COTOGO	16	Housing	1	O'TROIT.
, 9	0,17	Bolt	4	M6 × 20 mm



No. Part name Q'ty Remarks Remarks Oitseal 1 Not reusable Not reusable Not reason list a Remarks Remarks Oitseal 1 Not reusable Remarks Rem	(2)	No.			_0
19 Oil seal 1 Not reusable 1 Not reu	No.		Q'ty	™ Remarks	SA'
19 Oil seal 1 Not reusable 1 Not reu	18	Çrankshaft balancer %	1	Ta _m	80)
To Robation, U.S. A. S. A. D. So. Dealer Phy.	19	Offseal	1	Not reusable	
Topolation U.S.A. SA IOSO Dealer Prince to See See See See See See See See See Se	20	Nut 6	1	*Obra	
To the hand	® 30 16	Orobalion U.S.A. (S.A. 10.S.O.) Dealer Principal S.A. 10.S.O.)		ORDRAIDI, U.S.A. S.A. IOSO DERBER PA	ik balisa loss

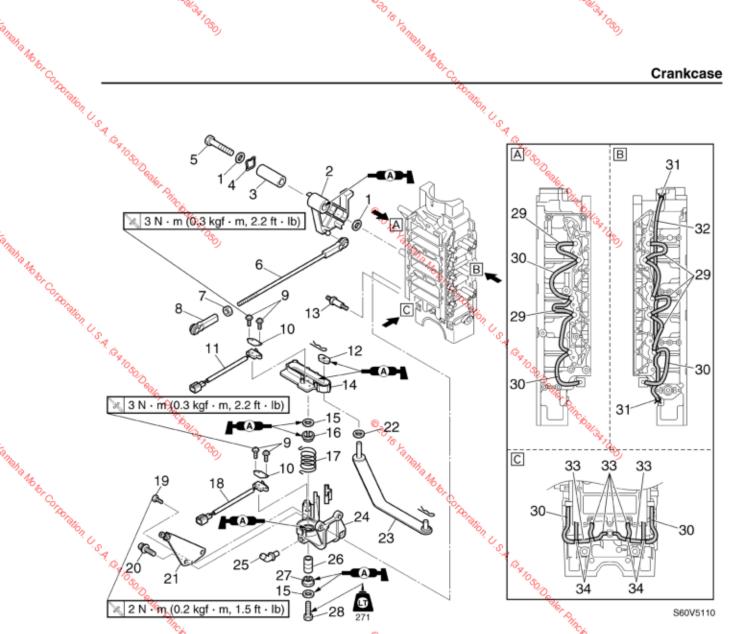
TORDING U.S.A. S.A. IOSO Dealer Dinchalas 1050) © 20 to Yamaha Makur Corkolalion U.S.A. SA 1080 Dealer Princ



	(A)	10,5		NO.
No.	್ಮಿ Part name	Q'ty	Remarks	**************************************
1	Washer 🧞	2%	Fa _m	- Osto
2	Throttle lever	1	9/13/12	
3	Collar	1	To be a second of the second o	
4	Wave washer	1	Corps	
5	Bolt	1	M8 × 45 mm	
6	Collar Wave washer Bolt Throttle link rod Nut Joint Screw Plate	1	M8 × 45 mm	
7	Nut 🤻 🚱	1	A W	
8	Joint ************************************	1	1	OSO.
9	Screw	4	ø4 × 16 mm	VO Dealer Principalisa Octo
10	Plate	2		or An
11	Shift position switch	6 _{9/} 1	©	"Char
12	Bushing	SAT OF	8/6 L	SA10"
13	Bolt 🗞	100	M8 × 11 mm	A)
14	Bracket %	1	704	
15	Washer 6	2	M8 × 11 mm	
16	Bushing	1	Oradi	
17	Bracket Washer Bushing Spring	1	^Q li _{Ol}	

5-31

60V1E11

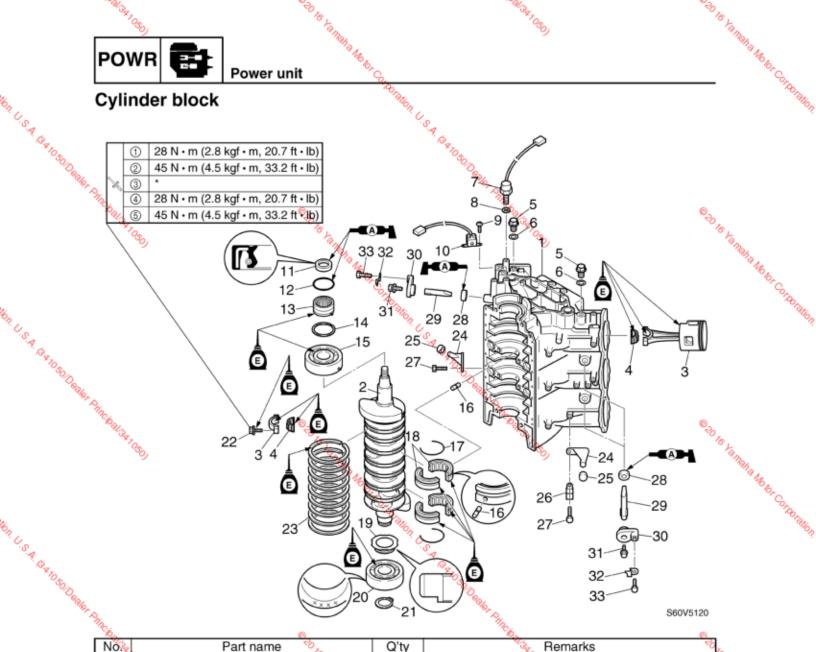


Sta Sandha Maber

		<i>1</i> 0 _×	a	D_
	No.	Part name	Q'ty	Remarks
All all a lake for Coldolation U.S.	18	Shift cut switch	anaha	(%)
aha no	19	Screw	1 3/10	
Obj	20	Bolt	2	M6 × 16 mm
CO/Ab.	21	Stopper screw assembly	1	CO/AD.
Tallion	22	Washer	1	Tako,
100	23	Shift lever	1	M6 × 16 mm M8 × 35 mm M8 × 35 mm
1	24	Bracket	1	7 P.
	25° ₀₀	Grease nipple	1	*h ₃
	26	Collar	1	O Sale
	27	Bushing	1	***A _{II}
	28	Bolt	ე 1	M8 × 35 mm
	29	Hose Total	% 6	Sep ₁₀
R _{De}	30	Hose	16 6 378ha	36
"ala	31	Clamp		4- I
"Orca	32	Hose	1	To _{rc}
OTAO _{TA}	33	Hose	6	O'TADA
"tion ,	34	Joint	4	P. B. Cortonalion
, 6 ⁷	4			, S. A
	(Ogy			" Gy
(60V1Ê	Ħ		5-32
Alteria Motor Coldoration U.S.		Teller,		5-32
		Pilipe.		Pine.



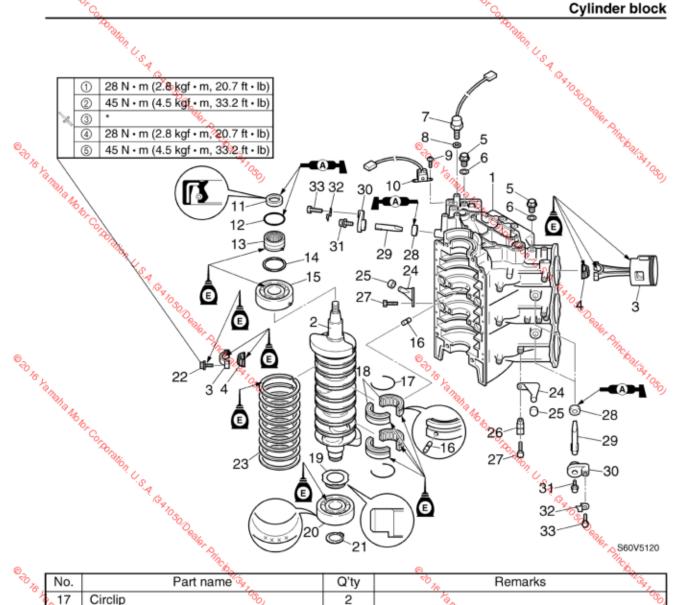
Cylinder block



	Co		0		"Cho	<u></u>	
	No.	Part name	80%	Q'ty	Remarks	₹0	۲.
	1	Cylinder block	am	1	%)		an
	2	Crankshaft	Tha As	1			Wha ke
	3	Piston and connecting rod a	ssembly %	6			TOROTO
	4	Connecting rod bearing		Co ₁₀₀ 6			Saliaha Motor Cortolation
6,	5	Bolt		2%	M14 × 12 mm		Tallon
100	6	Gasket		2 * 4	Not reusable		
₹. 1	7	Engine temperature sensor		1	A. C.		
1050 A	8	Gasket		1	Not reusable		
On U.S.A. 10-4 TO SO DERLEY A	9	Screw		2	ø5 × 12 mm		
*** _A	100	Crank position sensor		1	** Ann		
	100 M	Oil seal	<u>⊚</u> _	1	Not reusable	©_2	
	12	O-ring	© do to sa maha Motol	1	Not reusable	`°	L
	13	Roller bearing	ana,	1	89		a man
	14	Stopper ring	1916	1			1916
	15	Ball bearing	-6,	<u>_</u> 1	Not reusable		*O _F C
	16	Pin		702			TADIS
On U.S.A. G. A. D. S.O. Dealer L.	*: Loos	en completely		Thon !	S.A. C.A. D.S.O.D. C. R. R. P. P. C.		A Rela Mo bor Corporation
·54				Ý	S. A		
· Gy					G _A		
300	5-33				TO TO THE PARTY OF	60V1E11	
ealer.					aller .		
Q.	no.				Pine.		

^{*:} Loosen completely

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©_		`O ₂		<u> </u>
® 30 % 1	No.	Part name 🗓	Q'ty	Remarks Vy
1	, 17	Circlip	2	Fa ₁₀ (%)
	18	Main bearing	2	**************************************
	19	Oil pump drive gear	1	Not reusable Not reusable M9 × 28 mm M6 × 20 mm M6 × 20 mm
	20	Ball bearing	1	Not reusable
	21	Circlip	1	Tallon
	22	Bolt Seal ring 7	12	M9 × 28 mm
	23		9	76_
	24	Stopper Cap Holder Bolt Grommet Anode	2	*10 _{\$0}
	25	Cap	2	() () () () () () () () () ()
	26	Holder	1	**************************************
©_	27	Bolt	4	M6 × 20 mm
© 30 %	28	Grommet	3	Sold Sealing S
1	29	Anode	3	M5 × 12 mm
	30	Cover	3	**************************************
	31 4	Bolt	3	M5 × 12 mm
	32	Plate	3	TO/TO
	33	Bolt	3	M5 × 12 mm
	60V1E	11 S.A. G.A. D. G. D. G. C.		NIO X 20 MINI ON SA GRAND SOLD 5-34
		** Pinc.		** Rhe.



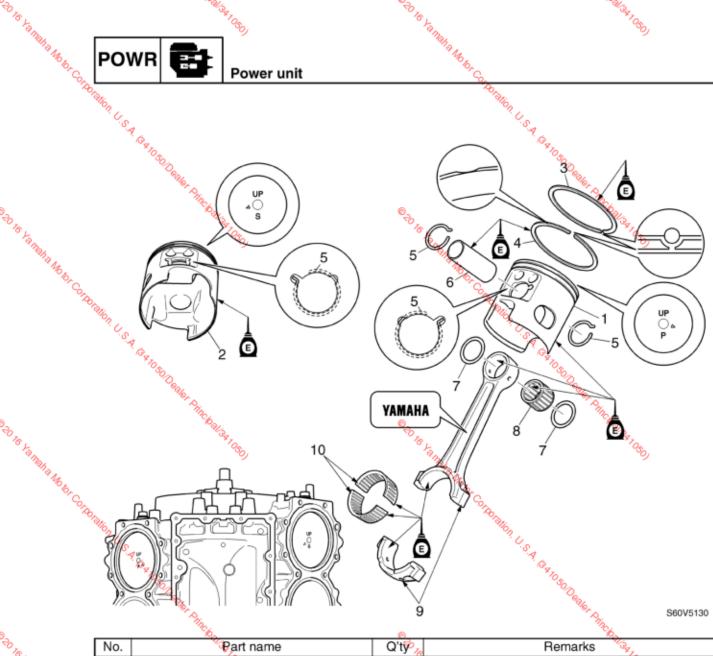


Table Vallaha Mobi Co

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		Anne.	9	· Anne	660V5130
O to Yangha Mater Corto	No.	Part name	Q'ty	Remarks ***	
tan	1	Piston %	3	Starboard	
Sha A	2	Piston	3	Port	
*Obr	3	Top ring	6	*Obr	
COFA	4	2nd piston ring	6	Olab.	
7	² 6/ _S	Clip	12	Not reusable	
	6 o	Piston pin	6	100	
	7 [Washer	12	**************************************	
	8	Needle bearing	6	10 ₅₀	
	9	Connecting rod	6	O Raile	
	10	Connecting rod bearing	6	Not reasone. U.S. A. R. A. T. R. A.	
Sco to Kallalla Moh		Palisa 1050,	® 30 16	Fanalla Mate	
SCO 16 Ya Maha Mobor Corbo	3 _{llon U.S.,} 5-35	A GRAND BOOK BOOK BOOK BOOK BOOK BOOK BOOK BOO		Sa maha Mobi Cortoration U.S.A. GADOSO Dealer Phic.	60V1E11
		* Aline.		Pine.	

5

Removing the crankcase

Remove the crankshaft balancer nut.



S60V5630

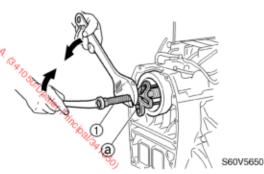
CAUTION:

Apply force in the direction of the arrows shown, to prevent the flywheel magnet holder from slipping off easily.



Flywheel magnet holder: YB-06139

2. Remove the crankshaft balancer.







S60V5660

CAUTION:

To prevent damage to the engine or tools, screw in the universal puller specified bolts evenly and completely so that the universal puller is parallel to the crankshaft balancer.

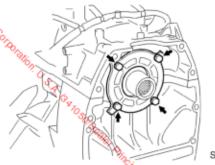
NOTE:

- Apply force to the crankshaft end until the crankshaft balancer comes off the tapered portion of the crankshaft.
- Use bolts (a) with the specified measurements.



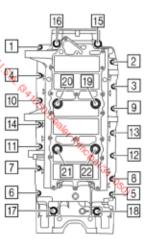
Universal puller ①: YB-06117 Specified bolts ②: M8 × 80 mm

Remove the oil seal housing.



S60V5690

Remove the crankcase bolts in the sequence shown.

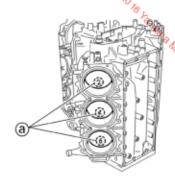


S60V5700

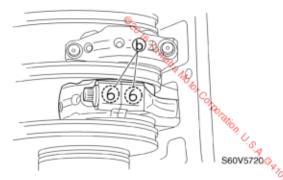
60V1E110

Removing the piston and connecting rod assemblies and crankshaft assembly

 Remove the connecting rod bolts and the connecting rod caps, and then remove the piston and connecting rod assemblies.

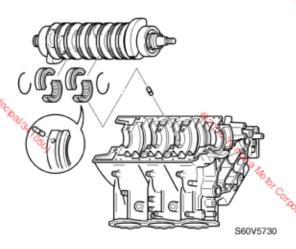


S60V5710



NOTE:

- Be sure to keep the bearings in the order as they were removed.
- Mark each piston with the identification number (a) of the corresponding cylinder.
 Also, mark each connecting rod and connecting rod cap with an identification number (b) as shown.
- Do not mix the connecting rods and caps.
 Keep them organized in their proper groups.
- 2. Remove the crankshaft assembly.

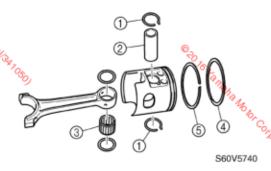


NOTE: _

Be sure to keep the bearings in the order as they were removed.

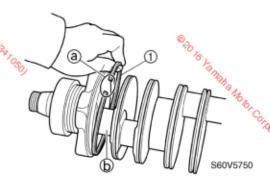
Disassembling the piston and connecting rod assemblies

- Remove the clips ① with pliers, and then remove the piston pin ② and needle bearing ③.
- Remove the top ring (4) and 2nd piston ring (5).



Disassembling the crankshaft

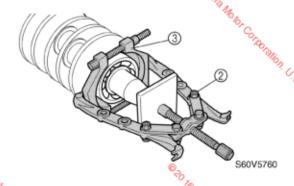
1. Remove the seal rings (1).



NOTE:

To remove the seal rings ①, widen the seal ring end gap ②, and then remove the ring from the groove and the crankpin ⑤.

- Remove the roller bearing.
- 3. Remove the upper ball bearing.



CAUTION:

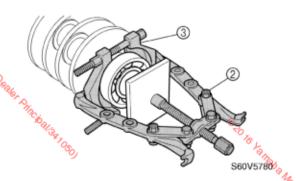
Do not reuse the ball bearing, always replace it with a new one.



Universal puller ②: (commercially available) Bearing separator ③: (commercially available)

4. Remove the circlip (4) and then remove the lower ball bearing.





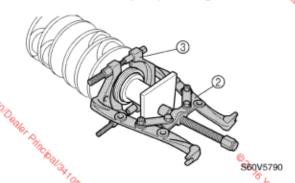
CAUTION:

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



Universal puller ②: (commercially available) Bearing separator ③: (commercially available)

5. Remove the oil pump drive gear.



▲ WARNING

Do not reuse the oil pump drive gear, always replace it with a new one.



Universal puller ②: (commercially available) Bearing separator ③: (commercially available)

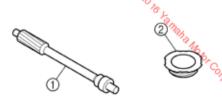
60V1E11 5-38



Power unit

Checking the oil pump driven gear and the oil pump drive gear

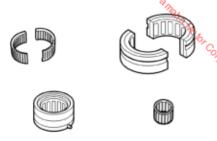
 Check the oil pump driven gear ① and the oil pump drive gear ② for cracks, damage, or wear. Replace if necessary.



S60V5800

Checking the bearings

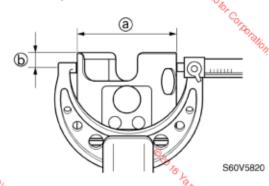
 Check the bearings for pitting or rumbling. Replace if necessary.

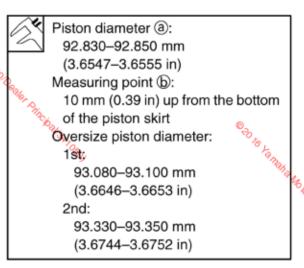


S60V5810

Checking the piston diameter

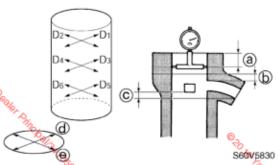
 Measure the piston outside diameter at the specified measuring point. Replace if out of specification.



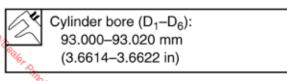


Checking the cylinder bore

Measure the cylinder bore (D₁-D₆) at measuring points (a), (b), and (c), and in direction (d) (D₁, D₃, D₅), which is parallel to the crankshaft, and direction (D₂, D₄, D₆), which is at a right angle to the crankshaft.



- (a):10 mm (0.39 in) from the cylinder block surface
- b:5 mm (0.20 in) above the exhaust port upper edge
- ©:5 mm (0.20 in) below the scavenging port lower edge



 Calculate the taper limit. Replace or rebore the cylinder block if out of specification.

5-39 60V1E11



Taper limit:

D₁-D₅ (direction @)

D₂-D₆ (direction (e)) 0.08 mm (0.0031 in)

Ner Phi

 Calculate the out-of-round limit. Replace or rebore the cylinder block if out of specification.



Out-of-round limit:

D₂-D₁ (measuring point ⓐ)

D₆-D₅ (measuring point ©)

0.05 mm (0.0020 in)

Checking the piston clearance

 Calculate the piston clearance using the piston outside diameter and the cylinder bore specifications. Replace the piston and piston rings as a set or the cylinder block or all parts, or rebore the cylinder if out of specification.



Piston clearance:

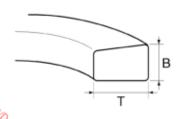
Cylinder bore – piston diameter

0.165-0.171 mm

(0.0065-0.0067 in)

Checking the piston rings

 Check the piston ring dimensions of B and T. Replace if out of specification.



S60V5840



Piston ring dimensions:

Top ring

B: 2.05 mm (0.0807 in)

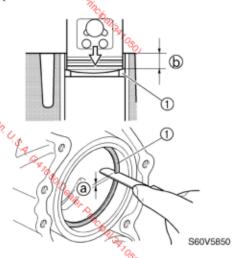
T: 3.00-3.20 mm (0.118-0.126 in)

2nd piston ring:

B: 2.05 mm (0.0807 in)

T: 2.70-2.90 mm (0.106-0.114 in)

- Level the piston rings ① in a cylinder with a piston crown.
- Check the piston ring end gap @ at the specified measuring point. Replace if out of specification.





Piston ring end gap @:

Top ring:

0.30-0.50 mm

(0.0118-0.0197 in)

2nd piston ring:

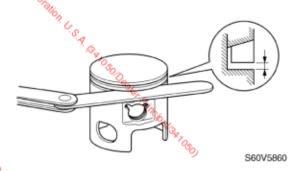
0.30-0.45 mm

(0.0118-0.0177 in)

Measuring point (b): 20 mm (0.8 in)

Checking the piston ring side clearance

1. Measure the piston ring side clearance.
Replace the piston and piston rings as a set if out of specification.





Piston ring side clearance:

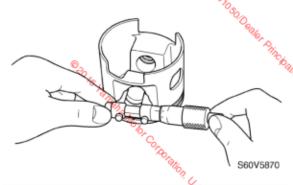
Top ring and 2nd piston ring:

0.02-0.06 mm

(0.0008-0.0024 in)

Checking the piston pin boss bore

 Measure the piston pin boss bore. Replace the piston if out of specification.

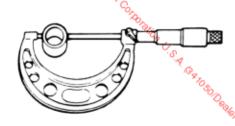




Piston pin boss bore: 26.004–26.015 mm (1.0238–1.0242 in)

Checking the piston pin

 Measure the piston pin diameter. Replace if out of specification.



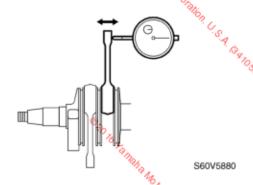
S69J5C306



Piston pin diameter: 25.995–26,000 mm (1.0234–1.0236 in)

Checking the connecting rod small end axial play

 Measure the connecting rod small end axial play. Replace the bearing and connecting rod if out of specification.



K

Connecting rod small end axial play limit:

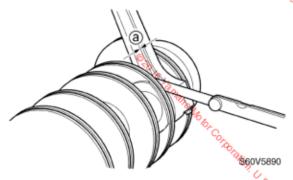
2.0 mm (0.079 in)

NOTE:

To measure the axial play, set the dial gauge at the connecting rod small end and parallel to the crankshaft.

Checking the connecting rod big end side clearance

 Measure the connecting rod big end side clearance (a). Replace the connecting rod or crankshaft or both if out of specification.





Connecting rod big end side clearance ⓐ:

0.12-0.26 mm (0.0047-0.0102 in)

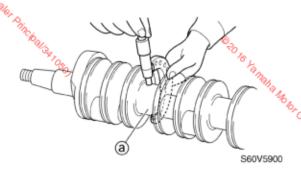
5-41

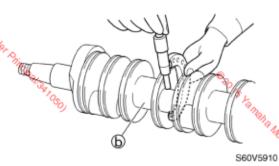
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60V1E11

Checking the crankshaft

Measure the crankshaft journal diameter and crankpin diameter b. Replace the crankshaft if out of specification.

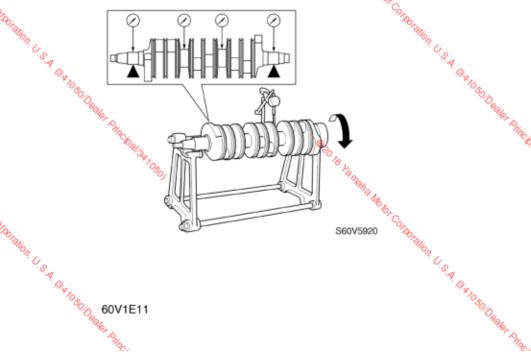




Crankshaft journal diameter @: 58.975-58.991 mm (2.3219-2.3225 in) Crankpin diameter (b): 40.485-40.500 mm

(1.5939-1.5945 in)

2. Measure the crankshaft runout. Replace the crankshaft if out of specification.

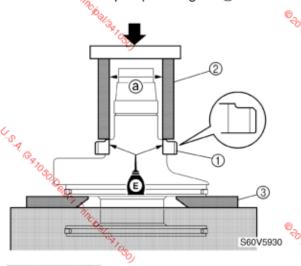




Crankshaft runout limit: 0.02 mm (0.0008 in)

Assembling the crankshaft

Install the oil pump drive gear ①.



CAUTION:

Do not reuse the oil pump drive gear, always replace it with a new one.



General pipe 2:

(a) = 50 mm (1.97 in)

Bearing separator 3:

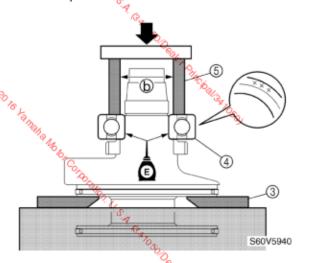
(commercially available)

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dion U.S.A. GANGOD.

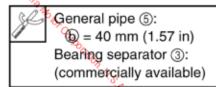
Power unit

2. Install the lower ball bearing (4), then the circlip.

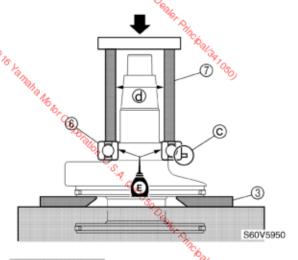


CAUTION:

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



3. Install the upper ball bearing 6.

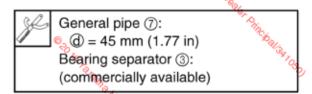


CAUTION:

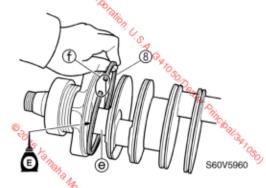
Do not reuse the ball bearing, always replace it with a new one.

NOTE:

Install the upper ball bearing with the projection © facing toward the crankshaft.



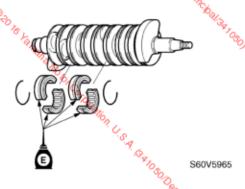
4. Install the seal rings ®.



NOTE:

First pass the seal ring ® over the crankpin ©, and then widen the seal ring end gap f to install the ring into the crankshaft groove.

Install the main bearings onto the crankshaft.



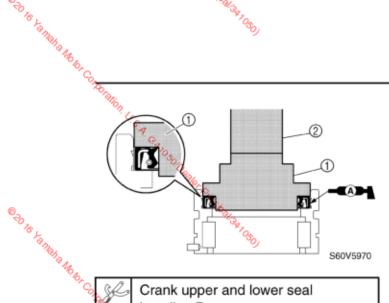
NOTE: .

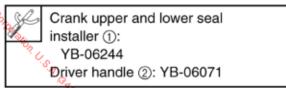
Face the dowel hole on the main bearings toward the bottom of the power unit.

Assembling the crankshaft roller bearings

 Apply grease to the new oil seal, and then install it into the roller bearing.

5-43 % 60V1E11



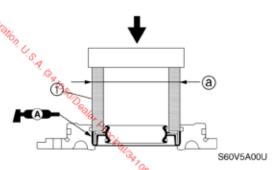


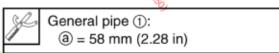
2. Install a new O-ring (3) and the stopper ring 4 onto the roller bearing, and then install the roller bearing assembly onto the crankshaft (5).



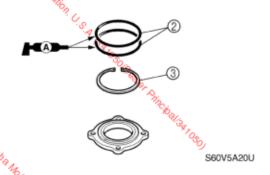
Assembling the oil seal housing

1. Apply grease to the new oil seal, and then install it into the oil seal housing.



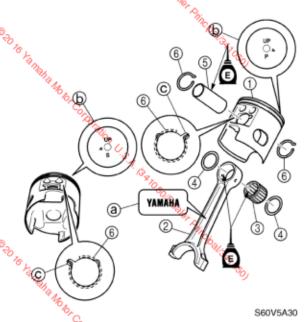


2.% Install a new O-rings ② and the circlip ③ into the oil seal housing.



Assembling the piston and connecting rod assemblies

1. Assemble the pistons ①, connecting rods (2), needle bearings (3), washers (4), piston pins (5), and new piston pin clips 6).



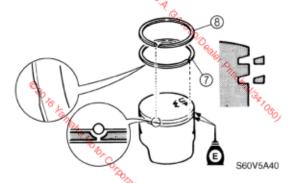
NOTE: _

- Face the embossed "YAMAHA" mark @ on the connecting rod in the same direction as the "UP" mark (b) on the piston.
- · Always use new piston pin clips.
- · Be sure to align the piston pin clip end with

60V1E11 5-44

Power unit

2. Install the 2nd piston ring (7) and top ring ® onto the pistons



CAUTION:

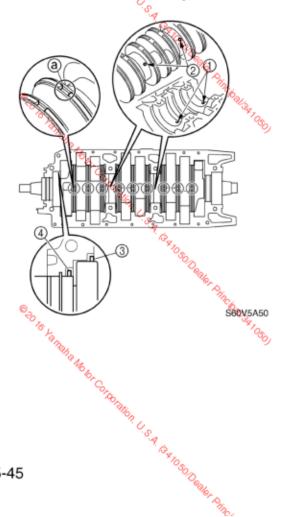
Do not scratch the pistons or break the piston rings.

NOTE:

Install the piston rings with the recess for the locating pin facing up toward the piston crown.

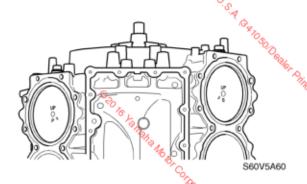
Assembling the power unit

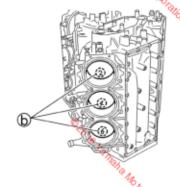
Set the crankshaft in the cylinder block.



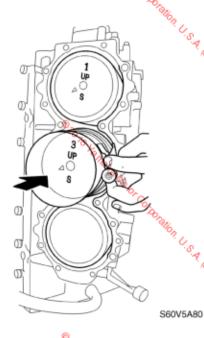
NOTE: .

- Fit dowels 1 on the cylinder block into the dowel holes ② in the main bearings 7/2
- Align the projection ③ of the upper ball bearing and the projection 4 of the needle bearing with the groove in the crankshaft.
- Align the seat ring end gaps @ with the crankcase center line.
- 2. Install the pistons into the cylinders with the "UP" mark on the piston crown facing towards the flywheel magnet.





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NOTE:

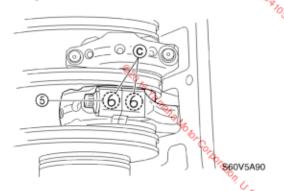
- Apply engine oil to the pistons and piston rings before installation.
- Be sure to install the piston and connecting rod assemblies into the corresponding cylinders according to the marks (b) made during disassembly. Also, be sure to install the assemblies with an "S" mark on the starboard side, and the assemblies with a "P" mark on the port side.



Piston ring compressor: YM-08037

 Install the connecting rod bearings and connecting rod caps onto the connecting rods, and then tighten the connecting rod bolts

 to the specified torques in five stages.



NOTE:

- Align the identification numbers © on the connecting rod caps and connecting rods, which you made during disassembly.
- Apply engine oil to the connecting rod bearings, connecting rod caps, and connecting rod bolts before installation.



Connecting rod bolt ⑤:

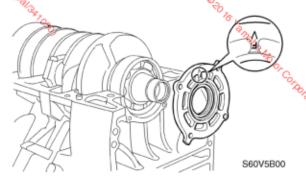
1st: 28 N·m (2.8 kgf·m, 20.7 ft·lb)

2nd: 45 N·m (4.5 kgf·m, 33.2 ft·lb)

3rd: Loosen completely

4th: 28 N·m (2.8 kgf·m, 20.7 ft·lb) 5th: 45 N·m (4.5 kgf·m, 33.2 ft·lb)

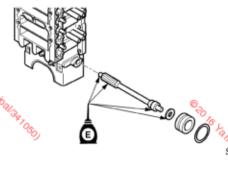
 Install the oil seal housing onto the cylinder block.



NOTE:

Install the oil seal housing with the "F" mark facing toward the crankcase.

Install the oil pump driven gear onto the crankcase.

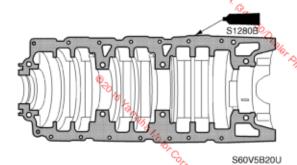


S60V5B10

60V1E11 5-46



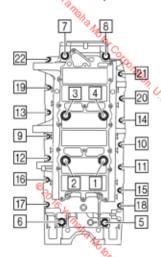
Apply sealant to the mating surface of the crankcase.



NOTE:

Do not get any sealant on the journals.

 Install the crankcase onto the cylinder block, and then tighten the crankcase bolts to the specified torques in two stages and in the sequence shown.



S60V5B30

NOTE:

- Apply engine oil to the crankcase bolts before installation.
- Tighten crankcase bolts 1—8 to the specified torques in two stages first, and then tighten crankcase bolts 9—22 to the specified torques in two stages.



1-8 Crankcase bolt (M10):

1st: 17 N·m (1.7 kgf·m, 12.5 ft·lb)

2nd: 34 N·m (3.4 kgf·m, 25.1 ft·lb)

9-22 Crankcase bolt (M8):

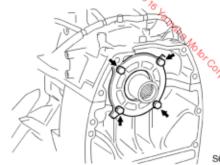
1st: 4 N·m (0.4 kgf·m, 3.0 ft·lb) 2nd: 9 N·m (0.9 kgf·m, 6.6 ft·lb) 4

1-4 Crankcase bolt:

 $M10 \times 130 \text{ mm}$

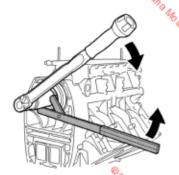
5-8 Crankcase bolt: M10 × 90 mm

Tighten the oil seal housing bolts.



S60V5690

Install the crankshaft balancer, and then tighten the crankshaft balancer nut to the specified torque.



S60V5B40

CAUTION:

Apply force in the direction of the arrows shown, to prevent the flywheel magnet holder from slipping off easily.

NOTE:

Apply engine oil to the crankshaft and the crankshaft balancer nut before installation.

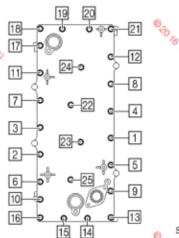


Flywheel magnet holder: YB-06139



Crankshaft balancer nut: 6, 100 N·m (10 kgf·m, 73.8 ft·lb)

10. Install the dowels, new gasket, and exhaust outer cover, and then tighten the outer cover bolts to the specified torque in two stages and in the sequence shown.



S60V5B60

Apply LOCTITE 572 to the exhaust outer cover bolts before installation.

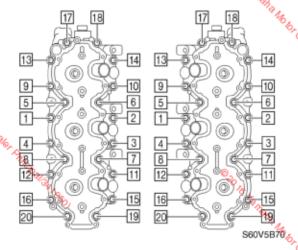


Exhaust outer cover bolt:

2nd: 11 N·m (1.11)

2nd: 11 N·m (1.11)

2nd: 11 N·m (1.11)



NOTE:

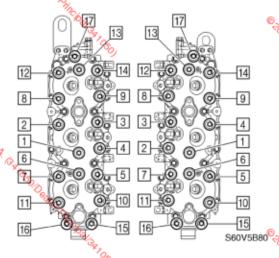
Apply engine oil to the cylinder head bolts before installation.



Cylinder head bolt:

1st: 15 N·m (1.5 kgf·m, 11.1 ft·lb) 2nd: 29 N·m (2.9 kgf·m, 21.4 ft·lb)

- 12. Install the thermoswitches onto the cylinder head.
- Install a new gasket and the cylinder head cover, and then tighten the cylinder head cover bolts to the specified torques in the sequence shown.



NOTE:

Apply LOCTITE 572 to the cylinder head cover bolts before installation.



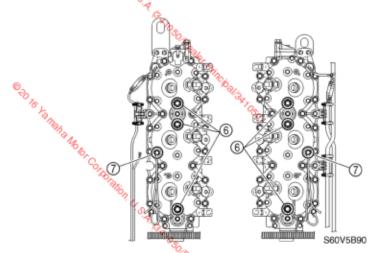
Cylinder head cover bolt: 1st: 5 N·m (0.5 kgf·m, 3.7 ft·lb) 2nd: 11 N·m (1.1 kgf·m, 8.1 ft·lb)

Tallon U.S.A. G. R. IOSON G. 5-48 60V1E11

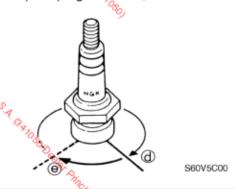


Power unit

14. Install the anode cover bolts 6 and ground lead bolts 7.



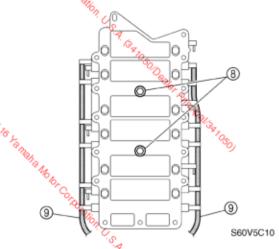
15. Install the spark plugs, tighten them finger tight @, then to the specified torque with a spark plug wrench @.





- 25 N·m (2.5 kg·m)

 16. Install the intake manifold assembly, and then tighten the intake manifold bolts (8)
 - 17. Connect the hoses ③.



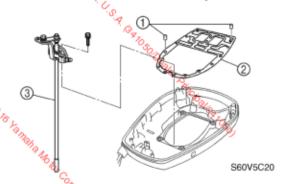


Intake manifold bolt (8): 13 N·m (1.3 kgf m, 9.6 ft·lb)

18. Install the starter motor, pulser coil, and stator coil onto the power units

Installing the power unit

1. Clean the power unit matching surface, and install new dowels (1), a new gasket and the shift rod assembly ③.



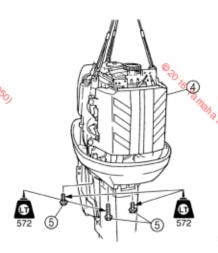
CAUTION:

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Do not reuse the dowels, always replace them with new one

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2. Install the power unit ④, and then tighten 4. the power unit mounting bolts ⑤ to the



S6D05105

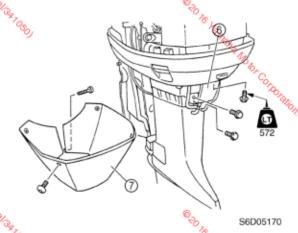
NOTE:

Beplace or reuse the power unit mounting bolts. If reusing the power unit mounting bolts, be sure to completely remove any LOCTITE remaining on the bolts.

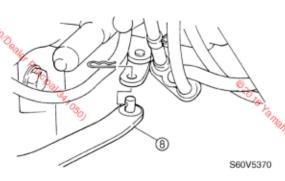


Power unit mounting bolt ⑤: 32 N·m (3.2 kgf·m, 23.6 ft·lb)

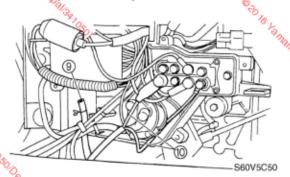
Install the hose joint assembly (6) and the apron 7.



Connect the PTT switch coupler and the shift lever ®.

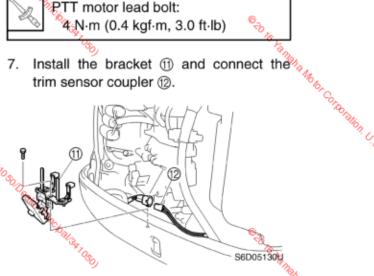


- Connect the cooling water hose (9) to the Rectifier Regulator.
- Connect the PTT motor leads (10), and then tighten the PTT motor lead bolts to the specified torque.





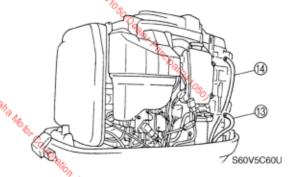
PTT motor lead bolt:



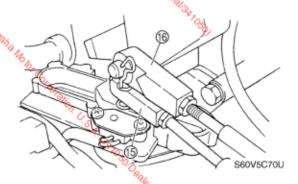
5-50 60V1E11

Power unit

- Install the junction box cover.
- 9. Connect the fuel hose (3) and oil hose (4).

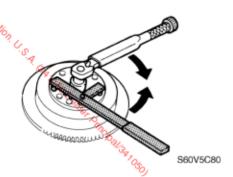


10. Connect the shift cable (5) and throttle cable ®, and then adjust their lengths. For adjustment procedures, see Chapter 3, "Adjusting the throttle cable," and "Checking the gear shift operation."



- 11. Install the Woodruff key and flywheel
- magnet.

 12. Tighten the flywheel magnet nut to the



CAUTION: Apply force in the direction of the arrows shown to prevent the flywheel magnet holder from slipping off easily.

NOTE: .

Apply engine oil to the flywheel magnet nut before installation.

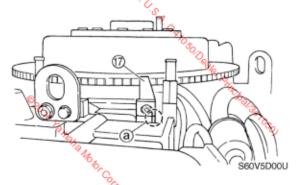


Flywheel magnet holder: YB-06139



Flywheel magnet nut: 190 N·m (19 kgf·m, 140 ft·lb)

13. Install the pointer 17.

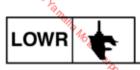


NOTE:

Align the marks @ on the pointer m, which you made during disassembly.

14. Install all removed parts.





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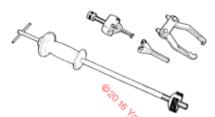
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Special service tools



Slide hammer and adapters YB-06096



Drive shaft needle bearing remover and installer YB-06196



Propeller shaft and bearing housing remover
YB-06335



Outer race installer-forward gear YB-06085



Puller claw YB-06523



Forward bearing installer YB-06430



Oil seal installer YB-06168



Bearing outer race attachment YB-06109



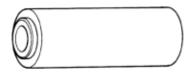
Driver handle YB-06071



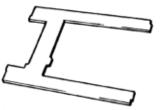
Drive shaft holder YB-06201



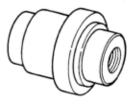
Roller bearing installer/remover YB-06432



Pinion shimming gauge III YB-064419



Shimming gauge I



Needle bearing installer YB-06435





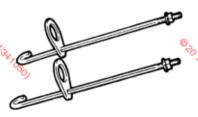
Shift rod push arm YB-06052



Pinion gear bushing installer YB-06029-4



Needle bearing remover and installer YR-06213



Bearing housing puller YB-06207



Faper roller bearing installer The Part of Taper roller bearing installer

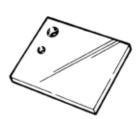


Universal puller YB-06117

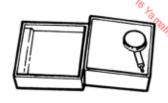




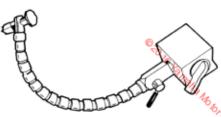
Backlash indicator gauge YB-06265



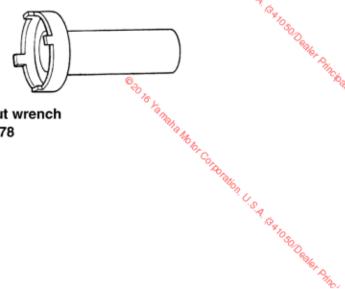
Magnetic plate YB-07003



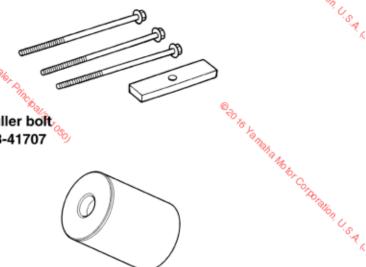
Dial gauge YU-03097



Magnetic flexible stand YU-34481



Ring nut wrench YB-06578



Puller bolt YB-41707



Shimming gauge YB-06440-A

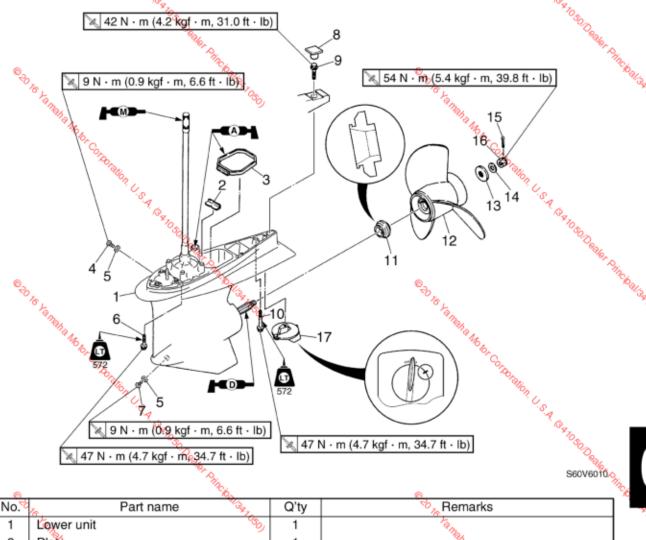


Needle bearing installer

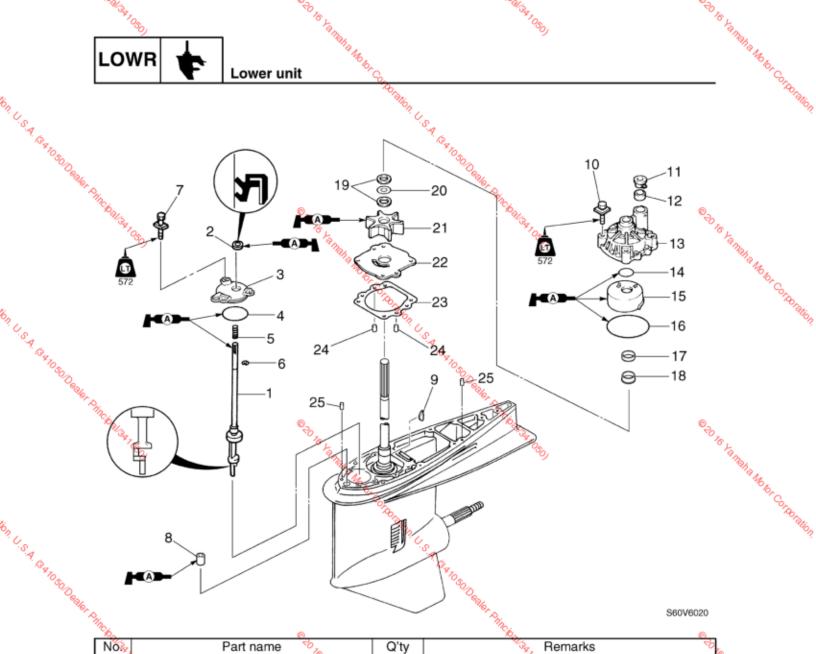
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Lower unit (regular rotation model)



@	(b)		<u> </u>
No.°	Part name	Q'ty	™ Remarks
1	Lower unit	1	Fam
2	Plate	1	Na _{la}
3	Rubber seal	1	**************************************
4	Check screw	1	Corps
5	Gasket %	2	Not reusable M10 × 45 mm M10 × 44 mm M10 × 70 mm
6	Bolt Drain screw Grommet Bolt Bolt Spacer Propeller Washer	7	M10 × 45 mm
7	Drain screw	1	A G.
8	Grommet ***********************************	1	**to _{\$p} .
9	Bolt	1	M10 × 44 mm
10	Bolt	1	M10 × 70 mm
115	Spacer	1	⊚_
12	Propeller	1	™ ₆
13	Washer	1	(ang)
14	Washer	1	**************************************
15	Cotter pin	1	Not reusable
16	Propeller nut	1	- Oradir
17	Trim tab	1	Not reusable



_	°6		<u> </u>		~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	0	
	No.	Part name	50 /6.	Q'ty	Remarks	40	6 .
	1	Shift rod	Tam.	1	(%)		Tan
	2	Oil seal	aha n	1	Not reusable		Shan.
	3	Oil seal housing	S Fallalla Mobile	1			S KARRAHA MADO CO (DO PARIO)
	4	O-ring		Corporation (Not reusable		CO/AD.
8,	5	Spring		Wo,			Tation
* U.S.	6	Circlip		1 1	gr.		*
On U.S.A. GAIDSOND COMER A	7	Bolt		3	M6 × 20 mm		
1050 A	8	Seal		1	1030 N		
Cea _{lle}	9	Woodruff key		1	O Cale		
~~	25.	Bolt		4	M8 × 45 mm		
	C41	Cover	© ₃	1	Sp _{QL}	© 20	
	12	Seal	© do lo Yanaha Mobile	1	TC Dallan TOSO	,	S Santala Mobi Coltolation
	13	Water pump housing	R Mah	1	l		a mah.
	14	O-ring	816,	1	Not reusable		816.
	15		0)	_{ල,} 1			**************************************
	16	O-ring		Corton 1	Not reusable		TO TO
On L	17	Collar		100			, doli
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Z ^N	20.				Tine.		

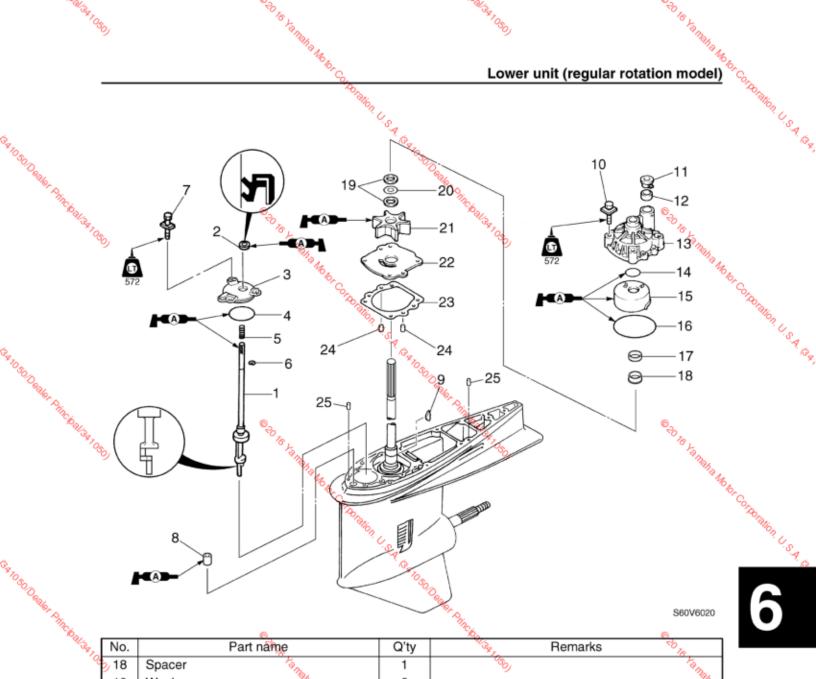


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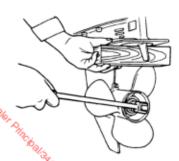
100		<u></u>		10,			
Paliga	No.	Part name	Q'ty	Way -	Remarks	80%	
Q	<u>)</u> 18	Spacer	1	80)		a maho	
	19	Washer Wave washer Impeller Outer plate cartridge	2			Wha h	
	20	Wave washer	1			70	6,
	21	Impeller	1			I	COLD
	22	Outer plate cartridge	1			I	Tallon
	23			Not reusable		I	100
© _	24	Dowel	2.0°			I	Or Colporation U.S.A. &.A.
1050	25	Dowel	2000				*)
G _{\$10,50,D} ealer Dincipalisa 10.	b)	© do la Yanaha M		Oedler Dinchal Ser OSO)		© do sa naha u	
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Removing the lower unit

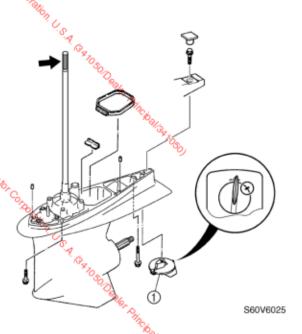
- 1. Drain the gear oil. For draining procedures, see Chapter 3, "Changing the gear oil."
- Set the gear shift to the neutral position, and place a block of wood between the anti-cavitation plate and propeller to keep the propeller from turning, and then remove the propeller nut and propeller.



S69J60157

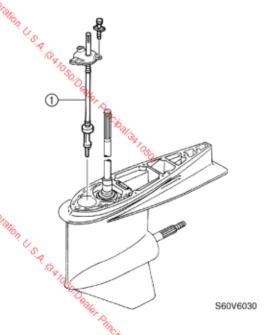
▲ WARNING

- Do not hold the propeller with your hands when loosening or tightening it.
- Be sure to disconnect the battery leads from the battery and the clip from the engine stop lanyard switch.
- Put a block of wood between the anticavitation plate and propeller to keep the propeller from turning.
- Mark the trim tab ① at the area shown, and then remove it.
- Loosen the bolts, and then remove the lower unit from the upper case.



Removing the water pump and shift rod

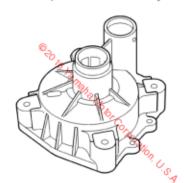
1. Remove the water pump assembly and shift rod assembly ①.



6-7

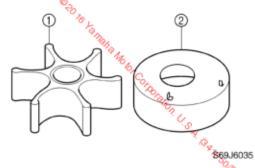
Checking the water pump and shift rod

 Check the water pump housing for deformation. Replace if necessary.

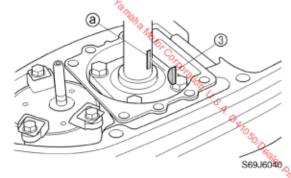


S69J6030

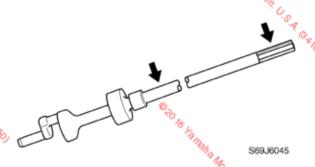
2. Check the impeller 1 and insert cartridge 2 for cracks or wear. Replace if necessary.



3. Check the Woodruff key 3 and the groove @ on the drive shaft for wear." Replace if necessary.

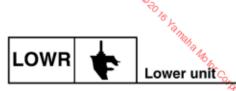


Check the shift rod for cracks or wear. SSA. Ala Make Corporation U.S.A. Sanoson Bealer Phin Replace if necessary.



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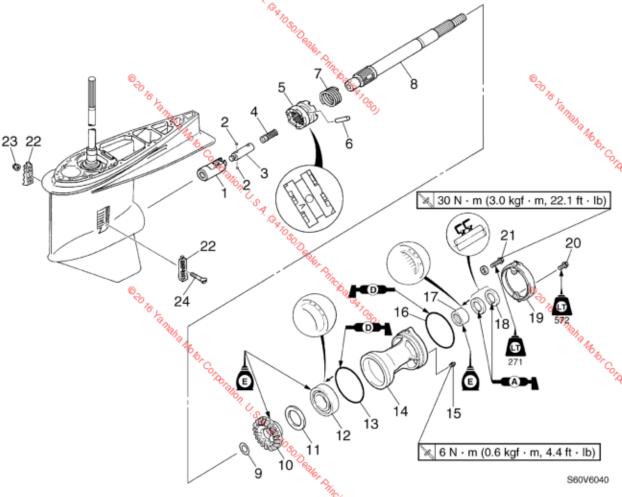
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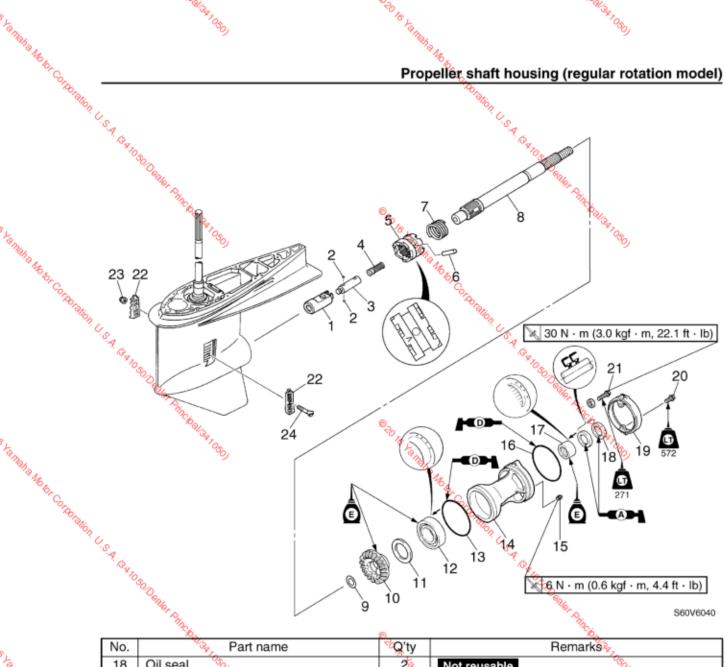
Realer Anicopalisa 1050)

Propeller shaft housing (regular rotation model)



	<u> </u>		6		<u> </u>
No.	Part name	Q'ty	W. Carlotte	Remarks	50 %
1	Shift rod joint	1	80)		Tan.
2	Ball %	2			aha n
3	Slider	1			Panaha Mobre
4	Shift rod joint Ball Slider Shift plunger Dog clutch Cross pin Spring	1			Ç
5	Dog clutch	1			
6	Cross pin	1			
7	Spring	1			
8	Propeller shaft	*70501			
9	Washer	Pear			
10	Reverse gear	1 7	0		
11	Reverse gear shim	—	As required		ତ୍ର
12	Ball bearing %,	1	Not reusable		6 ,
13	O-ring	1	Not reusable		Tame,
14	Propeller shaft housing	1			TO BA
15	Grease nipple	1			© 20 To Xa Raha Motor Co
16	O-ring Orang	1	Not reusable		-0
17	Needle bearing	1			

6-9 60V1E11

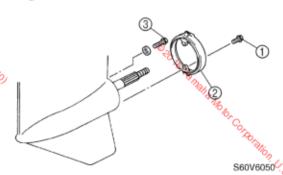


		<i>1</i> 0 ₂	ള	200
P.	No.	Part name	[©] Q'ty	Remarks
tam	18	Oil seal 🦠	200	Not reusable
Wha ha	19	Ring	1 📆	· · · · · · · · · · · · · · · · · · ·
*Bar	20	Bolt	2	Mt8 × 20 mm
COTA	21	Bolt	2	M8 ×33 mm
Tallon	22	Cooling water inlet cover	2	Talio,
* 0	_s 23	Nut	1	* 0,8
	24	Screw	1	A. 62

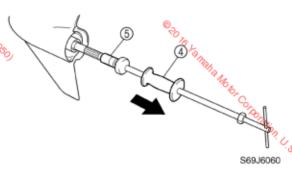
© 20 16 Ya maha Makar Corkolation U.S.A. G. A. IOSO Dealer Phile.

Removing the propeller shaft housing assembly

1. Remove the bolts ①, ring ②, and bolts



2. Pull out the propeller shaft housing assembly.





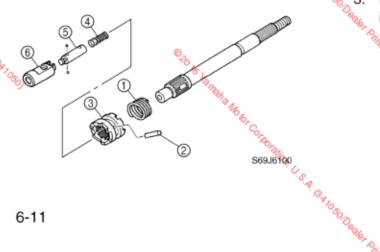
Slide hammer and adapters 4: YB-06096

Propeller shaft and bearing housing remover (5):

YB-06335

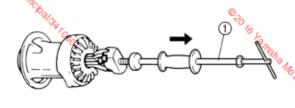
Disassembling the propeller shaft assembly

 Remove the spring ①, then the cross pin 2, dog clutch 3, shift plunger 4, slider and shift rod joint 6.



Disassembling the propeller shaft housing

Remove the reverse gear and reverse gear shim(s).

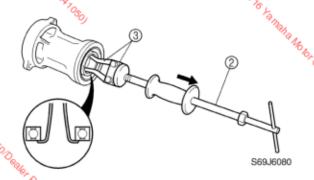


S69J6070



Slide hammer and adapters ①: YB-06096

Remove the ball bearing.



CAUTION:

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



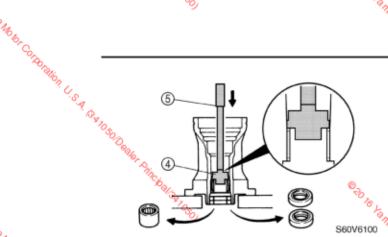
Slide hammer and adapters 2: YB-06096

Puller claw 3: YB-06523

Remove the oil seals and needle bear-

6-11 60V1E11

Propeller shaft housing (regular rotation model)



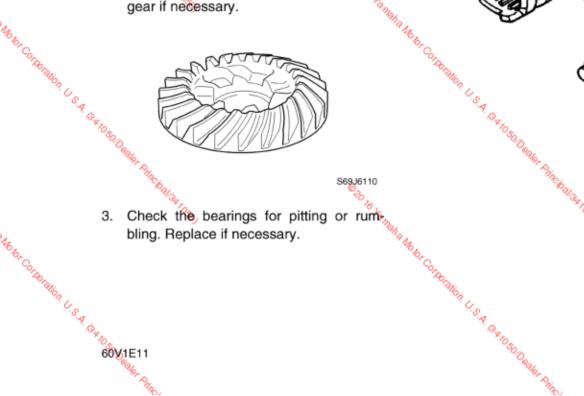


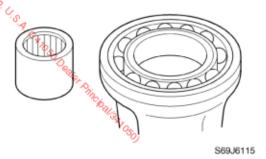
Checking the propeller shaft no.

Clean the propeller shaft housing using a soft brush and cleaning solvent, and then sheck it for cracks or damage. Replace if



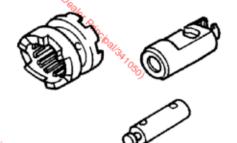
Check the teeth and dogs of the reverse gear for cracks or wear. Replace the gear if necessary.





Checking the propeller shaft or the propeller shaft for the propeller shaft fo 1% Check the propeller shaft for bends or





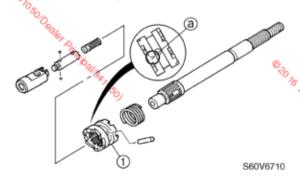
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6-12



Assembling the propeller shaft assembly

1. Install the dog clutch ① as shown.

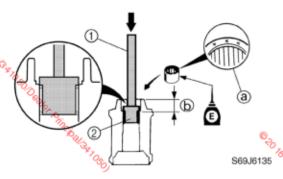


NOTE:

Install the dog clutch ① with the "V" mark ② facing toward the shift plunger.

Assembling the propeller shaft housing

 Install the needle bearing into the propeller shaft housing to the specified depth.



NOTE:.

Install the needle bearing with the manufacture identification mark ⓐ facing toward the oil seal (propeller side).



Driver handle ①: YB-06071 Drive shaft needle bearing remover and installer ②:

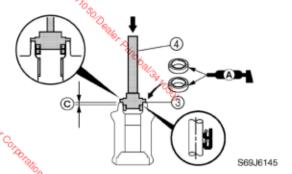
YB-06196



Depth (b):

25.05-25.55 mm (0.986-1.006 in)

 Apply grease to the new oil seals, and then install them into the propeller shaft housing to the specified depth.



NOTE

Install an oil seal halfway into the propeller shaft housing, then the other oil seal.



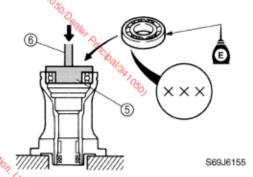
Oil seal installer 3: YB-06085 Driver handle 4: YB-06071



Depth ©:

4.75-5.25 mm (0.187-0.207 in)

Install the ball bearing into the propeller shaft housing.



NOTE:

Install the ball bearing with the manufacture identification mark facing toward the propeller shaft housing.



Forward bearing installer ⑤: YB-06430

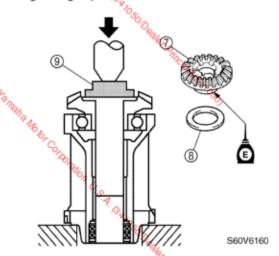
Driver handle 6: YB-06071

6-13₀ 60V1E11

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Can is Yangha Maker Corporation. U.S.A. G. A. O.S.O. Dealer Principalisa roso)

Install the reverse gear 7 and original shim(s) 8 into the propeller shaft housing using a press.



CAUTION:

Add or remove shim(s), if necessary, if replacing the reverse gear or ball bearing.



Bearing outer race attachment 9: YB-06109

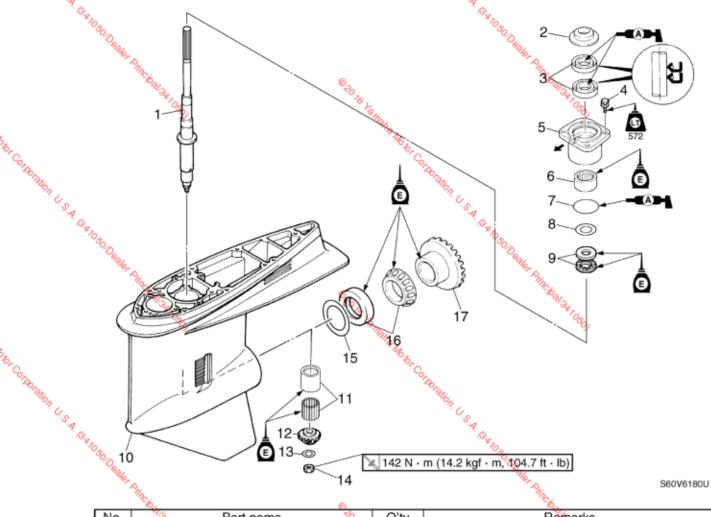
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Drive shaft and lower case (regular rotation model)

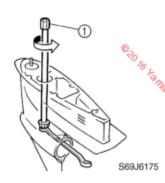


		Co.	0		%	
	No.	Part name	30%	Q'ty	Remarks	٦
	1	Drive shaft		1	The state of the s	1
	2	Cover		nahal 26		1
br	3	Oil seal		26,	Not reusable	1
Corps	4	Bolt		4	M8 × 25 mm	1
Tallon	5	Drive shaft housing		1	Talie,	1
100	6	Needle bearing		1	1 C C C C C C C C C C C C C C C C C C C	1
Not Coldination U.S.A. GAR	7	O-ring		1	Not reusable	١
**	8	Pinion shim		-	As required	١
	~ (g)	Thrust bearing		1	Not reusable As required on Real Philipped and Assert Control of the Control of t	١
	10	Lower case		1	* An	١
	11	Needle bearing assembly	⊚_	1	Achay.	١
	12	Pinion	© TO TO JE	1	**************************************	١
	13	Washer	3	_{7‰} 1	36	1
5	14	Nut		naha Mo		1
Or C.	15	Forward gear shim			As required	1
OTAO _E	16	Taper roller bearing assembly		1 1	Not reusable	1
allon .	17	Forward gear		1	Non.	╛
, e ²					·8.4	_
, QA					· Age	
Not Corporation U.S.A. GAL	6-15				60V1E1	1
	eale,				60V1E1	
		Pino.			Pine.	

Removing the drive shaft

 Remove the drive shaft, drive shaft housing, and pinion, and then pull out the forward gear.



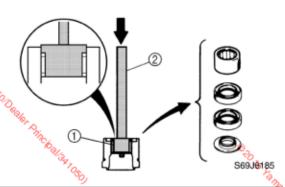




Drive shaft holder ①: YB-06201

Disassembling the drive shaft housing

Remove the cover, oil seals, and needle bearing.





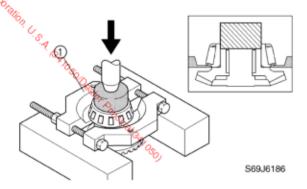
Drive shaft needle bearing remover and installer (1):

YB-06196

Driver handle 2: YB-06071

Disassembling the forward gear

Remove the taper roller bearing from the forward gear using a press.



CAUTION:

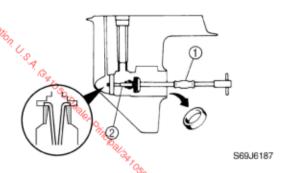
Do not reuse the bearing, always replace it with a new one.



Bearing splitter plate 1: (commercially available)

Disassembling the lower case

 Remove the taper roller bearing outer race and shim(s).



NOTE:

Install the claws as shown.



Slide hammer and adapters ①:

YB-06096

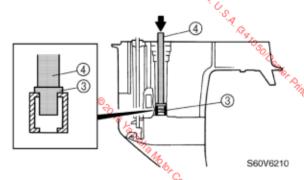
Puller claw 2: YB-06523

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2. Remove the needle bearing.



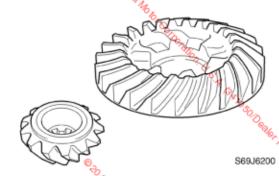


Roller bearing installer/remover ③: YB-06432

Driver handle 4: YB-060717

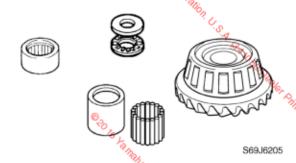
Checking the pinion and forward gear

 Check the teeth of the pinion, and the teeth and dogs of the forward gear for cracks or wear. Replace if necessary.



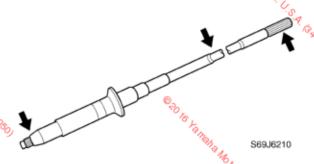
Checking the bearings

 Check the bearings for pitting or rumbling. Replace if necessary.



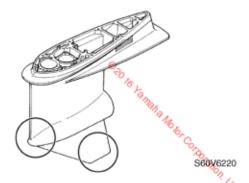
Checking the drive shaft

 Check the drive shaft for bends or wear. Replace if necessary.



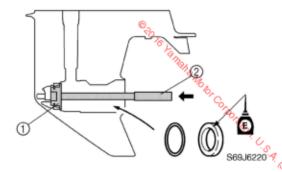
Checking the lower case

 Check the skeg and torpedo for cracks or damage. Replace the lower case if necessary.



Assembling the lower case

 Install the original shim(s) and taper roller bearing outer race.



CAUTION:

Add or remove shim(s), if necessary, if replacing the forward gear or lower case.

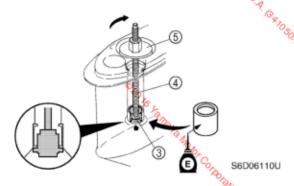


Taper roller bearing installer ①: YB-06431

Driver handle (2): YB-06071

6-17 60V1E11

2. Install the needle bearing outer case into the lower case.



NOTE:

Apply engine oil to the needle bearing outer case before installation.



Needle bearing installer 3:

YB-06435 @

Pinion gear bushing installer 4:

YB-06029-4

Needle bearing remover and

installer ⑤:

YB-06213

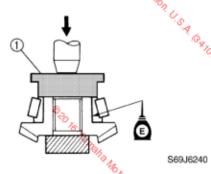
 Install the needle bearing into the needle bearing outer case.

NOTE: _

Apply engine oil or grease to the needle bearing before installation.

Assembling the forward gear

1. Install a new taper roller bearing into the forward gear using a press.



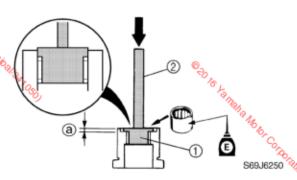
L

Forward gear bearing cupo installer 1:

YB-06276-B

Assembling the drive shaft housing

 Install the needle bearing into the drive shaft housing to the specified depth.



Z

Drive shaft needle bearing remover and installer ①:

YB-06196

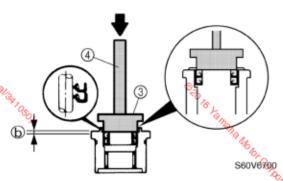
Driver handle 2: YB-06071



Depth @:

4.25-4.75 mm (0.167-0.187 in)

Apply grease to the new oil seals, and then install them into the drive shaft, housing to the specified depth.



NOTE:

Install an oil seal halfway into the drive shaft housing, then the other oil seal.



Oil seal installer ③: YB-06085 Driver handle ④: YB-06071



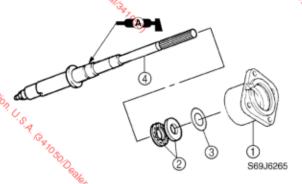
Depth (b):

0.25-0.75 mm (0.01-0.03 in)

60V1E11 6-18

Installing the drive shaft

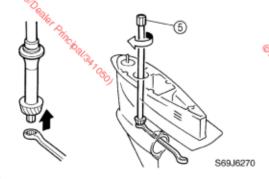
- Install the forward gear into the lower case.
- Install the drive shaft housing ①, thrust bearing ②, and original shim(s) ③ onto the drive shaft ④.



CAUTION!

Add or remove shim(s), if necessary, if replacing the drive shaft housing or drive shaft.

 Install the drive shaft and drive shaft housing into the lower case, then the pinion and pinion nut, and then tighten the nut to the specified torque.



NOTE:

Install the drive shaft by lifting it up slightly, then aligning it with the pinion and the spline of the drive shaft.



Drive shaft holder ⑤: YB-06201



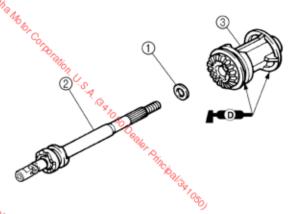
Pinion nut:

142 N·m (14.2 kgf·m, 104.7 ft·lb)

4. Tighten the drive shaft housing bolts.

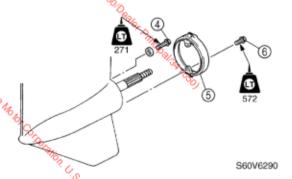
Installing the propeller shaft housing

- Install the washer ① and propeller shaft assembly ② into the propeller shaft housing assembly ③.
- 2. Apply grease to the new O-rings.



S69J6280

- 3. Install the propeller shaft housing assembly into the lower case, and then tighten the bolts 4 to the specified torque.
- 4. Install the ring (5) and bolts (6).



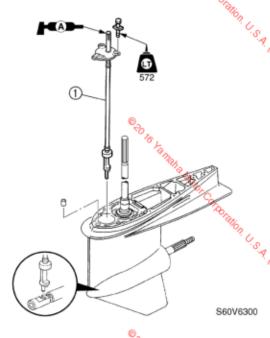


Propeller shaft housing bolt 4: 30 N·m (3.0 kgf·m, 22.1 ft·lb)

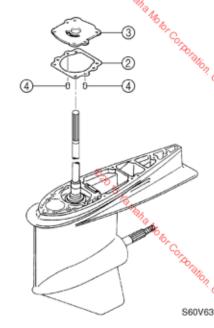
Installing the water pump and shift rod

Install the shift rod assembly ①.

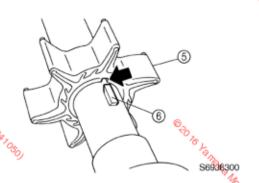
6-19 % 60V1E11



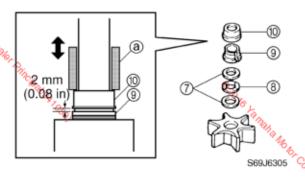
 Install a new gasket Q, the outer plate cartridge ③, and dowels Q.



- Install the Woodruff key into the drive shaft.
- Align the groove on the impeller (5) with the Woodruff key (6), and then install the impeller onto the drive shaft.

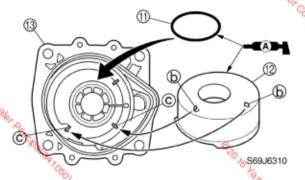


 Install the washers ⑦, wave washer ⑧, spacer ⑨, and collar ⑩ onto the drive shaft.



NOTE:

- The collar and spacer should fit together firmly.
- While pulling the drive shaft up, install the collar with an appropriate tool @ that fits over the drive shaft as shown.
- 6. Install the O-ring ① and insert cartridge ② into the pump housing ③.



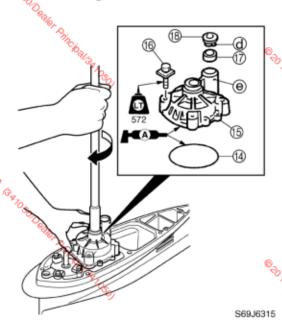
NOTE:

Align the insert cartridge projections **(b)** with the holes **(c)** in the pump housing.

60V1E11 6-20

Lower unit

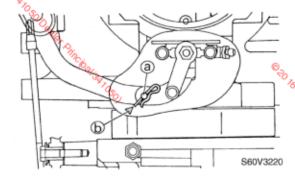
7. In assembly the bolts (B), and cover (B). Install the O-ring (4) and pump housing assembly (5) into the lower case, tighten the bolts (6), and then install the seal (7)

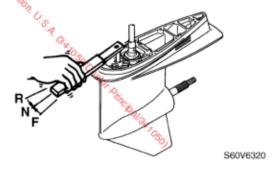


- · When installing the pump housing, apply grease to the inside of the clockwise while grease to the inside of the housing, and pushing down the pump housing.
 - · Align the cover projection @ with the hole (e) in the pump housing.

Installing the lower unit

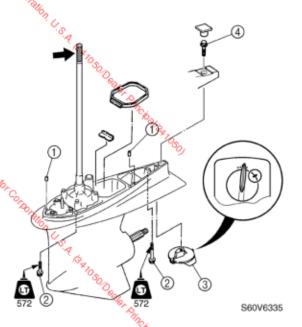
- Set the gear shift to the neutral position at the lower unit.
- Align the center of the set pin (a) with the alignment mark (b) on the bottom cowling.





Shift rod push arm: YB-06052

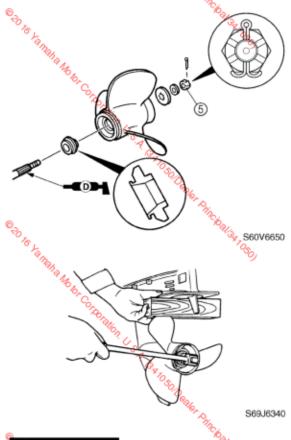
- Install the two dowels (1) into the lower unit.
- 4. Install the lower unit into the upper case, and then tighten the lower case mounting bolts 2 to the specified torque.
- Install the trim tab (3) to its original position, and then tighten the trim tab bolt 4) to the specified torque.





Lower case mounting bolt 2: 47 N·m (4.7 kgf·m)34.7 ft·lb) Trim tab bolt 4: 42 N·m (4.2 kgf·m, 31.0 ft·lb)

 Install the propeller and propeller nut, and then tighten the nut finger tight.
 Place a block of wood between the anticavitation plate and propeller to keep the propeller from turning, and then tighten the nut to the specified torque.



⚠ WARNING

- Do not hold the propeller with your hands when loosening or tightening it.
- Be sure to disconnect the battery leads from the battery and the clip from the engine stop lanyard switch.
- Put a block of wood between the anticavitation plate and propeller to keep the propeller from turning.

NOTE: _

If the grooves in the propeller nut of do not aligh with the cotter pin hole, tighten the nut until they are aligned.



Propeller nut ⑤: 54 N·m (5,4 kgf·m, 39.8 ft·lb)



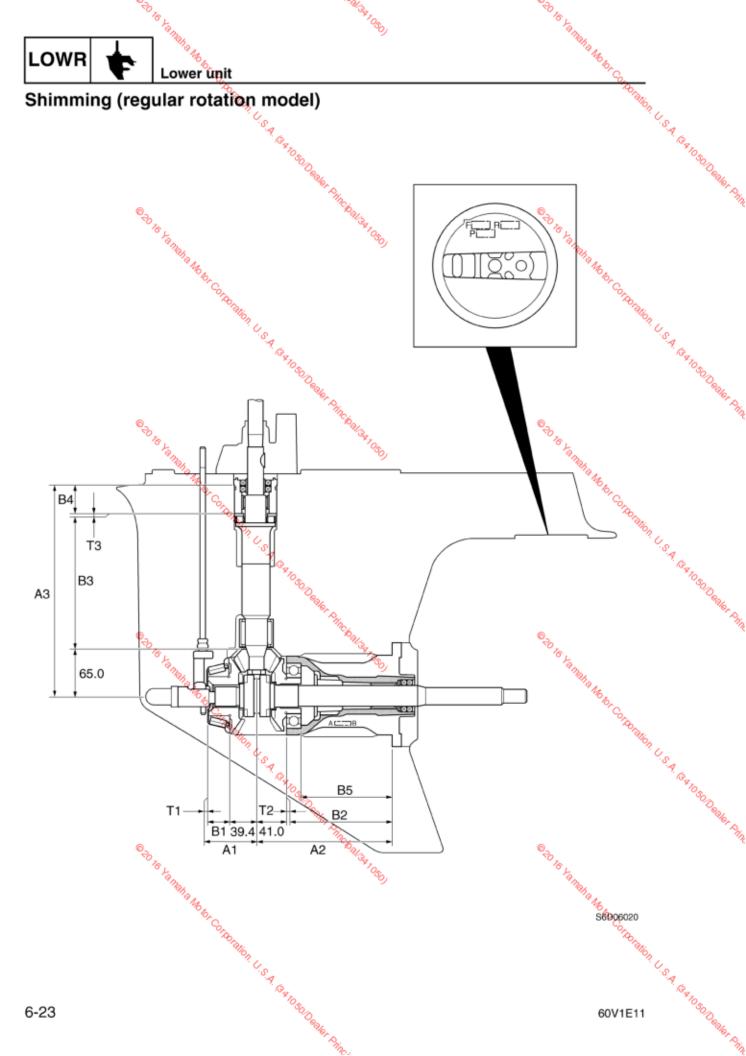
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6-23

Sallaha Mabreo.

Shimming (regular rotation model)

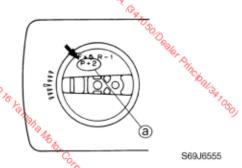
Shimming

NOTE:

- Shimming is not required when assembling the original lower case and inner parts.
- Shimming is required when assembling the original inner parts and a new lower case.
- Shimming is required when replacing the inner part(s).

Selecting the pinion shims

 Calculate the specified value (M0) as shown in the examples below.



NOTE:

"P" is the deviation of the lower case dimension from standard. The "P" mark (a) is stamped on the trim tab mounting surface of the lower case in 0.01 mm units. If the "P" mark is unreadable, assume that "P" is zero and check the backlash when the unit is assembled.

Calculation formula:

Specified value (M0) = 1.00 + P/100 mm

Example:

If "P" is (+5), then

M0 = 1.00 + (+5)/100 mm = 1.00 + 0.05 mm

= 1.05 mm

If "P" is (-3), then

M0 = 1.00 + (-3)/100 mm = 1.00 - 0.03 mm

 $= 0.97 \, \text{mm}$

Install the drive shaft ①, thrust bearing
 and drive shaft housing ③ onto the special service tool.

Install the pinion and pinion nut, and then tighten the nut to the specified torque.



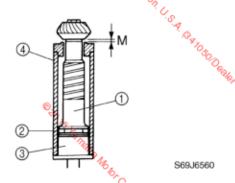
Pinion shimming gauge III 4: YB-06441



Pinion nut

142 N·m (14,2 kgf·m, 104.7 ft·lb)

 Measure the clearance (M) between the special service tool and the pinion as shown.



NOTE: _

Measure the pinion at three points to find the clearance average.

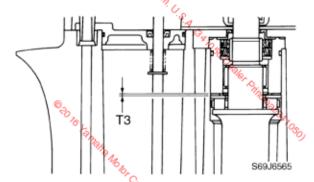
6

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A Reha Mobi Cor.

6-2 6-2 5. Select the pinion shim(s) (T3).



NOTE:

The sum of T3 and M should not be more than M0.

Calculation formula:

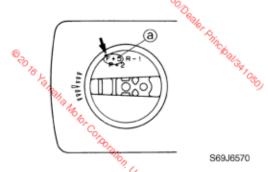
Pinion shim thickness (T3) = M0 - M

Available shim thicknesses:

0.10, 0.12, 0.15, 0.18, 0.30, 0.40, and 0.50 mm

Selecting the forward gear shims

 Calculate the specified value (M0) as shown in the examples below.



NOTE:

"F" is the deviation of the lower case dimension from standard. The "F" mark (a) is stamped on the trim tab mounting surface of the lower case in 0.01 mm units. If the "F" mark is unreadable, assume that "F" is zero and check the backlash when the unit is assembled.

Calculation formula: Specified value (M0) = 0.50 - F/100 mm

Example:

If "F" is (+5), then

M0 = 0.50 - (+5)/100 mm = 0.50 - 0.05 mm

= 0.45 mm

If "F" is (-3), then

M0 = 0.50 - (-3)/100 mm = 0.50 + 0.03 mm

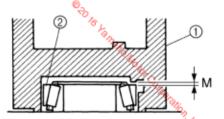
= 0.53 mm

2. Set the special service tool on the taper roller bearing.



Shimming gauge I (1): YB-06439

 Measure the clearance (M) between the special service tool and the bearing outer race ② as shown.

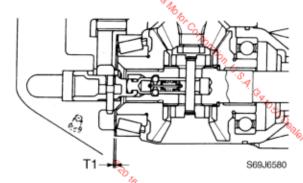


S69J6575

NOTE: _

Measure the taper roller bearing at three points to find the clearance average.

4. Select the forward gear shim(s) (T1).



NOTE:

The sum of T1 and M0 should not be more than M.

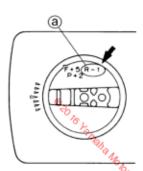
6-25

Available shim thicknesses:

0.10, 0.12, 0.15, 0.18, 0.30, 0.40, and 0.50 mm

Selecting the reverse gear shims

 Calculate the specified value (M0) as shown in the examples below.



S69J6585

NOTE:

"R" is the deviation of the lower case dimension from standard. The "R" mark (a) is stamped on the trim tab mounting surface of the lower case in 0.01 mm units. If the "R" mark is unreadable, assume that "R" is zero and check the backlash when the unit is assembled.

Calculation formula:

Specified value (M0) = 0.50 T R/100 mm

Example:

If "R" is (+5), then

M0 = 0.50 - (+5)/100 mm = 0.50 - 0.05 mm

= 0.45 mm

If "R" is (-3), then

M0 = 0.50 - (-3)/100 mm = 0.50 + 0.03 mm

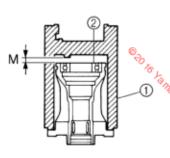
= 0.53 mm

Set the special service tool on the ball bearing.



Shimming gauge I ①: YB-06439

Measure the clearance (M) between the special service tool and the ball bearing
 as shown.

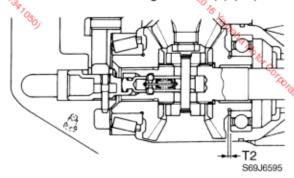


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NOTE: _

Measure the ball bearing at three points to find the clearance average.

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



NOTE

The sum of T2 and M0 should not be more than M.

Calculation formula:

Reverse gear shim thickness (T2) =

M - M0

Available shim thicknesses:

0.10, 0.12, 0.15, 0.18, 0.30, 0.40, and

0.50 mm

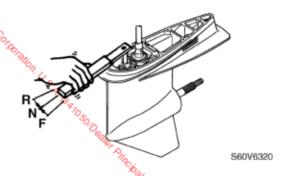
6

60V1E11 6-2

Backlash

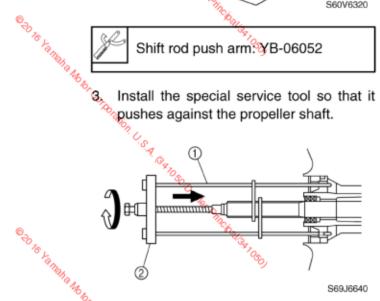
(regular rotation model) Measuring the forward and reverse gear backlash

- Remove the water pump assembly.
- 2. Set the gear shift to the neutral position at the lower unit.





Install the special service tool so that it

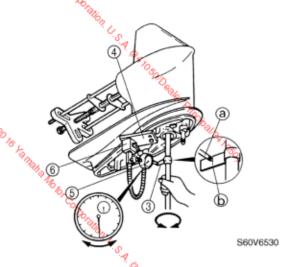


Tighten the universal puller while turning the drive shaft until the drive shaft can no longer be turned.



Bearing housing puller ①: YB-06207 Universal puller 2: YB-06117

- © 30 16 Yangaha Mobi Colon ter), 4. Install the backlash indicator onto the drive shaft (22.4 mm [0.88 in] in diameter), then the dial gauge onto the lower
 - Set the lower unit upside down.



NOTE:

Install the dial gauge so that the plunger @ contacts the mark (b) on the backlash indicator.



Backlash indicator gauge 3:

KYB-06265

Magnetic plate 4: YB-07003 Dial gauge (5): YU-03097

Magnetic flexible stand 6:

YU-3448 1/2

Slowly turn the drive shaft clockwise and counterclockwise and measure the backlash when the drive shaft stops in each direction.



Forward gear backlash:

0.13-0.42 mm (0.0051-0.0165 in)

Add or remove shim(s) if out of specification.

Forward gear backlash	Shim thickness
Less than 0.13 mm (0.0051 in)	To be decreased by (0.28 - M) × 0.78
More than 0,42 mm (0.0165 in)	To be increased by $(M - 0.28) \times 0.78$

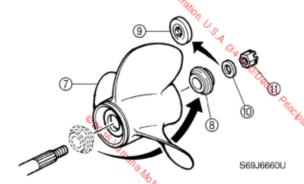
M: Measurement

6-27 60V1E11

Backlash (regular rotation model)

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

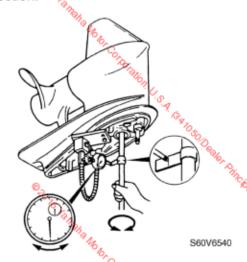
- Remove the special service tools from the propeller shaft.
- Apply a load to the reverse gear by installing the propeller (7), the spacer (8) (without the washer (9)), then the washer (10) as shown.



NOTE:

Tighten the propeller nut the while turning the drive shaft until the drive shaft can no longer be turned.

10. Slowly turn the drive shaft clockwise and counterclockwise and measure the back lash when the drive shaft stops in each direction.



Reverse gear backfash: 0.64-0.93 mm (0.0252-0.0366 in) Add or remove shim(s) if out of specification.

Reverse gear backlash	Shim thickness
Less than 0.64 mm (0.0252 in)	To be decreased by $(0.79 - M) \times 0.78$
More than 0.93 mm (0.0366 in)	To be increased by (M > 0.79) × 0.78

M: Measurement

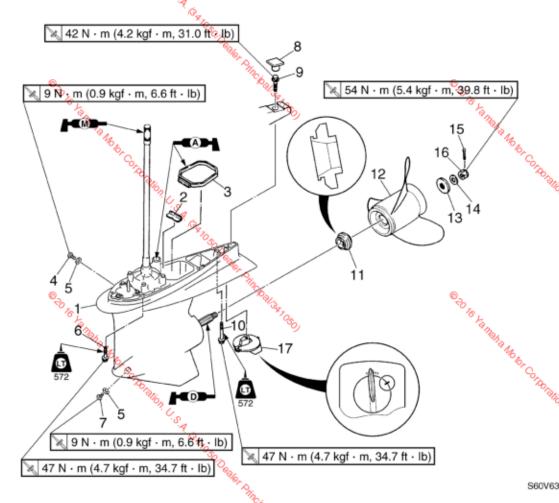
Available shim thicknesses: 0.10, 0.12, 0.15, 0.18, 0.30, 0.40, and 0.50 mm

Remove the special service tools, and then install the water pump assembly.

6-28

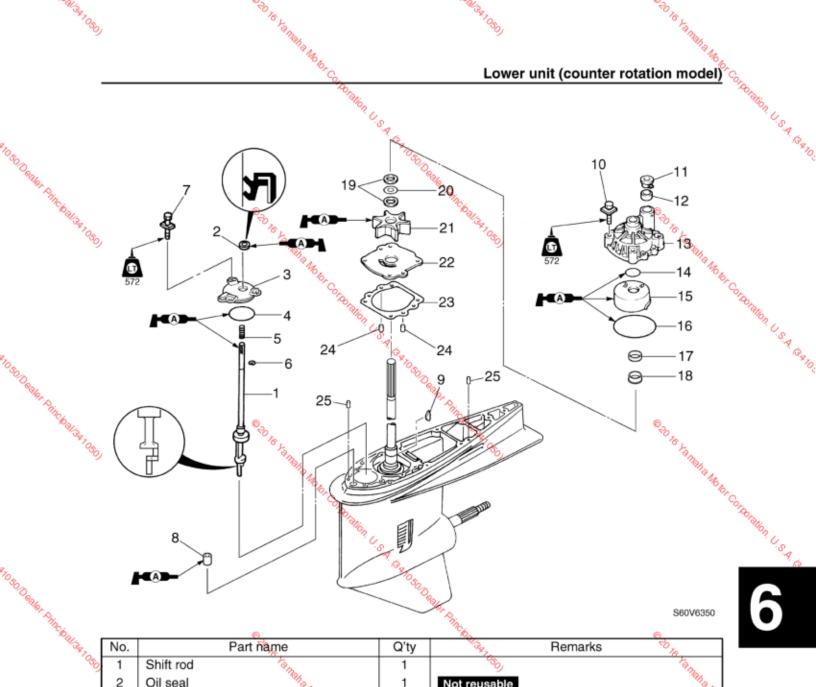


Lower unit (counter rotation model)



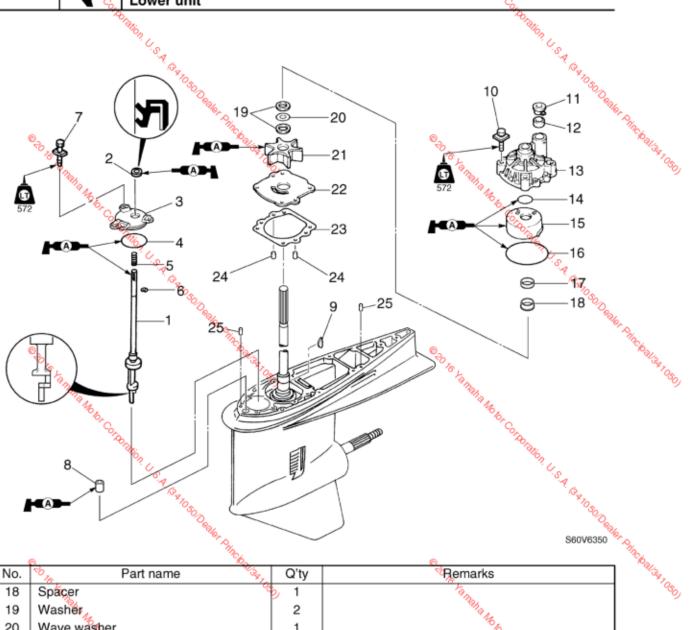
	<u> </u>	10	
No.	Part name	Q'ty 🦠	Remarks $^{\circ}_{\kappa}$
1	Lower unit	1	(SO)
2	Plate %,	1	alla L
3	Rubber seal ***	1	*Obs.
4	Check screw	1	Corps
5	Gasket ************************************	2	Not reusable
6	Bolt	7	M10 × 45 mm
7	Drain screw	1	
8	Plate Rubber seal Check screw Gasket Bolt Drain screw Grommet Bolt	1	
9	Bolt	1	M10 × 44 mm
10	Bolt	[®] / _~ 0,1	M10 × 70 mm
11	Spacer 👩	7900	_© _
12	Propeller %,	1 📆	6. The state of th
13	Washer 🗞	1	(S) (Single)
14	Washer 700/4	1	No Ma
15	Washer Washer Cotter pin Propeller nut Trim tab	1	Not reusable
16	Propeller nut	1	*** OFRON
17	Trim tab	1	Stion .

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*O ₅		<u> </u>		*Ø2		<u> </u>
Ballag TOS	No.	Part name	Q'ty	Gy.	Remarks	50%
- OSO	1	Shift rod	1	80)		Tan
	2	Shift rod Oil seal Oil seal housing O-ring Spring Circlip	1	Not reusable		Fanaha Mo
	3	Oil seal housing	1			~~
	4	O-ring	1	Not reusable		
	5	Spring	1			
	6	Circlip	1			
	7	Bolt	⁷ ,₀3	M6 × 20 mm		
7050	8	Seal	**************************************			
TO ROLL	9	Woodruff key	1 📆	2/		
* An	10	Bolt	4	M8 × 45 mm		
NOSODealer Dinchalls 1050	11	Cover _©	1	achar.		© do to talkalla Ma
SA YOU	12	Seal %,	1	SA ¹ O		16 L
The state of the s	13	Water pump housing	1	30		ame
	14	O-ring	1	Not reusable		70 A
	15	Cover Seal Water pump housing O-ring Insert cartridge O-ring Collar	1			· · ·
	16	O-ring	1	Not reusable		
	17	Collar	1			

6-30 60V1E11



	a 10,		<u> </u>	10 ₁₃
No.	Part name	Q'ty	Remarks	TOWN -
18	Spacer	5 1	Tay,	Palisy Toso,
19	Washer	2	NI ₂	
20	Wave washer	1	*64-	
21	Impeller %	1	Contraction	
22	Outer plate cartridge	1	Tallo,	
23	Gasket	1	Not reusable	
24	Dowel	2	A.O.	
25	Dowel	2	Not reusable	
	Ocaler Dinchalisa I Ocal Sanaha A.	By	V ₀	Pinchalia 1080

Sealer Principal Sea Loso) © 30 Is Yamaha Makur Corbonalion U.S.A. ISA IOSO Dealer Princ

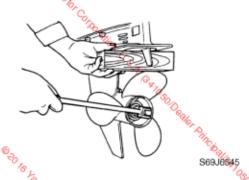
© 20 16 Ya Maha Motor Cortobration U.S.A. SA NOTEA 1
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6-31

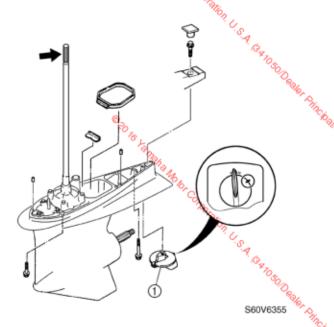
Removing the lower unit

- Drain the gear oil. For draining procedures, see Chapter 3, "Changing the gear oil."
- Set the gear shift to the neutral position, and place a block of wood between the anti-cavitation plate and propeller to keep the propeller from turning, and then remove the propeller nut and propeller.



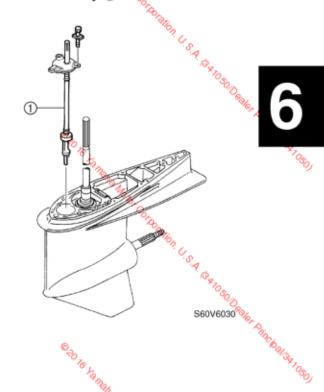
A WARNING

- Do not hold the propeller with your hands when loosening or tightening it.
- Be sure to disconnect the battery leads from the battery and the clip from the engine stop lanyard switch.
- Put a block of wood between the anticavitation plate and propeller to keep the propeller from turning.
- Mark the trim tab ① at the area shown and then remove it.
- Loosen the botts, and then remove the lower unit from the upper case.



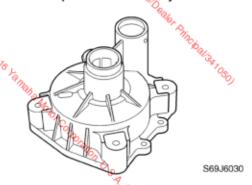
Removing the water pump and shift rod

 Remove the water pump assembly and shift rod assembly ①.

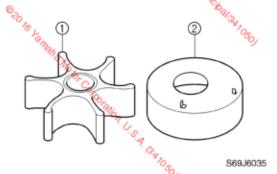


Checking the water pump and shift rod

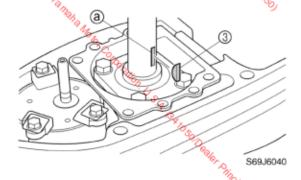
1. Check the water pump housing for deformation. Replace if necessary.



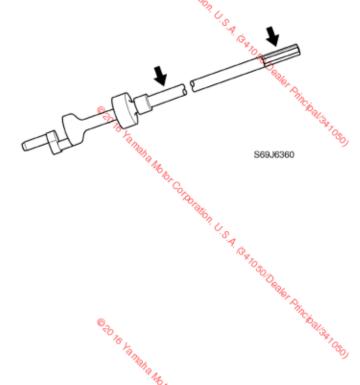
2. Check the impeller nand insert cartridge 2 for cracks or wear. Replace if necessary.



3. Check the Woodruff key 3 and the groove @ on the drive shaft for wear. Replace if necessary.

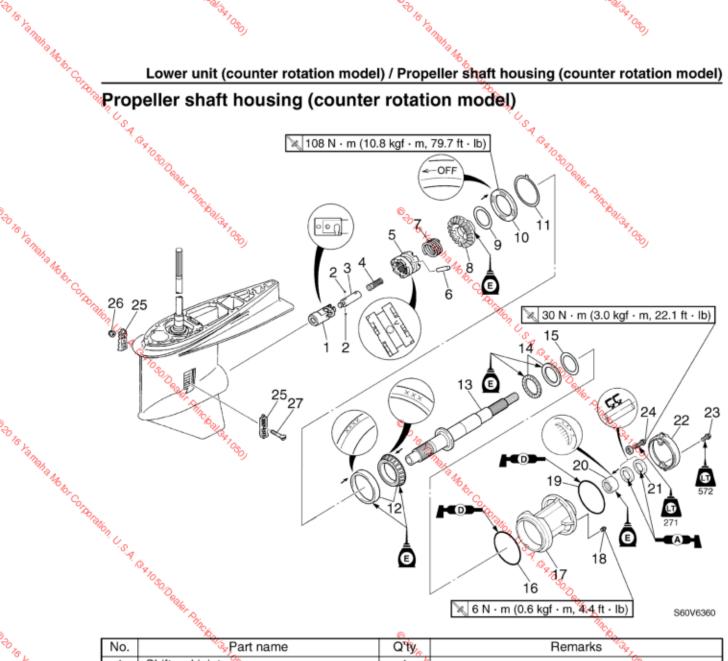


4. Check the shift rod for cracks or wear. ACE TO SOLD CORDER TO Replace if necessary.



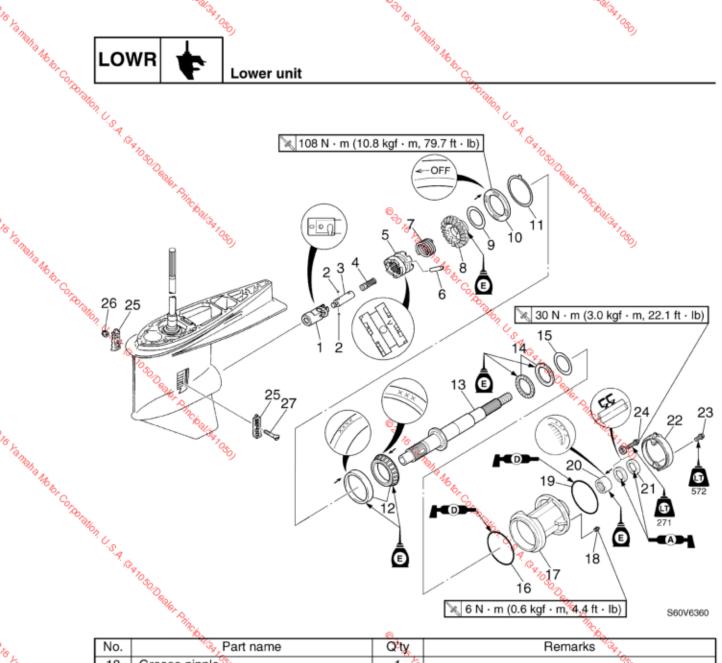
© RO No Vandala Maker Corkotalion. U.S.A. G. & 10.50 Dealer Principalisa 1050) © 30 IS Various Albert Corporation. U.S.A. G. & 10 St. D. Bester Principalist 1050)

6-33



		Chile to		The solveston
O So Samelia Motor Corporal	No.	Part name	Q'ty	Remarks
tan	1	Shift rod joint %	1 4	(%)
Sha A.	2	Ball	2	As required Not reusable
TOROT	3	Slider	1	* Obj.
CO/Ab.	4	Shift plunger	1	COTAD.
Tal	5 5	Dog clutch	1	Talion .
	6	Cross pin	1	* Co.
	77	Spring	1	76,
	8	Forward gear	1	**to _{\$0}
	9	Forward gear shim	_	As required
	10	Ring nût	1	** A _h ,
9	11	Claw washer	øj.	Achar.
" AL	12	Taper roller bearing assembly	100 K	Not reusable
(ana)	13	Propeller shaft 🦥	1 3	%, ⁹ 0
"ala	14	Thrust bearing	1	170 Mg
RO 16 X RIBIGIA NO BOT COTOGO	15	Propeller shaft shim	_	As required
OF TOP	16	O-ring	1	Not reusable
9/	17	Propeller shaft housing	1	allion .
	9			

60V1E11 6-34

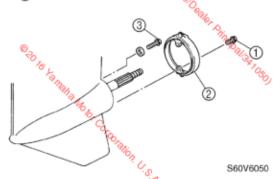


Tes le sa Maha Mater

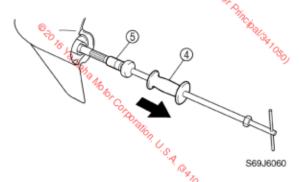
		nc _{io}	6	To the second se	
·	No.	Part name	Q ² ty	Remarks 🔖	
tan	18	Grease nipple 🏷	1 🧖	(%)	
Shan .	19	O-ring	1	Not reusable	
TO BY	20	Needle bearing	1	**************************************	
Corps	21	Oil seal	2	Not reusable	
S SA TRAILS MA BOT COTOD RAILS	22	Ring	1	Tallo,	
	′ 23	Bolt	2	M8 × 20 mm ² / ₂₀	
	24	Bolt	2	M8 × 33 mm 76	
	25	Cooling water inlet cover	2	*70 ₃₀	
	26	Nut	1	, S. C.	
	27	Screw 4	1	M8 × 20 mm/s M8 × 33 mm A Solution Depth of the control of the co	
to samala Maker Cor.		Policy Topo	© do to to	Taha la bar Cor	
**Ralisatoro Corporation: U.S. A. G. A. T. G. B. D. B.				Sols Kalland Motor Colaboliton U.S. A. G. A. D. Sold Dealer Philo.	

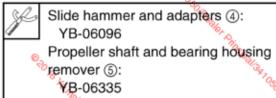
Removing the propeller shaft housing assembly 4

1. Remove the bolts (), ring (2), and bolts



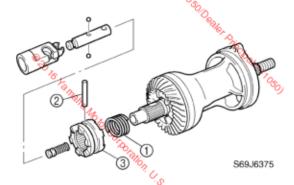
2. Pull out the propeller shaft housing assembly.



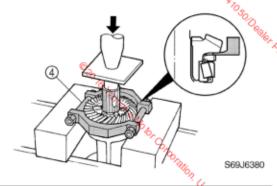


Disassembling the propeller shaft housing

1. Remove the spring (1), then the cross pin 2, dog clutch 3, slider, shift plunger, and shift rod joint.

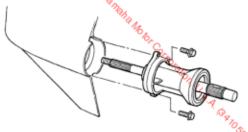


Remove the forward gear and forward gear shim(s) from the propeller shaft housing using a press.



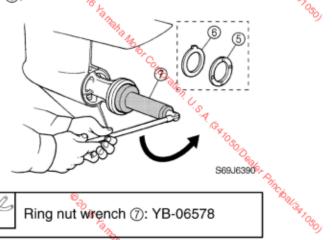
Bearing splitter plate 4:

3. Install the propeller shaft assembly in the Anthony of the Control of the Cont



S69J6385

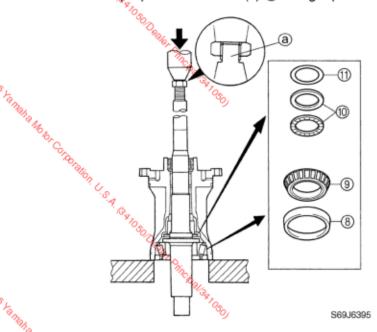
Remove the ring nut (5) and claw washer 6



Ring nut wrench 7: YB-06578

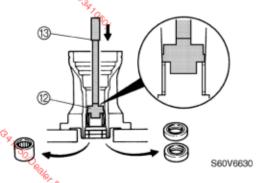
Lower unit

Remove the bearing outer race ®, taper roller bearing (9), thrust bearing (10), and propeller shaft shim(s) (1) using a press.



CAUTION:

- · Do not press the propeller shaft threads a directly.
- Do not reuse the taper roller bearing, always replace it with a new one.
- 6. Remove the oil seals and needle bearing.





Oil seal installer @: YB-06168 Driver handle (3): YB-06071

Checking the propeller shaft housing

1. Clean the propeller shaft housing using a soft brush and cleaning solvent, and then check it for cracks or damage. Replace if necessary.



S69J6105

2. Check the teeth and dogs of the forward gear for cracks or wear. Replace the gear if necessary.



S69J6110

3. Check the bearings for pitting or rumbling. Replace if necessary.





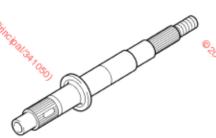


S69J6410

Dis Yantaha Matar Cortoralian U.S.A. S.A. ISA IOSODealer Air 60V1E11

Checking the propeller shaft

Check the propeller shaft for bends or wear. Replace if necessary.



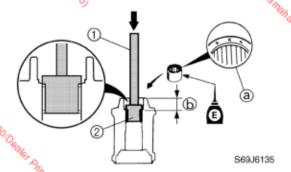
S69J6415

Check the dog clutch, shift rod joint, and shift slider for cracks or wear. Replace if necessary.



S69J6420

1. Install the needle bearing into the propeller shaft housing to the specified depth.



Install the needle bearing with the manufacture identification mark @ facing toward the Tor Corporation U.S.A. BAND 60V1E11 oil seal (propeller side).



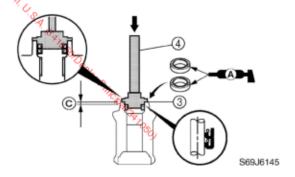
Driver handle ①: YB-06071 Drive shaft needle bearing remover and installer 2: YB-06196



Depth (b):

25.05-25.55 mm (0.986-1.006 in)

Apply grease to the new oil seals, and then install them into the propeller shaft housing to the specified depth.



Install an oil seal halfway into the propeller shaft housing, then the other oil seal.



Oil seal installer 3: YB-06085 Driver handle 4: YB-06071

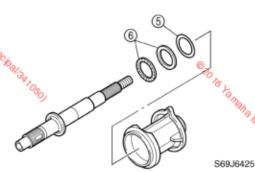


4.75-5.25 mm (0.187-0.207 in)

6-38

Lower unit

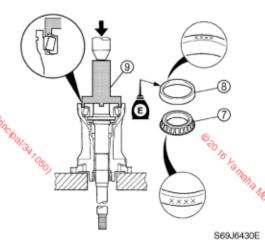
 Install the original shim(s) (5) and thrust bearing (6) with the propeller shaft into the propeller shaft housing.



CAUTION:

Add or remove shim(s), if necessary, if replacing the propeller shaft, the thrust bearing, or the propeller shaft housing.

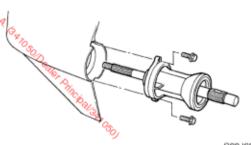
4. Install the new taper roller bearing (2) and bearing outer race (8) into the propeller shaft housing using a press.



L

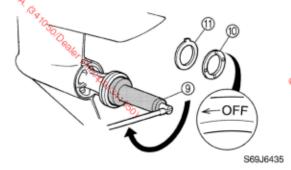
Ring nut wrench @: YB-06578

5. Install the propeller shaft assembly in the reverse direction into the lower case.



S69J6385

Install the ring nut (i) and claw washer (ii), and then tighten the ring nut to the specified torque.



J.

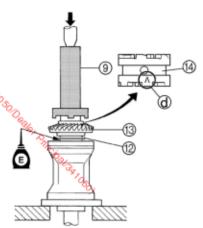
Ring nut wrench @: YB-06578



Ring nut 10:

108 N·m (10.8 kgf·m, 79.7 ft·lb)

7. Install the original shim(s) 12, forward gear 13, and dog clutch 14 using a press.



S60V6590

blalion U.S.A. R.A. 1050 D. 6-39

CAUTION:

Add or remove shim(s), if necessary, if replacing the forward gear or taper roller bearing.

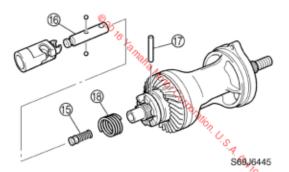
NOTE: _

Install the dog clutch @ with the "V" mark @ facing toward the forward gear.



Ring nut wrench @: YB-06578

8. Install the shift plunger (5) and slider (6) into the propeller shaft, and then install the cross pin (7) and spring (8).



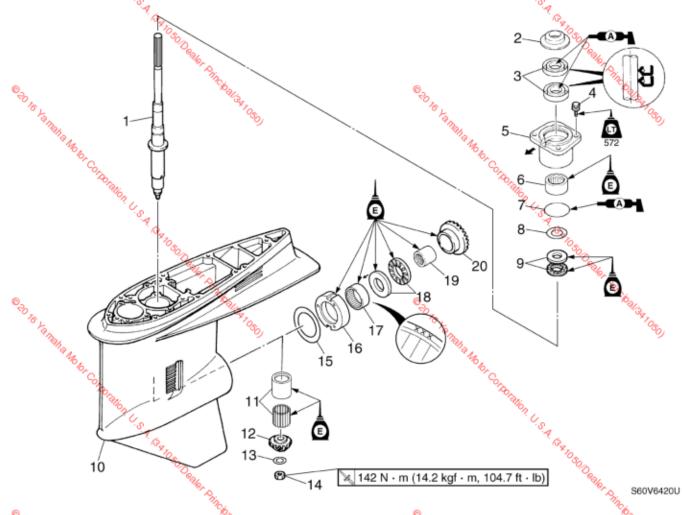
6

60V1E11

6-40



Drive shaft and lower case (counter rotation model)

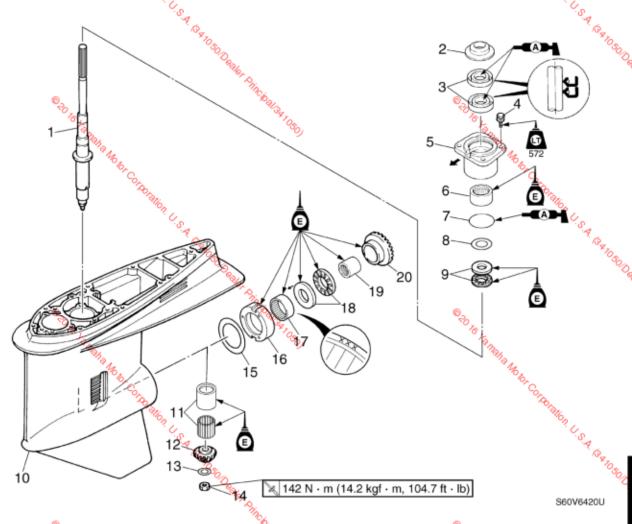


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©_		~6 <u>,</u>		
50%	No.	Part name	Q'ty	Remarks
©30 In Valuable	1	Drive shaft %	1	\$ m
"ah	, 2	Cover	1	**************************************
	**************************************	Oil seal	2	Not reusable
	400	Bolt	4	M8 × 25 mm
	5	Drive shaft housing	1	Tallo,
	6	Needle bearing	1	**U ₀
	7	O-ring ⁷	1	Not reusable
	8	Pinion shim	_	As required
	9	Thrust bearing	1	(A)
	10	Lower case	1	Not reusable As required **Replace of the state of the s
©_	11	Needle bearing Pinion Washer	1	© To balla.
80%,	12	Pinion	1	To to be a second of the secon
©30 % Yanahi	13	Washer	1	To Tank
, J.	<u>4</u> 14	Nut	1	**************************************
	1 95	Reverse gear shim	_	As required %
	16	Retainer	1	TO/TAOL
	17	Needle bearing	1	aton,

6-41

Drive shaft and lower case (counter rotation model)



No.	Part name	Q'ty	Remarks
18	Thrust bearing	(F)	Ta _{III}
19	Needle bearing	1	Not reusable
20	Reverse gear 6	1	*Obs.

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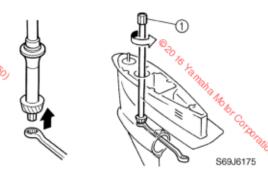
© 30 to Kanaha Makor Corbolation U.S.A. GANO Dealer De

60V1E11

Lower unit

Removing the drive shaft

 Remove the drive shaft assembly and pinion, and then pull out the reverse gear and thrust bearing.

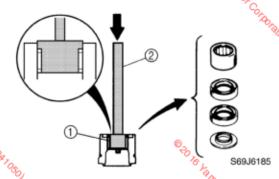




Drive shaft holder ①: YB-06201

Disassembling the drive shaft housing

1. Remove the cover, oil seals, and needle bearing.





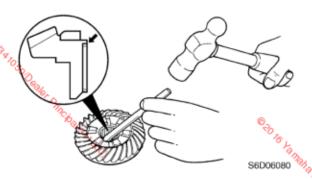
Drive shaft needle bearing remover and installer ①:

YB-06196

Driver handle 2: YB-06071

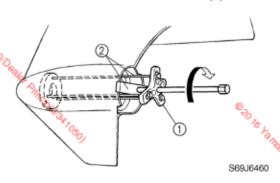
Disassembling the reverse gear

 Remove the needle bearing from the reverse gear using a chisel.



Disassembling the lower case

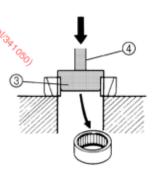
1. Remove the retainer and shim(s).





Universal puller ①: YB-06117 Puller bolt ②: YB-41707

2. Remove the needle bearing from the retainer.





Needle bearing installer $\ensuremath{\Im}$:

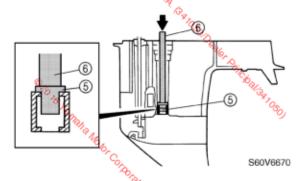
YB-06434

Driver handle 4: YB-06071

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6-43 60V1E11

3. Remove the needle bearing from the lower case.



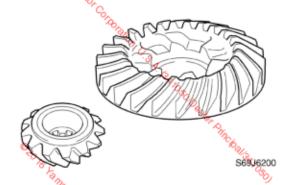


Roller bearing installer/remover ⑤: YB-06432

Driver handle 6: YB-06071

Checking the pinion and reverse gear

 Check the teeth of the pinion, and the teeth and dogs of the reverse gear for cracks or wear. Replace if necessary.



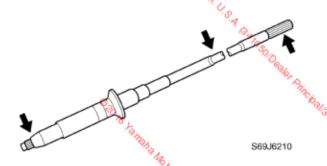
Checking the bearings

 Check the bearings for pitting or rumbling. Replace if necessary.



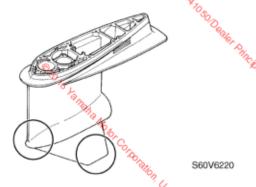
Checking the drive shaft

 Check the drive shaft for bends or wear. Replace if necessary.



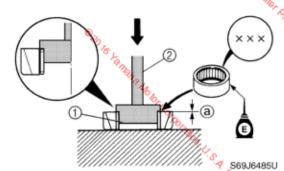
Checking the lower case

 Check the skeg and torpedo for cracks or damage. Replace the lower case if necessary.



Assembling the lower case

 Install the needle bearing into the retainer to the specified depth.





Needle bearing installer ①: YB-06434

Driver handle 2: YB-06071



Depth @:

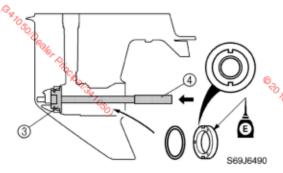
-0.25-0.25 mm (-0.010-0.010 in)

6

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60V1E11

Install the original shim(s) and retainer into the lower case.



CAUTION:

Add or remove shim(s), if necessary, if replacing the forward gear or lower case.

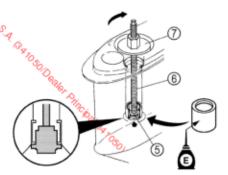


Forward bearing installer 3:

YB-06430

Driver handle (4): YB-06071

Install the needle bearing outer case into the lower case.



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NOTE:

Apply engine oil to the needle bearing outer case before installation.



Needle bearing installer ⑤:

YB-06435

Pinion gear bushing installer 6:

YB-06029-4

Needle bearing remover and

installer ⑦:

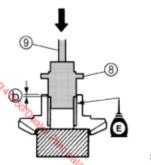
YB-06213

 Install the needle bearing into the needle bearing outer case.

NOTE:

Apply engine oil or grease to the needle bearing before installation.

5. Install the new needle bearings into the reverse gear to the specified depth.



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Z

Needle bearing installer ®:

YB-06435

Driver handle 9: YB-06071



Depth (b):

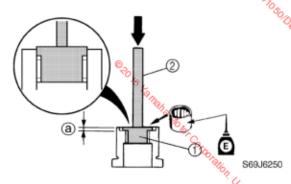
6.75-7.25 mm (0.266-0.285 in)

Install the thrust bearing and reverse gear into the lower case.

6

Assembling the drive shaft housing

 Install the needle bearing into the drive shaft housing to the specified depth





Drive shaft needle bearing remover and installer (1):

YB-06196

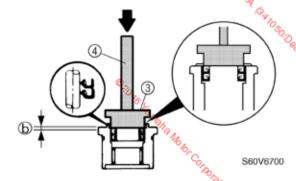
Driver handle 2: YB-06071



Depth @:

4.25-4.75 mm (0.167-0.187 in)

2. Apply grease to the new oil seals, and then install them into the drive shaft housing to the specified depth.



NOTE:

Install an oil seal halfway into the drive shaft housing, then the other oil seal.



Oil seal installer ③: YB-06085 Driver handle ④: YB-06071

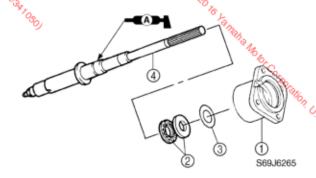


Depth (b):

0.25-0.75 mm (0.01-0.03 in)

Installing the drive shaft

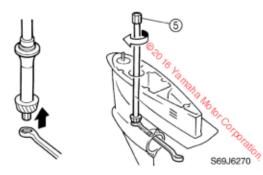
- Install the reverse gear into the lower case.
- 2. Install the drive shaft housing ①, thrust bearing ②, and original shim(s) ③ onto the drive shaft ④.



CAUTION:

Add or remove shim(s), if necessary, if replacing the drive shaft housing or drive shaft.

 Install the drive shaft and drive shaft housing into the lower case, then the pinion and pinion nut, and then tighten the nut to the specified torque.



NOTE

Install the drive shaft by lifting it up slightly, then aligning it with the pinion and the spline of the drive shaft.



Drive shaft holder (5): YB-06201



Pinion nut:

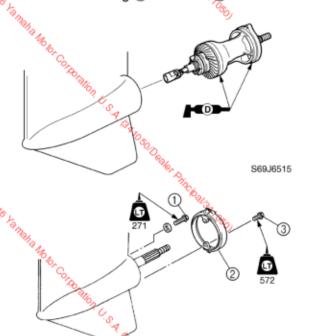
142 N·m (14.2 kgf·m, 104.7 ft·lb)

60V1E11 6-46

4. Tighten the housing bolts.

Installing the propeller shaft housing

- 1. Install the propeller shaft housing assembly into the lower case, and then tighten the bolts 1 to the specified torque.
- Install the ring ② and bolts ③.



NOTE:

Apply grease to the new O-rings before installation.

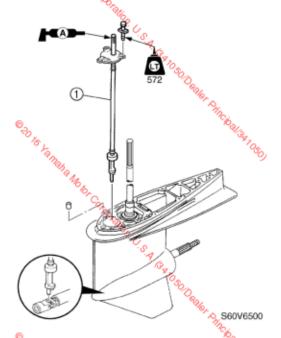
S60V6490



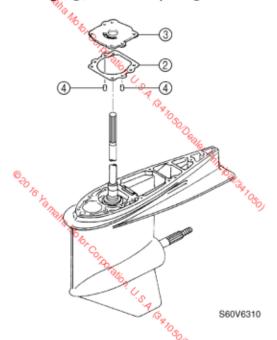
Propeller shaft housing bolt 1: 30 N·m (3.0 kgf·m, 22.1 ft·lb)

Installing the water pump and shift rod

Install the shift rod assembly ①.



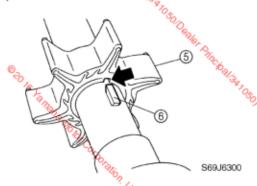
2. Install a new gasket ②, the outer plate cartridge 3, and dowel pins 4.



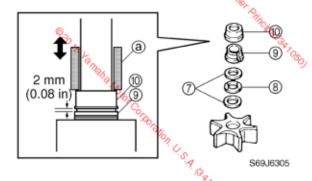
3. Install the Woodruff key into the drive shaft.

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4. Align the groove on the impeller ⑤ with the Woodruff key ⑥, and then install the impeller onto the drive shaft.

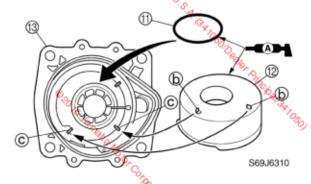


 Install the washers ⑦, wave washer ®, spacer ⑨, and collar ⑩ onto the drive shaft.



NOTE:

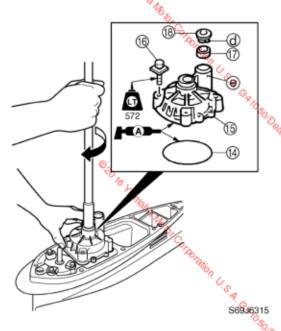
- The collar and spacer should fit together firmly.
- While pulling the drive shaft up, install the collar with an appropriate tool (a) that fits over the drive shaft as shown.
- Install the O-ring 11 and insert cartridge
 into the pump housing is.



NOTE: _

Align the insert cartridge projections with the holes © in the pump housing.

7. Install the O-ring (4) and pump housing assembly (5) into the lower case, tighten the bolts (6), and then install the seal (7) and cover (8).



NOTE:

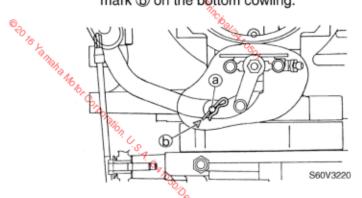
- When installing the pump housing, apply grease to the inside of the housing, and then turn the drive shaft clockwise while pushing down the pump housing.
- Align the cover projection @ with the hole
 in the pump housing.

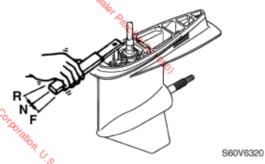
6

6-48

Installing the lower unit

- 1. Set the gear shift to the neutral position at the lower unit.
- 2. Align the center of the set pin @ with the mark (b) on the bottom cowling.

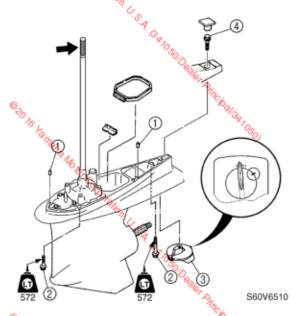






Shift rod push arm: YB-06052

- 3. Install the two dowel 1 into the lower
- 4. Install the lower unit in and then tighten the lower case bolts ② to the specified torque. 4. Install the lower unit into the upper case, and then tighten the lower case mounting
 - 5. Install the trim tab 3 to its original position, and then tighten the bolt 4 to the specified torque.



Sanaha Mobi

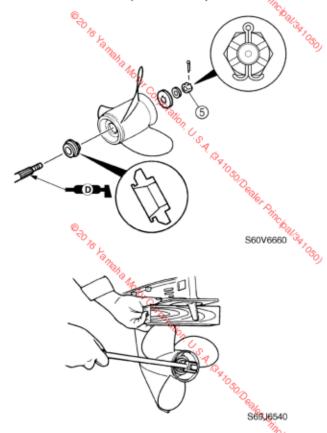
Lower case mounting bolt 29 47 N·m (4.7 kgf·m, 34.7 ft·lb) Trim tab bolt 4: 42 N·m (4.2 kgf·m, 31.0 ft·lb)

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60V1E11

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 Install the propeller and propeller nut, and then tighten the nut finger tight. Place a block of wood between the anticavitation plate and propeller to keep the propeller from turning, and then tighten the nut to the specified torque.



▲ WARNING

- Do not hold the propeller with your hands when loosening or tightening it.
- Be sure to disconnect the battery leads from the battery and the clip from the engine stop lanyard switch.
- Put a block of wood between the anticavitation plate and propeller to keep the propeller from turning.

NOTE: _

If the grooves in the propeller nut ⑤ do not align with the cotter pin hole, tighten the nut until they are aligned.



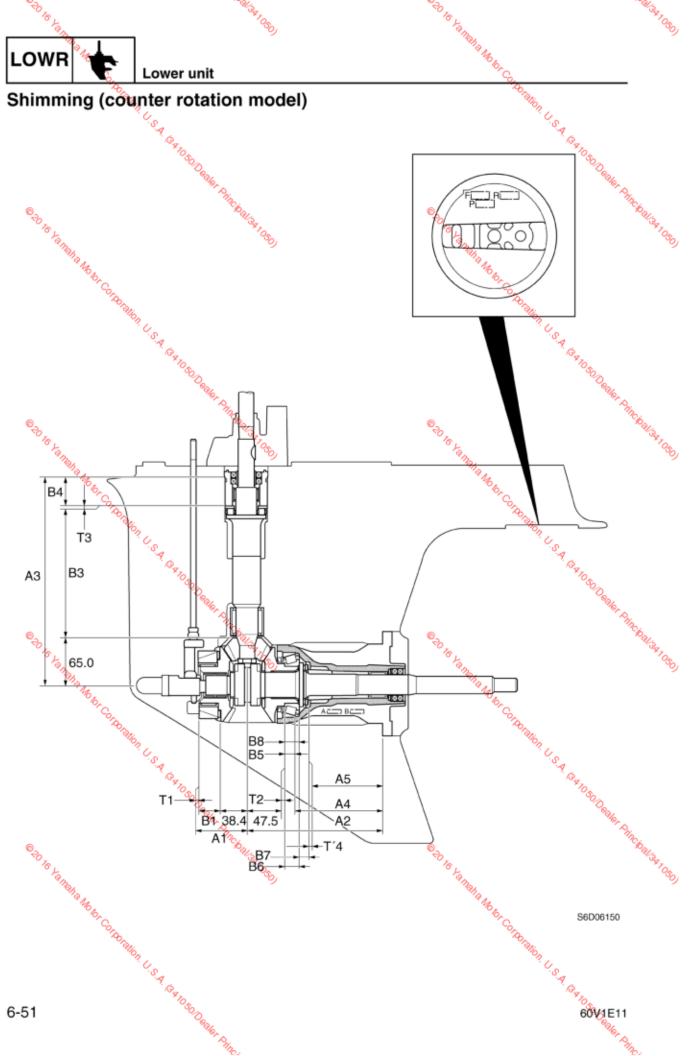
Propeller nut (5:5,4 kgf·m; 39.8 ft·lb)

6

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60V1E11





Shimming (counter rotation model)

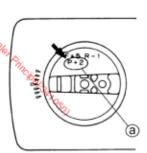
Shimming

NOTE:

- Shimming is not required when assembling the original lower case and inner parts.
- Shimming is required when assembling the original inner parts and a new lower case.
- · Shimming is required when replacing the inner part(s).

Selecting the pinion shims

Calculate the specified value (M0) as shown in the examples below.



S69J6555

Olo yamaha habar Cornoladio NOTE: "P" is the deviation of the lower case dimension from standard. The "P" mark @ is stamped on the trim tab mounting surface of the lower case in 0.01 mm units. If the "P" mark is unreadable, assume that "P" is zero and check the backlash when the unit is % assembled.

Calculation formula:

Specified value (M0) = 1.00 + P/100 mm

Example:

If "P" is (+5), then

M0 = 1.00 + (+5)/100 mm = 1.00 + 0.05 mm

= 1.05 mm

If "P" is (-3), then

M0 = 1.00 + (-3)/100 mm = 1.00 - 0.03 mm

= 0.97 mm

2. Install the drive shaft (1), thrust bearing 2), and drive shaft housing 3 onto the special service tool.

Install the pinion and pinion nut, and then tighten the nut to the specified torque.



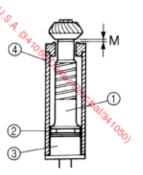
Pinion shimming gauge III 4: YB-06441



Pinion nut:

142 N·m (14.2 kgf·m, 104.7 ft·lb)

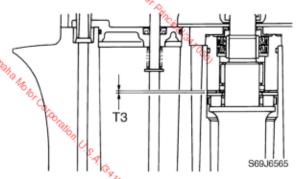
Measure the clearance (M) between the special service tool and the pinion as shown.



S69J6560

Measure the pinion at three points to find the clearance average.

Select the pinion shim(s) (T3).



NOTE:

The sum of T3 and M should not be more than M0.

Calculation formula:

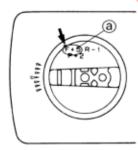
Pinion shim thickness (T3) = M0 - M

Available shim thicknesses:

 $0.10, \, 0.12, \, 0.15, \, 0.18, \, 0.30, \, 0.40, \, and \, 0.50 \, mm$

Selecting the reverse gear shims

 Calculate the specified value (M0) as shown in the examples below.



S69J6570

NOTE:

F" is the deviation of the lower case dimension from standard. The "F" mark (a) is stamped on the trim tab mounting surface of the lower case in 0.01 mm units. If the "F" mark is unreadable, assume that "F" is zero and check the backlash when the unit is assembled.

Calculation formula:

Specified value (M0) = 30.60 + F/100 mm

Example:

If "F" is (+5), then

M0 = 30.60 + (+5)/100 mm = 30.60 + 0.05 mm

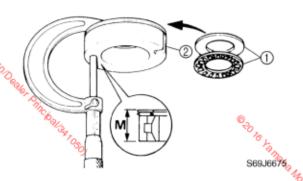
= 30.65 mm

If "F" is (-3), then

M0 = 30.60 + (-3)/100 mm = 30.60 - 0.03 mm

= 30.57 mm

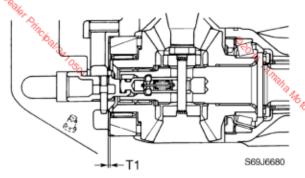
- 2. Set the thrust bearing ① to the bearing retainer ② as shown.
- Turn the thrust bearing two or three times to seat the bearing retainer, and then measure the bearing height (M).



NOTE:

Measure the bearing retainer at three points to find the clearance average.

4. Select the reverse gear shim(s) (T1).



NOTE:

The sum of T1 and M should not be more than M0.

Calculation formula:

Reverse gear shim thickness (T1) =

M0 - M

Available shim thicknesses:

0.10, 0.12, 0.15, 0.18, 0.30, 0.40, and

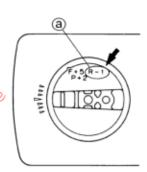
0.50 mm

6-53 60V1E11

Shimming (counter rotation model)

Selecting the forward gear shims

1. Calculate the specified value (M0) as shown in the examples below.



S69J6585

NOTE:

"R" is the deviation of the lower case dimension from standard. The "R" mark @ is stamped on the trim tab mounting surface of the lower case in 0.01 mm units. If the "R" mark is unreadable, assume that "R" is zero and check the backlash when the unit is assembled.

Calculation formula:

Specified value (M0) = 2.50 + R/100 mm

Example:

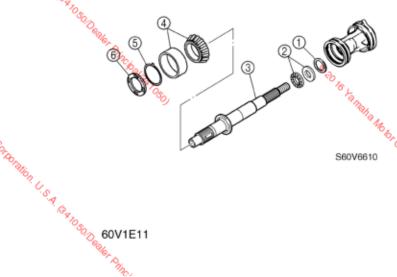
If "R" is (+5), then

M0 = 2.50 + (+5)/100 mm = 2.50 + 0.05 mm%= 2.55 mm

If "R" is (-3), then

M0 = 2.50 + (-3)/100 mm = 2.50 - 0.03 mm= 2.47 mm

2. Install the shim(s) (1), thrust bearing (2), propeller shaft 3, taper roller bearing 4, and claw washer (5), and then tighten the ring nut 6 to the specified torque.



Ring nut wrench: YB-06578



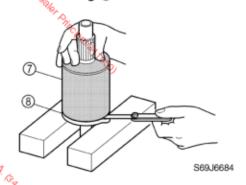
Ring nut (6): 108N·m (10.8 kgf·m, 79.7 ft·lb)

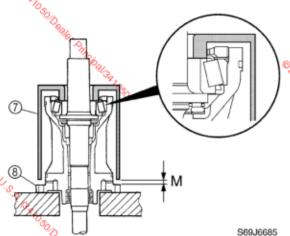
3. Set the special service tool on the taper roller bearing inner race.



Shimming gauge 7: YB-06440-A

4.7 Measure the clearance (M) between the Special service tool and the propeller shaft housing (8) as shown.

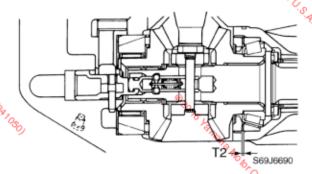




Measure the clearance at four points to find the clearance average.

6-54

5. Select the forward gear shim(s) (T2).



NOTE:

The sum of T2 and M should not be more than M0.

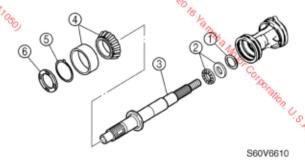
Calculation formula:

Forward gear shim thickness (T2) = M0 – M

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

Selecting the propeller shaft shims

 Install the shim(s) ①, thrust bearing ②, propeller shaft ③, taper roller bearing ④, and claw washer ⑤, and then tighten the ring nut ⑥ to the specified torque.

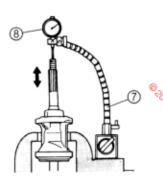




Ring nut wrench: YB-06578



Ring nut (6): 108 N·m (10.8 kgf·m, 79.7 tt:lb) Measure the propeller shaft free play as shown.



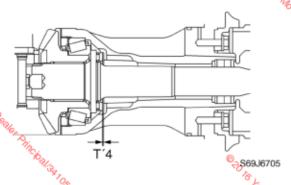
Propeller shaft free play: 0.25–0.35 mm (0.0098–0.0138 in)



Magnetic flexible stand ⑦: YU-34481

Dial gauge ®: YU-03097

3. Select the propeller shaft shim(s) (T'4)%



NOTE:

Add or remove shim(s) if the free play is out of specification.

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

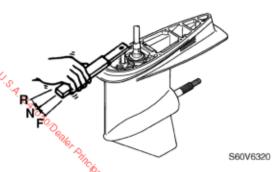
6-55 60V1E11

6

Backlash

(counter rotation model) Measuring the forward and reverse gear backlash

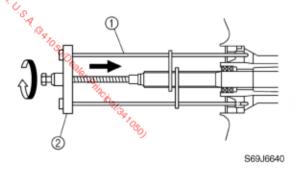
- Remove the water pump assembly.
- 2. Set the gear shift to the neutral position at the lower unit.





Shift rod push arm: YB-06052

Install the special service tool so that it pushes against the propeller shaft.



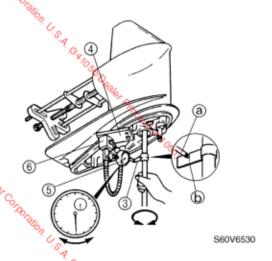
NOTE:

Tighten the universal puller while turning the drive shaft until the drive shaft can no longer be turned.



Bearing housing puller ①: YB-06207 Universal puller ②: YB-06117

- Install the backlash indicator onto the drive shaft (22.4 mm [0.88 in] in diameter), then the dial gauge onto the lower unit.
- 5. Set the lower unit upside down.



NOTE:

Install the dial gauge so that the plunger ⓐ contacts the mark ⓑ on the backlash indicator.



Backlash indicator gauge 3:

YB-06265

Magnetic plate 4: YB-07003

Dial gauge (5: YU-03097 Magnetic flexible stand (6):

YU-34481

 Slowly turn the drive shaft clockwise and counterclockwise and measure the backlash when the drive shaft stops in each direction.



Forward gear backlash:

0.32-0.64 mm (0.0126-0.0252 in)

Add or remove shim(s) if out of specification.

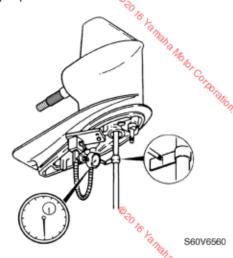
Forward gear backlash	Shim thickness
Less than 0.32 mm (0.0126 in)	To be decreased by (0.48 – M) × 0.78
More than 0.64 mm (0.0252 in)	To be increased by (M – 0.48) × 0.78

M. Measurement

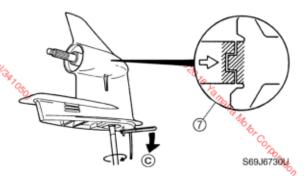
60V1E11⁶0 6-56

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

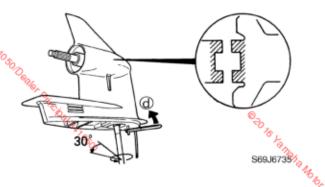
8. Remove the special service tools from the propeller shaft.



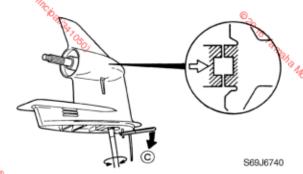
- Turn the shift rod into the reverse position © with the shift rod push arm.
- 10. Turn the drive shaft clockwise until the dog clutch (7) is fully engaged.



- 11. Turn the shift rod to the neutral position d with the shift rod push arm.
- 12. Turn the drive shaft counterclockwise approximately 30°.



- 13. Turn the shift rod to the reverse position © with the shift rod push arm.
- 14. Slowly turn the drive shaft clockwise and counterclockwise and measure the backlash when the drive shaft stops in each direction.



NOTE:

When measuring the reverse gear backlash, turn the shift rod push arm towards the reverse position © with force.



Reverse gear backlash:

0.64-0.93 mm (0.0252-0.0366 in)

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® 16 Xa Malia Mator College	**Wigg Table	
Porall	15. Add or remove shir	n(s) if out of specifica-
	Reverse gear backlash	Shim thickness
2	Less than 0.64 mm (0.0252 in)	To be decreased by $(0.79 - M) \times 0.78$
D To Yallah	More than 0.93 mm (0.0366 in)	To be increased by (M – 0.79) × 0.78

M: Measurement

Available shim thicknesses: 0.10, 0.12, 0.15, 0.18, 0.30, 0.40, and 0:50 mm

16. Remove the special service tools, and then install the water pump assembly.

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6-58



Bracket unit

CUSA GAOGODERIEF PRINCIPALISA (OSO)	Bracket unit		
A Gazo	Special service tools	7-1	ı
3000 C	The state of the s		
"aler	Bottom cowling	چ 7-2 7-2	2
"nnc _i	20101119	ne	•
Nal/gg	Unner case steering orm surival breaket and a	lamp Prockets 7.6	
7050,	Upper case, steering arm, swivel bracket, and continuous Disassembling the upper case		
	Checking the upper case		
	Assembling the upper case		
	Removing the steering arm		
	Installing the steering arm	7-16	΄.
?6	Installing the upper case	7-17	7
. O. A	Removing the power trim and tilt unit		
Og In	Removing the clamp brackets	7-19	2
30 ₀	Installing the clamp brackets	7-18	3
edle,	Installing the power trim and tilt unit	7-18	š
Phin	Adjusting the trim sensor	7-19)
· Dalla	03,	Palls	
A JOK	Power trim and tilt unit	700 7 01	
O.S.A. S.A. IOSO DEBERT Dinchalisa (OSO)	Disassembling the power trim and tilt motor	7-20	>
	Checking the power trim and tilt motor		
	Assembling the power trim and tilt motor		
	<u></u>		
2.	Disassembling the gear nump	7-32	,
0.8	Disassembling the gear pump?	7-33	2
, Q*	Disassembling the tilt cylinder and trim cylinder		
7050 .	Checking the reservoir		
TO SALE	Checking the tilt cylinder and trim cylinders	7-35	Ś
TOP PAR	Checking the valves		
nc _{bo}	Checking the filters		
TOWN TO THE PARTY OF THE PARTY	Checking the gear pump		
O.S.A. GA TOSO Dealer Dinchalisa (OSO)	Assembling the relief valve		
	Assembling the gear pump		
	Assembling the tilt ram		
	Assembling the trim rams	7-39)
	Installing the tilt cylinder	7-40)
? ₍₂₀	Installing the trim rams	7-40)
, A	Installing the power trim and tilt motor	7-41	ı
A POR	Installing the reservoir	7-42)
DO.	Installing the tilt ram	7-42	2
"Not to	-	6-0	
P. U.S. A. C. A. D. S. O. D. C. B. A. D. R. D. B. C. B. D. B. C. B. D. B. C. B. D. B. C. B	Bleeding the power trim and tilt unit	7-43	3
~2/3 _g	Not installed	7-43	3
705	Puilt in	7 14	í

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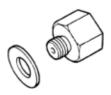
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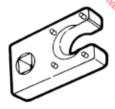
Special service tools



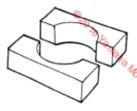
PTT oil pressure gauge assembly YB-06580



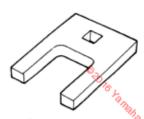
PTT oil pressure gauge adapter YB-06581



Trim and tilt cylinder wrench YB-06175-2B



PTT piston vice attachment YB-06572



Tilt rod wrench YB-06569 Store Vallella Motor Coltabellon U.S.A. Gano.

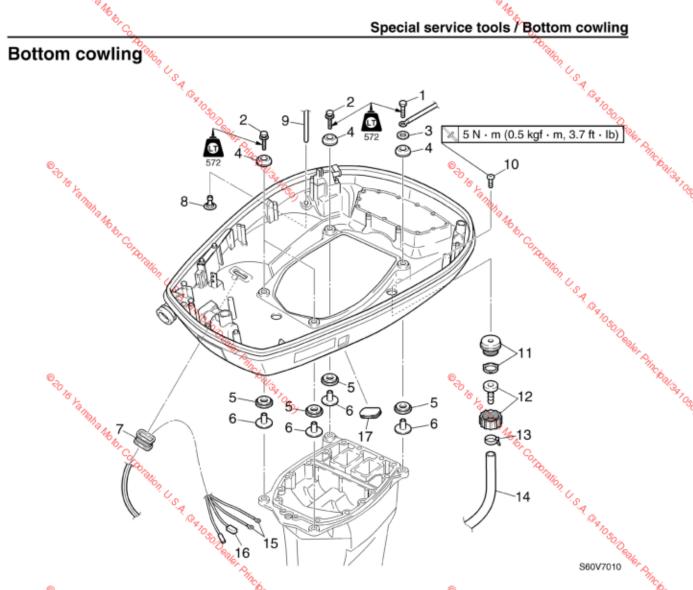
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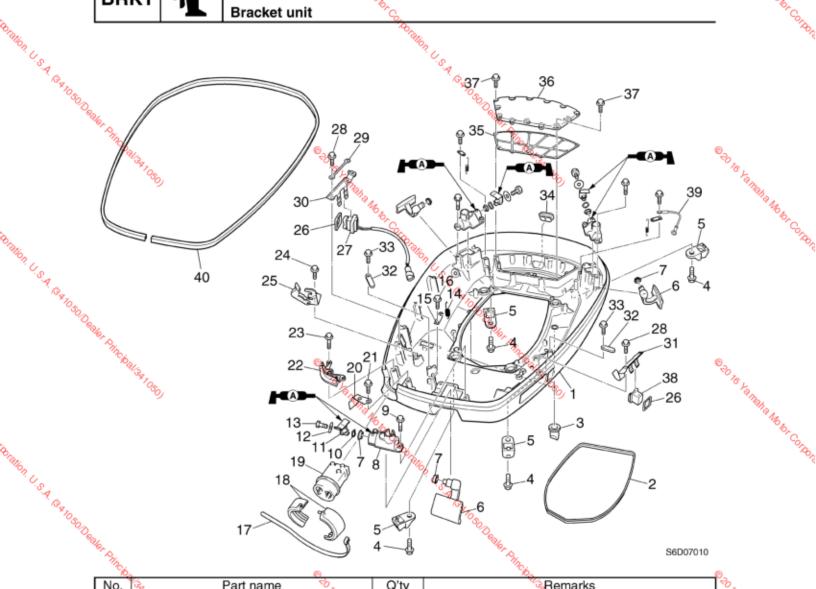
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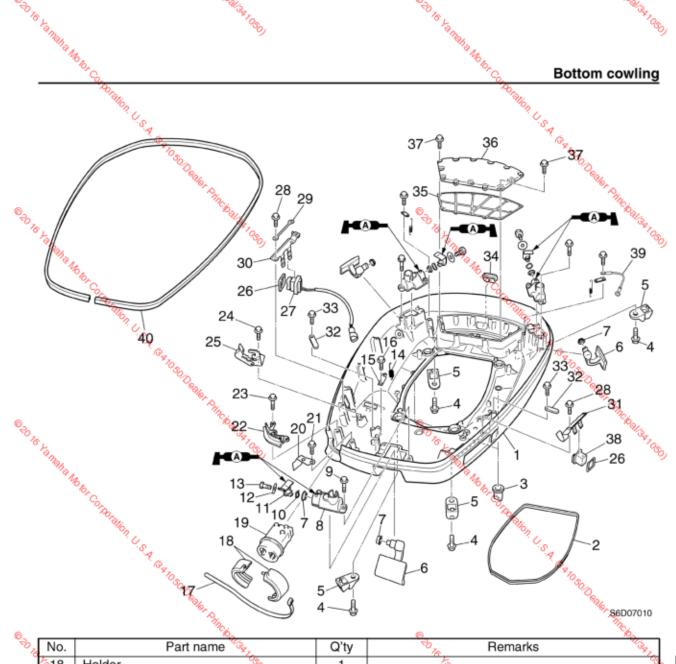
No.	Part name	Q'ty	Remarks	~ aligy , _
1	Bolt	[®] වු 1	M8 × 35 mm	
2	Bolt %	3	M8 × 35 mm	
3	Washer %	1	*Obr	
4	Grommet %	4	M8 × 35 mm M8 × 35 mm M8 × 35 mm M8 × 35 mm	
5	Grommet Collar Grommet	4	*Talion	
6	Collar	4	* (%)	
7	Grommet 76	1	76	
8	Grommet Cooling water pilot hole Pilot water hose Screw Adapter Hose joint	1	**************************************	
9	Pilot water hose	1		
10	Screw	1	M5 × 20 mm	(bal/341050)
11	Adapter	1	©	Bay
12	Høse joint	1	70 K	SA YOU
13	Plastic tie	ම 1	Not reusable	de
14	Flushing hose	1	700 Mg	
15	PTT motor lead	1	Top _C	
16	Trim sensor coupler	1	O'TAD _{II}	
17	Grommet %,	1	Not reusable Not reusable Not reusable	
	·S.A. R.A.T.D.		7-2	
60V1E1	11 TOD		7-2	
	No.		No. Pill	b _e



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No.	Part name	<u></u>		* Plinch	
I NO	Part name		04	Damada	
	10	80/6	Q'ty	Remarks	Sto Is Santaha Maker Corkey
1	Bottom cowling	ana,	1	To the second se	(3/hg)
2	Rubber seal	194	1		1914
3	Grommet		6,2		"br
<u>م</u>	Bolt		1 1 5 6 6 6 7 2 4	M6 × 16 mm	Orto
⁽⁸⁾ / ₍₀₎ 5	Bracket		4 %	2	
6	Cowling lock lever		3	U.S.A.	l
Oralion U.S. A. B. A. D. St. D. B. 9	Bushing		6	A Co	
********* 8	Plate		3	A GANGEO A	
9 کی	Bolt		6	M6 × 30 mg	l
4.0	Wave washer		3		
110	Lever	©_	3	"Cho.	Ð_
12	Washer	© do kanala n	3	M6 × 16 mm	Sto to Yantaha Motor Corto,
13	Bolt	Tana,	3	M6 × 16 mm	Tang.
14	Spring	That A	3		TO A Age
15	Hook		6 ₂ 3		o top-
<u>کي</u> 16	Bolt		30	M6 × 16 mm	70/20
⁸ 16 ₀ , 17	Plastic tie		1 %	2 .	
**************************************				S. A. S. A. D. S. O. D. G. G. Ber P. Phys.	
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్ర్మే 7-3				OSD N	60V1E11
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Prince				Phin.	

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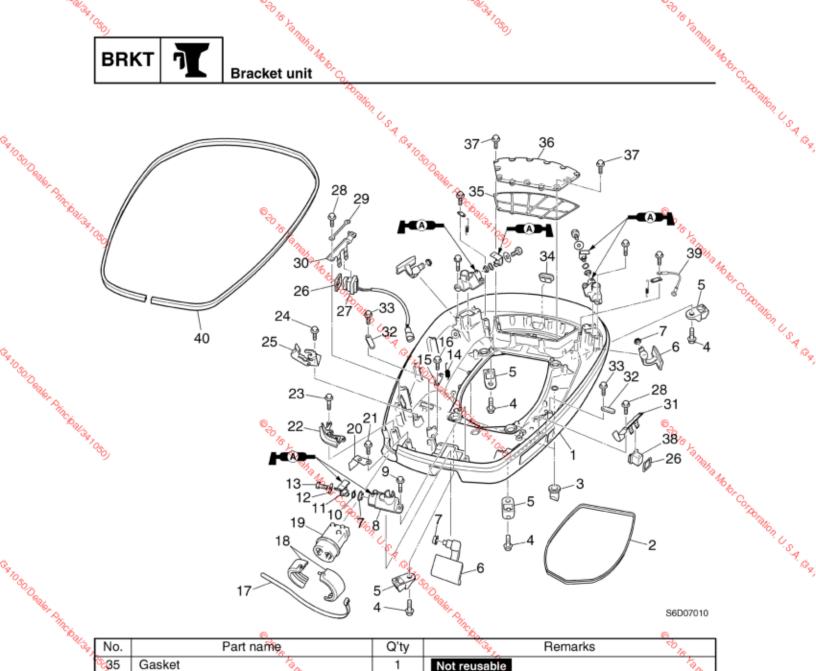


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€ .		No.		
© 30 %	No.	Part name 🗽	Q'ty	Remarks 🖏
Ĭ	5 18	Holder	1	To Marie Control of the Control of t
	19,	Grommet	1	**************************************
	20	Holder	1	*Obr
	21	Bolt	1	M6 × 25 mm
	22	Retaining plate	1	M6 × 25 mm M6 × 25 mm M6 × 16 mm M6 × 20 mm M6 × 20 mm
	23	Bolt ''	2	M6 × 25 mm
	24	Bolt	1	M6 × 16 mm
	25	Cable holder ************************************	1	*10 ₅₀
	26	Grommet	2	70 ₆₈₄
	27	Power trim and tilt switch	1	** A _h ,
®,	28	Bolt Bracket Bracket	4	M6 × 20 mm
10 To	29	Bracket	1	16 L
	30	Bracket	1	R _{Mo}
	310/4	Bracket	1	⁷⁰ 8 Mg
	32	Plate	2	· 6r
	33	Bolto	2	M6 × 20 mm
	34	Grommet	1	M6 × 20 mm

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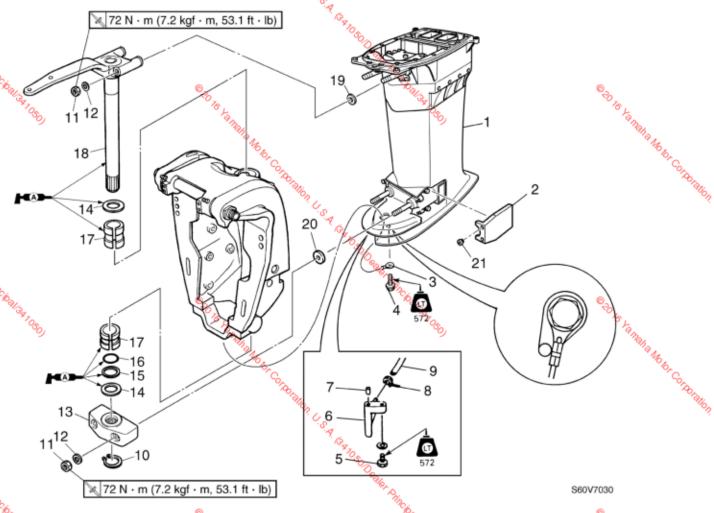


W341050)

10 ₀			<u></u>		10,		<u> </u>	
W. Say	No.	F	Part name	Q'ty	Jagar.	Remarks	50%	
	[®] ∕35	Gasket	Tan.	1	Not reusable		Talma,	
	36	Cover	Analia Maker Coltoballo	1			TO S	t.
	37	Bolt	*Obra	13	M6 × 20 mm			Obr
	38	Cover	Corps	1			- 1	Corps
	39	Ground lead	Talk)	1			- 1	Tallon
	40	Rubber trim		4,51				The Corbolation U.S.A. S.A.
GRIOSODERIEF Principalisan	₹ <i>b</i>)		© 30 Is Yantaha M	N. G. A. TO.	OD Dealer Principalist I Day		©30 le santahah	,
			na na				"Pay	<u>.</u>

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Upper case, steering arm, swivel bracket, and clamp brackets



	100		<u>a</u>			
	No.	Part name		Q'ty	Remarks 7	70.
	1 %	Upper case assembly	a naha Motor	1	(%)	74
	2	Cover	aha A	2		-
	3	Ground lead	TO BY	1		-
	4	Bolt			M6 × 10 mm	-
8,	5	Bolt		TO TOTAL	M6 × 17 mm	-
300	6	Adapter		1,00		-
. 4. O.	7	Dowel		1	₹ @_	-
*105n	8	Plastic tie		1	Not reusable	
O. O	9	Hose		1		
OR U.S.A. SA TOSODERIEF AN	10	Circlip		1	Oester Binchalist 1080)	-
**	611	Nut	⊚ _	4	^R ball ₂ © ₃	
	12	Washer	50 %,	4	No.	70,
	13	Steering yoke	Tanna,	1	%)	13
	14	Washer	TO AL	2		-
	15	Bushing	© 30 16 Ya Maha Mahar	1		
	16	O-ring	~	70 ₀ 1	Not reusable	
Bn .	17	Bushing		1 (2)		

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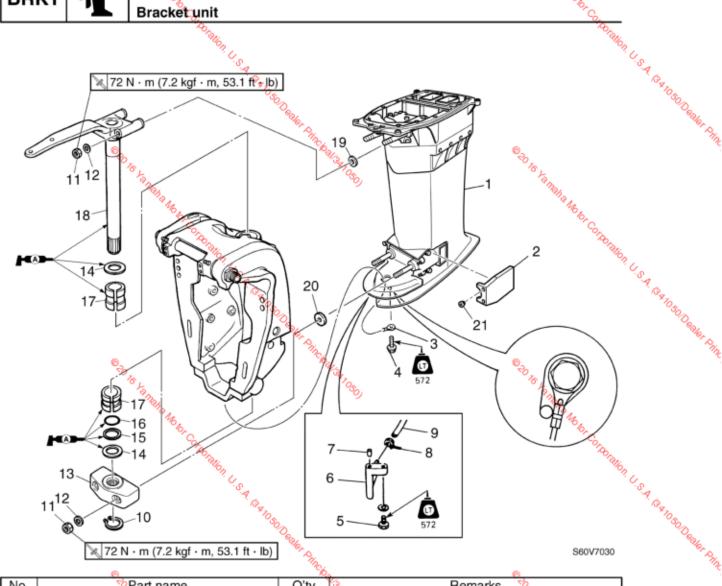
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			<u> </u>
No.	⁵Part name	Q'ty	Remarks 🍫
18	Steering arm	1	(Story) Story
19	Washer %	2	No.
20	Washer %	2	Ta Raha Make College
21	Washer Washer Grommet	4	Solar
	© Ranging U.S. A. G. A. D. S. A. G. A. D. S. A. G. A. D. S. D. S. A. D. D. S. A. D. D. S. A. D. D. S. D. S. D. S. D. D. S. D. D. S. D. D. S. D. D. D. S. D.	OD Cales Princip	elion U.S.A. (SA DOSODE Blet Prince) Salas TOSO) Salas TOSO

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O Dealer Aline Real Sea LOSO)

O Dealer Aline Real Sea LOSO)

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3	υu	v	w	44.

	27		~~		27
No.	Part name	Q'ty	ZAZZ	Remarks	50 /6.
1	Upper case	1	30)		Tam.
2	Dowel	2			Wha ha
3	Upper mount %	2			Sanaha Maker
4	Washer	2			ç
5	Upper case Dowel Upper mount Washer Washer Washer Bolt	2			
6	Washer	2			
7	Bolt	2	M14 × 190 mm		
8	Bracket	×1050			
9	Muffler assembly	Pool			
10	Gasket	1 7	Not reusable		
11	Mount housing o	2	Coal		©_
12	Ground lead %,	1	aliga 10to		16 L
13	Washer 🦠	2	36)		ans,
14	Ground lead Washer Washer Lower mount Bolt	2			© do la kalha Matar C
15	Lower mount	2			16FC
16	Bolt	3	M10 × 45 mm		-0
17	Bolt Won	1	M8 × 45 mm		

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O. Dealer Principal Services

O. Dealer Pilite Rall St. 1080)

Corporation U.S.A. GA 1050 De Con is a mana Make Cornelition. U.S.A. GARDSON. 32 N · m (3.2 kgf · m, 23.6 ft · lb) 32 N · m (3.2 kgf · m, 23.6 ft · lb) ©30 IS SA PROPER MADE CORNERIOR. U.S.A. GARDSON. 10 24-

200			151413	2 8 10 50 De				NA TOSOOD
O Dealer Principal 34 1080)		Seller Philips					S60V7040	•
Palag,	No.		Part name	Q'ty	No.	Remarks	50 /s	
(OSD)	18	Bolt	Tan.	2	M8 × 30 mm		Tan	
	19	Gasket	aha n	1	U-transom model		Sha h	
			Sanaha Makar Corporation U.S.		Not reusable		Sanaha Motor	
	20	Muffler	COTA	1	U-transom model		9	O/An
	21	Bolt	Talion	2	M6 × 35 mm / U-tra	ansom model		ORORATION U.S.A. GAROSODE
	22	Bolt	* C _S	4	M10 × 45 mm			100
	23	Bolt	ď	@ 2	M14 × 205 mm			4
b.	24	Circlip		1030				1050
Oedle.	25	Bushing		1 0				206
ODealer Principalisa (Odo)			© 20 to Yangha A.		Chincial Sar Osto)		© do to yantaha M	

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No?	Part name	Q'ty	% Remarks
1	Muffler %	1	Tanh.
2	Exhaust manifold	1	What.
3	Gasket	1	Not reusable
4	Lower exhaust guide	1	Oran
5	Gasket %	1	Not reusable Not reusable Not reusable Not reusable
6	Upper exhaust guide	1	*45
7	Flushing hose	1	A. W.
8	Flushing hose Plastic tie Joint Rubber seal Pipe Rubber seal Bolt	1	Not reusable
9	Joint	1	The state of the s
10	Rubber seal **\(\sqrt{\chi_{\chi\ti_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi\ti}}\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi\tiny{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi\tiny{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi_{\chi\tiny\ting\tiny\tiny\tiny\tiny\tiny\tiny\tiny\tiny	1	****
161	Pipe ************************************	1	<u>⊚</u>
12%	Rubber seal	1	70 K
13	Bolt	6	M8 × 50 mm
14	Rubber damper	2	M8 × 50 mm
15	Clip %	2	, pt-C
16	Bolt Oton	4	M8 × 50 mm
17	Bolt %,	4	M8 × 35 mm

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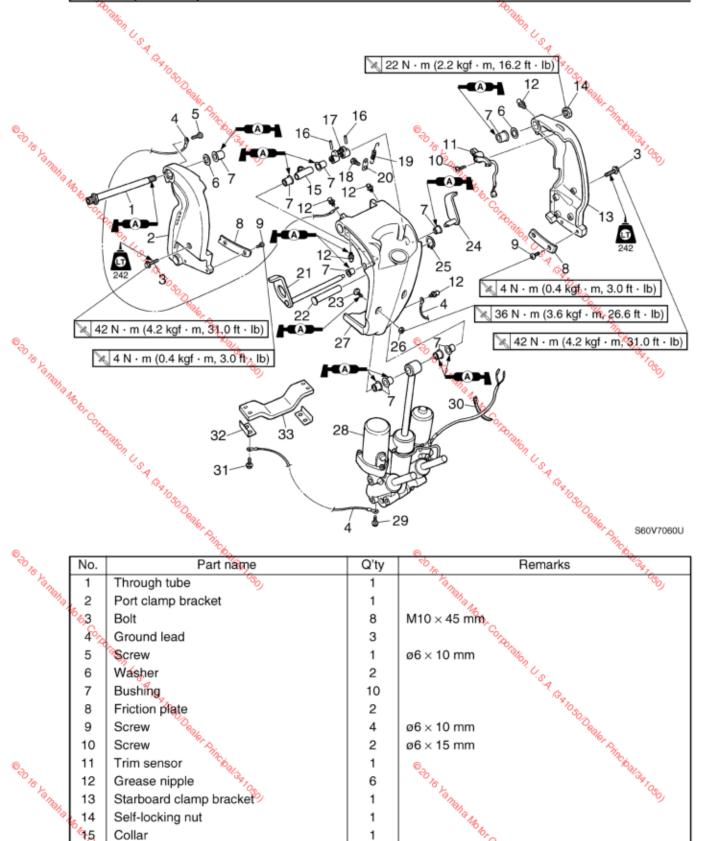
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Pin

Tilt lever joint

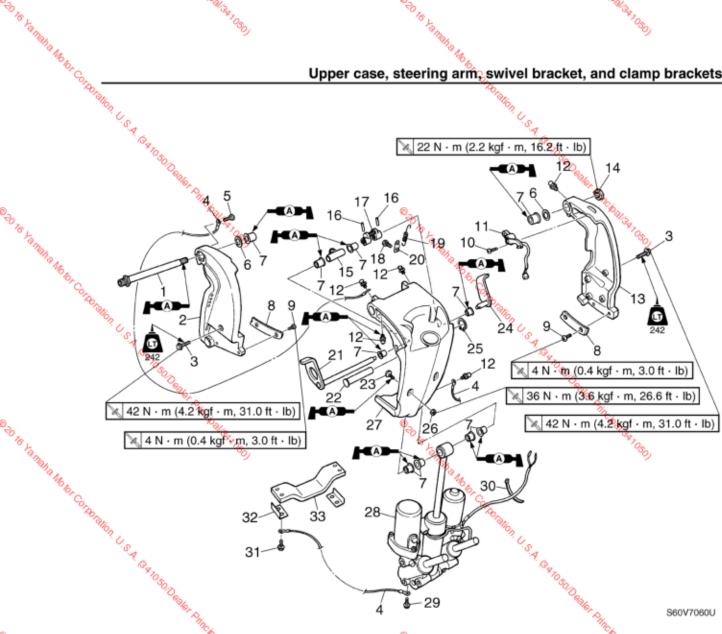


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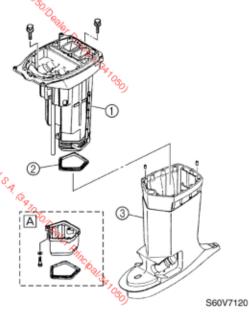
		T Dine:	4	\$60V7060U
ad to sa naha Motor Cortola	No.	Part name	Q'ty_	Remarks
Lan.	18	Bolt	1	M6 × 10 mm M6 × 10 mm M6 × 25 mm
"aha n	19	Spring	1	aha.
*Otor	20	Spring holder	1	*Obr
COLAR	21	Port tilt stop lever	1	Corps.
TG.	0,52	Shaft	1	Talia,
	23	Trim stopper	2	*'V _S
	24	çŞtarboard tilt stop lever	1	A. W.
	25	Circlip	1	***************************************
	26	Nut	2	O _{RM}
	27	Swivel bracket	1	**************************************
D ₂	28	Power trim and tilt unit	d _	*Chay
16 L	29	Bolt Plastic tie	10%	M6 × 10 mm
ana,	30	Plastic tie	4	P ₁₀₀
"a Ma	31	Bolt	4	M6 ₂ 25 mm
Thorac Ca	32	Bracket	2	M6 25 mm
Octo to sa maha Motor Cortors	33	Anode	1	"TOO,
	On U.S.	6		Mon U.S.A.
60V1E11 SOD BARRET PAIRS				7-12
		%.		No.



Bracket unit

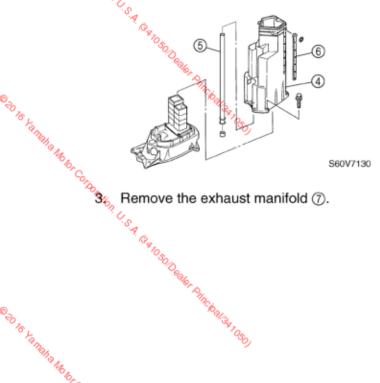
Disassembling the upper case

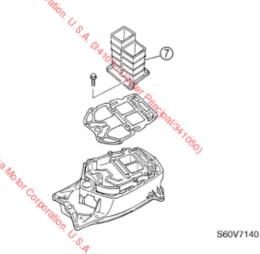
1. Remove the muffler assembly ① and gasket @ from the upper case 3.



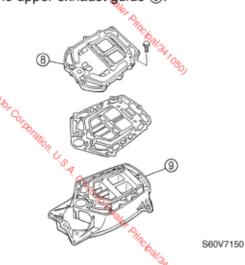
A U-transom model

Remove the muffler 4, cooling water pipe ⑤, and rubber damper ⑥.





4. Remove the lower exhaust guide ® from the upper exhaust guide 9.



Checking the upper case

1. Check the rubber damper for deterioration. Replace if necessary.

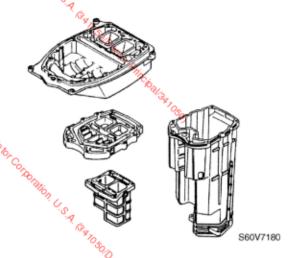


S60V7160

Check the cooling water pipe for deformation or corrosion. Replace if necessary.

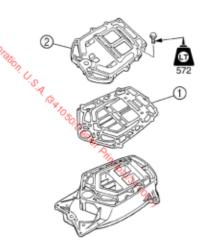


Check the exhaust guide, exhaust manifold, and muffler for damage or corrosion.



Assembling the upper case

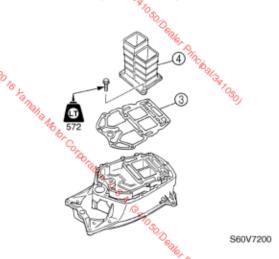
1. Install a new gasket ①, the lower exhaust guide (2), and bolts, and then tighten the bolts to the specified torque.



S60V7190

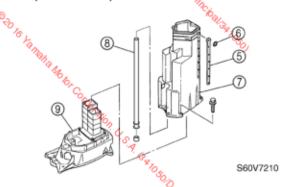


Lower exhaust guide bolt: 22 N·m (2.2 kgf·m, 16.2 ft·lb) Install a new gasket 3, the exhaust manifold (4), and bolts, and then tighten the bolts to the specified torque.



Exhaust manifold bolts: 25 N·m (2.5 kgf·m, 18.4 ft·lb)

- Install the rubber damper (5) and clip (6) onto the muffler 7.
- Install the cooling water pipe (8) onto the muffler 7.
- Install the muffler @ onto the exhaust guide (9), and then tighten the bolts to the specified torque.





Muffler bolt:

25 N·m (2.5 kgf·m, 18.4 ft·lb)

7-14 60V1E11

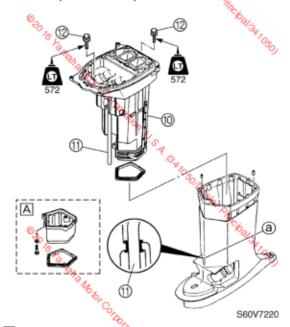
Bracket unit

- Install the muffler assembly

 water pipe

 ing the tip of the cooling water pipe

 into the joint hole
- 7. Tighten the muffler assembly bolts 12 to the specified torque.



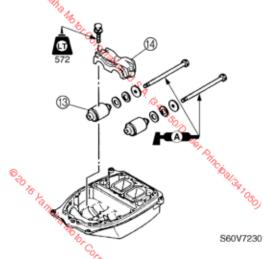
A U-transom model



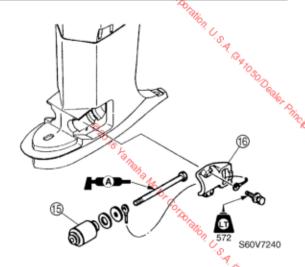
7-15

Muffler assembly bolt @: 32 N·m (3.2 kgf·m, 23.6 ft·lb)

- 8. Install the upper mounts (3) and bolts into the upper case.
- Install the bracket (4) and bolts.

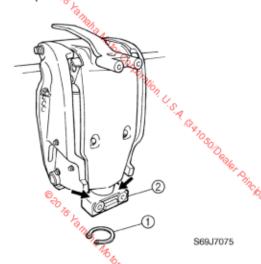


10. Install the lower mounts (5) and mount housings (6).



Removing the steering arm

- 1. Remove the circlip ①.
- Remove the steering yoke ② by striking it with a plastic hammer.



Remove the steering arm from the swivel bracket by pulling the arm off the bracket.

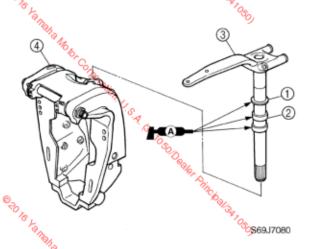
nousings (g).

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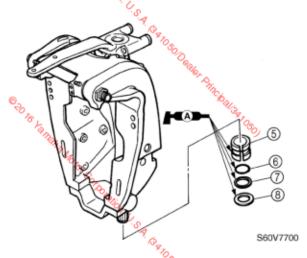
7

Installing the steering arm

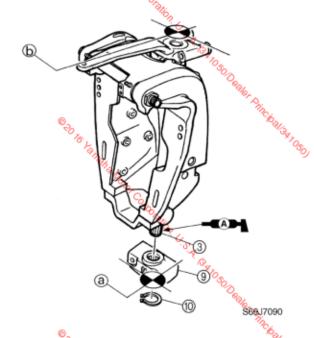
- Install the washer ① and bushing ② onto the steering arm.③.
- Place the swivel bracket (4) in an upright position, and then install the steering arm onto the swivel bracket.



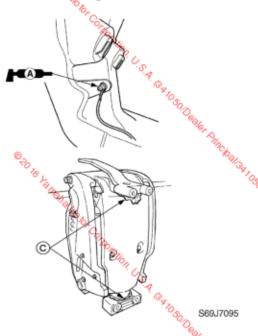
3. Install the bushing ⑤, O-ring ⑥, bushing ⑦, and washer ⑧ onto the swivel bracket.



- Install the steering arm 3 into the steering yoke 9 by aligning the center 0 of the yoke with the center 0 of the steering arm.
- Install the circlip ⑩.



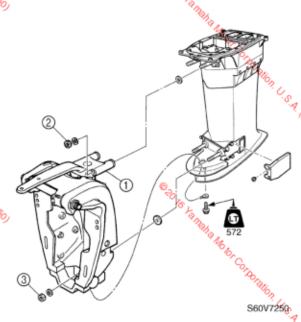
 Inject grease into the grease nipple until grease comes out from both the upper and lower bushings ©.



© 20 IS Yangala Maker Collegellon 11.2.

Installing the upper case

- Install the upper and lower mounting bolts into the swivel bracket 1 simultaneously.
- 2. Install the upper mounting nut ② and lower mounting nut ③, and then tighten them to the specified torques.





Upper mounting nut ②: 72 N·m (7.2 kgf·m, 53.1 ft·lb) Lower mounting nut ③: 72 N·m (7.2 kgf⋅m, 53.1 ft·lb)

Removing the power trim and tilt unit

1. Fully tilt the outboard motor up, and then support it with the tilt stop lever ①.



▲ WARNING

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

NOTE:

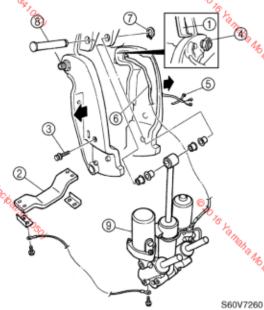
If the power trim and tilt does not operate, loosen the manual valve and tilt the outboard motor up manually.

- 2. Remove the anode (2) and bolts (3).
- 3. Loosen the self-locking nut ④, and then move the clamp brackets slightly in the direction of the arrows.

▲ WARNING

Do not remove the tilt stop lever ① from the clamp brackets.

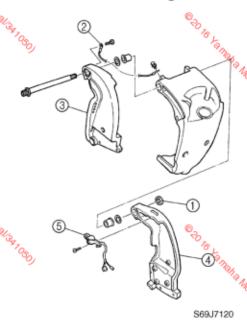
- Remove the plastic ties ⑤, and then pull out the PTT motor lead ⑥.
- Remove the circlip (7), then the shaft (8).
- 6. Remove the power trim and tilt unit (9).



7-17

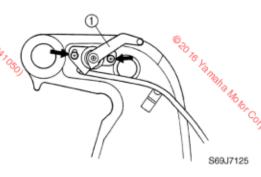
Removing the clamp brackets

- Remove the self-locking nut (1) and ground lead 2, then clamp brackets 3 and 4.
- Remove the trim sensor (5).



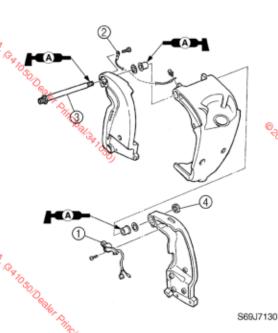
Installing the clamp brackets

Install the trim sensor ① onto the starboard clamp bracket.



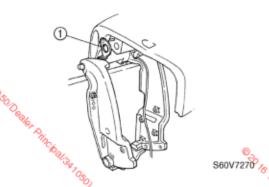
Adjust the trim sensor ① after installing the power trim and tilt unit.

Assemble the clamp swivel bracket by connecting the lead ②, installing the through tube ③, then tightening the self-locking nut ④ fine the locking nut ⑥ fine the locking nut fine the locking nut fine the lo



Installing the power trim and tilt unit %

1. Fully tilt the outboard motor up, and then support it with the tilt stop lever 1.



NOTE:

After tilting up the outboard motor, be sure to support it with the tilt stop lever 1.

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BRKT T

Bracket unit

Install the PTT unit mounting bolts ②
 onto both clamp brackets together with
 the power trim and tilt unit ③, and then
 tighten them to the specified torque.



PTT unit mounting bolt ②: 42 N·m (4.2 kgf·m, 31.0 ft·lb)

- Install the tilt ram upper end into the swivel bracket with the shaft (4) and circlip (5).
- Tighten the through tube nut 6 to the specified torque.

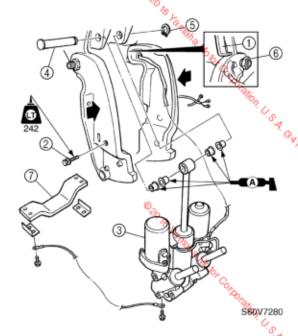


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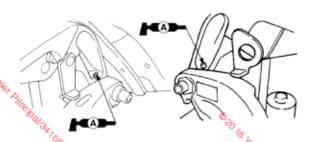
Oedler Dinchalser Octo,

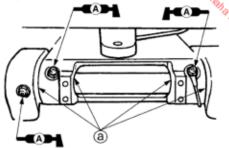
Through tube nut 6: 22 N·m (2.2 kgf·m, 16.2 ft·lb)

Install the anode



6. Inject grease into all grease nipples until grease comes out from the bushings (a).





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Adjusting the trim sensor

 Fully tilt the outboard motor up, and then support it with the tilt stop lever ①.



▲ WARNING

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

- Loosen the cam screws ②.
- Adjust the position of the trim sensor, and then tighten the screws finger tight.
- 4. Fully tilt the outboard motor down.

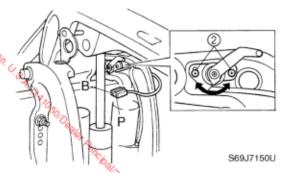
7-19

Measure the trim sensor setting resistance. Repeat steps 1–5 if out of specification.



Trim sensor setting resistance: Pink (P) – Black (B) 9–11 Ω at 20 °C (68 °F)

Tighten the screws ②.



Fully tilt the outboard motor up, and then support it with the tilt stop lever.

▲ WARNING

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

Measure the trim sensor resistance.
 Check the trim sensor if out of specification.



Trim sensor resistance:

Pink (P) - Black (B)

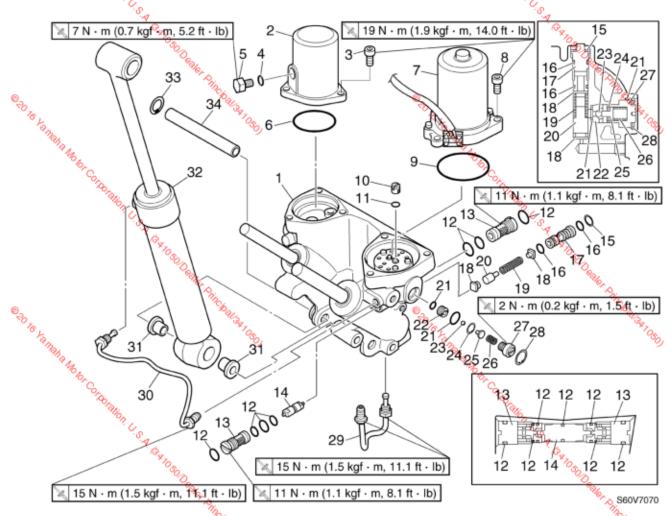
247.6-387.6 Ω at 20 °C (68 °F)

16 Sa Raha Mobi Colfb

7-20



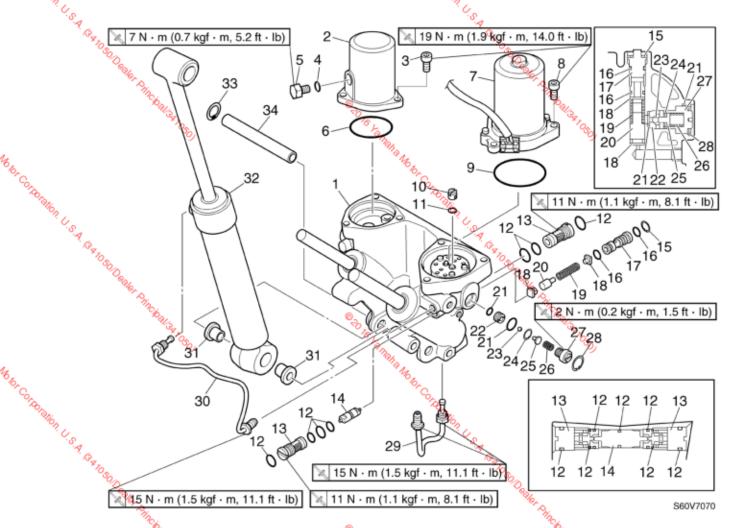
Power trim and tilt unit



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8		Tinco		The board of the b
® 30 % L	No.	Part name	Q'ty	Remarks 😽
4	₂ 1	Cylinder block	1	Te _M (%)
		Reservoir	1	alla A.
	3 %	Bolt	3	M8 × 20 mm Not reusable Not reusable M8 × 20 mm Not reusable Not reusable Not reusable Not reusable Not reusable Not reusable
	4	Oring	1	Not reusable
	5	Reservoir cap	1	Tallon
	6	O-ring 🗸	1	Not reusable
	7	Power trim and tilt motor	1	A Wa
	8	Bolt ************************************	3	M8 × 20 mm
	9	Power trim and tilt motor Bolt O-ring Joint O-ring O-ring Main valve	1	Not reusable
	10	Joint **A	1	* An
⊚ _	11	O-ring	1	Not reusable
@30 % J.	12	O-ring	7	Not reusable
(8)	№ 13	Main valve	2	(Ring)
	14	Piston	1	**************************************
	15 🖔	Circlip	1	o br
	16	Oring	2	Not reusable
	17	Retainer	1	Not reusable Thomas

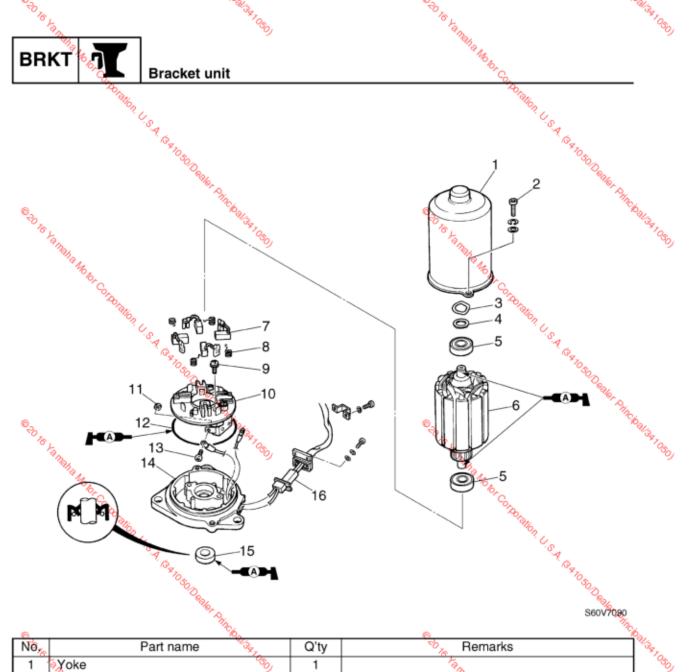
7-21 Hetanger 60V1E11



Tel 16 Yallaha Maha

		10 ₀	(A)		, , , , , , , , , , , , , , , , , , ,
	No.	Part name	50 %.	Q'ty	Remarks
	18	Valve seal	and the same	, 2	<i>™</i>
4.	19	Spring		nehal Abro	
Obr	20	Spring seat		Por	
COLAR	21	O-ring		2 %	≿ Not reusable
Tallon	22	Valve seat		1	Tallon
to Coldonation U.S.A. G.A.	23	Ball		1	Rot reusable Rotin U.S.A. R.A. D.S.O.D. Beller P. Principal S.A. T. O.S.O.D. Rotin D. J. S. A. R. A. D. S.O.D. Beller P. Principal S.A. T. O.S.O.D. Beller P. P. T.
400	24	Circlip		1	76
*76	₆ 25	Actuator pin		1	*1030
	26	Spring		1	**************************************
	27	Manual valve		1	* An
	28	Circlip	⊚ _	1	ACD _{BA}
	29	Pipe Pipe	® 30 % Je	1	The state of the s
	30	Pipe 🦠	3	₂₆ 1	36
4	31	Bushing		naha A	
16tC	32	Tilt cylinder assembly		100	
POTROL	33	Circlip		1	to,
allon	34	Shaft		1	PO _{Ration}
0.5					9,9,3
, QA					, Q
60V1E11					⁷ ₂₀ , 7-22
31 Bushing 32 Tilt cylinder assembly 33 Circlip 34 Shaft					eak,
		Onne.			7-22

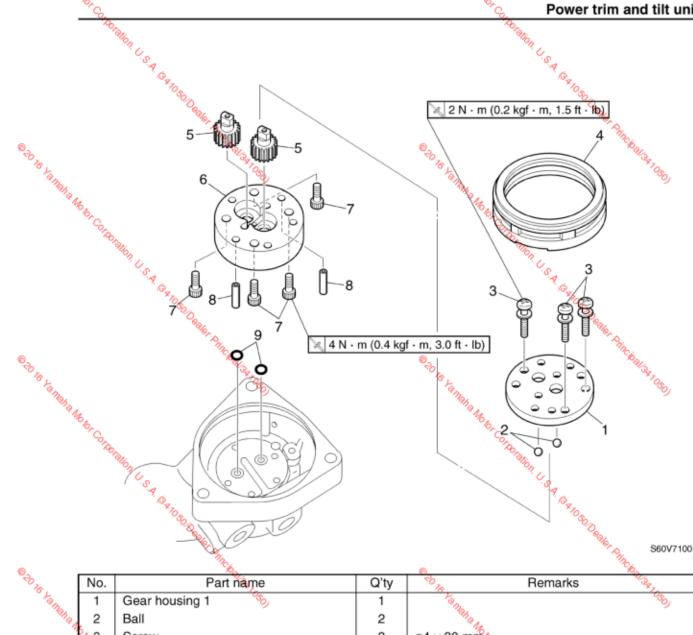
Tal 16 Yallalla Mo.



Ø.,	*0 ₀		<u> </u>	000
No.	Part name	Q'ty	™ Remarks	1080 P
1 1	Yoke %	1	Tann.	080
2	Bolt	2	M5 × 12 mm	
3	Wavewasher	1	To the state of th	
4	Washer	1	Copp	
5	Bearing %	2	Talio,	
6	Armature 4	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
7	Brush	4	**************************************	
8	Spring ************************************	4	*to _{sh}	
9	Bearing Armature Brush Spring Screw Brush holder Nut O-ring Screw	2	M5 × 12 mm W5 × 12 mm W64 × 12 mm	
10	Brush holder	1	***	×
a 1	Nut Too	2	©_	800 C
12%	O-ring	1	Not reusable 6	*8/3×1050,
13	Screw	2		100
14	PTT motor base	1	The Ma	
15	Oil seal	1	Not reusable	
16	PTT motor lead	1	Ø4 × 6 mm [®] N _{RAJI,8} Not reusable ^{COJ} RAJI,8	
	Non .		* Tion	_
	Co.			
	7. Ag.		7. Q _q	
7-23	10 to		60V1E	11
	Sealer Control of the		**************************************	
	Non. U.S.A. S.A. TOSODERAN PRINC.			no.

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Ted to Sallaha Mobil Co

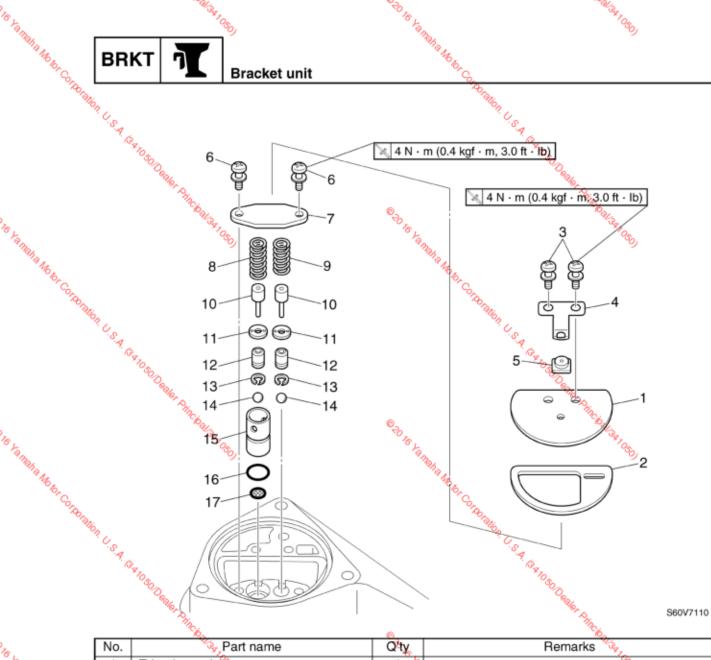


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	(A)		Ø
No.	Part name	Q'ty	Remarks S
1	Gear housing 1	1	Tank (Sp)
2	Ball	2	No As
6,3	Screw	3	ø4 × 30 mm ⁶ / ₂
40/2	Gear pump filter	1	CO _{TA}
5	Drive gear	2	Tallon,
6	Gear housing 2	1	1 Con
7	Bolt 7	4	M5 × 12 mm
8	Pin ************************************	2	M5 × 12 mm
9	O-ring	2	Not reusable
	* Dinchalas 1080,		© Roya Republicano Constitution of China Delicano Constitution of Constitution

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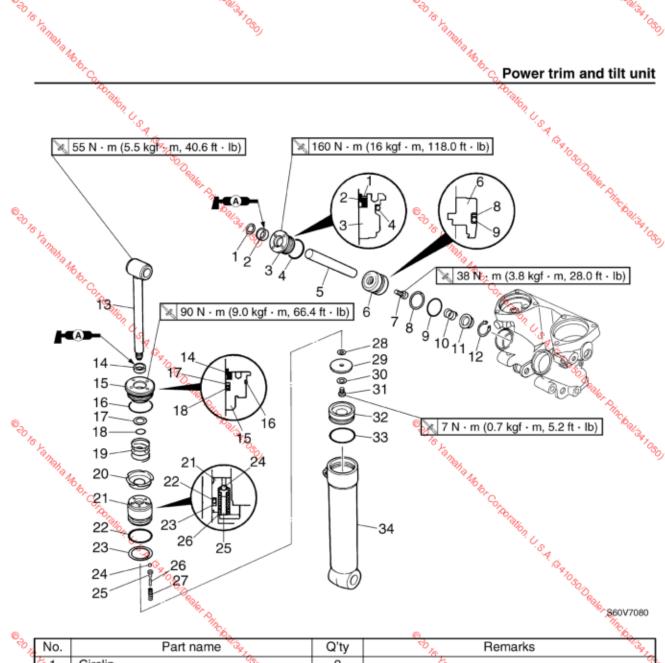




© 30 %

Sanaha Mobor

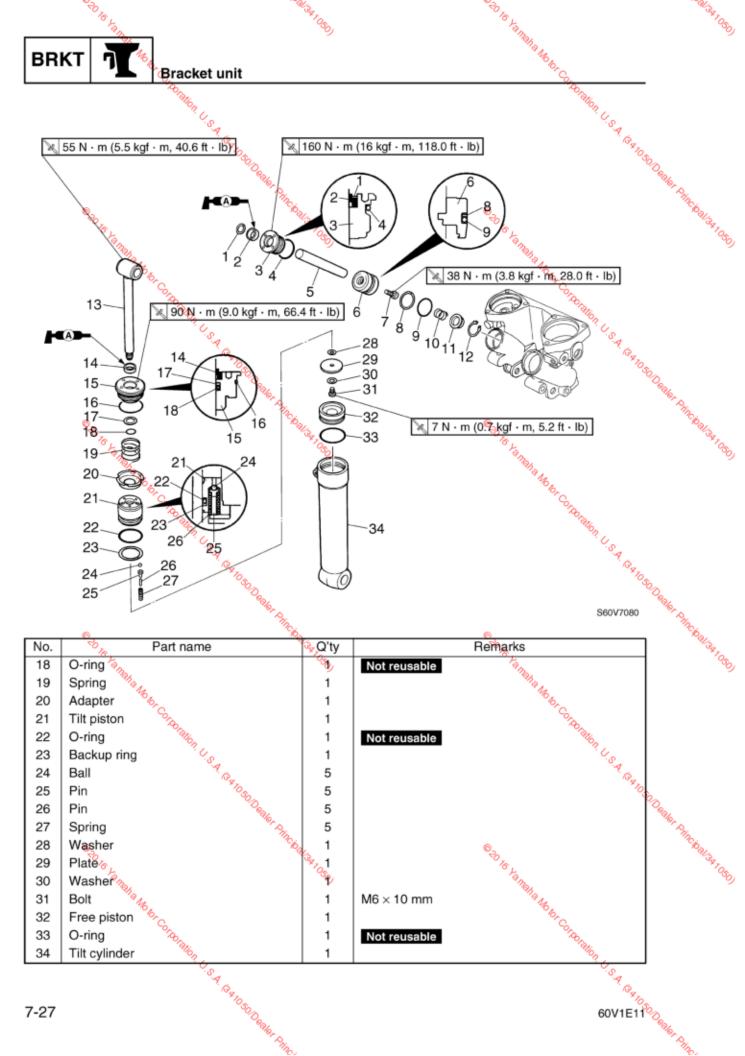
		To the second se	6	The state of the s
76 .	No.	Part name	Q'ty	Remarks 🗞
Tan.	1	Trim down plate	1 🕏	80
Sha A	2	Seal	1	No.
TOROT	3	Screw	2	ø5 % 10 mm
Se Sanala Motor Cortolate	4	Trim down spring	1	Corps
Talle	5	Valve seal	1	Talion .
	· 6	Screw	2	ø5 × 10 mm 4,
	77	Relief valve plate	1	A G
	8	Up-relief valve spring	1	*105n
	9	Down-relief valve spring	1	() () () () () () () () () ()
	10	Pin 🔭	2	**************************************
	11	Washer %	⊚2	S. A. 10-4 TO SO TO BE BET PAINCE BOLLOW TO SO T
76 j.	12	Valve seat 📆	©2 2 _% ⊾	Towns and the second
Tame,	13	Valve seal	2 🧖	8
TO AL	14	Ball	2	70a Na.
16rC	15	Relief valve	1	" OF C
Se Sanala Me to Cortolate	16	O-ring	1	Not reusable
· 946	17	Relief valve filter	1	*Von



Teo to talkalla labor Co

Ø .		D ₂		
30%	No.	Part name 🗽	Q'ty	Remarks 🔖
Ĩ	10 M	Circlip	2	Tank a
	200	Dust seal	2	Not reusable %
	3	Trim cylinder end screw	2	*O.br.
	4	O-ring	2	Not reusable
	5	Trim ram	2	Tallon
	6	Trim piston	2	* O _S
	7	Bolt	2	M8 × 20 mm
	8	Backup ring ************************************	2	**to _{\$0}
	9	Bolt Backup ring O-ring Spring Adapter Circlip Tilt ram	2	Not reusable Not reusable M8 × 20 mm Not reusable Not reusable
	10	Spring	2	W. App
®,	11	Adapter	2	©3
10%	12	Circlip	2	© do la companya de l
	[®] 13	Tilt ram	1	'A
	14%	Dust seal	1	Not reusable
	15	Filt cylinder end screw	1	6,C
	16	O-ring	1	Not reusable Not reusable
	17	Backup ring	1	*Yo ₁
		C/		

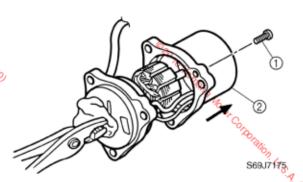
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7-27

Disassembling the power trim and tilt motor

Remove the PTT motor screws ①, then the yoke ②.



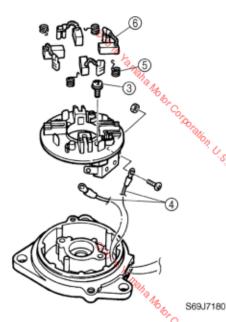
CAUTION:

Do not allow grease or oil to contact the commutator.

NOTE: _

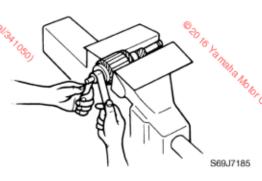
Place a clean cloth over the end of the armature shaft and carefully pull the armature from the yoke with pliers as shown.

Remove the screws ③, disconnect the PTT motor leads ④, and then remove the springs ⑤ and brushes ⑥.

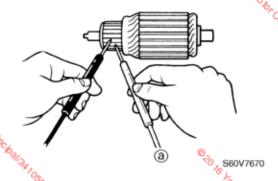


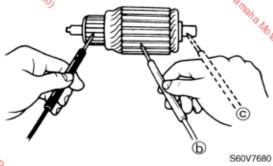
Checking the power trim and tilt motor

 Check the commutator for dirt or foreign substances. Clean with #600 grit sandpaper if necessary.



- Check the commutator undercut for dirt or foreign substances. Clean with compressed air if necessary.
- Check the armature coil for continuity.
 Replace if out of specification.





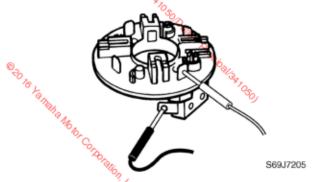
Armature coil continu	iity Sokana
Commutator segments @	Continuity %
Segment-laminations (b)	No continuity
Segment-shaft ©	No continuity

60V1E11 7-28

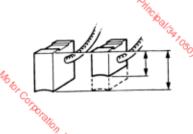


Bracket unit

 Check the circuit breaker for continuity. Replace the brush holder if there is no continuity.



5. Check the brush for wear. Replace if necessary.

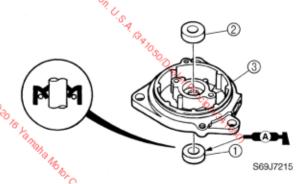


S60V7290

- Check the base for corrosion or damage. Replace if necessary.
- 7. Check the bearing for damage or wear. Replace if necessary.

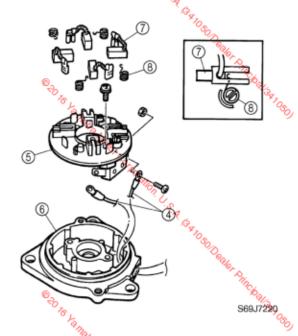
Assembling the power trim and tilt motor.

Install a new oil seal ① and the bearing
 into the motor base ③ as shown.

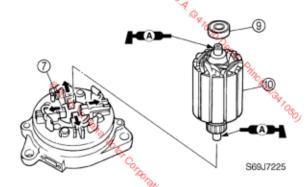


2. Connect the PTT motor leads 4 to the brush holder 5, and then install the brush holder 5 to the motor base 6.

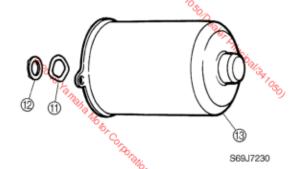
3. Install the brushes (1) and springs (8) onto the brush holder as shown.



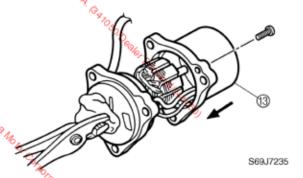
- Install the bearing (9) onto the armature (10).
- 5. Push the brushes 7 into the holders, and then install the armature 10.



6. Install the wave washer ① and washer ② into the yoke ③.



7-29 % 60V1E11



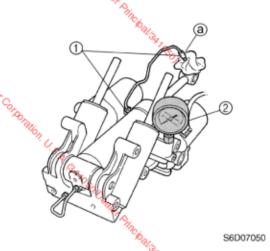
NOTE:

Tel Is Saltaha Molo,

Place a clean cloth over the end of the armature shaft and carefully push the armature from the yoke with a pair of pliers as shown.

Checking the hydraulic pressure

- Check the hydraulic pressure. Check the internal parts if out of specification.
- 2: Fully extend the power trim and tilt rams.
- 3. Loosen the pipe joints ①, and then remove the pipe joint ②.
- 4. Install the PTT oil pressure gauge assembly ②.

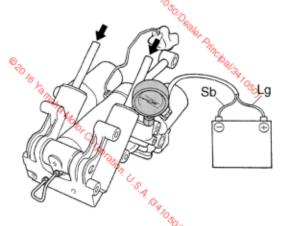


NOTE:

Wrap the removed pipe joint (a) in a rag.



PTT oil pressure gauge assembly: XB-06580 Connect the PTT motor leads to the battery terminals to retract the trim ram, and then measure the hydraulic pressure.



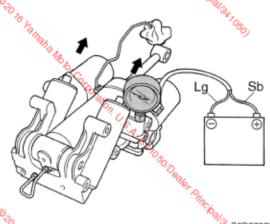
S6D07060

e, Ram	PTT motor lead	Battery terminal	
Down	Light green (Lg)	₩	
DOWN 46,	Sky blue (Sb)	Θ	



Hydraulic pressure (down): 4.7–6.7 MPa (47–67 kgf/cm²)

 Reverse the PTT motor leads between the battery terminals to fully extend the trim and tilt rams.



S6D07070

Ram 4	PTT motor lead	Battery terminal	
Up	Sky blue (Sb)	\oplus	
Ор	Light green (Lg)	Θ	

60V1E11 7-30

BRKT



Bracket unit

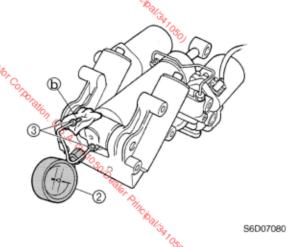
- Remove the PTT oil pressure gauge assembly ②.
- 8. Install the pipe joint ⓐ, and then tighten the pipe joints to the specified torque.



Pipe joint ①:

15 N·m (1.5 kgf·m, 11.1 ft·lb)

- Connect the PTT motor leads to the battery terminals to fully retract the trim and tilt rams.
- 10. Loosen the pipe joints ③, and then remove the pipe joint ⓑ.
- 11. Install the PTT oil pressure gauge assembly ②.



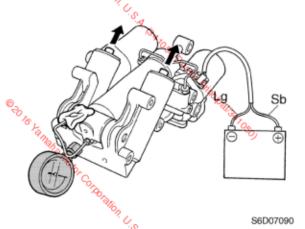
NOTE:

Wrap the removed pipe joint (b) in a rag.



PTT oil pressure gauge assembly: VB-06580

 Connect the PTT motor leads to the battery terminals to extend the trim ram, and then measure the hydraulic pressure.

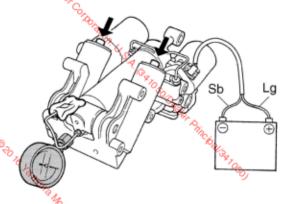


L

Hydraulic pressure (up):

11.3-13.3 MPa (113-133 kgf/cm²)

13. Reverse the PTT motor leads between the battery terminals to fully retract the trim and tilt rams.



S6D07100

- 14. Remove the PTT oil pressure gauge assembly 2.
- 15. Install the pipe joint (b), and then tighten the pipe joints to the specified torque.

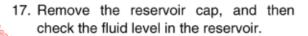


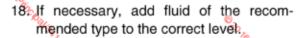
Pipe joint ③:

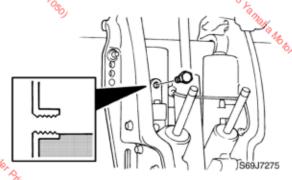
15 N·m (1.5 kgf·m, 11.1 ft·lb)

 After measuring the hydraulic pressure, connect the PTT motor leads to the battery terminals to fully extend the trim and tilt rams.

7-31







NOTE:

If the fluid is at the correct level, the fluid should overflow out of the filler hole when the cap is removed.



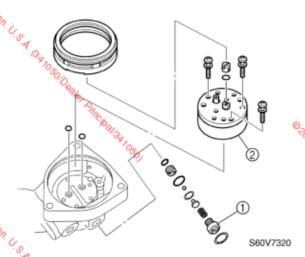
fluid.

ATF Dexidence

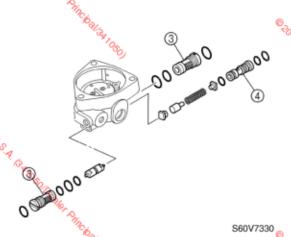
ATF Dexidence Recommended power trim and tilt



Arakon U.S.A. GAIOSO Deal

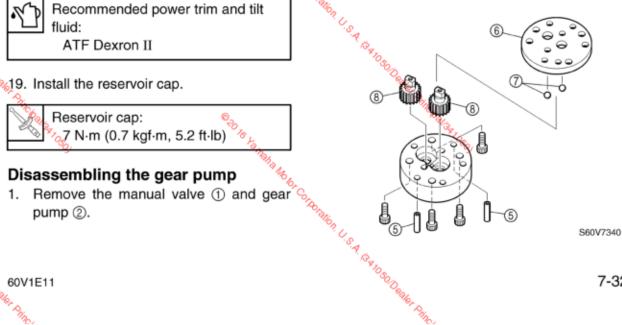


Remove the main valves ③ and retainer



Remove the pins (5).

Remove gear housing 1 6, then the balls 7 and drive gears 8.



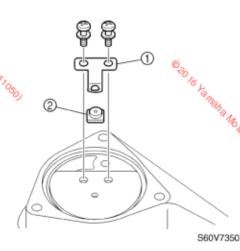
7-32 60V1E11



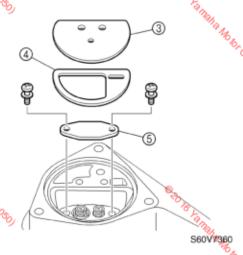
Bracket unit

Disassembling the relief valve

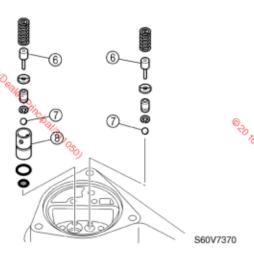
 Remove the trim down spring ① and valve seal ②.



2. Remove the trim down plate 3 and seal 4, then the relief valve plate 5.

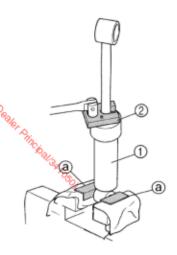


Remove the pins 6, balls 7, and relief valve 8.



Disassembling the tilt cylinder and trim cylinders

- 1. Hold the tilt cylinder ① in a vise using aluminum plates ② on both sides.
- Loosen the tilt cylinder end screw ②, and then remove the tilt piston assembly.



S69J7300

A WARNING

Make sure that the rams are fully extended before removing the end screw.

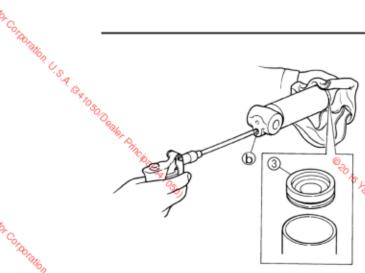


Trim and tilt cylinder wrench: YB-06175-2B

- 3. Drain the power trim and tilt fluid.
- Blow compressed air through the hole b
 to remove the free piston 3.

7-33 60V1E11

Power trim and tilt unit



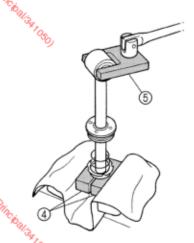
S69J7305

▲ WARNING

Never look into the tilt cylinder opening when removing the free piston. The free piston and power trim and tilt fluid can be forcefully expelled out.

Be sure to cover the opposite end of the tilt cylinder with a rag.

- 5. Hold the tilt piston in a vise using the special service tool 4 on both sides.
- Remove the tilt ram.



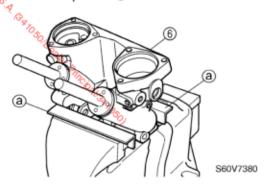
S6937310



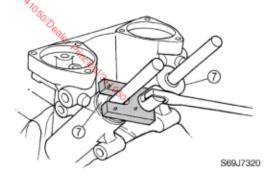
PTT piston vice attachment 4: YB-06752

Tilt rod wrench (5): YB-06569

Hold the cylinder block (6) in a vise using aluminum plates @ on both sides.



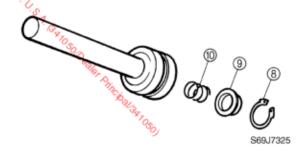
8. Loosen the trim cylinder end screws ①, and then remove them.





Trim and tilt cylinder wrench: YB-06175-2B

- Remove the trim piston assemblies.
- 10. Drain the power trim and tilt fluid.
- 11. Remove the circlip ®, adapter ®, and spring 10 from the trim piston assemblies.



Corporation U.S.A. SANDSO 60V1E11 7-34

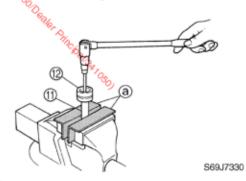


- BRKT Bracket unit

 Bracket unit

 Bracket unit

 minum plates (a) on both sides.



Checking the reservoir

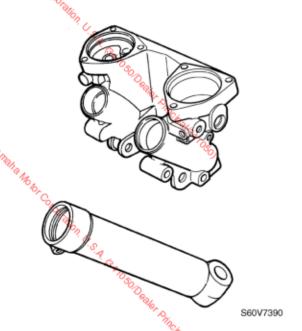
1. Check the reservoir for cracks or corrosion. Replace if necessary.



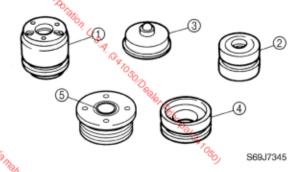
S69J7335

Checking the tilt cylinder and trim cylinders

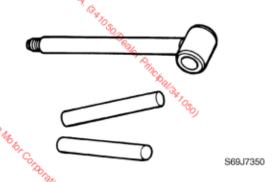
- 1. Check the power trim and tilt unit for cracks or corrosion. Replace if necessary.
- 2. Check the inner walls of the cylinder block and tilt cylinder for scratches. Replace if necessary.



3. Check the outer surface of the tilt piston ①, trim piston ②, adapter ③, free piston (4), and oil seal of end screw (5) for scratches. Replace if necessary.



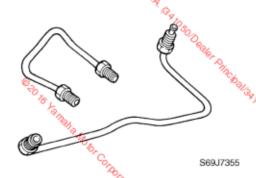
4. Check the trim and tilt rams for bends or 600 grit sandpaper if there is light rust or replace if necessary.



7-35

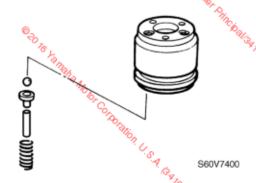
Ols Sanaha Motor Coltonation U.S.A.

5. Check the pipes for cracks or corrosion. Replace if necessary.



Checking the valves

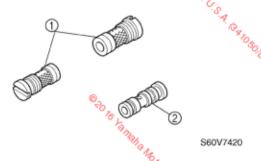
1. Check the operation of the tilt piston absorber valves and the valves for dirt or residue. Clean if necessary.



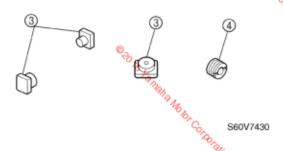
Check the up-relief valve and down-relief valve for dirt or residue. Clean if neces-



3. Check the main valve (1) and retainer (2) for dirtor residue. Replace if necessary.%

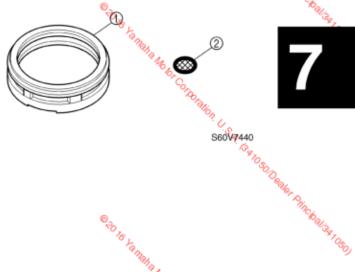


4. Check the valve seal 3 and valve seat 4 for dirt or residue. Replace if necessary.



Checking the filters

1. Check gear pump filter ① and relief valve filter @ for dirt or residue. Clean if necessary.

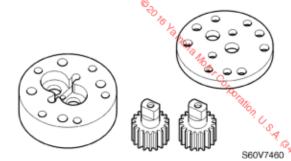


Palla Motor Corporation U.S.A. GA DSolleaker Prin 60V1E11



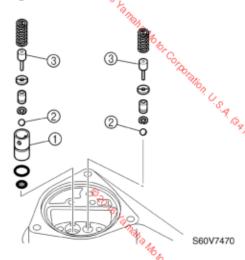
Checking the gear pump

- 1. Check the drive gear for damage or excessive wear. Replace if necessary.
- Check the gear pump housing for scratches. Replace if necessary.

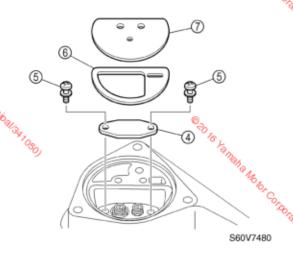


Assembling the relief valve

Install the relief valve ①, balls ②, and pins ③.



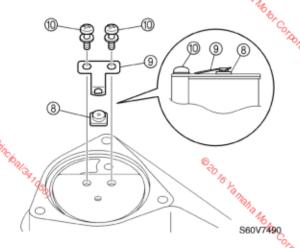
- 2. Install the relief valve plate by installing the screws then tighten them to the specified torque.
- 3. Install the seal (6) and tilt down plate (7).



M

Relief valve plate screw: 4 N·m (0.4 kgf·m, 3.0 ft·lb)

Install the valve seal (8) and trim down spring (9), and then tighten the screws (0) to the specified torque.





Trim down spring screw: 4 N·m (0.4 kgf·m, 3.0 ft·lb)

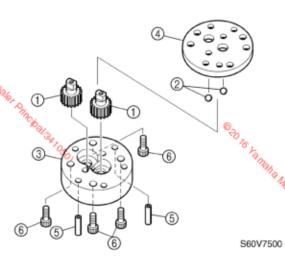
Assembling the gear pump

- 1. Install the drive gears ① and balls ② into gear housing 2 ③.
- 2. Install gear housing 1 (4), then the pins
- Tighten the bolts 6 to the specified torque.

7-37

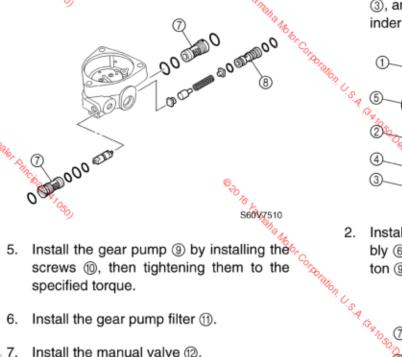
Ref Principalisa 1080,

Power trim and tilt unit

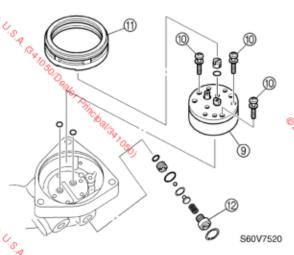


Gear housing bolt 6: 4 N·m (0.4 kgf·m, 3.0 ft·lb)

Install the main valves 🕜 and retainer 🛞.



- Install the manual valve 12.

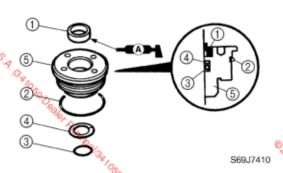




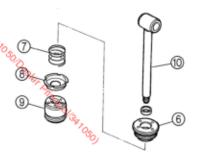
Gear pump screw: 2 N·m (0.2 kgf·m, 1.5 ft·lb)

Assembling the tilt ram

Install a new dust seal 1, O-rings 2 and and the backup ring 4 into the tilt cylinder end screw (5).



Install the tilt cylinder end screw assembly 6, spring 7, adapter 8, and tilt piston (9) onto the tilt ram (10).



S60V7690

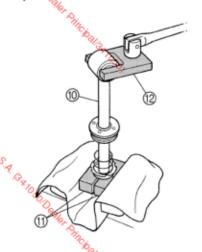
7-38

Tradition U.S.A. R.A. TOSOD 60V1E11

BRKT T

Bracket unit

- Hold the tilt piston in a vise using the special service tool (1) on both sides.
- Tighten the tilt ram (1) to the specified torque?



S69J7420



PTT piston vice attachment ①: YB-06752

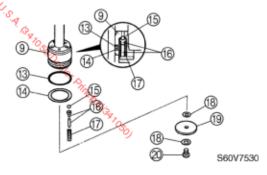
Tilt rod wrench (2): YB-06569



Tilt ram ⑩:

55 N·m (5.5 kgf·m, 40.6 ft·lb)

- 5. Install a new O-ring (3) and the backup ring (4) into the tilt piston (9).
- 6. Install the balls (5), pins (6), and springs (7) as shown.
- Install the washers ®, plate ®, and bolt
 into the tilt piston ®, and then tighten
 the bolt to the specified torque.

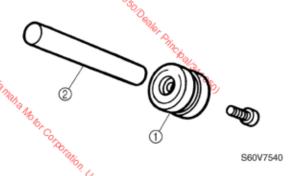


Son Real

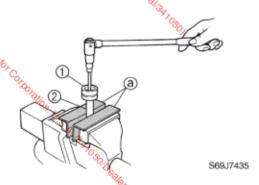
Tilt piston bolt ②: 7 N⋅m (0.7 kgf⋅m, 5.2 ft⋅lb)

Assembling the trim rams

1. Install the trim piston ① onto the trim ram ②.



- Hold the trim ram ② in a vise using aluminum plates ② on both sides.
- Tighten the trim piston bolt to the specified torque.

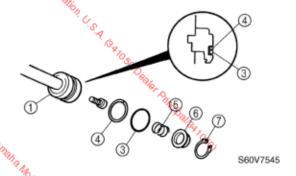




Trim piston bolt:

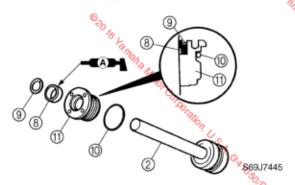
38 N·m (3.8 kgf·m, 28.0 ft·lb)

Install a new O-ring ③, the backup ring ④, spring ⑤, adapter ⑥, and circlip ⑦ into the trim piston ①.



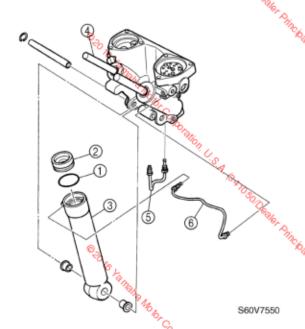
7-39

- 5. Install a new oil seal (8), the circlip (9), and a new O-ring (i) into the trim cylinder end screw 11).
- 6. Install the trim cylinder end screw monto the trim ram 2.



Installing the tilt cylinder

- 1. Install a new O-ring ① onto the free piston ②.
- 2. Push the free piston ② into the tilt cylinder (3) until it bottoms out.
- Install the tilt cylinder 3 onto the cylinder block (4).
- 4. Install pipes (5) and (6), and then tighten the pipe joints to the specified torque

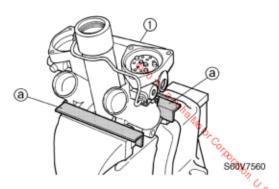




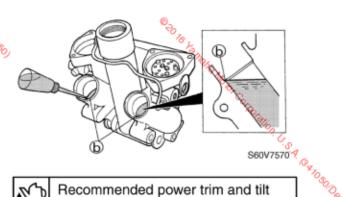
Pipe joint (5) and (6): 15 N·m (1.5 kgf·m, 11.1/ft·lb)

Installing the trim rams

1. Hold the cylinder block 1 in a vise using aluminum plates @ on both sides.



2. Fill the trim cylinders with the recom? mended fluid to the correct level (b) as shown.





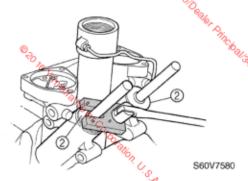
Recommended power trim and tilt

ATF Dexron II

BRKT 1

Bracket unit

 Install the trim piston assembly into the trim cylinder, and then eighten the trim cylinder end screw ② to the specified torque.



WARNING

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



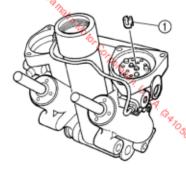
Trim and tilt cylinder wrench: YB-06175-2B



Trim cylinder end screw 2: 160 N·m (16.0 kgf·m, 118 ft·lb)

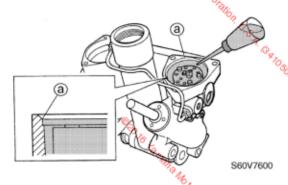
Installing the power trim and till motor

Install the joint ① into the pump housing.



S69V7590

Fill the pump housing with the recommended fluid to the correct level (a) as shown.



₹

Recommended power trimand tilt fluid:

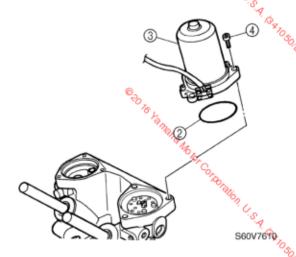
ATF Dexron II

Remove all of the air bubbles with a syringe or suitable tool.

NOTE: _

Turn the joint with a screwdriver, and then remove any air between the pump gear teeth.

 Install a new O-ring ② and the power trim and tilt motor ③, and then tighten the bolts ④ to the specified torque.



NOTE:

Align the armature shaft with the recess in the joint.

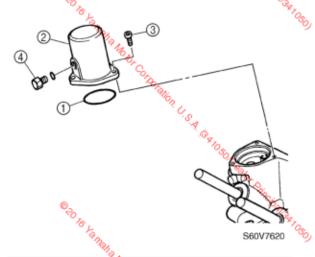


PTT motor bolt 4: %, 19 N·m (1.9 kgf·m, 14:0 ft·lb)

7-41

Installing the reservoir

- 1. Install a new O-ring () and the reservoir 2, and then tighten the bolts 3 to the specified torque.
- 2. Install the reservoir cap 4, and then tighten it to the specified torque.

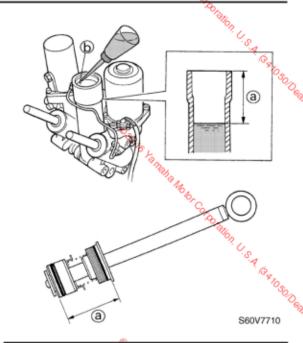




Reservoir bolt 3: 19 N·m (1.9 kgf·m, 14.0 ft·lb) Reservoir cap 43% 7 N·m (0.7 kgf·m, 5,2 ft·lb)

Installing the tilt ram

- 1. Fill the tilt cylinder with the recommended fluid to the correct level @ as shown,
- 2. Add a small amount of the recommended fluid through the cylinder block hole (b) as shown.



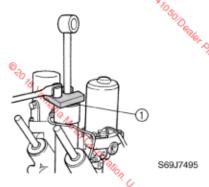


Recommended power trim and tilt fluid:

ATF Dexron II

© RO No Yamaha Makar Corkofallon, U.S.A. (S. A. O.S.O. Dealer Principal States of Corkofallon).

 Install the tilt piston assembly into the tilt cylinder, and then tighten the tilt cylinder end screw 1 to the specified torque.



WARNING

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

NOTE: _

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



Trim and tilt cylinder wrench: YB-06175-2B

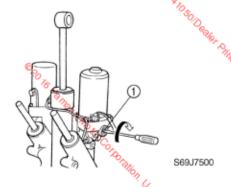


Tilt cylinder end screw: 90 N·m (9.0 kgf·m, 66.4 ft·lb)

Bleeding the power trim and tilt unit

Not installed

Tighten the manual valve turning it clockwise.



- 2. Place the power trim and tilt unit in an upright position.
- 3. Check the fluid level in the reservoir.

NOTE:

The fluid level should be at the brim of the filler hole.

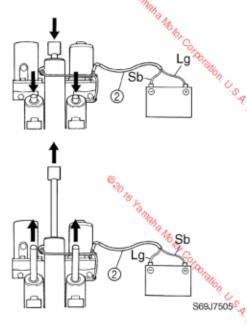
 If necessary, add sufficient fluid of the recommended type to the correct level.



Recommended power trim and till fluid:

ATF Dexron II

- Install the reservoir cap.
- 6. Connect the PTT motor leads ② to the battery terminals.



Ram	PTT motor lead	Battery terminal
Up	Sky blue (Sb)	⊕
Ор	Light green (Lg)	Θ
Down	Light green (Lg)	. ⊕
Down	Sky blue (Sb)	°4. ⊖

7-43 60V1E11

 Reverse the PTT motor leads between the battery terminals to fully extend the tilt ram and trim rams, and then reverse them again to fully retract the rams.

NOTE:

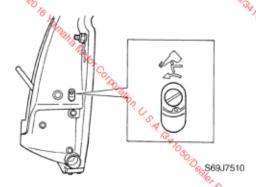
- Repeat this procedure so that the rams go up and down four to five times (be sure to wait a few seconds before switching the leads).
- The sound of the power trim and tilt motor will change when the rams are fully extended.
- If the rams do not move up and down easily, push and pull on the rams to assist operation.
- Check the fluid level again when the rams are fully extended. Add sufficient fluid, if necessary, and then repeat step?
 7.

NOTE:.

Repeat this procedure until the fluid remains at the correct level.

Built-in

 Loosen the manual valve by turning it counterclockwise until it cannot be turned further.



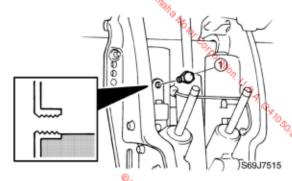
- Fully tilt the outboard motor up, and then release it and let it lower by its own weight four to five times.
- 3. Tighten the manual valve by turning it clockwise.
- Let the fluid settle for 5 minutes.

- 5. Push and hold the power trim and tilt switch in the up position until the outboard motor is fully tilted up.
- Support the outboard motor with the tilt
 stop lever, and then let the fluid settle for
 5 minutes.

A WARNING

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

- Remove the reservoir cap ①, and then check the fluid level in the reservoir.
- If necessary, add sufficient fluid of the recommended type to the correct level.



NOTE:

If the fluid is at the correct level, the fluid should overflow out of the filler hole when the cap is removed.

· 0.
Recommended power trim and tilt fluid:
ATF Dexron II

9. Install the reservoir cap.

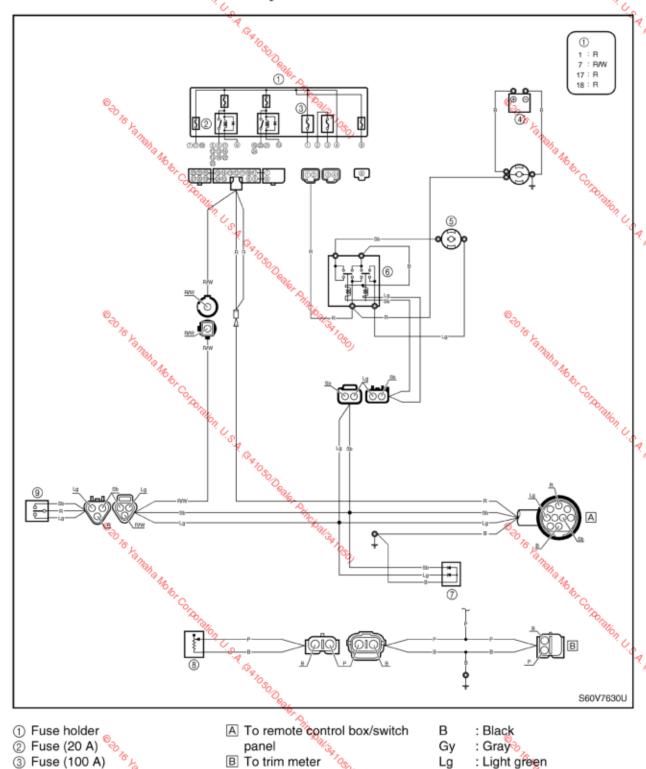
NOTE:		~°°				
Repeat	this	procedure	until	the	fluid	remains
at the c	orre	ct level.	"alla			

7

60V1E11 7-4



Power trim and tilt electrical system



- ③ Fuse (100 A)
- 4 Starting battery
- ⑤ Power trim and tilt motor
- Power trim and tilt relay
- ⑦ Diode
- ® Trim sensor
- Power trim and tilt switch

- A To remote control box/switch panel
- B To trim meter

В : Black Gy : Gray

: Light green Lg

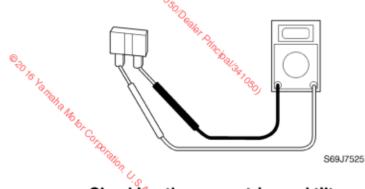
Ρ : Pink R : Red

: Sky blue Sb R/W : Red/white

Checking the fuse

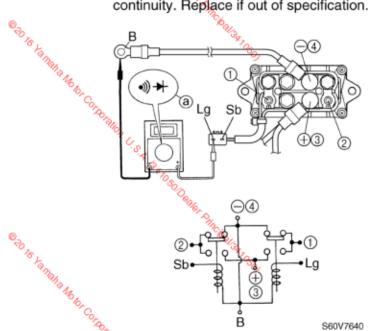
Tanto Sanaha Mobile

 Check the fuse for continuity. Replace if there is no continuity.



Checking the power trim and tilt relay

 Check the power trim and tilt relay for continuity. Replace if out of specification.

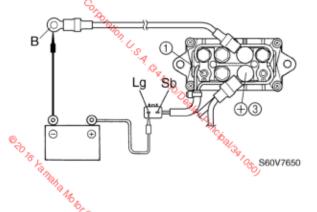


NOTE:

Be sure to set the measurement range (a) shown in the illustration when checking for continuity.

- W.	
Power trimgand tilt rel	ay continuity
Sky blue (Sb) – Black (B) Light green (Lg) – Black (B)	Continuity
Terminal ① - Terminal ④ Terminal ② - Terminal ④	Continuity
Terminal ① – Terminal ③ Terminal ② – Terminal ③	No continuity

- Connect the digital circuit tester between power trim and tilt relay terminals ① and ③.
- Connect the light green (Lg) lead to the positive battery terminal and the black (B) lead to the negative battery terminal as shown.
- Check for continuity between terminals and ③. Replace if there is no continuity.



7

*** Tollisa (Oso)

** Tollisa (Oso)

*** Tollisa (Oso)

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*** Tollisa (Oso)

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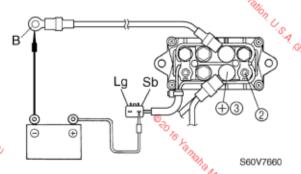
** Tollisa (Oso)

*** Tollisa (Oso)



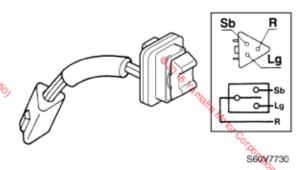
Bracket unit

- Connect the digital circuit tester between power trim and tilt relay terminals ② and ③.
- Connect the sky blue (Sb) lead to the positive battery terminal and the black
 (B) lead to the negative battery terminal as shown.
- Check for continuity between terminals
 and ③. Replace if there is no continuity.



Checking the power trim and tilt switch

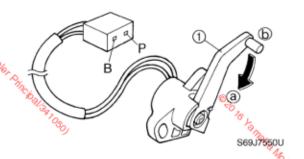
 Check the power trim and tilt switch for continuity. Replace if out of specification.



0	Lead color		
Switch position	Sky blue (Sb)	Red (R)	Lightgreen (Lg)
Up	0-	% ,0	
Free		10 ton	
Down		0 3/4	—

Checking the trim sensor

Measure the trim sensor resistance.
 Replace if out of specification.



NOTE: .

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



Trim sensor resistance:

Pink (P) - Black (B)

9–11 Ω at 20 °C (68 °F) ⓐ

247.6-387.6 Ω at 20 °C (68 °F) (b)

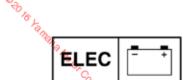
Sanaha Moto Corporation U.S.A. R.A. 1050.

7-47 60V1E11

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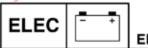
Electrical systems

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	Checking the electrical components	8-2
	Measuring the peak voltage	8-2
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	Measuring the peak voltage Measuring the lower resistance Electrical components Port view Starboard view Junction box assembly Aft view Top view Wiring harness Ignition and Ignition control system Checking the spark plug caps	%
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_©	Checking the ignition spark gap	8-14%
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© 30 16 Ya Maha Motor Cort.	Checking the throttle position sensor	0-10
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©_	Checking the ECM main relay	8-19%
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The As	Checking the injector drivers	0.22
Obj	Checking the fuel pressure sensor	9-22
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	Took and an angester arrow relay minimum.	705
	Checking the ECM main relay Fuel control system Checking the injector drivers Checking the fuel pressure sensor Checking the water detection switch Checking the electric fuel pump Checking the electric fuel pump relay Checking the injector driver relay Starting system Checking the fuses Checking the starter relay	000 OF
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Electrical systems

Special service tools



Dynamic spark tester YM-34487



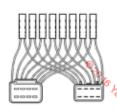
Digital multimeter YU-34899-A



Peak voltage adaptor YU-39991



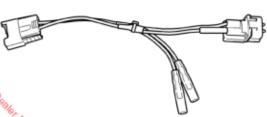
Test harness (2 pins) YB-06767



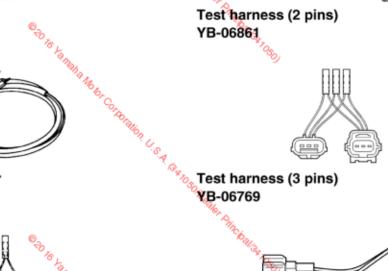
Test harness (8 pins) YB-06779

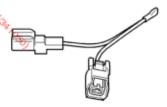


Test harness (3 pins) YB-06757



Test harness (2 pins)





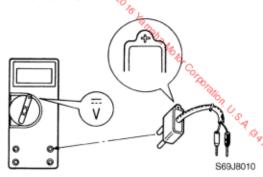
Test harness (1 pin)

Checking the electrical components Measuring the peak voltage

NOTE:

Before troubleshooting the peak voltage, check that all electrical connections are tight and free from corrosion, and that the battery is fully charged to 12 V.

The condition of the ignition system can be determined by measuring the peak voltage. Cranking speed is effected by many factors, such as fouled or weak spark plugs, or a weak battery. If one of these factors is present, the peak voltage will be lower than specification. In addition, if the peak voltage is lower than specification the engine will not operate properly.



▲ WARNING

When checking the peak voltage, do not touch any of the connections of the digital tester leads.

NOTE:

- Use the peak voltage adaptor with the digital circuit tester.
- When measuring the peak voltage, set the selector on the digital circuit tester to the DC voltage mode.
- · Connect the positive pin on the peak voltage adaptor to the positive terminal of the digital circuit tester.

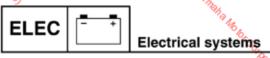
Measuring the lower resistance

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

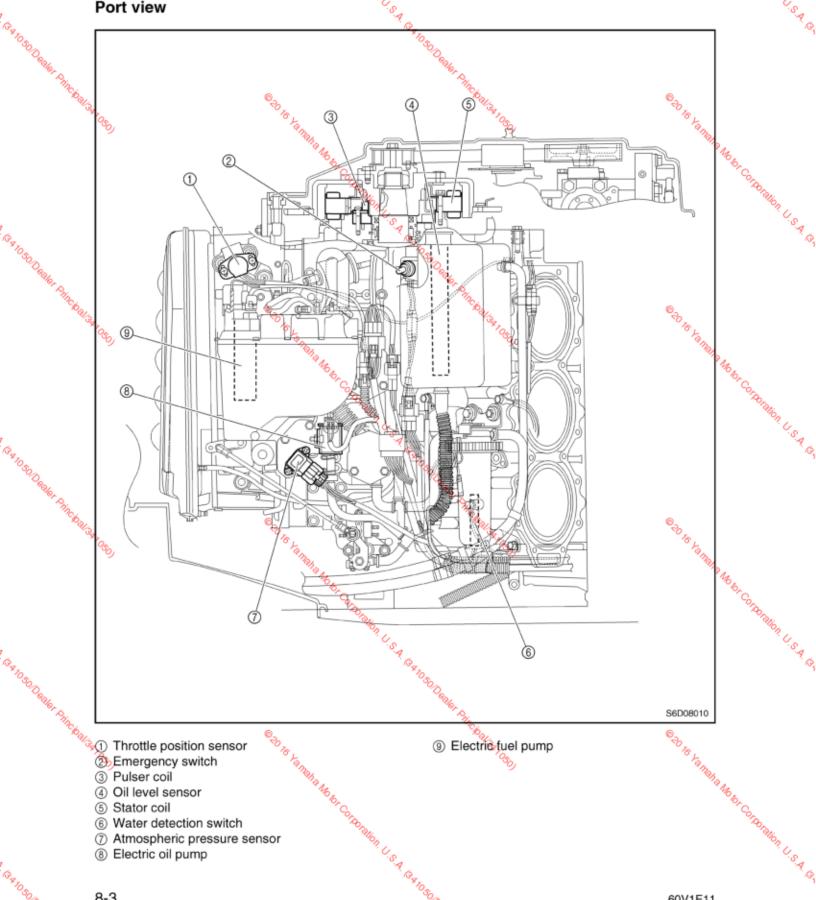
NOTE:

Obtain the internal resistance of the digital circuit tester by connecting both of its probes and checking the display.

Correct value = displayed measurement - internal resistance



Electrical components Port view



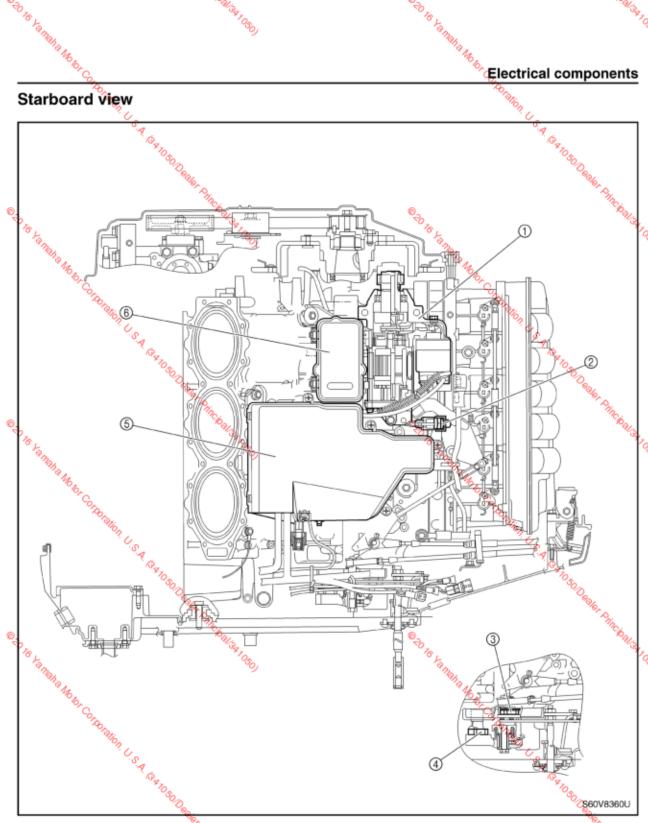
- Stator coil
- 6 Water detection switch
- ⑦ Atmospheric pressure sensor

Electric fuel pump

8-3 60V1E11

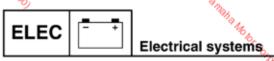
Starboard view

Sanaha Mober

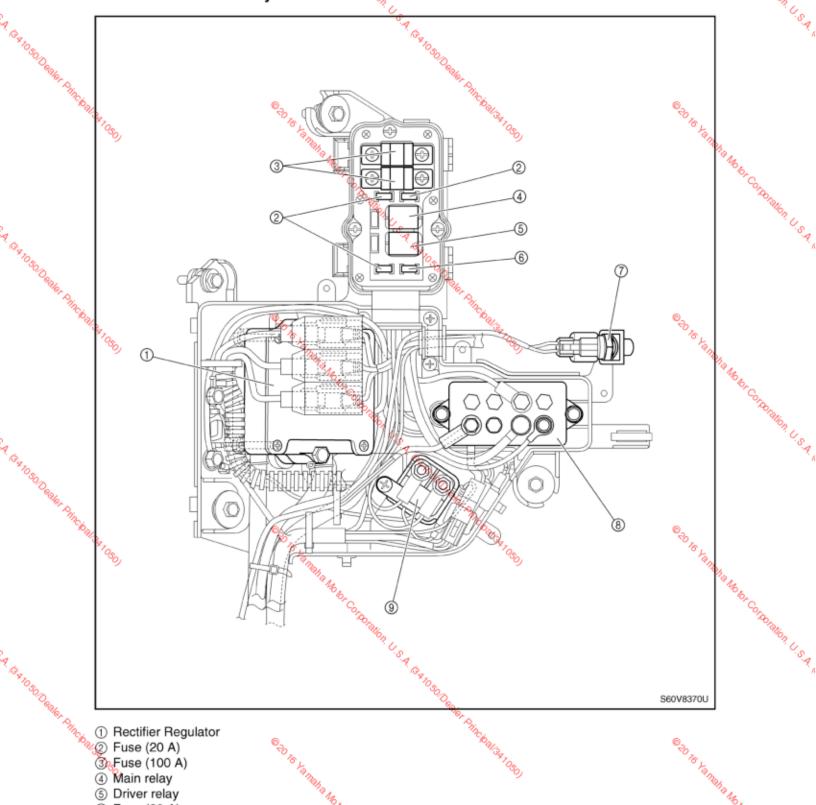


- ① Starter motor
- ntake air temperature sensor
 - 3 Shift position switch
 - 4 Shift cut switch
 - Junction box
 - 6 Fuse holder

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Junction box assembly

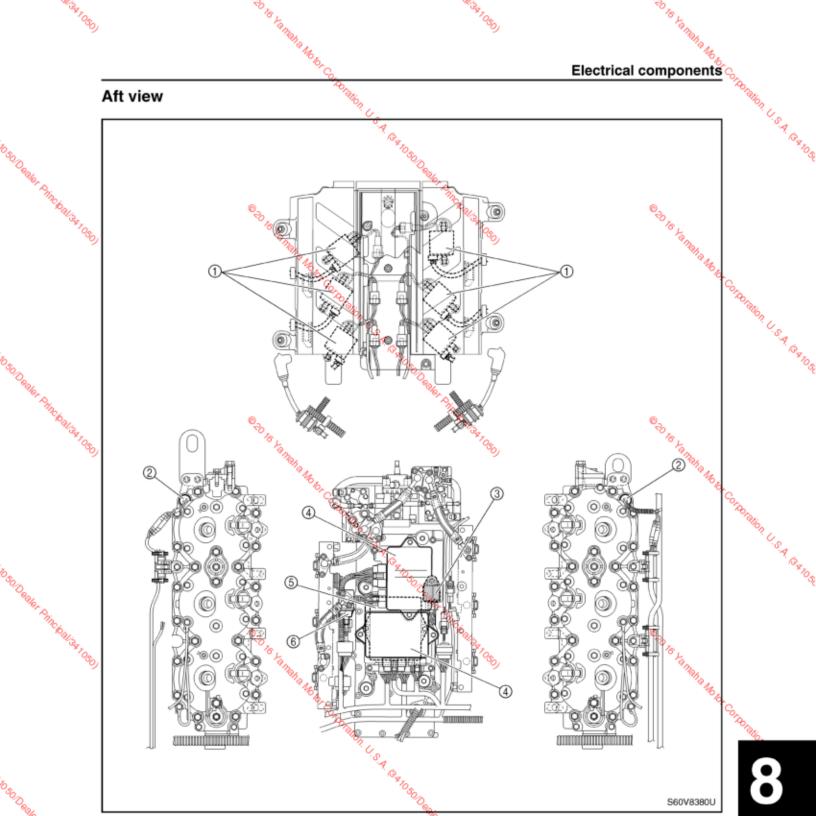


- Rectifier Regulator
- 3 Fuse (100 A)
- 5 Driver relay
- 6 Fuse (30 A)
- ⑦ Intake air temperature sensor
- 8 Power trim and tilt relay
- 9 Starter relay

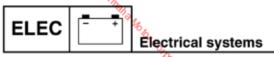
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Aft view

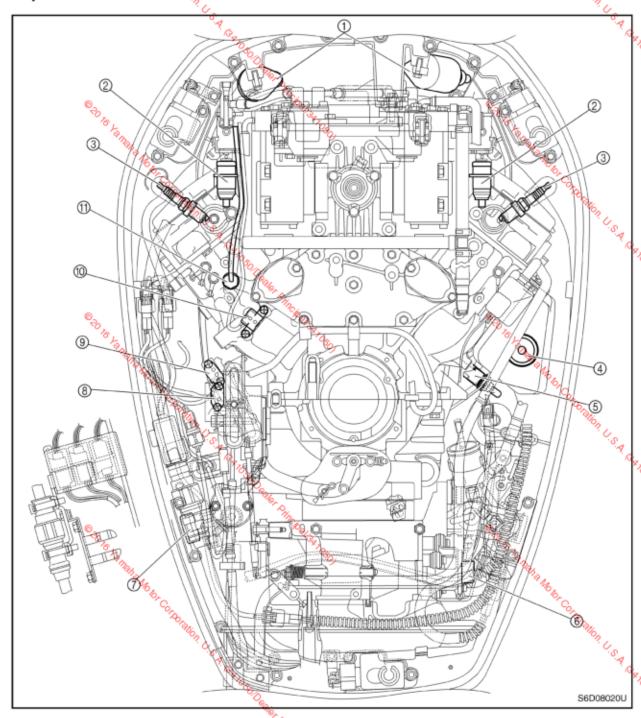
W341050)



- ① Ignition coil
- ② Thermoswitch
- ③ Fuel pump relay
- 4 Injector drivers
- ⑤ ECM
- 6 Fuel pressure sensor



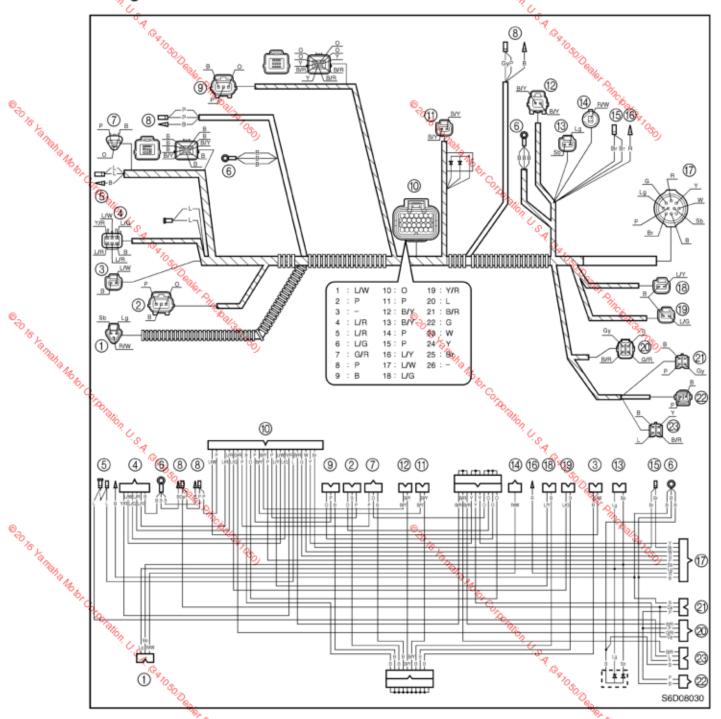
Top view



- 1 Ignition coil
- ② Fuel injector

① Engine temperature sensor

Salaha Motor Co Wiring harness



Ted to Sanisha Mobile

Connect to:

- Power trim and tilt switch
- 2 Atmospheric pressure sensor
- ② Atm.
 ③ Water detection
 ④ Oil level sensor
 ⑤ Emergency switch
 ⑥ Ground
 ottle position so ③ Water detection switch

 - 7 Throttle position sensor
 - Thermoswitch

- 9 Fuel pressure sensor
- ① ECM
- 11 Engine temperature sensor
- ① Intake air temperature sensor
- Power trim and tilt relay
- (4) Fuse holder
- (5) Starter relay
- (6) Fuse holder
- (7) Remote control
- Shift cut switch

- Shift position switch
- Oil level warning indicator
- 2) Trim meter
- Trim sensor
- No. Corto Ration. U.S. A. S. A. D. So. Dealer Prin.

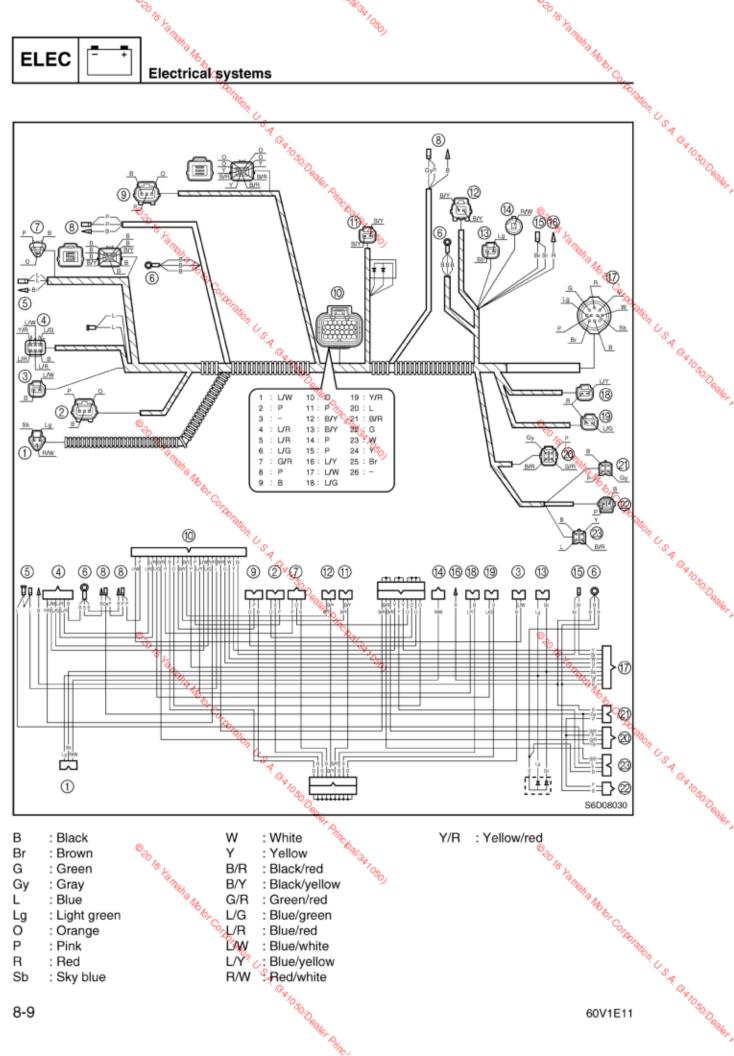
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Br : Brown : Green G Gy : Gray : Blue Lg : Light green 0 : Orange Ρ : Pink R

Sb

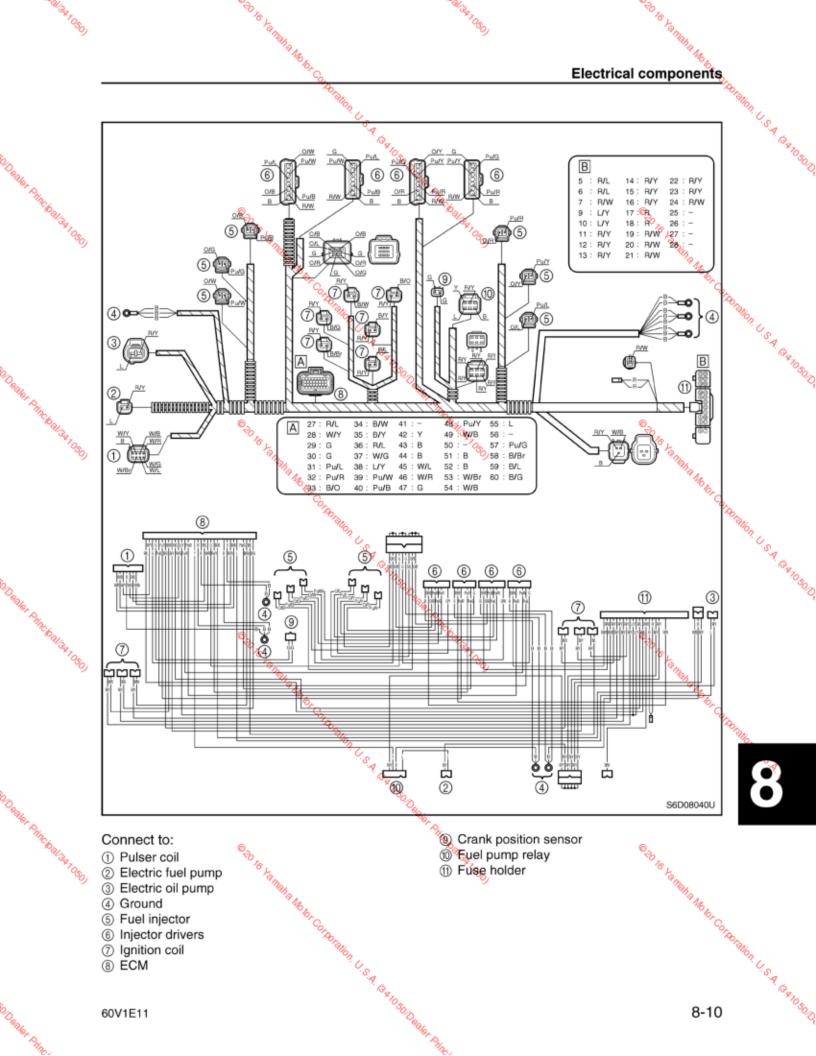
© ROYA MANA MANA LUG COALUR : Green/red : Blue/green : Blue/red : Blue/white : Red L/Y : Blue/yellow : Sky blue R/W Red/white

8-9

: Yellow

: Black/red

: Black/yellow

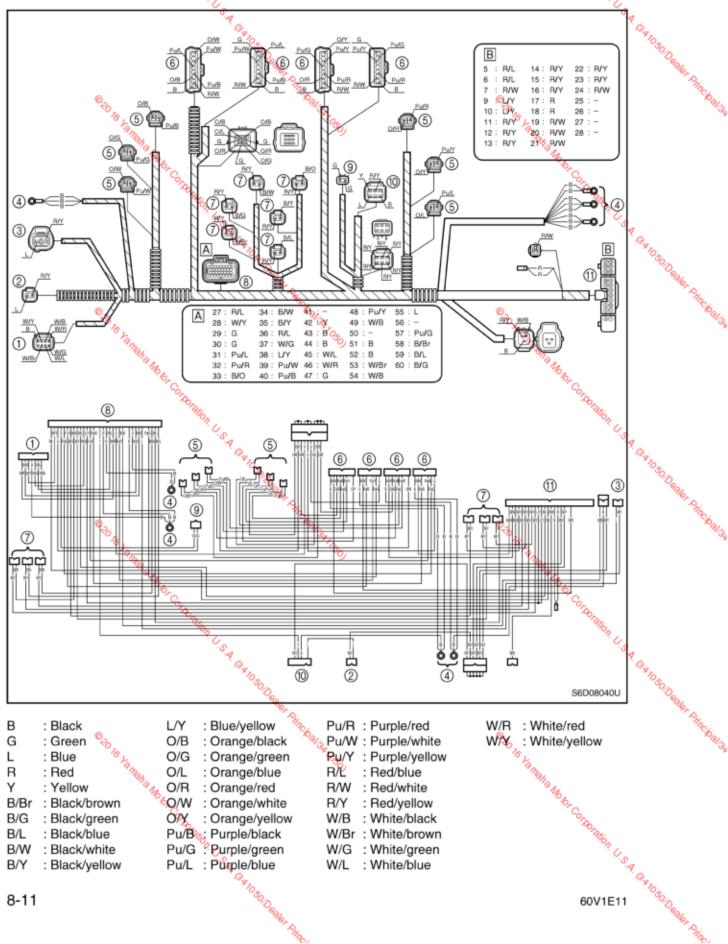


Tex 16 Xa Raha Make

Connect to:

- 1 Pulser coil
- ② Electric fuel pump
- ③ Electric oil pump
- ④ Ground
- 5 Fuel injector
- ⑤ Injector drivers
- ⑦ Ignition coil
- ® ECM

- Crank position sensor
- 10 Fuel pump relay
- ① Fuse holder

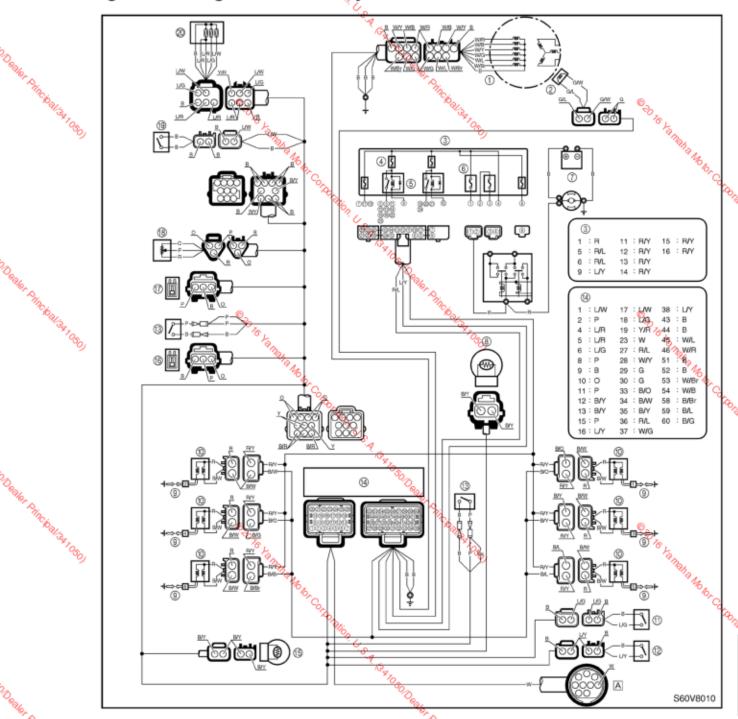


Tanaha Mobile

: Black L/Y В : Blue/yellow Pu/R: Purple/red G : Green O/B : Orange/black Pu/W: Purple/white : Blue Pu/Y: Purple/yellow O/G : Orange/green L R : Red O/L : Orange/blue R/L : Red/blue : Yellow O/R : Orange/red R/W : Red/white ⟨Q/W : Orange/white B/Br : Black/brown R/Y : Red/yellow B/G : Black/green O/X : Orange/yellow W/B : White/black B/L : Black/blue Pu/B Purple/black W/Br : White/brown Pu/G ? Purple/green B/W : Black/white W/G: White/green Pu/L : Purple/blue B/Y : Black/yellow W/L : White/blue

8-11

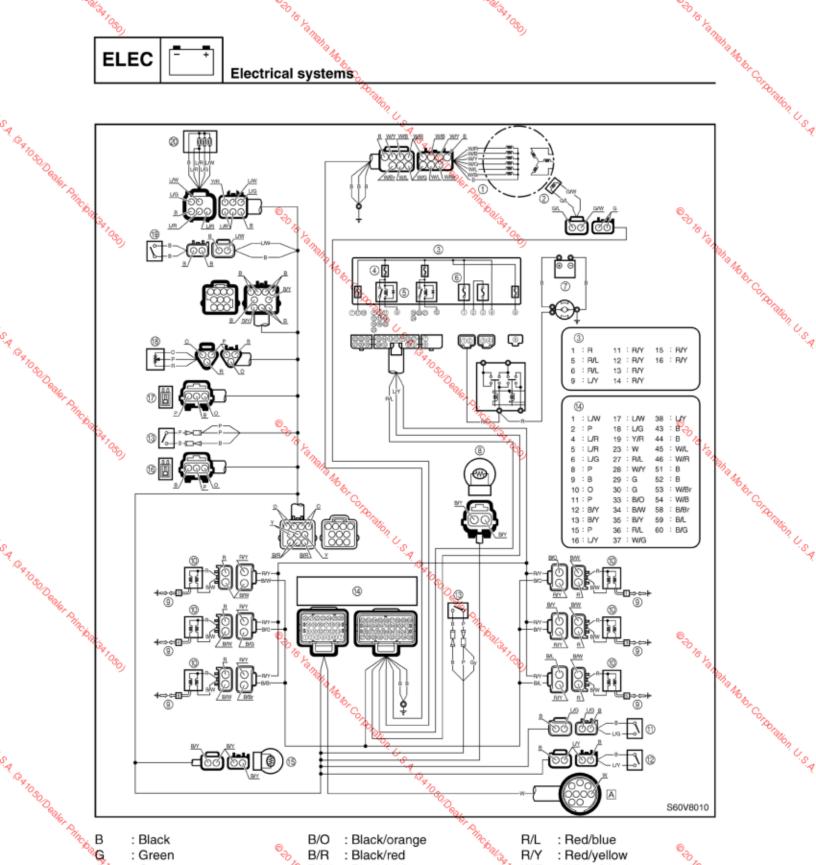
Ignition and ignition control system



- 1 Pulser coil
- ② Crank position sensor
- ③ Fuse holder
- 4 Fuse (20 A)
- ⑤ ECM main relay
- ⑥ Fuse (100 A)
- ⑦ Battery
- ® Intake air temperature sensor
- Spark plug
- 10 Ignition coil

- Shift position switch.
- Shift cut switch
- ① Thermoswitch
- (14) ECM
- (5) Engine temperature sensor
- è Fuel pressure sensor
 - Atmospheric pressure sensor
 - (8) Throttle position sensor
 - Water detection switch
 - Oil level sensor

A To remote control box/switch panel



: Black В G : Green 0'000 : Orange Ρ : Pink R : Red W : White : Yellow Υ B/Br : Black/brown B/G : Black/green B/L : Black/blue

S.A. G.A. IO. GO.D. Galler Phin.

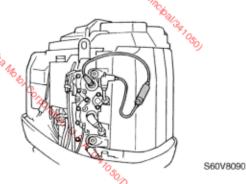
B/W : Black/red : Black/white : Black/yellow B/Y G/L4: Green/blue G/W Green/white

L/G : Blue/green L/R : Blue/red L/W : Blue/white L/Y : Blue/yellow R/ R/ R/ W/B : Red/blue : Red/yellow : White/black W/Br : White/brown

W/G: White/green : White/blue W/L W/R : White/red W/Y : White/yellow Y/R : Yellow/red

Checking the ignition spark gap

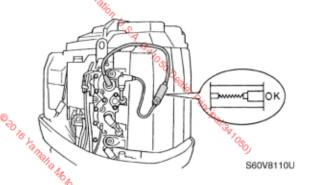
- 1. Disconnect the spark plug caps from the spark plugs.
- 2. Connect a spark plug cap to the special service tool.





Dynamic spark tester YM-34487

3. Crank the engine and observe the spark through the discharge window of the spark gap tester. Check the ignition system if the spark is weak.

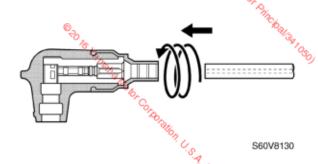


▲ WARNING

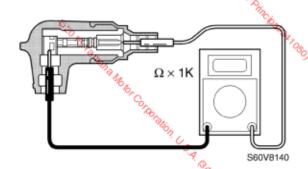
- · Do not touch any of the connections of the spark gap tester leads.
- · Do not let sparks leak out of the removed spark plug caps.
- Keep flammable gas or liquids away, since this test can produce sparks.

Checking the spark plug caps

1. Remove the spark plug caps from the spark plug wires by turning the caps counterclockwise.



Measure the spark plug cap resistance. Replace if out of specification.





Spark plug cap resistance: $4-6 k\Omega$

Checking the ignition coils

- Remove the spark plug wires from the spark plugs
- 2. Remove the harness cover and disconnect the ignition coll coupler.

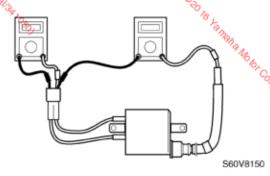
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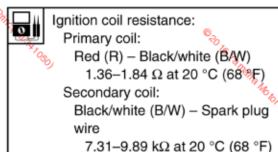
©30 to Samelia Mador Cordoration, U.S.A. (S.A. (S.A. (S.A. (O.S.A. (O. 8-14



Electrical systems

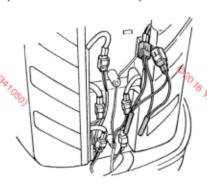
- Remove the ignition coil cover.
- Remove the spark plug caps from the spark plug wires.
- Measure the ignition coil resistance.
 Replace if out of specification.





Checking the ECM

- Remove the harness cover and disconnect a ignition coil coupler.
- 2. Connect the test harness (2 pins) to the ignition coil.
- Measure the ECM output peak voltage, If below specification, measure the pulser coil output peak voltage. Replace the ECM if the output peak voltage of the pulser coil is above specification.



S60V8160

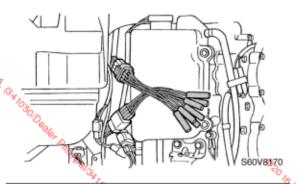


Digital multimeter: YU-34899-A Peak voltage adaptor: YU-39991 Test harness (2 pins): YB-06767

ECM output peak voltage: Red (R) – Black/white (B/W)						
r/min	0%)	Loaded				
'''	Cranking	1,500	3,500			
DC V	160	260	260			

Checking the pulser coil

- 1. Disconnect the pulser coil coupler.
- Connect the test harness (8 pins) to the pulser coil.
- Measure the pulser coil output peak voltage. Replace the pulser coil if below specification.





Digital multimeter: YU-34899-A Peak voltage adaptor: YU-39991 Test harness (8 pins): YB-06779



Pulser coil output peak voltage: White/red (W/R) – Black (B) White/black (W/B) – Black (B)

White/yellow (W/Y) – Black (B) White/green (W/G) – Black (B)

White/blue (W/L) – Black (B) White/brown (W/Br) – Black (B)

- 1		46			
	r/min	Unloaded	d Loaded		
	1/1111111	Crar	iking	1,500	3,500
	DC V	3.5	3.5	20.0	30.0

8-15 60V1E11

Pulser coil resistance (use as reference): 294-398 Ω

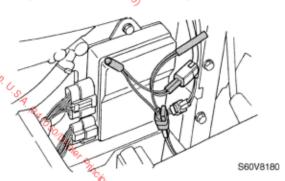
Checking the crank position sensor

1. Remove the harness cover bolts, and then pull back the ignition coil cover.

NOTE:

The ignition coils are connected to the ignition coil cover. Do not remove the ignition coil cover.

- Connect the test harness (2 pins) to the crank position sensor.
- 3. Measure the crank position sensor output peak voltage. Replace the crank % position sensor below specification.



DC V

1.5

S Yangha Make Cortora	L	Digital multimeter: YU-34899-A Peak voltage adaptor: YU-39991 Test harness (2 pins): YB-06767			
Corp					
*Valida	Crank position sensor output per voltage: Green/blue (G/L) – Green/white (G/W)				
		Unloaded	Loaded		
	r/min	Cranking	1,500	3,500	

1.5

8.0

10.0

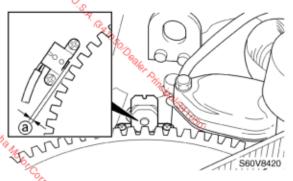


Crank position sensor resistance (use as reference):

Green/blue (G/L) -Green/white (G/W) $178.5-241.5 \Omega$

Checking the crank position sensor air gap

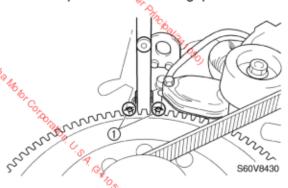
- Remove the flywheel magnet cover.
- Measure the crank position sensor air gap a. Adjust if out of specification.





Crank position sensor air gap: 0.5-1.5 mm (0.02-0.06 in)

Loosen the screws 1 and adjust the crank position sensor air gap.



Tighten the screws, and then check the crank position sensor air gap. Adjust if necessary.

Checking the throttle position sensor

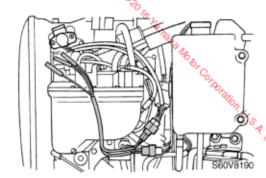
- 1. Connect the test harness (3 pins) to the throttle position sensor.
- Turn the engine start switch to ON.

8-16



Electrical systems

- 3. Measure the throttle position sensor input voltage. Replace the ECM if out of specification.
- 4. Measure the throttle position sensor output voltage. Adjust the throttle position sensor if out of specification.





Test harness (3 pins): YB-06757



Throttle position sensor input voltage:

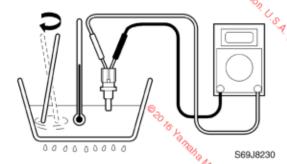
Orange (O) - Red (R)

Throttle position sensor output voltage:

Pink (P) - Orange (O) 0.58-0.62 V

Checking the intake air temperature sensor

 Place the intake air temperature sensor in a container of water and slowly heat the water.



2. Measure the intake air temperature sensor resistance. Replace if out of specification.

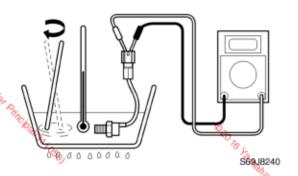


Intake air temperature sensor resistance:

at 0 °C (32 °F): 5.4-6.6 kΩ at 80 °C (176 °F): 0.3-0.4 kΩ

Checking the engine temperature sensor

 Place the engine temperature sensor in a container of water and slowly heat the water.



Measure the engine temperature sensor resistance. Replace if out of specification.



Engine temperature sensor resistance:

Black/yellow (B/Y) -Black/yellow (B/Y)

at 20 °C (68 °F): 54.2-69.0 kΩ at 100 °C (212 °F): 3.12-3.48 kΩ

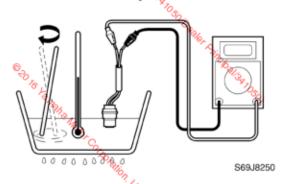
Ak br Corbolation U.S.A. GADSON

© 20 16 Ya The Ha Make Cortoration U.S.A. GA 1050. 8-17

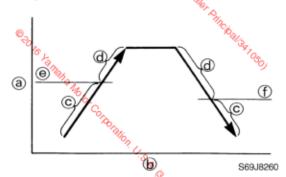
Checking the thermoswitches

Tex to Sallaha Mober

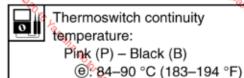
1. Place the thermoswitches in a container of water and slowly heat the water.



2. Check the switches for continuity at the specified temperatures. Replace if out of specification.



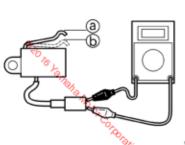
- a Temperature
- ⑤ Time
- © No continuity
- Continuity



①: 60-74 °C (140-165 °F)

Checking the shift cut switch

 Check the shift cut switch for continuity. Replace if there is no continuity.

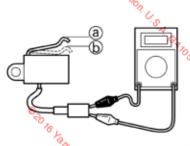


S69J8270

Switch	Lead color		
position	Blue/yellow (L/Y)	Black (B)	
Free @		TAN	
Push (b)	0-	—	

Checking the shift position switch

Check the shift position switch for continuity. Replace if there is no continuity.

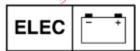


S69J8270

Switch	_C Lead	color	
position	Blue/green (L/G)	Black (B)	
Free @		A (0_	
Push (b)	0		ॉ ●
© 30 /6 /	³ Italia	Galer Ail	Challan Oso,

© 20 IS Yanaha Makar Corkolalion U.S.A IS A NOSODealer Prin

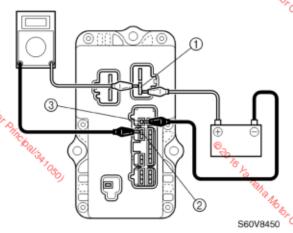
©30 IS Yangha Motor Cortoletion. U.S.A. Contract 8-18



Electrical systems

Checking the ECM main relay

- Remove the fuse holder cover, and then remove the fuse holder.
- 2. Connect the digital circuit tester leads to ECM main relay terminals ① and ②.
- 3. Connect positive battery terminal to the ECM main relay terminal ①.
- 4. Connect the negative battery terminal to the ECM main relay terminal 3.
- Check for continuity between the ECM main relay terminals. Replace if there is no continuity.
- 6. Check that there is no continuity between the relay terminals after disconnecting a battery terminal from ECM main relay terminal ① or ③. Replace if there is continuity.



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ON U.S.A. GANGON DEAL

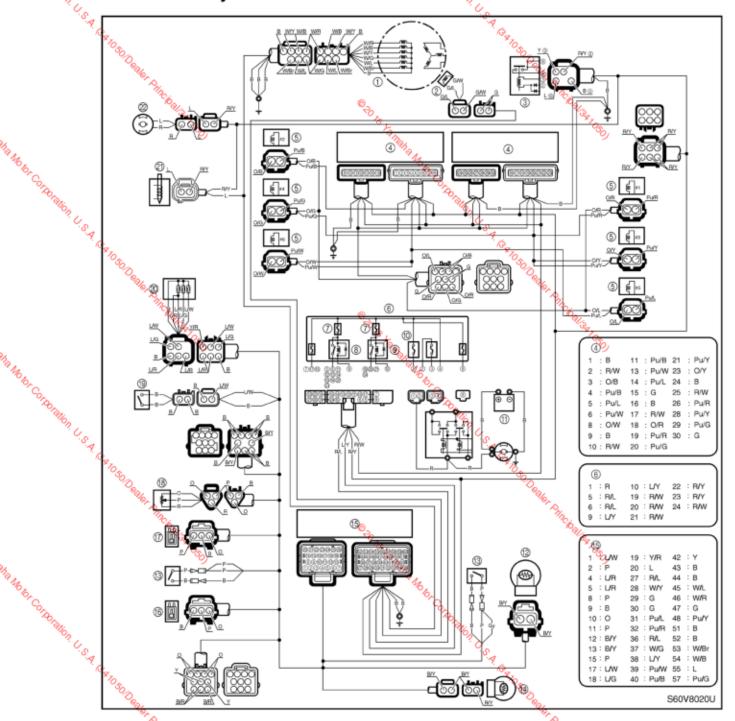
I. U.S.A. BANDSON

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Mon U.S.A. Ga

© 20 16 Yamaha

Fuel control system



- 1) Pulser coil
- Crank position sensor
- ③ Fuel pump relay
- 4 Injector drivers

- ® ECM main relay
- Injector driver relay

- Battery
- (2) Intake air temperature sensor
- ① Thermoswitch
- (4) Engine temperature sensor

- Electric oil pump
- ② Electric fuel pump

(7) Fuc (8) ECM ma. (9) Injector driver (9) Fuse (100 A) Engine

ECM

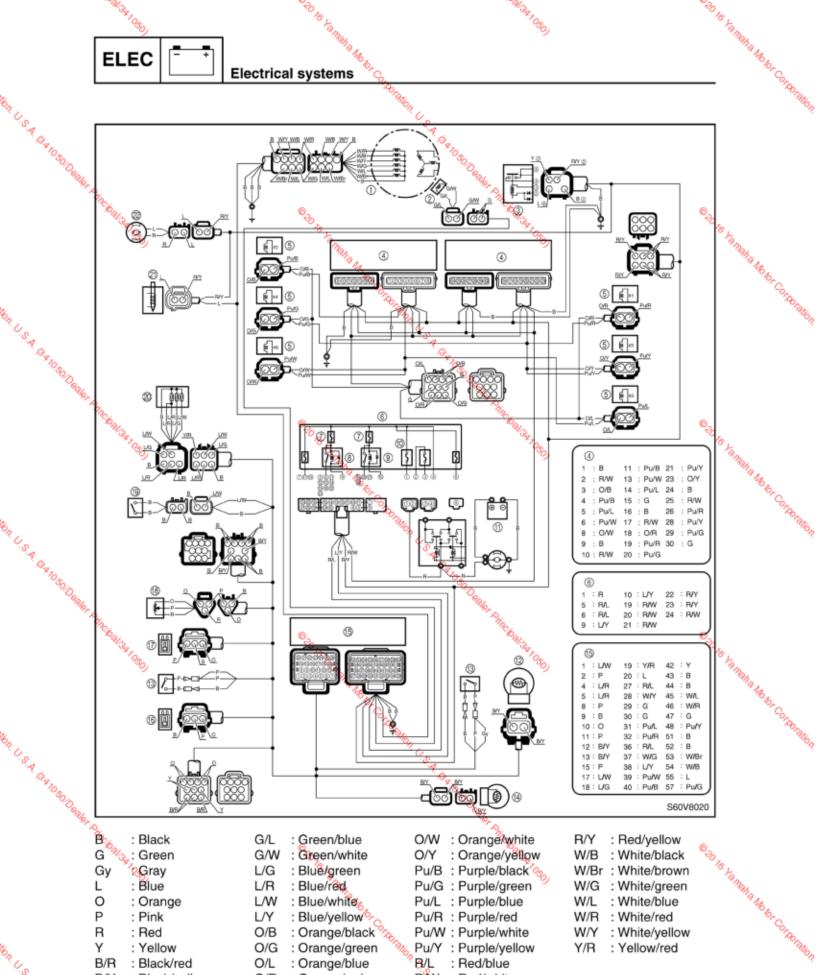
Fuel pressure serving

Atmospheric pressure serving

Throttle position sensor

Water detection switch

Very level sensor 8-20



Biological Black Green O/W : Orange/white G/L : Green/blue R/Y : Red/yellow : Orange/yellow G/W: Green/white W/B : White/black Pu/B : Purple/black % L/G : Blue/green W/Br : White/brown L/R Pu/G: Purple/green W/G: White/green : Blue : Blue/red 0 L/W : Blue/white Pu/L: Purple/blue : White/blue : Orange W/L Pu/R: Purple/red : White/red : Pink LY : Blue/yellow W/R : Orange/black R : Red O/B Pu/W: Purple/white W/Y : White/yellow : Yellow O/G : Orange/green Pu/Y: Purple/yellow Y/R : Yellow/red B/R : Black/red O/L : Orange/blue

On U.S.A. GAIDSON BRIEF 8-21 60V1E11

O/R

: Orange/red

B/Y

: Black/yellow

8

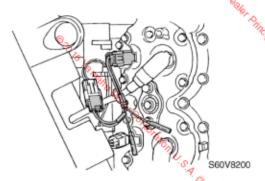
Checking the injector drivers

1. Remove the harness cover bolts, and then pull back the ignition coil cover ①.

NOTE:

The ignition coils are connected to the ignition coil cover. Do not remove the ignition coil cover.

- 2. Connect the test harness (2 pins) to the fuel injector.
- Measure the injector driver output peak voltage. If below specification, measure the fuel injector resistance or replace the injector drivers.





Digital multimeter: YU-34899-Ã Peak voltage adaptor: YU-39991 Test harness (2 pins): YB-06861



Injector driver output peak voltage (use as reference):

Purple/red (Pu/R) -

Orange/red (O/R)%

Purple/black (Pu/B)

Orange/black (O/B)

Purple/yellow (Pu/Y) -

Orange/yellow (O/Y)

Purple/green (Pu/G) -

Orange/green (O/G)

Purple/blue (Pu/L) -

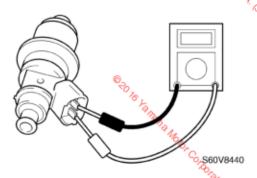
Orange/blue (O/L)

Purple/white (Pu/W) -

Orange/white (O/W)

r/min	Loaded				
1/111111	Cranking 1,500 3,500				
DC V	70	80	s 80		

Measure the resistance of the fuel injectors. Replace if out of specification.





Digital multimeter: YU-34899-A



Fuel injector resistance (use as reference):

0.9-1.1 Ω at 20°C (68 °F)

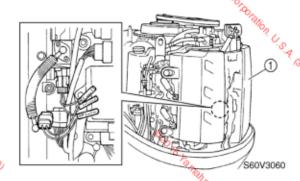
Checking the fuel pressure sensor

- Remove the flywheel magnet cover.
- 2. Remove the harness cover bolts, and then pull back the ignition coil cover ①,

NOTE: _

The ignition coils are connected to the ignition coil cover. Do not remove the ignition coil cover.

 Connect the test hames (3 pins) between the fuel pressure sensor and the wiring harness as shown.





Test harness (3 pins): YB-06769

60V1E11 8-22

ELEC

Electrical systems

Start the engine and warm it up for 5 minutes, and then measure the fuel pressure sensor output voltage. If out of specification, check the high-pressure fuel line and the mechanical fuel pump or replace the fuel pressure sensor.

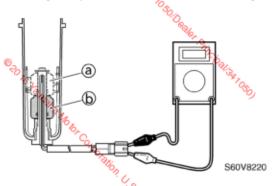


Fuel pressure sensor output voltage (use as reference):

Orange (O) - Pink (P) 3.2 V at 670-730 r/min

Checking the water detection switch

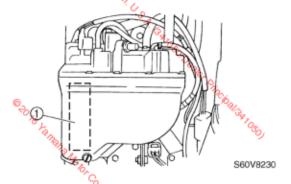
 Check the water detection switch for continuity. Replace if there is no continuity.



□	Lead color		
position	Black (B)	Black (B)	
On @	0		
Off (b)		nnc bo	

Checking the electric fuel pump

- Turn the engine start switch to ON.
- 2. Listen for the operating sound of the electric fuel pump (1).

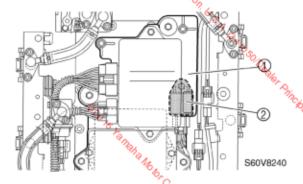


NOTE:

After the engine start switch is turned to ON, the electric fuel pump will operate for 5 seconds.

Checking the electric fuel pump relay

- Remove the ignition coil cover.
- 2. Remove the bracket (1), then the electric fuel pump relay 2.

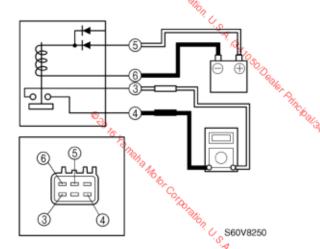


- 3. Connect the digital circuit tester leads to electric fuel pump relay terminals (3) and
- 4. Connect the positive battery terminal to the electric fuel pump relay terminal 6.
- Connect the negative battery terminal to the electric fuel pump relay terminal 6.
- 6. Check for continuity between the electric fuel pump relay terminals. Replace if there is no continuity.
- 7. Check that there is no continuity between the relay terminals after disconnecting a battery terminal from electric fuel pump relay terminal ⑤ or ⑥. Replace if there is continuity.

bis sanaha Motor Corporation U.S.A. Garo 60V1E11 8-23

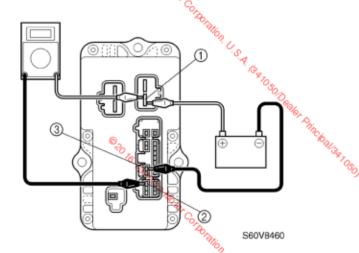
© 20 to Xantala Motor Cortonation U.S.A. (SA 1050) Dealer Princ.

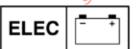
© 20 to Ya maha Motor Corporation, U.S.



Checking the injector driver relay

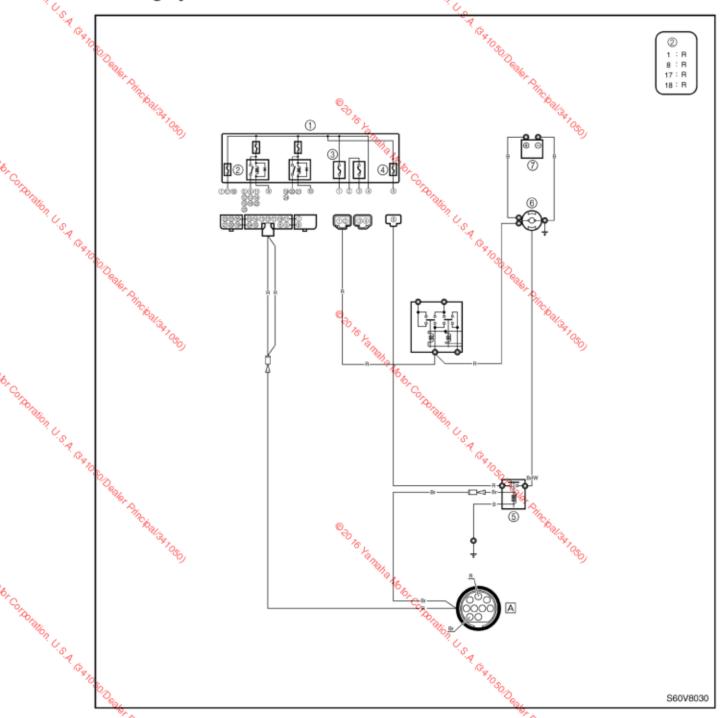
- 1. Remove the fuse holder cover, then the fuse holder.
- 2. Connect the digital circuit tester leads to terminals (1) and (2).
- 3. Connect the terminal to the positive battery terminal.
- 4. Connect the terminal 3 to the negative battery terminal.
- Check for continuity between the injector driver relay terminals. Replace if there is continuity. Check for continuity between the injector
- 6. Check that there is no continuity between the terminals after disconnecting terminal ① or ③. Replace if there is continuity.





Electrical systems

Starting system



- Fuse holder
- ② Fuse (20 A)
- ③ Fuse (100A)
- 4 Fuse (30 A)
- Starter relay
- 6 Starter motor
- ⑦ Battery
- A To remote control box/switch panel

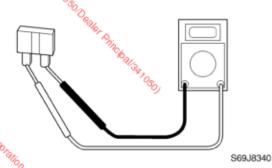
60V1E11

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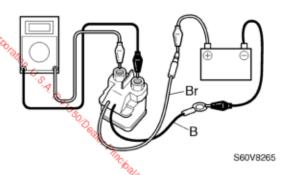
Checking the fuses

 Check the fuses for continuity. Replace if there is no continuity.



Checking the starter relay

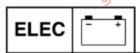
- Connect the digital circuit tester leads to the starter relay terminals.
- Connect the positive battery terminal to the brown (Br) lead,
- Connect the negative battery terminal to the black (B) lead.
- Check for continuity between the starter relay terminals. Replace if there is no continuity.
- 5. Check that there is no continuity between the starter relay terminals after disconnecting a battery terminal from the brown or black lead. Replace if there is continuity.



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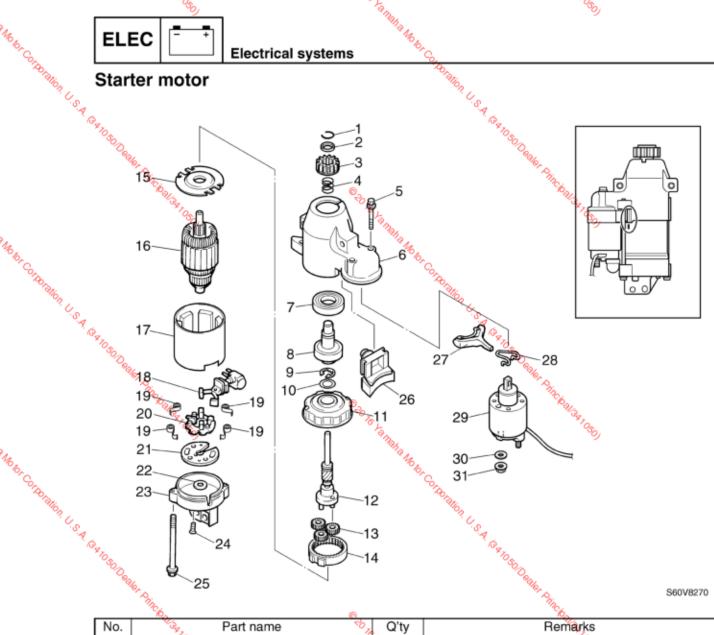
60V1E1

8-26



Ted to ka Maha Mobit Co **Electrical systems**

Starter motor



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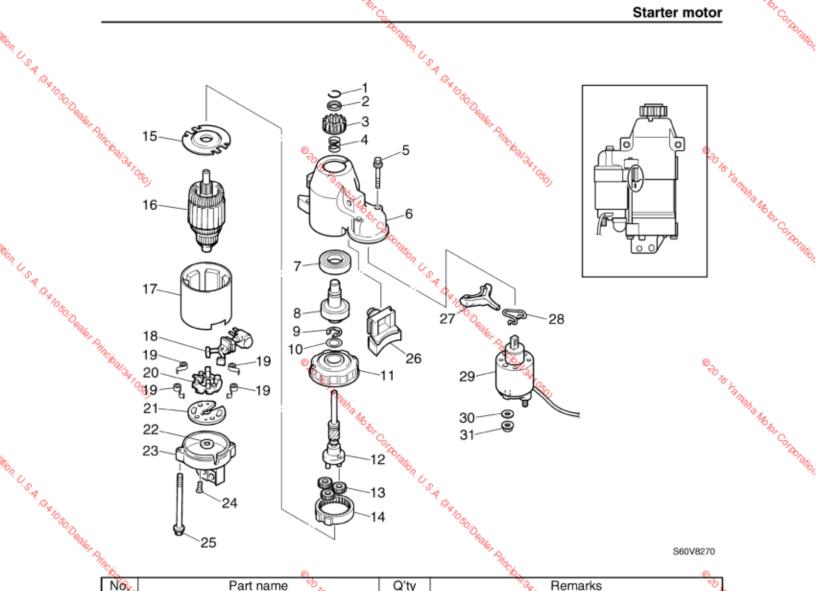
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	No.	Part name	گر Q'ty	Remarks	
	1	Clip 🗞	Tanahahahahahahahahahahahahahahahahahaha	80)	
Motor Corporation U.S.A. G.	2	Pinion stopper	×40 /10		
TO BOT	3	Starter motor pinion	1 %		
COLA	4	Spring	1	Organia Contraction of the Contr	
Tation	5	Bolt	2	M6 x 35 mm	
100	6	Housing	1	100 m	
4.0	7	Bearing	1	T.U.S. A. G. W.	
	8.0	Clutch assembly	1	No.	
	90%	E-clip	1	Not reusable	
	10	Washer	1	Not reusable Dealer Dinchallago	
	11	Bracket	⊚_ 1	*Cha _{l/}	
	12	Pinion shaft	°% 1	3470°	
	13	Planetary gear	8 n 3	79	
18.	14	Outer gear	© 30 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
TO C.	15	Plate	1 🗖		
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Motor Cortolation U.S.A.		Princ.		N. U.S.A. GANDSOIDERING PRINC.	

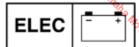


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W341050)

	CO.		<u> </u>		*Cho	<u></u>
	No	Part name	80 K.	Q'ty	Remarks	50 k.
	18	Brush assembly	Fanaha Mobi	1	80)	Sa Raha Motor Corporatio
	19	Brush spring	Wha ke	4		Wha As
	20	Brush holder	306	1		TO BY
	21	Plate	,	O/20.1		COTA
Non.	22	Washer		Of DO TO TO TO		Talio
Non U.S.A. BANGODERHAP D	23	Bracket		1 1 4		
A W	24	Screw		2	94 × 15 mm	
*1050	25	Bolt		2	M6 × 120 mm	
TO CONTRACT	26	Rubber seal		1	() () () () () () () () () ()	
**************************************	27	Shift lever		1	** Flinchall 34 I CSO,	
	28	Spring	⊚ _	1	TC Day	© 30
	29	Magnet switch assembly	76 L	1	GRA10	1
	30	Washer	(amar	1	36	(ana)
	31	Nut	© 30 16 Yanaha Ma	1		78 Mg.
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Electrical systems

Removing the starter motor pinion

1. Slide the pinion stopper 1 down as shown, and then remove the clip 2.



NOTE:.

Remove the clip with a thin screwdriver.

Checking the starter motor pinion

Check the teeth of the pinion for cracks
 or wear. Replace if necessary.



S69J8380

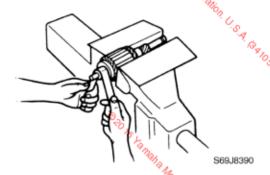
 Check for smooth operation. Replace if necessary.

NOTE:

Turn the pinion counterclockwise to check that it operates smoothly and turn it clockwise to check that it locks in place.

Checking the armature

 Check the commutator for dirt. Clean with #600 grid sandpaper and compressed air if necessary.



 Measure the commutator diameter. Replace the armature if out of specification.



Z

Commutator diameter limit: 28.0 mm (1.10 in)

 Measure the commutator undercut @.
 Replace the armature if out of specification.



S69J8410

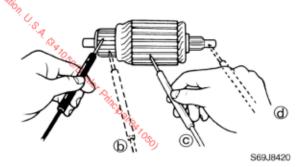
60V1E11



Commutator undercut limit @: 0.2 mm (0.01 in)

 Check the armature for continuity. Replace if out of specifications.

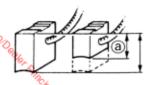
8-29



Armature continuity	
Commutator segments (b)	Continuity
Segment – Armature core ©	No continuity
Segment Armature shaft @	No continuity

Checking the brushes

Measure the brush length. Replace the brush assembly if out of specification.



S69J8430

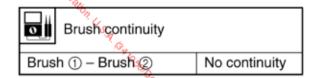


Brush length limit @: 9.5 mm (0.37 in)

26 Check the brush holder assembly for continuity. Replace if out of specifications.

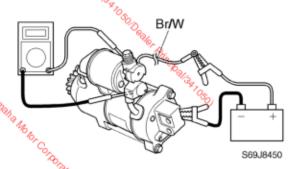


S69J8440



Checking the magnet switch

- 1. Connect the tester leads between the magnet switch terminals as shown.
- 24 Connect the positive battery lead to the brown and white (Br/W) lead.
- 3. Connect the negative battery lead to the starter motor body.



CAUTION:

Do not connect the battery for more than one second, otherwise the magnet switch can be damaged.

- Check that there is continuity between the magnet switch terminals. Replace if there is no continuity.
- Check that there is no continuity after the negative battery terminal is removed. Replace if there is continuity.

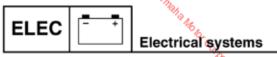
	^	_	_
N	. 1		_

The starter motor pinion should be pushed out while the magnet switch is on.

Checking the starter motor operation

Check the operation of the starter motor after installing it onto the power unit.

8-30 60V1E11



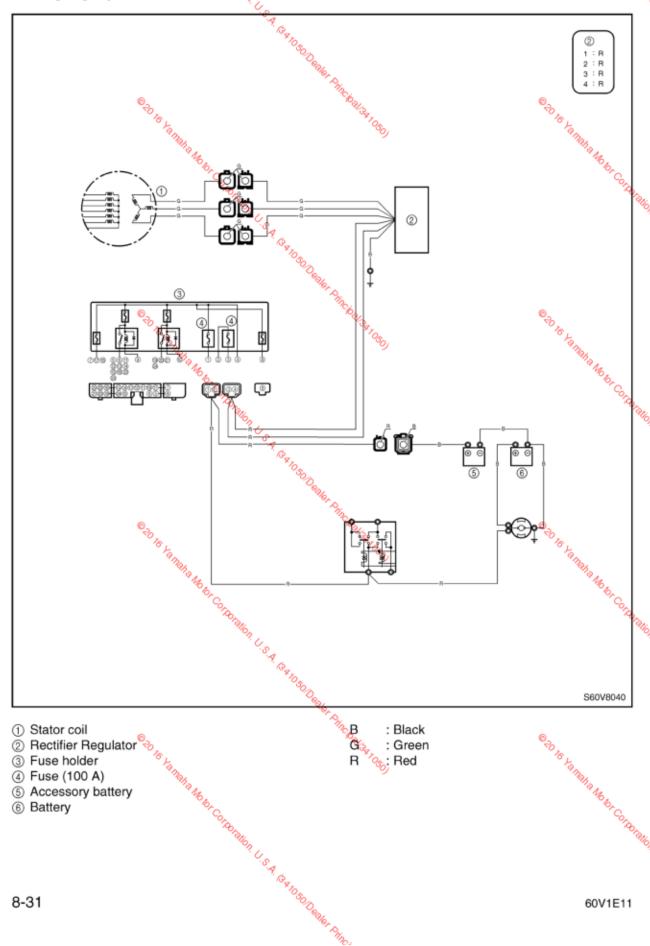
Charging system

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To Pinchalis 1050

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To Pinchaliss I Oso)



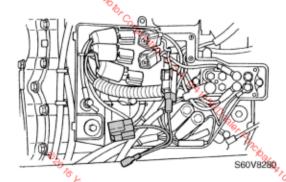
- Stator coil
- Rectifier Regulator
- ③ Fuse holder
- 4 Fuse (100 A)
- Accessory battery
- Battery

: Black G : G : Red : Green

8-31

Checking the stator coil

- Remove the junction box cover and disconnect the stator coil coupler.
- Connect the test harness (1 pin) to the stator coil.
- Measure the stator coil output peak voltage. Replace the stator coil if below specification.



R

Digital multimeter: YU-34899-A Peak voltage adaptor: YU-39991 Test harness (1 pin): YB-06788

	Stator coil output peak voltage: Green (G) – Green (G)					
r/min	Unloaded 📆					
1/1111111	Cranking	1,500	3,500			
DC V	S.5 40 90 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6					

0

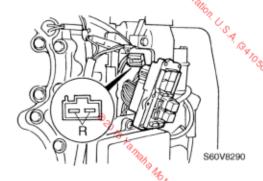
Stator coil resistance (use as reference):

Green (G) Green (G)

0.11-0.17 Ω at 20 °C (68 °F)

Checking the Rectifier Regulator

- Remove the fuse holder and disconnect the Rectifier Regulator coupler (blue).
- Measure the Rectifier Regulator output peak voltage. If below specification, measure the stator coil output voltage. Replace the Rectifier Regulator if the output peak voltage of the stator coil is above specification.



J

Digital multimeter: YU-34899-A Peak voltage adaptor: YU-39991

Rectifier Regulator output peak voltage:
Red (R) – Ground

T/min

Unloaded

1,500 3,500

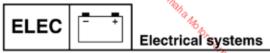
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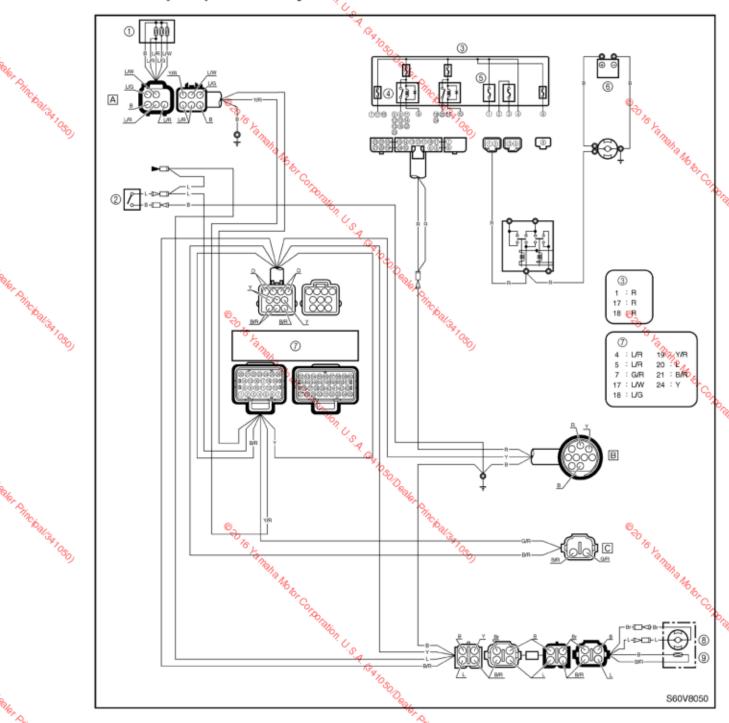
Oration U.S.A. GAIO

8-32



Oil feed pump control system

"Principaliza (OSO)



- 1 Oil level sensor
- ② Emergency switch
- ③ Fuse holder
- 4 Fuse (20 A)
- ⑤ Fuse (100 A)
- Battery
- ⑦ ECM
- ® Oil pump (remote oil tank)
- Oil level sensor (remote oil tank)
- A To diagnostic indicator (special service tool)
- B To remote control box/ switch panel
- C To oil level warning indicator

Brown В Br

: Blue 0 : Orange

R : Red Υ : Yellow

: Black/red B/R G/R : Green/red L/G : Blue/green L/R : Blue/red

L/W : Blue/white R/Y : Red/yellow W/B : White/black

: White/red W/R : Yellow/red Y/R

8-33 60V1E11

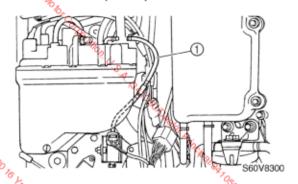
8

Checking the electric oil pump

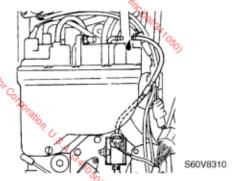
CAUTION:

Tel 16 Ya Maha Make,

- · Use unleaded straight gasoline only.
- Do not use gasoline mixed with oil (premixed fuel)
- 1. Remove the flywheel magnet cover and disconnect the electric oil pump hose 1 from the vapor separator.



- Wrap the end of the electric oil pump hose with a rag.
- Start the engine and let it idle.
- Check that the oil flows from the electric oil pump hose end. If no oil flows from the hose end, reptace the electric oil pump.

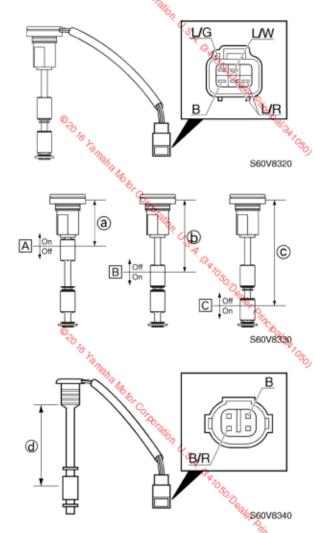


Connect the electric oil pump hose.

Checking the oil level sensor

Check the oil level sensor for continuity.

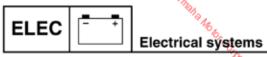
Replace if there is no continuity.



				70.
- W 80/	Lead color 🐾			
Float position	Black (B)	Blue/	Blue/	Blue/
		white	green	red
		(L/W)	_	(L/R)
A On	O.	0		
A Off	94	20.		
B On	0	. S.	9	
B Off		70%	050	
C On	0		O O	0
© Off			97	Olina

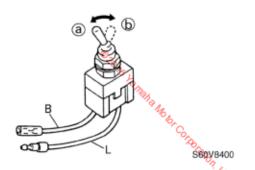
Noat distance:

- ②;53-57 mm (2.09-2.24 in)
- (b): 83–87 mm (3.27–3.43 in)
- ©: 126.5-130.5 mm (4.98-5.14 in)
- @: 150-153 mm (5.91-6.02 in)



Checking the emergency switch

1. Check the emergency switch for continuity. Replace if there is no continuity.

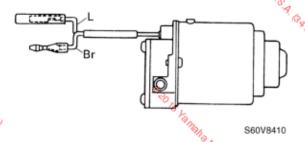


Switch		Lead color		
positi	ion	Blue (L)	Black (B)	
Home @				
On (b)		0	0	

Check that the emergency switch returns automatically to the home position from the on position when released. Replace if necessary.

Checking the oil pump (remote oil tank)

- 1. Connect the positive battery terminal to the blue (L) lead.
- 2. Connect the negative battery terminal to the brown (Br) lead.
- 3. Listen for the operating sound of the oil pump (remote oil tank). Replace if there is no sound.



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Troubleshooting

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Yamaha Diagnostic System		
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Self-diagnosis		
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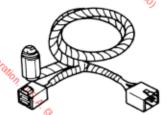
Special service tools







Yamaha Diagnostic System Sto Is A Repla Motor Cordorallon 60V-WS853-02



Diagnostic flash indicator YB-06444

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Yamaha Diagnostic System

Introduction

Features

The newly developed Yamaha Diagnostic System provides quicker detection and analysis of engine malfunctions for quicker troubleshooting procedures than traditional methods.

By connecting your computer to the ECM (Electronic Control Module) of an outboard motor using the communication cable, this software can be used to display sensor data and data stored in the ECM on a computer's monitor.

If this software is run on Microsoft Windows[®] 95, Windows 98, Windows Me, Windows 2000, or Windows XP the information can be displayed in colorful graphics. Also, the software can be operated using either a mouse or a keyboard.

In addition, the data for the main functions (Diagnosis, Diagnosis, record, Engine monitor, and Data logger) can be saved on a disk or printed out.

Functions

- Diagnosis: With the engine main switch ON, each sensor's status and each ECM diagnosis
 code or item is displayed. This enables you to find malfunctioning parts and controls quickly.
- 2. **Diagnosis record:** Sensors that had been activated and ECM diagnostic codes that have been recorded are displayed. This allows you to check the outboard motor's record of malfunctions.
- Engine monitor: Each sensor status and the ECM data are displayed while the engine is running. This enables you to find malfunctioning parts quickly.
- Stationary test: With the engine off, the ignition, fuel injection, electric fuel pump, and electric jump are checked. These tests can be performed quickly.
- 5. Active test: With the engine running, each firing cylinder has dropped and the engine speed is checked for changes to determine whether the cylinder is malfunctioning.
- 6. **Data logger:** Displays 20 minutes of recorded data for two or more of the items stored in the ECM. In addition, the operating time as compared to the engine speed and the total operating time are displayed. This allows you to check the operating status of the engine.
- Some files: Lets you select and run other applications while continuing to run the diagnostic program.

Contents

- Software (1)
- Adapter (1)
- Communication cable (1)
- Instruction Manual (1)
- 5. Installation Manual (1)





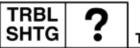






(5)

60V1E11 9-2



Troubleshooting

Hardware requirements

Make sure that your computer meets the following requirements before using this software.

Computer: IBM-compatible computer.

Operating system: Microsoft (Windows 95,) Windows 98, Windows Me, Windows 2000, or

Windows XP (English version)

CPU:

Windows 95/98: i486X, 100 MHz or higher (Pentium 100 MHz or higher recommended)
Windows Me/2000: Pentium, 166 MHz or higher (Pentium 233 MHz or higher recommended)
Windows XP: Pentium, 300 MHz or higher (Pentium 500 MHz or higher recommended)

Memory:

Windows 95/98: 16 MB or more (32 MB or more recommended)
Windows Me: 32 MB or more (64 MB or more recommended)
Windows 2000: 64 MB or more (128 MB or more recommended)
Windows XP: 128 MB or more (256 MB or more recommended)

Hard disk free space: 20 MB or more (40 MB or more recommended)

Drive: CD-ROM drive

Display: VGA (640 × 480 pixels), (SVGA [800 × 600 pixels] or more recommended)

256 or more colors

Mouse: Compatible with the operating systems mentioned above

Communication port: RS232C (Dsub-9 pin) port, USB port

Printer: Compatible with the operating systems mentioned above

NOTE:

- The amount of memory and the amount of free space on the hard disk differs depending on the computer.
- Using this software while there is not enough free space on the hard disk could cause errors and result in insufficient memory.
- This software will not run properly on some computers.
- When starting up this program, do not start other software applications.
- Do not use the screen saver function or the energy saving feature when using this program.
- If the ECM is changed, restart the program.
- Window XP is a multiuser operating system, therefore, be sure to end this program if the login user is changed.
- The USB adapter cannot be used with Windows 95.

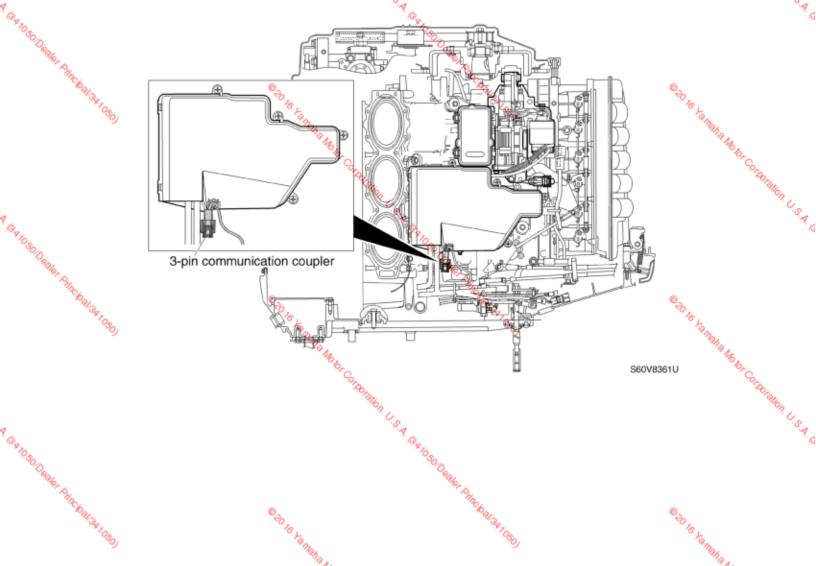
For operating instructions of the Yamaha Diagnostic System, refer to the "Yamaha Diagnostic System Instruction Manual."

9-3 60V1E11

Connecting the communication cable to the outboard motor Models: HPDI series 3.3L

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Troubleshooting

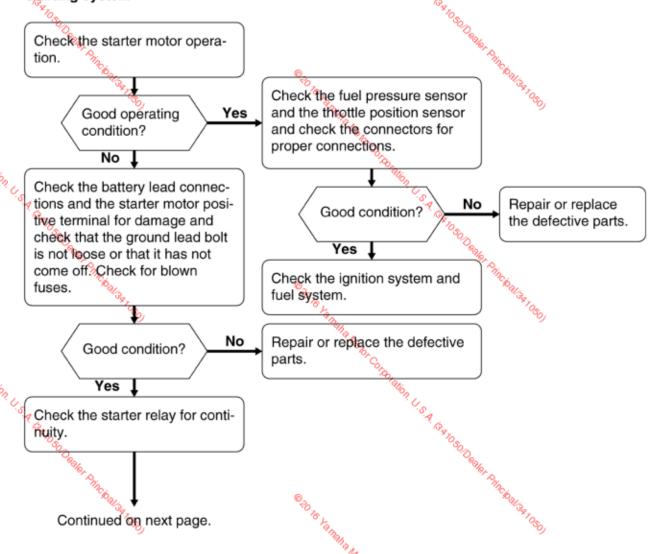
NOTE:

- Before troubleshooting the outboard motor, check the compression pressure, the mounting and rigging of the outboard motor, and the operation of the engine start switch. Also, make sure that specified fuel has been used and that the battery is fully charged.
- To diagnose a mechanical malfunction, use the troubleshooting charts for each trouble located in this chapter. Also, when checking and maintaining the outboard motor, see Chapters 3–8 for safe maintenance procedures.
- To diagnose a malfunctioning sensor or switch, use the diagnostic flash indicator to determine the cause.

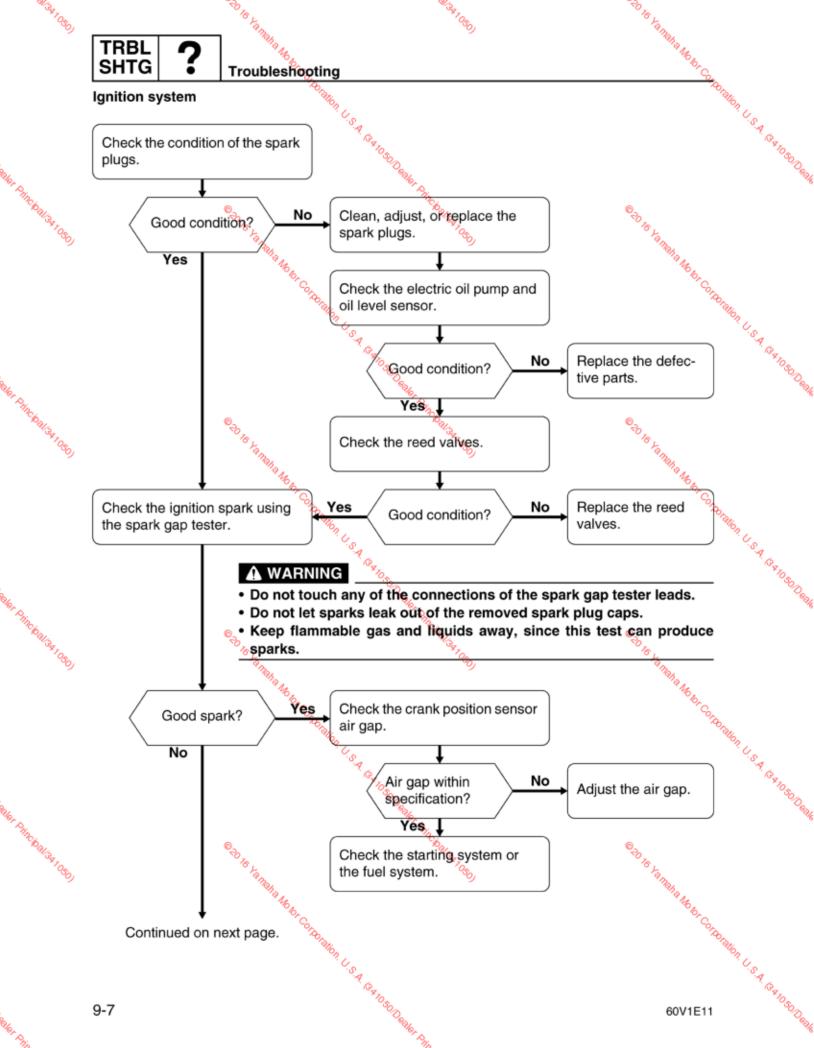
Power unit

Symptom 1: Engine does not start, or starting the engine is difficult.

Starting system

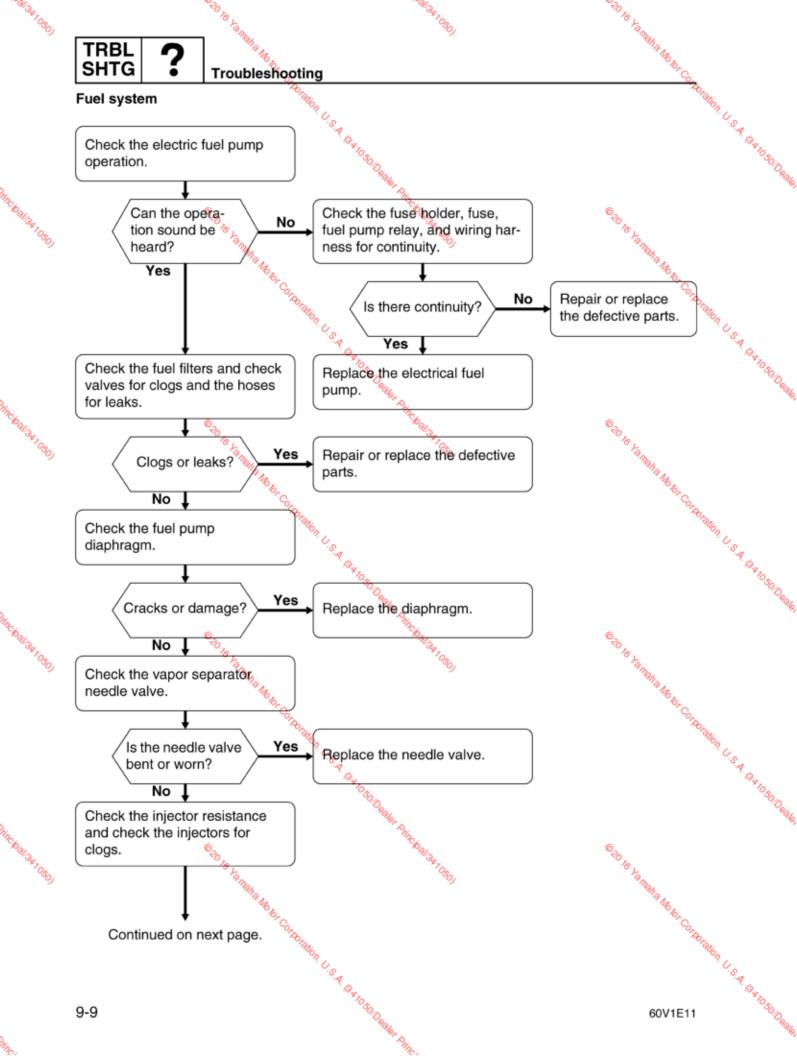


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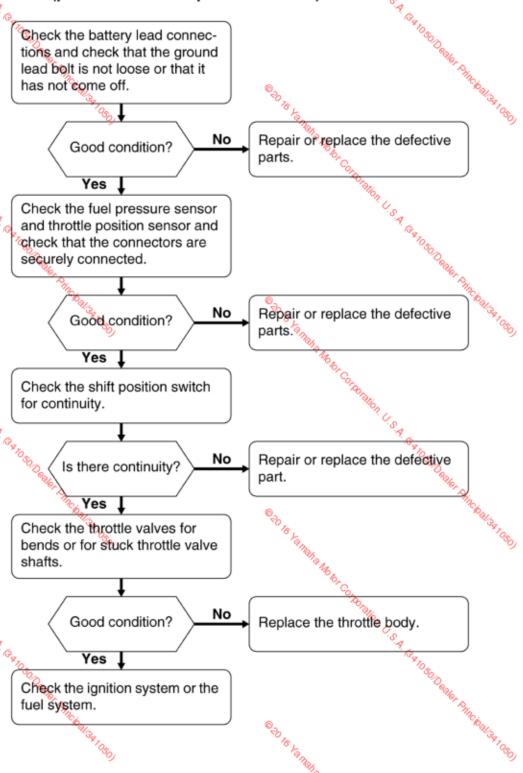
Check the ignition coil resistance and the ignition coil leads for salt buildup. Repair or replace the defective No Good condition? parts. Yes Check the spark plug cap resistance and the spark plug caps for salt buildup. Repair or replace the spark plug No Good condition? Na Makoto Cortoralion U.S.A. & A.O.SO. Dealer Aincheal Sar OSO.) Yes. Check the ECM output peak And Motor Corporation, U.S.A. G. A. T.O. T.E. 11

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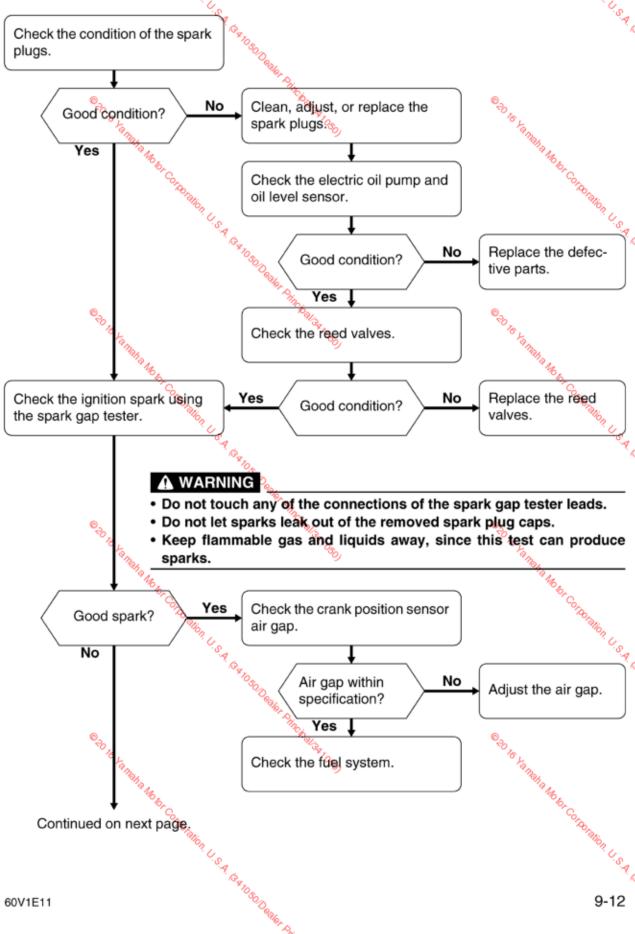


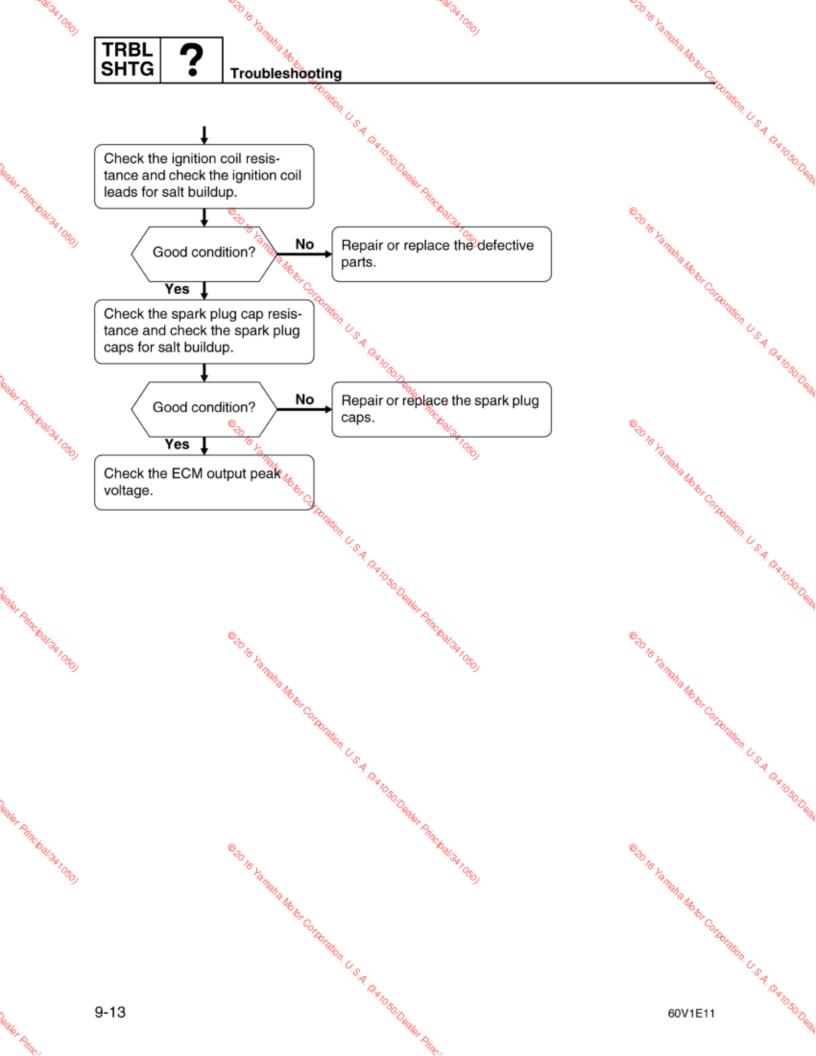
Troubleshooting

Symptom 2: Engine speed at wide open throttle is low, engine speed decreases, or engine stalls (poor acceleration or poor deceleration).



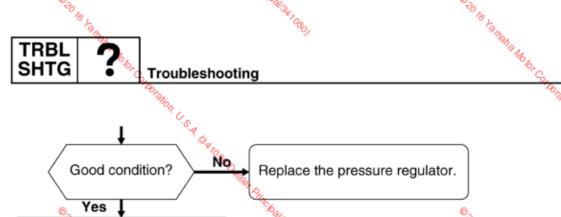
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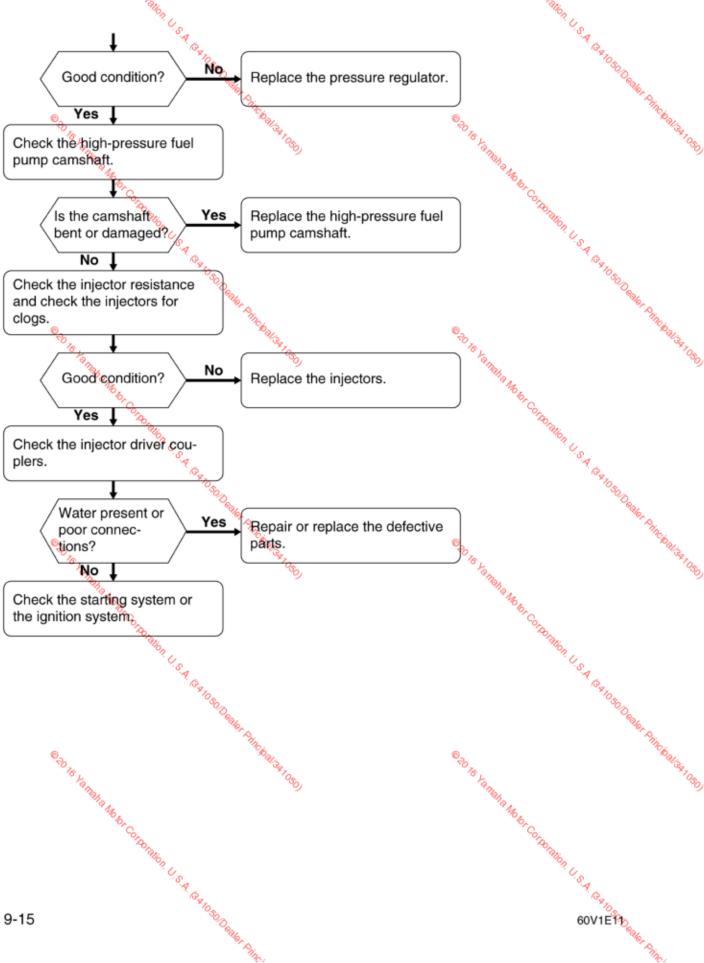




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9-14





9-15

Symptom 3: Engine speed not stable at low speeds.

Check the fuel pressure sensor and throttle position sensor and check that the connectors are securely connected. No Repair or replace the defective Good condition? parts. Yes Check the neutral switch for continuity. Repair or replace the defective No Is there continuity? Yes Check the throttle valve opening of each cylinder. Is the throttle valve opening Yes incorrect or is the Replace the throttle body. throttle valve link worn? No Check the ignition system or the fuel system.

9

60V1E11 9-16

Ignition system

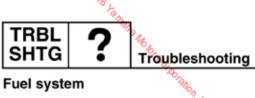
Check the condition of the spark plugs. No Clean, adjust, or replace the Good condition? spark plugs. Yes Check the electric oil pump and oil level sensor. Replace the defec-No Good condition? tive parts. Yes Check the reed valves. Check the ignition spark using Replace the reed Yes No Good condition? valves. the spark gap tester. **▲** WARNING Do not touch any of the connections of the spark gap tester leads. Do not let sparks leak out of the removed spark plug caps. Keep flammable gas and liquids away, since this test can produce sparks. Yes Good spark? Check the fuel system. No Check the ignition coil resistance and check the ignition coil leads for salt buildup. Continued on next page.

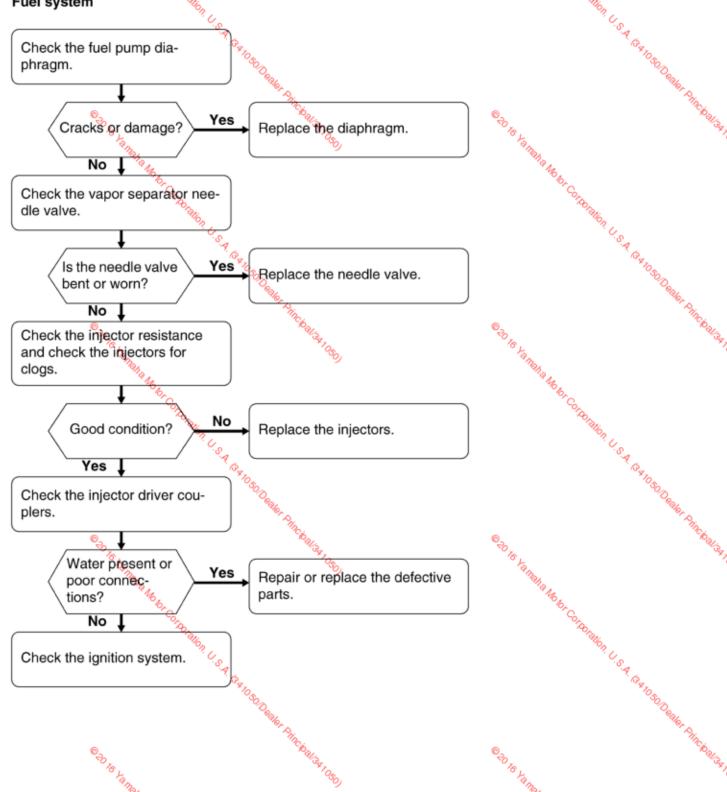
Repair or replace the defective No Good condition? parts. Yes Check the spark plug cap resistance and check the spark plug caps for salt buildup. Repair or replace the spark plug No Good condition? caps. bsollealer Pilite Real Ser loso) Yes Check the ECM output peak voltage.

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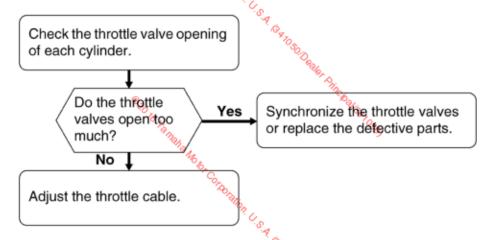
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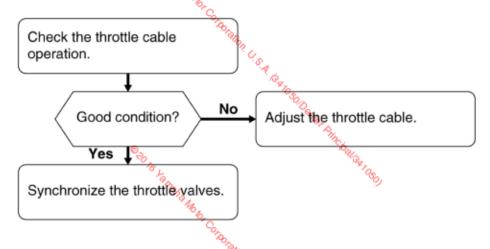




Symptom 4: Hunting occurs.



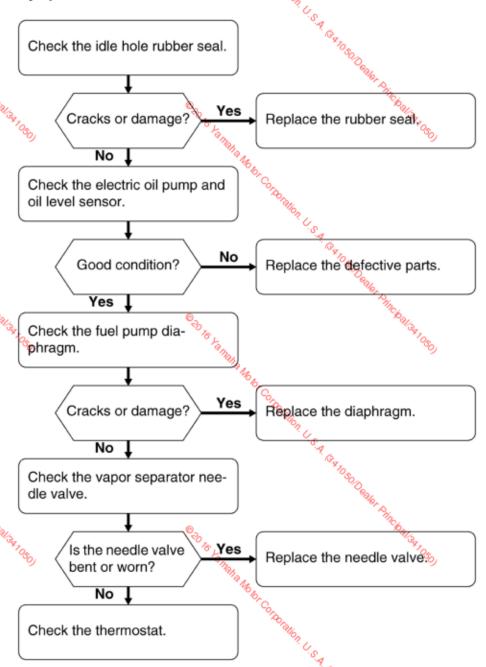
Symptom 5: Engine speed rises even when the throttle position is fixed.





9-21

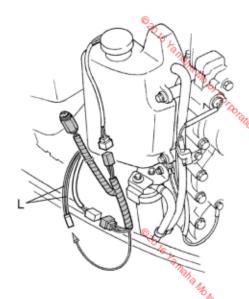
Symptom 6: Excessive white exhaust smoke.



Self-diagnosis

Diagnosing the electronic control system

1. Connect the special service tool to the outboard motor as shown.



S60V9020

NOTE:

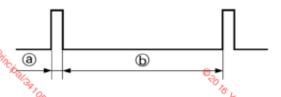
When performing this diagnosis, all of the electrical wires must be properly connected.



Diagnostic flash indicator: YB-06444

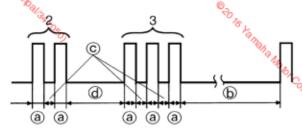
- Start the engine and let it idle.
- Check the flash pattern of the diagnostic flash indicator to determine if there are any malfunctions.
 - Normal condition (no defective part or irregular processing is found)
 - Single flash is onds.

 (a): Light on, 0.33 second
 (b): Light off, 4.95 seconds to the company of Single flash is given every 4.95 sec-



S6949020

- · Trouble code indication Example: The illustration indicates code number 23.
 - a: Light on, 0.33 second
 - b: Light off, 4.95 seconds
 - ©: Light off, 0.33 second
 - d: Light off, 1.65 seconds



S69J9030

Troubleshooting

 If a flash pattern listed in the diagnostic code chart is displayed, check the malfunctioning part according to the flash pattern.

NOTE: _

When more than one problem is detected, the light of the diagnostic flash indicator 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.

	0.7
Code	Symptom
1	Normal 000
13	Incorrect pulser coil signal
©14 %,	Incorrect crank position sensor signal
15	Incorrect engine temperature sensor signal
18	Incorrect throttle position sensor signal
19	Incorrect battery voltage
22	Incorrect atmospheric pressure sensor signal
23	Incorrect intake air temperature sensor signal
2 5	Incorrect fuel pressure signal
26 5	Incorrect injector signal
27	Incorrect water in fuel signal
28	Incerrect shift position switch signal
44	Incorrect engine stop lanyard switch signal
62	Low fuel pressure warning

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Dration U.S.A. G. NO. O. Dealer Prince 60V1E11



# Wiring diagram Z250TR, LZ250TR

	*O _D
1	Electric fuel pump Electric oil pump Oil level sensor Water detection switch Throttle position sensor Emergency switch Atmospheric pressure sensor Thermoswitch Power trim and tilt switch Fuel pressure sensor
2	Electric oil pump
3	Oil level sensor
4	Water detection switch
(5)	Throttle position sensor
6	Emergency switch
7	Atmospheric pressure sensor
8	Thermoswitch
9	Power trim and tilt switch
1	Fuel pressure sensor
11)	Pulser coil %
12	Stator coil Stator
13	Crank position sensor
(14)	Fuel injector
(6)	Fuel pump relay
16	Injector driver
17)	Ignition coil
18)	Spark plug
(19)	ECM %
20	Thermoswitch Power trim and tilt switch Fuel pressure sensor Pulser coil Stator coil Crank position sensor Fuel injector Fuel pump relay Injector driver Ignition coil Spark plug ECM Diode Engine temperature sensor Trim sensor Oil pump (remote oil tank) Oil level sensor (remote oil tank)
Ø	Engine temperature sensor
2	Trim sensor
23	Oil pump (remote oil tank)
24)	Oil level sensor (remote oil tank)
25	Shift cut switch
89	Shift position switch
0	Power trim and tilt relay
88	Oil level sensor (remote oil tank) Shift cut switch Shift position switch Power trim and tilt relay Power trim and tilt motor Intake air temperature sensor Starter relay Starter motor Starting battery Accessory battery Fuse holder Fuse (20 A) ECM main relay Injector driver relay
89	Intake air temperature sensor
00	Starter relay
3	Starter motor
83	Starting battery
83	Accessory battery
<b>34</b>	Fuse holder
69	Fuse (20 A)
69	Line to a disconnection
30	Injector driver relay
69	Fuse (100 A)
(B)	Postifier Postulator
40	Injector driver relay Fuse (100 A) Fuse (30 A) Rectifier Regulator
$\overline{\Lambda}$	To personal computer for diagnosis
А	To personal computer for diagnosis

E To diagnostic flash indicator (special service tool)

(*1) Isolator cable (optional)

D To trim meter

(*2) Negative cable (commercially available)

B To remote control box/switch panel C To oil level warning indicator

### Color code

: Black Br : Brown G Gy L 0

Green
Gray
Blue
Light green
Orange
Pink
Use

Gray

Grand

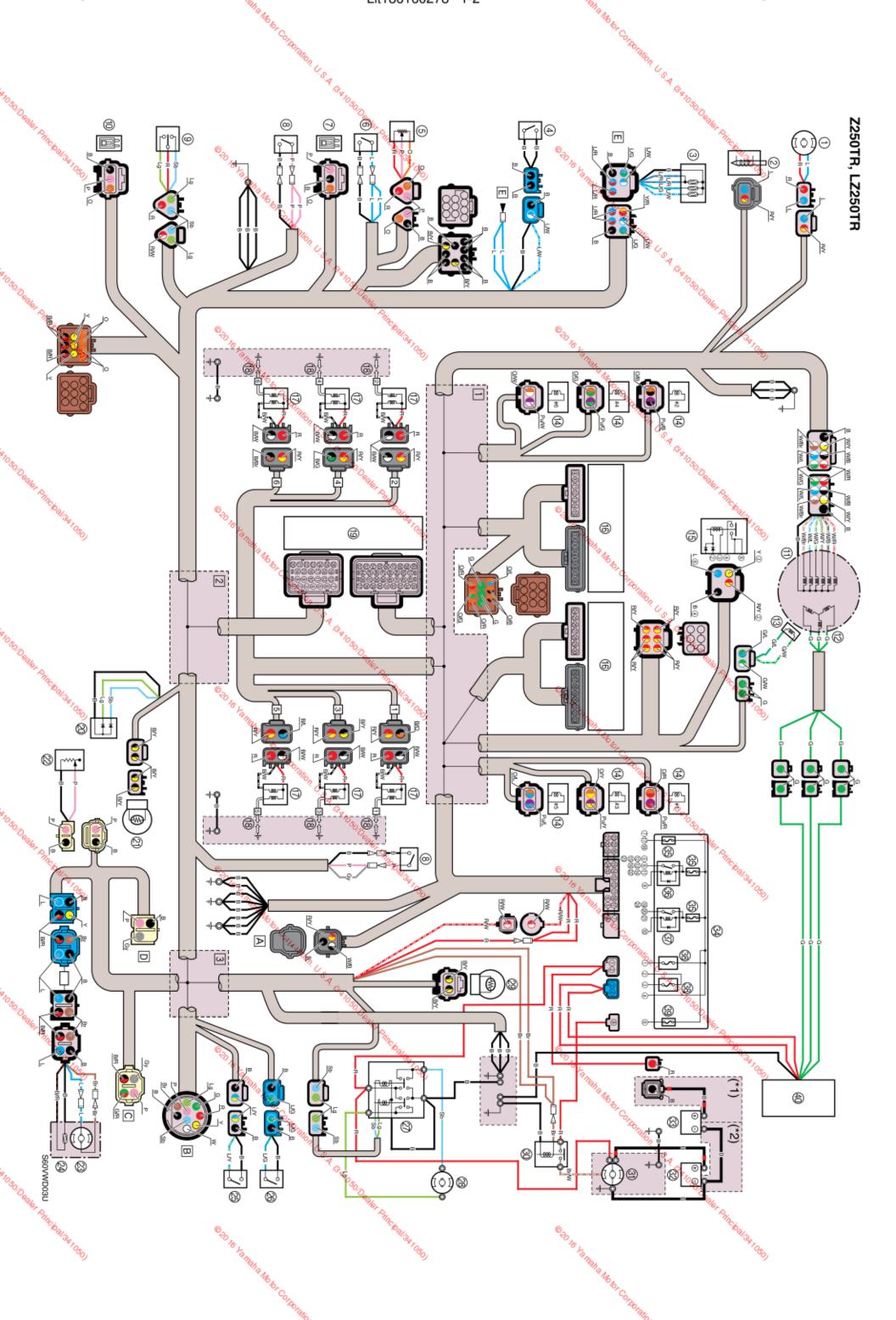
Gray

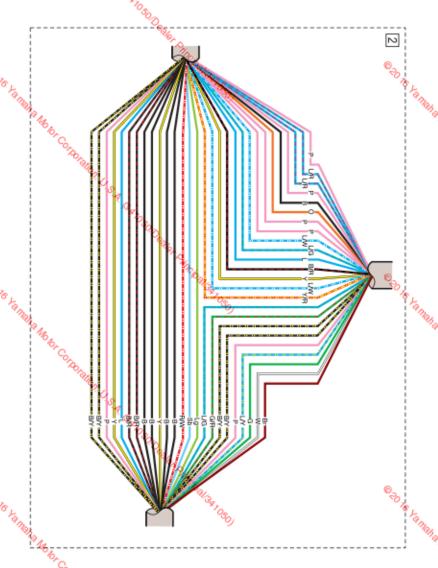
Grapha Managarana Managa R Sb W Υ B/Br : Black/brown B/G B/L B/O

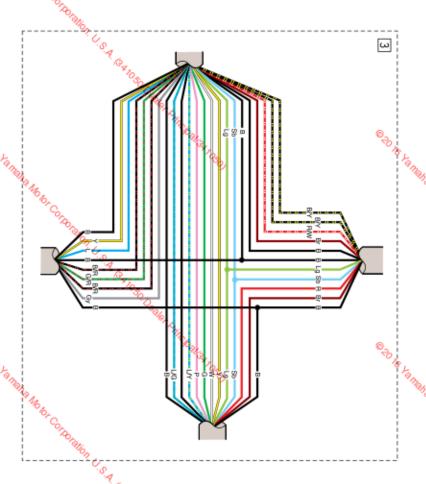
B/R B/W : Black/white B/Y G/L G/R G/W : Green/white

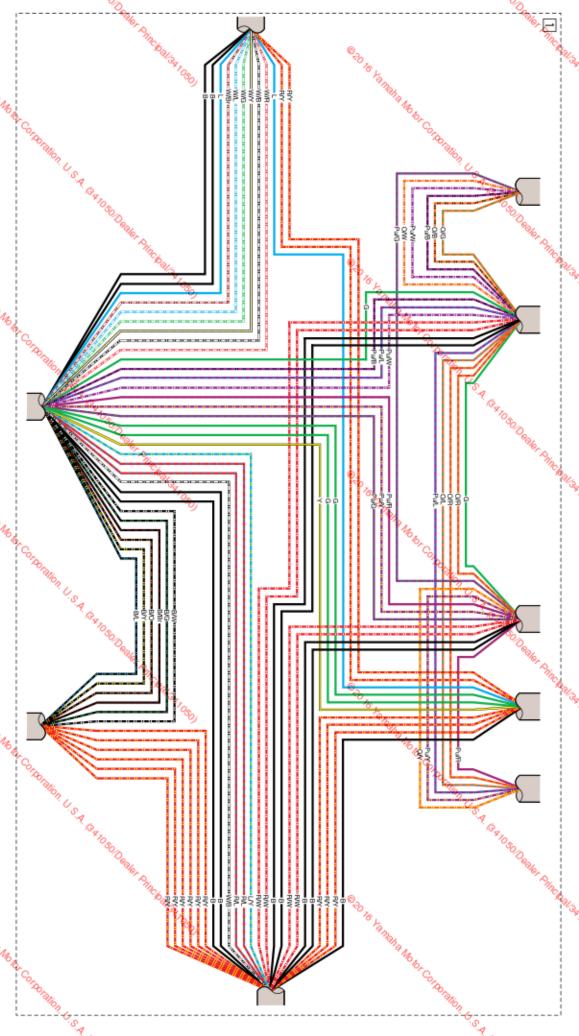
L/G : Blue/green L/R : Blue/red L/W : Blue/white L/Y : Blue/yellow O/B : Orange/black O/G : Orange/green O/L : Orange/blue

A Corange Cora Dis Salisha Motor Cortoliation, U.S.A. Sanoso Dealer Prin









15 : HWY 17 : R 18 : R 19 : RW 20 : RW 21 : RW 22 : RW 23 : RW 24 : RW

20: LRA 20: LR 21: B/R 22: G 22: G 24: Y 26: Br 27: R/L 27: R/L 29: G 30: H/L 31: Pu/L 32: Pu/L 33: B/O 34: B/O 35: B/O 36: R/L 37: W/G 38: L/Y 

1 : B 2 : R/W 3 : O/B 4 : Pu//B 5 : Pu// 6 : Pu// 7 : Pu/W 10 : B 10 : R/W 11: Pu/B 13: Pu/W 14: Pu/L 15: G 16: B 16: B 17: R/W 18: Pu/B 20: Pu/B

